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ON DEMAND BUSINESS™

IBM Systems and Technology Group University 2005

Oracle 10g Database Overview

Course #: CB49

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1/20/2005

Agenda

- **Oracle 10g Database Marketing Messages**
- **Manageability Features**
- **Real Application Clusters (RAC)**
- **Data Guard**
- **Oracle 10g and You**

Note: 10g features are too numerous to cover in their entirety

Learning Objectives

At the conclusion of this material, you should be able to:

- Understand the Oracle marketing messages around Oracle 10g Database
- Describe the major Oracle 10g Database features
- Be better equipped to sell IBM solutions in the Oracle space

Oracle 10g Database Marketing Claims

- **Half the cost**
  - Capital Expenditures, Administration
- **Easiest to Manage**
  - Oracle9*i* reduced administration costs by half
  - 10g reduces administration by another by half
- **Highest Quality of Service**
  - Availability, Reliability, Security, Performance, Scalability
- **RAC 10g for Everyone**
  - Only solution for **Enterprise Grids**
  - Mission Critical Quality of Service on Industry Standard, **Low Cost Servers**
  - Provides **Capacity on Demand**
  - Eliminate 3rd party components to reduce cost and complexity
  - Single System Image & Automatic Workload Management
- **End to End Integration**
  - Application Server (iAS), Database Server (RAC) and Storage (ASM)

Sources: "Oracle Database 10*g*: A Revolution in Database Technology", Andrew Mendelsohn, Oracle Corporation, Oracle World 2003.
"Oracle Real Application Clusters 10*g*: The Fourth Generation", Angelo Pruscino, Oracle Corporation, Oracle World 2003
"Oracle Database 10g Real Application Clusters - Customer Experience with Enterprise Grids", Barb Lundhild, Oracle Corporation, Oracle Open World London 2004

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- Oracle 10g Database Marketing Messages
- **Manageability Features**
- Real Application Clusters (RAC)
- Data Guard
- Oracle 10g and You

Where do DBAs spend their time?

- **Oracle Installation**
- **DB Creation**
- **Data Load**
- **Ongoing Management**
- **Software Maintenance**
- **Other**

10g Features to reduce Administration Costs

- **Fast, Lightweight Install**
- **Simplified Creation and Configuration**
- **Efficient Data Load**
- **Self-Managing Database**
- **Enterprise Configuration Management**

Simplified Installation, DB Creation & Configuration

- **Fast, lightweight Install**
  - **20 minute install from 1 CD**
  - **Automated pre and post install steps**
  - **Oracle components (listeners, database, agents) setup for automatic startup and shutdown**
- **Simplified Create & Configure**
  - **Pre-configured ready-to-use database**
  - **30 basic initialization parameters (90% reduction)**
  - **Automatic setup of common tasks (e.g. backups)**
- **Simplified Upgrade**
  - **Pre and post upgrade checks**
  - **Restartable**
- **Out of the box Database Control**
  - **Fully functional administration and monitoring after database creation**

Efficient Data Load

Data Pump

- **Up to 60% faster than Export (single stream)**
- **Up to 20x faster than Import (single stream)**
- **Automatic multi-stream operation**
- **Restartable**

Cross Platform Transportable Tablespaces

- **Much faster data migration than conventional data Export/Import**
- **Metadata is migrated via Export/Import**
- **Data moved via external copy facilities**
- **RMAN utility provides Endian conversion (if required)**

Makes competitive migrations faster and easier

Automatic Database Diagnostic Monitor (ADDM)

- **Provides database-wide performance diagnostics**
- **Instrumented database code paths**
- **Impact and benefit analysis**
- **Real-time Time & Wait Model results**
- **Active Session History snapshots**
- **SQL Advisor**
- **System Sizing Advice**
- **Network & Database Configuration Advice**

Automatic Shared Memory Tuning

- **Automatically adapts to changing workload conditions**
- **Dynamically resizes SGA and PGA components to optimize memory allocation**
  - DB Buffer Cache
  - Shared Pool
    - Library Cache
    - Dictionary Cache
    - Shared SQL area…
  - Java™ Pool
  - Sort Area…
- **Potentially avoid out of memory conditions and improve performance**

Proactive Space Management

- **Automatically monitors space usage and extent allocation**
- **Predicts and advises on growth and fragmentation trends**
- **Provides “just in time” alerts to avoid out of space conditions**
- **Online segment shrinks to reduce fragmentation and reclaim space**

Automatic Tuning Optimizer

- **Cost-Based evaluation of access path options**
- **Automatically gathers object and system statistics**
- **Automatic memory allocation and execution parallelism**
- **Automatically identifies “bad” or high load SQL**
  - Profile execution to feedback to optimizer (dynamically adjust access path)
  - Advise on SQL or schema changes, stale statistics
  - Advise on Indexes and Materialized Views

RMAN Automatic Backup and Recovery

- **Automated disk based backup and recovery**
- **Incremental backups are taken to disk based Flash Recovery Area**
  - Full backup/scan never required
  - Updated blocks are tracked by DB
  - Can offer significantly better backup/recovery performance
- **Flash Recovery Area can be archived to tape**

Disk based backups offer new storage sales opportunities

And, don't forget Tivoli® Storage Management (TSM)

Flashback Point-in-Time Recovery

- ***Flashback Database*** **restores the entire Database**
  - Uses Flashback logs
- ***Flashback Table*** **restores all rows in a set of tables**
  - Uses UNDO records
- ***Flashback Drop*** **restores a dropped table or index**
  - Uses DROP recycle bin
- ***Flashback Rows*** **restores individual rows**
  - Uses Flashback Query

Automatic Workload Management (AWM)

- **Workload can be divided into logical service groups**
- **Each service is profiled with respect to priority, response time target, preferred instances (RAC)…**
- **Supports performance monitoring at the service level**
- **Database Resource Manager prioritizes workload based on services definitions**
- **Automated alert generation when warning or critical thresholds exceeded**

Automatic Storage Management (ASM)

- **Alternative to conventional File System and Logical Volume Manager functions**
- **ASM manages pools of raw disk**
- **Allocation policy based on Oracle file type**
- **Data is automatically striped across all volumes in the applicable ASM pool**
- **Online add/drop of disk devices**
  - w/automatic restriping of data
  - **”Storage Capacity on Demand”**

