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pSeries

Planning for Partitioned-System Operations

SA38-0626-00

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Planning for Partitioned-System Operations

SA38-0626-00

First Edition (October 2002)

Before using this information and the product it supports, read the information in Appendix A, "Notices" on page 41 and product warranties included with your system.

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Contents

About This Book

This book provides information to planners, system administrators, and operators about how to plan for installing and using a partitioned server. It also discusses some issues associated with the planning and implementing of partitioning.

A discussion of permanent capacity on demand helps you understand how to order additional hardware for your system, and have this hardware available whenever you need it to supplement your server.

ISO 9000

ISO 9000 registered quality systems were used in the development and manufacturing of this product.

Online Publications

IBM @server pSeries and AIX publications are available online. This documentation is available at the following Web address: http://publib16.boulder.ibm.com/pseries/en_US/infocenter/base.

Related Publications

The following publications contain related information:

- The documentation shipped with your managed system contains detailed planning, installation, and option information.
- The managed system's user's guide contains user information for the managed system that might be partitioned.
- The *AIX 5L Version 5.2 AIX Installation in a Partitioned Environment* guide, order number SC23-4382, contains information about installing, managing, and maintaining the AIX 5L operating system in a partitioned environment.
- The *Site and Hardware Planning Information*, order number SA38-0508, contains information to help you plan the installation of your machine.
- The *IBM Hardware Management Console for pSeries Installation and Operations Guide*, order number SA38-0590, contains information to help you plan the installation of your machine.
- The *Electronic Service Agent for eServer pSeries User's Guide*, order number LCD4-1060, provides detailed information about the Service Agent application.
- The *PCI Adapter Placement Reference*, order number SA38-0538, provides information about the slots in which to place adapters in your managed system.

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Chapter 1. Reference Materials

This chapter helps you get started with installing and configuring the $@$server pSeries environment. The following information is included in the chapter:

- $@$server pSeries Roadmap
- Documentation Overview - Brief description of the printed and softcopy documentation shipped including targeted audience

The $@$server pSeries Roadmap helps you locate marketing, service, and customer task information. The roadmap guides you through the tasks and the publications that document those tasks.

Marketing and Customer Tasks

Begin

Managed by HMC ?

Yes → Planning

📖 *Site and Hardware Planning Information*
📖 *Planning for Partitioned-System Operations*
📖 *Hardware Management Console Installation and Operations Guide*

No → Planning

📖 *Site and Hardware Planning Information*

Service Personnel Tasks

Hardware Installation

📖 Hardware Installation Guide
📖 *Hardware Management Console Installation and Operations Guide*

Hardware Installation

Customer Tasks

Is System Using Partitions ?

Yes → Configuring Partitions

No → Configuring Full System Partition

📖 *Planning for Partitioned-System Operations*
📖 *AIX Installation in a Partitioned Environment*
📖 *AIX Installation Guide and Reference*
📖 *Operating System Installation: Getting Started*

Installing/Configuring the Operating System

Installing/Configuring the Operating System ← Configuring Full System Partition

Installing/Configuring Applications

📖 *AIX Installation in a Partitioned Environment*
📖 Application Documentation
📖 AIX Documentation Library

Using the System

📖 Hardware User's Guide
📖 AIX Documentation Library
📖 Application Documentation

The publications listed in this section are available online. To access the online books, visit our IBM @server pSeries Information Center at http://publib16.boulder.ibm.com/pseries/en_US/infocenter/base.

Documentation Overview

This section provides descriptions and target audience information for the @server pSeries and AIX 5L documentation libraries. Some of the documentation may only be available in printed form or in softcopy form. Based on the documentation content, the books are divided into the following categories: **Planning**, **Installing and Configuring**, and **Using the System**.

Table 1. Planning

Documentation Title	Description	Audience	Type
Site and Hardware Planning Information	Contains information to help plan for site preparation tasks, such as floor-planning, electrical needs, air conditioning, and other site-planning considerations.	Marketing, system administrators	softcopy
Planning for Partitioned-System Operations	Describes planning considerations for partitioned systems, including information on dynamic partitioning and Capacity Upgrade on Demand.	System administrators	printed and softcopy
Hardware Management Console for pSeries Installation and Operations Guide	Provides information on how to install, configure, and use a Hardware Management Console (HMC). Logical partition (LPAR) tasks, such as configuring and managing partitions on multiple host servers, are included.	System administrators	printed and softcopy

Table 2. Installing and Configuring

Documentation Title	Description	Audience	Type
Hardware Installation Guide	Provides information on how to install system hardware, cable the system, and verify operations.	Service personnel	printed and softcopy
Planning for Partitioned-System Operations	Describes planning considerations for partitioned systems, including information on dynamic partitioning and Capacity Upgrade on Demand.	System administrators	printed and softcopy
Hardware Management Console for pSeries Installation and Operations Guide	Provides information on how to install, configure, and use a Hardware Management Console (HMC). Logical partition (LPAR) tasks, such as configuring and managing partitions on multiple host servers, are included.	System administrators	printed and softcopy
AIX Installation in a Partitioned Environment	Provides information on how to install the AIX operating system in an LPAR environment.	System administrators	printed and softcopy
AIX Operating System Installation: Getting Started	Provides information on how to install and configure the AIX operating system on a standalone system using a CD-ROM device.	System administrators	printed and softcopy
AIX 5L Installation Guide and Reference	Provides information on installing the AIX 5L operating system on standalone systems, as well as on client systems using the Network Installation Management (NIM) interface.	System administrators	printed and softcopy
PCI Adapter Placement Reference	Outlines system-specific PCI adapter slot placement and adapter support configurations.	Service personnel	printed
AIX 5L Release Notes	Provides late-breaking information for a specific AIX release.	System administrators	printed and softcopy
AIX 5L Documentation CD	AIX documentation library (system management guides, user guides, application programmer guides, commands and files references, AIX man pages, and so on).	System administrators	softcopy

Table 3. Using the System

Documentation Title	Description	Audience	Type
Hardware Management Console for pSeries Installation and Operations Guide	Provides information on how to install, configure, and use a Hardware Management Console (HMC). Logical partition (LPAR) tasks, such as configuring and managing partitions on multiple host servers, are included.	System administrators	printed and softcopy
Hardware User's Guide	Provides using, problem determination, and service processor information.	System administrators	printed and softcopy
Diagnostic Information for Multiple Bus Systems	Combines operating instructions for hardware diagnostic programs with common MAPs and SRNs (Service Request Numbers).	Service personnel	printed and softcopy
PCI Adapter Placement Reference	Outlines system-specific PCI adapter slot placement and adapter support configurations.	Service personnel	printed
Hardware Management Console for pSeries Maintenance Guide	Contains MAPs, removal and replacement, error code, and parts information to help diagnose and repair the system.	Service personnel	printed and softcopy
Adapters, Devices, and Cable Information for Multiple Bus Systems	Provides information about adapters, devices, and cables that are attached to or used within the system.	System administrators	printed and softcopy
System Unit Safety Information	Contains the English version of safety notices, as well as translations of those safety notices into other languages.	System administrators, service personnel	printed and softcopy
AIX 5L Documentation CD	AIX documentation library (system management guides, user guides, application programmer guides, commands and files references, AIX man pages, and so on).	System administrators	softcopy

Chapter 2. Partitioning Overview

This chapter provides an overview of partitioning and some of the features that allow you to change partitions dynamically. Your planning needs will vary depending on your individual requirements. As your requirements change, careful planning helps you to be ready to change your system configuration.

Operating in a Partitioned Environment

Before partitioning, each system operated independently. The following figure represents three systems that could support three separate tasks and three sets of users.
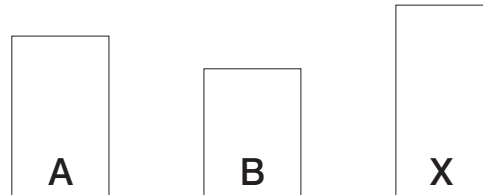
Partitioning enables system administrators to configure a single computer into several independent systems. Each of these independent systems, also referred to as *partitions*, can run applications in its own independent environment. This independent environment contains its own operating system, its own set of system processors, its own memory, and its own I/O adapters and devices. Even though it runs on the same physical hardware with other operating systems, after it is configured, a partition is booted and used as an independent system. The following figure represents a server that is divided into three partitions.
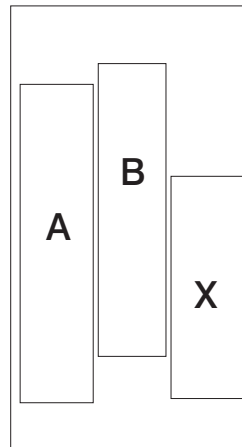
You can choose to operate your managed system as a single server, or you can choose to run multiple partitions. Partition management is performed using the hardware management console (HMC). Each system that is running partitions and managed by the HMC is referred to as a *managed system*. A managed system is capable of being configured to use logical partitions (LPARs) or a full system partition. If your computing needs are considered to be technical, real-time, or high-performance computing, a special type of partitioning called *affinity logical partitioning* is recommended.

