



# IBM PowerLinux 7R2 Model L2D is optimized for Linux to help deliver new solutions and services faster, with higher quality

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## At a glance

The PowerLinux™ 7R2 is fueled by the outstanding performance and energy efficiency of the IBM® POWER7+™ processor modules optimized for the Linux™ operating system running on the IBM Power® platform.

- Powerful 64-bit 8-core POWER7+ processor modules
  - Two 16-core configurations at 3.6 GHz and 4.2 GHz
- Up to 512 GB of memory with optional memory riser cards
- Rich I/O options in the system unit:
  - Five PCIe Gen2 Low Profile slots
  - PCIe2 LP 4-port 1GbE Adapter (#EL11)
  - Six disk or solid-state drive (SSD) SAS SFF (small form-factor) bays -- up to 5.4 TB
  - Slimline DVD-RAM
  - Bay for tape or removable drive (with #EJ0E)
  - Integrated SAS/SATA controller with RAID 0, 1, and 10 support for disk and SSD; also supports tape and DVD
- EnergyScale™ technology

For ordering, contact your IBM representative, an IBM Business Partner, or IBM Americas Call Centers at 800-IBM-CALL (Reference: YE001).

## Overview

The IBM PowerLinux™ 7R2 server delivers the outstanding performance of the IBM POWER7+ processor in a dense, highly efficient 2U rack-optimized form factor for Linux clients. It is ideal for running multiple Linux infrastructure and application workloads, virtualized with PowerVM®, more economically than traditional Linux servers. Take advantage of the scalability and capacity of the IBM PowerLinux 7R2 by leveraging IBM's feature-rich PowerVM virtualization technology to fully utilize the server's capacity and deploy virtual partitions faster. You can move workloads as needed across PowerLinux and Power Systems™ servers with Live Partition Mobility.

The IBM PowerLinux 7R2 server is a Linux only 2U rack-mount server with two sockets offering 16-core 3.6 GHz and 4.2 GHz configurations. The new PowerLinux

7R2 (8246-L2D) server also provides expanded I/O capabilities using the high-performance Gen2 PCIe interfaces.

The PowerLinux 7R2 server supports a maximum of 16 DDR3 DIMM slots, with four DIMM slots included in the base configuration and 12 DIMM slots available with three optional memory riser cards, allowing for a maximum system memory of 512 GB.

Memory features (two memory DIMMs per feature) supported are 8 GB, 16 GB, 32 GB, and 64 GB and run at speeds of 1066 MHz.

The IBM PowerLinux 7R2 server offers three storage backplane options. The first supports three SFF SAS HDDs or SSDs, a SATA DVD, and a half-high tape drive. The second supports six SFF SAS HDDs or SSDs and a SATA DVD. These two choices both provide an integrated SAS controller, offering RAID 0, 1, and 10 support. The third supports six SFF SAS HDDs or SSDs and a SATA DVD, and adds support for dual write cache RAID 5, RAID 6, and an external SAS port. HDDs and SSDs are hot-swap and front accessible with each of the three alternatives.

Other integrated features include:

- Five PCIe x8 Gen2 Low Profile expansion slots.
- PCIe2 LP 4-port 1GbE Adapter (#EL11).
- Two GX++ slots for 12X I/O loop.
- Service Processor.
- Integrated SAS/SATA controller for HDD, SSD, tape, and DVD in the system unit, supporting RAID 0, 1, and 10. RAID 5 and RAID 6 are available.
- EnergyScale technology.
- Two system ports, three USB ports, and two HMC ports.
- Redundant and hot-swap power.
- Redundant and hot-swap cooling.

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## Key prerequisites

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Refer to the [Hardware requirements](#) and [Software requirements](#) sections.

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## Planned availability date

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February 20, 2013, for Model L2D and all features except:

- March 15, 2013, for features EL38 and EN0B

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## Description

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### IBM PowerLinux 7R2

Summary of standard features:

- Rack-mount (2U) configuration
- 8-core processor modules, offering the following configurations:
  - 16-core 3.6 GHz and 4.2 GHz
- 8 GB, 16 GB, 32 GB, and 64 GB of 1066 MHz DDR3 ECC memory (error checking and correcting), minimum 32 GB expandable to 512 GB
- Three storage backplane options:
  - Three SFF SAS HDDs/SSDs, SATA DVD bay, tape drive bay
  - Six SFF SAS HDDs/SSDs, SATA DVD bay

- Six SFF SAS HDDs/SSDs, SATA DVD bay, Dual Write Cache SAS RAID, external SAS port
- Five PCIe x8 Gen2 and one PCIe x4 Gen2 Low Profile slots
  - 1 GbE adapter (#EL11) is standard and occupies the x4 slot.
- Two GX++ slots
- Integrated:
  - Service Processor
  - EnergyScale technology
  - Hot-swap and redundant cooling
  - Three USB ports, two system ports, and two HMC ports
- Two 1925 watt ac, hot-swap power supplies

The PowerLinux 7R2 is ordered using either feature number ELBC for a configuration with two POWER7+ 3.6 GHz processor modules or feature number ELBD for a configuration with two POWER7+ 4.2 GHz processor modules.

In addition to the two processor modules, the minimum PowerLinux 7R2 initial order must include 16 processor activations, 32 GB of memory, two HDD/SDDs, an Ethernet adapter, a storage backplane, two power supplies and two power cords, an operating system indicator, PowerVM for PowerLinux or GPFS™, and a Language Group Specify.

The minimum defined initial order configuration, if no choice is made, is as follows:

Feature number	Description
ELBC	Package indicator which includes:
2 x EPLJ	0/8 core 3.6 GHz POWER7+ Processor Module
16 x EPLM	16 Processor Activations (Zero-priced)
2 x EL2Q	Total 32 GB Memory (Zero-priced)
2 x EL03	146.8 GB 15k SFF HDD
ELBD	Package indicator which includes:
2 x EPLK	0/8 core 4.2 GHz POWER7+ Processor Module
16 x EPLN	16 Processor Activation (Zero-priced)
2 x EL2Q	Total 32 GB Memory (Zero-priced)
2 x EL03	146.8 GB 15k SFF HDD

The following features are required on packages ELBC and ELBD:

EL0T	Storage Backplane for 2.5-inch Drives/SATA DVD/Tape (Zero-priced)
EL11	PCIe2 LP 4-port 1GbE Adapter (\$0)
2 x 5532	Power Supply, 1925 watt AC
9300/97xx	Language Group Specify
2147	Primary Operating System Indicator - Linux (#2147)
16 x #EC22	PowerVM for PowerLinux (1 per core)
or	
5765-G66	GPFS
2 x 6xxx	Two Power Cords

**Note:** The first two memory features chosen on an initial order are installed in the nonfeaturized memory riser card. When 4 x #EL15 are chosen to meet the minimum memory requirements, 1 x #EL0A must be ordered. #EL0A is not allowed with #EL2Q, #EL2R, or #EL2V.

**Note:** No internal HDD/SSD is required if feature 0837 (Boot from SAN) is selected. A Fibre Channel or Fibre Channel over Ethernet adapter must be ordered if feature 0837 is selected.

**Note:** Alternative configuration options are available on a special bid basis from your IBM representative or Business Partner.

## Dynamic logical partitioning

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The dynamic logical partitioning function provides enhanced resource management for the PowerLinux 7R2 server. Dynamic LPAR allows available system resources to be quickly and easily configured across multiple logical partitions to meet the rapidly changing needs of your business.

Dynamic LPAR also allows you to add new system resources such as new HDDs or SSDs into your system's configuration without requiring a reboot. If the PowerVM Standard (#5227) or Enterprise Edition (#5228) feature is installed in the system, a maximum of 20 dynamic LPARs for each physical processor can be defined, with a PowerLinux 7R2 system maximum of 320 dynamic LPARs.

A Hardware Management Console (HMC) or Integrated Virtualization Manager (IVM) is required to manage the PowerLinux 7R2 (8246-L2D) implementing partitioning. Multiple PowerLinux 7R2 servers can be supported by a single HMC.

If an HMC is used to manage the PowerLinux 7R2, the HMC must be a CR3, or later, model rack-mount HMC or C05, or later, deskside HMC.

When IBM Systems Director is used to manage an HMC or if the HMC manages more than 254 partitions, the HMC should have 3 GB of RAM minimum and be a CR3 model, or later, rack-mount or C06, or later, deskside.

### IBM PowerVM for IBM PowerLinux (#EC22)

Either IBM PowerVM for PowerLinux or GPFS is required on the PowerLinux 7R2.

IBM PowerVM for IBM PowerLinux allows clients to create partitions in units of less than 1 CPU (sub-CPU LPARs) and allow the same system I/O to be virtually added to these partitions. The feature also includes a software component that provides cross-partition workload management.

IBM PowerVM for IBM PowerLinux offers:

- Micro-Partitioning® (up to 20 partitions per processor core, 320 per PowerLinux 7R2 system)
- Virtualized disk and optical devices (VIOS)
- Automated CPU reconfiguration
- Real-time partition configuration and load statistics
- Support for dedicated and shared processor LPAR groups
- Support for manual provisioning of resources

At initial order entry, selecting feature #EC22 will result in Micro-Partitioning to be enabled during manufacture and the enabling software media and publications to be shipped to the client. When you order a feature #EC22 as an MES, an activation key will be posted on an IBM website, and you must retrieve it and install it on the system.

The IBM website is

<http://www-912.ibm.com/pod/pod>

Notes for IBM PowerVM for IBM PowerLinux :

- If implementing IBM PowerVM for IBM PowerLinux :
  - IBM PowerVM 2.2 or later is required.
- Virtual machines, or logical partitions (LPARs), are managed using built-in Integrated Virtualization Manager (IVM) software or optionally through use of a Hardware Management Console (HMC).
- If any processors in a system have the Virtualization feature, all active processors must have it.

- Once the Virtualization feature is installed in a system, it cannot be removed.
- IBM PowerVM 2.2 or later, and a supported Linux operating system level are minimum requirements for performing Live Partition Mobility functions on POWER7+ . Refer to the [Software requirements](#) section for more information on minimum Linux operating system levels.
- Active Memory™ Sharing is supported with RHEL 6 and SLES 11 SP2.

Other features of IBM PowerVM for IBM PowerLinux :

- If any processors in a system have the Virtualization feature, all active processors must have it.
- Once the Virtualization feature is installed in a system, it cannot be removed.
- Virtual Ethernet and Virtual Storage are part of PowerVM Editions.

IBM PowerVM for IBM PowerLinux also includes Live Partition Mobility, which allows for the movement of a logical partition from one POWER6® or POWER7® server to another with no application downtime, and Active Memory Sharing, which dynamically reallocates memory between running logical partitions on a server.

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## IBM PowerLinux solution prerequisites

### IBM PowerLinux Big Data Solution Edition for InfoSphere® BigInsights™

The IBM PowerLinux Big Data Solution Edition for InfoSphere BigInsights supports Red Hat Enterprise Linux 6.2 or later for IBM PowerLinux with IBM InfoSphere BigInsights Version 2.0 for IBM PowerLinux on the IBM PowerLinux 7R2 8246-L2D and 8246-L2T servers. Red Hat Enterprise Linux 6 for IBM PowerLinux servers offers new pricing for cost-effective scale-out solutions.

Refer to Software Announcement [212-020](#), dated April 24, 2012 .

The IBM PowerLinux Big Data Solution Edition for InfoSphere BigInsights supports the 8246-L2D and 8246-L2T servers. For expanded storage, select the 8246-L2T with the EXP24S SFF Gen2-bay drawer.

IBM InfoSphere BigInsights Version 2.0 for IBM PowerLinux servers is available for order from IBM Passport Advantage® . Refer to

<http://www-01.ibm.com/software/data/infosphere/biginsights/>

How to order the IBM PowerLinux Big Data Solution Edition for InfoSphere BigInsights :

- HW: Select the IBM PowerLinux 7R2 server, 8246-L2T for expanded storage or 8246-L2D, from AAS.
- OS: Select Red Hat Enterprise Linux 6 as the operating system at the time of HW order in AAS.
- Submit order with the appropriate RPQ code to process the order (ask your IBM Sales Representative for the RPQ code).
- Big data application: Order IBM InfoSphere BigInsights Version 2.0 for IBM PowerLinux servers from IBM Passport Advantage .

### IBM PowerLinux Big Data Solution Edition for InfoSphere Streams

The IBM PowerLinux Big Data Solution Edition for InfoSphere Streams supports Red Hat Enterprise Linux 6.2 or later for IBM PowerLinux with IBM InfoSphere Streams Version 3.0 for IBM PowerLinux on the IBM PowerLinux 7R2 8246-L2D and 8246-L2T servers. Red Hat Enterprise Linux 6 for IBM PowerLinux servers offers new pricing for cost-effective scale-out solutions.

Refer to Software Announcement [212-020](#), dated April 24, 2012 .

The IBM PowerLinux Big Data Solution Edition for InfoSphere Streams supports the 8246-L2D and 8246-L2T servers. For expanded storage, select the 8246-L2T with the EXP24S SFF Gen2-bay drawer.

IBM InfoSphere Streams Version 3.0 for IBM PowerLinux servers is available for order from IBM Passport Advantage . Refer to

<http://www-01.ibm.com/software/data/infosphere/streams/>

The IBM PowerLinux Big Data Solution Edition for InfoSphere Streams supports General Parallel File System V3.4 or later. IBM's General Parallel File System enables fast, efficient, and seamless management of petabytes of data and billions of files over a big data cluster. For more information about GPFS refer to

<http://www-03.ibm.com/systems/software/gpfs/>

How to order the IBM PowerLinux Big Data Solution Edition for InfoSphere Streams:

- HW: Select the IBM PowerLinux 7R2 server, 8246-L2D or 8246-L2T for expanded storage, from AAS.
- OS: Select Red Hat Enterprise Linux 6 as the operating system at the time of HW order in AAS.
- GPFS : Select GPFS at the time of HW order in AAS.
- Big data application: Order IBM InfoSphere Streams Version 3.0 for IBM PowerLinux servers from IBM Passport Advantage .

### **IBM PowerLinux Solution Edition for SAP Applications**

The IBM PowerLinux Solution Edition for SAP Applications supports Red Hat Enterprise Linux 5.7 or later for IBM PowerLinux , Red Hat Enterprise Linux 6.2 or later for IBM PowerLinux , SUSE Linux Enterprise Server 10 Service Pack 2 or later, and SUSE Linux Enterprise Server 11 Service Pack 2 or later. The solution supports IBM PowerVM for IBM PowerLinux V2.2.1.5 and SAP POWER7 and POWER7+ certified products with IBM DB2® V9.7.

Refer to Software Announcement [212-020](#), dated April 24, 2012 .

