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**ORACLE®**

# **The Business Value of Upgrading to 11g**

**Itayi WP Mandonga**

**Tuesday 15<sup>th</sup> November**

**SAOUG 2011**

# Why NOT upgrade?

- **Often customers and partners hesitate to upgrade**
  - Project costs money and requires a lot of resources
  - Project lifecycle is measured in years
    - Oracle 9.2 => Oracle 11.2 – 3.5 years project
  - Benefits aren't seen this often
  - System is up and running – never touch it

# Why do customers upgrade?

- **Reason #1: Desupport**
  - When end of Oracle Premier Support comes close or has been reached already then customers start thinking and planning
    - We have tons of Oracle 9.2 and especially 10.2 customer out there live in production
- **Reason #2: Hardware is running out of support**
  - New HW requires new OS
  - New OS does not support "old" Oracle version
- **Reason #3: Specific hardware requires specific database versions**
  - Exadata
  - Oracle Database Appliance

# Why do customers upgrade?

- **Reason #4: Application will require a higher Oracle version**
  - Oracle EBS, Peoplesoft, Siebel, JDE
  - Provider of an 3rd party application is pushing the upgrade
- **Reason #5: New features in the database**
  - E.g. new security feature in database

# Today's Business Challenges


## Colliding pressures



Reduce IT Costs

Reduce Complexity

Reduce Risk



Increase Rate of Change  
Manage More Information  
Improve Quality of Service

# Oracle 11g Offers Remarkable Business Value

***Upgrading to Oracle 11G can reduce your hardware, storage and administration costs by as much as 70%!***

- *Run Faster*
- *Easier to Manage*
- *More Secure*
- *More Scalable, Available and Reliable*
- *And Costs Less to Operate*

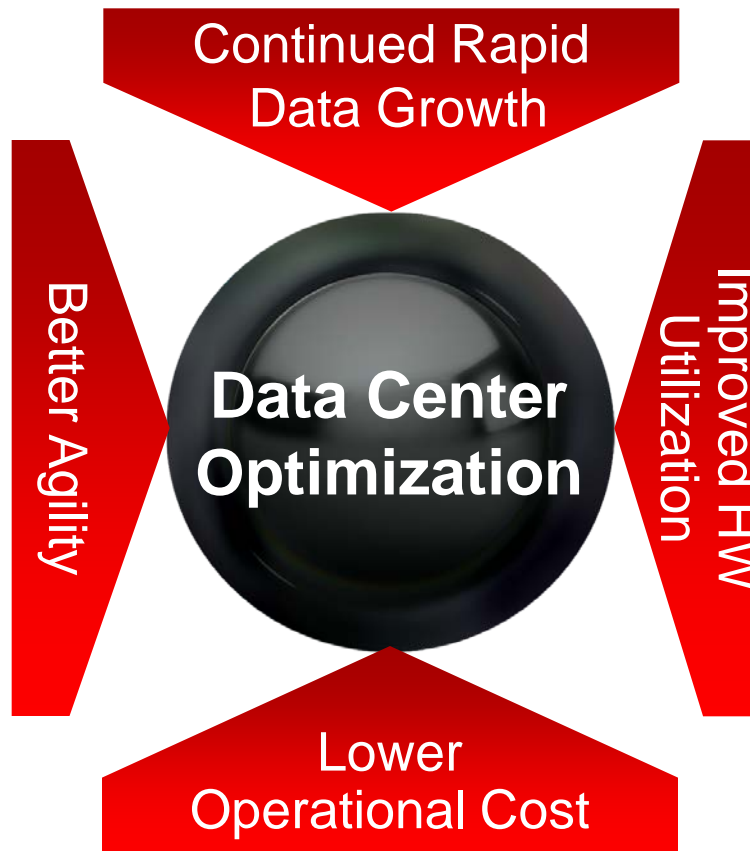


*Leap legacy versions (8i,9i) to 11G and accelerate the benefit*

# These Capabilities Enable Customers to Drive Costs Down and Productivity Up

Selected Capabilities	Cost/Productivity Impact*
<ul style="list-style-type: none"> <li>• <b>Maximizing Data Center Assets</b> <ul style="list-style-type: none"> <li>• Virtualization &amp; Real Application Clusters</li> <li>• Database Performance Improvements</li> <li>• Tiered Database Storage</li> <li>• Advanced Compression</li> <li>• Active Data Guard</li> <li>• Automated Tuning</li> <li>• Automatic Storage Management</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>↓ <b>Server Costs Down 70%</b></li> <li>↓ <b>Storage Costs Down 70%</b></li> </ul>
<ul style="list-style-type: none"> <li>• <b>System and Application Management</b> <ul style="list-style-type: none"> <li>• Real Application Testing</li> <li>• Automated Patching &amp; Provisioning</li> <li>• Automating Diagnostic and Tuning</li> <li>• Automated Change and Configuration Management</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>↓ <b>Reduce the Cost of Upgrades by 50%</b></li> <li>↑ <b>Increase DBA Productivity by 50%+</b></li> </ul>
<ul style="list-style-type: none"> <li>• <b>Automated Prevention Detection Security</b> <ul style="list-style-type: none"> <li>• Transparent Data Encryption</li> <li>• Separation of Duties and</li> <li>• Database Monitoring and Audit</li> <li>• De-Identify Data for Non-Production Use</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>↓ <b>Reduce cost of regulatory compliance by leveraging database infrastructure</b></li> <li>↓ <b>Reduce cost of securing data with preventive controls</b></li> <li>↓ <b>Reduce cost of database activity monitoring through automation</b></li> </ul>

# Data Center Optimization Drivers



- Improve hardware utilization and reduce data center server sprawl
- Traditional virtualization alone is not enough
- Data growth continues to outpace IT budget growth
  - Storage is becoming the most significant infrastructure cost
- Information Life-Cycle Management (ILM) and archiving strategies are needed

*A Virtualization lifecycle used by Oracle IT has reduced servers by 80% and improved utilization 10x*

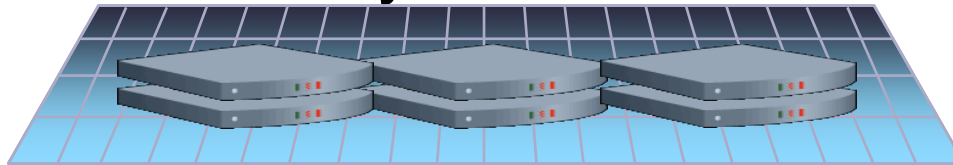
# Maximizing Data Center Assets

- ✓ **Maximize human resource potential**
    - Through database automation features
  - ✓ **Improve Server Utilization**
    - Through virtualization
  - ✓ **Utilize lower-cost computing hardware**
    - Through server clustering
  - ✓ **Fast, consistent response times**
    - High transaction throughput with In-Memory Database Cache
  - ✓ **Maximize value of DR assets**
    - Use redundant asset to perform real work
  - ✓ **Maximize value of storage**
    - Using compression on tiered-storage
- 
- ↑ Increase DBA Productivity by 50%+**
- ↓ Server Costs Down 70%**
- ↓ Storage Costs Down 70%**

