The New Generation of HP Integrity Servers and Oracle perspective

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What's announced..

Superdome 2

The ultimate mission-critical consolidation platform

Integrity Server Blades

World's first scale-up blades built on the industry's #1 blade infrastructure
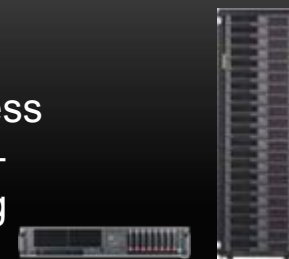
Delivered with Integrity

BladeSystem Matrix with HP-UX

Ultimate platform for shared services, now enhanced for mission-critical environments

rx2800 i2 Integrity Server

2-socket, 8-core scalability in 3x less compute density - without sacrificing RAS
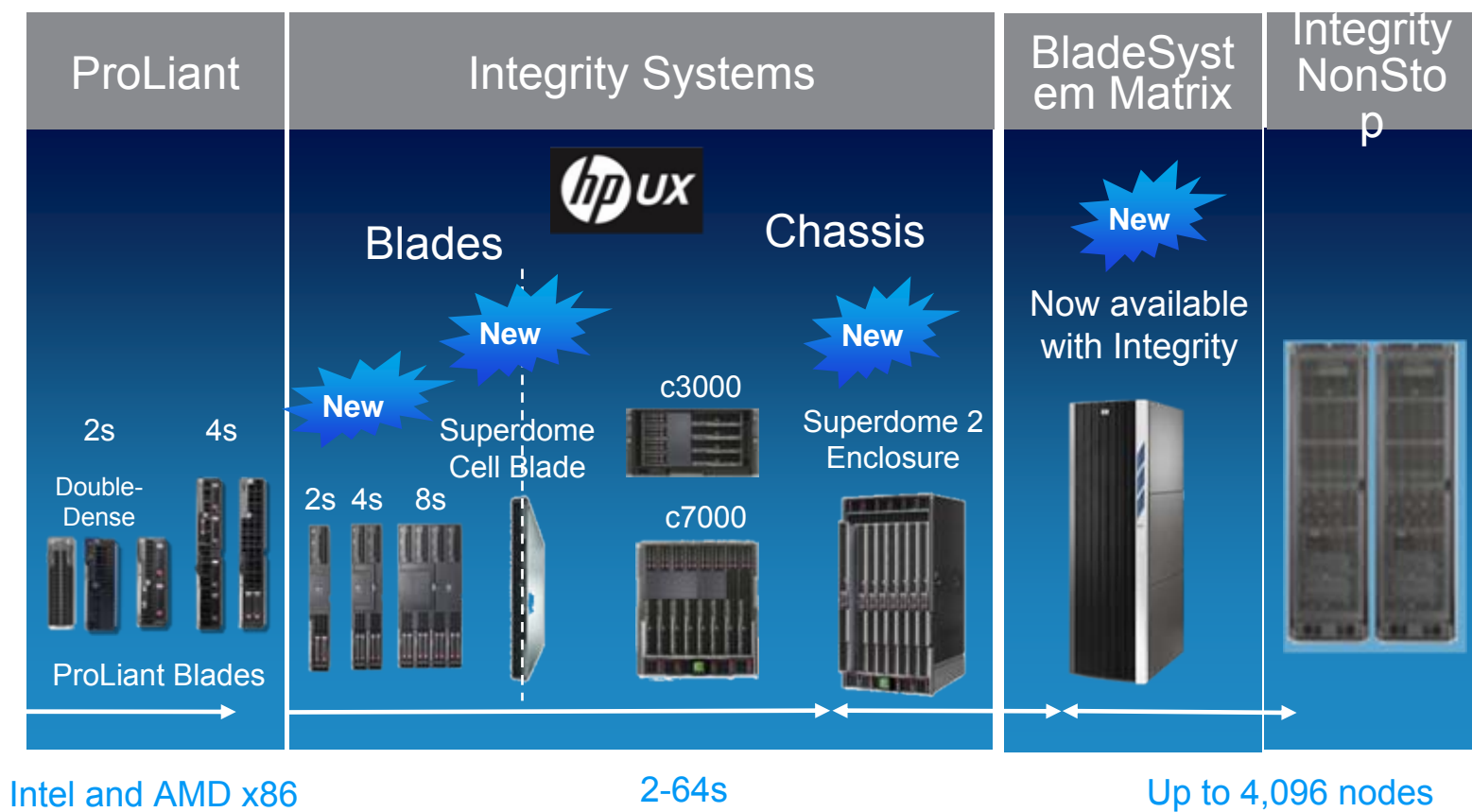
HP-UX 11i v3
The mission-critical foundation for converging resiliency and optimization

Unified blade architecture from x86 to Superdome

Simplify by consolidating applications on a common platform

ProLiant	Integrity Systems	BladeSystem Matrix	Integrity NonStop

hp ux

Blades

Chassis

2s   4s

Double-Dense

New

New

New

Superdome Cell Blade

c3000

Superdome 2 Enclosure

Now available with Integrity

New

2s 4s 8s

c7000

ProLiant Blades

Intel and AMD x86

2-64s

Up to 4,096 nodes
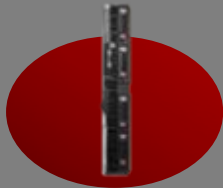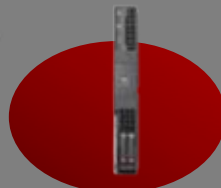
Train once, certify once, deploy once

