



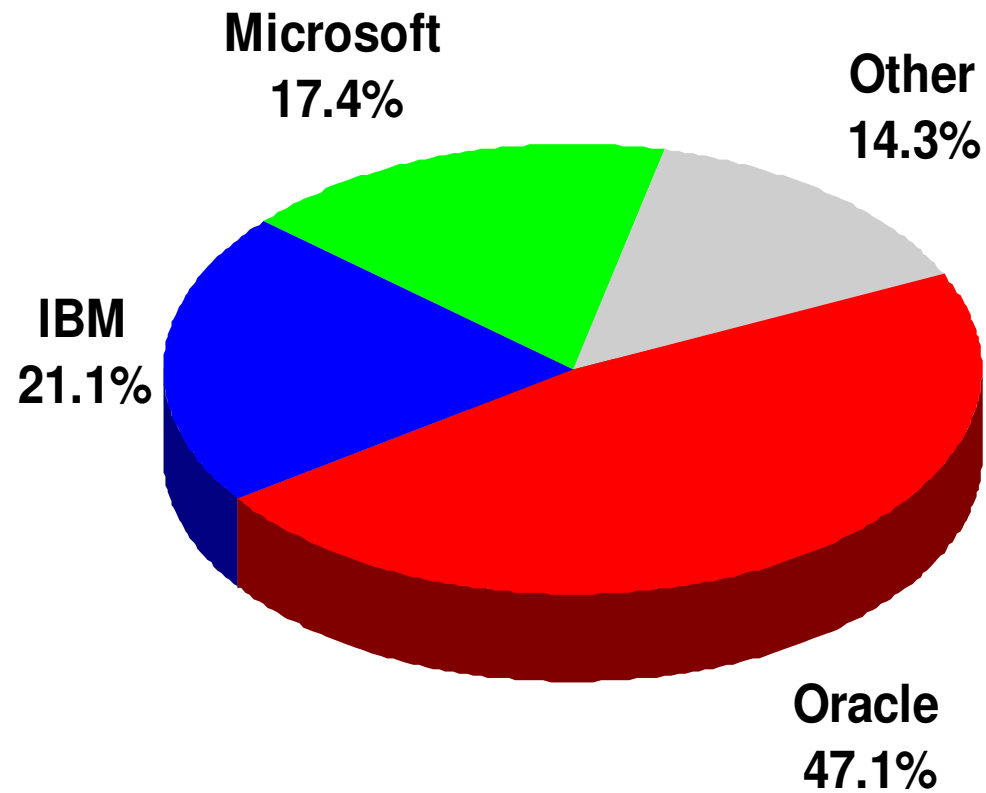
**Ibrahim Al Taher**

**Pre Sales Manager  
Oracle Database**

[ibrahim.al.taher@oracle.com](mailto:ibrahim.al.taher@oracle.com)

# Oracle Database is the Market Leader

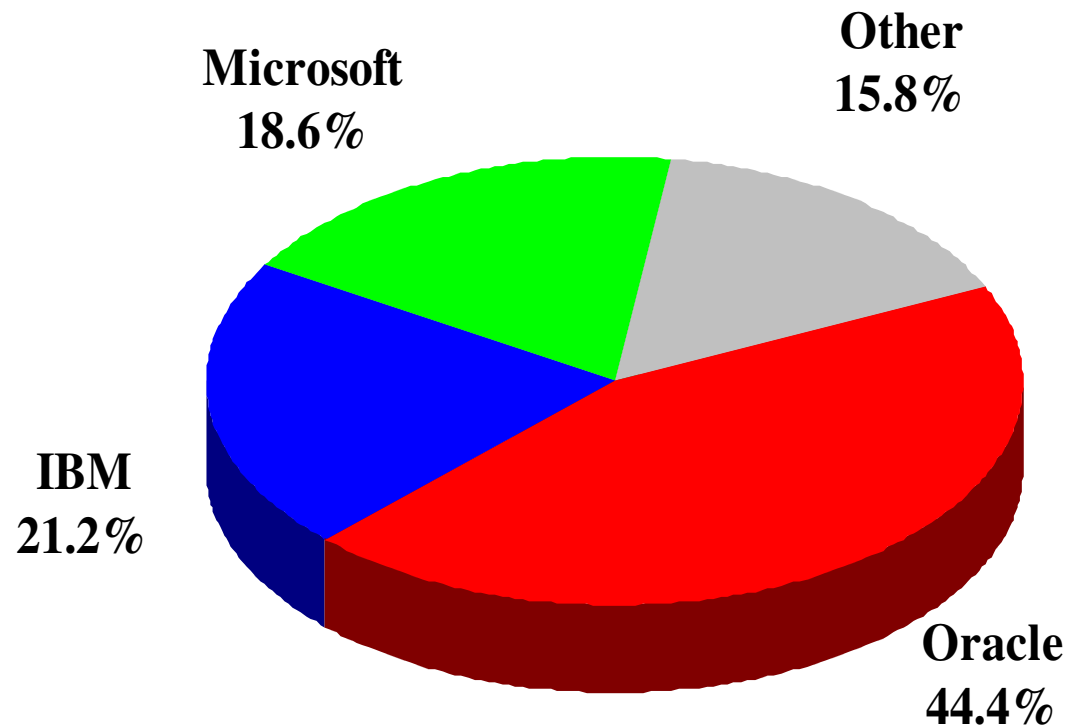
# Oracle #1 RDBMS Vendor



ORACLE

Source: Gartner DataQuest June 2007, based on Total Software Revenue

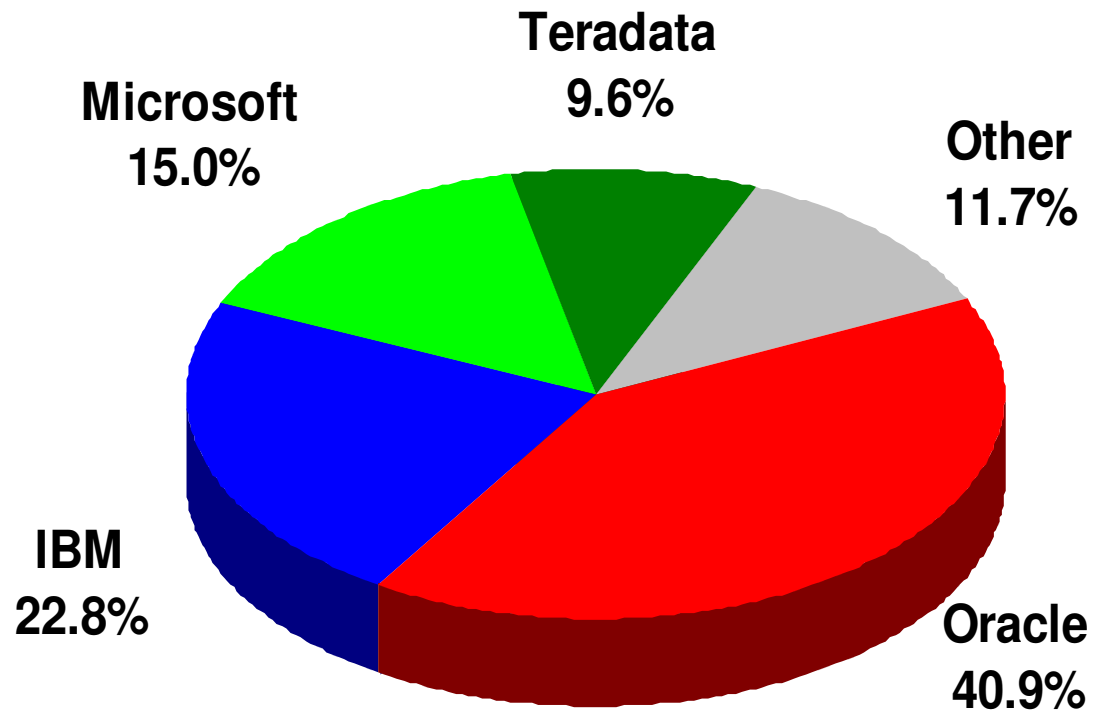
# Oracle #1 RDBMS Vendor



ORACLE

Source: IDC Worldwide RDBMS 2006 Vendor Shares, published April 2007

# Oracle #1 for Data Warehousing

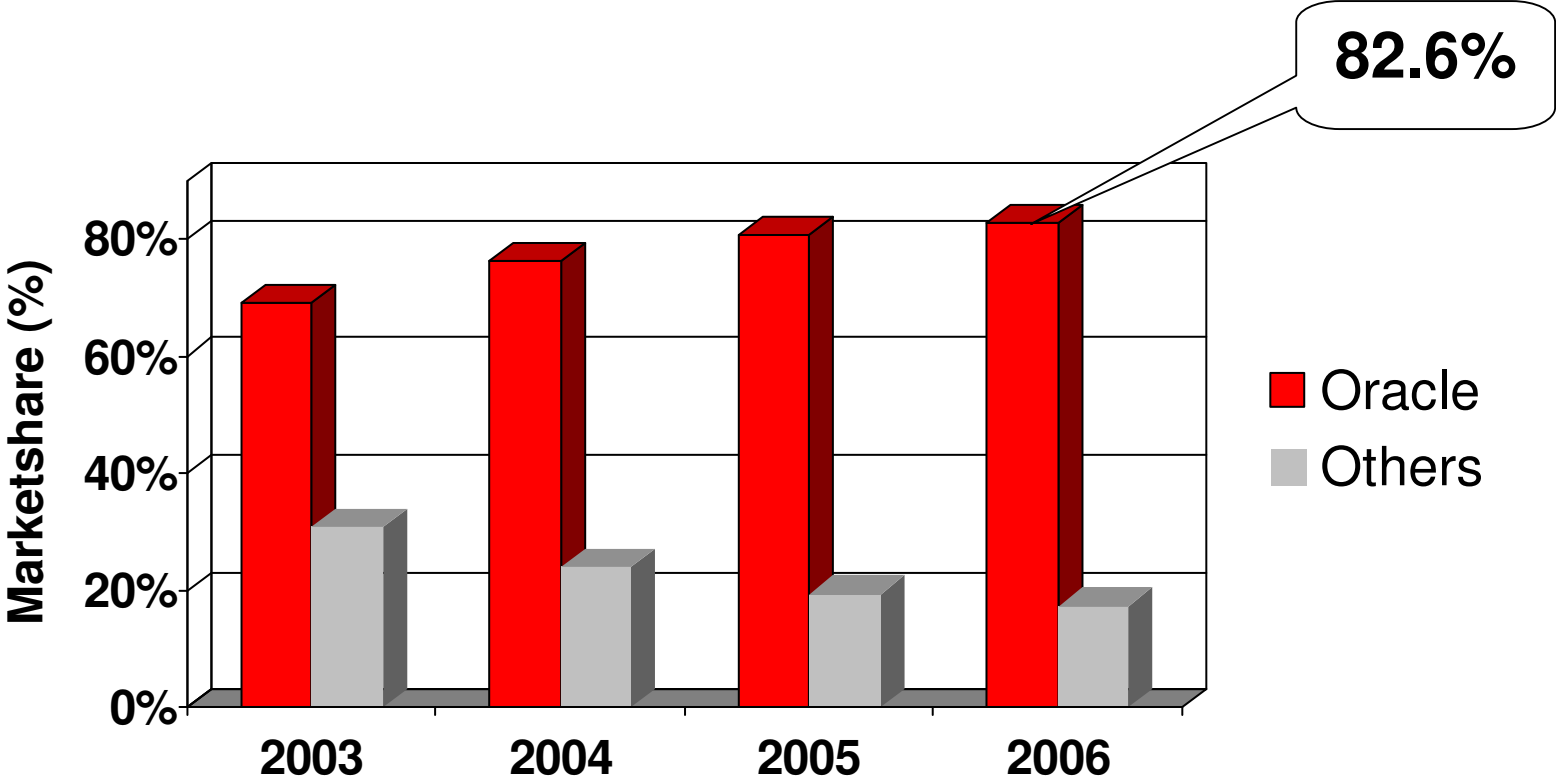


**Market Size is \$4.37 Billion with 12.4% Growth YoY**

**ORACLE**

Source: IDC, Aug 2007 – “Worldwide Data Warehouse Management Tools 2006 Vendor Shares”

