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# Introduction to Virtualization

REFERENCE
86 A1 73EW 05

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## Hardware

May 2009

BULL CEDOC
357 AVENUE PATTON
B.P.20845
49008 ANGERS CEDEX 01
FRANCE

REFERENCE
86 A1 73EW 05

Printed in France

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# Contents

# Introduction to virtualization

Power Systems servers and some IBM® BladeCenter® blade servers with Power Architecture® technology offer virtualization technologies to help you consolidate systems, optimize resource utilization, and improve IT flexibility and responsiveness. Virtualizing a system involves planning for, deploying, and managing virtual resources.

## Virtualization overview

Learn about virtual systems, virtual storage, virtual networking, and the benefits of virtualizing these resources.

*Virtualization* is the creation of substitutes for real resources, that is, substitutes that have the same functions and external interfaces as their counterparts, but that differ in attributes, such as size, performance, and cost. These substitutes are called *virtual resources*, and their users are typically unaware of the substitution. Virtualization is commonly applied to physical hardware resources by combining multiple physical resources into shared pools from which users receive virtual resources. With virtualization, you can make one physical resource look like multiple virtual resources. Virtual resources can have functions or features that are not available in their underlying physical resources.

Virtualization can provide the following benefits:

- Consolidation to reduce hardware cost
  - You can use virtualization to efficiently access and manage resources to reduce operations and systems management costs while maintaining needed capacity.
  - You can use virtualization to have a single server function as multiple virtual servers.
- Optimization of workloads
  - You can use virtualization to respond dynamically to the application needs of its users.
  - You can use virtualization to increase the use of existing resources by enabling dynamic sharing of resource pools.
- IT flexibility and responsiveness
  - You can use virtualization to have a single, consolidated view of, and easy access to, all available resources in the network, regardless of location.
  - You can use virtualization to reduce the management of your environment by providing emulation for compatibility and improved interoperability.

When you think about applying virtualization to your current environment, you must think about consolidating logical resources rather than physical resources into a system designed to support server, storage, and network virtualization. By adding any of these virtualization technologies to your environment, you create an on demand, secure, and flexible infrastructure prepared to handle workload changes in your environment.

### Virtual systems

*System virtualization* creates many virtual systems within a single physical system. *Virtual systems* are independent operating environments that use virtual resources. System virtualization can be approached through hardware partitioning or hypervisor technology. *Hardware partitioning* subdivides a physical server into fractions, each of which can run an operating system. These fractions are typically created with coarse units of allocation, such as whole processors or physical boards. This type of virtualization allows for hardware consolidation, but does not have the full benefits of resource sharing and emulation offered by hypervisors. *Hypervisors* use a thin layer of code in software or firmware to achieve

fine-grained, dynamic resource sharing. Because hypervisors provide the greatest level of flexibility in how virtual resources are defined and managed, they are the primary technology for system virtualization.

System virtualization yields the following benefits:

- Consolidate systems, workloads, and operating environments:
  - Multiple workloads and operating systems can be combined onto one physical server, reducing the costs of hardware and operations.
  - New versions of software can be tested on the hardware that they will later use in production mode without affecting production workloads.
  - Virtual systems can be used as low-cost test systems without jeopardizing production workloads.
  - Multiple operating system types and releases can run on a single system. Each virtual system can run the operating system that best matches its application or user requirements.
- Optimize resource use:
  - Hypervisors can achieve high resource use by dynamically assigning virtual resources (such as processors and memory) to physical resources through mechanisms such as dispatching and paging. The virtual resources that they provide can exceed the physical system resources in quantity and functionality.
  - With system virtualization, you can dynamically share physical resources and resource pools. This results in higher resource use, especially for variable workloads whose average needs are much less than an entire dedicated resource.
  - Different workloads tend to show peak resource use at different times of the day and week, so implementing multiple workloads in the same physical server can improve system use, price, and performance.
- Improve IT flexibility and responsiveness:
  - Service providers can create one virtual system or clone many virtual systems on demand, achieving dynamic resource provisioning.
  - Virtual systems with variable resources enable the manual or automated management of workload resources.

## Virtual storage

Virtual storage technology allows multiple logical partitions to share storage adapters and devices. Virtual SCSI adapters interact with the operating system like any other adapter, except that they are not physically present. A logical partition can use virtual SCSI to connect to a hard disk drive or optical device that is shared by multiple logical partitions on the system.

A logical partition can use virtual fibre channel to communicate with storage devices in a storage area network (SAN). Configuring this type of storage resource is available when system supports the use of virtual fibre channel adapters and has a physical fibre channel adapter installed and connected that supports N_Port ID Virtualization (NPIV) ports.

## Virtual networking

Network virtualization is the ability to manage and prioritize traffic in portions of a network that might be shared among different enterprises. This ability allows administrators to use performance, resources, availability, and security more efficiently. The following virtualization technologies primarily exist at the system level and require hypervisor and Licensed Internal Code support to enable sharing between different operating systems:

**Virtual IP address takeover**
The assignment of a virtual IP address to an existing interface. If one system becomes unavailable, virtual IP address takeover allows for automatic recovery of network connections between different servers.

**Virtual Ethernet**
With this technology, you can use internal TCP/IP communication between partitions.

**virtual LAN (VLAN)**
A logically independent network. Several virtual LANs can exist on a single physical switch.

**virtual private network (VPN)**
An extension of a company's intranet over the existing framework of either a public or private network. A VPN ensures that the data that is sent between the two endpoints of its connection remains secure.

## Virtualization technologies

Learn about the POWER6™ hypervisor and the virtualization capabilities that it supports, including logical partitions, Micro-Partitioning™ technology, dynamic logical partitioning, and multiple operating environments. In addition, you can learn about other virtualization capabilities such as PowerVM™ Editions, AIX® workload partitions, and Capacity on Demand.

The following information describes virtualization technologies available with IBM System i® models, IBM System p® servers, and some IBM BladeCenter servers with Power Architecture technology.

You can also use the following e-Learning courses and tutorials to learn about system virtualization:

- IBM Systems PowerVM Editions e-Learning course (This course applies to the PowerVM Standard Edition only.)
- IBM Systems Enterprise Server Virtualization e-Learning course
- IBM Systems Managing Hardware and Logical Partition e-Learning course

To view the Planning and Deploying Virtual Servers e-Learning course, see Learning and tutorials. .

**Related information**

PowerVM Editions Overview

Virtual adapters

## Capacity on Demand offerings

Learn the differences between the Capacity on Demand (CoD) offerings and learn basic information about each offering.

The following table provides a brief description of each CoD offering. Consult your IBM Business Partner or IBM sales representative to select the CoD offering most appropriate for your environment.

*Table 1. Capacity on Demand offerings*

| Offering | Description |
|---|---|
| Capacity Upgrade on Demand | You can permanently activate inactive processors and memory units by purchasing an activation feature and entering the provided activation code. You can do this without restarting your server or interrupting your business. |
| Trial Capacity on Demand | You can evaluate the use of inactive processors, memory, or both, at no charge using Trial CoD. After it is started, the trial period is available for 30 power-on days. |
| On/Off Capacity on Demand | You can activate processors or memory units for a number of days by using the HMC to activate resources on a temporary basis. |

*Table 1. Capacity on Demand offerings (continued)*

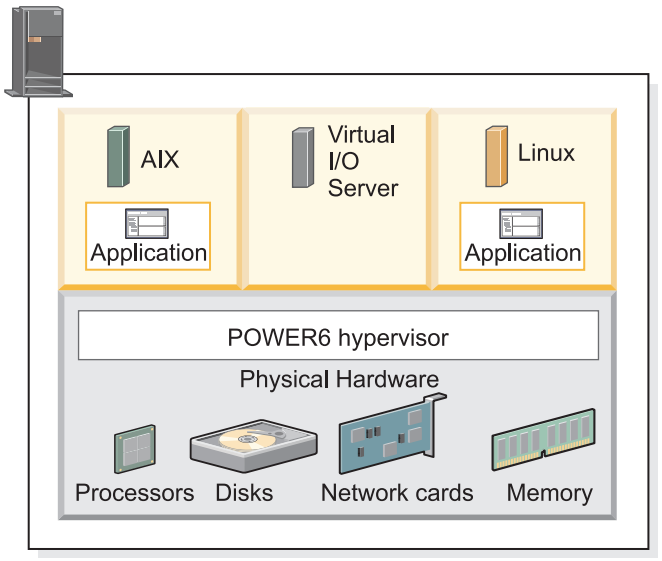
| Offering | Description |
|---|---|
| Utility Capacity on Demand | Utility CoD is used when you have unpredictable, short workload spikes.<br><br>Utility CoD automatically provides additional processor capacity on a temporary basis within the shared processor pool. Use is measured in processor minute increments and is reported at the Utility CoD Web site. |
| Capacity BackUp | You can use Capacity BackUp to provide an off-site, disaster recovery server using On/Off CoD capabilities. The Capacity BackUp offering has a minimum set of active processors that can be used for any workload and a large number of inactive processors that can be activated using On/Off CoD in the event of a disaster. A specified number of no-charge On/Off CoD processor days is provided with Capacity BackUp. |
| PowerVM Editions (PowerVM) | PowerVM Editions (PowerVM Editions) deliver advanced virtualization functions for AIX, IBM i, and Linux® clients.<br><br>PowerVM Editions (PowerVM Editions) include the following offerings:<br>• Micro-Partitioning™<br>• Virtual I/O Server<br>• Integrated Virtualization Manager<br>• Live Partition Mobility<br>• The ability to run x86 Linux applications on POWER® systems |

## POWER Hypervisor

The POWER Hypervisor™ is integrated with all IBM System i models, IBM System p servers, and some IBM BladeCenter blade servers as part of the system firmware. The hypervisor orchestrates and manages system virtualization, including creating logical partitions and dynamically moving resources across multiple operating environments.

The hypervisor provides the ability to divide physical system resources into isolated logical partitions. Each logical partition operates like an independent system running its own operating environment: AIX, IBM i, Linux, and the Virtual I/O Server. The hypervisor can assign dedicated processors, I/O, and memory, which you can dynamically reconfigure as needed, to each logical partition. The hypervisor can also assign shared processors to each logical partition using its Micro-Partitioning feature. Unknown to the logical partitions, the hypervisor creates a shared processor pool from which it allocates virtual processors to the logical partitions as needed. In other words, the hypervisor creates virtual processors so that logical partitions can share the physical processors while running independent operating environments.

The following figure shows a physical system running three logical partitions. Each logical partition is running an operating environment and applications independently of the other logical partitions, while sharing the same physical resources.

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**Related information**

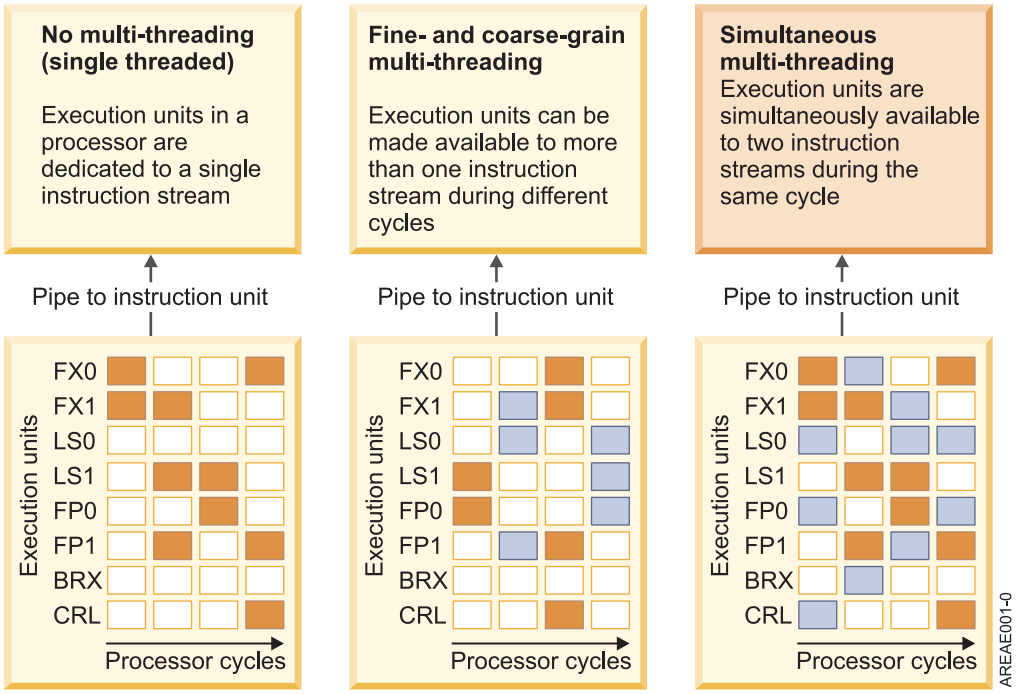
Logical partitioning

## Simultaneous multi-threading

Simultaneous multi-threading is the ability of a single physical processor to simultaneously dispatch instructions from more than one hardware thread context at the same time. Simultaneous multi-threading is designed to produce performance benefits in commercial environments and for workloads that have a high Cycles Per Instruction (CPI) count.

