

Sun™ Studio 10 Software for Solaris™ Platforms

Developing Reliable, Scalable, and High-Performance Applications
for the Solaris™ Operating System



Key feature highlights

- Complete developer toolset for creating the most performant applications on Sun's latest hardware, including UltraSPARC®, Intel Xeon-based, and the newest AMD Opteron processor-based systems, including AMD64 processors
- Sun™ Studio 10 software benchmarks show compile-time and runtime improvements on x86 systems of up to 60 percent over open source alternatives
- Standards-compliant C and C++ language systems to build high-performance applications on Sun's Solaris™ Operating System
- Standards-compliant FORTRAN 95 language systems and Sun Performance Library™ software for advanced matrix algebra and signal processing calculations allow high-performance scientific applications to be created on Sun's Solaris Operating System
- Complete support for building high-performance 64-bit applications on the Solaris Operating System for SPARC® and x86 platforms, including AMD64 and Intel Nocona processors
- "Template template parameters" and byteswapio in Fortran
- Intuitive integrated development environment (IDE) — built on the NetBeans™ open tools platform and tuned for the needs of the C, C++, and Fortran developer — that enables applications to be edited, compiled, debugged, and tuned easily
- Visual GUI builder to develop graphical user interfaces in the C, C++, and Java™ programming languages

Sun™ Studio 10 software makes it simple to get outstanding performance when developing C, C++, and Fortran for the Solaris™ Operating System. It provides a comprehensive, productive environment for developing scalable 32-bit and 64-bit applications on Sun's newest UltraSPARC®, Intel Xeon, and AMD Opteron processor-based systems. In addition, Sun Studio 10 software provides the industry's first debugger and performance analysis tools that can handle both Java™ and non-Java components in a single application. These tools can significantly help cut your development time and increase your team's productivity.

64-Bit Application Development

Sun's developer products support development of both 32-bit and 64-bit applications on SPARC® and x86 platforms. The 64-bit technology offers a variety of benefits to developers, including:

- *64-bit Address Space*: Increase the capacity of problems you can solve, or run problems entirely in RAM for a huge performance boost.
- *64-bit Integer Arithmetic*: Increase the calculation speed for mathematical operations.
- *Large Files (>4 GB)*: Store and manipulate large quantities of data without splitting it into multiple files.

With 64-bit technology, your applications can solve larger, more complex problems than ever before.

High-Performance Compilers

Sun Studio 10 software offers significant boosts in execution speed over previous versions:

- C++ compiler supports ISO/IEC C++
- C compiler supports the 1999 and 1990 ISO standard C, and K&R C (full 1999 ISO C requires the Solaris 10 OS)
- Fortran 95 compiler fully supports ISO/IEC Fortran 95 as well as new language constructs from the emerging Fortran 2003 standard, and is now available for the x86 platform
- Optimized code generation for UltraSPARC systems enables applications to run faster
- New Pentium-specific optimizations, such as SSE and SSE2, provide faster application runtime on the x86 platform

“Sun Studio tools continue to improve the performance of our applications for the Solaris platform and productivity for our C-based development environment. We find the debugging and performance analysis capabilities to be world-class and the tools to be an invaluable asset in our aggressive product release cycles.”

– Clarke Thacher, Senior Software Manager for SAS/UNIX® platforms

Turbocharge Applications With Multithreading Technology

Sun Studio 10 software can help you achieve higher system throughput with multithreaded applications. You can build these powerful applications using capabilities such as OpenMP v2.0 API support (SPARC platform only) for C, C++, and Fortran code, and improved performance analysis tools.

Boost Programming Productivity and Application Quality

The Sun Studio 10 integrated development environment (IDE) is built on the award-winning NetBeans™ platform. The IDE integrates modules such as text editors, tools for working with source code (C, C++, Fortran, and Java), performance analysis tools, a GUI builder, and more. The IDE is easy to use, yet designed to meet the demands of even the most sophisticated development needs.

