

iSeries. mySeries.

iSeries Tech Talk Linux on iSeries Technical Update 2004

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- ❑ **Enhancements to the Linux experience introduced with i5**
 - New i5/OS Functionality
 - New iSeries Navigator Functionality
 - New i5 Hardware Functionality

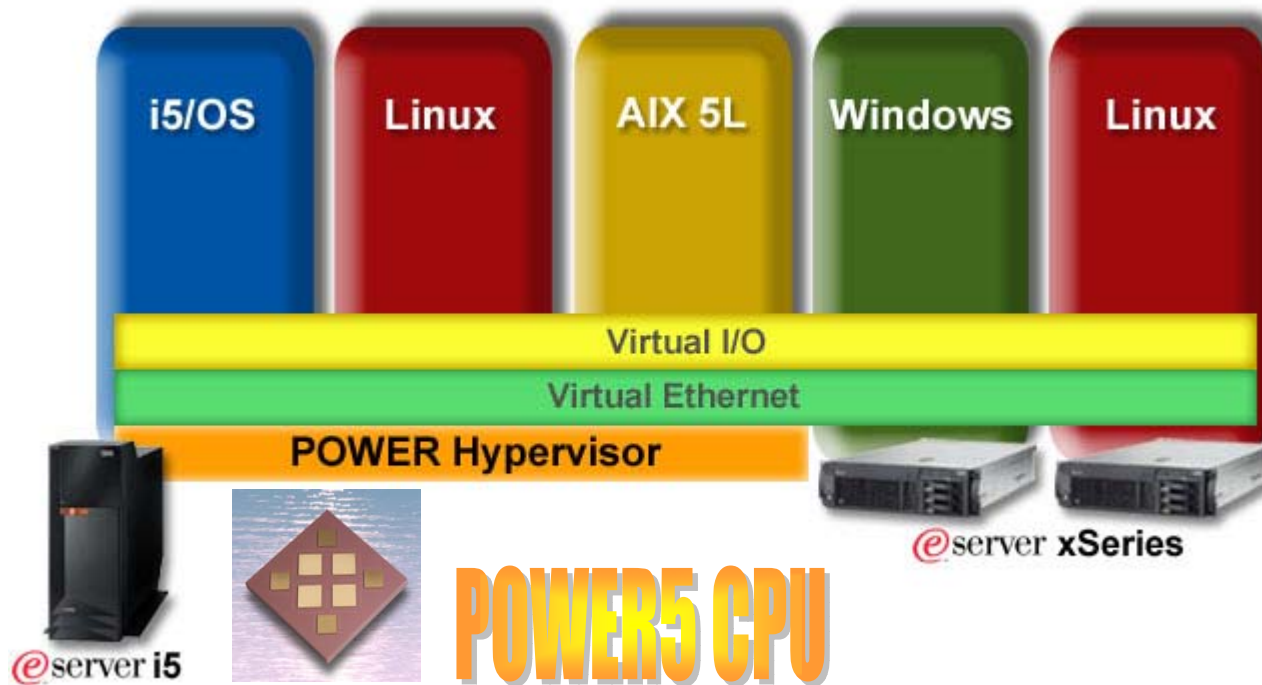
- ❑ Technical Features of running Linux on the Integrated xSeries Adapter/Server (IXS/IXA)

- ❑ Key features of the 2.6 Linux Kernel



Simplify the Infrastructure

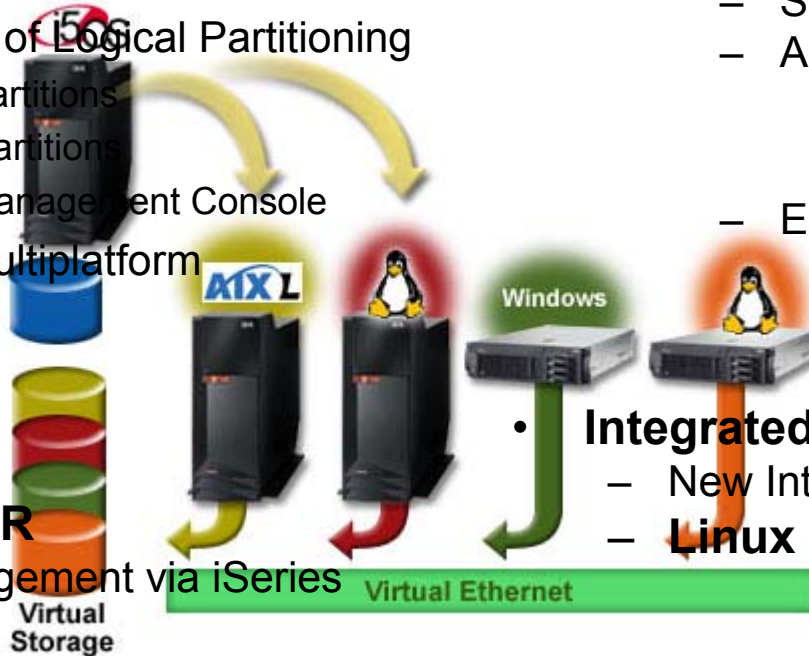
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- Drive new levels of productivity from integrated server infrastructure
- Application integration with i5/OS
- Cost reduction, better asset utilization through virtualization
- Increase asset utilization through virtualization
- Rapidly deploy and provision new applications

- **IBM Virtualization Engine**

- 3rd Generation of Logical Partitioning
 - Up to 254 Partitions
 - Uncapped partitions
 - Hardware Management Console
- IBM Director Multiplatform



- **AIX 5L**

- Supported Across eServer i5
- AIX 5L v5.2
 - 1 processor per partition
 - Direct I/O support
- Enterprise Edition

- **Linux on POWER**

- Storage Management via iSeries Navigator
- Backup Automation through BRMS
- New Distribution for eServer i5*
 - Red Hat Enterprise Linux AS 3 (update)
 - SUSE LINUX Enterprise Server 9

- **Integrated xSeries Solutions**

- New Integrated xSeries Server
- **Linux support**

- Multiple independent logical systems (LPARs) in one physical server

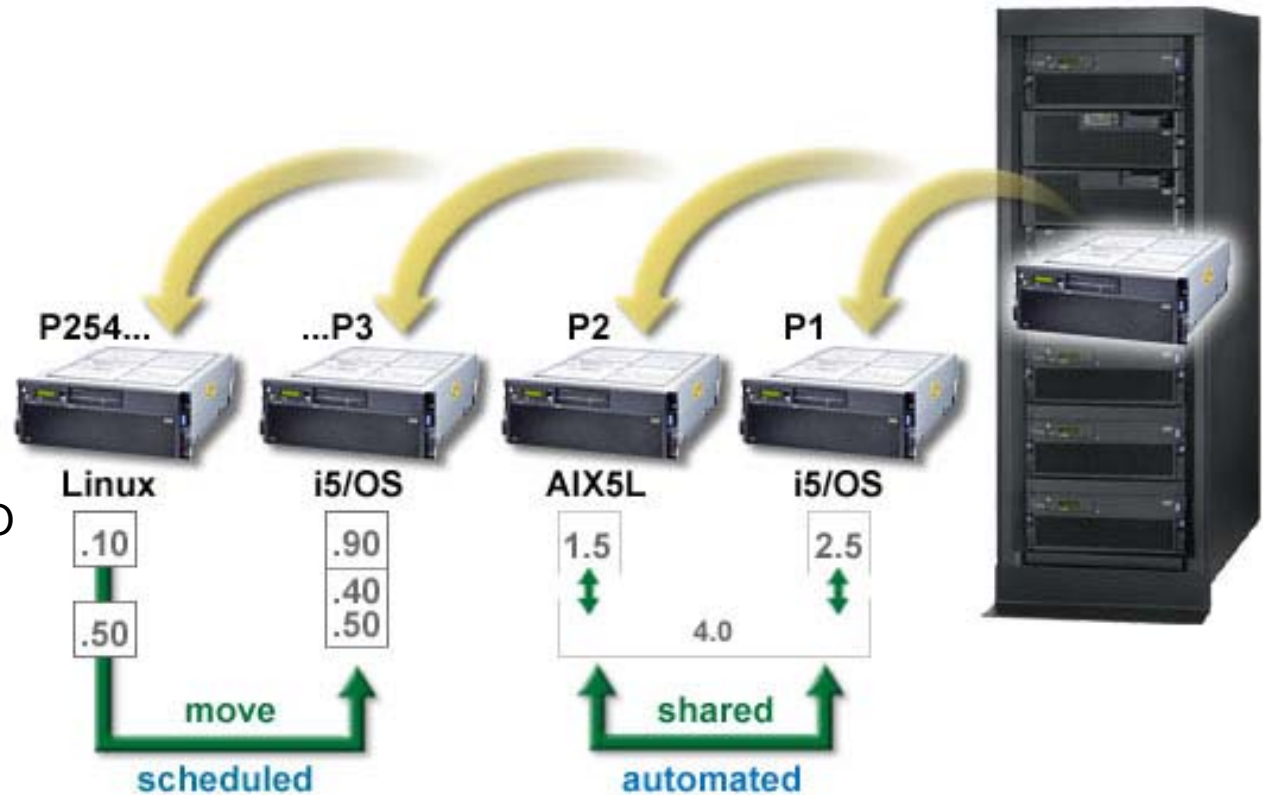
- Each partition has its own

- OS image
- Console
- CPU and memory
- Physical or virtual I/O

- Managed with Hardware Management Console (HMC)

- Dynamic LPAR: move CPU, memory, physical and virtual I/O cards between LPARs while they are running

- Linux supported in partitions on all POWER5 models





Penguin Grows up on POWER5

eServer®

❑ Enterprise Linux

- Rock-solid 64-bit kernel running on POWER5
- Reliability, availability, serviceability (RAS)
- Utilizes IBM Virtualization Engine

❑ POWER5 LPAR Enhancements

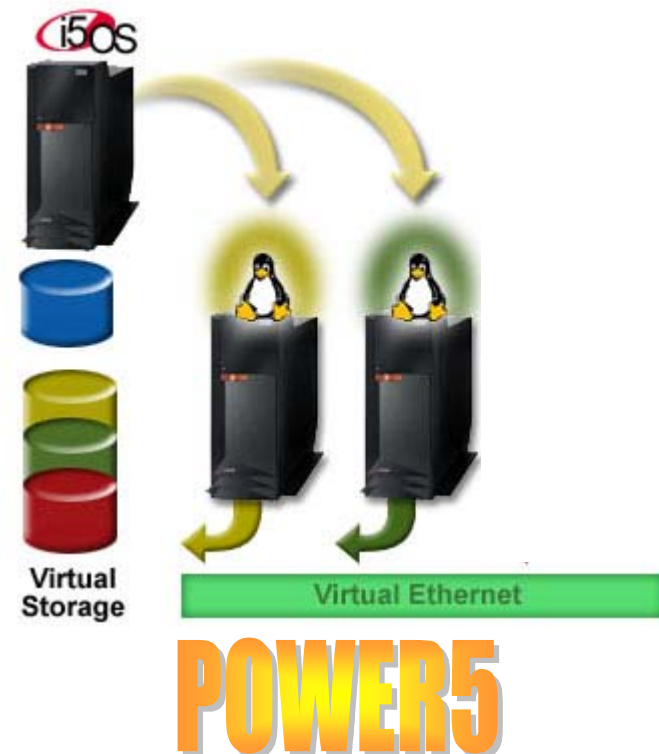
- Up to 160 Linux logical partitions (LPARs)
- Up to 254 Linux LPARs coming soon
- **No IPL/reboot to create Linux LPAR**
- **Hot-pluggable physical and virtual I/O**
- Uncapped LPARs (automatic CPU balancing)

❑ Common Linux distributions for eServer i5 and p5

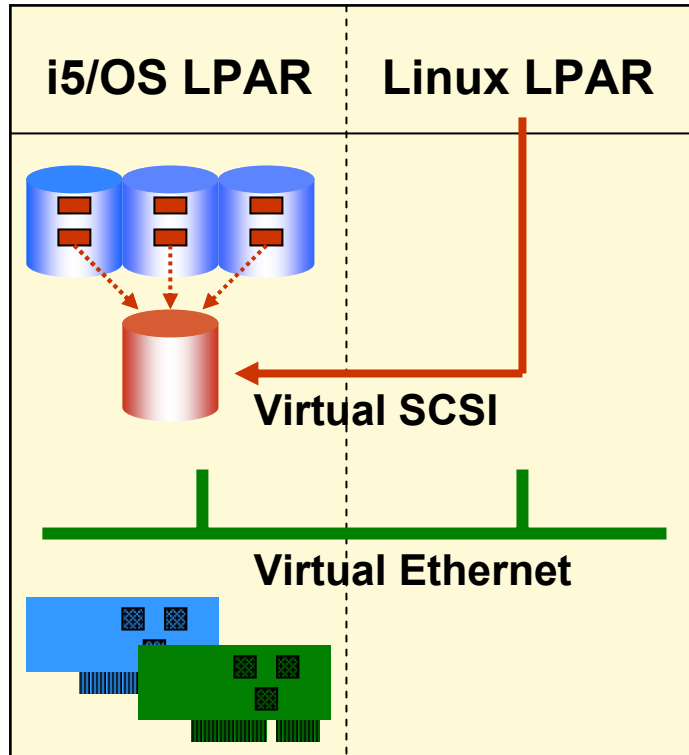
- RHEL 3 AS QU3 from Red Hat, Inc.
- SLES 9 from Novell, Inc. (SUSE part of Novell)