A system that is configured to use logical partitions can run the following:
- Multiple logical partitions (LPAR or affinity logical partitions)
- A full system partition

The HMC (shown attached to three partitions in the following illustration) provides the interface that allows you to choose the partition environment that best fits your needs.
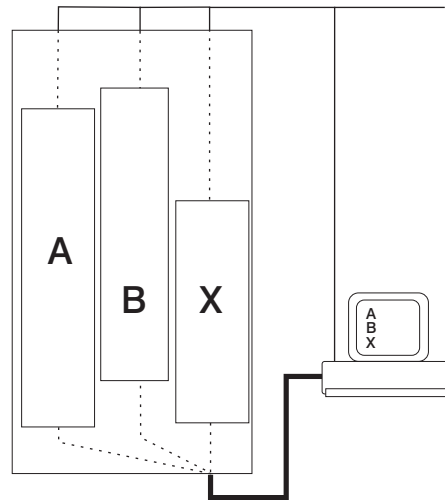
Logical Partitioning

Logical partitioning (LPAR) does not limit the number of hardware resources that are contained in a partition. A partition could have any number of the available processors assigned to it, limited only by the total number of processors. Similarly, a partition could have any amount of memory, limited only by the total amount of memory available. An I/O adapter is physically installed in one of many slots in the system. However, with LPAR, any I/O adapter in any I/O drawer can be assigned to any partition. Each partition on a server is defined by a profile. Profiles for logical partitions are created and managed using the HMC.

The operating system that is running in a partition is completely independent of any other operating system that is running in another partition. Operating system levels in each partition do not need to be the same, nor do the application levels. For example, you can install the Linux operating system in one partition and the AIX operating system in another partition.

By using partitions, you can test new programs in one partition, while developing the same program on another partition, all at the same time and using the same system. This "same system" partitioning method is more cost-effective than using all of the system resources on one large partition. Using partitions eliminates the need for dedicated systems for test or other purposes.

Dynamic Logical Partitioning (DLPAR) allows you to implement changes to your partitions at any time without affecting a partition's operation. LPAR should be used when the tasks you are performing are other than technical computing, real-time computing, or high-performance computing (see "Affinity Logical Partitioning" on page 9).

Dynamic Logical Partitioning

Dynamically changing a partition enables a partition's resources to be changed while the partition is up and running. The operating system that is running in the partition can configure and use additional hardware without being rebooted. In a DLPAR environment, the processors, memory, or input/output adapters can be added, moved, or removed after the partition is up and running.

Systems that are capable of performing dynamic logical partitioning can support the following tasks:
- Processor Tasks
    - Adding processors to a partition
    - Moving processors from one partition to another
    - Removing processors from a partition
- Memory Tasks
    - Adding memory to a partition
    - Moving memory from one partition to another
    - Removing memory from a partition
- Input/Output Tasks
    - Adding a PCI adapter
    - Moving a PCI adapter
    - Removing a PCI adapter

Affinity Logical Partitioning

An affinity logical partition is a special type of logical partition that has its processors and memory resources located physically close to one another. Processors needed for a partition can be grouped to use the closest physical memory available. Hardware resources for affinity partitioning are defined using the HMC. When creating an affinity partition, the HMC automatically determines which processors and memory are grouped and allows you to choose which type of grouping you want. The HMC then creates a profile for each affinity partition and a system profile that contains the affinity partitions for the managed system.

Affinity partitioning is best suited for use in technical computing, real-time computing, and high-performance computing. A system that is set up to use affinity logical partitions can dynamically move I/O devices. To change the quantity of processors or memory assigned to an affinity logical partition, the partition must be rebooted. A more detailed description of these tasks is found in Chapter 4, "Planning for Dynamic Logical Partitioning Updates" on page 23.

Note: If your system is enabled for capacity upgrade on demand, affinity logical partitioning is not available.

Full System Partition

A special partition called the full system partition assigns all of your managed system's resources to one large partition. The full system partition is similar to the traditional, nonpartitioned method of operating a system. Because all resources are assigned to this partition, no other partitions can be started when the full system partition is running. Likewise, the full system partition cannot be started while other partitions are running.

The HMC allows you to switch from the full system partition to logical partitions. The actual setup of the operating system in a partition might require some careful planning to ensure that no conflicts exist between the two environments.

Benefits of Partitioning

Partitioning provides greater flexibility when deploying multiple workloads on a server, providing better management, improved availability, and more efficient use of resources. Some systems allow you to purchase and install hardware, and then to dynamically configure that hardware to meet your operating needs. The following are some examples of how partitioning can benefit your computer operations:

- **Consolidate servers:** A server with sufficient processing capacity that is capable of being partitioned can address the need for server consolidation by logically subdividing the server into a number of separate, smaller systems. In this way, application-isolation needs can be met in a consolidated environment, with the additional benefits of reduced floor space, a single point of management, and easier redistribution of resources as workloads change.
- **Merge production and test environments:** Partitioning enables separate partitions to be allocated for production and test systems, 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.
- **Consolidate multiple versions of the same operating system:** A single system can have different versions of the operating system installed to accommodate multiple application requirements. Furthermore, a partition can be created to test applications under new versions of the operating system prior to upgrading the production environments. Instead of having a separate server for this function, a minimum set of resources can be temporarily used to create a new partition where the tests are performed. When the partition is no longer needed, its resources can be incorporated back into the other partitions.
- **Scalability balancing:** Partitioning allows you to create resource configurations appropriate to the scaling characteristics of a particular application, without hardware-upgrade restrictions.
- **Consolidate applications requiring different time zone settings:** Partitioning enables multiple regional workloads to be consolidated onto a single server. The different workloads can run in different partitions, with different operating systems, as well as with different time and date settings. For example, workloads for operations based in San Francisco and New York can run in different partitions on a single server. The evening batch workload, maintenance, or upgrade for the New York operation does not affect those of the San Francisco operation.
- **Flexible configuration:** Partitioning gives you the ability to change configurations easily to adapt to changing workload patterns and fluctuating computing-capacity requirements.

Processor on Demand

The processor on demand feature can help you manage a partitioned system. A processor on demand feature is ordered and installed as additional hardware that is not part of the system until you want to add it. The cost of using a processor on demand feature is deferred until you activate the hardware. After processor on demand hardware is activated on a system, it can then be added to logical partitions, as needed, to handle additional requirements.

Chapter 3. Planning for Logical Partitioning

Planning for logical partitioning requires the consideration of numerous factors and may take some time. If possible, planning for partitioning of a system should be performed prior to having the system installed in your location. If the planning work is careful and complete, the installation and configuration of the system will take less time.

Planning for installing partitions on a system is a two-phase process:

- Initial Phase

  Perform this planning phase when you are considering how much system capacity is required, in the form of processors, memory, and I/O, that you need for all your partitions. During this phase you begin your system design by identifying your requirements and completing worksheets to record your requirements. If, for example, the new system will duplicate the function of several existing systems, you probably will need a partition for each system. Each partition requires processors, memory, and I/O that is close to the capacity of the existing systems. When this phase is completed, you have your requirements documented on worksheets that you can use as a record of your requirements.

- Final phase

  Perform this planning phase after you have determined the general partition requirements. In this phase, details for each partition are developed and recorded. Information needed to set up and run partitions on your system when it is installed is finalized during this phase. Various worksheets are completed during this phase. After this phase is complete and the system is installed, you can then use your worksheets and the hardware management console to implement your system design.

Initial Phase

During this phase, you use a partition profile to identify fundamental requirements for each partition that you will implement on your system. The following list summarizes the steps for the initial phase:

1. Complete the "Basic LPAR Planning Checklist" on page 12.
2. Complete part of the "Partition Properties Worksheet" on page 44.

Final Phase

In the final phase of partition planning, you complete worksheets with the details for each of your planned partitions. When the following worksheet tasks are completed, you are ready to configure your system's partitions:

1. Complete the "Detailed LPAR Planning Checklist" on page 14.
2. Complete the the remainder of the "Partition Properties Worksheet" on page 44.
3. Complete the "I/O Drawer Resource Worksheet" on page 46 (optional).
4. Complete the "System Profile Worksheet" on page 47.

Basic LPAR Planning Checklist

Use this checklist during system design, before the hardware is ordered. These activities help ensure that you have a good understanding of LPAR, to perform high-level system design and planning, and to ensure adequate machine resources are available to meet your needs. Begin the planning process with the steps outlined in the following table.

When you have completed this checklist, you can compare the requirements you have recorded, to your system order, to ensure that your requirements are being met:

Completed?	Your Expectations
	Determine your goals for partitioning your workloads. If you are planning to install a partitioned system to divide workloads, analyze how your workloads can be divided so that your partitions can be configured to have adequate capacity for the workload. For example, if you are planning to consolidate a number of systems, each system represents a *workload*. If you are setting up a test environment and a production environment, consider each environment as a separate workload. You can then analyze your own workload and plan for a logical partition for each workload. As you define each workload for a partition, name the partition, and record its name on your copy of the "Partition Properties Worksheet" on page 44. If you want to isolate compatible workloads within a partition, you can use the Workload Manager (WLM) tool. For more information about the AIX Workload Manager, see *AIX System Management Concepts: Operating System and Devices*.
Completed?	**Hardware Configuration**
	Logical partition (LPAR) requirements have been determined for each workload that is desired for development, test, production, or failover environments. Record the partition requirements in your copy of the "Partition Properties Worksheet" on page 44. When performing this activity, carefully calculate the minimum resource requirements for each partition to ensure that the partition provides adequate performance.
	Processor, memory, and I/O adapter requirements have been determined for each partition and recorded on your copies of the "Partition Properties Worksheet" on page 44. Be sure to order all of the hardware in the partition properties worksheet. Consider processors, memory, internal disks, network, and other I/O adapters.
	A minimum of one network adapter has been included on the partition properties worksheet for each partition for administrative and user access. These adapters also can be used when configuring the HMC to be able to monitor each partition's status. Consider availability requirements when deciding how many network adapters to configure in a partitioned system. Update the "Partition Properties Worksheet" on page 44 as you define network adapters for each partition.
	Disk capacity and performance requirements have been determined for each partition for operating system and application purposes and has been included on the "Partition Properties Worksheet" on page 44. This should include redundant disks and disk adapters for availability as needed. **Note:** A disk 4-pack that is connected to a single controller can be owned and accessed by a single partition.
	If you want a redundant HMC for availability, ensure that planning is done for this requirement and that the order includes the additional HMC. If you are installing the new system in an environment that already has an HMC, decide whether to use the existing one, or to order an additional HMC. The HMC can be set up to be dedicated to the new system, shared by multiple systems, or connected in a redundant configuration so that two HMCs mirror each other.