# Consolidate on the Grid

## Oracle's Grid Computing Architecture

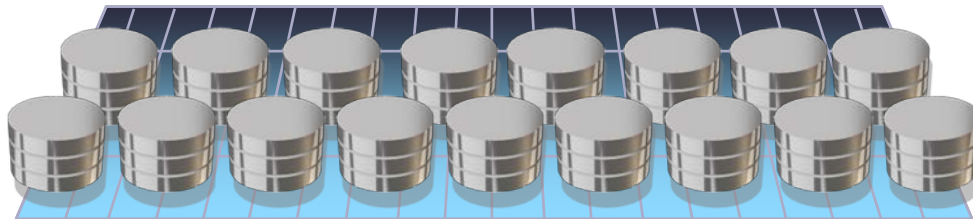
### In-Memory Database Cache



### Real Application Clusters



### Automatic Storage Management

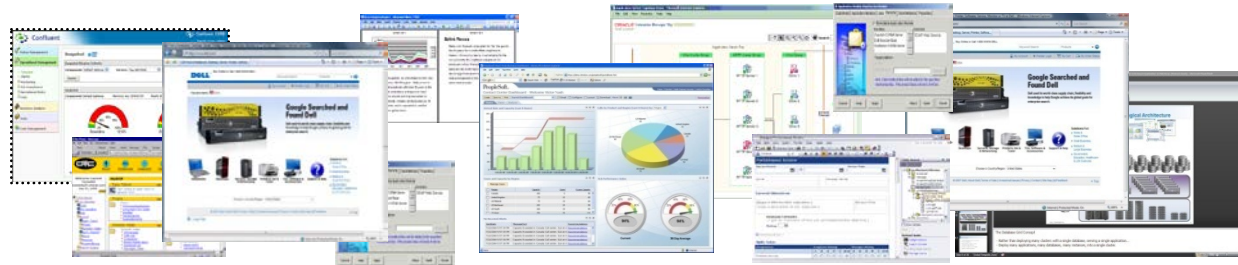


### Grid Control

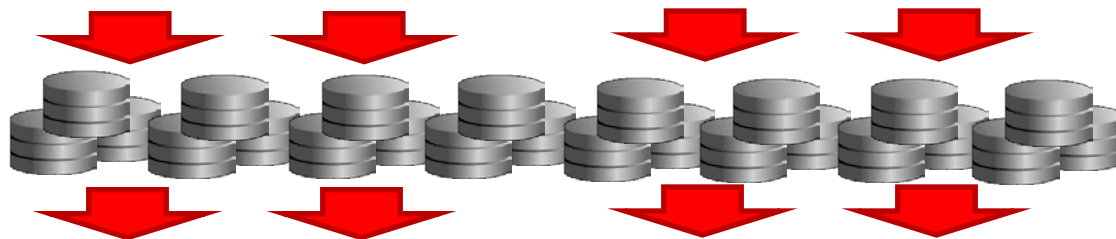
*Leverage low-cost server and storage grids*

# Completely Virtualized Infrastructure

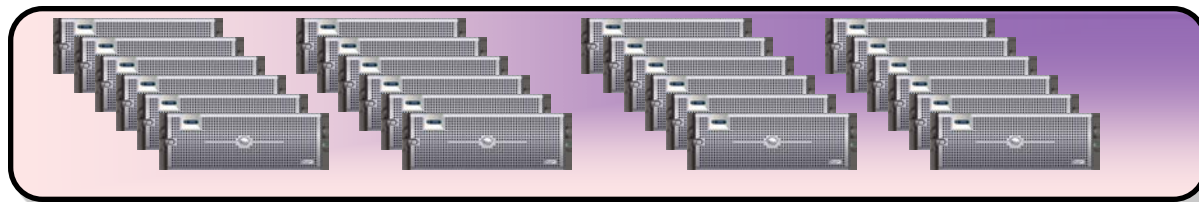
Application  
VMs



Database  
VMs



Virtual  
Clusters

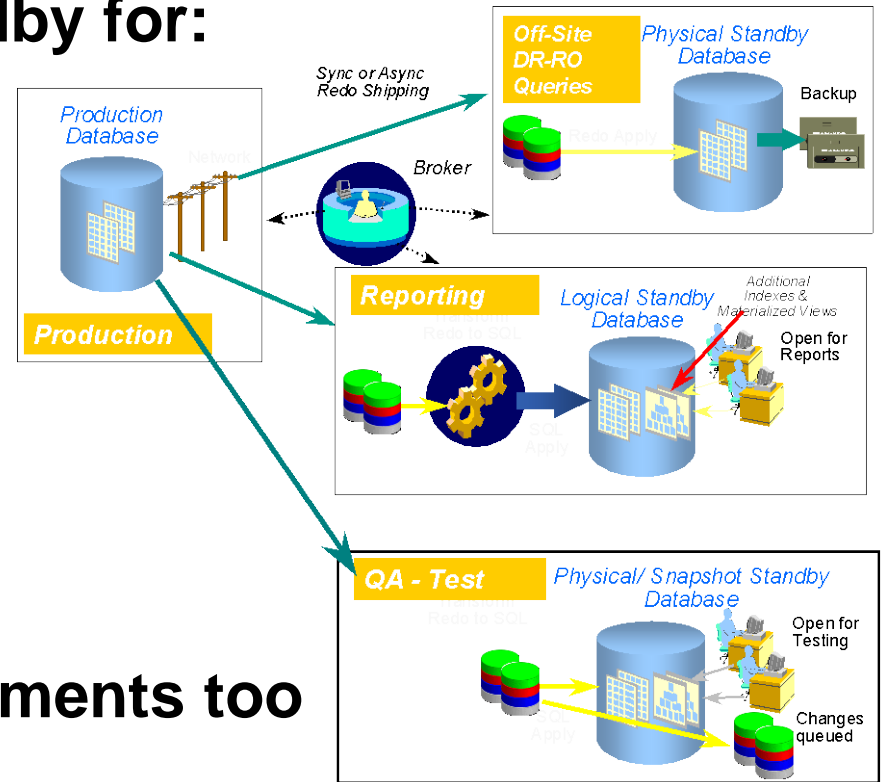


High Density  
Multi-Tier  
Storage



# Maximize DR Infrastructure

- Fundamentally changes the value of redundant infrastructure
- Can now use Physical Standby for:
  - Reporting
    - Read only Physical Standby
  - Online Upgrades
    - Transient Logical Standby
  - Testing
    - Snapshot Standby
  - Backups
    - Fast incremental backups
- Major performance enhancements too



# Maximizing Data Center Assets

*Pacific Gas & Electric (PG&E)*

Lower cost server infrastructure for enterprise applications



## Challenge

- Data Warehouse maxed out
- SAP, Siebel environments have scalability challenges
- Need to cost effectively support international expansion

