IBM Power Systems

5 February 2013 Announcement
Hardware Deep Deep Dive

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Thanks to Pat O’Rourke, Mark Olson, Nigel Griffiths and others for slides
POWER7 Portfolio

5 Feb POWER7+ Announcement

Power 710+/730+

Power 720+/740+

Power 750+/760+

Power 770+

Power 780+

Power 795

Announced Fall 2012

IBM PureFlex System

PS Blades

PowerLinux 7R1 / 7R2

p460

p260+

p24L

Power 755

Power 775

Power 750+/760+

Power 720+/740+

Power 710+/730+

POWER7 Portfolio
POWER7+ Portfolio ready for delivery from?

Generally Available (GA)
in most countries (there are a few exceptions)
20th February 15th March

Power 710+/730+
Power 720+/740+
Power 750+ / 760+
Power 770+
Power 780+
Power 795

HMC V7 R770 Firmware 770
Agenda

- POWER7+ Chip Technology
- Power 710-760 Intro
- POWER7+ 710/730 & 7R1/7R2
- POWER7+ 720/740
- POWER7+ 750/760
- Active Memory Expansion for POWER7+
- SSD Enhancements
- New PCIe Gen2 Adapters
- New Removable Media Options
- HMC insights
- New IBM Networking switches
Power Processor Technology Roadmap

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

POWER9
# 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>
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<tr>
<td>Size</td>
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<td>276 M</td>
<td>790 M</td>
<td>1.2 B</td>
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<td>2</td>
<td>2</td>
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<td>1.9 GHz</td>
<td>4 - 5 GHz</td>
<td>3 – 4 GHz</td>
<td>3.6 – 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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<tr>
<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>In 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>
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</tbody>
</table>
POWER7+ Design

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

Features:
- L3 Cache: 10 MB per core
- Higher Frequencies
- New RAS Features
- Memory Compression Engine
  - Active Memory Expansion with no processor overhead penalty
- Encryption / Cryptography Support
- Random Number Generator
- Enhanced Energy / Power Gating
- 2X SP performance
- 1/20 core LPAR Granularity
POWER7 / POWER7+ Module Packaging

**POWER7**

- **Power 795**
  - Single Chip Glass Ceramic
- **Power 775**
  - Quad-chip MCM

**POWER7**

- **Power 770 / 780**
  - Single Chip Glass Ceramic

**POWER7+**

- **Power 710 / 730**
  - Single Chip Organic
- **Power 720 / 740**
  - Single Chip Organic
- **Power 750 / 760**
  - Dual Chip Organic
- **Power 770 / 780**
  - Single Chip Organic
POWER7+ DCM

One Socket
Two POWER7+ Chips
- 4 Core option
- 6 Core option

Results in
- 8 Core DCM
- 12-Core DCM

POWER7+ Chip 0
Mem Ctrl 0
A B C D

POWER7+ Chip 1
Mem Ctrl 1
A B C D
POWER7  Core / Cache options

POWER7+ 6 Core Chip

POWER7+ 4 Core Chip

Conceptual diagrams above show one of several options to result in 6-core or 4-core chips
New RAS features improve system availability

New self-healing capability for L3 cache functions
- Existing systems use ECC to detect and correct “bit” errors in both L2 and L3 cache
- Thresholds today exist for correctable errors at the “cache line” prior to dynamically removing from use
- POWER7+ processors now have the ability to dynamically substitute faulty “bit-lines” in L3 cache with a spare line

POWER7+ processors can be re-initialized while remaining up & running
- All service packs to-date for POWER7 have been non-disruptive
- Helps ensure future firmware updates can be non-disruptive
New idle processor state improves energy savings

- POWER7+ provides a new power savings mode for unused cores that saves 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

**Sleep** *(improved from POWER7)*
- More savings at increased latency
- Purge and power off core plus L2 caches
- Leave shared L3 cache running

**Winkle** *(NEW for POWER7+)*
- Maximum savings at higher latency
- Purge and power off entire chiplet
- Takes eighth of chip L3 cache offline
Agenda

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- Power 710-760 Intro
- POWER7+ 710/730 & 7R1/7R2
- POWER7+ 720/740
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- HMC insights
- New IBM Networking switches
More Performance — Less Price

New POWER7+ Models Offer Significantly Improved Price/Performance

- Power 740
  - 21-42% Better
- Power 720
  - 14-21% Better
- Power 730
  - 49-60% Better
- Power 710
  - 16-39% Better

Based on rPerf and USA prices.
Prices are subject to change without notice. Reseller prices can vary
Power Express Memory Features

Memory MHz and capacity increase over time

<table>
<thead>
<tr>
<th>Feature GB</th>
<th>POWER6 520-550</th>
<th>POWER7 710-750 “B” Mdl</th>
<th>POWER7 710-740 “C” Mdl</th>
<th>POWER7 710-750 “D” Mdl</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 GB</td>
<td>DDR2</td>
<td>DDR3</td>
<td>DDR3</td>
<td>DDR3</td>
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<tr>
<td>MHz</td>
<td>400-667 MHz</td>
<td>1066 MHz</td>
<td>1066 MHz</td>
<td>1066 MHz</td>
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<tr>
<td>4 GB</td>
<td>#4521</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8 GB</td>
<td>#4522/4525/4532</td>
<td>#4525 (710 only)</td>
<td>#EM04</td>
<td>-</td>
</tr>
<tr>
<td>16 GB</td>
<td>#4523</td>
<td>#4526</td>
<td>#EM08</td>
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<tr>
<td>32 GB</td>
<td>#4524</td>
<td>#4527/44 (750 only)</td>
<td>#EM16</td>
<td>#EM4B</td>
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<tr>
<td>64 GB</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>#EM4D (not 750)</td>
</tr>
</tbody>
</table>

Within a model there may be specific configuration rules which preclude a memory feature’s use. Where there are multiple feature codes within one cell, this was typically caused by a technology refresh of that memory feature.
Power Express Memory Price Performance ($/GB)

When configuring memory, remember to use the “sweet spots” of memory prices per GB when it makes sense.

<table>
<thead>
<tr>
<th>Feature GB</th>
<th>POWER6 520-550</th>
<th>POWER7 710-750 “B” Mdl</th>
<th>POWER7 710-740 “C” Mdl</th>
<th>POWER7 710-750 “D” Mdl</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 GB</td>
<td>$255/GB</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4 GB</td>
<td>$260/GB</td>
<td>$133/GB (710 only)</td>
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<tr>
<td>32 GB</td>
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<td>$200/GB (750 only)</td>
<td>$120/GB</td>
<td>$53/GB</td>
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<tr>
<td>64 GB</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$100/GB (not 750)</td>
</tr>
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</table>

Prices are USA planned approximate suggested list prices as of Feb 2013. Price/GB above are rounded off. Actual price/GB are slightly different. Prices and are subject to change without notice. Reseller prices may vary. POWER7 memory riser prices not included. Where multiple feature codes provided this capacity point, the newer feature is used to calculate cost per GB.
Class A3 Environmental Specifications

- Power 710 - 760 can support up to 35C and 1825 meter at the rated performance. However, they could operate in a degraded performance above 35C up to 40C.
- Recommended operating range remains 18-27C

<table>
<thead>
<tr>
<th>Environment Class</th>
<th>Temperature (Dry Bulb)</th>
<th>Altitude</th>
<th>Relative Humidity</th>
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<tr>
<td>Operating</td>
<td>5C - 40C</td>
<td>Up to 3050 meter @ 5-28C</td>
<td>8% - 85%</td>
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<td></td>
<td></td>
<td>Up to 2875 meter @ 29C</td>
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<tr>
<td></td>
<td></td>
<td>Up to 2700 meter @ 30C</td>
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<td>Up to 2525 meter @ 31C</td>
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<td>Up to 2350 meter @ 32C</td>
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<td>Up to 2175 meter @ 33C</td>
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<td></td>
<td>Up to 2000 meter @ 34C</td>
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<td>Up to 1825 meter @ 35C</td>
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<td>Up to 1650 meter @ 36C</td>
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<td>Up to 1475 meter @ 37C</td>
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<td>Up to 1300 meter @ 38C</td>
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<td>Up to 1125 meter @ 39C</td>
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<td></td>
<td>Up to 950 meter @ 40C</td>
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<td>5% - 80%</td>
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<td>Shipping</td>
<td>-40C - 60C</td>
<td>5% - 100%</td>
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</tbody>
</table>
Agenda

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Configuring POWER7+ 710/720/730/740

- If you know “C” model Power 710, 720, 730 & 740, then you already have 95+% of the “D” model information you need.

- What’s new:
  - New POWER7+ ➔ new processor feat codes, new GHz
  - New memory ➔ new memory feature codes, bigger max
  - #EB34 for IBM i 6.1 and native I/O
  - Updated/expanded EXP30 Ultra SSD I/O Drawer
  - Some additional I/O

- What’s the same
  - Memory rules / structure / risers
  - Backplane, integrated SAS controller, PCIe slots, GX++ slots, risers
  - All the existing I/O (with some additions being announced)
POWER7+ 710 Express

- 1 Socket: Power 710
- 2U Form Factor
- POWER7+
- 4, 6 or 8 cores
- Up to 256 GB memory
- 5 PCIe x8 Gen2 Slots
- 6th PCIe x4 Gen2 slot for Ethernet
- Single GX++ Slots
  - Ultra SSD Drawer option
- 6 SFF Bays
  - Optional add’l storage drawers
POWER7+ 710  8231-E1D  4 / 6 / 8 Cores

- Single Socket
- Processor module options:
  - 4-core socket: FC #EPCE  3.6 GHz
  - 6-core socket: FC #EPCG  4.2 GHz
  - 8-core socket: FC #EPCJ  4.2 GHz

- For 4 Core
  - Zero Disk/SSD-only drawers
  - Zero Ultra SSD drawer

- For 6 / 8 Core
  - Disk/SSD-only drawers
  - Ultra SSD drawer

- For 4 / 6 / 8 Core
  - Zero 12X I/O loops
  - Max 256 GB memory
  - System unit HDD/SSD
  - Fibre Channel or FCoE attached SAN attachment
  - IBM i P05 tier (users)
  - AIX small tier
POWER7+ 730 Express

- 2 Sockets: Power 730
- 2U Form Factor
- POWER7+
- 4, 6 or 8 cores per socket
- Up to 512 GB Memory
- 5 PCIe x8 Gen2 Slots
- 6th PCIe x4 Gen2 slot for Ethernet
- Dual GX++ Slots
  - 12X PCIe Drawer option
  - Ultra SSD I/O Drawer option
- 6 SFF Bays
  - Optional add’l Storage drawers
POWER7+ 730  8231-E2D   8 / 12 / 16 Cores