❑ Enterprise Edition

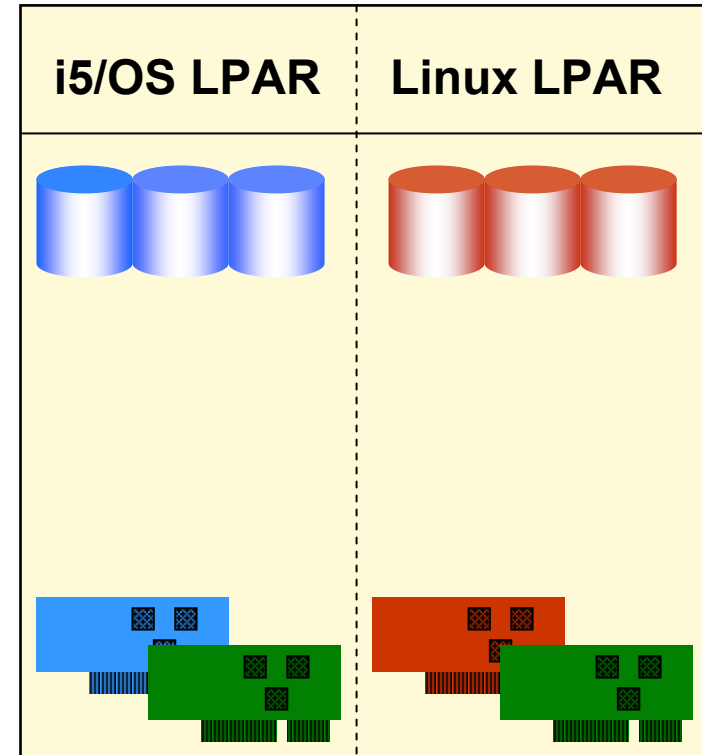
- Extra Processor, Service and Education Vouchers



Virtual I/O



Direct I/O



- i5/OS provides virtual disk to Linux
- All partitions use Virtual Ethernet
- Improves asset utilization and ROI
- Uses the IBM Virtualization Engine

- Resources dedicated to Linux
- Linux management of disk, NICs
- Linux independent of other LPARs



i5/OS V5R3 Storage Virtualization

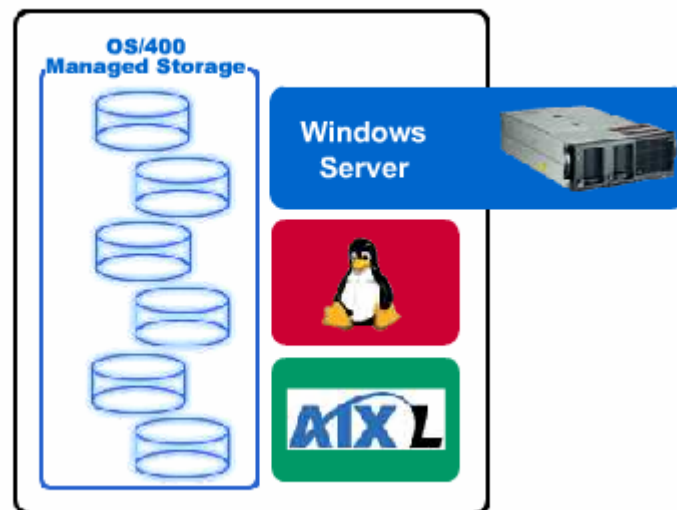


□ Storage spaces created from OS/400

- 1 MB to 1TB each
- Up to 32 per Integrated xSeries Solution
- Up to 64 per Linux
- Can be dynamically added

□ Enables other OSs to Leverage Advanced eServer i5 Storage Architecture

- Data automatically spread and protected
- More disk arms for better performance
- Automatic balancing of storage across drives
- Consolidated Backup
- Flexible Storage Management
- Easy setup of multiple environments



❑ Centralized Server and Virtual Storage Management for Windows, Linux, and AIX 5L

- New Support for POWER Linux
 - ❑ Start up, Shut down POWER Linux partitions
 - ❑ Create and manage virtual storage spaces
 - ❑ Requires iSeries Navigator V5R3, Supports OS/400 V5R2 and i5/OS V5R3
- Support planned for AIX 5L

The screenshot shows the iSeries Navigator application window. The left pane displays a tree view of system components, with 'Disk Drives' selected under 'Integrated xSeries Servers'. The right pane shows a table of disk drives for the selected server 'Rchastle4'.

Disk Drive	Capacity	% Used	Server	Device
Bluedisk	9.77 GB	0%	Bluehat	Ex
Dcdisk1	2 MB	0%	Bluehat	Ex
Dcdisk10	2 MB	0%	Slowlinx, Bluehat	Sh
Dcdisk11	2 MB	0%		Nc
Dcdisk12	2 MB	0%		Nc
Dcdisk13	2 MB	0%	Slowlinx	Sh
Dcdisk14	2 MB	0%		Nc
Dcdisk15	2 MB	0%		Nc
Dcdisk16	2 MB	0%		Nc
Dcdisk17	2 MB	0%	Bluehat	Sh
Dcdisk18	2 MB	0%		Nc
Dcdisk19	2 MB	0%		Nc
Dcdisk2	2 MB	0%		Nc
Dcdisk20	2 MB	0%		Nr

The 'Add Link to Server - Rchastle4' dialog box is open, showing the following fields:

- Disk drive name: Mydisk
- Description: Disk for my Linux server
- Server to link to: Bluehat (selected from a dropdown)
- Link type: Dynamic (selected from a dropdown)
- Link sequence position: 4 (selected from a dropdown)
- Access to disk drive: Exclusive - Update (selected with a radio button)

Buttons at the bottom of the dialog: OK, Cancel, Help, ?



iSeries Integration Enhancements



❑ Server Management through iSeries Navigator V5R3

The screenshot shows the iSeries Navigator V5R3 interface. The left pane displays a tree view of the environment 'My Connections', with 'Integrated xSeries Servers' selected under the 'Network' folder. The right pane shows a table of integrated xSeries servers for 'Rchase4'.

Windows Server	Status	Domain	Description
Bluehat	Started		BLUEHAT Linux NWSD fo
Guiw2	Shut down	Workgroup	Gui Testing Judy DeMars
Guiw3	Shut down	Workgroup	GUI TESTING JUDY DEM
Ruth2000	Shut down	Ntap	Ross ServerProven testin
Ruth2003	Shut down	Workgroup	Ross ServerProven Testi
Slowlinx	Shut down		Turbo Linux Server
Svrgd72	Shut down	Ntap	Ross Testing Serverguide
Tstdrv	Shut down	Ntap	Testing KrisD FindDDrive
Tstfull	Started	Ntap	Ross Testing FindDDrive
Tstsvrgd	Shut down	Ntap	Ross Testing Rmtcmd fix

1 - 10 of 10 objects



iSeries Integration Enhancements



❑ Disk Management through iSeries Navigator V5R3*

The screenshot displays the iSeries Navigator V5R3 interface. The main window shows a tree view on the left with 'Rchase4' selected. The right pane shows a table of disk drives for 'Rchase4: Disk Drives'.

Disk Drive	Capacity	% Used	Server	Data Access
Bluedisk	9.77 GB	0%	Bluehat	Exclusive - Update
Dcdisk1	2 MB	0%	Bluehat	Exclusive - Update
Dcdisk10	2 MB	0%	Slowinx, Bluehat	Shared - Read
Dcdisk11	2 MB	0%		Not linked
Dcdisk12	2 MB	0%		Not linked
Dcdisk13	2 MB	0%	Slowinx	Shared - Read
Dcdisk14	2 MB			
Dcdisk15	2 MB			
Dcdisk16	2 MB			
Dcdisk17	2 MB			

Two dialog boxes are open:

- New Disk - Rchase4**:
 - Disk drive name: Mydisk
 - Description: Disk for my Linux server
 - ☐ Initialize disk with data from another disk
 - Source disk: [dropdown]
 - Capacity: 5 GB (selected) / MB
 - Disk pool: Disk pool 1
- Add Link to Server - Rchase4**:
 - Disk drive name: Mydisk
 - Description: Disk for my Linux server
 - Server to link to: Bluehat
 - Link type: Dynamic
 - Link sequence position: 4
 - View Sequence button
 - Access to disk drive:
 - ☒ Exclusive - Update
 - ☐ Shared - Read
 - ☐ Shared - Update
 - OK, Cancel, Help buttons

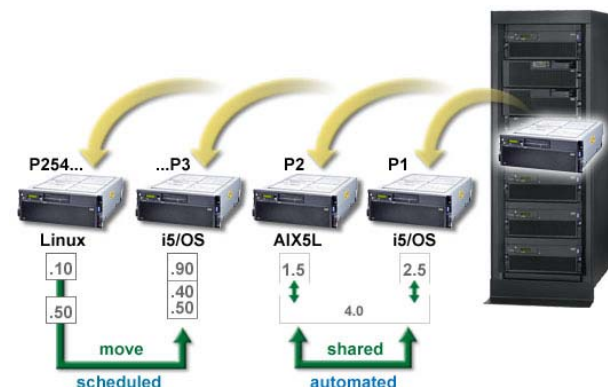
- ❑ 1TB Network Storage Spaces
- ❑ Supports Virtual SCSI (VSCSI) and VIO virtual disk
 - Only VSCSI supported on i5 Systems
 - VSCSI allows connection of up to 64 virtual disks from one Network Server Descriptor to a partition
 - VSCSI provides support for writable UDFS on DVD-RAM
- ❑ Support for dynamic add of virtual adapters



Virtualization Enhancements for POWER5



	iSeries	eServer i5
Maximum # of partitions	32	254
Partitions per Processor	Up to 10	Up to 10
Processor Movement	Static Dynamic	Static Dynamic Automatic
Maximum # of Virtual Ethernet	16	4094
Maximum Virtual Disk per partition	2 TB	64 TB
Partition Management	Primary	HMC
Operating Systems	i5/OS OS/400 Linux	i5/OS Linux AIX 5L

