Agenda

- Recent Announcements
- Power 795 Enhancements
- POWER7+
- New Power 770 / 780
- SmartCloud
- IBM i
- PowerLinux
- AIX
- PowerHA
- HMC Firmware
- CoD Updates
- Security
# POWER7 Systems Announcements

<table>
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<tr>
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<th>1H</th>
<th>2H</th>
<th>1H</th>
<th>2H</th>
</tr>
</thead>
</table>

- **Power 780 9179-MHB**
- **Power 770 9117-MMB**
- **Power 750 8233-E8B**
- **Power 755 8236-E8C**
- **PS702 8406-71Y**
- **PS701 8406-71Y**
- **PS700 8406-70Y**
- **PS704 7891-74XY**
- **PS703 7891-73X**
- **Power 720 / 740 8202-E4B 8205-E6B**
- **Power 720 / 730 8231-E2B**
- **Power 775 9119-FHB**
- **Power 795 9119-FHB**
- **Power 770 9119-FHB**
- **Power 770 9117-MMC**
- **Power 770 9117-MMC**
- **Power 770 9117-MHB**
- **Power 775 9117-FHB**
- **Power 780 9117-MHD**
- **p260 7895-22X**
- **p460 7895-42X**
- **p260+ 7895-22X**
- **7R1 / 7R2**
- **P260+ 7895-22X**
- **p24L**

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POWER7 Portfolio

Virtualization & Mgmt.

- Power 795
- Power 780+
- Power 770+
- Power 775
- Power 755

P7 Perf
P7 RAS
Advisors
P7+ AME

CoD

Power 720/740
Power 710/730

PS Blades

PowerLinux 7R1 / 7R2

IBM PureFlex System

p460
p260+
p24L

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Power 795 Refresh
Enhancing the Power 795

- New 64GB DIMM enable up to 16TB of memory
- New hybrid I/O adapters with Gen2 I/O support
- No-charge Elastic processor and memory days
- PowerVM enablement for 20 LPARs per core
- Pools of enterprise Power servers
Power 795

✓ Up to 256 Cores
✓ Up to 16TB of memory
✓ Enhanced Firmware
✓ PCIe Gen2 Support
  ▪ Dual port 10 Gbt CNA Ethernet
  ▪ Dual port 16 Gbt Fiber Channel
✓ Up to 8 CECs per system
✓ Up to 640 IO Slots
✓ Up to 1000 LPARs
✓ ROCE Support
✓ Enhanced CoD Options
✓ Enterprise RAS
  ▪ Dual Clocks / Service Processors
  ▪ Redundant TPMD
  ▪ Active Memory Mirroring
PCle Gen2 GX++ Adapters

2 x 10Gb ports:
- Ethernet
- Fibre Channel CNA support

2 x 16 Gbt Fiber Channel ports

Post GA SRIOV support

VCle Gen2 enabled
GX++ Hot pluggable
Power 795 Enhanced CoD Options

Elastic CoD Elastic no-charge processor days
- 15 Elastic CoD Elastic processor days for every processor core initially shipped with the system.

Elastic CoD Elastic no-charge memory GB-days
- 240 GB memory days will be included for every processor core initially shipped with the system.

90-days Elastic CoD temporary processor & memory enablement
- Allows temporarily activate all inactive processor and memory CoD resources for a maximum of 90 days before you must order an other temporary enablement activation

Power Systems Pools offering
- Allows for the aggregation of Elastic and Elastic CoD compute resources, including processors and memory, across a number of Power 780+ and 795 servers
POWER7+
Power Processor Technology Roadmap

POWER4/4+ 180/130 nm
- Dual Core
- Chip Multi Processing
- Distributed Switch
- Shared L2
- Dynamic LPARs (32)

POWER5/5+ 130/90 nm
- Dual Core
- Enhanced Scaling
- SMT
- Distributed Switch +
- Core Parallelism +
- FP Performance +
- Memory Bandwidth +
- Virtualization

POWER6/6+ 65/65 nm
- Dual Core
- High Frequencies
- Virtualization +
- Memory Subsystem +
- Altivec
- Instruction Retry
- Dynamic Energy Mgmt
- SMT +
- Protection Keys

POWER7/7+ 45/32 nm
- Eight Cores
- On-Chip eDRAM
- Power-Optimized Cores
- Memory Subsystem ++
- SMT++
- Reliability +
- VSM & VSX
- Protection Keys+

POWER8
- More Cores
- SMT+++%
- Reliability ++
- FPGA Support
- Transactional Memory
- Tape Out: Sept 2012

Future
POWER7+

POWER7 45 nm

“POWER7+” 32 nm
POWER7+

POWER7 45 nm

POWER7+ 32 nm

Add additional Cache
POWER7+

- POWER7 45 nm
- POWER7+ 32 nm

Add additional Cache
Add on Chip Accelerators
POWER7+ Design

Physical Design:
• 8 cores with integrated Cache, Memory Controllers, and Accelerators
• 3 / 4 / 6 / 8 Core options
• 32nm technology

