

# Er det fremdeles behov for TPC-tester?

**Ingemar Jansson Haverstad**

# Om foredragsholderen



**Ingemar Jansson Haverstad**  
dbWatch Services

- Arbeidet med Oracle siden 1985
- Konsulent, instruktør og foredragsholder
- Arbeider med to datavarehusprosjekter:  
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# Agenda

- TPC-tester
- TPC-C
- TPC-E
- TPC-H
- TPC-Energy

# PERFORMANCE

## Sun vs. IBM

**XX Million TPC-C  
Transactions Per Minute**



Sun **SPARC** Server

**6 Million TPC-C  
Transactions Per Minute\***



IBM's Fastest Server

**Sun + Oracle is Faster**  
**Proof October 14th**

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\*As of 08/27/09. Source: Transaction Processing Performance Council, [www.tpc.org](http://www.tpc.org)  
IBM Power 595 Server Model 9119-FHA, 6,085,166 tpmC, \$2.81/tpmC, available 12/10/08.

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## TPC Benchmark™ C Full Disclosure Report

Sun Microsystems  
Sun SPARC Enterprise T5440 Servers  
Using  
Oracle Database 11g with  
Oracle Real Application Clusters and  
Partitioning

First Edition  
October 11, 2009

TPC Benchmark ® C Full Disclosure Report © SUN Microsystems Inc. 2009 1

# Oracle to Buy Sun



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## SUN CUSTOMERS Oracle Plans To:

1. Spend more money developing SPARC than Sun does now;
2. Spend more money developing Solaris than Sun does now;
3. Spend more money developing MySQL than Sun does now;
4. Dramatically improve Sun's system performance by tightly integrating Oracle software with Sun hardware;
5. Have more than twice as many hardware specialists selling and servicing SPARC/Solaris systems than Sun does now.

**"We're in it to win it. IBM, we're looking forward to competing with you in the hardware business."**

– Larry Ellison



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Oracle's acquisition of Sun is subject to certain closing conditions. Please refer to Oracle's SEC filings for additional risks related to the proposed acquisition of Sun.

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"We're in it to win it."

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» Find Out How





The TPC defines transaction processing and database benchmarks and delivers trusted results to the industry.

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## What's New

- July 2009 - TPC releases TPC-Energy Specification for review
- May 5, 2009 - Springer to publish proceedings of Technical Conference in LNCS series
- April 20, 2009 - Jim Gray Inducted to the TPC Honor Roll
- March 16, 2009 - TPC Launches Technical Conference at VLDB 2009
- March 1, 2009 - TPC Energy Video (23 MB)

## Transaction Processing - OLTP

- ### TPC-E
- Top Ten TPC-E Results by Performance
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# TPC alfabet-suppe

- **TPC-C** OLTP, vedlikehold fra 5 til 3 år, 8x5 til 24x7
- **TPC-E** OLTP simulering av et meglerfirma
- **TPC-H** DSS eller Datavarehus simulering
- **TPC Energy**

Ikke i bruk:

- **TPC-A**
- **TPC-B**
- **TPC-D**
- **TPC-R**
- **TPC-W**
- **TPC-App**

tpmC  
USD/tpmC

# TPC-C

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TPC Ten Most Recently Pu... X

TPC http://tpc.org/tpcc/results/tpcc\_last\_ten\_results.asp

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**Ten Most Recently Published TPC-C Results**  
As of 18-Oct-2009 6:07 PM [GMT]

Note 1: The TPC believes it is not valid to compare prices or price/performance of results in different currencies.

