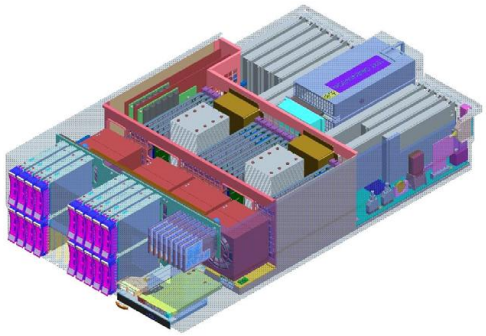
Systèmes Power8 scale-out

Yves Brissot
IBM STG System Architect
yves_brissot@fr.ibm.com

Juin 2014



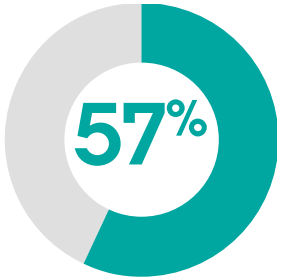
New Enterprise value is coming from the use of IT to leverage the confluence of 5 important technology trends

L’évolution des besoins et des applications nécessite une nouvelle approche, de nouveaux systèmes

Croissance des données

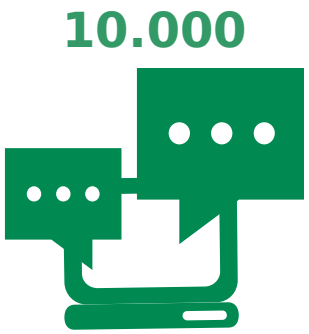
Croissance des données 2005-2020

Le Cloud est partout



des entreprises utilisent le Cloud.. Et ce n’est qu’un début !

Nouvelles technos, nouvelles applis



Nouvelles applications mobiles créees.. chaque semaine !

The Power Systems Strategy

Leadership and innovation to support today's core business applications and next generation solutions with strong financial benefits, industry leading support and a highly skilled and vibrant ecosystem

Next Gen Apps Big Data & Analytics



Cognos SPSS
Information Builders
Datameer
Powerfully Simple™

Retail

Healthcare


Banking

Government

Telecom

Open Platform for Choice

OpenPOWER Consortium

KVM

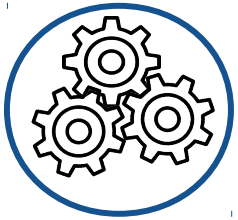

openstack™



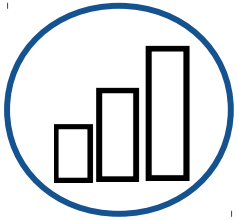
SmartCloud

Power Charter

Innovation that Matters



Client Value



Community Engagement

Cette annonce POWER8 s'appuie sur

1 milliard USD
Linux on Power

5 Power Systems Linux Centers.. dont 1 à Montpellier !

Le Cloud de développement Power AIX, i, Linux

Watson

L'écosystème OpenPOWER

SoftLayer Integration

Des milliers d'ingénieurs

Plus de 9.000 brevets

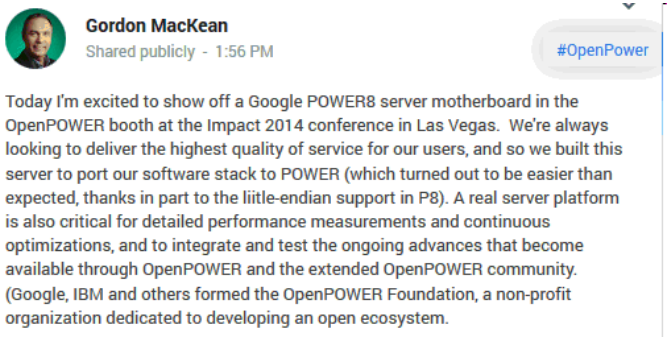
POWER 8
3 années de R&D,
2+ milliards USD investis

L’annonce POWER8 ne s’appuie pas que sur IBM

OpenPOWER™

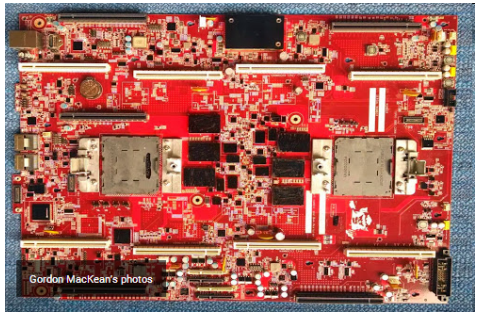
26+

Membres…
et bientôt plus !