Features:
• L3: 10 MB per Core
• eDRAM technology
• Higher Frequencies
• Memory Compression Engine
  • Active Memory Expansion
• Encryption / Cryptography Support
• Random Number Generator
• Enhanced Energy / Power Gating
• 1/20 LPAR Core Granularity
• 2X SPFP performance
# Processor Designs

<table>
<thead>
<tr>
<th></th>
<th>POWER5</th>
<th>POWER5+</th>
<th>POWER6</th>
<th>POWER7</th>
<th>POWER7+</th>
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<tbody>
<tr>
<td>Technology</td>
<td>130nm</td>
<td>90nm</td>
<td>65nm</td>
<td>45nm</td>
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<tr>
<td>Size</td>
<td>389 mm²</td>
<td>245 mm²</td>
<td>341 mm²</td>
<td>567 mm²</td>
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<td>Transistors</td>
<td>276 M</td>
<td>276 M</td>
<td>790 M</td>
<td>1.2 B</td>
<td>2.1 B</td>
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<tr>
<td>Cores</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
<td>8</td>
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<tr>
<td>Frequencies</td>
<td>1.65 GHz</td>
<td>1.9 GHz</td>
<td>4 - 5 GHz</td>
<td>3 - 4 GHz</td>
<td>Up to 4.4+ GHz</td>
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<tr>
<td>L2 Cache</td>
<td>1.9MB Shared</td>
<td>1.9MB Shared</td>
<td>4MB / Core</td>
<td>256 KB per Core</td>
<td>256 KB per Core</td>
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<tr>
<td>L3 Cache</td>
<td>36MB</td>
<td>36MB</td>
<td>32MB</td>
<td>4MB / Core</td>
<td>10MB / Core</td>
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<td>Memory Cntrl</td>
<td>1</td>
<td>1</td>
<td>2 / 1</td>
<td>2 / 1</td>
<td>2 / 1</td>
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<td>Architecture</td>
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<td>Out of Order</td>
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<tr>
<td>LPAR</td>
<td>10 / Core</td>
<td>10 / Core</td>
<td>10 / Core</td>
<td>10 / Core</td>
<td>20 / Core</td>
</tr>
</tbody>
</table>
POWER7+ RAS Specific Features

New Power On Reset Engine (PORE)
- Enables a processor 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 repair
- Bit Line
- 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.
AME Concept

Application Memory Region

Before AME

- Hot Pages
- Warm Pages
- Cold Pages

After AME

- Hot Pages
- Warm Pages
- Compressed
- Expanded Memory
Benefits of POWER7+ HW compression

**HW Acceleration:**
- Up to 2.1x Faster on decompress

**CPU TIME**

P7 AME CPU Time

- SW Decompression
- VMM Page Fault Handler

P7+ AME CPU Time

- HW Decompression
- VMM Page Fault Handler

SW

HW
POWER7+ uses on-chip hardware accelerator to do some of the compression / decompression work. There is a knee-of-cure relationship for CPU resource required for memory expansion

- Even with POWER7+ hardware accelerator there is some resource required.
- The more memory expansion done, the more CPU resource required

Knee varies depending on how compressible memory contents are
AME-friendly Application Characteristics

Necessary characteristics
- Memory consumption is dominated by application-level working storage (heap, stack, shared memory)
- Data retained in working storage isn’t already compressed by the application

Desirable characteristics
- Memory access is skewed toward a subset of working storage
- Application does not get a significant performance increase from use of 64 KB pages
- Average CPU utilization < 60% during peak periods
- Application is not response time sensitive

1 Many databases have a relatively random memory access pattern. Also, Java garbage collection has a relatively random access pattern.

2 Many Java applications experience a performance increase from the use of 64 KB pages. 64 KB pages are used by default starting in IBM JDK6 SR7 and WebSphere Application Server 7.0.0.9.
Power

770+ / 780+
Power 770+

✓ POWER7+
✓ Frequencies:
  ▪ 4C SCM @ 3.8 GHz Max Config: 64 Cores
  ▪ 3C SCM @ 4.2 GHz Max Config: 48 Cores
✓ Up to 64 Cores
✓ Up to 4 TB of memory
✓ 6 PCIe Gen2 slots / CEC
✓ Ethernet ports: Dual 10 Gbt & Dual 1 Gbt
✓ Capacity on Demand
✓ Enhanced RAS
  ▪ Self-healing capability for L3 Cache functions
  ▪ Core re-initialization (Running system)
  ▪ Dynamic Processor Fabric Bus repair

Power 770+: 4S / 4U
Power 780+

- POWER7+
- Frequencies:
  - 8C SCM @ 3.7 GHz  Max Cores: 128 Cores
  - 4C SCM @ 4.4 GHz  Max Cores: 64 Cores
- Up to 128 Cores
- Up to 4 TB of memory
- 6 PCIe Gen2 slots / CEC
- Ethernet ports: Dual 10 Gbt & Dual 1 Gbt
- Enhanced Capacity on Demand options
- Enhanced RAS
  - Self-healing capability for L3 Cache functions
  - Core re-initialization (Running system)
  - Dynamic Processor Fabric Bus repair