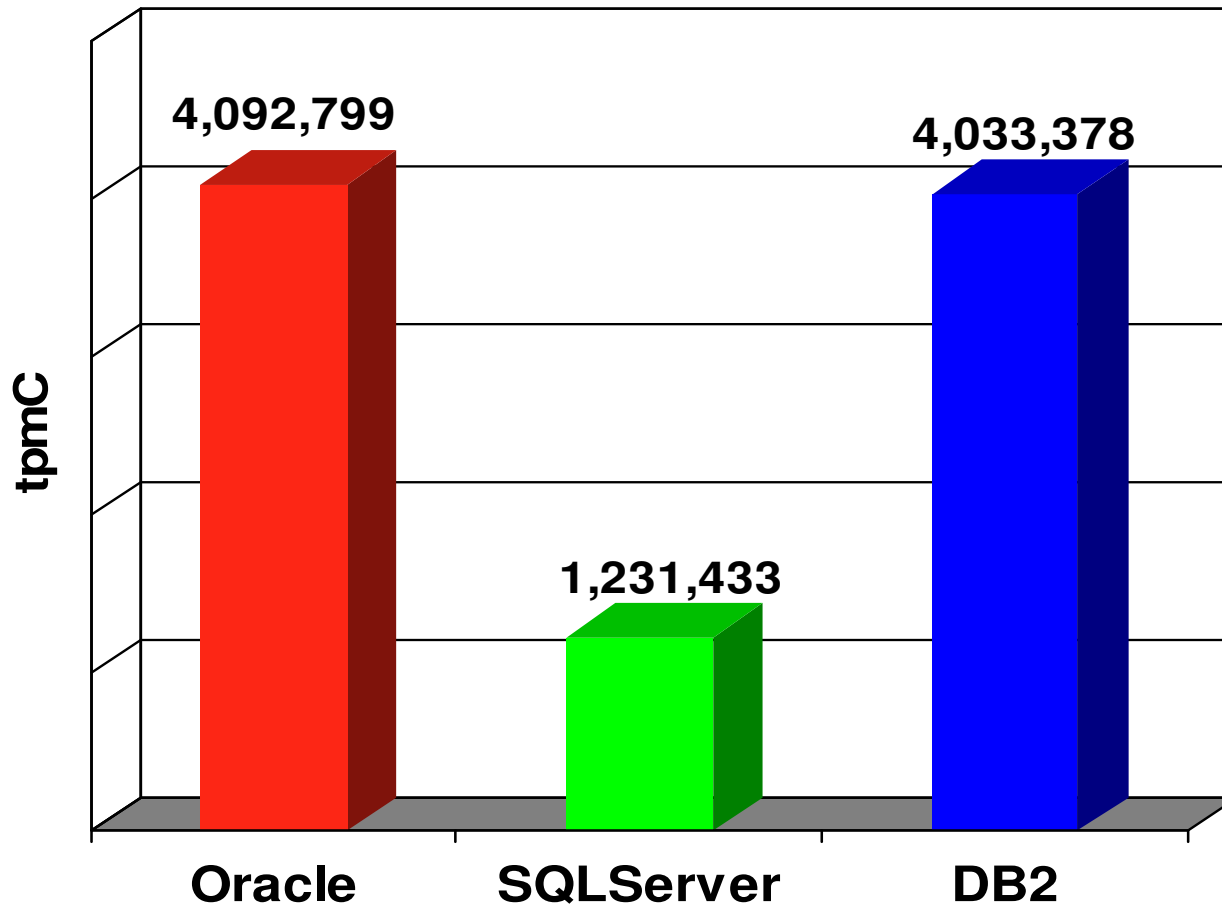
# Oracle #1 RDBMS Vendor on Linux



Source: Gartner DataQuest June 2007, based on Total Software Revenue

# Oracle Database: Best Performance

## TPC-C Highest Performance

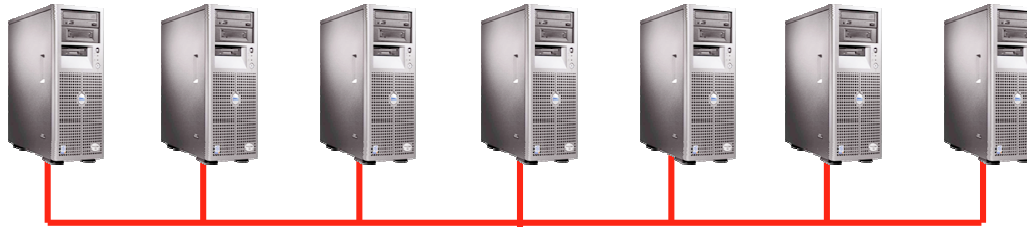


**ORACLE**

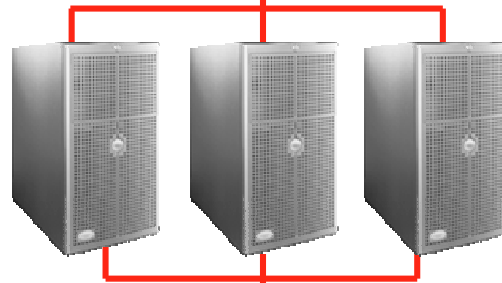
Source: TPC, As of Sept. 25, 2007:2007: Oracle Database 10g on HP Superdome Server, 4,092,799 tpmC, \$2.93/tpmC, avail 8/23/07. Microsoft SQL Server on HP Integrity Superdome, 1,231,433 tpmC, \$4.82/tpmC, avail 06/05/06. IBM DB/2 on IBM eServer p5 595 Model 9119 595, 4,033,378 tpmC, \$2.97/ tpmC, avail 12/20/06.

# Grid Computing

**Fusion  
Middleware**



**Real  
Application  
Clusters**



**Automatic  
Storage  
Management**



**Grid Control**

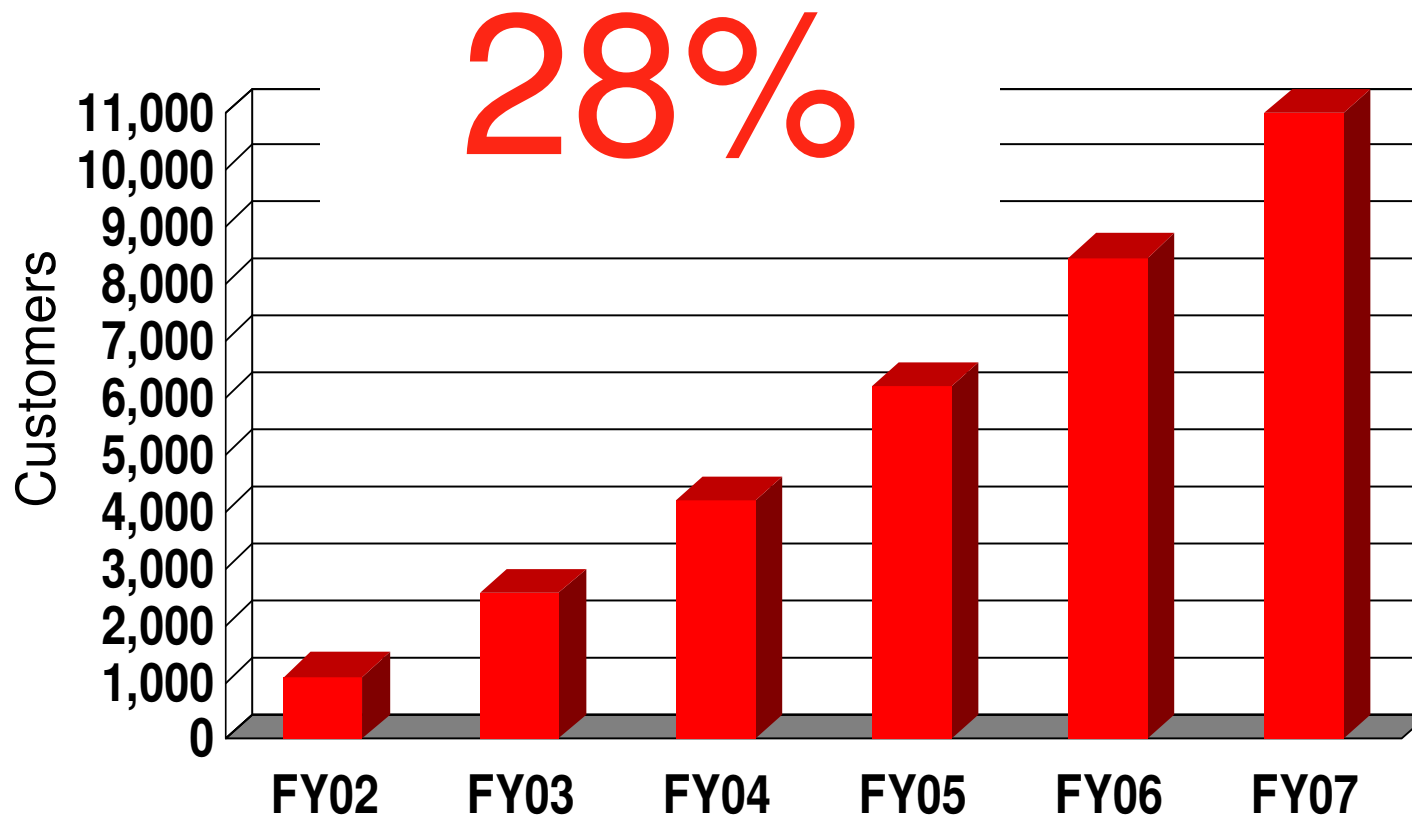


**ORACLE**



# Oracle Real Application Clusters

Annual adoption growth



ORACLE

# Oracle's Innovative Approach Breaks Tradeoff Between Availability and Cost

**Best Availability AND Lowest Cost**

- Better than Mainframe Availability
- Seamless and Simple to Use

# Oracle HA: Customer Success Stories

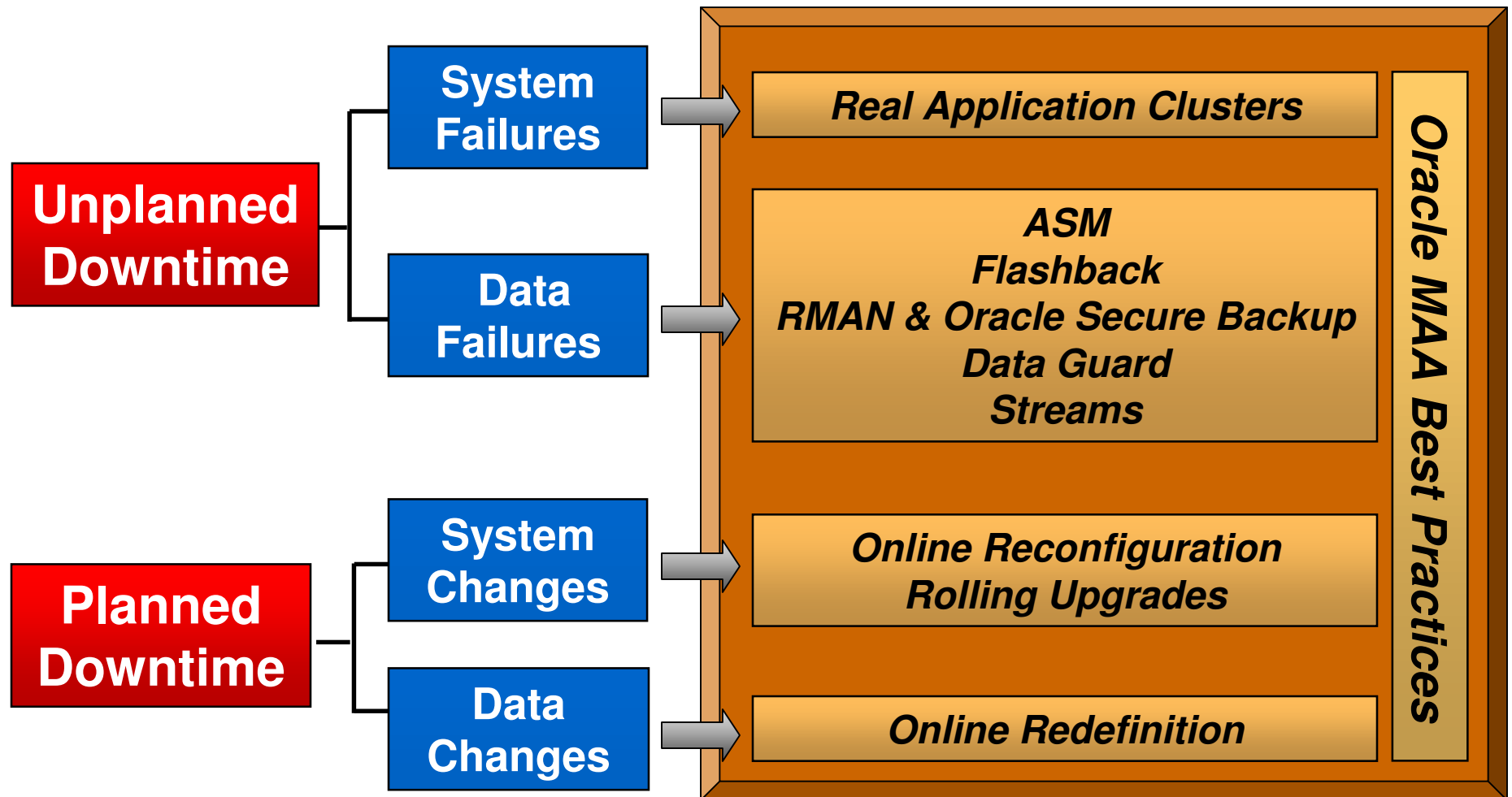
- **ADT Security Services** - Using Data Guard SQL Apply Across a Wide Area Network
- **Amadeus** - Using Data Guard for Disaster Recovery & Rolling Database Upgrades
- **Amazon.com** - Automatic Failover using Data Guard Fast-Start Failover
- **Banknorth Group, Inc.** - Using the Snapshot Capabilities of Flashback Technologies
- **CGI** - Helps Major North American Oil & Gas Company Save \$500K with RMAN
- **ChevronTexaco** - RMAN DUPLICATE – DBA Time Saver to the Rescue
- **Chicago Stock Exchange** - Expects 171% ROI in Five Years from Oracle Enterprise Grid Computing
- **Colgate-Palmolive** - Increased Performance with RMAN
- **CSX** - Online RMAN Backups Protect over 16TB of Data
- **Dell** - Dell Consolidates European Support System with Oracle Enterprise Grid on Dell
- **Fannie Mae** - Supporting 835 transactions per second & Zero Data Loss Protection in Oracle Database 10g
- **First American Real Estate** - Using Data Guard
- **Hartford** - Incrementally Updating Transportable Tablespaces using RMAN
- **Kemira GrowHow Ltd, UK** - Replacing Outsourced Disaster Recovery Services with Oracle Data Guard
- **KLM** - KLM Royal Dutch Airlines Eliminates Costly Downtime with Grid Solution
- **NeuStar** - Synchronous Zero Data Loss Protection with Production and Standby Databases Separated by 300 Miles
- **Ohio Savings Bank** - Oracle Database 10g - Maximum Availability Architecture & Zero Data Loss
- **Oracle Global IT** - Oracle E-Business Suite with Data Guard over a WAN
- **Purdue Pharma L.P.** - Surviving Media Disaster with RMAN
- **ReserveAmerica** - Capitalizing on Oracle 10g Flashback Technologies
- **Starwood Hotels** - RMAN in Oracle Database 10g Best Practices for Maximum Benefit
- **Swedish Post** - Extending the DR system using reporting capabilities of Data Guard SQL Apply
- **TALX Corporation** - Increased Performance with RMAN and Oracle Database 10g
- **Trilegiant** - Online RMAN Backups Protect over 8TB of Data
- **VP Bank** - Using Data Guard SQL Apply to deploy content outside the corporate firewall

