Highlights

● Deliver services with superior economics by consolidating virtualized workloads

● Deliver services faster by automating deployment of virtual machines and storage

● Optimize utilization of server and storage resources to control cost and boost ROI

● Scale your virtualized deployments without paying underlying performance penalties

● Eliminate scheduled downtime by deploying live mobility between servers

● Deliver higher quality services by improving virtual resource management

Complexity can work its way into any IT infrastructure, driven by the rollout of new applications and unanticipated change. However, adding servers in response to each demand for new workloads drives the need for more datacenter space, power, cooling, network cabling, data storage and administrative resources. Such complexity leads to inefficiency. The answer is virtualization, which allows organizations to consolidate multiple operating systems and software stacks on a single platform.

PowerVM™ provides the industrial-strength virtualization solution for IBM Power Systems™ servers and blades. Based on more than a decade of evolution and innovation, PowerVM represents the state of the art in enterprise virtualization and is broadly deployed in production environments worldwide by most Power Systems owners.

The IBM Power Systems family of servers includes proven workload consolidation platforms that help clients control costs while improving overall performance, availability and energy efficiency. With these servers and IBM PowerVM virtualization solutions, an organization can consolidate large numbers of applications and servers, fully virtualize its system resources, and provide a more flexible, dynamic IT infrastructure. In other words, IBM Power Systems with PowerVM deliver the benefits of virtualization without limits.

PowerVM provides industrial-strength virtualization for AIX®, IBM i, and Linux environments on IBM POWER® processor-based systems. IBM Power Systems servers integrated with PowerVM technology are designed to allow clients to build a dynamic infrastructure that will help them to reduce costs, manage risk and improve service levels.
PowerVM also offers a secure and resilient virtualization environment, built on the advanced RAS (reliability, availability and serviceability) features, extreme scalability and leadership performance of the IBM Power Systems platform, based on the outstanding POWER7® processors.

**Employing virtualization**

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

- Consolidation of multiple workloads, including those on underutilized servers and systems with varied and dynamic resource requirements
- Rapid deployment and scaling of workloads to meet changing business demands
- Aggregation of system resources such as CPUs, memory and storage into shared pools for dynamic reallocation between multiple workloads
- Application development and testing in secure, independent domains
- Live mobility of active workloads between servers to support platform upgrades, systems balancing, or to avoid planned maintenance downtime

**Processor virtualization**

The Power Systems family gives you the freedom to run the broadest selection of enterprise 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 virtual machine (VM) capabilities, a single VM can act as a completely separate AIX, IBM i, or Linux operating environment, using dedicated or shared system resources. With shared resources, PowerVM can automatically adjust pooled processor, memory or storage resources across multiple operating systems, borrowing capacity from idle VMs to handle high resource demands from other workloads.

With PowerVM on Power Systems, you have the power and flexibility to address multiple system requirements in a single machine. PowerVM Micro-Partitioning® supports multiple VMs per processor core and, depending upon the Power Systems model, can run up to 1000 VMs on a single server—each with its own processor, memory, and I/O resources. Processor resources can be assigned at a granularity of 1/100th 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 the automatic non-disruptive balancing of processing power between VMs assigned to shared pools, resulting in increased throughput. It also provides the ability to cap the processor core resources used by a group of VMs to potentially reduce processor-based software licensing costs.

Shared Dedicated Capacity allows for the “donation” of spare CPU cycles from dedicated processor VMs to a Shared Processor Pool. Since a dedicated VM maintains absolute priority for CPU cycles, enabling this feature can increase system utilization without compromising the computing power for critical workloads.

Because its core technology is built into the system firmware, PowerVM offers a highly-secure virtualization platform that has received the Common Criteria Evaluation and Validation Scheme (CCEVS) EAL4+ certification for its security capabilities.

**Memory virtualization**

PowerVM features Active Memory Sharing, a technology that allows you to intelligently and dynamically reallocate memory from one VM to another for increased utilization, flexibility and performance. Active Memory Sharing enables the sharing of a pool of physical memory among VMs on a server, helping to increase memory utilization and drive down system costs. The memory is dynamically allocated amongst the VMs as needed, to optimize the overall physical memory usage in the pool.

Active Memory Deduplication is a powerful optimization feature that can be enabled when Active Memory Sharing is in being used. This memory optimization intelligently detects and removes duplicate memory pages used between VMs and as a result reduces overall memory consumption.

**I/O virtualization**

The Virtual I/O Server (VIOS) is a special purpose VM that can be used to virtualize I/O resources for AIX, i, and Linux client VMs. VIOS owns the resources that are shared with clients. A physical adapter assigned to the VIOS can be shared by one or more other VMs. 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 VM. With VIOS, client VMs can easily be created for test, development, or production purposes.

