# Extreme Performance with Sun Oracle DB Machine

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# Sun Oracle Database Machine / Exadata
## The Extreme ROI Platform

- Fast Predictable Performance

- Lower Ongoing Costs

- The Fastest Time to Value & Lowest Risk
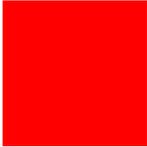
# Oracle Data Warehouse components
## Complete, Open, Integrated, Best-of-Breed

**EPM Workspace**
(Oracle Business Intelligence Enterprise Edition Plus: Desktop, Web, Search, Office, Alerts, Mobile)

**Performance Management**
(Strategy Mgmt, Business Planning, Profit Mgmt, Financial Reporting & Compliance)

**BI Applications**
(Sales, Service, Mkting, Order Mgmt, HR, Fin, Projects)

**Industry Bundles**

**Business Intelligence Foundation**
(Oracle Business Intelligence Enterprise Edition: BI Server, Essbase, Real-time Decisions)

**Middleware**
(BPEL, Oracle Data Integrator, MDM)

**Database**
(Oracle Database 11g Enterprise Edition, RAC, Partitioning, Exadata Software, OLAP, Data Mining Advanced Compression, Advanced Security, Real Application Testing, Packs)

**Database Machine / Storage**
(Sun Oracle Database Machine, Exadata Storage)

# Oracle Database 11*g*
## The Leading Database for Data Warehousing
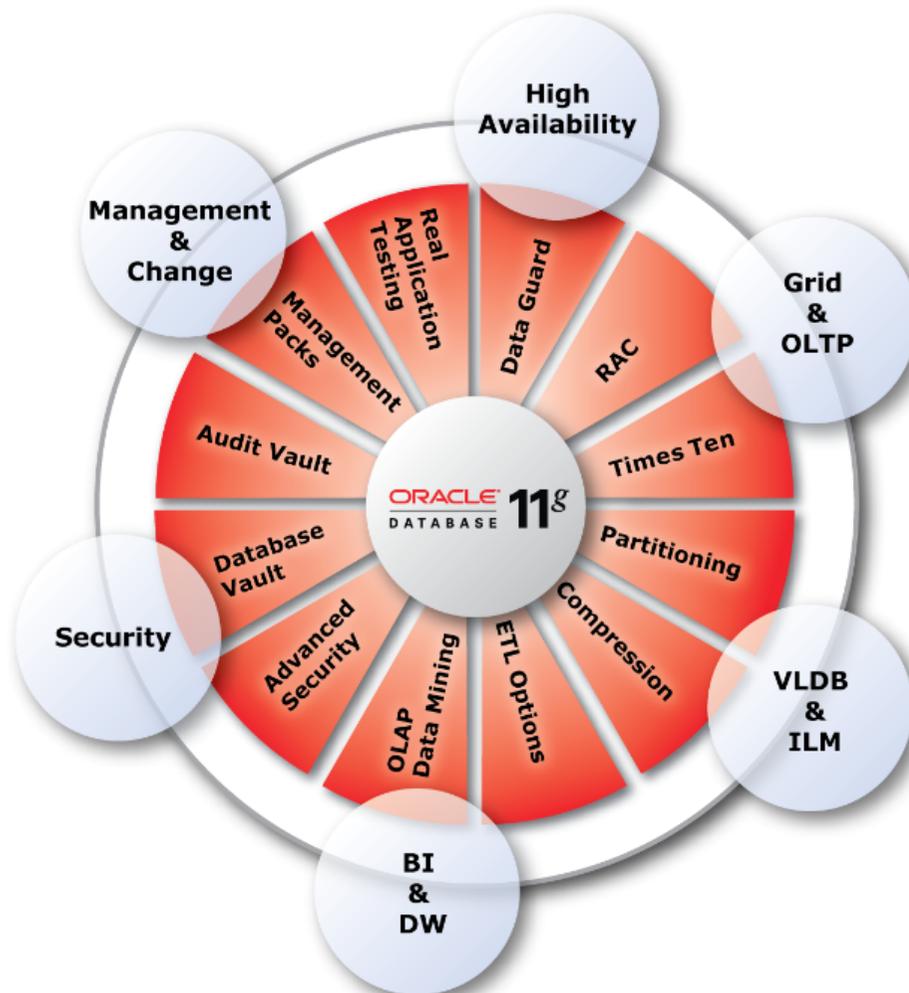


- **Key Data Warehousing Capabilities**
  - Embedded Analytics
  - Single Point of Management
  - Secure
  - 24X7 Availability
  - Optimal Storage Management
  - Scale to hundreds of Terabytes & large analyst communities
  - Flexible Model Deployment

