

IBM PowerVM Adds Support for Little Endian Linux Workloads

Regardless of whether your applications are written for big endian (BE) or little endian (LE) processors, they can all run under IBM® PowerVM® virtualization. The new little endian guest support for IBM PowerVM brings Linux based workloads that adhere to the LE mode of operation into the fold. Now, if you invested in Linux applications that support little endian mode but want to take advantage of all the capabilities that IBM Power Systems™ offer with the PowerVM LE guest support, you are ready to go. That means no code changes and maybe just a simple recompile – no crossing your fingers!

The IBM PowerVM LE guest support enables you to take advantage of all that PowerVM offers and all that the IBM Power systems provide, including these benefits:

- Controlling your IT costs while balancing the need to improve your IT performance, availability, and energy efficiency
- Taking advantage of the PowerVM ability to dynamically scale to meet your business needs
- Ensuring that your organization has highly secure and reliable IT systems, because the need for better data and system protection is of paramount importance

PowerVM LE guest support uses the industrial-strength virtualization solution that PowerVM provides for IBM Power Systems servers. It also uses PowerVM advanced enterprise virtualization capabilities (see Figure 1). In essence, PowerVM LE guest support lowers the barrier to entry for porting Linux and x86 applications (built for x86 using LE mode) to Linux on Power.

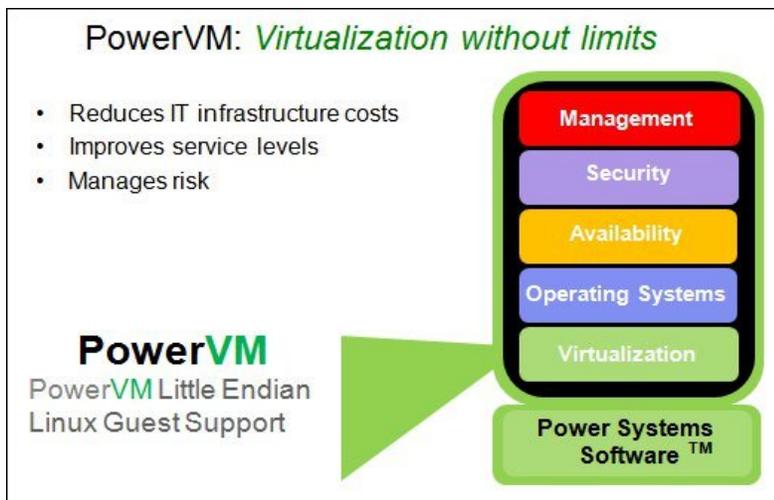


Figure 1. PowerVM, part of the Power Systems Software™

Did you know?

PowerVM supports mixing both BE and LE guest VMs on the same server with the addition of PowerVM LE guest support. This capability enables running traditional IBM AIX®, IBM i, and Linux workloads side-by-side with the newer Linux LE workloads, all on the same server, which increases your ability to respond to changing business needs. With PowerVM LE guest support, all three Linux on Power distribution partners (SUSE, Canonical, and Red Hat) with LE operating systems can run on the same IBM Power Systems.

This version of PowerVM provides the following benefits:

- Supports IBM AIX, IBM i, and Linux BE- and LE-based workloads running on the same server
- Supports the consolidation of virtualized workloads, which minimizes IT expenses
- Automates deployment of virtual machines (VMs) and storage, which enables delivery of cloud-based services faster
- Controls costs and boosts return on investment (ROI) by optimizing the use of server and storage resources
- Improves availability and eliminates scheduled downtime by deploying live partition mobility between servers
- Delivers higher-quality services to your employees, partners, and customers by taking advantage of virtual resource management

Business value

Virtualization can be used in a variety of ways to achieve improvements in efficiency and flexibility:

- Consolidate multiple workloads, including those on under-used servers and systems with varied and dynamic resource requirements
- Deployment and scale up and down workloads as needed to meet changing business demands and deploying multiple copies of the same workload type is simplified
- Aggregate system resources (including, central processing units (CPU), memory and storage) into shared pools for dynamic reallocation between multiple workloads
- Perform application development and testing in secure, independent domains
- Employ partition mobility on active workloads (between servers) to support platform upgrades, systems balancing, or to avoid planned maintenance downtime
- Bring workloads back online after an outage quickly and efficiently minimizing lost revenue
- Consolidate many diverse workloads hosting them on the same server saves IT resources

All of these capabilities increase your organization's ability to respond to business needs, cut costs, and improve system performance, reliability, and availability. These capabilities are now extended to include Linux applications that support little endian.

