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iSeries

Plan for logical partitions

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Contents

Plan for logical partitions

Once you understand logical partition concepts, you are ready to develop a plan that evaluates your hardware resources, software release levels, and your company's immediate and future workload demands. This section guides you through the necessary steps in the planning process before you create partitions on your iSeries server.

"Logical and guest partition scenarios"
Read logical and guest partition scenarios to understand how a partitioned server can be configured and used.

"Hardware requirements for logical partitions" on page 10
Determine if your hardware resources meet the minimum requirements needed to partition your server. Evaluate each iSeries model to determine how your hardware will function once you partition your server.

"Software requirements for logical partitions" on page 18
Learn what release levels are supported and how you can partition your system to support new functions.

"Plan for Linux in a guest partition" on page 19
Prepare your server to run a non-OS/400 operating system in a partition. Understand the hardware resources needed to install Linux on a partition.

"Design your logical partitions" on page 19
Perform capacity planning and complete the planning worksheets needed to successfully create partitions on your server. Examples of capacity planning worksheets and planning hardware worksheets guide you through the process.

"Order a new server or upgrade an existing server with logical partitions" on page 22
Determine if you need to purchase new hardware or upgrade existing hardware for your company. IBM can assist you in placing the correct order that meets your partition requirements.

Central site distribution and logical partitions
Learn how you can use central site distribution to distribute OS/400 and other software to partitions on your server.

"Examples: Logical partitioning" on page 23
Review examples of different iSeries models running variations of the logical partition concept. Create unique partition set-ups using Bus-level or IOP-level configurations.

Logical and guest partition scenarios

The following scenarios help you to understand how you can configure and use logical and guest partitions on your iSeries server. These scenarios introduce some common logical and guest partition implementations.

"Logical partition scenario: Server consolidation" on page 2
This scenario demonstrates how workload consolidation can be achieved on an iSeries server.

"Logical partition scenario: Scheduling movement of processing power" on page 3
This scenario shows how you can dynamically reallocate resources based on workload peaks.

"Guest partition scenario: Linux applications on the iSeries" on page 6
This scenario demonstrates how you can use the reliability of the iSeries to run Linux application.

This scenario demonstrates how you can implement a firewall using a guest partition running Linux.

Logical partition scenario: Server consolidation

Situation

You are the system administrator for a small technology company. You are responsible for maintaining 3 servers. Currently, server 1 maintains payroll and technical data for the company. Server 2 maintains development projects while server 3 serves as the production box. Management wants to reduce expenses and asked you for your suggestions. You believe partitioning will streamline the company's information technology (IT) operations and improve server availability. You suggest they consolidate servers and partition one iSeries server. You have consulted with an IBM Business Partner and verified that an 840 iSeries model will meet your company's needs. The server has arrived and your hardware has been assigned. What should you do?

Objectives

The objectives of this scenario are as follows:
- Create a Service Tools profile with LPAR administrator authority.
- Configure the Service Tools Server.
- Create 4 partitions on the iSeries server.

Solution

You must complete each of these tasks to create the 3 secondary partitions described in this scenario:

Task 1

You must create a Service Tools profile with LPAR administrator authority. To create a logical partition administration authority (which enables all operation task as well) profile, perform the following steps:
1. Start DST as QSECOFR or with any other user ID with Service tool security privilege.
2. From the Use Dedicated Service Tools display, select option 5 (Work with DST environment).
3. From the Work with DST Environment display, select option 3 (Service tools user profiles).
4. From the Work with User Profiles display, select option 1 (Create) to create a new user profile and password.
5. Ensure that the **System partitions-administration** privilege is granted.

Task 2

Before you can use iSeries Navigator to work with logical partitions you have to add the service tools server to the iSeries. To configure the service tools server, follow these steps:
1. From an OS/400 command line, type ADDSRVTBLE (Add Service Table Entry) and press Enter. The Service Table Entry display appears. Enter the following information:
   - Service: 'as-sts'
   - PORT: 3000
   - PROTOCOL: 'tcp'
   - TEXT: 'Service Tools Server'
   - ALIAS: 'AS-STS'
2. Press Enter to add the table entry.
3. Press F3 to Exit the Add Service Table Entry display.
4. Enter ENDTCP to End TCP application servers.

5. Enter STRTCP to Start TCP application servers.

6. Once active, the service tool server starts when TCP/IP starts until the service table entry is removed.

Task 3

You are now ready to create the partitions on your system. The create wizard will help you set up your 3 logical partitions. To create a new logical partition using the service tools window, follow these steps:

1. In iSeries Navigator, select **My Connections** or your active environment.

2. Select **Open iSeries Navigator service tools window** in the Taskpad window. If the Taskpad window is not displayed, select **View** and select **Taskpad**.

3. Enter the **IP address** of the service tool network interface to which you want to connect. Click **OK**.

4. You will be prompted for your **Service Tools User ID and password**.

5. Right-click **Logical Partitions** and select **Configure Partitions**. You are now working in the Configure Logical Partitions window.

6. Right-click the **Physical System** and select **New Logical Partitions** to start the wizard.

7. Follow the instructions in the wizard to complete the task.

Your new partitions will be available after you restart the entire system. You can now begin installing the OS/400 release, any LPPs, fixes, and application products.

Your single multiprocessing iSeries server is running as if it were four independent servers. The diagram shows the different servers running on the new iSeries.
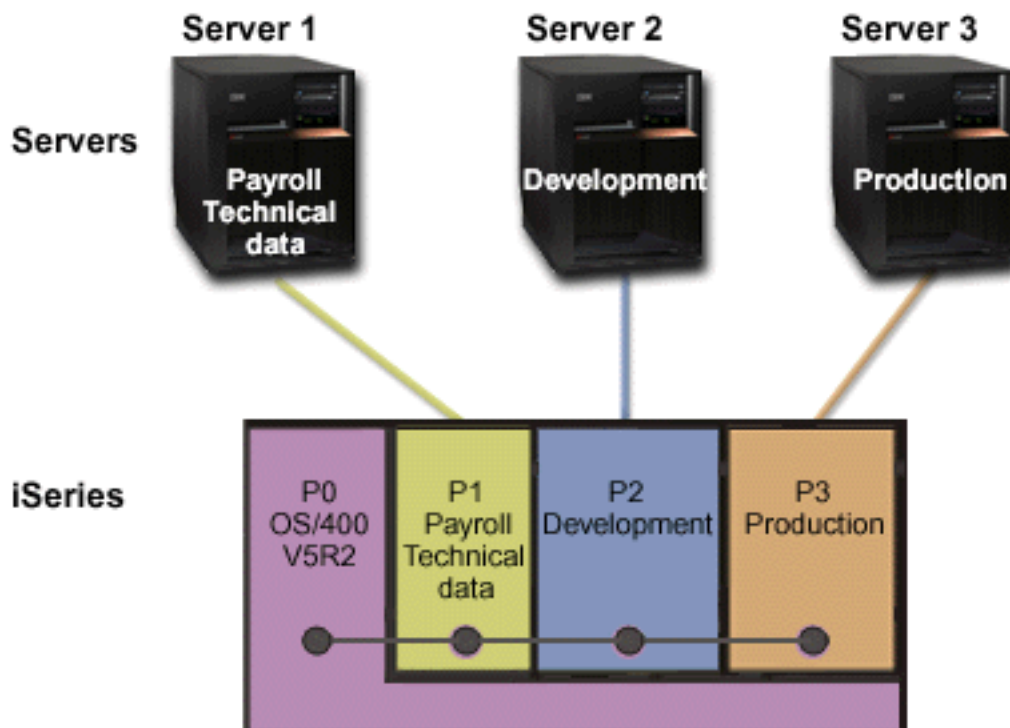
Logical partition scenario: Scheduling movement of processing power
Situation

