PowerVM Editions
Overview

Virtualization without Limits

Power is performance redefined
PowerVM: Foundation of Power Systems software

Workload-Optimizing Systems

Virtualization without Limits
✓ Drive over 90% utilization
✓ Dynamically scale per demand

Resiliency without Downtime
✓ Roadmap to continuous availability
✓ High availability systems and scaling

Security and Compliance
✓ Protect Virtual Workloads
✓ Maintain and Demonstrate Compliance

AIX - The Future of UNIX
Total Integration with i
Scalable Linux ready for x86
Consolidation
Dynamic Energy Optimization
✓ 70-90% energy cost reduction
✓ EnergyScale™ technologies

Management with Automation
✓ VMControl to manage virtualization
✓ Automation to reduce task time

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PowerVM: Virtualization without limits

- Reduces IT infrastructure costs
- Improves service levels
- Manages risk
PowerVM builds on IBM’s virtualization leadership

A 40-year track record in virtualization innovation continues with PowerVM™

The Power Systems team has integrated PowerVM world-class virtualization into every server – based on best practices gained from IBMers who created the ‘gold standard’ of mainframe virtualization.
PowerVM accelerates Power Systems success
Exploiting the superior economics of Power drove the historic shift in the UNIX server market

UNIX Server Rolling Four Quarter Average Revenue Share

POWER5 Micro-Partitioning
POWER4 Dynamic LPARs
POWER6 Live Partition Mobility
POWER6 Active Memory Sharing
POWER7 Shared Storage Pools
POWER6 Shared Processor Pools


Power is performance redefined
Client IT challenges demand leadership virtualization

Source: Morgan Stanley CIO Survey, July 2012
Why Virtualize workloads with PowerVM?

- Creating a virtualized workload with PowerVM is simple:
  - Create a new PowerVM logical partition (LPAR) or virtual machine (VM)
  - Install the operating system (AIX, IBM i or Linux) in the VM
  - Install the workload application(s) in the VM
  - Configure the operating system and applications as required

- At this point, the completed virtualized workload can be stored, copied, archived or modified just like any other file

- The benefits of virtualizing workloads with PowerVM in this way include:
  - **Rapid provisioning** – deploying the ready-to-run workload is a quick and easy process
  - **Scalability** – deploying multiple copies of the same workload type is simplified
  - **Recoverability** – bringing a workload back online after an outage is fast and reliable
  - **Consolidation** – many diverse workloads can be hosted on the same server

- All of these benefits save system administrator time and resources
  - In addition, workload consolidation offers significant IT infrastructure cost reductions
Virtualization Scalability: Key to Achieving Consolidation Goals

- The primary reason CIOs and IT managers deploy virtualization is for server workload consolidation
  - Put simply, the more workloads that can be encapsulated within VMs and combined onto a single server, the higher the consolidation ratio and greater the cost reduction
  - The integrated combination of the POWER architecture and PowerVM makes possible far higher consolidation ratios than alternative virtualization solutions
PowerVM Editions are tailored to client needs

PowerVM Editions offer a unified virtualization solution for all Power workloads

- **PowerVM Express Edition**
  - Evaluations, pilots, PoCs
  - Single-server projects

- **PowerVM Standard Edition**
  - Production deployments
  - Server consolidation

- **PowerVM Enterprise Edition**
  - Multi-server deployments
  - Cloud infrastructure

<table>
<thead>
<tr>
<th>PowerVM Editions</th>
<th>Express</th>
<th>Standard</th>
<th>Enterprise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concurrent VMs</td>
<td>2 per server</td>
<td>20 per core** (up to 1000)</td>
<td>20 per core** (up to 1000)</td>
</tr>
<tr>
<td>Virtual I/O Server</td>
<td>✔</td>
<td>✔ ✔</td>
<td>✔ ✔</td>
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<tr>
<td>NPIV</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Suspend/Resume</td>
<td></td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Shared Processor Pools</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Shared Storage Pools</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Thin Provisioning</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Live Partition Mobility</td>
<td></td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Active Memory Sharing</td>
<td></td>
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<td>✔</td>
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** Requires eFW7.6 or higher
Shared Storage Pools allow flexible VIOS linking
Business and IT security and resiliency are as critical as ever, and must be dynamic and intelligent in order to match the speed of business change