Completed?	Software Configuration
	On your copy of the "Partition Properties Worksheet" on page 44, for each partition, record the application software to be run, the level of AIX, and whether it is running the 32-bit or 64-bit kernel (if known). The 32-bit and 64-bit multi-processor kernels are automatically installed. The uniprocessor kernel is not supported on LPAR enabled systems.

If you want to use the AIX Workload Manager and learn more about its features, see *AIX System Management Concepts: Operating System and Devices*. |

Detailed LPAR Planning Checklist

Complete these activities after the system is ordered, and before partition deployment. The following table can be used as a checklist so that you can track your progress.

Completed?	Documentation and Information
	Obtain documentation relevant to partitioned systems, including *IBM Hardware Management Console for pSeries Installation and Operations Guide*, order number SA38-0590, and *AIX Installation in a Partitioned Environment*, order number SC23-4382.

Completed?	Hardware Configuration
	Complete detailed I/O planning for each LPAR by completing a copy of the "I/O Drawer Resource Worksheet" on page 46 for each I/O drawer (if the system unit drawer has I/O slots, complete a worksheet for the system unit drawer also). On the worksheet, record the drawer and slot assignments for each LPAR. Be sure to consider application availability requirements when planning your adapter usage. You may want to dynamically move some adapters to different LPARs as your requirements change.
	More information about considerations for adapter placement can be found in the section "Configuring the LPAR Environment for High Availability" in the *IBM pSeries 690 Availability Best Practices* white paper, available at http://www.ibm.com/servers/eserver/pseries/hardware/whitepapers/p690_avail.html and in the *PCI Adapter Placement Reference*, order number SA38-0538.

Completed?	Software Configuration
	Perform detailed software-configuration planning for each partition, and record the information on your copy of the "Partition Properties Worksheet" on page 44. For planning requirements, refer to operating system and application documentation.
	Plan for availability requirements for each partition, and record the information on your copy of the "Partition Properties Worksheet" on page 44. At this point you can plan your maximum and minimum resource requirements for each partition. Be sure to set the maximum values for resources in a partition higher than the desired value so that if you need to add resources dynamcially, the partition will allow the added resources. Also, be sure to set the minimum values for each partition so that resources are available from partitions if a dynamic move is required.
	Verify that all software licensing terms for all software are understood and implemented. See the terms and conditions of your application license agreements.
	Plan for any use of system profiles and record the information on your copy of the "System Profile Worksheet" on page 47.

Completed?	Installation and Update
	Understand AIX installation choices and implications for ongoing maintenance (NIM versus CD). NIM (Network Installation Management) is the recommended method. See *AIX Installation in a Partitioned Environment*, order number SC23-4382.
	Define and record your system profile using a copy of the "System Profile Worksheet" on page 47. Define profiles for booting into SMS menus, and with media (CD) as required. When you are defining your system profile, ensure that you identify the minimum set of partitions that must be activated to handle the workload and still provide adequate performance.
	When your system is installed and available, install each partition using the selected method. For instructions to help you set up your partitions and system profiles, refer to the *IBM Hardware Management Console for pSeries Installation and Operations Guide*, order number SA38-0590.
	To enable integrated management, Service Focal Point, and inventory collection, ensure that the network path is available between the HMC and each partition.

Completed?	System Management
	Ensure that remote management alternatives are understood (Web-based System Manager and command line from Microsoft Windows or AIX) and appropriate equipment is in place.
	Create a plan for backing up rootvg (root volume group) and non-rootvg in a partitioned environment.
	Understand how to handle AIX dump devices in partitioned environment.
	Define authorized users, with roles, for HMC and partition management.

Instructions for LPAR Planning Worksheet

This section contains samples of worksheets that have been completed for a typical managed system. Use these examples when completing worksheets for your system configuration planning. These worksheets are necessary when your system is installed and you are configuring your partitions for the first time.

Using the LPAR Planning Worksheets

The LPAR planning process proceeds through several phases, and the planning worksheets can be used to record design and implementation choices through those phases.

During the initial LPAR design phase, high-level choices about LPAR resource usage should be made to ensure an adequate machine configuration. Determine the number of desired LPARs, along with the usage of each. For each LPAR, record the number of processors, the amount of memory, and the I/O requirements to configure. To ensure adequate hardware redundancy, consider and record availability requirements. Total system memory size must leave adequate memory for operating system use.

Use the following table to determine the total number of partitions you can operate at one time, considering the total amount of memory available on your server.

Ensure that the total minimum resources for all partitions that you intend to run simultaneously does not exceed the total available system resources. You can also use the following table to verify that adequate operating system memory is available.

Total Memory (in GB)	Approximate Memory Overhead (memory required by firmware (in GB)	Approximate Usable Partition Memory (in GB)	Maximum Number of Partitions: AIX or Linux, any version Partitions ≤ 16GB and Partitions > 16GB (see Notes 1 and 2)	Maximum Number of Partitions: AIX 5.1 Partitions ≤ 16GB and Partitions > 16GB (see Notes 1 and 3)	Maximum Number of Partitions: AIX 5.2 (or higher) or Linux All partition sizes (see Notes 1, 4, and 5)
4GB	.75 to 1GB	3 to 3.25	3 and 0	13 and 0	13
8GB	.75 to 1GB	7 to 7.25	6 and 0	16 and 0	16
16GB	.75 to 1GB	15 to 15.25GB	14 and 0	16 and 0	16
24GB	1 to 1.25GB	22.75 to 23GB	16 and 0	16 and 0	16
32GB	1 to 1.25GB	30.75 to 31GB	16 and 0	16 and 0	16
48GB	1.25 to 1.75GB	46.25 to 46.75GB	16 and 1	16 and 1	16
64GB	1.5 to 2GB	62 to 62.5GB	16 and 2	16 and 2	16
96GB	2 to 2.5GB	93.5 to 94GB	16 and 4	16 and 4	16
128GB	2.5 to 3.5GB	124.5 to 125.5GB	16 and 6	16 and 6	16
192GB	3.5 to 4.5GB	187.5 to 188.5GB	16 and 10	16 and 10	16
256GB	5 to 6GB	250 to 251GB	16 and 14	16 and 14	16

Notes:

1. All partition maximum numbers are subject to availability of sufficient processor, memory, and I/O resources to support that number of partitions. For example, a system with only 8 processors can support a maximum of 8 partitions.

2. These rules apply to systems running partitions with any version of AIX or Linux, if the firmware and HMC release levels are earlier than the 10/2002 release level.

3. These rules apply to systems running partitions with AIX Version 5.1, if the firmware and HMC release levels are at the 10/2002 release level (or later). Do not select the HMC partition profile option for **Small Real Mode Address Region** for AIX 5.1 partitions. These numbers reflect the maximum when running only AIX 5.1 partitions, but AIX 5.1 and AIX 5.2 partitions can be mixed, and can allow for additional partitions to be run (up to the maximum of 16).

4. These rules apply to systems running partitions with AIX Version 5.2 (or later) or Linux, if the firmware and HMC release levels are at the 10/2002 release level (or later). Select the HMC partition profile option **Small Real Mode Address Region** for these partitions.

5. AIX 5.2, when run with the **Small Real Mode Address Region** profile option, requires that the maximum memory setting is no greater than 64 times the minimum memory setting. For example, if the minimum memory setting is 256 MB, then the maximum memory setting cannot be greater than 16 GB. Otherwise, AIX does not start.

To ensure that the system and partition profiles are created correctly as you complete the detailed partition planning checklist, carefully complete the "Partition Properties Worksheet" on page 44. Additional dedicated partition profiles for special use (for example, to boot to SMS menus, or to boot with and without a CD-ROM drive) should be identified.

For example, if you know that a specific resource, such as a CD-ROM or a data disk is required to perform a set of user defined tasks, a dedicated partition profile can be created with these resources explicitly listed as "required" for the partition to boot. This technique can help you to avoid booting a partition only to find that specific resources are not available. Dedicated partition profiles are useful for ISA devices that cannot be dynamically reconfigured.

Complete details about operating-system levels and application-software levels should be recorded in this phase.

Advanced considerations, such as using multiple system profiles, should also be considered during the detailed planning phase.

Instructions for Partition Properties Worksheet

On your copy of the "Partition Properties Worksheet" on page 44, complete the following fields. See the "Example of Partition Properties Worksheet" on page 19 for help when completing your worksheet. Using the following table as a guide, work through the entries to complete the worksheet for each partition you have planned to set up on your system:

Worksheet Field	Description
Partition Number	Arbitrary, used as link to the same partition on the I/O properties worksheet.
Partition Name	Unique name for this partition (up to 31 characters).
Processor Count	Record the minimum number of processors required for this partition.
Memory Size	Record the minimum amount of memory required for this partition. Memory allocation total should leave enough room for the various system overheads in memory usage.
Network Adapter	Each partition should have a network adapter. Initially record the type (for example, Ethernet). As planning progresses, record the adapter part number.
Disk Drives	Record the partition disk requirements including rootvg, data, use of internal 4-pack, mirroring, and so on.
Comment	If you are migrating from an existing system into a partition, indicate the type of system and general configuration (such as processors or memory).
Partition Host Name	Record host name for partition. This name must be resolvable by some method (such as DNS, /etc/hosts, NIS).
Networking Configuration	For each adapter, record the IP address, netmask information, and so on.
Application Stack Software Levels	Record levels of all applications to run in the partition. You can use this information to ensure application availability, and any operating system or application prerequisites.
Application License Requirements	Record license requirements from application license agreements. Use this information to define a partition profile that complies with the license agreements for your applications. If an application has specific licensing issues, such as the maxumum number of processors allowed in a multiprocessor environment, the maximum resource can be set in the partition profile keep the partition within the license terms.
Availability Requirements	Record desired availability requirements for this partition. This information can be used to plan for appropriate hardware and software redundancy to ensure availability. You might need redundant I/O for communication availability or you might decide to configure your partitions in a high-availability configuration (HA).

