IBM Power Systems

POWER7+

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IBM Power System

• Power System is the Enterprise UNIX Class Server of IBM

• #1 in UNIX market revenue (since 2005)

• Based on IBM POWER processor
  (*Performance Optimization With Enhanced RISC*)

• 4.2 B$ investment for POWER7 & POWER7+

• Can run AIX, Linux, IBM i
IBM Power Systems

Designed by IBM
The Power Systems Advantage

Competitors’ approach:
- Start with generic motherboard
- Insert third-party CPU
- Install third-party hypervisor
- Install third-party OS

IBM Power Systems approach:
- Start with leadership CPU
- Design industrial-strength server
- Integrate world-class virtualization
- OS are developed closely with Power Architecture
POWER7+

POWER7 45 nm

POWER7 32 nm

Less Heat + Slight increase of Frequency
2.5 times more L3 cache (10MB/Core)
On chip hardware accelerators
POWER7+ Processors & Architecture

Faster Performance
- Higher frequencies
- 10 MB L3 Cache per core
- **HW Random number generator**
- **HW encryption accelerator (AIX)**
- Enhanced Single Precision Floating Point

Increased Efficiency and Flexibility
- **HW Memory Expansion accelerator**
- More performance per watt
- Enhanced energy / power gating
- 20 Virtual Machines per core

Better Availability RAS
- Self-healing capability for L3 Cache functions
- Processor re-initialization

POWER7+ 32 nm
Power System Portfolio 1Q 2013

PowerLinux™ 7R2
Power 730
PowerLinux™ 7R1
Power 710
Power 750
Power 720
Power 740
Power 760
Power 770
Power 780
Power 795

1s/8c
2s/16c
4s/32c
4s/48c
16s/64c
16s/128c
32s/256c
Power 710, 720, 730 and 740 System Highlights

*Affordability with improved performance, virtualization, energy efficiency and reliability and for IBM i, AIX and Linux applications*

**Power 710**
- 2U - 1 Socket
- 4, 6, or 8 cores
- POWER7+ up to 4.2GHz
- 256GB memory

*Dense, attractively priced single-socket server*

**Power 720**
- 4U or tower - 1 Socket
- 4, 6, or 8 cores
- POWER7+ @ 3.6 GHz
- 512GB of memory

*Affordable, flexible rack or tower server for a complete, integrated business system*

**Power 730**
- 2U - 2 Socket
- 8, 12, or 16 cores
- POWER7+ up to 4.3 GHz
- 512GB of memory

*Dense, high performance, energy efficient server ideal for running multiple application and infrastructure workloads*

**Power 740**
- 4U - 2 Socket
- 6, 8, 12, or 16 cores
- POWER7+ up to 4.2 GHz
- 1TB of memory

*High-performance, flexible, configurable and reliable midsize database and consolidation server*
New POWER7+ Models Offer Significantly Improved Price/Performance

- Power 740 (2s/16cores)
  - 21-42% Better

- Power 720 (1s/8cores)
  - 14-21% Better

- Power 730 (2s/16cores)
  - 49-60% Better

- Power 710 (1s/8cores)
  - 16-39% Better

Based on rPerf and US prices
The New Power 710 and 730

What if you had a 2U system offering that has
- Industry leading performance
  - Up to 23% higher SPECint_rate*
- Significant RAS advantages
- Far superior Virtualization capabilities
- Greater expansion capabilities for disk and I/O
- Flexibility of the leading Unix, Linux, and integrated operating systems
- Automated Security and Compliance capabilities
- And is Priced competitive with an x86 box

<table>
<thead>
<tr>
<th></th>
<th>Power 730</th>
<th>HP Proliant DL380p x86</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor, 64 GB,</td>
<td>16-core 3.6GHz</td>
<td>16-core 2.9GHz</td>
</tr>
<tr>
<td>2 HDD</td>
<td>POWER7+</td>
<td>Xeon ES2600</td>
</tr>
<tr>
<td>US List price</td>
<td>$11,033</td>
<td>$11,033</td>
</tr>
</tbody>
</table>

