
hp
invent

hp virtual partitions (vPars)

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agenda

part 1

- ✓ what is partitioning?
- ✓ why is partitioning important?
- ✓ hp partitioning continuum
- ✓ hp virtual partitions (vPars)

part 2 (time permitting)

- ✓ vPar configuration & management
- ✓ CPU migration demo
- ✓ resources
- ✓ questions

definition of partitioning

partitions are physical or logical mechanisms for *isolating operational environments* within single or multiple servers to offer the *flexibility of dynamic resizing* while ensuring that applications can enjoy *protection from unrelated events* that could otherwise cause disruption, interruption, or performance degradation.

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why is partitioning important?

pressure to offer service level guarantee at reasonable costs

under utilization of servers

address high fluctuation of Web and App traffic

flexibility with privacy and high availability

hp partitioning customer benefits

meet service level agreements with best return-on-investment

80-90% + Utilization of compute power

fast and dynamic implementation of changing requirements

“right” level of application isolation with uptime

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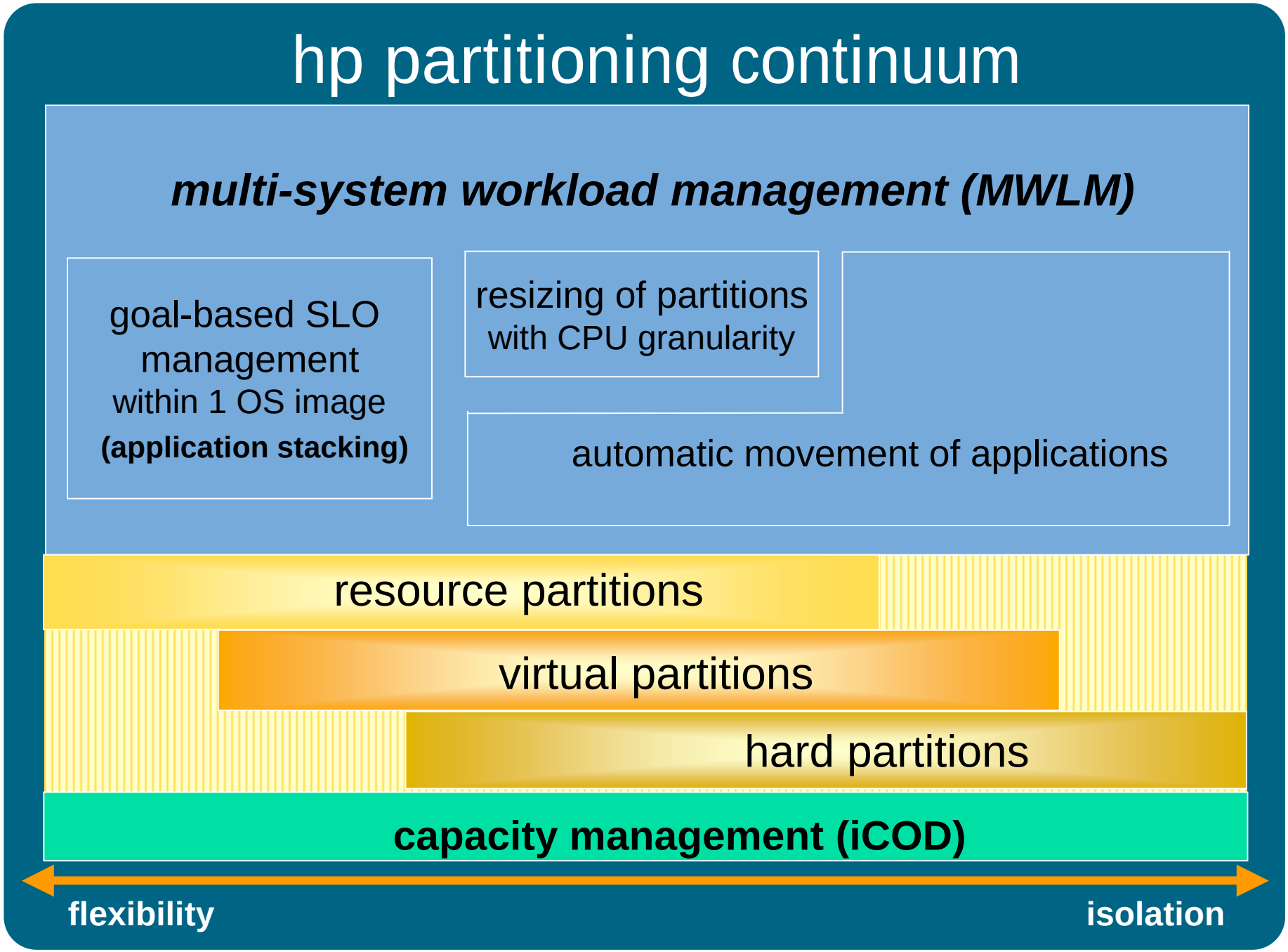
hp partitioning continuum



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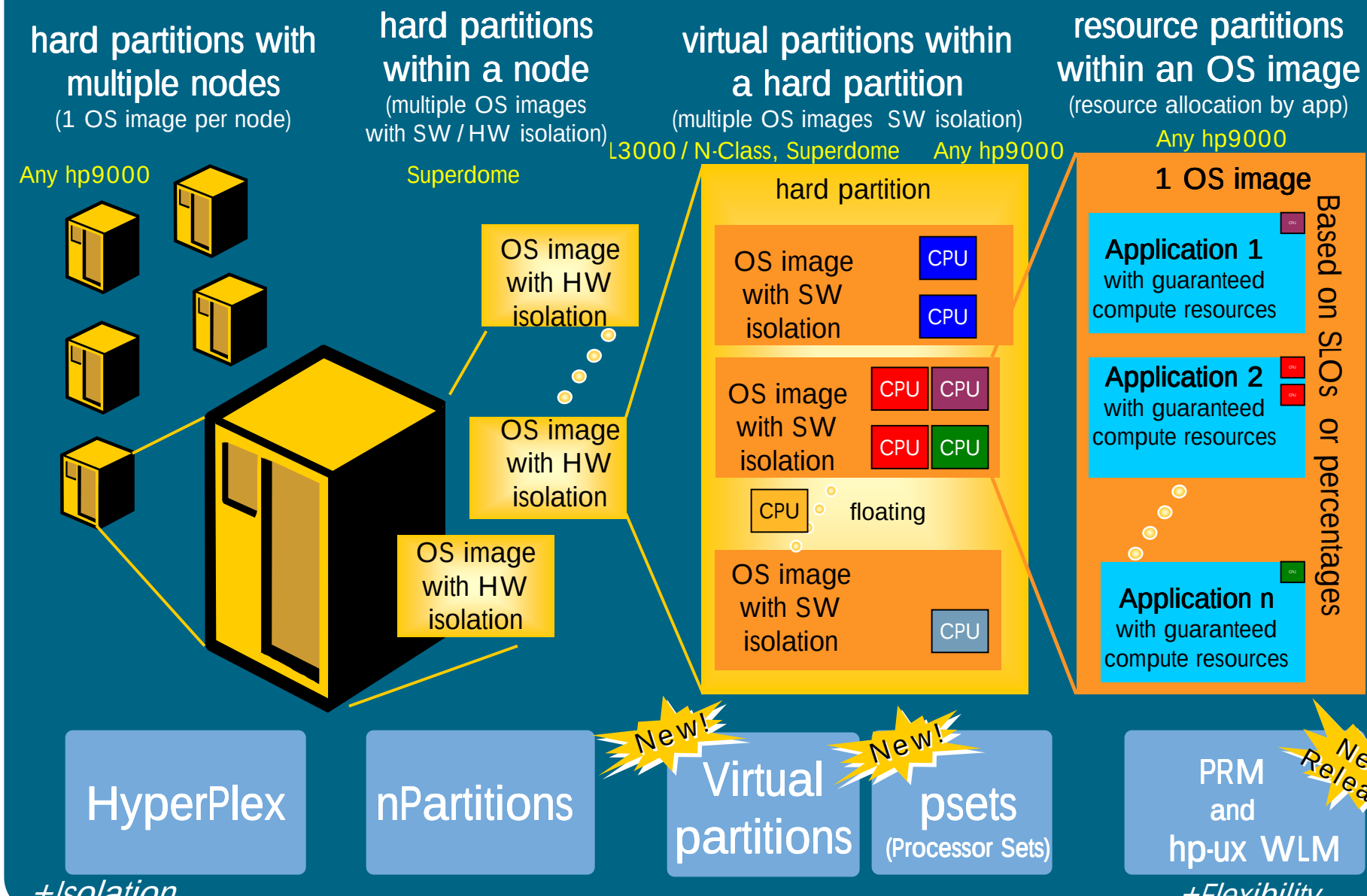
hp partitioning continuum



