ORACLE

OPTIMIZED SOLUTIONS

An Oracle Technical White Paper
May 2012

Why and How to Consolidate an SAP Landscape on Oracle SPARC SuperCluster

ORACLE

Introduction

The complexity of modern SAP landscapes makes them increasingly time-consuming and expensive to deploy and manage. SAP applications, databases, operating systems, servers, networking, storage, management tools, and backup software all must be integrated and validated to work together. Expert staff is critical to identifying bottlenecks, tuning the database, optimizing server and storage performance, and ensuring the high availability of critical services to make sure SAP application service-level agreements are met. Factor in infrastructure components and support contracts from a wide variety of vendors and complexity, risk, and cost rise exponentially.

Validated and supported by SAP[1], Oracle SPARC SuperCluster addresses these concerns by providing an innovative way to accelerate deployment and reduce operational costs throughout the SAP architecture lifecycle. Multiple layers of SAP infrastructure can be consolidated onto a high-performance, highly available SPARC SuperCluster system to reduce total cost of ownership (TCO) and improve SAP application performance and availability. Integrated in a pre-configured, pre-tested, and ready-to-deploy SPARC SuperCluster engineered system, the solution provides a complete and optimized infrastructure for SAP that is built around robust compute, networking, storage, virtualization, and management resources.

This technical white paper details what makes the SPARC SuperCluster engineered system an ideal infrastructure for SAP deployments. In addition, it presents recommendations and best practices for improving SAP application consolidation, availability, and performance while accelerating time to deployment and reducing the cost of operation.

[1] See SAP Note 1693680.

Why Deploy SAP on SPARC SuperCluster

Oracle SPARC SuperCluster simplifies and accelerates SAP deployment by enabling consolidation of a complete SAP landscape, including development, quality assurance (QA), and production, onto a single, highly available and scalable platform. A complete, factory-assembled enterprise infrastructure, SPARC SuperCluster eliminates complexity while reducing the time needed to get from concept to service deployment. Oracle's proven, tested, application-to-disk infrastructure runs in the pre-built and pre-tested SPARC SuperCluster, eliminating the need for complex, multitier, multivendor hardware configurations. Because the entire environment is engineered and optimized to work together, IT organizations can get SAP services up and running faster. Predictable, high-performance applications take advantage of a highly scalable, available, and serviceable platform to eliminate the potential pitfalls and time-consuming troubleshooting associated with complex SAP implementations.

Key Benefits of Deploying SAP on SPARC SuperCluster

Validated and supported by SAP, SPARC SuperCluster addresses many IT concerns by providing an innovative way to accelerate deployment and reduce operational costs throughout the SAP architecture lifecycle.

- **Simplified and accelerated SAP deployments.** SPARC SuperCluster reduces the time it takes to deploy SAP, improving productivity and ultimately lowering TCO.
- **Consolidated infrastructure.** Multiple layers of SAP infrastructure can be consolidated onto a high-performance, highly available SPARC SuperCluster system to improve SAP application performance and availability. Built-in, low-overhead virtualization technologies isolate SAP workloads and offer the fine-grained resource control needed to safely consolidate the SAP landscape within a single platform.
- **Low-risk migration.** Applications certified on Oracle Solaris 8, 9, 10, and 11 can run simultaneously on a SPARC SuperCluster system without modification. Oracle Database 10*g* can run within an Oracle Solaris Zone to ensure progressive and controlled migration to the latest database technology from Oracle.
- **Accelerated performance.** SPARC SuperCluster is designed around Oracle's most innovative and highest performing enterprise compute, storage, and networking components, including Oracle's SPARC T4-4 servers, Oracle Exadata Storage Servers, and Oracle's Sun Datacenter InfiniBand switches.
- **Resilient infrastructure.** Out of the box, the SPARC SuperCluster system delivers a resilient infrastructure for mission-critical SAP applications by eliminating any single point of failure and providing proven and tested failover mechanisms.

Why Run SAP on Oracle Software and Hardware

Oracle's extensive partnership with SAP—including database, operating system, hardware, and Java technology—has continued for over 20 years and still is strong today. As a large majority of SAP deployments rely on Oracle Database and Oracle Sun servers and storage systems for the backend, Oracle and SAP understand the importance of maintaining strong cooperation that benefits their joint customers.

Oracle was one of the technology partners involved in developing SAP R/3 in 1992, with a goal of closely integrating Oracle Database with SAP applications to provide optimal performance. Since that time, Oracle Database has been optimized continuously for SAP applications. This is why tens of thousands of SAP customers run SAP applications on Oracle hardware and Oracle Solaris, and over two-thirds of mid-size to large SAP customers rely on Oracle Database. (For more information on SAP and Oracle deployments, see http://www.sap.com/ecosystem/customers/directories/technology/oracle/index.epx.)

SPARC SuperCluster—Everything Needed for SAP Deployment

SPARC SuperCluster T4-4 is a complete, pre-engineered, and pre-tested high-performance enterprise infrastructure solution that is faster and easier to deploy. Available in half-rack or full-rack configurations, the system leverages innovative Oracle technology—combining the computing power of Oracle's SPARC T4-4 servers, the performance and scalability of Oracle Solaris, and the optimized database performance of Oracle Database 11*g* accelerated by Oracle Exadata Storage Servers, with a high-bandwidth, low-latency InfiniBand network fabric—into a scalable, engineered system that is optimized and tuned for consolidating enterprise applications (Figure 1).

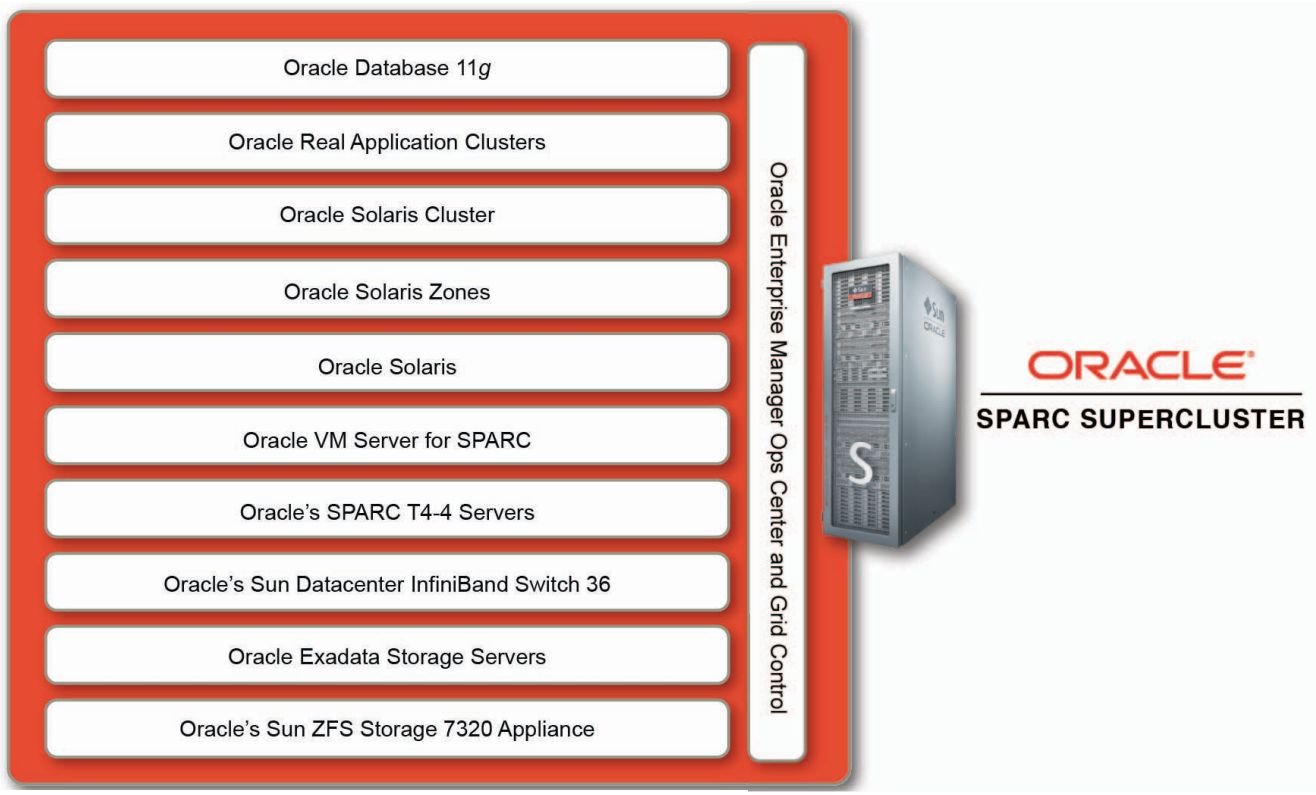

Figure 1. SPARC SuperCluster provides a complete infrastructure for SAP in a single system.