* vs. best HP published 2-socket rating
## IBM PowerLinux Rack Server Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>PowerLinux 7R1</th>
<th>PowerLinux 7R2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POWER7+ Processor Offerings</strong></td>
<td>4-core 3.6 GHz</td>
<td>2 x 8-core 3.6 GHz</td>
</tr>
<tr>
<td></td>
<td>6-core 4.2 GHz</td>
<td>2 x 8-core 4.2 GHz</td>
</tr>
<tr>
<td></td>
<td>8-core 4.2 GHz</td>
<td></td>
</tr>
<tr>
<td><strong>Planar</strong></td>
<td>One Socket</td>
<td>Two Socket</td>
</tr>
<tr>
<td><strong>DDR3 Memory features</strong></td>
<td>8 / 16 / 32 / 64GB</td>
<td>8 / 16 / 32 / 64GB</td>
</tr>
<tr>
<td></td>
<td>8GB to 256GB</td>
<td>8GB to 512GB</td>
</tr>
<tr>
<td><strong>OS Support</strong></td>
<td>Linux, RHEL 6.4, SLES 11 SP2</td>
<td></td>
</tr>
<tr>
<td><strong>DASD / Bays</strong></td>
<td>Up to 6 HDD or SSD</td>
<td></td>
</tr>
<tr>
<td><strong>PCle Gen2 Expansion Slots</strong></td>
<td>Five x8 low profile</td>
<td>One x4 low profile (Ethernet Adapter)</td>
</tr>
<tr>
<td><strong>Integrated SAS/SATA Cntrl</strong></td>
<td>Standard: RAID 0, 1, &amp; 10</td>
<td>Optional: RAID 5 &amp; 6</td>
</tr>
<tr>
<td><strong>GX++ Slots</strong></td>
<td>One</td>
<td>Two / Shared</td>
</tr>
<tr>
<td><strong>Ethernet</strong></td>
<td>Quad 10/100/1000</td>
<td></td>
</tr>
<tr>
<td><strong>Media Bays</strong></td>
<td>1 Slim-line &amp; 1 Half Height (Optional)</td>
<td></td>
</tr>
<tr>
<td><strong>IO Drawers</strong></td>
<td>No</td>
<td>Yes / Max: 2</td>
</tr>
<tr>
<td><strong>Storage Drawer</strong></td>
<td>Max = 4</td>
<td>Max = 14</td>
</tr>
<tr>
<td><strong>Power requirement</strong></td>
<td>100V to 240V AC</td>
<td>200V to 240V AC</td>
</tr>
<tr>
<td><strong>Redundant Power &amp; Cooling</strong></td>
<td>Optional</td>
<td>Standard</td>
</tr>
<tr>
<td><strong>EnergyScale</strong></td>
<td>Active Thermal Power Management</td>
<td>Dynamic Energy Save &amp; Capping</td>
</tr>
<tr>
<td><strong>Warranty</strong></td>
<td>3 Years</td>
<td></td>
</tr>
</tbody>
</table>
New IBM PowerLinuxTM 7R2 pricing comparison ($US)

<table>
<thead>
<tr>
<th></th>
<th>Dell R720</th>
<th>HP Proliant DL380p G8</th>
<th>IBM PowerLinux 7R2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Server model</strong></td>
<td>Dell R720</td>
<td>HP Proliant DL380p G8</td>
<td>IBM PowerLinux 7R2</td>
</tr>
<tr>
<td><strong>Processor / cores</strong></td>
<td>Two 2.9 GHz, E5-2690, Sandy Bridge, 8-core processors</td>
<td>Two 4.2 GHz POWER7+, 8-core</td>
<td></td>
</tr>
<tr>
<td><strong>Configuration</strong></td>
<td>32 GB memory, 2 x 147GB HDD, 10 Gb two port</td>
<td>Same memory, HDD, NIC</td>
<td></td>
</tr>
</tbody>
</table>

- **Server list price**
  - 3-year warranty, on-site
  - Dell R720: $10,483
  - HP Proliant DL380p G8: $11,946
  - IBM PowerLinux 7R2: $11,628

- **Virtualization**
  - OTC + 3yr. 9x5 SWMA
  - VMware vSphere Enterprise 5.1
  - Dell R720: $9,374
  - HP Proliant DL380p G8: $9,374
  - IBM PowerLinux 7R2: $7,840

- **Linux OS list price**
  - RHEL, 2 sockets, unlimited guests, 9x5, 3 yr. sub./ supp.
  - Red Hat subscription and Red Hat support
  - Dell R720: $5,697
  - HP Proliant DL380p G8: $5,697
  - IBM PowerLinux 7R2: $4,489

- **Total list price**
  - Server/Virtualization/Linux
  - Dell R720: $25,554
  - HP Proliant DL380p G8: $26,568
  - IBM PowerLinux 7R2: $23,957

* Based on US pricing for PowerLinux 7R2 announced on 2/05/2013 matching configuration table below. Source: dell.com, hp.com, vmware.com: 1/15/13

**Compare prices online**

- New Power7+
- Dell PowerEdge R720 Rack Server
- ProLiant Smart Buys

- Dell PowerEdge R720 (64GB, 1 Gb four port, 2 x 300GB, RHEL subscription only)
- IBM PowerLinux 7R2

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New POWER7+ System Optimization with DCM packaging

**POWER7+**
- Designed for resiliency
- Optimized for per core performance
- Additional fabric buses added to support eight or more sockets
- Supports enterprise memory
- Supports full CoD function

**POWER7+**
- Ideal for virtualized consolidation
- Optimized for multi-threaded system throughput
- Highest system density
- Supports up to 4 sockets
- Supports express memory
- Supports Processor Upgrade on Demand

