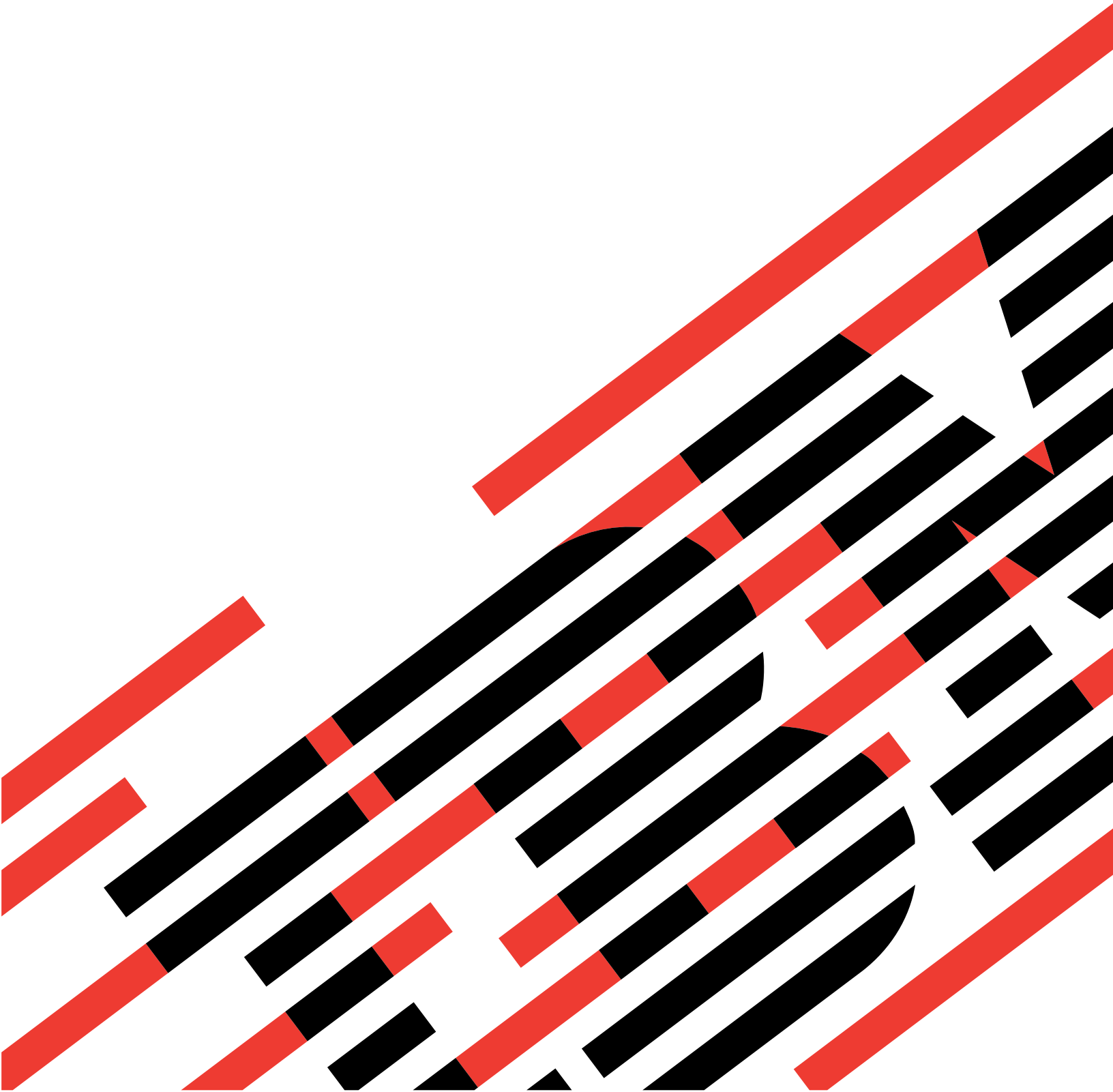
IBM

eserver

Partitioning for Linux



Partitioning for Linux

Sixth Edition (April 2005)

This edition applies to IBM AIX 5L Version 5.3 and to version 5, release 3, modification 0 of IBM i5/OS (product number 5722-SS1) and to all subsequent releases and modifications until otherwise indicated in new editions. This version does not run on all reduced instruction set computer (RISC) models nor does it run on CISC models.

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Chapter 1. Partitioning for Linux

The process of getting Linux up and running on IBM eServer hardware begins with Planning for Linux logical partitions. If you already have Linux for POWER™ installed on IBM eServer hardware, you may want to proceed to Migrating a Linux installation

In order to use logical partitions on an IBM® eServer™ OpenPower™ system, you need the appropriate Advanced OpenPower Virtualization technologies activated in your system's Hardware Management Console

What's new
Use this information to see the new or significantly changed enhancements to Linux partitioning.

Printable PDFs
If you prefer a hardcopy version of this information, go here to print the PDF.

General concepts for partitioning the server
Use this information to learn more about logical partitions on IBM eServer hardware.

Concepts for Linux logical partitions
Use this information to learn important concepts pertinent to logical partitioning for Linux.

Scenarios for Linux logical partitions
Use this information to understand related functions for Linux logical partitions.

Planning for Linux logical partitions
Use this information to help you plan for Linux logical partitions on IBM eServer hardware. This is your starting point for getting Linux up and running on IBM eServer hardware.

Configuring Linux logical partitions
Use this information to learn about logical partition configuration and resource requirements for a Linux installation.

Managing Linux logical partitions
Use this information to learn about procedures for managing Linux™ logical partitions.

Using Linux installed on a logical partition
Find information about using Linux when it is installed on a logical partition.

Troubleshooting Linux logical partitions
Use this information to learn how to resolve Linux logical partition errors.

Related information for Linux logical partitions
Use this information to find related material for Linux logical partitions, including Web sites, Redbooks™, and information center topics.

Chapter 2. What's new

You can run Linux in a logical partition on the IBM eServer OpenPower systems.

The following tables describe the enhancements to Linux logical partition support on IBM eServer hardware iSeries™ and pSeries®server hardware systems.

On iSeries systems, Linux logical partitions support these enhancements.

Function	Linux on IBM iSeries	Linux on IBM eServer i5
LPAR (Logical Partitioning) user interface	• iSeries Navigator • Dedicated Service Tools (DST) or System Service Tools (SST)	• Hardware Management Console (HMC) required to partition the server. • HMC remote command
LPAR authority	Service Tools User IDs created using DST or SST. • System partitions-administration authority • System partitions-operations authority	User roles created using the HMC: • Super administrator • Operator • Viewer • Product engineer • Service representative
Maximum number of partitions	31 for 270, 8xx, and 890 models The maximum number of partitions supported depends on the number of processors in the server model.	The maximum number of logical partitions supported equals 10 times the number of processors in the server model.
Types of partitions	Primary partition is i5/OS Secondary partitions are i5/OS or Linux	• No primary or secondary partitions • i5/OS™ service partition • Partition profiles • System profiles

Function	Linux on IBM iSeries	Linux on IBM eServer i5
Partition management	Operations Navigator GUI or SST/DST	• The Hardware Management Console (HMC) enablement utilities provide base infrastructure for communicating between the partition and the HMC. • The ppc64utils and lsvpd packages enable basic serviceability actions. • The Service Resource Manager, Platform Error Log Analysis, and I/O Error Log Analysis work with the Service Focal Point on the HMC to service hardware errors in a partition. • Inventory Scout reports system configuration information and facilitates update of system firmware. • Service Agent provides additional capability to monitor a system and report problems. • The Dynamic LPAR Resource Manager (DRM) must be used with Linux operating systems running the 2.6 kernel to perform Dynamic LPAR (DLPAR) processor and I/O capabilities. See the Service and Productivity tools for Linux on POWER Web site for more details. Service and Productivity tools for Linux on POWER (http://techsupport.services.ibm.com/server/lopdiags)
Processors	• Processors on legacy iSeries boxes can be changed dynamically. • Can be shared among multiple partitions.	• Processors can be changed without restarting the partition with Linux distributions running the 2.6 kernel and using the DLPAR Resource Manager (DRM).Service and Productivity tools for Linux on POWER (http://techsupport.services.ibm.com/server/lopdiags) • Can be shared among multiple partitions. • Sharing mode of capped and uncapped. • Powered-off partition using dedicated processors will have its processors available to shared processing pool.
Memory	Assigned in 1 MB increments.	Assigned in xx MB increments based on region size
Virtual Ethernet	Up to 16 networks	Up to 4094 networks
Fixes also known as program temporary fix (PTF)	Primary partition	• HMC • Service partition

On pSeries systems, Linux logical partitions support these enhancements.

Function	Linux on IBM pSeries	Linux on IBM eServer p5
LPAR user interface	• Hardware Management Console (HMC) required to partition the server. • HMC remote command	• Hardware Management Console (HMC) required to partition the server. • HMC remote command

Function	Linux on IBM pSeries	Linux on IBM eServer p5
LPAR authority	User roles created using the HMC: • Super administrator • Operator • Viewer • Product engineer • Service representative	User roles created using the HMC: • Super administrator • Operator • Viewer • Product engineer • Service representative
Maximum number of partitions	The maximum number of partitions supported depends on the number of processors in the server model.	The maximum number of logical partitions supported equals 10 times the number of processors in the server model.
Types of partitions	• AIX® service partition • Partition profiles • Full system profiles • System profiles	• AIX or Linux service partition • Partition profiles • System profiles
Partition management	• The Hardware Management Console (HMC) enablement utilities provide base infrastructure for communicating between the partition and the HMC. • The ppc64utils and lsvpd packages enable basic serviceability actions. • The Service Resource Manager, Platform Error Log Analysis, and I/O Error Log Analysis work with the Service Focal Point on the HMC to service hardware errors in a partition. • Inventory Scout reports system configuration information and facilitates update of system firmware. • Service Agent provides additional capability to monitor a system and report problems. See the Linux on Power Service Diagnostic Web site for more details.	• The Hardware Management Console (HMC) enablement utilities provide base infrastructure for communicating between the partition and the HMC. • The ppc64utils and lsvpd packages enable basic serviceability actions. • The Service Resource Manager, Platform Error Log Analysis, and I/O Error Log Analysis work with the Service Focal Point on the HMC to service hardware errors in a partition. • Inventory Scout reports system configuration information and facilitates update of system firmware. • Service Agent provides additional capability to monitor a system and report problems. • The Dynamic LPAR Resource Manager (DRM) must be used with Linux operating systems running the 2.6 kernel to perform DLPAR processor and I/O capabilities. See the Service and Productivity tools for Linux on POWER Web site for more details.Service and Productivity tools for Linux on POWER (http://techsupport.services.ibm.com/server/lopdiags) 

Function	Linux on IBM pSeries	Linux on IBM eServer p5
Processors	• Processors on legacy pSeries boxes cannot be changed dynamically. • Processors cannot be shared among multiple partitions.	• Processors can be changed without restarting the partition with Linux distributions running the 2.6 kernel and using the DLPAR Resource Manager (DRM).Service and Productivity tools for Linux on POWER (http://techsupport.services.ibm.com/server/lopdiags) • Can be shared among multiple partitions. • Sharing mode of capped and uncapped. • Powered-off partition using dedicated processors will have its processors available to shared processing pool.
Memory	Assigned in 256 MB increments.	Assigned in xx MB increments based on region size
Virtual Ethernet		Up to 4094 networks.
Virtual I/O		Supports virtual SCSI disk, CD, and tape attached to a dedicated Virtual I/O Server partition (VIOS) or i5OS partition on the same system.
DLPAR	Supports DLPAR processors and I/O when running a Linux distribution with the 2.6 kernel and the DLPAR Resource Manager (DRM).	Supports DLPAR processors and I/O when running a Linux distribution with the 2.6 kernel and the DLPAR Resource Manager (DRM).Service and Productivity tools for Linux on POWER (http://techsupport.services.ibm.com/server/lopdiags)
Shared Processor LPAR (SPLPAR)		Supports capped and uncapped sharing of all processors in the partition.
Fixes also known as program temporary fix (PTF)	Primary partition	• HMC • Service partition

Chapter 3. Printable PDFs

To view or download the PDF version of this document, select Partitioning for Linux (674 KB).

You can view or download these related topics:

- Partitioning for AIX (399 KB) contains the following topics:
  - Concepts for AIX logical partitions
  - Scenarios: AIX logical partitions
  - Planning for an AIX logical partition
  - Configuring AIX logical partitions
  - Managing AIX logical partitions
  - Troubleshooting AIX logical partitions
- Partitioning for i5/OS (957 KB) contains the following topics:
  - Concepts for i5/OS logical partitions
  - Scenarios: i5/OS logical partitions
  - Planning for i5/OS logical partitions
  - Configuring i5/OS logical partitions
  - Managing i5/OS logical partitions
  - Troubleshooting i5/OS logical partitions

Saving PDF files

To save a PDF on your workstation for viewing or printing:

1. Right-click the PDF in your browser (right-click the link above).
2. Click the option that saves the PDF locally.
3. Navigate to the directory in which you would like to save the PDF.
4. Click **Save**.

Downloading Adobe Reader

You need Adobe Reader to view or print these PDFs. You can download a copy from the Adobe Web site (www.adobe.com/products/acrobat/readstep.html)  .

Chapter 4. Concepts for partitioning the server

IBM eServer hardware offers you the ability to partition one server into several independent servers. Before you start creating logical partitions, it is essential that you understand the concepts behind this type of system configuration. The purpose of this information is to familiarize you with the hardware and software required for logical partitions and to prepare you to plan for and create logical partitions on your IBM eServer hardware.

"Benefits of partitioning"
This article lists the advantages of partitioning your server and practical scenarios that your company can use with this advanced technology.

"Types of logical partition configurations" on page 10
This article discusses the different types of logical partition configurations on your server.

"Components of a partitioned system" on page 14
This article discusses the components of a partitioned system and how the configuration of your server impacts your business needs.

"Hardware resources" on page 17
This article discusses the basic hardware concepts and requirements to partition your server.

"Communications options for logical partitions" on page 25
This article discusses how logical partitions are able to share data between partitions or between servers.

"Logical partition utilities" on page 26
This article describes tools that you can use for partitioning and the tasks you can perform with each tool.

Benefits of partitioning

Partitioning provides greater flexibility when deploying multiple independent workloads on servers, providing better management, improved availability, and more efficient use of resources. The following scenarios illustrate the benefits of partitioning your IBM eServer hardware.

Creating a mixed production and test environment

You can create a combined production and test environment on the same server. The production partition can run your main business applications, and the test partition is used to tests software. A failure in a test partition, while not necessarily planned, will not disrupt normal business operations.

Consolidation

A logically partitioned server can reduce the number of servers that are needed within an enterprise. You can consolidate several servers into a single logically partitioned system. This eliminates the need for, and expense of, additional equipment. You can shift resources from one logical partition to another as needs change.

Merge production and test environments

Partitioning enables separate partitions to be allocated for production and test servers, eliminating the need to purchase additional hardware and software. When testing has been completed, the resources

allocated to the test partition can be returned to the production partition or elsewhere as required. As new projects are developed, they can be built and tested on the same hardware on which they will eventually be deployed.

Integrated cluster

Using high-availability application software, your partitioned server can run as an integrated cluster. You can use an integrated cluster to protect your server from most unscheduled failures within a partition.

Maintaining independent servers

Dedicating a portion of the resources (disk storage unit, processors, memory, and I/O devices) to a partition achieves logical isolation of software. If configured properly, logical partitions also have some hardware fault tolerance. Interactive and batch workloads, which might not run well together on a single machine, can be isolated and run efficiently in separate partitions.

Types of logical partition configurations

This information provides an overview of the types of logical partition configurations:

"Logical partitions"
This information describes how AIX, i5/OS, and Linux can be installed on IBM eServer i5 and eServer p5.

"Manufacturing default configuration" on page 11
This information provides information about the hardware resources on a manufacturing default configuration.

"Service partition" on page 11
This information describes how one partition must be set up to report hardware status and software errors to IBM.

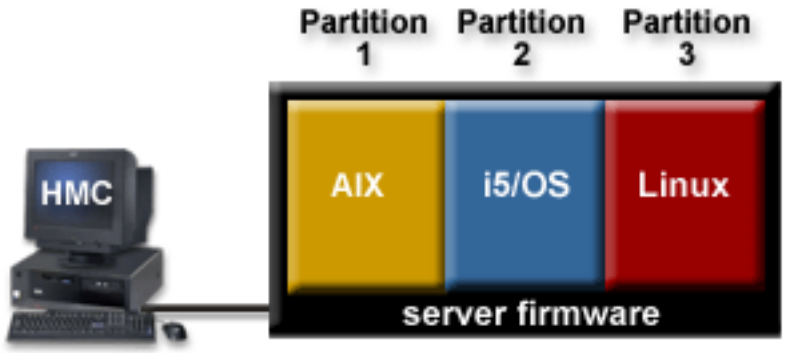
"Virtual I/O Server partition" on page 12
This information describes how the Virtual I/O Server provides virtual storage and shared Ethernet capability to client logical partitions on IBM eServer p5 servers.

"i5/OS on IBM eServer p5 servers" on page 12
This information describes how i5/OS logical partitions are set up on IBM eServer p5 servers.

Logical partitions

Logical partitioning is the ability to make a server run as if it were two or more independent servers. Each logical partition represents a division of resources on your server. The primary resources on a managed system are its processors, memory, disk drives, and adapters.

AIX, i5/OS, and Linux are supported operating systems that can be installed on selected IBM eServer i5 and eServer p5 models. These operating systems will operate as independent logical servers. However, partitions share a few system attributes, such as the system serial number, system model, and processor feature code. All other system attributes might vary among partitions.



To configure and manage logical partitions on your IBM eServer hardware, you must have at least one Hardware Management Console (HMC). For more information about the HMC, see Hardware Management Console (HMC).

Manufacturing default configuration

The manufacturing default configuration is the initial partition setup of the managed system as received from your service provider. When your system is in the manufacturing default configuration, you can install an operating system on the managed system and use the managed system as the only logical partition on the managed system. In this state, you do not need to manage the managed system using a Hardware Management Console (HMC).

If you choose to attach an HMC to the managed system for reasons other than partitioning (such as to activate Capacity on Demand), the HMC displays the managed system as having one logical partition with one partition profile. All of the physical hardware resources on the system are automatically assigned to this logical partition, and any new physical hardware resources that are added to the managed system are added automatically to this logical partition. The name of the logical partition is the serial number of the managed system, and the name of the partition profile is `default`. If desired, you can install an operating system to this single logical partition and use the logical partition as the only logical partition on the managed system. You do not need to make any partitioning changes on the server if you do not want to do so.

In either of these cases, the manufacturing default configuration has service authority. However, if you use the HMC to create, delete, change, copy, or activate any logical partitions or partition profiles on the managed system, the system will then be in partition mode. You must then change the managed system properties on the HMC so that one of the logical partitions on the managed system is the service partition for the managed system.

Service partition

The *service partition* is the logical partition on your managed system that has the authority needed to perform service-related functions on the managed system. For example, the operating system on the service partition can apply server firmware updates to the service processor or the POWER™ Hypervisor™. On certain server models, you can also configure the service partition to communicate errors to IBM. This ability is useful when the Hardware Management Console (HMC) is undergoing maintenance or is otherwise unable to report hardware errors to IBM. You can designate only one logical partition at a time as the service partition for your managed system.

For IBM eServer i5 models, only an i5/OS logical partition can be designated as the service partition. For IBM eServer p5 models, only an AIX or Linux logical partition can be designated as the service partition.

If you want to configure your service partition to communicate errors to IBM, then the service partition should have a physical network connection that can reach IBM if the HMC is unavailable. Otherwise,

there are no special hardware requirements for your service partition (apart from the hardware requirements for the operating system and for the normal workload of the service partition). The performance of the service partition is not affected when the service partition reports errors or performs service-related functions on the managed system.

The best candidate for a service partition is a logical partition that is running a set of applications that are not likely to bring down the logical partition. This increases the chances that the service partition will be available if there is a problem.

For more information about how to designate a logical partition as the service partition, see Designating a service partition for your managed system.

For more information about how your server helps you and your service provider quickly and accurately manage problems, see Customer service and support.

Virtual I/O Server partition

The Virtual I/O Server provides virtual SCSI and shared Ethernet capability to client logical partitions on the IBM eServer p5 system. The Virtual I/O Server is installed in its own partition. It allows a physical adapter with attached disks on the Virtual I/O Server partition to be shared by one or more partitions, enabling client logical partitions to consolidate, and potentially minimize, the number of physical adapters required. It also facilitates the sharing of physical Ethernet adapters, allowing multiple client logical partitions to share a single Ethernet adapter.

For more information about the Virtual I/O Server, see Using the Virtual I/O Server.

i5/OS on IBM eServer p5 servers

You can choose to install and run i5/OS on an IBM eServer p5 server if all of the following conditions apply.

- You have a limited amount of i5/OS workload.
- You anticipate limited growth for your i5/OS workload.
- You wish to consolidate your i5/OS workload onto a single server where the majority of the workload will be either AIX or Linux.

There are limitations to how you can configure your i5/OS logical partitions on an IBM eServer p5 server, and you cannot upgrade the IBM eServer p5 server to overcome these limitations. Therefore, IBM eServer i5 servers remain the best server platform for users who wish to upgrade their current iSeries servers and who anticipate continued i5/OS application workload growth. You might also consider IBM eServer i5 servers if you want to leverage your iSeries skills to manage the consolidated environment.

Requirements

All of the hardware requirements for running i5/OS on IBM eServer i5 servers also apply to running i5/OS on IBM eServer p5 servers. For more information on these general requirements, see Minimum hardware configuration requirements for an i5/OS logical partition.

In addition, the following requirements must be met to run i5/OS on an IBM eServer p5 server.

- **Operating system version**: Only V5R3 and later releases of i5/OS can be installed on IBM eServer p5 servers.
- **Hardware Management Console (HMC)**: Because logical partitioning is required for i5/OS on IBM eServer p5 servers, you must also use a Hardware Management Console (HMC) to partition the IBM eServer p5 server. The HMC must have machine code V4R3.1 installed.
- **I/O**: All of your i5/OS logical partitions must use I/O hardware with iSeries feature codes. Install the iSeries hardware in iSeries expansion towers, and then attach the iSeries expansion towers to your IBM eServer p5 server. The iSeries expansion towers are seen by the IBM eServer p5 server as an I/O

subsystem with the feature code 9411-100. You can then create i5/OS logical partitions that use the I/O hardware in those iSeries expansion towers. The i5/OS logical partitions cannot use I/O hardware outside of this I/O subsystem, and AIX and Linux logical partitions cannot use the I/O hardware in this I/O subsystem. You cannot have more than six iSeries towers within the I/O subsystem, and this limit can be lower with some tower models.

- **Licenses**: The i5/OS operating system is ordered against the IBM eServer p5 9117-570, 9119-590, and 9119-595 servers as product number 5722-SS1 with one of the following feature codes:
  - 1527 - i5/OS 570 per Processor License
  - 1528 - i5/OS 590, and 595 per Processor License

  You cannot transfer i5/OS licenses from existing iSeries hardware. The i5/OS licenses apply to the IBM eServer p5 server itself and not to the underlying I/O subsystem. Moving the subsystem to a new server at a later time will require that you obtain another license.
- **Feature codes**: You must order the following feature codes to install i5/OS on the IBM eServer p5 server.
  - 0530 - i5/OS Version V5R3 Specify. This feature code indicates that i5/OS Version V5R3 will be ordered for use in a logical partition on the server.
  - 0267 - i5/OS Partition Specify. This feature number indicates the number of logical partitions that are to run i5/OS on the managed system.

Use the Logical Partition Validation Tool (LVT) to validate the logical partition configuration on your IBM eServer p5 server. For more information on the LVT, see LPAR Validation Tool.

Limitations for running i5/OS on IBM eServer p5 servers

The following limitations apply to i5/OS on IBM eServer p5 servers:

Server models: The only IBM eServer p5 server models that support i5/OS are the p5 570, p5 590, and p5 595 servers with 1.65GHz processors.

Processors: You can run i5/OS on only one processor on a p5 570 server, and on only two processors on a p5 590 server or a p5 595 server. This limits the number of i5/OS logical partitions that you can create on these IBM eServer p5 servers and the possible configurations of those i5/OS logical partitions. The following table lists the possible configurations of i5/OS on IBM eServer p5 servers.

Server model	Possible i5/OS logical partition configurations
p5 570 servers	• One logical partition that uses one dedicated processor. • One logical partition that uses uncapped shared processing units, with a maximum of one virtual processor for the logical partition. • Up to ten logical partitions that use capped shared processing units, with a minimum of 0.10 shared processing units for each logical partition, and the total number of shared processing units not to exceed 1.00 shared processing units.

Server model	Possible i5/OS logical partition configurations
p5 590 servers or p5 595 servers	• One logical partition that uses one or two dedicated processors. • Two logical partitions that use one dedicated processor each. • One logical partition that uses uncapped shared processing units, with a maximum of two virtual processors for the logical partition. • Two logical partitions that use uncapped shared processing units, with a maximum of one virtual processor for each logical partition. • One logical partition that uses one dedicated processor and one logical partition that uses uncapped shared processing units, with a maximum of one virtual processor for the logical partition that uses uncapped shared processing units. • One logical partition that uses one dedicated processor and from one to ten logical partitions that use capped shared processing units, with a minimum of 0.10 processing units for each logical partition that uses capped shared processing units, and the total number of capped shared processing units not to exceed 1.00 shared processing units. • One logical partition that uses uncapped shared processors, with a maximum of one virtual processor for the logical partition that uses uncapped shared processing units, and from one to ten logical partitions that use capped shared processing units, with a minimum of 0.10 processing units for each logical partition that uses capped shared processing units, and the total number of capped shared processing units not to exceed 1.00 shared processing units. • From one to twenty logical partitions that use capped shared processors, with a minimum of 0.10 shared processing units for each logical partition, and the total number of shared processing units not to exceed 2.00 shared processing units.

Using resources of other logical partitions: i5/OS logical partitions on an IBM eServer p5 server cannot use the resources of a virtual I/O server logical partition, and other logical partitions cannot use the resources of an i5/OS logical partition on an IBM eServer p5 server.