- Dual Sockets
- Processor modules:
  - 4 Core sockets: FC #EPCF 4.3 GHz
  - 6 Core sockets: FC #EPCG 4.2 GHz
  - 8 Core sockets: FC #EPCH 3.6 GHz
  - 8 Core sockets: FC #EPCJ 4.2 GHz

For 8 / 12 / 16 core
- Max 1 12X I/O loops
- Max 512 GB memory
- System unit HDD/SSD
- Disk/SD-only drawers supported
- Ultra SSD drawer
- Fibre Channel or FCoE attached SAN attachment
- IBM i P20 tier (5250)
- AIX small tier
AIX Operating System Support

- AIX V7.1 TL00: Statement of Direction
- AIX V7.1 TL01: Statement of Direction
- AIX V7.1 TL02: Service Pack 2, or later
- AIX V6.1 TL08: Service Pack 2, or later
- AIX V6.1 TL07: Service Pack 7, or later
  - Planned availability March 29, 2013
- AIX V6.1 TL06: Service Pack 11, or later
  - Planned availability March 29, 2013
- AIX V5.3 TL12: Statement of Direction
IBM i Operating System Support

- IBM i 7.1, or later
- IBM i 6.1.1 with machine code 6.1.1, or later
  - NOTE: on POWER7+ servers 6.1 is supported as a CLIENT partition accessing all I/O through either IBM i 7.1 or through VIOS without additional charge
  - For a modest additional charge, FC # EB24: IBM i 6.1.1 Native IO Enablement on the Power 710/720/730/740 adds native 6.1 I/O access
  - Without #EB34, IBM i 6.1 can not be ordered as the primary OS with FC #2145 & #0566

- SAN Load Source Specify
  Boot from SAN (FC #0837)
  Optional Load Source Specify

- System Console - Internal LAN (FC #5553)
Linux

- SUSE Linux Enterprise Server 11 Service Pack 2, or later
  - With current maintenance updates available from SUSE to enable all planned functionality.

- SOD for Red Hat Executive Linux:
  - Red Hat intends to continue to work with Red Hat to provide support for the new Power 710 (8231-E1D), PowerLinux 7R1 (8246-L1D, 8246-L1T), Power 720 (8202-E4D), Power 730 (8231-E2D), PowerLinux 7R2 (8246-L2D, 8246-L2T), Power 740 (8205-E6D), Power 750 (8408-E8D), and Power 760 (9109-RMD) with an upcoming Red Hat Enterprise Linux 6 release. For additional questions about the availability of this release and supported hardware servers, consult the Red Hat Hardware Catalog at https://hardware.redhat.com

  - RHEL 6 PRE-INSTALL FEATURE FOR POWER 710, 720, 730, 740, 750, 760, AND POWERLINUX 7R1, 7R2

  - IBM intends to provide support for pre-install of an upcoming Red Hat Enterprise Linux 6 release on the new Power 710 (8231-E1D), PowerLinux 7R1 (8246-L1D, 8246-L1T), Power 720 (8202-E4D), Power 730 (8231-E2D), PowerLinux 7R2 (8246-L2D, 8246-L2T), Power 740 (8205-E6D), Power 750 (8408-E8D) and Power 760 (9109-RMD) systems.

  - Information concerning Red Hat Enterprise Linux was obtained from Red Hat. Questions concerning Red Hat Enterprise Linux should be directed to Red Hat, as Red Hat Enterprise Linux is not an IBM product. Red Hat Enterprise Linux is sold or licensed, as the case may be, to users under Red Hat’s terms and conditions. Availability and support is the responsibility of Red Hat. IBM IS NOT LIABLE AND MAKES NO WARRANTIES, EXPRESS OR IMPLIED, REGARDING RED HAT ENTERPRISE LINUX, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OR CONDITION OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Moreover, all statements regarding IBM’s or Red Hat’s future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only. Information regarding potential future third-party products that may work 3 with an IBM product should not be relied on in making a purchase decision. The information mentioned regarding potential future third-party products is not a commitment, promise, or legal obligation to deliver 3 any material, code or functionality. Information about potential future third-party products may not be incorporated into any contract. The development, release, and timing of any future features or functionality 3 described for IBM or Red Hat products remains at IBM’s or Red Hat’s sole discretion, as applicable.
VIOS Support

- VIOS 2.2.2.2

- VIOS 2.2.1 SOD

**SOD:**

VIOS 2.2.1 SUPPORT FOR POWER 710, 720, 730, 740, 750, 760, POWER_LINUX 7R1, AND POWER_LINUX 7R2

IBM intends to provide to those customers with VIOS 2.2.1 the ability to run that environment on the new Power 710 (8231-E1D), PowerLinux 7R1 (8246-L1D, 8246-L1T), Power 720 (8202-E4D), Power 730 (8231-E2D), PowerLinux 7R2 (8246-L2D, 8246-L2T), Power 740 (8205-E6D), Power 750 8408-E8D) and Power 760 (9109-RMD).

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## POWER7+ 710 and 730

**POWER7+ 710: 1S2U**  
**POWER7+ 730: 2S2U**

### Power 710 8231-E1D
- **POWER7+ Architecture**
  - 4 Core @ 3.6 GHz  
  - 6 Core @ 4.2 GHz  
  - 8 Core @ 4.2 GHz
- **Planar**
  - Single Socket
- **DDR3 Memory**
  - 4 / 8 / 16 / 32 GB DIMMs  
  - 8GB to 256GB
- **SFF SAS Bays**
  - Up to 6 HDD or SSD
- **PCle Gen2 Expansion Slots**
  - Five x8 LP  
  - One x4 LP (Ethernet Adapter)
- **Integrated SAS/SATA Cntrl**
  - Standard: RAID 0, 1, & 10  
  - Optional: RAID 5 & 6
- **GX++ Slots**
  - One
- **Ethernet in 6th slot**
  - Quad 10/100/1000
- **FC # 2319 Support**
  - Yes
- **Media Bays**
  - 1 Slim-line & optionally 1 Half Height
- **12X PCIe Drawers**
  - No  
  - Yes / Max: 2
- **HDD/SSD drawer**
  - Max 4  
  - Max 14
- **Ultra SSD Drawer**
  - Max = 1/2  
  - Max = 1
- **Virtual Management**
  - IVM or HMC
- **EnergyScale Power & Cooling**
  - Optional  
  - Standard
- **Warranty**
  - 3 Years

### Power 730 8231-E2D
- **POWER7+ Architecture**
  - 8 Core @ 4.3 GHz  
  - 12 Core @ 4.2 GHz  
  - 16 Core @ 3.6 GHz  
  - 16 Core @ 4.2 GHz
- **Planar**
  - Dual Socket
- **DDR3 Memory**
  - 4 / 8 / 16 / 32 GB DIMMs  
  - 8GB to 512GB
- **SFF SAS Bays**
  - Up to 6 HDD or SSD
- **PCle Gen2 Expansion Slots**
  - Five x8 LP  
  - One x4 LP (Ethernet Adapter)
- **Integrated SAS/SATA Cntrl**
  - Standard: RAID 0, 1, & 10  
  - Optional: RAID 5 & 6
- **GX++ Slots**
  - One  
  - Two
- **Ethernet in 6th slot**
  - Quad 10/100/1000
- **FC # 2319 Support**
  - Yes
- **Media Bays**
  - 1 Slim-line & optionally 1 Half Height
- **12X PCIe Drawers**
  - No  
  - Yes / Max: 2
- **HDD/SSD drawer**
  - Max 4  
  - Max 14
- **Ultra SSD Drawer**
  - Max = 1/2  
  - Max = 1
- **Virtual Management**
  - IVM or HMC
- **EnergyScale Power & Cooling**
  - Optional  
  - Standard
- **Warranty**
  - 3 Years

* 4-core 710 does not use these I/O drawers

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# PowerLinux 7R1 / Power 710 Positioning

<table>
<thead>
<tr>
<th>Feature</th>
<th>PowerLinux 7R1 8246-L1T</th>
<th>PowerLinux 7R1 8246-L1D</th>
<th>Power 710 8231-E1D</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating Systems</strong></td>
<td>Linux</td>
<td>AIX, Linux</td>
<td>Linux</td>
</tr>
<tr>
<td><strong>POWER7+ Architecture</strong></td>
<td>4 Core @ 3.6 GHz</td>
<td>4 Core @ 3.6 GHz</td>
<td>4 Core @ 3.6 GHz</td>
</tr>
<tr>
<td><strong>Dual Sockets</strong></td>
<td>6 Core @ 4.2 GHz</td>
<td>6 Core @ 4.2 GHz</td>
<td>6 Core @ 4.2 GHz</td>
</tr>
<tr>
<td></td>
<td>8 Core @ 4.2 GHz</td>
<td>8 Core @ 4.2 GHz</td>
<td>8 Core @ 4.2 GHz</td>
</tr>
<tr>
<td><strong>DDR3 Memory</strong></td>
<td>4 / 8 / 16 / 32 GB DIMMs</td>
<td>4 / 8 / 16 / 32 GB DIMMs</td>
<td>4 / 8 / 16 / 32 GB</td>
</tr>
<tr>
<td></td>
<td>32GB to 256GB</td>
<td>8GB to 256GB</td>
<td>DIMMs</td>
</tr>
<tr>
<td><strong>12X PCIe Expansion Drawer</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>HDD/SSD storage drawers</strong></td>
<td>Up to 4</td>
<td>N/A</td>
<td>Up to 4</td>
</tr>
<tr>
<td><strong>EXP30 Ultra SSD Drawer</strong></td>
<td>N/A</td>
<td>N/A</td>
<td>Up to ½</td>
</tr>
<tr>
<td><strong>SAS SFF Bays</strong></td>
<td></td>
<td></td>
<td>Up to 6 HDD or SSD</td>
</tr>
<tr>
<td><strong>PCIe Gen2 Slots</strong></td>
<td>General Purpose: Five x8 LP &amp; Dedicated: One x4 LP (Ethernet Adapter)</td>
<td></td>
<td></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>
<td></td>
</tr>
<tr>
<td><strong>GX++ Slots</strong></td>
<td>One</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Integrated Ports</strong></td>
<td>3 USB, 2 Serial, 2 HMC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ethernet in 6th PCIe slot</strong></td>
<td>Quad Port 10/100/1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Media Bays</strong></td>
<td>1 Slim-line (DVD) &amp; optionally 1 Half Height (DAT 160/320 tape or RDX)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Virt Management</strong></td>
<td>IVM or HMC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Redundant Power &amp; Cooling</strong></td>
<td>Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Warranty</strong></td>
<td>3 Years</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# PowerLinux 7R2 / Power 730 Positioning

