Power Systems

Capacity on Demand

IBM

Power Systems

Capacity on Demand

IBM

> **Note**
>
> Before using this information and the product it supports, read the information in "Notices" on page 53.

This edition applies to IBM Hardware Management Console Version 7 Release 7.8.0 Maintenance Level 0 and to all subsequent releases and modifications until otherwise indicated in new editions.

Contents

Capacity on Demand

With Capacity on Demand (CoD) offerings you can dynamically activate one or more resources on your server as your business peaks dictate. You can activate inactive processor cores or memory units that are already installed on your server on a temporary and permanent basis.

Capacity on demand offerings are available on select IBM® servers. For ordering information, see the POWER7® machine type/model tables within each CoD offering section of this document. Some servers include a number of active and inactive resources. Active processor cores and active memory units are resources that are available for use on your server. Inactive processor cores and inactive memory units are resources that are included with your server, but are not available for use until you activate them.

This topic collection contains information about how to use CoD offerings with the Hardware Management Console (HMC) Version 7 Release 7 Maintenance Level 1, and later. This topic collection is also meant for users who are managing systems based on the POWER7 processor.

What's new in Capacity on Demand

Read about new or significantly changed information in Capacity on Demand (CoD) since the previous update of this topic collection.

November 2013
- Added information about "Power enterprise pool" on page 36.

March 2013
- Added information about "PowerVM Editions concepts" on page 44.

November 2012
- Added information about PowerVM® Editions offerings.

May 2012
- Added information about Enterprise Enablement features.

February 2012
- Added information about Trial PowerVM Live Partition Mobility.

October 2011
- Added information about Trial PowerVM Live Partition Mobility.

May 2011
- Added information about PowerVM Editions offerings.

September 2010
- Added information about IBM Power® 795 (9119-FHB) servers.

February 2010
- Added information for IBM Power Systems™ servers that contain the POWER7 processor.

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" on page 6	You can permanently activate inactive processor cores 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" on page 10	You can evaluate the use of inactive processor cores, 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" on page 16	You can activate processor cores or memory units for a number of days by using the HMC to activate resources on a temporary basis.
"Utility Capacity on Demand" on page 31	Utility CoD is used when you have unpredictable, short workload spikes. 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 website.
"Capacity BackUp" on page 35	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 processor cores that can be used for any workload and a large number of inactive processor cores 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)" on page 44	PowerVM Editions (PowerVM Editions) deliver advanced virtualization functions for AIX®, Linux and IBM i clients. PowerVM Editions (PowerVM Editions) include the following offerings: • Micro-Partitioning™ • Virtual I/O Server • Integrated Virtualization Manager • Live Partition Mobility • The ability to run x86 Linux applications on Power Systems PowerVM Editions (Express, Standard , and Enterprise) offer different capabilities. For more information about each editions' capabilities, see "PowerVM Editions (PowerVM)" on page 44.
Capacity on Demand SDMC	For more information on Capacity on Demand for SDMC, see Capacity on Demand SDMC

Preparing for Capacity on Demand

Capacity on Demand (CoD) allows you to activate processor cores and memory units on your server when your workload requires the additional resources. To prepare your server for CoD, consider how you would like to license your software and determine when you need to activate your resources. You also must plan for and set up your environment in preparation for CoD.

Capacity on Demand software licensing considerations

As you select the software to install on activated Capacity on Demand (CoD) resources, consider how you would like to license your software. Many methods are used to license software, such as per user, software tier, or Processor Value Unit.

The following is the list of IBM Power Systems software for which incremental licensing is included in On/Off CoD, Utility CoD or Trial CoD. Note that CoD does not ship any software or provide the base licensing entitlement. The software has to be initially installed and licensed on the server before temporary CoD provides the incremental licensing to cover the additional processor cores which have been temporarily activated. Payment for the temporary use of this software is through the hardware billing features associated with On/Off or Utility CoD. Only these IBM software products' temporary incremental processor core licensing is included.

- AIX
- IBM i
- PowerVM
- PowerHA®
- PowerSC
- Cluster Systems Management (CSM)
- General Parallel File System (GPFS™)

Additional licensing for other IBM software products or for non-IBM products licensed on a per-core basis is not covered for temporarily activated cores.

Typically a tool, such as a license manager, is used to manage the licenses. A license manager detects use of the software, compares it to the entitlement, and then takes action based on the results. A license manager can be provided by IBM or can be made available by the software provider.

This table shows Capacity on Demand software licensing considerations.

Table 2. Capacity on Demand software licensing considerations

Licensing type[1]	Software type	Capacity Upgrade on Demand (permanent activations)	On/Off, Utility, and Trial CoD (temporary activations)
Per user licensing	• IBM and non-IBM middleware • Independent software vendor (ISV) software	No Charge - User entitlement does not change when inactive processor cores are permanently activated	No Charge - User entitlement does not change when inactive processor cores are temporarily activated
Software tier licensing	• IBM and non-IBM middleware • ISV software	No Charge - Tier entitlement does not change when inactive processor cores are permanently activated	No Charge - Tier entitlement does not change when inactive processor cores are temporarily activated
Processor Value Unit licensing	IBM i, AIX, Linux	Per activation charge - One processor entitlement must be purchased for each permanently activated processor assigned to a partition that uses the software.	No Charge - Processor entitlement does not change when inactive processor cores are temporarily activated. **Note:** This rule might not apply to Linux, see your Linux distributor for details.

Table 2. Capacity on Demand software licensing considerations (continued)

Licensing type[1]	Software type	Capacity Upgrade on Demand (permanent activations)	On/Off, Utility, and Trial CoD (temporary activations)
Processor Value Unit licensing	IBM middleware	Per activation charge - One processor entitlement must be purchased for each permanently activated processor assigned to a partition that uses the software.	Daily user charge - One processor day of entitlement must be purchased each time that any number of inactive processor cores are temporarily activated.
[1] It is possible that you use a combination of these licensing types. For details, consult the license agreement associated with your product.			

Determining when to activate resources

Capacity on Demand (CoD) provides the ability to activate processor cores and memory units on your server when your workload requires the additional resources. To determine when to activate additional processor cores or memory units and how many new resources you require, monitor your trends in CPU and memory utilization by using a performance tool. Several performance tools are available to report CPU utilization information.

To identify trends in your resource utilization, click the following links:
- Performance Management for IBM i
- Performance Management for Power Systems
- IBM Performance Management for Power Systems

When computing average usage of all available processor cores, the system functions that report CPU utilization do not include the inactive processor cores in the total amount of CPU capacity. The inactive processor cores are not considered active within the various system functions that report CPU utilization percentages. The percentage of used CPU capacity is a calculated metric based on the amount of time that the processor was active within an elapsed time. This capacity is typically reported as a percentage, where 100% indicates that the processor was busy for the entire elapsed time. When multiple processor cores are present, CPU time must be adjusted to represent the average usage of all processor cores, so utilization is always reported as the percentage of total available capacity.

Processor sparing and memory sparing

Dynamic *processor sparing* is a feature that allows inactive processor cores to act as dynamic spares in environments with the Capacity on Demand (CoD) offering. *Memory sparing* occurs when on-demand inactive memory is automatically activated by the system to temporarily replace failed memory until a service action can be performed.

Processor sparing helps minimize the impact to server performance caused by a failed processor. An inactive processor is activated if a failing processor reaches a predetermined error threshold, thus helping to maintain performance and improve system availability. Dynamic processor sparing happens dynamically and automatically when using dynamic logical partitioning (DLPAR) and the failing processor is detected prior to failure. If not detected prior to failure or when not using DLPAR, a reboot of the system or partition activates an alternate processor from the inactive spares. You can then re-establish required performance levels without waiting for parts to arrive on-site. Dynamic processor sparing does not require the purchase of an activation code; it requires only that the system have inactive CUoD processor cores available.

Memory sparing occurs only when inactive Capacity on Demand (CoD) memory is present in a system and when an entire memory feature becomes unusable. During an initial program load (IPL), failed memory parts are taken out of use and inactive CoD memory is activated in place of the failed part without operational intervention.

Moving activations

You might want to move parts (processor cores or memory) between compatible systems in an attempt to rebalance your capacity.

Sometimes the movement of the resource requires both the movement of the physical component and the movement of the Capacity on Demand (CoD) activation. Under these circumstances, a deactivation of the capacity on the source server is required as the processor or memory activation is being migrated.

It is not usual practice, but if the need arises to move activations, contact your Capacity on Demand administrator at:
- Power Systems: pcod@us.ibm.com

Planning for Capacity on Demand

Capacity planning for servers with inactive processor cores and memory units uses essentially the same procedures and resources that are used for sizing other servers. The set of tools, resources, and offerings available to help determine the required server capacity supports servers with inactive processor cores and memory units.

For information about pricing and to determine how much a particular Capacity on Demand (CoD) activation costs, contact your IBM Business Partner or IBM sales representative for more information.

For help with capacity planning, refer to these resources:
- IBM Benchmark Center

  Use this website for help with benchmarking application environments.
- Systems solution center, Bangalore

  Systems solution center, Bangalore can help find the right solution to run your business and can link you with solution developers. Connect to IBM eServer™ solution options for your business needs across technologies and solution areas such as business intelligence, client relationship management, and enterprise software.
- IBM Systems Workload Estimator

  IBM Systems Workload Estimator to help you predict a possible server model processor, interactive feature, memory, and disk storage to purchase for a given workload.

Setting up your environment for Capacity on Demand

Before you order any activation features, prepare your environment for integrating the additional capacity to ensure that your server is able to fully use the activated processor cores or memory.

To set up your environment for Capacity on Demand (CoD), you should:
- Prepare any logical partitions (LPARs)
- Perform any I/O conditioning
- Perform any disk upgrades

Newly activated processor cores are immediately available for use by uncapped logical partitions. You can choose to assign these processor cores to one or more logical partitions, except for processor cores that are activated by using Utility CoD. The processor cores that are activated by using Utility CoD are assigned to a default shared processor pool and are then used from the pool. You must assign these

processor cores to one or more logical partitions to begin using them. You must also assign newly activated memory to one or more logical partitions to begin using the memory.

Capacity Upgrade on Demand

Capacity Upgrade on Demand (CUoD) allows you to permanently activate one or more inactive processor cores or memory units without requiring you to restart your server or interrupt your business.

Capacity Upgrade on Demand concepts

With Capacity Upgrade on Demand (CUoD), you can activate additional processor cores and memory units on selected servers by purchasing a permanent processor or memory unit activation feature. CUoD adds capacity for new workloads, which enables your server to adapt to unexpected performance demands.

Make sure that you have prepared your server before continuing. For more information, see "Preparing for Capacity on Demand" on page 2.

With appropriate planning, you can determine exactly when to activate CUoD based on your current and future workloads. Without appropriate planning and preparation, you might not obtain the maximum potential that is available through CUoD.

Capacity Upgrade on Demand processor cores and memory units

This information lists the number of active and inactive processor cores and memory units available for each server model.

Your managed systems include a number of active processor cores and memory units. They can also include inactive processor cores and memory units. *Active* processor cores or memory units are processor cores or memory units that are already available for use on your server when it comes from the manufacturer. *Inactive* processor cores or memory units are processor cores or memory units that are included with your server, but not available for use until you activate them. Inactive processor cores and memory units can be permanently activated by purchasing an activation feature and entering the provided activation code on your server. For information about ordering, see "Ordering Capacity Upgrade on Demand activation features" on page 8.

The activation code is unique to your server and is posted at the website IBM Capacity on Demand: Activation code.

Allow several days for order processing and activation code posting to take place.

These tables list the number of active and inactive processor cores and memory units that are available for each server model.

Table 3. Power Systems Capacity Upgrade on Demand processor features and processor activation features

Machine type and model	Server *n*-core range	Processor feature *n*-core	Processor feature	CUoD processor core activation feature (priced/zero priced)
9117-MMB	4/48	0/12	4980 (3.5 GHz Processor Card 16x)	5459
9117-MMB	4/64	0/16	4981 (3.1 GHz Processor Card 16x)	5468
9117-MMC	4/48	0/12	4983 (3.72 GHz Processor Card)	5329
9117-MMC	4/64	0/16	4984 (3.304 GHz Processor Card)	5334
9117-MMD	4/48	0/12	EPM0 (4.228 GHz Processor Card)	EPMA
9117-MMD	4/64	0/16	EPM1 (3.808 GHz Processor Card)	EPMB

Table 3. Power Systems Capacity Upgrade on Demand processor features and processor activation features (continued)

Machine type and model	Server *n*-core range	Processor feature *n*-core	Processor feature	CUoD processor core activation feature (priced/zero priced)
9119-FHB	8/256	0/32	4700 (4.0 GHz/4.25 GHz TurboCore Processor Card)	4713 (1 core) 4717 (64 core)
9119-FHB	6/192	0/24	4702 (3.72 GHz Processor Card)	4714 (1 core) 4718 (64 core)
9179-MHB	4/64	0/16	4982 (3.86 GHz/4.14 GHz TurboCore Processor Card, 16*x*)	5469
9179-MHC	4/64	0/16	5003 (3.92 GHz/4.144 TurboCore Processor Card)	5339
9179-MHC	4/96	0/24	EP24 (3.444 GHz Processor Card)	EP25
9179-MHD	4/64	0/16	EPH0 (4.424 GHz/4.704 TurboCore Processor Card)	EPHA
9179-MHD	4/96	0/32	EPH2 (3.612 GHz Processor Card)	EPHC

Table 4. Power Systems Capacity Upgrade on Demand memory activation features

Machine type and model	Orderable memory feature code	Description	Minimum activation
9117-MMB, 9117-MMC, 9119-FHB, 9179-MHB, 9179-MHC	8212	Activation of 1 GB DDR2 POWER7 memory	
9117-MMB, 9117-MMC, 9119-FHB, 9179-MHC, 9179-MHB	8213	Activation of 100 GB DDR2 POWER7 memory	
9117-MMD, 9119-FHB, 9179-MHD	EMA2	Activation of 1 GB DDR3 POWER7 memory	Firmware level eFW 7.6
9117-MMD, 9119-FHB, 9179-MHD	EMA3	Activation of 100 GB DDR3 POWER7 memory	Firmware level eFW 7.6
Note: Memory must be 50% activated.			

Capacity Upgrade on Demand activation codes

After you decide to permanently activate some or all of your resources, you must order and purchase one or more activation features. When you order and purchase activation features, you are provided with one or more activation codes that you use to activate resources on your server.

When the order is placed, the order record is combined with vital product data (VPD) from your server. This information generates one or more activation codes that are specific to your server.

The activation codes are posted on an IBM website for quick access, usually within one business day (24 hours) after the order reaches the IBM manufacturing system. After your activation codes have been generated, you can access them by using your system type and serial number at the following Capacity on Demand (CoD) website http://www-912.ibm.com/pod/pod.