Supported functions

Although there are limitations to how you can implement i5/OS on IBM eServer p5 servers, many functions are still available, including the following:

- Micro-partitioning (when Advanced POWER Virtualization Technologies is activated on the IBM eServer p5 server)
- Dynamic logical partitioning
- Virtual Ethernet
- Integrated xSeries adapters (when they are installed within the 9411-100 I/O subsystem)

Migration process

Before you begin, you must ensure that you have met all the requirements required to run i5/OS on IBM eServer p5 servers. Otherwise, the hardware and software installation processes are identical to those used to install i5/OS on IBM eServer i5 servers.

Components of a partitioned system

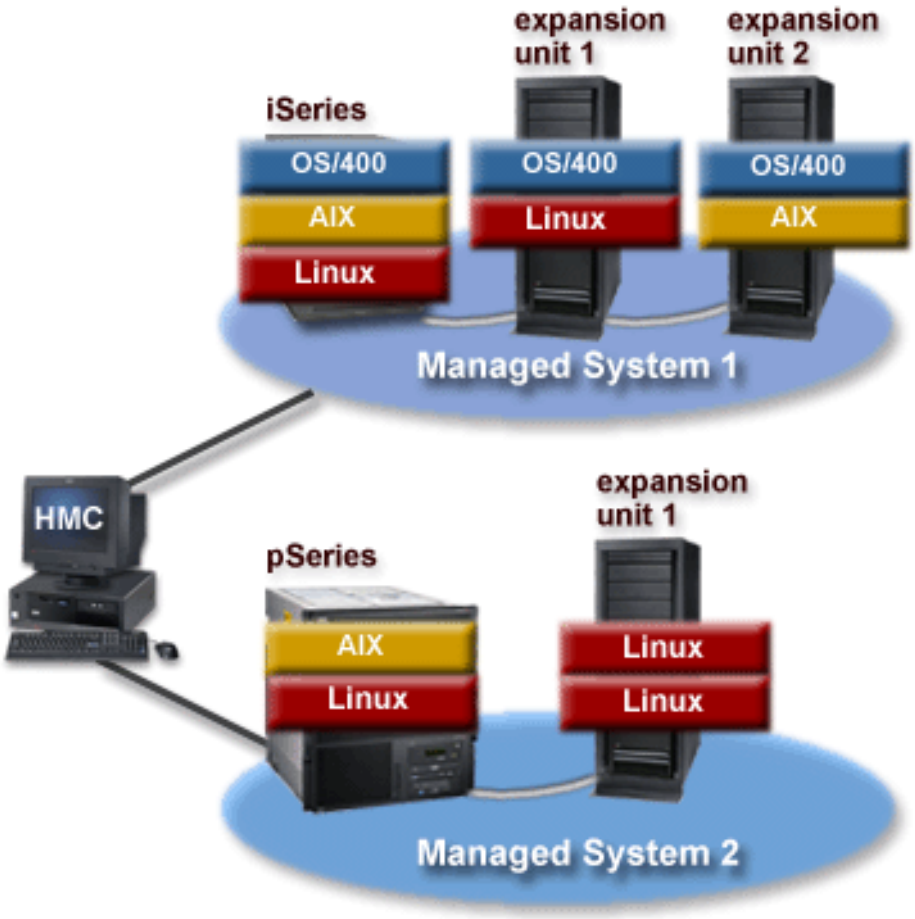
This information provides an overview of the components of a partitioned system.

"Managed systems" on page 15
This information describes the managed system and how the Hardware Management Console (HMC) manages the managed system.

"Profiles" on page 15
This information explains how profiles affect your system configuration.

Managed systems

Managed systems are physical servers (and their connected expansion units) that are managed by the Hardware Management Console (HMC). The HMC can manage more than one managed system at a time. Managed systems can have one or more logical partitions. These partitions and their profiles define the way that you configure and operate your partitioned server. The following figure shows two managed systems being managed by the HMC:



In this figure, you can see the logical partitions on each managed system, with the operating systems installed on the disk drives of the physical server and the connected expansion units.

When you create logical partitions on your managed system, there are limitations to where you can place the hardware for each logical partition. For example, you are not allowed to assign a storage I/O adapter (IOA) to an AIX, Linux, or Virtual I/O Server logical partition if the storage IOA is under an I/O processor (IOP). This limitation prevents storage devices from being overwritten accidentally.

Profiles

A profile defines the configuration of a logical partition or managed system. The Hardware Management Console (HMC) allows you to create multiple profiles for each partition or managed system. You can then use the profiles you created to start a partition or managed system in a particular configuration.

You can create the following types of profiles:

“Partition profile”
Use this information to learn more about partition profiles.

“Partition profiles that use all of the system resources” on page 17
Use this information to learn more about full system partition profiles.

“System profile” on page 17
Use this information to learn more about system profiles.

Partition profile

A logical partition does not own any resources until it is activated; resource specifications are stored within partition profiles. The resource information that a partition profile stores includes the required number of processors, memory, and I/O resources assigned to that profile. The partition profile can also specify certain operating settings for the logical partition. For example, you can set a partition profile so that, when the partition profile is activated, the logical partition is set to start automatically the next time that you power on the managed system.

Each logical partition has at least one partition profile. A logical partition can have more than one partition profile. You can create additional partition profiles with different resource specifications for your logical partition. If you create multiple partition profiles, you can designate any partition profile on the logical partition to be the default partition profile. The Hardware Management Console (HMC) activates the default profile if you do not select a specific partition profile to be activated. Only one partition profile can be active at one time. To activate another partition profile for a logical partition, you must shut down the logical partition before you activate the other partition profile.

A partition profile is identified by partition ID and profile name. Partition IDs are whole numbers used to identify each logical partition that you create on a managed system, and profile names identify the partition profiles that you create for each logical partition. Each partition profile on a logical partition must have a unique profile name, but you can use a profile name for different logical partitions on a single managed system. For example, logical partition 1 cannot have more than one partition profile with a profile name of `normal`, but you can create a `normal` partition profile for each logical partition on the managed system.

The HMC shows you all of the resources available on your system. The HMC does not verify if another partition profile is currently using a portion of these resources. Therefore, it is possible for you to overcommit resources. When you activate a profile, the system attempts to allocate the resources that you assigned to the profile. If you have overcommitted resources, the partition profile will not be activated.

For example, you have four processors on your managed system. Partition 1 profile A has three processors, and partition 2 profile B has two processors. If you attempt to activate both of these partition profiles at the same time, partition 2 profile B will fail to activate because you have overcommitted processor resources.

When you shut down a logical partition and reactivate the logical partition using a partition profile, the partition profile overlays the resource specifications of the logical partition with the resource specifications in the partition profile. Any resource changes that you made to the logical partition using dynamic logical partitioning are lost when you reactivate the logical partition using a partition profile. This is desirable when you want to undo dynamic logical partitioning changes to the logical partition. However, this is not desirable if you want to restart the logical partition using the resource specifications that the logical partition had when you shut down the managed system. It is therefore best to keep your partition profiles up to date with the latest resource specifications.

If you shut down a logical partition whose partition profiles are not up to date, and the logical partition is set to start automatically when the managed system starts, you can preserve the resource specifications on that logical partition by restarting the entire managed system using the Partition autostart power-on

mode. When the logical partitions start automatically, the logical partitions have the resource specifications that the logical partitions had when you shut down the managed system.

You can view a demo about the concept of partition profiles. This requires the Flash plug-in  . Alternatively, you can use the HTML version of this demo.

Partition profiles that use all of the system resources

You can set a partition profile so that, when it is activated, the logical partition uses all of the resources on the managed system. If you add additional resources to the managed system, and then activate such a partition profile, the logical partition automatically recognizes and uses the resources that you have added.

Because all of the hardware (both required and desired) is assigned to this partition, no other partitions can be started when the partition profile that uses all of the system resources is running. Likewise, the partition profile that uses all of the system resources cannot be started while other partitions are running.

System profile

A system profile is an ordered list of partition profiles. When you activate a system profile, the managed system will attempt to activate the partition profiles in order. A system profile helps you activate or change the managed system from one complete set of logical partition configurations to another.

It is possible for you to create a system profile that has a partition profile that has overcommitted resources. You can use the Hardware Management Console to validate the system profile against the currently available system resources and against the total system resources. Validating your system profile ensures that your I/O devices and processing resources are not overcommitted, and it increases the likelihood that the system profile can be activated. The validation process estimates the amount of memory needed to activate all of the partition profiles in the system profile. It is possible that a system profile can pass validation and yet not have enough memory to be activated.

You can view a demo about the concept of system profiles. This requires the Flash plug-in  . Alternatively, you can use the HTML version of this demo.

Hardware resources

During the process of planning for logical partitions, you must decide how you want to configure hardware resources. You can configure each server with logical partitions differently, based on the following choices:

"Minimum hardware configuration requirements for logical partitions"
This information provides the minimum hardware configuration needed to set up AIX, i5/OS, or Linux logical partitions.

"Physical and virtual hardware resources" on page 18
This information provides the physical and virtual hardware resources used by AIX, i5/OS, or Linux logical partitions.

Minimum hardware configuration requirements for logical partitions

This information provides an overview of minimum hardware configuration for AIX, i5/OS, and Linux logical partitions.

Minimum hardware configuration requirements for Linux logical partitions
Use this information to ensure your hardware meets the minimum configuration requirements for a Linux logical partition.

Minimum configuration requirements for a Linux partition

In order to use features which require logical partitions on an IBM eServer OpenPower system, you need the appropriate Advanced OpenPower Virtualization technologies activated in your system's Hardware Management Console.

Each Linux logical partition on an IBM eServer hardware system requires the following minimum hardware resources.

Minimum processor requirements

1 dedicated processor or 0.1 processing unit

Minimum memory requirements

128 MB

Minimum I/O requirements

- Storage adapter (physical or virtual)
- Network adapter (physical or virtual)
- Approximately 1 GB storage

Physical and virtual hardware resources

This information provides an overview of the physical and virtual hardware resources used for AIX, i5/OS, and Linux logical partitions.

"Virtual adapters"
Learn how your operating system can use virtual adapters.

"How each OS implements virtual resources" on page 20
Learn how AIX, i5/OS, and Linux logical partitions use virtual hardware resources.

"Processors" on page 20
Learn how the different types of processors affect your system configuration.

"Memory" on page 23
Learn how memory requirements for partitions are dependent on partition configuration, I/O resources assigned, and the applications used.

"Expansion unit" on page 24
Learn about expansion units and the types of hardware supported in the expansion unit.

"Console options for logical partitions" on page 24
Learn about the different types of consoles for AIX, i5/OS, and Linux logical partitions.

Virtual adapters

On IBM eServer hardware systems, virtual adapters, including Ethernet, Small Computer Systems Interface (SCSI), and serial, interact with the operating system like any other adapter card, except that they are not physically present. The system administrator uses the Hardware Management Console (HMC) to create virtual adapters in order to use virtual I/O devices. Adapters can be added while the system is running.

The virtual adapters are recorded in system inventory and management utilities. Converged location codes can be used to correlate operating system level or partition level software entities, such as eth0, en0, and CMN21, to adapters that are created on the HMC. Similarly, the Ethernet adapters are visible in the same way as physical Ethernet adapters.

By default, Virtual Ethernet Media Access Control (MAC) addresses are created from the locally administered range. Using the default MAC addresses, it is possible that different IBM eServer hardware servers will have virtual Ethernet adapters with the same addresses. This can present a problem if multiple, virtual networks are bridged to the same physical network.

If a server partition providing I/O for a client partition fails, the client partition might continue to function, depending on the significance of the hardware it is using. For example, if one partition is providing the paging volume for another partition, a failure of the partition providing that particular resource will be significant to the other partition. However, if the shared resource is a tape drive, a failure of the server partition providing the resource will have only minimal effects on the client partition.

Virtual I/O client support

The following table summarizes operating system support for using virtual I/O devices.

	Virtual console	Virtual Ethernet	Virtual disk	Virtual CD	Virtual tape
AIX	Yes	Yes	Yes	Not supported	Not supported
Linux	Yes	Yes	Yes	Yes	Yes
i5/OS	Yes	Yes	No	No	No

AIX partitions support boot from virtual devices including disk boot from virtual disk or network boot from virtual Ethernet.

The firmware running in AIX and Linux logical partitions recognizes virtual I/O and can start the partition from virtual I/O. IPL can be from either network over virtual Ethernet, or from a device such as virtual disk or virtual CD.

Virtual I/O server support

The following table summarizes operating system support for providing virtual I/O to partitions.

	Virtual CD	Virtual console	Virtual disk	Virtual tape
i5/OS	Yes	Yes	Yes	Yes
Linux	No	Yes	No	No
Virtual I/O Server	Not supported	Not supported	Yes	Not supported

Version 1.1 of the Virtual I/O Server (08/2004) provides SCSI disk and shared Ethernet adapter (SEA) function to client partitions.

i5/OS provides disk, CD, tape, and console. i5/OS uses the same network server storage and network server description that it uses on IBM eServer i5 systems.

Virtual I/O configuration is a combination of HMC and operating system configuration; whereas, adapter configurations are made in the HMC. They include:

- Creation of virtual Ethernet adapters
- Creation of virtual SCSI server adapters
- Creation of virtual SCSI client adapters

- Determination of whether a partition can start and shut down another partition

After the HMC configuration has been made, the partition is aware that virtual adapters and operating system configurations can be made. For Linux partitions, virtual adapters are listed in the device tree. The device tree is aware of only virtual SCSI adapters, not the devices under the adapter.

How each OS implements virtual resources

This information provides an overview of the physical and virtual hardware resources used for AIX, i5/OS, and Linux logical partitions.

"Linux"
Learn how Linux logical partitions use virtual resources.

Linux

Linux logical partitions can use virtual storage and networking devices that are made available by the Virtual I/O Server or by i5/OS. Devices and adapters are assigned to the Virtual I/O Server or i5/OS partition, which can then make those devices available for multiple Linux logical partitions to share.

For more information about virtual Ethernet, see "Virtual Ethernet" on page 25. For more information about virtual storage, see Concepts for Virtual SCSI.

Processors

A *processor* is a device that processes programmed instructions. Logical partitions support dedicated processors and shared processors. The more processors you have, the greater number of concurrent operations you can run at any given time.

On IBM eServer i5 servers and IBM eServer p5 servers, a logical partition can use as few as one whole, dedicated processor and as many dedicated processors as the number of processors on the server. Alternately, if a logical partition uses shared processors, the logical partition can use as little as 0.10 processing units, which is approximately one tenth of the processing capacity of a single processor. (Some IBM eServer p5 server models may require you to enter an activation code before you can create logical partitions that use shared processors.) However, i5/OS logical partitions on IBM eServer p5 servers can use only a limited number of the processors on the server. The number of processors that can be used by i5/OS logical partitions varies by server model. This limits the number of i5/OS logical partitions that you can create on these IBM eServer p5 servers and the possible configurations of those i5/OS logical partitions.

For example, on IBM eServer p5 servers that support one processor for i5/OS logical partitions, you can create the following i5/OS logical partitions:

- One logical partition that uses one dedicated processor.
- One logical partition that uses uncapped shared processing units, with a maximum of one virtual processor for the logical partition.
- Up to ten logical partitions that use capped shared processing units, with a minimum of 0.10 processing units for each logical partition.

On IBM eServer p5 servers that support two processors for i5/OS logical partitions, you can create the following i5/OS logical partitions:

- One logical partition that uses one or two dedicated processors.
- Two logical partitions that use one dedicated processor each.
- One logical partition that uses uncapped shared processing units, with a maximum of two virtual processors for the logical partition.
- Two logical partitions that use uncapped shared processing units, with a maximum of one virtual processor for each logical partition.

- One logical partition that uses one dedicated processor and one logical partition that uses uncapped shared processing units, with a maximum of one virtual processor for the logical partition that uses uncapped shared processing units.
- One logical partition that uses one dedicated processor and from one to ten logical partitions that use capped shared processing units, with a minimum of 0.10 processing units for each logical partition that uses capped shared processing units.
- One logical partition that uses uncapped shared processors, with a maximum of one virtual processor for each logical partition that uses uncapped shared processing units, and from one to ten logical partitions that use capped shared processing units, with a minimum of 0.10 processing units for each logical partition that uses capped shared processing units.
- From one to twenty logical partitions that use capped shared processors, with a minimum of 0.10 processing units for each logical partition.

For more information about the supported processors for logical partitions, see the following topics:

"Dedicated processors"
This information explains how a whole processor can be assigned to a single logical partition.

"Shared processors"
This information explains how processors can be shared among multiple logical partitions.

Dedicated processors

Dedicated processors are whole processors that are assigned to a single partition.

If you choose to assign dedicated processors to a logical partition, you must assign at least one processor to that partition. Likewise, if you choose to remove processor resources from a dedicated partition, you must remove at least one processor from the partition.

When you set up a partition profile, you set up the desired, minimum, and maximum values you want for the profile. The desired processing value you establish is the amount of processing resources that you would like to have if you did not overcommit the processing power. However, if you have overcommitted processors, you will get a value that is between the minimum and desired amount. If the minimum value is not met for a partition profile, the profile will not be activated.

If there is a processor failure, the system will attempt to accommodate the minimum processor sizes for all partitions. If all minimum values are satisfied, the partitions will restart with all additional resources distributed proportionately to their allocation.

By default, a powered-off logical partition using dedicated processors will have its processors available to the shared processor pool. When the processors are in the shared processor pool, an uncapped partition that needs more processing power can use the idle processing resources. However, when you power on the dedicated partition while the uncapped partition is using the processors, the activated partition will regain all of its processing resources. To prevent dedicated processors from being used in the shared processor pool, you can disable this function using the partition properties panels on the Hardware Management Console.

You can view a demo about the concept of dedicated processors. This requires the Flash plug-in  . Alternatively, you can use the HTML version of this demo.

Shared processors

The shared processor pool is a group of physical processors that provide processing capacity that can be shared among multiple logical partitions. The shared processor pool allows you to assign partial processors to a logical partition. A minimum of 0.10 processing units can be configured for any partition

using shared processors. Processing units are a unit of measure for shared processing power across one or more virtual processors. One shared processing unit on one virtual processor accomplishes approximately the same work as one dedicated processor.

Note: For some models, the ability to use shared processors is an option for which you must obtain and enter an activation code. If you have not yet entered this activation code for these server models, see Inputting the Advanced Power Virtualization activation code.

When you set up a partition profile, you set up the desired, minimum, and maximum values you want for the profile. The desired processing value that you establish is the amount of processing resources that the logical partition gets if you do not overcommit the processing power. If the desired amount of processing units is available, your partition profile starts with the desired amount. However, if you overcommit processors, the partition profile starts with a value that is between the minimum and desired amount. If the minimum value is not met for a partition profile, the managed system does not activate the partition profile.

If you have a processor failure, the system attempts to accommodate the minimum processor sizes for all partitions. If all minimum values are satisfied, the partitions restart with all additional resources distributed proportionately to their allocation.

Partitions in the shared processor pool can have a sharing mode of capped or uncapped. A *capped partition* indicates that the logical partition will never exceed its assigned processing capacity. The capped mode could be used if you know that a software application would never require more than a certain amount of processing power. Any unused processing resources will be used only by the uncapped partitions in the shared processor pool.

A partition using the uncapped mode indicates that the partition's assigned current processing capacity can be exceeded, up to the partition's current virtual processor setting, when the shared processor pool has any unused processing power. For example, partitions 2, 3, and 4 all had uncapped mode selected. Partition 2 had 3.00 processing units assigned to it, but only 1.00 processing unit was in use. Partition 3 had 1.00 processing unit, but had a workload demand that required additional processor resources. Because partition 3 is uncapped and has three virtual processors, the server allows the unused 2.00 processing units in partition 2 to be used in partition 3. This situation increases the processing power for partition 3 to 3.00 processing units, and the workload demand needed at that particular time finishes.

If partitions 3 and 4 both need additional resources at the same time to complete a job, the server can distribute the unused processing resources to both partitions. This distribution process is determined by the uncapped weight of each of the partitions.

Uncapped weight is a number in the range of 0 through 255 that you set for each uncapped partition in the shared processor pool. By setting the uncapped weight (255 being the highest weight), any available unused capacity is distributed to contending logical partitions in proportion to the established value of the uncapped weight. The default uncapped weight value is 128.

For example, if partition 3 had an uncapped weight of 100 and partition 4 had an uncapped weight of 200, partition 4 would get twice the unused processing resources that partition 3 received.

You can view a demo about the concept of capped and uncapped processors in the shared processor pool. This requires the Flash plug-in  . Alternatively, you can use the HTML version of the capped processor demo or the HTML version of the uncapped processor demo.

For more information about the shared processor pool, see the following topics:

"Virtual processors in the shared processor pool" on page 23

Virtual processors in the shared processor pool: Virtual processors are the whole number of concurrent operations that the operating system can use. The processing power can be conceptualized as being spread equally across these virtual processors. Selecting the optimal number of virtual processors depends on the workload in the partition. Some partitions benefit from greater concurrence, where other partitions require greater power.

By default, the number of processing units that you specify is rounded up to the minimum number of virtual processors needed to satisfy the assigned number of processing units. The default settings maintain a balance of virtual processors to processor units. For example:

- If you specify 0.50 processing unit, one virtual processor is assigned.
- If you specify 2.25 processing units, three virtual processors are assigned.

A logical partition in the shared processor pool will have at least as many virtual processors as its assigned processing capacity. By making the number of virtual processors too small, you limit the processing capacity of an uncapped partition. If you have a partition with 0.50 processing units and 1 virtual processor, the partition cannot exceed 1.00 processing unit because it can only run one job at a time, which cannot exceed 1.00 processing unit. However, if the same partition with 0.50 processing unit was assigned 2 virtual processors and processing resources were available, the partition could use an additional 1.50 processing units.

A system with four processors in the shared pool has 4.00 processing units. You could distribute the processing power in the following way:

- Partition 1 has 2.00 desired processing units and 2 to 20 virtual processors.
- Partition 2 has 0.50 desired processing unit and 1 to 5 virtual processors.
- Partition 3 has 0.50 desired processing unit and 1 to 5 virtual processors.
- Partition 4 has 0.25 desired processing unit and 1 to 2 virtual processors.
- Partition 5 has 0.75 desired processing unit and 1 to 7 virtual processors.

The sum of the five logical partitions' processing units is the desired amount that you would like the partition to have when it powers on. Depending on how the resources have been allocated, you can power on a number fewer than the desired number of processing units. Your partition will power on as long as the value is between the minimum and desired amount.

Memory

Processors use memory to temporarily hold information. Memory requirements for partitions depend on partition configuration, I/O resources assigned, and applications used. Memory can be assigned in increments of 16 MB, 32 MB, 64 MB, 128 MB, and 256 MB. The default memory block size varies according to the amount of configurable memory in the system.

Amount of configurable memory	Default memory block size
Less than 4 GB	16 MB
Greater than 4 GB up to 8 GB	32 MB
Greater than 8 GB up to 16 GB	64 MB
Greater than 16 GB up to 32 GB	128 MB
Greater than 32 GB	256 MB

The default memory block size can be changed by using the Logical Memory Block Size option in the Advanced System Management Interface (ASMI). To change the default memory block size, you must be a user with administrator authority, and you must shut down and restart the managed system for the

change to take effect. If the minimum memory amount in any partition profile on the managed system is less than the new default memory block size, you must also change the minimum memory amount in the partition profile.

Depending on the overall memory in your system and the maximum memory values you choose for each partition, the server firmware must have enough memory to perform logical partition tasks. Each partition has a Hardware Page Table (HPT). The size of the HPT is based on an HPT ratio of 1/64 and is determined by the maximum memory values you establish for each partition.

Server firmware requires memory to support the logical partitions on the server. The amount of memory required by the server firmware varies according to several factors. Factors influencing server firmware memory requirements include the following:

- Number of logical partitions.
- Partition environments of the logical partitions.
- Number of physical and virtual I/O devices used by the logical partitions.
- Maximum memory values given to the logical partitions.

Generally, you can estimate the amount of memory required by server firmware to be approximately 8% of the system installed memory. The actual amount required will generally be less than 8%. However, there are some server models that require an absolute minimum amount of memory for server firmware, regardless of the previously mentioned considerations.

When selecting the maximum memory values for each partition, consider the following:

- Maximum values affect the HPT size for each partition.
- The logical memory map size for each partition.

For more information about AIX, i5/OS, and Linux and memory requirements and considerations, see:

"Memory requirements for Linux logical partitions"

Memory requirements for Linux logical partitions

Linux logical partitions require a minimum of 128 MB of memory.

Expansion unit

You can add expansion units to many of the IBM eServer hardware models to support additional features and devices. If you want to create logical partitions on your IBM eServer hardware, you might need to add an expansion unit that contains the additional hardware that you need for each logical partition.

Some expansion units can support only disk units (storage expansion unit), while others can support a variety of hardware (system expansion unit). Expansion units generally contain one or more system I/O buses with various I/O devices. Depending on the type of hardware that you plan to install in the expansion unit, there are some restrictions. For example, you are not allowed to assign a storage I/O adapter (IOA) to an AIX, Linux, or Virtual I/O Server logical partition if the storage IOA is under an I/O processor (IOP). This prevents storage devices from being overwritten accidentally. The LPAR Validation Tool (LVT)  can help with the placement of I/O devices in the different types of expansion units.

Console options for logical partitions

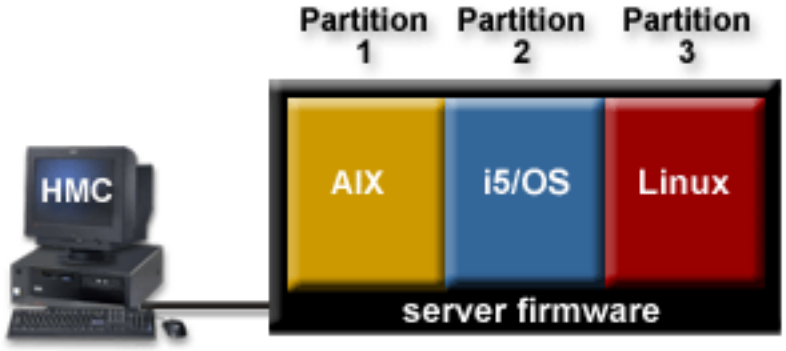
You can connect to your IBM eServer hardware by different methods depending on your operating system and business environment's needs. Read the following information to learn about the different ways you can connect to your server based on your operating system:

"Hardware Management Console"
Learn how the HMC communicates with servers using service applications to send information to IBM.