You are the system administrator for a company that has a partitioned 270 iSeries. Your company has 4 partitions with each partition owning .50 processing units. At the end of the each month, partition 2 needs .40 additional processing units due to workload demands. The workload demands on partition 3 are minimal at the end of the month. Your 270 only supports 2 processors. What should you do?

Objectives

The objectives of this scenario are as follows:
- Use dynamic movement of resources to move processing power to another partition.
- Schedule the movement of processing power to happen monthly.

Solution

You must complete each of these tasks to move processing power and to schedule the move to occur monthly. To schedule a shared processor move using the service tools window, follow these steps:
1. In iSeries Navigator, select **My Connections** or your active environment.
2. Select **Open iSeries Navigator service tools window** in the Taskpad window. If the Taskpad window is not displayed, select **View** and select **Taskpad**.
3. Enter the **IP address** of the service tool network interface to which you want to connect. Click **OK**.
4. You will be prompted for your **Service Tools User ID and password**.
5. Expand the system name select **Logical Partitions**.
6. Right-click the logical partition and select **Configure Partitions**. You are now working in the Configure Logical Partitions window.
7. Right-click the shared pool processors you want to move and select **Move**.
8. Specify the number of units in the shared processor pool to move in **Amount to move**.
9. Click **Schedule** to specify when you want the move to occur.
10. In the **Management Central Scheduler** window, select how often you want the processing power to move and what time you want the move to occur. Your selections will appear in the **Summary** at the bottom of the window.
11. Click **OK**.

You will want to set the processing power back to its original configuration once the monthly workload demands are over.
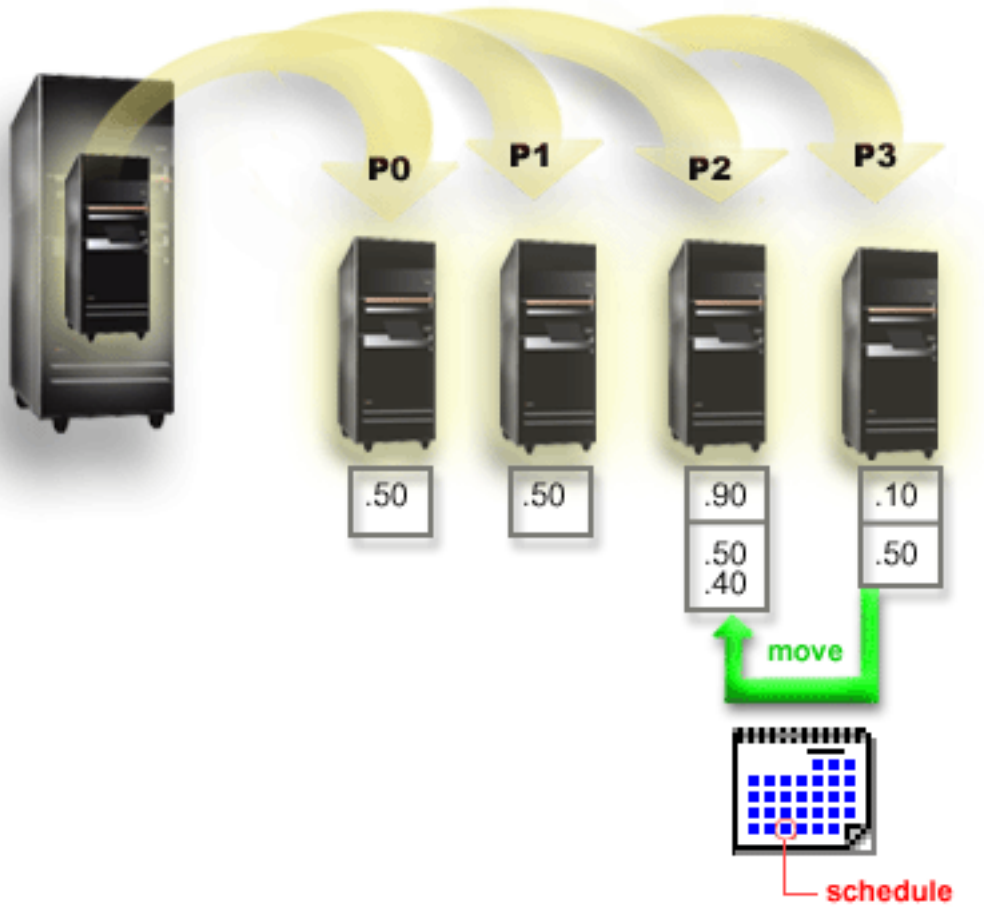
# Guest partition scenario: Linux applications on the iSeries