Paradigm shift may be difficult for some customers

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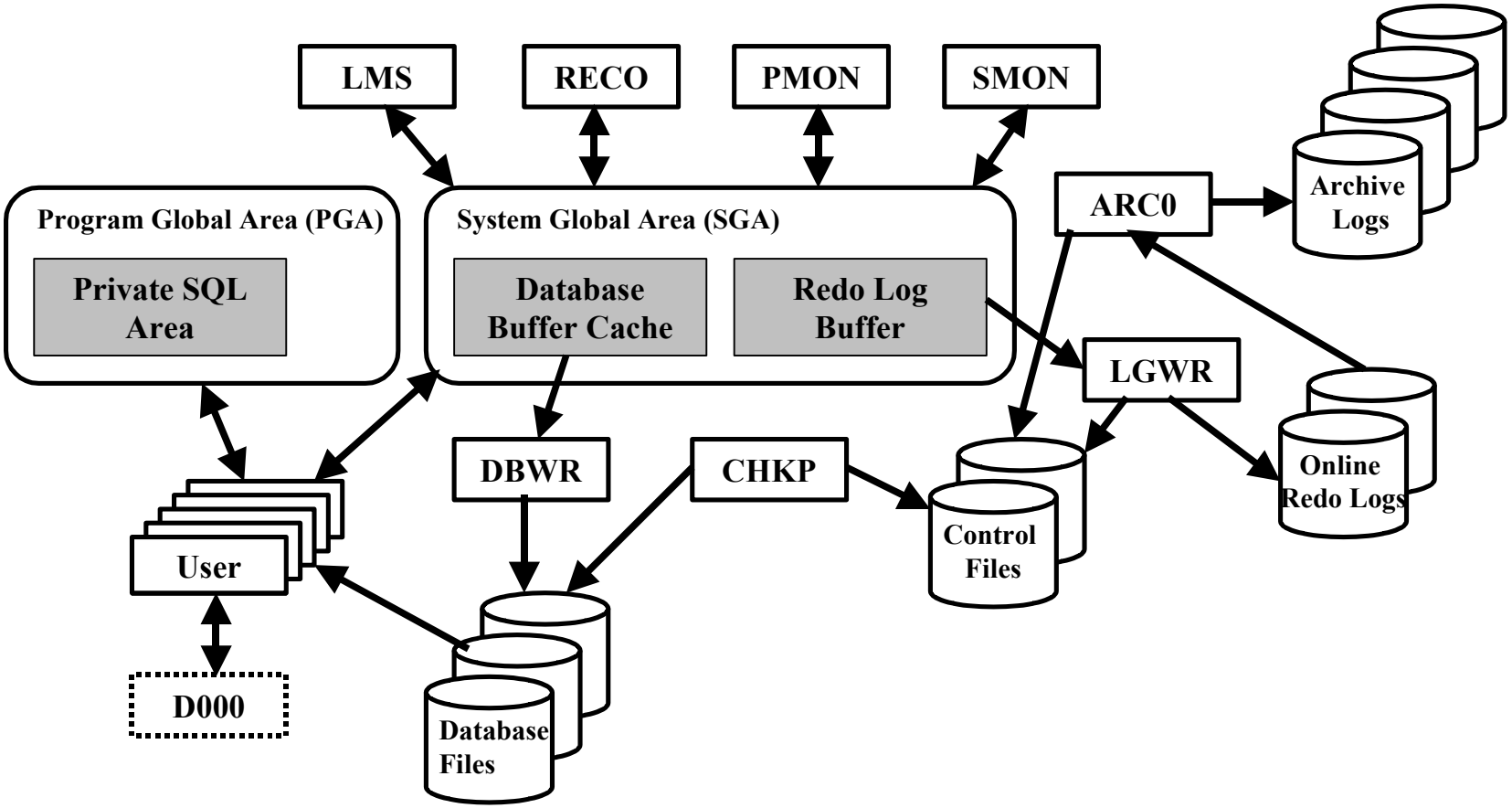
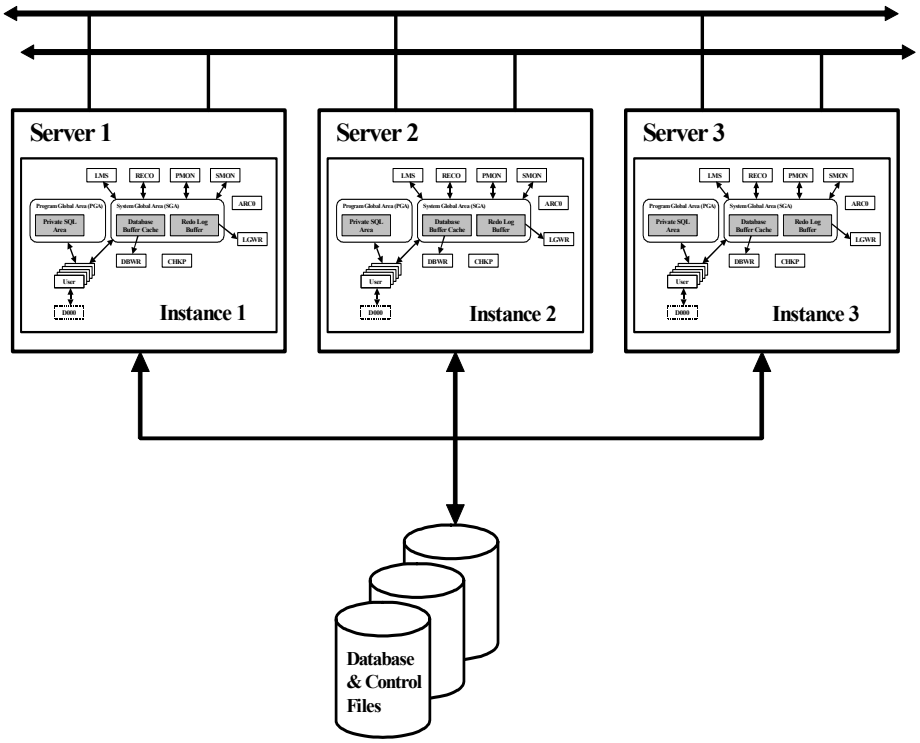
- **Real Application Clusters (RAC)**
- Data Guard
- Oracle 10g and You

Oracle Server Architecture



Oracle Real Application Clusters (RAC)

- **A computing environment that harnesses the power of multiple interconnected computers to create a single, robust computing environment…**
  - Using Real Application Clusters (RAC) software
  - Involving two or more computers (nodes)
  - Sharing data across all computers (nodes)



RAC is a separately licensed feature. Partitioning feature may also be req'd

Oracle 10g RAC Claims

- **Only solution for Enterprise Grids**
- **Mission Critical Quality of Service on Industry Standard, Low Cost Servers**
- **Provides Capacity on Demand**
- **Eliminate 3rd party components to reduce cost and complexity**
- **Single System Image & Automatic Workload Management**
- **Runs all applications**