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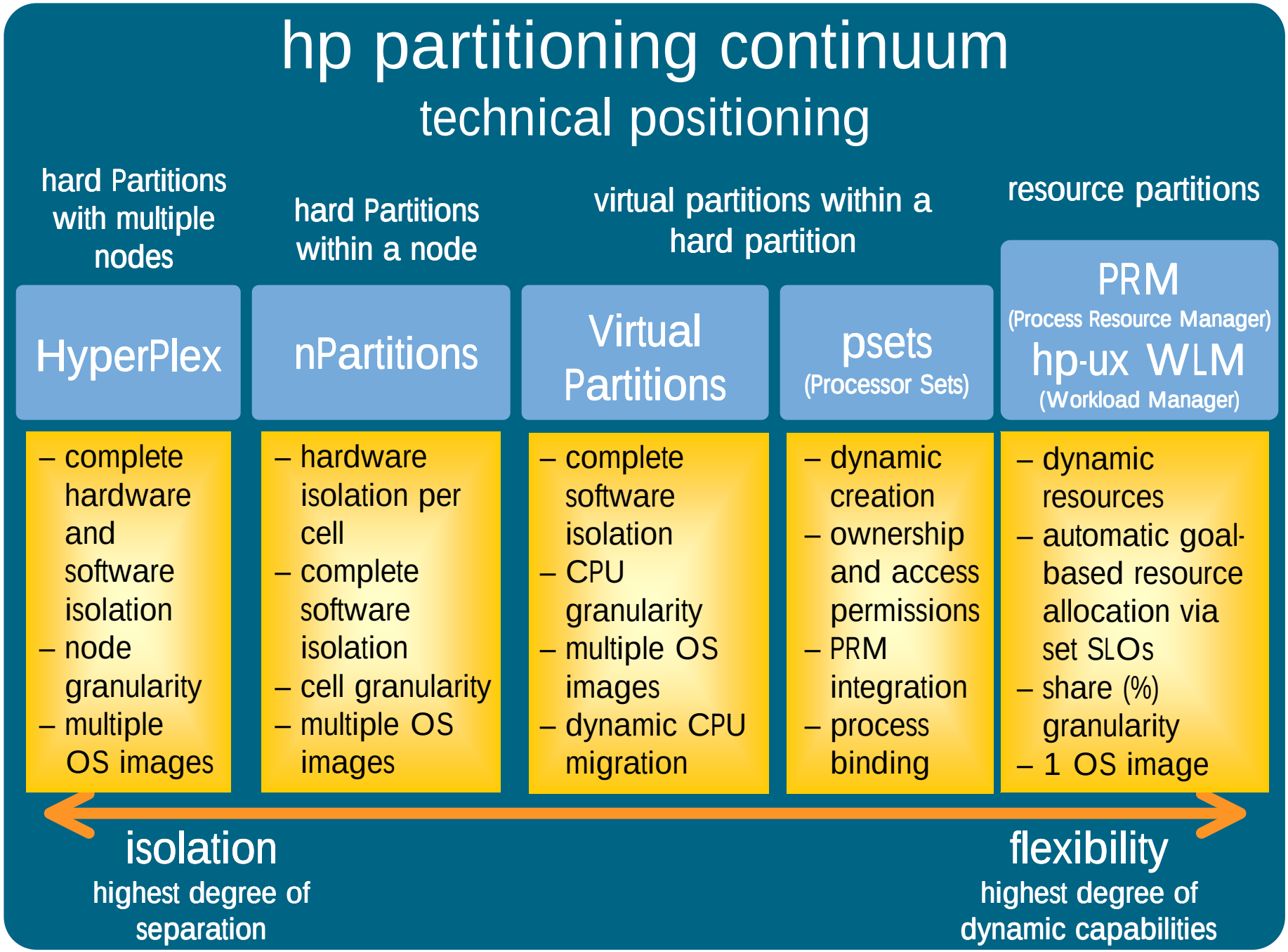
hp partitioning continuum

technical positioning



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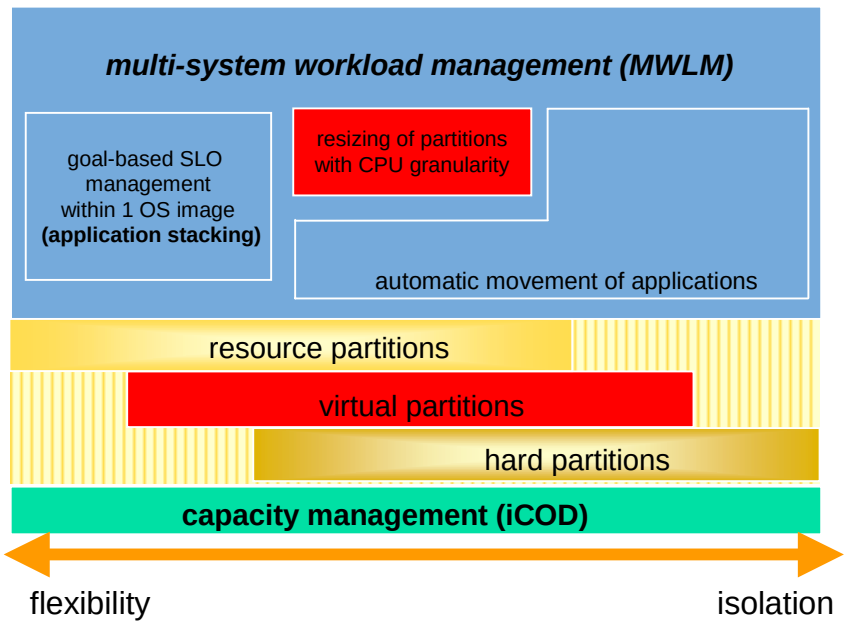
hp partitioning continuum

technology overview



hp virtual partitions (vPars)

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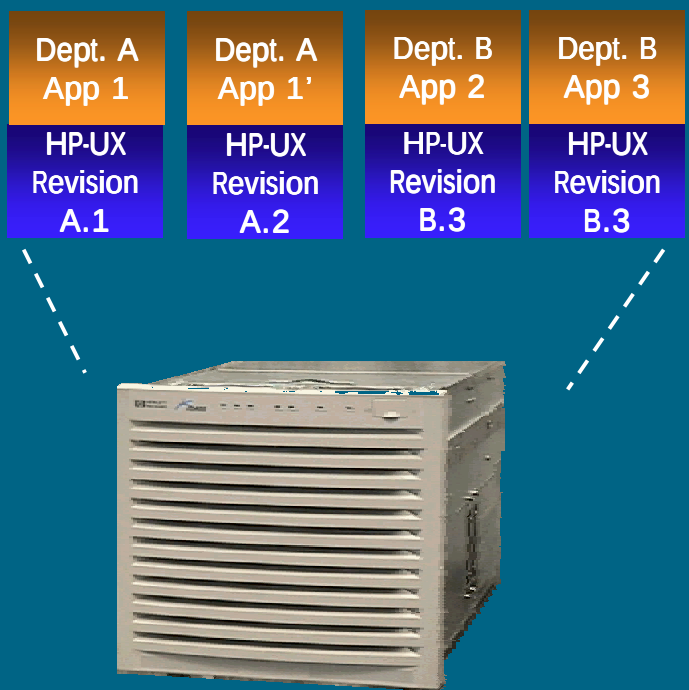
Base product for free!

