

ELECTRONIC DESIGN

TECHNOLOGY • APPLICATIONS • PRODUCTS • SOLUTIONS

SECOND EDITION

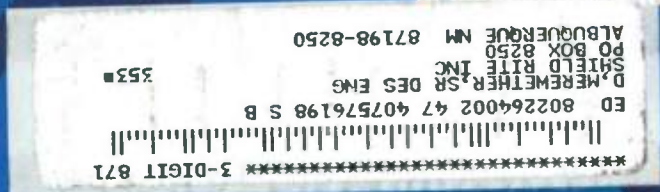
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FEBRUARY 24, 1998

Embedded Systems Development Directory

Full Function RTOSs
Basic RTOS Kernels
Integrated Development
Environments
Compilers
Assemblers
Emulators
Debuggers
Interpreters
Libraries
Drivers
Applications Software
Microprocessors
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INTRODUCTION

Welcome to the second edition of ELECTRONIC DESIGN's Embedded Systems Development Directory. The directory, a cooperative effort between ELECTRONIC DESIGN and the Embedded Software Association (ESOFTA), is chock full of information you can use to ease the task of designing embedded systems.

There's no way that designers can keep themselves apprised of all the companies supplying products for embedded systems developers, never mind know the full range of products available for the various devices their systems may employ. Hence, the need for a directory like this with listings supplied by an industry association formed to address the issues that affect embedded software developers.

The listing sections contain detailed descriptions of hundreds of software-development products. To make them easy to use, the listings are organized by processor type, with separate sections for microprocessors, microcontrollers, and digital signal processors. Among the products included are real-time operating systems, integrated development environments, compilers, assemblers, emulators, debuggers, and libraries. Other sections cover tools for



other types of logic devices, applications software, and systems development services.

Of course, our readers expect the most up-to-date help in product-specification information. But they also know that any ELECTRONIC DESIGN publication will provide them with specific, practical design information for current and future projects. This directory is no exception. We have selected from past issues several design application articles that we consider "keepers."

Among those articles are a discussion of what constitutes a "good" instruction set. That is, one that eases development, trims code size, and speeds execution time. Also included are articles on the increasing need for memory management units in CPUs used in software-intensive embedded systems and on the use of on-chip debuggers and analyzers to help designers working with state-of-the-art microprocessors. Another important topic is the criteria for selecting the right microprocessor for low-power systems, an increasingly larger segment of embedded applications.

John Novellino

Managing Editor, Special Projects

EDITOR-IN-CHIEF TOM HALLIGAN (201) 393-6228 THALLIGAN@PENTON.COM

EXECUTIVE EDITOR ROGER ALLAN (201) 393-6057 rallan@class.org

MANAGING EDITOR BOB MILNE (201) 393-6058 bmilne@class.org

MANAGING EDITOR JOHN NOVELLINO Special Projects
(201) 393-6077 jnovellino@penton.com

TECHNOLOGY EDITORS

ANALOG & POWER DEVICES ASHOK BINDRA (201) 393-6209 abindra@penton.com
COMMUNICATIONS LEE GOLDBERG (201) 393-6232 leeg@class.org
POWER, PACKAGING, INTERCONNECTS PATRICK MANNION (201) 393-6097 pemann@ibm.net
COMPONENTS & OPTOELECTRONICS
COMPUTER SYSTEMS RICHARD NASS (201) 393-6090 rnass@penton.com
ELECTRONIC DESIGN AUTOMATION CHERYL AJLUNI (San Jose) (408) 441-0550, ext. 102
cjajluni@class.org
DIGITAL ICs DAVE BURSKEY, West Coast Executive Editor (San Jose)
(408) 441-0550, ext. 105 dbursky@class.org
EMBEDDED SYSTEMS/SOFTWARE TOM WILLIAMS (Scotts Valley) (408) 335-1509
tomwillm@ix.netcom.com
TEST & MEASUREMENT JOSEPH DESPOSITO (201) 393-6060
NEW PRODUCTS ROGER ENGELKE JR. (201) 393-6276 rogere@csnet.net

EUROPEAN CORRESPONDENTS

LONDON PETER FLETCHER
+44 1 322 664 355 Fax: +44 1 322 669 829
panflet@cix.compulink.co.uk
MUNICH ALFRED B. VOLLMER
+49 89 614 8377 Fax: +49 89 614 8278
Alfred_Vollmer@compuserve.com

IDEAS FOR DESIGN EDITOR JIM BOYD xl_research@compuserve.com
COLUMNISTS RAY ALDERMAN, WALT JUNG, RON KMETOVICZ,
ROBERT A. PEASE
CONTRIBUTING EDITOR LISA MALINIAK

CHIEF COPY EDITOR DEBRA SCHIFF (201) 393-6221 debbras@csnet.net

PRODUCTION MANAGER PAT A. BOSELLI
PRODUCTION COORDINATOR WAYNE M. MORRIS

ELECTRONIC DESIGN ONLINE

WWW.ELECDDESIGN.COM

WEB MANAGER DONNA POLICASTRO (201) 393-6269 dpolICASTRO@penton.com
WEB EDITOR MICHAEL SCIANNONEA (201) 393-6024 mikemea@penton.com
WEB DESIGNER JOHN T. LYNCH (201) 393-6207 jlynch@penton.com
WEBMASTER DEBBIE BLOOM (201) 393-6038 dbloom@pop.penton.com

GROUP ART DIRECTOR PETER K. JEZORSKI
ASSOCIATE GROUP ART DIRECTOR TONY VITOLO
STAFF ARTISTS LINDA GRWELL, CHERYL GLOSS, JAMES M. MILLER

EDITORIAL ASSISTANTS

EDITORIAL SUPPORT SUPERVISOR MARY JAMES (New Jersey)
EDITORIAL ASSISTANTS ANN KUNZWEILER (New Jersey),
BRADIE SUE GRIMALDO (San Jose)

EDITORIAL HEADQUARTERS

611 Route 46 West, Hasbrouck Heights, N.J. 07604
(201) 393-6060 Fax: (201) 393-0204 edesign@class.org

ADVERTISING PRODUCTION

(201) 393-6093 or Fax (201) 393-0410
PRODUCTION MANAGER EILEEN SLAVINSKY
ASSISTANT PRODUCTION MANAGER JOYCE BORER
PRODUCTION ASSISTANTS DORIS CARTER, MYLAN CHU, JANET CONNORS,
LUCREZIA HLAWATY, THERESA LATINO

CIRCULATION DEPARTMENT

CUSTOMER SERVICE (216) 931-9123
REPRINTS ANNE ADAMS (216) 931-9626

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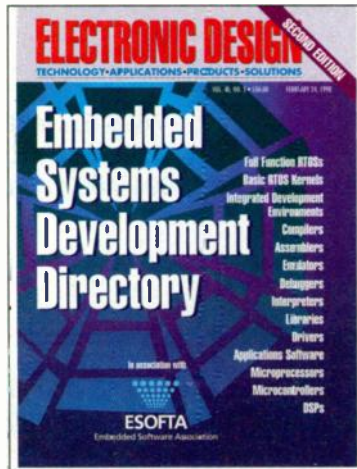
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FOREWORD

TM

ESOFTA

Embedded Software Association

7825 E. Gelding Dr. / Suite 104
Scottsdale AZ 85260-3415 USA
Telephone: (602) 991-4662 / Fax: (602) 951-0720
www.esofta.com

ESOFTA is proud to present its second issue of the Embedded Systems Development Directory. Please note that the size of the directory by page count has increased by 50 percent, and we anticipate that it will continue to grow in future issues.

Because we are in the dynamically evolving embedded systems industry, we will continue to produce a new directory every six months to be published by Penton Publishing. We want to ensure that you embedded system developer readers have timely and topical information with which to approach your respective system projects.

The companies and consultants represented herein offer software development tools, RTOS products, application software, chips and development services to assist with your design/development project needs. Our goal with this directory is to give you brief information about their products and make it easy for you to go directly to the company or even to the company's WWW site for more information.

Because of rapid changes in the industry, from popular new chip architectures to new simulation tools, we have updated our directory input forms at the back of this directory issue. If your company and/or products are in this directory, please use these new forms for input to the August issue. This enables us to better categorize your products and makes it easier for readers to find them.

ESOFTA has enjoyed working with all of the companies and individuals herein and very much appreciates the cooperative efforts of many people!

Please let us know if you have comments or suggestions for the directory. Visit <http://www.esofta.com> to learn more about the Embedded Software Association!

Sara Killingsworth
Executive Director, ESOFTA
sara@esofta.com

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World Wide Web www.smartm.com
E-mail info@smartm.com

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SMART MODULAR TECHNOLOGIES, INC.

SMART Modular Technologies, Inc., is a leading manufacturer of specialty and standard memory modules, flash memory cards, communications products and embedded computers. SMART offers more than 500 products

and is the supplier of choice for leading OEMs. Headquartered in Fremont, California, SMART has design centers in California and India; manufacturing plants in California, Puerto Rico, and Scotland; and sales offices throughout the world.



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COMPANY PROFILES

3L Ltd.

86-92 Causewayside
Edinburgh, Scotland EH9 1PY
Telephone: 011-44-131-662-4333
Fax: 011-44-131-662-4556

3L is an established software development firm focused on DSP parallel-processing tools in real-time operating environments. 3L's main products include Parallel C, a powerful RTOS for multiprocessing applications (DSP) that facilitate multi-tasking, multi-threading communications. Parallel C is supported by an interactive source-level debugger, DSP function and DOS graphics libraries, integration of the DSP network With Windows* OS user interface code, and other development tools such as Pegasus and VPB. 3L cooperates with a number of strategic partners to maximize software and hardware compatibility and flexibility. 3L Ltd. offers robust, competitive solutions with excellent after-sales support.

Software Products in this Directory include:

- 3L Debugger Support Kit
- 3L DSP Library For DSPs
- 3L Parallel C Real-Time Operating System
- Paramex Code Checker
- VPB Toolset
- Windows Server Library

For more information, contact: Alan Culloch,
adc@threeL.co.uk. Email: threeL@threeL.co.uk.
Visit 3L Ltd. on the World Wide Web at: www.threeL.co.uk.

Abraxas Software, Inc.

5530 SW Kelly Avenue
Portland, OR 97201
Telephone: 503-244-5253
Fax: 503-244-8375

Portland, Oregon-based Abraxas Software, Inc. provides cross-platform software development tools. The company's primary focus is in 'language analysis tools' because Abraxas Software believes that developers should be able to describe problems in a familiar language. The company's goal is to minimize the effort associated with platform portability for customers, based on the belief that all software applications need only be written once and then ported across all platforms. Abraxas Software knows about software tools. The company invites system developers who are searching for particular software tools to ask Abraxas Software to help find them, believing that the best ideas come from its customers.

Software Products in this Directory include:

- CodeCheck 7.0 Analyzer
- PCYACC 7.0 Compiler/Language Development Toolkit

For more information, contact: Tana Rae K., 503-244-5253.
Email: sales@abxsoft.com.
Visit Abraxas Software, Inc. on the World Wide Web at:
www.abxsoft.com.

Accelerated Technology, Inc.

720 Oak Circle Drive East
Mobile, AL 36609
Telephone: 334-661-5770
Fax: 334-661-5788

Accelerated Technology, Inc. provides the embedded system community with source code and non-royalty based real-time operating system (RTOS) products. The Nucleus* PLUS real-time kernel offers support for many popular RISC, CISC, and DSP microprocessors and development tools. ATI products include file system support; one of the broadest sets of networking products in the industry; Nucleus WebServ, an embedded web server; and Nucleus GRAFIX*, a simple and complete graphics solution. The Nucleus POWERplant* embedded development environment and Nucleus MNT round out one of the industry's best prototyping environments. Headquartered in Mobile, Alabama, ATI has offices in California, Tennessee, the United Kingdom, France and Germany. The ATI distribution network is worldwide, including offices in Japan, Russia, Israel, Australia and Taiwan.

Software Products in this Directory include:

- Nucleus* C++ RTOS Kernel
- Nucleus* FILE
- Nucleus JVI For Nucleus* RTOS
- Nucleus* NET Stack
- Nucleus PLUS* Real-Time Operating System
- Nucleus* UDB Debugger
- Nucleus* WebServ Library

For more information, contact: Jamie Little, 334-661-5770.
Email: Sales@atinucleus.com.
Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

Agranat Systems, Inc.

1345 Main Street
Waltham, MA 02154
Telephone: 781-893-7868
Fax: 781-893-5740

With extensive experience in the embedded systems arena, Agranat Systems offers EmWeb, the premier embedded Web server and development technology, and EmStack, a TCP/IP stack for use in embedded systems. Both products offer features that streamline the development of embedded Web interfaces, and are quickly ported in a wide variety of embedded environments. They are utilized by leading telecom, telecom and manufacturing companies to provide competitive advantages for their products by providing Web-based management capabilities.

Software Products in this Directory include:

- EmStack* TCP/IP Stack
- EmWEB* Embedded Internet Technology

For more information, contact: David Wienelne, 781-893-7868. Email: sales@agranat.com.
Visit Agranat Systems, Inc. on the World Wide Web at: http://www.agranat.com.

Aisys Incorporated

4633 Old Ironsides Drive, Ste. 105
Santa Clara, CA 95054
Telephone: 408-327-8820
Fax: 408-327-8830

Aisys Inc., a privately held, venture-funded company, develops and markets essential design automation tools to leverage the skills of high-end embedded system designers, allowing them to reduce development time and focus on their products' value-added capabilities. The DriveWay* 3DE* (Device Driver Design Environment) family of tools automates -- for the first time -- the design and implementation of microcontroller (embedded microprocessors) device drivers. Once this laborious and error-prone manual task is automated, designers can focus their efforts on differentiating capabilities and new product innovation. DriveWay also allows designers to work at the functional level, where they are isolated from the hardware specifics, and porting to new hardware is greatly simplified.

Software Products in this Directory include:

- DriveWay* -MPC860/MPC821/MPC823

For more information, contact: Renee Gonzales, 408-327-8820. Email: mkt@aisysinc.com.
Visit Aisys Incorporated on the World Wide Web at: www.aisysinc.com.

Allegro Software Development Corporation

43 Waite Road
Boxborough, MA 01719
Telephone: 508-266-1375
Fax: 508-266-2839

Allegro Software Development Corporation is dedicated to providing Internet connectivity to embedded systems. Founded as a consulting company by senior networking engineers in 1993, Allegro Software launched its initial Internet connectivity product, RomPager (an embedded Web server), in early 1996.

Software Products in this Directory include:

- ROMPager Embedded Web Server Toolkit

For more information, contact: Bob Van Andel, 508-266-1375. Email: bva@allegrosoft.com.
Visit Allegro Software Development Corporation on the World Wide Web at: www.allegrosoft.com.

American Arium

14281 Chambers Road
Tustin, CA 92780
Telephone: 714-731-1661
Fax: 714-731-6344

American Arium is a leading supplier of in-circuit emulators for high-performance Intel Architecture processors, including the Pentium*, Pentium II, and Pentium Pro processors. The company has been a primary market supplier of in-circuit emulators for Pentium processors since 1991. In 1995, American Arium introduced its emulator for the Pentium Pro

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processor, and in 1996, announced ICE support for the Pentium II processor series. The company's quality products are used throughout the industry to debug BIOS, OS kernels and device driver software. American Arium's mission is to provide superior technical products with an unmatched commitment to customer service.

Software Products in this Directory include:

- Comet In-Circuit Emulator

For more information, contact: Jeff Acampora, 714-731-1661. Email: info@arium.com.
Visit American Arium on the World Wide Web at: www.arium.com.

Angeles Design Systems Corp.

501 Santa Monica Blvd.
Santa Monica, CA 90401
Telephone: 310-899-5125
Fax: 310-899-5135
Angeles Design Systems Corporation, headquartered in Santa Monica, California, develops, markets and supports digital signal processing design automation and optimization software for low-power DSP applications in the wire-line and wireless video, voice and data markets. With Angeles Design's DSP Canvas* design automation system, users may develop applications, including top-down system design and DSP function development, for wired and wireless video, voice and data systems.

Software Products in this Directory include:

- DSP Canvas*

For more information, contact: Paul Giordano, 415-297-7272. Email: sales@angeles.com.
Visit Angeles Design Systems Corp. on the World Wide Web at: www.angeles.com.

AP Labs

5871 Oberlin Drive
San Diego, CA 92121
Telephone: 619-546-8626
Fax: 619-546-0278
AP Labs, an established real-time systems integrator and software developer, provides the AIO Driver Library. The library supports a broad range of VMEbus* and IP* modules with device driver software for Wind River System's VxWorks* RTOS and the Tomado* integrated development environment. AP Labs' VMEwindow control software (GUI) provides the developer with graphical (Motif-based) control of real-time systems. AP Labs is committed to lowering project costs, reducing risks and reducing system development-time investments.

Software Products in this Directory include:

- AIO Drivers for VxWorks* RTOS
- VMEwindcws GUI

For more information, contact: Steve Gills, 619-546-8626. Email: info@sd.aplabs.com.
Visit AP Labs on the World Wide Web at: www.sd.aplabs.com.

Apogee Software, Inc.

1999 S. Bascom, Ste. 325
Campbell, CA 95008
Telephone: 408-369-9001 or 800-854-6705
Fax: 408-369-9018
Apogee Software, Inc. generates and sells compilers for the SPARC* processor and other processor architectures. Apogee also offers optimization technology for C/C++, FORTRAN 77 and 90 languages running on SunOS* 4.1x and Solaris* 2.x operating system environments. Apogee compilers are designed for performance-minded developers.

Software Products in this Directory include:

- Apogee-C Compiler
- Apogee-C++ Compiler
- Apogee-FORTRAN 77/90 Compiler

For more information, contact: George Malek, 408-369-9001. Email: info@apogee.com.
Visit Apogee Software, Inc. on the World Wide Web at: www.apogee.com.

Applied Microelectronics Inc.

1046 Barrington Street
Halifax, Nova Scotia B3H 2R1 CANADA
Telephone: 902-421-1250 x273
Fax: 902-429-9983
Applied Microelectronics Inc. is an established leader in the design and development of electronics products. Applied Microelectronics has extensive experience in embedded software systems, ranging from small microcontroller-based designs to large multi-tasking, multiprocessor-based real-time systems. Systems developed include a Digital FM Exciter with an 8-bit microcontroller and three 24-bit DSPs; The Weather Star* 4000, comprised of two 16-bit microprocessors running multi-tasking RAM-based software and up to four 8-bit microcontrollers, all on a shared bus; and numerous VMEbus-based systems using multiprocessor designs for data processing and distribution at high data rates.

For more information, contact: Darren W. Taylor, 902-421-1250 x273. Email: taylor@appliedmicro.ns.ca.
Visit Applied Microelectronics Inc. on the World Wide Web at: www.appliedmicro.ns.ca.

Applied Microsystems Corporation

5020 148th Avenue NE, PO Box 97002
Redmond, WA 98073-9702
Telephone: 800-426-3925 or 425/882-2000
Fax: 425-883-3049
Applied Microsystems is a leader in hardware-enhanced embedded software design, debug and test solutions, helping engineers develop products faster, more reliably and at a lower cost-per-engineer. Applied's "hardware-enhanced" tool approach ensures embedded systems developers maximum control over and visibility into a microprocessor-based embedded system while simultaneously optimizing performance, minimizing the cost to AMC customers, yet causing minimal intrusion into the operation of the system being developed.
Applied's tools include: innovative VSP-TAP/Eaglei* hardware/software co-verification tools; SuperTAP*, CodeTAP*, and CodeICE* in-circuit emulators, and the CoreTAP* Development Platform for SOC projects - tools for both software and hardware development; and category-defining CodeTEST* embedded software test and analysis tools.

Software Products in this Directory include:

- CodeTEST* Software Verification Tools
- CoreTAP* System-On-A-Chip Co-Development Platform
- Emulation Tools for Embedded Development
- MWX-ICE* Debugger
- VSP-TAP*/Eaglei* Co-Verification Tools

Applied also develops custom measurement solutions for specific customer applications.

For more information, contact: Jay Gould, 425-882-5633. Email: info@amc.com.
Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

Applied Testing and Technology, Inc.

50 North Santa Cruz Avenue
Los Gatos, CA 95030
Telephone: 408-399-1930
Fax: 408-399-1931
Applied Testing and Technology, Inc. (ApTest) is an industry leader in developing and applying test technology. From its offices in the U.S. and Europe, ApTest provides application and system software test suites and services, with special emphasis on the following:
* Functional, QA, Regression and Performance testing
* GUI-based Application testing
* Object-Oriented Interface testing
* Distributed (client/server) testing
From test development to product testing, ApTest has the tools and expertise to help developers create the best solutions for their testing needs.

Software Products in this Directory include:

- PowerPC* EABI Test Suite (PEATS)

For more information, contact: Andy Silverman, 408-399-1930 x 203. Email: aptest@aptest.com.
Visit Applied Testing and Technology, Inc. on the World Wide Web at: www.aptest.com.

Aptix Corporation

2880 North First Street
San Jose, CA 95134
Telephone: 408-428-6200
Fax: 408-944-0646
Aptix Corporation, founded in 1989, develops, manufactures and markets products that enable system designers to rapidly prototype, verify and debug complex electronic systems in a real-time environment. Aptix's solutions enhance the electronic designer's ability to create higher quality products in less time, thereby addressing the critical competitive issues of time-to-market, productivity and reliability. Aptix, privately held, marked its sixth consecutive quarter and the beginning of the second calendar year of profitability in first quarter, 1997.

Software Products in this Directory include:

- System Explorer* MP3/MP4 Development Environment

For more information, contact: Anne Purvis-Blomquist, 408-428-6237. Email: info@aptix.com.
Visit Aptix Corporation on the World Wide Web at: www.aptix.com.

Archelon Inc.

460 Forestlawn Road
Waterloo, Ontario N2K 216 CANADA
Telephone: 800-387-5670
Fax: 519-746-7925
Archelon Inc. specializes in providing C compilers and related software tools in a rapid and cost-effective manner. Archelon's Retargetable C Tools Development System has been applied to a wide variety of old, new, and novel architectures, including microcontrollers, digital signal processors (DSPs), and high-performance, single-instruction, multiple-path parallel processors. The Archelon tools are aimed primarily at revitalizing support for older processors and for providing a rapid way to develop good-quality tools for newly designed embedded devices.

Software Products in this Directory include:

- Archelon C Compiler for Intel i960* Processor
- User-Retargetable Development Tools II

For more information, contact: Preston Gurd, 519-746-7925. Email: info@archelon.com.
Visit Archelon Inc. on the World Wide Web at: www.archelon.com.

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National Technological Park
Limerick, Ireland
Telephone: 353-61-334466
Fax: 353-61-334477

Ashling Microsystems of Limerick, Ireland, serves the embedded systems market as a manufacturer of 8- and 16-bit in-circuit emulators, source-level debuggers and software analysis test systems. All Ashling Microsystems' products are certified to ISO 9001 standards. Supported micro-processors include those from Intel, Motorola, Philips, Mitsubishi and others. In the U.S., Ashling Microsystems' products are sold and supported through Orion Instruments, Sunnyvale, California.

For more information, contact: In USA, call Orion Instruments 800-729-7700. Email: ashling@iol.ie. Visit Ashling Microsystems on the World Wide Web at: www.ashling.com.

Award Software International* Inc.

777 East Middlefield Road
Mountain View, CA 94043
Telephone: 415-237-6800
Fax: 415-968-0274

Award Software has a full range of software and services for designers of embedded systems. Award Software's embedded products include: modular, flexible, full-featured embedded EliteBIOS, based on the BIOS shipping in more than half of all desktop and server computers worldwide; APIAccess*; Win32-compatible libraries for embedding Windows* OS, 32-bit sources; and MR BIOS* for embedded systems. WWWAccess*; a complete solution for Internet appliance manufacturers, with embedded OS and Internet browser, and the ability to run Windows* OS applications; MPCAccess and RPBAccess*: remote administration and diagnostics; CardWare* customizable Card and Socket Services for MS-DOS*, Windows and WinNT; Embedded PC diagnostics.

Software Products in this Directory include:

- APIAccess* Middleware For Windows* OS
- Embedded EliteBIOS* Software
- MPCAccess* Diagnostic Firmware/Utility
- MR BIOS* System Management Software
- PC DIAG* Diagnostic Utility
- WWWAccess* Internet Appliance Creator

For more information, contact: Bill Goodrich, 415-237-6895. Email: sales@award.com. Visit Award Software International* Inc. on the World Wide Web at: www.award.com.

B-Tree Systems, Inc.

5929 Baker Road, Ste. 475
Minnetonka, MN 55345
Telephone: 612-936-7887
Fax: 612-988-8283

B-Tree Systems, Inc., founded in 1982 as a consulting venture, and incorporated in 1983, is a pioneer in the automation of functional verification and testing for the embedded systems and PC markets. B-Tree's vision is to enable vendors to develop and deliver high-quality embedded electronics products more efficiently. From its initial focus on the testing of life-critical medical devices such as heart pacemakers, B-Tree has expanded into other vertical and geographical markets. B-Tree's customer base can be found in a number of embedded system industries, including automotive, aerospace, communications, office automation, consumer electronics and industrial control. Keeping its focus on the developer's need to produce higher quality products within time-to-market and budget constraints, B-Tree offers a solution to automate the test and verification process, increase test coverage and ensure product functionality throughout the development cycle. B-Tree is involved in Y2K compliance testing.

Software Products in this Directory include:

- Va'idor* Verification Tools

For more information, contact: Laura Dominik, 612-936-7887. Email: info@btree.com. Visit B-Tree Systems, Inc. on the World Wide Web at: www.btree.com.

Baton Rouge International, Inc.

666 Plainsboro Road, Ste. # 1281
Plainsboro, NJ 08536
Telephone: 609-716-9030
Fax: 609-716-9029

Baton Rouge International, Inc. (BRI), a rapidly growing software consulting and systems integration company, has acquired an enviable reputation based on its unique combination of consultancy, turnkey development, support services, and maintenance of embedded real-time systems. The expertise gained in embedded systems over the past 15 years has resulted in BRI's Embedded Systems Division, based on a strong core group of more than 120 professionals and a state-of-the-art ISO9001-accredited problem-oriented R&D center at the company's India facilities. BRI services to clients include Firmware Development; Real-time System Design/Development; Development, Porting and Maintenance of Board Support Packages and Device Drivers; and Application Software Development. The BRI services are offered in various packages to suit individual customer needs, including: Fixed-price development - outsourcing; Consulting and on-site contract programming; and Outsourcing and offshore development. BRI provides excellent options for improving a customer's competitiveness by reducing costs, meeting tight deadlines, reducing time-to-market, freeing key people up to focus on key technology issues.

For more information, contact: Chandra Kandamuru, 609-716-9030. Email: emb.sys@bri.com. Visit Baton Rouge International, Inc. on the World Wide Web at: http://www.bri.com/embed.htm.

Beacon Development Tools, Inc.

9430 Research Blvd., Ste. 310
Austin, TX 78759
Telephone: 512-338-9211 or 800-769-9143
Fax: 512-346-6382

Beacon Development Tools* supplies Q.E.D.* and CheckMate Systems* In-Circuit Emulators, along with Metaware* and SSI* development tool products, which target the protected-mode, Intel Architecture (x86) processor-based systems development market. Founded in 1991, Beacon Development Tools remains privately held as its revenues compound annually. Beacon Development Tools in 1997 purchased all development tools formerly offered by Systems & Software, Inc. or SSI. These tools include debuggers, linkers, and simulators that work with the C/C++ languages for the x86 processor environment. Beacon's worldwide corporate headquarters are in Austin, Texas, with European headquarters located in Bristol, England.

Software Products in this Directory include:

- Beacon C/C++ Software Development Kit
- CheckMate II* In-Circuit Emulator
- Link&Locate 386
- Link&Locate 86
- Q.E.D.* In-Circuit Emulator
- SP/Tools for MetaWare*
- SSI SoftProbe* 386/TX Debugger
- SSI SoftProbe* 86/TX Debugger
- SSI SoftProbe* x86/SIM (DOS) Simulator/Debugger
- SSI VisualProbe* Remote Debugger (WIN)
- SSI VisualProbe* x86 Simulator (WIN)

For more information, contact: Beacon Sales, 512-338-9211. Email: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

BEOLOGIC A/S

Elkervej 30-32
Aabyhoj, Denmark 8230
Telephone: +45 8625 11 11
Fax: +45 8625 11 91

BEOLOGIC is a technological leader in developing and supplying its visualSTATE* software tools for embedded software development. BEOLOGIC's unique and patented software technology gives its customers a large competitive edge when it comes to developing, producing and selling products and services. BEOLOGIC's visualSTATE is sold and implemented the world over through a network of partners and distributors. BEOLOGIC became a company independent of Bang & Olufsen in 1995, but had many years of experience in developing software solutions for embedded applications as an independent division of the Danish manufacturer of audio/video equipment. Bang & Olufsen is known worldwide for its progressive design and innovative functionality.

Software Products in this Directory include:

- BEOLOGIC visualSTATE* Development Environment

For more information, contact: Henrik Leerberg, +45 862 51111. Email: xsp@beologic.com. Visit BEOLOGIC A/S on the World Wide Web at: http://www.beologic.dk.

Bernard Mushinsky, Marketing Consultant

444 East 82 Street

New York, NY 10028
Telephone: 212-734-4124
Fax: 212-734-4079

Bernard founded Industrial Programming, Inc., the pioneering company in the real-time operating systems field. From its inception in 1976, he was responsible for marketing and sales of IPI's MTOS* RTOS product family, now used by thousands of organizations around the world. Object copies of MTOS are embedded in millions of devices, from the AWACS surveillance airplane to the Zodiac telephone switch. Eminently successful in marketing, he consults in the following areas: Market Assessment; Development and Implementation of Marketing Strategies; Technical Writing; and Documentation.

For more information, contact: Bernard Mushinsky, 212-734-4124. Email: bermmu@worldnet.att.net. Visit Bernard Mushinsky, Marketing Consultant on the World Wide Web at: N/A.

BSQUARE

3633 136th Place S.E., Ste. 200
Bellevue, WA 98006
Telephone: 425-519-5000
Fax: 425-529-5999

BSQUARE* is a rapidly growing company, with more than 100 employees, specializing in Windows* CE operating system solutions. BSQUARE has three divisions: BSQUARE Consulting provides the industry's largest pool of Windows CE engineering resources. BSQUARE Development provides a suite of proprietary software products for use in Windows CE-based handheld PCs (HPCs). BSQUARE's flagship product, bFAX* was the first to earn Microsoft's "Designed for Windows CE" logo. bPRINT* and bMOBILE* are additional mobile communications software products for HPCs. BSQUARE Integration provides full-service Windows CE support for manufacturers, OEMs and end users. BSQUARE Integration provides OEM Adaptation Kits (OAK), reference hardware designs, and a cross-platform firmware environment for the Windows CE operating system. Customer-specific System Design/Development Services are provided by BSQUARE's Consulting Division.

* Trademark or registered trademark of its respective company or mark holder



Software Products in this Directory include:

- BFAX, BPRINT, BMOBILE HPC Communications Software
- BSQUARE Integration

For more information, contact: Ann Gorman, 425-519-5000. Email: donb@bsquare.com. Visit BSQUARE on the World Wide Web at: www.bsquare.com.

Byte Craft Limited

421 King Street North
Waterloo, Ontario N2J 4E4 CANADA
Telephone: 519-888-6911
Fax: 519-746-6751

Byte Craft Limited is a software development company specializing in PC-based embedded systems software development tools for single-chip microcomputers. Byte Craft provides innovative solutions for developers, consultants and manufacturers around the world. Byte Craft's products include a line of C cross-compilers targeted to microcontroller families including the Zilog Z8, National COP8, Microchip PIC16/17Cxx, Mitsubishi MELPS740 and Motorola 68HC05 and 68HC08. Other products include a C pre-processor that adds fuzzy logic capability to any C compiler, and host support software for the MC6805 C compiler and the Motorola EVM and EVS emulator boards.

Software Products in this Directory include:

- Byte Craft C6808 Code Development System-Compiler
- Byte Craft COP8C Code Development System-Compiler
- Byte Craft Fuzz-C Preprocessor for Fuzzy Logic
- Byte Craft MPC Code Development System-Compiler
- Byte Craft Z8C Code Development System-Compiler
- C38 Code Development System/Compiler
- C6805 Code Development System/Compiler

For more information, contact: Karen McMurray, 519-888-6911. Email: info@bytecraft.com. Visit Byte Craft Limited on the World Wide Web at: www.bytecraft.com.

Bytebos Integrated Systems

12032 Broadway Terrace
Oakland, CA 94611
Telephone: 800-788-7288 or 510-658-7797
Fax: 510-658-9334

Bytebos Integrated Systems has provided software for real-time computing applications since 1989 and is dedicated to the highest level of product quality and technical support. The company's principal product is its Bytebos Multitasking Operating System. Bytebos, a high-performance, real-time multitasking operating system, is available for a wide variety of microprocessors, microcontrollers and digital signal processors. The Bytebos Operating System is licensed to hundreds of high-technology companies and is used worldwide in a variety of well established products.

Software Products in this Directory include:

- Bytebos* Multitasking Operating System

For more information, contact: Nick Andrews, 800-788-7288. Email: andrews@bytebos.com. Visit Bytebos Integrated Systems on the World Wide Web at: www.bytebos.com.

CACI Products Company

3333 N. Torrey Pines Court
La Jolla, CA 92037
Telephone: 619-824-5200
Fax: 619-457-1184

CACI Products Company, headquartered in La Jolla, California, is a global provider of simulation software, with products ranging from object-oriented simulation languages

to industry-specific application products used worldwide by commercial government and academic institutions. CACI products include SIMPROCESS*, for business process and work-flow simulation and analysis, SIMSCRIPT II.5*, a simulation language compiler; MODSIM III*, an object-oriented simulation language compiler; COMNET III*, an industry-leading network simulation tool that accurately predicts LAN, WAN and enterprise network performance; and VeriSpec*, for rapid design and validation of complex systems, including those for real-time and embedded applications.

Software Products in this Directory include:

- COMNET III* Network Simulator
- NETWORK II.5* Simulator
- Verispec* System Verification

For more information, contact: Paul Gorman, 619-824-5200. Email: caci@caciasl.com. Visit CACI Products Company on the World Wide Web at: www.caciasl.com.

CAD-UL, Inc.

6330-1 E. Thomas Rd. Ste. #100
Scottsdale, AZ 85251-7056
Telephone: 602-945-8188
Fax: 602-945-8177

Since 1984, CAD-UL, Inc. has provided mature and sophisticated embedded applications development tools. CAD-UL provides the compiler, assembler, linker, loader, library, native symbolic debugger, cross symbolic debugger, and a project-oriented integrated development environment (IDE) called Workbench*. Customers may encapsulate other third-party vendor tools or their own internally developed tools into CAD-UL's Workbench. Today, CAD-UL employs sixty people, many of whom hold advanced degrees in engineering and computer science. CAD-UL is a leading supplier of x86/Pentium* and 680x0/68xxx hosted C/C++ compiler systems worldwide. The compiler systems are very mature, easy to use, and generate extremely efficient code, and CAD-UL's symbolic debugging technology is second to none.

Software Products in this Directory include:

- CAD-UL Workbench* Development Systems

For more information, contact: Jeff Liborio/Mike Halpin, 602-945-8188. Email: us.sales@cadul.com. Visit CAD-UL, Inc. on the World Wide Web at: www.cadul.com.

CARDtools Systems

101 Metro Drive, Ste. 250
San Jose, CA 95110
Telephone: 408-894-9500
Fax: 408-894-9600

CARDtools Systems is uniquely focused on the growing needs of the real-time embedded software and development market. CARDtools Systems was formed to develop, manufacture, market and support front-end design solutions, while also providing full system-level simulation through co-simulation of software with hardware. This multifaceted design tool is directly targeted to address all aspects of application design and simulation. Simulation capabilities allow customers to cost-effectively review design alternatives, rather than implementing inadequate systems, while allowing for an increasing level of accuracy as the model matures with a greater level of detail. CARDtools products focus not only on logical design issues, but on unique real-time embedded issues such as timing deadlines, target and operating system interaction, hardware/software interface and interrupt-driven multi-tasking systems.

Software Products in this Directory include:

- CARDtools Application: Simulation Tool

For more information, contact: Dave Allenbaugh, 408-894-9500. Email: info@cardtools.com. Visit CARDtools Systems on the World Wide Web at: http://www.cardtools.com.

Ceibo Inc.

7 Edgestone Court
Florissant, MO 63033
Telephone: 314-830-4084 or
800-833-4084
Fax: 314-830-4083

Ceibo is a producer of in-circuit emulators, development boards, programmers and software. Founded in 1988, Ceibo has been shipping products since early 1990 to customers worldwide. Ceibo is recognized as a leading Microprocessor Development Systems company. Joint ventures with silicon manufacturers are leading to the development of new systems to complement the existing product lines. Ceibo's products support embedded systems based on processors from Philips, Siemens, NEC, Microchip, Dallas, AMD, Intel and others. Ceibo has three main locations and many representatives and distributors throughout the world. Corporate and management headquarters are located in Herzlia, Israel, along with the engineering research and development and manufacturing facilities. The USA office handles sales, marketing, technical support and service for North and South America, Hong Kong, Australia, etc. A third office in Germany covers the same areas for the European market.

Software Products in this Directory include:

- DB-501 Debugger
- DB-51 Debugger
- DS-186 Development System
- DS-251 Development System
- DS-300 Debugger
- DS-386 Development System
- DS-48 Development System
- DS-51 Development System
- DS-750 Debugger
- DS-752 Development System
- DS-M8 Development System
- DS-XA Development System
- EB-251 Debugger
- EB-51 Emulator
- EB-XA Debugger
- MP-51 Programmer

For more information, contact: Ceibo Sales, 800-833-4084. Email: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

Chorus Systems

1999 S. Bascom Avenue
Campbell, CA 95008
Telephone: 408-879-1350
Fax: 408-879-4102

Chorus Systems designs, develops and markets a family of componentized* operating system products that allow custom configuration of capabilities to match enterprise-wide application needs -- from deeply embedded applications to high-end system platforms. The Chorus "Componentized OS" products are used by a variety of sophisticated OEMs in the general computing, telecommunications and embedded system industries. Founded in 1986, Chorus Systems is an ISO 9001-certified company with offices in the U.S., Europe and Asia Pacific.

Software Products in this Directory include:

- CHORUS/Classix* Real-Time Operating System
- CHORUS/Jazz* Real-Time Operation System

For more information, contact: Audrey Castine, 408-879-4145. Email: info@chorus.com. Visit Chorus Systems on the World Wide Web at: www.chorus.com.

* Trademark or registered trademark of its respective company or mark holder

CMX Company

5 Grant Street, Suite C
Framingham, MA 01702
Telephone: 508-872-7675
Fax: 508-620-6828

CMX Company designs, develops and markets Real-Time Multi-Tasking Operating System (RTOS) products that support MOST 8-, 16-, 32- and 64-bit embedded microcontrollers and microprocessors. CMX RTOS products are supplied with all source code on a no-royalty basis and support compilers from more than 25 vendors. CMX enhances its CMX-RTX* RTOS with optional networking packages, such as Control Area Network (CAN) and TCP/IP, with support available for most networking applications-oriented processors. CMX also provides many device drivers for TCP/IP and offers support for both CAN versions 2.0A and 2.0B, Passive and Active.

Software Products in this Directory include:

- CMX-CAN Library
- CMX-RTX* Real-Time Operating System
- CMX-TINY+* Real-Time Operating System

For more information, contact: Sales Department, 508-872-7675. Email: cmx@cmx.com.

Visit CMX Company on the World Wide Web at: www.cmx.com.

Concur System Technologies, LLC

2525 Wallingwood Dr., Ste. 804
Austin, TX 78746-6926
Telephone: 512-306-0511
Fax: 512-306-0558

Concur System Technologies provides the software and hardware technologies for its customers to view data in real time through the Internet or intranets. Concur manufactures low-cost mini-Web servers and its embedded hardware and software components. Concur's hardware and software is industrialized, inexpensive, and provides reliable real-time connectivity. Concur merges digital signal processing (DSP) and embedded PC software and hardware technologies. The combination of its dual processors provides a competitive price and performance solution for organizing, processing, and transferring data. These products provide solutions for applications such as real-time medical monitoring, process control, motion control, data measurement, telecommunications, and embedded mini-Web servers.

Software Products in this Directory include:

- CCOS* MicroKernel
- Flasher* Memory Programmer

For more information, contact: Mike Foley, 512-306-0511. Email: info@concursys.com.

Visit Concur System Technologies, LLC on the World Wide Web at: www.concursys.com.

Corelis Inc.

12607 Hidden Creek Way, Ste. H
Cerritos, CA 90703
Telephone: 562-926-6727
Fax: 562-404-6196

Corelis Inc. designs, develops, manufactures and markets embedded system development tools and test equipment for digital designers. Products include JTAG emulators for various RISC processors, including the PowerPC family and the AMD 29K family of processors. Corelis also has an extensive line of hardware and software tools for supporting Hewlett-Packard's family of logic analyzers. The tools also provide support for numerous RISC processor platforms such as the MIPS 3000/4000/5000 processor families. In addition, Corelis has an extensive line of preprocessors for digital signal processors (DSPs) from Motorola and Texas Instruments.

Software Products in this Directory include:

- EMDT/960Rx, Hx In-Circuit Emulator
- PowerEM Emulator
- Preprocessor for the HP Family of Logic Analyzers

For more information, contact: Mike Winters, 562-926-6726. Email: mikew@corelis.com.

Visit Corelis Inc. on the World Wide Web at: www.corelis.com.

COSMIC Software Inc.

100 Tower Office Park, Ste. C
Woburn, MA 01801
Telephone: 617-932-2556
Fax: 617-932-2557

COSMIC Software specializes in development tools for Motorola microcontrollers, including the 68HC05, 68HC08, 68HC11, 68HC12, 68HC16, 68K and CPU32. COSMIC products are developed in close cooperation with Motorola's Semiconductor Product Sector engineers and other partners in the embedded systems industry, including commercial real-time operating system and in-circuit emulator vendors. COSMIC's product development energies are dedicated to more efficient code generation, comprehensive high-level debugging and more powerful, easy to use development environments for PC and UNIX workstations.

Software Products in this Directory include:

- COSMIC* C Cross Compilers
- ZAP BDM Debugger
- ZAP MMDS Debugger
- ZAP MON Debugger
- ZAP SDI Debugger
- ZAP* SIM Debugger

For more information, contact: Alan Johnson, 617-932-2556. Email: sales@cosmic-us.com.

Visit COSMIC Software Inc. on the World Wide Web at: www.cosmic-us.com.

Cygnus Solutions

1325 Chesapeake Terrace
Sunnyvale, CA 94089
Telephone: 408-542-9600
Fax: 408-542-9699

Cygnus Solutions is a leading provider of single-source, Unix and Windows* NT desktop and cross-platform software development tools for 32- and 64-bit embedded processors and controllers. As the GNU technology leader, Cygnus continually pushes the frontier of compiler and debugger innovation.

Cygnus, founded in 1989, established a support model for the GNU standard, leveraging the contributions of the net community and the requirements of the semiconductor industry to produce a powerful multi-platform software development toolkit. The GNUPro* Toolkit has very broad coverage in the embedded systems marketplace. Cygnus also provides customization services. Headquartered in Sunnyvale, California, the company is global in both operations and customers, with offices in Boston and Atlanta, the U.K., Japan, Germany and Canada.

Software Products in this Directory include:

- GNUPro* Toolkit
- GNUPro* Toolkit Compiler Suite
- GNUPro* Toolkit Debugger Suite

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email: info@cygnus.com.

Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

Cyrix Corporation

2703 N. Central Expressway
Richardson, TX 75080-2044
Telephone: 800-848-2979
Fax: 972-699-9857

Headquartered in Richardson, Texas, Cyrix Corporation (NASDAQ:CYRX) designs, manufactures and markets innovative, high-performance processors (x86-compatible) for the personal computer industry as well as the embedded systems market. Founded in 1988, Cyrix has developed nine original processor architectures that are now in millions of computers world wide. Expertise in creating award-winning microprocessor architectures positions Cyrix as a leading provider of innovative processor solutions. The company pioneered new processor design methodologies, creating unique microcode and a superior architectural model that is compatible with today's PC software, the results of which have been demonstrated by its array of high-performance processor products. Cyrix Corporation's MediaGX* processor, with its high-integration level, offers an ideal solution to x86-based embedded system designs. In 1997, Cyrix became a National Semiconductor company.

For more information, contact: Technical Support, 1-800-462-9749. Email: tech_support@cyrix.com.

Visit Cyrix Corporation on the World Wide Web at: www.cyrix.com.

Datalight*

18810 59th Avenue NE
Arlington, WA 98223
Telephone: 360-435-8086 or
800-221-6630
Fax: 360-435-0253

Datalight* develops and distributes high-quality embedded 80x86 system software, including: ROM-DOS*, a compact, flexible MS-DOS 6.22-compatible operating system with additional features and utilities for embedded PCs; FlashFX*, a full feature flash file system using only 12K ROM and 7K RAM, written in ANSI C that can be ported to any CPU or OS; and WinLight*, a compact Windows* OS, version 3.11 work-alike including GUI, multitasking and protected mode. It is small in size, easy to use and an inexpensive alternative. All products include features designed specifically for the embedded market and are 100% guaranteed.

Software Products in this Directory include:

- Datalight's FlashFX Flash File System
- Datalight's ROM-DOS 6.22 Operating System
- Datalight's WinLight* Operating System

For more information, contact: Tim Gillman, 360-435-8086 x 115. Email: sales@datalight.com.

Visit Datalight* on the World Wide Web at: <http://www.datalight.com>.

DDC-I A/S

G1. Lundtoftevej 1B
Lyngby, Denmark DK-2800 DENMARK
Telephone: +45 45 87 11 44
Fax: +45 45 87 22 17

DDC-I's mission is to act as a business partner for developers of real-time safety-critical applications. As an established supplier of high-quality software development tools for Ada and Jovial, DDC-I is successful in this mission by working closely with customers and by focusing on the security and reliability of the application. The DDC-I Ada Compiler System (DACS), the first Ada 83 compiler validated was developed using formal, mathematically-based methods. Over the years, enhancements have made DACS a powerful solution with a run-time system supporting rate monotonic scheduling, real-time symbolic debugging, network support and more.

Software Products in this Directory include:

- DDC-I Ada Compiler Systems (DACS*)

For more information, contact: Morten Selling, +45 45 87 11 44. Email: sales@ddci.dk.

Visit DDC-I A/S on the World Wide Web at: www.ddci.com.

* Trademark or registered trademark of its respective company or mark holder



Diab Data, Inc.

323 Vintage Park Drive
Foster City, CA 94404
Telephone: 650-571-1700
Fax: 650-571-9068

Diab Data is a premiere developer of ultra-high-performance C and C++ compiling solutions for 32-bit embedded systems development. Diab Data's optimization technology has made it an expert, the choice for demanding PowerPC*, 68K/CPU32, ColdFire, and MCore applications. Diab Data is also the pioneer of the RTA Suite, a suite of visual run-time analysis tools for enhancing program performance, reliability, and memory utilization.

Diab Data was founded in 1983. As a Platinum-level vendor in Motorola's Embedded Developer Program, Diab Data is committed to providing top quality products and responsive technical support.

Software Products in this Directory include:

- D-C++ C/C++ Cross-Compiler Suite
- D-CC C Cross-Compiler Suite
- Run-Time Analysis Tools For Diab Data Compilers

For more information, contact: Jan Liband, 650-571-1700 x227. Email: Info@ddi.com.
Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

**Digital Semiconductor
Digital Equipment Corporation**

77 Reed Road
Hudson, MA 01749
Telephone: 800-332-2717 or
978-568-6868
Fax: n/a

Digital Semiconductor, a Digital Equipment Corporation business headquartered in Hudson, Massachusetts, designs, manufactures and markets industry-leading semiconductor products including Alpha* microprocessors and PCI chips for networking, bridging, and multimedia, plus low-power StrongARM* microprocessors under license from Advanced RISC Machines Ltd. Mitsubishi Electric Corporation and Samsung Electronics Company Ltd. are alternate sources for Alpha microprocessors.

For more information, contact: Sales, 800-332-2717. Email: semiconductor@digital.com.
Visit Digital Semiconductor
Digital Equipment Corporation on the World Wide Web at: <http://www.digital.com/semiconductor>.

Dinkumware, Ltd.

398 Main Street
Concord, MA 01742
Telephone: 978-369-8489
Fax: 978-371-9014

Dinkumware, Ltd. provides Dinkum* Libraries for the embedded marketplace. The Dinkum EC++ Library is the first implementation of the Embedded C++ Technical Committee specifications. The Dinkum Abridged Library, EC++ plus STL, is designed to help programmers write C++ programs, using an efficient subset of the ANSI/ISO Standard C++ by providing optional exception handling and/or namespaces. The Dinkum C++ Library is fully compliant with ANSI/ISO Standard (Nov., 1997, ISO DIS). Dinkum Customization Service enhances your C library by adding the Dinkum Supplement Package (wide-character, locale support, and a set of enhanced math functions) for closer conformance to the ANSI/ISO C Standard. Dinkumware can adapt the Dinkum C++ Library for use with your compiler, including upgrading your C library as needed for better conformance to the C++ Standard.

Dinkumware products are portable among most microprocessors and microcontrollers.

Software Products in this Directory include:

- Dinkum* Abridged Library
- Dinkum* C Library
- Dinkum* C++ Library
- Dinkum* C/C++ Library Reference In HTML
- Dinkum* EC++ Library
- Dinkum* EC++ Proofer*
- Dinkum* Library Products

For more information, contact: T.L. Plauger, 978-369-8489. Email: sales@dinkumware.com.
Visit Dinkumware, Ltd. on the World Wide Web at: www.dinkumware.com.

DSP Development Corporation

One Kendall Square
Cambridge, MA 02139
Telephone: 617-577-1133
Fax: 617-577-8211

Founded in 1984, DSP Development Corporation creates and markets graphical data analysis, acquisition, and scientific visualization software for scientists and engineers in diverse technical fields, such as automation, data acquisition, real-time process control, image processing, digital signal processing, computer-aided engineering (CAE) and testing.

Software Products in this Directory include:

- DADISP* Worksheet

For more information, contact: Sales Manager, 800-424-3131. Email: dspdev@world.std.com.
Visit DSP Development Corporation on the World Wide Web at: www.dadisp.com.

Electro-Logic Machines, Inc.

1757 Maple Street
Port Townsend, WA 98368
Telephone: 360-379-0969
Fax: 360-379-0960

Since 1990, Electro-Logic Machines, Inc. (ELMI) has provided award-winning architectural design and development support for real-time embedded systems. ELMI's specialty in Motorola's Time Processor Unit (TPU) microcode development has resulted in the company's firmware being used in many Motorola microcontroller-based products. ELMI is a Motorola Embedded Gold Developer. In addition to providing its Time Processor Unit firmware library, ELMI welcomes customers requiring expertise in customized functional microcode development (firmware support) for real-time embedded systems.

Software Products in this Directory include:

- TPU Microcode
- EPI AS Series Macro Assemblers

For more information, contact: Eric McRae, 360-379-0969. Email: sales@elmi.com.
Visit Electro-Logic Machines, Inc. on the World Wide Web at: www.elmi.com/elmi.

Embedded Performance, Inc.

1860 Barber Lane
Milpitas, CA 95035
Telephone: 408-434-2210
Fax: 408-435-7970

Founded in 1987, the charter of Embedded Performance, Inc. was to design and manufacture advanced development and debug tools for embedded designs using high-performance RISC microprocessors. Since that time, the company has become a leading manufacturer of support tools for RISC microprocessors and microcontrollers.

Acquisition of Biomation Corporation in 1994 expanded the product line to include high-performance logic analyzers that support a broad range of digital designs.

"We shorten your design time" is more than just our slogan -- it is our commitment to you.

Software Products in this Directory include:

- EPI CC Compilers
- EPI CCE-ARM Software Toolkit for ARM* μ PU
- EPI CCE29K Software Toolkit for AM29000 μ PU
- EPI CCE4K/CCE3K Software Toolkit for MIPS* μ PU
- EPI CLAS Series Configurable Logic Analyzers
- EPI DS4000 Development System for MIPS* μ PU
- EPI ICEMAN Series In-Circuit Emulators
- EPI Instruction Set Simulators
- EPI JEENI JTAG Emulator for ARM* μ PU Cores
- EPI Locating Linkers
- EPI MON Series Symbolic Assembly-Level Debugger
- EPI Target-Resident Debug Kernels
- EPI Turbo In-Circuit Emulator
- EPI Windowing C/C++ Source-Level Debugger

For more information, contact: Teresa Crews, 408-434-2210. Email: sales@episupport.com.
Visit Embedded Performance, Inc. on the World Wide Web at: <http://www.episupport.com>.

Embedded System Products, Inc.

10450 Stancliff Road, Ste. 110
Houston, TX 77099-4336
Telephone: 281-561-9990 or
800-525-4302
Fax: 281-561-9980

Embedded System Products, Inc. produces software for embedded system development, including the RTX* real-time executive (RTOS), XpresNET* TCP/IP communications protocol suites, and the RTEK kernel sold by Motorola. RTX is a full-featured, multitasking, real-time executive that offers designers a source-code included, royalty-free, small, fast, ROMable, and completely configurable operating system solution. Located in Houston, Texas with worldwide sales offices, Embedded System Products, Inc. was founded in 1978 and is privately held. The company is recognized for the quality and robustness of its products. A partner company, A.T. Barrett, provides system development services and can be reached at the same telephone number and address.

Software Products in this Directory include:

- RTX* Real-Time Kernel
- Xpres Net* Network Communications Suite

For more information, contact: Sales, 800-525-4302. Email: sales@esphou.com.
Visit Embedded System Products, Inc. on the World Wide Web at: www.esphou.com.

Empress Software, Inc.

6401 Golden Triangle Drive
Greenbelt, MD 20770
Telephone: 301-220-1919
Fax: 301-220-1997

Empress Software, Inc. develops an ANSI SQL, multimedia, technical Relational Database Management System with superior binary large-object-handling capabilities. The Empress compact, fast database engine makes it ideal for embedded system developers. Other products by Empress include an ODBC Interface, an Internet applications development toolkit, and a 4GL product. Empress products operate on more than 1500 UNIX and Windows* O.S. platforms, including real-time environments.

Empress has proven its ability to handle demanding applications in such fields as space exploration, telecommunications, network management, image and voice management, and geographical information systems. Customer services include timely technical support via maintenance programs and training classes.

Software Products in this Directory include:

- Embedded EMPRESS Developer's Toolkit*
- EMPRESS RDBMS

* Trademark or registered trademark of its respective company or mark holder

For more information, contact: Dick Naedel, 301-220-1919. Email: sales@empress.com. Visit Empress Software, Inc. on the World Wide Web at: www.empress.com.

Emulation Technology, Inc.

2344 Walsh Avenue, Bldg. F
Santa Clara, CA 95051
Telephone: 408-982-0660
Fax: 408-982-0664
Emulation Technology, Inc. provides more than 4,000 time-saving VLSI and surface mount technology (SMT) adapters and accessories for engineers involved in hardware and software product development, design and test, and electronic systems manufacturing. Free unlimited technical support is available to enhance productivity during the system debug process. For part specifications and details, Emulation Technology has a 24-hour Documents-on-Demand Faxback service at 408-982-9223, as well as a free 216-page, comprehensive interconnect solutions catalog.

For more information, contact: Rozc Rupprecht, Sales, 982-0660 x 234. Email: et@pmail.emulation.com. Visit Emulation Technology, Inc. on the World Wide Web at: www.emulation.com.

Enea OSE Systems AB

103 Southwick Court (U.S. Office)
Fletcher, NC 28732
Telephone: 800-369-3632
Fax: 704-687-7025
Enea OSE Systems is a market leader for real-time operating systems and development tools for building safe embedded real-time systems. OSE customers are found within the electronics, telecommunications, industrial automation, automotive, defense, biomedical technology and consumer electronics industries. Enea OSE Systems is a subsidiary of Enea Data, a Swedish company founded in 1968. Since the beginning, the core of its operation has been the development of time-critical and highly reliable real-time systems, the production of development tools, and the support of real-time applications. Over the years, a number of other activities have been added to the original business, including engineering services such as electronic hardware design and the development of general information systems.

Software Products in this Directory include:
• OSE* Real-Time Operating System

For more information, contact: Bill McCombie, +468-638-5000 (Sweden). Email: info.ose@enea.se. Visit Enea OSE Systems AB on the World Wide Web at: www.enea.se/ose.

Eonic Systems, Inc.

2214 Rock Hill Road, Ste. 120
Herndon, VA 20170-4200
Telephone: 703-707-9500
Fax: 703-707-9525
Eonic Systems is an innovator of real-time system development tools specifically targeted for the unique needs of DSP and embedded RISC core application developers. Eonic Systems has continually pioneered new capabilities to help customers solve their most difficult real-time software application problems. The Virtuoso* Real-Time Operating System (RTOS) and tool set is now in its third generation, employing Eonic System's latest innovation—SoftStealth* technology.
Eonic Systems is an international company with software development and direct customer support centers in North America and Europe. Eonic Systems is privately held, employs about 25 people worldwide, and is growing rapidly. Eonic Systems is a charter member of the DSP Valley Consortium, located in Leuven, Belgium, and a member of the Embedded Software Association (ESOFTA) and EDAC.

Software Products in this Directory include:
• Eonic Virtuoso* V.4 Real-Time Operation System

For more information, contact: Mark Steffler, 703-707-9500. Email: info@eonic.com. Visit Eonic Systems, Inc. on the World Wide Web at: http://www.eonic.com.

EST Corporation

120 Royal Street
Canton, MA 02021
Telephone: 781-828-5588
Fax: 781-821-2268
EST Corporation, headquartered in Canton, Massachusetts, is a leading developer and manufacturer of BDM (background debug mode) emulators, high-end in-circuit emulators and evaluation boards for Motorola's 683xx (CPU32), PowerPC (MPC8xx) and ColdFire (MCF52xx) processor families. Founded in 1988, EST has rapidly become a leading supplier of value-priced, high-performance development systems. EST's visionICE* emulation family is the first, and currently the only single tool architecture to scale developers' needs and budgets, from low-cost target control, to network-based BDM, to full-scale, real-time emulation. EST's unique open software architecture of visionICE gives developers the freedom to use their preferred software development tool suite, and its plug-and-play design allows for a powerful tool that grows with a product throughout its life cycle.

Software Products in this Directory include:
• visionICE* Emulator
For more information, contact: Sales Department, 617-828-5588. Email: sales@estc.com. Visit EST Corporation on the World Wide Web at: www.estc.com.

Eyring Corporation

6912 South 185 West
Midvale, UT 84047
Telephone: 800 YES PDOS or 801-561-1111
Fax: 801-565-4692
Eyring Corporation, established in 1972, is currently comprised of three divisions: Systems Engineering Group (SEG); Assembly Management Systems (AMS); and System Software Division (SSD). Eyring's System Software Division manufactures and distributes operating systems and development tools for high-performance real-time and embedded systems. In conjunction with the PDOS* and PDOSpro real-time operating systems, Eyring offers an interactive Windows* OS-based integrated development environment that supports C and C++ compilers, debugging tools, and network communications software.

Software Products in this Directory include:
• PDOS PowerSuite
• PDOS Real-Time Operating System
• PDOSpro Real-Time Operating System

For more information, contact: Clark Roundy, 801-561-1111. Email: pdos-info@eyring.com. Visit Eyring Corporation on the World Wide Web at: www.eyring.com.

FairCom Corporation

4006 West Broadway
Columbia, MO 65203-0100
Telephone: 573-445-6833
Fax: 573-445-9698
FairCom Corporation has provided quality database development tools since 1979 and is best known for its extremely high-performance file handler, C-tree, used by thousands of programmers worldwide. FairCom provides the embedded database technology for corporations like Motorola, Sharp and Alcatel. C-tree Plus* is released in full C source code,

allowing developers the flexibility to migrate C-tree Plus to their preferred platforms. FairCom's software servers offer advanced heterogeneous cross-platform client/server functionality with powerful features and small memory footprint, industrial quality transaction processing, file mirroring, automatic disaster recovery, multi-threaded design, full client-side source and flexible OEM licensing.

Software Products in this Directory include:
• C-tree Plus* File Handler
• FairCom* Server Engine
For more information, contact: Sales, 573-445-6833. Email: sales@faircom.com. Visit FairCom Corporation on the World Wide Web at: www.faircom.com.

FORTH, Inc.

111 N. Sepulveda Blvd. Ste 300
Manhattan Beach, CA 90266
Telephone: 310/372-8493 or 800/55FORTH
Fax: 310-318-7130
Since 1973 FORTH, Inc. has provided software development tools, design programming and training services for embedded and PC-based applications. FORTH products are based on the Forth programming language, known for interactivity, compactness, speed and extensibility. Forth is especially well suited to embedded systems because it allows programmers to pack more functionality into limited resources while benefiting from excellent performance levels. For these reasons, Forth is the language of choice for the Federal Express SuperTracker, NASA shuttle instrumentation, Europay International's token-based Open Terminal Architecture for "smart card" (ICC) payment terminals, and many more significant and challenging applications.

Software Products in this Directory include:
• SwiftX* Cross-Development Environment

For more information, contact: Steve Agarwal, 800-55-FORTH. Email: forthsales@forth.com. Visit FORTH, Inc. on the World Wide Web at: www.forth.com.

Franklin Software, Inc.

888 Saratoga Avenue, Ste. 2
San Jose, CA 95129
Telephone: 408-296-8051
Fax: 408-296-8061
Franklin Software, Inc. was formed in the late 1980s to provide fast, powerful, high-performance development tools for today's embedded software systems professionals. Franklin integrates many tools into a complete, tightly controlled and tested package, thus assuring a quality product for users. In addition to some of the best 8051 microcontroller development tools available today, Franklin offers clearly defined, well thought out, fully featured incremental product deliveries. Franklin continues this trend by providing users with the power to speed their MCS* 8051, Philips XA, and Intel MCS 251 microcontroller-based projects to completion with a fast, new 32-bit tool set.

Software Products in this Directory include:
• Advanced Development System: Compiler
• Advanced Development System: ProView
• Advanced Development System: WinSim
• Advanced Development Systems: FSI-RTOS
• Advanced Development Systems: Macro Assembler
• Advanced Development Systems: Special Function Libraries

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

* Trademark or registered trademark of its respective company or mark holder



Fujitsu Microelectronics, Inc.

3545 N. First Street
San Jose, CA 95134-1804
Telephone: 408-922-9000 or 800/866-8608
Fax: 408-922-9179

Fujitsu Microelectronics, Inc. (FMI) develops, manufactures and markets a broad selection of semiconductor products, including memories, ASICs, SPARC* processors, SPARC embedded control ICs, graphics chips, high-speed I/O devices and multi-chip modules. As a subsidiary of Fujitsu, Ltd., FMI has access to the global technical manufacturing and financial resources of the \$35.5 billion organization. FMI also offers customers the extensive benefits of local and regional design and manufacturing.

For more information, contact: Customer Service, 1-800-866-8608. Email: smcgray@fmi.fujitsu.com.
Visit Fujitsu Microelectronics, Inc. on the World Wide Web at: www.fujitsumicro.com.

General Software, Inc.

PO Box 2571
Redmond, WA 98073
Telephone: 425-454-5755
Fax: 425-454-5744

General Software, Inc. is recognized as a leading provider of award-winning software for real-time, embedded and consumer electronics. General Software's product offerings include: Embedded BIOS, Embedded DOS-ROM, Embedded DOS 6XL, and Embedded LAN. The products have provided competitive advantages to thousands of customers, including many Fortune 1000 companies, state and federal agencies, and foreign organizations.

Software Products in this Directory include:

- Embedded BIOS*
- Embedded DOS* 6-XL
- Embedded DOS*-ROM

For more information, contact: Dan De Lano, 425-454-5755. Email: general@gensw.com.
Visit General Software, Inc. on the World Wide Web at: www.gensw.com.

Geoworks

960 Atlantic Avenue
Alameda, CA 94501
Telephone: 510-814-1660
Fax: 510-814-5240

Geoworks is a leading software provider for the cellular industry and for manufacturers of mobile communicating devices. The company has licensed its GEOS* operating system to leading manufacturers such as Nokia, Ericsson, NEC, Toshiba Corporation and Hewlett-Packard. Through these alliances, GEOS is emerging as a global software platform standard for smart phones. Geoworks is working with content and service providers to provide software solutions for cellular operators that will repackage content and provide World-Wide Web access via digital cellular networks, thus allowing cellular operators to differentiate their service offerings as competition increases in their geographic regions.

Software Products in this Directory include:

- GEOS Real-Time Operating System

For more information, contact: Bob Bogard, 510-814-5811. Email: bbogard@geoworks.com.
Visit Geoworks on the World Wide Web at: www.geoworks.com.

**GO DSP Corporation
A Texas Instruments Company**

260 Richmond Street W, Ste. 201
Toronto, Ontario M5V 1W5
Telephone: 416-599-6868
Fax: 416-599-7171

GO DSP offers de facto standard DSP software development tools to minimize the time-to-market for DSP-based systems. Founded in 1993, GO DSP was first to introduce numerous innovative development tools, such as Probe Points*, and to provide a new level of functionality to DSP software designers. By focusing on simplifying the designer's daily development activities, GO DSP's Code Composer* IDE provides a more efficient development environment. GO DSP's products are distributed around the world by local distributors, third-party DSP hardware and software vendors, and by the Texas Instruments worldwide distribution network.

Software Products in this Directory include:

- Code Composer* Development Environment
- Code Explorer* Debugger

For more information, contact: Omar Fattah, 416-599-6868. Email: ofattah@go-dsp.com.
Visit GO DSP Corporation
A Texas Instruments Company on the World Wide Web at: www.go-dsp.com.

Green Hills Software, Inc.

30 West Sola Street
Santa Barbara, CA 93101
Telephone: 805-965-6044
Fax: 805-965-6343

Incorporated in 1982, Green Hills Software, Inc. is recognized world-wide as a leading developer of software development tools for 32- and 64-bit embedded systems. The software tools include highly optimizing Ada, C, C++ (including full support for EC++), and FORTRAN compilers, real-time operating systems, and the MULTI* Software Development Environment that automate the compile-edit-build-debug cycle by integrating advanced facilities such as an RTOS-aware source-level debugger, profiler, program builder and source code control system. Green Hills Software's tools support all major advanced microprocessor families and target environments including simulators, ROM monitors, commercial RTOSs and in-circuit emulators. Green Hills Software is headquartered in Santa Barbara, California, and has offices world-wide.

Software Products in this Directory include:

- Green Hills Cross Assembler Tool Chain
- Green Hills Instruction Set Simulator
- Green Hills Optimizing Ada 95 Compilers
- Green Hills Optimizing C Compilers
- Green Hills Optimizing C++ Compilers
- Green Hills Optimizing Embedded C++ Compiler
- Green Hills Optimizing FORTRAN Compilers
- INTEGRITY* Real-Time Operating System
- MULTI* Execution Profiler
- MULTI* Program Builder
- MULTI* Run-Time Error Checker
- MULTI* Software Development Environment
- MULTI* Source-Level Debugger
- MULTI* Version Control System

For more information, contact: Sales Department, 805-965-6044. Email: sales@ghs.com.
Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Hewlett-Packard Company

1900 Garden of the Gods Road MS C212JB18
Colorado Springs, CO 80907-3483
Telephone: 800-452-4844
408-746-5332
Fax: N/A

Hewlett-Packard Company is a leading global manufacturer of computing, communications and measurement products and services recognized for excellence in quality and support. HP's Colorado Springs Division designs and manufactures digital design and debug tools that help speed the

hardware and software integration phase of the embedded system design cycle.

Software Products in this Directory include:

- HP 64700 Series In-Circuit Emulators
- HP Processor Probes for On-Chip Emulation
- Logic Analyzers

For more information, contact: 800-452-4844. Email: N/A.
Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or /emulator.

HighTec EDV-Systeme GmbH

Feldmann-Strasse 98
Saarbruecker, D66119
Telephone: +43-681-92613-0
Fax: +43-681-92613-26

Founded in 1982, HighTec EDV-Systeme GmbH specializes in the integration of technical software and hardware systems. Emphasis is placed on fields at or near the production level with especially high-security and real-time requirements. Introduced in 1985, PXROS* is a real-time kernel with exceptional response time and security features. Since introduction, PXROS has found its way into thousands of technical applications. To complement PXROS, HighTec offers an adapted GNU C/C++ cross development toolkit. HighTec works closely with partners and customers in a wide range of applications, including ABB, Bosch, Daimler Benz, Klockner Moeller, Siemens, National Semiconductor, BSO/Tasking, Hitex, Lauterbach, and Philips Medical Systems.

Software Products in this Directory include:

- HighTec's Evaluation Boards for Siemens C16x µControllers
- HighTec's GNU C/C++ Development Kit
- PXROS* Portable, Extendable RTOS

For more information, contact: Hagen Heggenberger, +43-681-92613-0. Email: htc@hightec-rt.com.
Visit HighTec EDV-Systeme GmbH on the World Wide Web at: http://www.hightec-rt.com.

Hitex Development Tools

2055 Gateway Place, Ste. # 400
San Jose, CA 95110
Telephone: 408-298-9077 or
800-454-4839
Fax: 408-441-9486

Hitex Development Tools develops, manufactures and sells In-Circuit Emulators for embedded system development. Hitex ICEs systems support 8-, 16- and 32-bit microcontroller families from 14 semiconductor companies. Also a distributor for other manufacturers, Hitex can provide customers with integrated development environments or entire tool chains, including Starter Kits, Compilers, CAN and USB products.

Software Products in this Directory include:

- Hitex HiTools Integrated Development Environment

For more information, contact: Olaf Pfeiffer, 408-298-9077. Email: info@hitex.com.
Visit Hitex Development Tools on the World Wide Web at: http://www.hitex.com.

HotHaus Technologies Inc.

170-665; Frasenwood Place
Richmond, B.C., BC V6W 1J3
Telephone: 604-278-4300
Fax: 604-278-4317

HotHaus Technologies is a telecommunications software supplier focused on DSP algorithms for the Texas Instruments line of digital signal processors. The company's HausWare* product family is a suite of embedded DSP algorithms within a multi-tasking, multi-port embedded

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software framework. Algorithms offered include fax and data modems, vocoders, and general telephony functions. The HausWare architecture ensures that telecommunications product developers need not be well versed in programming DSPs to field successful products. In addition to its line of off-the-shelf software modules, HotHaus also offers both software and hardware consulting services.

Software Products in this Directory include:

- HausWare* DSP Software Suite

For more information, contact: P. Shore, 604-278-4300 x2734. Email: info@hohaus.com. Visit HotHaus Technologies Inc. on the World Wide Web at: www.hohaus.com.

Huntsville Microsystems Inc. (HMI)

PO Box 12415
Huntsville, AL 35815
Telephone: 205-881-6005
Fax: 205-882-6701

Huntsville Microsystems, Inc. (HMI) has been a leading embedded tools developer for more than 15 years. HMI provides development tools for a wide range of processors, including most Motorola devices and the PowerPC 40x family of processors from IBM. One of HMI's most popular products is the \$199-Windows/\$299-UNIX Background Mode Debugger (BMD), complete with the HMI source-level debugger, SourceGate II*. HMI sells and supports its products both directly and through a network of local manufacturers' representatives and internationally via distributors. Free lifetime technical support is included on all products.

Software Products in this Directory include:

- Source Gate* II Source-Level Debugger

For more information, contact: James Bell, 205-881-6005. Email: sales@hmi.com. Visit Huntsville Microsystems Inc. (HMI) on the World Wide Web at: www.hmi.com.

Hyperception, Inc.

9550 Skillman LB 125
Da'las, TX 75243
Telephone: 214-343-8525
Fax: 214-343-2457

Hyperception, Inc. was incorporated in 1984 to provide digital signal processing development software that combined the power and cost-effectiveness of two new technologies: the IBM PC and plug-in boards with DSPs. For more than a decade, Hyperception has been committed to providing cost-effective software tools that reduce design barriers for DSP applications development. Hyperception's software tools address the areas of traditional DSP design and analysis, general math analysis, control systems, virtual instrumentation, and simulation/CASE, with support for most general-purpose DSPs. Hyperception also offers a comprehensive line of DSP/Acquisition hardware and complete DSP development systems.

Software Products in this Directory include:

- Digital Image-Processing Library
- Hyperception Advanced Speech Library
- Hyperception Advanced Transmission Library
- Hyperception Applications Interface (HAppl)
- Hyperception HSV1000 Function Generator
- Hyperception HSV12000 Time Domain Analyzer
- Hyperception HSV13000 Frequency Domain Analyzer
- Hyperception HSV14000 Dynamic Signal Analyzer
- Hyperception HSV15000 Speech Analyzer
- Hyperception RIDE Compiler
- Hypersignal Block Diagram System Design/Simulator
- Hypersignal C Code Generator
- Hypersignal HAppl* Applications Interface
- Hypersignal RIDE* Visual Design Environment

For more information, contact: Sales Department, 214-343-8525. Email: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

i-Logix Inc.

Three Riverside Drive
Andover, MA 01810
Telephone: 978-682-2100
Fax: 978-682-5995

i-Logix Inc., founded in 1987, is an industry leader in developing systems and software design automation solutions for developers of complex embedded systems. i-Logix products allow engineers to graphically model the behavior and functionality of complex embedded systems, analyze and validate system behavior through simulation, and automatically generate application code. These models can also be interfaced to various embedded real-time operating systems, such as Wind River Systems' VxWorks* RTOS. With the i-Logix methodology, customers speed their products to market and reduce engineering costs by reallocating time from manually writing and testing code, to validating system behavior and functionality early in the development process. i-Logix is headquartered in Andover, Massachusetts, with direct sales and support offices throughout the U.S. and Europe, and internationally through distributors.

Software Products in this Directory include:

- Rhapsody* UML-Based Object-Oriented Analysis/Design & Implementation Tool Set
- StateMate MAGNUM* Development Environment

For more information, contact: Jeremy Goulding, 508-682-2100. Email: info@ilogix.com. Visit i-Logix Inc. on the World Wide Web at: www.ilogix.com.

IBM Microelectronics Division

3039 Cornwallis Road, MS YM7A-060
Research Triangle Park, NC 27709
Telephone: 919-543-5701
Fax: 919-543-7575

IBM Microelectronics Division is responsible for the development, manufacture and marketing of semiconductor and electronics packaging products, services and solutions for customers worldwide. One of IBM Microelectronics Division's prime marketing strategies is to become the premier vendor of embedded technology for the consumer electronics, office automation, and communications marketplace. As a pioneer in semiconductor technology, IBM Microelectronics offers an advanced and comprehensive family of embedded processors and controllers. One or more members of the product family is sure to meet the cost, performance and power requirements of a developer's given application. Additionally, IBM Microelectronics offers supporting software (compiler and debugger) and development tools (reference designs and evaluation kits), each engineered to help customers minimize time-to-market.

Software Products in this Directory include:

- High C/C++ Compiler
- PowerPC* Evaluation Kits
- RISCWatch* Debugger
- Set-Top Box Reference Design Kit

For more information, contact: PPC Hotline - call 919-543-5701. Email: ppcsupp@raleigh.ibm.com. Visit IBM Microelectronics Division on the World Wide Web at: www.chips.ibm.com/products/embedded.

Imagenation Corporation

4527 SW 96th Avenue
Beaverton, OR 97005-0276
Telephone: 800-366-9131
Fax: 503-643-2458

Imagenation Corporation provides machine vision components and subsystems for OEMs and VARs for a broad range of applications including manufacturing automation, quality assurance, traffic control, security, and medical/scientific. Imagenation product lines include precision video capture boards for ISA and PCI-bus PCs, as well as for embedded system formats PC/104, CompactPCI and STD. Imagenation also supplies video multiplexers, machine vision systems, and video capture software libraries and drivers.

Software Products in this Directory include:

- Imagenation Video Capture Libraries and Drivers

For more information, contact: Lucy Echon, 503-641-7408. Email: info@imagenation.com. Visit Imagenation Corporation on the World Wide Web at: www.imagenation.com.

Industrial Programming, Inc.

100 Jericho Quadrangle
Jericho, NY 11753
Telephone: 516-938-6600
Fax: 516-938-6609

When introduced in 1976, MTOS* was the first commercially available RTOS from an independent software firm, Industrial Programming, Inc. (IPI). All real-time operating systems had previously been proprietary, developed by product manufacturers. Since then, MTOS has undergone evolutionary enhancements, but today remains a rich, scalable, and flexible, full-featured real-time operating system that has been used worldwide in a very broad variety of embedded applications, including communication systems, process control, factory automation, graphics and imaging systems, and medical equipment. Literally millions of products containing embedded copies of IPI's MTOS have been manufactured by thousands of MTOS licensees.

Software Products in this Directory include:

- MTOS*/ MTOS-UX Real-Time Operating Systems

For more information, contact: Bernard Mushinsky, 800-365-MTOS. Email: info@ipi.com. Visit Industrial Programming, Inc. on the World Wide Web at: www.ipi.com.

Integrated Device Technology, Inc.

2975 Stender Way
Santa Clara, CA 95054
Telephone: 800-345-7015
Fax: 408-492-8674

Integrated Device Technology, Inc. (IDT) enables a digitally-connected world -- delivering innovative, high-performance integrated circuits and modules to its key markets: data and telecommunications equipment, including routers, hubs, switches and cellular base stations; personal computers; and shared-network devices, including workstations, servers and printers.

IDT's product mix consists of advanced communications products and specialty memories, high-speed SRAMs, high-performance logic and microprocessors. Headquartered in Santa Clara, Calif., with manufacturing facilities located in California, Oregon, and test and assembly facilities in the Philippines and Malaysia, IDT employs approximately 4,600 people worldwide. The company's shares are traded on NASDAQ under the "IDTI" symbol.

For more information, contact: Phil Bourekas, 408-492-8661. Email: info@idt.com. Visit Integrated Device Technology, Inc. on the World Wide Web at: www.idt.com.

Integrated Systems, Inc.

201 Moffett Park Drive
Sunnyvale, CA 94089
Telephone: 408-542-1500
Fax: 408-542-1957

* Trademark or registered trademark of its respective company or mark holder



Integrated Systems, Inc. (ISI) [NASDAQ:INTS] is a world-leading provider of embedded operating software as well as a leading provider of design automation tools. ISI's software helps embedded-product manufacturers bring higher quality, more fully-featured products to markets faster. With more than 25 million installations worldwide, ISI's software is the most widely adopted solution for embedded products, and the company is a dominant supplier to virtually every industry segment of the high-volume, high-growth embedded market.

Software Products in this Directory include:

- pRISM+ Integrated Development Environment
- pSOSystem Real-Time Operating System

For more information, contact: Sales, 408-542-1500. Email: N/A. Visit Integrated Systems, Inc. on the World Wide Web at: <http://www.isi.com>.

Intel Corporation

5000 W. Chandler Blvd.
Chandler, AZ 85226
Telephone: 602-554-8080 or 800-628-8686

Fax: N/A

Intel, the world's largest chip maker, is also a leading manufacturer of personal computer, networking and communications products. Intel's Computing Enhancement Group (CEG), located in Chandler, Arizona and Folsom, California, develops, manufactures and markets microprocessors, microcontrollers and flash memory products for embedded applications. CEG Development Tools Engineering supplies software and hardware evaluation tools for CEG products, including MCS* 51/151/251 and 96/196/296 microcontrollers, i960* processors, embedded Intel Architecture processors (80186/80386/80486/Pentium* processor families), Intelligent I/O, USB, and flash memories.

Software Products in this Directory include:

- ApBUILDER* Expert Development Software
- CTOOLSW95 Compiler
- MON960 Debug Monitor
- Intel i960* Processor Web-Based Remote Eval. Facility

For more information, contact: Local Intel Sales Office or Distributor. Email: N/A.
Visit Intel Corporation on the World Wide Web at: www.intel.com.

KADAK Products Ltd.

206-1847 W. Broadway Avenue
Vancouver, BC V6J 1Y5 CANADA
Telephone: 604-734-2796
Fax: 604-734-8114

Kadak Products Ltd. provides the AMX* Real-Time Multitasking Kernel and the KwikLook Fault Finder. The foundation for Kadak's AMX line of kernels was established between 1978 and 1980, when the company developed its first real-time operating system (RTOS) for use in embedded systems. AMX kernels have now been used worldwide by more than 1,500 embedded systems developers. Early on, Kadak also established high standards for design, documentation and on-going support. Kadak's no-nonsense approach to pricing and licensing means that customers can "Count on Kadak."

Software Products in this Directory include:

- AMX* Real-Time Multitasking Kernel

For more information, contact: Sales, 604-734-2796. Email: amxsales@kadak.com.
Visit KADAK Products Ltd. on the World Wide Web at: www.kadak.com.

Keil Software Inc.

16990 Dallas Parkway, Ste. 120
Dallas, TX 75248-1903
Telephone: 800-348-8051
Fax: 972-735-8055

Headquartered in Dallas, Texas, Keil Software Inc. develops, manufactures, and distributes embedded software development tools for the 8051, 80251, USB, and 166 microcontroller families. Keil has close ties to both semiconductor manufacturers and other firms serving the embedded systems market. Keil Software tools include C compilers, assemblers, real-time executives, debuggers and simulators, integrated development environments and evaluation boards. Keil tools can be used separately or together to provide an integrated development environment. Technical support and training for 8051/251, 166 and USB microcontroller software development tools products are provided at Keil Software's Dallas facilities.

Software Products in this Directory include:

- dScope* 51/251/166 Debugger
- Keil Software C Compilers
- Keil's CAN Library
- RTX166* Real-Time Operating Systems
- RTX251* Real-Time Operating Systems
- RTX251* Real-Time Operating Systems
- RTX51* Real-Time Operating Systems
- µVision* Windows* OS-Based User Interface

For more information, contact: Robert Boys, 800-348-8051. Email: sales@keil.com.
Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

Linden Technologies, Inc.

3840 N. 32nd Street, Ste. # 1
Phoenix, AZ 85018
Telephone: 602-954-8602
Fax: 602-954-8013

Linden Technologies, Inc. (LTI) is the world-wide support organization for the VERSAdos* Real-Time Operating Systems (RTOS), originally Motorola's M68000 processor RTOS. LTI supports all existing customers using VERSAdos on Motorola VME systems and other embedded applications. LTI has also developed several enhancements and ports to new Motorola VME boards and systems. LTI has more than 20 years experience with VERSAdos and related Motorola VME boards and systems.

Software Products in this Directory include:

- VERSAdos* Real-Time Operating System

For more information, contact: Richard Vanderlin, 602-954-8602. Email: dickv@inficad.com.
Visit Linden Technologies, Inc. on the World Wide Web at: N/A.

Loughborough Sound Images

70 West View Street
Lexington, MA 02173
Telephone: 781-860-9020
Fax: 781-860-0083

Loughborough Sound Images supplies more than on-half of the world's top 40 industrial companies with digital signal processing boards and subsystems. Founded in 1983, the company works closely with top DSP manufacturers and independent software companies to develop and manufacture the most revolutionary PC/PCI and VME DSP boards and supporting software for the latest in DSP technology. Loughborough DSP boards are designed for use in a wide range of applications, including imaging, telecommunications and multimedia in the medical, industrial and defense industries.

Software Products in this Directory include:

- LSI DSP Software Development Environment

For more information, contact: Kirsta Lewis, 978-263-2255. Email: ussales@lsi-dsp-usa.com.
Visit Loughborough: Sound Images on the World Wide Web at: <http://www.lsi-dsp.com>.

LP Elektronik GmbH

Ettishoferstr. 8
Weingarten, FRG 88250
Telephone: ++751-56122-0
Fax: ++751-56122-22

Founded in 1985, LP-Elektronik GmbH develops, produces and sells real-time extension products for Microsoft's standard operating systems. LP also offers completion of customer-specific projects, software and hardware development, consulting, and training on its products. The company's latest program includes services and consulting related to the Windows CE O.S., PC-Based Control.

Software Products in this Directory include:

- LP-VxWin* Real-Time Operating System

For more information, contact: Sales, ++751-56122-15. Email: info@lp-elektronik.com.
Visit LP Elektronik GmbH on the World Wide Web at: <http://www.lp-elektronik.com>.

LSI Logic Corporation

1551 McCarthy Blvd.
Milpitas, CA 95035
Telephone: 408-433-8000
Fax: 408-433-8989

LSI Logic Corporation, the System-on-a-Chip Company*, is a world leader in the design, production and sale of advanced custom semiconductors, including highly-integrated devices with embedded MIPS microprocessors. LSI Logic offers embedded MIPS microprocessors in both application-specific integrated circuits (ASICs) and application-specific standard products (ASSPs).

For more information, contact: RISC: R. Archide/Oak; Walter Croce 408-433-8000. Email: N/A.

Visit LSI Logic Corporation on the World Wide Web at: www.lsillogic.com.

Lynx Real-Time Systems

2239 Samaritan Drive
San Jose, CA 95124
Telephone: 408-879-3900
Fax: 408-879-3920

Lynx Real-Time Systems, Inc. is a worldwide supplier of real-time operating systems and development tools. Lynx products shorten product development cycles and lower costs for software engineers who design mid-range to high-end embedded applications. By committing to POSIX, UNIX, and other industry standards, Lynx enables users to leverage investments in software development and education. No real-time operating system matches the degree of compliance to POSIX better than the LynxOS* Real-Time Operating System. Founded in 1988 as a privately-held company, Lynx Real-Time Systems has offices in the U.S., Europe and Japan, and worldwide headquarters in San Jose, California.

Software Products in this Directory include:

- LynxInsure++*
- LynxOS* Real-Time Operating System
- TimeScan* Performance Analyzer
- TotalView* Debugger

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email: sales@lynx.com.

Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

* Trademark or registered trademark of its respective company or mark holder

MetaLink Corporation

325 E. Elliot Road, Ste. 23
Chandler, AZ 85225
Telephone: 602-926-0797 or 800-638-2423
Fax: 602-926-1198

Founded in 1984, MetaLink Corporation is a leading manufacturer of high-quality, high-performance and cost-effective in-circuit emulators (ICE) and development software. These development tools are used by hardware and software designers in the design, development and integration of embedded-controller-based products. MetaLink's worldwide customers are found in every industry segment where 8- and 16-bit embedded controller-based products are being developed.

MetaLink's corporate headquarters, sales, R&D, and manufacturing are located near Phoenix in Chandler, Arizona. The European sales and service subsidiary, MetaLink-Europe GmbH, is located near Munich, Germany.

Software Products in this Directory include:

- MetaLink ICEMaster Series Emulators

For more information, contact: Scott Ritchey, 602-926-0797 x 319. Email: sales@metaice.com.

Visit MetaLink Corporation on the World Wide Web at: <http://www.metaice.com> or <http://www.metalink.de>.

MetaWare Incorporated

2161 Delaware Avenue
Santa Cruz, CA 95060-5706
Telephone: 408-429-6382
Fax: 408-429-9273

Founded in 1979, MetaWare Incorporated is a leading developer of sophisticated, "industrial strength" compilers and development tools, including C/C++ and Java compilers and high-caliber development tool sets for native and embedded professional software developers worldwide. MetaWare's flagship product, the time-tested High C/C++ compiler, combines a robust C/C++ compiler front end with platform-specific code-generator back ends to produce high-performance, compact code for Intel's 32-bit processors and the PowerPC, ARM, ARC, picoJava and Sparc microprocessor targets. The super-optimizing High C/C++ compiler, which can compile even the most demanding programs, continues to earn the title of "Industrial Strength" compiler from both native and embedded developers. MetaWare is well-known as a major supplier of compiler technology to OEMs (including AMD, IBM, Sun and Taligent), end-users and resellers.

Software Products in this Directory include:

- High C/C++ Embedded ARM® Development Tool Set
- High C/C++ Embedded PowerPC Development Tool Set

For more information, contact: MetaWare Technical Sales, 408-429-6382. Email: techsales@metaware.com. Visit MetaWare Incorporated on the World Wide Web at: www.metaware.com.

Metrowerks Corporation

2201 Donley Drive, Ste. 310
Austin, TX 78758
Telephone: 512-873-4700
Fax: 512-873-4900

Metrowerks develops and sells programming tools in four major market segments: the desktop Windows® OS and Macintosh market; the embedded proprietary operating systems market; the real-time operating systems (RTOS)/Windows CE market; and the Java® technology market.

Metrowerks continues to strengthen its position as an industry leader by pursuing strategic partnerships with major industry players. CodeWarrior's front-end, back-end architecture allows support for new languages and computing platforms to be added to its IDE with relative ease. As a

result, emerging markets benefit from the large number of developers already using CodeWarrior®. Metrowerks plans to expand its product line and will continue to pursue other markets.

Software Products in this Directory include:

- Metrowerks' CodeWarrior®

For more information, contact: Jenny Page, 512-873-4740. Email: sales@metrowerks.com.

Visit Metrowerks Corporation on the World Wide Web at: <http://www.metrowerks.com>.

Micro Digital, Inc.

12842 Valley View Street
Garden Grove, CA 92845
Telephone: 714-373-6862*
Fax: 714-891-2363

Micro Digital, Inc., a privately held California company was incorporated in 1976 to provide design services to companies producing microprocessor-based products now referred to as "embedded systems." After many years working on diversified embedded system projects, the company in 1988 introduced its "smx" RTOS kernel or "simple multitasking executive." A real-time multitasking kernel, Micro Digital's smx runs on hundreds of embedded systems around the world. The company continues its focus on supporting Intel Architecture (x86) derivative processors and has recently added support for the PowerPC processor architecture.

Software Products in this Directory include:

- DEBUG/smx® Debugger
- Micro Digital smxAware Debugger
- Micro Digital's smx® V.3.2 Real-Time Operating System
- pmEasy V.3.2 Environment
- smx®++ Class Library
- smx® Dynamic Module Loader
- smxFile® Manager
- smxNet V.3.2 TCP/IP Networking Stack
- smxProbe V.3.2 Debugger
- unDOS® MS-DOS® and BIOS® Emulator

For more information, contact: Betty Martin-Danner, 714-373-6862. Email: ralph@smxinfo.com.

Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

Microchip Technology Inc.

2355 West Chandler Blvd.
Chandler, AZ 85224
Telephone: 602-786-7200
Fax: 602-899-9210

Microchip Technology Inc. manufactures the PICmicro® family of 8-bit one-time-programmable (OTP) microcontrollers, serial EEPROMs and related specialty market products, KEELOQ® code hopping devices and the QuikASIC® family of masked ASICs for FPGA/CPLD conversions. These products target thousands of embedded control applications in the consumer, automotive, office automation, communications and industrial markets. Microchip's quality systems are ISO 9001 certified. Headquartered near Phoenix in Chandler, Arizona, Microchip employs approximately 1,900 people worldwide and has sales offices throughout Asia, Europe, Japan and North America.

Software Products in this Directory include:

- fuzzyTECH™-MP Fuzzy Logic Development Tool
- ICEPIC In-Circuit Emulator System
- KEELOQ® Programmer
- MP-DriveWay® Application Code Generator
- MPLAB® Integrated Development Environment
- MPLAB-C Universal C Compiler
- PICMASTER® In-Circuit Emulator System
- PICSTART® Plus Programming System
- PRO MATE® II Device Programmer

For more information, contact: 602-786-7668. Email: info@microchip.com. Visit Microchip Technology Inc. on the World Wide Web at: www.microchip.com.

Microsoft® Corporation

One Microsoft Way
Redmond, WA 98052-6399
Telephone: 425-882-8080
Fax: 425-936-7329

Since its inception in 1975, Microsoft's mission has been to create software for the personal computer that empowers and enriches people in the workplace, at school and at home.

Microsoft® products include operating systems for personal computer server applications for client/server environments, business and consumer productivity applications, interactive media programs, and Internet platform and development tools. Microsoft also offers online services, sells personal computer books and input devices, and researches and develops advanced technology software products. Microsoft products, available in more than 30 languages and sold in more than 50 countries, are available for most PCs, including Intel microprocessor-based computers and Apple computers.

Software Products in this Directory include:

- Microsoft Windows® CE O.S. Embedded Toolkit

For more information, contact: Tony Barbagallo, 425-882-8080. Email: info@microsoft.com.

Visit Microsoft® Corporation on the World Wide Web at: <http://www.microsoft.com/windowse>.

Microtec®

A Division of Mentor Graphics Corporation

880 Ridder Park Drive
San Jose, CA 95131
Telephone: 408-487-7000
Fax: 408-487-7001

Microtec® is an ISO 9001-certified and leading supplier of proven, integrated and open embedded software development tools, real-time operating system (RTOS) solutions, and services to more than 50,000 users worldwide. The company's pioneering Spectra® development system, XRAY® debugger, Microtec C and C++ cross-compilers, and VRTX® RTOS are used to develop embedded applications for telecommunications, data communications, medical, transportation, industrial control and consumer electronics equipment. Microtec products are Year 2000 compliant. Founded in 1975, Microtec is headquartered in San Jose, California, and has sales, customer support and manufacturing facilities worldwide. Microtec is a division of Mentor Graphics (NASDAQ:MENT) Corporation.

Software Products in this Directory include:

- Microtec® C and C++ Cross-Compilers
- Spectra® Development System
- VRTX® Real-Time Operating System
- XRAY® Debugger

For more information, contact: Sales, 800-950-5554. Email: info@mri.com.

Visit Microtec®

A Division of Mentor Graphics Corporation on the World Wide Web at: www.mentorg.com/microtec.

Microtek International

3300 NW 211th Terrace
Hillsboro, OR 97124
Telephone: 503-645-7333
Fax: 503-629-8460

Microtek in-circuit emulators combine a state-of-the-art source-level debugger with one of the most advanced trigger and trace systems available. Powe-Pack® emulators dis-

* Trademark or registered trademark of its respective company or mark holder.

Microsoft Windows CE 2.0 is the greatest embedded operating system in the world! You'll get to leverage the billions of benefits supplied by a supported, standardized embedded platform.

Marketing Truth

Working with the componentized operating system is a snap with the award-winning visual development environment!

Wow! Talk about a giant leap for mankind!

Windows CE 2.0 is a new operating system for my embedded applications.

I can select only the parts I need. Lots of hardware and software companies support it.

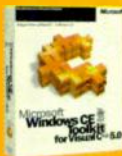
Developer Truth

The Microsoft Windows CE Embedded Toolkit for Visual C++ 5.0 supports the Win32 API and includes an integrated development environment.

This is good.



Here's the real skinny: companies are rallying around the Microsoft Windows CE operating system as the platform for developing embedded systems. Why? Because like you, they are frustrated with costly and proprietary real-time operating systems. Now, Windows CE makes embedded applications more affordable and faster to develop. And, if you've been using the Microsoft Visual C++ development system, you'll be right at home with Windows CE. That's why Windows CE is the standard you—and the rest of the industry—have been waiting for.



Windows CE is an advanced, real-time, 32-bit operating system with the power to deliver the most complex embedded applications. With

the Microsoft Windows CE Embedded Toolkit for Visual C++, you get all the operating system components as well as an integrated development environment with a rich set of Win32-based tools like cross-compilers, remote debuggers, build tools, and comprehensive libraries. Best-of-class tools and broad third-party support guarantee you a path into the future.

Yes, this is good.

To order the Windows CE Embedded Toolkit for Visual C++ 5.0, or for a reseller near you, call (800) 424-9688. For more information, go to www.microsoft.com/windowsce/developer/etk/.

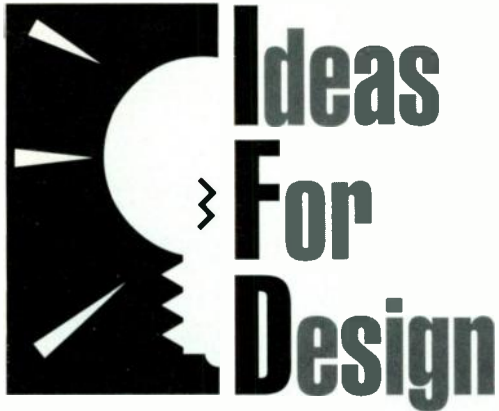
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play events that are invisible with software debuggers and logic analyzers, because they can link timing conflicts back to the source code without stopping the target system. The new SWAT* Software Analysis Tool shows non-stop executed code coverage without altering source code. Microtek's PowerPack emulators are available worldwide for Intel's Pentium*, Intel486*, National NS486*, Intel386*, Intel's 80C186, AMD's Am186*, and Motorola's 683xx and 68HC16 processors.

Software Products in this Directory include:

- PowerPack* In-Circuit Emulator
- SWAT* Software Analysis Tool

For more information, contact: 800-886-7333 or 503-645-7333. Email: info@microtektintl.com. Visit Microtek International on the World Wide Web at: www.microtektintl.com.

Microware Systems Corporation

1500 NW 118th Street
Des Moines, IA 50325-7077
Telephone: 515-223-8000
800-475-9000
Fax: 515-224-1352

Microware develops, markets and supports the OS-9* Real-Time Operating System and development tools for embedded consumer, communications and industrial products, including devices for the emerging Internet, wireless communications and digital television markets. Microware provides a quick time-to-market solution through complete product packages, professional services and customer support. Microware, headquartered in Des Moines, Iowa, was founded in 1977 and has technology and sales offices throughout the United States as well as in England, France, Germany and Japan.

Software Products in this Directory include:

- DAVID* Real-Time A/V Decoder RTOS
- FasTrak* Development Environment
- OS-9* Real-Time Operating System
- Wireless OS-9* Real-Time Operating System

For more information, contact: NA Sales, 800-475-9000. Email: info@microware.com. Visit Microware Systems Corporation on the World Wide Web at: www.microware.com.

Motorola Semiconductor Products Sector

6501 W. William Cannon Drive
Austin, TX 78735-8598
Telephone: 800-521-6274, 512-891-2000, 800-311-6456
Fax: N/A

Motorola's Semiconductor Products Sector (SPS) is headquartered in Austin, Texas and Phoenix, Arizona. As the largest US-based broad line supplier of semiconductor solutions, Motorola's SPS provides the products that power the world. SPS focuses on enabling its customers' success with logic devices including digital signal processors, microprocessors and microcontrollers. SPS serves its customers through a worldwide network of design, manufacturing, marketing and sales and support operations in North America, Asia-Pacific, Europe, Japan and developing markets. The sector's 1996 sales totaled \$7.9 billion.

For more information, contact: Motorola Sales Office. Email: N/A. Visit Motorola Semiconductor Products Sector on the World Wide Web at: www.motorola.com or sps.mot.com.

NEC Electronics Inc.

2880 Scott Blvd.
Santa Clara, CA 95050
Telephone: 408-588-6000 or
800-366-9782
Fax: 408-588-6130

NEC Electronics, Inc., headquartered in Santa Clara, California, designs, manufactures and markets an extensive line of electronic products, including ASICs, microprocessors and microcontrollers, 3D graphics accelerators, digital signal processors (DSPs), memories and components including flat-panel displays and lithium-ion batteries. In 1996, the company ranked fourth in semiconductor sales in the U.S. The company operates a 709,000-square-foot manufacturing facility in Roseville, California. NEC Electronics is an affiliate of NEC Corporation (NIPNY), a \$41 billion international manufacturer of computer, communications and semiconductor products.

For more information, contact: Product Information, 800-366-9782. Email: N/A. Visit NEC Electronics Inc. on the World Wide Web at: www.nec.com.

NKK Micro Devices Inc.

2350 Mission College Boulevard
Santa Clara, CA 95054
Telephone: 408-982-8277
Fax: 408-982-9809

NKK Micro Devices Inc. is the North American subsidiary of NKK Corporation, a \$17 billion company, headquartered in Japan. NKK Corporation's Semiconductor Division has supplied high-performance MIPS RISC architecture processors and high-speed SRAM products to the electronics market since the early 1990s. NKK offers complete solutions to system designers with R3000, R4000, and R5000-class MIPS processors, PCI chipset solutions for the processors (Little Dipper I, II and Big Dipper) and evaluation cards. Development tools support is provided via a broad base of third-party tool vendors. NKK's semiconductor product offerings are built and tested in the company's advanced sub-micron CMOS fabrication facility located in a Tokyo-area suburb.

For more information, contact: Jean Claude Toma, 408-982-8273. Email: toma@nkkmdl.com. Visit NKK Micro Devices Inc. on the World Wide Web at: www.nkk.co.jp/LSI.

Nohau Corporation

51 E. Campbell Avenue
Campbell, CA 95008
Telephone: 408-866-1820
Fax: 408-378-7869

Nohau Corporation, headquartered in Campbell, California, is one of the world's leading suppliers of 8-, 16- and 32-bit in-circuit emulators for microcontrollers, providing support for the major microcontroller manufacturers such as Intel, Phillips, Motorola and Siemens. Nohau's forty worldwide distributors provide sales and service to more than 15,000 direct customers. For ease of evaluation, Nohau offers free ten-day trials to qualified customers.

Software Products in this Directory include:

- EMUL12-PC* BDM Emulator
- EMUL16/300-PC* In-Circuit Emulator
- EMUL166-PC* In-Circuit Emulator
- EMUL196-PC* In-Circuit Emulator
- EMUL251-PC* In-Circuit Emulator
- EMUL296-PC* In-Circuit Emulator
- EMUL51-PC* In-Circuit Emulator
- EMUL51XA-PC* In-Circuit Emulator
- EMUL68-PC* In-Circuit Emulator

For more information, contact: Technical Support, 408-866-1820. Email: sales@nohau.com. Visit Nohau Corporation on the World Wide Web at: www.nohau.com.

Noral Micrologics Limited

Logic House, Gate Street
Blackburn, Lancashire, England BB1 3AQ UK
Telephone: +44 + (0)1254-682092
Fax: +44 + (0)1254-679412

Noral Micrologics Ltd. specializes in the design and manufacture of debugging tools for embedded systems development. Products include real-time debuggers, in-circuit emulators (ICE), background debug mode (BDM) hardware and simulators. Noraf's FlexTool* product line integrates a wide range of embedded system development tools within a single, highly intuitive debugging environment. A key feature is debugger compatibility with all the industry-standard C/C++ code generators, leaving the developer free to choose between the various compilers and linkers for development.

Software Products in this Directory include:

- Flex-BDM* Debugger
- Flex-ICE* In-Circuit Emulator
- Flex-Sim* Simulator
- SDT-XI* In-Circuit Emulator

For more information, contact: Harry Erickson, 508-647-0103 (U.S. Office). Email: noral@noral.co.uk. Visit Noral Micrologics Limited on the World Wide Web at: www.noral.com.

On Time

88 Christian Avenue
Setauket, NY 11733
Telephone: 516 689-6654
Fax: 516-689-1172

On Time produces real-time and embedded system software development tools for the Intel 80x86 processor family. On Time tools feature deterministic high performance, are small in size, low in cost, and are royalty-free.

Software Products in this Directory include:

- RTKernel*/RTKernel-32 Real-Time Operating Systems
- RTTarget-32* Cross Development System

For more information, contact: Tom Schotland, 516-689-6654. Email: info@on-time.com. Visit On Time on the World Wide Web at: www.on-time.com.

Orion Instruments

1376 Borregas Avenue
Sunnyvale, CA 94089
Telephone: 408-747-0440
Fax: 408-747-0688

For more than 16 years, Orion has served the embedded systems market as a supplier of in-circuit emulators and HLL source code debuggers for a wide range of 8-, 16- and 32-bit logic devices. Supported device manufacturers include Motorola, Hitachi, Fujitsu, Intel, Mitsubishi, NEC, Sharp, Toshiba, Siemens and more. Orion Instruments, located in Sunnyvale, California, is also the North American distributor for Ashling Microsystems of Limerick, Ireland. (See the Ashling Microsystems company profile in this directory.)

Software Products in this Directory include:

- Ashling Ultra* Series Emulators
- Orion* 8800 Emulator
- Orion CT* Series Emulators
- Orion/Advice* Emulator

For more information, contact: Jerry Beresh, 408-747-0440. Email: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

PantaSoft

7 Edgestone Court
Florrisant, MD 63033
Telephone: 314-830-4084
Fax: 314-830-4083

PantaSoft is a start-up company located in Herzlia, Israel. The company is dedicated to producing high-quality software tools for microprocessors. PantaSoft's tools include C

* Trademark or registered trademark of its respective company or mark holder.



compilers, assemblers, debuggers, simulators, code converters and more, with its initial product line supporting the Philips XA processor architecture. New software development tools, necessary for the design and testing of embedded systems based on microprocessors or DSPs, and telecom products are under development at PantaSoft. PantaSoft products are offered by Ceibo Inc.

Software Products in this Directory include:

- PantaSoft XA µcontroller Software Development Tools

For more information, contact: 800-833-4084. Email: panta-soft@ceibo.com.

Visit PantaSoft on the World Wide Web at: www.ceibo.com.

Paradigm Systems

3301 Country Club Rd. Ste.2214

Endwell, NY 13760

Telephone: 800-537-5043

Fax: 607-748-5968

Paradigm Systems is the embedded system developer's source for Paradigm DEBUG and Paradigm LOCATE, popular development tools for Intel, AMD and NEC x86 processor-compatible embedded systems. Get your embedded systems application on the fast track with Paradigm's world-class tools and technical support.

Software Products in this Directory include:

- Paradigm DEBUG
- Paradigm LOCATE

For more information, contact: Joanne Weir, 800-537-5043. Email: info@devtools.com.

Visit Paradigm Systems on the World Wide Web at: www.devtools.com.

Penumbra Software, Inc.

5901-C Peachtree Dunwoody Rd., Ste.375

Atlanta, GA 30328

Telephone: 770-352-0100

Fax: 770-352-0123

Penumbra Software, Inc. was formed in February 1996 for the sole purpose of designing and marketing a visual Java™ development environment. The company's first product, called Mojo™, began shipping in August of 1996 and is available to developers via downloads from the company's Web site. Mojo is a next-generation development tool designed to help businesses develop dynamic client- or server-based applications. These dynamic applications can be deployed on corporate intranets or on the global Internet. Additionally, Mojo provides the foundation for the rapid development of applications by allowing developers to concentrate on creating relevant business logic. With Mojo, the complexities of the underlying Java code are hidden from the developer.

Software Products in this Directory include:

- Penumbra Super Mojo™ Java Development Environment

For more information, contact: Michael Mittel, 770-352-0100 x 180. Email: mmittel@penumbra.com.

Visit Penumbra Software, Inc. on the World Wide Web at: www.penumbra.com.

Perihelion

The Maltings, Charlton Road

Shepton Mallet, Somerset, England BA4 5QE UK

Telephone: (44) 1749-344345

Fax: (44) 1749-344977

Perihelion is a United Kingdom-based software development company dedicated to the research, design and development of a wide variety of innovative software products. The Information Technology Group specializes in providing

skills in consulting -- analysis, design and development skills -- in information management. The Systems Programming Group is responsible for operating systems consultancy, embedded applications development and Perihelion's own real-time operating system, the Helios RTOS.

Software Products in this Directory include:

- Helios™ Real-Time Operating System

For more information, contact: Julia Gadd, (44) 1749-344345. Email: sales@perihelion.co.uk .

Visit Perihelion on the World Wide Web at: www.perihelion.co.uk.

Polyhedra PLC

Queensway House 207-209 Queensway

Bletchley, Milton Keynes, England MK2 2ED UK

Telephone: 44 -0- 1908-366844

Fax: 44 -0- 1908-366824

Polyhedra PLC was formed in 1990 to specialize in the production of software tools that meet the growing demand for responsive, real-time information systems. The technical staff is dedicated to developing leading-edge computer software technology to provide real world IT solutions for industrial and business users.

Software Products in this Directory include:

- Polyhedra Real-Time Database

For more information, contact: Colin Dowsett, +44-0-1908-366844. Email: sales@polyhedra.com.

Visit Polyhedra PLC on the World Wide Web at: www.polyhedra.com.

Precise Software Technologies Inc.

301 Moodie Drive, Ste. 308

Nepean, ON K2H 9C4

Telephone: 613-596-2251

Fax: 613-596-6713

Precise offers the Precise/MQX™ Real-Time Executive, Precise/MQX+m Embedded I/O Components , and a suite of tools to support Precise/MQX development. Precise products are compatible with most popular third-party compilers and debuggers, and the company's products are sold directly from both the headquarters in Nepean, Ontario and from the U.S. sales office in Boxborough, Mass. Precise products are distributed worldwide through a network of distributors, VARs and OEMs.

Precise provides technical support and maintenance via phone, fax, email, Internet and a BBS. Regularly scheduled Precise product training courses are held at locations in the U.S. and Canada. On-site support, training, and system integration are also available.

Software Products in this Directory include:

- Precise/MQX™ & MQX+m Real-Time Executive

For more information, contact: Clarke Esler, 508-264-4413. Email: info@psti.com.

Visit Precise Software Technologies Inc. on the World Wide Web at: www.psti.com.

Precise Software Technologies Inc.

1740 Massachusetts Avenue

Boxborough, MA 01719

Telephone: 800-628-8631

Fax: 508-264-4819

For more information, contact: Clarke Esler, Sales Mgr. 800-628-8631. Email: cesler@psti.com.

Visit Precise Software Technologies Inc. on the World Wide Web at: http://www..

Production Languages Corporation

P.O. Box 1900

Weatherford, TX 76086

Telephone: 800-525-6289

Fax: 817-599-5098

Since its inception in 1985, Production Languages Corporation (PLC), a privately owned company, has designed and developed -- on a target-by-target basis -- a complete line of fully integrated software development tools and language systems in DOS and Windows OS environments. These tools are used by software engineers to develop embedded system applications. During its first two years, PLC designed and developed its proprietary tool-building technology (SD/ToolSmith™). SD/ToolSmith takes advantage of many generic steps in the software tool building process, with the base technology continually being enhanced. PLC specializes in developing software environments that serve as an interface between various hardware emulation systems and PLC's tools. PLC's integrated development environments include a Macro Assembler, Linker/Locator, Object Librarian, Optimizing ANSI C Compiler, Full Symbolic Source-Level Debugger and Instruction Simulator. PLC routinely develops several integrated development tool sets annually, each averaging between five to nine months to completion.

Software Products in this Directory include:

- COMPASS/IDE™ Development Environment

For more information, contact: Mark A. Newsom, 800-525-6289. Email: mnewsom@plcorp.com.

Visit Production Languages Corporation on the World Wide Web at: www.plcorp.com.

QNX™ Software Systems Ltd.

175 Terence Matthews Crescent

Kanata, Ontario K2M 1W8 CANADA

Telephone: 613-591-0931 &

800-676-0566

Fax: 613-591-3579

With more than 16 years experience, QNX™ Software Systems Ltd. has become a proven leader in real-time operating system technology for the X86 platform. QNX™ is the only RTOS that fits a POSIX environment plus a full-featured windowing system (our award-winning Photon microGUI™) into less than 1M of flash or ROM. Our x86 and peripheral support is unequalled by any other real-time OS. Options include TCP/IP for QNX, GUIs such as the Photon microGUI or the X Window System, and development tools such as the Internet Application Toolkit (IAT™), Voyager™ Internet Technology, Watcom C/C++ compilers and tools, the Photon Developer's Toolkit, connectivity options, and more.

Software Products in this Directory include:

- QNX™ Real-Time Operating System Technology

For more information, contact: Marketing Services Dept., 800-676-0566. Email: info@qnx.com.

Visit QNX™ Software Systems Ltd. on the World Wide Web at: www.qnx.com.

RadiSys Corporation

5445 NE Dawson Creek Drive

Hillsboro, OR 97124

Telephone: 503-615-1100

Fax: 503-531-7912

RadiSys Corporation is the largest independent supplier of Intel Architecture (x86) based embedded board-level computer solutions. RadiSys brings more than 10 years of experience in the embedded software environment with an installed base of thousands. RadiSys products are used by OEMs in manufacturing automation, telecommunications, medical equipment, transportation, test and measurement, and retail/office automation applications. A new development tool, the RadiSys INtime™ real-time Windows NT extension, delivers hard real-time capabilities to the Windows™ NT development environment.

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Software Products in this Directory include:

- INtime* Real-Time For Windows* NT O.S.

For more information, contact: 1-888-4REALNT. Email: Info@radisys.com.

Visit RadiSys Corporation on the World Wide Web at: www.radisys.com.

Raima Corporation

701 Fifth Avenue #4800 Columbia Center
Seattle, WA 98104

Telephone: 206-515-9477

Fax: 206-748-5200

Raima is a leading developer of high-performance database engines for professional application programmers. Raima products are designed to provide commercial application developers with database development tools for creating portable, high-performance database applications. Raima's database products offer the choice of multiple operating platforms, APIs, client or server processing, and relational, network or a combined database model that can be combined to satisfy the performance requirements of virtually any application. Products include Velocis Database Server, Raima Database Manager, Raima Object Manager, and Raima Report Writer. Raima products are ideal for sophisticated Internet applications with demanding performance requirements. Companies using Raima technology in Web-based systems include DAZEL, CyberCash, MetalInfo, NDG Software and American Internet.

Software Products in this Directory include:

- Raima Database Manager++ 4.5
- Raima Object Manager
- Raima Report Writer
- Velocis* Database Server 2.0

For more information, contact: Paul Johnson, 206-515-9477. Email: sales@raima.com.

Visit Raima Corporation on the World Wide Web at: <http://www.raima.com>.

Real-Time Innovations, Inc.

155A Moffett Park Drive, Ste. 111

Sunnyvale, CA 94089

Telephone: 408-720-8312

Fax: 408-734-5009

Real-Time Innovations, Inc. is shaping the future of real-time tools and architectures. RTI's corporate mission is to apply advanced software research results to real-world applications. RTI markets the StethoScope* data monitoring tool, the ControlShell component-based, real-time programming system, the NDDS* network connectivity tool, the ScopeProfile* execution profiler, and the RTILib* library of programmers' tools. All RTI tools are integrated with Wind River Systems' Tornado* integrated development environment.

Software Products in this Directory include:

- RTI ControlShell* O-O Programming Environment
- RTI NDDS Network Data Delivery Service
- RTI ScopeProfile* Performance Analysis Tool/Debugger
- RTI StethoScope* Debugger

For more information, contact: Al Canal, 408-720-8312 x 118. Email: info@rti.com.

Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

Rogue Wave Software, Inc.

850 SW 35th Street

Corvallis, OR 97333

Telephone: 541-754-3010 or 800-487-3217

Fax: 541-757-6650

Rogue Wave Software, Inc. is a leading provider of object-oriented software parts and related tools. The company's

broad suite of C++ and Java-based products are used to develop robust, scalable software applications for a wide variety of environments, including client-server, intranet and Internet. These products enable customers to construct software applications more quickly, with higher quality and across multiple platforms, while reducing the complexity associated with the software development process. Rogue Wave's software parts provide the functionality developers need to perform fundamental operations such as network and database connectivity, allowing them to focus on the core functionality of the software under development

Software Products in this Directory include:

- DBTools.h++ Database Management Tool
- Inter.Net.h++ Library
- JChart Java Chart Maker
- JMoney Software
- JTools Utilities
- JWWidgets Library For Java Development
- Math.h++ Library
- Net.h++ Library
- Standard C++ Library
- Threads.h++* Library
- Tools.h++* Library
- zApp* Developer's Suite (Library)

For more information, contact: Billie Chapman, 541-754-4081. Email: info@roguewave.com.

Visit Rogue Wave Software, Inc. on the World Wide Web at: www.roguewave.com.

Samsung Semiconductor

3655 North First Street

San Jose, CA 95134

Telephone: 408-954-7000

Fax: 408-954-7883

Samsung Semiconductor is a wholly-owned subsidiary of Samsung Electronics, an \$18.8 billion dollar division of the \$88 billion, Korean-based, Samsung Group. Samsung's Semiconductor Division is the seventh largest semiconductor manufacturer and the leading producer of memory products in the world. Samsung Semiconductor's North American headquarters are located in San Jose, California. Samsung was the first company to introduce the 64-Megabit DRAM and the first fully functional 256-Megabit DRAM in 1994. In November 1996, Samsung had the world's first working silicon for the 1-Gigabit DRAM. Samsung's non-memory products, called System LSI, include ASICs, microcontrollers, power devices, media products and the Alpha* processor.

For more information, contact: Lisa Christiansen, 408-954-7000. Email: lchristi@ssi.samsung.com.

Visit Samsung Semiconductor on the World Wide Web at: www.sec.samsung.com.

Sharp Microelectronics Technology, Inc. (SMT)

5700 NW Pacific Rim Boulevard

Camas, WA 98607

Telephone: 360-834-8700

Fax: 360-834-8611

Sharp Microelectronics Technology, Inc. (SMT), a wholly-owned subsidiary of Sharp Corporation, is chartered with a focus on high technology growth products for the North American markets. SMT's IC Division, founded in 1986, designed and marketed the Butterfly product line until 1991, and recently re-acquired the rights to the Butterfly DSP product name and certain intellectual property. SMT's IC operations are composed of two business units: Standard Products (including Butterfly DSP) and Systems-on-a-Chip. SMT consists of marketing, design-engineering, product-engineering, quality assurance, and manufacturing operations using IC wafers fabricated in Sharp, Japan.

For more information, contact: Chris Ciuffo, 360-834-8796. Email: cciufo@sharpwva.com.

Visit Sharp Microelectronics Technology, Inc. (SMT) on the World Wide Web at: www.butterfly.com.

Signum Systems Corporation

11992 Challenger Court

Moorpark, CA 93021

Telephone: 805-523-9774 or 800-838-8012

Fax: 805-523-9776

Signum Systems (Est. 1979) manufactures and distributes in-circuit emulators, debuggers, development boards and compilers for the 8051, 80196, 80186, 8085, Z8, Z80, Z180, PIC processors and microcontrollers, and DSPs. Close ties with silicon manufacturers enable Signum Systems to stay at the forefront of the embedded systems market. Signum Systems supports processors from Atmel, Dallas, Intel, Lucent, Microchip, National, Siemens, Philips, Texas Instruments and Zilog. All Signum Systems products come with a two-week evaluation period to guarantee full customer satisfaction.

