

SPECjAppServer®2004 Result

**Oracle WebLogic Server Standard
Edition Release 10.3.3 on Cisco UCS
C250 M2 Rackmount Server**

5,185.45 SPECjAppServer2004
JOPS@Standard

Submitter:
Cisco Systems, Inc.

SPEC license # 9019

Test date:
Feb-2010

Software Products info included in this document	Software Configurations info included in this document	Hardware Systems info included in this document	Benchmark info included in this document
Oracle WebLogic Server Standard Edition Release 10.3.3 Oracle JRockit(R) 6.0 JDK (R28.0.0-587) (Linux x86 64bit) Java HotSpot(TM) 64- Bit Server VM on Linux, version 1.6.0_16 Oracle JDBC Driver 11.2.0.1.0 (Thin) Oracle Database Enterprise Edition Release 11.2.0.1.0	J2EE Application Server Emulator SW Config Database SW Config Driver SW Config Primary and Satellites	J2EE Application Server Database Server HW Primary Driver HW Satellite Drivers #1 and #2, and Emulator HW System Configuration Diagram	Modifications Configuration Bill of Materials Other Info General Notes Full Disclosure Archive

SUT Configuration

J2EE Server Nodes:	1	DB Server Nodes:	1
J2EE Server CPUs:	12 cores, 2 chips	DB Server CPUs:	12 cores, 2 chips
J2EE Instances:	8	DB Instances:	1

Other SUT Components:

Cisco MDS 9134 Multilayer Fabric Switch, Cisco Catlayst 4948 48 * 10/100/1000 Switch

Benchmark Settings

Dealer Injection Rate:	3,100	Ramp Up Time:	900 seconds
# of Dealer Agents:	19	Ramp Down Time:	300 seconds
# of Manufacturing Agents:	19	Steady State Time:	3,600 seconds
DB Load Injection Rate:	4,000	Trigger Time:	520 seconds

Detailed Results				
<u>Dealer Transaction Mix</u>	<u>Count</u>	<u>Tx. Mix</u>		
Purchase	2,808,119	25.02%		
Manage	2,804,643	24.99%		
Browse	5,610,594	49.99%		
<u>Total # Dealer Transactions</u>	<u>11,223,356</u>			
Total # Manufacturing Transactions	7,444,277			
<u>Response Times</u>	<u>Average</u>	<u>Maximum</u>	<u>90th%</u>	<u>Reqd</u>
Purchase	0.16	7.30	0.40	2.00
Manage	0.16	8.66	0.40	2.00
Browse	0.19	5.81	0.50	2.00
Manufacturing	1.61	7.52	3.00	5.00
Reproducibility Run (SPECjAppServer2004 JOPS)	5,186.19			

Oracle WebLogic Server Standard Edition Release 10.3.3	
Vendor: Oracle Corporation	Availability: Apr-2010
CTS Version: 5.0	Date Passed CTS: Feb-2007
Oracle Enterprise Linux 5 Update 3	
OS Name: x86_64	
EJB Protocol: RMI/T3	

Oracle JRockit(R) 6.0 JDK (R28.0.0-587) (Linux x86 64bit)	
Vendor: Oracle Corporation	Availability: Apr-2010
Oracle Enterprise Linux 5 Update 3	
OS Name: x86_64	

Java HotSpot(TM) 64-Bit Server VM on Linux, version 1.6.0_16	
Vendor: Sun Microsystems, Inc	Availability: Apr-2010
Red Hat Enterprise Linux 5 Update 3	
OS Name: x86_64	

Notes / Tuning Information

```
-server -Xms16g -Xmx16g -Xmn4g -Xss128k -XX:MaxPermSize=512M -  
XX:+AggressiveHeap  
-XX:+UseParallelGC -XX:ParallelGCThreads=4 -XX:MaxTenuringThreshold=3  
-XX:SurvivorRatio=20 -verbose:gc -XX:+PrintGCDetails -XX:+PrintGCTimeStamps  
-XX:-TraceClassUnloading -Dsun.net.inetaddr.ttl=1 -  
Dnetworkaddress.cache.ttl=1  
-Dweblogic.SocketReaders=1 -Dweblogic.management.discover=false
```