Power 780+: 4S / 4U
Power 770+ / 780+ Front View

- P7+ Cores
- 4 Sockets
- Memory
- 16 Slots
- PCIe Gen2
- 6 Slots
- SFF SAS
- 6 Bays
Power 770+ / 780+ Rear View

- Memory: 16 Slots
- PCIe Gen2: 6 Slots
- P7+ Cores: 4 Sockets
- Multi-Function Card
- GX++: 2 Slots
Power 770+ / 780+ Top View
## IBM Power 770 Systems Comparisons

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<thead>
<tr>
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<tbody>
<tr>
<td>Processor</td>
<td>POWER7</td>
<td>POWER7</td>
<td>POWER7+</td>
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<tr>
<td>L3 Cache</td>
<td>4 MB per Core</td>
<td>4 MB per Core</td>
<td>10 MB per Core</td>
</tr>
<tr>
<td>Frequency</td>
<td>3.1 GHz</td>
<td>3.3 GHz</td>
<td>3.8 GHz</td>
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<tr>
<td></td>
<td>Up to 64 Cores</td>
<td>Up to 64 Cores</td>
<td>Up to 64 Cores</td>
</tr>
<tr>
<td></td>
<td>3.5 GHz</td>
<td>3.7 GHz</td>
<td>4.2 GHz</td>
</tr>
<tr>
<td></td>
<td>Up to 48 Cores</td>
<td>Up to 48 Cores</td>
<td>Up to 48 Cores</td>
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<tr>
<td>System memory</td>
<td>Up to 2 TB</td>
<td>Up to 4 TB</td>
<td>Up to 4 TB</td>
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<tr>
<td>PCIe</td>
<td>Gen1</td>
<td>Gen2</td>
<td>Gen2</td>
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<tr>
<td>Ethernet</td>
<td>4x 1 Gbt</td>
<td>2 x 1 Gbt &amp; 2 x 10 Gbt</td>
<td>2 x 1 Gbt &amp; 2 x 10 Gbt</td>
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<tr>
<td>I/O Bandwidth (Internal)</td>
<td>Dual 10 GB/sec Hub Chips</td>
<td>Dual 20 GB/sec Hub Chips</td>
<td>Dual 20 GB/sec Hub Chips</td>
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<tr>
<td>EXP30 SSD Drawer Support</td>
<td>No</td>
<td>Yes (2013)</td>
<td>Yes</td>
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<td>I/O loops</td>
<td>Up to 8</td>
<td>Up to 8</td>
<td>Up to 8</td>
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<td>Max rPerf</td>
<td>579.39 (64 Core)</td>
<td>606.8 (64 Core)</td>
<td>729.3 (64 Core)</td>
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<td></td>
<td>493.37 (48 Core)</td>
<td>517.0 (48 Core)</td>
<td>612.7 (48 Core)</td>
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<tr>
<td>Activity Memory Mirroring</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<td>Memory DeDup</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<td>Active Platform Optimize</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Charm Support</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Fabric Bus Dynamic repair</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
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POWER7+ Modular Memory Card Options

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<thead>
<tr>
<th>DIMM Size</th>
<th>Memory Speed</th>
<th>Offering Size</th>
<th>Max Memory</th>
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<tr>
<td>8 GB</td>
<td>1066 MHz</td>
<td>32 GB</td>
<td>512 GB</td>
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<tr>
<td>16 GB</td>
<td>1066 MHz</td>
<td>64 GB</td>
<td>1 TB</td>
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<tr>
<td>32 GB</td>
<td>1066 MHz</td>
<td>128 GB</td>
<td>2 TB</td>
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<tr>
<td>64 GB</td>
<td>1066 MHz</td>
<td>256 GB</td>
<td>4 TB</td>
</tr>
</tbody>
</table>
POWER7+ Modular Memory Layout
Power 770+ / 780+ EXP30 Support

- GX++ x8 SAS adapters
  - Requires two connects per EXP30.
- Supports Two EXP30 SSD Storage Drawers / Node
- Total SSD capacity per Node: 22.8 TB
  - 91.2 TB per Systems
EXP30 Ultra SSD I/O Drawer

Features
- Capacity: 11.4 TB
- RAID 5 & 6 protection
- 3.1 GB Cache
- Mirrored Write cache
- Attaches via x8 PCIe adapter in GX++ slots in Power 710, 720, 730, 740, 770+, & 780+

Performance
- Up to 400,000 IOPS (100% Read)
- Up to 280,000 IOPS (70/30% R/W)
- Up to 165,000 IOPS (100% Write)

RAS Features
- Concurrent maintenance: SSD bays
- Redundant, hot plug power supplies
- Redundant fans
- Redundant SAS RAID controllers & SAS Expanders

19” 1U ~24” deep
PCle attached via GX++ adapter

Up to 30 1.8” 387 GB SSD’s
Operating Systems

IBM AIX operating system:
AIX Version 7.1 TL02
  AIX Version 7.1 TL01 SP 6, or later (planned availability December 19, 2012)
  AIX Version 7.1 TL00 SP 8, or later (planned availability December 19, 2012)
AIX Version 6.1 TL08, or later
  AIX Version 6.1 TL07 SP 6, or later (planned availability December 19, 2012)
  AIX Version 6.1 TL06 SP 10, or later (planned availability December 19, 2012)
AIX 5.3 TL12    Statement of Direction

