

# WIND RIVER

## Wind River Workbench On-Chip Debugging

Wind River offers the industry's leading development environment for on-chip debugging. Wind River Workbench On-Chip Debugging takes you from early hardware bring-up to test and manufacturing with a centralized development solution. Workbench On-Chip Debugging powers the Wind River ICE 2 and portable Wind River Probe JTAG debug units.

Workbench On-Chip Debugging makes it simple to take advantage of new, complex processor technology such as system on chip (SoC) designs. Embrace a more creative approach to debugging and analysis that expedites the hardware development process and provides collaboration between hardware, firmware, and software developers.

### Boost Schedule, Budget, and Product

Wind River's standards-based on-chip debugging solutions expedite the development process and support life cycle debug and analysis. With Workbench On-Chip Debugging, you can do the following:

- Bring up new hardware quickly—even before an operating system is available.
- Ensure that the OS and middleware run effectively on the hardware early in the development cycle.
- Enhance product quality and speed time-to-market.
- Improve overall development productivity by using a common, Eclipse-based debug platform for all development, debugging, and test phases.
- Debug even the most complex 32-bit, 64-bit, and multicore processors using patent-pending technology.
- Employ the same Wind River solutions across platforms and projects.

### Centralized Debugging and Analysis

Traditional methods of debugging and analysis—from homegrown debug tools to off-the-shelf, open source products—were not designed to deal with the complexity of today's 32-bit and 64-bit processors in an integrated development environment. Workbench enables you to meet today's unique hardware and software development challenges, such as effectively implementing a life cycle development process in a centralized organization, then extending that process to remote development sites and outsourced partners.

Workbench On-Chip Debugging provides a centralized, standards-based development environment that automates the debugging and analysis process. Designed with project-oriented methodologies in mind, Workbench simplifies the

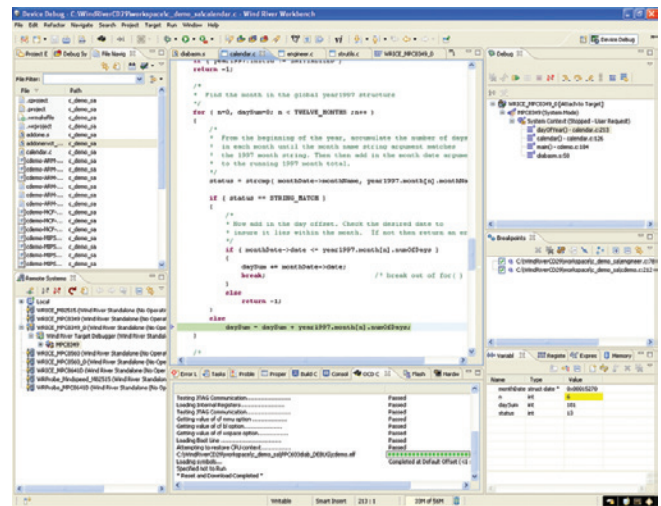


Figure 1: Wind River Workbench On-Chip Debugging

handoff between different phases of development, from initial hardware bring-up to firmware design, OS implementations, and platform and application development. Workbench's hardware diagnostics, flash programming, and scripting capabilities expedite the initial development phases.

With the optional Wind River On-Chip Debugging API, manufacturing and test engineers can employ the same Wind River emulator hardware used in hardware development and leverage existing tools throughout the design and implementation process. Workbench helps you to free engineering bandwidth for product innovation and focus on high-value differentiation.

Workbench On-Chip Debugging is the only JTAG solution to support a robust, end-to-end, standard Eclipse debug environment that allows

- Hardware developers to begin debugging without an operating system to expedite initial board bring-up
- Firmware and BSP developers to debug operating systems early in the development cycle, when agent-based debugging is not an option, enabling them to spot hardware/software integration issues quickly

