



# Effect of Technology On Oracle Solutions

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## *Oracle on Power Architecture*

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# The IBM & Oracle Relationship



## Sustaining Partnership

- Oracle 23 Years, PeopleSoft 21 Years, JD Edwards 32 Years, Siebel 11 Years

## Oracle is an IBM *“Integrated Account”* (2005)

- Regular Executive Reviews – Global and Geographic
- Named Oracle Sponsor: Charles Phillips, Oracle’s Co-President
- Dedicated IBM executive-led alliance team

## Over 19,000 Joint Application Customers Worldwide

- Hardware and Software support via Apps Unlimited

## Vibrant Technology Relationship

- Substantial investment in skills and resources
- Dedicated International Competency Centers

## Market Leading Services Practice

- IBM’s GBS is Oracle’s #1 SI Partner (4900 Joint Projects!)
- 9,000 skilled, of which 5,000 are dedicated to Oracle Practice

## Proven Customer Support Process

- Dedicated On-Site Resources
- Significant Program Investments



## The IBM investment for Oracle Solutions Development, Enablement & Support

### **50+** People dedicated full time to Oracle & IBM product development & sizing

- For Oracle Technology and Applications (EBS, JD Edwards, PeopleSoft, Siebel)
- Future joint offerings (new Oracle products on AIX 5.4, POWER6, Linux)
- Sizing Tools, white papers, education, technical support
- Dedicated on-site critical situation team

### Over **230** professionals world wide for sales & technical support

- 6 Fully staffed Competency Centers in the Americas, Asia and Europe
- Alliance Team and Solutions Sales in all geographies
- Regional Sizing Centers

### Over **1000 IT IBM assets valued at \$62,000,000** on loan to Oracle Technology and Applications

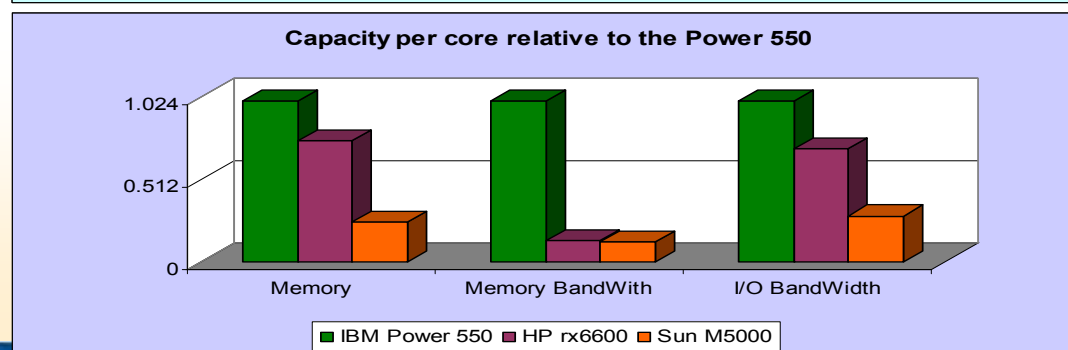
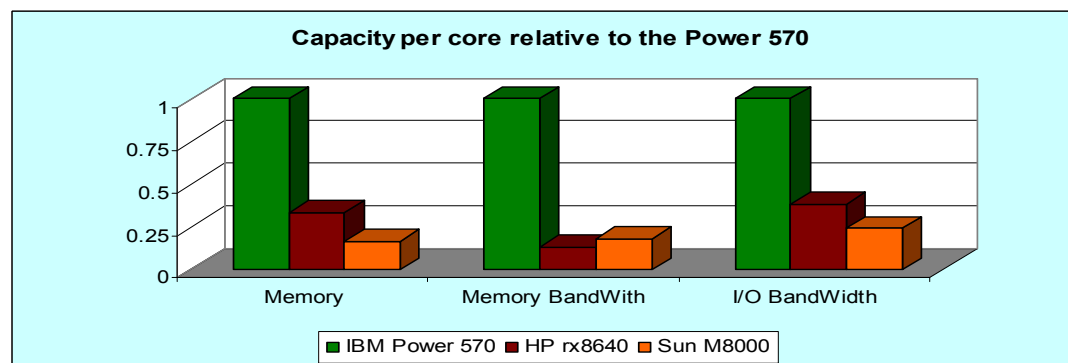
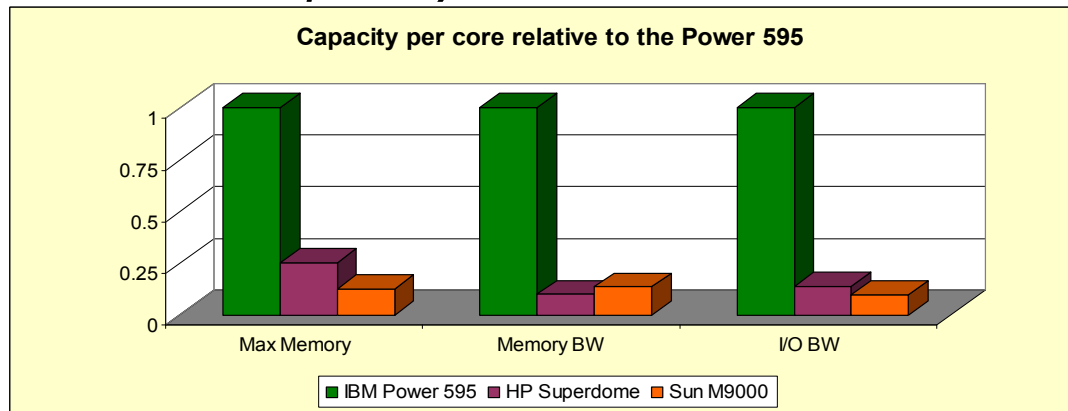
- *With Oracle Technology Products*
  - 250 servers; >500TB of disk
- *With Oracle Applications (EBS, PSFT, Siebel, JDE)*
  - 80 Servers on loan; >50TB of disk
- *Hundreds of Tape devices, switches and other hardware on Server and Applications*