hp virtual partitions:

multiple applications on the same server with software isolation



increased system utilization

- partitioning a single physical server or hard partition into multiple virtual partitions for L, N-class, and Superdome

increased flexibility

- multiple independent instances of hp-ux
- dynamic CPU migration across virtual partitions

increased isolation

- application (including name space) isolation across virtual partitions
- OS (kernel) isolation
- individual reconfiguration and reboot

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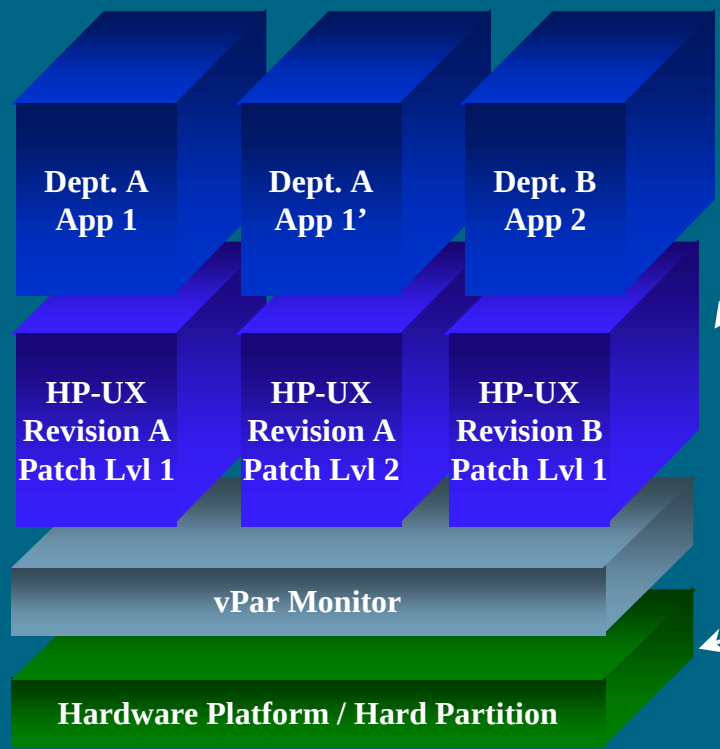
vPars logical overview

- multiple applications or multiple instances or versions of the same application
- no name space or resource conflicts



- each operating system instance tailored specifically for the application(s) it hosts
- operating systems instances are given a user-defined portion of the physical resources
- no name space or resource conflicts

- creates illusion of many separate hardware platforms
- manages shared physical resources
- monitors health of operating system instances

- supported on L-, N- and Superdome-Class systems
- no additional platform support required

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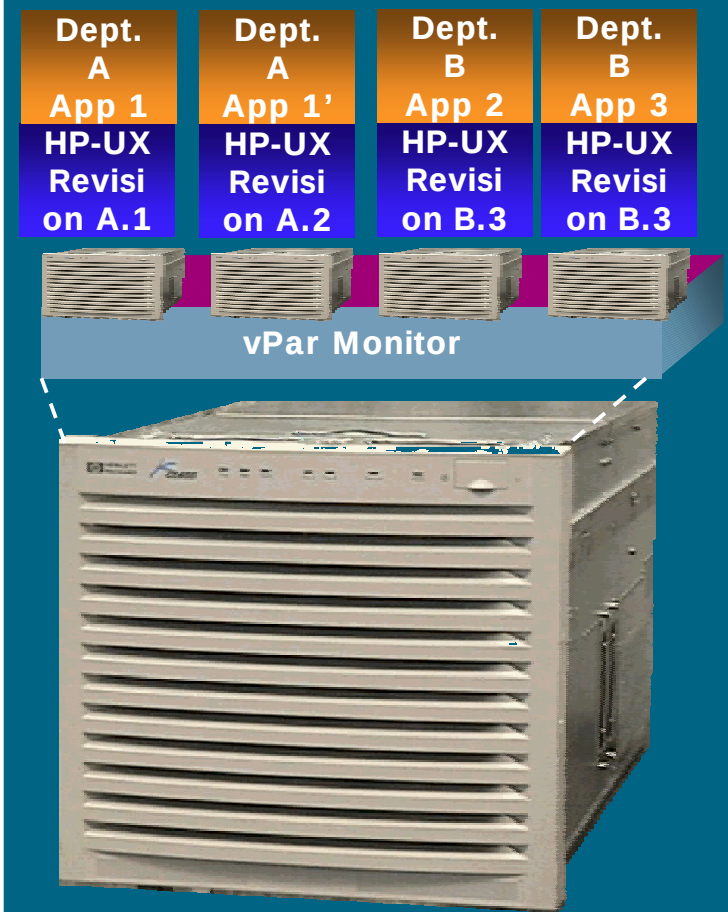
vPars technical overview



- a single physical server may be soft-partitioned into multiple virtual servers (virtual partitions)
- each virtual partition (vPar) runs an independent instance of hp-ux, providing complete name-space isolation
- vPars may run separate release and patch levels of hp-ux
- using vPars, multiple applications or multiple instances of the same application may coexist without kernel or user resource or name-space conflicts
- vPars may be individually reconfigured and rebooted
- vPars may be administered via SCM or separately via SAM or other tools

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hp virtual partitions key features

- core functionality is available for free with hp-ux 11i release
- support of hp 9000 L3000, N-Class, Superdome (including nPartition)
- support of multiple hp-ux instances (hp-ux 11i and later)
- different virtual partitions can run different versions of hp-ux
- single CPU granularity (virtual partition may contain single CPU)
  - L3000 - recommended up to 2 virtual partitions (max. 4)
  - N-Class - recommended up to 4 virtual partitions (max. 8)
  - Superdome - recommended up to 32 virtual partitions (max. 64)
- dynamic reassignment of CPUs across virtual partitions
- application and OS isolation (application, name space, OS and kernel isolation)
- individual reconfiguration and reboot, e.g. for rolling upgrades (virtual partitions don't affect each other)
- command line interface (in future via GUI – Second Release)
- single toggle console (in future consolidated console)
- compatible with PRM, hp-ux WLM, ServiceControl Manager, and MC/ServiceGuard

shipment for L, N-Class 3Q01 (Superdome after N and L)

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hp virtual partitions

vPar details

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vPars configuration & management overview

tasks

- planning
- installation
- recovery
- configuration changes
- starting & stopping partitions

