IBM i
7.2

Systems management
Logical partitions

Note

Before using this information and the product it supports, read the information in “Notices” on page 13.

Contents

Logical partitions

With logical partitions, you can distribute resources within a single system to make it function as if it were two or more independent systems. Plan your next upgrade to include logical partitions.

Select the appropriate logical partition information based on the hardware you own.

PDF file for Logical partitions

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Related reference

Related information for Logical partitions
IBM Redbooks, Web sites, and other information center topic collections contain information that relates to the Logical partitions topic collection. You can view or print any of the PDF files.

Partitioning with a IBM i

You can use IBM Navigator for i, Virtual Partition Manager (VPM) native screen, IVM or HMC to create and manage IBM i logical partitions.

This information steps you through the logical partition process, from creation to management.

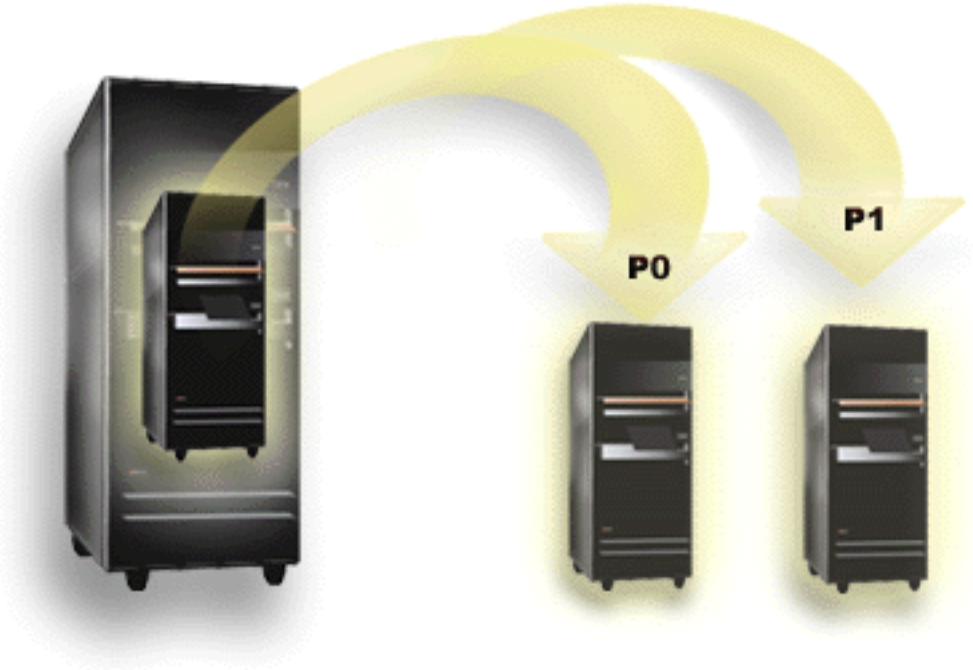
If you plan on partitioning a system that uses **Hardware Management Console**, see the logical partitioning information in the IBM Systems Hardware Information Center.

Logical partition concepts

The IBM i environment offers you the ability to partition one system into several independent systems. Before you start creating partitions, it is essential that you understand the concepts behind this type of system configuration.

