An Oracle Technical White Paper
October 2011

Sizing Guide for Single Click Configurations of Oracle Database on Sun Fire x86 Servers

Introduction

Oracle's industry-leading applications and database can be best utilized if they are hosted on Oracle hardware and managed by Oracle's management tools. Oracle's Single Click configurations for Oracle Database offer tightly integrated systems that deliver unmatched performance and scalability along with superior TCO. The configurations take advantage of Oracle technologies from applications to disk, greatly simplifying deployment and management.

This white paper provides sizing for system configurations designed to address common enterprise requirements. These configurations are designed to simplify the process of getting started with the Oracle Red Stack. By engineering optimized server solutions, Oracle is reducing the amount of time it would otherwise take to set up and configure the servers along with layers of software. These solutions also reduce risk and save time by specifying the correct amount of memory, storage, and I/O bandwidth that is needed to support the selected workloads. The proposed configurations in this white paper can be treated as starting points. It is very simple to expand the system resources and application capabilities to meet the needs of an expanding business.

Foundation for an Enterprise Infrastructure

The Single Click configurations provide a foundation for delivering enterprise reliability and performance on an x86 infrastructure. Key technologies in the solution stack include Oracle Database 11*g*, Oracle Linux, and Oracle's Sun Fire x86 servers.

Oracle Database 11*g*

The solution specifies Oracle Database 11*g* Release 2 as the data management foundation, enabling organizations to utilize the full power of the world's leading database to:

- Reduce server costs by up to a factor of 5
- Reduce storage requirements by up to a factor of 10
- Improve mission-critical system performance by up to a factor of 10
- Increase DBA and developer productivity by a factor of 5
- Eliminate idle redundancy in the data center and simplify the overall IT software portfolio

Oracle Linux

Oracle Linux, which has been optimized to run on Sun x86 systems from Oracle, brings the Oracle hardware and application stack together. Oracle Linux has been built and tested to run Oracle hardware, databases, and middleware, and it is recommended for all enterprise applications. It is based on Oracle's Unbreakable Enterprise Kernel and offers the latest Linux innovations while delivering extreme performance as well as advanced scalability and reliability for enterprise applications.

Key advantages of using Oracle Linux instead of a Red Hat 5 Compatible Kernel include:

- Greater than 75 percent improvement in OLTP performance
- 200 percent speedup of InfiniBand messaging
- 137 percent faster solid-state disk (SSD) access

Sun Fire x86 Servers

Sun Fire x86 servers provide enterprise RAS features in cost-effective platforms. Integrated Lights Out Manager (ILOM) and hot-swappable components also make the systems easy and cost-effective to manage. In addition, Sun Fire x86 servers fully integrate into Oracle management tools, allowing for a single management interface for Oracle applications, operating systems, and hardware.

Single Click Configurations

To simplify the process of building out a database environment, Oracle has developed Single Click configurations that include all the necessary CPU, memory, and storage resources to meet predetermined levels of user demand. Oracle offers several different Single Click configuration options to start from, as shown in Table 1.

TABLE 1. SINGLE CLICK CONFIGURATIONS AT A GLANCE

	ENTRY CONFIGURATION	STANDARD CONFIGURATION	POWER CONFIGURATION	ENTERPRISE CONFIGURATION	DATA CENTER CONFIGURATION
MAX NAMED USERS*	Up to 60	Up to 125	Up to 400	Up to 1000	Up to 2000
DB SIZE (TB)	1.2	3	4.2	2.7	2.7
LICENSED X86 CPU CORES	Six at 2.53 GHz	12 at 2.53 GHz	12 at 3.46 GHz	20 at 2.4 GHz	40 at 2.4 GHz
SYSTEM MEMORY SIZE	24 GB	72 GB	144 GB	512 GB	1 TB
FLASH	N/A	N/A	N/A	2 x F20	4 x F20
BASIC SERVER MODELS	Sun Fire X4170 M2	Sun Fire X4170 M2	Sun Fire X4270 M2	Sun Fire X4470 M2	Sun Fire X4470 M2
ORACLE DATABASE EDITION	11*g* R2 Standard Edition One 64-bit	11*g* R2 Standard Edition 64-bit	11*g* R2 Standard Edition 64-bit	11*g* R2 Enterprise Edition 64-bit	11*g* R2 Enterprise Edition 64-bit

* A named user is a human or a non-human operating device that can access Oracle Database at any time.

