Power Systems

*Power Integrated Facility for Linux
(Power IFL)*

IBM

Note

Before using this information and the product it supports, read the information in "Notices" on page 5 .

Contents

Power Integrated Facility for Linux (Power IFL)

Power® Integrated Facility for Linux (Power IFL) is an optional lower-cost per processor core activation feature for IFL-compliant workloads on IBM Power Systems servers. You can activate Power IFL processor cores that are restricted to run IFL workloads. The processor cores that are activated for running general-purpose workloads, can be run on any supported operating system.

Supported systems for Power IFL

You can use Capacity Upgrade on Demand (CUoD) activation codes to enable Power IFL processor cores on certain models of IBM Power Systems servers.

The CUoD activation codes to enable Power IFL are available for the following models:

- 9040-MR9
- 9080-M9S

Basic Power IFL configuration techniques

A Power IFL processor core is licensed for using only IFL-compliant workloads. The Virtual I/O Server (VIOS) or Linux partitions are IFL-compliant workloads. Power IFL processing capacity can't be used to satisfy the licensed processor core requirement for non-IFL compliant workloads.

The server firmware determines which workloads can use Power IFL processor cores on a managed system. You can verify whether the server firmware categorizes VIOS partitions as IFL workloads by using the Hardware Management Console (HMC) command **lssyscfg -r sys -F capabilities** on HMC version 9.2.0, or later. If the server firmware categorizes VIOS partitions as IFL workloads, the output lists the `ifl_vios_capable` attribute.

Verifying the Power IFL license configuration for a managed server by using the HMC

You can see the license configuration for a managed server that has Power IFL activations in the **Processors** tab when you view the HMC server properties. Two categories are listed in the **Configurable** section. Processors that are listed as **Linux or VIOS only** represent the number of Power IFL processor cores. Processors that are listed as **Any** can be used for any (general purpose) workload. This same information is available in the **CoD Processor Capacity Settings** window.

You can also use the `lscod` and `lshwres` HMC commands to display the number of Power IFL processor cores and general-purpose processor cores.

The `lscod` command displays the number of processors that are permanently licensed for Power IFL and general-purpose workloads. Depending upon the HMC version and server firmware version, the number of permanently licensed Power IFL processors is listed in either the `perm_procs_linux_vios` parameter or the `perm_procs_linux` parameter. The `perm_procs_linux` parameter is always displayed for HMC version 9.2.0, or earlier, even if the server has server firmware level FW920, or later. For example,

```
# lscod -t cap -c cuod -r proc -m <managed system>
perm_procs=10,perm_procs_linux_vios=3,perm_procs_all_os=7
```

Where the `perm_procs_linux_vios=3` parameter value indicates that three processor cores are licensed for IFL-compliant workloads. If the `perm_procs_linux_vios` parameter value is 0, the workload is not displayed in the command output unless you specify the -F flag. The `perm_procs_all_os=7` parameter value indicates that seven processor cores can be used for any workload. If the value of the `perm_procs_all_os` parameter is equal to the value of the `perm_procs` parameter, the `perm_procs_all_os` parameter value isn't displayed in the command output unless you specify the -F flag.

The `lshwres` command can also show the number of processor units that are licensed for Power IFL or general-purpose workloads. Depending on the HMC version and server firmware version, the number of configurable processors for IFL-compliant workloads is listed in either the `configurable_sys_proc_units_linux_vios` parameter or the `configurable_sys_proc_units_linux` parameter. The `configurable_sys_proc_units_linux` parameter is always displayed for HMC version 8.3.0, or earlier, even if the server has server firmware level FW920, or later. For example,

```
# lshwres -m <managed system> -r proc --level sys

configurable_sys_proc_units=10.0,curr_avail_sys_proc_units=1.0,pend_avail_sys_proc_units=0.0,\
installed_sys_proc_units=16.0,deconfig_sys_proc_units=0,min_proc_units_per_virtual_proc=0.05,\
max_virtual_procs_per_lpar=256,max_procs_per_lpar=256,max_curr_virtual_procs_per_aixlinux_lpar=6
4,\
max_curr_virtual_procs_per_vios_lpar=64,max_curr_virtual_procs_per_os400_lpar=64,\
max_curr_procs_per_aixlinux_lpar=64,max_curr_procs_per_vios_lpar=64,max_curr_procs_per_os400_lpa
r=64,\
max_shared_proc_pools=64,configurable_sys_proc_units_linux_vios=3.0,configurable_sys_proc_units_
all_os=7.0
```