Software Products in this Directory include:

- Signum Chameleon Debugger
- Signum ICE-PIC* In-Circuit Emulator
- Signum SDS-Z80/Z180 In-Circuit Emulator
- Signum USP-10/25 In-Circuit Emulator
- Signum USP-186 In-Circuit Emulator
- Signum USP-196 In-Circuit Emulator
- Signum USP-51A In-Circuit Emulator
- Signum USP-85 In-Circuit Emulator
- Signum USP-HPC In-Circuit Emulator
- Signum USP-Z8 In-Circuit Emulator

For more information, contact: Jerry Lewandowski, 805-523-9774. Email: sales@signum.com.

Visit Signum Systems Corporation on the World Wide Web at: <http://www.signum.com>.

Softing

Richard-Reitzner-Allee 6

Haar, 85540

Telephone: ++49 89 456 450

Fax: ++49 89 456 56 399

Softing is one of the most successful independent system providers today, focusing on solutions centered around Automation Engineering and Automobile Electronics. The company was founded in 1979 and is headquartered in Haar near Munich, Germany. Softing products are available around the world; in addition to Europe, sales markets particularly in the USA and Japan play an important role—roughly 40 percent of the company sales can be traced to business outside Germany. In 1997, a total turnover of approximately 25 million DM is expected.

Software Products in this Directory include:

- SoftControl IEC 1131-3 Programming System

For more information, contact: Dr. Goetz Guettich, ++49 89 456 56 311. Email: info.softcontrol@softing.com.

Visit Softing on the World Wide Web at: <http://www.softing.com>.

Software Development Systems, Inc.

815 Commerce Drive, Ste. 110

Oak Brook, IL 60523

Telephone: 630-368-0400

Fax: 630-990-4641

Software Development Systems (SDS) provides intelligent debugging tools for embedded applications targeting Motorola's 68K, PowerPC, ColdFire, and M.CORE processors. Its extensive debugging suite and compilers allow increased productivity to meet the developer's ever-demanding time-to-market pressures. SDS is based in Oak Brook, Illinois with offices and representatives throughout North America, Europe, Japan and Asia-Pacific.

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Software Products in this Directory include:

- SingleStep® Debug Suite

For more information, contact: Tim Tumilty, 630-368-0400.
Email: sales@sdsi.com.
Visit Software Development Systems, Inc. on the World Wide Web at: www.sdsi.com.

SPARC International

535 Middlefield Road, Ste. 210
Menlo Park, CA 94025
Telephone: 415-321-8692
Fax:
Group of Cos supporting Sparc processor

For more information, contact: . Email: info@sparc.com.
Visit SPARC International on the World Wide Web at: http://www..

Spectron Microsystems

315 Bolly Drive
Santa Barbara, CA 93117
Telephone: 805-968-5100
Fax: 805-968-9770

Spectron Microsystems, a Dialogic Company, is a total solutions provider of high-performance system software for digital and native signal processing applications. Spectron, creator of SPOX®, has several real-time operating systems available for most major DSPs and Pentium® processors. Coupled with Spectron's real-time operating systems are libraries, Windows connectivity products, debugging capabilities and real-time software analysis tools that are all tightly integrated with development tools from leading DSP hardware and software suppliers. Spectron offers custom design and services, resulting in a shorter development cycle.

Software Products in this Directory include:

- BIOSuite® RTOS Kernel
- IA-SPOX® Software Development Environment
- SPOX® RTOS and Software Development Kit (SDK)
- SPOXWorks DSP Algorithm Simulation Accelerator
- WinBRIDGE Host Connectivity Software

For more information, contact: Shirley Hance, 805-968-5100.
Email: info@spectron.com.
Visit Spectron Microsystems on the World Wide Web at: www.spectron.com.

Spyglass, Inc.

1240 E. Diehl Road
Naperville, IL 60563
Telephone: 630-505-1010
Fax: 630-505-4944

Spyglass, Inc. (NASDAQ:SPYG) provides a complete array of software and services necessary to make non-PC devices such as televisions, smart phones, set-top boxes, cellular phones, pagers, and office equipment work with the World Wide Web. The Spyglass product suite enables Web connectivity through embedded browsers and servers, and provides the infrastructure products needed to eliminate performance bottlenecks and deliver value-added services such as real-time, device-specific content conversion and surfwatch content filtering. Spyglass products feature both Internet standards-based functionality, including HTML and HTTP, and Java support in a light-weight ANSI C portable collection of components with robust and full-featured APIs for easy integration into a wide variety of environments.

Software Products in this Directory include:

- Device Mosaic® Thin Web Browser
- MicroServer® Embedded Web Server
- Prism® Web Content Converter
- Remote Mosaic® Web Browser

For more information, contact: Chris Phenner, 630-505-6505.
Email: needs@spyglass.com.
Visit Spyglass, Inc. on the World Wide Web at: www.spyglass.com.

Systems & Software, Inc. (SSI)

See Beacon Development Tools, Inc.
Austin, TX 78759
Telephone:
Fax: 512-338-9211

Systems & Software, Inc. (SSI) software development tools for the embedded systems marketplace are now offered by Beacon Development Tools, Inc. These development tools include debuggers, linkers, and simulators, all targeted toward developers working with the C/ C++ languages, and within the Intel Architecture (x86) processor environment. SSI's current product line includes the full family of SoftProbe® and VisualProbe® remote debuggers, Link&Locate linkers, and SoftProbe and VisualProbe simulators, used worldwide by embedded system developers who wish to build the fastest and most compact C and C++ embedded applications in the briefest time possible.

For more information, contact: Ford Frost, 512-338-9211.
Email: info@beacontools.com.
Visit Systems & Software, Inc. (SSI) on the World Wide Web at: www.beacontools.com.

TakeFive Software GmbH

Jakob-Haringer-Strasse 8
Salzburg, A-5020
Telephone: +43 (0) 662-457915-0
Fax: +43 (0) 662-457915-6

TakeFive Software is dedicated to improving the productivity and creativity of programmers and development teams by providing powerful programming environments and tools for managing complex software projects with latest object-oriented technologies.

TakeFive Software's open systems strategy frees software developers from project-specific constraints and gives them the flexibility to mix-and-match computing platforms, programming languages and the most appropriate tools while protecting and reusing their companies' capital and skills investments. These benefits become even more important as companies begin to develop across multiple platforms, including a mix of UNIX® and Windows® NT operating systems. Additionally, TakeFive Software offers complete development solutions with software partners, regular training classes, consultancy and technical support via offices and distributors throughout the world. The US-based TakeFive Software, Inc. is located at 20813 Stevens Creek Blvd., Ste. 200, in Cupertino, CA 95014. The US. office telephone number is 800-418-2535 or 408-777-1440, and the fax is 408-777-1444. Email for the US office can be sent to info@takefive.com and the same Web site applies to all TakeFive Software products.

Software Products in this Directory include:

- TakeFive Software's SNIFF+ Team Programming Environments

For more information, contact: Andreas Pfeiffer, +43 0 662 456915-0. Email: info@takefive.co.at.
Visit TakeFive Software GmbH on the World Wide Web at: http://www.takefive.com.

Tasking, Inc.

333 Elm Street
Dedham, MA 02026
Telephone: 617-320-9400
Fax: 617-320-9212

Since pioneering the concept of "cross development" more than 20 years ago, Tasking has been an industry leader in the development, manufacture and support of software development tools for the PC (Windows® O.S.) and Sun (SunOS and Solaris) and HP (HPUX). With more than 120

employees, annual revenues of more than \$15 million, and a global distribution network in North America, Europe and Asia, Tasking is committed to providing its customers with highly integrated, leading-edge software tools for embedded systems development. Tasking's development tools span across industry-standard computing platforms and are coupled with the most comprehensive support and training services available.

Software Products in this Directory include:

- C++ Compiler
- C Compiler Package
- CrossView® Pro Debugger
- EDE Project Environment
- Precise/MOX® Real-Time Operating System

For more information, contact: 1-800-458-8276. Email: sales-us@tasking.com.
Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

Tektronix, Inc.

P.O. Box 500
Beaverton, OR 97077
Telephone: 503-627-7111
Fax: 503-627-3678

Tektronix is a portfolio of measurement, color printing and video and networking businesses dedicated to applying technology excellence to customer challenges. Tektronix is headquartered in Wilsonville, Oregon and has operations in 23 countries outside the United States.

Software Products in this Directory include:

- Tektronix TLA 700 Series Logic Analyzer

For more information, contact: Sue Foley, 503-627-5157.
Email: sales@tektronix.com.
Visit Tektronix, Inc. on the World Wide Web at: http://www.tektronix.com.

Texas Instruments Inc. DSP Tools

300 Oxford Drive
Monroeville, PA 15146
Telephone: 412-856-3600
Fax: 412-856-3636

Texas Instruments Incorporated, headquartered in Dallas, Texas, is one of the world's foremost high-technology companies, with sales or manufacturing operations in more than 30 countries. TI products and services include semiconductors; software productivity tools; consumer products; electrical controls; and metallurgical materials. An industry pioneer and the worldwide leader in digital signal processing solutions, Texas Instruments celebrates the 15th anniversary of its first DSP in 1997. TI provides innovative DSP solutions to more than 20,000 customers worldwide in the computer, communications, consumer, automotive, military and industrial markets. TI offers a unique breadth of digital and mixed-signal products and technologies, hardware and software development tools, design information services and global support.

Software Products in this Directory include:

- TI DSP BIOS
- TI DSP320 Simulator
- TI TMS320 Extended Development System (XDS)
- TMS320Cxx Assemblers
- TMS320Cxx C Compilers
- TMS320Cxx C Debuggers

For more information, contact: 800-477-8924 x 4500 or Local TI Sales Office. Email: N/A.
Visit Texas Instruments Inc. DSP Tools on the World Wide Web at: www.ti.com.

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Texas Instruments Semiconductor Group

12203 Southwest Freeway
Stafford, TX 77477
Telephone: 800-477-8924 x4500
Fax:

Texas Instruments Incorporated is a global semiconductor company and the world's leading designer and supplier of digital signal processing solutions, the engines driving the digitization of electronics. Headquartered in Dallas, Texas, the company's businesses also include calculators, productivity products, controls and sensors, metallurgical materials and digital light processing technologies. The company has manufacturing or sales operations in 25 countries. Texas Instruments is traded on the New York Stock Exchange under the symbol TXN.

The worldwide leader and pioneer in DSP solutions since 1982, TI provides innovative DSP and mixed signal/analog technologies to more than 30,000 customers in the computer, wireless communications, networking, Internet, consumer, digital motor control and mass storage markets worldwide. To help customers get to market faster, TI offers easy-to-use development tools and extensive software and hardware support, further complemented by nearly 300 third-party DSP solutions providers.

For more information, contact: Literature Response, 1-800-477-8924, x 4500. Email: N/A.
Visit Texas Instruments Semiconductor Group on the World Wide Web at: www.ti.com.

TranSys, Inc.

459 N. Gilbert Road, Ste. A-198
Gilbert, AZ 85234
Telephone: 602-926-4100
Fax: 602-926-6622

TranSys, Inc., located in Gilbert, Arizona was formed in 1994 to promote, distribute and support ISaGRAF* in the Americas. ISaGRAF was originally introduced in 1990 by CJ International, a team of software engineers specializing in the development of Soft Logic systems developed to bridge the gap between microcomputer systems and programmable logic controllers (PLCs). CJ's software product offerings are based on industry standards that bring modern PLC programming techniques to industrial microcomputers. CJ is dedicated to providing innovative software solutions for the next generation of Factory Automation Controllers. ISaGRAF is available from TranSys in the Americas, other CJ VAR/OEM partners, and is distributed in Japan by Komatsu, and by Unitop in Korea.

Software Products in this Directory include:

- ISaGRAF* Run-Time Kernel
- ISaGRAF* Workbench Development Tool Set

For more information, contact: Robert R. Lyons, 602-926-4100. Email: info@ISaGRAF.com.
Visit TranSys, Inc. on the World Wide Web at: www.ISaGRAF.com.

TSQUARE

2350 Mission College Blvd.
Santa Clara, CA 95052
Telephone: 408-982-5804
Fax: 408-982-5585

Tsquare is a semiconductor manufacturer leading the industry with optimized, customizable RISC-based hardware and network access protocol software solutions for data communications and telecommunications equipment. Tsquare has optimized the SPARC* 32-bit V8 Processor to address the high-throughput networks and the large number of physical and virtual channels typical of distributed data processing. Tsquare's network processors support channelized and non-channelized HDLC processing, Frame Relay fast switching techniques, flexible queuing mechanisms and Packet over SONET.

For more information, contact: Tom McQuade, 619-792-6462. Email: tmcquade@tsquare.com.
Visit TSQUARE on the World Wide Web at: <http://www.tsquare.com>.

U S Software

14215 NW Science Park Drive
Portland, OR 97229
Telephone: 503-641-8446
Fax: 503-644-2413

U S Software, located in Portland, Oregon, has been developing, marketing and supporting real-time development tools for embedded applications since 1975. U S Software started as a consulting firm specializing in compiler and custom software for embedded applications. As interest grew in off-the-shelf development tools, a family of standard products was developed. U S Software's extensive experience working with embedded development teams, the quality of its products, along with engineering assistance and superior customer service, enable the company to meet the needs of a rapidly changing embedded market.

Software Products in this Directory include:

- Super TASK! Real-Time Operating System
- USNET* TCP/IP Development Tool

For more information, contact: Katrina Sumner, 503-641-8446 x 740. Email: info@ussw.com.
Visit U S Software on the World Wide Web at: www.ussw.com.

VenturCom, Inc.

215 First Street
Cambridge, MA 02132
Telephone: 617-661-1230
Fax: 617-577-1607

VenturCom's mission is to be the leading provider of tools and extensions to rapidly develop and deploy embedded and real-time applications on Windows NT and Windows CE. VCI's tools and extensions are the de facto standard, currently controlling about an 80% market share of third-party purchases, based on reported "partners." VenturCom has more than 120 Windows NT partners, including APCT, Cognex, Data General, Eaton, Fuji Xerox, GM Electromotive, Illusion, Komatsu, Meidensha, Motorola, ORSI, Rockwell Software, Schneider Automation, Siemens, UNISYS, Wisdom Controls, WonderWare, Yokogawa, and Ziatech Corporation. Complete corporate and product information is available at VenturCom's WWW site.

Software Products in this Directory include:

- VCI Component Integrator
- VCI RTX-Real-Time Extension for Windows* NT O.S.

For more information, contact: Betty Pool, 617-661-1230 x213. Email: info@vci.com.
Visit VenturCom, Inc. on the World Wide Web at: www.vci.com.

Virtual Prototypes Inc. (VPI)

4700 De La Savane, Ste. 300
Montreal, Quebec H4P1T7
Telephone: 514-341-3874
Fax: 514-341-8018

Virtual Prototypes Inc. (VPI) of Montreal, Canada, develops and markets leading-edge commercial-off-the-shelf (COTS) software for the development of real-time Human Machine Interfaces. VPI's customers include more than 400 leaders in the aerospace, automotive, medical, and other high-technology industries in twenty countries.

VPI provides complete life-cycle solutions addressing the specification, simulation, development, and training aspects of advanced systems and has built an enviable reputation as an innovator and standard setter. VPI employs 70 R&D, sales, marketing, customer support and administration personnel. Headquartered in Montreal, VPI has offices and distributors throughout the United States, Europe and Asia.

Software Products in this Directory include:

- VAPS Human-Machine Interface Development Software

For more information, contact: Paul A. Bennett, 514-341-3874 x 280. Email: sales@VirtualPrototypes.ca.
Visit Virtual Prototypes Inc. (VPI) on the World Wide Web at: <http://www.VirtualPrototypes.CA>.

VisiCom Laboratories, Inc.

10052 Mesa Ridge Court
San Diego, CA 92121
Telephone: 619-457-2111
Fax: 619-457-0888

VisiCom offers a broad range of products and services, providing both hardware and software solutions for developers of real-time and embedded applications. VisiCom's unique offerings include graphics support software products for real-time embedded applications; board support packages; system integration; C3I, simulation and training systems; and re-host engineering products. VisiCom also offers a complete line of NTDS I/O and video, audio and graphics boards for use in diverse applications such as military displays, shipboard tactical and combat systems, simulation and training, medical imaging, industrial control and entertainment applications. All products are supported by professional engineers skilled in real-word design and application development.

Software Products in this Directory include:

- RTGL* Graphics Tool Library
- RTX-Windows Scalable Graphics Tool
- VX-Windows Graphics Tool

For more information, contact: Sales Department, 1-800-668-4472. Email: sales@visicom.com.
Visit VisiCom Laboratories, Inc. on the World Wide Web at: www.visicom.com.

White Microelectronics

3601 E. University Drive
Phoenix, AZ 85034
Telephone: 602-437-1520
Fax: 602-437-9120

For more than thirty years, White Microelectronics has designed and manufactured standard and custom memory and processor-based products for embedded systems, including VME, high-speed DSP, ATM switch controllers, networking and communications applications. All products are designed for manufacturability and are 100% tested. White offers a comprehensive line of commercial SRAM, Flash, DRAM and mixed modules in SIMMs, ZIPs, DIMMs, PLCCs, and BGAs. They are built to the highest standards using name-brand manufacturers' original components. High-reliability SRAM, Flash, EEPROM, DRAM and mixed modules are available in hermetic ceramic CQFP, Flatpack, SOJ, and PGA packages for critical systems and harsh environments.

For more information, contact: Terri Macdonald, 602-437-1520. Email: info@whitemicro.com.
Visit White Microelectronics on the World Wide Web at: <http://www.whitemicro.com>.

Wind River Systems, Inc.

1010 Atlantic Avenue
Alameda, CA 94501
Telephone: 800/545-WIND or 510-748-4100
Fax: 510-749-2010

Wind River Systems, Inc. is a leading provider of integrated software development tools for real-time embedded applications in the Internet, telecommunications, data communications, office automation, networking, computer peripherals, medical, automotive, industrial, aerospace, and multimedia markets. Through one of the industry's most comprehensive product lines and customer support, Wind River

* Trademark or registered trademark of its respective company or mark holder.

EMBEDDED SOFTWARE AND 'Y2K'

There are thousands of Embedded System Applications that may be threatened by Year 2000 date changes!

The following is a partial list of areas for concern:

- Electric Power Grid Control
- Telecommunications Control
- Oil Pipeline Control
- Dam/Reservoir Water Control
- Industrial/Factory Automation & Control Systems
- Medical Instruments & Monitoring Systems

Help Solve These Problems... Become Involved Now!

To Join ESOFTA's Embedded Y2K Solutions Forum

1. Send an E-mail to majordomo@esofta.com
2. Leave E-mail 'subject' line blank.
Type: "Subscribe embedded_y2k" in the message portion of your email. (Do not type the quotation marks)

Visit ESOFTA's Y2K Web Area at:

<http://www.esofta.com>

***For More Information: E-mail sara@esofta.com
or phone: 602-991-4662***

TM

ESOFTA

Embedded Software Association

enables customers to develop and reuse application software across a variety of products and platforms, shortening development cycles and improving time-to-market. Incorporated in 1983, Wind River is headquartered in Alameda, California with operations in the UK, France, Germany, Sweden, Italy, Israel, Korea, and Japan and representation worldwide.

Software Products in this Directory include:

- Tornado* Integrated Development Environment
- VxWorks* Real-Time Operating System
- WindView* Debugger

For more information, contact: Sales 800-545-WIND. Email: inquiries@wrs.com.

Visit Wind River Systems, Inc. on the World Wide Web at: <http://www.wrs.com>.

ZF MicroSystems, Inc.

1052 Elwell Court
Palo Alto, CA 94303
Telephone: 650-940-4478 or
800-688-5943
Fax: 650-940-4050

ZF MicroSystems, Inc. designs and markets highly integrated Intel x86-compatible computers and peripheral controller modules in a new generation, ultra-miniature form factor (MCM). The company's OModule* technology provides the full functionality of a desktop computer in a package that can be integrated as easily as a semiconductor device. OModules are innovative, reliable, and cost-effective devices incorporating the full functionality of a 386SX motherboard in a 240-pin gull-wing package that can be surface-mounted directly within an OEM's proprietary design.

For more information, contact: Sales, 800-683-5943. Email: info@zfmicro.com.

Visit ZF MicroSystems, Inc. on the World Wide Web at: <http://www.zfmicro.com>.

Zilog, Inc.

210 East Hacienda Avenue
Campbell, CA 95008
Telephone: 408-370-8000
Fax: 408-370-8056

Zilog, Inc. (NYSE:ZLG) is an international integrated circuit company that designs, develops, manufactures and markets application-specific standard products (ASSPs) for the consumer electronics, data communications and computer peripherals markets. ASSPs are very-large-scale-integrated (VLSI) logic circuits designed for particular market applications, rather than for a single customer. The company utilizes its Superintegration* design methodology to combine cores and cells from its extensive library of customer-familiar microprocessors, microcontrollers, memory and logic circuits to meet the design, cost, and time-to-market requirements of its customers.

For more information, contact: Sales, 408-370-8000. Email: N/A.

Visit Zilog, Inc. on the World Wide Web at: www.zilog.com.

* Trademark or registered trademark of its respective company or mark holder

SOFTWARE TOOLS FOR MICROPROCESSORS

80x86 (186/286/386/486/586)

Intel Corporation (AMD, Cyrix)

FULL FUNCTION RTOS

Bytebos* Multitasking Operating System

Bytebos Integrated Systems

Host Development Environments: UNIX and Windows.

Bytebos is a full-featured multitasking operating system designed for use in high-performance, real-time embedded computing applications. Bytebos is configured for use with all major C compilers and debuggers and is available for a variety of microprocessors, microcontrollers, and DSPs. Bytebos applications are portable with simple licensing. There are no royalties on executables, and source code is provided.

For more information, contact: Nick Andrews, 800-788-7288. Email inquiries to: andrews@bytebos.com. Visit Bytebos Integrated Systems on the World Wide Web at: www.bytebos.com.

CHORUS/ClassiX* Real-Time Operating System

Chorus Systems

Host Development Environments: UNIX and Windows.

CHORUS/ClassiX is a highly configurable, richly-featured real-time executive. Users can easily tailor CHORUS/ClassiX at a very fine-grain level of real-time operating system services to meet specific hardware and application requirements. The componentized* architecture is industry unique and allows CHORUS/ClassiX to coherently scale from very small (10K) instances to highly distributed, multiple-personality platforms including support for POSIX, third-party RTOSs, the Java* Application Environment (JAE) and/or legacy operating systems. Hot application re-start, fair-share scheduling, and other high-availability enablers provide necessary capabilities for mission-critical embedded systems.

For more information, contact: Audrey Castine, 408-879-4145. Email inquiries to: info@chorus.com. Visit Chorus Systems on the World Wide Web at: www.chorus.com.

CHORUS/JaZZ* Real-Time Operation System

Chorus Systems

Host Development Environments: N/A.

CHORUS/JaZZ* is a feature-rich, Java-enabled real-time operating system providing full Java functionality and compatibility within the context of an embedded real-time operating system. CHORUS/JaZZ provides a Java "virtual machine" personality, supporting the full range of Java extensions and services, including Hot Java and JavaViews. CHORUS/JaZZ allows developers to integrate "off-the-shelf" Java applications into distributed real-time embedded systems, resulting in a significant decrease in development costs and time. Not only is CHORUS/JaZZ one of the richest Java-enabled operating systems, it is also significantly faster than most Java implementations.

For more information, contact: Audrey Castine, 408-879-4145. Email inquiries to: info@chorus.com. Visit Chorus Systems on the World Wide Web at: www.chorus.com.

CMX-RTX* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-RTX RTOS provides more than 65 kernel services allowing control of tasks, events, messages, resources, semaphores, cyclic timers, queues, fixed memory blocks and UARTs. Interrupts are allowed to use some of the CMX functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. Very small ROM and RAM requirements for small-footprint applications. Several compiler vendors are supported. Source code is included, and there are no royalties.

The CMX-RTX RTOS supports an unusually large number of μ PU, μ CU, and DSP architectures from a large number of manufacturers, including: Advanced RISC Machines, Analog Devices, Hitachi, Intel, MIPS, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Sharp, Siemens, Texas Instruments, Toshiba, and Zilog.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

OSE* Real-Time Operating System

Enea OSE Systems AB

Host Development Environments: UNIX and Windows.

Enea's OSE is a message-based, real-time operating system and tool-set for embedded systems. OSE has special built-in capabilities for fault tolerance, safety critical applications, runtime configuration and distributed systems. OSE is the first RTOS to be certified to meet the software quality standard IEC 1508, safety integrity level 3.

For more information, contact: Bill McCombie, +468-638-5000 (Sweden). Email inquiries to: info.ose@enea.se. Visit Enea OSE Systems AB on the World Wide Web at: www.enea.se/ose.

PDOSpro Real-Time Operating System

Eyring Corporation

Host Development Environments: Windows.

PDOSpro is a modular, scalable, and easy to configure operating system for embedded systems development. The PDOSpro kernel is extremely fast and platform independent. While powerful and robust, its minimum kernel size requires less than 5K of memory. Furthermore, PDOSpro enables developers to use standard Microsoft or Borland tools for code development. This modularity, cost-effectiveness, and exceptional performance makes PDOSpro the RTOS of choice for embedded systems developers.

For more information, contact: Clark Roundy, 801-561-1111. Email inquiries to: pdos-info@eyring.com. Visit Eyring Corporation on the World Wide Web at: www.eyring.com.

Embedded DOS* 6-XL

General Software, Inc.

Host Development Environments: Windows and DOS.

Embedded DOS 6-XL is a high-performance, real-time DOS for embedded applications where power and memory are readily available. The DOS kernel is fully re-entrant and the built-in real-time microkernel architecture provides pre-emptive, prioritized scheduling of threads and timers to allow applications written with DOS tools to use multi-tasking control flow. Threads, timers, mutexes, events, message ports, queues, shared memory, and object naming services are provided by the kernel and executive layers.

For more information, contact: Dan De Lano, 425-454-5755. Email inquiries to: general@gensw.com. Visit General Software, Inc. on the World Wide Web at: www.gensw.com.

GEOS Real-Time Operating System

Geoworks

Host Development Environments: Windows.

The GEOS operating environment delivers comprehensive capabilities needed to enable mobile communications devices, such as smart phones, and to integrate voice, paging, email, fax, Internet access, and other applications suitable for mobile devices. Geoworks created GEOS to provide efficient system software to run such mobile communications devices at consumer-appropriate price points.

For more information, contact: Bob Bogard, 510-814-5811. Email inquiries to: bbogard@geoworks.com. Visit Geoworks on the World Wide Web at: www.geoworks.com.

* Trademark or registered trademark of its respective company or mark holder

80x86 (186/286/386/486/586)

Intel Corporation (AMD, Cyrix)

INTEGRITY* Real-Time Operating System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The INTEGRITY RTOS, which provides a memory-protected superset of the facilities offered in Green Hills Software's *velOSity** Real-Time Operating System, targets mission-critical, real-time applications that emphasize reliability, security and testability. The INTEGRITY RTOS is available on a royalty-free basis: users pay only for the host-based software development environment. Run-time licenses for the target system are free.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

PXROS* Portable, Extendable RTOS

HighTec EDV-Systeme GmbH

Host Development Environments: UNIX and Windows and DOS.

PXROS has the following features: absolutely no interrupt latency with transparency; multiple independent activities with interrupt handlers and tasks (processes); priority-driven, preemptive scheduling with 32 task-priority levels; process coordination of messages, events, dynamically modified priorities, semaphores; flexible resource management with dynamically defined memory classes, fixed- and variable-length memory blocks, dynamically created objects, resource reservation; real-time-control-time based calls, period, for activities, timeouts and events.

For more information, contact: Hagen Heggenberger, ++43-681-92613-0. Email inquiries to: htc@hightec-rt.com. Visit HighTec EDV-Systeme GmbH on the World Wide Web at: <http://www.hightec-rt.com>.

MTOS*/ MTOS-UX Real-Time Operating Systems

Industrial Programming, Inc.

Host Development Environments: UNIX and Windows.

IPI's MTOS full-function RTOS products offer a uniform applications programming interface (API) across all supported processors, thus affording interface familiarity for programmers despite processor changes. MTOS also supports symmetric multi-processing and offers a complete coordination system for handling asynchronous operations. A "small footprint" RTOS, with code space ranging from 16KB to 45KB, MTOS is highly scalable for use with small, mid-size and very large programming projects.

For more information, contact: Bernard Mushinsky, 800-365-MTOS. Email inquiries to: info@ipi.com. Visit Industrial Programming, Inc. on the World Wide Web at: www.ipi.com.

pSOSystem Real-Time Operating System

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pSOSystem is a modular, high-performance real-time operating system designed specifically for embedded microprocessors. The RTOS provides a complete multi-tasking environment based on open system standards, such as network file system support. pSOSystem is designed for performance, reliability, and ease-of-use on either custom or commercial hardware.

Soon available for SPARC processors.

For more information, contact: Sales, 408-542-1500. Email: N/A. Visit Integrated Systems, Inc. on the World Wide Web at: <http://www.isi.com>.

AMX* Real-Time Multitasking Kernel

KADAK Products Ltd.

Host Development Environments: Windows and DOS.

KADAK's AMX Real-Time Operating System is a full-featured, fast, compact, ROMable kernel. AMX includes: preemptive, priority-based scheduler (optional time-slicing); nested interrupts with priority ordering; mailbox, semaphore, resource, event, list, buffer and memory managers; the Configuration Builder Utility eases system construction. And for debugging, KADAK's *KwikLook** fault finder exploits SDS's *SingleStep** and SSI's *VisualProbe** debuggers for fully AMX RTOS-aware debugging.

For more information, contact: Sales, 604-734-2796. Email inquiries to: amxsales@kadak.com. Visit KADAK Products Ltd. on the World Wide Web at: www.kadak.com.

LP-VxWin* Real-Time Operating System

LP Elektronik GmbH

Host Development Environments: Windows.

LP's LP-VxWin* RTOS enables Wind River's VxWorks RTOS and Microsoft's Windows 95/NT Operating Systems to run concurrently on one processor. Due to LP's Real-Time

basic technology, VxWorks remains 100% real-time capable. Communication between VxWorks and Windows 95/NT occurs over SM-TCP/IP. The software allows for sending messages to "normal" Windows OS programs as well as allowing access to any hardware address.

For more information, contact: Sales, ++751-56122-15. Email inquiries to: info@lp-elektronik.com. Visit LP Elektronik GmbH on the World Wide Web at: <http://www.lp-elektronik.com>.

LynxOS* Real-Time Operating System

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

LynxOS is a UNIX-compatible, POSIX-conforming, multi-process, and multi-threaded operating system designed for complex real-time applications that require fast, deterministic response. The LynxOS kernel was specifically designed for hard real-time applications. LynxOS is fully pre-emptible, re-entrant, and compact. The modularity inherent in the LynxOS architecture makes the operating system highly scalable and configurable. At its smallest, it can be configured with only the kernel and linked with an application to form a ROMable image for specialized embedded applications. At its fullest, LynxOS is a self-hosted development environment comprising a wide array of software development tools, UNIX-compatible utilities, industry-standard networking, a GUI, and a UNIX-like hierarchical file system.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

Microsoft Windows* CE O.S. Embedded Toolkit

Microsoft* Corporation

Host Development Environments: Windows.

Microsoft's Windows CE Embedded Toolkit for Visual C++ 5.0 includes integrated development environment tools designed specifically for embedded development. The Windows CE platform is a 32-bit, preemptive, multitasking, multithreaded operating system designed from the ground up to support embedded systems. Use the embedded toolkit to choose components for building a customized version of the Windows CE operating system to meet the unique requirements of your hardware. The toolkit contains the RTOS, compiler, assembler, emulator, debugger, library and drivers.

For more information, contact: N/A. Email inquiries to: N/A. Visit Microsoft* Corporation on the World Wide Web at: N/A.

VRTX* Real-Time Operating System

Microtec

Host Development Environments: UNIX and Windows.

An element of the Spectra* development system, the VRTX* RTOS is easily configured and includes a family of real-time kernels that gives developers complete freedom in making functionality, performance and size tradeoffs. VRTX has integrated STREAMS-based networking, I/O and file systems. VRTX is unique in offering a choice of three compatible real-time kernels: VRTXsa kernel, a high-performance, full-featured kernel based on a leading-edge architecture; VRTX32 kernel, which has logged more trouble-free hours than any other RTOS available and has been used in FAA-certified flight-critical applications; VRTXmc kernel, the first real-time kernel specifically designed for microcontrollers, featuring minimal RAM and ROM footprints.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

DAVID* Real-Time A/V Decoder RTOS

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

Microware's DAVID (Digital Audio/Video Interactive Decoder) is based on the company's OS-9* real-time operating system. The DAVID RTOS represents an open system software platform for digital television devices used in telephone, cable and wireless networks. The DAVID Decoder has been selected by more manufacturers than any other digital television system software solution because of its open architecture, proven reliability, and cost-effectiveness in bringing products to market.

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

OS-9* Real-Time Operating System

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

Microware's OS-9 is an architecturally advanced, high-performance real-time operating system. The OS-9 RTOS provides priority-based, preemptive task scheduling, interrupt and exception-handling services, dynamic memory management, inter-process communications facilities, system calls for system control, and unsurpassed I/O support.

* Trademark or registered trademark of its respective company or mark holder

80x86 (186/286/386/486/586)

Intel Corporation (AMD, Cyrix)

The OS-9 RTOS is used in industrial, telecommunications, transport, instrumentation, aerospace and consumer applications. Extensions to the OS-9 RTOS are available for designers of set-top boxes, pagers, cell phones, NCs and PDAs.

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

Wireless OS-9* Real-Time Operating System

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

The Wireless OS-9* RTOS is an integrated system software and development tool package designed specifically for manufacturers of battery-powered, intelligent computing and communication devices. Each Wireless OS-9 software subsystem contains the OS-9 operating system, power management, SPF communications file manager, FasTrak* and MAUI* (Multimedia Application User Interface), and a set of drawing and animation APIs (application program interfaces).

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

RTKernel*/RTKernel-32 Real-Time Operating Systems

On Time

Host Development Environments: Windows and MS-DOS.

On Time's RTKernel and RTKernel-32 are powerful, real-time multitasking systems for Intel Architecture-based (x86) 32-bit embedded systems. The RTOS was specifically designed for 32-bit flat address space environments, with special care taken to ensure ease of use and excellent run-time performance. RTKernel-32 is compact (~16K code, 6K data) and provides the programmer with the basic tools required to develop efficient real-time software. RTKernel-32 has a library which can be linked to C/C++ application programs. It offers functions to manage tasks, semaphores, mailboxes, interrupts, etc. All RTKernel-32 tasks run within a single program. An RTKernel-32 application consists of a single executable file containing the kernel, the required drivers and all tasks. The RTKernel is very similar to RTKernel-32 but produces 16-bit executable code to run on MS-DOS*. RTKernel executable(s) can be processed by On Time's RTTarget-32 cross-development system.

For more information, contact: Tom Schotland, 516-689-6654. Email inquiries to: info@on-time.com. Visit On Time on the World Wide Web at: www.on-time.com.

QNX* Real-Time Operating System Technology

QNX Software Systems Ltd.

Host Development Environments: Windows and QNX RTOS (self hosted).

The QNX RTOS is a leading real-time OS for PCs. Based on a very lean microkernel, the scalable, POSIX-certified QNX RTOS combines hard real-time performance, fault tolerance, and pre-emptive multitasking with full memory protection. QNX also offers its award-winning Photon microGUI*, a complete embeddable windowing system requiring less than 500KB of flash memory or ROM.

For more information, contact: Marketing Services Dept., 800-676-0566. Email inquiries to: info@qnx.com. Visit QNX Software Systems Ltd. on the World Wide Web at: www.qnx.com.

Super TASK! Real-Time Operating System

U S Software

Host Development Environments: Windows.

U S Software's SuperTask! is a mature, compact, fast, and user-configurable RTOS suite. SuperTask! supports more than 20 C/C++ compilers/tool chains, and source code is included with an ANSI standard C core.

For more information, contact: Katrina Sumner, 503-641-8446 x 740. Email inquiries to: info@ussw.com. Visit U S Software on the World Wide Web at: www.ussw.com.

VxWorks* Real-Time Operating System

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Part of the Tornado* development environment, VxWorks is an industry-standard, scalable real-time operating system. It features the multitasking wind* kernel, the POSIX real-time extensions, intertask communications, full networking functionality, file system support and C++ support. Additional functionality is available through optional products from Wind River and a wide range of third-party partners.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

BASIC RTOS KERNEL**Nucleus* C++ RTOS Kernel**

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus C++ is a version of the Nucleus PLUS kernel that provides an object-oriented interface to an application. Although the core of the product is the Nucleus PLUS kernel (thereby reinforcing its robustness), the interface has been completely redesigned with all of the standard C++ mechanisms including constructors, destructors, and the like. Tests indicate that the incorporation of these facilities has minimal impact on the code size and performance of the final application.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

Nucleus PLUS* Real-Time Operating System

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus PLUS is designed as a core component for an operating system environment. It is extensible and dynamic. Its modular design allows services to be easily produced by combining existing services. All of the Nucleus PLUS components (tasks, queues, semaphores, etc.) can be dynamically created and deleted. Each component has a control block defined by the user and placed anywhere in the available memory space of the target system. Nucleus PLUS is a real-time, pre-emptive, multitasking kernel designed for time-critical embedded applications. Approximately 95 percent of Nucleus PLUS is extremely portable and is currently available for use with most microprocessor families.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

CMX-TINY+* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-TINY+ RTOS provides more than 40 kernel services, thus allowing control of the following: tasks, events, messages, resources, semaphores, cyclic timers, and queues. Interrupts are allowed to use some CMX functions. The scheduler is based on true pre-emption. CMX-TINY+ RTOS features very fast context-switch times and very low interrupt-latency times. ROM and RAM requirements are very small. CMX offers support for several compiler vendors, with royalty-free source code included.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

RTXC* Real-Time Kernel

Embedded System Products, Inc.

Host Development Environments: UNIX and Windows.

Embedded System Products, Inc.'s RTXC is a multitasking real-time embedded kernel written primarily in C and featuring a single API for all supported processors. RTXC manages tasks and time, synchronizes with events, and permits transfer of data between tasks through 72 kernel services, including services for RAM management and exclusive access to an entity.

For more information, contact: Sales, 800-525-4302. Email inquiries to: sales@esphou.com. Visit Embedded System Products, Inc. on the World Wide Web at: www.esphou.com.

Micro Digital's smx* V 3.2 Real-Time Operating System

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's smx, originally introduced in 1988, enhanced and complemented with additional capabilities over the years, has stood the test of time as a preemptive, multitasking real-time operating system kernel that provides task and memory management, timing, character I/O, intertask communication, semaphores, event queues, primitives and more. The kernel OS supports testing by error monitoring. Micro Digital's smx RTOS kernel is the basis for its integrated development tools environment, all designed to offer superb development support environments for developers of x86-compatible and PowerPC processor-based embedded systems.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralf@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

* Trademark or registered trademark of its respective company or mark holder

80x86 (186/286/386/486/586)

Intel Corporation (AMD, Cyrix)

Precise/MQX* & MQX+m Real-Time Executive

Precise Software Technologies Inc.

Host Development Environments: .

Precise Software Technologies' Precise/MQX* is a portable high-performance, real-time executive. MQX is scalable from a single processor to distributed multiprocessor configurations. The real-time executive provides functions for multitasking, intertask communications and synchronization, dynamic interrupt management, and memory management. Optional protocols for networking and data communications are also available.

For more information, contact: Clarke Esler, 508-264-4413. Email inquiries to: info@psti.com. Visit Precise Software Technologies Inc. on the World Wide Web at: www.psti.com.

ISaGRAF* Run-Time Kernel

TranSys, Inc.

Host Development Environments: Windows.

The ISaGRAF* Run-Time Kernel is a portable execution engine that has behavior similar to traditional Programmable Logic Controllers (PLCs), but the kernel exceeds them in performance and flexibility. The ISaGRAF* Run-Time Kernel also has additional functionality, which greatly expands and enhances the application possibilities. The ISaGRAF kernel now makes communications, process control, SCADA and motion control all possible in a single control environment without special hardware.

For more information, contact: Robert R. Lyons, 602-926-4100. Email inquiries to: info@ISaGRAF.com. Visit TranSys, Inc. on the World Wide Web at: www.ISaGRAF.com.

INTEGRATED DEVELOPMENT ENVIRONMENT**CAD-UL Workbench* Development Systems**

CAD-UL, Inc.

Host Development Environments: UNIX and Windows and VMS.

CAD-UL provides a complete development environment for 80x86/Pentium (Real and Protected Mode) and 680x0/683xx target processors. The CAD-UL tool chain includes a C/C++ compiler, assembler, linker and high-level language debugger, all tightly integrated into a development environment (IDE) called Workbench. The CAD-UL XDB debugger interfaces to popular third-party real-time operating systems, in-circuit emulators, and is available as a ROM-monitor solution for debugging of actual hardware. The compiler systems are best known for generating highly optimized code.

For more information, contact: Jeff Liborio/Mike Halpin, 602-945-8188. Email inquiries to: us.sales@cadul.com. Visit CAD-UL, Inc. on the World Wide Web at: www.cadul.com.

PDOS PowerSuite

Eyring Corporation

Host Development Environments: Windows.

PDOS PowerSuite is a collection of easy to use tools that comprise a 32-bit multitasking, Windows-based embedded systems development environment. It gives PDOS and PDOSpro developers complete control of their real-time development environment. This toolset includes a GUI control center, operating system configuration and integration tools, complete on-line documentation, and links to compilers, debuggers, and other development tools.

For more information, contact: Clark Roundy, 801-561-1111. Email inquiries to: pdos-info@eyring.com. Visit Eyring Corporation on the World Wide Web at: www.eyring.com.

SwiftX* Cross-Development Environment

FORTH, Inc.

Host Development Environments: Windows and DOS.

FORTH's SwiftX is a PC-based, interactive cross-development environment for microcontroller, microprocessor or DSP-based embedded systems. SwiftX includes a Forth compiler, assembler, editor, libraries, debugger and real-time kernel, all in one package. The development environment supports Intel's 8051, 80186/80188, 8096/80196 microcontrollers and microprocessors and Motorola's 68HC11 and 68HC16 microcontrollers and 68xxx/CPU-32 processors. There are no run-time royalties for SwiftX kernels.

For more information, contact: Steve Agarwal, 800-55-FORTH. Email inquiries to: forth-sales@forth.com. Visit FORTH, Inc. on the World Wide Web at: www.forth.com.

MULTI* Software Development Environment

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Software Development Environment provides a framework of interacting tools to support program development by small or large workgroups. MULTI includes all of the tools needed to support major programming projects, including a program builder, version control, program editor, debugger, execution profiler, run-time error checker, and source-code control.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

HighTec's GNU C/C++ Development Kit

HighTec EDV-Systeme GmbH

Host Development Environments: UNIX, Windows, DOS and LINUX.

HighTec's GNU C16x Development Kit includes the GNU preprocessor, the C/C++ compiler, assembler, linker/locator and other useful GNU utilities. It has ANSI standard library support and an inline assembler with C/C++ operands. It also offers re-entrant programming, fast interrupt response time of 2-3 instructions for C/C++ routines. Debugging is accomplished via a serial interface or (optionally) TCP/IP or CAN. The Kit is available for Windows* NT/95 OS, Linux, Solaris 2.4, Sun 4.x, DOS and Windows 3.x operating systems. (The toolkit also includes gar, ghm, gsize, gabs, etc.)

For more information, contact: Hagen Heggenberger, ++43-681-92613-0. Email inquiries to: htc@hightec-rt.com. Visit HighTec EDV-Systeme GmbH on the World Wide Web at: <http://www.hightec-rt.com>.

Hitex HiTools Integrated Development Environment

Hitex Development Tools

Host Development Environments: UNIX, Windows and DOS.

The Hitex tools comprise a complete integrated development environment, including compiler, assembler, debugger and emulator for the μ Cs and μ Ps the company supports.

For more information, contact: Olaf Pfeiffer, 408-298-9077. Email inquiries to: info@hitex.com. Visit Hitex Development Tools on the World Wide Web at: <http://www.hitex.com>.

pRISM+ Integrated Development Environment

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pRISM+ is a complete, integrated development environment (IDE) for designing and delivering embedded software applications. pRISM+ combines the industry's optimal development tools with the pSOSystem, an industry-proven and reliable real-time operating system (RTOS). The pRISM+ environment combines "Best-Of-Class" tools for developing, analyzing and testing embedded applications in one seamless environment, built with an open, extensible architecture to accommodate future needs.

Note: Soon available for SPARC microprocessors.

For more information, contact: Sales, 408-542-1500. Email: N/A. Visit Integrated Systems, Inc. on the World Wide Web at: <http://www.isi.com>.

Metrowerks' CodeWarrior*

Metrowerks Corporation

Host Development Environments: UNIX and Windows.

Metrowerks' CodeWarrior is transforming embedded system development by offering the most intuitive GUI development tools available under Windows* 96/NT operating systems at a fraction of the cost of traditional command-line tools. With CodeWarrior, the developer gets a complete suite of tools (IDE) to create, compile, link, debug, and assemble fast, optimized embedded system code.

For more information, contact: Jenny Page, 512-873-4740. Email inquiries to: sales@metrowerks.com. Visit Metrowerks Corporation on the World Wide Web at: <http://www.metrowerks.com>.

Microsoft Windows* CE O.S. Embedded Toolkit

Microsoft* Corporation

Host Development Environments: Windows.

Microsoft's Windows CE Embedded Toolkit for Visual C++ 5.0 includes integrated development environment tools designed specifically for embedded development. The Windows CE platform is a 32-bit, preemptive, multitasking, multithreaded operating system designed from the ground up to support embedded systems. Use the embedded toolkit to choose components for building a customized version of the Windows CE operating system to meet the unique requirements of your hardware. The toolkit contains the RTOS, compiler, assembler, emulator, debugger, library and drivers.

For more information, contact: N/A. Email inquiries to: N/A. Visit Microsoft* Corporation on the World Wide Web at: N/A.

FasTrak* Development Environment

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

* Trademark or registered trademark of its respective company or mark holder

80x86 (186/286/386/486/586)**Intel Corporation (AMD, Cyrix)**

Microware's FasTrak is a client/server integrated development environment that provides powerful source-code management, makefile generation, and debugging and profiling tools. The FasTrak environment's tight integration with the OS-9* RTOS gives users an edge in software development, because FasTrak was designed from the ground up to be OS-9 RTOS-aware. The FasTrak IDE provides solutions across a wide variety of development schemes and computing platforms.

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

RTI ControlShell* O-O Programming Environment

Real-Time Innovations, Inc.

Host Development Environments: .

RTI's ControlShell is a component-based, object-oriented programming environment for real-time software development. Built on top of Wind River Systems' VxWorks* RTOS, ControlShell combines a modular structure, powerful graphical tools, and integrated data management into a unique approach to real-time software development. The ControlShell environment provides a framework that enables programmers/users to share and reuse software on a scale never before possible.

For more information, contact: Al Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

ISaGRAF* Workbench Development Tool Set

TranSys, Inc.

Host Development Environments: Windows.

The ISaGRAF Workbench is a Windows* OS-based software development tool set used to create control logic programs written in any or all of the five IEC 1131-3 languages. It is also a fully featured set of tools providing editing, debugging, code generation, documentation, library management, archiving, on-line monitoring, off-line simulation and on-line change of projects made for execution by the ISaGRAF run-time kernel.

For more information, contact: Robert R. Lyons, 602-926-4100. Email inquiries to: info@ISaGRAF.com. Visit TranSys, Inc. on the World Wide Web at: www.ISaGRAF.com.

Tornado* Integrated Development Environment

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Wind River Systems' Tornado is a complete software cross-development environment for embedded systems. Tornado is seamlessly integrated and includes powerful development tools and VxWorks*, a feature-rich, high performance and scalable real-time operating system. Completely open and customizable, the Tornado environment also facilitates the use of third-party and customer-developed tools to enhance its capabilities and meet unique customer requirements. Tornado has more than 90 software and hardware partners and is used by thousands of developers worldwide.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

COMPILER**PCYACC 7.0 Compiler/Language Development Toolkit**

Abraxas Software, Inc.

Host Development Environments: All.

Abraxas Software's PYACC v. 7.0 is a complete language-development environment that generates C, C++, Java, Delphi, and VBS source code (from Input Language Description Grammars or ILDGs) for building assemblers, compilers, interpreters, browsers, PDLs, language translators, syntax-directed editors, language validators, natural language processors, expert-system shells, and query languages. Includes "drop in" language engines for SQL, dBASE, PostScript, HyperTalk, SmallTalk-80, C++, C, Pascal, ProLog, FORTRAN, COBOL, Basic, SGML, ASN, RPG, SNA, VBasic, VHDL, HTML, VMRL, Java, ODMG-ODL/OQL, Modula-S, Delphi, VBS and Ada. The toolkit includes portable object-oriented classes for Java and C++ and debugging tools, including runtime visual parser debugging, abstract syntax tree generation and code referencing.

For more information, contact: Tana Rae K., 503-244-5253. Email inquiries to: sales@abxsoft.com. Visit Abraxas Software, Inc. on the World Wide Web at: www.abxsoft.com.

Apogee-C Compiler

Apogee Software, Inc.

Host Development Environments: UNIX.

The Apogee-C compiler accepts C source files and compiles them to produce assembly files. May invoke optionally available optimizing preprocessors. Targets SPARC workstations and embedded processors. Accepts ANSI C, Kernighan & Ritchie C, and more.

For more information, contact: George Malek, 408-369-9001. Email inquiries to: info@apogee.com. Visit Apogee Software, Inc. on the World Wide Web at: www.apogee.com

Apogee-C++ Compiler

Apogee Software, Inc.

Host Development Environments: UNIX.

The Apogee-C++ compiler accepts C++ source files and compiles them into assembly files. Includes RTTI, STL and exception handling. The compiler is performance optimizing and supports the SPARC v8plus processor.

For more information, contact: George Malek, 408-369-9001. Email inquiries to: info@apogee.com. Visit Apogee Software, Inc. on the World Wide Web at: www.apogee.com.

Apogee-FORTRAN 77/90 Compiler

Apogee Software, Inc.

Host Development Environments: UNIX.

The Apogee-FORTRAN 77/90 compiles FORTRAN 77 code and optimizes it for higher speed performance. It also compiles FORTRAN 90 code, optionally optimizing it for speed. An optional Apogee preprocessor for parallelizing code is available.

For more information, contact: George Malek, 408-369-9001. Email inquiries to: info@apogee.com. Visit Apogee Software, Inc. on the World Wide Web at: www.apogee.com.

Archelon C for Intel i960* Processor

Archelon Inc.

Host Development Environments: UNIX, Windows and DOS.

Archelon C for the i960 processor includes everything needed to develop C language code for any member of the Intel i960 family of embedded systems RISC processors. The package includes a C compiler and library, both of which fully conform to the ANSI standard, along with a state-of-the-art instruction scheduler, an assembler, a linker, and an object librarian. The compiler is fast, reliable, and generates very good code. The scheduler, which can be used either by itself on arbitrary assembly code or on code generated by the compiler, has been observed to improve the execution rate of benchmark code by up to twenty percent.

For more information, contact: Preston Gurd, 519-746-7925. Email inquiries to: info@archelon.com. Visit Archelon Inc. on the World Wide Web at: www.archelon.com.

User-Retargetable Development Tools II

Archelon Inc.

Host Development Environments: UNIX, Windows and DOS.

Archelon's User-Retargetable Microcode Tools package allows the user to implement a complete set of basic software tools for any programmable device, with particular emphasis on microcoded architectures. The package includes a C compiler, compactor, meta-assembler, linker, and librarian.

For more information, contact: Preston Gurd, 519-746-7925. Email inquiries to: info@archelon.com. Visit Archelon Inc. on the World Wide Web at: www.archelon.com.

Byte Craft C6808 Code Development System-Compiler

Byte Craft Limited

Host Development Environments: UNIX, Windows and DOS.

The Byte Craft Limited C6808 optimizing C cross-compiler is targeted to the Motorola 68HC08 family of microcontrollers. The compiler is part of an integrated development environment, including a linker, editor and built-in macro assembler. The Code Development System allows for programming in C without sacrificing code size or speed. C6808 produces ROMable code, symbol information and includes interrupt support.

For more information, contact: Karen McMurray, 519-888-6911. Email inquiries to: info@bytecraft.com. Visit Byte Craft Limited on the World Wide Web at: www.bytecraft.com.

Byte Craft COP8C Code Development System-Compiler

Byte Craft Limited

Host Development Environments: UNIX, Windows and DOS.

* Trademark or registered trademark of its respective company or mark holder

80x86 (186/286/386/486/586)**Intel Corporation (AMD, Cyrix)**

The Byte Craft Limited COP8C optimizing C cross-compiler is targeted to the National Semiconductor COP8 family of microcontrollers. The compiler is part of an integrated development environment, including a linker, editor and built-in macro assembler. The Code Development System allows for programming in C without sacrificing code size or speed. COP8C produces ROMable code, symbol information, and includes interrupt support.

For more information, contact: Karen McMurray, 519-888-6911. Email inquiries to: info@bytecraft.com. Visit Byte Craft Limited on the World Wide Web at: www.bytecraft.com.

Byte Craft Fuzz-C Preprocessor for Fuzzy Logic

Byte Craft Limited

Host Development Environments: UNIX, Windows and DOS.

Byte Craft Limited's Fuzz-C Preprocessor for Fuzzy Logic adds fuzzy logic capability to any C compiler. Fuzzy logic statements can be added to a C program. The preprocessor translates the fuzzy logic to C source code which can then be compiled by any C compiler.

For more information, contact: Karen McMurray, 519-888-6911. Email inquiries to: info@bytecraft.com. Visit Byte Craft Limited on the World Wide Web at: www.bytecraft.com.

Byte Craft MPC Code Development System-Compiler

Byte Craft Limited

Host Development Environments: UNIX, Windows and DOS.

The Byte Craft Limited MPC optimizing C cross-compiler is targeted to the Microchip PIC16/17Cxx families of microcontrollers, including 12-, 14- and 16-bit cores and 8K parts. The compiler is part of an integrated development environment, including a linker, editor and built-in macro assembler. The MPC Code Development System allows for programming in C without sacrificing code size or speed. MPC produces ROMable code, symbol information and includes interrupt support.

For more information, contact: Karen McMurray, 519-888-6911. Email inquiries to: info@bytecraft.com. Visit Byte Craft Limited on the World Wide Web at: www.bytecraft.com.

Byte Craft Z8C Code Development System-Compiler

Byte Craft Limited

Host Development Environments: UNIX, Windows and DOS.

The Byte Craft Limited Z8C optimizing C cross-compiler is targeted to the Zilog Z8 family of microcontrollers. The compiler is part of an integrated development environment, including a linker, editor and built-in macro assembler. The Code Development System allows for programming in C without sacrificing code size or speed. Z8C produces ROMable code, symbol information, and includes interrupt support.

For more information, contact: Karen McMurray, 519-888-6911. Email inquiries to: info@bytecraft.com. Visit Byte Craft Limited on the World Wide Web at: www.bytecraft.com.

C38 Code Development System/Compiler

Byte Craft Limited

Host Development Environments: SunOS 4.x, Solaris 1.x, HP-UX 9.1 and DOS/Windows 3.1/NT/95.

The Byte Craft Limited C38 optimizing C cross-compiler is targeted to the Mitsubishi MELPS740 series of microcontrollers. The compiler is part of an integrated development environment, including a linker, editor and built-in macro assembler. The code development system allows for programming in C without sacrificing code size or speed. The C38 compiler produces ROMable code, symbol information, and includes interrupt support.

For more information, contact: Karen McMurray, 519-888-6911. Email inquiries to: info@bytecraft.com. Visit Byte Craft Limited on the World Wide Web at: www.bytecraft.com.

C6805 Code Development System/Compiler

Byte Craft Limited

Host Development Environments: UNIX, Windows, DOS, Solaris and HP-UX.

The Byte Craft Limited C6805 optimizing C cross-compiler is targeted to the Motorola 68HC05 family of microcontrollers. The compiler is part of an integrated development environment including a linker, editor and built-in macro assembler. The C6805 Code Development System allows for programming in C without sacrificing code size or speed. C6805 produces ROMable code, symbol information and includes interrupt support. A companion product, the E6805 Symbolic Host Support provides C source-level debugging for the Motorola EVM and EVS boards.

For more information, contact: Karen McMurray, 519-888-6911. Email inquiries to: info@bytecraft.com. Visit Byte Craft Limited on the World Wide Web at: www.bytecraft.com.

GNUPro* Toolkit Compiler Suite

Cygnus Solutions

Host Development Environments: .

Cygnus Solutions' GNUPro* Toolkit compiler suite (with assembler) is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The compiler delivers speed- and size-performance advantages over a wide range of microprocessor architectures. Cygnus provides mission-critical technical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

DDC-I Ada Compiler Systems (DACS*)

DDC-I

Host Development Environments: UNIX and Windows.

A typical DDC-I Ada Language compiler system, the DACS-80x86 features include: compact, efficient ROMable code; modular stand-alone run-time system; advanced symbolic Ada debugger; superior real-time performance; easily configurable to developer's hardware; generates Intel OMF; supports bare PC as target; FAA-certifiable run-time system available (including tasking); supports rate-monotonic scheduling; fast and normal interrupt handling; fast Ethernet downloading; selective linking; stack analysis tools (static and dynamic); Multibus* II interface; CIFO and RTS entry-point package; numeric package using 80x87 NPX. (See other processors supported by DDC-I's compiler systems.)

For more information, contact: Morten Selling, +45 45 87 11 44. Email inquiries to: sales@ddci.dk. Visit DDC-I on the World Wide Web at: www.ddci.com.

D-C++ C/C++ Cross-Compiler Suite

Diab Data, Inc.

Host Development Environments: UNIX and Windows.

D-C++ is a highly-optimizing C/C++ compiler, producing exceptionally fast, compact, accurate code for the PowerPC, 68K/CPU32, ColdFire, and MCore processor-based applications. The D-C++ compiler is fully ANSI compliant and works with all popular debug, RTOS, and emulation systems. The suite contains a compiler, assembler, linker, profiler, program checker, archiver, advanced libraries package, and other utilities. An optional RTA (Real-Time Analysis) Suite enables developers to enhance program performance, reliability and memory utilization.

For more information, contact: Jan Liband, 415-571-1700. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

D-CC C Cross-Compiler Suite

Diab Data, Inc.

Host Development Environments: UNIX and Windows and Others.

Diab Data's D-CC is a highly-optimizing C compiler, producing exceptionally fast, compact, target-specific code for Motorola's PowerPC, 68K/CPU32, ColdFire and MCore Processor-based applications. The D-CC compiler is fully ANSI and EABI compliant, works with all popular debug, RTOS, and emulation systems. The suite provides the compiler, assembler, linker, profiler, program checker, archiver, advanced libraries package, and other utilities. An optional Real-Time Analysis Suite (RTA) enables developers to enhance program performance, reliability, and memory utilization.

For more information, contact: Jan Liband, 415-571-1700. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

Run-Time Analysis Tools For Diab Data Compilers

Diab Data, Inc.

Host Development Environments: UNIX and Windows.

Diab Data's RTA Suite is a suite of visual run-time analysis tools for improving program performance, reliability, and memory utilization. The RTA Suite works in conjunction with Diab Data's C/C++ compilers and includes a Visual Interactive Profiler, a Run-Time Error Checker, and a Link Map Analyzer for visualizing memory-map setups.

For more information, contact: Jan Liband, 650-571-1700 x227. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

EPI CC Compilers

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

EPI's Software Toolkits for the AM29K, ARM and MIPS microprocessors includes the CC Series compilers--CC29K, CC3K, CCA4K and CC-ARM. EPI has selected the compil-

* Trademark or registered trademark of its respective company or mark holder.

80x86 (186/286/386/486/586)**Intel Corporation (AMD, Cyrix)**

er technology best suited for each of the RISC processor families. The compilers are designed specifically for embedded applications and provide features to allow optimum tradeoffs between code size and system performance. Developers can easily tailor code to their specific targets and applications. EPI's compilers are fully ANSI-compliant, have big and little Endian support, and have a wide choice of optimization levels.

EPI compilers for the MIPS and AM29K processors are also supported on DOS hosts.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: <http://www.episupport.com>.

Advanced Development System: Compiler

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software provides a fast modern translator for the C language. The translator promotes continued compliance with the latest ANSI standard for C. The compiler is a smooth, integral part of the ProView* integrated development environment (IDE) and is tightly coupled to a fast color syntax-highlighting programmer's editor. The compiler supports Intel's MCS-51 and MCS-251 and Philips' 8051XA series microcontrollers.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

Green Hills Optimizing Ada 95 Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

A fully validated implementation of the Ada 95 language, including new task and synchronization features, POSIX threads, and type extensions of tagged types and child library units. Supports mixed-language programming with C, C++, FORTRAN and Assembly. Compilers support many 32- and 64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing C Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills' high-performance optimizing C compilers, for native or embedded development, have many advanced optimizations, such as cross-module inlining. The compilers allow for the fine tuning of optimization strategy so users can generate optimal code. Supports 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing C++ Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills offers high-performance optimizing C++ compilers for native or embedded development. The compilers are compatible with Green Hills Software's MULTI* debugger, which automatically handles C++ constructs such as name mangling and template debugging. The compilers support most 32-/64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing Embedded C++ Compiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills optimizing Embedded C++ compilers are high-performance and follow the Embedded C++ Technical Committee draft standard.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing FORTRAN Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills Software offers optimizing FORTRAN compilers for native or embedded development. A compile-time option allows users to select from among the F77, VMS and DoD dialects of the FORTRAN language, with additional support for many extensions. The FORTRAN compilers support most 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Hyperception RIDE Compiler

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's RIDE Compiler communicates with an installed board driver which links DSP COFF object files, downloads code, data, and parameters to the DSP memory, controls the execution, and monitors activity of the DSP. The application is linked in the same fashion as a dedicated DSP Compiler(Assembler)/Linker. There is no special real-time kernel or RTOS to increase complexity.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

High C/C++ Compiler

IBM Microelectronics

Host Development Environments: UNIX and Windows.

The IBM High C/C++ Compiler provides essential tools and technology for creating and distributing embedded PowerPC* processor applications. A true compiler rather than a C-to-C++ translator, it permits specification of C++ compilation to allow staged migration from C to C++. It also offers cross-platform compatibility, producing machine language that is compact, fast, and efficient. Features include: big- and little-Endian addressing; eight levels of global optimization; optional ANSI-Standard conformance; extensive/scalable error/warning messages; feature toggles and pragmas; C or C++ compiler invoking via user-definable source-file extension; lint-like checking; source-annotated assembly listings; functional inlining across compilers; no restrictions on inlined function complexity; four user-selectable warning message levels (500+ diagnostic messages); supports ELF and DWARF; floating-point code generation with U.S. Software's floating-point libraries.

For more information, contact: PowerPC Technical Support Hotline. Email inquiries to: ppcsupp@raleigh.ibm.com. Visit IBM Microelectronics on the World Wide Web at: www.chips.ibm.com/products/embedded.

CTOOLSW95 Compiler

Intel Corporation

Host Development Environments: UNIX and Windows.

Intel's C compiler for its i960* processors, CTOOLSW95, includes the following features: improved code generation for the i960 RP, Jx and Hx processor families; easy-to-use whole-program and profile-driven optimizations; efficient memory use with runtime decompression of compressed object code; debug of optimized code using the ELF object file format w/DWARF 2.0 symbolic debug records; conformance to the 80960 Tools Consortium's Application Binary Interface for enhanced interoperability; on-line HTML hypertext documentation; compatible w/GNU/960 R4.6 and CTOOLS960 R4.6; GUI interface to the gdb960 debugger for source-level debugging with point-and-click ease; conforms to ANSI Std X3.159-1989 and passes Plum Hall conformance and perennial tests; supports in-line Assembly code in C Source. For more on CTOOLS, go to <http://developer.intel.com> on the World Wide Web.

For more information, contact: Local Intel Sales Office or Distributor. Email inquiries to: N/A. Visit Intel Corporation on the World Wide Web at: www.intel.com.

Keil Software C Compilers

Keil Software Inc.

Host Development Environments: Windows and DOS.

Keil Software's C compilers are full ANSI C compilers and assemblers, designed specifically for the microcontroller families that they support. µVision* is the Windows* OS User Interface that drives the optimizing C compilers. Compiler, assembler and linker options are point-and-click. µVision and the manuals are written in the USA, and extensive on-line help is included. Keil optimizing C compilers support the 8051, the 80C251 (Intel and Temic), including the USB 8x930 µController families and the Siemens 161, 163, C164CI, 165, 166/167, 167CR and SGS Thomson ST10 family microcontrollers, with future derivative family chip members supported. Keil provides extensive support, free for one year, as well as on-line help and sample USB code, etc. from its Web URL.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

* Trademark or registered trademark of its respective company or mark holder

80x86 (186/286/386/486/586)**Intel Corporation (AMD, Cyrix)****High C/C++ Embedded ARM* Development Tool Set**

MetaWare Incorporated

Host Development Environments: UNIX and Windows and SunOS 4.x, Solaris 1.x, HP-UX 9.1 and Windows 3.1/NT/95.

High C/C++ is a super-optimizing toolset for creating fast and compact executable code. The toolset includes a high-performance C/C++ compiler, linker-locator-archiver, assembler, profiler, and run-time libraries. High C/C++ includes several advanced optimization features designed for improved code size and speed, including branch prediction, which alone can yield performance gains of as much as 10%.

For more information, contact: MetaWare Technical Sales, 408-429-6382. Email inquiries to: techsales@metaware.com. Visit MetaWare Incorporated on the World Wide Web at: www.metaware.com.

MPLAB-C Universal C Compiler

Microchip Technology Inc.

Host Development Environments: Windows.

Using MPLAB-C with MPLAB Integrated Development Environment provides full source level debugging in an easy-to-use project environment, thus reducing development time. The compiler generates executable code directly from the compile process so there is no need to assemble code generated by the compiler. MPLAB-C is compatible with MPLAB, allowing it to function with the PICMASTER in-circuit emulator and the MPLAB-SIM simulator.

For more information, contact: 602-786-7668. Email inquiries to: info@microchip.com. Visit Microchip Technology Inc. on the World Wide Web at: www.microchip.com.

Microtec* C and C++ Cross-Compilers

Microtec

Host Development Environments: UNIX and Windows.

Microtec's C and C++ compilers conform to the version of the C++ language that is defined in the Annotated C++ Reference Manual (ARM), including templates, exception handling, and nested classes. Because the C++ language continues to develop, Microtec is actively participating in the ANSI C++ standardization process. The company is committed to supporting both the ANSI C++ language and library standards with future product releases. The most significant new benefit is the addition of specialized linker optimizations that significantly reduce the size of modules when advanced C++ features, such as templates and in-line and virtual functions, are used. These optimizations allow developers to take advantage of the full power of object-oriented programming techniques in embedded systems without experiencing code bloat.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

C++ Compiler

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Object-oriented programming techniques increase productivity, improve quality and provide reusability with Tasking's C++ compiler. The compiler allows the intermixing of C++ and C code within a single application. Thus, the benefits of C++ can be incorporated into existing C applications a module at a time, thus providing easy migration from C to C++ programs.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

C Compiler Package

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking delivers ANSI C compilers that are highly optimized with individual target-specific extensions for ultimate flexibility and efficiency. As well as using these target-specific extensions, the developer-user can also define in-line functions and use in-line assembly. Included with every compiler is an assembler and linker/locator.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

TMS320Cxx C Compilers

Texas Instruments Inc./DSP Tools

Host Development Environments: UNIX and Windows and HP 9000.

The C Compiler accepts ANSI C source code and produces efficient assembly language source code, performing four selectable levels of state-of-the-art classical and target-specific optimizations to maximize the efficiency of the compiled code. Developers get the rapid development, easier code maintenance and portability benefits of using a standard high-level language.

For more information, contact: 800-477-8924 x 4500 or Local TI Sales Office. Email inquiries to: N/A. Visit Texas Instruments Inc./DSP Tools on the World Wide Web at: www.ti.com.

ASSEMBLER**GNUPro* Toolkit**

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit is a solution to the problem of delivering quality software to meet the increasingly tighter schedules required by today's marketplace. The highly optimized tool chain for a specific host-target combination drives competitive speed- and size-performance advantages into a developer's software without compromising either its portability or maintainability. The fully-featured debug tools and utilities significantly help to shorten the development, test, and validation cycles. Cygnus backs the GNU technology with a commitment to rapid and expert support. All GNUPro tool chains for native and embedded programming are bundled with mission-critical support services and guaranteed technical response times.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

Green Hills Cross Assembler Tool Chain

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills embedded tool chain includes a macro assembler, linker, librarian, run-time libraries, object formatters and other utilities useful for embedded development. Cross-assembler tool chains are available for most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

EMULATOR**Emulation Tools for Embedded Development**

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

Applied Microsystems offers a broad range of high-performance microprocessor emulators. Patented CodeTAP* low-cost emulators offer the capabilities most used by software engineers. CodeICE* emulators have advanced features for both hardware and software development. The award-winning new SuperTAP* compact emulator offers hardware and software development features in a palm-sized form factor.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

CheckMate II* In-Circuit Emulator

Beacon Development Tools, Inc.

Host Development Environments: Windows and WIN32.

The CheckMate II emulator system allows full C/C++ source level debug capability while the code executes in real time in the target environment. Real-time breakpoints and trigger points control execution while the real-time trace buffer captures execution history.

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

Q.E.D.* In-Circuit Emulator

Beacon Development Tools, Inc.

Host Development Environments: Windows and WIN32.

The Q.E.D. emulator system allows full C/C++ source level debug capability while the code executes in real time in the target environment. Real-time breakpoints and trigger points control execution while the real-time trace buffer captures execution history.

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

HP 64700 Series In-Circuit Emulators

Hewlett-Packard Company

Host Development Environments: UNIX and Windows.

The HP 64700 series development tools compose a comprehensive embedded devel-

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oment, debugging and analysis environment that continues to evolve and expand to meet the increasing demands of the software designer. Integrated under a common user interface and operating environment, these tools create an embedded design system that accelerates the development process.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or emulator.

unDOS* MS-DOS* and BIOS* Emulator

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's unDOS emulator is a cost-effective bridge product that helps embedded system developers migrate their applications to x86 (Intel Architecture) protected mode in which MS-DOS* functions are no longer accessible, or allows real-mode programs to run without DOS, allowing the applications to (1) avoid DOS royalties, (2) free up the memory capacity used by DOS, and (3) port an existing application to protected mode without needing a DOS extender.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

PowerPack* In-Circuit Emulator

Microtek International

Host Development Environments: Windows.

Microtek International's high-performance PowerPack in-circuit emulators combine a state-of-the-art source-level debugger with the most advanced trigger-and-trace system available. Users can relate clock-edge hardware timing events back to source code without stopping the target system. PowerPack emulators support Pentium, Intel486, National NS486, Intel386, Intel 80C186, AMD Am186 and Motorola 683xx/HC16 processors.

For more information, contact: 800-886-7333 or 503-645-7333. Email inquiries to: info@microtekintl.com. Visit Microtek International on the World Wide Web at: www.microtekintl.com.

SDT-Xi* In-Circuit Emulator

Noral Micrologics Limited

Host Development Environments: DOS.

The 68LC302, 68302, 68306, 68K, 80x86, NEC V series, WDC 65C02 family, 64180, Z80, 68xx, 8085, NSC800 processors and many others are supported by Noral's SDT-Xi series of universal in-circuit emulators. Noral's in-circuit emulator systems are easily reconfigured for each processor emulation by changing emulation probes and processor family configuration pods.

For more information, contact: Harry Erickson, 508-647-0103 (U.S. Office). Email inquiries to: noral@noral.co.uk. Visit Noral Micrologics Limited on the World Wide Web at: www.noral.com.

Orion/Advice* Emulator

Orion Instruments

Host Development Environments: UNIX and Windows.

The Orion/Advice is a high-performance, real-time emulation system. A sophisticated multi-level event-triggering system, combined with a non-intrusive trace buffer provide unmatched problem tracking. A point-and-click Windows* or UNIX* OS graphical user interface (GUI) provides true high-level-language (HLL) debug support. Profiling, performance analysis and code coverage complete the Orion/Advice emulation package.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

DEBUGGER**MWX-ICE* Debugger**

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

MWX-ICE is a full-featured C/C++ symbolic debugger tailored specifically for in-circuit emulation. It provides complete control of Applied Microsystems emulators and features a consistent interface across Sun4, HP 9000, and Windows PC platforms. The MWX-ICE debugger supports popular tool chains including those from Microtec, Cygnus-GNU, Green Hills, and SDS.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

SSI SoftProbe* 386/TX (DOS) Debugger

Beacon Development Tools, Inc.

Host Development Environments: Windows and DOS.

Beacon's SSI SoftProbe 386/TX is a DOS-hosted, source-level debugger that allows for the downloading of a program from the host PC, and for debugging on the actual Intel386/486* processor-based target system in real mode and protected mode. The debugger accepts executable files in Intel OMF-86/286/386 boot-loadable file format and also includes a multi-window user interface and a Target Monitor program.

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

SSI SoftProbe* 86/TX Debugger

Beacon Development Tools, Inc.

Host Development Environments: Windows and DOS.

Beacon Development Tools' SSI SoftProbe 86/TX is a source-level debugger that allows for downloading of a program from the host PC and debugging on the actual Intel real-mode 80x86/x88/186/188/286/386/486/Pentium* processor-based target system. It accepts executable files in Intel OMF86 absolute object file format. SoftProbe 86/TX includes a multi-window user interface and a Target Monitor program.

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

SSI SoftProbe* x86/SIM (DOS) Simulator/Debugger

Beacon Development Tools, Inc.

Host Development Environments: Windows and DOS.

SSI SoftProbe* x86/SIM is a DOS-hosted, bus-level simulator and source-level debugger for debugging real and protected-mode i386*, i386 EX, and i486* processor-based embedded applications in C or assembly language. The simulator accepts executable files in Intel OMF-86/286/386 boot-loadable format. SoftProbe x86/SIM performs program execution via software simulation. SoftProbe x86/SIM provides 80386 and 80486 microprocessor and 80387 coprocessor simulation at bus-level.

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

SSI VisualProbe* Remote Debugger (WIN)

Beacon Development Tools, Inc.

Host Development Environments: Windows.

Beacon's SSI VisualProbe Remote Debugger is a Windows* OS-hosted graphically embedded source-level debugger for debugging real and protected-mode Intel 80386/387, 80386EX, and 80486 processor-based embedded C and assembly language applications. Support for debugging C++ applications is provided at source-level with mangled symbols. Program execution on the target system is controlled by the target monitor. Accepts executable files in Intel OMF-86/286/386 boot-loadable file format.

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

SSI VisualProbe* x86 Simulator (WIN)

Beacon Development Tools, Inc.

Host Development Environments: Windows.

The SSI VisualProbe x86 is a Windows* OS-hosted simulator and source-level debugger for debugging real and protected-mode Intel 386/486/Pentium* processor-based embedded C and assembly language applications. The debugger allows the developer to run and debug applications without an actual target (hardware) system. Software engineers may write and debug their code and deliver finished applications concurrent with the target hardware release.

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

DS-186 Development System

Ceibo Inc.

Host Development Environments: Windows and DOS.

Ceibo's DS-186 Development System comprises a Paradigm Debugger and supports Intel's and AMD's 80C186 microprocessors as well as NEC's V20-50 processors and more. It supports full-speed emulation up to 25MHz and has a 1MB zero-wait-state

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Intel Corporation (AMD, Cyrix)

mapped memory, an 8K frames dynamic trace buffer, 1MB hardware breakpoints, numeric coprocessor support, an OMF converter, support for Borland, Microsoft and Intel compilers and full support for C, C++, Pascal and Assembler languages.

For more information, contact: Ceibo Sales, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

DS-386 Development System

Ceibo Inc.

Host Development Environments: Windows and DOS.

The DS-386 Development System consists of a Paradigm Debugger that supports Intel's 386EX/SX/CS processors and other 386/486 derivatives, the 80C186/8/LX/EA/EB/EC, 8086/8, NEC V20/25/30/40/50 and AMD186EM/386 microprocessors. The debugger supports up to 40MHz zero-wait-state operation, has 2MB mapped memory and a 32KB frames dynamic trace buffer, trace triggers on internal and external events. It also features a plug-in Run ONCE mode, 2.7V and 5.5V operation, high-level language source debug, macros for testing purposes, and support for compilers from MetaWare, Watcom, Borland, Microsoft and others.

For more information, contact: Ceibo Sales, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

GNUPro* Toolkit Debugger Suite

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit debugger suite is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The fully-featured debug tools and utilities significantly help to shorten the development, test and validation cycles. Cygnus provides mission-critical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

MULTI* Source-Level Debugger

Greer Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Source-level Debugger supports native or embedded debugging of most popular 32-/64-bit processors. The main debugger window shows source or interlaced source and assembly. A single click lets the user look at a variable or set a breakpoint. Small windows allow for the monitoring of specific variables, local variables, or the call stack.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

LynxInsure++*

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

LynxInsure++ is a powerful environment for the development of quality software. Using LynxInsure++, developers will produce more robust, optimized, higher quality real-time applications. LynxInsure++ automatically detects large classes of programming and run-time errors and quickly pinpoints algorithmic anomalies, bugs, and deficiencies. It visualizes in real time the memory manipulation of a program, helping developers spot bugs and inefficiencies in memory handling. LynxInsure++ also performs coverage analysis, providing necessary feedback to programmers about which parts of the code were actually run/tested.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

TimeScan* Performance Analyzer

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

TimeScan is an event-based tracing and performance analysis tool. It supports multi-process, multi-threaded, and multiprocessor applications with event logging at a sub-microsecond resolution. With TimeScan, programmers have the ability to measure and display dynamic behavior programs. TimeScan is useful for both performance analysis and as a debugging tool, resolving difficult problems such as resource contention, bottlenecks, deadlocks, and critical process timings that cannot be tackled with a conventional debugger.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

TotalView* Debugger

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

The TotalView Debugger is a powerful, source-level, window-oriented debugger for the LynxOS RTOS. TotalView provides the ability to debug multi-process, multi-threaded, and multiprocessor-based systems and applications. It is designed to operate in a networked environment, giving the developer the ability to manage and control multiple processes even when these processes are distributed across multiple, heterogeneous systems.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

DEBUG/smx* Debugger

Micro Digital, Inc.

Host Development Environments: DOS.

The Paradigm DEBUG family of stand-alone and in-circuit emulator debuggers has long been popular for Intel, AMD, and NEC x86 processor-based embedded system debugging. Micro Digital has tightly integrated its smx RTOS kernel with Paradigm's DEBUG family, thus enabling real-time embedded applications to get to market faster and easier than ever before. A sampling of extensions available in Paradigm DEBUG when DEBUG/smx is used follows: task-specific breakpoints simplify the process of debugging shared code; viewers for an smx object such as tasks, semaphores, etc.; task call stack analysis; inspectors allow the state of any object in a queue to be examined in detail.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

Micro Digital smxAware Debugger

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's smxAware adds smx RTOS awareness to debuggers produced by other vendors. This is a great convenience during debugging and results in significant time savings. smxAware is in the form of a DLL (dynamic link library), which is loaded on the host by the host portion of the debugger. "smx" is selected from the debugger's menu bar. Objects to view are then selected by first clicking on the radio button for the object type (e.g. Tasks), then selecting from the displayed list of objects of that type (e.g. idle, timeout, etc.). All fields of the control block for an object are shown. All levels of multi-level objects are shown. Objects may also be added to the Watch Window. smxAware supports specific breakpoints for some debuggers.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

smxProbe V.3.2 Debugger

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's smxProbe is a task-level symbolic debugger that either co-exists with source-code-level debuggers such as the Turbo* and CodeView* Debuggers, or runs on its own as a task. smxProbe maintains an error buffer, a task-trace buffer and an smx kernel call-trace buffer. These are allocated from far heap. Each buffer may be up to 64KB. The buffers permit the examination of smx kernel control blocks and queues. The debugger presents all information symbolically and allows for the setting of trigger points and break points. Micro Digital also offers an smx RTOS kernel-compatible remote version.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

XRAY* Debugger

Microtec

Host Development Environments: UNIX and Windows.

The XRAY* Debugger provides an environment designed to accelerate the edit-compile-download-debug cycle for development of embedded applications. Microtec's XRAY debugger is a well-known tool that has served embedded software developers for more than 10 years. The most current version of the XRAY debugger offers advanced debug support of multitasking and multiprocessing applications. Multiple execution

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environments are available, including: instruction-set simulator; target-resident monitor; ICE and RTOS-aware. Along with the debugger, XRAY offers a suite of development tools, including a context-sensitive editor, an interface to most popular source-code management systems, build facilities, and source browsing. The XRAY debugger features an intuitive, standard Windows or Motif user interface.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

SWAT* Software Analysis Tool

Microtek International

Host Development Environments: Windows.

The new SWAT Software Analysis Tool records executed code coverage without stopping the target processor and without altering the source code. Configured as PowerPack emulator options for i386*, i486* and Pentium* processors, the SWAT tool shows the design engineer whether his code is executing as intended.

For more information, contact: 800-886-7333 or 503-645-7333. Email inquiries to: info@microtektintl.com. Visit Microtek International on the World Wide Web at: www.microtektintl.com.

Paradigm DEBUG

Paradigm Systems

Host Development Environments: Windows and DOS.

Paradigm DEBUG is a premiere source-level debugger for Intel, AMD, and NEC x86-compatible embedded systems. Paradigm DEBUG is available either as a stand-alone version, or customized for use with popular in-circuit emulators. For full technical specifications on any version of Paradigm DEBUG, contact Paradigm Systems.

For more information, contact: Joanne Weir, 800-537-5043. Email inquiries to: info@devtools.com. Visit Paradigm Systems on the World Wide Web at: www.devtools.com.

RTI ScopeProfile* Performance Analysis Tool/Debugger

Real-Time Innovations, Inc.

Host Development Environments: UNIX and Windows.

RTI's ScopeProfile is a dynamic execution profiler for Wind River Systems' VxWorks* RTOS. The profiler shows the developer exactly where the CPU cycles are being spent. Both cumulative (including all subroutines) and direct CPU usage of each routine are captured. The output can be plotted in real time with RTI's StethoScope Debugger. The profiler will help developers tune their time-critical systems for maximum performance.

For more information, contact: Al Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

RTI StethoScope* Debugger

Real-Time Innovations, Inc.

Host Development Environments: UNIX and Windows.

Real-Time Innovations' (RTI) StethoScope debugger is a graphical monitoring, performance analysis, and data collection tool for real-time applications. The developer can watch program variables evolve in real time; any value in memory can be monitored. Much like a software oscilloscope, StethoScope allows the developer to see what the application is doing. StethoScope may rapidly become the developer's most important debugging and analysis tool.

For more information, contact: Al Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

Signum Chameleon Debugger

Signum Systems Corporation

Host Development Environments: Windows.

Signum's Chameleon Debugger supports the 8051, 80196, 80186, DSPs and the Compact RISC processors under a 32-bit Windows* O.S. environment. The debugger interfaces with emulators from Signum Systems, Lucent Technologies, National Semiconductor and Texas Instruments to provide a development environment for software and hardware designers.

For more information, contact: Jerry Lewandowski, 805-523-9774. Email inquiries to: sales@signum.com. Visit Signum Systems Corporation on the World Wide Web at: <http://www.signum.com>.

WindView* Debugger

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

WindView is a revolutionary diagnostic and analysis tool that provides detailed visibility into the dynamic operation of an embedded system. The developer using the WindView visual debugger can quickly and easily visualize the complicated interaction among tasks, interrupt service routines, and system objects in an application. This information is presented and can be manipulated through a state-of-the-art graphical user interface (GUI).

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

LIBRARY**C-tree Plus* File Handler**

FairCom Corporation

Host Development Environments: UNIX and Windows and Most Others.

C-tree Plus File Handler Version 6.7A is based on advanced B+tree (balanced) algorithm. The C-tree Plus API handles all aspects of database I/O. Customer can program single-user or multi-user non-server applications royalty free. C-tree Plus has a small memory footprint, unsurpassed portability, is client/server ready and ODBC compliant. Features include: transaction processing; fixed/variable length records; alternate collating sequence numbers; and file mirroring. Package supports Windows, OS/2, DOS, Macintosh and UNIX.

For more information, contact: Sales, 573-445-6833. Email inquiries to: sales@faircom.com. Visit FairCom Corporation on the World Wide Web at: www.faircom.com.

smx*++ Class Library

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's smx++ Class Library (C++ language) operates with smx. smx++ is recommended for C++ object-oriented applications. The library permits the creation of application-specific operating system objects by inheritance. The smx++ library also permits overloading the new and delete operators per class and other helpful features for C++ object-oriented programming.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

DRIVER**Datalight's FlashFX Flash File System**

Datalight*

Host Development Environments: Windows and DOS.

Datalight's FlashFX, a full-featured flash file system, makes flash memory appear to be a disk. It includes true wear-leveling, scheduled garbage collection, and uses only 12K ROM and 7K RAM. There is no faster flash file system on the market. FlashFX is portable to any operating system and any processor (CPU). FlashFX may also be categorized as a BIOS extension.

For more information, contact: Tim Gillman, 360-435-8086 x 115. Email inquiries to: sales@datalight.com. Visit Datalight* on the World Wide Web at: <http://www.datalight.com>.

OTHER TOOLS**Nucleus* FILE**

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

To meet the needs of embedded developers requiring standard off-line storage, Accelerated Technology offers Nucleus FILE. It is an MS-DOS-compatible file system that requires only driver software on the target in order to store and retrieve data. Accelerated Technology also provides drivers for the standard PC-compatible floppy disk and IDE controllers. By combining these products with an application, a user is able to read and write standard PC fixed and floppy disks from an embedded system.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

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Intel Corporation (AMD, Cyrix)

CodeTEST* Software Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

CodeTEST software verification tools for embedded system developers and testers support most major 32- and 16-bit microprocessors and VME boards, and supplies tools for accurately analyzing embedded system performance, code coverage, dynamic memory allocation and memory errors, as well as a powerful software trace tool. A VME version is now available.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

VSP-TAP*/Eaglei* Co-Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

Applied's VSP-TAP and the Eaglei co-verification environment from Viewlogic Systems provides software operation verification against a hardware description model (HDL). VSP-TAP adds enhanced real-time capabilities, connecting the simulated environment, the actual processor, and real-world data at real processor speeds, and supplying access to an emulator's full debugging capabilities.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

APIAccess* Middleware For Windows* OS

Award Software International, Inc.

Host Development Environments: Windows.

Award's APIAccess is the middleware needed to deploy Windows OS applications on embedded systems. Using APIAccess's Win32*-compatible libraries, Windows 32-bit source code can be ported and run natively on any supported combination of processor and RTOS. Embedded products can be designed, looking and acting just like a PC-based application.

For more information, contact: Bill Goodrich, 415-237-6895. Email inquiries to: sales@award.com. Visit Award Software International, Inc. on the World Wide Web at: www.award.com.

Embedded EliteBIOS* Software

Award Software International* Inc.

Host Development Environments: Windows.

Embedded EliteBIOS is a highly modular and full-featured, standards-compliant core BIOS* for all Intel Architecture x86 platforms and chip sets, supporting multiple BIOS extensions. Its highly modular architecture enables small footprint designs, and it can be augmented with MPCAccess or RPBAccess, for more remote administration of embedded systems.

For more information, contact: Bill Goodrich, 415-237-6895. Email inquiries to: sales@award.com. Visit Award Software International* Inc. on the World Wide Web at: www.award.com.

MPCAccess* Diagnostic Firmware/Utility

Award Software International* Inc.

Host Development Environments: Windows.

MPCAccess or RPBAccess solve the problem of a non-booting system with remote pre-boot (RPB) diagnostics, troubleshooting and repair. MPCAccess administers local or remote x86-based embedded systems that have no video/keyboard, providing a remote view of system output and remote keystroke input through a serial port connector.

For more information, contact: Bill Goodrich, 415-237-6895. Email inquiries to: sales@award.com. Visit Award Software International* Inc. on the World Wide Web at: www.award.com.

MR BIOS* System Management Software

Award Software International* Inc.

Host Development Environments: Windows.

MR BIOS is an alternate embedded BIOS offering from Award Software that has been popular for many years. Features include patented system speed calibration. In designs that permit such, CPUs can be interchanged without replacing the BIOS. MR BIOS 8042 is a masked component or binary code for OEM licensing.

For more information, contact: Bill Goodrich, 415-237-6895. Email inquiries to: sales@award.com. Visit Award Software International* Inc. on the World Wide Web at: www.award.com.

PC DIAG* Diagnostic Utility

Award Software International* Inc.

Host Development Environments: Windows.

PC DIAG is a disk-based, self-booting diagnostic package that performs systems and component diagnostics for any Intel Architecture x86-based microcomputers, including embedded PCs. With PC DIAG, system integrators, OEMs and VARs can identify and analyze system firmware problems and component flaws. A system's base memory, video functions, fixed and floppy drives, parallel and serial ports, keyboard and math coprocessor or extended memory can all be tested.

For more information, contact: Bill Goodrich, 415-237-6895. Email inquiries to: sales@award.com. Visit Award Software International* Inc. on the World Wide Web at: www.award.com.

WWWAccess* Internet Appliance Creator

Award Software International* Inc.

Host Development Environments: Windows.

WWWAccess combines a Web browser with an embedded, real-time operating system and custom 32-bit Windows* OS API library to offer a one-stop solution for creating Internet appliances based on the Intel x86 system architecture. The Award product allows developers to embed source-based Windows applications into their products.

For more information, contact: Bill Goodrich, 415-237-6895. Email inquiries to: sales@award.com. Visit Award Software International* Inc. on the World Wide Web at: www.award.com.

Validator* Verification Tools

B-Tree Systems, Inc.

Host Development Environments: Windows.

B-Tree's Validator and ValidatorGold Test Tools are fully automated test environments that enable the functional verification of embedded systems by providing real-time stimulation, non-intrusive monitoring, data visualization, automated test execution and logging of test results. B-Tree's Validator 2000 enables Year 2000 (Y2K) compliance testing for embedded and non-embedded systems. B-Tree's Validator SC product automates software compatibility testing for PCs and PC components.

For more information, contact: Laura Dominik, 612-936-7887. Email inquiries to: info@btrees.com. Visit B-Tree Systems, Inc. on the World Wide Web at: www.btrees.com.

Link&Locate 386

Beacon Development Tools, Inc.

Host Development Environments: Windows and DOS.

Link&Locate 386 is an absolute linker and locator for embedded software development. Link&Locate supports the building of 32-bit protected-mode programs for Intel 386/486 processor-based embedded applications and for 32-bit DOS extender applications using Watcom C/C++ and/or WASM (Watcom Assembly). The Link&Locate output is in absolute object files containing debug information in Intel OMF-286/386 format, which supports only C and assembly source-code level debugging.

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

Link&Locate 86

Beacon Development Tools, Inc.

Host Development Environments: Windows and DOS.

Beacon Development Tools' Link&Locate 86 is an advanced absolute linker/locator that generates code for Intel real-mode 80x86 processor-based (including the 80C186/188 uP family) embedded applications. The linker/locator accepts object files generated by Microsoft's C/C++ Optimizing Compiler v5.1 and MASM assembler c5.1 to 6.1 in order to generate absolute object files in Intel OMF86 format. The product supports the building of C/C++ language-based embedded applications.

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

SP/Tools for MetaWare*

Beacon Development Tools, Inc.

Host Development Environments: Windows and DOS.

The SP/Tools packages are designed to extend MetaWare's High C/C++* 32-bit compiler and Microsoft's MASM assembler. Tool extensions consist of the SP/Link 386, an advanced absolute linker/locator for 32-bit protected-mode i386*/486* processor-based embedded development. SP/RTD 386 is a DOS-hosted version of SoftProbe, enhanced for debugging C and C++ 32-bit protected-mode i386/486 processor-based embedded applications.

* Trademark or registered trademark of its respective company or mark holder

80x86 (186/286/386/486/586)**Intel Corporation (AMD, Cyrix)**

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

BSQUARE Integration

BSQUARE

Host Development Environments: Windows.

BSQUARE's Windows CE OEM Adaptation Kits (OAK*) provide OEMs the resources needed to adapt Windows CE to their respective products. Included with the kit are: support for processor, OEM adaptation layer, embedded drivers for processor devices, adaptation tools, and loader firmware for Windows CE.

For more information, contact: Ann Gorman, 425-519-5000. Email inquiries to: donb@bsquare.com. Visit BSQUARE on the World Wide Web at: www.bsquare.com.

CARDtools Application Simulation Tool

CARDtools Systems

Host Development Environments: UNIX & Windows.

CARDtools stands for Computer-Aided Real-time Design Tools, and the CARDtools design tool is dedicated to the design, evaluation, and simulation of embedded systems applications. An embedded system application consists of hardware devices interacting with a microprocessor, the microprocessor (CPU), a real-time operating system (RTOS), and the application program. CARDtools addresses all the aspects of embedded system application design and simulation.

For more information, contact: Dave Allenbaugh, 408-894-9500. Email inquiries to: info@cardtools.com. Visit CARDtools Systems on the World Wide Web at: http://www.cardtools.com.

Datalight's ROM-DOS 6.22 Operating System

Datalight*

Host Development Environments: Windows and DOS.

Datalight's ROM-DOS 6.22 is a compact, flexible MS-DOS 6.22-compatible operating system. Datalight has recently added new utilities for specific embedded markets. ROM-DOS is DOS for the Year 2000 and beyond. All date issues have been fully resolved.

For more information, contact: Tim Gillman, 360-435-8086 x 115. Email inquiries to: sales@datalight.com. Visit Datalight* on the World Wide Web at: http://www.datalight.com.

Datalight's WinLight* Operating System

Datalight*

Host Development Environments: Windows.

WinLight is a Windows V 3.11 work-alike operating system, including GUI, multitasking and protected mode. Datalight has implemented many new features and supported many additional API calls in the latest version. It is small in size, easy to use, and offers an inexpensive alternative to other Windows* O.S. versions for the embedded applications environment.

For more information, contact: Tim Gillman, 360-435-8086 x 115. Email inquiries to: sales@datalight.com. Visit Datalight* on the World Wide Web at: http://www.datalight.com.

Embedded BIOS*

General Software, Inc.

Host Development Environments: Windows and DOS.

Embedded BIOS 4.0 is a highly-configurable full-source BIOS kit with more than 330 source-level configuration options and 100 binary configuration options for customization to embedded hardware. Features include a royalty-free Run-From-ROM DOS with a 32KB footprint, resident Flash disk, APM, manufacturing mode, integrated debugger, advanced SETUP screens, and seven disk drivers: Floppy, IDE, ATA, ROM, RAM, Flash, and Remote. The BIOS footprint can be configured from 8KB and 64KB, depending on selected features.

For more information, contact: Dan De Lano, 425-454-5755. Email inquiries to: general@gensw.com. Visit General Software, Inc. on the World Wide Web at: www.gensw.com.

Embedded DOS*-ROM

General Software, Inc.

Host Development Environments: Windows and DOS.

General Software's Embedded DOS-ROM 6.22 is an MS-DOS-compatible operating system designed especially to run DOS application software from ROM in handheld and consumer electronics products. The product comes in adaptation kit form, so it is

easily adapted by the OEM, with source-level options for maximum flexibility. Featuring a micro-sized footprint of less than 32KB in ROM, Embedded DOS-ROM saves valuable Flash space for applications.

For more information, contact: Dan De Lano, 425-454-5755. Email inquiries to: general@gensw.com. Visit General Software, Inc. on the World Wide Web at: www.gensw.com.

Green Hills Instruction Set Simulator

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills Instruction Set Simulators allow programs for the target microprocessor to be executed on the PC or host workstation by simulating the execution of the target at the instruction level. A special interface exists to allow program control via a standard debugger. The simulators support most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Execution Profiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Execution Profiler provides a mechanism for looking at user code in many different ways in order to pinpoint hot spots. Reports show performance by procedure, source line, etc. Supports native and embedded profiling on most popular 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Program Builder

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Program Builder is a configuration management system for creating and managing large programs. The MULTI builder replaces traditional make files with a modern point-and-click interface, greatly simplifying the configuration management task and eliminating the need for engineers dedicated to managing the build process. Supports native and embedded profiling on most popular 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Run-Time Error Checker

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Run-time Error Checker inserts code into user's executable to check for things like array out of bounds, value too large for variable, read of variable before initialization, and attempts to access unallocated memory. The error checker supports native and embedded profiling on most popular 32 and 64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Version Control System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Version Control system is very unobtrusive, with files being automatically checked out when the first change is made in the editor. Advanced features support program branches and the ability to find out who made the last change to selected lines. Supports native and embedded profiling on most popular 32/64-bit CPUs.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Logic Analyzers

Hewlett-Packard Company

Host Development Environments: N/A.

HP's digital design and debug tools help system developers solve tough hardware and software integration problems fast. The HP benchtop logic analyzers offer cost-effective 100 MHz state analysis plus five timing modes up to 500 MHz. The HP 16500 modular logic analysis systems provide the power and flexibility to handle demanding hardware and software problems.

* Trademark or registered trademark of its respective company or mark holder

80x86 (186/286/386/486/586)**Intel Corporation (AMD, Cyrix)**

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or [emulator.com](http://www.emulator.com).

ApBUILDER* Expert Development Software

Intel Corporation

Host Development Environments: N/A.

Intel's ApBUILDER Development Software features include: interactive programming software for embedded applications; Windows interface for ease of use; the ability to program without prior knowledge of the architecture; generation of microcontroller peripheral initialization code with the click of a mouse; code generation in Assembler or C; context-sensitive screens that interface directly to Hypertext device user's manuals and data sheets; continuous expansion to the program and improvements to cover new logic devices; available FREE on Intel bulletin boards and downloadable via the company's WWW site at <http://developer.intel.com>.

For more information, contact: Local Intel Sales Office or Distributor. Email inquiries to: N/A. Visit Intel Corporation on the World Wide Web at: www.intel.com.

pmEasy V.3.2 Environment

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's pmEasy V.3.2. Environment software is a protected-mode environment for embedded systems that creates needed protected-mode structures and switches into protected mode. pmEasy includes a protected-mode loader to load the protected-mode application, or the application can run from ROM. pmEasy provides some DPML services.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

smx* Dynamic Module Loader

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's smxDynamic Module Loader (DLM) permits independent executable modules to be dynamically loaded and executed as tasks under the smx RTOS. smxDLM is recommended for downloading new or altered tasks; for loading only the tasks needed, thus avoiding memory over-flow; for providing user programmability; for solving library re-entry problems; or for enforcing greater task or process independence.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

smxFile* Manager

Micro Digital, Inc.

Host Development Environments: DOS.

The smxFile Manager gives embedded systems developers a DOS-compatible, reentrant file system. It features high-performance file I/O and disk directory management. More than 20 primary functions are provided as are numerous low-level functions and several utilities. The API is similar to POSIX or MS-DOS*. The device-driver interface is similar to UNIX* OS, but much less complex.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

RTTarget-32* Cross Development System

On Time

Host Development Environments: Windows and DOS.

On Time's RTTarget-32 is a cross development environment for Intel's i386* and higher performance x86 processors. Standard Window NT* (OS) console-mode applications can run without operating systems on almost any hardware with a 32-bit Intel Architecture processor or compatible CPU. Cross debugging is available using a standards Windows NT OS debugger. Programs to run with RTTarget-32 are developed using standard 32-bit compilers that produce native NT console-mode applications (ie, Borland C++, Microsoft Visual C++, Watcom C/C++, Borland Delphi). Executable files built with these compilers are processed by RTTarget-32 to run on the target x86 processor-based system.

For more information, contact: Tom Schotland, 516-689-6654. Email inquiries to: info@on-time.com. Visit On Time on the World Wide Web at: www.on-time.com.

Paradigm LOCATE

Paradigm Systems

Host Development Environments: Windows and DOS.

Paradigm LOCATE is the fastest and easiest way to develop embedded applications for Intel, AMD, and NEC x86-compatible microprocessors. Paradigm's LOCATE is designed for use with a favorite Borland, Microsoft, or Watcom compiler, Paradigm's ROMable start-up code and complete run-time library support. Paradigm offers unlimited free technical support for registered users!

For more information, contact: Joanne Weir, 800-537-5043. Email inquiries to: info@devtools.com. Visit Paradigm Systems on the World Wide Web at: www.devtools.com.

INtime* Real-Time For Windows* NT O.S.

RadiSys Corporation

Host Development Environments: Windows.

Radisys Corporation's INtime, a Real-Time Extension for the Microsoft Windows NT operating system, delivers hard real-time capabilities for Windows NT. With INtime, an applications developer can integrate real-time control, user interface, and connectivity functions all on the same PC-compatible system having standard hardware and software. INtime minimizes reliance on specialized or proprietary software development systems, lowering development costs, and reducing time-to-market by utilizing a standard Windows NT platform environment for applications development.

For more information, contact: 1-888-4REALNT. Email inquiries to: Info@radisys.com. Visit RadiSys Corporation on the World Wide Web at: www.radisys.com.

SoftControl IEC 1131-3 Programming System

Softing

Host Development Environments: Windows.

SoftControl is an IEC 1131-3-compliant programming system for all kinds of industrial controls, from LON to PLCs and PCs. The system supports all languages, functions and function blocks according to the standard. The backend is designed to be completely object-oriented and can be easily adapted to different target systems. A C-code generator is optionally available.

For more information, contact: Dr. Goetz Guettich, ++49 89 456 56 311. Email inquiries to: info.softcontrol@softing.com. Visit Softing on the World Wide Web at: <http://www.softing.com>.

Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabilities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: <http://www.tektronix.com>.

PowerPC**Motorola, IBM, Mitsubishi****FULL FUNCTION RTOS****CHORUS/ClassiX* Real-Time Operating System**

Chorus Systems

Host Development Environments: UNIX and Windows.

CHORUS/ClassiX is a highly configurable, richly-featured real-time executive. Users can easily tailor CHORUS/ClassiX at a very fine-grain level of real-time operating system services to meet specific hardware and application requirements. The componentized* architecture is industry unique and allows CHORUS/ClassiX to coherently scale from very small (10K) instances to highly distributed, multiple-personality platforms including support for POSIX, third-party RTOSs, the Java* Application Environment (JAE) and/or legacy operating systems. Hot application re-start, fair-share scheduling, and other high-availability enablers provide necessary capabilities for mission-critical embedded systems.

For more information, contact: Audrey Castine, 408-879-4145. Email inquiries to: info@chorus.com. Visit Chorus Systems on the World Wide Web at: www.chorus.com.

* Trademark or registered trademark of its respective company or mark holder

PowerPC

Motorola, IBM, Mitsubishi

CHORUS/JaZZ* Real-Time Operation System

Chorus Systems

Host Development Environments: N/A.

CHORUS/JaZZ* is a feature-rich, Java-enabled real-time operating system providing full Java functionality and compatibility within the context of an embedded real-time operating system. CHORUS/JaZZ provides a Java "virtual machine" personality, supporting the full range of Java extensions and services, including Hot Java and JavaViews. CHORUS/JaZZ allows developers to integrate "off-the-shelf" Java applications into distributed real-time embedded systems, resulting in a significant decrease in development costs and time. Not only is CHORUS/JaZZ one of the richest Java-enabled operating systems, it is also significantly faster than most Java implementations.

For more information, contact: Audrey Castine, 408-879-4145. Email inquiries to: info@chorus.com. Visit Chorus Systems on the World Wide Web at: www.chorus.com.

CMX-RTX* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-RTX RTOS provides more than 65 kernel services allowing control of tasks, events, messages, resources, semaphores, cyclic timers, queues, fixed memory blocks and UARTs. Interrupts are allowed to use some of the CMX functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. Very small ROM and RAM requirements for small-footprint applications. Several compiler vendors are supported. Source code is included, and there are no royalties.

The CMX-RTX RTOS supports an unusually large number of μ PU, μ CU, and DSP architectures from a large number of manufacturers, including: Advanced RISC Machines, Analog Devices, Hitachi, Intel, MIPS, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Sharp, Siemens, Texas Instruments, Toshiba, and Zilog.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

OSE* Real-Time Operating System

Enea OSE Systems AB

Host Development Environments: UNIX and Windows.

Enea's OSE is a message-based, real-time operating system and tool-set for embedded systems. OSE has special built-in capabilities for fault tolerance, safety critical applications, runtime configuration and distributed systems. OSE is the first RTOS to be certified to meet the software quality standard IEC 1508, safety integrity level 3.

For more information, contact: Bill McCombie, +468-638-5000 (Sweden). Email inquiries to: info.ose@enea.se. Visit Enea OSE Systems AB on the World Wide Web at: www.enea.se/ose.

INTEGRITY* Real-Time Operating System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The INTEGRITY RTOS, which provides a memory-protected superset of the facilities offered in Green Hills Software's *velOSity** Real-Time Operating System, targets mission-critical, real-time applications that emphasize reliability, security and testability. The INTEGRITY RTOS is available on a royalty-free basis: users pay only for the host-based software development environment. Run-time licenses for the target system are free.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MTOS*/ MTOS-UX Real-Time Operating Systems

Industrial Programming, Inc.

Host Development Environments: UNIX and Windows.

IPi's MTOS full-function RTOS products offer a uniform applications programming interface (API) across all supported processors, thus affording interface familiarity for programmers despite processor changes. MTOS also supports symmetric multi-processing and offers a complete coordination system for handling asynchronous operations. A "small footprint" RTOS, with code space ranging from 16KB to 45KB, MTOS is highly scalable for use with small, mid-size and very large programming projects.

For more information, contact: Bernard Mushinsky, 800-365-MTOS. Email inquiries to: info@ipi.com. Visit Industrial Programming, Inc. on the World Wide Web at: www.ipi.com.

pSOSystem Real-Time Operating System

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pSOSystem is a modular, high-performance real-time operating system designed specifically for embedded microprocessors. The RTOS provides a complete multi-tasking environment based on open system standards, such as network file system support. pSOSystem is designed for performance, reliability, and ease-of-use on either custom or commercial hardware.

Soon available for SPARC processors.

For more information, contact: Sales, 408-542-1500. Email: N/A. Visit Integrated Systems, Inc. on the World Wide Web at: <http://www.isi.com>.

AMX* Real-Time Multitasking Kernel

KADAK Products Ltd.

Host Development Environments: Windows and DOS.

KADAK's AMX Real-Time Operating System is a full-featured, fast, compact, ROMable kernel. AMX includes: preemptive, priority-based scheduler (optional time-slicing); nested interrupts with priority ordering; mailbox, semaphore, resource, event, list, buffer and memory managers; the Configuration Builder Utility eases system construction. And for debugging, KADAK's *KwikLook** fault finder exploits SDS's *SingleStep** and SSI's *VisualProbe** debuggers for fully AMX RTOS-aware debugging.

For more information, contact: Sales, 604-734-2796. Email inquiries to: amxsales@kadak.com. Visit KADAK Products Ltd. on the World Wide Web at: www.kadak.com.

LynxOS* Real-Time Operating System

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

LynxOS is a UNIX-compatible, POSIX-conforming, multi-process, and multi-threaded operating system designed for complex real-time applications that require fast, deterministic response. The LynxOS kernel was specifically designed for hard real-time applications. LynxOS is fully pre-emptible, re-entrant, and compact. The modularity inherent in the LynxOS architecture makes the operating system highly scalable and configurable. At its smallest, it can be configured with only the kernel and linked with an application to form a ROMable image for specialized embedded applications. At its fullest, LynxOS is a self-hosted development environment comprising a wide array of software development tools, UNIX-compatible utilities, industry-standard networking, a GUI, and a UNIX-like hierarchical file system.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

Microsoft Windows* CE O.S. Embedded Toolkit

Microsoft* Corporation

Host Development Environments: Windows.

Microsoft's Windows CE Embedded Toolkit for Visual C++ 5.0 includes integrated development environment tools designed specifically for embedded development. The Windows CE platform is a 32-bit, preemptive, multitasking, multithreaded operating system designed from the ground up to support embedded systems. Use the embedded toolkit to choose components for building a customized version of the Windows CE operating system to meet the unique requirements of your hardware. The toolkit contains the RTOS, compiler, assembler, emulator, debugger, library and drivers.

For more information, contact: N/A. Email inquiries to: N/A. Visit Microsoft* Corporation on the World Wide Web at: N/A.

VRTX* Real-Time Operating System

Microtec

Host Development Environments: UNIX and Windows.

An element of the Spectra* development system, the VRTX* RTOS is easily configured and includes a family of real-time kernels that gives developers complete freedom in making functionality, performance and size tradeoffs. VRTX has integrated STREAMS-based networking, I/O and file systems. VRTX is unique in offering a choice of three compatible real-time kernels: VRTXsa kernel, a high-performance, full-featured kernel based on a leading-edge architecture; VRTX32 kernel, which has logged more trouble-free hours than any other RTOS available and has been used in FAA-certified flight-critical applications; VRTXmc kernel, the first real-time kernel specifically designed for microcontrollers, featuring minimal RAM and ROM footprints.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

* Trademark or registered trademark of its respective company or mark holder.

PowerPC

Motorola, IBM, Mitsubishi

DAVID* Real-Time A/V Decoder RTOS

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

Microware's DAVID (Digital Audio/Video Interactive Decoder) is based on the company's OS-9* real-time operating system. The DAVID RTOS represents an open system software platform for digital television devices used in telephone, cable and wireless networks. The DAVID Decoder has been selected by more manufacturers than any other digital television system software solution because of its open architecture, proven reliability, and cost-effectiveness in bringing products to market.

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

OS-9* Real-Time Operating System

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

Microware's OS-9 is an architecturally advanced, high-performance real-time operating system. The OS-9 RTOS provides priority-based, preemptive task scheduling, interrupt and exception-handling services, dynamic memory management, inter-process communications facilities, system calls for system control, and unsurpassed I/O support. The OS-9 RTOS is used in industrial, telecommunications, transport, instrumentation, aerospace and consumer applications. Extensions to the OS-9 RTOS are available for designers of set-top boxes, pagers, cell phones, NCs and PDAs.

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

Wireless OS-9* Real-Time Operating System

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

The Wireless OS-9* RTOS is an integrated system software and development tool package designed specifically for manufacturers of battery-powered, intelligent computing and communication devices. Each Wireless OS-9 software subsystem contains the OS-9 operating system, power management, SPF communications file manager, FasTrak* and MAUI* (Multimedia Application User Interface), and a set of drawing and animation APIs (application program interfaces).

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

Precise/MQX* Real-Time Operating System

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking's full-featured, royalty-free, real-time Precise/MQX RTOS executive includes a design tool, performance analysis and an optional suite of communications protocols and drivers. MQX adds support for both shared memory multiprocessing and distributed processing. The functionality of the kernel can be extended with optional I/O components that add networking protocols and data communications protocols.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

Super TASK! Real-Time Operating System

U S Software

Host Development Environments: Windows.

U S Software's SuperTask! is a mature, compact, fast, and user-configurable RTOS suite. SuperTask! supports more than 20 C/C++ compilers/tool chains, and source code is included with an ANSI standard C core.

For more information, contact: Katrina Sumner, 503-641-8446 x 740. Email inquiries to: info@ussw.com. Visit U S Software on the World Wide Web at: www.ussw.com.

VxWorks* Real-Time Operating System

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Part of the Tornado* development environment, VxWorks is an industry-standard, scalable real-time operating system. It features the multitasking wind* kernel, the POSIX real-time extensions, intertask communications, full networking functionality, file system support and C++ support. Additional functionality is available through optional products from Wind River and a wide range of third-party partners.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

BASIC RTOS KERNEL

Nucleus* C++ RTOS Kernel

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus C++ is a version of the Nucleus PLUS kernel that provides an object-oriented interface to an application. Although the core of the product is the Nucleus PLUS kernel (thereby reinforcing its robustness), the interface has been completely redesigned with all of the standard C++ mechanisms including constructors, destructors, and the like. Tests indicate that the incorporation of these facilities has minimal impact on the code size and performance of the final application.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

Nucleus PLUS* Real-Time Operating System

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus PLUS is designed as a core component for an operating system environment. It is extensible and dynamic. Its modular design allows services to be easily produced by combining existing services. All of the Nucleus PLUS components (tasks, queues, semaphores, etc.) can be dynamically created and deleted. Each component has a control block defined by the user and placed anywhere in the available memory space of the target system. Nucleus PLUS is a real-time, pre-emptive, multitasking kernel designed for time-critical embedded applications. Approximately 95 percent of Nucleus PLUS is extremely portable and is currently available for use with most microprocessor families.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

CMX-TINY+* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-TINY+ RTOS provides more than 40 kernel services, thus allowing control of the following: tasks, events, messages, resources, semaphores, cyclic timers, and queues. Interrupts are allowed to use some CMX functions. The scheduler is based on true pre-emption. CMX-TINY+ RTOS features very fast context-switch times and very low interrupt-latency times. ROM and RAM requirements are very small. CMX offers support for several compiler vendors, with royalty-free source code included.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

RTXC* Real-Time Kernel

Embedded System Products, Inc.

Host Development Environments: UNIX and Windows.

Embedded System Products, Inc.'s RTXC is a multitasking real-time embedded kernel written primarily in C and featuring a single API for all supported processors. RTXC manages tasks and time, synchronizes with events, and permits transfer of data between tasks through 72 kernel services, including services for RAM management and exclusive access to an entity.

For more information, contact: Sales, 800-525-4302. Email inquiries to: sales@esphou.com. Visit Embedded System Products, Inc. on the World Wide Web at: www.esphou.com.

Micro Digital's smx* V 3.2 Real-Time Operating System

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's smx, originally introduced in 1988, enhanced and complemented with additional capabilities over the years, has stood the test of time as a preemptive, multitasking real-time operating system kernel that provides task and memory management, timing, character I/O, intertask communication, semaphores, event queues, primitives and more. The kernel OS supports testing by error monitoring. Micro Digital's smx RTOS kernel is the basis for its integrated development tools environment, all designed to offer superb development support environments for developers of x86-compatible and PowerPC processor-based embedded systems.

* Trademark or registered trademark of its respective company or mark holder

PowerPC

Motorola, IBM, Mitsubishi

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

Precise/MQX* & MQX+m Real-Time Executive

Precise Software Technologies Inc.

Host Development Environments: .

Precise Software Technologies' Precise/MQX* is a portable high-performance, real-time executive. MQX is scalable from a single processor to distributed multiprocessor configurations. The real-time executive provides functions for multitasking, intertask communications and synchronization, dynamic interrupt management, and memory management. Optional protocols for networking and data communications are also available.

For more information, contact: Clarke Ester, 508-264-4413. Email inquiries to: info@psti.com. Visit Precise Software Technologies Inc. on the World Wide Web at: www.psti.com.

ISaGRAF* Run-Time Kernel

TranSys, Inc.

Host Development Environments: Windows.

The ISaGRAF* Run-Time Kernel is a portable execution engine that has behavior similar to traditional Programmable Logic Controllers (PLCs), but the kernel exceeds them in performance and flexibility. The ISaGRAF* Run-Time Kernel also has additional functionality, which greatly expands and enhances the application possibilities. The ISaGRAF kernel now makes communications, process control, SCADA and motion control all possible in a single control environment without special hardware.

For more information, contact: Robert R. Lyons, 602-926-4100. Email inquiries to: info@ISaGRAF.com. Visit TranSys, Inc. on the World Wide Web at: www.ISaGRAF.com.

INTEGRATED DEVELOPMENT ENVIRONMENT

MULTI* Software Development Environment

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Software Development Environment provides a framework of interacting tools to support program development by small or large workgroups. MULTI includes all of the tools needed to support major programming projects, including a program builder, version control, program editor, debugger, execution profiler, run-time error checker, and source-code control.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

pRISM+ Integrated Development Environment

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pRISM+ is a complete, integrated development environment (IDE) for designing and delivering embedded software applications. pRISM+ combines the industry's optimal development tools with the pSOSystem, an industry-proven and reliable real-time operating system (RTOS). The pRISM+ environment combines "Best-Of-Class" tools for developing, analyzing and testing embedded applications in one seamless environment, built with an open, extensible architecture to accommodate future needs.

Note: Soon available for SPARC microprocessors.

For more information, contact: Sales, 408-542-1500. Email: N/A. Visit Integrated Systems, Inc. on the World Wide Web at: <http://www.isi.com>.

High C/C++ Embedded PowerPC Development Tool Set

MetaWare Incorporated

Host Development Environments: .

MetaWare's super-optimizing toolset for creating fast and compact executable code includes a high-performance C/C++ compiler, linker-locator-archiver, assembler, profiler, and run-time libraries. Version 3.6 includes several advanced optimizations designed for improved code size and speed, including branch prediction, which alone can yield performance gains of as much as 10%. The toolset is compatible with all of the leading real-time operating systems (RTOS) and is fully integrated with Software Development Systems' SingleStep* Debug Suite.

For more information, contact: MetaWare Technical Sales, 408-429-6382. Email inquiries to: techsales@metaware.com. Visit MetaWare Incorporated on the World Wide Web at: www.metaware.com.

Metrowerks' CodeWarrior*

Metrowerks Corporation

Host Development Environments: UNIX and Windows.