Sources: “Oracle Real Application Clusters 10*g*: The Fourth Generation”, Angelo Pruscino, Oracle Corporation, Oracle World 2003
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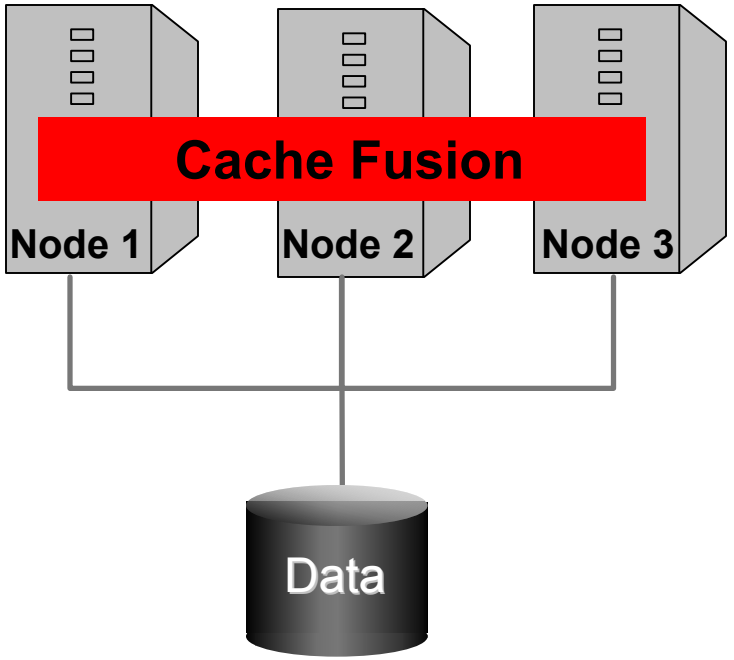
Oracle's "Grid Vision"

- **Computing as a utility**
  - A network of clients and service providers
- **Client-side: Simplicity**
  - Request computation or information and receive it
- **Server-side: Sophistication**
  - Availability, reliability, security
  - Capacity on demand, load balancing
- **Virtualization**
  - Nothing more virtual than a utility
  - Massive potential
- **Dedicated and hosted SMP cannot compete**
  - Economies of scale
  - Levels of service and priority
  - Low cost drives migration to blade farm
- **The database that works best (performance, administration) in blade farms wins!**

Source: "Oracle 10*g* Database - Focus Areas and Key Features", Shaun McLaurin Solutions Architect, Oracle Corporation, San Diego Oracle Users Group

Cache Fusion

- **All database caches in a RAC cluster are treated as one common database cache, shared by all participating nodes.**
- **Cache Fusion Phase II provides high performance access to data from all caches within the cluster**
- **Cache to Cache data transfers to maintain Cache Coherency are done over a Network Interconnect**
- **Scalability for all applications, across multiple computer systems**



Cluster Ready Services (CRS)

- **Oracle supplied clusterware for all platforms**
  - No need to purchase additional software
- **Easy**
  - Deploys in hours not days
  - Improved single system image
  - Single-vendor support
- **Remains open to third-party clusterware**
  - HACMP, RSCT, Veritas Storage Foundation for RAC…

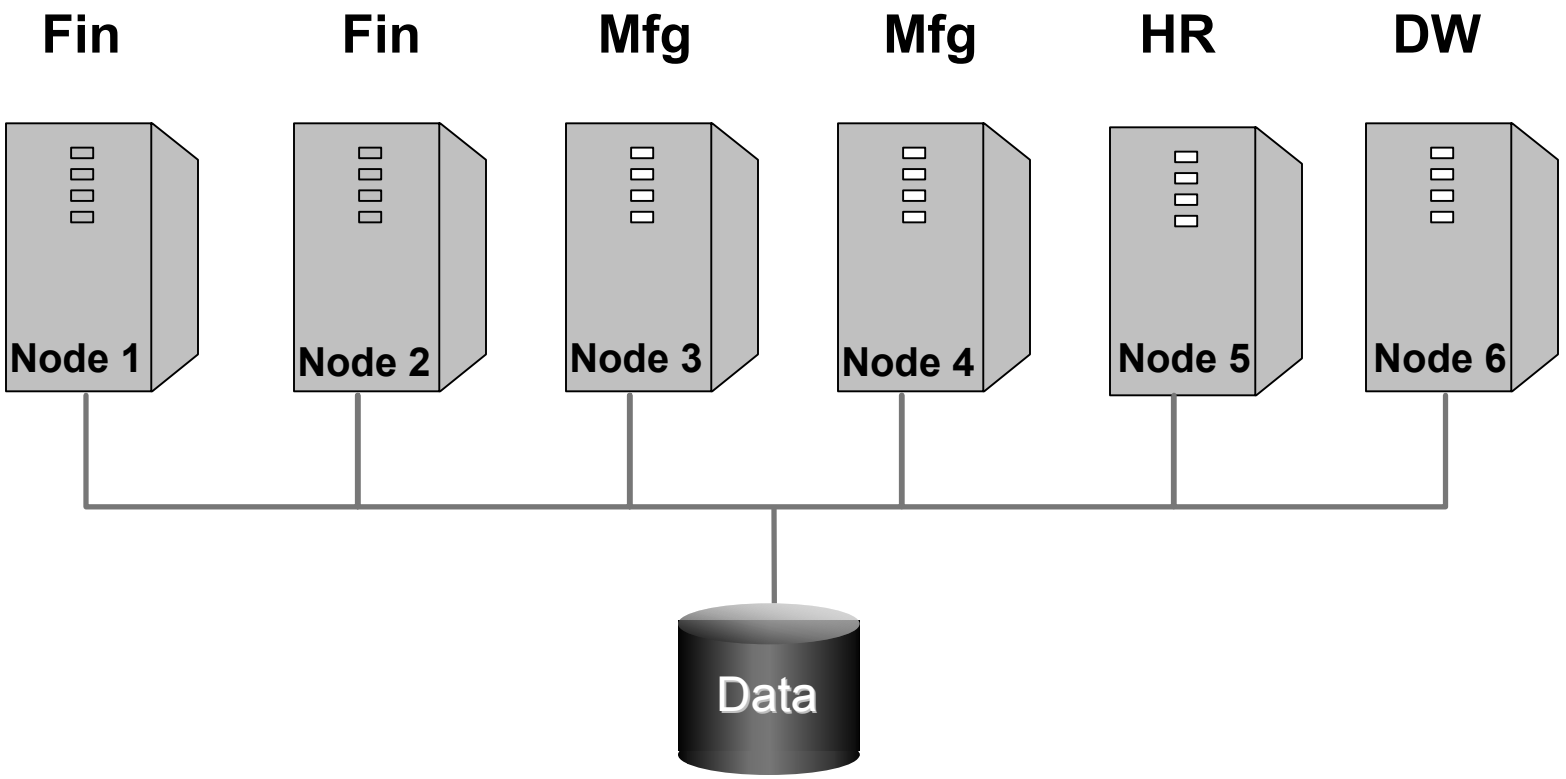
Some Cluster File System Options

- **Automatic Storage Management (ASM)**
  - Alternative to external file system and LVM
- **Oracle Cluster File Systems (OCFS)**
  - Open Source offering available on Linux®
- **General Parallel File System (GPFS)**
  - AIX 5L™ only
- **PolyServe**
  - Linux
- **Veritas Storage Foundation for RAC**
  - AIX and Linux (9i only as of 11/12/04)
- **Raw Devices**