Print Version

Date Submitted	Company	System	tpmC	Price/tpmC	System Availability	Database	Operating System	TP Monitor	Cluster
10/12/09	 Sun	Sun SPARC Enterprise T5440 Server	7,717,511	2.34 USD	12/14/09	Oracle Database 11g Enterprise Ed. RAC Partitioning	Solaris 10 10/09	Tuxedo CFS-R	Y
05/21/09	 HP	HP ProLiant ML350 G6	232,002	.54 USD	05/21/09	Oracle Database 11g Standard Edition One	Oracle Enterprise Linux	Microsoft COM+	N
03/30/09	 HP	HP ProLiant DL370 G6	631,766	1.08 USD	03/30/09	Oracle Database 11g Standard Edition One	Oracle Enterprise Linux	Microsoft COM+	N
02/20/09	 DELL	Dell PowerEdge 2900	104,492	.60 USD	02/20/09	Oracle Database 11g Standard Edition One	Microsoft Windows Server 2003 Standard Ed. x64	Microsoft COM+	N
01/16/09	 HP	HP ProLiant DL580G5	639,253	.97 USD	01/26/09	Oracle Database 11g Standard Edition	Oracle Enterprise Linux TP	Microsoft COM+	N
12/04/08	 FUJITSU	PRIMEQUEST 580A 32p/64c	2,382,032	3.76 USD	12/04/08	Oracle Database 10g R2 Enterprise Edt w/Partitioning	Red Hat Enterprise Linux 4 AS	BEA Tuxedo 8.1	N
11/22/08	 FUJITSU	PRIMEQUEST 540A 16p/32c	1,354,086	3.25 USD	11/22/08	Oracle Database 10g release2 Enterprise Edt	Red Hat Enterprise Linux 4 AS	BEA Tuxedo 8.1	N
11/17/08	 HP	HP ProLiant DL585G5/2.7GHz	579,814	.96 USD	11/17/08	Microsoft SQL Server 2005 x64 Enterprise Edt SP2	Microsoft Windows Server 2003 Enterprise x64 Ent. R2	Microsoft COM+	N
09/15/08	 IBM	IBM System x3850 M2	684,508	2.58 USD	10/31/08	Microsoft SQL Server 2005 Enterprise x64 Edition	Microsoft Windows Server 2003 Enterprise x64 Ent. R2	Microsoft COM+	N
08/19/08	 HP	HP ProLiant DL580G5	634,825	1.10 USD	09/15/08	Microsoft SQL Server 2005 x64 Enterprise Edt SP2	Microsoft Windows Server 2003 Enterprise x64 Ent. R2	Microsoft COM+	N

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Results

TPC-C

TPC-E

TPC-H

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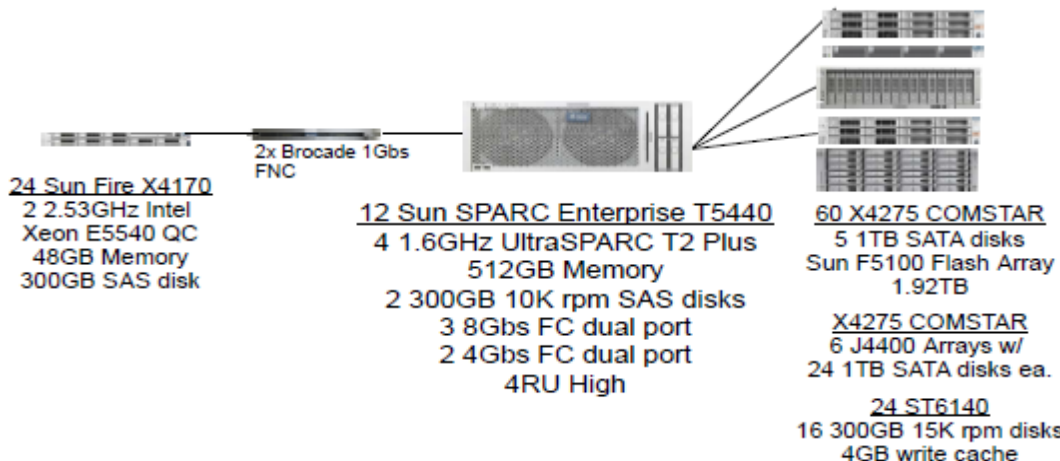
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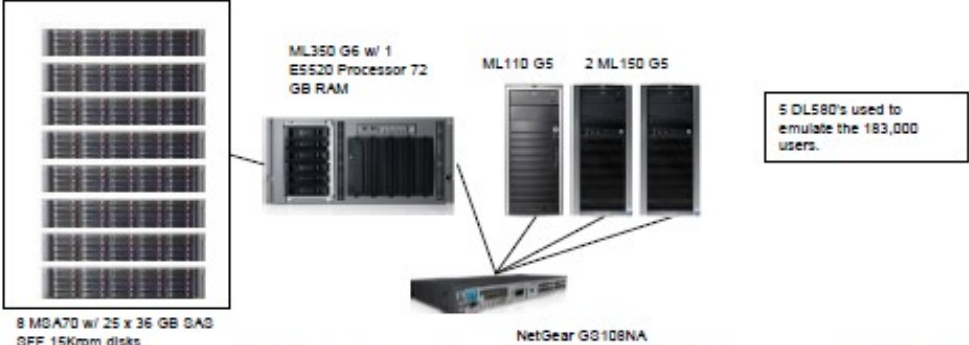
How can I join?