Metrowerks' CodeWarrior is transforming embedded system development by offering the most intuitive GUI development tools available under Windows* 95/NT operating systems at a fraction of the cost of traditional command-line tools. With CodeWarrior, the developer gets a complete suite of tools (IDE) to create, compile, link, debug, and assemble fast, optimized embedded system code.

For more information, contact: Jenny Page, 512-873-4740. Email inquiries to: sales@metrowerks.com. Visit Metrowerks Corporation on the World Wide Web at: <http://www.metrowerks.com>.

Microsoft Windows* CE O.S. Embedded Toolkit

Microsoft* Corporation

Host Development Environments: Windows.

Microsoft's Windows CE Embedded Toolkit for Visual C++ 5.0 includes integrated development environment tools designed specifically for embedded development. The Windows CE platform is a 32-bit, preemptive, multitasking, multithreaded operating system designed from the ground up to support embedded systems. Use the embedded toolkit to choose components for building a customized version of the Windows CE operating system to meet the unique requirements of your hardware. The toolkit contains the RTOS, compiler, assembler, emulator, debugger, library and drivers.

For more information, contact: N/A. Email inquiries to: N/A. Visit Microsoft* Corporation on the World Wide Web at: N/A.

Spectra* Development System

Microtec

Host Development Environments: UNIX and Windows.

Microtec's Spectra development system represents the next-generation Embedded IDE (Integrated Development Environment) for real-time and embedded software. Spectra addresses the full range of embedded applications, from austere, minimal-resource systems with no real-time operating system requirements, up to complex, resource-intensive systems. Designed specifically for real-world embedded applications, Spectra radically reduces target memory consumption, allowing more room for innovation at the application level. Organizations standardizing on Spectra can focus on a single software architecture - on both the host and target - thereby leveraging the full benefits of cross-training, consolidated support and simplified maintenance.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

FasTrak* Development Environment

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

Microware's FasTrak is a client/server integrated development environment that provides powerful source-code management, makefile generation, and debugging and profiling tools. The FasTrak environment's tight integration with the OS-9* RTOS gives users an edge in software development, because FasTrak was designed from the ground up to be OS-9 RTOS-aware. The FasTrak IDE provides solutions across a wide variety of development schemes and computing platforms.

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

Penumbra Super Mojo* Java Development Environment

Penumbra Software, Inc.

Host Development Environments: .

Super Mojo's Designer, Visual Scripter*, and integrated Coder create a unique Java Development Environment (JDE) for Java application and Java bean component creation. Super Mojo runs on any Java-supported operating system. Its incremental compiler compiles in background, and nothing is faster. Developers can create Java without coding by simply dragging-and-dropping components! Visually they can add events/actions, commands, logic, and calls to other scripts. Super Mojo Supports JDBC/ODBC.

For more information, contact: Michael Mittel, 770-352-0100 x 180. Email inquiries to: mmittel@penumbra.com. Visit Penumbra Software, Inc. on the World Wide Web at: www.penumbra.com.

RTI ControlShell* O-O Programming Environment

Real-Time Innovations, Inc.

Host Development Environments: .

RTI's ControlShell is a component-based, object-oriented programming environment for real-time software development. Built on top of Wind River Systems' VxWorks* RTOS,

* Trademark or registered trademark of its respective company or mark holder

PowerPC

Motorola, IBM, Mitsubishi

ControlShell combines a modular structure, powerful graphical tools, and integrated data management into a unique approach to real-time software development. The ControlShell environment provides a framework that enables programmers/users to share and reuse software on a scale never before possible.

For more information, contact: Al Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

EDE Project Environment

Tasking, Inc.

Host Development Environments: Windows.

EDE is a complete development project environment that gives the developer direct access to all the tools and features needed. EDE includes a language-sensitive editor, MAKE for automated application building and a project environment for specifying project files, including source files, tool options and build options.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

Tornado* Integrated Development Environment

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Wind River Systems' Tornado is a complete software cross-development environment for embedded systems. Tornado is seamlessly integrated and includes powerful development tools and VxWorks*, a feature-rich, high performance and scalable real-time operating system. Completely open and customizable, the Tornado environment also facilitates the use of third-party and customer-developed tools to enhance its capabilities and meet unique customer requirements. Tornado has more than 90 software and hardware partners and is used by thousands of developers worldwide.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

COMPILER

PCYACC 7.0 Compiler/Language Development Toolkit

Abraxas Software, Inc.

Host Development Environments: All.

Abraxas Software's PYACC v. 7.0 is a complete language-development environment that generates C, C++, Java, Delphi, and VBS source code (from Input Language Description Grammars or ILDGs) for building assemblers, compilers, interpreters, browsers, PDLs, language translators, syntax-directed editors, language validators, natural language processors, expert-system shells, and query languages. Includes "drop in" language engines for SQL, dBASE, PostScript, HyperTalk, SmallTalk-80, C++, C, Pascal, ProLog, FORTRAN, COBOL, Basic, SGML, ASN, RPG, SNA, VBasic, VHDL, HTML, VMRL, Java, ODMG-ODL/OQL, Modula-S, Delphi, VBS and Ada. The toolkit includes portable object-oriented classes for Java and C++ and debugging tools, including runtime visual parser debugging, abstract syntax tree generation and code referencing.

For more information, contact: Tana Rae K., 503-244-5253. Email inquiries to: sales@abxsoft.com. Visit Abraxas Software, Inc. on the World Wide Web at: www.abxsoft.com.

Apogee-C Compiler

Apogee Software, Inc.

Host Development Environments: UNIX.

The Apogee-C compiler accepts C source files and compiles them to produce assembly files. May invoke optionally available optimizing preprocessors. Targets SPARC workstations and embedded processors. Accepts ANSI C, Kernighan & Ritchie C, and more.

For more information, contact: George Malek, 408-369-9001. Email inquiries to: info@apogee.com. Visit Apogee Software, Inc. on the World Wide Web at: www.apogee.com.

Apogee-C++ Compiler

Apogee Software, Inc.

Host Development Environments: UNIX.

The Apogee-C++ compiler accepts C++ source files and compiles them into assembly files. Includes RTTI, STL and exception handling. The compiler is performance optimizing and supports the SPARC v8plus processor.

For more information, contact: George Malek, 408-369-9001. Email inquiries to: info@apogee.com. Visit Apogee Software, Inc. on the World Wide Web at: www.apogee.com.

GNUPro* Toolkit Compiler Suite

Cygnus Solutions

Host Development Environments: .

Cygnus Solutions' GNUPro* Toolkit compiler suite (with assembler) is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The compiler delivers speed- and size-performance advantages over a wide range of microprocessor architectures. Cygnus provides mission-critical technical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

D-C++ C/C++ Cross-Compiler Suite

Diab Data, Inc.

Host Development Environments: UNIX and Windows.

D-C++ is a highly-optimizing C/C++ compiler, producing exceptionally fast, compact, accurate code for the PowerPC, 68K/CPU32, ColdFire, and MCore processor-based applications. The D-C++ compiler is fully ANSI compliant and works with all popular debug, RTOS, and emulation systems. The suite contains a compiler, assembler, linker, profiler, program checker, archiver, advanced libraries package, and other utilities. An optional RTA (Real-Time Analysis) Suite enables developers to enhance program performance, reliability and memory utilization.

For more information, contact: Jan Liband, 415-571-1700. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

D-CC C Cross-Compiler Suite

Diab Data, Inc.

Host Development Environments: UNIX and Windows and Others.

Diab Data's D-CC is a highly-optimizing C compiler, producing exceptionally fast, compact, target-specific code for Motorola's PowerPC, 68K/CPU32, ColdFire and MCore Processor-based applications. The D-CC compiler is fully ANSI and EABI compliant, works with all popular debug, RTOS, and emulation systems. The suite provides the compiler, assembler, linker, profiler, program checker, archiver, advanced libraries package, and other utilities. An optional Real-Time Analysis Suite (RTA) enables developers to enhance program performance, reliability, and memory utilization.

For more information, contact: Jan Liband, 415-571-1700. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

Run-Time Analysis Tools For Diab Data Compilers

Diab Data, Inc.

Host Development Environments: UNIX and Windows.

Diab Data's RTA Suite is a suite of visual run-time analysis tools for improving program performance, reliability, and memory utilization. The RTA Suite works in conjunction with Diab Data's C/C++ compilers and includes a Visual Interactive Profiler, a Run-Time Error Checker, and a Link Map Analyzer for visualizing memory-map setups.

For more information, contact: Jan Liband, 650-571-1700 x227. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

Green Hills Optimizing Ada 95 Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

A fully validated implementation of the Ada 95 language, including new task and synchronization features, POSIX threads, and type extensions of tagged types and child library units. Supports mixed-language programming with C, C++, FORTRAN and Assembly. Compilers support many 32- and 64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing C Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills' high-performance optimizing C compilers, for native or embedded development, have many advanced optimizations, such as cross-module inlining. The compilers allow for the fine tuning of optimization strategy so users can generate optimal code. Supports 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

* Trademark or registered trademark of its respective company or mark holder

PowerPC

Motorola, IBM, Mitsubishi

Green Hills Optimizing C++ Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills offers high-performance optimizing C++ compilers for native or embedded development. The compilers are compatible with Green Hills Software's MULTI* debugger, which automatically handles C++ constructs such as name mangling and template debugging. The compilers support most 32-/64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing Embedded C++ Compiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills optimizing Embedded C++ compilers are high-performance and follow the Embedded C++ Technical Committee draft standard.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing FORTRAN Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills Software offers optimizing FORTRAN compilers for native or embedded development. A compile-time option allows users to select from among the F77, VMS and DoD dialects of the FORTRAN language, with additional support for many extensions. The FORTRAN compilers support most 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

High C/C++ Compiler

IBM Microelectronics

Host Development Environments: UNIX and Windows.

The IBM High C/C++ Compiler provides essential tools and technology for creating and distributing embedded PowerPC* processor applications. A true compiler rather than a C-to-C++ translator, it permits specification of C++ compilation to allow staged migration from C to C++. It also offers cross-platform compatibility, producing machine language that is compact, fast, and efficient. Features include: big- and little-Endian addressing; eight levels of global optimization; optional ANSI-Standard conformance; extensive/scalable error/warning messages; feature toggles and pragmas; C or C++ compiler invoking via user-definable source-file extension; lint-like checking; source-annotated assembly listings; functional inlining across compilers; no restrictions on inlined function complexity; four user-selectable warning message levels (500+ diagnostic messages); supports ELF and DWARF; floating-point code generation with U.S. Software's floating-point libraries.

For more information, contact: PowerPC Technical Support Hotline. Email inquiries to: ppcsupp@raleigh.ibm.com. Visit IBM Microelectronics on the World Wide Web at: www.chips.ibm.com/products/embedded.

Microtec* C and C++ Cross-Compilers

Microtec

Host Development Environments: UNIX and Windows.

Microtec's C and C++ compilers conform to the version of the C++ language that is defined in the Annotated C++ Reference Manual (ARM), including templates, exception handling, and nested classes. Because the C++ language continues to develop, Microtec is actively participating in the ANSI C++ standardization process. The company is committed to supporting both the ANSI C++ language and library standards with future product releases. The most significant new benefit is the addition of specialized linker optimizations that significantly reduce the size of modules when advanced C++ features, such as templates and in-line and virtual functions, are used. These optimizations allow developers to take advantage of the full power of object-oriented programming techniques in embedded systems without experiencing code bloat.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

C++ Compiler

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Object-oriented programming techniques increase productivity, improve quality and provide reusability with Tasking's C++ compiler. The compiler allows the intermixing of C++ and C code within a single application. Thus, the benefits of C++ can be incorporated into existing C applications a module at a time, thus providing easy migration from C to C++ programs.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

C Compiler Package

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking delivers ANSI C compilers that are highly optimized with individual target-specific extensions for ultimate flexibility and efficiency. As well as using these target-specific extensions, the developer-user can also define in-line functions and use in-line assembly. Included with every compiler is an assembler and linker/locator.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

ASSEMBLER

GNUPro* Toolkit

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit is a solution to the problem of delivering quality software to meet the increasingly tighter schedules required by today's marketplace. The highly optimized tool chain for a specific host-target combination drives competitive speed- and size-performance advantages into a developer's software without compromising either its portability or maintainability. The fully-featured debug tools and utilities significantly help to shorten the development, test, and validation cycles. Cygnus backs the GNU technology with a commitment to rapid and expert support. All GNUPro tool chains for native and embedded programming are bundled with mission-critical support services and guaranteed technical response times.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

Green Hills Cross Assembler Tool Chain

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills embedded tool chain includes a macro assembler, linker, librarian, run-time libraries, object formatters and other utilities useful for embedded development. Cross-assembler tool chains are available for most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

EMULATOR

Emulation Tools for Embedded Development

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

Applied Microsystems offers a broad range of high-performance microprocessor emulators. Patented CodeTAP* low-cost emulators offer the capabilities most used by software engineers. CodeICE* emulators have advanced features for both hardware and software development. The award-winning new SuperTAP* compact emulator offers hardware and software development features in a palm-sized form factor.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

PowerEM Emulator

Corelis

Host Development Environments: Windows.

Corelis' PowerEM-603 emulator allows users to debug high-speed, cached applications at the full speed of the target processor. Controlled by the Corelis PC-1149.1/100F high-performance, boundary-scan controller board, or the Corelis PCMCIA-1149.1 controller, the PowerEM-603 offers the user a tool with a powerful feature set at a fraction of the cost of traditional in-circuit emulators. Direct access to the ISA bus or the PCMCIA bus

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PowerPC

Motorola, IBM, Mitsubishi

allows for very fast code downloading. The source-level debugger supports most PowerPC compilers. The debugger is a true Microsoft Windows* application affording Windows 95 compatibility. Interaction with the source-level debugger is through resizable windows, context-sensitive user-programmable toolbars, menus, and dialog boxes, thus avoiding the necessity to learn a command line interface for interaction.

For more information, contact: Mike Winters, 562-926-6726. Email inquiries to: mikew@corelis.com. Visit Corelis on the World Wide Web at: www.corelis.com.

visionICE* Emulator

EST Corporation

Host Development Environments: UNIX and Windows.

EST's visionICE emulator is available for PowerPC MPC8xx, ColdFire MCF52xx and 683xx families. This completely scalable, single-solution emulator meets a wide range of performance and budget requirements. Modules for low-cost target control (visionBDM), integrated Ethernet support (visionNET), overlay memory (visionMEM), internal register configuring (visionSIM) and full-scale, real-time emulation (visionEVENT) can be added or shared at any time, boosting the developer's arsenal of debugging weapons.

For more information, contact: Sales Department, 617-828-5588. Email inquiries to: sales@estc.com. Visit EST Corporation on the World Wide Web at: www.estc.com.

HP Processor Probes for On-Chip Emulation

Hewlett-Packard Company

Host Development Environments: Popular Debuggers.

HP's processor probes are a low-cost emulation solution for much of a developer's day-to-day debugging. Processor probes access the on-chip debugging capabilities of today's newest processors, giving the software developer a connection for downloading code, modifying memory and registers and controlling program execution. HP processor probes are compatible with debuggers from SDS, Green Hills and Microtec.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or [/emulator.com](http://www.emulator.com).

DEBUGGER

MWX-ICE* Debugger

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

MXW-ICE is a full-featured C/C++ symbolic debugger tailored specifically for in-circuit emulation. It provides complete control of Applied Microsystems emulators and features a consistent interface across Sun4, HP 9000, and Windows PC platforms. The MWX-ICE debugger supports popular tool chains including those from Microtec, Cygnus-GNU, Green Hills, and SDS.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

GNUPro* Toolkit Debugger Suite

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit debugger suite is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The fully-featured debug tools and utilities significantly help to shorten the development, test and validation cycles. Cygnus provides mission-critical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

MULTI* Source-Level Debugger

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Source-level Debugger supports native or embedded debugging of most popular 32-/64-bit processors. The main debugger window shows source or interlaced source and assembly. A single click lets the user look at a variable or set a breakpoint. Small windows allow for the monitoring of specific variables, local variables, or the call stack.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Source Gate* II Source-Level Debugger

Huntsville Microsystems Inc. (HMI)

Host Development Environments: UNIX and Windows.

The Source Gate II is a full-featured source-level debugger that provides a common user interface to all Huntsville Microsystems, Inc. products, including SPS-2000 series emulators, HMI-2000 series emulators, Background Mode Debuggers (BMDs), and CPU simulators. The Source Gate II Debugger provides a watch window for viewing/changing memory variables; multiple CodeView windows that allow emulator operations to be controlled from a user file displayed in source, assembly, or a combination of the two. Provides C++/RTOS support and more.

For more information, contact: James Bell, 205-881-6005. Email inquiries to: sales@hmi.com. Visit Huntsville Microsystems Inc. (HMI) on the World Wide Web at: www.hmi.com.

RISCWatch* Debugger

IBM Microelectronics

Host Development Environments: UNIX and Windows.

RISCWatch is a premier hardware and software tool for developing applications using the PowerPC* 400 and 600 families of microprocessors and embedded controllers. RISCWatch offers the following capabilities: on-chip debugging via JTAG interface; target monitor debugging; source-level and assembler debugging of C/C++ executables; real-time trace support for the PowerPC 400 family; network support for remote debugging of development system; supports Embedded ABI for PowerPC (EABI) and XCOFF ABI; command-file support for automated test and command sequences; simple, reliable 16-pin interface to the development system; Ethernet-to-target JTAG interface hardware; multiple hosts supported; intuitive and easy-to-use windowed user interface.

For more information, contact: PowerPC Technical Support Hotline. Email inquiries to: ppcsupp@raleigh.ibm.com. Visit IBM Microelectronics on the World Wide Web at: www.chips.ibm.com/products/embedded.

LynxInsure++*

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

LynxInsure++ is a powerful environment for the development of quality software. Using LynxInsure++, developers will produce more robust, optimized, higher quality real-time applications. LynxInsure++ automatically detects large classes of programming and run-time errors and quickly pinpoints algorithmic anomalies, bugs, and deficiencies. It visualizes in real time the memory manipulation of a program, helping developers spot bugs and inefficiencies in memory handling. LynxInsure++ also performs coverage analysis, providing necessary feedback to programmers about which parts of the code were actually run/tested.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

TimeScan* Performance Analyzer

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

TimeScan is an event-based tracing and performance analysis tool. It supports multi-process, multi-threaded, and multiprocessor applications with event logging at a sub-microsecond resolution. With TimeScan, programmers have the ability to measure and display dynamic behavior programs. TimeScan is useful for both performance analysis and as a debugging tool, resolving difficult problems such as resource contention, bottlenecks, deadlocks, and critical process timings that cannot be tackled with a conventional debugger.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

TotalView* Debugger

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

The TotalView Debugger is a powerful, source-level, window-oriented debugger for the LynxOS RTOS. TotalView provides the ability to debug multi-process, multi-threaded, and multiprocessor-based systems and applications. It is designed to operate in a networked environment, giving the developer the ability to manage and control multiple processes even when these processes are distributed across multiple, heterogeneous systems.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

* Trademark or registered trademark of its respective company or mark holder

PowerPC

Motorola, IBM, Mitsubishi

Micro Digital smxAware Debugger

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's smxAware adds RTOS awareness to debuggers produced by other vendors. This is a great convenience during debugging and results in significant time savings. smxAware is in the form of a DLL (dynamic link library), which is loaded on the host by the host portion of the debugger. "smx" is selected from the debugger's menu bar. Objects to view are then selected by first clicking on the radio button for the object type (e.g. Tasks), then selecting from the displayed list of objects of that type (e.g. idle, timeout, etc.). All fields for the control block for an object are shown. All levels of multi-level objects are shown. Objects may also be added to the Watch Window. smxAware supports specific break points for some debuggers.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

smxProbe V.3.2 Debugger

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's smxProbe is a task-level symbolic debugger that either co-exists with source-code-level debuggers such as the Turbo* and CodeView* Debuggers, or runs on its own as a task. smxProbe maintains an error buffer, a task-trace buffer and an smx kernel call-trace buffer. These are allocated from far heap. Each buffer may be up to 64KB. The buffers permit the examination of smx kernel control blocks and queues. The debugger presents all information symbolically and allows for the setting of trigger points and break points. Micro Digital also offers an smx RTOS kernel-compatible remote version.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

XRAY* Debugger

Microtec

Host Development Environments: UNIX and Windows.

The XRAY* Debugger provides an environment designed to accelerate the edit-compile-download-debug cycle for development of embedded applications. Microtec's XRAY debugger is a well-known tool that has served embedded software developers for more than 10 years. The most current version of the XRAY debugger offers advanced debug support of multitasking and multiprocessing applications. Multiple execution environments are available, including: instruction-set simulator; target-resident monitor; ICE and RTOS-aware. Along with the debugger, XRAY offers a suite of development tools, including a context-sensitive editor, an interface to most popular source-code management systems, build facilities, and source browsing. The XRAY debugger features an intuitive, standard Windows or Motif user interface.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

RTI ScopeProfile* Performance Analysis Tool/Debugger

Real-Time Innovations, Inc.

Host Development Environments: UNIX and Windows.

RTI's ScopeProfile is a dynamic execution profiler for Wind River Systems' VxWorks* RTOS. The profiler shows the developer exactly where the CPU cycles are being spent. Both cumulative (including all subroutines) and direct CPU usage of each routine are captured. The output can be plotted in real time with RTI's StethoScope Debugger. The profiler will help developers tune their time-critical systems for maximum performance.

For more information, contact: Al Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

RTI StethoScope* Debugger

Real-Time Innovations, Inc.

Host Development Environments: UNIX and Windows.

Real-Time Innovations' (RTI) StethoScope debugger is a graphical monitoring, performance analysis, and data collection tool for real-time applications. The developer can watch program variables evolve in real time; any value in memory can be monitored. Much like a software oscilloscope, StethoScope allows the developer to see what the application is doing. StethoScope may rapidly become the developer's most important debugging and analysis tool.

For more information, contact: Al Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

SingleStep* Debug Suite

Software Development Systems, Inc.

Host Development Environments: UNIX and Windows.

Software Development Systems' SingleStep products offer a complete, intelligent debugging tool suite that was designed to reduce the code debugging time of the embedded applications development cycle. SingleStep products support simulation, on-chip debugging, in-circuit emulation, target monitoring and servers for Motorola's 68K, PowerPC, ColdFire, and M.CORE processors. SDS debugging suites and compilers are designed to increase customer productivity, thereby reducing product development-cycle times.

For more information, contact: Tim Tunnily, 630-368-0400. Email inquiries to: sales@sdsi.com. Visit Software Development Systems, Inc. on the World Wide Web at: www.sdsi.com.

CrossView* Pro Debugger

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking's CrossView Pro debugger delivers functionality that reduces time requirements for program testing and debugging, and includes the following: tracking scope and monitoring locals; an intelligent source window; and code coverage and performance analysis. CrossView Pro provides multiple views of the developer's code: C and/or assembly source, monitor, inspect, on-chip registers, call stack, variables, break point, execution trace, session log, simulated I/O and memory dumps.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

WindView* Debugger

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

WindView is a revolutionary diagnostic and analysis tool that provides detailed visibility into the dynamic operation of an embedded system. The developer using the WindView visual debugger can quickly and easily visualize the complicated interaction among tasks, interrupt service routines, and system objects in an application. This information is presented and can be manipulated through a state-of-the-art graphical user interface (GUI).

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

LIBRARY

C-tree Plus* File Handler

FairCom Corporation

Host Development Environments: UNIX and Windows and Most Others.

C-tree Plus File Handler Version 6.7A is based on advanced B+tree (balanced) algorithm. The C-tree Plus API handles all aspects of database I/O. Customer can program single-user or multi-user non-server applications royalty free. C-tree Plus has a small memory footprint, unsurpassed portability, is client/server ready and ODBC compliant. Features include: transaction processing; fixed/variable length records; alternate collating sequence numbers; and file mirroring. Package supports Windows, OS/2, DOS, Macintosh and UNIX.

For more information, contact: Sales, 573-445-6833. Email inquiries to: sales@faircom.com. Visit FairCom Corporation on the World Wide Web at: www.faircom.com.

smx*++ Class Library

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's smx*++ Class Library (C++ language) operates with smx. smx*++ is recommended for C++ object-oriented applications. The library permits the creation of application-specific operating system objects by inheritance. The smx*++ library also permits overloading the new and delete operators per class and other helpful features for C++ object-oriented programming.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

* Trademark or registered trademark of its respective company or mark holder

PowerPC

Motorola, IBM, Mitsubishi

DRIVER

AIO Drivers for VxWorks* RTOS

AP Labs

Host Development Environments: UNIX.

Extensive set of device drivers for Wind River's VxWorks*, supporting VME and IP Module interfaces for: analog, digital, serial, IRIG, PCM telemetry, 1553, ARINC-429, NTDS, DR11W, GPIB, FDDI and SCSI. AP Labs AIO supports high performance asynchronous and synchronous I/O operations under VxWorks 5.2 and Tornado.

For more information, contact: Steve Gills, 619-546-8626. Email inquiries to: info@sd.aplabs.com. Visit AP Labs on the World Wide Web at: www.sd.aplabs.com.

Datalight's FlashFX Flash File System

Datalight*

Host Development Environments: Windows and DOS.

Datalight's FlashFX, a full-featured flash file system, makes flash memory appear to be a disk. It includes true wear-leveling, scheduled garbage collection, and uses only 12K ROM and 7K RAM. There is no faster flash file system on the market. FlashFX is portable to any operating system and any processor (CPU). FlashFX may also be categorized as a BIOS extension.

For more information, contact: Tim Gillman, 360-435-8086 x 115. Email inquiries to: sales@datalight.com. Visit Datalight* on the World Wide Web at: http://www.datalight.com.

OTHER TOOLS

CodeCheck 7.0 Analyzer

Abraxas Software, Inc.

Host Development Environments: UNIX and Windows and MAC.

CodeCheck* Version 7.0 is a programmable tool for managing all C and C++ source code on a file or project basis. CodeCheck is input-compatible with all variants of K&R, ANSI C and C++. CodeCheck identifies code that will not port between MS DOS, OS/2, UNIX, VMS, WIN-95/NT, Macintosh, and porting to 64-bit machines. CodeCheck allows corporate coding and project specification standards to be completely automated for compliance validation. CodeCheck includes pre-written expert system Rule Files that can be applied to any C or C++ project for: POSIX, SVID, X3J11, Eltemtel, and ANSI C/C++ source code conformance validation.

For more information, contact: Tana Rae K., 503-244-5253. Email inquiries to: sales@abxsoft.com. Visit Abraxas Software, Inc. on the World Wide Web at: www.abxsoft.com.

Nucleus* FILE

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

To meet the needs of embedded developers requiring standard off-line storage, Accelerated Technology offers Nucleus FILE. It is an MS-DOS-compatible file system that requires only driver software on the target in order to store and retrieve data. Accelerated Technology also provides drivers for the standard PC-compatible floppy disk and IDE controllers. By combining these products with an application, a user is able to read and write standard PC fixed and floppy disks from an embedded system.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

DriveWay*-MPC860/MPC821/MPC823

Aisys Incorporated

Host Development Environments: Windows.

DriveWay* builds highly optimized, fully documented and tested peripheral device drivers using a point and click selection methodology. This not only saves time and money and enhances schedules, it also improves system maintainability and simplifies the task of migrating to new and more powerful processors as they become available.

For more information, contact: Renee Gonzales, 408-327-8820. Email inquiries to: mkt@aisysinc.com. Visit Aisys Incorporated on the World Wide Web at: www.aisysinc.com.

VMEwindows GUI

AP Labs

Host Development Environments: UNIX.

VMEwindows* provides a Motif-based point-and-click interface for the set-up and control of a VME-based system running the VxWorks* RTOS or Tornado* IDE. True real-time performance in the target system is maintained, and complete flexibility is provided by the optional development system. Typical applications include: data acquisition, avionics test and PCM telemetry.

For more information, contact: Steve Gills, 619-546-8626. Email inquiries to: info@sd.aplabs.com. Visit AP Labs on the World Wide Web at: www.sd.aplabs.com.

CodeTEST* Software Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

CodeTEST software verification tools for embedded system developers and testers support most major 32- and 16-bit microprocessors and VME boards, and supplies tools for accurately analyzing embedded system performance, code coverage, dynamic memory allocation and memory errors, as well as a powerful software trace tool. A VME version is now available.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

VSP-TAP*/Eaglei* Co-Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

Applied's VSP-TAP and the Eaglei co-verification environment from Viewlogic Systems provides software operation verification against a hardware description model (HDL). VSP-TAP adds enhanced real-time capabilities, connecting the simulated environment, the actual processor, and real-world data at real processor speeds, and supplying access to an emulator's full debugging capabilities.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

PowerPC* EABI Test Suite (PEATS)

Applied Testing and Technology, Inc.

Host Development Environments: UNIX and Windows.

ApTest's PowerPC Embedded ABI Test Suite (PEATS) verifies that development tools are compliant with the PowerPC Embedded Application Binary Interface (EABI), Version 1.0. Testing with PEATS facilitates product reliability as well as validating inter-operability between tools, debuggers, and libraries from multiple vendors. Therefore, PEATS is a valuable asset for both development tool vendors that support the PowerPC processors and for developers who are evaluating development tools for PowerPC processor-based system designs.

For more information, contact: Andy Silverman, 408-399-1930 x 203. Email inquiries to: aptest@aptest.com. Visit Applied Testing and Technology, Inc. on the World Wide Web at: www.aptest.com.

APIAccess* Middleware For Windows* OS

Award Software International, Inc.

Host Development Environments: Windows.

Award's APIAccess is the middleware needed to deploy Windows OS applications on embedded systems. Using APIAccess's Win32*-compatible libraries, Windows 32-bit source code can be ported and run natively on any supported combination of processor and RTOS. Embedded products can be designed, looking and acting just like a PC-based application.

For more information, contact: Bill Goodrich, 415-237-6895. Email inquiries to: sales@award.com. Visit Award Software International, Inc. on the World Wide Web at: www.award.com.

BSQUARE Integration

BSQUARE

Host Development Environments: Windows.

BSQUARE's Windows CE OEM Adaptation Kits (OAK*) provide OEMs the resources needed to adapt Windows CE to their respective products. Included with the kit are: support for processor, OEM adaptation layer, embedded drivers for processor devices, adaptation tools, and loader firmware for Windows CE.

For more information, contact: Ann Gorman, 425-519-5000. Email inquiries to: donb@bsquare.com. Visit BSQUARE on the World Wide Web at: www.bsquare.com.

CARDtools Application Simulation Tool

CARDtools Systems

Host Development Environments: UNIX & Windows.

CARDtools stands for Computer-Aided Real-time Design Tools, and the CARDtools

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PowerPC

Motorola, IBM, Mitsubishi

design tool is dedicated to the design, evaluation, and simulation of embedded systems applications. An embedded system application consists of hardware devices interacting with a microprocessor, the microprocessor (CPU), a real-time operating system (RTOS), and the application program. CARDtools addresses all the aspects of embedded system application design and simulation.

For more information, contact: Dave Allenbaugh, 408-894-9500. Email inquiries to: info@cardtools.com. Visit CARDtools Systems on the World Wide Web at: <http://www.cardtools.com>.

Embedded EMPRESS Developer's Toolkit*

Empress Software, Inc.

Host Development Environments: UNIX & Windows.

This suite is an applications development toolkit for embedded systems developers. It features the reliable, highly scalable Empress RDBMS with its fast, compact database engine, JDBC/ODBC bridge, and support for diverse data types. The suite includes the Empress RDBMS, Empress Dynamic SQL, Empress ODBC Interface, and Empress Internet Applications Development Toolkit.

For more information, contact: Dick Naedel, 301-220-1919. Email inquiries to: sales@empress.com. Visit Empress Software, Inc. on the World Wide Web at: www.empress.com.

EMPRESS RDBMS

Empress Software, Inc.

Host Development Environments: UNIX and Windows.

EMPRESS RDBMS is a powerful application development environment offering excellent data manipulation options to the embedded systems developer. The RDBMS can store and retrieve any data type that can be digitized, such as x-rays, voice, fingerprints and maps. Date variables and microsecond time stamps make this database Year 2000 compliant.

For more information, contact: Dick Naedel, 301-220-1919. Email inquiries to: sales@empress.com. Visit Empress Software, Inc. on the World Wide Web at: www.empress.com.

Green Hills Instruction Set Simulator

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills Instruction Set Simulators allow programs for the target microprocessor to be executed on the PC or host workstation by simulating the execution of the target at the instruction level. A special interface exists to allow program control via a standard debugger. The simulators support most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Execution Profiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Execution Profiler provides a mechanism for looking at user code in many different ways in order to pinpoint hot spots. Reports show performance by procedure, source line, etc. Supports native and embedded profiling on most popular 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Program Builder

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Program Builder is a configuration management system for creating and managing large programs. The MULTI builder replaces traditional make files with a modern point-and-click interface, greatly simplifying the configuration management task and eliminating the need for engineers dedicated to managing the build process. Supports native and embedded profiling on most popular 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Run-Time Error Checker

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Run-time Error Checker inserts code into user's executable to check for things like array out of bounds, value too large for variable, read of variable before initialization, and attempts to access unallocated memory. The error checker supports native and embedded profiling on most popular 32 and 64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Version Control System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Version Control system is very unobtrusive, with files being automatically checked out when the first change is made in the editor. Advanced features support program branches and the ability to find out who made the last change to selected lines. Supports native and embedded profiling on most popular 32/64-bit CPUs.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Logic Analyzers

Hewlett-Packard Company

Host Development Environments: N/A.

HP's digital design and debug tools help system developers solve tough hardware and software integration problems fast. The HP benchtop logic analyzers offer cost-effective 100 MHz state analysis plus five timing modes up to 500 MHz. The HP 16500 modular logic analysis systems provide the power and flexibility to handle demanding hardware and software problems.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or www.hp.com/go/emu.

PowerPC* Evaluation Kits

IBM Microelectronics

Host Development Environments: UNIX and Windows.

Evaluation kits for PowerPC 400 and 600 families of embedded controllers and microprocessors provide a reference design as well as a platform for benchmarking, prototyping and software development. Each kit provides all the hardware, software and documentation needed for design success. Kit components include: PowerPC reference board; limited capacity High C/C++ compiler, linker, and assembler; RISCWatch* debugger for use in ROM monitor mode only; run-time libraries; network services; ROM monitor with source code; sample applications; schematics and documentation; cables and power supply.

For more information, contact: PowerPC Technical Support Hotline. Email inquiries to: pccsupp@raleigh.ibm.com. Visit IBM Microelectronics on the World Wide Web at: www.chips.ibm.com/products/embedded.

smx* Dynamic Module Loader

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's smxDynamic Module Loader (DLM) permits independent executable modules to be dynamically loaded and executed as tasks under the smx RTOS. smxDLM is recommended for downloading new or altered tasks; for loading only the tasks needed, thus avoiding memory over-flow; for providing user programmability; for solving library re-entry problems; or for enforcing greater task or process independence.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

smxFile* Manager

Micro Digital, Inc.

Host Development Environments: DOS.

The smxFile Manager gives embedded systems developers a DOS-compatible, reentrant file system. It features high-performance file I/O and disk directory management. More than 20 primary functions are provided as are numerous low-level functions and several utilities. The API is similar to POSIX or MS-DOS*. The device-driver interface is similar to UNIX* OS, but much less complex.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

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PowerPC

Motorola, IBM, Mitsubishi

Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabilities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: <http://www.tektronix.com>.

680x0

Motorola Semiconductor

FULL FUNCTION RTOS

Bytebos* Multitasking Operating System

Bytebos Integrated Systems

Host Development Environments: UNIX and Windows.

Bytebos is a full-featured multitasking operating system designed for use in high-performance, real-time embedded computing applications. Bytebos is configured for use with all major C compilers and debuggers and is available for a variety of microprocessors, microcontrollers, and DSPs. Bytebos applications are portable with simple licensing. There are no royalties on executables, and source code is provided.

For more information, contact: Nick Andrews, 800-788-7288. Email inquiries to: andrews@bytebos.com. Visit Bytebos Integrated Systems on the World Wide Web at: www.bytebos.com.

CHORUS/ClassiX* Real-Time Operating System

Chorus Systems

Host Development Environments: UNIX and Windows.

CHORUS/ClassiX is a highly configurable, richly-featured real-time executive. Users can easily tailor CHORUS/ClassiX at a very fine-grain level of real-time operating system services to meet specific hardware and application requirements. The componentized* architecture is industry unique and allows CHORUS/ClassiX to coherently scale from very small (10K) instances to highly distributed, multiple-personality platforms including support for POSIX, third-party RTOSs, the Java* Application Environment (JAE) and/or legacy operating systems. Hot application re-start, fair-share scheduling, and other high-availability enablers provide necessary capabilities for mission-critical embedded systems.

For more information, contact: Audrey Castine, 408-879-4145. Email inquiries to: info@chorus.com. Visit Chorus Systems on the World Wide Web at: www.chorus.com.

CHORUS/JaZZ* Real-Time Operation System

Chorus Systems

Host Development Environments: N/A.

CHORUS/JaZZ* is a feature-rich, Java-enabled real-time operating system providing full Java functionality and compatibility within the context of an embedded real-time operating system. CHORUS/JaZZ provides a Java "virtual machine" personality, supporting the full range of Java extensions and services, including Hot Java and JavaViews. CHORUS/JaZZ allows developers to integrate "off-the-shelf" Java applications into distributed real-time embedded systems, resulting in a significant decrease in development costs and time. Not only is CHORUS/JaZZ one of the richest Java-enabled operating systems, it is also significantly faster than most Java implementations.

For more information, contact: Audrey Castine, 408-879-4145. Email inquiries to: info@chorus.com. Visit Chorus Systems on the World Wide Web at: www.chorus.com.

CMX-RTX* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-RTX RTOS provides more than 65 kernel services allowing control of tasks, events, messages, resources, semaphores, cyclic timers, queues, fixed memory blocks and UARTs. Interrupts are allowed to use some of the CMX functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. Very small ROM and RAM requirements for small-footprint applications. Several compiler vendors are supported. Source code is included, and there are no royalties.

The CMX-RTX RTOS supports an unusually large number of μ PU, μ CU, and DSP architectures from a large number of manufacturers, including: Advanced RISC Machines, Analog Devices, Hitachi, Intel, MIPS, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Sharp, Siemens, Texas Instruments, Toshiba, and Zilog.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

OSE* Real-Time Operating System

Enea OSE Systems AB

Host Development Environments: UNIX and Windows.

Enea's OSE is a message-based, real-time operating system and tool-set for embedded systems. OSE has special built-in capabilities for fault tolerance, safety critical applications, runtime configuration and distributed systems. OSE is the first RTOS to be certified to meet the software quality standard IEC 1508, safety integrity level 3.

For more information, contact: Bill McCombie, +468-638-5000 (Sweden). Email inquiries to: info.ose@enea.se. Visit Enea OSE Systems AB on the World Wide Web at: www.enea.se/ose.

PDOS Real-Time Operating System

Eyring Corporation

Host Development Environments: UNIX and Windows.

PDOS is a high-performance real-time operating system. It is reliable, deterministic, and proven in thousands of applications. A modular architecture makes PDOS a flexible solution for applications ranging from tightly embedded applications to distributed multi-user, multi-processor systems. The PDOS development model is supported by world-class tools for C, C++, and Ada applications, as well as source-level, multiple-task debugging.

For more information, contact: Clark Roundy, 801-561-1111. Email inquiries to: pdos-info@eyring.com. Visit Eyring Corporation on the World Wide Web at: www.eyring.com.

INTEGRITY* Real-Time Operating System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The INTEGRITY RTOS, which provides a memory-protected superset of the facilities offered in Green Hills Software's veLOsity* Real-Time Operating System, targets mission-critical, real-time applications that emphasize reliability, security and testability. The INTEGRITY RTOS is available on a royalty-free basis: users pay only for the host-based software development environment. Run-time licenses for the target system are free.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MTOS*/MTOS-UX Real-Time Operating Systems

Industrial Programming, Inc.

Host Development Environments: UNIX and Windows.

IPi's MTOS full-function RTOS products offer a uniform applications programming interface (API) across all supported processors, thus affording interface familiarity for programmers despite processor changes. MTOS also supports symmetric multi-processing and offers a complete coordination system for handling asynchronous operations. A "small footprint" RTOS, with code space ranging from 16KB to 45KB, MTOS is highly scalable for use with small, mid-size and very large programming projects.

For more information, contact: Bernard Mushinsky, 800-365-MTOS. Email inquiries to: info@ipi.com. Visit Industrial Programming, Inc. on the World Wide Web at: www.ipi.com.

pSOSystem Real-Time Operating System

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pSOSystem is a modular, high-performance real-time operating system designed specifically for embedded microprocessors. The RTOS provides a complete multi-tasking environment based on open system standards, such as network file system support. pSOSystem is designed for performance, reliability, and ease-of-use on either custom or commercial hardware.

Soon available for SPARC processors.

For more information, contact: Sales, 408-542-1500. Email: N/A. Visit Integrated Systems, Inc. on the World Wide Web at: <http://www.isi.com>.

AMX* Real-Time Multitasking Kernel

KADAK Products Ltd.

Host Development Environments: Windows and DOS.

KADAK's AMX Real-Time Operating System is a full-featured, fast, compact, ROMable

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kernel. AMX includes: preemptive, priority-based scheduler (optional time-slicing); nested interrupts with priority ordering; mailbox, semaphore, resource, event, list, buffer and memory managers; the Configuration Builder Utility eases system construction. And for debugging, KADAK's KwikLook* fault finder exploits SDS's SingleStep* and SSI's VisualProbe* debuggers for fully AMX RTOS-aware debugging.

For more information, contact: Sales, 604-734-2796. Email inquiries to: amxsales@kadak.com. Visit KADAK Products Ltd. on the World Wide Web at: www.kadak.com.

VERSAdos* Real-Time Operating System

Linden Technologies, Inc.

Host Development Environments: Self-hosted.

VERSAdos is a real-time operating system with Multi-tasking and Multi-user capability. The RTOS contains a full-function assembly language development environment with debug capability. The RTOS is self-hosted and supports all Motorola processors in the M68000 family and provides device drivers for most Motorola VME boards.

For more information, contact: Richard Vanderlin, 602-954-8602. Email inquiries to: dickv@inficad.com. Visit Linden Technologies, Inc. on the World Wide Web at: N/A.

LynxOS* Real-Time Operating System

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

LynxOS is a UNIX-compatible, POSIX-conforming, multi-process, and multi-threaded operating system designed for complex real-time applications that require fast, deterministic response. The LynxOS kernel was specifically designed for hard real-time applications. LynxOS is fully pre-emptible, re-entrant, and compact. The modularity inherent in the LynxOS architecture makes the operating system highly scalable and configurable. At its smallest, it can be configured with only the kernel and linked with an application to form a ROMable image for specialized embedded applications. At its fullest, LynxOS is a self-hosted development environment comprising a wide array of software development tools, UNIX-compatible utilities, industry-standard networking, a GUI, and a UNIX-like hierarchical file system.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

VRTX* Real-Time Operating System

Microtec

Host Development Environments: UNIX and Windows.

An element of the Spectra* development system, the VRTX* RTOS is easily configured and includes a family of real-time kernels that gives developers complete freedom in making functionality, performance and size tradeoffs. VRTX has integrated STREAMS-based networking, I/O and file systems. VRTX is unique in offering a choice of three compatible real-time kernels: VRTXsa kernel, a high-performance, full-featured kernel based on a leading-edge architecture; VRTX32 kernel, which has logged more trouble-free hours than any other RTOS available and has been used in FAA-certified flight-critical applications; VRTXmc kernel, the first real-time kernel specifically designed for microcontrollers, featuring minimal RAM and ROM footprints.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

DAVID* Real-Time A/V Decoder RTOS

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

Microware's DAVID (Digital Audio/Video Interactive Decoder) is based on the company's OS-9* real-time operating system. The DAVID RTOS represents an open system software platform for digital television devices used in telephone, cable and wireless networks. The DAVID Decoder has been selected by more manufacturers than any other digital television system software solution because of its open architecture, proven reliability, and cost-effectiveness in bringing products to market.

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

OS-9* Real-Time Operating System

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

Microware's OS-9 is an architecturally advanced, high-performance real-time operating system. The OS-9 RTOS provides priority-based, preemptive task scheduling, interrupt

and exception-handling services, dynamic memory management, inter-process communications facilities, system calls for system control, and unsurpassed I/O support. The OS-9 RTOS is used in industrial, telecommunications, transport, instrumentation, aerospace and consumer applications. Extensions to the OS-9 RTOS are available for designers of set-top boxes, pagers, cell phones, NCs and PDAs.

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

Wireless OS-9* Real-Time Operating System

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

The Wireless OS-9* RTOS is an integrated system software and development tool package designed specifically for manufacturers of battery-powered, intelligent computing and communication devices. Each Wireless OS-9 software subsystem contains the OS-9 operating system, power management, SPX communications file manager, FasTrak* and MAUI* (Multimedia Application User Interface), and a set of drawing and animation APIs (application program interfaces).

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

Precise/MQX* Real-Time Operating System

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking's full-featured, royalty-free, real-time Precise/MQX RTOS executive includes a design tool, performance analysis and an optional suite of communications protocols and drivers. MQX adds support for both shared memory multiprocessing and distributed processing. The functionality of the kernel can be extended with optional I/O components that add networking protocols and data communications protocols.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

Super TASK! Real-Time Operating System

U S Software

Host Development Environments: Windows.

U S Software's SuperTask! is a mature, compact, fast, and user-configurable RTOS suite. SuperTask! supports more than 20 C/C++ compilers/tool chains, and source code is included with an ANSI standard C core.

For more information, contact: Katrina Sumner, 503-641-8446 x 740. Email inquiries to: info@ussw.com. Visit U S Software on the World Wide Web at: www.ussw.com.

BASIC RTOS KERNEL**Nucleus PLUS* Real-Time Operating System**

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus PLUS is designed as a core component for an operating system environment. It is extensible and dynamic. Its modular design allows services to be easily produced by combining existing services. All of the Nucleus PLUS components (tasks, queues, semaphores, etc.) can be dynamically created and deleted. Each component has a control block defined by the user and placed anywhere in the available memory space of the target system. Nucleus PLUS is a real-time, pre-emptive, multitasking kernel designed for time-critical embedded applications. Approximately 95 percent of Nucleus PLUS is extremely portable and is currently available for use with most microprocessor families.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

CMX-TINY+* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-TINY+ RTOS provides more than 40 kernel services, thus allowing control of the following: tasks, events, messages, resources, semaphores, cyclic timers, and queues. Interrupts are allowed to use some CMX functions. The scheduler is based on true pre-emption. CMX-TINY+ RTOS features very fast context-switch times and very low interrupt-latency times. ROM and RAM requirements are very small. CMX offers support for several compiler vendors, with royalty-free source code included.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

* Trademark or registered trademark of its respective company or mark holder

680x0**Motorola Semiconductor****CMX-TINY+* Real-Time Operating System**

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-TINY+ RTOS provides more than 40 kernel services, allowing control of: tasks, events, messages, resources, semaphores, cyclic timers, queues. Interrupts are allowed to use some of the CMX-TINY+ functions. The scheduler is based on true pre-emption. Very fast context-switch times and very low interrupt-latency times are provided. The RTOS has very small ROM and RAM requirements, and supports several compiler vendors. Source code is included on a royalty-free basis.

The CMX-TINY+ RTOS supports an unusually large number of μ PU and μ CU architectures from the following manufacturers: Advanced RISC Machines, Hitachi, Intel, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Siemens, and Toshiba.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

RTXC* Real-Time Kernel

Embedded System Products, Inc.

Host Development Environments: UNIX and Windows.

Embedded System Products, Inc.'s RTXC is a multitasking real-time embedded kernel written primarily in C and featuring a single API for all supported processors. RTXC manages tasks and time, synchronizes with events, and permits transfer of data between tasks through 72 kernel services, including services for RAM management and exclusive access to an entity.

For more information, contact: Sales, 800-525-4302. Email inquiries to: sales@esphou.com. Visit Embedded System Products, Inc. on the World Wide Web at: www.esphou.com.

Precise/MQX* & MQX+m Real-Time Executive

Precise Software Technologies Inc.

Host Development Environments: .

Precise Software Technologies' Precise/MQX* is a portable high-performance, real-time executive. MQX is scalable from a single processor to distributed multiprocessor configurations. The real-time executive provides functions for multitasking, intertask communications and synchronization, dynamic interrupt management, and memory management. Optional protocols for networking and data communications are also available.

For more information, contact: Clarke Esler, 508-264-4413. Email inquiries to: info@psti.com. Visit Precise Software Technologies Inc. on the World Wide Web at: www.psti.com.

ISaGRAF* Run-Time Kernel

TranSys, Inc.

Host Development Environments: Windows.

The ISaGRAF* Run-Time Kernel is a portable execution engine that has behavior similar to traditional Programmable Logic Controllers (PLCs), but the kernel exceeds them in performance and flexibility. The ISaGRAF* Run-Time Kernel also has additional functionality, which greatly expands and enhances the application possibilities. The ISaGRAF kernel now makes communications, process control, SCADA and motion control all possible in a single control environment without special hardware.

For more information, contact: Robert R. Lyons, 602-926-4100. Email inquiries to: info@ISaGRAF.com. Visit TranSys, Inc. on the World Wide Web at: www.ISaGRAF.com.

INTEGRATED DEVELOPMENT ENVIRONMENT**CAD-UL Workbench* Development Systems**

CAD-UL, Inc.

Host Development Environments: UNIX and Windows and VMS.

CAD-UL provides a complete development environment for 80x86/Pentium (Real and Protected Mode) and 680x0/683xx target processors. The CAD-UL tool chain includes a C/C++ compiler, assembler, linker and high-level language debugger, all tightly integrated into a development environment (IDE) called Workbench. The CAD-UL XDB debugger interfaces to popular third-party real-time operating systems, in-circuit emulators, and is available as a ROM-monitor solution for debugging of actual hardware. The compiler systems are best known for generating highly optimized code.

For more information, contact: Jeff Liborio/Mike Halpin, 602-945-8188. Email inquiries to: us.sales@cadul.com. Visit CAD-UL, Inc. on the World Wide Web at: www.cadul.com.

COSMIC* C Cross Compilers

COSMIC Software Inc.

Host Development Environments: UNIX, Windows and DOS.

COSMIC C cross compilers are designed specifically for each family of microcontrollers. All processors in each family are supported. A special code generator and optimizer targeted for each specific family eliminates the overhead of a more generic compiler. The package includes an ANSI C compiler, assembler, linker, librarian, object inspector, hex file generator, object format converters, debugging support utilities, run-time library, and source code, compiler command driver and integration files for Premia's Codewright* Windows Editor for a complete integrated development environment (IDE).

For more information, contact: Alan Johnson, 617-932-2556. Email inquiries to: sales@cosmic-us.com. Visit COSMIC Software Inc. on the World Wide Web at: www.cosmic-us.com.

PDOS PowerSuite

Eyring Corporation

Host Development Environments: Windows.

PDOS PowerSuite is a collection of easy to use tools that comprise a 32-bit multitasking, Windows-based embedded systems development environment. It gives PDOS and PDOSpro developers complete control of their real-time development environment. This toolset includes a GUI control center, operating system configuration and integration tools, complete on-line documentation, and links to compilers, debuggers, and other development tools.

For more information, contact: Clark Roundy, 801-561-1111. Email inquiries to: pdos-info@eyring.com. Visit Eyring Corporation on the World Wide Web at: www.eyring.com.

SwiftX* Cross-Development Environment

FORTH, Inc.

Host Development Environments: Windows and DOS.

FORTH's SwiftX is a PC-based, interactive cross-development environment for micro-controller, microprocessor or DSP-based embedded systems. SwiftX includes a Forth compiler, assembler, editor, libraries, debugger and real-time kernel, all in one package. The development environment supports Intel's 8051, 80186/80188, 8096/80196 micro-controllers and microprocessors and Motorola's 68HC11 and 68HC16 microcontrollers and 68xxx/CPU-32 processors. There are no run-time royalties for SwiftX kernels.

For more information, contact: Steve Agarwal, 800-55-FORTH. Email inquiries to: forth-sales@forth.com. Visit FORTH, Inc. on the World Wide Web at: www.forth.com.

MULTI* Software Development Environment

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Software Development Environment provides a framework of interacting tools to support program development by small or large workgroups. MULTI includes all of the tools needed to support major programming projects, including a program builder, version control, program editor, debugger, execution profiler, run-time error checker, and source-code control.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Hitex HiTools Integrated Development Environment

Hitex Development Tools

Host Development Environments: UNIX, Windows and DOS.

The Hitex tools comprise a complete integrated development environment, including compiler, assembler, debugger and emulator for the μ Cs and μ Ps the company supports.

For more information, contact: Olaf Pfeiffer, 408-298-9077. Email inquiries to: info@hitex.com. Visit Hitex Development Tools on the World Wide Web at: <http://www.hitex.com>.

pRISM+ Integrated Development Environment

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pRISM+ is a complete, integrated development environment (IDE) for designing and delivering embedded software applications. pRISM+ combines the industry's optimal development tools with the pSOSsystem, an industry-proven and reliable real-time operating system (RTOS). The pRISM+ environment combines "Best-Of-Class" tools for developing, analyzing and testing embedded applications in one seamless environment, built with an open, extensible architecture to accommodate future needs.

Note: Soon available for SPARC microprocessors.

For more information, contact: Sales 408-542-1500. Email inquiries to: N/A. Visit Integrated Systems, Inc. on the World Wide Web at: <http://www.isi.com>.

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680x0**Motorola Semiconductor****Metrowerks' CodeWarrior***

Metrowerks Corporation

Host Development Environments: UNIX and Windows.

Metrowerks' CodeWarrior is transforming embedded system development by offering the most intuitive GUI development tools available under Windows* 96/NT operating systems at a fraction of the cost of traditional command-line tools. With CodeWarrior, the developer gets a complete suite of tools (IDE) to create, compile, link, debug, and assemble fast, optimized embedded system code.

For more information, contact: Jenny Page, 512-873-4740. Email inquiries to: sales@metrowerks.com. Visit Metrowerks Corporation on the World Wide Web at: <http://www.metrowerks.com>.

Spectra* Development System

Microtec

Host Development Environments: UNIX and Windows.

Microtec's Spectra development system represents the next-generation Embedded IDE (Integrated Development Environment) for real-time and embedded software. Spectra addresses the full range of embedded applications, from austere, minimal-resource systems with no real-time operating system requirements, up to complex, resource-intensive systems. Designed specifically for real-world embedded applications, Spectra radically reduces target memory consumption, allowing more room for innovation at the application level. Organizations standardizing on Spectra can focus on a single software architecture - on both the host and target - thereby leveraging the full benefits of cross-training, consolidated support and simplified maintenance.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

FasTrak* Development Environment

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

Microware's FasTrak is a client/server integrated development environment that provides powerful source-code management, makefile generation, and debugging and profiling tools. The FasTrak environment's tight integration with the OS-9* RTOS gives users an edge in software development, because FasTrak was designed from the ground up to be OS-9 RTOS-aware. The FasTrak IDE provides solutions across a wide variety of development schemes and computing platforms.

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

RTI ControlShell* O-O Programming Environment

Real-Time Innovations, Inc.

Host Development Environments: .

RTI's ControlShell is a component-based, object-oriented programming environment for real-time software development. Built on top of Wind River Systems' VxWorks* RTOS, ControlShell combines a modular structure, powerful graphical tools, and integrated data management into a unique approach to real-time software development. The ControlShell environment provides a framework that enables programmers/users to share and reuse software on a scale never before possible.

For more information, contact: Al Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

EDE Project Environment

Tasking, Inc.

Host Development Environments: Windows.

EDE is a complete development project environment that gives the developer direct access to all the tools and features needed. EDE includes a language-sensitive editor, MAKE for automated application building and a project environment for specifying project files, including source files, tool options and build options.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

Tornado* Integrated Development Environment

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Wind River Systems' Tornado is a complete software cross-development environment for embedded systems. Tornado is seamlessly integrated and includes powerful devel-

opment tools and VxWorks*, a feature-rich, high performance and scalable real-time operating system. Completely open and customizable, the Tornado environment also facilitates the use of third-party and customer-developed tools to enhance its capabilities and meet unique customer requirements. Tornado has more than 90 software and hardware partners and is used by thousands of developers worldwide.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

COMPILER**GNUPro* Toolkit Compiler Suite**

Cygnus Solutions

Host Development Environments: .

Cygnus Solutions' GNUPro* Toolkit compiler suite (with assembler) is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The compiler delivers speed- and size-performance advantages over a wide range of microprocessor architectures. Cygnus provides mission-critical technical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

DDC-I Ada Compiler Systems (DACS*)

DDC-I

Host Development Environments: UNIX and Windows.

A typical DDC-I Ada Language compiler system, the DACS-80x86 features include: compact, efficient ROMable code; modular stand-alone run-time system; advanced symbolic Ada debugger; superior real-time performance; easily configurable to developer's hardware; generates Intel OMF; supports bare PC as target; FAA-certifiable run-time system available (including tasking); supports rate-monotonic scheduling; fast and normal interrupt handling; fast Ethernet; downloading; selective linking; stack analysis tools (static and dynamic); Multibus* II interface; CIFO and RTS entry-point package; numeric package using 80x87 NPX. (See other processors supported by DDC-I's compiler systems.)

For more information, contact: Morter Selling, +45 45 87 11 44. Email inquiries to: sales@ddci.dk. Visit DDC-I on the World Wide Web at: www.ddci.com.

D-C++ C/C++ Cross-Compiler Suite

Diab Data, Inc.

Host Development Environments: UNIX and Windows.

D-C++ is a highly-optimizing C/C++ compiler, producing exceptionally fast, compact, accurate code for the PowerPC, 68K/CPU32, ColdFire, and MCORE processor-based applications. The D-C++ compiler is fully ANSI compliant and works with all popular debug, RTOS, and emulation systems. The suite contains a compiler, assembler, linker, profiler, program checker, archiver, advanced libraries package, and other utilities. An optional RTA (Real-Time Analysis) Suite enables developers to enhance program performance, reliability and memory utilization.

For more information, contact: Jan Liband, 415-571-1700. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

D-CC C Cross-Compiler Suite

Diab Data, Inc.

Host Development Environments: UNIX and Windows and Others.

Diab Data's D-CC is a highly-optimizing C compiler, producing exceptionally fast, compact, target-specific code for Motorola's PowerPC, 68K/CPU32, ColdFire and MCORE Processor-based applications. The D-CC compiler is fully ANSI and EABI compliant, works with all popular debug, RTOS, and emulation systems. The suite provides the compiler, assembler, linker, profiler, program checker, archiver, advanced libraries package, and other utilities. An optional Real-Time Analysis Suite (RTA) enables developers to enhance program performance, reliability, and memory utilization.

For more information, contact: Jan Liband, 415-571-1700. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

Run-Time Analysis Tools For Diab Data Compilers

Diab Data, Inc.

Host Development Environments: UNIX and Windows.

Diab Data's RTA Suite is a suite of visual run-time analysis tools for improving program performance, reliability, and memory utilization. The RTA Suite works in conjunction with Diab Data's C/C++ compilers and includes a Visual Interactive Profiler, a Run-Time

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Error Checker, and a Link Map Analyzer for visualizing memory-map setups.

For more information, contact: Jan Liband, 650-571-1700 x227. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

Green Hills Optimizing Ada 95 Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

A fully validated implementation of the Ada 95 language, including new task and synchronization features, POSIX threads, and type extensions of tagged types and child library units. Supports mixed-language programming with C, C++, FORTRAN and Assembly. Compilers support many 32- and 64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing C Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills' high-performance optimizing C compilers, for native or embedded development, have many advanced optimizations, such as cross-module inlining. The compilers allow for the fine tuning of optimization strategy so users can generate optimal code. Supports 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing C++ Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills offers high-performance optimizing C++ compilers for native or embedded development. The compilers are compatible with Green Hills Software's MULTI* debugger, which automatically handles C++ constructs such as name mangling and template debugging. The compilers support most 32-/64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing Embedded C++ Compiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills optimizing Embedded C++ compilers are high-performance and follow the Embedded C++ Technical Committee draft standard.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing FORTRAN Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills Software offers optimizing FORTRAN compilers for native or embedded development. A compile-time option allows users to select from among the F77, VMS and DoD dialects of the FORTRAN language, with additional support for many extensions. The FORTRAN compilers support most 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Microtec* C and C++ Cross-Compilers

Microtec

Host Development Environments: UNIX and Windows.

Microtec's C and C++ compilers conform to the version of the C++ language that is defined in the Annotated C++ Reference Manual (ARM), including templates, exception handling, and nested classes. Because the C++ language continues to develop, Microtec is actively participating in the ANSI C++ standardization process. The company is committed to supporting both the ANSI C++ language and library standards with future product releases. The most significant new benefit is the addition of specialized linker optimizations that significantly reduce the size of modules when advanced C++

features, such as templates and in-line and virtual functions, are used. These optimizations allow developers to take advantage of the full power of object-oriented programming techniques in embedded systems without experiencing code bloat.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

C++ Compiler

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Object-oriented programming techniques increase productivity, improve quality and provide reusability with Tasking's C++ compiler. The compiler allows the intermixing of C++ and C code within a single application. Thus, the benefits of C++ can be incorporated into existing C applications a module at a time, thus providing easy migration from C to C++ programs.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

C Compiler Package

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking delivers ANSI C compilers that are highly optimized with individual target-specific extensions for ultimate flexibility and efficiency. As well as using these target-specific extensions, the developer-user can also define in-line functions and use in-line assembly. Included with every compiler is an assembler and linker/locator.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

ASSEMBLER**GNUPro* Toolkit**

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit is a solution to the problem of delivering quality software to meet the increasingly tighter schedules required by today's marketplace. The highly optimized tool chain for a specific host-target combination drives competitive speed- and size-performance advantages into a developer's software without compromising either its portability or maintainability. The fully-featured debug tools and utilities significantly help to shorten the development, test, and validation cycles. Cygnus backs the GNU technology with a commitment to rapid and expert support. All GNUPro tool chains for native and embedded programming are bundled with mission-critical support services and guaranteed technical response times.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

Green Hills Cross Assembler Tool Chain

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills embedded tool chain includes a macro assembler, linker, librarian, run-time libraries, object formatters and other utilities useful for embedded development. Cross-assembler tool chains are available for most 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

EMULATOR**Emulation Tools for Embedded Development**

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

Applied Microsystems offers a broad range of high-performance microprocessor emulators. Patented CodeTAP* low-cost emulators offer the capabilities most used by software engineers. CodeICE* emulators have advanced features for both hardware and software development. The award-winning new SuperTAP* compact emulator offers hardware and software development features in a palm-sized form factor.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

* Trademark or registered trademark of its respective company or mark holder

680x0**Motorola Semiconductor****HP 64700 Series In-Circuit Emulators**

Hewlett-Packard Company

Host Development Environments: UNIX and Windows.

The HP 64700 series development tools compose a comprehensive embedded development, debugging and analysis environment that continues to evolve and expand to meet the increasing demands of the software designer. Integrated under a common user interface and operating environment, these tools create an embedded design system that accelerates the development process.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or [/emulator](http://www.hp.com/go/emulator).

Flex-ICE* In-Circuit Emulator

Noral Micrologics Limited

Host Development Environments: Windows.

Debugging for Motorola's 68020 and 683xx processors is supported by Noral's high-performance Flex-ICE in-circuit emulator. Emulator systems include overlay memory, emulation feature memory, trace buffer, advanced hardware breakpoints with event detection, ROM and RAM software breakpoints, time stamps, interrupt servicing while broke, and much more. A demonstration disk is available from Noral.

For more information, contact: Harry Erickson, 508-647-0103 (U.S. Office). Email inquiries to: noral@noral.co.uk. Visit Noral Micrologics Limited on the World Wide Web at: www.noral.com.

SDT-Xi* In-Circuit Emulator

Noral Micrologics Limited

Host Development Environments: DOS.

The 68LC302, 68302, 68306, 68K, 80x86, NEC V series, WDC 65C02 family, 64180, Z80, 68xx, 8085, NSC800 processors and many others are supported by Noral's SDT-Xi series of universal in-circuit emulators. Noral's in-circuit emulator systems are easily reconfigured for each processor emulation by changing emulation probes and processor family configuration pods.

For more information, contact: Harry Erickson, 508-647-0103 (U.S. Office). Email inquiries to: noral@noral.co.uk. Visit Noral Micrologics Limited on the World Wide Web at: www.noral.com.

Orion* 8800 Emulator

Orion Instruments

Host Development Environments: Windows and DOS.

The Orion 8800 is a non-intrusive, real-time emulator/analyzer that features a multi-level event-trigger system, deep trace capture and overlay memory. A unique Clip-On capability allows connection to soldered-in processors. The popular SDS SingleStep* Windows* OS-based debugger can serve as the user GUI for Motorola's MC68000 processor family.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

Orion/Advice* Emulator

Orion Instruments

Host Development Environments: UNIX and Windows.

The Orion/Advice is a high-performance, real-time emulation system. A sophisticated multi-level event-triggering system, combined with a non-intrusive trace buffer provide unmatched problem tracking. A point-and-click Windows* or UNIX* OS graphical user interface (GUI) provides true high-level-language (HLL) debug support. Profiling, performance analysis and code coverage complete the Orion/Advice emulation package.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

DEBUGGER**MWX-ICE* Debugger**

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

MWX-ICE is a full-featured C/C++ symbolic debugger tailored specifically for in-circuit emulation. It provides complete control of Applied Microsystems emulators and features a consistent interface across Sun4, HP 9000, and Windows PC platforms. The

MWX-ICE debugger supports popular tool chains including those from Microtec, Cygnus-GNU, Green Hills, and SDS.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

ZAP MON Debugger

COSMIC Software Inc.

Host Development Environments: Windows.

ZAP is a full-featured C and Assembly source-level debugger featuring ANSI C debugging, high-level RTXC kernel integration, source browsing, graphical performance analysis, chronograms and full on-line help. The ZAP Monitor version uses a small monitor program to provide a source-level debugging environment via a serial connection to several standard evaluation boards. ZAP MON includes monitor source code.

For more information, contact: Alan Johnson, 617-932-2556. Email inquiries to: sales@cosmic-us.com. Visit COSMIC Software Inc. on the World Wide Web at: www.cosmic-us.com.

ZAP* SIM Debugger

COSMIC Software Inc.

Host Development Environments: Windows and OSF MOTIF.

ZAP is a full-featured C and Assembly source-level debugger featuring ANSI C debugging, high-level RTXC kernel integration, source browsing, graphical performance analysis, chronograms and full on-line help. ZAP Simulator integrates a software CPU simulator with a full source-level debugger to provide a complete debugging environment on the host machine.

For more information, contact: Alan Johnson, 617-932-2556. Email inquiries to: sales@cosmic-us.com. Visit COSMIC Software Inc. on the World Wide Web at: www.cosmic-us.com.

GNUPro* Toolkit Debugger Suite

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit debugger suite is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The fully-featured debug tools and utilities significantly help to shorten the development, test and validation cycles. Cygnus provides mission-critical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

MULTI* Source-Level Debugger

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Source-level Debugger supports native or embedded debugging of most popular 32-/64-bit processors. The main debugger window shows source or interlaced source and assembly. A single click lets the user look at a variable or set a breakpoint. Small windows allow for the monitoring of specific variables, local variables, or the call stack.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Source Gate* II Source-Level Debugger

Huntsville Microsystems Inc. (HMI)

Host Development Environments: UNIX and Windows.

The Source Gate II is a full-featured source-level debugger that provides a common user interface to all Huntsville Microsystems, Inc. products, including SPS-2000 series emulators, HMI-2000 series emulators, Background Mode Debuggers (BMDs), and CPU simulators. The Source Gate II Debugger provides a watch window for viewing/changing memory variables; multiple CodeView windows that allow emulator operations to be controlled from a user file displayed in source, assembly, or a combination of the two. Provides C++/RTOS support and more.

For more information, contact: James Bell, 205-881-6005. Email inquiries to: sales@hmi.com. Visit Huntsville Microsystems Inc. (HMI) on the World Wide Web at: www.hmi.com.

LynxInsure++*

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

LynxInsure++ is a powerful environment for the development of quality software. Using LynxInsure++, developers will produce more robust, optimized, higher quality real-time

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Motorola Semiconductor

applications. LynxInsure++ automatically detects large classes of programming and run-time errors and quickly pinpoints algorithmic anomalies, bugs, and deficiencies. It visualizes in real time the memory manipulation of a program, helping developers spot bugs and inefficiencies in memory handling. LynxInsure++ also performs coverage analysis, providing necessary feedback to programmers about which parts of the code were actually run/tested.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

TimeScan* Performance Analyzer

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

TimeScan is an event-based tracing and performance analysis tool. It supports multi-process, multi-threaded, and multiprocessor applications with event logging at a sub-microsecond resolution. With TimeScan, programmers have the ability to measure and display dynamic behavior programs. TimeScan is useful for both performance analysis and as a debugging tool, resolving difficult problems such as resource contention, bottlenecks, deadlocks, and critical process timings that cannot be tackled with a conventional debugger.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

TotalView* Debugger

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

The TotalView Debugger is a powerful, source-level, window-oriented debugger for the LynxOS RTOS. TotalView provides the ability to debug multi-process, multi-threaded, and multiprocessor-based systems and applications. It is designed to operate in a networked environment, giving the developer the ability to manage and control multiple processes even when these processes are distributed across multiple, heterogeneous systems.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

XRAY* Debugger

Microtec

Host Development Environments: UNIX and Windows.

The XRAY* Debugger provides an environment designed to accelerate the edit-compile-download-debug cycle for development of embedded applications. Microtec's XRAY debugger is a well-known tool that has served embedded software developers for more than 10 years. The most current version of the XRAY debugger offers advanced debug support of multitasking and multiprocessing applications. Multiple execution environments are available, including: instruction-set simulator; target-resident monitor; ICE and RTOS-aware. Along with the debugger, XRAY offers a suite of development tools, including a context-sensitive editor, an interface to most popular source-code management systems, build facilities, and source browsing. The XRAY debugger features an intuitive, standard Windows or Motif user interface.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

Flex-BDM* Debugger

Noral Micrologics Limited

Host Development Environments: Windows.

The debugging of software for Motorola's 68HC12, 683xx and ColdFire processors is supported by Noral's low-cost Flex-BDM Debugger product range. Flex-BDM is different from the common background-debug-mode (BDM) cable solutions, because each system includes custom logic and a control processor, enhancing the debugging capabilities beyond the basic BDM specification. A demonstration disk is available from Noral.

For more information, contact: Harry Erickson, 508-647-0103 (U.S. Office). Email inquiries to: noral@noral.co.uk. Visit Noral Micrologics Limited on the World Wide Web at: www.noral.com.

Flex-Sim* Simulator

Noral Micrologics Limited

Host Development Environments: Windows.

Noral's Flex-Sim Simulator/Debugger was designed for debugging software for

Motorola's 68000 processor family. The Flex-Sim Simulator/Debugger is available free of charge from Noral and can also be downloaded from Noral's Web site. The debugger includes a powerful macro language with examples of I/O simulation included as part of the standard installation.

For more information, contact: Harry Erickson, 508-647-0103 (U.S. Office). Email inquiries to: noral@noral.co.uk. Visit Noral Micrologics Limited on the World Wide Web at: www.noral.com.

RTI ScopeProfile* Performance Analysis Tool/Debugger

Real-Time Innovations, Inc.

Host Development Environments: UNIX and Windows.

RTI's ScopeProfile is a dynamic execution profiler for Wind River Systems' VxWorks* RTOS. The profiler shows the developer exactly where the CPU cycles are being spent. Both cumulative (including all subroutines) and direct CPU usage of each routine are captured. The output can be plotted in real time with RTI's StethoScope Debugger. The profiler will help developers tune their time-critical systems for maximum performance.

For more information, contact: Al Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

RTI StethoScope* Debugger

Real-Time Innovations, Inc.

Host Development Environments: UNIX and Windows.

Real-Time Innovations' (RTI) StethoScope debugger is a graphical monitoring, performance analysis, and data collection tool for real-time applications. The developer can watch program variables evolve in real time; any value in memory can be monitored. Much like a software oscilloscope, StethoScope allows the developer to see what the application is doing. StethoScope may rapidly become the developer's most important debugging and analysis tool.

For more information, contact: Al Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

SingleStep* Debug Suite

Software Development Systems, Inc.

Host Development Environments: UNIX and Windows.

Software Development Systems' SingleStep products offer a complete, intelligent debugging tool suite that was designed to reduce the code debugging time of the embedded applications development cycle. SingleStep products support simulation, on-chip debugging, in-circuit emulation, target monitoring and servers for Motorola's 68K, PowerPC, ColdFire, and M.CORE processors. SDS debugging suites and compilers are designed to increase customer productivity, thereby reducing product development-cycle times.

For more information, contact: Tim Tumilty, 630-368-0400. Email inquiries to: sales@sdsi.com. Visit Software Development Systems, Inc. on the World Wide Web at: www.sdsi.com.

CrossView* Pro Debugger

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking's CrossView Pro debugger delivers functionality that reduces time requirements for program testing and debugging, and includes the following: tracking scope and monitoring locals; an intelligent source window; and code coverage and performance analysis. CrossView Pro provides multiple views of the developer's code: C and/or assembly source, monitor, inspect, on-chip registers, call stack, variables, break point, execution trace, session log, simulated I/O and memory dumps.

For more information, contact: 1-800-458-8276. Email inquiries to: sales@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

WindView* Debugger

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

WindView is a revolutionary diagnostic and analysis tool that provides detailed visibility into the dynamic operation of an embedded system. The developer using the WindView visual debugger can quickly and easily visualize the complicated interaction among tasks, interrupt service routines, and system objects in an application. This information is presented and can be manipulated through a state-of-the-art graphical user interface (GUI).

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

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680x0**Motorola Semiconductor****DRIVER****AIO Drivers for VxWorks* RTOS**

AP Labs

Host Development Environments: UNIX.

Extensive set of device drivers for Wind River's VxWorks*, supporting VME and IP Module interfaces for: analog, digital, serial, IRIG, PCM telemetry, 1553, ARINC-429, NTDS, DR11W, GPIB, FDDI and SCSI. AP Labs AIO supports high performance asynchronous and synchronous I/O operations under VxWorks 5.2 and Tornado.

For more information, contact: Steve Gills, 619-546-8626. Email inquiries to: info@sd.aplabs.com. Visit AP Labs on the World Wide Web at: www.sd.aplabs.com.

Datalight's FlashFX Flash File System

Datalight*

Host Development Environments: Windows and DOS.

Datalight's FlashFX, a full-featured flash file system, makes flash memory appear to be a disk. It includes true wear-leveling, scheduled garbage collection, and uses only 12K ROM and 7K RAM. There is no faster flash file system on the market. FlashFX is portable to any operating system and any processor (CPU). FlashFX may also be categorized as a BIOS extension.

For more information, contact: Tim Gillman, 360-435-8086 x 115. Email inquiries to: sales@datalight.com. Visit Datalight* on the World Wide Web at: http://www.datalight.com.

OTHER TOOLS**Nucleus* FILE**

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

To meet the needs of embedded developers requiring standard off-line storage, Accelerated Technology offers Nucleus FILE. It is an MS-DOS-compatible file system that requires only driver software on the target in order to store and retrieve data. Accelerated Technology also provides drivers for the standard PC-compatible floppy disk and IDE controllers. By combining these products with an application, a user is able to read and write standard PC fixed and floppy disks from an embedded system.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

VMEwindows GUI

AP Labs

Host Development Environments: UNIX.

VMEwindows* provides a Motif-based point-and-click interface for the set-up and control of a VME-based system running the VxWorks* RTOS or Tornado* IDE. True real-time performance in the target system is maintained, and complete flexibility is provided by the optional development system. Typical applications include: data acquisition, avionics test and PCM telemetry.

For more information, contact: Steve Gills, 619-546-8626. Email inquiries to: info@sd.aplabs.com. Visit AP Labs on the World Wide Web at: www.sd.aplabs.com.

CodeTEST* Software Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

CodeTEST software verification tools for embedded system developers and testers support most major 32- and 16-bit microprocessors and VME boards, and supplies tools for accurately analyzing embedded system performance, code coverage, dynamic memory allocation and memory errors, as well as a powerful software trace tool. A VME version is now available.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

VSP-TAP*/Eaglei* Co-Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

Applied's VSP-TAP and the Eaglei co-verification environment from Viewlogic Systems provides software operation verification against a hardware description model (HDL). VSP-TAP adds enhanced real-time capabilities, connecting the simulated environment,

the actual processor, and real-world data at real processor speeds, and supplying access to an emulator's full debugging capabilities.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

Validator* Verification Tools

B-Tree Systems, Inc.

Host Development Environments: Windows.

B-Tree's Validator and ValidatorGold Test Tools are fully automated test environments that enable the functional verification of embedded systems by providing real-time stimulation, non-intrusive monitoring, data visualization, automated test execution and logging of test results. B-Tree's Validator 2000 enables Year 2000 (Y2K) compliance testing for embedded and non-embedded systems. B-Tree's Validator SC product automates software compatibility testing for PCs and PC components.

For more information, contact: Laura Dominik, 612-936-7887. Email inquiries to: Info@btree.com. Visit B-Tree Systems, Inc. on the World Wide Web at: www.btree.com.

CARDtools Application Simulation Tool

CARDtools Systems

Host Development Environments: UNIX & Windows.

CARDtools stands for Computer-Aided Real-time Design Tools, and the CARDtools design tool is dedicated to the design, evaluation, and simulation of embedded systems applications. An embedded system application consists of hardware devices interacting with a microprocessor, the microprocessor (CPU), a real-time operating system (RTOS), and the application program. CARDtools addresses all the aspects of embedded system application design and simulation.

For more information, contact: Dave Allenbaugh, 408-894-9500. Email inquiries to: info@cardtools.com. Visit CARDtools Systems on the World Wide Web at: http://www.cardtools.com.

Green Hills Instruction Set Simulator

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills Instruction Set Simulators allow programs for the target microprocessor to be executed on the PC or host workstation by simulating the execution of the target at the instruction level. A special interface exists to allow program control via a standard debugger. The simulators support most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Execution Profiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Execution Profiler provides a mechanism for looking at user code in many different ways in order to pinpoint hot spots. Reports show performance by procedure, source line, etc. Supports native and embedded profiling on most popular 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Program Builder

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Program Builder is a configuration management system for creating and managing large programs. The MULTI builder replaces traditional make files with a modern point-and-click interface, greatly simplifying the configuration management task and eliminating the need for engineers dedicated to managing the build process. Supports native and embedded profiling on most popular 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Run-Time Error Checker

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Run-time Error Checker inserts code into user's executable to check for things like array out of bounds, value too large for variable, read of variable before initialization, and attempts to access unallocated memory. The error checker supports native and embedded profiling on most popular 32 and 64-bit processors.

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Motorola Semiconductor

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Version Control System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Version Control system is very unobtrusive, with files being automatically checked out when the first change is made in the editor. Advanced features support program branches and the ability to find out who made the last change to selected lines. Supports native and embedded profiling on most popular 32/64-bit CPUs.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Logic Analyzers

Hewlett-Packard Company

Host Development Environments: N/A.

HP's digital design and debug tools help system developers solve tough hardware and software integration problems fast. The HP benchtop logic analyzers offer cost-effective 100 MHz state analysis plus five timing modes up to 500 MHz. The HP 16500 modular logic analysis systems provide the power and flexibility to handle demanding hardware and software problems.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or /emulator.

Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabilities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: http://www.tektronix.com.

Pentium

Intel Corporation

FULL FUNCTION RTOS

Bytebos* Multitasking Operating System

Bytebos Integrated Systems

Host Development Environments: UNIX and Windows.

Bytebos is a full-featured multitasking operating system designed for use in high-performance, real-time embedded computing applications. Bytebos is configured for use with all major C compilers and debuggers and is available for a variety of microprocessors, microcontrollers, and DSPs. Bytebos applications are portable with simple licensing. There are no royalties on executables, and source code is provided.

For more information, contact: Nick Andrews, 800-788-7288. Email inquiries to: andrews@bytebos.com. Visit Bytebos Integrated Systems on the World Wide Web at: www.bytebos.com.

CHORUS/ClassiX* Real-Time Operating System

Chorus Systems

Host Development Environments: UNIX and Windows.

CHORUS/ClassiX is a highly configurable, richly-featured real-time executive. Users can easily tailor CHORUS/ClassiX at a very fine-grain level of real-time operating system services to meet specific hardware and application requirements. The componentized* architecture is industry unique and allows CHORUS/ClassiX to coherently scale from very small (10K) instances to highly distributed, multiple-personality platforms including support for POSIX, third-party RTOSs, the Java* Application Environment (JAE) and/or legacy operating systems. Hot application re-start, fair-share scheduling, and other high-availability enablers provide necessary capabilities for mission-critical embedded systems.

For more information, contact: Audrey Castine, 408-879-4145. Email inquiries to: info@chorus.com. Visit Chorus Systems on the World Wide Web at: www.chorus.com.

CHORUS/JaZZ* Real-Time Operation System

Chorus Systems

Host Development Environments: N/A.

CHORUS/JaZZ* is a feature-rich, Java-enabled real-time operating system providing full Java functionality and compatibility within the context of an embedded real-time operating system. CHORUS/JaZZ provides a Java "virtual machine" personality, supporting the full range of Java extensions and services, including Hot Java and JavaViews. CHORUS/JaZZ allows developers to integrate "off-the-shelf" Java applications into distributed real-time embedded systems, resulting in a significant decrease in development costs and time. Not only is CHORUS/JaZZ one of the richest Java-enabled operating systems, it is also significantly faster than most Java implementations.

For more information, contact: Audrey Castine, 408-879-4145. Email inquiries to: info@chorus.com. Visit Chorus Systems on the World Wide Web at: www.chorus.com.

OSE* Real-Time Operating System

Enea OSE Systems AB

Host Development Environments: UNIX and Windows.

Enea's OSE is a message-based, real-time operating system and tool-set for embedded systems. OSE has special built-in capabilities for fault tolerance, safety critical applications, runtime configuration and distributed systems. OSE is the first RTOS to be certified to meet the software quality standard IEC 1508, safety integrity level 3.

For more information, contact: Bill McCombie, +468-638-5000 (Sweden). Email inquiries to: info.ose@enea.se. Visit Enea OSE Systems AB on the World Wide Web at: www.enea.se/ose.

PDOSpro Real-Time Operating System

Eyring Corporation

Host Development Environments: Windows.

PDOSpro is a modular, scalable, and easy to configure operating system for embedded systems development. The PDOSpro kernel is extremely fast and platform independent. While powerful and robust, its minimum kernel size requires less than 5K of memory. Furthermore, PDOSpro enables developers to use standard Microsoft or Borland tools for code development. This modularity, cost-effectiveness, and exceptional performance makes PDOSpro the RTOS of choice for embedded systems developers.

For more information, contact: Clark Roundy, 801-561-1111. Email inquiries to: pdos-info@eyring.com. Visit Eyring Corporation on the World Wide Web at: www.eyring.com.

PXROS* Portable, Extendable RTOS

HighTec EDV-Systeme GmbH

Host Development Environments: UNIX and Windows and DOS.

PXROS has the following features: absolutely no interrupt latency with transparency; multiple independent activities with interrupt handlers and tasks (processes); priority-driven, preemptive scheduling with 32 task-priority levels; process coordination of messages, events, dynamically modified priorities, semaphores; flexible resource management with dynamically defined memory classes, fixed- and variable-length memory blocks, dynamically created objects, resource reservation; real-time-control-time based calls, period, for activities, timeouts and events.

For more information, contact: Hagen Heggenberger, ++43-681-92613-0. Email inquiries to: htc@hightec-rt.com. Visit HighTec EDV-Systeme GmbH on the World Wide Web at: http://www.hightec-rt.com.

MTOS*/MTOS-UX Real-Time Operating Systems

Industrial Programming, Inc.

Host Development Environments: UNIX and Windows.

IPi's MTOS full-function RTOS products offer a uniform applications programming interface (API) across all supported processors, thus affording interface familiarity for programmers despite processor changes. MTOS also supports symmetric multi-processing and offers a complete coordination system for handling asynchronous operations. A "small footprint" RTOS, with code space ranging from 16KB to 45KB, MTOS is highly scalable for use with small, mid-size and very large programming projects.

For more information, contact: Bernard Mushinsky, 800-365-MTOS. Email inquiries to: info@ipi.com. Visit Industrial Programming, Inc. on the World Wide Web at: www.ipi.com.

pSOSystem Real-Time Operating System

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pSOSystem is a modular, high-performance real-time operating system designed specifically for embedded microprocessors. The RTOS provides a complete multi-tasking environment based on open system standards, such as network file system support.

* Trademark or registered trademark of its respective company or mark holder

Pentium Intel Corporation

pSOSystem is designed for performance, reliability, and ease-of-use on either custom or commercial hardware.
Soon available for SPARC processors.

For more information, contact: Sales, 408-542-1500. Email: N/A. Visit Integrated Systems, Inc. on the World Wide Web at: <http://www.isi.com>.

AMX* Real-Time Multitasking Kernel

KADAK Products Ltd.

Host Development Environments: Windows and DOS.

KADAK's AMX Real-Time Operating System is a full-featured, fast, compact, ROMable kernel. AMX includes: preemptive, priority-based scheduler (optional time-slicing); nested interrupts with priority ordering; mailbox, semaphore, resource, event, list, buffer and memory managers; the Configuration Builder Utility eases system construction. And for debugging, KADAK's KwikLook* fault finder exploits SDS's SingleStep* and SSI's VisualProbe* debuggers for fully AMX RTOS-aware debugging.

For more information, contact: Sales, 604-734-2796. Email inquiries to: amxsales@kadak.com. Visit KADAK Products Ltd. on the World Wide Web at: www.kadak.com.

LP-VxWin* Real-Time Operating System

LP Elektronik GmbH

Host Development Environments: Windows.

LP's LP-VxWin* RTOS enables Wind River's VxWorks RTOS and Microsoft's Windows 95/NT Operating Systems to run concurrently on one processor. Due to LP's Real-Time basic technology, VxWorks remains 100% real-time capable. Communication between VxWorks and Windows 95/NT occurs over SM-TCP/IP. The software allows for sending messages to "normal" Windows OS programs as well as allowing access to any hardware address.

For more information, contact: Sales, ++751-56122-15. Email inquiries to: info@lp-elektronik.com. Visit LP Elektronik GmbH on the World Wide Web at: <http://www.lp-elektronik.com>.

LynxOS* Real-Time Operating System

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

LynxOS is a UNIX-compatible, POSIX-conforming, multi-process, and multi-threaded operating system designed for complex real-time applications that require fast, deterministic response. The LynxOS kernel was specifically designed for hard real-time applications. LynxOS is fully pre-emptible, re-entrant, and compact. The modularity inherent in the LynxOS architecture makes the operating system highly scalable and configurable. At its smallest, it can be configured with only the kernel and linked with an application to form a ROMable image for specialized embedded applications. At its fullest, LynxOS is a self-hosted development environment comprising a wide array of software development tools, UNIX-compatible utilities, industry-standard networking, a GUI, and a UNIX-like hierarchical file system.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

Microsoft Windows* CE O.S. Embedded Toolkit

Microsoft* Corporation

Host Development Environments: Windows.

Microsoft's Windows CE Embedded Toolkit for Visual C++ 5.0 includes integrated development environment tools designed specifically for embedded development. The Windows CE platform is a 32-bit, preemptive, multitasking, multithreaded operating system designed from the ground up to support embedded systems. Use the embedded toolkit to choose components for building a customized version of the Windows CE operating system to meet the unique requirements of your hardware. The toolkit contains the RTOS, compiler, assembler, emulator, debugger, library and drivers.

For more information, contact: N/A. Email inquiries to: N/A. Visit Microsoft* Corporation on the World Wide Web at: N/A.

VRTX* Real-Time Operating System

Microtec

Host Development Environments: UNIX and Windows.

An element of the Spectra* development system, the VRTX* RTOS is easily configured and includes a family of real-time kernels that gives developers complete freedom in making functionality, performance and size tradeoffs. VRTX has integrated STREAMS-based networking, I/O and file systems. VRTX is unique in offering a choice of three

compatible real-time kernels: VRTXsa kernel, a high-performance, full-featured kernel based on a leading-edge architecture; VRTX32 kernel, which has logged more trouble-free hours than any other RTOS available and has been used in FAA-certified flight-critical applications; VRTXmc kernel, the first real-time kernel specifically designed for microcontrollers, featuring minimal RAM and ROM footprints.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

DAVID* Real-Time A/V Decoder RTOS

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

Microware's DAVID (Digital Audio/Video Interactive Decoder) is based on the company's OS-9* real-time operating system. The DAVID RTOS represents an open system software platform for digital television devices used in telephone, cable and wireless networks. The DAVID Decoder has been selected by more manufacturers than any other digital television system software solution because of its open architecture, proven reliability, and cost-effectiveness in bringing products to market.

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

OS-9* Real-Time Operating System

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

Microware's OS-9 is an architecturally advanced, high-performance real-time operating system. The OS-9 RTOS provides priority-based, preemptive task scheduling, interrupt and exception-handling services, dynamic memory management, inter-process communications facilities, system calls for system control, and unsurpassed I/O support. The OS-9 RTOS is used in industrial, telecommunications, transport, instrumentation, aerospace and consumer applications. Extensions to the OS-9 RTOS are available for designers of set-top boxes, pagers, cell phones, NCs and PDAs.

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

Wireless OS-9* Real-Time Operating System

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

The Wireless OS-9* RTOS is an integrated system software and development tool package designed specifically for manufacturers of battery-powered, intelligent computing and communication devices. Each Wireless OS-9 software subsystem contains the OS-9 operating system, power management, SPF communications file manager, FasTrak* and MAUI* (Multimedia Application User Interface), and a set of drawing and animation APIs (application program interfaces).

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

RTKernel*/RTKernel-32 Real-Time Operating Systems

On Time

Host Development Environments: Windows and MS-DOS.

On Time's RTKernel and RTKernel-32 are powerful, real-time multitasking systems for Intel Architecture-based (x86) 32-bit embedded systems. The RTOS was specifically designed for 32-bit flat address space environments, with special care taken to ensure ease of use and excellent run-time performance. RTKernel-32 is compact (~16K code, 6K data) and provides the programmer with the basic tools required to develop efficient real-time software. RTKernel-32 has a library which can be linked to C/C++ application programs. It offers functions to manage tasks, semaphores, mailboxes, interrupts, etc. All RTKernel-32 tasks run within a single program. An RTKernel-32 application consists of a single executable file containing the kernel, the required drivers and all tasks. The RTKernel is very similar to RTKernel-32 but produces 16-bit executable code to run on MS-DOS*. RTKernel executable(s) can be processed by On Time's RTTarget-32 cross-development system.

For more information, contact: Tom Schotland, 516-689-6654. Email inquiries to: info@on-time.com. Visit On Time on the World Wide Web at: www.on-time.com.

QNX* Real-Time Operating System Technology

QNX Software Systems Ltd.

Host Development Environments: Windows and QNX RTOS (self hosted).

The QNX RTOS is a leading real-time OS for PCs. Based on a very lean microkernel, the scalable, POSIX-certified QNX RTOS combines hard real-time performance, fault tolerance, and pre-emptive multitasking with full memory protection. QNX also offers its

* Trademark or registered trademark of its respective company or mark holder

Pentium

Intel Corporation

award-winning Photon microGUI*, a complete embeddable windowing system requiring less than 500KB of flash memory or ROM.

For more information, contact: Marketing Services Dept., 800-676-0566. Email inquiries to: info@qnx.com. Visit QNX Software Systems Ltd. on the World Wide Web at: www.qnx.com.

IA-SPOX* Software Development Environment

Spectron Microsystems

Host Development Environments: .

IA-SPOX is a high-performance real-time development environment for Pentium* processors (Intel Architecture) running under Windows 95. IA-SPOX provides a true prioritized, preemptive multi-tasking kernel and real-time services at Ring 0. The environment also provides access to the Pentium processor's floating point and MMX instructions. A simple interface with Ring 3 applications provides developers with a familiar programming environment.

For more information, contact: Shirley Hance, 805-968-5100. Email inquiries to: info@spectron.com. Visit Spectron Microsystems on the World Wide Web at: www.spectron.com.

Super TASK! Real-Time Operating System

U S Software

Host Development Environments: Windows.

U S Software's SuperTask! is a mature, compact, fast, and user-configurable RTOS suite. SuperTask! supports more than 20 C/C++ compilers/tool chains, and source code is included with an ANSI standard C core.

For more information, contact: Katrina Sumner, 503-641-8446 x 740. Email inquiries to: info@ussw.com. Visit U S Software on the World Wide Web at: www.ussw.com.

VCI RTX-Real-Time Extension for Windows* NT O.S.

VenturCom, Inc.

Host Development Environments: Windows.

VenturCom's RTX is an extension to the Windows* NT operating system that enables deterministic response characteristics. RTX has the following features:

- Fixed-priority scheduling with 128 priorities;
- IPC with semaphores, mail slots, and shared memory objects;
- Real-time process and thread management;
- Memory locking, mapping, and management functions;
- High-speed clocks and timers.

For more information, contact: Betty Pool, 617-661-1230 x213. Email inquiries to: info@vci.com. Visit VenturCom, Inc. on the World Wide Web at: www.vci.com.

VxWorks* Real-Time Operating System

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Part of the Tornado* development environment, VxWorks is an industry-standard, scalable real-time operating system. It features the multitasking wind* kernel, the POSIX real-time extensions, intertask communications, full networking functionality, file system support and C++ support. Additional functionality is available through optional products from Wind River and a wide range of third-party partners.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

BASIC RTOS KERNEL

RTXC* Real-Time Kernel

Embedded System Products, Inc.

Host Development Environments: UNIX and Windows.

Embedded System Products, Inc.'s RTXC is a multitasking real-time embedded kernel written primarily in C and featuring a single API for all supported processors. RTXC manages tasks and time, synchronizes with events, and permits transfer of data between tasks through 72 kernel services, including services for RAM management and exclusive access to an entity.

For more information, contact: Sales, 800-525-4302. Email inquiries to: sales@esphou.com. Visit Embedded System Products, Inc. on the World Wide Web at: www.esphou.com.

Micro Digital's smx* V 3.2 Real-Time Operating System

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's smx, originally introduced in 1988, enhanced and complemented with additional capabilities over the years, has stood the test of time as a preemptive, multitasking real-time operating system kernel that provides task and memory management, timing, character I/O, intertask communication, semaphores, event queues, primitives and more. The kernel OS supports testing by error monitoring. Micro Digital's smx RTOS kernel is the basis for its integrated development tools environment, all designed to offer superb development support environments for developers of x86-compatible and PowerPC processor-based embedded systems.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

Precise/MQX* & MQX+m Real-Time Executive

Precise Software Technologies Inc.

Host Development Environments: .

Precise Software Technologies' Precise/MQX* is a portable high-performance, real-time executive. MQX is scalable from a single processor to distributed multiprocessor configurations. The real-time executive provides functions for multitasking, intertask communications and synchronization, dynamic interrupt management, and memory management. Optional protocols for networking and data communications are also available.

For more information, contact: Clarke Esler, 508-264-4413. Email inquiries to: info@psti.com. Visit Precise Software Technologies Inc. on the World Wide Web at: www.psti.com.

ISaGRAF* Run-Time Kernel

TranSys, Inc.

Host Development Environments: Windows.

The ISaGRAF* Run-Time Kernel is a portable execution engine that has behavior similar to traditional Programmable Logic Controllers (PLCs), but the kernel exceeds them in performance and flexibility. The ISaGRAF* Run-Time Kernel also has additional functionality, which greatly expands and enhances the application possibilities. The ISaGRAF kernel now makes communications, process control, SCADA and motion control all possible in a single control environment without special hardware.

For more information, contact: Robert R. Lyons, 602-926-4100. Email inquiries to: info@ISaGRAF.com. Visit TranSys, Inc. on the World Wide Web at: www.ISaGRAF.com.

INTEGRATED DEVELOPMENT ENVIRONMENT

CAD-UL Workbench* Development Systems

CAD-UL, Inc.

Host Development Environments: UNIX and Windows and VMS.

CAD-UL provides a complete development environment for 80x86/Pentium (Real and Protected Mode) and 680x0/683xx target processors. The CAD-UL tool chain includes a C/C++ compiler, assembler, linker and high-level language debugger, all tightly integrated into a development environment (IDE) called Workbench. The CAD-UL XDB debugger interfaces to popular third-party real-time operating systems, in-circuit emulators, and is available as a ROM-monitor solution for debugging of actual hardware. The compiler systems are best known for generating highly optimized code.

For more information, contact: Jeff Liborio/Mike Halpin, 602-945-8188. Email inquiries to: us.sales@cadul.com. Visit CAD-UL, Inc. on the World Wide Web at: www.cadul.com.

PDOS PowerSuite

Eyring Corporation

Host Development Environments: Windows.

PDOS PowerSuite is a collection of easy to use tools that comprise a 32-bit multitasking, Windows-based embedded systems development environment. It gives PDOS and PDOSpro developers complete control of their real-time development environment. This toolset includes a GUI control center, operating system configuration and integration tools, complete on-line documentation, and links to compilers, debuggers, and other development tools.

For more information, contact: Clark Roundy, 801-561-1111. Email inquiries to: pdos-info@eyring.com. Visit Eyring Corporation on the World Wide Web at: www.eyring.com.

* Trademark or registered trademark of its respective company or mark holder

Pentium

Intel Corporation

MULTI* Software Development Environment

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Software Development Environment provides a framework of interacting tools to support program development by small or large workgroups. MULTI includes all of the tools needed to support major programming projects, including a program builder, version control, program editor, debugger, execution profiler, run-time error checker, and source-code control.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Hitex HiTools Integrated Development Environment

Hitex Development Tools

Host Development Environments: UNIX, Windows and DOS.

The Hitex tools comprise a complete integrated development environment, including compiler, assembler, debugger and emulator for the μ Cs and μ Ps the company supports.

For more information, contact: Olaf Pfeiffer, 408-298-9077. Email inquiries to: info@hitex.com. Visit Hitex Development Tools on the World Wide Web at: http://www.hitex.com.

Hypersignal RIDE* Visual Design Environment

Hyperception, Inc.

Host Development Environments: Windows.

Hypersignal RIDE is a complete visual design environment for use in real-time systems development. It can be used for applications ranging from low-level DSP systems design and implementation to application-specific projects such as real-time instrumentation, data acquisition, control systems, and more. It provides complete control and observation of DSP designs.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

pRISM+ Integrated Development Environment

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pRISM+ is a complete, integrated development environment (IDE) for designing and delivering embedded software applications. pRISM+ combines the industry's optimal development tools with the pSOSystem, an industry-proven and reliable real-time operating system (RTOS). The pRISM+ environment combines "Best-Of-Class" tools for developing, analyzing and testing embedded applications in one seamless environment, built with an open, extensible architecture to accommodate future needs.

Note: Soon available for SPARC microprocessors.

For more information, contact: Sales, 408-542-1500. Email: N/A. Visit Integrated Systems, Inc. on the World Wide Web at: http://www.isi.com.

Metrowerks' CodeWarrior*

Metrowerks Corporation

Host Development Environments: UNIX and Windows.

Metrowerks' CodeWarrior is transforming embedded system development by offering the most intuitive GUI development tools available under Windows* 96/NT operating systems at a fraction of the cost of traditional command-line tools. With CodeWarrior, the developer gets a complete suite of tools (IDE) to create, compile, link, debug, and assemble fast, optimized embedded system code.

For more information, contact: Jenny Page, 512-873-4740. Email inquiries to: sales@metrowerks.com. Visit Metrowerks Corporation on the World Wide Web at: http://www.metrowerks.com.

Microsoft Windows* CE O.S. Embedded Toolkit

Microsoft* Corporation

Host Development Environments: Windows.

Microsoft's Windows CE Embedded Toolkit for Visual C++ 5.0 includes integrated development environment tools designed specifically for embedded development. The Windows CE platform is a 32-bit, preemptive, multitasking, multithreaded operating system designed from the ground up to support embedded systems. Use the embedded toolkit to choose components for building a customized version of the Windows CE operating system to meet the unique requirements of your hardware. The toolkit contains the RTOS, compiler, assembler, emulator, debugger, library and drivers.

For more information, contact: N/A. Email inquiries to: N/A. Visit Microsoft* Corporation on the World Wide Web at: N/A.

FasTrak* Development Environment

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

Microware's FasTrak is a client/server integrated development environment that provides powerful source-code management, makefile generation, and debugging and profiling tools. The FasTrak environment's tight integration with the OS-9* RTOS gives users an edge in software development, because FasTrak was designed from the ground up to be OS-9 RTOS-aware. The FasTrak IDE provides solutions across a wide variety of development schemes and computing platforms.

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

Penumbra Super Mojo* Java Development Environment

Penumbra Software, Inc.

Host Development Environments: .

Super Mojo's Designer, Visual Scripter*, and integrated Coder create a unique Java Development Environment (JDE) for Java application and Java bean component creation. Super Mojo runs on any Java-supported operating system. Its incremental compiler compiles in background, and nothing is faster. Developers can create Java without coding by simply dragging-and-dropping components! Visually they can add events/actions, commands, logic, and calls to other scripts. Super Mojo Supports JDBC/ODBC.

For more information, contact: Michael Mittel, 770-352-0100 x 180. Email inquiries to: mmittel@penumbra.com. Visit Penumbra Software, Inc. on the World Wide Web at: www.penumbra.com.

RTI ControlShell* O-O Programming Environment

Real-Time Innovations, Inc.

Host Development Environments: .

RTI's ControlShell is a component-based, object-oriented programming environment for real-time software development. Built on top of Wind River Systems' VxWorks* RTOS, ControlShell combines a modular structure, powerful graphical tools, and integrated data management; into a unique approach to real-time software development. The ControlShell environment provides a framework that enables programmers/users to share and reuse software on a scale never before possible.

For more information, contact: AI Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

ISaGRAF* Workbench Development Tool Set

TranSys, Inc.

Host Development Environments: Windows.

The ISaGRAF Workbench is a Windows* OS-based software development tool set used to create control logic programs written in any or all of the five IEC 1131-3 languages. It is also a fully featured set of tools providing editing, debugging, code generation, documentation, library management, archiving, on-line monitoring, off-line simulation and on-line change of projects made for execution by the ISaGRAF run-time kernel.

For more information, contact: Robert R. Lyons, 602-926-4100. Email inquiries to: info@ISaGRAF.com. Visit TranSys, Inc. on the World Wide Web at: www.ISaGRAF.com.

VCI Component Integrator

VenturCom, Inc.

Host Development Environments: .

Component Integrator is a configuration management tool for building dedicated Windows NT systems. Functionally, Component Integrator is designed to:

- Import custom applications and commercial-off-the-shelf components.

- Build embedded Windows NT systems.

- Utilize VenturCom's embedded and real-time extension.

- Analyze RAM and persistent storage requirements.

- Validate system completeness.

- Preconfigure operating system and applications.

For more information, contact: Betty Pool, 617-661-1230 x213. Email inquiries to: info@vci.com. Visit VenturCom, Inc. on the World Wide Web at: www.vci.com.

Tornado* Integrated Development Environment

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Wind River Systems' Tornado is a complete software cross-development environment for embedded systems. Tornado is seamlessly integrated and includes powerful development tools and VxWorks*, a feature-rich, high performance and scalable real-time

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Pentium

Intel Corporation

operating system. Completely open and customizable, the Tornado environment also facilitates the use of third-party and customer-developed tools to enhance its capabilities and meet unique customer requirements. Tornado has more than 90 software and hardware partners and is used by thousands of developers worldwide.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

COMPILER

PCYACC 7.0 Compiler/Language Development Toolkit

Abraxas Software, Inc.

Host Development Environments: All.

Abraxas Software's PYACC v. 7.0 is a complete language-development environment that generates C, C++, Java, Delphi, and VBS source code (from Input Language Description Grammars or ILDGs) for building assemblers, compilers, interpreters, browsers, PDLs, language translators, syntax-directed editors, language validators, natural language processors, expert-system shells, and query languages. Includes "drop in" language engines for SQL, dBASE, PostScript, HyperTalk, SmallTalk-80, C++, C, Pascal, ProLog, FORTRAN, COBOL, Basic, SGML, ASN, RPG, SNA, VBasic, VHDL, HTML, VMRL, Java, ODMG-ODL/OQL, Modula-S, Delphi, VBS and Ada. The toolkit includes portable object-oriented classes for Java and C++ and debugging tools, including runtime visual parser debugging, abstract syntax tree generation and code referencing.

For more information, contact: Tana Rae K., 503-244-5253. Email inquiries to: sales@abxsoft.com. Visit Abraxas Software, Inc. on the World Wide Web at: www.abxsoft.com.

GNUPro* Toolkit Compiler Suite

Cygnus Solutions

Host Development Environments: .

Cygnus Solutions' GNUPro* Toolkit compiler suite (with assembler) is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The compiler delivers speed- and size-performance advantages over a wide range of microprocessor architectures. Cygnus provides mission-critical technical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

DDC-I Ada Compiler Systems (DACS*)

DDC-I

Host Development Environments: UNIX and Windows.

A typical DDC-I Ada Language compiler system, the DACS-80x86 features include: compact, efficient ROMable code; modular stand-alone run-time system; advanced symbolic Ada debugger; superior real-time performance; easily configurable to developer's hardware; generates Intel OMF; supports bare PC as target; FAA-certifiable run-time system available (including tasking); supports rate-monotonic scheduling; fast and normal interrupt handling; fast Ethernet downloading; selective linking; stack analysis tools (static and dynamic); Multibus* II interface; CIFO and RTS entry-point package; numeric package using 80x87 NPX. (See other processors supported by DDC-I's compiler systems.)

For more information, contact: Morten Selling, +45 45 87 11 44. Email inquiries to: sales@ddci.dk. Visit DDC-I on the World Wide Web at: www.ddci.com.

Green Hills Optimizing Ada 95 Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

A fully validated implementation of the Ada 95 language, including new task and synchronization features, POSIX threads, and type extensions of tagged types and child library units. Supports mixed-language programming with C, C++, FORTRAN and Assembly. Compilers support many 32- and 64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing C Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills' high-performance optimizing C compilers, for native or embedded development, have many advanced optimizations, such as cross-module inlining. The compilers allow for the fine tuning of optimization strategy so users can generate optimal code. Supports 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing C++ Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills offers high-performance optimizing C++ compilers for native or embedded development. The compilers are compatible with Green Hills Software's MULTI* debugger, which automatically handles C++ constructs such as name mangling and template debugging. The compilers support most 32-/64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing Embedded C++ Compiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills optimizing Embedded C++ compilers are high-performance and follow the Embedded C++ Technical Committee draft standard.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing FORTRAN Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills Software offers optimizing FORTRAN compilers for native or embedded development. A compile-time option allows users to select from among the F77, VMS and DoD dialects of the FORTRAN language, with additional support for many extensions. The FORTRAN compilers support most 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Hyperception RIDE Compiler

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's RIDE Compiler communicates with an installed board driver which links DSP COFF object files, downloads code, data, and parameters to the DSP memory, controls the execution, and monitors activity of the DSP. The application is linked in the same fashion as a dedicated DSP Compiler(Assembler)/Linker. There is no special real-time kernel or RTOS to increase complexity.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

ASSEMBLER

GNUPro* Toolkit

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit is a solution to the problem of delivering quality software to meet the increasingly tighter schedules required by today's marketplace. The highly optimized tool chain for a specific host-target combination drives competitive speed- and size-performance advantages into a developer's software without compromising either its portability or maintainability. The fully-featured debug tools and utilities significantly help to shorten the development, test, and validation cycles. Cygnus backs the GNU technology with a commitment to rapid and expert support. All GNUPro tool chains for native and embedded programming are bundled with mission-critical support services and guaranteed technical response times.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

* Trademark or registered trademark of its respective company or mark holder

Pentium

Intel Corporation

Green Hills Cross Assembler Tool Chain

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills embedded tool chain includes a macro assembler, linker, librarian, runtime libraries, object formatters and other utilities useful for embedded development. Cross-assembler tool chains are available for most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

EMULATOR

Comet In-Circuit Emulator

American Arium

Host Development Environments: Windows.

American Arium's Comet* Series are available as full-featured emulators, with real-time trace and event breakpoint capabilities, or as background-mode emulators. The emulators support embedded software development and debug for systems based on Intel's Pentium*, Pentium II and Pentium Pro processors. American Arium includes a free 12-month comprehensive warranty for its emulator products.

For more information, contact: Jeff Acampora, 714-731-1661. Email inquiries to: Info@arium.com. Visit American Arium on the World Wide Web at: www.arium.com.

Emulation Tools for Embedded Development

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

Applied Microsystems offers a broad range of high-performance microprocessor emulators. Patented CodeTAP* low-cost emulators offer the capabilities most used by software engineers. CodeICE* emulators have advanced features for both hardware and software development. The award-winning new SuperTAP* compact emulator offers hardware and software development features in a palm-sized form factor.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

HP Processor Probes for On-Chip Emulation

Hewlett-Packard Company

Host Development Environments: Popular Debuggers.

HP's processor probes are a low-cost emulation solution for much of a developer's day-to-day debugging. Processor probes access the on-chip debugging capabilities of today's newest processors, giving the software developer a connection for downloading code, modifying memory and registers and controlling program execution. HP processor probes are compatible with debuggers from SDS, Green Hills and Microtec.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or /emulator.

PowerPack* In-Circuit Emulator

Microtek International

Host Development Environments: Windows.

Microtek International's high-performance PowerPack in-circuit emulators combine a state-of-the-art source-level debugger with the most advanced trigger-and-trace system available. Users can relate clock-edge hardware timing events back to source code without stopping the target system. PowerPack emulators support Pentium, Intel486, National NS486, Intel386, Intel 80C186, AMD Am186 and Motorola 683xx/HC16 processors.

For more information, contact: 800-886-7333 or 503-645-7333. Email inquiries to: info@microtekintl.com. Visit Microtek International on the World Wide Web at: www.microtekintl.com.

DEBUGGER

MWX-ICE* Debugger

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

MWX-ICE is a full-featured C/C++ symbolic debugger tailored specifically for in-circuit emulation. It provides complete control of Applied Microsystems emulators and fea-

tures a consistent interface across Sun4, HP 9000, and Windows PC platforms. The MWX-ICE debugger supports popular tool chains including those from Microtec, Cygnus-GNU, Green Hills, and SDS.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

SSI SoftProbe* 386/TX (DOS) Debugger

Beacon Development Tools, Inc.

Host Development Environments: Windows and DOS.

Beacon's SSI SoftProbe 386/TX is a DOS-hosted, source-level debugger that allows for the downloading of a program from the host PC, and for debugging on the actual Intel386/486* processor-based target system in real mode and protected mode. The debugger accepts executable files in Intel OMF-86/286/386 boot-loadable file format and also includes a multi-window user interface and a Target Monitor program.

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

SSI SoftProbe* 86/TX Debugger

Beacon Development Tools, Inc.

Host Development Environments: Windows and DOS.

Beacon Development Tools' SSI SoftProbe 86/TX is a source-level debugger that allows for downloading of a program from the host PC and debugging on the actual Intel real-mode 80x86/x88/186/188/286/386/486/Pentium* processor-based target system. It accepts executable files in Intel OMF86 absolute object file format. SoftProbe 86/TX includes a multi-window user interface and a Target Monitor program.

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

SSI VisualProbe* Remote Debugger (WIN)

Beacon Development Tools, Inc.

Host Development Environments: Windows.

Beacon's SSI VisualProbe Remote Debugger is a Windows* OS-hosted graphically embedded source-level debugger for debugging real and protected-mode Intel 80386/387, 80386EX, and 80486 processor-based embedded C and assembly language applications. Support for debugging C++ applications is provided at source-level with mangled symbols. Program execution on the target system is controlled by the target monitor. Accepts executable files in Intel OMF-86/286/386 boot-loadable file format.

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

SSI VisualProbe* x86 Simulator (WIN)

Beacon Development Tools, Inc.

Host Development Environments: Windows.

The SSI VisualProbe x86 is a Windows* OS-hosted simulator and source-level debugger for debugging real and protected-mode Intel 386/486/Pentium* processor-based embedded C and assembly language applications. The debugger allows the developer to run and debug applications without an actual target (hardware) system. Software engineers may write and debug their code and deliver finished applications concurrent with the target hardware release.

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

GNUPro* Toolkit Debugger Suite

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit debugger suite is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The fully-featured debug tools and utilities significantly help to shorten the development, test and validation cycles. Cygnus provides mission-critical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

MULTI* Source-Level Debugger

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Source-level Debugger supports native or embedded debugging of most

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popular 32-/64-bit processors. The main debugger window shows source or interlaced source and assembly. A single click lets the user look at a variable or set a breakpoint. Small windows allow for the monitoring of specific variables, local variables, or the call stack.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

LynxInsure++*

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

LynxInsure++ is a powerful environment for the development of quality software. Using LynxInsure++, developers will produce more robust, optimized, higher quality real-time applications. LynxInsure++ automatically detects large classes of programming and run-time errors and quickly pinpoints algorithmic anomalies, bugs, and deficiencies. It visualizes in real time the memory manipulation of a program, helping developers spot bugs and inefficiencies in memory handling. LynxInsure++ also performs coverage analysis, providing necessary feedback to programmers about which parts of the code were actually run/tested.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

TimeScan* Performance Analyzer

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

TimeScan is an event-based tracing and performance analysis tool. It supports multi-process, multi-threaded, and multiprocessor applications with event logging at a sub-microsecond resolution. With TimeScan, programmers have the ability to measure and display dynamic behavior programs. TimeScan is useful for both performance analysis and as a debugging tool, resolving difficult problems such as resource contention, bottlenecks, deadlocks, and critical process timings that cannot be tackled with a conventional debugger.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

TotalView* Debugger

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

The TotalView Debugger is a powerful, source-level, window-oriented debugger for the LynxOS RTOS. TotalView provides the ability to debug multi-process, multi-threaded, and multiprocessor-based systems and applications. It is designed to operate in a networked environment, giving the developer the ability to manage and control multiple processes even when these processes are distributed across multiple, heterogeneous systems.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

SWAT* Software Analysis Tool

Microtek International

Host Development Environments: Windows.

The new SWAT Software Analysis Tool records executed code coverage without stopping the target processor and without altering the source code. Configured as PowerPack emulator options for i386*, i486* and Pentium* processors, the SWAT tool shows the design engineer whether his code is executing as intended.

For more information, contact: 800-886-7333 or 503-645-7333. Email inquiries to: info@microtekintl.com. Visit Microtek International on the World Wide Web at: www.microtekintl.com.

RTI ScopeProfile* Performance Analysis Tool/Debugger

Real-Time Innovations, Inc.

Host Development Environments: UNIX and Windows.

RTI's ScopeProfile is a dynamic execution profiler for Wind River Systems' VxWorks* RTOS. The profiler shows the developer exactly where the CPU cycles are being spent. Both cumulative (including all subroutines) and direct CPU usage of each routine are captured. The output can be plotted in real time with RTI's StethoScope Debugger. The profiler will help developers tune their time-critical systems for maximum performance.

For more information, contact: AI Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

RTI StethoScope* Debugger

Real-Time Innovations, Inc.

Host Development Environments: UNIX and Windows.

Real-Time Innovations' (RTI) StethoScope debugger is a graphical monitoring, performance analysis, and data collection tool for real-time applications. The developer can watch program variables evolve in real time; any value in memory can be monitored. Much like a software oscilloscope, StethoScope allows the developer to see what the application is doing. StethoScope may rapidly become the developer's most important debugging and analysis tool.

For more information, contact: AI Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

WindView* Debugger

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

WindView is a revolutionary diagnostic and analysis tool that provides detailed visibility into the dynamic operation of an embedded system. The developer using the WindView visual debugger can quickly and easily visualize the complicated interaction among tasks, interrupt service routines, and system objects in an application. This information is presented and can be manipulated through a state-of-the-art graphical user interface (GUI).

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

LIBRARY

C-tree Plus* File Handler

FairCom Corporation

Host Development Environments: UNIX and Windows and Most Others.

C-tree Plus File Handler Version 6.7A is based on advanced B-tree (balanced) algorithm. The C-tree Plus API handles all aspects of database I/O. Customer can program single-user or multi-user non-server applications royalty free. C-tree Plus has a small memory footprint, unsurpassed portability, is client/server ready and ODBC compliant. Features include: transaction processing; fixed/variable length records; alternate collating sequence numbers; and file mirroring. Package supports Windows, OS/2, DOS, Macintosh and UNIX.

For more information, contact: Sales, 573-445-6833. Email inquiries to: sales@faircom.com. Visit FairCom Corporation on the World Wide Web at: www.faircom.com.

Digital Image-Processing Library

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's image library contains more than 50 commonly used, dedicated image-processing functions to support image processing research and development applications. Color and monochrome processing, matrix functions, and conversion routines for one- and two-dimensional data are all included. It is simple to add user-specific functions to the library, thereby extending the environment to include custom image applications.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Hyperception Advanced Speech Library

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's Advanced Speech Library contains speech-related simulation blocks for speech processing research and development. Detailed analysis and comparison of speech processing waveforms can be performed easily. Encoding/decoding, LPC filtering, and analysis are included. An open architecture lets the user create custom or proprietary speech algorithms to achieve a specialized design.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

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Hyperception Advanced Transmission Library

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception Advanced Transmission Library is a complete set of design and analysis blocks for radio, wireline, and fiber transmission systems. Baseband and carrier transmission systems can be modeled with a variety of line codes and modulation formats. Carrier-recovery and clock-recovery models are included. Filter design facilities enable modeling of transmission links for the design/testing of various equalizers. Performance measures include Bit Error Rate simulations, BER calculations, eye patterns, and jitter analysis.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

smx*++ Class Library

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's smx++ Class Library (C++ language) operates with smx. smx++ is recommended for C++ object-oriented applications. The library permits the creation of application-specific operating system objects by inheritance. The smx++ library also permits overloading the new and delete operators per class and other helpful features for C++ object-oriented programming.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

DRIVER**Datalight's FlashFX Flash File System**

Datalight*

Host Development Environments: Windows and DOS.

