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Wind River ICE

Wind River ICE, previously known as Wind Power ICE, is a feature-rich debugging tool with broad processor and target operating system support that enables users to accelerate the hardware and software development process.

This tool provides true multicore debugging support for multiple JTAG, EJTAG, and BDM devices on a single scan chain, and it can support connections for up to eight devices simultaneously in a scan chain of up to 128 individual JTAG devices. Wind River ICE is a network-based emulator that supports 10/100 Ethernet communications to the host PC.

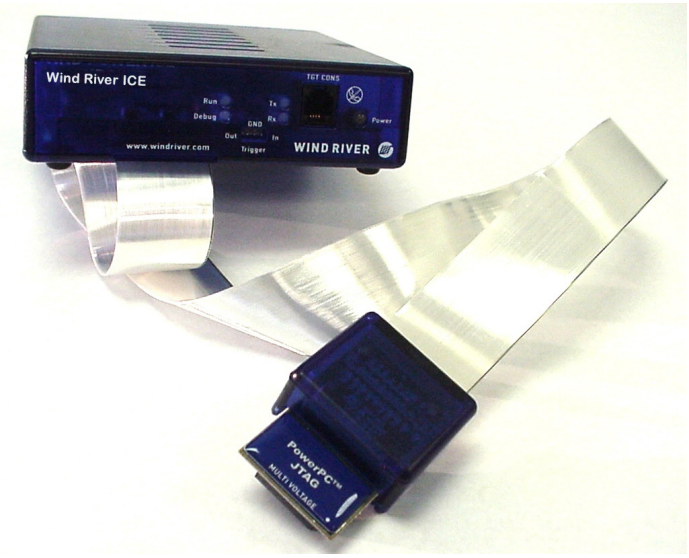


Figure 1: Wind River ICE

Wind River ICE features Wind River's JTAG Server technology, which allows developers to:

- Access a single device on the scan chain, or multiple devices simultaneously to provide synchronous start and stop
- Set breakpoints within a single microprocessor to halt the execution of multiple microprocessors
- Make JTAG debugging connections to many microprocessors, regardless of their architecture
- Establish and remove connections without affecting any microprocessor or device on the scan chain

Wind River ICE offers the ability to support remote debugging, a development environment in which your device and/or emulator are not located next to your desktop environment. With Wind River ICE, your device can be located anywhere, as long as you can connect to it via the Internet. With its target console port, Wind River ICE supports remote debugging by allowing developers to backhaul the serial output port of the target device via an Ethernet connection.

Wind River ICE is a scalable solution that enables developers to add capabilities, such as Trace support, through a simple plug-in module. This tool also provides a broad range of processor support, with easy migration from one processor family to another via an interchangeable adapter located at the end of the emulator's target connection cable.

Benefits

- Single emulator can be used to debug multiple processors, providing true multicore capability
  - Debugs complex multiprocessor systems with one development environment cockpit
  - Enables savings in tools investment: One hardware device can support multiple devices on a scan chain
  - Supports simultaneous access to eight JTAG devices from 128 possible devices in a scan chain
  - Provides simultaneous support for homogenous or heterogeneous microprocessor architectures
- Single emulator can be used across the entire development team
  - Can be used in any or all projects in your development team, facilitating collaboration across the team and enterprise
  - Broad support for processors and operating systems
    - ARM, ColdFire, MIPS, PowerPC, and XScale
    - VxWorks, Linux, ThreadX, and others
- Scalability protects your initial hardware investment
  - Supports internal trace buffering for PowerPC and XScale processors that support this technology with no additional hardware
  - Supports external trace buffering for PowerPC and CF processors that support this technology with the addition of Wind River Trace
- Provides leading download speeds and flexibility in the development environment
  - Supports 10/100 Ethernet connection
  - Can be remotely located and accessed via internal IP network and/or the Internet

- Integrated with the industry's leading development suite and debugging tools
  - Wind River Workbench
  - visionCLICK
  - Wind River OCD Utility

Features

Wind River ICE lets you control a target by using the on-chip debugging (OCD) services embedded in the microprocessor of that target. It operates effectively as a stand-alone system, communicating with the OCD services resident in the microcode of the chip.