Hardware Management Console

The Hardware Management Console (HMC) is a system that controls IBM eServer i5 and eServer p5 logical partitions and Capacity on Demand. The HMC communicates with servers using service applications to detect, consolidate, and send information to IBM for analysis.

The following figure shows a partitioned server being managed by an HMC.



For more information about adding and using the HMC, refer to Adding the Hardware Management Console.

Communications options for logical partitions

The type of communications options that you use depend on your business needs and the operating system you are running. For more information about the communication methods available for AIX, i5/OS, or Linux logical partitions, see the following topics:

"Virtual Ethernet"
Learn how you can use virtual Ethernet to establish multiple high-speed interpartition connections.

Virtual Ethernet

This information provides an overview of virtual Ethernet and how AIX, i5/OS, and Linux logical partitions use virtual Ethernet to establish interpartition communication.

"Virtual Ethernet for Linux logical partitions"
Learn how you can use virtual Ethernet in Linux logical partitions to establish multiple high-speed interpartition connections.

Virtual Ethernet for Linux logical partitions

Virtual Ethernet technology is supported on versions 2.4 and 2.6 of the Linux kernel on POWER5™ hardware. This technology enables IP-based communication between logical partitions on the same system using a VLAN capable software switch in POWER5 systems. The bridge module of the Linux kernel, along with the bridge-utils package, enables the logical partitions to communicate with other systems outside the hardware unit without assigning physical Ethernet slots to the logical partitions.

Virtual networking along with other POWER5 virtualization technologies offers greater flexibility in configuration scenarios. Workloads can be easily consolidated with more control over resource allocation. Network availability can also be improved for more systems with fewer resources using a combination of Virtual Ethernet, the bridge kernel module, and the bonding kernel module. When there are not enough

physical slots to allocate a physical network adapter to each LPAR, network access using Virtual Ethernet and the bridge kernel module is preferable to IP forwarding as it does not complicate the IP network topology.

IBM eServer p5 hardware supports inter-LPAR communication using virtual networking. Virtual Ethernet adapters are connected to an IEEE 802.1q (VLAN)-style virtual Ethernet switch. Using this switch function, logical partitions can communicate with each other by using virtual Ethernet adapters and assigning VIDs (VLAN ID) that enable them to share a common logical network. The Virtual Ethernet adapters are created and the VID assignments are done using the Hardware Management Console. The system transmits packets by copying the packet directly from the memory of the sender partition to the receive buffers of the receiver partition without any intermediate buffering of the packet.

The number of Virtual Ethernet adapters per LPAR varies by operating system. Version 2.4 of the Linux kernel supports up to 100 Virtual Ethernet adapters while version 2.6 of the Linux kernel can support up to 32768 Virtual Ethernet adapters. Besides a Primary VID (PVID), the number of additional VID values that can be assigned per Virtual Ethernet adapter is 20, which implies that each Virtual Ethernet adapter can be used to access 21 networks. The HMC generates a locally administered Ethernet MAC address for the Virtual Ethernet adapters so that these addresses do not conflict with physical Ethernet adapter MAC addresses. To ensure uniqueness among the Virtual Ethernet adapters, the address generation is based on the system serial number, LPAR ID and adapter ID.

For VLAN unaware operating systems, each Virtual Ethernet adapter should be created with only a PVID (no additional VID values) and the Hypervisor will ensure that packets have their VLAN tags removed before delivering to that LPAR. In the case of VLAN aware systems, such as Linux with the vlan module, one can assign additional VID values besides the PVID and the Hypervisor will only strip the tags of any packets which arrive with the PVID tag. Since the number of Virtual Ethernet adapters supported per LPAR is quite large, one can have multiple Virtual Ethernet adapters with each adapter being used to access a single network and therefore assigning only PVID and avoiding the additional VID assignments. This also has the advantage that no additional VLAN configuration is required for the operating system using these Virtual Ethernet adapters.

After a specific virtual Ethernet is enabled for a partition, a network device named `ethX` is created in the partition. The user can then set up TCP/IP configuration similar to a physical Ethernet device to communicate with other partitions.

Logical partition utilities

This information provides an overview of the utilities available to plan and manage logical partitions on your IBM eServer hardware.

"LPAR Validation Tool"
Learn how you can use the LPAR Validation Tool to validate your logical partition configuration.

LPAR Validation Tool

The LPAR Validation Tool (LVT) emulates an LPAR configuration and validates that the planned partitions are valid. In addition, the LVT allows you to test the placement of AIX, i5/OS, and Linux hardware within the system to ensure that the placement is valid.

To download the LPAR Validation Tool, see the Logical Partition Web site  .

Chapter 5. Concepts for Linux logical partitions

It is essential that you understand Linux concepts before you start creating Linux logical partitions. The purpose of this information is to familiarize you with the hardware and software required for Linux logical partitions. Before you use this information, you should familiarize yourself with the general concepts for partitioning the server.

In order to use features which require logical partitions on an IBM eServer OpenPower system, you need the appropriate Advanced OpenPower Virtualization technologies activated in your system's Hardware Management Console.

"Hardware requirements for Linux logical partitions"
Learn about hardware requirements for Linux on IBM eServer hardware systems.

"Virtual I/O devices" on page 31
Learn about virtual and direct I/O options, and the sharing of physical resources among Linux logical partitions on IBM eServer hardware systems.

"Communications options for Linux logical partitions" on page 31
Learn about communications options for Linux logical partitions on an IBM eServer hardware system.

"Linux distributions" on page 33
Learn about Linux for POWER™ distributions available for IBM eServer hardware systems.

Hardware requirements for Linux logical partitions

During the process of planning for logical partitions, you must decide how you want to configure hardware resources. You can configure each server with logical partitions differently, based on the following choices:

"Supported hardware resources for Linux logical partitions"
Learn about drivers and adapters supported by Linux on IBM eServer hardware systems.

"Minimum configuration requirements for a Linux partition" on page 18
Learn about configuration requirements for Linux on IBM eServer hardware systems.

"Shared processor support for Linux logical partitions" on page 30
Learn about shared processing for Linux on IBM eServer hardware systems.

"Console requirements for Linux logical partitions" on page 30
Learn about consoles for working with Linux on IBM eServer hardware systems.

"Storage options for Linux logical partitions" on page 31
Learn about storage options for working with Linux on IBM eServer hardware systems.

Supported hardware resources for Linux logical partitions

This topic provides a list of device drivers for virtual and physical devices and adapters supported for Linux on IBM eServer hardware systems. This list may not include all the hardware devices currently supported for Linux on IBM eServer hardware systems.

For the most current information about supported hardware devices for Linux, refer to the Facts and features report (http://www.ibm.com/servers/eserver/pseries/hardware/factsfeatures.html) Web site.

Virtual devices

IBM eServer hardware systems support the following virtual devices.

Device	Driver	Linux	AIX	i5/OS	Virtual I/O Server
Virtual console	hvc	client/server	client	server	
Virtual tape	st & ibmvscsic	client	client	server	
Virtual CD	sr & ibmvscsic	client	client	server	
Virtual disk unit	sd & ibmvscsic	client	client	server	server
Virtual SCSI	ibmvscsic	client	client	server	server
Virtual serial	HVSI	client	client	client	
Virtual Ethernet	ibmveth	server	server	server	server

In order to use Virtual SCSI on an IBM eServer OpenPower system, you need Advanced OpenPower Virtualization activated in your system's Hardware Management Console and the Virtual I/O Server installed on your OpenPower system.

Physical devices

The following table shows device drivers for **Ethernet adapters** supported for Linux on IBM eServer hardware systems.

Device driver	Device description	Linux feature code	iSeries feature code	pSeries feature code
e1000	PCI-X 1Gb Ethernet-SX Fiber	0620	5700	5700
e1000	PCI-X 10/100/1G Base-TX Ethernet	0621	5701	5701
e1000	PCI-X 10/100/1G 2–port Base-TX Ethernet	0643	5706	5706
e1000	PCI-X 1Gb 2–port Ethernet–SX Fiber	0644	5707	5707
olympic	PCI 100Mb TokenRing	0603	2744	
acenic	PCI 1Gb Ethernet	0601	2743	2969
acenic	PCI 1Gb Ethernet UTP	0602	2760	2975
pcnet32	PCI 10/100Mb Ethernet	0623	2849	
pcnet32	PCI 10/100Mb Ethernet	0607	2838	
pcnet32	PCI 10/100Mb 4–port Universal Ethernet	0637		4961

Device driver	Device description	Linux feature code	iSeries feature code	pSeries feature code
e100	PCI II 10/100Mb Ethernet with IPsec (No IPsec support on Linux)	4962		4962

The following table shows device drivers for **storage adapters** supported for Linux on IBM eServer hardware systems.

Device driver	Device description	Linux feature code	iSeries feature code	pSeries feature code
ipr	PCI-X U320 SCSI RAID	0628	5703	5703/5711
ipr	32MB Planar Dual Channel SCSI RAID	5709	5709	5709
ipr	PCI-X U320 SCSI Tape Controller	0645		5712/5710
sym/sym2	PCI 160MB Ultra3 SCSI LVD	6203		6203
sym/sym2	PCI 40MB Ultra SCSI HVD	6204		6204
lpfc	PCI 2Gb Fiber Channel	0611	2765	6228
lpfc	PCI-X 2Gb Fibre Channel	0625	5704	6239
lpfc	Low Cost 2Gb Fibre Channel	0646		5716

The following table shows device drivers for **WAN adapters** supported for Linux on IBM eServer hardware systems.

Device driver	Device description	Linux feature code	iSeries feature code	pSeries feature code
icom	PCI Two-Line WAN (feature 0613)	0613	2742	
icom	PCI Two-Line WAN (feature 0608)	0608	2745	
icom	PCI Dual WAN/Modem	0609	2772	
icom	PCI Dual WAN/Modem (ANSI)	0610	2773	
icom	PCI Two-Line WAN with Modem	0614	2793	
icom	PCI Two-Line WAN with Modem (CIM)	0615	2794	
icom	PCI Quad Modem	0616	2805	
icom	PCI Quad Modem (CIM)	0617	2806	

Shared processor support for Linux logical partitions

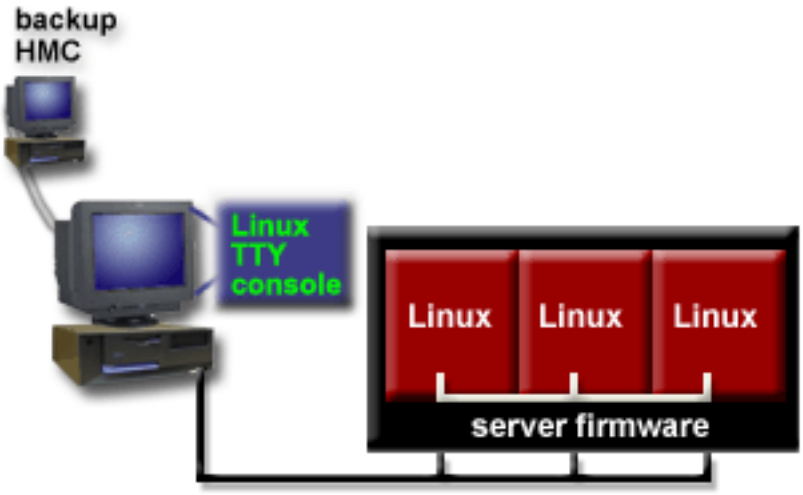
The IBM eServer hardware systems provide shared processor support that allows Linux to run on less than 100% of a processor. The minimum number of shared processing units that can be allocated to a Linux partition is 0.1.

On IBM eServer i5 and eServer p5 and OpenPower systems, the system administrator can alter the shared processor units for a Linux for POWER distribution with the Linux 2.6 kernel and the Dynamic Resource Manager (DRM) without restarting the operating system by using a Dynamic LPAR operation. On a Linux for POWER distribution with the Linux 2.4 kernel, changing the shared processing units allocated to the partition requires the operating system to be restarted. On Linux on iSeries systems, the system administrator can alter the shared processor units without involving Linux.

For more information about shared processing, see Shared processors.

Console requirements for Linux logical partitions

While Linux can operate independently and without the Hardware Management Console (HMC) on any IBM eServer hardware system, an independent installation of Linux cannot access the serviceability that is provided by a system that includes the HMC.



The HMC is required for both logical partitioning and Capacity on Demand on IBM eServer hardware systems. The HMC provides the following support for IBM eServer hardware systems:

- Logical partition configuration and management

  Note: In order to use logical partitions on an IBM eServer OpenPower system, you need Advanced OpenPower Virtualization activated in your system's Hardware Management Console. Currently, OpenPower does not come with Capacity on Demand.
- Dynamic logical partitioning
- Capacity and resource management
- System status
- HMC management
- Remote HMC interface

i5/OS virtual console

i5/OS provides a virtual console for Linux logical partitions. This capability allows partitions to be managed (started, stopped, and installed) without access to the HMC. Configuration for an i5/OS virtual

console capability is performed through the HMC. However, partition configuration and all dynamic logical partitioning functions must still be performed from the HMC.

Storage options for Linux logical partitions

Linux on IBM eServer hardware systems supports the following storage options:

- Internal storage using SCSI adapters and drives attached within the system
- External storage (SAN) using SAN adapters and drives in an external storage unit
- Virtual storage using a virtual SCSI adapter and storage in a different partition

Internal storage

Internal storage requires that a SCSI adapter and storage drives be dedicated to the Linux partition.

For internal storage using SCSI adapters, a partition cannot logically configure individual storage drives, but must configure a SCSI adapter and all the storage drives attached to that SCSI adapter. Virtual Storage removes this restriction.

External storage

External storage requires that a SAN adapter be dedicated to the Linux partition. However, the external storage unit allows flexible configuration of storage and allows storage to be allocated to systems in units that are unrelated to the size of the physical disk drives.

Virtual storage

Virtual storage allows multiple partitions within an IBM eServer hardware system to share storage. More information about virtual storage is available in the “Virtual adapters” on page 18 topic.

Virtual I/O devices

Linux logical partitions can use virtual storage and networking devices that are made available by the Virtual I/O Server or by i5/OS. Devices and adapters are assigned to the Virtual I/O Server or i5/OS partition, which can then make those devices available for multiple Linux logical partitions to share.

For more information about virtual Ethernet, see “Virtual Ethernet” on page 25. For more information about virtual storage, see Concepts for Virtual SCSI.

Communications options for Linux logical partitions

Linux on an IBM eServer hardware system can establish a TCP/IP connection through either a directly attached network interface or through a virtual Ethernet interface.

Physical Ethernet adapters

A logical partition running Linux can own its Ethernet adapters. After the supported Ethernet adapters are allocated to a Linux partition, Linux uses the Ethernet adapter in a manner similar to any other operating system.

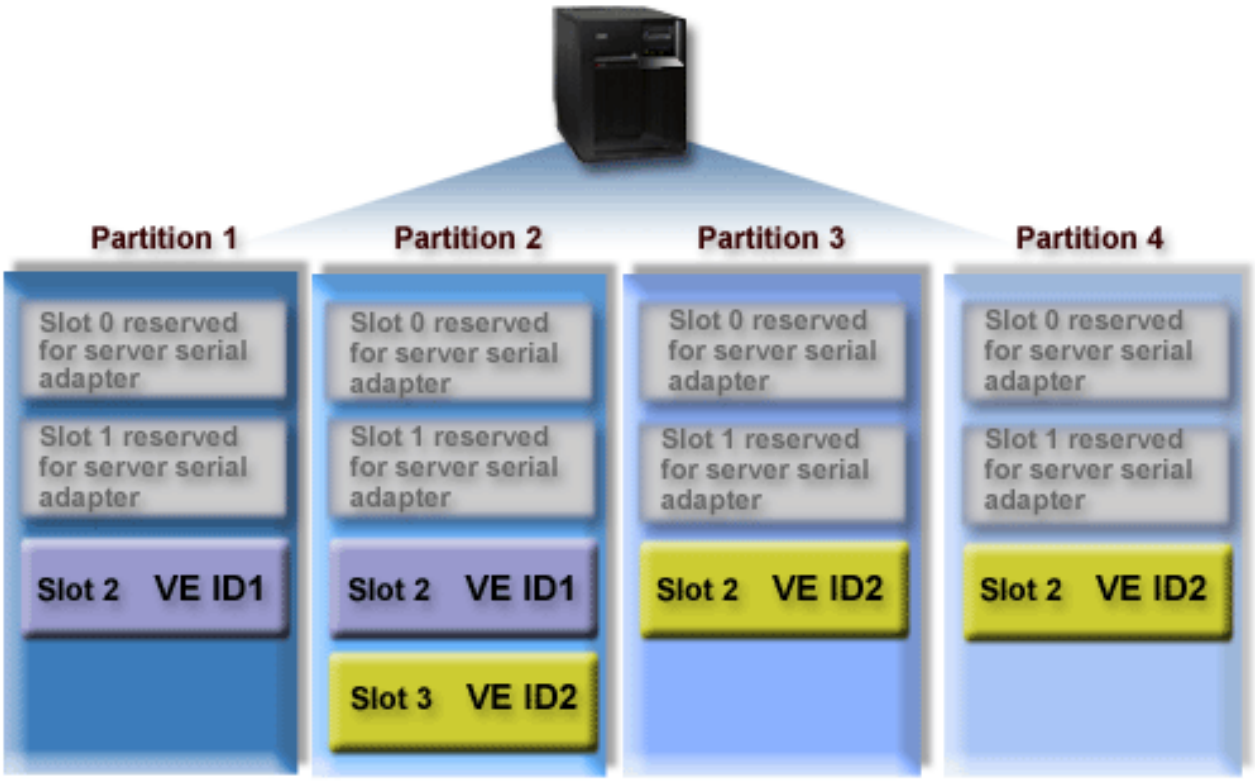
If you have multiple Ethernet adapters and can dedicate one or more to the Linux partition, you might consider doing so. A dedicated adapter eliminates the extra step involved in using the virtual Ethernet to communicate with the network. The configuration for the physical adapter is accomplished on Linux using the **ifconfig** and **route** commands for basic configuration of Linux networking.

Virtual Ethernet

To learn about how you can use the Virtual I/O Server to provide virtual Ethernet capabilities that you can use with Linux, refer to Concepts for virtual networking.

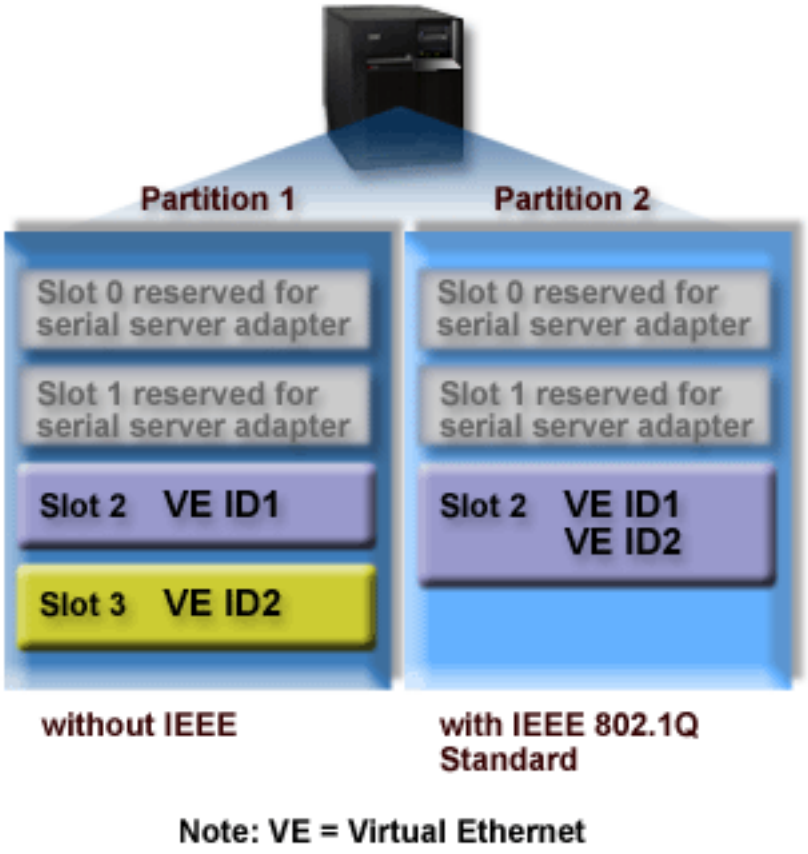
This section describes how i5/OS can provide virtual Ethernet capability for Linux. Virtual Ethernet provides the same function as using a 1 Gigabit Ethernet adapter. i5/OS and Linux partitions on an iSeries system can communicate using TCP/IP over the virtual Ethernet communication ports.i5/OS does not support the IEEE (802.3) standard. Virtual Ethernet provides a very high speed, secure mechanism for communication among partitions on a single physical system.

However, in most cases, you will want to allow partitions connected to a virtual Ethernet to also communicate with the physical network. That situation requires that at least one partition have both a physical Ethernet adapter and a virtual Ethernet adapter that is connected to the other partitions. The partition owning both adapters routes traffic between the physical and virtual Ethernets using Layer 3 routing, or TCP/IP routing, which involves configuring TCP/IP to route traffic between the separate networks. In many cases, the partition performing the routing will also perform network address translation to make systems on the virtual Ethernet appear to be directly attached to the physical network.



Note: VE = Virtual Ethernet

The implementation of virtual Ethernet adapters on an IBM eServer i5 system within Linux is assigned without enabling IEEE 802.1Q virtual Ethernet tagging for multiple, separate Ethernets within a physical switch.Up to 4094 separate virtual Ethernets can be defined. Each partition can have up to 65,534 virtual Ethernet adapters connected to the virtual switch (65,536, 0 through 65,535, with the exception of the two virtual serial adapters already created). Each adapter can be connected to 20 Ethernets. The partition having the physical Ethernet adapter does not have to be the serving partition for virtual SCSI.



The enablement and setup of a virtual Ethernet does not require any special hardware or software. After a specific virtual Ethernet is enabled for a partition, a network device named ethXX is created in the partition. The user can then set up TCP/IP configuration appropriately to communicate with other partitions.

For information about network TCP/IP setup and configuration tools, see your Linux distributor documentation.

Linux distributions

The IBM eServer hardware systems require a Linux for POWER distribution. The Linux for POWER distribution refers to Linux distributions available from Linux distributors that run on POWER Technology-based systems.

Linux distributors provide custom components that ease the installation and maintenance of Linux systems. Before installing a distributor's version of Linux, verify that the kernel has been compiled for the IBM eServer hardware.

For current information about Linux distributions, refer to the Linux at IBM Web site.

Chapter 6. Scenarios for Linux logical partitions

In order to use features that require logical partitions on an IBM eServer OpenPower system, you need the appropriate Advanced OpenPower Virtualization technologies activated in your system's Hardware Management Console.

These scenarios describe common configurations of Linux logical partitions on IBM eServer hardware servers.

Scenario: Configuring an IBM eServer OpenPower 710 system with Linux on two logical partitions using virtual I/O
These instructions explain how to configure and install an IBM eServer OpenPower 710 system with Linux running on two logical partitions (LPARs) using the Virtual I/O Server.

Scenario: Creating a Linux logical partition and partition profile
Use this scenario to help you become familiar with the details involved with creating a Linux logical partition.

Scenario: Using partition profiles
Use this scenario to help you become familiar with the details involved with using partition profiles.

Scenario: Using system profiles
Use this scenario to help you become familiar with the details involved with using system profiles.

Scenario: Capacity on Demand for Linux
Use this scenario to become familiar with the steps of planning, ordering, and using Capacity Upgrade on Demand for Linux logical partitions on an IBM eServer hardware system.

Scenario: Server consolidation
Use this scenario to become familiar with the advantages of consolidating Linux servers as uncapped logical partitions on an IBM eServer hardware system.

Scenario: Configuring an IBM eServer OpenPower 710 system with Linux on two logical partitions using virtual I/O

These instructions explain how to configure and install an IBM eServer OpenPower 710 system with Linux running on two logical partitions (LPARs) using the Virtual I/O Server.

This scenario shows how you can use different logical partitions to run various applications. These instructions describe how to prepare for the following applications on the different logical partitions:

- Logical partition 1: Virtual I/O server
- Logical partition 2: SuSE Linux Enterprise Server 9
- Logical partition 3: Red Hat Enterprise Linux 3 update 4

Prerequisites
Use this list of prerequisites to ensure you have everything needed for configuring your system.

Preparing your system
Use this information to prepare your system for configuration.

Using the HMC to configure your server
Use this information to configure your server using the HMC.

Installing Linux
Once your system is configured, use the steps in this document to install the Linux operating system.

Resource allocation
Use this information to see how your system's resources will be allocated when the configuration is complete.

Prerequisites

- IBM eServer OpenPower 710 with two 1.65 GHz processors
- 8 GB memory
- Four 73 GB, 15K rpm disk drives
- One SCSI RAID controller
- Two 1 Gbit Ethernet adapters
- Hardware Management Console (HMC)
- SUSE Linux Enterprise Server 9 for POWER (1-2 processors)
- Red Hat Enterprise Linux AS 3 Update 4 for POWER
- POWER Hypervisor
- Virtual I/O Server CD
- Linux or Windows(tm) workstation or laptop with a serial port
- Null modem cable

  Note: You will need this null modem cable to connect the OpenPower 710 system to the Linux or Windows workstation or laptop when you are preparing your system.
- IP addresses and host names for the Linux installations you will perform, as well as the other network information for your environment, such as name server, and routing information (gateway IP address).