100%

	<b>Sun SPARC Enterprise T5440 Cluster with Oracle Database 11g with Real Application Clusters and Partitioning</b>			TPC-C 5.10.1 TPC-Pricing 1.5.0
				Report Date October 11, 2009
<b>Total System Cost</b>	<b>TPC-C Throughput</b>	<b>Price/Performance</b>	<b>Availability Date</b>	
<b>\$18,051,719 USD</b>	<b>7,717,510.6 tpmC</b>	<b>\$2.34 USD/tpmC</b>	<b>12/14/09</b>	
Database Processors/Cores/Threads	Database Manager	Operating System	Other Software	Number of Users
US T2 Plus 1.6GHz 4 / 32 / 256 Each Node	Oracle Database 11g Enterprise Ed. With Real Application Clusters and Part.	Solaris 10 10/09	Tuxedo CFS-R Tier 1 Sun One Java Web Server 7.1	6,048,000
 <p> <b>24 Sun Fire X4170</b>          2 2.53GHz Intel Xeon E5540 QC          48GB Memory          300GB SAS disk       </p> <p> <b>12 Sun SPARC Enterprise T5440</b>          4 1.6GHz UltraSPARC T2 Plus          512GB Memory          2 300GB 10K rpm SAS disks          3 8Gbs FC dual port          2 4Gbs FC dual port          4RU High       </p> <p> <b>60 X4275 COMSTAR</b>          5 1TB SATA disks          Sun F5100 Flash Array          1.92TB  <b>X4275 COMSTAR</b>          6 J4400 Arrays w/          24 1TB SATA disks ea.  <b>24 ST6140</b>          16 300GB 15K rpm disks          4GB write cache       </p>				
<b>System Component</b>	<b>Each Server Node</b>		<b>Each Client</b>	
Processors/Cores/Threads and cache	4/32/256	UltraSPARC T2 Plus 1.6GHz 4 MB L2 Cache	2/4/8	Intel Xeon E5540 8MB L2 Cache
Memory		512GB (6TB Total all nodes)		48GB
Disk Controllers	3 2	8Gbs FC Dual Port 4Gbs FC Dual Port	1	8 port Internal SAS
Disk Drives	4800 384 24 449	24GB SSD Flash Modules 300GB 15K rpm 2.5" SAS 300GB 10K rpm 2.5" SAS 1TB 7.2K rpm 3.5" SATA	1	300GB 10K rpm 2.5" SAS
Total Storage		859.4TB		

- Rapport på 500 sider
- Total system kostnad
- Pris / ytelse
- Tilgjengelig
- Proc / Core / Threads
- Server konfigurasjon
- Klient konfigurasjon
- Disk oppsett
- Database parameterer
- ACID
  - Atomicity
  - Consistency
  - Isolation
  - Durability

		<b>HP ProLiant ML350 G6 2.27 GHz 8 MB L2</b> C/S with 2 ProLiant ML150 G5 and 1 ProLiant ML110 G5		<b>TPC-C Version 5.10.1</b> Report Date May 21, 2009					
Total System Cost		TPC-C Throughput		Price/Performance		Availability Date			
\$123,681 USD		232,002 tpmC		\$0.54 USD/tpmC		May 21, 2009			
Processors		Database Manager		Operating System		Other Software		Number of Users	
1/4/8 Intel Xeon E5520 2.27 GHz 8MB L2 cache		Oracle Database 11g Standard Edition One		Oracle Enterprise Linux		Microsoft COM+		183,000	