**INFRASTRUCTURE:  
WITH ORACLE,  
SOONER OR LATER  
IT MATTERS.**



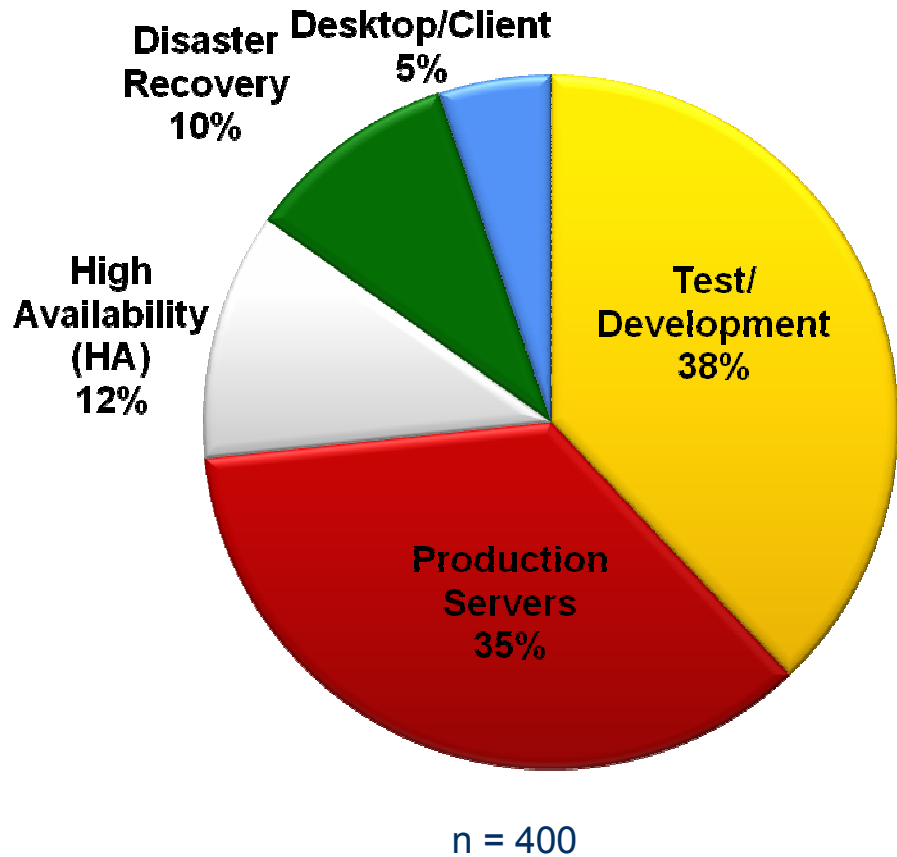
# IBM Power Servers

- *designed with capacity for consolidation*



# Emerging Drivers for Virtualization

Q. How important each environment is as a driver for virtual server purchases?



## Oracle License Multiplier Factors per Core

Factor	Vendor	Processor Chip
1.00	Varies	Any Single Core Processor Z9, Z10, Power6
0.75	IBM	Power5/5+
0.75	Sun Microsystems	Ultra SPARC IV / IV+ Ultra SPARC T2 1.2 & 1.4 GHZ
0.75	Hewlett-Packard	PA8800/PA8900
0.5	Intel®	Itanium2™ (Dual), Xeon™ MP, x86-64, Pentium™
0.5	AMD®, Sun Microsystems	Opteron™, Ultra SPARC T1 1.4GHZ
0.25	Sun Microsystems	Ultra SPARC T1 1.0, 1.2 GHZ

***Please note: This is not an official list nor is it intended to replace the normal Oracle vehicles to provide this information. Always consult Oracle Corporation for updated information for this topic***

## Power Systems TCO Advantage: Before and After

	POWER6	Itanium	SPARC64	SPARC CMT	Xeon
Performance	1.00	0.33	0.28	0.25	0.33
Old Oracle License per core	0.75	0.5	0.75	0.75	0.5
Licenses for one unit of work	0.75	1.52	2.70	3.00	1.52
Per core price advantage		\$54,161	\$138,031	\$159,266	\$54,161
New Oracle License per core	1	0.5	0.75	0.75	0.5
License per one unit of work	1.00	1.52	2.70	3.00	1.52
Per core price advantage		\$36,465	\$120,335	\$141,570	\$36,465

Price per core advantage calculated by multiplying the difference between one unit of work for POWER6 and each other technology by 42,570 (price for one license + 3 times \$9,405 (the price of one year's subscription and support. For example the advantage versus Itanium with the New Oracle License requirement is  $(1.52 - 1) * (42570 + 3*9405) = \$36,465$ .



## Oracle pricing analysis

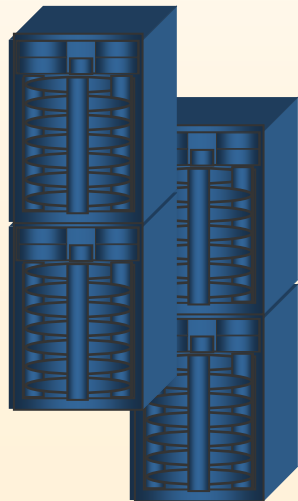
	IBM p6	HP Itanium
DB Engines	8	16
List price Oracle per engine	\$ 47,500	\$ 47,500
Core license factor (p6 vs Montecito)	1	0.5
Discount	44%	44%
Effective per engine cost	\$ 26,600	\$ 26,600
Total license cost	<b>\$ 212,800</b>	<b>\$ 212,800</b>
Annual maintenance	22%	22%
Maint/engine	\$ 10,450	\$ 5,225
Total Maint cost	\$ 83,600	\$ 83,600
5yr Maint cost	<b>\$ 418,000</b>	<b>\$ 418,000</b>
Total cost	<b>\$ 630,800</b>	<b>\$ 630,800</b>