To order activation features and receive activation codes, see "Ordering Capacity Upgrade on Demand activation features" on page 8.

Ordering Capacity Upgrade on Demand activation features

You can order activation features for a new server, a server model upgrade, or an installed server. After you place your order, you will receive a code that activates inactive processor cores or memory units.

For a new server or a server model upgrade, your order can contain one or more activation features for processor cores or memory units, which results in one or more activation codes. In this case, the activation codes are entered before the server is sent to you.

When you order Capacity Upgrade on Demand (CUoD) activation features for an installed server, you must determine whether you want to permanently activate some or all of your inactive processor cores or memory units. You must order one or more activation features and then use the resulting one or more activation codes to activate your inactive processor cores or memory units.

Notes:

- It can take several days to process an order. You can use a one-time no-charge Trial Capacity on Demand for 30 days to satisfy workload requirements while your order for permanent activation of additional capacity is being fulfilled. For more information, see "Ordering Trial Capacity on Demand" on page 11.
- An order for activation features will process more quickly if you do not include any miscellaneous features with the order.

To order one or more CUoD activation features:

1. Determine the number of inactive processor cores or memory units that you want to activate. For more information, see "Capacity Upgrade on Demand processor cores and memory units" on page 6.
2. Contact your IBM Business Partner or IBM sales representative to place your order for one or more activation features.

After ordering, see "Activating Capacity Upgrade on Demand" to activate inactive resources permanently.

Related concepts:

"Trial Capacity on Demand" on page 10
Trial Capacity on Demand (CoD) provides no-charge temporary capacity to enable you to test new function on your server.

Using Capacity Upgrade on Demand from ASMI

You can use the Hardware Management Console (HMC) or the Advanced System Management Interface (ASMI) to manage Capacity Upgrade on Demand (CUoD).

Most Capacity on Demand (CoD) tasks on the HMC require the HMC Super Administrator user role.

If you are not using the HMC, you can use the ASMI.

For more information on using On-demand Utilities from ASMI, seeOn Demand Utilities.

Activating Capacity Upgrade on Demand

When you purchase one or more activation features, you will receive corresponding activation codes to permanently activate your inactive processor cores or memory units.

To permanently activate your inactive resources by retrieving and entering your activation code:

1. Retrieve the activation code by going to Capacity on Demand: Activation code.
2. Enter the system type and serial number of your server.
3. Record the activation code that is displayed on the website.
4. Enter your activation code on your server using the HMC. To enter your code:

a. Click **Systems Management**.

b. Select **Servers**.

c. Select the server on which you want enter your activation code.

d. Select **Tasks > Capacity on demand (CoD) > Enter CoD Code**.

e. Type your activation code in the **Code** field.

f. Click **OK**.

Any newly activated processor cores are now available for use by uncapped logical partitions. If there are no uncapped logical partitions, you must assign the processor cores to one or more logical partitions in order to begin using the processor cores. Any newly activated memory must be assigned to one or more logical partitions to begin using the newly activated memory.

You can dynamically assign the newly activated processor cores or memory to the default partition. Alternatively, if your server is in the manufacturing default configuration, the server can start to use the newly activated processor cores or memory immediately after restarting your server operating system

You can now begin using the new resources.

Viewing settings for Capacity on Demand resources

You can use the Hardware Management Console (HMC) to view Capacity on Demand (CoD) settings.

You can see how many processor cores or memory units you have, how many are active, and how many are available for activation using CoD with these settings. You can also view information about your On/Off CoD processor cores and memory units, Trial CoD processor cores and memory units, and your Utility CoD processor cores.

To view the capacity settings for processor cores or memory, do the following:

1. In the navigation area of the HMC window, expand **Systems Management**.

2. Select **Servers**.

3. In the contents area, select the server on which you want to view capacity settings.

4. Select **Capacity on demand**.

5. Select either **Processor** or **Memory**.

6. Select the CoD offering that you want to view.

7. Select **View Capacity Settings**.

Viewing and saving Capacity on Demand code-generation information

You can view and save Capacity on Demand (CoD) code-generation information using the Hardware Management Console (HMC). You might need to do this if the CoD code that was provided for your server does not work.

You can view CoD code-generation information and save it to a file on a remote system or to a file on removable media. The information that is used to generate your CoD codes must exactly match the information that is shown on the HMC CoD Code Information window. To collect the information that is used to generate your CoD codes, use the CoD Code Information window to save the CoD code information to a file on a remote system or to a file on removable media. Then, you can either attach the file to an email, or print the file and fax it to your CoD administrator.

To view and save CoD code-generation information:

1. In the navigation area of the HMC window, expand **Systems Management**.

2. Select **Servers**.

3. In the contents area, select the server on which you want to view and save the CoD code information.

4. Select **Tasks**.
5. Select **Capacity on Demand (CoD)**.
6. Select **Processors (or Memory)**.
7. Select the CoD offering you want to view or save.
8. Select **View Code Information**.
9. In the CoD Code Information window, click **Save** to save the CoD code information to a file on a remote system or to a file on removable media.
10. In the Save CoD Code Information panel, select one of these options, and then perform the tasks associated with that option.

Option	Description
Save to a file on a remote system	1. Enter the remote system name, file name, user ID, and password. 2. Click **OK** to save the CoD code information or click **Cancel** to exit the panel without saving the CoD code information.

Save to media	1. Click **OK**.
	2. Select the required device. These options might be included in the list (the list includes only those removable media devices that are available for use on the HMC):
	  • **Diskette drive**
	  • **Flash memory**
	  • **USB diskette drive**
	3. Click **OK** to save the CoD code-generation information, or click **Cancel** to exit the panel without saving the CoD code information.

To fax or email the CoD code information to your CoD administrator, use one of these options to send your information:

- Fax-to information:
  - **Send to:** Capacity on demand Administrator
  - **Location:** Rochester, Minnesota, U.S.
- Fax-from information:
  - **Customer name:**
  - **Customer contact name:**
  - **Customer address:**
  - **Customer phone number:**
  - **Customer fax number:**
- If you are using email, send the electronic image of the code information in an email to:
  - Power Systems models: pcod@us.ibm.com

Trial Capacity on Demand

Trial Capacity on Demand (CoD) provides no-charge temporary capacity to enable you to test new function on your server.

Related concepts:

"Ordering Capacity Upgrade on Demand activation features" on page 8
You can order activation features for a new server, a server model upgrade, or an installed server. After you place your order, you will receive a code that activates inactive processor cores or memory units.

Trial Capacity on Demand concepts

You can evaluate the use of inactive processor cores, memory, or both, at no charge with Trial Capacity on Demand (CoD).

After you start the CoD trial, the trial period is available for 30 power-on days. The trial period only advances while the server is powered on.

When action on your part is required after you implement this CoD offering, the HMC displays messages on the HMC desktop.

You can use the Hardware Management Console to stop a current CoD trial for processor cores or memory units before the trial automatically expires. If you choose to stop the trial before it expires, you cannot restart it and you forfeit any remaining days.

Ordering Trial Capacity on Demand

If you need to test new functions or evaluate inactive processor cores, memory, or both processor cores and memory, order Trial Capacity on Demand (CoD).

An HMC is required to use Trial Capacity on Demand.

To order Trial CoD, do the following:

1. Click the Trial Capacity on Demand website.
2. Select a request based on your situation.

Before using Trial CoD, you must activate Trial Capacity on Demand. See "Activating Trial Capacity on Demand" to activate your inactive processor cores or memory.

Using Trial Capacity on Demand

You must use the Hardware Management Console (HMC) to manage your Trial Capacity on Demand (CoD) activations.

Most Capacity on Demand (CoD) tasks on the HMC require the HMC Super Administrator user role.

Activating Trial Capacity on Demand

You can activate your inactive processor cores or memory for a trial period by obtaining and entering a trial processor code or a trial memory code.

To activate Trial Capacity on Demand (CoD), do the following:

1. Retrieve the activation code by going to the following web address: http://www-912.ibm.com/pod/pod.
2. Enter your activation code on your server using the HMC. To enter your code:
   a. Click **Systems Management**.
   b. Select **Servers**.
   c. Select the server on which you want enter your activation code.
   d. Select **Tasks > Capacity on demand (CoD) > Enter CoD Code**.
   e. Type your activation code in the **Code** field.
   f. Click **OK**.

Any newly activated processor cores are now available for use by uncapped logical partitions. If there are no uncapped logical partitions, you must assign the processor cores to one or more logical partitions in order to begin using the processor cores. Any newly activated memory must be assigned to one or more logical partitions to begin using the newly activated memory.

You can dynamically assign the newly activated processor cores or memory to the default partition. Alternatively, if your server is in the manufacturing default configuration, the server can start to use the newly activated processor cores or memory immediately after restarting your server operating system

Before the trial period expires, you must either enter a Capacity Upgrade on Demand activation code to permanently activate the Trial CoD resources, or you must return the Trial CoD resources. For more information, see "Activating Capacity Upgrade on Demand" on page 8 or "Returning Capacity on Demand resources" on page 13.

Stopping Trial Capacity on Demand

Trial Capacity on Demand (CoD) ends when the trial period is over and the resources have been reclaimed by the server. You must return the resources before the trial period has ended.

For more information about returning Capacity on Demand (CoD) resources, see "Returning Capacity on Demand resources" on page 13. If your server is powered off or loses power before the resources are removed from the logical partitions, you might need to perform recovery actions to successfully power on your server. For more information, see "Recovery actions."

Trial Capacity on Demand can also end when you enter a Capacity Upgrade on Demand activation code to permanently activate the processor cores or memory. For more information about permanently activating resources, see "Activating Capacity Upgrade on Demand" on page 8. For more information about Capacity Upgrade on Demand, see "Capacity Upgrade on Demand" on page 6.

Stopping a current trial

You can use the HMC to stop a current Capacity on Demand trial for processor cores or memory units before the trial automatically expires. If you choose to stop the trial before it expires, you cannot restart it and you forfeit any remaining days.

Additional requests for Trial Capacity on Demand might be available from your Capacity on Demand administrator.

To stop a current Trial Capacity on Demand, follow these steps:
1. Return the trial resources. See "Returning Capacity on Demand resources" on page 13 for more information.
2. In the navigation area of the HMC window, expand **Systems Management**.
3. Select **Servers**.
4. In the contents area, select the server on which you want to stop Trial Capacity on Demand.
5. Select **Tasks**.
6. Select **Capacity on Demand (CoD)**.
7. Select either **Processor** or **Memory**.
8. Select **Trial CoD**.
9. Select **Stop**.
10. In the confirmation window, click **Yes** to stop the trial. Click **No** to cancel the request to stop the trial (the trial will remain active).

Trial Capacity on Demand is now stopped and cannot be restarted.

Recovery actions:

Perform these recovery actions in the event the server is powered off or loses power when there are unreturned Trial CoD or On/Off CoD resources. Unreturned Trial CoD resources result when the trial period ends before the Trial CoD resources have been removed from your logical partition. Unreturned On/Off CoD resources result when the On/Off CoD request expires before the On/Off CoD resources have been removed from your logical partition. These recovery actions need to be used to ensure that logical partitions that were running prior to the power off or loss of power are successfully powered on.

When a server is powered off or loses power, all unreturned Trial CoD or On/Off CoD resources are reclaimed by the server. As a result, when the server is powered back on, all logical partitions that were running prior to the power off or loss of power might not be able to be restarted since only licensed resources are available for use. Furthermore, when a logical partition is powered on, if there are not enough licensed resources to satisfy the logical partition's memory or processor requirements, the power on of that logical partition will fail. The failure might result in an HMC message of HSCL03F4 (not enough processing resources to meet the allocation setting), or a system reference code of B2xx1150 or B2xx1230.

Note: The server can power on to standby mode only if you have specified that option prior to powering on your server.

To successfully power on those logical partitions, perform either step 1 or 2, or a combination of the 2 steps.
1. Reduce logical partition resources so that the total of logical partition resources across all logical partitions to be powered on does not exceed the total number of activated resources.
2. Enter new Capacity on Demand activation codes to satisfy these requirements. Additionally, start an On/Off CoD request (if On/Off CoD is still enabled) or enter a new Trial CoD activation code. If the On/Off CoD enablement is exhausted, a new On/Off CoD enablement code would need to be entered before doing a new On/Off CoD request.

Returning Capacity on Demand resources

To return Trial Capacity on Demand (CoD) processor cores or memory, you must remove the processor cores or memory from the logical partitions to which they are assigned, thus making them available to be reclaimed by the server.

You do not need to remove the processor cores or memory from the same logical partitions to which they were assigned when you started your On/Off CoD request or Trial CoD. You can remove the processor cores or memory from any of your logical partitions.

It is best to remove processor cores or memory from a logical partition when the logical partition is running.

Logical partitions that are not activated might still have processor cores and memory assigned to them. To remove processor cores or memory from a logical partition that is not activated, you have these options:
- Modify a partition profile for the logical partition to reduce the number of processor cores or memory, and then activate the logical partition by using the modified partition profile.
- Delete the logical partition.

Entering a Capacity Upgrade on Demand activation while running Trial Capacity on Demand

To manage the permanent activation of resources while running under a Trial Capacity on Demand (CoD) activation, you select your option based on the number of resources that you would like to activate.

The following describes each option:

- When the number of resources to be permanently activated is equal to the number of resources that are activated by Trial CoD, these options are presented to convert the trial resource activations into permanent resource activations when the permanent activation code is entered on the Hardware Management Console (HMC):

Option	Description
Yes	The conversion occurs immediately (dynamic conversion from trial resources to permanent resources).
No	- If there are enough inactive resources (not trial or permanent), the permanent activation will be accomplished using the inactive resources that are currently installed on the system. - If there are not enough inactive resources to satisfy the request, the permanent activation will not be accepted.

- When the number of resources to be permanently activated is greater than the number of resources activated through Trial CoD and there are enough inactive resources plus the trial resources to satisfy the permanent activation, these options are presented to convert the trial resource activations into permanent resource activations when the permanent activation code is entered on the HMC:

Option	Description
Yes	The conversion occurs immediately (dynamic conversion from trial resources to permanent resources using as many inactive resources as necessary).
No	- If there are enough inactive resources (not trial or permanent), the permanent activation will be accomplished using the inactive resources that are currently installed on the system. - If there are not enough inactive resources to satisfy the request, then the permanent activation will not be accepted. You should stop the Trial CoD request before attempting to permanently activate resources.

- When the number of resources to be permanently activated is less than the number of resources activated through Trial CoD, these are the results that occur:
  - If there are enough inactive resources (not trial or permanent), then the permanent activation will be accomplished using the inactive resources that are currently installed on the system.
  - If there are not enough inactive resources to satisfy the request, then the permanent activation code will not be accepted. Stop the Trial CoD request before attempting to permanently activate resources.

Viewing settings for Trial Capacity on Demand resources

You can use the Hardware Management Console (HMC) to view Trial Capacity on Demand (CoD) settings.

