POWER8 as a Platform of Choice for Data Centric Computing

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What if you had the innovation to...

Deliver insights

Experience IBM Watson™ technology

Support mobile big data apps with

Achieve more than twice the throughput

50x faster

5x faster

1 vs 24

47% lower cost
Power Systems delivering on the promise of open innovation

- USD1 billion Linux on Power investment
- 5 Power Systems Linux Centers
- Power development cloud
- Watson
- OpenPOWER Foundation
- SoftLayer Integration
- 1000’s of Engineers
- More than 9,000 patents*
- POWER8: 3 years USD2.4B R&D investment with hundreds of patents*
Introducing **POWER8**, a new generation of Power Systems: Open innovation to put data to work

- **Designed for Big Data**
  First server processor generation optimized for big data and analytics with POWER8 innovative design

- **Superior Cloud Economics**
  Superior cloud price/performance advantages and security to move data-centric applications to the cloud

- **Open Innovation Platform**
  Delivering an open server ecosystem revolutionizing the way IT is developed & delivered
Designed for Big Data: optimized Big Data & Analytics performance

Delivering insights 82x faster

4X threads per core vs. x86
4X memory bandwidth vs. x86
2.4X more I/O bandwidth than POWER7

Processors flexible, fast execution of analytics algorithms
Memory large, fast workspace to maximize business insight
Data Bandwidth bring massive amounts of information to compute resources in real-time

Optimized for a broad range of data and analytics:

IBM DB2
Cognos
SPSS

Industry
Retail
Government
Healthcare
Telecom
Banking

Faster 5X
POWER8 Processor: Game-changing innovation that accelerates big data & analytics

**Smart Acceleration enabled by CAPI (Coherent Accelerator Processor Interface) Technology**

- Smart, simplified attach for accelerators: GPUs, flash memory, networking & FPGAs
- Connects directly to processor, sharing the same address space
- Improves performance, reduces latency, and provides more workload for your dollar

*CAPI enables innovation from the OpenPOWER Foundation*
# Power Systems are Designed for Big Data

<table>
<thead>
<tr>
<th>Compute</th>
<th>Memory</th>
<th>IO Network</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible, fast cores and threads to run analytics algorithms</td>
<td>Large working data set to maximize business insights</td>
<td>Large IO bandwidth to deal with data in motion</td>
<td>Fast access to volumes of high priority stored data</td>
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## CAPI Delivers Custom Innovation

- **3X query acceleration with DB2 on Power/Linux using NVIDIA GPUs** *
- **Texas Memory Systems Flash enabling up to 80 TB of memory**
- **Distributed store accelerated by RDMA, delivering 10X throughput, 7X latency for in-memory stores**
- **Compression acceleration enables 4X storage capacity improvement with 2X increase in effective bandwidth** *

## Base System Delivers Higher Utilization

- **4X the threads per core of x86 with 30% higher frequency**
- **4x the memory bandwidth of x86 with 2.7X the memory capacity**
- **2.4x the IO Bandwidth of POWER7 Systems Far outpacing x86**
- **Up to 26 TB of internal flash Automated tiering of locally attached HDD and SSDs**

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*Initial claims pending validation*
Scale out as your business grows with Linux on Power Systems

S812 / S822

2X\textsuperscript{1} Performance vs x86

58\%\textsuperscript{2} Lower costs of acquisition

66\%\textsuperscript{2} Fewer systems

Speed & Agility
to capture value from new Linux

Economic Advantages
that scale to meet business needs

Efficiency
to minimize infrastructure overhead

Utilization outperforming industry standards

65\%\textsuperscript{Guaranteed} vs. typical commodity servers

Scale out as your business grows with IBM i and AIX

S822

S814

S824

2X

58%

66%

Performance vs x86

Lower costs of acquisition

Fewer systems

Speed & Agility
to capture value from new Linux workloads

Economic Advantages
that scale to meet business needs

Efficiency
to minimize infrastructure overhead

3. IBM i does not support S822, all POWER8 servers also run Linux
New Power Systems Naming Transition

Scale-out Systems (1 & 2 sockets)
- PowerS812L
- Power S814

Enterprise Systems (4+ sockets)
- Power 750
- Power 760
- Power 770
- Power 780
- Power 795

