



Oracle Solaris 11, Aimed at Cloud Deployments, Enhances Network Virtualization

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Oracle's announcement of [Oracle Solaris 11](#) deepened the operating system's support for server, storage and network virtualization, even as it carried forward support for earlier generations of Solaris applications for SPARC and x86 server platforms.

Although customer updates have been shipping to customer sites for many years, this was the first major release of Solaris in seven years — and the first major release since Oracle acquired Sun Microsystems in January 2010. Following a beta program that began in 2010, there were more than 750 customers with Solaris 11 in production at launch.

As [announced on November 9, 2011](#), highlights of the feature/functions being shipped with Oracle Solaris 11 include the following:

- Support for Oracle VM technology on SPARC and x86 servers, including enhanced support for live migration of VMs on both types of server platforms
- Enhanced network virtualization, through the inclusion of technology that was originally developed as Project Crossbow, speeding up cloud deployments. A single instance of Solaris 11 manages discovery of connected objects across multiple networking links.
- Scalability to hundreds of "Zones" per physical server node for workload isolation and workload consolidation and for granular controllability
- Support for SPARC T4 processors' dynamic threads, which allows individual cores to dynamically allocate more resources to active processors, a feature that is aimed at improving runtime performance
- Support for fast reboot processes and fast updates of new Oracle Solaris modules, during ongoing maintenance and planned downtime, via the new Image Packaging System (IPS). IPS supports fast rollbacks to address incomplete installation or updates.
- Support for [Oracle Enterprise Manager 12c](#), the latest release of the OEM system management framework. OEM now includes support for Oracle Enterprise Manager Ops Center, which combines management of server system hardware with management of VMs, from a single point of control; in this release, OEM Ops Center is delivered with Oracle Solaris.
- Oracle Solaris ZFS (zettabyte file system) deduplication functionality, supporting compression of disk space for enterprise workloads for backup and high availability
- Secure-by-default design, which delivers Oracle Solaris in a secure mode, then adds role-based access, via permission. Built-in encryption acceleration to reduce processing time to secure applications and data. These security features addresses customer requirements for ever-higher levels of security, especially when it comes to deploying cloud computing apps.
- Life-cycle management tools and automation to reduce operational expenses associated with IT staff time and preparation time prior to deployments. Solaris 11 supports a "boot environment" built on the ZFS for safe rollbacks.

An Operating System for SPARC and x86

Oracle Solaris runs on the Oracle SPARC hardware systems and on x86 server systems (systems based on Intel or AMD x86 microprocessors). Oracle sees this dual-platform approach as a differentiator from the two other major Unix operating systems, IBM AIX and HP-UX 11 v3, which run on POWER and Itanium systems, respectively, but not on x86 architecture. For a time, Solaris had briefly moved away from supporting x86 with Solaris 9 in the 1999–2000 timeframe. However, that support returned in Solaris 10, even though most of the Unix server revenue competition in the marketplace has remained in the midrange and high-end segments of the market. This dual-platform support, with SPARC and x86, gave Solaris a bigger footprint in datacenter through the early 2000s and helped sustain the full portfolio of 11,000 Solaris ISV applications.

IDC believes that Oracle Solaris' functionality could be emphasized even more on x86-based servers due to a number of feature/functions that exist on Oracle Solaris but not on either Linux or Windows. Specific examples include Dtrace, the troubleshooting functionality that identifies processing bottlenecks; the ZFS, which extends storage support to multiple TBs, and up to the zettabyte level (10 to the 21st power); and Solaris Containers — now called Zones — which isolate workloads and application environments. These Zones support multiple Solaris application environments running under a single instance of Solaris 10, including older applications that were originally written to run under Solaris 8, 9 or 10.

Granular Controllability

The Zones capability is featured in Oracle Solaris 11, and it will play two key roles for customers: supporting the isolation of dozens, or hundreds, of workloads per Oracle Solaris 11 instance and bringing the older Solaris application environment forward to run on Oracle Solaris 11 systems. One way to do that is to use P2V and V2V tools to move current Oracle Solaris 10 environments into a Zone running under Oracle Solaris 11.

This level of controllability provides differentiation for Oracle Solaris in the marketplace. However, that could change over time. However, the Oracle Unbreakable Enterprise Kernel (UEK) in Oracle's Linux distribution is scheduled to add support for Dtrace and Linux Containers, according to an announcement made at Oracle OpenWorld in October. It is also possible that, via open source collaboration, similar functionality could find its way into other Linux distributions over time. More importantly, for the wide Solaris installed base, the presence of Zones is a practical tool that helps customers move to newer releases while preserving investments in older ISV or custom Solaris applications.

Addressing a Large Installed Base

IDC notes that some longtime customers have had their Sun hardware in place for nearly 10 years. This degree of loyalty to using SPARC/Solaris systems is high, but customers interviewed by IDC have repeatedly pointed to the stability provided by Solaris, especially for workloads in the financial services, government and telecommunications markets. IDC estimates that there are hundreds of thousands of instances of Solaris and Oracle Solaris in customer sites worldwide — including some that date back to Solaris 8 and Solaris 9, in addition to more recent deployments of Solaris 10 (from 2005 to 2011). Oracle is claiming about 60,000 customers running Solaris worldwide, although IDC believes this is a conservative number based on the size of the historical installed base.