Automatic Workload Management in the Grid

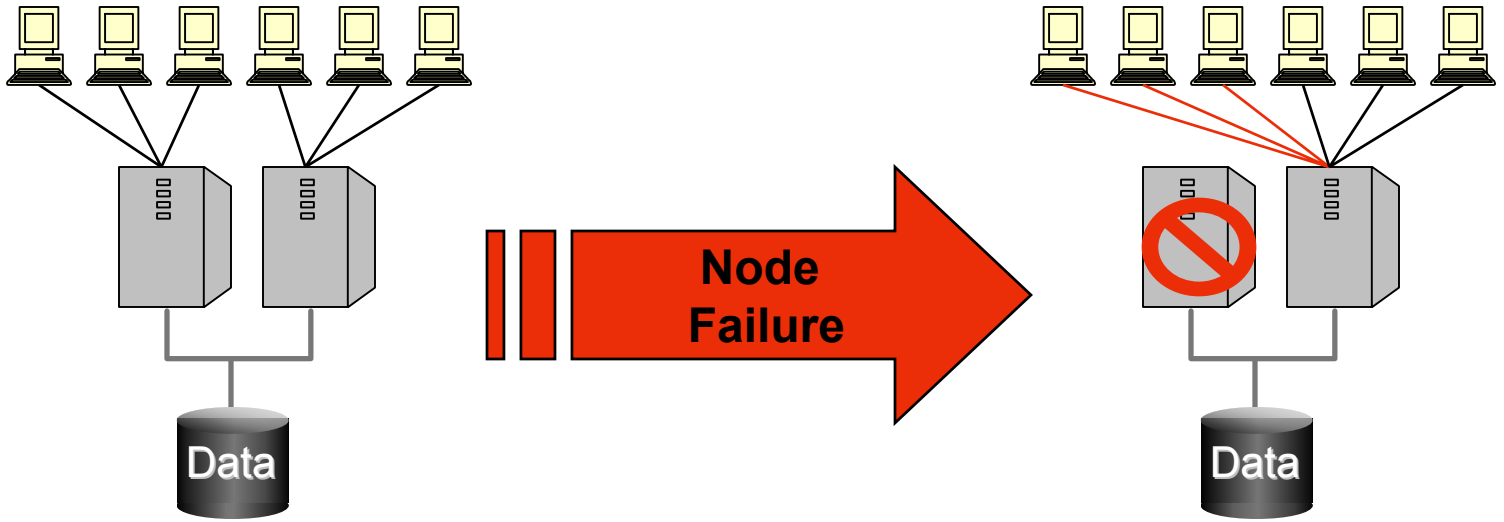
- **Push-button, online add/drop server to cluster via Grid Control**
- **Automatic Workload Management**
  - **Based on “service” concept**
  - **Automatic routing of service connection requests to appropriate server with lowest load**
  - **On server failure, automatic re-allocation of surviving servers to services**

Automatic Workload Management in the Grid…



Transparent Application Failover (TAF)

- **Little or no user downtime**
- **Applications and users are automatically and transparently reconnected to another system**
- **Login context maintained**
- **Read-only automatically restarted**
- **Update transactions are rolled back**
  - "TAF aware" applications can redo SQL after rollback



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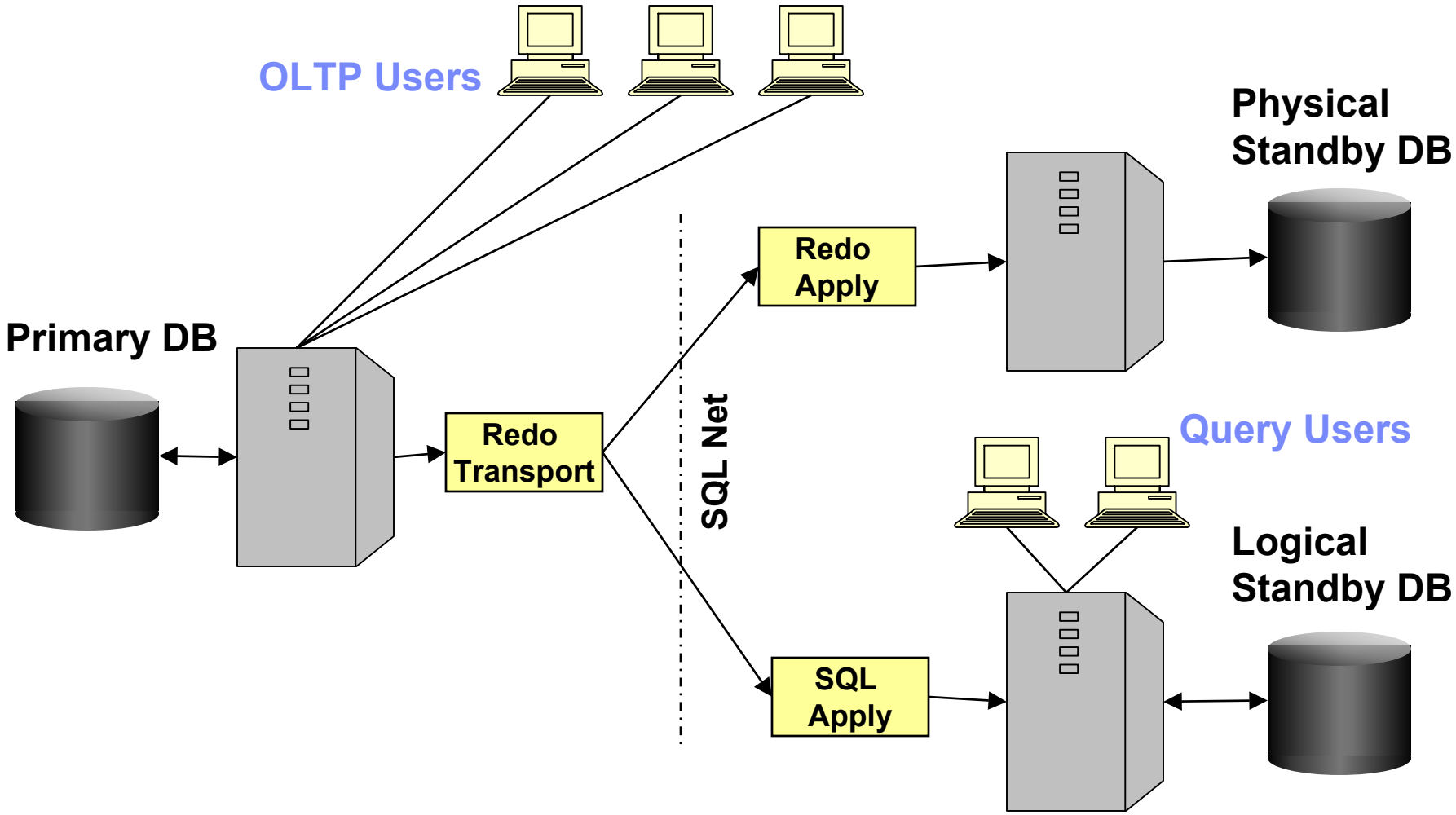
- **Data Guard**
- Oracle 10g and You