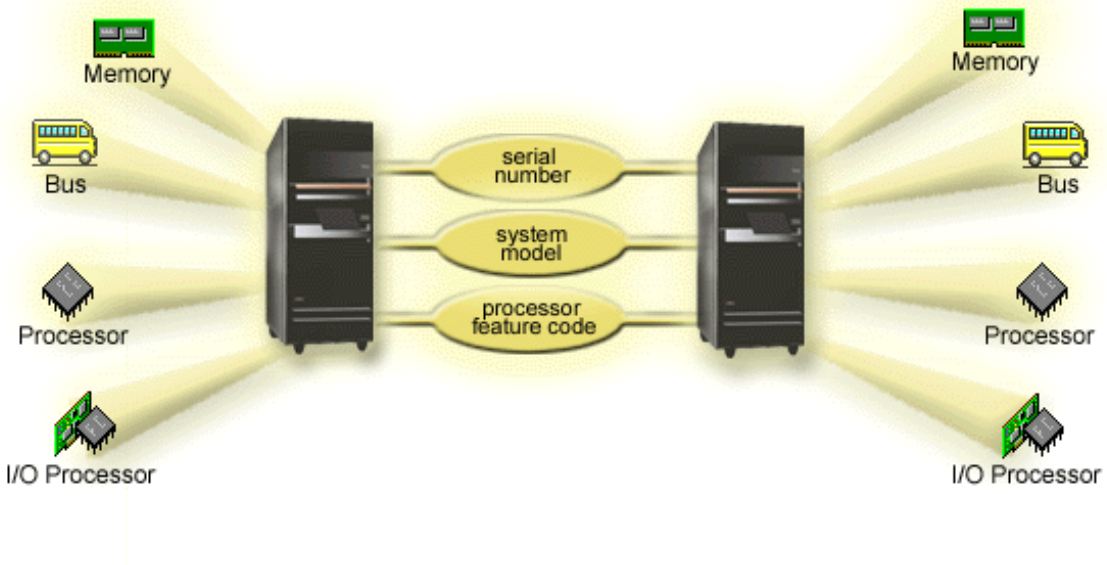
The purpose of this topic is to familiarize you partition concepts.

Understand the meaning of a logical partitioned system and how partitions operate as independent servers.



Logical partitioning is the ability to make a system run as if it were two or more independent systems. Each logical partition operates as an independent logical server. However, each partition shares a few physical system attributes such as the system serial number, system model, and processor feature code. All other system attributes may vary among partitions.

Each logical partition represents a division of resources in your system. Each partition is logical because the division of resources is virtual, not along physical boundaries. The primary resources in your system are its processors, memory, buses, and IOPs. The following diagram shows the division of system resources on a system that has two partitions:



Related concepts

Managing logical partitions

If you implement logical partitions on your system, you must consider a few factors when managing logical partitions, such as restarting and powering down individual logical partitions, changing logical partition configuration, managing security, and changing processing resources.

Scenarios: Logical and guest partition

These scenarios introduce some common logical and guest partition implementations, which can help you understand how you can configure and use logical and guest partitions on your IBM i products.

Scenario: Linux applications on a IBM i

This scenario demonstrates how you can use the reliability of the IBM i platform to run a Linux® application.

Situation

You are the system administrator of a company with three servers boxes. Each server performs unique tasks for your business. These servers are as follows:

- The IBM system runs the ordering system which is the core business application.
- The UNIX Web server is your corporate intranet Web server.
- The Microsoft based file server is used for sharing and backing up files.

These servers provide services to computers on your company's network. Your company wants to consolidate aging equipment to streamline the company's information technology (IT) operations and to improve server availability. The company also wants to increase application flexibility using an open-source operating system. What should you do?

Solution

The solution is to use a consolidated system running logical and guest partitions.

After researching and planning your partitioned environment, you created four partitions on your new server using IBM Navigator for i. You allocated the minimum amount of hardware resources to your

hosting partition. All of the information on your older IBM i was migrated to partition P1 running IBM i V7R1, or later. IBM i V7R1, or later provides the flexibility of dynamically moving logical partition resources among partitions. You installed the Linux operating system on partition P2 and P3. Partition P2 runs Apache and is your HTTP server. You installed the Samba software to partition P3. This partition provides file and print services to Server Message Block (SMB) clients.

All of the partitions own directly attached LAN adapters. Each of these LAN adapters are connected to the corporate network. Your employees are still able to access data from each of these partitions using either their laptop computers or workstation.

Now that you have your new configuration, you are still concerned about protecting the corporate network. You believe that your current firewall solution is inadequate and you want a more customized firewall application.

Virtual Partition Manager

The Virtual Partition Manager (VPM) is a partition management tool.

The **Virtual Partition Manager (VPM)** is a partition management tool that supports the creation of partitions that use only virtual input/output (I/O) and does not require the Hardware Management Console, Systems Director Management Console, or Integrated Virtualization Manager. In addition to being able to manage Linux guest partitions, the VPM now supports creation and management of IBM i partitions.