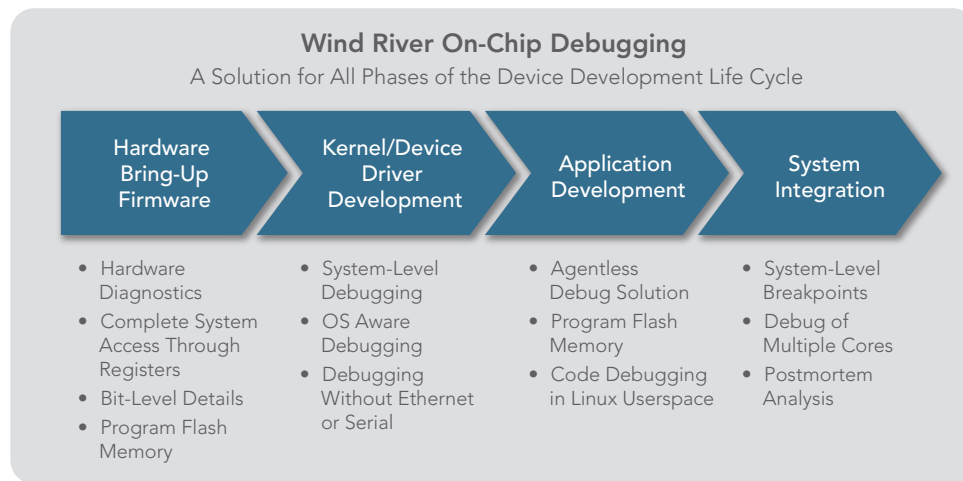


Figure 2: Wind River on-chip debugging solution simplifies development

- Application developers to use the same debugging tools, improving communication and troubleshooting with hardware and firmware/BSP developers
- System integrators to perform postmortem analysis and system mode debugging as they bring various modules and components together into a fully functioning unit

#### Advanced Hardware Diagnostics

Mitigate the risk as you move from debugging single-core 8-bit and 16-bit processors to multicore 32-bit or 64-bit processors. The complex and time-consuming traditional hardware diagnostics process required detailed knowledge of processor technology and multiple debug tools. Workbench On-Chip Debugging gives you a more innovative hardware diagnostic toolset that supports a wide range of processors. Workbench was designed for these complex SoC microprocessors, and you don't need to rely on the availability of target firmware—all hardware initialization is performed by the emulator through the processors' JTAG interface.

#### Scalable, Robust Multicore On-Chip Debugging

Workbench On-Chip Debugging introduces patent-pending technology that solves one of the hardest problems in embedded software development in a multicore environment: diagnosing and analyzing embedded application behavior across multiple processors in a single board, or across multiple boards within a system.

Overcome the challenges of multicore processors such as establishment of the initialization sequence for multicore devices, control of multiple cores from a single emulator, organization of debug information for easy visualization, and simultaneous synchronous debugging of multiple cores.

Workbench On-Chip Debugging supports up to 16 separate cores and 32 threads, enabling you to synchronize the start and stop of multiple cores from a central location. In addition, you can easily visualize each core and its debug information to quickly locate and isolate problems. Additional breakpoint management enables cross-correlation of breakpoints to stop a specific processor—or even the entire system—when the breakpoint is hit. Combined with

error tracking and cache management, this provides the most advanced on-chip debugging solution for multicore environments.

#### Powerful, Eclipse-Based Environment

The award-winning Workbench On-Chip Debugging software is based on the Eclipse framework, providing the Device Software Optimization (DSO) industry's first integrated JTAG debugging environment that can be easily extended through in-house, third-party, open source, or commercially available Eclipse plug-ins. For example, you can integrate software version control and change management solutions such as CVS and ClearCase. You can also integrate UML-based software visualization and code generation tools, enhanced static analysis solutions, and simulation/virtualization software. Wind River on-chip debugging solutions enable you to take advantage of the growing Eclipse ecosystem to improve collaboration between hardware, firmware, and software developers, ensuring a smooth handoff in the debug process.