***and many more\* ...***

**ORACLE**

\* [http://www.oracle.com/technology/deploy/availability/htdocs/HA\\_CaseStudies.html](http://www.oracle.com/technology/deploy/availability/htdocs/HA_CaseStudies.html)

# Oracle's Integrated HA Solution Set



# Oracle

## Real Application Clusters 10g

# Agenda

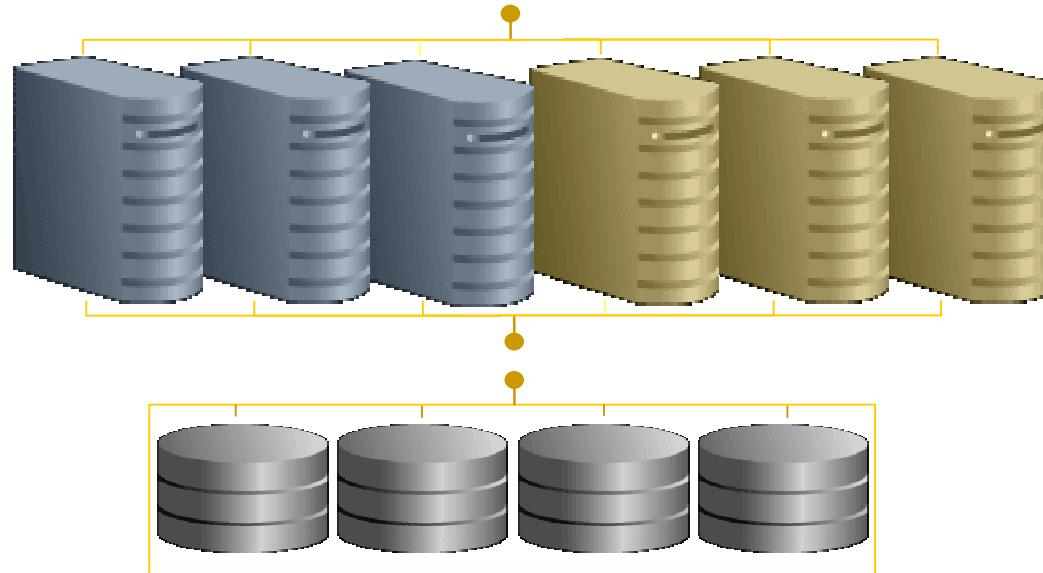
- **What is RAC ?**
- **Oracle RAC 10g for Everyone**
  - **Integrated Clusterware**
  - **Automatic Workload Management**
  - **Database Security**
  - **Enterprise Manager for RAC**

# What is a modern Cluster?

*A cluster is a group of independent computers working together as a single system*

- *Availability* - **Continues running in case of a hardware or software failure**
- *Scalability* - **New nodes can be added to a cluster to accommodate increased workload**
- *Performance* - **Workload can be distributed among nodes for optimal performance**

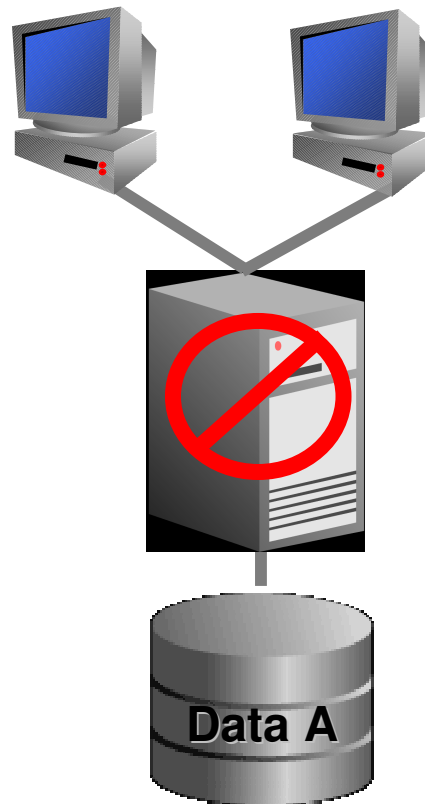
# Real Application Clusters 10<sup>g</sup>



- Works with ALL applications
- Scalable AND highly available
- Runs on low cost, commodity hardware

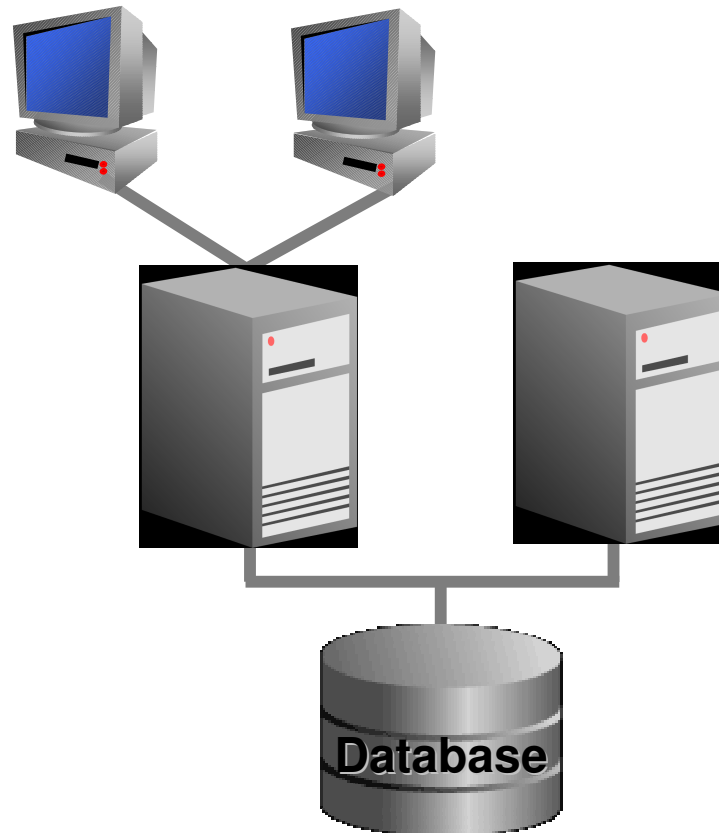


# Server Availability Challenge



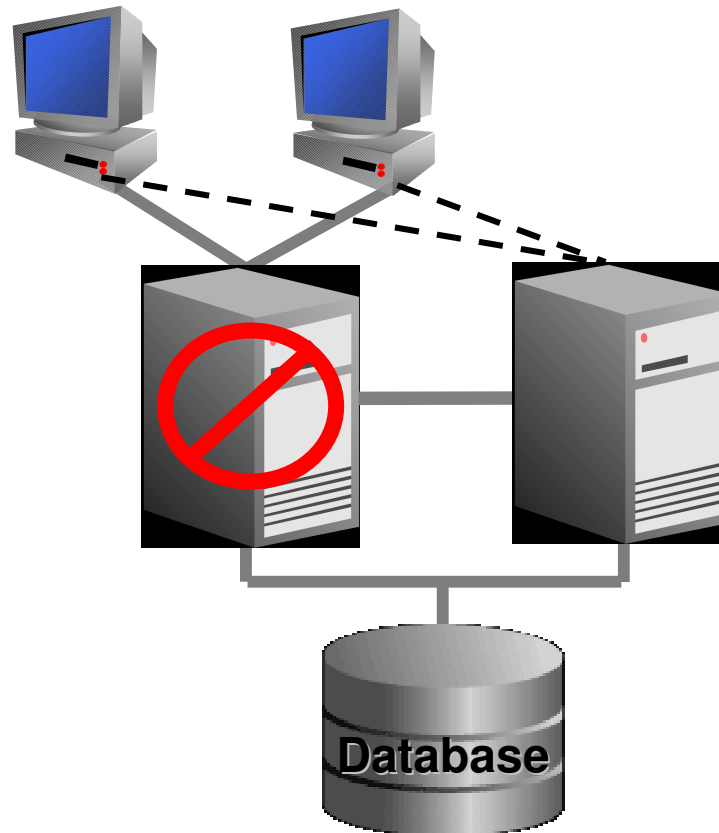
**Server is a SINGLE point of failure**

# Clusters without RAC



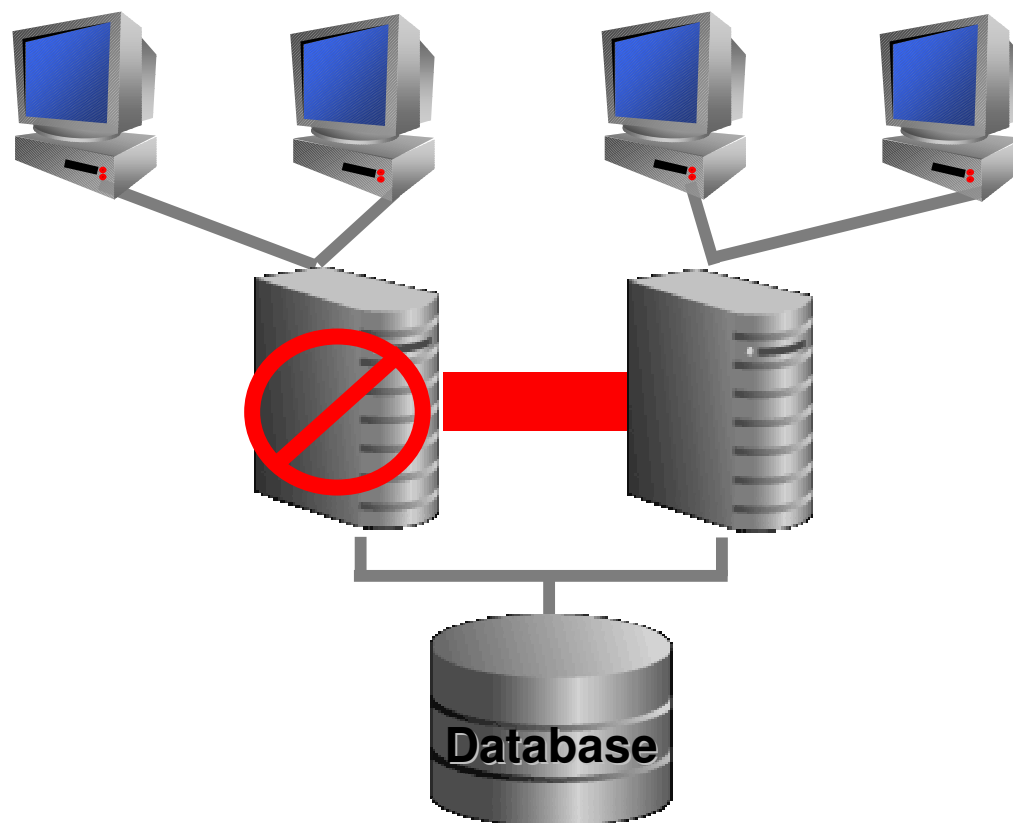
**Removes Server as SINGLE point of failure**