You can see how many processor cores or memory units you have, how many are active, and how many are available for activation using CoD with these settings. You can also view information about your On/Off CoD processor cores and memory units, Trial CoD processor cores and memory units, and your Utility CoD processor cores.

To view the capacity settings for processor cores or memory, do the following:

1. In the navigation area of the HMC window, expand **Systems Management**.
2. Select **Servers**.
3. In the contents area, select the server on which you want to view capacity settings.
4. Select **Capacity on demand**.

5. Select either **Processor** or **Memory**.

6. Select the CoD offering that you want to view.

7. Select **View Capacity Settings**.

Viewing and saving Trial Capacity on Demand code-generation information

You can view and save Trial Capacity on demand (CoD) code-generation information using the Hardware Management Console (HMC). You might need to do this if the CoD code that was provided for your server does not work.

You can view CoD code-generation information and save it to a file on a remote system or to a file on removable media. The information that is used to generate your CoD codes must exactly match the information that is shown on the HMC CoD Code Information window. To collect the information that is used to generate your CoD codes, use the CoD Code Information window to save the CoD code information to a file on a remote system or to a file on removable media. Then, you can either attach the file to an email, or print the file and fax it to your CoD administrator.

To view and save CoD code-generation information:

1. In the navigation area of the HMC window, expand **Systems Management**.

2. Select **Servers**.

3. In the contents area, select the server on which you want to view and save the CoD code information.

4. Select **Tasks**.

5. Select **Capacity on Demand (CoD)**.

6. Select **Processors (or Memory)**.

7. Select the CoD offering you want to view or save.

8. Select **View Code Information**.

9. In the CoD Code Information window, click **Save** to save the CoD code information to a file on a remote system or to a file on removable media.

10. In the Save CoD Code Information panel, select one of these options, and then perform the tasks associated with that option.

Option	Description
Save to a file on a remote system	1. Enter the remote system name, file name, user ID, and password. 2. Click **OK** to save the CoD code information or click **Cancel** to exit the panel without saving the CoD code information.
Save to media	1. Click **OK**. 2. Select the required device. These options might be included in the list (the list includes only those removable media devices that are available for use on the HMC): • **Diskette drive** • **Flash memory** • **USB diskette drive** 3. Click **OK** to save the CoD code-generation information, or click **Cancel** to exit the panel without saving the CoD code information.

To fax or email the CoD code information to your CoD administrator, use one of these options to send your information:

- Fax-to information:
  - **Send to:** Capacity on demand Administrator
  - **Location:** Rochester, Minnesota, U.S.
- Fax-from information:
  - **Customer name:**
  - **Customer contact name:**
  - **Customer address:**
  - **Customer phone number:**
  - **Customer fax number:**
- If you are using email, send the electronic image of the code information in an email to:
  - Power Systems models: pcod@us.ibm.com

On/Off Capacity on Demand

On/Off Capacity on Demand (CoD) allows you to temporarily activate and deactivate processor cores and memory units to help meet the demands of business peaks. After you request that a number of processor cores or memory units are to be made temporarily available for a specified number of days, those processor cores and memory units are available immediately. You can start and stop requests for On/Off CoD, and you are billed for usage at the end of each quarter.

You can change the number of resources and number of days in a running On/Off CoD request. Instead of having to stop the current request and start a new request, or wait until the current request expires, you can change the number of resources and number of days in the current request. For more information about how billing works when changing a current request, or how to change a current request, see "Billing when changing a running On/Off Capacity on Demand request" on page 20 or "Changing a running On/Off Capacity on Demand request" on page 26.

Make sure that you have prepared your server before continuing. For more information, see "Preparing for Capacity on Demand" on page 2.

On/Off Capacity on Demand concepts

You can activate inactive processor cores or memory units on a temporary basis with On/Off Capacity on Demand (CoD).

You can turn on inactive processor cores or memory units for a number of days as your business peaks demand and pay only for the days that the processor cores or memory units remain activated.

When action on your part is required after you implement this CoD offering, the HMC displays messages on the HMC desktop.

On/Off Capacity on Demand processor days or memory days

Temporary capacity provided by On/Off Capacity on Demand (CoD) is measured and billed in units called processor days or memory days.

Requested processor or memory days

Requested processor days or memory days equal the number of temporarily activated processor cores or memory units multiplied by the number of days that are specified on a request for temporary capacity using On/Off CoD. After a request for temporary capacity is made on the server, the server records one processor day for each requested processor or one memory day for each requested memory unit at the beginning of each 24-hour period that the request is running. One memory unit is one GB of memory.

[number of processor cores or memory units] * [number of requested days]

Unreturned processor or memory days

Unreturned processor days or memory days equal the number of days (24-hour periods) that the temporarily activated processor cores or memory units were used beyond the expiration of the request for temporary capacity, multiplied by the number of requested processor cores or memory units that are still in use.

[number of days processor cores or memory units were used beyond expiration of temporary capacity request] * [number of requested processor cores or memory units still in use]

Tip: Unreturned processor or memory days are charged at the beginning of each 24-hour period that the temporarily activated processor cores or memory units are still being used after the expiration of the request for temporary capacity.

Related concepts:

"Billing for On/Off Capacity on Demand" on page 18
The customer contract that must be signed prior to receiving your On/Off Capacity on Demand (CoD) enablement code requires you to report billing data, at least once per month, regardless of whether you have used the temporary capacity provided by On/Off CoD during the period.

On/Off Capacity on Demand enablement code

After you have decided to take advantage of On/Off Capacity on Demand (CoD), you must order an On/Off CoD enablement feature. The enablement feature provides the On/Off CoD enablement code that allows you to request temporary activation of inactive processor cores or memory units by entering the code on your server.

Notes:

- An HMC is required to use On/Off Capacity on Demand.
- You must have an assigned contract for the enablement code before you can obtain the enablement code.
- The enablement code is available only through an MES upgrade order.
- An On/Off CoD enablement code enables you to request temporary capacity on the server. You can make requests for temporary capacity over the life of the machine as long as your total days do not exceed the predefined limit. When the limit is reached, a new On/Off CoD enablement feature must be ordered and a new enablement code entered on your server. Each time a new enablement code is entered, it will reset the limit of processor days or memory days that can be requested as temporary capacity.

Table 5. On/Off CoD processor enablement features

Machine type and model	On/Off CoD processor enablement feature
9117-MMB	7951
9117-MMC	7951
9117-MMD	7951
9117-MMD	EP9T (Requires minimum firmware level eFW 7.6)
9119-FHB	7971
9119-FHB	EP9T (Requires minimum firmware level eFW 7.6)
9179-MHB	7951
9179-MHC	7951
9179-MHD	7951
9179-MHD	EP9T (Requires minimum firmware level eFW 7.6)

Table 6. On/Off CoD memory enablement features

Machine type and model	On/Off CoD memory enablement feature
9117-MMB	7954
9117-MMC	7954
9117-MMD	7954
9117-MMD	EM9T (Requires minimum firmware level eFW 7.6)
9119-FHB	7973
9119-FHB	EM9T (Requires minimum firmware level eFW 7.6)
9179-MHB	7954
9179-MHC	7954
9179-MHD	7954
9179-MHD	EM9T (Requires minimum firmware level eFW 7.6)

After your On/Off CoD enablement code has been generated, you can access it by using your system type and serial number at theCapacity on Demand website. (http://www-912.ibm.com/pod/pod)

Billing for On/Off Capacity on Demand

The customer contract that must be signed prior to receiving your On/Off Capacity on Demand (CoD) enablement code requires you to report billing data, at least once per month, regardless of whether you have used the temporary capacity provided by On/Off CoD during the period.

Billing data is used to calculate billing amounts at the end of each billing period (calendar quarter). For instructions about setting up a method of reporting, see "Establishing monthly reporting to IBM" on page 25.

Ensure that you report billing data if your server has been enabled for On/Off CoD. Failure to report the billing data results in an estimated bill for 90 processor days or memory days of temporary capacity.

Processor days or memory days of credit are applied against any requested or unreturned processor days or memory days of temporary capacity that are provided by On/Off CoD. This credit happens automatically until all of the days of credit are used. On/Off CoD credits cannot be transferred to another system serial number and there is no feature conversion offered for remaining credits on a model upgrade.

If the temporary resources that are provided by On/Off CoD are still assigned to partitions after your request has expired, the processor days or memory days continue to be recorded at the beginning of each 24-hour period, and you continue to be billed for these days at the end of the On/Off CoD billing cycle. You are charged for these unreturned processor days or memory days at the same rate as requested processor days or memory days.

You must return the resources before your request expires, so you are not billed for any unreturned processor cores or memory units. If your request has already expired and you do not want to be billed for any more unreturned processor cores or memory units, return the expired processor cores or memory units immediately. For more information about returning CoD resources, see "Returning On/Off Capacity on Demand resources" on page 28.

The following table lists the models, processor features, and billing features for On/Off CoD.

Table 7. On/Off CoD processor features and billing features

Machine type and model	Orderable processor feature	On/Off CoD processor day billing feature
9117-MMB	4980	7644 (EP2A = Bundle of 100 x 7644)

Table 7. On/Off CoD processor features and billing features (continued)

Machine type and model	Orderable processor feature	On/Off CoD processor day billing feature
9117-MMB	4980	7645 (IBM i) (EP2B = Bundle of 100 x 7645)
9117-MMB	4981	7648 (EP2C = Bundle of 100 x 7648)
9117-MMB	4981	7649 (IBM i) (EP2D = Bundle of 100 x 7649)
9117-MMC	4983	5332 (EP2G = Bundle of 100 x 5332)
9117-MMC	4983	5333 (IBM i) (EP2H = Bundle of 100 x 5333)
9117-MMC	4984	5337 (EP2J = Bundle of 100 x 5337)
9117-MMC	4984	5338 (IBM i) (EP2K = Bundle of 100 x 5338)
9117-MMD	EPM0	EPME (EPMN = Bundle of 100 x EPME)
9117-MMD	EPM0	EPMF (IBM i) (EPMP = Bundle of 100 x EPMF)
9117-MMD	EPM1	EPMG (EPMQ = Bundle of 100 x EPMG)
9117-MMD	EPM1	EPMH (IBM i) (EPMR = Bundle of 100 x EPMH)
9119-FHB	4700	4709 (4704 = Bundle of 100 x 4709)
9119-FHB	4700	4721 (IBM i) (4712 = Bundle of 100 x 4721)
9119-FHB	4702	4711
9119-FHB	4702	4724 (IBM i)
9179-MHB	4982	7635 (EP2E = Bundle of 100 x 7635)
9179-MHB	4982	7636 (IBM i) (EP2F = Bundle of 100 x 7636)
9179-MHC	5003	5342 (EP2L = Bundle of 100 x 5342)
9179-MHC	5003	5343 (IBM i) (EP2M = Bundle of 100 x 5343)
9179-MHC	EP24	EP28 (EP2N = Bundle of 100 x EP28)
9179-MHC	EP24	EP29 (IBM i) (EP2P = Bundle of 100 x EP29)
9179-MHD	EPH0	EPHE (EPHN = Bundle of 100 x EPHE)
9179-MHD	EPH0	EPHF (IBM i) (EPHP = Bundle of 100 x EPHF)
9179-MHD	EPH2	EPHJ (EPHS = Bundle of 100 x EPHJ)
9179-MHD	EPH2	EPHK (IBM i) (EPHT = Bundle of 100 x EPHK)

The following table lists the models, memory features, and billing features for On/Off CoD.

Table 8. On/Off CoD memory features and billing features

Machine type and model	On/Off CoD memory billing feature
9117-MMB	7377 (4710 = Bundle of 999 x FC 7377)
9117-MMC	7377 (4710 = Bundle of 999 x FC 7377)
9117-MMD	7377 (4710 = Bundle of 999 x FC 7377)
9119-FHB	7377 (4710 = Bundle of 999 x FC 7377)
9179-MHB	7377 (4710 = Bundle of 999 x FC 7377)
9179-MHC	7377 (4710 = Bundle of 999 x FC 7377)
9179-MHD	7377 (4710 = Bundle of 999 x FC 7377)

Related concepts:

"On/Off Capacity on Demand processor days or memory days" on page 16
Temporary capacity provided by On/Off Capacity on Demand (CoD) is measured and billed in units called processor days or memory days.

Billing when changing a running On/Off Capacity on Demand request:

Ensure that you understand the implications to billing before you decide to change a running On/Off Capacity on Demand (CoD) request.

When you issue a change request, the days in the running request are not preserved; however, the time in the current resource day is carried forward from the running request. It is important to understand that the resource days that remain in a request are decremented at the start of each day. Therefore, the number of resource days billed is incremented at the start of each day.

The change request expires in the number of days that are requested in the change request plus the time that remains in the current resource day of the running request since you have already been charged for that entire resource day. For example, if there are 23 hours and 12 minutes in the current On/Off CoD request, and the request is changed to 5 days, the new request will expire in 5 days, 23 hours, and 12 minutes (the 5 days that are specified by the change request plus the time in the current resource day).

Note: In the confirmation message, the time is rounded up to the nearest hour, so it will show 6 days and 0 hours.

Another example, if there are 3 hours and 45 minutes that remain in the current On/Off CoD request, and the request is changed to 5 days, the new request will expire in 5 days, 3 hours, and 45 minutes (the 5 days that are specified by the change request plus the time that remains in the current resource day).

Note: The time displayed by the confirmation message is rounded up to the nearest hour and will be 5 days and 4 hours.

If the change request decreases the amount of resources in the running request, the remainder of the current resource day is forfeited for each of the resources that are being canceled. No credit is given for any partial resource days that are forfeited. If the change request increases the amount of resources in the running request, a charge for the additional resources for the time that remains in the current resource day is immediately applied. That charge is calculated as additional resources multiplied by the quantity (time that remains in the current resource day rounded up to the whole hour and divided by 24). The result is rounded up to whole resource days. The usual charge for any requested days in the change request applies.

The number of resource days in the On/Off CoD enablement is calculated separately from the number of resource days that are billed. When an On/Off CoD request is started, the number of enabled resource days is reduced by the number of requested resource days (number of requested resources multiplied by the number of requested days). When a running On/Off CoD request is changed, the number of enabled resource days is increased by the number of remaining resource days in the running request, then reduced by the number of requested resource days in the change request. If the change request increases the number of resources, the number of enabled resource days is also reduced by the number of resource days that are charged for the additional resources for the time in the current resource day.

If you decide, within the same day, to again activate the On/Off CoD processors, such as during a test period, the implications to billing are slightly different. The 24-hour test period starts when the first On/Off CoD request is made. During the 24-hour test period that your server is powered on, a record is kept of the maximum number of On/Off CoD processors or memory requested when you make On/Off CoD activation or change requests. Therefore, as the testing reactivation occurs, you can start and stop, or change, On/Off CoD requests repeatedly. Any subsequent requests during the same 24-hour period for the same or fewer resources are not charged. Requests that are made for more resources result in a

pro-rated charge for the excess resources. This new, higher level of resources becomes the maximum resource amount for the 24-hour period, and subsequent requests during the same 24-hour period are not charged for resources up to this new maximum amount. For information about testing your On/Off CoD activations, see Testing your On/Off Capacity on demand activations.