# Reduce Server Acquisition Costs up to \$439,520 and Save up to 91% of the energy use!

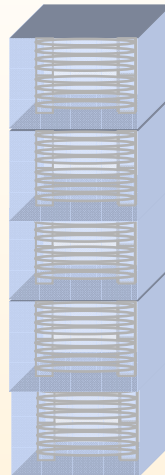
**-- Use up to 1/7th the rack space**

**Coming From:**

- 2 Racks: **10 V490 servers** (20% utilized)
- Maximum energy requirement of **17,500 WATTS**

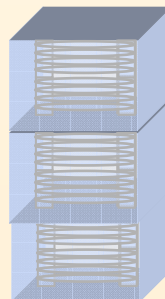


- One Power 550 Express server
- List Price of \$132,380
- Maximum energy requirement of **1,500 Watts**



Sun M4000 supports no more than 2 dynamic domains per system and would require **Five** M4000 servers to consolidate 10 V490s

- **Five M4000 servers**
- List price of \$571,900
- Maximum energy requirement of **10,080 Watts**



Requires **Three** HP Integrity rx6600 servers using IVM to consolidate 10 V490s

- Three HP rx6600 servers
- List price of **\$250,899**
- Maximum energy requirement of **4,800 Watts**

See Power 550 consolidation substantiation in backup for substantiation detail.

# AIX 6 and Power Is Very Available



## Virtualization

- Workload Partitions
- Workload Partitions Manager™
- Multiple Shared Pools
- Shared Dedicated Processors

## Security

- Role Based Access Control
- Trusted AIX
- Encrypting Filesystem
- AIX Security Expert

## Continuous Availability

- Concurrent AIX Updates
- Kernel Memory Protection keys
- Hot Add - Cold Replace
- Live Application Mobility
- Live Partition Mobility

## Manageability

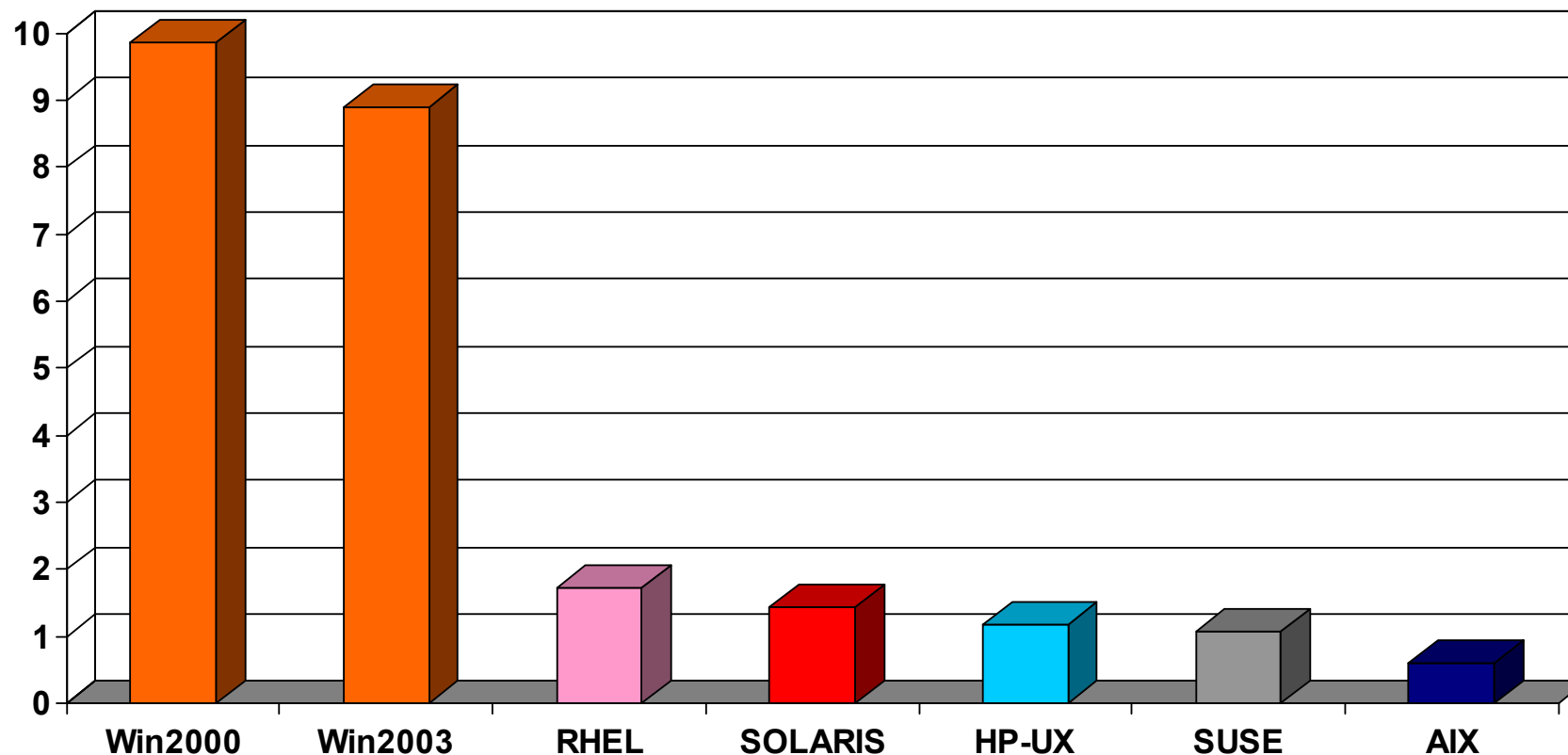
- System Director for AIX
- WPAR manageability
- Integrated Filesystem Snapshot
- Graphical Install