8 M9A70 w/ 25 x 36 GB SAS SFF 15Krpm disks

ML350 G6 w/ 1 E5520 Processor 72 GB RAM

ML110 G5 2 ML150 G5

5 DL580's used to emulate the 183,000 users.

NetGear GS108NA

	ML350G6 (Server)		ML150G5 (Clients)		ML110G5 (Client)	
System Components	Quantity	Description	Quantity Per Server	Description	Quantity	Description
Processor/Core/Thread	1/4/8	Intel® Xeon® E5520 (2.27 GHz 8MB L2 Cache)	1/4/4	Intel® Xeon® E5405 (2.00 GHz, 12M L2 Cache)	1/2/2	Intel® Xeon® 3075 (2.66 GHz, 4M L2 Cache)
Memory	9	8GB 2Rx4 PC3-8500R	2	1GB PC2-5300 DIMMs (DDR2-667)	2	1GB PC2-6400 ECC (DDR2-800)
Disk Controllers	4	HP P411/512MB BBWC Smart Array Controllers	1	HP SAS SC40Ge 4-Port SATA/SAS HBA Controller	1	HP Embedded 6 Port SATA Controller
Disk Drives	6	300GB 10K SFF SAS drives (Log)	1	148GB 15K LFF SAS drive	1	180GB 7.2K LFF SATA drive
	200	38GB 15K SFF SAS drives (Data)				
	1	38GB 15 SFF SAS drives (OS)				
Total Storage	12636 GB					

- Oracle Enterprise Edition
  - Real Application Cluster
  - Partitioning
- VS.
- Oracle Standard Edition One
- 6.000.000 / 183.000 brukere
- Diskteknologi, Sun 859 TB
  - 4800 x 24 GB SSD
  - 384 x 300 GB 15K
  - 24 x 300 GB 10K
  - 449 x 1 TB 7,2K
- Diskteknologi, HP 12 TB
  - 1 x 36 GB 15K (OS)
  - 200 x 36 GB 15K (data)
  - 6 x 300 GB 10K (log)

# Tabell oppsett

Tabell	Sun (12 node klynge)	HP (Standard One)
Warehouse	604,800	
District	6,048,000	18,300
Customer	18,144,000,000	183,000
History	<b>18,144,000,000*</b>	549,000,000
Orders	<b>18,144,000,000**</b>	549,000,000
New order	5,443,200,000	549,000,000
Order line	<b>181,450,000,000</b>	164,700,000
Stock	60,480,000,000	<b>5,490,125,872</b>
Item	100,000	1,830,000,000
		100,000
Processors/Cores/Threads	4 / 32 / 256	1 / 4 / 8

\* *History* tabellen er partisjonert

\*\* Et indeks til *orders* tabellen er partisjonert

# TPC-C: Tabell design

```
create cluster ordcluster_queue (  
    o_w_id number,  
    o_d_id number,  
    o_id number SORT,  
    o_number number SORT)  
hashkeys 183000  
hash is ( (o_w_id - 1) * 10 + o_d_id - 1 )size 1490  
tablespace ord_0;  
  
create table ordr (  
    o_id number sort,  
    o_w_id number,  
    o_d_id number,  
    o_c_id number,  
    o_carrier_id number,  
    o_ol_cnt number,  
    o_all_local number,  
    o_entry_d date,  
    constraint ord_uk primary key ( o_w_id, o_d_id, o_id ))  
cluster ordcluster_queue (o_w_id, o_d_id, o_id);
```

# Kjerne parametere

## /etc/sysctl.conf

```
net.ipv4.ip_forward = 0
net.ipv4.conf.default.rp_filter = 1
net.ipv4.conf.default.accept_source_route = 0
kernel.sysrq = 0
net.ipv4.tcp_syncookies = 1
kernel.msgmnb = 65536
kernel.msgmax = 65536
kernel.shmmax = 68719476736
kernel.shmall = 4294967296
fs.file-max = 6553600
vm.nr_hugepages=32768
kernel.sem = 250 32000 250 128
net.ipv4.ip_local_port_range = 1024 65000
fs.aio-max-nr = 804800
net.core.rmem_default = 262144
net.core.wmem_default = 262144
net.core.rmem_max = 262144
net.core.wmem_max = 262144
```

# TPC-C: *init.ora* parameterere

## Sun 12-node klynge

```

db_block_size           = 8192

db_cache_size           = 65G
db_4k_cache_size        = 2G
db_16k_cache_size       = 95G
db_keep_cache_size      = 210G
db_recycle_cache_size   = 40G

shared_pool_size        = 20G
java_pool_size          = 0

db_file_multiblock_read_count = 1

parallel_max_servers    = 0

log_buffer               = 268435456

gc_files_to_locks="1217-1276=42EACH"