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 AS/400 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 following image shows the consolidated iSeries server running logical and guest partitions.
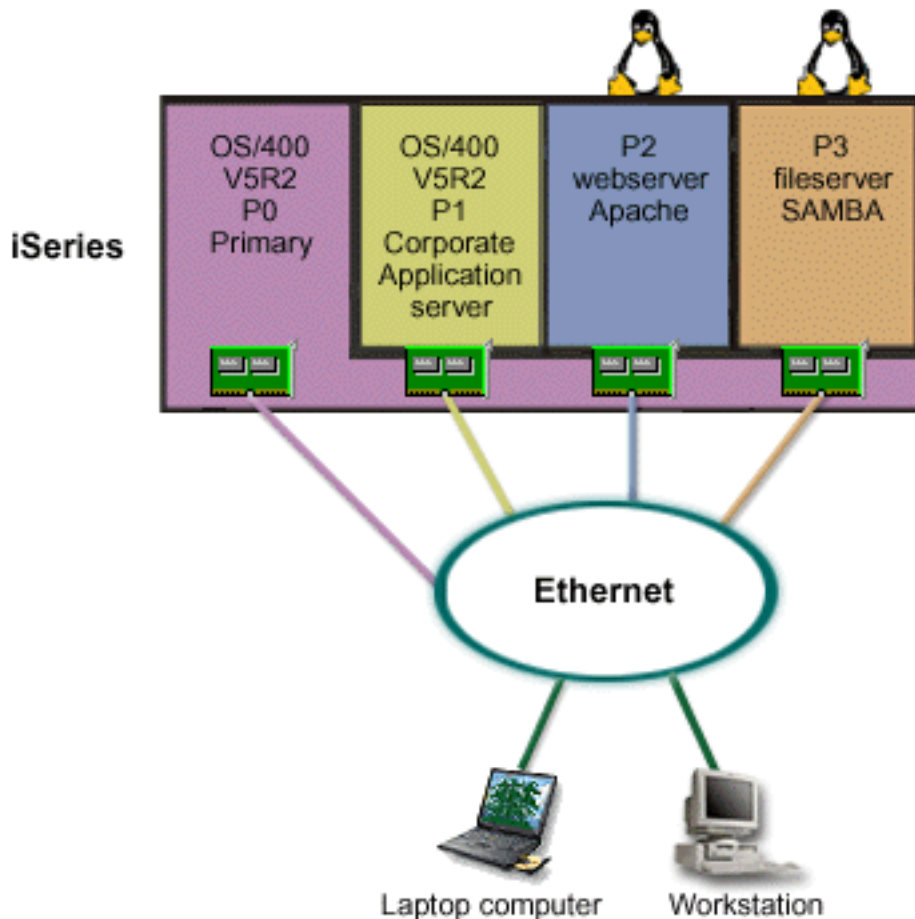
After researching and planning your partitioned environment, you created four partitions on your new server using iSeries Navigator. You allocated the minimum amount of hardware resources to your primary partition. All of the information on your older AS/400 was migrated to partition P1 running OS/400 V5R2. This release provides the flexibility of dynamically moving logical partition resources among partitions without a system restart. 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. For more information on the firewall on Linux and how you can implement it on the iSeries, refer to the "Guest partition scenario: Linux firewall" on page 8 scenario.

Guest partition scenario: Linux firewall
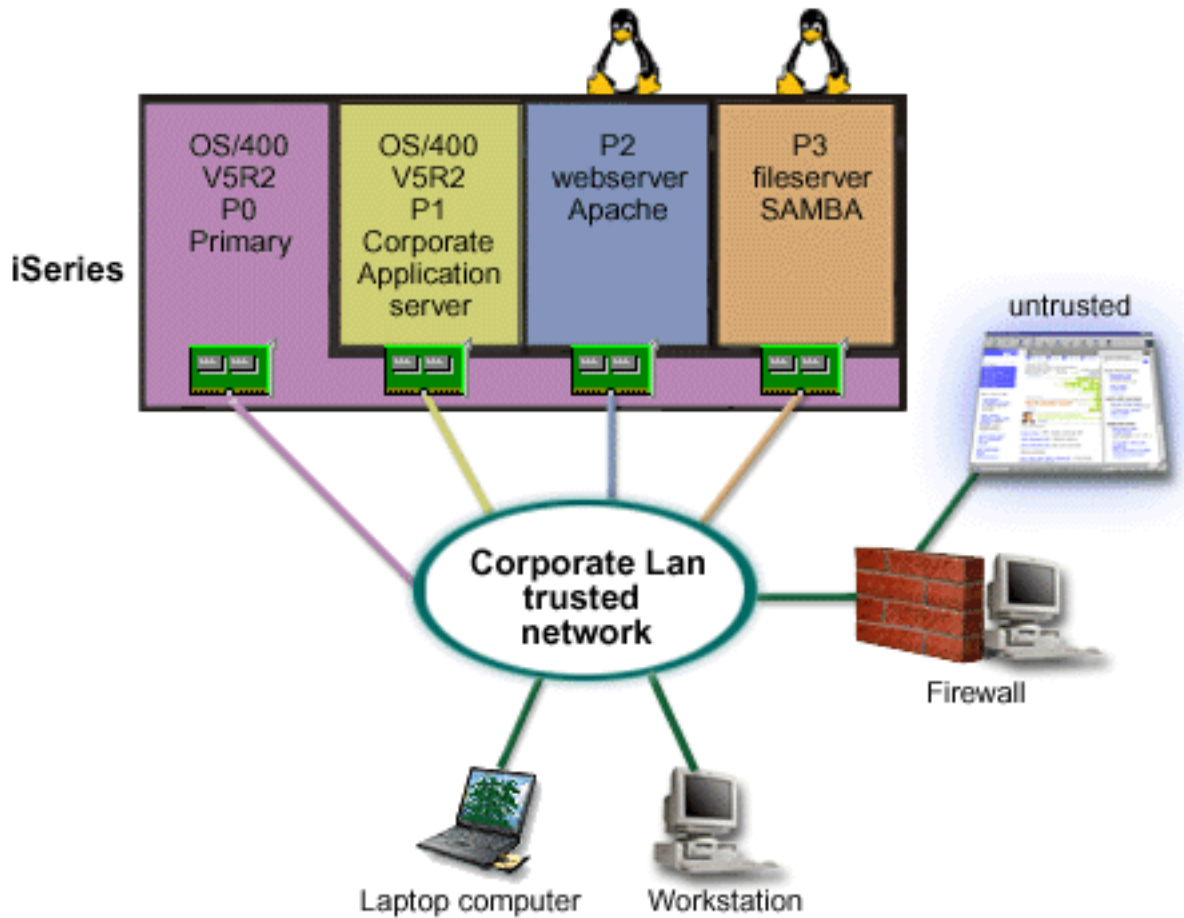
Situation

You are the system administrator of a company that has just "Guest partition scenario: Linux applications on the iSeries" on page 6 your company's workload to a new iSeries server. Your new iSeries configuration has four partitions. You are running in a supported mixed environment with OS/400 partitions and guest partitions running Linux. You have a separate system with a firewall installed to protect the corporate network from untrusted data. However, that system is outdated and very expensive to maintain. You still want to protect your network what should you do?