# OS Downtime Comparison Survey

400 participants in 27 countries

Hours



The Yankee Group "2007-2008 Global Server Operating Systems Reliability Survey" as quoted in "Windows Server: The New King of Downtime" by Mark Joseph Edwards at [www.windowsitpro.com/article/articleid/98475/windows-server-the-new-king-of-downtime.html](http://www.windowsitpro.com/article/articleid/98475/windows-server-the-new-king-of-downtime.html), March 5, 2008 and in <http://www.sunbeltsoftware.com/stu/Yankee-Group-2007-2008-Server-Reliability.pdf>

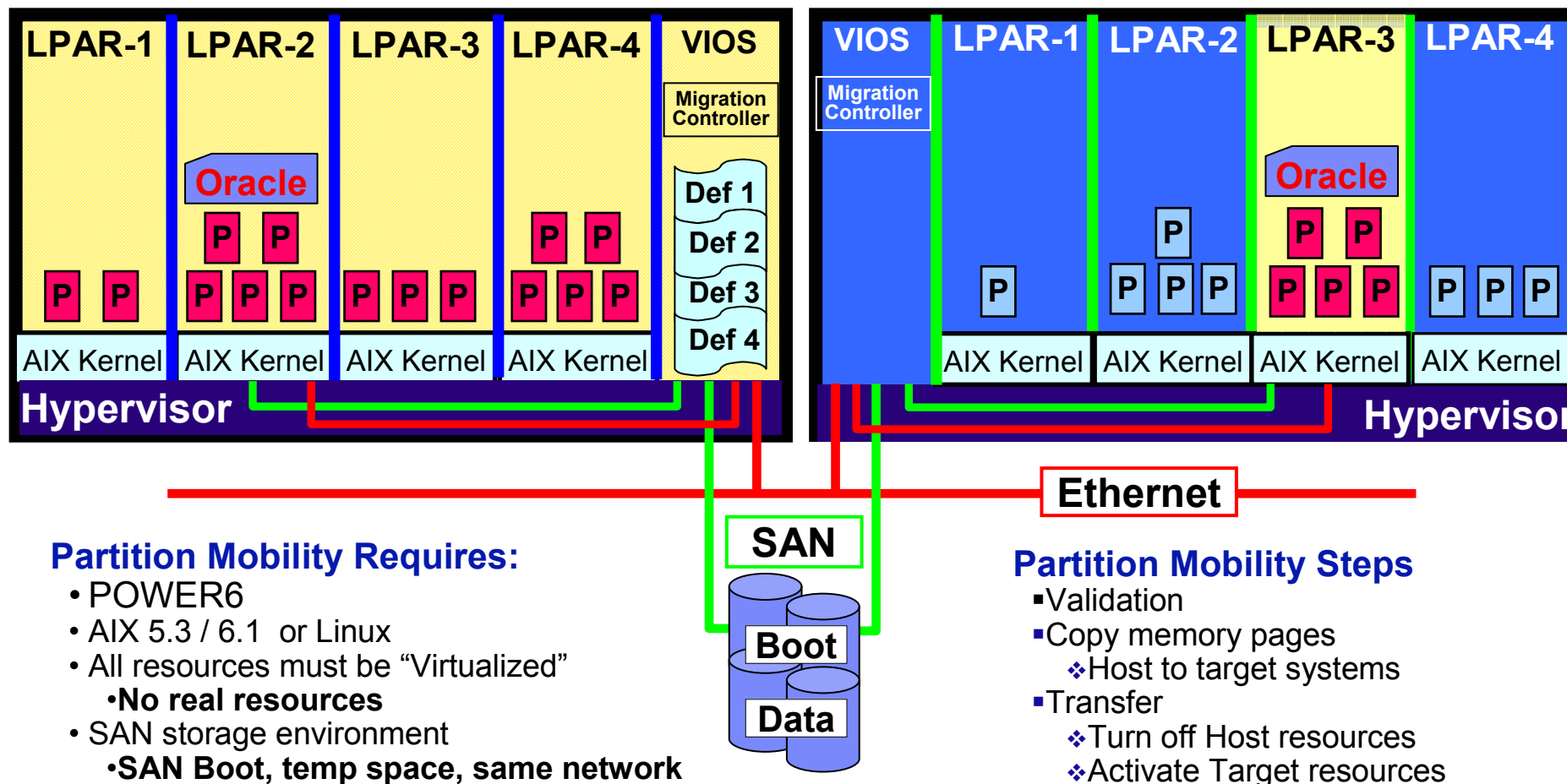
# Reliability by Design

- **Mainframe RAS Functionality for Unplanned Outages**
  - ▶ Extensive error detection and correction
  - ▶ Dynamic de-allocation of processors and cache
  - ▶ Hot plug, power, fans, adapters, disk, nodes
  - ▶ Concurrent maintenance of I/O drawers
  - ▶ Concurrent firmware upgrades
  - ▶ Logical Partition isolation
  
- **Elimination of Planned Outages**
  - ▶ Hot Add - Cold Replace of Processors and Memory
  - ▶ Live Partition Mobility
  - ▶ Live Application Mobility