How to order the IBM PowerLinux Solution Edition for SAP Applications:

- HW: Select the IBM PowerLinux 7R2 server, 8246-L2D or 8246-L2T for expanded storage, from AAS.
- OS: Select Red Hat Enterprise Linux 5, Red Hat Enterprise Linux 6, SUSE Linux Enterprise Server 10, or SUSE Linux Enterprise Server 11 at the time of HW order in AAS.
- Virtualization: Select IBM PowerVM for IBM PowerLinux at the time of HW order in AAS.
- SAP: Order SAP POWER7 certified products with IBM DB2 V9.7 from SAP or your SAP business partner.

### **IBM PowerLinux Linux Application Services Edition**

The IBM PowerLinux Linux Application Services Edition supports Red Hat Enterprise Linux 5.7 or later for IBM PowerLinux , Red Hat Enterprise Linux 6.2 or later for IBM PowerLinux , and SUSE Linux Enterprise Server 11 Service Pack 2 or later. For more information on Red Hat Enterprise Linux for IBM PowerLinux , refer to Software Announcement [212-020](#), dated April 24, 2012 .

IBM PowerLinux Linux Application Services Edition supports IBM PowerVM for IBM PowerLinux V2.2.1.5. Refer to Software Announcement [212-012](#), dated April 24, 2012 .

The packages for the open source applications are distributed in the supported SUSE and Red Hat releases. These workloads can be installed and configured with the IBM Installation Toolkit, an optional, no-charge utility available for download from IBM

<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/installtools/>

How to order the IBM PowerLinux Linux Application Services Edition:

- HW: Select the IBM PowerLinux 7R2 server, 8246-L2D or 8246-L2T for expanded storage, from AAS.
- OS: Select Red Hat Enterprise Linux 6 or SUSE Linux Enterprise Server 11 at the time of HW order in AAS.
- Virtualization: Select IBM PowerVM for IBM PowerLinux at the time of HW order in AAS.
- Open Source Workload Packages: The packages are available in the supported Linux releases.
- IBM Installation Toolkit: Download from

<http://www14.software.ibm.com/webapp/set2/sas/f/lopdiags/installtools/>

### **IBM PowerLinux Big Data Solution for Apache Hadoop**

The IBM PowerLinux Big Data Solution for Apache Hadoop supports Red Hat Enterprise Linux 6.2 or later for Hadoop Common Source Version 1.1.1 on the IBM PowerLinux 7R2 8246-L2D and 8246-L2T servers. Red Hat Enterprise Linux 6 for IBM PowerLinux servers offers new pricing for cost-effective scale-out solutions.

Refer to Software Announcement [212-020](#), dated April 24, 2012 .

The IBM PowerLinux Big Data Solution for Apache Hadoop supports the 8246-L2D and 8246-L2T servers. For expanded storage, select the 8246-L2T with the EXP24S SFF Gen2-bay drawer.

Refer to Hardware Announcement [112-118](#), dated July 10, 2012 .

Hadoop Common Source version 1.1.1 is available for download. Refer to

<http://hadoop.apache.org/common/releases.html>

How to order the IBM PowerLinux Big Data Solution for Apache Hadoop:

- HW: Select the IBM PowerLinux 7R1 server, 8246-L2T for expanded storage or 8246-L2D, from AAS. Refer to Hardware Announcement [112-118](#), dated July 10, 2012 .
- OS: Select Red Hat Enterprise Linux 6 as the operating system at the time of HW order in AAS.
- Submit order with the appropriate RPQ code to process the order (ask your IBM Sales Representative for the RPQ code).
- Apache Hadoop application: Download from

<http://hadoop.apache.org/common/releases.html>

### **IBM Solution for WebSphere® Mobile and Web Applications Development on PowerLinux**

The IBM Solution for WebSphere Mobile and Web Applications Development on PowerLinux supports Red Hat Enterprise Linux 6.1 and above for IBM PowerLinux with IBM WAS Liberty Profile Version 8.5.0.1 for IBM PowerLinux on the IBM PowerLinux 7R2 8246-L2D and 8246-L2T servers. Red Hat Enterprise Linux 6 for IBM PowerLinux servers offers new pricing for cost-effective scale-out solutions.

Refer to Software Announcement [212-020](#), dated April 24, 2012 .

The IBM Solution for WebSphere Mobile and Web Applications Development on PowerLinux supports the 8246-L2D and 8246-L2T servers. For expanded storage, select the 8246-L2T with the EXP24S SFF Gen2-bay drawer.

Refer to Hardware Announcement [112-118](#), dated July 10, 2012 .

IBM WAS Liberty Profile Version 8.5.0.1 for IBM PowerLinux servers is available for order from IBM Passport Advantage . Refer to

[https://www.ibm.com/developerworks/mydeveloperworks/blogs/wasdev/entry/download\\_wlp?lan\\_g=en](https://www.ibm.com/developerworks/mydeveloperworks/blogs/wasdev/entry/download_wlp?lan_g=en)

How to order the IBM Solution for WebSphere Mobile and Web Applications Development on PowerLinux :

- HW: Select the IBM PowerLinux 7R2 server, 8246-L2T for expanded storage or 8246-L2D, from AAS. Refer to Hardware Announcement [112-118](#), dated July 10, 2012 .
- OS: Select Red Hat Enterprise Linux 6 as the operating system at the time of HW order in AAS.
- Submit order with the appropriate RPQ code to process the order (ask your IBM Sales Representative for the RPQ code).
- WebSphere application: Order IBM WAS Liberty Profile Version 8.5.0.1 for IBM PowerLinux servers from IBM Passport Advantage .

### **19-inch racks**

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The PowerLinux 7R2 (8246-L2D) is designed to mount in the 36U 7014-T00 (#0551) or the 42U 7014-T42 (#0553) rack. These racks are built to the 19-inch EIA standard. When you order a new 8246 system, you can also order the appropriate 7014 rack model with the system hardware on the same initial order. IBM is making the racks available as features of the 8246-L2D when you order additional I/O drawer hardware for an existing system (MES order). The rack feature number should be used if you want IBM to integrate the newly ordered I/O drawer in a 19-inch rack before shipping the MES order.

#### **1.8-meter rack (#0551)**

The 1.8-meter rack (#0551) is a 36 EIA unit rack. The rack that is delivered as feature 0551 is the same rack delivered when you order the 7014-T00 rack; the included features may be different. Some features that are delivered as part of the 7014-T00 must be ordered separately with the feature 0551. Order the feature 0551 only when required to support rack integration of MES orders prior to shipment from IBM .

#### **2.0-meter rack (#0553)**

The 2.0-meter rack (#0553) is a 42 EIA unit tall rack. The rack that is delivered as feature 0553 is the same rack delivered when you order the 7014-T42 rack; the included features may be different. Some features that are delivered as part of the 7014-T42 must be ordered separately with the feature 0553. Order the feature 0553 only when required to support rack integration of MES orders prior to shipment from IBM .

### **IBM Power Systems Deployment-ready Services**

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IBM offers a portfolio of integration, configuration, and customization services for IBM Power Systems . These Deployment-ready Services are designed to accelerate solution deployment and reduce related resources and cost. Offerings include:

- Integration
  - Component integration
  - Rack integration
  - Operating system preinstallation
  - Unit personalization
  - Third-party hardware/software installation
  - Customer-specified placement



- Asset tagging
  - Standard tagging Radio Frequency Item Device (RFID)
- Special packaging
  - Box consolidation
- System customization
  - Remote access partitioning customized operating system/firmware

For more information on Deployment-ready Services, refer to

<http://www.ibm.com/power/deploymentreadyservices/>

## **Reliability, availability, and serviceability (RAS) features**

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### ***Reliability, fault tolerance, and data correction***

The reliability of systems starts with components, devices, and subsystems that are designed to be highly reliable. The POWER7+ processor SCM uses lower-voltage technology, improving reliability with stacked latches to reduce soft error (SER) susceptibility. During the design and development process, subsystems go through rigorous verification and integration testing processes. During system manufacturing, systems go through a thorough testing process to help ensure the highest level of product quality.

The system cache and memory offer ECC (error checking and correcting) fault-tolerant features. ECC is designed to correct environmentally induced, single-bit, intermittent memory failures and single-bit hard failures. With ECC, the likelihood of memory failures will be reduced. ECC also provides double-bit memory error detection that helps protect data in the event of a double-bit memory failure.

The Linux operating system supports disk drive mirroring (RAID 1) through software, while other RAID protection schemes are provided via hardware RAID adapters.

### ***Memory error correction extensions***

The memory has single-bit-error correction and double-bit-error detection ECC circuitry. The ECC code is also designed such that the failure of any one specific memory module within an ECC word by itself can be corrected absent any other fault.

Memory protection features include scrubbing to detect errors, a means to call for the deallocation of memory pages for a pattern of correctable errors detected, and signaling deallocation of a logical memory block when an error occurs that cannot be corrected by the ECC code.

### ***Fault monitoring functions***

Disk drive fault tracking is designed to alert the system administrator of an impending disk drive failure before it impacts operation.

### ***Mutual surveillance***

The Service Processor monitors the operation of the firmware during the boot process, and also monitors the hypervisor for termination. The hypervisor monitors the Service Processor and will perform a reset/reload if it detects the loss of the Service Processor. If the reset/reload does not correct the problem with the Service Processor, the hypervisor will notify the operating system and the operating system can take appropriate action, including calling for service.

### ***Environmental monitoring functions***

POWER7 based servers include a range of environmental monitoring functions:

- Temperature monitoring warns the system administrator of potential environmental-related problems by monitoring the air inlet temperature. When the inlet temperature rises above a warning threshold, the system initiates an orderly shutdown. When the temperature exceeds the critical level or if the temperature remains above the warning level for too long, the system will shut down immediately.
- Fan speed is controlled by monitoring actual temperatures on critical components and adjusting accordingly. If internal component temperatures reach critical levels, the system will shut down immediately, regardless of fan speed. When a redundant fan fails, the system calls out the failing fan and continues running. When a nonredundant fan fails, the system shuts down immediately.

### **Availability enhancement functions**

The POWER7 family of systems continues to offer and introduce significant enhancements designed to increase system availability.

### **POWER7 processor functions**

As in POWER6 and POWER7, the POWER7+ processor has the ability to do processor instruction retry and alternate processor recovery for a number of core-related faults. This significantly reduces exposure to both hard (logic) and soft (transient) errors in the processor core. Soft failures in the processor core are transient (intermittent) errors, often due to cosmic rays or other sources of radiation, and generally are not repeatable. When an error is encountered in the core, the POWER7+ processor will first automatically retry the instruction. If the source of the error was truly transient, the instruction will succeed and the system will continue as before. On IBM systems prior to POWER6, this error would have caused a checkstop.

Hard failures are more difficult, being true logical errors that will be replicated each time the instruction is repeated. Retrying the instruction will not help in this situation. As in POWER6 and POWER7, POWER7+ processors have the ability to extract the failing instruction from the faulty core and retry it elsewhere in the system for a number of faults, after which the failing core is dynamically deconfigured and called out for replacement. These systems are designed to avoid a full system outage.

### **POWER7+ single processor check stopping**

As in POWER6, POWER7+ includes single processor check stopping for certain faults that cannot be handled by the availability enhancements described in the preceding section. This significantly reduces the probability of any one processor affecting total system availability.

### **Partition availability priority**

Also available is the ability to assign availability priorities to partitions. If an alternate processor recovery event requires spare processor resources in order to protect a workload, when no other means of obtaining the spare resources is available, the system will determine which partition has the lowest priority and attempt to claim the needed resource. On a properly configured POWER7+ processor-based server, this allows that capacity to be first obtained from, for example, a test partition instead of a financial accounting system.

### **POWER7+ cache availability**

The L2 and L3 caches in the POWER7+ processor are protected with double-bit detect, single-bit correct error detection code (ECC). In addition, the caches maintain a cache line delete capability. A threshold of correctable errors detected on a cache line can result in the data in the cache line being purged and the cache line removed from further operation without requiring a reboot. An ECC uncorrectable error detected in the cache can also trigger a purge and delete of the cache line. This results in no loss of operation if the cache line contained data unmodified from what was stored in system memory. Modified data would be handled through Special Uncorrectable Error handling. L1 data and instruction caches also have a retry

capability for intermittent error and a cache set delete mechanism for handling solid failures. In addition, the POWER7+ processors also have the ability to dynamically substitute a faulty bit-line in an L3 cache dedicated to a processor with a spare bit-line.

### **Special Uncorrectable Error handling**

Special Uncorrectable Error (SUE) handling prevents an uncorrectable error in memory or cache from immediately causing the system to terminate. Rather, the system tags the data and determines whether it will ever be used again. If the error is irrelevant, it will not force a check stop. If the data is used, termination may be limited to the program/kernel or hypervisor owning the data; or the I/O adapters controlled by an I/O hub controller would freeze if data were transferred to an I/O device.

### **PCI extended error handling**

PCI extended error handling (EEH)-enabled adapters respond to a special data packet generated from the affected PCI slot hardware by calling system firmware, which will examine the affected bus, allow the device driver to reset it, and continue without a system reboot. For Linux, EEH support extends to the majority of frequently used devices, although some third-party PCI devices may not provide native EEH support.

### **Predictive failure and dynamic component deallocation**

Servers with POWER+ processors have long had the capability to perform predictive failure analysis on certain critical components such as processors and memory. When these components exhibit certain symptoms that may indicate a failure is imminent, the system can dynamically deallocate and call home, when enabled, about the failing part before the error is propagated system-wide. In many cases, the system will first attempt to reallocate resources in such a way that will avoid unplanned outages. In the event that insufficient resources exist to maintain full system availability, these servers will attempt to maintain partition availability by user-defined priority.

### **Uncorrectable error recovery**

When the auto-restart option is enabled, the system can automatically restart following an unrecoverable software error, hardware failure, or environmentally induced (ac power) failure.

### **Serviceability**

The purpose of serviceability is to repair the system while attempting to minimize or eliminate service cost (within budget objectives), while maintaining high user satisfaction. Serviceability includes system installation, MES (system upgrades/downgrades), and system maintenance/repair. Depending upon the system and warranty contract, service may be performed by the client, an IBM representative, or an authorized warranty service provider.

The serviceability features delivered in this system provide a highly efficient service environment by incorporating the following attributes:

- Design for Customer Setup (CSU), Customer Installed Features (CIF), and Customer Replaceable Units (CRU)
- Error Detection and Fault Isolation (ED/FI)
- First Failure Data Capture (FFDC)
- Converged service approach across multiple IBM server platforms

### **Service environments**

The HMC is a dedicated server that provides functions for configuring and managing servers for either partitions or a full-system partition using a GUI or command-line interface (CLI). An HMC attached to the system allows support personnel (with

client authorization) to remotely log in to review error logs and perform remote maintenance if required.