All components within the SPARC SuperCluster system, including SPARC T4-4 servers, Sun ZFS Storage appliances, and Oracle Exadata Storage Servers, are interconnected over a fully redundant InfiniBand fabric. Built-in virtualization enables consolidation and ensures applications are isolated from one another and

remain highly available, virtually eliminating resource contention and service disruption. The SAP Central Services (SCS and ASCS) instances, SAP Application Servers, and Oracle Database software are consolidated on the system, eliminating much of the integration effort and deployment time typically associated with clustered solutions.

Platform Infrastructure

The core components of SPARC SuperCluster—servers, storage systems, networking components, and operating system—provide many unique technical advantages to SAP applications.

- **Oracle's SPARC T4-4 Servers.** These servers are designed with performance and consolidation in mind. Ideal for resource-intensive SAP applications, each SPARC T4-4 server includes four sockets, each with an eight-core, 3.0 GHz, SPARC T4 processor, two solid-state disks, and a massive 1 TB memory footprint. Chip multithreading technology built into each processor supports 256 threads per server in as little as five rack units (5RU), providing increased computational density to consolidated SAP deployments while staying within constrained envelopes for power and cooling. Very high levels of integration help reduce latency and improve overall system security and reliability.
- **Oracle Exadata Storage Servers.** Oracle Exadata Storage Servers deliver extreme database performance to SAP applications in a highly available, highly secure environment. Optimized for use with Oracle Database, Oracle Exadata Storage Servers employ a massively parallel architecture and Exadata Smart Flash Cache to accelerate Oracle Database processing and speed I/O operations. Intelligent software enables Oracle Exadata Storage Servers to quickly process database queries and return only the relevant rows and columns to the database server. Pushing SQL processing to Oracle Exadata Storage Servers reduces database server CPU consumption while using significantly less bandwidth to move data between storage and database servers. Oracle Exadata Storage Servers return a query result set rather than entire tables, eliminate network bottlenecks, and free up database server resources. As a result, users often see a 10x performance increase when scanning and analyzing data.
- **Oracle's Sun ZFS Storage 7320 appliance.** Providing 60 TB of disk capacity for shared file systems, the Sun ZFS Storage 7320 appliance uses Flash-enabled Hybrid Storage Pools to accelerate SAP application response time. Easy-to-use DTrace Analytics optimize performance with minimal intervention, and powerful storage controllers run multiple data services, increasing efficiency and deployment flexibility. Oracle Solaris ZFS and self-healing technologies provide superior data integrity, while cluster failover and Flash-based write caches ensure the high availability of data for SAP applications.
- **Oracle's Sun Datacenter InfiniBand Switch 36.** Oracle SPARC SuperCluster is built around an InfiniBand fabric for rapid exchange of data among the cluster components. The high-speed, low-latency InfiniBand fabric utilizes a pair of redundant (leaf) Sun QDR InfiniBand Switches to interconnect all SPARC SuperCluster components: SPARC T4-4 servers, Oracle Exadata Storage Cells, and Sun ZFS Storage 7320 appliances. Another InfiniBand (spine) switch interconnects the two leaf switches and provides InfiniBand ports for expansion. The Sun Datacenter InfiniBand Switch 36 is designed specifically for application clusters comprised of Oracle rackmount servers and storage systems, and delivers the extreme scale, application isolation, and elasticity needed to consolidate and virtualize core SAP enterprise business applications.

- **Oracle Solaris.** Optimized for SPARC T4 servers, Oracle Solaris delivers high performance, massive threading and batch processing, and high I/O rates critical to the most demanding SAP applications. Scalability enhancements, enhanced kernel data structures, and library optimizations, enable the platform to support large-scale SAP workloads. In addition, integrated server, storage, and network virtualization and resource control mechanisms support the vertical and horizontal scalability and optimized utilization needed for consolidating high-demand enterprise SAP applications and growing data sets.

More information on SPARC SuperCluster can be found in the *A Technical Overview of the Oracle SPARC SuperCluster T4-4* and *Oracle Solaris: The Foundation for Successful SAP Solutions* white papers.

Built-in Virtualization for Simplified SAP Application Consolidation

Built-in virtualization technologies isolate SAP workloads and enable resource controls, supporting consolidation of the SAP landscape within a single platform. Applications certified on Oracle Solaris 8, 9, 10, and 11 can run simultaneously on a SPARC SuperCluster system without modification. Organizations that use SAP business applications, such as governments, financial institutions, and HR organizations, can securely consolidate SAP applications using these technologies, at the same time protecting sensitive data, maintaining application availability, and shifting system resources to where they are most needed.

- **Oracle VM Server for SPARC.** Oracle VM Server for SPARC (previously called Sun Logical Domains) is a built-in firmware-based hypervisor that supports multiple virtual machines, called domains, on a single system. The hypervisor allocates subsets of system resources (memory, I/O, and CPU) to each domain, isolating each Oracle Solaris instance and SAP workload to a virtual machine with dedicated resources. Built-in virtual machine snapshot and cloning capabilities help to speed virtual machine configuration and migration, enabling faster provisioning when growth occurs. For I/O-intensive SAP workloads on SPARC SuperCluster, separate I/O domains are configured to take advantage of the large number of I/O ports, enabling I/O performance at bare-metal speed within a virtualized environment.
- **Oracle Solaris Zones.** Using flexible, software-defined boundaries, Oracle Solaris Zones (also known as Oracle Solaris Containers) are a lightweight virtualization technology that creates multiple private execution environments within a single Oracle Solaris instance. SAP applications running within zones are completely isolated, preventing processes in one zone from affecting processes running in another. Oracle Solaris Zones support fault isolation, feature extremely fast boot times, and can be configured to instantly restart SAP applications. Because zones make it easy to prioritize applications and adjust resource allocations, they are ideal for consolidated SAP workloads.

Oracle VM Server for SPARC and Oracle Solaris Zones are complementary virtualization technologies that work together to isolate SAP applications and control system resources. In this example architecture, Oracle VM Server for SPARC defines two virtual servers or domains: one for the underlying database and one for the application tier (Figure 2). To optimize the performance of Oracle Exadata Storage Servers, Oracle Solaris 11 runs in the database domain to support the database and, optionally, Oracle Real Application Clusters (Oracle RAC). To support Web, SAP application, and Central Services, Oracle Solaris Zones are configured in the application domains, enabling zone clusters to be created in conjunction with Oracle Solaris Cluster. These application domains run Oracle Solaris 11, or Oracle Solaris 10 to maintain compatibility with applications that are not yet certified for Oracle Solaris 11.

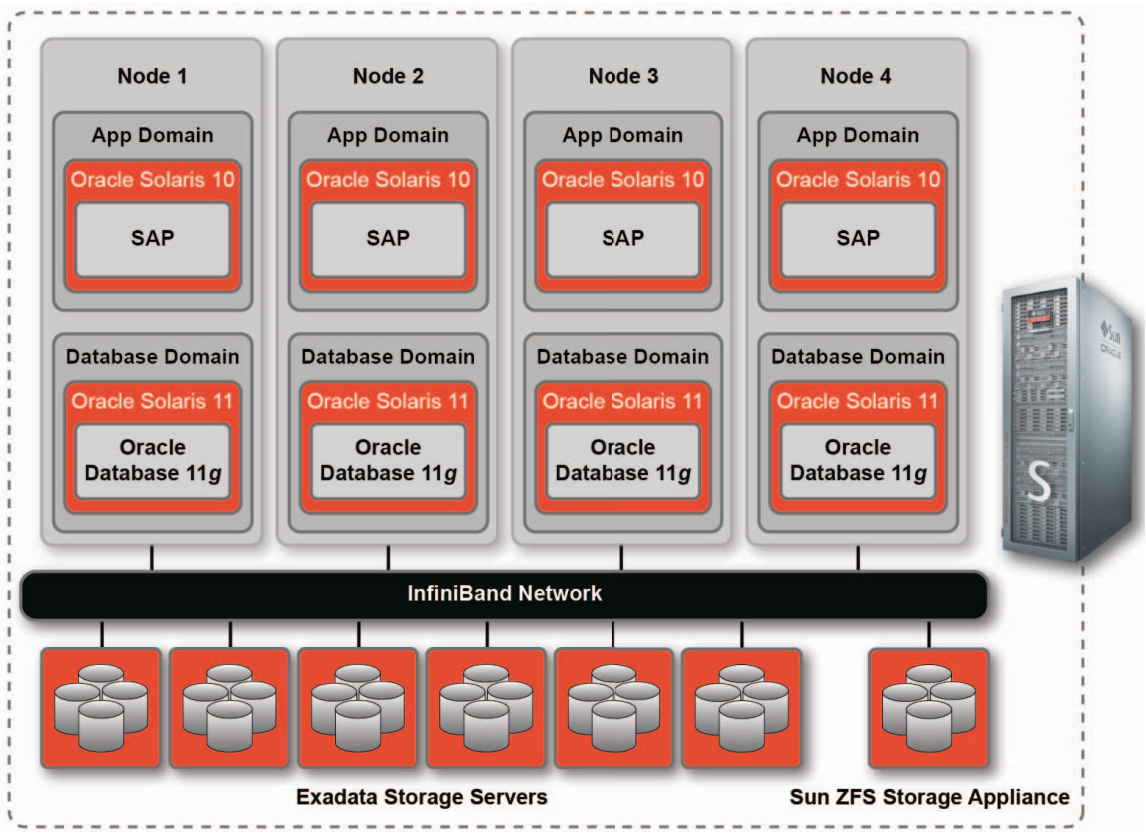

Figure 2. Built-in virtualization technologies provide workload isolation and resource controls.