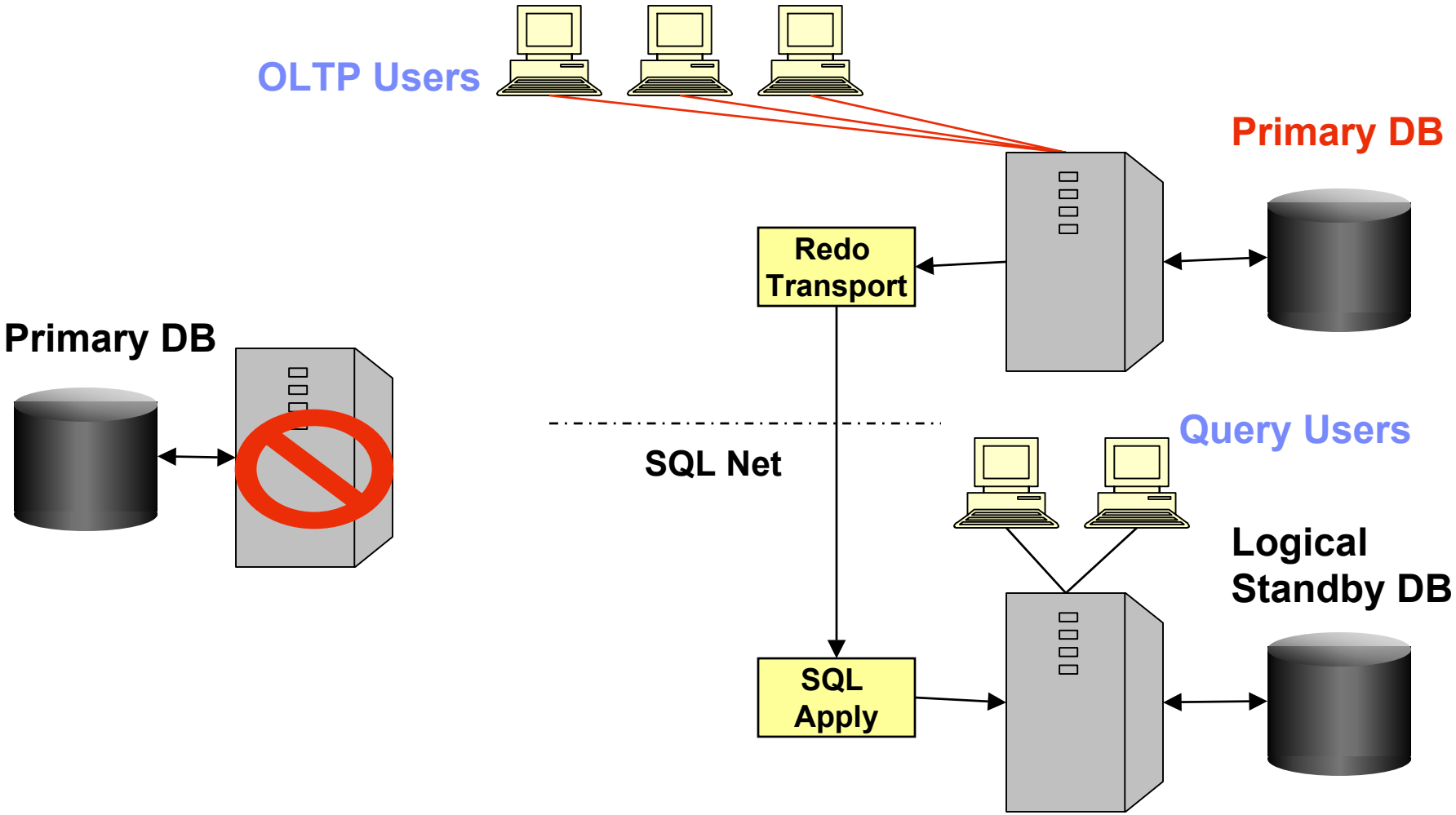
Oracle Data Guard

- **Oracle's primary disaster recovery solution**
  - Complimentary to RAC High Availability solution
  - May also be used to maintain separate reporting instance(s)
- **Provides one or more "standby" copies of the primary production database**
  - Physical (Identical structure as primary)
  - Logical (Index/Schema differences)
- **Production workload can be failed over to a standby database if the primary database becomes unavailable**
- **Multiple Log Capture and Log Apply options**
  - Synchronous or Asynchronous log data transmission
  - Continuous or deferred log apply