This enhanced VPM function is available on IBM POWER6® or later (scale-out Models only) that do not have an external management console. With this enhancement to IBM i, VRM provides the ability to create up to four IBM i or Linux partitions. In addition, the hosting IBM i partition must own and manage all of the physical I/O resources. A PowerVM license is required to partition the server using VPM.

Client IBM i partitions, which are created with VPM, use virtual I/O to access disk, tape, DVD, and Ethernet resources owned by the hosting partition. VPM in the hosting partition creates the virtual SCSI and virtual Ethernet adapters for the client partitions. Assignment of physical I/O resources to client partitions and dynamic movement of virtual I/O resources is not supported. You have to power off the client partition to move the virtual I/O resources. Memory and processor resources can be added or removed when partition is powered on but that requires an IPL to take effect. The user can use Network Storage Spaces (NWSSTG) and Network Storage Descriptions (NWSD) in the hosting partition to define the storage for the client partitions. Tape, disk, and optical are allowed to be virtualized to the client partitions.

You can not use Virtual Partition Manager on an IBM i server that is configured using an HMC which means you have to disconnect your IBM i server from HMC before you are trying to use Virtual Partition Manager. You can only use Virtual Partition Manager on the hosting IBM i partition. PowerVM Standard or Enterprise edition is required to support four client partitions.

IBM Navigator for i provides graphical interface for Virtual Partition Manager and has the following advantages over the existing Virtual Partition Manager screens:

- Allows assignment of additional virtual Ethernet and virtual SCSI devices (after a partition is created)
- Allows multiple virtual Ethernet devices to use the same VLAN ID
- Allows for more flexibility in assigning trunk ports
- Allows for multiple VLAN IDs, under the 802.1Q standard.

To manage partitions by IBM Navigator for i, follow these steps:

1. In IBM Navigator for i of hosting partition, expend **Configuration and Services**.
2. Select **Partitions**.

Related reference

Creating logical partitions
You can use the IBM Navigator for i wizard to create logical partitions on your server.

Managing logical partitions

If you implement logical partitions on your system, you must consider a few factors when managing logical partitions, such as restarting and powering down individual logical partitions, changing logical partition configuration, managing security, and changing processing resources.

Creating logical partitions

You can use the IBM Navigator for i wizard to create logical partitions on your server.

Before you start to create logical partitions on your system, see the logical partition planning information for assistance. For instructions on performing a full system backup, see Backing up your system.

There are three ways to create logical partitions on IBM i:

1. Setting up IBM i logical partitions on Power Systems™ using IVM:

   For information on this topic refer to IBM i Virtualization and Open Storage Read-me First.
2. Setting up IBM i logical partitions in the HMC environment:

   In the HMC environment, you can create an IBM i logical partition that uses IBM i virtual I/O resources. You also can create a Virtual I/O Server logical partition and configure the IBM i client logical partition to use the virtual SCSI and virtual Ethernet resources of the Virtual I/O Server logical partition. You might need to enter a PowerVM™ Editions activation code to create a Virtual I/O Server logical partition on your server.

   For information about using a Hardware Management Console (HMC) to create and maintain logical partitions on a server, see the Logical partitioning topic in the IBM Power Systems Hardware Information Center.
3. Setting up IBM i logical partitions using Virtual Partition Manager:

   The **Virtual Partition Manager (VPM)** is a partition management tool that supports the creation of partitions that use only virtual input/output (I/O) and does not require the Hardware Management Console, Systems Director Management Console, or Integrated Virtualization Manager. In addition to being able to manage Linux guest partitions, the VPM now supports creation and management of IBM i partitions.

Virtual Partition Manager supports the needs of small and medium customers that want to add simple Linux workloads to their server and want to isolate Linux and IBM i workloads into separate partitions. The Virtual Partition Manager supports environments with a hosting IBM i partition and up to four client Linux or IBM i partitions. In addition, the hosting IBM i partition must own and manage all of the I/O resources. The logical partition uses virtual I/O to access disk, tape, DVD, and Ethernet resources owned by the hosting partition. Assignment of physical I/O resources to client partitions and dynamic movement of virtual I/O resources is not supported. You have to power off the client partition to move the virtual I/O resources. Memory and processor resources can be added or removed when partition is powered on but that requires an IPL to take effect.