These configurations take advantage of the latest Sun Fire x86 server hardware technologies starting with the 1 rack unit (RU) Sun Fire X4170 M2 server up to the very powerful 3 RU Sun Fire X4470 M2 server utilizing the latest Intel® Xeon® processor E7-4800 product family, capable of offering 40 processing cores and 1 TB of low-voltage memory. In addition, Oracle Linux and Oracle Database versions have also been provided with reduced TCO in mind. More details on each of these Single Click configurations can be found within this white paper.

The sizing metric used for building these configurations is the maximum number of supported named users per system. A named user is defined as an individual authorized to use the Oracle Database application installed on a single server or multiple servers, regardless of whether the individual is actively using Oracle Database at any given time. A non-human operated device is also considered a named user, in addition to all individuals authorized to use Oracle Database, if such devices can access the database. Named users can also refer to different user types ranging from simple database users who access the database to generate reports and to enter, modify, or delete permissible data from the database, up to application developers, database security officers, and database administrators.

Single Click Entry Configuration: Up to 60 DB Users (Sun Fire X4170 M2 Small Configuration)

The Single Click Entry Configuration, which supports up to 60 database users, is intended to be the launching point for Oracle Database for x86 environments. Utilizing Oracle's Sun Fire X4170 M2 server with Oracle Database 11*g* Release 2 Standard Edition One allows customers to take advantage of the critical feature set that Oracle Database offers while not breaking the bank. The Single Click Entry Configuration offers six processing cores with an initial 24 GB of low-voltage memory and 1.2 TB of usable database space.

Packing the optimal balance of compute power, memory capacity, and I/O capability into a compact and energy efficient 1 RU enclosure, the Sun Fire X4170 M2 server is the most versatile IT infrastructure building block. This server is ideal for middleware workloads, enterprise systems administration needs (such as identity management, network management, and systems management), and as a platform for application development.

Figure 1. Sun Fire X4170 M2 server.

The Sun Fire X4170 M2 server utilizes the Intel Xeon processor 5600 Series and offers unparalleled performance balanced with compute, memory, and I/O capabilities that are accelerated with two flash options, making it the most versatile building block for a number of IT applications including Oracle Database.

Oracle Database 11*g* Standard Edition One is an affordable, full-featured database for servers with up to two sockets. It provides enterprise-class performance and security, is simple to manage, and can easily scale as demand increases. It is also upwardly compatible with other database editions and can easily grow with demand to protect initial investments.

Single Click Entry Configuration Details

Table 2 provides a detailed breakdown for the Single Click Entry Configuration.

TABLE 2. DETAILED SINGLE CLICK ENTRY CONFIGURATION

CATEGORY	MARKETING PART NUMBER	DESCRIPTION	QTY
BASE CHASSIS	X4170M2-H1-AA	Sun Fire X4170 M2 base chassis package with 1x PSU	1
PROCESSOR	4374A	E5649 (6c, 2.53 GHz, 5.86 GT/s QPI, 80W)	1
	5898A-N	Processor heat sink for Sun Fire X4170 M2	1
MEMORY	4911A	8 GB low-voltage DDR3 memory kit: 1 x 8 GB 1066 MHz registered ECC DDR3 DIMM RoHS-6, ATO	3
STORAGE	RA-SS2CF-300G10K-N	300 GB/10K RPM SFF SAS drive mounted in Marlin bracket, ATO	2
	RA-SS2CF-600G10K2	600 GB/10K RPM SFF SAS drive mounted in Marlin bracket, ATO	3
MISCELLANEOUS	SG-SAS6-R-INT-Z	SAS II RAID 0,1,5,6 HBA	1
	5932A	Second hot-swappable 760W gold PSU	1
	8325A-N	DVD+/-RW drive	1
	6326A-N	Tooled rack mount slide rail kit for Sun Fire X4170 M2	1
		Power cable TBD based on country (depends on NEMA and IEC requirements)	2
FILLER PANELS	5879A-N	Memory slot filler panel: RoHS-6 (auto-configured by W5C), ATO	17
	5895A-N	Processor filler panel: RoHS-6 (auto-configured by W5C), ATO	1
	6331A-N	2.5-inch HDD filler panel: RoHS-6 (auto-configured by W5C), ATO	4
SOFTWARE-RELATED ITEMS		Oracle Linux 5.6, 64-bit	1
		Oracle Database 11*g* R2 Standard Edition One, 64-bit per CPU	1
		Named user* max capability	60
DISK LAYOUT	RAID 1 (2 x 300 GB) = 300 GB RAID 5 (3 x 600 GB) = 1200 GB 300 GB LogicalVolume0 for OS 1500 GB LogicalVolume1 for DB		

