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Configuring SAP BusinessObjects for Scalability and Performance on Oracle Systems

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Executive Overview

The Business Objects Enterprise XI suite are a comprehensive suite of business intelligence (BI) applications for gathering, storing, analyzing, and providing access to operational data to help users and automated systems make fact-driven business decisions. The BusinessObjects Enterprise XI suite is composed of a set of interconnected services and tools, each optimized for specific tasks and operations that include a range of developer services, platform services, data services, specialized tools and applications, and management tools. The sizing study described in this white paper demonstrates the scalability and performance of the Business Objects Enterprise XI suite on Oracle's CoolThreads servers and open storage technologies.

Introduction

Oracle's CoolThreads servers and open storage technologies, together with the Oracle Solaris operating system, provide an ideal platform to run the SAP BusinessObjects Enterprise XI software suite and deliver a rapidly-deployable, fast, cost-effective, and stable business intelligence (BI) solution. This white paper describes a sizing study that illustrates the functional capabilities, deployment flexibility, and performance capacity of the SAP BusinessObjects Enterprise XI software suite installed on CoolThreads technology-based servers and Oracle storage systems.

This white paper is targeted at technical IT managers and system architects who are responsible for implementing, managing, or recommending SAP BusinessObjects solutions.

A Brief Introduction to Business Intelligence

BI is a broad term that encompasses business-critical applications and technologies for gathering, storing, analyzing, and providing access to operational data to help users and automated systems make fact-driven business decisions. The utility of BI systems, also known as decision support systems, ranges from supporting senior management strategic decision making, to driving automated processes such as inventory management, and all points in-between.

A non-exhaustive list of BI applications includes data mining, statistical processing, composite report generation, and data visualization. These applications typically run on dedicated systems and are often very demanding in terms of the computing, networking, and storage resources they require.

The configuration and operational requirements of a given BI system are derived from the way the system is used by an organization. Where the enterprise relies on BI systems for conducting daily business, reliability is a primary consideration. If a company uses BI for automated decision-making (e.g., for logistics and inventory control) the main requirements are responsiveness and speed. Thus, optimal BI deployments should be both responsive and reliable.

BusinessObjects Enterprise XI

SAP BusinessObjects Enterprise XI is one of the flagship products of SAP AG, acquired as part of the acquisition of BusinessObjects Corporation in 2007. SAP BusinessObjects Enterprise XI is a modern, service-oriented architecture (SOA) BI platform that delivers mission-critical information to help companies track, understand, and manage their business.

BusinessObjects Enterprise XI is composed of a set of interconnected services and tools, each optimized for specific tasks and operations. The services and tools are grouped into the following tiers and categories:

• User interaction

• Developer services

• Platform services

• Data services

• Specialized tools and applications

• Management tools

User Interaction

The user interaction tier consists of a range of interface mechanisms, including a Web portal, that enable users to interact with any type of business intelligence reports, analytics, dashboards, scorecards, and strategy maps.

Developer Services

The developer services tier consists of a set of software development kits (SDKs) that expose the SAP BusinessObjects Enterprise XI services to external software components. These SDKs include all of the end-user interfaces provided by the platform as application programming interfaces (APIs) or Web services. These SDKs include the interfaces needed to extract content listings from the system, control content processing and delivery, view and interact with content, and administer the system.

The developer services host includes the server-side components that interface between the end-user and the SAP BusinessObjects Enterprise XI services. The components process requests from the user interaction tier and pass these requests to the appropriate service. These components are installed on one of a number of supported application servers.

Platform Services

The platform services tier is the core processing and management engine for SAP BusinessObjects Enterprise XI. The platform services tier is where the actual data processing, document processing, and end-user access occurs. The platform services tier includes a series of specialized services for different tasks:

• The central management server (CMS) maintains a database of information on the SAP BusinessObjects Enterprise XI system. The platform services are managed by the CMS, which is also responsible for maintaining the system's access control information, applications, and end-user viewing experience.

• The file repository services manage the files used and produced by the SAP BusinessObjects Enterprise XI software suite.

• The event services manage the different events used to track and trigger tasks in the system.