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# Sun Oracle Database Machine

**Highest performance, lowest cost, redundant, incrementally scalable**

## RAC Database Server Grid

- 8 High-performance low-cost computer servers
- 2 Intel quad-core Xeons each

## InfiniBand Network

- 40 Gb/sec fault-tolerant unified server and storage network
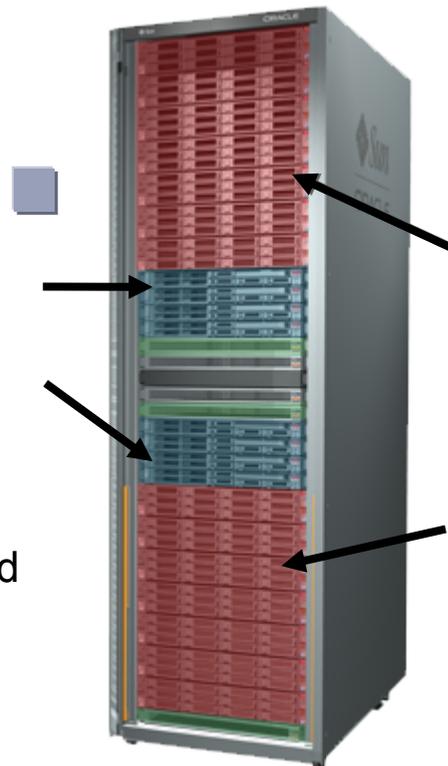
## Exadata Storage Server Grid

- 14 High-performance low-cost storage servers
- 100 TB raw SAS disk storage

  or

  336 TB raw SATA disk storage
- **5TB flash storage!**

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*1st and only complete grid architecture for all data management needs*
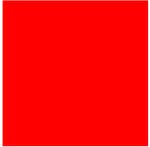
# IT Challenges

| CHALLENGES | ORACLE STRATEGY |
| --- | --- |
| • Fragmented Solutions | • Information Consolidation |
| • Difficulty of Self-Service BI | • Flexible, Guided, Easy-to-Use, Automated |
| • Data Not Current | • Solutions for Just-in-Time understood data |
| • Time to ROI / Development Time | • Horizontal and industry pre-built solutions, appliance-like solutions |
| • Rapidly Growing Data & User Communities | • Enterprise class solutions serving 1000s of users and providing 100s TB of data |
| • Deployment Manageability, Security & Expense | • Integrated solutions that are centrally managed with advanced security / governance |

# The Products
## Exadata Storage Server & Database Machine

- Exadata Storage Server
  - *Storage* optimized for Oracle DDBB
  - Extreme I/O and SQL Processing performance
  - Combination of HW & SW

- Exadata Storage Server Software

- Sun Oracle Database Machine
  - Pre-Configured for High Performance
  - Balanced Configuration
  - Pre-Tested Configuration

- Exadata Storage Server Software

- Oracle Database 11gR2

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EXADATA
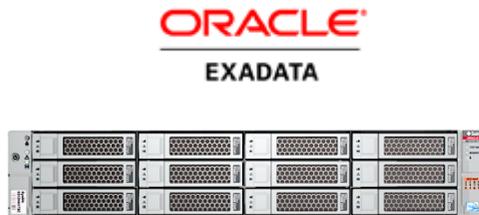
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# Sun Oracle Database Machine
## Extreme Performance!

