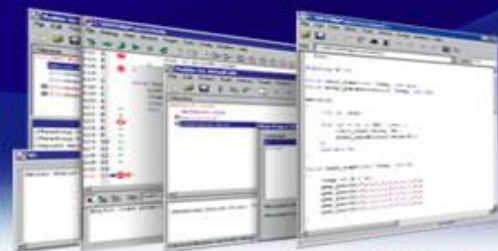


Green Hills 嵌入式集成开发环境

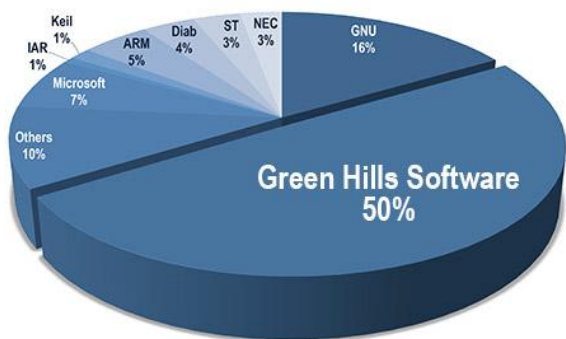
√MULTI √DoubleCheck √TimeMachine √Green Hills Probe √SuperTrace Probe





MULTI 集成开发环境

美国Green Hills软件公司的MULTI IDE提供一种具有调试、编译器和闪存编程工具的综合开发环境，包括 AUTOSAR 感知、性能分析器、项目构建器、代码覆盖、运行时错误检查、MISRA C 符合向导和DoubleCheck™ 集成式静态代码分析器。

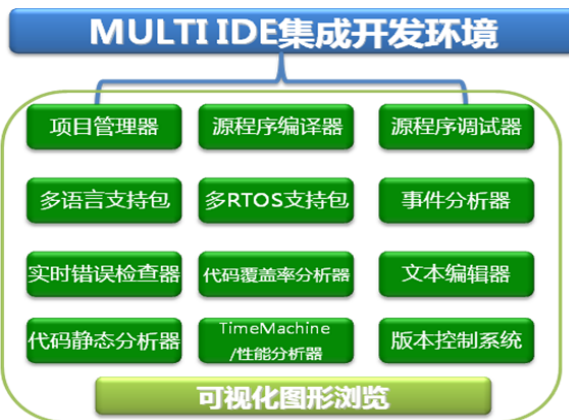


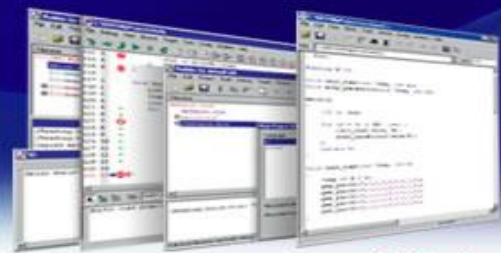
EEMBC评比Green Hills软件占领比例

Green Hills 已从 TÜV NORD 和 exida 获得认证，使得 Green Hills IDE 成为市场上可以获得的唯一一个经过认证，满足 SIL 4（安全完整性水平）和 ASIL D（汽车安全完整性水平）工具资质要求的工具链。同时取得了目前世界顶级的功能安全标准“DO-178B Level A”（美国航空无线技术委员会认定）和安全规格“EAL6+”（美国国家安全保障局认定）。

产品结构

Green Hills的MULTI集成环境综合了软件开发和调试过程中要用到的各种工具，如源级调试器、项目管理器、版本控制器、文本编辑器、事件分析器、可视化图形浏览器、代码覆盖率分析器、静态代码分析器、TimeMachine/性能分析器、实时错误检测器、ARM指令集仿真器以及底层调试接口等。用户可方便地在MULTI环境中利用上述工具来开发应用程序。