• The schedule services provide scheduling capabilities for the specialized tools and applications detailed in the section "Specialized Tools and Applications". These services also refresh performance management data.

• The page viewing services support page-on-demand access so only a specific page of a given report is returned, enhancing performance and reducing unnecessary network traffic.

• The cache services handle report viewing requests and maintain the different caches in the system. These services are implemented to support improved performance of Crystal Reports and Desktop Intelligence by preventing multiple transfers of frequently requested pages.

• The report services create reports based on ad-hoc and predefined queries and analysis when requested by users for the specialized tools and applications detailed in the section "Specialized Tools and Applications". The report services collect data from multiple sources and generate reports.

• The report modification service supports interactive report creation and modification.

The SAP BusinessObjects Enterprise XI software suite includes a number of additional services. For further details see the SAP Businessobjects Enterprise XI Web site listed in "References".

Data Services

The data services tier provides a set of features for accessing, organizing, and exposing data to report writers, analysts, and end-users. These features consist of tools that enable and simplify end-user query and analysis, abstracting the complexity of data by using business language rather than data language to access, manipulate, and organize data.

Specialized Tools and Applications

End users can access, create, edit, and interact with specialized tools and applications that interface with the other components of the SAP BusinessObjects Enterprise XI software suite and other sources of information. These tools include:

Crystal Reports, which is a dynamic reporting solution that enables users to create formatted and interactive reports using layout tools and design controls. Users can connect to almost any data source, export reports to several popular formats, include reports in enterprise applications, and develop data mashups.

Web Intelligence enables both self-service access to data and intuitive information analysis. Users can create queries, format the retrieved information, and analyze it to understand underlying trends and root causes or simply explore information in existing reports.

Desktop Intelligence enables users to analyze data in standard reports, perform ad hoc queries to gather new data, and create their own reports.

In addition to the above tools, the SAP BusinessObjects Enterprise XI software suite includes a set of performance management services for dashboards, metrics management, predictive analysis, process analysis, and more.

Management Tools

The management tools provide the SAP BusinessObjects Enterprise XI administrator with a Web-based environment to access and configure the system while controlling the overall access rights, applications, and end-user viewing experience.

Oracle's Sun Hardware for Demanding BI Workloads

BI workloads are demanding. Even a seemingly simple query and report can generate many transactions creating significant demands on multiple subsystems — CPU, memory, network, and storage — and across multiple software components — Web servers, application servers, and databases. The required processing, networking, and storage capacity is extensive, since data must be

obtained from many sub-systems and then cross-referenced, cross-tabulated, and processed. The resulting reports might then require post-processing for graphic visualization.

Because of their complicated, multitransactional nature, BI workloads benefit from concurrent and parallel processing and I/O rather than the raw speed of serial execution and storage. To meet these demands, the test environment used in this sizing exercise is based on a likely production scenario utilizing a combination of different CoolThreads servers and high performance storage systems using both Flash and conventional disk technologies.