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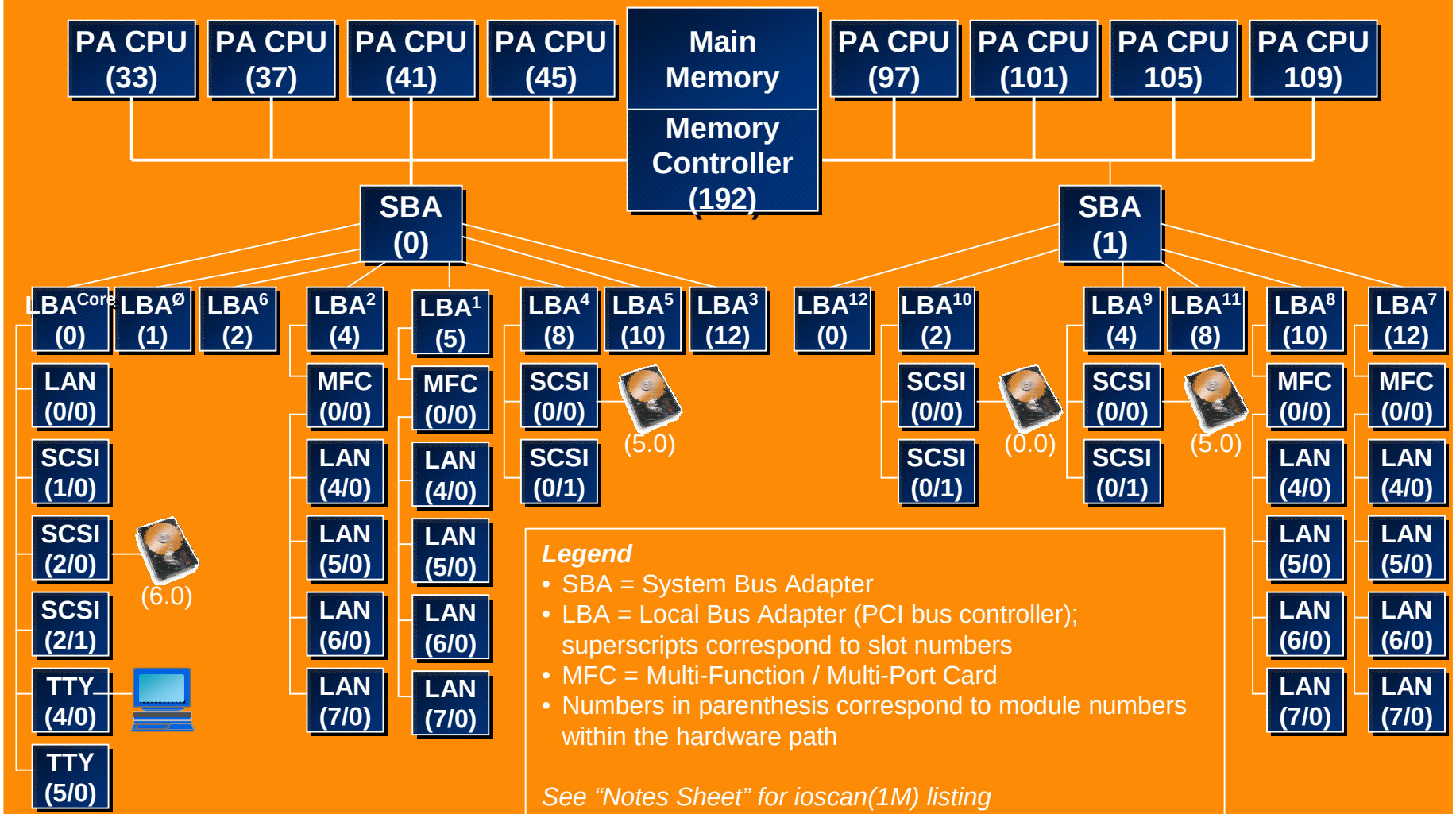
N-class block diagram



Legend

- SBA = System Bus Adapter
- LBA = Local Bus Adapter (PCI bus controller); superscripts correspond to slot numbers
- MFC = Multi-Function / Multi-Port Card
- Numbers in parenthesis correspond to module numbers within the hardware path

See "Notes Sheet" for ioscan(1M) listing

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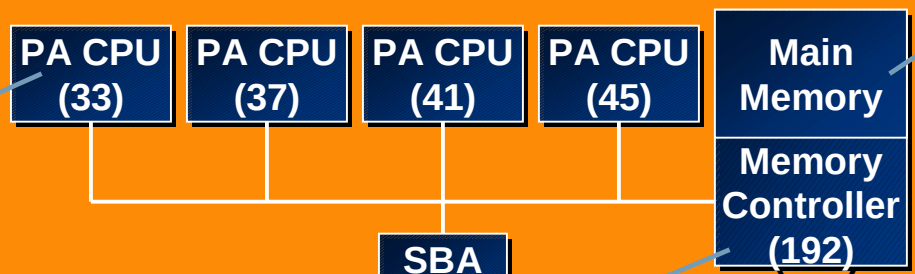
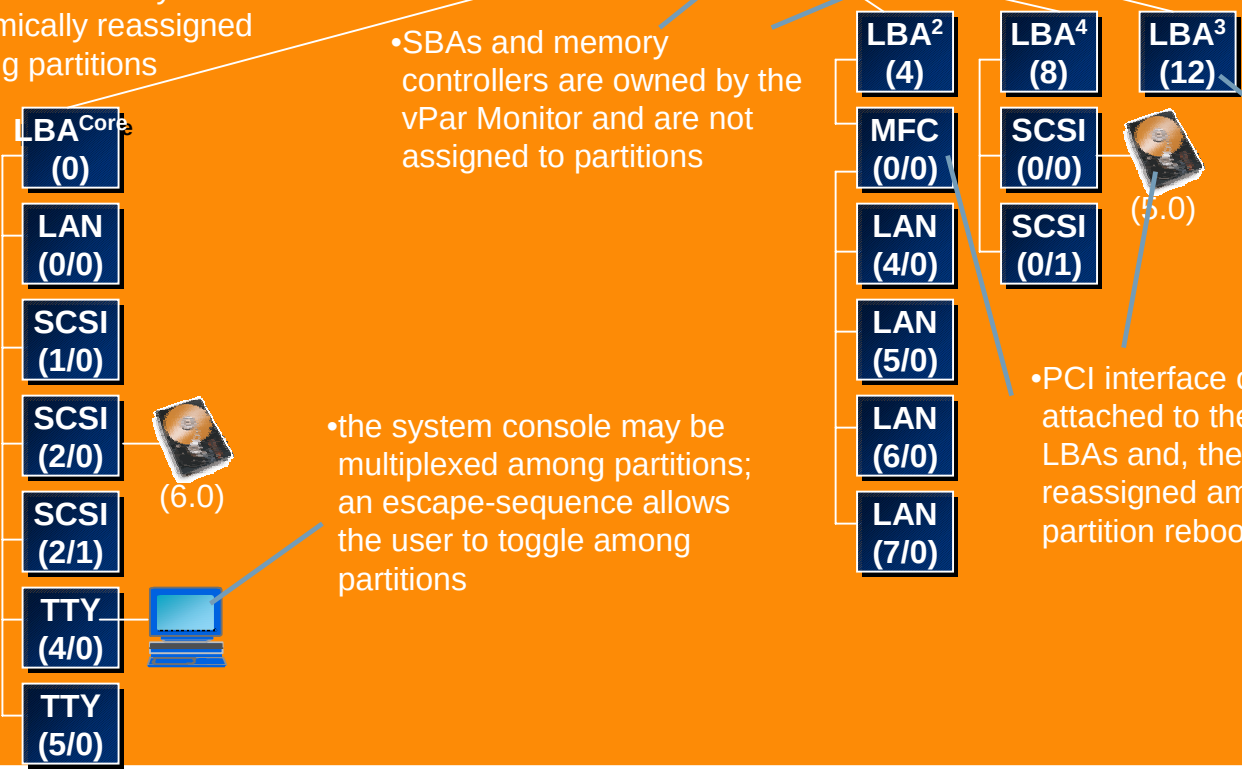
partitionable resources & dynamic partitions

- CPUs may be "pinned" to a single partition or allowed to "float" among partitions
- pinned CPUs require a partition reboot to be reassigned among partitions
- floater CPUs may be dynamically reassigned among partitions



- main memory is allocated to partitions in multiples of 4KB ranges
- adding or removing a memory range to or from a partition requires a partition reboot

- SBAs and memory controllers are owned by the vPar Monitor and are not assigned to partitions



- LBAs are pinned to a single partition
- adding or removing LBAs to or from a partition requires a partition reboot

- the system console may be multiplexed among partitions; an escape-sequence allows the user to toggle among partitions

- PCI interface cards and the devices attached to them are connected through LBAs and, therefore, cannot be logically reassigned among partitions without a partition reboot