* A named user is a human or a non-human operating device that can access Oracle Database at any time.

Single Click Standard Configuration: Up to 125 DB Users (Sun Fire X4170 M2 Medium Configuration)

The Single Click Standard Configuration, which supports up to 125 database users, builds on the Single Click Entry Configuration utilizing the Sun Fire X4170 M2 and provides double or more additional resources. The Single Click Standard Configuration provides twelve computational cores, 72 GB of low-voltage memory, and 3 TB of usable database space.

With these additional available resources, a more-powerful version of Oracle Database is introduced into the Single Click offering. The Single Click Standard Configuration provides Oracle Database 11*g* Release 2 Standard Edition. Oracle Database 11*g* Standard Edition is an affordable, full-featured database for servers with up to four sockets. It includes Oracle Real Application Clusters for higher availability, provides enterprise-class performance and security, is simple to manage, and can easily scale as demand increases. It is also upwardly compatible with Oracle Database 11*g* Enterprise Edition and can easily grow with business needs to protect initial investments.

Single Click Standard Configuration Details

Table 3 provides a detailed breakdown for the Single Click Standard Configuration.

TABLE 3. DETAILED SINGLE CLICK STANDARD CONFIGURATION

CATEGORY	MARKETING PART NUMBER	DESCRIPTION	QTY
BASE CHASSIS	X4170M2-H1-AA	Sun Fire X4170 M2 base chassis package with 1x PSU	1
PROCESSOR	4374A	E5649 (6c, 2.53 GHz, 5.86 GT/s QPI, 80W)	2
	5898A-N	Processor heat sink for Sun Fire X4170 M2	2
MEMORY	4911A	8 GB low-voltage DDR3 memory kit: 1 x 8 GB 1066 MHz registered ECC DDR3 DIMM RoHS-6, ATO	9
STORAGE	RA-SS2CF-300G10K-N	300 GB/10K RPM SFF SAS drive mounted in Marlin bracket, ATO	2
	RA-SS2CF-600G10K2	600 GB/10K RPM SFF SAS drive mounted in Marlin bracket, ATO	6
MISCELLANEOUS	SG-SAS6-R-INT-Z	SAS II RAID 0,1,5,6 HBA	1
	8325A-N	DVD+/-RW drive	1
	5932A	Second hot-swappable 760W gold PSU	1
	6326A-N	Tooled rack mount slide rail kit for Sun Fire X4170 M2	1
		Power cable TBD based on country (depends on NEMA and IEC requirements)	2

FILLER PANELS	5879A-N	Memory slot filler panel: RoHS-6 (auto-configured by W5C), ATO	10
	6331A-N	2.5-inch HDD filler panel: RoHS-6 (auto-configured by W5C), ATO	0
SOFTWARE-RELATED ITEMS		Oracle Linux 5.6, 64-bit	1
		Oracle Database 11g R2 Standard Edition, 64-bit per CPU	2
		Named user* max capability	125
DISK LAYOUT	RAID 1 (2 x 300 GB) = 300 GB RAID 5 (6 x 600 GB) = 3 TB 300 GB LogicalVolume0 for OS 3 TB GB LogicalVolume1 for DB		

* A named user is a human or a non-human operating device that can access Oracle Database at any time.