- PowerVM Live Partition Mobility
  - Move running AIX, Linux, IBM i partitions between systems

- Eliminate planned outages and balance workloads across systems
Active Memory Sharing optimizes resources

- Dynamically adjusts memory available on a physical system for multiple virtual images based on their workload activity levels:
  - Different workload peaks due to time zones
  - Mixed workloads with different time of day peaks (e.g. CRM by day, batch at night)
  - Ideal for highly-consolidated workloads with low or sporadic memory requirements

- Available with PowerVM Enterprise Edition
  - Supports AIX, IBM i and Linux workloads

- Blends Power Systems hardware, firmware and software enhancements to optimize resources
  - Supports over-commitment of logical memory
  - Overflow managed by VIOS paging device
  - Two VIOS partitions can be used for redundancy
  - Compatible with Live Partition Mobility
VMControl Editions: Add value to PowerVM on Power Systems

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<tbody>
<tr>
<td><strong>Virtualization Capabilities</strong></td>
<td>Manage resources</td>
<td>Automate virtual images</td>
<td>Optimize system pools</td>
</tr>
<tr>
<td><strong>PowerVM</strong></td>
<td></td>
<td></td>
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<tr>
<td>Create/manage virtual machines (x86, PowerVM and z/VM)</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Virtual machine relocation</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Capture/import, create/remove standardized virtual images</td>
<td></td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Deploy standard virtual images</td>
<td></td>
<td>✔</td>
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<tr>
<td>Maintain virtual images in a centralized library</td>
<td></td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Create/remove system pools and manage system pool resources</td>
<td></td>
<td></td>
<td>✔</td>
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<tr>
<td>Add/remove physical servers within system pools</td>
<td></td>
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Analyst commentary on PowerVM with POWER7

“A data center scaling out to a cloud-supporting infrastructure or supporting multiple applications placing varying demands on system resources, would have to purchase, deploy, provision, and maintain a good deal more hardware and software with a VMWare based solution to achieve the same workload productivity possible with PowerVM on POWER7.”

— Barry Cohen, CTO, Edison Group 2012
Adobe Systems

Technology giant Adobe partnered with IBM to strategically migrate its SAP environments and Oracle databases – Beating our x86 alternative

Business challenge:

- Hundreds of physical servers
- Slow to respond to new business demands
- Costs did not scale efficiently
- Delays in responding to new business requirements.

Benefits:

- IBM/SAP consolidation key contributor to company wide IaaS Project that is estimated to save ~$60 million over five years
- Optimized infrastructure and simplified landscape makes the solution easier and more cost-effective to manage
- New servers provisioning reduced from weeks to hours
- Accelerated time to market for new offerings

Solution:

Working with IBM, Adobe Systems moved from a traditional server environment to a fully virtualized environment

- Private Cloud capabilities
- Hundreds of business-critical SAP consolidated to just five IBM Power 770 servers running IBM PowerVM.

“Once we got them in and we started to do the testing, we started to see the benefits from the performance perspective. We actually made the decision to run all our Oracle databases on the Power Systems.”

Paulette Scheffer: Senior Director of Core Infrastructure and Service Management, Adobe


Video

Solution components:

Hardware:
- Power Systems: IBM Power 770 servers

Software:
- IBM AIX®, IBM PowerVM, Oracle DB

Services:
- IBM Migration Factory

Applications:
- SAP ERP
PowerVM Client Success: GHY International
Consolidating infrastructure benefits midsize business

Business challenge:
Predicting that international trade would increase as economic conditions improve, customs brokerage GHY International wanted to update its IT infrastructure to provide headroom for business growth.