High Availability Features to Keep SAP Running

Most mission-critical SAP applications must be available 24x7x365. To that end, Oracle recommends using an architecture that is integrated, tested, and validated to work together to reduce the risk of deployment problems, interoperability issues, and unplanned downtime.

- **No single point of failure**. The SPARC SuperCluster system provides full built-in redundancy—from compute nodes to storage, network switches to network interface cards (NICs), and power distribution units (PDUs) to power supplies—to support the demands of mission-critical SAP applications.
- **Oracle Solaris Cluster.** Oracle Solaris Cluster ensures the availability of SAP applications by detecting, isolating, and containing failing cluster nodes or specific components, such as NICs, HBAs, networks, and storage. Agents—software programs that enable Oracle or third-party applications to take full advantage of Oracle Solaris Cluster features—specify the actions to be taken should a node or service fail or become unavailable. In this solution, SAP application-specific agents are used to manage availability of components in the SAP environment. Agents are available for SAP Enqueue (including enqueue and replication servers), central services, the Web application server, SAP J2EE Engine, SAP liveCache, and Oracle Database. To achieve a configuration that supports business continuity, agents implement automated failover for the

primary SAP application server, SAP Central Services, and the database tier, as well as failover for other mission-critical production applications.

- **Oracle Real Application Clusters.** Oracle RAC is the preferred implementation option to ensure database availability for mission-critical SAP workloads. Oracle RAC supports the transparent deployment of the database across all four servers within the SPARC SuperCluster system, providing database fault tolerance in the event of hardware failures or planned outages. When Oracle RAC is not implemented, the single instance Oracle Database can be made highly available using Oracle Solaris Cluster.
- **Virtual clustering**. Oracle Solaris Cluster supports virtual clustering, allowing Oracle Solaris Zones to function in the same role as physical cluster nodes. Applications that run within dedicated zone clusters are associated with specific cluster management policies. Agent actions can be layered, such as first trying to restart the service in a different zone before attempting to restart it on a different server. This helps SAP applications achieve the required levels of service.
- **Highly available NFS storage**. In the SAP environment, application servers access shared file systems for SAP binaries, configuration files, and log files. Accessed over the high-speed InfiniBand network, Sun ZFS Storage appliances provide a highly available shared file system. Configured for redundancy, these appliances use the built-in self-healing and data integrity features of Oracle Solaris ZFS with clustered controllers to ensure data availability.

Network Infrastructure and Remote Management

SPARC SuperCluster is a factory-integrated infrastructure complete with a high-performance internal InfiniBand interconnect and comprehensive management tools. The solution is designed to create a fully functional SAP landscape that can be deployed into production quickly, while merging smoothly into existing IT infrastructure and taking advantage of data center assets wherever possible. The "Mapping the SAP Landscape to SPARC SuperCluster" section discusses the architecture in more detail and explains how SPARC SuperCluster integrates into an existing infrastructure.

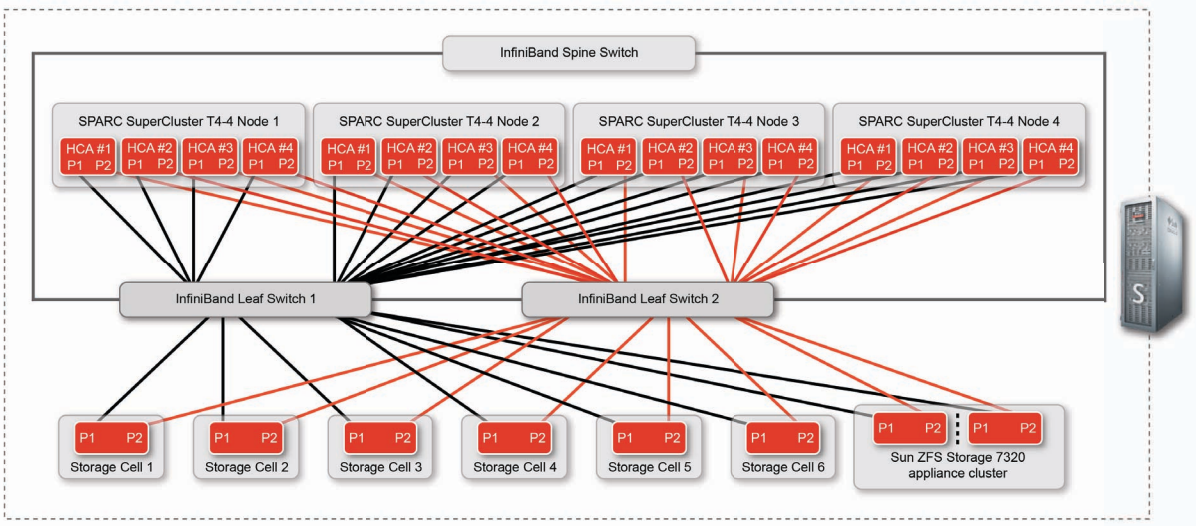

Figure 3. SPARC SuperCluster interconnects all system components over a high-performance, fully redundant InfiniBand fabric.

- **Redundant networking**. Factory built and entirely pre-wired, the architecture uses redundant network components and links to promote application availability. Each database or application domain features dual connections to the InfiniBand networks, using separate interface cards connected to separate PCI busses to support communication with the cluster interconnect, Oracle Exadata Storage Servers, and storage appliances. All tiers within the SPARC SuperCluster architecture communicate using the internal InfiniBand network. Separate redundant 10 GbE interfaces are used for connection to the rest of the data center, and support incoming client connects and external SAP application servers. Optional Fibre Channel (FC) cards in SPARC SuperCluster support connections to existing SAN data storage.
- **Built-in remote management tools.** All components within SPARC SuperCluster are connected to a dedicated 1 GbE management network, ensuring physical isolation of management traffic. The management software stack includes Oracle Enterprise Manager Ops Center 12*c* to govern SPARC SuperCluster components and Oracle Enterprise Manager Grid Control to manage the Oracle Database. These tools provide out-of-box deployment processes that streamline software updates and patch rollouts. To simplify software maintenance, Oracle tests and aggregates patches for SPARC SuperCluster components, as well as patches from SAP components. Patches from Oracle and SAP are integration-tested for compatibility, verified, and bundled together for distribution. This means the entire software stack—even patches and upgrades applied previously—goes through load and stress testing before being released to ensure patch combinations work as expected.