Créer un écosystème ouvert, basé sur l’architecture Power

Faciliter l’innovation matériel et logiciel autour de POWER8

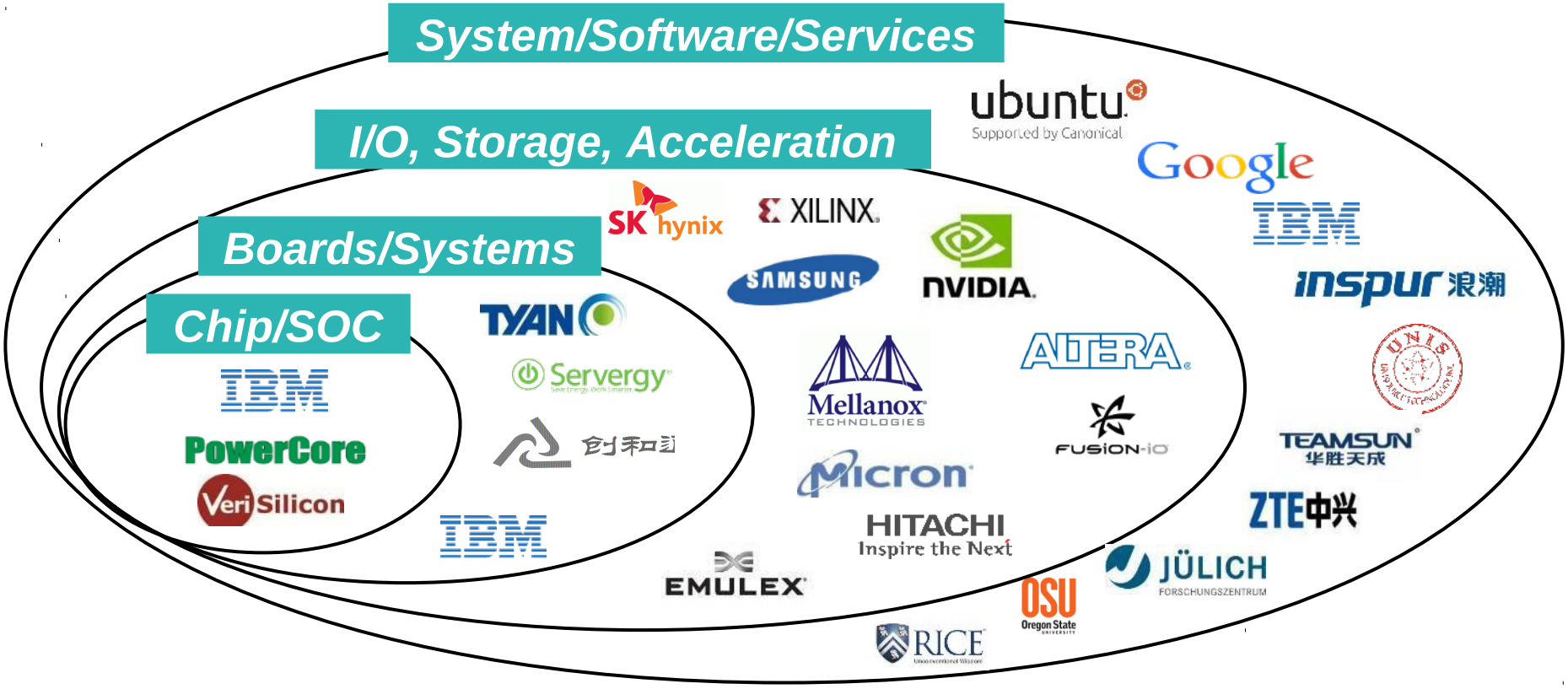


Platinum Members

ALTERA Google IBM Mellanox TECHNOLOGIES Micron NVIDIA SAMSUNG PowerCore TYAN

The OpenPOWER Foundation: Open & Collaborative Innovation Growing Fast

OpenPOWER™



TECH | 11/18/2013 @ 9:01AM | 6,021 views

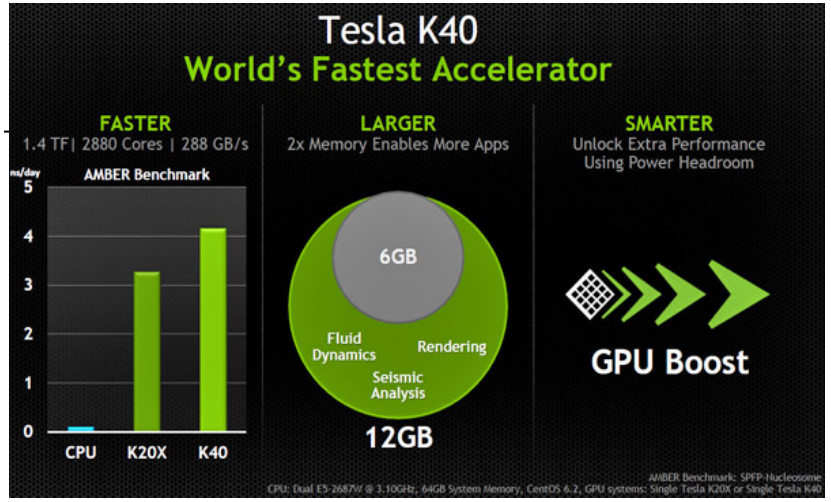
Nvidia Unveils Tesla K40 Accelerator And Strategic Partnership With IBM

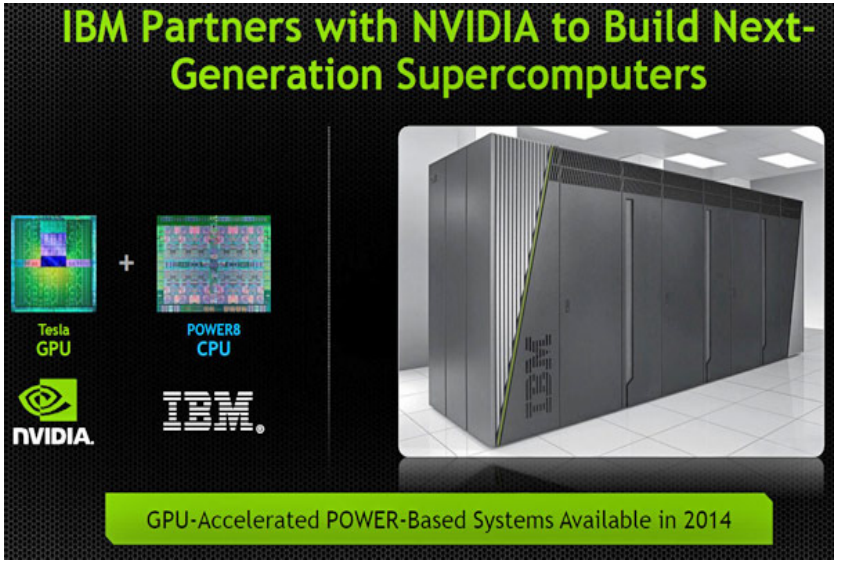
+ Comment Now + Follow Comments

Nvidia is stepping out in rather grand fashion this week at the SC13 conference in Denver Colorado. Not only is the company rolling out a new GPU Accelerator that offers a sizable performance boost and more local memory, but there's also serious flag-waving going on with respect to a formalized partnership with IBM IBM +0.94% for collaboration on next generation GPU-accelerated software and systems.