COMMON MODULAR BUILDING BLOCKS

– Simplicity through standardization

Common management	Matrix operating environment delivered by Insight Dynamics Onboard Administrator, iLO3
Common networking	Virtual Connect
Common enclosure	c3000 c7000 Superdome 2 enclosure Common spares
Common server architecture	ProLiant blades Integrity blades Cell blades

HP INTEGRITY BL8X0C I2 SERVER BLADES

World's first scale-up blades built on the industry's #1 blade infrastructure

C3000 C7000

BL860c i2 BL870c i2 BL890c i2
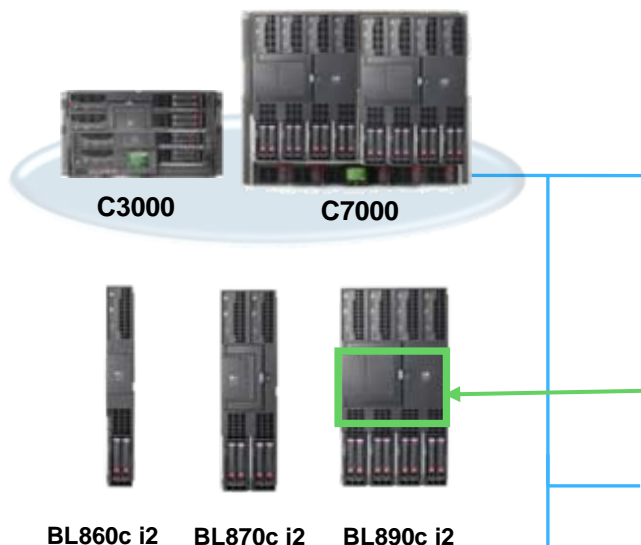
- Up to 8 socket/32 cores Intel® Itanium® processor 9300 series
- Up to 384GB DIMMs
- Up to 16 x 10 GbE (Flex-10) NICs

Common Architecture from x86 to Superdome

- Mix and match new and existing Integrity, ProLiant and StorageWorks storage blades within the same enclosure
- 2.5x compute density compared to traditional rack mount servers

Blade Link

- Scale up, out and within, scale more and scale linear
- Combine multiple blades to create 2, 4 and 8 socket systems

HP Virtual Connect Flex-

- Network scalability and configuration flexibility
- Up to 20x increase in networking bandwidth
- Virtually connect LAN, SAN, facilities, etc.

Flexible mission-critical server blades combined with the efficiency of HP BladeSystem to accelerate IT effectiveness

NEW INTEGRITY SERVER BLADES OVERVIEW

Management

- Integrity iLO 3
- Integrity iLO 3 Advanced Pack
- Integrated VGA console
- c-Class Onboard Administrator (firmware v3.0)

Processors and chipset

- Intel Itanium 9300-series processors (Tukwila family)
- Intel E7500 Scalable Memory Buffer (Mill Brook)
- Intel E7500 IOH (Boxboro)
- Intel ICH10 south bridge

Form factor

- Full-height c-Class form factor
  - Single wide BL860c i2 — 2S
  - Double wide BL870c i2 — 4S
  - Quad wide BL890c i2 — 8S
- Supported in c3000 and c7000 enclosures

I/O subsystem per blade

- 5X I/O BW increase over previous generation
- Integrated p410i RAID controller
- 2 dual-port 10GbE Flex-10 NICs
- 3 PCIe G2 mezzanine slots

Memory

- ~6X memory BW increase over previous generation
- 24 PC3-8500 DIMM sockets
- 192 GB capacity per blade with 8GB DIMMs

High availability

- Memory double chip spare
- Redundant hot-plug power
- Redundant hot-swappable fans
- Internal SAS RAID
- Processor deallocation on failure

Operating system support

- HP-UX 11i v3
- OpenVMS 8.4 (CQ3 2010)
- Windows 2008 R2 (Q3/Q4 2010)

3-year, next-day, on-site base warranty

Additional I/O options

- Two hot-plug SFF SAS HDDs per blade
- Partner blade support (BL860/870) – disk, tape

Blade Link
Linear scalability with industry's first 2-4-8 socket UNIX server blades

Blade Link combines multiple blades into
a single, scalable system

Scale Up, Out and Within

Scale More — Only 8-Socket UNIX blade in industry standard blade enclosure

CPU	2s/8c	4s/16c	8s/32c
Memory	96GB **X 2 =**	192GB **X 2 =**	384GB
LAN	4 x 10GbE	8 x 10GbE	16 x 10GbE
HDDs	2 Slots	4 Slots	8 Slots

Scale Linear — System resources grow evenly across CPU, memory, I/O, and etc

8 socket system at 2x the performance in half the footprint

BUSINESS BENEFITS OF BLADE SCALE ARCHITECTURE

THE TRUE VALUE OF A MISSION-CRITICAL INFRASTRUCTURE

Business outcomes

Up to 100% application uptime

>2x improvement in resource utilization

Reduce deployment times by up to 50%

System Performance

- 2 – 9X on Benchmarks

- Up to 40x for our historic customers

30% less power per core

Half the data center footprint

Integrity server blades based on Blade Scale Architecture

Per-socket performance increase
Up to 2.7x   SPECint_rate_base200
3.8x   SPECfp_rate_base2006
2.5x   SPECsfs2008_nfs.v3
9.1x   STREAM Triad