When accessed, the OCD services in the chip provide complete control of the microprocessor. All interaction between Wind River ICE and the target runs exclusively through the OCD connection, so the emulation system is effective for the entire development process, even before board-level peripherals are stable.

Wind River ICE includes full high-speed Ethernet support, as well as networking support for shared and remote debugging. It includes the following features:

Multicore Debugging

Wind River ICE SX enables users to debug multiple devices on a scan chain using JTAG Server. Several commands have been implemented that let you initialize multiple processors and start and stop all devices simultaneously, so multiple debug sessions can be active at once.

JTAG Server

The Wind River ICE SX JTAG Server provides the ability to control and manipulate multiple devices on a single scan chain ring. JTAG Server is a single development tool that can access any device on the scan chain ring. FPGAs, EPLDs, and other programmable devices can be loaded, eliminating the need for multiple device programmers and emulation hardware.

High-Performance JTAG

Eliminates slow download times and run-control when developing with OCD microprocessors. Performance is improved due to hardware logic that caches common JTAG scan chains.

High-Speed Ethernet Connection

Provides download speeds of up to 100KB per second, depending on the target. This is considerably faster than many other available products.

On-Chip Debug Target Control

Allows users to start and stop the target, set internal hardware and software breakpoints, take a target snapshot, reset the target, step one statement or instruction into function calls, and step over or out of a function.

Built-In Hardware Diagnostics

Includes a comprehensive suite of RAM tests, scope loops, and CRC tests.

Target Console Port

Includes a target console port, which permits remote monitoring of applications and the serial port by channeling the serial port up through the network.

Additional Custom Registers

The ICE unit supports 32 custom register groups, with a total of 960 custom registers.

Remote Boot

In normal operation, Wind River ICE SX boots from system files located in the flash file system. The ICE unit is also capable of booting from firmware via TFTP from a remote host. The only configuration required is the server IP address, so a group of developers could manage the Wind River ICE SX firmware from a single server, with everyone in this group booting remotely. Configuration files can also be loaded remotely, allowing a group to manage all of its ICE files from a central location.

Static Boot

In this mode, a default target driver is loaded automatically when the Wind River ICE SX unit is booted. Multiple target drivers can also be automatically loaded at boot. The whole process is controlled by a bootapps.1st file, similar to an autoexec.bat file. This file can be generated by the ICE unit, or it can be edited on a host and copied into the flash file system.

Dynamic Boot

This is the default mode for the ICE unit. Without the bootapps.1st file, no applications are loaded. Target drivers can be loaded manually using the Load command; or they can be loaded using Wind River Workbench, which automatically loads the target driver required by the specified target in the Workbench Configuration view. If a target driver is not found, Wind River ICE SX searches for it on the default TFTP server, then boots remotely.

Wind River ICE SX Firmware Update Emulation

For backward compatibility, you can send new firmware to the ICE unit using the Firmware Update Utility in Wind River Workbench. After the update, the ICE unit defaults the updated firmware to static boot.

Wind River Technologies

JTAG Server

The majority of CPUs available today use the JTAG scan chain to offer access to core components that enable control and configuration of the CPU for debugging. Access through the JTAG scan chain provides visibility and control of internal processor resources (hardware breakpoints and registers), as well as external memory to allows users to download code or program flash.

Wind River ICE, coupled with Wind River's JTAG Server technology, allows developers to control all the devices that exist in the scan chain via a single tool. With a single interface, this system eliminates the need to separate the scan chain and use

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precious board real-estate for additional JTAG access headers. Fewer headers also means reduced routing complexity and increased board yield rate.

Within the scan chain, Wind River's leading-edge tools provide the capability to simultaneously or individually debug code on one or more CPUs of the same or dissimilar architectures, whether they are individual components or embedded within a System on Chip (SoC). Wind River ICE also supports multiple debug sessions running on one or more hosts simultaneously.

