Oracle SuperCluster: Taking Oracle Clustered Engineering Systems to the Next Level

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Abstract:- Oracle's Super Cluster is robust and coherent Oracle Database and application environment. Oracle SuperCluster is an engineered and homogeneous server, with storage, consistent networking and software system which provides extreme end-to-end database, application capacity also minimal initial, ongoing assist and maintenance effort and convolution at the low total cost of possession. It is ideal for Oracle Database that is best for Oracle application customers who need to maximize return on the software investments, increase their IT agility and improve the application usability and overall IT productivity.

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I. BACKGROUND

In a time of constantly make more secure budgets, with the typical home owner being more likely to look into doing a project personally rather than paying someone else to do that for him. *Do It Yourself (DIY)* which has become, for many, the watchword for home improvements. Do you required to construct a deck? Which have blueprints and for these ideas that get you started. This may be able to classify these efforts as small based projects that fall within your realm of its capabilities. To know what about being a major project, such as constructing an entire building? Would you ever do that, or give a thought about it? For working together with engineers, efficient contractors, and a variety of craftsmen and might be beyond the scope of your abilities. As this might required to consult real estate agent who can find you the finished product or work with a builder who knows what he is doing.

Doing it yourself, however, is exactly what many enterprise data center managers trying to figure out themselves, if they can find eligible employee, when ever gets under deployment as the typical, scalable efficient business application with reliability, availability, and service are required by senior management, while remaining within their budget. Since the fear of the cost for integrated system solution, the penalty is exceeding one's budget, many IT staff would be charged for the responsibility of finding the best platform, reliable operating system, high storage, ease of networking and application sets, then trying to put it together in a coherent trend, despite of the complexities that are inherent in a multi-product and as usually multi-vendor architecture.

If they get that much fat for deploying it then trying to maintain it becomes a big challenge, especially when an outage inevitably occurs with six or more separate vendors to each pointing their finger at someone other. You may require achieving what DIY costs, in term for time and lost customers.

This is the problem that Oracle has addressed with its latest integrated effort, the *Oracle SuperCluster T5-8*. Oracle has established a goal to put together the fastest "engineered system" which that is possible, makes it complete the fastest database and application servers, for the fastest database server, which are being connected over fast high speed.

InfiniBand technology is an operating system environment carefully being virtualized so that it can support a highly scalable solution. Oracle uses SuperCluster T5-8, Oracle expects to believe that it has being eliminated or at least reduced, the complexity for optimizing, assembling, managing, initializing a robust platform is mission-critical work.

II. INTRODUCTION

"Oracle SuperCluster is a complete engineered system integrating compute, storage, networking, and software—that has been designed, tested also integrated to run databases and enterprise applications and to rapidly deploy cloud services while delivering extreme efficient, cost saving and performance. Is well suited for multitier enterprise applications with web, database, and application components. This versatility, along with powerful, bundled virtualization capabilities, makes it an ideal platform on which to consolidate large numbers of applications, databases, and middleware workloads, or to deploy complex, multiuser development, test, and deployment environments."[3]

Oracle SuperCluster impacts all tiers of the data center, and enables businesses to reduce their operating expenses, including costs to assemble, test, deploy, maintain, upgrade and debug their infrastructure.
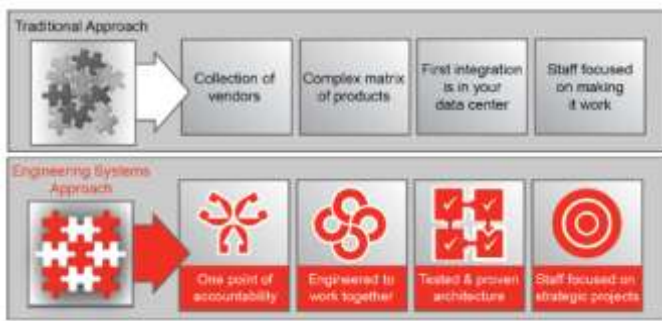
Figure 1.0 represents the engineering system approach which has driven various aspects to increase efficiency and robustness.[3]

A. ORACLE SUPERCLUSTER T5-8

Figure 1.1 represents the Oracle Super Cluster T5-8 giving the view of its entire designing display.[3]