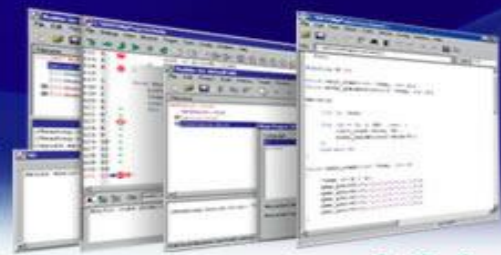
产品优势

- 1) 工程化管理：**通过项目管理器实现对项目源文件、目标文件、库文件以及子项目的统一管理，显示程序结构，检测文件相互依赖关系，提供编译和链接的图形设置窗口，并可对编程语言的进行特定环境设定。
- 2) 系统事件分析：**通过事件分析器为用户观察和跟踪各类应用系统运行和RTOS事件的可配置图形化界面，并对以下事件提供基于时间的测量：上下文切换、信号量获取/释放、中断和异常、消息发送/接受、用户定义事件。
- 3) 系统性能分析：**通过性能分析器提供对代码运行时间的剖析，可基于表格或图形显示结果，有效的帮助用户优化代码。
- 4) 实时运行错误检查：**通过实时运行错误检查工具提供对程序运行错误的实时检测，对程序代码大小和运行速度只有极小影响，并具有内存泄漏检测功能。
- 5) 代码静态分析：**提供在不运行代码的方式下，通过词法分析、语法分析、控制流分析等技术对程序代码进行扫描，验证代码是否满足规范性、安全性、可靠性、可维护性等指标的一种代码分析技术。确保符合例如DO-178B、ISO26262等安全标准！
- 6) 代码覆盖率分析：**提供多种测试覆盖率分析报告，包括语句、分支、路径和 MC/DC 覆盖率，帮助用户评估测试的有效性和完整性，以及证明符合测试和验证的需求，例如 DO-178B、ISO26262等。
- 7) 图形化浏览器：**提供对程序中的类、结构变量、全局变量等系统单元的单独显示，并可显示静态的函数调用关系以及动态的函数调用表。
- 8) 版本控制工具：**提供对应用工程的多用户共同开发功能。Multi IDE的版本控制工具通过配置对支持很多流行的版本控制程序，如Rational公司的ClearCase等。

产品支持的处理器

Green Hills Multi 集成开发环境支持众多流行的16位、32位和64位处理器和DSP，如PowerPC、ARM、MIPS、x86、Sparc、TriCore、SH-DSP 等，并支持多处理器调试。支持的处理器及相关操作系统信息如下表：

Target processors			
• Power Architecture	• SH	• XScale	
• ARM/Thumb	• i.MX (ARM)	• V850/RH850	
• 68K/Cold Fire	• ARC	• Blackfin	
• Intel Architecture	• FR	• DaVinci	
• MIPS	• OMAP	• Tricore	
• ARM Cortex	• SPARC		
Development hosts			
• windows	• Solaris	• Linux	
Operating systems			
• INTEGRITY RTOS	• Linux	• OSE	
• μ-velOSity RTOS	• ThreadX	• Bare board	
• Windows	• VxWorks	• In-house	
• Solaris			
Third-party products			
• Eclipse	• vi	• CVS	
• Rhapsody	• Subversion	• SourceSafe	
• Emacs	• ClearCase	• DWARF/Stabs compilers	
Languages			
• C	• C++	• EC++	
• Ada (w/AdaMULTI)			