Example of Partition Properties Worksheet
Duplicate the worksheets from "Partition Properties Worksheet" on page 44, and complete a worksheet for each partition. Examples of completed partition-properties worksheets follow:

Partition Number	Partition Name	Processor Minimum/ Desired/ Maximum Count	Memory Size Minimum/ Desired/ Maximum (in GB)	Required Network Adapter	Disk Drives	Comments
1	WebServer	4/6/6	1/2/4	2x 10/100 Ethernet	2x36	
2	AppServer1	4/8/10	1/4/6	10/100 Ethernet	2x36	
3	AppServer2	4/6/8	4/4/4	10/100 Ethernet	2x36	
4	Database	2/2/2	2/4/6	10/100 Ethernet	2x36	
5	Development	2/4/4	1/1/2	10/100 Ethernet	2x36	
...						
16						
Totals		16/26/30	9/15/22			
Total Installed		24	16			

When the partitions in the previous example are activated, there are not enough processors for each partition to use the desired value. Depending on the order in which the partitions are activated, one partition might have to be activated with fewer than the desired number of processors.

The memory values for Minimum/Desired/Maximum should leave enough room for the various system overheads of memory usage. See the memory requirements table on page 16.

Partition Number	Partition Host Name	Networking Configuration	Application Stack Software Levels	Availability Requirements	Application License Requirements	Comments (New deployment or migration environment?)
1	ws1.dot.com	108.25.25.2	Networking Configuration	Redundant SCSI	Up to 6 processors	Second system will be added for HACMP
2	ap1.dot.com	108.25.25.5	4GB	Redundant SCSI		HACMP
3	AppServ2.dot.com	108.25.25.11	4GB	HA		HACMP
4	db1.dot.com	108.25.25.13	4GB	HA	2 processors max.	HACMP
5	dev1.dot.com	108.25.25.15	1GB			
...						
16						

Instructions for I/O Drawer Resource Worksheet

Duplicate the worksheet from the "I/O Drawer Resource Worksheet" on page 46 for each installed I/O drawer (if the system unit has I/O slots or integrated I/O, complete a separate worksheet for the system unit as well). Record the drawer location code, adapter type for each slot, and also the partition assignment. Remember that full disk 4-packs that are connected to a single controller cannot be shared between partitions. Also, it is important for each partition to have a network adapter.

Example of I/O Drawer Resource Worksheet

I/O Drawer Location and Serial Number	Adapter Slot Physical Location	Adapter Type	Partition Assignment	Comments
U1.9	P1/Z1	Integrated SCSI	1	Hdisk0, hdisk1
	P1/Z2	Integrated SCSI	1	Hdisk2, hdisk3
	P1-I1	Fibre Channel	1	
	P1-I2	Ethernet	1	ent0
	P1-I3			
	P1-I4			
	P1-I5	Fibre Channel	1	
	P1-I6			
	P1-I7			
	P1-I8	SCSI	1	
	P1-I9			
	P1-I10	SCSI	1, 2, 3, 4	CD-ROM
	Px/Z1	Integrated SCSI	2	Hdisk0, hdisk1
	Px/Z2	Integrated SCSI	2	Hdisk2, hdisk3
	Px-I1	Fibre Channel	2	
	Px-I2			
	Px-I3			
	Px-I4			
	Px-I5	Fibre Channel	2	
	Px-I6			
	Px-I7			
	Px-I8	Ethernet	2	ent0
	Px-I9			
	Px-I10			

Instructions for System Profile Worksheet

Duplicate the "System Profile Worksheet" on page 47 to record information about any system profiles you want to create. A system profile allows you to activate or deactivate a set of partitions as needed. You can setup your system with system profiles that you might want to activate at different times of the day. For example, system profiles can be used to allocate different resources to your partitions based on workload peaks. If you want to deactivate a set of partitions and activate a different set of partitions, you would define your system profiles to match your requirements.

Remember that the memory allocation totals in the third column should leave enough room for the various system overheads of memory usage. For more information about system memory overheads, see the memory requirements table on page 16.

Example of I/O a System Profile Worksheet

System Profile Name: Morning		
Activation Times: 8:00 AM		
Partition Name	**Number of Desired Processors**	**Desired Memory Size**
Partition 1	4	2GB
Partition 2	4	4GB
Partition 3	4	4GB
Partition 4	2	4GB
Partition 5	2	1GB
...		
Partition 16		
Totals:	16	15GB
Total Installed:	16	16GB

Chapter 4. Planning for Dynamic Logical Partitioning Updates

The dynamic LPAR (DLPAR) feature allows partitions to be changed while they are up and running. This chapter provides an overview of procedures related to DLPAR operations and outlines planning steps that you should consider before performing a DLPAR operation.

This chapter describes the considerations for adding resources to a partition, moving resources between partitions, and removing resources from partitions. Flowcharts are used to show the general process for each action. The gray highlighting in the flowcharts indicates planning considerations. The black highlighting indicates tasks that are performed using the HMC.

Adding a Processor

The following flowchart shows the basic steps needed to add processors to a partition that is already operational. Before adding processors to a partition, review the following planning considerations and the flowchart.

There are some considerations for each step of this process. Generally, the following questions correlate to a decision step in the flowchart:

- **Are additional processors needed for a partition?** Before adding a processor, ensure that it is necessary. A new application in a partition might require more processors, or there may be performance benefits with additional processors. Refer to your application documentation for recommendations, and also see the *Performance Management Guide* in the AIX documentation library.

- **Are extra processors available?** To answer this question, use the HMC to check the system for available processors. If there are no available processors in your system, you can move a processor from another partition, see "Moving a Processor Between Partitions" on page 26.

- **Are processors available in other partitions?** If other partitions are not busy when you need to move a processor to supplement a partition, you can move the processor from one partition to another. If this is an option you want to use now, go to "Moving a Processor Between Partitions" on page 26. If there are no available processors in your system, you can either use a processor from another partition or add hardware to your system. If your system has Processors on Demand (POD) features installed, you might decide to enable additional processors now, and then add them to partitions as needed.

- **Are POD features available?** If your system has inactive POD features installed, you can activate additional processors, and then add them to partitions as needed. To learn more about POD features, see Chapter 5, "Processor on Demand" on page 37.

- **Does the new number exceed the maximum number of processors in the profile?** When moving processors into a partition, the system allows only as many processors to be added to a partition as are allowed by the maximum set in the partition profile. If you plan to add processors to a partition and the partition is already at its maximum, you must change the partition profile to increase the maximum and then reboot the partition.

- **Do you have more processors to add to another partition?** If you are in the process of moving processors, repeat the process for any additional processor moves you may need to do.

- **Are there any licensing requirements you need to consider?** Check your partition profile worksheets to see if you have noted any licensing requirements when you performed the procedures in "Using the LPAR Planning Worksheets" on page 16.

Start

Additional processors are needed for a partition

Are extra processors available? — Yes →

No ↓

Are processors available in other partitions? — Yes → Go to Move Processor

No ↓

Are CUoD processors available? — Yes → Activate CUoD processors

No ↓

Purchase and install processors and return to Start

HMC:
Select partition to add processors

Select menus:
Dynamic configuration of processors

DLPAR dialog:
Enter number of processors to add to partition

Greater than the maximum number of processors in the profile? — Yes → Reduce the number of processors, or update the partition profile, reboot and try again

No ↓

More processors to add to another partition? — Yes → Return to Start

No ↓

End

Moving a Processor Between Partitions

The following flowchart shows the basic steps needed to move processors from one operational partition to another operational partition. Before moving a processor from one partition to another, make sure that the partition from which you are moving the processor does not need that processor for performance requirements. Use the *Performance Tuning Guide* in the AIX documentation to help identify a partition that can spare processors.

Consider the following point for each step of the process before performing the task of moving a processor:

- **Do you have more processors to move to another partition?** You can move processors into or out of partitions as long as you do not exceed the minimum or maximum values for the partition. Ensure that you can add processors to the target partition (maximum value not exceeded) and that the moving of a processor into a partition does not violate any software license requirements. If you need to move more processors, repeat the process.

```
                    ┌───────┐
                    │ Start │
                    └───┬───┘
                        │
                        ▼
    ┌───────────────────────────┐
    │ HMC:                      │
    │ Select partition          │
    │ containing processors     │◄──────────┐
    │ you want to move          │           │
    │                           │           │
    │ Select menu for           │           │
    │ dynamic reconfiguration   │           │
    │ of processors             │           │
    │                           │           │
    │ Enter the                 │           │
    │ quantity of processors    │           │
    │ to move                   │           │
    └───────────┬───────────────┘           │
                │                            │
                ▼                            │
           ◄ More processors ►              │
             to move to          Yes ───────┘
           ◄ other partitions? ►
                │
                │ No
                ▼
            ┌───────┐
            │  End  │
            └───────┘
```
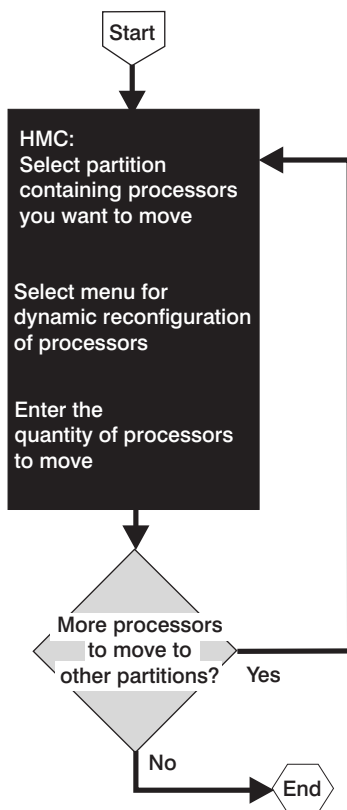
Removing a Processor

Removing a processor from a partition allows you to make processors available to be used by another partition. Before you remove a processor from a partition, prioritize your partitions and try to remove the processor from your lowest-priority partition that has available processors. Prioritizing your partitions helps you minimize the impact to the source partition.