```

## HP - Oracle Standard Ed.

```

db_block_size           = 2048

db_cache_size           = 11000M
db_8k_cache_size        = 512M
db_16K_cache_size       = 11000M
db_keep_cache_size      = 33500M
db_recycle_cache_size   = 6600M

shared_pool_size        = 2272M
java_pool_size          = 0

db_file_multiblock_read_count =32

parallel_max_servers    = 0

log_buffer               = 10485760

```

# Listepris – database lisens(er)

## **Sun:**

---

<b>Oracle 11g Enterprise Edition</b> , Per Processor	\$ 23.750
Real Application Clusters Per Processor	\$ 11.500
Partitioning, Per Processor	\$ 5.750

\* 192 Processorer

**Sum:\$ 7.872.000**

## **HP:**

---

<b>Oracle 11g Standard Edition One</b> , Per Processor	\$ 2.900
--	----------

\* 1 Processor

**Sum: \$ 2.900**

# TPC-E

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TPC http://tpc.org/tpce/results/tpce\_last\_ten\_results.asp

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**Ten Most Recently Published TPC-E Results**  
As of 18-Oct-2009 6:15 PM [GMT]

Note 1: The TPC believes it is not valid to compare prices or price/performance of results in different currencies.

Date Submitted	Company	System	tpsE	Price/tpsE	System Availability	Database	Operating System	Cluster
07/14/09	<b>IBM</b>	IBM System x3650 M2	817	319.15 USD	07/31/09	Microsoft SQL Server 2008 Enterprise x64 Edt SP1	Microsoft Windows Server 2008 Enterprise x64 Edition	N
04/13/09	<b>UNISYS</b>	Unisys ES7000 Model 7600R Enterprise Server (8s)	1,165	783.56 USD	04/13/09	Microsoft SQL Server 2008 Enterprise x64 Edition	Microsoft Windows Server 2008 Enterprise x64 Edition	N
03/30/09	<b>FUJITSU</b>	PRIMERGY RX300 S5	800	343.91 USD	04/01/09	Microsoft SQL Server 2008 Enterprise x64 Edition	Microsoft Windows Server 2008 Enterprise x64 Edition	N
03/30/09	<b>IBM</b>	IBM System x3650 M2	798	378.63 USD	06/30/09	Microsoft SQL Server 2008 Enterprise x64 Edition	Microsoft Windows Server 2008 Enterprise x64 Edition	N
03/30/09	<b>DELL</b>	Dell PowerEdge T610	766	334.09 USD	03/30/09	Microsoft SQL Server 2008 Enterprise x64 Edition	Microsoft Windows Server 2008 Enterprise x64 Edition	N
03/18/09	<b>NEC</b>	NEC Express5800/A1160 (16 Processors)	1,568	1,180.01 USD	03/18/09	Microsoft SQL Server 2008 Enterprise x64 Edition	Microsoft Windows Server 2008 Datacenter x64 Edition	N
02/19/09	<b>DELL</b>	Dell PowerEdge R905	635	403.87 USD	02/19/09	Microsoft SQL Server 2008 Enterprise x64 Edition	Microsoft Windows Server 2008 Enterprise x64 Edition	N
11/19/08	<b>UNISYS</b>	Unisys ES7000 Model 7600R Enterprise Server (16s)	1,493	917.26 USD	12/09/08	Microsoft SQL Server 2008 Enterprise x64 Edition	Microsoft Windows Server 2008 Datacenter x64 Edition	N
11/06/08	<b>NEC</b>	NEC Express5800/A1160 (12 Processors)	1,400	1,190.24 USD	12/31/08	Microsoft SQL Server 2008 Enterprise x64 Edition	Microsoft Windows Server 2008 Datacenter x64 Edition	N
09/26/08	<b>inspur</b>	inspur NF520D2	695	4,844.22 CNY	11/30/08	Microsoft SQL Server 2008 Enterprise x64 Edition	Microsoft Windows Server 2008 Enterprise x64 Edition	N

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# TPC-H

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As of 18-Oct-2009 6:14 PM [GMT]

Note 1: The TPC believes that comparisons of TPC-H results measured against different database sizes are misleading and discourages such comparisons.  
Note 2: The TPC believes it is not valid to compare prices or price/performance of results in different currencies.