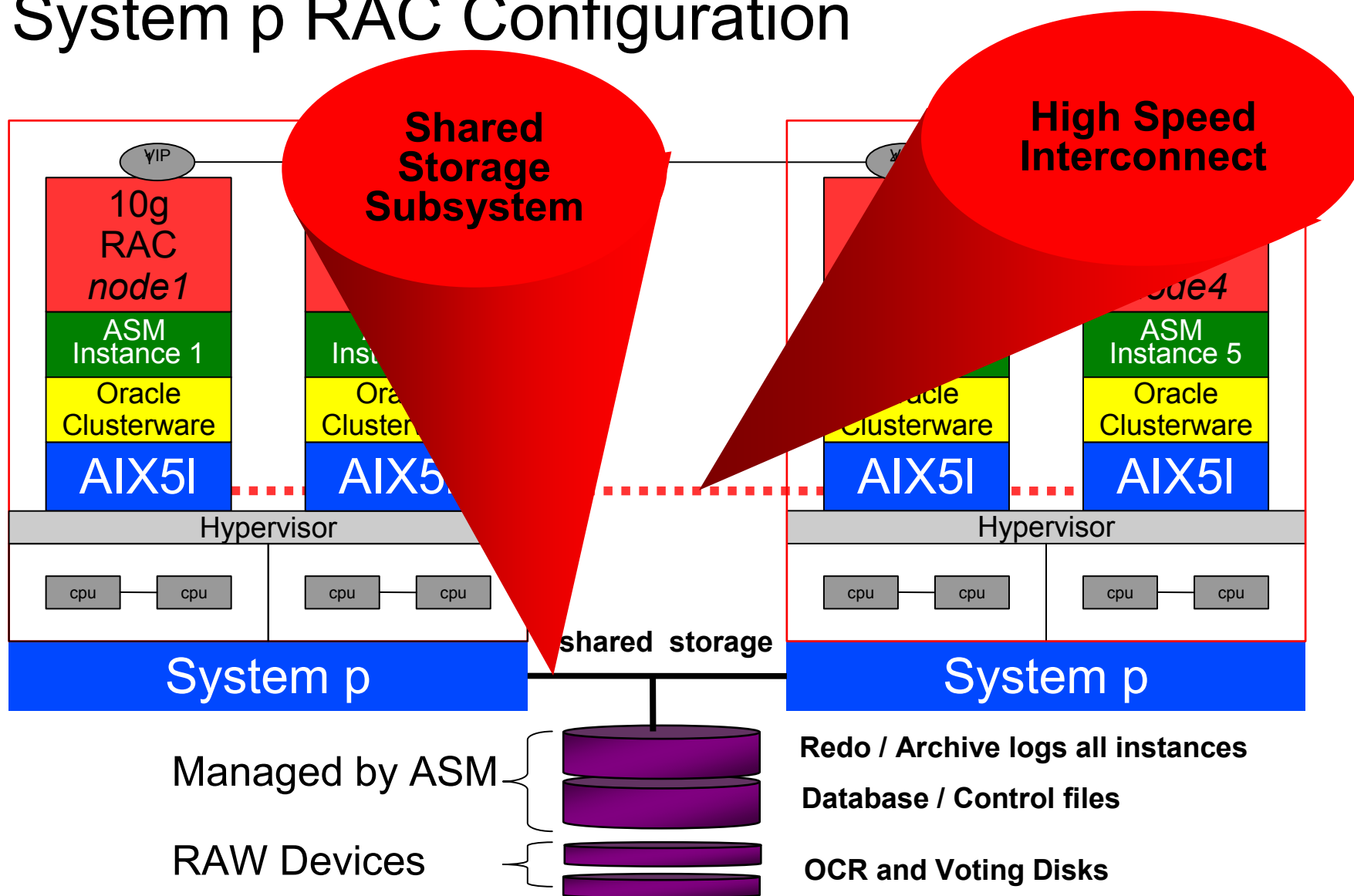
# Live Partition Mobility – migrate active LPAR between systems

Reduce impact of planned outages, relocate workloads to enable growth, provision new technology with no disruption to service



The number of Oracle licenses needed does not change before and after the migration

# System p RAC Configuration



# Real Application Cluster Realities

- Continuous Availability
- Performance & Scalability
- Resource Management
- Lower Cost



## RAC Provides Incremental High Availability

- Unplanned DB Outages:
  - RAC based node failover: **seconds**
  - HACMP (or other HA solutions) based failover: **minutes**
  - Manual failover: **minutes, hours or days**
  - **DB focused, applications may vary**
  
- Planned DB Outages:
  - Node startup/shutdown operations may be used to “move” workload from node to node or server to server
  - Rolling Upgrades may be used to perform some types of hardware/software maintenance (limited)
  - RAC may reduce downtime for conventional maintenance:
    - e.g. shutdown node 1, update node 1, shutdown node 2, startup node 1, update node 2, startup node 2

**Most/all of the HA benefit is achievable with 2-node or 3-node clusters. Greater numbers of nodes increase the number of possible failure points and overall management complexity.**

## RAC Scalability: OLTP Environments

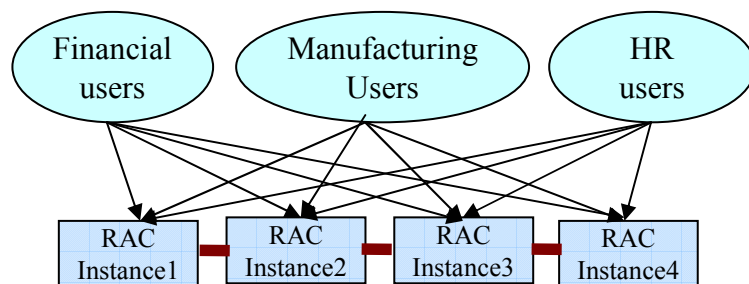
- **Scale-out tends to be good for OLTP environments when:**
  - There is low to moderate update activity
  - The workload is relatively uniform and predictable
  - The application is well designed and there are minimal lock/latch or serialization related contention issues
  - A functional partitioning strategy is used to direct users to a limited number of nodes
    - However, functional partitioning may reduce load balancing effectiveness
- **Industry benchmark proof points are limited:**
  - 1 out of 220 TPC-C benchmarks used RAC (16-node HP Integrity rx5670)
    - Relatively poor scale-out (1.72x) vs. non-RAC result on same hardware
    - No demonstrable \$/tpmC advantage vs. IBM p595 non-RAC results
  - Limited number of SAP, Oracle E-Business Suite, PeopleSoft, other results
- **Most customer RAC environments are 2 or 3 nodes**