IBM i operating system
IBM i 7.1 TR5, or later; required if the primary OS is IBM
IBM i 6.1 with machine code 6.1.1, or later
  All I/O must be virtual (I/O provided through either IBM i 7.1 or VIOS)
  Can not be ordered as the primary OS with feature number 0566

Linux:
Red Hat Enterprise Linux 6.3 for POWER, or later
Red Hat Enterprise Linux 5.7 for POWER, or later
SUSE Linux Enterprise Server 11 Service Pack 2, or later, with current maintenance updates available from SUSE to enable all planned functionality

VIOS:
VIOS 2.2.2.0
VIOS 2.2.1.5 (planned availability December 19, 2012)
PowerCare Services Offering

IBM Power Systems global program that delivers technical expertise bundled with all new Power 780 or Power 795 systems

System Availability Optimization
- Power Systems Availability Optimization
- Power Systems Health Check Optimization
- Power System Pools Enablement
- PowerHA SystemMirror

Cloud & Virtualization Enablement
- IBM Cloud Design Workshop
- SmartCloud Entry Enablement
- Systems Director and Cloud Foundations Enablement

Security & Compliance
- Security Assessment
- PowerSC Enablement
- RBAC Workshop

Performance Optimization Assessment
- Systems Performance Assessment
- Application Performance Assessment
- Transition Workshop
- PowerVM Optimization

PowerCare Technical Training
CoD Update
CoD Enhancements

Elastic CoD

Current On/Off CoD enablement codes can enable a maximum of 9999 gigabyte days or 9999 processor days
- Requires some customers to get a new enablement code every 2 – 3 days

New Elastic CoD enablement codes enable calendar days
- Number of resource days enabled is number of calendar days in code multiplied by number of resources not permanently activated on server
- A code can enable up to 9999 calendar days
- User only sees resource days, not calendar days

Once an Elastic CoD calendar day enablement code is accepted on a server, future Elastic CoD resource day enablement codes will be rejected

Trial CoD

Support Trial CoD periods of only 7 days
- Must contact CoD project office to get code
Power 780 / 795 Elastic Elastic CoD Offering

Elastic COD Processor & Memory days for Power 780+ & Power 795 new orders
- No-charge offering
- 15 Processor days for every active / inactive processor ordered
- 240 GBs of Elastic Memory days for every processor ordered
- Available at time of initial ship or upgrade
- Elastic CoD processor and memory days will be kept as a credit by IBM

Usage of Elastic CoD resources
- No restrictions on how client uses the Elastic CoD resources
- TCoD contract must be signed prior to receiving TCoD Enablement code
- Enablement code is ordered via an MES
- Reports of usage of Elastic CoD resources will be sent to IBM on monthly basis
- Usage will be debited to clients account on a quarterly basis and a report will be sent providing the Elastic CoD account status
- Normal billing occurs when all the client’s Elastic Processor and memory days credits are exhausted
Example:
Purchased - Power 780+ w/128 cores

- 64 Active / 64 Elastic Status

Processors Days Received:

- 1920 Proc days (128 cores x 15 days)

Memory Days Received:

- 30,720 GB days (128 cores x 240GBs)
Scalable Power Pools with Power Enterprise Systems

Previously

“Power Flex”
4 x 795
64/128c each

4Q12

System Pool
Enhanced CoD
10 x Power 780/795

Extending the “Power Flex” concept

• System pools of High end Enterprise Power (power 780+ & 795) servers will leverage COD enhancements to extend aspects of Power Flex to a broader range of clients and simplify delivery

• Support for
  • Planned maintenance
  • Peak workload resource utilization

• Simplified Elastic Capacity on Demand enables utility-like compute capacity
HMC / Firmware
## New CR7 HMC….

Technology update:
7042-CR7 system is replacing 7042-CR6

<table>
<thead>
<tr>
<th>Feature</th>
<th>CR6</th>
<th>CR7</th>
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<tbody>
<tr>
<td>Processor</td>
<td>Westmere-EP</td>
<td>Intel Xeon E5 (Sandy Bridge)</td>
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<tr>
<td>Memory</td>
<td>4 GB</td>
<td>4 GB</td>
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<tr>
<td>DASD</td>
<td>500 GB</td>
<td>500 GB</td>
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<tr>
<td>RAID 1</td>
<td>Optional in 4Q2012</td>
<td>Default in 4Q2012</td>
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<tr>
<td>Multitech Internal Modem</td>
<td>Defaulted</td>
<td>Optional</td>
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<tr>
<td>USB Ports</td>
<td>2 front/4 back/1 Internal</td>
<td>2 front / 4 back 1 Internal</td>
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<td>Integrated Network</td>
<td>2 on Main Bus +</td>
<td>4 x 1 GbE</td>
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<tr>
<td></td>
<td>2 on expansion slot</td>
<td></td>
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<tr>
<td>I/O Slots</td>
<td>1 PCI Express 2.0 slot</td>
<td>1 PCI Express 3.0 slot</td>
</tr>
</tbody>
</table>
HMC v7.760