Naming Structure: Power S824
- First digit: S = Scale-out
- Second digit: 8 = POWER8 processor
- Third digit: 2 = Number of sockets, 2 in this case (could be 1 socket)
- Fourth digit: 4 = Height, 4u in this case (could be 2u)
- L: Added at end for Linux models

Announced: April 28, 2014
Power System Software extends the business value of Power Systems servers

- PowerVM
- PowerKVM
- PowerVC
- PowerVP
- PowerHA
- PowerSC

ibm.com/systems/software
Simplified Virtualization and Cloud Management

- **PowerKVM – Open Virtualization Choice**
  - Kernel-Based Virtual Machine (KVM) Linux based virtualization for scale out POWER8 Linux Servers

- **PowerVM - Virtualization without Limits**
  - Improved virtualization administration experience including new performance monitoring views and simplified deployment

- **PowerVP - Virtualization Performance**
  - Improved memory and shared processor affinity information for performance optimization of enterprise servers

- **PowerVC – Virtualization Center**
  - Improved scalability and extended capability for faster integration with clients existing PowerVM infrastructure

- **SmartCloud Entry**
  - Supports PowerVC shared storage pools and PowerKVM for rapid deployment of Open Stack management of cloud solutions
Power + SWG – Teaming for Success

Power Solutions Review Board

Creating a joint SWG-STG culture

- SWG Workloads optimized for POWER
- SWG/STG POWER Leadership Lab
- Technical Interlock sessions
- POWER Exploitation Report Cards
- Improved Optimization Tooling
- Coordinated Launch Messaging

Results

- **150+** products support Linux on Power today
- **360+** products support AIX today
- DB2 on Power achieved **161%** of revenue target

Mission – Power and SWG solution board driving competitive performance and optimization results and go-to-market.
Power Systems Solutions Optimized for POWER8

### Insights from Data
Leverage systems that optimize big data & analytics performance

- **Analytics**: NEW: Power Analytics for BLU Acceleration
- **Analytics**: NEW: Power Analytics for SPSS

### Cloud Innovations
Realize the true potential of public, private & hybrid cloud

- **Public Cloud**: NEW: Solution Edition for Scale out Cloud
- **Private Cloud**: Update: Solution Edition for Cloud
- **Hybrid Cloud**: NEW: SmartCloud Entry for Power Systems

### Mobile
Revolutionize the way IT is created and consumed

- **Mobile**: NEW: Mobile Scale Out Sales Offering with Worklight & WebSphere Application Server

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*Planned 2Q Announcement / GA*
IBM Solution for Analytics - Power Systems Edition

**Simple to Acquire**
Order server, storage, software and support from a single vendor

**Simple to Deploy**
Pre-installed and pre-optimized server, storage & software

**Simple to Implement**
Highly scalable to grow as your analytics need change

- **POWER8 server options**: Power S814, Power S822, Power S824
- **BLU Acceleration options**: IBM DB2 Advanced Workgroup or Advanced Enterprise Edition
- **Analytics options**: Cognos BI, SPSS Modeler, SPSS C&DS, SPSS ADM, InfoSphere DataStage

Includes options for pre-installed DB2 AWSE or DB2 EWSE, Cognos BI, SPSS Modeler, SPSS C&DS, SPSS ADM, or InfoSphere DataStage licenses ready for activation. Registration of valid IBM SWG licenses required prior to server shipment with selected options. Pre-load of Power hardware and software is not available in Greater China Group, Thailand, and Korea.
POWER8 delivers insights **82x faster**

Running Cognos BI reports and analytics on POWER8 with DB2 with BLU Acceleration versus Ivy Bridge with a traditional database

- **DB2 with BLU Acceleration on POWER8 for Cognos BI is ‘Fast on Fast on Fast!’**

- Real world Cognos BI Telco workload
  - 60 concurrent users running 70%/25%/5% split of simple, intermediate and complex reports

- First processor designed for Big Data with massive parallelism and bandwidth for real-time results
  - 18x more throughput for simple reports
  - 40x more throughput for intermediate reports
  - 747x better throughput for complex reports