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N-class partition plan

vPar Number	0	1	2
vPar Name	Bergen	Oslo	Trondheim
CPUs	33, 37	41, 45	105, 109
Memory Ranges	0x01000000 to 0x07ffffff (112MB) 0x40000000 to 0x5fffffff(512MB)	0x08000000 to 0x0fffffff (128MB) 0x60000000 to 0x9fffffff (1024MB)	0x10000000 to 0x17ffffff (128MB) 0xA0000000 to 0xdfffffff (1024MB)
I/O Paths (LBAs)	0/0 0/4	0/8 1/10	0/5 1/4
Boot Path	0/0/2/0.6.0	0/8/0/0.5.0	1/4/0/0.5.0
Console	0/0/4/0 (Virtual)	Virtual	Virtual
Kernel Image	/stand/vmunix	/stand/vmunix	/stand/vmunix
Autoboot	On	On	On

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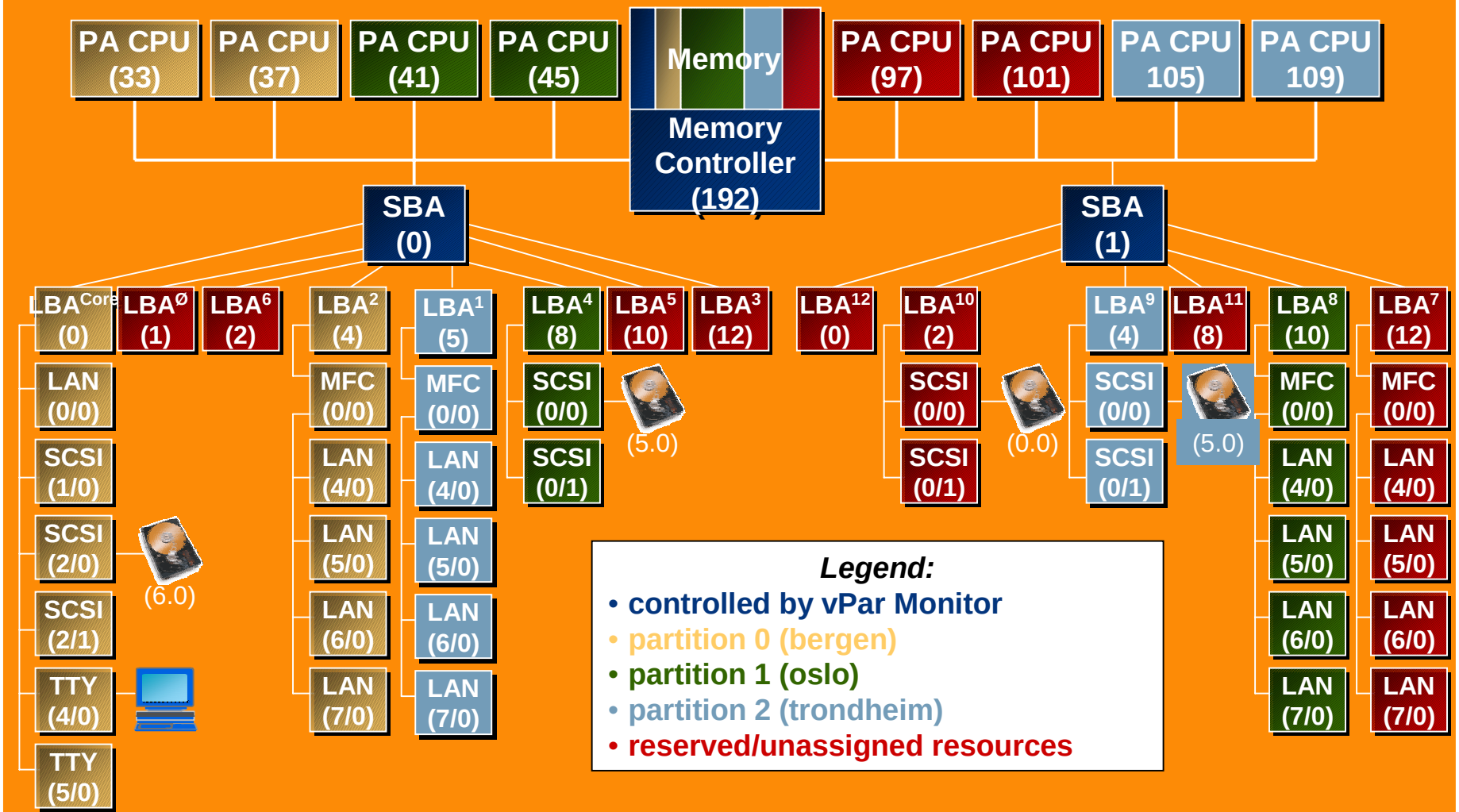
partitioned N-class block diagram



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note: command names subject to change

configuration & management commands

- *vparcreate* – create a new partition definition, with or without resources
- *vparremove* – destroy an existing partition definition
- *vparmodify*
  - add resources to an existing partition
  - remove resources from an existing partition
  - modify the attributes (e.g. boot path) of an existing partition
- *vparboot* – load and launch an operating system within an existing partition
- *vparreset* – stop/reset a partition
- *vparstatus*
  - display one or more partition definition(s) in human readable form
  - check the status of one or more partitions and/or the monitor

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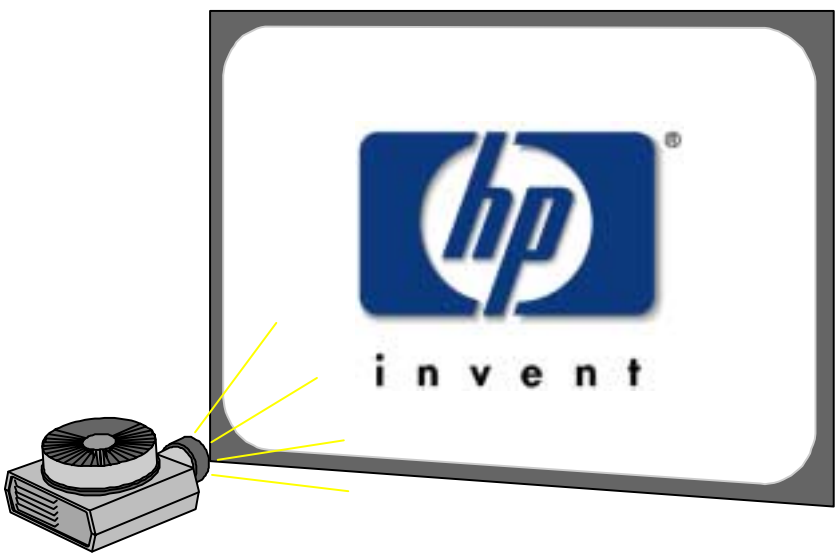
hp virtual partitions