Solution:
GHY International deployed an IBM® Power® 750, running IBM AIX®, IBM i, and Linux® on a single POWER7® system using IBM PowerVM™ and a separate IBM System x® 3850 and VMware environment for Windows®.

Benefits:
- Enhanced scalability: IBM Power 750 delivers over four times the capacity of current server
- Easy manageability: A four-person IT team now spends just five percent versus 95 percent of its time on server management
- Better energy efficiency: reduces electricity and cooling requirements with three operating systems running on one box

“With PowerVM, we went from 95 percent to only 5% of our time managing or reacting to our environment. And saved the business hundreds of thousands of dollars in licensing and application fees.”

— Nigel Fortlage, vice president of IT and CIO, GHY International
PowerVM on POWER7 delivers better scale-up and higher throughput performance than VMware vSphere

131%

PowerVM on Power 750 delivers superior scale-up efficiency that outperforms vSphere 5.0 by up to 131%, running the same workloads across virtualized resources.

PowerVM is 103% better than vSphere 4.1 and 131% better than vSphere 5.0. vSphere 5.0 is no better than vSphere 4.1.

PowerVM advantage increases as we scale-up

* "A Comparison of PowerVM and VMware vSphere(4.1&5.0) Virtualization Performance", January 2012

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PowerVM on POWER7 delivers better scale-out and higher throughput performance than VMware vSphere

525%

PowerVM on Power 750 outperforms VMware by up to 525% when running multiple VM’s and workloads.

PowerVM maximizes workload performance and all system resources. vSphere 5.0 has more cores but still can’t compete with PowerVM.

AIM7 Multiple VM scale-out
(32 vcpus per VM)

PowerVM on Power 750
32 cores (8 cores/chip)

HP Proliant DL580 G7 (Westmere EX)
Xeon E7 – 4870 40 cores (10 cores/chip)

* "A Comparison of PowerVM and VMware vSphere(4.1&5.0) Virtualization Performance", January 2012
PowerVM and POWER7 deliver a level of integration unmatched by VMware and x86

<table>
<thead>
<tr>
<th>Client Needs</th>
<th>PowerVM</th>
<th>VMware vSphere 5.0/5.1</th>
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</thead>
<tbody>
<tr>
<td>High Performance</td>
<td>Built-in hypervisor means all industry-leading Power Systems benchmarks are fully virtualized</td>
<td>Degrades x86 workload performance by up to 30% compared to ‘bare metal’</td>
</tr>
<tr>
<td>Elastic Scalability</td>
<td>Scales to support the most demanding mission-critical enterprise workloads</td>
<td>Imposes constraints that limit virtualization to small/medium workloads</td>
</tr>
<tr>
<td>Extreme Flexibility</td>
<td>Dynamically reallocates CPU, memory, storage and I/O without impacting workloads</td>
<td>Limited ‘hot-add’ of CPU and memory, with high risk of workload failures</td>
</tr>
<tr>
<td>Maximum Security</td>
<td>Embedded in Power Systems firmware and protected by secure access controls and encryption</td>
<td>Downloaded software exposes more attack surfaces, with many published vulnerabilities</td>
</tr>
<tr>
<td>Platform Integration</td>
<td>Designed in sync with POWER processor and platform architecture road maps</td>
<td>Third-party add-on software utility, developed in isolation from processor or systems</td>
</tr>
</tbody>
</table>
Learn more about PowerVM on the Web

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

(... or Google ‘PowerVM’ and click I’m Feeling Lucky)
PowerVM Vision

- PowerVM fully exploits capabilities of POWER7 server family
- PowerVM is the foundation for enterprise cloud computing
- PowerVM delivers leadership benchmark performance
- PowerVM optimizes resource utilization
- PowerVM is virtualization without limits
Smarter Computing: Power is Performance Redefined.

Virtualization without Limits
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