Software Development Tools

CodeWarrior™ Development Studio
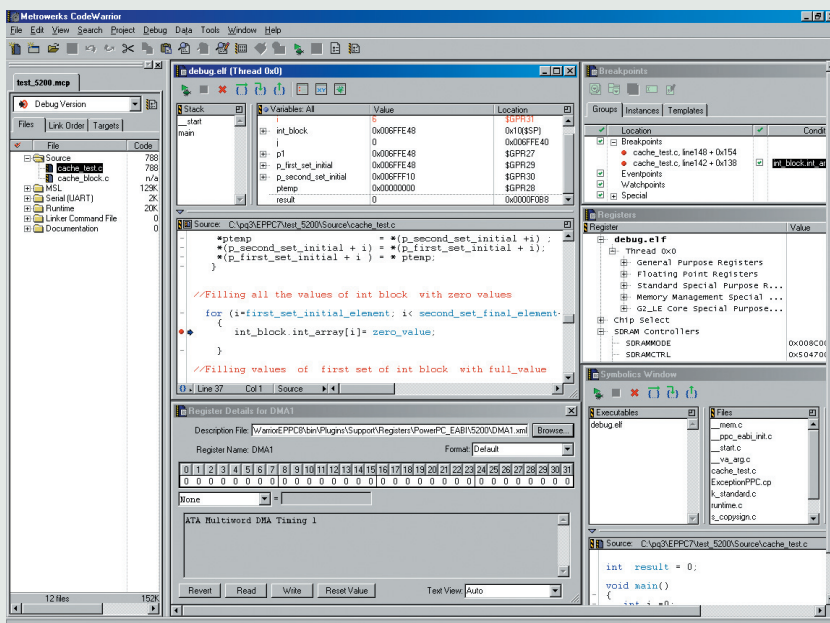## mobileGT™ Processor Edition

When building complex embedded devices, comprehensive development tools that enhance developer productivity are a crucial element to project success. Selecting an established software partner who combines the advantage of being the original development tools provider for the mobileGT™ alliance, and also the creator of the award-winning CodeWarrior™ integrated development environment (IDE), enables embedded developers to meet the pressures of shorter project life cycles. Engineering managers gain comfort knowing Metrowerks is a Freescale™ company, permitting us to leverage our unique access to the silicon manufacturer when creating or supporting our high-quality products.

CodeWarrior development studio is a complete IDE designed for each stage of the development process – from board bring-up through embedded application development. State-of-the-art debugging technology, the simplicity of an intuitive development environment and robust run-control bring hardware board bring-up and C/C++ embedded application development to a new level. In addition, developers remain productive by using a consistent development environment across all supported workstations and personal computers.

CodeWarrior development studio contains all of the tools needed to complete a major embedded development project:

> Project Manager: Handles top-level file management for the software developer, determines build order and coordinates with plug-ins to provide additional services (e.g., version-control).

> Source-Level Debugger: Provides a high-performance graphical source-level debugger equipped with the latest features to shorten hardware bring-up and application development time. Supports DWARF (Debug With Arbitrary Records Format) and STABS.

> Source Browser: Permits user to navigate code quickly for both object-oriented and procedural languages.

> Build System: Generates relocatable object code and an executable image from the source and assembly code.

> CodeWarrior C/C++ Compiler suite: Includes the industry-leading C/C++ CodeWarrior compiler, standard template library (STL) and a variety of other tools.

> Integrated Text Editor: Enables the creation and manipulation of source code and other textual files. Completely integrated with other IDE functions.

> Search Engine: Locates a specific text string; provides file-comparison and file-differencing functionality.