Nvidia's new Tesla K40 GPU Accelerator is the highlight of Nvidia's announcements today. K40 is a further extension of Nvidia's existing GK110 architecture that makes use of a larger number of Nvidia CUDA processing cores at higher clock speeds. Specifically, versus Nvidia's previous generation Tesla K20X accelerator, the K40 has 2880 CUDA cores (2688 in K20X) at a base clock of 745MHz with GPU Boost clocks of 810 and 875MHz (732MHz for the previous gen K20X). In addition, the K40 employes a faster 3GHz GDDR5 memory interface to a total of 12GB on-board, which is a sizable

> Today, IBM and Nvidia are jointly announcing co-development of GPU-accelerated IBM enterprise software and applications on IBM POWER Systems. The companies plan to work together integrating IBM's POWER8 Processor architecture with Nvidia Tesla GPUs.

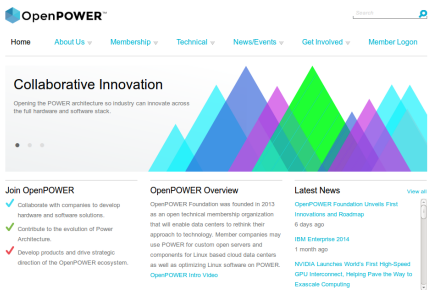




http://www.forbes.com/sites/davealtavilla/2013/11/18/nvidia-unveils-tesla-k40-accelerator-and-strategic-partnership-with-ibm/

Le premier écosystème ouvert pour serveurs

OpenPOWER™



- Innovation créée de manière collaborative par la communauté OpenPOWER
- Plateforme ouverte autour de Linux, OpenStack et KVM

Développement d'une large palette de services et technologies utilisant la même base technique

Ecosystème supporté par Power Development Cloud, Power Systems Linux Centers et Watson Development Cloud

Nous avons atteint un point de transformation …

IBM présente la première génération de systèmes bâtis pour exploiter les grands volumes de données en environnement ouvert et collaboratif : POWER8

POWER8 : une architecture, des systèmes, des solutions

POWER8 processeurs & architecture

Première génération de systèmes optimisés pour le big data et l'analytics

POWER8

IBM Solution for BLU Acceleration

Nouvelle génération de database in-memory

IBM Solution for Analytics

Déploiement rapide d'analytique prédictif

Cognos SPSS

IBM Solution for Hadoop

Optimisation de la performance de traitement des données non structurées

First generation of systems built with open innovation to put data to work

Optimize Data and Analytics

- **Solutions & operating systems** optimized for new POWER8 big data & analytics innovations
- **Chip designs** for Java apps, big data/analytics
- **I/O** - PCI-3 for more disk and SSD for faster access and greater efficiency

Enhance Cloud Efficiency

- **Solutions & operating systems** optimized for POWER8 Java & virtualization innovations
- **Virtualization and cloud management** built on OpenStack, KVM, PowerVM
- **Chip designs** for cloud and MSP environments, i.e. KVM micro larger number of partitions

Enable Open Innovation

- Accelerate key emerging workloads with open source community and **OpenPOWER Foundation**
- Engaging new, leading **ecosystem partners to deliver new innovations**

POWER8 Processor

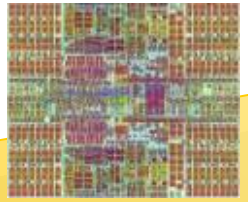
Power Systems

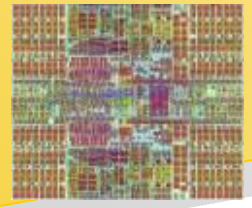
IBM

Power Processor Technology Roadmap

POWER5/5+ 130/90 nm

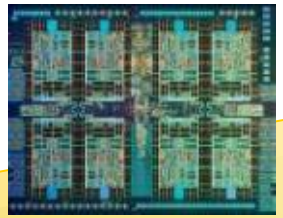
- ✓Dual Core
- ✓Enhanced Scaling
- ✓SMT
- ✓Distributed Switch +
- ✓Core Parallelism +
- ✓FP Performance +
- ✓Memory Bandwidth +
- ✓Virtualization

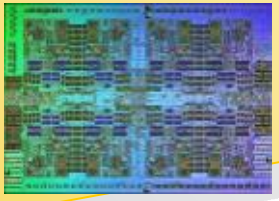




POWER6/6+ 65/65 nm

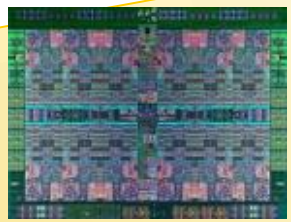
- ✓Dual Core
- ✓High Frequencies
- ✓Virtualization +
- ✓Memory Subsystem +
- ✓Altivec
- ✓Instruction Retry
- ✓Dynamic Energy Mgmt
- ✓SMT +
- ✓Protection Keys





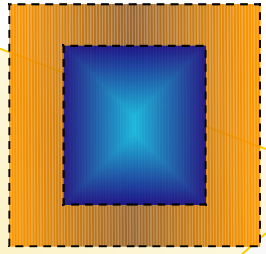
POWER7/7+ 45/32 nm

- ✓Eight Cores
- ✓On-Chip eDRAM
- ✓Power-Optimized Cores
- ✓Memory Subsystem ++
- ✓SMT++
- ✓Reliability +
- ✓VSM & VSX
- ✓Protection Keys+