Introducing Superdome 2

The ultimate mission-critical consolidation platform

Common Architecture from x86 to Superdome

- Common spares: power supplies, fans & I/O
- Modular, front-back serviceable racks
- Common management for entire infrastructure
- Zero-to-managed in minutes

Superdome 2 Crossbar Fabric for Extreme Scalability and Reliability

- Independent I/O scaling to meet any workload
- Only Unix system with end-to-end multi-pathing
- Boosts infrastructure reliability by 450%

- Up to eight 2s cell blades (16s/enclosure)
- 32 DIMM sockets (2TB with 8GB DIMMS)
- Up to 24 mezz. & 96 stand up I/O slots
- 18U in standard HP Rack
- 64s capable with 4 base enclosures
- Programmable active door display

Power-on-Once Technology

- **Superdome 2 Analysis Engine:** proactive error detection and prescriptive recommendations
- **End-to-End Transaction Retry:** transactions tracked, retried and rerouted to completion
- **Online Optimization and Repair**: tool-free serviceability + single-click firmware upgrades

Extreme scalability, on-demand modularity and unquestioned reliability

SUPERDOME 2

– The ultimate mission-critical consolidation platform

Front View

| Blades/ Processors	• Up to eight 2S Superdome blades per enclosure
Memory	• 2TB memory capacity (per enclosure, 8GB DIMMS)
Form Factor	• 18U in standard HP rack
Networking	• 32 integrated 10Gb Ethernet NICs • 8 switch bays • 1GE Manageability LAN
I/O Slots	• 24 mezzanine slots • Up to 96 stand-up I/O slots with IO expansion
Management	Onboard Administrator: HP Insight display
Partitioning	• 8 nPars (up to 32 with 4 enclosures) • vPars (16 per nPar), HPvm
Bandwidth	• 1.2TB/s memory BW, .8TB/s I/O BW (64 socket)
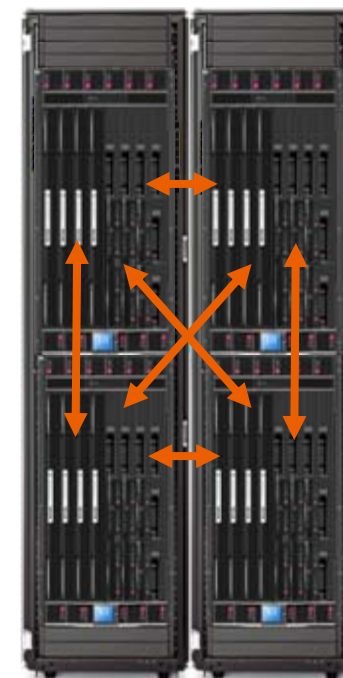
SD64
32 Cell blades
(36U, dual 19" racks)

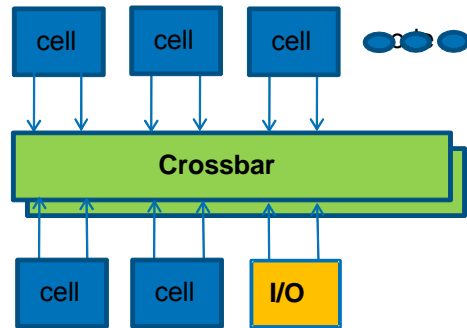| Tukwila	
64	Sockets
256	Cores
512	Threads
8* TB	Memory
128 Internal	10 GbE
96 Internal	PCI-E
96 IOX	PCI-E

SUPERDOME 2 CROSSBAR FABRIC

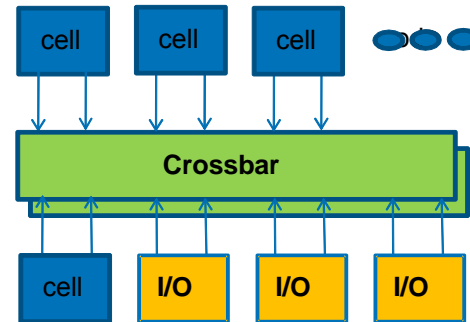Independent I/O scaling with fault tolerant crossbar

Compute Intensive

I/O Intensive

Independent Scaling
- Flexibly adjust compute and I/O mix
- Only Unix server to scale I/O independently from CPU
- Enables optimal configuration for every workload

Fault Tolerant Crossbar
- Multiple crossbars enable fully redundant data path
- Crossbars blade modules provide simple hot-plug serviceability