If all of the processors have bound applications, then it might not be possible to remove a processor. Whenever you perform dynamic remove operations, remember that it might be easier to remove a processor from another partition than to reconfigure applications.

The following flowchart shows the basic steps needed to remove processors from an operational partition. Before performing the operation to remove processors, see the following flowchart and planning considerations. Use the *Performance Tuning Guide* in the AIX documentation to help identify a partition that can spare a processor.

- **Is the processor count less than the partition profile minimum?** If you attempt to remove processors from a partition, and the total number of processors that would remain is fewer than the minimum number specified in the partition's profile, the operation will not complete. If this occurs, you must remove a processor from a different partition or reset the partition's minimum value for processors.

```
                    ┌──────────┐
                    │  Start   │
                    └────┬─────┘
                         │
                         ▼
    ┌────────────────────────────┐
    │ HMC:                       │◄──────────────┐
    │ Select partition           │               │
    │ containing processors      │               │
    │ you want to remove         │               │
    │                            │               │
    │ Select processors          │               │
    │                            │               │
    │ Type number of             │               │
    │ processors to remove       │               │
    └────────────┬───────────────┘               │
                 │                                │
                 ▼                    ┌───────────────────────┐
            ╱  Does  ╲                │ Edit profile properties│
          ╱  processor ╲    Yes       │ or remove fewer        │
         ◄  count drop   ►──────────► │ processors             │
          ╲ below       ╱             └───────────────────────┘
           ╲ minimum   ╱
            ╲ profile ╱
             ╲amounts?╱
                 │ No
                 ▼
              ┌──────┐
              │ End  │
              └──────┘
```
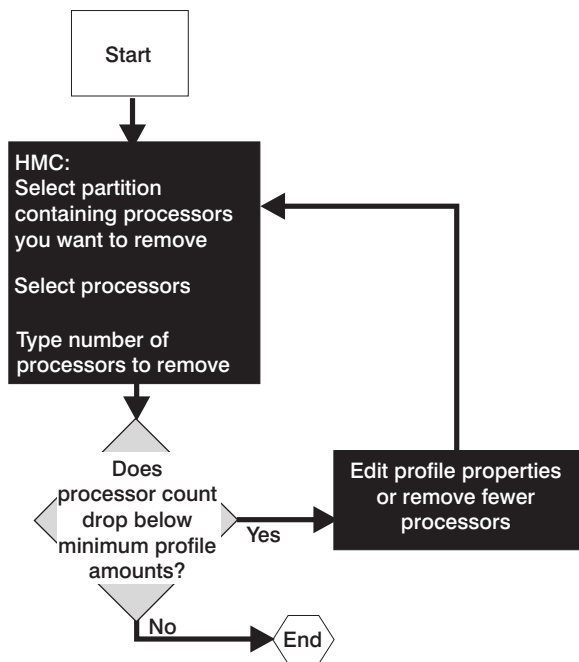
Adding Memory

The following flowchart shows the basic steps needed to add memory to a partition that is already operational. Before adding memory to a partition, review the flowchart and the planning considerations.

Consider the following points for each step of the process before performing the task of dynamically adding memory to a partition:

- **Is additional unused memory available?** To answer this question, use the HMC to check the system for available memory. Determine if memory is available for use in an existing partition. A new application on a partition might require more memory, or there might be performance benefits to increasing the amount of memory that is available to a partition. Refer to your application documentation for recommendations. Refer to the *Performance Tuning Guide* in the AIX documentation to help determine if the partition is doing excessive paging.

- **Does the new memory amount exceed the maximum amount of memory in the profile?** Plan ahead to add memory as needed. When moving memory into a partition, the system allows only as much memory to be added to a partition as is allowed by the profile maximum. If you plan to add memory to a partition and the partition is already at or near its maximum, change the partition profile to increase the maximum and then reboot.

- **Does the new memory size require larger paging space?** Check the applications for paging-space requirements. If necessary, use the operating system to change the paging-space parameters. When planning the memory values for the partition, plan the paging space using the following formula. The maximum amount of paging space that is required in the worst case, assuming that the partition is configured with the maximum amount of memory that is allowed by the partition profile. To this amount, add the difference between the maximum and the minimum. To avoid rebooting the partition to change the maximum memory amount, determine the maximum amount of memory needed during your planning for the partition.

- **Is memory available from other partitions?** If you find that there is not enough available memory for the target partition, you may be able to get memory from other partitions. If a partition is not being used or if a partition has more memory than is needed, make the memory available to other partitions as required.

- **Does the system have room for more physical memory?** If you cannot locate enough memory on your system to fulfill all your partition requirements, contact your sales representative to order additional memory.

- **Do you have more memory to add to another partition?** You can move memory into or out of partitions at any time. If you are in the process of moving memory, repeat the process for any additional memory moves you might need to perform.

```
Start
  │
  ▼
Additional memory                          HMC:
is needed for          ──────────────┐     Select partition
a partition                          │     to add memory
  │                                  │
  ▼                                  │     Select menus:
Is additional                        │     Dynamic configuration
unused memory ───────────────────────┘     of memory
available?    Yes
  │                                        DLPAR dialog:
  No                                       Enter amount          ◄──────┐
  │                                        of memory to add              │
  ▼                                        to partition                  │
Is                                            │                          │
memory                                        ▼                          │
available from                             Greater            Reduce the │
other           Go to                      than the          amount of   │
partitions?  ─► Move                       maximum amount    memory, or  │
           Yes  Memory                     of memory in  ──► update the ─┘
  │                                        the profile?  Yes partition profile,
  No                                          │              reboot and
  │                                          No              try again
  ▼                                           │
Does the system                              ▼
have room for   ─► Purchase                  End
more            Yes and install
physical memory?    memory,
  │                 return to
  No                Start
  │
  ▼
Review your partition
requirements, if
possible, schedule
partition loads to allow
memory to be moved,
go to Move Memory
```

Moving Memory

The following flowchart shows the basic steps needed to move memory from one operational partition to another operational partition. Before performing the operation to move memory, review the following planning considerations and flowchart.

- **Is memory available in the source partition?** Use the HMC to check other partitions to determine if there is enough memory available in those partitions for use in the partition where you need the extra memory. A new application on a partition might require more memory, or there may be performance benefits to increasing the memory that is available to a partition. Refer to your application documentation for recommendations.

- **Are minimum or maximum profile amounts exceeded?** Plan ahead to move memory as needed. Do not allow the moved memory to cause the target partition to exceed the profile maximum for memory. In addition, the source partition's minimum memory amount cannot fall below the minimum memory amount that is assigned.

- **Does the new memory size require larger paging space?** Check your applications for paging-space requirements. If necessary, use the operating system to change the paging-space parameters. For more information about paging space, see "Adding Memory" on page 28.
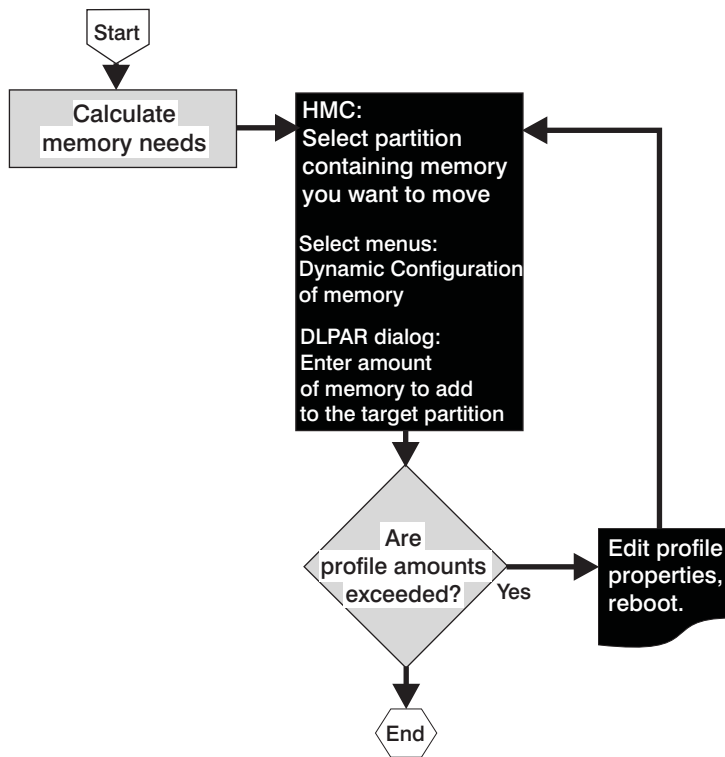
Removing Memory