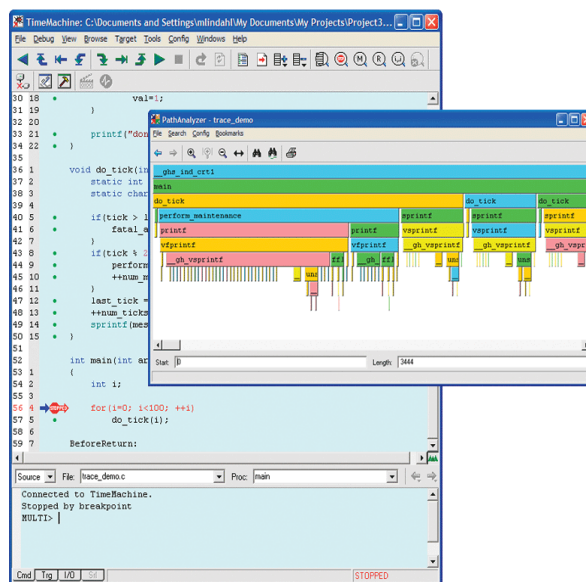
TimeMachine Debugging Suite 调试工具

Green Hills公司推出的TimeMachine Debugging Suite是业界首个为开发人员在程序运行的时间维上提供向前和后向完全可视性的调试器。TimeMachine Debugging Suite可使开发人员在程序出错后能够按照时间顺序反向连续或单步运行，从而易于查找错误原因，避免了使用上一代调试器所必需的单调、冗长的试错(trial-and-error)调试方法。

此外该产品集成了MULTI EventAnalyzer操作系统分析工具以及MULTI Performance和Code Coverage Profiler专利工具。传统的操作系统分析工具需要插入工具和数据记录，而TimeMachine Debugging Suite能够采集内核服务调用等操作系统事件的跟踪数据，并显示实时的程序代码，同时无需任何其它工具。TimeMachine Debugging Suite独有的追踪和反向追踪技术，让你只要追踪到一次错误，你就可以充分利用追踪到的数据，重复跟踪指导错误找到并修正为止。

产品特点

- 具有追踪和反向追踪技术，让你只要追踪到一次错误，你就可以充分利用追踪到的数据，重复跟踪指导错误找到并修正为止；
- 以可视化的方法呈现整个程序在时间上的各种行为，让研发人员快速查找定位修复错误；
- 帮助工程师发现错误、进行测试和优化程序，优化嵌入式系统的代码质量，提升嵌入式产品质量；
- 同时提供独特的代码覆盖工具，确保系统全面测试。



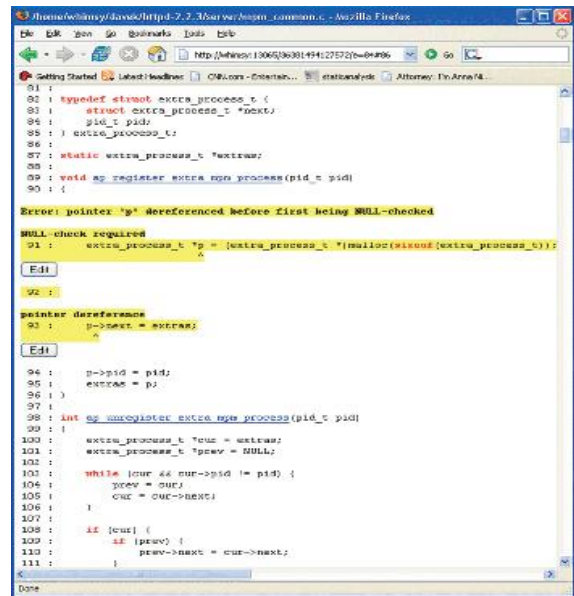
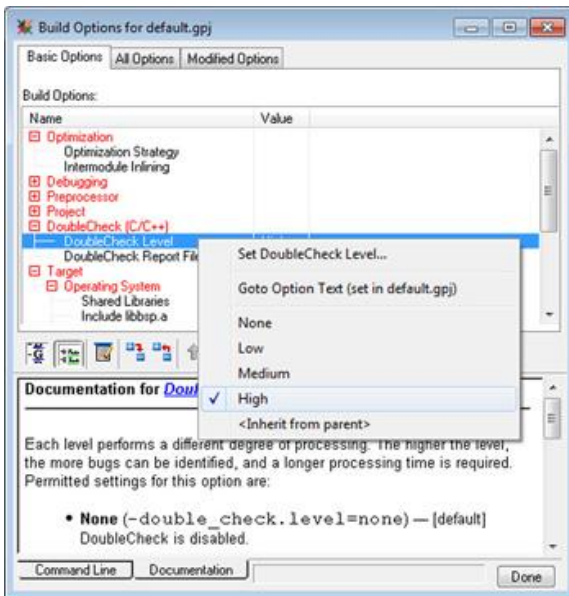
INTEGRITY