Examples: Changing a running On/Off CoD request

At 9:00 a.m. on Monday, you start a new request for 5 processors for 1 day. The result is:
* 24 hours remain in current processor day
* 1 day plus 0 hours until request expires
* Charge for 5 processor days (5 processors multiplied by 1 day)
* Enablement reduced by 5 processor days

At 11:00 a.m. on Monday, you change the request to 5 processors for 2 days. The result is:
* 22 hours remain in current processor day
* 2 days plus 22 hours until request expires
* No additional charge
* Enablement reduced by 10 processor days (5 processors multiplied by 2 days)

At 3:00 p.m. on Monday, you change the request to 10 processors for 2 days. The result is:
* 18 hours remain in current processor day
* 2 days + 18 hours until request expires
* Charge for 4 processor days (5 additional processors multiplied by 18 hours in current processor day divided by 24 equals 3.75, which is then rounded up to 4)
* Enablement increase by the 10 processor days in the running request, then reduced by 24 processor days (10 processors multiplied by 2 days plus 4 processor days charged for the hours in the current processor day)

At 5:00 p.m. on Monday, you change the request to 2 processors for 2 days. The result is:
* 16 hours remain in current processor day
* 2 days plus 16 hours until request expires
* No charge and no credit for the 8 canceled processors
* Enablement increased by the 20 processor days in the running request, then reduced by 4 processor days (2 processors multiplied by 2 days)

At 7:00 p.m. on Monday, you change the request to 2 processors for 1 day. The result is:
* 14 hours remain in current processor day
* 1 day plus 14 hours until request expires
* No charge and no credit
* Enablement increased by the 4 processor days in the running request, then reduced by 2 processor days (2 processors multiplied by 1 day)

At 9:00 a.m. on Tuesday, the request is still active. The result is:
* Start of new processor day
* 24 hours remain in current processor day
* 1 day plus 0 hours until request expires
* Charge for 2 processor days
* No change to enablement

At 9:00 a.m. on Wednesday, the request expires. The result is:

- No charge or credit
- No change to enablement

At 10:00 a.m. on Wednesday, you start a new request for 5 processors for 2 days. The result is:
- 24 hours remain in current processor day
- Charge for 5 processor days
- Enablement reduced by 10 processor days

Related concepts:
"Billing when testing your On/Off Capacity on Demand activations"
You can test your On/Off Capacity on Demand (CoD) and Capacity BackUp activations several times within a 24-hour period without incurring duplicate billing charges.

Billing when testing your On/Off Capacity on Demand activations:

You can test your On/Off Capacity on Demand (CoD) and Capacity BackUp activations several times within a 24-hour period without incurring duplicate billing charges.

With this capability, you can test your activations several times over a 24-hour period while the server is powered on. When performing this test, you are only charged for the maximum number of On/Off CoD processors or memory that you request during that 24-hour period. The 24-hour period only accounts for when your server is powered on, which eliminates the possibility that the period would expire if you power off your system for an extended period of time.

The following is an example of how billing works if you decide to test your On/Off CoD activations.

Examples: On/Off CoD processor activations and billing results

Table 9. Billing example for testing On/Off CoD activations

Time	Processor activations and billing results
8:00 a.m.	• 5 processors activated • 5 processor days charged • 5 processor maximum
11:00 a.m. (3 hours later)	• 3 processors added • 3 processor days charged • 8 processor maximum
3:00 p.m. (4 hours later)	• 3 processors canceled (no credit) • 8 processor maximum
5:00 p.m. (2 hours later)	• 3 processors added (no charge) • 8 processor maximum
8:00 p.m. (3 hours later)	• 3 processors canceled (no credit) • 8 processor maximum
11:00 p.m. (3 hours later)	• 3 processors added (no charge) • 8 processor maximum
4:00 a.m. (5 hours later; 20 hours since 8:00 a.m. initial activation)	• 3 processors canceled (no credit) • 8 processor maximum
Total charge	8 processor days total

This is billing example when starting and stopping On/Off CoD requests during a test.

Table 10. Billing example for starting and stopping On/Off CoD requests when testing

Time	Processor activations and billing results
8:00 a.m.	• 3 processors activated • 3 processor days charged • 3 processor maximum
9:00 a.m. (1 hour later)	• 1 processor canceled (no credit) • 3 processor maximum
10:00 a.m. (1 hour later)	• 1 processor added • No charge • 3 processor maximum
11:00 a.m. (1 hour later)	• 3 processors stopped (no credit) • 3 processor maximum
12:00 p.m. (1 hour later)	• 4 processors activated • 1 processor day charged (1 multiplied by 20 hours < 24 hours) • 4 processor maximum
1:00 p.m. (1 hour later)	• 4 processors stopped (no credit) • 4 processor maximum
2:00 p.m. (1 hour later)	• 1 processor activated • No charge • 4 processor maximum
4:00 p.m. (2 hours later)	• 1 processor stopped (no credit) • 4 processor maximum
Total charge	4 processor days total

Related concepts:

"Billing when changing a running On/Off Capacity on Demand request" on page 20
Ensure that you understand the implications to billing before you decide to change a running On/Off
Capacity on Demand (CoD) request.

Ordering On/Off Capacity on Demand

To order On/Off Capacity on Demand (CoD), contact your IBM Business Partner or IBM sales
representative.

Your IBM Business Partner or IBM sales representative guides you through the completion of the
required On/Off CoD contracts with IBM. Then, your IBM Business Partner or IBM sales representative
places a customer order for an On/Off CoD enablement feature. For more information about the
enablement feature, see"On/Off Capacity on Demand enablement code" on page 17.

Before using On/Off CoD, you must enable On/Off CoD. See "Enabling On/Off Capacity on Demand"
on page 24 for more information.

Using On/Off Capacity on Demand

You must use the Hardware Management Console (HMC) to use and manage On/Off Capacity on
Demand (CoD).

Most Capacity on Demand (CoD) tasks on the HMC require the HMC Super Administrator user role.

After you have enabled and activated On/Off CoD, minimal day-to-day management of your temporary capacity is required.

Enabling On/Off Capacity on Demand

Enable your server for On/Off Capacity on Demand (CoD), before requesting temporary capacity on your server. To enable your server for On/Off CoD, you must use the Hardware Management Console (HMC).

Most CoD tasks on the HMC require the HMC super administrator user role.

Perform the following steps to enable your server for On/Off CoD:

1. Retrieve the On/Off CoD enablement code by accessing http://www-912.ibm.com/pod/pod.
2. Enter your activation code on your server using the HMC. To enter your code:
   a. Click **Systems Management**.
   b. Select **Servers**.
   c. Select the server on which you want enter your activation code.
   d. Select **Tasks > Capacity on demand (CoD) > Enter CoD Code**.
   e. Type your activation code in the **Code** field.
   f. Click **OK**.

Your server is now enabled for On/Off CoD. To use your processors or memory, see "Activating On/Off Capacity on Demand."

Activating On/Off Capacity on Demand

After you have ordered On/Off Capacity on Demand (CoD) and enabled On/Off CoD, you can request temporary activation of On/Off CoD resources.

For information about entering On/Off CoD enablement codes, see "Ordering On/Off Capacity on Demand" on page 23 and "Enabling On/Off Capacity on Demand."

To request activation of On/Off CoD resources:

1. In the navigation area of the Hardware Management Console window, expand **Systems Management**.
2. Select **Servers**.
3. In the contents area, select the server on which you want to activate processor cores or memory temporarily.
4. Select **Tasks**.
5. Select **Capacity on Demand**.
6. Select either **Processor** or **Memory**.
7. Select **On/Off CoD**.
8. Select **Manage**.
9. Type the number of On/Off CoD resources you want and the number of days you want them for, and then click **OK**.

Any newly activated processor cores are now available for use by uncapped logical partitions. If there are no uncapped logical partitions, you must assign the processor cores to one or more logical partitions in order to begin using the processor cores. Any newly activated memory must be assigned to one or more logical partitions to begin using the newly activated memory.

You can dynamically assign the newly activated processor cores or memory to the default partition. Alternatively, if your server is in the manufacturing default configuration, the server can start to use the newly activated processor cores or memory immediately after restarting your server operating system

You will be billed for the activated On/Off CoD resources regardless of whether they have been assigned to a logical partition or are being used. You can stop an active request for On/Off Capacity on Demand before it expires. For more information, see "Stopping an On/Off Capacity on Demand request" on page 26.

You can change a running On/Off CoD request. For more information, see "Changing a running On/Off Capacity on Demand request" on page 26. If you stopped the previous On/Off CoD request that was running on your server, and you start a new On/Off CoD request before the current resource day from the previous request expires (the hours remaining in the current resource day is a non-zero number), the new On/Off CoD request will be handled like a change request for billing purposes. For more information, see "Billing when changing a running On/Off Capacity on Demand request" on page 20.

To avoid being billed for unreturned processor or memory days, you must return the On/Off CoD resources before your On/Off CoD request expires. For more information, see "Returning On/Off Capacity on Demand resources" on page 28.

Establishing monthly reporting to IBM

You can establish monthly reporting to IBM by using the IBM Electronic Service Agent™, fax, or email.

The customer contract that is required prior to receiving your On/Off Capacity on Demand (CoD) enablement code requires you to report billing data, at least once per month, regardless of whether you have used temporary capacity during the period.

You can use several methods to report information about your requests for temporary capacity provided by On/Off CoD to IBM. The preferred method of reporting is to send information electronically using the Electronic Service Agent. Reporting can also be done using fax or email. If fax or email is used, you must sign a separate contract with IBM.

Establish monthly reporting using the Electronic Service Agent

Monthly reporting of your temporary capacity billing information can be sent to IBM electronically by using the Electronic Service Agent, which is part of the Hardware Management Console. The Electronic Service Agent is designed to monitor events and to transmit server inventory information to IBM on a periodic, customer-definable timetable.

Establish monthly reporting using fax or email

To fax or send an email containing your billing information for On/Off CoD, do the following:
1. Save your billing information. For instructions about how to save your billing information, see "Viewing and saving On/Off Capacity on Demand information" on page 29.
2. If you are using fax, prepare a fax document with the following information:
   - Fax-to Information:
     - **Send to:** Capacity on demand Administrator
     - **Fax number:** 507-253-4553
     - **Location:** Rochester, Minnesota USA
   - Fax-from Information:
     - **Customer name:**
     - **Customer contact name:**
     - **Customer address:**
     - **Customer phone number:**
     - **Customer fax number:**

3. If you are using email, send the electronic image of the billing information in an email to the appropriate address. For IBM System i5® or eServer i5 models, send to icod@us.ibm.com. For IBM System p5® or eServer p5 models, send to pcod@us.ibm.com.

Stopping an On/Off Capacity on Demand request

You can stop a request for temporary capacity before it expires.

On/Off Capacity on Demand (CoD) remains enabled on your server, but an issued request for temporary capacity will be stopped. For example, consider this scenario: you have requested the temporary activation of one inactive processor for 14 days. After seven days of this request, you determine that you do not need the temporarily activated processor for the remaining seven days of the request. You can stop the request and avoid being billed for any unused processor or memory days of your request. Stopping a request does not preclude making any further requests at a later time.

To stop a request for temporary capacity at any time during the period of requested temporary capacity:

1. Return the On/Off CoD resources. See "Returning On/Off Capacity on Demand resources" on page 28 for information about how to return On/Off CoD resources.
2. In the navigation area of the Hardware Management Console window, expand **Systems Management**.
3. Select **Servers**.
4. In the contents area, select the server on which you want to stop your On/off CoD request.
5. Select **Tasks**.
6. Select **Capacity on Demand**.
7. Select either **Processor** or **Memory**.
8. Select **On/Off CoD**.
9. Select **Manage**.
10. Type **0** for the number of On/Off CoD processors and type **0** for the number of days, then click **OK**.

Changing a running On/Off Capacity on Demand request

In a running On/Off Capacity on Demand (CoD) request, you can change the number of resources, number of days, or both the number of resources and number of days. You do not need to stop the current request to start a new request or wait until the current request expires.

Before you change a running On/Off CoD request, ensure that you understand the implications to billing. For more information, see "Billing when changing a running On/Off Capacity on Demand request" on page 20.

To successfully change a running On/Off CoD request:

1. If you are decreasing the amount of resources in the running request, return the On/Off CoD resources to be deactivated. See "Returning On/Off Capacity on Demand resources" on page 28 for details about how to return On/Off CoD resources.
2. In the navigation area of the Hardware Management Console window, expand **Systems Management**.
3. Select **Servers**.
4. In the contents area, select the server on which you want to change your request.
5. Select **Tasks**.
6. Select **Capacity on Demand**.
7. Select either **Processor** or **Memory**.
8. Select **On/Off CoD**.
9. Select **Manage**.

10. Type the new number of On/Off CoD resources that you want and how many days you want them for and then click **OK**.

Any newly activated processor cores are now available for use by uncapped logical partitions. If there are no uncapped logical partitions, you must assign the processor cores to one or more logical partitions in order to begin using the processor cores. Any newly activated memory must be assigned to one or more logical partitions to begin using the newly activated memory.

You can dynamically assign the newly activated processor cores or memory to the default partition. Alternatively, if your server is in the manufacturing default configuration, the server can start to use the newly activated processor cores or memory immediately after restarting your server operating system

Testing your On/Off Capacity on Demand activations

You can test your On/Off Capacity on Demand (CoD) and Capacity BackUp activations several times within a 24-hour period without incurring duplicate billing charges.

You can test your activations several times over a 24-hour period while the server is powered on. When performing this test, you are only charged for the maximum number of On/Off CoD processor cores or memory that you request during that 24-hour period. The 24-hour period only accounts for when your server is powered on, which eliminates the possibility that the period would expire if you power off your system for an extended period of time.

For an example of how billing works when testing your On/Off CoD activations, see Table 9 on page 22.

Discontinuing On/Off Capacity on Demand

To discontinue the On/Off Capacity on Demand (CoD) function on your server, disabling the capability for future use, you must obtain and enter an On/Off CoD termination code on your server.

To obtain this termination code, send a request for an On/Off CoD termination code to the appropriate CoD administrator at the following email address:

- Power Systems: pcod@us.ibm.com

A single On/Off CoD termination code disables On/Off CoD for both processor cores and memory units. The termination code cannot be entered if an active On/Off CoD request exists on the system, or if unreturned On/Off CoD resources are in use on the system. The active request must be stopped and any unreturned resources must be returned before On/Off CoD can be discontinued. For information about how to stop the active On/Off CoD request, see "Stopping an On/Off Capacity on Demand request" on page 26. For information about how to return On/Off CoD resources, see "Returning On/Off Capacity on Demand resources" on page 28.