The POWER7 processor-based platforms support two main service environments:

- Attachment to one or more HMCs is a supported option by the system. This is the default configuration for servers supporting logical partitions with dedicated or virtual I/O. In this case, all servers have at least one logical partition.
- No HMC. There are two service strategies for non-HMC systems:
  - Full system partition: A single partition owns all the server resources and only one operating system may be installed.
  - Partitioned system: In this configuration, the system can have more than one partition and can be running more than one operating system. In this environment, partitions are managed by the Integrated Virtualization Manager (IVM), which provides some of the functions provided by the HMC.

## Service Interface

The Service Interface allows support personnel to communicate with the service support applications in a server using a console, interface, or terminal. Delivering a clear, concise view of available service applications, the Service Interface allows the support team to manage system resources and service information in an efficient and effective way. Applications available via the Service Interface are carefully configured and placed to give service providers access to important service functions.

Different service interfaces are used, depending on the state of the system and its operating environment. The primary service interfaces are:

- LEDs
- Operator Panel
- Service Processor menu
- Operating system service menu
- Service Focal Point™ on the HMC
- Service Focal Point Lite on IVM

In the light path LED implementation, the system can clearly identify components for replacement by using specific component-level LEDs, and can also guide the servicer directly to the component by signaling (turning on solid) the amber system fault LED, the enclosure fault LED, and the component FRU fault LED. The servicer can also use the identify function to blink the FRU-level LED. When this function is activated, a roll-up to the blue enclosure locate and system locate LEDs will occur. These LEDs will turn on solid and can be used to follow the light path from the system to the enclosure and down to the specific FRU.

## First Failure Data Capture and error data analysis

First Failure Data Capture (FFDC) is a technique that helps ensure that when a fault is detected in a system, the root cause of the fault will be captured without the need to re-create the problem or run any sort of extended tracing or diagnostics program. For the vast majority of faults, a good FFDC design means that the root cause can also be detected automatically without servicer intervention. FFDC information, error data analysis, and fault isolation are necessary to implement the advanced serviceability techniques that enable efficient service of the systems and to help determine the failing items.

In the rare absence of FFDC and error data analysis, diagnostics are required to re-create the failure and determine the failing items.

## Diagnostics

General diagnostic objectives are to detect and identify problems such that they can be resolved quickly. Elements of IBM's diagnostics strategy include:

- Provide a common error code format equivalent to a system reference code, system reference number, checkpoint, or firmware error code.
- Provide fault detection and problem isolation procedures. Support remote connection ability to be used by the IBM Remote Support Center or IBM Designated Service.
- Provide interactive intelligence within the diagnostics with detailed online failure information while connected to IBM's back-end system.

### **Automatic diagnostics**

Because of the FFDC technology designed into IBM servers, it is not necessary to perform re-create diagnostics for failures or require user intervention. Solid and intermittent errors are designed to be correctly detected and isolated at the time the failure occurs. Runtime and boot-time diagnostics fall into this category.

### **Stand-alone diagnostics**

As the name implies, stand-alone or user-initiated diagnostics require user intervention. The user must perform manual steps, including:

- Compact disk-based diagnostics
- Keying in commands
- Interactively selecting steps from a list of choices

### **Concurrent maintenance**

The system will continue to support concurrent maintenance of power, cooling, HDD or SSD, DVD, and firmware updates (when possible). The determination of whether a firmware release can be updated concurrently is identified in the readme information file released with the firmware.

### **Service labels**

Service providers use these labels to assist them in performing maintenance actions. Service labels are found in various formats and positions, and are intended to transmit readily available information to the servicer during the repair process. Following are some of these service labels and their purpose:

- **Location diagrams:** Location diagrams are located on the system hardware, relating information regarding the placement of hardware components. Location diagrams may include location codes, drawings of physical locations, concurrent maintenance status, or other data pertinent to a repair. Location diagrams are especially useful when multiple components are installed such as DIMMs, CPUs, processor books, fans, adapter cards, LEDs, and power supplies.
- **Remove/replace procedures:** Service labels that contain remove/replace procedures are often found on a cover of the system or in other spots accessible to the servicer. These labels provide systematic procedures, including diagrams, detailing how to remove/replace certain serviceable hardware components.
- **Arrows:** Numbered arrows are used to indicate the order of operation and serviceability direction of components. Some serviceable parts such as latches, levers, and touch points need to be pulled or pushed in a certain direction and certain order for the mechanical mechanisms to engage or disengage. Arrows generally improve the ease of serviceability.

### **Packaging for service**

The following service enhancements are included in the physical packaging of the systems to facilitate service:

- **Color coding (touch points):** Terracotta-colored touch points indicate that a component (FRU/CRU) can be concurrently maintained. Blue-colored touch points delineate components that are not concurrently maintained -- those that require the system to be turned off for removal or repair.

- Tool-less design: Selected IBM systems support tool-less or simple tool designs. These designs require no tools or simple tools such as flathead screw drivers to service the hardware components.
- Positive retention: Positive retention mechanisms help to assure proper connections between hardware components such as cables to connectors, and between two cards that attach to each other. Without positive retention, hardware components run the risk of becoming loose during shipping or installation, preventing a good electrical connection. Positive retention mechanisms like latches, levers, thumb-screws, pop Nylatches (U-clips), and cables are included to help prevent loose connections and aid in installing (seating) parts correctly. These positive retention items do not require tools.

### ***Error handling and reporting***

In the event of system hardware or environmentally induced failure, the system runtime error capture capability systematically analyzes the hardware error signature to determine the cause of failure. The analysis result will be stored in system NVRAM. When the system can be successfully restarted either manually or automatically, the error will be reported to the operating system. Error Log Analysis (ELA) can be used to display the failure cause and the physical location of the failing hardware.

With the integrated Service Processor, the system has the ability to automatically send out an alert via phone line to a pager or call for service in the event of a critical system failure. A hardware fault will also turn on the amber system fault LED located on the system unit to alert the user of an internal hardware problem. The indicator may also be set to blink by the operator as a tool to allow system identification. For identification, the blue locate LED on the enclosure and at the system level will turn on solid. The amber system fault LED will be on solid when an error condition occurs.

On POWER7+ processor-based servers, hardware and software failures are recorded in the system log. When an HMC is attached, an ELA routine analyzes the error, forwards the event to the Service Focal Point (SFP) application running on the HMC, and notifies the system administrator that it has isolated a likely cause of the system problem. The Service Processor event log also records unrecoverable checkstop conditions, forwards them to the SFP application, and notifies the system administrator. Once the information is logged in the SFP application, if the system is properly configured, a call home service request will be initiated and the pertinent failure data with service parts information and part locations will be sent to an IBM service organization. Client contact information and specific system-related data such as the machine type, model, and serial number, along with error log data related to the failure, are sent to IBM Service.

### ***Live Partition Mobility***

With Live Partition Mobility you can migrate an AIX® or Linux partition running on one POWER7 or POWER7+ partition system to another POWER6 , POWER7 , or POWER7+ system without disrupting services. Also, IBM i and Linux partitions are enabled to migrate to another system without disrupting services. The migration transfers the entire system environment, including processor state, memory, attached virtual devices, and connected users. It provides continuous operating system and application availability during planned partition outages for repair of hardware and firmware faults, or continuous availability during a concurrent repair that requires freeing up CEC resources.

### ***Service Processor***

The Service Processor provides the capability to diagnose, check the status of, and sense the operational conditions of a system. It runs on its own power boundary and does not require resources from a system processor to be operational to perform its tasks.

The Service Processor supports surveillance of the connection to the HMC and to the system firmware (hypervisor). It also provides several remote power control options, environmental monitoring, reset, restart, remote maintenance, and diagnostic

functions, including console mirroring. The Service Processor menus (ASMI) can be accessed concurrently with system operation, allowing nondisruptive abilities to change system default parameters.

## **Call home**

Call home refers to an automatic or manual call from the client's location to the IBM support structure with error log data, server status, or other service-related information. Call home invokes the service organization in order for the appropriate service action to begin. Call home can be done through HMC or most non-HMC managed systems. While configuring call home is optional, clients are encouraged to implement this feature in order to obtain service enhancements such as reduced problem determination time and faster and potentially more accurate transmittal of error information. In general, using the call home feature can result in increased system availability. The Electronic Service Agent™ application can be configured for automated call home. Refer to the next section for specific details on this application.

## **IBM Electronics Services**

Electronic Service Agent and the IBM Electronic Services web portal comprise the IBM Electronic Services solution -- dedicated to providing fast, exceptional support to IBM clients. IBM Electronic Service Agent is a no-charge tool that proactively monitors and reports hardware events such as system errors, performance issues, and inventory. Electronic Service Agent can help you focus on your company's business initiatives, save time, and spend less effort managing day-to-day IT maintenance issues.

Integrated in the operating system in addition to the HMC, Electronic Service Agent is designed to automatically and electronically report system failures and client-perceived issues to IBM, which can result in faster problem resolution and increased availability. System configuration and inventory information collected by Electronic Service Agent also can be viewed on the secure Electronic Services web portal and used to improve problem determination and resolution between the client and the IBM support team. As part of an increased focus to provide even better service to IBM clients, Electronic Service Agent tool configuration and activation comes standard with the system. In support of this effort, a new HMC External Connectivity security whitepaper has been published, which describes data exchanges between the HMC and the IBM Service Delivery Center (SDC) and the methods and protocols for this exchange. To read the whitepaper and prepare for Electronic Service Agent installation, go to the "Reference Guide" section at

<http://www.ibm.com/support/electronic>

Select your country.

Click on " IBM Electronic Service Agent Connectivity Guide."

## **Benefits**

### **Increased uptime:**

Electronic Service Agent is designed to enhance the warranty and maintenance service by providing faster hardware error reporting and uploading system information to IBM Support. This can optimize the time monitoring the symptoms, diagnosing the error, and manually calling IBM Support to open a problem record. And 24x7 monitoring and reporting means no more dependency on human intervention or off-hours client personnel when errors are encountered in the middle of the night.

### **Security:**

Electronic Service Agent is secure in monitoring, reporting, and storing the data at IBM. Electronic Service Agent securely transmits via the Internet (HTTPS or VPN) and can be configured to communicate securely through gateways to provide clients a single point of exit from their site. Communication between you and IBM

flows only one way; activating Service Agent does not enable IBM to call into your system. System inventory information is stored in a secure database, which is protected behind IBM firewalls. Your business applications or business data is never transmitted to IBM .

### **More accurate reporting:**

Because system information and error logs are automatically uploaded to the IBM Support Center in conjunction with the service request, clients are not required to find and send system information, decreasing the risk of misreported or misdiagnosed errors. Once inside IBM , problem error data is run through a data knowledge management system and knowledge articles are appended to the problem record.

### **Customized support:**

Using the IBM ID entered during activation, you can view system and support information in the "My Systems" and "Premium Search" sections of the Electronic Services website.

The Electronic Services web portal is a single Internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. This web portal enables you to gain easier access to IBM resources for assistance in resolving technical problems. The newly improved My Systems and Premium Search functions make it even easier for Electronic Service Agent-enabled clients to track system inventory and find pertinent fixes.

My Systems provides valuable reports of installed hardware and software using information collected from the systems by IBM Electronic Service Agent . Reports are available for any system associated with your IBM ID. Premium Search combines the function of search and the value of Electronic Service Agent information, providing advanced search of the technical support knowledgebase. Using Premium Search and the Service Agent information that has been collected from the system, clients are able to see search results that apply specifically to their systems.

For more information on how to utilize the power of IBM Electronic Services, visit the following website or contact an IBM Systems Services Representative

<http://www.ibm.com/support/electronic>

### **Accessibility by people with disabilities**

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A US Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at

[http://www.ibm.com/able/product\\_accessibility/index.html](http://www.ibm.com/able/product_accessibility/index.html)

### **Section 508 of the US Rehabilitation Act**

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IBM PowerLinux 7R2 server is capable as of March 15, 2013, when used in accordance with associated IBM documentation, of satisfying the applicable requirements of Section 508 of the Rehabilitation Act, provided that any assistive technology used with the product properly interoperates with it. A US Section 508 Voluntary Product Accessibility Template (VPAT) can be requested via de the IBM website

[http://www.ibm.com/able/product\\_accessibility/](http://www.ibm.com/able/product_accessibility/)

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## **Statement of general direction**

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### **VIOS 2.2.1 support for Power 710, 720, 730, 740, 750, 760, PowerLinux 7R1, 7R2**

IBM intends to provide to those customers with VIOS 2.2.1 the ability to run that environment on the new Power 710 (8231-E1D), PowerLinux 7R1 (8246-L1D, 8246-



L1T), Power 720 (8202-E4D), Power 730 (8231-E2D), PowerLinux 7R2 (8246-L2D, 8246-L2T), Power 740 (8205-E6D), Power 750 (8408-E8D) and Power 760 (9109-RMD).

### **Red Hat statement of direction**

IBM intends to continue to work with Red Hat to provide support for the new Power 710 (8231-E1D), PowerLinux 7R1 (8246-L1D, 8246-L1T), Power 720 (8202-E4D), Power 730 (8231-E2D), PowerLinux 7R2 (8246-L2D, 8246-L2T), Power 740 (8205-E6D), Power 750 (8408-E8D) and Power 760 (9109-RMD) with an upcoming Red Hat Enterprise Linux 6 release. For additional questions about the availability of this release and supported HW servers, consult the Red Hat Hardware Catalog at

<https://hardware.redhat.com>

### **RHEL 6 Pre-Install feature for Power 710, 720, 730, 740, 750, 760, 7R1, 7R2**

IBM intends to provide support for pre-install of an upcoming Red Hat Enterprise Linux 6 release on the new Power 710 (8231-E1D), PowerLinux 7R1 (8246-L1D, 8246-L1T), Power 720 (8202-E4D), Power 730 (8231-E2D), PowerLinux 7R2 (8246-L2D, 8246-L2T), Power 740 (8205-E6D), Power 750 (8408-E8D) and Power 760 (9109-RMD) systems.

### **Standard Red Hat disclaimer**

Information concerning Red Hat Enterprise Linux was obtained from Red Hat. Questions concerning Red Hat Enterprise Linux should be directed to Red Hat, as Red Hat Enterprise Linux is not an IBM product. Red Hat Enterprise Linux is sold or licensed, as the case may be, to users under Red Hat's terms and conditions. Availability and support is the responsibility of Red Hat. IBM IS NOT LIABLE AND MAKES NO WARRANTIES, EXPRESS OR IMPLIED, REGARDING RED HAT ENTERPRISE LINUX, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OR CONDITION OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Moreover, all statements regarding IBM's or Red Hat's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only. Information regarding potential future third-party products that may work with an IBM product should not be relied on in making a purchase decision. The information mentioned regarding potential future third-party products is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. Information about potential future third-party products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for IBM or Red Hat products remain at IBM's or Red Hat's sole discretion, as applicable.

