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OPTIMIZED SOLUTIONS

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Oracle Optimized Solution for PeopleSoft Human Capital Management Consolidation

using M-Series servers, Flash and Enterprise Storage

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Introduction

Oracle's PeopleSoft Human Capital Management (HCM) is a leading product in the industry and has evolved over the years to meet customer's increasing requirements. PeopleSoft HCM has been optimized to run best with the Oracle Database and now we present the hardware architecture and optimizations that will allow the software stack run best on Oracle's hardware – systems and storage.

The acquisition of Sun Microsystems offers customers the opportunity to work with a vendor that can build complete solutions including applications, database, operating environment, servers and storage leveraging the advantage of integration. Engineering teams partner to bring the unique features each technology offers to work together.

Oracle's Enterprise SPARC servers and Oracle's Solaris operating system offer benefits like security, consolidation, scalability, performance and reliability to a PeopleSoft HCM solution. These benefits are the result of years of experience with infrastructure designed for business applications combined with in-depth understanding of the datacenter. In addition, the Oracle Solaris operating system is the most widely used operating system for Oracle Database server deployments.

The introduction of Oracle's FlashFire technology featuring various forms of flash devices is a disruptive technology that allows performance improvements to applications. These performance improvements can be dramatic and with additional benefits such as reduced operational cost of the infrastructure.

This paper describes the benefits of integrating Oracle's software and hardware technologies to achieve optimal results in the form of increased performance and reduced cost of operation, lower energy consumption, and smaller footprint.

A Brief Overview

As part of the integration between hardware and software, synergies have been identified which benefit the operation of PeopleSoft HCM. Focusing on these improvements, there are various areas where optimizations can be achieved. This paper covers the following key areas for optimizing the infrastructure to run Oracle's PeopleSoft HCM:

- *Faster time to service* – Reducing deployment times when deploying PeopleSoft Payroll for North America and PeopleSoft Human Resources (HR) self service applications can have a significant impact on Total Cost of Ownership (TCO) as well as Return on Investment (ROI). This solution offers the ability to jump over time consuming tuning efforts at all levels of the implementation.
- *Server Consolidation* – The ability to combine multiple workloads that run independently into a single physical server while keeping complete isolation between environments offers the benefits of reduced server count for less management and reduction of server sprawl.
- *Storage Innovation* –. Oracle's FlashFire technology offers a leap in IOPS performance, which enables new architectures to be built in the datacenter contributing to smaller physical storage system footprints and as a result reduced power consumption and acquisition cost.

The two PeopleSoft HCM modules selected for this architecture were the Payroll for North America module and Human Resources module. The reason for choosing the payroll module is that it represents a workload that is batch in nature requiring many transactions to occur sequentially in the database. Conversely, the HR module offers an online/transactional workload that will drive random transactions to the database.

By having both workloads implemented, the test will more accurately represent a real world scenario where an enterprise will host both modules in an environment that accesses the same database leveraging the infrastructure as much as possible for reduced management and workload consolidation.

Faster time to service

Bringing a service online successfully in a short amount of time is of prime importance to enterprises because of the productivity effects these services have in an enterprise. Implementation time once the decision to deploy a service is made and actual service availability can have direct impact on the bottom line and affect business.

Using the Oracle Optimized Solution for PeopleSoft HCM offers a guide to implement services in the most direct track to success. It documents activities such as tuning which in practice is an iterative process that requires extensive time and hardware for a test environment. Being able to obtain these configurations in a single document with tuning information and configuration characteristics for all areas of the infrastructure allows the deployment effort to remain ahead of the curve.

In addition to system and application tunings, the optimal components are chosen for each individual workload so that the application running on it takes optimal advantage of the underlying hardware. Choosing the right infrastructure and adding the best components to do the job offers the fastest path to ROI.

A tested environment offers predictable results

Customers are in the business of delivering services to customers, not necessarily implementing core business applications, and the experience of implementing a PeopleSoft HCM environment will greatly be enhanced with the help of the Oracle Optimized Solutions technical whitepapers because of the documented architectural design as well as system and application tuning information included.

This solution includes a guide to identify the hardware resources needed to run different size workloads and it provides a starting point for sizing the implementation with mixed server and storage environments. When deploying a new environment, these starting points will shorten the overall deployment time with predictable results.

Server Consolidation

By using enterprise class servers such as Oracle's Enterprise SPARC M-series line of servers, consolidation is included as a feature in the product. They allow the system to be partitioned into Dynamic Domains that run completely isolated environments within a single system. This feature offers reduced server management of the infrastructure and enables other applications to utilize the resources available in these servers.

Another benefit that consolidation has to offer is flexibility in resource management, where compute, memory and I/O resources can be allocated and re-allocated to the different applications running in the partitioned server to benefit applications that need the additional compute power permanently or temporarily.

Choice of options for consolidation: Dynamic Domains and Oracle Solaris Containers

The SPARC Enterprise M-series line of servers have some of the most advanced consolidation capabilities. For example, the SPARC Enterprise M8000 server supports up to 16 Dynamic Domains, enabling massive server consolidation and data center virtualization. Each physical domain can also be further optimized into more granular resource divisions through the use of Oracle Solaris Containers, enabling each SPARC Enterprise M8000 server to support thousands of software partitions.