The processor is a superscalar processor that is optimized to read and run instructions in parallel. Simultaneous multi-threading allows you to take advantage of the superscalar nature of the processor by scheduling two applications at the same time on the same processor. No single application can fully saturate the processor. Simultaneous multi-threading also allows instructions from one thread to use all the execution units if the other thread encounters a long latency event. For example, when one of the threads has a cache miss, the second thread can continue to execute. Simultaneous multi-threading is a feature of the POWER5™ and POWER6 processors and is available with shared processors.

The following figure shows how simultaneous multi-threading works:




The figure shows single-threaded mode where all physical resources go to a single thread. POWER systems support single-threading and simultaneous multi-threading.

The figure then shows coarse-grain multi-threading mode where only one thread executes at a time. When a thread encounters a long-latency event, such as a cache miss, the hardware switches to a second thread to use the processing resources, rather than letting the server remain idle. By allowing other work to use what otherwise would be idle processor cycles, this design increases overall system throughput. To conserve resources, both threads share many system resources, such as architectural registers. Therefore, swapping program control from one thread to another requires several cycles.

Finally, the figure shows simultaneous multi-threading mode where the processor retrieves instructions from more than one hardware thread at the same time. The processor schedules instructions for execution from multiple hardware threads concurrently. With simultaneous multi-threading, the system dynamically adjusts to the environment, allowing instructions to execute from each hardware thread if possible, and allowing instructions from one hardware thread to use all the execution units if the other hardware thread encounters a long-latency event.

Simultaneous multi-threading is primarily beneficial in the following contexts:

- In commercial environments where the speed of an individual transaction is not as important as the total number of transactions that are performed. Simultaneous multi-threading is expected to increase the throughput of workloads with large or frequently changing working sets, such as database servers and Web servers.
- Workloads that have a high CPI count. These workloads tend to use processor and memory resources poorly. Large CPI counts are usually caused by high cache-miss rates from a large working set. Large commercial workloads are somewhat dependent upon whether the two hardware threads share instructions or data, or whether the hardware threads are completely distinct. Workloads that share instructions or data, including those that run extensively in the operating system or within a single application, might see increased benefits from simultaneous multi-threading.

## Logical partition overview

*Logical partitioning* is the ability to make a server run as if it were two or more independent servers. When you logically partition a server, you divide the resources on the server into subsets called *logical*

*partitions*. You can install software on a logical partition, and the logical partition runs as an independent logical server with the resources that you have allocated to the logical partition.

You can assign processors, memory, and input/output devices to logical partitions. You can run AIX, IBM i, Linux, and the Virtual I/O Server in logical partitions. The Virtual I/O Server provides virtual I/O resources to other logical partitions with general-purpose operating systems.

Logical partitions share a few system attributes, such as the system serial number, system model, and processor feature code. All other system attributes can vary from one logical partition to another.

You must use tools to create logical partitions on your servers. The tool that you use to create logical partitions on each server depends on the server model and the operating systems and features that you want to use on the server.

## Dynamic logical partitioning

Dynamic logical partitioning allows you to move resources to, from, and between running logical partitions manually without shutting down or restarting the logical partitions.

You can use the POWER Hypervisor to dynamically add and delete dedicated or shared resources (such as processors, I/O, and memory) across logical partitions while the partitions are actively in use. When you apply this dynamic resource allocation, known as *dynamic logical partitioning* or *dynamic LPAR*, you can dynamically redefine all available system resources to reach optimum capacity for each partition. This allows you to share devices that logical partitions use occasionally. The following examples describe situations in which you might want to employ dynamic LPAR:

- Move processors from a test partition to a production partition in periods of peak demand, then move them back again as demand decreases.
- Move memory to a partition that is doing excessive paging.
- Move an infrequently used I/O device between partitions, such as a CD-ROM for installations, or a tape drive for backups.
- Release a set of processor, memory, and I/O resources into the free pool, so that a new partition can be created from those resources.
- Configure a set of minimal logical partitions to act as backup to primary logical partitions, while also keeping some set of resources available. If one of the primary logical partitions fails, you can assign available resources to that backup logical partition so that it can assume the workload.

Dynamic LPAR is supported on all logical partitions running on systems managed by the Hardware Management Console (HMC) or Integrated Virtualization Manager.

## Multiple operating environment support

In a virtual computing environment, a single server can run multiple operating environments simultaneously.

The POWER Hypervisor provides the ability to divide physical system resources into isolated logical partitions. Each logical partition operates like an independent system that is running its own operating environment. You can use this to consolidate dedicated servers on to a single server, which can reduce the costs of hardware and operations by optimizing the use of resources.

The following table describes operating environment support for each server platform.

*Table 2. Multiple operating environment support details*

| Machine type | POWER6 processor-based systems | POWER5 processor-based systems |
|---|---|---|
| IBM System i | • AIX 5L™ version 5.3 with the 5300-06 Technology Level or later<br>• IBM i V5R4 or later<br>• SUSE Linux Enterprise Server 10 SP 1 or later<br>• Virtual I/O Server version 1.4 or later (Integrated Virtualization Manager version 1.5 or later) | • AIX 5L version 5.2 or later<br>• IBM i V5R3 or later<br>• SUSE Linux Enterprise Server 8 or later<br>• Red Hat Enterprise Linux version 3 or later<br>• Virtual I/O Server version 1.0 or later |
| IBM System p | • AIX 5L version 5.3 with the 5300-06 Technology Level or later<br>• SUSE Linux Enterprise Server 10 SP 1 or later<br>• Virtual I/O Server version 1.4 or later (Integrated Virtualization Manager version 1.4 or later) | • AIX 5L version 5.2 or later<br>• SUSE Linux Enterprise Server 8 or later<br>• Red Hat Enterprise Linux version 3 or later<br>• Virtual I/O Server version 1.0 or later (version 1.2 or later for Integrated Virtualization Manager) |

## Virtual adapters

With virtual adapters, you can connect logical partitions with each other without using physical hardware. Operating systems can display, configure, and use virtual adapters just like they can display, configure, and use physical adapters. Depending on the operating environment used by the logical partition, you can create virtual Ethernet adapters, virtual fibre channel adapters, virtual Small Computer Serial Interface (SCSI) adapters, and virtual serial adapters for a logical partition.

The system administrator uses the following tools to create virtual adapters:

- Hardware Management Console (HMC)
- Integrated Virtualization Manager
- Virtual Partition Manager

Adapters can be added while the system is running using dynamic logical partitioning. The virtual adapters are recorded in system inventory and management utilities. Converged location codes can be used to correlate operating-system level or partition-level software entities to adapters, such as eth0, CMN21, and en0. Similarly, the Ethernet adapters are visible in the same way as physical Ethernet adapters.

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

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

## Client support for virtual I/O

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

*Table 3. Client support for virtual I/O by operating system*

| Client operating system | Virtual console | Virtual Ethernet | Virtual fibre channel | Virtual disk | Virtual optical | Virtual tape |
|---|---|---|---|---|---|---|
| AIX | Yes | Yes | Yes | Yes | Yes, on HMC-managed systems, at least one Virtual I/O Server logical partition must be present | Yes |
| IBM i | Yes | Yes | No | Yes | Yes | No |
| Linux | Yes | Yes | Yes | Yes | Yes | Yes |

AIX logical partitions support booting from virtual devices, including disk boot from virtual disk, network boot from virtual Ethernet, and tape boot from virtual tape.

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

## Server support for virtual I/O

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

*Table 4. Server support for virtual I/O by operating system*

| Server | Virtual optical | Virtual console | Virtual disk | Virtual tape | Virtual fibre channel |
|---|---|---|---|---|---|
| IBM i | Yes | Yes | Yes | Yes | No |
| Linux | Yes | Yes | No | No | No |
| Virtual I/O Server | Yes | Yes | Yes | Yes | Yes |

Virtual I/O Server provides SCSI disk, shared Ethernet, virtual fibre channel, virtual optical, and virtual tape functions to logical partitions that use Virtual I/O Server resources. The Virtual I/O Server also provides a virtual console to AIX and Linux logical partitions.

IBM i provides disk, CD, tape, and console functions to logical partitions that use IBM i resources. IBM i uses standard IBM i network server storage and network server descriptions to provide disk, CD, and tape resources to other logical partitions. An IBM i logical partition cannot simultaneously provide virtual resources to other logical partitions and use virtual resources provided by another IBM i logical partition or by the Virtual I/O Server logical partition.

To configure virtual I/O for the logical partitions on your managed system, you must create virtual I/O adapters on the HMC or Integrated Virtualization Manager. Virtual I/O adapters are usually created when you create your logical partitions. Alternatively, you can add virtual I/O adapters to running logical partitions using dynamic logical partitioning. After you create a virtual I/O adapter, you can then access the operating system used by the logical partition and complete the configuration of the virtual

I/O adapter in the operating system software. For Linux partitions, virtual adapters are listed in the device tree. The device tree contains virtual SCSI adapters, not the devices under the adapter.

### Logical Host Ethernet Adapter

A logical Host Ethernet Adapter (LHEA) is a special type of virtual adapter. Even though an LHEA is a virtual resource, an LHEA can exist only if a physical Host Ethernet Adapter, or Integrated Virtual Ethernet, provides its resources to the LHEA.

**Related information**

Logical Partitions
You can set up, manage, and troubleshoot AIX, IBM i, Linux, and Virtual I/O Server logical partitions using the Hardware Management Console (HMC), Integrated Virtualization Manager, or Virtual Partition Manager. By creating logical partitions, you can reduce the footprint of your datacenter by consolidating servers, and maximize the use of system resources by sharing resources across logical partitions.

## AIX workload partitions

Workload partitions (WPARs) are virtualized operating system environments within a single instance of the AIX operating system. WPARs secure and isolate the environment for the processes and signals that are used by enterprise applications.

WPARs provide an isolated application environment that minimizes potential interactions with system objects or processes outside the WPAR. Even though a WPAR is using the same operating system instance as other WPARs or the global environment, the ability to view or interact with processes or devices outside the partition is limited.

The following table describes the types of WPARs that you can create:

*Table 5. WPAR types*

| WPAR type | Description |
|---|---|
| System WPAR | Autonomous virtual system environment with its own private file systems, users and groups, login, network space, and administrative domain. Most traditional system services are virtualized at the WPAR level, and they can be independently used and managed within each WPAR. While the system WPAR environment is largely partitioned and isolated, read-only file systems might be shared between WPARs to facilitate the sharing of application data and text. |
| Application WPAR | Provide an environment for isolation of applications and their resources to enable checkpoint, restart, and relocation at the application level. Application WPARs use fewer system resources than system WPARs. Application WPARs do not require their own instance of system services. |

IBM Workload Partitions Manager™ for AIX (WPAR Manager) is a platform management solution that provides a centralized point of control for managing WPARs across a collection of managed systems running AIX. WPAR Manager includes the following features:

- Cross-system management of WPARs, including life-cycle management
- Global load balancing with application mobility
- Web-based administration of basic WPAR operations and advanced management tasks
- Monitoring and reporting of WPAR performance metrics

**Related information**

Workload Partitions for AIX
The Partition Load Manager for AIX 5L provides automated processor and memory resource management across logical partitions that are capable of dynamic logical partitioning on AIX 5L.

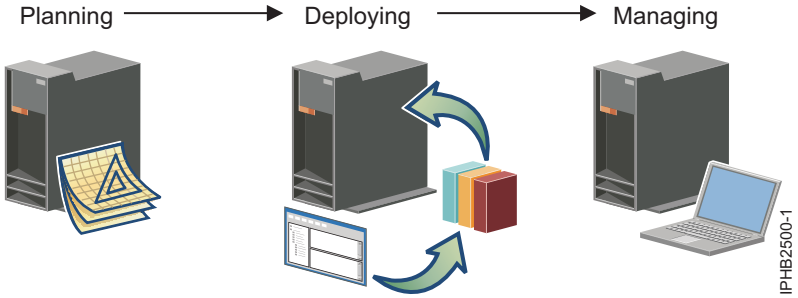
## Virtualization tasks

You can plan for, deploy, and manage virtual systems, and learn about the tools available to help you complete each task.