You can not use Virtual Partition Manager on an IBM i server that is configured using an HMC which means you have to disconnect your IBM i server from HMC before you are trying to use Virtual Partition Manager. You can only use Virtual Partition Manager on the hosting IBM i partition. PowerVM Standard or Enterprise edition is required to support four client partitions.

IBM Navigator for i provides graphical interface for Virtual Partition Manager. To create logical partition by IBM Navigator for i, follow these steps:

1. In IBM Navigator for i navigation area, expend **Configuration and Services**.
2. Select **Create Partition** to start the wizard.
3. Follow the wizard instruction to create IBM i or Linux partition.

Similar to existing Virtual Partition Manager screens, IBM Navigator for i associates virtual Ethernet connections between client partitions and the hosting partition. This association is done by specifying the same VLAN ID for virtual Ethernet adapters in both the client and hosting partitions. As a new feature, IBM Navigator for i also creates and associates the required Network Server Description (NWSD) and Network Storage Space (NWSSTG) objects in the hosting partition. Since several options exist

for implementing virtual Ethernet, IBM Navigator for i does not configure the connection to physical resources in the host partition.

Examples of how to configure the physical connection are documented in previous publications. Chapter 6 of the Redbook article Virtual Partition Manager - A guide to Planning and Implementation documents the Proxy ARP method. The section "Ethernet Layer-2 Bridging" section of the Redbook article Creating IBM i Client Partitions Using Virtual Partition Manager documents how to set up layer-2 bridging. As described above, the NWSD object will already have been created by IBM Navigator for i.

After creating a partition, you can install the operating system on that partition.

Related tasks

Logical partition authority
The authorities that you grant to service tool users determines what logical partition information they can access and what tasks they can perform. Care should be exercised in assigning service tool user profile privileges to manage partition security.

Related reference

Configuring the service tools server

Virtual Partition Manager
The Virtual Partition Manager (VPM) is a partition management tool.

Managing logical partitions

If you implement logical partitions on your system, you must consider a few factors when managing logical partitions, such as restarting and powering down individual logical partitions, changing logical partition configuration, managing security, and changing processing resources.

When you create one or more logical partitions on the system, 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, operating system (IBM i), and optional software applications.

You can use IBM Navigator for i, Virtual Partition Manager (VPM) native screen, IVM or HMC to manage your logical partitions. Most tasks you perform are independent of the other logical partitions on the system. You must approach each logical partition as an independent system.

Related concepts

Logical partition concepts
The IBM i environment offers you the ability to partition one system into several independent systems. Before you start creating partitions, it is essential that you understand the concepts behind this type of system configuration.

Virtual Partition Manager
The Virtual Partition Manager (VPM) is a partition management tool.

System i Navigator

Backup and recovery

Basic system operations

Related tasks

Installing fixes on systems with logical partitions

Managing logical partitions by using VPM, IVM, and HMC

To control your client partitions you can use IBM Navigator for i, Virtual Partition Manager (VPM) native screen, IVM or HMC.

There are three ways to manage logical partitions on IBM i:

1. Managing IBM i logical partitions on Power Systems™ using IVM (Integrated Virtualization Manager):

For information on this topic refer to Integrated Virtualization Manager in the IBM Power Systems Hardware Information Center.

2. Managing IBM i logical partitions in the HMC environment:

   For information about using a Hardware Management Console (HMC) to create and maintain logical partitions on a server, see the Logical partitioning topic in the IBM Power Systems Hardware Information Center.

3. Managing IBM i logical partitions using Virtual Partition Manager:

   The **Virtual Partition Manager (VPM)** is a partition management tool that supports the creation of partitions that use only virtual input/output (I/O) and does not require the Hardware Management Console, Systems Director Management Console, or Integrated Virtualization Manager. In addition to being able to manage Linux guest partitions, the VPM now supports creation and management of IBM i partitions.

Related concepts

System i Navigator

Related tasks

Logical partition authority

The authorities that you grant to service tool users determines what logical partition information they can access and what tasks they can perform. Care should be exercised in assigning service tool user profile privileges to manage partition security.

