Looking ahead with IBM i

10+ year roadmap
Why IBM Power Systems?

POWER9 is the future-forward infrastructure IT Leaders need to transform their business, servers that are built for cloud, able to crush today’s most advanced data applications and revolutionize any mission critical application.

Enterprises Trust IBM® Power

- 80 of Fortune 100 have IBM Power Systems
- The top 10 banking firms have IBM Power Systems
- 9 of top 10 insurance companies have IBM Power Systems
- 8 of top 10 healthcare companies have IBM Power Systems
- 8 of top 10 retailers have IBM Power Systems

Simplified Multicloud

IBM Power Systems enable the most data intensive and mission critical workloads in private and hybrid cloud environments.²

Delivered with Security

IBM Power Systems have security built in at all layers, from processor to the OS, designed to deliver end-to-end security.

Scales Performance Affordably

IBM POWER9 core technology drives the world’s fastest supercomputers and is ready to accelerate your enterprise.

Proven Reliable

IBM Power Systems ranked the most reliable for 10th straight year delivering 99.9996% uptime.³
POWER9 Facts & Figures

**IBM POWER9:**
Enhanced core and chip architecture for next-gen workloads

Built from the ground-up for data intensive workloads, POWER9 is the only processor with state-of-the-art I/O subsystem technology, including next generation NVIDIA NVLink, PCIe Gen4 and OpenCAPI.

Gain up to 4.6x performance improvement when you upgrade to POWER9

- 4.6x per-core performance vs. POWER5
- 2.5x per-core performance vs. POWER6
- 2x per-core performance vs. POWER7

<table>
<thead>
<tr>
<th>Feature</th>
<th>POWER9 vs x86 Xeon (SP)</th>
<th>POWER9 with NVLink vs x86 Xeon</th>
</tr>
</thead>
<tbody>
<tr>
<td>IO Bandwidth</td>
<td>74 GB/sec</td>
<td>307 GB/sec</td>
</tr>
<tr>
<td>Memory Bandwidth</td>
<td>315 GB/sec</td>
<td>768 GB/sec</td>
</tr>
<tr>
<td>CPU to accelerator bandwidth</td>
<td>630 GB/sec</td>
<td>920 GB/sec</td>
</tr>
</tbody>
</table>

POWER9 also increases IO bandwidth & memory bandwidth

<table>
<thead>
<tr>
<th>Feature</th>
<th>POWER7 → POWER9</th>
<th>POWER8 → POWER9</th>
</tr>
</thead>
<tbody>
<tr>
<td>IO Bandwidth</td>
<td>&gt;8X</td>
<td>2X</td>
</tr>
<tr>
<td>Memory Bandwidth</td>
<td>3X</td>
<td>20% More</td>
</tr>
</tbody>
</table>

IBM POWER9

Enhanced core and chip architecture for next-gen workloads

Built from the ground-up for data intensive workloads, POWER9 is the only processor with state-of-the-art I/O subsystem technology, including next generation NVIDIA NVLink, PCIe Gen4 and OpenCAPI.
POWER9 Helps You Save

Results:
• Server consolidation

Upgrading results in savings on:
1. Hardware
2. Software licensing
3. Maintenance & support for hardware & software
4. Data center energy & cooling costs

Results:
• Nearly 3x better performance per core
• Server consolidation (4 nodes to 1 node)

3-year TCO example*

$2.0M
3-year savings = $1.4M

$0.6M

Power 730 (2)
Power 740 (2)
Power 770
Power S824

Power 730 (2)
Power 740 (2)
Power 770
Power S824

$940K
3-year savings = $337K

$603K

Power 780
Power E980
3 nodes

Power 770
Power E950
4 nodes

$420K
3-year savings = $211K

$209K
IBM Power Systems enable the most data intensive and mission critical workloads in private and hybrid cloud environments. With IBM POWER9 based Power Systems, you can dynamically scale compute and memory on demand and build a cloud designed for the most data intensive workloads.