Datalight's FlashFX, a full-featured flash file system, makes flash memory appear to be a disk. It includes true wear-leveling, scheduled garbage collection, and uses only 12K ROM and 7K RAM. There is no faster flash file system on the market. FlashFX is portable to any operating system and any processor (CPU). FlashFX may also be categorized as a BIOS extension.

For more information, contact: Tim Gillman, 360-435-8086 x 115. Email inquiries to: sales@datalight.com. Visit Datalight* on the World Wide Web at: http://www.datalight.com.

OTHER TOOLS**CodeCheck 7.0 Analyzer**

Abraxas Software, Inc.

Host Development Environments: UNIX and Windows and MAC.

CodeCheck* Version 7.0 is a programmable tool for managing all C and C++ source code on a file or project basis. CodeCheck is input-compatible with all variants of K&R, ANSI C and C++. CodeCheck identifies code that will not port between MS DOS, OS/2, UNIX, VMS, WIN-95/NT, Macintosh, and porting to 64-bit machines. CodeCheck allows corporate coding and project specification standards to be completely automated for compliance validation. CodeCheck includes pre-written expert system Rule Files that can be applied to any C or C++ project for: POSIX, SVID, X3J11, Ellementel, and ANSI C/C++ source code conformance validation.

For more information, contact: Tana Rae K., 503-244-5253. Email inquiries to: sales@abxsoft.com. Visit Abraxas Software, Inc. on the World Wide Web at: www.abxsoft.com.

CodeTEST* Software Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

CodeTEST software verification tools for embedded system developers and testers support most major 32- and 16-bit microprocessors and VME boards, and supplies tools for accurately analyzing embedded system performance, code coverage, dynamic memory allocation and memory errors, as well as a powerful software trace tool. A VME version is now available.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

VSP-TAP*/Eaglei* Co-Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

Applied's VSP-TAP and the Eaglei co-verification environment from Viewlogic Systems provides software operation verification against a hardware description model (HDL). VSP-TAP adds enhanced real-time capabilities, connecting the simulated environment, the actual processor, and real-world data at real processor speeds, and supplying access to an emulator's full debugging capabilities.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

APIAccess* Middleware For Windows* OS

Award Software International, Inc.

Host Development Environments: Windows.

Award's APIAccess is the middleware needed to deploy Windows OS applications on embedded systems. Using APIAccess's Win32*-compatible libraries, Windows 32-bit source code can be ported and run natively on any supported combination of processor and RTOS. Embedded products can be designed, looking and acting just like a PC-based application.

For more information, contact: Bill Goodrich, 415-237-6895. Email inquiries to: sales@award.com. Visit Award Software International, Inc. on the World Wide Web at: www.award.com.

Embedded EliteBIOS* Software

Award Software International* Inc.

Host Development Environments: Windows.

Embedded EliteBIOS is a highly modular and full-featured, standards-compliant core BIOS* for all Intel Architecture x86 platforms and chip sets, supporting multiple BIOS extensions. Its highly modular architecture enables small footprint designs, and it can be augmented with MPCAccess or RPBAccess, for more remote administration of embedded systems.

For more information, contact: Bill Goodrich, 415-237-6895. Email inquiries to: sales@award.com. Visit Award Software International* Inc. on the World Wide Web at: www.award.com.

MPCAccess* Diagnostic Firmware/Utility

Award Software International* Inc.

Host Development Environments: Windows.

MPCAccess or RPBAccess solve the problem of a non-booting system with remote pre-boot (RPB) diagnostics, troubleshooting and repair. MPCAccess administers local or remote x86-based embedded systems that have no video/keyboard, providing a remote view of system output and remote keystroke input through a serial port connector.

For more information, contact: Bill Goodrich, 415-237-6895. Email inquiries to: sales@award.com. Visit Award Software International* Inc. on the World Wide Web at: www.award.com.

MR BIOS* System Management Software

Award Software International* Inc.

Host Development Environments: Windows.

MR BIOS is an alternate embedded BIOS offering from Award Software that has been popular for many years. Features include patented system speed calibration. In designs that permit such, CPUs can be interchanged without replacing the BIOS. MR BIOS 8042 is a masked component or binary code for OEM licensing.

For more information, contact: Bill Goodrich, 415-237-6895. Email inquiries to: sales@award.com. Visit Award Software International* Inc. on the World Wide Web at: www.award.com.

PC DIAG* Diagnostic Utility

Award Software International* Inc.

Host Development Environments: Windows.

PC DIAG is a disk-based, self-booting diagnostic package that performs systems and component diagnostics for any Intel Architecture x86-based microcomputers, including embedded PCs. With PC DIAG, system integrators, OEMs and VARs can identify and analyze system firmware problems and component flaws. A system's base memory, video functions, fixed and floppy drives, parallel and serial ports, keyboard and math coprocessor or extended memory can all be tested.

For more information, contact: Bill Goodrich, 415-237-6895. Email inquiries to: sales@award.com. Visit Award Software International* Inc. on the World Wide Web at: www.award.com.

* Trademark or registered trademark of its respective company or mark holder.

Pentium

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WWWAccess* Internet Appliance Creator

Award Software International* Inc.

Host Development Environments: Windows.

WWWAccess combines a Web browser with an embedded, real-time operating system and custom 32-bit Windows* OS API library to offer a one-stop solution for creating Internet appliances based on the Intel x86 system architecture. The Award product allows developers to embed source-based Windows applications into their products.

For more information, contact: Bill Goodrich, 415-237-6895. Email inquiries to: sales@award.com. Visit Award Software International* Inc. on the World Wide Web at: www.award.com.

Link&Locate 386

Beacon Development Tools, Inc.

Host Development Environments: Windows and DOS.

Link&Locate 386 is an absolute linker and locator for embedded software development. Link&Locate supports the building of 32-bit protected-mode programs for Intel 386/486 processor-based embedded applications and for 32-bit DOS extender applications using Watcom C/C++ and/or WASM (Watcom Assembly). The Link&Locate output is in absolute object files containing debug information in Intel OMF-286/386 format, which supports only C and assembly source-code level debugging.

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

Link&Locate 86

Beacon Development Tools, Inc.

Host Development Environments: Windows and DOS.

Beacon Development Tools' Link&Locate 86 is an advanced absolute linker/locator that generates code for Intel real-mode 80x86 processor-based (including the 80C186/188 uP family) embedded applications. The linker/locator accepts object files generated by Microsoft's C/C++ Optimizing Compiler v5.1 and MASM assembler c5.1 to 6.1 in order to generate absolute object files in Intel OMF86 format. The product supports the building of C/C++ language-based embedded applications.

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

SP/Tools for MetaWare*

Beacon Development Tools, Inc.

Host Development Environments: Windows and DOS.

The SP/Tools packages are designed to extend MetaWare's High C/C++* 32-bit compiler and Microsoft's MASM assembler. Tool extensions consist of the SP/Link 386, an advanced absolute linker/locator for 32-bit protected-mode i386*/486* processor-based embedded development. SP/RTD 386 is a DOS-hosted version of SoftProbe, enhanced for debugging C and C++ 32-bit protected-mode i386/486 processor-based embedded applications.

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

Datalight's ROM-DOS 6.22 Operating System

Datalight*

Host Development Environments: Windows and DOS.

Datalight's ROM-DOS 6.22 is a compact, flexible MS-DOS 6.22-compatible operating system. Datalight has recently added new utilities for specific embedded markets. ROM-DOS is DOS for the Year 2000 and beyond. All date issues have been fully resolved.

For more information, contact: Tim Gillman, 360-435-8086 x 115. Email inquiries to: sales@datalight.com. Visit Datalight* on the World Wide Web at: http://www.datalight.com.

Datalight's WinLight* Operating System

Datalight*

Host Development Environments: Windows.

WinLight is a Windows V 3.11 work-alike operating system, including GUI, multitasking and protected mode. Datalight has implemented many new features and supported many additional API calls in the latest version. It is small in size, easy to use, and offers an inexpensive alternative to other Windows* O.S. versions for the embedded applications environment.

For more information, contact: Tim Gillman, 360-435-8086 x 115. Email inquiries to: sales@datalight.com. Visit Datalight* on the World Wide Web at: http://www.datalight.com.

Embedded EMPRESS Developer's Toolkit*

Empress Software, Inc.

Host Development Environments: UNIX & Windows.

This suite is an applications development toolkit for embedded systems developers. It features the reliable, highly scalable Empress RDBMS with its fast, compact database engine, JDBC/ODBC bridge, and support for diverse data types. The suite includes the Empress RDBMS, Empress Dynamic SQL, Empress ODBC Interface, and Empress Internet Applications Development Toolkit.

For more information, contact: Dick Naedel, 301-220-1919. Email inquiries to: sales@empress.com. Visit Empress Software, Inc. on the World Wide Web at: www.empress.com.

EMPRESS RDBMS

Empress Software, Inc.

Host Development Environments: UNIX and Windows.

EMPRESS RDBMS is a powerful application development environment offering excellent data manipulation options to the embedded systems developer. The RDBMS can store and retrieve any data type that can be digitized, such as x-rays, voice, fingerprints and maps. Date variables and microsecond time stamps make this database Year 2000 compliant.

For more information, contact: Dick Naedel, 301-220-1919. Email inquiries to: sales@empress.com. Visit Empress Software, Inc. on the World Wide Web at: www.empress.com.

Embedded BIOS*

General Software, Inc.

Host Development Environments: Windows and DOS.

Embedded BIOS 4.0 is a highly-configurable full-source BIOS kit with more than 330 source-level configuration options and 100 binary configuration options for customization to embedded hardware. Features include a royalty-free Run-From-ROM DOS with a 32KB footprint, resident Flash disk, APM, manufacturing mode, integrated debugger, advanced SETUP screens, and seven disk drivers: Floppy, IDE, ATA, ROM, RAM, Flash, and Remote. The BIOS footprint can be configured from 8KB and 64KB, depending on selected features.

For more information, contact: Dan De Lano, 425-454-5755. Email inquiries to: general@gensw.com. Visit General Software, Inc. on the World Wide Web at: www.gensw.com.

Green Hills Instruction Set Simulator

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills Instruction Set Simulators allow programs for the target microprocessor to be executed on the PC or host workstation by simulating the execution of the target at the instruction level. A special interface exists to allow program control via a standard debugger. The simulators support most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Execution Profiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Execution Profiler provides a mechanism for looking at user code in many different ways in order to pinpoint hot spots. Reports show performance by procedure, source line, etc. Supports native and embedded profiling on most popular 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Program Builder

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Program Builder is a configuration management system for creating and managing large programs. The MULTI builder replaces traditional make files with a modern point-and-click interface, greatly simplifying the configuration management task and eliminating the need for engineers dedicated to managing the build process. Supports native and embedded profiling on most popular 32/64-bit processors.

* Trademark or registered trademark of its respective company or mark holder

Pentium

Intel Corporation

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Run-Time Error Checker

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Run-time Error Checker inserts code into user's executable to check for things like array out of bounds, value too large for variable, read of variable before initialization, and attempts to access unallocated memory. The error checker supports native and embedded profiling on most popular 32 and 64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Version Control System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Version Control system is very unobtrusive, with files being automatically checked out when the first change is made in the editor. Advanced features support program branches and the ability to find out who made the last change to selected lines. Supports native and embedded profiling on most popular 32/64-bit CPUs.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Logic Analyzers

Hewlett-Packard Company

Host Development Environments: N/A.

HP's digital design and debug tools help system developers solve tough hardware and software integration problems fast. The HP benchtop logic analyzers offer cost-effective 100 MHz state analysis plus five timing modes up to 500 MHz. The HP 16500 modular logic analysis systems provide the power and flexibility to handle demanding hardware and software problems.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or /emulator.

Hyperception HSVI1000 Function Generator

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's HSVI1000 Function Generator and waveform synthesizer is a virtual instrument with standard functions, including sine, square, and triangle waveform generation for a broad range of test and measurement applications. Knobs, toggle switches, and pushbutton controls allow adjustment of frequency, amplitude and offset settings.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Hyperception HSVI2000 Time Domain Analyzer

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's HSVI2000 Time Domain Analyzer is a general-purpose digital oscilloscope that provides the same user controls and displays as conventional oscilloscopes. The RMS level is displayed for quick energy estimates. Edge triggering, vertical control, and timebase range are selectable through control knobs. Remote test and measurement capability is built in.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Hyperception HSVI3000 Frequency Domain Analyzer

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's HSVI3000 Frequency Domain Analyzer has a realistic user interface. Controls allow frequency measurements to be displayed as 20 Log, 10 Log, or linear magnitude data. Toggle switches for the selection of peak frequency value and the corresponding magnitude value are provided for Peak Detection analysis. Window options include both Hamming and Rectangular Windows.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Hyperception HSVI4000 Dynamic Signal Analyzer

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's HSVI4000 Dynamic Signal Analyzer is a virtual instrument with real-time capability for quick and accurate signal analyses. Operation modes include FFT Analyzer, Frequency Band Analyzer, Phase Analysis, and Time Domain. The analyzer has an intuitive, photo-realistic front-panel display with convenient user-control knobs. The analyzer includes Internet Remote for remote test and measurement over the Internet or an internal network.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

pmEasy V.3.2 Environment

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's pmEasy V.3.2. Environment software is a protected-mode environment for embedded systems that creates needed protected-mode structures and switches into protected mode. pmEasy includes a protected-mode loader to load the protected-mode application, or the application can run from ROM. pmEasy provides some DPMI services.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

RTTarget-32* Cross Development System

On Time

Host Development Environments: Windows and DOS.

On Time's RTTarget-32 is a cross development environment for Intel's i386* and higher performance x86 processors. Standard Window NT* (OS) console-mode applications can run without operating systems on almost any hardware with a 32-bit Intel Architecture processor or compatible CPU. Cross debugging is available using a standard Windows NT OS debugger. Programs to run with RTTarget-32 are developed using standard 32-bit compilers that produce native NT console-mode applications (ie, Borland C++, Microsoft Visual C++, Watcom C/C++, Borland Delphi). Executable files built with these compilers are processed by RTTarget-32 to run on the target x86 processor-based system.

For more information, contact: Tom Schotland, 516-689-6654. Email inquiries to: info@on-time.com. Visit On Time on the World Wide Web at: www.on-time.com.

INtime* Real-Time For Windows* NT O.S.

RadiSys Corporation

Host Development Environments: Windows.

Radisys Corporation's INtime, a Real-Time Extension for the Microsoft Windows NT operating system, delivers hard real-time capabilities for Windows NT. With INtime, an applications developer can integrate real-time control, user interface, and connectivity functions all on the same PC-compatible system having standard hardware and software. INtime minimizes reliance on specialized or proprietary software development systems, lowering development costs, and reducing time-to-market by utilizing a standard Windows NT platform environment for applications development.

For more information, contact: 1-888-4REALNT. Email inquiries to: Info@radisys.com. Visit RadiSys Corporation on the World Wide Web at: www.radisys.com.

SoftControl IEC 1131-3 Programming System

Softing

Host Development Environments: Windows.

SoftControl is an IEC 1131-3-compliant programming system for all kinds of industrial controls, from LON to PLCs and PCs. The system supports all languages, functions and function blocks according to the standard. The backend is designed to be completely object-oriented and can be easily adapted to different target systems. A C-code generator is optionally available.

For more information, contact: Dr. Goetz Guettlich, ++49 89 456 56 311. Email inquiries to: info.softcontrol@softing.com. Visit Softing on the World Wide Web at: http://www.softing.com.

Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabil-

* Trademark or registered trademark of its respective company or mark holder

Pentium

Intel Corporation

ities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: <http://www.tektronix.com>.

MIPS (Rxxx/Rxxxxx)

MIPS, NEC, IDT, NKK, Toshiba, QED, Philips

FULL FUNCTION RTOS

CMX-RTX* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-RTX RTOS provides more than 65 kernel services allowing control of tasks, events, messages, resources, semaphores, cyclic timers, queues, fixed memory blocks and UARTs. Interrupts are allowed to use some of the CMX functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. Very small ROM and RAM requirements for small-footprint applications. Several compiler vendors are supported. Source code is included, and there are no royalties.

The CMX-RTX RTOS supports an unusually large number of μ PU, μ CU, and DSP architectures from a large number of manufacturers, including: Advanced RISC Machines, Analog Devices, Hitachi, Intel, MIPS, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Sharp, Siemens, Texas Instruments, Toshiba, and Zilog.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

INTEGRITY* Real-Time Operating System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The INTEGRITY RTOS, which provides a memory-protected superset of the facilities offered in Green Hills Software's veOSity* Real-Time Operating System, targets mission-critical, real-time applications that emphasize reliability, security and testability. The INTEGRITY RTOS is available on a royalty-free basis: users pay only for the host-based software development environment. Run-time licenses for the target system are free.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MTOS*/ MTOS-UX Real-Time Operating Systems

Industrial Programming, Inc.

Host Development Environments: UNIX and Windows.

IPI's MTOS full-function RTOS products offer a uniform applications programming interface (API) across all supported processors, thus affording interface familiarity for programmers despite processor changes. MTOS also supports symmetric multi-processing and offers a complete coordination system for handling asynchronous operations. A "small footprint" RTOS, with code space ranging from 16KB to 45KB, MTOS is highly scalable for use with small, mid-size and very large programming projects.

For more information, contact: Bernard Mushinsky, 800-365-MTOS. Email inquiries to: info@ipi.com. Visit Industrial Programming, Inc. on the World Wide Web at: www.ipi.com.

pSOSystem Real-Time Operating System

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pSOSystem is a modular, high-performance real-time operating system designed specifically for embedded microprocessors. The RTOS provides a complete multi-tasking environment based on open system standards, such as network file system support. pSOSystem is designed for performance, reliability, and ease-of-use on either custom or commercial hardware.

Soon available for SPARC processors.

For more information, contact: Sales, 408-542-1500. Email: N/A. Visit Integrated Systems, Inc. on the World Wide Web at: <http://www.isi.com>.

AMX* Real-Time Multitasking Kernel

KADAK Products Ltd.

Host Development Environments: Windows and DOS.

KADAK's AMX Real-Time Operating System is a full-featured, fast, compact, ROMable kernel. AMX includes: preemptive, priority-based scheduler (optional time-slicing); nested interrupts with priority ordering; mailbox, semaphore, resource, event, list, buffer and memory managers; the Configuration Builder Utility eases system construction. And for debugging, KADAK's KwikLook* fault finder exploits SDS's SingleStep* and SSI's VisualProbe* debuggers for fully AMX RTOS-aware debugging.

For more information, contact: Sales, 604-734-2796. Email inquiries to: amxsales@kadak.com. Visit KADAK Products Ltd. on the World Wide Web at: www.kadak.com.

Microsoft Windows* CE O.S. Embedded Toolkit

Microsoft* Corporation

Host Development Environments: Windows.

Microsoft's Windows CE Embedded Toolkit for Visual C++ 5.0 includes integrated development environment tools designed specifically for embedded development. The Windows CE platform is a 32-bit, preemptive, multitasking, multithreaded operating system designed from the ground up to support embedded systems. Use the embedded toolkit to choose components for building a customized version of the Windows CE operating system to meet the unique requirements of your hardware. The toolkit contains the RTOS, compiler, assembler, emulator, debugger, library and drivers.

For more information, contact: N/A. Email inquiries to: N/A. Visit Microsoft* Corporation on the World Wide Web at: N/A.

OS-9* Real-Time Operating System

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

Microware's OS-9 is an architecturally advanced, high-performance real-time operating system. The OS-9 RTOS provides priority-based, preemptive task scheduling, interrupt and exception-handling services, dynamic memory management, inter-process communications facilities, system calls for system control, and unsurpassed I/O support. The OS-9 RTOS is used in industrial, telecommunications, transport, instrumentation, aerospace and consumer applications. Extensions to the OS-9 RTOS are available for designers of set-top boxes, pagers, cell phones, NCs and PDAs.

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

Wireless OS-9* Real-Time Operating System

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

The Wireless OS-9* RTOS is an integrated system software and development tool package designed specifically for manufacturers of battery-powered, intelligent computing and communication devices. Each Wireless OS-9 software subsystem contains the OS-9 operating system, power management, SPF communications file manager, FasTrak* and MAUI* (Multimedia Application User Interface), and a set of drawing and animation APIs (application program interfaces).

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

Precise/MQX* Real-Time Operating System

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking's full-featured, royalty-free, real-time Precise/MQX RTOS executive includes a design tool, performance analysis and an optional suite of communications protocols and drivers. MQX adds support for both shared memory multiprocessing and distributed processing. The functionality of the kernel can be extended with optional I/O components that add networking protocols and data communications protocols.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

Super TASK! Real-Time Operating System

U S Software

Host Development Environments: Windows.

U S Software's SuperTask! is a mature, compact, fast, and user-configurable RTOS suite. SuperTask! supports more than 20 C/C++ compilers/tool chains, and source code is included with an ANSI standard C core

For more information, contact: Katrina Sumner, 503-641-8446 x 740. Email inquiries to: info@ussw.com. Visit U S Software on the World Wide Web at: www.ussw.com.

* Trademark or registered trademark of its respective company or mark holder

MIPS (Rxxx/Rxxxx)

MIPS, NEC, IDT, NKK, Toshiba, QED, Philips

VxWorks* Real-Time Operating System

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Part of the Tornado* development environment, VxWorks is an industry-standard, scalable real-time operating system. It features the multitasking wind* kernel, the POSIX real-time extensions, intertask communications, full networking functionality, file system support and C++ support. Additional functionality is available through optional products from Wind River and a wide range of third-party partners.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

BASIC RTOS KERNEL**Nucleus* C++ RTOS Kernel**

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus C++ is a version of the Nucleus PLUS kernel that provides an object-oriented interface to an application. Although the core of the product is the Nucleus PLUS kernel (thereby reinforcing its robustness), the interface has been completely redesigned with all of the standard C++ mechanisms including constructors, destructors, and the like. Tests indicate that the incorporation of these facilities has minimal impact on the code size and performance of the final application.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

Nucleus PLUS* Real-Time Operating System

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus PLUS is designed as a core component for an operating system environment. It is extensible and dynamic. Its modular design allows services to be easily produced by combining existing services. All of the Nucleus PLUS components (tasks, queues, semaphores, etc.) can be dynamically created and deleted. Each component has a control block defined by the user and placed anywhere in the available memory space of the target system. Nucleus PLUS is a real-time, pre-emptive, multitasking kernel designed for time-critical embedded applications. Approximately 95 percent of Nucleus PLUS is extremely portable and is currently available for use with most microprocessor families.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

CMX-TINY+* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-TINY+ RTOS provides more than 40 kernel services, thus allowing control of the following: tasks, events, messages, resources, semaphores, cyclic timers, and queues. Interrupts are allowed to use some CMX functions. The scheduler is based on true pre-emption. CMX-TINY+ RTOS features very fast context-switch times and very low interrupt-latency times. ROM and RAM requirements are very small. CMX offers support for several compiler vendors, with royalty-free source code included.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

Precise/MQX* & MQX+m Real-Time Executive

Precise Software Technologies Inc.

Host Development Environments: .

Precise Software Technologies' Precise/MQX* is a portable high-performance, real-time executive. MQX is scalable from a single processor to distributed multiprocessor configurations. The real-time executive provides functions for multitasking, intertask communications and synchronization, dynamic interrupt management, and memory management. Optional protocols for networking and data communications are also available.

For more information, contact: Clarke Esler, 508-264-4413. Email inquiries to: info@psti.com. Visit Precise Software Technologies Inc. on the World Wide Web at: www.psti.com.

INTEGRATED DEVELOPMENT ENVIRONMENT**MULTI* Software Development Environment**

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Software Development Environment provides a framework of interacting tools to support program development by small or large workgroups. MULTI includes all of the tools needed to support major programming projects, including a program builder, version control, program editor, debugger, execution profiler, run-time error checker, and source-code control.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

pRISM+ Integrated Development Environment

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pRISM+ is a complete, integrated development environment (IDE) for designing and delivering embedded software applications. pRISM+ combines the industry's optimal development tools with the pSOSystem, an industry-proven and reliable real-time operating system (RTOS). The pRISM+ environment combines "Best-Of-Class" tools for developing, analyzing and testing embedded applications in one seamless environment, built with an open, extensible architecture to accommodate future needs.

Note: Soon available for SPARC microprocessors.

For more information, contact: Sales, 408-542-1500. Email: N/A. Visit Integrated Systems, Inc. on the World Wide Web at: <http://www.isi.com>.

Metrowerks' CodeWarrior*

Metrowerks Corporation

Host Development Environments: UNIX and Windows.

Metrowerks' CodeWarrior is transforming embedded system development by offering the most intuitive GUI development tools available under Windows* 96/NT operating systems at a fraction of the cost of traditional command-line tools. With CodeWarrior, the developer gets a complete suite of tools (IDE) to create, compile, link, debug, and assemble fast, optimized embedded system code.

For more information, contact: Jenny Page, 512-873-4740. Email inquiries to: sales@metrowerks.com. Visit Metrowerks Corporation on the World Wide Web at: <http://www.metrowerks.com>.

Microsoft Windows* CE O.S. Embedded Toolkit

Microsoft* Corporation

Host Development Environments: Windows.

Microsoft's Windows CE Embedded Toolkit for Visual C++ 5.0 includes integrated development environment tools designed specifically for embedded development. The Windows CE platform is a 32-bit, preemptive, multitasking, multithreaded operating system designed from the ground up to support embedded systems. Use the embedded toolkit to choose components for building a customized version of the Windows CE operating system to meet the unique requirements of your hardware. The toolkit contains the RTOS, compiler, assembler, emulator, debugger, library and drivers.

For more information, contact: N/A. Email inquiries to: N/A. Visit Microsoft* Corporation on the World Wide Web at: N/A.

RTI ControlShell* O-O Programming Environment

Real-Time Innovations, Inc.

Host Development Environments: .

RTI's ControlShell is a component-based, object-oriented programming environment for real-time software development. Built on top of Wind River Systems' VxWorks* RTOS, ControlShell combines a modular structure, powerful graphical tools, and integrated data management into a unique approach to real-time software development. The ControlShell environment provides a framework that enables programmers/users to share and reuse software on a scale never before possible.

For more information, contact: Al Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

EDE Project Environment

Tasking, Inc.

Host Development Environments: Windows.

EDE is a complete development project environment that gives the developer direct access to all the tools and features needed. EDE includes a language-sensitive editor, MAKE for automated application building and a project environment for specifying project files, including source files, tool options and build options.

* Trademark or registered trademark of its respective company or mark holder

MIPS (Rxxx/Rxxxx)**MIPS, NEC, IDT, NKK, Toshiba, QED, Philips**

For more information, contact: 1-800-458-8276. Email inquiries to: sales@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

Tornado* Integrated Development Environment

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Wind River Systems' Tornado is a complete software cross-development environment for embedded systems. Tornado is seamlessly integrated and includes powerful development tools and VxWorks*, a feature-rich, high performance and scalable real-time operating system. Completely open and customizable, the Tornado environment also facilitates the use of third-party and customer-developed tools to enhance its capabilities and meet unique customer requirements. Tornado has more than 90 software and hardware partners and is used by thousands of developers worldwide.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

COMPILER**Apogee-C Compiler**

Apogee Software, Inc.

Host Development Environments: UNIX.

The Apogee-C compiler accepts C source files and compiles them to produce assembly files. May invoke optionally available optimizing preprocessors. Targets SPARC workstations and embedded processors. Accepts ANSI C, Kernighan & Ritchie C, and more.

For more information, contact: George Malek, 408-369-9001. Email inquiries to: info@apogee.com. Visit Apogee Software, Inc. on the World Wide Web at: www.apogee.com.

Apogee-C++ Compiler

Apogee Software, Inc.

Host Development Environments: UNIX.

The Apogee-C++ compiler accepts C++ source files and compiles them into assembly files. Includes RTTI, STL and exception handling. The compiler is performance optimizing and supports the SPARC v8plus processor.

For more information, contact: George Malek, 408-369-9001. Email inquiries to: info@apogee.com. Visit Apogee Software, Inc. on the World Wide Web at: www.apogee.com.

GNUPro* Toolkit Compiler Suite

Cygnus Solutions

Host Development Environments: .

Cygnus Solutions' GNUPro* Toolkit compiler suite (with assembler) is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The compiler delivers speed- and size-performance advantages over a wide range of microprocessor architectures. Cygnus provides mission-critical technical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

DDC-I Ada Compiler Systems (DACS*)

DDC-I

Host Development Environments: UNIX and Windows.

A typical DDC-I Ada Language compiler system, the DACS-80x86 features include: compact, efficient ROMable code; modular stand-alone run-time system; advanced symbolic Ada debugger; superior real-time performance; easily configurable to developer's hardware; generates Intel OMF; supports bare PC as target; FAA-certifiable run-time system available (including tasking); supports rate-monotonic scheduling; fast and normal interrupt handling; fast Ethernet downloading; selective linking; stack analysis tools (static and dynamic); Multibus* II interface; CIFO and RTS entry-point package; numeric package using 80x87 NPX. (See other processors supported by DDC-I's compiler systems.)

For more information, contact: Morten Selling, +45 45 87 11 44. Email inquiries to: sales@ddci.dk. Visit DDC-I on the World Wide Web at: www.ddci.com.

EPI CC Compilers

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

EPI's Software Toolkits for the AM29K, ARM and MIPS microprocessors includes the CC Series compilers--CC29K, CC3K, CCA4K and CC-ARM. EPI has selected the compiler technology best suited for each of the RISC processor families. The compilers are designed specifically for embedded applications and provide features to allow optimum tradeoffs between code size and system performance. Developers can easily tailor code to their specific targets and applications. EPI's compilers are fully ANSI-compliant, have big and little Endian support, and have a wide choice of optimization levels.

EPI compilers for the MIPS and AM29K processors are also supported on DOS hosts.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

Green Hills Optimizing Ada 95 Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

A fully validated implementation of the Ada 95 language, including new task and synchronization features, POSIX threads, and type extensions of tagged types and child library units. Supports mixed-language programming with C, C++, FORTRAN and Assembly. Compilers support many 32- and 64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing C Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills' high-performance optimizing C compilers, for native or embedded development, have many advanced optimizations, such as cross-module inlining. The compilers allow for the fine tuning of optimization strategy so users can generate optimal code. Supports 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing C++ Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills offers high-performance optimizing C++ compilers for native or embedded development. The compilers are compatible with Green Hills Software's MULTI* debugger, which automatically handles C++ constructs such as name mangling and template debugging. The compilers support most 32-/64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing Embedded C++ Compiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills optimizing Embedded C++ compilers are high-performance and follow the Embedded C++ Technical Committee draft standard.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing FORTRAN Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills Software offers optimizing FORTRAN compilers for native or embedded development. A compile-time option allows users to select from among the F77, VMS and DoD dialects of the FORTRAN language, with additional support for many extensions. The FORTRAN compilers support most 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

* Trademark or registered trademark of its respective company or mark holder

MIPS (Rxxx/Rxxxx)

MIPS, NEC, IDT, NKK, Toshiba, QED, Philips

C++ Compiler

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Object-oriented programming techniques increase productivity, improve quality and provide reusability with Tasking's C++ compiler. The compiler allows the intermixing of C++ and C code within a single application. Thus, the benefits of C++ can be incorporated into existing C applications a module at a time, thus providing easy migration from C to C++ programs.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

C Compiler Package

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking delivers ANSI C compilers that are highly optimized with individual target-specific extensions for ultimate flexibility and efficiency. As well as using these target-specific extensions, the developer-user can also define in-line functions and use in-line assembly. Included with every compiler is an assembler and linker/locator.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

ASSEMBLER

GNUPro* Toolkit

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit is a solution to the problem of delivering quality software to meet the increasingly tighter schedules required by today's marketplace. The highly optimized tool chain for a specific host-target combination drives competitive speed- and size-performance advantages into a developer's software without compromising either its portability or maintainability. The fully-featured debug tools and utilities significantly help to shorten the development, test, and validation cycles. Cygnus backs the GNU technology with a commitment to rapid and expert support. All GNUPro tool chains for native and embedded programming are bundled with mission-critical support services and guaranteed technical response times.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

EPI AS Series Macro Assemblers

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

EPI's Macro Assemblers allow all original routines to be written in assembly code and integrated into a C or C++ program. The EPI Macro Assemblers have powerful macro facilities and are compliant with Approved Instruction Sets.

The EPI Macro Assembler for the R3000 is the AS3K; for the R4000 is the AS4K; for the AM29000 is the AS29K; and for the ARM is the AS-ARM. For the MIPS and AM29K processors, the assemblers are also supported on DOS hosts. The AS29K Macro Assembler also includes a Linker/Locator with Librarian and Utilities.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

Green Hills Cross Assembler Tool Chain

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills embedded tool chain includes a macro assembler, linker, librarian, runtime libraries, object formatters and other utilities useful for embedded development. Cross-assembler tool chains are available for most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

EMULATOR**EPI DS4000 Development System for MIPS* μ Ps**

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

Embedded Performance, Inc.'s DS Series Development System is integrated to provide many of the logic analysis and profiling features of EPI's Turbo Class emulators, inte-

grated with EPI's target-resident debug kernel. The chassis can be upgraded to a full-featured Turbo class emulator. The DS Series consists of the basic logic analyzer and CPU functions of a Turbo class emulator combined with the control and observation features of the debug kernel. The debug kernel resides in target memory and provides the downloading, stepping and breakpoint control, along with features for viewing and editing the memory and registers. The state analyzer features EPI's unique Three-Dimensional Trace Control. The powerful state machine can easily capture simple bus activity or be programmed to capture very complex event sequences. It allows for the capture of many hard-to-find coding problems in a single trace.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

EPI ICEMAN Series In-Circuit Emulators

Embedded Performance, Inc.

Host Development Environments: UNIX, Windows and DOS.

EPI's ICEMAN series emulators are full-function in-circuit emulators in small, Probe-Head-Size Packages that have Ethernet and serial interfaces, high-speed download, a wide choice of overlay memory sizes and speeds, and a Trace Option for capturing real-time target activity. Compact ICEMAN Emulators offer high-performance, with the integration, speed, overlay memory, trace capture, and networking features of more costly bench-top emulators, but in small, less costly packages. With base pricing only slightly higher than that of a JTAG emulator, the emulators may be expanded to include additional features as needs require. ICEMAN products offer on-board overlay memory options and direct connections to PCs or UNIX OS hosts and are fully network-compatible via the Ethernet interface. The trace option provides real-time capture of target activity both at processor pins and additional user-selected points on target hardware. Non-intrusive ICEMAN Emulators operate at maximum μ PU clock rates, using none of target system memory or communication resources.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

EPI Turbo In-Circuit Emulator

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

Turbo Class In-Circuit Emulators have the following features: a unique 3-D trace/breakpoint control; a real-time profiler option provides performance analysis, code and branch coverage; optional execution tracker captures real-time execution from on-chip cache (selected μ Ps); a wide choice of overlay memory sizes and speeds; large overlay memory sizes for large, ROM-based programs; high-speed download; and real-time emulation to 67 MHz bus rates. The Turbo Class Emulators shorten development time by integrating an ICE with a high-performance logic state analyzer to provide a versatile tool for all phases of the development cycle. The three-dimensional trace and breakpoint control makes it easy to capture complex software paths leading to failures, and the emulator may be used with its large time stamp to make absolute and delta timing measurements of the software execution. (Emulator Models are SYS4K for MIPS R4000, SYS29K-MANX for Am29K, and SYS-R3051 for R3000).

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

Orion/Advice* Emulator

Orion Instruments

Host Development Environments: UNIX and Windows.

The Orion/Advice is a high-performance, real-time emulation system. A sophisticated multi-level event-triggering system, combined with a non-intrusive trace buffer provide unmatched problem tracking. A point-and-click Windows* or UNIX* OS graphical user interface (GUI) provides true high-level-language (HLL) debug support. Profiling, performance analysis and code coverage complete the Orion/Advice emulation package.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

DEBUGGER**Nucleus* UDB Debugger**

Accelerated Technology, Inc.

Host Development Environments: Windows.

Nucleus UDB is a powerful, Graphical User Interface-based source-level debugger for embedded applications. Its three component configurations include the debugger front

* Trademark or registered trademark of its respective company or mark holder

MIPS (Rxxx/Rxxxxx)

MIPS, NEC, IDT, NKK, Toshiba, QED, Philips

for the start, end and length of each section, as linked, for programs that must manipulate the contents of a section directly; incremental linking; and automatic rescan of libraries. MIPS processor Linkers are the LD3K and LD4K, and the LD-ARM is for the ARM processor. All Linkers are supported on UNIX and Windows hosts, and MIPS Linkers are supported on DOS hosts as well.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: <http://www.episupport.com>.

Green Hills Instruction Set Simulator

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills Instruction Set Simulators allow programs for the target microprocessor to be executed on the PC or host workstation by simulating the execution of the target at the instruction level. A special interface exists to allow program control via a standard debugger. The simulators support most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Execution Profiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Execution Profiler provides a mechanism for looking at user code in many different ways in order to pinpoint hot spots. Reports show performance by procedure, source line, etc. Supports native and embedded profiling on most popular 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Program Builder

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Program Builder is a configuration management system for creating and managing large programs. The MULTI builder replaces traditional make files with a modern point-and-click interface, greatly simplifying the configuration management task and eliminating the need for engineers dedicated to managing the build process. Supports native and embedded profiling on most popular 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Run-Time Error Checker

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Run-time Error Checker inserts code into user's executable to check for things like array out of bounds, value too large for variable, read of variable before initialization, and attempts to access unallocated memory. The error checker supports native and embedded profiling on most popular 32 and 64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Version Control System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Version Control system is very unobtrusive, with files being automatically checked out when the first change is made in the editor. Advanced features support program branches and the ability to find out who made the last change to selected lines. Supports native and embedded profiling on most popular 32/64-bit CPUs.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Logic Analyzers

Hewlett-Packard Company

Host Development Environments: N/A.

HP's digital design and debug tools help system developers solve tough hardware and software integration problems fast. The HP benchtop logic analyzers offer cost-effective

time 100 MHz state analysis plus five timing modes up to 500 MHz. The HP 16500 modular logic analysis systems provide the power and flexibility to handle demanding hardware and software problems.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or [emu-lab.com](http://www.emu-lab.com).

Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabilities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: <http://www.tektronix.com>.

SPARC/UltraSPARC

Sun Microelectronics, Fujitsu, TI, Temic

FULL FUNCTION RTOS

CHORUS/ClassiX* Real-Time Operating System

Chorus Systems

Host Development Environments: UNIX and Windows.

CHORUS/ClassiX is a highly configurable, richly-featured real-time executive. Users can easily tailor CHORUS/ClassiX at a very fine-grain level of real-time operating system services to meet specific hardware and application requirements. The componentized* architecture is industry unique and allows CHORUS/ClassiX to coherently scale from very small (10K) instances to highly distributed, multiple-personality platforms including support for POSIX, third-party RTOSs, the Java* Application Environment (JAE) and/or legacy operating systems. Hot application re-start, fair-share scheduling, and other high-availability enablers provide necessary capabilities for mission-critical embedded systems.

For more information, contact: Audrey Castine, 408-879-4145. Email inquiries to: info@chorus.com. Visit Chorus Systems on the World Wide Web at: www.chorus.com.

CHORUS/JaZZ* Real-Time Operation System

Chorus Systems

Host Development Environments: N/A.

CHORUS/JaZZ* is a feature-rich, Java-enabled real-time operating system providing full Java functionality and compatibility within the context of an embedded real-time operating system. CHORUS/JaZZ provides a Java "virtual machine" personality, supporting the full range of Java extensions and services, including Hot Java and JavaViews. CHORUS/JaZZ allows developers to integrate "off-the-shelf" Java applications into distributed real-time embedded systems, resulting in a significant decrease in development costs and time. Not only is CHORUS/JaZZ one of the richest Java-enabled operating systems, it is also significantly faster than most Java implementations.

For more information, contact: Audrey Castine, 408-879-4145. Email inquiries to: info@chorus.com. Visit Chorus Systems on the World Wide Web at: www.chorus.com.

LynxOS* Real-Time Operating System

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

LynxOS is a UNIX-compatible, POSIX-conforming, multi-process, and multi-threaded operating system designed for complex real-time applications that require fast, deterministic response. The LynxOS kernel was specifically designed for hard real-time applications. LynxOS is fully pre-emptible, re-entrant, and compact. The modularity inherent in the LynxOS architecture makes the operating system highly scalable and configurable. At its smallest, it can be configured with only the kernel and linked with an application to form a ROMable image for specialized embedded applications. At its fullest, LynxOS is a self-hosted development environment comprising a wide array of software development tools, UNIX-compatible utilities, industry-standard networking, a GUI, and a UNIX-like hierarchical file system.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

* Trademark or registered trademark of its respective company or mark holder

MIPS (Rxxx/Rxxxxx)

MIPS, NEC, IDT, NKK, Toshiba, QED, Philips

C++ Compiler

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Object-oriented programming techniques increase productivity, improve quality and provide reusability with Tasking's C++ compiler. The compiler allows the intermixing of C++ and C code within a single application. Thus, the benefits of C++ can be incorporated into existing C applications a module at a time, thus providing easy migration from C to C++ programs.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

C Compiler Package

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking delivers ANSI C compilers that are highly optimized with individual target-specific extensions for ultimate flexibility and efficiency. As well as using these target-specific extensions, the developer-user can also define in-line functions and use in-line assembly. Included with every compiler is an assembler and linker/locator.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

ASSEMBLER

GNUPro* Toolkit

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit is a solution to the problem of delivering quality software to meet the increasingly tighter schedules required by today's marketplace. The highly optimized tool chain for a specific host-target combination drives competitive speed- and size-performance advantages into a developer's software without compromising either its portability or maintainability. The fully-featured debug tools and utilities significantly help to shorten the development, test, and validation cycles. Cygnus backs the GNU technology with a commitment to rapid and expert support. All GNUPro tool chains for native and embedded programming are bundled with mission-critical support services and guaranteed technical response times.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

EPI AS Series Macro Assemblers

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

EPI's Macro Assemblers allow all original routines to be written in assembly code and integrated into a C or C++ program. The EPI Macro Assemblers have powerful macro facilities and are compliant with Approved Instruction Sets.

The EPI Macro Assembler for the R3000 is the AS3K; for the R4000 is the AS4K; for the AM29000 is the AS29K; and for the ARM is the AS-ARM. For the MIPS and AM29K processors, the assemblers are also supported on DOS hosts. The AS29K Macro Assembler also includes a Linker/Locator with Librarian and Utilities.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

Green Hills Cross Assembler Tool Chain

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills embedded tool chain includes a macro assembler, linker, librarian, runtime libraries, object formatters and other utilities useful for embedded development. Cross-assembler tool chains are available for most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

EMULATOR**EPI DS4000 Development System for MIPS* μ PU's**

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

Embedded Performance, Inc.'s DS Series Development System is integrated to provide many of the logic analysis and profiling features of EPI's Turbo Class emulators, inte-

grated with EPI's target-resident debug kernel. The chassis can be upgraded to a full-featured Turbo class emulator. The DS Series consists of the basic logic analyzer and CPU functions of a Turbo class emulator combined with the control and observation features of the debug kernel. The debug kernel resides in target memory and provides the downloading, stepping and breakpoint control, along with features for viewing and editing the memory and registers. The state analyzer features EPI's unique Three-Dimensional Trace Control. The powerful state machine can easily capture simple bus activity or be programmed to capture very complex event sequences. It allows for the capture of many hard-to-find coding problems in a single trace.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

EPI ICEMAN Series In-Circuit Emulators

Embedded Performance, Inc.

Host Development Environments: UNIX, Windows and DOS.

EPI's ICEMAN series emulators are full-function in-circuit emulators in small, Probe-Head-Size Packages that have Ethernet and serial interfaces, high-speed download, a wide choice of overlay memory sizes and speeds, and a Trace Option for capturing real-time target activity. Compact ICEMAN Emulators offer high-performance, with the integration, speed, overlay memory, trace capture, and networking features of more costly bench-top emulators, but in small, less costly packages. With base pricing only slightly higher than that of a JTAG emulator, the emulators may be expanded to include additional features as needs require. ICEMAN products offer on-board overlay memory options and direct connections to PCs or UNIX OS hosts and are fully network-compatible via the Ethernet interface. The trace option provides real-time capture of target activity both at processor pins and additional user-selected points on target hardware. Non-intrusive ICEMAN Emulators operate at maximum μ PU clock rates, using none of target system memory or communication resources.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

EPI Turbo In-Circuit Emulator

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

Turbo Class In-Circuit Emulators have the following features: a unique 3-D trace/breakpoint control; a real-time profiler option provides performance analysis, code and branch coverage; optional execution tracker captures real-time execution from on-chip cache (selected μ PU's); a wide choice of overlay memory sizes and speeds; large overlay memory sizes for large, ROM-based programs; high-speed download; and real-time emulation to 67 MHz bus rates. The Turbo Class Emulators shorten development time by integrating an ICE with a high-performance logic state analyzer to provide a versatile tool for all phases of the development cycle. The three-dimensional trace and breakpoint control makes it easy to capture complex software paths leading to failures, and the emulator may be used with its large time stamp to make absolute and delta timing measurements of the software execution. (Emulator Models are SYS4K for MIPS R4000, SYS29K-MANX for Am29K, and SYS-R3051 for R3000).

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

Orion/Advice* Emulator

Orion Instruments

Host Development Environments: UNIX and Windows.

The Orion/Advice is a high-performance, real-time emulation system. A sophisticated multi-level event-triggering system, combined with a non-intrusive trace buffer provide unmatched problem tracking. A point-and-click Windows* or UNIX* OS graphical user interface (GUI) provides true high-level-language (HLL) debug support. Profiling, performance analysis and code coverage complete the Orion/Advice emulation package.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

DEBUGGER**Nucleus* UDB Debugger**

Accelerated Technology, Inc.

Host Development Environments: Windows.

Nucleus UDB is a powerful, Graphical User Interface-based source-level debugger for embedded applications. Its three component configurations include the debugger front

* Trademark or registered trademark of its respective company or mark holder

MIPS (Rxxx/Rxxxx)**MIPS, NEC, IDT, NKK, Toshiba, QED, Philips**

end, host communications module, and target monitor. These components comprise a powerful and portable debugging environment. Since the front end is standard across all target CPU platforms, developers need learn only one debugging environment.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

GNUPro* Toolkit Debugger Suite

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit debugger suite is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The fully-featured debug tools and utilities significantly help to shorten the development, test and validation cycles. Cygnus provides mission-critical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

EPI MON Series Symbolic Assembly-Level Debugger

Embedded Performance, Inc.

Host Development Environments: UNIX, Windows and DOS.

EPI's Symbolic Assembly-Level Debuggers are ideal for scripted automatic testing, great for low-level hardware and software debugging, support all EPI execution vehicles, have an extensible command language, provide Call Stack display, and are available for a variety of host computers. EPI's MON Debugger provides a common command-line interface to all the EPI execution environments. The MON debugger's rich feature set is accessed through an extensive command language that includes expressions on evaluation, aliases, command files with parameter passing and flow control, debugger local variables and conditional command execution. EPI's MON29K supports AMD's AM29000 μ P family; the MON3K and MON4K support the MIPS R3000 and R4000 series processors; and the MON-ARM supports debugging of programs for the ARM μ P family.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

EPI Target-Resident Debug Kernels

Embedded Performance, Inc.

Host Development Environments: UNIX, Windows and DOS.

EPI's Target-Resident Debug Kernels support download speeds of up to 115K Baud over standard serial interfaces; require less than 25K ROM for popular evaluation boards; full source-code availability; support interfaces to both EPI Debuggers (assembly and source-level). EPI's Target-Resident Debug Kernels implement the functions necessary to enable the EPI debuggers to communicate with the target. The kernels are supplied with sample source code for common UARTs and may be easily customized for target-to-host communication links.

Target-Resident Debug Kernels are the RSS-ARM for the ARM μ P; the RSS3K/RSS4K for the MIPS R3000 and R4000 μ Ps; and the RSS29K for the AM29K μ P.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

EPI Windowing C/C++ Source-Level Debugger

Embedded Performance, Inc.

Host Development Environments: UNIX, Windows and DOS.

Windowing C/C++ Source-Level Debuggers feature a graphical multi-windowed user interface. EPI's debuggers have an intuitive set of graphical controls and highly integrated window relationships and interface to all EPI instruction-set simulators, target-resident debug kernels, and EPI emulators. Some of the many windows include Value Watch, Source, Memory, Global Registers, Local Registers, Call Stack, Profiler, Breakpoint Editing and Trace Data. Memory and Trace Data windows offer a wide selection of display modes including disassembled instructions with interleaved source. For many processors, the debugger accepts text commands for complex debugging and permits the use of debugging scripts. These debuggers support multiple hosts and all EPI execution vehicles; are mouse-driven with "point and click" operations; debug very large programs easily; are hyper-linked between windows; and support M/S Windows* (NT/95) OS, X-Terminal and Motif. WCDB is for AM29K processors; CADB is for ARM processors; and WCDB3K and WCDB4K are for MIPS R3000 and R4000 processors.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

MULTI* Source-Level Debugger

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Source-level Debugger supports native or embedded debugging of most popular 32-/64-bit processors. The main debugger window shows source or interlaced source and assembly. A single click lets the user look at a variable or set a breakpoint. Small windows allow for the monitoring of specific variables, local variables, or the call stack.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

RTI ScopeProfile* Performance Analysis Tool/Debugger

Real-Time Innovations, Inc.

Host Development Environments: UNIX and Windows.

RTI's ScopeProfile is a dynamic execution profiler for Wind River Systems' VxWorks* RTOS. The profiler shows the developer exactly where the CPU cycles are being spent. Both cumulative (including all subroutines) and direct CPU usage of each routine are captured. The output can be plotted in real time with RTI's StethoScope Debugger. The profiler will help developers tune their time-critical systems for maximum performance.

For more information, contact: Al Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

RTI StethoScope* Debugger

Real-Time Innovations, Inc.

Host Development Environments: UNIX and Windows.

Real-Time Innovations' (RTI) StethoScope debugger is a graphical monitoring, performance analysis, and data collection tool for real-time applications. The developer can watch program variables evolve in real time; any value in memory can be monitored. Much like a software oscilloscope, StethoScope allows the developer to see what the application is doing. StethoScope may rapidly become the developer's most important debugging and analysis tool.

For more information, contact: Al Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

CrossView* Pro Debugger

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking's CrossView Pro debugger delivers functionality that reduces time requirements for program testing and debugging, and includes the following: tracking scope and monitoring locals; an intelligent source window; and code coverage and performance analysis. CrossView Pro provides multiple views of the developer's code: C and/or assembly source, monitor, inspect, on-chip registers, call stack, variables, break point, execution trace, session log, simulated I/O and memory dumps.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

WindView* Debugger

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

WindView is a revolutionary diagnostic and analysis tool that provides detailed visibility into the dynamic operation of an embedded system. The developer using the WindView visual debugger can quickly and easily visualize the complicated interaction among tasks, interrupt service routines, and system objects in an application. This information is presented and can be manipulated through a state-of-the-art graphical user interface (GUI).

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

LIBRARY**C-tree Plus* File Handler**

FairCom Corporation

Host Development Environments: UNIX and Windows and Most Others.

C-tree Plus File Handler Version 6.7A is based on advanced B-tree (balanced) algorithm. The C-tree Plus API handles all aspects of database I/O. Customer can program

* Trademark or registered trademark of its respective company or mark holder

MIPS (Rxxx/Rxxxx)**MIPS, NEC, IDT, NKK, Toshiba, QED, Philips**

single-user or multi-user non-server applications royalty free. C-tree Plus has a small memory footprint, unsurpassed portability, is client/server ready and ODBC compliant. Features include: transaction processing; fixed/variable length records; alternate calculating sequence numbers; and file mirroring. Package supports Windows, OS/2, DOS, Macintosh and UNIX.

For more information, contact: Sales, 573-445-6833. Email inquiries to: sales@faircom.com. Visit FairCom Corporation on the World Wide Web at: www.faircom.com.

DRIVER**AIO Drivers for VxWorks* RTOS**

AP Labs

Host Development Environments: UNIX.

Extensive set of device drivers for Wind River's VxWorks*, supporting VME and IP Module interfaces for: analog, digital, serial, IRIG, PCM telemetry, 1553, ARINC-429, NTDS, DR11W, GPIB, FDDI and SCSI. AP Labs AIO supports high performance asynchronous and synchronous I/O operations under VxWorks 5.2 and Tornado.

For more information, contact: Steve Gills, 619-546-8626. Email inquiries to: info@sd.aplabs.com. Visit AP Labs on the World Wide Web at: www.sd.aplabs.com.

OTHER TOOLS**CodeTEST* Software Verification Tools**

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

CodeTEST software verification tools for embedded system developers and testers support most major 32- and 16-bit microprocessors and VME boards, and supplies tools for accurately analyzing embedded system performance, code coverage, dynamic memory allocation and memory errors, as well as a powerful software trace tool. A VME version is now available.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

CoreTAP* System-On-A-Chip Co-Development Platform

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

AMC's CoreTAP* provides a pre-silicon co-design, integration and test platform for system architects, lead engineers and software developers. CoreTAP accelerates system-on-a-chip (SOC) projects by providing an environment for designing, integrating and testing software and hardware before final design sign-off. This supports integration of real product software and commercial RTOSs with both real and virtual hardware.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

VSP-TAP*/Eaglei* Co-Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

Applied's VSP-TAP and the Eaglei co-verification environment from Viewlogic Systems provides software operation verification against a hardware description model (HDL). VSP-TAP adds enhanced real-time capabilities, connecting the simulated environment, the actual processor, and real-world data at real processor speeds, and supplying access to an emulator's full debugging capabilities.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

BSQUARE Integration

BSQUARE

Host Development Environments: Windows.

BSQUARE's Windows CE OEM Adaptation Kits (OAK*) provide OEMs the resources needed to adapt Windows CE to their respective products. Included with the kit are: support for processor, OEM adaptation layer, embedded drivers for processor devices, adaptation tools, and loader firmware for Windows CE.

For more information, contact: Ann Gorman, 425-519-5000. Email inquiries to: donb@bsquare.com. Visit BSQUARE on the World Wide Web at: www.bsquare.com.

CARDtools Application Simulation Tool

CARDtools Systems

Host Development Environments: UNIX & Windows.

CARDtools stands for Computer-Aided Real-time Design Tools, and the CARDtools design tool is dedicated to the design, evaluation, and simulation of embedded systems applications. An embedded system application consists of hardware devices interacting with a microprocessor, the microprocessor (CPU), a real-time operating system (RTOS), and the application program. CARDtools addresses all the aspects of embedded system application design and simulation.

For more information, contact: Dave Allenbaugh, 408-894-9500. Email inquiries to: info@cardtools.com. Visit CARDtools Systems on the World Wide Web at: http://www.cardtools.com.

Preprocessor for the HP Family of Logic Analyzers

Corelis

Host Development Environments: HP Logic Analyzer.

Corelis designs, develops and manufactures a family of preprocessors for use with Hewlett-Packard Company's family of log-c analyzers. These preprocessors are designed to provide a convenient and easy means of connection between an HP logic analyzer and an embedded processor or data bus. Corelis preprocessors are supplied with inverse assembly software as well as screen configuration software that runs on the HP logic analyzer. Preprocessors are available for most MIPS architecture processors as well as most TI DSP processors. Also available are tools for Motorola DSPs, the PCI* bus and ISA bus, and various FPGAs.

For more information, contact: Mike Winters, 562-926-6726. Email inquiries to: mikew@corelis.com. Visit Corelis on the World Wide Web at: www.corelis.com.

EPI CCE4K/CCE3K Software Toolkit for MIPS* μ PU

Embedded Performance, Inc.

Host Development Environments: UNIX, Windows and DOS.

Embedded Performance, Inc.'s MIPS R3000 μ PU Software Toolkit (CCE3K) includes:

CC3K C Compiler

AS3K Assembler, Linker/Locator, Librarian and Utilities

MON3K Symbolic Debugger

WCDB3K C Source-Level Debugger

RSS3K Target-Resident Debug Kernel

The Software Toolkit for the MIPS R4000 μ PU includes:

CC4K C/C++ Compiler

AS4K Assembler, Linker/Locator, Librarian and Utilities

MON4K Symbolic Debugger

WCDB4K C Source-Level Debugger

RSS4K Target-Resident Debug Kernel

NOTE: Embedded Performance, Inc. also makes available as individual component products, the above products comprising the MIPS μ PU toolkit.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

EPI Instruction Set Simulators

Embedded Performance, Inc.

Host Development Environments: UNIX, Windows and DOS.

Instruction Set Simulators are up to 30 times faster than traditional Architectural Simulators, provide access to host resources, are available on a variety of host computers, and interfaces to both EPI debuggers (assembly and source level). The EPI Instruction Set Simulator simulates only those functions of the processors that are visible to the software. This optimization makes it many times faster than an architectural simulator. The result is a tool that can be used to execute and debug large programs before the target system is available. The EPI Instruction Set Simulators are the ISS29K for the AM29K, ISS-ARM for the ARM, and ISS-MIPS for the MIPS processors.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

EPI Locating Linkers

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

The heart of an embedded tool chain is the linker, and for maximum developer productivity, the linker must be fast, powerful, flexible, and controllable. EPI's Locating Linker is all of these with its efficient use of host resources allowing it to link extremely large programs, even on hosts with limited memory. In addition, the Linker provides type compression, thus eliminating redundant type information from the symbol table and reducing file sizes by up to 90%. Additional features include linker-generated symbols

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MIPS (Rxxx/Rxxxx)

MIPS, NEC, IDT, NKK, Toshiba, QED, Philips

for the start, end and length of each section, as linked, for programs that must manipulate the contents of a section directly; incremental linking; and automatic rescan of libraries. MIPS processor Linkers are the LD3K and LD4K, and the LD-ARM is for the ARM processor. All Linkers are supported on UNIX and Windows hosts, and MIPS Linkers are supported on DOS hosts as well.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: <http://www.episupport.com>.

Green Hills Instruction Set Simulator

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills Instruction Set Simulators allow programs for the target microprocessor to be executed on the PC or host workstation by simulating the execution of the target at the instruction level. A special interface exists to allow program control via a standard debugger. The simulators support most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Execution Profiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Execution Profiler provides a mechanism for looking at user code in many different ways in order to pinpoint hot spots. Reports show performance by procedure, source line, etc. Supports native and embedded profiling on most popular 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Program Builder

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Program Builder is a configuration management system for creating and managing large programs. The MULTI builder replaces traditional make files with a modern point-and-click interface, greatly simplifying the configuration management task and eliminating the need for engineers dedicated to managing the build process. Supports native and embedded profiling on most popular 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Run-Time Error Checker

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Run-time Error Checker inserts code into user's executable to check for things like array out of bounds, value too large for variable, read of variable before initialization, and attempts to access unallocated memory. The error checker supports native and embedded profiling on most popular 32 and 64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Version Control System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Version Control system is very unobtrusive, with files being automatically checked out when the first change is made in the editor. Advanced features support program branches and the ability to find out who made the last change to selected lines. Supports native and embedded profiling on most popular 32/64-bit CPUs.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Logic Analyzers

Hewlett-Packard Company

Host Development Environments: N/A.

HP's digital design and debug tools help system developers solve tough hardware and software integration problems fast. The HP benchtop logic analyzers offer cost-effec-

tive 100 MHz state analysis plus five timing modes up to 500 MHz. The HP 16500 modular logic analysis systems provide the power and flexibility to handle demanding hardware and software problems.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or [emulator](http://www.hp.com/go/emulator).

Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabilities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: <http://www.tektronix.com>.

SPARC/UltraSPARC

Sun Microelectronics, Fujitsu, TI, Temic

FULL FUNCTION RTOS

CHORUS/ClassiX* Real-Time Operating System

Chorus Systems

Host Development Environments: UNIX and Windows.

CHORUS/ClassiX is a highly configurable, richly-featured real-time executive. Users can easily tailor CHORUS/ClassiX at a very fine-grain level of real-time operating system services to meet specific hardware and application requirements. The componentized architecture is industry unique and allows CHORUS/ClassiX to coherently scale from very small (10K) instances to highly distributed, multiple-personality platforms including support for POSIX, third-party RTOSs, the Java* Application Environment (JAE) and/or legacy operating systems. Hot application re-start, fair-share scheduling, and other high-availability enablers provide necessary capabilities for mission-critical embedded systems.

For more information, contact: Audrey Castine, 408-879-4145. Email inquiries to: info@chorus.com. Visit Chorus Systems on the World Wide Web at: www.chorus.com.

CHORUS/JaZZ* Real-Time Operation System

Chorus Systems

Host Development Environments: N/A.

CHORUS/JaZZ* is a feature-rich, Java-enabled real-time operating system providing full Java functionality and compatibility within the context of an embedded real-time operating system. CHORUS/JaZZ provides a Java "virtual machine" personality, supporting the full range of Java extensions and services, including Hot Java and JavaViews. CHORUS/JaZZ allows developers to integrate "off-the-shelf" Java applications into distributed real-time embedded systems, resulting in a significant decrease in development costs and time. Not only is CHORUS/JaZZ one of the richest Java-enabled operating systems, it is also significantly faster than most Java implementations.

For more information, contact: Audrey Castine, 408-879-4145. Email inquiries to: info@chorus.com. Visit Chorus Systems on the World Wide Web at: www.chorus.com.

LynxOS* Real-Time Operating System

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

LynxOS is a UNIX-compatible, POSIX-conforming, multi-process, and multi-threaded operating system designed for complex real-time applications that require fast, deterministic response. The LynxOS kernel was specifically designed for hard real-time applications. LynxOS is fully pre-emptible, re-entrant, and compact. The modularity inherent in the LynxOS architecture makes the operating system highly scalable and configurable. At its smallest, it can be configured with only the kernel and linked with an application to form a ROMable image for specialized embedded applications. At its fullest, LynxOS is a self-hosted development environment comprising a wide array of software development tools, UNIX-compatible utilities, industry-standard networking, a GUI, and a UNIX-like hierarchical file system.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

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SPARC/UltraSPARC

Sun Microelectronics, Fujitsu, TI, Temic

Super TASK! Real-Time Operating System

U S Software

Host Development Environments: Windows.

U S Software's SuperTask! is a mature, compact, fast, and user-configurable RTOS suite. SuperTask! supports more than 20 C/C++ compilers/tool chains, and source code is included with an ANSI standard C core

For more information, contact: Katrina Sumner, 503-641-8446 x 740. Email inquiries to: info@ussw.com. Visit U S Software on the World Wide Web at: www.ussw.com.

VxWorks* Real-Time Operating System

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Part of the Tomado* development environment, VxWorks is an industry-standard, scalable real-time operating system. It features the multitasking wind* kernel, the POSIX real-time extensions, intertask communications, full networking functionality, file system support and C++ support. Additional functionality is available through optional products from Wind River and a wide range of third-party partners.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

BASIC RTOS KERNEL**Nucleus PLUS* Real-Time Operating System**

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus PLUS is designed as a core component for an operating system environment. It is extensible and dynamic. Its modular design allows services to be easily produced by combining existing services. All of the Nucleus PLUS components (tasks, queues, semaphores, etc.) can be dynamically created and deleted. Each component has a control block defined by the user and placed anywhere in the available memory space of the target system. Nucleus PLUS is a real-time, pre-emptive, multitasking kernel designed for time-critical embedded applications. Approximately 95 percent of Nucleus PLUS is extremely portable and is currently available for use with most microprocessor families.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

INTEGRATED DEVELOPMENT ENVIRONMENT**MULTI* Software Development Environment**

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Software Development Environment provides a framework of interacting tools to support program development by small or large workgroups. MULTI includes all of the tools needed to support major programming projects, including a program builder, version control, program editor, debugger, execution profiler, run-time error checker, and source-code control.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Penumbra Super Mojo* Java Development Environment

Penumbra Software, Inc.

Host Development Environments: .

Super Mojo's Designer, Visual Scripter*, and integrated Coder create a unique Java Development Environment (JDE) for Java application and Java bean component creation. Super Mojo runs on any Java-supported operating system. Its incremental compiler compiles in background, and nothing is faster. Developers can create Java without coding by simply dragging-and-dropping components! Visually they can add events/actions, commands, logic, and calls to other scripts. Super Mojo Supports JDBC/ODBC.

For more information, contact: Michael Mittel, 770-352-0100 x 180. Email inquiries to: mmittel@penumbraoftware.com. Visit Penumbra Software, Inc. on the World Wide Web at: www.penumbraoftware.com.

RTI ControlShell* O-O Programming Environment

Real-Time Innovations, Inc.

Host Development Environments: .

RTI's ControlShell is a component-based, object-oriented programming environment for real-time software development. Built on top of Wind River Systems' VxWorks* RTOS, ControlShell combines a modular structure, powerful graphical tools, and integrated data management into a unique approach to real-time software development. The ControlShell environment provides a framework that enables programmers/users to share and reuse software on a scale never before possible.

For more information, contact: Al Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

Tornado* Integrated Development Environment

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Wind River Systems' Tornado is a complete software cross-development environment for embedded systems. Tornado is seamlessly integrated and includes powerful development tools and VxWorks*, a feature-rich, high performance and scalable real-time operating system. Completely open and customizable, the Tornado environment also facilitates the use of third-party and customer-developed tools to enhance its capabilities and meet unique customer requirements. Tornado has more than 90 software and hardware partners and is used by thousands of developers worldwide.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

COMPILER**PYACC 7.0 Compiler/Language Development Toolkit**

Abraxas Software, Inc.

Host Development Environments: All.

Abraxas Software's PYACC v. 7.0 is a complete language-development environment that generates C, C++, Java, Delphi, and VBS source code (from Input Language Description Grammars or ILDGs) for building assemblers, compilers, interpreters, browsers, PDLs, language translators, syntax-directed editors, language validators, natural language processors, expert-system shells, and query languages. Includes "drop in" language engines for SQL, dBASE, PostScript, HyperTalk, SmallTalk-80, C++, C, Pascal, ProLog, FORTRAN, COBOL, Basic, SGML, ASN, RPG, SNA, VBasic, VHDL, HTML, VMRL, Java, ODMG-ODL/OQL, Modula-S, Delphi, VBS and Ada. The toolkit includes portable object-oriented classes for Java and C++ and debugging tools, including runtime visual parser debugging, abstract syntax tree generation and code referencing.

For more information, contact: Tana Rae K., 503-244-5253. Email inquiries to: sales@abxsoft.com. Visit Abraxas Software, Inc. on the World Wide Web at: www.abxsoft.com.

Apogee-C Compiler

Apogee Software, Inc.

Host Development Environments: UNIX.

The Apogee-C compiler accepts C source files and compiles them to produce assembly files. May invoke optionally available optimizing preprocessors. Targets SPARC workstations and embedded processors. Accepts ANSI C, Kernighan & Ritchie C, and more.

For more information, contact: George Malek, 408-369-9001. Email inquiries to: info@apogee.com. Visit Apogee Software, Inc. on the World Wide Web at: www.apogee.com.

Apogee-C++ Compiler

Apogee Software, Inc.

Host Development Environments: UNIX.

The Apogee-C++ compiler accepts C++ source files and compiles them into assembly files. Includes RTTI, STL and exception handling. The compiler is performance optimizing and supports the SPARC v6plus processor.

For more information, contact: George Malek, 408-369-9001. Email inquiries to: info@apogee.com. Visit Apogee Software, Inc. on the World Wide Web at: www.apogee.com.

Apogee-FORTRAN 77/90 Compiler

Apogee Software, Inc.

Host Development Environments: UNIX.

The Apogee-FORTRAN 77/90 compiles FORTRAN 77 code and optimizes it for higher speed performance. It also compiles FORTRAN 90 code, optionally optimizing it for

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SPARC/UltraSPARC

Sun Microelectronics, Fujitsu, TI, Temic

speed. An optional Apogee preprocessor for parallelizing code is available.

For more information, contact: George Malek, 408-369-9001. Email inquiries to: info@apogee.com. Visit Apogee Software, Inc. on the World Wide Web at: www.apogee.com.

GNUPro* Toolkit Compiler Suite

Cygnus Solutions

Host Development Environments: .

Cygnus Solutions' GNUPro* Toolkit compiler suite (with assembler) is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The compiler delivers speed- and size-performance advantages over a wide range of microprocessor architectures. Cygnus provides mission-critical technical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

DDC-I Ada Compiler Systems (DACS*)

DDC-I

Host Development Environments: UNIX and Windows.

A typical DDC-I Ada Language compiler system, the DACS-80x86 features include: compact, efficient ROMable code; modular stand-alone run-time system; advanced symbolic Ada debugger; superior real-time performance; easily configurable to developer's hardware; generates Intel OMF; supports bare PC as target; FAA-certifiable run-time system available (including tasking); supports rate-monotonic scheduling; fast and normal interrupt handling; fast Ethernet downloading; selective linking; stack analysis tools (static and dynamic); Multibus* II interface; CIFO and RTS entry-point package; numeric package using 80x87 NPX. (See other processors supported by DDC-I's compiler systems.)

For more information, contact: Morten Selling, +45 45 87 11 44. Email inquiries to: sales@ddci.dk. Visit DDC-I on the World Wide Web at: www.ddci.com.

Green Hills Optimizing Ada 95 Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

A fully validated implementation of the Ada 95 language, including new task and synchronization features, POSIX threads, and type extensions of tagged types and child library units. Supports mixed-language programming with C, C++, FORTRAN and Assembly. Compilers support many 32- and 64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing C Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills' high-performance optimizing C compilers, for native or embedded development, have many advanced optimizations, such as cross-module inlining. The compilers allow for the fine tuning of optimization strategy so users can generate optimal code. Supports 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing C++ Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills offers high-performance optimizing C++ compilers for native or embedded development. The compilers are compatible with Green Hills Software's MULTI* debugger, which automatically handles C++ constructs such as name mangling and template debugging. The compilers support most 32-/64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing Embedded C++ Compiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills optimizing Embedded C++ compilers are high-performance and follow the

Embedded C++ Technical Committee draft standard.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing FORTRAN Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills Software offers optimizing FORTRAN compilers for native or embedded development. A compile-time option allows users to select from among the F77, VMS and DoD dialects of the FORTRAN language, with additional support for many extensions. The FORTRAN compilers support most 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

ASSEMBLER

GNUPro* Toolkit

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit is a solution to the problem of delivering quality software to meet the increasingly tighter schedules required by today's marketplace. The highly optimized tool chain for a specific host-target combination drives competitive speed- and size-performance advantages into a developer's software without compromising either its portability or maintainability. The fully-featured debug tools and utilities significantly help to shorten the development, test, and validation cycles. Cygnus backs the GNU technology with a commitment to rapid and expert support. All GNUPro tool chains for native and embedded programming are bundled with mission-critical support services and guaranteed technical response times.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

Green Hills Cross Assembler Tool Chain

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills embedded tool chain includes a macro assembler, linker, librarian, run-time libraries, object formatters and other utilities useful for embedded development. Cross-assembler tool chains are available for most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

EMULATOR

Orion/Advice* Emulator

Orion Instruments

Host Development Environments: UNIX and Windows.

The Orion/Advice is a high-performance, real-time emulation system. A sophisticated multi-level event-triggering system, combined with a non-intrusive trace buffer provide unmatched problem tracking. A point-and-click Windows* or UNIX* OS graphical user interface (GUI) provides true high-level-language (HLL) debug support. Profiling, performance analysis and code coverage complete the Orion/Advice emulation package.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

DEBUGGER

GNUPro* Toolkit Debugger Suite

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit debugger suite is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The fully-featured debug tools and utilities significantly help to shorten the development, test and validation cycles. Cygnus provides mission-critical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

* Trademark or registered trademark of its respective company or mark holder

SPARC/UltraSPARC

Sun Microelectronics, Fujitsu, TI, Temic

MULTI* Source-Level Debugger

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Source-level Debugger supports native or embedded debugging of most popular 32-/64-bit processors. The main debugger window shows source or interlaced source and assembly. A single click lets the user look at a variable or set a breakpoint. Small windows allow for the monitoring of specific variables, local variables, or the call stack.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

LynxInsure++*

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

LynxInsure++ is a powerful environment for the development of quality software. Using LynxInsure++, developers will produce more robust, optimized, higher quality real-time applications. LynxInsure++ automatically detects large classes of programming and run-time errors and quickly pinpoints algorithmic anomalies, bugs, and deficiencies. It visualizes in real time the memory manipulation of a program, helping developers spot bugs and inefficiencies in memory handling. LynxInsure++ also performs coverage analysis, providing necessary feedback to programmers about which parts of the code were actually run/tested.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

TimeScan* Performance Analyzer

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

TimeScan is an event-based tracing and performance analysis tool. It supports multi-process, multi-threaded, and multiprocessor applications with event logging at a sub-microsecond resolution. With TimeScan, programmers have the ability to measure and display dynamic behavior programs. TimeScan is useful for both performance analysis and as a debugging tool, resolving difficult problems such as resource contention, bottlenecks, deadlocks, and critical process timings that cannot be tackled with a conventional debugger.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

TotalView* Debugger

Lynx Real-Time Systems

Host Development Environments: UNIX and LynxOS Native/Hosted.

The TotalView Debugger is a powerful, source-level, window-oriented debugger for the LynxOS RTOS. TotalView provides the ability to debug multi-process, multi-threaded, and multiprocessor-based systems and applications. It is designed to operate in a networked environment, giving the developer the ability to manage and control multiple processes even when these processes are distributed across multiple, heterogeneous systems.

For more information, contact: Lynx Sales Dept. 408-879-3900 (US/ROW) and Freddy LeMarquand in Europe (33) 1 30 85 06 00. Email inquiries to: sales@lynx.com. Visit Lynx Real-Time Systems on the World Wide Web at: www.lynx.com.

RTI ScopeProfile* Performance Analysis Tool/Debugger

Real-Time Innovations, Inc.

Host Development Environments: UNIX and Windows.

RTI's ScopeProfile is a dynamic execution profiler for Wind River Systems' VxWorks* RTOS. The profiler shows the developer exactly where the CPU cycles are being spent. Both cumulative (including all subroutines) and direct CPU usage of each routine are captured. The output can be plotted in real time with RTI's StethoScope Debugger. The profiler will help developers tune their time-critical systems for maximum performance.

For more information, contact: AI Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

RTI StethoScope* Debugger

Real-Time Innovations, Inc.

Host Development Environments: UNIX and Windows.

Real-Time Innovations' (RTI) StethoScope debugger is a graphical monitoring, perfor-

mance analysis, and data collection tool for real-time applications. The developer can watch program variables evolve in real time; any value in memory can be monitored. Much like a software oscilloscope, StethoScope allows the developer to see what the application is doing. StethoScope may rapidly become the developer's most important debugging and analysis tool.

For more information, contact: AI Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

WindView* Debugger

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

WindView is a revolutionary diagnostic and analysis tool that provides detailed visibility into the dynamic operation of an embedded system. The developer using the WindView visual debugger can quickly and easily visualize the complicated interaction among tasks, interrupt service routines, and system objects in an application. This information is presented and can be manipulated through a state-of-the-art graphical user interface (GU.).

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

LIBRARY**C-tree Plus* File Handler**

FairCom Corporation

Host Development Environments: UNIX and Windows and Most Others.

C-tree Plus File Handler Version 6.7A is based on advanced B+tree (balanced) algorithm. The C-tree Plus API handles all aspects of database I/O. Customer can program single-user or multi-user non-server applications royalty free. C-tree Plus has a small memory footprint, unsurpassed portability, is client/server ready and ODBC compliant. Features include: transaction processing; fixed/variable length records; alternate collating sequence numbers; and file mirroring. Package supports Windows, OS/2, DOS, Macintosh and UNIX.

For more information, contact: Sales, 573-445-6833. Email inquiries to: sales@faircom.com. Visit FairCom Corporation on the World Wide Web at: www.faircom.com.

DRIVER**AIO Drivers for VxWorks* RTOS**

AP Labs

Host Development Environments: UNIX.

Extensive set of device drivers for Wind River's VxWorks*, supporting VME and IP Module interfaces for: analog, digital, serial, IRIG, PCM telemetry, 1553, ARINC-429, NTDS, DR11W, GPIB, FDDI and SCSI. AP Labs AIO supports high performance asynchronous and synchronous I/O operations under VxWorks 5.2 and Tornado.

For more information, contact: Steve Gills, 619-546-8626. Email inquiries to: info@sd.aplabs.com. Visit AP Labs on the World Wide Web at: www.sd.aplabs.com.

OTHER TOOLS**CodeCheck 7.0 Analyzer**

Abraxas Software, Inc.

Host Development Environments: UNIX and Windows and MAC.

CodeCheck* Version 7.0 is a programmable tool for managing all C and C++ source code on a file or project basis. CodeCheck is input-compatible with all variants of K&R, ANSI C and C++. CodeCheck identifies code that will not port between MS DOS, OS/2, UNIX, VMS, WIN-95/NT, Macintosh, and porting to 64-bit machines. CodeCheck allows corporate coding and project specification standards to be completely automated for compliance validation. CodeCheck includes pre-written expert system Rule Files that can be applied to any C or C++ project for: POSIX, SVID, X3J11, Ellemtel, and ANSI C/C++ source code conformance validation.

For more information, contact: Tana Rae K., 503-244-5253. Email inquiries to: sales@abxsoft.com. Visit Abraxas Software, Inc. on the World Wide Web at: www.abxsoft.com.

CodeTEST* Software Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

CodeTEST software verification tools for embedded system developers and testers

* Trademark or registered trademark of its respective company or mark holder

SPARC/UltraSPARC

Sun Microelectronics, Fujitsu, TI, Temic

support most major 32- and 16-bit microprocessors and VME boards, and supplies tools for accurately analyzing embedded system performance, code coverage, dynamic memory allocation and memory errors, as well as a powerful software trace tool. A VME version is now available.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

CARDtools Application Simulation Tool

CARDtools Systems

Host Development Environments: UNIX & Windows.

CARDtools stands for Computer-Aided Real-time Design Tools, and the CARDtools design tool is dedicated to the design, evaluation, and simulation of embedded systems applications. An embedded system application consists of hardware devices interacting with a microprocessor, the microprocessor (CPU), a real-time operating system (RTOS), and the application program. CARDtools addresses all the aspects of embedded system application design and simulation.

For more information, contact: Dave Allenbaugh, 408-894-9500. Email inquiries to: info@cardtools.com. Visit CARDtools Systems on the World Wide Web at: <http://www.cardtools.com>.

Embedded EMPRESS Developer's Toolkit*

Empress Software, Inc.

Host Development Environments: UNIX & Windows.

This suite is an applications development toolkit for embedded systems developers. It features the reliable, highly scalable Empress RDBMS with its fast, compact database engine, JDBC/ODBC bridge, and support for diverse data types. The suite includes the Empress RDBMS, Empress Dynamic SQL, Empress ODBC Interface, and Empress Internet Applications Development Toolkit.

For more information, contact: Dick Naedel, 301-220-1919. Email inquiries to: sales@empress.com. Visit Empress Software, Inc. on the World Wide Web at: www.empress.com.

EMPRESS RDBMS

Empress Software, Inc.

Host Development Environments: UNIX and Windows.

EMPRESS RDBMS is a powerful application development environment offering excellent data manipulation options to the embedded systems developer. The RDBMS can store and retrieve any data type that can be digitized, such as x-rays, voice, fingerprints and maps. Date variables and microsecond time stamps make this database Year 2000 compliant.

For more information, contact: Dick Naedel, 301-220-1919. Email inquiries to: sales@empress.com. Visit Empress Software, Inc. on the World Wide Web at: www.empress.com.

Green Hills Instruction Set Simulator

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills Instruction Set Simulators allow programs for the target microprocessor to be executed on the PC or host workstation by simulating the execution of the target at the instruction level. A special interface exists to allow program control via a standard debugger. The simulators support most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Execution Profiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Execution Profiler provides a mechanism for looking at user code in many different ways in order to pinpoint hot spots. Reports show performance by procedure, source line, etc. Supports native and embedded profiling on most popular 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Program Builder

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Program Builder is a configuration management system for creating and man-

aging large programs. The MULTI builder replaces traditional make files with a modern point-and-click interface, greatly simplifying the configuration management task and eliminating the need for engineers dedicated to managing the build process. Supports native and embedded profiling on most popular 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Run-Time Error Checker

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Run-time Error Checker inserts code into user's executable to check for things like array out of bounds, value too large for variable, read of variable before initialization, and attempts to access unallocated memory. The error checker supports native and embedded profiling on most popular 32 and 64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Version Control System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Version Control system is very unobtrusive, with files being automatically checked out when the first change is made in the editor. Advanced features support program branches and the ability to find out who made the last change to selected lines. Supports native and embedded profiling on most popular 32/64-bit CPUs.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Logic Analyzers

Hewlett-Packard Company

Host Development Environments: N/A.

HP's digital design and debug tools help system developers solve tough hardware and software integration problems fast. The HP benchtop logic analyzers offer cost-effective 100 MHz state analysis plus five timing modes up to 500 MHz. The HP 16500 modular logic analysis systems provide the power and flexibility to handle demanding hardware and software problems.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or emulator.

Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabilities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: <http://www.tektronix.com>.

ARM/StrongARM

Advanced RISC Machines (DEC, Sharp, VLSI, GEC Plessey)

FULL FUNCTION RTOS

Bytebos* Multitasking Operating System

Bytebos Integrated Systems

Host Development Environments: UNIX and Windows.

Bytebos is a full-featured multitasking operating system designed for use in high-performance, real-time embedded computing applications. Bytebos is configured for use with all major C compilers and debuggers and is available for a variety of microprocessors, microcontrollers, and DSPs. Bytebos applications are portable with simple licensing. There are no royalties on executables, and source code is provided.

For more information, contact: Nick Andrews, 800-788-7288. Email inquiries to: andrews@bytebos.com. Visit Bytebos Integrated Systems on the World Wide Web at: www.bytebos.com.

* Trademark or registered trademark of its respective company or mark holder

ARM/StrongARM

Advanced RISC Machines (DEC, Sharp, VLSI, GEC Plessey)

CHORUS/JaZZ* Real-Time Operation System

Chorus Systems

Host Development Environments: N/A.

CHORUS/JaZZ* is a feature-rich, Java-enabled real-time operating system providing full Java functionality and compatibility within the context of an embedded real-time operating system. CHORUS/JaZZ provides a Java "virtual machine" personality, supporting the full range of Java extensions and services, including Hot Java and JavaViews. CHORUS/JaZZ allows developers to integrate "off-the-shelf" Java applications into distributed real-time embedded systems, resulting in a significant decrease in development costs and time. Not only is CHORUS/JaZZ one of the richest Java-enabled operating systems, it is also significantly faster than most Java implementations.

For more information, contact: Audrey Castine, 408-879-4145. Email inquiries to: info@chorus.com. Visit Chorus Systems on the World Wide Web at: www.chorus.com.

CMX-RTX* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-RTX RTOS provides more than 65 kernel services allowing control of tasks, events, messages, resources, semaphores, cyclic timers, queues, fixed memory blocks and UARTs. Interrupts are allowed to use some of the CMX functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. Very small ROM and RAM requirements for small-footprint applications. Several compiler vendors are supported. Source code is included, and there are no royalties.

The CMX-RTX RTOS supports an unusually large number of μ PU, μ CU, and DSP architectures from a large number of manufacturers, including: Advanced RISC Machines, Analog Devices, Hitachi, Intel, MIPS, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Sharp, Siemens, Texas Instruments, Toshiba, and Zilog.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

OSE* Real-Time Operating System

Enea OSE Systems AB

Host Development Environments: UNIX and Windows.

Enea's OSE is a message-based, real-time operating system and tool-set for embedded systems. OSE has special built-in capabilities for fault tolerance, safety critical applications, runtime configuration and distributed systems. OSE is the first RTOS to be certified to meet the software quality standard IEC 1508, safety integrity level 3.

For more information, contact: Bill McCombie, +468-638-5000 (Sweden). Email inquiries to: info.ose@enea.se. Visit Enea OSE Systems AB on the World Wide Web at: www.enea.se/ose.

Eonic Virtuoso* V.4 Real-Time Operation System

Eonic Systems, Inc.

Host Development Environments: UNIX, Windows and DOS.

Eonic Systems' Virtuoso* v.4 is a complete RTOS development environment for industry-leading DSPs and ASIC cores. The RTOS includes a System Generation Tool, Task-Level Debugger, Workload Monitor and other productivity tools. Virtuoso innovations include SoftStealth* technology, which automatically generates an application-specific real-time kernel with a minimum memory footprint, and the Virtual Single Processor (VSP) programming model to accelerate multi-processor development.

For more information, contact: Jan Borghs, +32 16 62 15 85. Email inquiries to: info@eonic.com. Visit Eonic Systems, Inc. on the World Wide Web at: http://www.eonic.com.

pSOSystem Real-Time Operating System

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pSOSystem is a modular, high-performance real-time operating system designed specifically for embedded microprocessors. The RTOS provides a complete multi-tasking environment based on open system standards, such as network file system support. pSOSystem is designed for performance, reliability, and ease-of-use on either custom or commercial hardware.

Soon available for SPARC processors.

For more information, contact: Sales, 408-542-1500. Email: N/A. Visit Integrated Systems, Inc. on the World Wide Web at: http://www.isi.com.

Microsoft Windows* CE O.S. Embedded Toolkit

Microsoft Corporation

Host Development Environments: Windows.

Microsoft's Windows CE Embedded Toolkit for Visual C++ 5.0 includes integrated development environment tools designed specifically for embedded development. The Windows CE platform is a 32-bit, preemptive, multitasking, multithreaded operating system designed from the ground up to support embedded systems. Use the embedded toolkit to choose components for building a customized version of the Windows CE operating system to meet the unique requirements of your hardware. The toolkit contains the RTOS, compiler, assembler, emulator, debugger, library and drivers.

For more information, contact: N/A. Email inquiries to: N/A. Visit Microsoft Corporation on the World Wide Web at: N/A.

VRTX* Real-Time Operating System

Microtec

Host Development Environments: UNIX and Windows.

An element of the Spectra* development system, the VRTX* RTOS is easily configured and includes a family of real-time kernels that gives developers complete freedom in making functionality, performance and size tradeoffs. VRTX has integrated STREAMS-based networking, I/O and file systems. VRTX is unique in offering a choice of three compatible real-time kernels: VRTXsa kernel, a high-performance, full-featured kernel based on a leading-edge architecture; VRTX32 kernel, which has logged more trouble-free hours than any other RTOS available and has been used in FAA-certified flight-critical applications; VRTXmc kernel, the first real-time kernel specifically designed for microcontrollers, featuring minimal RAM and ROM footprints.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

OS-9* Real-Time Operating System

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

Microware's OS-9 is an architecturally advanced, high-performance real-time operating system. The OS-9 RTOS provides priority-based, preemptive task scheduling, interrupt and exception-handling services, dynamic memory management, inter-process communications facilities, system calls for system control, and unsurpassed I/O support. The OS-9 RTOS is used in industrial, telecommunications, transport, instrumentation, aerospace and consumer applications. Extensions to the OS-9 RTOS are available for designers of set-top boxes, pagers, cell phones, NCs and PDAs.

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

Wireless OS-9* Real-Time Operating System

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

The Wireless OS-9* RTOS is an integrated system software and development tool package designed specifically for manufacturers of battery-powered, intelligent computing and communication devices. Each Wireless OS-9 software subsystem contains the OS-9 operating system, power management, SPF communications file manager, FasTrak* and MAUI* (Multimedia Application User Interface), and a set of drawing and animation APIs (application program interfaces).

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

Helios* Real-Time Operating System

Perihelion

Host Development Environments: UNIX and Windows.

Helios is a real-time operating system: having a multi-threaded, multi-tasking kernel. It has a small ROMable micro-kernel with additional modular system servers and libraries. UNIX source compatibility, including POSIX, BSD4.3, network support based on 4.4BSD TCP/IP. Shared C run-time libraries. Kernel source included.

For more information, contact: Julia Gadd, (44) 1749-344345. Email inquiries to: sales@perihelion.co.uk. Visit Perihelion on the World Wide Web at: www.perihelion.co.uk.

Super TASK! Real-Time Operating System

U S Software

Host Development Environments: Windows.

U S Software's SuperTask! is a mature, compact, fast, and user-configurable RTOS suite. SuperTask! supports more than 20 C/C++ compilers/tool chains, and source code is included with an ANSI standard C core

* Trademark or registered trademark of its respective company or mark holder

ARM/StrongARM

Advanced RISC Machines (DEC, Sharp, VLSI, GEC Plessey)

For more information, contact: Katrina Sumner, 503-641-8446 x 740. Email inquiries to: info@ussw.com. Visit U S Software on the World Wide Web at: www.ussw.com.

VxWorks* Real-Time Operating System

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Part of the Tornado* development environment, VxWorks is an industry-standard, scalable real-time operating system. It features the multitasking wind* kernel, the POSIX real-time extensions, intertask communications, full networking functionality, file system support and C++ support. Additional functionality is available through optional products from Wind River and a wide range of third-party partners.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

BASIC RTOS KERNEL

Nucleus* C++ RTOS Kernel

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus C++ is a version of the Nucleus PLUS kernel that provides an object-oriented interface to an application. Although the core of the product is the Nucleus PLUS kernel (thereby reinforcing its robustness), the interface has been completely redesigned with all of the standard C++ mechanisms including constructors, destructors, and the like. Tests indicate that the incorporation of these facilities has minimal impact on the code size and performance of the final application.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

Nucleus PLUS* Real-Time Operating System

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus PLUS is designed as a core component for an operating system environment. It is extensible and dynamic. Its modular design allows services to be easily produced by combining existing services. All of the Nucleus PLUS components (tasks, queues, semaphores, etc.) can be dynamically created and deleted. Each component has a control block defined by the user and placed anywhere in the available memory space of the target system. Nucleus PLUS is a real-time, pre-emptive, multitasking kernel designed for time-critical embedded applications. Approximately 95 percent of Nucleus PLUS is extremely portable and is currently available for use with most microprocessor families.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

CMX-TINY+* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-TINY+ RTOS provides more than 40 kernel services, thus allowing control of the following: tasks, events, messages, resources, semaphores, cyclic timers, and queues. Interrupts are allowed to use some CMX functions. The scheduler is based on true pre-emption. CMX-TINY+ RTOS features very fast context-switch times and very low interrupt-latency times. ROM and RAM requirements are very small. CMX offers support for several compiler vendors, with royalty-free source code included.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

CMX-TINY+* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-TINY+ RTOS provides more than 40 kernel services, allowing control of: tasks, events, messages, resources, semaphores, cyclic timers, queues. Interrupts are allowed to use some of the CMX-TINY+ functions. The scheduler is based on true pre-emption. Very fast context-switch times and very low interrupt-latency times are provided. The RTOS has very small ROM and RAM requirements, and supports several compiler vendors. Source code is included on a royalty-free basis.

The CMX-TINY+ RTOS supports an unusually large number of μ PU and μ CU architectures from the following manufacturers: Advanced RISC Machines, Hitachi, Intel,

Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Siemens, and Toshiba.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

RTXC* Real-Time Kernel

Embedded System Products, Inc.

Host Development Environments: UNIX and Windows.

Embedded System Products, Inc.'s RTX is a multitasking real-time embedded kernel written primarily in C and featuring a single API for all supported processors. RTX manages tasks and time, synchronizes with events, and permits transfer of data between tasks through 72 kernel services, including services for RAM management and exclusive access to an entity.

For more information, contact: Sales, 800-525-4302. Email inquiries to: sales@esphou.com. Visit Embedded System Products, Inc. on the World Wide Web at: www.esphou.com.

Precise/MQX* & MQX+m Real-Time Executive

Precise Software Technologies Inc.

Host Development Environments: .

Precise Software Technologies' Precise/MQX* is a portable high-performance, real-time executive. MQX is scalable from a single processor to distributed multiprocessor configurations. The real-time executive provides functions for multitasking, intertask communications and synchronization, dynamic interrupt management, and memory management. Optional protocols for networking and data communications are also available.

For more information, contact: Clarke Esler, 508-264-4413. Email inquiries to: info@psti.com. Visit Precise Software Technologies Inc. on the World Wide Web at: www.psti.com.

INTEGRATED DEVELOPMENT ENVIRONMENT

MULTI* Software Development Environment

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Software Development Environment provides a framework of interacting tools to support program development by small or large workgroups. MULTI includes all of the tools needed to support major programming projects, including a program builder, version control, program editor, debugger, execution profiler, run-time error checker, and source-code control.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

PRISM+ Integrated Development Environment

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pPRISM+ is a complete, integrated development environment (IDE) for designing and delivering embedded software applications. pPRISM+ combines the industry's optimal development tools with the pSOSystem, an industry-proven and reliable real-time operating system (RTOS). The pPRISM+ environment combines "Best-Of-Class" tools for developing, analyzing and testing embedded applications in one seamless environment, built with an open, extensible architecture to accommodate future needs.

Note: Soon available for SPARC microprocessors.

For more information, contact: Sales, 408-542-1500. Email: N/A. Visit Integrated Systems, Inc. on the World Wide Web at: http://www.isi.com.

Metrowerks' CodeWarrior*

Metrowerks Corporation

Host Development Environments: UNIX and Windows.

Metrowerks' CodeWarrior is transforming embedded system development by offering the most intuitive GUI development tools available under Windows* 96/NT operating systems at a fraction of the cost of traditional command-line tools. With CodeWarrior, the developer gets a complete suite of tools (IDE) to create, compile, link, debug, and assemble fast, optimized embedded system code.

For more information, contact: Jenny Page, 512-873-4740. Email inquiries to: sales@metrowerks.com. Visit Metrowerks Corporation on the World Wide Web at: http://www.metrowerks.com.

Microsoft Windows* CE O.S. Embedded Toolkit

Microsoft* Corporation

Host Development Environments: Windows.

Microsoft's Windows CE Embedded Toolkit for Visual C++ 5.0 includes integrated

* Trademark or registered trademark of its respective company or mark holder

ARM/StrongARM

Advanced RISC Machines (DEC, Sharp, VLSI, GEC Plessey)

development environment tools designed specifically for embedded development. The Windows CE platform is a 32-bit, preemptive, multitasking, multithreaded operating system designed from the ground up to support embedded systems. Use the embedded toolkit to choose components for building a customized version of the Windows CE operating system to meet the unique requirements of your hardware. The toolkit contains the RTOS, compiler, assembler, emulator, debugger, library and drivers.

For more information, contact: N/A. Email inquiries to: N/A. Visit Microsoft Corporation on the World Wide Web at: N/A.

Tornado* Integrated Development Environment

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Wind River Systems' Tornado is a complete software cross-development environment for embedded systems. Tornado is seamlessly integrated and includes powerful development tools and VxWorks*, a feature-rich, high performance and scalable real-time operating system. Completely open and customizable, the Tornado environment also facilitates the use of third-party and customer-developed tools to enhance its capabilities and meet unique customer requirements. Tornado has more than 90 software and hardware partners and is used by thousands of developers worldwide.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

COMPILER

PCYACC 7.0 Compiler/Language Development Toolkit

Abraxas Software, Inc.

Host Development Environments: All.

Abraxas Software's PYACC v. 7.0 is a complete language-development environment that generates C, C++, Java, Delphi, and VBS source code (from Input Language Description Grammars or ILDGs) for building assemblers, compilers, interpreters, browsers, PDLs, language translators, syntax-directed editors, language validators, natural language processors, expert-system shells, and query languages. Includes "drop in" language engines for SQL, dBASE, PostScript, HyperTalk, SmallTalk-80, C++, C, Pascal, ProLog, FORTRAN, COBOL, Basic, SGML, ASN, RPG, SNA, VBasic, VHDL, HTML, VMRL, Java, ODMG-ODL/OQL, Modula-S, Delphi, VBS and Ada. The toolkit includes portable object-oriented classes for Java and C++ and debugging tools, including runtime visual parser debugging, abstract syntax tree generation and code referencing.

For more information, contact: Tana Rae K., 503-244-5253. Email inquiries to: sales@abxsoft.com. Visit Abraxas Software, Inc. on the World Wide Web at: www.abxsoft.com.

EPI CC Compilers

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

EPI's Software Toolkits for the AM29K, ARM and MIPS microprocessors includes the CC Series compilers--CC29K, CC3K, CCA4K and CC-ARM. EPI has selected the compiler technology best suited for each of the RISC processor families. The compilers are designed specifically for embedded applications and provide features to allow optimum tradeoffs between code size and system performance. Developers can easily tailor code to their specific targets and applications. EPI's compilers are fully ANSI-compliant, have big and little Endian support, and have a wide choice of optimization levels.

EPI compilers for the MIPS and AM29K processors are also supported on DOS hosts.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

Green Hills Optimizing C Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills' high-performance optimizing C compilers, for native or embedded development, have many advanced optimizations, such as cross-module inlining. The compilers allow for the fine tuning of optimization strategy so users can generate optimal code. Supports 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at:

www.ghs.com.

Green Hills Optimizing C++ Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills offers high-performance optimizing C++ compilers for native or embedded development. The compilers are compatible with Green Hills Software's MULTI* debugger, which automatically handles C++ constructs such as name mangling and template debugging. The compilers support most 32-/64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing Embedded C++ Compiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills optimizing Embedded C++ compilers are high-performance and follow the Embedded C++ Technical Committee draft standard.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

High C/C++ Embedded ARM* Development Tool Set

MetaWare Incorporated

Host Development Environments: UNIX and Windows and SunOS 4.x, Solaris 1.x, HP-UX 9.1 and Windows 3.1/NT/95.

High C/C++ is a super-optimizing toolset for creating fast and compact executable code. The toolset includes a high-performance C/C++ compiler, linker-locator-archiver, assembler, profiler, and run-time libraries. High C/C++ includes several advanced optimization features designed for improved code size and speed, including branch prediction, which alone can yield performance gains of as much as 10%.

For more information, contact: MetaWare Technical Sales, 408-429-6382. Email inquiries to: techsales@metaware.com. Visit MetaWare Incorporated on the World Wide Web at: www.metaware.com.

Microtec* C and C++ Cross-Compilers

Microtec

Host Development Environments: UNIX and Windows.

Microtec's C and C++ compilers conform to the version of the C++ language that is defined in the Annotated C++ Reference Manual (ARM), including templates, exception handling, and nested classes. Because the C++ language continues to develop, Microtec is actively participating in the ANSI C++ standardization process. The company is committed to supporting both the ANSI C++ language and library standards with future product releases. The most significant new benefit is the addition of specialized linker optimizations that significantly reduce the size of modules when advanced C++ features, such as templates and in-line and virtual functions, are used. These optimizations allow developers to take advantage of the full power of object-oriented programming techniques in embedded systems without experiencing code bloat.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

ASSEMBLER

EPI AS Series Macro Assemblers

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

EPI's Macro Assemblers allow all original routines to be written in assembly code and integrated into a C or C++ program. The EPI Macro Assemblers have powerful macro facilities and are compliant with Approved Instruction Sets.

The EPI Macro Assembler for the R3000 is the AS3K; for the R4000 is the AS4K; for the AM29000 is the AS29K; and for the ARM is the AS-ARM. For the MIPS and AM29K processors, the assemblers are also supported on DOS hosts. The AS29K Macro Assembler also includes a Linker/Locator with Librarian and Utilities.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

Green Hills Cross Assembler Tool Chain

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills embedded tool chain includes a macro assembler, linker, librarian, run-

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ARM/StrongARM

Advanced RISC Machines (DEC, Sharp, VLSI, GEC Plessey)

time libraries, object formatters and other utilities useful for embedded development. Cross-assembler tool chains are available for most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

EMULATOR

EPI JEENI JTAG Emulator for ARM* μ PU Cores

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

JEENI is a JTAG emulator, is non-intrusive and uses no target resources. Instead it uses on-chip debug resources, high-speed download, interfaces to EPI debuggers, and is ideally suited for use with ASIC processor cores. Available for the ARM processor family, the emulators provide high-speed, non-intrusive connection between the target and the EPI debugger through an IEEE 1149.1 JTAG interface via the existing boundary scan pins. Using no target memory, these emulators do not require porting to the target system. All on-chip debug facilities are accessible by the debuggers and may be used to set hardware and software breakpoints, start, stop, single-step, read and write registers and memory, as well as for downloading code to RAM. JTAG Emulators are ideal for interfacing to the processor core when the core is embedded in a standard cell or gate array device.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

Orion/Advice* Emulator

Orion Instruments

Host Development Environments: UNIX and Windows.

The Orion/Advice is a high-performance, real-time emulation system. A sophisticated multi-level event-triggering system, combined with a non-intrusive trace buffer provide unmatched problem tracking. A point-and-click Windows* or UNIX* OS graphical user interface (GUI) provides true high-level-language (HLL) debug support. Profiling, performance analysis and code coverage complete the Orion/Advice emulation package.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

DEBUGGER

Nucleus* UDB Debugger

Accelerated Technology, Inc.

Host Development Environments: Windows.

Nucleus UDB is a powerful, Graphical User Interface-based source-level debugger for embedded applications. Its three component configurations include the debugger front end, host communications module, and target monitor. These components comprise a powerful and portable debugging environment. Since the front end is standard across all target CPU platforms, developers need learn only one debugging environment.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

EPI MON Series Symbolic Assembly-Level Debugger

Embedded Performance, Inc.

Host Development Environments: UNIX, Windows and DOS.

EPI's Symbolic Assembly-Level Debuggers are ideal for scripted automatic testing, great for low-level hardware and software debugging, support all EPI execution vehicles, have an extensible command language, provide Call Stack display, and are available for a variety of host computers. EPI's MON Debugger provides a common command-line interface to all the EPI execution environments. The MON debugger's rich feature set is accessed through an extensive command language that includes expression evaluation, aliases, command files with parameter passing and flow control, debugger local variables and conditional command execution. EPI's MON29K supports AMD's AM29000 μ PU family; the MON3K and MON4K support the MIPS R3000 and R4000 series processors; and the MON-ARM supports debugging of programs for the ARM μ PU family.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

EPI Target-Resident Debug Kernels

Embedded Performance, Inc.

Host Development Environments: UNIX, Windows and DOS.

EPI's Target-Resident Debug Kernels support download speeds of up to 115K Baud over standard serial interfaces; require less than 25K ROM for popular evaluation boards; full source-code availability; support interfaces to both EPI Debuggers (assembly and source-level). EPI's Target-Resident Debug Kernels implement the functions necessary to enable the EPI debuggers to communicate with the target. The kernels are supplied with sample source code for common UARTs and may be easily customized for target-to-host communication links.

Target-Resident Debug Kernels are the RSS-ARM for the ARM μ PU; the RSS3K/RSS4K for the MIPS R3000 and R4000 μ PU; and the RSS29K for the AM29K μ PU.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

EPI Windowing C/C++ Source-Level Debugger

Embedded Performance, Inc.

Host Development Environments: UNIX, Windows and DOS.

Windowing C/C++ Source-Level Debuggers feature a graphical multi-windowed user interface. EPI's debuggers have an intuitive set of graphical controls and highly integrated window relationships and interface to all EPI instruction-set simulators, target-resident debug kernels, and EPI emulators. Some of the many windows include Value Watch, Source, Memory, Global Registers, Local Registers, Call Stack, Profiler, Breakpoint Editing and Trace Data. Memory and Trace Data windows offer a wide selection of display modes including disassembled instructions with interleaved source. For many processors, the debugger accepts text commands for complex debugging and permits the use of debugging scripts. These debuggers support multiple hosts and all EPI execution vehicles; are mouse-driven with "point and click" operations; debug very large programs easily; are hyper-linked between windows; and support M/S Windows* (NT/95) OS, X-Terminal and Motif. WCDB is for AM29K processors; CADB is for ARM processors; and WCDB3K and WCDB4K are for MIPS R3000 and R4000 processors.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: http://www.episupport.com.

MULTI* Source-Level Debugger

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Source-level Debugger supports native or embedded debugging of most popular 32-/64-bit processors. The main debugger window shows source or interlaced source and assembly. A single click lets the user look at a variable or set a breakpoint. Small windows allow for the monitoring of specific variables, local variables, or the call stack.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

XRAY* Debugger

Microtec

Host Development Environments: UNIX and Windows.

The XRAY* Debugger provides an environment designed to accelerate the edit-compile-download-debug cycle for development of embedded applications. Microtec's XRAY debugger is a well-known tool that has served embedded software developers for more than 10 years. The most current version of the XRAY debugger offers advanced debug support of multitasking and multiprocessing applications. Multiple execution environments are available, including: instruction-set simulator; target-resident monitor; ICE and RTOS-aware. Along with the debugger, XRAY offers a suite of development tools, including a context-sensitive editor, an interface to most popular source-code management systems, build facilities, and source browsing. The XRAY debugger features an intuitive, standard Windows or Motif user interface.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

WindView* Debugger

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

WindView is a revolutionary diagnostic and analysis tool that provides detailed visibility into the dynamic operation of an embedded system. The developer using the WindView visual debugger can quickly and easily visualize the complicated interaction among tasks, interrupt service routines, and system objects in an application. This

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ARM/StrongARM

Advanced RISC Machines (DEC, Sharp, VLSI, GEC Plessey)

information is presented and can be manipulated through a state-of-the-art graphical user interface (GUI).

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

OTHER TOOLS

CodeCheck 7.0 Analyzer

Abraxas Software, Inc.

Host Development Environments: UNIX and Windows and MAC.

CodeCheck* Version 7.0 is a programmable tool for managing all C and C++ source code on a file or project basis. CodeCheck is input-compatible with all variants of K&R, ANSI C and C++. CodeCheck identifies code that will not port between MS DOS, OS/2, UNIX, VMS, WIN-95/NT, Macintosh, and porting to 64-bit machines. CodeCheck allows corporate coding and project specification standards to be completely automated for compliance validation. CodeCheck includes pre-written expert system Rule Files that can be applied to any C or C++ project for: POSIX, SVID, X3J11, Ellementel, and ANSI C/C++ source code conformance validation.

For more information, contact: Tana Rae K., 503-244-5253. Email inquiries to: sales@abxsoft.com. Visit Abraxas Software, Inc. on the World Wide Web at: www.abxsoft.com.

Nucleus* FILE

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

To meet the needs of embedded developers requiring standard off-line storage, Accelerated Technology offers Nucleus FILE. It is an MS-DOS-compatible file system that requires only driver software on the target in order to store and retrieve data. Accelerated Technology also provides drivers for the standard PC-compatible floppy disk and IDE controllers. By combining these products with an application, a user is able to read and write standard PC fixed and floppy disks from an embedded system.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

CodeTEST* Software Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

CodeTEST software verification tools for embedded system developers and testers support most major 32- and 16-bit microprocessors and VME boards, and supplies tools for accurately analyzing embedded system performance, code coverage, dynamic memory allocation and memory errors, as well as a powerful software trace tool. A VME version is now available.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

CoreTAP* System-On-A-Chip Co-Development Platform

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

AMC's CoreTAP* provides a pre-silicon co-design, integration and test platform for system architects, lead engineers and software developers. CoreTAP accelerates system-on-a-chip (SOC) projects by providing an environment for designing, integrating and testing software and hardware before final design sign-off. This supports integration of real product software and commercial RTOSs with both real and virtual hardware.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

VSP-TAP*/Eaglei* Co-Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

Applied's VSP-TAP and the Eaglei co-verification environment from Viewlogic Systems provides software operation verification against a hardware description model (HDL). VSP-TAP adds enhanced real-time capabilities, connecting the simulated environment, the actual processor, and real-world data at real processor speeds, and supplying access to an emulator's full debugging capabilities.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

APIAccess* Middleware For Windows* OS

Award Software International, Inc.

Host Development Environments: Windows.

Award's APIAccess is the middleware needed to deploy Windows OS applications on embedded systems. Using APIAccess's Win32*-compatible libraries, Windows 32-bit source code can be ported and run natively on any supported combination of processor and RTOS. Embedded products can be designed, looking and acting just like a PC-based application.

For more information, contact: Bill Goodrich, 415-237-6895. Email inquiries to: sales@award.com. Visit Award Software International, Inc. on the World Wide Web at: www.award.com.

BSQUARE Integration

BSQUARE

Host Development Environments: Windows.

BSQUARE's Windows CE OEM Adaptation Kits (OAK*) provide OEMs the resources needed to adapt Windows CE to their respective products. Included with the kit are: support for processor, OEM adaptation layer, embedded drivers for processor devices, adaptation tools, and loader firmware for Windows CE.

For more information, contact: Ann Gorman, 425-519-5000. Email inquiries to: domb@bsquare.com. Visit BSQUARE on the World Wide Web at: www.bsquare.com.

Preprocessor for the HP Family of Logic Analyzers

Corelis

Host Development Environments: HP Logic Analyzer.

Corelis designs, develops and manufactures a family of preprocessors for use with Hewlett-Packard Company's family of logic analyzers. These preprocessors are designed to provide a convenient and easy means of connection between an HP logic analyzer and an embedded processor or data bus. Corelis preprocessors are supplied with inverse assembly software as well as screen configuration software that runs on the HP logic analyzer. Preprocessors are available for most MIPS architecture processors as well as most TI DSP processors. Also available are tools for Motorola DSPs, the PCI* bus and ISA bus, and various FPGAs.

For more information, contact: Mike Winters, 562-926-6726. Email inquiries to: mikew@corelis.com. Visit Corelis on the World Wide Web at: www.corelis.com.

EPI CCE-ARM Software Toolkit for ARM* μ PUs

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

EPI's Software Toolkit for the ARM microprocessor includes the following:

CC-ARM	C Compiler
AS-ARM	Macro Assembler
LD-ARM	Linker/Locator, Librarian and Utilities
MON-ARM	Symbolic Debugger
CADB	C/C++ Source-Level Debugger
ISS-ARM	Instruction Set Simulator
RSS-ARM	Target-Resident Debug Kernel

Note: The above-listed products are also sold individually by Embedded Performance, Inc.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: <http://www.episupport.com>.

EPI CLAS Series Configurable Logic Analyzers

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

There are two models in EPI's CLAS Series Configurable Logic Analyzers (Biomation derivatives) allowing for a choice of memory sizes. The analyzers have a state clock with speeds to 100MHz, with 5.0 ns timing resolution; configurable from 96 to 384 channels; a memory depth of up to 12 million samples; up to four independent analyzers per chassis; and Sun or Macintosh host software. Formerly Biomation products, the EPI enhanced Configurable Logic Analysis Systems (CLAS) are extremely easy to use and flexible, ideal for complex applications having multiple processors, high-speed logic, or complex, high-pin-count ASICs. A high-performance trace control allows complex triggering and capture sequences to be set up and changed easily with a mouse interface. Microprocessor Analysis Packages available include interconnections, set-up programs, and disassemblers for most popular μ PUs. In addition to MAPs for RISC μ PUs (SPARC, SPARClite, Intel i960, PowerPC, MIPS, AMD 29K), MAPs are also available for

* Trademark or registered trademark of its respective company or mark holder

ARM/StrongARM

Advanced RISC Machines (DEC, Sharp, VLSI, GEC Plessey)

many CISC μ PIs, including a wide selection of Motorola and Intel devices. The two analyzer models offer excellent price/performance value.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: <http://www.episupport.com>.

EPI Instruction Set Simulators

Embedded Performance, Inc.

Host Development Environments: UNIX, Windows and DOS.

Instruction Set Simulators are up to 30 times faster than traditional Architectural Simulators, provide access to host resources, are available on a variety of host computers, and interfaces to both EPI debuggers (assembly and source level). The EPI Instruction Set Simulator simulates only those functions of the processors that are visible to the software. This optimization makes it many times faster than an architectural simulator. The result is a tool that can be used to execute and debug large programs before the target system is available. The EPI Instruction Set Simulators are the ISS29K for the AM29K, ISS-ARM for the ARM, and ISS-MIPS for the MIPS processors.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: <http://www.episupport.com>.

EPI Locating Linkers

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

The heart of an embedded tool chain is the linker, and for maximum developer productivity, the linker must be fast, powerful, flexible, and controllable. EPI's Locating Linker is all of these with its efficient use of host resources allowing it to link extremely large programs, even on hosts with limited memory. In addition, the Linker provides type compression, thus eliminating redundant type information from the symbol table and reducing file sizes by up to 90%. Additional features include linker-generated symbols for the start, end and length of each section, as linked, for programs that must manipulate the contents of a section directly; incremental linking; and automatic rescan of libraries. MIPS processor Linkers are the LD3K and LD4K, and the LD-ARM is for the ARM processor. All Linkers are supported on UNIX and Windows hosts, and MIPS Linkers are supported on DOS hosts as well.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: <http://www.episupport.com>.

Green Hills Instruction Set Simulator

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills Instruction Set Simulators allow programs for the target microprocessor to be executed on the PC or host workstation by simulating the execution of the target at the instruction level. A special interface exists to allow program control via a standard debugger. The simulators support most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Execution Profiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Execution Profiler provides a mechanism for looking at user code in many different ways in order to pinpoint hot spots. Reports show performance by procedure, source line, etc. Supports native and embedded profiling on most popular 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Program Builder

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Program Builder is a configuration management system for creating and managing large programs. The MULTI builder replaces traditional make files with a modern point-and-click interface, greatly simplifying the configuration management task and eliminating the need for engineers dedicated to managing the build process. Supports native and embedded profiling on most popular 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Run-Time Error Checker

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Run-time Error Checker inserts code into user's executable to check for things like array out of bounds, value too large for variable, read of variable before initialization, and attempts to access unallocated memory. The error checker supports native and embedded profiling on most popular 32 and 64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Version Control System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Version Control system is very unobtrusive, with files being automatically checked out when the first change is made in the editor. Advanced features support program branches and the ability to find out who made the last change to selected lines. Supports native and embedded profiling on most popular 32/64-bit CPUs.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Logic Analyzers

Hewlett-Packard Company

Host Development Environments: N/A.

HP's digital design and debug tools help system developers solve tough hardware and software integration problems fast. The HP benchtop logic analyzers offer cost-effective 100 MHz state analysis plus five timing modes up to 500 MHz. The HP 16500 modular logic analysis systems provide the power and flexibility to handle demanding hardware and software problems.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or emulator.

SuperH RISC (SH)

Hitachi Semiconductor (SGS-T)

FULL FUNCTION RTOS

Bytebos* Multitasking Operating System

Bytebos Integrated Systems

Host Development Environments: UNIX and Windows.

Bytebos is a full-featured multitasking operating system designed for use in high-performance, real-time embedded computing applications. Bytebos is configured for use with all major C compilers and debuggers and is available for a variety of microprocessors, microcontrollers, and DSPs. Bytebos applications are portable with simple licensing. There are no royalties on executables, and source code is provided.

For more information, contact: Nick Andrews, 800-788-7288. Email inquiries to: andrews@bytebos.com. Visit Bytebos Integrated Systems on the World Wide Web at: www.bytebos.com.

CMX-RTX* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-RTX RTOS provides more than 65 kernel services allowing control of tasks, events, messages, resources, semaphores, cyclic timers, queues, fixed memory blocks and UARTs. Interrupts are allowed to use some of the CMX functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. Very small ROM and RAM requirements for small-footprint applications. Several compiler vendors are supported. Source code is included, and there are no royalties.

The CMX-RTX RTOS supports an unusually large number of μ PU, μ CU, and DSP architectures from a large number of manufacturers, including: Advanced RISC Machines, Analog Devices, Hitachi, Intel, MIPS, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Sharp, Siemens, Texas Instruments, Toshiba, and Zilog.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

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SuperH RISC (SH) Hitachi Semiconductor (SGS-T)

Eonic Virtuoso* V.4 Real-Time Operation System

Eonic Systems, Inc.

Host Development Environments: UNIX, Windows and DOS.

Eonic Systems' Virtuoso* v.4 is a complete RTOS development environment for industry-leading DSPs and ASIC cores. The RTOS includes a System Generation Tool, Task-Level Debugger, Workload Monitor and other productivity tools. Virtuoso innovations include SoftStealth* technology, which automatically generates an application-specific real-time kernel with a minimum memory footprint, and the Virtual Single Processor (VSP) programming model to accelerate multi-processor development.

For more information, contact: Jan Borghs, +32 16 62 15 85. Email inquiries to: info@eonic.com. Visit Eonic Systems, Inc. on the World Wide Web at: <http://www.eonic.com>.

INTEGRITY* Real-Time Operating System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The INTEGRITY RTOS, which provides a memory-protected superset of the facilities offered in Green Hills Software's vELOCITY* Real-Time Operating System, targets mission-critical, real-time applications that emphasize reliability, security and testability. The INTEGRITY RTOS is available on a royalty-free basis: users pay only for the host-based software development environment. Run-time licenses for the target system are free.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Microsoft Windows* CE O.S. Embedded Toolkit

Microsoft* Corporation

Host Development Environments: Windows.

Microsoft's Windows CE Embedded Toolkit for Visual C++ 5.0 includes integrated development environment tools designed specifically for embedded development. The Windows CE platform is a 32-bit, preemptive, multitasking, multithreaded operating system designed from the ground up to support embedded systems. Use the embedded toolkit to choose components for building a customized version of the Windows CE operating system to meet the unique requirements of your hardware. The toolkit contains the RTOS, compiler, assembler, emulator, debugger, library and drivers.

For more information, contact: N/A. Email inquiries to: N/A. Visit Microsoft* Corporation on the World Wide Web at: N/A.

OS-9* Real-Time Operating System

Microware Systems Corp.

Host Development Environments: UNIX and Windows.