Positioning the new vs. current servers

Montvale-based Integrity servers

Integrity Servers based on
Blade Scale Architecture

Cores

Superdome

rx8640

rx7640

rx6600

BL870c

rx3600

rx2660

BL860c

Superdome 2
32 s

Superdome 2
8 s

BL890c i2

BL870c i2

BL860c i2

rx2800 i2

Primary

Secondary
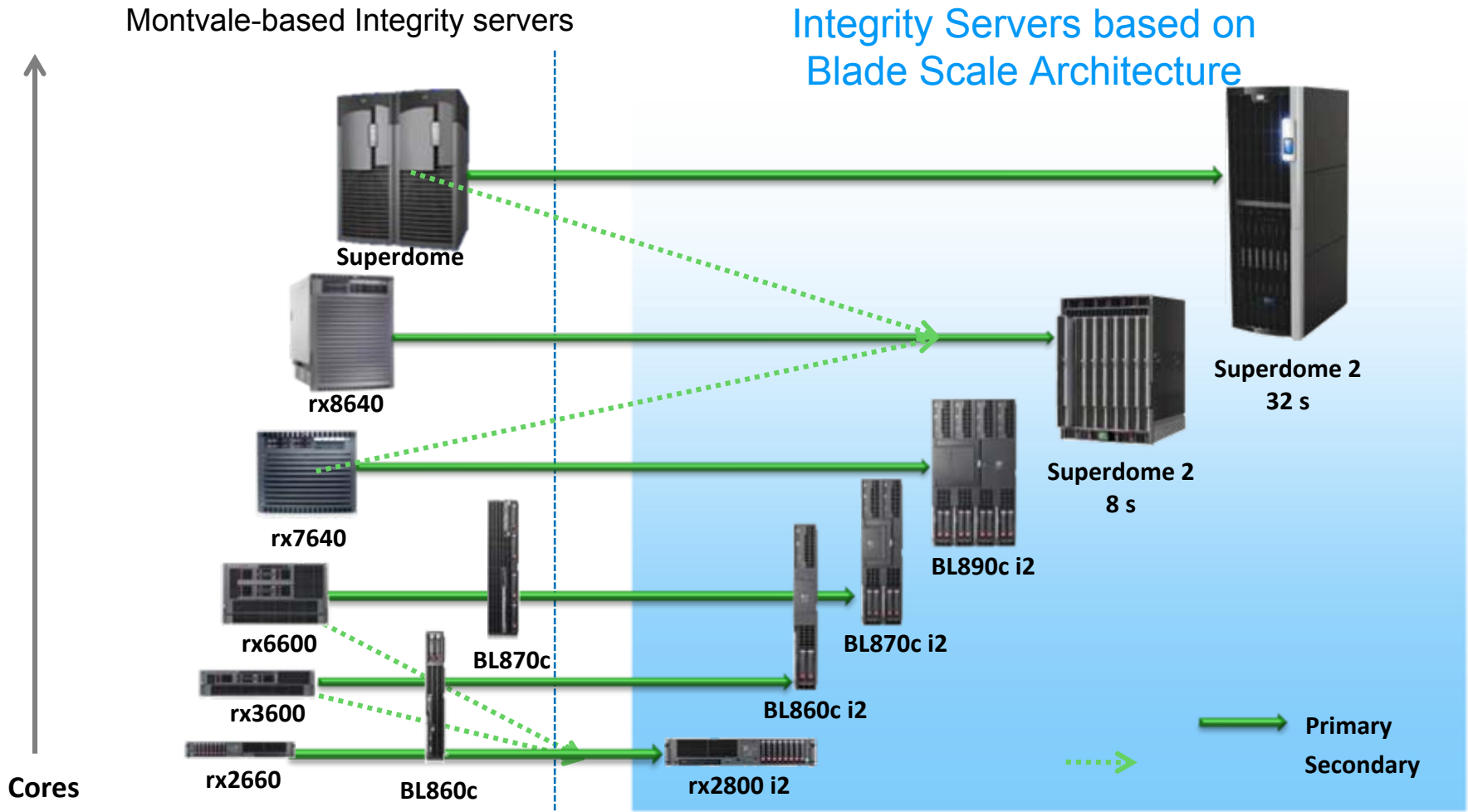
>2x performance per socket and much better price/performance

The HP Advantage
The Most Complete IT Portfolio
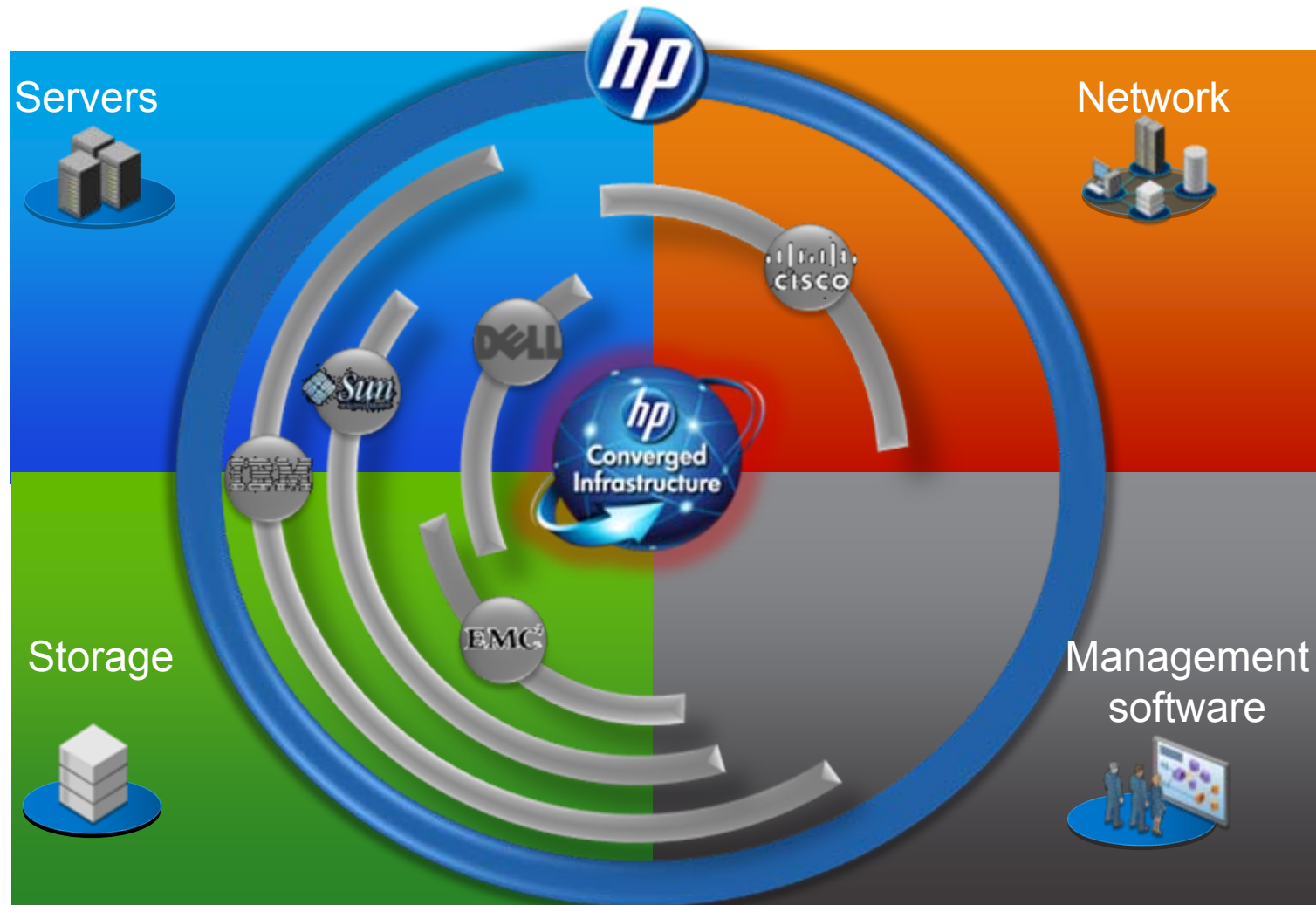
HP-UX 11I SOFTWARE POLICIES