## Solution

- Oracle for Linux
- Automatic Storage Management
- Real Application Clusters

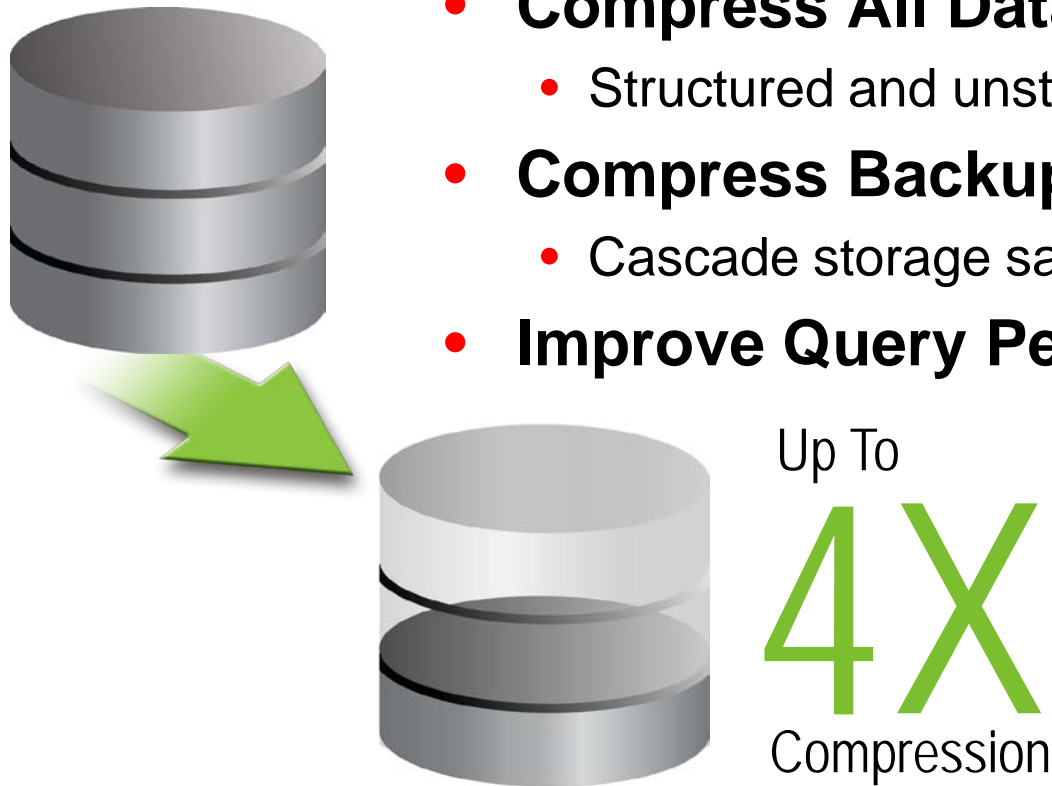
## Results

- Saved \$1.5M in hardware costs
- Improved query times by as much as 70%
- Solved both scalability and availability problems for enterprise applications

# Advanced Compression Option

*Save Disk, Reduce I/O, Maximize Memory*

- **Compress Large Application Tables**
  - Transaction processing, data warehousing
- **Compress All Data Types**
  - Structured and unstructured data types
- **Compress Backup Data**
  - Cascade storage savings throughout data center
- **Improve Query Performance**



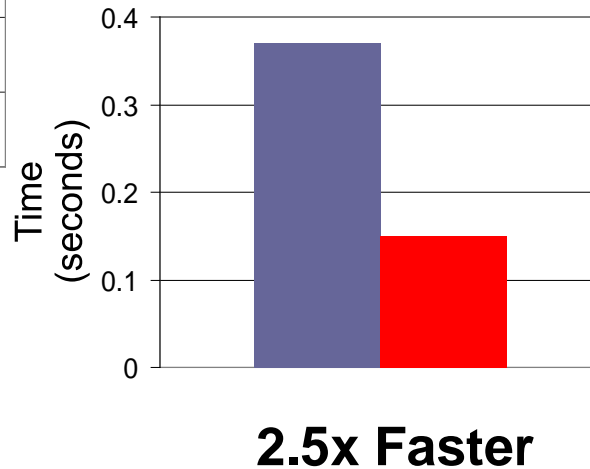
# Real World Compression Results

## 10 Largest ERP Database Tables

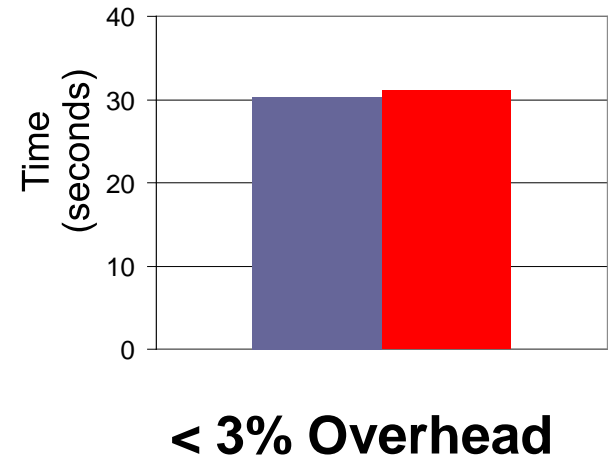
### Data Storage



### Table Scans



### DML Performance





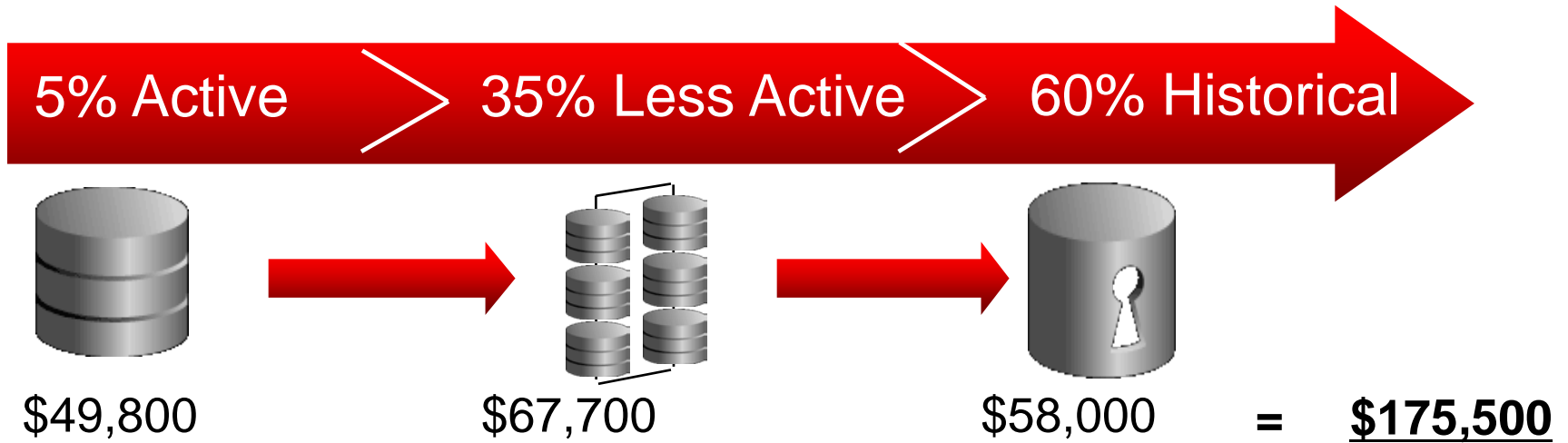
David Apgar  
Business Continuity Planning  
High Availability Engineer  
Yahoo

“One of the large Oracle RAC systems we have is a 16-node system with six storage nodes behind it....the uncompressed data within it is about a fully Petabyte worth of data. It's 200 terabytes compressed.”