Database SW Config

DB Product: [Oracle Database Enterprise Edition Release 11.2.0.1.0](#)

Hardware: [Database Server HW](#)

of Instances: 1

Notes / Tuning Information

```
db_name = spec  
compatible = 11.1.0.1.0  
control_files = ?/dbs/cntrlspec  
aq_tm_processes = 0  
cursor_space_for_time = TRUE  
db_4k_cache_size = 10000M  
db_8k_cache_size = 10000M  
db_block_checking = FALSE  
db_block_checksum = FALSE  
db_block_size = 2048  
db_cache_advice = OFF  
db_cache_size = 51000M  
db_file_multiblock_read_count = 128  
db_files = 256  
db_keep_cache_size = 2200M  
db_writer_processes = 24  
dml_locks = 1000  
filesystemio_options = DirectIO  
log_buffer = 67108864  
log_checkpoint_interval= 0  
log_checkpoints_to_alert= TRUE  
open_cursors = 2000  
parallel_max_servers = 100  
pga_aggregate_target = 0  
processes = 2000  
query_rewrite_enabled = FALSE  
replication_dependency_tracking = FALSE  
session_cached_cursors = 2000  
sessions = 5000  
shared_pool_size = 4000M  
statistics_level = BASIC  
timed_statistics = false  
trace_enabled = FALSE  
transactions = 15000  
transactions_per_rollback_segment = 1  
undo_management = AUTO
```

```
undo_retention          = 180
undo_tablespace         = undo_ts
```

Driver SW Config Primary and Satellites

JVM Product: [Java HotSpot\(TM\) 64-Bit Server VM on Linux, version 1.6.0_16](#)
Hardware: [Primary Driver HW](#)
of Instances: 3

Notes / Tuning Information

```
-server -Xms2048M -Xmx2048M -XX:+DisableExplicitGC -XX:+UseParallelGC
-Dsun.net.inetaddr.ttl=0 -Dnetworkaddress.cache.ttl=0
```

J2EE Application Server (SUT hardware)

Hardware Vendor:	Cisco	OS Vendor:	Oracle Corporation
Model Name:	Cisco UCS C250 M2 Rackmount Server	OS Name:	Oracle Enterprise Linux 5 Update 3 x86_64
Processor:	Six Core Intel(R) Xeon(R) X5680	Filesystem:	ext3
MHz:	3333	Disks:	2x 72GB SAS 15K RPM
# of CPUs:	12 cores, 2 chips, 6 cores/chip, 2 threads/core (Hyper-Threading)	Network Interface:	2x Quad Port Gigabit NIC
Memory (MB):	98304	Other Hardware:	See notes
L1 Cache:	32KB(I)+32KB(D) on chip per core	# of Systems:	1
L2 Cache:	256KB on chip per core 12MB(I+D) L3 on chip per chip	H/W Available:	Apr-2010
Other Cache:		OS Available:	Jan-2009

Notes / Tuning Information

```
Added to /etc/sysctl.conf:
fs.file-max = 262144
kernel.sem = 250 32000 100 128
kernel.shmall = 4294967296
kernel.shmmax = 68719476736
net.core.netdev_max_backlog = 400000
net.core.optmem_max = 30000000
net.core.rmem_default = 30000000
net.core.rmem_max = 30000000
net.core.somaxconn = 40000
net.core.wmem_default = 30000000
net.core.wmem_max = 30000000
```

```

net.ipv4.ip_local_port_range = 1024 65000
net.ipv4.tcp_fin_timeout = 10
net.ipv4.tcp_max_syn_backlog = 30000
net.ipv4.tcp_max_tw_buckets = 2000000
net.ipv4.tcp_mem = 30000000 30000000 30000000
net.ipv4.tcp_rmem = 30000000 30000000 30000000
net.ipv4.tcp_timestamps = 0
net.ipv4.tcp_wmem = 30000000 30000000 30000000
net.ipv4.tcp_window_scaling=1
vm.zone_reclaim_mode=1

```

For each of the NICs:

```

set arp_announce = 2
set arp_ignore = 1
set txqueuelen 60000
enable tso and gso
bind interrupt to a core corresponding to the server instance

```

Server instances were started using numactl, binding 2 instances per chip.
 Stop iptables.
 Stop irqbalance.
 Configure 15000 hugepages.