**Oracle DB Server Grid**

- Millions of transactions / second
- Tens of millions of queries / minute
- Billions of rows / minute

**Exadata Storage Server Grid**

- 21 GBs disk bandwidth
- 50 GBs flash memory bandwidth
- 1 million I/Os per second

**InfiniBand Network**

- 880 Gb/sec aggregate throughput

# *Deployments* drastically simplified

- Database Machine eliminates the complexity of deployment
  - Months of Configuration, troubleshooting, tuning

- Database Machine ready from day one
  - Pre-built, Tested, Standard, Supported Configuration
  - Executes applications without any changes

- Extreme Performance *out of the box*

**Months to days**

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# Start Small and Grow



¼ Rack      ½ Rack      1 Rack

# The Architecture of the Future
## Massively Parallel Grid

**The Best for DW**

**The Best for OLTP**

**The Best for Consolidation**



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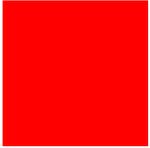
# THE BEST FOR DW

# The Best Machine for Data Warehouse

**OLAP**

**ETL**

**Data Mining**

New

- Massively Parallel Hardware
  - Processes great quantities of data
  - Exadata processes data at the storage system

- More Complete Analytical Capacity
  - OLAP, Statistics, Spatial, Data Mining, Real-time transactional ETL, Efficient point queries

- Specific Optimizations for DW
  - Flexible Partitioning, Bitmap Indexing, Join indexing, Materialized Views, Result Cache

- **New  Capacities for DW**

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# Exadata Storage
## Smart Scan

What were my sales yesterday?

Oracle Database Grid

Optimizer Chooses Partitions and Indexes to Access

Exadata Storage Grid

Select sum (sales) where Date='24-Sept'

Scan compressed blocks in partitions/ indexes

Retrieve sales amounts for Sept 24

SUM

10 TB scanned
1 GB returned to servers

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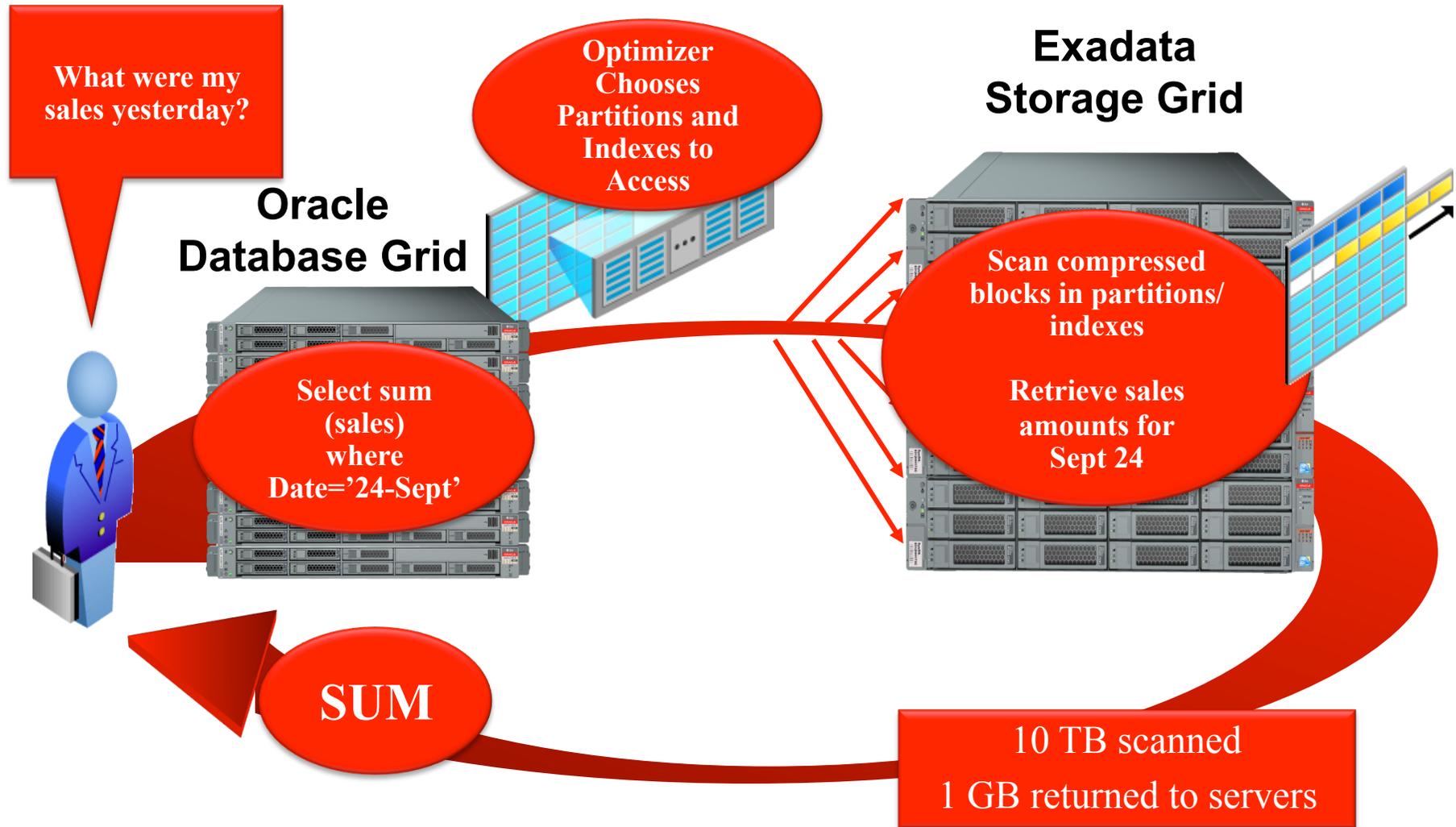
# Exadata Database Processing in Storage