If your server unexpectedly loses power after you have stopped an On/Off CoD request, you might need to perform "Recovery actions" to successfully power on your server.

To disable future use of On/Off CoD on your server after you have obtained a termination code:

1. In the navigation area of the HMC window, expand **Systems Management**.
2. Select **Servers**.
3. In the contents area, select the server on which you want enter your termination code.
4. Select **Tasks > Capacity on Demand > Enter CoD Code**.
5. Type your termination code in the **Code** field.
6. Click **OK**.

Recovery actions:
Perform these recovery actions in the event the server is powered off or loses power when there are unreturned Trial CoD or On/Off CoD resources. Unreturned Trial CoD resources result when the trial

period ends before the Trial CoD resources have been removed from your logical partition. Unreturned On/Off CoD resources result when the On/Off CoD request expires before the On/Off CoD resources have been removed from your logical partition. These recovery actions need to be used to ensure that logical partitions that were running prior to the power off or loss of power are successfully powered on.

When a server is powered off or loses power, all unreturned Trial CoD or On/Off CoD resources are reclaimed by the server. As a result, when the server is powered back on, all logical partitions that were running prior to the power off or loss of power might not be able to be restarted since only licensed resources are available for use. Furthermore, when a logical partition is powered on, if there are not enough licensed resources to satisfy the logical partition's memory or processor requirements, the power on of that logical partition will fail. The failure might result in an HMC message of HSCL03F4 (not enough processing resources to meet the allocation setting), or a system reference code of B2xx1150 or B2xx1230.

Note: The server can power on to standby mode only if you have specified that option prior to powering on your server.

To successfully power on those logical partitions, perform either step 1 or 2, or a combination of the 2 steps.
1. Reduce logical partition resources so that the total of logical partition resources across all logical partitions to be powered on does not exceed the total number of activated resources.
2. Enter new Capacity on Demand activation codes to satisfy these requirements. Additionally, start an On/Off CoD request (if On/Off CoD is still enabled) or enter a new Trial CoD activation code. If the On/Off CoD enablement is exhausted, a new On/Off CoD enablement code would need to be entered before doing a new On/Off CoD request.

Returning On/Off Capacity on Demand resources

To return On/Off Capacity on Demand (CoD) processor cores or memory, you must remove the processor cores or memory from the logical partitions to which they are assigned, thus making them available to be reclaimed by the server.

You do not need to remove the processor cores or memory from the same logical partitions to which they were assigned when you started your On/Off CoD request or Trial CoD. You can remove the processor cores or memory from any of your logical partitions.

It is best to remove processor cores or memory from a logical partition when the logical partition is running.

Logical partitions that are not activated might still have processor cores and memory assigned to them. To remove processor cores or memory from a logical partition that is not activated, you have these options:
- Modify a partition profile for the logical partition to reduce the number of processor cores or memory, and then activate the logical partition by using the modified partition profile.
- Delete the logical partition.

Viewing settings for On/Off Capacity on Demand resources

You can use the Hardware Management Console (HMC) to view On/Off Capacity on Demand (CoD) settings. You can see how many processor cores or memory units you have, how many are active, and how many are available for activation using CoD with these settings. You can also view information about On/Off CoD processor cores and memory units.

You can see how many processor cores or memory units you have, how many are active, and how many are available for activation using CoD with these settings. You can also view information about your On/Off CoD processor cores and memory units, Trial CoD processor cores and memory units, and your Utility CoD processor cores.

To view the capacity settings for processor cores or memory, do the following:

1. In the navigation area of the HMC window, expand **Systems Management**.
2. Select **Servers**.
3. In the contents area, select the server on which you want to view capacity settings.
4. Select **Capacity on demand**.
5. Select either **Processor** or **Memory**.
6. Select the CoD offering that you want to view.
7. Select **View Capacity Settings**.

Viewing and saving On/Off Capacity on Demand information

You can use the Hardware Management Console (HMC) to view and save On/Off Capacity on Demand (CoD) code-generation and billing information. You might need to do this if the CoD code that was provided for your server does not work.

You can view CoD code-generation information and save it to a file on a remote system or to a file on removable media. The information that is used to generate your CoD codes must exactly match the information that is shown on the HMC CoD Code Information window. To collect the information that is used to generate your CoD codes, use the CoD Code Information window to save the CoD code information to a file on a remote system or to a file on removable media. Then, you can either attach the file to an email, or print the file and fax it to your CoD administrator.

To view and save CoD code-generation information:

1. In the navigation area of the HMC window, expand **Systems Management**.
2. Select **Servers**.
3. In the contents area, select the server on which you want to view and save the CoD code information.
4. Select **Tasks**.
5. Select **Capacity on Demand (CoD)**.
6. Select **Processors (or Memory)**.
7. Select the CoD offering you want to view or save.
8. Select **View Code Information**.
9. In the CoD Code Information window, click **Save** to save the CoD code information to a file on a remote system or to a file on removable media.
10. In the Save CoD Code Information panel, select one of these options, and then perform the tasks associated with that option.

Option	Description
Save to a file on a remote system	1. Enter the remote system name, file name, user ID, and password. 2. Click **OK** to save the CoD code information or click **Cancel** to exit the panel without saving the CoD code information.

Option	Description

Save to media	1. Click **OK**.
	
	2. Select the required device. These options might be included in the list (the list includes only those removable media devices that are available for use on the HMC):
	   • **Diskette drive**
	   • **Flash memory**
	   • **USB diskette drive**
	
	3. Click **OK** to save the CoD code-generation information, or click **Cancel** to exit the panel without saving the CoD code information.

Viewing and saving Capacity on demand billing information:
You can view CoD billing information and save it to a file on a remote system or to a file on removable media. If you choose to manually report the billing information, use the CoD Billing Information window on the HMC to save the billing information. Then, you can either attach the file to an email or print the file and fax it to your CoD administrator.

To view and save CoD billing information, do the following:
1. In the navigation area of the HMC window, expand **Systems Management**.
2. Select **Servers**.
3. In the contents area, select the server on which you want to view and save your billing information.
4. Select **Tasks**.
5. Select **Capacity on Demand**.
6. Select **Processor** or **Memory**.
7. Select **On/Off CoD**.
8. Select **View Billing Information**.
9. In the CoD Billing Information window, click **Save** to save the CoD billing information to a file on a remote system or to media.
10. In the Save Billing Information panel, select one of these options, and then perform the tasks associated with that option.

Option	Description
Save to a file on a remote system	1. Enter the remote system name, file name, user ID, and password 2. Click **OK** to save the CoD billing information or click **Cancel** to exit the panel without saving the CoD billing information.

Save to media	1. Click **OK**.
	
	2. Select the required device. The following options might be displayed (the list will include only those removable media devices that are available for use on your HMC):
	   • **Diskette drive**
	   • **Flash memory**
	   • **USB diskette drive**
	
	3. Click **OK** to save the CoD billing information, or click **Cancel** to exit the panel without saving the CoD billing information.

Utility Capacity on Demand

Utility Capacity on Demand (CoD) automatically delivers additional processor capacity on a temporary basis within the system's default Shared Processor Pool.

Utility Capacity on Demand concepts

The Utility Capacity on demand (CoD) offering is for customers with unpredictable, short workload increases who need an automated and affordable way to help assure that adequate server resource is available as needed.

When you add utility CoD processor cores, they are automatically placed in the default shared processor pool. These processor cores are available to any uncapped partition in any shared processor pool.

The processor cores become available to the pool's resource manager. When the system recognizes that the combined processor utilization within the shared pool exceeds 100% of the level of base (purchased or active) processor cores assigned across uncapped partitions, a Utility CoD Processor Minute is charged, and this level of performance is available for the next minute of use. If additional workload requires a higher level of performance, the system will automatically allow the additional Utility CoD processor cores to be used. The system automatically and continuously monitors and charges for the performance needed above the base (permanent) level.

When action on your part is required after you implement this CoD offering, the HMC displays messages on the HMC desktop.

Utility Capacity on Demand enablement code

Learn more about enabling your Hardware Management Console (HMC) so that it can use Utility Capacity on Demand (CoD). An HMC is required to use Utility CoD.

You must enable your system to use Utility Capacity on Demand. The Utility CoD website can provide a Utility CoD Enablement Code. To start using the inactive capacity on your system as utility capacity, you must enter the enablement code. The Utility CoD enablement code is valid for 365 server powered-on days.

The HMC displays messages on the HMC desktop. Console messages are sent during the last 30 days of the enablement period. This allows you time to return to the CoD website, accept the terms and conditions for another year and receive a new enablement code.

After you have enabled your machine to use Utility Capacity on Demand, you can move the inactive processor cores into the shared processor pool. Then you can use them as utility processor cores for uncapped partitions.

Utility Capacity on Demand processor minutes

You can use Capacity on Demand (CoD) to add processor minutes to your managed system.

Utility CoD automatically delivers additional processor capacity on a temporary basis within the system's shared processor pool. You can place any number of inactive processor cores into the shared processor pool. After you have placed the processor cores in the shared processor pool, the processor cores become available to the pool's resource manager. When the system recognizes that all the used processor cores within the shared pool exceeds 100% of the level of base (purchased or active) processor cores assigned across uncapped partitions, a Utility CoD Processor Minute is charged. This level of performance is available for the next minute of use. If additional workload requires a higher level of capacity, the system automatically allows the additional Utility CoD processor cores to be used. The system automatically and continuously monitors and charges for the capacity needed above the base (permanent) level.

When the system recognizes that the base processor cores assigned across uncapped partitions is 100% used and at least 10% of one processor is needed, the additional processor resource is automatically applied and chargeable processor minutes start accruing. Processor minutes stop accruing when the utilization level drops and the base processor cores assigned can handle the workload.

Utility Capacity on Demand billing features

Learn more about the Utility Capacity on Demand (CoD) billing features associated with your machine type and model.

The following table describes the processor and billing features for Utility CoD.

Table 11. Utility CoD features

Machine type-model	Orderable processor feature	Utility CoD processor billing feature
9117-MMB	4980	7642
9117-MMB	4980	7643 (IBM i)
9117-MMB	4981	7646
9117-MMB	4981	7647 (IBM i)
9117-MMC	4983	5330
9117-MMC	4983	5331 (IBM i)
9117-MMC	4984	5335
9117-MMC	4984	5336 (IBM i)
9117-MMD	EPM0	EPMW
9117-MMD	EPM0	EPMX (IBM i)
9117-MMD	EPM1	EPMY
9117-MMD	EPM1	EPMZ (IBM i)
9119-FHB	4700	4706
9119-FHB	4700	4719 (IBM i)
9119-FHB	4702	4707
9119-FHB	4702	4722 (IBM i)
9179-MHB	4982	7633
9179-MHB	4982	7634 (IBM i)
9179-MHC	5003	5340
9179-MHC	5003	5341 (IBM i)
9179-MHC	EP24	EP 26
9179-MHC	EP24	EP 27 (IBM i)
9179-MHD	EPH0	EPHU
9179-MHD	EPH0	EPHV (IBM i)
9179-MHD	EPH2	EPHY
9179-MHD	EPH2	EPHZ (IBM i)

Note: Each billing feature is purchased to pay for 100 Utility CoD processor minutes.

Using Utility Capacity on Demand

Utility Capacity on Demand (CoD) automatically provides additional processor capacity on a temporary basis within the shared processor pool.

Utility CoD use is measured in processor minute increments and is reported at the Utility CoD website. Payment is required based on the reported use of processor minutes. You must purchase and pay for an order that includes a quantity of Utility CoD billing features.

Each managed system has a *reporting limit* and a *reporting threshold*. These values are set by the Utility CoD Enablement Code. On managed systems with 1 - 4 inactive processor cores, the reporting threshold is 500 minutes, and the reporting limit is 1000 minutes. On managed systems with 5 - 16 inactive processor cores, the reporting threshold is 1000 minutes, and the reporting limit is 2000 minutes. If the number of inactive processor cores is more than 16, then the reporting threshold is 2500 minutes, and the reporting limit is 5000 minutes.

The HMC displays a message on the desktop when the number of unreported minutes reaches 90% of the reporting threshold. To ensure that you can continue to use your Utility CoD processor cores, you should report when your reporting threshold reaches 90%. For more information about reporting Utility Capacity on Demand processor minutes, see "Reporting Utility Capacity on Demand processor minutes" on page 34.

Enabling Utility Capacity on Demand

Learn more about how to enable your managed system to use Utility Capacity on Demand (CoD).

Utility CoD allows you to report your use based on how your business uses utility processor minutes. There is no fixed reporting schedule, and there are no electronic or screen captures required to report use of utility processor minutes. The managed system notifies you when the reporting threshold has been reached. You can also choose to report at any time before the threshold has been reached. The enablement code sets the reporting threshold and reporting limit for the system.

Perform the following steps to enable your managed system to use Utility Capacity on Demand:

1. Go to the Utility Capacity on Demand website.
2. Click **Utility CoD** to accept the Terms and Conditions associated with Utility CoD. A Utility CoD Enablement Code will be provided for your system after you agree to the Terms and Conditions.
3. Enter your activation code on your server using the HMC. To enter your code:
   a. Click **Systems Management**.
   b. Select **Servers**.
   c. Select the server on which you want enter your activation code.
   d. Select **Tasks > Capacity on demand (CoD) > Enter CoD Code**.
   e. Type your activation code in the **Code** field.
   f. Click **OK**.
4. Assign a quantity of inactive processor cores (any number you choose) to the shared processor pool using the HMC.

You can then configure Utility CoD so that you can use the new utility processor cores based on your business priorities and performance requirements. For example, you can set an upper limit on the maximum amount of usage that Utility CoD consumes. For example, if you want to limit the total usage at 500 minutes, you can use the HMC to set this limit.

Discontinuing Utility Capacity on Demand

You can stop Utility Capacity on Demand (CoD) by removing all utility processor cores from the shared processor pool.

To disable and end active Utility CoD, you must request for a termination code from the Utility CoD website. When you enter the termination code on the HMC, Utility CoD functions will be disabled. The termination code will not be accepted by the HMC if more than 100 minutes of use remain unreported.

Reporting Utility Capacity on Demand processor minutes

Learn more about how to report the number of Utility Capacity on Demand (CoD) processor minutes your managed system has used.

To report utility processor minutes, go to the CoD website and enter the number of processor minutes you would like to report. You can enter the value currently displayed on your system's HMC Utility CoD screen, or some amount less than what is displayed. You can also report some amount greater than what is displayed, if you would like to purchase minutes before they have been used.

You must report in increments of 100 processor minutes. The website ensures you report only 100, 200, 300, or any multiple of 100 processor minutes.