#### Features

- Centralized, project-oriented environment, common with Wind River Linux and VxWorks, simplifies end-to-end debugging
- Support for Wind River JTAG debug units: multicore-capable Wind River ICE 2 and the entry-level portable Wind River Probe
- Extensible support for a wide range of processors based on ARM, ColdFire, Intel, MIPS, and PowerPC architectures\*
- Comprehensive JTAG debugging engine, when coupled with a Wind River JTAG debug unit
  - Full run-control of target: start/resume, stop/suspend, step-in/over/return, source, function, and assembly mode debugging

- Access to core and peripheral registers and bit-level detail including up to 32 user-defined register groups
- Access to L1 and L2 instruction and data cache (for supported processors)\*
- Graphical JTAG editor to enable easy layout and configuration of devices on the scan chain
- Flash programming capability to simplify board bring-up; turnkey algorithms provided for common flash devices
- Advanced source and assembly language symbolic debugging with conditional breakpoint support
- Advanced debug engine to support comprehensive JTAG-based run control, software agents, and simulators for maximum flexibility
- Multicore and multiple thread debugging for a variety of configurations such as multiple cores running different operating systems (i.e., AMP)
  - Target connection manager to support up to 128 devices on the JTAG scan chain
  - Cross-correlated breakpoints for up to 16 cores and 32 threads
  - Color-coded and numbered debug sessions to quickly spot issues on specific cores
  - Advanced multicore diagnostics to spot software and hardware dependencies across multiple cores
- Connection and configuration management to centralize contexts for processors, cores, and threads in a single graphical view
- Cache memory analysis capabilities to help identify and resolve cache coherency issues, even across multiple cores
- Simultaneous support for JTAG- and agent-based debugging to tighten project handoff between hardware and software developers
- Operating system awareness to provide access to kernel objects to simplify OS and device driver stabilization for the following
  - VxWorks 5.5, 6.3, and higher (for supported processors)\*
  - Wind River Linux (for supported processors)\*
  - Wind River Real-Time Core for Linux (for supported processors)\*
  - Linux kernels based on open source version 2.4.26 and higher; version 2.6 (for supported processors)\*
  - Express Logic's ThreadX 4.0, 5.0 (for supported processors)\*
- Support for board bring-up, kernel module debugging, and user-mode debugging
- Comprehensive diagnostics including RAM tests, address bus test, CRC checks, and scope loops to resolve bus routing issues
- Statistical code profiling (based on the program counter) for analyzing system performance
- Internal and external trace capabilities that dramatically reduce debug time by providing the underlying cause of specific defects
- Advanced editing capabilities to reduce complexity of repeated development-debug cycles
- Extensive scripting capabilities via host shell scripting framework to control debugger activities

- Comprehensive build system to provide a centralized solution for activities related to editing, compiling, and debug software
- Support on a wide range of Microsoft Windows, Linux, and Solaris 32- and 64-bit host environments\*\*
- Available as an add-on extension to Wind River Workbench development tools included with the VxWorks and Wind River Linux platforms, providing developers with a complete tool suite comprising on-chip and agent-based analysis and diagnostic tools

*\*Consult your Wind River sales representative for details on current and future supported devices and features.*

*\*\*Consult the Wind River Workbench On-Chip Debugging product note on [www.windriver.com](http://www.windriver.com) for supported configurations.*

### Supported Processors

Wind River Workbench On-Chip Debugging supports a wide range of processors. Visit [www.windriver.com/products/OCD/PAM/processor-support](http://www.windriver.com/products/OCD/PAM/processor-support) for a current list. Supported operating systems include the industry-leading VxWorks and Wind River Linux in addition to kernel.org Linux and Express Logic's ThreadX. Other commercial operating systems and in-house proprietary operating systems can be integrated by Wind River Professional Services.

### Wind River Services and Support

Wind River provides outsourced engineering services specifically designed to help you meet strict market deadlines while keeping development costs down. Our technical experts have in-depth knowledge of Wind River products and experience assisting customers with Workbench On-Chip Debugging customization and product realization across a broad set of vertical industries. We can help you with device design, board support package (BSP) and driver optimization, software system and middleware integration, legacy application and infrastructure migration, and real-time best practices.

Wind River Support works when you do with person-to-person help lines, a broad and deep knowledge base, and Web-based support to solve problems as they arise. Our Online Support site also provides details on Wind River products and services to help you overcome obstacles or find innovative ways to resolve debugging issues quickly and get you out of the lab sooner.

### How to Purchase Wind River Solutions

Visit [www.windriver.com/company/contact/index.html](http://www.windriver.com/company/contact/index.html) to find your local Wind River sales contact. To have a sales representative contact you, call 800-545-9463 or write to [inquiries@windriver.com](mailto:inquiries@windriver.com).