DoubleCheck Static Analysis Tool



DoubleCheck Static Analysis Tool 静态分析工具

MULTI IDE的调试套件工具之一，是一款通过对C/C++代码的整体分析，可以发现代码中复杂的编程错误，这些错误会导致系统崩溃、内存冲突以及其他严重的问题，整个分析过程它可以自动化地执行测试、评估测试结果并生成测试报告。套件工具的优势是可以提前发现程序隐藏错误，提高代码质量，节省测试时间，并提供编码规则检查，规范软件人员的编码行为。



DoubleCheck Static Analysis Tool分析对象包括

- Potential NULL pointer dereferences
- Access beyond an allocated area (e.g. array or dynamically allocated buffer);
- otherwise known as a buffer overflow
- Potential writes to read-only memory
- Reads of potentially uninitialized objects
- Resource leaks (e.g. memory leaks and file descriptor leaks)
- Use of memory that has already been deallocated
- Out of scope memory usage (e.g. returning the address of an automatic variable from a subroutine)
- Failure to set a return value from a subroutine
- Buffer and array underflows

The analyzer understands the behavior of many standard runtime library functions. For example it knows that subroutines like free should be passed pointers to memory allocated by subroutines like malloc. The analyzer uses this information to detect errors in code that calls or uses the result of a call to these functions.



Green Hills Probe仿真器

Green Hills Probe仿真器是Green Hills公司针对嵌入式系统调试工具之一，它能很好地与MULTI IDE无缝集成，支持第三的IDE环境（如：Wind River、ARM公司的IDE等），支持最新的RTOS调试（如Android、Window Mobile、Linux、WinCE等），支持多核调试，支持远程调试，同时具有快速，可靠调试、编程和可视化图形界面，是一个先进、实时，在线调试高端应用的仿真器。



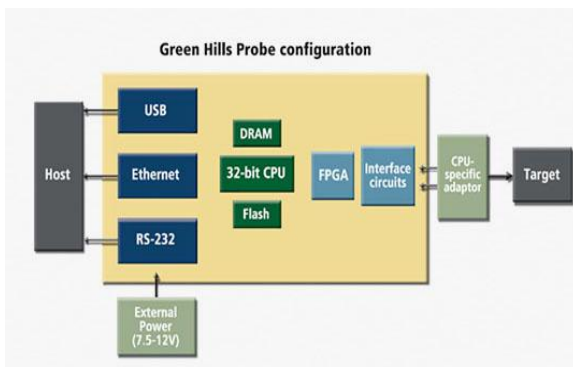
产品主要特征

- 100+ MHz sustained JTAG TCK rates
- 10+ MB/second sustained download speed
- Gigabit Ethernet
- USB 2.0 High Speed
- Web 2.0 user interface for configuration
- RoHS, PSE, and CEC compliance

支持的处理器

AMD Alchemy

- ARC
- ARM/Thumb/Xscale
- Broadcom
- ColdFire
- DaVinci
- Intel Architecture
- MIPS32/MIPS64
- OMAP
- NXP (ARM, MIPS)
- Power Architecture
- STMicroelectronics (ARM)
- Super-H/SH
- Texas Instruments (ARM)
- Toshiba
- TriCore





SuperTrace Probe仿真器

SuperTrace Probe仿真器是美国Green Hills软件公司针对嵌入式系统调试工具之一，它能很好地与MULTI IDE无缝集成，是一套对处理器的调试和分析的跟踪工具，为开发者在开发高性能、实时嵌入系统中调试特殊问题时提供先进的可视化手段。这些实时的可视的详细信息可用来查找复杂的、断断续续的问题所在，也可以用来在系统优化中分析、展现和调整应用。SuperTrace Probe仿真器是一个先进，实时，具有跟踪功能的在线调试器，集调试，测试和验证的高端应用于一身。