**POWER7+**
- Most affordable implementation
- Supports 4, 6, & 8 core packaging
- Supports up to 2 sockets
- Supports express memory
- Enables lower energy consumption
Power 750

- Up to 32 cores (4 GHz or 3.5 GHz)
- Up to 1TB of real memory
- Customer setup

Power 760

- New!
- Up to 48 cores (3.4 GHz or 3.1 GHz)
- Up to 2TB of real memory
- Processor Upgrade on Demand
- IBM installed

- 5U form factor
- Dual 10 Gb and dual 1 Gb ethernet ports
- 6 PCIe Gen2 slots
- 2 GX++ slots, dual 20GB buses
- Up to 20 VMs per core
- 3 years of 24x7 service (varies by country)
Save BIG with the new Power 750 / 760

- **Hardware maintenance**
  - Hardware list prices for the new Power 750 and 760 include 3 years of hardware maintenance service @ 24x7

- **New memory prices (example)**
  - Today 32 GB (EM32) $3,834
  - Tomorrow 32 GB (EM4C) $1,700
  - Reduction 56% $2,134

- **3 Year TCA prices have been reduced for the new Power 750**
  - P7 750 32c @ 3.6 + SW & maint $317k
  - P7+ 750 32c @ 4.0 + SW & maint $223k
  - Reduction 30% $94k

- Overall **price performance has improved** as much as 42% on the faster clock speed

All prices are US list
Power 780 / 770 - Processor Core Options

1- Power 770 – MMD

From 1 to 4 nodes
Up to 64 cores @ 3.8 GHz
Up to 48 cores @ 4.22 GHz

2- Power 780 – MHD

From 1 to 4 nodes
Up to 128 cores @ 3.72 GHz
Up to 64 cores @ 4.42 GHz

- Up to 8 12X I/O drawers
- Up to 4TB Memory
- Active Memory Mirroring
- Advanced EnergyScale Power Management
- P7 I/O Backplane
- 4 Socket Processor Backplane
POWER7+ System Upgrades….

Power 570 & 770 systems can upgrade to POWER7+

- **POWER7 780**
  - 9179-MHC

- **POWER7 780**
  - 9179-MHB

- **POWER6 570**
  - 9117-MMA

- **POWER7 770**
  - 9117-MMG

- **POWER7 770**
  - 9117-MMB

- **POWER6 570**
  - 9117-MMA

  (9406-MMA converted to 9117-MMA)

- **POWER7+ 780**
  - 9179-MHD

- **POWER7+ 770**
  - 9117-MMD
48% more performance*
80% less maintenance*
66% less energy

* Power 780 running SMT4
* Over 3 year period

Power 595
- 64 cores
- 5.0 GHz
- rPerf 553

Power 780
- 64 cores
- 4.4 GHz
- rPerf 817
Solid State Disk can provide substantial benefits

New EXP30 Ultra SSD I/O Drawer combines performance and density

97% less space ...similar IOP performance

- 1U drawer ... Up to 30 SSD
  - up to 11.6 TB (30 x 387 GB drives)
  - Up to 480,000 IOPS (100% read)
  - Up to 4.5 GB/s bandwidth

- Supported on Power 770 and 780 via GX+ bus
- Priced similar to existing EXP30 SSD
  I/O drawer with 20% more IOPS
  - AIX support at GA; IBM i SOD

Solid State Disk benefits:
- Improve transaction response time
- Speed up operational procedures
- Cut batch windows by up to 50% to improve service levels
- Save space, energy, cooling by dramatically reducing the number of HDD up to 10X

Ability to attach up to 48 HDD drives downstream, providing an additional 43 TB
IBM Power Systems advantage

Designed by IBM

Designed for Performance
POWER7+ continues its leadership performance with…

Over 3 times more performance per core

-x86 still trails POWER7 in performance

SPECint\_rate per core

Oracle Itanium POWER6 Xeon POWER7 POWER7+

SPECfp\_rate per core

Oracle Itanium Xeon POWER6 POWER7 POWER7+

4.7X

3.8X

Best results listed per core for systems with four or more sockets with IBM POWER, Itanium, SPARC and Xeon processors.

Source: http://www.spec.org as of 9/18/12.

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Power 780 benchmark results

SPECint_rate2006 – 3,730 for 64-core system @ 4.42 GHz
• Best overall industry performance for 64 cores or less system
• 18% better result than Oracle’s 256 core result
• 23% better per core performance than HP’s best result

SPECfp_rate2006 – 2,880 for 64-core system @ 3.72 GHz
• Best overall industry performance for 64 cores or less system
• >2x better than HP’s best 80-core result
• 13% better result than Oracle’s 256 core result

SPECjbb2005 – 12,560,858 for 128-core system @ 3.72 GHz
• >2x better than any 256-core or less non-IBM result
Power Systems top all others in SAP Sales and Distribution Standard Application 2-Tier benchmark

*Simple, single Power 780 delivers over 2X scale and 88% more per-core performance than HP DL980 G7*

125%

more SAP SD Users than best Intel

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IBM Power Systems advantage

Designed by IBM

Designed for Performance
• Auto-Optimized
Dynamic Platform Optimizer Function

On system startup, Hypervisor optimize LPAR to have a good CPU/Memory affinity.