Virtualizing a system consists of the following high-level tasks:

1. Plan your virtualization configuration
2. Deploy your virtualization configuration
3. Manage your virtual resources and virtual systems

Throughout this book, versions of the following figure are used in the task topics to help you quickly understand where you are in the overall virtualization task flow:




The following sections provide further explanation of the planning, deploying, and managing stages of the virtualization task flow. Each section includes a description of subtasks and tools that can help you complete each stage.

You can also use the Planning and Deploying Virtual Servers e-Learning course to learn about the overall process and tools available to help you plan for and deploy virtualization on your system. The Planning and Deploying Virtual Servers course provides the following information:

- The benefits of employing a virtualization strategy and how logical partitions can help answer server management challenges.
- The process for planning and deploying logical partitions, and introduces the tools that can assist you. Specifically, it provides a high-level tutorial of the System Planning Tool.
- Example scenarios of companies that have planned and deployed virtualization technologies using these tools.

To view the Planning and Deploying Virtual Servers e-Learning course, see Learning and tutorials. .

## System plans on the HMC

You can use system plans with the Hardware Management Console (HMC) to perform a number of high-level system management tasks.

You can use system plans with the HMC to accomplish the following goals:

- You can deploy a system plan that you create based on one system that an HMC manages to other systems that the HMC manages with identical hardware as that in the system plan. Note that any internal drive bays and external SCSI cables also must be cabled in an identical manner on the target system. In this way, you can rapidly configure and use other, similar systems in your business.

- You can export a system plan from one HMC to another HMC and use it to deploy the system plan to other systems that the target HMC manages with identical hardware, and identical cabling, as that in the system plan. In this case and the previous case, you can use the system plan to create logical partitions on new managed systems that do not already have logical partitions created on them.
- You can convert a system plan that you created by using the HMC for use in the System Planning Tool (SPT). However, the SPT Conversion Wizard can convert a limited amount of hardware information from the original system plan. How much the wizard can convert depends on the operating environment of the logical partition and the version of the HMC that you used to create the system plan.

  You must use the SPT to manually specify any missing or incomplete information. After you convert the system plan, you can use the SPT to edit the system plan for redeployment of newly added partitions or additional provisioning items for Virtual I/O Server partitions. For example, assume that you converted an HMC system plan that contains two client logical partitions. You can use the SPT to add another logical partition and to specify Ethernet adapters, Small Computer System Interface (SCSI) disks, and virtual Ethernet adapters for the new partition. You then can use the HMC to redeploy the modified system plan to configure the new logical partition.

  However, if you make changes to a number of existing items in the system plan, the system plan cannot pass validation or the changed item cannot be deployed. For example, you cannot use a system plan to make changes to the attributes for a partition and then deploy that system plan to make those changes to the already deployed partition.

To create logical partitions from a system plan, you must first complete the following tasks:

1. Create the system plan.
2. Import the system plan (when necessary).
3. If you are deploying a system plan that you created in the SPT, verify that cards and disk drives on the target system are in the same locations specified for the cards and disk drives that are in the system plan. Also, verify that any cabling instructions for disk-drive bays have been followed. You can obtain these instructions by means of the Report function in the SPT.
4. If you are deploying a system plan that you created by using the HMC, verify that the hardware and cabling on the target system is identical to that on the source system.
5. Deploy the system plan.

After you create a system plan, you also can view, delete, and export the system plan. The following table provides a complete overview of system plan tasks.

*Table 6. Overview of the tasks for system plans*

| Task | Overview |
| --- | --- |
| Create a system plan | You can create system plans by using any of the following methods:<br>• System Planning Tool (SPT)<br>*SPT* helps you design a system to fit your needs, whether you want to design a logically partitioned system or want to design an unpartitioned system. SPT incorporates the function from Workload Estimator to help you create an overall system plan. The SPT opens the Workload Estimator to help you gather and integrate workload data, and provides advanced users with the option of creating a system plan without the help of additional tools.<br>• Hardware Management Console (HMC) Web user interface<br>You can use the HMC to create a system plan based on the configuration of one managed system and can use the HMC to deploy that plan to another managed system. Based on the logical partition configuration in the system plan, the HMC creates logical partitions on the managed system to which it deploys the system plan. Depending on the contents of the system plan, the HMC can install operating environments on the logical partitions in the plan and, if the plan contains Virtual I/O Server provisioning information for a partition, such as storage assignments, the HMC can make these resource assignments for the partition.<br>• HMC command-line interface<br>You also can use the **mksysplan** command to create a system plan. After the system plan is created, you can also use the command-line interface to deploy that plan to a managed system. Based on the logical partition configuration in the system plan, the HMC creates logical partitions on the managed system to which it deploys the system plan. |
| Import the system plan | Before you can use a system plan to create logical partitions, the system-plan file must exist on the HMC that manages the managed system to which you want to deploy the system plan. If the system-plan file does not already exist on the HMC, you must import the file into the HMC. You can use the HMC Web user interface to import the file into the HMC from one of the following sources:<br>• Upload the system-plan file from the remote console (the computer from which you remotely access the HMC)<br>• Copy the system-plan file to media (optical disc or USB drive), insert the media into the HMC, and import the file from the media.<br>• Download the system-plan file from a remote FTP site.<br>**Note:** You can also use the HMC command-line interface to import a system plan.<br>After you import the system-plan file into an HMC, you can deploy the system plan within that file to other systems that the HMC manages. |

*Table 6. Overview of the tasks for system plans (continued)*

| Task | Overview |
|---|---|
| Deploy the system plan | You can choose to deploy a system plan in stages, with some logical partitions being created in one stage, and other logical partitions being created in later stages. You cannot, however, deploy a system plan to a managed system if the managed system has logical partitions that are not also in the system plan. Also, if you want to deploy a system plan in stages, you need to create a new system plan if you change the resource allocations on the logical partitions on the managed system between stages to avoid validation problems in later stages.<br><br>When you deploy a system plan by using the HMC Web user interface, the HMC validates the system plan. The managed system on which you deploy a system plan must have hardware, including any internal drive bay cabling and external SCSI cabling, that is identical to the hardware in the system plan. The HMC deploys a system plan to a managed system only if the system plan level is supported by the HMC, the format of the system plan is valid, and the hardware and each existing logical partition on the managed system passes validation.<br><br>If the system plan contains installation information about the Virtual I/O Server, you can use the Deploy System Plan Wizard to install the Virtual I/O Server and assign virtual networking and storage resources for the client logical partitions. Beginning with HMC Version 3.3.0, and later, you also can use the wizard to install the AIX or Linux operating environments on client logical partitions if the necessary installation information is in the system plan. |
| Export the system plan | You can use the HMC Web user interface to export a system-plan file from the HMC to one of the following locations:<br>• Save the system-plan file to the remote console (the computer from which you remotely access the HMC).<br>• Export the system-plan file to media that is mounted to the HMC (such as optical discs or USB drives).<br>• Export the system-plan file to a remote FTP site.<br><br>**Note:** You can also use the HMC command-line interface to export a system plan. |
| View the system plan | You can look at the contents of a system-plan file in the HMC by using the System Plan Viewer that is integrated with the HMC. The System Plan Viewer uses a navigation tree and tables to display the information in the system-plan file. It includes features such as dynamic table-column sorting and displaying EADS boundary lines. You can open a system plan in the System Plan Viewer, either by using the View System Plan task or by clicking the name of a system plan. When you start the System Plan Viewer, you must enter your HMC user ID and password before you can view the system plan.<br>**Note:** Some messages, such as cabling instructions for internal drive bays, are viewable only when you use the System Plan Viewer in the SPT. |
| Print the system plan | You can use the System Plan Viewer to print a system plan that you have open in the Viewer. You can print all of the system plan or a portion of the system plan, depending on the current view of the system plan. To print the current view of the system plan, click **Print** in the Actions pane of the System Plan Viewer. |
| Delete the system plan | You can delete unnecessary system plans from your HMC. |

To learn more about how to maximize the amount of information that you can obtain in a system plan that you create by using the HMC, see System plan validation on the HMC.

To learn more about how the system plan validation process on the HMC affects system plan deployment, see System plan validation on the HMC.

To learn more about how to maximize the amount of information that you can obtain in a system plan that you create by using the HMC, see Optimizing data when creating a system plan on the HMC.

## System plans on the Integrated Virtualization Manager

You can use system plans with the Integrated Virtualization Manager (IVM) to perform a number of high-level system management tasks. For example, you can create a system plan based on an existing system and deploy that system plan onto a different system.

You can use system plans with the Integrated Virtualization Manager to accomplish the following goals:

- You can use the Integrated Virtualization Manager (IVM) to create a system plan based on the managed system, export that system plan, and import it into another. You then can deploy the system plan to the system that the other manages when that system has hardware that is identical to the hardware in the system plan. Note that any internal drive bays and external SCSI cables also must be cabled in an identical manner on the target system.
- You can convert a system plan that you created by using theIVM for use in the System Planning Tool (SPT). However, the SPT Conversion Wizard can convert only a limited amount of hardware information from the original system plan. For example, a converted system plan from IVM prior to version 1.5.2, contains information for only a few, if any, PCI cards and the system plan does not contain any information about disk drives. In contrast, a converted system plan from Integrated Virtualization Manager version 1.5.2, or later, contains information for most PCI cards and Serial Attached SCSI (SAS) disk drives. You must use the SPT to manually specify any missing or incomplete information.

  After you complete the conversion process, you can edit the system plan for redeployment of newly added partitions or additional provisioning items for Virtual I/O Server partitions. For example, assume that you converted an v system plan that contains two client logical partitions. You can use the SPT to add another logical partition and to specify Ethernet adapters, Small Computer System Interface (SCSI) disks, and virtual Ethernet adapters for the new partition. You then can use the IVM to redeploy the modified system plan to configure the new logical partition. However, if you make changes to a number of existing items in the system plan, the system plan cannot pass validation or the changed item cannot be deployed. For example, you cannot use a system plan to make changes to the attributes for a partition and then deploy that system plan to make those changes to the already deployed partition.

To create logical partitions on an IVM managed system from a system plan, you must first complete the following tasks:

1. Create the system plan.
2. Import the system plan (when necessary).
3. If you are deploying a system plan that you created in the SPT, verify that cards and disk drives on the target system are in the same locations as the cards and disk drives that are specified in the system plan. Also, verify that any cabling instructions for disk-drive bays have been followed. You can obtain these instructions by means of the Report function in the SPT.

   **Note:** If you are deploying a system plan that has operating installation information, you cannot use the IVM Web user interface to do so. Instead, you must use the IVM command line interface (CLI) to install operating environments as part of system plan deployment. See Installing operating environments from a system plan with Integrated Virtualization Manager for more information about how to deploy such as system plan.
4. If you are deploying a system plan that you created by using the IVM, verify that the hardware and cabling on the target system is identical to that on the source system.
5. Deploy the system plan.

After you create a system plan, you also can view, delete, and export the system plan. The following table provides a complete overview of system plan tasks.