Integrated editors help you write and understand programs more quickly. You can easily traverse build errors in source code via hyperlinks or be more productive writing code with your choice of integrated editors.

Debugging is easy with the graphical user interface, which can provide a significant boost from basic to advanced features. Set breakpoints, examine variables, and navigate the call stack — all via the debugger’s convenient menus and buttons. Slash turnaround time for fixes and achieve greater debugging productivity with Fix and Continue. You can even debug mixed languages (C, C++, Fortran, and Java) seamlessly.

To improve application quality, advanced features such as Runtime Checking can help you catch hard-to-find bugs like memory access violations and memory leaks — before putting the application into production. You can also tune for best application performance with sophisticated performance analysis tools.

Sun Studio 10 software also includes an incremental linker to significantly reduce the link time of changes to your large applications during the debug cycle.

Develop Client-Server Applications — Quickly

The included X-Designer software helps you quickly and easily build sophisticated GUI applications with greater quality. Existing GUIs can be imported even if there is no source code. Upon design completion, a built-in code generator automatically generates portable C, C++, or Java source code at the touch of a button. Based on standard Internet protocols, you can build Java technology-based front ends to existing C and C++ server-based applications and deploy clients on any platform supporting Java applications.

Language Development Systems

C compiler offers:

- Support of the following standards:
 - ISO/IEC 9899:1999 C (full support requires the Solaris 10 OS)
 - ISO/IEC 9899:1996 C
 - K&R C
- Mixed-mode capabilities to ease K&R to ANSI C transition
- OpenMP C v2.0 API support (SPARC platform only)
- Automatic Precompiled Header (PCH) support
- Thread-local storage (TLS) for multithreaded applications
- Lint security checks for a more robust application
- Native Connector Tool support, allowing Java applications easy access to native C functions and data objects

Native C++ compiler offers:

- Support for the ISO/IEC 14882:1998 C++ standard
- Compatibility mode for easy migration from prestandard (ARM-style) ISO/IEC C++
- Choice of the Sun binary-compatible default or STLport standard library
- OpenMP C v2.0 API support (SPARC platform only)
- Improved support and reduction of compilation time for programs using templates
- Automatic Precompiled Header (PCH) support
- Thread-local storage (TLS) for multithreaded applications
- Native Connector Tool support, allowing Java applications easy access to native C++ functions and data objects

Libraries offer:

- IEEE 754 floating-point arithmetic
- Single-, double-, and quadruple-precision floating-point numerical formats
- Algebraic, transcendental, financial, rounding, conversion, and random number functions
- Multithreading support throughout the C++ libraries
- Garbage collection to eliminate memory leaks
- Tools.h++ Class Library Version 7.1.0
- File space management
- Multithreading compatibility with both UNIX® and POSIX threads

Fortran 95 compiler¹ offers:

- Automatic loop parallelization
- Sun and Cray-style parallelization directives in Fortran

- Global Program Checking across multiple source files, now extended to perform static verification of OpenMP directives (SPARC platform only)
- Support for the following standards:
 - ANSI X3.198-1992 Fortran 90
 - ISO 1539:1991 Fortran 90
 - ISO/IEC 1539-1:1997 Fortran 95
- Improved support for the emerging Fortran 2003 standard; new intrinsics for processing command line arguments and environment variables
- OpenMP Fortran v2.0 API support
- New autoscopying for OpenMP Codes
- Cray extensions, such as Cray POINTER
- Compatibility with the discontinued Forte™ Compiler FORTRAN 77

Sun Performance Library™ component² offers:

- Numerical routines optimized for maximum performance that are callable from C, C++, or Fortran, including:
 - LAPACK version 3.0
 - BLAS - 1,2,3
 - NetLib Sparse BLAS
 - NST Fortran Sparse BLAS version 0.5
 - Fast Fourier Transform (FFT) routines
 - Convolution and correlation routines
- Support for single-processor or multiprocessor systems
- Support for Fortran 95 language features
- SPARC libraries, with performance improvements for the latest SPARC chips
- Hot-spot tuning for key BLAS routines (SPARC platform only)
- Support for 64-bit code on UltraSPARC platforms