Solution using directly attached LAN adapters

Attention: Directly attached I/O resources are under the control of the Linux operating system.
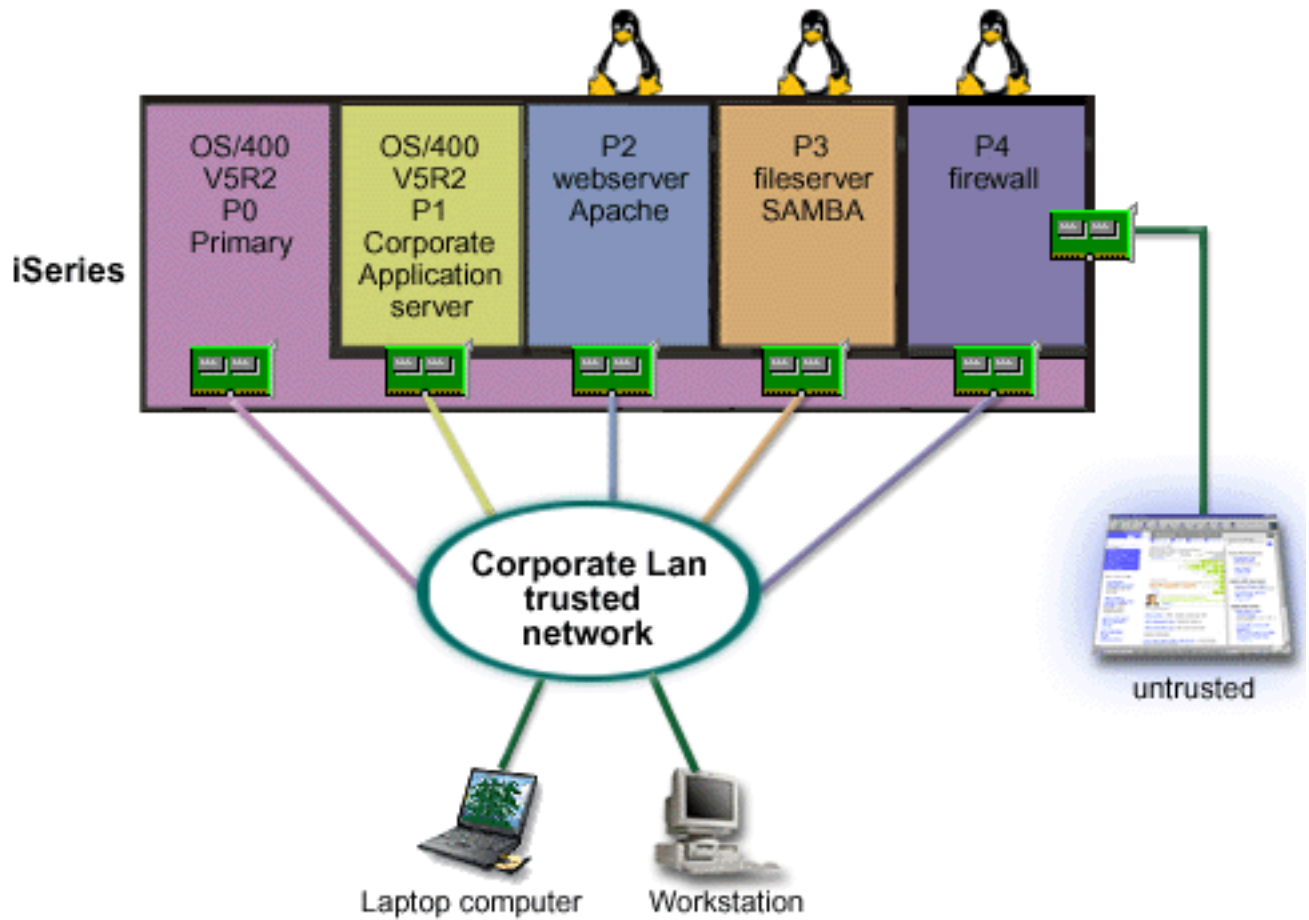
You had the hardware resources on your server to create another guest partition using iSeries Navigator. You installed Linux in partition P4. The firewall is built into the kernel that you are using. Your Linux firewall partition owns a directly attached LAN adapter that protects the entire system from untrusted data.

While your employees are able to use their laptop computers and workstations to connect to the trusted corporate network, you have the added assurance that your entire Corporate LAN is protected with your iSeries Linux firewall partition.

Solution using virtual Ethernet adapters
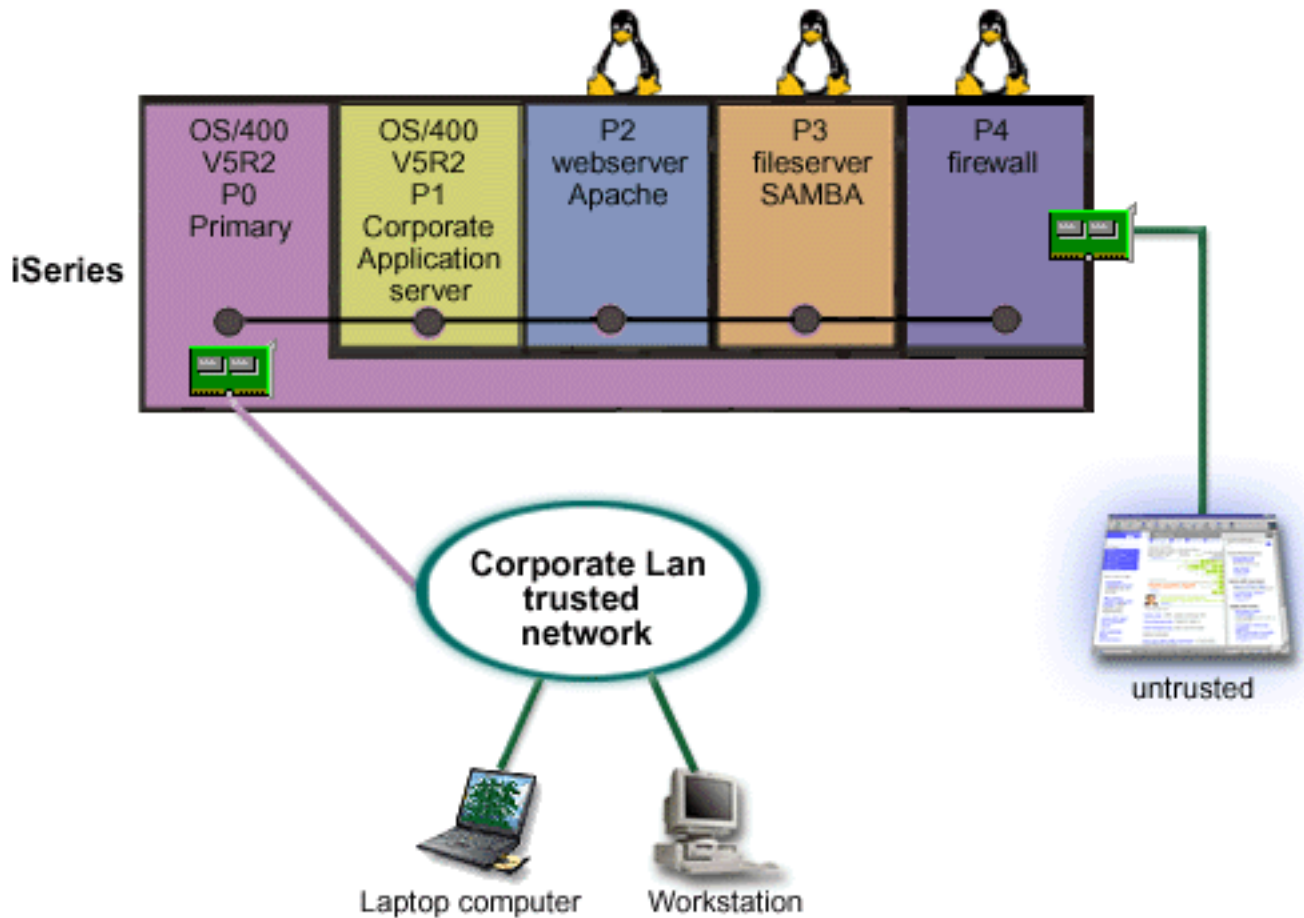
Attention:	Virtual I/O resources are devices owned by the hosting OS/400 partition that provide I/O function to the guest partition.