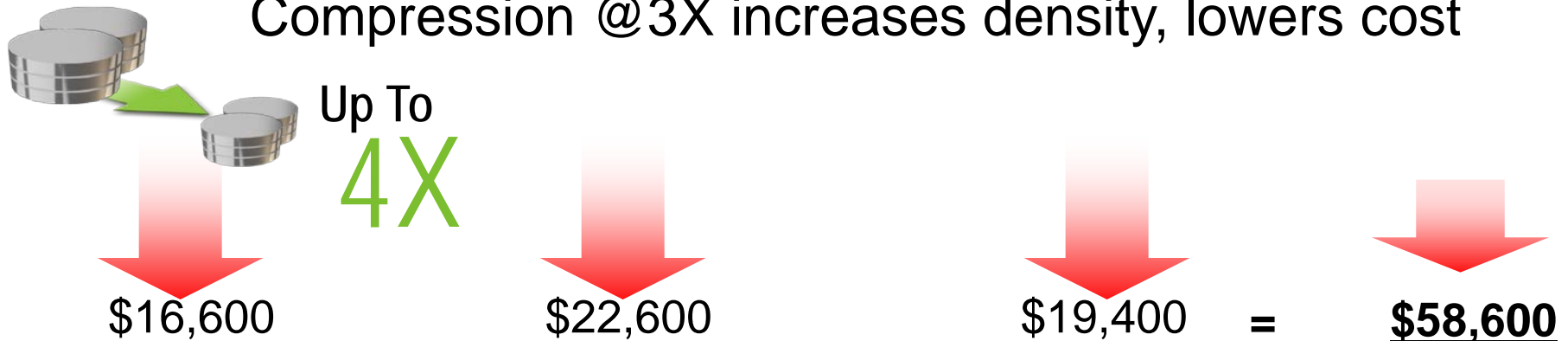


# Multi-Tier Storage & Data Compression

All data on active tier .... \$972,000



Compression @3X increases density, lowers cost



# Maximizing Data Center Assets

*Banking Customer*



Faster throughput with lower cost through Partitioning and Advanced Compression

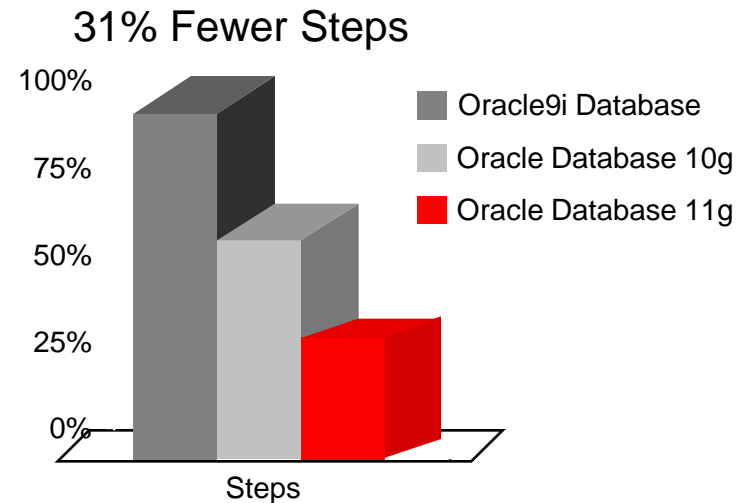
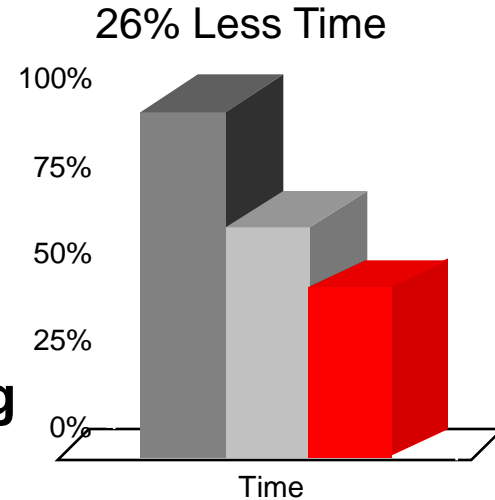
88% reduction in storage costs!

<b>Challenge</b>	<ul style="list-style-type: none"><li>• Large data volumes (650M GL Journal Entry Lines)</li><li>• Application throughput issues</li><li>• High cost of storage</li></ul>
<b>Solution</b>	<ul style="list-style-type: none"><li>• Advanced Compression</li><li>• Database Partitioning</li><li>• Multiple storage tiers</li></ul>
<b>Results</b>	<ul style="list-style-type: none"><li>• System uses 1/3 as much disk</li><li>• 7.5 million journal lines imported and posted per hour!</li><li>• Faster Performance – Lower Cost</li></ul>

# Database Automation

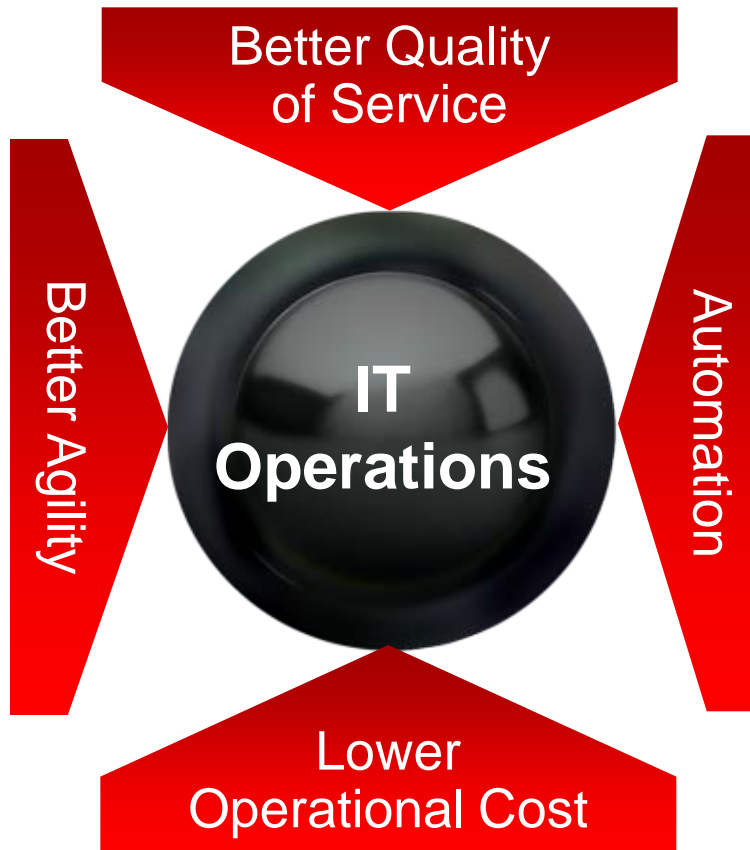
*Maximize Human Resource Potential*

- Automatic Storage Management
- Automatic Memory Management
- Automatic SQL tuning with self-learning
- Automatic Diagnostic Repository
- Automatic Health Monitoring
- Automatic Maintenance Tasks
- Online Maintenance & Upgrade
- Incident Packaging Service



**Reducing time and complexity even further...**

# System and Application Management



- Increasing IT complexity and static IT resources is making agility difficult without automation
- 60%–70% of IT budget is spent on operations and maintenance\*\* and is limiting strategic IT investments
- Ad-hoc process don't support standards and automation across the data center
- Difficult to replicate actual production workloads during testing
- Script-based testing does not exercise the database at granular enough levels e.g concurrency

\* Enterprise Management Associates, 2007

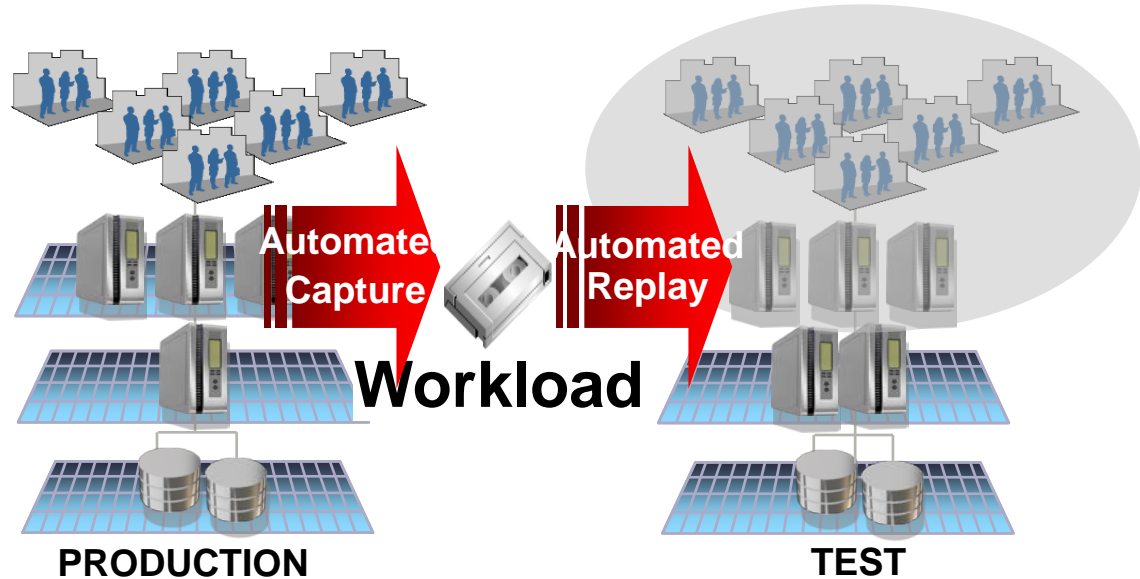
\*\* CIO Magazine, 2007

# Automating Database Testing

*Workload for 1,000s of Users Captured and Replayed*

- **Real Application Testing**

- Recreate actual production workload
- Replay with production timing
- Analyze & fix issues before production