CoolThreads Technology-Based Servers

Servers with CoolThreads technology provide high performance in a compact form factors at competitive price points with low operational costs. These chip-level multithreading (CMT) platforms avoid bottlenecks often encountered when workloads are dependent on large data transfers over a system bus by keeping the critical components of the workload near the actual point of execution. CoolThreads servers are based on the UltraSPARC® T2 Plus and UltraSPARC T2 processors. These servers include both standard rack-mount servers and blades (Figure 1).
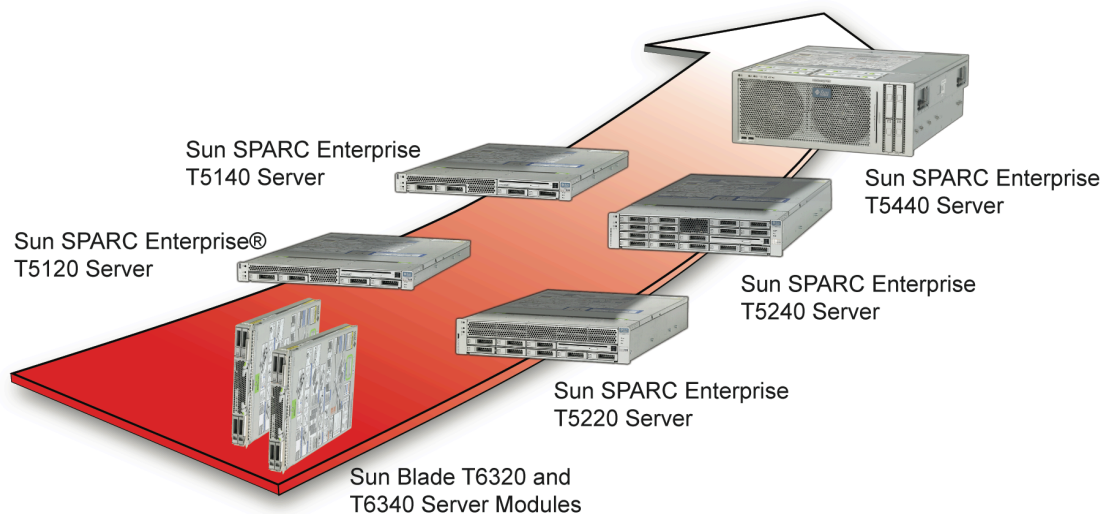

Figure 1. Oracle's UltraSPARC T2 Plus processor-based servers

The CoolThreads technology-based servers are well suited for the SAP BusinessObjects Enterprise XI architecture and can deliver high performance across a broad spectrum of user and deployment scenarios. For example, specialized platform services are included that handle either on-demand data access and report generation or time- and event-based report scheduling. Processor intensive scheduling and processing can be off-loaded to dedicated virtual servers to minimize performance impact for end-users who are simply viewing and interacting with documents. The CoolThreads technology-based servers can meet the needs of virtually any BI deployment with an architecture that is flexible enough to grow from several users with simple requirements, to tens of thousands of users with complex requirements.

BI applications in general and the SAP BusinessObjects Enterprise XI software suite in particular do not require optimization to take advantage of the multithreading capabilities of CMT since the underlying environment — the Oracle Solaris OS and Java™ platform — are optimized for multithreaded execution.

Sun SPARC Enterprise® T5440 Server

The Sun SPARC Enterprise T5440 server integrates 256 threads across 32 processing cores backed by up to 512 GB of memory in a 4U package. Yet, it has up to 9x fewer parts, is just one-fifth the cost of competitive systems, and is fast, cool, highly reliable, and economical. In addition, the server includes:

• One to four UltraSPARC T2 Plus 1.2 GHz, 1.4 GHz, or 1.6 GHz processors per system

• A maximum of 256 hardware threads with eight-cores per processor

• Up to 512 GB of memory

• Four on-board 10/100/1000 Mb/sec Ethernet and up to two optional 10 Gb/sec Ethernet connections

• Unparalleled expandability with four dedicated eight-lane Peripheral Component Interconnect Express (PCIe) expansion slots with eight-lane connectors, two eight-lane PCIe slots with 16-lane connectors, two additional eight-lane PCIe or 10 Gb/sec Ethernet expansion slots, expandable to a maximum of 28 PCIe slots with the Sun I/O Expansion Modules

• Four hot swappable AC 1120 Watt (W) redundant (2 + 2) power supplies

Sun SPARC Enterprise T5140 Server

The compact Sun SPARC Enterprise T5140 server provides breakthrough computational power in a space-efficient low-power 1U rackmount package. With up to two 1.2 GHz, 1.4 GHz, or 1.6 GHz UltraSPARC T2 Plus processors, and up to 128 threads, the server is designed to address the challenges of modern datacenters with greatly reduced power consumption and a small physical footprint. In addition, the server includes:

• Up to 128 GB of memory

• Four on-board 10/100/1000 Mb/sec Ethernet ports

• A dedicated low-profile PCIe slot and two combination Extended Attachment Unit Interface (XAUI) or low-profile PCIe x8 slots

• Four or eight available disk drives slots support Serial Attached SCSI (SAS) commodity disk drives or solid-state drives (SSDs)