Wind River ICE High-Performance JTAG

Wind River's JTAG Accelerator technology enables Wind River ICE to incorporate maximum scheduling efficiency, yielding 100 percent use of the available JTAG scan chain communication bandwidth.

Wind River ICE eliminates slow download times and slow user response to user-run control commands (step in, step out, and single step) when developing with OCD microprocessors. With our new hardware logic that optimizes JTAG scan chain communications, Wind River ICE dramatically improves performance in development.

Related Products

Wind River OCD API

Wind River ICE is fully integrated with Wind River OCD API, allowing fast and flexible integration of these powerful capabilities into your own custom environment (e.g., automated test and production application). Wind River OCD API comes with complete and intuitive documentation, so developers can take full advantage of its features and benefits.

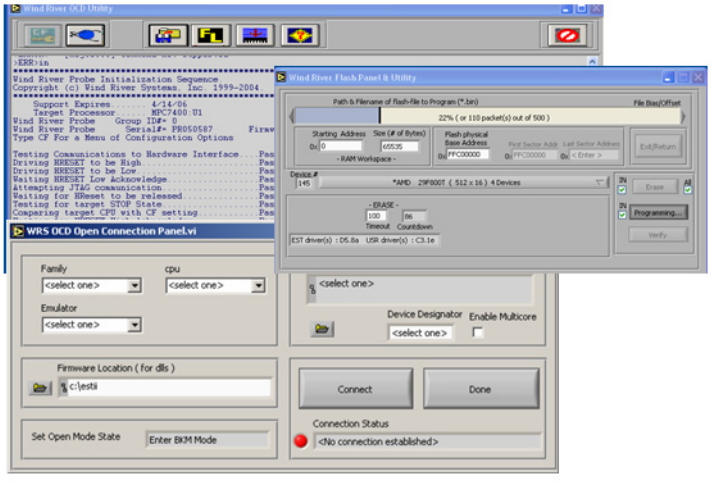


Figure 2: OCD API with OCD Utility

Wind River Workbench

Wind River ICE is fully compatible with Wind River Workbench, the industry-leading open and extensible development suite. Wind River Workbench, On-Chip Debugging Edition, is specifically configured to meet the needs of developers early in the device software development cycle—handling initial board bring-up and validation, developing device drivers, incorporating low-level software capabilities, and developing C/C++ applications. This edition offers a feature-rich development suite optimized for the capabilities of JTAG-based debugging using Wind River ICE and Wind River Probe.

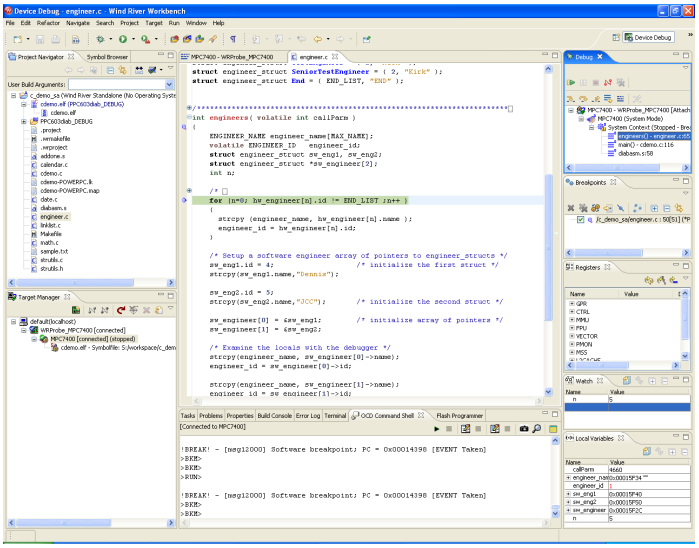


Figure 3: Workbench GUI

visionCLICK

visionCLICK is a debugger created specifically to use hardware run-control to optimize board bring-up and operating system bring-up, and to debug difficult problems that may result in catastrophic software failures. visionCLICK connects to a given target via Wind River ICE or Wind River Probe hardware emulators, and it maintains a reliable direct connection to the target at all times.