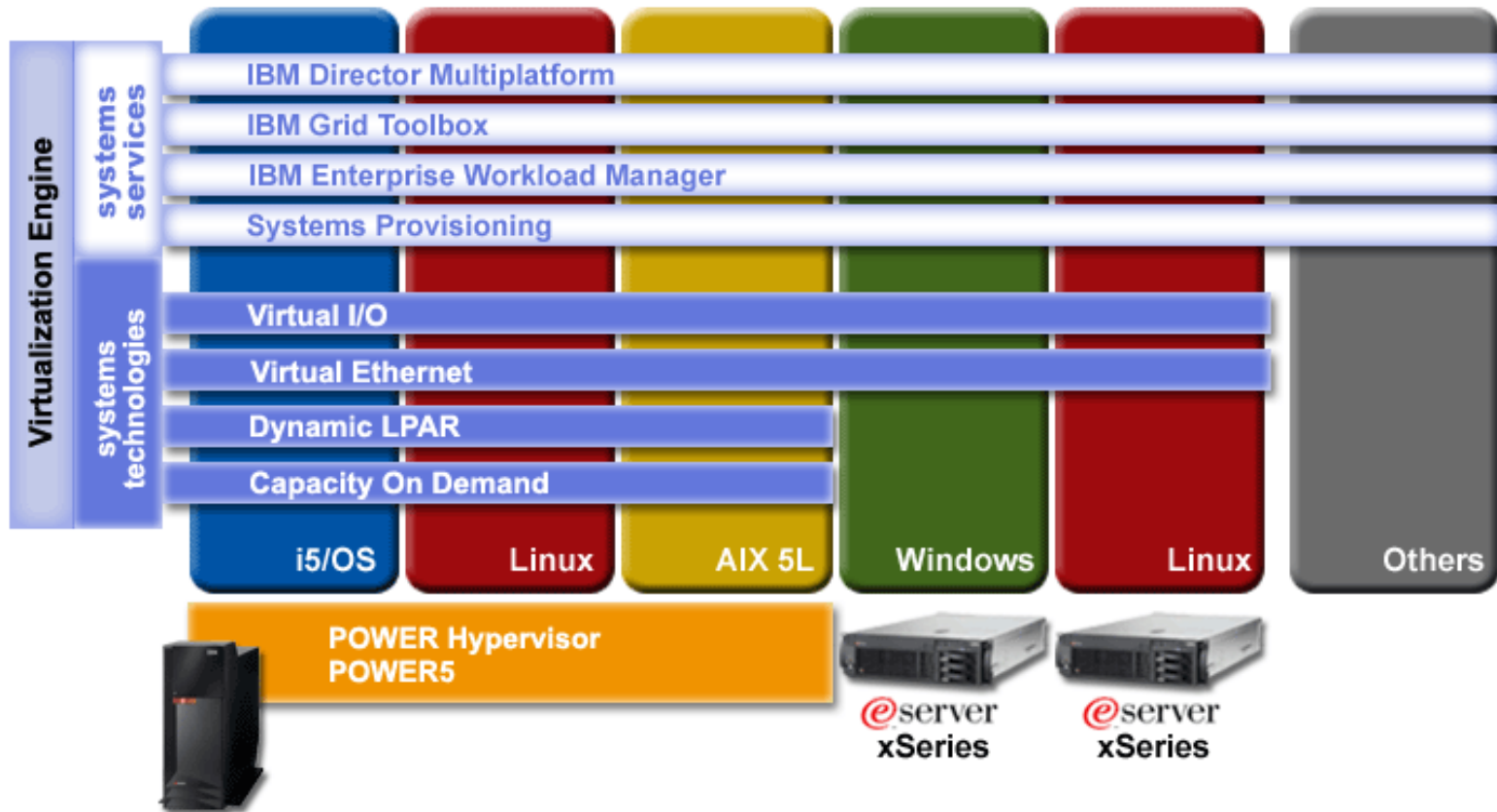


IBM Virtualization Engine
Systems Technologies



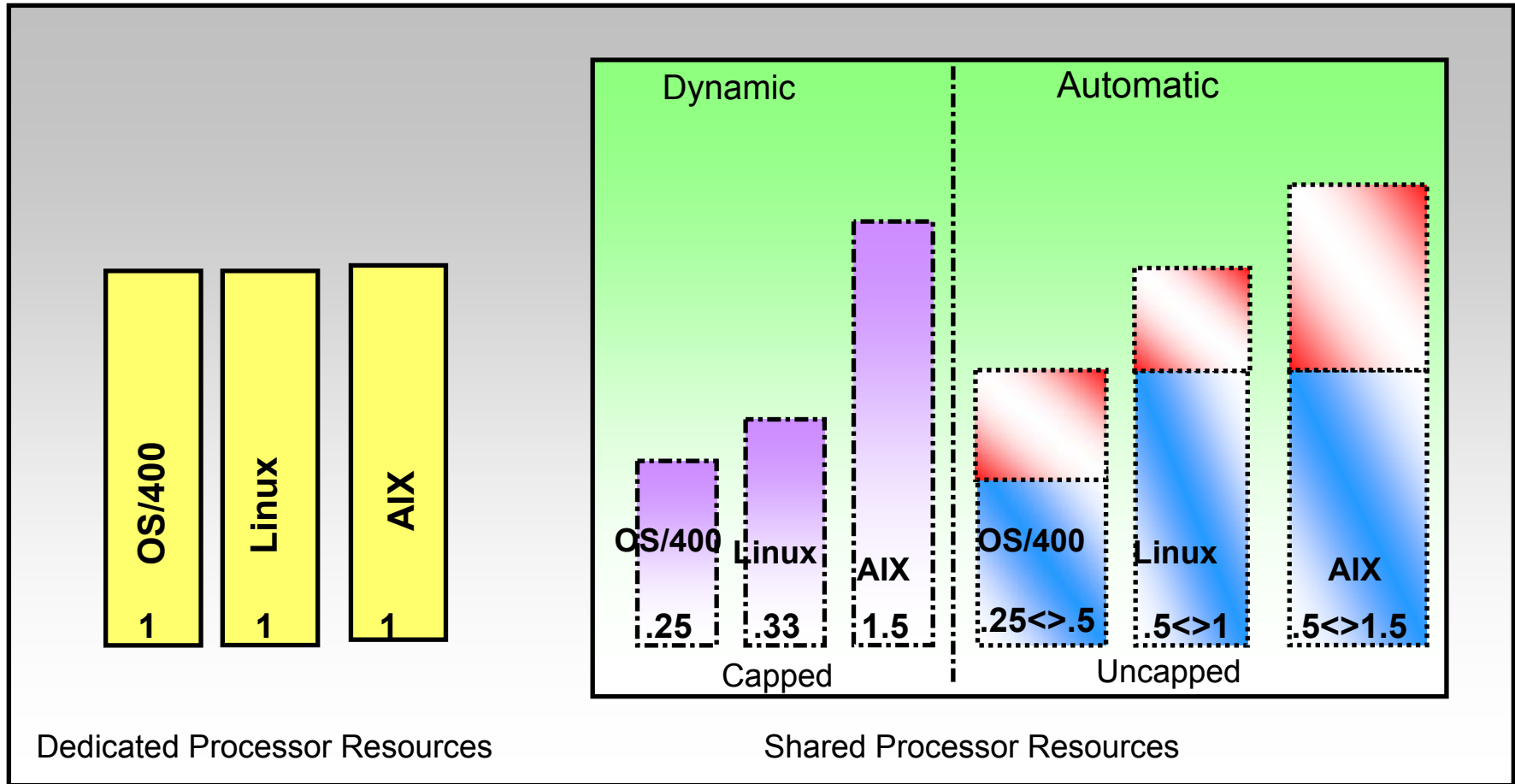
IBM Virtualization Engine on IBM eServer i5

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- ❑ Flexibility and scalability
 - Dynamic LPAR (CPU, memory, I/O)
 - Virtual I/O
 - Automatic CPU balancing
 - Capacity on Demand

- ❑ Enterprise-wide integration
 - Cross-LPAR system technologies
 - Cross-platform system services



Uncapped partitions allow firmware to balance CPU among LPARs



Hardware Management Console (HMC)



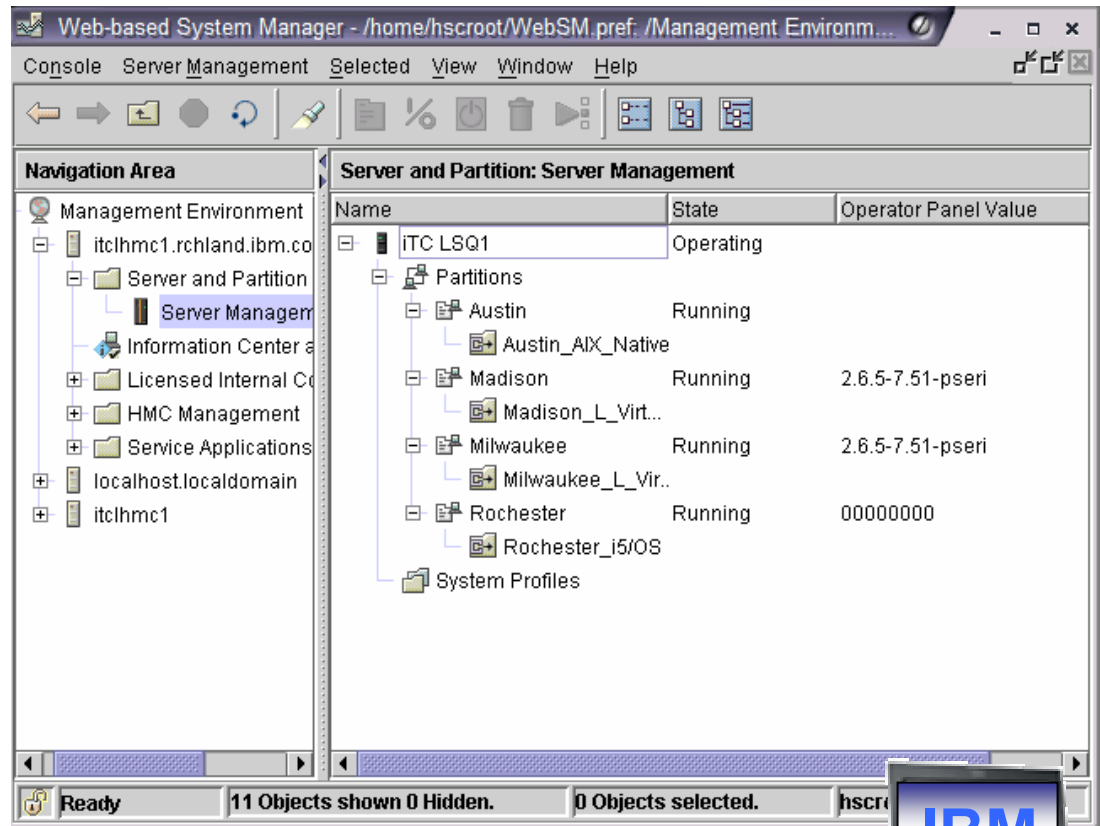
What is it?

- Pre-installed PC appliance
- Locally connected to server via Ethernet
- Accessible remotely through WebSM client
- Desktop or rack-mount



What is it used for?

- All LPAR functions
- Local console for Linux, AIX 5L, i5/OS
- Replaces primary partition and improves system resiliency
- Service focal point
- Remote support
- Capacity on Demand
- Firmware updates



Web-based System Manager - /home/hscroot/WebSM.pref: /Management Environment/itcsquad1.rchland...

Console Server Management Selected View Window Help

Find in Server Management Ctrl-F

Add Managed System(s)

Navigation Area

- Management Environment
 - itcsquad1.rchland.ibm.com
 - Server and Partition
 - Server Management
 - Information Center and Se
 - Licensed Internal Code Ma
 - HMC Management
 - Service Applications
 - localhost.localdomain
 - itclhmc1

Server and Partition: Server Management

Name	State	Operator Panel Value
ITC LSQ1	Operating	
Partitions		
Austin	Running	
Austin_AIX_Native	Not Activated	00000000
Madison	Not Activated	00000000
Madison_L_Virtual	Not Activated	00000000
Milwaukee	Not Activated	00000000
Milwaukee_L_Virtual	Not Activated	00000000
Rochester	Running	00000000
Rochester_i5/OS		
System Profiles		
Production_Profile		

Ready 12 Objects shown 0 Hidden. 0 Objects selected. hscroot - itcsquad1

One HMC can manage multiple physical servers
New MS added through context-sensitive menu

Managed System (MS)

Partition

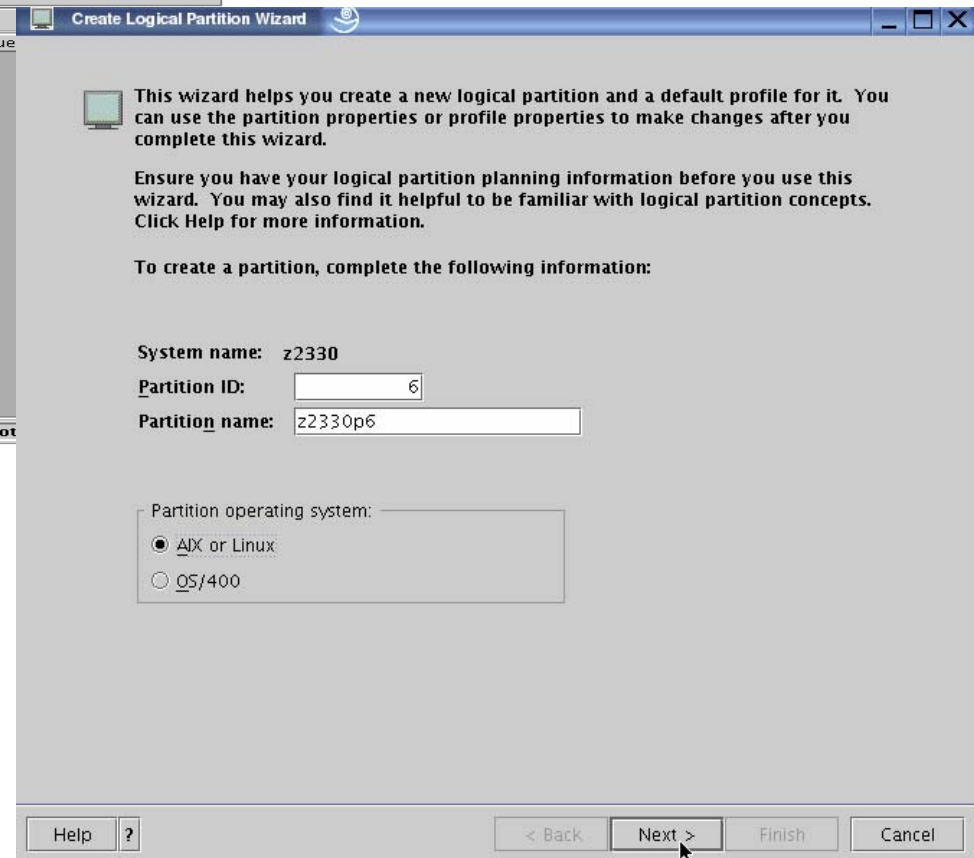
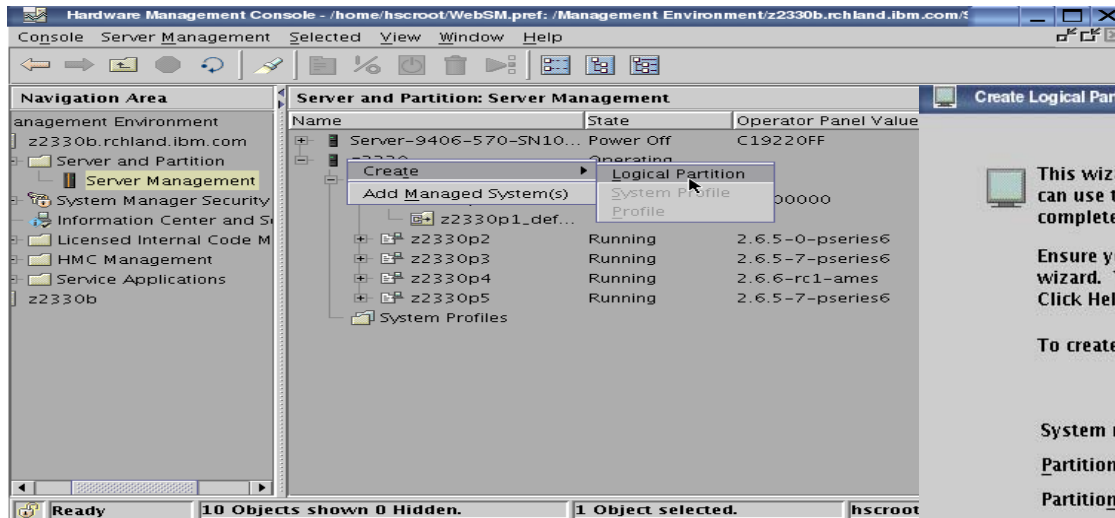
Partition profile

System profile

- ❑ Remote connection to system with WebSM
- ❑ Local HMC interface looks identical



HMC is used to Create Partitions!



- ❑ Profiles are used to define the resources that will be used by a partition.
- ❑ Profiles can be moved or even copied between partitions to facilitate easy/quick partition setup!

The screenshot shows a window titled "Create Logical Partition Profile". It contains the following text and fields:

A profile specifies how many processors, how much memory, and which I/O devices and slots are to be allocated to the partition.