After a lot of DLPAR operation, CPU and Memory affinity of your LPARs could be degraded.

This could affect performance.

DPO optimizes processor and memory affinity in virtualized consolidated environments without down time.

- Available with no charge on new Power 750, 760, 770, 780 (POWER 7+)
- Also available for Power 795 (with eFW > 760 + FC EB33)
IBM AIX Dynamic System Optimizer

Designed to simplify operations, adjust for changes in demand and optimize performance

Automatically identifies opportunities to improve performance, and applies the appropriate system changes thus simplifying operations and adjusting for changes in demand

Monitors the workload and then adjusts the memory prefetch register to optimize performance of large database workloads

Utilizes the the automatic page size tuning capabilities to improve the performance of workloads that have a large memory space, exhibit high CPU utilization, are memory intensive and are long running.

- **Memory affinity**
  - Reduce reference to remote memory
  - Migrate frequently accessed pages to local memory

- **Workload placement**
  - Optimize placement in platform topology
  - Group threads in common affinity domain

- **Dynamic page sizes**
  - Promote memory regions to 16Meg pages

- **Memory prefetch controls**

---

**Need AIX 6.1 TL 8 + or AIX 7.1 TL 2+**
Dynamic System Optimizer Testing

Notes:
• Performance improvements ranged from 0-50% depending on workload and environment details
• Long lived multi-threaded workloads with sustained modest CPU usage are good DSO candidates
IBM Power Systems advantage

*Designed by IBM*

**Designed for Performance**
- Auto-Optimized
- Optimized Power saving
POWER7+ Deliver more Performance per Watt

>5X increase in performance per watt over POWER6+
>10X increase in performance per watt since POWER5+
>10 years of changing the server landscape

* rPerf values used, CPW would be similar
New idle processor state improves energy savings

POWER7+ provides a new power savings mode for unused cores that can save 55% more energy per processor than POWER7.

**Nap** (same as POWER7)
- Optimized for wake-up time
- Turn off clocks to execution units only
- Caches remain coherent (L2 and L3)
- **Save 10%**
- 10 microseconds to restart

**Sleep** (improved from POWER7 – “deep sleep”)  
- More savings at increased latency
- Purge and power off core plus L2 caches
- Leave shared L3 cache running
- **Save 80%**
- 4.5 milliseconds to restart

**Winkle** (NEW for POWER7+)
- Maximum savings at higher latency
- Purge and power off entire chiplet
- Takes eighth of chip L3 cache offline
- **Save 95%**
- 7 milliseconds to restart

The graph shows typical wake-up latency (ms) and processor energy reduction compared to Idle Loop.
IBM Power Systems advantage

Designed by IBM

Designed for Performance
• Auto-Optimized
• Optimized Power saving

Designed for Virtualization
New!! VIOS Performance Advisor

- Proactive VIOS Health Check
- Provides Advise on how to Tune the VIO Server Before Problems Occur
- Shipped with PowerVM 2.2.2
- Reports are viewed with a web browser
- Can be use as a historical measure of performance

### CPU Section Snapshot

<table>
<thead>
<tr>
<th>VIOS - CPU</th>
<th>Measured Value</th>
<th>Recommended Value</th>
<th>First Observed</th>
<th>Last Observed</th>
<th>Risk 1=lowest</th>
<th>Impact 1=lowest</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Capacity</td>
<td>1.0 ent</td>
<td>-</td>
<td>01/12 14:01:29</td>
<td>-</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>CPU Consumption</td>
<td>avg:14.1% (corex:0.2) high:14.3% (corex:0.2)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Processing Mode</td>
<td>Shared CPU, (UnCapped)</td>
<td>-</td>
<td>01/12 14:01:29</td>
<td>-</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Variable Capacity Weight</td>
<td>128</td>
<td>129-255</td>
<td>01/12 14:01:29</td>
<td>-</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Virtual Processors</td>
<td>6 vCPUs</td>
<td>3 vCPUs or less</td>
<td>01/12 14:01:29</td>
<td>-</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>SMT Mode</td>
<td>SMT2</td>
<td>-</td>
<td>01/12 14:01:29</td>
<td>-</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