Shared Storage Pools allow storage subsystems to be combined into a common pool of virtualized storage that can be shared by the VIOS on multiple Power Systems servers. Shared storage pools support capabilities such as thin provisioning, whereby VM storage is dynamically allocated and released as required, to improve overall storage resource utilization.

N_Port ID Virtualization (NPIV) provides direct access to Fiber Channel Adapters from multiple VMs, simplifying the deployment and management of Fiber Channel SAN environments.

**Live Partition Mobility**

Live Partition Mobility supports the movement of a running AIX or Linux VM from one Power Systems server to another without application downtime, helping avoid application interruption for planned system maintenance, provisioning, and workload management. Live Partition Mobility can be used to simplify migration of operating environments to new servers temporarily or permanently.

**Systems management**

PowerVM virtualization features are managed through the Systems Director Management Console (SDMC), the Hardware Management Console (HMC) or the Integrated Virtualization Manager (IVM) on entry-level Power Systems.
The SDMC represents the next generation of management appliance for Power Systems and provides a common interface for systems administration across the data center. The SDMC is meant to replace the HMC and can coexist with either HMC or IVM.

IVM allows you to point, click and consolidate workloads with its easy-to-use web-based interface. IVM lowers the cost of entry into POWER7 processor-based virtualization since it does not require the use of an HMC for system management. With IVM, you can manage a single system, including the creation of VMs, virtualized storage and virtualized networking.

IBM Systems Director VMControl™ also supports the PowerVM environment. VMControl is the IBM virtualization management tool for multiple, heterogeneous servers. With VMControl you can manage PowerVM for your Power virtualization from the same screen as VMWare for your x86 servers such as IBM System x and BladeCenter. VMControl is a plug-in for IBM Systems Director that supports advanced management functions such as health check and topology mappings, as well as the ability to take action on monitored events. VMControl simplifies the creation and management of standardized virtual appliances (ready-to-run VMs) and system pools—combinations of VMs on multiple servers that can be managed as a single entity.

**PowerVM Editions**

IBM PowerVM Editions are packaged to offer a broad range virtualization functionality for AIX, IBM i and Linux operating systems that suit the needs of a wide range of businesses.

PowerVM Express® Edition is offered exclusively on Power Express servers and is designed for clients seeking to evaluate virtualization features at an affordable price. With the Express Edition, users can create up to three VMs on a server with IVM, use virtualized disk and optical devices with VIOS.

PowerVM Standard Edition is intended for production deployments and is available for all Power Systems servers and blades. It includes all the features of PowerVM Express Edition, plus Micro-Partitioning, HMC management, dual VIOS support, Shared Processor Pools and Shared Storage Pools.

PowerVM Enterprise Edition is intended for multiserver production deployments and is available for all Power Systems servers and blades. It includes all the features of PowerVM Standard Edition, as well as Live Partition Mobility and Active Memory Sharing.

**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 enterprise applications and SOA environments. 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 unmatched. IBM Global Services technical consultants not only have hands-on experience and familiarity with these state-of-the-art servers, but they also maintain intimate knowledge of emerging technologies, software releases and hardware enhancements through working with 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.
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<tr>
<th>Feature</th>
<th>Benefits</th>
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<tr>
<td>PowerVM Hypervisor</td>
<td>• Supports multiple operating environments on a single system</td>
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<tr>
<td>Micro-Partitioning</td>
<td>• Enables up to 10 VMs per processor core</td>
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<td>Dynamic Logical Partitioning</td>
<td>• Processor, memory, and I/O resources can be dynamically moved between VMs</td>
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| Shared Processor Pools        | • Processor resources for a group of VMs can be capped, reducing software license costs  
                                | • VMs can use shared (capped or uncapped) processor resources  
                                | • Processor resources can automatically move between VMs based on workload demands                                                   |
| Shared Storage Pools          | • Storage resources for Power Systems servers and VIOS can be centralized in pools to optimize resource utilization                      |
| Integrated Virtualization Manager | • Simplifies VM creation and management for entry Power Systems servers and blades                                              |
| Live Partition Mobility       | • Live AIX and Linux VMs can be moved between servers, eliminating planned downtime                                                      |
| Active Memory Sharing         | • Intelligently flows memory from one VM to another for increased memory utilization                                                  |
| Active Memory Deduplication   | • Reduces memory consumption for Active Memory Sharing configurations by detecting and eliminating duplicate memory pages               |
| NPIV                          | • Simplifies the management and improves performance of Fibre Channel SAN environments                                                 |
| System Planning Tool         | • Simplifies the planning for and installation of Power Systems servers with PowerVM                                                   |
For more information
To learn more about PowerVM, please contact your IBM marketing representative or IBM Business Partner, or visit the following websites:
ibm.com/systems/power/software/virtualization/index.html