You created and installed Linux in a guest partition on your iSeries. However, you don't want to use a separate physical ethernet adapter for each partition, so you decide to use virtual ethernet to connect your partitions to the network. Your new Linux partition has a directly attached LAN adapter that connects your firewall to the untrusted network. Your primary partition owns a directly attached LAN adapter so your iSeries server can be connected to the trusted network. All of your partitions are able to communicate with each other and the Corporate Lan because they use virtual Ethernet.

Although you reduced the number of directly attached LAN adapters in this configuration, your entire network is still protected by the Linux firewall partition.

Hardware requirements for 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:

- "Networking for logical partitions" on page 15
- Console options

Determine the possible number of logical partitions

The number of processors you want to add to a logical partition depends on the planned workload for the partition and the desired level of performance. The number of partitions supported depends on the number of processors in the server model. If you are running release V5R1 or later, the 820, 830, and 840 models can have up to 32 logical partitions using the shared processor pool. The 820, 830, and 840 models are also designed to have up to 24 logical partitions using dedicated processors. The 810, 825, 870, and 890 models support up to 32 logical partitions using dedicated processors.

For estimation purposes, approximately each processor of a server offers 1/(total number of processors on the server) of the total Commercial Processing Workload (CPW) performance available through that processor feature.

Refer to the Logical Partition web site for additional information on performing Capacity Planning for your iSeries server. To fully understand the benefits of creating logical partitions, refer to How logical partitioning can work for you to enhance your company's use of partitions on your server.

Select bus-level or IOP-level partitioning

Depending on your needs, there can be advantages to partitioning your I/O resources in different ways.

Bus-level partitioning

With bus-level I/O partitioning, you dedicate an I/O bus and all resources on the bus to the same partition. A partition using the bus-level configuration, all I/O (included the alternate IPL device, console, and electronic customer support device) is dedicated and no resources are dynamically switched into or out of the partition. On a server that has partitions at the bus level, all buses are owned dedicated by their respected partitions and no devices are switched.

Bus-level logical partitions allow for:
- Better problem isolation and therefore higher availability.
- Better performance.
- Simplified hardware management.

IOP-level partitioning

When you partition a bus at the IOP level, you share the bus and divide up the I/O resources by IOP. This type of logical partitions allows for:
- Greater flexibility with partition I/O subsystems.
- Potential cost reduction by eliminating some expansion units that you may need to support additional buses.
- Optimization of hardware resources to avoid server limits such as 19 buses per server (only on AS/400e models).
- The ability to dynamically switch an IOP from one logical partition to another without the need to restart the server.
- Simplified configuration planning since hardware movement is not necessary.

Additionally, it is possible to configure a partition to utilize both dedicated buses and dedicated IOPs on shared buses.

Choose dedicated or switchable IOP and devices for logical partitions

IOPs that are candidates for switching include:

- IOPs that control high cost devices.
- IOPs that control low utilization devices and low demand devices.
- IOPs that solely control the target device or devices.

The IBM recommended approach is to confine all hardware within a partition. This is not always a cost-effective solution. With some devices it may be preferable to share them among partitions. Although partitions do not support concurrent device sharing, "Select bus-level or IOP-level partitioning" on page 11 may be an effective solution.

- **Advantages of switching IOPs and devices**
  - Reduced cost.
  - Fewer card slots needed. In some cases, this could mean that you need fewer expansion units.
- **Disadvantages of switching IOPs and devices**
  - Inconvenience of having to schedule use of switchable IOPs and devices.

Attention:	For external tape (for instance, 3590), it is possible to have one tape device, but separate IOPs for each partition that will use it. A partition requesting use of the device receives a ″busy″ indication if it is in use by another partition.

Before implementing a switchable IOP and other devices, you should also consider other possible alternatives. To share devices among partitions, you can apply the same techniques that are used to share devices among separate physical servers:

- Use multiple IOPs, one in each partition, for devices that support multiple connections (some high end tape drives).
- Use multiple IOPs, one in each partition and use a switch box for devices that only support single connections (printers, or some high end tape drives).
- Use multiple IOPs and multiple devices in each partition for a self-contained solution (internal removable media devices).

Select dedicated or shared processors

Partitions can use one of two modes of processors on the iSeries server. The results of your capacity planning and system hardware configuration will help you make a decision about utilizing dedicated processors or the shared processor pool for each partition. Depending on workload demands for each partition, one partition can use dedicated processors and another partition can use the shared processor pool.

Dedicated processors allows you to assign a whole processor to a partition. You can assign dedicated processors to a partition as long as processors are available or unassigned.

The shared processor pool allows you to assign partial processors to a partition. The processors are held in the shared processing pool and are shared among the logical partitions. A minimum of 0.10 processing units per virtual processor can be configured for any partition using shared processors. The primary partition may require more than 0.10 processing units when starting secondary partitions, otherwise timeout conditions may occur with resources communicating directly with the primary partition. Each system processing capacity and partition configuration needs to be evaluated to determine reasonable processor units for primary and secondary partitions.

To adjust to workload demands, you can move shared processing resources without needing to restart the partition. Use of the shared processor pool is preferred for small (less than one processor) partitions or where the use of a whole processor increments are too great for the partition.

Perform dynamic movement of resources

You can dynamically move processors, memory, and interactive performance. Dynamic movement of resources provides users the ability to move resources between partitions without requiring a partition or system restart. To take full advantage of this enhancement your primary and secondary partitions must be running OS/400 V5R1 or V5R2. For more information on software release guidelines, refer to Logical partition release support.

To ensure that you understand the concept of dynamic movement of resources refer to the following articles for more information:

- "Allocate processor power" on page 14
- "Determine the amount of memory to move"
- "Select interactive performance"

Select interactive performance

Every physical system is purchased with a specific quantity of interactive performance which is allocated to the partition as a percentage of the total system interactive performance. Interactive performance enables you to run jobs that require user interaction in contrast to batch jobs which require no user interaction. Each partition has a unique requirement for the amount of interactive performance.

To move interactive performance, you have to establish a minimum and maximum range within which you can move the resource without needing to restart the logical partition. If you change either the minimum or maximum value you will have to restart the partition.

You can specify an interactive performance minimum value equal to the minimum amount of interactive performance needed to support the logical partition. The maximum value must be less than the amount of interactive performance available on the system. The maximum interactive performance is limited by the number of processors in a partition.