*Table 7. Overview of the tasks for system plans*

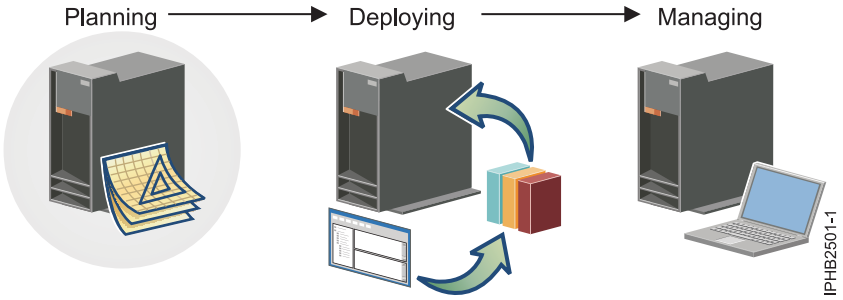
| Task | Overview |
|---|---|
| Create a system plan | You can create system plans by using any of the following methods:<br>• System Planning Tool (SPT)<br>*SPT* helps you design a system to fit your needs, whether you want to design a logically partitioned system or want to design an unpartitioned system. SPT incorporates the function from Workload Estimator to help you create an overall system plan. The SPT opens the Workload Estimator to help you gather and integrate workload data, and provides advanced users with the option of creating a system plan without the help of additional tools.<br>• Integrated Virtualization Manager Web user interface (GUI)<br>You can use the IVM to create a system plan based on the configuration of the managed system. You can export the system plan to the local file system. You then can use the IVM on another managed system to import the system plan from the local file system and deploy that plan to its managed system. Based on the logical partition configuration in the system plan, the IVMcreates logical partitions on the managed system to which it deploys the system plan.<br>• IVM command-line interface<br>You also can use the **mksysplan** command to create a system plan. The IVM creates the system plan based on the configuration information of the existing managed system and stores this information in the system plan. After using the **mksysplan** command, you can also use the command-line interface to perform other tasks, such as deploy the system plan. |
| Import the system plan | Before you can use a system plan to create logical partitions, the system-plan file must exist on the IVM management partition. If the system-plan file does not already exist on the management partition, you must import the file into the management partition. You can import the file into the management partition by using the IVM Web interface. This allows you to upload the plan from your local file system.<br><br>After you import the system-plan file into the management partition, you can deploy the system plan within that file to the managed system. |
| Deploy the system plan | When you deploy a system plan, the IVM validates the system plan. The IVM deploys a system plan to a managed system only if the system plan level is supported by the IVM, the format of the system plan is valid, and the hardware and each existing logical partition on the managed system passes validation. Additionally, the managed system must be in the manufacturing default configuration, unless you are using IVM 1.5.2, or later, to deploy a system plan. For IVM 1.5.2, and later, if the managed system is not in the manufacturing default configuration, the managed system must have hardware that is identical to the hardware in the system plan. This includes any internal drive bay cabling and external SCSI cabling.<br><br>When using IVM 1.5.2, or later, you can choose to deploy a system plan in stages, with some logical partitions being created in one stage, and other logical partitions being created in later stages. You cannot, however, deploy a system plan to a managed system if the managed system has logical partitions that are not also in the system plan. Also, if you want to deploy a system plan in stages, you need to create a new system plan if you change the resource allocations on the logical partitions on the managed system between stages to avoid validation problems in later stages. |
| Export the system plan | You can export a system plan from the IVM to the local file system by using Web browser functions so that you can use the system plan for deployment on other systems. |

*Table 7. Overview of the tasks for system plans (continued)*

| Task | Overview |
|---|---|
| View the system plan | You can look at the contents of a system-plan file in the IVM by using the System Plan Viewer that is included with the IVM. The System Plan Viewer uses a navigation tree and tables to display the information in the system-plan file. It includes features such as dynamic table column sorting and displaying EADS boundary lines. When you start the System Plan Viewer, you must enter your IVM user ID and password before you can view the system plan.<br>**Note:** Some messages, such as cabling instructions for internal drive bays, are viewable only when you use the System Plan Viewer in the SPT. |
| Print the system plan | You can use the System Plan Viewer to print a system plan that you have open in the Viewer. You can print all of the system plan or a portion of the system plan, depending on the current view of the system plan. To print the current view of the system plan, click **Print** in the Actions pane of the System Plan Viewer. |
| Delete the system plan | You can delete unnecessary system plans from the IVM. |

## Planning to virtualize a system

Plan your virtualization configuration so that you can optimize your resources to meet your computing needs.




Planning your virtualization configuration includes the following tasks:

- Planning for logical partitions, operating environments, capacity, workloads, and performance by using either the System Planning Tool (SPT) or creating your own strategy
- Planning for Capacity on Demand
- Planning for Live Partition Mobility
- Planning for AIX workload partitions

The following table describes the tools available to help you plan your virtualization configuration.

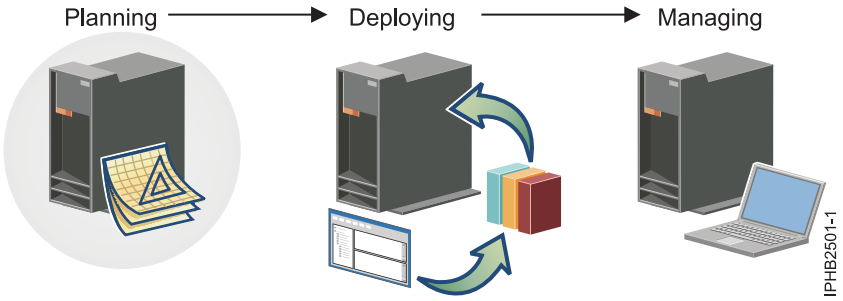
| Virtualization planning tool | Description |
|---|---|
| System Planning Tool (SPT) | SPT is a PC-based, Web-browser application that helps you design, create, and validate a system plan. A *system plan* is a specification of the hardware and the logical partitions contained in one or more systems.<br><br>To help you get started, SPT provides the following options:<br>• SPT provides sample system plans that you can use as a starting point for planning your system.<br>• You can create a system plan based on existing performance data. SPT launches IBM Performance Management for System i5® (PM for System i5)to help you gather and integrate performance data.<br>• You can create a system plan based on new or anticipated workloads. SPT launches IBM Systems Workload Estimator (WLE) to help you gather and integrate workload data.<br>• With SPT version 3.0, you can copy logical partitions from a system in one system plan to either another system in the same system plan or to a different system in another system plan. For example, you can build up system plans that contain your own sample logical partitions, and then copy one or more of these sample logical partitions into a new system plan that you are creating.<br>• SPT provides advanced users with the option of creating a system plan without the help of additional tools.<br><br>After you have created a system plan, you can export the system plan for ordering or deployment as follows:<br>• You can export the system-plan file as a configuration file with the extension .cfr. Then, you can import the file into the marketing configurator (eConfig) for ordering. When you import the .cfr file into the eConfig tool, the tool populates your order with the information from the .cfr file. The .cfr file does not contain all the information required by the eConfig tool. You must enter the required information before you submit your order.<br>• You can save the system plan in a system-plan file, and then import the file into the Hardware Management Console (HMC) or the Integrated Virtualization Manager and deploy the system plan to the managed system. The HMC or Integrated Virtualization Manager creates logical partitions (on the managed system) based on the logical partition configuration specified in the system plan.<br><br>You cannot use SPT to plan for your IBM BladeCenter blade server. |
| IBM Systems Workload Estimator (WLE) | WLE provides system resource recommendations based on the planned number of logical partitions and the planned workloads for each logical partition. It can also use performance data collected by PM for System i5. WLE can estimate the computer resources required for Domino®, WebSphere® Commerce, WebSphere Application Server, Web Serving, and traditional workloads. WLE projects the most current server models meeting the capacity requirements within the processor utilization objectives. |
| IBM Performance Management for System i5 (PM for System i5) | PM for System i5 provides the capability to automatically collect system performance information (processor usage, memory usage, and so on) from a system at regular intervals, and then aggregate this data to show usage trends. You can access information about system performance, capacity, and growth. You can also access supported Web-based reporting and system sizing tools for WebSphere, Domino, and Linux. When used in conjunction with WLE, you can use PM for System i5 to plan for the growth, performance, and availability of your system. |

## Planning to virtualize a system managed by the HMC

Create a system plan using the System Planning Tool. Then, optionally plan for Capacity on Demand, Partition Mobility, and AIX workload partitions.

The following procedure applies to POWER6 processor-based systems. However, most of the planning tasks also apply to POWER5 processor-based systems. For planning information pertaining to POWER5 processor-based systems, see the Creating a virtual computing environment topic collection in the IBM Systems Information Center.

Within the virtualization task flow, you are in the planning stage.




The following table outlines the planning tasks that you must complete to plan your virtualization configuration. The table also provides information resources that can help you complete each planning task.

*Table 8. Planning tasks and associated resources for system virtualization*

| Planning task | Resources to help you complete the task |
|---|---|
| 1. Create a system plan using the System Planning Tool (SPT). SPT helps you plan your system configuration, which can include the following information:<br>• Resource preferences and allocations for each logical partition, which can include shared processors (also called Micro-Partitioning technology)<br>• Correct locations for hardware components needed to support your logical partition configuration<br>• Operating environments that can run in each logical partition, which include the Virtual I/O Server, AIX, IBM i, or Linux<br>• Operating environment installation for Virtual I/O Server, AIX, or Linux<br>• Virtual I/O configuration, including configuration specifications for virtual SCSI adapters and virtual Ethernet adapters | • System Planning Tool<br>• Planning for Virtual I/O Server using system plans |
| 2. Optional: Plan for Capacity on Demand | Preparing for Capacity on Demand |
| 3. Optional: Plan for Partition Mobility | HMC environment for Partition Mobility |
| 4. Optional: Plan for AIX workload partitions | IBM Workload Partitions for AIX |
| | |

You are ready to deploy virtualization technologies when you have the following System Planning Tool (SPT) outputs available:

- A system-plan file that you can import to the Hardware Management Console (HMC) and deploy to the managed system.
- A hardcopy of your system plan that you can use as a guide to help you arrange hardware components to support your logical partition configuration.

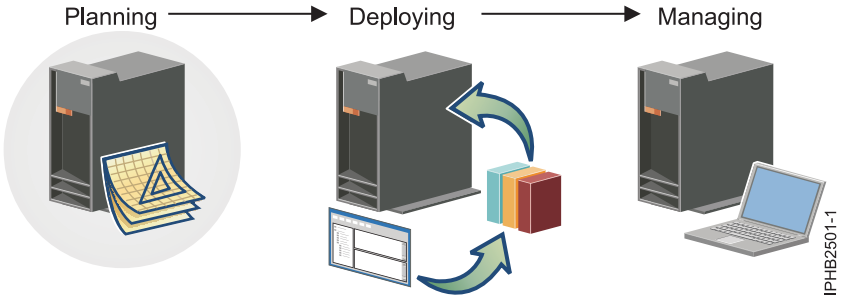
For instructions, see Deploying virtualization to a system managed by the HMC.

## Planning to virtualize a system managed by the Integrated Virtualization Manager

Create a system plan using the System Planning Tool. Then, optionally plan for Partition Mobility and AIX workload partitions.

The following procedure applies to IBM System p, IBM System i, and IBM BladeCenter POWER6 processor-based systems.

Within the virtualization task flow, you are in the planning stage.




The following table outlines the planning tasks that you must complete to plan your virtualization configuration. The table also provides information resources that can help you complete each planning task.

*Table 9. Planning tasks and associated resources for system virtualization*

| Planning task | Resources to help you complete the task |
|---|---|
| 1. If your system is an IBM System p or IBM System i server, create a system plan using the System Planning Tool (SPT). SPT helps you plan your system configuration, which can include the following information:<br>• Resource preferences and allocations for each logical partition, which can include shared processors (also called Micro-Partitioning technology)<br>• Correct locations for hardware components needed to support your logical partition configuration<br>• Operating environment that will run in each logical partition<br>• Virtual I/O configuration, including configuration specifications for virtual SCSI adapters and virtual Ethernet adapters | • System Planning Tool<br>• Planning for the Integrated Virtualization Manager using system plans |
| 2. If your system is an IBM BladeCenter blade server, create a system plan using the mksysplan command. | Integrated Virtualization Manager mksysplan Command |
| 3. Optional: Plan for Partition Mobility | Moving the mobile partition using the Integrated Virtualization Manager. |
| 4. Optional: Plan for AIX workload partitions | IBM Workload Partitions for AIX |

You are ready to deploy virtualization technologies when you have the following System Planning Tool (SPT) outputs available:

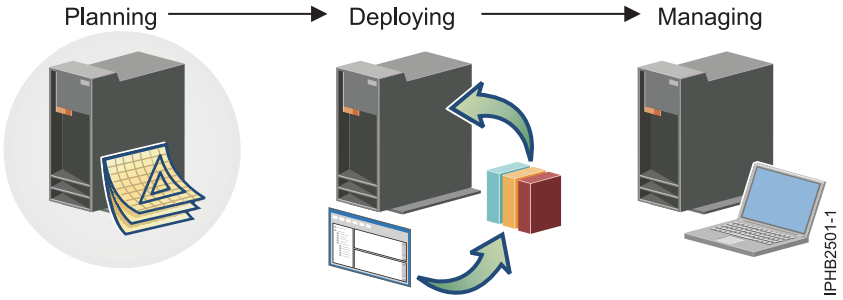
- A system-plan file that you can import to the Integrated Virtualization Manager and deploy to the managed system.
- A hardcopy of your system plan that you can use as a guide to help you arrange hardware components to support your logical partition configuration.

For instructions, see Deploying virtualization to a system managed by the Integrated Virtualization Manager.

## Planning to virtualize a system managed by the Virtual Partition Manager

Plan for logical partitions, capacity (including Capacity on Demand), and performance.

Within the virtualization task flow, you are in the planning stage.




The following procedure applies to IBM System i POWER6 processor-based models. For planning information pertaining to POWER5 processor-based models, see the Solution planning topic collection in the IBM Power Systems® hardware information.

The following table outlines the planning tasks that you must complete to plan your virtualization configuration. The table also provides information resources that can help you complete each planning task.