### SYSTEM - SHARED PROCESSING POOL

<table>
<thead>
<tr>
<th>Name</th>
<th>Measured Value</th>
<th>Recommended Value</th>
<th>First Observed</th>
<th>Last Observed</th>
<th>Risk 1=lowest</th>
<th>Impact 1=lowest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared Pool Monitoring</td>
<td>enabled</td>
<td>-</td>
<td>01/12 14:01:29</td>
<td>-</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Shared Processing Pool Capacity</td>
<td>3.0 ent.</td>
<td>-</td>
<td>01/12 14:01:29</td>
<td>-</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Free CPU Capacity</td>
<td>avg_free2/9 ent, lowest_free2/8 ent.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Active Memory Expansion with POWER7+

POWER7+ AME Hardware Accelerator
- Enhanced Power Systems value for AIX
- On-chip enhancement

Compared to POWER7, more efficient memory expansion (less processor overhead for the same compression/decompression – or even more equivalent memory for the same processor overhead)
AME value add for SAP

In cases, when server resp. LPAR throughput is limited by insufficient memory allocation, AME can help to fully utilize the available CPU power.
- OS paging is avoided or shifted to a higher utilization rate

LPARs can be deployed with fewer real memory
- Allows for more LPARs per server and thus even more compact consolidation scenarios

Depending on SAP memory requirements, customers may be able to stay with smaller or less DIMMS per box:
- Less TCA
- Headroom for future growth
Power 7 : AME example with Oracle database

AME test on a Oracle Database 11g during eBusiness Suite batch activity. Lpar has 24 cores with 120 GB of memory. Oracle Database has a 112 GB of SGA defined for the 3 following runs.

- Run 48: 120GB real mem ; AME disabled
- Run 53: 60 GB real mem ; AME factor 2
- Run 54: 40 GB real mem ; AME factor 3

<table>
<thead>
<tr>
<th>RUN</th>
<th>LPAR</th>
<th>usage</th>
<th>CPU</th>
<th>Memory</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>LPDBGFS1</td>
<td>eBS DB</td>
<td>24</td>
<td>120 GB (no AME)</td>
<td>124 min (avg: 16.3 cpu)</td>
</tr>
<tr>
<td>53</td>
<td>LPDBGFS1</td>
<td>eBS DB</td>
<td>24</td>
<td>60 GB (AMEx2)</td>
<td>127 min (avg: 16.8 cpu)</td>
</tr>
<tr>
<td>54</td>
<td>LPDBGFS1</td>
<td>eBS DB</td>
<td>24</td>
<td>40 GB (AMEx3)</td>
<td>134 min (avg: 17.5 cpu)</td>
</tr>
</tbody>
</table>

The impact of AME on batch duration is really low (<10%) with few cpu overhead (7%), even with a 3 time less memory.

Note: This is an illustrative scenario based on using a sample workload. This data represents measured results in a controlled lab environment. Your results may vary.
PowerVM Editions are tailored to client needs

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

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

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

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<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>
</tr>
<tr>
<td>NPIV</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Suspend/Resume</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Shared Processor Pools</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Thin Provisioning</td>
<td>✔️</td>
<td>✔️</td>
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</tr>
<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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<tr>
<td>Shared Storage Pools</td>
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<tr>
<td>Enhancements</td>
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<tr>
<td>VIOS Performance Advisor</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Live Partition Mobility</td>
<td></td>
<td></td>
<td>✔️</td>
</tr>
<tr>
<td>Encryption automation</td>
<td></td>
<td></td>
<td>✔️</td>
</tr>
<tr>
<td>Linked Clones</td>
<td></td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td><strong>Live Partition Mobility Performance Improvements</strong></td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*FW7.6 Prereq*
IBM Power Systems advantage

*Designed by IBM*

*Designed for Performance*
  - Auto-Optimized
  - Optimized Power saving

*Designed for Critical Business*
  - RAS

*Designed for Virtualization*
POWER7+ RAS Specific Features

New Power On Reset Engine (PORE)
- Enables a processor core to be re-initialized while system remains up and running
- Directly used to:
  - *Allow for Concurrent Firmware Updates:* In cases where a processor initialization register value needs to be changed

L3 Cache dynamic column repair
- New self-healing capability that complements cache line delete
- Uses PORE feature to remove a substitute a failing bit-line for a spare during run-time.

New Fabric Bus Dynamic Lane Repair
- POWER7+ has spare bit lanes that can dynamically be repaired (using PORE)
  - For Busses that connect CEC drawers
  - Avoids any repair action or outage related to a single bit failure.
Power Systems deliver superior RAS capabilities

<table>
<thead>
<tr>
<th>RAS Feature</th>
<th>Power Systems</th>
<th>x86</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application/Partition RAS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Live Partition Mobility (vMotion)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Partition Availability priority</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>System RAS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OS independent First Failure Data Capture</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Dynamic clock fail-over</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Dynamic service processor fail-over</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Memory Keys (including OS exploitation)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Processor RAS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Processor Instruction Retry</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Alternate Processor Recovery</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Dynamic Processor Re-Init (POWER7+)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Dynamic Processor Deallocation</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Dynamic Processor Sparing</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Memory RAS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chipkill™</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Active Memory Mirroring for Hypervisor</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Memory Sparing</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>I/O RAS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended Error Handling</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>I/O Adapter Isolation (PCI-Bus and TCEs)</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