demo



8-way N-class

2 vPars

4 floating CPUs

running SDET/Glance

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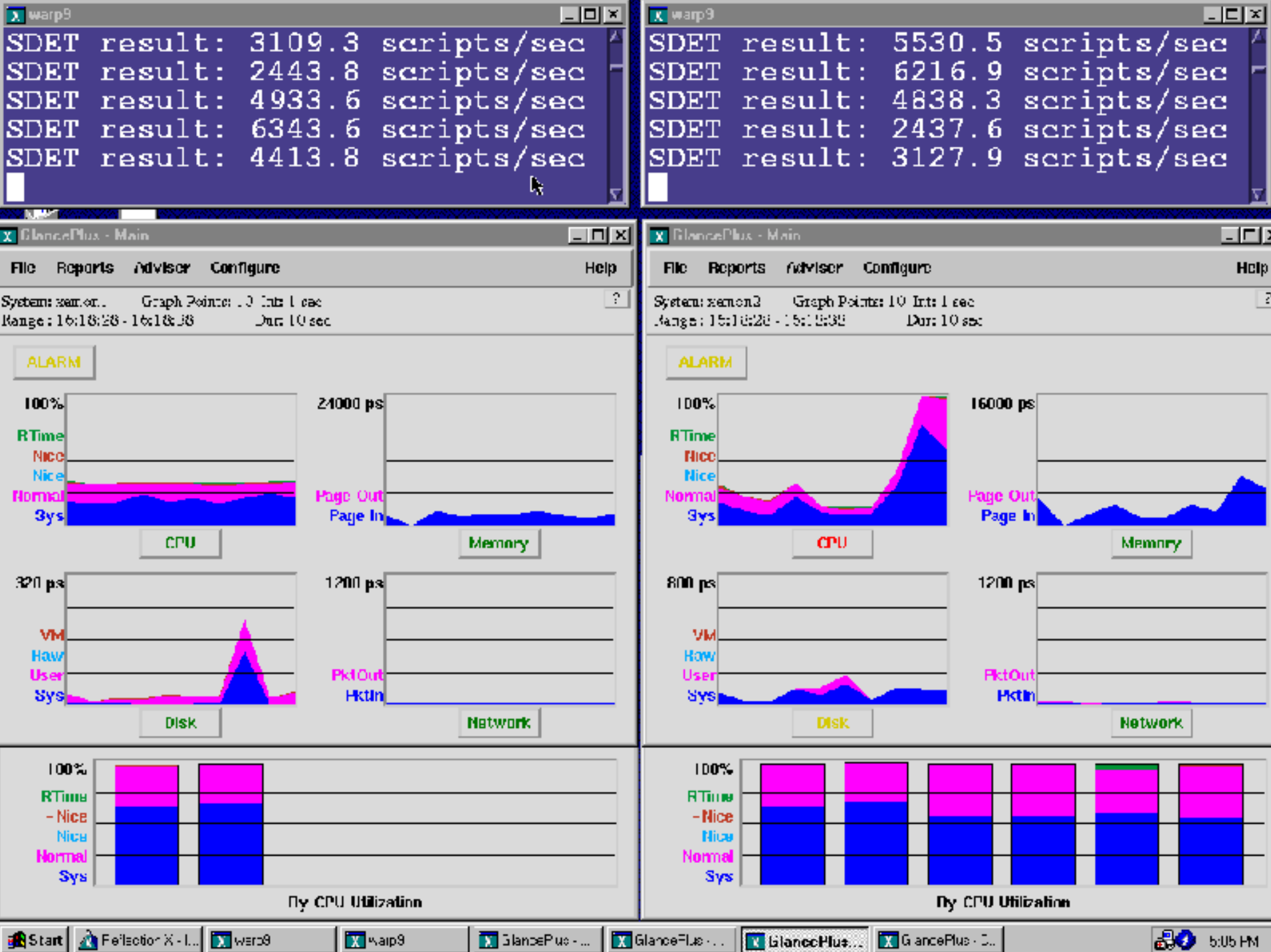

warp9
SDET result: 3109.3 scripts/sec
SDET result: 2443.8 scripts/sec
SDET result: 4933.6 scripts/sec
SDET result: 6343.6 scripts/sec
SDET result: 4413.8 scripts/sec
warp9
SDET result: 5530.5 scripts/sec
SDET result: 6216.9 scripts/sec
SDET result: 4838.3 scripts/sec
SDET result: 2437.6 scripts/sec
SDET result: 3127.9 scripts/sec
GlancePlus - Main
File Reports Advisor Configure Help
ALARM
100%
RTime
Nice
Nice
Normal
Sys
CPU
24000 ps
Page Out
Page In
Memory
320 ps
VM
Raw
User
Sys
Disk
1200 ps
PktOut
PktIn
Network
100%
RTime
Nice
Nice
Normal
Sys
By CPU Utilization
GlancePlus - Main
File Reports Advisor Configure Help
ALARM
100%
RTime
Nice
Nice
Normal
Sys
CPU
16000 ps
Page Out
Page In
Memory
800 ps
VM
Raw
User
Sys
Disk
1200 ps
PktOut
PktIn
Network
100%
RTime
Nice
Nice
Normal
Sys
By CPU Utilization
Start
warp9
warp9
GlancePlus
GlancePlus
GlancePlus
GlancePlus
5:05 PM

warp9

```
SDET result:  4933.6 scripts/sec
SDET result:  6343.6 scripts/sec
SDET result:  4413.8 scripts/sec
SDET result:  2455.8 scripts/sec
SDET result:  2454.2 scripts/sec
```

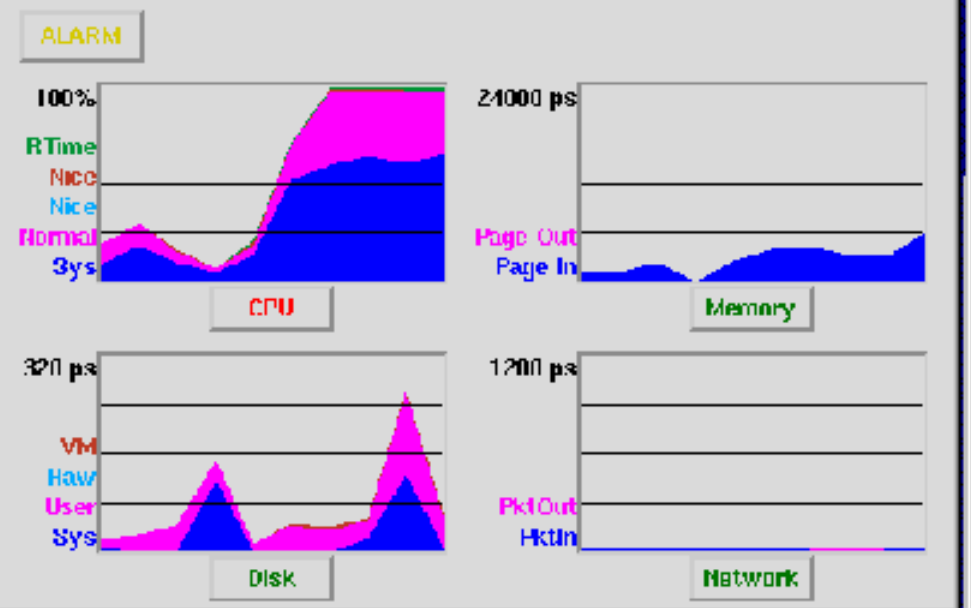
warp9

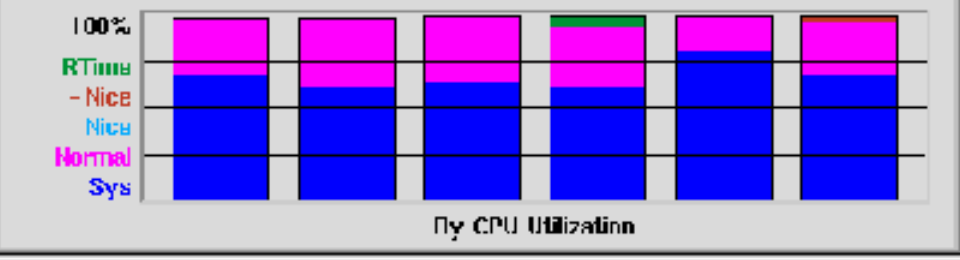
```
SDET result:  4838.3 scripts/sec
SDET result:  2437.6 scripts/sec
SDET result:  3127.9 scripts/sec
SDET result:  6479.2 scripts/sec
SDET result:  6389.4 scripts/sec
```

GlancePlus - Main

File Reports Adviser Configure Help

System: xeon... Graph Points: 10 Int: 990 ms
Range: 16:20:08 - 16:20:19 Dur: 11 sec