After you report a quantity of processor minutes, a Utility CoD reporting code will be provided to you. This code acts like a receipt, showing that you reported processor minutes. You must enter this code on your HMC for the processor minutes you reported to be recorded.

To ensure that you can continue to use your Utility CoD processor cores, you should report when the HMC notifies you that the number of unreported minutes has reached 90% of the reporting threshold. The HMC displays a message on the desktop when the number of unreported minutes reaches 90% of the reporting threshold. At that point, you have 30 powered-on days to report or you have until the reporting limit is reached, whichever comes first. At this time, if the Utility CoD reporting code has not yet been entered at the HMC, Utility CoD will be disabled and all utility processor cores will be removed from the shared pool.

Paying for Utility Capacity on Demand processor minutes

Learn more about how to pay for the Utility Capacity on Demand (CoD) processor minutes you have used and what will happen if you do not pay for processor minutes.

The marketing team that you specify at the time you enable your system for Utility CoD is notified of the processor minutes you report. The marketing team works with you to process a standard miscellaneous equipment specification (MES) order for a quantity of 100 processor minute billing features (for example, feature code 7642 for the 9117-MMB) so that you can pay for what you used. If you do not pay for the utility processor minutes you report, the CoD website does not accept future reported minutes. As a result, you are not be provided with another Utility CoD reporting code to enter at your system to continue using Utility CoD.

Entering Utility CoD enablement codes and reporting codes

Learn more about how to use the HMC to enter enablement and reporting codes.

To enter the Utility Capacity on Demand (CoD) enablement and reporting codes, do the following:
1. In the navigation area of the HMC window, expand **Systems Management**.
2. Select **Servers**.
3. In the contents area, select the server on which you want to enter your Utility CoD enablement or reporting code.
4. Select **Tasks > Capacity on Demand > Enter CoD Code**.
5. Type your enablement or reporting code in the **Code** field.
6. Click **OK**.

Reviewing used or reported processor minutes

You can review the used or reported processor minutes using the Hardware Management Console (HMC) interface.

To review used or reported processor minutes, do the following:
1. In the Navigation area, click **Systems Management > Servers**.

2. Select the server for which you want to view Utility CoD processor minute information.
3. Click **Tasks > Capacity on Demand (CoD) > Processor > Utility CoD > View Capacity Settings**.

Setting a usage limit on processor minutes

Learn more about setting a limit on the processor minutes that you use.

To set a usage limit on processor minutes, do the following:

1. In the Navigation area, click **Systems Management > Servers**.
2. Select the server for which you want to set a Utility CoD processor minute usage limit.
3. Click **Tasks > Capacity on Demand (CoD) > Processor > Utility CoD > Manage**.
4. Select **Enable processor minute usage limit**.
5. In the **New limit** field, type the number of processor minutes you want to set as the limit.
6. Click **OK**.

Obtaining the information needed to report processor minutes

Read more about how to view the information you need to report Utility Capacity on Demand (CoD) processor minutes.

To view the information you need to report Utility CoD processor minutes for billing, do the following:

1. In the Navigation area, click **Systems Management > Servers**.
2. Select the server for which you want to report Utility CoD processor minutes.
3. Click **Tasks > Capacity on Demand > Processor > Utility CoD > View Code Information**.

Capacity BackUp

Capacity BackUp uses On/Off Capacity on Demand (CoD) capabilities to provide an off-site, disaster-recovery server.

The Capacity BackUp offering has a minimum set of active processor cores that can be used for any workload and a large number of inactive processor cores 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.

For more information about On/Off CoD, see "On/Off Capacity on Demand" on page 16.

Make sure that you have prepared your server before continuing. For more information, see "Preparing for Capacity on Demand" on page 2.

You can test your Capacity BackUp activations while not incurring duplicate charges. For more information, see Testing your On/Off activations.

Processors available for Capacity BackUp

Learn about the number of active and inactive processor cores available for each server model.

Capacity BackUp provides a minimum number of active processor cores that can be used for any workload and a large number of inactive processor cores that can be used in the event of a disaster. On/Off Capacity on Demand (CoD) is used to temporarily activate the processor cores for disaster testing or in the event of an actual disaster. For more information about On/Off CoD, see "On/Off Capacity on Demand" on page 16.

Note: Additional capacity backup configurations are available for various Power Systems servers. For more information, see IBM Capacity Backup for Power Systems.

The following table lists the server models and processor features that offer inactive processor cores that can be temporarily activated by using Capacity BackUp.

Table 12. Temporary activation by using Capacity BackUp

Machine type-model	Capacity BackUp processor feature	On/Off CoD Enablement billing feature	Active processor cores	No-charge processor days
9119-FHB	7560	7971	4/64, 8/128, 12/192, or 16/256	1800, 3600, 5400, and 7200
9119-FHB	7562	7971	3/48, 6/96, 9/144, or 12/192	1360, 2720, 4080, and 5440

Software licensing considerations for Capacity BackUp

Learn about software licensing considerations for Capacity BackUp.

Software licensing for IBM i is included with the active processor cores for the Capacity BackUp server and is not required with the use of temporary capacity. AIX software licensing for permanently active processor cores is licensed separately. AIX software licensing of inactive processor cores is typically not required in the event of a disaster. IBM software licensing is not required on the Capacity BackUp server. Non-IBM software licensing is based on the software tier or conditional use licensing explicitly required by the software provider.

Power enterprise pool

Power enterprise pools provides flexibility and value for Power Systems. A Power enterprise pool is a group of 9119-FHB systems that can share Mobile Capacity on Demand (CoD) processor resources and memory resources.

You can move Mobile CoD resource activations among the systems in a pool with Hardware Management Console (HMC) commands. These operations provide flexibility when you manage large workloads in a pool of systems and helps to rebalance the resources to respond to business needs. This feature is useful for providing continuous application availability during maintenance. Not only can the workloads be easily moved to alternate systems but the processor activations and memory activations can be moved. Disaster recovery planning also is more manageable with the ability to move activations where and when they are required.

Power enterprise pool configuration requirements

Only 9119-FHB systems can participate in a Power enterprise pool. Each system must have machine code release level of 7.8.0 or higher installed. Each system must have a minimum of 24 processor cores or 25% of the installed processor cores, whichever is higher, permanently activated. All remaining processor activations on the system can be Mobile CoD activations. Up to 75% of all physically installed memory can be Mobile CoD activations.

All the systems in a pool must be managed by the same HMC or by the same pair of redundant HMCs. If redundant HMCs are used, the HMCs must be connected to a network so that they can communicate with each other. The HMCs must be at V7R7.8 or later and have at least 2 GB of memory.

An HMC can manage multiple Power enterprise pools and can also manage systems that are not part of a Power enterprise pool. The maximum number of systems an HMC can manage is 32 high-end systems, 48 mid-range, or 48 low-end systems. An HMC can manage a maximum of 1000 total partitions. Systems can belong to only one Power enterprise pool at a time.

Ordering Power enterprise pools

To order Power enterprise pools, contact your IBM Business Partner or IBM sales representative.

Your IBM Business Partner or IBM sales representative helps you complete the following steps:

1. Complete and submit the Power enterprise pools contract and addendum specifying all system serial numbers to be included in the pool. A copy must be sent to the Power Systems CoD Project Office (pcod@us.ibm.com) to generate a pool ID number.
2. Order mobile enablement and processor and memory activation features for participating systems. Every system in the pool must have feature code EB35 as an identifier.

When the order is fulfilled, a configuration file is generated which contains a Power enterprise pool membership activation code for each of the systems in the pool along with the Mobile processor activation code and Mobile memory activation code for the pool. This file is made available on the Capacity on Demand (CoD) website (http://www-912.ibm.com/pod/pod). The file is required by the Hardware Management Console (HMC) to create the pool.

Mobile CoD feature codes

Table 13. Mobile CoD feature codes

Feature code	Description	Maximum
EP23	1-Core Mobile activation	192
EMA4	100 GB Mobile memory activation	120
EB35	Mobile enablement	1

All Mobile CoD feature codes for Power enterprise pools are MES only.

The amount of permanent and Mobile CoD activations ordered for any system cannot exceed the total physical capacity of the system.

Power enterprise pool configuration file

The configuration file is a signed XML file that contains the required information to configure a Power enterprise pool.

Pool ID
> The unique ID that IBM assigns to the Power enterprise pool.

Sequence number
> A numeric value that increments higher whenever IBM updates the configuration file.

Power enterprise pool membership codes
> An activation code or a termination code for each system that is a member of the pool.

Mobile CoD processor code
> The activation code that sets the total number of Mobile CoD processors that you can use in the pool.

Mobile CoD memory code
> The activation code that sets the total amount of Mobile CoD memory that you can use in the pool.

You must contact IBM to get a new configuration file to do the following operations:

- Create a Power enterprise pool
- Add systems to a pool or remove systems from a pool
- Add Mobile CoD resources to a pool or remove Mobile CoD resources from a pool

You must have the latest configuration file for a pool to do the following operations:

* Recover the master Hardware Management Console (HMC) for a pool after a clean installation of the master HMC.
* Set a new master HMC for a pool.

  Note: You do not always need the configuration file to set the master HMC. For more information, see the "Power enterprise pools and the master HMC" on page 39.

The latest configuration file for a Power enterprise pool is available on the Capacity on Demand (CoD) website (http://www-912.ibm.com/pod/pod)

Add or remove systems from Power enterprise pools

Adding or removing a system from an established Power enterprise pool requires notification to IBM.

An updated addendum must be submitted to the Power Systems CoD project office (pcod@us.ibm.com) to add or remove systems from Power enterprise pool. When the update is processed, a new pool configuration file is posted on the CoD website.

Before you remove the systems from a pool, all assets (including Mobile CoD resources) that were originally purchased with the system must be returned to that same system serial number. Mobile assets that belong to a system might qualify for transfer to another system serial number depending on normal qualifying guidelines and, if possible, require more administrative action.

Systems that are removed from a pool can join another pool and contribute Mobile CoD resources to the new pool and use Mobile CoD resources of other systems. Mobile CoD resources require a pool ID to be recognized.

Eligible program authorizations

As a result of authorized participation in a Power enterprise pools offering, you are authorized to temporarily transfer entitlements for authorized use of each Eligible Program from a Power Systems server that is participating in the pool to another Power Systems server that is also participating in the pool. You must not exceed the maximum number of software licenses within the pool for any specific software agreement.

Required maintenance service and support

Within each Power enterprise pool, all participating systems must either be serviced by IBM under warranty or an IBM maintenance service agreement, or not be serviced by IBM. In addition, each eligible program that is entitled for IBM software maintenance (SWMA) on one or more systems that are participating in the pool must also have a valid SWMA agreement on every participating system in the pool that eligible program will execute on.

Additional Power enterprise pool requirements

The following are the additional Power enterprise pool requirements:

* Any licenses for Power software like AIX, IBM i, and other Power software, that exist on any system in a pool must also be licensed for at least one core on each of the additional systems in the pool.
* All systems in a pool must be owned by the same customer enterprise number.
* Activations cannot be transferred, moved, or otherwise reassigned across country boundaries.
* Integrated Facility for Linux activations are not supported as mobile activations within Power enterprise pools but can reside separately on systems within a pool. AIX, IBM i, and Linux operating systems and their workloads are all supported by Power enterprise pools.

Power enterprise pools and the master HMC

A single Hardware Management Console (HMC) must be selected as the master HMC for a Power enterprise pool. The HMC that is used to create a Power enterprise pool is initially set as the master HMC of that pool. A redundant HMC can be configured as a backup. You can set a new master HMC for a pool at any time.

All Power enterprise pool change operations can be performed only by the master HMC for the pool.

When you power on or restart a server, ensure that the server is connected to the master HMC. This action ensures that the required Mobile CoD resources are assigned to the server. When both the server and the master HMC are powered off, restart the master HMC first, then restart the server. This ensures that the server can connect to the HMC to obtain its Mobile CoD resource assignments.

Note: If a restarted server is not able to contact the master HMC, it restarts with no Mobile CoD resources. However, when the master HMC connects to the server the Mobile CoD resources are automatically assigned to the server.

Upgrading the master HMC

You cannot perform any Power enterprise pool change operations when you are upgrading the master HMC. After the upgrade is complete, you can resume performing pool change operations on the HMC. If you plan to perform any pool change operations when you are upgrading the master HMC, you must set a new master HMC before you start the upgrade.

Installing the master HMC

Performing a clean installation of the master HMC deletes all Power enterprise pool data from the HMC. After installation, the HMC cannot resume master HMC functions for the pool until you perform a recovery operation. To avoid this situation, you can set a new master HMC for the pool before you start the clean installation of the current master HMC.

To perform a recovery operation after a clean installation of the HMC, run the following HMC command in a restricted shell terminal:

```
chcodpool -o recover -p <pool name> -f<configuration file name>
```

For more information, run the `man chcodpool` command in a restricted shell terminal on the HMC to view the online help.

Using Power enterprise pools

After you obtain your Power enterprise pool configuration file from IBM, you can create and update the Power enterprise pools by using the Hardware Management Console (HMC).

Create a Power enterprise pool

You can create a Power enterprise pool by using the HMC.

Ensure that you meet the following prerequisites for creating a Power enterprise pool:
* Ensure that the configuration file is in the appropriate location. You must place the file on the local system that you are using to remotely access the HMC. This HMC is the master HMC for the new pool.
* Ensure that the HMC manages all the servers that are to participate in the pool.
* Ensure that all servers that are to participate in the pool are in the standby or the operating state.
* Ensure that all servers that are to participate in the pool use firmware that is version 7.8 or later.

To create a Power enterprise pool, from the master HMC select **Systems Management > Server Pools**, then click **Create Pool**.

Update the configuration of a Power enterprise pool

After the Power enterprise pool is created, you can update the configuration of your pool. You must contact IBM and get a new configuration file for your pool to make the following types of configuration changes:

- You can add Mobile Capacity on Demand (CoD) resources to your pool or you can remove Mobile CoD resources from your pool.
- You can add servers to your pool or you can remove servers from your pool.

  Attention: The HMC deletes the pool automatically if you remove the last server from a pool.

Ensure that you meet the following prerequisites for updating the configuration of a Power enterprise pool:

- Ensure that you obtained the required configuration file from IBM.
- Ensure that the configuration file is in the appropriate location. You must place the file on the local system that you are using to remotely access the master HMC for the pool.
- Ensure that any new server that is to participate in the pool is in the standby state or the operating state.
- Ensure that any new server that is to participate in the pool uses firmware that is version 7.8 or later.
- Ensure that any server to be removed from the pool is in the standby state or the operating state.
- Ensure that any server to be removed from the pool does not have any Mobile CoD resource assignments or any unreturned Mobile CoD resources.

When you update the configuration of a pool, the HMC validates the sequence number in the current configuration file. This sequence number must be greater than, or equal to, the sequence number in the last file that was used to create or update the pool. If the current sequence number does not meet this requirement, the update fails. You must obtain the latest configuration file for the pool and update the pool again.