See the following URLs for additional details:
http://www-03.ibm.com/systems/migrateibm/systems/power/availability.html
http://www-03.ibm.com/systems/migrateibm/systems/power/virtualization.html
POWER Instruction Retry – Proton Beam Experiment

• Test “Power Instruction Retry” with a 720 billion high-energy protons are directed at a 780 server, Generated ~ 26000 transient errors
Resilient Enough to Survive an Earthquake

A scene from IBM Tokyo Datacenter after an 8.9-magnitude earthquake on March 2011

There were no service interruptions, and there was no need to switch over to a disaster recovery site
IBM Power Systems advantage

Designed by IBM

Designed for
Performance
• Auto-Optimized
• Optimized Power saving

Designed for
Critical Business
• RAS
• Security

Designed for
Virtualization
AIX POWER7+ Crypto Acceleration Support

Applications Using Standard Unix Interfaces: No Recompile

- OpenSSLL Key Generation
- Encrypted Data In
- Encrypted Data In Flight
- Encrypted Data At Rest
- PKCS11 Standard Library

User Space

- Strong Keys
- IPsec TCP/IP
- Encrypted File System

Kernel

- /dev/random
- CliC (Cryptographic Library in C)

Hardware

- Random Number Generation
- P7+ HW Acceleration Crypto

Strong Key Generation

- P7+ HW RNG Eliminates Weak Keys
  - HW generated random numbers with high quality measurable faster randomness.
  - /dev/random legacy (S/W) blocking behavior practically eliminated, while maintaining high quality entropy.

AES / SHA / HMAC Crypto

- Strong cryptography accelerated with offload engines in P7+ cores can be applied to a broader set of data creating a stronger security ecosystem.
- This offload allows the P7+ core to remain focused on business application performance.
## PowerSC Offerings Security and Compliance Options

- **PowerSC Express**
  - *Basic compliance automation for AIX* (formerly IBM Compliance Expert)

- **PowerSC Standard**
  - *Security and compliance for virtual & cloud environments*

- **PowerSC Trusted Surveyor**
  - *Virtual network segregation compliance monitoring*

### PowerSC Editions

<table>
<thead>
<tr>
<th>Feature</th>
<th>Express</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security and Compliance Automation</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>New HIPAA Profile</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Real time Compliance Monitoring</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Trusted Logging</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Trusted Boot **</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Trusted Network Connect and Patch Management</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Trusted Firewall</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

** Requires eFW7.4 or higher

© 2013 IBM Corporation
PowerSC – Trusted Surveyor  New Offering!!

How PowerSC Trusted Surveyor works:
• Discovers the virtual infrastructure via the HMC
• Builds a realization model which is compared to the saved state or policy
• Displays a map showing items that have changed and are out of compliance
• Logical model can be exported into flat file for documentation and can be consumed by other tools.

Overview
Challenge: Demonstrate compliance to network segregation policies. Where are my virtual systems? are they secure and isolated properly.

PowerSC solution: Compare current state of VM virtual network segregation to defined desired policy. Reports on configuration drift.

Benefits
• Provides visibility to show segregation of virtual networks to prove compliance
• Lower Admin costs by automating compliance reporting
• Independent audit and governance of virtualized infrastructure
• Ensure consistent and safe configuration changes
IBM Power Systems advantage

Designed by IBM

**Designed for Solution**
- Cloud
- Analytics
- SAP

**Designed for Critical Business**
- RAS
- Security

**Designed for Performance**
- Auto-Optimized
- Optimized Power saving

**Designed for Virtualization**
The new enterprise Power Systems

Dynamic efficiency for cloud

Provide a secure cloud with elastic capacity on demand through intelligent workload based resource allocation

- POWER7+ processors & architecture
- Elastic Capacity (CoD) for Power System Pools
- Power Systems Solution Edition for Cloud
- Enhanced PowerVM Virtualization
  - PowerVM Virtualization Performance Advisor
  - PowerVM Live Partition Mobility enhancements

Enhanced compliance for security

Real time security and compliance automation and alerts for critical data and services across the enterprise

- PowerSC
- Trusted Surveyor
- Hardware assisted encryption
- POWER7+ processors

Business analytics for data

Extract real time insights from large volumes of structured and unstructured data from multiple sources

- AIX Solution Edition for Cognos
- AIX Solution Edition for SPSS
- POWER7+ processors & architecture
- PowerHA HyperSwap
- Elastic Capacity (CoD) for Power System Pools
Power Systems delivers…
The Best Enterprise, Private cloud for UNIX/Linux

The flexibility and cost of a public cloud in the security and convenience of your data center

- **Instant elastic capacity** to accelerate deployment of new services and dynamically respond to business changes
- Leading IT efficiency and lower cost with **pay as you go** and **pay for use**
- **Trusted security and resiliency** that you count on for your most critical applications in your data center
- **Streamlined operations** with simple self service interface
- **Flexibility** to run the applications you want

“By using IBM System Director, VMControl and SmartCloud Entry, a single portal was introduced to monitor all our power systems, also virtual appliance management such as capture and deploy are totally automated, which saves us huge efforts.”