• Two hot-swappable high-efficiency power supply units

Sun SPARC Enterprise T5240 Server

The expandable Sun SPARC Enterprise T5240 server is optimized to deliver highly scalable transaction and Web services. With two 1.2 GHz, 1.4 GHz, or 1.6 GHz UltraSPARC T2 Plus processors, considerable expansion capabilities, and integrated virtualization technologies, the Sun SPARC Enterprise T5240 server is an ideal platform for consolidated workloads. In addition, the server includes:

• Up to 256 GB of memory

• Four on-board 10/100/1000 Mb/sec Ethernet ports

• Four dedicated low-profile x8 PCIe slots and two combination XAUI or low-profile PCIe x8 slots

• Up to eight or sixteen disk drive slots supporting commodity SAS disk drives or SSDs

• Two hot-swappable high-efficiency power supply units

Sun SPARC Enterprise T5120 Server

The compact Sun SPARC Enterprise T5120 server provides significant computational power in a space-efficient low-power 1U rackmount package. With an UltraSPARC T2 processor with four or eight cores at 1.2 GHz, or eight cores at 1.4 GHz or 1.6 GHz, this server is ideally suited to the delivery of horizontally-scaled transaction and Web services that require extreme network performance. The server is designed to address the challenges of modern datacenters with greatly reduced power consumption and a small physical footprint. In addition, the server includes:

• Up to 128 GB of memory

• Four on-board 10/100/1000 Mb/sec Ethernet ports

• Dedicated low-profile PCIe slot (x8) and two combination XAUI or low-profile PCIe x4 slots

• Four or eight available disk drive slots support SAS disk drives or up to four SSDs

• Two hot-swappable high-efficiency power supplies

Sun Storage Systems

In addition to high processing workloads, BI applications create significant demands on storage sub-systems, generating a vast number of relatively small transactions. This sizing study demonstrates how these demands, requiring high volumes of fast storage, can be satisfied cost-effectively by a combination of new Flash-based systems and high-capacity conventional storage systems from Oracle.

Sun Storage F5100 Flash Array Storage

Sun Storage F5100 Flash Array storage is a high-performance, solid-state storage solution designed to help accelerate database operations at an affordable price. The Sun Storage F5100 Flash Array was included in this sizing study to demonstrate the reliability and practicality of a low power, solid-state storage unit in high transactional workloads and enterprise architectures.

In addition, the Sun Storage F5100 Flash Array delivers the following features:

• Up to 2 TB Flash memory modules

• Rack-mountable 1U chassis

• Fast access to critical data and enhanced responsiveness of database applications, without requiring modifications to the application code

• Over 1 million I/O operations per second (IOPS) — 4X the performance of other Flash technology-based systems

• 100X less power and space than traditional disk-based solutions with similar performance

• Four separate SAS domains that can be attached to a number of servers

Sun SotargeTek 2540 Array

Designed for flexibility, the Sun StorageTek 2540 array provides consolidated RAID to FC host interfaces. The Sun StorageTek 2540 array was selected for this sizing study as a conventional, proven, cost-effective storage array. This easy-to-use array delivers better price/performance and greater rack density than comparable solutions and delivers advanced technology, reliability, and affordability.

In addition, the Sun StorageTek 2540 array delivers the following features:

• Simple, server-oriented management

• Two to four 4 Gb/sec FC host ports per controller tray and up to two 10/100Base-T Ethernet ports

• Up to 36 drives

• Small footprint for maximum storage density

• RAID levels — 0, 1, (1+0), 3, 5 and 6 (p+q)

Sizing SAP BusinessObjects Enterprise XI on CMT Servers and Storage

A sizing study was implemented to evaluate the performance and scalability of CoolThreads technology-based servers running the SAP BusinessObjects Enterprise XI 3.1 sp2 software suite with the Web Intelligence, Crystal Reports, and Desktop Intelligence applications.