- Exadata cells process data in an intelligent manner
  - *Row filtering  with "where"  clause*
  - *Column filtering*
  - *Join filtering*
  - *Incremental backup filtering*
  - *Storage Indexing*
  - *Scans on encrypted data*
  - *Data Mining model scoring*

- 10x  less data sent to the DDBB servers

- Transparent
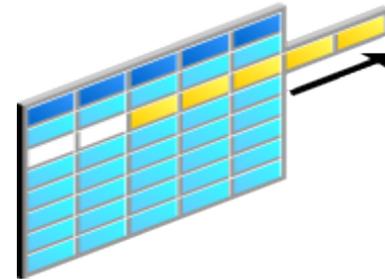
# Exadata Storage Index
## Transparent I/O Elimination with No Overhead

**Tabla**

**Idx**

| A | B | C | D |
|---|---|---|---|
|   | 1 |   |   |
|   | 3 |   |   |
|   | 5 |   |   |
|   | 5 |   |   |
|   | 8 |   |   |
|   | 3 |   |   |

Min B=1
Max B=5

Min B=3
Max B=8

- Keeps in memory range of values
  - Stores the MIN and MAX of columns
  - Normally one entry in the index / MB of disk

- Automatic and transparent

- Reduces I/Os
  - Is it the same "where" clause?

**Select * from Table where B<2**

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# Exadata software
## Hybrid Columnar Compressión

- Data stored by columns and then compressed

- **Query Mode** for DW
  - Optimized for speed
  - **10X** Compression ratio
  - Improved Scans

- **Archival Mode** to access unfrequent data
  - Optimized to reduce space
  - **15X** Compression ratio (up to 50X)

Up to

# 50x!

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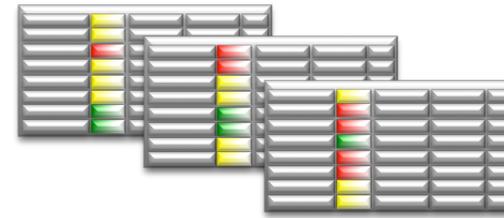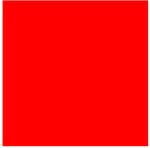
# THE BEST FOR OLTP

# Exadata Storage Server
## Eliminates bottlenecks for Random I/O

300 iops

10's of thousands iops

- Disks
  - Great quantity of data ⬆
  - Physical limit on iops
  - Cheaper

- Memory Flash Technology
  - Hosts less data
  - 10 of thousands iops ⬆
  - +  expensive

- Ideal Solution
  - Only hot data on flash memory ⬆
  - Transparent
  - Flash Cards
    - High bandwidth
    - Low latency
    - Avoids disk controller limitations

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# THE BEST FOR CONSOLIDATION