Determine the amount of memory to move

Primary partitions need a minimum of 256 MB of memory. The minimum memory of V5R1 and V5R2 secondary partitions is 128MB. V4R4 and V4R5 secondary partitions minimum memory requirement remains 64MB. Depending on the number of secondary partitions on the server, the primary partition may need more memory to successfully manage the partitions on the server.

To dynamically move memory, you have to establish a minimum and maximum range within which you can move the resource without needing to restart the logical partition. Changing the maximum value requires a system restart. Changing the minimum value only requires you to restart the partition. Due to performance reasons, you are recommended to specify the maximum value close to the amount of memory the partition will be assigned. By specifying a maximum value higher than what is needed for the partition, you waste valuable memory resources. Minimum values dictate what is required to restart the partition. If the minimum value is not met for all logical partitions, only the primary will restart. You can specify a memory minimum value as low as 0. A value of 0 in any partition creates a non-functioning partition. If the primary partition has been restarted (a system restart) after the secondary partition was set to 0, then another system restart is required when the secondary memory value is changed. If the changes are made to the memory within the same primary restart, then a system restart is not required to make changes to the memory allocations.

The full amount of memory that you assign to a logical partition may not be available for the partition's use. Static memory overhead required to support the assigned maximum memory will affect the reserved or hidden memory amount. This static memory overhead will also influence the minimum memory size of a partition.

When you dynamically remove memory from a logical partition, the currently allocated amount may not be reduced to the new value you have specified until you restart the partition. This is dependent upon factors in the running operating system in that partition. Runtime values are based on memory the partition needs to complete an assigned task.

Allocate processor power

The ability to move processor power dynamically becomes important when you need to adjust to changing workloads. Processors have minimum and maximum values associated with them. These values enable you to establish a range within which you can dynamically move the resource without needing to restart the logical partition. Minimum values dictate what is required to restart the partition. A minimum value of zero is valid. A partition with zero processors or processing units is not functional. For example, a test partition can free up valuable processing power to apply to a production partition if needed. Once the demand on the production partition is over, the processing power can be moved back to the test partition.

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 cannot be more than or equal to the amount of processing power available on the system. If you change either the minimum or maximum value, it will require you to restart the entire partition. If the minimum value is not met for all logical partitions, only the primary will restart.

Evaluate the hardware limitations of the iSeries servers

The 6xx, 7xx, Sxx, 8xx and 270 servers support logical partitions (LPAR). However, 6xx, 7xx and Sxx models must have more than one processor.

For upgrade customers, the current physical placement of hardware may restrict your configuration choices. For server-specific information, consult the Technical information section on the Logical Partition

 web site, and contact your business partner, marketing representative, or service specialist.

Be sure that you have the right hardware and software for your server. The following table list the LPAR hardware function by model.

Available hardware function, listed by model:

Hardware function	AS/400e models Sx0, 6xx, and 7xx	iSeries models 820, 830, and 840	iSeries model 270	iSeries models 810, 825, 870, and 890
Logical partitioning	For all versions of the OS/400: • S20 processor feature codes 2165, 2166, 2170, 2177, 2178 • S30 processor feature codes 2258, 2259, 2260, 2320, 2321, 2322 • S40 all processor features • 620 processor feature code 2182 • 640 processor feature codes 2238, 2239 • 650 all processor features • 720 processor features 2063, 2064 • 730 processor features 2066, 2067, 2068 • 740 all processor features	With V4R5 in the primary partition: • 820 processor feature codes 2397, 2398, 2426, 2427 • 830 processor feature codes 2400, 2402, and 2403 • 840 all processor feature codes With V5R1 in the primary partition: • 820 all processor feature codes • 830 all processor feature codes • 840 all processor feature codes	No LPAR support with V4R5 in the primary partition. With V5R1 in the primary partition: • 270 processor feature codes 2431, 2432, 2434, 2452, 2454	These models only support V5R2 in the primary and secondary partition.
Shared processor pools	No.	Yes.	Yes.	Yes.
Linux.	No.	Yes for all models excluding 820 processor feature codes 2303, 2395, 2396, 2425.	Yes for all 270 models with feature codes 2431, 2432, 2434, 2452, 2454.	Yes.

You can create a maximum of one logical partitions for each installed processor using dedicated processors. Or you can use the shared processor pool and specify a partial amount of processors for the partition.

For more information on release support for iSeries models, refer to Logical partition release support.

Networking for logical partitions

Logical partitions can use any of the following communication methods to interact with other partitions or servers.

- "Virtual Ethernet" on page 16
- "HSL OptiConnect" on page 16
- "Virtual OptiConnect" on page 17
- "SPD OptiConnect" on page 18

The type of communication options that you use will depend on your business needs. You can use any combination (or none) of these communication methods within a partition.

For more information about OptiConnect, see OptiConnect for OS/400 .

Virtual Ethernet
Virtual Ethernet enables you to establish communication via TCP/IP between logical partitions. Each partition can define up to 16 virtual local area networks. Partitions defined to use the same port can communicate through that link.

Virtual Ethernet can be used without any additional hardware or software.

For more information related to configuring a virtual Ethernet line description and TCP/IP for virtual Ethernet, refer to:
- "Configure an Ethernet line description for virtual Ethernet"
- Configure TCP/IP using the character-based interface

Configure an Ethernet line description for virtual Ethernet: Creating an Ethernet line description is the first step in configuring OS/400 to use virtual Ethernet. The system will create a virtual Ethernet communications port, such as CMNxx with a resource type of 268C. Logical partitions assigned to the same virtual Ethernet then become available to communicate through that link.

To configure a new Ethernet line description to support virtual Ethernet, complete the following steps:
1. At the OS/400 command line, type WRKHDWRSC *CMN and press Enter.
2. From the Work with Communication Resources display, select option 7 (Display resource detail) next to the appropriate virtual Ethernet port. The Ethernet port identified as a 268C is the virtual Ethernet resource. There will be one for each virtual Ethernet that is connected to the partition.
3. From the Display Resource Detail display, scroll down to find the port address. The port address corresponds to the virtual Ethernet you selected during the configuration of the partition.
4. From the Work with Communication Resources display, select option 5 (Work with configuration descriptions) next to the appropriate virtual Ethernet port and press Enter.
5. From the Work with Configuration Descriptions display, select option 1 (Create) enter the name of the line description and press Enter.
6. From the Create Line Description Ethernet (CRTLINETH) display, provide the following information:
   RSRCNAME
   LINESPEED (1G)
   DUPLEX (*FULL)
   Press Enter.
   Press Enter.

From the Work with Configuration Description display, you will see a message stating the line description has been created.

Configure TCP/IP for virtual Ethernet: To assign an IP address to an Ethernet line description, you must configure TCP/IP.

For more information on configuring TCP/IP for virtual Ethernet, refer to Configure TCP/IP using the character-based interface

HSL OptiConnect
High-Speed link (HSL) OptiConnect provides high speed system-to-system communication. This cannot be used for partition to partition communication. HSL OptiConnect requires standard HSL cables, but no additional hardware. You must purchase OptiConnect (a priced optional feature) for OS/400 software before this feature can be used.