**A deployment involving a small number of large nodes carries significantly less business risk than one involving many small nodes**

# Workload Balancing / Data Partitioning

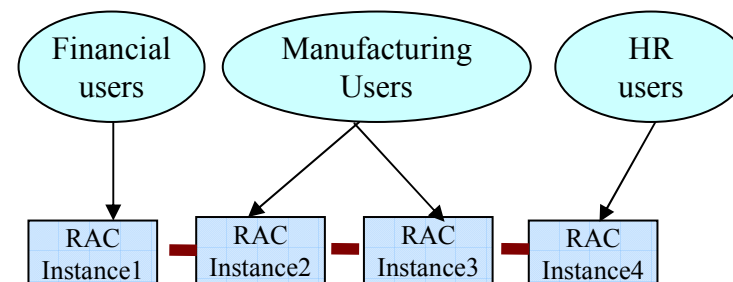
## Load Balancing:

- All workload is distributed across all available RAC nodes
- Common for well designed OLTP applications with few nodes



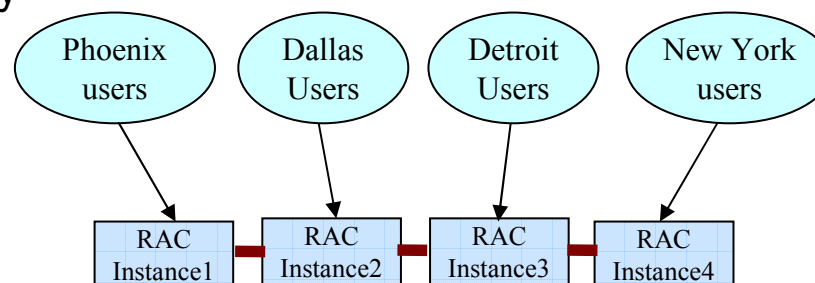
## Functional Partitioning

- Users or transactions assigned to one (or more) instances based on functional role
- May potentially mitigate contention related scale-out issues