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# DDBB Consolidation



ERP      CRM      HR

Warehouse      Data Mart

ERP
CRM
Warehouse
Data Mart
HR
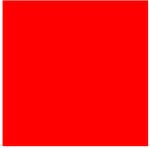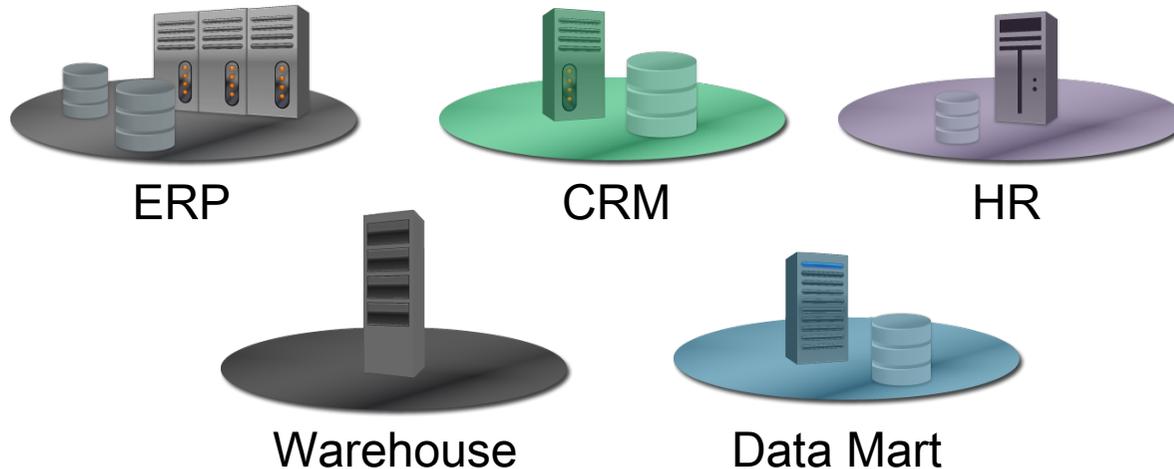
- Consolidate on the Database Machine
  - High Performance for all Applications
  - Low Cost HW  for all Applications
  - Predictable Response time on a shared environment
  - Centralized management
  - Complete, Integrated, Open
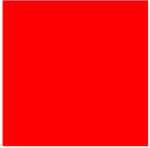
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# CONCLUSION
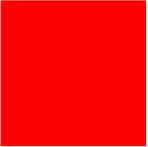
# Sun Oracle Database Machine Focuses on Optimizing Mixed Workloads

- *"Consider this platform as a consolidation strategy for multiple TP applications and for improving performance by consolidating TP and DW on a single RAC system".*

- *"Nevertheless, it's prebuilt, tested and configured appliances can speed up deployment and will enable users to receive service from a single source.*

Gartner, 23-Sep-09

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# Flash Performance

- Flash storage more than doubles scan throughput
  - **50 GB/sec**
- When combined with Exadata hybrid columnar compression
  - **500 GB/sec**
- Full benefits of Flash enabled by Exadata storage software and high-bandwidth Infiniband network