Objectives

The objectives of the sizing study were:

• Determine the maximum advisable load of the SAP BusinessObjects Enterprise XI software suite on the test environment

• Demonstrate the benefits of using Oracle Solaris Containers for the SAP BusinessObjects Enterprise XI software suite

- Demonstrate operational capability and explore the upper limits of a cost-effective SAP BusinessObjects Enterprise XI system using a standard configuration with standard components

- Determine the optimal configuration of Sun CoolThread servers to support 1,000 to 4,000 concurrent users, with no more than 10 second response latency for 90% of the requests, while making maximum use of CPU resources

- Demonstrate the cost/performance advantages of Sun's CMT architecture

Testing Methodology

The QALoad testing suite from Compuware (currently owned and supported by Micro Focus) was used to test the SAP BusinessObjects Enterprise XI software suite. The QALoad suite simulates virtual users. It is comprised of players that simulate users and a conductor module that gathers response time information from the players. QALoad is an enterprise-wide load testing tool for client/server or midrange hosted applications. It supports Oracle, Sybase, Microsoft SQL Server, and any Open Database Connectivity (ODBC) compliant database, as well as HTTP, TelNet, or Tuxedo traffic. QALoad stresses a client/server system by simulating thousands of users simultaneously performing different operations. It creates test scripts that are used to simulate application transactions on the client/server system. QALoad is part of Compuware's comprehensive QACenter family of application testing products.

The test system was tested under five load simulations of 1,000, 2,000, 3,000, 3,500, and 4,000 users by reproducing a common view of data using the Web Intelligence, Crystal Reports, and Desktop Intelligence SAP BusinessObjects Enterprise XI modules.

Oracle Solaris Containers

Oracle Solaris Containers are supported for SAP BusinessObjects Enterprise XI deployments. The advantage of using Oracle Solaris Containers are that they provide isolation to the applications running in them and enable the system to dedicate resources and portions of resources without the abstraction and resulting overhead of other virtualization technologies. Containers enable the SAP BusinessObjects Enterprise XI application suite to achieve a high level of hardware utilization while isolating applications on distinct virtual servers, reducing the hardware requirements and operational costs of running SAP BusinessObjects Enterprise XI.

Test Environment

Given that one of the objectives of the sizing study was to use a standard configuration with standard components, the configuration settings of the test environment (Figure 2) were set to default settings as much as possible and the tuning parameters for all loads were static. In addition, the environment was not designed for redundancy nor was it particularly weighted for performance and did not include hardware enhancements for performance. Thus, no multipath FC connections to the storage subsystems, redundant networking devices, nor NIC teaming or bonding to enhance fault-tolerance or increase performance were included.

As in any SAP BusinessObjects Enterprise XI software suite deployment, the test environment consisted of a client tier, Web tier, application tier, and data tier. The client tier, Web tier, and application tier were connected to a 1 GbE client network while the Web tier, application tier, and data tier were connected to a 10 GbE application network.
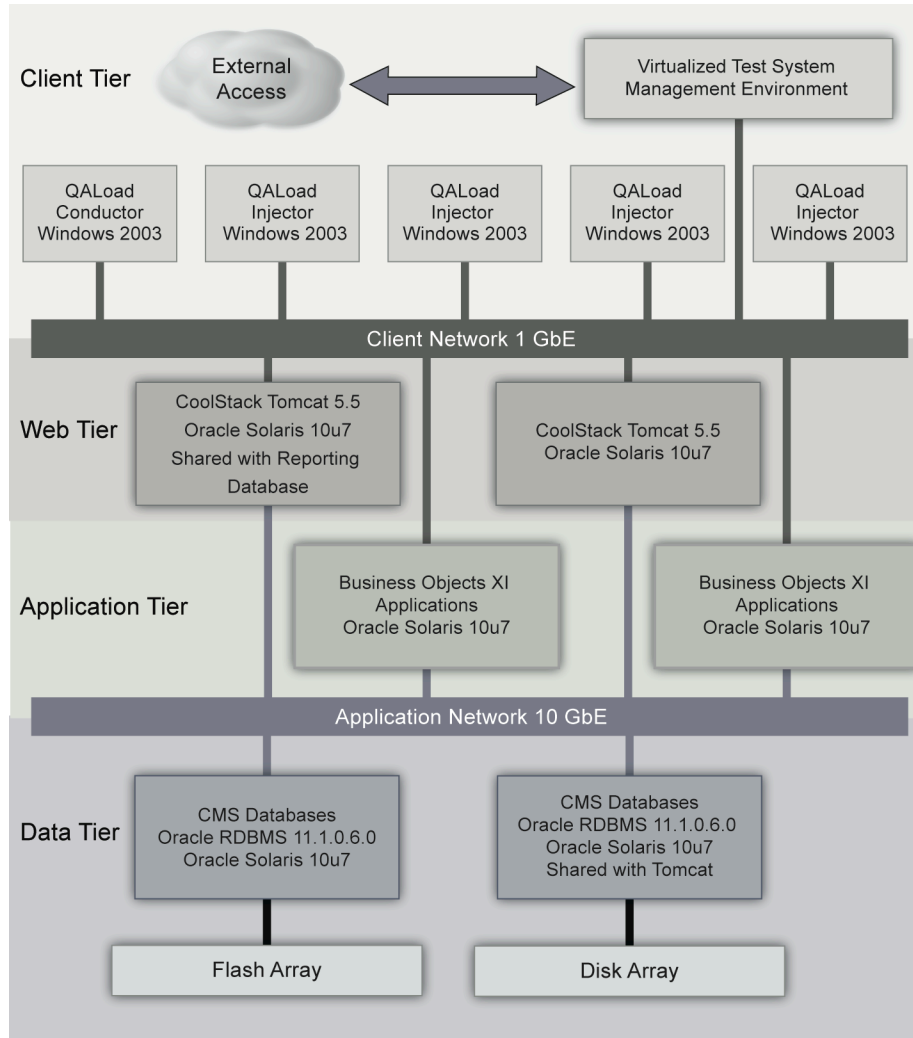