The use of dynamic domains technology used to assign resources offers flexibility in resource allocation. This flexibility allows the system to accommodate workload changes depending on the various cycles that occur throughout the month or the year.

Higher RAS capabilities with M-series servers

Reliability, Availability and Serviceability (RAS) features come standard in the Sun SPARC Enterprise M-series server—features like automatic recovery with instruction retry, up to 1 TB of system memory error-correcting code (ECC) protection with extended ECC support, guaranteed data-path integrity, total SRAM and register protection, and configurable memory mirroring. Major system components are redundant and hot-swappable, providing the superior reliability and availability required by a 24x7 compute infrastructure.

All of these technical advantages allow the business to continue running smoothly and maintain service availability even through errors or hardware failures. Enhanced high availability options are available when combined with Oracle Solaris Cluster that offers not only local failover to a backup environment but also geographic cluster failover for disaster recovery scenarios or even planned maintenance windows that will keep users connected to the application.

Storage Innovation

Traditional storage environments have gone through a transformation in many ways improving the connectivity, reliability and availability of the data repositories as well as capacity, yet there is one key aspect of these systems that has not improved significantly over time. The I/O operations per second (IOPS) of hard drives have remained practically unchanged for the last decade or more. Oracle's FlashFire technology changes that by offering greatly enhanced IOPS performance, which directly enhances batch process transaction times.

Besides offering high performance storage, Oracle's FlashFire technology is capable of doing so in a very small form factor eliminating a large number of traditional storage disk arrays that are required to provide IOPS. This reduction in the number of disks initially offers the ability to use fewer racks of equipment to implement the storage device. When using flash technology in combination with traditional hard drive storage systems an optimal architecture can be built to leverage the best traits from both technologies.

Today's datacenters have large investments in Storage Area Network (SAN) based storage that offer exceptional storage capacity and performance. The challenge with spindle-based storage appears when the applications accessing them require high rates of throughput or large numbers of database transactions, which saturate the mechanical capabilities to the point where the spindles simply can't keep up. Historically, the solution has been to add more spindles – in the order of hundreds or thousands – that are minimally used for capacity but rather aggregated to provide throughput.

The traditional solution described above has long been used to address the problem, but the increasing cost pressures of administering to these massive disk farms – plus the huge floor space and rising heat generation they produce – makes it increasingly difficult to justify the cost/performance trade-off.

The Sun Storage Flash Arrays offer a cost effective alternative for accelerating databases and I/O intensive applications. The technology can offer significant benefits when compared to hard drives as shown by the table below.

METRIC	HARD DRIVE	ORACLE FLASH TECHNOLOGY
Input/Output operations per second	200-500 per hard drive	100k per F20 Flash Storage PCIe Card up to 1.6M (fully loaded F5100 Flash Array)
Latency (ms)	2	.378
Power required for 1.6M IOps (kWh)	68 (4000 disks / 18 racks)	< 0.4 (one array / one rack unit)

Better Performance and Throughput by using Sun's new database accelerator technology

Oracle's Sun Flash Accelerator F20 PCIe Card allows customers to turbo charge applications instantly, improve response times, and reduce I/O latency. Based on Sun FlashFire technology, it delivers the I/O performance of over 300 disk drives to eliminate storage I/O bottlenecks and help servers and applications run faster and more efficiently. Two of the key applications of Oracle's Sun Flash Accelerator F20 PCIe Card are databases and storage grids.

When a system is configured with the Sun FlashFire technology, it can accelerate applications and improve response times therefore offering improved productivity, space utilization and power efficiency.

The use of it reduces storage latencies and eliminates I/O bottlenecks. The unit is high performance and offers highly reliable FlashFire technology that is easy to use with no need for special software or drivers required.

Conclusion

In today's competitive environment where power and space are at a premium, CIO's are looking to squeeze every drop of resources from their infrastructure in order to maximize service delivery with the minimal server and storage sprawl in the datacenter. Oracle Optimized Solutions integrate PeopleSoft HCM with the Oracle Database server and Oracle Solaris on Oracle's new line of hardware and storage offer an opportunity to reach these goals in a fast and effective way through documented, tested environments.

Testing shows that introducing flash technologies to an existing architecture or building one from scratch with the use of these high performance components can increase performance to new levels making simple changes to the configuration. In the data shown above, even a small amount of flash storage can increase performance by 20%, and using larger amounts of Oracle's FlashCache technology up to 47% of performance improvements can be seen.

This exercise has also helped show that fewer spindles can be used to store the overall database and fully utilize each hard drive to increase storage density in these high performance SAN attached devices. The PeopleSoft HR online self service application helped verify this by confirming that service response times remained very good when using this traditional storage device.

Use of a SPARC Enterprise server helped us show how to consolidate the entire environment into a single managed server leveraging the Dynamic Domains technology, which offers the complete separation of different applications or modules. The managed environment can further be enhanced in the datacenter by using the other management tools from Oracle including Oracle Ops Center and Oracle Enterprise Manager for a complete and integrated managed environment.

Overall, these results bring us to the conclusion that Oracle's integrated stack of end to end products can really offer great benefits to the customer given it's high performance building blocks and highly integrated environments.

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