主要优势

- Captures up to 8 GB of trace data, enabling analysis of hundreds of millions of instructions
- Collects trace data at core clock rates up to 1.2 GHz and trace port speeds over 300 MHz
- Supports processors with and without built-in trace ports
- Tight integration with TimeMachine Debugging Suite
- Offers sophisticated analysis tools for quickly locating key execution points in large datasets
- Virtual memory-aware for tracing INTEGRITY-based applications

支持的处理器

- ARM7™, ARM9™, ARM11™ with ETM, Cortex™-M3, Cortex™-R4, Cortex™-A8, and Cortex™-A9
- PowerPC™ 405 and 440
- Freescale™ MAC71xx family (ARM)
- Freescale™ Power Architecture™ MPC55xx/56xx.57xx and PX families
- Freescale™ i.MX (ARM)
- Freescale™ ColdFire® MCF52xx/53xx/54xx families
- TI OMAP™1/2/3/4 (ARM)
- Toshiba TX49xx family



产品规格

Trace Memory and Timing

- 8 GB (higher capacities available)
- 7.5 ns timestamp

Communications

- 10/100/1000Base-T Ethernet
- USB 2.0 High-Speed

Trigger In/Out

- SMB in: 50 Ohm , average 50 ns delay , 0 - 15 Volts
- SMB out: 1 kOhm , average 50 ns delay , 0 - 3.3 Volts

JTAG Debug Port

- JTAG clock: 2 kHz – 120 MHz
- JTAG logic levels (Volts): 3.3、 2.5、 1.8、 1.3

Size and Weight

- Width: 7.5 inches
- Depth: 7.25 inches
- Height: 2.5 inches
- 3.75 pounds

Environmental

- 0-50° C
- up to 85% non-condensing humidity

Compliance

- FCC Class A
- EN 61326-1:2006
- RoHS-compliant



Green Hills Software典型应用案例

Green Hills Software is...



...Software that is **Powerful**

Lockheed Martin is using Green Hills Software's INTEGRITY-1788 RTOS and AdaMLSTM IDE to develop safety-critical and security-critical software for the F-35 Joint Strike Fighter (JSF). Lockheed Martin's design for the JSF was selected by the Department of Defense (DoD) in a \$200 billion award, the largest in US DoD history. AdaMLSTM software developed by Lockheed Martin is running on INTEGRITY-1788 in multiple airborne, Power Architecture-based systems.



Visit Our Web Site: www.ghs.com

Lockheed Martin F-35 JSF

Green Hills Software is...



...Software that **Guides**

Northrop Grumman is using Green Hills Software's INTEGRITY-1788 RTOS to produce a PowerPC-based inertial navigation system for the Airbus A380, providing 4 times the reliability of traditional systems. The long-range Airbus A380, seating up to 854 passengers at a length of 231 feet, will be the industry's largest commercial airplane.



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Northrop Grumman

Green Hills Software is...



...Software that **Detects**

CEA Technologies uses Green Hills Software's INTEGRITY-1788, REALITY IDE, Green Hills Probe, and extending middleware to develop the fully-digital CEAFAAR Active Phased Array Radar. The CEAFAAR is a multi-function Digital Beam Forming Radar installed on board the Royal Australian Navy's ANZAC Class Digital Beam Forming Radar installed on board the Royal Australian Navy's ANZAC Class Digital Beam Forming Radar. CEAFAAR provides capabilities for features such as 3D volume search, surface search and fire control support. Green Hills Software was selected for its absolute reliability and productivity enhancing debugging capabilities.



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CEAFAAR Active Phased Array Radar

Green Hills Software is...



...Software that **Launches**

Japan Aerospace Exploration Agency (JAXA) has adopted Green Hills Software's REALITY development tools, compiler and debug probe, as their standard MPS-based development environment for the H-IIA/H-II launch vehicles GuidanceControl System. The H-IIA/H-II launch vehicles are capable of launching four to eight-ton geostationary satellites.