HMC 760 firmware:
- Supports: 7310-C04, 7315-CR2, 7310-CR2 and later
- Last planned FW level for: 7310-C04, 7315-CR2, 7310-CR2
- No support to manage P7 for 7310-C04, 7315-CR2, 7310-CR2
- Provides support for .05 processor (LPAR) on POWER7+ systems

HMC 760 can manage P5 and newer systems
- Power Blades support (New)
- No Power 775

760 Firmware system support: POWER7+
- Power 795, 780, and 770

SW Requirements for .05 processor support
- AIX 7.1 TL2, AIX 6.1 TL8
- IBM i 7.1 TR4, IBM i 6.1.1-H
- Linux (Future)
- PowerVM v2.2.2
- FW 760
- HMC 760
HMC v7.760 Blade Support

HMC V7R760:
- HMC management of IBM BladeCenter Power Blade servers
- Support for dual VIOS
- Live partition mobility between blades and rack servers
- Management of both blades and rack servers from a single management console
PureSystems
PureSystems Family

Flex System
Nodes
Storage
Management
Network
Expansion

PureFlex
Infrastructure Components
Next generation of Blades
Delivering Infrastructure Services

PureApplication
Integrated Infrastructure
Delivering Platform Services

PureData
Data Platform
Delivering Data Services
The PureFlex Transition...

Rack Servers Technology

- Processor Options
- IO Capabilities
- Memory Options
- Power & Cooling

Blade Technology

- Modular
- Packaging Density

PureFlex Platform

Enhanced Integration / Management
- Hardware
- Networking / Storage
- Operating Systems
- Virtualization / Provisioning
- Workloads

Processor Options
- Modular
- IO Capabilities
- Packaging Density
- Memory Options
- Power & Cooling
PureFlex System Integrated System Solution

IBM 42U Slim Rack (7953-94X)
IBM Flex System Enterprise Chassis (7893-92X)
IBM Flex System Compute Node: p260, p460, x220, x240, & x440
IBM Flex System Manager (7955-01M)
IBM Storwize V7000 Disk System (2076-124)
## Flex System p260 Compute Node

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
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<tbody>
<tr>
<td><strong>POWER7+ Architecture</strong></td>
<td>Dual Socket 4 Cores @ 4.0 GHz 8 Cores @ 3.6 / 4.1 GHz</td>
</tr>
<tr>
<td><strong>DDR3 Memory</strong></td>
<td>Up to 512 GB</td>
</tr>
<tr>
<td><strong>DASD / Bays</strong></td>
<td>0 – 2 SAS (600 / 900 GB) 0 – 2 SSD (177 GB)</td>
</tr>
<tr>
<td><strong>Dual VIOS</strong></td>
<td>Yes (2Q 2013)</td>
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<tr>
<td><strong>Mezzanine Card I/O Options</strong></td>
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**Power 730 - 740**
**Flex System p24L Compute Node**

<table>
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<tr>
<th>Feature</th>
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<tr>
<td><strong>POWER7 Architecture</strong></td>
<td>Dual Socket</td>
</tr>
<tr>
<td></td>
<td>6 Cores @ 3.7 GHz</td>
</tr>
<tr>
<td></td>
<td>8 Cores @ 3.3 / 3.55 GHz</td>
</tr>
<tr>
<td><strong>DDR3 Memory</strong></td>
<td>Up to 512 GB</td>
</tr>
<tr>
<td><strong>DASD / Bays</strong></td>
<td>0 – 2 SAS (300 / 600 / 900 GB)</td>
</tr>
<tr>
<td></td>
<td>0 – 2 SSD (177 GB)</td>
</tr>
<tr>
<td><strong>Dual VIOS</strong></td>
<td>Yes (2Q 2013)</td>
</tr>
<tr>
<td><strong>Mezzanine Card I/O Options</strong></td>
<td>2</td>
</tr>
</tbody>
</table>
**Flex System p460 Compute Node**

- **16 / 32 Core**

**Table:**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER7 Architecture</td>
<td></td>
</tr>
<tr>
<td>FC #2319</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>DDR3 Memory</td>
<td></td>
</tr>
<tr>
<td>DASD / Bays</td>
<td>0 – 2 SAS (300 / 600 / 900 GB)</td>
</tr>
<tr>
<td></td>
<td>0 – 2 SSD (177 GB)</td>
</tr>
<tr>
<td>Dual VIOS</td>
<td>Yes</td>
</tr>
<tr>
<td>Mezzanine Card I/O Options</td>
<td>4</td>
</tr>
</tbody>
</table>
Platform Management Expertise: Flex System Manager

- **New 1.2 Code base**
- **Single Point of Control**
- **Auto discovery of resources**
- **Physical and virtual management**
- **Network and storage management**
- **Alerts, health status, call home**
- **Firmware management**
- **Remote console**
Positioning with Power …

- Traditional and highly customizable portfolio of systems designed for a wide array of client needs.
  - Lowest entry price
  - Smallest configuration
  - Distributed systems

- Clients leading the wave toward integrated compute, networking and storage with integrated mgmt and integrated solution building blocks

- Rapid deployment of virtualized compute, network, & storage

- Consolidated x86 & Power applications

- Most resilient and scalable systems with flexibility to consolidate the most demanding workloads and customize to deliver the highest quality SLAs

- Industry-best performance, scalability, availability

- Greatest resource sharing and highest utilization with seamless growth from Capacity on Demand

- Memory and I/O infrastructure to optimize most demanding workloads

Power Express

Power Enterprise

Flex Systems
IBM PureData System Offerings..