*Table 10. Planning tasks and associated resources for system virtualization*

| Planning task | Resources to help you complete the task |
|---|---|
| Plan for logical partitions. Subtasks can include:<br>• Take inventory of your current environment, and what is available<br>• Design and validate your partition configuration<br>• Identify the console you will use to interact with the system and its operating systems<br>• Determine how the partitions will communicate with other partitions, systems, or workstations<br>• Decide if you want your operating systems to share I/O resources with each other<br>• Plan for software licensing in an environment with logical partitions | Planning for logical partitions |
| Plan for capacity. Subtasks can include:<br>• Establish current workload size<br>• Estimate future workloads<br>• Optimize current usage<br>• Plan to simulate the environment<br>• Prepare for Capacity on Demand | Preparing for Capacity on Demand |

*Table 10. Planning tasks and associated resources for system virtualization (continued)*

| Planning task | Resources to help you complete the task |
|---|---|
| Plan for performance. Subtasks can include:<br>• Build a plan for performance<br>• Understand the tools available to you<br>• Identify performance considerations for operating system release requirements<br>• Plan to create a performance baseline<br>• Plan for performance management services<br>• Plan to test your solution's performance<br>• Plan to sustain performance through growth | Planning for performance |

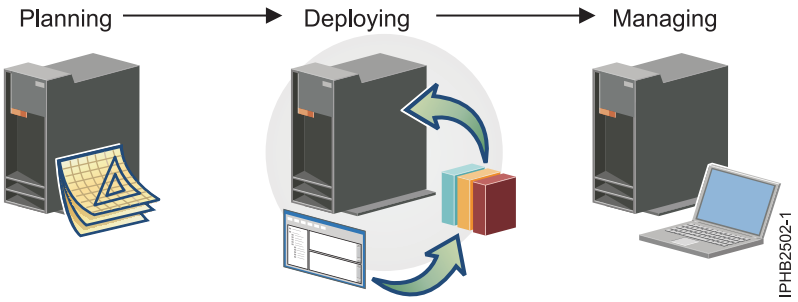
You are ready to deploy virtualization technologies when you have prepared a complete strategy for your logical partition configuration. At a minimum, ensure that your strategy includes the following information:

- The number of logical partitions you will create
- The amount and types of resources you will allocate to each logical partition
- The correct locations of hardware components needed to support your logical partition configuration
- The operating system that will run in each logical partition
- Performance and capacity requirements of projected workloads

For instructions, see Deploying virtualization to a system managed by the HMC.

## Deploying virtualization to the system

You can create logical partitions, install operating systems, and deploy Capacity on Demand, Partition Mobility, and AIX workload partitions using tools and instructions.




Deploying your virtualization configuration includes the following tasks:

1. Creating logical partitions and assigning virtual or physical resources to them by deploying a system plan
2. Installing operating environments in the logical partitions
3. Deploying Capacity on Demand
4. Preparing the environment for Partition Mobility
5. Deploying AIX workload partitions

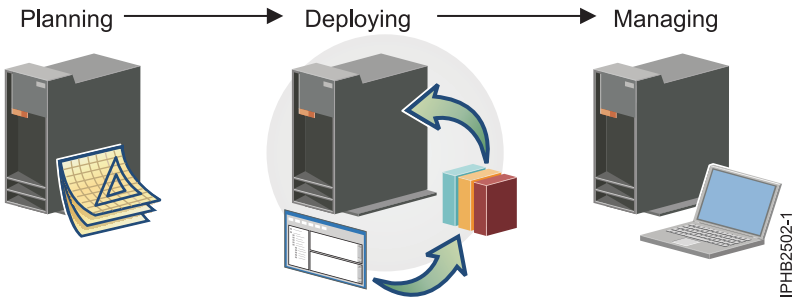
The following table describes the tools available to help you deploy your virtualization configuration.

| Virtualization deployment tool | Description |
|---|---|
| Hardware Management Console (HMC) | You can import a system plan (created using SPT) to the HMC, and the HMC can deploy that plan to the managed system. The HMC creates logical partitions, assigns processors and memory to the partitions, installs some operating environments, and configures virtual networking and storage based on the logical partition configuration specified in the system plan. |
| Integrated Virtualization Manager | The Integrated Virtualization Manager is the user interface to the management partition (the Virtual I/O Server) on some IBM System p and IBM System i models that are not managed by an HMC and some IBM BladeCenter blade servers with Power Architecture technology.<br><br>On IBM System p and IBM System i servers, you can import a system plan that was created using SPT or the mksysplan command to the Integrated Virtualization Manager. The Integrated Virtualization Manager deploys that plan to the managed system by creating logical partitions, assigning processors and memory to the partitions, and configuring virtual networking and storage based on the logical partition configuration specified in the system plan.<br><br>Starting with the IVM version 2.1, and later, you can use the IVM command line interface (CLI) to deploy a system plan that contains operating environment installation information for a client logical partition. By using the CLI, you can install AIX or Linux operating environments on client logical partitions in a system plan. |

## Deploying virtualization to a system managed by the HMC

You can deploy a system plan, install operating systems, and, optionally, deploy Capacity on Demand, Partition Mobility, and AIX workload partitions to a system that is managed by a Hardware Management Console (HMC).

Within the virtualization task flow, you are in the deploying stage.




The following tasks and resources contain information specific to POWER6 processor-based IBM System i models and IBM System p servers, as well as the HMC version 7.

Before you start, ensure that you have completed the following tasks:

1. Ensure that you have completed the required planning tasks. For instructions, see Planning to virtualize a system managed by the HMC. For example, as a result of planning for logical partitions, you have a system-plan file that specifies information such as the number of logical partitions you want to create and the resources that each logical partition needs.
2. Ensure that you have the following System Planning Tool (SPT) outputs available:
   - A system-plan file that you can import to the HMC and deploy to the managed system.

- If you have not already set up your system and your system plan includes hardware placement specifications, you need a hardcopy of your system plan. You can use it as a guide to help you arrange hardware components to support your logical partition configuration.

If an IBM Business Partner or marketing representative completed the planning tasks for the system, obtain the system-plan file from your IBM Business Partner or marketing representative.

3. Verify that your system is set up and operational.
4. If you plan to deploy a system plan that includes AIX or Linux installation information for at least one client logical partition, ensure that you meet the following requirements:
   - The HMC is at V7R3.3.0, or later.
   - The client logical partition does not have an operating system already installed.

   The HMC installs AIX and Linux on client logical partitions that do not already have an operating system installed. If the client logical partition already has an operating system installed, the HMC does not deploy the operating system that is specified in the system plan.

The following table outlines the deployment tasks that you must complete to deploy your virtualization configuration. The table also provides information resources that can help you complete each deployment task.

*Table 11. Deployment tasks and associated resources for system virtualization*

| Deployment task | Resources to help you complete the task |
|---|---|
| 1. If your system plan includes a Virtual I/O Server logical partition, enter the activation code for PowerVM Editions. | Entering the activation code for PowerVM Editions using the HMC |
| 2. Deploy the system plan. | Deploying a system plan by using the HMC |
| 3. If any of the logical partitions in your system plan are IBM i partitions, install IBM i in those logical partitions. | Installing, upgrading, and deleting IBM i and related software |
| 4. Optional: Deploy Capacity on Demand. | Activating Capacity on Demand |
| 5. Optional: Prepare the environment for Partition Mobility. | HMC environment for Partition Mobility |
| 6. Optional: Deploy AIX workload partitions. | IBM Workload Partitions for AIX |

After you have created virtual resources and configured logical partitions, virtual systems management is the next consideration. Managing a virtual system is similar to managing a dedicated, stand-alone system. For information about managing virtual systems, see Managing virtual systems.

**Deploying a system plan by using the HMC:**

You can use the Hardware Management Console (HMC) to deploy all or part of a system plan to a managed system.

When you deploy a system plan, the HMC creates logical partitions on the managed system according to the specifications in the system plan. Depending on the contents of the system plan, you can also install operating environments on the logical partitions in the plan, including the Virtual I/O Server (VIOS), AIX or Linux.

**Note:** The HMC cannot install the IBM i operating environment on a logical partition.

If the plan contains VIOS provisioning information for a logical partition, such as storage assignments and virtual networking for the client logical partitions of the VIOS. the HMC can make these resource assignments for the client logical partitions.

You do not have to deploy a system plan in its entirety, but can instead partially deploy a system plan on the target system by selecting which logical partitions in the plan to deploy. You can run the Deploy System Plan Wizard again at another time to deploy the remainder of the logical partitions in the system plan. However, if you select a VIOS partition to be deployed, the wizard deploys all the VIOS provisioning items that are planned for that partition even if the client logical partition that uses the provisioned item is not selected for deployment.

If the system plan contains installation information for the VIOS, you can use the Deploy System Plan Wizard to install the VIOS and to set up virtual networking and storage resources for the client logical partitions of the VIOS.

Before you deploy a system plan, complete the following tasks:

- Ensure that the system-plan file exists on the HMC. If the system-plan file does not exist on the HMC, you must import the system-plan file into the HMC. For instructions, see Importing a system plan into an HMC.
- Ensure that you meet all the appropriate requirements for deploying the system plan. See System plan deployment requirements for more information.

**Deploying a system plan**

To use the HMC to deploy a system plan on a managed system, complete the following steps:

1. In the navigation area of the HMC, select **System Plans**.
2. In the contents area, select the system plan that you want to deploy.
3. Select **Tasks** → **Deploy system plan**. The Deploy System Plan Wizard starts.
4. On the Welcome page, complete the following steps:
   a. Select the system-plan file that contains the system plan that you want to deploy.
   b. Choose the managed system to which you want to deploy the system plan and click **Next**. If the system plan does not match the managed system to which you want to deploy the plan, the wizard displays a window that informs you of this. Click **OK** to continue or **Cancel** to select a different system plan.

      **Note:** If the system-plan file contains multiple system plans, the wizard provides a step so that you can select a specific system plan from the file. This step does not occur unless there is more than one system plan in the specified file.
5. On the Validation page, complete the following steps:
   a. Wait for the wizard to validate the managed system and its hardware against the system plan. The validation process can take several minutes.
   b. If the validation process completes successfully, click **Next**.
   c. If the validation process fails, correct the problems that the error messages describe, click **Cancel** to exit the wizard, and restart this procedure from the beginning. To help you correct any validation problems, you might want to create a system plan that is based on the current configuration of the managed system. Such a system plan allows you to compare the system plan that you want to deploy with the current configuration of the managed system. You can do this by using the Create System Plan task in the HMC, or you can run the following command from the HMC command line:

      ```
      mksysplan -m name_of_managed_system -f name_of_new_system_plan.sysplan
      ```

      This action creates a new system plan that you can view and compare to the old system plan to help diagnose any problems.
6. Optional: On the Partition Deployment page, if you do not want to create all of the logical partitions, partition profiles, virtual adapter types, or virtual adapters in the system plan, clear the boxes in the **Deploy** column beside the logical partitions, partition profiles, virtual adapter types, or virtual

adapters that you do not want to create. Virtual serial adapters are required in virtual slots 0 and 1 for each logical partition. You cannot create the logical partition unless you create these virtual serial adapters.

7. Optional: On the Operating Environment Install page, if there is operating environment installation information specified in the system plan, complete the following steps:
   a. Select the operating environments that you want to deploy to the managed system for each logical partition. For HMC V7R3.2.0 or V7R3.1.0, you can deploy only the Virtual I/O Server operating environment. For HMC V7R3.3.0, or later, versions, you also can select to deploy the AIX or Linux operating environments if the system plan contains installation information for them.
   b. Enter the location of the Virtual I/O Server installation image.
   c. Enter or change late-binding installation settings for the specified Virtual I/O Server, AIX, or Linux operating environment. Late-binding installation settings are settings that are specific to the installation instance and must be supplied during the installation step to ensure that the settings are accurate for the installation instance. For example, you can enter the IP address of the target logical partition on which you are installing the operating environment.

      **Note:** If you need to use automatic installation files to deploy an operating environment, you cannot add them during the HMC deployment process. You must use the System Planning Tool (SPT) to create any necessary automatic installation files separately and attach them to the system plan prior to deploying the system plan.
   d. Save any changes that you make to late-binding installation settings. You can save them to the current system-plan file or to a new system-plan file.
8. On the Summary page, review the system deployment step order and click **Finish**. The HMC uses the system plan to create the specified logical partitions and to install any specified operating environments. This process can take several minutes.

After you finish the deployment of the system plan, install operating environments and software on the logical partitions, if they did not install as part of system plan deployment.