The latest configuration file for a Power enterprise pool is available on the Capacity on Demand (CoD) website (http://www-912.ibm.com/pod/pod).

To update the configuration of a Power enterprise pool, complete the following steps:

1. From the master HMC for the pool, select **Systems Management > Server Pools**.
2. In the Power enterprise pools table, right-click on the pool and then select **Update Pool**.

Allocate Mobile CoD resources to servers in a Power enterprise pool

After you create your Power enterprise pool, all Mobile CoD processor resources and Mobile CoD memory resources are allocated to the pool. You must use the HMC to allocate Mobile CoD resources to the servers in the pool. You do not have to notify IBM when you allocate resources.

You can assign Mobile CoD resources to partitions in the same manner as you assign permanent resources to partitions. Mobile CoD resources remain on a server until you remove them from that server. Mobile CoD resources do not expire in the same manner as On/Off CoD resources or Trial CoD resources do.

It is easy to move Mobile CoD resources from one server to another when migrating partitions. You can remove Mobile CoD resources from a server and add them to another server, when the resources are still being used on the server from which they were removed. This action allows the processor and memory resources of the migrating partition to exist both on the source and destination servers, and be used by both the servers at the same time, until the migration is complete.

The following are Mobile CoD resource allocation guidelines:

- You can add Mobile CoD resources only to servers with unlicensed resources.
- If you remove Mobile CoD resources from a server that the server cannot reclaim because they are still in use, these resources become unreturned resources. A grace period timer then starts for the unreturned Mobile CoD resources on that server. If you do not free the unreturned Mobile CoD resources so that the server can reclaim them before the grace period expires, the pool becomes out of compliance.
- If the pool is out of compliance and the grace period timer for the pool is expired, you can add Mobile CoD resources only to servers that have unreturned resources. And, you cannot add more resources than the number of unreturned Mobile CoD resources on that server.
- When you add Mobile CoD resources to a server, they are used first to satisfy any unreturned CoD resources on that server.

Mobile CoD resource allocation guidelines for a server that is in **No Connection**, **Pending Authentication**, or **Failed Authentication** state:

- You can add Mobile CoD resources only to a server with unreturned Mobile CoD resources. The number of resources that you add cannot exceed the number of unreturned Mobile CoD resources on that server.
- You can remove Mobile CoD resources from a server. The Mobile CoD resources that you remove from the server become unreturned and a grace period timer starts for these resources. If you do not reconnect the server to the master HMC before the grace period expires, the pool becomes out of compliance.

Mobile CoD resource allocation guidelines for a server that is in **Power Off**, **Power Off In Progress**, **Error**, or **Initializing** state:

- You cannot add Mobile CoD resources to the server.
- You can remove Mobile CoD resources from a server and the resources are reclaimed immediately.

Mobile CoD resource allocation guidelines for a server that is in **Incomplete** or **Recovery** state, and the server is powered on:

- You can add Mobile CoD resources only to a server with unreturned Mobile CoD resources. The number of processors that you add cannot exceed the number of unreturned Mobile CoD resources on that server.
- You can remove Mobile CoD resources from the server.

To allocate Mobile CoD processors to servers in a Power enterprise pool, complete the following steps:

1. From the master HMC for the pool, select **Systems Management > Server Pools**.
2. In the left navigation pane, select the pool name and then select **Processor Resources**.

To allocate Mobile CoD memory to servers in a Power enterprise pool, complete the following steps:

1. From the master HMC for the pool, select **Systems Management > Server Pools**.
2. In the left navigation pane, select the pool name and then select **Memory Resources**.

Set the master HMC for a Power enterprise pool

Each Power enterprise pool has a master HMC.

Initially, the HMC that you use to create the pool is set as the master HMC of the pool. It is preferred that you configure a backup master HMC for a pool when you create the pool. The backup master HMC must manage all of the servers in the pool. Configuring a backup master HMC for a pool allows you to easily set the backup master HMC as the new master HMC for the pool if the current master HMC becomes unavailable.

Use the following guidelines for designating a new HMC to be the master HMC for a pool:

- Whenever possible, use the current master HMC of a pool to set a new master HMC for the pool. You must use the current HMC to set a new master HMC if the current master HMC is running.
- You must use the latest configuration file for the pool to set a new master HMC for the pool when the master HMC is down and one of the following conditions also applies:
  - The new master HMC is not configured as the backup master HMC for the pool.
  - The new master HMC that is configured as the backup master HMC for the pool does not have valid backup data for the pool.

  Whenever possible, ensure that you meet the following prerequisites:
  - Ensure that all of the servers that participate in the pool are connected to the new master HMC.
  - Ensure that the participating servers are in either the standby state or the operating state.
- Set a new master HMC before you perform a clean installation of the current master HMC.

You can view information for a pool from any HMC that manages the pool. You must perform all other pool operations from the master HMC of the pool.

Note: The HMC that you use to manage the pool must have a connection to the master HMC. If it does not, the amount and type of information that you can view might be limited.

To configure a backup master HMC for a pool, complete the following steps:
1. From the master HMC for the pool, select **Systems Management > Server Pools**.
2. In the left navigation pane, select the pool name and then select **General Pool Properties**.

To set a new master HMC for a pool, complete the following steps:
- From the current master HMC for the pool, select **Systems Management > Server Pools**.

  Tip: If the current master HMC is not available, log on to the HMC you want to set as the new master HMC for the pool.
- In the left navigation pane, select the pool name and then select **General Pool Properties**.

View history logs

The master HMC for a Power enterprise pool maintains a history log of the Mobile CoD resource usage in the pool. Other Power enterprise pool related events that have occurred are also recorded in this history log.

To view the history log for a pool, complete the following steps:
- From the master HMC for the pool, select **Systems Management > Server Pools**.
- In the left navigation pane, select the pool name and then select **View Pool History Log**.

Each server maintains a history log of the CoD events that have occurred on the server. Mobile CoD resource usage and other Power enterprise pool related events are recorded in this history log.

To view the history log for a server, complete the following steps:
1. From an HMC managing the server, select **Systems Management > Server Pools**.
2. In the left navigation pane, select the pool name and then select **Processor Resources**.
3. In the **Server Processor Information** table, right-click on the server and select **View Server History Log**.

The history log for a server can also be accessed from the Memory Resources screen.

Power enterprise pool compliance

When you share Mobile Capacity on Demand (CoD) resources among servers in a Power enterprise pool, the pool must be in compliance with your CoD licensing agreements.

The resource entitlements for the pool are procured through your CoD licenses, which include a grace period for overuse of these resources. The resource entitlements for the pool must synchronize with the actual usage of those resources. You can temporarily overuse the Mobile CoD pool resources. However, the grace period in your licenses restricts this overuse. When resources are in use beyond the grace period, those resources are overdue and the server is out of compliance with the CoD license. Compliance policies for the Power enterprise pool are based on your CoD licenses and these policies enforce resource availability and usage restrictions for the pool.

The Mobile CoD resource compliance of the servers in the pool determines the compliance state of the pool itself. A server is in compliance if the server does not have any unreturned Mobile CoD resources.

A Power enterprise pool can have one of the following four compliance states:

In compliance
> None of the servers in the pool have any unreturned Mobile CoD resources.

Approaching out of compliance (within server grace period)
> At least one server in the pool has Mobile CoD resources that are unreturned, and the server grace period for those resources is unexpired. None of the servers in the pool have Mobile CoD resources that are unreturned and overdue.

Out of compliance (within pool grace period)
> At least one server in the pool has overdue, unreturned Mobile CoD resources and the pool grace period is unexpired.

Out of compliance
> At least one server in the pool has overdue, unreturned Mobile CoD resources and the pool grace period is expired.

A Mobile CoD resource becomes an unreturned resource under the following conditions:

- You remove the Mobile CoD resource from a server, but the server cannot reclaim the resource because that resource is still in use. For example, the resource is assigned to one or more partitions. You must remove the partition assignments to enable the server to reclaim the resource.
- You remove a Mobile CoD resource from a server that is not connected to the master Hardware Management Console (HMC) of the pool.

When Mobile CoD resources that are removed from a server become unreturned, a grace period timer starts for the unreturned resources on that server. There is a separate grace period timer for unreturned Mobile CoD processors and for unreturned Mobile CoD memory on each server.

Before a server grace period expires, you must release the unreturned Mobile CoD resources and make them available for the server to reclaim. If a resource remains unreturned after the end of the grace period, the pool is out of compliance. When the pool moves to the out of compliance state, a new grace period timer starts for the pool itself. There is only one grace period timer for the pool. If any servers have overdue Mobile CoD resources when the pool grace period expires, add operations for Mobile CoD resources are restricted to servers with unreturned Mobile CoD resources. This restriction is enforced until there are no servers in the pool with overdue unreturned Mobile CoD resources.

When a server in a pool is out of compliance, or the pool is out of compliance, console messages are displayed on the HMCs that manage the pool.

To view compliance information for a Power enterprise pool, complete the following steps:

1. From the master HMC for the pool, select **Systems Management > Server Pools**.

2. In the left navigation pane, select the pool name and then select **Compliance Information**.

Resolving compliance issues

To avoid compliance issues, ensure that Mobile CoD resources are released on a server before you remove the resources from that server. Also, do not remove Mobile CoD resources from a server that is not connected to the master HMC for the pool.

If you want to overuse your Mobile CoD resources when migrating partitions, ensure that all Mobile CoD resources removed from the source server are released and reclaimed by the source server as soon as the migration completes. If the migration fails, immediately remove the Mobile CoD resources added to the destination system and add them back to the source system.

You can resolve unreturned Mobile CoD resources in any of the following ways:

* Migrate a partition to another server. After the partition migrates successfully, any resources that are assigned to the partition on the source server are reclaimed automatically.
* Remove resources from a running partition by using the appropriate dynamic logical partition (DLPAR) task.
* Remove resources from a shutdown partition.
* Delete a partition to release resources that are assigned to that partition.
* Activate Capacity Upgrade on Demand (CUoD), On/Off CoD, or Trial CoD resources.
* Add Mobile CoD resources to the server.

Note: When a server is powered off, any unreturned Mobile CoD resources are reclaimed automatically by the master HMC for the pool.

If the server is not connected to the master HMC for the pool, you must establish a connection from the master HMC to that server. After you reestablish the connection, if any unreturned Mobile CoD resources remain on the server, take one of the previously stated actions to release them. If you cannot reestablish this connection, you can add Mobile CoD resources to the server to resolve the unreturned resources.

PowerVM Editions (PowerVM)

PowerVM Editions (also referred to as *PowerVM*) is activated with a code, similar to the way that capacity is activated on IBM Systems and IBM eServer hardware.

When you purchase a PowerVM Editions feature, a code is provided that can be entered on the Hardware Management Console (HMC) to activate the technology. You can enter PowerVM activation codes by using the Integrated Virtualization Manager (IVM).

PowerVM Editions concepts

This information describes the virtualization technologies that are available.

The following virtualization technologies are available:

* PowerVM is a Virtualization Engine technology that enables the system for the following features:
  - Micro-Partitioning®
  - Virtual I/O Server
  - Integrated Virtualization Manager
  - Live Partition Mobility
  - The ability to run x86 Linux applications on Power Systems

The following table describes the features each PowerVM Edition offers:

Table 14. PowerVM Editions offerings

Offering	Express Edition	Standard Edition	Enterprise Edition
Maximum number of logical partitions offered	3 per server	1000 per server	1000 per server
Management offering	VMControl, IVM	VMControl, IVM, HMC	VMControl, IVM, HMC
Virtual I/O server	Offered	Offered (Dual)	Offered (Dual)
PowerVM Lx86	Offered	Offered	Offered
Suspend/Resume	Offered	Offered	Offered
N_Port Virtualization (NPIV)	Offered	Offered	Offered
Multiple shared processor pools	Not offered	Offered	Offered
Multiple shared storage pools	Not offered	Offered	Offered
Thin provisioning	Not offered	Offered	Offered
Live Partition Mobility	Not offered	Not offered	Offered
Active Memory™ Sharing	Not offered	Not offered	Offered

This table shows the PowerVM Editions features.

Table 15. PowerVM Editions features

Machine	Express Edition feature	Standard Edition feature	Enterprise Edition feature
7895-22X	5225	5227	5228
7895-23X	5225	5227	5228
7895-42X	5225	5227	5228
8202-E4B	5225	5227	5228
8202-E4C	5225	5227	5228
8202-E4D	5225	5227	5228
8205-E6C	5225	5227	5228
8205-E6B	5225	5227	5228
8205-E6D	5225	5227	5228
8231-E2B	5225	5227	5228
8231-E1C and 8231-E2C	5225	5227	5228
8231-E1D, 8231-E2D, or 8268-E1D	5225	5227	5228
8233-E8B	7793	7794	7795
8408-E8D	7793	7794	7795
8412-EAD	7793	7794	7795
9109-RMD	7793	7794	7795
9117-MMB	Not offered	7942	7995
9117-MMC	Not offered	7942	7995
9117-MMD	Not offered	7942	7995
9119-FHB	Not offered	7943	8002
9179-MHB	Not offered	7942	7995
9179-MHC	Not offered	7942	7995

Table 15. PowerVM Editions features (continued)

Machine	Express Edition feature	Standard Edition feature	Enterprise Edition feature
9179-MHD	Not offered	7942	7995

Ordering PowerVM Editions features

You can order PowerVM Editions features for a new server, a server model upgrade, or an installed server.

For a new server or a server model upgrade, your order can contain one or more PowerVM Editions features, resulting in a single PowerVM Editions code. In this case, the PowerVM Editions code is entered before the server is sent to you.

When you order PowerVM Editions features for an installed server, determine which PowerVM Editions technology you want to enable and then order the associated features. A single PowerVM Editions code will be generated for you to enter that enables all of the technologies that you ordered.

Perform the following steps to order one or more PowerVM Editions features:

1. Determine which PowerVM Editions features you want to enable. For more information, see "PowerVM Editions concepts" on page 44.
2. Contact your IBM Business Partner or IBM sales representative to place your order for one or more PowerVM Editions features.
3. Enter the resulting code on your server to enable PowerVM Editions. See "Activating PowerVM Editions" for more information.

Using PowerVM Editions

You can activate Virtualization Engine technologies after you order the features. Learn about how to view a history log of your past PowerVM Editions activations and code-generation information.

Activating PowerVM Editions

To activate PowerVM Editions, you must enter an activation code from the Hardware Management Console (HMC) or the Advanced System Management Interface (ASMI) menu interface. You can also use the Integrated Virtualization Manager (IVM) interface.

To activate PowerVM Editions on the HMC, you must have an HMC super administrator user role.