Single Click Power Configuration: Up to 400 DB Users (Sun Fire X4270 M2 Medium Configuration)

The Single Click Power Configuration, which supports up to 400 database users, takes a step to the next level by leveraging Oracle's Sun Fire X4270 M2 server powered by two of the highest performing Intel Xeon processor 5600 Series. This configuration offers superior scalability with maximum performance, higher amounts of memory, robust I/O bandwidth, and unique I/O storage capabilities in a compact 2 RU system. Offering ultimate flexibility with two storage configurations and two flash storage options that enable higher data capacity and I/O-intensive application acceleration, this is the best server in its class for clustered database workloads.

Figure 2. Sun Fire X4270 M2 server.

The Single Click Power Configuration provides twelve computational cores, similar to the Single Click Standard Configuration, but it runs at a much higher frequency (3.46 GHz). In addition, the Single Click Power Configuration utilizes the internal disk density capability to provide improved reliability and performance by using RAID 10 configuration for the database disk space.

In addition, it provides a total of 4.2 TB of database disk space, which is 1.2 TB more than the Single Click Standard Configuration. Finally, the Single Click Power Configuration is also configured to supply twice as much memory capacity, implementing 144 GB of low-voltage memory.

Single Click Power Configuration Details

Table 4 provides detailed configuration information for the Single Click Power Configuration.

TABLE 4. DETAILED SINGLE CLICK POWER CONFIGURATION

CATEGORY	MARKETING PART NUMBER	DESCRIPTION	QTY
BASE CHASSIS	X4270M2-H1-AB	Sun Fire X4270 M2 base chassis for 2.5-inch HDD with 1x PSU	1
PROCESSOR	4375A	X5690 (6c, 3.46 GHz, 6.4 GT/s QPI, 130W)	2
	5899A-N	Processor heat sink for Sun Fire X4270 M2	2
MEMORY	4911A	8 GB low-voltage DDR3 memory kit: 1 x 8GB 1066 MHz registered ECC DDR3 DIMM RoHS-6, ATO	18
STORAGE	RA-SS2CF-300G10K-N	300 GB/10K RPM SFF SAS drive mounted in Marlin bracket, ATO	2
	RA-SS2CF-600G10K2	600 GB/10K RPM SFF SAS drive mounted in Marlin bracket, ATO	14
MISCELLANEOUS	SG-SAS6-R-INT-Z	SAS II RAID 0,1,5,6 HBA	1
	5933A	Second hot-swappable 1200W PSU	1
	7100714 (pre-7/12) 5906A (post-7/12)	Tooled rack mount slide rail kit for Sun Fire X4270 M2	1
		Power cable TBD based on country (depends on NEMA and IEC requirements)	2
FILLER PANELS	6331A-N	2.5-inch HDD filler panel: RoHS-6 (auto-configured by W5C), ATO	8
SOFTWARE-RELATED ITEMS		Oracle Linux 5.6, 64-bit	1
		Oracle Database 11*g* R2 Standard Edition, 64-bit per CPU	2
		Named user* max capability	400
DISK LAYOUT	RAID 1 (2 x 300 GB) = 300 GB RAID 10 (14 x 600 GB) = 4.2 TB (RAID 10 provides better performance and reliability.) 300 GB LogicalVolume0 for OS 3 TB GB LogicalVolume1 for DB		

* A named user is a human or a non-human operating device that can access Oracle Database at any time.

Single Click Enterprise Configuration: Up to 1000 DB Users (Sun Fire X4470 M2 Small Configuration)

The Single Click Enterprise Configuration, which supports up to 1000 database users, takes the next leap in the Single Click configurations with Oracle's Sun Fire X4470 M2 server. By offering high-performance processors, a large memory footprint, and superior I/O bandwidth and expandability, the architecture of the Sun Fire X4470 M2 server can help IT managers maximize database performance results.

Figure 3. Sun Fire X4800 M2 server.

The Sun Fire X4800 M2 server is the industry's leading compact and expandable enterprise class 4-socket x86 server, delivering best-in-class performance, expandability, density, and power efficiency in a 3 RU form factor.