**Related information**

Logical Partitions
You can set up, manage, and troubleshoot AIX, IBM i, Linux, and Virtual I/O Server logical partitions using the Hardware Management Console (HMC), Integrated Virtualization Manager, or Virtual Partition Manager. By creating logical partitions, you can reduce the footprint of your datacenter by consolidating servers, and maximize the use of system resources by sharing resources across logical partitions.

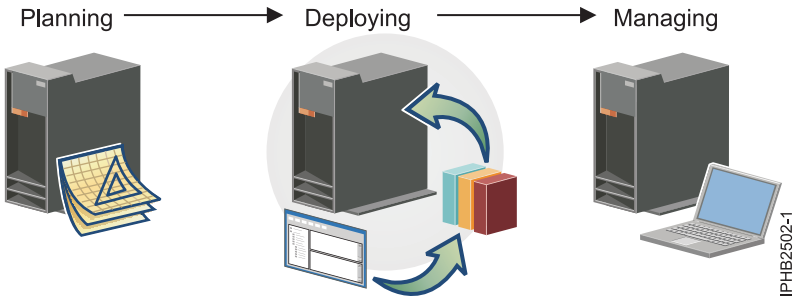
Managing HMC users and tasks

## Deploying virtualization to a system managed by the Integrated Virtualization Manager

You can deploy a system plan, install operating systems, and, optionally, deploy Partition Mobility and AIX workload partitions to a system that is managed by the Integrated Virtualization Manager.

The following procedure applies to IBM System p, IBM System i, and IBM BladeCenter POWER6 processor-based systems.

Within the virtualization task flow, you are in the deploying stage.




Before you start, ensure that you have completed the following tasks:

1. Ensure that you have completed the required planning tasks. For instructions, see the "Planning to virtualize a system managed by the Integrated Virtualization Manager" on page 20 topic. For example, as a result of planning for logical partitions, you should have a system-plan file that specifies information like the number of logical partitions you want to create and the resources that each logical partition needs.
2. Verify that your system is set up and operational.

The following table outlines the deployment tasks that you must complete to deploy your virtualization configuration. The table also provides the information resources that can help you complete each deployment task.

*Table 12. Deployment tasks and associated resources for system virtualization*

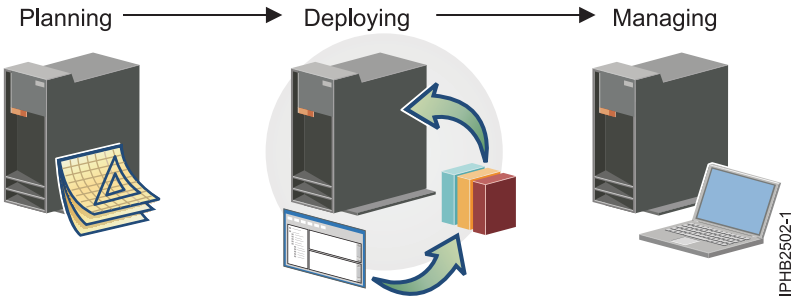
| Deployment task | Resources to help you complete the task |
|---|---|
| 1. Install the Integrated Virtualization Manager. | Installing the Integrated Virtualization Manager. |
| 2. If the server is an IBM System p or IBM System i server, and both of the following scenarios apply to your situation, then you must enable PowerVM Editions on the system:<br>• Your system plan contains more than two client logical partitions that use shared processors or virtual SCSI.<br>• PowerVM Editions is not enabled on the system. | Entering the activation code for PowerVM Editions with the Integrated Virtualization Manager. |
| 3. Deploy the system plan for System i and System p. **Note:** For an IBM BladeCenter blade server, you need to manually configure partitions for Integrated Virtualization Manager. | • System i and System p: Deploying a system plan by using the Integrated Virtualization Manager.<br>• IBM BladeCenter blade server: Manually configuring the management partition and client logical partitions. |
| 4. Install AIX, IBM i, or Linux in the logical partitions. | • AIX Installation and Migration<br>• Installing, upgrading, and deleting IBM i and related software<br>• Installing Linux |
| 5. Optional: Prepare the environment for Partition Mobility. | Moving the mobile partition using the Integrated Virtualization Manager. |
| 6. Optional: Deploy AIX workload partitions. | IBM Workload Partitions for AIX |

After you have created virtual resources and configured logical partitions, virtual systems management is the next consideration. Managing a virtual system is similar to managing a dedicated, stand-alone system. For information about managing virtual systems, see "Managing virtual systems" on page 28.

## Deploying virtualization to a system managed by the Virtual Partition Manager

You can create logical partitions and install operating systems on a system that is managed by the Virtual Partition Manager.

Within the virtualization task flow, you are in the deploying stage.




Before you start, ensure that you have completed the following tasks:

1. Ensure that you have completed the required planning tasks. For instructions, see the "Planning to virtualize a system managed by the Virtual Partition Manager" on page 21 topic. For example, as a result of planning for logical partitions and planning for workloads, you should know the number of logical partitions you want to create and the resources that each logical partition needs.
2. Verify that your system is set up and operational.
3. Verify that IBM i is installed. For instructions that specify how to install IBM i, see Installing, upgrading, and deleting IBM i and related software.

The following table outlines the deployment tasks that you must complete to deploy your virtualization configuration. The table also provides the information resources that can help you complete each deployment task.

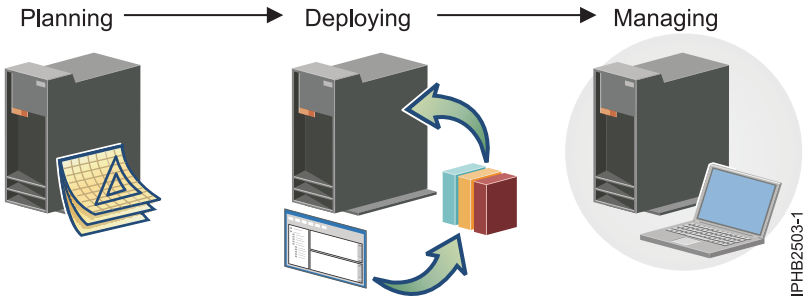
*Table 13. Deployment tasks and associated resources for system virtualization*

| Deployment task | Resources to help you complete the task |
|---|---|
| 1. Create logical partitions. | Virtual Partition Manager: A Guide to Planning and Implementation PDF, chapter 5: Creating Linux Partitions using Virtual Partition Manager |
| 2. Install Linux in the logical partitions. | Installing Linux |
| 3. Optional: Set up IBM i virtual I/O resources for Linux partitions. | Virtual Partition Manager: A Guide to Planning and Implementation PDF:<br>• Chapter 6: Establish Network Connectivity for Linux Partitions<br>• Chapter 7: Setting up IBM i Virtual I/O Resources for Linux Partition |

After you have created virtual resources and configured logical partitions, virtual systems management is the next consideration. Managing a virtual system is similar to managing a dedicated, stand-alone system. For information about managing virtual systems, see the "Managing virtual systems" topic collection.

# Managing virtual systems

You can manage virtual resources on a single system (or group of like systems) and then expand that management view across multiple, heterogeneous systems.




After you plan for and deploy virtualization technologies to the system, the next consideration is systems management. Managing virtual resources on a single system (or group of like systems) means performing traditional systems management tasks in a virtual environment (an environment with virtual systems and virtual resources). You can use virtual systems management tools such as the Hardware Management Console (HMC), Integrated Virtualization Manager, Partition Load Manager, Virtual I/O Server, or IBM Workload Partitions Manager for AIX (WPAR Manager). In addition, you can use IBM Systems Director to manage IBM Power Systems servers.

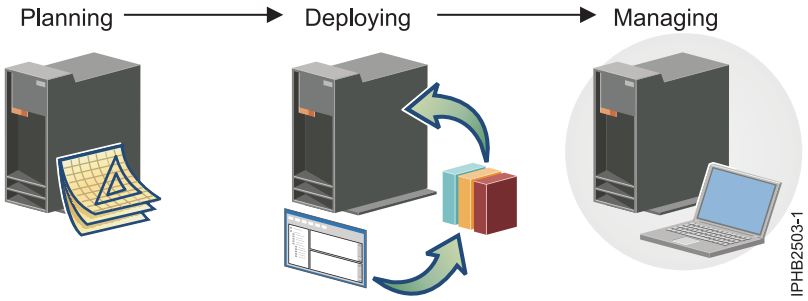
**Related information**

Managing IBM Power Servers with IBM Systems Director 6.1

## Managing a virtual system

You can manage virtual resources on a single system (or group of like systems) using virtual systems management tools.

Within the virtualization task flow, you are in the managing stage.




After you plan for and deploy virtualization technologies to the system, the next consideration is systems management. The IBM Power Systems servers, IBM eServer™ OpenPower® servers, and IBM BladeCenter blade servers with Power Architecture technology support a variety of operating environments. With multiple operating environments, systems management becomes more complex.

Managing your virtualization configuration means performing traditional systems management tasks in a virtual environment (an environment with virtual systems and virtual resources). For example:

- Configure a Shared Ethernet Adapter
- Create AIX workload partition (WPAR) groups and monitor performance metrics of WPARs
- Dynamically add, move, or remove processing resources, memory, and I/O devices to, from, or between logical partitions
- Move, or relocate, a logical partition or a WPAR from one system to another
- View partition workload status and statistics for AIX logical partitions.

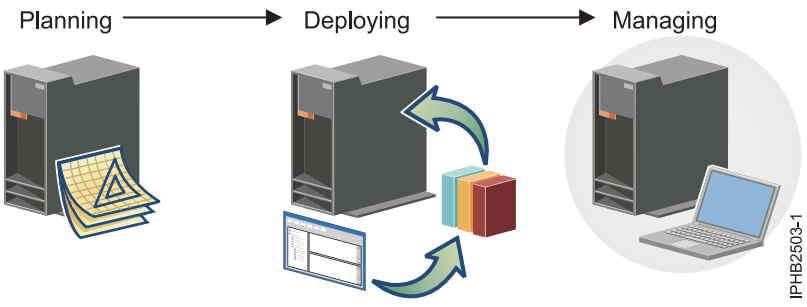
The following table describes the tools available to help you manage virtual resources on a single system (or group of like systems).

| Virtualization management tool | Description |
|---|---|
| IBM Systems Director | IBM Systems Director simplifies management by providing a single interface to manage Power Systems and platform managers such as the Hardware Management Console (HMC) and the Integrated Virtualization Manager (IVM). IBM Systems Director simplifies Power systems management in several key areas:<br>• Consolidated IT management<br>• Visualization of system resources<br>• Health monitoring<br>• Updates |
| Hardware Management Console (HMC) | The HMC is a hardware appliance that you can use to configure and control one or more managed systems. You can use the HMC to create and manage logical partitions and activate Capacity on Demand. Using service applications, the HMC communicates with managed systems to detect, consolidate, and send information to service and support for analysis. |
| Integrated Virtualization Manager | The Integrated Virtualization Manager is a browser-based system management interface for the Virtual I/O Server on some IBM Power System servers and IBM eServer OpenPower models that are not managed by an HMC, as well as BladeCenter JS12 Express™, JS21 Express, and JS22 Express. With the Integrated Virtualization Manager, you can create and manage AIX, IBM i, and Linux logical partitions. |
| Partition Load Manager for AIX | The Partition Load Manager provides processor and memory resource management and monitoring across AIX logical partitions within a single managed system. With Partition Load Manager, you can more effectively use resources by setting thresholds for designated resources. When a threshold is exceeded, Partition Load Manager can try to assign resources to that logical partition by using resources assigned to other logical partitions that are not being used. |
| Virtual I/O Server | The Virtual I/O Server is software that runs in its own logical partition and provides virtual I/O resources to client logical partitions on the managed system. The Virtual I/O Server lets one or more client logical partitions share physical adapters with attached disks or optical devices. |
| IBM Workload Partitions Manager for AIX (WPAR Manager) | WPAR Manager is a platform management solution that provides a centralized point of control for managing workload partitions (WPARs) across a collection of managed systems that are running AIX. |

**Managing a virtual system with IBM Systems Director:**

You can perform virtual systems management tasks with IBM Systems Director such as discovery, inventory, system status and health, monitoring, power management, and the functionality available with update manager, automation manager, and virtualization manager.

Within the virtualization task flow, you are in the managing stage.



Before you start, ensure that you have completed the required deployment tasks for your environment. For instructions, see “Deploying virtualization to the system” on page 22.