– Simple, predictable, sustainable investments

Licensing

Now it's per socket

– Easy to understand

– Fewer licenses to manage

Pricing

Not based on core counts

– Prices will be the same, or slightly higher, than today's Montvale socket price (which means per core price is 50% less)
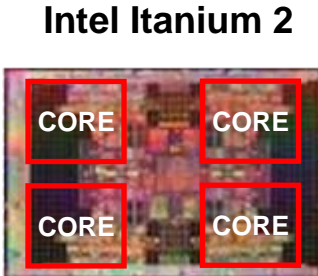
Investment protection
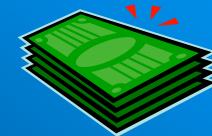
Maintains the value

– Customers can "trade-in" existing software licenses for new licenses when upgrading servers*

– "A socket for a socket" – 2 per core licenses = 1 per socket licenses

– Retains the value of prior investments

* Software support contract required

# IBM & ORACLE SOFTWARE LICENSING REQUIREMENTS FOR HP INTEGRITY SERVERS:

– As of February 16th, 2010 Oracle is charging IBM Power7 customers one full license per processor core, consistent with their POWER6 license charge. All Intel processors, including Itanium, still have a core factor of .5.[1]

– IBM charges a 20% higher license fee for its own software (including DB2) running on POWER7 (POWER 770/780) systems vs. Power5 or Itanium-based Servers.[2]

	IBM SW	Oracle
IBM Power7	Up to 120 PVU	1.0
RISC (Dual Core)	100 PVU	.75
Intel Itanium 93XX	100 PVU	.5

Intel Itanium 2

Oracle:
0.5 Core Factor * 4 Cores = **2.0 Licenses**

IBM Software:
100 PVU's * 4 Cores = **400 PVU's Required**

IBM POWER7
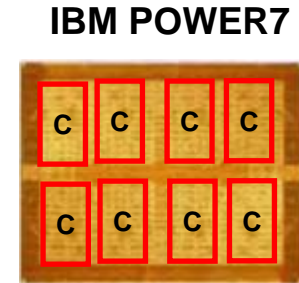
Oracle:
1.0 Core Factor * 8 Cores = **8.0 Licenses**

IBM Software:
120 PVU's * 8 Cores = **960 PVU's Required**

Licenses for IBM P6 cost:

• 200% more per core than Itanium running Oracle

• 20% more per core than Itanium running IBM SW

http://www.oracle.com/corporate/contracts/library/processor-core-factor-table.pdf (02/16/2010)

2 http://www-01.ibm.com/software/lotus/passportadvantage/pvu_licensing_for_customers.html

ORACLE DATABASE AND MIDDLEWARE FOR HP-UX

NGIS Blade Scale Architecture

– Oracle Database and OFM versions

  • If supported on HP-UX 11iV3 → supported for NGIS

  • No Oracle certifications required

– HP APS lab has been using NGIS servers for several months

  • testing Oracle Database (single-instance and RAC)

  • testing OFM (on physical servers and HP VMs)

– "NGIS support for Oracle RDBMS" best practices white paper in preparation

– Oracle per-core database pricing (0.5) the same as current Integrity platforms

ORACLE APPLICATIONS FOR HP-UX

NGIS Blade Scale Architecture

– For major "managed" applications
  • Focused on E-business suite, PeopleSoft, Siebel, J.D. Edwards, Retail
  • No certifications needed
  • Applications supported on 11iV3 will run on NGIS at launch
  • New upcoming releases of these applications will be fully supported on 11iV3

– Results from testing
  • EBS seeing about 10% performance increase per core
  • Scaling testing shows more than 2X performance per socket

– Other applications
  • Check availability matrix

ORACLE ON HP-UX 11.31

- BL8x0-i2 servers are just another "HP-UX 11.31 Itanium" platform for Oracle

  - Database 10gR2 requires "-ignoreSysPreReqs" option to Universal Installer
  - HP-UX 11.31.1003 contains all the HP-UX patches required for currently shipping Oracle products
    - Exception: PHKL_40381 for Database 11.2.0.1
  - Kernel parameter recommendations remain unchanged

- Java Support

  - Base HP-UX install includes 1.4.2, 5.0, and 6.0
  - JVM 1.4.2 included with Oracle 10gR2 is outdated; runInstaller may require "-jreLoc /opt/java1.4" option to function properly.