Every partition needs a default profile. To create the default profile, specify the following information :

System name: z2330

Partition name: z2330p6

Partition ID: 6

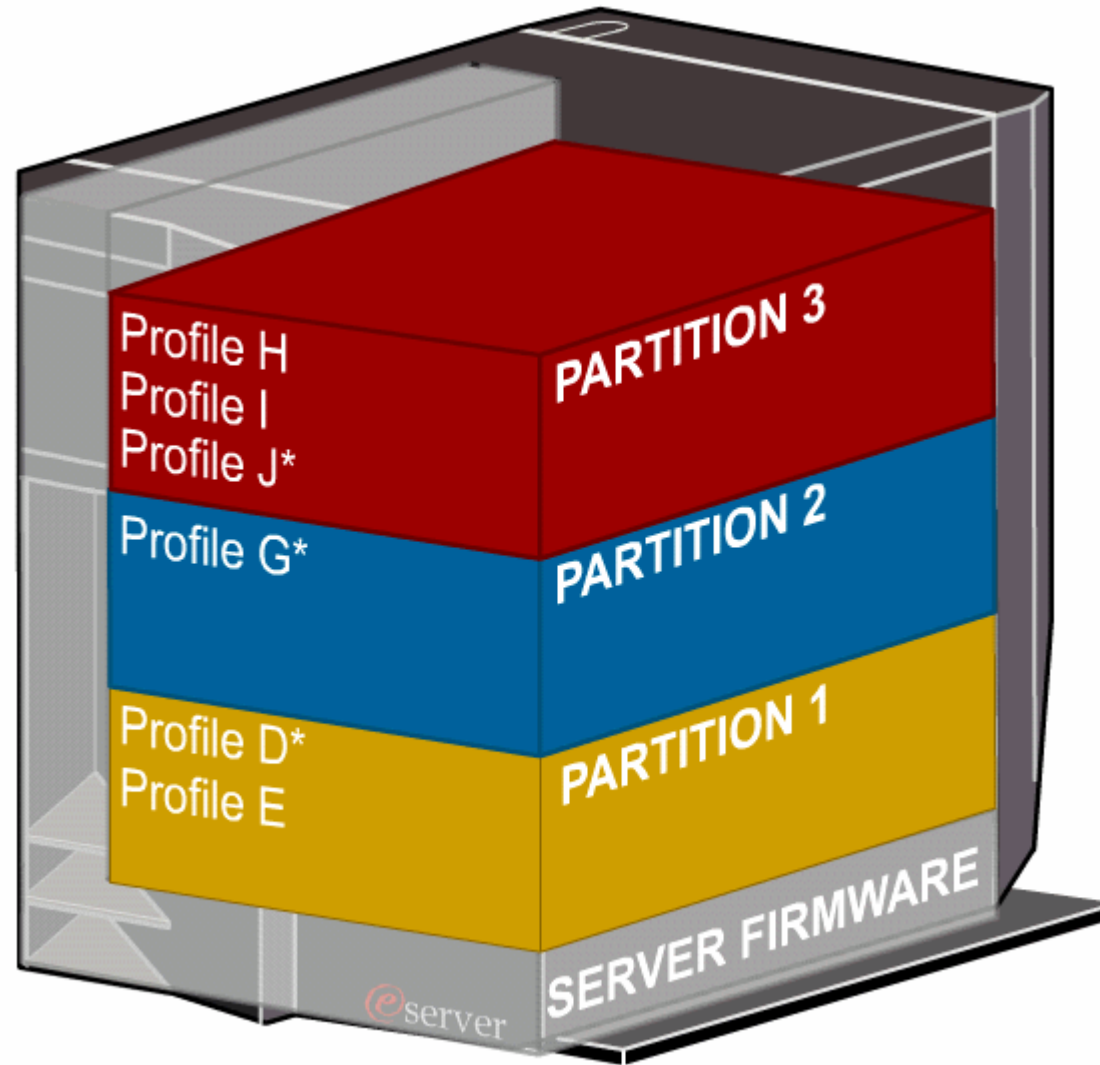
Profile name: z2330p6_virtual

This profile can assign specific resources to the partition or all resources to the partition. Click Next if you want to specify the resources used in the partition. Select the option below and then click Next if you want the partition to have all the resources in the system.

☐ Use all the resources in the system.

At the bottom, there are buttons for "Help", "?", "< Back", "Next >", "Finish", and "Cancel".

- ❑ A partition profile is a collection of system resources that will be available to that partition
- ❑ A partition **may** have multiple profiles – always has at least one
- ❑ A default (*) profile is the profile that is activated unless a different profile is selected. It is also the first profile created
- ❑ A system profile is a collection of partition profiles that are activated together
- ❑ **System resources in each partition profile that is part of a system profile are checked for conflicts**
- ❑ Two partition profiles may contain the same Ethernet adapter, as long as they are not active at the same time



* Default Partition Profile

- Similar to existing LPAR except now a “desired memory” can be defined.
- The partition is guaranteed the ‘minimum’ amount of memory but may vary on with less than the value under ‘desired’

Create Logical Partition Profile - Memory

Specify desired, minimum and maximum amounts of memory for this profile using a combination of the gigabyte and megabyte fields below.

Installed memory (MB): 4096

Current memory available for partition usage (MB): 3776

Minimum memory	Desired memory	Maximum memory
0 GB	0 GB	1 GB
128 MB	256 MB	0 MB

Help ? < Back Next Finish Cancel

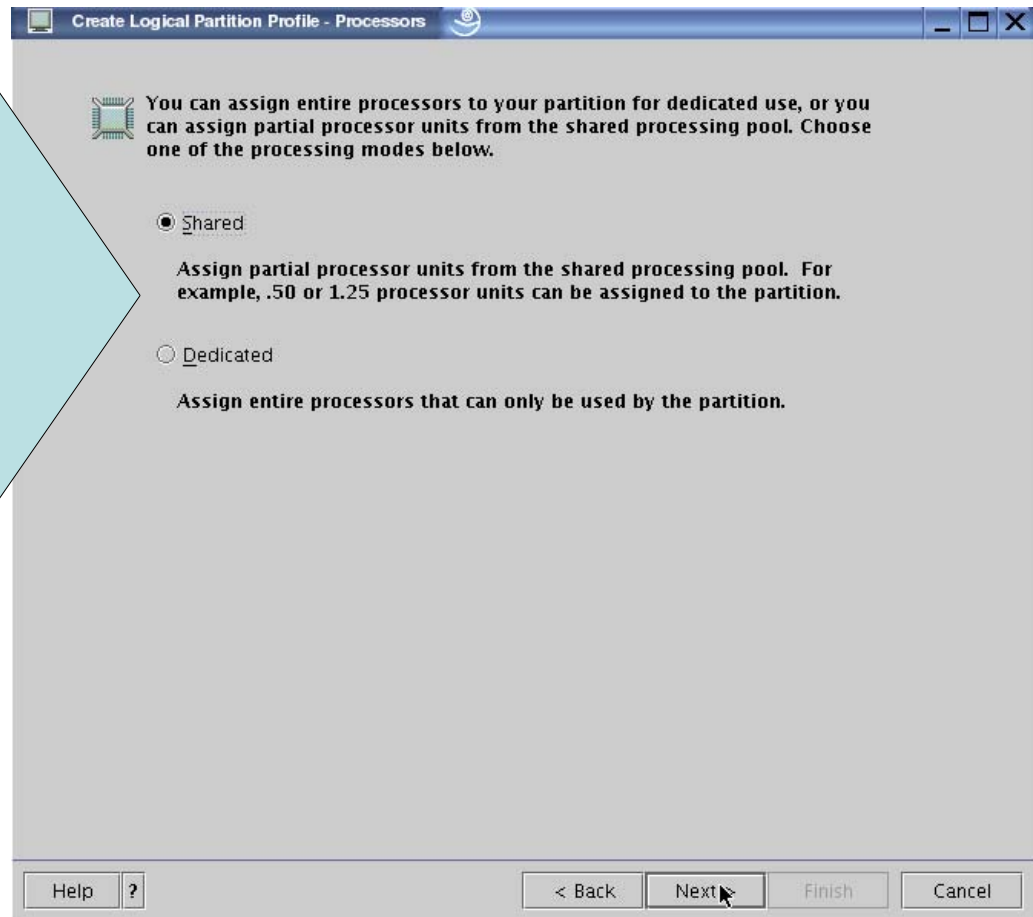
- Partition will start if its desired memory is not available
- Partition will not start if its minimum memory is not available
- Upon partition activation, the Hypervisor will attempt to allocate the desired amount of memory and reserve memory space for the Hardware Page Table.



Both Shared and Dedicated Processors Supported



i5 continues to support the assignment of Shared (i.e., partial processors) and Dedicated Processors for partitions.





Capped and Uncapped Processor Support

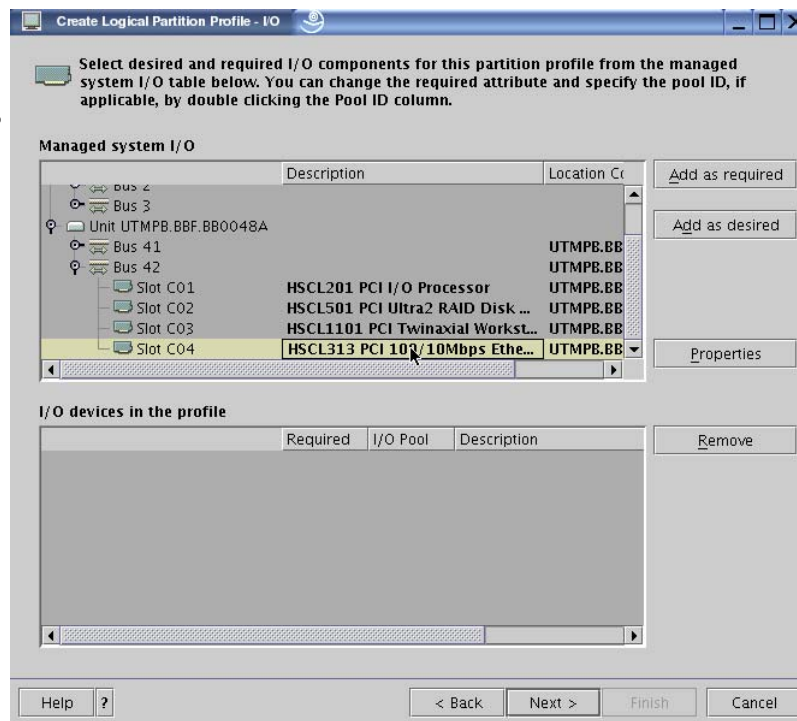


- ❑ Both capped (static) processor allocation as well as uncapped (dynamic) processor allocation is supported.
- ❑ Uncapped processor allocation allows for the Hypervisor to manage processor resources within a defined range
- ❑ The weight allows the user to set the priority with which the partition gets uncapped resources
- ❑ Uncapped provides for the automation of workload balancing across the entire i5 system

The screenshot shows two overlapping windows from the IBM i5 OS. The top window, titled 'Advanced Processing Settings', displays 'Sharing modes' with 'Capped' selected. Below it, 'Uncapped' is also shown with a 'Weight' of 200. The bottom window, titled 'Create Logical Partition Profile - Processing Settings', contains fields for 'Total usable processing units' (2), 'Desired processing units' (0.75), 'Minimum processing units' (0.1), and 'Maximum processing units' (2). A light blue text box is overlaid on the bottom window, stating: 'As with memory, the minimum number of units are required to activate the partition but the desired number of units are not guaranteed.'

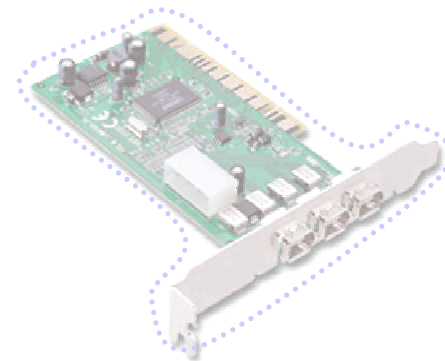
- Partitions on i5 hardware have the ability to use native (physical) resources that the operating system within the assigned partition will own and manage.