Microware's OS-9 is an architecturally advanced, high-performance real-time operating system. The OS-9 RTOS provides priority-based, preemptive task scheduling, interrupt and exception-handling services, dynamic memory management, inter-process communications facilities, system calls for system control, and unsurpassed I/O support. The OS-9 RTOS is used in industrial, telecommunications, transport, instrumentation, aerospace and consumer applications. Extensions to the OS-9 RTOS are available for designers of set-top boxes, pagers, cell phones, NCs and PDAs.

For more information, contact: NA Sales, 800-475-9000. Email inquiries to: info@microware.com. Visit Microware Systems Corp. on the World Wide Web at: www.microware.com.

SPOX* RTOS and Software Development Kit (SDK)

Spectron Microsystems

Host Development Environments: UNIX and Windows.

Spectron Microsystems' SPOX SDK provides a complete software development environment for digital signal processing (DSP) developers. At the core is SPOX-KNL, a deterministic real-time, multi-tasking operating system designed specifically for DSP architectures. Also included are math libraries, host connectivity to DSP subsystems and extensions to the capabilities of C source code debuggers.

For more information, contact: Shirley Hance, 805-968-5100. Email inquiries to: info@spectron.com. Visit Spectron Microsystems on the World Wide Web at: www.spectron.com.

VxWorks* Real-Time Operating System

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Part of the Tomado* development environment, VxWorks is an industry-standard, scalable real-time operating system. It features the multitasking wind* kernel, the POSIX

real-time extensions, intertask communications, full networking functionality, file system support and C++ support. Additional functionality is available through optional products from Wind River and a wide range of third-party partners.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

BASIC RTOS KERNEL

Nucleus* C++ RTOS Kernel

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus C++ is a version of the Nucleus PLUS kernel that provides an object-oriented interface to an application. Although the core of the product is the Nucleus PLUS kernel (thereby reinforcing its robustness), the interface has been completely redesigned with all of the standard C++ mechanisms including constructors, destructors, and the like. Tests indicate that the incorporation of these facilities has minimal impact on the code size and performance of the final application.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

Nucleus PLUS* Real-Time Operating System

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus PLUS is designed as a core component for an operating system environment. It is extensible and dynamic. Its modular design allows services to be easily produced by combining existing services. All of the Nucleus PLUS components (tasks, queues, semaphores, etc.) can be dynamically created and deleted. Each component has a control block defined by the user and placed anywhere in the available memory space of the target system. Nucleus PLUS is a real-time, pre-emptive, multitasking kernel designed for time-critical embedded applications. Approximately 95 percent of Nucleus PLUS is extremely portable and is currently available for use with most microprocessor families.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

Precise/MQX* & MQX+m Real-Time Executive

Precise Software Technologies Inc.

Host Development Environments: .

Precise Software Technologies' Precise/MQX* is a portable high-performance, real-time executive. MQX is scalable from a single processor to distributed multiprocessor configurations. The real-time executive provides functions for multitasking, intertask communications and synchronization, dynamic interrupt management, and memory management. Optional protocols for networking and data communications are also available.

For more information, contact: Clarke Esler, 508-264-4413. Email inquiries to: info@psti.com. Visit Precise Software Technologies Inc. on the World Wide Web at: www.psti.com.

INTEGRATED DEVELOPMENT ENVIRONMENT

MULTI* Software Development Environment

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Software Development Environment provides a framework of interacting tools to support program development by small or large workgroups. MULTI includes all of the tools needed to support major programming projects, including a program builder, version control, program editor, debugger, execution profiler, run-time error checker, and source-code control.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Hypersignal Block Diagram System Design/Simulator

Hyperception, Inc.

Host Development Environments: Windows.

Block Diagram System Design/Simulator allows for comprehensive dynamic system design and simulation. It was developed for use in applications including DSP, communications, simulation, signal analysis, and general engineering modeling. Block

* Trademark or registered trademark of its respective company or mark holder

SuperH RISC (SH)

Hitachi Semiconductor (SGS-T)

Diagram comes standard with a large library of functions which run at executable speed rather than interpretive speed. Hyperception has made it easy to add user-defined functions to Block Diagram.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Hypersignal RIDE* Visual Design Environment

Hyperception, Inc.

Host Development Environments: Windows.

Hypersignal RIDE is a complete visual design environment for use in real-time systems development. It can be used for applications ranging from low-level DSP systems design and implementation to application-specific projects such as real-time instrumentation, data acquisition, control systems, and more. It provides complete control and observation of DSP designs.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

LSI DSP Software Development Environment

Loughborough Sound Images

Host Development Environments: UNIX, Windows and VxWorks.

LSI's DSP software development environment includes kernels, compilers, assemblers, debuggers, libraries and drivers. LSI produces and markets a wide range of software products used in conjunction with the company's various DSP boards for VME, ISA and PCI systems. This software ranges from simple operating system drivers/libraries (e.g. Windows* NT/95, Solaris, VxWorks*, etc.) to sophisticated IDE tools, kernels and libraries which run on the DSP devices.

For more information, contact: Krista Lewis, 978-263-2255. Email inquiries to: ussales@lsi-dsp-usa.com. Visit Loughborough Sound Images on the World Wide Web at: <http://www.lsi-dsp.com>.

Metrowerks' CodeWarrior*

Metrowerks Corporation

Host Development Environments: UNIX and Windows.

Metrowerks' CodeWarrior is transforming embedded system development by offering the most intuitive GUI development tools available under Windows* 96/NT operating systems at a fraction of the cost of traditional command-line tools. With CodeWarrior, the developer gets a complete suite of tools (IDE) to create, compile, link, debug, and assemble fast, optimized embedded system code.

For more information, contact: Jenny Page, 512-873-4740. Email inquiries to: sales@metrowerks.com. Visit Metrowerks Corporation on the World Wide Web at: <http://www.metrowerks.com>.

Microsoft Windows* CE O.S. Embedded Toolkit

Microsoft* Corporation

Host Development Environments: Windows.

Microsoft's Windows CE Embedded Toolkit for Visual C++ 5.0 includes integrated development environment tools designed specifically for embedded development. The Windows CE platform is a 32-bit, preemptive, multitasking, multithreaded operating system designed from the ground up to support embedded systems. Use the embedded toolkit to choose components for building a customized version of the Windows CE operating system to meet the unique requirements of your hardware. The toolkit contains the RTOS, compiler, assembler, emulator, debugger, library and drivers.

For more information, contact: N/A. Email inquiries to: N/A. Visit Microsoft* Corporation on the World Wide Web at: N/A.

Tornado* Integrated Development Environment

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Wind River Systems' Tornado is a complete software cross-development environment for embedded systems. Tornado is seamlessly integrated and includes powerful development tools and VxWorks*, a feature-rich, high performance and scalable real-time operating system. Completely open and customizable, the Tornado environment also facilitates the use of third-party and customer-developed tools to enhance its capabilities and meet unique customer requirements. Tornado has more than 90 software and hardware partners and is used by thousands of developers worldwide.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

COMPILER

PCYACC 7.0 Compiler/Language Development Toolkit

Abraxas Software, Inc.

Host Development Environments: All.

Abraxas Software's PYACC v. 7.0 is a complete language-development environment that generates C, C++, Java, Delphi, and VBS source code (from Input Language Description Grammars or ILDGs) for building assemblers, compilers, interpreters, browsers, PDLs, language translators, syntax-directed editors, language validators, natural language processors, expert-system shells, and query languages. Includes "drop in" language engines for SQL, dBASE, PostScript, HyperTalk, SmallTalk-80, C++, C, Pascal, ProLog, FORTRAN, COBOL, Basic, SGML, ASN, RPG, SNA, VBasic, VHDL, HTML, VMRL, Java, ODMG-ODL/OQL, Modula-S, Delphi, VBS and Ada. The toolkit includes portable object-oriented classes for Java and C++ and debugging tools, including runtime visual parser debugging, abstract syntax tree generation and code referencing.

For more information, contact: Tana Rae K., 503-242-5523. Email inquiries to: sales@abxsoft.com. Visit Abraxas Software, Inc. on the World Wide Web at: www.abxsoft.com.

Green Hills Optimizing C Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills' high-performance optimizing C compilers, for native or embedded development, have many advanced optimizations, such as cross-module inlining. The compilers allow for the fine tuning of optimization strategy so users can generate optimal code. Supports 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing C++ Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills offers high-performance optimizing C++ compilers for native or embedded development. The compilers are compatible with Green Hills Software's MULTI* debugger, which automatically handles C++ constructs such as name mangling and template debugging. The compilers support most 32-/64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing Embedded C++ Compiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills optimizing Embedded C++ compilers are high-performance and follow the Embedded C++ Technical Committee draft standard.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Hyperception RIDE Compiler

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's RIDE Compiler communicates with an installed board driver which links DSP COFF object files, downloads code, data, and parameters to the DSP memory, controls the execution, and monitors activity of the DSP. The application is linked in the same fashion as a dedicated DSP Compiler(Assembler)/Linker. There is no special real-time kernel or RTOS to increase complexity.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

ASSEMBLER

GNUPro* Toolkit

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit is a solution to the problem of delivering quality software to meet the increasingly tighter schedules required by today's marketplace.

* Trademark or registered trademark of its respective company or mark holder

SuperH RISC (SH)

Hitachi Semiconductor (SGS-T)

The highly optimized tool chain for a specific host-target combination drives competitive speed- and size-performance advantages into a developer's software without compromising either its portability or maintainability. The fully-featured debug tools and utilities significantly help to shorten the development, test, and validation cycles. Cygnus backs the GNU technology with a commitment to rapid and expert support. All GNUPro tool chains for native and embedded programming are bundled with mission-critical support services and guaranteed technical response times.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

Green Hills Cross Assembler Tool Chain

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills embedded tool chain includes a macro assembler, linker, librarian, run-time libraries, object formatters and other utilities useful for embedded development. Cross-assembler tool chains are available for most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

EMULATOR

HP 64700 Series In-Circuit Emulators

Hewlett-Packard Company

Host Development Environments: UNIX and Windows.

The HP 64700 series development tools compose a comprehensive embedded development, debugging and analysis environment that continues to evolve and expand to meet the increasing demands of the software designer. Integrated under a common user interface and operating environment, these tools create an embedded design system that accelerates the development process.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or /emulator.

Orion/Advice* Emulator

Orion Instruments

Host Development Environments: UNIX and Windows.

The Orion/Advice is a high-performance, real-time emulation system. A sophisticated multi-level event-triggering system, combined with a non-intrusive trace buffer provide unmatched problem tracking. A point-and-click Windows* or UNIX* OS graphical user interface (GUI) provides true high-level-language (HLL) debug support. Profiling, performance analysis and code coverage complete the Orion/Advice emulation package.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

DEBUGGER

3L Debugger Support Kit

3L Ltd.

Host Development Environments: UNIX, Windows and DOS.

The 3L Debugger Support Kit acts as a bridge that allows the debugging of 3L Parallel C code using standard JTAG emulators for the TMS320C4x, including GO DSP's Code Composer.

For more information, contact: Alan Culloch, adc@threeL.co.uk. Email inquiries to: threeL@threeL.co.uk. Visit 3L Ltd. on the World Wide Web at: www.threeL.co.uk.

Nucleus* UDB Debugger

Accelerated Technology, Inc.

Host Development Environments: Windows.

Nucleus UDB is a powerful, Graphical User Interface-based source-level debugger for embedded applications. Its three component configurations include the debugger front end, host communications module, and target monitor. These components comprise a powerful and portable debugging environment. Since the front end is standard across all target CPU platforms, developers need learn only one debugging environment.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

GNUPro* Toolkit Debugger Suite

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit debugger suite is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The fully-featured debug tools and utilities significantly help to shorten the development, test and validation cycles. Cygnus provides mission-critical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

MULTI* Source-Level Debugger

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Source-level Debugger supports native or embedded debugging of most popular 32-/64-bit processors. The main debugger window shows source or interlaced source and assembly. A single click lets the user look at a variable or set a breakpoint. Small windows allow for the monitoring of specific variables, local variables, or the call stack.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

WindView* Debugger

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

WindView is a revolutionary diagnostic and analysis tool that provides detailed visibility into the dynamic operation of an embedded system. The developer using the WindView visual debugger can quickly and easily visualize the complicated interaction among tasks, interrupt service routines, and system objects in an application. This information is presented and can be manipulated through a state-of-the-art graphical user interface (GUI).

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

LIBRARY

3L DSP Library For DSPs

3L Ltd.

Host Development Environments: UNIX, Windows and DOS.

The 3L DSP Library performs a wide range of digital signal processing operations on real and complex data (data generation, windowing, convolution, correlation, filter design, transforms, spectral analysis, vector manipulation).

For more information, contact: Alan Culloch, adc@threeL.co.uk. Email inquiries to: threeL@threeL.co.uk. Visit 3L Ltd. on the World Wide Web at: www.threeL.co.uk.

Windows Server Library

3L Ltd.

Host Development Environments: Windows.

The Windows DLL allows for the easy integration of DSP target code with user-interface code written in Visual C++. Simple "cookbook-style" documentation is easy to understand. Sixteen and 32-bit versions available.

For more information, contact: Alan Culloch, adc@threeL.co.uk. Email inquiries to: threeL@threeL.co.uk. Visit 3L Ltd. on the World Wide Web at: www.threeL.co.uk.

Digital Image-Processing Library

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's image library contains more than 50 commonly used, dedicated image-processing functions to support image processing research and development applications. Color and monochrome processing, matrix functions, and conversion routines for one- and two-dimensional data are all included. It is simple to add user-specific functions to the library, thereby extending the environment to include custom image applications.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

* Trademark or registered trademark of its respective company or mark holder

SuperH RISC (SH)

Hitachi Semiconductor (SGS-T)

Hyperception Advanced Speech Library

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's Advanced Speech Library contains speech-related simulation blocks for speech processing research and development. Detailed analysis and comparison of speech processing waveforms can be performed easily. Encoding/decoding, LPC filtering, and analysis are included. An open architecture lets the user create custom or proprietary speech algorithms to achieve a specialized design.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Hyperception Advanced Transmission Library

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception Advanced Transmission Library is a complete set of design and analysis blocks for radio, wireline, and fiber transmission systems. Baseband and carrier transmission systems can be modeled with a variety of line codes and modulation formats. Carrier-recovery and clock-recovery models are included. Filter design facilities enable modeling of transmission links for the design/testing of various equalizers. Performance measures include Bit Error Rate simulations, BER calculations, eye patterns, and jitter analysis.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

DRIVER

Datalight's FlashFX Flash File System

Datalight*

Host Development Environments: Windows and DOS.

Datalight's FlashFX, a full-featured flash file system, makes flash memory appear to be a disk. It includes true wear-leveling, scheduled garbage collection, and uses only 12K ROM and 7K RAM. There is no faster flash file system on the market. FlashFX is portable to any operating system and any processor (CPU). FlashFX may also be categorized as a BIOS extension.

For more information, contact: Tim Gillman, 360-435-8086 x 115. Email inquiries to: sales@datalight.com. Visit Datalight* on the World Wide Web at: http://www.datalight.com.

OTHER TOOLS

CodeCheck 7.0 Analyzer

Abraxas Software, Inc.

Host Development Environments: UNIX and Windows and MAC.

CodeCheck* Version 7.0 is a programmable tool for managing all C and C++ source code on a file or project basis. CodeCheck is input-compatible with all variants of K&R, ANSI C and C++. CodeCheck identifies code that will not port between MS DOS, OS/2, UNIX, VMS, WIN-95/NT, Macintosh, and porting to 64-bit machines. CodeCheck allows corporate coding and project specification standards to be completely automated for compliance validation. CodeCheck includes pre-written expert system Rule Files that can be applied to any C or C++ project for: POSIX, SVID, X3J11, Eltemtel, and ANSI C/C++ source code conformance validation.

For more information, contact: Tana Rae K., 503-244-5253. Email inquiries to: sales@abxsoft.com. Visit Abraxas Software, Inc. on the World Wide Web at: www.abxsoft.com.

Green Hills Instruction Set Simulator

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills Instruction Set Simulators allow programs for the target microprocessor to be executed on the PC or host workstation by simulating the execution of the target at the instruction level. A special interface exists to allow program control via a standard debugger. The simulators support most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Execution Profiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Execution Profiler provides a mechanism for looking at user code in many different ways in order to pinpoint hot spots. Reports show performance by procedure, source line, etc. Supports native and embedded profiling on most popular 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Program Builder

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Program Builder is a configuration management system for creating and managing large programs. The MULTI builder replaces traditional make files with a modern point-and-click interface, greatly simplifying the configuration management task and eliminating the need for engineers dedicated to managing the build process. Supports native and embedded profiling on most popular 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Run-Time Error Checker

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Run-time Error Checker inserts code into user's executable to check for things like array out of bounds, value too large for variable, read of variable before initialization, and attempts to access unallocated memory. The error checker supports native and embedded profiling on most popular 32 and 64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Version Control System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Version Control system is very unobtrusive, with files being automatically checked out when the first change is made in the editor. Advanced features support program branches and the ability to find out who made the last change to selected lines. Supports native and embedded profiling on most popular 32/64-bit CPUs.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Logic Analyzers

Hewlett-Packard Company

Host Development Environments: N/A.

HP's digital design and debug tools help system developers solve tough hardware and software integration problems fast. The HP benchtop logic analyzers offer cost-effective 100 MHz state analysis plus five timing modes up to 500 MHz. The HP 16500 modular logic analysis systems provide the power and flexibility to handle demanding hardware and software problems.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or /emulator.

Hyperception HSVI1000 Function Generator

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's HSVI1000 Function Generator and waveform synthesizer is a virtual instrument with standard functions, including sine, square, and triangle waveform generation for a broad range of test and measurement applications. Knobs, toggle switches, and pushbutton controls allow adjustment of frequency, amplitude and offset settings.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Hyperception HSVI2000 Time Domain Analyzer

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's HSVI2000 Time Domain Analyzer is a general-purpose digital oscillo

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SuperH RISC (SH)

Hitachi Semiconductor (SGS-T)

scope that provides the same user controls and displays as conventional oscilloscopes. The RMS level is displayed for quick energy estimates. Edge triggering, vertical control, and timebase range are selectable through control knobs. Remote test and measurement capability is built in.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Hyperception HSVI3000 Frequency Domain Analyzer

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's HSVI3000 Frequency Domain Analyzer has a realistic user interface. Controls allow frequency measurements to be displayed as 20 Log, 10 Log, or linear magnitude data. Toggle switches for the selection of peak frequency value and the corresponding magnitude value are provided for Peak Detection analysis. Window options include both Hamming and Rectangular Windows.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Hyperception HSVI4000 Dynamic Signal Analyzer

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's HSVI4000 Dynamic Signal Analyzer is a virtual instrument with real-time capability for quick and accurate signal analyses. Operation modes include FFT Analyzer, Frequency Band Analyzer, Phase Analysis, and Time Domain. The analyzer has an intuitive, photo-realistic front-panel display with convenient user-control knobs. The analyzer includes Internet Remote for remote test and measurement over the Internet or an internal network.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Hypersignal HAppl* Applications Interface

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's HAppl Applications Interface software allows visual simulations/real-time projects to be executed as stand-alone applications. User controls representing inputs and outputs are used to accomplish specific user I/O. Objects such as knobs, sliders, keypads, meters, and displays are typical user controls. Applications may use either real-time DSP/Acquisition boards or be based entirely on the PC.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

i960 RISC

Intel Corporation

FULL FUNCTION RTOS

pSOSystem Real-Time Operating System

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pSOSystem is a modular, high-performance real-time operating system designed specifically for embedded microprocessors. The RTOS provides a complete multi-tasking environment based on open system standards, such as network file system support. pSOSystem is designed for performance, reliability, and ease-of-use on either custom or commercial hardware.

Soon available for SPARC processors.

For more information, contact: Sales, 408-542-1500. Email: N/A. Visit Integrated Systems, Inc. on the World Wide Web at: http://www.isi.com.

AMX* Real-Time Multitasking Kernel

KADAK Products Ltd.

Host Development Environments: Windows and DOS.

KADAK's AMX Real-Time Operating System is a full-featured, fast, compact, ROMable kernel. AMX includes: preemptive, priority-based scheduler (optional time-slicing);

nested interrupts with priority ordering; mailbox, semaphore, resource, event, list, buffer and memory managers; the Configuration Builder Utility eases system construction. And for debugging, KADAK's KwikLook* fault finder exploits SDS's SingleStep* and SSI's VisualProbe* debuggers for fully AMX RTOS-aware debugging.

For more information, contact: Sales, 604-734-2796. Email inquiries to: amxsales@kadak.com. Visit KADAK Products Ltd. on the World Wide Web at: www.kadak.com.

VxWorks* Real-Time Operating System

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Part of the Tornado* development environment, VxWorks is an industry-standard, scalable real-time operating system. It features the multitasking wind* kernel, the POSIX real-time extensions, intertask communications, full networking functionality, file system support and C++ support. Additional functionality is available through optional products from Wind River and a wide range of third-party partners.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

BASIC RTOS KERNEL

Nucleus* C++ RTOS Kernel

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus C++ is a version of the Nucleus PLUS kernel that provides an object-oriented interface to an application. Although the core of the product is the Nucleus PLUS kernel (thereby reinforcing its robustness), the interface has been completely redesigned with all of the standard C++ mechanisms including constructors, destructors, and the like. Tests indicate that the incorporation of these facilities has minimal impact on the code size and performance of the final application.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

Nucleus PLUS* Real-Time Operating System

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus PLUS is designed as a core component for an operating system environment. It is extensible and dynamic. Its modular design allows services to be easily produced by combining existing services. All of the Nucleus PLUS components (tasks, queues, semaphores, etc.) can be dynamically created and deleted. Each component has a control block defined by the user and placed anywhere in the available memory space of the target system. Nucleus PLUS is a real-time, pre-emptive, multitasking kernel designed for time-critical embedded applications. Approximately 95 percent of Nucleus PLUS is extremely portable and is currently available for use with most microprocessor families.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

INTEGRATED DEVELOPMENT ENVIRONMENT

MULTI* Software Development Environment

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Software Development Environment provides a framework of interacting tools to support program development by small or large workgroups. MULTI includes all of the tools needed to support major programming projects, including a program builder, version control, program editor, debugger, execution profiler, run-time error checker, and source-code control.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

pRISM+ Integrated Development Environment

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pRISM+ is a complete, integrated development environment (IDE) for designing and delivering embedded software applications. pRISM+ combines the industry's optimal development tools with the pSOSystem, an industry-proven and reliable real-time

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Intel Corporation

operating system (RTOS). The pRISM+ environment combines "Best-Of-Class" tools for developing, analyzing and testing embedded applications in one seamless environment, built with an open, extensible architecture to accommodate future needs.

Note: Soon available for SPARC microprocessors.

For more information, contact: Sales, 408-542-1500. Email: N/A. Visit Integrated Systems, Inc. on the World Wide Web at: <http://www.isi.com>.

Tornado* Integrated Development Environment

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Wind River Systems' Tornado is a complete software cross-development environment for embedded systems. Tornado is seamlessly integrated and includes powerful development tools and VxWorks*, a feature-rich, high performance and scalable real-time operating system. Completely open and customizable, the Tornado environment also facilitates the use of third-party and customer-developed tools to enhance its capabilities and meet unique customer requirements. Tornado has more than 90 software and hardware partners and is used by thousands of developers worldwide.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

COMPILER

Archelon C for Intel i960* Processor

Archelon Inc.

Host Development Environments: UNIX, Windows and DOS.

Archelon C for the i960 processor includes everything needed to develop C language code for any member of the Intel i960 family of embedded systems RISC processors. The package includes a C compiler and library, both of which fully conform to the ANSI standard, along with a state-of-the-art instruction scheduler, an assembler, a linker, and an object librarian. The compiler is fast, reliable, and generates very good code. The scheduler, which can be used either by itself on arbitrary assembly code or on code generated by the compiler, has been observed to improve the execution rate of benchmark code by up to twenty percent.

For more information, contact: Preston Gurd, 519-746-7925. Email inquiries to: info@archelon.com. Visit Archelon Inc. on the World Wide Web at: www.archelon.com.

GNUPro* Toolkit Compiler Suite

Cygnus Solutions

Host Development Environments: .

Cygnus Solutions' GNUPro* Toolkit compiler suite (with assembler) is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The compiler delivers speed- and size-performance advantages over a wide range of microprocessor architectures. Cygnus provides mission-critical technical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

Green Hills Optimizing C Compilers

Greer Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills' high-performance optimizing C compilers, for native or embedded development, have many advanced optimizations, such as cross-module inlining. The compilers allow for the fine tuning of optimization strategy so users can generate optimal code. Supports 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing C++ Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills offers high-performance optimizing C++ compilers for native or embedded development. The compilers are compatible with Green Hills Software's MULTI* debugger, which automatically handles C++ constructs such as name mangling and template debugging. The compilers support most 32-/64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing Embedded C++ Compiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills optimizing Embedded C++ compilers are high-performance and follow the Embedded C++ Technical Committee draft standard.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing FORTRAN Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills Software offers optimizing FORTRAN compilers for native or embedded development. A compile-time option allows users to select from among the F77, VMS and DoD dialects of the FORTRAN language, with additional support for many extensions. The FORTRAN compilers support most 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

CTOOLSW95 Compiler

Intel Corporation

Host Development Environments: UNIX and Windows.

Intel's C compiler for its i960* processors, CTOOLS95, includes the following features: improved code generation for the i960 RP, Jx and Hx processor families; easy-to-use whole-program and profile-driven optimizations; efficient memory use with runtime decompression of compressed object code; debug of optimized code using the ELF object file format w/DWARF 2.0 symbolic debug records; conformance to the 80960 Tools Consortium's Application Binary Interface for enhanced interoperability; on-line HTML hypertext documentation; compatible w/GNU/960 R4.6 and CTOOLS960 R4.6; GUI interface to the gdb960 debugger for source-level debugging with point-and-click ease; conforms to ANSI Std X3.159-1989 and passes Plum Hall conformance and perennial tests; supports in-line Assembly code in C Source. For more on CTOOLS, go to <http://developer.intel.com> on the World Wide Web.

For more information, contact: Local Intel Sales Office or Distributor. Email inquiries to: N/A. Visit Intel Corporation on the World Wide Web at: www.intel.com.

Microtec* C and C++ Cross-Compilers

Microtec

Host Development Environments: UNIX and Windows.

Microtec's C and C++ compilers conform to the version of the C++ language that is defined in the Annotated C++ Reference Manual (ARM), including templates, exception handling, and nested classes. Because the C++ language continues to develop, Microtec is actively participating in the ANSI C++ standardization process. The company is committed to supporting both the ANSI C++ language and library standards with future product releases. The most significant new benefit is the addition of specialized linker optimizations that significantly reduce the size of modules when advanced C++ features, such as templates and in-line and virtual functions, are used. These optimizations allow developers to take advantage of the full power of object-oriented programming techniques in embedded systems without experiencing code bloat.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

ASSEMBLER

GNUPro* Toolkit

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit is a solution to the problem of delivering quality software to meet the increasingly tighter schedules required by today's marketplace. The highly optimized tool chain for a specific host-target combination drives competitive speed- and size-performance advantages into a developer's software without compromising either its portability or maintainability. The fully-featured debug tools and utilities significantly help to shorten the development, test, and validation cycles. Cygnus backs the GNU technology with a commitment to rapid and expert support. All GNUPro tool chains for native and embedded programming are bundled with mission-critical support services and guaranteed technical response times.

* Trademark or registered trademark of its respective company or mark holder

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For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

Green Hills Cross Assembler Tool Chain

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills embedded tool chain includes a macro assembler, linker, librarian, run-time libraries, object formatters and other utilities useful for embedded development. Cross-assembler tool chains are available for most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

EMULATOR

Emulation Tools for Embedded Development

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

Applied Microsystems offers a broad range of high-performance microprocessor emulators. Patented CodeTAP* low-cost emulators offer the capabilities most used by software engineers. CodeICE* emulators have advanced features for both hardware and software development. The award-winning new SuperTAP* compact emulator offers hardware and software development features in a palm-sized form factor.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

EMDT/960Rx, Hx In-Circuit Emulator

Corelis

Host Development Environments: Windows.

Corelis' EMDT/960RP is a powerful real-time emulator for the Intel i960* RP intelligent I/O processor. The EMDT/960RP is a member of Corelis' extensive line of IEEE-1149.1 boundary-scan (JTAG) test-access-port-based in-circuit emulators. The high-density Ball Grid Array (BGA) packaging used for i960 RP/Hx processors rules out the use of traditional bond-out chip-based in-circuit emulators that require physical access to the processor bus. The non-intrusive nature of the JTAG Test Access Port and the associated fast JTAG data transfer protocol, in combination with on-chip debug circuitry, create a powerful yet low-cost debug solution. The high clock speed of the JTAG interface enables fast downloading of user code to target RAM.

For more information, contact: Mike Winters, 562-926-6726. Email inquiries to: mikew@corelis.com. Visit Corelis on the World Wide Web at: www.corelis.com.

DEBUGGER

Nucleus* UDB Debugger

Accelerated Technology, Inc.

Host Development Environments: Windows.

Nucleus UDB is a powerful, Graphical User Interface-based source-level debugger for embedded applications. Its three component configurations include the debugger front end, host communications module, and target monitor. These components comprise a powerful and portable debugging environment. Since the front end is standard across all target CPU platforms, developers need learn only one debugging environment.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

MWX-ICE* Debugger

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

MWX-ICE is a full-featured C/C++ symbolic debugger tailored specifically for in-circuit emulation. It provides complete control of Applied Microsystems emulators and features a consistent interface across Sun4, HP 9000, and Windows PC platforms. The MWX-ICE debugger supports popular tool chains including those from Microtec, Cygnus-GNU, Green Hills, and SDS.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

GNUPro* Toolkit Debugger Suite

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit debugger suite is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The fully-featured debug tools and utilities significantly help to shorten the development, test and validation cycles. Cygnus provides mission-critical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

MULTI* Source-Level Debugger

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Source-level Debugger supports native or embedded debugging of most popular 32-/64-bit processors. The main debugger window shows source or interlaced source and assembly. A single click lets the user look at a variable or set a breakpoint. Small windows allow for the monitoring of specific variables, local variables, or the call stack.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MON960 Debug Monitor

Intel Corporation

Host Development Environments: UNIX and Windows.

Intel's MON960 Debug tool supports communication on the user's host via the PCI Bus, or a parallel or serial cable. Code is down-loaded via the PCI Bus, a parallel port or a serial port. MON960 Debug software runs on Cyclone Evaluation Boards, EP80960BB, PCI80960DP, and IQ80960Rx. The monitor tool requires only 64K ROM and 32K of system RAM. The MON960 is shipped with the complete source code and is easily ported to custom board designs. The debug monitor communicates with software debuggers like Intel's GDB960 and supports Big-Endian byte-ordering and flash memory down-loading. The tool also supports the Windows* 95 and Windows NT operating systems. For more on Intel's debugger, go to the company's <http://developer.intel.com> WWW URL.

For more information, contact: Local Intel Sales Office or Distributor. Email inquiries to: N/A. Visit Intel Corporation on the World Wide Web at: www.intel.com.

XRAY* Debugger

Microtec

Host Development Environments: UNIX and Windows.

The XRAY* Debugger provides an environment designed to accelerate the edit-compile-download-debug cycle for development of embedded applications. Microtec's XRAY debugger is a well-known tool that has served embedded software developers for more than 10 years. The most current version of the XRAY debugger offers advanced debug support of multitasking and multiprocessing applications. Multiple execution environments are available, including: instruction-set simulator; target-resident monitor; ICE and RTOS-aware. Along with the debugger, XRAY offers a suite of development tools, including a context-sensitive editor, an interface to most popular source-code management systems, build facilities, and source browsing. The XRAY debugger features an intuitive, standard Windows or Motif user interface.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

RTI ScopeProfile* Performance Analysis Tool/Debugger

Real-Time Innovations, Inc.

Host Development Environments: UNIX and Windows.

RTI's ScopeProfile is a dynamic execution profiler for Wind River Systems' VxWorks* RTOS. The profiler shows the developer exactly where the CPU cycles are being spent. Both cumulative (including all subroutines) and direct CPU usage of each routine are captured. The output can be plotted in real time with RTI's StethoScope Debugger. The profiler will help developers tune their time-critical systems for maximum performance.

For more information, contact: AI Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

RTI StethoScope* Debugger

Real-Time Innovations, Inc.

Host Development Environments: UNIX and Windows.

Real-Time Innovations' (RTI) StethoScope debugger is a graphical monitoring, perfor-

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mance analysis, and data collection tool for real-time applications. The developer can watch program variables evolve in real time; any value in memory can be monitored. Much like a software oscilloscope, StethoScope allows the developer to see what the application is doing. StethoScope may rapidly become the developer's most important debugging and analysis tool.

For more information, contact: Al Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

WindView* Debugger

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

WindView is a revolutionary diagnostic and analysis tool that provides detailed visibility into the dynamic operation of an embedded system. The developer using the WindView visual debugger can quickly and easily visualize the complicated interaction among tasks, interrupt service routines, and system objects in an application. This information is presented and can be manipulated through a state-of-the-art graphical user interface (GUI).

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

OTHER TOOLS

Nucleus* FILE

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

To meet the needs of embedded developers requiring standard off-line storage, Accelerated Technology offers Nucleus FILE. It is an MS-DOS-compatible file system that requires only driver software on the target in order to store and retrieve data. Accelerated Technology also provides drivers for the standard PC-compatible floppy disk and IDE controllers. By combining these products with an application, a user is able to read and write standard PC fixed and floppy disks from an embedded system.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

Nucleus JVi For Nucleus* RTOS

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus JVi is a port of Sun Microsystems' Java* Virtual Machine to the Nucleus PLUS operating system. It provides embedded devices with the capability of loading and executing standard Java code, while coexisting with the present applications in a seamless manner.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

CodeTEST* Software Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

CodeTEST software verification tools for embedded system developers and testers support most major 32- and 16-bit microprocessors and VME boards, and supplies tools for accurately analyzing embedded system performance, code coverage, dynamic memory allocation and memory errors, as well as a powerful software trace tool. A VME version is now available.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

VSP-TAP*/Eaglei* Co-Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

Applied's VSP-TAP and the Eaglei co-verification environment from Viewlogic Systems provides software operation verification against a hardware description model (HDL). VSP-TAP adds enhanced real-time capabilities, connecting the simulated environment, the actual processor, and real-world data at real processor speeds, and supplying access to an emulator's full debugging capabilities.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

Validator* Verification Tools

B-Tree Systems, Inc.

Host Development Environments: Windows.

B-Tree's Validator and ValidatorGold Test Tools are fully automated test environments that enable the functional verification of embedded systems by providing real-time stimulation, non-intrusive monitoring, data visualization, automated test execution and logging of test results. B-Tree's Validator 2000 enables Year 2000 (Y2K) compliance testing for embedded and non-embedded systems. B-Tree's Validator SC product automates software compatibility testing for PCs and PC components.

For more information, contact: Laura Dominik, 612-936-7887. Email inquiries to: Info@btree.com. Visit B-Tree Systems, Inc. on the World Wide Web at: www.btree.com.

CARDtools Application Simulation Tool

CARDtools Systems

Host Development Environments: UNIX & Windows.

CARDtools stands for Computer-Aided Real-time Design Tools, and the CARDtools design tool is dedicated to the design, evaluation, and simulation of embedded systems applications. An embedded system application consists of hardware devices interacting with a microprocessor, the microprocessor (CPU), a real-time operating system (RTOS), and the application program. CARDtools addresses all the aspects of embedded system application design and simulation.

For more information, contact: Dave Allenbaugh, 408-894-9500. Email inquiries to: info@cardtools.com. Visit CARDtools Systems on the World Wide Web at: http://www.cardtools.com.

Preprocessor for the HP Family of Logic Analyzers

Corelis

Host Development Environments: HP Logic Analyzer.

Corelis designs, develops and manufactures a family of preprocessors for use with Hewlett-Packard Company's family of logic analyzers. These preprocessors are designed to provide a convenient and easy means of connection between an HP logic analyzer and an embedded processor or data bus. Corelis preprocessors are supplied with inverse assembly software as well as screen configuration software that runs on the HP logic analyzer. Preprocessors are available for most MIPS architecture processors as well as most TI DSP processors. Also available are tools for Motorola DSPs, the PCI* bus and ISA bus, and various FPGAs.

For more information, contact: Mike Winters, 562-926-6726. Email inquiries to: mikew@corelis.com. Visit Corelis on the World Wide Web at: www.corelis.com.

Green Hills Instruction Set Simulator

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills Instruction Set Simulators allow programs for the target microprocessor to be executed on the PC or host workstation by simulating the execution of the target at the instruction level. A special interface exists to allow program control via a standard debugger. The simulators support most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Execution Profiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Execution Profiler provides a mechanism for looking at user code in many different ways in order to pinpoint hot spots. Reports show performance by procedure, source line, etc. Supports native and embedded profiling on most popular 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Program Builder

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Program Builder is a configuration management system for creating and managing large programs. The MULTI builder replaces traditional make files with a modern point-and-click interface, greatly simplifying the configuration management task and eliminating the need for engineers dedicated to managing the build process. Supports native and embedded profiling on most popular 32-/64-bit processors.

* Trademark or registered trademark of its respective company or mark holder

i960 RISC

Intel Corporation

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Run-Time Error Checker

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Run-time Error Checker inserts code into user's executable to check for things like array out of bounds, value too large for variable, read of variable before initialization, and attempts to access unallocated memory. The error checker supports native and embedded profiling on most popular 32 and 64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Version Control System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Version Control system is very unobtrusive, with files being automatically checked out when the first change is made in the editor. Advanced features support program branches and the ability to find out who made the last change to selected lines. Supports native and embedded profiling on most popular 32/64-bit CPUs.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Logic Analyzers

Hewlett-Packard Company

Host Development Environments: N/A.

HP's digital design and debug tools help system developers solve tough hardware and software integration problems fast. The HP benchtop logic analyzers offer cost-effective 100 MHz state analysis plus five timing modes up to 500 MHz. The HP 16500 modular logic analysis systems provide the power and flexibility to handle demanding hardware and software problems.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or /emulator.

Intel i960* Processor Web-Based Remote Eval. Facility

Intel Corporation

Host Development Environments: N/A.

The new i960* processor Remote Evaluation Facility (REF) provides developers with an on-line facility that utilizes an easy-to-use Web interface for evaluating code prior to purchasing Intel evaluation boards and tools. Key features: Supports C language; Compilation of source files using the Intel i960 processor CTOOLS Development Suite; Ability to run programs on the following i960 processors: CA, CF, HA, HD, JA, JD, JF, KA, KB, SA, SB; Three different levels of optimization available for compiling code; Private accounts for storing files; Easy-to-use Timers; Example projects; Links to on-line manuals for CTOOLS and processors as well as other information. Visit Intel Corporation's Developers' Site at developer.intel.com/design/i960/testcncr on the World Wide Web to visit the i960 Processor Remote Evaluation Facility (REF).

For more information, contact: Local Intel Sales Office or Distributor. Email inquiries to: N/A. Visit Intel Corporation on the World Wide Web at: www.intel.com.

Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabilities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: <http://www.tektronix.com>.

Alpha

Digital Semiconductor (DEC)

FULL FUNCTION RTOS

INTEGRITY* Real-Time Operating System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The INTEGRITY RTOS, which provides a memory-protected superset of the facilities offered in Green Hills Software's veLOsity* Real-Time Operating System, targets mission-critical, real-time applications that emphasize reliability, security and testability. The INTEGRITY RTOS is available on a royalty-free basis: users pay only for the host-based software development environment. Run-time licenses for the target system are free.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

INTEGRATED DEVELOPMENT ENVIRONMENT

MULTI* Software Development Environment

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Software Development Environment provides a framework of interacting tools to support program development by small or large workgroups. MULTI includes all of the tools needed to support major programming projects, including a program builder, version control, program editor, debugger, execution profiler, run-time error checker, and source-code control.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Penumbra Super Mojo* Java Development Environment

Penumbra Software, Inc.

Host Development Environments: .

Super Mojo's Designer, Visual Scripter*, and integrated Coder create a unique Java Development Environment (JDE) for Java application and Java bean component creation. Super Mojo runs on any Java-supported operating system. Its incremental compiler compiles in background, and nothing is faster. Developers can create Java without coding by simply dragging-and-dropping components! Visually they can add events/actions, commands, logic, and calls to other scripts. Super Mojo Supports JDBC/ODBC.

For more information, contact: Michael Mittel, 770-352-0100 x 180. Email inquiries to: mmittel@penumbra.com. Visit Penumbra Software, Inc. on the World Wide Web at: www.penumbra.com.

COMPILER

GNUPro* Toolkit Compiler Suite

Cygnus Solutions

Host Development Environments: .

Cygnus Solutions' GNUPro* Toolkit compiler suite (with assembler) is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The compiler delivers speed- and size-performance advantages over a wide range of microprocessor architectures. Cygnus provides mission-critical technical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

Green Hills Optimizing C Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills' high-performance optimizing C compilers, for native or embedded development, have many advanced optimizations, such as cross-module inlining. The compilers allow for the fine tuning of optimization strategy so users can generate optimal code. Supports 32-/64-bit processors.

* Trademark or registered trademark of its respective company or mark holder

Alpha

Digital Semiconductor (DEC)

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing C++ Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills offers high-performance optimizing C++ compilers for native or embedded development. The compilers are compatible with Green Hills Software's MULTI* debugger, which automatically handles C++ constructs such as name mangling and template debugging. The compilers support most 32-/64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing Embedded C++ Compiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills optimizing Embedded C++ compilers are high-performance and follow the Embedded C++ Technical Committee draft standard.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing FORTRAN Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills Software offers optimizing FORTRAN compilers for native or embedded development. A compile-time option allows users to select from among the F77, VMS and DoD dialects of the FORTRAN language, with additional support for many extensions. The FORTRAN compilers support most 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

ASSEMBLER

GNUPro* Toolkit

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit is a solution to the problem of delivering quality software to meet the increasingly tighter schedules required by today's marketplace. The highly optimized tool chain for a specific host-target combination drives competitive speed- and size-performance advantages into a developer's software without compromising either its portability or maintainability. The fully-featured debug tools and utilities significantly help to shorten the development, test, and validation cycles. Cygnus backs the GNU technology with a commitment to rapid and expert support. All GNUPro tool chains for native and embedded programming are bundled with mission-critical support services and guaranteed technical response times.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

Green Hills Cross Assembler Tool Chain

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills embedded tool chain includes a macro assembler, linker, librarian, run-time libraries, object formatters and other utilities useful for embedded development. Cross-assembler tool chains are available for most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

DEBUGGER

GNUPro* Toolkit Debugger Suite

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit debugger suite is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The fully-featured debug tools and utilities significantly help to shorten the development, test and validation cycles. Cygnus provides mission-critical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

MULTI* Source-Level Debugger

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Source-level Debugger supports native or embedded debugging of most popular 32-/64-bit processors. The main debugger window shows source or interlaced source and assembly. A single click lets the user look at a variable or set a breakpoint. Small windows allow for the monitoring of specific variables, local variables, or the call stack.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

RTI StethoScope* Debugger

Real-Time Innovations, Inc.

Host Development Environments: UNIX and Windows.

Real-Time Innovations' (RTI) StethoScope debugger is a graphical monitoring, performance analysis, and data collection tool for real-time applications. The developer can watch program variables evolve in real time; any value in memory can be monitored. Much like a software oscilloscope, StethoScope allows the developer to see what the application is doing. StethoScope may rapidly become the developer's most important debugging and analysis tool.

For more information, contact: AI Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

LIBRARY

Windows Server Library

3L Ltd.

Host Development Environments: Windows.

The Windows DLL allows for the easy integration of DSP target code with user-interface code written in Visual C++. Simple "cookbook-style" documentation is easy to understand. Sixteen and 32-bit versions available.

For more information, contact: Alan Culloch, adc@threeL.co.uk. Email inquiries to: threeL@threeL.co.uk. Visit 3L Ltd. on the World Wide Web at www.threeL.co.uk.

C-tree Plus* File Handler

FairCom Corporation

Host Development Environments: UNIX and Windows and Most Others.

C-tree Plus File Handler Version 6.7A is based on advanced B+tree (balanced) algorithm. The C-tree Plus API handles all aspects of database I/O. Customer can program single-user or multi-user non-server applications royalty free. C-tree Plus has a small memory footprint, unsurpassed portability, is client/server ready and ODBC compliant. Features include: transaction processing; fixed/variable length records; alternate collating sequence numbers; and file mirroring. Package supports Windows, OS/2, DOS, Macintosh and UNIX.

For more information, contact: Sales, 573-445-6833. Email inquiries to: sales@faircom.com. Visit FairCom Corporation on the World Wide Web at: www.faircom.com.

DRIVER

AIO Drivers for VxWorks* RTOS

AP Labs

Host Development Environments: UNIX.

Extensive set of device drivers for Wind River's VxWorks*, supporting VME and IP Module interfaces for: analog, digital, serial, IRIG, PCM telemetry, 1553, ARINC-429, NTDS, DR111W, GPIB, FDDI and SCSI. AP Labs AIO supports high performance asynchronous and synchronous I/O operations under VxWorks 5.2 and Tornado.

* Trademark or registered trademark of its respective company or mark holder

Alpha**Digital Semiconductor (DEC)**

For more information, contact: Steve Gills, 619-546-8626. Email inquiries to: info@sd.aplabs.com. Visit AP Labs on the World Wide Web at: www.sd.aplabs.com.

OTHER TOOLS**Embedded EMPRESS Developer's Toolkit***

Empress Software, Inc.

Host Development Environments: UNIX & Windows.

This suite is an applications development toolkit for embedded systems developers. It features the reliable, highly scalable Empress RDBMS with its fast, compact database engine, JDBC/ODBC bridge, and support for diverse data types. The suite includes the Empress RDBMS, Empress Dynamic SQL, Empress ODBC Interface, and Empress Internet Applications Development Toolkit.

For more information, contact: Dick Naedel, 301-220-1919. Email inquiries to: sales@empress.com. Visit Empress Software, Inc. on the World Wide Web at: www.empress.com.

EMPRESS RDBMS

Empress Software, Inc.

Host Development Environments: UNIX and Windows.

EMPRESS RDBMS is a powerful application development environment offering excellent data manipulation options to the embedded systems developer. The RDBMS can store and retrieve any data type that can be digitized, such as x-rays, voice, fingerprints and maps. Date variables and microsecond time stamps make this database Year 2000 compliant.

For more information, contact: Dick Naedel, 301-220-1919. Email inquiries to: sales@empress.com. Visit Empress Software, Inc. on the World Wide Web at: www.empress.com.

Green Hills Instruction Set Simulator

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills Instruction Set Simulators allow programs for the target microprocessor to be executed on the PC or host workstation by simulating the execution of the target at the instruction level. A special interface exists to allow program control via a standard debugger. The simulators support most 32/64-bit processors.

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MULTI* Execution Profiler

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MULTI* Run-Time Error Checker

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Run-time Error Checker inserts code into user's executable to check for things like array out of bounds, value too large for variable, read of variable before initialization, and attempts to access unallocated memory. The error checker supports native and embedded profiling on most popular 32 and 64-bit processors.

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MULTI* Version Control System

Green Hills Software, Inc.

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For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

ColdFire**Motorola Semiconductor****FULL FUNCTION RTOS****CMX-RTX* Real-Time Operating System**

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-RTX RTOS provides more than 65 kernel services allowing control of tasks, events, messages, resources, semaphores, cyclic timers, queues, fixed memory blocks and UARTs. Interrupts are allowed to use some of the CMX functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. Very small ROM and RAM requirements for small-footprint applications. Several compiler vendors are supported. Source code is included, and there are no royalties.

The CMX-RTX RTOS supports an unusually large number of μ PU, μ CU, and DSP architectures from a large number of manufacturers, including: Advanced RISC Machines, Analog Devices, Hitachi, Intel, MIPS, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Sharp, Siemens, Texas Instruments, Toshiba, and Zilog.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

pSOSystem Real-Time Operating System

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pSOSystem is a modular, high-performance real-time operating system designed specifically for embedded microprocessors. The RTOS provides a complete multi-tasking environment based on open system standards, such as network file system support. pSOSystem is designed for performance, reliability, and ease-of-use on either custom or commercial hardware.

Soon available for SPARC processors.

For more information, contact: Sales, 408-542-1500. Email: N/A. Visit Integrated Systems, Inc. on the World Wide Web at: http://www.isi.com.

BASIC RTOS KERNEL**Nucleus PLUS* Real-Time Operating System**

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus PLUS is designed as a core component for an operating system environment. It is extensible and dynamic. Its modular design allows services to be easily produced by combining existing services. All of the Nucleus PLUS components (tasks, queues, semaphores, etc.) can be dynamically created and deleted. Each component has a control block defined by the user and placed anywhere in the available memory space of the target system. Nucleus PLUS is a real-time, pre-emptive, multitasking kernel designed for time-critical embedded applications. Approximately 95 percent of Nucleus PLUS is extremely portable and is currently available for use with most microprocessor families.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Acceleratec Technology, Inc. on the World Wide Web at: www.atinucleus.com.

* Trademark or registered trademark of its respective company or mark holder

ColdFire**Motorola Semiconductor****RTXC* Real-Time Kernel**

Embedded System Products, Inc.

Host Development Environments: UNIX and Windows.

Embedded System Products, Inc.'s RTXC is a multitasking real-time embedded kernel written primarily in C and featuring a single API for all supported processors. RTXC manages tasks and time, synchronizes with events, and permits transfer of data between tasks through 72 kernel services, including services for RAM management and exclusive access to an entity.

For more information, contact: Sales, 800-525-4302. Email inquiries to: sales@esphou.com. Visit Embedded System Products, Inc. on the World Wide Web at: www.esphou.com.

Precise/MQX* & MQX+m Real-Time Executive

Precise Software Technologies Inc.

Host Development Environments: .

Precise Software Technologies' Precise/MQX* is a portable high-performance, real-time executive. MQX is scalable from a single processor to distributed multiprocessor configurations. The real-time executive provides functions for multitasking, intertask communications and synchronization, dynamic interrupt management, and memory management. Optional protocols for networking and data communications are also available.

For more information, contact: Clarke Esler, 508-264-4413. Email inquiries to: info@psti.com. Visit Precise Software Technologies Inc. on the World Wide Web at: www.psti.com.

INTEGRATED DEVELOPMENT ENVIRONMENT**MULTI* Software Development Environment**

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Software Development Environment provides a framework of interacting tools to support program development by small or large workgroups. MULTI includes all of the tools needed to support major programming projects, including a program builder, version control, program editor, debugger, execution profiler, run-time error checker, and source-code control.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

pRISM+ Integrated Development Environment

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pRISM+ is a complete, integrated development environment (IDE) for designing and delivering embedded software applications. pRISM+ combines the industry's optimal development tools with the pSOSystem, an industry-proven and reliable real-time operating system (RTOS). The pRISM+ environment combines "Best-Of-Class" tools for developing, analyzing and testing embedded applications in one seamless environment, built with an open, extensible architecture to accommodate future needs.

Note: Soon available for SPARC microprocessors.

For more information, contact: Sales, 408-542-1500. Email: N/A. Visit Integrated Systems, Inc. on the World Wide Web at: http://www.isi.com.

COMPILER**D-C++ C/C++ Cross-Compiler Suite**

Diab Data, Inc.

Host Development Environments: UNIX and Windows.

D-C++ is a highly-optimizing C/C++ compiler, producing exceptionally fast, compact, accurate code for the PowerPC, 68K/CPU32, ColdFire, and MCore processor-based applications. The D-C++ compiler is fully ANSI compliant and works with all popular debug, RTOS, and emulation systems. The suite contains a compiler, assembler, linker, profiler, program checker, archiver, advanced libraries package, and other utilities. An optional RTA (Real-Time Analysis) Suite enables developers to enhance program performance, reliability and memory utilization.

For more information, contact: Jan Liband, 415-571-1700. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

D-CC C Cross-Compiler Suite

Diab Data, Inc.

Host Development Environments: UNIX and Windows and Others.

Diab Data's D-CC is a highly-optimizing C compiler, producing exceptionally fast, compact, target-specific code for Motorola's PowerPC, 68K/CPU32, ColdFire and MCore Processor-based applications. The D-CC compiler is fully ANSI and EABI compliant, works with all popular debug, RTOS, and emulation systems. The suite provides the compiler, assembler, linker, profiler, program checker, archiver, advanced libraries package, and other utilities. An optional Real-Time Analysis Suite (RTA) enables developers to enhance program performance, reliability, and memory utilization.

For more information, contact: Jan Liband, 415-571-1700. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

Run-Time Analysis Tools For Diab Data Compilers

Diab Data, Inc.

Host Development Environments: UNIX and Windows.

Diab Data's RTA Suite is a suite of visual run-time analysis tools for improving program performance, reliability, and memory utilization. The RTA Suite works in conjunction with Diab Data's C/C++ compilers and includes a Visual Interactive Profiler, a Run-Time Error Checker, and a Link Map Analyzer for visualizing memory-map setups.

For more information, contact: Jan Liband, 650-571-1700 x227. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

Green Hills Optimizing C Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills' high-performance optimizing C compilers, for native or embedded development, have many advanced optimizations, such as cross-module inlining. The compilers allow for the fine tuning of optimization strategy so users can generate optimal code. Supports 32-/64-bit processors.

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Green Hills Optimizing C++ Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

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For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing Embedded C++ Compiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills optimizing Embedded C++ compilers are high-performance and follow the Embedded C++ Technical Committee draft standard.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Microtec* C and C++ Cross-Compilers

Microtec

Host Development Environments: UNIX and Windows.

Microtec's C and C++ compilers conform to the version of the C++ language that is defined in the Annotated C++ Reference Manual (ARM), including templates, exception handling, and nested classes. Because the C++ language continues to develop, Microtec is actively participating in the ANSI C++ standardization process. The company is committed to supporting both the ANSI C++ language and library standards with future product releases. The most significant new benefit is the addition of specialized linker optimizations that significantly reduce the size of modules when advanced C++ features, such as templates and in-line and virtual functions, are used. These optimizations allow developers to take advantage of the full power of object-oriented programming techniques in embedded systems without experiencing code bloat.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

* Trademark or registered trademark of its respective company or mark holder

ColdFire**Motorola Semiconductor****ASSEMBLER****Green Hills Cross Assembler Tool Chain**

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills embedded tool chain includes a macro assembler, linker, librarian, runtime libraries, object formatters and other utilities useful for embedded development. Cross-assembler tool chains are available for most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

EMULATOR**visionICE* Emulator**

EST Corporation

Host Development Environments: UNIX and Windows.

EST's visionICE emulator is available for PowerPC MPC8xx, ColdFire MCF52xx and 683xx families. This completely scalable, single-solution emulator meets a wide range of performance and budget requirements. Modules for low-cost target control (visionBDM), integrated Ethernet support (visionNET), overlay memory (visionMEM), internal register configuring (visionSIM) and full-scale, real-time emulation (visionEVENT) can be added or shared at any time, boosting the developer's arsenal of debugging weapons.

For more information, contact: Sales Department, 617-828-5588. Email inquiries to: sales@estc.com. Visit EST Corporation on the World Wide Web at: www.estc.com.

Orion/Advice* Emulator

Orion Instruments

Host Development Environments: UNIX and Windows.

The Orion/Advice is a high-performance, real-time emulation system. A sophisticated multi-level event-triggering system, combined with a non-intrusive trace buffer provide unmatched problem tracking. A point-and-click Windows* or UNIX* OS graphical user interface (GUI) provides true high-level-language (HLL) debug support. Profiling, performance analysis and code coverage complete the Orion/Advice emulation package.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oriontools.com. Visit Orion Instruments on the World Wide Web at: www.oriontools.com.

DEBUGGER**MULTI* Source-Level Debugger**

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The MULTI Source-level Debugger supports native or embedded debugging of most popular 32-/64-bit processors. The main debugger window shows source or interlaced source and assembly. A single click lets the user look at a variable or set a breakpoint. Small windows allow for the monitoring of specific variables, local variables, or the call stack.

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XRAY* Debugger

Microtec

Host Development Environments: UNIX and Windows.

The XRAY* Debugger provides an environment designed to accelerate the edit-compile-download-debug cycle for development of embedded applications. Microtec's XRAY debugger is a well-known tool that has served embedded software developers for more than 10 years. The most current version of the XRAY debugger offers advanced debug support of multitasking and multiprocessing applications. Multiple execution environments are available, including: instruction-set simulator; target-resident monitor; ICE and RTOS-aware. Along with the debugger, XRAY offers a suite of development tools, including a context-sensitive editor, an interface to most popular source-code management systems, build facilities, and source browsing. The XRAY debugger features an intuitive, standard Windows or Motif user interface.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

Flex-BDM* Debugger

Noral Micrologics Limited

Host Development Environments: Windows.

The debugging of software for Motorola's 68HC12, 683xx and ColdFire processors is supported by Noral's low-cost Flex-BDM Debugger product range. Flex-BDM is different from the common background-debug-mode (BDM) cable solutions, because each system includes custom logic and a control processor, enhancing the debugging capabilities beyond the basic BDM specification. A demonstration disk is available from Noral.

For more information, contact: Harry Erickson, 508-647-0103 (U.S. Office). Email inquiries to: noral@noral.co.uk. Visit Noral Micrologics Limited on the World Wide Web at: www.noral.com.

OTHER TOOLS**Green Hills Instruction Set Simulator**

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills Instruction Set Simulators allow programs for the target microprocessor to be executed on the PC or host workstation by simulating the execution of the target at the instruction level. A special interface exists to allow program control via a standard debugger. The simulators support most 32/64-bit processors.

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ColdFire

Motorola Semiconductor

Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabilities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: <http://www.tektronix.com>.

Vxx Series

NEC Electronics

FULL FUNCTION RTOS

PXROS* Portable, Extendable RTOS

HighTec EDV-Systeme GmbH

Host Development Environments: UNIX and Windows and DOS.

PXROS has the following features: absolutely no interrupt latency with transparency; multiple independent activities with interrupt handlers and tasks (processes); priority-driven, preemptive scheduling with 32 task-priority levels; process coordination of messages, events, dynamically modified priorities, semaphores; flexible resource management with dynamically defined memory classes, fixed- and variable-length memory blocks, dynamically created objects, resource reservation; real-time-control-time based calls, period, for activities, timeouts and events.

For more information, contact: Hagen Heggenberger, ++43-681-92613-0. Email inquiries to: htc@hightec-rt.com. Visit HighTec EDV-Systeme GmbH on the World Wide Web at: <http://www.hightec-rt.com>.

Microsoft Windows* CE O.S. Embedded Toolkit

Microsoft* Corporation

Host Development Environments: Windows.

Microsoft's Windows CE Embedded Toolkit for Visual C++ 5.0 includes integrated development environment tools designed specifically for embedded development. The Windows CE platform is a 32-bit, preemptive, multitasking, multithreaded operating system designed from the ground up to support embedded systems. Use the embedded toolkit to choose components for building a customized version of the Windows CE operating system to meet the unique requirements of your hardware. The toolkit contains the RTOS, compiler, assembler, emulator, debugger, library and drivers.

For more information, contact: N/A. Email inquiries to: N/A. Visit Microsoft* Corporation on the World Wide Web at: N/A.

BASIC RTOS KERNEL

Nucleus PLUS* Real-Time Operating System

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus PLUS is designed as a core component for an operating system environment. It is extensible and dynamic. Its modular design allows services to be easily produced by combining existing services. All of the Nucleus PLUS components (tasks, queues, semaphores, etc.) can be dynamically created and deleted. Each component has a control block defined by the user and placed anywhere in the available memory space of the target system. Nucleus PLUS is a real-time, pre-emptive, multitasking kernel designed for time-critical embedded applications. Approximately 95 percent of Nucleus PLUS is extremely portable and is currently available for use with most microprocessor families.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

CMX-TINY+* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-TINY+ RTOS provides more than 40 kernel services, allowing control of tasks, events, messages, resources, semaphores, cyclic timers, queues. Interrupts are allowed to use some of the CMX-TINY+ functions. The scheduler is based on true pre-

emption. Very fast context-switch times and very low interrupt-latency times are provided. The RTOS has very small ROM and RAM requirements, and supports several compiler vendors. Source code is included on a royalty-free basis.

The CMX-TINY+ RTOS supports an unusually large number of μ PU and μ CU architectures from the following manufacturers: Advanced RISC Machines, Hitachi, Intel, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Siemens, and Toshiba.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

INTEGRATED DEVELOPMENT ENVIRONMENT

MULTI* Software Development Environment

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Software Development Environment provides a framework of interacting tools to support program development by small or large workgroups. MULTI includes all of the tools needed to support major programming projects, including a program builder, version control, program editor, debugger, execution profiler, run-time error checker, and source-code control.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Hitex HiTools Integrated Development Environment

Hitex Development Tools

Host Development Environments: UNIX, Windows and DOS.

The Hitex tools comprise a complete integrated development environment, including compiler, assembler, debugger and emulator for the μ Cs and μ Ps the company supports.

For more information, contact: Olaf Pfeiffer, 408-298-9077. Email inquiries to: info@hitex.com. Visit Hitex Development Tools on the World Wide Web at: <http://www.hitex.com>.

Metrowerks' CodeWarrior*

Metrowerks Corporation

Host Development Environments: UNIX and Windows.

Metrowerks' CodeWarrior is transforming embedded system development by offering the most intuitive GUI development tools available under Windows* 96/NT operating systems at a fraction of the cost of traditional command-line tools. With CodeWarrior, the developer gets a complete suite of tools (IDE) to create, compile, link, debug, and assemble fast, optimized embedded system code.

For more information, contact: Jenny Page, 512-873-4740. Email inquiries to: sales@metrowerks.com. Visit Metrowerks Corporation on the World Wide Web at: <http://www.metrowerks.com>.

Microsoft Windows* CE O.S. Embedded Toolkit

Microsoft* Corporation

Host Development Environments: Windows.

Microsoft's Windows CE Embedded Toolkit for Visual C++ 5.0 includes integrated development environment tools designed specifically for embedded development. The Windows CE platform is a 32-bit, preemptive, multitasking, multithreaded operating system designed from the ground up to support embedded systems. Use the embedded toolkit to choose components for building a customized version of the Windows CE operating system to meet the unique requirements of your hardware. The toolkit contains the RTOS, compiler, assembler, emulator, debugger, library and drivers.

For more information, contact: N/A. Email inquiries to: N/A. Visit Microsoft* Corporation on the World Wide Web at: N/A.

COMPILER

GNUPro* Toolkit Compiler Suite

Cygnus Solutions

Host Development Environments:

Cygnus Solutions' GNUPro* Toolkit compiler suite (with assembler) is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The compiler delivers speed- and size-performance advantages over a wide range of microprocessor architectures. Cygnus provides mission-critical technical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

* Trademark or registered trademark of its respective company or mark holder

Vxx Series

NEC Electronics

Green Hills Optimizing C Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills' high-performance optimizing C compilers, for native or embedded development, have many advanced optimizations, such as cross-module inlining. The compilers allow for the fine tuning of optimization strategy so users can generate optimal code. Supports 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing C++ Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills offers high-performance optimizing C++ compilers for native or embedded development. The compilers are compatible with Green Hills Software's MULTI* debugger, which automatically handles C++ constructs such as name mangling and template debugging. The compilers support most 32-/64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing Embedded C++ Compiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills optimizing Embedded C++ compilers are high-performance and follow the Embedded C++ Technical Committee draft standard.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

ASSEMBLER

GNUPro* Toolkit

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit is a solution to the problem of delivering quality software to meet the increasingly tighter schedules required by today's marketplace. The highly optimized tool chain for a specific host-target combination drives competitive speed- and size-performance advantages into a developer's software without compromising either its portability or maintainability. The fully-featured debug tools and utilities significantly help to shorten the development, test, and validation cycles. Cygnus backs the GNU technology with a commitment to rapid and expert support. All GNUPro tool chains for native and embedded programming are bundled with mission-critical support services and guaranteed technical response times.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

Green Hills Cross Assembler Tool Chain

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills embedded tool chain includes a macro assembler, linker, librarian, run-time libraries, object formatters and other utilities useful for embedded development. Cross-assembler tool chains are available for most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

EMULATOR

CheckMate II* In-Circuit Emulator

Beacon Development Tools, Inc.

Host Development Environments: Windows and WIN32.

The CheckMate II emulator system allows full C/C++ source level debug capability while the code executes in real time in the target environment. Real-time breakpoints

and trigger points control execution while the real-time trace buffer captures execution history.

For more information, contact: Beacon Sales, 512-338-9211. Email inquiries to: info@beacontools.com. Visit Beacon Development Tools, Inc. on the World Wide Web at: www.beacontools.com.

HP 64700 Series In-Circuit Emulators

Hewlett-Packard Company

Host Development Environments: UNIX and Windows.

The HP 64700 series development tools compose a comprehensive embedded development, debugging and analysis environment that continues to evolve and expand to meet the increasing demands of the software designer. Integrated under a common user interface and operating environment, these tools create an embedded design system that accelerates the development process.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or /emulator.

Orion/Advice* Emulator

Orion Instruments

Host Development Environments: UNIX and Windows.

The Orion/Advice is a high-performance, real-time emulation system. A sophisticated multi-level event-triggering system, combined with a non-intrusive trace buffer provide unmatched problem tracking. A point-and-click Windows* or UNIX* OS graphical user interface (GUI) provides true high-level-language (HLL) debug support. Profiling, performance analysis and code coverage complete the Orion/Advice emulation package.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

DEBUGGER

GNUPro* Toolkit Debugger Suite

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit debugger suite is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The fully-featured debug tools and utilities significantly help to shorten the development, test and validation cycles. Cygnus provides mission-critical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

MULTI* Source-Level Debugger

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Source-level Debugger supports native or embedded debugging of most popular 32-/64-bit processors. The main debugger window shows source or interlaced source and assembly. A single click lets the user look at a variable or set a breakpoint. Small windows allow for the monitoring of specific variables, local variables, or the call stack.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

OTHER TOOLS

Green Hills Instruction Set Simulator

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills Instruction Set Simulators allow programs for the target microprocessor to be executed on the PC or host workstation by simulating the execution of the target at the instruction level. A special interface exists to allow program control via a standard debugger. The simulators support most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

* Trademark or registered trademark of its respective company or mark holder.

Vxx Series

NEC Electronics

MULTI* Execution Profiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Execution Profiler provides a mechanism for looking at user code in many different ways in order to pinpoint hot spots. Reports show performance by procedure, source line, etc. Supports native and embedded profiling on most popular 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Program Builder

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Program Builder is a configuration management system for creating and managing large programs. The MULTI builder replaces traditional make files with a modern point-and-click interface, greatly simplifying the configuration management task and eliminating the need for engineers dedicated to managing the build process. Supports native and embedded profiling on most popular 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Run-Time Error Checker

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Run-time Error Checker inserts code into user's executable to check for things like array out of bounds, value too large for variable, read of variable before initialization, and attempts to access unallocated memory. The error checker supports native and embedded profiling on most popular 32 and 64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Version Control System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Version Control system is very unobtrusive, with files being automatically checked out when the first change is made in the editor. Advanced features support program branches and the ability to find out who made the last change to selected lines. Supports native and embedded profiling on most popular 32/64-bit CPUs.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabilities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: http://www.tektronix.com.

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FULL FUNCTION RTOS**OSE* Real-Time Operating System**

Enea OSE Systems AB

Host Development Environments: UNIX and Windows.

Enea's OSE is a message-based, real-time operating system and tool-set for embedded systems. OSE has special built-in capabilities for fault tolerance, safety critical applications, runtime configuration and distributed systems. OSE is the first RTOS to be certified to meet the software quality standard IEC 1508, safety integrity level 3.

For more information, contact: Bill McCombie, +468-638-5000 (Sweden). Email inquiries to: info.ose@enea.se. Visit Enea OSE Systems AB on the World Wide Web at: www.enea.se/ose.

AMX* Real-Time Multitasking Kernel

KADAK Products Ltd.

Host Development Environments: Windows and DOS.

KADAK's AMX Real-Time Operating System is a full-featured, fast, compact, ROMable kernel. AMX includes: preemptive, priority-based scheduler (optional time-slicing); nested interrupts with priority ordering; mailbox, semaphore, resource, event, list, buffer and memory managers; the Configuration Builder Utility eases system construction. And for debugging, KADAK's KwikLook* fault finder exploits SDS's SingleStep* and SSI's VisualProbe* debuggers for fully AMX RTOS-aware debugging.

For more information, contact: Sales, 604-734-2796. Email inquiries to: amxsales@kadak.com. Visit KADAK Products Ltd. on the World Wide Web at: www.kadak.com.

BASIC RTOS KERNEL**Nucleus PLUS* Real-Time Operating System**

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus PLUS is designed as a core component for an operating system environment. It is extensible and dynamic. Its modular design allows services to be easily produced by combining existing services. All of the Nucleus PLUS components (tasks, queues, semaphores, etc.) can be dynamically created and deleted. Each component has a control block defined by the user and placed anywhere in the available memory space of the target system. Nucleus PLUS is a real-time, pre-emptive, multitasking kernel designed for time-critical embedded applications. Approximately 95 percent of Nucleus PLUS is extremely portable and is currently available for use with most microprocessor families.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

COMPILER**GNUPro* Toolkit Compiler Suite**

Cygnus Solutions

Host Development Environments: . . .

Cygnus Solutions' GNUPro* Toolkit compiler suite (with assembler) is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The compiler delivers speed- and size-performance advantages over a wide range of microprocessor architectures. Cygnus provides mission-critical technical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9500. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

DDC-I Ada Compiler Systems (DACS*)

DDC-I

Host Development Environments: UNIX and Windows.

A typical DDC-I Ada Language compiler system, the DACS-80x86 features include: compact, efficient ROMable code; modular stand-alone run-time system; advanced symbolic Ada debugger; superior real-time performance; easily configurable to developer's hardware; generates Intel OMF; supports bare PC as target; FAA-certifiable run-time system available (including tasking); supports rate-monotonic scheduling; fast and normal interrupt handling; fast Ethernet downloading; selective linking; stack analysis tools (static and dynamic); Multibus* II interface; CIFO and RTS entry-point package; numeric package using 80x87 NPX. (See other processors supported by DDC-I's compiler systems.)

For more information, contact: Morten Selling, +45 45 87 11 44. Email inquiries to: sales@ddci.dk. Visit DDC-I on the World Wide Web at: www.ddci.com.

EPI CC Compilers

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

EPI's Software Toolkits for the AM29K, ARM and MIPS microprocessors includes the CC Series compilers—CC29K, CC3K, CCA4K and CC-ARM. EPI has selected the compiler technology best suited for each of the RISC processor families. The compilers are

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Advanced Micro Devices

designed specifically for embedded applications and provide features to allow optimum tradeoffs between code size and system performance. Developers can easily tailor code to their specific targets and applications. EPI's compilers are fully ANSI-compliant, have big and little Endian support, and have a wide choice of optimization levels.

EPI compilers for the MIPS and AM29K processors are also supported on DOS hosts.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: <http://www.episupport.com>.

ASSEMBLER

GNUPro* Toolkit

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit is a solution to the problem of delivering quality software to meet the increasingly tighter schedules required by today's marketplace. The highly optimized tool chain for a specific host-target combination drives competitive speed- and size-performance advantages into a developer's software without compromising either its portability or maintainability. The fully-featured debug tools and utilities significantly help to shorten the development, test, and validation cycles. Cygnus backs the GNU technology with a commitment to rapid and expert support. All GNUPro tool chains for native and embedded programming are bundled with mission-critical support services and guaranteed technical response times.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

EPI AS Series Macro Assemblers

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

EPI's Macro Assemblers allow all original routines to be written in assembly code and integrated into a C or C++ program. The EPI Macro Assemblers have powerful macro facilities and are compliant with Approved Instruction Sets.

The EPI Macro Assembler for the R3000 is the AS3K; for the R4000 is the AS4K; for the AM29000 is the AS29K; and for the ARM is the AS-ARM. For the MIPS and AM29K processors, the assemblers are also supported on DOS hosts. The AS29K Macro Assembler also includes a Linker/Locator with Librarian and Utilities.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: <http://www.episupport.com>.

EMULATOR

EPI ICEMAN Series In-Circuit Emulators

Embedded Performance, Inc.

Host Development Environments: UNIX, Windows and DOS.

EPI's ICEMAN series emulators are full-function in-circuit emulators in small, Probe-Head-Size Packages that have Ethernet and serial interfaces, high-speed download, a wide choice of overlay memory sizes and speeds, and a Trace Option for capturing real-time target activity. Compact ICEMAN Emulators offer high-performance, with the integration, speed, overlay memory, trace capture, and networking features of more costly bench-top emulators, but in small, less costly packages. With base pricing only slightly higher than that of a JTAG emulator, the emulators may be expanded to include additional features as needs require. ICEMAN products offer on-board overlay memory options and direct connections to PCs or UNIX OS hosts and are fully network-compatible via the Ethernet interface. The trace option provides real-time capture of target activity both at processor pins and additional user-selected points on target hardware. Non-intrusive ICEMAN Emulators operate at maximum μ PU clock rates, using none of target system memory or communication resources.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: <http://www.episupport.com>.

EPI Turbo In-Circuit Emulator

Embedded Performance, Inc.

Host Development Environments: UNIX and Windows.

Turbo Class In-Circuit Emulators have the following features: a unique 3-D trace/break-

point control; a real-time profiler option provides performance analysis, code and branch coverage; optional execution tracker captures real-time execution from on-chip cache (selected μ pus); a wide choice of overlay memory sizes and speeds; large overlay memory sizes for large, ROM-based programs; high-speed download; and real-time emulation to 67 MHz bus rates. The Turbo Class Emulators shorten development time by integrating an ICE with a high-performance logic state analyzer to provide a versatile tool for all phases of the development cycle. The three-dimensional trace and breakpoint control makes it easy to capture complex software paths leading to failures, and the emulator may be used with its large time stamp to make absolute and delta timing measurements of the software execution. (Emulator Models are SYS4K for MIPS R4000, SYS29K-MANX for Am29K, and SYS-R3051 for R3000).

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: <http://www.episupport.com>.

DEBUGGER

GNUPro* Toolkit Debugger Suite

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit debugger suite is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The fully-featured debug tools and utilities significantly help to shorten the development, test and validation cycles. Cygnus provides mission-critical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

EPI MON Series Symbolic Assembly-Level Debugger

Embedded Performance, Inc.

Host Development Environments: UNIX, Windows and DOS.

EPI's Symbolic Assembly-Level Debuggers are ideal for scripted automatic testing, great for low-level hardware and software debugging, support all EPI execution vehicles, have an extensible command language, provide Call Stack display, and are available for a variety of host computers. EPI's MON Debugger provides a common command-line interface to all the EPI execution environments. The MON debugger's rich feature set is accessed through an extensive command language that includes expression evaluation, aliases, command files with parameter passing and flow control, debugger local variables and conditional command execution. EPI's MON29K supports AMD's AM29000 μ PU family; the MON3K and MON4K support the MIPS R3000 and R4000 series processors; and the MON-ARM supports debugging of programs for the ARM μ PU family.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: <http://www.episupport.com>.

EPI Target-Resident Debug Kernels

Embedded Performance, Inc.

Host Development Environments: UNIX, Windows and DOS.

EPI's Target-Resident Debug Kernels support download speeds of up to 115K Baud over standard serial interfaces; require less than 25K ROM for popular evaluation boards; full source-code availability; support interfaces to both EPI Debuggers (assembly and source-level). EPI's Target-Resident Debug Kernels implement the functions necessary to enable the EPI debuggers to communicate with the target. The kernels are supplied with sample source code for common UARTs and may be easily customized for target-to-host communication links.

Target-Resident Debug Kernels are the RSS-ARM for the ARM μ PU; the RSS3K/RSS4K for the MIPS R3000 and R4000 μ pus; and the RSS29K for the AM29K μ PU.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: <http://www.episupport.com>.

EPI Windowing C/C++ Source-Level Debugger

Embedded Performance, Inc.

Host Development Environments: UNIX, Windows and DOS.

Windowing C/C++ Source-Level Debuggers feature a graphical multi-windowed user interface. EPI's debuggers have an intuitive set of graphical controls and highly integrated window relationships and interface to all EPI instruction-set simulators, target-resident debug kernels, and EPI emulators. Some of the many windows include Value Watch, Source, Memory, Global Registers, Local Registers, Call Stack, Profiler,

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Breakpoint Editing and Trace Data. Memory and Trace Data windows offer a wide selection of display modes including disassembled instructions with interleaved source. For many processors, the debugger accepts text commands for complex debugging and permits the use of debugging scripts. These debuggers support multiple hosts and all EPI execution vehicles; are mouse-driven with "point and click" operations; debug very large programs easily; are hyper-linked between windows; and support M/S Windows* (NT/95) OS, X-Terminal and Motif. WCDB is for AM29K processors; CADB is for ARM processors; and WCDB3K and WCDB4K are for MIPS R3000 and R4000 processors.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: <http://www.episupport.com>.

OTHER TOOLS

CodeTEST* Software Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

CodeTEST software verification tools for embedded system developers and testers support most major 32- and 16-bit microprocessors and VME boards, and supplies tools for accurately analyzing embedded system performance, code coverage, dynamic memory allocation and memory errors, as well as a powerful software trace tool. A VME version is now available.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

VSP-TAP*Eaglei* Co-Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

Applied's VSP-TAP and the Eaglei co-verification environment from Viewlogic Systems provides software operation verification against a hardware description model (HDL). VSP-TAP adds enhanced real-time capabilities, connecting the simulated environment, the actual processor, and real-world data at real processor speeds, and supplying access to an emulator's full debugging capabilities.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

CARDtools Application Simulation Tool

CARDtools Systems

Host Development Environments: UNIX & Windows.

CARDtools stands for Computer-Aided Real-time Design Tools, and the CARDtools design tool is dedicated to the design, evaluation, and simulation of embedded systems applications. An embedded system application consists of hardware devices interacting with a microprocessor, the microprocessor (CPU), a real-time operating system (RTOS), and the application program. CARDtools addresses all the aspects of embedded system application design and simulation.

For more information, contact: Dave Allenbaugh, 408-894-9500. Email inquiries to: info@cardtools.com. Visit CARDtools Systems on the World Wide Web at: <http://www.cardtools.com>.

Preprocessor for the HP Family of Logic Analyzers

Corelis

Host Development Environments: HP Logic Analyzer.

Corelis designs, develops and manufactures a family of preprocessors for use with Hewlett-Packard Company's family of logic analyzers. These preprocessors are designed to provide a convenient and easy means of connection between an HP logic analyzer and an embedded processor or data bus. Corelis preprocessors are supplied with inverse assembly software as well as screen configuration software that runs on the HP logic analyzer. Preprocessors are available for most MIPS architecture processors as well as most TI DSP processors. Also available are tools for Motorola DSPs, the PCI* bus and ISA bus, and various FPGAs.

For more information, contact: Mike Winters, 562-926-6726. Email inquiries to: mikew@corelis.com. Visit Corelis on the World Wide Web at: www.corelis.com.

EPI CCE29K Software Toolkit for AM29000 μ P

Embedded Performance, Inc.

Host Development Environments: UNIX, Windows and DOS.

Embedded Performance Inc.'s CCE29K complete 29K μ processor toolkit includes the following:

CC29K C Compiler

AS29K Assembler, Linker/Locater, Librarian and Utilities

ISS29K Instruction Set Simulator

MON29K Symbolic Assembly Debugger

WCDB Windowing C Debugger

NOTE: All components of the 29K software toolkit may be purchased separately as well, including the RSS29K Target-Resident Debug Kernel.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: <http://www.episupport.com>.

EPI Instruction Set Simulators

Embedded Performance, Inc.

Host Development Environments: UNIX, Windows and DOS.

Instruction: Set Simulators are up to 30 times faster than traditional Architectural Simulators, provide access to host resources, are available on a variety of host computers, and interfaces to both EPI debuggers (assembly and source level). The EPI Instruction Set Simulator simulates only those functions of the processors that are visible to the software. This optimization makes it many times faster than an architectural simulator. The result is a tool that can be used to execute and debug large programs before the target system is available. The EPI Instruction Set Simulators are the ISS29K for the AM29K, ISS-ARM for the ARM, and ISS-MIPS for the MIPS processors.

For more information, contact: Teresa Crews, 408-434-2210. Email inquiries to: sales@episupport.com. Visit Embedded Performance, Inc. on the World Wide Web at: <http://www.episupport.com>.

Logic Analyzers

Hewlett-Packard Company

Host Development Environments: N/A.

HP's digital design and debug tools help system developers solve tough hardware and software integration problems fast. The HP benchtop logic analyzers offer cost-effective 100 MHz state analysis plus five timing modes up to 500 MHz. The HP 16500 modular logic analysis systems provide the power and flexibility to handle demanding hardware and software problems.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or [emulator.com](http://www.emulator.com).

Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabilities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: <http://www.tektronix.com>.

80C166/80C167 Family

Siemens

FULL FUNCTION RTOS

Bytebos* Multitasking Operating System

Bytebos Integrated Systems

Host Development Environments: UNIX and Windows.

Bytebos is a full-featured multitasking operating system designed for use in high-performance, real-time embedded computing applications. Bytebos is configured for use with all major C compilers and debuggers and is available for a variety of microprocessors, microcontrollers, and DSPs. Bytebos applications are portable with simple licensing. There are no royalties on executables, and source code is provided.

For more information, contact: Nick Andrews, 800-788-7288. Email inquiries to: andrews@bytebos.com. Visit Bytebos Integrated Systems on the World Wide Web at: www.bytebos.com.

CMX-RTX* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-RTX RTOS provides more than 65 kernel services allowing control of tasks,

* Trademark or registered trademark of its respective company or mark holder

80C166/80C167 Family**Siemens**

events, messages, resources, semaphores, cyclic timers, queues, fixed memory blocks and UARTs. Interrupts are allowed to use some of the CMX functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. Very small ROM and RAM requirements for small-footprint applications. Several compiler vendors are supported. Source code is included, and there are no royalties.

The CMX-RTX RTOS supports an unusually large number of μ PU, μ CU, and DSP architectures from a large number of manufacturers, including: Advanced RISC Machines, Analog Devices, Hitachi, Intel, MIPS, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Sharp, Siemens, Texas Instruments, Toshiba, and Zilog.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

PXROS* Portable, Extendable RTOS

HighTec EDV-Systeme GmbH

Host Development Environments: UNIX and Windows and DOS.

PXROS has the following features: absolutely no interrupt latency with transparency; multiple independent activities with interrupt handlers and tasks (processes); priority-driven, preemptive scheduling with 32 task-priority levels; process coordination of messages, events, dynamically modified priorities, semaphores; flexible resource management with dynamically defined memory classes, fixed- and variable-length memory blocks, dynamically created objects, resource reservation; real-time-control-time based calls, period, for activities, timeouts and events.

For more information, contact: Hagen Heggenberger, ++43-681-92613-0. Email inquiries to: hgc@hightec-rt.com. Visit HighTec EDV-Systeme GmbH on the World Wide Web at: <http://www.hightec-rt.com>.

RTX166* Real-Time Operating Systems

Keil Software Inc.

Host Development Environments: N/A.

Keil Software's RTX166 Full (#FR166) is a multitasking real-time operating system for the Siemens and SGS Thomson 166/167 microcontroller family. With FR166, a developer can manage multiple tasks on a single microcontroller CPU, which makes program development much easier. The RTX166 Full RTOS also includes CAN libraries. Keil Software's RTX166 (#TR166) Tiny is a subset of the RTX166 Full RTOS product.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

BASIC RTOS KERNEL**Nucleus PLUS* Real-Time Operating System**

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus PLUS is designed as a core component for an operating system environment. It is extensible and dynamic. Its modular design allows services to be easily produced by combining existing services. All of the Nucleus PLUS components (tasks, queues, semaphores, etc.) can be dynamically created and deleted. Each component has a control block defined by the user and placed anywhere in the available memory space of the target system. Nucleus PLUS is a real-time, pre-emptive, multitasking kernel designed for time-critical embedded applications. Approximately 95 percent of Nucleus PLUS is extremely portable and is currently available for use with most microprocessor families.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

CMX-TINY+* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-TINY+ RTOS provides more than 40 kernel services, allowing control of: tasks, events, messages, resources, semaphores, cyclic timers, queues. Interrupts are allowed to use some of the CMX-TINY+ functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. The RTOS has very small ROM and RAM requirements, and supports several compiler vendors. Source code is included on a royalty-free basis.

The CMX-TINY+ RTOS supports an unusually large number of μ PU and μ CU architectures from the following manufacturers: Advanced RISC Machines, Hitachi, Intel, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Siemens, and Toshiba.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

RTXC* Real-Time Kernel

Embedded System Products, Inc.

Host Development Environments: UNIX and Windows.

Embedded System Products, Inc.'s RTXC is a multitasking real-time embedded kernel written primarily in C and featuring a single API for all supported processors. RTXC manages tasks and time, synchronizes with events, and permits transfer of data between tasks through 72 kernel services, including services for RAM management and exclusive access to an entity.

For more information, contact: Sales, 800-525-4302. Email inquiries to: sales@esphou.com. Visit Embedded System Products, Inc. on the World Wide Web at: www.esphou.com.

INTEGRATED DEVELOPMENT ENVIRONMENT**HighTec's GNU C/C++ Development Kit**

HighTec EDV-Systeme GmbH

Host Development Environments: UNIX, Windows, DOS and LINUX.

HighTec's GNU C16x Development Kit includes the GNU preprocessor, the C/C++ compiler, assembler, linker/locator and other useful GNU utilities. It has ANSI standard library support and an inline assembler with C/C++ operands. It also offers re-entrant programming, fast interrupt response time of 2-3 instructions for C/C++ routines. Debugging is accomplished via a serial interface or (optionally) TCP/IP or CAN. The Kit is available for Windows* NT/95 OS, Linux, Solaris 2.4, Sun 4.x, DOS and Windows 3.x operating systems. (The toolkit also includes `gar`, `ghm`, `gsz`, `gabs`, etc.)

For more information, contact: Hagen Heggenberger, ++43-681-92613-0. Email inquiries to: hgc@hightec-rt.com. Visit HighTec EDV-Systeme GmbH on the World Wide Web at: <http://www.hightec-rt.com>.

Hitex HiTools Integrated Development Environment

Hitex Development Tools

Host Development Environments: UNIX, Windows and DOS.

The Hitex tools comprise a complete integrated development environment, including compiler, assembler, debugger and emulator for the μ Cs and μ Ps the company supports.

For more information, contact: Olaf Pfeiffer, 408-298-9077. Email inquiries to: info@hitex.com. Visit Hitex Development Tools on the World Wide Web at: <http://www.hitex.com>.

EDE Project Environment

Tasking, Inc.

Host Development Environments: Windows.

EDE is a complete development project environment that gives the developer direct access to all the tools and features needed. EDE includes a language-sensitive editor, MAKE for automated application building and a project environment for specifying project files, including source files, tool options and build options.

For more information, contact: 1-800-458-8276. Email inquiries to: sales@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

COMPILER**Keil Software C Compilers**

Keil Software Inc.

Host Development Environments: Windows and DOS.

Keil Software's C compilers are full ANSI C compilers and assemblers, designed specifically for the microcontroller families that they support. μ Vision* is the Windows* OS User Interface that drives the optimizing C compilers. Compiler, assembler and linker options are point-and-click. μ Vision and the manuals are written in the USA, and extensive on-line help is included. Keil optimizing C compilers support the 8051, the 80C251 (Intel and Temic), including the USB 8x930 μ Controller families and the Siemens 161, 163, C164CI, 165, 166/167, 167CR and SGS Thomson ST10 family microcontrollers, with future derivative family chip members supported. Keil provides extensive support, free for one year, as well as on-line help and sample USB code, etc. from its Web URL.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

C++ Compiler

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Object-oriented programming techniques increase productivity, improve quality and

* Trademark or registered trademark of its respective company or mark holder.

80C166/80C167 Family

Siemens

provide reusability with Tasking's C++ compiler. The compiler allows the intermixing of C++ and C code within a single application. Thus, the benefits of C++ can be incorporated into existing C applications a module at a time, thus providing easy migration from C to C++ programs.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

EMULATOR

HP Processor Probes for On-Chip Emulation

Hewlett-Packard Company

Host Development Environments: Popular Debuggers.

HP's processor probes are a low-cost emulation solution for much of a developer's day-to-day debugging. Processor probes access the on-chip debugging capabilities of today's newest processors, giving the software developer a connection for downloading code, modifying memory and registers and controlling program execution. HP processor probes are compatible with debuggers from SDS, Green Hills and Microtec.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or /emulator.

EMUL166-PC* In-Circuit Emulator

Nohau Corporation

Host Development Environments: Windows.

The EMUL166-PC Emulator's hardware configuration, designed to aid software development for the Siemens C166 family of microcontrollers, consists of a communication board which connects to a pod board through a flexible cable. The system communicates through a standard parallel port, via direct ISA plug-in boards, or a PCMCIA-compliant PC card. An optional trace board offers advanced trace functions.

For more information, contact: Technical Support, 408-866-1820. Email inquiries to: sales@nohau.com. Visit Nohau Corporation on the World Wide Web at: www.nohau.com.

DEBUGGER

dScope*-51/251/166 Debugger

Keil Software Inc.

Host Development Environments: Windows.

Keil Software's dScope is a source-level debugger that allows a developer to debug programs created with Keil compilers. The dScope debugger simulates the program in either stand-alone mode or in the target system by using the monitor. External hardware, signals, and interrupts can be simulated. The debugger's viewable windows include capabilities to view the program from I/O, Trace, Stack, Watch and CPU Registers.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

RTI StethoScope* Debugger

Real-Time Innovations, Inc.

Host Development Environments: UNIX and Windows.

Real-Time Innovations' (RTI) StethoScope debugger is a graphical monitoring, performance analysis, and data collection tool for real-time applications. The developer can watch program variables evolve in real time; any value in memory can be monitored. Much like a software oscilloscope, StethoScope allows the developer to see what the application is doing. StethoScope may rapidly become the developer's most important debugging and analysis tool.

For more information, contact: Al Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

CrossView* Pro Debugger

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking's CrossView Pro debugger delivers functionality that reduces time requirements for program testing and debugging, and includes the following: tracking scope and monitoring locals; an intelligent source window; and code coverage and performance analysis. CrossView Pro provides multiple views of the developer's code: C and/or assembly source, monitor, inspect, on-chip registers, call stack, variables, break

point, execution trace, session log, simulated I/O and memory dumps.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

LIBRARY

Keil's CAN Library

Keil Software Inc.

Host Development Environments: N/A.

Keil Software's RTX51 and RTX166 Full RTOS products support Controller Area Network (CAN) controllers with the inclusion of CAN libraries, which are packaged with the RTOS products. The CAN interface is popular for both automotive and industrial markets. The libraries support 11- and 29-bit identifiers and interface with Keil's compilers for the Siemens 166 and Intel 8051/251 microcontroller families, as well as interfacing to Keil's RTOS products.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

OTHER TOOLS

HighTec's Evaluation Boards for Siemens C16x μ Controllers

HighTec EDV-Systeme GmbH

Host Development Environments: .

HighTec offers two evaluation boards for evaluating the Siemens C167 microcontrollers, the Mini 167-ETH (Ethernet) and the Mini 167. The Mini 167 ETH version board is a target board based on the Siemens C167 16-bit microcontroller at 20 MHz, with a size of 160 x 100 millimeters. It is equipped with 1 MB RAM, 512 KB flash, SMC 91C94 Ethernet chip and BNC connector; 2 serial interfaces (RS232, RS485), CAN interface; the board has a VG-96 socket with address, data bus and I/O signals. The Mini 167 board version is essentially the same, but offers only 256 KB of RAM and does not offer the SMC Ethernet chip and BNC connector.

For more information, contact: Hagen Heggenberger, ++43-681-92613-0. Email inquiries to: htc@hightec-rt.com. Visit HighTec EDV-Systeme GmbH on the World Wide Web at: http://www.hightec-rt.com.

μ Vision* Windows* OS-Based User Interface

Keil Software Inc.

Host Development Environments: Windows.

μ Vision is Keil Software's USA-developed, Windows OS-based front-end interface for all the company's compilers and assemblers. μ Vision includes an editor, project manager, and make facility. Compiler, assembler, and linker options are set by pointing-and-clicking on prompted selections. μ Vision's Program Manager conveniently accesses the developer's files, third-party executables, and calls the optional Keil simulator for code debugging.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabilities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: http://www.tektronix.com.

Transputer

FULL FUNCTION RTOS

Eonic Virtuoso* V.4 Real-Time Operation System

Eonic Systems, Inc.

Host Development Environments: UNIX, Windows and DOS.

Eonic Systems' Virtuoso* v.4 is a complete RTOS development environment for industry-leading DSPs and ASIC cores. The RTOS includes a System Generation Tool, Task-Level Debugger, Workload Monitor and other productivity tools. Virtuoso innovations include SoftStealth* technology, which automatically generates an application-specif-

* Trademark or registered trademark of its respective company or mark holder

Transputer

ic real-time kernel with a minimum memory footprint, and the Virtual Single Processor (VSP) programming model to accelerate multi-processor development.

For more information, contact: Jan Borghs, +32 16 62 15 85. Email inquiries to: info@eonic.com. Visit Eonic Systems, Inc. on the World Wide Web at: <http://www.eonic.com>.

Helios* Real-Time Operating System

Perihelion

Host Development Environments: UNIX and Windows.

Helios is a real-time operating system having a multi-threaded, multi-tasking kernel. It has a small ROMable micro-kernel with additional modular system servers and libraries. UNIX source compatibility, including POSIX, BSD4.3, network support based on 4.4BSD TCP/IP. Shared C run-time libraries. Kernel source included.

For more information, contact: Julia Gadd, (44) 1749-344345. Email inquiries to: sales@perihelion.co.uk. Visit Perihelion on the World Wide Web at: www.perihelion.co.uk.

LIBRARY

Windows Server Library

3L Ltd.

Host Development Environments: Windows.

The Windows DLL allows for the easy integration of DSP target code with user-interface code written in Visual C++. Simple "cookbook-style" documentation is easy to understand. Sixteen and 32-bit versions available.

For more information, contact: Alan Culloch, adc@threeL.co.uk. Email inquiries to: threeL@threeL.co.uk. Visit 3L Ltd. on the World Wide Web at: www.threeL.co.uk.

OTHER TOOLS

Logic Analyzers

Hewlett-Packard Company

Host Development Environments: N/A.

HP's digital design and debug tools help system developers solve tough hardware and software integration problems fast. The HP benchtop logic analyzers offer cost-effective 100 MHz state analysis plus five timing modes up to 500 MHz. The HP 16500 modular logic analysis systems provide the power and flexibility to handle demanding hardware and software problems.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or [/emulator](http://www.hp.com/go/emulator).

i860 RISC

Intel Corporation

FULL FUNCTION RTOS

MTOS*/ MTOS-UX Real-Time Operating Systems

Industrial Programming, Inc.

Host Development Environments: UNIX and Windows.

IPI's MTOS full-function RTOS products offer a uniform applications programming interface (API) across all supported processors, thus affording interface familiarity for programmers despite processor changes. MTOS also supports symmetric multi-processing and offers a complete coordination system for handling asynchronous operations. A "small footprint" RTOS, with code space ranging from 16KB to 45KB, MTOS is highly scalable for use with small, mid-size and very large programming projects.

For more information, contact: Bernard Mushinsky, 800-365-MTOS. Email inquiries to: info@ipi.com. Visit Industrial Programming, Inc. on the World Wide Web at: www.ipi.com.

COMPILER

DDC-I Ada Compiler Systems (DACS*)

DDC-I

Host Development Environments: UNIX and Windows.

A typical DDC-I Ada Language compiler system, the DACS-80x86 features include: compact, efficient ROMable code; modular stand-alone run-time system; advanced symbolic Ada debugger; superior real-time performance; easily configurable to developer's hardware; generates Intel OMF; supports bare PC as target; FAA-certifiable run-time system available (including tasking); supports rate-monotonic scheduling; fast and normal interrupt handling; fast Ethernet downloading; selective linking; stack analysis tools (static and dynamic); Multibus* II interface; CIFO and RTS entry-point package; numeric package using 80x87 NPX. (See other processors supported by DDC-I's compiler systems.)

For more information, contact: Morten Selling, +45 45 87 11 44. Email inquiries to: sales@ddci.dk. Visit DDC-I on the World Wide Web at: www.ddci.com.

OTHER TOOLS

CodeTEST* Software Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

CodeTEST software verification tools for embedded system developers and testers support most major 32- and 16-bit microprocessors and VME boards, and supplies tools for accurately analyzing embedded system performance, code coverage, dynamic memory allocation and memory errors, as well as a powerful software trace tool. A VME version is now available.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

Logic Analyzers

Hewlett-Packard Company

Host Development Environments: N/A.

HP's digital design and debug tools help system developers solve tough hardware and software integration problems fast. The HP benchtop logic analyzers offer cost-effective 100 MHz state analysis plus five timing modes up to 500 MHz. The HP 16500 modular logic analysis systems provide the power and flexibility to handle demanding hardware and software problems.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or [/emulator](http://www.hp.com/go/emulator).

* Trademark or registered trademark of its respective company or mark holder

SOFTWARE TOOLS FOR MICROCONTROLLERS

8051

Intel Corporation

FULL FUNCTION RTOS

Bytebos* Multitasking Operating System

Bytebos Integrated Systems

Host Development Environments: UNIX and Windows.

Bytebos is a full-featured multitasking operating system designed for use in high-performance, real-time embedded computing applications. Bytebos is configured for use with all major C compilers and debuggers and is available for a variety of microprocessors, microcontrollers, and DSPs. Bytebos applications are portable with simple licensing. There are no royalties on executables, and source code is provided.

For more information, contact: Nick Andrews, 800-788-7288. Email inquiries to: andrews@bytebos.com. Visit Bytebos Integrated Systems on the World Wide Web at: www.bytebos.com.

CMX-RTX* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-RTX RTOS provides more than 65 kernel services allowing control of tasks, events, messages, resources, semaphores, cyclic timers, queues, fixed memory blocks and UARTs. Interrupts are allowed to use some of the CMX functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. Very small ROM and RAM requirements for small-footprint applications. Several compiler vendors are supported. Source code is included, and there are no royalties.

The CMX-RTX RTOS supports an unusually large number of μ PU, μ CU, and DSP architectures from a large number of manufacturers, including: Advanced RISC Machines, Analog Devices, Hitachi, Intel, MIPS, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Sharp, Siemens, Texas Instruments, Toshiba, and Zilog.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

Advanced Development Systems: FSI-RTOS

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software provides a complete, modern real-time operating system available in three distinct levels of capability. The FSI RTOS is delivered as libraries and some source code. By adding mailboxes and other specifically selected capabilities, it can be configured by the user to accommodate a wide range of special circumstances and situations.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

RTX51* Real-Time Operating Systems

Keil Software Inc.

Host Development Environments: N/A.

RTX51 Full (#FR51) is a multitasking real-time operating system for the entire 8051 family. This powerful tool allows the developer to manage multiple tasks on a single microcontroller CPU. The RTX51 Full also includes CAN (Controller Area Network) function libraries. The RTX51 Tiny (#TR51) RTOS is a subset of the RTX51 Full RTOS. RTX51 Tiny RTOS functions include interrupt and memory management, clock, and semaphores. The Keil RTOS products are royalty-free.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

BASIC RTOS KERNEL

CMX-TINY+* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-TINY+ RTOS provides more than 40 kernel services, allowing control of: tasks, events, messages, resources, semaphores, cyclic timers, queues. Interrupts are allowed to use some of the CMX-TINY+ functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. The RTOS has very small ROM and RAM requirements, and supports several compiler vendors. Source code is included on a royalty-free basis.

The CMX-TINY+ RTOS supports an unusually large number of μ PU and μ CU architectures from the following manufacturers: Advanced RISC Machines, Hitachi, Intel, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Siemens, and Toshiba.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

RTXC* Real-Time Kernel

Embedded System Products, Inc.

Host Development Environments: UNIX and Windows.

Embedded System Products, Inc.'s RTXC is a multitasking real-time embedded kernel written primarily in C and featuring a single API for all supported processors. RTXC manages tasks and time, synchronizes with events, and permits transfer of data between tasks through 72 kernel services, including services for RAM management and exclusive access to an entity.

For more information, contact: Sales, 800-525-4302. Email inquiries to: sales@esphou.com. Visit Embedded System Products, Inc. on the World Wide Web at: www.esphou.com.

INTEGRATED DEVELOPMENT ENVIRONMENT

SwiftX* Cross-Development Environment

FORTH, Inc.

Host Development Environments: Windows and DOS.

FORTH's SwiftX is a PC-based, interactive cross-development environment for microcontroller, microprocessor or DSP-based embedded systems. SwiftX includes a Forth compiler, assembler, editor, libraries, debugger and real-time kernel, all in one package. The development environment supports Intel's 8051, 80186/80188, 8096/80196 microcontrollers and microprocessors and Motorola's 68HC11 and 68HC16 microcontrollers and 68xxx/CPU-32 processors. There are no run-time royalties for SwiftX kernels.

For more information, contact: Steve Agarwal, 800-55-FORTH. Email inquiries to: forth-sales@forth.com. Visit FORTH, Inc. on the World Wide Web at: www.forth.com.

Advanced Development System: ProView

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software's Advanced Development System IDE provides the fully Windows OS-based GUI called ProView. With ProView, the user is not required to learn and implement slow, error-prone command line arguments to the wide range of development system tools (i.e., FSI-RTOS, C compiler, macro assembler, debugger/simulator, and libraries) included in a delivery. All tools, including emulators, integrate through/with ProView.


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Electronic Design Online has been created for you, the design engineer, as the world's most comprehensive technical information resource and solution center. It offers a compendium of topics—from the contents of current *Electronic Design* issues including all the articles, schematics, and QuickLook features to ED University, Pease Porridge, Career/Job Bank, and more. Link up to our web site today for online forums, direct links to industry organizations and advertisers, trade show previews, industry surveys, technology archives, and humor. In addition, you can now utilize ED JetLINK, the industry's fastest "drill down" tool to find application- and market-specific product solutions and vendors with a minimum number of clicks in one site visit.



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www.elecdesign.com

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For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

Hitex HiTools Integrated Development Environment

Hitex Development Tools

Host Development Environments: UNIX, Windows and DOS.

The Hitex tools comprise a complete integrated development environment, including compiler, assembler, debugger and emulator for the μ Cs and μ Ps the company supports.

For more information, contact: Olaf Pfeiffer, 408-298-9077. Email inquiries to: info@hitex.com. Visit Hitex Development Tools on the World Wide Web at: http://www.hitex.com.

COMPASS/IDE* Development Environment

Production Languages Corporation

Host Development Environments: Windows and DOS.

COMPASS/IDE is a Windows* OS-hosted integrated development environment for developing software for Intel's 8051, 80251, and 8x93x (USB) Microcontrollers and Zilog's Z8, Z89462 and Z893XX Microcontrollers. Production Languages Corporation pioneered the total Windows-based development environment for embedded programmers. When a programmer launches the COMPASS/IDE, he gets a host of powerful tools such as a macro assembler, linker/locator, object librarian, optimizing ANSI C compiler, full symbolic source-level debugger, instruction simulator, drivers, ROM monitor and programmer's editor, all of which are controlled by the IDE control panel. PLC's COMPASS/IDE represents yet another software development tool set built with the company's proprietary tool-building technology, SD/ToolSmith.

For more information, contact: Mark A. Newsom, 800-525-6289. Email inquiries to: mnewsom@plcorp.com. Visit Production Languages Corporation on the World Wide Web at: www.plcorp.com.

EDE Project Environment

Tasking, Inc.

Host Development Environments: Windows.

EDE is a complete development project environment that gives the developer direct access to all the tools and features needed. EDE includes a language-sensitive editor, MAKE for automated application building and a project environment for specifying project files, including source files, tool options and build options.

For more information, contact: 1-800-458-8276. Email inquiries to: sales@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

COMPILER**Advanced Development System: Compiler**

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software provides a fast modern translator for the C language. The translator promotes continued compliance with the latest ANSI standard for C. The compiler is a smooth, integral part of the ProView* integrated development environment (IDE) and is tightly coupled to a fast color syntax-highlighting programmer's editor. The compiler supports Intel's MCS-51 and MCS-251 and Philips' 8051XA series microcontrollers.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

Keil Software C Compilers

Keil Software Inc.

Host Development Environments: Windows and DOS.

Keil Software's C compilers are full ANSI C compilers and assemblers, designed specifically for the microcontroller families that they support. μ Vision* is the Windows* OS User Interface that drives the optimizing C compilers. Compiler, assembler and linker options are point-and-click. μ Vision and the manuals are written in the USA, and extensive on-line help is included. Keil optimizing C compilers support the 8051, the 80C251 (Intel and Temic), including the USB 8x930 μ Controller families and the Siemens 161, 163, C164C1, 165, 166/167, 167CR and SGS Thomson ST10 family microcontrollers, with future derivative family chip members supported. Keil provides extensive support, free for one year, as well as on-line help and sample USB code, etc. from its Web URL.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

ASSEMBLER**Advanced Development Systems: Macro Assembler**

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software provides a fast modern translator for assembly language. The macro assembler can accept a variety of macro language standards, including Intel ASM51. The assembler is an integral part of the ProView integrated development environment (IDE) and is tightly coupled to a fast color syntax-highlighting programmer's editor.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

EMULATOR**EB-51 Emulator**

Ceibo Inc.

Host Development Environments: Windows and DOS.

The Ceibo EB-51 emulates 80C51 microcontrollers and derivatives with real-time operation up to 40MHz, and 3.3V or 5V voltage operation. It affords a simulation debug mode; source-level debugger for C, PLM and Assembler; runs under DOS and MS-Windows* OS software. The debugger supports ROMless and ROMable microcontrollers, offers 64KB of code and 64KB of data memory, data memory with mapping capabilities, a performance analyzer, real-time and conditional breakpoints, and emulation header and signal test points.

For more information, contact: Ceibo Sales, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

MetaLink ICEMaster Series Emulators

MetaLink Corporation

Host Development Environments: Windows and DOS.

MetaLink's ICEMaster Series Emulators currently supports a wide variety of 8-bit and 16-bit embedded controllers. MetaLink's emulators connect to a PC via a serial link, thus eliminating the need for a plug-in interface board. The emulators are non-intrusive, requiring no microcontroller resources (memory or communication) for emulation. The emulator software interface is a Windows* O.S.-based interface that provides a productive and cost-effective debugging environment.

For more information, contact: Scott Ritchey, 602-926-0797 x 319. Email inquiries to: sales@metaice.com. Visit MetaLink Corporation on the World Wide Web at: http://www.metaice.com or metalink.de.

EMUL51-PC* In-Circuit Emulator

Nohau Corporation

Host Development Environments: Windows.

Nohau's EMUL51-PC is a high-performance in-circuit emulator specifically designed to provide an optimized environment for development of 8051 family microcontroller hardware and software. The EMUL51-PC system communicates through a standard parallel port or via direct ISA plug-in boards. An optional trace board features advanced trace functions with sophisticated trigger capabilities.

For more information, contact: Technical Support, 408-866-1820. Email inquiries to: sales@nohau.com. Visit Nohau Corporation on the World Wide Web at: www.nohau.com.

Ashling Ultra* Series Emulators

Orion Instruments

Host Development Environments: Windows.

The Ashling Microsystems Ultra Series emulators, sold in North America by Orion Instruments, are full-featured, real-time emulation systems for 8-bit and 16-bit microcontrollers. Features include a Windows* OS-based source-level debugger, sophisticated event triggering, deep trace buffer and overlay memory. Optional performance analysis and code coverage measurement functions are available.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

Orion CT* Series Emulators

Orion Instruments

Host Development Environments: Windows.

The CT Series from Orion represents low-cost, full-featured emulation systems for 8-bit microcontrollers. Emulator features include a Windows* OS-based source-level debugger, multi-event triggering, non-intrusive trace capture, overlay memory and full

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8051**Intel Corporation**

in-circuit emulation. Performance analysis and code-coverage measurement functions are optional.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

Signum USP-51A In-Circuit Emulator

Signum Systems Corporation

Host Development Environments: Windows.

Signum's high-performance USP-51A Emulator supports virtually all Intel, Dallas, Atmel, Philips, Siemens, Oki and MHS 8051 microcontroller family members with interchangeable pods. The emulator interfaces to a PC via a serial or parallel port and features a trace buffer, C level debugging and dual-ported memory access.

For more information, contact: Jerry Lewandowski, 805-523-9774. Email inquiries to: sales@signum.com. Visit Signum Systems Corporation on the World Wide Web at: <http://www.signum.com>.

DEBUGGER**DB-501 Debugger**

Ceibo Inc.

Host Development Environments: Windows and DOS.

Ceibo's DB-501 debugger supports all Siemens SAB-C500 microcontrollers with frequency ranges up to 40MHz. The product includes: 64KB of code and 64KB of data memory (with mapping capabilities); 8KB-deep real-time trace; emulation headers for different microcontroller versions; external test points and real-time and conditional breakpoints; a source-level debugger for Assembler, PLM and C; and a performance analyzer.

For more information, contact: Ceibo Sales, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

DB-51 Debugger

Ceibo Inc.

Host Development Environments: Windows and DOS.

Ceibo's DB-51 debugger for MCS[®] 51 microcontrollers features 32KB user code memory; software breakpoints; examine and alter chip registers, RAM and ports; source-level debugger; on-line assembler and disassembler; an included power supply; upload and download of object and hex files; special wire-wrap area for prototyping; a user's manual with examples and applications. The debugger is adaptable to 80C51XA microcontrollers.

For more information, contact: Ceibo Sales, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

Advanced Development System: WinSim

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software provides a fast, modern debugger/simulator. WinSim is capable of simulating a wide variety of embedded microcontrollers through the use of dynamically selectable DLLs. The WinSim debugger/simulator is an integral part of the ProView integrated development environment (IDE) and is tightly coupled to a fast multi-mode simulation engine.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

Source Gate[®] II Source-Level Debugger

Huntsville Microsystems Inc. (HMI)

Host Development Environments: UNIX and Windows.

The Source Gate II is a full-featured source-level debugger that provides a common user interface to all Huntsville Microsystems, Inc. products, including SPS-2000 series emulators, HMI-2000 series emulators, Background Mode Debuggers (BMDs), and CPU simulators. The Source Gate II Debugger provides a watch window for viewing/changing memory variables; multiple CodeView windows that allow emulator operations to be controlled from a user file displayed in source, assembly, or a combination of the two. Provides C++/RTOS support and more.

For more information, contact: James Bell, 205-881-6005. Email inquiries to: sales@hmi.com. Visit Huntsville Microsystems Inc. (HMI) on the World Wide Web at: www.hmi.com.

dScope[®]-51/251/166 Debugger

Keil Software Inc.

Host Development Environments: Windows.

Keil Software's dScope is a source-level debugger that allows a developer to debug programs created with Keil compilers. The dScope debugger simulates the program in either stand-alone mode or in the target system by using the monitor. External hardware, signals, and interrupts can be simulated. The debugger's viewable windows include capabilities to view the program from I/O, Trace, Stack, Watch and CPU Registers.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

Signum Chameleon Debugger

Signum Systems Corporation

Host Development Environments: Windows.

Signum's Chameleon Debugger supports the 8051, 80196, 80186, DSPs and the Compact RISC processors under a 32-bit Windows[®] O.S. environment. The debugger interfaces with emulators from Signum Systems, Lucent Technologies, National Semiconductor and Texas Instruments to provide a development environment for software and hardware designers.

For more information, contact: Jerry Lewandowski, 805-523-9774. Email inquiries to: sales@signum.com. Visit Signum Systems Corporation on the World Wide Web at: <http://www.signum.com>.

CrossView[®] Pro Debugger

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking's CrossView Pro debugger delivers functionality that reduces time requirements for program testing and debugging, and includes the following: tracking scope and monitoring locals; an intelligent source window; and code coverage and performance analysis. CrossView Pro provides multiple views of the developer's code: C and/or assembly source, monitor, inspect, on-chip registers, call stack, variables, breakpoint, execution trace, session log, simulated I/O and memory dumps.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

LIBRARY**Advanced Development Systems: Special Function Libraries**

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software continues to provide a long list of standard and special function libraries. Each C-based product delivered includes all standard ANSI string, math, standard function, and transcendental libraries. In addition, hundreds of special "intrinsic", communications, and utility functions are included as a part of all standard deliveries.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

Keil's CAN Library

Keil Software Inc.

Host Development Environments: N/A.

Keil Software's RTX51 and RTX166 Full RTOS products support Controller Area Network (CAN) controllers with the inclusion of CAN libraries, which are packaged with the RTOS products. The CAN interface is popular for both automotive and industrial markets. The libraries support 11- and 29-bit identifiers and interface with Keil's compilers for the Siemens 166 and Intel 8051/251 microcontroller families, as well as interfacing to Keil's RTOS products.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

OTHER TOOLS**DS-51 Development System**

Ceibo Inc.

Host Development Environments: Windows and DOS.

Ceibo's DS-51 Development System has a real-time and transparent in-circuit emulator that supports most 8051 microcontroller derivatives. The DS-51 emulates 1.5V to 6V microcontrollers, at a maximum frequency of 42MHz, with 128KB internal memory and 32KB trace memory 'on the fly.' The system supports 64K hardware and conditional

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breakpoints, has a source-level debugger for Assembler, PLM and C, an on-line assembler and disassembler, and a performance analyzer.

For more information, contact: Ceibo Sales, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

MP-51 Programmer

Ceibo Inc.

Host Development Environments: Windows and DOS.

Ceibo's MP-51 is an EPROM, Flash, PLD and microcontroller programmer that programs all 8051 microcontrollers (all vendors), programs 16-bit microcontrollers, supports 24 to 32-pin EPROMs and programs 32-pin Flash memories, PLD and PSD3XX devices. The programmer has macros and easy-to-follow menus, handles hex, binary, object and JEDEC files. It programs DIP, QFP, LCC and PLCC-packaged devices, supports lock bits, encryption tables and security bits, and includes format converters.

For more information, contact: Ceibo Sales, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

ApBUILDER* Expert Development Software

Intel Corporation

Host Development Environments: N/A.

Intel's ApBUILDER Development Software features include: interactive programming software for embedded applications; Windows interface for ease of use; the ability to program without prior knowledge of the architecture; generation of microcontroller peripheral initialization code with the click of a mouse; code generation in Assembler or C; context-sensitive screens that interface directly to Hypertext device user's manuals and data sheets; continuous expansion to the program and improvements to cover new logic devices; available FREE on Intel bulletin boards and downloadable via the company's WWW site at <http://developer.intel.com>.

For more information, contact: Local Intel Sales Office or Distributor. Email inquiries to: N/A. Visit Intel Corporation on the World Wide Web at: www.intel.com.

µVision* Windows* OS-Based User Interface

Keil Software Inc.

Host Development Environments: Windows.

µVision is Keil Software's USA-developed, Windows OS-based front-end interface for all the company's compilers and assemblers. µVision includes an editor, project manager, and make facility. Compiler, assembler, and linker options are set by pointing-and-clicking on prompted selections. µVision's Program Manager conveniently accesses the developer's files, third-party executables, and calls the optional Keil simulator for code debugging.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

SoftControl IEC 1131-3 Programming System

Softing

Host Development Environments: Windows.

SoftControl is an IEC 1131-3-compliant programming system for all kinds of industrial controls, from LON to PLCs and PCs. The system supports all languages, functions and function blocks according to the standard. The backend is designed to be completely object-oriented and can be easily adapted to different target systems. A C-code generator is optionally available.

For more information, contact: Dr. Goetz Guetlich, ++49 89 456 56 311. Email inquiries to: info.softcontrol@softing.com. Visit Softing on the World Wide Web at: <http://www.softing.com>.

Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabilities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: <http://www.tektronix.com>.

68HCxx**Motorola Semiconductor****FULL FUNCTION RTOS****Bytebos* Multitasking Operating System**

Bytebos Integrated Systems

Host Development Environments: UNIX and Windows.

Bytebos is a full-featured multitasking operating system designed for use in high-performance, real-time embedded computing applications. Bytebos is configured for use with all major C compilers and debuggers and is available for a variety of microprocessors, microcontrollers, and DSPs. Bytebos applications are portable with simple licensing. There are no royalties on executables, and source code is provided.

For more information, contact: Nick Andrews, 800-788-7288. Email inquiries to: andrews@bytebos.com. Visit Bytebos Integrated Systems on the World Wide Web at: www.bytebos.com.

CMX-RTX* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-RTX RTOS provides more than 65 kernel services allowing control of tasks, events, messages, resources, semaphores, cyclic timers, queues, fixed memory blocks and UARTs. Interrupts are allowed to use some of the CMX functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. Very small ROM and RAM requirements for small-footprint applications. Several compiler vendors are supported. Source code is included, and there are no royalties.

The CMX-RTX RTOS supports an unusually large number of µPU, µCU, and DSP architectures from a large number of manufacturers, including: Advanced RISC Machines, Analog Devices, Hitachi, Intel, MIPS, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Sharp, Siemens, Texas Instruments, Toshiba, and Zilog.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

BASIC RTOS KERNEL**Nucleus PLUS* Real-Time Operating System**

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus PLUS is designed as a core component for an operating system environment. It is extensible and dynamic. Its modular design allows services to be easily produced by combining existing services. All of the Nucleus PLUS components (tasks, queues, semaphores, etc.) can be dynamically created and deleted. Each component has a control block defined by the user and placed anywhere in the available memory space of the target system. Nucleus PLUS is a real-time, pre-emptive, multitasking kernel designed for time-critical embedded applications. Approximately 95 percent of Nucleus PLUS is extremely portable and is currently available for use with most microprocessor families.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

CMX-TINY+* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-TINY+ RTOS provides more than 40 kernel services, allowing control of: tasks, events, messages, resources, semaphores, cyclic timers, queues. Interrupts are allowed to use some of the CMX-TINY+ functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. The RTOS has very small ROM and RAM requirements, and supports several compiler vendors. Source code is included on a royalty-free basis.