# Clusters with 'Cold' Failover



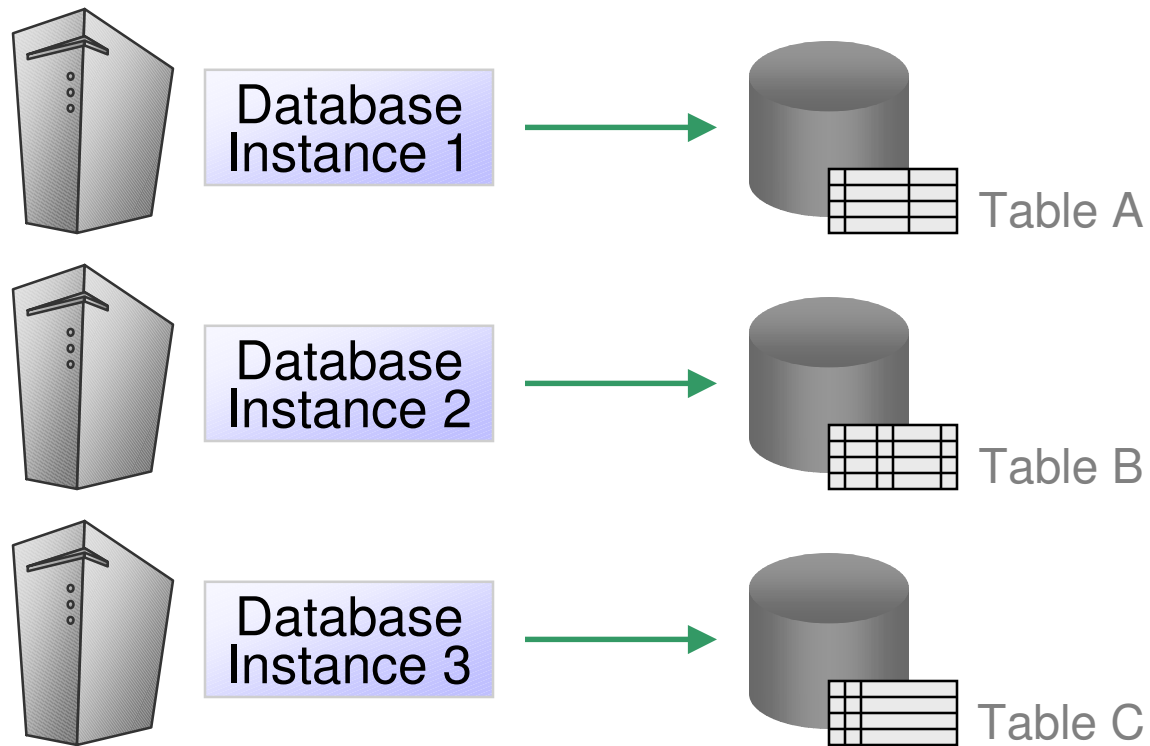
**Restart single instance on Server 2**

# Real Application Clusters

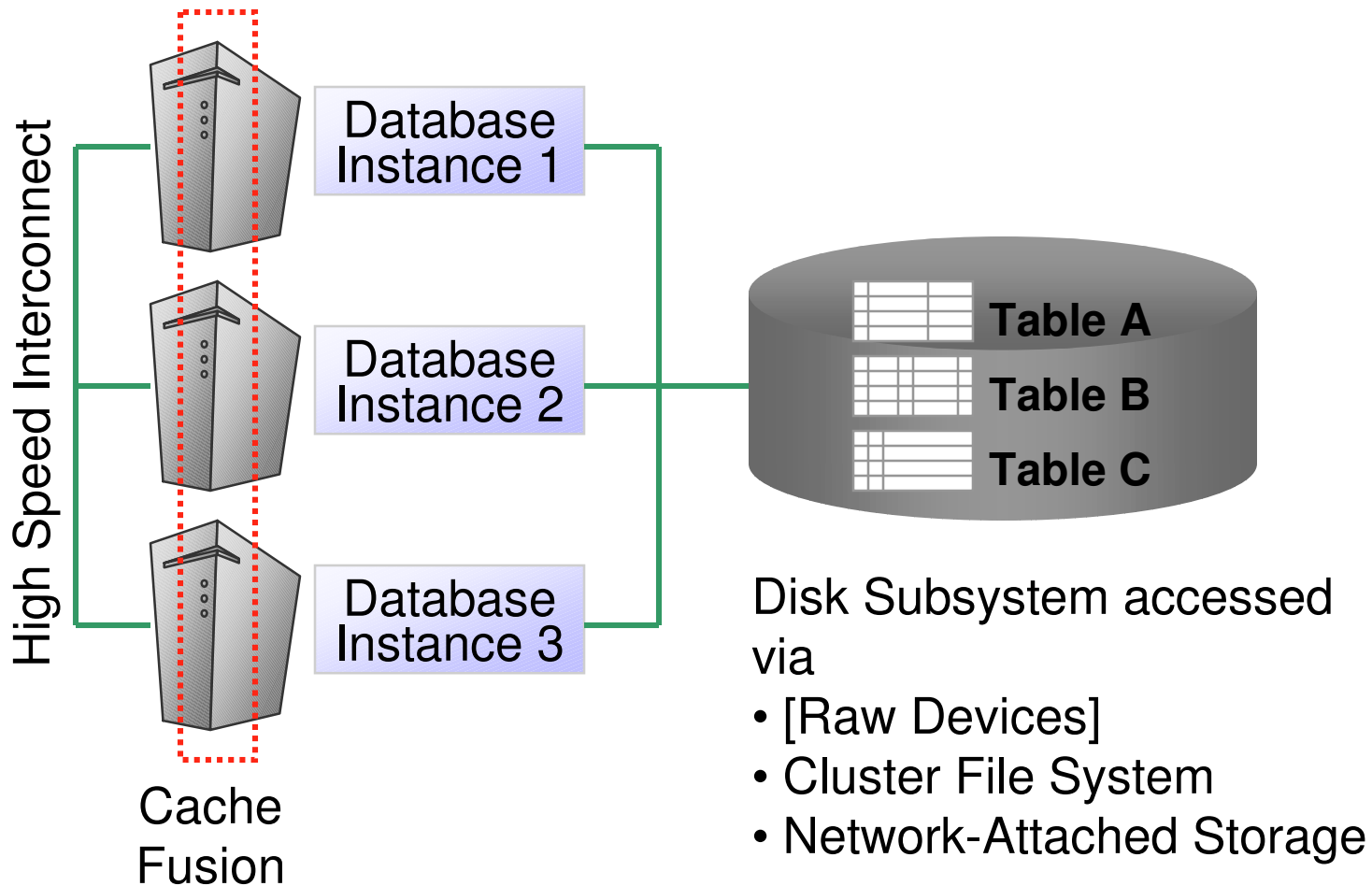


**Protect from SERVER failures**

# Shared Nothing Architecture



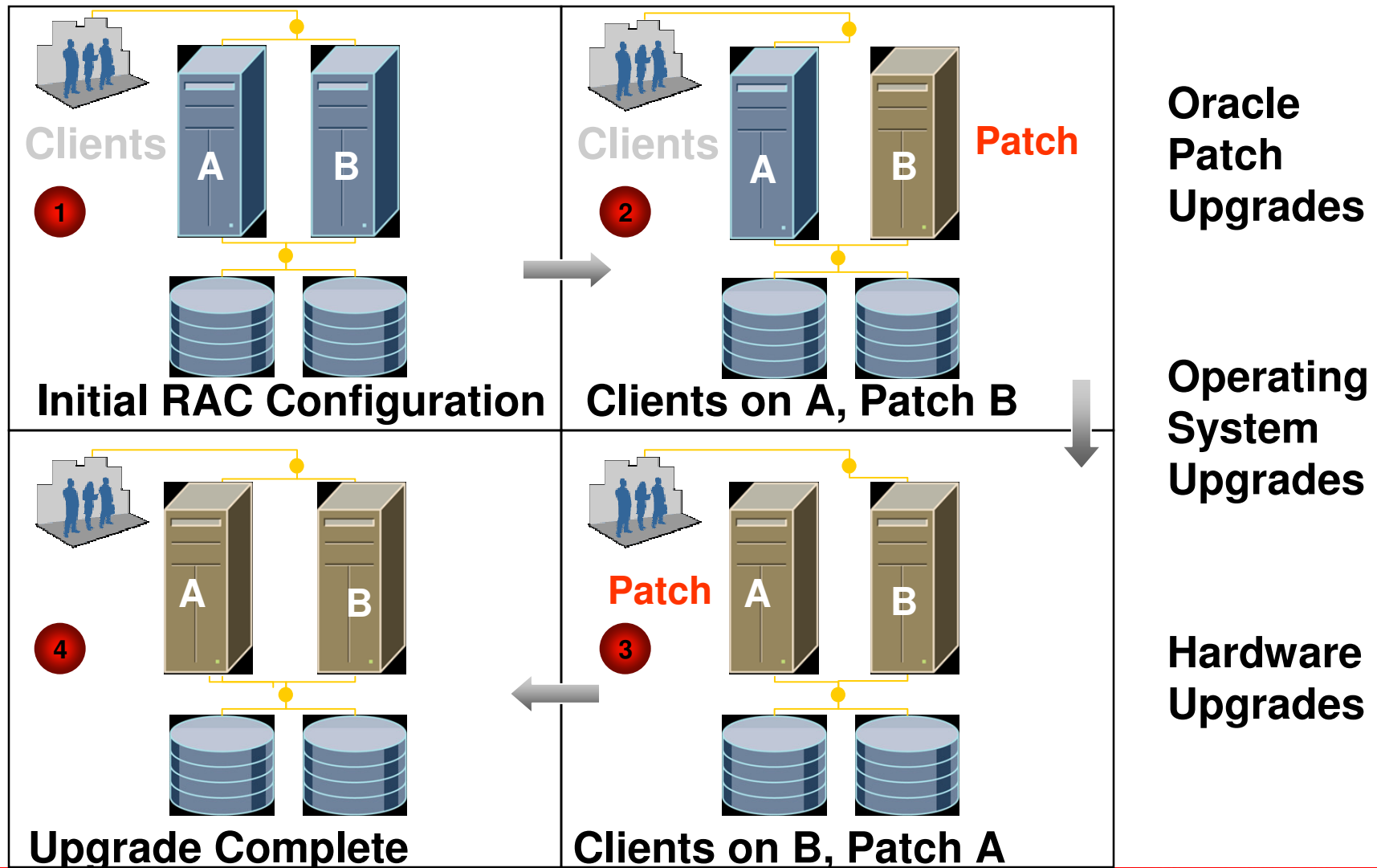
# RAC Architecture



# RAC vs 'Cold' Failover?

Failover Operation	RAC	'Cold'
Reconfigure Group Membership	15 sec	0 sec
Reconfigure Distributed Locks	5 sec	0 sec
Failover Disk Volumes	0 sec	Up to 20 min
Restart Oracle	0 sec	Up to 5 min
Recover Oracle	20 sec	20 sec
Warm Buffer Cache	0 sec	10 + min
Total Failover Time	< 60 sec	> 35 min