Oracle has done a good job of supporting older Solaris environments inside the latest Solaris or Oracle Solaris release (e.g., Solaris 8 and 9 applications running inside Solaris 10 Containers). Another reason for Solaris' longevity is the binary compatibility of Solaris applications for SPARC, allowing older applications to be moved forward to new platforms without being recompiled. Many of these older systems (e.g., Ultra Enterprise 10K and Ultra Enterprise 25K high-end servers, Sun Enterprise 6900 servers and midrange V880 servers) are clearly not as efficient as newer SPARC-based server models, and these older servers are getting more expensive to maintain.

Just as clearly, these longtime Sun customers long ago decided not to migrate workloads to other Unix or Linux server platforms — or they had custom applications running on Sun servers they wanted to keep. Now they find themselves behind the adoption curve and need to decide whether, and when, to move to Solaris 11.

Update Vs. Migration

The majority of the current Solaris installed base moved to Solaris 10 from 2005 to 2010, with adoption that was sweetened by Solaris 10's Containers (or Zones); Dtrace troubleshooting capabilities to identify system bottlenecks; and the ZFS to support large data-stores associated with a single instance of the Solaris 10 operating system. Updates of new "bits" were delivered periodically for Solaris 10 and were installed at customers' convenience, so as not to force a frequent update cycle for enterprise workloads. More recently, a Solaris 11 Express release also allowed some developers to move to Solaris 11, starting in 2010. With Solaris 11, Oracle has extended beyond this original SVR4 source code (it had paid for the Unix SVR4 royalty rights in perpetuity) and intends to continue optimizing future Solaris releases to each future generation of SPARC processors (now in the SPARC T4 generation, moving to SPARC T5 in 2012).

The new IPS packaging system will only be supported on Oracle Solaris 11. That means that longtime customers must consider how the new software packaging will affect their installation and deployment procedures. Overall, IPS allows rapid deployment, more automation for installs, and improved software life-cycle management. However, any change is likely to be the subject of study for customers that are accustomed to a different installation style, and Oracle should expect that this change must be explained — via videos, social media and the like — to customers. The business value associated with reducing the planned downtime windows for deployment, and reducing the IT skill-set requirements for deployment via snapshots, rollbacks and self-service management, should be made clear to prospective users.

Intended for Cloud Deployments

Although Oracle was cautious about marketing cloud computing solutions in recent years, Oracle Solaris 11 is squarely aimed at cloud computing deployments. Its enhanced support for virtualization and isolation of workloads and its deeper support for network virtualization are combined when provisioning VMs across the network. The secure-by-default features for startup, role-based root access, phone-home automatic reporting and auditing are intended to support cloud deployments. Oracle expects customers to deploy multiple VMs, over and over, as cloud deployments scale up.

Among the early support sites are those that deployed Solaris 11 on Oracle's Sun ZFS Storage Appliances, Oracle Exadata Database Machine X-2 and X2-8 engineered systems, and the Oracle Exalogic Elastic Cloud engineered systems. For cloud deployments, there is an emphasis on private cloud and stateful workloads, bringing enterprise apps into a virtualized Solaris environment for cloud computing. Given the earlier caution that Oracle showed in 2008–2010, the Solaris 11 release shows strong support for cloud computing — and it is intended to fit into a broader Oracle software environment with other Oracle software stack components (e.g., the Java programming language, Oracle VM, Oracle applications, Oracle WebLogic, Oracle Fusion middleware and the Oracle Database 11g products).

Future Outlook

Oracle has expanded the functionality of Solaris with Oracle Solaris 11 — adding new features related to virtualization and cloud computing. There is a very short list of vendors that show this kind of continued investment in operating systems — including Microsoft (Windows); Red Hat (Linux); and the two leading Unix competitors, IBM and HP. Each of these operating systems costs tens of millions of dollars to maintain and enhance annually. Those same R&D efforts generally require the work of 1,000 or more employees for programming, updating and engaging with the user community.

IDC expects Oracle to continue to evolve Oracle Solaris, even as it works to extend the UEK for Oracle Linux. This dual operating system approach carries some nuances with it: Oracle Solaris will be favored on SPARC systems, while Oracle Linux, via the UEK, will be one of several operating systems supporting customers' Oracle software stack (e.g., Oracle Database, Oracle middleware and Oracle applications).

For all its strong features, Oracle Solaris will compete increasingly with Linux for new workloads, especially for web-enabled and cloud-enabled deployments. For this reason, Oracle must highlight the business value to be gained from Solaris 11's RAS and enterprise features. IDC expects to see the maximum optimization of Oracle Solaris on SPARC, through joint engineering of hardware and software components, as in the Oracle SPARC SuperCluster engineered systems. Overall, IDC expects Oracle to emphasize

the use of Oracle Solaris 11 for mission-critical workloads and enterprise data, whether for cloud computing or for IT datacenter deployments.

For the x86 server world, Oracle Solaris will remain an option for Solaris-certified x86 systems, supporting Oracle workloads — including clustered systems leveraging Oracle Real Application Clusters (RAC) and standalone systems. But, even as many customers with older Solaris versions move to Solaris 11, some will move to Linux and Windows through platform migration from older Sun servers, based on input from multiple IDC studies of customers with extensive x86 server infrastructure.

Over the years, the stability of Solaris was a key factor in retaining this installed base, but it also resulted in delayed upgrades for some sites, some of which are still on Solaris 8, 9 or 10. Now, a new release with deep support for traditional Solaris functionality, enhanced virtualization and cloud-computing capabilities could pay off in the form of new Oracle Solaris 11 deployments — provided that the right level of technical support is available from Oracle, its ISVs and its channel partners.

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