

ORACLE SOLARIS OPTIMIZATIONS FOR THE ORACLE STACK

BEST PLATFORM FOR ORACLE ENVIRONMENTS

KEY BENEFITS

- World-record performance running Oracle Database, Oracle Middleware and Oracle Applications
- New high-performance, super scalable virtual memory
- Reduced downtime with new Optimized Shared Memory interface
- Kernel Mode Acceleration for Oracle Real Application Clusters (Oracle RAC)
- Faster transparent hardware cryptography acceleration
- Unique Observability with Oracle Solaris DTrace
- High availability and disaster recovery across the Oracle Stack
- Integrated development environment

Enterprises increasingly need to manage cost, reduce time to market, and improve business agility. They need to ensure security, scalability, and reliability for deployment and simplify the management and support of their full solution stack, which most often includes Oracle Databases, Oracle applications, and Oracle middleware. Oracle Solaris 11 is uniquely positioned to address these needs across the Oracle stack.

Engineered together with Oracle hardware, Oracle Database, middleware, and applications, Oracle Solaris 11 delivers unique features to increase performance, streamline management, and automate support for Oracle deployments. To get the most out of your Oracle deployments, Oracle recommends Oracle Solaris 11.

World-Record Performance

Oracle software, running on the combination of Oracle hardware and Oracle Solaris, can leverage many system-level enhancements to deliver optimized performance. Oracle Solaris 11 is architected to provide support for tens of thousands of CPU cores and hundreds of terabytes of memory capacity, practically limitless virtualization and even higher reliability, availability and serviceability (RAS) for future SPARC and x86 servers.

Oracle Solaris 11 takes advantage of Oracle's SPARC architecture – the world's fastest microprocessor and computer system. It is specifically tuned to deliver world-record performance with Java, Oracle Database, middleware and applications. World record enterprise benchmarks with Oracle SPARC T5 can be found at:

<http://www.oracle.com/benchmarks> with more details at <https://blogs.oracle.com/bestperf/>.

New High-Performance, Super Scalable Virtual Memory Subsystem

Customers are running larger databases and more virtual machines on their systems that in turn increase memory requirements. New servers are created to satisfy such needs. For example, Oracle SPARC M5 Servers have 32 TB of memory. Managing such amounts of memory by the Operating System can itself become a challenge. Oracle hardware designers, working with Oracle software engineers, designed a new virtual memory system for Oracle Solaris that could not only scale but also optimized the assignment of memory resources. The result of these efforts is a high-performance, virtual memory system that scales with the size of the system memory. Very large memory pages are now supported with the Oracle Solaris 11.1 virtual memory system that transparently speeds applications such as databases and enterprise applications.

Another performance innovation is the new built-in memory predictor, which monitors large memory page usage and adjusts the size of the memory pages based on application usage patterns. This optimization also helps smaller memory systems by more closely matching the

size of the memory pages with the application needs.

Reduced downtime

Oracle Solaris now includes a new Optimized Shared Memory (OSM) interface, which is a dynamic, NUMA-optimized, granular shared memory that offers flexibility without compromising performance or functionality.

OSM allows dynamic resizing of the Oracle Database system global area (SGA)* without having to reserve memory and reboot the Oracle Database, unlike other operating systems such as IBM AIX or Red Hat Linux. It also allows faster startup of Oracle Database instances by using fewer OSM segments, which can be grown later as needed. The next generation Oracle Database technology is planned to use OSM to allow online resizing of the SGA and avoid downtime.

Oracle RAC Kernel Mode Acceleration

The new Oracle RAC Kernel Mode Acceleration in Oracle Solaris 11.1 filters database block requests destined for the Oracle RAC Lock Manager Service (LMS) ** processes. It directly grants requests for any blocks with uncontended locks, which eliminates the need for LMS itself to do any processing of these requests. This also eliminates user-kernel context switches, and the data copying that otherwise would have occurred. This speeds up the process of granting locks 30-40 percent, and frees up CPU cycles, allowing up to 20 percent higher throughput. This feature is planned for inclusion in the next generation of Oracle Engineered Systems.