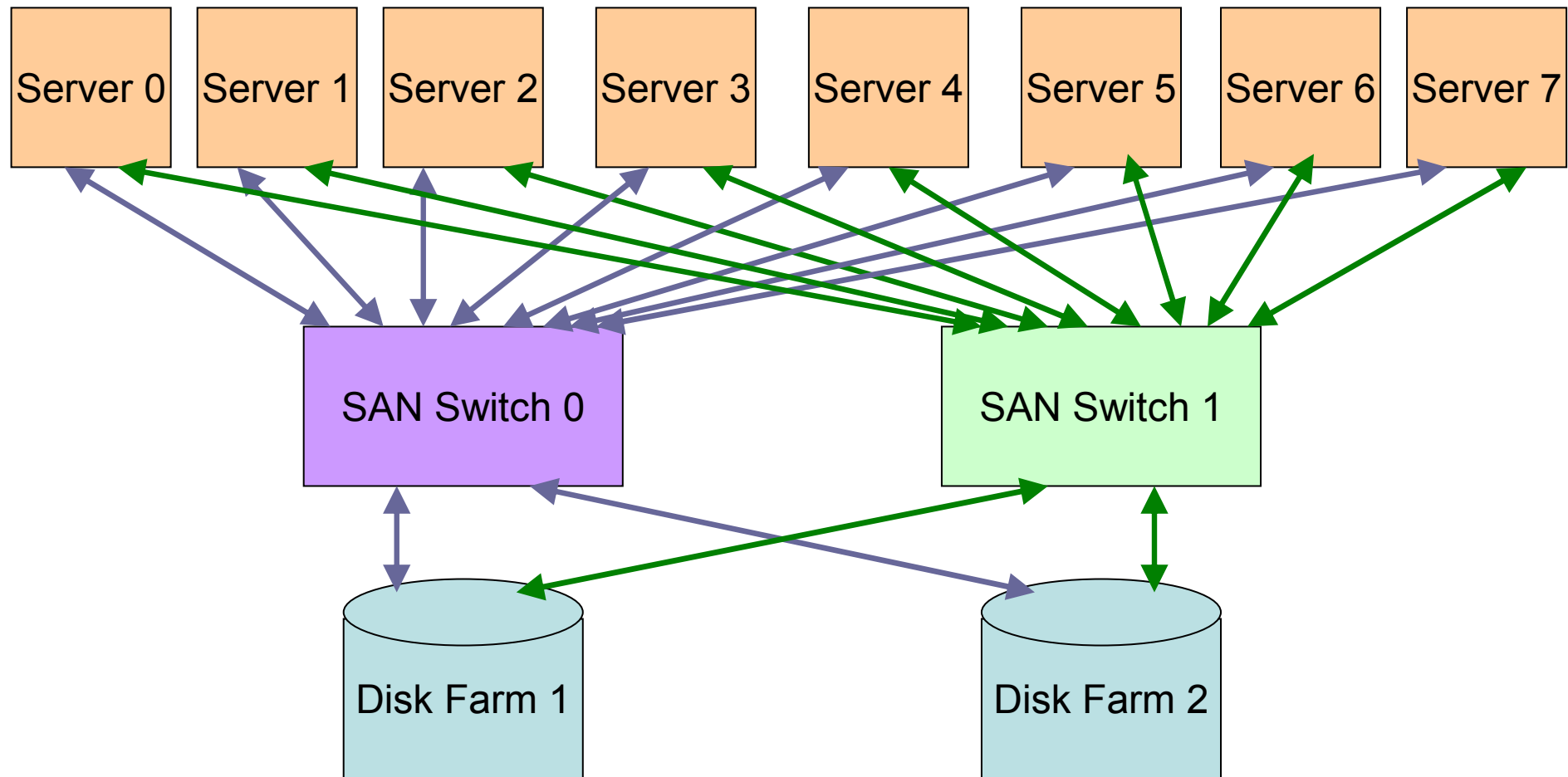


## Data Partitioning

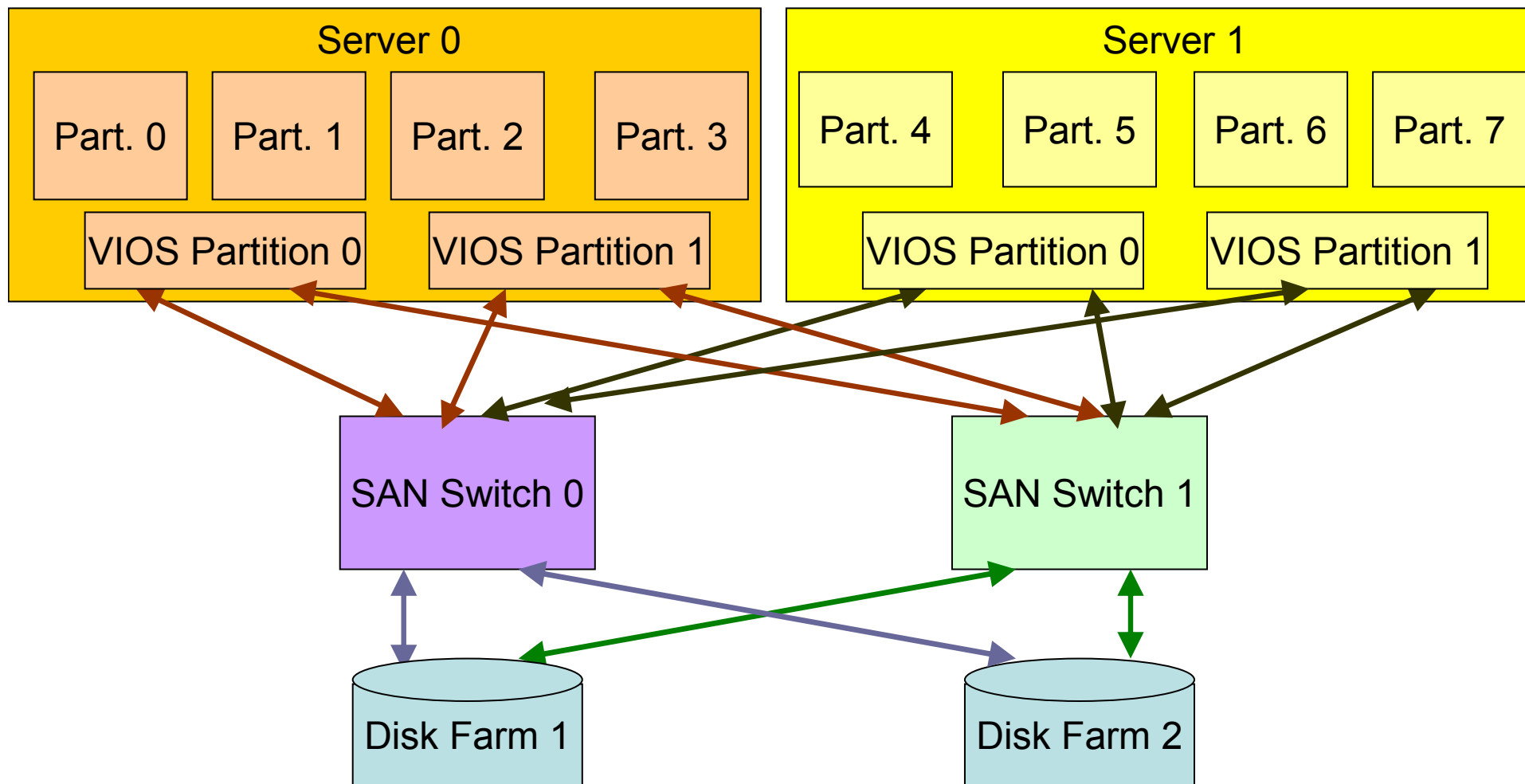
- Tablespaces are partitioned by key range
- Users or transactions assigned to one (or more) instances based on key range
- Common for Data Warehouse Environments



# Scale Out RAC Cluster Disk Topology



# Power RAC Cluster Disk Topology



## CPU Performance Matters: Software Savings Can Pay for Better Hardware

	Oracle Pricing Assumptions
Database	Oracle 10G
List Price**	\$47,500 per CPU
Annual Support	22% of Purchase Price
	Oracle RAC Pricing Assumptions
RAC License	\$23,000 per CPU
RAC Mgt Tools	
Configuration Mgt	\$3,500 per CPU
Change Mgt	\$3,500 per CPU
Tuning Pack	\$3,500 per CPU
Diagnostic Pack	\$3,500 per CPU
Partition Mgr	\$3,500 per CPU
Annual Support	22% of Purchase Price

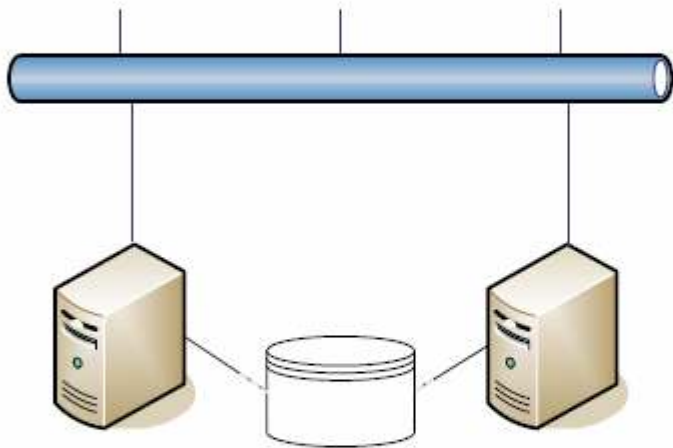
**Does Not Include RAC Node Connection Costs**