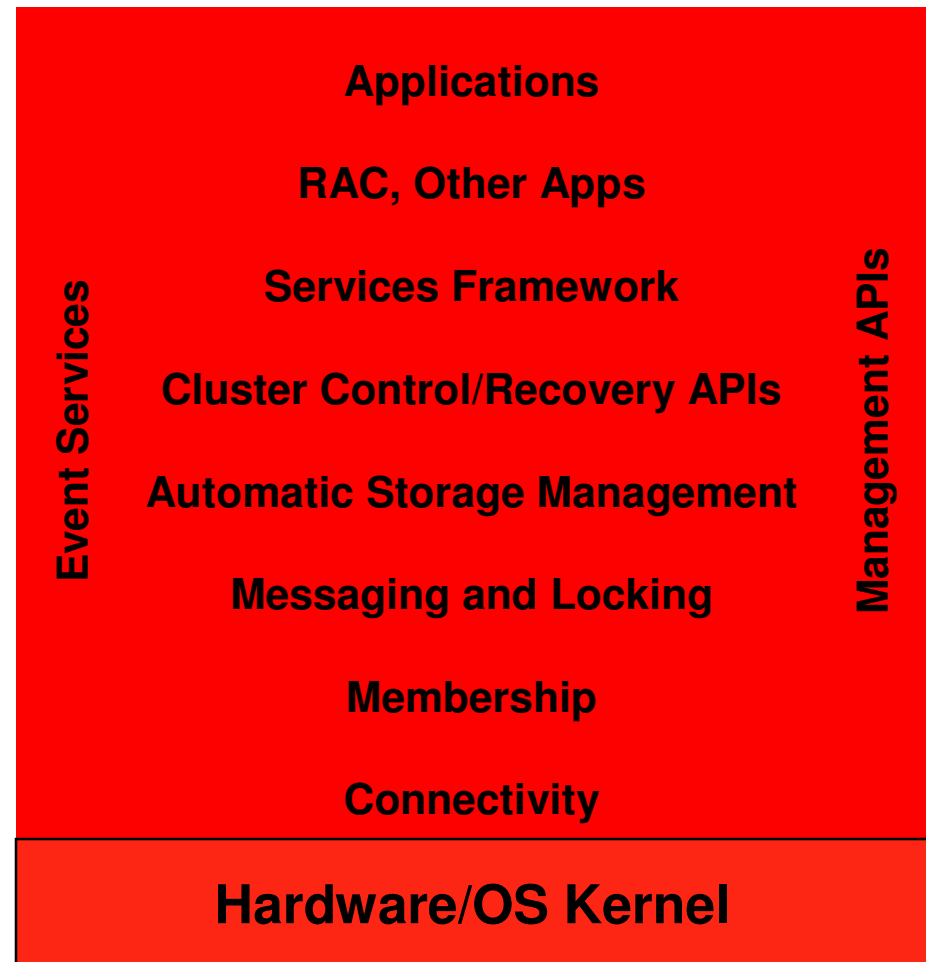
# Rolling Patch Upgrade using RAC



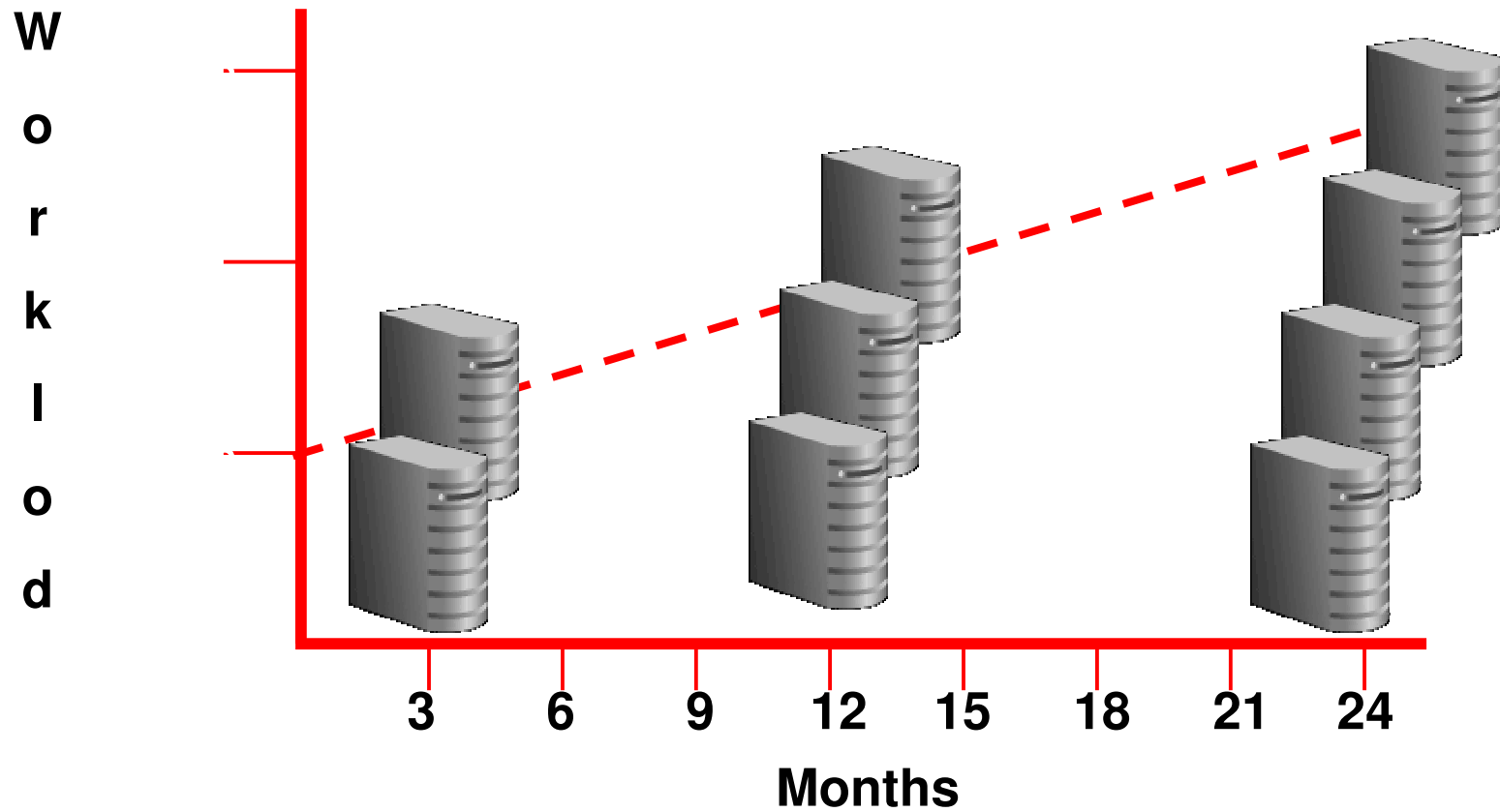


# Oracle RAC 10g Integrated Clusterware

- Complete Oracle cluster software solution
- HA API for non-Oracle processes
- Single-vendor support
- Low Cost
  - No need to purchase additional software
  - Easy to install, manage
- High quality and functionality across all platforms
  - 100 nodes on all platforms
- Advanced functionality
  - Failure Notification (FaN)
- Support for third-party clusterware



# Pay and Scale Incrementally

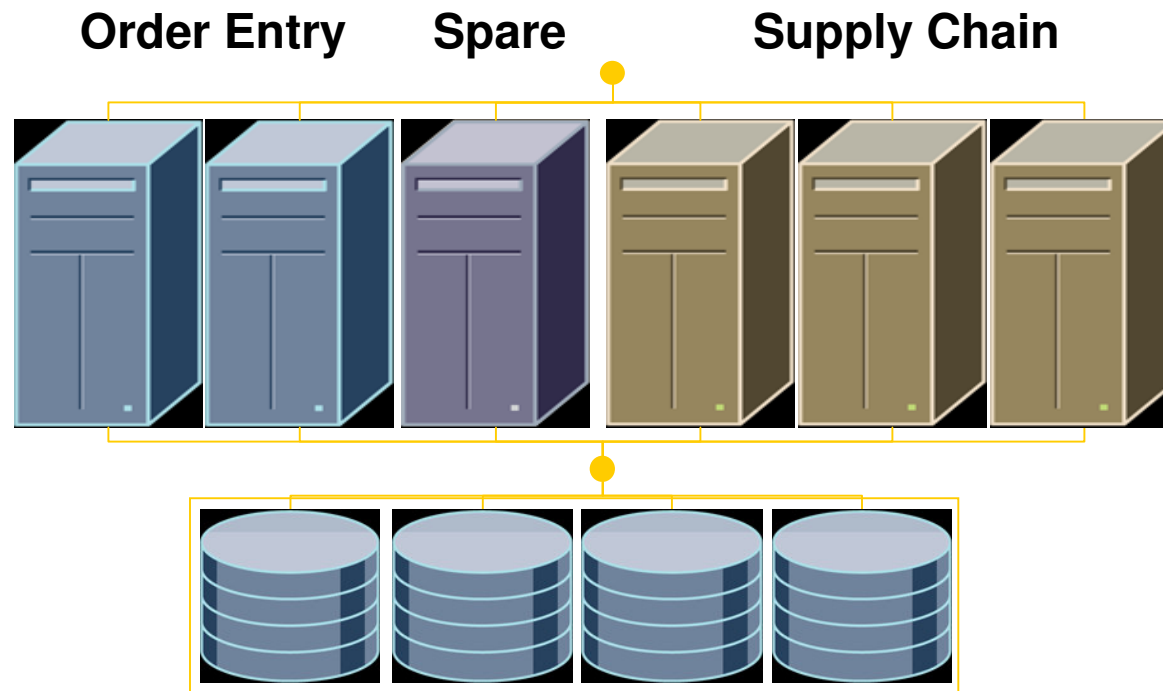


# Workload Management

# Automatic Workload Management

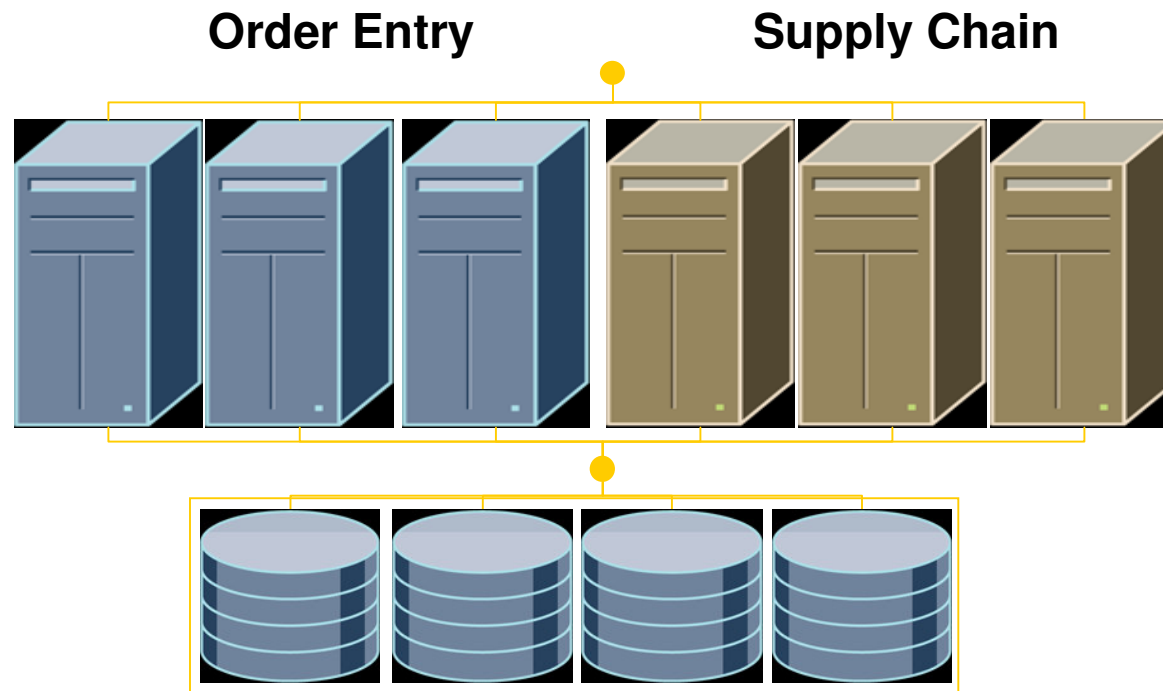
- **Application workloads can be defined as Services**
  - Individually managed and controlled
  - Assigned to instances during normal startup
  - On instance failure, automatic re-assignment
  - Service performance individually tracked
  - Finer grained control with Resource Manager
  - Integrated with other Oracle tools / facilities (Streams, Scheduler)