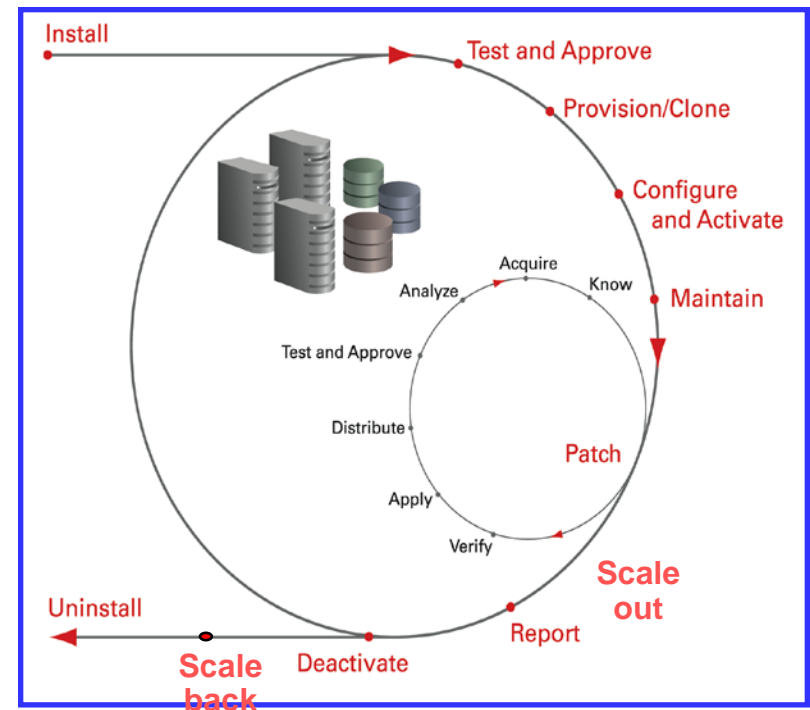
- **Business Agility through Superior Testing**

- Greater Agility - Reduce time required to test and QA system changes by as much as 80%
- Lower Costs - Lower infrastructure testing costs by as much as 70%
- Reduced Risk - Accurately assess the effects of changes
- Enhanced Efficiency - Automating manual and complex testing tasks

# Configuration & Patch Management

## *Compete Software Lifecycle & Configuration Management*

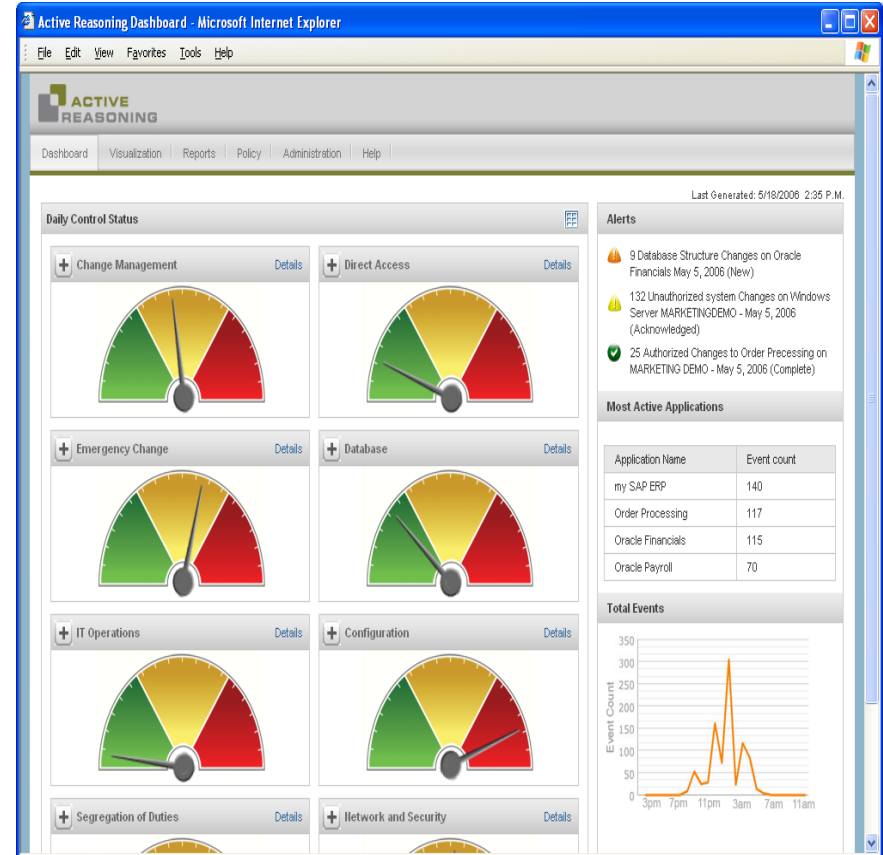
- Automation of Configuration & Patch Management reduces costs of maintaining your Oracle software
- Increases the effectiveness of your IT staff
  - Tracking and auditing changes and patch levels
- **Enables Regulatory Compliance**
  - Enforcing compliance standards and policies
- **Provisioning**
  - Mass deployment of gold images
- **Configuration Management**
  - Complete stack discovery
- **Patching**
  - Automate multiple patching steps across multiple systems
  - Comprehensive coverage of Database, Middleware and Linux



# Real-Time Configuration Change Capture

## *Configuration Change Console*

- Enables IT departments to easily demonstrate compliance to government regulations
  - Provides audit reporting of changes
  - Detect authorized and unauthorized configuration changes in real time
    - Who, What, When, Where
- Implements industry standard policies such as PCI, SOX, COBIT
- Supports a wide variety of components in the data center
  - Operating Systems, Databases, Middleware and Applications







“The Grid Control Infrastructure has been incredibly stable and we’ve had 100% (No 9’s in there!!) availability from the infrastructure, ZERO downtime since the production environment launched in September.”