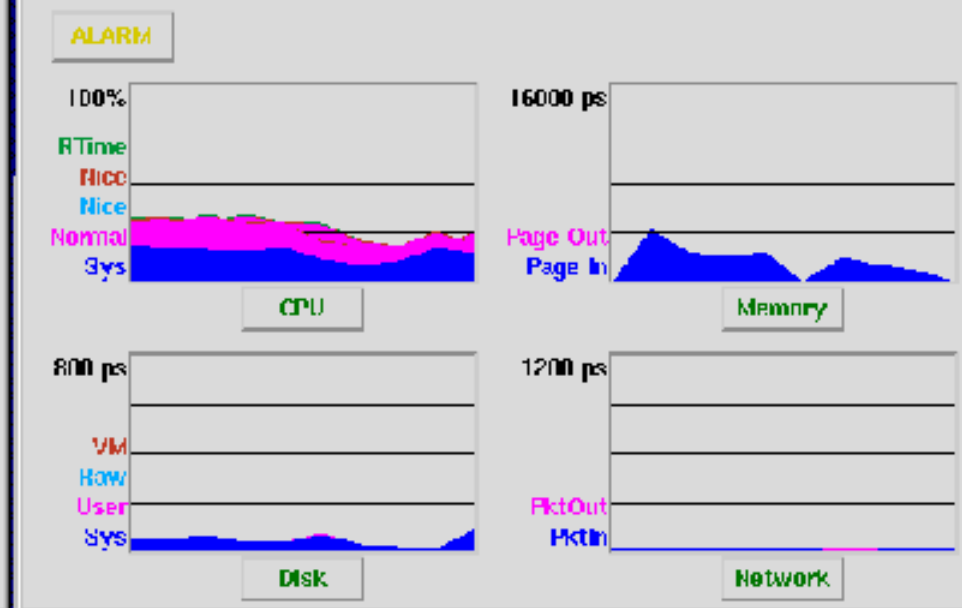


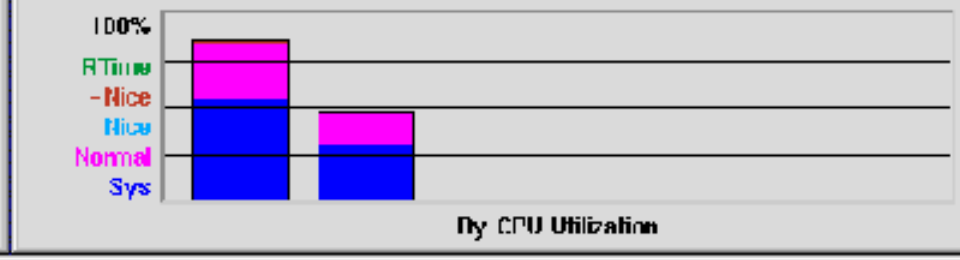


GlancePlus - Main

File Reports Adviser Configure Help

System: xeon2 Graph Points: 10 Int: 750 ms
Range: 15:20:08 - 15:20:18 Dur: 10 sec

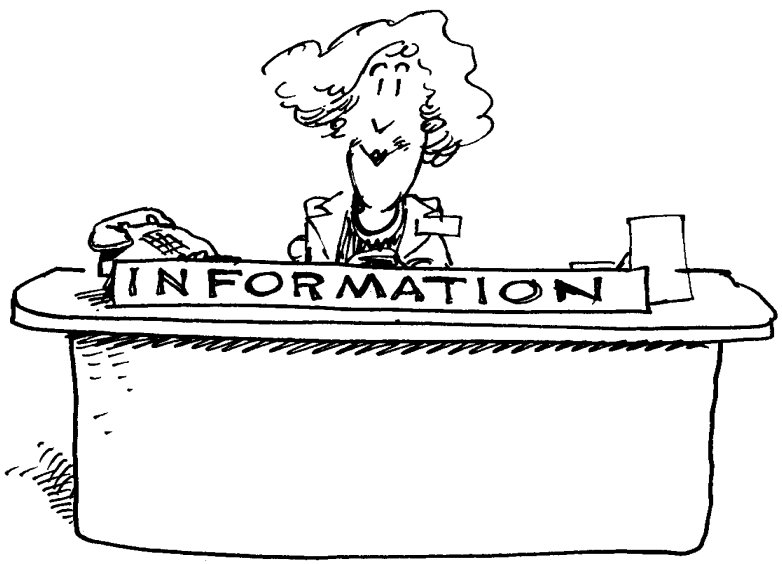




Start | Reflection X - I... | warp9 | warp9 | GlancePlus - ... | GlancePlus - ... | GlancePlus - C... | GlancePlus - C... | 5:07 PM

hp partitioning continuum

resources



- ✓ **hp partitioning continuum for always on white paper**
- ✓ **hp vPar, WLM, PRM product briefs**
- ✓ **hp virtual partitions, WLM, and PRM technical white papers**
- ✓ **web sites**

  http://www.hp.com/go/servicecontrol

  http://www.hp.com/go/wlm

  http://www.hp.com/go/prm
- ✓ **documentation web site**

  http://docs.hp.com

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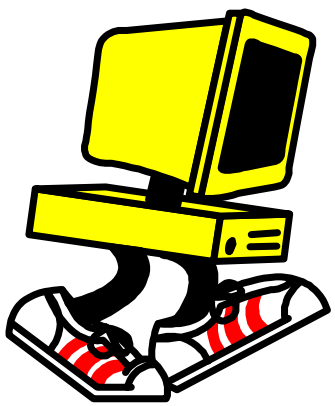
sample configuration

example of configuration and setup on L3000



system

4 way L3000

2 vPars

2 floating CPUs

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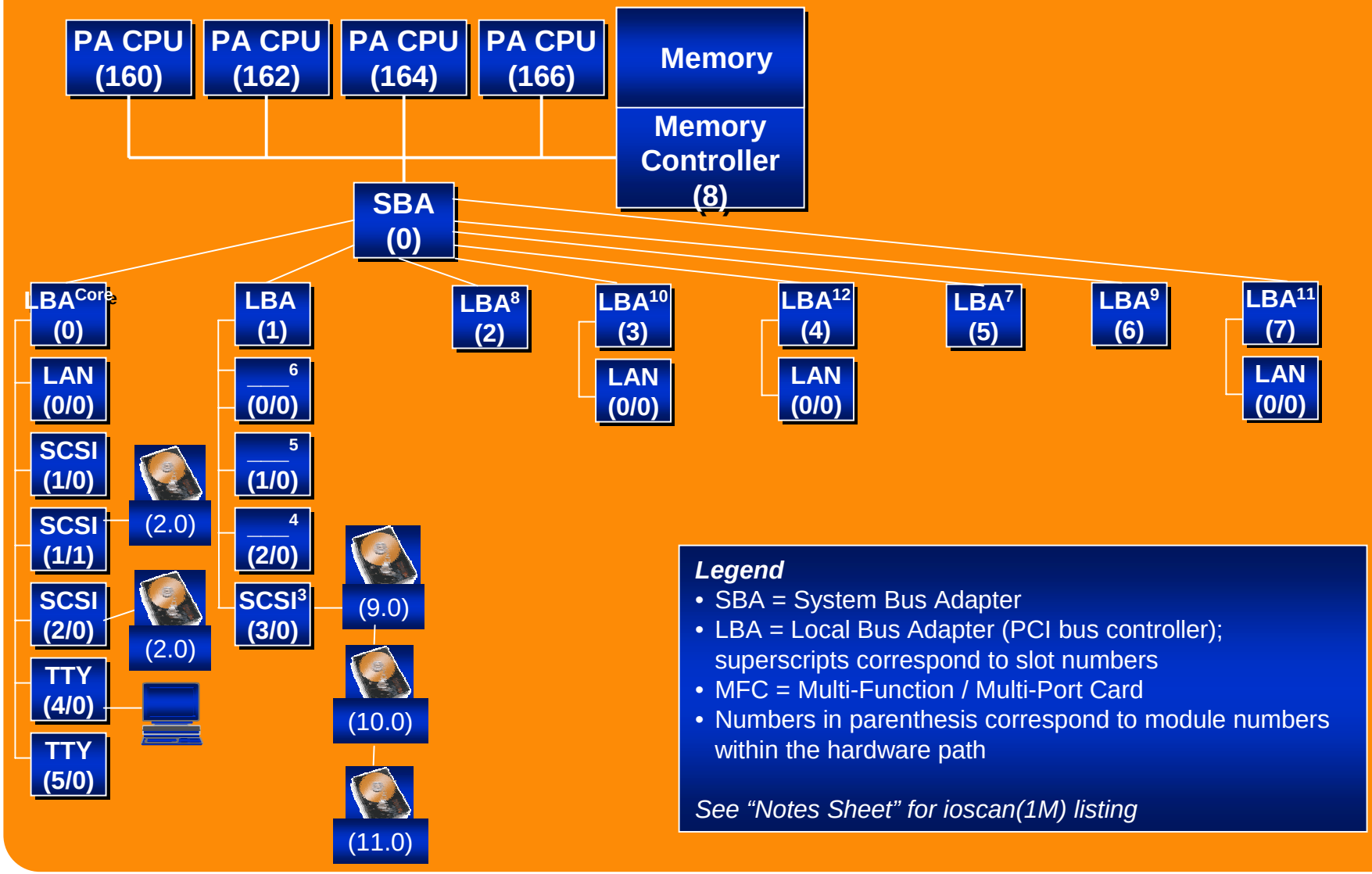
L - class block diagram