# Automatic Workload Management



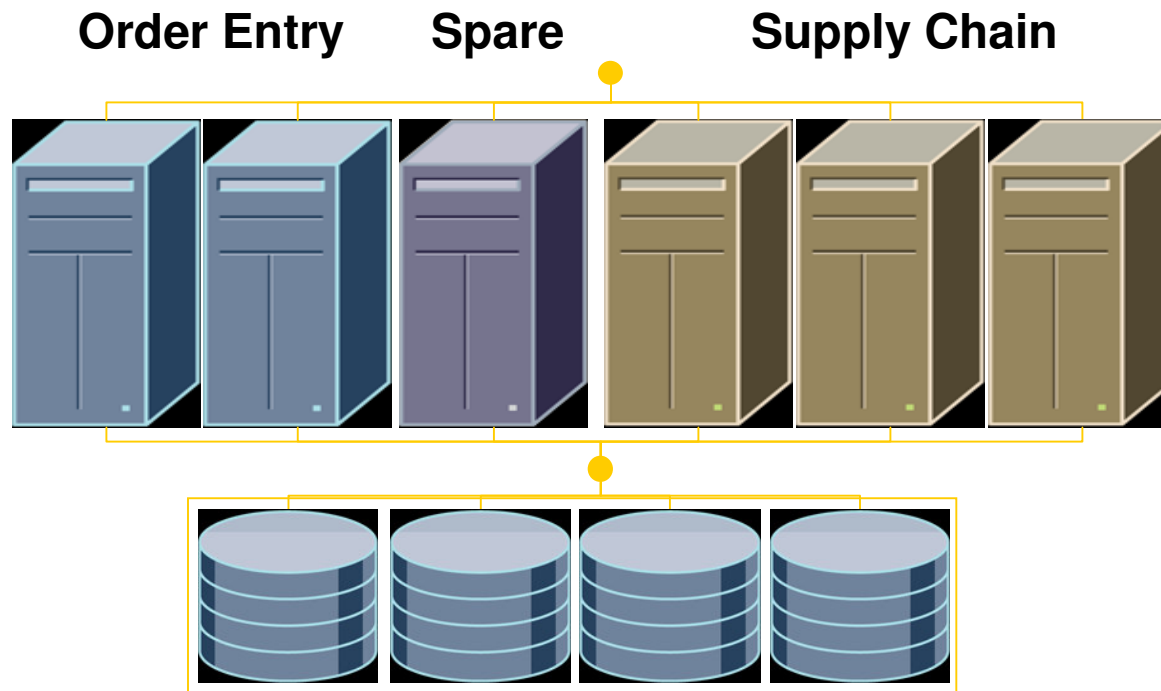
Normal Server Allocation

# Automatic Workload Management



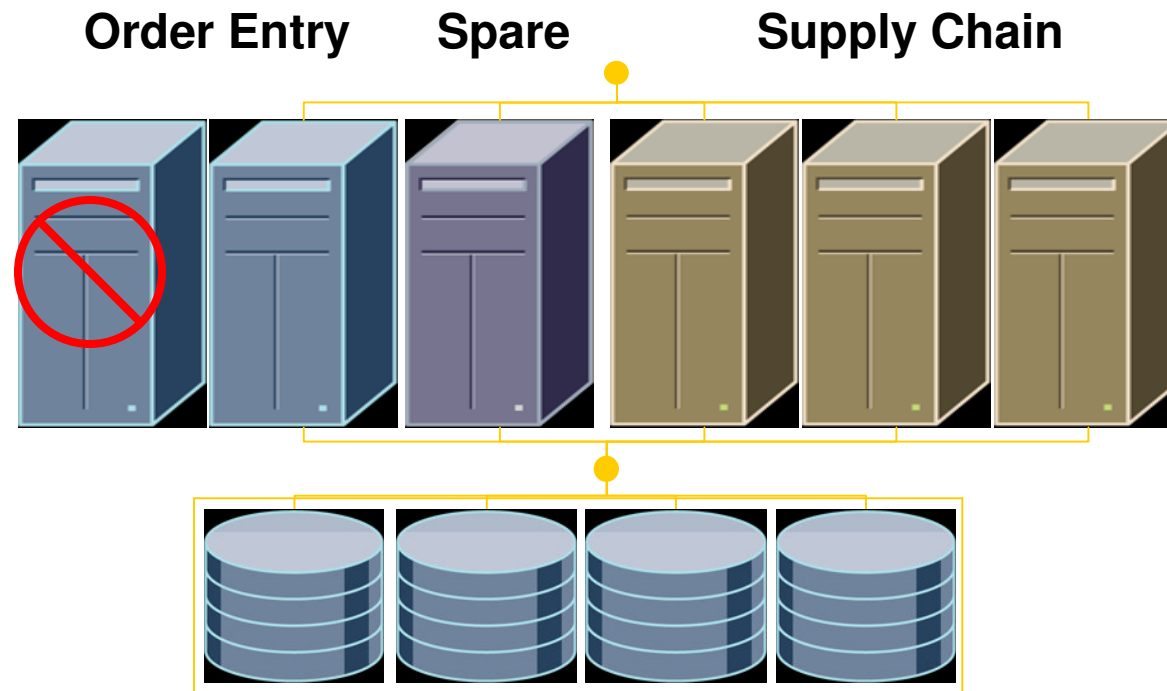
End of Quarter

# Automatic Workload Management



Normal Server Allocation

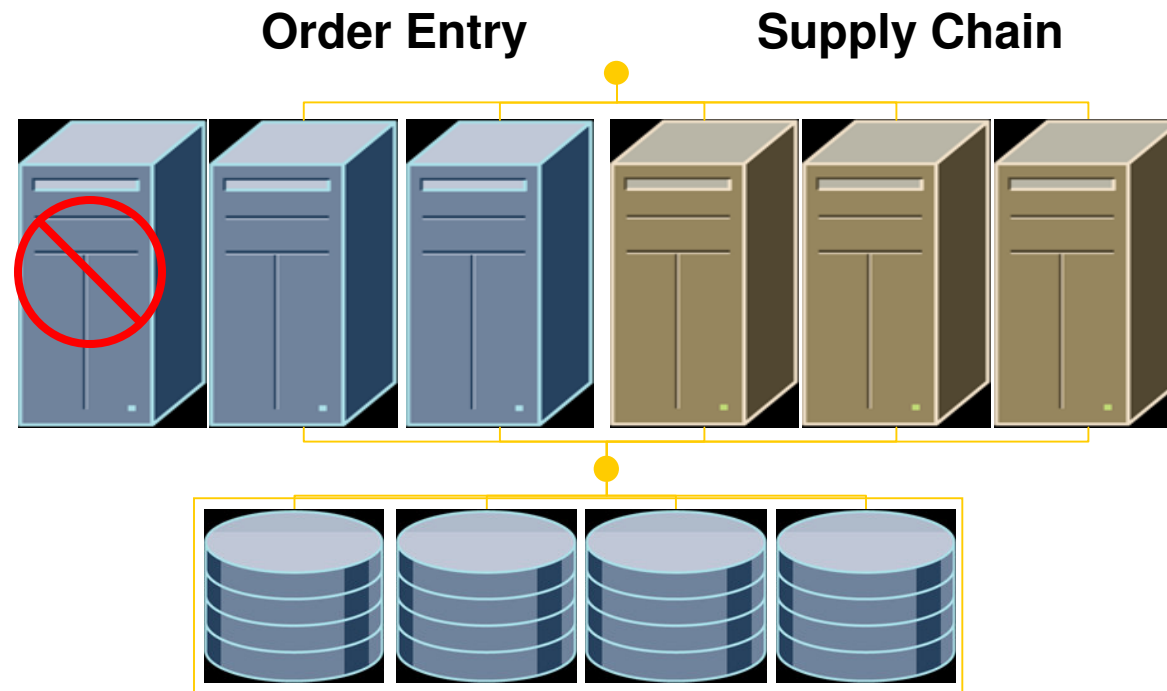
# Automatic Workload Management



Server Fails

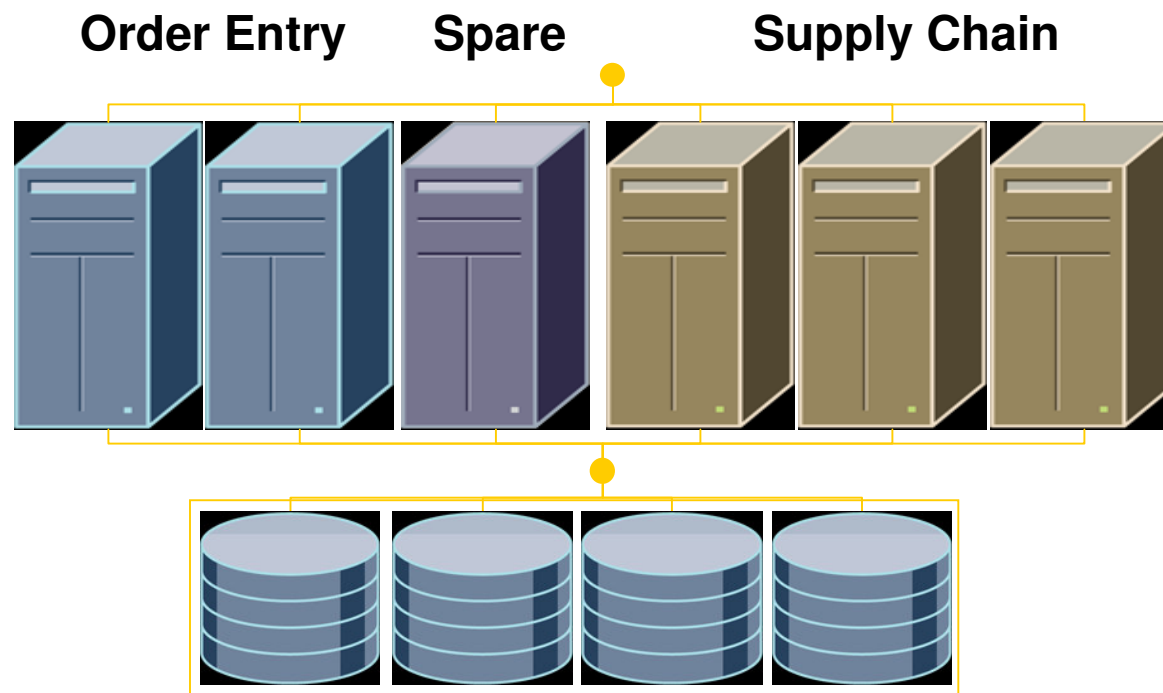


# Automatic Workload Management



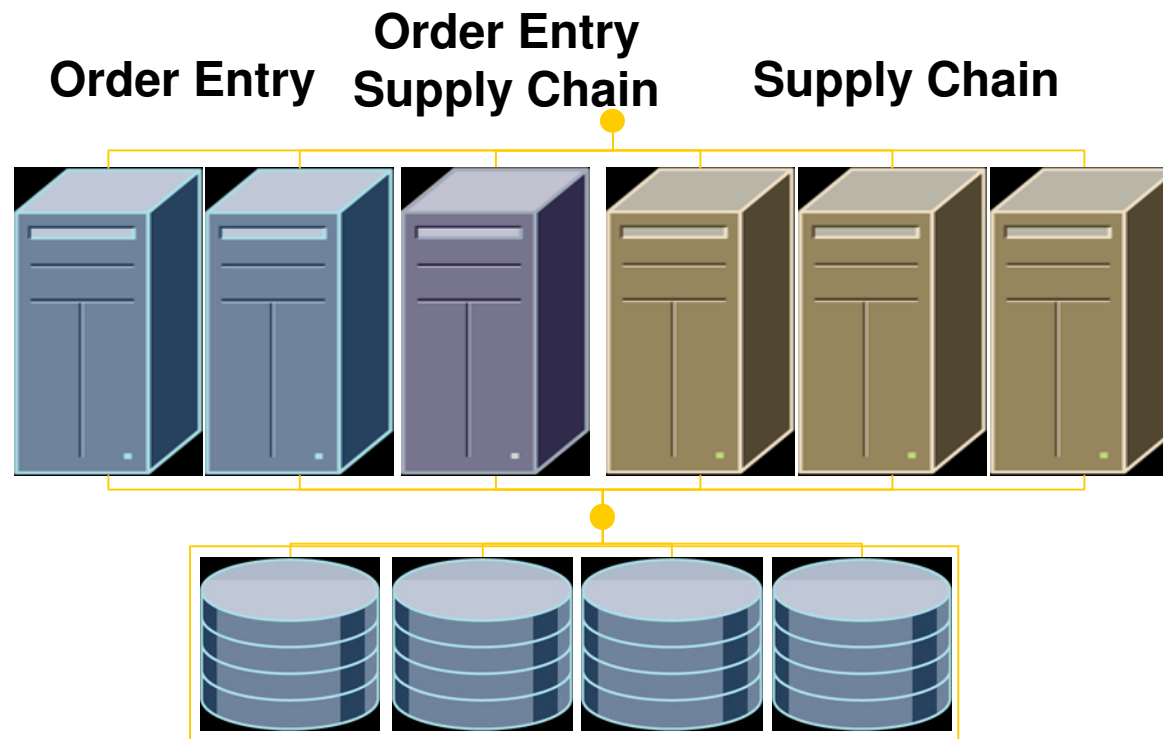
Reallocate Spare server to Order Entry

# Enterprise Grid – Cluster Failure



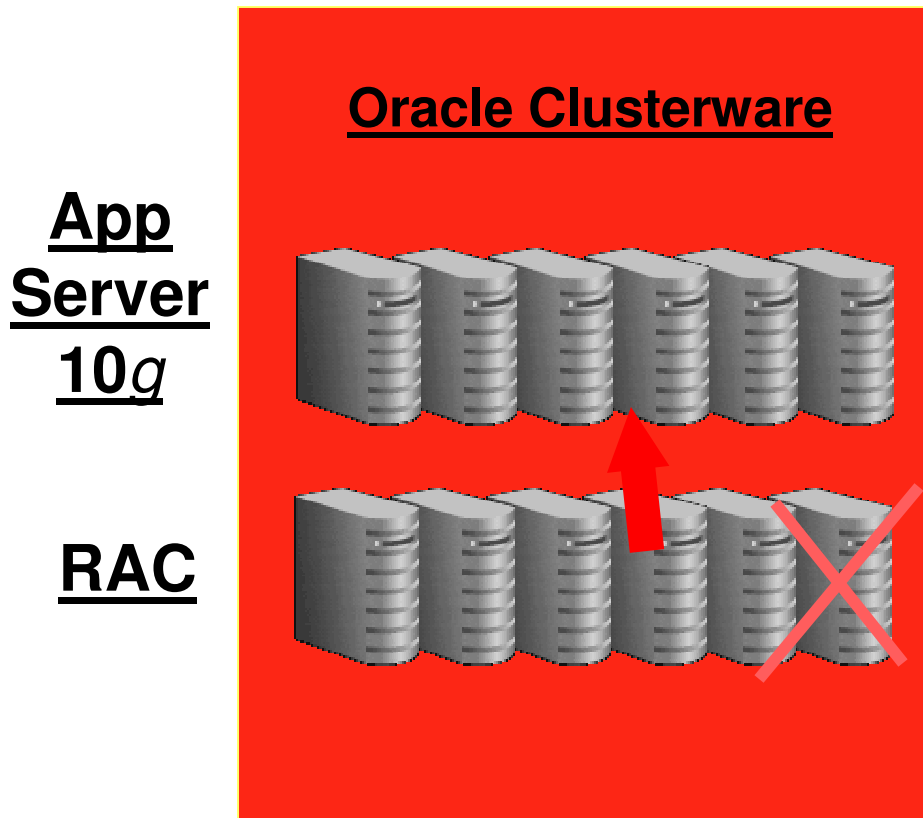
Failed Server Restored

# Automatic Workload Management



Application Resource Requirements Grow

# Failure Notification (FaN) with Oracle Application Server 10g



- Fast, coordinated recovery without human intervention
  - Oracle RAC 10g signals JDBC Fast Connect Failover when instances failures occur
  - Immediate recovery for mid-tiers
    - < 4 seconds from 15 minutes
    - self correcting

# Oracle RAC 10g For Everyone

- Eliminate need for 3<sup>rd</sup> party components that add significantly to complexity and cost
- Automatic workload management
- Automatic fast failure notification (FaN)
- Single system image GUI management
- Benefits from Oracle Database 10g manageability improvements
- Improved diagnostic and verification tools
- Performance improvements

