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Enterprise Database Cloud Deployment with Oracle SuperCluster T5-8
Introduction

Databases form the underlying foundation for most business applications by storing, organizing, retrieving, and protecting application data. With the number of applications and amount of application data growing faster than ever, traditional database deployment models struggle to deliver services efficiently. Applications are assigned a dedicated set of compute and storage resources, allowing for a high level of security and isolation, but hindering agility and scalability. When the dedicated resources are fully consumed, IT staff must manually procure, configure, and deploy new hardware and software—a process that can take days, weeks, or even months and impedes business productivity. Over time, a complex landscape of disparate application silos develops, and integration and management challenges prevent IT staff from meeting business objectives.

Creating an enterprise database cloud to provide on-demand database services, or Database as a Service (DbaaS), simplifies deployment and operation while reducing costs and overcoming the challenges of traditional approaches. With a database cloud, pooled resources can be dynamically deployed, managed, and reclaimed to improve performance and efficiency while reducing complexity. On-demand, self-service database provisioning from predefined templates and configurations reduces new database deployment time from days and weeks to minutes while ensuring quality of service (QoS) goals are met. Standardization on best practices and technologies reduces costs and increases reliability. Detailed resource tracking and reporting eliminates the need for over-provisioning, while accounting and chargeback features ensure that departments are accurately billed for time and resources used.

With an enterprise database cloud architecture, IT departments can better react to changing requirements and support strategic business objectives. Oracle SuperCluster T5-8 is the best system for database and enterprise application consolidation and enterprise cloud infrastructure, providing organizations with the competitive edge they need to thrive and succeed.
Oracle SuperCluster T5-8: Engineered for Database Clouds

Oracle SuperCluster engineered systems are the highest-performing database services solutions offered by Oracle and are ideal for deploying database clouds. Oracle SuperCluster T5-8 improves upon the performance and ease of operation established by Oracle’s SPARC SuperCluster T4-4. Oracle SuperCluster T5-8 is optimal for mission-critical, multitier enterprise applications and cloud services, and it delivers extreme efficiency, performance, high availability, and cost savings. As an enterprise database cloud platform, it has many advantages over custom, build-your-own environments.

System Consolidation

One of the key benefits of deploying cloud-based technologies is the ability to consolidate large numbers of legacy systems and IT silos into a single resource pool, reducing infrastructure complexity and capital and operational expenditures. Disparate, multivendor environments can be greatly simplified by standardizing on a single vendor or solution, thereby eliminating finger-pointing among vendors and streamlining support. Oracle SuperCluster T5-8 is the foremost platform for database environment consolidation. Featuring twice the number of compute cores and 33 percent greater Exadata database storage capacity than SPARC SuperCluster T4-4, Oracle SuperCluster T5-8 can achieve Oracle Database and application consolidation ratios of 28:1 and drive five times the cost savings in a private cloud implementation.

Rapid Cloud Deployment

Without a complete, prebuilt solution, organizations must undergo the lengthy process of developing a cloud from scratch, including architecture design, component selection and validation, operational and management procedure development, and many other complex and tedious tasks. The Oracle SuperCluster T5-8 engineered system provides a fully integrated database cloud solution and enables services to be up and running in a few days' time, greatly decreasing the time to realize benefits. Rapid cloud deployment increases infrastructure agility and allows IT departments to respond quickly to customer needs and changing business demands. A self-service portal further decreases response times from hours and days to minutes by enabling users to self-provision database services as needed.

Extreme Database Performance

Designed from the start to deliver exceptional database performance, Oracle SuperCluster T5-8 is a well-balanced system that has been optimized at all architecture levels.

- **Compute nodes.** Powered by the world’s fastest microprocessor, Oracle’s SPARC T5 processor, and based on the fastest server for running databases and applications, Oracle’s SPARC T5-8 server, each compute node features up to 128 cores, 2 TB of memory, and a PCIe Gen 3 I/O subsystem to ensure the best database performance.
• **Operating system.** Scalable and secure, Oracle Solaris is optimized for database performance. A new kernel accelerator in Oracle Solaris 11 improves Oracle Real Application Clusters (Oracle RAC) deployment throughput by up to 20 percent. Enhancements to the virtual memory system allow larger 2-GB page sizes to be allocated to the database’s system global area (SGA), reducing paging and improving database performance. Dynamic page resizing allows Oracle Solaris to match application and database needs for increased efficiency.

• **Networking.** Fully redundant, low-latency, high-bandwidth 40-Gb/sec InfiniBand internal networking enables fast and efficient data transfers between nodes and storage. All key SuperCluster system components are connected to the InfiniBand fabric, while external systems communicate with Oracle SuperCluster T5-8 via 10-GbE connections on the compute nodes.