ORACLE ON HP-UX 11.23

- BL8x0-i2 servers require HP-UX 11.31

  - HP-UX 11.23 support available as HPVM Guest O/S
  - Patches required on guest: PHCO_40685 and PHKL_40684

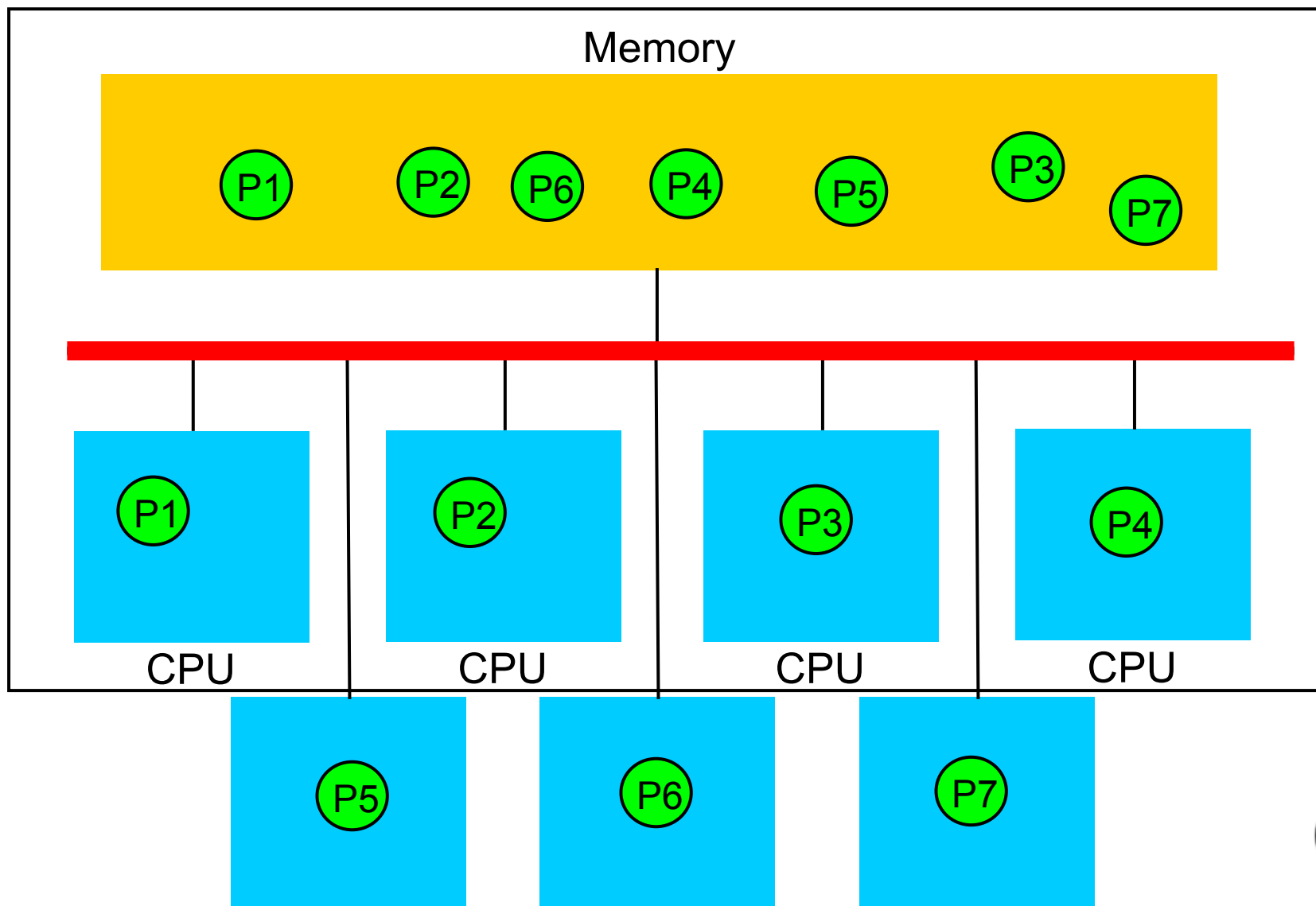- Oracle Database 11.2.0 is NOT supported on HP-UX 11.23

PREVIEW: TWO SIMPLE RULES REMEMBER THESE IF NOTHING ELSE!

1. Be consistent in configuring Oracle and HP-UX

   • Ensure sufficient CLM or disable ccNUMA optimizations

   • Especially with older Oracle/HP-UX versions!