The following flowchart shows the basic steps needed to remove memory from an operational partition. Removing memory from partitions is a convenient way to have the memory needed to start new partitions. Before performing the operation to remove memory, consider the impacts to the partitions from which you remove memory.
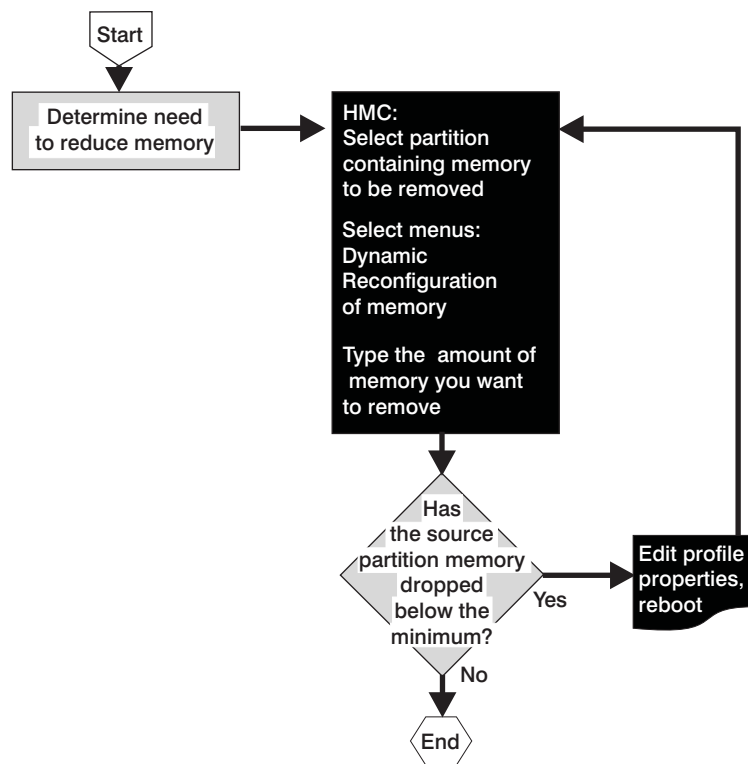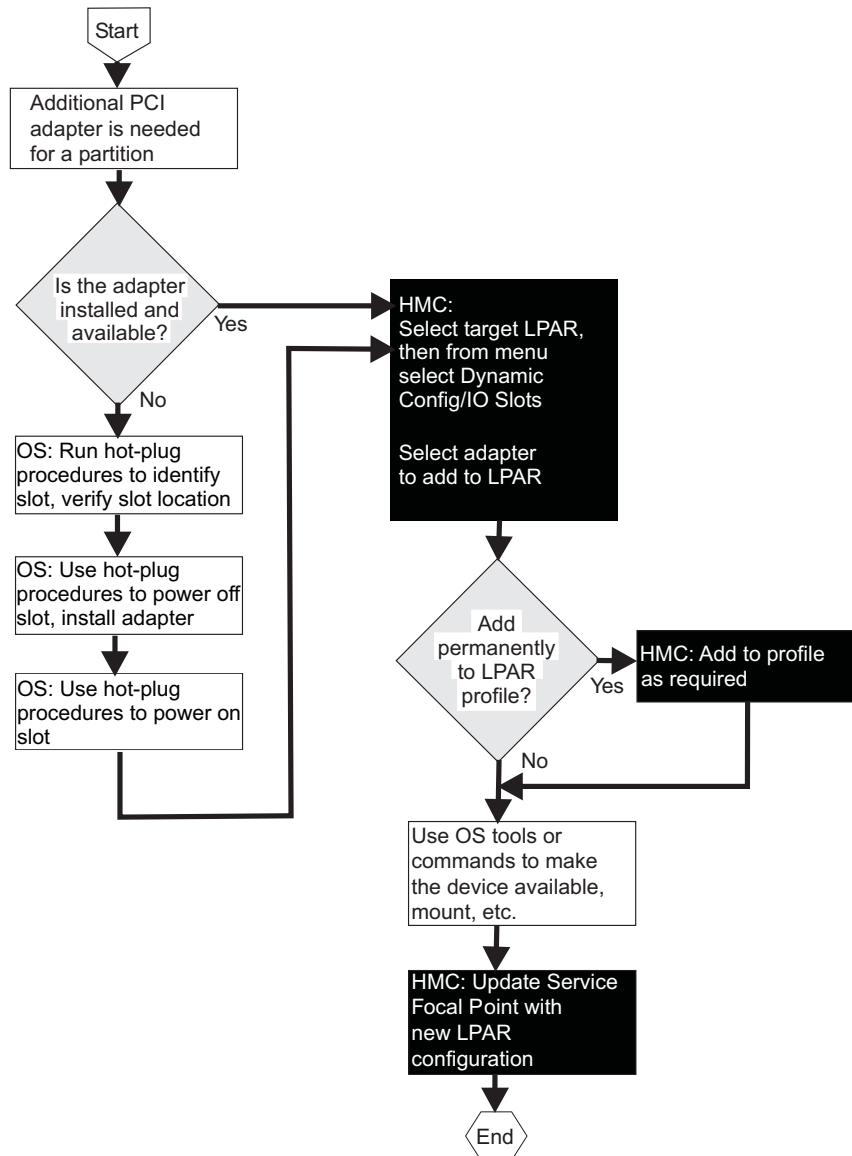
- **Is memory available from a partition?** Use the HMC to check other partitions to determine if there is enough memory available in those partitions for use in the partition where you need the extra memory. A new application on a partition might require more memory, or there may be performance benefits to increasing the memory that is available to another partition. Refer to your application documentation for recommendations.
- **Is the memory amount less than the partition profile minimum?** Plan ahead to move memory as needed. The remove memory operation will fail if the source partition's memory amount falls below the minimum memory amount that is assigned.

```
                  ┌────────┐
                  │ Start  │
                  └───┬────┘
                      │
                      ▼
         ┌───────────────────┐      ┌──────────────────────────┐
         │  Determine need   │─────▶│ HMC:                     │◀──────┐
         │ to reduce memory  │      │ Select partition         │       │
         └───────────────────┘      │ containing memory        │       │
                                    │ to be removed            │       │
                                    │                          │       │
                                    │ Select menus:            │       │
                                    │ Dynamic                  │       │
                                    │ Reconfiguration          │       │
                                    │ of memory                │       │
                                    │                          │       │
                                    │ Type the  amount of      │       │
                                    │  memory you want         │       │
                                    │ to remove                │       │
                                    └────────────┬─────────────┘       │
                                                 │                     │
                                                 ▼                     │
                                            ◇ Has ◇                    │
                                          ◇ the source ◇               │
                                        ◇ partition memory ◇           │   ┌──────────────┐
                                        ◇ dropped          ◇──── Yes ──┼──▶│ Edit profile │
                                          ◇ below the ◇                │   │ properties,  │
                                            ◇ minimum? ◇               └───│ reboot       │
                                                 │                        └──────────────┘
                                                 │ No
                                                 ▼
                                            ┌─────────┐
                                            │  End    │
                                            └─────────┘
```

Adding an Adapter

The following flowchart shows the basic steps needed to dynamically add an adapter to a partition that is already operational. If the adapter is a hot-plug capable adapter, the adapter can be installed in the system and then added to a partition. Before adding an adapter to a partition, review the flowchart and the planning considerations.

- **Is the adapter already installed?** If the adapter is not installed in the system, install the adapter hardware now and then perform the steps to add it to a partition.
- **Do you want to permanently add the adapter to the partition profile?** If the adapter is to be permanently used by a partition, update the partition profile to include the new adapter.
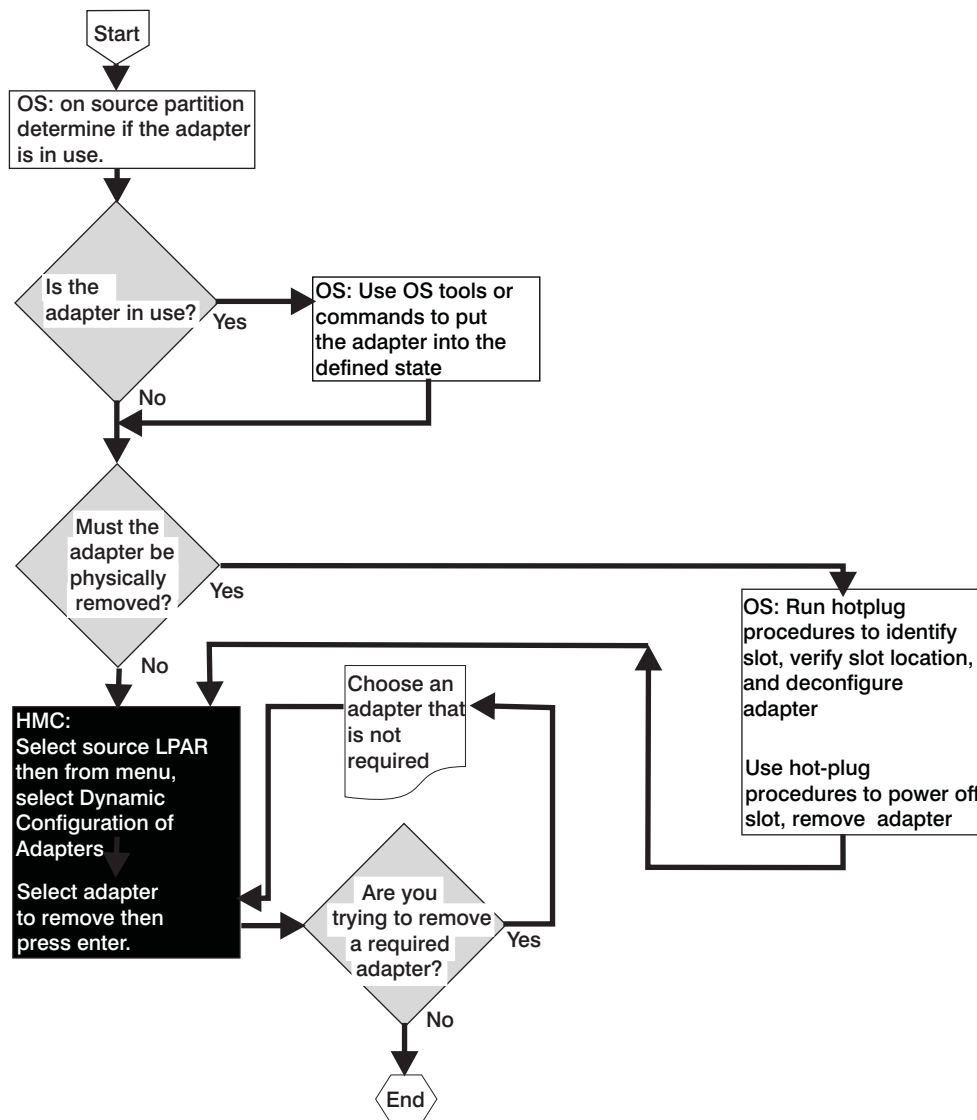
```
                    Start
                      │
                      ▼
            ┌──────────────────┐
            │ Additional PCI   │
            │ adapter is needed│
            │ for a partition  │
            └──────────────────┘
                      │
                      ▼
              ╱───────────╲
             ╱ Is the adapter╲         Yes      ┌──────────────────┐
            ╱  installed and  ╲──────────────▶  │ HMC:             │
            ╲   available?    ╱                  │ Select target    │
             ╲───────────────╱                   │ LPAR,            │
                   │ No                          │ then from menu   │
                   ▼                             │ select Dynamic   │
          ┌──────────────────┐                   │ Config/IO Slots  │
          │ OS: Run hot-plug │                   │                  │
          │ procedures to    │                   │ Select adapter   │
          │ identify slot,   │                   │ to add to LPAR   │
          │ verify slot      │                   └──────────────────┘
          │ location         │                             │
          └──────────────────┘                             ▼
                   │                                 ╱───────────╲
                   ▼                                ╱    Add      ╲    Yes   ┌──────────────────┐
          ┌──────────────────┐                    ╱  permanently   ╲──────▶ │ HMC: Add to      │
          │ OS: Use hot-plug │                    ╲  to LPAR        ╱        │ profile as       │
          │ procedures to    │                     ╲  profile?     ╱         │ required         │
          │ power off slot,  │                      ╲─────────────╱          └──────────────────┘
          │ install adapter  │                           │ No
          └──────────────────┘                           ▼
                   │                             ┌──────────────────┐
                   ▼                             │ Use OS tools or  │
          ┌──────────────────┐                   │ commands to make │
          │ OS: Use hot-plug │                   │ the device       │
          │ procedures to    │                   │ available,       │
          │ power on slot    │                   │ mount, etc.      │
          └──────────────────┘                   └──────────────────┘
                                                          │
                                                          ▼
                                                 ┌──────────────────┐
                                                 │ HMC: Update      │
                                                 │ Service Focal    │
                                                 │ Point with new   │
                                                 │ LPAR             │
                                                 │ configuration    │
                                                 └──────────────────┘
                                                          │
                                                          ▼
                                                        End
```

