

## IBM PowerVM™ Virtualization



Complexity can work its way into your IT infrastructure. Potential culprits include introduction of new applications and unanticipated growth. You add a server each time you have a new demand, a new application. With each new server, additional floor space, power, cooling, network interfaces, data storage and administrative staff may be required.

The answer is consolidation and virtualization. New technologies have emerged that allow organizations to consolidate multiple operating systems and software stacks on a single platform, and allocate the platform to meet specific business and application requirements in a more dynamic fashion. The latest IBM advances in virtualization may offer even more possibilities than you've heard about before.

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### Highlights

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- **Consolidate a diverse set of applications from multiple operating systems on a single server: AIX®, IBM i, and Linux®**
- **Virtualize processor and I/O resources increasing asset utilization and reducing system costs**
- **Dynamically adjust server capability to meet changing workload demands**
- **Move running partitions between servers to avoid planned downtime**

The IBM Power™ Systems family of servers includes proven<sup>1</sup> server consolidation platforms that help you control costs while improving overall performance, availability and energy efficiency. With these servers and IBM PowerVM™ virtualization technologies, capabilities and offerings, your business can consolidate applications and servers, virtualization system resources, and provide a more flexible, dynamic IT infrastructure.

PowerVM offers a secure virtualization environment, built on the advanced RAS features and leadership performance<sup>2</sup> of the Power Systems platform.

#### **Employing Virtualization**

You can employ virtualization in many ways to achieve improvements in efficiency and flexibility:

- *Consolidation of several environments including underutilized servers and systems with varied and dynamic resource requirements*
- *Rapid deployment of new workloads to meet IT or business demands*

- *Application development and testing in secure, independent domains*
- *Live movement of operating environments to support server migrations, systems balancing, or to avoid planned downtime*

#### **Processor Virtualization**

The Power Systems family gives you the freedom to run a wide variety of applications without the costs and complexity often associated with managing multiple physical servers.

PowerVM can help eliminate underutilized servers because it is designed to pool resources and optimize their use across multiple application environments and operating systems. Through advanced dynamic logical partitioning (LPAR) capabilities, a single partition can act as a completely separate AIX, i, or Linux operating environment. Partitions can have dedicated or shared processors resources. With shared resources, PowerVM can automatically adjust pooled processor resources across multiple operating systems, borrowing processing power from idle partitions to handle high transaction volumes in other partitions.

With PowerVM on Power Systems, you have both the power and flexibility to address multiple system requirements in a single machine. PowerVM Micro-Partitioning™ supports up to 10 dynamic logical partitions per processor core. So, depending upon the Power server, you can run up to 254 independent servers—each with its own processors and memory resources within a single physical Power server. Processor resources can be assigned at a granularity of 1/100<sup>th</sup> of core. Consolidating systems with PowerVM can help cut operational costs, improve availability, ease management and improve service levels, while allowing businesses to quickly deploy applications.

#### **Multiple Shared Processor**

Pools\* allows for automatic non-disruptive balancing of processing power between partitions assigned to shared pools resulting in increased throughput. It also provides the ability to cap the processor core resources used by a group of partitions to potentially reduce processor-based software licensing costs.

Shared Dedicated Capacity\* allows for the “donation” of spare CPU cycles from dedicated processor partitions to a Shared Processor Pool. The dedicated partition maintains absolute priority for dedicated CPU cycles. Enabling this feature may help to increase system utilization, without compromising the computing power for critical workloads in a dedicated processor.

PowerVM Logical Partitioning for POWER6 processor-based systems has received the Common Criteria Evaluation and Validation Scheme (CCEVS) EAL4+ certification<sup>3</sup> for security capabilities.

### **I/O Virtualization**

The Virtual I/O Server (VIOS) is a special-purpose partition which provides virtual I/O resources to client partitions. The Virtual I/O Server owns the resources that are shared with clients. A physical adapter assigned to the VIOS partition can be shared by one or more other partitions. VIOS is designed to reduce costs by eliminating the need for dedicated network adapters, disk

adapters and disk drives, and tape adapters and tape drives in each client partition. With VIOS, AIX, i, and Linux partitions can easily be created for test, development, or production purposes.

N Port ID Virtualization (NPIV)\* provides direct access to Fiber Channel Adapters from multiple client partitions, simplifying the deployment and management of Fibre Channel SAN environments.

### **Partition Mobility**

Live Partition Mobility\* supports the movement of a running AIX or Linux partition from one physical server to another compatible server without application downtime, helping avoid application interruption for planned system maintenance, provisioning, and workload management. Live Partition Mobility can be used to easily migrate operating environments to new servers temporarily or permanently.

### **x86 Linux Applications**

PowerVM Lx86 enables you to run a wide range of x86 Linux applications<sup>4</sup> on Power Systems platforms within a Linux on Power partition. This feature is

designed to support the consolidation of x86 applications onto the Power platform to take advantage of advanced performance, scalability, and RAS characteristics. PowerVM Lx86 enables the dynamic execution of x86 Linux instructions by mapping them to instructions on a POWER processor-based system and caching the mapped instructions to optimize performance.

### **Systems Management**

PowerVM virtualization features are managed through the Hardware Management Console (HMC) or the Integrated Virtualization Manager (IVM) on entry systems.

IVM literally allows you to point, click and consolidate workloads with its easy to use browser-based interface. IVM lowers the cost of entry into POWER6 and POWER5™ processor-based virtualization since it does not require the use of an HMC for single system partitioning. With IVM, you can partition a single system, including the creation of LPARs, and management of virtual storage and virtual Ethernet.