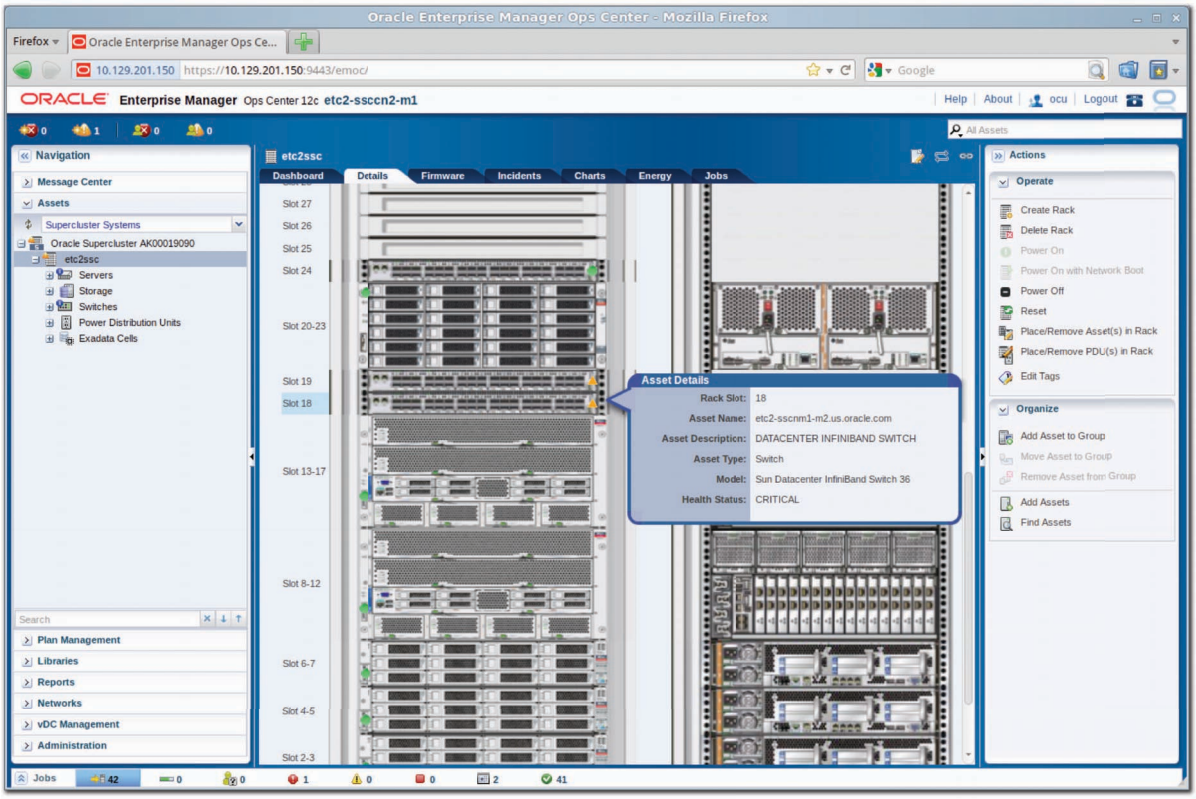

Figure 4. Oracle Enterprise Manager Ops Center 12*c* simplifies the management of SPARC SuperCluster systems.

- **Backup, restore, and disaster recovery**. To provide short-term data protection and long-term data preservation for SPARC SuperCluster, a variety of backup, restore, and disaster recovery solutions exist. Options vary according to the type of data (structured or unstructured), data protection needs, recovery time, performance, capacity, and service level requirements. For very fast backups to disk storage, the Sun ZFS Storage appliances in SPARC SuperCluster can be used to generate and store file system snapshots, storing them either locally or remotely to other Sun ZFS Storage appliances. Alternatively, snapshots can be stored to Exadata Storage Expansion Racks from Oracle that are directly connected to the InfiniBand fabric, creating a solution that takes advantage of the Fast Recovery Area in Oracle Exadata Storage Servers to get back up and running instantly.

  For structured data in the Oracle Database, backups can be done with the Oracle Recovery Manager (Oracle RMAN) to disk or to tape through Oracle Secure Backup. Oracle offers the Oracle Optimized Solution for Oracle Secure Backup that is designed to perform network backups of heterogeneous clients, including Oracle's engineered systems for Oracle Exadata, SPARC SuperCluster, and Oracle Optimized Solutions. For backup, recovery, and long-term archival, tape remains the most cost-effective and reliable storage media available. For SAP landscapes where longer retention periods and greater capacity are required, Oracle Secure Backup and tape storage can be used for backup, vaulting, and archiving.

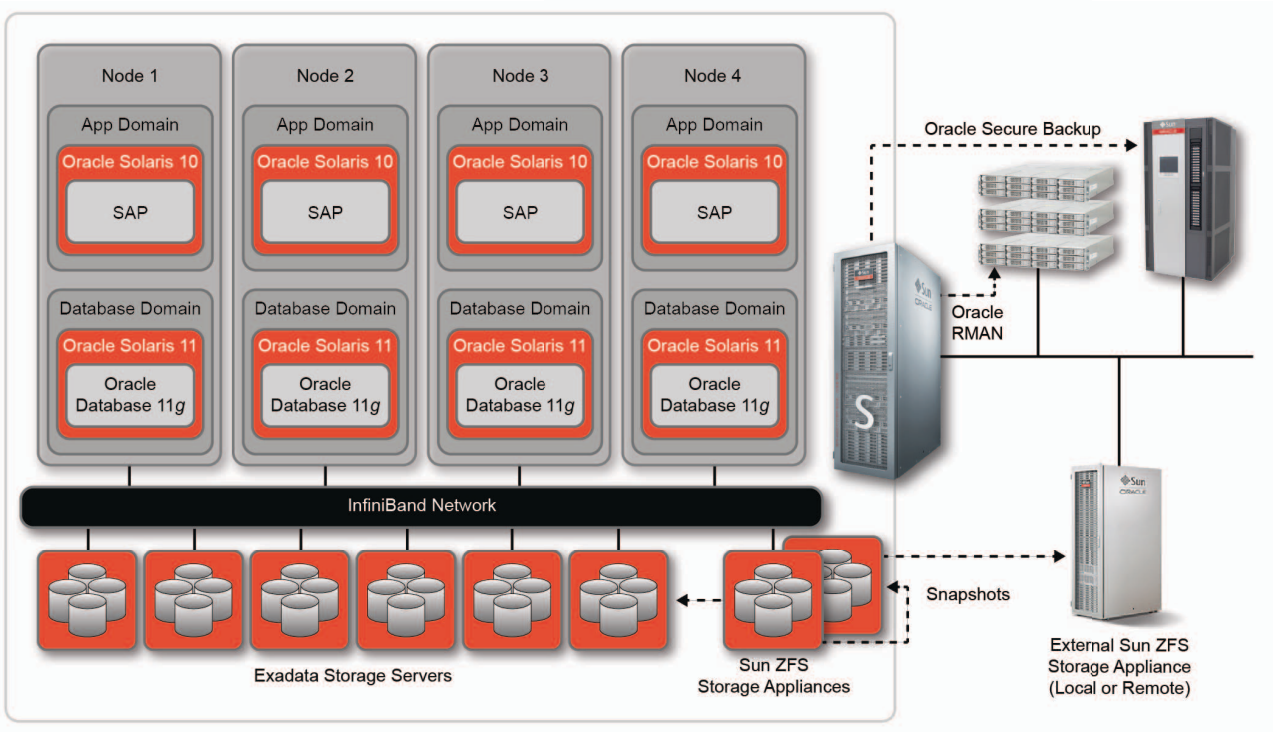

Figure 5. SAP on SPARC SuperCluster integrates with Oracle backup tools.

For disaster recovery scenarios, Oracle's Maximum Availability Architecture (MAA) includes best practices that take advantage of Oracle Active Data Guard, Oracle RAC, Oracle Automatic Storage Management, Oracle Flashback, and the Oracle Exadata Database Machine. Oracle Active Data Guard can be deployed in conjunction with the snapshot and cloning features of the Sun ZFS Storage appliance, enabling easy and efficient database cloning to create a remote standby database.

How to Map the SAP Landscape to SPARC SuperCluster

A typical large-scale SAP landscape is complex, with users at the edge of the network, data center infrastructure hosting the SAP landscape, and storage systems handling information management. Within the data center, the SAP landscape consists of separate Development (DEV), Test and Quality Assurance (QAS), and Production (PRD) systems for each SAP Business Suite application and SAP NetWeaver solution. SAP components commonly are deployed with the SAP application and database server layers residing on a single system (two-tier architecture), or with the application and database layers residing on separate systems (three-tier architecture).

The independent hosting of each layer on separate physical servers results in increasing complexity and infrastructure sprawl that makes adding new SAP services expensive and time consuming. Because individual servers must be sized for peak demand—a condition that might occur only once a week or once a month—they experience very low utilization rates for the rest of the time. With so many servers often running only at 10 to 20 percent of capacity, resource utilization is low, power and cooling demands are high, and data center floor space is over consumed and underutilized. As a result, enterprises running multiple SAP applications on multiple sites quickly find themselves with a complex and fragmented SAP landscape (Figure 6).