See Communications for logical partitions and OptiConnect for OS/400 for more information about OptiConnect.

Virtual OptiConnect

Virtual OptiConnect allows one partition to communicate with another partition if both partitions have virtual OptiConnect enabled.

Any partition can use virtual OptiConnect. You can enable virtual OptiConnect at any time. When you enable or disable virtual OptiConnect, the changes take effect immediately. No additional hardware is required to use virtual OptiConnect. However, you must purchase the OptiConnect (a priced optional feature) OS/400 software to use this feature.

For more information related to configuring TCP/IP and SNA for virtual OptiConnect, refer to:
* "Configure TCP/IP for virtual OptiConnect"
* "Configure SNA for virtual OptiConnect"

See OptiConnect for OS/400 for more information about OptiConnect.

Configure TCP/IP for virtual OptiConnect: Virtual OptiConnect emulates external OptiConnect hardware by providing a virtual bus between logical partitions. You can use virtual OptiConnect without any additional hardware requirements. To use virtual OptiConnect, you only need to purchase OptiConnect for OS/400 (a priced optional feature).

To enable virtual OptiConnect, follow these steps:
1. In iSeries Navigator, expand **My Connections** or your active environment.
2. Select the primary partition of the system.
3. Expand **Configuration and Service** and select **Logical Partitions**.
4. Right-click the logical partition and select **Properties**.
5. Select the **Options** page.
6. Select the **Virtual (internal) OptiConnect** Click **Help** if you need more information on this field.
7. Click **OK**.

You must have an IP address that is in a different subnet than the site LAN. For more information on configuring TCP/IP for virtual OptiConnect, refer to Configure TCP/IP using the character-based interface.

Attention: The internet address is assigned to a line description of *OPC.

Configure SNA for virtual OptiConnect: In IBM networks, Systems Network Architecture (SNA) is the layered logical structure, formats, protocols, and operational sequences that are used for transmitting information units through networks. SNA also controls the configuration and operation of networks.

You can use SNA communications in a partitioned environment. SNA communication is limited to APPC using virtual OptiConnect. You can only communicate directly between two servers. In order to communicate with partitions that are not part of your server, you will have to access the server that has access to the network.

To establish an APPC connection from a primary partition to a secondary partition, follow these steps:
1. At an OS/400 command line, enter the command CRTCTLAPPC and press Enter.
2. From the Create Controller Description (APPC) display, provide the following information:
   Controller description (Name)
   Link type (*OPC)

Remote System Name (System name)
Data link role (*pri)
Text description

3. At the OS/400 command line, enter the command CRTDEVAPPC and press Enter.

4. From the Create Device Description (APPC) display, provide the following information:
Device description (Name)
Option (*BASIC)
Category of device (*APPC)
Remote location (Provide the same system name found in the Display Network Attributes (DSPNETA) display.)
Online at IPL (*YES)
Local location (Name)
Remote network identifier (*None)
Attached controller (Name)
APPN-capable (*NO)

To establish an APPC connection from a secondary partition, following these steps:

1. At an OS/400 command line, enter the command CRTCTLAPPC and press Enter.

2. From the Create Controller Description (APPC) display, provide the following information:
Controller description (Name)
Link type (*OPC)
Remote System Name (System name)
Data link role (*SEC)
Text description

3. At the OS/400 command line, enter the command CRTDEVAPPC and press Enter.

4. From the Create Device Description (APPC) display, provide the following information:
Device description (Name)
Option (*BASIC)
Category of device (*APPC)
Remote location (Name)
Online at IPL (*YES)
Local location (Name)
Remote network identifier (*None)
Attached controller (Name)
APPN-capable (*NO)

SPD OptiConnect

SPD OptiConnect allows a partition to communicate with another server or another partition that also has the OptiConnect hardware.

Any partition that uses OptiConnect must have the OptiConnect hardware on a dedicated bus in the partition. The OptiConnect hardware can not be on a shared bus. Additionally, you must purchase OptiConnect (a priced optional feature) for OS/400 software.

See Communications for logical partitions and OptiConnect for OS/400 for more information about OptiConnect.

Software requirements for logical partitions

Only Version 4 Release 4 (V4R4) and newer versions of the OS/400 operating system support logical partitions. V4R4 is the earliest release that is supported in any logical partition.

Generally, OS/400 logical partitions support secondary partitions with only 1 release older or 1 release newer than the primary partition. As an exception 6xx, 7xx, and Sxx hardware running V4R4 in the primary can run V5R1 in a secondary partition. These models must have 2 or more processors and are not capable of supporting the shared processor pool.

The 820, 830, and 840 servers can only support OS/400 V4R5 or later software releases on all logical partitions. Some models only support V5R1 in the primary partition.

The 810, 825, 870, and 890 servers only support OS/400 V5R2 in the primary and secondary partition.

Read more information about release support in Logical partition concepts.

Plan for Linux in a guest partition

You can run Linux, a non-OS/400 operating system, in a guest partition. An iSeries server running Linux embraces new applications with the increased reliability over other hardware platforms.

Before you create a guest partition running Linux, refer to Linux in a guest partition for more information.

Design your logical partitions

After understanding the "Hardware requirements for logical partitions" on page 10 and "Software requirements for logical partitions" on page 18 requirements for logical partitions, it is time to develop a detailed outline of your company's immediate and future workload demands for each partition. You need to consider how these demands will change your system resources. You should focus on the workload demand in each partition and then determine the hardware resources required to achieve the desired server performance.

You can start the planning process for each partition on your server by completing the following steps:
- "Decide what runs in the primary and secondary partition"
- "Enforce security in secondary partitions" on page 20
- "Capacity planning for logical partitions" on page 20
- "Examples: Capacity planning" on page 20
- "Use the LPAR Validation Tool" on page 20
- "Examples: Logical partitioning" on page 23
- "Submit 6xx, 7xx, Sxx worksheets to IBM" on page 21
- "Load source placement rules for secondary partitions" on page 21

Refer to the Logical Partition web site for additional information on planning for logical partitions.

Decide what runs in the primary and secondary partition

Each secondary partition on an iSeries server acts as an independent system on the server. However, these partitions maintain a dependency on the primary partition. It must be running to keep each secondary partition on the system accessible. With that in mind, deciding on what runs in the primary partition is important to maintain stability throughout your system.

If you have multiple production environments on the same server, it is recommended to configure the primary partition with the minimum amount of hardware resources and if necessary use the primary only for applications that are stable.

Secondary partitions can handle different types of workload demands without causing down time on the server. You can perform fixes or new release testing on secondary partitions before installing these packages to the primary partition. Applications that require high availability should be running in a

secondary partition to minimize problems with the applications. You can also use the secondary partition to back-up data on another partition on the server. This way if data is lost the secondary partition responsible for backing up the information can be used without causing delays to your business schedule.