Based on IBM internal tests as of April 17, 2014 comparing IBM DB2 with BLU Acceleration on Power with a comparably tuned competitor row store database server on x86 executing a materially identical 2.6TB BI workload in a controlled laboratory environment. Test measured 60 concurrent user report throughput executing identical Cognos report workloads. Competitor configuration: HP DL380p, 24 cores, 256GB RAM, Competitor row-store database, SUSE Linux 11SP3 (Database) and HP DL380p, 16 cores, 384GB RAM, Cognos 10.2.1, SUSE Linux 11SP3 (Cognos). IBM configuration: IBM S824, 24 cores, 256GB RAM, DB2 10.5, AIX 7.1 TL2 (Database) and IBM S822L, 16 of 20 cores activated, 384GB RAM, Cognos 10.2.1, SUSE Linux 11SP3 (Cognos). Results may not be typical and will vary based on actual workload, configuration, applications, queries and other variables in a production environment.
Transaction Processing Workload – SAP S&D
IBM Power System S824 with DB2 10.5 vs. Competition

Over 2x better, 24 core performance than nearest competitive results
Up to 2x greater performance than previous POWER generation
Exploiting more cores, more threads and L3 cache than past POWER platforms

(1.0) IBM Power System S824 on the two-tier SAP SD standard application benchmark running SAP enhancement package 5 for the SAP ERP 6.0 application; 4 processors / 24 cores / 96 threads, POWER6 3.52GHz; 512 GB memory, 21,212 SD benchmark users, running X08 7.1 and DB29 10, 10,000 SAPS, 6.96s database response time (dialog/update): 2.317s 330; dialog step Also 330; 6.952s 900 SAPS, 115.676 database response time (dialog/update): 0.811s 10s; CPU utilization: 39.1%, Certification #: 2012035

(1.1) Fujitsu RX300 S5 on the two-tier SAP SD standard application benchmark running SAP enhancement package 5 for the SAP ERP 6.0 application; 2 processors / 24 cores / 48 threads, Intel Xeon 6297 processor 2.70 GHz, 256 GB memory, 10,246 SD benchmark users, running Windows Server 2012 SE and SQL Server 2012, Certification #: 201304

(1.2) Cisco UCS C420 M3 on the two-tier SAP SD standard application benchmark running SAP enhancement package 5 for the SAP ERP 6.0 application; 2 processors / 24 cores / 48 threads, Intel Xeon ES-2697 processor 2.70 GHz, 256 GB memory, 10,045 SD benchmark users, running Windows Server 2012 SE and SQL Server 2012, Certification #: 2013038

(1.3) HP ProLiant BL460c G7 on the two-tier SAP SD standard application benchmark running SAP enhancement package 5 for the SAP ERP 6.0 application; 2 processors / 24 cores / 48 threads, Intel Xeon ES-2697 processor 2.70 GHz, 256 GB memory, 10,025 SD benchmark users, running Windows Server 2012 SE and SQL Server 2012, Certification #: 2013025

(2.1) IBM Flex System p270 Compute Node on the two-tier SAP SD standard application benchmark running SAP enhancement package 5 for the SAP ERP 6.0 application; 4 processors / 24 cores / 96 threads, POWER7+ 3.4GHz; 256 GB memory, 12,526 SD benchmark users, running X08 7.1 and DB29 10, Certification #: 2013019

(1.1) IBM Flex System p260 on the two-tier SAP SD standard application benchmark running SAP enhancement package 5 for the SAP ERP 6.0 application; 2 processors / 16 cores / 64 threads, POWER7+, 4.1GHz, 256 GB memory, 10,000 SD benchmark users, running X08 7.1 and DB29 10, Certification #: 2012035
IBM Solution for Hadoop - Power Systems Edition

NEW. A storage-dense integrated platform optimized to simplify and accelerate unstructured big data & analytics

Speed Matters
Higher ingest rates delivers 37% faster insights than competitive Hadoop solutions with 31% fewer data nodes.¹

Availability Matters
Better reliability and resiliency with 73% fewer outages and 92% fewer performance problems over x86.²

Integrated platform solution for Hadoop ready for analytics software

1) Based on STG Performance testing comparing to Cloudera/HP published benchmark
2) CLAIMS: Solitaire Interglobal Paper - Power Boost Your Big Data Analytics Strategy –
POWER8 delivers 2x performance on Big Data/Hadoop