Other hardware:

Cisco LSI 6G MegaRAID 9261-8i card

Systems were configured with RAID 1 of the 2 disks using the integrated controller for OS, JMS filestores and server logs.

Database Server HW (SUT hardware)

Hardware			
Vendor:	Cisco	OS Vendor:	Oracle Corporation
	Cisco UCS C250 M2		Oracle Enterprise Linux 5
Model Name:	Rackmount Server	OS Name:	Update 3 x86_64
	Six Core Intel(R) Xeon(R)		
Processor:	X5670	Filesystem:	ext3
MHz:	2933	Disks:	8x 72GB SAS 15K RPM
	12 cores, 2 chips, 6		
	cores/chip, 2 threads/core	Network	
# of CPUs:	(Hyper-Threading)	Interface:	2x Dual Port Gigabit NIC
Memory (MB):	196608	Other Hardware:	See notes
	32KB(I)+32KB(D) on chip		
L1 Cache:	per core	# of Systems:	1
L2 Cache:	256KB on chip per core	H/W Available:	Apr-2010
	12MB(I+D) L3 on chip per		
Other Cache:	chip	OS Available:	Jan-2009

Notes / Tuning Information

Added to /etc/sysctl.conf:

```
fs.aio-max-nr= 3145728
fs.file-max = 6553600
kernel.msgmni = 2878
kernel.sem = 250 32000 100 128
kernel.shmall = 4294967296
kernel.shmmax = 4398046511104
net.core.netdev_max_backlog = 400000
net.core.rmem_default = 4194304
net.core.rmem_max = 4194304
net.core.somaxconn = 15000
net.core.wmem_default = 262144
net.core.wmem_max = 262144
net.ipv4.ip_local_port_range = 9000 65000
net.ipv4.tcp_max_syn_backlog = 400000
net.ipv4.tcp_mem = 30000000 30000000 30000000
net.ipv4.tcp_rmem = 30000000 30000000 30000000
net.ipv4.tcp_timestamps = 0
net.ipv4.tcp_wmem = 30000000 30000000 30000000
```

For each of the 5 NICs used:

```
set arp_announce = 2
set arp_ignore = 1
set txqueuelen 60000
enable tso and gso
```

Stop iptables.

Stop irqbalance.

Configure 55000 hugepages.

Lgwr nice priority was set to -20

named nice priority was set to -10

8 Oracle listener processes were started and bound each to a single core.

Other hardware:

Cisco LSI 6G MegaRAID 9261-8i card

40 drives configured as RAID1/0 with EMC Clariion for data

16 drives configured as RAID1/0 with EMC Clariion for logs

Primary Driver HW (non-SUT hardware)

Hardware

Vendor:	Cisco	OS Vendor:	Red Hat
Model Name:	Cisco UCS C210 M1 Rackmount Server	OS Name:	Red Hat Enterprise Linux 5 Update 3 x86_64
Processor:	Quad Core Intel(R) Xeon(R) X5570	Filesystem:	ext3
MHz:	2933	Disks:	4x 73GB SAS 15K RPM
# of CPUs:	8 cores, 2 chips, 4 cores/chip, 2 threads/core	Network Interface:	2x Quad Port Gigabit NIC

	(Hyper-Threading)	
Memory (MB):	49152	Other Hardware:
	32KB(I)+32KB(D) on chip	
L1 Cache:	per core	# of Systems: 1
L2 Cache:	256KB on chip per core	H/W Available: May-2009
	12MB(I+D) L3 on chip per	
Other Cache:	chip	OS Available: Jan-2009

Notes / Tuning Information	
<pre> Added to /etc/sysctl.conf: fs.file-max = 262144 kernel.sem = 250 32000 100 128 net.core.netdev_max_backlog = 400000 net.core.optmem_max = 30000000 net.core.rmem_default = 30000000 net.core.rmem_max = 30000000 net.core.somaxconn = 40000 net.core.wmem_default = 30000000 net.core.wmem_max = 30000000 net.ipv4.ip_local_port_range = 1024 65000 net.ipv4.tcp_fin_timeout = 10 net.ipv4.tcp_max_syn_backlog = 30000 net.ipv4.tcp_max_tw_buckets = 2000000 net.ipv4.tcp_mem = 30000000 30000000 30000000 net.ipv4.tcp_rmem = 30000000 30000000 30000000 net.ipv4.tcp_timestamps = 0 net.ipv4.tcp_wmem = 30000000 30000000 30000000 For each of the 9 NICs: set arp_announce = 2 set arp_ignore = 1 set txqueuelen 60000 enable tso and gso Stop iptables. </pre>	