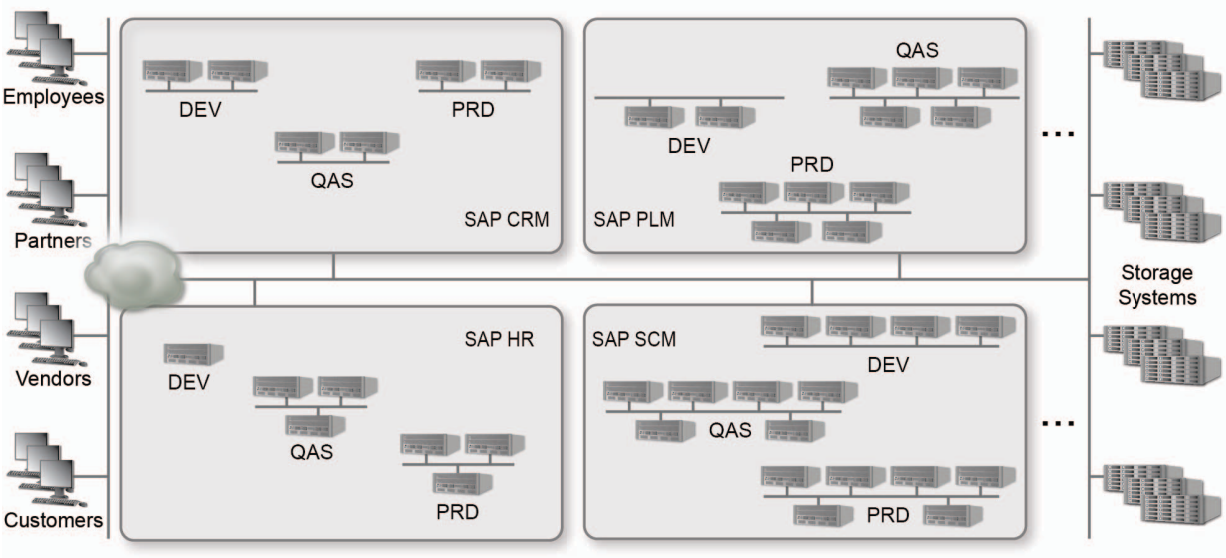

Figure 6. A typical SAP landscape has separate development, test, and production systems for each SAP application

SAP Landscape Architecture Using Two SPARC SuperCluster Systems

To simplify the SAP landscape, production environments can be consolidated on a SPARC SuperCluster system, with development and testing environments deployed together on a second system (Figure 7). In this scenario, the testing and quality assurance environment can replicate all or a portion of the production system.

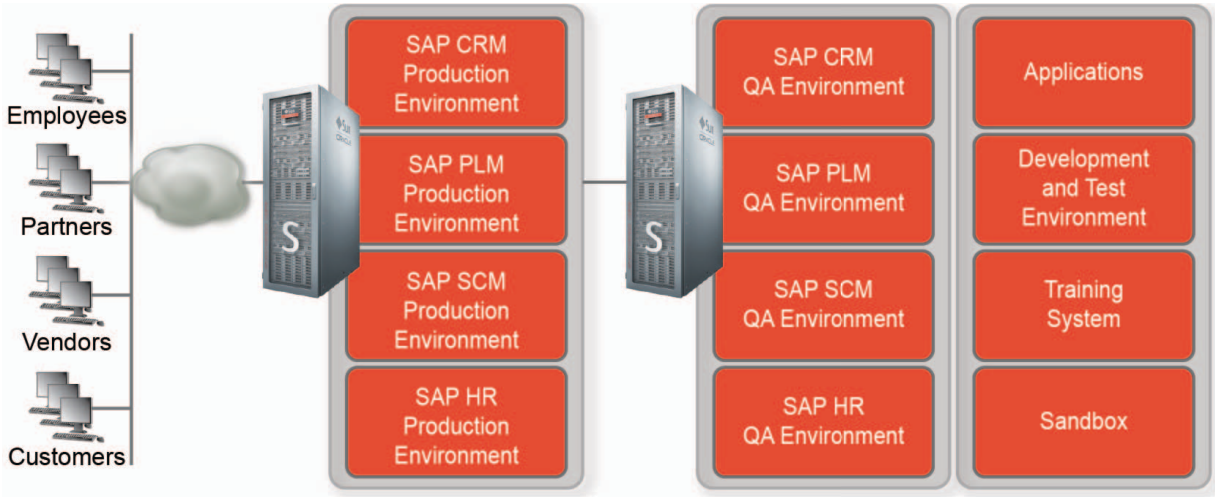

Figure 7. SAP QA, development, and testing environments can be consolidated onto a single SPARC SuperCluster, with production systems deployed on a second SPARC SuperCluster to maintain physical isolation.

Production System

The production system contains live data and is where business processes are executed. To ensure the highest performance and availability, three-tier SAP architectures should be run on SPARC SuperCluster production systems. In this configuration, SAP applications run in Oracle Solaris Zones within an application domain, and can be configured for failover as needed. Databases run in a separate database domain connected to Oracle Exadata Storage Servers for performance acceleration.

Figure 8 illustrates a SPARC SuperCluster system with consolidated production SAP applications. Oracle Solaris Zones are used to safely run multiple services in a single application domain to get the best efficiency, while zone clusters ensure high availability. Since they generate no system overhead, there is no hard limit to the number of Oracle Solaris Zones that can run within a domain. Because Oracle Solaris Zones enable isolation and separate access rights, multiple departments with separate administrative domains can be consolidated onto a single SPARC SuperCluster.

The SAP Central Services and primary application servers run within the same zone as the SAP applications they support, and are configured with Oracle Solaris zone clusters for high availability. Oracle Solaris Cluster is part of SPARC SuperCluster systems to eliminate single points of failure and ensure availability of SAP components. High availability agents are available for SAP SCS and ASCS (formerly known as Central Instance or SAP CI), managing the SAP Enqueue Server and Message Server, and are aware of the Replicated Enqueue functionality from SAP. Additional agents support other SAP products, such as Web Application Servers or SAP LiveCache. All agents support a variety of SAP installation types, including Advanced Business Application Programming (ABAP) only, Java only, or ABAP and Java combined.

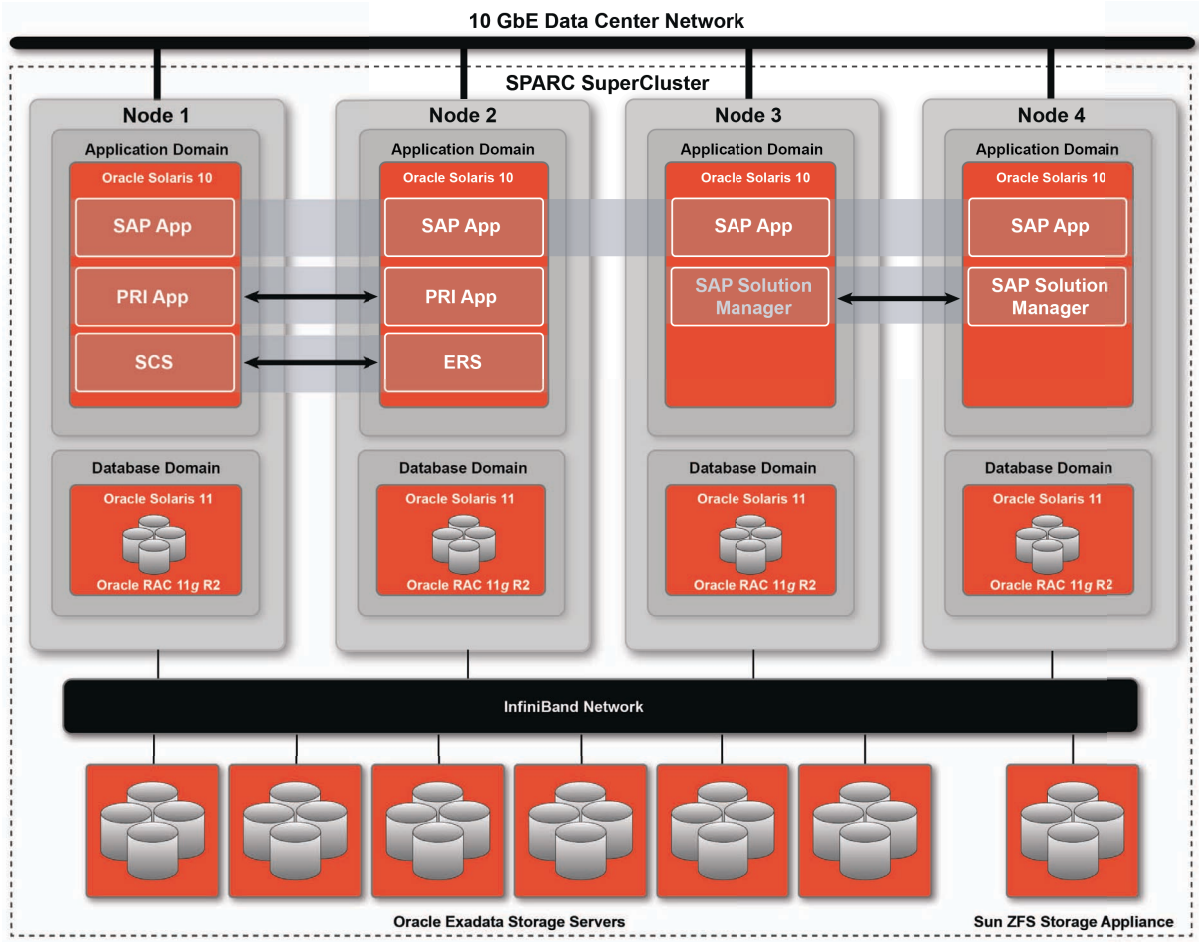

Figure 8. All SAP production systems can be consolidated onto a single SPARC SuperCluster system.

