Linux® Development Environment for the SGI® Altix® Family

Development Environment for Compute- and Data-intensive 64-Bit Linux Applications

Features

- Tuned for the SGI Altix server family: Take advantage of the world's most scalable Linux platform
- Designed for HPC: Quickly create elegant, high-performance solutions to compute- and data-intensive problems
- Industry-standards support: Develop robust, portable solutions

With its focus on high-productivity computing environments, SGI has contributed to Linux scalability, scheduling, memory usage, I/O, and other efforts critical to high-demand application performance. Now, with the SGI® Altix™ family of servers and superclusters, Linux supports performance and scalability levels previously only attainable with proprietary UNIX® operating systems. Development tools for SGI platforms are designed to make sure you get the most out of these capabilities. They give you access to the SGI Altix family's powerful NUMAflex™ architecture, including support for shared memory across cluster nodes and high-performance I/O capabilities. With SGI Altix, you can choose from a large collection of debuggers, performance analysis tools, and other development aids available from SGI third-party software suppliers, and the open-source community.

Industry Standards

The Linux community offers a broad selection of applications and tools to solve all kinds of business, technical, and systems administration problems, as well as a rich set of development tools and features. Linux software for SGI systems is designed and configured to ensure compliance with industry standards, so that you can run commercial Linux applications, open-source software, and your own standards-compatible codes on your Altix system.

Development Languages and Libraries

These tools from SGI, Intel®, other third parties, and the open-source community are designed to help you create and run high-performance applications efficiently.

Major languages: High-performance compilers are available from Intel and the Free Software Foundation.

- **Intel® compilers for Linux:** The Intel® C/C++ Compiler for Linux and Intel® Fortran Compiler for Linux offer strong industry standards support and advanced optimization features. SGI works closely with Intel on the specification of these compilers to ensure that they can take full advantage of the Altix architecture. They can be purchased directly from SGI, and include one year's support.

Libraries: These products from SGI and third parties can help you create high-performance applications efficiently, producing effective solutions for a lower development cost.

- **SGI® Message Passing Toolkit (MPT):** Effectively utilizing resources in a large multiprocessor system can be a complex undertaking. SGI Message Passing Toolkit is an optimized set of the MPI and SHMEM parallel programming libraries, tuned to give your application access to the full power of the SGI Altix 3000 architecture. These libraries implement an innovative "global pointer" construct that allows jobs to address both local and remote memory regions, crossing node boundaries without a performance penalty. MPT and SHMEM one-sided (put/get) communication and other features in MPT can provide as much as half the send/recv latency and many more times the bandwidth normally achieved with MPICH.
- **SGI CPU sets and memory placement:** These features enable system services and applications to specify on which CPUs they may be scheduled and from which nodes they may allocate memory. This gives users maximum flexibility in resource allocation and can help deliver fast, repeatable run times on mission-critical work.

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- **SGI clustering software (Array Services):** The Array Services software package contains a library, a system daemon, and a set of commands that enable developers to define and administer cluster configurations and manage the set of jobs running on the cluster.
- **SGI Scientific Computing Software Library (SCSL):** SCSL is a comprehensive collection of scientific and mathematical functions that have been optimized for use on Altix systems. The libraries include optimization of basic linear algebra subprograms (BLAS), a linear algebra package, signal processing functions such as fast Fourier transforms (FFTs) and linear filtering operations, and include support for direct sparse solver functions.
- **SGI Flexible File Input/Output (FFIO):** This library allows programmers to control specifics of I/O transfers to maximize performance.
- **Intel® Math Kernel Library (MKL):** The Intel MKL is composed of highly optimized mathematical functions for engineering and scientific applications requiring high performance on Intel platforms. The functional areas of the library include linear algebra consisting of LAPACK and BLAS, fast Fourier transform(FFT), and vector transcendental functions.
- **Intel® Integrated Performance Primitives (IPP):** The IPP is a cross-platform library for multimedia, audio codecs, video codecs, image processing, signal processing, speech compression, computer vision, and mathematical functions, with support for audio and video as well as for matrix and vector math.

Debuggers

These tools provide a faster time to solution, and are designed for your complex compute-intensive codes.

- **Intel® Debugger (idb):** Bundled with the Intel compilers and supports MPI and threads for multithreaded application support.
- **Etnus® TotalView™:** An advanced debugger for complex and parallel code, scales transparently to support codes running on thousands of processors.

Performance Analysis Tools

Critical tools used to help you get the best possible application performance.

- **SGI® Performance Co-Pilot™:** Track performance at the system-resource level to help identify potential areas for efficiency optimization. Invaluable to SGI engineers during the Linux scaling process, this tool can provide enormous benefit to system administrators and programmers who need optimal performance.
- **pfmon:** A performance tuning tool for experts, pfmon allows users to collect performance data at the command line. It uses Itanium Performance Monitoring Unit (PMU) to do counting and sampling on unmodified binaries.
- **Intel® VTune™** Performance Analyzer: Used to identify and locate performance bottlenecks in code. TheVTune analyzer collects, analyzes, and displays software performance data from the system-wide view down to a specific function, module, or instruction. VTune is available in native Linux form as a command-line version and also as a product with a Linux data collector, requiring a Windows console for display of graphical results.
- **Intel® Trace Analyzer and Intel® Trace Collector:** Formerly known as Vampir and Vampirtrace, these tools enable developers to create and graphically analyze run-time event traces from MPI programs, in order to understand application behavior and identify bottlenecks.
- **SGI® Histx:** Performance analysis tool designed to complement pfmon. It can produce separate reports for individual pthreads, OpenMP API threads, forked processes, and MPI processes. Among the group of tools included with SGI Histx are a profiling tool, a "perfex"-like tool, and a tool that produces a report similar to the SGI® SpeedShop™ “butterfly” report. SGI Histx is freely available, without support, as a download on the SGI Web site.

Developer Programs

The SGI Global Developer Program helps developers create the best possible solutions on SGI platforms. It provides you with a vital connection to SGI, and comes with access to the Developer Central Web site, technical and business newsletters, development tools, increased marketing opportunities, and access to equipment discounts and special promotions. Membership is free to all developers.

Support and Services

With SGI, you get a fully supported solution focused on high performance computing. SGI supports all of the software shipped standard with its servers and superclusters based on Linux Intel and other third parties support their own development tools, and SGI works closely with them and with the open source community to help create and maintain a rich and robust set of development tools. SGI also offers services to implement and integrate Linux applications in your environment. For more information on available services, please see *www.sgi.com/support.* For a list of additional Linux software, please see *www.sgi.com/go/linux/dir.*

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