POWER8

- ✓More Cores
- ✓SMT+++
- ✓Reliability ++
- ✓Huge bandwidth
- ✓PCIe Gen3 I/O
- ✓FPGA Support
- ✓Transactional Memory
- ✓PCIe Acceleration



POWER9

- ✓Extreme Analytics Optimization
- ✓Extreme Big Data Optimization
- ✓On-chip accelerators

2004 2007 2010 2014

Power Systems

IBM

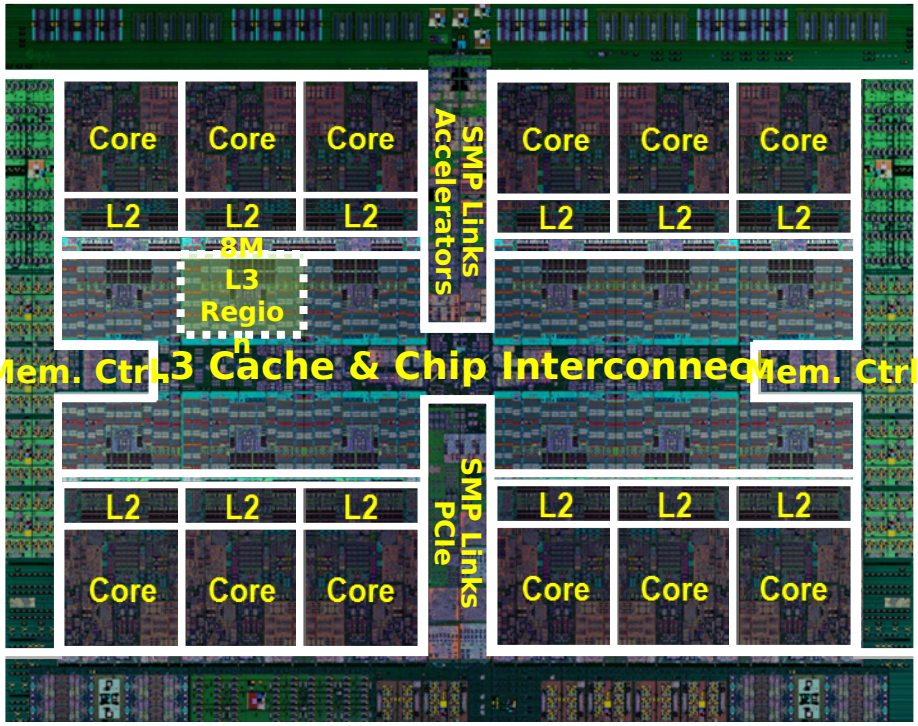
Le processeur POWER8

Cores

- 12 cores (SMT8)
- 8 dispatch, 10 issue, 16 exec pipe
- 2X internal data flows/queues
- Enhanced prefetching
- 64K data cache, 32K instruction cache

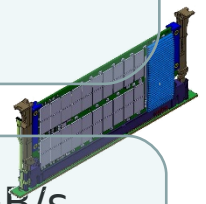
Technology

22nm SOI, eDRAM, 15 ML 650mm2



Caches

- 512 KB SRAM L2 / core
- 96 MB eDRAM shared L3
- Up to 128 MB eDRAM L4 (off-chip)



Memory

- Up to 230 GB/s sustained bandwidth
- Up to 1TB per socket

Accelerators

- Crypto & memory expansion
- Transactional Memory
- VMM assist
- Data Move / VM Mobility

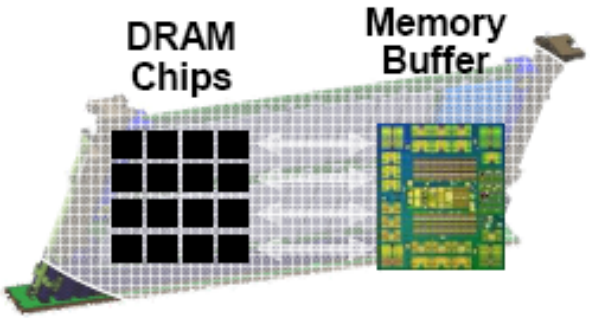
Energy Management

- On-chip Power Management Micro-controller
- Integrated Per-core VRM
- Critical Path Monitors

Bus Interfaces

- Durable open memory attach interface
- Integrated PCIe Gen3
- SMP Interconnect
- CAPI (Coherent