The CMX-TINY+ RTOS supports an unusually large number of µPU and µCU architectures from the following manufacturers: Advanced RISC Machines, Hitachi, Intel, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Siemens, and Toshiba.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

RTXC* Real-Time Kernel

Embedded System Products, Inc.

Host Development Environments: UNIX and Windows.

Embedded System Products, Inc.'s RTXC is a multitasking real-time embedded kernel written primarily in C and featuring a single API for all supported processors. RTXC

manages tasks and time, synchronizes with events, and permits transfer of data between tasks through 72 kernel services, including services for RAM management and exclusive access to an entity.

For more information, contact: Sales, 800-525-4302. Email inquiries to: sales@esphou.com. Visit Embedded System Products, Inc. on the World Wide Web at: www.esphou.com.

INTEGRATED DEVELOPMENT ENVIRONMENT

COSMIC* C Cross Compilers

COSMIC Software Inc.

Host Development Environments: UNIX, Windows and DOS.

COSMIC C cross compilers are designed specifically for each family of microcontrollers. All processors in each family are supported. A special code generator and optimizer targeted for each specific family eliminates the overhead of a more generic compiler. The package includes an ANSI C compiler, assembler, linker, librarian, object inspector, hex file generator, object format converters, debugging support utilities, run-time library, and source code, compiler command driver and integration files for Premia's Codewright* Windows Editor for a complete integrated development environment (IDE).

For more information, contact: Alan Johnson, 617-932-2556. Email inquiries to: sales@cosmic-us.com. Visit COSMIC Software Inc. on the World Wide Web at: www.cosmic-js.com.

SwiftX* Cross-Development Environment

FORTH, Inc.

Host Development Environments: Windows and DOS.

FORTH's SwiftX is a PC-based, interactive cross-development environment for microcontroller, microprocessor or DSP-based embedded systems. SwiftX includes a Forth compiler, assembler, editor, libraries, debugger and real-time kernel, all in one package. The development environment supports Intel's 8051, 80186/80188, 8096/80196 microcontrollers and microprocessors and Motorola's 68HC11 and 68HC16 microcontrollers and 68xxx/CPU-32 processors. There are no run-time royalties for SwiftX kernels.

For more information, contact: Steve Agarwal, 800-55-FORTH. Email inquiries to: forth-sales@forth.com. Visit FORTH, Inc. on the World Wide Web at: www.forth.com.

Hitex HiTools Integrated Development Environment

Hitex Development Tools

Host Development Environments: UNIX, Windows and DOS.

The Hitex tools comprise a complete integrated development environment, including compiler, assembler, debugger and emulator for the μ Cs and μ Ps the company supports.

For more information, contact: Olaf Pfeiffer, 408-298-9077. Email inquiries to: info@hitex.com. Visit Hitex Development Tools on the World Wide Web at: <http://www.hitex.com>.

COMPILER

Byte Craft C6808 Code Development System-Compiler

Byte Craft Limited

Host Development Environments: UNIX, Windows and DOS.

The Byte Craft Limited C6808 optimizing C cross-compiler is targeted to the Motorola 68HC08 family of microcontrollers. The compiler is part of an integrated development environment, including a linker, editor and built-in macro assembler. The Code Development System allows for programming in C without sacrificing code size or speed. C6808 produces ROMable code, symbol information and includes interrupt support.

For more information, contact: Karen McMurray, 519-888-6911. Email inquiries to: info@bytecraft.com. Visit Byte Craft Limited on the World Wide Web at: www.bytecraft.com.

C6805 Code Development System/Compiler

Byte Craft Limited

Host Development Environments: UNIX, Windows, DOS, Solaris and HP-UX.

The Byte Craft Limited C6805 optimizing C cross-compiler is targeted to the Motorola 68HC05 family of microcontrollers. The compiler is part of an integrated development environment including a linker, editor and built-in macro assembler. The C6805 Code Development System allows for programming in C without sacrificing code size or speed. C6805 produces ROMable code, symbol information and includes interrupt sup-

port. A companion product, the E6805 Symbolic Host Support provides C source-level debugging for the Motorola EVM and EVS boards.

For more information, contact: Karen McMurray, 519-888-6911. Email inquiries to: info@bytecraft.com. Visit Byte Craft Limited on the World Wide Web at: www.bytecraft.com.

EMULATOR

MetaLink ICEMaster Series Emulators

MetaLink Corporation

Host Development Environments: Windows and DOS.

MetaLink's ICEMaster Series Emulators currently supports a wide variety of 8-bit and 16-bit embedded controllers. MetaLink's emulators connect to a PC via a serial link, thus eliminating the need for a plug-in interface board. The emulators are non-intrusive, requiring no microcontroller resources (memory or communication) for emulation. The emulator software interface is a Windows* O.S.-based interface that provides a productive and cost-effective debugging environment.

For more information, contact: Scott Ritchey, 602-926-0797 x 319. Email inquiries to: sales@metalink.com. Visit MetaLink Corporation on the World Wide Web at: <http://www.metalink.de>.

PowerPack* In-Circuit Emulator

Microtek International

Host Development Environments: Windows.

Microtek International's high-performance PowerPack in-circuit emulators combine a state-of-the-art source-level debugger with the most advanced trigger-and-trace system available. Users can relate clock-edge hardware timing events back to source code without stopping the target system. PowerPack emulators support Pentium, Intel486, National NS486, Intel386, Intel 80C186, AMD Am186 and Motorola 683xx/HC16 processors.

For more information, contact: 800-886-7333 or 503-645-7333. Email inquiries to: info@microtekintl.com. Visit Microtek International on the World Wide Web at: www.microtekintl.com.

EMUL12-PC* BDM Emulator

Nohau Corporation

Host Development Environments: Windows.

Nohau's EMUL12-PC Background Debug Mode Emulator supports non-intrusive emulation for Motorola's 68HC12 microcontroller through the new, single-wire BDM interface of the HC12. An EMUL12-PC/BDM system consists of a small PC plug-in board which connects to a BDM pod through a flexible ribbon cable. For ease of use, the EMUL12-PC/BDM emulator features a user-friendly Microsoft Windows* OS interface.

For more information, contact: Technical Support, 408-866-1820. Email inquiries to: sales@nohau.com. Visit Nohau Corporation on the World Wide Web at: www.nohau.com.

EMUL16/300-PC* In-Circuit Emulator

Nohau Corporation

Host Development Environments: Windows.

The EMUL16/300-PC is a high-performance emulator for two families of microcontrollers: Motorola's 68HC16 and 68300. The user-friendly Microsoft Windows* software features windows for editing variables, RAM, registers and instructions. An optional trace board features advanced trace functions with sophisticated trigger capabilities.

For more information, contact: Technical Support, 408-866-1820. Email inquiries to: sales@nohau.com. Visit Nohau Corporation on the World Wide Web at: www.nohau.com.

EMUL68-PC* In-Circuit Emulator

Nohau Corporation

Host Development Environments: Windows.

Nohau's EMUL68-PC in-circuit emulator provides an extensive set of features at a reasonable cost, with minimal intrusion into the developer's hardware or software. EMUL68-PC was also designed to be fast. Consequently, emulation occurs in real time at full processor speed without requiring any memory space, I/O pins, interrupt pins, wait states or stolen bus cycles.

For more information, contact: Technical Support, 408-866-1820. Email inquiries to: sales@nohau.com. Visit Nohau Corporation on the World Wide Web at: www.nohau.com.

* Trademark or registered trademark of its respective company or mark holder

68HCxx**Motorola Semiconductor****Ashling Ultra* Series Emulators**

Orion Instruments

Host Development Environments: Windows.

The Ashling Microsystems Ultra Series emulators, sold in North America by Orion Instruments, are full-featured, real-time emulation systems for 8-bit and 16-bit microcontrollers. Features include a Windows* OS-based source-level debugger, sophisticated event triggering, deep trace buffer and overlay memory. Optional performance analysis and code coverage measurement functions are available.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

Orion CT* Series Emulators

Orion Instruments

Host Development Environments: Windows.

The CT Series from Orion represents low-cost, full-featured emulation systems for 8-bit microcontrollers. Emulator features include a Windows* OS-based source-level debugger, multi-event triggering, non-intrusive trace capture, overlay memory and full in-circuit emulation. Performance analysis and code-coverage measurement functions are optional.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

DEBUGGER**ZAP BDM Debugger**

COSMIC Software Inc.

Host Development Environments: Windows.

ZAP is a full-featured C and Assembly source-level debugger featuring ANSI C debugging, high-level RTXC kernel integration, source browsing, graphical performance analysis, chronograms and full on-line help. ZAP BDM offers a source-level real-time debugging environment for Motorola's standard Background Debug Mode Interface (i.e. ICD cable or EVB board).

For more information, contact: Alan Johnson, 617-932-2556. Email inquiries to: sales@cosmic-us.com. Visit COSMIC Software Inc. on the World Wide Web at: www.cosmic-us.com.

ZAP MMDS Debugger

COSMIC Software Inc.

Host Development Environments: Windows.

ZAP is a full-featured C and Assembly source-level debugger featuring ANSI C debugging, high-level RTXC kernel integration, source browsing, graphical performance analysis, chronograms and full on-line help. ZAP MMDS provides interface and full source-level debugger for Motorola's MMDS05 and MMDS08.

For more information, contact: Alan Johnson, 617-932-2556. Email inquiries to: sales@cosmic-us.com. Visit COSMIC Software Inc. on the World Wide Web at: www.cosmic-us.com.

ZAP MON Debugger

COSMIC Software Inc.

Host Development Environments: Windows.

ZAP is a full-featured C and Assembly source-level debugger featuring ANSI C debugging, high-level RTXC kernel integration, source browsing, graphical performance analysis, chronograms and full on-line help. The ZAP Monitor version uses a small monitor program to provide a source-level debugging environment via a serial connection to several standard evaluation boards. ZAP MON includes monitor source code.

For more information, contact: Alan Johnson, 617-932-2556. Email inquiries to: sales@cosmic-us.com. Visit COSMIC Software Inc. on the World Wide Web at: www.cosmic-us.com.

ZAP SDI Debugger

COSMIC Software Inc.

Host Development Environments: Windows.

ZAP is a full-featured C and Assembly source-level debugger featuring ANSI C debugging, high-level RTXC kernel integration, source browsing, graphical performance analysis, chronograms and full on-line help. ZAP SDI adds a real-time C and Assembly source-level debug to Motorola's new Serial Debug Interface to the Background Debug Mode.

For more information, contact: Alan Johnson, 617-932-2556. Email inquiries to: sales@cosmic-us.com. Visit COSMIC Software Inc. on the World Wide Web at: www.cosmic-us.com.

ZAP* SIM Debugger

COSMIC Software Inc.

Host Development Environments: Windows and OSF MOTIF.

ZAP is a full-featured C and Assembly source-level debugger featuring ANSI C debugging, high-level RTXC kernel integration, source browsing, graphical performance analysis, chronograms and full on-line help. ZAP Simulator integrates a software CPU simulator with a full source-level debugger to provide a complete debugging environment on the host machine.

For more information, contact: Alan Johnson, 617-932-2556. Email inquiries to: sales@cosmic-us.com. Visit COSMIC Software Inc. on the World Wide Web at: www.cosmic-us.com.

Source Gate* II Source-Level Debugger

Huntsville Microsystems Inc. (HMI)

Host Development Environments: UNIX and Windows.

The Source Gate II is a full-featured source-level debugger that provides a common user interface to all Huntsville Microsystems, Inc. products, including SPS-2000 series emulators, HMI-2000 series emulators, Background Mode Debuggers (BMDs), and CPU simulators. The Source Gate II Debugger provides a watch window for viewing/changing memory variables; multiple CodeView windows that allow emulator operations to be controlled from a user file displayed in source, assembly, or a combination of the two. Provides C++/RTOS support and more.

For more information, contact: James Bell, 205-881-6005. Email inquiries to: sales@hmi.com. Visit Huntsville Microsystems Inc. (HMI) on the World Wide Web at: www.hmi.com.

Flex-BDM* Debugger

Noral Micrologics Limited

Host Development Environments: Windows.

The debugging of software for Motorola's 68HC12, 683xx and ColdFire processors is supported by Noral's low-cost Flex-BDM Debugger product range. Flex-BDM is different from the common background-debug-mode (BDM) cable solutions, because each system includes custom logic and a control processor, enhancing the debugging capabilities beyond the basic BDM specification. A demonstration disk is available from Noral.

For more information, contact: Harry Erickson, 508-647-0103 (U.S. Office). Email inquiries to: noral@noral.co.uk. Visit Noral Micrologics Limited on the World Wide Web at: www.noral.com.

OTHER TOOLS**VSP-TAP*/EagleI* Co-Verification Tools**

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

Applied's VSP-TAP and the EagleI co-verification environment from Viewlogic Systems provides software operation verification against a hardware description model (HDL). VSP-TAP adds enhanced real-time capabilities, connecting the simulated environment, the actual processor, and real-world data at real processor speeds, and supplying access to an emulator's full debugging capabilities.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

DS-M8 Development System

Ceibo Inc.

Host Development Environments: Windows and DOS.

Ceibo's DS-M8 Development System supports Motorola's HC05/HC08 microcontrollers and can be adapted to support Microchip Technology's PIC series microcontrollers. The system includes a real-time, transparent in-circuit emulator that supports a maximum frequency of 40MHz; a 128KB internal memory and a 32KB trace memory and logic analyzer; 64KB hardware and conditional breakpoints; DOS* and MS-Windows* OS debuggers; an on-line assembler and disassembler; and a performance analyzer.

For more information, contact: Ceibo Sales, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

TPU Microcode

Electro-Logic Machines, Inc.

Host Development Environments: Any Host.

The TPU is a programmable timing/control co-processor included in several of

* Trademark or registered trademark of its respective company or mark holder

68HCxx**Motorola Semiconductor**

Motorola's microcontrollers. ELMi has established a growing library of off-the-shelf functions which extend the capabilities of the TPU. Microcode functions currently available include: micro-stepping motor controller, synchronous serial-stream decoder, UART with CTS control, high-resolution min/max/average signal timing, I2C serial bus master, sampled input frequency measurement, and super-fast quadrature decode. ELMi also provides custom microcode development services and development support services for real-time embedded systems.

For more information, contact: Eric McRae, 360-379-0969. Email inquiries to: sales@elmi.com. Visit Electro-Logic Machines, Inc. on the World Wide Web at: www.elmi.com/elmi.

Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabilities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: http://www.tektronix.com.

683xx**Motorola Semiconductor****FULL FUNCTION RTOS****CMX-RTX* Real-Time Operating System**

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-RTX RTOS provides more than 65 kernel services allowing control of tasks, events, messages, resources, semaphores, cyclic timers, queues, fixed memory blocks and UARTs. Interrupts are allowed to use some of the CMX functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. Very small ROM and RAM requirements for small-footprint applications. Several compiler vendors are supported. Source code is included, and there are no royalties.

The CMX-RTX RTOS supports an unusually large number of μ PU, μ CU, and DSP architectures from a large number of manufacturers, including: Advanced RISC Machines, Analog Devices, Hitachi, Intel, MIPS, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Sharp, Siemens, Texas Instruments, Toshiba, and Zilog.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

PDOS Real-Time Operating System

Eyring Corporation

Host Development Environments: UNIX and Windows.

PDOS is a high-performance real-time operating system. It is reliable, deterministic, and proven in thousands of applications. A modular architecture makes PDOS a flexible solution for applications ranging from tightly embedded applications to distributed multi-user, multi-processor systems. The PDOS development model is supported by world-class tools for C, C++, and Ada applications, as well as source-level, multiple-task debugging.

For more information, contact: Clark Roundy, 801-561-1111. Email inquiries to: pdos-info@eyring.com. Visit Eyring Corporation on the World Wide Web at: www.eyring.com.

MTOS*/ MTOS-UX Real-Time Operating Systems

Industrial Programming, Inc.

Host Development Environments: UNIX and Windows.

IPI's MTOS* full-function RTOS products offer a uniform applications programming interface (API) across all supported processors, thus affording interface familiarity for programmers despite processor changes. MTOS also supports symmetric multi-processing and offers a complete coordination system for handling asynchronous operations. A "small footprint" RTOS, with code space ranging from 16KB to 45KB, MTOS is highly scalable for use with small, mid-size and very large programming projects.

For more information, contact: Bernard Mushinsky, 800-365-MTOS. Email inquiries to: info@ipi.com. Visit Industrial Programming, Inc. on the World Wide Web at: www.ipi.com.

AMX* Real-Time Multitasking Kernel

KADAK Products Ltd.

Host Development Environments: Windows and DOS.

KADAK's AMX Real-Time Operating System is a full-featured, fast, compact, ROMable kernel. AMX includes: preemptive, priority-based scheduler (optional time-slicing); nested interrupts with priority ordering; mailbox, semaphore, resource, event, list, buffer and memory managers; the Configuration Builder Utility eases system construction. And for debugging, KADAK's KwikLook* fault finder exploits SDS's SingleStep* and SSI's VisualProbe* debuggers for fully AMX RTOS-aware debugging.

For more information, contact: Sales, 604-734-2796. Email inquiries to: amxsales@kadak.com. Visit KADAK Products Ltd. on the World Wide Web at: www.kadak.com.

BASIC RTOS KERNEL**Nucleus* C++ RTOS Kernel**

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus C++ is a version of the Nucleus PLUS kernel that provides an object-oriented interface to an application. Although the core of the product is the Nucleus PLUS kernel (thereby reinforcing its robustness), the interface has been completely redesigned with all of the standard C++ mechanisms including constructors, destructors, and the like. Tests indicate that the incorporation of these facilities has minimal impact on the code size and performance of the final application.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

Nucleus PLUS* Real-Time Operating System

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus PLUS is designed as a core component for an operating system environment. It is extensible and dynamic. Its modular design allows services to be easily produced by combining existing services. All of the Nucleus PLUS components (tasks, queues, semaphores, etc.) can be dynamically created and deleted. Each component has a control block defined by the user and placed anywhere in the available memory space of the target system. Nucleus PLUS is a real-time, pre-emptive, multitasking kernel designed for time-critical embedded applications. Approximately 95 percent of Nucleus PLUS is extremely portable and is currently available for use with most microprocessor families.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

CMX-TINY+* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-TINY+ RTOS provides more than 40 kernel services, allowing control of: tasks, events, messages, resources, semaphores, cyclic timers, queues. Interrupts are allowed to use some of the CMX-TINY+ functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. The RTOS has very small ROM and RAM requirements, and supports several compiler vendors. Source code is included on a royalty-free basis.

The CMX-TINY+ RTOS supports an unusually large number of μ PU and μ CU architectures from the following manufacturers: Advanced RISC Machines, Hitachi, Intel, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Siemens, and Toshiba.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

RTXC* Real-Time Kernel

Embedded System Products, Inc.

Host Development Environments: UNIX and Windows.

Embedded System Products, Inc.'s RTXC is a multitasking real-time embedded kernel written primarily in C and featuring a single API for all supported processors. RTXC manages tasks and time, synchronizes with events, and permits transfer of data between tasks through 72 kernel services, including services for RAM management and exclusive access to an entity.

For more information, contact: Sales, 800-525-4302. Email inquiries to: sales@esphou.com. Visit Embedded System Products, Inc. on the World Wide Web at: www.esphou.com.

* Trademark or registered trademark of its respective company or mark holder

683xx**Motorola Semiconductor****Precise/MQX* & MQX+m Real-Time Executive**

Precise Software Technologies Inc.

Host Development Environments: .

Precise Software Technologies' Precise/MQX* is a portable high-performance, real-time executive. MQX is scalable from a single processor to distributed multiprocessor configurations. The real-time executive provides functions for multitasking, intertask communications and synchronization, dynamic interrupt management, and memory management. Optional protocols for networking and data communications are also available.

For more information, contact: Clarke Esler, 508-264-4413. Email inquiries to: info@psti.com. Visit Precise Software Technologies Inc. on the World Wide Web at: www.psti.com.

INTEGRATED DEVELOPMENT ENVIRONMENT**CAD-UL Workbench* Development Systems**

CAD-UL, Inc.

Host Development Environments: UNIX and Windows and VMS.

CAD-UL provides a complete development environment for 80x86/Pentium (Real and Protected Mode) and 680x0/683xx target processors. The CAD-UL tool chain includes a C/C++ compiler, assembler, linker and high-level language debugger, all tightly integrated into a development environment (IDE) called Workbench. The CAD-UL XDB debugger interfaces to popular third-party real-time operating systems, in-circuit emulators, and is available as a ROM-monitor solution for debugging of actual hardware. The compiler systems are best known for generating highly optimized code.

For more information, contact: Jeff Liborio/Mike Halpin, 602-945-8188. Email inquiries to: us.sales@cadul.com. Visit CAD-UL, Inc. on the World Wide Web at: www.cadul.com.

COSMIC* C Cross Compilers

COSMIC Software Inc.

Host Development Environments: UNIX, Windows and DOS.

COSMIC C cross compilers are designed specifically for each family of microcontrollers. All processors in each family are supported. A special code generator and optimizer targeted for each specific family eliminates the overhead of a more generic compiler. The package includes an ANSI C compiler, assembler, linker, librarian, object inspector, hex file generator, object format converters, debugging support utilities, run-time library, and source code, compiler command driver and integration files for Premia's Codewright* Windows Editor for a complete integrated development environment (IDE).

For more information, contact: Alan Johnson, 617-932-2556. Email inquiries to: sales@cosmic-us.com. Visit COSMIC Software Inc. on the World Wide Web at: www.cosmic-us.com.

PDOS PowerSuite

Eyring Corporation

Host Development Environments: Windows.

PDOS PowerSuite is a collection of easy to use tools that comprise a 32-bit multitasking, Windows-based embedded systems development environment. It gives PDOS and PDOSpro developers complete control of their real-time development environment. This toolset includes a GUI control center, operating system configuration and integration tools, complete on-line documentation, and links to compilers, debuggers, and other development tools.

For more information, contact: Clark Roundy, 801-561-1111. Email inquiries to: pdos-info@eyring.com. Visit Eyring Corporation on the World Wide Web at: www.eyring.com.

SwiftX* Cross-Development Environment

FORTH, Inc.

Host Development Environments: Windows and DOS.

FORTH's SwiftX is a PC-based, interactive cross-development environment for microcontroller, microprocessor or DSP-based embedded systems. SwiftX includes a Forth compiler, assembler, editor, libraries, debugger and real-time kernel, all in one package. The development environment supports Intel's 8051, 80186/80188, 8096/80196 microcontrollers and microprocessors and Motorola's 68HC11 and 68HC16 microcontrollers and 68xxx/CPU-32 processors. There are no run-time royalties for SwiftX kernels.

For more information, contact: Steve Agarwal, 800-55-FORTH. Email inquiries to: forth-sales@forth.com. Visit FORTH, Inc. on the World Wide Web at: www.forth.com.

Hitex HiTools Integrated Development Environment

Hitex Development Tools

Host Development Environments: UNIX, Windows and DOS.

The Hitex tools comprise a complete integrated development environment, including compiler, assembler, debugger and emulator for the μ Cs and μ Ps the company supports.

For more information, contact: Olaf Pfeiffer, 408-298-9077. Email inquiries to: info@hitex.com. Visit Hitex Development Tools on the World Wide Web at: <http://www.hitex.com>.

Metrowerks' CodeWarrior*

Metrowerks Corporation

Host Development Environments: UNIX and Windows.

Metrowerks' CodeWarrior is transforming embedded system development by offering the most intuitive GUI development tools available under Windows* 95/NT operating systems at a fraction of the cost of traditional command-line tools. With CodeWarrior, the developer gets a complete suite of tools (IDE) to create, compile, link, debug, and assemble fast, optimized embedded system code.

For more information, contact: Jenny Page, 512-873-4740. Email inquiries to: sales@metrowerks.com. Visit Metrowerks Corporation on the World Wide Web at: <http://www.metrowerks.com>.

Spectra* Development System

Microtec

Host Development Environments: UNIX and Windows.

Microtec's Spectra development system represents the next-generation Embedded IDE (Integrated Development Environment) for real-time and embedded software. Spectra addresses the full range of embedded applications, from austere, minimal-resource systems with no real-time operating system requirements, up to complex, resource-intensive systems. Designed specifically for real-world embedded applications, Spectra radically reduces target memory consumption, allowing more room for innovation at the application level. Organizations standardizing on Spectra can focus on a single software architecture - on both the host and target - thereby leveraging the full benefits of cross-training, consolidated support and simplified maintenance.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

COMPILER**D-C++ C/C++ Cross-Compiler Suite**

Diab Data, Inc.

Host Development Environments: UNIX and Windows.

D-C++ is a highly-optimizing C/C++ compiler, producing exceptionally fast, compact, accurate code for the PowerPC, 68K/CPU32, ColdFire, and MCORE processor-based applications. The D-C++ compiler is fully ANSI compliant and works with all popular debug, RTOS, and emulation systems. The suite contains a compiler, assembler, linker, profiler, program checker, archiver, advanced libraries package, and other utilities. An optional RTA (Real-Time Analysis) Suite enables developers to enhance program performance, reliability and memory utilization.

For more information, contact: Jan Liband, 415-571-1700. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

D-CC C Cross-Compiler Suite

Diab Data, Inc.

Host Development Environments: UNIX and Windows and Others.

Diab Data's D-CC is a highly-optimizing C compiler, producing exceptionally fast, compact, target-specific code for Motorola's PowerPC, 68K/CPU32, ColdFire and MCORE Processor-based applications. The D-CC compiler is fully ANSI and EABI compliant, works with all popular debug, RTOS, and emulation systems. The suite provides the compiler, assembler, linker, profiler, program checker, archiver, advanced libraries package, and other utilities. An optional Real-Time Analysis Suite (RTA) enables developers to enhance program performance, reliability, and memory utilization.

For more information, contact: Jan Liband, 415-571-1700. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

Run-Time Analysis Tools For Diab Data Compilers

Diab Data, Inc.

Host Development Environments: UNIX and Windows.

Diab Data's RTA Suite is a suite of visual run-time analysis tools for improving program performance, reliability, and memory utilization. The RTA Suite works in conjunction with Diab Data's C/C++ compilers and includes a Visual Interactive Profiler, a Run-Time Error Checker, and a Link Map Analyzer for visualizing memory-map setups.

* Trademark or registered trademark of its respective company or mark holder

683xx**Motorola Semiconductor**

For more information, contact: Jan Liband, 650-571-1700 x227. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

ASSEMBLER**GNUPro* Toolkit**

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit is a solution to the problem of delivering quality software to meet the increasingly tighter schedules required by today's marketplace. The highly optimized tool chain for a specific host-target combination drives competitive speed- and size-performance advantages into a developer's software without compromising either its portability or maintainability. The fully-featured debug tools and utilities significantly help to shorten the development, test, and validation cycles. Cygnus backs the GNU technology with a commitment to rapid and expert support. All GNUPro tool chains for native and embedded programming are bundled with mission-critical support services and guaranteed technical response times.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

EMULATOR**visionICE* Emulator**

EST Corporation

Host Development Environments: UNIX and Windows.

EST's visionICE emulator is available for PowerPC MPC8xx, ColdFire MCF52xx and 683xx families. This completely scalable, single-solution emulator meets a wide range of performance and budget requirements. Modules for low-cost target control (visionBDM), integrated Ethernet support (visionNET), overlay memory (visionMEM), internal register configuring (visionSIM) and full-scale, real-time emulation (visionEVENT) can be added or shared at any time, boosting the developer's arsenal of debugging weapons.

For more information, contact: Sales Department, 617-828-5588. Email inquiries to: sales@estc.com. Visit EST Corporation on the World Wide Web at: www.estc.com.

PowerPack* In-Circuit Emulator

Microtek International

Host Development Environments: Windows.

Microtek International's high-performance PowerPack in-circuit emulators combine a state-of-the-art source-level debugger with the most advanced trigger-and-trace system available. Users can relate clock-edge hardware timing events back to source code without stopping the target system. PowerPack emulators support Pentium, Intel486, National NS486, Intel386, Intel 80C186, AMD Am186 and Motorola 683xx/HC16 processors.

For more information, contact: 800-886-7333 or 503-645-7333. Email inquiries to: info@microtekintl.com. Visit Microtek International on the World Wide Web at: www.microtekintl.com.

EMUL16/300-PC* In-Circuit Emulator

Nohau Corporation

Host Development Environments: Windows.

The EMUL16/300-PC is a high-performance emulator for two families of microcontrollers: Motorola's 68HC16 and 68300. The user-friendly Microsoft Windows* software features windows for editing variables, RAM, registers and instructions. An optional trace board features advanced trace functions with sophisticated trigger capabilities.

For more information, contact: Technical Support, 408-866-1820. Email inquiries to: sales@nohau.com. Visit Nohau Corporation on the World Wide Web at: www.nohau.com.

Orion* 8800 Emulator

Orion Instruments

Host Development Environments: Windows and DOS.

The Orion 8800 is a non-intrusive, real-time emulator/analyzer that features a multi-level event-trigger system, deep trace capture and overlay memory. A unique Clip-On capability allows connection to soldered-in processors. The popular SDS SingleStep* Windows* OS-based debugger can serve as the user GUI for Motorola's MC68000 processor family.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

DEBUGGER**ZAP BDM Debugger**

COSMIC Software Inc.

Host Development Environments: Windows.

ZAP is a full-featured C and Assembly source-level debugger featuring ANSI C debugging, high-level RTXC kernel integration, source browsing, graphical performance analysis, chronograms and full on-line help. ZAP BDM offers a source-level real-time debugging environment for Motorola's standard Background Debug Mode Interface (i.e. ICD cable or EVB board).

For more information, contact: Alan Johnson, 617-932-2556. Email inquiries to: sales@cosmic-us.com. Visit COSMIC Software Inc. on the World Wide Web at: www.cosmic-us.com.

ZAP* SIM Debugger

COSMIC Software Inc.

Host Development Environments: Windows and OSF MOTIF.

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GNUPro* Toolkit Debugger Suite

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit debugger suite is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The fully-featured debug tools and utilities significantly help to shorten the development, test and validation cycles. Cygnus provides mission-critical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

Source Gate* II Source-Level Debugger

Huntsville Microsystems Inc. (HMI)

Host Development Environments: UNIX and Windows.

The Source Gate II is a full-featured source-level debugger that provides a common user interface to all Huntsville Microsystems, Inc. products, including SPS-2000 series emulators, HMI-2000 series emulators, Background Mode Debuggers (BMDs), and CPU simulators. The Source Gate II Debugger provides a watch window for viewing/changing memory variables; multiple CodeView windows that allow emulator operations to be controlled from a user file displayed in source, assembly, or a combination of the two. Provides C++/RTOS support and more.

For more information, contact: James Bell, 205-881-6005. Email inquiries to: sales@hmi.com. Visit Huntsville Microsystems Inc. (HMI) on the World Wide Web at: www.hmi.com.

XRAY* Debugger

Microtec

Host Development Environments: UNIX and Windows.

The XRAY* Debugger provides an environment designed to accelerate the edit-compile-download-debug cycle for development of embedded applications. Microtec's XRAY debugger is a well-known tool that has served embedded software developers for more than 10 years. The most current version of the XRAY debugger offers advanced debug support of multitasking and multiprocessing applications. Multiple execution environments are available, including: instruction-set simulator; target-resident monitor; ICE and RTOS-aware. Along with the debugger, XRAY offers a suite of development tools, including a context-sensitive editor, an interface to most popular source-code management systems, build facilities, and source browsing. The XRAY debugger features an intuitive, standard Windows or Motif user interface.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

* Trademark or registered trademark of its respective company or mark holder.

683xx**Motorola Semiconductor****Flex-BDM* Debugger**

Noral Micrologics Limited

Host Development Environments: Windows.

The debugging of software for Motorola's 68HC12, 683xx and ColdFire processors is supported by Noral's low-cost Flex-BDM Debugger product range. Flex-BDM is different from the common background-debug-mode (BDM) cable solutions, because each system includes custom logic and a control processor, enhancing the debugging capabilities beyond the basic BDM specification. A demonstration disk is available from Noral.

For more information, contact: Harry Erickson, 508-647-0103 (U.S. Office). Email inquiries to: noral@noral.co.uk. Visit Noral Micrologics Limited on the World Wide Web at: www.noral.com.

RTI ScopeProfile* Performance Analysis Tool/Debugger

Real-Time Innovations, Inc.

Host Development Environments: UNIX and Windows.

RTI's ScopeProfile is a dynamic execution profiler for Wind River Systems' VxWorks* RTOS. The profiler shows the developer exactly where the CPU cycles are being spent. Both cumulative (including all subroutines) and direct CPU usage of each routine are captured. The output can be plotted in real time with RTI's StethoScope Debugger. The profiler will help developers tune their time-critical systems for maximum performance.

For more information, contact: Al Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

OTHER TOOLS**TPU Microcode**

Electro-Logic Machines, Inc.

Host Development Environments: Any Host.

The TPU is a programmable timing/control co-processor included in several of Motorola's microcontrollers. ELMI has established a growing library of off-the-shelf functions which extend the capabilities of the TPU. Microcode functions currently available include: micro-stepping motor controller, synchronous serial-stream decoder, UART with CTS control, high-resolution min/max/average signal timing, I2C serial bus master, sampled input frequency measurement, and super-fast quadrature decode. ELMI also provides custom microcode development services and development support services for real-time embedded systems.

For more information, contact: Eric McRae, 360-379-0969. Email inquiries to: sales@elmi.com. Visit Electro-Logic Machines, Inc. on the World Wide Web at: www.elmi.com/elmi.

SoftControl IEC 1131-3 Programming System

Softing

Host Development Environments: Windows.

SoftControl is an IEC 1131-3-compliant programming system for all kinds of industrial controls, from LON to PLCs and PCs. The system supports all languages, functions and function blocks according to the standard. The backend is designed to be completely object-oriented and can be easily adapted to different target systems. A C-code generator is optionally available.

For more information, contact: Dr. Goetz Guettich, ++49 89 456 56 311. Email inquiries to: info.softcontrol@softing.com. Visit Softing on the World Wide Web at: <http://www.softing.com>.

Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabilities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: <http://www.tektronix.com>.

XA Family**Philips Semiconductor****FULL FUNCTION RTOS****CMX-RTX* Real-Time Operating System**

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-RTX RTOS provides more than 65 kernel services allowing control of tasks, events, messages, resources, semaphores, cyclic timers, queues, fixed memory blocks and UARTs. Interrupts are allowed to use some of the CMX functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. Very small ROM and RAM requirements for small-footprint applications. Several compiler vendors are supported. Source code is included, and there are no royalties.

The CMX-RTX RTOS supports an unusually large number of μ PU, μ CU, and DSP architectures from a large number of manufacturers, including: Advanced RISC Machines, Analog Devices, Hitachi, Intel, MIPS, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Sharp, Siemens, Texas Instruments, Toshiba, and Zilog.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

Advanced Development Systems: FSI-RTOS

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software provides a complete, modern real-time operating system available in three distinct levels of capability. The FSI RTOS is delivered as libraries and some source code. By adding mailboxes and other specifically selected capabilities, it can be configured by the user to accommodate a wide range of special circumstances and situations.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

BASIC RTOS KERNEL**CMX-TINY+* Real-Time Operating System**

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-TINY+ RTOS provides more than 40 kernel services, allowing control of: tasks, events, messages, resources, semaphores, cyclic timers, queues. Interrupts are allowed to use some of the CMX-TINY+ functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. The RTOS has very small ROM and RAM requirements, and supports several compiler vendors. Source code is included on a royalty-free basis.

The CMX-TINY+ RTOS supports an unusually large number of μ PU and μ CU architectures from the following manufacturers: Advanced RISC Machines, Hitachi, Intel, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Siemens, and Toshiba.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

INTEGRATED DEVELOPMENT ENVIRONMENT**Advanced Development System: ProView**

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software's Advanced Development System IDE provides the fully Windows OS-based GUI called ProView. With ProView, the user is not required to learn and implement slow, error-prone command line arguments to the wide range of development system tools (i.e., FSI-RTOS, C compiler, macro assembler, debugger/simulator, and libraries) included in a delivery. All tools, including emulators, integrate through/with ProView.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

PantaSoft XA μ controller Software Development Tools

PantaSoft

Host Development Environments: UNIX, Windows and DOS.

These development tools comprise an integrated development environment for systems based on the Philips XA series of microcontrollers and represent PantaSoft's ini-

* Trademark or registered trademark of its respective company or mark holder

XA Family

Philips Semiconductor

tial software development tool products. PantaSoft products are sold in North America by Ceibo, and include the following: an ANSI Standard C cross compiler; a full Microsoft Windows* OS interface; extended keywords specific to XA series microcontrollers; a huge number of functions and externals; full floating-point math support; direct C interrupt-handling; a built-in C and assembler optimizer; a C source-code-level simulator/debugger; and a direct ICE interface. Ceibo will soon offer additional PantaSoft tools, currently under development, for the design and testing of embedded systems based on microprocessors, DSPs, microcontrollers, etc.

For more information, contact: 800-833-4084. Email inquiries to: pantasoftware@ceibo.com. Visit PantaSoft on the World Wide Web at: www.ceibo.com.

EDE Project Environment

Tasking, Inc.

Host Development Environments: Windows.

EDE is a complete development project environment that gives the developer direct access to all the tools and features needed. EDE includes a language-sensitive editor, MAKE for automated application building and a project environment for specifying project files, including source files, tool options and build options.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

COMPILER

Advanced Development System: Compiler

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software provides a fast modern translator for the C language. The translator promotes continued compliance with the latest ANSI standard for C. The compiler is a smooth, integral part of the ProView* integrated development environment (IDE) and is tightly coupled to a fast color syntax-highlighting programmer's editor. The compiler supports Intel's MCS-51 and MCS-251 and Philips' 8051XA series microcontrollers.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

C++ Compiler

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Object-oriented programming techniques increase productivity, improve quality and provide reusability with Tasking's C++ compiler. The compiler allows the intermixing of C++ and C code within a single application. Thus, the benefits of C++ can be incorporated into existing C applications a module at a time, thus providing easy migration from C to C++ programs.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

ASSEMBLER

Advanced Development Systems: Macro Assembler

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software provides a fast modern translator for assembly language. The macro assembler can accept a variety of macro language standards, including Intel ASM51. The assembler is an integral part of the ProView integrated development environment (IDE) and is tightly coupled to a fast color syntax-highlighting programmer's editor.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

EMULATOR

EMUL51XA-PC* In-Circuit Emulator

Nohau Corporation

Host Development Environments: Windows.

The EMUL51XA-PC is a high performance in-circuit emulator specifically designed to give an optimized environment for developing Philips P51XA family hardware and software. The MS Windows*-based software has the availability of Source, Register, Data,

Program and Trace windows, and will support symbolic assembly as well as high-level C debugging.

For more information, contact: Technical Support, 408-866-1820. Email inquiries to: sales@nohau.com. Visit Nohau Corporation on the World Wide Web at: www.nohau.com.

Ashling Ultra* Series Emulators

Orion Instruments

Host Development Environments: Windows.

The Ashling Microsystems Ultra Series emulators, sold in North America by Orion Instruments, are full-featured, real-time emulation systems for 8-bit and 16-bit microcontrollers. Features include a Windows* OS-based source-level debugger, sophisticated event triggering, deep trace buffer and overlay memory. Optional performance analysis and code coverage measurement; functions are available.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

DEBUGGER

EB-XA Debugger

Ceibo Inc.

Host Development Environments: Windows and DOS.

Ceibo's EB-XA debugger emulates 80C51XA microcontrollers and derivatives with real-time operation up to 30MHz and 3.3V or 5V voltage operation. It includes: a source-level debugger for C and Assembler; support for ROMless and ROMable microcontrollers; 64K of code memory; a performance analyzer; real-time and conditional breakpoints; and 44-pin PLCC emulation header and signal test points.

For more information, contact: Ceibo Sales, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

Advanced Development System: WinSim

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software provides a fast, modern debugger/simulator. WinSim is capable of simulating a wide variety of embedded microcontrollers through the use of dynamically selectable DLLs. The WinSim debugger/simulator is an integral part of the ProView integrated development environment (IDE) and is tightly coupled to a fast multi-mode simulation engine.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

CrossView* Pro Debugger

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking's CrossView Pro debugger delivers functionality that reduces time requirements for program testing and debugging, and includes the following: tracking scope and monitoring locals; an intelligent source window; and code coverage and performance analysis. CrossView Pro provides multiple views of the developer's code: C and/or assembly source, monitor, inspect, on-chip registers, call stack, variables, breakpoint, execution trace, session log, simulated I/O and memory dumps.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

LIBRARY

Advanced Development Systems: Special Function Libraries

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software continues to provide a long list of standard and special function libraries. Each C-based product delivered includes all standard ANSI string, math, standard function, and transcendental libraries. In addition, hundreds of special "intrinsic", communications, and utility functions are included as a part of all standard deliveries.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

* Trademark or registered trademark of its respective company or mark holder

XA Family

Philips Semiconductor

OTHER TOOLS**DS-XA Development System**

Ceibo Inc.

Host Development Environments: Windows and DOS.

Ceibo's DS-XA Development System for the Philips XA Series microcontrollers offers a real-time, transparent in-circuit emulator with 3.3V and 5V microcontroller emulation at a maximum frequency of 30MHz; 64KB to 2MB internal memory and 32KB to 512KB trace memory with logic analyzer; external and internal trace triggers; hardware and conditional breakpoints; and a source-level debugger for Assembler and C as well as an on-line assembler and disassembler, and a performance analyzer.

For more information, contact: Ceibo Sales, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

80C251

Intel Corporation

FULL FUNCTION RTOS**CMX-RTX* Real-Time Operating System**

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-RTX RTOS provides more than 65 kernel services allowing control of tasks, events, messages, resources, semaphores, cyclic timers, queues, fixed memory blocks and UARTs. Interrupts are allowed to use some of the CMX functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. Very small ROM and RAM requirements for small-footprint applications. Several compiler vendors are supported. Source code is included, and there are no royalties.

The CMX-RTX RTOS supports an unusually large number of μ PU, μ CU, and DSP architectures from a large number of manufacturers, including: Advanced RISC Machines, Analog Devices, Hitachi, Intel, MIPS, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Sharp, Siemens, Texas Instruments, Toshiba, and Zilog.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

Advanced Development Systems: FSI-RTOS

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software provides a complete, modern real-time operating system available in three distinct levels of capability. The FSI RTOS is delivered as libraries and some source code. By adding mailboxes and other specifically selected capabilities, it can be configured by the user to accommodate a wide range of special circumstances and situations.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

RTX251* Real-Time Operating Systems

Keil Software Inc.

Host Development Environments: N/A.

RTX251 Full (#FR251) is a multitasking real-time operating system for the entire 80251 family of . This powerful tool allows the developer to manage multiple tasks on a single microcontroller CPU. The RTX51 Full also includes CAN (Controller Area Network) function libraries. The RTX51 Tiny (#TR51) RTOS is a subset of the RTX51 Full RTOS. RTX51 Tiny RTOS functions include interrupt and memory management, clock, and semaphores. The Keil RTOS products are royalty-free.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

RTX251* Real-Time Operating Systems

Keil Software Inc.

Host Development Environments: N/A.

RTX251 Full (#FR251) is a multitasking real-time operating system for Intel's 80C251 family. This powerful tool allows the developer to manage multiple tasks on a single microcontroller CPU. The RTX251 Full also includes CAN (Controller Area Network) function libraries. The RTX251 Tiny (#TR251) RTOS is a subset of the RTX251 Full RTOS.

RTX251 Tiny RTOS functions include interrupt and memory management, clock, and semaphores. The Keil RTOS products are royalty-free.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

BASIC RTOS KERNEL**CMX-TINY+* Real-Time Operating System**

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-TINY+ RTOS provides more than 40 kernel services, allowing control of tasks, events, messages, resources, semaphores, cyclic timers, queues. Interrupts are allowed to use some of the CMX-TINY+ functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. The RTOS has very small ROM and RAM requirements, and supports several compiler vendors. Source code is included on a royalty-free basis.

The CMX-TINY+ RTOS supports an unusually large number of μ PU and μ CU architectures from the following manufacturers: Advanced RISC Machines, Hitachi, Intel, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Siemens, and Toshiba.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

INTEGRATED DEVELOPMENT ENVIRONMENT**SwiftX* Cross-Development Environment**

FORTH, Inc.

Host Development Environments: Windows and DOS.

FORTH's SwiftX is a PC-based, interactive cross-development environment for micro-controller, microprocessor or DSP-based embedded systems. SwiftX includes a Forth compiler, assembler, editor, libraries, debugger and real-time kernel, all in one package. The development environment supports Intel's 8051, 80186/80188, 8096/80196 micro-controllers and microprocessors and Motorola's 68HC11 and 68HC16 microcontrollers and 68xxx/CPU-32 processors. There are no run-time royalties for SwiftX kernels.

For more information, contact: Steve Agarwal, 800-55-FORTH. Email inquiries to: forth-sales@forth.com. Visit FORTH, Inc. on the World Wide Web at: www.forth.com.

Advanced Development System: ProView

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software's Advanced Development System IDE provides the fully Windows OS-based GUI called ProView. With ProView, the user is not required to learn and implement slow, error-prone command line arguments to the wide range of development system tools (i.e., FSI-RTOS, C compiler, macro assembler, debugger/simulator, and libraries) included in a delivery. All tools, including emulators, integrate through/with ProView.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

Hitex HiTools Integrated Development Environment

Hitex Development Tools

Host Development Environments: UNIX, Windows and DOS.

The Hitex tools comprise a complete integrated development environment, including compiler, assembler, debugger and emulator for the μ Cs and μ Ps the company supports.

For more information, contact: Olaf Pfeiffer, 408-298-9077. Email inquiries to: info@hitex.com. Visit Hitex Development Tools on the World Wide Web at: <http://www.hitex.com>.

COMPASS/IDE* Development Environment

Production Languages Corporation

Host Development Environments: Windows and DOS.

COMPASS/IDE is a Windows* OS-hosted integrated development environment for developing software for Intel's 8051, 80251, and 8x93x (USB) Microcontrollers and Zilog's Z8, Z89462 and Z893XX Microcontrollers. Production Languages Corporation pioneered the total Windows-based development environment for embedded programmers. When a programmer launches the COMPASS/IDE, he gets a host of powerful tools such as a macro assembler, linker/locator, object librarian, optimizing ANSI C compiler, full symbolic source-level debugger, instruction simulator, drivers, ROM monitor and programmer's editor, all of which are controlled by the IDE control panel. PLC's COMPASS/IDE represents yet another software development tool set built with the company's proprietary tool-building technology, SD/ToolSmith.

* Trademark or registered trademark of its respective company or mark holder.

80C251**Intel Corporation**

For more information, contact: Mark A. Newsom, 800-525-6289. Email inquiries to: mnewsom@plcorp.com. Visit Production Languages Corporation on the World Wide Web at: www.plcorp.com.

EDE Project Environment

Tasking, Inc.

Host Development Environments: Windows.

EDE is a complete development project environment that gives the developer direct access to all the tools and features needed. EDE includes a language-sensitive editor, MAKE for automated application building and a project environment for specifying project files, including source files, tool options and build options.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

COMPILER**Advanced Development System: Compiler**

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software provides a fast modern translator for the C language. The translator promotes continued compliance with the latest ANSI standard for C. The compiler is a smooth, integral part of the ProView® integrated development environment (IDE) and is tightly coupled to a fast color syntax-highlighting programmer's editor. The compiler supports Intel's MCS-51 and MCS-251 and Philips' 8051XA series microcontrollers.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

Keil Software C Compilers

Keil Software Inc.

Host Development Environments: Windows and DOS.

Keil Software's C compilers are full ANSI C compilers and assemblers, designed specifically for the microcontroller families that they support. µVision® is the Windows® OS User Interface that drives the optimizing C compilers. Compiler, assembler and linker options are point-and-click. µVision and the manuals are written in the USA, and extensive on-line help is included. Keil optimizing C compilers support the 8051, the 80C251 (Intel and Temic), including the USB 8x930 µController families and the Siemens 161, 163, C164C1, 165, 166/167, 167CR and SGS Thomson ST10 family microcontrollers, with future derivative family chip members supported. Keil provides extensive support, free for one year, as well as on-line help and sample USB code, etc. from its Web URL.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

ASSEMBLER**Advanced Development Systems: Macro Assembler**

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software provides a fast modern translator for assembly language. The macro assembler can accept a variety of macro language standards, including Intel ASM51. The assembler is an integral part of the ProView integrated development environment (IDE) and is tightly coupled to a fast color syntax-highlighting programmer's editor.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

EMULATOR**MetaLink ICEMaster Series Emulators**

MetaLink Corporation

Host Development Environments: Windows and DOS.

MetaLink's ICEMaster Series Emulators currently supports a wide variety of 8-bit and 16-bit embedded controllers. MetaLink's emulators connect to a PC via a serial link, thus eliminating the need for a plug-in interface board. The emulators are non-intrusive, requiring no microcontroller resources (memory or communication) for emulation. The emulator software interface is a Windows® O.S.-based interface that provides a productive and cost-effective debugging environment.

For more information, contact: Scott Ritchey, 602-926-0797 x 319. Email inquiries to: sales@metaice.com. Visit MetaLink Corporation on the World Wide Web at: <http://www.metaice.com> or metalink.de.

EMUL251-PC® In-Circuit Emulator

Nohau Corporation

Host Development Environments: Windows.

Nohau's EMUL251-PC supports Intel's MCS®251 family of microcontrollers, the high-performance upgrade path for the MCS 51 series. The EMUL251-PC emulator is designed around Intel's special emulation technology for accurate emulation of both single-chip and external-mode operation. The user-friendly Microsoft Windows®-based interface is packed with features to minimize debugging time.

For more information, contact: Technical Support, 408-866-1820. Email inquiries to: sales@nohau.com. Visit Nohau Corporation on the World Wide Web at: www.nohau.com.

DEBUGGER**EB-251 Debugger**

Ceibo Inc.

Host Development Environments: Windows and DOS.

The EB-251 emulates 8XC251SB microcontrollers and derivatives, offering real-time operation up to 16MHz, a simulation debug mode. EB-251 has a source-level debugger for C, PLM and Assembler. It runs under DOS and Windows® OS software and supports ROMless and ROMable microcontrollers. EB-251 has 128KB of code/data memory with mapping capabilities, a performance analyzer, real-time and conditional breakpoints, and emulation header and signal test points.

For more information, contact: Ceibo Saies, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

Advanced Development System: WinSim

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software provides a fast, modern debugger/simulator. WinSim is capable of simulating a wide variety of embedded microcontrollers through the use of dynamically selectable DLLs. The WinSim debugger/simulator is an integral part of the ProView integrated development environment (IDE) and is tightly coupled to a fast multi-mode simulation engine.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

dScope®-51/251/166 Debugger

Keil Software Inc.

Host Development Environments: Windows.

Keil Software's dScope is a source-level debugger that allows a developer to debug programs created with Keil compilers. The dScope debugger simulates the program in either stand-alone mode or in the target system by using the monitor. External hardware, signals, and interrupts can be simulated. The debugger's viewable windows include capabilities to view the program from I/O, Trace, Stack, Watch and CPU Registers.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

CrossView® Pro Debugger

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking's CrossView Pro debugger delivers functionality that reduces time requirements for program testing and debugging, and includes the following: tracking scope and monitoring locals; an intelligent source window; and code coverage and performance analysis. CrossView Pro provides multiple views of the developer's code: C and/or assembly source, monitor, inspect, on-chip registers, call stack, variables, break point, execution trace, session log, simulated I/O and memory dumps.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

* Trademark or registered trademark of its respective company or mark holder

80C251

Intel Corporation

LIBRARY**Advanced Development Systems: Special Function Libraries**

Franklin Software, Inc.

Host Development Environments: Windows.

Franklin Software continues to provide a long list of standard and special function libraries. Each C-based product delivered includes all standard ANSI string, math, standard function, and transcendental libraries. In addition, hundreds of special "intrinsic", communications, and utility functions are included as a part of all standard deliveries.

For more information, contact: Siegfried W. Bleher, 408-296-8051. Email inquiries to: info@fsinc.com. Visit Franklin Software, Inc. on the World Wide Web at: www.fsinc.com.

Keil's CAN Library

Keil Software Inc.

Host Development Environments: N/A.

Keil Software's RTX51 and RTX166 Full RTOS products support Controller Area Network (CAN) controllers with the inclusion of CAN libraries, which are packaged with the RTOS products. The CAN interface is popular for both automotive and industrial markets. The libraries support 11- and 29-bit identifiers and interface with Keil's compilers for the Siemens 166 and Intel 8051/251 microcontroller families, as well as interfacing to Keil's RTOS products.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

OTHER TOOLS**DS-251 Development System**

Ceibo Inc.

Host Development Environments: Windows and DOS.

Ceibo's DS-251 Development System was designed to aid in developing software for Intel's MCS[®] 251 family of microcontrollers. It offers a real-time and transparent in-circuit emulator, with a standard 256KB emulation memory; real-time trace up to 512K frames deep and 104 bits wide; complex hardware breakpoints; support for both binary mode and source mode; high-level support for popular C compilers, full support of local and global variables; an on-line assembler and disassembler; and a performance analyzer.

For more information, contact: Ceibo Sales, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

ApBUILDER[®] Expert Development Software

Intel Corporation

Host Development Environments: N/A.

Intel's ApBUILDER Development Software features include: interactive programming software for embedded applications; Windows interface for ease of use; the ability to program without prior knowledge of the architecture; generation of microcontroller peripheral initialization code with the click of a mouse; code generation in Assembler or C; context-sensitive screens that interface directly to Hypertext device user's manuals and data sheets; continuous expansion to the program and improvements to cover new logic devices; available FREE on Intel bulletin boards and downloadable via the company's WWW site at <http://developer.intel.com>.

For more information, contact: Local Intel Sales Office or Distributor. Email inquiries to: N/A. Visit Intel Corporation on the World Wide Web at: www.intel.com.

µVision[®] Windows[®] OS-Based User Interface

Keil Software Inc.

Host Development Environments: Windows.

µVision is Keil Software's USA-developed, Windows OS-based front-end interface for all the company's compilers and assemblers. µVision includes an editor, project manager, and make facility. Compiler, assembler, and linker options are set by pointing-and-clicking on prompted selections. µVision's Program Manager conveniently accesses the developer's files, third-party executables, and calls the optional Keil simulator for code debugging.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabilities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: <http://www.tektronix.com>.

**PICmicro Family
Microchip Technology****INTEGRATED DEVELOPMENT ENVIRONMENT****MPLAB[®] Integrated Development Environment**

Microchip Technology Inc.

Host Development Environments: Windows.

MPLAB IDE offers a project manager and program text editor, a user-configurable toolbar containing four pre-defined sets, and a status bar which communicates editing and debugging information. MPLAB is the common user interface for Microchip development systems tools, including MPLAB Editor, MPASM Assembler, MPLAB-SIM software simulator, PICMASTER[®] in-circuit emulator and PICSTART[®] Plus development programmer.

For more information, contact: 602-786-7668. Email inquiries to: info@microchip.com. Visit Microchip Technology Inc. on the World Wide Web at: www.microchip.com.

COMPILER**Byte Craft MPC Code Development System-Compiler**

Byte Craft Limited

Host Development Environments: UNIX, Windows and DOS.

The Byte Craft Limited MPC optimizing C cross-compiler is targeted to the Microchip PIC16/17Cxx families of microcontrollers, including 12-, 14- and 16-bit cores and 8K parts. The compiler is part of an integrated development environment, including a linker, editor and built-in macro assembler. The MPC Code Development System allows for programming in C without sacrificing code size or speed. MPC produces ROMable code, symbol information and includes interrupt support.

For more information, contact: Karen McMurray, 519-888-6911. Email inquiries to: info@bytecraft.com. Visit Byte Craft Limited on the World Wide Web at: www.bytecraft.com.

MPLAB-C Universal C Compiler

Microchip Technology Inc.

Host Development Environments: Windows.

Using MPLAB-C with MPLAB Integrated Development Environment provides full source level debugging in an easy-to-use project environment, thus reducing development time. The compiler generates executable code directly from the compile process so there is no need to assemble code generated by the compiler. MPLAB-C is compatible with MPLAB, allowing it to function with the PICMASTER in-circuit emulator and the MPLAB-SIM simulator.

For more information, contact: 602-786-7668. Email inquiries to: info@microchip.com. Visit Microchip Technology Inc. on the World Wide Web at: www.microchip.com.

EMULATOR**ICEPIC In-Circuit Emulator System**

Microchip Technology Inc.

Host Development Environments: Windows.

ICEPIC is a low-cost in-circuit emulation solution for Microchip's PIC16CXXX devices. The modular system can support different subsets of PIC16C5X and PIC16C6X products through the use of interchangeable personality modules or daughter boards. The emulator is capable of emulating without target application circuitry being present. CE compliant.

For more information, contact: 602-786-7668. Email inquiries to: info@microchip.com. Visit Microchip Technology Inc. on the World Wide Web at: www.microchip.com.

* Trademark or registered trademark of its respective company or mark holder

PICmicro Family

Microchip Technology

PICMASTER* In-Circuit Emulator System

Microchip Technology Inc.

Host Development Environments: Windows.

The PICMASTER system is a flexible in-circuit emulator system providing a high quality universal platform for emulating the entire PICmicro* family. The system includes the emulator, MPLAB Integrated Development Environment, MPASM assembler and MPLAB-SIM simulator. PICMASTER features real-time instruction emulation with program memory emulation and memory mapping capability up to 64K words. CE compliant.

For more information, contact: 602-786-7668. Email inquiries to: info@microchip.com. Visit Microchip Technology Inc. on the World Wide Web at: www.microchip.com.

Signum ICE-PIC* In-Circuit Emulator

Signum Systems Corporation

Host Development Environments: Windows.

Signum's ICE-PIC* Emulator emulates the entire Microchip PIC* family of microcontrollers. The ICE interfaces to the PC via a serial port and features trace buffer, C-level debugging, breakpoints and windows user interface.

For more information, contact: Jerry Lewandowski, 805-523-9774. Email inquiries to: sales@signum.com. Visit Signum Systems Corporation on the World Wide Web at: <http://www.signum.com>.

OTHER TOOLS

DS-M8 Development System

Ceibo Inc.

Host Development Environments: Windows and DOS.

Ceibo's DS-M8 Development System supports Motorola's HC05/HC08 microcontrollers and can be adapted to support Microchip Technology's PIC series microcontrollers. The system includes a real-time, transparent in-circuit emulator that supports a maximum frequency of 40MHz; a 128KB internal memory and a 32KB trace memory and logic analyzer; 64KB hardware and conditional breakpoints; DOS* and MS-Windows* OS debuggers; an on-line assembler and disassembler; and a performance analyzer

For more information, contact: Ceibo Sales, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

fuzzyTECH*-MP Fuzzy Logic Development Tool

Microchip Technology Inc.

Host Development Environments: Windows.

The fuzzyTECH-MP tool contains everything users need to gain a comprehensive work-

ing knowledge of fuzzy-logic system design, including a fully functional demonstration board for hands-on experience. It is easy to use with all graphic editors. Tools guide users step-by-step through the development phases of fuzzy logic. A fully functional demonstration board gives users hands-on experience.

For more information, contact: 602-786-7668. Email inquiries to: info@microchip.com. Visit Microchip Technology Inc. on the World Wide Web at: www.microchip.com.

MP-DriveWay* Application Code Generator

Microchip Technology Inc.

Host Development Environments: Windows.

With MP-DriveWay, users can visually configure all the peripherals in a PICmicro device and, with a click of the mouse, generate all the initialization and many functional code modules in C language. The code produced is highly modular and allows easy integration of the developer's own code.

For more information, contact: 602-786-7668. Email inquiries to: info@microchip.com. Visit Microchip Technology Inc. on the World Wide Web at: www.microchip.com.

PICSTART* Plus Programming System

Microchip Technology Inc.

Host Development Environments: Windows.

PICSTART Plus provides the product design engineer with a highly flexible low-cost microcontroller design tool set for all PICmicro 8-bit OTP microcontroller devices. The tool features Microchip's MPLAB Integrated Development Environment with its built-in editor, assembler, and Windows-based MPLAB-SIM simulator. The system includes full documentation, software, development programmer and a device sample. CE compliant.

For more information, contact: 602-786-7668. Email inquiries to: info@microchip.com. Visit Microchip Technology Inc. on the World Wide Web at: www.microchip.com.

PRO MATE* II Device Programmer

Microchip Technology Inc.

Host Development Environments: Windows.

The PRO MATE II device programmer tool allows development engineers to program user software into the PICmicro family of microcontrollers. This robust and reliable tool features enhanced socket module alignment with four auto alignment pins, three levels of over-current protection and superior electrostatic discharge immunity for rugged environments. CE compliant.

For more information, contact: 602-786-7668. Email inquiries to: info@microchip.com. Visit Microchip Technology Inc. on the World Wide Web at: www.microchip.com.

DO YOU HAVE PRODUCTS OR SERVICES THAT SHOULD BE LISTED IN THIS DIRECTORY?

ESOFTA (the Embedded Software Association) and Electronic Design Magazine want this Directory to be the most comprehensive embedded software reference available, anywhere! If you have products or services that were not listed, act NOW to ensure that they are included in the next issue.

A complete set of listing forms is provided at the back of this directory for your use.

There is NO COST to you for having your listings published.

Questions? Email: sara@esofta.com

SOFTWARE TOOLS FOR DIGITAL SIGNAL PROCESSORS

TMS320Cxx Texas Instruments

FULL FUNCTION RTOS

Bytebos* Multitasking Operating System

Bytebos Integrated Systems

Host Development Environments: UNIX and Windows.

Bytebos is a full-featured multitasking operating system designed for use in high-performance, real-time embedded computing applications. Bytebos is configured for use with all major C compilers and debuggers and is available for a variety of microprocessors, microcontrollers, and DSPs. Bytebos applications are portable with simple licensing. There are no royalties on executables, and source code is provided.

For more information, contact: Nick Andrews, 800-788-7288. Email inquiries to: andrews@bytebos.com. Visit Bytebos Integrated Systems on the World Wide Web at: www.bytebos.com.

CMX-RTX* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-RTX RTOS provides more than 65 kernel services allowing control of tasks, events, messages, resources, semaphores, cyclic timers, queues, fixed memory blocks and UARTs. Interrupts are allowed to use some of the CMX functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. Very small ROM and RAM requirements for small-footprint applications. Several compiler vendors are supported. Source code is included, and there are no royalties.

The CMX-RTX RTOS supports an unusually large number of μ PU, μ CU, and DSP architectures from a large number of manufacturers, including: Advanced RISC Machines, Analog Devices, Hitachi, Intel, MIPS, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Sharp, Siemens, Texas Instruments, Toshiba, and Zilog.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

OSE* Real-Time Operating System

Enea OSE Systems AB

Host Development Environments: UNIX and Windows.

Enea's OSE is a message-based, real-time operating system and tool-set for embedded systems. OSE has special built-in capabilities for fault tolerance, safety critical applications, runtime configuration and distributed systems. OSE is the first RTOS to be certified to meet the software quality standard IEC 1508, safety integrity level 3.

For more information, contact: Bill McCombie, +468-638-5000 (Sweden). Email inquiries to: info.ose@enea.se. Visit Enea OSE Systems AB on the World Wide Web at: www.enea.se/ose.

Eonic Virtuoso* V.4 Real-Time Operation System

Eonic Systems, Inc.

Host Development Environments: UNIX, Windows and DOS.

Eonic Systems' Virtuoso* v.4 is a complete RTOS development environment for industry-leading DSPs and ASIC cores. The RTOS includes a System Generation Tool, Task-Level Debugger, Workload Monitor and other productivity tools. Virtuoso innovations include SoftStealth* technology, which automatically generates an application-specific real-time kernel with a minimum memory footprint, and the Virtual Single Processor (VSP) programming model to accelerate multi-processor development.

For more information, contact: Jan Borghs, +32 16 62 15 85. Email inquiries to: info@eonic.com. Visit Eonic Systems, Inc. on the World Wide Web at: <http://www.eonic.com>.

Helios* Real-Time Operating System

Perihelion

Host Development Environments: UNIX and Windows.

Helios is a real-time operating system having a multi-threaded, multi-tasking kernel. It has a small ROMable micro-kernel with additional modular system servers and libraries. UNIX source compatibility, including POSIX, BSD4.3, network support based on 4.4BSD TCP/IP. Shared C run-time libraries. Kernel source included.

For more information, contact: Julia Gadd, (44) 1749-344345. Email inquiries to: sales@perihelion.co.uk. Visit Perihelion on the World Wide Web at: www.perihelion.co.uk.

SPOX* RTOS and Software Development Kit (SDK)

Spectron Microsystems

Host Development Environments: UNIX and Windows.

Spectron Microsystems' SPOX SDK provides a complete software development environment for digital signal processing (DSP) developers. At the core is SPOX-KNL, a deterministic real-time, multi-tasking operating system designed specifically for DSP architectures. Also included are math libraries, host connectivity to DSP subsystems and extensions to the capabilities of C source code debuggers.

For more information, contact: Shirley Hance, 805-968-5100. Email inquiries to: info@spectron.com. Visit Spectron Microsystems on the World Wide Web at: www.spectron.com.

BASIC RTOS KERNEL

Nucleus* C++ RTOS Kernel

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus C++ is a version of the Nucleus PLUS kernel that provides an object-oriented interface to an application. Although the core of the product is the Nucleus PLUS kernel (thereby reinforcing its robustness), the interface has been completely redesigned with all of the standard C++ mechanisms including constructors, destructors, and the like. Tests indicate that the incorporation of these facilities has minimal impact on the code size and performance of the final application.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

Nucleus PLUS* Real-Time Operating System

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus PLUS is designed as a core component for an operating system environment. It is extensible and dynamic. Its modular design allows services to be easily produced by combining existing services. All of the Nucleus PLUS components (tasks, queues, semaphores, etc.) can be dynamically created and deleted. Each component has a control block defined by the user and placed anywhere in the available memory space of the target system. Nucleus PLUS is a real-time, pre-emptive, multitasking kernel designed for time-critical embedded applications. Approximately 95 percent of Nucleus PLUS is extremely portable and is currently available for use with most microprocessor families.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

CCOS* MicroKernel

Concur System Technologies, LLC

Host Development Environments: Windows and DOS.

CCOS is a time-slicing, real-time operating system micro-kernel for the TMS320C3x

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CODE

Composer

version **3.0**



PERFORMANCE
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www.go-dsp.com

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“Code Composer is probably the most sophisticated, comprehensive development environment... comparable to the best of any microprocessor development systems... There's presently nothing else I know of in the DSP marketplace that compares with it.”

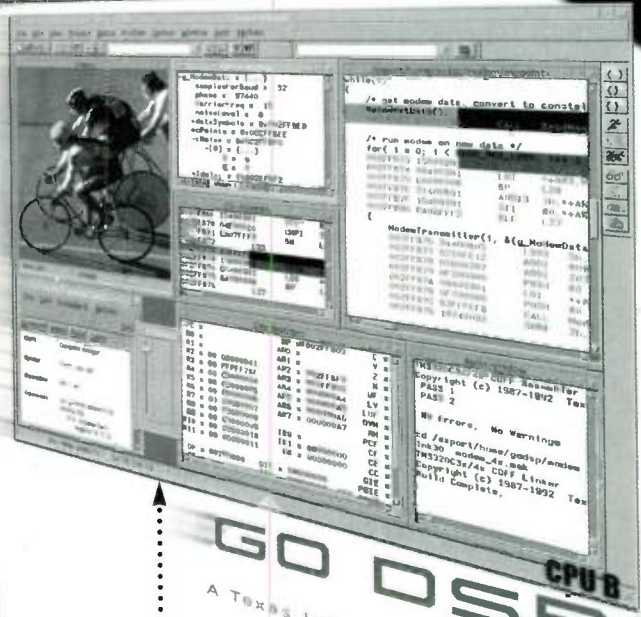
Desktop Engineering, May 1997

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TMS320Cxx

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family of Digital Signal Processors (DSPs). CCOS is highly optimized for setting up and managing multiple channels of uniformly sampled data for acquisition and control systems. The CCOS Task Manager pipelines user procedures for pre-sample set-up, sampling, control output and background processing.

For more information, contact: Mike Foley, 512-306-0511. Email inquiries to: info@concur.com. Visit Concur System Technologies, LLC on the World Wide Web at: www.concur.com.

RTXC* Real-Time Kernel

Embedded System Products, Inc.

Host Development Environments: UNIX and Windows.

Embedded System Products, Inc.'s RTXC is a multitasking real-time embedded kernel written primarily in C and featuring a single API for all supported processors. RTXC manages tasks and time, synchronizes with events, and permits transfer of data between tasks through 72 kernel services, including services for RAM management and exclusive access to an entity.

For more information, contact: Sales, 800-525-4302. Email inquiries to: sales@esphou.com. Visit Embedded System Products, Inc. on the World Wide Web at: www.esphou.com.

Precise/MQX* & MQX+m Real-Time Executive

Precise Software Technologies Inc.

Host Development Environments: .

Precise Software Technologies' Precise/MQX* is a portable high-performance, real-time executive. MQX is scalable from a single processor to distributed multiprocessor configurations. The real-time executive provides functions for multitasking, intertask communications and synchronization, dynamic interrupt management, and memory management. Optional protocols for networking and data communications are also available.

For more information, contact: Clarke Esler, 508-264-4413. Email inquiries to: info@psti.com. Visit Precise Software Technologies Inc. on the World Wide Web at: www.psti.com.

BIOSuite* RTOS Kernel

Spectron Microsystems

Host Development Environments: Windows.

Spectron's BIOSuite is a software development environment for use with off-the-shelf and custom DSP hardware. BIOSuite includes a small target-resident kernel that implements the functionality specified in the DSP/BIOS API. Coupled with the kernel is the BIOScope analysis utility, a suite of visual host-based, real-time analysis tools designed to leverage the kernel services.

For more information, contact: Shirley Hance, 805-968-5100. Email inquiries to: info@spectron.com. Visit Spectron Microsystems on the World Wide Web at: www.spectron.com.

TI DSP BIOS

Texas Instruments Inc./DSP Tools

Host Development Environments: UNIX and Windows and HP 9000.

TI's DSP BIOS is an open API standard that provides a compact set of queuing, dispatch and synchronization functions; enables real-time collection of information; and allows developers to build inter-operable software tool suites. Its consistent interface allows third parties to broaden the customer's choice of development tools for all TMS320Cxx processors.

For more information, contact: 800-477-8924 x 4500 or Local TI Sales Office. Email inquiries to: N/A. Visit Texas Instruments Inc./DSP Tools on the World Wide Web at: www.ti.com.

INTEGRATED DEVELOPMENT ENVIRONMENT

SwiftX* Cross-Development Environment

FORTH, Inc.

Host Development Environments: Windows and DOS.

FORTH's SwiftX is a PC-based, interactive cross-development environment for micro-controller, microprocessor or DSP-based embedded systems. SwiftX includes a Forth compiler, assembler, editor, libraries, debugger and real-time kernel, all in one package. The development environment supports Intel's 8051, 80186/80188, 8096/80196 micro-controllers and microprocessors and Motorola's 68HC11 and 68HC16 microcontrollers and 68xxx/CPU-32 processors. There are no run-time royalties for SwiftX kernels.

For more information, contact: Steve Agarwal, 800-55-FORTH. Email inquiries to: forth-sales@forth.com. Visit FORTH, Inc. on the World Wide Web at: www.forth.com.

Code Composer* Development Environment

GO DSP Corporation

Host Development Environments: UNIX and Windows.

GO DSP's Code Composer* is the first fully Integrated Development Environment (IDE) with DSP-specific functionality, providing a truly VISUAL environment. With its familiar MS-Visual C++-like environment, Code Composer also offers unique debugging features like: Probe Points*: 3-D graphical data plots; injection/extraction of data signal files; multi-processor debugging; interactive profiling; automated testing; workspace customization; and much more. Code Composer supports all TI TMS320Cxx DSPs (320C2xx/C3xx/C4xx/C5xx/C54x/C6x).

For more information, contact: Omar Fattah, 416-599-6868. Email inquiries to: ofattah@go-dsp.com. Visit GO DSP Corporation on the World Wide Web at: www.go-dsp.com.

Hypersignal Block Diagram System Design/Simulator

Hyperception, Inc.

Host Development Environments: Windows.

Block Diagram System Design/Simulator allows for comprehensive dynamic system design and simulation. It was developed for use in applications including DSP, communications, simulation, signal analysis, and general engineering modeling. Block Diagram comes standard with a large library of functions which run at executable speed rather than interpretive speed. Hyperception has made it easy to add user-defined functions to Block Diagram.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Hypersignal RIDE* Visual Design Environment

Hyperception, Inc.

Host Development Environments: Windows.

Hypersignal RIDE is a complete visual design environment for use in real-time systems development. It can be used for applications ranging from low-level DSP systems design and implementation to application-specific projects such as real-time instrumentation, data acquisition, control systems, and more. It provides complete control and observation of DSP designs.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

LSI DSP Software Development Environment

Loughborough Sound Images

Host Development Environments: UNIX, Windows and VxWorks.

LSI's DSP software development environment includes kernels, compilers, assemblers, debuggers, libraries and drivers. LSI produces and markets a wide range of software products used in conjunction with the company's various DSP boards for VME, ISA and PCI systems. This software ranges from simple operating system drivers/libraries (e.g. Windows* NT/95, Solaris, VxWorks*, etc.) to sophisticated IDE tools, kernels and libraries which run on the DSP devices.

For more information, contact: Krista Lewis, 978-263-2255. Email inquiries to: ussales@lsi-dsp-usa.com. Visit Loughborough Sound Images on the World Wide Web at: http://www.lsi-dsp.com.

COMPILER

Hyperception RIDE Compiler

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's RIDE Compiler communicates with an installed board driver which links DSP COFF object files, downloads code, data, and parameters to the DSP memory, controls the execution, and monitors activity of the DSP. The application is linked in the same fashion as a dedicated DSP Compiler(Assembler)/Linker. There is no special real-time kernel or RTOS to increase complexity.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

TMS320Cxx C Compilers

Texas Instruments Inc./DSP Tools

Host Development Environments: UNIX and Windows and HP 9000.

The C Compiler accepts ANSI C source code and produces efficient assembly language

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TMS320Cxx

Texas Instruments

source code, performing four selectable levels of state-of-the-art classical and target-specific optimizations to maximize the efficiency of the compiled code. Developers get the rapid development, easier code maintenance and portability benefits of using a standard high-level language.

For more information, contact: 800-477-8924 x 4500 or Local TI Sales Office. Email inquiries to: N/A. Visit Texas Instruments Inc./DSP Tools on the World Wide Web at: www.ti.com.

ASSEMBLER

TMS320Cxx Assemblers

Texas Instruments Inc./DSP Tools

Host Development Environments: UNIX and Windows and HP 9000.

The assembler translates assembly language code into machine language COFF format object files and supports a macro language that lets users create their own instructions. TI also provides a simple, accessible programming interface to the C run-time environment to implement performance-critical algorithms in assembly language, if required.

For more information, contact: 800-477-8924 x 4500 or Local TI Sales Office. Email inquiries to: N/A. Visit Texas Instruments Inc./DSP Tools on the World Wide Web at: www.ti.com.

EMULATOR

VPB Toolset

3L Ltd.

Host Development Environments: UNIX and Windows.

The VPB Toolset hooks into Parallel C to provide a powerful tool for monitoring and tuning the performance of TMS320C4x multi-DSP systems. VPB captures run-time data on CPU loading, comport bandwidth usage and user-defined events. A graphical tool provides analysis of the data in familiar "oscilloscope trace" format to identify hot spots.

For more information, contact: Alan Culloch, adc@threeL.co.uk. Email inquiries to: threeL@threeL.co.uk. Visit 3L Ltd. on the World Wide Web at: www.threeL.co.uk.

Signum USP-10/25 In-Circuit Emulator

Signum Systems Corporation

Host Development Environments: DOS.

Signum's USP-10 and USP-25 are high-performance in-circuit emulators for the Texas Instruments TMS320C1x and TMS320C2x DSPs. Both emulators interface to a PC via a serial port and feature trace buffers, complex breakpoints, C-level debugging and dual-ported memory overlays.

For more information, contact: Jerry Lewandowski, 805-523-9774. Email inquiries to: sales@signum.com. Visit Signum Systems Corporation on the World Wide Web at: <http://www.signum.com>.

TI TMS320 Extended Development System (XDS)

Texas Instruments Inc./DSP Tools

Host Development Environments: UNIX, Windows and DOS and HP9000.

The TMS320 Extended Development Systems (XDSs) are powerful, full-speed emulators used for system-level integration and debug. They support hardware and software debugging of systems via a JTAG emulation cable. Scan-based emulation is a unique, non-intrusive approach to system emulation, integration and debugging.

For more information, contact: 800-477-8924 x 4500 or Local TI Sales Office. Email inquiries to: N/A. Visit Texas Instruments Inc./DSP Tools on the World Wide Web at: www.ti.com.

DEBUGGER

3L Debugger Support Kit

3L Ltd.

Host Development Environments: UNIX, Windows and DOS.

The 3L Debugger Support Kit acts as a bridge that allows the debugging of 3L Parallel C code using standard JTAG emulators for the TMS320C4x, including GO DSP's Code Composer.

For more information, contact: Alan Culloch, adc@threeL.co.uk. Email inquiries to: threeL@threeL.co.uk. Visit 3L Ltd. on the World Wide Web at: www.threeL.co.uk.

Paramex Code Checker

3L Ltd.

Host Development Environments: Windows.

Paramex integrates Parallel C into the MATLAB environment to give networks of TMS320C4x DSPs access to the powerful data manipulation and visualization facilities of MATLAB. Code running on the DSPs can exchange arrays of values via MATLAB code running on the host. Use MATLAB as a sophisticated visualization front end, or as a testbed to check real-time data.

For more information, contact: Alan Culloch, adc@threeL.co.uk. Email inquiries to: threeL@threeL.co.uk. Visit 3L Ltd. on the World Wide Web at: www.threeL.co.uk.

Code Explorer* Debugger

GO DSP Corporation

Host Development Environments: Windows.

Available FREE from the GO DSP web site (www.go-dsp.com), Code Explorer* is a GUI-based debugger. Debugging capabilities include: single stepping; running to breakpoints; memory/register examination/modification; color syntax highlighting; symbol information in the DisAsm window; graphical signal analysis; animated run to monitor the execution of the algorithms; and extensive context-sensitive, on-line help. The Code Explorer debugger supports the TMS320Cxx DSP series, including the C2x, C2xx, C3x, C5x, and the C54x DSK's only.

For more information, contact: Omar Fattah, 416-599-6868. Email inquiries to: ofattah@go-dsp.com. Visit GO DSP Corporation on the World Wide Web at: www.go-dsp.com.

Signum Chameleon Debugger

Signum Systems Corporation

Host Development Environments: Windows.

Signum's Chameleon Debugger supports the 8051, 80196, 80186, DSPs and the Compact RISC processors under a 32-bit Windows* O.S. environment. The debugger interfaces with emulators from Signum Systems, Lucent Technologies, National Semiconductor and Texas Instruments to provide a development environment for software and hardware designers.

For more information, contact: Jerry Lewandowski, 805-523-9774. Email inquiries to: sales@signum.com. Visit Signum Systems Corporation on the World Wide Web at: <http://www.signum.com>.

TMS320Cxx C Debuggers

Texas Instruments Inc./DSP Tools

Host Development Environments: UNIX and Windows and HP 9000.

A standard window-, menu-, and mouse-based debugger interface, used with all instruction-level simulators and emulators, allows users to run and stop the processor; view and modify registers, memory values and C variables; and view disassembly and C source. TI provides powerful, full-speed, in-system, scan-based emulators for system-level integration and debugging.

For more information, contact: 800-477-8924 x 4500 or Local TI Sales Office. Email inquiries to: N/A. Visit Texas Instruments Inc./DSP Tools on the World Wide Web at: www.ti.com.

LIBRARY

3L DSP Library For DSPs

3L Ltd.

Host Development Environments: UNIX, Windows and DOS.

The 3L DSP Library performs a wide range of digital signal processing operations on real and complex data (data generation, windowing, convolution, correlation, filter design, transforms, spectral analysis, vector manipulation).

For more information, contact: Alan Culloch, adc@threeL.co.uk. Email inquiries to: threeL@threeL.co.uk. Visit 3L Ltd. on the World Wide Web at: www.threeL.co.uk.

Windows Server Library

3L Ltd.

Host Development Environments: Windows.

The Windows DLL allows for the easy integration of DSP target code with user-interface code written in Visual C++. Simple "cookbook-style" documentation is easy to understand. Sixteen and 32-bit versions available.

For more information, contact: Alan Culloch, adc@threeL.co.uk. Email inquiries to: threeL@threeL.co.uk. Visit 3L Ltd. on the World Wide Web at: www.threeL.co.uk.

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TMS320Cxx

Texas Instruments

Digital Image-Processing Library

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's image library contains more than 50 commonly used, dedicated image-processing functions to support image processing research and development applications. Color and monochrome processing, matrix functions, and conversion routines for one- and two-dimensional data are all included. It is simple to add user-specific functions to the library, thereby extending the environment to include custom image applications.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Hyperception Advanced Speech Library

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's Advanced Speech Library contains speech-related simulation blocks for speech processing research and development. Detailed analysis and comparison of speech processing waveforms can be performed easily. Encoding/decoding, LPC filtering, and analysis are included. An open architecture lets the user create custom or proprietary speech algorithms to achieve a specialized design.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Hyperception Advanced Transmission Library

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception Advanced Transmission Library is a complete set of design and analysis blocks for radio, wireline, and fiber transmission systems. Baseband and carrier transmission systems can be modeled with a variety of line codes and modulation formats. Carrier-recovery and clock-recovery models are included. Filter design facilities enable modeling of transmission links for the design/testing of various equalizers. Performance measures include Bit Error Rate simulations, BER calculations, eye patterns, and jitter analysis.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

OTHER TOOLS**Preprocessor for the HP Family of Logic Analyzers**

Corelis

Host Development Environments: HP Logic Analyzer.

Corelis designs, develops and manufactures a family of preprocessors for use with Hewlett-Packard Company's family of logic analyzers. These preprocessors are designed to provide a convenient and easy means of connection between an HP logic analyzer and an embedded processor or data bus. Corelis preprocessors are supplied with inverse assembly software as well as screen configuration software that runs on the HP logic analyzer. Preprocessors are available for most MIPS architecture processors as well as most TI DSP processors. Also available are tools for Motorola DSPs, the PCI* bus and ISA bus, and various FPGAs.

For more information, contact: Mike Winters, 562-926-6726. Email inquiries to: mikew@corelis.com. Visit Corelis on the World Wide Web at: www.corelis.com.

Hyperception HSVI1000 Function Generator

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's HSVI1000 Function Generator and waveform synthesizer is a virtual instrument with standard functions, including sine, square, and triangle waveform generation for a broad range of test and measurement applications. Knobs, toggle switches, and pushbutton controls allow adjustment of frequency, amplitude and offset settings.

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Hyperception HSVI2000 Time Domain Analyzer

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's HSVI2000 Time Domain Analyzer is a general-purpose digital oscilloscope that provides the same user controls and displays as conventional oscilloscopes. The RMS level is displayed for quick energy estimates. Edge triggering, vertical control, and timebase range are selectable through control knobs. Remote test and measurement capability is built in.

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Hypersignal HAppl* Applications Interface

Hyperception, Inc.

Host Development Environments: Windows.

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WinBRIDGE Host Connectivity Software

Spectron Microsystems

Host Development Environments: Windows.

The WinBRIDGE product family provides a hardware-independent connection between Windows* OS applications and DSP boards that is independent of the target real-time operating system. WinLINK builds on the baseline connectivity of WinCONNEX, adding a graphical I/O server, a SPOX RTOS interface, and facilities for enabling DSP real-time tasks to access host I/O resources.

For more information, contact: Shirley Hance, 805-968-5100. Email inquiries to: info@spectron.com. Visit Spectron Microsystems on the World Wide Web at: www.spectron.com.

Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabilities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: <http://www.tektronix.com>.

* Trademark or registered trademark of its respective company or mark holder

TMS320Cxx**Texas Instruments****TI DSP320 Simulator**

Texas Instruments Inc./DSP Tools

Host Development Environments: UNIX, Windows and DOS and HP9000.

TI DSP320 simulators for the company's TMS320xx DSPs are software programs that use the host processor and memory to perform instruction- and C-level simulation of the DSP. The simulator provides cost-effective application development and program verification in non-real-time and facilitates application development before target hardware is available.

For more information, contact: 800-477-8924 x 4500 or Local TI Sales Office. Email inquiries to: N/A. Visit Texas Instruments Inc./DSP Tools on the World Wide Web at: www.ti.com.

RAD6000**IBM Microelectronics****FULL FUNCTION RTOS****VxWorks* Real-Time Operating System**

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Part of the Tornado* development environment, VxWorks is an industry-standard, scalable real-time operating system. It features the multitasking wind* kernel, the POSIX real-time extensions, intertask communications, full networking functionality, file system support and C++ support. Additional functionality is available through optional products from Wind River and a wide range of third-party partners.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

INTEGRATED DEVELOPMENT ENVIRONMENT**MULTI* Software Development Environment**

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Software Development Environment provides a framework of interacting tools to support program development by small or large workgroups. MULTI includes all of the tools needed to support major programming projects, including a program builder, version control, program editor, debugger, execution profiler, run-time error checker, and source-code control.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Tornado* Integrated Development Environment

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Wind River Systems' Tornado is a complete software cross-development environment for embedded systems. Tornado is seamlessly integrated and includes powerful development tools and VxWorks*, a feature-rich, high performance and scalable real-time operating system. Completely open and customizable, the Tornado environment also facilitates the use of third-party and customer-developed tools to enhance its capabilities and meet unique customer requirements. Tornado has more than 90 software and hardware partners and is used by thousands of developers worldwide.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

COMPILER**Green Hills Optimizing Ada 95 Compilers**

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

A fully validated implementation of the Ada 95 language, including new task and synchronization features, POSIX threads, and type extensions of tagged types and child library units. Supports mixed-language programming with C, C++, FORTRAN and Assembly. Compilers support many 32- and 64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing C Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills' high-performance optimizing C compilers, for native or embedded development, have many advanced optimizations, such as cross-module inlining. The compilers allow for the fine tuning of optimization strategy so users can generate optimal code. Supports 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing C++ Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills offers high-performance optimizing C++ compilers for native or embedded development. The compilers are compatible with Green Hills Software's MULTI* debugger, which automatically handles C++ constructs such as name mangling and template debugging. The compilers support most 32-/64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing Embedded C++ Compiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills optimizing Embedded C++ compilers are high-performance and follow the Embedded C++ Technical Committee draft standard.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Green Hills Optimizing FORTRAN Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills Software offers optimizing FORTRAN compilers for native or embedded development. A compile-time option allows users to select from among the F77, VMS and DoD dialects of the FORTRAN language, with additional support for many extensions. The FORTRAN compilers support most 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

ASSEMBLER**Green Hills Cross Assembler Tool Chain**

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills embedded tool chain includes a macro assembler, linker, librarian, run-time libraries, object formatters and other utilities useful for embedded development. Cross-assembler tool chains are available for most 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

DEBUGGER**MULTI* Source-Level Debugger**

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Source-level Debugger supports native or embedded debugging of most popular 32-/64-bit processors. The main debugger window shows source or interlaced source and assembly. A single click lets the user look at a variable or set a breakpoint. Small windows allow for the monitoring of specific variables, local variables, or the call stack.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

* Trademark or registered trademark of its respective company or mark holder

RAD6000

IBM Microelectronics

WindView* Debugger

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

WindView is a revolutionary diagnostic and analysis tool that provides detailed visibility into the dynamic operation of an embedded system. The developer using the WindView visual debugger can quickly and easily visualize the complicated interaction among tasks, interrupt service routines, and system objects in an application. This information is presented and can be manipulated through a state-of-the-art graphical user interface (GUI).

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

OTHER TOOLS**Green Hills Instruction Set Simulator**

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills Instruction Set Simulators allow programs for the target microprocessor to be executed on the PC or host workstation by simulating the execution of the target at the instruction level. A special interface exists to allow program control via a standard debugger. The simulators support most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Execution Profiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Execution Profiler provides a mechanism for looking at user code in many different ways in order to pinpoint hot spots. Reports show performance by procedure, source line, etc. Supports native and embedded profiling on most popular 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Program Builder

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Program Builder is a configuration management system for creating and managing large programs. The MULTI builder replaces traditional make files with a modern point-and-click interface, greatly simplifying the configuration management task and eliminating the need for engineers dedicated to managing the build process. Supports native and embedded profiling on most popular 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Run-Time Error Checker

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Run-time Error Checker inserts code into user's executable to check for things like array out of bounds, value too large for variable, read of variable before initialization, and attempts to access unallocated memory. The error checker supports native and embedded profiling on most popular 32 and 64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

MULTI* Version Control System

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Version Control system is very unobtrusive, with files being automatically checked out when the first change is made in the editor. Advanced features support program branches and the ability to find out who made the last change to selected lines. Supports native and embedded profiling on most popular 32/64-bit CPUs.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

DSP56xx

Motorola Semiconductor

FULL FUNCTION RTOS**Eonic Virtuoso* V.4 Real-Time Operation System**

Eonic Systems, Inc.

Host Development Environments: UNIX, Windows and DOS.

Eonic Systems' Virtuoso* v.4 is a complete RTOS development environment for industry-leading DSPs and ASIC cores. The RTOS includes a System Generation Tool, Task-Level Debugger, Workload Monitor and other productivity tools. Virtuoso innovations include SoftStealth* technology, which automatically generates an application-specific real-time kernel with a minimum memory footprint, and the Virtual Single Processor (VSP) programming model to accelerate multi-processor development.

For more information, contact: Jan Borghs, +32 16 62 15 85. Email inquiries to: info@eonic.com. Visit Eonic Systems, Inc. on the World Wide Web at: <http://www.eonic.com>.

SPOX* RTOS and Software Development Kit (SDK)

Spectron Microsystems

Host Development Environments: UNIX and Windows.

Spectron Microsystems' SPOX SDK provides a complete software development environment for digital signal processing (DSP) developers. At the core is SPOX-KNL, a deterministic real-time, multi-tasking operating system designed specifically for DSP architectures. Also included are math libraries, host connectivity to DSP subsystems and extensions to the capabilities of C source code debuggers.

For more information, contact: Shirley Hance, 805-968-5100. Email inquiries to: info@spectron.com. Visit Spectron Microsystems on the World Wide Web at: www.spectron.com.

Precise/MQX* Real-Time Operating System

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking's full-featured, royalty-free, real-time Precise/MQX RTOS executive includes a design tool, performance analysis and an optional suite of communications protocols and drivers. MQX adds support for both shared memory multiprocessing and distributed processing. The functionality of the kernel can be extended with optional I/O components that add networking protocols and data communications protocols.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

BASIC RTOS KERNEL**Precise/MQX* & MQX+m Real-Time Executive**

Precise Software Technologies Inc.

Host Development Environments: .

Precise Software Technologies' Precise/MQX* is a portable high-performance, real-time executive. MQX is scalable from a single processor to distributed multiprocessor configurations. The real-time executive provides functions for multitasking, intertask communications and synchronization, dynamic interrupt management, and memory management. Optional protocols for networking and data communications are also available.

For more information, contact: Clarke Esler, 508-264-4413. Email inquiries to: info@psti.com. Visit Precise Software Technologies Inc. on the World Wide Web at: www.psti.com.

INTEGRATED DEVELOPMENT ENVIRONMENT**Hypersignal Block Diagram System Design/Simulator**

Hyperception, Inc.

Host Development Environments: Windows.

Block Diagram System Design/Simulator allows for comprehensive dynamic system design and simulation. It was developed for use in applications including DSP, communications, simulation, signal analysis, and general engineering modeling. Block Diagram comes standard with a large library of functions which run at executable

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DSP56xx**Motorola Semiconductor**

speed rather than interpretive speed. Hyperception has made it easy to add user-defined functions to Block Diagram.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Hypersignal RIDE* Visual Design Environment

Hyperception, Inc.

Host Development Environments: Windows.

Hypersignal RIDE is a complete visual design environment for use in real-time systems development. It can be used for applications ranging from low-level DSP systems design and implementation to application-specific projects such as real-time instrumentation, data acquisition, control systems, and more. It provides complete control and observation of DSP designs.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

LSI DSP Software Development Environment

Loughborough Sound Images

Host Development Environments: UNIX, Windows and VxWorks.

LSI's DSP software development environment includes kernels, compilers, assemblers, debuggers, libraries and drivers. LSI produces and markets a wide range of software products used in conjunction with the company's various DSP boards for VME, ISA and PCI systems. This software ranges from simple operating system drivers/libraries (e.g. Windows* NT/95, Solaris, VxWorks*, etc.) to sophisticated IDE tools, kernels and libraries which run on the DSP devices.

For more information, contact: Krista Lewis, 978-263-2255. Email inquiries to: ussales@lsi-dsp-usa.com. Visit Loughborough Sound Images on the World Wide Web at: <http://www.lsi-dsp.com>.

EDE Project Environment

Tasking, Inc.

Host Development Environments: Windows.

EDE is a complete development project environment that gives the developer direct access to all the tools and features needed. EDE includes a language-sensitive editor, MAKE for automated application building and a project environment for specifying project files, including source files, tool options and build options.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

COMPILER**PCYACC 7.0 Compiler/Language Development Toolkit**

Abraxas Software, Inc.

Host Development Environments: All.

Abraxas Software's PYACC v. 7.0 is a complete language-development environment that generates C, C++, Java, Delphi, and VBS source code (from Input Language Description Grammars or ILDGs) for building assemblers, compilers, interpreters, browsers, PDLs, language translators, syntax-directed editors, language validators, natural language processors, expert-system shells, and query languages. Includes "drop in" language engines for SQL, dBASE, PostScript, HyperTalk, SmallTalk-80, C++, C, Pascal, ProLog, FORTRAN, COBOL, Basic, SGML, ASN, RPG, SNA, VBasic, VHDL, HTML, VMRL, Java, ODMG-ODL/OQL, Modula-S, Delphi, VBS and Ada. The toolkit includes portable object-oriented classes for Java and C++ and debugging tools, including runtime visual parser debugging, abstract syntax tree generation and code referencing.

For more information, contact: Tana Rae K., 503-244-5253. Email inquiries to: sales@abxsoft.com. Visit Abraxas Software, Inc. on the World Wide Web at: www.abxsoft.com.

Hyperception RIDE Compiler

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's RIDE Compiler communicates with an installed board driver which links DSP COFF object files, downloads code, data, and parameters to the DSP memory, controls the execution, and monitors activity of the DSP. The application is linked in the same fashion as a dedicated DSP Compiler(Assembler)/Linker. There is no special real-time kernel or RTOS to increase complexity.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

C Compiler Package

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking delivers ANSI C compilers that are highly optimized with individual target-specific extensions for ultimate flexibility and efficiency. As well as using these target-specific extensions, the developer-user can also define in-line functions and use in-line assembly. Included with every compiler is an assembler and linker/locator.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

DEBUGGER**CrossView* Pro Debugger**

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking's CrossView Pro debugger delivers functionality that reduces time requirements for program testing and debugging, and includes the following: tracking scope and monitoring locals; an intelligent source window; and code coverage and performance analysis. CrossView Pro provides multiple views of the developer's code: C and/or assembly source, monitor, inspect, on-chip registers, call stack, variables, break point, execution trace, session log, simulated I/O and memory dumps.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

LIBRARY**Digital Image-Processing Library**

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's image library contains more than 50 commonly used, dedicated image-processing functions to support image processing research and development applications. Color and monochrome processing, matrix functions, and conversion routines for one- and two-dimensional data are all included. It is simple to add user-specific functions to the library, thereby extending the environment to include custom image applications.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Hyperception Advanced Speech Library

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's Advanced Speech Library contains speech-related simulation blocks for speech processing research and development. Detailed analysis and comparison of speech processing waveforms can be performed easily. Encoding/decoding, LPC filtering, and analysis are included. An open architecture lets the user create custom or proprietary speech algorithms to achieve a specialized design.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

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DSP56xx

Motorola Semiconductor

OTHER TOOLS**CodeCheck 7.0 Analyzer**

Abraxas Software, Inc.

Host Development Environments: UNIX and Windows and MAC.

CodeCheck* Version 7.0 is a programmable tool for managing all C and C++ source code on a file or project basis. CodeCheck is input-compatible with all variants of K&R, ANSI C and C++. CodeCheck identifies code that will not port between MS DOS, OS/2, UNIX, VMS, WIN-95/NT, Macintosh, and porting to 64-bit machines. CodeCheck allows corporate coding and project specification standards to be completely automated for compliance validation. CodeCheck includes pre-written expert system Rule Files that can be applied to any C or C++ project for: POSIX, SVID, X3J11, Ellemtel, and ANSI C/C++ source code conformance validation.

For more information, contact: Tana Rae K., 503-244-5253. Email inquiries to: sales@abxsoft.com. Visit Abraxas Software, Inc. on the World Wide Web at: www.abxsoft.com.

Validator* Verification Tools

B-Tree Systems, Inc.

Host Development Environments: Windows.

B-Tree's Validator and ValidatorGold Test Tools are fully automated test environments that enable the functional verification of embedded systems by providing real-time stimulation, non-intrusive monitoring, data visualization, automated test execution and logging of test results. B-Tree's Validator 2000 enables Year 2000 (Y2K) compliance testing for embedded and non-embedded systems. B-Tree's Validator SC product automates software compatibility testing for PCs and PC components.

For more information, contact: Laura Dominik, 612-936-7887. Email inquiries to: Info@btree.com. Visit B-Tree Systems, Inc. on the World Wide Web at: www.btree.com.

Preprocessor for the HP Family of Logic Analyzers

Corelis

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For more information, contact: Mike Winters, 562-926-6726. Email inquiries to: mikew@corelis.com. Visit Corelis on the World Wide Web at: www.corelis.com.

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Tektronix TLA 700 Series Logic Analyzer

Tektronix Inc.

Host Development Environments: N/A.

Tektronix has supplied its TLA 700 Series Logic Analyzers to embedded system developers for many years. The logic analyzers, well known for their real-time trace capabilities, support a wide variety of microprocessors, microcontrollers and digital signal processors.

For more information, contact: Sue Foley, 503-627-5157. Email inquiries to: sales@tektronix.com. Visit Tektronix Inc. on the World Wide Web at: http://www.tektronix.com.

SHARC/ADSP21xxx

Analog Devices

FULL FUNCTION RTOS**CMX-RTX* Real-Time Operating System**

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-RTX RTOS provides more than 65 kernel services allowing control of tasks, events, messages, resources, semaphores, cyclic timers, queues, fixed memory blocks and UARTs. Interrupts are allowed to use some of the CMX functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. Very small ROM and RAM requirements for small-footprint applications. Several compiler vendors are supported. Source code is included, and there are no royalties.

The CMX-RTX RTOS supports an unusually large number of μ PU, μ CU, and DSP architectures from a large number of manufacturers, including: Advanced RISC Machines, Analog Devices, Hitachi, Intel, MIPS, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Sharp, Siemens, Texas Instruments, Toshiba, and Zilog.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

* Trademark or registered trademark of its respective company or mark holder.

SHARC/ADSP21xxx**Analog Devices****Eonic Virtuoso* V.4 Real-Time Operation System**

Eonic Systems, Inc.

Host Development Environments: UNIX, Windows and DOS.

Eonic Systems' Virtuoso* v.4 is a complete RTOS development environment for industry-leading DSPs and ASIC cores. The RTOS includes a System Generation Tool, Task-Level Debugger, Workload Monitor and other productivity tools. Virtuoso innovations include SoftStealth* technology, which automatically generates an application-specific real-time kernel with a minimum memory footprint, and the Virtual Single Processor (VSP) programming model to accelerate multi-processor development.

For more information, contact: Jan Borghs, +32 16 62 15 85. Email inquiries to: info@eonic.com. Visit Eonic Systems, Inc. on the World Wide Web at: <http://www.eonic.com>.

SPOX* RTOS and Software Development Kit (SDK)

Spectron Microsystems

Host Development Environments: UNIX and Windows.

Spectron Microsystems' SPOX SDK provides a complete software development environment for digital signal processing (DSP) developers. At the core is SPOX-KNL, a deterministic real-time, multi-tasking operating system designed specifically for DSP architectures. Also included are math libraries, host connectivity to DSP subsystems and extensions to the capabilities of C source code debuggers.

For more information, contact: Shirley Hance, 805-968-5100. Email inquiries to: info@spectron.com. Visit Spectron Microsystems on the World Wide Web at: www.spectron.com.

BASIC RTOS KERNEL**Precise/MQX* & MQX+m Real-Time Executive**

Precise Software Technologies Inc.

Host Development Environments: .

Precise Software Technologies' Precise/MQX* is a portable high-performance, real-time executive. MQX is scalable from a single processor to distributed multiprocessor configurations. The real-time executive provides functions for multitasking, intertask communications and synchronization, dynamic interrupt management, and memory management. Optional protocols for networking and data communications are also available.

For more information, contact: Clarke Esler, 508-264-4413. Email inquiries to: info@psti.com. Visit Precise Software Technologies Inc. on the World Wide Web at: www.psti.com.

INTEGRATED DEVELOPMENT ENVIRONMENT**Hypersignal Block Diagram System Design/Simulator**

Hyperception, Inc.

Host Development Environments: Windows.

Block Diagram System Design/Simulator allows for comprehensive dynamic system design and simulation. It was developed for use in applications including DSP, communications, simulation, signal analysis, and general engineering modeling. Block Diagram comes standard with a large library of functions which run at executable speed rather than interpretive speed. Hyperception has made it easy to add user-defined functions to Block Diagram.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Hypersignal RIDE* Visual Design Environment

Hyperception, Inc.

Host Development Environments: Windows.

Hypersignal RIDE is a complete visual design environment for use in real-time systems development. It can be used for applications ranging from low-level DSP systems design and implementation to application-specific projects such as real-time instrumentation, data acquisition, control systems, and more. It provides complete control and observation of DSP designs.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

LSI DSP Software Development Environment

Loughborough Sound Images

Host Development Environments: UNIX, Windows and VxWorks.

LSI's DSP software development environment includes kernels, compilers, assemblers, debuggers, libraries and drivers. LSI produces and markets a wide range of software products used in conjunction with the company's various DSP boards for VME, ISA and PCI systems. This software ranges from simple operating system drivers/libraries (e.g. Windows* NT/95, Solaris, VxWorks*, etc.) to sophisticated IDE tools, kernels and libraries which run on the DSP devices.

For more information, contact: Krista Lewis, 978-263-2255. Email inquiries to: ussales@lsi-dsp-usa.com. Visit Loughborough Sound Images on the World Wide Web at: <http://www.lsi-dsp.com>.

COMPILER**PCYACC 7.0 Compiler/Language Development Toolkit**

Abraxas Software, Inc.

Host Development Environments: All.

Abraxas Software's PYACC v. 7.0 is a complete language-development environment that generates C, C++, Java, Delphi, and VBS source code (from Input Language Description Grammars or ILDGs) for building assemblers, compilers, interpreters, browsers, PDLs, language translators, syntax-directed editors, language validators, natural language processors, expert-system shells, and query languages. Includes "drop in" language engines for SQL, dBASE, PostScript, HyperTalk, SmallTalk-80, C++, C, Pascal, ProLog, FORTRAN, COBOL, Basic, SGML, ASN, RPG, SNA, VBasic, VHDL, HTML, VMRL, Java, ODMG-ODL/OQL, Modula-S, Delphi, VBS and Ada. The toolkit includes portable object-oriented classes for Java and C++ and debugging tools, including runtime visual parser debugging, abstract syntax tree generation and code referencing.

For more information, contact: Tana Rae K., 503-244-5253. Email inquiries to: sales@abxsoft.com. Visit Abraxas Software, Inc. on the World Wide Web at: www.abxsoft.com.

Hyperception RIDE Compiler

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's RIDE Compiler communicates with an installed board driver which links DSP COFF object files, downloads code, data, and parameters to the DSP memory, controls the execution, and monitors activity of the DSP. The application is linked in the same fashion as a dedicated DSP Compiler/Assembler/Linker. There is no special real-time kernel or RTOS to increase complexity.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

DEBUGGER**3L Debugger Support Kit**

3L Ltd.

Host Development Environments: UNIX, Windows and DOS.

The 3L Debugger Support Kit acts as a bridge that allows the debugging of 3L Parallel C code using standard JTAG emulators for the TMS320C4x, including GO DSP's Code Composer.

For more information, contact: Alan Culloch, adc@threeL.co.uk. Email inquiries to: threeL@threeL.co.uk. Visit 3L Ltd. on the World Wide Web at: www.threeL.co.uk.

LIBRARY**3L DSP Library For DSPs**

3L Ltd.

Host Development Environments: UNIX, Windows and DOS.

The 3L DSP Library performs a wide range of digital signal processing operations on real and complex data (data generation, windowing, convolution, correlation, filter design, transforms, spectral analysis, vector manipulation).

For more information, contact: Alan Culloch, adc@threeL.co.uk. Email inquiries to: threeL@threeL.co.uk. Visit 3L Ltd. on the World Wide Web at: www.threeL.co.uk.

Windows Server Library

3L Ltd.

Host Development Environments: Windows.

The Windows DLL allows for the easy integration of DSP target code with user-inter

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SHARC/ADSP21xxx**Analog Devices**

face code written in Visual C++. Simple "cookbook-style" documentation is easy to understand. Sixteen and 32-bit versions available.

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Digital Image-Processing Library

Hyperception, Inc.

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Hyperception Advanced Speech Library

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OTHER TOOLS**CodeCheck 7.0 Analyzer**

Abraxas Software, Inc.

Host Development Environments: UNIX and Windows and MAC.

CodeCheck* Version 7.0 is a programmable tool for managing all C and C++ source code on a file or project basis. CodeCheck is input-compatible with all variants of K&R, ANSI C and C++. CodeCheck identifies code that will not port between MS DOS, OS/2, UNIX, VMS, WIN-95/NT, Macintosh, and porting to 64-bit machines. CodeCheck allows corporate coding and project specification standards to be completely automated for compliance validation. CodeCheck includes pre-written expert system Rule Files that can be applied to any C or C++ project for: POSIX, SVID, X3J11, Ellementel, and ANSI C/C++ source code conformance validation.

For more information, contact: Tana Rae K., 503-244-5253. Email inquiries to: sales@abxsoft.com. Visit Abraxas Software, Inc. on the World Wide Web at: www.abxsoft.com.

Logic Analyzers

Hewlett-Packard Company

Host Development Environments: N/A.

HP's digital design and debug tools help system developers solve tough hardware and software integration problems fast. The HP benchtop logic analyzers offer cost-effective 100 MHz state analysis plus five timing modes up to 500 MHz. The HP 16500 modular logic analysis systems provide the power and flexibility to handle demanding hard-

ware and software problems.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or /emulator.

Hyperception HSVI1000 Function Generator

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's HSVI1000 Function Generator and waveform synthesizer is a virtual instrument with standard functions, including sine, square, and triangle waveform generation for a broad range of test and measurement applications. Knobs, toggle switches, and pushbutton controls allow adjustment of frequency, amplitude and offset settings.

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Hyperception's HSVI3000 Frequency Domain Analyzer has a realistic user interface. Controls allow frequency measurements to be displayed as 20 Log, 10 Log, or linear magnitude data. Toggle switches for the selection of peak frequency value and the corresponding magnitude value are provided for Peak Detection analysis. Window options include both Hamming and Rectangular Windows.

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Hypersignal HAppl* Applications Interface

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Host Development Environments: Windows.

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* Trademark or registered trademark of its respective company or mark holder

DSP96xxx

Motorola Semiconductor

FULL FUNCTION RTOS**Eonic Virtuoso* V.4 Real-Time Operation System**

Eonic Systems, Inc.

Host Development Environments: UNIX, Windows and DOS.

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INTEGRATED DEVELOPMENT ENVIRONMENT**Hypersignal Block Diagram System Design/Simulator**

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C Compiler Package

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking delivers ANSI C compilers that are highly optimized with individual target-specific extensions for ultimate flexibility and efficiency. As well as using these target-specific extensions, the developer-user can also define in-line functions and use in-line assembly. Included with every compiler is an assembler and linker/locator.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

LIBRARY**Digital Image-Processing Library**

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Host Development Environments: Windows.

Hyperception's image library contains more than 50 commonly used, dedicated image-processing functions to support image processing research and development applications. Color and monochrome processing, matrix functions, and conversion routines for one- and two-dimensional data are all included. It is simple to add user-specific functions to the library, thereby extending the environment to include custom image applications.

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OTHER TOOLS**Hyperception HSVI1000 Function Generator**

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Host Development Environments: Windows.

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Hyperception HSVI3000 Frequency Domain Analyzer

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Host Development Environments: Windows.

Hyperception's HSVI3000 Frequency Domain Analyzer has a realistic user interface.

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DSP96xxx**Motorola Semiconductor**

Controls allow frequency measurements to be displayed as 20 Log, 10 Log, or linear magnitude data. Toggle switches for the selection of peak frequency value and the corresponding magnitude value are provided for Peak Detection analysis. Window options include both Hamming and Rectangular Windows.

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Host Development Environments: N/A.

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DSP32C**Lucent****COMPILER****Hyperception RIDE Compiler**

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OTHER TOOLS**Preprocessor for the HP Family of Logic Analyzers**

Corelis

Host Development Environments: HP Logic Analyzer.

Corelis designs, develops and manufactures a family of preprocessors for use with Hewlett-Packard Company's family of logic analyzers. These preprocessors are designed to provide a convenient and easy means of connection between an HP logic analyzer and an embedded processor or data bus. Corelis preprocessors are supplied with inverse assembly software as well as screen configuration software that runs on the HP logic analyzer. Preprocessors are available for most MIPS architecture processors as well as most TI DSP processors. Also available are tools for Motorola DSPs, the PCI* bus and ISA bus, and various FPGAs.

For more information, contact: Mike Winters, 562-926-6726. Email inquiries to: mikew@corelis.com. Visit Corelis on the World Wide Web at: www.corelis.com.

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DSP32C

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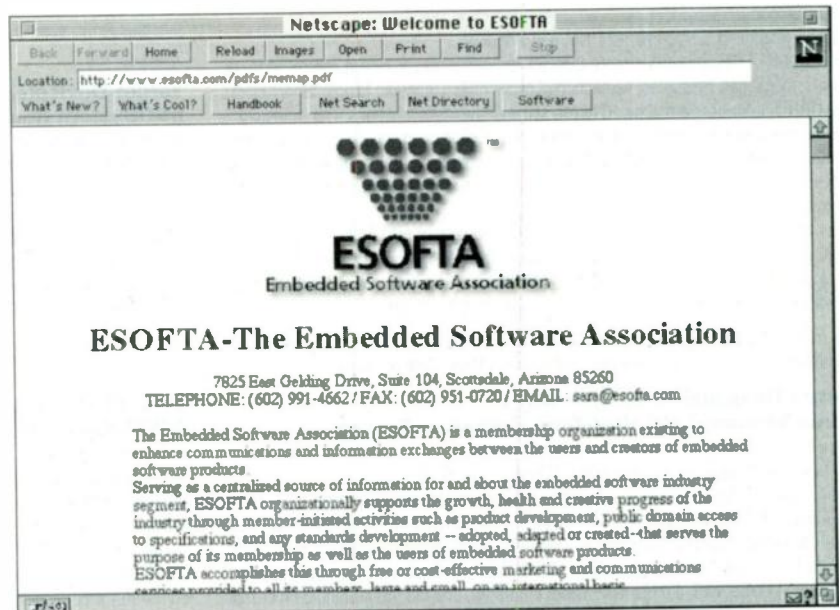
ESOF TA On-Line Product Directory --

a compendium of embedded software suppliers and products, including processors (uPUs and DSPs); real-time operating systems (and kernels); development tools; simulators; compilers; assemblers/ linkers/ loaders/ libraries; applications software; and integrated development environments. Produced by web masters at ESOF TA, this directory augments a supplier's marketing efforts. Statistical reports of visitors to supplier's products will reveal user interests and product trends.

"Year 2000" Reports -- A growing discussion area in which embedded software application solutions may be presented for the upcoming turn of the century.

COMING IN THE MONTHS AHEAD:

ESOF TA Member On-Line Exhibitor Booths -- an opportunity to display products in a "virtual trade show" setting, with access for the member company to update and maintain the booth. Statistical reports about visitors provided to participating members.



"Product News" on the Internet -- a special place on the ESOF TA web site for member companies' latest product offerings, updated as new product releases arrive.

www.esofta.com

• • • TM

ESOF TA

Embedded Software Association

SOFTWARE TOOLS FOR OTHER LOGIC DEVICES

Full Function RTOS

Target Device(s): H8300X, 37700, M16C and 64180/Z180. Bytebos* Multitasking Operating System

Bytebos Integrated Systems

Host Development Environments: UNIX and Windows.

Bytebos is a full-featured multitasking operating system designed for use in high-performance, real-time embedded computing applications. Bytebos is configured for use with all major C compilers and debuggers and is available for a variety of microprocessors, microcontrollers, and DSPs. Bytebos applications are portable with simple licensing. There are no royalties on executables, and source code is provided.

For more information, contact: Nick Andrews, 800-788-7288. Email inquiries to: andrews@bytebos.com. Visit Bytebos Integrated Systems on the World Wide Web at: www.bytebos.com.

Target Device(s): Intel 80C196/296, Mitsubishi M16C, MELPS7700, SGS-T ST9/9+/10, Zilog Z80/180 & Toshiba TLCS-900.

CMX-RTX* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-RTX RTOS provides more than 65 kernel services allowing control of tasks, events, messages, resources, semaphores, cyclic timers, queues, fixed memory blocks and UARTs. Interrupts are allowed to use some of the CMX functions. The scheduler is based on true preemption. Very fast context-switch times and very low interrupt-latency times are provided. Very small ROM and RAM requirements for small-footprint applications. Several compiler vendors are supported. Source code is included, and there are no royalties.

The CMX-RTX RTOS supports an unusually large number of μ PU, μ CU, and DSP architectures from a large number of manufacturers, including: Advanced RISC Machines, Analog Devices, Hitachi, Intel, MIPS, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Sharp, Siemens, Texas Instruments, Toshiba, and Zilog.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

Target Device(s): Oak, Pine DSPs.

Eonic Virtuoso* V.4 Real-Time Operation System

Eonic Systems, Inc.

Host Development Environments: UNIX, Windows and DOS.

Eonic Systems' Virtuoso* v.4 is a complete RTOS development environment for industry-leading DSPs and ASIC cores. The RTOS includes a System Generation Tool, Task-Level Debugger, Workload Monitor and other productivity tools. Virtuoso innovations include SoftStealth* technology, which automatically generates an application-specific real-time kernel with a minimum memory footprint, and the Virtual Single Processor (VSP) programming model to accelerate multi-processor development.

For more information, contact: Jan Borghs, +32 16 62 15 85. Email inquiries to: info@eonic.com. Visit Eonic Systems, Inc. on the World Wide Web at: <http://www.eonic.com>.

Target Device(s): NSC Compact RISC* Family & Siemens 166/167.

PXROS* Portable, Extendable RTOS

HighTec EDV-Systeme GmbH

Host Development Environments: UNIX and Windows and DOS.

PXROS has the following features: absolutely no interrupt latency with transparency; multiple independent activities with interrupt handlers and tasks (processes); priority-

driven, preemptive scheduling with 32 task-priority levels; process coordination of messages, events, dynamically modified priorities, semaphores; flexible resource management with dynamically defined memory classes, fixed- and variable-length memory blocks, dynamically created objects, resource reservation; real-time-control-time based calls, period, for activities, timeouts and events.

For more information, contact: Hagen Heggenberger, ++43-681-92613-0. Email inquiries to: htc@hightec-rt.com. Visit HighTec EDV-Systeme GmbH on the World Wide Web at: <http://www.hightec-rt.com>.

Target Device(s): 88000.

MTOS*/ MTOS-UX Real-Time Operating Systems

Industrial Programming, Inc.

Host Development Environments: UNIX and Windows.

IPI's MTOS full-function RTOS products offer a uniform applications programming interface (API) across all supported processors, thus affording interface familiarity for programmers despite processor changes. MTOS also supports symmetric multi-processing and offers a complete coordination system for handling asynchronous operations. A "small footprint" RTOS, with code space ranging from 16KB to 45KB, MTOS is highly scalable for use with small, mid-size and very large programming projects.

For more information, contact: Bernard Mushinsky, 800-365-MTOS. Email inquiries to: info@ipi.com. Visit Industrial Programming, Inc. on the World Wide Web at: www.ipi.com.

Target Device(s): Super H 1,2,3.

pSOSystem Real-Time Operating System

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pSOSystem is a modular, high-performance real-time operating system designed specifically for embedded microprocessors. The RTOS provides a complete multi-tasking environment based on open system standards, such as network file system support. pSOSystem is designed for performance, reliability, and ease-of-use on either custom or commercial hardware.

Soon available for SPARC processors.

For more information, contact: . Email inquiries to: . Visit Integrated Systems, Inc. on the World Wide Web at: .

Target Device(s): Z80/HD64180.

AMX* Real-Time Multitasking Kernel

KADAK Products Ltd.

Host Development Environments: Windows and DOS.