Integrated Development Environment (IDE)*Editing*

- Choice of three tightly-integrated editors (built-in NetBeans, Vim, and XEmacs) for editing and browsing with hyperlinks that enable easy navigation and referencing

Building

- Executes build jobs in parallel on single or multiple machines distributed on a network

Debugging

- Graphical and command line debugging of:
 - Multithreaded applications
 - Shared and dynamically linked libraries
 - Running processes
 - Core files
 - Assembly language programs
 - Java language support for seamless stepping through C, C++, Fortran, and Java programs
- Fix and Continue
 - Make source changes, recompile, and patch an existing application without leaving the debugger
- Program control and data evaluation features
 - Set conditional breakpoints, postbreak modifiers, and watchpoints
 - Trace program statements and variables
 - Navigate the call stack
 - Evaluate expressions and functions
 - Monitor variables and expressions

1. The Fortran 95 language compiler is now available for the x86 platform.

2. The Sun Performance Library component is now available for the x86 platform, 32-bit only.

Runtime Checking

- Detects memory access violations, runtime memory usage, and memory leaks:
 - Read/write from/to unallocated memory
 - Write to read-only memory
 - Read from uninitialized memory
 - Misaligned read/write
 - Bad/misaligned/duplicate free
 - Out of memory
- Integrated with debugger
 - Interactive or batch operation

Performance Analysis Tools

Performance analysis tools help you assess the performance of your program, identify potential performance problems, and locate the section of the code where the problems occur. The tools can collect clock- and hardware-counter-overflow profile data and trace calls to some library routines. They also display metrics of performance for functions, callers and callees, source lines, and instructions for applications written in C, C++, Fortran, Java, or combinations of those languages.

- Visualize performance bottlenecks via an execution timeline
- Display performance metrics for Java programs on a per-method basis for methods that are compiled with the Java HotSpot™ virtual machine
- Enable collection of runtime performance statistics
- Graphically display user, system, lock, wait, and page fault times
- Provide memory and cache analysis of references to program data structures
- Generate an optimized linker load map
- Generate annotated source code or disassembly, including compiler commentary for pinpointing performance problems
- Display thread and LWP metrics for multi-threaded programs

- Filter data by samples, threads, LWPs, CPUs, or any combination
- Provide an API for programmatic control of data collection
- Solaris Kernel can now be profiled, and the Performance Analyzer shows function, caller-callee, and instruction-level data, as well as the Timeline (requires the Solaris 10 OS)

Java Technology Support

Sun Studio 10 provides the following features to support work integrating the Java language with the traditional languages (C, C++, and Fortran):

- The Native Connector Tool, which wraps C and C++ functions and data objects and exposes them as Java classes, enabling the deployment of legacy code as Web services
- The Debugger, supporting mixed languages (C, C++, Fortran, and Java classes) for Java Native Interface (JNI) debugging
- The Performance Analyzer, allowing for tuning of Java code
- Basic Java 2 Platform, Standard Edition (J2SE™) technology support, for building and syntax highlighting in text editors (also available via a menu option)

Multithreading Development Tools

Multithreaded Debugging and Analysis

- Browse, select, and view active threads
- Control, evaluate, and modify specific threads
- Monitor thread entry point, current location status, pending event, and lightweight process
- Displays performance data by thread using the new Timeline display in the Performance Analyzer

Multithreaded Locking Analysis (LockLint)

- Static source code analyzer for ANSI C code
- Captures locking design assertions
- Reports on potential synchronization errors, deadlock, and data race conditions

