

Solaris™ 10 Operating System Performance Advantages



Increasing demand for more throughput while managing the same — or even reduced — resources is a critical issue in today's business computing environment. The Solaris™ 10 OS opens new doors for breakthrough small system performance gains. In fact, it outperforms the competition on customer applications, as well as industry-standard benchmarks.

Optimizing performance and efficiency is a joint effort of underlying technologies, system configuration and utilization, tools, applications, and system tuning. A newly enhanced TCP/IP stack in Solaris 10 lowers overhead by reducing the number of instructions required to process packets. In addition, Solaris Dynamic Tracing (DTrace) makes it possible to delve deeply into today's complex systems when troubleshooting systemic problems in real time or diagnosing performance bottlenecks on the fly. And system performance optimization with the Solaris 10 OS running on x64/x86-based systems allows head-to-head comparisons to Linux and BSD.

Solaris™ 10 performance enhancements

- Delivers near-linear performance gains: 92 percent for database applications, and 88 percent for Java™ platform applications
- Speeds up Web workload processing by 47 percent on SPARC® platforms with four processors over Solaris 9, and more than 80 percent over Solaris 8
- Increases Web workloads on x86 architecture systems, delivering up to 43-percent improvement over Solaris 9 with two processors
- Increases Secure Sockets Layer (SSL) Data Encryption Standard (DES) performance by 77 percent. Performance for 3DES increases by 130 percent over Solaris 9

- Improves performance up to 38 percent for Solaris 10 over Linux on dual-processor Sun Fire™ systems
- Outperforms commercial distributions of Linux on x64 systems
- Sets performance and price/performance world records on multiple platforms

Superior networking performance

Since its first introduction, Solaris 10 has included an enhanced TCP/IP stack. By optimizing the code and making it easier to develop drivers supporting new hardware technologies, customers have seen as much as 50-percent speed increases when moving network-based applications to Solaris 10. An enhanced software stack not only reduces CPU overhead when processing network packets, but also improves scalability. More network connections can be supported, and throughput can scale linearly with the number of CPUs and interface cards. This enables the latest 10-Gigabit cards to deliver throughput converging on wire speed. The latest Solaris innovations ensure optimized handling of interrupts for the UltraSPARC™ T1 processor, and in-kernel acceleration of SSL traffic.

Highlights

- Performance gains for all network-intensive applications
- Up to 50x performance gains through application tuning
- Increased application throughput on systems with one to eight CPUs
- Improved scalability for multi-threaded applications
- Optimized for next-generation CMP and AMD Opteron™ technologies

Application performance tools

With DTrace, system administrators, integrators, and developers can use dynamic instrumentation and tracing capabilities to really see what the system is doing, for both the kernel and user processes. It can also be utilized on production systems without modification to applications. DTrace is a unique, powerful tool that gives a true, system-level view of application and kernel activities, even those running in a Java Virtual Machine. This baseline data gathering reduces the time for diagnosing problems from days and weeks to minutes and hours, enabling faster data-driven fixes.

Improved kernel performance

Latency reduction in the Solaris 10 kernel is the result of workload analysis and micro benchmarking. With the mindset that if another OS is faster, it is a Solaris bug, engineers identified and tackled performance challenges. As a result, many system and library calls sped up by as much as a factor of 15, most of them through fine-tuning kernel algorithms and locating bottlenecks with DTrace. A large number of system calls are improved by 25 percent. To help developers identify performance gaps, the LibMicro4 benchmark was created. It is portable, scalable, extensible, and easy to use. As an aid to the developer community, Sun offers it as open source.

Multithreading advancements

By simplifying underlying thread implementation, existing applications can see dramatic performance and stability improvements without requiring recompilation. In Solaris 10, Threaded Local Storage (TLS) was added, simplifying and improving thread memory utilization. The combination of a new threads model and the latest Java Virtual Machine technology significantly improves SPECjbb2000.

Memory placement optimization (MPO)

The Solaris 10 OS uses MPO to improve memory placement across a server's physical memory, resulting in increased performance. MPO support is extended to UltraSPARC IIIi and AMD Opteron-based systems, in addition to the range of Sun Fire 6800 to Sun Fire E25K server lines. Through MPO, Solaris 10 works to ensure that memory is as close as possible to processors that access it, while still maintaining workload balance within the system. As a result, TPC-H runtime is reduced considerably, TPC-C performance increases, and many high-performance computing (HPC) applications run in half the time.

Learn More

All existing Solaris applications are guaranteed to run on Solaris 10. For more details, please visit sun.com/solaris/guarantee.jsp.

For Solaris 10 world record details, see sun.com/solaris/benchmarks.

Conclusions

A design goal for Solaris 10 was significantly improved performance for all applications. Users immediately benefit from an enhanced network stack, radically improved kernel, advanced tracing technology, and special optimizations for memory allocation and chip multithreading. Solaris customers can improve performance on their existing applications by simply upgrading to Solaris 10.