Preparing your system

1. Connect a computer with a terminal emulator by a null modem serial cable to the OpenPower server serial port 1. Use these communication parameters: 19200 bps, 8N1.
2. Log in using `admin` as both the default user ID and password. During the initial login, you will also be prompted to enter the following: User ID to change, Current password for current user, New password for user, and New password again. You can choose to change the user ID and password, or you can reenter the default login and password, `admin`.
3. Enter the number of columns for the display. Press Enter to accept the default (80) or type another number and press Enter.
4. Enter the number of lines for the display. Press Enter to accept the default (24) or type another number and press Enter.
5. At the Field Service Processor Configuration Menu, select **Network Services**.
6. Select **Network Configuration**.
7. Select **Configure interface Eth0**.
8. Select **Static**. At a minimum, enter the settings that are appropriate for your system for options 1-6. You may also set options 7 and 8. The options are as follows:

```
1. Host name
2. Domain name
3. IP address
4. Subnet mask
5. Default gateway
6. IP address of first DNS server
7. IP address of second DNS server
8. IP address of third DNS server
```

9. Select **Save settings and reset the service processor**. Enter 1 to confirm. Wait several minutes for the system to recycle. Press Enter. If there is no response, wait a few more minutes and press Enter again, repeating until the login screen appears.
10. Log in using `admin` or the new user ID and password that you entered in step two.
11. Enter the number of columns for the display. Press Enter to accept the default (80) or type another number and press Enter.
12. Enter the number of lines for the display. Press Enter to accept the default (24) or type another number and press Enter.
13. At the FSP Configuration Menu, select **Power/Restart Control**.
14. Select **Power On/Off System**.
15. Select **Boot to system server firmware**.
16. Select **Standby**. You will return to the previous menu.
17. Select **Power on**. Press Enter to continue. The terminal will freeze while you wait for it to power on to standby mode (this can take several minutes).

Using the HMC to set up and configure your server

1. Use the Guided Setup Wizard to configure the HMC by completing the following steps:
   a. Ensure that the managed system is not connected to a power source.
   b. Press the power button on the HMC to turn it on.
   c. If English is your language preference, skip this step. If your language preference is something other than English, type the number 2 when you are prompted to change the locale. Select the locale you want to display from the list in the Locale Selection window, and click OK. The locale identifies the language that the HMC interface displays. If your numerical keypad does not work, use the normal numerical keys instead.

      Note: This prompt times out in 30 seconds if you do not act.
   d. Log in to the HMC using the following default user ID and password: ID: hscroot Password: abc123
   e. To continue, accept the Hardware Management Console license agreements. If you decline the license agreement, you cannot complete the HMC configuration.
   f. When the Guided Setup wizard is displayed, complete the wizard to configure the HMC. If the Guided Setup wizard is not displayed, you can access it manually from the HMC interface using the following steps:
      1) In the navigation area, expand the HMC you want to work with. HMCs are listed by hostname or IP address.
      2) Select **Information Center and Setup Wizard**.
      3) In the contents pane, select **Launch the Guided Setup wizard**.
2. If your system did not come with POWER(tm) Hypervisor(tm) already activated, you will need to follow the instructions on the POWER Hypervisor Activation Code Entitlement Letter that you received with your system in order to activate the POWER Hypervisor. If the POWER Hypervisor is already activated on your system, you can skip this step.
3. From the navigation area of your HMC, expand the **Server and Partition** section.
4. Select **Server Management**.
5. From the Menu bar, select **Server Management**, then select **Add Managed System(s)** in the drop-down window.
6. In the **Add Managed Systems** dialog, make sure that **Add a managed system** is checked, then enter the IP address from step eight in the section **Preparing your system** in the **IP Address/Host name** text field and select **Next**.
7. Select **Finish**. Wait until the connection is established, at which point the server should have the state `Pending Authentication - Password Updates Required`.

8. To update the system passwords:
   a. Right-click on the server you are configuring. Select **Update Managed System Password**.
   b. When the **Update Password - Authentication Pending** dialog appears, enter a password in the **New HMC Access password** text field and repeat in the **Verify HMC Access password** text field.
   c. Click on the **ASM General** tab.
   d. Enter a password in the **New ASM General password** text field and repeat in the **Verify ASM General password** text field. Select **OK**.
9. Right-click on the server you are configuring. Select **Properties**. Under the **General** tab, in the **Name** text field type: `IBMOP_SERVER`.
10. Set up the Virtual I/O server partition.
    a. Right-click the server `IBMOP_SERVER`, select **Create**, then select **Logical Partition**.
    b. The **Create Logical Partition Wizard** dialog will appear. Enter 1 for the **Partition ID** and `IBMOP_VIO` for the **Partition Name**. Make sure **Virtual I/O server** is selected, and select **Next**.
    c. In the **Create Logical Partition – Workload Management Groups** window, skip the definition of the workload management group by selecting the **No**. Select **Next**.
    d. At the **Create Logical Partition Profile** screen, use `IBMOP_VIO_default` as the **Profile name**.
    Unselect **Use all the resources in the system** if it is selected. Select **Next**.
    e. At the **Create Logical Partition Profile – Memory** screen, assign memory requirement values. Set **Minimum** to 0 GB and 512 MB, **Desired** to 0 GB and 512 MB, and **Maximum** to 0 GB and 512 MB. Select **Next**.
    f. At the **Create Logical Partition Profile – Processors** screen, select **Shared** for processor allocation. Select **Next**.
    g. At the **Create Logical Partition Profile - Processing Settings** screen, assign processor values. Set **Desired** to 0.1, **Minimum** to 0.1, and **Maximum** to 2.0. Select **(Advanced...)**. Under **Sharing modes**, make sure **Uncapped** is selected, and change **Weight** to 160. Under **Virtual processors**, change **Maximum number of virtual processors** to 2. Select **OK**. Select **Next**.
    h. At the **Create Logical Partition Profile – I/O** screen, double click on the unit to expand thebuses. Expand **Bus 2** for the following selections:
       1) Highlight **PCI 10/100/1000Mbps Ethernet UTP 2-port** (this provides a 2 port network adapter). Then, select **Add as required**.
       2) Highlight **Storage Controller** (this is a SCSI adapter). Then, select **Add as required**.
       3) Highlight **Other Mass Storage Controller** (this is the CD-ROM). Then, select **Add as desired**.

       Expand **Bus 3** for the following selections:
       1) Highlight **Ethernet controller** (this is another network adapter). Then, select **Add as required**.

       Select **Next**.
    i. At the **Create Logical Partition Profile - I/O Pools** screen, select **Next**.
    j. At the **Create Logical Partition Profile - Virtual I/O Adapters** screen, Select **Yes, I want to specify virtual I/O adapters.** Select **Next**.
    k. The **Create Logical Partition Profile - Create Virtual I/O Adapters** screen will appear. Under **Virtual Adapters**, change **Number of virtual adapter slots** to 64. Create two virtual Ethernet adapters for the Virtual I/O Server:
       1) Complete the following steps twice to create two virtual Ethernet adapters.
          a) Add a virtual Ethernet adapter by choosing the **Ethernet** in the **Create adapters** area. Select **(Create...)**.
          b) At the **Virtual Ethernet Adapter Properties** window, set the **Slot number** to 2 the first time you complete these steps and to 3 the second time.
          c) Set **Port virtual LAN ID** to 1 the first time you complete these steps and to 2 the second time.

d) Select the **Trunk Adapter** checkbox to use this adapter as a gateway between VLANs and an external network. This Ethernet adapter will be configured as a shared Ethernet adapter.

e) Select the **IEEE 802.1Q compatible adapter** checkbox.

f) Select **OK**.

g) You will return to the **Create Logical Partition Profile - Create Virtual I/O adapters** screen. Under **Virtual Adapters**, select **Required** for the adapter you just created.

l. From the **Create Logical partition Profile - Create Virtual I/O Adapters** screen, create the virtual SCSI server adapters.

1) You will create a total of five virtual SCSI server adapters. You will perform these steps for each adapter you create.

Note: The slot numbers must be assigned in the order shown.

a) Add a virtual SCSI adapter by choosing the **SCSI** radio button in the **Create adapters** area. Select **(Create...)**.

b) At the **Virtual SCSI Adapter Properties** window, set the **Slot number** for the adapters as follows:

	First	Second	Third	Fourth	Fifth
Slot number	21	22	31	32	33

.

c) Under **Adapter Type**, select the **Server** radio button.

d) Under **Connection Information**, select the **Any remote partition and slot can connect** radio button.

e) Select **OK**.

f) You will return to the **Create Logical Partition Profile - Create Virtual I/O adapters** screen.

2) Under **Virtual Adapters**, check the **Required** checkbox for the five virtual SCSI adapters you just created.

3) Select **Next**.

m. At the **Create Logical Partition Profile – Power Controlling Partitions** screen, accept the defaults for Power Controlling. Select **Next**.

n. At the **Create Logical Partition Profile - Optional Settings** screen, select **Normal** (this is the default) for the **Boot modes** setting. Select **Next**.

o. At the **Create Logical Partition Profile - Profile Summary** screen, you will see a summary of what you have selected. Select **Finish**. Wait until the `IBMOP_VIO` partition appears under `IBMOP_SERVER` in the HMC console.

Note: Expand the view of **Partitions** under `IBMOP_SERVER` in order to view the partitions you are creating.

11. Create two logical partitions that will use virtual I/O for the Linux installations.

a. Create the logical partition for the first Linux installation.

1) Right-click the server `IBMOP_SERVER`, select **Create**, then select **Logical Partition**.

2) The **Create Logical Partition Wizard** dialog will appear. Enter `2` for the **Partition ID** and `IBMOP_LINUX1` for the **Partition Name**. Make sure **AIX or Linux** is selected, and select **Next**.

3) In the **Create Logical Partition – Workload Management Groups** window, skip the definition of the workload management group by selecting the **No** checkbox. Select **Next**.

4) At the **Create Logical Partition Profile** screen, use `IBMOP_LINUX1_default` as the **Profile name**.

Unselect **Use all the resources in the system** if it is selected. Select **Next**.

5) At the **Create Logical Partition Profile – Memory** screen, assign memory requirement values. Set **Minimum** to 2 GB and 0 MB, **Desired** to 2 GB and 0 MB, and **Maximum to** 2 GB and 0 MB. Select **Next**.
6) At the **Create Logical Partition Profile – Processors** screen, select **Shared** for processor allocation. Select **Next**.
7) At the **Create Logical Partition Profile - Processing Settings** screen, assign processor values. Set **Desired** to 0.1, **Minimum** to 0.1, and **Maximum** to 2.0. Select **(Advanced...)**. Under **Sharing modes**, make sure **Uncapped** is selected, and change **Weight** to 140. Under **Virtual processors**, change **Maximum number of virtual processors** to 2. Select **OK**. Select **Next**.
8) At the **Create Logical Partition Profile – I/O** screen, double click on the unit to expand the buses. Expand **Bus 2** for the following selections:
   a) Highlight **Other Mass Storage Controller** (this is the CD-ROM). Then, select **Add as desired**.

   Select **Next**.
9) At the **Create Logical Partition Profile - I/O Pools** screen, select **Next**.
10) At the **Create Logical Partition Profile - Virtual I/O Adapters** screen, Select **Yes, I want to specify virtual I/O adapters.** Select **Next**.
11) Create a virtual Ethernet adapter.
   a) Add a virtual Ethernet adapter by choosing the **Ethernet** radio button in the **Create adapters** area. Select **(Create...)**.
   b) At the **Virtual Ethernet Adapter Properties** window, accept the default for the **Slot number**.
   c) Set **Port virtual LAN ID** to 1.
   d) Select the **IEEE 802.1Q compatible adapter** checkbox.
   e) Select **OK**.
   f) You will return to the **Create Logical Partition Profile - Create Virtual I/O adapters** screen. Under **Virtual Adapters**, check the **Required** checkbox for the adapter you just created.
12) You will create a total of two virtual SCSI client adapters for this partition. You will perform these steps for each adapter you create.

   Note: The remote partition virtual slot numbers must be assigned in the order shown.
   a) Add a virtual SCSI adapter by choosing the **SCSI** radio button in the **Create adapters** area. Select **(Create...)**.
   b) At the **Virtual SCSI Adapter Properties** window, accept the default **Slot number**.
   c) Under **Adapter Type**, select the **Client** radio button.
   d) Under **Connection Information**, select `IBMOP_VIO (1)` for the **Remote partition** and set the **Remote partition virtual slot number** for the adapters as follows:

	First	**Second**
Remote partition virtual slot number	21	22

   e) Select **OK**.
   f) You will return to the **Create Logical Partition Profile - Create Virtual I/O adapters** screen. Under **Virtual Adapters**, check the **Required** checkbox for the adapter you just created.
13) Select **Next**.
14) At the **Create Logical Partition Profile – Power Controlling Partitions** screen, accept the defaults for Power Controlling. Select **Next**.

15) At the **Create Logical Partition Profile - Optional Settings** screen, select **Normal** (this is the default) for the **Boot modes** setting. Select **Next**.

16) At the **Create Logical Partition Profile - Profile Summary** screen, you will see a summary of what you have selected. Select **Finish**. Wait until the `IBMOP_LINUX1` partition appears under `IBMOP_SERVER` in the HMC console.

b. Create the logical partition for the second Linux installation.

1) Right-click the server `IBMOP_SERVER`, select **Create**, then select **Logical Partition**.

2) The **Create Logical Partition Wizard** dialog will appear. Enter 3 for the **Partition ID** and `IBMOP_LINUX2` for the **Partition name**. Make sure **AIX or Linux** is selected, and select **Next**.

3) In the **Create Logical Partition – Workload Management Groups** window, skip the definition of the workload management group by selecting the **No** checkbox. Select **Next**.

4) At the **Create Logical Partition Profile** screen, use `IBMOP_LINUX2_default` as the **Profile name**.

   Unselect **Use all the resources in the system** if it is selected. Select **Next**.

5) At the **Create Logical Partition Profile – Memory** screen, assign memory requirement values. Set **Minimum** to 2 GB and 0 MB, **Desired** to 2 GB and 0 MB, and **Maximum** to 2 GB and 0 MB. Select **Next**.

6) At the **Create Logical Partition Profile – Processors** screen, select **Shared** for processor allocation. Select **Next**.

7) At the **Create Logical Partition Profile - Processing Settings** screen, assign processor values. Set **Desired** to 0.1, **Minimum** to 0.1, and **Maximum** to 2.0. Select **(Advanced...)**. Under **Sharing modes**, make sure **Uncapped** is selected, and change **Weight** to 140. Under **Virtual processors**, change **Maximum number of virtual processors** to 2. Select **OK**. Select **Next**.

8) At the **Create Logical Partition Profile – I/O** screen, double click on the unit to expand the buses. Expand **Bus 2** for the following selections:

   a) Highlight **Other Mass Storage Controller** (this is the CD-ROM). Then, select **Add as desired**.

   Select **Next**.

9) At the **Create Logical Partition Profile - I/O Pools** screen, select **Next**.

10) At the **Create Logical Partition Profile - Virtual I/O Adapters** screen, Select **Yes, I want to specify virtual I/O adapters.** Select **Next**.

11) Create a virtual Ethernet adapter.

   a) Add a virtual Ethernet adapter by choosing the **Ethernet** radio button in the **Create adapters** area. Select **(Create...)**.

   b) At the **Virtual Ethernet Adapter Properties** window, accept the default for the **Slot number**.

   c) Set **Port virtual LAN ID** to 2.

   d) Select the **IEEE 802.1Q compatible adapter** checkbox.

   e) Select **OK**.

   f) You will return to the **Create Logical Partition Profile - Create Virtual I/O adapters** screen. Under **Virtual Adapters**, check the **Required** checkbox for the adapter you just created.

12) You will create a total of three virtual SCSI client adapters for this partition. You will perform these steps for each adapter you create.

   Note: The remote partition virtual slot numbers must be assigned in the order shown.

   a) Add a virtual SCSI adapter by choosing the **SCSI** radio button in the **Create adapters** area. Select **(Create...)**.

   b) At the **Virtual SCSI Adapter Properties** window, accept the default **Slot number**.

c) Under **Adapter Type**, select the **Client** radio button.

d) Under **Connection Information**, select `IBMOP_VIO (1)` for the **Remote partition** and set the **Remote partition virtual slot number** for the adapters as follows:

	First	Second	Third
Remote partition virtual slot number	31	32	33

e) Select **OK**.

f) You will return to the **Create Logical Partition Profile - Create Virtual I/O adapters** screen. Under **Virtual Adapters**, check the **Required** checkbox for the adapter you just created.

13) Select **Next**.

14) At the **Create Logical Partition Profile – Power Controlling Partitions** screen, accept the defaults for Power Controlling. Select **Next**.

15) At the **Create Logical Partition Profile - Optional Settings** screen, select **Normal** (this is the default) for the **Boot modes** setting. Select **Next**.

16) At the **Create Logical Partition Profile - Profile Summary** screen, you will see a summary of what you have selected. Select **Finish**. Wait until the `IBMOP_LINUX2` partition appears under `IBMOP_SERVER` in the HMC console.

12. Right-click on the server `IBMOP_SERVER`, select **Properties**.
13. In the property dialog, under the **General** tab, in the **Policy** section, uncheck **Power off the system after all the logical partitions are powered off**. Select **OK**.
14. Make sure all of the partitions are shown as `Not Activated` under state; if not, click the reload icon below the menu bar.
15. To install and configure the Virtual I/O Server software:
    a. Insert the Virtual I/O Server CD into the OpenPower server CD-ROM drive.
    b. Activate the Virtual I/O Server partition. Right-click on the partition name, `IBMOP_VIO`. Select **Activate**.
    c. Select the profile `IBMOP_VIO_default`. Select the **Open a terminal window or console session** checkbox. Select **(Advanced...)**.
    d. Under **Boot mode**, select **SMS**. Select **OK** to return to the previous window.
    e. Select **OK** to activate the partition and launch a terminal window.
    f. A vterm window will appear. Press 0 to select this console as the active console, if prompted.
    g. At the **SMS Main Menu**, select **Select Boot Options**. Press **Enter**.
    h. Select **Select Install/Boot Device**. Press **Enter**.
    i. At the **Select Device Type** menu, select **CD/DVD**. Press **Enter**.
    j. At the **Select Media Type** menu, select **IDE**. Press **Enter**.
    k. Press `x` to exit **System Management Services**. Select **Yes** when prompted. Press **Enter**.
    l. The **STARTING SOFTWARE** screen will appear.
    m. Select 1 (the 1 will not appear on your screen) and press Enter to select this terminal as the system console.
    n. Select your language and press Enter.
    o. Select **Change/Show Installation Settings and Install**, so you can verify the install location for the VIO server. Press Enter.
        1) If **Disk(s) where you want to install** is set to `hdisk0`, skip to step p However, if this is set to `hdisk0...` (hdisk0 followed by "...") rather than `hdisk0`, it means that the installation will use more disk drives than it should, so you must not skip ahead.
        2) Select **Disk(s) where you want to install**. Press Enter.

3) The current choice is indicated by >>>. If hdisk0 is not the current choice, select the number for hdisk0, and press Enter.
4) If any disks other than hdisk0 are identified as current choices, by >>>, cancel those choices by selecting the number for each and pressing Enter, until hdisk0 is the only choice indicated.
5) Select **Continue with choices indicated above**. Press Enter.

p. Select **Install with the settings listed above** and press Enter.

q. When the installation is complete, use padmin for the username at the login prompt. Set a new password.

r. After you log in as padmin, you can view the license by using the **license** command on the command line, as follows:

```
license -view
```

You can use the Space key to page through the license agreement.

s. Accept the license by entering the following command:

```
license -accept
```

t. Configure the shared Ethernet adapters.

1) To configure the first shared Ethernet adapter, enter the following command:

```
mkvdev -sea ent0 -vadapter ent3 -default ent3 -defaultid 1
```

2) To configure the second shared Ethernet adapter, enter the following command:

```
mkvdev -sea ent2 -vadapter ent4 -default ent4 -defaultid 2
```

u. Enter the following commands to make your logical volumes:

1) `mklv -lv lv_linux1 rootvg 4G`
2) `mklv -lv lv_linux2 rootvg 6G`
3) `mklv -lv lv_linux2_data1 rootvg 8G`

v. Enter the following commands to configure the virtual SCSI adapters for the Linux partitions:

1) `mkvdev -vdev lv_linux1 -vadapter vhost0 -dev dev_linux1`
2) `mkvdev -vdev hdisk1 -vadapter vhost1 -dev dev_linux1_dat1`
3) `mkvdev -vdev lv_linux2 -vadapter vhost2 -dev dev_linux2`
4) `mkvdev -vdev lv_linux2_data1 -vadapter vhost3 -dev dev_linux2_dat1`
5) `mkvdev -vdev hdisk2 -vadapter vhost4 -dev dev_linux2_dat2`
6) If you want to back up the operating systems by shadowing hdisk0 on hdisk3, skip to the next step. Otherwise, you can add hdisk3 as another data device by entering the following command:

```
mkvdev -vdev hdisk3 -vadapter vhost3 -dev dev_linux2_dat3
```

Note: The *vhost* entries in these commands correspond to the order in which you created the virtual SCSI server adapters for the Virtual I/O server partition. The first virtual SCSI adapter you created corresponds to vhost0, and was assigned slot 21. Since you created a virtual SCSI client adapter at slot 21 in logical partition IBMOP_LINUX1, the 4 GB logical volume you just created with the **mklv** command, lv_linux1, will be associated with logical partition IBMOP_LINUX1. The second virtual SCSI adapter you created corresponds with vhost1, and so on. The following table shows how the virtual SCSI devices you have created are allocated:

vhost	Slot	Logical Partition	Devices
vhost0	21	IBMOP_LINUX1	lv_linux1
vhost1	22	IBMOP_LINUX1	hdisk1
vhost2	31	IBMOP_LINUX2	lv_linux2
vhost3	32	IBMOP_LINUX2	lv_linux2_data1

vhost	Slot	Logical Partition	Devices
vhost4	33	IBMOP_LINUX2	hdisk2 and optionally hdisk3

w. If you don't want to back up your operating systems, you can skip to step 15. If you want to back up your operating systems, shadowing hdisk0 on hdisk3 is recommended. To shadow your main disk, enter the following command:

1) `extendvg -f rootvg hdisk3`
2) `mirrorios -f hdisk3`

Note: This command may take up to 30 minutes.

Note: The mirrorios command will produce an error message when it completes. However, the shadowing of the main disk was completed successfully, so you can safely proceed.

16. From the HMC window, right-click on IBMOP_VIO and select **Shut Down Partition**.
17. In the **Shutdown Options** area, select **Delayed** (this is the default) and select **OK.**
18. Wait until the state of IBMOP_VIO is Not Activated. Right-click on IBMOP_VIO and select **Close Terminal Connection**. Select **Yes** at warning prompt.
19. Expand the IBMOP_VIO partition view. Right-click on IBMOP_VIO_default and select **Properties**.
20. Select the **Physical I/O** tab.
21. In the **Profile I/O devices** area, click on the unit to display the buses.
22. Click on Bus 2 and select Other Mass Storage Controller.
23. Select **Remove**.
24. Select **OK**.
25. Right-click on IBMOP_VIO and select **Activate**.
26. At the **Activate Logical Partition** window, select **OK**.
27. Wait until the state of IBMOP_VIO is Running and no more messages display in the operator panel value before you proceed with the next section.

Install Linux

1. Install SLES 9 on the partition IBMOP_LINUX1. You may wish to refer to the SLES 9 documentation at http://www.novell.com/documentation/sles9/index.html before you proceed with this installation.
   a. Insert your SLES 9 installation CD-ROM into the OpenPower server CD-ROM Drive.
   b. Right-click on the partition IBMOP_LINUX1 under the server IBMOP_SERVER. Select **Activate**. A VTERM window will appear. Check the box **Open a terminal window or console session**. Select **OK**.
   c. A screen will appear. Press 0 to select this console as the active console, if prompted.
   d. At the yaboot prompt (**boot:**), press Enter to begin the installation.
   e. At the prompt, **What type of terminal do you have?**, select **4) X Terminal Emulator (xterm)**.
   f. After you have read the License Agreement, select **I Agree**.
   g. Select your language. Select **Accept**.
   h. The **Installation Settings** menu will appear. Select **Change** to alter the settings for your system.
   i. Select **Partitioning**.
   j. Select **Create custom partition setup**. Select **Next**.
   k. At the **Preparing Hard Disk – Step 1** screen, select the 4GB SCSI hard disk. This is the 4 GB logical volume you created as lv_linux1 in the Virtual I/O Server. Select **Next**.
   l. At the **Preparing Hard Disk – Step 2** screen, select **Next**.

m. Select **Accept**. A warning will appear; select **Yes, install** to begin the installation. During this part of the installation procedure, you may need to change the CD-ROM. Follow the on-screen prompts. At the end of this phase of the installation, the system will reboot.

   Note: The SLES 9 installer will automatically set the SMS boot order so the partition will reboot from the virtual SCSI device.

n. After the **boot:** prompt appears, the system will automatically start as `linux` after several seconds.

o. When the install screen reappears, you will be prompted to create a password for root, the system administrator. Enter the password for the root user twice, as prompted. Select **Next**.

p. At the **Network Configuration** screen, select **Change**.

q. Select **Network Interfaces**.

r. At the **Network cards configuration** screen, select **Change** under `IBM Virtual Ethernet card 0`.

s. Select **Edit**.

t. Select and enter the settings appropriate for your environment, such as IP Address, Host name and name server, and Routing. Select **Next**.

u. At the **Network cards configuration overview** screen, select **Finish**. Select **Next**.

v. At the **Test Internet Connection** screen, select **No, Skip This Test**. Select **Next**.

w. At the **Service Configuration** screen, make sure the Common Name and Server Name are correct for your environment. Select **Next**.

x. For **User Authentication Method**, select **Local (/etc/passwd)**. Select **Next**.

y. For **LDAP Client Configuration**, select **Next**.

z. At the **Add a New LDAP User** screen, if you would like to create a new user, you can do that now. Otherwise, do not create a new user. Select **Next** and select **Yes** if you are warned about Empty user login.

aa. After you have read the **Release Notes** screen, select **Next**.

ab. At the **Hardware Configuration** menu, select **Next**.

ac. When you see the **Installation Completed** screen, select **Finish**.

ad. When a login prompt appears, log in as root, type `halt`, then press Enter.

ae. When system messages stop appearing and the **Power down** message appears in the terminal window, right-click on the `IBMOP_LINUX1` partition, select **Close Terminal Connection** and **Yes** at warning prompt. Wait until the terminal window disappears and `Not Activated` appears for the state of the `IBMOP_LINUX1` partition.