• **Storage.** Oracle Exadata Storage Servers provide Oracle SuperCluster T5-8 with 33 percent more capacity than the previous-generation SPARC SuperCluster T4-4. A full-rack Oracle SuperCluster T5-8 configuration delivers up to one million IOPS of storage performance and rapid query throughput, driving ten-times faster database operation and quicker results. Exadata Smart Flash Logging improves transaction response time and database throughput. Oracle’s Sun ZFS Storage Appliance provides further unstructured data resource sharing and snapshot and cloning capabilities. With the Sun ZFS Storage Appliance, complete operating system and database environments can be cloned in minutes, much faster than the hours required by traditional cloning methods. Additionally, both Oracle Exadata Storage Servers and Sun ZFS Storage Appliances support Oracle Hybrid Columnar Compression, enabling database data compression ratios of 10:1 to 50:1 and reducing the storage footprint required.

Integrated Virtualization

Layered virtualization technologies included in Oracle Solaris, Oracle Solaris Zones, and Oracle VM Server for SPARC ensure secure consolidation onto a database cloud. Implemented as a firmware-based hypervisor, Oracle VM Server for SPARC allocates subsets of system assets, such as memory, I/O, and CPU, to each domain, isolating each Oracle Solaris instance and database workload into a virtual machine with dedicated resources. With flexible software-based boundaries, Oracle Solaris Zones is a lightweight virtualization technology that creates multiple private execution environments within a single Oracle Solaris instance.

Together, these virtualization technologies are critical enablers to secure database workload consolidation within Oracle SuperCluster, allowing an assortment of test, development, and production databases to run on a single system without impacting each other’s service requirements. Additionally, organizations that must safeguard access and protect sensitive data, such as governments, financial institutions, and human resources departments, can safely segregate Oracle Database instances into configured virtual environments.
Lower Costs
Support for twice the workload within the same footprint at a lower cost improves on the already strong five-year total cost of ownership (TCO) for Oracle SuperCluster systems. With Oracle SuperCluster T5-8, time to value is reached five times faster than with build-it-yourself systems while administration and maintenance time is reduced by up to a factor of three. Using Oracle Hybrid Columnar Compression further increases TCO savings.

Reliability and Availability
Mission-critical operation benefits from 99.999 percent database and application availability, minimizing both planned and unplanned downtime. Integrated stack patching time is reduced by a factor of ten and causes no service interruption for increased uptime. A no-single-point-of-failure design and real-time fault notification and resolution further enhance reliability and availability.

Enterprise Database Cloud Architecture
Oracle SuperCluster T5-8 can be deployed in half-rack and full-rack configurations. Multi-rack configurations can be built by combining multiple full racks. Figure 1 shows the architecture and layout of an enterprise database cloud using a half-rack configuration. To meet differing availability needs, Oracle Database can be configured into a variety of Oracle Real Application Clusters (Oracle RAC) single- or multi-node instances. In this example, four domains are configured on each compute node to provide isolation and separation for different workloads. Within each domain, one to sixteen distinct database zones can be designated to further isolate and dedicate compute resources.

For consistent workload performance, maximum isolation and workload separation is needed, and specific resources can be dedicated to specific databases, as shown in Domain 1 within each node. In contrast, Domain 4 shows resources pooled into two larger zones for increased flexibility and resource sharing. In this example, Domain 1 could be used for production, test, or development workloads requiring dedicated resources, while Domain 4 could provide shared resources to support multiple production, development, and test groups. Domains 2 and 3 illustrate configuration flexibility with middle-ground configurations. Resources can be dynamically added to each zone as each workload requires using Oracle Solaris Resource Manager, a part of the Oracle Solaris operating system.
Once base configurations are decided upon and implemented, users can self-provision database resources as needed through Oracle Enterprise Manager Cloud Control 12c (shown in Figure 2), which automates and accelerates database provisioning and management. By utilizing the full prebuilt, ready-to-deploy enterprise database cloud architecture of Oracle Enterprise Manager 12c and Oracle SuperCluster T5-8, provisioning times can be slashed by as much as 32-fold when compared to traditional architectures. Automated resource recovery and the retirement of unneeded databases eliminate orphaned assets, ensuring that all unused resources are available for reassignment and eliminating the need for overprovisioning.
Final Thoughts

Oracle SuperCluster T5-8 is the ideal platform for building an enterprise database cloud. The engineered system's fully integrated and optimized hardware and software stack brings together the performance, simplicity, scalability, and reliability needed to efficiently consolidate application database workloads while lowering TCO. Designed from the ground up for enterprise database and cloud operations, Oracle SuperCluster T5-8 is the best system for aligning IT infrastructure with business needs.