Logical partition authority

The authorities that you grant to service tool users determines what logical partition information they can access and what tasks they can perform. Care should be exercised in assigning service tool user profile privileges to manage partition security.

Two service tool functional privileges relate to logical partitions. These privileges support basic operations or advanced administration.

To grant a user logical partition **operations** authority perform the following steps:

1. Start DST as QSECOFR or with any other user ID with Service tool security privilege.
2. Select option 5 (Work with DST environment).
3. Select option 3 (Service tools user profiles).
4. Select option 1 (Create) to create a new user profile or option 7 (Change attributes) to adjust an existing user.
5. Ensure that the **System partitions-operations** privilege is granted.

To grant a user logical partition **administration** authority , perform the following steps:

1. Start DST as QSECOFR or with any other user ID with Service tool security privilege.
2. Select option 5 (Work with DST environment).
3. Select option 3 (Service tools user profiles).
4. Select option 1 (Create) to create a new user profile or option 7 (Change attributes) to adjust an existing user.
5. Ensure that the **System partitions-administration** privilege is granted.

Related concepts

Managing logical partitions by using VPM, IVM, and HMC

To control your client partitions you can use IBM Navigator for i, Virtual Partition Manager (VPM) native screen, IVM or HMC.

Related tasks

Creating logical partitions

You can use the IBM Navigator for i wizard to create logical partitions on your server.

Related reference
Service tools user IDs

Restarting and powering down a system with logical partitions

At times you will need to perform an initial program load (IPL) or power down the entire system or a single partition. It is important to remember that when you perform an IPL on the hosting partition you are also performing an IPL on all the client partitions.

If you power down the hosting partition, you will also power down any client partitions that are running. Unless you power down the client partitions before the hosting partition, any client partitions that are still running may have an abnormal IPL.

Refer to Basic system operations for more information on abnormal IPLs.

Some of the IPL tasks you can perform are as follows:

- Power down the system.
- Restart the system.
- Change operating mode for a logical partition.
- Change the IPL source for a logical partition.

Powering down a system with logical partitions

The proper way to power down a partition is by using the IBM i power down system (PWRDWNSYS) command. If the partitions were created by VPM(Virtual Partition Manager), you could power down a partition by using IBM Navigator for i.

From a command line at a workstation on that partition type PWRDWNSYS OPTION (*CNTRLD) DELAY (600) and press Enter.

If the partitions were created by IVM or HMC, you will not affect any other logical partitions. This command is the preferred way to power down a partition.

If the partitions were created by Virtual Partition Manager, you could power down a client partition by using IBM Navigator for i.

To power off partition by IBM Navigator for i, follow these steps:

1. In IBM Navigator for i of hosting partition, expend **Configuration and Services**.
2. Select **Partitions**.
3. Right click the partition you want to power off and select **Power Off**.

Note: The power off option is only available when the client partition is in "Manual" IPL mode. The power off option for hosting partition is only available when all client partitions are powered off.

There are two options for power off:

Delayed power off

When you use the delayed power off option, the partition waits a predetermined amount of time to power down. This allows the partition time to end jobs and write data to disks. If the partition is unable to shut down within the predetermined amount of time, it will end abnormally and the next restart may take a long time.

Immediate power off

When you select the immediate power off option, the system powers down without any preset delay. This may cause an abnormal IPL of the logical partition and possibly cause loss of data.

Related concepts
Starting the system
Related tasks
Restarting a system with logical partitions
Control panel functions

Restarting a system with logical partitions

If the partitions were created by IVM or HMC, you can restart a partition without affecting the other partitions. If the partition is powered on, you can restart it using PWRDWNSYS OPTION *CNTRLD DELAY (600) RESTART (*YES). You can use this command from a command line at one of its workstations or use the Run Command in IBM Navigator for i.

If the partitions were created by Virtual Partition Manager, you can restart a client partition without affecting the other client partitions. But if you are going to restart the hosting partition, you need first power down all of the client partitions.