**E-commerce like apps...**
*Database cluster services optimized for transactional throughput and scalability*

---

**Customer Analysis like apps...**
*Data warehouse services optimized for high-speed, peta-scale analytics and simplicity*

---

**Real-time Fraud Detection like apps...**
*Operational data warehouse services optimized to balance high performance analytics and real-time operational throughput*
AIX Solution Edition For Cognos and SPSS

Leveraging IBM business and predictive analytics software Optimization on IBM Power Systems

- AIX Standard or Enterprise Edition
- PowerVM Std or Ent Edition
- Power 710, 720, 730, 740
- WebSphere

Hardware incentives:
- .5 processor activations at no-charge
- 50% discount on AIX licenses

For more information:  http://www.ibm.com/systems/power/hardware/solutioneditions/aix/index.html

Delivering Faster Insights

40% better performance with Cognos BI V10.1.1 on POWER7/AIX 7.1, over Windows 2008 on x86

Predicting Outcomes Faster

22% better performance with SPSS Collaboration and Deployment Services V4.2 on POWER7/AIX 7.1, over Windows 2008 on x86
PowerLinux Solutions
PowerLinux: Targeted 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

Smarter solutions built on Linux & Open Source

IBM InfoSphere
BigInsights & Streams

IBM Flex System p24L
PowerLinux Compute Node

IBM PowerLinux 7R1
2U Rack Server

IBM PowerLinux 7R2
2U Rack Server

Compelling value vs. VMware and x86

50% less time to sort a terabyte of data
40% better application performance stated by ISVs like Zucchetti
33% lower solution cost for virtualized infrastructure
# PowerVM for IBM PowerLinux™ vs. VMware

<table>
<thead>
<tr>
<th>Virtualization features</th>
<th>PowerVM for IBM PowerLinux</th>
<th>VMware vSphere 5.0 – Enterprise&lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Server platforms supported</td>
<td>PowerLinux 7R2 (two sockets – 16 cores)</td>
<td>x86-64 based servers</td>
</tr>
<tr>
<td>Guest operating systems supported</td>
<td>Linux</td>
<td>Linux, Windows, Solaris and others</td>
</tr>
<tr>
<td>Virtual memory cap / license entitlement</td>
<td>Unlimited</td>
<td>64 GB per socket</td>
</tr>
<tr>
<td>Virtual CPUs per VM</td>
<td>Up to 256 (limited by # cores on the server)</td>
<td>Up to 32 (limited to 8 per socket by licensing)</td>
</tr>
<tr>
<td>CPU threads</td>
<td>4 per core</td>
<td>2 per core</td>
</tr>
<tr>
<td>Dynamic virtual CPUs and virtual memory</td>
<td>Add/Remove</td>
<td>Limited Hot Add/Hot Remove</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(hot add only for memory)</td>
</tr>
<tr>
<td>Secure hypervisor (zero reported vulnerabilities)</td>
<td>Yes (h/w based)</td>
<td>No (s/w based)</td>
</tr>
<tr>
<td>License + 3 year, 9x5 SWMA</td>
<td>$7,840&lt;sup&gt;3&lt;/sup&gt;</td>
<td>$9,374&lt;sup&gt;2&lt;/sup&gt; (2-socket / 128 GB license)</td>
</tr>
</tbody>
</table>

---


<sup>2</sup>VMware pricing: [http://www.vmware.com/products/vsphere/pricing.html](http://www.vmware.com/products/vsphere/pricing.html)

<sup>3</sup>Based on US pricing for PowerVM for PowerLinux announced on 4/24/2012
**IBM PowerLinux™ 7R2 pricing comparison**