Enabling Software in Silicon

Oracle has the unique ability to put software instructions that will accelerate Oracle software into the SPARC processor making the combination of Oracle software on Oracle hardware the optimal choice. An example of this Software in Silicon technology is the offloading of database cryptography tasks on to the SPARC T4 and T5 chips making encrypting database tables near to no overhead.

Oracle Solaris cryptographic framework transparently utilizes the SPARC cryptographic accelerators, producing extremely high-performance encryption with no application code changes or additional configurations. The Oracle SPARC T5 servers running Oracle Solaris deliver 3.9x encryption performance over Intel Xeon E5-2690 and the SPARC T4-2 server is over 42 percent faster than Intel AES-NI systems when running DSS-style queries referencing an encrypted tablespace. This allows customers to use the Oracle Database Advanced Security Transparent Data Encryption (TDE) more pervasively without worrying about performance penalties. For details please refer to:

https://blogs.oracle.com/BestPerf/entry/20110927_sparc_t4_2_oracle

* The Oracle Database SGA is a group of shared memory areas that are dedicated to an Oracle Database instance. The SGA is used to store incoming data and internal control information that is needed by the Oracle Database. The amount of memory to be allocated to the SGA is controlled by setting some of the Oracle "initialization parameters."

** The Oracle Real Application Clusters (Oracle RAC) product includes a lock management system, a user-level distributed lock protocol, which mediates requests for database blocks between processes on the nodes of a database cluster. Fulfilling a lock request requires traversing and copying data across the user/kernel boundary on the requesting and serving nodes. This is also needed for the significant number of requests for blocks with uncontended locks.

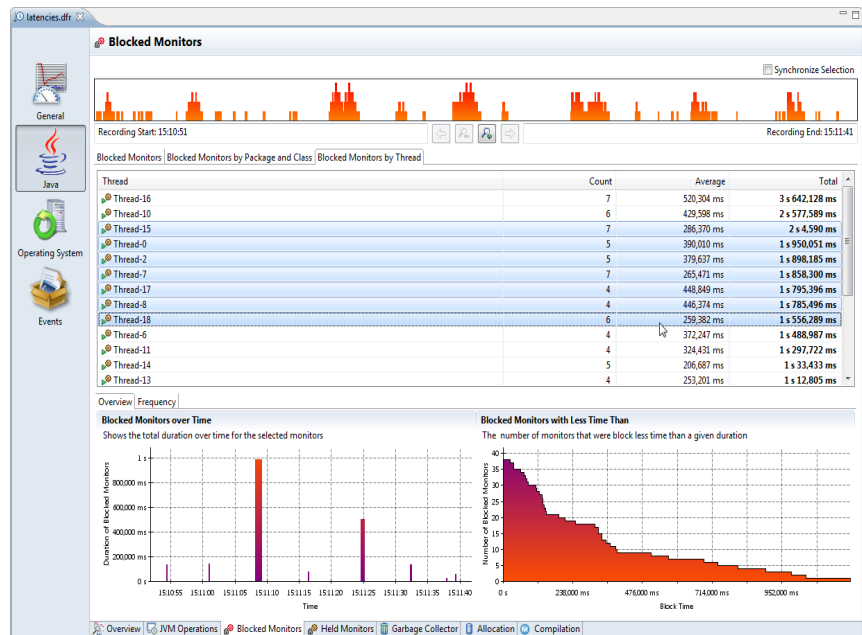
Vital Observability

Oracle Solaris DTrace is a comprehensive dynamic tracing facility, built into Oracle Solaris, available for administrators and developers on live production systems to examine the behavior of both user programs and of the operating system itself. Oracle Solaris DTrace enables you to explore your system to track down performance problems across many layers of software, or locate the cause of aberrant behavior.

The following Oracle Solaris DTrace probes have been added to Java Hotspot VM:

- VM Lifecycle Probes, Thread Lifecycle Probes, Class Loading Probes, Garbage Collection, Method Compilation Probes, Application Tracking Probes, Monitor Probes

This instrumentation allows users to closely monitor their Java applications, uncover performance bottlenecks and troubleshoot runtime issues.