# RAC Customers

# Real Application Clusters is Proven

- 11000+ Customers
- Running on all platforms

## Oracle Customers on RAC

### High Tech

- Dell Global IT
- Electronic Arts

### Manufacturing

- POSCO
- Lithonia Lighting

### Telecom

- Orange
- Telefonica

### Government

- German Police
- Federal Aircraft Association

### Financial Services

- Futuro de Bolivia
- Euronext

### Education / Research

- Texas Tech University
- CERN



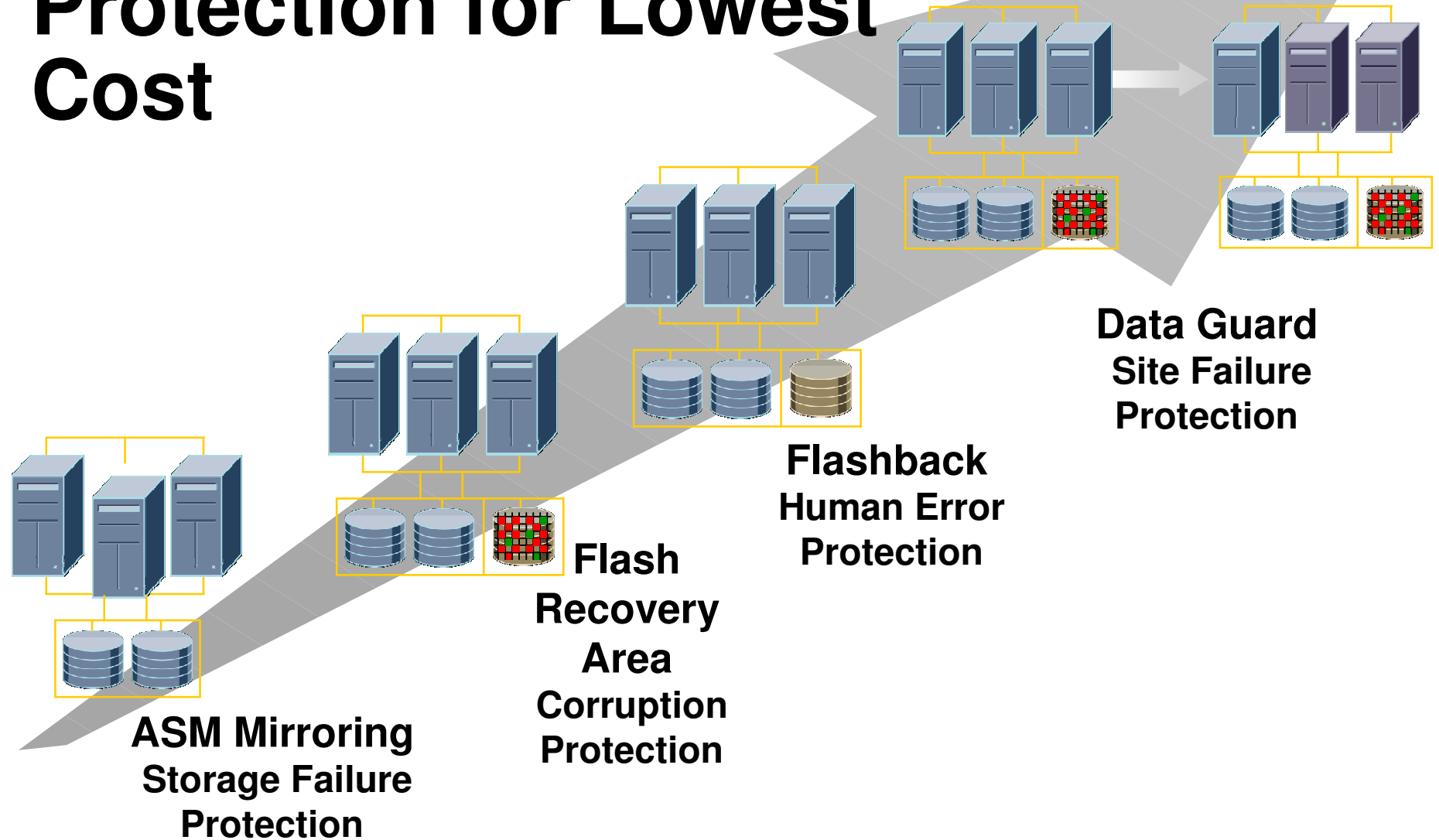
ORACLE

# Oracle Database 10g RAC

- **Runs all Applications**
- **Mission Critical Quality of Service on Industry Standard, Low Cost Servers**
- **RAC Made Easy for Everyone**
- **Complete, Integrated Oracle Clusterware**
- **Automatic Workload Management**
- **Provides Capacity on Demand**



# Highest Data Protection for Lowest Cost



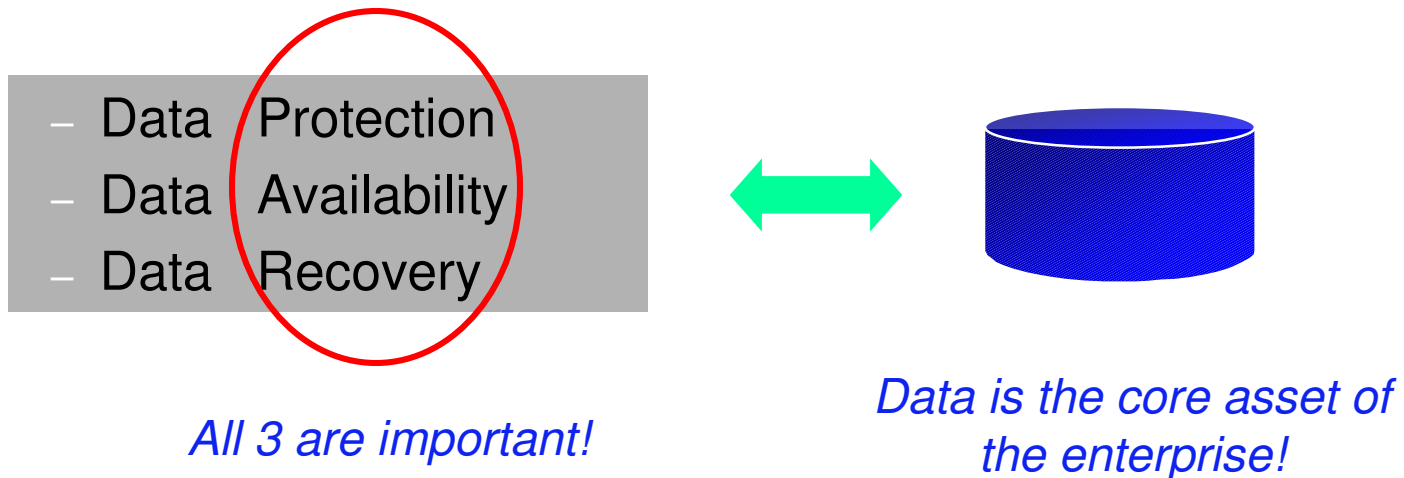
# **Oracle Data Guard: Maximum Data Protection at Minimum Cost**

# What is Oracle Data Guard?

- Oracle's disaster recovery solution for Oracle data
- Feature of Oracle Database Enterprise Edition
- Automates the creation and maintenance of one or more transactionally consistent copies (standby) of the production (or primary) database
- If the primary database becomes unavailable (disasters, maintenance), a standby database can be activated and assume the primary role

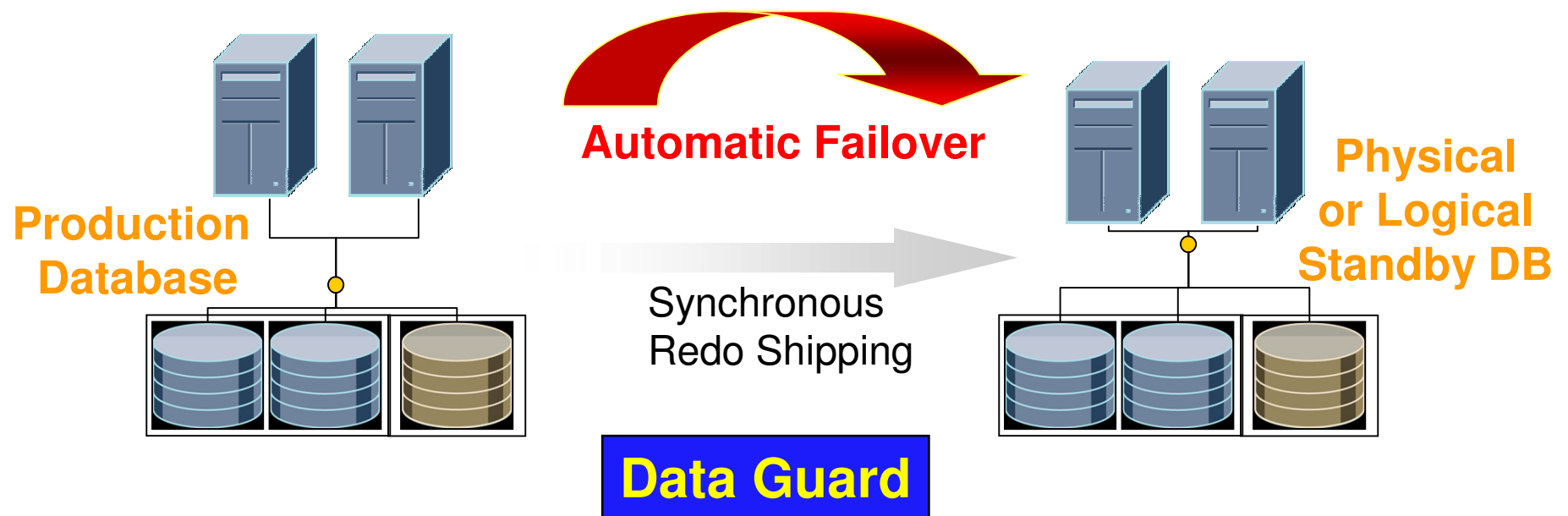
# Oracle Data Guard Focus

- Data Failures & Site Disasters:



- Also addresses human errors & planned maintenances

# Data Guard: Best Failure Protection at Lowest Cost

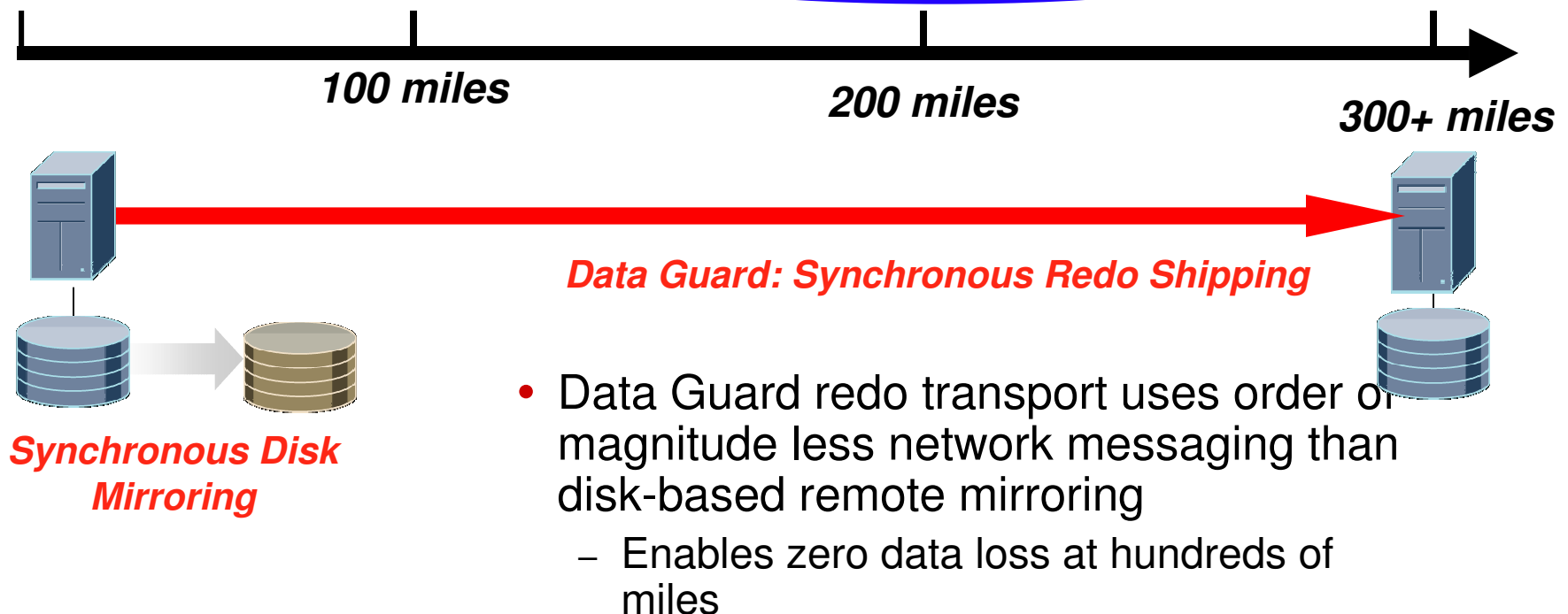


- Synchronous or asynchronous redo shipping
- Corruptions don't propagate
- Low cost servers and storage
- Data Guard is **free with EE**
- Thousands of production customers