IBM Systems Director can manage the following IBM Power environments that might include POWER5™ and POWER6™ processor-based servers running AIX®, IBM i, or Linux®:

- Power Systems managed by the Hardware Management Console (HMC)
- Power Systems managed by the Integrated Virtualization Manager
- Power Systems server with a single image (a nonpartitioned configuration)

IBM Systems Director gives you an overall understanding of any HMC or Integrated Virtualization Manager that you might have in your environment, as well as the hosts that they manage and their associated virtual servers (logical partitions). You can access and manage the logical partitions as you can any other managed system. Use the following links to access more information about IBM Systems Director.

*Table 14. Tasks and associated resources for virtual systems management*

| Task | Resources to help you complete the task |
|---|---|
| 1. Review the capabilities of IBM Systems Director to manage the physical and virtual resources of IBM Power Systems. | Managing IBM Power Systems |
| 2. Review the capabilities of IBM Systems Director to manage virtual environments. | • Managing virtual environments<br>• Finding and navigating resources<br>• System status and health<br>• Map view |
| 3. Plan for, install, and configure IBM Systems Director. | IBM Systems Director roadmap |

After you become comfortable with managing virtual resources across a single system (or group of like systems), you can expand that management view across multiple, heterogeneous systems. IBM Systems Director is a powerful management tool that can also be used across heterogeneous systems. For information about management tools that can be used in a heterogeneous environment, see “Managing a virtual enterprise” on page 37.

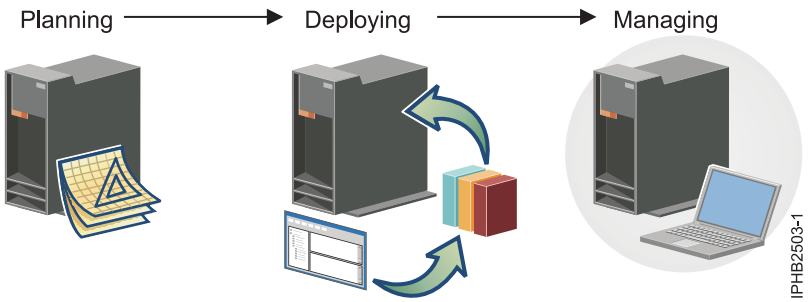
**Related information**

Managing IBM Power Servers with IBM Systems Director 6.1

**Managing a virtual system with the HMC:**

You can perform virtual systems management tasks such as dynamically managing resources across logical partitions, migrating a partition from one system to another, and configuring a Host Ethernet Adapter (or Integrated Virtual Ethernet).

Within the virtualization task flow, you are in the managing stage.



Before you start, ensure that you have completed the required deployment tasks. For instructions, see "Deploying virtualization to a system managed by the HMC" on page 23.

The following table outlines most of the major virtualization management tasks that you can perform on a system managed by the HMC. The table also provides the resources that can help you complete each management task.

*Table 15. Management tasks and associated resources for virtual systems management*

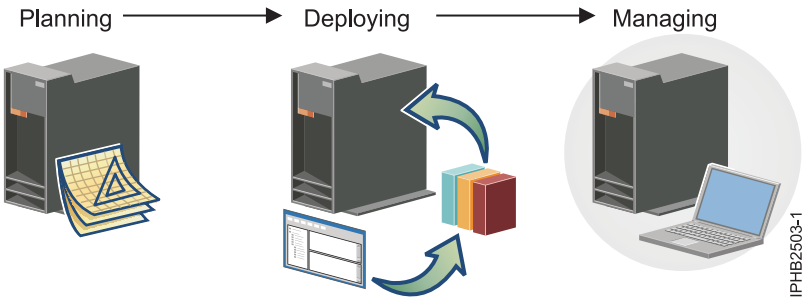
| **Management task** | **Resources to help you complete the task using HMC version 7** |
|---|---|
| Create a system plan from an existing configuration. | Creating a system plan by using the HMC |
| Create and configure a Host Ethernet Adapter to facilitate inter-partition communication, as well as provide internal networks with access to external networks without going through an Ethernet bridge on another logical partition. | • Creating a Logical Host Ethernet Adapter for a running logical partition using the HMC<br>• Configuring physical ports on a Host Ethernet Adapter using the HMC |
| Dynamically add, move, or remove processing resources, memory, I/O devices, and 5250 CPW for logical partitions. | Managing logical partition resources dynamically using the HMC |
| Manage Capacity on Demand. For example, you can activate, change, stop, discontinue, and view settings for the feature. | Capacity on Demand |
| Migrate a partition from one system to another system. | Migrating the mobile partition with the HMC |

After you become comfortable with managing virtual resources across a single system (or group of like systems), you can expand that management view across multiple, heterogeneous systems. IBM provides virtualization management tools that work in conjunction with the HMC to help you manage your enterprise by providing one, single management view across a heterogeneous infrastructure. For information about virtualization management tools, see "Managing a virtual enterprise" on page 37.

**Managing a virtual system with Integrated Virtualization Manager:**

You can perform virtual systems management tasks such as dynamically managing resources across logical partitions, migrate a partition from one system to another, and create a system plan from an existing configuration.

Within the virtualization task flow, you are in the managing stage.




Before you start, ensure that you have completed the required deployment tasks. For instructions, see "Deploying virtualization to a system managed by the Integrated Virtualization Manager" on page 26.

The following table outlines most of the major virtualization management tasks that you can perform on a system managed by the Integrated Virtualization Manager. The table also provides the information

resources that can help you complete each management task.

*Table 16. Management tasks and associated resources for virtual systems management*

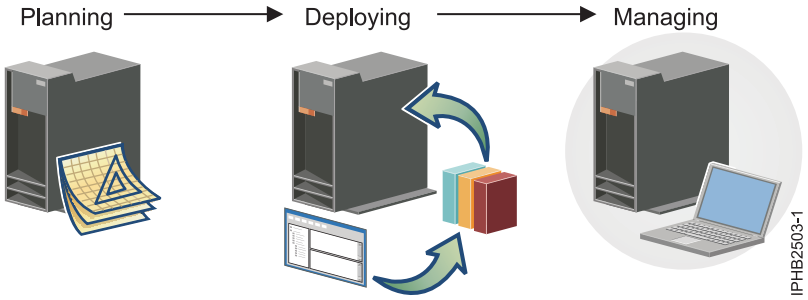
| Management task | Resources to help you complete the task |
|---|---|
| Create a system plan from an existing configuration. | Creating a system plan by using the Integrated Virtualization Manager |
| Dynamically add, move, or remove processing resources, memory, and I/O devices for logical partitions. | • Dynamically managing memory<br>• Dynamically managing physical adapters<br>• Dynamically managing processing power |
| Migrate a partition from one system to another system. | Migrating the mobile partition with the Integrated Virtualization Manager |

After you become comfortable with managing virtual resources across a single system (or group of like systems), you can expand that management view across multiple, heterogeneous systems. IBM provides virtualization management tools that work in conjunction with the Integrated Virtualization Manager to help you manage your enterprise by providing one, single management view across a heterogeneous infrastructure. For information about virtualization management tools, see "Managing a virtual enterprise" on page 37.

**Managing a virtual system with Virtual Partition Manager:**

You can access the Virtual Partition Manager through System Service Tools (SST) to manage processor and memory resource allocations for Linux logical partitions.

Within the virtualization task flow, you are in the managing stage.




Before you start, ensure that you have completed the required deployment tasks. For instructions, see "Deploying virtualization to a system managed by the Virtual Partition Manager" on page 28.

The following table outlines most of the major virtualization management tasks that you can perform on a system managed by the Virtual Partition Manager. The table also provides the resources that can help you complete each management task.

*Table 17. Management tasks and associated resources for virtual systems management*

| Management task | Resources to help you complete the task |
|---|---|
| Access Virtual Partition Manager through system service tools (SST). | Accessing service tools using SST |

*Table 17. Management tasks and associated resources for virtual systems management (continued)*

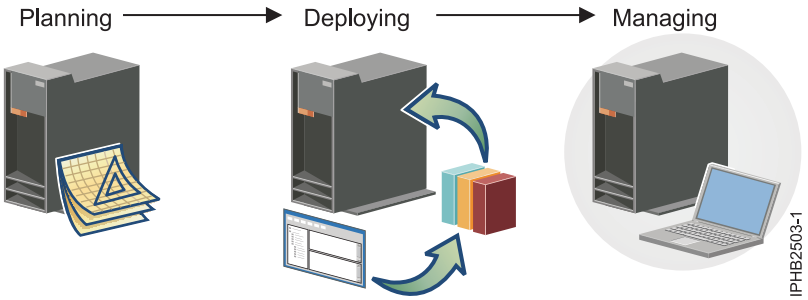
| Management task | Resources to help you complete the task |
|---|---|
| Manage processor and memory resource allocations for Linux logical partitions. | Virtual Partition Manager: A Guide to Planning and Implementation PDF :<br>• Chapter 4: Preparing your system for Virtual Partition Manager<br>• Chapter 5: Creating Linux Partitions using Virtual Partition Manager |

After you become comfortable with managing virtual resources across a single system (or group of like systems), you can expand that management view across multiple, heterogeneous systems. IBM provides virtualization management tools to help you manage your enterprise by providing one, single management view across a heterogeneous infrastructure. For information about virtualization management tools, see "Managing a virtual enterprise" on page 37.

**Managing virtual adapters with Virtual I/O Server:**

You can manage virtual networking devices, virtual storage devices, and back up and restore the Virtual I/O Server and user-defined virtual devices.

Within the virtualization task flow, you are in the managing stage.




Before you start, ensure that you have completed the required deployment tasks. For instructions, see "Deploying virtualization to a system managed by the HMC" on page 23.

The following table outlines most of the major virtualization management tasks that you can perform on virtual resources that are managed by the Virtual I/O Server. The table also provides the information resources that can help you complete each management task.

*Table 18. Management tasks and associated resources for virtual systems management*

| Management task | Resources to help you complete the task |
|---|---|
| Manage virtual networking devices, such as:<br>• Configuring a Shared Ethernet Adapter and Shared Ethernet Adapter failover<br>• Configuring a Link Aggregation or EtherChannel device<br>• Enabling GARP (Generic Attribute Registration Protocol) VLAN Registration Protocol (GVRP) on the Shared Ethernet Adapter | Virtual I/O Server |
| Manage virtual storage devices, such as:<br>• Creating volume groups and logical volumes<br>• Importing or exporting volume groups | |
| Back up and restore the Virtual I/O Server and user-defined virtual devices | |

You can also view the following example configuration scenarios for the Virtual I/O Server in Configuration scenarios for the Virtual I/O Server:

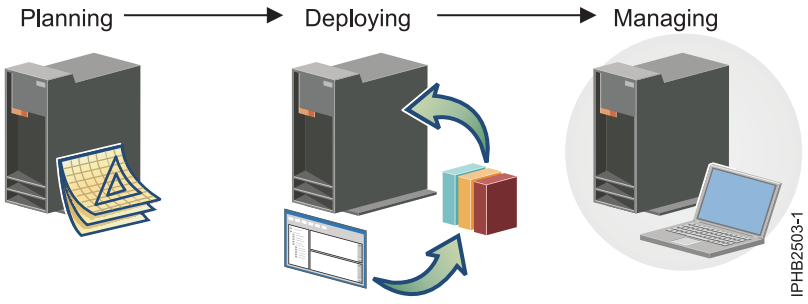
- Configuring a Virtual I/O Server without VLAN tagging
- Configuring a Virtual I/O Server using VLAN tagging
- Configuring Shared Ethernet Adapter failover
- Configuring Network Interface Backup in virtual I/O clients without VLAN tagging
- Configuring Multi-Path I/O for AIX client logical partitions

After you become comfortable with managing virtual resources across a single system (or group of like systems), you can expand that management view across multiple, heterogeneous systems. IBM provides virtualization management tools that work in conjunction with the Virtual I/O Server to help you manage your enterprise by providing one, single management view across a heterogeneous infrastructure. For information about virtualization management tools, see "Managing a virtual enterprise" on page 37.

**Managing AIX workloads with Partition Load Manager:**

You can install Partition Load Manager, configure the policy file, and then view partition status and statistics.

Within the virtualization task flow, you are in the managing stage.




Before you start, ensure that you have completed the required deployment tasks. For instructions, see "Deploying virtualization to a system managed by the HMC" on page 23.

The following table outlines the tasks that you must complete to manage AIX workloads using the Partition Load Manager. The table also provides the resources that can help you complete each

management task.