2. Install Red Hat Enterprise Linux 3 update 4 on the partition `IBMOP_LINUX2`. You may want to refer to the Red Hat Enterprise Linux 3 documentation at http://www.redhat.com/docs/manuals/enterprise/RHEL-3-Manual/ppc-multi-install-guide/ before you proceed with the installation.

   a. Insert your RHEL 3 update 4 installation CD-ROM into the OpenPower server CD-ROM Drive.

   b. From the navigation area of your HMC, right-click on the partition `IBMOP_LINUX2`. Select **Activate**. A new VTERM window will appear.

   c. Check the box **Open a terminal window or console session**. Select **OK**.

   d. A screen will appear. Press `0` to select this console as the active console, if prompted.

   e. The partition will begin to boot. Enter the SMS menu by pressing the ″1″ key after the ″keyboard″ checkpoint, and before the ″speaker″ checkpoint is reached.

   f. At the SMS Main Menu, select **5. Select Boot Options**.

   g. Select **1. Select Install/Boot Device**.

   h. Select **7. List all Devices**.

   i. Select the CD-ROM device.

   j. Select **2. Normal Mode Boot**.

k. Select **1. Yes** to exit System Management Services.

l. At the yaboot prompt (**boot:**), press Enter to begin the installation.

m. At **CD Found** screen, select **Skip** if you do not want to test the CD media, and go to step n. Otherwise, select **OK** if you want to test the CD media before you proceed with the installation.

   1) At the **Media Check** screen, select **Test** to test the CD currently in the CD-ROM drive.
   2) If the media check result is **PASS**, then select **OK** and proceed with the installation from that CD.
   3) If the CD is ejected after the media check, reinsert the CD into the CD-ROM drive.
   4) Select **Continue**.

n. At the **Red Hat Enterprise Linux AS** welcome screen, select **OK**.

o. Select your language, then select **OK**.

p. At the **Disk Partitioning Setup** screen, select **Autopartition**. If you get a warning that says that says the drive will be initialized and all data will be lost, select **Yes**.

q. At the **Automatic Partitioning** screen, select **Remove all partitions on this system** and select the device where you want to install Red Hat Enterprise Linux AS, `sda`. Selected devices are indicated by an asterisk (*). Unselect any other devices, so the Linux installation will only use `sda` for installation. Select **OK**. If you get a warning that says that you have chosen to remove all partitions on the drive, select **Yes**.

r. At the Partitioning screen, you can see how the devices will be allocated by the Linux installation. Select **OK**. Be aware that you will need approximately 3GB allocated for the root (/) partition.

   Note: If you get a **Format Warning** saying that you have pre-existing partitions that may be destroyed by your installation, you can select **Yes**, because you are doing a new installation.

s. At the **Network configuration for eth0** screen, select **Activate on boot** and enter the appropriate network settings for your environment.

t. When your network configuration is complete, the **Firewall** screen appears. Select **OK** if you want to enable the default firewall configuration.

u. At the **Language Support** screen, select any additional languages you want to use on this Linux installation, then select **OK**.

v. At the **Time Zone Selection** screen, select **System clock uses UTC** and select the appropriate time zone for your system. Select **OK**.

w. Set the root password for your system. Select **OK**.

x. At the **Package Defaults** screen, select **OK** to use the default software packages.

y. At the **Installation to begin** screen, select **OK**.

z. The install process will prompt you to change the CD-ROM several times. After the installation is complete, the Red Hat system will reboot.

Appendix 1: Resource allocation

This information describes the allocation of the system's resources after you follow the configuration procedures described in this document.

Resource allocation for 3 logical partitions

Logical partition 1: IBMOP_VIO

VIO disk

VIO disk name	VIO logical/ physical volume names	VIO Server and client slot	VIO vhost	Logical/Physical volume sizes
hdisk0	lv_linux1, lv_linux2, lv_linux2_data1			34GB

VIO disk name	VIO logical/ physical volume names	VIO Server and client slot	VIO vhost	Logical/Physical volume sizes
(optionally) hdisk3	pv_vio_mirror			34GB

Shared processor allocation: Minimum/Desired/Maximum
0.1/0.1/2.0

Virtual processors: Minimum/ Desired/ Maximum
1/1/2

Uncapped/Weight
Yes/160

LPAR memory requirements: Minimum/Desired/Maximum
512MB/512MB/512MB

VIO Ethernet PVID/ Client LAN ID

Logical partition 2: IBMOP_LINUX1

VIO disk

VIO disk name	VIO logical/ physical volume names	VIO Server and client slot	VIO vhost	Logical/Physical volume sizes
hdisk0	lv_linux1	21	vhost0	4GB
hdisk1	lv_linux1_data1	22	vhost1	34GB

Shared processor allocation: Minimum/Desired/Maximum
0.1/0.1/2.0

Virtual processors: Minimum/ Desired/ Maximum
1/1/2

Uncapped/Weight
Yes/140

LPAR memory requirements: Minimum/Desired/Maximum
2GB/2GB/2GB

VIO Ethernet PVID/ Client LAN ID
1

Logical partition 3: IBMOP_LINUX2

VIO disk

VIO disk name	VIO logical/ physical volume names	VIO Server and client slot	VIO vhost	Logical/Physical volume sizes
hdisk0	lv_linux2	31	vhost1	6GB
hdisk0	lv_linux2_data1	32	vhost2	8GB
hdisk2	pv_linux2_data2	33	vhost3	34 GB
(optionally) hdisk3	pv_linux2_data3	33	vhost3	34 GB

Shared processor allocation: Minimum/Desired/Maximum
0.1/0.1/2.0

Virtual processors: Minimum/ Desired/ Maximum
1/1/2

Uncapped/Weight
Yes/140

LPAR memory requirements: Minimum/Desired/Maximum
2GB/2GB/2GB

VIO Ethernet PVID/ Client LAN ID
2

Scenario: Creating a Linux logical partition and partition profile

Situation

You are the system administrator responsible for configuring and managing the IBM eServer hardware system. You would like to know how to create a Linux partition profile.

Objectives

The objective of this scenario is to create a Linux logical partition and partition profile on an IBM eServer hardware system.

Prerequisites and assumptions

This scenario assumes that the following prerequisite steps have been completed and are operational prior to beginning the configuration steps:

1. The Hardware Management Console for @server was set up.
   - The Hardware Management Console (HMC) was cabled.
   - You completed the planning process and you understand how you want to configure your HMC.
   - You used the Guided Setup wizard or the HMC configuration checklist to set up the HMC.
2. You understand the concepts for partitioning the server.
3. You completed the tasks recommended for planning for Linux logical partitions.
4. You signed onto the HMC with one of the following user roles:
   - Super administrator
   - Operator

Configuration steps

Ensure that all the prerequisites for this scenario have been completed prior to completing these tasks:

To create a new logical partition on your server using the HMC, follow these steps:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which you want to create the partition profile.
4. Right-click **Partitions**, and click **Create > Logical Partitions**.
5. Follow the steps in the Create Logical Partitions wizard to create a logical partition and a partition profile.

Scenario: Using partition profiles

Situation

You are the system administrator for a business recovery service center with IBM eServer hardware. You use IBM eServer hardware primarily to test disaster recovery strategies for your clients. Each of your clients has a different system configuration. This means that, each time a client comes in, you must change the system configuration of your managed system.

On each logical partition on your server, you create one partition profile for each client that uses the logical partition. When a client returns to the business recovery service center, you can reconfigure the managed system for that client simply by activating the partition profiles for that client.

You have just finished testing for Client 1. You must now reconfigure the server for Client 2, who comes in tomorrow.

Note: This is one example of how to change your system configuration. Depending on your operating system, business needs, and resource allocation, you could resolve this situation by dynamically moving resources.

Objectives

The objective of this scenario is to change the configuration of your managed system by using partition profiles.

Details

Your managed system has three logical partitions. It has eight processors and 12 GB of memory. Each logical partition has one or two partition profiles. The following table illustrates how the logical partitions and partition profiles are set up

Logical partition ID	Name of logical partition	Name of partition profile	Processor resources	Memory resources
Partition 1	Test 1	Profile 1: Client 1	5 dedicated processors	8 GB
		Profile 2: Client 2	7 dedicated processors	10 GB
Partition 2	Test 2	Profile 1: Client 1	2 dedicated processors	3 GB
		Profile 2: Client 2	1 dedicated processor	2 GB
Partition 3	Test 3	Profile 1: Client 1	1 dedicated processor	1 GB

Prerequisites and assumptions

This scenario assumes that the following prerequisite steps have been completed and are operational prior to beginning the configuration steps:

1. The Hardware Management Console was set up.
   - The Hardware Management Console (HMC) was cabled.
   - You completed the planning process and you understand how you want to configure your HMC.
   - You used the Guided Setup wizard or the HMC configuration checklist to set up the HMC.
2. You read the logical partitioning concepts topic.
3. You completed the tasks recommended for logical partition planning.
4. You moved and assigned the physical hardware according to the LPAR Validation Tool (LVT) output.
5. You logged in to the HMC with one of the following user roles:

- Super administrator
- Service representative
- Product engineer

6. You created the logical partitions and partition profiles.
7. You activated the partition profiles for Client 1.

The following table lists the partition profiles that are currently active for each logical partition on the managed system.

Logical partition ID	Name of logical partition	Name of partition profile	Processor resources	Memory resources
Partition 1	Test 1	Profile 1: Client 1	5 dedicated processors	8 GB
Partition 2	Test 2	Profile 1: Client 1	2 dedicated processors	3 GB
Partition 3	Test 3	Profile 1: Client 1	1 dedicated processor	1 GB

Configuration steps

To change the configuration of your managed system so that it is ready for Client 2, you must first shut down the logical partitions using usual operating system procedures.

After shutting down the logical partitions, you can activate the partition profiles for Client 2. To do this, complete the following steps on your HMC:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server.
4. Open **Partitions**.
5. In the contents area, right-click the Test 1 logical partition and select **Activate**.
6. Select the Profile 2 partition profile and click **OK**.
7. Right-click the Test 2 logical partition and select **Activate**.
8. Select the Profile 2 partition profile and click **OK**.

After activating the partition profile, the managed system is configured according to the needs of Client 2. The following table lists the partition profiles that are currently active for each logical partition on the managed system.

Logical partition ID	Name of logical partition	Name of partition profile	Processor resources	Memory resources
Partition 1	Test 1	Profile 2: Client 2	5 dedicated processors	8 GB
Partition 2	Test 2	Profile 2: Client 2	1 dedicated processor	2 GB

Scenario: Using system profiles

Situation

You are the system administrator for a business recovery service center with IBM eServer hardware. You use IBM eServer hardware primarily to test disaster-recovery strategies for your clients. Each of your clients has a different system configuration. This means that, each time a client comes in, you must change the system configuration of your managed system.

You decide to create and use system profiles to change the system configuration of your managed system. First, on each logical partition on your server, you create a partition profile for each client that uses the logical partition. Then, you create a system profile for each client. Each system profile contains the partition profiles that you want to activate for the client. When a client returns to the business recovery service center, you can reconfigure the managed system for that client simply by activating the system profile for that client.

You have just finished testing for Client 1. You must now reconfigure the managed system for Client 2, who comes in tomorrow.

Note: This is one example of how to change your system configuration. Depending on your operating system, business needs, and resource allocation, you could resolve this situation by dynamically moving resources.

Objectives

The objective of this scenario is to change the configuration of your managed system by using system profiles.

Details

Your managed system has eight processors and 12 GB of memory. You have created two system profiles on this managed system. Each system profile divides the resources of the managed system between two or three logical partitions.

The following table shows how the system profiles are set up:

System Profile	Logical partition ID	Name of logical partition	Name of partition profile	Processor resources	Memory resources
Client 1	Partition 1	Test 1	Profile 1: Client 1	5 dedicated processors	8 GB
	Partition 2	Test 2	Profile 1: Client 1	2 dedicated processors	3 GB
	Partition 3	Test 3	Profile 1: Client 1	1 dedicated processor	1 GB
Client 2	Partition 1	Test 1	Profile 2: Client 2	7 dedicated processors	10 GB
	Partition 2	Test 2	Profile 2: Client 2	1 dedicated processor	2 GB

Prerequisites and assumptions

This scenario assumes that the following prerequisite steps have been completed and are operational prior to beginning the configuration steps:

1. The Hardware Management Console was set up.
   - The Hardware Management Console (HMC) was cabled.
   - You completed the planning process and you understand how you want to configure your HMC.
   - You used the Guided Setup wizard or the HMC configuration checklist to set up the HMC.

2. You read the logical partitioning concepts topic.
3. You completed the tasks recommended for logical partition planning.
4. You moved and assigned the physical hardware according to the LPAR Validation Tool (LVT) output.
5. You logged in to the HMC with one of the following user roles:
   - Super administrator
   - Service representative
   - Product engineer
6. You created the logical partitions, partition profiles, and system profiles described.
7. You activated the system profile for Client 1.

The following table lists the system profile that is currently active on the managed system.

System Profile	Logical partition ID	Name of logical partition	Name of partition profile	Processor resources	Memory resources
Client 1	Partition 1	Test 1	Profile 1: Client 1	5 dedicated processors	8 GB
	Partition 2	Test 2	Profile 1: Client 1	2 dedicated processors	3 GB
	Partition 3	Test 3	Profile 1: Client 1	1 dedicated processor	1 GB

Configuration steps

To change the configuration of your managed system so that it is ready for Client 2, you must first shut down the logical partitions using usual operating system procedures.

After shutting down the logical partitions, you can activate the system profile for Client 2. To do this, complete the following steps on your HMC:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server.
4. Open **System Profiles**.
5. Right-click the Client 2 system profile and select **Activate**.
6. Select the activation settings you want to use and click **Continue**.

After activating the system profile, the managed system is configured according to the needs of Client 2. The following table lists the system profile that is currently active on the managed system.

System Profile	Logical partition ID	Name logical partition	Name of partition profile	Processor resources	Memory resources
Client 2	Partition 1	Test 1	Profile 2: Client 2	7 dedicated processors	10 GB
	Partition 2	Test 2	Profile 2: Client 2	1 dedicated processor	2 GB

Scenario: Capacity on Demand for Linux

Capacity on Demand is not available on all hardware models. Capacity on Demand is not currently available with OpenPower.

Capacity on Demand allows customers to activate inactive processors as their workload requires. The following scenario walks through the steps of planning for, ordering, and using this feature.

Situation

An IBM eServer hardware server is operating with eight active processors and four inactive processors. As the server workload grows, the available processor resource utilization consistently approaches or exceeds 70% of the available capacity. Anticipating the need for additional resources, the system administrator decides to consider activating some of the inactive processors.

Objectives

- To test the effectiveness of increasing the number of available processors.
- To increase the number of processors (if that change will improve performance).

Capacity on Demand preparation and activation

1. Before activating any processors, the system administrator prepares the server for Capacity on Demand. This involves performing trend analysis to learn how many additional processors will be required, preparing the server to activate additional processors, and preparing to order the new capacity.
2. To investigate the benefits of activating the additional processors, the system administrator decides to activate the processors for a trial period. The trial period lasts 14 days.
3. After deciding that the performance improvement gained by activating the additional processors warrants purchasing the processors permanently, the system administrator contacts the IBM marketing representative or IBM Business Partner, or visits http://www.ibm.com to place an order for four processor activation features.
4. The IBM marketing representative places the order in the IBM configurator, and receives a reminder to send the vital product data (VPD) from the server with the order. The VPD can be faxed to IBM or sent electronically with the Electronic Service Agent™. (Electronic Service Agent is located on your HMC and is designed to monitor events and to transmit server inventory information to IBM on a periodic, customer-definable timetable.)
5. The system administrator retrieves the activation codes from the Web and activates the permanent capacity. This task involves entering the activation code on the target server and assigning the processors to a logical partition.

The IBM eServer hardware now has all eight processors available for use.

For more information, refer to Working with Capacity on Demand.

Scenario: Server consolidation

This scenario demonstrates the advantages of consolidating Linux servers as uncapped logical partitions on an IBM eServer hardware managed system.

Situation

As the system administrator for a medium-sized manufacturing company, you are responsible for maintaining an efficient, reliable set of servers to support your company intranet and Internet activities. Currently your company runs five servers on separate four-way processor systems. This arrangement has proven less than optimal during peak business operations. During a temporary sales increase over a

holiday weekend, two of your servers were overloaded causing a loss of business. Marketing analysts at your company estimate that a failure to upgrade the servers might mean even bigger losses in the future.

Objectives

Your company needs to expand the peak workload capability of its servers, but the cost of replacing your current hardware with multiple high-powered multiprocessor computers is prohibitive. Your objectives are simple:

- To increase peak workload capacity of the company servers
- To get the best value for your company's dollar

Details

Your company has approved resource allocation for the purchase of new hardware. You will be required to justify your purchases, and your chief financial officer will not accept replacing the existing machines with systems having twice the current processing capacity.

You decide to consolidate the five servers as Linux logical partitions on a single iSeries. Setting the sharing mode for the processors to uncapped will allow logical partitions to access idle processors during peak workload periods.

Prerequisites and assumptions

- Three of your five company servers (servers A, B, and C) operate normally at a processing level requiring approximately three quarters of a processor.
- Two of your five company servers (servers D and E) operate normally at a processing level requiring two dedicated processors.
- The peak workload required of any server is five processors.
- No more than two servers operate at peak workload at any time.

Consolidating the servers

You must complete the following steps:

- Install the hardware for your iSeries.
- Plan for Linux logical partitions.
- Configure Linux logical partitions for five logical partitions. During the creation of the partition profiles, ensure that you:
  - Specify .75 processing units each for servers A, B, and C.
  - Specify 2.0 processing units each for servers D and E.
  - Specify the number of virtual processors to be the same as the number of physical processors in the system. This situation allows each partition to use the maximum uncapped capability.
  - Set the sharing mode to uncapped for all five partitions.
- Back up each server and restore each server to its assigned partition.

During peak workload periods, each server can now access idle processors and remain online.

Chapter 7. Planning for Linux logical partitions

This information introduces the tasks that are recommended for Linux logical partition planning, and it links to the places where you can find more detailed information. Before you begin your planning tasks, be sure that you have completed the items in the following checklist:

Before you begin

_ Read the Hardware requirements for Linux logical partitions documentation.
_ Understand and document your current partitioning environment.
_ Obtain a copy of the current system's Logical Partition Validation Tool (LVT)

output.
_ Evaluate and document your current and future software and hardware needs.
_ If you want to use logical partitions on an HV system, install the virtual I/O server product on your system.
_ Plan your new system and decide when to migrate.

Logical partition planning tasks

__ **Identify the requirements for each logical partition**
Use this information to understand the hardware requirements for a Linux logical partition.
__ **Identify how the partitions will communicate with other partitions, servers, or workstations**
Use this information to select the communication option you prefer to use for your logical partition. Determine which communications option you will use to connect to other partitions, servers, and workstations.
__ **Identify how the partitions will communicate with the HMC**
Use this information to ensure your partitions are communicating to the HMC. Determine how you will implement a network connection to the HMC.
__ **Design and validate your partition configuration**
Use the Logical Partition Validation Tool (LVT)

to help you design a partitioned system. The LVT provides you with a validation report that reflects your system requirements while not exceeding logical partition recommendations.
__ **Decide if you want i5/OS to provide Linux logical partitions**
Use this information to understand how i5/OS can provide I/O resources to Linux logical partitions. Determine if your i5/OS logical partition will provide I/O function to the Linux logical partition.
__ **Plan for Linux software licensing in a partitioned environment**
Read and understand the license agreement for your Linux distribution.

When you have completed the tasks identified in this topic, you should have constructed a plan for logical partitions that identifies the following elements:

After you finish

_ Identify and record a single set of hardware requirements for your logical partition solution.
_ Record a complete and validated plan for logical partition configuration.
_ Ensure the hardware requirements for your logical partition configuration have been met.
_ Ensure the software licensing requirements for your logical partition configuration have been met.
_ Record a complete hardware feature placement plan, which includes your post-installation strategy to move features to match your logical partition configuration.

Chapter 8. Configuring Linux logical partitions

In order to use features which require logical partitions on an IBM eServer OpenPower system, you need the appropriate Advanced OpenPower Virtualization technologies activated in your system's Hardware Management Console.

You can use the Hardware Management Console to create logical partitions on your IBM eServer hardware system. Before you start creating logical partitions, it is essential that you understand the concepts behind this type of system configuration. The purpose of this information is to familiarize you with the following:

Creating logical partitions and partition profiles
Find information about the Create Logical Partition wizard and how it guides you through the process of creating a logical partition and partition profiles on your server.

Creating additional partition profiles
Find information about the Create Partition Profile wizard and how it guides you through the process of creating partition profiles on your server

Creating logical partitions from the manufacturing default configuration or the nonpartitioned configuration
Find details on the procedure used to create logical partitions from the manufacturing default configuration.

Migrating a Linux installation
Find information about the options and requirements for upgrading or migrating a Linux installation from an iSeries or a pSeries system to an IBM eServer hardware system.

Copying a partition profile
Learn how you can copy the contents of a profile that you have already created.

Creating a system profile
Learn how to create system profiles.

Copying a system profile
Learn how you can copy the contents of a system profile you that have already created.

Creating a Linux logical partition using i5/OS virtual I/O resources
Learn how to create a logical partition that shares resources with another partition.

Creating logical partitions and partition profiles

You can use the Create Logical Partition wizard on the Hardware Management Console (HMC) to create a new logical partition and partition profile on your IBM eServer hardware.

If you are creating logical partitions on a managed system in the manufacturing default configuration, or if you are creating logical partitions on a nonpartitioned managed system, then you must test the hardware on your managed system to ensure that the hardware is in working order. Testing the hardware helps you detect potential problems with your managed system and makes such problems easier to correct. For more information on how to create logical partitions on such managed systems, see Creating logical partitions from the manufacturing default configuration or from the nonpartitioned configuration.

Before you create a logical partition, have the LPAR Validation Tool (LVT) output available. Use the output from this tool as a guide as you start to create partition profiles on your server.

To create a partition profile, you must be a super administrator or an operator. For more information about the role of a super administrator and operator, refer to Overview of HMC roles.

To create a logical partition and a partition profile on your server using the HMC, follow these steps:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which you want to create the partition profile.
4. Right-click **Partitions**, and select **Create > Logical Partition**.
5. Follow the steps in the Create Logical Partition wizard to create a logical partition and a partition profile.

After creating your logical partition and partition profile, you must install an operating system. For installation procedures for the AIX, i5/OS, and Linux operating systems, refer to Installing operating systems.

Creating additional partition profiles

A partition profile stores the required number of processors, memory, and hardware resources assigned to that profile. A partition profile is identified by partition ID and profile name.

Before you start to create your partition profile, it is recommended that you have the LPAR Validation Tool (LVT) output available. You should use the output from this tool as a guide as you start to create partition profiles on your server.

To create a partition profile, you must be a super administrator or an operator . For more information about the role of a super administrator and operator, refer to Overview of HMC roles.

To create a partition profile using the Hardware Management Console, follow these steps:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which you want to create the partition profile.
4. Open **Partitions**.
5. Right-click the logical partition for which you want to create the partition profile and select **Create > Profile**.
6. Follow the steps in the Create Partition Profile wizard to create the partition profile.

Creating logical partitions from the manufacturing default configuration or from the nonpartitioned configuration

When you receive your managed system from your service provider, the managed system is in what is known as the manufacturing default configuration. You can install an operating system on the managed system and use the managed system in a nonpartitioned configuration. However, if you want to create logical partitions on the managed system, you must develop a partition plan for the managed system, validate the hardware on the managed system, move the hardware according to your partition plan, and create the logical partitions using the Hardware Management Console (HMC).

The procedure used to create logical partitions from the manufacturing default configuration or the nonpartitioned configuration varies by server type. For more information, see the following:

"Creating logical partitions from the manufacturing default configuration or from the nonpartitioned configuration on an IBM eServer i5 server"
Use this procedure to create logical partitions on an IBM eServer i5 server.

"Creating logical partitions from the manufacturing default configuration or from the nonpartitioned configuration on an IBM eServer p5 server" on page 62
Use this information to create logical partitions on an IBM eServer p5 server.

"Creating logical partitions from the manufacturing default configuration or the nonpartitioned configuration on an OpenPower server" on page 65
Use this information to create logical partitions on an IBM eServer OpenPower server.

Creating logical partitions from the manufacturing default configuration or from the nonpartitioned configuration on an IBM eServer i5 server

Use this procedure to create logical partitions from the manufacturing default configuration or from the nonpartitioned configuration on an IBM eServer i5 server. By using this procedure, you will validate the hardware on your managed system before partitioning the managed system. This allows you to isolate and fix hardware problems more easily than if you had moved the hardware and partitioned the system without first validating the hardware.

Use this procedure in the following cases:

- You have just received your server from your service provider and want to partition the server immediately.
- You have used the server as a nonpartitioned server, but want to partition the server.

Note: If either of these cases is not valid for your system configuration, you can create logical partitions and partition profiles according to your validated Logical Partition Validation Tool (LVT) output and designate the service partition on the managed system.

Before you begin, complete the following:

- Use the LVT to ensure that your hardware configuration supports your desired logical partition configuration. Depending on your new hardware configuration, you might need to add hardware resources to your managed system.
- Set up the Hardware Management Console (HMC) to manage your logical partition and the managed system.
- If you have used the managed system prior to partitioning, back up all data on the managed system.
- Power on the managed system to standby using the HMC (if the managed system is not already powered on in a **Standby** or **Operating** state). If the managed system is in any state other than **Standby** or **Operating**, fix the problem before beginning this procedure.

To create logical partitions from the manufacturing default configuration or from the nonpartitioned configuration, you must be a super administrator or operator on the HMC. For more information about user roles, refer to Overview of HMC roles.

To create logical partitions from the manufacturing default configuration or from the nonpartitioned configuration, complete the following:

1. Verify that the managed system has one logical partition. To verify that this logical partition exists, complete the following:
   a. In the navigation area of the HMC, open **Server and Partition**.
   b. Select **Server Management**.
   c. In the contents area of the HMC, open the managed system.

d. Open **Partitions**. The logical partition will be visible as an object under **Partitions**.

