SGI® IRGO™

HPC Workflow Optimization Features for IRIX®

Highlights

- Run-time optimization: Faster answers
- Development optimization: More-elegant solutions
- Workflow security: Protecting your intellectual property

Productivity takes more than just a fast computer. Accelerating the achievement of breakthrough results takes a technical operating environment that promotes both efficiency and security. SGI, with its 100% focus on high-productivity computing environments, proposes a unique solution: IRGO.

IRGO is a set of HPC workflow optimization features from the IRIX operating environment that are specifically designed to optimize both your run-time and development environments, complete with the peace of mind that your intellectual property is secure. With IRGO, SGI enables tough HPC problems to be solved in ways that far exceed what can be done with generalized e-business operating systems. When the emphasis is on breakthrough ideas, IRGO makes fast computers more productive.

Run-Time Optimization: Faster Answers

Real productivity isn't measured in megahertz or gigabytes; it's measured by the reduction in time and effort you have to invest to reach a solution. IRGO reduces that effort with features that make it easier to run your code faster.

Resource allocation and utilization: Efficient resource management is a major concern for scalable systems. IRGO has features that allow you to achieve and maintain a high degree of productive usage across your system.

- Dynamic load balancing—Allows jobs to be redirected from busy nodes to idle ones on the fly, without intervention from the system administrator
- Weighted prioritization—Allows system administrators to set different priorities for threads in accessing system resources—from real-time threads with guaranteed latencies to "weightless" threads, which receive minimum priority—so systems can be run at high utilization rates with no degradation in performance to core technical jobs
- Job limits and cpusets—Allows system administrators to efficiently allocate resources to specific jobs or processes so core technical jobs can be run without interruption
- Data locality algorithms—Allows data to be intelligently placed into specific nodes for faster access times
- Large page support—Allows large amounts of data to be stored in memory to avoid bottlenecks for complex applications
- Load Sharing Facility from Platform Computing[1]—Allows reliable, on-demand access to computing resources and maintains a continuously balanced workload regardless of programming model
- XFS™ and CXFS™ filesystems—Allows filesystem scalability up to billions of gigabytes without performance degradation, with sharing of remote files at local filesystem speeds and elimination of bottlenecks inherent to copy and transfer of data

Guaranteed real-time response: For some mission-critical applications, a late answer is a wrong answer. When timeliness is as important as accuracy, you need the real-time features of IRGO.

- REACT™ real-time extensions[1]—Provide consistent, guaranteed latency and response times
- Guaranteed-rate I/O—Provides consistent, guaranteed I/O throughput rates for real-time functionality in I/O bandwidth

Productive uptime: Failures sometimes happen, but with IRGO they aren't catastrophes. These IRGO features help shorten your time to solution by maximizing the productive usefulness of your system.

- Checkpoint restart—Saves an application's work in progress as it runs; if a running application is stopped for any reason, it can be restarted from its most recently executed "checkpoint," rather than from the beginning of the run, so all compute cycles are productive ones
- Embedded Support Partner[1]—Automatically notifies SGI support personnel of system outages with remote diagnostic information, so SGI can get your system running again as quickly as possible—sometimes before you are even aware of the outage yourself

Development Optimization: More-Elegant Solutions

There are dozens of hints and tricks for writing elegant HPC code that gets the job done better. IRGO helps developers compile and monitor high-productivity solutions with an environment specifically designed for HPC.

Optimized MIPSpro™ compilers: With hundreds of options and flags for HPC compilation, MIPSpro compilers give programmers unmatched flexibility in creating scalable high-productivity solutions.

- Advanced code optimizations—Provide optimizations such as software pipelining and inter-procedural analysis
- Automatic Parallelization Option—Allows novice programmers to achieve optimized parallel code
- Advanced standards support—Includes OpenMP™ 2.0 and ANSI C99

Binary-compatible release streams: SGI employs a release-stream distribution model for IRIX that gives developers stability.

- Maintenance release stream[2]—Gives developers regular hardware support and bug-fix updates while maintaining forward and backward binary compatibility, so the development environment on all IRIX® 6.5 systems is equivalent
- Feature release stream[2]—Allows users to adopt the latest new functionality in IRIX as soon as it becomes available

Advanced programming tools and libraries: Jobs are easier when you have the right tools. IRGO contains an assortment of tools for HPC optimization.

- ProDev™ WorkShop—Provides the specific tools required for debugging large, scalable application code and supports multiprocessor programming interfaces including MPI, OpenMP, and POSIX threads
- Message Passing Toolkit—Optimizes the performance of MPI codes running over the SGI® NUMAflex™ architecture
- SCSL scientific libraries—Provide the specific library calls needed for technical and scientific applications

Superior performance monitoring and analysis: Once your application is ready to deploy, IRGO helps you understand and improve its performance.

- SGI® SpeedShop™ software—Helps to identify and eliminate programming bottlenecks
- Performance Co-Pilot™[1] software—Tracks performance at the system resource level to help identify potential areas for efficiency optimization

Standards compliance: The IRIX 6.5 operating system is certified to meet industry certifications, including COE and Open Groups Standards Compatibility (including UNIX® 95, UNIX® 98[3], C99, and POSIX).

Workflow Security: Protecting Your Intellectual Property

Across all segments of commercial, governmental, and research environments, all HPC solutions are creating models of critical data that represents the organization's core intellectual property. IRGO helps keep that data secure, with certified, multilevel security features and standards compliance.

Trusted IRIX™[1]: For environments that require the highest degree of certified, multilevel security, Trusted IRIX provides total security against unauthorized or accidental data leaks. Multilevel data classification keeps confidential data from being stored or displayed in ways that would compromise its security.

Standards compliance: The IRIX 6.5 operating system is certified to meet critical industry standards for security, including CAPP and LSPP.

[1] Purchased separately
[2] SGI support contract required
[3] UNIX 98 certification pending; expected first-half calendar year 2003

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