Moving an Adapter

The following flowchart shows the basic steps needed to move an adapter from one operational partition to another operational partition. Before performing the operation to move an adapter, review the flowchart and the planning considerations.

- **Is the adapter in use?** Before moving an I/O adapter from one partition to another, ensure that the adapter is available in the source partition from which you are moving the adapter. Use the operating system tools to make the adapters available.

- **Must the adapter be physically moved?** As adapters are assigned to different partitions, you might want to move an adapter to a different I/O slot. If you decide to physically move a hot-plug adapter, the PCI adapter hot-plug procedures that are available in the installation or user's documentation for your system, allow this to be done without rebooting partitions.

- **Are you trying to move a required adapter?** Some of the adapters installed for use in a partition are required to be in the partition. Before deciding to move an adapter that is required by a partition, check to ensure that the adapter can be moved.

- **Do you want to permanently add the adapter to a partition profile?** If the adapter is to be permanently used by a partition, update the partition profile to include the new adapter.
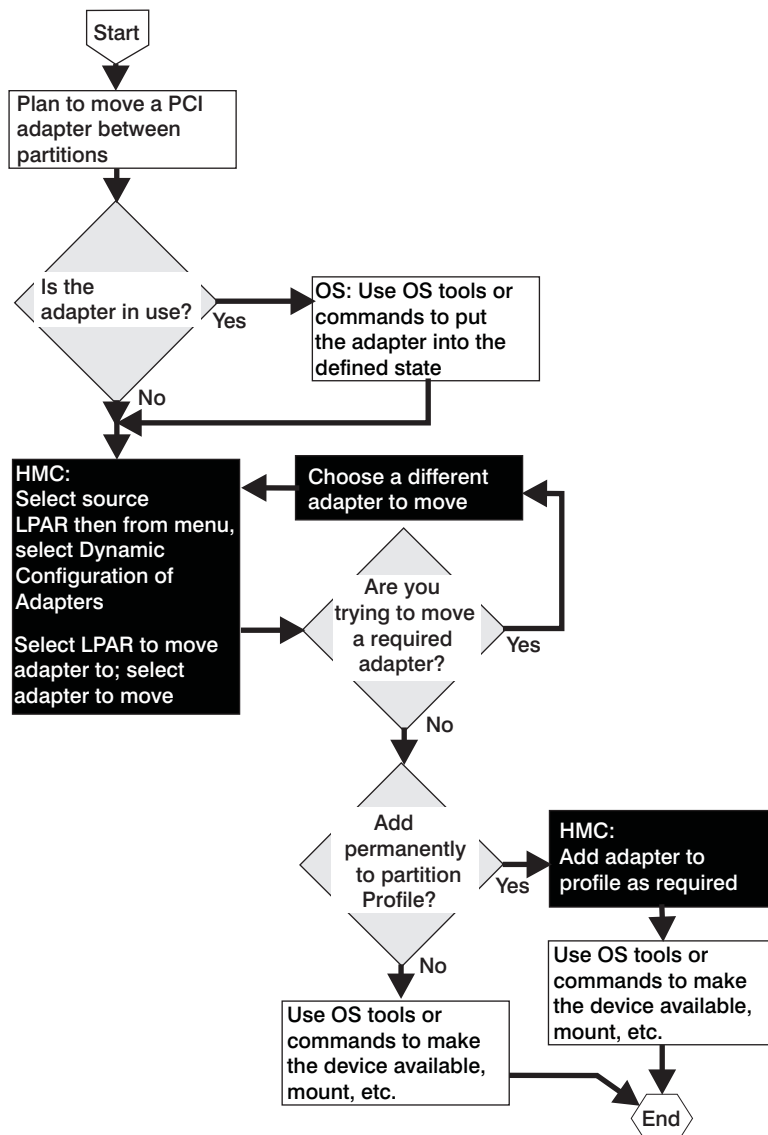
Removing a PCI Adapter

The following flowchart shows the basic steps needed to remove a PCI adapter from an operational partition. You might want to remove an adapter from a partition because:
- You are preparing to start a partition that needs a certain adapter.
- You are upgrading your system.

Before performing the task of removing an adapter, review the flowchart and the planning considerations.
- **Is the adapter in use?** Before removing I/O adapters, ensure that the adapter is available. If necessary, use the operating system tools to change the adapter state to defined.
- **Must the adapter be physically moved?** As adapters are assigned to different partitions, you might want to move an adapter to a different I/O slot. If you decide to physically move a hot-plug adapter, the PCI adapter hot-plug procedures that are available in the installation or user's documentation for your system allow this to be done without rebooting partitions.
- **Are you trying to move a required adapter?** Some of the adapters installed for use in a partition are required for that partition. Before deciding to remove an adapter that is required by a partition, verify that the adapter can be removed.

```
                   ┌────────┐
                   │ Start  │
                   └────────┘
                        │
                        ▼
        ┌──────────────────────────┐
        │ OS: on source partition  │
        │ determine if the adapter │
        │ is in use.               │
        └──────────────────────────┘
                        │
                        ▼
            ◇ Is the              ┌────────────────────┐
            ◇ adapter in use? ─Yes─► OS: Use OS tools or│
            ◇                      │ commands to put    │
                │                  │ the adapter into the│
               No                  │ defined state      │
                │                  └────────────────────┘
                ▼
          ◇ Must the
          ◇ adapter be ──────Yes──────────────────────────┐
          ◇ physically                                     │
          ◇ removed?                       ┌───────────────────────────┐
                │                           │ OS: Run hotplug           │
               No                          │ procedures to identify    │
                │         ┌──────────┐      │ slot, verify slot location,│
                ▼         │ Choose an│◄─┐   │ and deconfigure           │
        ┌──────────────┐  │ adapter  │  │   │ adapter                   │
        │ HMC:         │  │ that     │  │   │                           │
        │ Select source│  │ is not   │  │   │ Use hot-plug              │
        │ LPAR         │  │ required │  │   │ procedures to power off   │
        │ then from    │  └──────────┘  │   │ slot, remove adapter      │
        │ menu,        │                │   └───────────────────────────┘
        │ select       │                │
        │ Dynamic      │          ◇ Are you ──Yes──┘
        │ Configuration│          ◇ trying to remove
        │ of Adapters  │─────────►◇ a required
        │              │          ◇ adapter?
        │ Select adapter│              │
        │ to remove then│             No
        │ press enter. │              │
        └──────────────┘              ▼
                                  ┌───────┐
                                  │  End  │
                                  └───────┘
```

Managing Devices

When you need to add, move, or remove a device such as a SCSI device, you will need to perform those actions for these devices using the PCI slot that contains the adapter to which the devices are connected. For example, to move the CD-ROM device that is attached to a SCSI adapter in a partition, you will need to move the adapter slot for the SCSI adapter from one partition to another. If the CD-ROM is attached to an integrated component (typically at least one SCSI adapter is integrated on a system board or I/O board) the slot that represents the integrated adapter is likewise moved.