Providing high availability for SAP System Central Services requires the Standalone Enqueue Server to be replicated. One server node runs the Standalone Enqueue Server and another server runs the Replica Enqueue Server. The SAP Enqueue Server, Replica Server, and Message Server all are configured as Oracle Solaris Cluster failover resources in a zone cluster, in a specific way to perform the recovery of the replicated Enqueue services. In addition, an external Oracle Database proxy resource is configured in the same zone cluster to monitor and represent the availability of the specific database services provided by the Oracle RAC 11*g* Release 2 database domains. The SAP system has a dependency on such database services. This resource enables the coordination of availability between the two types of domains in SPARC SuperCluster systems.

Quality Assurance System

When creating, building, and testing SAP applications, a number of independent systems must be used.

- **Quality assurance system.** Ideally, the quality assurance system is identical to the production system so that issues can be found and fixed during the verification process. With the ability to control the system, engineers can work together to conduct exhaustive tests on configurations, new functionality, and implementation changes prior to deployment in the production system. If a duplicate environment is not

possible, a smaller system can be used in a ratio that enables technical staff to forecast the performance impact.

- **Development and test system.** Customization efforts and the development of new functionality typically take place on a small server and database. All maintenance activities, including break-fixes for production processes, tend to be performed on these systems as well.
- **Training and sandbox systems.** Using a small system and database, the training and sandbox systems make it easy for developers to gain experience with applications, test scenarios prior to incorporation into the mainstream code base, and conduct feasibility studies for customer-specific requirements or requests.

In all of these environments, developers frequently test new functionality and software products, patch applications, and perform upgrades. Toward this end, many developers and test engineers are given root access to enable them to perform tasks independently.

Consolidating QA and DEV on SPARC SuperCluster

SAP quality assurance systems can be consolidated onto a single SPARC SuperCluster system to simplify the SAP landscape and shorten the time needed to get a new QA system up and running (Figure 9). In this example configuration, the servers are combined into a highly available quality assurance environment that mimics the production system. Each server is divided into two domains (application and database) using Oracle VM Server for SPARC. The application domain is further subdivided into isolated environments using Oracle Solaris Zones, with each SAP application and its QA tools contained within the zone to ensure isolation from other applications. Oracle Solaris Cluster is used to combine zones into clusters to enable failover for SAP Central Services. Oracle Database and Oracle Real Application Clusters run in the database domain connected to Oracle Exadata Storage Servers to support highly available data access.

The massive scalability and performance of SPARC SuperCluster enable development and test systems to be consolidated onto the system as well. Within the application domain, Oracle Solaris Zones provide a complete runtime environment to SAP applications, and house all programming tools and databases required for development. Each zone provides full resource containment and control, and fault and security isolation, to ensure applications do not hamper one another's access to resources or impact execution. Developers and administrators can manage compute, memory, and I/O resources on a fine-grained basis (statically or during operation) to ensure applications have access to an appropriate amount of resources and that no workload consumes the entire platform. As a result, programmers can maintain a one-application-per-server deployment model while simultaneously sharing hardware resources.

For organizations that use training and sandbox systems, SAP recommends running the development test client (testing) and prototype client (sandbox) on the development system, and the training client on the quality assurance system within the SPARC SuperCluster solution.

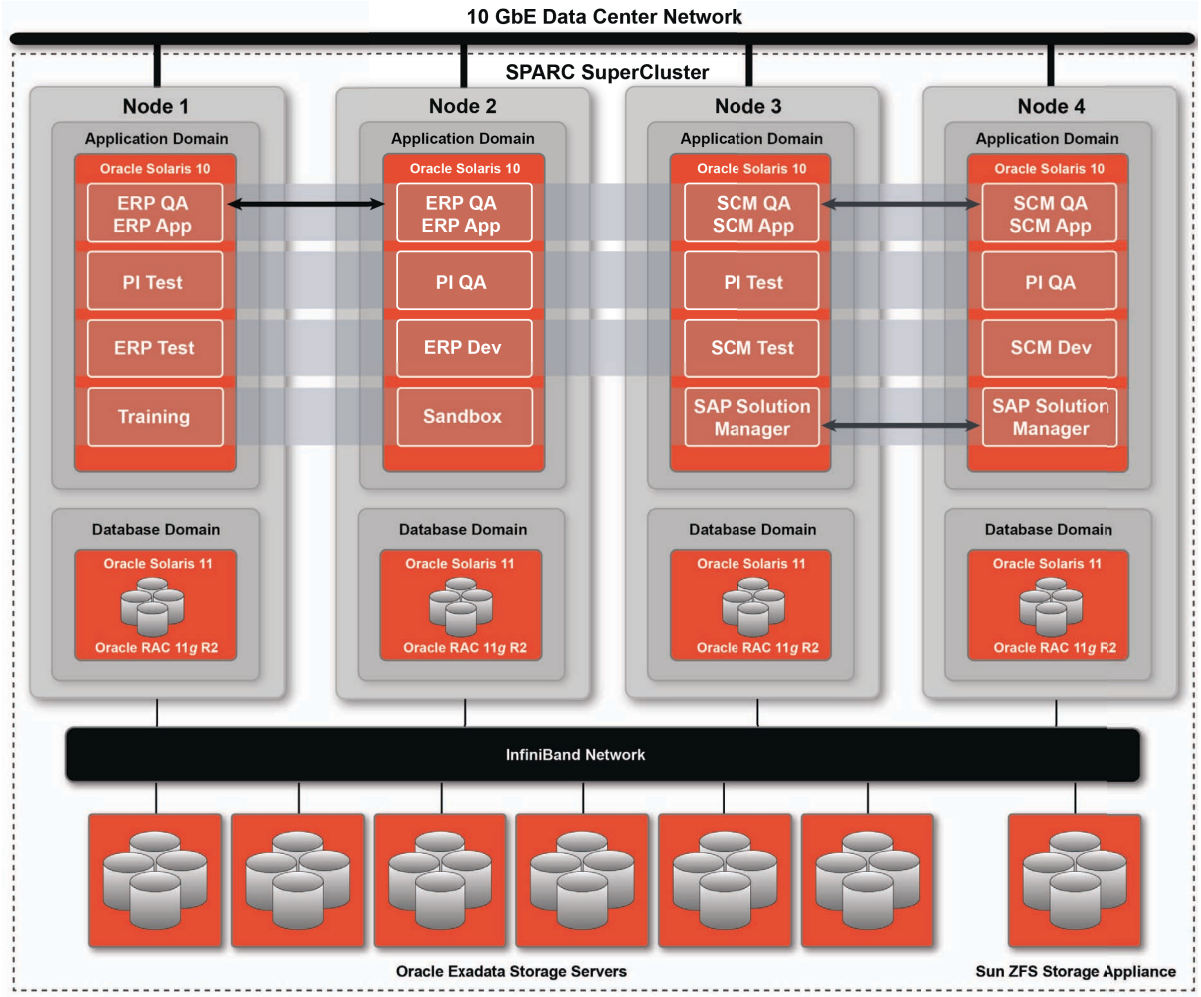

Figure 9. SAP QA systems can be consolidated onto a SPARC SuperCluster system, along with development and test, training, and sandbox systems.

SAP Landscape Architecture Using a Single SPARC SuperCluster

SAP deployments with more moderate performance or scalability requirements can consolidate the entire SAP landscape onto a single, full-rack SPARC SuperCluster system. In such a configuration, all production, quality assurance, development, and other systems run in isolated areas (Figure 10). Development systems run within an Oracle Solaris Zone to maintain the one-application-per-server model preferred by developers, while the production system runs on two clustered servers to ensure high availability. The quality assurance system replicates all or part of the production environment, enabling applications to be tested in the same environment in which they are to be deployed.