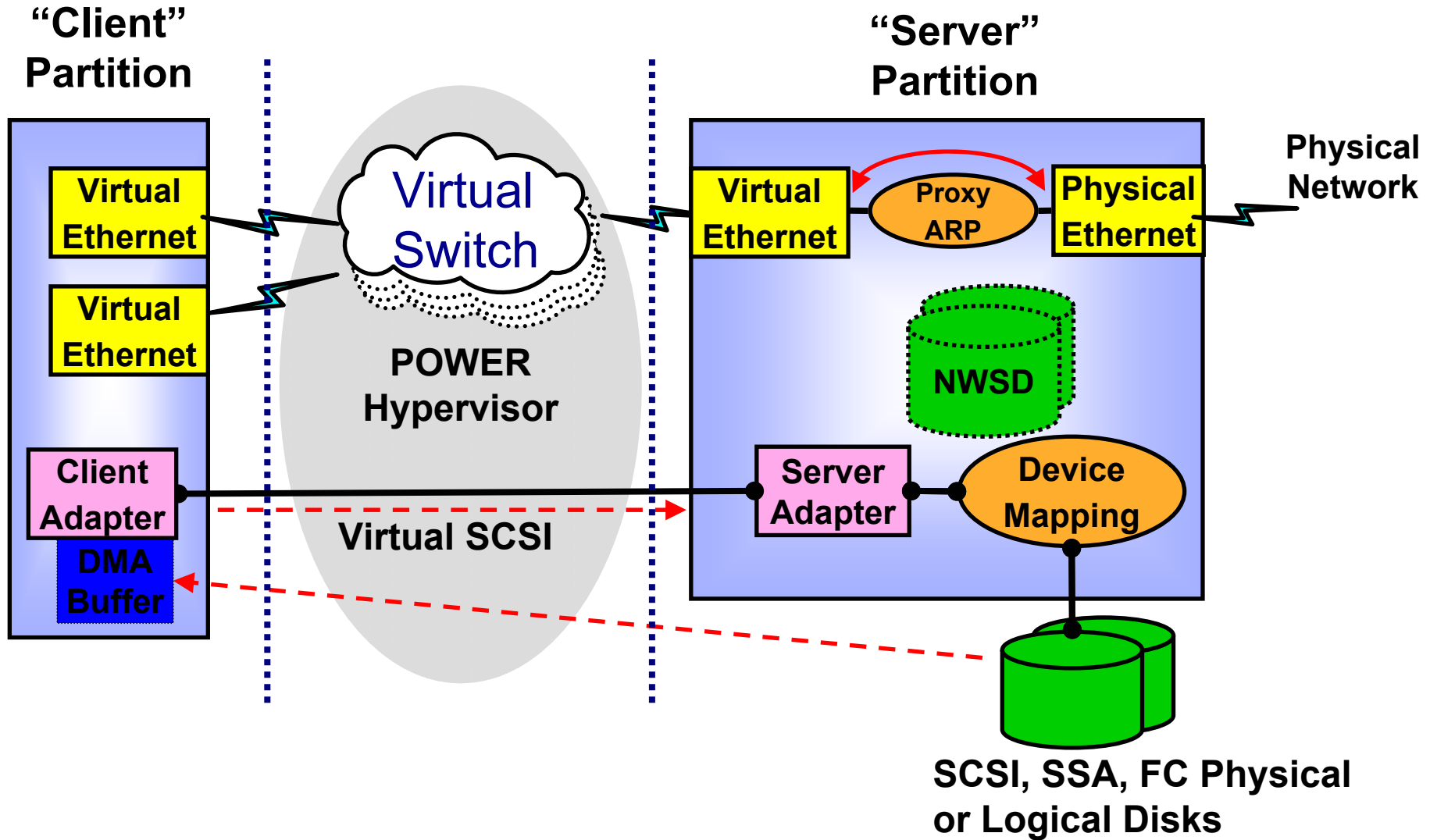
- Units, buses, and slots can be allocated to partition as “required” and “desired”



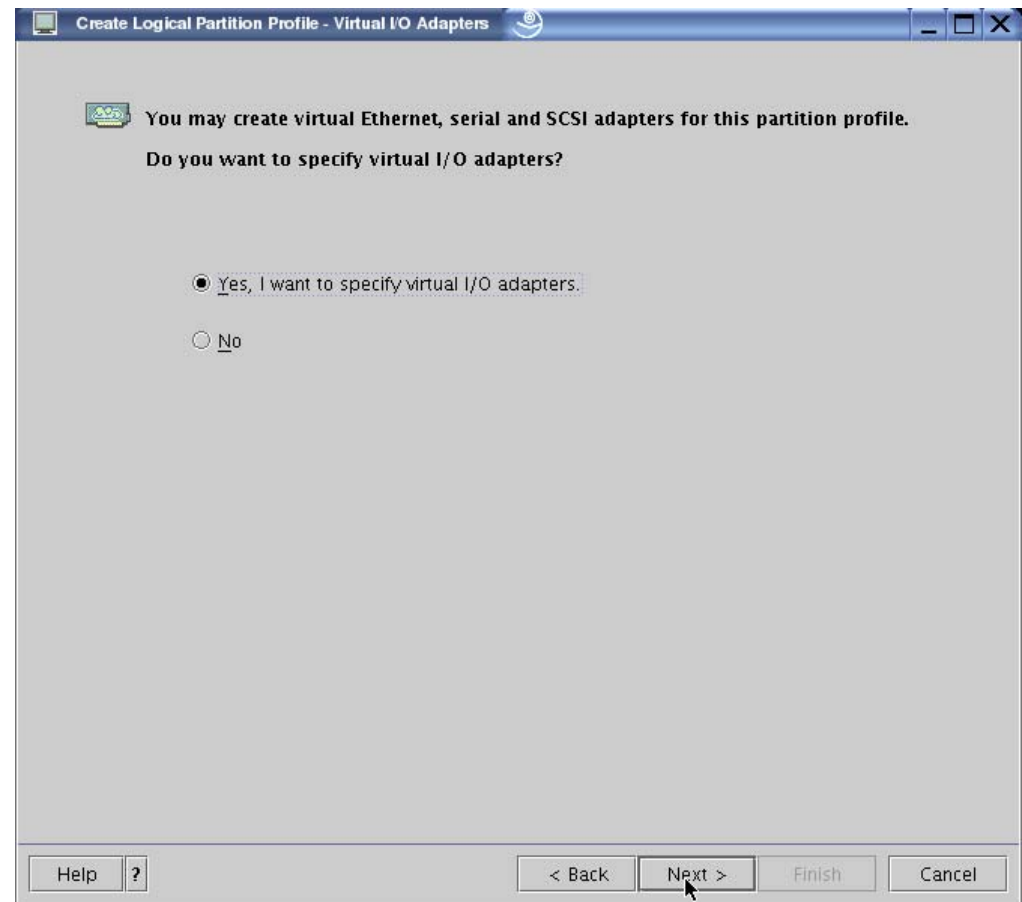
- Partition will start if “desired” resource is being used by another partition
- Partition will not start if “required” resource is being used.

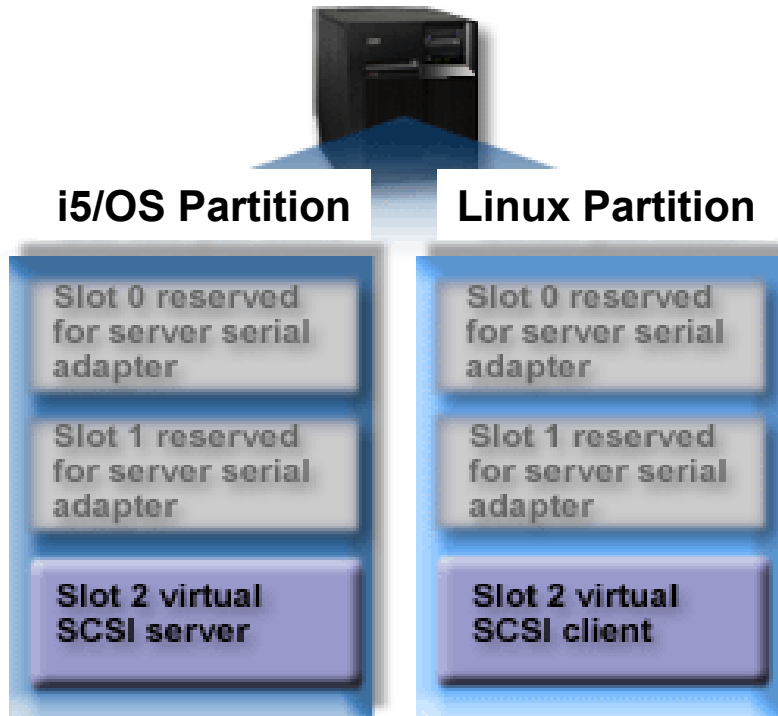
- ❑ Each partition has virtual I/O “slots”
 - Configurable for each partition in HMC
- ❑ Slots can have virtual adapter instance
 - Ethernet, serial, or SCSI
- ❑ Virtual adapters configured in partition profile
- ❑ Maximum number of virtual adapters cannot be changed without de/reactivation
- ❑ Can be dynamically added or removed just like physical I/O slots
 - Cannot be dynamically moved to another partition
 - Configuration of what is in the slot can be redefined without a restart of the partition





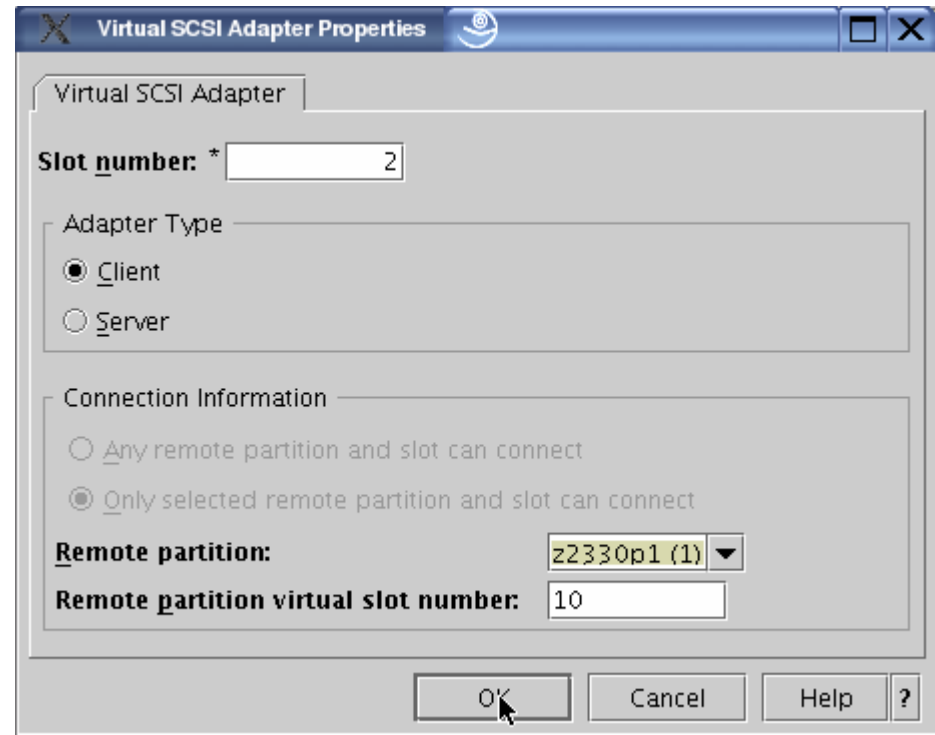
- ☐ The partition may be assigned virtual resources that are served from other partitions on the system.
- ☐ Virtual devices such as Ethernet and Disk continue to be supported in i5