Memory Buffer Chip …. *with 16MB Cache !!!*



Intelligence Moved into Memory

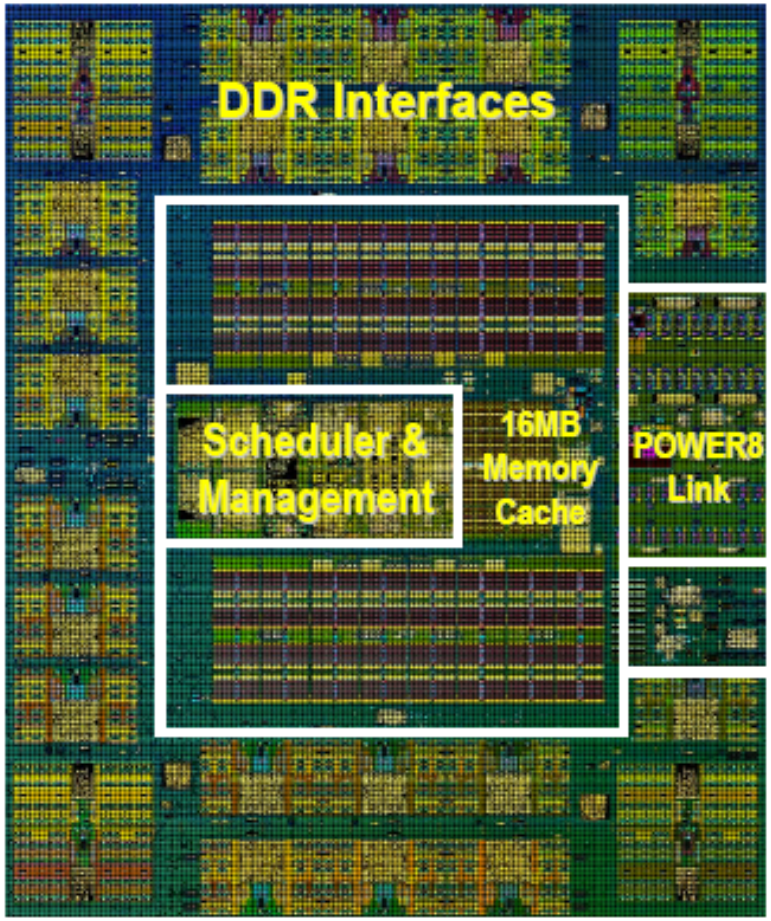
- Scheduling logic, caching structures
- Energy Mgmt, RAS decision point
  - Formerly on Processor
  - Moved to Memory Buffer

Processor Interface

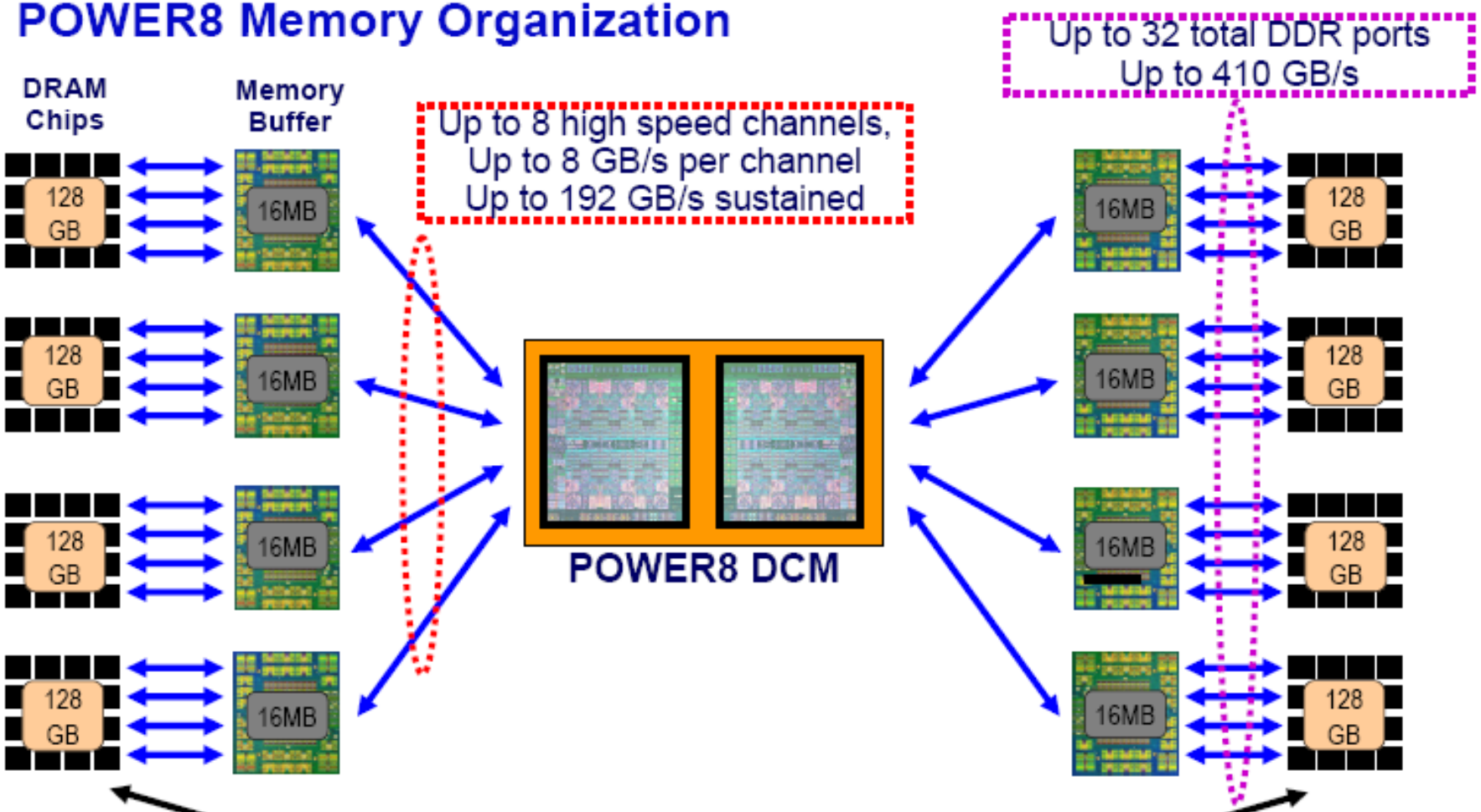
- 9.6 GB/s high speed interface
- More robust RAS
- "On-the-fly" lane isolation/repair
- Extensible for innovation build-out

Performance Value

- End-to-end fastpath and data retry (latency)
- Cache → latency/bandwidth, partial updates
- Cache → write scheduling, prefetch, energy
- 22nm SOI for optimal performance / energy
- 15 metal levels (latency, bandwidth)