Logan McLeod  
Senior Architect - Dell

<b>Challenge</b>	<ul style="list-style-type: none"><li>• Maintain high levels of availability of Dell systems</li><li>• Deliver superior quality of service to customers on their web site that serves 2 Billion page requests/Quarter at 84 country sites</li><li>• Eliminate routine tasks and reallocate administrators to value added tasks</li></ul>
<b>Solution</b>	<ul style="list-style-type: none"><li>• Proactive monitoring of 700+ production DBs including RAC</li><li>• Diagnostic tools to carry out system testing and identify worst performing transactions</li><li>• Focus troubleshooting efforts on problems</li><li>• Configuration information extending from host to OS, Oracle and 3rd party software</li></ul>
<b>Results</b>	<ul style="list-style-type: none"><li>• 20% productivity gain for administrators using Grid Control</li><li>• Response time for diagnosing problems improved significantly</li><li>• Integrated management across hardware &amp; software components</li><li>• Out-of-box deployment generates immediate business value</li></ul>

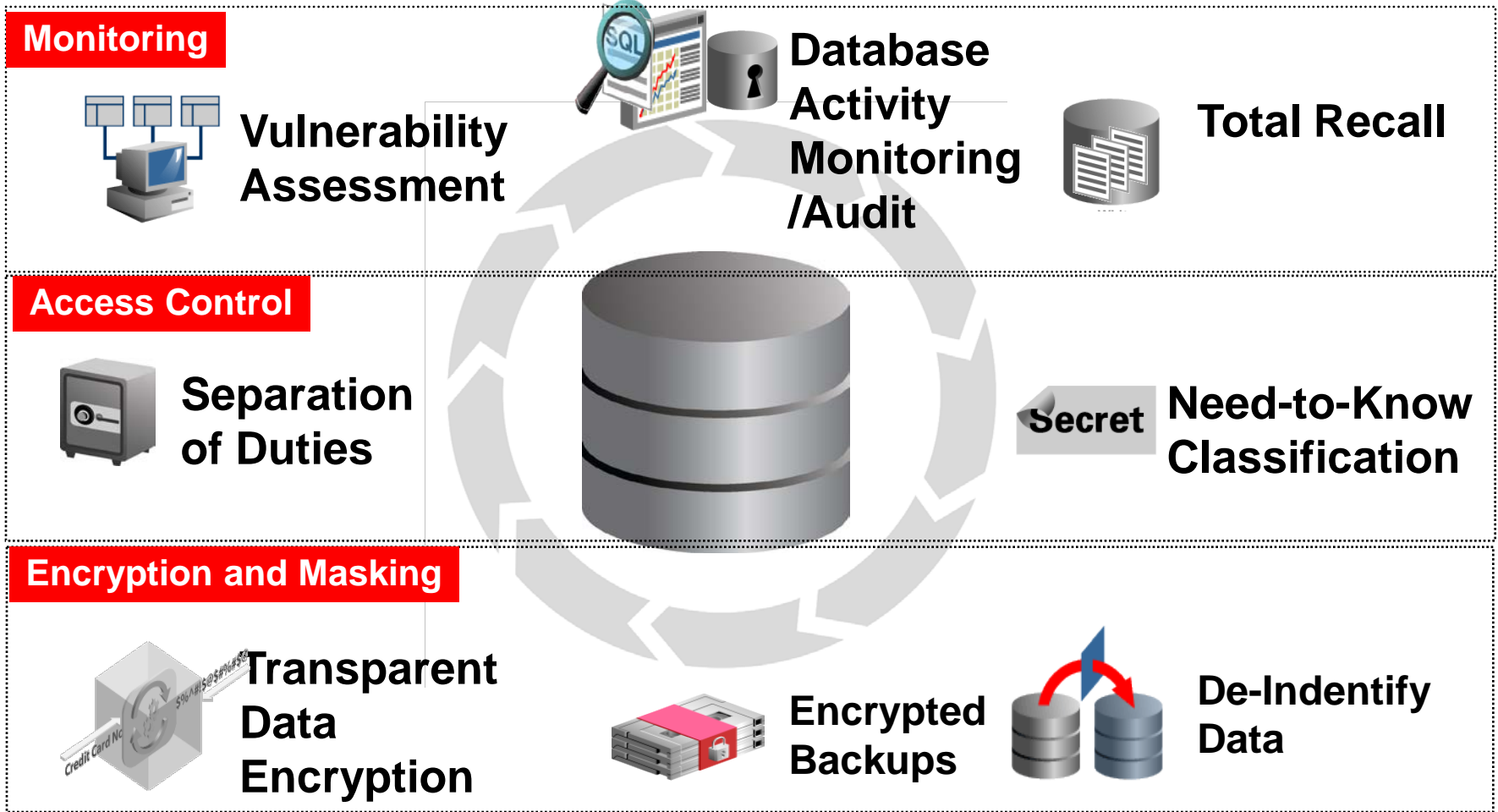
# Security Automation Drivers



- Business-critical data increasingly under attack
- Privacy and compliance mandates continue to expand
  - PCI / HIPAA / SOX / EU Directives / Basel II
- Pressure to reduce IT costs demands more security
  - Outsourcing and Consolidation
- Defense-in-depth is critical to protecting the enterprise data
- Copies of production data for testing and development can lead to compliance and security issues

# Oracle Database Security

## Defense-in-Depth for Security and Compliance



**STARWOOD**

HOTELS & RESORTS WORLDWIDE, INC.

“All database administrators know they are responsible for protecting their databases from attack and unauthorized access.”

Arup Nanda

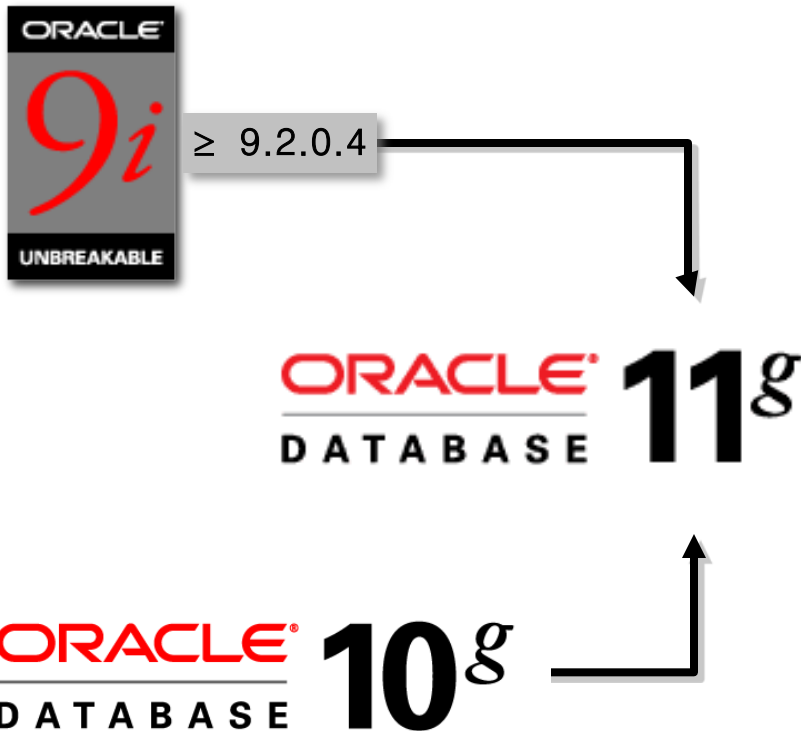
Sr. Director, Database Engineering

<b>Challenge</b>	<ul style="list-style-type: none"><li>• Protect data privacy and prevent unauthorized access</li><li>• Create an IT infrastructure to meet current and future business needs</li><li>• Reduce IT Management costs</li></ul>
<b>Solution</b>	<ul style="list-style-type: none"><li>• Data encryption</li><li>• Data integrity over the network</li></ul>
<b>Results</b>	<ul style="list-style-type: none"><li>• Maintain data privacy at rest and in transit</li><li>• Prevented any possibility of unauthorized tampering of sensitive information</li></ul>