The backslash (\) character in the preceding example represents line continuation.

Where the `configurable_sys_proc_units_linux_vios=3.0` parameter value indicates that 3.0 processor cores are configurable for IFL-compliant workloads. If the `configurable_sys_proc_units_linux_vios` parameter value is 0, it's not displayed in the command output unless you specify the `-F` flag. The `configurable_sys_proc_units_all_os=7.0` parameter value indicates that 7.0 processor cores are configurable for general-purpose workloads. If the value of the `configurable_sys_proc_units_all_os` parameter is equal to the value of the `configurable_sys_proc_units` parameter, the `configurable_sys_proc_units_all_os` parameter value isn't displayed in the command output unless you specify the `-F` flag.

Ensuring Power IFL license compliance for a managed system

The number of general-purpose processor cores is the total number of cores that have licensed activations minus any cores that have Power IFL activations. The result represents the processing capacity that is available for non-IFL workloads.

You don't need to limit the usage of CPU for partitions that are running IFL workloads to satisfy licensing requirements. Any licensed processor core can be used to supply processor capacity for IFL workloads. Therefore, IFL workloads that are targeted to run on Power IFL processor cores can overflow onto the general-purpose processor cores when that capacity is available.

You can create a shared processor pool for Linux partitions to control software licensing costs. Set the maximum processing capacity of this shared processor pool to minimize your software licensing costs. The maximum processing capacity of a Linux-only shared processor pool has no effect on Power IFL licensing.

Responsibility for ensuring Power IFL license compliance

The server firmware automatically ensures that the total entitled capacity used by active AIX® and IBM i partitions doesn't exceed the number of general-purpose processor cores. An AIX or IBM i partition can start only if the available number of general-purpose processor cores can satisfy the partition minimum requirement. If the available number of general-purpose processor cores is less than the required number of processors, the available number of general-purpose processor cores is used. You can add processor resources dynamically to an AIX or IBM i partition only if general-purpose processor cores are available. If you request more general-purpose processor cores than the available number of general-purpose processor cores, the available number of general-purpose processor cores is added to the partition. The PowerVM® hypervisor automatically ensures that uncapped AIX and IBM i partitions don't exceed the number of general-purpose processor cores.

Server firmware periodically determines whether the system is in compliance with the Power IFL license terms. If the system isn't in compliance, the HMC displays a message every hour, and the server firmware

logs system reference codes (SRCs). For more information about compliance monitoring assistance, see "Compliance monitoring assistance" on page 3.

Capacity on Demand (CoD) with Power IFL

On/Off Capacity on Demand (CoD) and Utility CoD don't license Power IFL processor cores. You can use On/Off CoD and Utility CoD to manage the other, general-purpose processor core activations on your system. Power IFL processor cores can't be used in a Power Enterprise Pool and can't be licensed as Mobile CoD cores.