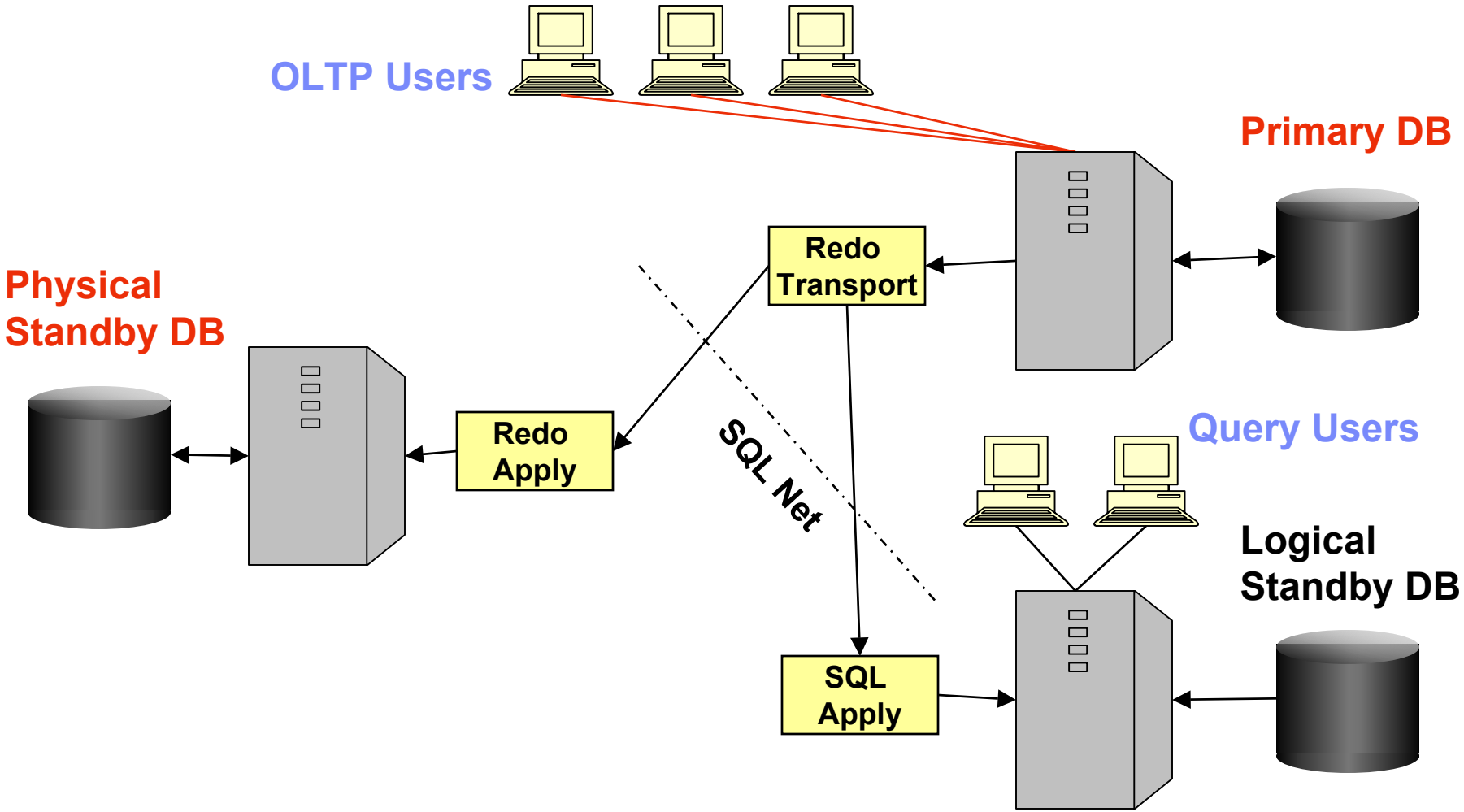
Oracle Data Guard Architecture



Oracle Data Guard Architecture (Failover)



Oracle Data Guard Architecture (Switchover)



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Oracle 10g Database Support on IBM @server

xSeries®

- SUSE SLES 8 & SLES 9
- Red Hat Enterprise Linux AS/ES 2.1 & AS/ES 3
- Red Flag, Miracle Linux, Asianux 1.0…
- Microsoft® Windows® 2000, 2003, NT® 4.0 (non-RAC), XP (non-RAC)
- RAC may not be available on some Linux versions & chipset combinations

@server® i5, p5, pSeries®, iSeries®

- AIX 5L™ (V5.2 and later)
- POWER™ based Linux planned for 2005, Developer's Release now available
  - Oracle 10g Client (10.1.0.3) is supported on POWER™ Linux today
  - http://www.oracle.com/technology/software/products/database/oracle10g/index.html

zSeries®

- z/OS® V1R4
- SUSE SLES 8
- SUSE SLES 9 and Red Hat Enterprise Linux AS 3 are planned

Shared “pay as you grow” vision

- Oracle and IBM @server xSeries® offer economical, upgradeable products that allow you to make a small initial investment then grow as the needs of the business grow
  - IBM’s Enterprise X-Architecture delivers servers based on modular, scalable designs
  - Maintain Oracle Database 10*g*™ investment through seamless upgrade from Standard to Enterprise for increased levels of system availability

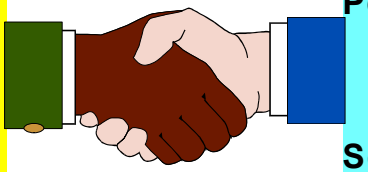
Oracle Database 10*g*

Performance
- System Provisioning
- Workload management

Scalability
- Automated Storage Management
- Integrated Clusterware

Availability
- End-to-end Tracing
- Predictive Behavior Reports
- System Health Checks
- Best Practice Advisories

Systems Management
- Deployment Automation
- Centralized Management Console



IBM eServer xSeries

Performance
- Intel® and AMD® Processors
- Enterprise X-Architecture™
- XceL4™ Server Accelerator Cache

Scalability
- Modular XpandOnDemand™
- Flexible System Partitioning
- IBM RXE-100 Remote I/O

Availability
- Predictive Failure Analysis
- OnForever™ Initiative
- Hot Swap Memory
- Active PCI-X™
- Light Path Diagnostics™

Systems Management
- IBM Director
- Integrated Systems Management Processor

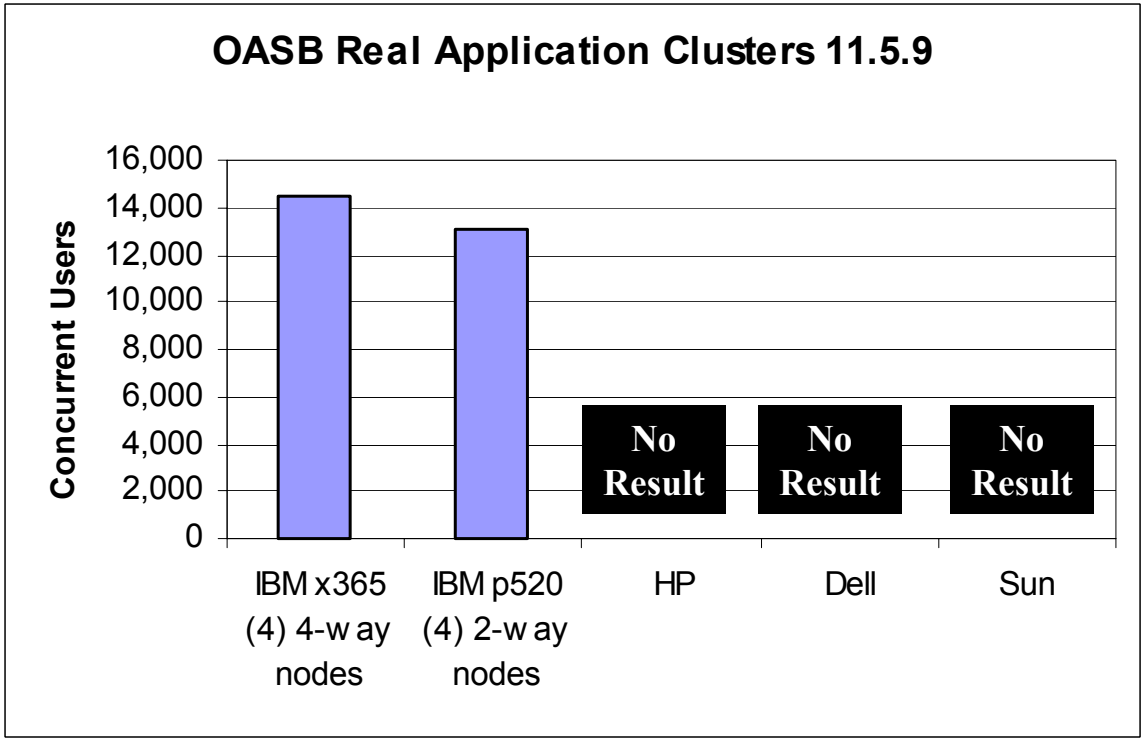
xSeries® Leadership on Oracle's OASB RAC Benchmark

14,508 users on a 4-node cluster of x365's

- 4-way 3.0 GHz Intel® Xeon™ Processor MP
- 32 GB Memory per Node
- .722 Second avg response time
- Red Hat Enterprise Linux 3.0 AS

Highest Intel Result
Highest Linux Result
Highest RAC Result

IBM is the only Vendor to post 11.5.9 results!