Note: The name of this logical partition will be the serial number of the managed system, and the logical partition will have one partition profile called `default`.

If this logical partition exists, continue to step 2. If this logical partition does not exist, complete the following **at your HMC** (not using a remote client such as Web-based System Manager) to create this logical partition on your managed system:

a. Contact your service provider. Continue this procedure only under the guidance of your service provider.
b. In the contents area, right-click the managed system.
c. From the menu, click **Profile Data > Initialize** and click **Yes**.
d. Right-click your HMC desktop (outside of any of the displayed windows) and click **Terminal > rshterm**.
e. From the Restricted shell command-line interface, type the command:

```
lpcfgop -m (name of managed system as it appears in the content area) -o clear
```

and enter **1** to confirm.

2. Ensure that the logical partition is in a **Not Activated** state. If the logical partition is not in a **Not Activated** state, see the following:
   - If the logical partition is in a **Running** state, right-click the managed system in the contents area, click **Properties**, ensure that **Power off the system after all the logical partitions are powered off** is cleared, and click **OK**. You can then shut down the logical partition using operating system procedures.
   - If the logical partition is in any state other than **Not Activated** or **Running**, fix the problem before continuing.
3. Activate the logical partition with a manual B-mode IPL type to access Dedicated Service Tools (DST). To do this, complete the following:
   a. Right-click the logical partition and click **Activate**.
   b. Click the **Advanced** button.
   c. Select `Manual` in the **Keylock position** field, select `B: IPL from the second side of the load source` in the **IPL type** field, and click **OK**.
   d. If you are performing this procedure from the HMC, select **Open a terminal window or console session** and click **OK**. If you are performing this procedure remotely, click **OK** and then open a 5250 console session remotely on the logical partition.
4. Verify that the physical adapters are connected and reporting to the server using the Failed and non-reporting hardware resources option in the Hardware Service Manager. (The Failed and non-reporting hardware resource option allows you to display a list of the logical hardware resources that either failed or did not report to the system at the last IPL.)

   Note: Incorrect use of the Failed and non-reporting hardware resource option can cause damage to data in your system.

   To do this, complete the following:
   a. Type `3` and press Enter to select option 3 (Use Dedicated Service Tools (DST)).
   b. Sign onto DST with a valid user ID and password.
   c. Type `7` and press Enter to select option 7 (Start a service tool).
   d. Type `4` and press Enter to select option 4 (Hardware service manager).
   e. Type `4` and press Enter to select option 4 (Failed and non-reporting hardware resources).
   f. Verify that there are no failed or non-reporting resources. If no failed resources or non-reporting resources exist, the informational message `No failed or non-reporting logical hardware resources were found` will appear. If there are failed resources, contact your service provider.

Note: You can verify only the adapters that are supported by i5/OS. Any adapter that is not supported by i5/OS might have an error of unknown or failed hardware.

g. When you are done, press F3 until the **Use Dedicated Service Tools (DST)** display appears.

h. Type 7 and press Enter to select option 7 (Start a service tool).

i. Type 7 and press Enter to select option 7 (Operator panel functions).

j. Press F10 to power off, press Enter to confirm, close the 5250 console session window, and wait until the logical partition shuts down.

5. Power off the managed system using the HMC.
6. Move the hardware in the managed system according to your LVT configuration plan.
7. Power on the managed system to standby using the HMC.
8. Activate the logical partition with a manual B-mode IPL type to access Dedicated Service Tools. To do this, complete the following:
   a. Right-click the logical partition and click **Activate**.
   b. Click the **Advanced** button.
   c. Select `Manual` in the **Keylock position** field, select `B: IPL from the second side of the load source` in the **IPL type** field, and click **OK**.
   d. If you are performing this procedure from the HMC, select **Open a terminal window or console session** and click **OK**. If you are performing this procedure remotely, click **OK** and then open a 5250 console session remotely on the logical partition.
9. Verify that the physical adapters are connected and reporting to the server using the Failed and non-reporting hardware resources option in the Hardware Service Manager.

   Note: Incorrect use of the Failed and non-reporting hardware resource option can cause damage to data in your system.

   To do this, complete the following:
   a. Type 3 and press Enter to select option 3 (Use Dedicated Service Tools (DST)).
   b. Sign onto DST with a valid user ID and password.
   c. Type 7 and press Enter to select option 7 (Start a service tool).
   d. Type 4 and press Enter to select option 4 (Hardware service manager).
   e. Type 4 and press Enter to select option 4 (Failed and non-reporting hardware resources).
   f. Verify that there are no failed or non-reporting hardware resources. If no failed or non-reporting hardware resources exist, the informational message `No failed or non-reporting logical hardware resources were found` will appear. If there are failed resources, contact your service provider.

      Note: You can verify only the adapters that are supported by i5/OS. Any adapter that is not supported by i5/OS might have an error of unknown or failed hardware.

   g. When you are done, press F3 until the **Use Dedicated Service Tools (DST)** display appears.
   h. Type 7and press Enter to select option 7 (Start a service tool).
   i. Type 7 and press Enter to select option 7 (Operator panel functions).
   j. Press F10 to power off, press Enter to confirm, close the 5250 console session window, and wait until the logical partition shuts down.
10. Delete the logical partition.

    Note: This procedure erases the logical partition and the logical partition configuration data stored on the partition profiles. This procedure does not affect any of the data stored on the managed system.

When you are done, you can create logical partitions and partition profiles according to your validated LVT output and designate the service partition on the managed system.

Creating logical partitions from the manufacturing default configuration or from the nonpartitioned configuration on an IBM eServer p5 server

Use this procedure to create logical partitions from the manufacturing default configuration or from the nonpartitioned configuration on an IBM eServer p5 server. By using this procedure, you will validate the hardware on your managed system before partitioning the managed system. This allows you to isolate and fix hardware problems more easily than if you had moved the hardware and partitioned the system without first validating the hardware.

Use this procedure in the following cases:

- You have just received your server from your service provider and want to partition the server immediately.
- You have used the server as a nonpartitioned server, but want to partition the server.

Note: If either of these cases is not valid for your system configuration, you can create logical partitions and partition profiles according to your validated Logical Partition Validation Tool (LVT) output and designate the service partition on the managed system.

Before you begin, complete the following:

- Use the LVT to ensure that your hardware configuration supports your desired logical partition configuration. Depending on your new hardware configuration, you might need to add hardware resources to your managed system.
- Set up the Hardware Management Console (HMC) to manage your logical partition and the managed system.
- If you have used the managed system prior to partitioning, back up all data on the managed system.
- Power on the managed system to standby using the HMC (if the managed system is not already powered on in a **Standby** or **Operating** state). If the managed system is in any state other than **Standby** or **Operating**, fix the problem before beginning this procedure.

To create logical partitions from the manufacturing default configuration or from the nonpartitioned configuration, you must be a super administrator or operator on the HMC. For more information about user roles, refer to Overview of HMC roles.

To create logical partitions from the manufacturing default configuration or from the nonpartitioned configuration, complete the following:

1. Verify that the managed system has one logical partition. To verify that this logical partition exists, complete the following:
   a. In the navigation area of the HMC, open **Server and Partition**.
   b. Select **Server Management**.
   c. In the contents area of the HMC, open the managed system.
   d. Open **Partitions**. The logical partition will be visible as an object under **Partitions**.

      Note: The name of this logical partition will be the serial number of the managed system, and the logical partition will have one partition profile called `default`.

   If this logical partition exists, continue to step 2. If this logical partition does not exist, complete the following **at your HMC** (not using a remote client such as Web-based System Manager) to create this logical partition on your managed system:
   a. Contact your service provider. Continue this procedure only under the guidance of your service provider.
   b. In the contents area, right-click the managed system.
   c. From the menu, click **Profile Data > Initialize** and click **Yes**.

d. Right-click your HMC desktop (outside of any of the displayed windows) and click **Terminal > rshterm**.
e. From the Restricted shell command-line interface, type the command:

```
lpcfgop -m (name of managed system as it appears in the content area) -o clear
```

and enter **1** to confirm.

2. Ensure that the logical partition is in a **Not Activated** state. If the logical partition is not in a **Not Activated** state, see the following:
   - If the logical partition is in a **Running** state, right-click the managed system in the contents area, click **Properties**, ensure that **Power off the system after all the logical partitions are powered off** is cleared, and click **OK**. You can then shut down the logical partition using operating system procedures. For more information on shutting down logical partitions using operating system procedures, see the following:
     – For servers running AIX, see Shutting down AIX in a logical partition.
     – For servers running Linux, see Shutting down Linux in a logical partition.
   - If the logical partition is in any state other than **Not Activated** or **Running**, fix the problem before continuing.
3. Activate the logical partition and verify that the physical adapters on the server are connected and reporting to the server. There are two different methods for activating the logical partition and verifying the physical adapters. The method that you use depends on whether you have installed AIX on the server:
   - If AIX is installed on the server, you can use the configuration manager in AIX to view all of the available devices. When AIX boots and the configuration manager runs, the device tree is populated with all the working adapters. The recognized adapters will be in the Available state if they are configured properly.

     To view the available adapters in AIX using the configuration manager, complete the following:
     a. In the contents area, right-click the partition and click **Activate**.
     b. Click the **Advanced** button.
     c. In the **Boot mode** field, select `Normal` and click **OK**.
     d. Select **Open a terminal window or console session** and click **OK**. A virtual terminal (vterm) window opens for the logical partition.
     e. Ensure that all the resources are attached and powered on.
     f. Log onto AIX using a valid user name and password.
     g. Enter the following command at the command prompt to list all of the adapters on AIX:

```
# lsdev -Cc adapter
```

     If there are any adapters that do not display as `Available`, contact your service provider for hardware support.

     Note: You can verify only the adapters that are recognized by AIX. Any adapter that is not recognized by AIX might have an error of unknown or failed hardware.
     h. When you are done, shut down the logical partition using operating system procedures and close the terminal session window.
   - If Linux is installed on the server, or if there is no operating system on the server, you can use the System Management Services (SMS) interface to view the available devices. When the logical partition is activated, the bus is scanned to determine what device adapters are attached. The recognized adapters are listed.

     To view the recognized adapters using SMS, complete the following:
     a. In the contents area, right-click the partition and click **Activate**.
     b. Click the **Advanced** button.

c. In the **Boot mode** field, select `SMS` and click **OK**.
d. Select **Open a terminal window or console session** and click **OK**. A virtual terminal (vterm) window opens for the logical partition.
e. When the SMS interface is displayed, type 5 and press Enter to select option 5 (Select Boot Options).
f. Type 1 and press Enter to select option 1 (Select Install or Boot a Device).
g. Type 7 and press Enter to select option 7 (List all Devices). All of the recognized devices in the partition are listed. If there are any devices that do not display, contact your service provider for hardware support.

   Note: You can verify only the adapters that are recognized by SMS. Any adapter that is not recognized by SMS might have an error of unknown or failed hardware.
h. When you are done, close the terminal session window, right-click the partition in the contents area, click **Shut down partition**, and click **OK**.

4. Power off the managed system using the HMC.
5. Move the hardware in the managed system according to your LVT configuration plan.
6. Power on the managed system to standby using the HMC.
7. Activate the logical partition and verify that the physical adapters on the server are connected and reporting to the server. There are two different methods for activating the logical partition and verifying the physical adapters. The method that you use depends on whether you have installed AIX on the server:
   - If AIX is installed on the server, you can use the configuration manager in AIX to view all of the available devices. When AIX boots and the configuration manager runs, the device tree is populated with all the working adapters. The recognized adapters will be in the Available state if they are configured properly.

     To view the available adapters in AIX using the configuration manager, complete the following:
     a. In the contents area, right-click the partition and click **Activate**.
     b. Click the **Advanced** button.
     c. In the **Boot mode** field, select `Normal` and click **OK**.
     d. Select **Open a terminal window or console session** and click **OK**. A virtual terminal (vterm) window opens for the logical partition.
     e. Ensure that all the resources are attached and powered on.
     f. Log onto AIX using a valid user name and password.
     g. Enter the following command at the command prompt to list all of the adapters on AIX:
        ```
        # lsdev -Cc adapter
        ```

        If there are any adapters that do not display as `Available`, contact your service provider for hardware support.

        Note: You can verify only the adapters that are recognized by AIX. Any adapter that is not recognized by AIX might have an error of unknown or failed hardware.
     h. When you are done, shut down the logical partition using operating system procedures and close the terminal session window.
   - If Linux is installed on the server, or if there is no operating system on the server, you can use the System Management Services (SMS) interface to view the available devices. When the logical partition is activated, the bus is scanned to determine what device adapters are attached. The recognized adapters are listed.

     To view the recognized adapters using SMS, complete the following:
     a. In the contents area, right-click the partition and select **Activate**.
     b. Click the **Advanced** button.

c. In the **Boot mode** field, select SMS and click **OK**.
d. Select **Open a terminal window or console session** and click **OK**. A virtual terminal (vterm) window opens for the logical partition.
e. When the SMS interface is displayed, type 5 and press Enter to select option 5 (Select Boot Options).
f. Type 1 and press Enter to select option 1 (Select Install or Boot a Device).
g. Type 7 and press Enter to select option 7 (List all Devices). All of the recognized devices in the partition are listed. If there are any devices that do not display, contact your service provider for hardware support.

   Note: You can verify only the adapters that are recognized by SMS. Any adapter that is not recognized by SMS might have an error of unknown or failed hardware.
h. When you are done, close the terminal session window, right-click the partition in the contents area, click **Shut down partition**, and click **OK**.

8. Delete the logical partition.

   Note: This procedure erases the logical partition and the logical partition configuration data stored on the partition profiles. This procedure does not affect any of the data stored on the managed system.

When you are done, you can create logical partitions and partition profiles according to your validated LVT output and designate the service partition on the managed system.

Creating logical partitions from the manufacturing default configuration or the nonpartitioned configuration on an OpenPower server

Use this procedure to create logical partitions from the manufacturing default configuration or from the nonpartitioned configuration on an OpenPower server. By using this procedure, you will validate the hardware on your managed system before partitioning the managed system. This allows you to isolate and fix hardware problems more easily than if you had moved the hardware and partitioned the system without first validating the hardware.

Use this procedure in the following cases:

- You have just received your server from your service provider and want to partition the server immediately.
- You have used the server as a nonpartitioned server, but want to partition the server.

Note: If either of these cases is not valid for your system configuration, you can create logical partitions and partition profiles according to your validated Logical Partition Validation Tool (LVT) output and designate the service partition on the managed system.

Before you begin, complete the following:

- Use the LVT to ensure that your hardware configuration supports your desired logical partition configuration. Depending on your new hardware configuration, you might need to add hardware resources to your managed system.
- Set up the Hardware Management Console (HMC) to manage your logical partition and the managed system.
- If you have used the managed system prior to partitioning, back up all data on the managed system.
- Power on the managed system to standby using the HMC (if the managed system is not already powered on in a **Standby** or **Operating** state). If the managed system is in any state other than **Standby** or **Operating**, fix the problem before beginning this procedure.

To create logical partitions from the manufacturing default configuration or from the nonpartitioned configuration, you must be a super administrator or operator on the HMC. For more information about user roles, refer to Overview of HMC roles.

To create logical partitions from the manufacturing default configuration or from the nonpartitioned configuration, complete the following:

1. Verify that the managed system has one logical partition. To verify that this logical partition exists, complete the following:
   a. In the navigation area of the HMC, open **Server and Partition**.
   b. Select **Server Management**.
   c. In the contents area of the HMC, open the managed system.
   d. Open **Partitions**. The logical partition will be visible as an object under **Partitions**.

      Note: The name of this logical partition will be the serial number of the managed system, and the logical partition will have one partition profile called `default`.

   If this logical partition exists, continue to step 2. If this logical partition does not exist, complete the following **at your HMC** (not using a remote client such as Web-based System Manager) to create this logical partition on your managed system:
   a. Contact your service provider. Continue this procedure only under the guidance of your service provider.
   b. In the contents area, right-click the managed system.
   c. From the menu, click **Profile Data > Initialize** and click **Yes**.
   d. Right-click your HMC desktop (outside of any of the displayed windows) and click **Terminal > rshterm**.
   e. From the Restricted shell command-line interface, type the command:

      ```
      lpcfgop -m (name of managed system as it appears in the content area) -o clear
      ```

      and enter **1** to confirm.
2. Ensure that the logical partition is in a **Not Activated** state. If the logical partition is not in a **Not Activated** state, see the following:
   - If the logical partition is in a **Running** state, right-click the managed system in the contents area, click **Properties**, ensure that **Power off the system after all the logical partitions are powered off** is cleared, and click **OK**. You can then shut down the logical partition using operating system procedures.
   - If the logical partition is in any state other than **Not Activated** or **Running**, fix the problem before continuing.
3. Activate the logical partition and verify that the physical adapters on the server are connected and reporting to the server using the System Management Services (SMS) interface. When the logical partition is activated, the bus is scanned to determine what device adapters are attached. The recognized adapters are listed.

   To view the recognized adapters using SMS, complete the following:
   a. In the contents area, right-click the partition and click **Activate**.
   b. Click the **Advanced** button.
   c. In the **Boot mode** field, select `SMS` and click **OK**.
   d. Select **Open a terminal window or console session** and click **OK**. A virtual terminal (vterm) window opens for the logical partition.
   e. When the SMS interface displays, type `5` and press Enter to select option 5 (Select Boot Options).
   f. Type 1 and press Enter to select option 1 (Select Install or Boot a Device).

g. Type 7 and press Enter to select option 7 (List all Devices). All of the recognized devices in the logical partition are listed. If there are any devices that do not display, contact your service provider for hardware support.

   Note: You can verify only the adapters that are recognized by SMS. Any adapter that is not recognized by SMS might have an error of unknown or failed hardware.

h. When you are done, close the terminal session window, right-click the partition in the contents area, click **Shut down partition**, and click **OK**.

4. Power off the managed system using the HMC.
5. Move the hardware in the managed system according to your LVT configuration plan.
6. Power on the managed system to standby using the HMC.
7. Activate the logical partition and verify that the physical adapters on the server are connected and reporting to the server using the System Management Services (SMS) interface. When the logical partition is activated, the bus is scanned to determine what device adapters are attached. The recognized adapters are listed.

   To view the recognized adapters using SMS, complete the following:

   a. In the contents area, right-click the partition and click **Activate**.
   b. Click the **Advanced** button.
   c. In the **Boot mode** field, select SMS and click **OK**.
   d. Select **Open a terminal window or console session** and click **OK**. A virtual terminal (vterm) window opens for the logical partition.
   e. When the SMS interface displays, type 5 and press Enter to select option 5 (Select Boot Options).
   f. Type 1 and press Enter to select option 1 (Select Install or Boot a Device).
   g. Type 7 and press Enter to select option 7 (List all Devices). All of the recognized devices in the partition are listed. If there are any devices that do not display, contact your service provider for hardware support.

      Note: You can verify only the adapters that are recognized by SMS. Any adapter that is not recognized by SMS might have an error of unknown or failed hardware.

   h. When you are done, close the terminal session window, right-click the partition in the contents area, click **Shut down partition**, and click **OK**.

8. Delete the logical partition.

   Note: This procedure erases the logical partition and the logical partition configuration data stored on the partition profiles. This procedure does not affect any of the data stored on the managed system.

When you are done, you can create logical partitions and partition profiles according to your validated LVT output and designate the service partition on the managed system.

Migrating a Linux installation

This topic describes the options and requirements for updating and migrating a Linux installation from an iSeries to an IBM eServer i5 server or from a pSeries system to an IBM eServer p5 IBM eServer hardware system.

"Migrating a Linux installation from an existing iSeries to IBM eServer i5" on page 68
This topic describes the options and requirements for updating and migrating a Linux installation from an iSeries system to an IBM eServer i5 IBM eServer hardware system.

"Migrating a Linux installation from pSeries to IBM eServer p5" on page 68
This topic describes the options and requirements for updating and migrating a Linux installation from a pSeries system to an IBM eServer p5 IBM eServer hardware system.

Migrating a Linux installation from an existing iSeries to IBM eServer i5

Migrating Linux when performing a data migration

A data migration is the process of moving data from an IBM iSeries server to a IBM eServer i5 machine when the serial number changes. The following two topics contain more information:

Preparing for data migration from a Linux logical partition
See this topic to learn what you need to do to prepare your Linux partition for the data migration.

Completing the data migration from a Linux logical partition
See this topic to learn the steps you need to perform to complete your Linux migration.

Migrating Linux when performing an upgrade

During a server model upgrade when moving from an IBM iSeries server to a IBM eServer i5 machine and the serial number does not change, use the following two topics to perform your Linux migration.

Preparing for data migration from a Linux logical partition
Use this information to prepare your Linux partition for your server upgrade.

Finalizing server configuration
Use the information in this topic to complete your upgrade and Linux migration.

Migrating a Linux installation from pSeries to IBM eServer p5

This topic describes the process for updating and migrating a Linux installation to a pSeries IBM eServer hardware managed system. The first step in migrating a Linux installation to a pSeries IBM eServer hardware managed system is to upgrade to a Linux version that supports IBM eServer hardware

1. On the existing IBM eServer p5 server, upgrade the partition to be migrated to a Linux version that supports the IBM eServer hardware. For detailed migration instructions, refer to your Linux distributor documentation.
2. Back up all data on the existing partition.
3. On the existing pSeries system, install and configure the same Linux version to which the IBM eServer p5 partition was upgraded in step 1.
4. Load the data that was backed up in step 3 onto the newly configured Linux logical partition on IBM eServer hardware.

For general information about migration and upgrading, or for information on migrating logical partitions with operating systems other than Linux, refer to Migrating your server..

Copying a partition profile

You can use the Hardware Management Console to copy the contents of a partition profile that you have already created. For example, you might decide that you need a partition profile that is similar to one that you have already created, but with a small change in resource allocation.

To copy a partition profile, you must be a super administrator, operator, or product engineer. For more information about user roles, refer to Overview of HMC roles.

To copy a partition profile using the HMC, follow these steps:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the partition profile that you want to copy is located.

4. Open **Partitions**.
5. Open the logical partition for the partition profile that you want to copy.
6. Right-click the partition profile and select **Copy**.
7. Type the name of the copy and click **OK**.

Creating a system profile

A system profile is a collection of partition profiles. A system profile helps you change the managed system from one complete set of partition configurations to another. System profiles are useful to validate your partition profile. If a partition profile has overcommitted resources, you will not be able to add that profile to the system profile.

To create a system profile, you must be a super administrator or an operator. For more information about the role of a super administrator and operator, refer to Overview of HMC roles.

To create a system profile using the Hardware Management Console, follow these steps:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, right-click the server on which you want to create the system profile and select **Create > System Profile**.

Copying a system profile

A system profile is a collection of partition profiles. A system profile helps you change the managed system from one complete set of partition configurations to another. You can use the Hardware Management Console (HMC) to copy the contents of a profile that you have already created.

To copy a system profile, you must be a super administrator, operator, or product engineer. For more information about user roles, refer to Overview of HMC roles.

To copy a system profile using the HMC, follow these steps:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the system profile that you want to copy is located.
4. Open **System Profiles**.
5. Right-click the system profile and select **Copy**.
6. Enter the name of the copy and click **OK**.

Creating a Linux logical partition using i5/OS virtual I/O resources

If you want to create a Linux logical partition on the IBM eServer i5 and you do not have enough physical hardware for your configuration requirements, you can use i5/OS virtual I/O resources. i5/OS can share virtual I/O resources to provide I/O function for Linux logical partitions. Linux running on IBM eServer i5 supports several types of virtual I/O resources. Use the Hardware Management Console Create Logical Partition and Partition Profile wizard to create virtual SCSI adapters and virtual serial adapters for Linux logical partitions.

Note: You cannot create a Linux logical partition that uses i5/OS virtual I/O resources on IBM eServer p5 servers. On IBM eServer p5 servers, you can create a Virtual I/O Server logical partition and configure the Linux logical partition to use the virtual SCSI and virtual Ethernet resources of the Virtual I/O Server logical partition. You might need to enter an enablement code to create a Virtual I/O Server logical partition on your IBM eServer p5 server. For more information about the Virtual I/O Server, see Using the Virtual I/O Server.

To create a Linux logical partition using i5/OS virtual I/O resources, you must be a super administrator or operator. For more information about the role of a super administrator and an operator, refer to Overview of HMC roles.

To create a Linux logical partition using i5/OS virtual I/O resources, follow these steps:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which you want to create the partition profile.
4. Right-click **Partitions** and select **Create > Logical Partitions**.
5. Follow the steps in the Create Logical Partition wizard to create a logical partition and a partition profile.
6. Create a network server description (NWSD) and network-server storage space. See "Creating a network server description and a network-server storage space for a Linux logical partition" for details.
7. Set up the console for your Linux partition. See "Connecting to the virtual console for a Linux logical partition" on page 72.
8. Start the NWSD. See Starting and stopping the network server description .
9. Install the Linux operating system on your new logical partition. For installation procedures, see Installing operating systems.

Creating a network server description and a network-server storage space for a Linux logical partition

A network server description (NWSD) is used to give a name to the configuration, to provide an interface for starting and stopping a Linux logical partition, and to provide a link between Linux and its virtual disks.

Important:

- As an alternative to the Partition parameter, you can also specify a partition number by typing `PTNNBR(`*`integer`*`)` where *integer* is the number of the partition you are specifying.
- If you specify `PWRCTL(*NO)`, virtual devices will be available to the partition. You will need to shut down and restart the partition using the Hardware Management Console (HMC).
- If you specify `PWRCTL (*YES)`, you need to perform the following steps:
  - Ensure that the server adapter in the i5/OS partition specifies the remote partition and remote slot in its configuration.
  - Ensure that the client partition has the i5/OS partition as the power-controlling partition in the profile.
  - Ensure before you activate the NWSD that the client partition's profile has been saved to the server by activating the partition from the HMC, even if the client operating system does not activate correctly because of the absence of virtual devices
- You can store a kernel in a disk partition of a virtual disk (a network-server storage space (NWSSTG)). By specifying the `IPLSRC (*NWSSTG)` parameter, you are specifying that the Linux logical partition will start from a disk partition on that virtual disk. The disk partition on the virtual disk must be formatted as type `PReP Boot` (type 0x41) and marked as a device that starts. You can format a disk partition as type `PReP Boot` by using the Linux **fdisk** command with the -t option. You can specify that the disk partition starts by using the **fdisk** command with the -a option.
- To start an NWSD with a kernel from a stream file, set the `IPLSRC` parameter to `*STMF` and set the `IPLPATH` parameter to point to the kernel. You must have read access to the file and the path leading to the file to use the vary on command. This value only loads the kernel. After the kernel is running, it must find a root file system. In an initial installation, the root file system might be a RAM disk that is physically attached to the kernel.