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Date Submitted	Scale Factor	Company	System	QphH	Price/QphH	System Availability	Database	Operating System	Cluster
10/07/09	100 GB	 HP	HP ProLiant DL380 G6	50,738	1.79 USD	10/07/09	Microsoft SQL Server 2008 Enterprise x64 Edt SP1	Microsoft Windows Server 2008 Enterprise x64 Edt SP2	N
09/04/09	100 GB	 HP	HP ProLiant DL380 G6	51,085	1.09 USD	10/05/09	Microsoft SQL Server 2008 Enterprise x64 Edt SP1	Microsoft Windows Server 2008 Enterprise x64 Edt SP2	N
08/27/09	100 GB	 HP	HP ProLiant DL380 G6	51,422	1.07 USD	09/14/09	Microsoft SQL Server 2008 Enterprise x64 Edt SP1	Microsoft Windows Server 2008 Enterprise x64 Edt SP2	N
07/31/09	300 GB	 HP	HP ProLiant DL785 G6	91,558	1.94 USD	10/30/09	Microsoft SQL Server 2008 Enterprise x64 Edt SP1	Microsoft Windows Server 2008 Enterprise x64 Edt SP1	N
07/06/09	300 GB	 Sun	Sun Fire X4600 M2	55,157	2.80 USD	07/06/09	Microsoft SQL Server 2008 Enterprise x64 Edt SP1	Microsoft Windows Server 2008 Enterprise x64 Edition	N
06/03/09	1000 GB	 HP	HP BladeSystem c-Class 128P RAC	1,166,976	5.42 USD	12/01/09	Oracle Database 11g Release 2 Enterprise Edt.	Oracle Enterprise Linux	Y
06/02/09	100 GB	 DELL	PowerEdge T610	28,772	1.46 USD	06/02/09	Microsoft SQL Server 2008 Enterprise x64 Edt SP1	Microsoft Windows Server 2008 Enterprise x64 Edt SP1	N
04/29/09	1000 GB	 HP	HP Integrity Superdome-Dual-Core Itanium	123,323	20.54 USD	04/29/09	Oracle Database 11g Enterprise Edition	HP-UX 11.i v3 64 bit	N
04/14/09	1000 GB	 Sun	SunFire X4275	23,365	2.41 USD	04/14/09	Sybase IQ 15 SAS	Sun Solaris 10	N
03/04/09	3000 GB	 Sun	SunFire X4540	11,435	5.26 USD	04/09/09	Sybase IQ 15 SAS	Sun Solaris 10	N

100%



# HP Integrity Superdome - Itanium/1.6 GHz/18MB iL3 - 32p/64c

TPC-H Rev 2.8.0

Report Date:  
April 29, 2009

Total System Cost

Composite Query per Hour Metric

Price/Performance

**\$2,532,527 USD**

**123,323.1**

**\$20.54 USD**

QphH@1000GB

Price/QphH@1000GB

Database Size

Database Manager

Operating System

Other Software

Availability Date

1000 GB\*

Oracle Database 11g  
Enterprise Edition with  
Partitioning and Oracle  
Automatic Storage  
Management

HP-UX 11i v3 64-bit

None

Now

Database Load Time = 01:07:12

Load Includes Backup: N

Total Data Storage/Database Size = 112.42

RAID (Base Tables Only): N

RAID (Base Tables and Auxiliary Data Structures): N

RAID (All): Y

### System Configuration

Number of Nodes:

1

Processors/Cores/Threads/Type:

32/64/64/Intel Itanium 9140 1.6GHz, 9MB iL3 cache per core

Memory:

384 GB

Disk Drives:

1 High Availability Storage Systems with 4 18GB disks and  
32 EVA 4400 (with total of 768 146GB 15K RPM disks)

Total Disk Storage

112416GB (In this number one GB is defined as 1024\*1024\*1024 bytes)

Lan Controllers

1 PCI 1000BT Lan Adapter

\*Database Size includes only raw data (e.g. no temp, index, redundant storage space, etc.)