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion. Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision. The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remain at our sole discretion.

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## **Reference information**

For information on IBM PowerVM for IBM PowerLinux , refer to Software Announcement [212-012](#), dated April 24, 2012 .

For information on Red Hat Enterprise Linux for IBM POWER® , refer to Software Announcement [212-020](#), dated April 24, 2012 .

For information on PowerLinux 7R2 with EX24S Drawer support, refer to Hardware Announcement [112-070](#), dated April 24, 2012 .

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## Product number

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The following are newly announced features on the specific models of the IBM Power Systems 8246 machine type:

Description	MT	Model	Feature
IBM PowerLinux 7R2	8246	L2D	
System AC Power Supply, 1925 W	8246	L2D	5532
SPSS on Power Solution Indicator	8246	L2D	EHSS
16GB (2x8GB) Memory DIMMs, 1066 MHz, 4Gb DDR3 DRAM	8246	L2D	EL2Q
32GB (2x16GB) Memory DIMMs, 1066 MHz, 4Gb DDR3 DRAM	8246	L2D	EL2R
16GB (2x8GB) Memory DIMMs, 1066 MHz, 4Gb DDR3 DRAM	8246	L2D	EL2S
32GB (2x16GB) Memory DIMMs, 1066 MHz, 4Gb DDR3 DRAM	8246	L2D	EL2T
64GB (2x32GB) Memory DIMMs, 1066 MHz, 4Gb DDR3 DRAM	8246	L2D	EL2U
64GB (2x32GB) Memory DIMMs, 1066 MHz, 4Gb DDR3 DRAM	8246	L2D	EL2V
PCIe2 LP 2-Port 10GbE RoCE SR Adapter	8246	L2D	EL2Z
PCIe2 LP 4-port (10Gb FCoE & 1GbE) SRIOV SR&RJ45	8246	L2D	EL38
PowerLinux Base package -- 16-core 3.6 GHZ			
PowerLinux 7R2	8246	L2D	ELBC
PowerLinux Base package -- 16-core 4.2 GHZ			
PowerLinux 7R2	8246	L2D	ELBD
PCIe2 LP 16Gb 2-port Fibre Channel Adapter	8246	L2D	EN0B
8-core 3.6 GHZ POWER7 Processor Module (Zero-priced)	8246	L2D	EPLJ
8-core 4.2 GHZ POWER7+ Processor Module (Zero-priced)	8246	L2D	EPLK
Processor Activation for #EPLJ (Zero-priced)	8246	L2D	EPLM
Processor Activation for #EPLK (Zero-priced)	8246	L2D	EPLN
1.5TB Removable Disk Drive Cartridge	8246	L2D	EU15

The following are features already announced for the IBM Power Systems 8246 machine type:

Description	MT	Model	Feature
Linux Partition Specify	8246	L2D	0266
V.24/EIA232 6.1m (20-Ft) PCI Cable	8246	L2D	0348
V.35 6.1m (20-Ft) PCI Cable	8246	L2D	0353
X.21 6.1m (20-Ft) PCI Cable	8246	L2D	0359
SSD Placement Indicator - CEC	8246	L2D	0462
19 inch, 1.8 meter high rack	8246	L2D	0551
19 inch, 2.0 meter high rack	8246	L2D	0553
Rack Filler Panel Kit	8246	L2D	0599
SAN Load Source Specify	8246	L2D	0837
US TAA Compliance Indicator	8246	L2D	0983
USB 160 GB Removable Disk Drive	8246	L2D	1106
USB 500 GB Removable Disk Drive	8246	L2D	1107
Custom Service Specify, Rochester Minn, USA	8246	L2D	1140
177GB SFF-1 SSD w/ eMLC (AIX/Linux)	8246	L2D	1775
System port/UPS Conversion Cable	8246	L2D	1827
177GB SSD Module with eMLC (AIX/Linux)	8246	L2D	1995
PCIe LP RAID & SSD SAS Adapter 3Gb	8246	L2D	2053
Primary OS - Linux	8246	L2D	2147
Factory Deconfiguration of 1-core	8246	L2D	2319
2M LC-SC 50 Micron Fiber Converter Cable	8246	L2D	2456
2M LC-SC 62.5 Micron Fiber Converter Cable	8246	L2D	2459
3M Asynchronous Terminal/Printer Cable EIA-232	8246	L2D	2934
Asynchronous Cable EIA-232/V.24 3M	8246	L2D	2936
Serial-to-Serial Port Cable for Drawer/Drawer-			

3.7M	8246	L2D	3124
Serial-to-Serial Port Cable for Rack/Rack- 8M	8246	L2D	3125
1m, (3.3-ft) IB 40G Copper Cable QSFP/QSFP	8246	L2D	3287
3m, (9.8-ft.) IB 40G Copper Cable QSFP/QSFP	8246	L2D	3288
5m QDR IB/E'Net Copper Cable QSFP/QSFP	8246	L2D	3289
10 meter Quad Data Rate InfiniBand Optical Cable, QSFP/QSFP	8246	L2D	3290
30 meter Quad Data Rate InfiniBand Optical Cable, QSFP/QSFP	8246	L2D	3293
Widescreen LCD Monitor	8246	L2D	3632
0.3M Serial Port Converter Cable, 9-Pin to 25-Pin	8246	L2D	3925
Serial Port Null Modem Cable, 9-pin to 9-pin, 3.7M	8246	L2D	3927
Serial Port Null Modem Cable, 9-pin to 9-pin, 10M	8246	L2D	3928
System Serial Port Converter Cable	8246	L2D	3930
1.8 M (6-ft) Extender Cable for Displays (15-pin D-shell to 15-pin D-shell)	8246	L2D	4242
Extender Cable - USB Keyboards, 1.8M	8246	L2D	4256
VGA to DVI Connection Converter	8246	L2D	4276
Rack Integration Services: BP only	8246	L2D	4648
Rack Integration Services	8246	L2D	4649
One and only one rack indicator feature is required on all orders (#4650 to #4666).			
Rack Indicator- Not Factory Integrated	8246	L2D	4650
Rack Indicator, Rack #1	8246	L2D	4651
Rack Indicator, Rack #2	8246	L2D	4652
Rack Indicator, Rack #3	8246	L2D	4653
Rack Indicator, Rack #4	8246	L2D	4654
Rack Indicator, Rack #5	8246	L2D	4655
Rack Indicator, Rack #6	8246	L2D	4656
Rack Indicator, Rack #7	8246	L2D	4657
Rack Indicator, Rack #8	8246	L2D	4658
Rack Indicator, Rack #9	8246	L2D	4659
Rack Indicator, Rack #10	8246	L2D	4660
Rack Indicator, Rack #11	8246	L2D	4661
Rack Indicator, Rack #12	8246	L2D	4662
Rack Indicator, Rack #13	8246	L2D	4663
Rack Indicator, Rack #14	8246	L2D	4664
Rack Indicator, Rack #15	8246	L2D	4665
Rack Indicator, Rack #16	8246	L2D	4666
Software Preload Required	8246	L2D	5000
PCIe2 LP 4-port 1GbE Adapter	8246	L2D	5260
PCIe LP POWER GXT145 Graphics Accelerator	8246	L2D	5269
PCIe LP 10Gb FCoE 2-port Adapter	8246	L2D	5270
PCIe LP 4-Port 10/100/1000 Base-TX Ethernet Adapter	8246	L2D	5271
PCIe LP 10GbE CX4 1-port Adapter	8246	L2D	5272
PCIe LP 2-Port 1GbE SX Adapter	8246	L2D	5274
PCIe LP 10GbE SR 1-port Adapter	8246	L2D	5275
PCIe LP 4-Port Async EIA-232 Adapter	8246	L2D	5277
PCIe2 LP 4-Port 10GbE&1GbE SFP+ Copper&RJ45	8246	L2D	5279
PCIe2 LP 4-Port 10GbE&1GbE SR&RJ45 Adapter	8246	L2D	5280
PCIe2 LP 2-Port 4X IB QDR Adapter 40Gb	8246	L2D	5283
PCIe2 LP 2-Port 10GbE SFP+ Copper Adapter	8246	L2D	5286
PCIe LP 2-Port Async EIA-232 Adapter	8246	L2D	5290
SATA Slimline DVD-RAM Drive	8246	L2D	5771
Opt Front Door for 1.8m Rack	8246	L2D	6068
Opt Front Door for 2.0m Rack	8246	L2D	6069
1.8m Rack Acoustic Doors	8246	L2D	6248
2.0m Rack Acoustic Doors	8246	L2D	6249
1.8m Rack Trim Kit	8246	L2D	6263
2.0m Rack Trim Kit	8246	L2D	6272
Power Cord 4.3m (14-ft), Drawer to wall/IBM PDU (250V/10A)	8246	L2D	6458
Power Cord 4.3m (14-ft), Drawer To OEM PDU (125V, 15A)	8246	L2D	6460
Power Cord 4.3m (14-ft), Drawer to wall/OEM PDU (250V/15A) U. S.	8246	L2D	6469
Power Cord 1.8m (6-ft), Drawer to wall (125V/15A)	8246	L2D	6470
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU (125V/15A)	8246	L2D	6471
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU (250V/16A)	8246	L2D	6472
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU			

(250V/10A)	8246	L2D	6473
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (250V/13A)	8246	L2D	6474
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (250V/16A)	8246	L2D	6475
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (250V/10A)	8246	L2D	6476
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (250V/16A)	8246	L2D	6477
Power Cord 2.7 M(9-foot), To wall/OEM PDU, (250V, 16A)	8246	L2D	6478
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (125V/15A or 250V/10A )	8246	L2D	6488
4.3m (14-Ft) 3PH/24A 380-415V Power Cord	8246	L2D	6489
4.3m (14-Ft) 1PH/48A 200-240V Power Cord	8246	L2D	6491
4.3m (14-Ft) 1PH/48-60A 200-240V Power Cord	8246	L2D	6492
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (250V/10A)	8246	L2D	6493
Power Cord 2.7m (9-ft), Drawer to wall/OEM PDU, (250V/10A)	8246	L2D	6494
Power Cord 2.7M (9-foot), To wall/OEM PDU, (250V, 10A)	8246	L2D	6496
Power Cable - Drawer to IBM PDU, 200-240V/10A	8246	L2D	6577
Optional Rack Security Kit	8246	L2D	6580
Modem Tray for 19-Inch Rack	8246	L2D	6586
Power Cord 2.7M (9-foot), To wall/OEM PDU, (125V, 15A)	8246	L2D	6651
4.3m (14-Ft) 1PH/24-30A Pwr Cord	8246	L2D	6654
4.3m (14-Ft) 1PH/24-30A WR Pwr Cord	8246	L2D	6655
4.3m (14-Ft)1PH/24A Power Cord	8246	L2D	6656
Power Cord 2.7M (9-foot), To wall/OEM PDU, (250V, 15A)	8246	L2D	6659
Power Cord 4.3m (14-ft), Drawer to wall/OEM PDU (125V/15A)	8246	L2D	6660
Power Cord 2.8m (9.2-ft), Drawer to wall/IBM PDU, (250V/10A)	8246	L2D	6665
Power Cord 4.3M (14-foot), Drawer to OEM PDU, (250V, 15A)	8246	L2D	6669
Power Cord 2.7M (9-foot), Drawer to IBM PDU, 250V/10A	8246	L2D	6671
Power Cord 1.5M (5-foot), Drawer to IBM PDU, 250V/10A	8246	L2D	6672
Power Cord 2.7m (9-ft), Dawer to wall/OEM PDU, (250V/10A)	8246	L2D	6680
Intelligent PDU+, 1 EIA Unit, Universal UTG0247 Connector	8246	L2D	7109
Environmental Monitoring Probe	8246	L2D	7118
Power Distribution Unit	8246	L2D	7188
Ethernet Cable, 15m, Hardware Management Console to System Unit	8246	L2D	7802
Linux Software Preinstall	8246	L2D	8143
USB Mouse	8246	L2D	8845
Order Routing Indicator- System Plant	8246	L2D	9169
Language Group Specify - US English	8246	L2D	9300
New Red Hat License Core Counter	8246	L2D	9442
New SUSE License Core Counter	8246	L2D	9443
Other Linux License Core Counter	8246	L2D	9445
3rd Party Linux License Core Counter	8246	L2D	9446
VIOS Core Counter	8246	L2D	9447
Month Indicator	8246	L2D	9461
Day Indicator	8246	L2D	9462
Hour Indicator	8246	L2D	9463
Minute Indicator	8246	L2D	9464
Qty Indicator	8246	L2D	9465
Countable Member Indicator	8246	L2D	9466
Language Group Specify - Dutch	8246	L2D	9700
Language Group Specify - French	8246	L2D	9703
Language Group Specify - German	8246	L2D	9704
Language Group Specify - Polish	8246	L2D	9705
Language Group Specify - Norwegian	8246	L2D	9706
Language Group Specify - Portuguese	8246	L2D	9707
Language Group Specify - Spanish	8246	L2D	9708
Language Group Specify - Italian	8246	L2D	9711
Language Group Specify - Canadian French	8246	L2D	9712