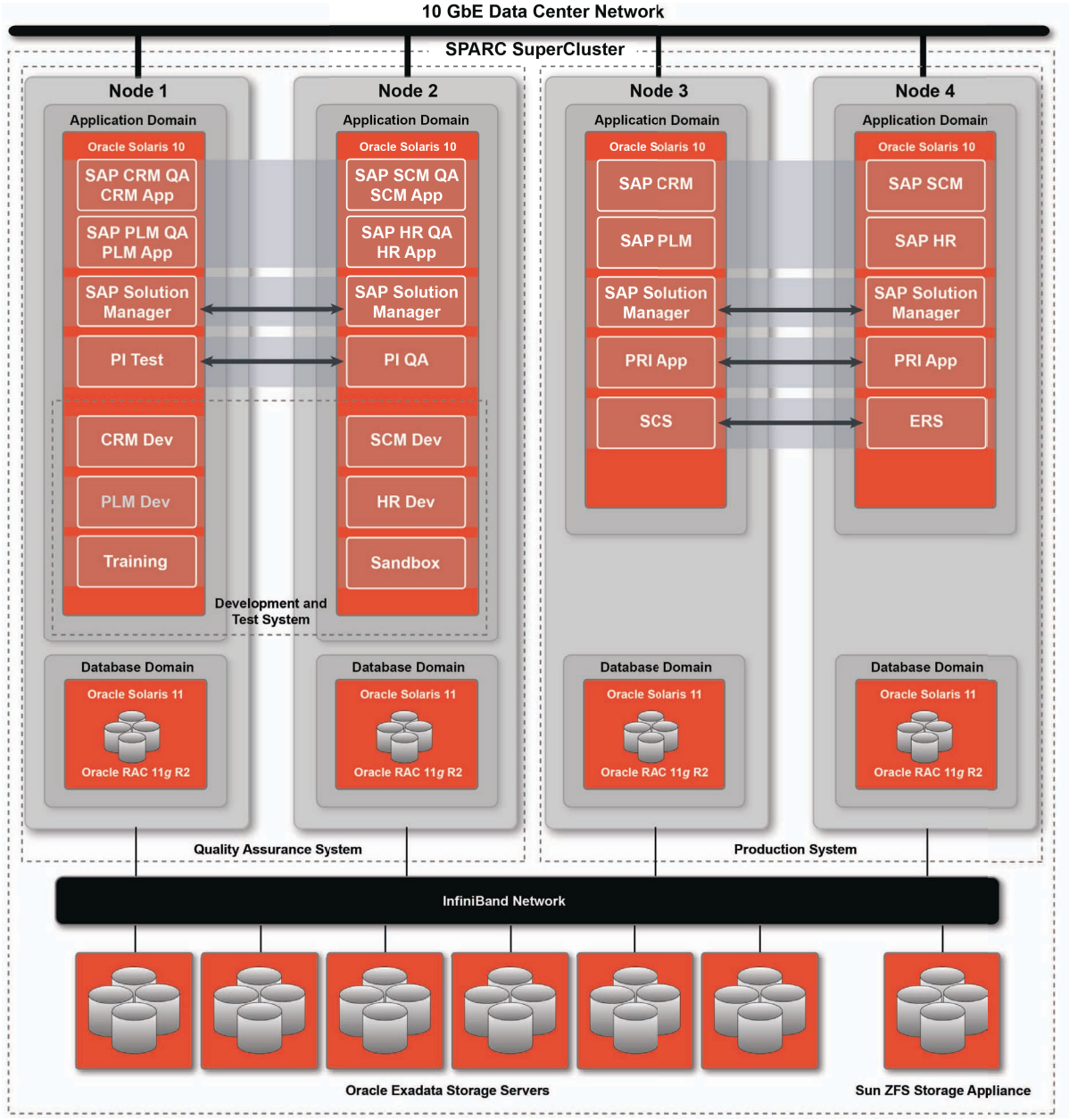

Figure 10. SAP deployments with moderate performance or scalability requirements can be consolidated onto a single SPARC SuperCluster system.

Migration Considerations

Organizations that currently utilize previous versions of Oracle Database, Oracle Real Application Clusters, or Oracle Solaris can take advantage of SPARC SuperCluster. In this scenario, SAP applications and databases run within a dedicated Oracle Solaris Zone, with the database stored on the Sun ZFS Storage appliance (Figure 11). Oracle Solaris Cluster can be leveraged to provide failover services for the database (and applications, if desired). This construction enables legacy databases to run on the system and support SAP

applications. Over time, IT organizations can progressively test applications against Oracle Real Application Clusters 11*g* Release 2 running in the database domain, and migrate them to a three-tier deployment that takes advantage of the Oracle Exadata accelerated database.

Oracle Solaris 11 has native support for Oracle Solaris 10 within Oracle Solaris 10 Zones. This enables organizations to run specific applications within an Oracle Solaris 10 environment while seamlessly migrating to Oracle Solaris 11. As a result, organizations can benefit from innovation in Oracle Solaris 11, such as kernel improvements, increased performance, faster kernel patching, and virtualization improvements, while providing access to Oracle Solaris 10 runtime environments for applications that require them. For example, it is possible to migrate pre-existing applications to Oracle Solaris 10 environments and run them alongside new applications that can take advantage of Oracle Solaris 11.

Figure 11 illustrates a production environment with three-tier and two-tier deployments. Nodes 1 and 2 comprise a three-tier production environment that runs SAP applications and SAP Central Services in the application domain, and databases in the database domain on Oracle Exadata Storage Servers. Nodes 3 and 4 comprise a two-tier production environment that runs SAP applications and legacy databases within dedicated zones in the application domain.

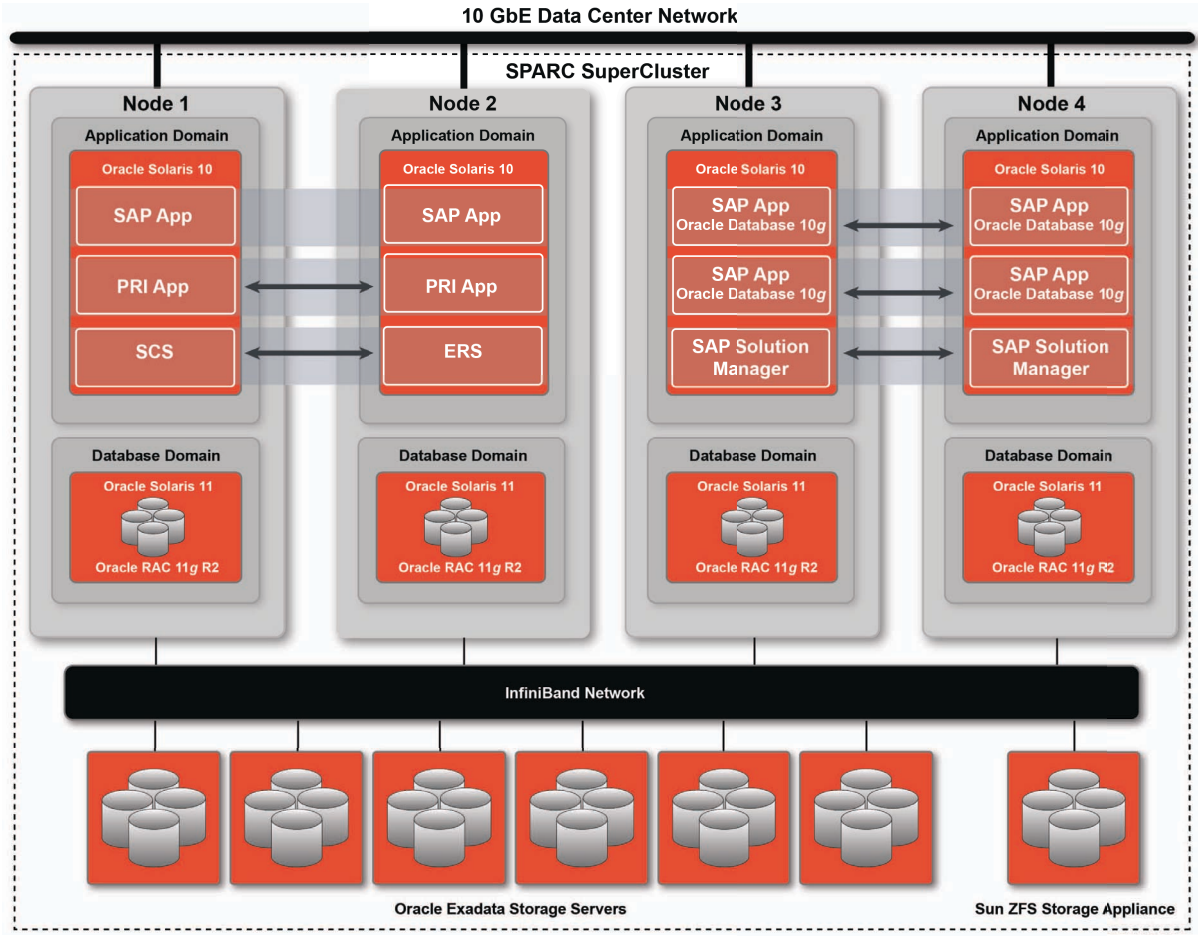

Figure 11. Two-tier SAP landscapes can be run on Oracle SPARC SuperCluster.

Service Offerings for SAP on SPARC SuperCluster

Oracle offers a complete portfolio of services to help IT organizations design, test, deploy, optimize, and maintain their SAP infrastructure on SPARC SuperCluster.