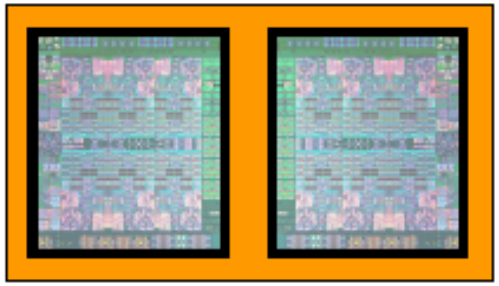
POWER8 Memory Organization



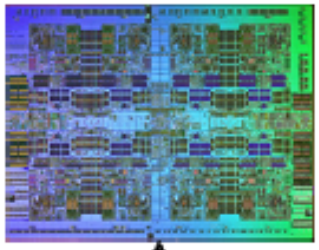
- Up to 1 TB / Socket
- First POWER8 Systems:
  - 512 GB /Socket

POWER8 Integrated PCI Gen 3

POWER8

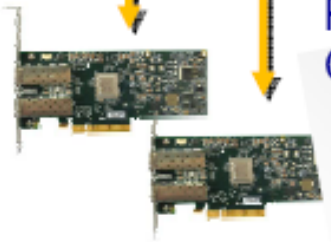


POWER7



GX Bus

I/O Bridge



PCIe Gen2

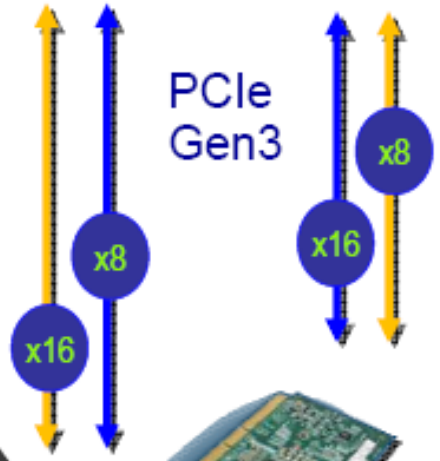
PCI Devices

Native PCIe Gen 3 Support

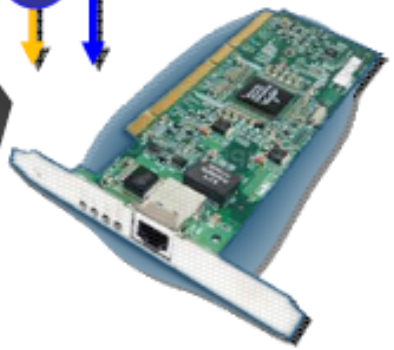
- Direct processor integration
- Replaces proprietary GX/Bridge
- Low latency
- Gen3 x16 bandwidth (32 GB/s)

Transport Layer for CAPI Protocol

- Coherently Attach Devices connect to processor via PCIe
- Protocol encapsulated in PCIe



PCI Devices

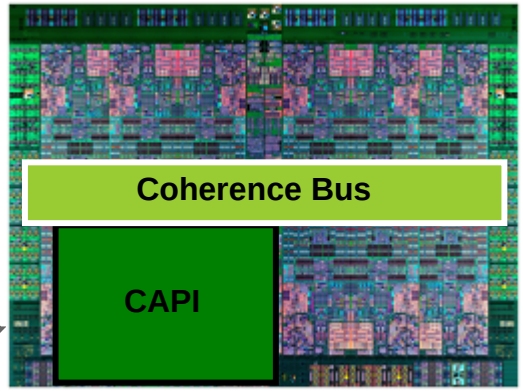


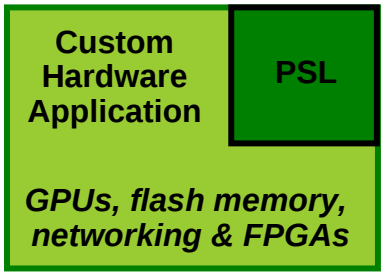
POWER8 CAPI

Coherent Accelerator Processor Interface (CAPI)

Virtual Addressing
- Accelerator can work with same memory addresses that the processors use
- Pointers de-referenced same as the host application
- Removes OS & device driver overhead

Hardware Managed Cache Coherence
- Enables the accelerator to participate in “Locks” as a normal thread
- Lowers Latency over IO communication model