Language Group Specify - Japanese	8246	L2D	9714
Language Group Specify - Traditional Chinese (Taiwan)	8246	L2D	9715
Language Group Specify - Korean	8246	L2D	9716
Language Group Specify - Turkish	8246	L2D	9718
Language Group Specify - Hungarian	8246	L2D	9719
Language Group Specify - Slovakian	8246	L2D	9720
Language Group Specify - Russian	8246	L2D	9721
Language Group Specify - Simplified Chinese (PRC)	8246	L2D	9722
Language Group Specify - Czech	8246	L2D	9724
Language Group Specify -- Romanian	8246	L2D	9725
Language Group Specify - Croatian	8246	L2D	9726
Language Group Specify -- Slovenian	8246	L2D	9727
Language Group Specify - Brazilian Portuguese	8246	L2D	9728
Language Group Specify - Thai	8246	L2D	9729
IBM PowerVM for IBM PowerLinux	8246	L2D	EC22
Full width Keyboard -- USB, US English, #103P	8246	L2D	EK51
Full width Keyboard -- USB, French, #189	8246	L2D	EK52
Full width Keyboard -- USB, Italian, #142	8246	L2D	EK53
Full width Keyboard -- USB, German/Austrian, #129	8246	L2D	EK54
Full width Keyboard -- USB, UK English, #166P	8246	L2D	EK55
Full width Keyboard -- USB, Spanish, #172	8246	L2D	EK56
Full width Keyboard -- USB, Japanese, #194	8246	L2D	EK57
Full width Keyboard -- USB, Brazilian Portuguese, #275	8246	L2D	EK58
Full width Keyboard -- USB, Hungarian, #208	8246	L2D	EK59
Full width Keyboard -- USB, Korean, #413	8246	L2D	EK60
Full width Keyboard -- USB, Chinese, #467	8246	L2D	EK61
Full width Keyboard -- USB, French Canadian, #445	8246	L2D	EK62
Full width Keyboard -- USB, Belgian/UK, #120	8246	L2D	EK64
Full width Keyboard -- USB, Swedish/Finnish, #153	8246	L2D	EK65
Full width Keyboard -- USB, Danish, #159	8246	L2D	EK66
Full width Keyboard -- USB, Bulgarian, #442	8246	L2D	EK67
Full width Keyboard -- USB, Swiss/French/German, #150	8246	L2D	EK68
Full width Keyboard -- USB, Norwegian, #155	8246	L2D	EK69
Full width Keyboard -- USB, Dutch, #143	8246	L2D	EK70
Full width Keyboard -- USB, Portuguese, #163	8246	L2D	EK71
Full width Keyboard -- USB, Greek, #319	8246	L2D	EK72
Full width Keyboard -- USB, Hebrew, #212	8246	L2D	EK73
Full width Keyboard -- USB, Polish, #214	8246	L2D	EK74
Full width Keyboard -- USB, Slovakian, #245	8246	L2D	EK75
Full width Keyboard -- USB, Czech, #243	8246	L2D	EK76
Full width Keyboard -- USB, Turkish, #179	8246	L2D	EK77
Full width Keyboard -- USB, LA Spanish, #171	8246	L2D	EK78
Full width Keyboard -- USB, Arabic, #253	8246	L2D	EK79
Full width Keyboard -- USB, Thai, #191	8246	L2D	EK80
Full width Keyboard -- USB, Russian, #443	8246	L2D	EK81
Full width Keyboard -- USB, Slovenian, #234	8246	L2D	EK82
Full width Keyboard -- USB, US English Euro, #103P	8246	L2D	EK83
80/160GB DAT160 SAS Tape Drive (3.5") for PowerLinux	8246	L2D	EL01
300GB 10K RPM SFF SAS Disk Drive - PowerLinux	8246	L2D	EL02
146GB 15K RPM SFF SAS Disk Drive - PowerLinux	8246	L2D	EL03
PCIe LP 4Gb 2-Port Fibre Channel Adapter - PowerLinux	8246	L2D	EL09
Memory Riser Card - PowerLinux (Zero-priced)	8246	L2D	EL0A
Memory Riser Card - PowerLinux	8246	L2D	EL0K
600GB 10K RPM SAS SFF Disk Drive - PowerLinux	8246	L2D	EL0P
Storage Backplane -- 6 SFF Drives/SATA DVD	8246	L2D	EL0R
Storage Backplane -- 3 SFF Drives/SATA DVD/HH Tape	8246	L2D	EL0T
Storage Backplane -- 6 SFF Drives/SATA DVD/RAID/ External SAS Port	8246	L2D	EL0V
Storage Backplane -- 6 SFF Drives/SATA DVD PowerLinux	8246	L2D	EL0W
Storage Backplane -- 3 SFF Drives/SATA DVD/HH Tape - PowerLinux	8246	L2D	EL0X
Storage Backplane -- 6 SFF Drives/SATA DVD/RAID/ External SAS Port - PowerLinux	8246	L2D	EL0Y
300GB 15K RPM SAS SFF Disk Drive - PowerLinux	8246	L2D	EL0Z
PCIe LP 2-x4-port SAS Adapter 3Gb - PowerLinux	8246	L2D	EL10
PCIe2 LP 4-port 1GbE Adapter - PowerLinux	8246	L2D	EL11

8GB (2x4GB) Memory DIMMs - PowerLinux	8246	L2D	EL15
8GB (2x4GB) Memory DIMMs - PowerLinux	8246	L2D	EL1F
PCIe2 LP 2-Port 10GbE RoCE SFP+ Adapter	8246	L2D	EL27
PCIe LP 8Gb 2-Port Fibre Channel Adapter	8246	L2D	EL2N
PCIe2 LP 2-port 10GbE SR Adapter	8246	L2D	EL2P
900GB 10K RPM SAS SFF Disk Drive (Linux)	8246	L2D	EL35
Trial PowerVM Live Partition Mobility	8246	L2D	ELPM
1m (3.3-ft), 10GbE'Net Cable SFP+ Act Twinax Copper	8246	L2D	EN01
3m (9.8-ft), 10Gb E'Net Cable SFP+ Act Twinax Copper	8246	L2D	EN02
5m (16.4-ft), 10Gb E'Net Cable SFP+ Act Twinax Copper	8246	L2D	EN03
PCIe2 LP 8Gb 4-port Fibre Channel Adapter	8246	L2D	EN0Y
RFID Tags for Servers, Compute Nodes, Chassis, Racks, and HMCs	8246	L2D	ERF1
387GB SFF-1 SSD for AIX/Linux with eMLC	8246	L2D	ES0A
1TB Removable Disk Drive Cartridge	8246	L2D	EU01
RDX USB External Docking Station for Removable Disk Cartridge	8246	L2D	EU04
RDX 320 GB Removable Disk Drive	8246	L2D	EU08
RDX USB Internal Docking Station for Removable Disk Cartridge	8246	L2D	EU23

### Business Partner information

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If you are a Direct Reseller - System Reseller acquiring products from IBM , you may link directly to Business Partner information for this announcement. A PartnerWorld® ID and password are required (use IBM ID).

<https://www.ibm.com/partnerworld/mem/sla.jsp?num=113-011>

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### Publications

IBM Power Systems hardware documentation provides you with the following topical information:

- System Overview
- Planning for the system
- Installing and configuring the system
- Working with consoles, terminals, and interfaces
- Managing system resources
- Working with operating systems and software applications
- Troubleshooting, service, and support

You can access the product documentation at

<http://publib.boulder.ibm.com/infocenter/powersys/v3r1m5/index.jsp>

Product documentation is also available on DVD (5K5T-7087).

The following information is shipped with the 8246-L2D:

- Power Hardware Information DVD (SK5T-7087)
- Installing the 8246-L2D
- Safety Information

Hardware documentation such as installation instructions, user's information, and service information is available to download or view at

<http://www.ibm.com/systems/support>

Visit the IBM System Support Site, which contains the documentation for the hardware

<http://www.ibm.com/systems/support>

The IBM Systems Information Center provides you with a single information center where you can access product documentation for IBM systems hardware, operating systems, and server software. Through a consistent framework, you can efficiently find information and personalize your access. The IBM Systems Information Center is located at

<http://publib14.boulder.ibm.com/infocenter/systems>

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### **IBM Publications Center Portal**

<http://www.ibm.com/shop/publications/order>

The Publications Center is a worldwide central repository for IBM product publications and marketing material with a catalog of 70,000 items. Extensive search facilities are provided, as well as payment options via credit card. A large number of publications are available online in various file formats, which can currently be downloaded free of charge.

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## **Services**

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### **Global Technology Services**

IBM services include business consulting, outsourcing, hosting services, applications, and other technology management.

These services help you learn about, plan, install, manage, or optimize your IT infrastructure to be an on-demand business. They can help you integrate your high-speed networks, storage systems, application servers, wireless protocols, and an array of platforms, middleware, and communications software for IBM and many non-IBM offerings. IBM is your one-stop shop for IT support needs.

For details on available services, contact your IBM representative or visit

<http://www.ibm.com/services/>

For details on available IBM Business Continuity and Recovery Services, contact your IBM representative or visit

<http://www.ibm.com/services/continuity>

For details on education offerings related to specific products, visit

<http://www.ibm.com/services/learning/index.html>

Select your country, and then select the product as the category.

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## **Technical information**

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### **Specified operating environment**

#### ***Physical specifications***

- Width: 440 mm (19.0 in)
- Depth: 706 mm (27.8 in)
- Height: 89 mm (3.5 in)
- Weight (maximum configuration): 29.5 kg (65 lb)

## **Operating environment**

- Temperature: Nonoperating 5° to 45°C (41° to 113°F); recommended temperature (operating) 18° to 27°C (64° to 80°F); allowable operating temperature 5° to 35°C (41° to 95°F)
- Relative humidity: Nonoperating 8% to 80%; recommended 5.5°C (42°F) dew point to 60% RH and 15°C (59°F) dew point
- Maximum dew point: 28°C (84°F) (operating)
- Operating voltage: 200 to 208 V ac or 220 to 240 V ac
- Operating frequency: 47/63 Hz
- Maximum measured power consumption:
  - 1368 watts (maximum)
- Power factor: 0.98
- Thermal output:
  - 4,668 Btu/hour (maximum)
- Power-source loading
  - 1.396 kVa (maximum configuration)
  - Maximum altitude: 3,050 m (10,000 ft)

**Note:** The maximum measured value is the worst case power consumption expected from a fully populated server under an intensive workload. The maximum measured value also accounts for component tolerance and non-ideal operating conditions. Power consumption and heat load vary greatly by server configuration and utilization. The IBM Systems Energy Estimator should be used to obtain a heat output estimate based on a specific configuration.

<http://www-912.ibm.com/see/EnergyEstimator>

## **Noise level and sound power**

6.6 bels (operating and idling)

## **EMC conformance classification:**

This equipment is subject to FCC rules and shall comply with the appropriate FCC rules before final delivery to the buyer or centers of distribution.

- US: FCC Class A
- Europe: CISPR 22 Class A
- Japan: VCCI-A
- Korea: Korean Requirement Class A
- China: People's Republic of China commodity inspection law Class A

## **Homologation -- Telecom environmental testing (Safety and EMC):**

Homologation approval for specific countries has been initiated with the IBM Homologation and Type Approval (HT&A) organization in LaGaude, France. This Power Systems model and applicable features meet the environmental testing requirements of the country telecom and have been designed and tested in compliance with the Full Quality Assurance Approval (FQAA) process as delivered by the British Approval Board for Telecom (BABT), the UK Telecom regulatory authority.

This product is not certified for connection by any means whatsoever to interfaces of public telecommunications networks. Certification may be required by law prior to making any such connection. Contact an IBM representative or reseller for any questions.

## **Product safety/Country testing/Certification:**

- UL 60950 Underwriters Laboratory, Safety Information



- CSA C22.2 No. 60950-00, Canadian Standards Association
- EN60950 European Norm
- IEC 60950, Edition 1, International Electrotechnical Commission, Safety Information
- Nordic deviations to IEC 60950-1 1st Edition

### **General requirements:**

The product is in compliance with IBM Corporate Bulletin C-B 0-2594-000 Statement of Conformity of IBM Product to External Standard (Suppliers Declaration).

### **Homologation**

This product is not certified for direct connection by any means whatsoever to interfaces of public telecommunications networks. Certification may be required by law prior to making any such connection. Contact an IBM representative or reseller for any questions.

### **Hardware requirements**

#### **PowerLinux 7R2 minimum system configuration**

The PowerLinux 7R2 offers 16-core configurations with two processor modules. The PowerLinux 7R2 can contain up to 512 GB of system memory (128 GB maximum per memory riser card).

The PowerLinux 7R2 offers five PCIe x8 Gen2 slots and one PCIe x4 Gen2 Low Profile slot, and three or six SFF HDDs/SDDs and one or two media devices, depending on the storage backplane selected.

PowerLinux 7R2 initial order must include a minimum of the following items:

- Choose package from:
  - Feature ELBC indicates a package that includes two 3.6 GHz processor modules (2 x #EPLJ) and 16 processor activations (16 x #EPLM).
  - Feature EPLD indicates a package that includes two 4.2 GHz processor modules (2 x #EPLK) and 16 processor activations (16 x #EPLN).
- Choose 32 GB minimum memory from:
  - 4 x 8 GB (2 x 4 GB) Memory DIMMs, 1066 MHz, DDR3 (#EL15)
  - 2 x 16 GB (2 x 8 GB) Memory DIMMs, 1066 MHz, DDR3 (#EL2Q)
  - 1 x 32 GB (2 x 16 GB) Memory DIMMs, 1066 MHz, DDR3 (#EL2R)
  - 1 x 64 GB (2 x 32 GB) Memory DIMMs, 1066 MHz, DDR3 (#EL2V)

**Note:** The first two memory features chosen on an initial order are installed in the nonfeaturized memory riser card. When 4 x #EL15 are chosen to meet the minimum memory requirements, 1 x #EL0A must be ordered. #EL0A is not allowed with #EL2Q, #EL2R, or #EL2V.
- Choose Storage Backplane from:
  - 3 x SFF/SATA DVD bay/Tape bay (#EL0R)
  - 6 x SFF/SATA DVD bay (#EL0T)
  - 6 x SFF/SATA DVD bay with Dual Write Cache RAID, and an external SAS port (#ELOV)
- One PCIe2 LP 4-port 1GbE Adapter (#EL11)
 

**Note:** Takes up one PCIe slot
- Choose minimum of two HDDs or SSDs from:
  - 177 GB SAS SFF SSD (#1775)
  - 387 GB SAS SFF SSD (#ES0A)
  - 600 GB SAS SFF HDD 10,000 RPM (#EL0P)

- 300 GB SAS SFF HDD 15,000 RPM (#EL0Z)
- 146.8 GB SAS SFF HDD 15,000 RPM (#EL03)
- 300 GB SAS SFF HDD 10,000 RPM (#EL02)
- 900 GB SAS SFF HDD 10,000 RPM (#EL35)
- 177 GB SAS 1.8" Solid-State Drive (#1995)
  - Feature 1995 requires feature 2053.
  - No internal HDD or SSD is required if feature 0837 (Boot from SAN) is selected. In this case, a Fibre Channel or Fibre Channel over Ethernet adapter must also be ordered.
- Two 1925 watt AC Power Supplies (2 x #5532) and two power cords (2 x #6xxx)
- Linux Primary Operating System Indicator (#2147)
- Choose:
  - PowerVM for PowerLinux (16 x #EC22)
  - or
  - GPFS (5765-G66)
- One Language Group, Specify (#9300 or #97xx)

**Note:** One nonfeaturized memory riser card is included in the base system. Additional memory riser card features (#EL0K) can be ordered on the PowerLinux 7R2.

## **RAID**

There are multiple protection options for HDD/SSD drives in the SAS SFF bays in PowerLinux 7R2 system units or drives in disk-only I/O drawers. Although protecting drives is always recommended, Linux users may choose to leave some or all drives unprotected at their own risk and IBM supports these configurations.