* OASB = Oracle Application Standard Benchmark

13,020 users on 4, 2-way p520 nodes (1.65 Ghz), 32GB per node .606 Second avg response time

Source: http://www.oracle.com/apps_benchmark/html/index.html?results.html **(as of 12/12/2004)**

Oracle on POWER5™ Systems

"Oracle has worked closely with IBM to ensure Oracle products are scalable, reliable, and achieve high performance on IBM's POWER5 technology. The advanced features in IBM's microprocessor such as Micropartitioning and enhanced scalability, combined with Oracle's industry-leading technology, will deliver incredible benefits to our customers."

Juan Jones

Vice President, System Platforms Division

Oracle Corporation

POWER5™ "Jaw Dropping" Performance Leadership

50 "best-in-class" industry benchmark results:

http://www.ibm.com/eserver/benchmarks

TPC-C: http://www.tpc.org

System	CPU	tpmC	$/tpmC	Database	OS	Avail.	Rank
IBM p5-595 (1.9 GHz)	64	3,210,540	$5.19	IBM DB2 8.2	AIX 5L V5.3	05/14/05	#1 overall
IBM p5-570 (1.9 GHz)	16	809,144	$4.95	IBM DB2 8.1	AIX 5L V5.3	09/30/04	#1 16-way
IBM p5-570 (1.9 GHz)	8	429,899 371,044	$4.99 $5.26	IBM DB2 8.1 Oracle 10g	AIX 5L V5.3	09/30/04	#1 8-way #2 8-way
IBM p5-570 (1.9 GHz)	4	194,391	$5.62	**Oracle 10g**	AIX 5L V5.3	09/30/04	#1 4-way

And, POWER5™ offers very competitive price/performance…

- **P5-595 64-way - #1 $/tpmC for all results > 1 million tpmC**
- **p5-570 16-way - #1 $/tpmC for all results between 500,000 and 1,000,000 tpmC**
- **P5-570 8-way - #4 (#1 Unix) $/tpmC for all results between 250,000 and 500,000 tpmC**
- **P5-570 4-way is #6 (#1 Unix) $/tpmC for all results between 150,000 and 250,000 tpmc**

All results as of 12/12/04

POWER5™ "Jaw Dropping" Performance Leadership…

Oracle OASB 11.5.9: http://www.oracle.com/apps_benchmark

System	CPU	Users	Avg Resp	BM Version	Submitted	Rank
IBM p5-570 (1.9 GHz)	8	15,004	0.553	11.5.9	07/13/04	#1 Single Server

Oracle OASB RAC 11.5.9: http://www.oracle.com/apps_benchmark

System	CPU	Users	Avg Resp	BM Version	Submitted	Rank
IBM p5-520 (1.65 GHz)	4 x 2	13,020	0.606	11.5.9	10/27/04	#2 RAC (xSeries #1)

SAP SD 2-Tier: http://www.sap.com/benchmark

System	CPU	Users	Avg Resp	Line Items/Hr	DB	Cert#	Rank
IBM p5-520 (1.65 GHz)	2	572	1.96	57,330	DB2	2004061	#1 2-way
IBM p5-570 (1.9 GHz)	4	1,313	1.97	131,670	DB2	2004042	#1 4-way
IBM p5-570 (1.9 GHz)	8	2,600	1.99	260,330	DB2	2004041	#1 8-way
IBM p5-570 (1.9 GHz)	16	5,056	1.99	506,000	DB2	2004040	#1 16-way
IBM p5-595 (1.9 GHz)	64	20,000	1.92	2,014,000	DB2	2004062	#1 overall, #1 64-way