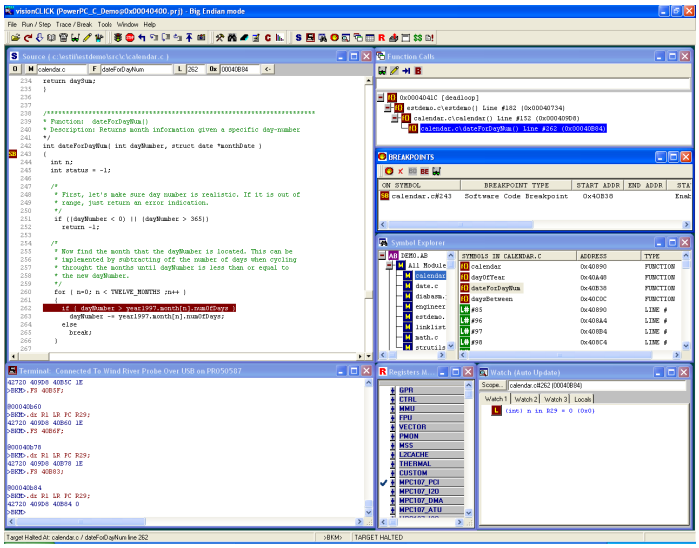


Figure 4: visionCLICK GUI

Wind River Trace

Wind River Trace allows developers better visibility into the hardware/software interaction within their device. It offers a GUI within the development environment, providing Trace configuration parameters and displaying Trace data. Wind River Trace also offers a hardware adapter for Wind River ICE, enabling it to capture and buffer more than 900,000 lines of Trace data from the target.

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Technical Specifications

Host OS Support

- Red Hat Enterprise Linux 3 and 4
- Solaris 8 and 9
- SuSE Desktop Linux 9.2 and 9.3
- Windows 2000 Professional with the latest Service Pack installed
- Windows XP Professional with Service Pack 1 and all patches
- Windows XP Professional with Service Pack 2 and all patches

Host OS System Requirements

Specific host OS system requirements depend on the host software connected to Wind River ICE. Please refer to product information for Wind River Workbench, visionCLICK, and the Wind River OCD API for more details.

Target OS Support

Wind River ICE provides support for the following target operating systems:

- VxWorks 6.0, 6.1, and 6.2
- VxWorks 5.x
- Linux: Wind River ICE can support any Linux distribution available in the market. However, Wind River ICE is validated with the following specific Linux platforms:
  - Red Hat Enterprise Linux (3 and 4)
  - SuSE Linux (9.2 and 9.3)
  - Wind River Linux platforms
- ThreadX 4.0
- Customizable target OS awareness capability for Wind River Workbench, On-Chip Debugging Edition, enables the addition of support for other target operating systems

Processor Family Support

ARM	ARM 9
ColdFire	MCF52xx MCF53xx MCF54xx
Intel XScale	IXP4xx IXP12xx IXP2xxx IXC11xx PXA2xx IOP3xx IOP80xxx
MIPS	MIPS 32 and MIPS 64 MIPS 4Kx, 4KEx, 5Kx MIPS 20Kx, 24Kx, 25Kx PR19xx, 39xx, 44xx PNX30xx, 83xx, 85xx BCM11xx, 33xx, 47xx BCM63xx, 70xx, 71xx, 73xx VR41xx, 54xx, 55xx, 77xx TX49xxRM79xx, 9xxx
Power PC	PPC40x (including Xilinx Virtex-II Pro) PPC44x PPC5xx PPC52xx PPC6xx PPC7xx PPC74xx PPC8xx PPC82xx PPC83xx PPC85xx

Support

Wind River provides full technical support for its development solutions, including Wind River ICE, Wind River Probe, Wind River Trace, Wind River Workbench, visionCLICK, VxWorks 6.x, and Wind River VxWorks and Linux platforms. Our products are backed by the most comprehensive customer support network in the DSO industry.