Solution overview and architecture

The Power Systems Software stack provides hardware that is rock solid and highly scalable. The related software stack starts with a virtualization layer that enables you to fully use the machine by allowing different workloads to coexist on a common hardware platform (shown in Figure 2). IBM AIX, IBM i, and Linux (LE and BE) applications can run in different partitions simultaneously.

PowerVM is designed to offer the following key advantages:

- High efficiency to provide high overall performance
- High scalability, linear from 1/20 to 256 cores
- Isolation to provide security and “no compromise” consolidation
- Maximum resource granularity to reduce wasting resources

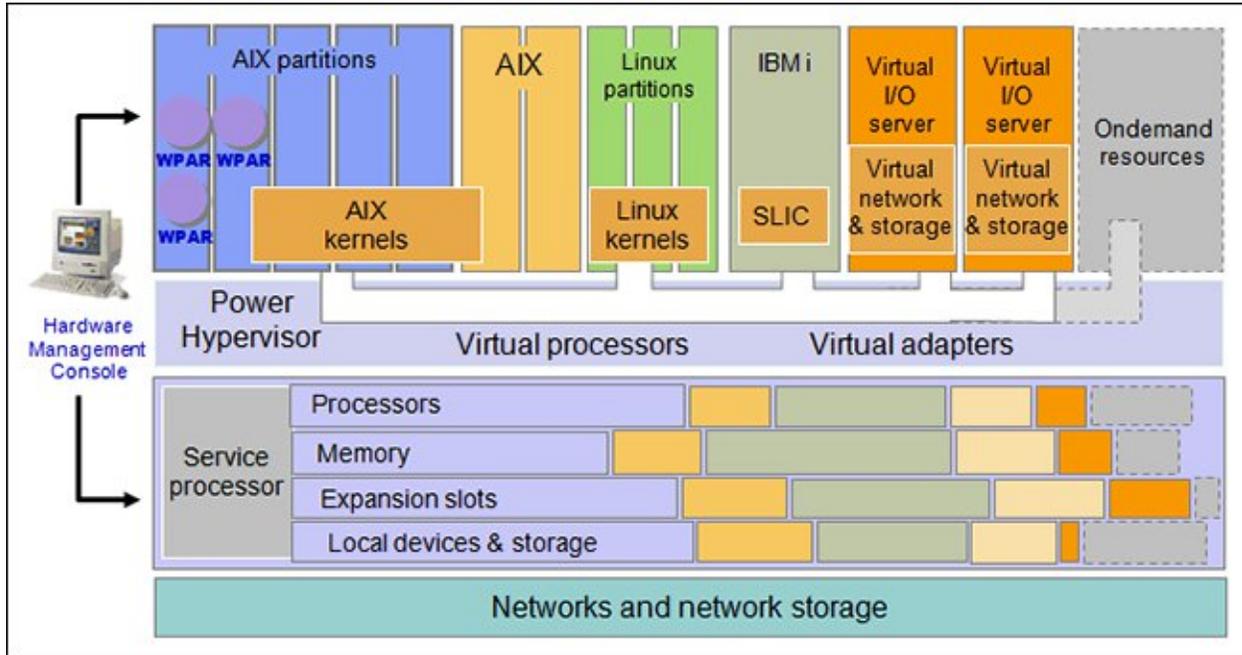


Figure 2. High-level PowerVM architecture

Because individual Power Systems offerings can host many system images, isolating and handling service interruptions is more important. These service interruptions can be planned or unplanned. Technologies such as Live Partition Mobility or clustering (for example, IBM PowerHA® System Mirror) can be used to move workloads between machines to allow for scheduled maintenance while minimizing any service interruptions.

PowerHA brings applications-aware high availability and failover in case of hardware or software problems. The Power Systems security solution, IBM PowerSC™, hardens the virtual data center environment by providing security and compliance extensions for the virtual data center. PowerSC is a security offering that includes Security and Compliance Automation, Trusted Boot, Trusted Firewall, Trusted Logging, and Trusted Network Connect and patch management. The security technology within the virtualization layer provides additional security to stand-alone systems.

Also, advanced virtualization management can be provided by PowerVC, which is powered by OpenStack. PowerVC increase scalability without adding complexity and can manage traditional workloads and new LE Linux guests. It includes the following capabilities, among others:

- Virtual systems management for PowerVM and PowerKVM
- Virtual image management and deployment
- Resource pooling and dynamic VM placement
- Ongoing optimization and VM resilience

PowerKVM was the first to support LE distributions, and now PowerVM also has LE guest support. To better understand the difference between PowerKVM and PowerVM, review Table 1.