Satellite Drivers #1 and #2, and Emulator HW (non-SUT hardware)			
Hardware			
Vendor:	Cisco	OS Vendor:	Red Hat
	Cisco UCS C200 M1		Red Hat Enterprise Linux 5
Model Name:	Rackmount Server	OS Name:	Update 3 x86_64
	Quad Core Intel(R) Xeon(R)		
Processor:	X5570	Filesystem:	ext3
MHz:	2933	Disks:	2x 146GB SAS 15K RPM
	8 cores, 2 chips, 4		
	cores/chip, 2 threads/core	Network	
# of CPUs:	(Hyper-Threading)	Interface:	2x Quad Port Gigabit NIC

Memory (MB): 49152

32KB(I)+32KB(D) on chip

L1 Cache: per core

L2 Cache: 256KB on chip per core

12MB(I+D) L3 on chip per

Other Cache: chip

Other Hardware:

of Systems: 1

H/W Available: May-2009

OS Available: Jan-2009

Notes / Tuning Information

Added to /etc/sysctl.conf:

```
fs.file-max = 262144
kernel.sem = 250 32000 100 128
net.core.netdev_max_backlog = 400000
net.core.optmem_max = 30000000
net.core.rmem_default = 30000000
net.core.rmem_max = 30000000
net.core.somaxconn = 40000
net.core.wmem_default = 30000000
net.core.wmem_max = 30000000
net.ipv4.ip_local_port_range = 1024 65000
net.ipv4.tcp_fin_timeout = 10
net.ipv4.tcp_max_syn_backlog = 30000
net.ipv4.tcp_max_tw_buckets = 2000000
net.ipv4.tcp_mem = 30000000 30000000 30000000
net.ipv4.tcp_rmem = 30000000 30000000 30000000
net.ipv4.tcp_timestamps = 0
net.ipv4.tcp_wmem = 30000000 30000000 30000000
```

For each of the 8 NICs:

```
set arp_announce = 2
set arp_ignore = 1
set txqueuelen 60000
enable tso and gso
```

Stop iptables.

Benchmark Modifications

Schema Modifications:

Tablespace sizes were increased to support the Injection rate. Table and index

intrans were modified. The C_CUSTOMERINVENTORY, M_WORKORDER and O_ORDERLINE tables were

horizontally partitioned. C_CUSTOMER, M_PARTS, M_BOM and M_INVENTORY were hash clustered.

Table locks were disabled during the run for all the tables using ALTER TABLE DISABLE TABLE LOCK.

Scripts to create the DB are included in the FDA.

Load Program Modifications:

The load program was not modified.

Benchmark Configuration Information

Isolation Requirement Info:

The following Beans were deployed in READ_COMMITTED mode as per the benchmark

requirement:

Mfg - AssemblyEnt, BomEnt, ComponentEnt, LargeOrderEnt, PartEnt

Orders - ItemEnt

Supplier - SupplierCompEnt, SupplierEnt

All other beans were deployed using pessimistic locking mode such that all selects including finders are issued with a FOR UPDATE clause in select statement:

Corp - CustomerEnt, CustomerInventoryEnt

Mfg - InventoryEnt, WorkOrderEnt

Orders - OrderEnt, OrderLineEnt

Supplier - POEnt, POLineEnt, SComponentEnt

Util - SequenceEnt

The ItemEnt bean was cached for 20 minute intervals by setting the following in bea-orders.xml deployment descriptor:
concurrency-strategy to ReadOnly
read-timeout-seconds to 1200

Durability Requirement Info:

To ensure database durability, RAID 10 was used for the data files and RAID 1 for database redo logs.

The application server used RAID 1 to provide durability for server logs and JMS persistence filestores.

The RAID controller on the database and the application server machines were configured with Write-Back cache policy supported with battery backup unit on the controller.