This HDD/SSD drive protection can be provided by Linux software or by the HDD or SSD hardware controllers. Mirroring of drives is provided by Linux software. In addition, Linux supports controllers providing RAID 0, 1, 5, 6, or 10. To further augment HDD/SSD protection, hot spare capability can be used for protected drives. Specific hot spare prerequisites apply.

An integrated SAS HDD/SSD controller is provided in the PowerLinux 7R2 system unit and provides support for JBOD and RAID 0, 1, and 10 for Linux. It is optionally augmented by RAID 5 and RAID 6 capability when storage backplane feature number EL0V is added to the configuration. Other disk/SSD controllers are provided as PCIe SAS adapters are supported. PCI Controllers with and without write cache are supported. RAID 5 and RAID 6 on controllers with write cache are supported.

Linux can use disk drives formatted with 512 byte blocks when being mirrored by the operating system. These disk drives must be reformatted to 528 byte sectors when used in RAID arrays. Although a small percentage of the drive's capacity is lost, additional data protection such as ECC and bad block detection is gained in this reformatting. For example, a 300 GB disk drive when reformatted provides around 283 GB. IBM Power SSDs are formatted to 528 bytes.

## **Software requirements**

- SUSE Linux Enterprise Server 11 Service Pack 1, or later, with current maintenance updates available from SUSE to enable all planned functionality.
- Users interested in Red Hat Enterprise Linux should consult the Red Hat Statement of Direction.

Users should also update their systems with the latest Linux for Power service and productivity tools available at

<http://www.ibm.com/support/customercare/sas/f/lopdiags/home.html>

Refer to the IBM Prerequisite website for software requirements for each feature number

[https://www-912.ibm.com/e\\_dir/eServerPrereq.nsf](https://www-912.ibm.com/e_dir/eServerPrereq.nsf)

## **Limitations**

### **System**

- Integrated system ports are not supported under Linux when the HMC ports are connected to an HMC. Either the HMC ports or the integrated system ports can be used, but not both.
- The integrated system ports are supported for modem and asynch terminal connections by Linux . Any other application using serial ports requires a serial port adapter to be installed in a PCI slot. The integrated system ports do not support HACMP™ configurations.

### **Hardware Management Console (HMC) Machine Code**

An HMC or IVM is required to manage the PowerLinux 7R2 (8246-L2D) implementing partitioning. Multiple PowerLinux 7R2 servers can be supported by a single HMC.

If an HMC is used to manage the PowerLinux 7R2, the HMC must be a CR3, or later, model rack-mount HMC or C05, or later, deskside HMC.

If attaching an HMC to a new server or adding function to an existing server that requires a firmware update, the HMC Machine Code may need to be updated. Machine Code includes firmware and microcode. Access to Machine Code updates is conditioned on entitlement and license validation in accordance with IBM policy and practice. IBM may verify entitlement through customer number, serial number, electronic restrictions, or any other means or methods employed by IBM in its discretion.

To determine the HMC Machine Code level required for the firmware level on any server, go to the following web page to access the Fix Level Recommendation Tool (FLRT) on or after the planned availability date for this product. FLRT will identify the correct HMC Machine Code for the selected system firmware level

<https://www14.software.ibm.com/webapp/set2/sas/f/hmc/home.html>

If a single HMC is attached to multiple servers, the HMC Machine Code level must be updated to the server with the most recent firmware level. All prior levels of server firmware are supported with the latest HMC Machine Code level.

When IBM Systems Director is used to manage an HMC or if the HMC manages more than 254 partitions, the HMC should have 3 GB of RAM minimum and be a CR3 model, or later, rack-mount or C06, or later, deskside.

HMC V7 R7.7.0:

The IBM Hardware Management Console (HMC) V7.7.0 contains the following:

- Support for managing IBM Power 710, 720, 730, 740 and IBM PowerLinux 7R1/7R2 systems

HMC V7 R7.7.0 SP1:

The IBM Hardware Management Console (HMC) V7.7.0 contains the following:

- Support for PowerVM functions such as: new HMC GUI interface for VIOS install; improved transition from IVM to HMC management; support for 802.1 Qbg on virtual Ethernet adapters; ability to update the user's password in Kerberos from the HMC for clients utilizing remote HMC

### **Boot requirements**

- Selection of feature 0837 will indicate boot from SAN.

### **Processor modules**

- Two processor modules are required on an order with eight processor cores on each processor module. A minimum/maximum of two processor modules are required on a PowerLinux 7R2 order.
- All processors must be activated.
  - A PowerLinux 7R2 with two 8-core 3.6 GHz processor modules (2 x #EPLJ) requires that 16 processor activation codes (16 x #EPLM) be ordered.
  - A PowerLinux 7R2 with two 8-core 4.2 GHz processor modules (2 x #EPLK) requires that 16 processor activation codes (16 x #EPLN) be ordered.

### **Power supply**

- Two 1925 watt ac power supplies (2 x #5532) are required.

### **Redundant fans**

- Redundant fans are standard.

### **Power cords**

Two power cords are required. The PowerLinux 7R2 supports 200-240 V ac power cords.

### **System memory**

A minimum 32 GB is required on the PowerLinux 7R2. A system must be ordered with a minimum/maximum of 4 x #EL15, 2 x #EL2Q, 1 x #EL2R, or 1 x #EL2V.

If more than 32 GB of memory is required, optional memory features EL1F, EL2S, EL2T, and EL2V may be ordered.

- The base machine contains one nonfeaturized memory riser card with four DIMM sockets. Memory features consume two memory DIMM sockets.
  - The PowerLinux 7R2 offers three optional memory riser card features (3 x #EL0A on initial orders; 3 x EL0K on MES orders) with an additional four DIMM sockets per feature. Maximum system memory is 128 GB without feature EL0A/EL0K and 512 GB with three x feature EL0A/EL0K.
- A system can be ordered with a single memory feature EL2R or EL2V. The second memory feature ordered on the same memory riser card does not have to match the first memory feature. Memory features can be mixed on a memory riser card.
- A minimum of one memory feature must be plugged into each memory riser card. Empty memory riser cards are not allowed.
- There is a performance benefit when all DIMMs on a memory riser card are of the same capacity.
- It is generally recommended that memory be installed evenly across all memory riser cards in the system. Balancing memory across the installed memory riser cards allows memory access in a consistent manner and typically results in the best possible performance for your configuration. However, balancing memory fairly evenly across multiple memory riser cards, compared to balancing memory exactly evenly, typically has a very small performance difference.

Plans for future memory upgrades should be taken into account when deciding which memory feature size to use at the time of initial system order.

## Memory features

Feature	Feature number	Minimum quantity	Maximum quantity
8 GB 1066 MHz (2 x 4 GB RDIMMs) (Zero priced)	EL15	0	4
16 GB 1066 MHz (2 x 8 GB RDIMMs) (Zero priced)	EL2Q	0	2
32 GB 1066 MHz (2 x 16 GB RDIMMs) (Zero priced)	EL2R	0	1
64 GB 1066 MHz (2 x 32 GB RDIMMs) (Zero priced)	EL2V	0	1
8 GB 1066 MHz (2 x 4 GB RDIMMs) (Reduced price)	EL1F	0	8
16 GB 1066 MHz (2 x 8 GB RDIMMs) (Reduced price)	EL2S	0	8
32 GB 1066 MHz (2 x 16 GB RDIMMs) (Reduced price)	EL2T	0	8
64 GB 1066 MHz (2 x 32 GB RDIMMs) (Reduced price)	EL2U	0	8

## PCI card slots

The PowerLinux 7R2 contains five 8x Gen2 slots and one 4x Gen2 PCIe Low Profile slot, which is restricted to the standard Ethernet adapter.

## Graphics adapters

- A graphics adapter, keyboard, and mouse are not required in the minimum configuration.
- The maximum number of graphics adapters supported in the PowerLinux 7R2 CEC is four.

## I/O adapters

- Feature number EL11 is required in the 8246-L2D minimum configuration and occupies the 4x slot.
- Two GX++ slots are available on the PowerLinux 7R2. The GX++ slot 1 does not share space with the CEC PCIe Low Profile adapter slots. The GX++ slot 2 shares space with the PCIe 4x slot. If a GX++ adapter is plugged into the 4x slot, then the feature EL11 required LAN adapter must occupy one of the five 8x slots, leaving four 8x slots available for other adapters.
- No GX++ adapters are supported.
- Refer to the table below for additional I/O adapter information.

## I/O adapter features

I/O adapter	Orderable feature number	Supported feature number	CEC Max qty	Sys Max qty	Size
PCIe LP RAID & SSD SAS A	2053		2	2	LP

PCIe2 LP 4-port 1GbE Adapter	5260	5	5	LP
PCIe LP POWER GXT145 Graphics Acc	5269	4	4	LP
PCIe LP 10Gb FCoE 2-port Adapter	5270	5	5	LP
PCIe LP 4-Port 10/100/1000 Base-T	5271	5	5	LP
PCIe LP 10GbE CX4 1-port Adapter	5272	5	5	LP
PCIe LP 2-Port 1GbE SX Adapter	5274	5	5	LP
PCIe LP 10GbE SR 1-port Adapter	5275	5	5	LP
PCIe LP 4-Port Async EIA-232 Adap	5277	5	5	LP
PCIe2 LP 4-port 1/10GbE SFP+	5279	5	5	LP
PCIe2 LP 4-port 1/10GbE SR	5280	5	5	LP
PCIe2 LP PCIe2 2-port 4X IB QDR	5283	2	2	LP
PCIe2 LP PCIe2 2-Port 10GbE SFP	5286	5	5	LP
PCIe LP 2-Port Async EIA 232	5290	2	2	LP
PCIe LP 4 Gb 2-Port Fibre Channel	EL09	5	5	LP
PCIe LP 2-x4-port SAS Adapter 3Gb	EL10	5	5	LP
PCIe2 LP 4-port 1GbE Adapter (\$0)	EL11	1	1	LP
PCIe2 LP 2-Port 10GbE RoCE SFP+	EL27	5	5	LP
PCIe LP 8Gb 2-Port Fibre Channel	EL2N	5	5	LP
PCIe2 LP PCIe2 2-port 10GbE SR	EL2P	5	5	LP
PCIe2 LP 2-Port 10GbE RoCE SR	EL2Z	5	5	LP
PCIe2 LP 4-port (10Gb FCoE & 1GbE)	EL38	5	5	LP
PCIe2 LP 16Gb 2-port Fibre Channel	EN0B	5	5	LP
PCIe2 LP 8Gb 4-port Fibre Channel	EN0Y	5	5	LP

### Storage devices/Bays

- The PowerLinux 7R2 has a slim media bay that can contain an optional DVD-RAM (#5771 or follow-on) and a tape bay (only available with #EL0T/#ELOX) that can contain a tape drive or removable disk drive.
- Either feature number EL0R, EL0T, or EL0V must be selected.
  - Feature number EL0T/ELOX supports three small form-factor (SFF) disk units, either HDD or SSD, a SATA DVD, and a tape. No split backplane supported. No RAID 5 or 6 support.
  - Feature number EL0R/ELOW supports six SFF disk units, either HDD or SSD, and a SATA DVD. No split backplane supported. No RAID 5 or 6 support.
  - Feature number EL0V/ELOY supports six SFF disk units, either HDD or SSD, and a SATA DVD, and adds an external SAS port. No split backplane supported. RAID 5 and 6 are supported.
  - A valid orderable HDD or SSD is required in a minimum configuration. No HDDs or SSDs are required in the CEC if feature number 0837 is selected.
  - A feature EL01 DAT160 80/160 GB tape feature and a feature EU23 USB Internal Docking Station for Removable Disk Cartridge are mutually exclusive. One or the other can be on the system but not both. A minimum of one feature 1106, 1107, EU01, EU08, or EU15 must be ordered with each feature EU23 ordered.
- SAS-bay-based 1775/ES0A support restrictions:
  - SFF features 1775 and ES0A are supported in the PowerLinux 7R2 CEC.
  - SSDs and disk drives (HDDs) are not allowed to mirror each other.

#### Storage device features

Device	Maximum quantity	Bay	Orderable feature number
DVD-RAM (SATA)	1	slim	5771
80/160GB DAT160 SAS Tape Drive (3.5") for PowerLinux	1	Tape	EL01
RDX USB Internal Docking Station for Removable Disk Cartridge	1	Tape	EU23

Orderable

Device	Maximum quantity	Bay	feature number
177 GB SAS, SFF, Solid-state	6	SFF 1-6	1775
387 GB SAS, SFF, Solid-state	6	SFF 1-6	ES0A
300 GB 10K, SAS, SFF	6	SFF 1-6	EL02
146.8 GB 15K, SAS, SFF	6	SFF 1-6	EL03
600 GB 10K, SAS, SFF	6	SFF 1-6	EL0P
900 GB 10K, SAS, SFF	6	SFF 1-6	EL35
300 GB 15K, SAS, SFF	6	SFF 1-6	EL0Z
177 GB 1.8", Solid-state, for #2053	4	2 per #2053	1995

**Note:** Six disks or solid-state drives maximum can be installed internally.

### **Planning information**

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#### ***Cable orders***

No cables required.

#### ***Security, auditability, and control***

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The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communications facilities.

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## **IBM Electronic Services**

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Electronic Service Agent and the IBM Electronic Support web portal are dedicated to providing fast, exceptional support to IBM Systems customers. The IBM Electronic Service Agent tool is a no-additional-charge tool that proactively monitors and reports hardware events, such as system errors, performance issues, and inventory. The Electronic Service Agent tool can help you stay focused on your company's strategic business initiatives, save time, and spend less effort managing day-to-day IT maintenance issues. Servers enabled with this tool can be monitored remotely around the clock by IBM Support, all at no additional cost to you.

Electronic Service Agent is designed to automatically and electronically report system failures and utilization issues to IBM, which can result in faster problem resolution and increased availability. System configuration and inventory information collected by the Electronic Service Agent tool also can be viewed on the secure Electronic Support web portal, and used to improve problem determination and resolution by you and the IBM support team. To access the tool main menu, simply type "smitty esa\_main", and select "Configure Electronic Service Agent ." In addition, ESA now includes a powerful web user interface, giving the administrator easy access to status, tool settings, problem information, and filters. For more information and documentation on how to configure and use Electronic Service Agent, refer to

<http://www.ibm.com/support/electronic>

The IBM Electronic Support portal is a single Internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. This portal enables you to gain easier access to IBM resources for assistance in resolving technical problems. The My Systems and Premium Search functions make it even easier for Electronic Service Agent tool-enabled customers to track system inventory and find pertinent fixes.