"Oracle SuperCluster T5-8 combines the high performance, high availability and rapid deployment, making it ideal for Oracle database and application consolidation and private cloud infrastructure. The engineered system which combines up to 4 TB of memory and to 16 SPARC T5 processors with Oracle Exadata Storage Servers for extreme database performance and compression. With redundancy of servers, storage nodes, network switches and key components Oracle SuperCluster T5-8 has no single point of failure and enables zero downtime maintenance."[3]

- Delivers extreme performance and 10x better price/performance than a comparable IBM Power7+ based solution
- Based on the world's fastest database server, the world's fastest database storage, and the world's fastest processor
- Ensures the highest availability, with No single point of failure and zero downtime maintenance
- Provides the highest efficiency, with up to 10x database compression, 3x less administrative overhead, and 5x faster deployment than build-it-yourself systems

Figure 1.2 represents the Architecture overview of Oracle Super Cluster T5-8 and the respective hierarchy of its various components.[3]

- Consolidates the largest, most mission-critical OLTP and data warehousing databases on the same system, making it ideal for the largest enterprise-wide applications
- Integrates Oracle's best-in-class servers, storage, networking, and software

B. ORACLE SUPERCLUSTER M6-32

Figure 1.3 represents the Oracle Super Cluster T5-8 giving the view of its entire designing display.[3]

"Oracle SuperCluster is Oracle's most powerful Oracle Database and application consolidation platform. It is also ideal for in-memory processing and the largest and most complex workloads and provides the highest consolidation ratios, availability, and serviceability. Oracle SuperCluster M6-32 scales up to 32 TB of memory and up to 32 SPARC M6 processors, and comes with Oracle Exadata storage servers optimized for Oracle Database performance and compression."[3]

- Most scalable engineered system - up to 32 TB of memory and 32 SPARC M6 processors
- Most flexible - Grow compute and storage capacity independently.
- Best for in-memory computing - Oracle Database12c and applications-optimized.
- Highest consolidation ratios, availability and service.[1][3]

III. Controlling the Costs of an Enterprise Data Center

We have all heard the axiom, expressed by companies attempting to discredit it, that "Tape is dead." This axiom has failed to pass the test of time, simply because not only has it stood that test, but it use has been simplified over the years (decades) to remove complexity from the deployment equation and thus has lowered the total cost of ownership (TCO) of the IT infrastructure. One axiom, however, that we can all believe in is that the more complex a solution, the more costly is that solution. With all things, if you can remove some of the complexity, you can simplify the solution and likely lower the TCO of deploying that solution. As a good rule of thumb, the more complex the solution, the greater the staff required to keep it operational.

What contributes to the complexity of an enterprise data center solution? What raises the TCO, destroying the data center budget? [2]. Many factors go into the calculation of the TCO and the list of items, assumptions, and methods of calculation may be different for every enterprise. First of all, the acquisition charges for a complex and multi-vendor architecture for the software required to run it, tend to be significant, but usually they are only one-time charges, which tend to be followed (sooner or later) by annual maintenance chargers. The operational costs of the facilities, which includes the energy consumption that is on-going charges, which are only going up. The more complex and expansive the solution, the more floor space it occupies and the more energy it consumes to drive the hardware and then cool the environment. Then there are the human charges – costs to implement and deploy a system that needs to be designed to respond to spikes in demand, and then to support and maintain it. People, your IT staff, are the critical factor to get new services up and running in order to keep up with critical enterprise requirements and changing business conditions. Here you have to factor in not only salaries but training and benefit costs as well. The increased staff that you have to hire to run the mission- and business-critical enterprise applications not only drains the IT infrastructure budget, but also increases the TCO. Reliability and security are other factors that must be considered. Every hour, every minute of downtime might cost the enterprise millions of dollars in lost production and lost reputation. The system must remain operational. To do this, it is vital for the senior IT managers to invest in an integrated hardware and software solution that can simplify IT operations and reduce the drain on the enterprise IT budget. Reducing, and possibly eliminating, planned and unplanned outages should be a goal in every deployment. In addition, enterprise data must remain secure, in an end-to-end operation, and protected from prying eyes with malicious intent.[6]

The typical infrastructure stack involves deploying a complex, multi-vendor architecture. It is both expensive to acquire and deploy, and also to maintain. *What is the usual result of this activity?* It becomes a unique "one-off" configuration that cannot benefit from any economies of scale or integration. In fact, as the data center workload grows, it usually becomes (a) harder and harder to scale the infrastructure to meet the new demands and (b) more difficult to reach the performance goals and SLAs established by both senior management *and* the user community. A complex infrastructure also carries the potential burden of isolated (soloed) system resources, possibly creating an environment with inaccessible surplus capacities, which may make it wasteful, more vulnerable, and harder to keep operational.