On/Off Capacity on Demand (CoD) and Power IFL

On/Off Capacity on Demand (CoD), Mobile CoD, Trial CoD, and Utility CoD licenses provide general-purpose processor cores. If partitions in a shared processor pool need additional capacity, you can activate additional general-purpose processor cores by using CoD and then increase the maximum processing units for the shared processor pool. When the demand for more capacity subsides, you can return the excess capacity by reducing the shared processor pool limit and by deactivating processor cores that aren't required.
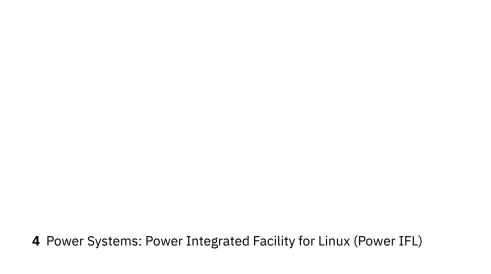
Compliance monitoring assistance

The PowerVM hypervisor automatically manages the usage of general-purpose cores to ensure the server is in compliance with the hardware licenses.

For example, if both IFL and general-purpose processor cores exist, the hypervisor will ensure that AIX and IBM i workloads do not exceed the number of general-purpose processor cores. If you attempt to activate a dedicated processor partition with more capacity, which exceeds the available general-purpose cores, the hypervisor will try to reduce the requested processor for the partition to maintain compliance. If the partition meets its minimum processor requirement, the partition will be able to boot successfully. A similar condition is applicable while using dynamic logical partition to add processors to a dedicated processor partition. The hypervisor will allow the request if it doesn't exceed the number of general-purpose processor cores. Shared processor entitlement is handled in a similar manner as dedicated processor entitlement. The hypervisor won't allow the entitlement to exceed the number of available general-purpose processor cores. For uncapped partitions, the hypervisor controls the overall system-wide consumption of CPU time on general-purpose cores to ensure that the AIX and IBM i workloads remain in compliance. You do not need to create shared processor pools to ensure compliance with the number of general-purpose processor cores. Live Partition Mobility is another situation that is automatically handled by the hypervisor. The migration operation of an AIX or IBM i partition to a server fails if the server has insufficient number of general-purpose cores.

Related information

HMC commands

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Accessibility features for IBM Power Systems servers

Accessibility features assist users who have a disability, such as restricted mobility or limited vision, to use information technology content successfully.

Overview

The IBM Power Systems servers include the following major accessibility features:

- Keyboard-only operation
- Operations that use a screen reader

The IBM Power Systems servers use the latest W3C Standard, WAI-ARIA 1.0 (www.w3.org/TR/wai-aria/), to ensure compliance with US Section 508 (www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards/section-508-standards) and Web Content

Accessibility Guidelines (WCAG) 2.0 (www.w3.org/TR/WCAG20/). To take advantage of accessibility features, use the latest release of your screen reader and the latest web browser that is supported by the IBM Power Systems servers.

The IBM Power Systems servers online product documentation in IBM Knowledge Center is enabled for accessibility. The accessibility features of IBM Knowledge Center are described in the Accessibility section of the IBM Knowledge Center help (www.ibm.com/support/knowledgecenter/doc/kc_help.html#accessibility).

Keyboard navigation

This product uses standard navigation keys.

Interface information

The IBM Power Systems servers user interfaces do not have content that flashes 2 - 55 times per second.

The IBM Power Systems servers web user interface relies on cascading style sheets to render content properly and to provide a usable experience. The application provides an equivalent way for low-vision users to use system display settings, including high-contrast mode. You can control font size by using the device or web browser settings.

The IBM Power Systems servers web user interface includes WAI-ARIA navigational landmarks that you can use to quickly navigate to functional areas in the application.

Vendor software

The IBM Power Systems servers include certain vendor software that is not covered under the IBM license agreement. IBM makes no representation about the accessibility features of these products. Contact the vendor for accessibility information about its products.

Related accessibility information

In addition to standard IBM help desk and support websites, IBM has a TTY telephone service for use by deaf or hard of hearing customers to access sales and support services:

TTY service
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Programming interface information

This Power Integrated Facility for Linux (Power IFL) publication documents intended Programming Interfaces that allow the customer to write programs to obtain the services of the Hardware Management Console (HMC) Version 9 Release 1 Maintenance level 930, or later.

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