## **Benefits**

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**Increased uptime:** The Electronic Service Agent tool is designed to enhance the Warranty or Maintenance Agreement by providing faster hardware error reporting and uploading system information to IBM Support. This can translate to less wasted time monitoring the "symptoms," diagnosing the error, and manually calling IBM Support to open a problem record. Its 24 x 7 monitoring and reporting mean no more dependence on human intervention or off-hours customer personnel when errors are encountered in the middle of the night.

**Security:** The Electronic Service Agent tool is designed to be secure in monitoring, reporting, and storing the data at IBM . The Electronic Service Agent tool securely transmits either via the Internet (HTTPS or VPN) or modem, and can be configured to communicate securely through gateways to provide customers a single point of exit from their site. Communication is one way. Activating Electronic Service Agent does not enable IBM to call into a customer's system. System inventory information is stored in a secure database, which is protected behind IBM firewalls. It is viewable only by the customer and IBM . The customer's business applications or business data is never transmitted to IBM .

**More accurate reporting:** Since system information and error logs are automatically uploaded to the IBM Support center in conjunction with the service request, customers are not required to find and send system information, decreasing the risk of misreported or misdiagnosed errors. Once inside IBM , problem error data is run through a data knowledge management system and knowledge articles are appended to the problem record.

**Customized support:** Using the IBM ID entered during activation, customers can view system and support information in the "My Systems" and "Premium Search" sections of the Electronic Support website at

<http://www.ibm.com/support/electronic>

My Systems provides valuable reports of installed hardware and software using information collected from the systems by Electronic Service Agent . Reports are available for any system associated with the customer's IBM ID. Premium Search combines the function of search and the value of Electronic Service Agent information, providing advanced search of the technical support knowledgebase. Using Premium Search and the Electronic Service Agent information that has been collected from their system, customers are able to see search results that apply specifically to their systems.

For more information on how to utilize the power of IBM Electronic Services, contact your IBM Systems Services Representative, or visit

<http://www.ibm.com/support/electronic>

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## **Terms and conditions**

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**Volume orders:** Contact your IBM representative.

### **IBM Global Financing**

Yes

### **Warranty period**



Three years.

An IBM part or feature installed during the initial installation of an IBM machine is subject to a full warranty effective on the date of installation of the machine. An IBM part or feature that replaces a previously installed part or feature assumes the remainder of the warranty period for the replaced part or feature. An IBM part or feature added to a machine without replacing a previously installed part or feature is subject to a full warranty effective on its date of installation. Unless specified otherwise, the warranty period, type of warranty service, and service level of a part or feature are the same as those for the machine in which it is installed.

### **Warranty service**

If required, IBM provides repair or exchange service depending on the types of warranty service specified for the machine. IBM will attempt to resolve your problem over the telephone, or electronically via an IBM website. IBM may request Electronic Service Agent (ESA) activation and you must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend the time of your call and is subject to parts availability. If applicable to your product, parts considered Customer Replaceable Units (CRUs) will be provided as part of the machine's standard warranty service.

Service levels are response-time objectives, may be limited in some areas, and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country-specific and location-specific information.

### **CRU Service**

IBM provides replacement CRUs to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM upon your request. CRUs are designated as being either a Tier 1 (mandatory) or a Tier 2 (optional) CRU.

#### *Tier 1 (mandatory) CRU*

Installation of Tier 1 CRUs, as specified in this announcement, is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.

#### *Tier 2 (optional) CRU*

You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge.

Based upon availability, CRUs will be shipped for next business day (NBD) delivery. IBM specifies, in the materials shipped with a replacement CRU, whether a defective CRU must be returned to IBM. When return is required, return instructions and a container are shipped with the replacement CRU. You may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

The following parts have been designated as Tier 1 CRUs:

- DASD drive
- DASD Media Backplane
- DVD drive
- Fan Air Baffle
- Fan
- All PCI Adapters
- Memory Riser Card
- Power Supply

- Line/power cord
- Keyboard
- Mouse
- External cables
- Display
- Operator Panel
- TOD battery
- Memory DIMMs
- Processor VRM
- SAS Conduit Cable
- SAS Tape Drive Cables
- USB and SAS Tape Drive
- USB Tape Drive Signal Cable
- Storage Interposer
- SPCN Cable
- Interlock Switch
- RAID Battery
- RAID Package Card
- RAID Battery Card

To service a Linux system end to end, Linux service and productivity tools must be installed from the web page at

<http://www.ibm.com/support/customercare/sas/f/lopdiags/home.html>

It's automatically loaded if IBM manufacturing installs Linux image or IBM Installation Toolkit. PowerPack is the best way to install required service packages from the website. Linux call home feature is also supported in a stand-alone system configuration to report serviceable events.

### ***On-site Service:***

At IBM's discretion, you will receive specified CRU service, or IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

Service level is:

- 9 hours per day, Monday through Friday, excluding holidays, next-business-day response. Calls must be received by 5:00 pm local time in order to qualify for next business day response.

### **Non-IBM parts service**

#### ***Warranty service***

IBM is now shipping machines with selected non-IBM parts that contain an IBM field replaceable unit (FRU) part number label. These parts are to be serviced during the IBM machine warranty period. IBM is covering the service on these selected non-IBM parts as an accommodation to their customers, and normal warranty service procedures for the IBM machine apply.

#### **Warranty service upgrades**

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During the warranty period, warranty service upgrades provide an enhanced level of on-site service for an additional charge. A warranty service upgrade must be purchased during the warranty period and is for a fixed term (duration). It is not

refundable or transferable and may not be prorated. If required, IBM will provide the warranty service upgrade enhanced level of on-site service acquired by the customer. Service levels are response-time objectives and are not guaranteed. See the warranty services information for additional details.

IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM website. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with IBM. You must follow the problem determination and resolution procedures that IBM specifies. Following problem determination, if IBM determines on-site service is required, scheduling of service will depend upon the time of your call, machine technology and redundancy, and availability of parts.

### ***On-site Service***

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

The service level is:

- 9 hours per day, Monday through Friday, excluding holidays, 4-hour average response, same-business-day response
- 24 hours per day, 7 days a week, 4-hour average response
- 24 hours per day, 7 days a week, 2-hour average response

**Note:** Canada does not offer 2-hour response option.

### **Maintenance services**

If required, IBM provides repair or exchange service depending on the types of maintenance service specified for the machine. IBM will attempt to resolve your problem over the telephone or electronically, via an IBM website. IBM may request Electronic Service Agent (ESA) activation and certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with IBM. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call, machine technology and redundancy, and availability of parts.

Service levels are response-time objectives, may be limited in some areas, and are not guaranteed. The specified level of maintenance service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country-specific and location-specific information. The following service selections are available as maintenance options for your machine type.

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

The service level is:

- 9 hours per day, Monday through Friday, excluding holidays, next-business-day response
- 9 hours per day, Monday through Friday, excluding holidays, 4-hour average response
- 24 hours per day, 7 days a week, 4-hour average response
- 24 hours per day, 7 days a week, 2-hour average response

**Note:** Canada does not offer 2-hour response option.

### ***Customer Replaceable Unit (CRU) Service***

If your problem can be resolved with a CRU (for example, keyboard, mouse, speaker, memory, or hard disk drive), and depending upon the maintenance service offerings in your geography, IBM will ship the replacement CRU to you for you to

install. CRU information and replacement instructions are shipped with your machine and are available from IBM upon your request.

Based upon availability, CRUs will be shipped for next business day delivery. IBM specifies, in the materials shipped with a replacement CRU, whether a defective CRU must be returned to IBM. When return is required, 1) return instructions and a container are shipped with the replacement CRU, and 2) you may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

CRUs may be provided as part of the machine's standard maintenance service except that you may install a CRU yourself or request IBM installation, at no additional charge, under any of the On-site Service levels specified above.

### **Non-IBM parts service**

Under certain conditions, IBM provides services for selected non-IBM parts at no additional charge for machines that are covered under warranty service upgrades or maintenance services.

This service includes hardware problem determination (PD) on the non-IBM parts (for example, adapter cards, PCMCIA cards, disk drives, memory) installed within IBM machines and provides the labor to replace the failing parts at no additional charge.

If IBM has a Technical Service Agreement with the manufacturer of the failing part, or if the failing part is an accommodations part (a part with an IBM FRU label), IBM may also source and replace the failing part at no additional charge. For all other non-IBM parts, customers are responsible for sourcing the parts. Installation labor is provided at no additional charge, if the machine is covered under a warranty service upgrade or a maintenance service.

### **Warranty service upgrades**

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#### ***Usage plan machine***

No

#### ***IBM hourly service rate classification***

Two

When a type of service involves the exchange of a machine part, the replacement may not be new, but will be in good working order.

#### ***Field-installable features***

Yes

#### ***Model conversions***

No

#### ***Machine installation***

Customer setup. Customers are responsible for installation according to the instructions IBM provides with the machine.

#### ***Graduated program license charges apply***

Yes

The applicable processor group is: Small.

#### ***Licensed Machine Code***

IBM Machine Code is licensed for use by a customer on the IBM machine for which it was provided by IBM under the terms and conditions of the IBM License Agreement for Machine Code, to enable the machine to function in accordance with its specifications, and only for the capacity authorized by IBM and acquired by the customer. You can obtain the agreement by contacting your IBM representative or visiting

[http://www.ibm.com/servers/support/machine\\_warranties/machine\\_code.html](http://www.ibm.com/servers/support/machine_warranties/machine_code.html)

Machine using LMC Type Model  
8246-L2D

Access to Machine Code updates is conditioned on entitlement and license validation in accordance with IBM policy and practice. IBM may verify entitlement through customer number, serial number, electronic restrictions, or any other means or methods employed by IBM in its discretion.

If the machine does not function as warranted and your problem can be resolved through your application of downloadable Machine Code, you are responsible for downloading and installing these designated Machine Code changes as IBM specifies. If you would prefer, you may request IBM to install downloadable Machine Code changes; however, you may be charged

### **Educational allowance**

A reduced charge is available to qualified education customers. The educational allowance may not be added to any other discount or allowance.

The educational allowance is 18% for the products in this announcement.

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## **Pricing**

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### **Product charges**

The following are newly announced features on the specific models of the IBM Power Systems 8246 machine type:

Description	Model number	Feature number	Initial/ MES/ Both support	RP CSU MES
IBM PowerLinux 7R2	L2D			Yes
Linux Partition Specify	L2D	0266	Both	Yes No
V.24/EIA232 6.1m (20 Ft) PCI C	L2D	0348	Both	Yes No
V.35 6.1m (20 Ft) PCI Cable	L2D	0353	Both	Yes No
X.21 6.1m (20 Ft) PCI Cable	L2D	0359	Both	Yes No
SSD Placement Indicator CEC	L2D	0462	Both	Yes No
19 inch, 1.8 meter high rack	L2D	0551	MES	Yes No
19 inch, 2.0 meter high rack	L2D	0553	MES	Yes No
Rack Filler Panel Kit	L2D	0599	Both	Yes No
SAN Load Source Specify	L2D	0837	Both	Yes No
US TAA Compliance Indicator	L2D	0983	Both	Yes No
USB 160 GB Removable Disk Dr				

USB 500 GB Removable Disk Dr	L2D	1106	Support	Yes	No
	L2D	1107	Both	Yes	No
Custom Serv. Specify, Roch	L2D	1140	Both	Yes	No
177GB SFF-1 SSD w/ eMLC AIX/Li	L2D	1775	Both	Yes	No
System port/UPS Conversion Cab	L2D	1827	Both	Yes	No
177GB SSD Module with eMLC (AI	L2D	1995	Both	No	No
PCIe LP RAID SSD SAS Adapter 3	L2D	2053	Both	Yes	No
Primary OS Linux	L2D	2147	Both	Yes	No
Factory Deconfiguration of 1 c	L2D	2319	Initial	N/A	No
LC-SC 50 Micron Fiber Conv Cab	L2D	2456	Both	Yes	No
LC-SC 62.5 Mic.Fib.Conv.Cable	L2D	2459	Both	Yes	No
Asynch.Termin/Print.Cbl EIA232	L2D	2934	Both	Yes	No
Asynchronous Cable EIA 232/V	L2D	2936	Both	Yes	No
Ser to Ser Port Cab Draw/Draw	L2D	3124	Both	Yes	No
Serial to Se.Port Cbl Rack 8M	L2D	3125	Both	Yes	No
1m, QDR IB Copper Cable	L2D	3287	Both	Yes	No
3m, QDR IB Copper Cable	L2D	3288	Both	Yes	No
5m QDR IB/E'Net Copper Cable	L2D	3289	Both	Yes	No
10m QDR IB Optic Cable	L2D	3290	Both	Yes	No
30m QDR IB Optic Cable	L2D	3293	Both	Yes	No
Widescreen LCD Monitor	L2D	3632	Both	Yes	No
0.3M Serial Prt Converter Cbl	L2D	3925	Both	Yes	No
Serial Port Null Mod Cab 3.7M	L2D	3927	Both	Yes	No
Ser.Port Null Modem Cable,10M	L2D	3928	Both	Yes	No
System Serial Port Converter C	L2D	3930	Both	Yes	No
6Foot Extend.Cbl for Displays	L2D	4242	Both	Yes	No
Extender Cable USB Keybo 1.8M	L2D	4256	Both	Yes	No
VGA to DVI Connection Converte	L2D	4276	Both	Yes	No
Rack Integration Services: BP	L2D	4648	Initial	N/A	No
Rack Integration Services	L2D	4649	Initial	N/A	No
One and only one rack indicator feature is required on all orders (#4650 to #4666).					
No Factory Integration Ind.	L2D	4650	Initial	N/A	No
Rack Indicator, Rack 1	L2D	4651	Initial	N/A	No
Rack Indicator, Rack 2	L2D	4652	Initial	N/A	No
Rack Indicator, Rack 3	L2D	4653	Initial	N/A	No
Rack Indicator, Rack 4	L2D	4654	Initial	N/A	No
Rack Indicator, Rack 5	L2D	4654	Initial	N/A	No