Additionally, many larger enterprises, such as those involved in media and entertainment, are not looking to become systems integrators. Their business *is* media and entertainment. They want to acquire a reliable system that has both hardware and software pre-integrated to ensure fast, consistent operations at a reasonable cost, not just acquisition cost, but TCO!

"The *Oracle SuperCluster T5-8* is exactly that – a system that has been engineered for extreme performance, availability, operational efficiency, including deployment, data compression, and management efficiency, and security, in order to significantly speed up time-to-value when compared to a DIY architecture."[1] Pursuing advantage with the best hardware that engineering could provide, Oracle released, in 2011, the *Oracle SuperCluster T4-4*. As with fine wines, time and advanced engineering makes most good things better. With the announcement of the *Oracle SPARC T5*1 in April 2013, Oracle has laid the ground-work for an even faster and more complete system for the most demanding enterprises.

With Oracle *Solaris* providing the operating environment, along with the *Oracle Sun ZFS Storage Appliance*, Oracle's SuperCluster T5-8 is the ideal platform to achieve performance advantages that the competition cannot match. This is even truer when Oracle applications and database are deployed, making this amalgamation a complete and integrated solution built on an "Oracle-on-Oracle" architecture. In doing so, the *Oracle SuperCluster T5-8*-based solution delivers the fastest servers, with extreme performance storage, and high-performance, low-latency networking via *InfiniBand*. This provides tightly coupled storage and the accelerated performance and high availability required for the consolidation of mission-critical databases applications and private cloud deployments, in a balanced architecture.[7]

IV. Architecture of Oracle SuperCluster T5-8

"The SuperCluster T5-8 is the fastest engineered system ever manufactured by Oracle. Designed as a complete solution, with hardware and software2 bound together, pre-tested, and integrated, it has the extreme performance intrinsic to the SPARC T5 processor."[3] In fact, the Oracle SuperCluster T5-8 can be configured in a full rack with two nodes and up to 256 SPARC T5 cores and 4TB of memory. The Oracle

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SPARC T5 has twice the number of cores and threads as compared to the SPARC T4, with double the cache and 2.5 times the memory bandwidth. The Oracle SuperCluster T5-8 delivers response times 2.5 times that of the SuperCluster T4-4, with 33% greater storage capacity, three times the price/performance, while meeting all user SLAs. In addition, with two 8-socket SPARC T5 processors, the SuperCluster T5-8 has no single-point-of-failure (SPOF), minimizing both planned and unplanned outages for 24x7 accessibility and five "9s" database and application availability, as reported by Oracle customers. [3][4]

Oracle's SuperCluster T5-8 also lowers the TCO of the IT infrastructure by enabling the consolidation of a myriad number of applications for efficient processing; not just Oracle applications, but for a heterogeneous mix of mission-critical applications from a wide variety of vendors. By reducing the number of servers required, the data center can (a) save significantly by reducing the administration and maintenance time being spent by the IT staff, and (b) by saving on both floor space and energy consumption, thus lowering the TCO of the IT infrastructure. In addition, with all of the components pre-tested at the factory, the system is up and running when it is installed, enabling the IT staff to implement new applications faster. It also enables the data center to deploy a secure, multi-tenant cloud, with automated provisioning of cloud services, faster than was possible before. With the Oracle SPARC T5 hardware-assisted encryption – the industry's fastest Oracle-transparent data encryption – the SuperCluster delivers secure high-performance security for enterprise, web, middleware, and database applications. [1]

The SuperCluster T5-8 utilizes all of the best engineering innovation that Oracle has put into *Oracle Exadata Storage Server* (with *Smart Cache Flash* for improved database response and throughput), *Oracle Exalogic* storage offerings (including *Elastic Cloud* software capabilities to accelerate JAVA applications), and *Oracle Virtualization* (with zero overhead, via *Oracle VM Server for SPARC*). Each Exadata Storage Server is configured with either (12) 600GB high-performance disks or (12) 3TB high-capacity disks, and (4) 400GB Smart Cache Flash SSDs. This results in a dramatic decrease in application response time for consolidated and virtualized applications. This makes the Oracle SuperCluster T5-8 ideal for running mission-critical databases and applications, including consolidation and cloud processing.