**HP BladeSystem c-Class 128P RAC  
with  
HP Oracle Exadata Storage Servers**

TPC-H Rev. 2.8.0

Report Date:  
**June 3, 2009**

Total System Cost		Composite Query per Hour Metric		Price / Performance	
<b>\$6,320,001USD</b>		<b>1,166,976.6</b> QphH@1000GB		<b>\$5.42USD</b> \$ / QphH@1000GB	
Database Size	Database Manager	Operating System	Other Software	Availability Date	
1000GB	<b>Oracle Database 11g Release 2 Enterprise Edition with Oracle Real Application Clusters, Partitioning and Advanced Compression</b>	<b>Oracle Enterprise Linux</b>		<b>December 1, 2009</b>  <b>Hardware Available Now</b>	

Database Load Time = 2:22:57	Load Included Backup: N	Total Data Storage / Database Size = 38.79
RAID (Base tables only): n.a	RAID (Base tables and auxiliary data structures): n.a	RAID (All): Y

Database Server Components	System Total	Per Node
HP BladeSystem c7000 Enclosure:	4	n.a.
HP ProLiant BL460c Server:	64	n.a.
Quad-Core Intel Xeon X5450 Processor (12M Cache, 3GHz)		
(Processor/Cores/Threads):	128/512/512	2/8/8
Memory:	2080GB	32GB x 63 Nodes 64GB x 1 Node
HP 146GB 10K SAS 2.5 Hot Plug HDD (OS, Flat files):	128	2
Total formatted storage internal to Database Servers:	18688GB	292GB
HP 4X DDR IB DP Mezzanine HCA for HP BladeSystem c-Class:	128	2
HP GbE2c Ethernet Blade Switch for c-Class BladeSystem:	8	n.a.
HP 4X DDR IB Switch Module for HP BladeSystem c-Class	12	n.a.

# TPC-H: Tabell design

```
create table orders(  
  o_orderdate,  
  o_orderkey NOT NULL,  
  o_custkey NOT NULL,  
  o_orderpriority,  
  o_shippriority,  
  o_clerk,  
  o_orderstatus,  
  o_totalprice,  
  o_comment)  
pctfree 1  
pctused 99  
initrans 10  
tablespace ts_o  
compress for all operations  
parallel  
nologging  
partition by range (o_orderdate)  
subpartition by hash(o_orderkey)  
...;
```

```
create unique index i_o_orderkey  
on orders (o_orderkey)  
  global partition  
    by hash (o_orderkey)  
partitions 512  
pctfree 10  
initrans 10  
tablespace ts_io  
parallel  
compute statistics  
nologging;
```

# TPC-H: *init.ora* parameterere

## HP Superdome

```

cpu_count = 64
db_block_size = 32768
db_file_multiblock_read_count = 64

db_cache_size = 24G
db_writer_processes = 16

java_pool_size = 1024
shared_pool_size = 100G
large_pool_size =

optimizer_features_enable = 11.1.0.6.1
optimizer_index_cost_adj = 200
parallel_execution_message_size = 65535
parallel_max_servers = 2560
parallel_min_servers = 2560
parallel_threads_per_cpu = 2

pga_aggregate_target = 60g

```

## HP-blades (RAC)

```

= 8
= 32768
= 32

= 19G
= 1

= 52428800
= 3G
= 2G

= 11.1.0.7.1
= 1000
= 16384
= 128
= 128
=

= 16g

```

# TPC-H: CREATE DATABASE

## HP Superdome

```
create database
  controlfile reuse
  logfile '+DG1' size 120000m reuse,
         '+DG1' size 120000m reuse
  datafile '+DG1' size 5000m reuse
  sysaux datafile '+DG1' size 5000m reuse
  undo tablespace ts_undol
    datafile '+DG1' size 32000m reuse
  maxdatafiles 3000;

create temporary tablespace ts_temp
  tempfile '+DG1' size 128000m reuse
  extent management local
  uniform size 5M;

create tablespace ts_l${i}
  datafile '+DG1' size 25600m reuse
  extent management dictionary
  default storage (initial 100m next 100m maxextents unlimited
    pctincrease 0) nologging;
```