― Designed for Agility  
• Reduce IT burden with policy based automation and self-service tools  
• Effortlessly move workloads across generations of Power Systems without disruption  
• Cloud-enable any workload in with built-in PowerVM hypervisor$^2$  
• Dynamic sharing of up to 192 cores, 64TB of memory across up to 1000 VMs

― Seamless Multicloud Compatibility  
• Open integration with leading multicloud managers  
• Rapidly build and deploy cloud-native apps for scalability and optimal performance in multi-cloud environments  
• Easily import/export VMs between Power based private and public clouds.

― “Pay As You Grow” IT for Mission Critical workloads  
• Dynamically scale compute and memory on demand based on business needs  
• Deploy multiple production workloads and multiple OS – IBM i, AIX, Linux - in a server with workload isolation  
• Reduce data center footprint deploying up to 8 SAP HANA production instances per server$^4$
Delivered with Security

Security should be designed in and not an add on. IBM Power Systems has security built in at all layers, from processor to the OS, to deliver end-to-end security.

**End-to-End Security**
- Security built in at all layers in the stack – Processor, Systems, Firmware, OS, Hypervisor
- IBM owns, tests and delivers end-to-end security

**Secured Cloud**
- PowerVM is the only hypervisor amongst its major competitors with no reported vulnerabilities
- Reinforce security of cloud environments by only executing verified images across all layers, from processor to the OS

**Security In Motion**
- Protect data in motion with secured Live Partition Mobility (LPM)
- Accelerated encryption built into the chip (120GB/S in POWER9 vs 60GB/S in POWER8) protects data at rest and in motion
## Scales Performance Affordably

You need servers that stay ahead of workload challenges, new data sources and compute demands. IBM POWER9 processor drives the world’s fastest supercomputers and is ready to accelerate your enterprise.

### POWER9 vs compared x86

<table>
<thead>
<tr>
<th></th>
<th>POWER9 vs compared x86</th>
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<tbody>
<tr>
<td></td>
<td>Xeon SP</td>
</tr>
<tr>
<td>2x</td>
<td>Performance per core(^7)</td>
</tr>
<tr>
<td>2.6x</td>
<td>RAM per socket(^8)</td>
</tr>
<tr>
<td>1.8x</td>
<td>Memory bandwidth per socket(^9)</td>
</tr>
</tbody>
</table>

### POWER9 vs POWER8

<table>
<thead>
<tr>
<th></th>
<th>POWER9 vs POWER8</th>
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<tbody>
<tr>
<td>2x-4x</td>
<td>Memory Capacity(^10)</td>
</tr>
<tr>
<td>2x</td>
<td>IO bandwidth(^11)</td>
</tr>
<tr>
<td>40-50%</td>
<td>More Performance(^12)</td>
</tr>
</tbody>
</table>

### Lower TCO

Save 50% in 3-5 years moving from POWER7 to POWER9\(^13\)
Proven Reliable

Today's always-on world requires resilient, mission-critical servers that deliver continuous operations. IBM Power Systems ranked the most reliable for 10th straight year\(^3\) and is an industry leader for enterprise servers.\(^5\)

**Industry leading Reliability**

- IBM Power Systems ranked the most reliable for 10th straight year\(^3\)
- IBM Power Systems delivered highest uptime of 99.9996% (2.0 minutes/server/annum unplanned downtime) of any non-mainframe Linux platforms\(^3\)
- IBM Power Systems have security built in at all layers of the stack – processor, firmware, hypervisor, OS and everything between.

**Investment Protection**

- Committed 10+ years roadmap for both IBM i and AIX
- Deploy a new generation of servers without recompiling existing applications
- Effortlessly move workloads across generations of Power Systems without disruption

**Industry Leadership in Enterprise Servers**

- IBM Systems was #1 in combined 16+ socket large system, standard rack optimized and tower servers during 2017 with an aggregate revenue share of 82.1%\(^5\)
- IBM Power Systems was #1 in combined 8 socket large system, standard rack optimized and tower servers during 2017 with an aggregate revenue share of 34.4%\(^5\)
POWER9 gives you a performance advantage

2.54X

per-core performance vs. comparable Intel x86 solutions
POWER9 offers a cost advantage vs. x86

57%

lower solution cost potential vs. comparable Intel x86 solutions