Applications that can take advantage of the Oracle SuperCluster T5-8 capabilities include OLTP, batch, data warehousing, and analytics. In addition, by the use of unique *Hybrid Columnar Compression,* Oracle has lowered database storage requirements, improved data center efficiencies (with a ten-times database compression, resulting in a ten-times faster database execution), and created price/performance advantages over the competition.

The Oracle SuperCluster T5-8 has complete application-to-disk management with Oracle's *Enterprise Manager Ops Center12c*. This enables the IT staff to proactively monitor, manage, and troubleshoot the entire enterprise hardware and software environment. In addition, after investing thousands of hours in testing as a single integrated system to reduce risk and expedite updates, Oracle has enabled an integrated SuperCluster T5-8 with simplified maintenance and one-patch deployment for the entire system.

With *Oracle Platinum Services* provided by Oracle at no additional charge, the data center can rely upon a higher support level for the entire Oracle stack, including 24x7 remote fault monitoring. This enables the fastest response times for any detected fault and provides for patch deployment by Oracle engineers. This helps to reduce patch time by a factor of ten.

V. Oracle Integrated Solutions

Oracle SuperCluster T5-8 will run any application that is supported on *Oracle Solaris 11* or *Solaris 10*. In addition, applications running on *Oracle Solaris 9* or *Solaris 8* can be deployed on a SuperCluster using *Oracle Solaris Legacy Containers* on Solaris 10. With an Oracle DBMS integrated into the SuperCluster T5-8, Oracle has provided the enterprise with a system designed for extreme performance for all database and mission-critical applications. This includes third-party applications, such as those from *SAS* and *SAP*, in addition to Oracle's database and enterprise applications, including *Siebel app*, *E-Business Suite* and *JD Edwards*. This system is ideal for the consolidation of databases, applications, and private cloud onto a single, engineered system. Oracle has optimized the interaction among all of these applications with the standardized solution, in order to provide superior performance and significantly reduced cost/performance when compared to their competition.

Oracle has documented a myriad of Oracle SuperCluster T5-8 customers that have experienced a reduced TCO with up to 20 times consolidation of complex business systems3, up to four-times efficiency improvements, along with significantly reduced software licensing costs. The Oracle SuperCluster T5-8 is ideal for a multi-tenant cloud environment, SAP, heterogeneous databases and JAVA applications. One customer has documented a five-time performance improvement over its previous solution.

VI. ORACLE SUPERCLUSTER COMPONENTS

A. Oracle Recovery Manager (Oracle RMAN)

Oracle SuperCluster works with Oracle Recovery Manager (Oracle RMAN) to allow efficient Oracle Database backup and recovery. All are existing in Oracle RMAN scripts that work unchanged in the Oracle SuperCluster environment. In Oracle RMAN it is designed to work with an intimately with a server, providing block-level corruption detection during backup and restore. In Oracle RMAN optimization and performance are space consumption during backup with file multiplexing and backup set compression. The integrated Oracle ZFS Storage ZS3-ES appliance could be used by Oracle RMAN to back up Oracle Database, or an external Oracle ZFS Storage Appliance could be connected to Oracle SuperCluster. [4]

B. Oracle Solaris Cluster

For applications run in application domains, Oracle Solaris Cluster which helps organizations to deliver highly available

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application services. To provide limit outages due for those single points of failure and mission-critical services that need to be running in a clustered physical servers that efficiently and smoothly take over the services from failing nodes, with an minimal interruption for data services. While Oracle SuperCluster is designed with full redundancy at the hardware level gives an impact for Oracle Solaris Cluster to provide for the best solution for Oracle's SPARC servers running Oracle Solaris and applications. Oracle Solaris Cluster is focused on failover between zones and application domains within Oracle SuperCluster. Tightly coupled following with Oracle Solaris Cluster detects failures without delay (zero-second delay) and provides much faster failure notification, application with failover, and the reconfiguration time. "Oracle Solaris Cluster offers high availability for today's complex solution stacks, with failover and protection from the given application layer through to the storage layer. Figure shows an example of the time it takes Oracle Solaris Cluster to detect a failure and recover on the redundant node. "[5][6]

Oracle Solaris Cluster recovery times.