To enter a PowerVM Editions code, do the following:

1. Retrieve the enablement code by going to http://www-912.ibm.com/pod/pod
2. Enter your activation code on your server using the HMC. To enter your code, do the following:
   a. In the navigation area of the HMC window, expand **Systems Management**.
   b. Select **Servers**.
   c. In the contents area, select the server on which you want enter your activation code.
   d. Select **Tasks**.
   e. Select **Capacity on Demand**.
   f. Select **PowerVM**.
   g. Select **Enter Activation Code**.
   h. Type your activation code in the **Code** field and click **OK**.

You can now begin using PowerVM Editions.

Viewing history log for PowerVM Editions activations

You can see what PowerVM Editions technologies activations are entered and what capabilities have been enabled on your server by using the history log.

To view the PowerVM Editions technologies activations that have been entered and the capabilities that have been enabled, do the following:

1. In the navigation area of the HMC window, expand **Systems Management**.
2. Select **Servers**.
3. In the contents area, select the server on which you want to view the history log.
4. Select **Tasks**.
5. Select **Capacity on Demand**.
6. Select **Power VM**.
7. Select **View History Log**.

Viewing and saving PowerVM Editions technologies code-generation information

You can view and save PowerVM Editions code-generation information using the Hardware Management Console (HMC). You might need to do this if the PowerVM Editions code that was provided for your server does not work.

You can view PowerVM Editions code-generation information, and then save it to a file on a remote system or to a file on removable media. The information used to generate your PowerVM Editions codes must exactly match the information shown on the HMC PowerVM Editions Code Information window. To update the information that is used to generate your PowerVM Editions codes, use the PowerVM Editions Code Information window to save the PowerVM Editions code information to a file on a remote system or to a file on removable media. Then, you can either attach the file to an email, or print the file and fax it to your Capacity on Demand (CoD) administrator.

To view and save PowerVM Editions code-generation information, do the following:

1. In the navigation area of the HMC window, expand **Systems Management**.
2. Select **Servers**.
3. In the contents area, select the server on which you want to view and save your code-generation information.
4. Select **Tasks**.
5. Select **Capacity on Demand**.
6. Select **Power VM**.
7. Select **View Code information**.
8. On the **Show Code Information** page, click **Save** to save the activation code information to a file on a remote system or to media.
9. In the Save Activation Code Information window, select one of the following options, and then perform the task associated with that option.

Option	Description
Save to a file on a remote system	1. Enter the remote system name, file name, user ID, and password 2. Click **OK** to save the activation code information or click **Cancel** to exit the panel without saving the activation code information.

Option	Description

Save to media	1. Click **OK**.
	
	2. Select your device. The following options might be displayed (the list will include only those removable media devices that are available for use on the HMC):
	  • **Diskette drive**
	  • **Flash memory**
	  • **USB diskette drive**
	
	3. Click **OK** to save the CoD code-generation information, or click **Cancel** to exit the panel without saving the CoD code information.

To fax or send an email with the PowerVM Editions code information in it to your PowerVM Editions or CoD administrator, use one of these options to send your information:

- Fax-to information:
  - **Send to:** Capacity on Demand Administrator
  - **Fax number:** 507-253-4553
  - **Location:** Rochester, Minnesota, U.S.
- Fax-from information:
  - **Customer name:**
  - **Customer contact name:**
  - **Customer address:**
  - **Customer phone number:**
  - **Customer fax number:**
- If you are using email, send the electronic image of the code information in an email to the appropriate address:
  - IBM System i5 or eServer i5 models: icod@us.ibm.com
  - IBM System p5 or eServer p5 models: pcod@us.ibm.com

Other Capacity on Demand Advanced Functions

This topic explains other Capacity on Demand (CoD) Advanced Functions such as Enterprise Enablement, Active Memory Expansion, worldwide port name renewal, Live Partition Mobility Trial, activation for 256-core LPAR and Active Memory Mirroring for Hypervisor.

Enterprise Enablement features

Enterprise Enablement is a Capacity on Demand Advanced Function technology that enables the system for 5250 online transaction processing (OLTP).

The following table describes the Enterprise Enablement features. Full-system Enterprise Enablement means that 100% of the processor cores are enabled.

Table 16. Enterprise Enablement features

Machine type and model	Single-processor enterprise enablement	Full-system enterprise enablement
8205-E6B	4970, 4973	4974
8205-E6C	4970, 4973	4974
8205-E6D	4970, 4973	4974

Table 16. Enterprise Enablement features (continued)

Machine type and model	Single-processor enterprise enablement	Full-system enterprise enablement
8231-E2B	4970	4974
8231-E1C and 8231-E2C	4970	4974
8231-E1D, 8231-E2D, and 8268-E1D	4970	4974
8233-E8B	4988	4989
8236-E8C	4988	4989
8408-E8D	4988	4989
8412-EAD	4992	4997
9109-RMD	4988	4989
9117-MMB	4992	4997
9117-MMC	4992	4997
9117-MMD	4992	4997
9119-FHB	4995	4996
9179-MHB	4992	4997
9179-MHC	4992	4997
9179-MHD	4992	4997

Active Memory Expansion

Active Memory Expansion (AME) is a POWER7 function available for use in AIX partitions (AIX 6.1 or later with Technology Level 4).

With AME, memory can be expanded beyond the physical limits of the server or of the true physical memory assigned to the AIX partition by using compression and decompression of memory content.

Depending on your data's characteristics and the available processor resource, you might see expansion up to 100% of the true memory that can allow your partition to do more work, or allow your server to run more partitions and do more work, or both. After Active Memory Expansion is enabled on the server, you control which AIX partitions use Active Memory Expansion and control the degree of expansion.

You can evaluate the use of Active Memory Expansion at no charge with Trial Capacity on Demand (Trial CoD). With Trial CoD, the Active Memory Expansion function can be temporarily activated for up to 60 days at no charge. Trial Active Memory Expansion is available once per server and it allows you to validate the benefits your POWER7 server can realize.

Complete the following steps to order Trial Active Memory Expansion:
1. Go to the Trial Capacity on Demand website:

   Trial Capacity on Demand
2. Select the request for Active Memory Expansion.
3. Retrieve the activation code by going to

   Active Memory Expansion request

Table 17. Active Memory Expansion features

Machine type and model	Active Memory Expansion feature
8202-E4B	4793
8202-E4C	4793

Machine type and model	Active Memory Expansion feature
8202-E4D	4793
8205-E6B	4794
8205-E6C	4794
8205-E6D	4794
8231-E2B	4795
8231-E1C and 8231-E2C	4795
8231-E1D and 8231-E2D	4795
8233-E8B	4792
8236-E8C	4792
9117-MMB	4791
9117-MMC	4791
9119-FHB	4790
9179-MHB	4791
9179-MHC	4791

Worldwide port name renewal code

A worldwide port name (WWPN) is a unique 64-bit identifier that is assigned to a fibre channel node port, called an N_port. The storage area network (SAN) administrator assigns storage to a WWPN. This scheme provides security that limits access to storage on the SAN. The fibre channel standards allow N_Port virtualization, called NPIV, so that one N_port can be shared and require the generation of a unique worldwide port name for each NPIV. Each IBM server that supports NPIV provides up to 64,000 unique WWPNs. When a server indicates that there are no WWPNs remaining, customers must request a WWPN renewal code on the website. The code enables a WWPN prefix, which provides the first 48 bits of each WWPN and makes 64,000 more WWPNs available on the server.

Live Partition Mobility Trial

The Live Partition Mobility feature enables live partitions in servers with no application downtime, resulting in better system utilization, improved application availability, and energy savings. You can use the Live Partition Mobility Trial version to evaluate Live Partition Mobility free of charge for a period of 60 days. After the trial period of 60 days, if you want to continue to use Live Partition Mobility, you can order the PowerVM Enterprise Edition. If you do not upgrade to PowerVM Enterprise Edition, at the end of the trial period, your system automatically returns to PowerVM Standard Edition.

Table 18. Trial PowerVM feature

Machine	Trial PowerVM feature
POWER7	ELPM

Activation for 256 core LPAR

The activation for 256 core LPAR feature permanently enables greater than 128 cores and up to 256 cores per dedicated processor partition on the 9119-FHB POWER7 servers. Without this feature, the largest partition that can be created is up to 128 cores. Micropartitions, which are not affected by this feature, can only be created with a maximum of 128 virtual processors.

Note: The System Partition Processor Limit (SPPL) setting must be set to the maximum value to allow a partition to be created with more than 32 cores. If the system is running in TurboCore mode, a partition cannot be created with more than 128 cores.

Table 19. Activation for 256-core LPAR

Machine	Activation for 256-core LPAR
9119-FHB	1256

Active Memory Mirroring for hypervisor

Active Memory Mirroring for hypervisor is designed to ensure that system operation continues even in the unlikely event of an uncorrectable error occurring in main memory used by the system hypervisor. The feature permanently activates the Active Memory Mirroring for hypervisor capability on the 9179-MHC POWER7 servers. When this feature is activated, two identical copies of the system hypervisor are maintained in memory at all times. Both copies are simultaneously updated with any changes. In the event of a memory failure on the primary copy, the second copy is automatically called, eliminating platform outages due to uncorrectable errors in system hypervisor memory.

Table 20. Active Memory Mirroring for Hypervisor

Machine	Active Memory Mirroring feature
9117-MMC	4797
9117-MMD	4797

Related information for Capacity on Demand

Websites contain information related to the Capacity on demand topic collection.

Websites
* Hardware Information website at http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7hdx/power_systems.htm

  provides the entire POWER7 library.
* Capacity on Demand for IBM i

  describes the various Capacity on Demand offerings.
* Capacity Upgrade on Demand for System p® servers

  describes Capacity Upgrade on Demand for processors (CoD) and memory.
* WWPN details on the support page. provides information on World wide port name.
* Virtualization editions provides information on server virtualization with IBM PowerVM.

Unlocking the activation code interface

Read this topic, to understand how to unlock the activation code interface.

Keying errors during the entry of the 34-character activation code are simply flagged and the interface remains functional for as many times as it takes for the activation code to be keyed correctly. However, if the activation code is keyed correctly but is invalid (Invalid means that the activation code is properly formed and entered correctly but is not for a valid CoD function or is not for the server on which it is being entered), the firmware permits only five entry attempts. On the first four attempts, if the activation code is refused as invalid, the HMC provides a warning message. On the fifth entry attempt, the HMC warns of the last entry attempt before the activation code entry interface is locked, and confirms whether you want to proceed. On the fifth entry of an invalid activation code, the HMC locks the code interface.

Refer to the table below for recovery options. Contact the CoD Admin for a valid CoD activation code for the invalid code.

Note:

- Server reboot clears the five invalid activation code attempts and unlocks the activation code interface; therefore, the five invalid activation code attempts accumulate since the last server reboot.
- If Advance System Management Interface (ASMI) is used to enter the activation code, note that ASMI does not provide the invalid activation code warnings that the HMC does. After using ASMI to enter an invalid activation code five times, the activation code entry interface will be locked without warning.

Table 21. Recovery options for POWER5, POWER6 and POWER7 systems depending on the firmware level.

System	Procedure
POWER5	Reboot the server to unlock the activation code entry interface.
POWER6®	Contact the CoD Admin for the reset code. Enter the reset code to unlock the activation code entry interface and reset the count of invalid codes entered. Note that the CoD activation codes do not interoperate with VET activation codes and no reset code will unlock the VET activation code entry interface. Therefore, for Power6 firmware, the only recovery option for a locked VET activation code entry interface is to reboot the server.
POWER7	For POWER7 Release 2 firmware, both the CoD and VET activation code entry interfaces remain locked for approximately one hour. Wait for one hour. You do not need to reboot the server or enter a reset code to unlock the activation code entry interface.

Notices

This information was developed for products and services offered in the U.S.A.

The manufacturer may not offer the products, services, or features discussed in this document in other countries. Consult the manufacturer's representative for information on the products and services currently available in your area. Any reference to the manufacturer's product, program, or service is not intended to state or imply that only that product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any intellectual property right of the manufacturer may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any product, program, or service.

The manufacturer may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not grant you any license to these patents. You can send license inquiries, in writing, to the manufacturer.

For license inquiries regarding double-byte character set (DBCS) information, contact the Intellectual Property Department in your country or send inquiries, in writing, to the manufacturer.

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: THIS PUBLICATION IS PROVIDED "AS IS " WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. The manufacturer may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to websites not owned by the manufacturer are provided for convenience only and do not in any manner serve as an endorsement of those websites. The materials at those websites are not part of the materials for this product and use of those websites is at your own risk.

The manufacturer may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact the manufacturer.

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement, IBM License Agreement for Machine Code, or any equivalent agreement between us.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the

same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Information concerning products not produced by this manufacturer was obtained from the suppliers of those products, their published announcements or other publicly available sources. This manufacturer has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to products not produced by this manufacturer. Questions on the capabilities of products not produced by this manufacturer should be addressed to the suppliers of those products.

All statements regarding the manufacturer's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

The manufacturer's prices shown are the manufacturer's suggested retail prices, are current and are subject to change without notice. Dealer prices may vary.

This information is for planning purposes only. The information herein is subject to change before the products described become available.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to the manufacturer, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. The manufacturer, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. The sample programs are provided "AS IS", without warranty of any kind. The manufacturer shall not be liable for any damages arising out of your use of the sample programs.

Each copy or any portion of these sample programs or any derivative work, must include a copyright notice as follows:

© (your company name) (year). Portions of this code are derived from IBM Corp. Sample Programs. © Copyright IBM Corp. _enter the year or years_.

If you are viewing this information in softcopy, the photographs and color illustrations may not appear.

Trademarks

IBM, the IBM logo, and ibm.com are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the web at Copyright and trademark information at www.ibm.com/legal/copytrade.shtml.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Terms and conditions

Permissions for the use of these publications are granted subject to the following terms and conditions.

Applicability: These terms and conditions are in addition to any terms of use for the IBM website.

Personal Use: You may reproduce these publications for your personal, noncommercial use provided that all proprietary notices are preserved. You may not distribute, display or make derivative works of these publications, or any portion thereof, without the express consent of IBM.

Commercial Use: You may reproduce, distribute and display these publications solely within your enterprise provided that all proprietary notices are preserved. You may not make derivative works of these publications, or reproduce, distribute or display these publications or any portion thereof outside your enterprise, without the express consent of IBM.

Rights: Except as expressly granted in this permission, no other permissions, licenses or rights are granted, either express or implied, to the Publications or any information, data, software or other intellectual property contained therein.

IBM reserves the right to withdraw the permissions granted herein whenever, in its discretion, the use of the publications is detrimental to its interest or, as determined by IBM, the above instructions are not being properly followed.

You may not download, export or re-export this information except in full compliance with all applicable laws and regulations, including all United States export laws and regulations.

IBM MAKES NO GUARANTEE ABOUT THE CONTENT OF THESE PUBLICATIONS. THE PUBLICATIONS ARE PROVIDED "AS-IS" AND WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT, AND FITNESS FOR A PARTICULAR PURPOSE.

IBM ®

Printed in USA