Table 1. PowerKVM and PowerVM comparison

Feature	IBM PowerKVM	IBM PowerVM
CPU sharing	Yes	Yes
Dynamic addition/removal of resources	Partial	Yes
Single root I/O virtualization (SR-IOV) support	No	Yes
Shared pools of storage	Yes	Yes
Active VM migration	Yes	Yes
Memory compression	No (zswap can be installed manually)	Yes (uses IBM Active Memory™)
Memory page sharing	Yes (described as kernel same-page merging)	Yes (described as Active Memory deduplication)
N Port ID Virtualization (NPIV)	No	Yes
License	Open source	Proprietary
Direct attached I/O devices	Yes	Yes
Supported machines	IBM scale-out Linux systems only	All IBM Power Systems
Supported operating systems in the guest	Linux	IBM AIX, IBM i, Linux
Different editions	Standard	Standard and Enterprise
Thin-provisioned storage	Yes (qcow2 image)	Yes (thin provisioning) requires Shared Storage Pools
Adding devices to the guest	Hot plug	Dynamic Logical Partitioning (DLPAR)

Usage scenario

Many business environments require partitioned systems, either for testing reasons or for specific application requirements, such as Linux applications written in LE mode. In this scenario, a company that has IBM i applications has acquired a smaller specialty business that is running Linux applications written in LE mode. The parent company wants to consolidate all of the applications on a single server. Because the company and its new acquisition are growing fast, they can't afford the downtime to rework the applications to a single operating environment.

By using a Power System along with PowerVM with LE guest support, the company is able consolidate these diverse workloads on the same server by porting the Linux applications written in LE mode. This solution enables the company and the acquired business to continue operating smoothly. As a bonus, your company reduces IT infrastructure costs and saves system administrator time and resources.

Integration

The IBM Power Systems server used to run your virtual environment provides various services that are important to your business beyond running applications. These services include accessibility, availability, scalability, performance, security, compliance, and disaster recovery. PowerVM has two editions, as shown in Figure 3.

PowerVM Editions offer a unified virtualization solution for all Power workloads

- PowerVM Standard Edition
 - Production deployments
 - Server consolidation
- PowerVM Enterprise Edition
 - Multi-server deployments
 - Cloud infrastructure

<i>PowerVM Editions</i>	Standard	Enterprise
Concurrent VMs	20 per core** (up to 1000)	20 per core** (up to 1000)
Virtual I/O Server	Multiple per server	Multiple per server
NPIV	✓	✓
Linux Little Endian Distro Support ⇄	✓	✓
Shared Processor Pools	✓	✓
Shared Storage Pools	✓	✓
Thin Provisioning	✓	✓
Live Partition Mobility		✓
Active Memory Sharing		✓
PowerVP*		✓




**** Requires eFW7.6 or higher**
*** Requires eFW7.7 or higher**
⇄ Requires wFW8.30 or higher

Figure 3. PowerVM editions

Supported platforms

PowerVM LE Linux guest support requires Firmware 8.30 and IBM POWER8® hardware.

PowerVM version 2.2.3.50 is the release level required, in addition to the firmware requirements, for the LE Linux guest support. PowerVM version 2.2.3.50 supports little endian guest VMs, including Red Hat Enterprise Linux (RHEL) 7.1 LE, SUSE Linux Enterprise Server (SLES) 12, and Ubuntu Server 15.04. This new capability allows applications running in little endian mode to share resources on the same server as workloads that are running on IBM AIX, IBM i, and older Linux versions.

Note: The Power processors running PowerVM can run in either LE or BE mode and are qualified on POWER8 systems running PowerVM.

For more information about the supported operating systems, platforms, or other key prerequisites, see the "Server virtualization with IBM PowerVM" web page:

<http://www.ibm.com/systems/power/software/virtualization/>

Ordering information

To order PowerVM, use the information in Table 2.

Table 2. Ordering part numbers and feature codes

Program name	PID number	VRM
IBM PowerVM	5765-PVS (Standard Edition) 5765-PVE (Enterprise Edition) 5765-PVL (PowerLinux Edition)	PowerVM V2.2.3

Related information

For more information, see the following documents:

- IBM Redbooks:
 - IBM PowerVM Virtualization Introduction and Configuration*, SG24-7940
<http://www.redbooks.ibm.com/abstracts/sg247940.html>
 - IBM PowerVM Virtualization Introduction and Configuration*, SG24-8062
<http://www.redbooks.ibm.com/abstracts/sg248062.html>
 - IBM PowerVM Getting Started Guide*, REDP-4815
<http://www.redbooks.ibm.com/abstracts/REDP4815.html>
- IBM PowerVM product page
<http://ibm.com/systems/power/software/virtualization/>
- IBM Offering Information page (announcement letters and sales manuals):
http://www.ibm.com/common/ssi/index.wss?request_locale=en

On this page, enter PowerVM, select the information type, and then click **Search**. On the next page, narrow your search results by geography and language.

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