Evergrowing Bank
Power Systems Analytics Solutions

*Industry’s best platform for compute intensive analytics workloads*

**Big Data Analytics Solution**
- Analyze and manage massive amounts of structured and unstructured data

**Custom Designed Business Analytics Solutions**
- BI and Predictive Analytics of real-time and historical data

**Expert Integrated Operational Analytics Solution**
- Real-time continuous analysis of operational data streams
Customer Pain Points and IBM Analytics Solutions

Client Pain Points

- Analytics & BI at top on CIO technology priority list, yet many aren’t clear how to get start
- Business decisions lack of insight, inability to predict, when data volume, variety and velocity are huge. Valuable data often left unused
- High performance system for handling huge data warehouses with near real-time data ingestion and analytics needed
- Downtime for OLAP and analytic systems can’t be tolerated
- Data security can not be compromised for data warehouse of customer critical data

IBM Analytics Solutions

- IBM Cognos BI on Power is pre-loaded and Integrated for turn-key BI Analytics for SMB customers
- IBM SPSS on Power is bundled solution gives the top Predictive Analytics solution that is fast time-to-value
- IBM PureData System for Operational Analytics is the most powerful, most expandable Analytics system for all business analytics needs.
- Reduced TCA with AIX Solution Edition and Solution Accelerator discounts** on both hardware and software

**Solution Accelerator discounts, apply to applicable BP sales
© 2013 IBM Corporation
PowerLinux is positioned for three specific solution areas

• New workloads emerging from Open Source projects
• Existing industry applications transitioning to Linux
• Workloads standardizing on Linux and x86 servers

Deliver smarter solutions built on Linux & Open Source

IBM InfoSphere BigInsights & Streams
- Powered by Hadoop
- Big Data Analytics

IBM Flex System p24L
- 2U Rack Server

IBM PowerLinux 7R1
- PowerLinux Compute Node
- 2U Rack Server

IBM PowerLinux 7R2
- 2U Rack Server

Zucchetti Group
- Industry Application Solutions
- Open Source Infrastructure Services

Provide compelling value vs. VMware and x86

Less than \( \frac{1}{2} \) the time to sort a terabyte of data

40% better application performance stated by ISVs like Zucchetti

Up to 33% lower solution cost for virtualized infrastructure

Virtualization & Management

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AIX Solution Edition for Cognos BI for SMB Customers (ANN 9/11, GA 9/22)

Customer & Partner benefits
AIX Solution Edition Incentive to Customers
• ½ processor activations at no-charge
• 50% discount on AIX Standard Edition licenses

Post-Sales IBM Lab Services
• Offered for a limited time only
• Up to 125 hours services depending on the deal size

ibm.com/systems/power/hardware/solutioneditions/aix/index.html

Power is Architected for Cognos

- Highest rated RAS and System Performance
- Top performance for Cognos BI on Power 7 up to 42% over HP DL580 server
- Low software cost due to higher per core throughput
- Power Cognos can grow to larger systems using PowerVM features

Configurations to Fit Your Business

- Designed for SMB Customers
- One-button ordering, pre-installed, pre-configured
- Cognos, web / data tier software all included
- Small Configuration, Power 710, 720, 730, 740, with 4 or 8 cores, 48G RAM, AIX 7.1, PowerVM Express,
  Cognos BI 10-user license, system capacity supports 10 to 50 Cognos users
- Large Configuration, Power 710, 720, 730, 740, with 4 or 8 cores, 64G RAM, AIX 7.1, PowerVM Express,
  Cognos BI 50-user license, system capacity supports 50 to 200 Cognos users
- Number of cores and RAM upgrades available
- Complete Software Suite included:
  - IBM Cognos 10.2, IBM DB2 10.1, IBM WAS 8.0, IBM HTTP Server, Mozilla Firefox
AIX Solution Edition for SPSS C&DS and Modeler – Predictive Analytics for SMB Customers (ANN 10/3, GA 10/25)

Customer & Partner benefits

AIX Solution Edition Incentive to Customers

• ½ processor activations at no-charge
• 50% discount on AIX Standard Edition licenses

ibm.com/systems/power/hardware/solutioneditions/aix/index.html

Power is Architected for Analytics

• Highest rated RAS and system performance
• Top performance for SPSS on Power 7 up to 22% over equivalent HP DL580 server
• SPSS on Power can grow to larger servers by adding virtual processors or migrating partitions in a non-disruptive fashion in the most efficient virtualization environment provided by PowerVM.