<table>
<thead>
<tr>
<th>Server list price*</th>
<th>$9,102</th>
<th>$9,527</th>
<th>$9,027</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtualization - OTC + 3yr. 9x5 SWMA</td>
<td>$9,374</td>
<td>$9,374</td>
<td>$7,840</td>
</tr>
<tr>
<td>VMware vSphere Enterprise 5</td>
<td>VMware vSphere Enterprise 5</td>
<td>PowerVM for IBM PowerLinux</td>
<td></td>
</tr>
<tr>
<td>Linux OS list price - RHEL, 2 sockets, unlim. guests, 9x5, 3 yr. sub./ supp.</td>
<td>$5,697</td>
<td>$5,697</td>
<td>$4,489</td>
</tr>
<tr>
<td>Red Hat subscription and Red Hat support</td>
<td>Red Hat subscription and Red Hat support</td>
<td>Red Hat subscription and IBM support</td>
<td></td>
</tr>
<tr>
<td>Total list price: Server/Virtualization/Linux</td>
<td>$24,173</td>
<td>$24,598</td>
<td>$21,356</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Server model</th>
<th>Dell R720</th>
<th>HP Proliant DL380 G8</th>
<th>IBM PowerLinux 7R2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor</td>
<td>16-core, 2.40 GHz E5-2665, Sandy Bridge</td>
<td>16-core, 3.55 GHz POWER7</td>
<td></td>
</tr>
<tr>
<td># of sockets</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Total memory installed</td>
<td>32 GB</td>
<td>32 GB</td>
<td></td>
</tr>
<tr>
<td>Hard drives installed</td>
<td>2 x 300 GB, 10K SAS</td>
<td>2 x 300 GB, 10K SAS</td>
<td></td>
</tr>
<tr>
<td>Network controller</td>
<td>4 x 1GbE</td>
<td>4 x 1GbE</td>
<td></td>
</tr>
<tr>
<td>Storage controller</td>
<td>SAS, DVD, RAID</td>
<td>SAS, DVD, RAID</td>
<td></td>
</tr>
</tbody>
</table>

* Based on US pricing for PowerLinux 7R2 announced on 4/24/2012 matching comparable configurations. Source: dell.com, hp.com, vmware.com: 4/29/12
AIX
Enhancements
AIX Enhancements…

**AIX 7.1 TL2, 6.1 TL8**

- POWER7+ processor-based system support
- Virtual Processor Management Scaled Throughput Option - improves the ratio of workload throughput
- **LPAR to WPAR migration tool** – for migrating workloads from an LPAR to a WPAR.
- Exploitation of POWER7+ Crypto Offload Accelerators – encrypted File Systems & IPsec enablement
- **Active System Optimizer** now available with AIX 6.1 TL8
- **Enhanced AIX Enterprise Edition** now delivering with
  - **PowerSC** to simplify security management and compliance measurement
  - **SmartCloud Entry Bundle** to easily deploy and manage private clouds
AIX Enterprise Edition Content Changes

AIX Enterprise Edition Past
AIX 7 or AIX 6
WP AR Manager
Systems Director Enterprise Edition
▪ IBM System Director
▪ Active Energy Manager
▪ VMControl Enterprise Edition
▪ Network Control
▪ Transition Manager for HP® SIM
▪ Service and Support Manager

Tivoli Products
▪ IBM Tivoli Monitoring
▪ IBM Tivoli Monitoring for Energy Management
▪ Tivoli Application Dependency Discovery Manager

AIX Enterprise Edition Future
AIX 7 or AIX 6
WP AR Manager
PowerSC Standard Edition
Active System Optimizer
SmartCloud Entry for Power
+ Director Storage Control
+ Systems Director Standard Edition
  ▪ IBM System Director
  ▪ Active Energy Manager
  ▪ Network Control
  ▪ Transition Manager for HP® SIM
  ▪ Service and Support Manager
= VMControl Enterprise Edition

Tivoli Products
▪ IBM Tivoli Monitoring
## AIX / VIOS Software Support

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>AIX.5.3 TL10</strong></td>
<td>SP 4</td>
<td>SP 4</td>
<td>SP 5</td>
<td>SP 5</td>
<td>N / A</td>
<td>N / A</td>
<td>N / A</td>
<td>N / A</td>
</tr>
<tr>
<td><strong>AIX.5.3 TL11</strong></td>
<td>SP 2</td>
<td>SP 2</td>
<td>SP 5</td>
<td>SP 5</td>
<td>SP 7</td>
<td>N / A</td>
<td>N / A</td>
<td>N / A</td>
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<tr>
<td><strong>AIX.5.3 TL12</strong></td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>SP 1</td>
<td>SP 4</td>
<td>SP 5</td>
<td>SP 6</td>
<td>SoD</td>
</tr>
<tr>
<td><strong>AIX 6.1 TL4</strong></td>
<td>SP 2</td>
<td>SP 3</td>
<td>SP 7</td>
<td>SP 7</td>
<td>SP 10</td>
<td>N / A</td>
<td>N / A</td>
<td>N / A</td>
</tr>
<tr>
<td><strong>AIX 6.1 TL5</strong></td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>SP 3</td>
<td>SP 6</td>
<td>SP 7</td>
<td>N / A</td>
<td>N / A</td>
</tr>
<tr>
<td><strong>AIX 6.1 TL6</strong></td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>SP 5</td>
<td>SP 6</td>
<td>SP 8</td>
<td>SP 10</td>
</tr>
<tr>
<td><strong>AIX 6.1 TL7</strong></td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>SP 3</td>
<td>SP 6</td>
</tr>
<tr>
<td><strong>AIX 6.1 TL8</strong></td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
</tr>
<tr>
<td><strong>AIX 7.1 TL0</strong></td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>SP 3</td>
<td>SP 4</td>
<td>SP 6</td>
<td>SP 8</td>
</tr>
<tr>
<td><strong>AIX 7.1 TL1</strong></td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>SP 3</td>
<td>SP 6</td>
</tr>
<tr>
<td><strong>AIX 7.1 TL2</strong></td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
</tr>
<tr>
<td><strong>VIOS</strong></td>
<td>2.1.2.11 FP 22.1 + SP1</td>
<td>2.1.2.12 FP 22.1 + SP2</td>
<td>2.1.3</td>
<td>2.2</td>
<td>2.2.0.12 FP24 + SP2</td>
<td>2.2.1</td>
<td>2.2.2</td>
<td>2.2.1.5</td>
</tr>
</tbody>
</table>