To create a virtual disk for a logical partition running Linux, follow these steps:

Note: The default or suggested parameter values are provided within the parentheses. These settings are relevant only to a logical partition.

1. Determine the correct SCSI server resource name.
   a. If there is only one SCSI server adapter corresponding to a given client partition, and that adapter has its remote partition and remote slot configured correctly, you can specify *AUTO as the RSRCNAME in your NWSD.
   b. Otherwise, you will need to determine the actual resource name. At an i5/OS command line, type `WRKHDWRSC *CMN`, and find a controller resource with type 290B and a converged location code that corresponds to the SCSI server adapter at the HMC. This resource name will be used later to specify the SCSI server resource.
2. At an i5/OS command line on the partition that shares resources, type `CRTNWSD` and press F4 for prompts.
3. Specify the following information:

```
NWSD (Provide a name for the NWSD)
RSRCNAME (*AUTO or the resource name of the SCSI server resource)
TYPE(*GUEST)
ONLINE (*NO or *YES)
PARTITION ('Provide the name of your Linux logical partition')
CODEPAGE (437)
TCPPORTCFG (*NONE)
RSTDDEVRSC (for virtual CD and tape devices) (*NONE)
SYNCTIME (*TYPE)
IPLSRC (*NWSSTG)
IPLSTMF (*NONE)
IPLPARM (*NONE)
PWRCTL (*YES)
```

   Note: After the installation, if your root file system (/) is not installed on the first partition of the first disk, you must set a root parameter.
4. Create the network-server storage space using either the character-based interface or iSeries Navigator.
   - **iSeries Navigator**
     a. Expand **My Connections** > *your server* > **Network > Windows® Administration** .
     b. Right-click the **Disk Drives** and select **New Disk**.
     c. In the **Disk drive name** field, specify the name that you want to give to the disk drive.
     d. In the **Description** field, specify a meaningful description for the disk drive.
     e. In the **Capacity** field, specify the size of the new disk drive in megabytes. (Refer to your preferred Linux distributor installation documentation to determine the size you want to use.)
     f. Click **OK**.
   - **Character-based interface**
     a. At an i5/OS command line, type the command CRTNWSSTG and press F4.
     b. Enter the following parameter values on the Create NWS Storage Space (CRTNWSSTG) display and press Enter.
        – In the Network-server storage space field, specify the name you want to give to the storage space.
        – In the Size field, specify the size in megabytes for the new storage space. (Refer to your preferred Linux distributor installation documentation to determine the size you want to use.)
        – In the Text description field, specify a meaningful description for the storage space.
5. Link the network-server storage space using either the character-based interface or iSeries Navigator.
   - **iSeries Navigator**

a. Expand **My Connections** > *your server* > **Network > Windows Administration**.
b. Click **Disk Drives**, right-click an available network-server storage space, and select **Add Link**.
c. Select the server to which you want to link the network-server storage space.
d. Select the link sequence position you want to use.
e. Select one of the available data access types.
f. Click **OK**.

- **Character-based interface**
  a. At an i5/OS command line, type the command ADDNWSSTGL and press F4.
  b. Enter the following parameter values on the Add Network-Server Storage Link (ADDNWSSTGL) display and press Enter.
     – In the Network server description field, specify the name of the network server description (NWSD).
     – In the Dynamic storage link field, specify *YES to make the network-server storage space dynamically available to the partition (that is, available without rebooting the Linux partition).
     – In the Drive sequence number field, specify the link sequence position you want to use.

Connecting to the virtual console for a Linux logical partition

The virtual console provides the console function for a Linux server. It is used primarily during the initial installation of the operating system. The virtual console can also be used to view server errors or to restore communication to the LAN. This console connection is used prior to configuring TCP/IP.

Any Telnet client can be used as the Linux console. Multiple Telnet clients can share access to the same virtual console. To connect to a console, use Telnet to connect to port 2301 of the partition that is sharing its resources. TCP/IP must be configured and running on at least one i5/OS logical partition. The following procedure uses the IBM Personal Communications client.

To connect to a virtual console using IBM Personal Communication, follow these steps:

1. At the **Start** button, select **IBM Personal Communications** and **Start or Configure Session**.
2. From the Customize Communication window, select **ASCII** as your type of host and select **Link Parameters**.
3. From the Telnet ASCII window, enter the host name or the IP address of the partition that is sharing its resources, and enter port number 2301 of the partition sharing its resources, click **OK**.
4. If you are not using an Integrated xSeries® Server, go to the next step. If you are using both Linux partitions and Integrated xSeries Server consoles, select **i5/OS Guest Partition Consoles** from the i5/OS Virtual Consoles window.
5. From the i5/OS Guest Partition Console window, select the logical partition to which you want to connect as the console.
6. Enter the i5/OS service tools ID and password to connect to the Linux logical partition.

To connect to the virtual console using Telnet from a DOS prompt, follow these steps:

1. From an MS DOS command prompt, use the Telnet command to connect to your server and port 2301 (telnet xxxxxx 2301).
2. If you are not using an Integrated xSeries Server, go to the next step. If you are using both Linux partitions and Integrated xSeries Server consoles, select **i5/OS Guest Partition Consoles** from the i5/OS Virtual Consoles window.
3. From the i5/OS Guest Partition Console window, select the logical partition to which you want to connect as the console.
4. Enter the i5/OS service tools ID and password to connect to the Linux logical partition.

The Remote Panel privilege or System Partitions - Administration privilege for Linux logical partitions is required to use the Linux virtual console.

Starting and stopping the network server description for a Linux logical partition

To stop and start (vary off and vary on) the network server description (NWSD), use either of the following methods:

iSeries Navigator

To stop the NWSD, do the following:

1. Click **Network > Windows Administration > Integrated xSeries Servers**
2. Right-click the name of the NWSD that you want to stop.
3. Click **Shut Down**.

To start the NWSD, right-click the name of the NWSD that you want to start and click **Start**.

Character-based interface

To stop the NWSD using the Work with configuration status (WRKCFGSTS) command, do the following:

1. Type `WRKCFGSTS *NWS` and press Enter.
2. Type 2 next to the NWSD that you want to stop and press Enter.

To start the NWSD using the WRKCFGSTS command, do the following:

1. Type `WRKCFGSTS *NWS` and press Enter.
2. Type 1 next to the NWSD that you want to start and press Enter.

Chapter 9. Managing Linux logical partitions

When you create one or more logical partitions on IBM eServer hardware, you are creating partitions that are independent of each other. Each logical partition has its own independent configuration of processor, memory, input/output (I/O) devices, Licensed Internal Code (also known as server firmware), operating system (Linux), and optional software applications.

In order to use features which require logical partitions on an IBM eServer OpenPower system, you need the appropriate Advanced OpenPower Virtualization technologies activated in your system's Hardware Management Console.

You can use the Hardware Management Console to manage your logical partitions. Most tasks that you perform are independent of the other logical partitions on the system. Consider each logical partition as an independent system.

"Managing partition profiles for logical partitions"
Learn how to activate and delete partition profiles.

"Managing system profiles for logical partitions" on page 77
Learn how to activate and delete system profiles.

"Managing partitions remotely" on page 77
Learn how to connect to the remote HMC client.

Managing logical partition and operating system security
Understand how you can protect the logical partitions and operating systems running on your managed system.

"Dynamically managing Linux logical partition resources" on page 78
Learn how you can dynamically add, remove, and move resources between partitions.

"Application support" on page 82
Learn how you can integrate Linux with i5/OS applications and data.

"Backing up and recovering Linux installations" on page 82
Learn how to back up and restore Linux installations on IBM eServer hardware servers.

Managing partition profiles for logical partitions

This information provides an overview and procedures for functions that can help you manage your partition profiles. The partition profile functions are available through the Hardware Management Console (HMC). Select from the following information to learn how you can manage your partition profiles:

"Activating a partition profile" on page 76
Use this procedure to activate a partition profile using the HMC.

"Changing partition profile properties" on page 76
Use this procedure to change partition profile properties using the HMC.

"Deleting a partition profile" on page 76
Use this procedure to delete a partition profile using the HMC.

Activating a partition profile

A partition profile stores the required number of processors, memory, and hardware resources assigned to that profile.

To activate a partition profile, you must be a super administrator, operator, or product engineer. For more information about user roles, refer to Overview of HMC roles.

To activate a partition profile using the Hardware Management Console, follow these steps:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the partition profile is located.
4. Open **Partitions**.
5. Open the logical partition for the partition profile.
6. Right-click the partition profile and select **Activate**.
7. Select the partition profile you want to activate and click **OK**.

Changing partition profile properties

A partition profile stores the required number of processors, memory, and hardware resources assigned to that profile. Any partition profile property changes will not be applied to the logical partition until the partition profile has been activated.

To change partition profile properties, you must be a super administrator, service representative, operator, or product engineer. For more information about user roles, refer to Overview of HMC roles.

To change partition profile properties using the Hardware Management Console, follow these steps:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the partition profile is located.
4. Open **Partitions**.
5. Open the logical partition for the partition profile.
6. Right-click the partition profile and select **Properties**.
7. Make the appropriate changes and click **OK**.

Deleting a partition profile

A partition profile stores the required number of processors, memory, and hardware resources assigned to that profile.

To delete a partition profile, you must be a super administrator or an operator. For more information about the role of a super administrator and operator, refer to Overview of HMC roles.

Note: The Hardware Management Console (HMC) will not allow you to delete a partition profile that is the default partition profile for the logical partition. If the partition profile you want to delete is the default partition profile, you must first change the default profile to another partition profile.

To delete a partition profile using the HMC, follow these steps:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the partition profile is located.
4. Open **Partitions**.
5. Open the logical partition for the partition profile.

6. Right-click the partition profile and select **Delete**.
7. Click **OK** to confirm.

Managing system profiles for logical partitions

This information provides an overview and procedures for functions that can help you manage your system profiles. The system profile functions are available through the Hardware Management Console (HMC). Select from the following information to learn how you can manage your system profiles:

"Activating a system profile"
Use this procedure to activate a system profile using the HMC.

"Deleting a system profile"
Use this procedure to delete a system profile using the HMC.

Activating a system profile

A system profile is an ordered list of partition profiles. When you activate a system profile, the managed system will attempt to activate the partition profiles in order. A system profile helps you activate or change the managed system from one complete set of logical partition configurations to another.

To activate a system profile, you must be a super administrator, operator, or product engineer. For more information about user roles, refer to Overview of HMC roles.

To activate a system profile using the Hardware Management Console, follow these steps:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the system profile is located.
4. Open **System Profiles**.
5. Right-click the system profile and select **Activate**. Optionally, you may set the activation settings for your system profile.
6. Click **Continue**.

Deleting a system profile

A system profile helps you activate or change the managed system from one complete set of logical partition configurations to another.

To delete a system profile, you must be a super administrator or an operator. For more information about the role of a super administrator and operator, refer to Overview of HMC roles.

To delete a system profile using the Hardware Management Console, follow these steps:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the system profile is located.
4. Right-click the system profile and select **Delete**.
5. Click **Yes** to confirm.

Managing partitions remotely

You can access your Hardware Management Console (HMC) remotely by installing the remote client on your personal computer (PC). The remote client provides flexibility by allowing you to manage your system from virtually anywhere you have a PC.

For more information about the remote client and how to install it, refer to Installing and uninstalling the remote client.

Dynamically managing Linux logical partition resources

If you are using a Linux distribution with Linux kernel version 2.6 or greater, you can add, remove, or move resources between partitions without restarting a partition or system.

To dynamically add or remove Linux logical partitions, you need to install additional software.

These RPM packages are available at the Service and Productivity tools for Linux on POWER Web site.  .

To add, remove, or move specific logical partition resources, refer to the following information:

"Dynamically managing physical I/O devices and slots on Linux"
Learn how to dynamically add, remove, and move physical I/O devices and slots from one running logical partition to another using the Hardware Management Console (HMC). Learn how to make Linux recognize the changes in the available resources.

"Dynamically managing processing power on Linux" on page 80
Learn how to dynamically move processors from one running logical partition to another using the HMC.

Dynamically managing physical I/O devices and slots on Linux

This topic describes how to manage physical I/O devices and slots on Linux, limitations to this capability, and ways to work around those limitations.

A Linux distribution with Linux kernel version 2.6 or greater is required in order to dynamically move I/O devices and slots to or from a Linux logical partition.

If you add slots with adapters, the devices are automatically configured by Linux kernel modules (rpaphp and PCI Hotplug Core). However, after the devices have been added with the HMC, you must log in to the running Linux logical partition as root so you can set up those devices that have been added using the appropriate user space tools, such as the mount command or the ifup command.

If you remove adapters for storage devices, you must unmount the file systems on those devices before you remove the slots and adapters. Also, if you remove network adapters, you should shut down the network interfaces for those devices before removing the slots and adapters.

Logical partitions can have desired or required I/O devices or slots. When you specify that an I/O device or slot is desired (or shared), this means that the I/O device or slot is optional. When you specify that an I/O device or slot is required (or dedicated), then you cannot activate the logical partition if the I/O device or slot is unavailable or in use by another logical partition.

Note: If resources are moved dynamically, the configuration change is temporary and is not reflected in the partition profile. This means that all configuration changes will be lost the next time the partition profile is activated. If you wish to save your new partition configuration, you should modify the partition profile. For more information on changing the partition profile properties, see Changing partition profile properties.

The following limitations exist for Dynamic Logical Partitioning (DLPAR) for I/O slots on Linux kernel 2.6.

The limitations for I/O DLPAR involve the distinction between PCI Host Bridges (PHBs) and their child slots.

The **Partition Properties** dialog from the partition context menu on the HMC shows the relationship between PHBs and slots. Under the I/O tab, PHBs are represented by the tree members labeled ″Bus 1″, ″Bus 2″, and so on. Expanding a PHB entry reveals the child slots, and their corresponding adapters.

Add scenarios that will fail

If you attempt to dynamically add a slot from Bus *X*, the operation will fail unless the logical partition booted with another slot from Bus X.

Remove scenarios that will fail

If you attempt to dynamically remove a slot from Bus *X*, the operation will fail if the partition does not own at least one other slot from Bus X.

You can work around these limitations by creating the logical partition with an extra slot (which can be empty) from each PHB that contains slots you may want to dynamically add to, or remove from, the logical partition.

To **add** physical I/O devices or slots to a running logical partition, follow these steps on the Hardware Management Console (HMC):

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the logical partitions reside.
4. Open **Partitions**.
5. Right-click the logical partition and select **Dynamic Logical Partitioning > Adapter Resources > Add**.
6. In the **Current** area, open the unit on which the physical I/O device or slot resides, open the planar on which the physical I/O device or slot resides, and select the line corresponding to the physical I/O device or slot.
7. Select the I/O pool for the physical I/O device or slot (if any).
8. Click **Advanced** and adjust the settings there. You might need to increase the value in the **Timeout setting** field to allow enough time for the HMC to complete the operation. (These settings relate to how the managed system adds the physical I/O device or slot dynamically. These settings are not retained after the change is completed.)
9. Click **OK**.

To **remove** physical I/O devices or slots from a running logical partition, follow these steps on the HMC:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the logical partitions reside.
4. Open **Partitions**.
5. Right-click the logical partition and select **Dynamic Logical Partitioning > Adapter Resources > Remove**.
6. In the **Current** area, open the unit on which the physical I/O device or slot resides, open the planar on which the physical I/O device or slot resides, and select the line corresponding to the physical I/O device or slot.
7. Click **Advanced** and adjust the settings there. You might need to increase the value in the **Timeout setting** field to allow enough time for the HMC to complete the operation.(These settings relate to how the managed system removes the physical I/O device or slot dynamically. These settings are not retained after the removal is completed.)
8. Ensure that any devices attached to the I/O processor you want to remove are not busy. Unmount the file systems on any storage devices you are removing, and shut down any network interfaces on network devices you are removing.

9. Click **OK**.

To **move** physical I/O devices or slots from one a running logical partition to another using the HMC, follow these steps:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the logical partitions reside.
4. Open **Partitions**.
5. Right-click the logical partition and select **Dynamic Logical Partitioning > Adapter Resources > Move**.
6. In the **Current** area, open the unit on which the physical I/O device or slot resides, open the planar on which the physical I/O device or slot resides, and select the line corresponding to the physical I/O device or slot.
7. In **Logical Partition**, select the logical partition to which you want to move the physical I/O device or slot.
8. Click **Advanced** and adjust the settings there. You might need to increase the value in the **Timeout setting** field to allow enough time for the HMC to complete the operation. (These settings relate to how the managed system moves the physical I/O device or slot dynamically. These settings are not retained after the move is completed.)
9. Ensure that any devices attached to the I/O processor you want to remove are not busy. Unmount the filesystems on any storage devices you are removing, and shut down any network interfaces on network devices you are removing.
10. Click **OK**.

Dynamically managing processing power on Linux

A Linux distribution with Linux kernel version 2.6 or greater is required in order to dynamically move processing power to or from a Linux logical partition.

The ability to move processor power dynamically becomes important when you need to adjust to changing workloads. Processing power can be moved based on the desired, minimum, and maximum values you created for the profile. The desired processing value you establish is the amount of processing resources that you get if you do not overcommit the processing power. The minimum and maximum values enable you to establish a range within which you can dynamically move the processors.

For both shared and dedicated processors, you can specify a minimum value equal to the minimum amount of processing power needed to support the logical partition. The maximum value must be less than the amount of processing power available on the system.

Note: If resources are moved dynamically, the configuration change is temporary and is not reflected in the partition profile. This means that all configuration changes will be lost the next time the partition profile is activated. If you wish to save your new partition configuration, you should modify the partition profile. For more information on changing the partition profile properties, see Changing partition profile properties.

To **add** processor resources dynamically to a running logical partition, follow these steps:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the logical partitions are located.
4. Open **Partitions**.
5. Right-click the logical partition that is currently using the processor resources that you want to add, and select **Dynamic Logical Partitioning > Processor Resources > Add**.

6. Specify the amount of processor resources you want to add. If the logical partition uses processors from the shared processor pool, you can change the logical partition's sharing mode, uncapped weight, and number of virtual processors.
7. Click **Advanced** and adjust the settings there. You might need to increase the value in the **Timeout setting** field to allow enough time for the HMC to complete the operation. (These settings relate to how the managed system adds the processor resources dynamically. These settings are not retained after the addition is completed.)
8. Click **OK**.

To **remove** processor resources dynamically from a running logical partition, follow these steps:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the logical partitions are located.
4. Open **Partitions**.
5. Right-click the logical partition that is currently using the processor resources that you want to move, and select **Dynamic Logical Partitioning > Processor Resources > Remove**.
6. Specify the amount of processor resources you want to remove. If the logical partition uses processors from the shared processing pool, you can change the logical partition's sharing mode, uncapped weight, and number of virtual processors.
7. Click **Advanced** and adjust the settings there. You might need to increase the value in the **Timeout setting** field to allow enough time for the HMC to complete the operation.(These settings relate to how the managed system removes the processor resources dynamically. These settings are not retained after the removal is completed.)
8. Click **OK**.

To **move** processors from one running logical partition to another using the HMC, follow these steps:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the logical partitions are located.
4. Open **Partitions**.
5. Right-click the logical partition that is currently using the processor resources that you want to move, and select **Dynamic Logical Partitioning > Processor Resources > Move**.
6. Specify the amount of processor resources that you want to move and the logical partition to which you want to move the processor resources. If either logical partition uses processing resources from the shared processor pool, you can change the sharing mode, uncapped weight, and number of virtual processors for the logical partition.
7. Click **Advanced** and adjust the settings there. You might need to increase the value in the **Timeout setting** field to allow enough time for the HMC to complete the operation. (These settings relate to how the managed system moves the processor resources dynamically. These settings are not retained after the move is completed.)
8. Click **OK**.

Managing logical-partition and operating-system security

All logical partitions on IBM eServer hardware are managed by the Hardware Management Console (HMC). The system administrator for the HMC can control who has access to the HMC and the managed systems by creating HMC users roles. The user roles control who can access different parts of the HMC and what tasks they can perform on the managed system.

For more information about securing the HMC and protecting your server, refer to Managing security on your HMC.

You can use the IBM eServer Security Planner to help you plan a basic security policy for each of the operating systems on your IBM eServer hardware. The planner provides you with a list of recommendations for setting password rules, resource-access rules, logging and auditing rules, and other security settings that are specific to the operating system.

For more information about protecting your operating system, refer to the IBM eServer Security Planner  .

Application support

This topic describes integrating Linux with i5/OS applications and data.

"Samba support with i5/OS Netserver"
This topic describes Linux integration with i5/OS applications.

"Accessing i5/OS data using Linux ODBC driver"
This topic describes how to access i5/OS data using the Linux Open Database Connectivity (ODBC) driver.

Samba support with i5/OS Netserver

Server Message Block (SMB) is a file-sharing protocol that is commonly used by Windows PCs. Whenever a network drive is mapped from a Windows PC to another Windows PC, the SMB TCP/IP protocol is being used.

Samba implements the SMB/CIFS standard on UNIX® style operating systems. This protocol enables file sharing among SMB-enabled operating systems, including i5/OS with the NetServer™.

Samba allows Linux PCs and servers to interact with existing Windows PCs and file servers without requiring any additional software. i5/OS Netserver supports Linux Samba clients.

You can use a Samba server to run printers and authenticate users, share files, and directories, just like Microsoft® Windows. Samba can also act as a Primary Domain Controller (PDC) or as a Backup Domain Controller (BDC) in your Windows network. You can use it to run OpenLDAP and add LDAP function to your Windows Network without the expense. You can use Samba and NetServer to share printers and files on eServer 5800 server Linux partitions.

Accessing i5/OS data using Linux ODBC driver

The IBM eServer i5 ODBC Driver for Linux allows you to access the IBM eServer i5 database data from Linux applications written to the ODBC API. It is based on the ODBC driver in the IBM eServer i5 Access Express for Windows® product.

Refer to Linux for iSeries  for more information on using the Linux ODBC driver.

Backing up and recovering Linux installations

These topics provide instructions for backing up and restoring Linux installations on IBM eServer hardware servers.

"Backing up and recovering Linux" on page 90
This topic provides information for backing up and restoring a Linux installation on a pSeries IBM eServer hardware server.

Backing up and recovering Linux logical partitions that use i5/OS resources
These topics describe how to backup and recover a Linux installation that is using virtual disk from an i5/OS partition.

Backing up and recovering Linux logical partitions that use i5/OS virtual I/O resources

When you create a Linux logical partition that uses resources from an i5/OS logical partition, you can use i5/OS commands or Linux commands, or a combination of them, to manage backup and recovery. For more information on planning your backup strategy, see the i5/OS Backup and recovery topic.

To save Linux data in a logical partition that uses i5/OS resources to a shared tape drive and restore the data from the tape drive, you can use either the Linux **tar** command or the i5/OS Save (SAV) and Restore (RST) commands. You can also use the **tar** command to save your data to a file. If you use the **tar** command to save data, the only way you can restore that data is by using the **tar** command again. Similarly, if you use the SAV command to save data, the only way you can restore that data is by using the RST command. The two methods of backing up and restoring data are not compatible.

Restrictions

The following restrictions apply:

- To use the tape device from Linux, you must vary the tape off under i5/OS .
- To use the i5/OS SAV or RST command to save or restore the NWSD, Linux must be inactive (that is, the NWSD must be varied off).
- Saving the storage space is typically much faster than saving by using the **tar** command, but it does not provide file-level backup and recovery.
- Linux does not support switching tapes in a library device. You can only use the tape that is currently in the device.
- You cannot save i5/OS data and **tar** data on the same tape volume.

The following methods are available to back up and recover data involving Linux logical partitions on iSeries servers:

Backing up and recovering Linux files using the tar command
This article contains information on how to use the Linux **tar** command for backup and recovery.

Backing up and recovering Linux logical partitions using i5/OS commands
This article contains information on how to use the i5/OS SAV and RST commands for backup and recovery.

Backing up and recovering Linux files using the tar command

The most common data backup utility in Linux is the **tar** (tape archive) utility. The Linux **tar** command is used if you have Linux installed on a dedicated disk and when you cannot vary off a Linux partition while you are backing up data. Backups using the Linux **tar** command are file-level backups. They save only the files and directories that the **tar** command specifies. Therefore, you cannot use the **tar** command to save Linux data that is not in the file server. For example, you cannot save a kernel residing in the PowerPC Reference Platform® (PReP) start partition by using the **tar** command.

You can use the **tar** utility to archive files and directories into one file that you can save in either of the following ways:

- You can save the file directly to a virtual or directly attached tape device.
- You can save the file to the file system of the logical partition.

Saving to and restoring from a tape device

To save Linux files from a partition that uses i5/OS resources to the shared tape drive, type the following:

```
tar -b 40 -c -f /dev/st0 files
```

where

```
tar          = command name (contraction of "tape archive")
-b 40        = block size in sectors
-c           = command action (create)
-f /dev/st0  = virtual tape device and number
files        = names of files to be saved
```

Linux typically treats tape as a *character device* that it can quickly read from or write to in long streams of data, but cannot quickly access to find specific data. By contrast, Linux treats a disk or CD as a *block device* that it can read from or write to quickly at any point on the device, making it suitable for the **mount** command. The **-b 40** argument specifies that Linux is to write the archive stream in blocks of 40 sectors (20 KB). If you do not specify a value for this argument, the default value is 20 sectors (10 KB), which does not perform as well over virtual tape as does a value of 40.