Multiprocessing (MP) Optimizations

- Automatic parallelization of C, C++, and Fortran code — detects loops that can be executed in parallel and generates code to distribute execution on SPARC SMP and CMT systems
- Automatic parallelization and vectorization support for AMD Opteron processors
- Integrated in compiler optimization phases, avoiding source code preprocessing
- Support for the OpenMP C, C++, and Fortran v2.0 APIs

Visual GUI Builder*Thin-Client, Client-Server Connectivity*

- Grouping to reference multiple widgets optimally
- Generates toolkit independent callbacks
- Internet Smart Code provides immediate access to preexisting Web pages or CGI programs

C and C++ Code Generation

- Generates highly portable code — quickly
- Supports definition of widgets with additional structure in generated code
- Offers code preludes — user-defined code to be inserted into generated code or an X resource file at specific points
- Stubs file creation for callbacks
- Provides incremental make file generation

Java Programming Language Code Generation

- Supports Java and Swing technology
- Implements Motif widgets in Java technology for easy migration from Motif

Zero to Application in Seconds

- Quickly generates application template with AppGuru feature

Capture for Reengineering

- Breathes new life into old Motif applications
- Re-creates the interface design of a running Motif application in C++
 - Enables migration of old GUIs to extensible ones

Testing and Problem Re-Creation

- Record and play back Motif GUI applications to:
 - Automate the testing of an application
 - Re-create problems found in an application
 - Develop tutorials or demonstrations

Drawing Features

- Layout editor
 - Drag widgets in place to build your interface
 - Supports easy design layout, including features such as automatic align and distribute with a multilevel undo option
- Font editor
 - Enables user selection of font styles and sizes
 - Bind fonts to objects; easier design revision
 - Supports internationalization
- Advanced color pixmap editor
- Extensible widget palette

Cross-Platform Development

- Creates Motif, Java, or Microsoft Windows GUIs from the same design
 - Compliant with OSF/Motif 1.2.3 and 2.1 specifications
 - Generates Microsoft Foundation Class-ready interfaces and resource files (for Microsoft Windows)
- Develop on the Solaris Operating System; deploy on Solaris, Linux, Java, and Microsoft Windows platforms

Licensing

- Product entitlement based on serial numbers eases license installation and administration
- Royalty-free runtime library (.so) distribution
- Attractive upgrade pricing available for existing licensed users

Serious Software Made Simple

Sun provides a complete portfolio of affordable, interoperable, and open software systems designed to help you maximize the utilization and efficiency of your IT infrastructure. Built from the secure, highly available foundations of UNIX and Java, these systems deliver implementations that are preintegrated and backward compatible.

Sun's portfolio consists of Solaris and Linux software for SPARC and x86 platforms, the N1™ Grid platform for dynamic and utility computing, and the Sun Java System — five integrated software systems for the data center, the desktop, the developer, mobile devices, and identity implementations.

About Sun Microsystems, Inc.

Since its inception in 1982, customers have continually turned to Sun to help them grow their business, lower their costs, and gain competitive advantage. Sun is a leading provider of industrial-strength hardware, software, services, and technologies that make the Net work.

Sun™ Studio 10 Software for Solaris™ Platforms

Platforms and Requirements

Operating Systems and Platforms

Solaris 8, 9, and 10 Operating Systems — Entire Solaris Software Group, Entire Solaris Software Group Plus OEM Support, or Developer Solaris Software Group

SPARC Platforms

- Recommended: Sun Blade™ server (750-MHz, UltraSPARC III processor)
- Minimum: Sun Ultra™ 60 server (450-MHz, UltraSPARC II processor)

x86 Platforms

- x86 Architecture
 - Recommended: AMD Mobile Athlon XP 1800+ 1.53 GHz (Sun Fire™ B200x Blade server) and Intel Xeon 2.0 GHz (Sun Fire V60x server) system
 - Minimum: Pentium III 500 MHz system
- AMD64 Architecture
 - Recommended: Sun Fire V40x server, Sun Java Workstation W2100zs, and Sun Java Workstation W1100z
 - Minimum: Sun Fire V20z server