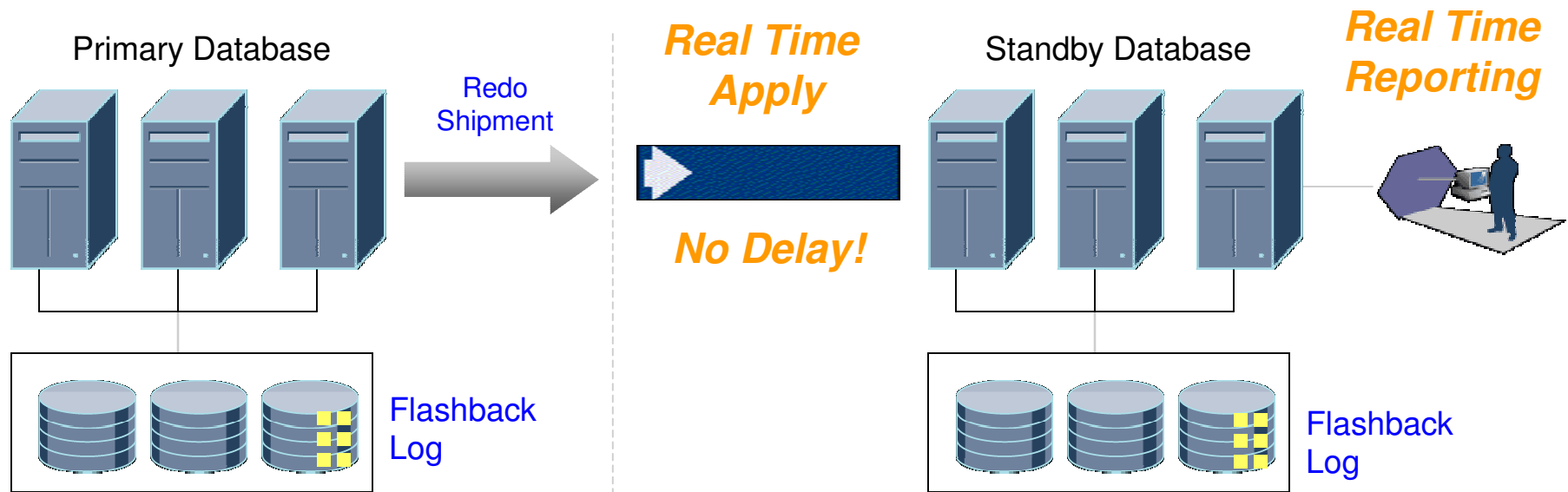
# Zero Data Loss over Long Distance

## Data Guard DR Sweet Spot

- Far enough to avoid regional disaster
- Close enough for zero data loss



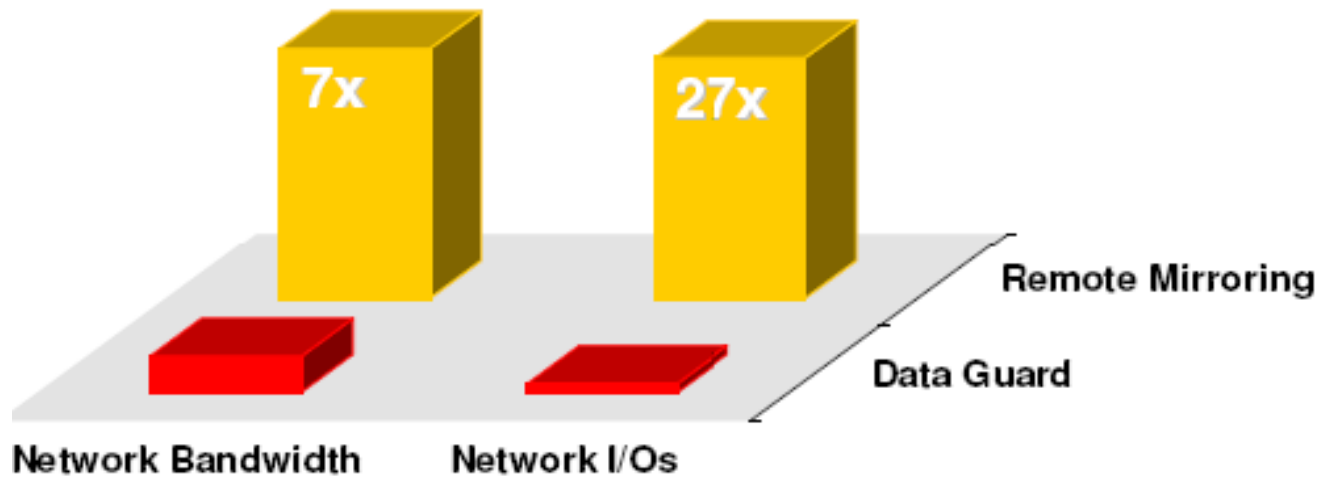
# Enhanced DR with Flashback Database



***Primary: No reinstantiation  
after failover!***

- Flashback DB removes the need to delay application of logs
- Flashback DB removes the need to reinstantiate primary after failover
- Real-time apply enables real-time reporting on standby

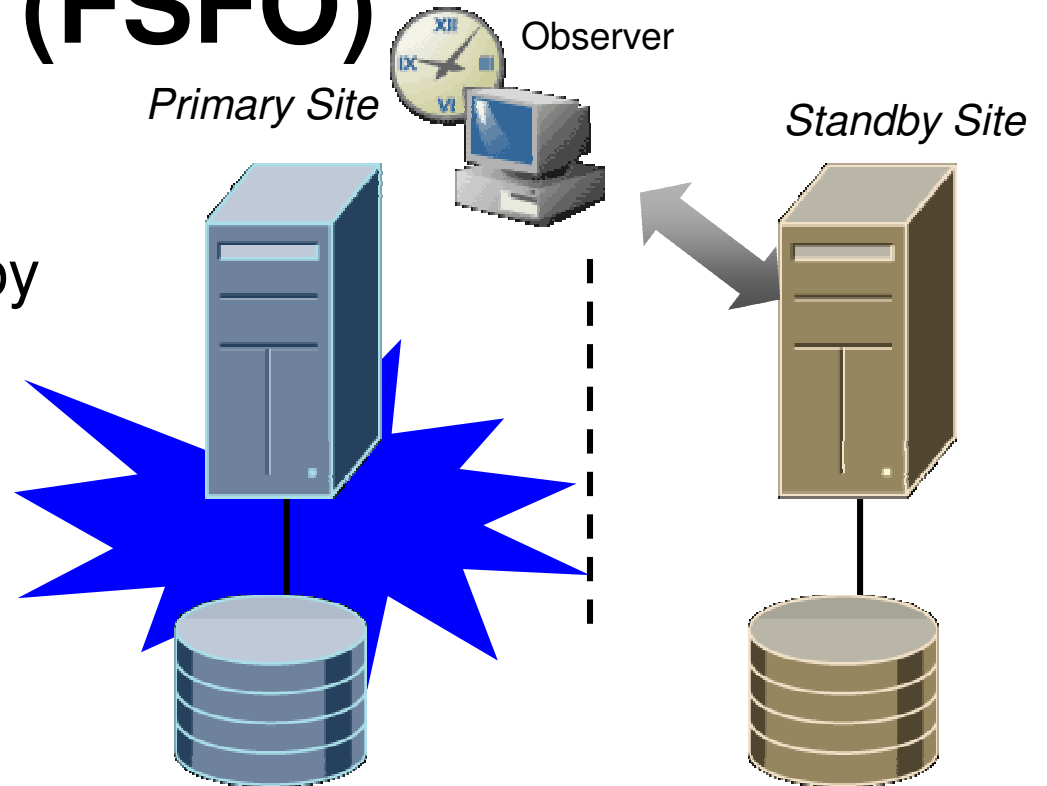
# Performance of RM vs DG





# Automate failover using Fast Start Fail Over (FSFO)

- Threshold based monitoring of primary by EM Grid Control
- Monitoring standby if failure detected in primary
- Observer fails primary over to standby



# Enterprise Manager New Features

- Streamlined browser-based interface that enables complete standby database lifecycle management
- Focus on:
  - Ease of use
  - Management based on best practices
  - Pre-built integration with other HA features

# Example – Ease of Use

- Switchover using Enterprise Manager is now literally two mouse clicks

## Data Guard

Page Refreshed August 1, 2003 5:27:25 PM EDT

### Overview

Overall Status **✓ Normal**  
Protection Mode [Maximum Performance](#)

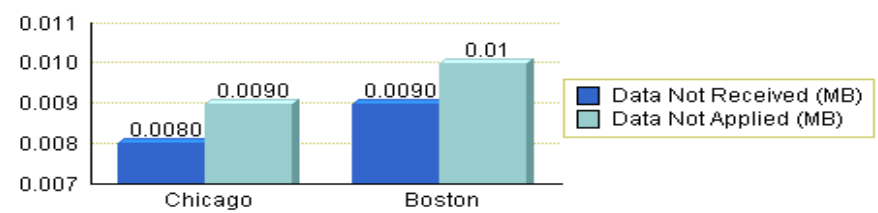
### Primary Cluster Database

Name [San Francisco](#)  
Cluster [drcluster](#)  
Status **✓ Normal**

Current Log [Multiple Threads](#)  
Related Link [Edit](#)

### Standby Progress Summary

This chart shows the amount of data that each standby has not yet received and applied.



### Standby Databases

[Add Standby Database](#) [Edit](#) [Remove](#) [Switchover](#) [Failover](#)

Select	Name	Host	Status	Role	Last Received Log	Last Applied Log
<input checked="" type="radio"/>	<a href="#">Chicago</a>	<a href="#">drlab3</a>	✓ Normal	Physical Standby	<a href="#">Multiple Threads</a>	<a href="#">Multiple Threads</a>
<input type="radio"/>	<a href="#">Boston</a>	<a href="#">drlab4</a>	✓ Normal	Logical Standby	<a href="#">Multiple Threads</a>	<a href="#">Multiple Threads</a>

### Performance

[Performance Overview](#)  
[Log File Details](#)

### Additional Administration

[Verify](#)  
[Remove Data Guard Configuration](#)

Oracle Enterprise Manager (SYSMAN) - Processing: Switchover - Microsoft Internet Explorer

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Enterprise Manager

Setup Preferences Help Logout

Home Targets Configuration Alerts Jobs Management System

Hosts Databases Application Servers Web Applications Groups All Targets

### Oracle Enterprise Manager (SYSMAN) - Confirmation Switchover to Chicago

A switchover will cause the primary and standby databases to switch roles. Since Chicago is a physical standby database, the primary and standby databases will be shutdown and restarted. The switchover operation cannot be cancelled.

Any active sessions connected to the primary database will be automatically closed during the switchover operation.

[Browse Primary Database Sessions](#)

**TIP** Standby databases not involved in the switchover will continue to function normally after the switchover.

**Are you sure you want to switchover to Chicago?**

[Home](#) | [Targets](#) | [Configuration](#) | [Alerts](#) | [Jobs](#) | [Management System](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

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## Processing: Switchover

### Switching over to Chicago

This process will take some time. The page will automatically forward to the overview page upon completion.  
Click on the alert log link to view progress details in a new browser window. View alert log: [San Francisco Chicago](#)

- ➔ Performing role change.
- Restarting databases.
- Waiting for switchover to complete.

**TIP** This process cannot be cancelled. It will continue even if the browser window is closed.

[Home](#) | [Targets](#) | [Configuration](#) | [Alerts](#) | [Jobs](#) | [Management System](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

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- ✓ Performing role change.
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Waiting for switchover to complete.

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- ✓ Performing role change.
- ✓ Restarting databases.
- ✓ Waiting for switchover to complete.

**TIP** This process cannot be cancelled. It will continue even if the browser window is closed.

[Home](#) | [Targets](#) | [Configuration](#) | [Alerts](#) | [Jobs](#) | [Management System](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

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Oracle Enterprise Manager (SYSMAN) - Data Guard - Microsoft Internet Explorer

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[Home](#) [Targets](#) [Configuration](#) [Alerts](#) [Jobs](#) [Management System](#)

[Hosts](#) [Databases](#) [Application Servers](#) [Web Applications](#) [Groups](#) [All Targets](#)

[Cluster: drcluster](#) > [Cluster Database: San Francisco](#) > Data Guard

## Data Guard

Page Refreshed August 1, 2003 5:38:59 PM EDT

### Overview

Overall Status ✓ **Normal**  
 Protection Mode [Maximum Performance](#)

### Primary Database

Name [Chicago](#)  
 Host [drclab3](#)  
 Status ✓ [Normal](#)  
 Current Log [Multiple Threads](#)  
 Related Link [Edit](#)

*Switched!*

### Standby Progress Summary

This chart shows the amount of data that each standby has not yet received and applied.

Standby	Data Not Received (MB)	Data Not Applied (MB)
San Francisco	1.564	0.013
Boston	1.564	0.013

### Standby Databases

[Add Standby Database](#)

[Edit](#) [Remove](#) [Switchover](#) [Failover](#)

Select	Name	Host/Cluster	Status	Role	Last Received Log	Last Applied Log
<input checked="" type="radio"/>	<a href="#">San Francisco</a>	<a href="#">drcluster</a>	<span style="color: green;">✓</span> <a href="#">Normal</a>	Physical Standby Cluster Database	<a href="#">Multiple Threads</a>	<a href="#">Multiple Threads</a>
<input type="radio"/>	<a href="#">Boston</a>	<a href="#">drclab4</a>	<span style="color: green;">✓</span> <a href="#">Normal</a>	Logical Standby	<a href="#">Multiple Threads</a>	<a href="#">Multiple Threads</a>

### Performance

[Performance Overview](#)  
[Log File Details](#)

### Additional Administration

[Verify](#)  
[Remove Data Guard Configuration](#)

[Home](#) | [Targets](#) | [Configuration](#) | [Alerts](#) | [Jobs](#) | [Management System](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

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[About Oracle Enterprise Manager](#)

# Why Oracle Data Guard?

1. Disaster Recovery & High Availability
  - Easy failover/switchover between primary and standby databases
2. Complete data protection
  - Enables zero data loss, safeguard against data corruptions
3. Efficient utilization of system resources
  - Standby databases can be used for reporting, backups, queries
4. Balance data availability against performance
  - Flexible data protection/synchronization modes
5. Automatic resynchronization after restoration of network connectivity
  - Automatic archive gap detection and resolution with no manual intervention
6. Centralized and simple management
  - Push-button graphical interface for management and monitoring

A large, stylized graphic of the letters 'Q' and 'A' in a black, serif font. A red ampersand is positioned between the two letters, overlapping them. The words 'QUESTIONS' and 'ANSWERS' are written in a smaller, black, sans-serif font across the middle of the 'Q' and 'A' respectively.

**QUESTIONS**  
**ANSWERS**