Oracle Solaris DTrace plug-in for Java Mission Control provides extra data views.

Oracle Engineered Systems

Oracle Solaris 11 powers the Oracle Exadata Database Machine, Oracle SPARC SuperCluster and Oracle Exalogic Elastic Cloud—providing ultimate reliability, fastest deployment, and lower cost for Oracle deployments. Faster InfiniBand fabric is complemented by support for the RDSv3 protocol to provide secure, low-latency communication between engineered systems and their compute and storage nodes.

Oracle Optimized Solutions

Oracle Optimized Solutions with Oracle Solaris are designed, tested, and fully documented architectures that are tuned for optimal performance and availability. They are based on uniquely matched components including Oracle's Sun servers, storage, and networking components, Oracle Database, Oracle Fusion Middleware and Oracle applications. Refer to the portfolio of Oracle Optimized Solutions at <http://www.oracle.com/technetwork/server-storage/hardware-solutions/index.html> for more details.

High Availability and Disaster Recovery across the Oracle Stack

Integrated with Oracle Solaris at the kernel level, Oracle Solaris Cluster enables high availability and disaster recovery for Oracle databases and applications. The solutions are seamlessly integrated and stringently tested together with a spectrum of Oracle Sun hardware. It is the HA component for Oracle Optimized Solutions and SPARC SuperCluster. Oracle Solaris Cluster also supports Oracle Solaris Zones and Oracle VM Server for SPARC and is configurable to offer protection at application, zone, or VM level with policy-based recovery behavior and reliable management of multi-tier dependencies for virtualized deployments.

Integrated Development Environment

Oracle database application development is streamlined with the Oracle Solaris Studio 12.3 IDE which supports Pro*C and OCI-based applications, simplified setup with database project and connection wizards, and the ability to manage database schemas, tables and data within the IDE.

Oracle Solaris Studio 12.3, Oracle's advanced C, C++ and Fortran development tool suite, delivers the latest in compiler optimizations, multithread performance, and powerful analysis tools for the best application performance and reliability on Oracle Solaris. It includes a Performance Analyzer that seamlessly combines and reconciles two call stacks (the Java stack and the machine stack) into a single view. Java programs often contain Java code mixed with C/C++ native code as well as Hotspot compiled methods.

Running Oracle's Business

Oracle Corporation is running its mission-critical global ERP deployment with Oracle Enterprise Business Suite R12 and Oracle Database 11gR2 on Oracle Solaris 11, SPARC SuperCluster T4-4 and Sun ZFS Storage Appliances. It has a database size of 23+ TB and it services over one million customers with room to grow.

Best Customer Experience

Engineered, tested and supported together with the Oracle stack, Oracle Solaris provides the best experience for customers. Joint engineering teams work together to provide the best ease of management, performance, reliability, and security compared to other operating systems from IBM and HP. For example, Oracle Solaris releases are shipped with the latest JDK release that is provided via IPS packages for easy risk-free updates.

Oracle's integrated stack testing ensures the hardware and software components in an enterprise configuration interoperate and perform optimally throughout the system's lifetime. Integrated testing means that the entire stack, including patches and upgrades that have been previously applied, go through another round of load and stress tests to ensure the combinations of patches and upgrades work as expected.

Customers running Oracle Database, Oracle middleware and Oracle applications on Oracle Solaris with Oracle servers and storage benefit from having a single point of contact for support, which allows faster problem resolution and reduced risk.

Contact Us

For more information about Oracle Solaris, visit oracle.com/solaris or call +1.800.ORACLE1 to speak to an Oracle representative.



Copyright © 2012, Oracle and/or its affiliates. All rights reserved.

This document is provided for information purposes only and the contents hereof are subject to change without notice. This document is not warranted to be error-free, nor subject to any other warranties or conditions, whether expressed orally or implied in law, including implied warranties and conditions of merchantability or fitness for a particular purpose. We specifically disclaim any liability with respect to this document and no contractual obligations are formed either directly or indirectly by this document. This document may not be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without our prior written permission.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group. 0612

Hardware and Software, Engineered to Work Together