2. We highly recommend that you disable Oracle's ccNUMA optimizations when dynamic resource allocation will be used; otherwise:

   • Need to ensure survival of all "original localities"

   • Dynamically adding resources tends to de-optimize Oracle optimizations
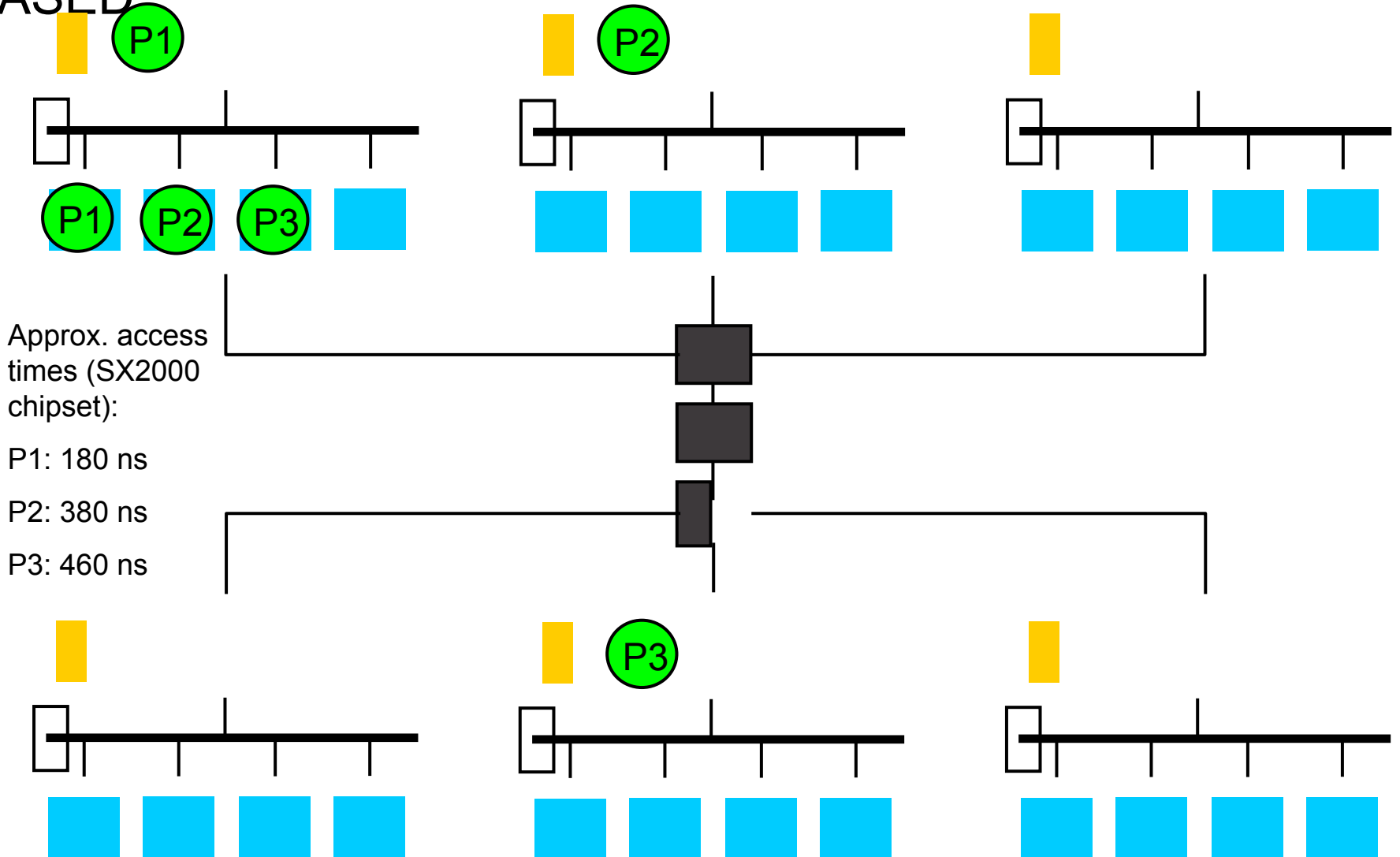
TRADITIONAL SERVER DESIGN
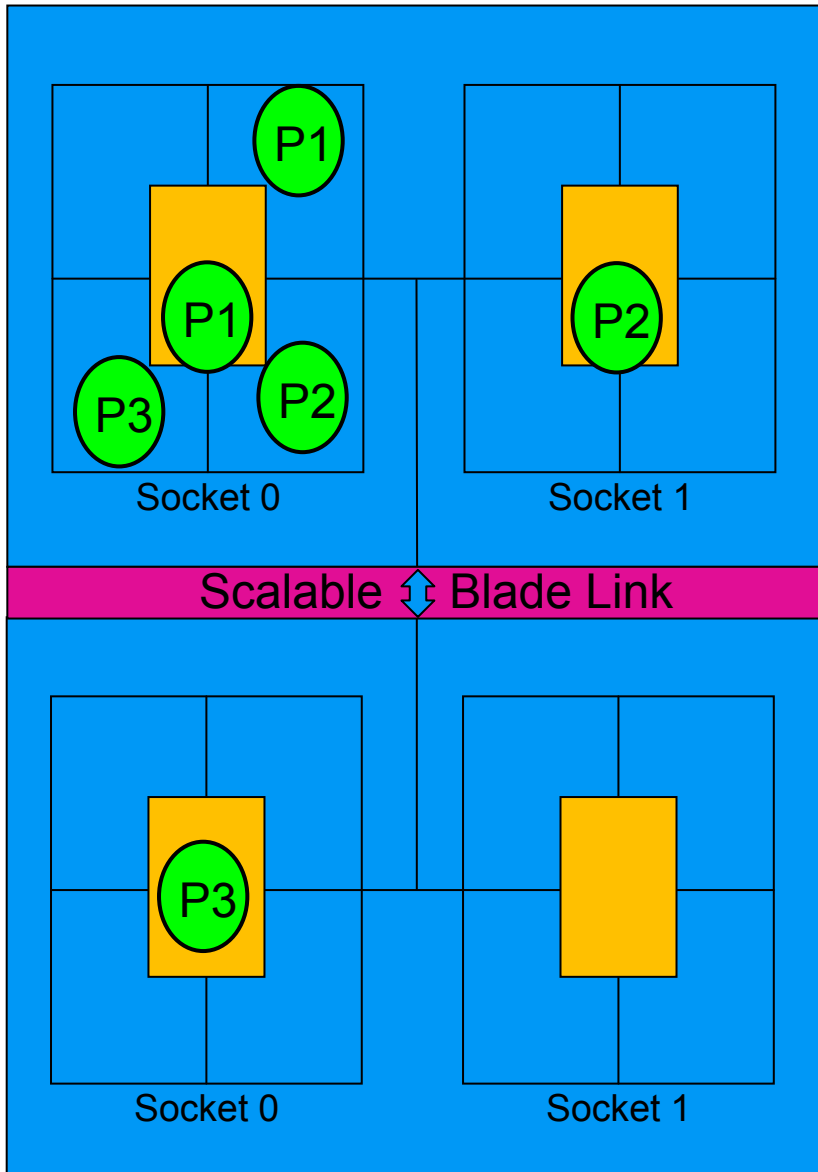## UNIFORM MEMORY ACCESS