Legend

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- LBA = Local Bus Adapter (PCI bus controller); superscripts correspond to slot numbers
- MFC = Multi-Function / Multi-Port Card
- Numbers in parenthesis correspond to module numbers within the hardware path

See "Notes Sheet" for ioscan(1M) listing

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L-class partition plan
L3000 system

vPar Number	0	1
vPar Name	vpar1	vpar2
CPUs	160	162
Memory Ranges	0x04000000:512MB 2048MB	0x40000000:1024MB
I/O Paths (LBAs)	0/0	0/1 0/3 0/4 0/7
Boot Path	0/0/1/1.2.0	0/1/3/0.9.0
Console	0/0/4/0 (Virtual)	Virtual
Kernel Image	/stand/vmunix	/stand/vmunix
Autoboot	On	On

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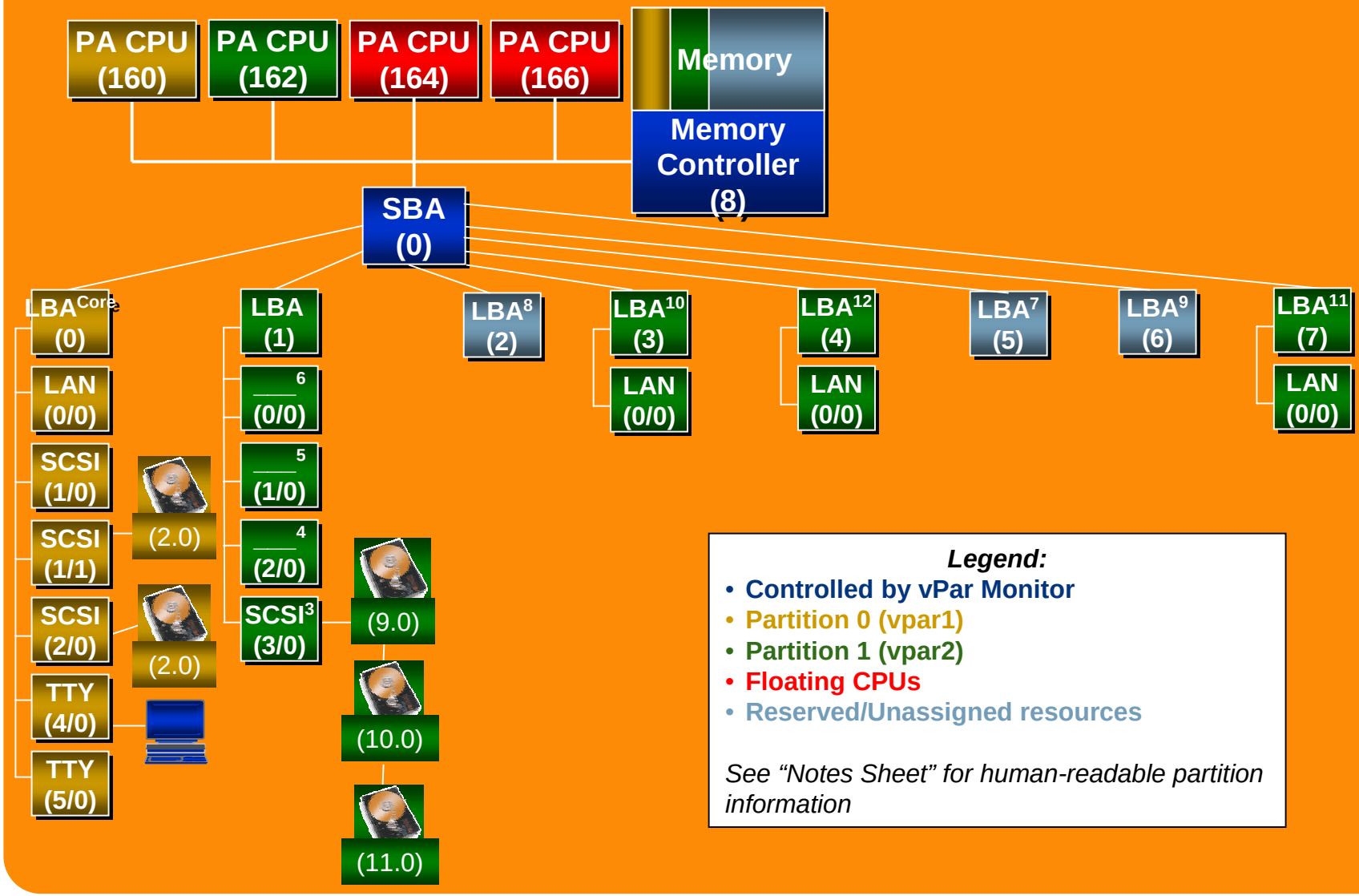
L - class block diagram
L3000 system



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building vPars

use vparcreate `cat opts.1` –D “file name”

option file for vpar1

vpar1
-i 0/0*
-i 0/0/0/0
-i 0/0/1/1.2.0:boot
-i 0/0/4/0
-P 160
-M 0x04000000:512MB
-m 2048MB
-k /stand/vmunix
-A auto

option file for vpar2

vpar2
-i 0/1*
-i 0/1/0/0
-i 0/3*
-i 0/3/0/0
-i 0/4*
-i 0/4/0/0
-i 0/7*
-i 0/7/0/0
-i 0/1/3/0.9.0:boot
-P 162
-m 2024MB
-k /stand/vmunix
-A auto

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vPar status

[vpar1]/ # vparstatus -a

vpar1: up

vpar2: up

[vpar1]/ # vpardisplay vpar1

VPAR: vpar1

Attributes: AUTOBOOT

Bound CPU: 160

Memory size: 2048MB

Memory range: Base:0x0000000004000000 (512MB)

I/O: 0.0*

I/O: 0.0.0.0

I/O: 0.0.1.1.2.0 BOOT

I/O: 0.0.4.0

Kernel Image: /stand/vmunix

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getting vPar configuration

[vpar1]/ # vpardisplay vpar2

VPAR: vpar2

Attributes: AUTOBOOT

Bound CPU: 162

Memory range: Base:0x0000000040000000 (1024MB)

I/O: 0.1*

I/O: 0.1.0.0

I/O: 0.1.3.0.9.0 BOOT

I/O: 0.3*

I/O: 0.3.0.0

I/O: 0.4*

I/O: 0.4.0.0

I/O: 0.7*

I/O: 0.7.0.0

Kernel Image: /stand/vmunix

- vPar configuration is stored in vPar database file (vpdb) found by default under /stand.
- this is replicated on each vPar boot disk for availability and ease of configuration

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adding a cpu to a running vPar

adding a floating cpu to vpar1

[vpar1]/ # vparadd vpar1 –p 1 {look for first available}

remove a floating cpu to vpar1

[vpar1]/ # vparremove vpar1 –p 1 {look for first available}

- using the lowercase “***p*** “ does not “pin” the cpu to the vPar
- non-pinned cpu’s are not kept by vPar on reboot
- using the uppercase “***P*** “ - cpu is pinned to the vPar
- pinned cpu’s will be kept by vPar on reboot.
- only way to remove pinned cpu’s is reset the vPar
- adding and removing a cpu can be done for any vPar from any vPar

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