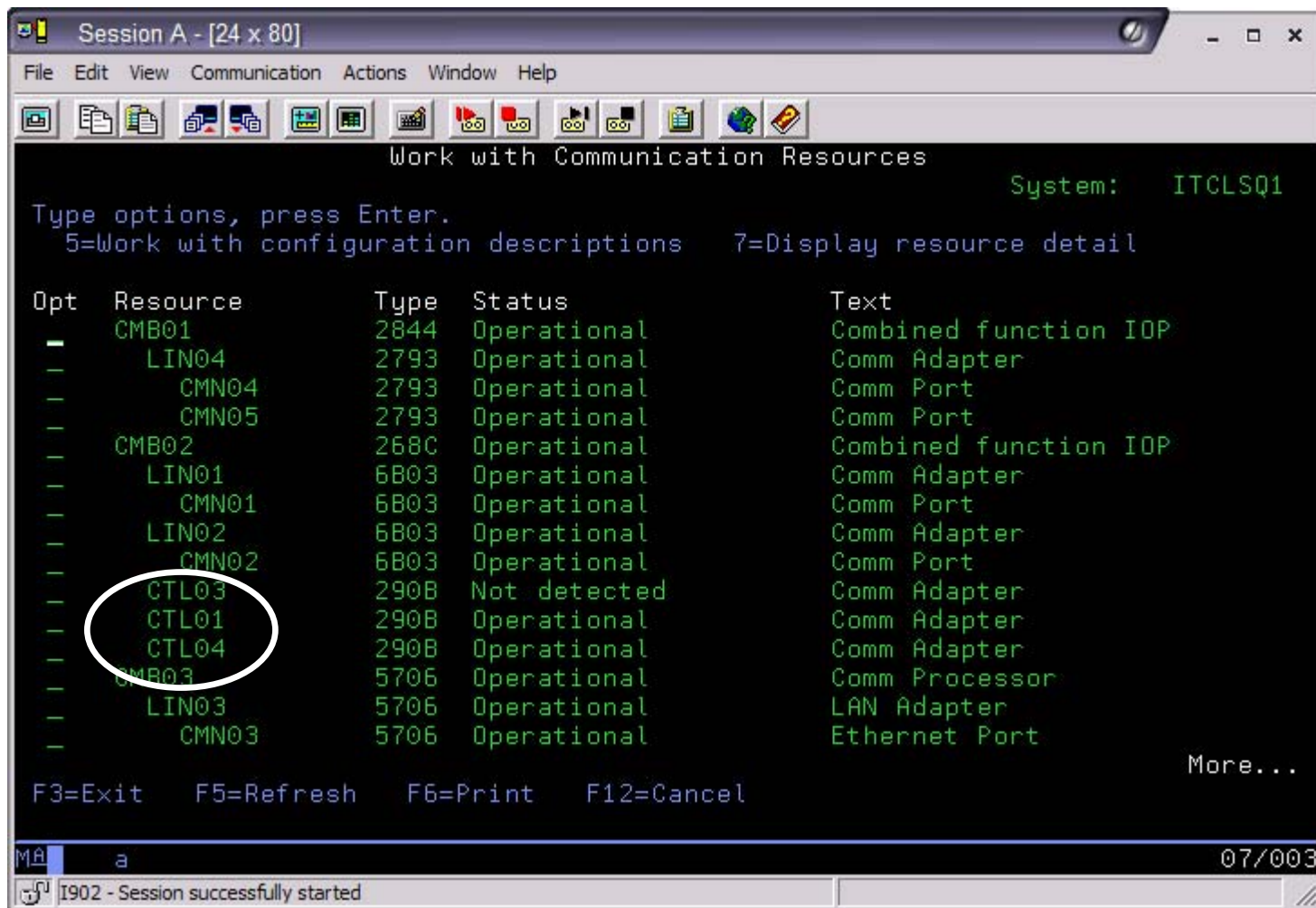




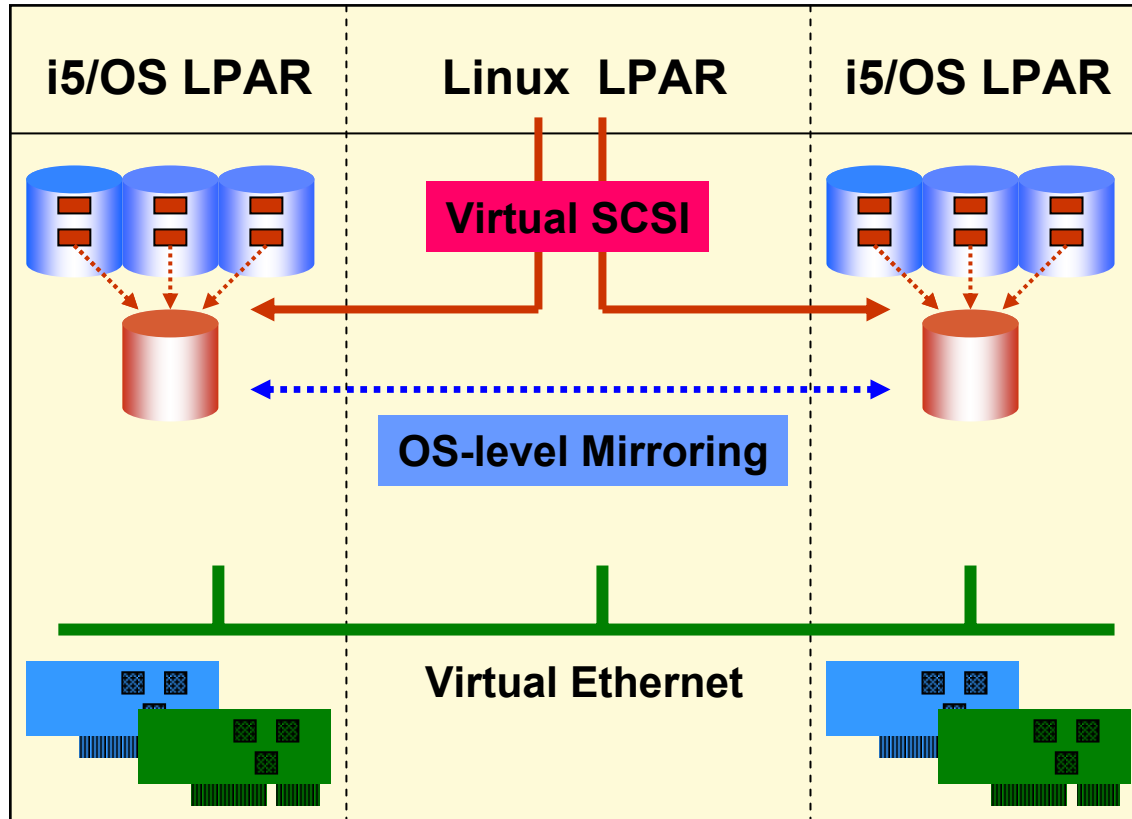
- ☐ Virtual SCSI server and client adapters
- ☐ i5/OS is server, Linux is client
- ☐ Required for accessing Virtual Disk, CD/DVD, tape from i5/OS
- ☐ Virtual disk = NWSSTG object
- ☐ NWSSTG created in IFS
- ☐ NWSD object connects server-client SCSI adapter pair with NWSSTG
- ☐ **One NWSD/multiple NWSSTG possible per server-client adapter pair**
- ☐ Linux sees virtual disk as physical drive
- ☐ /dev/sdX in Linux
- ☐ Leverage RAID-5, multiple disk arms, scatter-loading, single-level storage

- ❑ Virtual disk can be provided to the partition through the use of the VSCSI driver.
 - NOTE: Incorporate of virtual SCSI is new in i5. Previous LPAR supported IDE virtual disks through viodasd.



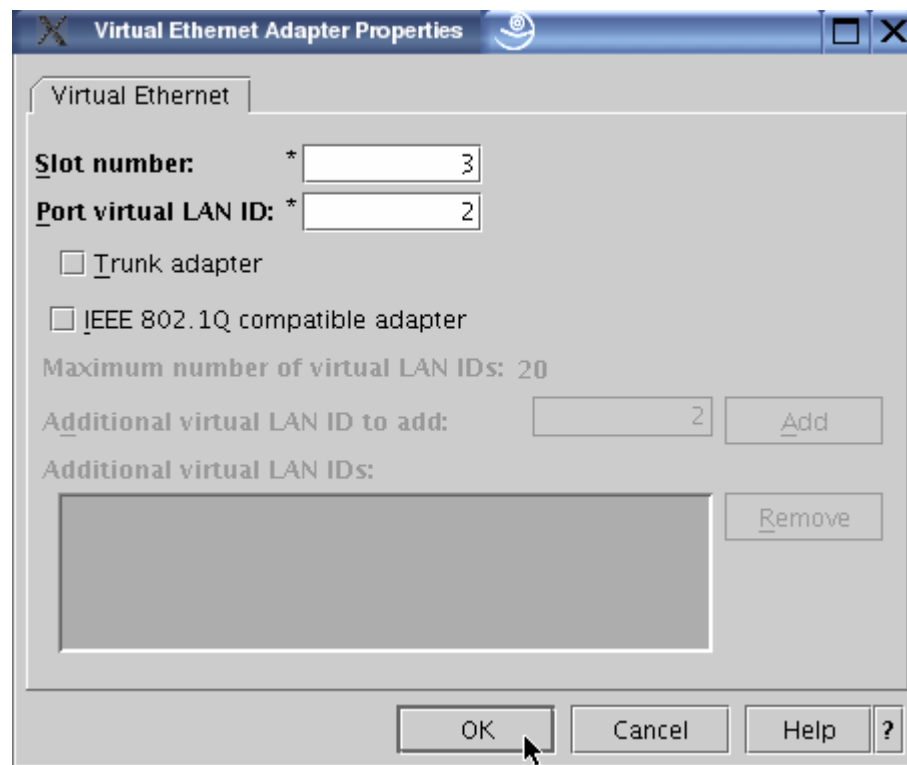


“Resource name” for Linux NWSD

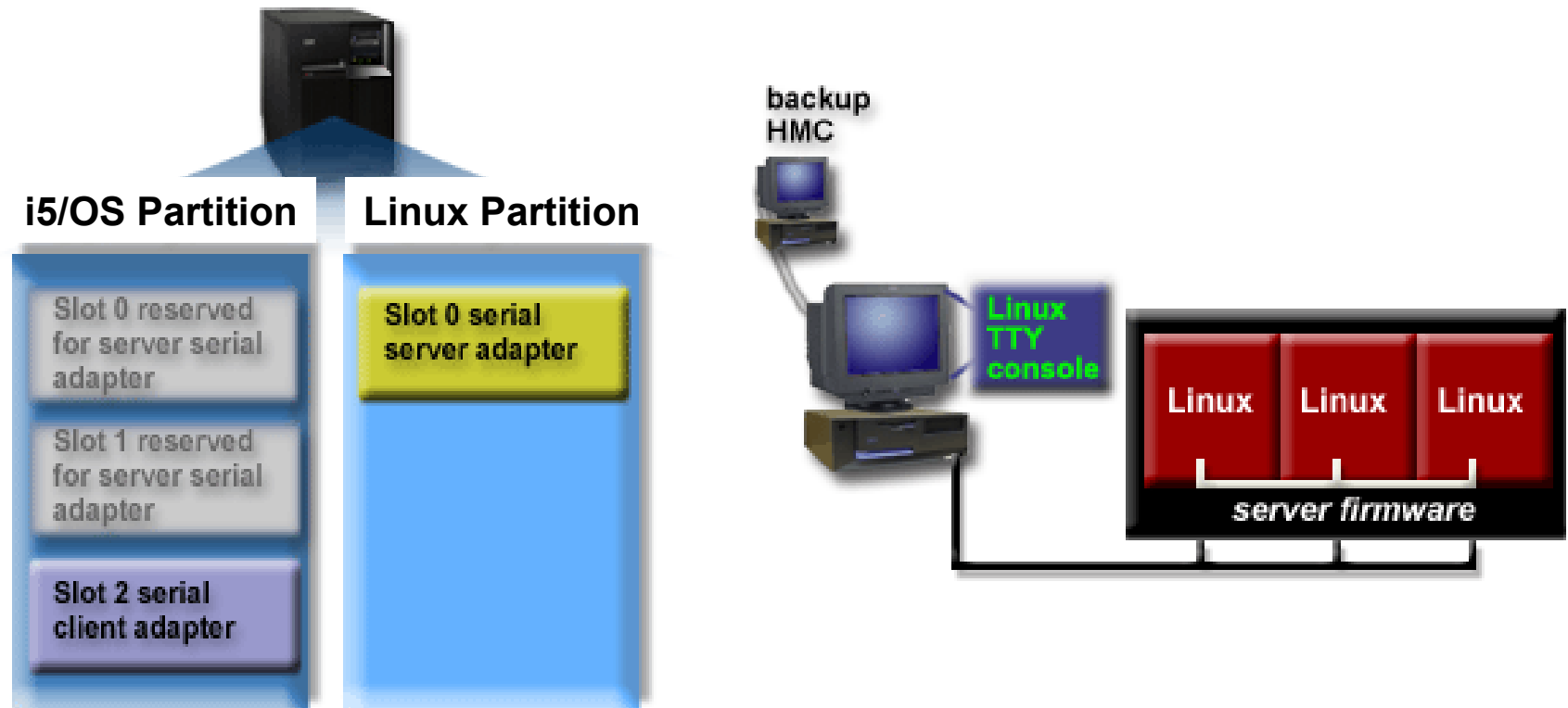


- ❑ Linux partitions can access virtual disk from two or more i5/OS partitions
- ❑ Two virtual disks of equal size from separate i5/OS partitions allow mirroring of Linux system disk
- ❑ Two Virtual SCSI server/client adapter pairs required, one for each i5/OS partition providing storage
- ❑ Mirroring accomplished with OS tools within Linux
- ❑ Linux partition becomes highly available, able to withstand failure of either host i5/OS partition

- ❑ Assignment of virtual LAN continues to be supported in i5.
- ❑ Up to 4096 virtual LANs can be configured
- ❑ Partitions can be given connections on multiple virtual LANs
- ❑ IEEE 802.1Q is supported by i5 Virtual LAN



- ❑ CMNxx in i5/OS
- ❑ ethX in Linux
- ❑ entX in AIX 5L



❑ First 2 virtual slots in every partition reserved for virtual serial server adapters for system console in HMC

❑ For i5/OS, virtual serial adapters provide 5250 console

❑ For Linux and AIX 5L, they provide character console



Virtual Serial

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Logical Partition Profile Properties: Rochester_i5/OS @ ITC LSQ1

Tagged I/O Virtual I/O OptiConnect Power Controlling Settings

General Memory Processors

Detailed below are the virtual adapters created in this partition

Virtual adapters

Number of virtual adapters : 10

Slot Number	Type
0	Server Serial
1	Server Serial
3	Server SCSI
4	Server SCSI

Delete

Create adapters

☐ Ethernet

☒ Serial

☐ SCSI

(Create...)

Click to create the selected adapter type

OK Cancel Help ?

Virtual Serial Adapter Properties

Virtual Serial

Slot number: * 2

Adapter Type

☐ Client

☒ Server

Connection Information

☐ HMC and any remote partition and slot can connect

☐ Any remote partition and slot can connect

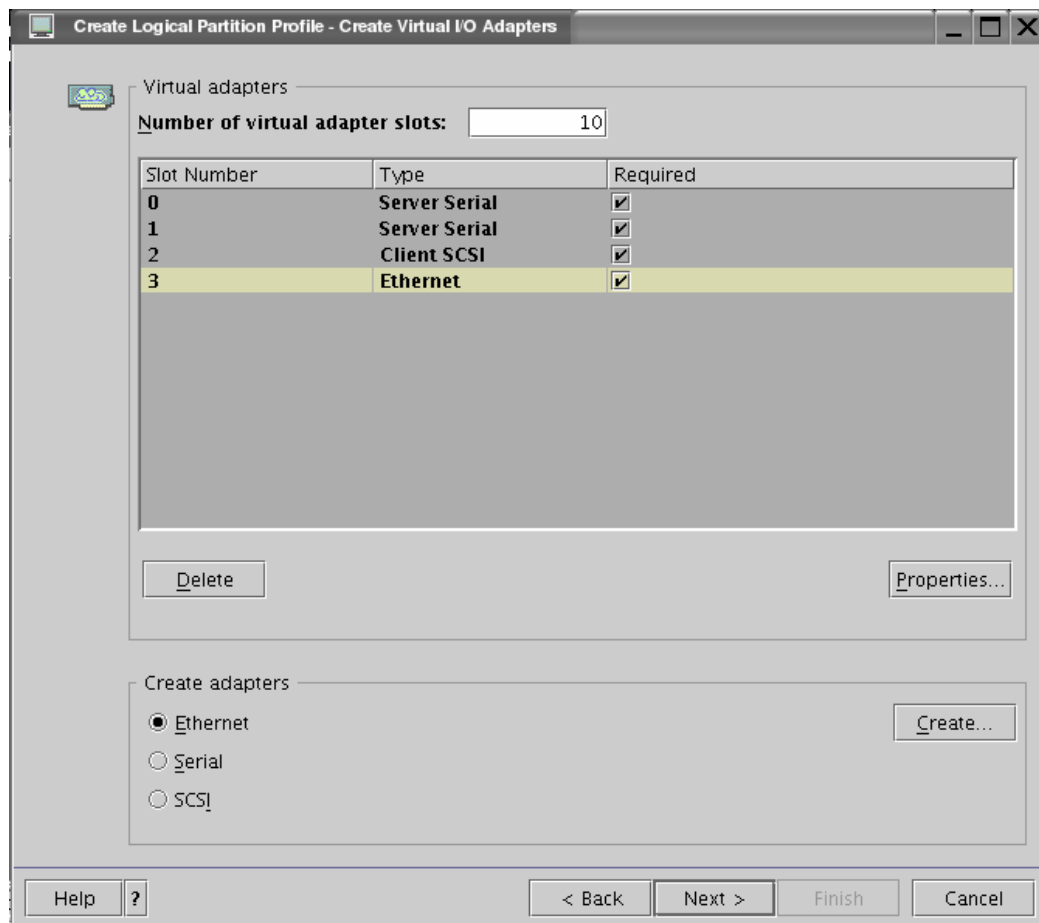
☒ Only selected remote partition and slot can connect

Remote partition: Milwaukee (3)

Remote partition virtual slot number: 5

OK Cancel Help ?