Storage Requirement Info:

A 75 min run at Injection Rate of 3100 increased storage by 7.0 GB. Extrapolating for 24 hrs we need 134 GB. The system is configured with 12TB of durable storage.

Argument Passing Semantics:

Oracle WebLogic Server Standard Edition uses pass-by-value as required by the EJB specification.

Bill of Materials

Supplier	Description	SKU #
Qty		
-----	-----	-----
-		

Application Server

Cisco	Cisco UCS C250 M2 Rackmount Server	R250-2480805W	1
Cisco	Six Core Intel(R) Xeon(R) Processor X5680 12MB L3 cache, 3.33GHz, 130W, Turbo	A01-X0100	2
Cisco	Cisco 8GB DDR3-1333MHz RDIMM/PC3-10600/2x4GB Kit	A02-M308GB1-2	12
Cisco	Cisco LSI 6G MegaRAID 9261-8i card	R2XX-PL003	1
Cisco	Cisco RAID Controller Battery Back-up Option	R2XX-LBBU2	1
Cisco	Cisco 73GB 6Gb SAS 15K RPM SFF HDD/hot plug	A03-D073GC2	2
Cisco	Broadcom NetXtreme II 5709 Quad Port Ethernet PCIe Adapter Card	N2XX-ABPCI03	2

Database server

Cisco	Cisco UCS C250 M2 Rackmount Server	R250-2480805W	1
Cisco	Six Core Intel(R) Xeon(R) Processor X5670 12MB L3 cache, 2.93GHz, 95W, Turbo	A01-X0102	2
Cisco	Cisco 16GB DDR3-1333MHz RDIMM/PC3-10600/2x8GB Kit	A02-M316GB1-2	12
Cisco	Cisco LSI 6G MegaRAID 9261-8i card	R2XX-PL003	1
Cisco	Cisco RAID Controller Battery Back-up Option	R2XX-LBBU2	1
Cisco	Cisco 73GB 6Gb SAS 15K RPM SFF HDD/hot plug	A03-D073GC2	8
Cisco	Broadcom NetXtreme II 5709 Quad Port Ethernet PCIe Adapter Card	N2XX-ABPCI03	2
Cisco	QLogic SANblade QLE2462 Dual Port 4-Gbps Fibre Channel-to-PCI Express Host Bus Adapter	N2XX-AQPCI03	1
EMC	EMC CLARiiON CX4-240	CX4-240C	1
EMC	VAULT PACK 450GB 15k 4G Drives	V-CX4-45015K	1
EMC	EMC 450 GB 15K 4G FC HDD 40 drives in 4 x (5+5) RAID1/0 for data 16 drives in 2 x (4+4) RAID1/0 for logs 2 drives configured as spares	CX-4G15-450	58

Oracle	Oracle Enterprise Linux Basic Support for 3 years		2
Oracle	Oracle Database 11g Enterprise Edition, Per Processor Unlimited Users for 3 years		6*
Oracle	Partitioning, Per Processor, Unlimited Users for 3 years		6*
Oracle	Oracle Premium Support for 3 years		2
Oracle	Oracle WebLogic Server Standard Edition Release 10.3, Per Processor for 3 years		6*
Oracle	Oracle Premium Support for 3 years		1

(* 6 = 0.50 * 12) Explanation: For the purposes of counting

the number of processors which require licensing, an Intel multicore chip with "n" cores shall be determined by multiplying "n" cores by a factor of 0.50).

Other Benchmark Information

The xerces implementation version 2.6.2 from xml.apache.org was used as it comes packaged with Oracle Weblogic Server Standard Edition.

Requests were directed to the Appserver instances using DNS round robin, with the database node acting as the DNS server.

General Notes

On the database, incremental checkpointing ensured that no buffer will remain dirty (in the cache) for more than the allowed time.

The only errors in the driver error logs are the application errors generated by this benchmark.

For questions about this result, please contact the submitter: Cisco Systems, Inc.

- Benchmark run on Sun Feb 21 10:55:53 PST 2010 by SPECjAppServer2004 v1.08
- Report generated on Tue Feb 23 20:37:38 PST 2010 by SPECjAppServer2004 Reporter v1.08

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