<table>
<thead>
<tr>
<th></th>
<th>PowerLinux 7R2 8246-L2T</th>
<th></th>
<th>Power 730 8231-E2D</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating Systems</strong></td>
<td>Linux</td>
<td>AIX, i5</td>
<td>Linux</td>
</tr>
<tr>
<td><strong>POWER7+ Architecture</strong></td>
<td>16 Cores @ 3.6 GHz</td>
<td>8 Cores @ 4.3 GHz</td>
<td>12 Core @ 4.2 GHz</td>
</tr>
<tr>
<td><strong>Dual Sockets</strong></td>
<td>16 Cores @ 4.2 GHz</td>
<td>16 Core @ 3.6 / 4.2 GHz</td>
<td></td>
</tr>
<tr>
<td><strong>DDR3 Memory</strong></td>
<td>4 / 8 / 16 / 32 GB DIMMs</td>
<td>4 / 8 / 16 / 32 GB DIMMs</td>
<td>8GB to 512GB</td>
</tr>
<tr>
<td></td>
<td>32GB to 512GB</td>
<td>32GB to 512GB</td>
<td></td>
</tr>
<tr>
<td><strong>12X PCIe Expansion Drawer</strong></td>
<td>Up to 2</td>
<td>N/A</td>
<td>Up to 2</td>
</tr>
<tr>
<td><strong>HDD/SSD storage drawers</strong></td>
<td>Up to 14</td>
<td>N/A</td>
<td>Up to 14</td>
</tr>
<tr>
<td><strong>EXP30 Ultra SSD Drawer</strong></td>
<td>Up to 1</td>
<td>N/A</td>
<td>Up to 1</td>
</tr>
<tr>
<td><strong>SAS SFF Bays</strong></td>
<td>Up to 6 HDD or SSD</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PCIe Gen2 Slots</strong></td>
<td>General Purpose: Five x8 LP &amp; Dedicated: One x4 LP (Ethernet Adapter)</td>
<td></td>
<td></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>
<td></td>
</tr>
<tr>
<td><strong>GX++ Slots</strong></td>
<td>Two</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Integrated Ports</strong></td>
<td>3 USB, 2 Serial, 2 HMC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ethernet in 6th PCIe slot</strong></td>
<td>Quad Port 10/100/1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Media Bays</strong></td>
<td>1 Slim-line (DVD) &amp; optionally Half Height (DAT 160/320 tape or RDX)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Virt Management</strong></td>
<td>IVM or HMC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Redundant Power &amp; Cooling</strong></td>
<td>Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Warranty</strong></td>
<td>3 Years</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
IBM PowerLinux 7R2 SAP SD 2-Tier Performance

28% Better than best published Linux 16-core Sandy Bridge EP result on the latest SAP SD 2-Tier benchmark (6_EHP5) with 16-core, 4.22 GHz PowerLinux 7R2

28% Better than best published Linux 16-core Sandy Bridge EP result on the latest SAP SD 2-Tier benchmark (6_EHP5) with 16-core, 4.22 GHz PowerLinux 7R2

POWER7+
IBM PowerLinux 7R2

#1 for SAP Linux on 2-socket

IBM PowerLinux 7R2 (4.22 GHz POWER7+, SLES 11 SP2)
HP DL 380 G8 (2.90 GHz Xeon E5 2690, RHEL 6.2)

SAP source: http://www.sap.com/benchmark/
As of 12/17/12.
SAP Publication number for HP results: 2012032
Agenda

- POWER7+ Chip Technology
- Power 710-760 Intro
- POWER7+ 710/730 & 7R1/7R2
- POWER7+ 720/740
- POWER7+ 750/760
- Active Memory Expansion for POWER7+
- SSD Enhancements
- New PCIe Gen2 Adapters
- New Removable Media Options
- HMC insights
- New IBM Networking switches
POWER7+ 720 Express

- Single Socket:
- 4U Form Factor
- POWER7+
- 4, 6 or 8 cores per socket
- Up to 512 GB Memory
- 5 + 4 PCIe x8 Gen2 Slots
- 6th PCIe x4 Gen2 slot for Ethernet
- One GX++ Slots
  - 12X PCI Drawer
  - Ultra SSD I/O Drawer option
- 6 SFF Bays
  - Optional add’l Storage drawers
- Optional Split Backplane support on planar
POWER7+ 720  8202-E4D  4 / 6 / 8 Core

- Single POWER7+ socket options:
  - FC #EPCK  4-core @ 3.6 GHz
  - FC #EPCL  6-core @ 3.6 GHz
  - FC #EPCM  8-core @ 3.6 GHz

- For 4 Core Systems
  - Max 64 GB memory
  - Zero 12X I/O loops
  - Zero Ultra SSD drawer
  - IBM i P05 tier (users)
  - AIX small tier

- For 6 / 8 Core Systems
  - Max 512 GB memory
  - Max one 12X I/O loop
  - Max one Ultra SSD drawer
  - IBM i P10 tier (users)
  - AIX small tier
520 / 720 Upgrade Paths Details (same serial number)

Notes:
- Same-serial-number upgrades from Power 720 to a newer Power 720 (B-to-C, B-to-D, or C-to-D) are not offered
- POWER6 9408-M25 to POWER6 8203-E4A conversions remain available
POWER7+ 740 Express

- Single or Dual Sockets
- 4U Form Factor
- **POWER7+**
- 6 or 8 cores per socket
- **Up to 1 TB Memory**
- 5 + 4 PCIe x8 Gen2 Slots
- 6th PCIe x4 Gen2 slot for Ethernet
- Dual GX++ Slots
  - 12X PCI Drawer option
  - Ultra SSD I/O Drawer option
- 6 SFF Bays
  - Optional add’l Storage drawers
- Optional Split Backplane support on planar
POWER7+ 740  8205-E6D  6 / 8 / 12 / 16 Core

- Single or dual sockets processor options:
  - FC #EPCP  6 Core @ 4.2 GHz
  - FC #EPCQ  8 Core @ 3.6 GHz
  - FC #EPCR  8 Core @ 4.2 GHz
- Can add 2nd module later

- For 6 / 8 Core Single Socket
  - Max 512 GB memory
  - Max 1 12X I/O loop
  - Max 1 EXP30 Ultra SSD Drawer
  - IBM i P20 tier / 5250 Entitlements
  - AIX small tier

- For 12 / 16-core Dual Sockets
  - Max 1024 GB memory
  - Max 2 12X I/O loops
  - Max 2 EXP30 Ultra SSD Drawer
  - IBM i P20 tier / 5250 Entitlements
  - AIX small tier

* Added 4Q 2010
## POWER7+ 720 / 740

### Power 720: 1S4U
- **Tower**

### Power 740: 2S4U

<table>
<thead>
<tr>
<th>Feature</th>
<th>Power 720 8202-E4D</th>
<th>Power 740 8205-E6D</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POWER7+ Architecture</strong></td>
<td>4-core 3.6 GHz</td>
<td>1 or 2 x 6-core 4.2 GHz</td>
</tr>
<tr>
<td></td>
<td>6-core 3.6 GHz</td>
<td>1 or 2 x 8-core 3.6 GHz</td>
</tr>
<tr>
<td></td>
<td>8 core 3.6 GHz</td>
<td>1 or 2 x 8-core 4.2 GHz</td>
</tr>
<tr>
<td><strong>Planar</strong></td>
<td>Single Socket</td>
<td>Dual Socket Single Socket option</td>
</tr>
<tr>
<td><strong>DDR3 Memory DIMMs</strong></td>
<td>4 / 8 / 16* / 32* GB</td>
<td>4 / 8 / 16 / 32 GB</td>
</tr>
<tr>
<td></td>
<td>4GB to 512* GB</td>
<td>4GB to 1 TB</td>
</tr>
<tr>
<td><strong>SAS SFF Bays</strong></td>
<td>Up to 6 or 8 HDD or SSD</td>
<td></td>
</tr>
<tr>
<td><strong>PCle Gen2 Expansion Slots</strong></td>
<td>Five x8 Full High (FH)  (Base)</td>
<td>One x4 FH (Base) / Ethernet Adapter</td>
</tr>
<tr>
<td></td>
<td>Four x8 LP (Optional)</td>
<td></td>
</tr>
<tr>
<td><strong>Integrated SAS Controller</strong></td>
<td>Standard: RAID 0, 1, &amp; 10</td>
<td>Optional: RAID 5 &amp; 6</td>
</tr>
<tr>
<td><strong>Integrated Ports</strong></td>
<td>3 USB, 2 Serial, 2 HMC</td>
<td></td>
</tr>
<tr>
<td><strong>Ethernet in 6th PCIe slot</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</td>
<td></td>
</tr>
<tr>
<td><strong>12X PCIe IO Drawers</strong></td>
<td>Max 2 **</td>
<td>Max 2 / 4</td>
</tr>
<tr>
<td><strong>12X PCI-X I/O Drawers</strong></td>
<td>Supported **</td>
<td>Supported</td>
</tr>
<tr>
<td><strong>HDD/SSD-only drawer</strong></td>
<td>Max 14 **</td>
<td>Max 14</td>
</tr>
<tr>
<td><strong>EXP30 Ultra SSD Drawer</strong></td>
<td>Max 1 **</td>
<td>Max 1 or 2</td>
</tr>
<tr>
<td><strong>Virt Management</strong></td>
<td>IVM &amp; HMC</td>
<td></td>
</tr>
<tr>
<td><strong>Redundant Power and Cooling</strong></td>
<td>Optional</td>
<td>Standard</td>
</tr>
<tr>
<td><strong>EnergyScale</strong></td>
<td></td>
<td>TPMD</td>
</tr>
<tr>
<td><strong>Warranty</strong></td>
<td></td>
<td>3 Years</td>
</tr>
</tbody>
</table>

* max of 64GB memory on 4-core Power 720
** max zero drawers on 4-core Power 720
Agenda

- POWER7+ Chip Technology
- Power 710-760 Intro
- POWER7+ 710/730 & 7R1/7R2
- POWER7+ 720/740
- POWER7+ 750/760
- Active Memory Expansion for POWER7+
- SSD Enhancements
- New PCIe Gen2 Adapters
- New Removable Media Options
- HMC insights
- New IBM Networking switches
Merging Power 770 & Power 740 = Power 750/760

- Quad Sockets
- IO Subsystem
- Memory Architecture
- RAS Features

Enterprise System features
Express System pricing

Power 770
Power 740
Power 750
Power 760
IBM Power 750 Express

Secure, reliable performance at an affordable price

- Completely redesigned to leverage the performance of POWER7+
- 30-40% more performance than non-IBM 32 core systems
- Twice the memory and VMs for greater levels of consolidation
- Energy Star compliant for efficiency
- 3 years of 24x7 service included with every system

IBM Power 760

Secure, reliable performance with On-Demand Expansion

- Great for virtualized consolidation of application workloads like SAP
- Beats the leading 80 core HP system result for SAP 2 tier performance
- Processor Upgrade on Demand for seamless growth
- Workload optimizing capabilities
- Installed by IBM for your convenience
- 3 years of 24x7 service included with every system
POWER7+ Power 750 / 760

- **New generation of Express/Enterprise Class servers**
  - Evolution of Power 750
  - Provides more Core, more Memory, more IO bandwidth, etc.