KADAK's AMX Real-Time Operating System is a full-featured, fast, compact, ROMable kernel. AMX includes: preemptive, priority-based scheduler (optional time-slicing); nested interrupts with priority ordering; mailbox, semaphore, resource, event, list, buffer and memory managers; the Configuration Builder Utility eases system construction. And for debugging, KADAK's KwikLook* fault finder exploits SDS's SingleStep* and SSI's VisualProbe* debuggers for fully AMX RTOS-aware debugging.

For more information, contact: Sales, 604-734-2796. Email inquiries to: amxsales@kadak.com. Visit KADAK Products Ltd. on the World Wide Web at: www.kadak.com.

Target Device(s): SGS-T microcontrollers.

RTX166* Real-Time Operating Systems

Keil Software Inc.

Host Development Environments: N/A.

Keil Software's RTX166 Full (#FR166) is a multitasking real-time operating system for the Siemens and SGS Thomson 166/167 microcontroller family. With FR166, a developer can manage multiple tasks on a single microcontroller CPU, which makes program

* Trademark or registered trademark of its respective company or mark holder

development much easier. The RTX166 Full RTOS also includes CAN libraries. Keil Software's RTX166 (#TR166) Tiny is a subset of the RTX166 Full RTOS product.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

**Target Device(s): Philips R3150A.
Microsoft Windows* CE O.S. Embedded Toolkit**

Microsoft* Corporation

Host Development Environments: Windows.

Microsoft's Windows CE Embedded Toolkit for Visual C++ 5.0 includes integrated development environment tools designed specifically for embedded development. The Windows CE platform is a 32-bit, preemptive, multitasking, multithreaded operating system designed from the ground up to support embedded systems. Use the embedded toolkit to choose components for building a customized version of the Windows CE operating system to meet the unique requirements of your hardware. The toolkit contains the RTOS, compiler, assembler, emulator, debugger, library and drivers.

For more information, contact: N/A. Email inquiries to: N/A. Visit Microsoft* Corporation on the World Wide Web at: N/A.

**Target Device(s): M-Core and all 386/486/586.
VRTX* Real-Time Operating System**

Microtec

Host Development Environments: UNIX and Windows.

An element of the Spectra* development system, the VRTX* RTOS is easily configured and includes a family of real-time kernels that gives developers complete freedom in making functionality, performance and size tradeoffs. VRTX has integrated STREAMS-based networking, I/O and file systems. VRTX is unique in offering a choice of three compatible real-time kernels: VRTXsa kernel, a high-performance, full-featured kernel based on a leading-edge architecture; VRTX32 kernel, which has logged more trouble-free hours than any other RTOS available and has been used in FAA-certified flight-critical applications; VRTXmc kernel, the first real-time kernel specifically designed for microcontrollers, featuring minimal RAM and ROM footprints.

For more information, contact: Sales, 800-950-5554. Email inquiries to: info@mri.com. Visit Microtec on the World Wide Web at: www.mri.com.

Target Device(s): SC300/310/400 , ULP, Cyrix Media GX, & Intel Pentium Pro.

QNX* Real-Time Operating System Technology

QNX Software Systems Ltd.

Host Development Environments: Windows and QNX RTOS (self hosted).

The QNX RTOS is a leading real-time OS for PCs. Based on a very lean microkernel, the scalable, POSIX-certified QNX RTOS combines hard real-time performance, fault tolerance, and pre-emptive multitasking with full memory protection. QNX also offers its award-winning Photon microGUI*, a complete embeddable windowing system requiring less than 500KB of flash memory or ROM.

For more information, contact: Marketing Services Dept., 800-676-0566. Email inquiries to: info@qnx.com. Visit QNX Software Systems Ltd. on the World Wide Web at: www.qnx.com.

**Target Device(s): Most DSPs.
SPOX* RTOS and Software Development Kit (SDK)**

Spectron Microsystems

Host Development Environments: UNIX and Windows.

Spectron Microsystems' SPOX SDK provides a complete software development environment for digital signal processing (DSP) developers. At the core is SPOX-KNL, a deterministic real-time, multi-tasking operating system designed specifically for DSP architectures. Also included are math libraries, host connectivity to DSP subsystems and extensions to the capabilities of C source code debuggers.

For more information, contact: Shirley Hance, 805-968-5100. Email inquiries to: info@spectron.com. Visit Spectron Microsystems on the World Wide Web at: www.spectron.com.

**Target Device(s): 683xx, SH, Z80/Z180.
Super TASK! Real-Time Operating System**

U S Software

Host Development Environments: Windows.

U S Software's SuperTask! is a mature, compact, fast, and user-configurable RTOS suite. SuperTask! supports more than 20 C/C++ compilers/tool chains, and source code is included with an ANSI standard C core

For more information, contact: Katrina Sumner, 503-641-8446 x 740. Email inquiries to: info@ussw.com. Visit U S Software on the World Wide Web at: www.ussw.com.

**Target Device(s): CPU32, PA-RISC and c16.
VxWorks* Real-Time Operating System**

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Part of the Tornado* development environment, VxWorks is an industry-standard, scalable real-time operating system. It features the multitasking wind* kernel, the POSIX real-time extensions, intertask communications, full networking functionality, file system support and C++ support. Additional functionality is available through optional products from Wind River and a wide range of third-party partners.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

Basic RTOS Kernel

**Target Device(s): NEC851.
Nucleus* C++ RTOS Kernel**

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus C++ is a version of the Nucleus PLUS kernel that provides an object-oriented interface to an application. Although the core of the product is the Nucleus PLUS kernel (thereby reinforcing its robustness), the interface has been completely redesigned with all of the standard C++ mechanisms including constructors, destructors, and the like. Tests indicate that the incorporation of these facilities has minimal impact on the code size and performance of the final application.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

**Target Device(s): 3081, H8300H, i460032, LR33000,
MN10200, N420032, NEC4xxx/5000/8xx & PR30100.
Nucleus PLUS* Real-Time Operating System**

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus PLUS is designed as a core component for an operating system environment. It is extensible and dynamic. Its modular design allows services to be easily produced by combining existing services. All of the Nucleus PLUS components (tasks, queues, semaphores, etc.) can be dynamically created and deleted. Each component has a control block defined by the user and placed anywhere in the available memory space of the target system. Nucleus PLUS is a real-time, pre-emptive, multitasking kernel designed for time-critical embedded applications. Approximately 95 percent of Nucleus PLUS is extremely portable and is currently available for use with most microprocessor families.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

**Target Device(s): Most Architectures.
CMX-TINY+* Real-Time Operating System**

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-TINY+ RTOS provides more than 40 kernel services, thus allowing control of the following: tasks, events, messages, resources, semaphores, cyclic timers, and queues. Interrupts are allowed to use some CMX functions. The scheduler is based on true pre-emption. CMX-TINY+ RTOS features very fast context-switch times and very low interrupt-latency times. ROM and RAM requirements are very small. CMX offers support for several compiler vendors, with royalty-free source code included.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

**Target Device(s): Intel 80196/296, SGS-T ST9/9+/10,
Hitachi HL, NEC 78K3/4, Mitsubishi M16C/MELPS7700,
Toshiba TLCS-900.**

CMX-TINY+* Real-Time Operating System

CMX Company

Host Development Environments: UNIX and Windows.

The CMX-TINY+ RTOS provides more than 40 kernel services, allowing control of: tasks, events, messages, resources, semaphores, cyclic timers, queues. Interrupts are allowed to use some of the CMX-TINY+ functions. The scheduler is based on true pre-emption. Very fast context-switch times and very low interrupt-latency times are pro-

* Trademark or registered trademark of its respective company or mark holder

vided. The RTOS has very small ROM and RAM requirements, and supports several compiler vendors. Source code is included on a royalty-free basis.

The CMX-TINY+ RTOS supports an unusually large number of μ PU and μ CU architectures from the following manufacturers: Advanced RISC Machines, Hitachi, Intel, Mitsubishi, Motorola, NEC, Philips, SGS-Thomson, Siemens, and Toshiba.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

Target Device(s): 80x96, 80251, 520x, 80C51XA, 80C16x & M16C.

RTXC* Real-Time Kernel

Embedded System Products, Inc.

Host Development Environments: UNIX and Windows.

Embedded System Products, Inc.'s RTXC is a multitasking real-time embedded kernel written primarily in C and featuring a single API for all supported processors. RTXC manages tasks and time, synchronizes with events, and permits transfer of data between tasks through 72 kernel services, including services for RAM management and exclusive access to an entity.

For more information, contact: Sales, 800-525-4302. Email inquiries to: sales@esphou.com. Visit Embedded System Products, Inc. on the World Wide Web at: www.esphou.com.

Target Device(s): PC.

Micro Digital's smx* V 3.2 Real-Time Operating System

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's smx, originally introduced in 1988, enhanced and complemented with additional capabilities over the years, has stood the test of time as a preemptive, multitasking real-time operating system kernel that provides task and memory management, timing, character I/O, intertask communication, semaphores, event queues, primitives and more. The kernel OS supports testing by error monitoring. Micro Digital's smx RTOS kernel is the basis for its integrated development tools environment, all designed to offer superb development support environments for developers of x86-compatible and PowerPC processor-based embedded systems.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

Target Device(s): FR20, M16 and RH32.

MULTI* Software Development Environment

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Software Development Environment provides a framework of interacting tools to support program development by small or large workgroups. MULTI includes all of the tools needed to support major programming projects, including a program builder, version control, program editor, debugger, execution profiler, run-time error checker, and source-code control.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Target Device(s): Siemens 166/167.

HighTec's GNU C/C++ Development Kit

HighTec EDV-Systeme GmbH

Host Development Environments: UNIX, Windows, DOS and LINUX.

HighTec's GNU C16x Development Kit includes the GNU preprocessor, the C/C++ compiler, assembler, linker/locator and other useful GNU utilities. It also offers re-entrant library support and an inline assembler with C/C++ operands. It has ANSI standard programming, fast interrupt response time of 2-3 instructions for C/C++ routines. Debugging is accomplished via a serial interface or (optionally) TCP/IP or CAN. The Kit is available for Windows* NT/95 OS, Linux, Solaris 2.4, Sun 4.x, DOS and Windows 3.x operating systems. (The toolkit also includes gar, ghm, gsize, gabs, etc.)

For more information, contact: Hagen Heggenberger, ++43-681-92613-0. Email inquiries to: hgc@hightec-rt.com. Visit HighTec EDV-Systeme GmbH on the World Wide Web at: <http://www.hightec-rt.com>.

Target Device(s): Bullet DSP, PCMCIA, and PCI.

Hypersignal Block Diagram System Design/Simulator

Hyperception, Inc.

Host Development Environments: Windows.

Block Diagram System Design/Simulator allows for comprehensive dynamic system design and simulation. It was developed for use in applications including DSP, communications, simulation, signal analysis, and general engineering modeling. Block Diagram comes standard with a large library of functions which run at executable speed rather than interpretive speed. Hyperception has made it easy to add user-defined functions to Block Diagram.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Target Device(s): Bullet DSP and PCMCIA.

Hypersignal RIDE* Visual Design Environment

Hyperception, Inc.

Host Development Environments: Windows.

Hypersignal RIDE is a complete visual design environment for use in real-time systems development. It can be used for applications ranging from low-level DSP systems design and implementation to application-specific projects such as real-time instrumentation, data acquisition, control systems, and more. It provides complete control and observation of DSP designs.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Target Device(s): N/A.

Statemate MAGNUM* Development Environment

i-Logix Inc.

Host Development Environments: UNIX and Windows.

Embedded systems developers use the i-Logix Statemate MAGNUM automated development environment to graphically model, simulate, analyze, and verify the functionality and behavior of complex embedded systems. C or Ada source code can be generated automatically from a verified system model. Embedded systems developers use the generated code in desktop "virtual" prototypes, or in physical prototypes running on target hardware platforms, using an RTOS such as Wind River Systems' VxWorks*. The Statemate MAGNUM environment enables embedded system developers to do behavioral modeling of complex systems, analyze and validate system behavior via simulation, and generate application code automatically. The product reduces system time-to-market by validating the design much earlier than in the typical system development cycle.

For more information, contact: Jeremy Goulding, 508-682-2100. Email inquiries to: info@ilogix.com. Visit i-Logix Inc. on the World Wide Web at: www.ilogix.com.

Integrated Development Environment

Target Device(s): Processor Independent.

System Explorer* MP3/MP4 Development Environment

Aptix Corporation

Host Development Environments: UNIX.

Aptix Corporation's System Explorer development environment is based on an open architecture that becomes the platform for integrating all system components, including software and hardware. Hardware elements include processors, memories, peripherals and FPGAs for mapping custom logic in a reprogrammable environment. Debug of the system in real-time allows algorithms to be fully tested before the design is sent to fabrication.

For more information, contact: Anne Purvis-Blomquist, 408-428-6237. Email inquiries to: info@aptix.com. Visit Aptix Corporation on the World Wide Web at: www.aptix.com.

Target Device(s): Intel 8051, 80186/80188, 8096/80196, Motorola 68HC11, 68HC16, 68K/CPU-32.

SwiftX* Cross-Development Environment

FORTH, Inc.

Host Development Environments: Windows and DOS.

FORTH's SwiftX is a PC-based, interactive cross-development environment for microcontroller, microprocessor or DSP-based embedded systems. SwiftX includes a Forth compiler, assembler, editor, libraries, debugger and real-time kernel, all in one package. The development environment supports Intel's 8051, 80186/80188, 8096/80196 microcontrollers and microprocessors and Motorola's 68HC11 and 68HC16 microcontrollers and 68xxx/CPU-32 processors. There are no run-time royalties for SwiftX kernels.

For more information, contact: Steve Agarwal, 800-55-FORTH. Email inquiries to: forth-sales@forth.com. Visit FORTH, Inc. on the World Wide Web at: www.forth.com.

* Trademark or registered trademark of its respective company or mark holder

Target Device(s): Super H 1,2,3 .**pRISM+ Integrated Development Environment**

Integrated Systems, Inc.

Host Development Environments: UNIX and Windows.

ISI's pRISM+ is a complete, integrated development environment (IDE) for designing and delivering embedded software applications. pRISM+ combines the industry's optimal development tools with the pSOSystem, an industry-proven and reliable real-time operating system (RTOS). The pRISM+ environment combines "Best-Of-Class" tools for developing, analyzing and testing embedded applications in one seamless environment, built with an open, extensible architecture to accommodate future needs.

Note: Soon available for SPARC microprocessors.

For more information, contact: . Email inquiries to: . Visit Integrated Systems, Inc. on the World Wide Web at: .

Target Device(s): Philips R3150A.**Microsoft Windows* CE O.S. Embedded Toolkit**

Microsoft* Corporation

Host Development Environments: Windows.

Microsoft's Windows CE Embedded Toolkit for Visual C++ 5.0 includes integrated development environment tools designed specifically for embedded development. The Windows CE platform is a 32-bit, preemptive, multitasking, multithreaded operating system designed from the ground up to support embedded systems. Use the embedded toolkit to choose components for building a customized version of the Windows CE operating system to meet the unique requirements of your hardware. The toolkit contains the RTOS, compiler, assembler, emulator, debugger, library and drivers.

For more information, contact: N/A. Email inquiries to: N/A. Visit Microsoft* Corporation on the World Wide Web at: N/A.

Target Device(s): USB.**COMPASS/IDE* Development Environment**

Production Languages Corporation

Host Development Environments: Windows and DOS.

COMPASS/IDE is a Windows* OS-hosted integrated development environment for developing software for Intel's 8051, 80251, and 8x93x (USB) Microcontrollers and Zilog's Z8, Z89462 and Z893XX Microcontrollers. Production Languages Corporation pioneered the total Windows-based development environment for embedded programmers. When a programmer launches the COMPASS/IDE, he gets a host of powerful tools such as a macro assembler, linker/locator, object librarian, optimizing ANSI C compiler, full symbolic source-level debugger, instruction simulator, drivers, ROM monitor and programmer's editor, all of which are controlled by the IDE control panel. PLC's COMPASS/IDE represents yet another software development tool set built with the company's proprietary tool-building technology, SD/ToolSmith.

For more information, contact: Mark A. Newsom, 800-525-6289. Email inquiries to: mnewsom@plcorp.com. Visit Production Languages Corporation on the World Wide Web at: www.plcorp.com.

Target Device(s): TLCS-900, SMC88, 80C196/296.**EDE Project Environment**

Tasking, Inc.

Host Development Environments: Windows.

EDE is a complete development project environment that gives the developer direct access to all the tools and features needed. EDE includes a language-sensitive editor, MAKE for automated application building and a project environment for specifying project files, including source files, tool options and build options.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

Target Device(s): CPU32, PA-RISC and c16.**Tornado* Integrated Development Environment**

Wind River Systems, Inc.

Host Development Environments: UNIX and Windows.

Wind River Systems' Tornado is a complete software cross-development environment for embedded systems. Tornado is seamlessly integrated and includes powerful development tools and VxWorks*, a feature-rich, high performance and scalable real-time operating system. Completely open and customizable, the Tornado environment also facilitates the use of third-party and customer-developed tools to enhance its capabilities and meet unique customer requirements. Tornado has more than 90 software and hardware partners and is used by thousands of developers worldwide.

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

Compiler

Target Device(s): Processor Independent.**User-Retargetable Development Tools II**

Archelon Inc.

Host Development Environments: UNIX, Windows and DOS.

Archelon's User-Retargetable Microcode Tools package allows the user to implement a complete set of basic software tools for any programmable device, with particular emphasis on microcoded architectures. The package includes a C compiler, compactor, meta-assembler, linker, and librarian.

For more information, contact: Preston Gurd, 519-746-7925. Email inquiries to: info@archelon.com. Visit Archelon Inc. on the World Wide Web at: www.archelon.com.

Target Device(s): NSC COP8 μ C Family.**Byte Craft COP8C Code Development System-Compiler**

Byte Craft Limited

Host Development Environments: UNIX, Windows and DOS.

The Byte Craft Limited COP8C optimizing C cross-compiler is targeted to the National Semiconductor COP8 family of microcontrollers. The compiler is part of an integrated development environment, including a linker, editor and built-in macro assembler. The Code Development System allows for programming in C without sacrificing code size or speed. COP8C produces ROMable code, symbol information, and includes interrupt support.

For more information, contact: Karen McMurray, 519-888-6911. Email inquiries to: info@bytecraft.com. Visit Byte Craft Limited on the World Wide Web at: www.bytecraft.com.

Target Device(s): Any Processor.**Byte Craft Fuzz-C Preprocessor for Fuzzy Logic**

Byte Craft Limited

Host Development Environments: UNIX, Windows and DOS.

Byte Craft Limited's Fuzz-C Preprocessor for Fuzzy Logic adds fuzzy logic capability to any C compiler. Fuzzy logic statements can be added to a C program. The preprocessor translates the fuzzy logic to C source code which can then be compiled by any C compiler.

For more information, contact: Karen McMurray, 519-888-6911. Email inquiries to: info@bytecraft.com. Visit Byte Craft Limited on the World Wide Web at: www.bytecraft.com.

Target Device(s): Zilog Z8 μ C Family.**Byte Craft Z8C Code Development System-Compiler**

Byte Craft Limited

Host Development Environments: UNIX, Windows and DOS.

The Byte Craft Limited Z8C optimizing C cross-compiler is targeted to the Zilog Z8 family of microcontrollers. The compiler is part of an integrated development environment, including a linker, editor and built-in macro assembler. The Code Development System allows for programming in C without sacrificing code size or speed. Z8C produces ROMable code, symbol information, and includes interrupt support.

For more information, contact: Karen McMurray, 519-888-6911. Email inquiries to: info@bytecraft.com. Visit Byte Craft Limited on the World Wide Web at: www.bytecraft.com.

Target Device(s): Mitsubishi MELPS740.**C38 Code Development System/Compiler**

Byte Craft Limited

Host Development Environments: SunOS 4.x, Solaris 1.x, HP-UX 9.1 and DOS/Windows 3.1/NT/95.

The Byte Craft Limited C38 optimizing C cross-compiler is targeted to the Mitsubishi MELPS740 series of microcontrollers. The compiler is part of an integrated development environment, including a linker, editor and built-in macro assembler. The code development system allows for programming in C without sacrificing code size or speed. The C38 compiler produces ROMable code, symbol information, and includes interrupt support.

For more information, contact: Karen McMurray, 519-888-6911. Email inquiries to: info@bytecraft.com. Visit Byte Craft Limited on the World Wide Web at: www.bytecraft.com.

Target Device(s): Motorola 68HC05 μ C.**C6805 Code Development System/Compiler**

Byte Craft Limited

Host Development Environments: UNIX, Windows, DOS, Solaris and HP-UX.

* Trademark or registered trademark of its respective company or mark holder

The Byte Craft Limited C6805 optimizing C cross-compiler is targeted to the Motorola 68HC05 family of microcontrollers. The compiler is part of an integrated development environment including a linker, editor and built-in macro assembler. The C6805 Code Development System allows for programming in C without sacrificing code size or speed. C6805 produces ROMable code, symbol information and includes interrupt support. A companion product, the E6805 Symbolic Host Support provides C source-level debugging for the Motorola EVM and EVS boards.

For more information, contact: Karen McMurray, 519-888-6911. Email inquiries to: info@bytecraft.com. Visit Byte Craft Limited on the World Wide Web at: www.bytecraft.com.

Target Device(s): Toshiba TX, Mitsubishi M32RD, D10V, D30 & Hitachi H8/300.
GNUPro* Toolkit Compiler Suite

Cygnus Solutions

Host Development Environments:

Cygnus Solutions' GNUPro* Toolkit compiler suite (with assembler) is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The compiler delivers speed- and size-performance advantages over a wide range of microprocessor architectures. Cygnus provides mission-critical technical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

Target Device(s): MCORE.

D-C++ C/C++ Cross-Compiler Suite

Diab Data, Inc.

Host Development Environments: UNIX and Windows.

D-C++ is a highly-optimizing C/C++ compiler, producing exceptionally fast, compact, accurate code for the PowerPC, 68K/CPU32, ColdFire, and MCORE processor-based applications. The D-C++ compiler is fully ANSI compliant and works with all popular debug, RTOS, and emulation systems. The suite contains a compiler, assembler, linker, profiler, program checker, archiver, advanced libraries package, and other utilities. An optional RTA (Real-Time Analysis) Suite enables developers to enhance program performance, reliability and memory utilization.

For more information, contact: Jan Liband, 415-571-1700. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

Target Device(s): MCORE.

D-CC C Cross-Compiler Suite

Diab Data, Inc.

Host Development Environments: UNIX and Windows and Others.

Diab Data's D-CC is a highly-optimizing C compiler, producing exceptionally fast, compact, target-specific code for Motorola's PowerPC, 68K/CPU32, ColdFire and MCORE Processor-based applications. The D-CC compiler is fully ANSI and EABI compliant, works with all popular debug, RTOS, and emulation systems. The suite provides the compiler, assembler, linker, profiler, program checker, archiver, advanced libraries package, and other utilities. An optional Real-Time Analysis Suite (RTA) enables developers to enhance program performance, reliability, and memory utilization.

For more information, contact: Jan Liband, 415-571-1700. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

Target Device(s): MCORE.

Run-Time Analysis Tools For Diab Data Compilers

Diab Data, Inc.

Host Development Environments: UNIX and Windows.

Diab Data's RTA Suite is a suite of visual run-time analysis tools for improving program performance, reliability, and memory utilization. The RTA Suite works in conjunction with Diab Data's C/C++ compilers and includes a Visual Interactive Profiler, a Run-Time Error Checker, and a Link Map Analyzer for visualizing memory-map setups.

For more information, contact: Jan Liband, 650-571-1700 x227. Email inquiries to: Info@ddi.com. Visit Diab Data, Inc. on the World Wide Web at: www.ddi.com.

Target Device(s): FR20, M16 and RH32.

Green Hills Optimizing C Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills' high-performance optimizing C compilers, for native or embedded development, have many advanced optimizations, such as cross-module inlining. The compilers allow for the fine tuning of optimization strategy so users can generate optimal code. Supports 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Target Device(s): FR20, M16 and RH32.
Green Hills Optimizing C++ Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills offers high-performance optimizing C++ compilers for native or embedded development. The compilers are compatible with Green Hills Software's MULTI* debugger, which automatically handles C++ constructs such as name mangling and template debugging. The compilers support most 32-/64-bit microprocessor architectures.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Target Device(s): FR20, M16 and RH32.

Green Hills Optimizing Embedded C++ Compiler

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills optimizing Embedded C++ compilers are high-performance and follow the Embedded C++ Technical Committee draft standard.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Target Device(s): RH32.

Green Hills Optimizing FORTRAN Compilers

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

Green Hills Software offers optimizing FORTRAN compilers for native or embedded development. A compile-time option allows users to select from among the F77, VMS and DoD dialects of the FORTRAN language, with additional support for many extensions. The FORTRAN compilers support most 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Target Device(s): SGS-T ST10 Series Microcontrollers.
Keil Software C Compilers

Keil Software Inc.

Host Development Environments: Windows and DOS.

Keil Software's C compilers are full ANSI C compilers and assemblers, designed specifically for the microcontroller families that they support. µVision* is the Windows* OS User Interface that drives the optimizing C compilers. Compiler, assembler and linker options are point-and-click. µVision and the manuals are written in the USA, and extensive on-line help is included. Keil optimizing C compilers support the 8051, the 80C251 (Intel and Temic), including the USB 8x930 µController families and the Siemens 161, 163, C164CI, 165, 166/167, 167CR and SGS Thomson ST10 family microcontrollers, with future derivative family chip members supported. Keil provides extensive support, free for one year, as well as on-line help and sample USB code, etc. from its Web URL.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

Target Device(s): 80C296.

C++ Compiler

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Object-oriented programming techniques increase productivity, improve quality and provide reusability with Tasking's C++ compiler. The compiler allows the intermixing of C++ and C code within a single application. Thus, the benefits of C++ can be incorporated into existing C applications a module at a time, thus providing easy migration from C to C++ programs.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

Target Device(s): 80C166, XA, 196, 296, TLCS-900, 8051, 251, SMC88.

C Compiler Package

Tasking, Inc.

Host Development Environments: UNIX and Windows.

Tasking delivers ANSI C compilers that are highly optimized with individual target-specific extensions for ultimate flexibility and efficiency. As well as using these target-spe-

* Trademark or registered trademark of its respective company or mark holder

cific extensions, the developer-user can also define in-line functions and use in-line assembly. Included with every compiler is an assembler and linker/locator.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

Assembler

Target Device(s): Toshiba TX, Mitsubishi M32R/D, D10V, D30 & Hitachi H8/300. GNUPro* Toolkit

Cygnus Solutions

Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit is a solution to the problem of delivering quality software to meet the increasingly tighter schedules required by today's marketplace. The highly optimized tool chain for a specific host-target combination drives competitive speed- and size-performance advantages into a developer's software without compromising either its portability or maintainability. The fully-featured debug tools and utilities significantly help to shorten the development, test, and validation cycles. Cygnus backs the GNU technology with a commitment to rapid and expert support. All GNUPro tool chains for native and embedded programming are bundled with mission-critical support services and guaranteed technical response times.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

Target Device(s): FR20, M16 and RH32. Green Hills Cross Assembler Tool Chain

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills embedded tool chain includes a macro assembler, linker, librarian, run-time libraries, object formatters and other utilities useful for embedded development. Cross-assembler tool chains are available for most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Emulator

Target Device(s): Hitachi H8/3XXX, 5XX, H8S/2000, Mitsubishi MELPS 7700, 7750/51 and M16C/60, Toshiba TLCS 9000/42.

HP 64700 Series In-Circuit Emulators

Hewlett-Packard Company

Host Development Environments: UNIX and Windows.

The HP 64700 series development tools compose a comprehensive embedded development, debugging and analysis environment that continues to evolve and expand to meet the increasing demands of the software designer. Integrated under a common user interface and operating environment, these tools create an embedded design system that accelerates the development process.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or /emulator.

Target Device(s): Hitachi 7040/7050, Mitsubishi M16C/60, Toshiba R3900 series and Pentium Pro.

HP Processor Probes for On-Chip Emulation

Hewlett-Packard Company

Host Development Environments: Popular Debuggers.

HP's processor probes are a low-cost emulation solution for much of a developer's day-to-day debugging. Processor probes access the on-chip debugging capabilities of today's newest processors, giving the software developer a connection for downloading code, modifying memory and registers and controlling program execution. HP processor probes are compatible with debuggers from SDS, Green Hills and Microtec.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or /emulator.

Target Device(s): NSC COP8, NEC 78K4, CR16.

MetaLink ICEMaster Series Emulators

MetaLink Corporation

Host Development Environments: Windows and DOS.

MetaLink's ICEMaster Series Emulators currently supports a wide variety of 8-bit and 16-bit embedded controllers. MetaLink's emulators connect to a PC via a serial link, thus eliminating the need for a plug-in interface board. The emulators are non-intrusive, requiring no microcontroller resources (memory or communication) for emulation. The emulator software interface is a Windows* O.S.-based interface that provides a productive and cost-effective debugging environment.

For more information, contact: Scott Ritchey, 602-926-0797 x 319. Email inquiries to: sales@metaice.com. Visit MetaLink Corporation on the World Wide Web at: http://www.metaice.com or metalink.de.

Target Device(s): 80C196.

EMUL196-PC* In-Circuit Emulator

Nohau Corporation

Host Development Environments: Windows.

Designed for use with Intel's 8096/80C196 16-bit microcontroller family, Nohau's EMUL196-PC in-circuit emulator is designed to minimize debugging time with all information regarding the microcontroller and the developer's application software available on-screen. The system communicates through a standard parallel port, via direct ISA plug-in boards, or via a PCMCIA-compliant PC card. An optional trace board offers advanced trace functions.

For more information, contact: Technical Support, 408-866-1820. Email inquiries to: sales@nohau.com. Visit Nohau Corporation on the World Wide Web at: www.nohau.com.

Target Device(s): 80C296.

EMUL296-PC* In-Circuit Emulator

Nohau Corporation

Host Development Environments: Windows.

The EMUL296-PC in-circuit emulator, designed to aid software development for Intel's MCS* 296 microcontroller series, consists of an emulator board which connects to a pod board through a flexible cable. The system communicates through a standard parallel port or via direct ISA plug-in boards. The optional trace board with advanced trace functions attaches directly under the pod for higher speed capabilities.

For more information, contact: Technical Support, 408-866-1820. Email inquiries to: sales@nohau.com. Visit Nohau Corporation on the World Wide Web at: www.nohau.com.

Target Device(s): CPU32 .

Flex-ICE* In-Circuit Emulator

Noral Micrologics Limited

Host Development Environments: Windows.

Debugging for Motorola's 68020 and 683xx processors is supported by Noral's high-performance Flex-ICE in-circuit emulator. Emulator systems include overlay memory, emulation feature memory, trace buffer, advanced hardware breakpoints with event detection, ROM and RAM software breakpoints, time stamps, interrupt servicing while broke, and much more. A demonstration disk is available from Noral.

For more information, contact: Harry Erickson, 508-647-0103 (U.S. Office). Email inquiries to: noral@noral.co.uk. Visit Noral Micrologics Limited on the World Wide Web at: www.noral.com.

Target Device(s): Most Architectures.

SDT-Xi* In-Circuit Emulator

Noral Micrologics Limited

Host Development Environments: DOS.

The 68LC302, 68302, 68306, 68K, 80x86, NEC V series, WDC 65C02 family, 64180, Z80, 68xx, 8085, NSC800 processors and many others are supported by Noral's SDT-Xi series of universal in-circuit emulators. Noral's in-circuit emulator systems are easily reconfigured for each processor emulation by changing emulation probes and processor family configuration pods.

For more information, contact: Harry Erickson, 508-647-0103 (U.S. Office). Email inquiries to: noral@noral.co.uk. Visit Noral Micrologics Limited on the World Wide Web at: www.noral.com.

Target Device(s): C500 and 37700.

Ashling Ultra* Series Emulators

Orion Instruments

Host Development Environments: Windows.

The Ashling Microsystems Ultra Series emulators, sold in North America by Orion

* Trademark or registered trademark of its respective company or mark holder

Instruments, are full-featured, real-time emulation systems for 8-bit and 16-bit microcontrollers. Features include a Windows® OS-based source-level debugger, sophisticated event triggering, deep trace buffer and overlay memory. Optional performance analysis and code coverage measurement functions are available.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

**Target Device(s): 80C196, Z18x and Z382.
Orion® 8800 Emulator**

Orion Instruments

Host Development Environments: Windows and DOS.

The Orion 8800 is a non-intrusive, real-time emulator/analyzer that features a multi-level event-trigger system, deep trace capture and overlay memory. A unique Clip-On capability allows connection to soldered-in processors. The popular SDS SingleStep® Windows® OS-based debugger can serve as the user GUI for Motorola's MC68000 processor family.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

**Target Device(s): Smart Card.
Orion CT® Series Emulators**

Orion Instruments

Host Development Environments: Windows.

The CT Series from Orion represents low-cost, full-featured emulation systems for 8-bit microcontrollers. Emulator features include a Windows® OS-based source-level debugger, multi-event triggering, non-intrusive trace capture, overlay memory and full in-circuit emulation. Performance analysis and code-coverage measurement functions are optional.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

**Target Device(s): H8, MELPS 377XX, M16C, 78K, TLCS.
Orion/Advice® Emulator**

Orion Instruments

Host Development Environments: UNIX and Windows.

The Orion/Advice is a high-performance, real-time emulation system. A sophisticated multi-level event-triggering system, combined with a non-intrusive trace buffer provide unmatched problem tracking. A point-and-click Windows® or UNIX® OS graphical user interface (GUI) provides true high-level-language (HLL) debug support. Profiling, performance analysis and code coverage complete the Orion/Advice emulation package.

For more information, contact: Jerry Beresh, 408-747-0440. Email inquiries to: info@oritools.com. Visit Orion Instruments on the World Wide Web at: www.oritools.com.

**Target Device(s): Zilog Z80 and Z180 µPUs.
Signum SDS-Z80/Z180 In-Circuit Emulator**

Signum Systems Corporation

Host Development Environments: DOS.

Signum's SDS-Z80/Z180 In-Circuit Emulator interfaces to a PC via a serial port and features up to 1MB of emulation memory, C-level debugging, and unlimited breakpoints.

For more information, contact: Jerry Lewandowski, 805-523-9774. Email inquiries to: sales@signum.com. Visit Signum Systems Corporation on the World Wide Web at: <http://www.signum.com>.

**Target Device(s): 80C186 XL/EA/EB/EC.
Signum USP-186 In-Circuit Emulator**

Signum Systems Corporation

Host Development Environments: Windows.

Signum's USP-186 In-Circuit Emulator supports all versions of Intel's 16-bit 80C186 processors in real time. The emulator interfaces to a PC via a serial or parallel port and features C/C++ debugging, trace buffer, dual-ported memory, LAN remote debugging and code analysis.

For more information, contact: Jerry Lewandowski, 805-523-9774. Email inquiries to: sales@signum.com. Visit Signum Systems Corporation on the World Wide Web at: <http://www.signum.com>.

Target Device(s): 8xC196Kx Series µCUs.

Signum USP-196 In-Circuit Emulator

Signum Systems Corporation

Host Development Environments: Windows.

Signum's USP-196 In-Circuit Emulator is a high-performance emulator designed for Intel's 16-bit 8x196Kx family of microcontrollers (KB/KC/KD/KR). The ICE interfaces to a PC via a serial or parallel port and features trace buffer, C-level debugging, dual-ported memory for on-the-fly access, complex events and external triggers.

For more information, contact: Jerry Lewandowski, 805-523-9774. Email inquiries to: sales@signum.com. Visit Signum Systems Corporation on the World Wide Web at: <http://www.signum.com>.

Target Device(s): Intel 8085/8085A µPUs.

Signum USP-85 In-Circuit Emulator

Signum Systems Corporation

Host Development Environments: DOS.

Signum's USP-85 is a high-performance in-circuit emulator for the Intel 8085 and 8085A processors. The ICE interfaces to the PC via a serial port and features trace buffer, C-level debugging, dual-ported memory and complex breakpoints.

For more information, contact: Jerry Lewandowski, 805-523-9774. Email inquiries to: sales@signum.com. Visit Signum Systems Corporation on the World Wide Web at: <http://www.signum.com>.

Target Device(s): NSC's HPC Series µCUs.

Signum USP-HPC In-Circuit Emulator

Signum Systems Corporation

Host Development Environments: DOS.

Signum's USP-HPC is a high-performance in-circuit emulator for the National Semiconductor HPC family of microcontrollers. The ICE interfaces to the PC via a serial port and features trace buffer, C-level debugging, complex breakpoints and dual-ported memory overlay.

For more information, contact: Jerry Lewandowski, 805-523-9774. Email inquiries to: sales@signum.com. Visit Signum Systems Corporation on the World Wide Web at: <http://www.signum.com>.

Target Device(s): Zilog Z8 µCUs.

Signum USP-Z8 In-Circuit Emulator

Signum Systems Corporation

Host Development Environments: DOS.

Signum's USP-Z8 In-Circuit Emulator is a high-performance emulator for Zilog's Z8 microcontroller family. The ICE interfaces to the PC via a serial port and features trace buffer, C-level debugging, dual-ported memory, complex breakpoints and DSP support for the Z89C95.

For more information, contact: Jerry Lewandowski, 805-523-9774. Email inquiries to: sales@signum.com. Visit Signum Systems Corporation on the World Wide Web at: <http://www.signum.com>.

Debugger

Target Device(s): C500 Microcontrollers.

DB-501 Debugger

Ceibo Inc.

Host Development Environments: Windows and DOS.

Ceibo's DB-501 debugger supports all Siemens SAB-C500 microcontrollers with frequency ranges up to 40MHz. The product includes: 64KB of code and 64KB of data memory (with mapping capabilities); 8KB-deep real-time trace; emulation headers for different microcontroller versions; external test points and real-time and conditional breakpoints; a source-level debugger for Assembler, PLM and C; and a performance analyzer.

For more information, contact: Ceibo Sales, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

Target Device(s): PSD3XX Devices.

DS-300 Debugger

Ceibo Inc.

Host Development Environments: Windows and DOS.

The DS-300 emulates PSD3XX devices. It reads from and writes to memories; has 1024Kb of emulated EPROM; 16kb of emulated SRAM; 19 programmable I/O ports; supports full DPLD emulation; supports 8 and 16 bus bits; includes configuration software for Windows® OS; includes a software interface for programming PSD3XX; and features target-reset synchronization.

For more information, contact: Ceibo Sales, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

Target Device(s): 87C750 Microcontrollers. DS-750 Debugger

Ceibo Inc.
Host Development Environments: Windows and DOS.

The DS-750 debugger emulates 87C750 microcontrollers in real time with a programmable clock up to 40MHz. The DS-750 has a built-in programmer for 87C748/9 and 87C750/1/2 microcontrollers; a simulator debug mode; a source-level debugger for C, PLM and Assembler; 24-pin DIP emulation header; and includes microcontroller samples.

For more information, contact: Ceibo Sales, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

Target Device(s): Toshiba TX, Mitsubishi M32RD, D10V/D30 & Hitachi H8/300. GNUPro* Toolkit Debugger Suite

Cygnus Solutions
Host Development Environments: UNIX & Windows.

Cygnus Solutions' GNUPro* Toolkit debugger suite is a highly optimized toolkit for embedded development teams with strict time-to-market deadlines. The fully-featured debug tools and utilities significantly help to shorten the development, test and validation cycles. Cygnus provides mission-critical support as an integral part of the product and delivers semi-annual product upgrades to all customers.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email inquiries to: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

Target Device(s): FR20, M16 and RH32. MULTI* Source-Level Debugger

Green Hills Software, Inc.
Host Development Environments: UNIX and Windows.

The MULTI Source-level Debugger supports native or embedded debugging of most popular 32-/64-bit processors. The main debugger window shows source or interlaced source and assembly. A single click lets the user look at a variable or set a breakpoint. Small windows allow for the monitoring of specific variables, local variables, or the call stack.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

Target Device(s): Z180/64180, 6809, 8085, MCS96, NSC800 and Z80. Source Gate* II Source-Level Debugger

Huntsville Microsystems Inc. (HMI)
Host Development Environments: UNIX and Windows.

The Source Gate II is a full-featured source-level debugger that provides a common user interface to all Huntsville Microsystems, Inc. products, including SPS-2000 series emulators, HMI-2000 series emulators, Background Mode Debuggers (BMDs), and CPU simulators. The Source Gate II Debugger provides a watch window for viewing/changing memory variables; multiple CodeView windows that allow emulator operations to be controlled from a user file displayed in source, assembly, or a combination of the two. Provides C++/RTOS support and more.

For more information, contact: James Bell, 205-881-6005. Email inquiries to: sales@hmi.com. Visit Huntsville Microsystems Inc. (HMI) on the World Wide Web at: www.hmi.com.

Target Device(s): PC. smxProbe V.3.2 Debugger

Micro Digital, Inc.
Host Development Environments: Windows and DOS.

Micro Digital's smxProbe is a task-level symbolic debugger that either co-exists with source-code-level debuggers such as the Turbo* and CodeView* Debuggers, or runs on its own as a task. smxProbe maintains an error buffer, a task-trace buffer and an smx kernel call-trace buffer. These are allocated from far heap. Each buffer may be up to 64KB. The buffers permit the examination of smx kernel control blocks and queues. The debugger presents all information symbolically and allows for the setting of trigger points and break points. Micro Digital also offers an smx RTOS kernel-compatible remote version.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

Target Device(s): CompactRISC, CR16/CR32, 80196, 80186.

Signum Chameleon Debugger

Signum Systems Corporation
Host Development Environments: Windows.

Signum's Chameleon Debugger supports the 8051, 80196, 80186, DSPs and the Compact RISC processors under a 32-bit Windows* O.S. environment. The debugger interfaces with emulators from Signum Systems, Lucent Technologies, National Semiconductor and Texas Instruments to provide a development environment for software and hardware designers.

For more information, contact: Jerry Lewandowski, 805-523-9774. Email inquiries to: sales@signum.com. Visit Signum Systems Corporation on the World Wide Web at: <http://www.signum.com>.

Target Device(s): M.CORE. SingleStep* Debug Suite

Software Development Systems, Inc.
Host Development Environments: UNIX and Windows.

Software Development Systems' SingleStep products offer a complete, intelligent debugging tool suite that was designed to reduce the code debugging time of the embedded applications development cycle. SingleStep products support simulation, on-chip debugging, in-circuit emulation, target monitoring and servers for Motorola's 68K, PowerPC, ColdFire, and M.CORE processors. SDS debugging suites and compilers are designed to increase customer productivity, thereby reducing product development-cycle times.

For more information, contact: Tim Tumilty, 630-368-0400. Email inquiries to: sales@sdsi.com. Visit Software Development Systems, Inc. on the World Wide Web at: www.sdsi.com.

Target Device(s): 80C196/296, TLCS-900 and SMC88. CrossView* Pro Debugger

Tasking, Inc.
Host Development Environments: UNIX and Windows.

Tasking's CrossView Pro debugger delivers functionality that reduces time requirements for program testing and debugging, and includes the following: tracking scope and monitoring locals; an intelligent source window; and code coverage and performance analysis. CrossView Pro provides multiple views of the developer's code: C and/or assembly source, monitor, inspect, on-chip registers, call stack, variables, breakpoint, execution trace, session log, simulated I/O and memory dumps.

For more information, contact: 1-800-458-8276. Email inquiries to: sales-us@tasking.com. Visit Tasking, Inc. on the World Wide Web at: www.tasking.com.

Target Device(s): CPU32, PA-RISC and c16. WindView* Debugger

Wind River Systems, Inc.
Host Development Environments: UNIX and Windows.

WindView is a revolutionary diagnostic and analysis tool that provides detailed visibility into the dynamic operation of an embedded system. The developer using the WindView visual debugger can quickly and easily visualize the complicated interaction among tasks, interrupt service routines, and system objects in an application. This information is presented and can be manipulated through a state-of-the-art graphical user interface (GUI).

For more information, contact: Sales 800-545-WIND. Email inquiries to: inquiries@wrs.com. Visit Wind River Systems, Inc. on the World Wide Web at: www.wrs.com.

Library

Target Device(s): CAN Processors/Controllers. CMX-CAN Library

CMX Company
Host Development Environments: UNIX and Windows.

CMX's RTOS products are enhanced with an optional Control Area Network (CAN) interface. The CMX-CAN real-time networking software provides easy-to-use CAN services within a single API. These services allow the user to send and receive messages between tasks from many nodes. CAN Version 2.0A and Version 2.0B Passive and Active are supported. The software supports CAN processors such as the 80C16x, 80C515, 80C196, 68376, and CAN controllers.

For more information, contact: Sales Department, 508-872-7675. Email inquiries to: cmx@cmx.com. Visit CMX Company on the World Wide Web at: www.cmx.com.

* Trademark or registered trademark of its respective company or mark holder

Target Device(s): CAN Processors/Controllers.**Keil's CAN Library**

Keil Software Inc.

Host Development Environments: N/A.

Keil Software's RTX51 and RTX166 Full RTOS products support Controller Area Network (CAN) controllers with the inclusion of CAN libraries, which are packaged with the RTOS products. The CAN interface is popular for both automotive and industrial markets. The libraries support 11- and 29-bit identifiers and interface with Keil's compilers for the Siemens 166 and Intel 8051/251 microcontroller families, as well as interfacing to Keil's RTOS products.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

Target Device(s): N/A.**JWidgets Library For Java Development**

Rogue Wave Software, Inc.

Host Development Environments: UNIX and Windows and OS/2.

The JWidgets Library complements the Java Development Kit by offering Java-language widgets that are central to building good-looking, intuitive user interfaces. Developers may use the JWidgets IDE-independent library with the defaults provided for each widget, or may extend the classes via their public interfaces. The JWidgets Library includes grid widget, group box, tool bar, tabbed dialog, tree control, animation, and more.

For more information, contact: Billie Chapman, 541-754-4081. Email inquiries to: info@roguewave.com. Visit Rogue Wave Software, Inc. on the World Wide Web at: www.roguewave.com.

Other Tools

Target Device(s): 683xx, H8300H and IDT305x.**Nucleus* FILE**

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

To meet the needs of embedded developers requiring standard off-line storage, Accelerated Technology offers Nucleus FILE. It is an MS-DOS-compatible file system that requires only driver software on the target in order to store and retrieve data. Accelerated Technology also provides drivers for the standard PC-compatible floppy disk and IDE controllers. By combining these products with an application, a user is able to read and write standard PC fixed and floppy disks from an embedded system.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

Target Device(s): Portable.**EmStack* TCP/IP Stack**

Agranat Systems, Inc.

Host Development Environments: UNIX and Windows.

With a very small (20K) footprint, the EmStack* TCP/IP stack enables Web-based monitoring and control for any microprocessor-based system, when used in tandem with the EmWeb server development technology architecture.

For more information, contact: David Wienelne, 781-893-7868. Email inquiries to: sales@agranat.com. Visit Agranat Systems, Inc. on the World Wide Web at: http://www.agranat.com.

Target Device(s): Portable.**EmWEB* Embedded Internet Technology**

Agranat Systems, Inc.

Host Development Environments: UNIX and Windows.

Gain Web-based device management capabilities using EmWeb*, a real-time, Web-enabling technology which provides tools to streamline the development of embedded Web servers. EmWeb features an HTML-to-C interface, dynamic document handling, innovative run-time capabilities, all within a footprint of typically 25 to 30K.

For more information, contact: David Wienelne, 781-893-7868. Email inquiries to: sales@agranat.com. Visit Agranat Systems, Inc. on the World Wide Web at: http://www.agranat.com.

Target Device(s): VME BUS.**CodeTEST* Software Verification Tools**

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

CodeTEST software verification tools for embedded system developers and testers

support most major 32- and 16-bit microprocessors and VME boards, and supplies tools for accurately analyzing embedded system performance, code coverage, dynamic memory allocation and memory errors, as well as a powerful software trace tool. A VME version is now available.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

Target Device(s): CW400x and PCI. VSP-TAP*/Eaglei* Co-Verification Tools

Applied Microsystems Corporation

Host Development Environments: UNIX and Windows.

Applied's VSP-TAP and the Eaglei co-verification environment from Viewlogic Systems provides software operation verification against a hardware description model (HDL). VSP-TAP adds enhanced real-time capabilities, connecting the simulated environment, the actual processor, and real-world data at real processor speeds, and supplying access to an emulator's full debugging capabilities.

For more information, contact: Jay Gould, 425-882-5633. Email inquiries to: info@amc.com. Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

Target Device(s): PC.**Validator* Verification Tools**

B-Tree Systems, Inc.

Host Development Environments: Windows.

B-Tree's Validator and ValidatorGold Test Tools are fully automated test environments that enable the functional verification of embedded systems by providing real-time stimulation, non-intrusive monitoring, data visualization, automated test execution and logging of test results. B-Tree's Validator 2000 enables Year 2000 (Y2K) compliance testing for embedded and non-embedded systems. B-Tree's Validator SC product automates software compatibility testing for PCs and PC components.

For more information, contact: Laura Dominik, 612-936-7887. Email inquiries to: Info@btree.com. Visit B-Tree Systems, Inc. on the World Wide Web at: www.btree.com.

Target Device(s): 8048 Microcontroller Derivatives.**DS-48 Development System**

Ceibo Inc.

Host Development Environments: Windows and DOS.

Ceibo's DS-48 Development System for 8048 microcontroller derivatives also supports the Philips Telecom derivatives and can be adapted for 8051 microcontroller derivative devices. The development system is equipped with a real-time, transparent in-circuit emulator that emulates 1.5V to 6V microcontrollers with a maximum frequency of 40MHz. The DS-48 has an 8KB internal memory and a 32KB trace memory and logic analyzer with 8KB of hardware and conditional breakpoints. It also includes a source-level debugger for Assembler and C, an on-line assembler and disassembler and a performance analyzer.

For more information, contact: Ceibo Sales, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

Target Device(s): 8xC750/1/2 and 8xC748/9**Microcontrollers.****DS-752 Development System**

Ceibo Inc.

Host Development Environments: Windows and DOS.

Ceibo's DS-752 Development System for the 8xC750 and 8xC748/9 microcontrollers features a real-time, transparent in-circuit emulator; a symbolic debugger that is compatible with Intel object files; source-level debug for C and PLM; 2K hardware breakpoints and conditional breakpoints; 2KB of internal memory; a 64KB software trace buffer; an on-line assembler and disassembler; and easy-to-follow pull-down menus and windows.

For more information, contact: Ceibo Sales, 800-833-4084. Email inquiries to: usa@ceibo.com. Visit Ceibo Inc. on the World Wide Web at: www.ceibo.com.

Target Device(s): Portable.**Dinkum* EC++ Proofer***

Dinkumware, Ltd.

Host Development Environments: UNIX & Windows & DOS.

The Dinkum EC++ Proofer provides software developers with a testing tool for the Dinkum EC++ Library. It contains more than 500 anecdotal breadth tests that check conformance to the Embedded C++ Technical Committee Specifications, as well as extensions specific to the Dinkum EC++ Library. Dinkumware provides several licensing

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options. Dinkumware products are portable across most $\mu\text{p}/\mu\text{C}$ architectures and run on UNIX, DOS, or Windows (and Windows NT) OS-based systems.

For more information, contact: T.L. Plauger, 978-369-8489. Email inquiries to: sales@dinkumware.com. Visit Dinkumware, Ltd. on the World Wide Web at: www.dinkumware.com.

**Target Device(s): FR20, M16 and RH32.
Green Hills Instruction Set Simulator**

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The Green Hills Instruction Set Simulators allow programs for the target microprocessor to be executed on the PC or host workstation by simulating the execution of the target at the instruction level. A special interface exists to allow program control via a standard debugger. The simulators support most 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

**Target Device(s): FR20, M16 and RH32.
MULTI* Execution Profiler**

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Execution Profiler provides a mechanism for looking at user code in many different ways in order to pinpoint hot spots. Reports show performance by procedure, source line, etc. Supports native and embedded profiling on most popular 32-/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

**Target Device(s): FR20, M16 and RH32.
MULTI* Program Builder**

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Program Builder is a configuration management system for creating and managing large programs. The MULTI builder replaces traditional make files with a modern point-and-click interface, greatly simplifying the configuration management task and eliminating the need for engineers dedicated to managing the build process. Supports native and embedded profiling on most popular 32/64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

**Target Device(s): FR20, M16 and RH32.
MULTI* Run-Time Error Checker**

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

MULTI Run-time Error Checker inserts code into user's executable to check for things like array out of bounds, value too large for variable, read of variable before initialization, and attempts to access unallocated memory. The error checker supports native and embedded profiling on most popular 32 and 64-bit processors.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

**Target Device(s): FR20, M16 and RH32.
MULTI* Version Control System**

Green Hills Software, Inc.

Host Development Environments: UNIX and Windows.

The MULTI Version Control system is very unobtrusive, with files being automatically checked out when the first change is made in the editor. Advanced features support program branches and the ability to find out who made the last change to selected lines. Supports native and embedded profiling on most popular 32/64-bit CPUs.

For more information, contact: Sales Department, 805-965-6044. Email inquiries to: sales@ghs.com. Visit Green Hills Software, Inc. on the World Wide Web at: www.ghs.com.

**Target Device(s): Pentium Pro.
Logic Analyzers**

Hewlett-Packard Company

Host Development Environments: N/A.

HP's digital design and debug tools help system developers solve tough hardware and

software integration problems fast. The HP benchtop logic analyzers offer cost-effective 100 MHz state analysis plus five timing modes up to 500 MHz. The HP 16500 modular logic analysis systems provide the power and flexibility to handle demanding hardware and software problems.

For more information, contact: 800-452-4844. Email inquiries to: N/A. Visit Hewlett-Packard Company on the World Wide Web at: www.hp.com/go/logicanalyzer or /emulator.

**Target Device(s): PCMCIA.
Hypersignal HAppl* Applications Interface**

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's HAppl Applications Interface software allows visual simulations/real-time projects to be executed as stand-alone applications. User controls representing inputs and outputs are used to accomplish specific user I/O. Objects such as knobs, sliders, keypads, meters, and displays are typical user controls. Applications may use either real-time DSP/Acquisition boards or be based entirely on the PC.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

**Target Device(s): N/A.
Rhapsody* UML-Based Object-Oriented Analysis/Design & Implementation Tool Set**

i-Logix Inc.

Host Development Environments: UNIX and Windows and SunOS, Solaris.

Rhapsody is the first and only UML-compliant (Unified Modeling Language) object-oriented analysis, design and implementation tool (OOAD) used by developers of embedded systems software. With Rhapsody, developers generate complete production code from designs, shifting the focus of work from low-level coding to design, with significant improvements in total productivity. A graphical animation capability allows the design focus to be extended to the debugging and validation stages, yielding tremendous productivity benefits. Rhapsody extends the benefits of graphical design into the implementation phase, allowing the generation and debugging of complete, production-ready code directly from the design environment.

For more information, contact: Jeremy Goulding, 508-682-2100. Email inquiries to: info@ilogix.com. Visit i-Logix Inc. on the World Wide Web at: www.ilogix.com.

**Target Device(s): MCS 96.
ApBUILDER* Expert Development Software**

Intel Corporation

Host Development Environments: N/A.

Intel's ApBUILDER Development Software features include: interactive programming software for embedded applications; Windows interface for ease of use; the ability to program without prior knowledge of the architecture; generation of microcontroller peripheral initialization code with the click of a mouse; code generation in Assembler or C; context-sensitive screens that interface directly to Hypertext device user's manuals and data sheets; continuous expansion to the program and improvements to cover new logic devices; available FREE on Intel bulletin boards and downloadable via the company's WWW site at <http://developer.intel.com>.

For more information, contact: Local Intel Sales Office or Distributor. Email inquiries to: N/A. Visit Intel Corporation on the World Wide Web at: www.intel.com.

**Target Device(s): N/A.
 μ Vision* Windows* OS-Based User Interface**

Keil Software Inc.

Host Development Environments: Windows.

μ Vision is Keil Software's USA-developed, Windows OS-based front-end interface for all the company's compilers and assemblers. μ Vision includes an editor, project manager, and make facility. Compiler, assembler, and linker options are set by pointing-and-clicking on prompted selections. μ Vision's Program Manager conveniently accesses the developer's files, third-party executables, and calls the optional Keil simulator for code debugging.

For more information, contact: Robert Boys, 800-348-8051. Email inquiries to: sales@keil.com. Visit Keil Software Inc. on the World Wide Web at: www.keil.com.

**Target Device(s): i386/486/586/686 μ Pus.
pmEasy V.3.2 Environment**

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's pmEasy V.3.2. Environment software is a protected-mode environment for embedded systems that creates needed protected-mode structures and switches

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into protected mode. pmEasy includes a protected-mode loader to load the protected-mode application, or the application can run from ROM. pmEasy provides some DPML services.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

Target Device(s): PC.

smxFile* Manager

Micro Digital, Inc.

Host Development Environments: DOS.

The smxFile Manager gives embedded systems developers a DOS-compatible, reentrant file system. It features high-performance file I/O and disk directory management. More than 20 primary functions are provided as are numerous low-level functions and several utilities. The API is similar to POSIX or MS-DOS*. The device-driver interface is similar to UNIX* OS, but much less complex.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

Target Device(s): KEELOQ Encoders and Decoders.

KEELOQ* Programmer

Microchip Technology Inc.

Host Development Environments: Windows.

The KEELOQ programmer provides manufacturing with the capability to program large quantities of the HCSXXX family of encoders and decoders.

For more information, contact: 602-786-7668. Email inquiries to: info@microchip.com. Visit Microchip Technology Inc. on the World Wide Web at: www.microchip.com.

Target Device(s): LON.

SoftControl IEC 1131-3 Programming System

Softing

Host Development Environments: Windows.

SoftControl is an IEC 1131-3-compliant programming system for all kinds of industrial

controls, from LON to PLCs and PCs. The system supports all languages, functions and function blocks according to the standard. The backend is designed to be completely object-oriented and can be easily adapted to different target systems. A C-code generator is optionally available.

For more information, contact: Dr. Goetz Guettich, ++49 89 456 56 311. Email inquiries to: info.softcontrol@softing.com. Visit Softing on the World Wide Web at: <http://www.softing.com>.

Target Device(s): ALL.

TakeFive Software's SNIFF+ Team Programming Environments

TakeFive Software

Host Development Environments: UNIX and Windows.

SNIFF+ is an integrated programming environment for native and embedded team projects. SNIFF+ is an integrated collection of source code analysis, browsing, navigation, comprehension, editing, make, and configuration management tools for C, C++, Java, FORTRAN and CORBA IDL developers. SNIFF+ runs on Windows and all important UNIX OS platforms, supports cross-development and heterogeneous development environments, all using the same tool set and GUI. This reduces programmer learning time and enhances developer productivity. SNIFF+ combines high performance, based on its unique Fuzzy Parsing* technology, and scalability with an intuitive and easy-to-learn graphical user interface. The SNIFF+ product versions include SNIFF+ for C/C++, SNIFF+ for Java, AND SNIFF+ for FORTRAN. The SNIFF+ products are independent of a target system, compiler or debugger, thus enabling to product to support ALL processors.

For more information, contact: Andreas Pfeiffer, +43 0 662 456915-0. Email inquiries to: info@takefive.co.at. Visit TakeFive Software on the World Wide Web at: <http://www.takefive.com>.

JOIN ESOFTA AND HELP SHAPE YOUR INDUSTRY!

MEMBER BENEFITS

- **Unified Embedded Software Market Representation**
- **Forum for Communications Between Software Creators and Users**
- **Repository for Public Domain Software and Specifications**
- **Support for Member-Initiated Standards Efforts**
- **Free Member Marketing/Marketing Communications Services**
- **Embedded Software Product Directories**

World-Wide Web Services

- 1) ESOFTA On-Line Product Directory -- a compendium of embedded software suppliers and products, including processors (uPJs and DSPs); real-time operating systems (and kernels); development tools; simulators; compilers; assemblers/linkers/loaders/libraries; applications software; and integrated development environments. Produced by web masters at ESOFTA, this directory augments supplier's marketing efforts via statistical reports of visitors to supplier's products; reveals user interests and product trends.
- 2) ESOFTA Member On-Line Exhibitor Booths -- an opportunity to display products in a "virtual trade show" setting, with access for the member company to update and maintain the booth. Statistical reports about visitors provided to participating members.
- 3) "Product News" on the internet -- a special place on the ESOFTA web site for member company's latest product offerings, updated as new product releases arrive.

repository for public-domain software and specifications.

- 3) Provides contact point for industry analysts; contacts within companies; advocates embedded software industry segment and reports trends to members. Works with analyst firms to compile valid market research data.

Marketing Communications Services

- 1) Up-to-date publication/editor list available for members; members forward news releases to ESOFTA where releases are distributed to appropriate press list via ESOFTA news wires (U.S. and Europe).
- 2) Members receive notification of industry events; trade shows; editorial opportunities; and very significant industry news items.
- 3) Members receive trade publication advertising space discount rates pre-negotiated by ESOFTA.
- 4) Members can dry-run press presentations to ESOFTA staff members.
- 5) Members receive publication alerts when publications are working on survey or round-up type articles related to member products or soliciting articles about such products.

Embedded Software Association Membership

Contact: Sara Killingsworth at (602) 991-4662 or email: sara@esofta.com

Embedded Software Trade Association (ESOFTA)
7825 E. Gelding Drive, Ste. 104
Scottsdale, AZ 85260-3415

ESOFTA

Embedded Software Association

Industry Information Exchange/Marketing Services

- 1) Organizes membership and task force meetings.
- 2) Supports member-driven initiatives on standards and provides

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PORTABLE LIBRARIES

Dinkum* Abridged Library

Dinkumware, Ltd.

Host Development Environments: UNIX, Windows and DOS.

The Dinkum Abridged Library provides a powerful subset of the Standard C++ Library (Nov. 97 ISO DIS) with optional exception handling and namespaces. It consists of the Dinkum EC++ Library plus the the Dinkumware Standard Template Library. Programmers now have a powerful bridge to Standard C++ that makes sense for embedded systems. Dinkumware provides several licensing options.

Dinkumware library products are portable across most μ P/ μ C architectures and run on UNIX, DOS, Windows (+NT) host platforms.

For more information, contact: T.L. Plauger, 978-369-8489. Email inquiries to: sales@dinkumware.com. Visit Dinkumware, Ltd. on the World Wide Web at: www.dinkumware.com.

Dinkum* C Library

Dinkumware, Ltd.

Host Development Environments: Portable.

Dinkum C Library is a complete ANSI/ISO Standard C Library with locales, wide-character functions (Amendment 1), and an enhanced set of math functions. It also provides the additions required by ANSI/ISO Standard C++ and can compile C++ code. Dinkum Customization Service can adapt your C for better Standards conformance. (See System Development Services section for more on Dinkum Customization Services.) Dinkumware's library products are portable across most microprocessors/microcontrollers.

For more information, contact: T.L. Plauger, 978-369-8489. Email inquiries to: sales@dinkumware.com. Visit Dinkumware, Ltd. on the World Wide Web at: www.dinkumware.com.

Dinkum* C++ Library

Dinkumware, Ltd.

Host Development Environments: UNIX & Windows & DOS.

The Dinkum C++ Library is a complete implementation of the ANSI/ISO Standard C++ Library (Nov. 97 ISO DIS). Microsoft* Visual C++ V. 5.0 incorporates an earlier version of this library. The code is highly portable, thread safe, and parametrized for use with your C++ compiler. Dinkumware can adapt the Dinkum C++ Library for use with your compiler, including upgrading of your existing C library for better conformance to the C++ Standard. Dinkumware, Ltd. provides several licensing options. See also Dinkum* Customization Service in the System Development Services section.

Dinkumware products are portable across most μ P/ μ C architectures and may be hosted on UNIX, DOS, and Windows (and NT) platforms.

For more information, contact: T.L. Plauger, 978-369-8489. Email inquiries to: sales@dinkumware.com. Visit Dinkumware, Ltd. on the World Wide Web at: www.dinkumware.com.

Dinkum* C/C++ Library Reference In HTML

Dinkumware, Ltd.

Host Development Environments: Portable HTML.

The Dinkum C/C++ Library Reference in HTML describes the ANSI/ISO Standard C++ and C Libraries. The ISO DIS Standard C++ changes are incorporated into the latest version. The reference contains overviews of iostreams, STL, and the augmented Standard C Library. The reference provides top-down access to overviews and header descriptions. The extensive cross-links offer speedy searches with bottom-up access to individual names and terms.

All Dinkumware library products are portable across most μ P/ μ C architectures and are UNIX, DOS, Windows (and Win NT) host system compatible.

For more information, contact: T.L. Plauger, 978-369-8489. Email inquiries to: sales@dinkumware.com. Visit Dinkumware, Ltd. on the World Wide Web at: www.dinkumware.com.

Dinkum* EC++ Library

Dinkumware, Ltd.

Host Development Environments: UNIX, Windows and DOS.

The Dinkum EC++ Library provides embedded system software developers an efficient subset of the ANSI/ISO Standard C++ Library (ISO DIS). It is the first implementation of the Embedded C++ Technical Committee specifications, with optional exception handling and namespaces. Code size is often dramatically reduced when linking with the Dinkum EC++ Library rather than the full Standard C++ Library.

Dinkumware library products are portable across most μ P/ μ C architectures and use UNIX, Windows (and NT), and DOS host platforms.

Note: See also the Dinkum* EC++ Proofer* test/analysis tool.

For more information, contact: T.L. Plauger, 978-369-8489. Email inquiries to: sales@dinkumware.com. Visit Dinkumware, Ltd. on the World Wide Web at: www.dinkumware.com.

Dinkum* Library Products

Dinkumware, Ltd.

Host Development Environments: UNIX, Windows and DOS.

Dinkum Library products provide the C/C++ libraries that are required by ANSI and ISO Standards. Dinkumware can adapt the Dinkum C++ Library for use with your compiler, including upgrading of your C library for better conformance to the C++ Standard. Some Dinkum Libraries are especially designed for programming embedded applications. Libraries include: Dinkum EC++ Library, Dinkum Abridged Library, Dinkum C++ Library, Dinkum C Library, and Dinkum C/C++ Library Reference. Dinkumware products are portable among most microprocessors and microcontrollers and are supported on UNIX, DOS, Windows and Win NT host platforms.

For more information, contact: T.L. Plauger, 978-369-8489. Email inquiries to: sales@dinkumware.com. Visit Dinkumware, Ltd. on the World Wide Web at: www.dinkumware.com.

Raima Object Manager

Raima Corporation

Host Development Environments: UNIX, Windows and DOS.

Raima's Object Manager (ROM) is a C++ class library that encapsulates database storage, retrieval and manipulation in C++ libraries, providing an object-oriented interface for both Raima Database Manager and Raima's Velocis Database Server.

For more information, contact: Paul Johnson, 206-515-9477. Email inquiries to: sales@raima.com. Visit Raima Corporation on the World Wide Web at: <http://www.raima.com>.

Net.h++ Library

Rogue Wave Software, Inc.

Host Development Environments: UNIX and Windows and OS/2.

Rogue Wave's Net.h++ is a C++ class library that makes it easier for developers to write applications that communicate across a network.

For more information, contact: Billie Chapman, 541-754-4081. Email inquiries to: info@roguewave.com. Visit Rogue Wave Software, Inc. on the World Wide Web at: www.roguewave.com.

Standard C++ Library

Rogue Wave Software, Inc.

Host Development Environments: UNIX and Windows and OS/2.

Rogue Wave's Standard C++ Library provides the best, highest-conformance-level implementation of the library available in the marketplace. The Standard C++ Library

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helps developers (to) work with low-level constructs. The library includes updated data structure and algorithm classes, plus string, numeric limits, complex classes, and allocators. Used with Rogue Wave's Tools.h++, a developer achieves the portability of the standard with the safety and reusability characteristic of an object-oriented language.

For more information, contact: Billie Chapman, 541-754-4081. Email inquiries to: info@roguewave.com. Visit Rogue Wave Software, Inc. on the World Wide Web at: www.roguewave.com.

Threads.h++* Library

Rogue Wave Software, Inc.

Host Development Environments: UNIX and Windows and OS/2.

Threads.h++ is a C++ language-class library for writing portable multi-threaded applications, or for adding multi-threading support to existing single-threaded applications. The library includes a platform-independent programming model that provides a common set of portable, object-oriented multi-threading mechanisms.

For more information, contact: Billie Chapman, 541-754-4081. Email inquiries to: info@roguewave.com. Visit Rogue Wave Software, Inc. on the World Wide Web at: www.roguewave.com.

Tools.h++* Library

Rogue Wave Software, Inc.

Host Development Environments: UNIX and Windows and OS/2.

Rogue Wave Software's Tools.h++ Library simplifies the software developer's code and improves the performance of his/her applications by providing a powerful set of C++ data structures and collection classes. The library includes persistent template collections and non-intrusive persistence. Endian byte streams allow for the sharing of binary data, and Tools.h++ is multi-thread safe.

For more information, contact: Billie Chapman, 541-754-4081. Email inquiries to: info@roguewave.com. Visit Rogue Wave Software, Inc. on the World Wide Web at: www.roguewave.com.

AN ASSOCIATION THAT PROMOTES YOUR EMBEDDED SOFTWARE INDUSTRY

Don't you believe it's time the embedded software market got its collective act together and joined forces for mutual benefit? Do you ever think what a better market it would be with some sort of organizational framework to enable you to talk to users, other suppliers, or to support standards initiatives? If you answered yes to one or both of the questions above, consider solving these problems by joining the Embedded Software Association, ESOFTA for short!

The Embedded Software Association's mission is to provide the communications vehicles for the industry that allows for free exchange of information between the users and creators of embedded software products and between the members of the association. This will be accomplished through assorted free and cost-effective marketing and marketing communications services provided by ESOFTA for all members, large and small, on an international basis.

Organizationally, ESOFTA will support the growth, health, and creative progress of the embedded software industry through member-initiated activities such as product development, public domain access to specifications, and any standards development, whether adopted, adapted or created, that serves the purpose of its members and the users of embedded software. Become an ESOFTA Software Association member and participate in shaping the market segment for the 21st century while simultaneously improving your company's visibility and your product(s) awareness level!

Companies wishing to discuss the association or its services may call (602) 991-4662 or email: sara@esofta.com.

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APPLICATIONS SOFTWARE

Application Type: DSP Simulator **SPOXWorks DSP Algorithm Simulation Accelerator**

Spectron Microsystems

Host Development Environments: Windows.

SPOXWorks allows a developer to hardware-accelerate the simulation of DSP algorithms and other SIMULINK/Real-Time Workshop-generated models by executing directly on the target DSP. This rapid prototyping of DSP algorithms or DSP-in-the-loop processing enables developers to access the actual performance afforded by the target DSP architecture.

For more information, contact: Shirley Hance, 805-968-5100. Email inquiries to: info@spectron.com. Visit Spectron Microsystems on the World Wide Web at: www.spectron.com.

Application Type: Application Interface **Hyperception Applications Interface (HApl)**

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's HApl allows a real-time DSP application to be created from visual designs and executed as a stand-alone, run-time only version of the end user's simulation/project. User controls such as knobs, sliders, keypads, meters, and displays are used to accomplish specific user I/O. This is useful for creating stand-alone virtual instruments and for sharing simulation/test results.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Application Type: Code Generation **Hypersignal C Code Generator**

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's Hypersignal C Code Generator automatically creates ANSI C source code, which represents an algorithm designed visually. The C code can be transferred to alternative platforms such as UNIX. It may be cross-compiled for a particular DSP chip. User-written assembly (and C) routines may also be interfaced to the C source code.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

Application Type: Database Engine **Raima Database Manager++ 4.5**

Raima Corporation

Host Development Environments: UNIX, Windows and DOS.

Raima Database Manager++ is a high-performance database engine designed for fast data retrieval, storage and manipulation. RDM++ consists of a database engine and libraries of C code for database operations. It also includes a C++ object-oriented interface. RDM++ supports real-time operating systems (RTOS), including QNX, Wind River's VxWorks/Tornado IDE, and others.

For more information, contact: Paul Johnson, 206-515-9477. Email inquiries to: sales@raima.com. Visit Raima Corporation on the World Wide Web at: <http://www.raima.com>.

Application Type: Database Management Application **DBTools.h++ Database Management Tool**

Rogue Wave Software, Inc.

Host Development Environments: UNIX and Windows and OS/2.

Rogue Wave's DBTools.h++ delivers portable, object-oriented access to the leading

RDBMSs, including those from Oracle, Sybase, MS SQL Server, DB/2, Informix, and ODBC.

For more information, contact: Billie Chapman, 541-754-4081. Email inquiries to: info@roguewave.com. Visit Rogue Wave Software, Inc. on the World Wide Web at: www.roguewave.com.

Application Type: Database Report Writer **Raima Report Writer**

Raima Corporation

Host Development Environments: Windows.

Raima's Report Writer provides high-performance reporting from Raima databases, with state-of-the-art graphical query definition, interactive browsing, and support for all Raima-supported data types. The Report Writer supports Multimedia data through object frame-based technology. The product handles complex reports with multiple nested headers, footers, and body sections.

For more information, contact: Paul Johnson, 206-515-9477. Email inquiries to: sales@raima.com. Visit Raima Corporation on the World Wide Web at: <http://www.raima.com>.

Application Type: Design/Specification Validation **Verispec® System Verification**

CACI Products Company

Host Development Environments: UNIX and Windows.

VeriSpec enables developers to quickly generate validated specifications for complex systems, including real-time and embedded systems. By allowing for the inclusion of timing constraints and the simulation of an actual prototype system, including the user interface, VeriSpec helps developers meet their overall performance requirements. By using VeriSpec, developers can test alternative physical implementations and accurately predict performance by executing the logical specification.

For more information, contact: Paul Gorman, 619-824-5200. Email inquiries to: caci@caciasl.com. Visit CACI Products Company on the World Wide Web at: www.caciasl.com.

Application Type: DSP Design Automation **System/Simulator** **DSP Canvas***

Angeles Design Systems Corp.

Host Development Environments: UNIX and Windows and Windows NT.

DSP Canvas allows the user to easily model a digital signal processing system. Provides for unified model creation using standard C for both fixed-point and floating-point models; seamless transition from floating-point to fixed point; automatic performance optimization (system parameters and word widths) and other cost functions; co-simulates different levels of abstraction in order to iteratively refine the design and to reuse legacy design blocks. DSP Canvas effectively communicates system design and performance characteristics to other design team members, along with test benches using scripted test suites.

For more information, contact: Paul Giordano, 415-297-7272. Email inquiries to: sales@angeles.com. Visit Angeles Design Systems Corp. on the World Wide Web at: www.angeles.com.

Application Type: DSP-based Telecommunications S/W **HausWare® DSP Software Suite**

HotHaus Technologies Inc.

Host Development Environments: Windows.

HausWare is a suite of embedded DSP algorithms for telecommunications applications. Algorithms offered include fax and data modems, vocoders, and general telephony functions. The HausWare architecture ensures that telecommunications product

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developers need not be well versed in the programming of DSPs to field successful products.

For more information, contact: 604-278-4300. Email inquiries to: info@hothaus.com. Visit HotHaus Technologies Inc. on the World Wide Web at: www.hothaus.com.

**Application Type: Embedded Browser
Device Mosaic* Thin Web Browser**

Spyglass, Inc.

Host Development Environments: UNIX and Windows.

Spyglass Inc.'s Device Mosaic is the embedded industry's first full-featured, thin browser. Occupying less than 500KB of code space when compiled specifically for devices, it supports the latest features found in desktop browsers 20 times its size. Moreover, Device Mosaic's modular design makes it scalable across a broad range of devices. Features can be added to support the latest needs of televisions and set-top boxes, or a stripped-down version can be embedded in more memory-constrained screen phones and hand-held devices. Easily ported to a variety of popular real-time operating systems, Device Mosaic enables consumer electronic manufacturers to add Web functionality to products quickly, cutting development costs and sharply reducing product time-to-market.

For more information, contact: Chris Phenner, 630-505-6505. Email inquiries to: needs@spyglass.com. Visit Spyglass, Inc. on the World Wide Web at: www.spyglass.com.

**Application Type: Embedded Browser
Remote Mosaic* Web Browser**

Spyglass, Inc.

Host Development Environments: N/A.

Spyglass Inc.'s Remote Mosaic brings Web-browsing capabilities to devices with extremely limited CPU, RAM, or display capacity, such as PDAs, cellular phones, pagers, or traditional television sets. By splitting the browser into two components: a lightweight viewer which resides in the device, and a proxy browser that resides on a server, Remote Mosaic can deliver Web-browsing functionality in as little as 50KB. Coupled with Spyglass Prism, a server-based Web content converter, Remote Mosaic makes it possible for Internet service providers to offer a broad range of information and services to previously limited devices.

For more information, contact: Chris Phenner, 630-505-6505. Email inquiries to: needs@spyglass.com. Visit Spyglass, Inc. on the World Wide Web at: www.spyglass.com.

**Application Type: Embedded Web Server
MicroServer* Embedded Web Server**

Spyglass, Inc.

Host Development Environments: UNIX and Windows and RTOS.

Spyglass MicroServer is a small-footprint, embedded Web server that enables full HTML page-based monitoring/management/control of devices such as copiers, printers, hubs/routers, and manufacturing equipment. It delivers standards-based Web server functionality to multiple concurrent users in as little as 36KB of RAM. Application user interfaces for MicroServer-enabled devices are authored in HTML and may be used with any commercial Web browser. Typical uses include providing operational/status information to a user, updating a device's internal database through HTML-forms collected information, or initiating a device action, such as running a user-requested diagnostic utility. Developed specifically for the embedded systems market, MicroServer has already been ported to many of the leading real-time operating systems.

For more information, contact: Chris Phenner, 630-505-6505. Email inquiries to: needs@spyglass.com. Visit Spyglass, Inc. on the World Wide Web at: www.spyglass.com.

**Application Type: Flash Memory Programming Utility
Flasher* Memory Programmer**

Concur System Technologies, LLC

Host Development Environments: Windows.

Flasher is a Windows* 95 application program and embedded Intel x86 compatible BIOS designed to program Flash EEPROM via a serial connection or remotely via a modem. Flasher provides both Flash file management and BIOS functions for initializing x86 processors, performing hardware self tests, and managing operating system and application execution.

For more information, contact: Mike Foley, 512-306-0511. Email inquiries to: info@concur.com. Visit Concur System Technologies, LLC on the World Wide Web at: www.concur.com.

**Application Type: Graphics Library
RTGL* Graphics Tool Library**

VisiCom

Host Development Environments: UNIX and VxWorks* and Tornado*.

RTGL is a set of graphics primitives supporting the creation of real-time and embedded graphics and text when memory, processing or file I/O constraints specify a small, robust, high-performance graphic system. It is particularly effective for real-time applications for office automation, telecommunications, embedded networking devices, medical instrumentation, and process control systems.

For more information, contact: VisiCom Sales Department, 1-800-668-4472. Email inquiries to: sales@visicom.com. Visit VisiCom on the World Wide Web at: www.visicom.com.

**Application Type: Graphics Tool
VX-Windows Graphics Tool**

VisiCom

Host Development Environments: UNIX and VxWorks* and Tornado*.

VisiCom's VX-Windows offers real-time graphics capabilities compatible with Wind River Systems' VxWorks* RTOS. VX-Windows is a fully re-entrant X Window* and OSF/Motif* environment for developing complex graphical displays for real-time applications. Full functionality and sophisticated capabilities are provided to create real-time graphics displays for medical imaging, simulation, monitoring systems, communications and aerospace/defense.

For more information, contact: VisiCom Sales Department, 1-800-668-4472. Email inquiries to: sales@visicom.com. Visit VisiCom on the World Wide Web at: www.visicom.com.

**Application Type: Graphics Tool
RTX-Windows Scalable Graphics Tool**

VisiCom

Host Development Environments: UNIX and VxWorks* and Tornado*.

RtX-Windows software provides scalable graphics with an X and Motif API interface, and maximum flexibility and functionality for graphical applications, ranging from workstations to hand-held devices. The system can be configured to incorporate all the features of the X Window System, or only a subset, to create applications that utilize only the features necessary for the image.

For more information, contact: VisiCom Sales Department, 1-800-668-4472. Email inquiries to: sales@visicom.com. Visit VisiCom on the World Wide Web at: www.visicom.com.

**Application Type: GUI Builder
zApp* Developer's Suite (Library)**

Rogue Wave Software, Inc.

Host Development Environments: UNIX and Windows and OS/2.

Rogue Wave's zApp Developer's Suite is a visual builder, interface tester, and code generation system for building graphical user interfaces (GUIs) that are portable to 10 platforms.

For more information, contact: Billie Chapman, 541-754-4081. Email inquiries to: info@roguewave.com. Visit Rogue Wave Software, Inc. on the World Wide Web at: www.roguewave.com.

**Application Type: Java Chart Maker
JChart Java Chart Maker**

Rogue Wave Software, Inc.

Host Development Environments: UNIX and Windows.

Rogue Wave's JChart software was designed to incorporate customizable, dynamic charts into Java applets and applications. Developers may choose from built-in basic chart types or use the charting primitives included in JChart to create their own chart types of any complexity or detail. JChart is pure Java and runs on all platforms that fully support the JDK 1.1 (Java Development Kit).

For more information, contact: Billie Chapman, 541-754-4081. Email inquiries to: info@roguewave.com. Visit Rogue Wave Software, Inc. on the World Wide Web at: www.roguewave.com.

**Application Type: Java Product
JTools Utilities**

Rogue Wave Software, Inc.

Host Development Environments: UNIX and Windows and All platforms that fully support the JDK 1.1.

JTools provides fundamental data structure and utility classes, and classes that facilitate formatted output. JTools Version 2.0 adds Java virtual streams to Java applications in order for them to exchange data with any C++ application that uses Tools.h++

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virtual streams. JTools 2.0 supports the 1.1 version of the JDK.

For more information, contact: Billie Chapman, 541-754-4081. Email inquiries to: info@roguewave.com. Visit Rogue Wave Software, Inc. on the World Wide Web at: www.roguewave.com.

**Application Type: Java product- Finance Package
JMoney Software**

Rogue Wave Software, Inc.
Host Development Environments: UNIX and Windows and OS/2.
Rogue Wave's JMoney software offers precision arithmetic and built-in financial calculations for Java development. The JMoney numeric package captures the precision of a decimal number to 15 digits, whereas Java's float and double data types only approximate decimal numbers. The finance package includes annuity, loan, and time-value calculations, and asset, warehouse, and depreciation classes.

For more information, contact: Billie Chapman, 541-754-4081. Email inquiries to: info@roguewave.com. Visit Rogue Wave Software, Inc. on the World Wide Web at: www.roguewave.com.

**Application Type: Java Tools/DB Engine
Velocis* Database Server 2.0**

Raima Corporation
Host Development Environments: UNIX, Windows and DOS.
Velocis Database Server 2.0 is a Web-enabled new release of Raima's high-performance client/server database engine. Server extensions are a unique Velocis feature that allows application code to be hosted on the database server, dramatically reducing network traffic and increasing application performance. New features include a direct interface to the Netscape Web server API, BLOB support and hot, on-line backup, and support for Very Large Databases.

For more information, contact: Paul Johnson, 206-515-9477. Email inquiries to: sales@raima.com. Visit Raima Corporation on the World Wide Web at: <http://www.raima.com>.

**Application Type: Library/Networking
Inter.Net.h++ Library**

Rogue Wave Software, Inc.
Host Development Environments: UNIX and Windows.
Rogue Wave's latest C++ class library, Inter.Net.h++, is a cross-platform C++ class library that makes it easy for system developers to create network applications for use on the Internet or any other TCP/IP network. The Inter.Net.h++ Library includes support for client-side implementations of FTP, HTTP, SMTP, POP3, and URL parsing and management. Development with Inter.Net.h++ requires Rogue Wave's Net.h++, Threads.h++ and Tools.h++.

For more information, contact: Billie Chapman, 541-754-4081. Email inquiries to: info@roguewave.com. Visit Rogue Wave Software, Inc. on the World Wide Web at: www.roguewave.com.

**Application Type: Mobile Computing
BSQUARE, BPRINT, BMOBILE HPC Communications Software**

BSQUARE
Host Development Environments: Windows.
BSQUARE produces a suite of mobile communications software products for Windows* CE OS-based hand-held PCs. BSQUARE's flagship product, BFAX*, was the first to earn Microsoft's "Designed for Windows CE" logo. Our BPRINT* and BMOBILE* products expand the functionality of hand-held PCs. Additional products are under development.

For more information, contact: Ann Gorman, 425-519-5000. Email inquiries to: donb@bsquare.com. Visit BSQUARE on the World Wide Web at: www.bsquare.com.

**Application Type: Network
FairCom* Server Engine**

FairCom Corporation
Host Development Environments: UNIX and Windows and Most Others.
FairCom Database Server Version 6.06.26A offers heterogeneous network support, allowing dissimilar clients to attach to virtually any FairCom server. The server is multi-threaded and incorporates new indexing technology that allows concurrency among clients without jeopardizing data integrity. Portability is afforded through more than 26 supported platforms including Windows95/NT, OS/2, DOS, Apple, Banyan, HP, AT&T, SCO and Sun. OEM/source possible.

For more information, contact: Sales, 573-445-6833. Email inquiries to: sales@faircom.com. Visit FairCom Corporation on the World Wide Web at: www.faircom.com.

**Application Type: Network Simulator
COMNET III* Network Simulator**

CACI Products Company
Host Development Environments: UNIX and Windows.
COMNET III simulates network performance for accurate, high-fidelity analysis of proposed designs. Network developers graphically describe their proposed networks and experiment with diverse network alternatives to avoid costly mistakes. COMNET III simulates all networking technologies including ATM, frame relay, TCP/IP, and FDDI. COMNET III imports baseline topology and traffic and COMNET Predictor models.

For more information, contact: Paul Gorman, 619-824-5200. Email inquiries to: caci@caciasl.com. Visit CACI Products Company on the World Wide Web at: www.caciasl.com.

**Application Type: Network Simulator
NETWORK II.5* Simulator**

CACI Products Company
Host Development Environments: UNIX and Windows.
NETWORK II.5 is a simulation tool for embedded system designers that predicts device loading, software execution times, response times and other measures of system performance through simulation. By simulating the interactions of all system components, NETWORK II.5 reveals the effects of conflicts and contention on total system performance. No programming is required.

For more information, contact: Paul Gorman, 619-824-5200. Email inquiries to: caci@caciasl.com. Visit CACI Products Company on the World Wide Web at: www.caciasl.com.

**Application Type: Networking
RTI NDDS Network Data Delivery Service**

Real-Time Innovations, Inc.
Host Development Environments: .
RTI's network connectivity tool, NDDS, provides easy connectivity between real-time network nodes and Unix* and Windows* NT OS-based workstations. NDDS makes it easier to share data and event information among distributed systems. Multicast capability, client/server functionality, and reliable communications ensure that NDDS fits distributed application needs. By simply calling a few functions, network coding is done.

For more information, contact: Al Canal, 408-720-8312 x 118. Email inquiries to: info@rti.com. Visit Real-Time Innovations, Inc. on the World Wide Web at: www.rti.com.

**Application Type: Networking/TCP/IP Protocol Stack
USNET* TCP/IP Development Tool**

U S Software
Host Development Environments: Windows.
The USNET TCP/IP protocol stack, with an optionally available embedded HTTP Web server, includes HTML Pages and Forms, Java Applets, CGI Functions, ISMAP as well as Meta Commands. SNMP is also available.

For more information, contact: Katrina Sumner, 503-641-8446 x 740. Email inquiries to: info@ussw.com. Visit U S Software on the World Wide Web at: www.ussw.com.

**Application Type: Real-time Database
Polyhedra Real-Time Database**

Polyhedra Plc.
Host Development Environments: UNIX and Windows.
Polyhedra's Real-Time Database features include: a high-speed, memory-resident active database; full object-oriented application design; automatic data update from server to client; direct connection to "high-speed data" devices; event-driven interfaces to other commercial databases; along with fault tolerance, full SQL access and programming interfaces.

For more information, contact: Colin Dowsett, +44-0-1908-366844. Email inquiries to: sales@polyhedra.com. Visit Polyhedra Plc on the World Wide Web at: www.polyhedra.com.

**Application Type: Scientific and Engineering
DADiSP* Worksheet**

DSP Development Corporation
Host Development Environments: Windows and HP-UX, Solaris, SGI, and DEC.
DSP Development's DADiSP Worksheet is a visually-oriented analytical graphics software package designed exclusively for scientific and technical applications. DADiSP was designed to remove the burden of programming from technical professionals, freeing them to devote their energy to creativity in their work. DADiSP is an interactive graphics worksheet to display, manage, and analyze scientific and technical data. The

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worksheet allows users to acquire, input and generate data, and display results in multiple windows for graphic comparison. Dependent analysis windows recalculate automatically as new data enters. Includes native GUI standards and a complete programming language. Menu-driven modules available.

For more information, contact: Sales Manager, 800-424-3131. Email inquiries to: dspdev@world.std.com. Visit DSP Development Corporation on the World Wide Web at: www.dadisp.com.

**Application Type: Server-based Web content converter
Prism* Web Content Converter**

Spyglass, Inc.

Host Development Environments: UNIX and Windows.

The Spyglass Prism is a server-based, content-conversion solution, designed to optimize the performance of the new generation of Web-enabled devices, such as handheld PCs, PDAs, smart phones, cellular phones, and pagers. The Prism converter dynamically translates richly-formatted, relatively complex Web content -- tables, JPEG, frames, Java applets -- into formats that match the display capabilities of the attached non-PC device. For example, with a PDA, Prism will instantly convert a color JPEG image into a less complex gray-scale GIFF file and reformat that image file for the PDA's small display screen. These conversions of graphic-laden content can reduce access times by as much as 90 percent. Performance is further enhanced by a caching feature that stores previously converted, frequently-requested Web content.

For more information, contact: Chris Phenner, 630-505-6505. Email inquiries to: needs@spyglass.com. Visit Spyglass, Inc. on the World Wide Web at: www.spyglass.com.

**Application Type: Set-Top Box Reference Design Kit
Set-Top Box Reference Design Kit**

IBM Microelectronics

Host Development Environments: UNIX and Windows.

IBM Microelectronics' Set-Top Box (STB) Reference Design Kit hardware includes: IBM PowerPC* 403CG* embedded controller; two RS-232 ports; serial port for IR remote control; IEEE 1284 parallel port; smart card interface; I2C port; IBM CD21 MPEG-2 A/V decoder; 4MB system DRAM (SIMM); 2MB flash memory; 2KB serial EEPROM; 4MB DRAM for video; digital video encoder for NTSC, PAL or SECAM composite video; RGB and Y/C outputs; digital/analog converter (for audio); MPEG-2 transport chip; system clock recovery logic; and connectors. Reference design kit software includes an RTOS, compiler, debugger, device drivers, and sample STB applications.

For more information, contact: PowerPC Technical Support Hotline. Email inquiries to: pccsupp@raleigh.ibm.com. Visit IBM Microelectronics on the World Wide Web at: www.chips.ibm.com/products/embedded.

**Application Type: Speech Analyzer for DSP
Hyperception HSVI5000 Speech Analyzer**

Hyperception, Inc.

Host Development Environments: Windows.

Hyperception's HSVI5000 is a real-time spectrum analyzer for speech analysis or virtually any signal. It has photo-realistic front-panel displays for selection of instrument controls. Frequency measurement displays can be log or linear magnitude data. A toggle switch controls FFT size, and scaling knobs allow selection of high- and low-amplitude display settings.

For more information, contact: Sales Department, 214-343-8525. Email inquiries to: info@hyperception.com. Visit Hyperception, Inc. on the World Wide Web at: www.hyperception.com.

**Application Type: TCP/IP Network Protocols
Xpres Net* Network Communications Suite**

Embedded System Products, Inc.

Host Development Environments: UNIX and Windows.

Embedded System Products, Inc.'s XpresNET is a family of fully portable software for use in network communications with embedded systems. All XpresNET family members are both processor- and operating system-independent, as well as compact for a small footprint and high performance. The suite of networking products includes TCP, IP, PPP, DHCP, SNMP, FTP, Web server, and others.

For more information, contact: Sales, 800-525-4302. Email inquiries to: sales@esphou.com. Visit Embedded System Products, Inc. on the World Wide Web at: www.esphou.com.

**Application Type: TCP/IP Protocol Stack
Nucleus* NET Stack**

Accelerated Technology, Inc.

Host Development Environments: UNIX and Windows.

Nucleus NET was developed to be a fast, small, and portable TCP/IP protocol stack. It is tightly integrated with the Nucleus PLUS kernel for optimized performance in embedded systems. It is approximately 30Kb in size on a standard CISC architecture and performs as well as, or better than, most commercially available TCP/IP implementations costing a great deal more. To round out the offering, Accelerated Technology has many standard applications available including: FTP (client), Telnet (client and server), TFTP, ICMP, ARP, RARP and BOOTP.

For more information, contact: Jamie Little, 334-661-5770. Email inquiries to: Sales@atinucleus.com. Visit Accelerated Technology, Inc. on the World Wide Web at: www.atinucleus.com.

**Application Type: TCP/IP Stack
smxNet V3.2 TCP/IP Networking Stack**

Micro Digital, Inc.

Host Development Environments: Windows and DOS.

Micro Digital's smxNet* is a TCP/IP network stack for the company's smx RTOS kernel. The stack supports both the TCP and UDP protocols through a Berkeley socket-compatible API. smxNet uses smx RTOS primitives to manage data flow, thereby minimizing code and data space. A simple device driver interface provides access to the hardware layer for custom drivers. Included with the smxNet product are ARP, RARP, BOOTP, ICMP, and SLIP, SMC, 3COM, and NE drivers.

For more information, contact: Betty Martin-Danner, 714-373-6862. Email inquiries to: ralph@smxinfo.com. Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

**Application Type: Video Capture Library
Imagenation Video Capture Libraries and Drivers**

Imagenation Corporation

Host Development Environments: Windows and DOS.

Imagenation's Video Capture Libraries and Drivers work with Imagenation's machine vision components and systems, providing full control of the video capture process including resettable cameras, gen-locking video sources, and software-initiated or triggered capture of video frames or fields. Products support PC/104, PC/104-Plus, STD and CompactPCI embedded system formats.

For more information, contact: Lucy Echon, 503-641-7408. Email inquiries to: info@imagenation.com. Visit Imagenation Corporation on the World Wide Web at: www.imagenation.com.

**Application Type: Web Server Toolkit
ROMPager Embedded Web Server Toolkit**

Allegro Software Development Corporation

Host Development Environments: UNIX and Windows and Macintosh, Lynx and OS/2.

The royalty-free ROMPager* toolkit enables a developer to embed a Web Server in a networked device, thereby allowing customers to control the server using standard browsers. The ANSI-C source code toolkit was designed from the ground up to support embedded devices with a minimum memory footprint for the server engine and the pages.

For more information, contact: Bob Van Andel, 508-266-1375. Email inquiries to: bva@allegrosoft.com. Visit Allegro Software Development Corporation on the World Wide Web at: www.allegrosoft.com.

* Trademark or registered trademark of its respective company or mark holder.

LOGIC DEVICES

Microprocessors

MediaGX* 64-Bit Microprocessors

Cyrix Corporation
Cyrix's MediaGX 3.3V microprocessor integrates VGA graphics, 16-bit audio, a memory controller and a PCI bus controller on a single processor that provides performance equivalent to a Pentium* processor operating at the same speed (MHz). The MediaGX processor is ideal for embedded applications requiring high performance, low power and x86 μ P compatibility. The 64-bit MediaGX processor is available in versions operating at 133/150/166 or 180MHz.

For more information, contact: Technical Support, 1-800-462-9749. Email: tech_support@cyrix.com.
Visit Cyrix Corporation on the World Wide Web at: www.cyrix.com.

Digital StrongARM 32-Bit RISC μ PUs/SA-110 and SA-1100

Digital Semiconductor
Digital Semiconductor's SA-110 StrongARM microprocessor features superior power efficiency, low-cost large caches, and high performance. Operating at speeds from 100 MHz to 233 MHz, the SA-110 offers performance from 115 to 260 Dhrystone MIPS and power dissipation of 150 mW to less than 900 mW.
The SA-1100 processor, at 133 MHz and 200 MHz, delivers up to 230 Dhrystone 2.1 MIPS and dissipates typically less than 250 mW of power. The first embedded processor to emulate a v.34+ modem in software, the device contains an integrated, high-speed multiplier with DSP functions.

For more information, contact: . Email: .
Visit Digital Semiconductor on the World Wide Web at: .

32-Bit MB8683x SPARClike* Embedded RISC Processor

Fujitsu Microelectronics, Inc.
At a volume price of between \$6 and \$7 each, the MB86833 SPARClike μ P is one of the lowest priced 32-bit processors available. The processor has already been designed into twelve digital cameras. FMI also makes a full-fledged MB8683x Processor Evaluation Kit available for \$99.00.

For more information, contact: Customer Service, 1-800-866-8608. Email: smcgray@fmi.fujitsu.com.
Visit Fujitsu Microelectronics, Inc. on the World Wide Web at: www.fujitsumicro.com.

PowerPC* 602*, 603*, 603e* 32-Bit Microprocessors

IBM Microelectronics
All IBM PowerPC 600 family microprocessors are ideal for high-performance embedded applications and are becoming very popular in networking and network computers. These powerful microprocessors offer outstanding superscalar processing and attractive prices for high-end products. Functionality for PowerPC 603 applications can be further enhanced with an IBM Memory Controller/PCI Bridge chipset or a 'multi-chip module' package.

For more information, contact: PowerPC Technical Support Hotline. Email: ppcsupp@raleigh.ibm.com.
Visit IBM Microelectronics on the World Wide Web at: www.chips.ibm.com/products/embedded.

IDT 79R30xx 32-Bit MIPS RISC Microprocessors

Integrated Device Technology, Inc.
IDT offers multiple versions of its MIPS processors, including the 79R3041 low-cost version with a 2KB instruction cache, 512 byte data cache; frequencies from 16MHz to 33MHz; Vcc of 3.3V or 5V; and 8-, 16-, or 32-bit external bus support.

IDT's 79R3052 version offers an 8KB instruction cache, 2KB data cache, frequencies of from 25MHz to 40MHz; E version device includes an MMU with 64-entry TLB and Vcc of 5V.

The 79R3081 offers a 16KB instruction cache, 4KB data cache (cache configurable to 8KB instruction and 8KB data), with frequencies from 40MHz to 50MHz. E version device includes an MMU with 64-entry TLB at either 3.3V or 5V.

For more information, contact: Phil Bourekas, 408-492-8661. Email: info@idt.com.
Visit Integrated Device Technology, Inc. on the World Wide Web at: http://www.idt.com.

IDT 79R36100 32-Bit MIPS RISC Microprocessor

Integrated Device Technology, Inc.
IDT's 79R36100 is a highly integrated MIPS RISC microprocessor with a 4KB instruction cache, 1KB data cache, frequencies of from 20MHz to 33MHz, and Vcc of 5V. The 79R36100 processor integrates memory, DMA and an I/O controller as well as system peripherals.

For more information, contact: Phil Bourekas, 408-492-8661. Email: info@idt.com.
Visit Integrated Device Technology, Inc. on the World Wide Web at: http://www.idt.com.

IDT 79RV4xxx 64-bit MIPS RISC Microprocessors

Integrated Device Technology, Inc.
IDT offers multiple versions of its MIPS R4000 series processors. The IDT 79RV4640 has a 32-bit external bus, an 8KB instruction cache, 8KB data cache; the processor operates at frequencies of from 100MHz to 180MHz at 3.3V and features a single-precision floating point unit (FPU). The IDT 79RV4650 has 8KB caches (I and D), frequencies of 100MHz to 180MHz, VCC of 3.3V, a single-precision FPU, and features either a 32-bit or 64-bit external bus. IDT's 79RV4700 processor offers a 16KB instruction cache, a 16KB data cache, frequencies of 100MHz to 200MHz, 3.3V operation, an FPU, and an MMU with large translation look-aside buffer (TLB).

For more information, contact: Phil Bourekas, 408-492-8661. Email: info@idt.com.
Visit Integrated Device Technology, Inc. on the World Wide Web at: http://www.idt.com.

IDT 79RV5000 64-Bit Superscalar MIPS RISC Microprocessor

Integrated Device Technology, Inc.
IDT's 79RV5000 is a superscalar 64-bit MIPS RISC microprocessor with 32KB instruction cache, 32KB data cache, frequencies of 150MHz to 200MHz, 3.3V operation, an FPU and TLB with an on-chip L2 cache controller.

For more information, contact: Phil Bourekas, 408-492-8661. Email: info@idt.com.
Visit Integrated Device Technology, Inc. on the World Wide Web at: http://www.idt.com.

i960* 32-Bit RISC Embedded Microprocessors

Intel Computing Enhancement Group
Intel's i960* processor family is a high-performance, 32-bit embedded RISC architecture that has shipped more than 50-million units into diverse embedded applications, from laser printers to the family's derivative intelligent I/O processors (Rx series) currently targeted at intelligent I/O applications.

For more information, contact: Local Intel Sales Office. Email: N/A.
Visit Intel Computing Enhancement Group on the World Wide Web at: www.intel.com.

Intel Architecture (Embedded) Pentium*, i486* and i386* Processors

Intel Computing Enhancement Group
The Intel Architecture embedded 16- and 32-bit microprocessors offer a price-perfor-

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mance range that matches well with the needs of the embedded applications market segment. The core of the Intel Architecture processors, which the industry commonly refers to as x86 processors, is the same as that developed for the PC industry, which enables the processors to afford software compatibility and a very large industry-support infrastructure.

For more information, contact: Local Intel Sales Office. Email: N/A.
Visit Intel Computing Enhancement Group on the World Wide Web at: www.intel.com.

CW4010/11 MiniRISC* 32-Bit Microprocessor ASIC Core
LSI Logic Corporation

LSI Logic's MiniRISC* 32-bit superscalar microprocessor core is based on the MIPS-II instruction-set architecture (ISA). The core-based devices offer performance levels of up to 120 Dhrystone MIPS and instruction set extensions, making them good fits for embedded applications in networking products, printers, and in graphics and video applications. The product number is CW4010/11, and LSI makes an evaluation chip, the LR4500, available to customers.

For more information, contact: RISC: R. Archide/Oak; Walter Croce 408-433-8000. Email: N/A.
Visit LSI Logic Corporation on the World Wide Web at: www.lsillogic.com.

TR4100 TinyRISC* 16-/32-Bit Microprocessor ASIC Core
LSI Logic Corporation

LSI Logic's TinyRISC* TR4100 32-bit microprocessor core is based on the MIPS-II ISA and MIPS 16 ASE. A processor based on the TinyRISC core yields a 72 Dhrystone MIPS performance level, code compression, and low power for applications in the wireless communications and portable equipment markets. LSI's EV4101 chip is available for customers evaluating a TinyRISC* core-based processor design.

For more information, contact: RISC: R. Archide/Oak; Walter Croce 408-433-8000. Email: N/A.
Visit LSI Logic Corporation on the World Wide Web at: www.lsillogic.com.

MC68328 DragonBall* 32-Bit Microprocessor

Motorola Semiconductor Products Sector
By providing 3.3V, fully static operation in an efficient package, the MC68328 DragonBall microprocessor delivers cost-effective performance to satisfy the extensive requirements of today's portable consumer electronics market. Call the Personal Systems Embedded Processor Group at 512-891-6742 or 512-891-2142 for product information about this device.

For more information, contact: Motorola Sales Office. Email: N/A.
Visit Motorola Semiconductor Products Sector on the World Wide Web at: www.motorola.com or sps.mot.com.

MPC821 32-Bit PowerPC* Microprocessor

Motorola Semiconductor Products Sector
A versatile, single-chip integrated microprocessor and peripheral combination device on which portable computing and personal communications products are based. Call the Personal Systems Embedded Microprocessor Group at 512-891-6742 or 512-891-2142 for product information about this device.

For more information, contact: Motorola Sales Office. Email: N/A.
Visit Motorola Semiconductor Products Sector on the World Wide Web at: www.motorola.com or sps.mot.com.

MPC823 32-Bit PowerPC* Microprocessor

Motorola Semiconductor Products Sector
The MPC823 32-bit integrated PowerPC chip is optimized for low-power imaging and communication products such as digital cameras and other mobile computing devices. Call the Personal Systems Embedded Microprocessor Group at 512-891-6742 or 512-891-2142 for product information on this device.

For more information, contact: Motorola Sales Office. Email: N/A.
Visit Motorola Semiconductor Products Sector on the World Wide Web at: www.motorola.com or sps.mot.com.

Motorola Microprocessors

Motorola Semiconductor Products Sector
Popular logic devices for the embedded market are Motorola's M68000 family of microprocessors; the M68300 integrated processors; the MPC 600 and 800 RISC processors, based on the PowerPC* architecture; the variable-length ColdFire* (MCF) RISC processors; and the FlexCore* program of semi-custom integrated microprocessors. Motorola SPS offers a wide variety of processor family derivatives with different power requirements/speeds/peripherals, which match well with the wide variety of embedded applications Motorola serves today.

For more information, contact: Motorola Sales Office. Email: N/A.

Visit Motorola Semiconductor Products Sector on the World Wide Web at: www.motorola.com or sps.mot.com.

NEC VR* Series/VR4100 64-bit Family RISC Microprocessors

NEC Electronics Inc.
NEC's VR4102 MIPS RISC Microprocessor is designed for Windows* CE O.S.-based HPCs and other portable applications and offers peripheral enhancements, 66MHz, advanced power management and soft modem capabilities.
The company's VR4111 high-performance, low-power-consumption MIPS RISC microprocessor emulates a mode in software and is aimed at portable and embedded products. The VR4111 CPU runs at 100MHz and is supported by the Windows* CE Operating System and the MIPS16 Instruction Set Architecture (ISA).

For more information, contact: Product Information, 800-366-9782. Email: N/A.
Visit NEC Electronics Inc. on the World Wide Web at: www.nec.com.

VR* Series/VR4300 64-bit RISC µP Family

NEC Electronics Inc.
NEC's VR4300 MIPS RISC microprocessor is available in 100 and 133MHz versions and is targeted for office automation, networking and consumer applications. The VR4300 also is supported by the Windows* CE Operating System for embedded applications.
The company's VR4305 MIPS RISC microprocessor provides 80MHz, 105 Dhrystone MIPS and low power dissipation of 1.5 Watts for embedded applications such as set-top boxes, printers, network computers and consumer electronics.
NEC's VR4310 MIPS RISC microprocessor is available in three speed versions: 100, 133 and 167MHz and is ideal for use in embedded applications such as advanced laser printers, networking equipment and consumer electronics. The VR4310 processor also uses an advanced 0.28-micron process technology and is supported by the Windows* CE Operating System for embedded applications.

For more information, contact: Product Information, 800-366-9782. Email: N/A.
Visit NEC Electronics Inc. on the World Wide Web at: www.nec.com.

NEC VR* Series/VR5000 64-bit µP Family

NEC Electronics Inc.
NEC's VR5000 MIPS RISC processor is a 200MHz dual-issue superscalar microprocessor offering enhanced floating-point computing capabilities and high performance in embedded systems applications such as internetworking devices, office automation equipment, X-terminals and workstations.

For more information, contact: Product Information, 800-366-9782. Email: N/A.
Visit NEC Electronics Inc. on the World Wide Web at: www.nec.com.

NEC VR* Series/VR10000 64-bit RISC µP Family

NEC Electronics Inc.
NEC's VR10000 MIPS RISC microprocessor is a 200MHz processor designed for powerful applications including high-end personal computers, workstations, multiprocessor systems and fault-tolerant systems.

For more information, contact: Product Information, 800-366-9782. Email: N/A.
Visit NEC Electronics Inc. on the World Wide Web at: www.nec.com.

NKK's NR5000, NR46xxx and NR3700 Microprocessors

NKK Micro Devices Inc.
NKK's MIPS-architecture-based NR5000 RISC-technology microprocessors are the 64-bit flagship-performance products for the embedded systems market. They are offered at speeds of 180 and 200MHz in BGA packages and are second-sourced by NEC and IDT. The NR46xxx family processors consist of 64-bit devices with options such as a 16-bit internal bus, small form factor package and low-power version. The NR4700 is a 64-bit (internal/external) workhorse for high-performance embedded systems, with speeds ranging from 100 to 175MHz, providing up to 230 MIPS performance levels. The NR3700, sole-sourced by NKK, is a core-based derivative of the MIPS R3000 processor architecture that may be integrated with peripheral and custom logic to provide semi-custom processor design solutions.

For more information, contact: Jean Claude Toma, 408-982-8273. Email: toma@nkkm-di.com.
Visit NKK Micro Devices Inc. on the World Wide Web at: www.nkk.co.jp/LSI.

WC32P020-XXX and WC32P040-XXX 32-bit MC68xxx µPUs

White Microelectronics
White Microelectronics' version of the MC68020 32-bit Motorola microprocessor is available in a 114-pin PGA or 132-lead CQFP with clock frequencies of 16MHz, 20MHz and 25MHz and an operating temperature range of -55°C to +125°C. The company's version of the 32-bit MC68040 microprocessor is available in a 179-pin PGA or a 184-lead CQFP with clock frequencies of 25MHz and 33MHz and an operating temperature

* Trademark or registered trademark of its respective company or mark holder



range of -55°C to +125°C.

For more information, contact: . Email: .
Visit White Microelectronics on the World Wide Web at: <http://www.whitemicro.com>.

WC64P603E-XXX Version of Motorola 64-bit PowerPC* 603e μ PU

White Microelectronics
White Microelectronics' Motorola PowerPC*603e microprocessor version, the WC64P603E-XXX, is available in a 240-pin CQFP or a 256-lead BGA. The processor has clock frequencies of 80MHz and 100MHz and an operating temperature range of -55°C to +125°C.

For more information, contact: . Email: .
Visit White Microelectronics on the World Wide Web at: <http://www.whitemicro.com>.

OEMmodule* 386 Central Processor Unit

ZF MicroSystems, Inc.
ZF MicroSystems' Intel i386* processor-based CPU is in the form of a multi-chip module (MCM). The company's OEMmodule* 386 combines the system hardware, software and solid state mass storage of a 386SX 40 MHz PC/AT motherboard in a single compact device measuring 2.2" x 3". The CPU is ideal for embedded PC applications or those requiring the functionality of a PC.

For more information, contact: . Email: .
Visit ZF MicroSystems, Inc. on the World Wide Web at: <http://www.zfmicro.com>.

Z80* Superintegration* Microprocessors

Zilog, Inc.
Zilog's Z80 8-, 16-, and 32-bit processor family of Superintegration* products are employed in keyboards, pointing devices, hard disk memories, digital audio cards, and PCMCIA bus interface applications.

For more information, contact: Sales, 408-370-8000. Email: N/A.
Visit Zilog, Inc. on the World Wide Web at: www.zilog.com.

Microcontrollers

MB86930-36 SPARClite* 32-Bit Microcontroller Series

Fujitsu Microelectronics, Inc.
The SPARClite RISC Embedded Processor Series of microcontrollers provides a highly efficient integer unit with on-chip instruction and data caches and full system-support functions.

For more information, contact: Customer Service, 1-800-866-8608. Email: smcgray@fmi.fujitsu.com.
Visit Fujitsu Microelectronics, Inc. on the World Wide Web at: www.fujitsumicro.com.

PowerPC* 401GF* 32-Bit Embedded Microcontroller

IBM Microelectronics
IBM Microelectronics' PowerPC 401GF 32-bit microcontroller is available in 50, 66 and 75MHz versions and is ideal for applications requiring ultra-low cost and power consumption. Based on IBM's tiny PowerPC 401 CPU core, and dissipating a mere 140mW (@50MHz, 3.3V) of power, this entry-level 32-bit processor can significantly boost performance in systems constrained by 8- and 16-bit embedded processors, and, in many cases, at a lower cost.

For more information, contact: PowerPC Technical Support Hotline. Email: pccsupp@raleigh.ibm.com.
Visit IBM Microelectronics on the World Wide Web at: www.chips.ibm.com/products/embedded.

PowerPC* 403GA*/403GB*/403GC* 32-Bit Embedded Microcontroller

IBM Microelectronics
With available speeds between 25 and 40MHz, the appropriate PowerPC 403GA, 403GB or 403GC, can reduce overall system hardware cost for 32-bit embedded applications. Each 403Gx processor integrates a varying mix of peripherals on chip. Peripheral integration includes devices such as a DRAM controller, serial port, timers, JTAG, caches, and MMU. The microcontroller integration level reduces system power requirements, chip count, and design complexity for embedded systems.

For more information, contact: PowerPC Technical Support Hotline. Email: pccsupp@raleigh.ibm.com.
Visit IBM Microelectronics on the World Wide Web at: www.chips.ibm.com/products/embedded.

PowerPC* 403GCX* 32-Bit Embedded Microcontroller

IBM Microelectronics
IBM Microelectronics' 50 or 66MHz PowerPC 403GCX microcontroller retains the heritage and all benefits of other PowerPC 403xx processors, providing the 403GCS microcontrollers with a natural migration path for higher performance 32-bit applications. This higher performance is a result of higher speeds and increased instruction (16KB) and data (8KB) caches. It is now possible to begin with or migrate toward high performance, low power requirements, reduced chip count, and less design complexity within IBM Microelectronics' PowerPC architecture-based microcontrollers.

For more information, contact: PowerPC Technical Support Hotline. Email: pccsupp@raleigh.ibm.com.
Visit IBM Microelectronics on the World Wide Web at: www.chips.ibm.com/products/embedded.

MCS* 51/151/251 8-Bit Microcontrollers

Intel Computing Enhancement Group
The 8-bit MCS* 51 single-chip microcontroller architecture is optimized for control-oriented applications. A variety of fast addressing modes for accessing the internal RAM facilitates byte-processing and numerical operations on small data structures. Based on advanced modular design techniques, Intel has launched the next generation of its 8-bit (80C51) architectures: the MCS 151 and MCS 251 architecture families of microcontrollers. The 80C51 microcontrollers are found in a very large variety of embedded applications, and development solutions for the devices are abundant and available from a variety of tools vendors.

For more information, contact: Local Intel Sales Office. Email: N/A.
Visit Intel Computing Enhancement Group on the World Wide Web at: www.intel.com.

MCS* 96/196/296 16-Bit Microcontrollers

Intel Computing Enhancement Group
Intel's MCS* 96 microcontroller architecture is a high-performance, register-to-register architecture that is ideal for complex, real-time control applications. The 80C196 (C196) controllers are the CMOS versions of the original MCS 96 (8096) 16-bit family of devices, historically the first 16-bit microcontrollers offered to the embedded applications market. The MCS 296 architecture is the latest generation of devices added to Intel's MCS 96 microcontroller family.

For more information, contact: Local Intel Sales Office. Email: N/A.
Visit Intel Computing Enhancement Group on the World Wide Web at: www.intel.com.

PICmicro* PIC12Cxxx 8-Bit Microcontroller Family

Microchip Technology Inc.
The PIC12Cxxx family of 8-bit OTP microcontrollers packs Microchip's powerful RISC-based PICmicro architecture into 8-pin DIP and SOIC packages. The PIC microcontrollers feature 12-bit-wide instructions for high performance, with a low 2.5V voltage that is ideal for embedded applications.

For more information, contact: 602-786-7668. Email: info@microchip.com.
Visit Microchip Technology Inc. on the World Wide Web at: www.microchip.com.

PICmicro* PIC16C5x 8-Bit Microcontroller Family

Microchip Technology Inc.
Microchips' PIC16C5x OTP microcontrollers provide cost-effective solutions that feature a 12-bit wide instruction set and are available in 18-, 20- or 28-pin packages. The devices require only a low, 2.0V operating voltage.

For more information, contact: 602-786-7668. Email: info@microchip.com.
Visit Microchip Technology Inc. on the World Wide Web at: www.microchip.com.

PICmicro* PIC16Cxxx 8-Bit Microcontroller Family

Microchip Technology Inc.
Available in 18-pin to 68-pin packages, Microchip's PIC16Cxxx family of 8-bit one-time-programmable (OTP) microcontrollers provides low-to-high levels of peripheral integration. The devices feature a 14-bit-wide instruction set, interrupt handling, and an 8-level hardware stack.

For more information, contact: 602-786-7668. Email: info@microchip.com.
Visit Microchip Technology Inc. on the World Wide Web at: www.microchip.com.

PICmicro* PIC17Cxxx 8-Bit Microcontroller Family

Microchip Technology Inc.
The PIC17Cxxx 8-bit OTP microcontroller family offers fast execution performance as well as 16-bit instructions, an enhanced instruction set, and powerful vectored interrupt-handling capabilities.

For more information, contact: 602-786-7668. Email: info@microchip.com.
Visit Microchip Technology Inc. on the World Wide Web at: www.microchip.com.

* Trademark or registered trademark of its respective company or mark holder.

Enhanced PICmicro* 8-Bit Microcontroller Family (PIC16C1XX)

Microchip Technology Inc.

The PIC16C1XX 8-bit OTP microcontroller architecture is an enhanced RISC core that is upward compatible from all PICmicro μ CU families. Devices feature 8K-to-16 words of on-chip EPROM (OTP) program memory and 512 bytes-to-1536 bytes of data SRAM. Available in 28- and 40-pin configurations, these devices provide various feature sets of 10-bit, up to 12-channel analog-to-digital converters; capture, compare and pulse-width modulation; and I2C*, SPI*, and high-performance USART communications capability.

For more information, contact: 602-786-7668. Email: info@microchip.com. Visit Microchip Technology Inc. on the World Wide Web at: www.microchip.com.