Figure 1.4 represents the Clustering mechanism of Oracle Super Cluster from the point view in terms of efficiency, reliability and robustness. [3]

C. Oracle Configuration Manager

Oracle Configuration Manager is used to personalize the support experience by collecting configuration information and uploading it to the management repository. When customer configuration data is uploaded on a regular basis, following support representatives would be able to analyze this data and provide better service to customers. [2]
Some benefits for using OCM are as follows:

- Reduces time for the resolution support issues

- Provides a highly efficient proactive problem avoidance

- Improves access to the best practices of Oracle knowledge base

- Improves understanding for customer's business that needs and provides a consistent responses and services

Figure shows the possible configurations of Oracle Configuration Manager, depending on customer requirements and restrictions for connectivity to the internet.
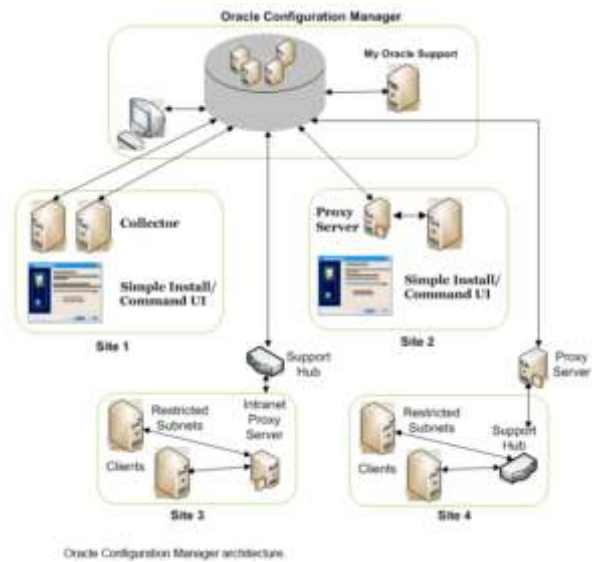

Oracle Configuration Manager architecture.

Figure 1.5 represents the Oracle Configuration Manager that gives the complete view of cluster implementation in an enterprise and different connectivity. [3]
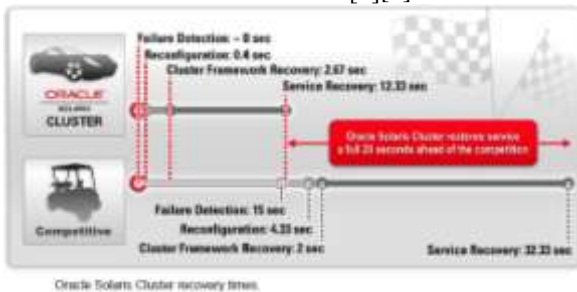
VII. FUTURE WORK

In this paper, we proved the feasibility of deploying Oracle SuperCluster which can achieve equivalent performance with a dedicated Oracle database. Oracle SuperCluster pre-integrates Oracle's Exadata Storage Servers. For this reason it is well suited for a wide range of high-performance database deployments ranging from scan-intensive data warehouse applications to highly concurrent online transaction processing(OLTP) applications. Because of its support for the latest Oracle Database and its built-in zero-overhead virtualization, and earlier versions of Oracle Database, Oracle SuperCluster is an ideal system for database consolidation. Exadata Storage in expansion racks can be connected to Oracle SuperCluster using high-speed InfiniBand networking.

VIII. CONCLUSION

The Oracle SuperCluster T5-8 has been designed for extreme performance, integrated as a single system. With no single-point-of-failure, it provides the reliability that every enterprise demands for its mission- and business-critical applications. Through its unique and innovative compression capabilities, each system makes an ideal platform for optimized consolidation and virtualization, resulting in the highest efficiency possible, while maintaining the lowest-possible risk levels.
    If your enterprise needs to remove complexity while reducing risks for its IT architecture and lower the TCO of its data center IT infrastructure in order to comply with budgetary and performance requirements, then you need to take a close look at Oracle's SuperCluster T5-8 for your integrated system database and application requirements.

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