# TPC-H: CREATE TABLESPACE

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## HP Superdome

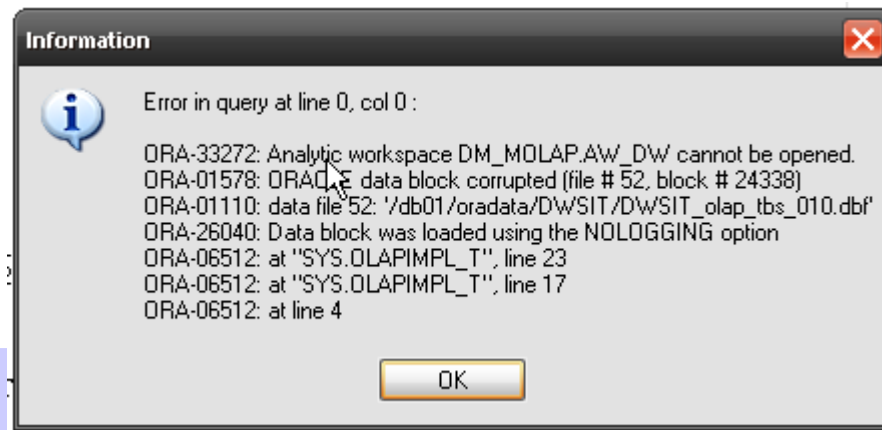
```
create tablespace ts_l${i}
  datafile '+DG1' size 25600m reuse
  extent management dictionary
  default storage
    (initial 100m next 100m maxextents unlimited pctincrease 0)
  nologging;

create tablespace ts_o${i}
  datafile '+DG1' size 6100m reuse
  extent management dictionary
  default storage
    (initial 20m next 20m maxextents unlimited pctincrease 0)
  nologging;

create tablespace ts_s
  datafile '+DG1' size 2800M reuse
  extent management local autoallocate nologging;

create bigfile tablespace ts_p
  datafile '+DG1' size 38000m reuse
  extent management local autoallocate nologging;
```

# TPC-H: NOLOGGING



- NOLOGGING medfører at du ikke på en sikker måte kan duplisere en database ved hjelp av *Recovery Manager Cloning*.
- NOLOGGING medfører at du kan risikere å måtte gå tilbake til siste fulle sikkerhetskopiering.

# TPC-H: NOLOGGING

```
DVH@DV1T SQL> INSERT INTO ingemar_person SELECT * FROM PERSON;  
NOLOGGING 00:02:21.72, 00:02:25.23, 00:02:17.84  
LOGGING 00:02:16.28, 00:02:22.92, 00:02:11.67
```

```
DVH@DV1T SQL> ALTER SESSION ENABLE PARALLEL DML;
```

```
DVH@DV1T SQL> ALTER TABLE person PARALLEL 8;
```

```
DVH@DV1T SQL> INSERT /*+ PARALLEL(i,4,4) */  
INTO ingemar_person i  
SELECT * FROM PERSON;  
NOLOGGING 00:00:31.02, 00:00:36.16, 00:00:35.37  
LOGGING 00:00:41.83, 00:00:35.15, 00:00:35.33
```

```
DVH@DV1T SQL> INSERT /*+ APPEND PARALLEL(i,4,4) */  
INTO ingemar_person i  
SELECT * FROM PERSON;  
NOLOGGING 00:00:32.71, 00:00:26.25, 00:00:24.23  
LOGGING 00:00:26.34, 00:00:27.80, 00:00:23.50
```

# TPC Energy

## Eksempel:

A TPC-C result of 139,693 tpmC is completed over a period of 120 minutes using 38,643,582 transactions of all types. The total energy consumption of that single measurement interval was 21,050 watt-hr or 1,263,000 watt-min. So, even though the 16,763,160 transactions used in the reported throughput is not all the work completed, it is a fixed linear function of the entire work (43%) and is used to calculate the TPC Energy Primary Metric.

The calculation  $1,263,000 \text{ watt-min} / 16,763,160 \text{ transactions}$  results in 75.3 watts/KtpmC

$$1,263,000 \text{ watt-min} / 16,763,160 \text{ transactions} = 75.3 \text{ watts/KtpmC}$$

# Konklusjon

- Oracle Standard Edition One kan være aktuell.
  - TPC-C benytter 2, 4, 8 og 16 KB databuffere.
  - **Raw device** TPC-C; **ASM** TPC-H.
  - Mange diskere med ulik ytelse.
  - Hash Cluster bør vurderes.
  - Trenger ikke å partisjonere alt.
  - Fremdeles brukes *Dictionary Managed* tablespaces.
  - TPC-Energy kan bli viktigere...
- 
- **Ja, TPC-tester kan fremdeles være av stor interesse!**
  - **Men først og fremst i markedsføringen.**