System Requirements

SPARC Platforms

- Memory: 512 MB of memory minimum; 1 GB recommended
- Disk Space: 1.6 GB
- CD-ROM for installation
- Minimum 15-inch monitor with 1152x900 resolution

x86 Platforms

- Memory: 512 MB of memory minimum; 1 GB recommended
- Disk Space: 0.8 GB
- CD-ROM for installation
- Minimum 15-inch monitor with 1024x768 resolution

Learn More

Get the inside story on the trends and technologies shaping the future of computing by signing up for the Sun Inner Circle program. You'll receive a monthly newsletter packed with information, plus access to a wealth of resources. Register today at sun.com/joinic.

Sun Microsystems, Inc. 4150 Network Circle, Santa Clara, CA 95054 USA Phone 1-650-960-1300 or 1-800-555-9SUN Web sun.com



Sun Worldwide Sales Offices: Argentina +5411-4317-5600, Australia +61-2-9844-5000, Austria +43-1-60563-0, Belgium +32-2-704-8000, Brazil +55-11-5187-2100, Canada +905-477-6745, Chile +56-2-3724500, Colombia +571-629-2323, Commonwealth of Independent States +7-502-935-8411, Czech Republic +420-2-3300-9311, Denmark +45 4556 5000, Egypt +202-570-9442, Estonia +372-6-308-900, Finland +358-9-525-561, France +33-134-03-00-00, Germany +49-89-46008-0, Greece +30-1-618-8111, Hungary +36-1-489-8900, Iceland +354-563-3010, India-Bangalore +91-80-2298989/2295454; New Delhi +91-11-6106000; Mumbai +91-22-697-8111, Ireland +353-1-8055-666, Israel +972-9-9710500, Italy +39-02-641511, Japan +81-3-5717-5000, Kazakhstan +7-3272-466774, Korea +82-2193-5114, Latvia +371-750-3700, Lithuania +370-729-8468, Luxembourg +352-49 11 33 1, Malaysia +603-21161888, Mexico +52-5-258-6100, The Netherlands +00-31-33-45-15-000, New Zealand-Auckland +64-9-976-6800; Wellington +64-4-462-0780, Norway +47 23 36 96 00, People's Republic of China-Beijing +86-10-6803-5588; Chengdu +86-28-619-9333, Guangzhou +86-20-8755-5900; Shanghai +86-21-6466-1228; Hong Kong +852-2202-6688, Poland +48-22-8747800, Portugal +351-21-4134000, Russia +7-502-935-8411, Saudi Arabia +9661 273 4567, Singapore +65-6438-1888, Slovak Republic +421-2-4342-94-85, South Africa +27 11 256-6300, Spain +34-91-767-6000, Sweden +46-8-631-10-00, Switzerland-German 41-1-908-90-00; French 41-22-999-0444, Taiwan +886-2-8732-9933, Thailand +662-344-6888, Turkey +90-212-335-22-00, United Arab Emirates +9714-3366333, United Kingdom +44-1-276-20444, United States +1-800-555-9SUN or +1-650-960-1300, Venezuela +58-2-905-3800, or online at sun.com/store

SUN © 2004 Sun Microsystems, Inc. All rights reserved. Sun, Sun Microsystems, the Sun logo, Forte, Java, Java HotSpot, J2SE, NetBeans, N1, Solaris, Sun Blade, Sun Fire, Sun Performance Library, Ultra, and The Network is the Computer are trademarks or registered trademarks of Sun Microsystems, Inc. in the United States and other countries. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. in the U.S. and other countries. Products bearing SPARC trademarks are based upon an architecture developed by Sun Microsystems, Inc. UNIX is a registered trademark in the United States and other countries, exclusively licensed through X/Open Company, Ltd. Information subject to change without notice. 11/04 R1.0