- **Wide range of uses..**
  - Data Base
  - ERP
  - Server consolidation

- **Enterprise features**
  - 40GB of Internal IO bandwidth
  - Split Backplane support standard
  - Six full size PCIe Gen2 slots with Blind swap support
  - Blind swap PCIe adapter support
  - Quad Socket processor design
  - Memory Density options
  - CUoD support ( Power 760 )

- Supports up to 640 / 960 LPARs
### Processor Offerings for Power 750 and Power 760

<table>
<thead>
<tr>
<th>Sockets</th>
<th>Cores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Power 750</td>
<td>8</td>
</tr>
<tr>
<td>Power 760</td>
<td>12</td>
</tr>
</tbody>
</table>

**Power 750**

**Power 760**
Power 750

✓ POWER7+
✓ 8 Cores per Socket @ 3.5 & 4.0 GHz
✓ Up to Four Sockets
✓ Up to 32 Cores
✓ Up to 1 TB of memory
✓ 6 PCIe Gen2 slots
✓ 6 SFF DASD/SSD Bays
✓ Multifunction card w/ up to 4 10GbE ports
✓ Enhanced RAS
✓ Three year maintenance coverage
POWER7+ 750 Editions

- Like Power 740 Express, Power 750 Express can qualify for 50% of processor activations at no charge
- To qualify need a minimum of 8GB per core memory
  - Rule applies to entire server, can not “partially qualify” and be allocated less than 50% no-charge features on the order

<table>
<thead>
<tr>
<th>Power 750 DCM processor</th>
<th>Chargeable Activation</th>
<th>No Charge Activation</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0 GHz #EPT7</td>
<td>#EPTE</td>
<td>#EPTC</td>
</tr>
<tr>
<td>3.5 GHz #EPT8</td>
<td>#EPTF</td>
<td>#EPTD</td>
</tr>
</tbody>
</table>
## Power 750

**Up to 32 Cores**

**4 Socket / 5U**

Supports up to 640 LPARs

### 8408-E8D

<table>
<thead>
<tr>
<th>Feature</th>
<th>Power 750 Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER7+ Arch.</td>
<td>8-core DCM @ 4.0 GHz</td>
</tr>
<tr>
<td>Up to 4 Sockets</td>
<td>8-core DCM @ 3.5 GHz</td>
</tr>
<tr>
<td>DDR3 Memory</td>
<td>Up to 1 TB</td>
</tr>
<tr>
<td>Capacity on Demand</td>
<td>N / A</td>
</tr>
<tr>
<td>SAS SFF Bays</td>
<td>Up to 6 HDD or SSD</td>
</tr>
<tr>
<td></td>
<td>Split Backplane support</td>
</tr>
<tr>
<td>IO Expansion Slots in CEC</td>
<td>PCIe x8: 6 Slots (Hot Swap)</td>
</tr>
<tr>
<td></td>
<td>Dual GX++ Bus (with 2 or more DCM)</td>
</tr>
<tr>
<td>Integrated IO Cntrl</td>
<td>SAS (Dual) plus SATA</td>
</tr>
<tr>
<td></td>
<td>Standard RAID 0, 1, &amp; 10</td>
</tr>
<tr>
<td></td>
<td>Optional RAID 5 &amp; 6</td>
</tr>
<tr>
<td>IVM / HMC Support</td>
<td>Yes / Yes (HMC optional)</td>
</tr>
<tr>
<td>Integrated Multifunction Card (IMFC)</td>
<td>4 Ethernet (Dual 10 Gb &amp; Dual 1 Gb or Quad 10Gb); 2 USB, 1 serial</td>
</tr>
<tr>
<td>Integrated Ports</td>
<td>1 USB, 2 HMC, 2 SPCN, plus IMFC</td>
</tr>
<tr>
<td>Media Bays</td>
<td>1 Slim-line for DVD</td>
</tr>
<tr>
<td>12X PCIe IO Drawers</td>
<td>Max 4 (no PCI-X drawers)</td>
</tr>
<tr>
<td>EXP30 Ultra SSD Drawer</td>
<td>Max 2</td>
</tr>
<tr>
<td>HDD/SSD-only drawer</td>
<td>Max 51</td>
</tr>
<tr>
<td>Redundant Power</td>
<td>Yes</td>
</tr>
<tr>
<td>Redundant Cool</td>
<td>Yes</td>
</tr>
<tr>
<td>EnergyScale</td>
<td>Dynamic Energy Save &amp; Capping</td>
</tr>
</tbody>
</table>

### Additional Features

- **3 Yr Maintenance**
  - 24 x 7
- **Operating Systems**
  - AIX
  - i for Business
  - Linux
- **Media Bays**
  - 1 Slim-line for DVD
- **EXP30 Ultra SSD Drawer**
  - Max 2
  - (no PCI-X drawers)
- **Redundant Power**
  - Yes
- **Redundant Cool**
  - Yes
- **EnergyScale**
  - Dynamic Energy Save & Capping
Power 760

✓ POWER7+
✓ 12 Cores per Socket @ 3.1 & 3.4 GHz
✓ Up to Four Sockets
✓ Up to 48 Cores
✓ Up to 2 TB of memory
✓ 6 PCIe Gen2 slots
✓ 6 SFF DASD/SSD Bays
✓ Multifunction card w/ up to 4 10Gb E ports
✓ Capacity on Demand for Processors
  ▪ Permanent activations
  ▪ Dynamic Processor Sparing
✓ Enhanced RAS
✓ Three year maintenance coverage
Power 760 Capacity Upgrade on Demand

- Minimum of 8 Core activations is required
- Permanent activations only
  - No temporary or Trial CoD
    - No Elastic (On/Off) CoD or Utility CoD
- No memory CoD
  - Plan ahead for memory demands
  - Adding memory requires system unit to be powered down
- Dynamic Processor Sparing is available

CUoD provides flexibility to have “stand by” resources available to be permanently activated.

<table>
<thead>
<tr>
<th>Power 760</th>
<th>0/12-core DCM feature</th>
<th>Processor core activation feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 GHz</td>
<td>#EPT5</td>
<td>#EPTA</td>
</tr>
<tr>
<td>3.4 GHz</td>
<td>#EPT6</td>
<td>#EPTB</td>
</tr>
</tbody>
</table>

Prices shown are IBM USA suggested list prices as of Feb 2013 and are subject to change without notice; Reseller prices may vary.
## Power 760

**Up to 48 Cores**
4 Socket / 5U

Supports up to 960 LPARs

### 3 Yr Maintenance
24 x 7

---

### IBM Power Systems

<table>
<thead>
<tr>
<th>9109-RMD</th>
</tr>
</thead>
</table>
| **POWER7+ Arch.** | 12-core DCM @ 3.4 GHz  
12-core DCM @ 3.1 GHz |
| **Up to 4 Sockets** | Up to 2 TB |
| **Capacity on Demand** | Yes for Processors (Permanent only) |
| **SAS SFF Bays** | Up to 6 HDD or SSD  
Split Backplane support |
| **IO Expansion Slots in CEC** | PCIe x8: 6 Slots (Hot Swap)  
Dual GX++ Bus (with 2 or more DCM) |
| **Integrated IO Cntrl** | SAS (Dual) plus SATA  
Standard RAID 0, 1, & 10  
Optional RAID 5 & 6 |
| **IVM / HMC Support** | No / Yes (HMC required) |
| **Integrated Multifunction Card (IMFC)** | 4 Ethernet (Dual 10 Gb & Dual 1 Gb or Quad 10Gb); 2 USB, 1 serial |
| **Integrated Ports** | 1 USB, 2 HMC, 2 SPCN, plus IMFC |
| **Media Bays** | 1 Slim-line for DVD |
| **12X PCIe IO Drawers** | Max 4 (no PCI-X drawers) |
| **EXP30 Ultra SSD Drawer** | Max 2 |
| **HDD/SSD-only drawer** | Max 51 |
| **Redundant Power** | Yes |
| **Redundant Cooling** | Yes |
| **EnergyScale** | Dynamic Energy Save & Capping |

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6 SFF DASD/SSD Bays
- Standard split Backplane 3+3
- Optional 2+2+2 split
- Optional 6 (no split) w/ RAID5/6

Batteries for Opt RAID5/6 Write Cache

Op Panel
Power 750 / 760 Rear View

- HMC Ports
- SPCN Ports
- PCIe
- PCIe
- PCIe
- PCIe
- PCIe
- PCIe
- GX++ Bus
- GX++ Bus
- Power Supplies
- VPD
- 1Gbt ENet
- 10 Gb ENet
- USB Ports
- Serial Port
Blind Swap Cassette (BSC) support...