Wind River's global support organization is staffed with experienced engineers who have extensive knowledge of Wind River products and device software development. With 10 major support centers and 15 additional support hubs worldwide, our local experts can help diagnose problems, provide guidance, and answer basic "How do I…?" questions.

Support is available 24/7 at our Online Support website or by email at support@windriver.com. The website provides patches, manuals, the latest errata, and other announcements. Online Support also offers tech tips, and application notes, and answers to FAQs. Visit Online Support at www.windriver.com or consult our Customer Support Users' Guide at www.windriver.com/support/resources/csug.pdf.

Wind River experts are also available for telephone support during standard business hours. If you cannot find the information you need through Online Support, please contact our global support team:

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Professional Services

Wind River Professional Services enables companies to reduce risk and improve competitiveness. Our team delivers device software expertise within structured engagements that directly address key development challenges and contribute to the success of our clients. Our track record of timely delivery and in-depth understanding of market and technology dynamics makes Wind River a valuable implementation partner for clients worldwide. Based on our commercial-grade project methodology, service offerings include device design, BSP and driver optimization, software system and middleware integration, and legacy application and infrastructure migration.

Workbench Services

Whether you select Wind River ICE with Wind River Workbench as a stand-alone product or as part of our platform solutions, Wind River Professional Services knows how to jump-start your development efforts. Even if you opt for a non–Wind River platform, Linux distribution, host operating system, or target architecture, we can help.

No matter which development environment you use, Wind River Professional Services can extend Workbench to adapt to your needs with the following offerings:

- Extend Workbench processor support
- Extend Workbench target OS support
- Validate Workbench on Linux host environment
- Validate Eclipse plug-ins
- Integrate agents

Education Services

Education is fundamentally connected not only to individual performance, but also to the success of a project or company. Lack of instructional services can translate into longer release schedules, poorer quality, and higher costs. The ability to learn—and to convert that learning into improved performance—creates extraordinary value for individuals, teams, and organizations. To help your team achieve that end, Wind River offers public courses and on-site education intended to increase your productivity as quickly as possible.

Public Courses

Wind River's public courses are scheduled for your geographical convenience. They are conducted over one to five days, using a mixed lecture and lab classroom format that allows students to leverage the experience of Wind River instructors and their peers. Courses provide a fast, cost-effective way for students to become more productive immediately.

Benefits of public courses include:

- A conceptual introduction that orients students to the subject matter
- A selective examination of the details, focusing on the most commonly used areas or on areas with which users tend to be least familiar
- Personal guidance and hands-on application of individual tools and course concepts
- The chance to grasp embedded software concepts, as well as the fundamental issues involved in real-time design
- The knowledge needed to develop device drivers, perform hardware porting, or develop applications
- Answers to specific questions about topics addressed in the course

Courses of interest to Wind River ICE customers may include General Purpose Platform, VxWorks Edition; General Purpose Platform, Linux Edition; and Workbench for Linux. Please consult your local Wind River sales representative or visit education.windriver.com for course schedules and fees.

In addition to these Wind River–sponsored courses, we also offer half-day seminars on a regional basis for processor architecture and OS development training. Please refer to education.windriver.com or contact your local Wind River sales representative for information on courses in your area.

On-Site Education

If you have a large project team or a number of new users, you may benefit greatly from custom on-site education. Instructors will consult with you and, based on the workshop series curriculum, determine which topics should be included and emphasized. This type of education offers an opportunity for one-on-one discussions with our instructors about your specific project needs, technical requirements, and challenges—all in the comfort of your own office.

Advantages of on-site education include:

- The entire team gains a common knowledge base
- The training format helps ensure that knowledge and skills will transfer from the classroom to the workplace
- The on-site location saves employees both travel expenses and time away from the office

Please consult your local Wind River sales representative for further information.

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