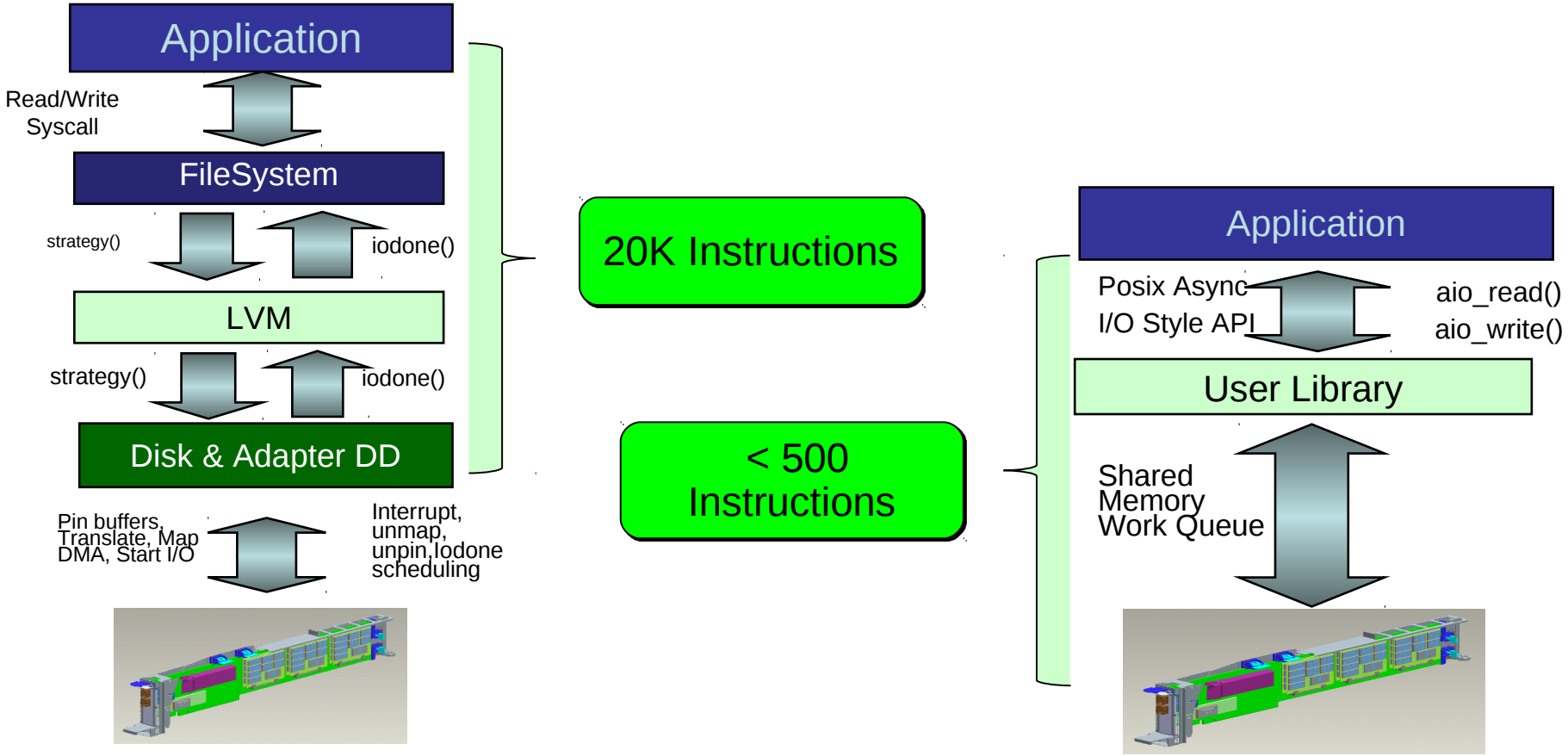
PCIe Gen 3
Transport for encapsulated messages

Processor Service Layer (PSL)
- Present robust, durable interfaces to applications
- Offload complexity / content from CAPI

Customizable Hardware Application Accelerator
- Specific system SW, middleware, or user application
- Written to durable interface provided by PSL

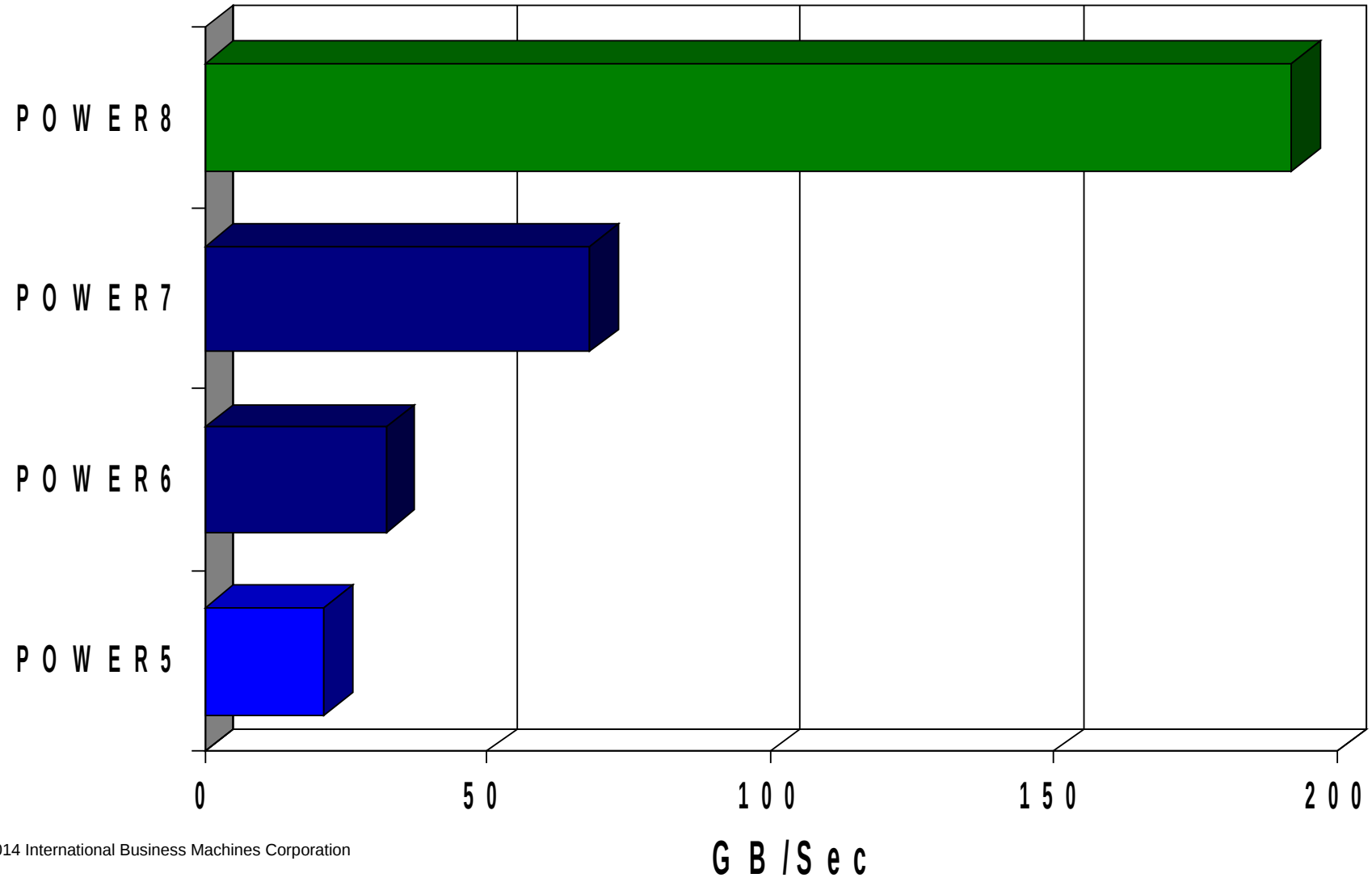
CAPI enables innovation from the OpenPOWER Foundation