*Table 19. Management tasks and associated resources for virtual systems management*

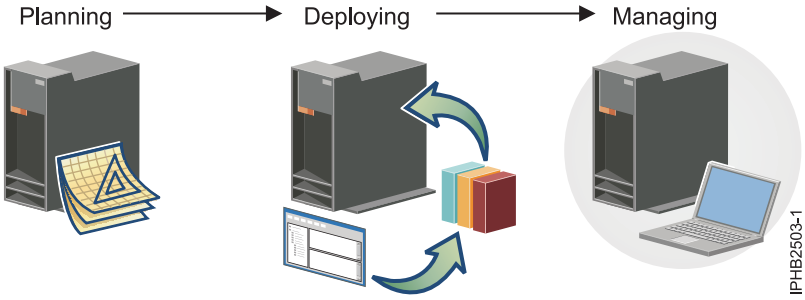
| Management task | Resources to help you complete the task |
|---|---|
| 1. Prepare to install the Partition Load Manager. | Partition Load Manager for AIX |
| 2. Install OpenSSH tools so that the Partition Load Manager can use remote Hardware Management Console (HMC) commands to gather partition information and initiate dynamic logical partitioning operations. | |
| 3. Install the Partition Load Manager server. | |
| 4. Configure the policy file. | |
| 5. Configure Resource Monitoring and Control (RMC) so that Partition Load Manager can communicate with the managed logical partitions. | |
| 6. View partition information. | |

After you become comfortable with managing virtual resources across a single system (or group of like systems), you can expand that management view across multiple, heterogeneous systems. IBM provides virtualization management tools to help you manage your enterprise by providing one, single management view across a heterogeneous infrastructure. For information about virtualization management tools, see "Managing a virtual enterprise" on page 37.

**Managing AIX workload partitions with WPAR Manager:**

You can install and configure the IBM Workload Partitions Manager for AIX (WPAR Manager), and then perform management tasks such as creating WPAR groups and relocating a WPAR.

Within the virtualization task flow, you are in the managing stage.




Before you start, ensure that you have completed the required deployment tasks. For instructions, see one of the following procedures:

- "Deploying virtualization to a system managed by the HMC" on page 23
- "Deploying virtualization to a system managed by the Integrated Virtualization Manager" on page 26

The following table outlines the tasks that you must complete to manage AIX workload partitions using the WPAR Manager. The table also provides the resources that can help you complete each management task.

*Table 20. Management tasks and associated resources for virtual systems management*

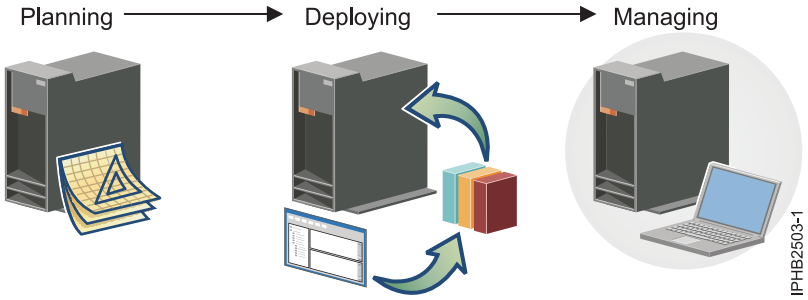
| Management task | Resources to help you complete the task |
|---|---|
| 1. Plan for WPAR Manager. | • WPAR Manager Overview<br>• Planning for Application Mobility<br>• Planning for Role Based Access Control |
| 2. Install WPAR Manager on the management server and the managed systems. | Installing WPAR Manager |
| 3. Configure WPAR Manager. | Configuring WPAR Manager |
| 4. Manage WPARs, performing tasks such as:<br>• View performance metrics for a WPAR<br>• Create WPAR groups and assign WPARs to them on the basis of ownership, application affinity, or other reasons<br>• Move a WPAR to another logical partition or system | Managing workload partitions with WPAR Manager |

After you become comfortable with managing virtual resources across a single system (or group of like systems), you can expand that management view across multiple, heterogeneous systems. IBM provides virtualization management tools to help you manage your enterprise by providing one, single management view across a heterogeneous infrastructure. For information about virtualization management tools, see "Managing a virtual enterprise."

## Managing a virtual enterprise

You can manage virtual resources across multiple, homogenous and heterogeneous systems using virtualization management tools that provide a consolidated view of your enterprise.

Within the virtualization task flow, you are in the managing stage.




Managing your virtualization configuration means performing traditional systems management tasks in a virtual environment (an environment with virtual systems and virtual resources). For example:

- Back up and restore the Virtual I/O Server
- View the topology map to help you visualize the relationships and dependencies between physical and virtual resources

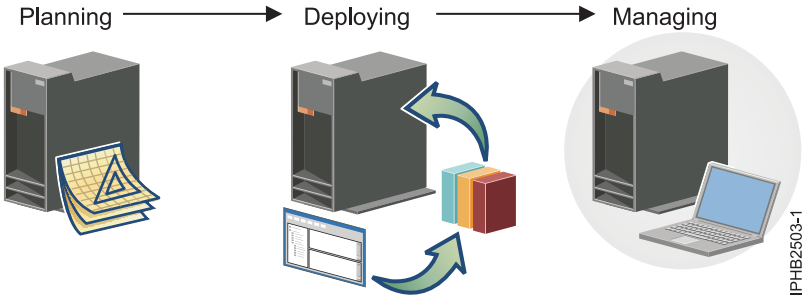
The following table describes the tools available to help make your enterprise easier to manage by providing one, single management view across a heterogeneous infrastructure:

| Virtualization management tool | Description |
|---|---|
| IBM Systems Director | IBM Systems Director provides platform management capabilities for virtual resources across a homogenous and heterogeneous environment. You can use IBM Systems Director to visualize the relationships between your physical systems and the associated virtual resources. You can also create virtual servers (also called logical partitions) and view real-time health metrics for your resources. |
| IBM Tivoli® software | Tivoli software offers a range of products and solutions tailored by industry or individual business to enable you to better manage your infrastructure, operations and IT processes, and to more effectively deliver services aligned to business goals. You can use Tivoli software to manage heterogeneous systems in a virtualized environment using a common set of interfaces and solutions, thus simplifying system management and allowing you to more effectively utilize your system resources. |

**Managing virtual servers with IBM Systems Director:**

Using IBM Systems Director, you can monitor and manage both physical and virtual resources across homogenous and heterogeneous environments from one location.

Within the virtualization task flow, you are in the managing stage.




After you become comfortable with managing virtual resources across a single system (or group of like systems), you can expand that management view across multiple, homogenous and heterogeneous systems. IBM Systems Director helps you manage both physical and virtual resources from one location. It enables you to work with virtualized environments that are managed by the Hardware Management Console (HMC), Integrated Virtualization Manager, Microsoft® Virtual Server, VMware, and Xen virtualization. IBM Systems Director features a health summary that allows you to specify and monitor health goals, as well as a topology map view that helps visualize relationships between physical and virtual resources.

The following table outlines the tasks that you must complete to manage virtual systems using IBM Systems Director. The table also provides the resources that can help you complete each management task.

*Table 21. Tasks and associated resources for virtual systems management*

| Task | Resources to help you complete the task |
|---|---|
| 1. Review the capabilities of IBM Systems Director to manage the physical and virtual resources of IBM Power Systems. | Managing IBM Power Systems |

*Table 21. Tasks and associated resources for virtual systems management (continued)*

| Task | Resources to help you complete the task |
|---|---|
| 2. The IBM Systems Director Web interface provides many ways to navigate between resources. Manage virtual servers, performing tasks such as:<br>• View the health summary to see a consolidated view of the health of your system resources, storage resources, and thresholds<br>• View the topology map to help you visualize the relationships and dependencies between physical and virtual resources<br>• Work with resources in tables<br>• Navigate between resources | • Managing virtual environments<br>• Finding and navigating resources<br>• System status and health<br>• Map view |
| 3. Plan for, install, and configure IBM Systems Director. | IBM Systems Director Roadmap |

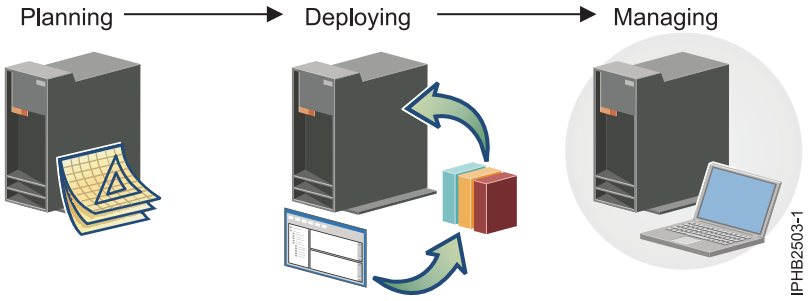
**Related information**

Managing IBM Power Servers with IBM Systems Director 6.1

**Managing a virtual enterprise with IBM Tivoli software:**

Using the IBM Tivoli software, you can better manage your infrastructure, operations and IT processes, to more effectively deliver services aligned to business goals.

Within the virtualization task flow, you are in the managing stage.




After you become comfortable with managing virtual resources across a single system (or group of like systems), you can expand that management view across multiple, heterogeneous systems. Tivoli software offers solutions tailored by industry or individual business to enable you to better manage your infrastructure, operations and IT processes, to more effectively deliver services aligned to business goals. It enables you to manage heterogeneous systems in a virtualized environment using a common set of interfaces and solutions, thus simplifying system management and allowing you to more effectively utilize your system resources.

The following table outlines the tasks that you must complete to manage a virtual enterprise using Tivoli software. The table also provides the resources that can help you complete each management task.

*Table 22. Management tasks and associated resources for virtual systems management*

| Management task | Resources to help you complete the task |
|---|---|
| 1. Determine your Tivoli software solution. Tivoli offers a range of products to help you manage your enterprise, including:<br>• Asset Management products that offer efficiency by managing all your asset types on a single platform<br>• Business Application Management products that manage composite applications and optimize application performance and service levels<br>• Security Management products that ensure compliance to identity and access control policies for IT resources and services<br>• Server, Network and Device Management products that optimize performance and automate the provisioning of IT infrastructure resources<br>• Service Management that offers innovation, execution and leadership for enterprises to optimize and manage the business of IT<br>• Service Provider Solutions products that ensure critical services are performing to the highest standards<br>• Storage Management products that back up, restore, protect and optimize your storage infrastructure and data | • Industry solutions<br>• Software services<br>• Tivoli software demos |
| 2. Deploy your Tivoli software solution. | Tivoli software information center |
| 3. Manage your virtual environment. | • Tivoli Case studies<br>• Tivoli software demos<br>• Tivoli software information center |

The following table outlines the tasks that you must complete so that the Tivoli software can discover and manage Virtual I/O Server as part of the overall Tivoli environment. The table also provides the resources that can help you complete each management task.

*Table 23. Management tasks and associated resources for virtual systems management*

| Management task | Resources to help you complete the task |
|---|---|
| 1. Configure Tivoli agents on the Virtual I/O Server. | Configuring the IBM Tivoli agents and clients on the Virtual I/O Server |

*Table 23. Management tasks and associated resources for virtual systems management (continued)*

| Management task | Resources to help you complete the task |
|---|---|
| 2. Perform management tasks:<br>• IBM Tivoli Application Dependency Discovery Manager (TADDM): Create and maintain application infrastructure maps that can help you determine the interdependencies between business applications, software applications, and physical components. This can help you improve application availability in your environment.<br>• IBM Tivoli Identity Manager: Manage your Virtual I/O Server user IDs.<br>• IBM Tivoli Monitoring: View the data gathered by the monitoring agent from the Tivoli Enterprise Portal<br>• IBM Tivoli Usage and Accounting Manager: View high-level and detailed cost and usage information so that you can allocate, distribute, or charge IT costs to users, cost centers, and organizations.<br>• IBM Tivoli Storage Manager: Back up and restore the Virtual I/O Server using Tivoli Storage Manager | • IBM Tivoli Application Dependency Discovery Manager Information Center<br>• Tivoli Identity Manager: IBM Tivoli Identity Manager<br>• Tivoli Monitoring:<br>– IBM Tivoli Monitoring 6.2 documentation<br>– IBM Tivoli Monitoring Virtual I/O Server Premium Agent User's Guide<br>• Tivoli Usage and Accounting Manager: IBM Tivoli Usage and Accounting Manager Information Center<br>• Tivoli Storage Manager:<br>– Backing up the Virtual I/O Server using IBM Tivoli Storage Manager<br>– Restoring the Virtual I/O Server using IBM Tivoli Storage Manager |

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## Programming interface information

This Introduction to virtualization publication documents intended Programming Interfaces that allow the customer to write programs to obtain the services of IIBM AIX Version 6.1, to IBM AIX 5L Version 5.3, to IBM Virtual I/O Server Version 2.1, and to version 6, release 1, modification 0 of IBM i.

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