- Same as BSC for Power 770 and 780 system unit
  - Different from the Gen3 BSC in the #5802/5877 12X I/O Drawers
- Easier, more reliable connections
  - No lever to move PCIe card downward and into PCI connections
- Empty PCIe slots in a processor enclosure “filled” with an empty BSC when shipped from IBM Manufacturing.
- PCIe adapters when needed can be placed by a client in the empty BSC and then inserted in the processor enclosure
<table>
<thead>
<tr>
<th>Feature</th>
<th>POWER7 750</th>
<th>POWER7+ 750</th>
<th>POWER7+ 760</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sockets</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Cores</td>
<td>32</td>
<td>32</td>
<td>48</td>
</tr>
<tr>
<td>Frequencies</td>
<td>3.2 – 3.6 GHz</td>
<td>3.5 – 4.0 GHz</td>
<td>3.1 – 3.4 GHz</td>
</tr>
<tr>
<td>Maximum Memory</td>
<td>512 GB</td>
<td>1 TB</td>
<td>2 TB</td>
</tr>
<tr>
<td>GX slots</td>
<td>1 GX++ &amp; 1 shared GX</td>
<td>2 GX++</td>
<td>2 GX++</td>
</tr>
<tr>
<td>PCI slots</td>
<td>2 PCIe Gen1</td>
<td>6 PCIe Gen2</td>
<td>6 PCIe Gen2</td>
</tr>
<tr>
<td>MultiFunction Ethernet ports *</td>
<td>Four 1Gb or two 10Gb</td>
<td>Two 10Gb CNA + Two 10/1 Gb</td>
<td>Two 10Gb CNA + Two 10/1 Gb</td>
</tr>
<tr>
<td>SFF SAS bays</td>
<td>6 / 8</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Integrated split backplane</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>LPARs</td>
<td>10 per core</td>
<td>20 per core</td>
<td>20 per core</td>
</tr>
<tr>
<td>Height</td>
<td>4U</td>
<td>5U</td>
<td>5U</td>
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<tr>
<td>Installation</td>
<td>Customer Set-Up</td>
<td>Customer Set-Up</td>
<td><strong>IBM installed</strong></td>
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<tr>
<td>CoD</td>
<td>N / A</td>
<td>N / A</td>
<td><strong>Processor on Demand</strong></td>
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<tr>
<td>Software Tier</td>
<td>Small</td>
<td>Small</td>
<td><strong>Medium</strong></td>
</tr>
<tr>
<td>HMC</td>
<td>Optional</td>
<td>Optional</td>
<td><strong>Required</strong></td>
</tr>
</tbody>
</table>
POWER7+ Performance

rPerf ratings charted. If CPW ratings charted, the bars show the same scaling.
Power 750 / 760 Performance …

- Power 595 POWER5+ 64 Core @ 2.3 GHz
- Power 570 POWER6 16 Core @ 5.0 GHz
- Power 750 POWER7+ 32 Core @ 4.0 GHz
- Power 760 POWER7+ 48 Core @ 3.4 GHz

rPerf ratings charted. If CPW ratings charted, the bars show the same scaling.
New POWER7+ systems demonstrate performance leadership

**Power 750 with POWER7+** (32 cores @ 4.0 GHz)

- 40% better SPECint_rate than the best 32-core non-IBM result
- 34% better SPECfp_rate than the best 32-core non-IBM result
- 42% better SPECjbb than the best 32-core non-IBM result

**Power 760 with POWER7+** (48 cores @ 3.4 GHz)

- 37% better SPECint_rate than the best 64-core non-IBM result
- 22% better SPECfp_rate than the best 64-core non-IBM result
- 32% better SPECjbb than the best 64-core non-IBM result
- 87% more SAP users than the best 40 core non-IBM result

IBM results to be submitted on 2/5/13
New Power 750 demonstrates leadership results

**SPECint_rate2006** – 1,740 for 32-core system @ 4.0 GHz
- Best 32 core result in the industry
- 40% better than the best 32-core non-IBM result

**SPECfp_rate2006** – 1,200 for 32-core system @ 4.0 GHz
- Best 32 core result in the industry
- 34% better than the best 32-core non-IBM result

**SPECjbb2005** – 3,983K for 32-core system @ 4.0 GHz
- Best 32 core result in the industry
- 42% better than the best 32-core non-IBM result

IBM results to be submitted on 2/5/13.
New Power 760 demonstrates leadership results

**SPECint_rate2006** – 2,170 for 48-core system @ 3.4 GHz
  • 37% better than the best 64-core non-IBM result

**SPECfp_rate2006** – 1,400 for 48-core system @ 3.4 GHz
  • 22% better than the best 64-core non-IBM result

**SPECjbb2005** – 5,032 for 48-core system @ 3.4 GHz
  • 32% better than the best 64-core non-IBM result

**SAP 2-tier S&D** – 25,488 uses for 48-core system @ 3.4 GHz
  • Highest 4-socket result in industry
  • 87% better than the best 4 socket non-IBM result

# POWER7+ RAS Feature Overview

<table>
<thead>
<tr>
<th>RAS Item</th>
<th>Power 750+</th>
<th>Power 760+</th>
<th>Power 770+</th>
<th>Power 780+</th>
<th>Power 795</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redundant / Hot Swap Fans &amp; Blowers</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<td>●</td>
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<tr>
<td>Hot Swap DASD / Media / PCI Adapters</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Concurrent Firmware Update</td>
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<td>●</td>
<td>●</td>
<td>●</td>
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<td>Redundant / Hot Swap Power Supplies</td>
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<tr>
<td>Dual disk controllers (split backplane)</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<td>Processor Instruction Retry</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Alternate Processor Recovery</td>
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<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Redundant / Hot Swap Power Regulators</td>
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<td>PowerVM™/Live Part. Mobility/Live App Mobility</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<td>Dynamic Processor Sparing</td>
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<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Memory Sparing</td>
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<td>●</td>
<td>●</td>
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<tr>
<td>Redundant Service Processors</td>
<td></td>
<td></td>
<td>●*</td>
<td>●*</td>
<td>●</td>
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<tr>
<td>Redundant System Clocks</td>
<td></td>
<td></td>
<td>●*</td>
<td>●*</td>
<td>●</td>
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<tr>
<td>Hot GX Adapter Add and Cold Repair</td>
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<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Hot-node Add / Cold-node Repair</td>
<td></td>
<td></td>
<td>●*</td>
<td>●*</td>
<td>●</td>
</tr>
<tr>
<td>Hot-node Repair / Hot-memory Add</td>
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<td></td>
<td>●*</td>
<td>●*</td>
<td>●</td>
</tr>
<tr>
<td>Dynamic Service Processor &amp; System Clock Failover</td>
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<td>Hot-node Repair / Hot-memory Add for all nodes</td>
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<td>●*</td>
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<td>Enterprise Memory</td>
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<td>Hot GX Adapter Repair</td>
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<tr>
<td>Active Memory Mirroring for Hypervisor</td>
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<td>●</td>
<td>●</td>
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<tr>
<td>Power Pools</td>
<td></td>
<td></td>
<td>●</td>
<td>●</td>
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</tr>
</tbody>
</table>

* Requires two or more nodes
AIX Operating System Support

- AIX V7.1 TL00: Statement of Direction
- AIX V7.1 TL01: Statement of Direction
- AIX V7.1 TL02: Service Pack 2, or later

- AIX V6.1 TL08: Service Pack 2, or later
- AIX V6.1 TL07: Service Pack 7, or later
  - Planned availability March 29, 2013
- AIX V6.1 TL06: Service Pack 11, or later
  - Planned availability March 29, 2013

- AIX V5.3 TL12: Statement of Direction
  - Must have AIX 5.3 Service Extension contract signed
# AIX / VIOS Software Support

<table>
<thead>
<tr>
<th></th>
<th>PS700</th>
<th>Power 710 / 730 720 / 740 795</th>
<th>PS703</th>
<th>Power 710⁻¹ / 730⁻¹ 720⁻¹ / 740⁻¹ 770⁻¹ / 780⁻¹</th>
<th>PureFlex p260 p460</th>
<th>Power 770+ / 780+</th>
<th>Power 710+ / 730+ 720+ / 740+ 750+ / 760</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIX.5.3 TL10</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>
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<tr>
<td>AIX.5.3 TL11</td>
<td>SP 5</td>
<td>SP 5</td>
<td>SP 7</td>
<td>N / A</td>
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<td>AIX.5.3 TL12</td>
<td>New</td>
<td>SP 1</td>
<td>SP 4</td>
<td>SP 5</td>
<td>SP 6</td>
<td>SP 7</td>
<td>SoD</td>
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<td>AIX 6.1 TL4</td>
<td>SP 7</td>
<td>SP 7</td>
<td>SP 10</td>
<td>N / A</td>
<td>N / A</td>
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<td>AIX 6.1 TL5</td>
<td>New</td>
<td>SP 3</td>
<td>SP 6</td>
<td>SP 7</td>
<td>N / A</td>
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<td>AIX 6.1 TL6</td>
<td>New</td>
<td>New</td>
<td>SP 5</td>
<td>SP 6</td>
<td>SP 8</td>
<td>SP 10</td>
<td>SP 11</td>
</tr>
<tr>
<td>AIX 6.1 TL7</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>SP 3</td>
<td>SP 6</td>
<td>SP 7</td>
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<td>AIX 6.1 TL8</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>SP 6</td>
<td>SP 2</td>
</tr>
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<td>AIX 7.1 TL0</td>
<td>New</td>
<td>New</td>
<td>SP 3</td>
<td>SP 4</td>
<td>SP 6</td>
<td>SP 8</td>
<td>SoD</td>
</tr>
<tr>
<td>AIX 7.1 TL1</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>SP 3</td>
<td>SP 6</td>
<td>SP 6</td>
<td>SoD</td>
</tr>
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<td>AIX 7.1 TL2</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>New</td>
<td>SP 2</td>
<td></td>
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<tr>
<td>VIOS</td>
<td>2.1.3</td>
<td>2.2</td>
<td>2.2.0.12 FP24 + SP2</td>
<td>2.2.1</td>
<td>2.2.1</td>
<td>2.2.1.5 SP 2.2.1.5 SoD</td>
<td>2.2.2.2 SP 2.2.1.5 SoD</td>
</tr>
</tbody>
</table>

*Notes:*
- AIX/G5/G6/G7/S/SP: IBM AIX releases
- PureFlex: IBM PureFlex Systems releases
- POWER7+: IBM POWER7+ releases
IBM i Operating System Support

- IBM i 7.1, or later
- IBM i 6.1.1 with machine code 6.1.1, or later
  - NOTE: on POWER7+ servers 6.1 is supported as a CLIENT partition accessing all I/O through either IBM i 7.1 or through VIOS without additional charge
  - For a modest additional charge, FC # EB24: *IBM i 6.1.1 Native IO Enablement* on the Power 710/720/730/740 adds native 6.1 I/O access
  - Without #EB34, IBM i 6.1 can not be ordered as the primary OS with FC #2145 & #0566

- SAN Load Source Specify
  Boot from SAN (FC #0837)
  Optional Load Source Specify

- System Console - Internal LAN (FC #5553)
Linux

- SUSE Linux Enterprise Server 11 Service Pack 2, or later
  - With current maintenance updates available from SUSE to enable all planned functionality.