Oracle Solution Center

Oracle Solution Centers offer a proven way to architect SAP deployments on Oracle technology. A simple engagement framework provides access to Oracle's state-of-the-art facilities and Oracle and SAP architects. With a global presence, the Oracle Solution Center team helps IT organizations assess current SAP deployments and achieve optimal results when transitioning to Oracle engineered systems, new Oracle servers, and other Oracle technology. Engagements include targeted assessments, proof of concept (POC), capacity planning, and architecture and design of consolidated SAP landscapes. To learn more, visit http://www.oracle.com/osc.

Oracle Advanced Customer Support Services

Oracle Advanced Customer Support Services (ACS) offers an extensive range of services to help achieve optimization of SAP on SPARC SuperCluster architectures. More detailed information on Oracle Advanced Customer Support Services can be found at http://www.oracle.com/acs.

Fixed Scope Services

These services include configuration review and recommendations for Oracle SPARC SuperCluster; performance review and recommendations for Oracle SPARC SuperCluster; and patch review and installation for SPARC SuperCluster. To assist IT staff with building their capabilities and confidence in optimizing the Oracle Database in an SAP environment, the workshops listed below are created and delivered by experts in SAP application interactions with Oracle Database.

- Fundamentals of Oracle for SAP ERP (Level I)
- Oracle Advanced Performance Tuning for SAP ERP (Level II)
- Oracle Expert for SAP ERP (Level III)
- Oracle 11*g* database for SAP Business Suite Technical Skills Workshop
- Oracle Database Administration for SAP BI (Business/Intelligence)
- Oracle Real Application Clusters for SAP
- SAP ERP ABAP Tuning with Oracle Database Platform

SAP-aware Annual Services

Oracle Advanced Customer Support Services offers three standard levels of SAP-aware annual services that are delivered by professionals experienced with the products, processes, tools, and systems from Oracle and SAP. These unique capabilities ensure support that is focused on overall SPARC SuperCluster system optimization and continued supportability from SAP.

- **Oracle Advanced Support Assistance.** SAP-aware Advanced Service Delivery Manager (ASDM) ensures the right people and organizations are aligned with meaningful action plans, resulting in more efficient and effective issue resolution.
- **Oracle Business Critical Assistance.** SAP-aware proactive support provides service request resolution with proactive advice and assistance tailored to a customer's specific operations and projects.
- **Oracle Solution Support Center.** SAP-aware engineering teams are available through a direct access hotline, provide assistance for critical SRs, and provide a range of proactive services such as assessments and root cause analysis with direct access to SAP support, escalation process and one-point-of contact for both Oracle and SAP.

Custom Oracle and SAP Technical Engagements

Oracle ACS can perform custom Oracle and SAP technical engagements. Many customers find that additional experience, expertise, and specialized tools are needed to support their Oracle and SAP environment. Oracle ACS can establish a statement of work to provide such assistance with varying degrees of involvement. In addition, Oracle ACS engineers have close ties to Oracle Support, Oracle Development, and SAP to ensure the highest level of service.

Summary

The complexity of SAP landscapes continues to challenge many IT organizations. The complete infrastructure in Oracle SPARC SuperCluster enables IT staff to simplify the data center by consolidating SAP systems on a pre-tested, ready-to-deploy architecture. By taking advantage of Oracle's integrated solution, IT organizations can put more workloads on a high-performance, highly available system with a very compact data center footprint to achieve significantly better resource utilization. Development, test, and production systems can be isolated from one another, and clustering techniques can be used to ensure SAP applications and databases remain available for users.

Innovative integration and intelligent engineering built into Oracle SPARC SuperCluster enable enterprises to take advantage of incremental scalability, accelerate SAP application performance, simplify administration tasks, and reduce day-to-day management demands. Because system installation, configuration, and patching (to the patch level required by SAP) are handled at the factory, IT managers can rely on the system right out of the box. Plus, the elimination of expensive third-party specialty hardware and security management software reduces the number of software licenses required and lowers overall acquisition costs. These unique characteristics work together to help IT organizations improve overall productivity, lower total cost of ownership, and reduce deployment risk.

For More Information

For more information on Oracle's technology stack for SAP environments, see the references in Table 1.

TABLE 1. REFERENCES FOR MORE INFORMATION

RELEVANT SAP NOTES	
1643799 — Support for Oracle Solaris 11	
1693680 — Running SAP Software on Oracle SPARC SuperCluster	
1669684 — SAP on Oracle Solaris 11	
WEB SITES	
Oracle Database and IT Infrastructure for SAP	http://oracle.com/sap
Oracle Optimized Solutions	http://oracle.com/optimizedsolutions
Oracle SPARC SuperCluster	http://www.oracle.com/supercluster
Oracle's SPARC T-series Servers	http://www.oracle.com/goto/tseries
Oracle Solaris	http://www.oracle.com/solaris
Oracle Solaris Cluster	http://www.oracle.com/us/products/servers-storage/solaris/cluster/features/index.html
Oracle's Sun ZFS Storage appliance	http://www.oracle.com/us/products/servers-storage/storage/unified-storage/
Oracle and SAP	http://www.sap.com/partners/directories/technology/oracle/
NEWSLETTERS	
Oracle for SAP Newsletter	http://www.oracle.com/us/solutions/sap/database/sap-tech-update-subscribe-183649.html
ORACLE SPARC SUPERCLUSTER WHITE PAPERS	
A Technical Overview of the Oracle SPARC SuperCluster T4-4	http://www.oracle.com/us/products/servers-storage/servers/sparc-enterprise/supercluster-t4-4-arch-wp-1537679.pdf
ORACLE EXADATA DATABASE MACHINE WHITE PAPERS	
Moving your SAP Database to Oracle 11g R2 ASM: A Best Practices Guide	http://www.oracle.com/us/solutions/sap/asm-bestpractices-304655.pdf
Using SAP NetWeaver with the Oracle Exadata Database Machine	http://www.oracle.com/us/products/database/sap-exadata-wp-409603.pdf
ORACLE SOLARIS WHITE PAPERS	
Minimizing Planned Downtime of SAP Systems with the Virtualization Technologies in Oracle Solaris 10	http://www.oracle.com/us/solutions/sap/database/minimize-planned-downtime-sap-352633.pdf

Oracle Solaris: The Foundation for Successful SAP Solutions	http://www.oracle.com/us/solutions/sap/database/oracle-solaris-sap-solutions-1534330.pdf
Oracle Solaris and Oracle SPARC T4 Servers—Engineered Together for Enterprise Cloud Deployments	http://www.oracle.com/us/products/servers-storage/solaris/solaris-and-sparc-t4-497273.pdf
Oracle Solaris and Oracle Solaris Cluster: Extending Oracle Solaris for Business Continuity	http://www.oracle.com/technetwork/server-storage/solaris-cluster/documentation/solaris-cluster-businesscontinuity-168285.pdf
The Role of Oracle Solaris in Support of SAP Enterprise Applications	http://www.oracle.com/us/solutions/sap/database/platform-design-flexibility-352621.pdf
ORACLE DATABASE WHITE PAPERS	
Oracle Database: The Database of Choice for Deploying SAP Solutions	http://www.oracle.com/us/products/database/039450.pdf
SAP on Oracle Automatic Storage Management 11g R2: Configuration Guidelines for UNIX/LINUX	http://www.oracle.com/us/solutions/sap/asm-configguidelines-304656.pdf
SAP with Oracle Real Application Clusters 11g Release 2 and Oracle Automatic Storage Management 11g Release 2	http://scn.sap.com/docs/DOC-15894
BACKUP, RECOVERY, HIGH AVAILABILITY, AND DISASTER RECOVERY	
Oracle Optimized Solution for Oracle Secure Backup	http://www.oracle.com/us/solutions/oracle-secure-backup-opt-solution-347243.html
Minimizing Downtime in SAP Environments	http://www.oracle.com/us/solutions/sap/database/minimizing-downtime-sap-enviro-352631.pdf
CLOUD COMPUTING	
SAP ERP in the Cloud	http://www.oracle.com/us/solutions/sap/database/sap-erp-cloud-352626.pdf

Why and How to Consolidate an SAP Landscape on Oracle SPARC SuperCluster
May 2012

Authors: Pierre Reynes, Ken Kutzer, Gilly Clough, Victor Galis

Oracle Corporation
World Headquarters
500 Oracle Parkway
Redwood Shores, CA 94065
U.S.A.

Worldwide Inquiries:
Phone: +1.650.506.7000
Fax: +1.650.506.7200
oracle.com

Oracle is committed to developing practices and products that help protect the environment

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.

AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. 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. UNIX is a registered trademark licensed through X/Open Company, Ltd. 0410

Hardware and Software, Engineered to Work Together