Motorola Microcontroller Devices

Motorola Semiconductor Products Sector

Motorola SPS develops, manufactures and markets several microcontroller families, including the M68HCxx devices, the M6833x series, and the MPC (PowerPC*) RISC controllers. M68HC05/08/11 chips are 8-bit devices, and the M68HC12/M68HC16 are 16-bit microcontrollers, code-compatible with the M68HC11 for easy upgrades. Motorola microcontrollers based on the PowerPC architecture include the ColdFire* MPC500 family.

For more information, contact: Motorola Sales Office. Email: N/A. Visit Motorola Semiconductor Products Sector on the World Wide Web at: www.motorola.com or sps.mot.com.

NEC K Series*/K0 and K0S 8-Bit Microcontroller Families

NEC Electronics Inc.

The K0 family is the backbone of NEC's K Series microcontroller platform. The platform offers devices operating from 1.8 to 5.5 V over a temperature range of -40 to +85° C. All families within the series are compatible enabling designers to easily modify their designs between lower cost and higher performance devices.

The K0 family is divided into three functional groups including general-purpose devices, and devices for LCD- and FIP-based (vacuum fluorescent) designs. Each K0 family group offers varying memory sizes from 16K up to 60K of ROM and 256 to 2K of RAM. The K Series microcontrollers are targeted for use in low-power, portable applications including car radios, cordless phones, remote controls, beepers and pagers.

NEC's K0S family represents the low-cost option within the K Series microcontroller platform, offering an integrated 8-bit architecture at 4-bit μ CU pricing. This family features three functional groups that contain specific devices for general purpose, LCD- or USB-based designs. The family is used in the telecommunications, automotive and consumer markets.

For more information, contact: Product Information, 800-366-9782. Email: N/A. Visit NEC Electronics Inc. on the World Wide Web at: www.nec.com.

NEC V800 Series/V830 and V831 32-Bit RISC μ CUs

NEC Electronics Inc.

NEC's V830 microcontroller is targeted for use in multimedia and wireless applications. Fabricated using a 0.35-micron CMOS process, the μ CU features 4 Kbytes of instruction and data cache and instruction and data RAM. In addition, the V830 features a 64-bit MAC unit and single-cycle MAC instructions with 200 MOPS at 100 MHz.

Also manufactured using a 0.35-micron process, the V831 μ CU features a high performance level of 118 MIPS, low power dissipation and DSP capabilities. These features and capabilities make the device ideal for applications such as Internet appliances, digital cameras, software modems and Java-based designs where real-time processing is needed.

For more information, contact: Product Information, 800-366-9782. Email: N/A. Visit NEC Electronics Inc. on the World Wide Web at: www.nec.com.

NEC V800 Series/V850 Family/V851 & V852 32-Bit RISC μ CUs

NEC Electronics Inc.

NEC's V850 family of 32-bit RISC microcontrollers are low-voltage, low-power devices with on-chip DSP functionality, flash memory and peripheral integration.

The V851 μ CU delivers 39 dhrystone MIPS at 33 MHz and is targeted for use in hard disk drives, servo control, engine control, automotive and office automation. The V851 μ CU also features DSP functionality with an integrated MAC instruction.

NEC's V852 μ CU delivers performance equal to the V851 and features three times more memory—90KB of ROM and 3KB of RAM. The V852 controller also features DSP functionality with an integrated MAC instruction. The device is ideal for portable or low-power designs with large embedded program requirements.

For more information, contact: Product Information, 800-366-9782. Email: N/A.

Visit NEC Electronics Inc. on the World Wide Web at: www.nec.com.

NEC V800 Series/V850 Family/V853 & V854 32-Bit RISC μ CUs

NEC Electronics Inc.

The V853 was the industry's first high-speed 32-bit RISC μ CU with integrated flash memory. Delivering 38 MIPS performance at 33 MHz, the device is designed for embedded applications including digital cellular phones and wireless communications, point-of-sale systems, camcorders and office automation equipment. The V853 μ CU also features DSP functionality with an integrated MAC instruction.

The V854 delivers 38 MIPS at 33 MHz, features on-chip DSP functionality and flash memory, but provides a wide array of standard on-chip peripherals. When combined with the integrated MAC function, the device offers an efficient, cost-effective solution for applications such as wireless communications and embedded multimedia systems that require low-to-mid-range DSPs. The V854 offers functionality and performance at 3.3 V.

For more information, contact: Product Information, 800-366-9782. Email: N/A. Visit NEC Electronics Inc. on the World Wide Web at: www.nec.com.

NEC K Series/K4 Family of 16-Bit μ CUs

NEC Electronics Inc.

NEC's K4 family represents the high-performance option within the K Series microcontroller platform, offering memory sizes of up to 256K of ROM and 12K of RAM. The devices are designed for embedded control applications in wireless communications devices (such as two-way pagers and cellular phones), point-of-sale systems, industrial control systems and office automation products.

For more information, contact: Product Information, 800-366-9782. Email: N/A. Visit NEC Electronics Inc. on the World Wide Web at: www.nec.com.

NEC V800 Series/V850 Family/V850E/MS1 32-Bit RISC μ CU

NEC Electronics Inc.

The V850E/MS1 microcontroller features low power consumption of 160 mW and delivers 52 MIPS at 40 MHz. It is ideal for portable consumer applications, digital imaging and wireless communications. The device also features an enhanced instruction set that improves code density by 20 percent over other members of the V850 μ CU family, powerful DSP functionality with an integrated 32 x 32 multiplier, and improved external memory support with an on-chip DMA and DRAM controller.

For more information, contact: Product Information, 800-366-9782. Email: N/A. Visit NEC Electronics Inc. on the World Wide Web at: www.nec.com.

KS32xx Series 32-Bit Microcontrollers

Samsung Semiconductor

Samsung's KS32 series of 32-bit microcontrollers, based on the ARM7 processor and the ARM7 TDMI core, are designed for use in application-specific and customer-specific integrated circuit applications. Samsung supplies both types of devices. KS32 microcontrollers include the KS32C6000, the KS32C6100 and the KS32C6200 microcontroller device.

For more information, contact: Lisa Christiansen, 408-954-7000. Email: Ichristi@ssi.samsung.com.

Visit Samsung Semiconductor on the World Wide Web at: www.sec.Samsung.com.

KS88xx Series 8-Bit Microcontrollers

Samsung Semiconductor

Samsung's KS88xx series of 8-bit microcontrollers, based on the company's SAM8 processor core, includes 10 different devices: KS88C0116, KS88C0504, KS88C0604, KS88C0916, KS88C3208, KS88C3216, KS88C4116, KS88C4208, KS88C4400, KS88C8016, and KS88C9316. The microcontrollers are designed for high performance and feature programming flexibility for supporting a very wide range of consumer electronics applications.

For more information, contact: Lisa Christiansen, 408-954-7000. Email: Ichristi@ssi.samsung.com.

Visit Samsung Semiconductor on the World Wide Web at: www.sec.Samsung.com.

KS86xx Series 8-Bit Microcontrollers

Samsung Semiconductor

The Samsung KS86xx series of 8-bit microcontrollers, based on Samsung's SAM87RI core (SAM8 w/reduced instruction set), offers a wide range of integrated peripherals, including USB support, and are suitable for a variety of embedded applications.

For more information, contact: Lisa Christiansen, 408-954-7000. Email: Ichristi@ssi.samsung.com.

Visit Samsung Semiconductor on the World Wide Web at: www.sec.Samsung.com.

* Trademark or registered trademark of its respective company or mark holder.



KS57xx Series 4-Bit Microcontrollers

Samsung Semiconductor

The KS57xx series of microcontrollers was designed specifically for low-power consumption and flexible operating-voltage range embedded applications. The series provides LCD, LED, ADC, SIO and other integrated peripherals suited to the needs of the low-power embedded applications market segment.

For more information, contact: Lisa Christiansen, 408-954-7000. Email: lchristi@ssi.samsung.com.

Visit Samsung Semiconductor on the World Wide Web at: www.sec.Samsung.com.

KS56xx Series 4-Bit Microcontrollers

Samsung Semiconductor

Samsung's KS56xx and KS57xx 4-bit microcontrollers are based on the company's SAM4 core. The KS56xx microcontrollers feature low-power dissipation and have a cost-effective 4-bit external/8-bit internal bus that results in very high-efficiency devices.

For more information, contact: Lisa Christiansen, 408-954-7000. Email: lchristi@ssi.samsung.com.

Visit Samsung Semiconductor on the World Wide Web at: www.sec.Samsung.com.

KS51xx Series 4-Bit Microcontrollers

Samsung Semiconductor

The architecture of Samsung's KS51xx series of 4-bit microcontrollers is optimized for low-end, low-cost consumer electronics applications, including games and remote control devices.

For more information, contact: Lisa Christiansen, 408-954-7000. Email: lchristi@ssi.samsung.com.

Visit Samsung Semiconductor on the World Wide Web at: www.sec.Samsung.com.

TMS370 Family of 8-Bit Microcontrollers

Texas Instruments Semiconductor Group

TI's 135 general-purpose, fully code-compatible 8-bit microcontroller devices in 13 sub-families meet the price and functionality needs of a broad range of applications. The chips have a wide variety of highly integrated peripherals: SCI, SPI, I/O functions, ADC, several timer options, and memory expansion bus. The ROM and OTP version devices have up to 48KB ROM/EPROM, up to 3.5KB RAM, and up to a 512-byte EEPROM.

For more information, contact: Literature Response, 1-800-477-8924, x 4500. Email: N/A.

Visit Texas Instruments Semiconductor Group on the World Wide Web at: www.ti.com.

TMS370C8 8-Bit CISC Microcontroller

Texas Instruments Semiconductor Group

TI's TMS370C8 devices represent an advanced generation of custom 8-bit MCUs with two to four times the performance of the standard TMS370 Microcontrollers. The advanced microcontroller family is based on TI's PRISM* process, which supports much higher integration levels of peripherals, including power linear.

For more information, contact: Literature Response, 1-800-477-8924, x 4500. Email: N/A.

Visit Texas Instruments Semiconductor Group on the World Wide Web at: www.ti.com.

TMS370C16 Family of 16-Bit Microcontrollers

Texas Instruments Semiconductor Group

TI's TMS370C16 family is an advanced generation of custom 16-bit microcontrollers. The devices are based on the company's PRISM* process that yields far higher integration levels of peripheral circuits, including power linear. The custom library for this family of devices includes advanced timer capabilities and the availability of large memory sizes.

For more information, contact: Literature Response, 1-800-477-8924, x 4500. Email: N/A.

Visit Texas Instruments Semiconductor Group on the World Wide Web at: www.ti.com.

TMS470 Family of 32-Bit Microcontrollers

Texas Instruments Semiconductor Group

The TMS470 family of microcontrollers is based on the ARM7 TDMI processor architecture with the best MIPS-per-Watt performance and flexible 16- or 32-bit instruction capabilities. The devices are currently available in a c470 customizable ASIC design flow.

For more information, contact: Literature Response, 1-800-477-8924, x 4500. Email: N/A.

Visit Texas Instruments Semiconductor Group on the World Wide Web at: www.ti.com.

Tsquare TS701 32-Bit HDLC Controller

TSQUARE

Tsquare's TS7xx Series HDLC 32-bit Controller products have various capabilities and are all based on the SPARC* RISC processor architecture. The TS701 HDLC controller is capable of 64 full-duplex channels with integrated timers/memory controllers/MAC layer software and is targeted at the datacom and telecom markets.

For more information, contact: . Email: .

Visit TSQUARE on the World Wide Web at: <http://www..>

Tsquare TS 702 32-Bit HDLC Controller

TSQUARE

Based on the SPARC* V8 RISC μ P architecture, Tsquare's TS702 is a RISC-based HDLC Controller capable of 128 full-duplex channels with integrated timers/memory controllers/MAC layer software and is targeted at the datacom and telecom markets.

For more information, contact: . Email: .

Visit TSQUARE on the World Wide Web at: <http://www..>

Tsquare TS703 32-Bit HDLC Controller

TSQUARE

Tsquare's TS 703 HDLC Controller is capable of 256 full-duplex channels with integrated timers/memory controllers/MAC layer software and is targeted at the datacom and telecom markets.

For more information, contact: . Email: .

Visit TSQUARE on the World Wide Web at: <http://www..>

Tsquare TS 704 HDLC Controller

TSQUARE

Tsquare's TS 704 RISC-based HDLC Controller is capable of 672 full-duplex channels, along with integrated timers/memory controllers and MAC layer software, and is targeted at the datacom and telecom markets.

For more information, contact: . Email: .

Visit TSQUARE on the World Wide Web at: <http://www..>

Tsquare TS 715 32-Bit HDLC Controller

TSQUARE

Tsquare's TS 715 is a RISC-based controller capable of 672 channels of HDLC, Packet over SONET, and has integrated timers, memory controllers, Utopia interface, 10/100 Base T interface and MAC layer software.

For more information, contact: . Email: .

Visit TSQUARE on the World Wide Web at: <http://www..>

WC16P332-XCX 16-bit Motorola MC683xx μ C

White Microelectronics

White Microelectronics make the MC683x2 microcontroller available in a 132-lead CQFP (ceramic quad flatpack) with clock frequencies of 16MHz and 20MHz. The device operates over a temperature range of -55° C to +125° C, and Military 883 screening is available.

For more information, contact: . Email: .

Visit White Microelectronics on the World Wide Web at: <http://www.whitemicro.com>.

WC32P360-XXX Motorola MC68360 32-bit μ C

White Microelectronics

White Microelectronics' WC32P360-XXX version of the MC68360 microcontroller is available in a 241-pin PGA or a 240-lead CQFP with a maximum clock frequency of 25MHz and an operating temperature range of -55°C to +125°C.

For more information, contact: . Email: .

Visit White Microelectronics on the World Wide Web at: <http://www.whitemicro.com>.

Z8* 8-Bit Microcontrollers

Zilog*, Inc.

Zilog's Z8* Family of 8-bit, general-purpose, multi-protocol microcontrollers offers the LAN and WAN markets optimized solutions for data networking, high-speed fax modems, and printers. The microcontrollers are used in a wide variety of embedded applications.

For more information, contact: Sales, 408-370-8000. Email: N/A.

Visit Zilog*, Inc. on the World Wide Web at: www.zilog.com.

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DSPs

OAK* DSP Core - CWDSP16xx For ASIC Designs

LSI Logic Corporation

LSI Logic's CWDSP16xx family of DSP cores is based on its OAKDSPCore* architecture. Resulting 16-bit fixed-point code-efficient core-based DSPs are ideal for application in wireless communications, and in the consumer and PC computing market segments. The product number for the core is CW4011 with the LR4500 the evaluation chip.

For more information, contact: RISC: R. Archide/Oak/Walter Croce 408-433-8000. Email: N/A.

Visit LSI Logic Corporation on the World Wide Web at: www.lsillogic.com.

DSP56000 Family of 24-Bit Digital Signal Processors

Motorola Semiconductor Products Sector

Motorola SPS's DSP56000 family of digital signal processors boasts the industry's highest performance for fixed-point, 24-bit DSPs. The family is very highly integrated, with an array of on-chip memories, communication ports, and a host interface that allows the processor to communicate directly to other processors or DMA channels. The family is widely used in a variety of advanced communication, digital audio, automotive, robotic, military, medical and sophisticated control applications. Unlike other processors, the DSP56000 family features three separate buses to internal memories, and were the first DSPs to have an extended triple-bus Harvard architecture that can supply an instruction plus two pieces of data simultaneously. In addition to the DSP56000 family, Motorola SPS offers the DSP56100 family as well as the DSP96000 digital signal processor.

For more information, contact: Motorola Sales Office. Email: N/A.

Visit Motorola Semiconductor Products Sector on the World Wide Web at: www.motorola.com or sps.mot.com.

Butterfly BDSP 9124 24-Bit DSP FFT Engine

Sharp Microelectronics Technology, Inc.

The BDSP9124 is the fastest digital signal processor optimized for fast fourier transform (FFT) and other block computing.

For more information, contact: Chris Ciuffo, 360-834-8796. Email: cciuffo@sharpwa.com. Visit Sharp Microelectronics Technology, Inc. on the World Wide Web at: www.butterfly.com.

Butterfly BDSP 9320 20-Bit DSP MMU

Sharp Microelectronics Technology, Inc.

The BDSP9320 Memory Management Unit (MMU) is a high-speed memory addressing device uniquely designed to create address patterns for digital signal processors with real or complex memory arrays.

For more information, contact: Chris Ciuffo, 360-834-8796. Email: cciuffo@sharpwa.com. Visit Sharp Microelectronics Technology, Inc. on the World Wide Web at: www.butterfly.com.

TMS320C2xx 16-Bit Fixed-Point DSP Family

Texas Instruments Semiconductor Group

TI's 'C2xx DSP generation offers an outstanding price-to-performance ratio and features two main product groups: the 'C20x devices are general-purpose DSPs ideal for telecommunications, computer and consumer applications, and the 'C24x devices are highly integrated DSPs optimized for digital control system applications.

For more information, contact: Literature Response, 1-800-477-8924, x 4500. Email: N/A.

Visit Texas Instruments Semiconductor Group on the World Wide Web at: www.ti.com.

TMS320C3x 32-Bit Floating-Point DSPs

Texas Instruments Semiconductor Group

The TMS320C3x generation is the first of TI's 32-bit floating-point DSPs. The 'C3x devices provide an easy-to-use, high-performance architecture that allows users to develop breakthrough products quickly. The 'C3x CPU has an independent multiplier and ALU to offer up to 60 MegaFLOPs per second at up to 30 MIPS.

For more information, contact: Literature Response, 1-800-477-8924, x 4500. Email: N/A.

Visit Texas Instruments Semiconductor Group on the World Wide Web at: www.ti.com.

TMS320C4x 32-Bit Floating-Point DSPs

Texas Instruments Semiconductor Group

TI's TMS320C4x DSP devices are optimized for parallel processing. The 'C4x generation combines a high-performance CPU and DMA controller with up to six communication ports to meet the needs of multiprocessor and I/O-intensive applications.

For more information, contact: Literature Response, 1-800-477-8924, x 4500. Email:

N/A.

Visit Texas Instruments Semiconductor Group on the World Wide Web at: www.ti.com.

TMS320C5x 16-Bit Fixed-Point DSPs

Texas Instruments Semiconductor Group

The TMS320C5x generation of 16-bit, fixed-point DSPs performs up to 50 MIPS and offers devices with a variety of memory mixes and peripherals options. Some 3V versions maintain 50 MIPS performance, but reduce power consumption to 1.15 mA/MIPS. The standard synchronous, double-buffered serial port operates at up to 12.5 Mbps with independent transmit and receive sections.

For more information, contact: Literature Response, 1-800-477-8924, x 4500. Email: N/A.

Visit Texas Instruments Semiconductor Group on the World Wide Web at: www.ti.com.

TMS320C54x 16-Bit Fixed-Point DSPs

Texas Instruments Semiconductor Group

The TMS320C54x generation of DSPs integrates functions to reduce power consumption, improve performance, and lower chip count to enable greater system cost savings. The 'C54x devices combine high performance, a large degree of parallelism, and a specialized instruction set to effectively implement a variety of complex algorithms in wireless communications, telecom, computer telephony and networking.

For more information, contact: Literature Response, 1-800-477-8924, x 4500. Email: N/A.

Visit Texas Instruments Semiconductor Group on the World Wide Web at: www.ti.com.

TMS320C6x 16-Bit Fixed- /Floating-Point DSPs & TMS320C62x 16-Bit Fixed- Point DSPs

Texas Instruments Semiconductor Group

TI's TMS320C6x generation of 16-bit fixed-point DSPs performs at 1600 MIPS and provides dramatic improvements for an entirely new class of products. Key features include: up to 10 times the performance of any DSP on the market, 1600 MIPS and 200MHz; advanced VelociTI* VLIW architecture that enables sustained throughput of up to eight instructions in parallel; new development paradigm based on software that reduces development time and system cost by 50 percent, with new-generation tools that were designed for greatest ease-of-use and maximum optimization.

For more information, contact: Literature Response, 1-800-477-8924, x 4500. Email: N/A.

Visit Texas Instruments Semiconductor Group on the World Wide Web at: www.ti.com.

TMS320C8x 32-Bit Multiprocessing DSPs

Texas Instruments Semiconductor Group

The TMS320C8x multiprocessing DSP generation integrates as many as four parallel-processing DSPs and a 32-bit RISC master processor on a chip that delivers more than two-billion RISC-like operations per second. The first member of the new generation, the 'C80, can be used for applications such as real-time audio/video processing, high-end data communications and image processing. The 'C82 is the second member of the DSP series that can be used in high-volume applications such as desktop videoconferencing.

For more information, contact: Literature Response, 1-800-477-8924, x 4500. Email: N/A.

Visit Texas Instruments Semiconductor Group on the World Wide Web at: www.ti.com.

TMS320C67x 32-Bit Floating-Point CPU Core

Texas Instruments Semiconductor Group

The TMS320C67x CPU core is the 32-bit floating-point member of the first fixed- and floating-point code-compatible generation of DSPs, the TMS320C6x. Based on the VelociTI* advanced VLIW architecture, the 'C67x, performing at 1 GFLOPs, delivers up to 10 times the performance of today's floating-point DSPs. Floating-point functionality exists in six of the eight functional units inside the 'C6x CPU, including two ALUs, two auxiliary units, and two multipliers. Because the 'C67x instruction set is a superset of the 'C62x fixed-point DSP, designers can use existing 'C6x tools to develop 'C67x systems now.

For more information, contact: Literature Response, 1-800-477-8924, x 4500. Email: N/A.

Visit Texas Instruments Semiconductor Group on the World Wide Web at: www.ti.com.

Zilog DSP Plus Microcontroller Solutions

Zilog, Inc.

Zilog provides DSP/μC solutions for the consumer electronics market, including TV applications, IR remote controllers, digital telephone answering machines, and cordless personal communications.

For more information, contact: Sales, 408-370-8000. Email: N/A.

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SYSTEM DEVELOPMENT SERVICES

Applied Microelectronics Inc.

1046 Barrington Street
Halifax, Nova Scotia B3H 2R1 CANADA
Telephone: 902-421-1250 x273
Fax: 902-429-9983

Applied Microelectronics Inc. is an established leader in the design and development of electronics products. Applied Microelectronics has extensive experience in embedded software systems, ranging from small microcontroller-based designs to large multi-tasking, multi-processor-based real-time systems. Systems developed include a Digital FM Exciter with an 8-bit microcontroller and three 24-bit DSPs; The Weather Star* 4000, comprised of two 16-bit microprocessors running multi-tasking RAM-based software and up to four 8-bit microcontrollers, all on a shared bus; and numerous VMEbus-based systems using multiprocessor designs for data processing and distribution at high data rates.

For more information, contact: Darren W. Taylor, 902-421-1250 x273. Email: taylor@applied-micro.ns.ca.
Visit Applied Microelectronics Inc. on the World Wide Web at: www.appliedmicro.ns.ca.

Applied Microsystems Corporation

5020 148th Avenue NE, PO Box 97002
Redmond, WA 98073-9702
Telephone: 800-426-3925 or
425/882-2000
Fax: 425-883-3049

Applied Microsystems is a leader in hardware-enhanced embedded software design, debug and test solutions, helping engineers develop products faster, more reliably and at a lower cost-per-engineer. Applied's "hardware-enhanced" tool approach ensures embedded systems developers maximum control over and visibility into a microprocessor-based embedded system while simultaneously optimizing performance, minimizing the cost to AMC customers, yet causing minimal intrusion into the operation of the system being developed. Applied's tools include: innovative VSP-TAP/Eagle* hardware/software co-verification tools; SuperTAP*, CodeTAP*, and CodeICE* in-circuit emulators, and the CoreTAP* Development Platform for SOC projects -- tools for both software and hardware development; and category-defining CodeTEST* embedded software test and analysis tools.

Applied also develops custom measurement solutions for specific customer applications.

For more information, contact: Jay Gould, 425-882-5633. Email: info@amc.com.
Visit Applied Microsystems Corporation on the World Wide Web at: www.amc.com.

Baton Rouge International, Inc.

666 Plainsboro Road, Ste. # 1281
Plainsboro, NJ 08536
Telephone: 609-716-9030
Fax: 609-716-9029

Baton Rouge International, Inc. (BRI), a rapidly growing software consulting and systems integration company, has acquired an enviable reputation based on its unique combination of consultancy, turnkey development, support services, and maintenance of embedded real-time systems. The expertise gained in embedded systems over the past 15 years has resulted in BRI's Embedded Systems Division, based on a strong core group of more than 120 professionals and a state-of-the-art ISO9001-accredited problem-oriented R&D center at the company's India facilities. BRI services to clients include Firmware Development; Real-time System Design/Development; Development, Porting and Maintenance of Board Support Packages and Device Drivers; and Application Software Development. The BRI services are offered in various packages to suit individual customer needs, including: Fixed-price development - outsourcing; Consulting and on-site contract programming; and Outsourcing and offshore development. BRI provides excellent options for improving a cus-

tomers competitiveness by reducing costs, meeting tight deadlines, reducing time-to-market, freeing key people up to focus on key technology issues.

For more information, contact: Chandra Kandanuru, 609-716-9030. Email: emb.sys@bri.com.
Visit Baton Rouge International, Inc. on the World Wide Web at: <http://www.bri.com/embed.htm>.

Bernard Mushinsky, Marketing Consultant

444 East 82 Street

New York, NY 10028
Telephone: 212-734-4124
Fax: 212-734-4079

Bernard founded Industrial Programming, Inc. the pioneering company in the real-time operating systems field. From its inception in 1976, he was responsible for marketing and sales of IPI's MTOS* RTOS product family, now used by thousands of organizations around the world. Object copies of MTOS are embedded in millions of devices, from the AWACS surveillance airplane to the Zodiac telephone switch. Eminently successful in marketing, he consults in the following areas: Market Assessment; Development and Implementation of Marketing Strategies; Technical Writing; and Documentation.

For more information, contact: Bernard Mushinsky, 212-734-4124. Email: bermmu@world-net.att.net.
Visit Bernard Mushinsky, Marketing Consultant on the World Wide Web at: N/A.

BSQUARE

3633 136th Place S.E., Ste. 200
Bellevue, WA 98006
Telephone: 425-519-5000
Fax: 425-529-5999

BSQUARE* is a rapidly growing company, with more than 100 employees, specializing in Windows* CE operating system solutions. BSQUARE has three divisions: BSQUARE Consulting provides the industry's largest pool of Windows CE engineering resources. BSQUARE Development provides a suite of proprietary software products for use in Windows CE-based handheld PCs (HPCs). BSQUARE's flagship product, bFAX* was the first to earn Microsoft's "Designed for Windows CE" logo. bPRINT* and bMOBILE* are additional mobile communications software products for HPCs. BSQUARE Integration provides full-service Windows CE support for manufacturers, OEMs and end users. BSQUARE Integration provides OEM Adaptation Kits (OAK), reference hardware designs, and a cross-platform firmware environment for the Windows CE operating system. Customer-specific System Design/Development Services are provided by BSQUARE's Consulting Division.

For more information, contact: Ann Gorman, 425-519-5000. Email: donb@bsquare.com.
Visit BSQUARE on the World Wide Web at www.bsquare.com.

Cygnus Solutions

1325 Chesapeake Terrace
Sunnyvale, CA 94089
Telephone: 408-542-9600
Fax: 408-542-9699

Cygnus Solutions is a leading provider of single-source, Unix and Windows* NT desktop and cross-platform software development tools for 32- and 64-bit embedded processors and controllers. As the GNU technology leader, Cygnus continually pushes the frontier of compiler and debugger innovation.

Cygnus, founded in 1989, established a support model for the GNU standard, leveraging the contributions of the net community and the requirements of the semiconductor industry to

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produce a powerful multi-platform software development toolkit. The GNUPro* Toolkit has very broad coverage in the embedded systems marketplace. Cygnus also provides customization services. Headquartered in Sunnyvale, California, the company is global in both operations and customers, with offices in Boston and Atlanta, the U.K., Japan, Germany and Canada.

For more information, contact: 800-CYGNUS1 or 408-542-9600. Email: info@cygnus.com. Visit Cygnus Solutions on the World Wide Web at: www.cygnus.com.

Dinkumware, Ltd.

398 Main Street
Concord, MA 01742
Telephone: 978-369-8489
Fax: 978-371-9014

Dinkumware, Ltd. provides Dinkum* Libraries for the embedded marketplace. The Dinkum EC++ Library is the first implementation of the Embedded C++ Technical Committee specifications. The Dinkum Abridged Library, EC++ plus STL, is designed to help programmers write C++ programs, using an efficient subset of the ANSI/ISO Standard C++ by providing optional exception handling and/or namespaces. The Dinkum C++ Library is fully compliant with ANSI/ISO Standard (Nov., 1997, ISO DIS). Dinkum Customization Service enhances your C library by adding the Dinkum Supplement Package (wide-character, locale support, and a set of enhanced math functions) for closer conformance to the ANSI/ISO C Standard. Dinkumware can adapt the Dinkum C++ Library for use with your compiler, including upgrading your C library as needed for better conformance to the C++ Standard. Dinkumware products are portable among most microprocessors and microcontrollers.

For more information, contact: T.L. Plauger, 978-369-8489. Email: sales@dinkumware.com. Visit Dinkumware, Ltd. on the World Wide Web at: www.dinkumware.com.

Electro-Logic Machines, Inc.

1757 Maple Street
Port Townsend, WA 98368
Telephone: 360-379-0969
Fax: 360-379-0960

Since 1990, Electro-Logic Machines, Inc. (ELMI) has provided award-winning architectural design and development support for real-time embedded systems. ELMI's specialty in Motorola's Time Processor Unit (TPU) microcode development has resulted in the company's firmware being used in many Motorola microcontroller-based products. ELMI is a Motorola Embedded Gold Developer. In addition to providing its Time Processor Unit firmware library, ELMI welcomes customers requiring expertise in customized functional microcode development (firmware support) for real-time embedded systems.

For more information, contact: Eric McRae, 360-379-0969. Email: sales@elmi.com. Visit Electro-Logic Machines, Inc. on the World Wide Web at: www.elmi.com/elmi.

Embedded System Products, Inc.

10450 Stancliff Road, Ste. 110
Houston, TX 77099-4336
Telephone: 281-561-9990 or
800-525-4302
Fax: 281-561-9980

Embedded System Products, Inc. produces software for embedded system development, including the RTX* real-time executive (RTOS), XpresNET* TCP/IP communications protocol suites, and the RTEK kernel sold by Motorola. RTX is a full-featured, multitasking, real-time executive that offers designers a source-code included, royalty-free, small, fast, ROMable, and completely configurable operating system solution. Located in Houston, Texas with worldwide sales offices, Embedded System Products, Inc. was founded in 1978 and is privately held. The company is recognized for the quality and robustness of its products. A partner company, A.T. Barrett, provides system development services and can be reached at the same telephone number and address.

For more information, contact: Sales, 800-525-4302. Email: sales@esphou.com. Visit Embedded System Products, Inc. on the World Wide Web at: www.esphou.com.

Enea OSE Systems AB

103 Southwick Court (U.S. Office)
Fletcher, NC 28732
Telephone: 800-369-3632
Fax: 704-687-7025

Enea OSE Systems is a market leader for real-time operating systems and development tools for building safe embedded real-time systems. OSE customers are found within the electronics, telecommunications, industrial automation, automotive, defense, biomedical tech-

nology and consumer electronics industries. Enea OSE Systems is a subsidiary of Enea Data, a Swedish company founded in 1968. Since the beginning, the core of its operation has been the development of time-critical and highly reliable real-time systems, the production of development tools, and the support of real-time applications. Over the years, a number of other activities have been added to the original business, including engineering services such as electronic hardware design and the development of general information systems.

For more information, contact: Bill McCombie, +468-638-5000 (Sweden). Email: info.ose@enea.se. Visit Enea OSE Systems AB on the World Wide Web at: www.enea.se/ose.

Eyring Corporation

6912 South 185 West
Midvale, UT 84047
Telephone: 800 YES PDOS or 801-561-1111
Fax: 801-565-4692

Eyring Corporation, established in 1972, is currently comprised of three divisions: Systems Engineering Group (SEG); Assembly Management Systems (AMS); and System Software Division (SSD). Eyring's System Software Division manufactures and distributes operating systems and development tools for high-performance real-time and embedded systems. In conjunction with the PDOS* and PDOSpro real-time operating systems, Eyring offers an interactive Windows* OS-based integrated development environment that supports C and C++ compilers, debugging tools, and network communications software.

For more information, contact: Clark Roundy, 801-561-1111. Email: pdos-info@eyring.com. Visit Eyring Corporation on the World Wide Web at: www.eyring.com.

HotHaus Technologies Inc.

170-6651 Fraserwood Place
Richmond, B.C., BC V6W 1J3
Telephone: 604-278-4300
Fax: 604-278-4317

HotHaus Technologies is a telecommunications software supplier focused on DSP algorithms for the Texas Instruments line of digital signal processors. The company's HausWare* product family is a suite of embedded DSP algorithms within a multi-tasking, multi-port embedded software framework. Algorithms offered include fax and data modems, vocoders, and general telephony functions. The HausWare architecture ensures that telecommunications product developers need not be well versed in programming DSPs to field successful products. In addition to its line of off-the-shelf software modules, HotHaus also offers both software and hardware consulting services.

For more information, contact: P. Shore, 604-278-4300 x2734. Email: info@hothaus.com. Visit HotHaus Technologies Inc. on the World Wide Web at: www.hothaus.com.

LP Elektronik GmbH

Ettishoferstr. 8
Weingarten, FRG 88250
Telephone: ++751-56122-0
Fax: ++751-56122-22

Founded in 1985, LP-Elektronik GmbH develops, produces and sells real-time extension products for Microsoft's standard operating systems. LP also offers completion of customer-specific projects, software and hardware development, consulting, and training on its products. The company's latest program includes services and consulting related to the Windows CE O.S., PC-Based Control.

For more information, contact: Sales, ++751-56122-15. Email: info@lp-elektronik.com. Visit LP Elektronik GmbH on the World Wide Web at: <http://www.lp-elektronik.com>.

Micro Digital, Inc.

12842 Valley View Street
Garden Grove, CA 92845
Telephone: 714-373-6862
Fax: 714-891-2363

Micro Digital, Inc., a privately held California company was incorporated in 1976 to provide design services to companies producing microprocessor-based products now referred to as "embedded systems." After many years working on diversified embedded system projects, the company in 1988 introduced its "smx*" RTOS kernel or "simple multitasking executive." A real-time multitasking kernel, Micro Digital's smx runs on hundreds of embedded systems around the world. The company continues its focus on supporting Intel Architecture (x86) derivative processors and has recently added support for the PowerPC processor architecture.

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For more information, contact: Betty Martin-Danner, 714-373-6862. Email: ralph@smxinfo.com.
Visit Micro Digital, Inc. on the World Wide Web at: www.smxinfo.com.

Perihelion

The Maltings, Charlton Road
Shepton Mallet, Somerset, England BA4 5QE UK
Telephone: (44) 1749-344345
Fax: (44) 1749-344977

Perihelion is a United Kingdom-based software development company dedicated to the research, design and development of a wide variety of innovative software products. The Information Technology Group specializes in providing skills in consulting -- analysis, design and development skills -- in information management. The Systems Programming Group is responsible for operating systems consultancy, embedded applications development and Perihelion's own real-time operating system, the Helios RTOS.

For more information, contact: Julia Gadd, (44) 1749-344345. Email: sales@perihelion.co.uk
Visit Perihelion on the World Wide Web at: www.perihelion.co.uk.

Spectron Microsystems

315 Bollay Drive
Santa Barbara, CA 93117
Telephone: 805-968-5100
Fax: 805-968-9770

Spectron Microsystems, a Dialogic Company, is a total solutions provider of high-performance system software for digital and native signal processing applications. Spectron, creator of SPOX*, has several real-time operating systems available for most major DSPs and Pentium* processors. Coupled with Spectron's real-time operating systems are libraries, Windows connectivity products, debugging capabilities and real-time software analysis tools that are all tightly integrated with development tools from leading DSP hardware and software suppliers. Spectron offers custom design and services, resulting in a shorter development cycle.

For more information, contact: Shirley Hance, 805-968-5100. Email: info@spectron.com.
Visit Spectron Microsystems on the World Wide Web at: www.spectron.com.

TakeFive Software GmbH

Jakob-Haringer-Strasse 8
Salzburg, A-5020
Telephone: +43 (0) 662-457915-0
Fax: +43 (0) 662-457915-6

TakeFive Software is dedicated to improving the productivity and creativity of programmers and development teams by providing powerful programming environments and tools for managing complex software projects with latest object-oriented technologies. TakeFive Software's open systems strategy frees software developers from project-specific constraints and gives them the flexibility to mix-and-match computing platforms, programming languages and the most appropriate tools while protecting and reusing their companies' capital and skills investments. These benefits become even more important as companies begin to develop across multiple platforms, including a mix of UNIX* and Windows* NT operating systems. Additionally, TakeFive Software offers complete development solutions with software partners, regular training classes, consultancy and technical support via offices and distributors throughout the world. The US-based TakeFive Software, Inc. is located at 20813 Stevens Creek Blvd., Ste. 200, in Cupertino, CA 95014. The US. office telephone number is 800-418-2535 or 408-777-1440, and the fax is 408-777-1444. Email for the US office can be sent to info@takefive.com and the same Web site applies to all TakeFive Software products.

For more information, contact: Andreas Pfeiffer, +43 0 662 456915-0. Email: info@takefive.co.at.
Visit TakeFive Software GmbH on the World Wide Web at: http://www.takefive.com.

Virtual Prototypes Inc. (VPI)

4700 De La Savane, Ste. 300
Montreal, Quebec H4P1T7
Telephone: 514-341-3874
Fax: 514-341-8018

Virtual Prototypes Inc. (VPI) of Montreal, Canada, develops and markets leading-edge commercial-off-the-shelf (COTS) software for the development of real-time Human Machine Interfaces. VPI's customers include more than 400 leaders in the aerospace, automotive, medical, and other high-technology industries in twenty countries. VPI provides complete life-cycle solutions addressing the specification, simulation, development, and training aspects of advanced systems and has built an enviable reputation as an innovator and standard setter. VPI employs 70 R&D, sales, marketing, customer support and administration personnel. Headquartered in Montreal, VPI has offices and distributors throughout the United States, Europe and Asia.

For more information, contact: Paul A. Bennett, 514-341-3874 x 280. Email: sales@VirtualPrototypes.ca.
Visit Virtual Prototypes Inc. (VPI) on the World Wide Web at: http://www.VirtualPrototypes.CA.

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Questions? Email: sara@esofta.com

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To have your company's profile and its products/services published in the next edition of the Embedded Systems Development Directory, this form must be completed and returned to ESOFDA, 7825 E. Gelding Dr., Suite 104, Scottsdale AZ 85253-3415 USA, telephone: (602) 991-4662. Forms may also be faxed to: (602) 951-0720. Inquiries via email may be sent to: sara@esofta.com

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INTERESTED CUSTOMERS SHOULD CONTACT:

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COMPANY PROFILE (100 word maximum. ESOFDA reserves the right to edit copy that exceeds word limit.):

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PRODUCT NAME / DESIGNATION _____

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| <input type="checkbox"/> PowerPC | <input type="checkbox"/> i960 | <input type="checkbox"/> Other Microprocessors (specify) _____ |
| <input type="checkbox"/> MC680x0 | <input type="checkbox"/> Alpha | _____ |
| <input type="checkbox"/> Pentium | <input type="checkbox"/> ColdFire | |
| <input type="checkbox"/> MIPS | <input type="checkbox"/> NEC Vxx | |
| <input type="checkbox"/> SPARC | <input type="checkbox"/> Am29xxx | <input type="checkbox"/> Portable Among Most Microprocessors |
| <input type="checkbox"/> ARM | <input type="checkbox"/> RH32 | |

MICROCONTROLLERS SUPPORTED (Check All That Apply to This Product)

- | | | | |
|---------------------------------|--|-------------------------------------|---|
| <input type="checkbox"/> 8051 | <input type="checkbox"/> 80C251 | <input type="checkbox"/> FR | <input type="checkbox"/> Other Microcontrollers (specify) _____ |
| <input type="checkbox"/> 68HCxx | <input type="checkbox"/> PIC | <input type="checkbox"/> 80C196/296 | |
| <input type="checkbox"/> 683xx | <input type="checkbox"/> Siemens 166/167 | <input type="checkbox"/> ST 9/10 | |
| <input type="checkbox"/> XA | <input type="checkbox"/> M16 | <input type="checkbox"/> TLCS | <input type="checkbox"/> Portable Among Most Microcontrollers |

DSPs SUPPORTED (Check All That Apply to This Product)

- | | | |
|---|---|---|
| <input type="checkbox"/> TMS320Cxx/C54x | <input type="checkbox"/> OAK DSP Core/CWDSP16xx | <input type="checkbox"/> Other DSPs (specify) _____ |
| <input type="checkbox"/> RAD6000 | <input type="checkbox"/> Butterfly BDSP9xxx | |
| <input type="checkbox"/> DSP56xxx/DSP96xx | | |
| <input type="checkbox"/> SHARC/ADSP21xxx | | <input type="checkbox"/> Portable Among Most DSPs |

SOFTWARE PRODUCT CATEGORY (Check The Category That is the Most Inclusive for This Product)

- | | | | |
|---|------------------------------------|---|---|
| <input type="checkbox"/> Full Function RTOS | <input type="checkbox"/> Assembler | <input type="checkbox"/> Generator | <input type="checkbox"/> Other (specify): _____ |
| <input type="checkbox"/> Basic RTOS Kernel | <input type="checkbox"/> Emulator | <input type="checkbox"/> Linker/Locator | |
| <input type="checkbox"/> Integrated Development Environment | <input type="checkbox"/> Debugger | <input type="checkbox"/> Simulator | |
| <input type="checkbox"/> Java Tools | <input type="checkbox"/> Library | <input type="checkbox"/> Driver | <input type="checkbox"/> Applications Software |
| <input type="checkbox"/> Compiler | <input type="checkbox"/> Code | | |

HOST DEVELOPMENT ENVIRONMENT UNIX Windows DOS OTHER: _____

Provide a 50 word technical description of this product:

LOGIC DEVICE PRODUCT INFORMATION

Microprocessors, Microcontrollers, DSPs, Multi-Chip Modules containing CPU (MCMs)

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PRODUCT NUMBER _____ 8-, 12-, 16-, 32-, or 64-bit: _____

PRODUCT CLASSIFICATION (μ P, μ C, DSP or MCM): _____

PRODUCT DESCRIPTION (25 words maximum, please):

COMPANY NAME _____

LISTING SUBMITTED BY (Name, Telephone and email, please) : _____

PRODUCT FAMILY/ SERIES (i.e. Motorola 683xx Series Microprocessors) _____

PRODUCT NUMBER _____ 8-, 12-, 16-, 32-, or 64-bit: _____

PRODUCT CLASSIFICATION (μ P, μ C, DSP or MCM): _____

PRODUCT DESCRIPTION (25 words maximum, please):

Embedded RTOSs Keep Pace With Processing Power

As Embedded Applications Grow In Complexity, Designers Rely On Real-Time Operating Systems

And Integrated Development Tools For 32-Bit Controllers.

GIL BASSAK

Drawn by falling prices for 32-bit embedded controllers and memory, designers are discovering that real-time operating systems (RTOSs) can be a cornerstone for building increasing varieties of complex systems. In particular, the marriage of low-cost, high-performance processing hardware to responsive and reconfigurable software has found wide appeal in the booming field of data communications and telecommunications. And the same formula is proving to be a winning combination wherever companies compete under tight price and time-to-market pressures.

As embedded applications become more complex, RTOS vendors—who see themselves selling reduced time to market more than software—are placing increased emphasis on easy-to-use development tools and even turnkey design services. Moreover, growth in general has served as a wedge into an increasingly segmented arena, slimming the chances for any industry-wide software standardization.

Instead, standards are cropping up within specific applications like telecommunications and network servers. Moreover, for high-end equipment and their relaxed memory constraints, standard tools like the C++ language and standard VME and PC hardware are widespread.

For RTOSs themselves, possibly the closest a vendor has come to a common product is a scalable operating system; that is, one that adapts to a wide range of system and memory requirements. Specifically, Lynx Real-Time Systems Inc. (San Jose, Calif.) introduced the industry's first scalable, multiplatform RTOS. Using

a Web-based browser configuration tool, designers can add Lynx OS Kernel Plug-Ins to scale the RTOS from a 28-kbyte microkernel to a full-featured Unix-compatible system.

What's more, the Web-based tool points to the sudden appeal that the Internet, Intranets, and World Wide Web hold for RTOS software vendors. For designers, the Internet and the Web open up a rich and, where needed, wireless communication link for remote monitoring and diagnostics and information access. Consequently, RTOS vendors are scrambling to add Web, and specifically Java, compatibility to their products.

Although 32-bit processors have always inhabited the embedded processing world, only recently were they considered for anything but the most expensive systems. Today, however, a spate of highly affordable 32-bit processors aimed specifically at embedded systems is giving designers new options.

In particular, devices like Motorola's MPC860 PowerQUICC, which combines a PowerPC core with so-called system integration

and communications processor modules, help designers eliminate blocks of external hardware. "Instead of surrounding an 8- or 16-bit processor with digital-signal-processing hardware," says communications-segment marketing director Dino Brusco of Lynx Real-Time Inc., "you can use a 32-bit processor to eliminate the added hardware."

In this way, he says, one chip can replace a board of logic, yielding significant cost savings. What's more, in the communications field, which draws heavily on embedded processing, the added performance of a 32-bit processor helps products keep pace with increasing data rates. "As communication speeds go up, you can handle faster lines, and more of them, at lower cost," says Brusco.

In addition, although business telecommunications is the largest commercial market for off-the-shelf 32-bit processors running RTOSs (medical and other large systems also are targets but have lower volumes), the past year has seen them emerge in such consumer items as set-top boxes, cellular phones, and entertainment equipment.

Sony's Digital Satellite System is typical of the new generation of equipment resulting from the low price and high performance of 32-bit processors. Indeed, equipment ranging from automobile navigation gear to retail gasoline delivery systems to karaoke machines are exploiting the advantages of 32-bit embedded systems. In short, says David Stepler, vice president of research and development for Santa Clara, Calif.-based Integrated System Inc. (ISI), "Embedded systems are winding up in everything."

For their part, RTOSs play a key

As embedded applications become more complex, RTOS vendors—who see themselves selling reduced time to market more than software—are placing increased emphasis on easy-to-use development tools and even turnkey design services.

role by giving designers the flexibility to do more in software, changing and enhancing designs without modifying hardware. The bottom line payoff is a faster time to market. RTOSs also help meet the time-critical demands of these new applications. For example, "a satellite set-top box must transfer data to the television when it's needed," says Stepner. "It cannot get hung up handling commands from the remote control."

TOOL TIME

At the same time, complex application software and tight time-to-market requirements for these new embedded applications are creating a need for easy-to-use development tools. Although, historically, embedded applications run in relatively limited memory, low-priced memory chips and the spread of embedded applications are forcing designers to rethink this rule. "For many applications, memory size is no longer an issue," says Stepner, "and programs with 500,000 lines of code are not unusual."

To get a grip on these larger programs, RTOS vendors are preparing software development and debugging tools. Wind River Systems, for example, has come out with Tornado, a cross-development environment that runs on Unix- and Windows-based hosts. In addition to the company's VxWorks RTOS and a tool that scales VxWorks to an application, Tornado includes a launcher, C and C++ compilers, a source-level debugger, and a shell interpreter. It accommodates third-party plug-in tools as well, including simulators, compilers, CASE tools, and math libraries. Other vendors also have supplemented their RTOS offerings with integrated toolsets—or plan to soon.

The value of effective, easy-to-use tools can't be overstated; development time and cost are at stake. "Customers are discovering that software development is a primary expense," says Bob Howry, vice president of strategic marketing for Spectron Microsystems, Santa Barbara, Calif. "They are looking for tools to cut the time it takes to get a product out the door."

Ease of use also is important because, in many cases, a customer's

core competence may rest in areas outside of embedded software design. "Those people are nervous about getting into the embedded market because it's highly specialized and events need to be tightly timed," says Larry Heminger, AP Labs' (San Diego, Calif.) business manager for real-time systems.

Thus, to simplify and speed their use, RTOSs and their tools are moving to graphical interaction. "As designers' expectations of how they write software are raised," says Wind River Systems' chairman Jerry Fiddler, "RTOSs have become more graphical to use, more point and shoot." Graphical representations spare designers the trouble of "wandering around lines of code," says Stepner. "If I have a problem, I want tools to run from a graphical to code representations. I don't want to figure out what line in the code is causing the problem."

Since some customers will be new to embedded design and because RTOS vendors commonly position themselves as selling not software, but fast time to market, those vendors are finding new ways to help their customers speed the roll-out of products built around embedded systems. ISI has gone so far as to acquire a design house for building complete products from a customer's specification. Such a move puts the company in the position of offering a continuum of products, from a simple RTOS to a range of software products to a complete design.

AN EXPANDING UNIVERSE

Despite such moves, the widening diversity of products adopting real-

time embedded architectures means RTOS vendors must stretch their product offerings to serve as much of the overall market as possible. For example, as production volumes increase, designers who once used a standard VME single-board computer are likely to seek greater economy by building their own hardware. "That makes it harder for us to deliver turnkey tools," says Wind River's Fiddler. To serve standard and proprietary targets, the company recently moved its tools off the target system to a Unix or PC host.

Even where designers stick with the choice of standard off-the-shelf processor boards, the increased popularity of PC-based systems for embedded applications—prompted partly by the popular PC/104 form factor as well as the ubiquitous desktop PC—has reshaped a landscape dominated by Motorola's 68K processor family. For Jim Ready, chief technical officer for Microtec, Santa Clara, Calif., the PC's presence as an embedded platform has gained enough importance for the company to start a separate business unit.

Consistent with that move, the company earlier this year introduced comprehensive development and real-time software for the 80x86 market. It also invested in software that paves a migration from the 68K family to the increasingly popular PowerPC. "If designers write code that is portable," says Ready, "they need only recompile and relink their 68K application software to be off and running" on the PowerPC.

Nor has Posix evolved into the standard RTOS some have longed for. Indeed, for some, that long-sought hope is best left unrealized. "Posix leaves out the better part of the embedded market," says Bill Lamie, a technical staff member of San Diego-based Nuera Communications. "Anyone doing their own design," he says, "is unlikely to afford the size and complexity of a Unix derivative." What's more, Lamie believes that Windows NT will eventually erode demand for Unix.

Perhaps the closest that RTOS vendors have come to standard software are packages that conform to the specifications defined within particular application areas. For exam-

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ple, Microtec, in alliance with Open Networks Engineering Inc. and DSET Corp., announced a version of its VRTX operating system and C and C++ compilers that conforms to the Telecommunications Management Network. The new software will make it easier for carrier equipment makers to add management functions to their products.

Similarly, Wind River Systems introduced the IxWorks RTOS and corresponding Tornado for the I₂O toolkit for designers working on computers that conform to the emerging I₂O specification. I₂O (for intelligent input/output) spells out a distributed framework for offloading the I/O processing done by servers and other centralized systems handling lots of data. If nothing else, I₂O signals the start of "a merging of the desktop and embedded worlds," says Wind River's Fiddler. "The architecture will eventually migrate to desktop PCs, which will have embedded processors running an RTOS to handle the I/O."

WEB CONNECTION

As with PCs, the operating software for embedded systems has been pulled into orbit around the World Wide Web. Indeed, the Web has captured the imagination of embedded-systems software designers, who see it as an easy, standard way to effect remote diagnostics and control, a convenient graphical interface, and a means to transfer general information.

Consider one scenario painted by Edward Steinfeld, marketing director for Phar Lap Software Inc., Cambridge, Mass., which sells embedded-systems software to medical instrument makers. Equipped with a TCP/IP interface and a small Web server, an embedded device that delivers intravenous fluids to a patient can be monitored remotely by a nurse at his or her station.

But that's just the start. Observers in the hospital's other departments—for instance, the pathology and pharmacology labs—also can keep track of the medication. So can the patient's own doctor, who is able to even change dosages and check vital signs. In short, "when it dawns on users what they can do with Web technology and embedded systems," says Steinfeld, "it's going to change

the way the intelligent machines are made."

To help designers exploit Web technology, the company announced what it claims is the smallest Web server for embedded systems. The package consists of its RealTime ETS Kernel, TCP/IP support, and HTML-On-The-Fly package for converting raw data in HTML code. What's more, other vendors are rapidly incorporating Web technology--servers and browsers--in their RTOS products. For example, ISI added Java and the hypertext transfer protocol (HTTP) to a product family based on its pSOSystem software. Dubbed the pSOS/HTTP server, the new software allows browser access to embedded systems based on the company's pSOS operating system.

Also, Lynx Real-Time Systems, in addition to using the Web to deliver its scalable Kernel Plug-Ins, includes a Web-based browser as part of its development environment. Like other vendors, Lynx Real-Time Systems sees the Web as the foundation for a graphical user interface to embedded applications. With much of the work already done by Web browser makers like Netscape and Microsoft, designers should be able to slap together a sophisticated GUI with just a few HTML pages or a modest amount of Java code.

The Web revolution goes hand-in-hand with wireless technology, says MicroWare's executive vice president, Mike Burgher. Thus, MicroWare Systems Corp., Des Moines, Iowa, licensed Spyglass Inc.'s Web Technology Kit and, earlier, Sun Microsystems's Java programming environment to fold into its OS-9 RTOS product. Focused largely on advanced consumer and communications equipment, Burgher, envisions an explosion of Web-enabled products from televisions and network computers to digital cameras, cellular phones, and two-way pagers. Indeed, the Internet in general and the Web in particular, says Burgher, "have captured the imagination of this industry."

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Reliable Memory Management For Real-time Systems

As 32-bit CPUs proliferate, MMUs are becoming a requirement in real-time applications, both embedded and non-embedded.

BY VIK SOHAL
LYNX REAL-TIME SYSTEMS INC.

Building sophisticated real-time applications these days can be a challenge with the limited memory management schemes offered by many real-time operating systems (RTOSs). As embedded systems step up in complexity, this problem is growing. A solution exists in the form of hardware memory-management support. More and more RTOSs are offering it, and it has already simplified the way in which real-time applications are written.

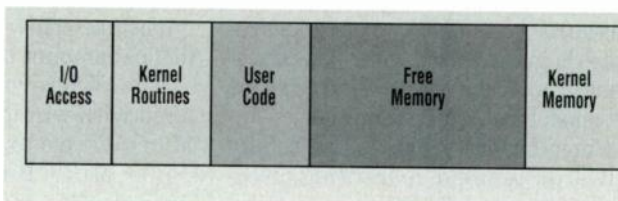
Traditionally, embedded systems have used CPUs without MMUs (memory management units), primarily because applications were simple, and too cost-sensitive to justify the cost of the additional silicon for the MMU. However, as newer embedded systems move to 32-bit CPUs, the MMU is a much smaller part of the cost, and more significantly, the embedded software is becoming much more complex, and is becoming the driving factor. The MMU will become a requirement for software-intensive embedded systems because of the compelling benefits it provides to the embedded software developer and the end user.

In embedded systems built without a hardware MMU, interprocess memory corruption is a very real and sometimes undetectable problem. Most RTOSs designed to work with non-MMU processors load process text and data segments using offset registers for relocation into a flat memory model. This technique works fine until a process accidentally makes a memory reference outside of its designated memory range. Illegal references of this type are generally impossible to trap without special hardware since they may occur any time a process makes a memory reference. In such a system, each

process has a system-wide view of the system's memory that implicitly includes other processes' address mappings.

In this article we will show how support for hardware memory management can be built into an RTOS, and how users can build applications that are more reliable, robust, and better designed in less time. Key in explaining all of this will be an examination of the five major benefits of hardware MMU support:

- Protected address spaces,
- Avoidance of system-wide memory fragmentation,
- Advanced process-specific memory management,
- Paged virtual memory, and
- Dynamic stack and data growth



1. A typical 8-bit CPU memory map is straightforward; memory is clearly allocated to various functions.

As an example of an OS that provides support for hardware memory management, we will use LynxOS, a real-time Unix-compatible Posix OS.

When microprocessors were first used for computer control, the degree of application complexity was quite low. Multitasking was virtually non-existent. Of the situations that did warrant multiple threads of execution, interrupt routines almost always fit the bill. In this environment, 8-bit microprocessors like the 8086, 6502, and 6809 made their debut.

In such a system, there was not really an OS per se (Fig. 1 shows the memory model). The kernel was re-

ally more of a collection of synchronously called routines that manipulated hardware and kept track of various system-specific data structures in a fixed part of memory. Applications did all their own memory management and multitasking, using interrupts directly.

Although in many cases the OS kernel was kept on a ROM, it was still susceptible to corruption through errant accesses into its RAM data area. This made debugging difficult, since memory access could cause problems without the user being able to track down the cause of the failure. The only real way to see all errant accesses in such a system was to use an ICE (in-circuit emulator). ICEs emulated the

CPU and trapped all memory references made by it into a RAM buffer. Unfortunately, emulators for popular CPUs were (and still are) expensive, so their use was not widespread.

The only way to debug these types of systems was to exhaustively analyze exactly how the code was running and try to track down where the illegal access could be made. The situation was complicated by the fact that such errors could occur in the field, where no debugging fixtures (such as the ability to save stack traces and system state dumps) existed. Errors in the field were even harder to track down than those in the development lab.

Like any growing industry, as embedded applications grew, so did their complexity. More and more applications required increasingly so-

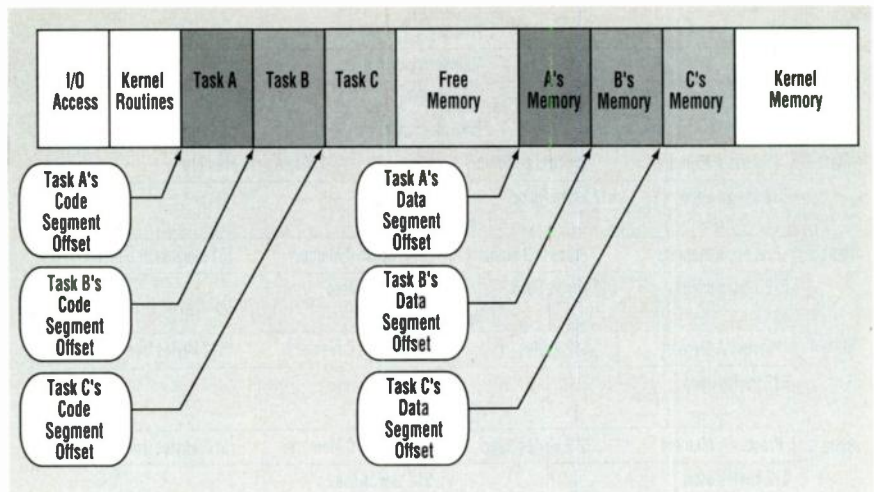
phisticated OS functions such as multitasking and more elaborate memory management. Into this generation of applications came the 68000, 80286, and other CPUs, offering a richer instruction set and even richer memory models. Segmented memory models were the "in thing," to be used in conjunction with multitasking process models (Fig. 2). In such a scheme, offset pointers are used to de-reference both the code and/or data of a particular process. In processors like the 80286, the offset pointers were actually implemented in hardware and were accessed through separate segment registers. Segment registers offered a certain degree of protection, but they were highly inflexible from a dynamic memory allocation standpoint. Managing segments in such a system was very difficult because once established, segment allocations were difficult to change.

Generally, on CPU architectures like the 68000, the flat memory model was used where offset pointers were stored within the information block of each process. These pointers told the CPU where to begin executing the code or where to begin accessing the data for a particular process. Offset pointers did offer one very important advantage: they allowed the code to be located anywhere in memory.

Unfortunately, the code for processes being run in such a scheme required the linker to resolve all internal code constructs like jumps and memory references as indirect offsets off the offset pointer. This complicated the linking and loading of programs, and its static nature also created a large degree of inflexibility in the overall design of such systems.

MEMORY FRAGMENTATION

Another problem that was created at this time involved the issue of managing a pool of user- and system-allocatable memory. With applications becoming more complex, having designers code their own memory-management routines became undesirable. Generalized memory-pool management became a feature required of real-time kernels. To do this, however, it became necessary to consider the issues involved in dynamically allocating and freeing chunks of memory. In a software-



2. In the 16-bit flat memory model, offset pointers are introduced for each of three tasks to de-reference both code and/or data associated with task.

based memory-management scheme, a problem often arises that no amount of clever programming can solve. The problem is that the system's pool of memory becomes fragmented through repeated allocation and de-allocation of randomly sized blocks (Fig. 3).

The diagram in Fig. 3 exhibits the key inflexibility of a purely software-based memory management scheme. All the system's memory is available to any process that requests it in state 1. In state 2, two processes have allocated some memory. The memory management system has accommodated these requests as best it could with the restriction that as much memory be left available for other processes that require it. By state 4, it is impossible to ensure that system memory is contiguous, since the other processes have integrated their allocated memory into their operation. The problem comes to a head in state 5 when a request is made for a memory chunk that is the size of all the free memory in the system. Since this memory is unavailable in a con-

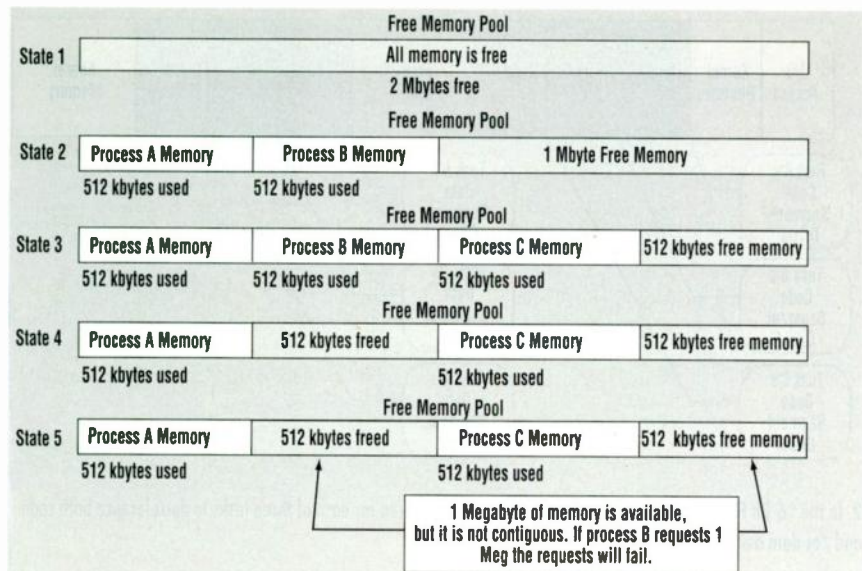
tiguous mode, the request fails.

Overall, although the flat memory model created the basis for future multitasking models, it has problems with allowing multiple processes to protect their respective address spaces as well as the OS's address space. Other problems with inherently dynamic data structures like stacks and trees also made pre-allocation and per-application memory management a must to avoid system-wide memory fragmentation.

Today, things have become quite different indeed. Of all the CPU market segments, the new 32- and 64-bit segments are the fastest growing. The 8- and 16-bit designs are still there, but they are being phased out in favor of the newer 32-bit designs. All of this is happening primarily because of a steady progression in the complexity of new design-ins. Today's applications need not only multitasking, but also much more sophisticated networking, graphics, and interfacing capabilities. Providing these features using the aforementioned memory-management models is simply not possible. What is needed is a new way to manage memory.

When considering the requirements, the first realization that comes to mind in creating a new memory model is that it is impossible to provide the tricky combination of performance, reliability, and robustness through a purely software-based memory-management scheme. Hardware assistance is most definitely a requirement for any new memory-management scheme under consideration.

The MMU will become a requirement for software-intensive embedded systems because of the compelling benefits it provides to the embedded software developer and the end user.



3. System-wide memory fragmentation on a non-MMU system occurs when memory blocks are allocated to particular processes and subsequently released by one of the processes. When an attempt is made to re-allocate a large block of contiguous memory, it will no longer be available because of the segmentation created by earlier allocations. For example, here, memory is allocated in states 2 and 3 and then 512 kbytes are released in state 4. In state 5, it is impossible to allocate 1 Mbyte in contiguous blocks.

Fortunately, special-purpose hardware that suits our purposes has already been designed into virtually every modern 32-bit CPU design in the form of an MMU. MMUs generally implement a form of memory management known as virtual memory.

In a virtual memory system, physical memory is divided into pages of a fixed size, usually around 4096 bytes. These pages are in turn mapped by the MMU into individual virtual-address spaces for each process (Fig. 4). In this system, the virtual-physical relationship between process memory and physical memory is arbitrated by the MMU device. Each process thinks it has access to the system's entire address space, but in fact, it has access to only the portions it requires. This makes linking and loading programs much easier since no relocation needs to be done. All programs are loaded in at the same place relative to each process.

Whenever a process requests a contiguous chunk of memory, the MMU maps pages from anywhere in physical memory straight into the virtual memory of each process, thus creating the impression that the memory for that particular process is contiguous. Since the MMU handles page mapping on a page-by-page ba-

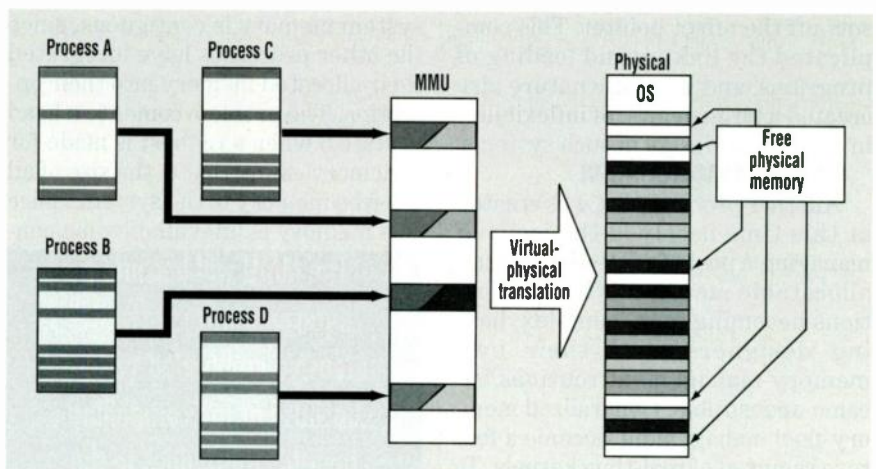
sis, system-wide memory fragmentation is also eliminated. (Actually, fragmentation is limited to inter-page occurrences. You can use only a part of a single page within your process. There is really nothing that can be done about this other than to decrease the physical page size, although, in actual use, this type of fragmentation is not significant.)

Aside from the obvious benefits provided in the area of memory fragmentation avoidance, virtual memory also provides another very im-

portant benefit: per-process address space protection. Each process in a virtual memory system can access only the pages it has been allocated in its virtual space. If an access occurs outside of its allocated pages, it is trapped immediately by the MMU and passed to the OS which can then easily shut down the process without affecting anything else. This feature has many profound implications. For example, processes cannot corrupt other processes or even the OS. For long-term operation, this is a god-send to the real-time embedded world. Often, situations arise within systems that use the flat memory model where an accidental memory access is made to some other process or even to the OS itself. This corruption may not cause the system to fail immediately, but when it does, it is extremely difficult if not impossible to track down.

Virtual memory can also be extended in some interesting ways for environments where system requirements dictate the use of more memory than is physically available. Such situations are surprisingly frequent in today's real-time environments. They can be dealt with through the addition of demand paging to the virtual memory system. Demand paging can be considered to be another subsystem in the memory architecture of a virtual memory system.

In this concept, the idea of breaking up physical memory into pages is elaborated upon through the use of



4. In a virtual memory model, the MMU arbitrates the allocation of memory so that each process thinks it has access to the entire address space, seeing a large virtual memory. The MMU translates this virtual memory by page mapping into the physical memory. Memory fragmentation is largely eliminated, since the MMU handles the page mapping on a page-by-page basis.

external mass storage. When there are no more physical pages left, the MMU generates a page fault informing the OS that the requested physical page is not available. The OS then loads the appropriate page into memory after discarding some other page that has not been used for some time (often, this page isn't even copied back to disk if it hasn't been modified). LynxOS uses a LRU (least recently used) policy to decide which page needs to be discarded from physical memory.

The downside to using paged memory management is the extra overhead that could occur in running programs. Also, how does one keep real-time performance from being affected by swaps out to disk? LynxOS handles all of these problems through the establishment of a paging threshold priority. The threshold priority is configurable by the user upon invocation of the paging system. Basically, any processes or threads that have a priority level higher than the threshold priority will not be swapped out to disk ever.

In addition, LynxOS reserves some memory so that such processes won't fault when performing minor mallocs (memory allocations). Processes and threads that run below the threshold priority can, however, be swapped out to disk. Obviously, one would want to make sure that all the time-critical real-time processing is done by the processes that can't be swapped out

Finally, and most important, enabling swapping under LynxOS does not interfere with the system's worst-case task response time. This is very important, as it allows the simultaneous operation of time critical real-time tasks while at the same time allowing large, complex non-real-time applications like databases and compilers to operate without affecting the real-time response of the whole system.

SYSTEM PERFORMANCE ISSUES

Detractors of the virtual memory model for real-time claim that having a hardware MMU perform translations on each memory access results in overall reduced system performance. Measurements at Lynx Real-Time Systems have determined that using the MMU results in only a 15-

20% memory performance reduction. Although this may seem like a lot, it is insignificant when you consider the influence of another element that now is in virtually all computers—the memory cache. Delays imposed by the memory cache can amount to 200-300% delays in memory access!

To better understand this, consider what memory caches do. The primary purpose of the memory cache is to improve memory performance by taking advantage of the fact that most software makes predominantly localized memory accesses. Normally, more than 90% of memory accesses made by the CPU never even go beyond the cache (actually there are usually two caches: L1 (level 1) and L2 (Level 2); L1 is usually inside the CPU itself, while L2 is usually on the motherboard, and, functionally, L2 usually sits between the MMU and physical memory). This being the case, memory caches are designed using high speed RAM, six to seven times faster than main memory.

The problem occurs when a memory accesses a location that isn't in the cache. The cache then must be loaded with the actual memory from main memory. This can be time-consuming, increasing total access time for that particular access many times. On a non-real-time system, this isn't a problem, but on a real-time system, one needs to know all the worst-case delays in the system. Caches usually compound this problem by randomly imposing a rather large delay in accessing memory. To build a reliable hard real-time system, this delay must be considered and accounted for in the frame time of the processes under consideration.

Through the creative use of hardware MMU facilities, real-time systems can be made more robust, easier to program, and easier to debug than their flat-memory model counterparts. Also, since the world is moving to 32-bit CPUs, MMUs are becoming more ubiquitous and their use will undoubtedly be required for upcoming real-time projects, embedded and non-embedded.

This article originally appeared in the June 24, 1996 issue of ELECTRONIC DESIGN.

Preelaboration in Ada 95

Extending the ADA 95 initial conditional for preelaboration for use in real-systems

Dr. JOYCE TOKAR and TIMOTHY BIRUS

Tartan Inc.

Real-time applications need to be able to use read-only memory (ROM) for both code and data. Code units might consist of initialization or restart routines or simply of fixed algorithms. For data, large constant tables would be a typical use. For these units to be burned into ROM, they must contain no elaboration code. Ada 95 addresses the needs of the real-time community with the introduction of preelaborable library units through the use of pragma *Preelaborate* and with enhancements to the definition of static (see "Defining Preelaboration").

Further refinements are made to the requirements for preelaboration in the systems programming annex to offer additional support for real-time applications. These extensions

to the requirements of preelaborable objects guarantee that there will be no writes to memory after load time for the elaboration of constant objects declared immediately within the declarative region of a preelaborated library package.

The rules specified in Ada 95 address the minimal requirements for preelaboration needed in real-time applications. Many real-time applications place further demands on the support environment to enable the preelaboration of objects that are determined to be constant at compile time or link time. This article examines the Ada 95 preelaboration model. It then presents three common programming paradigms that allow more objects to be preelaborable. Finally, results demonstrat-

ing how these enhancements improve the performance of real-time applications are discussed.

Real-time applications that have limited dynamic memory require additional objects to be preelaborated. The objective is to place all statically (compile-time or link-time) determinable data into ROM to allow units to be restarted without elaboration. The initial condition of these real-time applications is the Ada 95 definition of preelaborable objects. The compiler and linker can determine the static values of some additional objects. The increased scope of values that may be placed in ROM is available due to the late binding of values to objects; post optimization and at link time. The extended definition includes pure functions, link-

DEFINING PREELABORATION

Many embedded applications define large blocks of data whose initial values are known at compile and link time. Since the embedded application needs to be small and fast, no run-time code should be generated for the initialization. Ada 95 recognizes the importance of this and gives users the ability to control their initialization code.

Most languages have the concept of compile-time known values. These are values that can be evaluated at compile-time. There is no need for any code to be generated for them in the application. Ada calls these expressions static. In Ada 83 only scalars were considered static. Ada 95 extends the definition of static to include, among other things, certain scalar and string expressions, pure functions, type conversions on static scalar subtypes, attributes on static types, and subtypes such as *FIRST*, *LAST*, *LENGTH*, and *SIZE*.

Further, the systems programming annex extends the definition to include the attribute *ADDRESS* and *ACCESS* and allocators for an access-to-constant type. All these extensions allow for many more compile-time known values.

Next, Ada 95 defines the concept of a preelaborable object. A preelaborable object is an Ada object whose initial value is a static expression. No run-time code will be generated for the initialization of the object. By extending the definition of static, Ada 95 allows for many more preelaborable objects. Large data objects, which are initialized with pure functions, static expressions, or even other static aggregates (typical in embedded applications), will be preelaborable in Ada 95. No run-time code will be produced for the initialization of the object, resulting in smaller and faster applications when using Ada 95.

Finally, Ada 95 defines a preelaborable unit to be a unit that has only preelaborable objects in it. No run-time code is generated for its initialization. In Ada 95 a user can apply a pragma *preelaborate* to a unit to insist that all unit initialization be done at compile-time. If this can't be done, because of non-preelaborable objects in the unit initialization, a compile-time error is given.

By extending the definition of static, defining a preelaborable object, and allowing users to control initialization code via pragma *preelaborate*, Ada 95 allows for small and fast embedded applications.

time known expressions involving the use of the Address or Access attribute, and some composite objects, and propagated constant objects.

Pure Functions

The code example here (*see listing*) contains two packages from a real-time application containing objects that are candidates for preelaboration. The package `Global_Constant_Data` includes the declaration of a constant table named `Jump_Table`. This table is an array of records that contain the address of a routine, `Proc`, and the parameters for this routine, `Int_Value`, and `Parameter`. The package also includes the definition of a constant record, `Default_Value`. The package `Math_Support` defines a function, `F`, that computes an equation that uses the floating-point parameter and returns the integer result. This is a pure function in that it has no side effects, and it will return the same result every time it is called with the same value. The formula to be computed has been encapsulated into a function to allow it to be modified during development without disrupting the full system.

The function `F` initializes the `Int_Value` component of the `Default_Value` structure. The `Default_Value` object is to be preelaborated in the final system. Hence, the function `F` must be expanded before run time to initialize the `Int_Value` component. This is achieved through the use of the `pragma Inline` and the compiler's inline expansion optimization. The compiler will replace the call to `F` with the encapsulated formula, replacing all occurrences of the formal parameter with the actual parameter. The result is a static expression that can be preelaborated.

The inline expansion optimization allows the definition of preelaborable objects to be extended to include initial values that may be a function call provided that:

The function adheres to the rules of `pragma Pure` described in section 10.2.1 of the Ada 95 Reference Manual.

- The function has a `pragma Inline` applied to it and the body of the function contains only declaration of constants and named numbers.

```
package Math_Support is
  function F(X : in Float) return Integer;
  pragma Inline(F);
end Math_Support;

package body Math_Support is
  PI : constant := 3.14;
  function F(X : in Float) return Integer is
  begin
    return Integer (X + 180.) / PI;
  end F;
end Math_Support;

with System;
with Math_Support; use Math_Support;
package Global_Constant_Data is

  procedure P1 (X : Integer; Y : System.Address);
  procedure P2 (X : Integer; Y : System.Address);

  type Integer_Array is array (1..10) of Integer;

  type Dispatch_Record is record
    Int_Value : Integer;
    Parameter : System.Address;
    Proc      : System.Address;
  end record;

  type Jump_Array is (1..10) of Dispatch_Record;

  Param_Array : Integer_Array;

  Default_Value : constant Dispatch_Record :=
    (Int_Value => F(45.0),
     Parameter => Param_Array'Address,
     Proc      => P1 'Address);

  Jump_Table : constant Jump_Array := Jump_Array'
    (1 => (Int_Value => F(10.25),
          Parameter => Param_Array' Address - 16#1000#,
          Proc      => P2'Address),
     5 => (Int_Value => F(2.348),
          Parameter => Param_Array (5) 'Address,
          Proc      => P2'Address),
     others => Default_Value);
end Global_Constant_Data;
```

- The function contains only null, return, and if statements.

- Expressions within the if statements and return statements can only be references to the formal parameters, other link-time known values (as discussed below), or other pure function calls.

- The return type is an elementary return type.

- The actual parameters are static scalars or link-time known (LTK) expressions.

If the function call satisfies these requirements, then the inline expansion optimization will produce a static result that may be used as a preelaboration value.

Often real-time applications need to perform some arithmetic on a base address to obtain the required address of an object. In the code example, the `Address` attribute is used in expressions to initialize the `Parameter` components of the records in the

`Jump_Table`. It is possible to treat these expressions as compile-time constant values because the values of the expressions will not change during run time. These are examples of LTK expressions. An LTK expression can be determined to have a constant value by the compiler or linker through optimizations and link-time expressions. LTK values will have a constant static value at the point at which the executable program image is created. No elaboration code is generated for these expressions.

The compiler can recognize LTK expressions as constants to be used as initial values for preelaborable constant objects. The compiler must inform the linker of LTK expressions to have the linker generate the appropriate values for the LTK expressions. The linker will see the LTK representations and will calculate the appropriate static values after it has allocated objects to memory.

Prelaborable objects may be initialized with LTK expressions. An LTK expression must satisfy a number of conditions. It is of type System.Address, includes only the predefined operators on type System.Address, and does not raise an exception. Further, it contains only primary values that are one of the following:

- an integer literal,
- a named number,
- the result of the Position, First_Bit, or Last_Bit attribute for a component of a statically constrained record,
- the result of the Size attribute for a statically constrained composite object,
- the result of other LTK expressions, or
- the result of the Address attribute applied to specific entities.

Those specific entities are:

- a variable declared in a package specification or a package body,
- an indexed component of a statically constrained array declared in a package specification or a package body,
- a statically constrained composite object or a component of such an object,
- a subprogram or task, and
- an object with an address clause.

The prelaborable constant record Default_Value is the initial value for some of the components of the Jump_Table array. This type of initialization is very common as it espouses good software engineering principles. For example, if the default initialization value must be changed, it must only be changed in one place, the definition of Default_Value.

The compiler can propagate the prelaborable values in much the same way as named numbers. The prelaborable values derived from LTK expressions and pure functions may be used as initial values for other prelaborable constant objects. The resulting code will not include any run-time code for the initialization of the objects declared with these prelaborable values as initial expressions. All the constant objects declared in the package Global_Constant_Data are prelaborable.

Tartan has implemented these extensions to the definition of prelaboration in its 1750A Ada compiler. This entailed first modifying the

compiler to recognize the Ada 95 definition of static. Then the compiler was revised to accept initial values of prelaborable constant objects as defined in Ada 95. Finally, the compiler was modified to support the three extensions to the definition of prelaborable objects described above: pure functions, link-time known expressions, and the propagation of constant values.

Three real-time applications were compiled with the Ada 95 definition and with the extended definition. The results showed that in addition to the reduction in code size, the elaboration time for these modules, using the prelaboration enhancements, was reduced.

The limited data collected also showed the results of these enhancements can vary greatly. A significant improvement was found in application 1. This embedded application contains large constant tables that are initialized at elaboration time. The initialization of these tables is done via constant scalars or expressions, pure functions, and LTK values. Ada 83 would not consider these tables static. However, with Ada 95 and the extensions described in this article, these tables are prelaborable. As a result, no run-time code is generated for them. This greatly reduces the size of the application.

The improvement of applications 2 and 3 is much smaller. The application contains very few constant data structures initialized at elaboration time. Because there is no chance for these enhancements to occur, the improvement is minor. However, there is still an improvement, basically due to the recognition of LTK values.

Ada 95 provides features that address issues common to embedded applications. As we have shown, the prelaboration features can lead to large improvements in size and speed for these applications. Most applications will see small improvements due to recognition of link-time-known values and pure functions. The greatest improvement will be seen in applications that contain large constant tables.

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A Closer Look at Instruction Set Design

A good instruction set helps ease development, trims code size, and speeds execution, but what does good consist of?

BY JAMES M. SIBIGTROTH
MOTOROLA ADVANCED MICROCONTROLLER DIV.

Any programmer knows a good instruction set simplifies programming, reduces code size, and speeds up execution time. But what makes a good instruction set? This article addresses this question by discussing some of the challenges faced by the designers of the instruction set for Motorola's new M68HC12 family of microcontrollers. The original motivation for designing this new instruction set was to support users of the M68HC11 that are pushing that CPU's upper performance limits in their highest-performance products. This sets the first constraint on the CPU12: it had to accept all M68HC11 source code. Of course, we wanted this new instruction set to be faster so we did not expect CPU12 instructions to be identical cycle by cycle to the M68HC11 instructions.

But we did insist on identical functionality down to the way condition code bits are affected. Most CPU12 instructions even match the M68HC11 object coding, although we did make some changes to the opcode map to improve the indexed addressing mode. Even so, X-indexed instructions with small offsets still produce the same object code as the M68HC11 did, but they execute in fewer cycles on the CPU12.

Once we decided to develop a new instruction set, it was clear that it had to support the modern realities of C programming and larger memory spaces. But the M68HC11 was an extension of the M6801, which was an extension of the original M6800, designed more than 20 years ago. Fortunately we discovered that the original M6800 was a sound foundation for a modern instruction set. We also discovered that what is good for C is also good for assembly-language pro-

grammers so we did not have to trade off one language for the other.

GETTING STARTED

Even before the instruction set work started, we knew we had to change to a newer silicon fabrication process to get the advantages of greater shrink levels (smaller die). And we really wanted to move to a 16-bit bus width if we could do so without losing compatibility with the HC11 instruction set. Typically, 16-bit processors force instructions to be multiples of 16 bits and force them to be aligned to even addresses or suffer a speed penalty. We had to overcome these problems, or we could not have changed to the 16-bit bus width.

An instruction queue was the answer. This instruction queue fetches program information into the system in aligned 16-bit words. The queue has two stages plus a holding buffer that can temporarily hold a third 16-bit word if the queue is not ready to advance when a fetched program word arrives. A block of logic manages an interface to the CPU to present the next three bytes of object code to the CPU at the start of each

instruction. This logic keeps track of instruction alignment. If the current instruction is aligned, the logic presents the high and low bytes of the leading queue word plus the high byte of the second queue word to the CPU. If the current instruction is misaligned, the logic presents the low byte of the leading queue word plus the high and low bytes of the second queue word to the CPU. The CPU is not directly aware of this difference and instructions execute in the same number of CPU cycles regardless of alignment.

This instruction queue provides two important benefits to the CPU12. It allows instructions with an odd number of bytes for more efficient object code (many CPU12 instructions are a single byte). This means smaller program ROM than in typical 16-bit systems. And since the instruction queue makes three bytes of object code available to the CPU at the start of each instruction, execution time is reduced. The HC11 had to fetch each byte of program information as it was needed. A three-byte instruction, like LDAA \$1000, took three cycles just to get the whole instruction into the CPU. In the CPU12, this whole instruction is already in the CPU at the start of the first cycle of the instruction.

INDEXED ADDRESSING

Indexed addressing on the HC11 was pretty good with its ability to use either of two 16-bit index registers plus an 8-bit offset supplied in the instructions. But there were strong requests for enhancement from HC11 users and from C compiler developers. The HC11 users wanted to eliminate the penalty of an extra byte and extra cycle for instructions using the second index

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register (Y). C developers had to have stack pointer addressing and could benefit from the addition of signed offsets, accumulator offsets, and auto increment modes if they could be worked in. The challenge was to find a way to meet all these needs without losing compatibility with the HC11 and without adding too much CPU logic.

An instruction postbyte was the answer. The postbyte includes a two-bit field to select the reference index register (X, Y, SP, or PC). Other bits in this postbyte further classify the type of indexed addressing to be used. Analysis of both assembly language and C programs showed that most indexed instructions use small offsets (0, 1, 2, or 4). The number of occurrences of larger offsets drops off sharply as the offsets get larger. A 5-bit constant offset mode allows the offset to fit into the postbyte so a LDAA 4,X instruction produces two bytes of object code just as it did in the HC11.

By careful arrangement of the encoding scheme for the postbyte, the CPU12 produces the same object code for X-indexed instructions as the HC11 does (for offsets of 0 to 15). Unlike the HC11, the postbyte allows the same two bytes to specify X, Y, SP, or PC as the base reference and the five-bit offset is signed so negative offsets up to -16 can be used.

The new indexed addressing scheme also supports 9- and 16-bit offsets. The 9-bit option includes the sign bit in the postbyte and has one additional byte of object code for the other 8 bits of the offset. This 9-bit signed mode has the same positive offset range as the HC11's 8-bit unsigned offsets. The 16-bit offset mode allows indexed addressing to reach anywhere in the 64-kbyte map of the CPU12. Since the CPU address bus is 16 bits, the 16-bit offset \$FFFF may be thought of as -1 or as +65,535.

The next largest block of postbyte codes is used for a new kind of auto-increment indexed addressing. Some higher performance processors have an indexed addressing mode that automatically adjusts the index register besides performing some other task such as loading a register. This

saves the program space and time it would take to do the index adjustment in separate instructions.

A stack is a perfect example of this operation. The PSHX instruction adjusts the stack pointer to point at the next free location on the stack and stores the content of X to the address pointed to by the stack pointer. This is called a pre-decrement operation. The PULX instruction reverses this process using a post-increment operation to recover the previously saved value from the stack. In a last-used stack like the 68000, pushes use pre-decrement and pulls use post-increment. In a next-available byte stack like the HC11, pushes use a post-decrement and pulls use pre-increment.

The CPU12 extends this idea to expand the ways it can be used to improve code size and execution time. Unlike a stack or previous auto-increment implementations, the CPU12 allows the programmer to specify an adjustment amount that is not implied by the size of the data involved in the instruction. Any value from -8 through +8 may be used, and for the sake of orthogonality, the adjustment can be applied before (pre-) or after (post-) the operation performed by the instruction.

This was intended to improve the efficiency of C compilers for coding of loop counters. We also intended to allow more efficient coding of routines that manipulate small data structures up to eight bytes long.

It had the unintended benefit that many index register adjustments that used to be performed with separate instructions can now be absorbed into a nearby indexed instruction to completely eliminate the cost of the adjustment (code size and exe-

cution time). An optimizer in a C compiler can apply this idea automatically but assembly-language programmers can also use this trick to get smaller, faster code.

The next most requested indexed enhancement was accumulator offsets. This allows the offset to be a program-generated value as opposed to a constant that is set at the time of program assembly. The following HC11 code segment implements a program loop that uses the ABX instruction (add B to X) to approximate the effect of accumulator offset indexing. This code takes 11 bytes of object code and the loop executes in 15 cycles per pass.

```
C6 05 [2] LDAB #$5
CE 10 00 [3] LOOP LDX #$1000
3A [3] ABX
A6 00 [4] LDAA 0,X
| (other code)
5A [2] DECB
26 F7 [3] BNE LOOP
```

The next code segment does the same thing using the CPU12's accumulator offset indexing. The code savings of one byte in this case is not exciting but the loop time is cut from 15 cycles to just 6 cycles. This is partly because the ABX instruction is eliminated and the cycle count for several instructions is smaller on the CPU12. A more subtle but important difference is that the LDX is now outside the loop. The ABX instruction alters X on each loop pass so it needs to be reloaded with the base reference value every time.

```
C6 05 [1] LDAB #$5
CE 10 00 [2] LDX #$1000
CE 10 00 [3] LOOP LDAA B,X
| (other code)
26 F7 [3] DBNE B,LOOP
```

This code example also demonstrates two more subjective aspects of instruction set design. First, since the new CPU12 takes fewer instruction lines it should improve programmer productivity in addition to the speed and code size benefits. Second, the value of individual instructions cannot be measured separately—the whole is more than the sum of the parts. Consider how the instructions LDAA B,X and DBNE B,LOOP are working together. B is both an index offset and the loop counter. The B,X mode of indexing does not, in itself, suggest that B could be anything

Assembly-language programmers can also benefit by studying the ways programming constructs are implemented in C. Many of the techniques can be applied in assembly-language programs.

other than the index offset. But considered in the context of the other instructions in the set, these two instructions can be combined to form a useful higher-level construct.

The CPU12 also supports constant offset and D accumulator offset indexed-indirect modes. Ordinary indexed addressing in the HC11 and CPU12 is equivalent to register-indirect addressing in a register-based architecture. Indexed-indirect addressing in the CPU12 has a second level of indirection. First the index register points to memory where a second pointer is stored. This second pointer is fetched and used as the address of the actual operand for the instruction. This is very useful in implementing C pointers.

BANK SWITCHING

Many modern embedded-control applications have grown beyond the 64-kbyte limit of the original M6800. At the time the M6800 was developed, an 8-kbyte program was considered huge. Bank switching schemes can extend the available program space, but these systems typically require a lot of extra programming effort and extra logic. On the plus side, bank switching is compatible with processors like the HC11 and can be code size efficient compared to large linear address space architectures like the 68000. In a machine with 24 address lines, it takes an extra byte to express the absolute address of any operand location. While this approach is conceptually simpler to use than a bank select scheme, it costs a lot in program size, which is a big negative for most embedded control applications.

The HC12 strikes a compromise by adding two new instructions and on-chip address management logic. The instructions overcome the biggest programming difficulties of bank switching and the on-chip logic takes care of the hardware designer's difficulties. The result is an efficient system that is simple to use.

The CALL instruction can be thought of as a jump to subroutine (JSR) long instruction. The bank select register (PPAGE) is saved on the stack along with the 16-bit return address, and a new destination page value is written to the PPAGE register before jumping to the subroutine.

A return from call (RTC) instruction reverses the process to restore the old bank number during the return. This eliminates two programming problems associated with bank switching.

The first problem has to do with interrupts. If an interrupt were allowed in the middle of changing banks, and the interrupt service routine modified the bank number you were dead. Since CALL and RTC perform the entire bank change sequence within an uninterruptible instruction, there is no need to disable interrupts during the switch. Not only is this faster, it does not extend the worst case interrupt latency to the time it takes to disable interrupts, change banks, and re-enable interrupts with an instruction sequence.

The second problem with traditional bank switch systems is that you cannot perform the switch with instructions that are in the banked space. If you try, the program you were executing is replaced with the program in a different bank as soon as the new bank value is written. Right in the middle of executing one program the CPU suddenly finds itself in the middle of a different program. Most programmers consider this bad. The old way to avoid this was to jump to a routine in unbanked space to perform the switch sequence (extra instructions). In the CPU12, the CALL instruction provides the new bank number and a new address within the CPU's 64k address space. So you can execute the CALL from anywhere, including from one bank to another.

The programmer or linker still needs to split the program up into segments that fit into a bank but switching among banks is now greatly simplified. Since CALL and RTC use an extra byte of stack compared to JSR and RTS, it is still a good idea to place the most frequently used subroutines in an unbanked memory space. But this isn't as critical on the HC12 because CALL and RTC are so much more efficient than the complex page switch sequence used in older bank switched systems.

The CPU sees only a 64-kbyte space. A 16k block from \$8000

through \$BFFF is considered to be a window into the expanded memory space. When an access is made to this 16k block, on-chip logic combines address lines A13-A0 with the current value in an 8-bit PPAGE register (the current bank number) to form a 22-bit address on external address lines A21-A0. This allows paged access to 256 pages of 16 kbytes each for a total of 4 megabytes plus the 48 kbytes that fall outside the 16k bank window. The PPAGE register is accessible like any other control register or memory location. In addition, the CPU can access this register directly through CALL and RTC without knowing its address in the memory map. This is important because registers are not always located in the same place on different derivatives in the M68HC12 family.

To connect a large program memory to the HC12, a hardware designer just connects all the address lines plus a Chip Select. The Chip Select is also implemented in on-chip logic. Several control bits allow the Chip Selects to be set up for a variety of system arrangements.

PUTTING THE MOVES ON

Accumulator-based architectures like the HC11 are sometimes criticized as having an accumulator bottleneck compared to register-based architectures like the 68000. On the other hand, the HC05's accumulator architecture is extremely successful because of its small size. In the smaller applications where the M68HC05 is used, the extra area for a CPU with a large set of general purpose registers cannot be justified. If you try to apply the HC05 to an application that needs a lot of CPU performance for complex programs, the single accumulator does show up as a limiting factor.

The HC11 is also an accumulator-based architecture but it has two accumulators and two 16-bit index registers. This goes a long way toward reducing any bottleneck. Still there are times when programmers wish they didn't have to save a register to the stack to free it up for some simple task.

In the CPU12 we looked for ways to improve performance while keeping the same programmer's model as the HC11. Byte and word, memory-

to-memory moves were added. This means many tasks that used to require a register as a transport mechanism can now be handled without disturbing the content of any CPU registers.

Thanks to the redesigned indexed addressing mode, it was a comparatively easy job to provide completely general moves where any sensible combination of immediate, extended, or indexed addressing can be used for the source and destination. (It doesn't make sense to use immediate addressing mode for a destination.) Since the indexed postbyte controls whether X, Y, SP, or PC is used as the index reference, the CPU12 did not require a large set of separate opcodes to handle all the combinations.

INDEXED VARIATIONS LIMITED

Only six opcodes are needed for byte moves and six for word moves. To keep the logic small, the indexed variations were limited to the modes that could be specified in the postbyte without extension bytes, and indexed indirect modes are not supported. This still leaves the five-bit constant offsets, accumulator offsets, and auto increment modes. As an example of the power of the move instructions, the following code segment implements a block move. Index register X is a pointer to an array of seventeen 8-byte data structures. Index register Y points to a destination array of seventeen 16-bit values.

The object of the block move is to collect the second 16-bit element from each data structure into the destination array in another area of memory. The MOVW indexed-to-indexed instruction is used. The source operand is specified by 8,X+, which loads the source operand into the CPU and then post-increments X by eight to point at the next data structure in the source array. The destination operand uses 2,Y+ to store the operand to the destination array and point to the next location in that array.

```
C6 11 [1] LDAB #17
1A 02 [2] LEAX 2,X ;point
to 2nd word in record
18 02 37 71 [5] LOOP MOVW
8,X+,2,Y+
26 F7 [3] DBNE B,LOOP
Besides the indexing and memory
```

expansion aspects described in this article, the CPU12 has long branches, a universal transfer/exchange instruction that works with any combination of CPU registers, fast extended math instructions, and even a new set of fuzzy logic instructions. Even with all these additions the CPU12 can execute all M6800, M6801, and M68HC11 instructions. This is a credit to the original 6800 architects. They defined a solid basic instruction set that still performs well as the foundation for the CPU12 instruction set more than 20 years later.

The CPU12 shows that you don't have to give up compatibility with a previous CPU to meet the needs of modern applications. Even though the CPU12 added many new modes to indexed addressing, it is still compatible with the HC11. The CALL/RTC mechanism is a good alternative to the more radical approach of changing to a new architecture to obtain a wider address bus. Although the wider address sounds like a good idea, it actually increases memory requirements.

This wasn't a complete description of the new CPU12 instruction set, but it does give useful insight into the way instruction sets influence the programmers work and results. Some engineers thought programming in the C language would relieve them of concerns about the detailed architecture of the target CPU (let the compiler worry about that). But the reality is that if code size or execution speed are important, you should not ignore the architecture of the CPU. You must study it and use C-language coding practices that take advantage of architectural strengths and avoid the limitations of the underlying CPU.

The code generated by the C compiler should also be studied to make sure it is taking full advantage of the target CPU. Assembly-language programmers can also benefit by studying the ways programming constructs are implemented in C. Many of the techniques can be applied in assembly-language programs.

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Low-Power System Design: Selecting The Right μ P

Here Are Some Simple Suggestions That Will Take The Guesswork Out Of Determining The Trade-offs For Your Next Design.

J.S. HOLMES, Boehringer Mannheim Corp., 9115 Hague Rd., Indianapolis, IN 46250; (317) 576-7584.
E-mail: jay_holmes@bmc.corange.com

Over the last 15 years, microprocessors (μ P) and microcontrollers have proliferated and found their way into many products. Today, μ Ps can be seen embedded within refrigerators, engines, ovens, glucose meters, CD players, pocket pagers, cell phones, and so on. Many of these devices operate on either rechargeable or primary batteries.

Potential buyers often make evaluations based on the number of hours of use they can get between battery changes or charges. These same consumers, however, will also form opinions based on the flexibility and functionality of the product they have purchased. A key factor affecting both the battery life and the performance of many products is the type and speed of their embedded microprocessors.

To get a practical understanding of the trade-off process involved in microprocessor selection, this article will take a close look at the methods used in a recent project (the Accu-

ata GTS system) which was developed at Boehringer Mannheim Corp. This methodical evaluation includes the definition of requirements, the development of a power budget, and the preparation of a requirements specification sheet. Only when these steps are complete, can there be a final selection of an appropriate processor chip.

At the beginning of a new development project, the system requirements are written into a system specification that can be used as a guide for the design team during the product design cycle. One of the first tasks the design team will undertake is selecting a μ P. This activity can be formidable¹ when the only considerations are cost and performance. But, when the problems of power consumption for battery operation are considered, it can be overwhelming.

DEFINING REQUIREMENTS

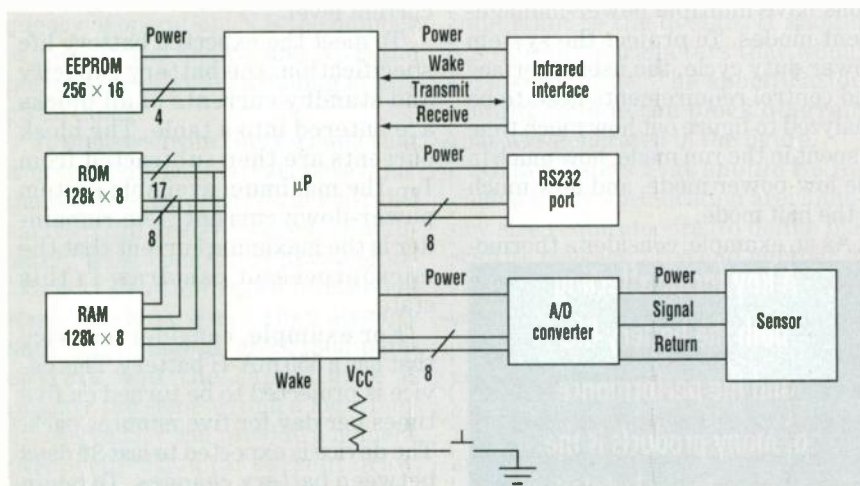
One of the most important criteria for selecting a microprocessor is the μ P type. There are three main

groups that microprocessors fall into:² microprocessor units (MPUs), digital signal processors (DSPs), and application specific integrated circuits (ASICs). Each of these categories has several subcategories (embedded controllers, RISC processors, etc.).

Normally, μ P type will not be explicitly described in the system specification: it will usually be implied. For instance, a system that is described as a new type of PC in the system specification would require a microprocessor that had a rich set of data manipulation instructions, a wide data bus, and so on. A new and improved CD player, however, might require a digital signal processor in order to accurately read the data from the musical CD.

Whether the system requires a 32-bit RISC processor or a 4-bit embedded controller, the specification is the resource that will provide information to the designers that will allow them to determine the type of microprocessor required.

Once the microprocessor type is defined, the design team will make an estimate of the memory requirements. This space complexity estimate requires consideration of the specified data and control flows, user interface tasks, μ P word size, μ P register complement, instruction set, address capacity, addressing modes, stack, and languages to be supported.³ Oftentimes, especially in embedded-control applications, this can be the most difficult part of the specification process. Underestimating the memory requirements can cause major delays and cost overruns toward the end of the project. Therefore, enough time should be spent on this activity to produce a high level of



This example block diagram illustrates the typical system functions taken into account when selecting a low-power microprocessor. Besides helping designers determine processor package size, the diagram also comes in handy when calculating the system power budget.

specified at a frequency of operation. The latter is sometimes given in the

such as high-level-language support, and emulator and simulator require-

vendors. These parts can then be compared to the requirements data

sheet and the most desirable component selected from the choices.

When making the final selection, there is one area of caution which the designer must be aware of. Time should be spent evaluating the business practices of the vendor (responsiveness to customer inquiries, availability of training, willingness to expedite parts when necessary, etc.). This simple consideration could cause the design team to select a less than optimum part, but it will make management of the project somewhat easier.

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Advanced Software Tools Narrow The Prototyping-Implementation Gap

Developing complex algorithms for embedded systems requires experimentation and simulation. New development tools are helping engineers turn their ideas into code.

RANDY CONK, 9 Hawthorne Pl. #7M, Boston, MA 02114.

The majority of embedded systems developed today operate at higher degrees of complexity and include more mixed-signal circuits than ever before. Engineers of these systems have been struggling to balance the time-consuming, labor-intensive process of system-level design and languages such as C and C++ with the pressure to reduce cycle time. Generally, C and C++ are used for the speed at which the code is executed, as well as for the freedom they allow for implementing almost an unlimited number of data structure types. C and C++ also have been around for a long time and are now ANSI standards. Yet these languages can be tedious for new designers and for exploring multiple conceptual ideas in a design cycle. What is needed for concept and architectural testing is a simple and powerful way to implement ideas quickly in software while still being able to view results in a reasonable amount of time.

Many companies require software tools that enable engineers to manipulate and analyze complex mathematical computations and algorithms while presenting the results in an easy-to-inter-

preting form. Aerospace companies testing the control systems of airplanes rely on such software as heavily as communications companies de-

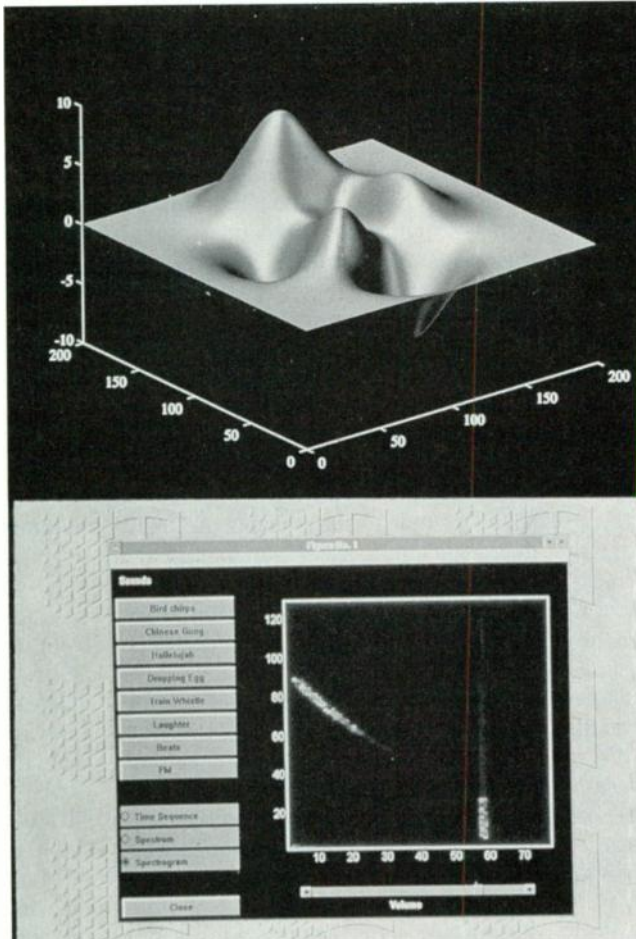
veloping handheld devices do. These tools are often used to speed the processes of designing analog circuits and system-level architectures. Such tools also have been used to simulate complete systems in ways

that were not available with conventional tools, such as in bit-error rate (BER) testing. The tools that are used surpass the capabilities offered by more general languages, both in features and in ease-of-use. Furthermore, they add value to the design process by allowing engineers to easily integrate their results with C and C++ code and ultimately to complete product design and prototyping within a single environment.

Doing It The Old Way

Before software tools for algorithm development became available, engineers often resorted to one of two approaches. They developed algorithms within an interactive environment, and then manually translated their work into C or some other language for implementation. Some of these interactive environments provided flexibility but lacked the power and speed of other languages.

Generally, these tools were not integrated with the rest of the development process. In essence, engineers were required to do their work using two or more different programs that did not speak to one another. This process of transferring the output between developing systems was not only time-consuming, but also error-prone. Alternatively, engineers developed their algorithms using a compiled lan-



1. The visualization features of MATLAB include the ability to graph pre- functions in 3D (top). Here, a function of two variables is rendered using Gouraud shading and multiple light sources. The bottom display shows an audio spectrogram of a dropping egg. MATLAB provides a GUI that lets the end-user choose from several operations to perform on selected waveforms.

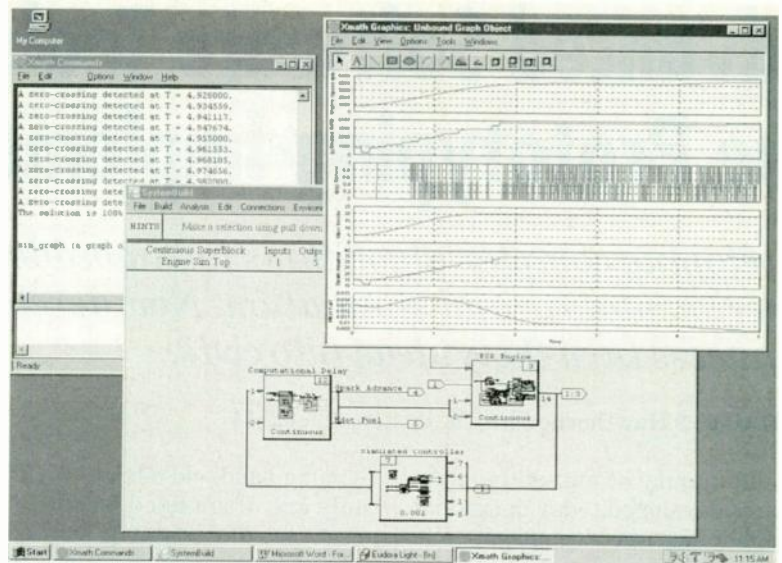
guage such as C, C++, and FORTRAN. This compiled-language approach removed the need for translation for implementation, but lacked the interactivity, graphics, and computational core provided by other software packages, thus limiting the opportunity for efficient problem-solving.

In the digital design world, high-level languages have been widely available for years, the two most common being Verilog and VHDL. Many digital designers have used these languages and software synthesis tools to develop actual circuits. However, these languages help only the electronic digital design community. When it comes to analog, mixed-signal, or system design, the utility of these languages drops off. Many creative engineers have used C and now C++ to model system-level circuit designs. However, this approach still has the disadvantage of constantly having to deal with the intricacies of the programming language rather than the system design. Both C and C++ leave the designer with a large initial learning curve, a limited library of functions and constant concern with how to code the design in C or C++ instead of how to implement the design itself. In other words, the language gets in the way of solving the problem.

Dealing With The Issues

Initially, when attempting to use C or C++, the designer needs to spend a large amount of time up front to understand the structure and commands of either language. Pointers and memory management have been known to bog the new users down to a point of extreme frustration in implementing a new data structure. A new user of C and C++ also must deal with the variable, function and class scope issue. The designer must ask: Did I include the correct file? Am I linking with the correct library? To a new C or C++ programmer, developing a program that works is an accomplishment. Experimenting with multiple system-level design architectures quickly and easily is unthinkable.

Having successfully tunneled through the initial learning curve, the next concern for a design engineer is the lack of standard library functions for both C and C++. More often than not, C and C++ programmers spend a fair amount of time creating functions



2. Functional blocks can be connected by users building embedded control systems with the MATRIXx SystemBuild facility. Here, the MATRIXx Xmath and SystemBuild tools display the results of a simulation. Using simulation, such a system can be evaluated and optimized prior to generating code.

and/or classes which implement tasks such as calculating an FFT, printing a form, or plotting a result. Classes and functions can be found or sometimes bought to help reduce the need for home-grown code. Here, once again, the designer is distracted from the real issue at hand. When designing a circuit or system, the designer is forced to consider issues like which functions to implement and how to view the results.

After all is said and done, and the designer has learned C or C++, has built the additional libraries, and implemented a method for viewing the results, one more issue remains: Actually using the language. When using C or C++, the designer, at times, is more focused on the language than the problem at hand. For instance, the designer may ask: Should this variable be a double or a float? Should a new class for this structure be created, or is there an easier method? Pointer errors and memory leakage problems cause designers to completely focus on the code and language implementation rather than the design to be done. C and C++ also have inherent problems when the designer tries to rip out part of the design and simulate it without having to modify code. This task usually requires writing special test code and hooking it into the code to be modified.

What is needed is a programming and simulation environment that lets

the system design engineer easily program and try out new system architectures without having to fight the programming language or spend weeks learning its intricacies. Once you have made the decision to use an advanced development tool, rather than just C/C++, you next have to decide which tool, or collection of tools, you want to use. Of course, that decision centers on what you are trying to build.

Some engineers want to develop device-level algorithms; others want to develop a system that may incorporate algorithms, but which also has an overall functional architecture showing how the various devices work together. Tools like MATLAB from The Math Works of Natick, Mass., and MATRIXx from Integrated Systems, Sunnyvale, Calif., offer fourth-generation languages (4GLs) for defining algorithms. They also offer block-level modeling tools for describing system architectures. The 4GLs let you define algorithms relatively quickly, without all the headaches of C/C++. The block-level modeling tools (Simulink, in the case of MATLAB; System Build in the case of MATRIXx) let you model the architectures by drawing blocks representing various devices and software components and viewing the corresponding outputs and inputs among them (see "The Power Of 4GLs: A Case Study").

The Power Of 4GLs: A Case Study

A handful of leading-edge organizations have found a solution to the C and C++ language problem: One major communications company, for example, concerned with losing valuable time and R&D engineers to the programming learning curve, is using advanced front-end application development tools that incorporate math, graphics, GUIs, and specialized functions that enable engineers to focus on the engineering task at hand, rather than on the intricacies of programming languages.

In designing local-area network transceivers, the engineers have been able to simplify, hasten, and improve the integration between architectural analysis and design by implementing their system-level simulations using the language provided within the MATLAB framework. In designing the transceivers, engineers depend upon the software to characterize how a signal travels down varying lengths of cable, to design the equalizer, and to test the product's different architectures for adaptation to varying conditions.

In the latter of these processes, the engineers needed to develop algorithms to simulate system behavior to make judgments about the feasibility and effectiveness of a particular architecture. To simulate the system within a reasonable time frame, the MATLAB compiler was used to auto-translate MATLAB programs into C code, which was then integrated into the original environment. This allowed the engineers to simulate more conditions and architectures than would otherwise have been possible without the speed of compiled code. Without the compiler, the engineers would still be simulating today. It greatly altered the engineers' end-result product because it sped up the design process to a point where they had the freedom to explore areas they otherwise couldn't have touched.

Until now, the use of compiled C code for system-level simulations has been limited to those few with the ability to learn C and create the code necessary to define the system. Engineers have not been given sufficient freedom to easily change code in an effort to explore architectural differences of solutions.

It also is important to recognize that while tools like MATLAB and MATRIXx can model the behavior of algorithms, they cannot model the actual implementation of algorithms into circuits. For that you might need a tool like Spice, a common industry standard for designing analog and digital circuits at the transistor level. Unfortunately, for large circuits, Spice simulations take far too long to execute. This is where analog behavior simulators are becoming more attractive. For example, SABER, from Analogy Inc., is a tool for exploiting Analog Hardware Description Languages (AHDL) and behavioral modeling in circuit simulation.

With SABER's modeling capability, transistor-level circuits can be modeled in a way to maintain the electrical integrity of the designs (i.e., models do not violate Kirchoff's laws concerning current and voltage) while still maintaining simulation speeds that execute much faster than SPICE. Together,

Spice and SABER can be used to create accurate, fast simulations of large circuits which have already been shown to work functionally in MATLAB or MATRIXx.

It also is important for embedded system engineers to realize that just because a product lets you do math on a computer screen or generate graphs from numeric inputs, doesn't necessarily make the product ideal for embedded systems programming. Two examples of products that provide very complex mathematics and graphing yet address different needs are MathCAD from MathSoft, Cambridge, Mass., and Mathematica, Wolfram Research, Champaign, Ill.

The applications that are addressed by these products just don't happen to be embedded-systems programming. MathCAD, for example, is oriented toward teaching math and doing math in a scratch-pad or white-board-type environment. MathSoft describes MathCAD as a "graphing

calculator, a math-smart word processor, and an interactive encyclopedia." MathCAD may be effective for users who want to solve complex math problems and arrive at a numeric result. However, it does not provide a programming and systems modeling environment. Embedded systems people aren't looking to simply replace their calculators and drafting paper. They're looking to replace C, C++ and Fortran.

What MathCAD does for numeric computation, Mathematica does for symbolic computation, including graphing. Mathematica provides a white-board type environment, but this time, the white board is meant to reduce complex mathematical formulas to simple ones (the way a board full of equations reduces to $E = MC^2$). But what MATLAB and MATRIXx provide is the ability to easily commit mathematics to external hardware.

One reason for using tools like MATLAB or MATRIXx is that they allow users to try ideas quickly without going through all the steps of creating a real circuit. Another is that they let you quickly develop algorithms that can be implemented and run as C/C++ programs in a computer. The question, "How quickly?" is often the basic measure that helps you decide which tool to use. There are several factors involved, including:

- Can the models be converted into C/C++? If a C/C++ program is what you are after, then the fastest way to get there from a 4GL is to have a compiler that translates the 4GL code directly to C/C++. The MATLAB programming language produces files called M files that can be executed in MATLAB. There is a code generator that can translate Mex files into C/C++ source code. MATRIXx has a code generator called AutoCode that produces C or Ada source code from functional blocks in its SystemBuild facility. SystemBuild lets users graphically connect functional blocks to design control systems and other embedded applications.

- Does the environment support interactive analysis of the model? In other words, once you build the model, can you feed it data and view the results? Can the way results are presented be manipulated by the user through the tool's graphical user interface (GUI) while the model is "on?"

This capability can go well beyond simply having access to a previously built plotting function or a plotting program. MATLAB and MATRIXx, for example, offer powerful object-oriented 2D and 3D graphics that support visual data analysis (Fig. 1). Users can create color graphics with modern 3D features, such as surface rendering, wire frame, pseudocolor, light sources, 3D contour, animation, and more.

•Does the tool offer application-specific extensions? An application-specific extension, called a tool box in MATLAB, supplies pre-defined functions, icons, graphs and other objects that are useful to an engineer working in a specific area. An inference viewer taken from MATLAB's Fuzzy Logic Tool Box, for example, can display the relationship between membership functions and decision rules. Other MATLAB tool boxes cover such areas as wavelets, digital signal processing, and statistics.

MATRIXx offers extensions (called modules) in areas that include signal processing, interactive system identification, and interactive control design. Such specialized tools are a major time-saver, not only compared to C/C++, but also compared to developing in an advanced environment that lacks these tools. Perhaps the most important advantage of an application-specific extension is that it gives the engineer-user instant access to the best insights of the world's leading experts in that particular field of engineering. Not only does the engineer not have to reinvent the wheel, he or she can have the best wheel available.

•Does the tool come with productivity tools for the developer? Other features that reduce the time and increase the quality of the modeling include things like a GUI builder, a performance profiler, and a GUI-based debugger. Even with a 4GL, describing how a GUI works can be an arduous task in a procedural language. A GUI builder provides pre-built objects that the engineer can select from to create a graphical user interface. A performance profiler gives line-by-line feedback about the execution time of a function. This gives you insight into which sections of code might benefit from further optimization, allowing you to increase the overall execution speed of the routine (Fig. 2). A GUI-based debugger, as the name implies, is a debugger that employs a graphical

user interface to highlight and manipulate program text needing rework — making fixes easier to do than when working in a text-only mode.

•Can the model be easily ported to new platforms? A portable model doesn't just mean, "Is the C/C++ code generated ANSI standard?" It also means "Can the resulting code be embedded within other applications developed outside the modeling environment?" That requires not just an ANSI standard compiler, but also the ability to call and be called by external code. Some applications also may require the visualization engine itself to be embeddable within an external application's runtime environment. In the case of MATLAB, for example, you may want to use some of that tool's graphics capabilities in your finished application's output — rather than having to create your own graphics output engine by writing your own C/C++ programs. For embedded applications, the MATRIXx AutoCode

**Developers should be
looking for real power
tools that can help them
see their application's
potential more clearly.**

tool allows you to create different templates so that the same model can generate code for multiple hardware platforms. Another aspect of portability concerns compatibility with other tools. Moving a functionally modeled circuit from MATLAB or MATRIXx to SABER, for example, for circuit-level modeling is facilitated by the integration of the products.

Clearly, developers should expect more than the basics when evaluating development environments. In the race to market, it is no longer enough just to leapfrog developers who think they have to hand code everything in C/C++. These days, developers should be looking for real power tools that can help them see their application's potential more clearly and realize that potential more quickly and more accurately.

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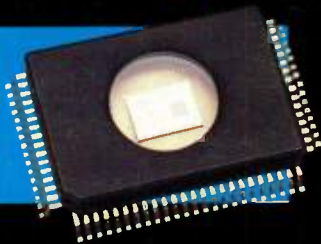
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