- SOD for Red Hat Executive Linux:
POWER7+
750 / 760
Integrated Multifunction Card
Multifunction Cards

**FC #1768 (Copper)**
**FC #1769 (Optical)**
- Dual 10 Gb Optical / 1 Gb Ethernet
- Dual 10 Gb Copper / 1 Gb Ethernet

**FC #EN10 (Copper)**
**FC #EN11 (Optical)**
- Dual 10 Gb Optical / 1/10 Gb Ethernet
- Dual 10 Gb Copper / 1/10 Gb Ethernet

- 10Gb / 1Gb / 100Mb RJ45 Ethernet
- USB
- Serial

- 10 Gb Ethernet
- USB
- Serial

- 10Gb / 1Gb / 100Mb RJ45 Ethernet
- CAT-6A cabling
**Integrated Multifunction Card**

- **2 Ethernet RJ45 ports**
- **2 Ethernet SFP+ 10Gb ports**
- **2 USB ports**
- **1 serial port**

**Ethernet ports**

<table>
<thead>
<tr>
<th>Description</th>
<th>10Gb SFP+ uses Copper Twinax cabling (max 5 meter)</th>
<th>10Gb SFP+ uses SR Optical cabling (max 300 meter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RJ45 is <strong>10Gb/1Gb/100Mb</strong> with CAT-6A cabling</td>
<td>#EN10 = $ 3013</td>
<td>#EN11 = $ 4061</td>
</tr>
<tr>
<td>SFP+ is 10Gb <strong>CNA</strong> (FCoE and NIC)</td>
<td>#1768 = $ 1785</td>
<td>#1769 = $ 3358</td>
</tr>
<tr>
<td>RJ45 is <strong>1Gb/100Mb/10Mb</strong> with CAT-5 or CAT-6 cabling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SFP+ is 10Gb <strong>NIC only</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Prices shown are IBM USA suggested list prices as of Feb 2013 on a Power 760 and are subject to change without notice; Reseller prices may vary.
Unlike POWER7 750 or POWER7/POWER7+ 770, No PCI-X slots
• Thus no SCSI I/O
• Can’t migrate older PCI-X drawers to 750/760

Unlike POWER7 750, need two or more processor sockets filled for any GX++ capability
• 1 DCM = 0 GX++ slots usable
• 2-4 DCM = 2 GX++ slots usable
Agenda

- POWER7+ Chip Technology
- Power 710-760 Intro
- POWER7+ 710/730 & 7R1/7R2
- POWER7+ 720/740
- POWER7+ 750/760
- Active Memory Expansion for POWER7+
- SSD Enhancements
- New PCIe Gen2 Adapters
- New Removable Media Options
- HMC insights
- New IBM Networking switches
POWER7+ Active Memory Expansion

- 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)

Note expansion percentage very workload dependent
Benefit of POWER7+ HW Accelerator

- **Less CPU for the same amount of memory expansion**
  - Can then run more partitions or work per partition
  - If fewer cores needed, may result in lower software licensing

- **OR more memory expansion for the same amount of processor**
  - Better able to relieve memory shortages and improve performance
  - May be able to do more work
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.
Active Memory Expansion – Client Deployment Steps

**1. Planning Tool (AMEPAT)**
- A. Part of AIX 6.1 TL4
- B. Calculates data compressibility & estimates CPU overhead due to Active Memory Expansion
- C. Provides initial recommendations

**2. 60-Day Trial (no charge)**
- A. One-time, temporarily enablement
- B. Config LPAR based on planning tool
- C. Use AIX tools to monitor Act Mem Exp environment
- D. Tune based on actual results

**3. Deploy into Production**
- A. Permanently enable Active Memory Expansion
- B. Deploy workload into production
- C. Continue to monitor workload using AIX performance tools

- **Estimated Results**
  - CPU Utilization
    - Memory Expansion

- **Actual Results**
  - CPU Utilization
  - App. Performance
    - Memory Expansion
  - Performance
    - Time

Same for POWER7+ as for POWER7 servers
Agenda

- POWER7+ Chip Technology
- Power 710-760 Intro
- POWER7+ 710/730 & 7R1/7R2
- POWER7+ 720/740
- POWER7+ 750/760
- Active Memory Expansion for POWER7+
- SSD Enhancements
- New PCIe Gen2 Adapters
- New Removable Media Options
- HMC insights
- New IBM Networking switches
SSD Savings with 6-Packs and 4-Packs

Save 20%  PLUS
convenient to order & easy to understand / explain

Order with a new server order

For Ultra SSD I/O Drawer:

A 2.3 TB six-pack = up to 140,000 IOPS for 20% less than buying single features

For EXP24S Drawer or system unit or 12X drawer:

A 1.5 TB four-pack = up to 90,000 IOPS for 20% less than buying single features

Prices shown are IBM USA suggested list prices and are subject to change without notice; reseller prices may vary. Packs consists of six or four SSD drives. An SSD drawer or SAS controller is not included in the pack. Maintenance after warranty is not discounted. IOPS are read-only using a typical workload used to measure I/O workload, not necessarily typical server I/O usage. IOPs achievable will vary with the configuration.
SSD Six-Packs  (#ESR2/ESR4)

For Ultra SSD Drawer:

- A 2.3TB six-pack = up to 140,000 IOPS for 20% less than buying six single features
- Assuming Power 740, list price savings = $7,320 for one 6-pack
- Package is SSD only. EXP30 Ultra SSD Drawer ordered in addition to six-packs

For EXP30 Ultra SSD I/O Drawer
- #EDR1 or #5888
- Must order with a new server, no MES orders.
- Max quantity = 5X available Ultra SSD Drawers which can hold them
  - #ESR2 (AIX, Linux, VIOS) (= 6 X #ES02)
  - #ESR4 (IBM i) (= 6 X #ES04)

Prices shown are IBM USA suggested list prices and are subject to change without notice; reseller prices may vary. Packs consists of six or four SSD drives. An SSD drawer or SAS controller is not included in the pack. Maintenance after warranty is not discounted. IOPS are read-only using a typical workload used to measure I/O workload, not necessarily typical server I/O usage. IOPs achievable will vary with the configuration.
SSD Four-Packs (#ESRA/ESRB/ESRC/ESRD)

- A 1.5TB four-pack = up to 90,000 IOPS for 20% less than buying four single features

- Assuming Power 740, list price savings = $4,960 for one 4-pack

- Package is SSD only. SAS bay enclosure or SAS adapters ordered in addition to four-packs

- Must order with a new server, no MES orders.

- Max quantity = 1
  - Qty ESRA + ESRB + ESRC + ESRD = 1

- For CEC or for #5802/5803
  - #ESRA (AIX, Linux, VIOS) (= 4 x #ES0A)
  - #ESRB (IBM i) (= 4 x #ES0B)

- For #5887 EXP24S I/O Drawer
  - #ESRC (AIX, Linux, VIOS) (= 4 x #ES0C)
  - #ESCD (IBM i) (= 4 x #ES0D)

- Can be ordered with “singles” features

Prices shown are IBM USA suggested list prices and are subject to change without notice; reseller prices may vary. Packs consists of six or four SSD drives. An SSD drawer or SAS controller is not included in the pack. Maintenance after warranty is not discounted. IOPS are read-only using a typical workload used to measure I/O workload, not necessarily typical server I/O usage. IOPs achievable will vary with the configuration.
EXP30 Ultra SSD I/O Drawer Enhancements

Feb 2013 Announcements:
- Support on ‘D’ models of 710, 720, 730, 740, 750, 760 (already supported on ‘D’ model 770 and 780)
- SOD for ‘C” model 770 and 780
- IBM i 7.1 TR6 native support  (AIX/Linux already in place)
- New 6-pack convenience package
- Uses zero PCIe slots – attaches to GX++ slot
- 3.1GB write cache SAS adapters integrated in drawer.

Ultra performance
Ultra density

Up to 480,000 IOPS (100% read)
Up to 11.6 TB
Up to 4.5 GB/s bandwidth
Downstream HDD
Front, Rear and Inner Views…

1.8” SSD Bays
30 Bays !!!!
Ultra Drawer Attachment: GX++ PCIe2 Adapter

**POWER7+ 750 & 760**

- Uses zero PCIe slots!
- **Rear of EXP30 Ultra Drawer (#EDR1)**
- **GX++ PCIe2 Adapter #1914**
- **2 ports**
- **PCle cables**
  - #EN05 (1.5m),
  - #EN07 (3m),
  - #EN08 (8m)

“D” Model 750/760

- Integrated SAS RAID controller connects to Power server into a GX++ PCIe2 Adapter via PCIe cable

- GX++ PCIe2 Adapter plugs into a GX++ slot –
  - **NOTE:** a 12X I/O loop can NOT be connected to that GX++ slot
Ultra Drawer Cabling Examples to the 750/760

One Ultra Drawer with both connections to a single #1914 GX++ adapter

One Ultra Drawer attached to two different #1914 GX++ adapters *

Two Ultra Drawers, each attached to two different #1914 GX++ adapters *

* Attaching an Ultra Drawer to two different GX++ PCI adapters provides additional redundancy
“Sharing” an Ultra Drawer

- Nice High Availability option for two servers or two* partitions
- But BE CAREFUL !!!
  - Exactly the same considerations as sharing a pair of SAS adapters between two servers or two partitions with AIX/Linux (not IBM i)
  - Both controllers can read all the attached SAS drives
  - Both controllers can WRITE to all the attached SAS drives
  - User-written application code or applications such as PowerHA need to control when this is allowed to avoid problems
    - NOTE – As of Feb 2013, PowerHA application has not tested and thus doesn’t not support the use of the Ultra SSD Drawer

* If VIOS is virtualizing, could be more than two partitions
Ultra Drawer Attachment Downstream HDD

- Up to 78 SAS bays in 5U
- Up to 54.8TB in just 5U
  - Up to 11.6 TB SSD (30 x 387GB drives)
  - Up to 43.2 TB HDD (48 x 900GB drives)
- Zero PCIe slots! Direct GX++ connection
- With huge IOPs

Up to two* EXP24S #5887 disk drawers run by the two integrated SAS controllers in the #EDR1 Ultra Drawer

IBM i supports one downstream EXP24S off the #EDR1. Thus
Up to 54 SAS bays in 3U
Up to 32TB in just 3U
Integrated SAS RAID controllers in Ultra Drawer run the 30 SSD bays in the Ultra Drawer PLUS run up to 48 HDD SAS bays in up to two #5887 EXP24S Drawers *

Each of the two integrated SAS controllers need a SAS EX cable connection to the #EXP24S Drawer.

Note: only HHD, not SSD in the downstream #5887 EXP24S are supported. The EXP24S must be in mode 1.