The **-c** argument specifies that the **tar** command creates a new archive or overwrites an old one (as opposed to restoring files from an archive or adding individual files to an existing archive).

The **-f /dev/st0** argument specifies that the command uses virtual tape 0 on the eServer i5 server. After the **tar** command runs, the tape device is closed and the tape is rewound. To save more than one archive on the tape, you must keep the tape from rewinding after each use, and you must position the tape to the next file marker. To do this, specify the *nst0* (nonrewinding virtual tape) device instead of *st0*.

The **files** argument specifies the names of the files and directories that you want to save.

To restore Linux files from the shared tape drive to a partition that is sharing resources, type the following command:

```
tar -b 40 -x -f /dev/st0 files
```

where the **-x** (extract) argument replaces the **-c** (create) argument in the **tar** command used to save files to tape.

Saving to or from a file

The following is an example of using the **tar** command to save to a file.

```
tar -cvf /tmp/etc.tar /etc
```

where

```
c             = create a tar file
v             = verbose (show the files that are being added to the tar file
f             = name of the tar file follows
/tmp/etc.tar  = name of the tar file
/etc          = object to be added to the tar file
```

Note: Because /etc is a directory, the utility adds all the contents of the directory and its subdirectories to the tar file.

After you create the tar file, you can save it to an offline medium in several ways. For example, you can save the tar file to a virtual tape device or a directly attached tape device. You can also copy the tar file to the integrated file system and save it at a later time.

You can save the data on a Linux partition to a tar file during normal server usage. You can automate and start the **tar** utility by using the **cron** (chronology) daemon on the logical partition. The **cron** daemon

is a scheduling mechanism for Linux. You can also use the **tar** utility to schedule a single backup request. For example, if you want to use the **tar** utility to back up the /etc directory at 10 p.m. on 19 September, you can type the following command:

```
at 10pm Sep 19 -f tar.command
```

The following is an example of using the **tar** command to restore from file:

```
tar -xvf /tmp/etc.tar /etc
```

where the **-x** (extract) argument replaces the **-c** (create) argument in the **tar** command used to save the files.

Backing up and recovering Linux logical partitions using i5/OS CL commands

If you have a Linux logical partition that uses resources from an i5/OS partition, tools are available in i5/OS for backup and recovery. You can use the Save (SAV) and Restore (RST) control language (CL) commands to save and restore entire virtual disks in their current state.

The SAV command saves the directory that has the same name as the virtual disk under the QFPNWSSTG directory in the integrated file system. This method of backup and recovery is most effective if the Linux kernel is saved in a PowerPC Reference Platform (PReP) start partition on the virtual disk. On most Linux distributions, this normally occurs as part of a default installation.

Backups using i5/OS commands are at drive level. This means that i5/OS backs up the entire contents of a virtual disk, or network storage space, rather than individual files. Thus, the correct SAV command backs up any information on the drive, including a kernel in the PReP start partition.

If you save the Linux kernel in a PReP partition, you can restore and start the partition after a total IBM eServer i5 reinstallation. You can also transport and restore saved virtual disks to other IBM eServer i5 servers using File Transfer Protocol (FTP) and tape.

Save Linux data by using i5/OS SAV

On i5/OS, your data is in a network-server storage space. To save Linux files to the shared tape drive of the partition that shares resources, use these i5/OS commands:

- Save (SAV), where you save the network-server storage space to the save file. On the Save display, enter the following parameter values:
  - In the **Device** field, enter the associated i5/OS device description. To save to a save file in a library like QGPL, enter `/qsys.lib/qgpl.lib/myfile.file`. For example, if your tape device is named TAP01, enter `/qsys.lib/tap01.devd`.
  - In the **Objects: Name** field, enter the integrated-file-system location of the network-server storage space. For example, if your network-server storage space is named TEST1, enter `/qfpnwsstg/test1`.
- Display Save File (DSPSAVF) to verify that the changed save file exists. In the Option field by the new save file name, enter 5 (Display) to display a list of the stream files in the save file.

Restore Linux data by using i5/OS RST

The i5/OS command to restore Linux files from the shared tape drive of the partition that shares resources is Restore (RST). On the Restore Object display, enter the following parameter values:

- To restore from a tape device, enter the associated i5/OS device description in the **Device** field. For example, if your tape device is named TAP01, enter `/qsys.lib/tap01.devd`. To restore from a save file in library QGPL, enter `/qsys.lib/qgpl.lib/myfile.file`.
- In the **Objects: Name** field, enter the integrated-file-system location of the network-server storage space. For example, `/qfpnwsstg/test1`.

Backing up the network server description and virtual disk drives associated with a Linux logical partition

When you install the logical partitions with virtual disk, the i5/OS logical partition that shares resources creates a network server description and creates disk drives for your Linux logical partition that you need to back up. Some of the disk drives are server-related (the installation and server drives), while others are user-related. Because your Linux logical partition might consider the disk drives to be a unified server, you must save all the disk drives and the network server description so they restore correctly.

The implementation of a logical partition for IBM eServer i5 servers allows you to save and restore virtual disks as i5/OS network-server storage space objects. These objects are saved as part of the i5/OS server when you perform a full i5/OS server backup. You can also specifically save the network server description and storage spaces that are associated with a logical partition on IBM eServer i5. Daily backup of the server drive is a good practice.

Building a rescue image on an NWSSTG
Use this procedure to build a Linux rescue image on a network storage space (NWSSTG).

Using a rescue image from an network storage space
Use this procedure to use a Linux rescue image on an NWSSTG.

Backing up network server descriptions for a Linux logical partition
Use this procedure to back up a network server description (NWSD) that is associated with a Linux logical partition.

Restoring network server descriptions for a Linux logical partition
Use this procedure to restore an NWSD that is associated with a Linux logical partition.

Unlinking disk drives from a Linux logical partition
Use this procedure to unlink a virtual disk drive that is associated with a Linux logical partition.

Building a rescue image on an network storage space

One rescue solution for a logical partition is to create a small network storage space (NWSSTG) that can remain on the integrated file system solely for the purpose of rescuing logical partitions.

Many distributors include a rescue image on their installation disks that contains all the basic diagnostic tools, drivers, and other utilities that would be useful for checking a previously existing logical partition. You can simplify this process by creating a network storage space that contains a rescue server at the time you create your logical partition.

Prerequisites

Before creating a rescue image on network storage, it is important to document the configuration information for each of your logical partitions.

1. Document the drive configuration information, which is located in the /etc/fstab file.
2. Capture the networking information that is reported when you run the **ifconfig** command.
3. Create a list of the modules that are needed by each partition. You can see which modules are in use by using the **lsmod** command from within Linux. It is recommended that you take the information obtained from the commands and files listed above and put them into files that can be stored on your rescue network storage space

To create the rescue storage space, complete the following tasks:

1. Determine how much network storage space you need to build the rescue image. Consult your Linux documentation to see what amount of space is required for a minimum installation of your

distribution, and add enough space to create a swap partition (a PowerPC Reference Platform (PReP) start partition) and to install any extra software that you would like to have available in your rescue image. For example, if the documentation says a minimum server installation is 291 MB, then create a storage space of 425 MB.

2. Create a network storage space (CRTNWSSTG) of the size you determined for the rescue image. You might want to make a note in the storage space description field telling what distribution was used to make the rescue image and warning that it should be saved.
3. Link this storage space to a network server descriptor (NWSD). You do not need to create a new NWSD for this step. You could unlink an existing storage space and temporarily link your rescue storage space to any of your existing NWSDs.
4. Start the installation server for your distribution as described in the documentation and follow the prompts. If you choose to partition your installation manually, ensure that you create a PReP start partition. When you get to the package group selection display, select the minimum number of packages supported. The name for the package group varies by distribution.
5. Let the installer complete its package installation and configuration. After installation has finished, the installer starts the rescue image for you.
6. Verify that the rescue image has all the utilities that you need. For a logical partition, at a Linux command prompt, type `rpm -qa | grep ibmsis` to make sure that the utilities that work with the integrated disk are available.
7. Ensure that the device drivers that your logical partitions require are installed. (For example, verify that pcnet32 is installed for Ethernet devices, or that olympic is installed for token-ring devices.) The kernel modules that have been compiled can be found in the /lib/modules/kernel version/kernel/drivers directory structure.
8. Install any other special drivers or software packages that your logical partitions require.
9. Use File Transfer Protocol (FTP) to send the files with the configuration information for your other logical partitions to the rescue server network storage space at this time.
10. Install the kernel manually (if you are required to do so by your Linux distribution). For details regarding installing the kernel, consult the appropriate installation documentation for your distribution.
11. Make note of the path to the root partition on the rescue-storage space. You must use this information to start the rescue network storage space from the network. To determine the root partition, type the command `cat /etc/fstab`. The partition that has a forward slash (/) in the second column is your root partition. For further assistance in determining the root partition, see the documentation for your distribution.

You have now created your rescue image. You can shut down your logical partition by typing `shutdown -h now` and varying off the partition after the shutdown has completed. After the partition has varied off, you can unlink the rescue storage space and relink the normal storage space for the NWSD.

Using a rescue image from an network-server storage space

To use the rescue image that you created on the network-server storage space (NWSSTG), use the following steps:

1. Disconnect the virtual storage space for the failed logical partition (if applicable) by using the Work with NWS Storage Spaces (WRKNWSSTG) command.
2. Connect your rescue storage space as the first drive to the network server description (NWSD), and reconnect the original storage space (where applicable) as the second drive.
3. Edit the NWSD for the failed partition so that it starts from IPL source *NWSSTG. Also, edit the IPL Parameters field to reflect the root partition on the rescue storage space. For most distributions, this is a parameter like `root=/dev/sda3` or `root=/dev/vda1`. For assistance, see your Linux documentation.
4. Restart the partition.
5. If the existing root partition is on a dedicated disk, you might need to insert the `ibmsis` driver using the `insmod ibmsis` command.

6. Create a mount point to which you will mount the root partition of the network storage space that you are trying to rescue. You can use a command such as `mkdir /mnt/rescue`.
7. Mount the root partition of the network storage space that you are trying to rescue. Mount a drive using the command `mount -t partition-type partition-location mount-point`, where the partition type is the format of the partition like ext2 or reiserfs, the partition location is similar to /dev/sdb3 (for non-devfs disk partitions), /dev/sd/disc1/part3 (for devfs disk partitions), or /dev/sda2 (for a partition on a dedicated disk).
8. The drive that you are trying to rescue, when using virtual disk, will be the second drive rather than the first drive. (That is, if the drive was /dev/sda3 when the partition was running normally, it will be /dev/sdb3 in the rescue server.)
9. Use the documentation or the configuration files you created when you created the rescue NWSSTG to help you determine the device for the root of the partition you are trying to rescue. Your mount point will be similar to /mnt/rescue if you use the previous example.

You can either use the rescue tools provided in your rescue storage space against the mount point you have created or you can work on the partition that you are rescuing from within its own storage space. If rescuing the image from its own storage space, change the root directory for that partition using the `chroot mount-point` command.

Backing up network sever descriptions for a Linux logical partition

When you save the storage space objects that are associated with a logical partition that uses virtual disks, you must also save the network server description (NWSD). Otherwise, a logical partition might not be able to re-establish items such as the file-system permissions for the partition.

To save the network server description, use the Save Configuration (SAVCFG) command as follows:

1. On the i5/OS command line, type `SAVCFG`.
2. Press Enter to save the NWSD configuration.

The Save Configuration command (SAVCFG) saves the objects associated with an NWSD and the current static network-server storage spaces. This command does not save the links associated with the dynamically added storage spaces. You must add these links manually after the configuration and the dynamically linked storage spaces have been restored.

Restoring network server descriptions for a Linux logical partition

In a disaster-recovery situation, you would restore all the configuration objects, which include the network server description (NWSD) for your logical partition. In some situations, for example, when you migrate to new hardware, you must specifically restore the NWSD. To have i5/OS automatically relink disk drives within the integrated file system to the restored NWSD, restore those disk drives first.

To restore the network server description (NWSD), use the Restore Configuration (RSTCFG) command:

1. On an i5/OS command line, type `RSTCFG` and press F4 (Prompt).
2. In the **Objects** field, specify the name of the NWSD.
3. In the **Device** field, specify which device you are using to restore the NWSD.
   - If you are restoring from media, specify the device name.
   - If you are restoring from a save file, specify *SAVF and identify the name and library for the save file in the appropriate fields.
4. Press Enter to restore the NWSD.
5. When you have restored the NWSD and all of its associated storage spaces, start (vary on) the logical partition.

Unlinking disk drives from a Linux logical partition

By unlinking Linux virtual disk drives (network-server storage spaces), you disconnect them from the logical partition, making them inaccessible to users. If you are uninstalling a logical partition, you must also unlink disk drives. Use either of the following methods to do this:

iSeries Navigator

To unlink disk drives from a logical partition, do the following:

1. Vary off the NWSD for your logical partition. For more information, see Starting and stopping the NWSD.
2. Click **Network > Windows Administration > Disk Drives**.
3. Right-click the name of the disk drive that you want to unlink.
4. Click **Remove Link**.
5. Select a server from the list of linked servers.
6. If you are unlinking a disk drive that you plan to relink later, uncheck **Compress link sequence**.

   You must relink the disk drive as the same link sequence number before you vary on the server. By preventing compression of the link sequence values, you avoid having to unlink and relink all the disk drives to get them in the correct sequence.
7. Click **Remove**.

Character-based interface

To unlink disk drives from a logical partition using the Remove Server Storage Link (RMVNWSSTGL) command, do the following:

1. Vary off the NWSD for your logical partition. For more information, see Starting and stopping the NWSD.
2. Type `RMVNWSSTGL` and press F4.
3. In the Network-server storage space field, type the name of the storage space that you want to unlink and press Enter.
4. In the Network server description field, type the name of the server from which you want to unlink the storage space and press Enter.
5. If you are unlinking a linked disk drive that you plan to relink later, specify *NO in the Renumber field.

   Note: You must relink the disk drive as the same sequence number before you vary on the server. By preventing automatic renumbering, you avoid having to unlink and relink all the disk drives to get them in the correct sequence.
6. Press Enter.

   Note: If you are uninstalling a logical partition, your next step is to delete the disk drive. For more information on deleting disk drives, see Deleting virtual disk drives for a logical partition. Otherwise, vary on the NWSD for your logical partition. For more information about starting the NWSD, see Starting and stopping the NWSD.

For more information about saving i5/OS server objects, see Saving server objects in i5/OS.

Saving server objects in i5/OS

Many objects are created as a result of installing an operating system in a logical partition and using virtual storage. Some of these objects are server-related, while others are user-related. You need to save all these objects if you want to restore server objects correctly.

You can save these objects by using options of the i5/OS GO SAVE command in the server.

- Option 21 saves the entire server.
- Option 22 saves server data (which includes objects in the QUSRSYS library).
- Option 23 saves all user data (which includes objects in the QFPNWSSTG library).

If you want to save a particular object, use the following table to see the location of that object on i5/OS and the command to use. For more information about using the save commands, see the i5/OS Backup and recovery topic collection.

Objects to save

Object content	Object name	Object location	Object type	Save command
For logical partitions with virtual disk				
Guest partition and virtual disk drive	stgspc	/QFPNWSSTG	User-defined network-server storage spaces in system auxiliary storage pool (ASP)	GO SAV, option 21 or 23
				SAV OBJ('/QFPNWSSTG/stgspc') DEV('/QSYS.LIB/TAP01.DEVD')
			User-defined network-server storage spaces in user ASP	SAV OBJ(('/QFPNWSSTG/stgspc') ('/dev/QASPnn /stgspc.UDFS')) DEV('/QSYS.LIB/TAP01.DEVD')
For all logical partitions with a server				
Messages from the logical partition	Various	Various	Server message queue	GO SAVE, option 21 or 23
				SAVOBJ OBJ(msg) LIB(qlibrary) DEV(TAP01) OBJTYPE(*MSGQ)
i5/OS configuration objects for logical partitions	Various	QSYS	Device configuration objects	GO SAVE, option 21, 22, or 23
				SAVOBJ DEV (TAPO1)
Various	Various	QUSRSYS	Various	GO SAVE, option 21 or 23
				SAVLIB LIB(*NONSYS) or LIB(*ALLUSR)

Backing up and recovering Linux

It is crucial that you back up your data because you never know when you may need to do a server recovery. You may not be prepared to recover from a site loss or certain types of disk failures if you do not regularly perform backups. For more information about planning a backup and recovery strategy for Linux data, refer to the following topic, Backing up and recovering partition data.

Backing up and recovering partition data

Linux on managed systems supports numerous file systems, but those files systems do not share a universal backup-and-restore function. The most commonly-used journaling file systems are ext3, Reiser FS, SGI XFS, and IBM JFS. Backup of the ext3 file system is supported by the dump and restore programs. SGI XFS has its own pair of backup utilities: xfsdump and xfsrestore. The Reiser FS and IBM JFS do not have backup programs; the only method currently available for backing up Reiser FS and JFS on Linux is the GNU tar program.

Note: The GNU **tar** program supports file-system-level backups. It does not operate on the i-node level. It is slower than the **dump** utility, but it does not care about the underlying file system type. It supports incremental backups and backup of special devices, which is not common for **tar** implementations.

Backing up and restoring partition profile data

On servers, the HMC is used to back up and restore partition profiles.

Back up profile data

To back up profile data, do the following.

1. In the Contents area, select the managed system.
2. From the menu bar, choose **Selected > Profile Data > Backup** to open the **Profile Data Backup** window.
3. Type the file name in the **Backup** filename field, then click **OK**. The backup file is saved in the /var/hsc/profiles/MT-MDL*S/N directory on the HMC, as shown in the following example.

```
[user1@remote_host]$ ssh -l hscroot itsohmc.itsc.austin.ibm.com

hscroot@itsohmcs password: XXXXXX

[hscroot@itsohmc]$ cd /var/hsc/profiles/7040-681*021768A

[hscroot@itsohmc 7040-681*021768A]$ ls -l

total 40

-rw-r--r-- 1 root root 20464 Nov 27 12:00 backupFile

-rw-r--r-- 1 root root 20464 Nov 27 12:18 ITSO_p690
```

MT, MDL, and S/N are the system machine type, model, and serial number.

Restore profile data

To restore profile data, do the following.

1. In the **Contents** area, select the managed system.
2. From the menu bar, choose **Selected > Profile Data > Restore** to open the **Profile Data Restore** window.
3. Select the backup file name that you want to restore from the list.
4. Select one of the following options.
   - **Full restore from the selected backup file:** Restores all profile data using only your backup file. Profile modifications performed after the selected backup file was created will be lost.
   - **Backup priority – merge current profile and backup:** Merges the stored backup with recent profile activity. If information conflicts, the stored backup data is restored over the recent profile activity. Note: Select this option for a managed system in the Recovery state.
   - **Managed system priority – merge current profile and backup:** Merges recent profile activity with the stored backup. If information conflicts, the recent profile activity is restored over the stored backup data.
5. Click **OK**.

Chapter 10. Using Linux installed on a logical partition

In order to use logical partitions on an IBM eServer OpenPower system, you need the appropriate Advanced OpenPower Virtualization technologies activated in your system's Hardware Management Console.

RPM packages are available at the Service and Productivity tools for Linux on POWER Web site.  .

The following topics contain information about using Linux installed on a logical partition.

"Restarting and shutting down Linux in a logical partition"
Understand how you can shut down Linux logical partitions.

Restarting and shutting down Linux in a logical partition

In order to use features which require logical partitions on an IBM eServer OpenPower system, you need the appropriate Advanced OpenPower Virtualization technologies activated in your system's Hardware Management Console.

You can shut down and restart Linux using the Hardware Management Console (HMC). To find out how to shut down and restart Linux, refer to the following information:

"Using the Hardware Management Console to shut down Linux logical partitions"
Find out how to shut down Linux using the HMC.

"Using the Hardware Management Console to restart Linux logical partitions" on page 94
Find out how you can restart Linux logical partitions.

Using the Hardware Management Console to shut down Linux logical partitions

There are two ways to shut down Linux logical partitions. You can perform a delayed shutdown or an immediate shutdown of a logical partition or the operating system only.

Delayed shutdown of a logical partition

When you use the delayed shutdown option, the logical partition waits a predetermined amount of time to shut down. This allows the logical partition time to end jobs and write data to disks. To perform a delayed shutdown of a Linux logical partition, complete the following:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the logical partition resides.
4. Open **Partitions**.
5. Right-click the logical partition that you wish to shut down and select **Shut Down Partition**.
6. Select **Delayed** and click **OK**.

Immediate shutdown of a logical partition

When you use the immediate shutdown option, the system shuts down without any preset delay. To perform an immediate shutdown of a Linux logical partition, complete the following:

1. In the navigation area, open **Server and Partition**.

2. Select **Server Management**.
3. In the contents area, open the server on which the logical partition resides.
4. Open **Partitions**.
5. Right-click the logical partition that you wish to shut down and select **Shut Down Partition**.
6. Select **Immediate** and click **OK**.

Delayed shutdown of the operating system

When you use the delayed shutdown option, the Hardware Management Console (HMC) issues the Linux **shutdown -h +1** command to shut down the logical partition normally. To perform a delayed shutdown of the operating system, complete the following:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the logical partition resides.
4. Open **Partitions**.
5. Right-click the logical partition that you wish to shut down and select **Shut Down Operating System**.
6. Select **Delayed** and click **OK**.

Immediate shutdown of the operating system

When you use the immediate shutdown option, the Hardware Management Console (HMC) issues the Linux **shutdown -h now** command to shut down the logical partition as quickly as possible, bypassing messages to other users. To perform an immediate shutdown of the operating system, complete the following:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the logical partition resides.
4. Open **Partitions**.
5. Right-click the logical partition that you wish to shut down and select **Shut Down Operating System**.
6. Select **Immediate** and click **OK**.

Using the Hardware Management Console to restart Linux logical partitions

You can use the Hardware Management Console (HMC) to restart a Linux logical partition. Restarting a logical partition shuts the partition down and then starts it again. You can restart a logical partition or the operating system only in the following ways.

Immediate restart of a logical partition

When you use the immediate restart option, the logical partition is restarted as quickly as possible, without notifying the logical partition. To perform an immediate restart of a Linux logical partition, complete the following:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the logical partition resides.
4. Open **Partitions**.
5. Right-click the logical partition that you wish to shut down and select **Restart Partition**.
6. Select **Immediate** and click **OK**.

Restart of a logical partition with main storage or system memory dump

When you use this option, the HMC initiates a main storage or system memory dump on the logical partition and restarts the logical partition after the dump. To restart aLinux logical partition with a main storage or system memory dump, complete the following:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the logical partition resides.
4. Open **Partitions**.
5. Right-click the logical partition that you wish to shut down and select **Restart Partition**.
6. Select **Dump** and click **OK**.

Normal restart of the operating system

When you use the normal restart option, the HMC issues the Linux **shutdown -r +1** command to shut down and restart the logical partition normally. To perform a normal restart of the operating system, complete the following:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the logical partition resides.
4. Open **Partitions**.
5. Right-click the logical partition that you wish to shut down and select **Restart Operating System**.
6. Click **OK**.

Immediate restart of the operating system

When you use the immediate restart option, the Hardware Management Console (HMC) issues the Linux **shutdown -r now** command to shut down and restart the logical partition as quickly as possible, bypassing messages to other users. To perform an immediate restart of the operating system, complete the following:

1. In the navigation area, open **Server and Partition**.
2. Select **Server Management**.
3. In the contents area, open the server on which the logical partition resides.
4. Open **Partitions**.
5. Right-click the logical partition that you wish to shut down and select **Restart Operating System**.
6. Select **Immediate** and click **OK**.

Chapter 11. Troubleshooting Linux logical partitions

If you have problems with a partitioned system, determine if the problem is specific to logical partitions or is a system problem. To determine whether the problem is a general system problem, refer to Troubleshooting. If your problem is specific to logical partitions, reference codes may resolve the error. However, specific recovery actions and tasks might require the assistance of service support.

Reference codes for logical partitions
Find a detailed description of reference codes that relate to logical partitions.

Virtual I/O Server
Find a detailed description of concepts related to Virtual I/O Server.

Chapter 12. Related information for Linux logical partitions

Listed below are IBM Redbooks (in PDF format), Web sites, and information center topics that relate to the topic of partitioning for Linux. You can view or print any of the PDFs.

Redbooks

- Partitioning Implementations for IBM eServer p5 Servers (4.6 MB)
- Linux Handbook: A Guide to IBM Linux Solutions and Resources, SG24–7000–00 (5.0 MB)
- AIX and Linux Interoperability, SG24–6622–00 (4.3 MB)
- Linux on the IBM iSeries Server: An Implementation Guide, SG24–6232–00 (4.6 MB)

Web sites

- Linux at IBM Web site (http://www.ibm.com/linux/)
- IBM eServer OpenPower Servers (http://www.ibm.com/servers/eserver/openpower/)
- IBM eServer OpenPower Consolidation Express Solutions (http://www.ibm.com/servers/eserver/openpower/solutions/consolidation/express.html)
- IBM Redbooks Web site (http://www.redbooks.ibm.com)
- Service and Productivity Tools for Linux on POWER (http://techsupport.services.ibm.com/server/lopdiags)
- IBM Linux Servers Web site (http://www.ibm.com/servers/eserver/linux/home.html?c=serversintro=Linux2001=ad)
- IBM Linux Technology Center Web site (http://www.ibm.com/developerworks/oss/linux/)
- IBM pSeries Information Center (http://www16.boulder.ibm.com/pseries/en_US/infocenter/base/index.htm)
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- Facts and features report (http://www.ibm.com/servers/eserver/pseries/hardware/factsfeatures.html)
- InfiniBand Trade Association Web site (www.infinibandta.org)
  Use this Web site to learn more about InfiniBand and how you can simplify your I/O infrastructure by using InfiniBand devices.

Information center topics

- Installing Linux
- Using the Virtual I/O Server
- Partitioning for AIX
- Partitioning for i5/OS
- Migrating or upgrading your iSeries system

- Managing your server
- Working with Capacity on Demand
- Customer service and support

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2. Click the option that saves the PDF locally.
3. Navigate to the directory in which you would like to save the PDF.
4. Click **Save**.

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Appendix. Notices

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