SCALING UP WITHOUT THE BUS BOTTLENECK NON-UNIFORM MEMORY ACCESS (NUMA) – CELL-BASED

P1

P2

P1 P2 P3

Approx. access times (SX2000 chipset):

P1: 180 ns

P2: 380 ns

P3: 460 ns

P3

CCNUMA IN A BLADE ARCHITECTURE
2ND-GENERATION INTEGRITY BLADES

- Each socket is a locality domain (LDOM)

- In one-blade or two-blade server, every LDOM at most one "hop"
  - P1: ~175ns
  - P2: ~245ns
  - P3: ~263ns

ORACLE CCNUMA OPTIMIZATIONS
ORACLE DATABASE – SUPPORTED VERSIONS

- 10gR2 was the first to support NUMA optimizations on HP-UX
  - 10.2.0.3 : optimizations enabled by default
  - 10.2.0.4 : optimizations enabled by default BUT DO NOT WORK (bug 9668940). <u>Optimizations should be explicitly disabled.</u>
  - 10.2.0.5 (future) : optimizations off by default; 9668940 will be fixed.
- 11gR1 (11.1.0.6 and 11.1.0.7) : optimizations on by default
- 10gR2, 11gR1: no supported way to disable optimizations
  - Oracle recommends patch 8199533 to switch optimizations off by default (10.2.0.5: not necessary)
- 11gR2: *NEW* supported init.ora parm to control optimizations
  - 11.2.0.1 : optimizations disabled by default
  - 11gR2 generates messages in alert log
- *Best Practice: explicitly set optimizations state in init.ora!*

ALWAYS MATCH HP-UX & ORACLE SETTINGS!

Optimize or don't optimize

hp-ux Oracle	11i v2	11i v3
10gR2/11gR1	Ensure adequate CLM & _enable_NUMA_optimization=true (or set to false and config most memory as ILM)	Ensure adequate CLM & _enable_NUMA_optimization =true (or set to false and config system in non-LORA mode – most memory ILM)
11gR2	N/A (Oracle11gR2 does not support HP-UX 11i v2)	_enable_NUMA_support=true ;Ensure that LORA_MODE=1 (config enough CLM) (or config system in non-LORA mode – config most memory as ILM)

REFERENCE MATERIALS

– http://www.hp.com/go/integrity

  • Select "HP Integrity server blades" link at left

– http://support.oracle.com

  • "Platform Notes" section for HP-UX Itanium certification page contains specific language about Tukwila support

– http://www.hporacle.com

  • Success stories about Oracle on Integrity server blades
  • Reference architectures for server blade deployments

Outcomes that matter.

Backup Slides

ON JANUARY 27TH ORACLE TOOK CONTROL OF SUN AND DELIVERED THIS MESSAGE

Oracle + Sun: Transforming The Industry

- Complete, engineered, and integrated systems
- Innovation across the stack
- Open standards
- Industry solutions
- Highest level of customer service

Improving the way you buy, run and manage business systems.

ORACLE

WITH SUN ELLISON WANTS TO BUILD ANOTHER "IBM OF THE 60'S" VISION FOR THE NEW ORACLE

ORACLE'S "GO FORWARD" STRATEGY – DO IT ALL

Only Oracle Delivers Complete Systems

But When and for Whom?

	Oracle	IBM	Microsoft	HP	SAP
Vertical Apps	●				
Horizontal Apps	●		●		●
Middleware	●	●	●		◗
Database	●	●	●		◗
Operating System	●	●	●	●	
Virtualization	●	◗	●	◗	
Servers	●	●		●	
Storage	●	●		●	
Management	●	●		●	

ORACLE

EXADATA V2 – 1ST ORACLE PRODUCT REFLECTING ORACLE/SUN HIGH VALUE APPLIANCE STRATEGY

– Based on low cost x86, servers - <u>not SPARC</u>

– Uses Oracle Enterprise Linux (OEL) , <u>not Solaris</u>

– Software costs are astronomically high – $2,624,000 per rack

– 22 servers per rack to manage (14 storage, 8 database)