IBM Systems Director also supports the PowerVM environment. Systems Director is the IBM management tool for multiple, heterogeneous servers. It supports AIX, i, Linux as well x86 operating environments. Systems Director supports advanced management functions such as health check and topology mappings as well as the ability to take action on monitored events.

### **PowerVM Editions**

IBM PowerVM Editions offer broad virtualization functionality for AIX, i and Linux operating systems:

PowerVM Express Edition is offered exclusively on the Power 520 and Power 550 Express servers and is designed for users looking for an introduction to more advanced virtualization features at a highly affordable price. With the Express Edition, users can create up to three partitions on the server with IVM, leverage virtualized disk and optical devices with VIOS and even try out PowerVM Lx86.

PowerVM Standard Edition is supported on POWER5 and POWER6 processor based servers and blades and supports the features included in Express Edition plus full micro-partitioning, HMC management, and Multiple Shared Processor Pools.\*

PowerVM Enterprise Edition is offered exclusively on POWER6™ processor-based servers and blades and includes all the features of PowerVM Standard Edition plus Live Partition Mobility.

### **Diverse Set of Workloads**

Many IBM Software Group offerings are optimized for a PowerVM environment supporting the consolidation of a diverse set of workloads—from database and application servers to Web infrastructure. For example, PowerVM and WebSphere® Virtual Enterprise work together to provide a cross system virtualized application infrastructure that can lower operational and energy costs required to create, run, and manage your enterprise applications and SOA environment. WebSphere Virtual

Enterprise increases flexibility and agility to ensure business process integrity, improve service and application performance, and better manage application health.

### **Help from the Experts**

IBM's depth and breadth of expertise in IBM Power Systems servers is virtually unmatched. Our IBM Global services technical consultants not only have hands-on experience and longtime familiarity with these state-of-the-art servers, but they also maintain intimate knowledge of emerging technologies, software releases and hardware enhancements through IBM development teams and research laboratories. When your organization works with IBM to implement PowerVM capabilities, you can benefit from the extensive intellectual capital and implementation methods that the entire IBM Global Services team has accumulated, tested and proven over the years.



Feature	Benefits
<b>Hypervisor</b>	<ul style="list-style-type: none"> <li>• Supports multiple operating environments on a single system</li> </ul>
<b>Micro-Partitioning™</b>	<ul style="list-style-type: none"> <li>• Enables up to 10 partitions per processor core</li> </ul>
<b>Dynamic Logical Partitioning</b>	<ul style="list-style-type: none"> <li>• Processor, memory, and I/O resources can be dynamically moved between partitions</li> <li>• Partitions can use dedicated or shared (capped or uncapped) processor resources</li> <li>• Processor resources can automatically move between partitions based on workload demands</li> </ul>
Multiple Shared Processor Pools*	<ul style="list-style-type: none"> <li>• Processor resources for a group of partitions can be capped helping to reduce software license requirements</li> </ul>
<b>Virtual I/O Server</b>	<ul style="list-style-type: none"> <li>• Virtualizes I/O resources (disk, tape, Ethernet) for client partitions simplifying management and reducing system costs</li> </ul>
<b>Integrated Virtualization Manager</b>	<ul style="list-style-type: none"> <li>• Simplifies partition creation and management for entry Power servers</li> </ul>
<b>PowerVM Lx86</b>	<ul style="list-style-type: none"> <li>• Supports running many x86 Linux applications in a Linux on Power partition</li> </ul>
<b>Live Partition Mobility*</b>	<ul style="list-style-type: none"> <li>• Running AIX and Linux partitions can be moved to another system, helping to avoid planned downtime</li> </ul>
<b>NPIV*</b>	<ul style="list-style-type: none"> <li>• Simplifies the management and improves performance of Fibre Channel SAN environments</li> </ul>
<b>System Planning Tool</b>	<ul style="list-style-type: none"> <li>• Simplifies the planning for and installation of Power servers with PowerVM</li> </ul>



## For more information

To learn more about PowerVM, please contact your IBM marketing representative or IBM Business Partner, or visit the following Web sites:

[ibm.com/systems/power/software/virtualization/index.html](http://ibm.com/systems/power/software/virtualization/index.html)

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All performance information was determined in a controlled environment. Actual results may vary. Performance information is provided "AS IS" and no warranties or guarantees are expressed or implied by IBM. Buyers should consult other sources of information, including system benchmarks, to evaluate the performance of a system they are considering buying.

<sup>1</sup> PowerVM Case Studies: [ibm.com/systems/power/success/index.html](http://ibm.com/systems/power/success/index.html)

<sup>2</sup> Power Systems benchmark results: [ibm.com/systems/power/hardware/benchmarks/index.html](http://ibm.com/systems/power/hardware/benchmarks/index.html)

<sup>3</sup> Common Criteria Evaluation and Validation Scheme (CCEVS) EAL4 Augmented with ALC\_FLR.2 certification: [www.niap-ccevs.org/cc-scheme/st/index.cfm/vid/10178](http://www.niap-ccevs.org/cc-scheme/st/index.cfm/vid/10178)

<sup>4</sup> PowerVM Lx86 application qualifications: [ibm.com/systems/power/software/virtualization/editions/lx86/qual.html](http://ibm.com/systems/power/software/virtualization/editions/lx86/qual.html)

\* Supported on selected POWER6 processor-based servers

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