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Japan Aerospace Exploration Agency

Green Hills Software is...



...Software that **Explores**

Northrop Grumman is using Green Hills Software's Platform for Avionics safety-critical systems, including the command computer, sub-RTOS, Orion crew exploration vehicle. Lockheed Martin selected Green Hills Software's INTEGRITY-1788 and the safety-critical AdaMLSTM-1788 RTOS for use in the spacecraft's Avionics system, including the Flight Control Module (FCM), Guidance/Control/Communication Adapter (GCCA), and Backup Emergency Controller. Green Hills was selected to be the most technically robust and offering a most economical solution off the shelf solution.



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NASA's Orion crew exploration vehicle

Green Hills Software is...



...Software that is **First-Class**

Bombardier, the global leader in rail technology, is using Green Hills Software's BC 4160M32 safety-critical RTOS/RTOS-1788 and REALITY integrated development environment on the safety platform for its next-generation Data Control Management System (DCMS). The DCMS will run software with multiple levels of safety-criticality concurrently on a single processor and enables code and certification reuse. Green Hills Software was selected for safety, reliability and proven path to CENELEC EN 50128 safety certification.



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Bombardier

Green Hills Software is...



...Software with **Foresight**

Kaiser Electronics, a major producer of Head-Up, Head-Down, and Helmet Mounted Displays, is using Green Hills Software's Optimizing AdaMLSTM-1788 RTOS and AdaMLSTM-1788 integrated Development Environment to produce PowerPC- and Pentium-based cockpit display systems software for our Nation's most advanced aircraft.



Visit Our Web Site: www.ghs.com

Kaiser Electronics

Green Hills Software is...



...Software that **Rockets**

Japan Aerospace Exploration Agency (JAXA) has adopted Green Hills Software's REALITY development tools, compiler and debug probe as their standard MPS-based development environment for the Space launch vehicle GuidanceControl System. The Space launch vehicle is a next-generation solid-fuel rocket designed to reduce the costs and complexity of rocket launches, allowing launches to become everyday events.



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Japan Aerospace Exploration Agency

Green Hills Software is...



...Software that **Stores**

EMC Corporation is using Green Hills Software's REALITY IDE and family of debug probes including SingleShot and the Green Hills Probe in the development of the EMC Symmetrix ONE—the leading storage solution for high-end data environments. EMC systems deliver management performance, disaster recovery, rock-solid business continuity protection, and the robust software functionality available.



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EMC Corporation

关于 Green Hills Software



Green Hills Software成立于1982年，是全球最大的独立嵌入式系统开发解决方案提供商。2008年，Green Hills INTEGRITY-178B实时操作系统是市场首款也是唯一获得由美国NSA和NIST成立的国家信息安全保障联盟（NIAP）认证的EAL6+高稳健性操作系统，这是软件产品有史以来取得的最高安全等级的认证。其开放式架构集成开发解决方案可满足深度嵌入、绝对安全和高可靠性应用的需求，适用于对工业级认证解决方案有需求的市场，包括军事 / 航天、医疗、工业、汽车、网络以及消费电子等。Green Hills Software总部设在美国加州圣巴巴拉，欧洲总部设在英国。

□ 30 Years of Leading the Embedded Software Industry in Safety and Security Certified Solutions

- RTCA/DO-178B Level A
- SKPP/High Robustness, Common Criteria EAL6+
- FDA Class II and Class III
- IEC 61508 SIL 3
- CENELEC EN 50128 SWSIL 4

□ Technology Innovator

- Safe, Secure, Certified, Real-Time Operating Systems
- Complete IPv4/v6 Networking, Routing
- Secure Guest Operating System Virtualization
- Static Analysis Tools
- Integrated Development Environment
- Advanced Target Trace Debugging
- Gold Standard for Optimizing C/C++ Compilers
- Hardware Debug Probes





携手开拓无限可能

Together to create all possible