The Single Click Enterprise Configuration provides incredible horsepower for database applications with 20 computational nodes running at 2.4 GHz, 512 GB of memory, and 2.7 TB of internal disk storage. Compared to the Single Click Power Configuration, the Single Click Enterprise Configuration nearly doubles the number of CPU cores and provides over thee and a half times the amount of available low-voltage memory. Although internal disk storage might be less than the Single Click Power Configuration, use of external storage is possible through the supported PCIe connection cards found at the following site:

http://wikis.sun.com/display/SystemsComm/Sun+Fire+X4470+M2+Server#tab:Option-Cards

In addition, the Single Click Enterprise Configuration is configured with two 96 GB Sun Flash Accelerator F20 PCIe cards, which provide superior FlashFire technology, advanced wear-leveling, and write endurance as well as ensuring the highest level of data integrity and write-through persistence. This flash option delivers the highest I/O performance and turbo-charges application performance while eliminating bottlenecks and reducing power consumption.

On top of the additional hardware resources, Oracle Database 11*g* Release 2 Enterprise Edition is also provided with the Single Click Enterprise Configuration. Oracle Database 11*g* Release 2 Enterprise Edition delivers industry-leading performance, scalability, security, and reliability on a choice of clustered or single servers running Windows, Linux, or UNIX. It provides comprehensive features for easily managing the most demanding transaction processing, business intelligence, and content management applications.

Oracle Database 11*g* Release 2 Enterprise Edition comes with a wide range of options to extend the world's number-one database to help grow business and meet performance, security, and availability service-level expectations.

Single Click Enterprise Configuration Details

Table 5 provides detailed configuration information for the Single Click Enterprise Configuration.

TABLE 5. DETAILED SINGLE CLICK ENTERPRISE CONFIGURATION

CATEGORY	MARKETING PART NUMBER	DESCRIPTION	QTY
BASE CHASSIS	7100142	Sun Fire X4470 M2 base chassis	1
PROCESSOR	7100144 7100146	2 x E7-4860 (10c, 2.26 GHz, 24 MB, 6.40 GT/s QPI, 130W)	1
MEMORY	7100166	2 x 8 DIMM memory riser card	2
	7100158 7100160	2 x 16 GB 1066 MHz registered ECC DDR3 DIMM RoHS-6, ATO	16
STORAGE	RA-SS2CF-600G10K2	600 GB 10K RPM 2.5-inch SAS drive	6
MISCELLANEOUS	8370A	DVD+/-RW drive	1
	SG-SAS6-R-INT-Z	SAS II RAID 0,1,5,6 HBA	1
	2365A	Tool-less rack mount slide rail kit for Sun Fire X4470 M2	1
	TA-FAS-S3IE96GB-N	Flash Accelerator F20 PCIe	2
		Power cable TBD based on country (depends on NEMA and IEC requirements)	2
FILLER PANELS	2340A	2x processor socket filler panel	1
	2351A	2x memory riser filler panel	2
	2352A	2x memory DIMM slot filler	16
	5394A	PCIe fillers	7
SOFTWARE-RELATED ITEMS		Oracle Linux 5.6, 64-bit	1
		Oracle Database 11*g* R2 Enterprise Edition, 64-bit per core**	10
		Named user* max capability	1000
DISK LAYOUT	RAID 5 (6 x 600 GB) = 3 TB 300 GB LogicalVolume0 for OS 2.7 TB LogicalVolume1 for DB		

* A named user is a human or a non-human operating device that can access Oracle Database at any time.

**The number of required licenses is determined by multiplying the total number of cores of the processor by a core processor licensing factor specified on the Oracle Processor Core Factor Table, which can be accessed at http://oracle.com/contracts. All cores before multiplying by the appropriate core processor licensing factor and all fractions of a number are to be rounded up to the next whole number on all multicore chips for each licensed program to be aggregated. The Core Processor Licensing Factor for Intel Xeon processor Series 56XX, Series 65XX, Series 75XX, or earlier Multicore chips is 0.5. Other Core Processor Licensing Factors can be found at: http://www.oracle.com/us/corporate/contracts/processor-core-factor-table-070634.pdf.