# Case 1: Oracle RAC on Nehalem vs Power6

(No compelling advantage)

## Nehalem

Oracle RAC

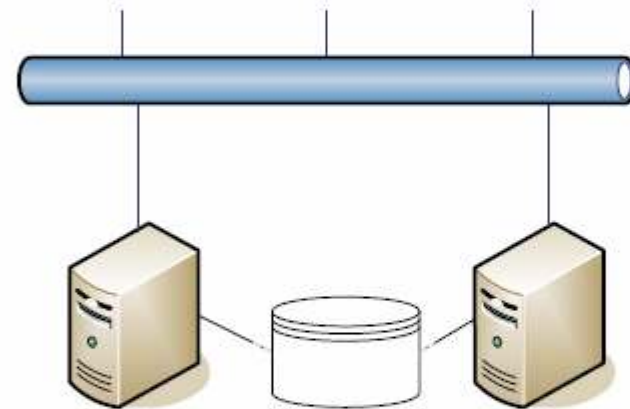


2 x 4 3550 2.6 GHz x5520 Core (RPE=14000)

4 Oracle licenses (8 cores x 0.5 Oracle lic/core )

## Power6+

Oracle RAC



2 x 4 p550 5GHz (RPE<14000)

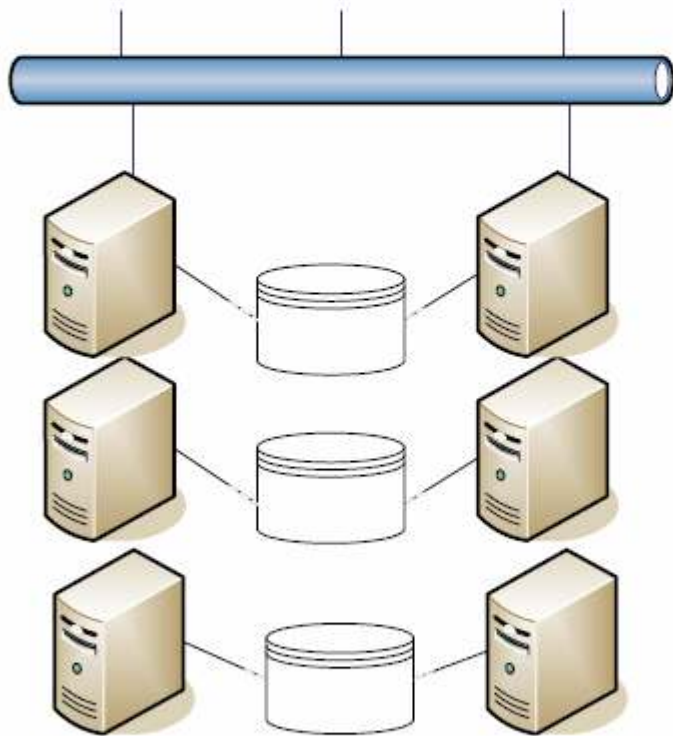
8 Oracle licenses (8 cores x 1 Oracle lic/core )

## Case 2: Oracle RAC on Nehalem vs Virtualized Power6

(Advantage moves to Power6)

### Nehalem

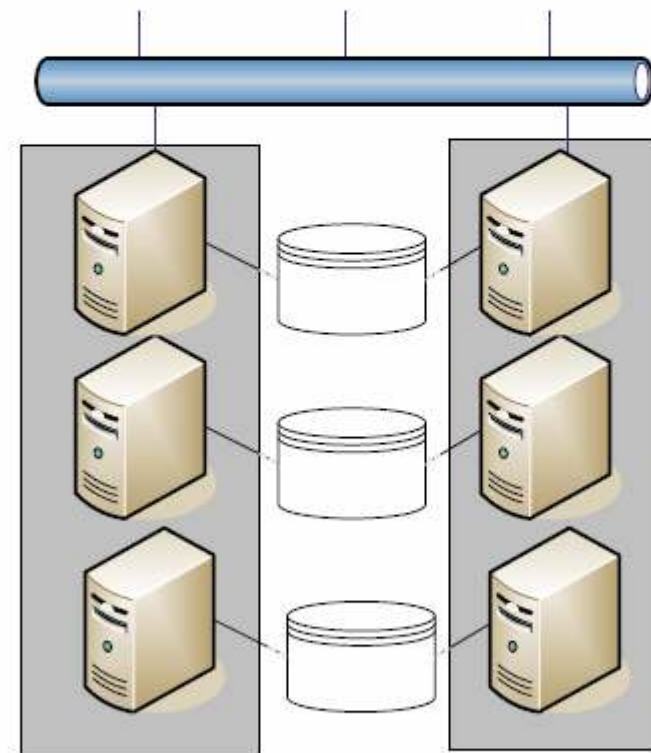
Oracle RAC



6 Standalone servers, 3 RAC Instances  
25% utilization  
24 Nehalem cores (6 x 4W x3550 2.6 GHz x5520 Core)  
12 Oracle licenses (24 cores x 0.5 Oracle lic/core )

### Power6+

Oracle RAC



2 P6 Servers, 6 micropartitions, 3 RAC Instances  
75% utilization  
8 P6 cores (2 x 4W p550 5GHz)  
8 Oracle licenses (8 cores x 1 Oracle lic/core )



## Power and Oracle Solutions Provide Unique Value

- Availability
  - Performance & Scalability
  - Resource Management
  - Lower Cost
- 
- System P, Oracle and RAC Is A Proven Solution
    - **System p performance and scale up ability is important**
    - **System p reliability is important**
    - **System p virtualization is important**
    - **IGS and GBS Solution teams have many happy customers**

Q&A