Configurations to Fit Your Business

• Designed for SMB Customers
• Customers have the choice of Power 710, 720, 730, 740, with 4, 8 and up to 16 cores with memory, disks and FC adapters
• SPSS Collaboration & Deployment Services and SPSS Modeler ordered through Passport Advantage System
• AIX Solution Edition incentive and Solution Accelerator Incentive apply

ibm.com/systems/power/hardware/solutioneditions/aix/index.html
IBM Power Systems is the ideal platform for SAP

Leadership SAP performance combined with Enterprise class virtualization enables lower costs and greater flexibility

35% better economics than x86*

- **Best SAP performance** across all classes of systems ... with over 80% more performance per core than x86 systems**
- **Lower TCO** leveraging the resilience, flexibility and security of PowerVM to consolidate your SAP production, non-production and HA landscapes together to achieve greater utilization and IT efficiency
  - Enhanced Active Memory Expansion can increase memory capacity 125%, lowering costs or increasing flexibility
- **Trusted security and resiliency** with 70% fewer end-user complaints that Linux or Windows, 85% fewer outages than Windows and no reported security vulnerabilities ***
- **Flexibility to respond more dynamically** to business changes with the PowerVM and new Elastic Capacity on Demand
- **Streamlined operations** leveraging SAP Landscape Virtualization Manager and System Director/VMcontrol

* ITG Value Proposition for IBM Power Systems Platform Choices for the Enterprise SAP Infrastructure - Feb 2012
**See following charts
*** Does Your OS Matter? Selecting a Strategic Operating System; Solitaire Interglobal Ltd (All rights reserved); October 2011.
IBM Power Systems and SAP LVM Synergy

SAP LVM = Landscape Virtualisation Manager

The strong synergy between IBM and SAP, enable us to …

• Provisions new systems directly from the LVM GUI.
• Automate the mapping of volumes and mount files systems.
• Drive Flash Copy Manager to create volume copies.
• Monitor vital system statistics from the LVM GUI.
• Start and stop lpars.
• Migrate lpars between nodes.
• …

... empower our SAP administrators.
SAP LVM relies on tight integration with IBM technologies
## SAP and IBM Products, examples of Savings

<table>
<thead>
<tr>
<th>Use Case</th>
<th>Tooling</th>
<th>Frequency</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topology view / Server and hypervisor monitoring</td>
<td>Landscape Manager using Systems Director</td>
<td>Continuously</td>
<td>No integrated view / Involves different teams + diverse tools</td>
<td>E2E view in SAP tools; SAP admin sees same infos/metrics as IT admin</td>
</tr>
<tr>
<td>Virtual server mgmt – Start / Stop / Relocate</td>
<td>Landscape Manager using Systems Director</td>
<td>Weekly</td>
<td>Request to IT admin</td>
<td>Self-service</td>
</tr>
<tr>
<td>Provisioning of a new virtual server</td>
<td>Landscape Manager using Systems Director</td>
<td>Some every month</td>
<td>3 - 4 weeks elapse time, involves different teams (network, storage, server admin)</td>
<td>15 min through self-service capabilities and automated workflow</td>
</tr>
<tr>
<td>SAP system cloning - Offline / image-based</td>
<td>Landscape Manager using Systems Director</td>
<td>Some every month</td>
<td>3 days manual effort</td>
<td>2 - 10 hrs (depending on size) automated workflow</td>
</tr>
<tr>
<td>SAP system cloning - Consistent online copy</td>
<td>Landscape Manager using FlashCopy Manager</td>
<td>Weekly / Daily</td>
<td>14 hrs elapse time</td>
<td>5 - 30 min elapse time</td>
</tr>
<tr>
<td>SAP Post Copy automation</td>
<td>Landscape Manager</td>
<td>Weekly / Daily</td>
<td>5 - 10 days manual effort</td>
<td>½ - 5 hrs (depending on size) automated workflow</td>
</tr>
<tr>
<td>Dynamic SAP instance provisioning</td>
<td>Landscape Manager incl. Systems Director for topology view and metrics</td>
<td>Weekly / Monthly</td>
<td>1 day manual effort</td>
<td>5 min automated workflow</td>
</tr>
</tbody>
</table>

“Self-services” in this context means IT infrastructure services made available to the SAP administrator
SAP LVM Features: Landscape Visualization Manager GUI

Dashboards
- Are pre-defined
- Provide a status overview of services and resources
- Show running activities
- Are customizable

Landscape Visualization
- Shows available landscapes, with infrastructure and system details
- Shows available networks with physical and virtual hosts
- Shows integrated virtualization technology

Reports
- Let you compare recent performance data
- For each landscape
- For each individual system in any landscape
Thank You

Merci

Danke

Obrigado

感谢