If the partitions were created by Virtual Partition Manager, you could power on a partition by using IBM Navigator for i. To power on client partition by IBM Navigator for i, follow these steps:

1. In IBM Navigator for i of hosting partition, expend **Configuration and Services**.
2. Select **Partitions**.
3. Right click the partition you want to power on and select **Power On**.

Related concepts
Powering down a system with logical partitions
The proper way to power down a partition is by using the IBM i power down system (PWRDWNSYS) command. If the partitions were created by VPM(Virtual Partition Manager), you could power down a partition by using IBM Navigator for i.

Changing the IPL source for a logical partition
You can choose a separate initial program load (IPL) source (type) for each logical partition. Each IPL source (A, B, C, or D) on a system with logical partitions works just like it would on a system without logical partitions.

Changing the operating mode for a logical partition

The operating mode for logical partitions works just like operating mode on a system without logical partitions.

For more information on how operating mode works and why you may need to change it, refer to Operating mode of an IPL.

If the client partitions were created by Virtual Partition Manager, you could change the operating mode for a client and hosting partition by using IBM Navigator for i.

To change the operating mode for a client and hosting partition by using IBM Navigator for i, follow these steps:

1. In IBM Navigator for i of hosting partition, expend **Configuration and Services**.
2. Select **Partitions**.
3. Right click the partition you want to change the operating mode and select **Properties**.
4. On the **General** tab, you could change the value of **IPL mode** to change the operating mode.

Related concepts
Changing operating modes and IPL types

Changing the IPL source for a logical partition

You can choose a separate initial program load (IPL) source (type) for each logical partition. Each IPL source (A, B, C, or D) on a system with logical partitions works just like it would on a system without logical partitions.

For information on how each IPL source works and why you may need to change it, refer to IPL Type.

Attention: Only a hardware service representative should use IPL source C. Only use IPL source C under the direction of your service representative. Severe data loss can occur with improper use of this function.

If the client partitions were created by Virtual Partition Manager, you could change the IPL source for a client and hosting partition by using IBM Navigator for i.

To change the IPL source for a client and hosting partition by using IBM Navigator for i, follow these steps:

1. In IBM Navigator for i of hosting partition, expend **Configuration and Services**.
2. Select **Partitions**.
3. Right click the partition you want to change the IPL source and select **Properties**.
4. On the **General** tab, you could change the value of **IPL source**.

Related concepts

Changing operating modes and IPL types

Related tasks

Restarting a system with logical partitions

Control panel functions

Troubleshooting logical partitions

Resolve logical partition errors efficiently using the troubleshooting advisor. You can also determine whether the server having problems has logical partitions so that you can more quickly find a solution.

If you have problems with a partitioned system, determine if the problem is specific to logical partitions or a general system problem. If your problem is specific to logical partitions, use this section to understand system reference codes (SRCs) and recovery action needed to resolve the error. However, specific recovery actions and tasks might require the assistance of the Technical Support Center.

If the client partitions were created by **Virtual Partition Manager**, you could get the reference code of the partition by using IBM Navigator for i.

To get the reference code of the partition by using IBM Navigator for i, follow these steps:

1. In IBM Navigator for i of hosting partition, expend **Configuration and Services**.
2. Select **Partitions**.
3. On **Reference Code** column, you could see the SRC.
4. If the **Reference Code** column is not displayed, you could select **Actions->Columns** to display the **Reference Code** column.

To understand the system reference codes (SRCs), you need refer to **System reference codes (Bxxx) overview**.

Related information

Service and support

Related information for Logical partitions

IBM Redbooks, Web sites, and other information center topic collections contain information that relates to the Logical partitions topic collection. You can view or print any of the PDF files.

IBM Redbooks

- Implementing POWER Linux on IBM IBM i Platform  (about 8.6 MB)
- Virtual Partition Manager: A Guide to Planning and Implementation  (about 7.4 MB)
- Creating IBM i Client Partitions Using Virtual Partition Manager  (about 0.38 MB)

Web sites

- Dynamic Logical Partitioning(www.ibm.com)

Other information

- Backup and recovery
- Capacity on Demand
- Installing, upgrading, or deleting i5/OS and related software

Related reference

PDF file for Logical partitions
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