Innovations in action with Power7+

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POWER7 Portfolio

Major Features:
- Modular systems with linear scalability
  - PowerVM Virtualization
- Physical and Virtual Management
- Roadmap to Continuous Availability
  - Binary Compatibility
- Energy / Thermal Management

Power 755
Power 780
Power 770
Power 750
Power 720 / 740
Power 710 / 730
Power 775
Power 795

Software
- AIX
- Linux
- AIX 7.1
- IBM i 7.1
- BladeCenter
  - PS700 / PS701 / PS702
  - PS703 / PS704
- Flex 2S/4S

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Power Processor Technology Roadmap

2001 - POWER4/4+
180/130 nm
- Dual Core
- Chip Multi Processing
- Distributed Switch
- Shared L2
- Dynamic LPARs (32)

2004 - POWER5/5+
130/90 nm
- Dual Core
- Enhanced Scaling
- SMT
- Distributed Switch +
- Core Parallelism +
- FP Performance +
- Memory Bandwidth +
- Virtualization

2007 - POWER6/6+
65/65 nm
- Dual Core
- High Frequencies
- Virtualization +
- Memory Subsystem +
- Altivec
- Instruction Retry
- Dynamic Energy Mgmt
- SMT +
- Protection Keys

2010 - POWER7/7+
45/32 nm
- Eight Cores
- On-Chip eDRAM
- Power-Optimized Cores
- Memory Subsystem ++
- SMT++
- Reliability +
- VSM & VSX
- Protection Keys+

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## Processor designs

<table>
<thead>
<tr>
<th></th>
<th>POWER5</th>
<th>POWER5+</th>
<th>POWER6</th>
<th>POWER7</th>
<th>POWER7+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology</td>
<td>130nm</td>
<td>90nm</td>
<td>65nm</td>
<td>45nm</td>
<td>32nm</td>
</tr>
<tr>
<td>Size</td>
<td>389 mm²</td>
<td>3245 mm²</td>
<td>341 mm²</td>
<td>567 mm²</td>
<td>567 mm²</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>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>4 MB / Core</td>
<td>256 KB per core</td>
<td>256 KB per Core</td>
</tr>
<tr>
<td>L3 Cache</td>
<td>36 MB</td>
<td>35 MB</td>
<td>32 MB</td>
<td>4 MB / Core</td>
<td>10 MB / Core</td>
</tr>
<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+

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POWER7+

POWER7
45 nm

POWER7
32 nm

Add additional Cache

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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:
• 2.5X increase in L3 Cache
• eDRAM technology
• Higher Frequencies
• Memory Compression Engine
• Active Memory Expansion with no processor overhead penalty
• Encryption / Cryptography Support
• Random Number Generator
• Enhanced Energy / Power Gating
• 1/20 LPAR Core Granularity
• 2X SPFP performance

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POWER7/7+ has four FP pipelines. Each pipeline in POWER7/7+ can do either a SP or a DP. DP width is 2x of SP. POWER7/7+ feeds two SP in each DP pipeline
- Needed separate area for control and some status bits.

In POWER7: Two DP pipe together can execute a 2-way SIMP FPDP instruction.

In POWER7+: Same two DP pipe together now can execute a 4-way SIMD SPFP instruction.

Two 4-way SIMD SPFP instruction can be executed in POWER7+
- Only one in POWER7.

Multiply-add counting as two, POWER7+ has 16 SP FLOP per cycle
POWER7+ Encryption Accelerator

**Technology**

- **Crypto Offload Accelerators:**
  - Provide cryptographic engines to relieve the P7+ processor from the performance intensive cryptographic algorithms of AES, SHA, and RSA.

- **High quality random numbers:**
  - Generated with high performance with the RNG offload feature of the P7+ processor.

**Client Benefits**

- Can be applied to a broader set of data creating a stronger security ecosystem
- POWER7+ core focused on application performance.
- Two primary AIX security applications:
  1) **Encrypted File Systems** protecting your data in storage or on backup media
  2) **IPsec** protecting your data over the network.

- Ensures that the high demand for entropy on a heavily loaded systems always yields high quality random numbers.
- RNG offload provides entropy and security is ensured
- Processor performance focused on your applications.
Benefits to POWER7+ AME 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+ 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

4Socket / 4U
16-core or 12-core / 4U

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POWER7+ 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

4Socket / 4U
32-core or 16-core / 4U
Power 570 & 770 systems can upgrade to POWER7+

- POWER7 780 9179-MHC
- POWER7 780 9179-MHB
- POWER6 570 9117-MMA

- POWER7 770 9117-MMC
- POWER7 770 9117-MMB
- POWER6 570 9117-MMA

9406-MMA converted to 9117-MMA
2X Max Memory
Now up to 16 TB

PCIe Gen2
Two new GX++ Adapters
16Gb Fibre Channel
10Gb FCoE / CNA

RoCE support
Thank You