Figure 2. The test environment

Client Tier

The client tier consisted of three distinct functional components, each running on its own server:

• A virtualized test system management environment provided remote access through servers that were accessible from the Internet without protection from a firewall, known as bastion servers. The servers ran Windows 2003 over VMWare.

• A QALoad conductor used to set up the load testing scenarios, control the test conditions, create the virtual users, initiate and monitor the tests, and report the results. The system ran Windows 2003.

• Four QALoad injectors to simulate user requests. The systems ran Windows 2003.

The client tier components shared a 1 GbE network with the Web tier and application tier and they are summarized in detail in Table 1.

TABLE 1. CLIENT TIER HARDWARE AND SOFTWARE

FUNCTION	#	MODEL	# OF CPUS	RAM (GB)	SOFTWARE
Test System Management	1	Sun Fire X2270 Server	2X Intel® Xeon® 5500	32	Remote Access, Bastion
QA Load Conductor	1				QALoad 5.2 SP6, QAScript 7, MS Visual Studio 6 SP6, Oracle Net Client 10.2 for Oracle 11g Server
QA Load Injectors	4				

Web Tier

The Web tier consisted of an Apache Tomcat 5.5 Java application server (JAS) running on JDK™ 1.5.0-20 and Oracle Solaris 10 update 7 OS. The JAS acted as the gateway between the Web server and the rest of the SAP BusinessObjects Enterprise XI software suite components and was responsible for processing Web requests. As detailed in Table 2, the Web tier functionality was distributed on two physical servers, using 126 hardware threads partitioned into 18 Oracle Solaris Containers. The Sun SPARC Enterprise T5120 server was shared with the Reporting Database component of the data tier, which occupied two of its 64 hardware threads.

TABLE 2. WEB TIER HARDWARE AND SOFTWARE

MODEL	CPU	RAM (GB)	HARDWARE THREADS	ORACLE SOLARIS CONTAINERS	SOFTWARE
Sun SPARC Enterprise T5140 server	UltraSPARC T2 Plus 1.165 GHz	32	64	10	Cool Stack Tomcat 5.5, JDK 1.5.0-20 (32b)
Sun SPARC Enterprise T5120 servers	UltraSPARC T2 1.415 GHz	32	62	8	Cool Stack Tomcat 5.5, JDK 1.5.0-20 (32b)

Application Tier

The application tier consisted of the SAP BusinessObjects applications running on the Oracle Solaris 10 update 7 OS. As detailed in Table 3, the application tier functionality was distributed on two physical servers and 124 hardware threads.