Enforce security in secondary partitions

Secondary partitions act as independent servers on your iSeries. In general, when making security decisions and performing security actions, you have to remember to plan and perform the task for each logical partition.

For more information on logical partition security, refer to Manage security for logical partitions.

In order to access logical partition functions, you must first configure the service tools server. For more information on the service tools server, refer to Configure the service tools server.

Capacity planning for logical partitions

Capacity planning will help you determine how many partitions you need for your business and how much hardware you need in each partition.

You must perform capacity planning individually for each logical partition that you have or want on a server. Depending on the number of partitions you decide to create on your server, the primary partition may need more memory to successfully manage the partitions on the server.

See Capacity Planning on the Logical Partition web site for more information. This information can help you to determine the resources necessary to achieve a desired performance.

Examples: Capacity planning

Once you have decided you want to partition your iSeries server, you must perform capacity planning for each partition. Capacity planning helps you determine the hardware configuration needed on your server to meet your business demands. Capacity planning results are key to the successful implementation of logical partitions.

Refer to the Logical Partition web site to read more information on Capacity Planning.

Use the LPAR Validation Tool

The LPAR Validation Tool (LVT) emulates an LPAR configuration and validates that the planned partitions are valid. In addition, LVT allows you to test the placement of OS/400 and Linux hardware within the system to ensure that the placement is valid.

Refer to the Logical Partition web site for information on the LPAR Validation Tool.

Complete the Configuration Planning Worksheet

It takes careful planning to create logical partitions on the iSeries. This includes planning for all the required hardware.

The Guide to Completing the Configuration Planning Worksheet on the Logical Partition web site, gives a framework for providing the information necessary to build a server capable of supporting logical partitions. On the web site, you can also download the worksheet as a Lotus Smartmaster, Microsoft Word, or HTML document (when prompted, save the document to your computer).

This planning worksheet can help you prepare the necessary information for completing the Configuration Planning Worksheet. The Configuration Planning Worksheet is available from the Logical Partition web site.

Submit 6xx, 7xx, Sxx worksheets to IBM

In order to help you, IBM must receive the following from you:

*   Logical Partitions Configuration Planning Worksheet
*   Configurator output (in HTML or text file format)

Send these documents by using one of the following methods:
*   E-mail: rchtsc@us.ibm.com
*   Fax: (507) 286-5045

If sending by e-mail, include the documents as attachments to the e-mail.

IBM also provides assistance with the following:
*   Technical conference calls with your IBM Marketing Representative or Business Partner
*   Customized hardware configuration
*   Customized order outline
*   Onsite consulting, if needed
*   Education
*   Consulting services

Some of these services may be billable to the customer.

It is the responsibility of the IBM representative or Business Partner to provide the validated worksheets to the Hardware CE.

If assistance is needed for the LPAR planning process, contact your local Global Services (IGS) representative. Your IBM marketing representative can assist in locating your IGS representative.

Load source placement rules for secondary partitions

Each logical partition requires a load source disk unit. The load source contains the Licensed Internal Code. The server uses the load source to start the partition. Each secondary partition has a specific slot placement for its load source depending on the type of system unit or expansion unit where it is installed. An IOP or IOA is then required to control the load source disk unit for each partition.

Attention: The information provided does not replace the LPAR Validation Tool. This information should be used as a resource with the LVT output. It's purpose is to assist you in the load source placement for your secondary partitions.

The load source disk for a secondary partition must be placed as follows:

Server or Expansion Unit	IOA	Disk Slot
5082 or 5083		15C
5064 or 9364		F31, F32, F33, F34
5052 or 5058		K01, K02, K03, K04
5077	617A in S02 and S03	11A, 11B, 13A, 13B
5065 or 5066	IOA in slot C4	D31, D32, D33, D34
	IOA in slot C9	D01, D02
	IOA in slot C14	D06, D07

Server or Expansion Unit	IOA	Disk Slot
5074, 5079, 5094, or 5294	The IOA controlling DB3	D31, D32, D33, D34
	The IOA controlling DB1	D01, D02
	The IOA controlling DB2	D06, D07
5075		D01, D02, D03, D04
5095	The IOA controlling DB1	D01, D02, D03, D04
	The IOA controlling DB2	D07, D08, D09, D10
830, 840, 870, or 890	The IOA controlling DB1	D01, D02
	The IOA controlling DB2	D06, D07

You should be aware of these rules for secondary partition load source placement:
- You specify the load source IOP when you create your partition.
- Disk compression must be disabled for the load source disk.
- Disk units must have at least 1GB of usable capacity.

Attention: A parity-protected 1GB file (6602 or 6605) can not be used.

- Disk mirroring requires two load source disk devices in valid load source positions.
- External disk units can not be used.
- Any disk IOP or IOAs that can attach to a system capable of having logical partitions can be used for additional storage capacity once the special requirements for load source disk are met.
- Each partition has its own single level storage and hence its own ASP configuration. The same rules for ASP configuration apply within a partition as apply on a system without logical partitions.
- Disk protection can be defined for a partition in the same way as for a non-partitioned system: parity protection (RAID), mirroring, or mixed. Bus-level mirroring requires two buses in the partition. IOP-level partitioning requires two disk IOPs in the partition.
- Disk units that are already in use by a logical partition can not be added to a different logical partition. You must first remove them from the configuration of the partition that is using the disk units before adding the disk units to a different partition. In doing this, the system automatically moves any user or system data to other disk units in the same ASP.

Order a new server or upgrade an existing server with logical partitions

Contact your IBM Marketing Representative or Business Partner to enter the order for your new server. You can enter the order by using the configurator. When placing the order for a server with logical partitions, specify feature code 0140 for each partition.

To upgrade an existing server with logical partitions, detailed planning must be performed prior to upgrading the server. It is highly recommended that all of the logical partition configuration actions be performed by an LPAR-trained services person. Refer to Convert expansion units in a partitioned environment for more information on upgrading an existing server with logical partition.

Provide hardware placement information to service providers

Logical partitions require that certain resources for secondary partitions occupy specific card slots in System Expansion Units and Storage Expansion Units on iSeries servers. The LVT output or the Configuration Planning Worksheets will provide the necessary card placement information to satisfy your specific partition requirements.

IBM Manufacturing places features in servers to optimize performance as a singlehandedly server. If you plan to order a new server to support logical partitions, some card movement may be required after customer installation. Card movement may be a billable to the customer. If you plan to upgrade an existing server to support logical partitions, the card placement instructions that usually accompany an upgrade may be incorrect. Additionally, some already-installed cards may need to be moved.

Examples: Logical partitioning

The time you spend in planning will save you steps and avoid trouble during partition setup. The following detailed partitioning examples should provide a helpful guide:

Bus-level partitioning using a 840 server
Refer to the Logical Partition web site for more information on Bus-level partitioning using a 840 server.

IOP-level partitioning using a 840 server
Refer to the Logical Partition web site for more information on IOP-level partitioning using a 840 server.

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