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New Features for version 8
> Faster, more intuitive flash programming supporting the latest devices

> Integrated hardware diagnostics for board-level testing

> Agilent Logic Analyzer interface within the IDE

> Cache visibility for the MPC5200

> Enhanced command window permits more complex scripting capabilities

> Upgraded breakpoint support increases ease of use

> Built-in software profiler for hot-spot analysis

> Editor enhancements for greater developer productivity

> Superior compiler optimization technology generates fast, compact, high-quality code

> Compatibility with the latest ANSI C++ specs (ISO/IEC 14882:1998(E) C++ standard) and the ANSI C spec (X3.159-1989)

> Complete control of code and data memory allocation

> Options to pack or byte-swap structures to match existing data types

> Supports position independent code (PIC) and position independent data (PID)

> File I/O for bare board applications (no OS)

> Proven performance with industry leading RTOSs

Supported Hosts
> Windows® XP/2000/Windows NT® 4.0 + Service Pack 5 and above

Supported Targets
> MPC823e, MGT5100, MPC5200

Supported Connections
> Ethernet TAP, BDI 2000, USB TAP and more

CodeWarrior Project Manager

For new users, a Project Wizard takes the developer step-by-step through a series of questions to create a project that is ready for development. The graphical user interface (GUI) enables the user to easily configure a project by selecting options covering everything from compiler optimization and debugging level, to symbolic output format (DWARF1, DWARF2, STABS) and target type (executable or library). Example templates, called stationery, are provided as a starting place for the application and include a linker command file, target initialization files and project files — making it easy to get your project up and running.

Enhanced CodeWarrior Debugger

Metrowerks CodeWarrior debugger brings C/C++ source-level debugging to a new level. The CodeWarrior debugger assembles a wide array of high-powered components and features into a powerful GUI to enable projects to be completed on time and under budget.

Windows-based Workspace Environment

The CodeWarrior debugger's user-configurable workspace allows developers to focus on complex debugging tasks. Each workspace contains just the set of views needed for the task at hand. If it is a source view, cache view or logic analyzer interface, the developer views what he wants, when he wants it.

Seamless Integration with Ethernet TAP

The CodeWarrior debugger is fully integrated with the Ethernet TAP run-control device, resulting in optimized run control, faster downloads and more productive developers.

Full-Featured Debugging

The CodeWarrior debugger provides a rich set of debugging features designed to help the developer quickly find and repair software defects, including:
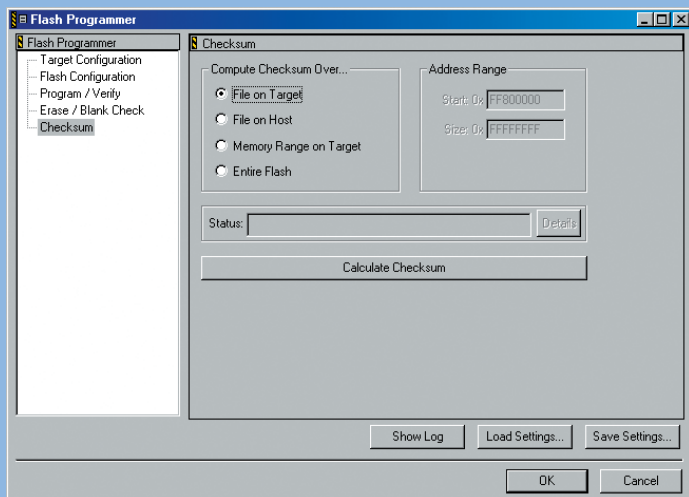
> Breakpoints: Hardware and software breakpoints are easily set or removed in source code, assembly or mixed-mode views.

> Eventpoints: Used to perform a task when program execution arrives at a specific line of source code or when an associated conditional expression evaluates to true. Set an eventpoint to perform a task (i.e., run a script, play a sound or collect trace data), to enhance your debugging or testing processes.

- Log Point - Logs a string to a file and records messages to the Log window

- Pause Point - Pauses execution to refresh debugger data – great for watching a variable change over time

- Script Point - Runs a script or application

- Skip Point - Skips execution of a line of source code

- Sound Point - Plays a sound when triggered

- Trace Collection On - Starts collecting trace data for the Trace window

- Trace Collection Off - Stops collecting trace data for the Trace window

> Watchpoints: Halt program execution when a specific location in memory changes value. After setting a watchpoint in memory, you can halt program execution when that point in memory changes value or when the memory location is accessed.

> Single-Stepping: The CodeWarrior debugger supports high-level and low-level language support for Step Into, Step Over and Step Out.