TABLE 3. APPLICATION TIER HARDWARE AND SOFTWARE

MODEL	CPU	RAM (GB)	HARDWARE THREADS	SOFTWARE
Sun SPARC Enterprise T5240 servers	UltraSPARC T2 Plus 1.165 GHz	64	60	BusinessObjects Enterprise XI 3.1 sp2
Sun SPARC Enterprise T5140 servers	UltraSPARC T2 Plus 1.165 GHz	32	64	BusinessObjects Enterprise XI 3.1 sp2

Data Tier

As detailed in Table 4, the data tier consisted of two database servers running Oracle Solaris 10 update 7 OS, each connected directly over a 4 Gb FC interface to its storage device, using a single channel 4 Gb FC PCIe host adapter. The data tier's two physical servers were a dedicated Sun SPARC Enterprise T5440 server with 256 hardware threads for the CMS database, and 2 hardware threads from a Sun SPARC Enterprise T5120 server, that also hosted part of the Web tier.

TABLE 4. DATA TIER HARDWARE AND SOFTWARE

FUNCTION	MODEL	CPU	RAM (GB)	HARDWARE THREADS	SOFTWARE	STORAGE
CMS database	Sun SPARC Enterprise T5440 server	4x UltraSPARC T2 Plus 1.415 GHz	52	256	Oracle RDBMS 11.1.0.6.0	Sun Storage F5100 Flash Array
Reporting database	Sun SPARC Enterprise T5120 server	UltraSPARC T2 1.415 GHz	32	2	Oracle RDBMS 11.1.0.6.0	Sun StorageTek 2540 array

Storage

The storage used by the data tier consisted of a Sun Storage F5100 Flash Array and a Sun StorageTek 2540 disk array. The Sun StorageTek F2540 array was chosen for its simplicity, availability of standard interfaces, speed, and cost-effectiveness. The Sun StorageTek 5100 Flash Array demonstrated the improved performance of power-efficient SSD based storage. However, while the SSD storage resulted in a noticable improvement in the database performance, it did not significantly affect the overall performance of the SAP BusinessObjects applications as tested.

Test Execution and Results

A total of five test runs were executed using a single dataset, under five load simulations of 1,000, 2,000, 3,000, 3,500, and 4,000 virtual users. Each user simulation initiated a simple request to the application server to generate a typical report including sales history and available inventory. Table 5 details all of the results of the test runs.

TABLE 5. 90TH PERCENTILE RESPONSE TIME FOR AND MEAN RESPONSE TIME

RUN #	VIRTUAL USERS	RESPONSE TIMES (SECONDS)	
		MEAN	90TH PERCENTILE
1	1,000	0.718	0.787
2	2,000	0.914	1.030
3	3,000	1.127	1.228
4	3,500	1.266	1.480
5	4,000	2.500	6.939

The tests were run using QALoad from Micro Focus to simulate gradually increasing the number of concurrent users. Four servers were used to simulate the users and the tests were configured to simulate a multi-user business network by connecting the load simulators to the same network as the test targets over 1 GbE, with no load balancing.

Different workloads were selected to represent small, medium, and high loads while the system responsiveness was measured. The configuration was tested under varying degrees of stress, which exercised the different SAP BusinessObjects applications more streneously than they are normally used. In a real-world business environment, the demand for resources is normally fairly low on average, with only a few intermittant demand spikes, and fewer concurrent users. This environment is further characterized by small workloads that are typical of the real-world use of the SAP BusinessObjects suite.

The tests results demonstrate the scalability and performance of the tested configuration, as the application load is increased. At the same time, the flexibility offerred by Oracle Solaris Container based virtualization, enable the precise allocation of hardware resources to the varying demands of the SAP BusinessObjects suite. For example, without virtualization, an I/O bound application may reach its maximum performance due to limited I/O capacity while utilizing only half the processing power of a CMT server with 64 hardware threads. With Oracle Solaris Containers, two virtual servers can be deployed on a single physical server and achieve a much higher level of overall utilization.