Single Click Data Center Configuration: Up to 2000 DB Users (Sun Fire X4470 M2 Medium Configuration)

The Single Click Data Center Configuration, which provides up to 2000 database users, has the most processing power of all the Single Click configurations. The Single Click Data Center Configuration also uses the Sun Fire X4470 M2 server, but it doubles the memory, processing cores, and flash capacity compared to the Single Click Enterprise Configuration. With 40 computational cores running at 2.4 GHz, 1 TB of memory, and four 96 GB Sun Flash Accelerator F20 PCIe cards, the Single Click Data Center Configuration is ideal for large data center databases. External storage can also be used to fully utilize the computational power of the Single Click Data Center Configuration by using the supported PCIe connection cards listed at the following site:

http://wikis.sun.com/display/SystemsComm/Sun+Fire+X4470+M2+Server#tab:Option-Cards

It is possible to expand this configuration by utilizing the Oracle Database 11*g* Real Application Clusters feature as well as other Oracle Database 11*g* Enterprise Edition features.

Single Click Data Center Configuration Details

Table 6 provides detailed configuration information for the Single Click Data Center Configuration.

TABLE 6. DETAILED SINGLE CLICK DATA CENTER CONFIGURATION

CATEGORY	MARKETING PART NUMBER	DESCRIPTION	QTY
BASE CHASSIS	7100142	Sun Fire X4470 M2 base chassis	1
PROCESSOR	7100148 7100150	2x E7-4870 (10c, 2.4 GHz, 30 MB, 6.40 GT/s QPI, 130W)	2
MEMORY	7100166	2x 8-DIMM memory riser card	4
	7100162 7100164	2 x 16 GB 1066 MHz registered ECC DDR3 DIMM RoHS-6, ATO	32
STORAGE	RA-SS2CF-600G10K2	600 GB 10K RPM 2.5-inch SAS drive	6
MISCELLANEOUS	8325A-N	DVD+/-RW drive	1
	SG-SAS6-R-INT-Z	SAS II RAID 0,1,5,6 HBA	1

	2365A	Tool-less rack mount slide rail kit for Sun Fire X4470 M2	1
	TA-FAS-S3IE96GB-N	Flash Accelerator F20 PCIe	4
		Power cable TBD based on country (depends on NEMA and IEC requirements)	2
FILLER PANELS		PCIe fillers	5
SOFTWARE-RELATED ITEMS		Oracle Linux 5.6, 64-bit	1
		Oracle Database 11*g* Enterprise Edition, 64-bit per core**	20
		Named user* max capability	2000
DISK LAYOUT	RAID 5 (6 x 600 GB) = 3 TB 300 GB LogicalVolume0 for OS 2.7 TB LogicalVolume1 for DB		

* A named user is a human or a non-human operating device that can access Oracle Database at any time.

**The number of required licenses is determined by multiplying the total number of cores of the processor by a core processor licensing factor specified on the Oracle Processor Core Factor Table, which can be accessed at http://oracle.com/contracts. All cores before multiplying by the appropriate core processor licensing factor and all fractions of a number are to be rounded up to the next whole number on all multicore chips for each licensed program to be aggregated. The Core Processor Licensing Factor for Intel Xeon Series 56XX, Series 65XX, Series 75XX, or earlier Multicore chips is 0.5. Other Core Processor Licensing Factors can be found at: http://www.oracle.com/us/corporate/contracts/processor-core-factor-table-070634.pdf.

Conclusion

Leveraging the Oracle stack of products integrated with Oracle's renowned support, the Oracle Single Click configurations virtually eliminate the struggles associated with planning and building out an initial database. These configurations are meant to help as a starting point, but they are by no means a limiting factor. These configurations can easily grow as business demands increase while continuing to provide the best TCO and ROI.

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

Sizing Guide for Single Click Configurations of Oracle Database on Sun Fire x86 Servers
October 2011, Version 1.0

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

Hardware and Software, Engineered to Work Together