Terasort benchmark on POWER8 will be double system capacity of the best x86 published result

- Terasort is a common benchmark to measure the performance of a Hadoop solution:
  - Sort a large dataset in parallel
  - Exercise the MapReduce framework and Hadoop Distributed File System (HDFS)
- **Over 2x the performance** of the best x86 system
- In conjunction with superior reliability, availability, and serviceability associated with the Power Systems
- Exploitation of POWER8’s additional cores, memory and bandwidth

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IBM Analytics Stack: IBM Power System S824; 24 cores / 192 threads, POWER8; 3.5GHz, 512 GB memory, RHEL 6.5, InfoSphere BigInsights 2.1.0.2

OpenPOWER: Scale-out Server Evolution

How will the OpenPOWER Foundation benefit clients?
- OpenPOWER technology creates greater choice for customers
- Open and collaborative development model on the Power platform will create more opportunity for Member and industry innovation
- New innovators broaden capability and value of the Power platform

What does this mean to the industry?
- Game changer in the server industry for providers and clients
- Will enable and drive innovation in the industry
- Provide more choice in the industry
“I'm excited to show off a Google POWER8 server motherboard in the OpenPOWER booth at the Impact 2014 conference in Las Vegas. We're always looking to deliver the highest quality of service for our users, and so we built this server to port our software stack to POWER (which turned out to be easier than expected, thanks in part to the little-endian support in P8). A real server platform is also critical for detailed performance measurements and continuous optimizations, and to integrate and test the ongoing advances that become available through OpenPOWER and the extended OpenPOWER community. (Google, IBM and others formed the OpenPOWER Foundation, a non-profit organization dedicated to developing an open ecosystem.”

https://plus.google.com/111282580643669107165/posts/Uwh9W3XiZTQ
An Open Innovation Platform at the heart of an open server ecosystem

Open & Collaborative Ecosystem

- An open server ecosystem delivering continuous innovation
- Consumable for hyperscale datacenters

Designed with Open Source Technologies

- An open technology platform
- Built with Linux portability, OpenStack and KVM

Growing Linux Ecosystem

- Ubuntu
- SUSE
- Red Hat
Fostering open innovation for cloud based applications with Ubuntu and Power Systems

Moving Linux apps to Power has never been easier

Well-written Java applications written in scripting or interpretive languages will **run as is**

Most x86/Linux applications written in C/C++ will require **no source code change, only a recompile**
Power Systems 2014 ISV Linux ecosystem

- 50+ New Linux solutions for targeted segments
- 800 ISVs with over 1,500 applications

Linux Ecosystem

- Linux solutions compliment industry offerings
- Zato’s healthcare analytics solution leverages existing patient data from EPIC and Cerner
- ISV partners that bring a broad community of new developers
- Ex: 9 New Linux ISVs bring along >100,000 Developers

Next Gen ISVs
Existing ISVs
Community
Industry Focus

Epic
Cerner
AIX
Linux Based Analytics
New Patient Insights

IBM
Analysts Quotes from Power 8 Launch

"IBM has leveraged its experience with open communities and open source to substantially change its go-to-market strategy for the POWER8 solutions" - Al Gillen, Program VP, System Software, IDC (IDC write-up)

"I believe it could shake up the markets for scale-out and cloud servers pretty significantly" - Charles King, Pund-IT

"For IBM customers in particular the POWER8 represents a generational jump forward so far as overall performance and system capacity goes" - Charles King, Pund-IT (WSJ)

"We think IBM makes abundantly clear their commitment to a truly open server market" - Rich Ptak, Ptak & Associates (Ptak write-up)

"IBM's bombshell is that with the launch of the POWER8 chip, the platform will now work with little endian Linux. In effect, anything that runs on Linux on x86 can now run on POWER8. The implications for IBM are not just big, they are huge", Ian Murphy, Creative Intellect

"The POWER8 specs are mind boggling…IBM’s newest server processor will smash existing performance records, particularly for memory-intensive applications" - Linley Gwennap, Linley Group (from Sept. 2013 Analyst WP)
ISV Quotes from Power 8 Launch

"We see an enormous opportunity to further improve patient care and cost effectiveness from the cooperative innovation of IBM and Baystate Health - leaders in health care information technology and quality of healthcare delivery to patients. Zato’s software platform for data liquidity and system interoperability will accelerate benefits to patients and providers from next generation medical text processing, automated coding, and reporting of quality measures by leveraging the revolutionary hardware architecture of the new POWER8 line of IBM servers. IBM POWER8, running on Linux, provides increased processors per core, more threads, less latency, uses less power, less space, and less cooling to deliver extraordinary gains in information processing throughput."