# *Mitigating the Risk of Upgrading to Oracle 11g*

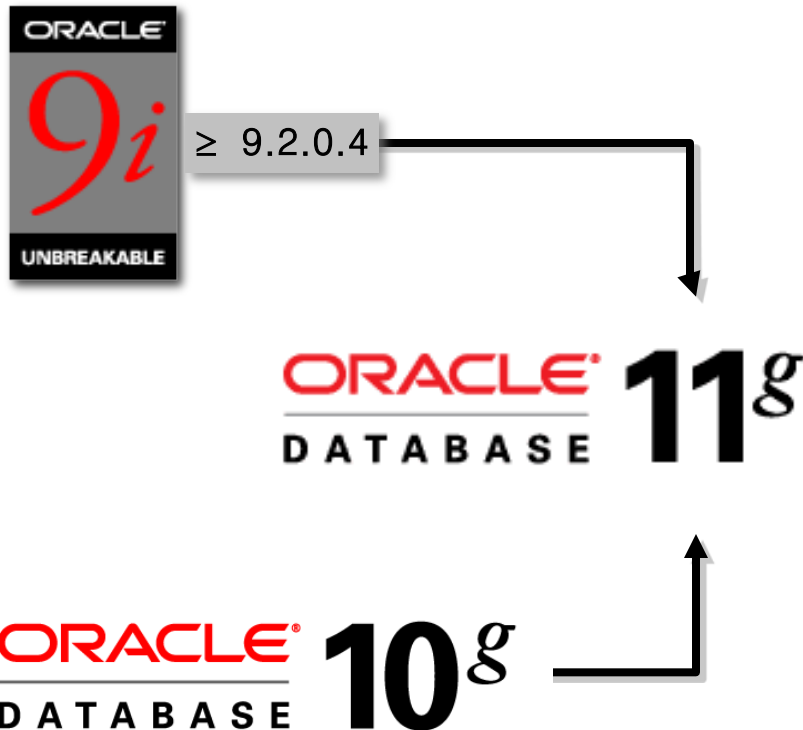


# Mitigating the Risk of Upgrading



- How do we mitigate risk?
  - Use sufficient test scenarios and methods
  - Always use real production data
  - Identify and tune problem SQL before they create a production issue
  - Run performance tests with real life loads!!!
- >90% of upgrade problems aren't really upgrade problems but performance issues after the upgrade

# Mitigating the Risk of Upgrading



- **The Tools**
  - Real Application Testing
    - SQL Performance Analyzer
    - Database Replay
  - Application Test Suite
  - Database upgrade assistant
  - SQL Plan management
  - Online upgrades
- **The Services**
  - Best practices on OTN
  - Upgrade forum
  - Advanced customer services

# Upgrade Webpage on OTN

shortcuts GETTING STARTED DOWNLOADS DOCUMENTATION FORUMS ARTICLES SAMPLE CODE TUTORIALS

Printer View E-mail this page Bookmark

**ORACLE** **11<sup>g</sup>** Oracle Database Upgrade  
DATABASE

Upgrading to Oracle Database 11g provides the latest in efficient, reliable, secure data management for mission-critical on-line transaction processing applications, query-intensive data warehouses, and content management and Web2.0 applications. The right planning, preparation, and upgrade steps will make the upgrade process simpler, faster, and more predictable from start to finish.

**Latest** (July 2008)

- Database Rolling Upgrade Using Transient Logical Standby: Oracle Data Guard 11g (PDF) (June 2008)
- Database Rolling Upgrade Using Data Guard SQL Apply - Oracle Database 11g and 10gR2 (PDF) (April 2008)
- Database Replay (RAT) DBUA for Upgrade (PDF) (May 2008)
- Best Practices for Upgrading to Oracle Database 11g (PDF) (November 2007)
- Innovate Faster with Oracle Database 11g (PDF) (August 2007)
- Updating to Oracle RAC 11g on Oracle Enterprise Linux (OTN) (October 2007)

**Technical Information**

- Different Upgrade Methods for Upgrading your Database (Metalink)
- Complete Checklist for Manual Upgrades - 11gR1 (Metalink)
- Complete Checklist for Upgrades - 11gR1 Using DBUA (Metalink)
- Database Server Upgrade/Downgrade Compatibility Matrix (Metalink)

**Documentation**

- 11g Upgrade Companion (Metalink)
- Oracle 11g Release 1 Documentation

**Support**

- 11g Upgrade Companion (Metalink)
- Recommended Patches Tool (Metalink)
- Oracle Lifetime Support Policy

**Previous Releases**

- 10g Upgrade Companion (Metalink)
- Database Rolling Upgrade Using Transient Logical Standby - Oracle Database 10g Release 2 (PDF) (April 2008)
- Real Application Testing on earlier releases (Metalink)
- Complete Checklist for Manual Upgrades - 10gR2 (Metalink)

**Questions**

- Oracle MetaLink Information

<http://www.oracle.com/technology/products/database/oracle11g/upgrade/index.html>

# Oracle Database 11G

## Driving Costs Down and Productivity Up

Selected Capabilities	Cost/Productivity Impact*
<ul style="list-style-type: none"><li>Maximizing Data Center Assets</li></ul>	<ul style="list-style-type: none"><li>↓ Server Costs Down 70%</li><li>↓ Storage Costs Down 70%</li></ul>
<ul style="list-style-type: none"><li>System &amp; Application Management</li></ul>	<ul style="list-style-type: none"><li>↓ Reduce the Cost of Upgrades by 50%</li><li>↑ Increase DBA Productivity by 50%+</li></ul>
<ul style="list-style-type: none"><li>Automated Prevention &amp; Detection</li></ul>	<ul style="list-style-type: none"><li>↓ Reduce cost of regulatory compliance by leveraging database infrastructure</li><li>↓ Reduce cost of securing data with preventive controls</li><li>↓ Reduce cost of database activity monitoring through automation</li></ul>

# *Upgrading to Oracle 11g is Only Part of the Cost Savings Equation*



# Without Oracle Database 11g - can you reduce your IT Costs?

- Can You ....
  - Leverage Virtualized Infrastructure?
  - Increase DBA Productivity?
  - Reduce the Cost of Upgrades?
  - Leverage Low Cost Hardware?
  - Reduce Complexity?
  - Maximize Your DR Assets?
  - Reduced Compliance Costs?
  - Optimize Your Software Portfolio?
  - Reduce Your Storage Costs?