All results as of 12/12/04

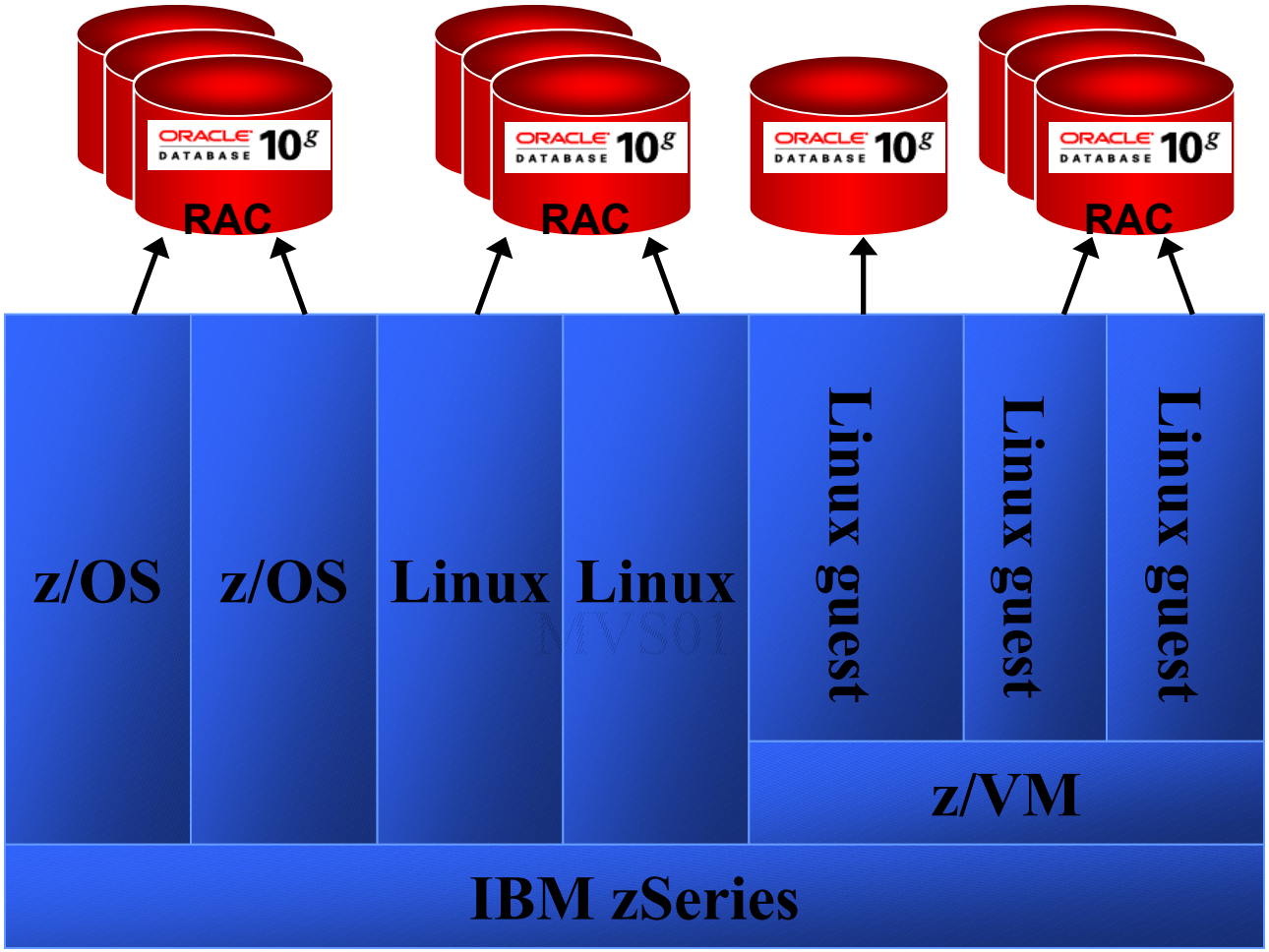
Oracle Licensing Considerations

- **Per CPU licensing is most common**
  - Base license options:
    - Standard Edition (up to 4-way capable)
    - Enterprise Edition:
  - Optional licensed features include:
    - RAC Feature:
    - Partitioning Feature:
  - See http://store.oracle.com) for current list prices and published discounts
- **"CPU" refers to a physical processor core**
  - A POWER5™ chip has 2 cores, 4 SMT threads = 2 CPUs
  - An UltraSPARC IV chip has 2 cores = 2 CPUs
- **LPAR licensing requirements:**
  - Dedicated partitions = # physical CPUS in that LPAR
  - Capped partitions = processor cap limit
  - Uncapped partitions = virtual processors defined
    - (typically # CPUs in pool)

Oracle on zSeries

- **Oracle DB available on mainframe since 1986**
- **Oracle 10g is fully supported on z/OS (31-bit)**
- **Linux on zSeries was Oracle's first non-Intel port**
  - Oracle Database 10g on Linux on zSeries is 64 bit
- **Full client transaction integration with CICS/TM, IMS/TM**
- **Server-side integration of 3rd party data stores with transparent gateways**
- **Offering high availability, high security with scalability**
- **DB tier on Linux on zSeries for 11i EBS, OCS and AS10g**
- **Consolidation, Integration and Migration opportunities**

zSeries Server Consolidation Opportunity



Oracle Documentation References

- **"Oracle® Database New Features Guide 10g Release 1 (10.1)" Part No. B10750-01**
- **"Oracle® Real Application Clusters Administrator's Guide 10g Release 1 (10.1)" Part No. B10765-01**
- **"Oracle® Data Guard Concepts and Administration 10g Release 1 (10.1)" Part No. B10824-01**
- **"Oracle 10g: Infrastructure for Grid Computing, An Oracle White Paper", September 2003**
- **"Oracle Database 10g – The database for the Grid", Brajesh Goyal, Oracle Corporation**
- **"Oracle Database 10g: The Self-Managing Database", Richard Sarwal VP, Oracle Corporation**
- **"Oracle 10*g* Database - Focus Areas and Key Features", Shaun McLaurin Solutions Architect, Oracle Corporation, San Diego Oracle Users Group**
- **"Oracle Database 10*g*: Administering the Self-Managing Database" presentation, Joel Goodman, Oracle Corporation**
- **"Oracle Database 10*g*: A Revolution in Database Technology" presentation, Andrew Mendelsohn, Oracle Corporation, Oracle World 2003**
- **"Oracle Real Application Clusters 10*g*: The Fourth Generation", Angelo Pruscino, Oracle Corporation, Oracle World 2003**
- **"Oracle Database 10g Real Application Clusters - Customer Experience with Enterprise Grids", Barb Lundhild, Oracle Corporation, Oracle Open World London 2004**

Information Sources (External)

Oracle Certification Info

- http://metalink.oracle.com **(Requires a Metalink Id)**
- http://otn.oracle.com/support/metalink/index.html

Oracle Technology Network

- http://otn.oracle.com

IBM Redbooks:

- http://www.ibm.com/redbooks

IBM Techdocs – Technical Sales Library

- http://www.ibm.com/support/techdocs

Information Sources (IBM Internal)

Techdocs – Technical Sales Library

- http://w3.ibm.com/support/techdocs

ISV SolutionLink - Oracle:

- http://w3.developer.ibm.com/isvsolutionlink/oracle/sales/competency.html

Conclusion / Wrap-up

- **Oracle 10g Database offers many significant new features**
  - Manageability
  - Real Application Clusters
  - Data Guard
  - And much more…
- **Oracle marketing messages attempt to capitalize on industry trends**
  - The only Database solution for Enterprise Grids
  - Server and Storage “Capacity on Demand”
  - Lower Cost commodity servers
- **IBM is strongly positioned to compete in the Oracle marketplace**
  - Supported on all @server platforms
  - @server is the “Best Platform” for Oracle

Additional Resources

- **The Campus for more education:**
  - BPs: http://www.ibm.com/partnerworld/sales/systems/education
    - Includes link to IBM PartnerWorld University (Web lectures for key topics)
    - http://www.ibmweblectureservices.ihost.com/pwu
  - IBMers: w3.ibm.com/sales/systems/education
    - Includes links to the Online Universities for Cross-Brand and each Brand (Web lectures for key topics)
  - Customers: www-1.ibm.com/servers/eserver/education

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NOTES:

Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.

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Notes on Benchmarks and Values

The benchmarks and values shown herein were derived using particular, well configured, development-level computer systems. Unless otherwise indicated for a system, the values were derived using external cache, if external cache is supported on the system. Buyers should consult other sources of information to evaluate the performance of systems they are considering buying and should consider conducting application oriented testing. For additional information about the benchmarks, values and systems tested, contact your local IBM office or IBM authorized reseller or access the following on the Web:

- TPC http://www.tpc.org
- SAP http://www.sap.com/benchmark
- Oracle http://www.oracle.com/apps_benchmark

Transaction Processing Performance Council (TPC) benchmarks reflect the performance of the microprocessor, memory subsystem, disk subsystem, and some portions of the network:

- tpmC - TPC Benchmark C throughput measured as the average number of transactions processed per minute during a valid TPC-C configuration run of at least twenty minutes.
- $/tpmC - TPC Benchmark C price/performance ratio reflects the estimated five year total cost of ownership for system hardware, software, and maintenance and is determined by dividing such estimated total cost by the tpmC for the system.

Application Benchmarks

- SAP - Benchmark overview information: http:// www.sap-ag.de/solutions/technology/bench.htm; Benchmark White Paper September, 2000;
  - http://www.sap-ag.de/solutions/technology/pdf/50020428.pdf.
- Oracle Applications - Benchmark overview information:
  - http://www.oracle.com/apps_benchmark/

Closing slide

Oracle 10g Database Overview