**“C” Models**

**POWER7+ Models**
IBM i Enhancements
IBM i 7.1 Technology Refresh 5 - Highlights

Self-managing value proposition of **DB2 for IBM i** extended with improvements for better performance and usability.

Extract maximum value from POWER7 with **DB2 Symmetric Multiprocessing**

**IBM SmartCloud Entry** available for IBM i

Manage IBM i with significant performance and usability updates of the Web based **IBM Navigator for i**

**XML Service** provides a language independent method to access native IBM i objects either local or remote

New **Enterprise Functions in BRMS** to manage and automate networked BRMS installations

Access IBM i native data in Java based mobile applications by leveraging the new small format **JTOpen Lite**

Latest Releases of Selected **IBM Software Group Offerings** available on IBM i

**New I/O Device** support including USB-attached tape drives
Security
Operating System Protection Profile (OSPP) standard replaces the old CAPP/EAL4+ certification

Evaluation included AIX 7 and the VIOS 2.2
PowerSC Trusted Surveyor

Compare current state of VM virtual network segregation to defined desired policy.

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.

• 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
### 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

<table>
<thead>
<tr>
<th>PowerSC Editions</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**
PowerHA
PowerHA SystemMirror 7.1 Enterprise Edition

- Simpler to deploy and easier to manage multi-site configurations with IBM Systems Director, intuitive interfaces, multi-site install wizard
- Stretched Cluster; Cluster wide AIX commands, kernel based event management single repository multicast communications
- Linked Clustering; cluster wide AIX commands, kernel based event management, linked clusters with unicast communications & dual repositories
- HyperSwap for continuously available storage in two-site topologies
- Cluster Split/Merge technology for managing split-site policy scenarios
PowerHA 7.1 Two-Site Solutions

PowerHA SystemMirror Enterprise Ed
- Two distinct options for multi-site deployments
- Each option provide configurations optimized for customer requirements

Stretched Cluster
- Exploits multicast communications
- Triple redundant heartbeat
- Campus/Metro deployments

Linked Cluster
- Enables two sites with independent networks (campus or cross country)
- Suitable for campus, metro and cross country deployments

* Future capability
PowerHA SystemMirror for AIX Hyperswap

- Designed to dramatically improve service availability
- Eliminates most outages caused by storage errors
- Uses IBM Storage device Peer to Peer Remote Copy functionality
- Similar to IBM System z GDPS Hyperswap capability

Legend:
- Active Path
- Passive Path

Continuous Availability for Storage
Smarter Cloud
Power Systems Cloud Solutions

Virtualization Foundation
POWER7 Systems, PowerVM, PowerSC, Systems Director & VMControl

Industrial strength virtualization coupled with automated resource balancing and virtual image management

Entry Cloud
IBM SmartCloud Entry delivered by IBM Starter Kit for Cloud
IBM PureFlex

Basic cloud functions including simple self service interface and infrastructure with automated provisioning

Advanced Cloud
Tivoli Service Automation Manager
IBM Service Delivery Manager

Integrated service management platform with automated IT service deployment, full lifecycle management, metering & chargeback

Cloud Capabilities

Infrastructure as a Service Technologies
- Infrastructure Platform
- Management and Administration
- Availability and Performance
- Security and Compliance
- Usage and Accounting
IBM Power Systems Solution Edition for Cloud

**Pre-built, pre-installed entry cloud system delivers fast time to value with enterprise performance, availability and IT efficiency**

**What’s new:**
- Power Systems 770 (*with POWER7+*) enterprise system completely assembled, cabled and integrated at manufacturing
- Entire software stack pre-installed including OS, hypervisor, management and cloud delivery
- Configuration options allow client customization

**Features / Business Value:**
- **Built on Power Systems 770 (*with POWER7+*)** for the highest reliability, scalability and serviceability
- Gets clients up and running and realizing the value of cloud delivery quickly and easily
- **Accelerates service delivery** with approval process automation and automated provisioning of resources
- **Provides an enhanced request-driven "user experience,"** while driving down costs and accelerating time to market
- **Improves utilization & efficiency** without interruption to the end-users with virtualization on Power

- ✓ POWER7+ configuration
- ✓ 32 – 128 processor cores
- ✓ 7 – 72 TB V7000 Storage
- ✓ 1 and 10 GB switches
- ✓ IBM FC Networking Switch
- ✓ IBM SmartCloud Entry + prerequisites
- ✓ Set-up Services
Questions???