IBM i supports up to one downstream #5887 EXP24S
EXP30 Ultra SSD I/O Drawer OS Support Levels
For #EDR1

- **AIX**
  - Version 7.1 with the 7100-02 Technology Level, or later
  - Version 7.1 with the 7100-01 Technology Level and Service Pack 6, or later
  - Version 7.1 with the 7100-00 Technology Level and Service Pack 8, or later
  - Version 6.1 with the 6100-08 Technology Level, or later
  - Version 6.1 with the 6100-07 Technology Level and Service Pack 6, or later
  - Version 6.1 with the 6100-06 Technology Level and Service Pack 10, or later

- **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 V2.2.2.0**
- **VIOS V2.2.1.5**
- **IBM i 7.1 TR6 for native support (no VIOS support)**
  - Announced Feb 2013
  - #EDR1 only support, no #5888 support
<table>
<thead>
<tr>
<th></th>
<th>EXP30 Ultra Drawer SOD Summary   (April 2012)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>More POWER7 Models supported in the future</td>
</tr>
<tr>
<td>2.</td>
<td>Down stream HDD drawers</td>
</tr>
<tr>
<td>3.</td>
<td>Easy Tier capability for HDD drawers (AIX/Linux)</td>
</tr>
<tr>
<td>4.</td>
<td>DS8000 integration -- DAS performance + SAN functionality</td>
</tr>
</tbody>
</table>
Agenda

- POWER7+ Chip Technology
- Power 710-760 Intro
- POWER7+ 710/730 & 7R1/7R2
- POWER7+ 720/740
- POWER7+ 750/760
- Active Memory Expansion for POWER7+
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- New PCIe Gen2 Adapters
- New Removable Media Options
- HMC insights
- New IBM Networking switches
4-port 10GbE CNA & 1GbE Adapter

- Two ports: 10 Gb per port
  - CNA (Converged Network Adapter) – FCoE & NIC
- Two ports: 1 Gb (1000Mb) or 100Mb per port
  - NIC (Network Interface Card)

- For PCIe Gen2 slots in POWER7+ 710/720/730/740/750/760
  - SOD for 770/780 (‘C’ and ‘D’ models)
  - For Power 795 see #EN23 2-port 10Gb CNA GX++ Adapter

- NPIV support through VIOS for FCoE

- AIX, IBM i, Linux, VIOS support
  - AIX Version 7.1 with TL 7100-02 and Service Pack 2, or later
  - AIX Version 6.1 with TL 6100-08 and Service Pack 2, or later
  - AIX Version 6.1 with TL 6100-07 and Service Pack 7, or later (Planned availability March 29, 2013)
  - IBM i 6.1 -- VIOS required. NIC supported, FCoE not tested/supported
  - IBM i 7.1 -- VIOS required. NIC supported, FCoE not tested/supported
  - SUSE Linux Enterprise 11 Service Pack 2, or later
  - Red Hat Executive Linux – see SOD
  - VIOS requires VIOS 2.2.2.2, or later
2-port 16 Gb Fibre Channel (HBA)

- Runs at 16Gb, 8Gb or 4Gb
- For POWER7+ 710/720/730/740/750/760
  - SOD for 770/780 (‘C’ and ‘D’ models)

- Compared to the #5735 2-port 8Gb FC
- Price* #5735 = $3499 #EN0A = $4500

- Only 30% more price = 100% more bandwidth**
- Even if not using 16Gb switches / devices today, for just a little more, buy and use an adapter which can adapt to your future configurations

- AIX, IBM i, Linux, VIOS support
  - AIX Version 7.1 with TL 7100-02 and Service Pack 2, or later
  - AIX Version 6.1 with TL 6100-08 and Service Pack 2, or later
  - AIX Version 6.1 with TL 6100-07 and Service Pack 7, or later (Planned availability March 29, 2013)
  - IBM i 6.1 -- VIOS required. Both VSCSI and NPIV protocols supported.
  - IBM i 7.1 -- VIOS required. Both VSCSI and NPIV protocols supported.
  - SUSE Linux Enterprise 11 Service Pack 2, or later
  - Red Hat Executive Linux – see SOD
  - VIOS requires VIOS 2.2.2.2, or later

* Prices shown are IBM USA suggested list prices as of Feb 2013 on a Power 720 and are subject to change without notice; Reseller prices may vary.
** Running at 8Gb provides half the potential bandwidth compared to running at 16 Gb. Running at 4Gb provides ¼ the potential bandwidth.
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- New IBM Networking switches
New RDX 1.5 TB Cartridge (#EU15)

- Expanding strategic ENTRY save/restore technology
- 50% larger capacity than previous max capacity
- Larger capacity than DAT 80/160 cartridge
  - 1770% more no compression (80GB)
  - 830% more with 2X compression (160 GB)
  - 360% more with 4X compression (320 GB)
- Lower cost per GB RDX storage
- Works on all RDX docking stations
  - #EU03, #EU04, #EU23, #1103, #1104, #1123
- Supported by AIX, IBM i, Linux

<table>
<thead>
<tr>
<th>RDX Cartridge</th>
<th>320GB #EU08</th>
<th>500GB #1107</th>
<th>1 TB #EU01</th>
<th>1.5 TB #EU15</th>
</tr>
</thead>
<tbody>
<tr>
<td>$/GB</td>
<td>$0.70</td>
<td>$0.59</td>
<td>$0.35</td>
<td>$0.33</td>
</tr>
</tbody>
</table>

Prices shown are IBM USA suggested list prices as of Feb 2013 on a Power 720 and are subject to change without notice; Reseller prices may vary.
LTO-6 HH SAS Tape Drive - #EU11

- Higher capacity and performance than LTO-5
  - 2.5 TB uncompressed capacity .. 66% more
  - 6.25 TB capacity with typical compression .. 108% more
  - Up to 240 MB/s … 14% more
  - For only 5% higher price

- Read LTO-4; Read/Write LTO-5 and LTO-6
- For HH bays of
  - Power 720/740 ‘C’ and ‘D’ models
  - Power 750 ‘B’ model
  - Power 795 1U media drawer (#5724)
- Shipped w/ cleaning and test cartridge
- Convenience cartridge ordering
  - #EU17 – single & #EU18 – five-pack
- Supported by AIX, IBM i, Linux, VIOS
- See also 7226-1U3 and 3580-H6S/L63 (TS2260/TS2360)

LTO-6 price is only 5% higher than LTO-5 .. $4200 vs $4000

Prices shown are IBM USA suggested list prices as of Feb 2013 on a Power 720 and are subject to change without notice; Reseller prices may vary.
7226-1U3 Storage Drawer Enhancements
Feb 2013 Announcement

Feb: adding LTO-6 drives to matching LTO-6 drive technology announced on Power Systems HH bays

<table>
<thead>
<tr>
<th>7226-1U3</th>
<th>HH LTO5 SAS</th>
<th>HH LTO5 Fiber</th>
<th>HH LTO6 Fiber</th>
<th>HH LTO6 SAS</th>
<th>DVD SATA / SAS</th>
<th>DVD USB *</th>
<th>RDX USB 2.0</th>
<th>RDX USB 3.0</th>
<th>HH DAT160 SAS</th>
<th>HH DAT160 USB</th>
</tr>
</thead>
</table>

Adding 1.5TB RDX cartridge

* Only supported on Power Blades or PureFlex servers

History note: 7226-1U2 and 7214-1U2 are 7226-1U3 predecessors
Nov 2012 Removable Media Announcements

Nov: added USB-3 RDX docking station support – matching #EU04 drive technology announced on Power Oct 2012

![7226-1U3](image)

<table>
<thead>
<tr>
<th>7226-1U3</th>
<th>HH LTO5 SAS</th>
<th>HH LTO5 Fiber</th>
<th>HH DVD SATA/SAS</th>
<th>HH DVD USB*</th>
<th>HH RDX USB 2.0</th>
<th>HH RDX USB 3.0</th>
<th>HH DAT160 SAS</th>
<th>HH DAT160 USB</th>
<th>HH LTO4 SAS</th>
</tr>
</thead>
</table>

* Only supported on Power Blades or PureFlex servers

Nov: added LTO-6 to bridge boxes
Half High: 3580-H6S TS2260
Full high: 3580-L63 TS2360
Agenda

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- HMC insights
- New IBM Networking switches
HMC Support

- HMC V7 R760: Minimum level for POWER7+ 710 - 760 support
- HMC used to manage any POWER7 processor based server, must be a CR3 or later model rack-mount HMC or C05 or later desk side HMC.
- If IBM Systems Director is used to manage an HMC or if the HMC manages more than 254 partitions, the HMC should have 3GB of RAM minimum and be a CR3 model or later rack-mount, or C06 or later desk side.
- No IVM support for Power 760
HMC V7 R7.7.0 (1H 2013) Highlights

- **Server Management**
  - POWER7+ 710 / 720 / 730 / 740 / 750 / 760

- **Virtualization Management**
  - Mobility
    - Performance improvement for Live Partition Migration
  - Usability
    - GUI for VIOS install

- **Console Management**
  - Browser currency
  - Security currency
  - Update of expired user password for Kerberos authenticated users
  - Remove support for 7315-C04, 7315-CR2, 7310-CR2

FYI: POWER7 Servers which currently are **not planned** to be provided 7.6 or later Firmware levels. (Fixes continued to be provided.)

- Power 710/720/730/740 “B” or “C” models
- Power 750 “B” model
- Power 755 “C” model
- Power 770/780 “B” models
- Power Blades
Agenda

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- New PCIe Gen2 Adapters
- New Removable Media Options
- HMC insights
- New IBM Networking switches
# IBM RackSwitch Portfolio for Power Systems

**Datacenter class switches ideal for networking of Power Servers -- low latency, low power consumption, built in virtualization and excellent price/performance**

## 1/10G

<table>
<thead>
<tr>
<th>IBM RackSwitch G8052</th>
<th>(Power MTM) 1455-48E</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 48 ports 1G, RJ-45</td>
<td></td>
</tr>
<tr>
<td>• 4 ports 10G, SFP+</td>
<td></td>
</tr>
<tr>
<td>• Hot-swap redundant fans &amp; power supplies</td>
<td></td>
</tr>
</tbody>
</table>

## 10G

<table>
<thead>
<tr>
<th>IBM RackSwitch G8124E</th>
<th>(Power MTM) 1455-24E</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 24 ports 10G SFP+</td>
<td></td>
</tr>
<tr>
<td>• Low Latency – 570ns</td>
<td></td>
</tr>
<tr>
<td>• Redundant fans and power supplies</td>
<td></td>
</tr>
</tbody>
</table>

## 10/40G

<table>
<thead>
<tr>
<th>IBM RackSwitch G8264</th>
<th>(Power MTM) 1455-64C</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 48 ports 10G SFP+</td>
<td></td>
</tr>
<tr>
<td>• 4 ports 40G QSFP+</td>
<td></td>
</tr>
<tr>
<td>• Low Latency – 880ns</td>
<td></td>
</tr>
<tr>
<td>• Hot-swap redundant fans &amp; power supplies</td>
<td></td>
</tr>
</tbody>
</table>

## 40Gb

<table>
<thead>
<tr>
<th>IBM RackSwitch G8316</th>
<th>(Power MTM) 1611-16E</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 16 ports 40G QSFP+</td>
<td></td>
</tr>
<tr>
<td>• Up to 64 SFP+ connections</td>
<td></td>
</tr>
<tr>
<td>• Low Latency - ~1ms</td>
<td></td>
</tr>
<tr>
<td>• Hot-swap redundant fans &amp; power supplies</td>
<td></td>
</tr>
</tbody>
</table>