Chapter 5. Processor on Demand

The Processor On Demand (POD) feature of some IBM servers allows the server to be manufactured with extra processor capacity built in, ready to be activated when you need it. If your system is ordered with processor on demand features, you can activate the features and pay for the increased processing power as your needs grow.

The processor on demand feature enables you to start small, and then increase your processing capacity without disrupting any of your current operations.

For information about how to activate processor on demand features on your server, refer to "Activating Process for Processor on Demand" on page 39, or refer to the *IBM Hardware Management Console for pSeries Installation and Operations Guide*, order number SA38-0590 that was delivered with your hardware management console.

The processor on demand feature offers the capability to non-disruptively activate two or more processors on a server that was ordered and installed with inactive processor on demand features. The processor on demand feature adds capacity in increments of two processors, up to the maximum number of standby processors. The processor on demand feature adds significant value if you want to upgrade without disruption, handle business peaks, or add new workloads. The processor on demand feature adds permanent capacity growth with no requirement to reboot the server.

Processor on Demand Features

If your system was ordered with processor on demand features, your managed system has a set of processors that are ″active″ and a set of standby processors that are ″not active.″ In the event that an active processor fails, the inactive processors are then available to be used by the system until the failing processor is replaced.

Processor on Demand Activation Features

Standby processors (two or more) can be permanently activated by ordering a quantity of permanent processor on demand activation features. This order is filled when your service provider receives your request, generates an activation code, and delivers it to you. Activation codes can be delivered to you through postal mail and they are posted on the Web.

Capacity Planning

If you are doing capacity planning for models offering processor on demand, plan ahead for any potentially disruptive actions that might inhibit your using fully the capacity of the activated processors. Some actions you may want to take prior to activating any processor on demand features are as follows:

- Perform any I/O updates, such as adding adapters necessary to increase system capacity
- Perform memory upgrades
- Prepare LPAR partitions

By planning ahead, you can accommodate the growth of existing workloads, as well as handle new workloads without requiring a server outage. Other components of a server such as memory and I/O affect performance and overall throughput of workloads. By planning ahead and taking into account the complete server configuration, you can help ensure that you get the full benefit of processor on demand activations.

Note: If you have questions about capacity-planning topics not covered here, contact your sales representative for assistance.

Processor on Demand Ordering

Permanent processor-on-demand capacity can be activated in either of the following scenarios. The description of each of the following scenarios highlights if and when it is necessary to send vital product data (VPD) to IBM.

- **New system order (new footprint):** An order can contain a number of processor on demand activation features. The manufacturing facility fills orders directly at the plant of manufacture, before the server is delivered to the customer.
- **Ordering activation features for an installed server:** After you have determined that you want to permanently activate some or all of your standby processors, contact your business partner or sales representative to place an order.

  When the order record and the VPD are both available to the manufacturing facility, a processor on demand activation code unique to your server is generated. The activation code is mailed to you and posted at a public Web site for quick access:

  http://www.ibm.com/servers/eserver/pseries/cuod/index.html

  As part of the order process, VPD collected from the installed server is combined with information from the actual order records for processor on demand activation features. This combined information is used to generate a processor on demand activation code specifically for your server, enabling the activation of the desired number of standby processors. Allow some time for the order processing and posting of the processor on demand activation code to take place. Then use the code to activate the processor on demand features directly on your server.

  Processor on demand activation features will not be fulfilled until you submit the VPD through the Electronic Service Agent or manually to the following Web site:

  http://www.ibm.com/servers/eserver/pseries/cuod/index.html

  When you enter a processor on demand activation code, standby processors will immediately become activated for use. After their status changes from Standby to Active, the processors can be dynamically moved to the partition where they are needed.

Electronic Service Agent and Processor on Demand

When Electronic Service Agent is used to electronically report VPD on a regular basis, you can eliminate potential delays in the order process for processor on demand activation features (no manual reporting of VPD is necessary prior to the fulfillment of a feature upgrade order). To best utilize Electronic Service Agent and to be prepared to activate processor on demand features conveniently, make sure that Electronic Service Agent and related communications requirements are up and running. If this is done before the processor on demand activation features are ordered, the VPD for the system will already be up to date, and the manual process of updating the VPD is not needed.

After Electronic Service Agent is installed, follow the procedures under "Activating Process for Processor on Demand" on page 39 to enable the system to collect and transfer the required VPD for processor on demand.

If a processor on demand activation feature is ordered and then canceled, an action by the service representative is required to cancel the order. After the activation code is posted on the Web or mailed, the order for processor on demand activation features is considered fulfilled, and the downstream billing process is started.

Dynamic Processor Sparing

In environments with CUoD, Dynamic Processor Sparing allows inactive processors to act as "dynamic spares". An inactive processor is transparently activated if a failing processor reaches a predetermined error threshold, thus helping to maintain performance and improve system availability. Starting with AIX 5L V5.2, this capability is offered on pSeries servers with CUoD to help minimize the impact to server

performance caused by a failed processor. This will happen dynamically and automatically when using DLPAR and the failing processor is detected prior to failure. If not detected prior to failure or not using DLPAR, a reboot of the system will bring onboard an alternate processor from the inactive spares. The user can then re-establish required performance levels without waiting for parts to arrive on-site. Dynamic Processor Sparing does not require the purchase of an Activation Code, it only requires the system have inactive CUoD processors available.

Software Licenses and Processor on Demand

Activating a processor may change the terms and conditions for applications that you use on your server. Consult the application documentation to determine if the license terms and conditions requirements change based on hardware configuration.

Activating Process for Processor on Demand

The processor on demand process begins when you determine a potential need for more processing capability in the future and want to have the hardware installed on the server now. If processor on demand features are ordered for your server, they are included in the server when it is delivered. When additional processors become a necessity, use the following steps to activate them:

1. Determine the number of standby processors you want to activate.
2. Contact your sales representative or business partner to place an order for particular processor on demand activation features.
3. The sales representative places an order to the system coordinator or feature coordinator for the specific number of processor on demand activation features. The order specifies the number of additional processors you have requested to add.
4. To process the order, you must send the system Vital Product Data (VPD) to IBM in either of the following ways:
   - Electronic process (Electronic Service Agent)
   - Web-based VPD entry:

   For details on how to submit the VPD either through the Electronic Service Agent or using the Web system go to the following Web site and locate the document *Planning Guide for Capacity Upgrade on Demand*. The planning guide provides detailed procedures.

   `http://www.ibm.com/servers/eserver/pseries/cuod/index.html`
5. After the Activation Code is received (either from the Web or the mailed copy), enter the Activation Code using the HMC. Detailed procedures are available in the document *Planning Guide for Capacity Upgrade on Demand*.
6. Once you have finished the acivation process, you can assign the activated processors to a partition. If you are using dynamic partitioning (DLPAR), you need not reboot the system to use the processors. If you are not using DLPAR, you must reboot the managed system before the newly activated processors can be used.

   Before adding processors to a partition that is running Linux, you must stop Linux partitions and then restart them after you have assigned the processors.

Begin using the new processor capacity. If you encountered any problems using the preceding process, see the following Web site:

`http://www.ibm.com/servers/eserver/pseries/cuod/index.html`

Appendix A. Notices

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Appendix B. Worksheets for Partition Configuration Planning

This appendix contains worksheets that you can use when planning for partition configuration. Make copies of these worksheets, and be sure to complete the worksheets for each partition that you plan to create.

Partition Properties Worksheet

Complete both of the the following worksheets for each partition that you plan to set up on your system:

1 of 2

Partition Number	Partition Name	Processor Minimum/ Desired/ Maximum	Memory Size Minimum/ Desired/ Maximum (in GB)	Required Network Adapter	Disk Drives	Comments
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
Totals (see note 1 below)						
Total Installed						

Notes:

1. The total memory size should leave enough room for various system overheads of memory usage. See the memory requirements table on page 16

Partition Number	Partition Host Name	Networking Configuration	Application Stack Software Levels	Availability Requirements	Comments (new deployment or migration environment?)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					

I/O Drawer Resource Worksheet

I/O drawers can be installed in different locations. Make a copy of the following worksheet for each I/O drawer in your managed system configuration based on the location code for that drawer. Use the worksheet copy to keep a record of slot usage for each adapter installed in each drawer.

I/O Drawer Location and Serial Number	Adapter Slot Physical Location	Adapter Type	Partition Assignment	Comments
U__.__	P1/Z1			
	P1/Z2			
	P1-I1			
	P1-I2			
	P1-I3			
	P1-I4			
	P1-I5			
	P1-I6			
	P1-I7			
	P1-I8			
	P1-I9			
	P1-I10			
	Px/Z1			
	Px/Z2			
	Px-I1			
	Px-I2			
	Px-I3			
	Px-I4			
	Px-I5			
	Px-I6			
	Px-I7			
	Px-I8			
	Px-I9			
	Px-I10			

System Profile Worksheet

Make a copy of this worksheet to keep track of the resources in the system profiles you create. Create a new worksheet for each additional system profile.

System Profile Name		
Activation Times		
Partition Name	**Number of Desired Processors**	**Desired Memory Size (see Note 1 below)**
Partition 1		
Partition 2		
Partition 3		
Partition 3		
Partition 4		
Partition 5		
Partition 6		
Partition 7		
Partition 8		
Partition 9		
Partition 10		
Partition 11		
Partition 12		
Partition 13		
Partition 14		
Partition 15		
Partition 16		
Totals:		
Total Installed:		

Notes:

1. The desired memory size amount should leave enough room for the various system overheads of memory usage, see the memory requirements table on page 16.

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pSeries
Planning for Partitioned-System Operations

Publication No. SA38-0626-00

Overall, how satisfied are you with the information in this book?

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