Conclusion

The study demonstrates that the SAP BusinessObjects Enterprise XI software suite running on CoolThreads technology-based servers can leverage the latest in Sun and SAP innovative hardware and software to deliver a cost-efficient, reliable, and high-capacity solution. By deploying on the latest high-density servers from Sun, a SAP BusinessObjects Enterprise XI based BI solution can be implemented cost effectively and deliver excellent performance and scalability in a dense package. With Oracle's CoolThread servers, the complete hardware infrastructure required to deploy a fully functional and responsive BI solution for 3,000 users using the SAP BusinessObjects Enterprise XI suite can be implemented cost-effectively.

About the Authors

Sherry Yu is a software engineer in Oracle's Sun ISV Engineering group. Sherry contributes to Oracle's engineering relationship with SAP to align SAP business applications and Oracle technology through various communities within SAP. She is an active member of Enterprise Virtualization Community and SAP's Co-Innovation Lab. Sherry has over nine years experience providing ISVs assistance with performance tuning for the Oracle Solaris OS, Java, and Oracle tools and applications.

Chad Prucha has over 20 years of professional computing experience ranging from coding to datacenter design. Much of his experience derives from work in Professional Services where he designed and led projects in telepresence, open source software, virtualization, and security. He is most familiar working with academic, state government, manufacturing, and public utility clients.

Yumiko Hata is a senior Performance and Scalability specialist at SAP Business Objects Technology Development BI Division. In the 11 years she has been working in Business Intelligence she has contributed to a number of sizing studies and benchmarks of several releases of Business Objects XI.

References

TABLE 6. REFERENCES FOR MORE INFORMATION

DESCRIPTION	URL
SAP BusinessObjects Enterprise XI Technical Overview	http://www.businessobjects.com/pdf/products/platform/enterprise_tech_overview.pdf
SAP BusinessObjects Enterprise XI site	http://www.sap.com/solutions/sapbusinessobjects/large/business-intelligence/information-infrastructure/enterprise/index.epx
Java HotSpot VM Options	http://java.sun.com/javase/technologies/hotspot/vmoptions.jsp

Appendix: Configuration and Tuning Details

In general, the systems were tuned for optimal performance on CMT systems as detailed below.

Prerequisites

To successfully deploy and run the SAP BusinessObjects Enterprise XI application, the following prerequisites must be met:

- The Oracle Solaris 10 update 7 must be installed on all systems

- An active and reliable network time protocol (NTP) server must be accessible to all servers

Oracle Configuration

The Oracle database was configured with the following parameters:

- The shared memory pool was set to 8 GB

- The `Cursor_sharing` parameter was set to `force`

- The Oracle system global area (SGA) was set to 12 GB

- The default setting of 26 GB for the Oracle program or process global area (PGA) was retained

Operating System and Network Parameters

Soft rings are kernel threads that offload processing of received packets from witihn the CPU's interrupt handler, thus improving CPU throughput in high network loads at the expense of increasing latency. This parameter is set to 16 to increase utilization of the CMT CPU and resulting throughput.

```
set ip:ip_soft_rings_cnt = 16
```

The following settings are used to optimize network performance.

```
ndd -set /dev/tcp tcp_conn_req_max_q 16384
ndd -set /dev/tcp tcp_conn_req_max_q0 16384
ndd -set /dev/tcp tcp_xmit_hiwat 131072
ndd -set /dev/tcp tcp_recv_hiwat 131072
ndd -set /dev/tcp tcp_naglim_def 1
```

Tomcat Tuning

The version of the Tomcat application server used was tuned specifically for CMT. In this case, Tomcat was further optimized for speed by disabling logging, and the JVM options were set as follows:

```
JAVA_OPTS="-server -Xms2000m -Xmx2000m -Xmn800m -Xss128k
-XX:+AggressiveHeap -XX:+UseParallelGC -XX:ParallelGCThreads=8
-XX:PermSize=256m -XX:MaxPermSize=256m -XX:SurvivorRatio=15
-XX:MaxTenuringThreshold=3 -XX:+UseParallelOldGC
```

Detail on CMT specific tuning for the JVM can be found in the Java HotSpot VM Options document listed in the references.

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