## 10/40G Eth, 4/8G FC

<table>
<thead>
<tr>
<th>IBM RackSwitch G8264CS</th>
<th>(Power MTM) 1455-64F</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Supports Ethernet, FC, FCoE and iSCSI, and enables network convergence</td>
<td></td>
</tr>
<tr>
<td>• 12 Omni Ports – 10GbE or 4/8Gb Fibre Channel</td>
<td></td>
</tr>
<tr>
<td>• 36 ports 10G SFP+</td>
<td></td>
</tr>
<tr>
<td>• 4 ports 40G QSFP+</td>
<td></td>
</tr>
<tr>
<td>• Hot-swap redundant fans &amp; power supplies</td>
<td></td>
</tr>
</tbody>
</table>

## 10GBase-T/ 40G

<table>
<thead>
<tr>
<th>IBM RackSwitch G8264T</th>
<th>(Power MTM) 1455-48T</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Allows use of low cost RJ45/CAT6 connections and cables</td>
<td></td>
</tr>
<tr>
<td>• Forty-eight 10GBase-T ports, Four QSFP+ 40GbE ports</td>
<td></td>
</tr>
<tr>
<td>• Hot-swap redundant fans &amp; power supplies</td>
<td></td>
</tr>
</tbody>
</table>

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**Feb 2013 Announce**
## Benefits

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reduces capital expenditure</strong></td>
<td>- G8264T uses standard inexpensive RJ45 ports and Cat 6/6A cables allowing easy of deployment 10 Gb Ethernet with existing networks using Base-T connections.</td>
</tr>
<tr>
<td><strong>Datacenter class features</strong></td>
<td>- 48 10GBase-T ports, 4 x 40 GbE QSFP+ ports</td>
</tr>
<tr>
<td></td>
<td>- Hot-swap redundant fans &amp; power supplies</td>
</tr>
<tr>
<td></td>
<td>- G8264T is a full featured high bandwidth datacenter switch</td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td>- Advanced L2/L3 Ethernet switching with virtualization</td>
</tr>
<tr>
<td></td>
<td>- Line-rate, high-bandwidth switching with throughput up to 1.28 Tbps</td>
</tr>
<tr>
<td><strong>Simplified virtualization</strong></td>
<td>- VMready</td>
</tr>
</tbody>
</table>
Benefits

- **Reduces Capital Expense and Operating Expense**
  - G8264CS enables deployment of converged networks:
    - Supports multiple protocols including Ethernet, Fibre Channel, FCoE and iSCSI.
    - Reduces CAPEX: requires fewer switches, adapters and cables than separate LAN and SAN networks
    - Reduces network management costs

- **Converged switch with flexible datacenter class features**
  - 12 Omni Ports – 10GbE or 4/8Gb Fibre Channel
  - 36 10GbE ports; 4 40GbE ports
  - Hot-swap redundant fans & power supplies

- **Performance**
  - Advanced L2/L3 Ethernet switching with virtualization
  - Seamless connectivity to existing SANs
  - Low latency, low power consumption,

- **Simplified virtualization**
  - VMready
Schedules and Availability - Hardware

- **Announce: 5 Feb 2013**
  - eConfig support: 5 Feb 2013
    - Except LTO-6 on Power 795 drawer planned 26 Feb
    - Except new IBM RackSwitches planned 12 March

- **Planned Availability (GA):**
  - **20 Feb**
    - Power 710, Power 720, Power 730, Power 740
    - (see below for exceptions)
    - Also People’s Republic of China, Taiwan, Korea see annn letter
  - **15 March**
    - Power 750, Power 760
    - PCIe Gen2 adapters … 16Gb FC & 4-port 10/1 Gb Ethernet
    - New IBM RackSwitches
    - 7226-1U3 Removable Media Drawer enhancements
    - Left/Right PDU specify
  - **29 March**
    - Rack integration features for RackSwitch
  - **12 April**
    - LTO-6 tape drive in Power 795 I/O drawer
Schedules and Availability - Software

- **Announce:** 5 Feb 2013
- **eConfig support:** 5 Feb 2013

- **Planned Availability (GA):** 13 Feb to support
  - POWER7+ 710, 720, 730, 740
  - AIX V7.1 TL02: Service Pack 2, or later (pre-installed)
  - AIX V6.1 TL08: Service Pack 2, or later (pre-installed)
  - IBM i 7.1 TR6 PTF group (except #6488 license transfer is 26 Feb)
  - VIOS 2.2.2.2

- **Planned Availability (GA):** 8 March
  - IBM i 6.1 on POWER7+ 710-760
  - Native 6.1 I/O support on 710-740 + 770/780 with #EB34

- **Planned Availability (GA):** 15 March
  - Physical media available for AIX and VIOS
  - OS support of Power 750/760 GA (hardware GAs)

- **Planned Availability (GA):** 29 March
  - AIX V6.1 TL07: Service Pack 7, or later
  - AIX V6.1 TL06: Service Pack 11, or later

- See also SODs
Agenda

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whew! (smile)
Q & A
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All performance measurements were made with AIX or AIX 5L operating systems unless otherwise indicated to have used Linux. For new and upgraded systems, the latest versions of AIX were used. All other systems used previous versions of AIX. The SPEC CPU2006, LINPACK, and Technical Computing benchmarks were compiled using IBM's high performance C, C++, and FORTRAN compilers for AIX 5L and Linux. For new and upgraded systems, the latest versions of these compilers were used: XL C for AIX v11.1, XL C/C++ for AIX v11.1, XL FORTRAN for AIX v13.1, XL C/C++ for Linux v11.1, and XL FORTRAN for Linux v13.1.

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TPC  http://www.tpc.org  
SPEC  http://www.spec.org  
Pro/E  http://www.proe.com  
GPC  http://www.spec.org/gpc  
VolanoMark  http://www.volano.com  
STREAM  http://www.cs.virginia.edu/stream/  
SAP  http://www.sap.com/benchmark/  
Oracle, Siebel, PeopleSoft  http://www.oracle.com/apps_benchmark/  
Baan  http://www.ssaglobal.com  
Fluent  http://www.fluent.com/software/fluent/index.htm  
TOP500 Supercomputers  http://www.top500.org/  
Ideas International  http://www.ideasinternational.com/benchmark/bench.html  
Storage Performance Council  http://www.storageperformance.org/results

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The IBM benchmarks results shown herein were derived using particular, well configured, development-level and generally-available computer systems. Buyers should consult other sources of information to evaluate the performance of systems they are considering buying and should consider conducting application oriented testing. For additional information about the benchmarks, values and systems tested, contact your local IBM office or IBM authorized reseller or access the Web site of the benchmark consortium or benchmark vendor.

IBM benchmark results can be found in the IBM Power Systems Performance Report at http://www.ibm.com/systems/p/hardware/system_perf.html.

All performance measurements were made with AIX or AIX 5L operating systems unless otherwise indicated to have used Linux. For new and upgraded systems, the latest versions of AIX were used. All other systems used previous versions of AIX. The SPEC CPU2006, LINPACK, and Technical Computing benchmarks were compiled using IBM's high performance C, C++, and FORTRAN compilers for AIX 5L and Linux. For new and upgraded systems, the latest versions of these compilers were used: XL C for AIX v11.1, XL C/C++ for AIX v11.1, XL FORTRAN for AIX v13.1, XL C/C++ for Linux v11.1, and XL FORTRAN for Linux v13.1. Linpack HPC (Highly Parallel Computing) used the current versions of the IBM Engineering and Scientific Subroutine Library (ESSL). For Power7 systems, IBM Engineering and Scientific Subroutine Library (ESSL) for AIX Version 5.1 and IBM Engineering and Scientific Subroutine Library (ESSL) for Linux Version 5.1 were used.

For a definition/explanation of each benchmark and the full list of detailed results, visit the Web site of the benchmark consortium or benchmark vendor.

SPEC  http://www.spec.org
Pro/E  http://www.proe.com
GPC  http://www.spec.org/gpc
STREAM  http://www.cs.virginia.edu/stream/
Fluent  http://www.fluent.com/software/fluent/index.htm
TOP500 Supercomputers  http://www.top500.org/
AMBER  http://amber.scripps.edu/
GAMESS  http://www.msg.chem.iastate.edu/gamess
GAUSSIAN  http://www.gaussian.com
ANSYS  http://www.ansys.com/services/hardware-support-db.htm

Click on the "Benchmarks" icon on the left hand side frame to expand. Click on "Benchmark Results in a Table" icon for benchmark results.

ECLIPSE  http://www.sis.slb.com/content/software/simulation/index.asp?seg=geoquest&
MM5  http://www.mmm.ucar.edu/mm5/
MSC.NASTRAN  http://www.mscsoftware.com/support/prod%5Fsupport/nastran/performance/v04_sngl.cfm
NAMD  http://www.ks.uiuc.edu/Research/namd
HMMER  http://hmmer.janelia.org/
http://powerdev.osuosl.org/project/hmmerAltivecGen2mod

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Notes on performance estimates

rPerf for AIX

rPerf (Relative Performance) is an estimate of commercial processing performance relative to other IBM UNIX systems. It is derived from an IBM analytical model which uses characteristics from IBM internal workloads, TPC and SPEC benchmarks. The rPerf model is not intended to represent any specific public benchmark results and should not be reasonably used in that way. The model simulates some of the system operations such as CPU, cache and memory. However, the model does not simulate disk or network I/O operations.

- rPerf estimates are calculated based on systems with the latest levels of AIX and other pertinent software at the time of system announcement. Actual performance will vary based on application and configuration specifics. The IBM eServer pSeries 640 is the baseline reference system and has a value of 1.0. Although rPerf may be used to approximate relative IBM UNIX commercial processing performance, actual system performance may vary and is dependent upon many factors including system hardware configuration and software design and configuration. Note that the rPerf methodology used for the POWER6 systems is identical to that used for the POWER5 systems. Variations in incremental system performance may be observed in commercial workloads due to changes in the underlying system architecture.

All performance estimates are provided "AS IS" and no warranties or guarantees are expressed or implied by IBM. Buyers should consult other sources of information, including system benchmarks, and application sizing guides to evaluate the performance of a system they are considering buying. For additional information about rPerf, contact your local IBM office or IBM authorized reseller.

CPW for IBM i

Commercial Processing Workload (CPW) is a relative measure of performance of processors running the IBM i operating system. Performance in customer environments may vary. The value is based on maximum configurations. More performance information is available in the Performance Capabilities Reference at: www.ibm.com/systems/i/solutions/perfmgmt/resource.html

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