# Engineered Systems for Oracle Database

**Oracle Database Appliance**



*Quarter Rack*



*Half Rack*

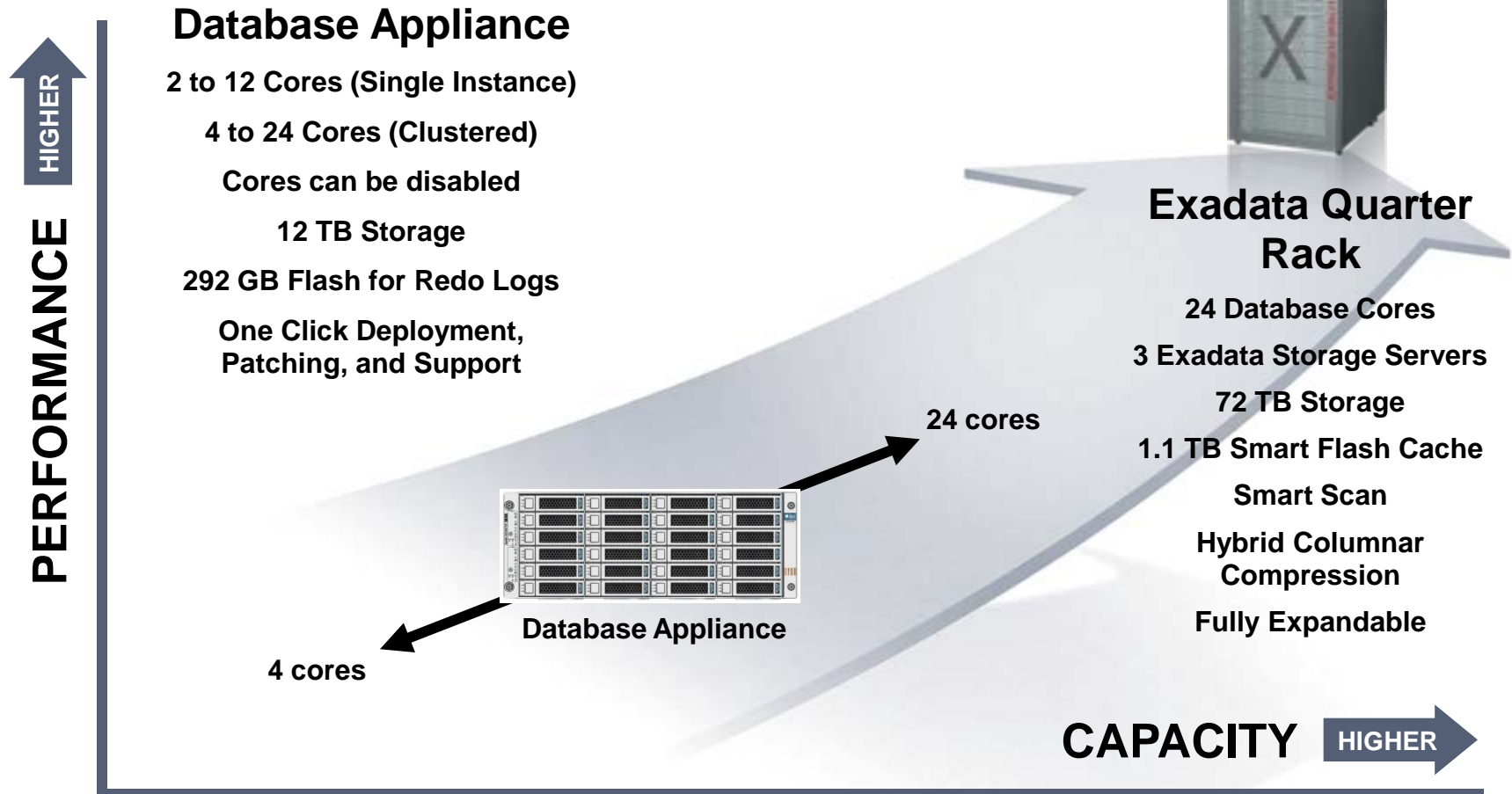


*Full Rack*

**Oracle Exadata Database Machine**

# Oracle Database Systems Family

Engineered for Simplicity

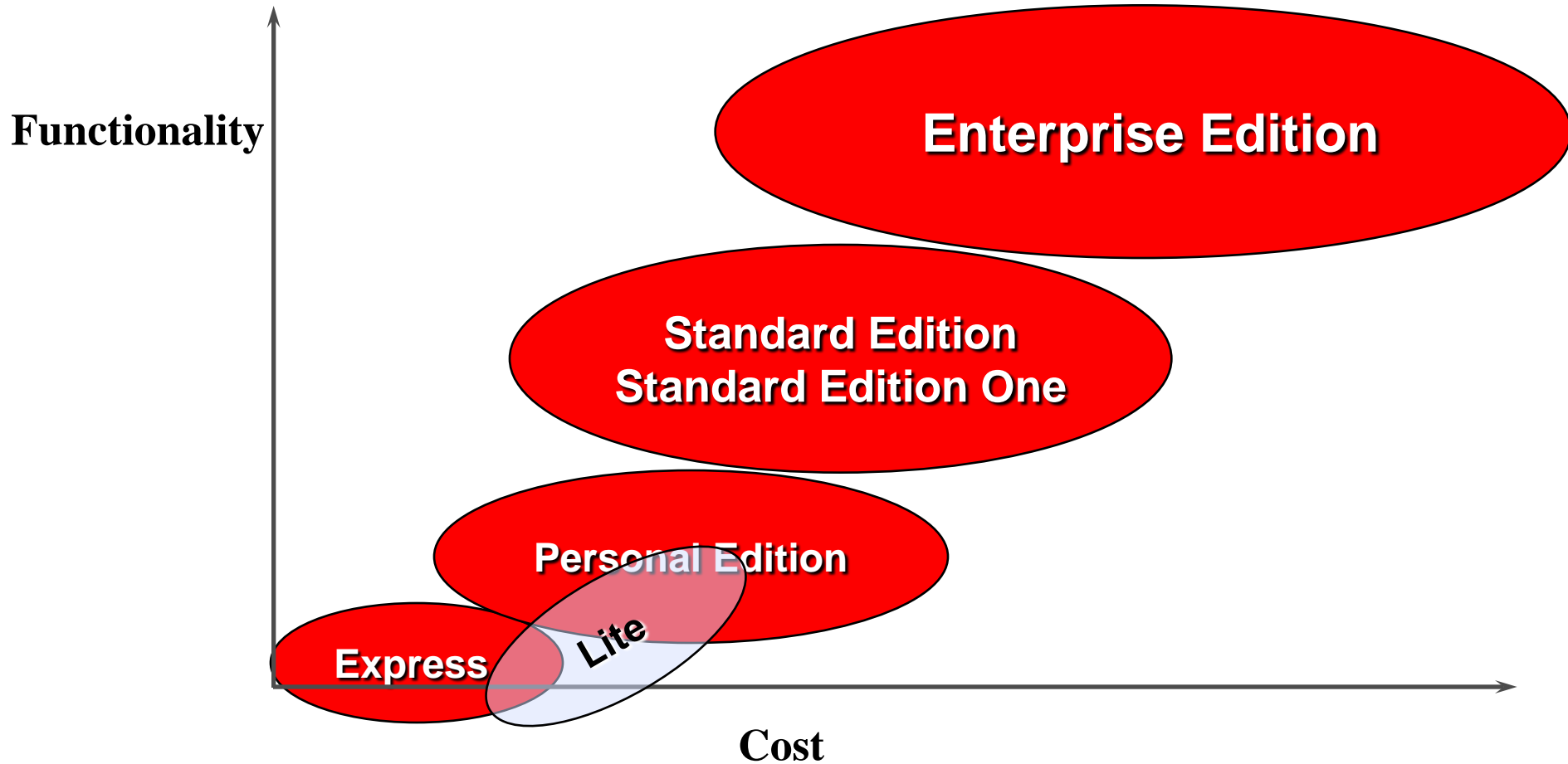


**Upgrade to Oracle Database 11g done!**

***Now - Why Consider  
Enterprise Edition over  
Standard Edition?***



# Oracle - A Single Architecture Throughout the Enterprise!



# Database Product Family

Express Edition	Standard Edition One	Standard Edition	Enterprise Edition
Non-Oracle developers, open source developers, new DBAs, students, non-Oracle ISVs, hw vendors	Low-price option for SMB/LOB Deployments, ISVs who need a supported Oracle database	Full-featured database for SMBs with optional clustering support (up to 4 CPUs)	Large-scale Enterprises that demand high-performance BI (ETL, DW, OLTP), security, scalability, availability, etc.
FREE	user (min. 5) or CPU (Sockets)	User (min. 5) or CPU (Sockets)	User ( min 25 for CPU) or CPU
No Cluster	Active/Passive	Active/Passive RAC	Active/Passive RAC Extended RAC
1 CPU ( 1 core) < 4GB DB size 1 instance per CPU 1GB RAM	Max 2 Sockets	Single or clustered up to 4 Sockets	4+ CPUs > 500 GB DB size
Free OTN Community Forum	Support available	Support available	Support available

- Database options only available with Database Enterprise Edition, not with Database Standard Edition (RAC included with SE 10g and SE 11g)

# For More Information

<http://search.oracle.com>

oracle database 11g



or

[www.oracle.com/database](http://www.oracle.com/database)