- ❑ At this point the partition has VSCSI (virtual) disk and Ethernet adapters configured.
- ❑ Note that there is room for up to 10 virtual adapters
 - ❑ The number of virtual adapters can be increased – requires a restart of the partition.
- ❑ Also note that serial servers are assigned by default.
 - Required for console support



- ❑ Power controlling allows i5/OS partition to activate Linux partition
- ❑ Analogous to host partition for Linux on pre-POWER5 servers
- ❑ Linux cannot act as a power controlling partition
- ❑ Power controlling is not necessary if virtual storage from i5/OS is not being used, use “Power control = *NO” in NWSD
- ❑ One NWSD per Linux partition is necessary for virtual storage.

Create Logical Partition Profile - Power Controlling Partitions

You may specify power controlling partitions for this partition profile using the fields below.

Power controlling partitions

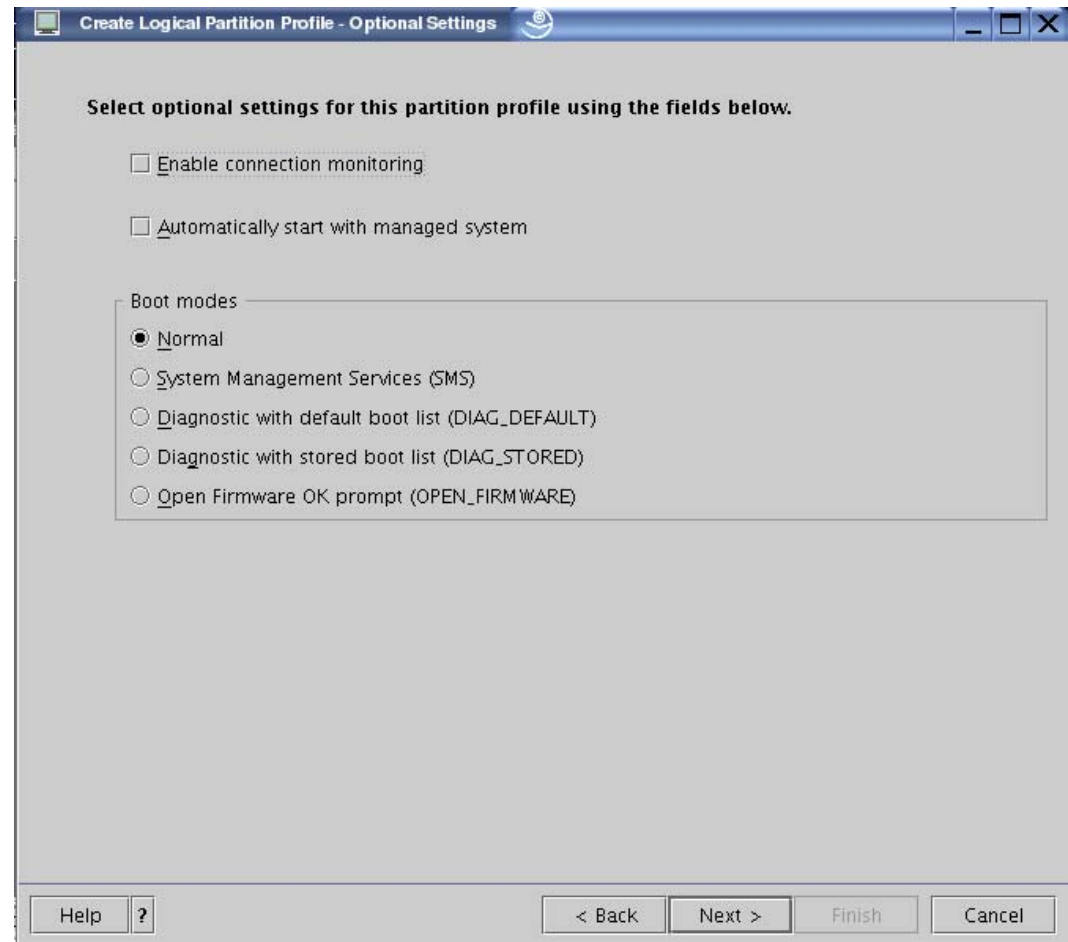
Number of power controlling partitions:

Power controlling partition to add:

Partition ID	Partition name	<input type="button" value="Remove"/>
1	z2330p1	

Help ?

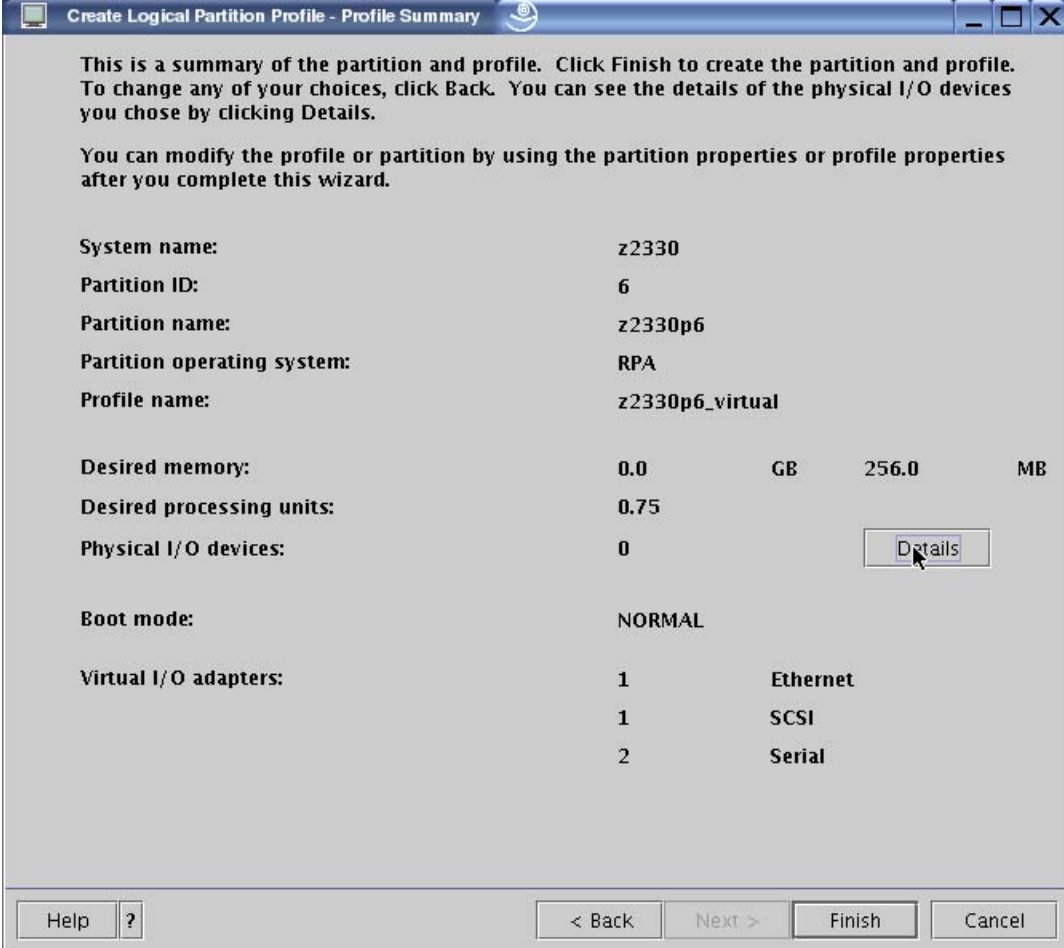
- ☐ Boot mode important when partition is starting from native disk
- ☐ Ignored when partition is starting from virtual disk
- ☐ SMS is service of Open Firmware used to configure boot from native disk
- ☐ SMS also used to perform network install



IBM Partition Configuration Summary

☐ Partition definition is complete.

☐ A summary of the partition configuration is displayed.



Create Logical Partition Profile - Profile Summary

This is a summary of the partition and profile. Click Finish to create the partition and profile. To change any of your choices, click Back. You can see the details of the physical I/O devices you chose by clicking Details.

You can modify the profile or partition by using the partition properties or profile properties after you complete this wizard.

System name:	z2330			
Partition ID:	6			
Partition name:	z2330p6			
Partition operating system:	RPA			
Profile name:	z2330p6_virtual			
Desired memory:	0.0	GB	256.0	MB
Desired processing units:	0.75			
Physical I/O devices:	0			Details
Boot mode:	NORMAL			
Virtual I/O adapters:	1	Ethernet		
	1	SCSI		
	2	Serial		

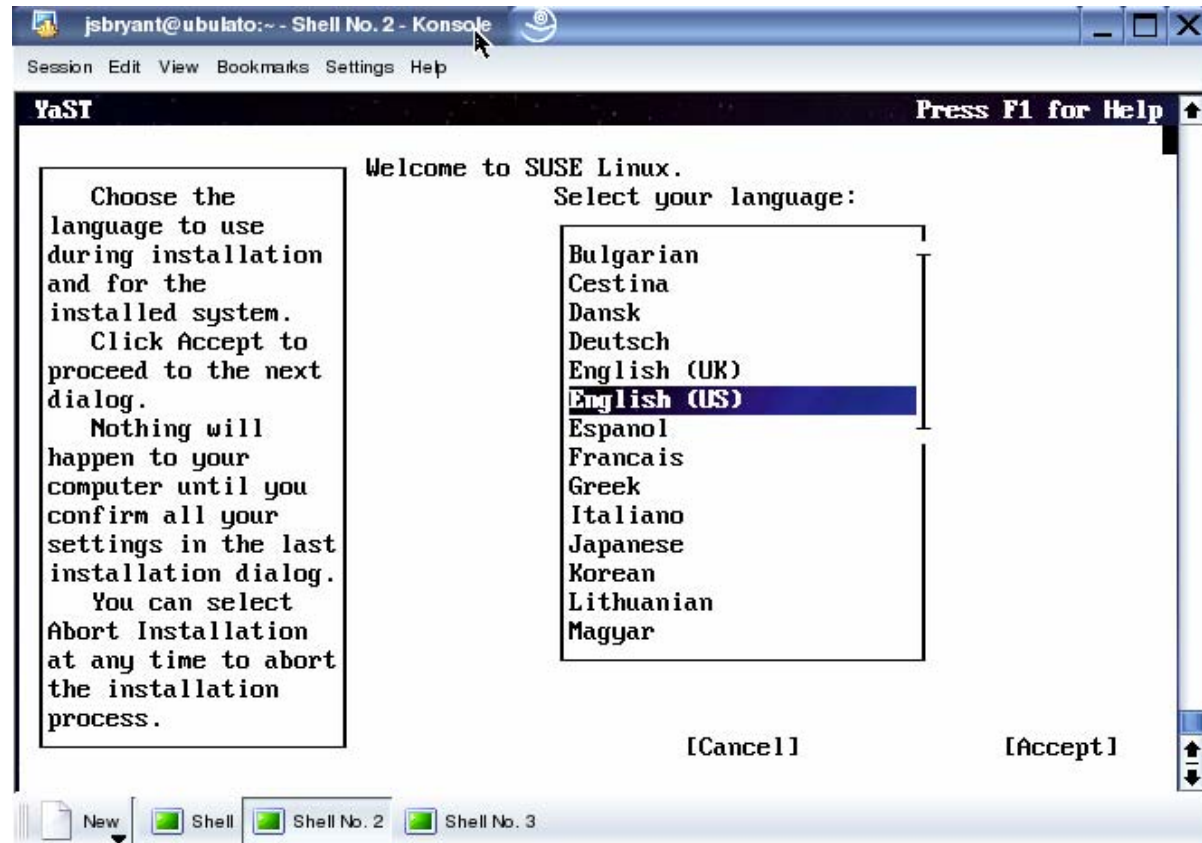
Help ? < Back Next > Finish Cancel

- ☐ Virtual Disk Drives are created and associated (attached) to the Network Server Descriptor
- ☐ A connection to the virtual console is established
- ☐ The partition is activated
- ☐ The Network Server Descriptor is modified to boot the installation kernel
- ☐ The Network Server is started
 - ☐ A start of the Network Server causes the partition to be started as well

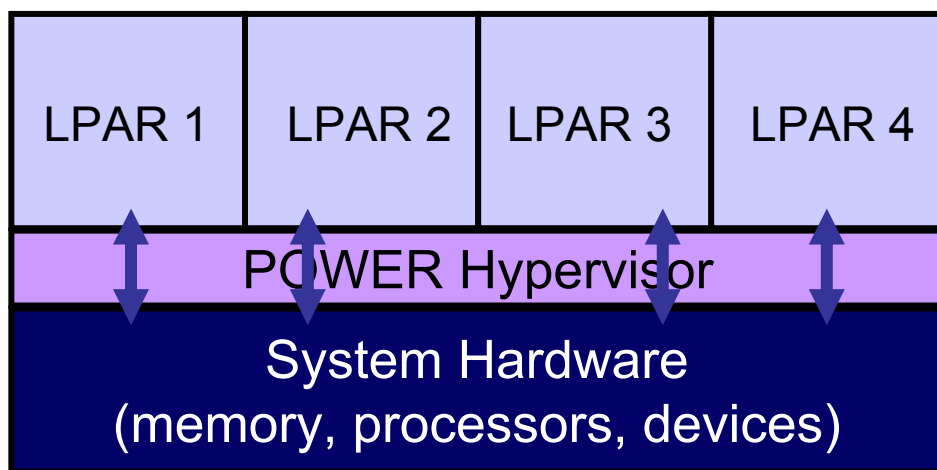
IBM Linux running without IPL!!!