> Tooltips: Data and icon tooltips enable the developer to view crucial information easily. Data Tooltips display a quick, one-time view of a variable. Icon Tooltips display an items function when the cursor is placed over it.

> Simple Module and Function Browsing: The tight integration between the symbol browser and the debugger enables access to an internal table of all modules, global variables and functions in a given debug context.

> Display Stack Trace: The "Call Stack" view provides an easy display of all functions active in the calling chain and enables the developer to follow the progress of a program through its hierarchical call structure.

> Watch View: for monitoring and updating data in a separate window.

> Memory View: Memory view is the fastest way to display and modify the contents of target memory. Quickly find a value in memory, compare memory regions or upload and download memory to a file using this view.

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> Register view: The register view provides extensive information on CPU and peripheral registers, as well as user-defined custom registers. The registers displayed can also include bit-level details for an English-language equivalent of register contents.

> Cache View: Use the Cache window along with the Metrowerks Ethernet TAP run-control device, to view cache information for the MPC5200 processor.

> Mixed Language Debugging: The CodeWarrior debugger supports mixed language debugging in C, C++ and Assembly language by automatically analyzing the file in view and adjusting the expression evaluation and data display accordingly.

> Target Connection Wizard: The Connection Wizard simplifies and automates the task of defining new connection definitions based on hardware and communication parameters.

> Profile Window: Improve the performance of your application by using the Profile window to examine profile data that collected from executing code.

> Command-Line Window: Use the command-line interface together with various scripting engines, such as the Microsoft® Visual Basic® script engine, Java™ script engine, TCL, Python and Perl to automate testing, standardize data-logging or uncover that hard to find problem.

Board Bring-Up

Board bring-up is easier using the CodeWarrior debugger by providing complete control over all board settings, including initial register values and memory configuration. The CodeWarrior debugger also includes a comprehensive set of hardware diagnostics and robust flash programming algorithms supporting an industry-leading flash devices.

Flash Programming

Program on-board flash devices from within the same graphical user interface used to troubleshoot the application. Over 150 leading flash devices are supported out-of-the-box.
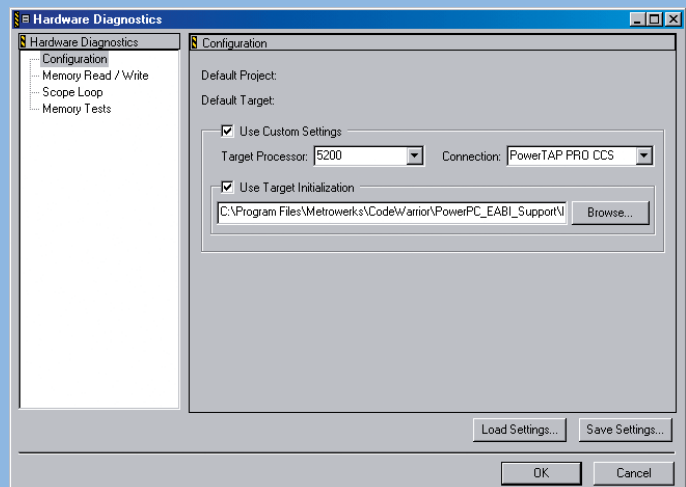
Logic Analyzer

The most complex embedded systems problems require a powerful interface to troubleshoot low-level hardware components. Utilize the CodeWarrior debugger in concert with a logic analyzer to quickly and easily understand complex signals on an embedded hardware platform.

Supporting the Agilent logic analysis systems, Metrowerks has seamlessly integrated Logic Analyzer communications into the CodeWarrior debugger. Including:

> Trace On/Off

> Trace Everything

> Trace History

> Start Trace Based on Specified Address

> Start Trace on Address Range

> Trace All in Address Range

> Breakpoint on Trigger
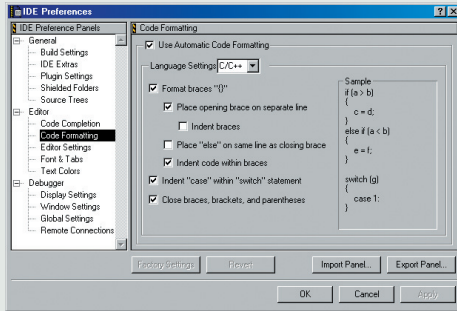
> Trigger Tracing on Breakpoint

Hardware Diagnostics

CodeWarrior development studio comes with diagnostics that enable the developer to help determine if the basic hardware is functional. These tests include:

> Memory Read/Write: Performs diagnostic tests by writing and reading memory through the emulator interface

> Scope Loop: Repeated memory reads and writes through the emulator interface.