Paul McOwen, COO
Zato Health

"Creating the most compelling client facing apps is essential to a company’s competitiveness today, and IBM gets this. The challenge is to find a way to pair rapid front end development and delivery of new apps with the scale, security, and cloud economics required for the back end system supporting that application. Zend is excited to partner with IBM to develop a solution to this. Going forward, developers who work with the PHP web development language will be able to leverage Zend Server to develop the mobile and web applications in an API centric model, while tapping into the back end scale and security that Power Systems based data systems can provide. We are excited to announce that we are working with the IBM Power team to port and optimize Zend Server for the POWER8 platform running Linux, and to enable this compelling new option for the community of 5 million PHP web application developers."

Andi Gutmans, CEO
Zend Technologies
ISV Quotes from Power 8 Launch

“Enterprises are seeking open source based solutions to cut costs and gain greater control over their infrastructure. Certifying our Postgres Plus Advanced Server for the IBM Linux on Power server platform provides the leading open source database solution for IBM enterprise customers. Combining the expanded processing power in IBM POWER8 with Postgres’ capabilities to support structured and unstructured data is a big win for our users. IBM and EDB equip our mutual end users to better and more cost-effectively address today’s complex and compute-intensive workloads.”

Ed Boyajian, President and CEO
EnterpriseDB

“Redis Labs clients use Redis, the fastest database available today because they require very high throughputs at low latencies. Our dynamic clustering technology accelerates Redis by processing it with multiple cores. Combined with IBM’s POWER8 systems running Linux, Redis can run much faster and our clients will be able to process hundreds of thousands transactions per second at sub-millisecond latencies.”

Ofer Bengal, Co-Founder and CEO
Redis Labs
ISV Quotes from Power 8 Launch

"Storix, Inc. has been a Disaster Recovery software partner with IBM since 1999. Over the years, we have seen IBM make several advances in server hardware but few have impressed us more than Power8. With the improved I/O performance of the PCIe Gen3 adapters, our benchmark tests exceeded expectations for the speed of backups. And with 50% more cores and twice the number of simultaneous threads per core, encryption processing no longer effects backup and recovery speeds."

Dave Huffman, President & CEO
Storix Inc.  

"As a longstanding partner of IBM, SugarCRM is proud to team with IBM on the rollout of its new Power Systems built on the innovative design of POWER8. We believe the combination of SugarCRM and IBM Power Systems running Linux will be an exceptional platform for our customers as they deploy new solutions and upgrade existing offerings. Recent performance testing resulted in an increase of up to 2x over comparable platforms, delivering a superior price/performance advantage that our customers are looking for."

Clint Oram, Co-founder and Chief Technology Officer
SugarCRM
Power Systems: Open Innovation to Put Data to Work

**Designed for Big Data**

First server processor generation optimized for big data and analytics with POWER8 innovative design

**Superior Cloud Economics**

Superior cloud price/performance advantages and security to move data-centric applications to the cloud

**Open Innovation Platform**

Delivering an open server ecosystem revolutionizing the way IT is developed and delivered

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**Systems**

Power Systems Scale-out Servers

- 1 & 2 Socket
  - Three 2U
  - Two 4U

- 2 Linux
- 3 AIX/IBM i/Linux

**Software**

*Big Data & Analytics*

- **New.** IBM Solution for Analytics: Power Systems Edition
- **New.** IBM Solution for Hadoop: Power Systems Edition

**Virtualization, Cloud, Linux**

- Power
- KVM
- Red Hat
- SUSE
- Ubuntu
- Openstack
Questions?

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Let’s build something special!