■ Query Throughput  ■ Query Throughput with Flash

**Query Throughput Uncompressed Data**

| | HITACHI USP V | TERADATA 2550 | NETEZZA TwinFin 12 | SUN ORACLE Database Machine |
|---|---|---|---|---|
| Query Throughput | 11,4 | 7,5 | 10 | 21 |
| With Flash | | | | 50 |
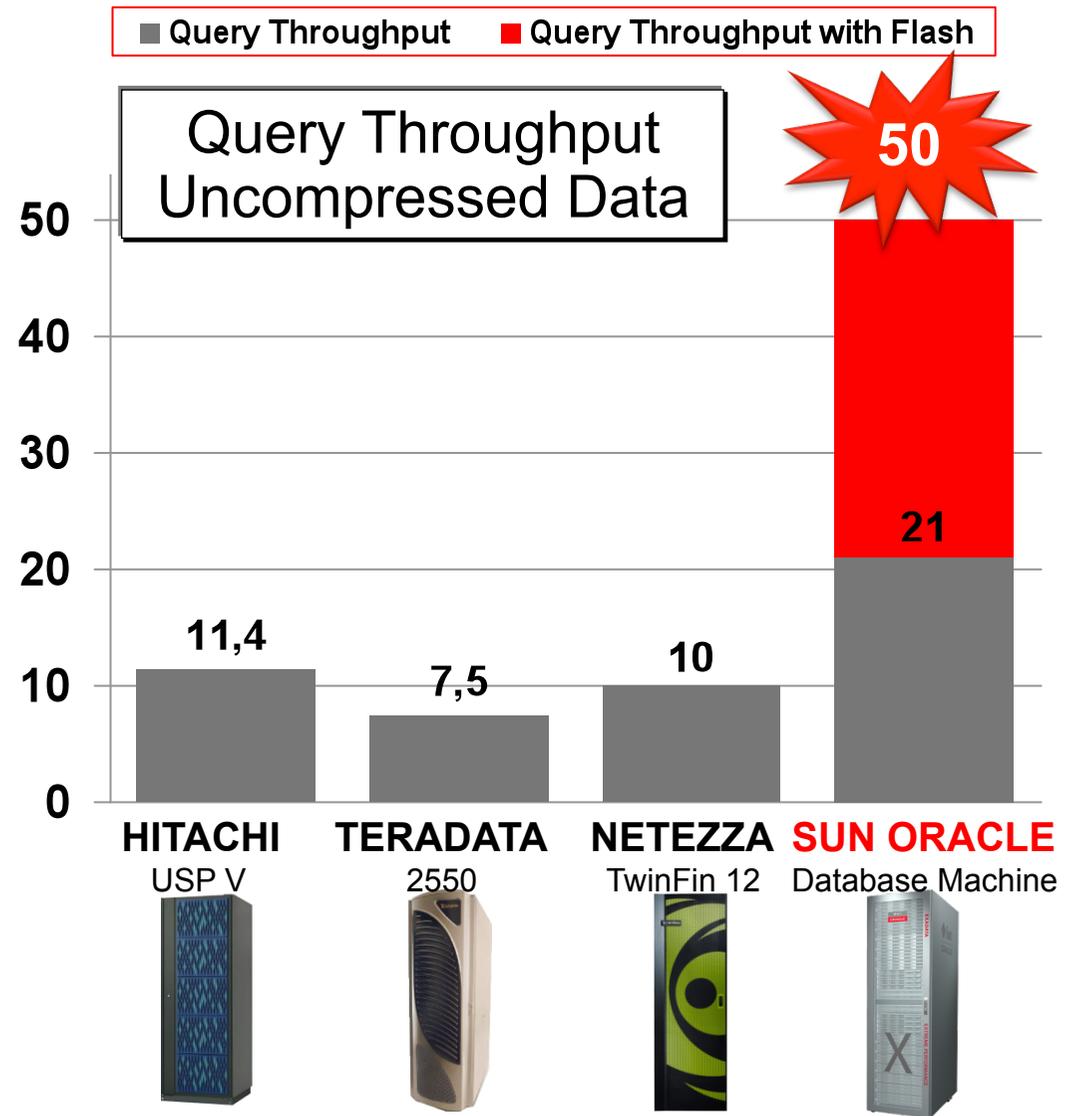
# Lower Costs vs Conventional Hardware

Database Machine

$1,150,000

- Better Performance

  6x Less Cost

  3x Less Power

  5x Less Space

High End SMP    High End Storage Array

$7,700,000

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# Exadata Customers

"A query that used to take **24 hours** now runs in **less than 30 minutes**. The Oracle Database Machine beats competing solutions on **bandwidth, load rate, disk capacity, and transparency.**"

Christian Maar, CIO

"**Every query was faster** on Exadata compared to our current systems. The smallest performance improvement was **10x** and the biggest one was an incredible **72x**."

Simeon Dimitrov, Enterprise Resources Manager

"Call Data Record queries that used to run for **over 30 minutes** now complete in **under 1 minute**. **That's extreme performance**."

Grant Salmon, CEO, LGR Telecommunications

# Storage & Price/Performance Comparison

| | SUN ORACLE Database Machine | | TERADATA 2550 | NETEZZA Twinfin 12 |
|---|---|---|---|---|
| | **SAS Disks** | **SATA Disks** | | |
| **Total Disk Storage** | 100 TB | 336 TB | 42 TB | 96 TB |
| **User Data Capacity** | 140 TB @ 10x compression | 500 TB @ 10x compression | 12.6 TB @ 1.43x compression | 72 TB @ 2.25 compression |
| **System Price** | $1,150,000 H/W  $1,680,000 S/W* | | $819,000 | $1,480,000 |
| **Price per User TB** | $20,000 | $5,700 | $65,000 | $20,000 |
| **Price per GB/sec of query thruput** | $55,000 | | $110,000 | $150,000 |

\* Use your existing database licenses,  full list price for Storage Server Software

# Thank you!