> Memory Tests: The Memory Tests component lets you perform three different tests on the hardware:

> Walking ones

> Address

> Bus noise

Specify any combination of the tests and the number of passes to perform them. Save a log file to memory or view data in the log window after all tests are complete.

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CodeWarrior III Compiler

The CodeWarrior III compiler, combines industry-proven optimization technology with the versatility and control needed to fully exploit today's complex PowerPC ISA CPUs. Fast, tight, correct code – that's what the CodeWarrior III compiler is all about.

Proven Optimization Technology

A large number of highly refined, global, local, CPU-specific and application-specific (profile-driven) optimization techniques enable the programmer to fine-tune the compiler's output to match the application's requirements. Programmers can select various optimizations to balance execution speed with code size while intelligent defaults can generate optimal code with no user interaction.

Advanced C/C++ compiler – Designed for highly embedded development support. Key features include:

> Compatibility with the latest ANSI C++ specs (ISO/IEC 14882:1998E) and the ANSI C spec (X3.159-1989)
> Standards conformance (ANSI and EABI) for maximum tool interoperability
> Complete control of code and data memory allocation
> Options to pack or byte-swap structures to match existing data types
> Supports position independent code (PIC) and data (PID)

> Board support routines for bare board applications (no OS)
> Proven performance with industry-leading RTOSs

Assembler – Full-featured macro assembler invoked automatically by the project manager or as a stand-alone assembler for generating object modules.

Linker – Provides precise control over the allocation, placement and alignment of code and data in memory.

Libraries – The Metrowerks Standard Libraries is included:

> Complete C++ STL
> Complete, re-entrant C libraries compliant with ANSI/ISO, POSIX and SVID standards
> Multi-threading
> Full complement of math libraries, including IEEE-754 appendix functions
> Efficient floating-point libraries for fast execution of calculations

Profiler – profiling options contained in the compiler instrument application code, which when executed save profile information that can be viewed by the profiler utility. This profile data can also be fed back automatically to the compiler for additional code optimization based on execution paths.

CodeWarrior Text Editor

CodeWarrior development studio includes a full-featured, user-configurable, windowed text editor with syntax coloring, auto-indenting and more. Quickly identifying language keywords and constructs, integrating powerful search capabilities that can find values within multiple files and being highly user-configurable by permitting a developer to change the key bindings, font type, font size, color scheme and syntax

coloring quickly and easily, the CodeWarrior text editor provides a single, consistent editor interface for all host and target development combinations.

Search Engine

Industry observers estimate that software developers spend nearly half their time searching for basic information buried in application code. As applications grow in complexity, the time required finding, analyzing and modifying code increases as a proportion of total engineering effort. Fast, semantic code navigation makes it possible to find specific code structures among hundreds of directories and files quickly and easily. Seamless integration between the CodeWarrior search engine and the text editor also increases user productivity by reflecting all code changes immediately in the browser. No recompilation necessary.

Plug-in Facility

The plug-in facility of the CodeWarrior development studio lets you extend the IDE to include new features or to upgrade/replace existing features. Users and third parties can develop a plug-in to create a new interface or functionality into the IDE. Plug-ins include kernel awareness for OSEK and other operating systems, as well as standard plug-ins for many third party applications (i.e., ClearCase, Slick Edit, PC-LINT and more).

Minimum System Requirements:
> 400 Mhz Intel® Pentium® class processor
> Microsoft Windows XP/2000/Windows NT 4.0
> 128 MB RAM
> 300 MB disk space
> CD-ROM drive for installation

Learn More: For more information about Freescale products, please visit **www.freescale.com/codewarrior**

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