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- ❑ Linux is running in a completely new partition which required no IPLs to create!!



- ❑ The POWER Hypervisor is firmware that provides:
 - Virtual memory management
 - Controls internal operations and I/O access
 - Manages memory
 - Virtual hardware support – processors, Ethernet, SCSI, Serial and Opticonnect
 - Security and isolation between partitions
 - Partitions are allowed access only to resources that are allocated to them (enforced by the POWER Hypervisor)

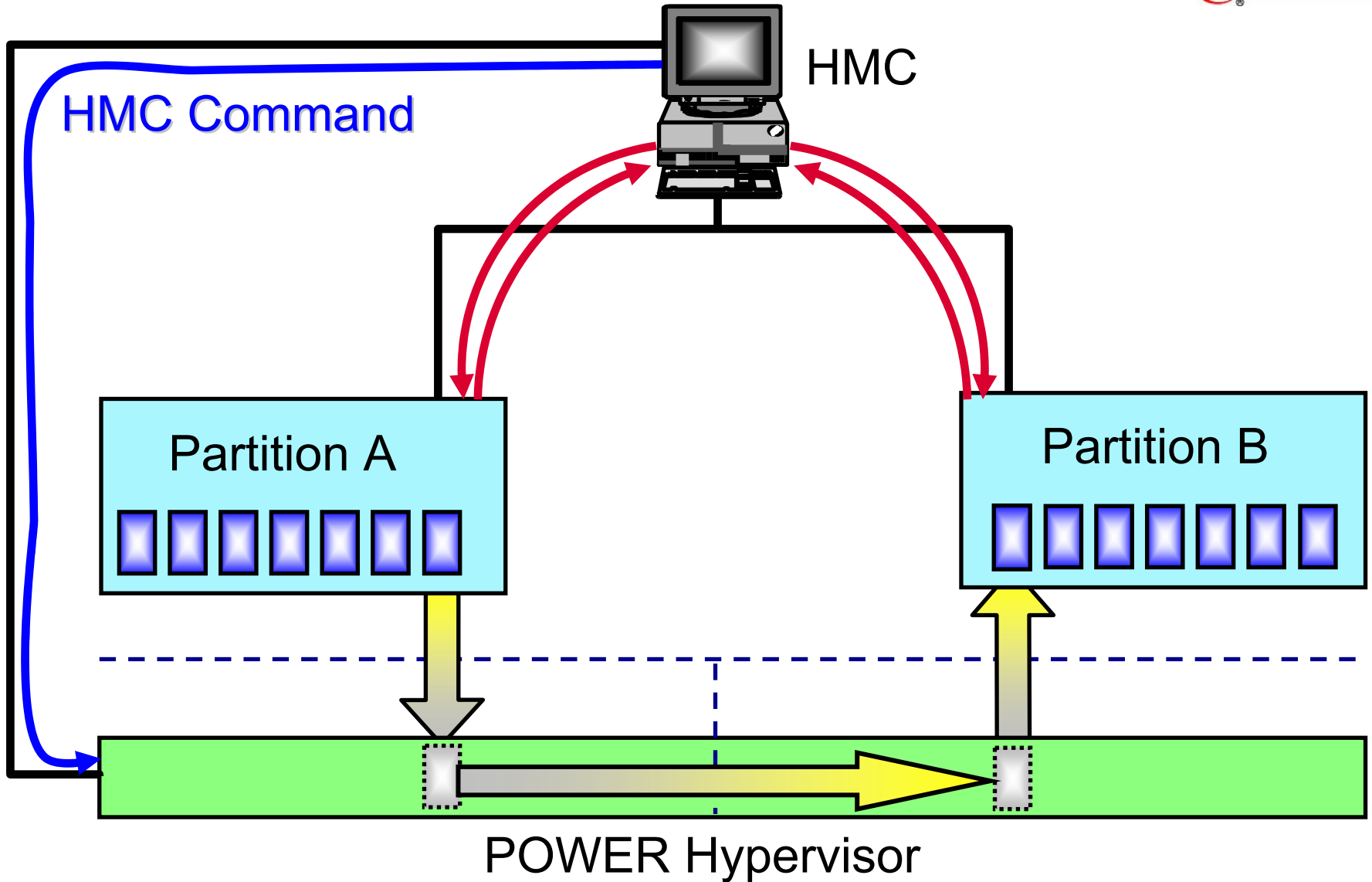


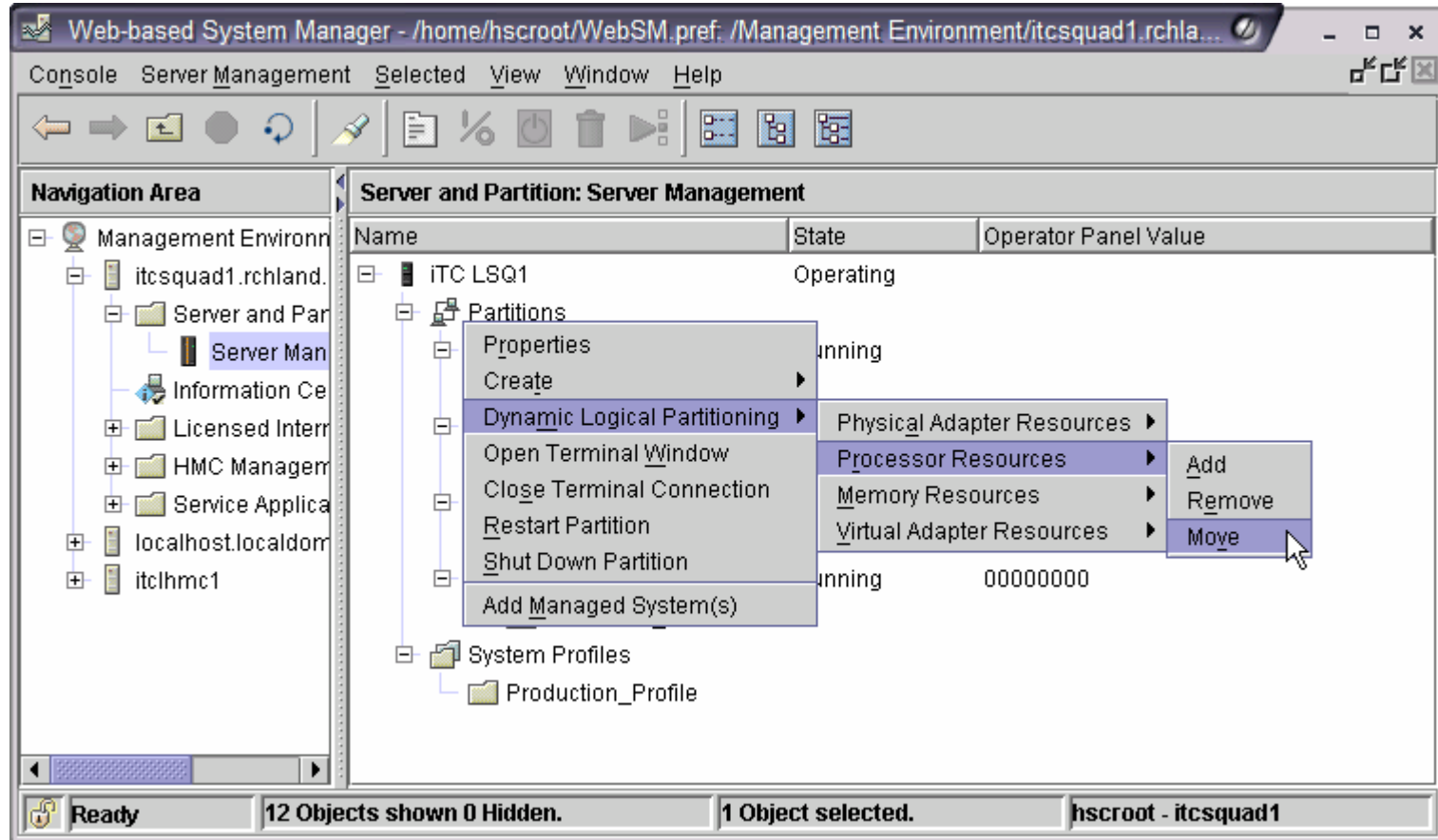
- ❑ Security and isolation barriers
- ❑ POWER Hypervisor independent of any OS

- ❑ DLPAR is the ability to add, remove, or move resources among partitions without restarting them
- ❑ Resources
 - Processors, memory, and physical I/O slots that are not 'required'
 - Virtual I/O
 - Processors and I/O only for Linux
- ❑ Security and isolation between LPARs are not compromised
 - A partition sees its own resources plus other *available* resources
 - Resources are reset when moved
- ❑ Applications may or may not be DLPAR-aware



DLPAR maximizes resource
utilization and productivity





Dynamic change: right-click on partition, not profile

Move Processor Resources - AIX (4)

General Advanced

Dynamic Logical Partitioning -- Move Processing Units

Move Processing Units From

☒ Uncapped **Weight**

	Minimum	Current	Number to move	After move
Processing units :	0.1	1.0	<input type="text" value="0.2"/>	0.8
Virtual processors :	1	2.0	<input type="text" value="0"/>	

Move Processing Units To

Logical partition :

☒ Uncapped **Weight :**

	Maximum	Current	After move
Processing units :	2.0	0.5	0.7
Virtual processors :	20	2.0	2.0

OK Cancel Help ?

☐ Partition from which CPU is being removed must have at least 0.10 units per virtual CPU left, **and** enough units left to satisfy its minimum

☐ Only active partitions will appear in drop-down menu in lower pane

☐ CPU changes take effect immediately

- ☐ Create and delete partitions without having to IPL the system
- ☐ Uncapped processors
 - ☐ A partition gets to use unused processing power on the system up to 100% assigned virtual processors
- ☐ Ability to dynamically add and remove Physical I/O resources to/from Linux partitions
 - ☐ Requires distributions with the 2.6 Linux kernel
- ☐ Ability to dynamically add and remove entire virtual or physical processors to/from Linux partitions
 - ☐ Requires distributions with the 2.6 Linux kernel.
- ☐ Ability to dynamically add and remove virtual resources to/from Linux partitions
 - ☐ Requires distributions with the 2.6 Linux kernel



New i5 Systems



- ❑ Addition of the /proc/ppc64/lparcfg file which contains information about the partition and system that Linux is running on
- ❑ The new IBMVETH VLAN acts as an Ethernet switch that may be bridged to external LAN.
- ❑ Support for up to 4096 VLANS
- ❑ IEEE 802.1Q VLAN support
- ❑ Most system information is moving from /proc to /sys
- ❑ Ability for Linux partitions to use VSCSI disk that is shared from multiple Network Server Descriptors and even multiple OS/400 partitions.

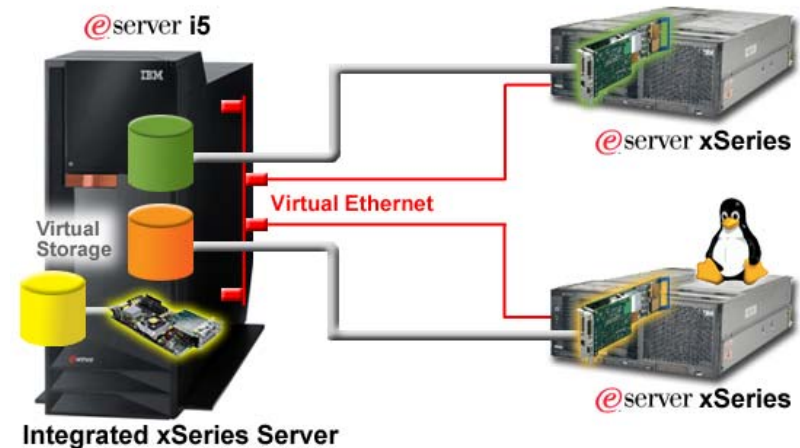
☐ Kernel Version 2.6

- “The usual scalability stuff” – Linus Torvalds
- Improved support for processor scalability
 - ☐ Improved scalability to 16 cpus or more
 - ☐ True asynchronous I/O provides performance improvements in enterprise applications
 - ☐ Improved threading support
- Improved support for large memory models
- New Hardware Architecture support
 - ☐ AMD 64-bit Opteron CPUs
 - ☐ PowerPC 64-bit CPUs
- Improved high-bandwidth networking support

☐ SAMBA Version 3

- Ability to authenticate against an Active Directory Server (ADS)!!
- Support for Windows NT Domain trust relationships
- Tools to migrate accounts from native NT servers to SAMBA
- NOTES:
 - ☐ SAMBA 3 is included with the current Red Hat RHEL 3 product
 - ☐ SAMBA 3 is included with the current SuSE SLES 9 product

- ❑ Intel Linux running on Integrated xSeries (IXS) or xSeries server attached with Integrated xSeries Adapter (IXA)
- ❑ Optimize investments
 - Utilize i5/OS Virtual SCSI
 - Integrate i5/OS and Linux backup
 - Leverage Resources, skills and best practices
- ❑ Deliver support for Intel Linux applications
- ❑ Provide a path to Linux on POWER
- ❑ Technical education: AS560





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