Rack Indicator, Rack 6	L2D	4655	Initial	N/A	No
Rack Indicator, Rack 7	L2D	4656	Initial	N/A	No
Rack Indicator, Rack 8	L2D	4657	Initial	N/A	No
Rack Indicator, Rack 9	L2D	4658	Initial	N/A	No
Rack Indicator, Rack 10	L2D	4659	Initial	N/A	No
Rack Indicator, Rack 11	L2D	4660	Initial	N/A	No
Rack Indicator, Rack 12	L2D	4661	Initial	N/A	No
Rack Indicator, Rack 13	L2D	4662	Initial	N/A	No
Rack Indicator, Rack 14	L2D	4663	Initial	N/A	No
Rack Indicator, Rack 15	L2D	4664	Initial	N/A	No
Rack Indicator, Rack 16	L2D	4665	Initial	N/A	No
Software Preload Required	L2D	4666	Initial	N/A	No
PCIe2 LP 4-port 1GbE Adapter	L2D	5000	Initial	N/A	No
PCIe LP POWER GXT145 Graphics	L2D	5260	Both	Yes	No
PCIe LP 10Gb FCoE 2 port Adapt	L2D	5269	Both	Yes	No
PCIe LP 4 Port 10/100/1000 Bas	L2D	5270	Both	Yes	No
PCIe LP 10GbE CX4 1 port Adapt	L2D	5271	Both	Yes	No
PCIe LP 2 Port 1GbE SX Adapter	L2D	5272	Both	Yes	No
PCIe LP 10GbE SR 1 port Adapt	L2D	5274	Both	Yes	No
PCIe LP 4 Port Async EIA 232 A	L2D	5275	Both	Yes	No
PCIe2 4Port 10GBE&1GBE SFP+ LP	L2D	5277	Both	Yes	No
PCIe2 4-Port 10GbE&1GbE SR LP	L2D	5279	Both	Yes	No
PCIe2 LP 2-Port 4X IB QDR Adap	L2D	5280	Both	Yes	No
PCIe2 LP 2 Port 10GbE SFP Copp	L2D	5283	Both	Yes	No
PCIe LP 2 Port Async EIA 232 A	L2D	5286	Both	Yes	No
System Pwr Sup -1925W	L2D	5290	Both	Yes	No
SATA Slimline DVD-RAM Drive	L2D	5532	Initial	N/A	No
Opt Front Door for 1.8m Rack	L2D	5771	Both	Yes	No
Opt Front Door for 2.0m Rack	L2D	6068	MES	Yes	No
1.8m Rack Acoustic Doors	L2D	6069	MES	Yes	No
2.0m Rack Acoustic Doors	L2D	6248	MES	Yes	No
1.8m Rack Trim Kit	L2D	6249	MES	Yes	No
2.0m Rack Trim Kit	L2D	6263	MES	Yes	No
Pwr Crd 4.3m 14ft wall	IBM PDU	6272	MES	Yes	No
Pwr Crd (14FT), Drwr - OEM PDU	L2D	6458	Both	Yes	No
Pwr Crd 4.3m 14ft wall	OEM PDU	6460	Both	Yes	No
Pwr Crd 1.8m 6ft wall	L2D	6469	Both	Yes	No
		125V/15A			

	L2D	6470	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU	L2D	6471	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU	L2D	6472	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU	L2D	6473	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU	L2D	6474	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU	L2D	6475	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU	L2D	6476	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU	L2D	6477	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU	L2D	6478	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU	L2D	6488	Both	Yes	No
4.3m (14 Ft) 3PH/24A Power Cor	L2D	6489	MES	Yes	No
4.3m (14 Ft) 1PH/48A Pwr Cord	L2D	6491	MES	Yes	No
4.3m (14 Ft) 1PH/48 60A Pwr Co	L2D	6492	MES	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU	L2D	6493	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU	L2D	6494	Both	Yes	No
Pwr Crd 2.7m 9ft wall 250V,10A	L2D	6496	Both	Yes	No
Power Cable Drawer to IBM PD	L2D	6577	Both	Yes	No
Optional Rack Security Kit	L2D	6580	MES	Yes	No
Modem Tray for 19-Inch Rack	L2D	6586	MES	Yes	No
Pwr Crd 2.7m 9ft wall 125V,15A	L2D	6651	Both	Yes	No
4.3m 1PH/24-30A Pwr Cord	L2D	6654	MES	Yes	No
4.3m 14Ft 1PH/24 30A WR Pwr	L2D	6655	MES	Yes	No
4.3m 14Ft 1PH/24A Power Cord	L2D	6656	MES	Yes	No
Pwr.Cord(9ft),To wall/OEM PDU	L2D	6659	Both	Yes	No
Pwr Crd 14ft 4.3m wall OEM PDU	L2D	6660	Both	Yes	No
Pwr Crd 2.8m 9.2ft wall PDU	L2D	6665	Both	Yes	No
Pwr Crd 4.3M, Drwr - OEM PDU	L2D	6669	Both	Yes	No
Pwr Crd 2.7M, Drwr - IBM PDU	L2D	6671	Both	Yes	No
Pwr Crd 1.5M, Drwr - IBM PDU	L2D	6672	Both	Yes	No
Pwr Crd 2.7m 9ft wall OEM PDU	L2D	6680	Both	Yes	No
IIntelligent PDU+ 1 EIA Unit	L2D	7109	MES	Yes	No
Environmental Monitoring Probe	L2D	7118	Both	Yes	No
Power Distribution Unit	L2D	7188	MES	Yes	No
Eth Cbl 15M HW Management	L2D	7802	Both	Yes	No
Linux Software Preinstall	L2D	8143	Initial	N/A	No
USB Mouse	L2D	8845	Both	Yes	No
Order Routing Indicator System	L2D	9169	Initial	N/A	No
Language Group Spcf-US Eng					



	L2D	9300	Initial	N/A	No
New Red Hat Lic Core Counter	L2D	9442	Initial	N/A	No
New SUSE Lic Core Counter	L2D	9443	Initial	N/A	No
Other Linux Lic Core Counter	L2D	9445	Initial	N/A	No
3rd Party Linux Lic Core Cnt	L2D	9446	Initial	N/A	No
VIOS Core Counter	L2D	9447	Initial	N/A	No
Month Indicator	L2D	9461	Initial	N/A	No
Day Indicator	L2D	9462	Initial	N/A	No
Hour Indicator	L2D	9463	Initial	N/A	No
Minute Indicator	L2D	9464	Initial	N/A	No
Qty Indicator	L2D	9465	Initial	N/A	No
Countable Member Indicator	L2D	9466	Initial	N/A	No
Language Group Spcf-Dutch	L2D	9700	Initial	N/A	No
Language Group Spcf-French	L2D	9703	Initial	N/A	No
Language Group Spcf-German	L2D	9704	Initial	N/A	No
Language Group Spcf-Polish	L2D	9705	Initial	N/A	No
Lang Group Specify - Norwegian	L2D	9706	Initial	N/A	No
Lang.Group Spcf-Portuguese	L2D	9707	Initial	N/A	No
Language Group Spcf-Spanish	L2D	9708	Initial	N/A	No
Language Group Spcf-Italian	L2D	9711	Initial	N/A	No
Langua Gr Speci Canadian Frenc	L2D	9712	Initial	N/A	No
Language Group Spcf-Japanese	L2D	9714	Initial	N/A	No
Language Group Specify Tr Chin	L2D	9715	Initial	N/A	No
Language Group Spcf-Korean	L2D	9716	Initial	N/A	No
Language Group Spcf-Turkish	L2D	9718	Initial	N/A	No
Language Group Spcf-Hungarian	L2D	9719	Initial	N/A	No
Language Group Spcf-Slovakian	L2D	9720	Initial	N/A	No
Language Group Spcf-Russian	L2D	9721	Initial	N/A	No
Lang Group Spcf Simpl Chinese	L2D	9722	Initial	N/A	No
Language Group Spcf-Czech	L2D	9724	Initial	N/A	No
Language Group Spcf-Romanian	L2D	9725	Initial	N/A	No
Lang Group Specify - Croatian	L2D	9726	Initial	N/A	No
Language Group Spcf-Slovenian	L2D	9727	Initial	N/A	No
Lang Group Specify - Braz Port	L2D	9728	Initial	N/A	No
Lang Group Specify - Thai	L2D	9729	Initial	N/A	No
IBM PowerVM for IBM PowerLinux	L2D	EC22	Both	Yes	No
SPSS on Pwr Sol Ind	L2D	EHSS	Initial	Yes	No

Full width Key USB, US English					
	L2D	EK51	Both	Yes	No
Full width Key USB, French					
	L2D	EK52	Both	Yes	No
Full width Key USB, Italian					
	L2D	EK53	Both	Yes	No
Full width Key USB, German/Aus					
	L2D	EK54	Both	Yes	No
Full width Key USB, UK English					
	L2D	EK55	Both	Yes	No
Full width Key USB, Spanish					
	L2D	EK56	Both	Yes	No
Full width Key USB, Japanese					
	L2D	EK57	Both	Yes	No
Full width Key USB, BrazilianP					
	L2D	EK58	Both	Yes	No
Full width Key USB, Hungarian					
	L2D	EK59	Both	Yes	No
Full width Key USB, Korean					
	L2D	EK60	Both	Yes	No
Full width Key USB, Chinese					
	L2D	EK61	Both	Yes	No
Full width Key USB, French Can					
	L2D	EK62	Both	Yes	No
Full width Key USB, Belgian/UK					
	L2D	EK64	Both	Yes	No
Full width Key USB, Swedish/Fi					
	L2D	EK65	Both	Yes	No
Full width Key USB, Danish					
	L2D	EK66	Both	Yes	No
Full width Key USB, Bulgarian					
	L2D	EK67	Both	Yes	No
Full width Key USB, Swiss/Fr/G					
	L2D	EK68	Both	Yes	No
Full width Key USB, Norwegian					
	L2D	EK69	Both	Yes	No
Full width Key USB, Dutch					
	L2D	EK70	Both	Yes	No
Full width Key USB, Portuguese					
	L2D	EK71	Both	Yes	No
Full width Key USB, Greek					
	L2D	EK72	Both	Yes	No
Full width Key USB, Hebrew					
	L2D	EK73	Both	Yes	No
Full width Key USB, Polish					
	L2D	EK74	Both	Yes	No
Full width Key USB, Slovakian					
	L2D	EK75	Both	Yes	No
Full width Key USB, Czech					
	L2D	EK76	Both	Yes	No
Full width Key USB, Turkish					
	L2D	EK77	Both	Yes	No
Full width Key USB, LA Spanish					
	L2D	EK78	Both	Yes	No
Full width Key USB, Arabic					
	L2D	EK79	Both	Yes	No
Full width Key USB, Thai					
	L2D	EK80	Both	Yes	No
Full width Key USB, Russian					
	L2D	EK81	Both	Yes	No
Full width Key USB, Slovenian					
	L2D	EK82	Both	Yes	No
Full width Key USB, US English					
	L2D	EK83	Both	Yes	No
80/160GB Tape - PowerLinux					
	L2D	EL01	Both	Yes	No
300GB 10K SFF Disk-PowerLinux					
	L2D	EL02	Both	Yes	No
146GB 15K SFF Disk-PowerLinux					
	L2D	EL03	Both	Yes	No
4Gb 2-port FCAL - PowerLinux					
	L2D	EL09	Both	Yes	No
Memory Riser Card(Zero-priced)					
	L2D	EL0A	Initial	N/A	No

Memory Riser Card - PowerLinux	L2D	EL0K	Both	Yes	No
600GB 10K SFF Disk-PowerLinux	L2D	EL0P	Both	Yes	No
Storage Backplane 6 SFF Dri	L2D	EL0R	Initial	N/A	No
Storage Backplane 3 SFF Dri	L2D	EL0T	Initial	N/A	No
Storage Backplane w/ext SAS	L2D	EL0V	Initial	N/A	No
Backplane 6 SFFs -PowerLinux	L2D	EL0W	MES	Yes	No
Backplane 3 SFFs -PowerLinux	L2D	EL0X	MES	Yes	No
Backplane w/ext SAS-PowerLinux	L2D	EL0Y	MES	Yes	No
300GB 15K SFF Disk-PowerLinux	L2D	EL0Z	Both	Yes	No
2-port SAS adapter -PowerLinux	L2D	EL10	Both	Yes	No
PCIe2 LP 4-port 1GbE Adapter	L2D	EL11	Initial	N/A	No
8GB (2x4GB) Memory-PowerLinux	L2D	EL15	Initial	N/A	No
8GB (2x4GB) Memory-PowerLinux	L2D	EL1F	Both	Yes	No
PCIe2 LP 2-Port 10GbE RoCE SFP	L2D	EL27	Both	Yes	No
PCIe LP 8Gb 2 Port Fibre Chann	L2D	EL2N	Both	Yes	No
PCIe2 LP 2 port 10GbE SR Adapt	L2D	EL2P	Both	Yes	No
16GB (2x8GB) Memory DIMMs 1066	L2D	EL2Q	Initial	N/A	No
32GB (2x16GB) Mem DIMMS 1066	L2D	EL2R	Initial	N/A	No
16GB (2x8GB) Memory DIMMS 1066	L2D	EL2S	Both	Yes	No
32GB (2x16GB) Mem DIMMS 1066	L2D	EL2T	Both	Yes	No
64GB (2x32GB) Mem DIMMS 1066	L2D	EL2U	Both	Yes	No
64GB (2x32GB) Mem DIMMS 1066	L2D	EL2V	Initial	N/A	No
PCIe2 LP 2-Port 10GbE RoCE SR	L2D	EL2Z	Both	Yes	No
900GB 10k RPM SAS SFF Disk	L2D	EL35	Both	Yes	No
PCIe2 LP 4-port 10GB FCoE & 1G	L2D	EL38	Both	Yes	No
PowerLinux Base - 16c 3.6 GHZ	L2D	ELBC	Initial	N/A	No
PowerLinux Base - 16c 4.2 GHZ	L2D	ELBD	Initial	N/A	No
Trial Live Partition Mobility	L2D	ELPM	Both	Yes	No
1m 10GbE Cable SFP+ Act Twinax	L2D	EN01	Both	Yes	No
3m 10GbE Cable SFP+ Act Twinax	L2D	EN02	Both	Yes	No
5m 10GbE Cable SFP+ Act Twinax	L2D	EN03	Both	Yes	No
PCIe2 LP 16Gb 2-port Fibre Cha	L2D	EN0B	Both	Yes	No
PCIe2 LP 8Gb 4-port Fibre Chan	L2D	EN0Y	Both	Yes	No
8-core 3.6 GHZ (Zero-priced)	L2D	EPLJ	Initial	N/A	No
8-core 4.2 GHZ (Zero-priced)	L2D	EPLK	Initial	N/A	No
EPLJ Proc Activ (Zero-priced)	L2D	EPLM	Initial	N/A	No
EPLK Proc Activ (Zero-priced)	L2D	EPLN	Initial	N/A	No

RFID Tags for Compute Nodes	L2D	ERF1	Initial	N/A	No
387GB SFF-1 SSD for AIX/Linux	L2D	ES0A	Both	Yes	No
1TB Removable Disk Cartridge	L2D	EU01	Both	Yes	No
RDX USB External Docking	L2D	EU04	Both	Yes	No
RDX 320 GB Removable Disk Driv	L2D	EU08	Both	Yes	No
1.5TB Removable Disk Cartridge	L2D	EU15	Both	Yes	No
RDX USB Internal Docking	L2D	EU23	Both	Yes	No

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