Comment CAPI change la donne

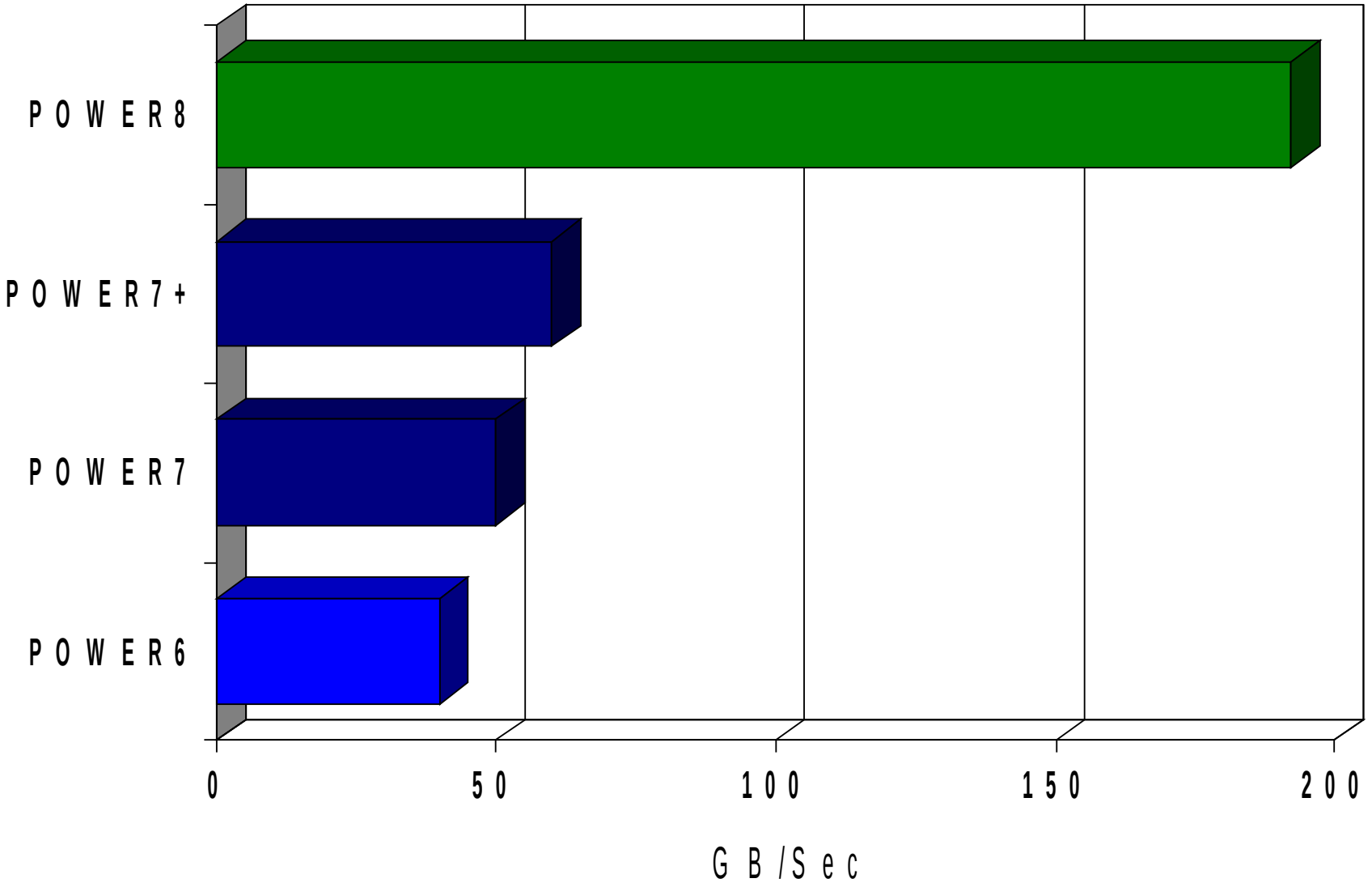


- **Exemple d'attachement de CAPI vers une baie flash (mais aussi réseau et GPU)**
- **Suppression de 97% des instructions déroulées**
- **Economie nette : 10 Cores pour 1M IOPs**

POWER8 Memory Bandwidth per Socket



POWER8 IO Bandwidth



Power Systems

IBM

POWER8 – Continued Leadership

(what you expected)

More Cores

Industry Best Practice

12 processor cores per socket (50% more than before) that deliver better per core performance

What this means

Enjoy better scale up performance, and more throughput per scale out server node.

More Threads

Industry Leading

SMT8 – 8 dynamic threads per core, supporting SMT1, 2, 4, & 8 modes dynamically across VMs

What this means

You choose – Deploy VM's in the optimal SMT mode based on application needs.

More Cache

Industry Leading

At 100MB, 3X the on-chip cache as POWER7 – plus 128MB of new off-chip cache as well

What this means

Memory-intensive applications (like database) will perform better as memory latency is reduced

More Bandwidth

Industry Leading

2.3X our prior gen to memory, and 2.4X our prior gen to I/O.

What this means

Data-hungry applications (like big data & analytics) will respond twice as fast and scale more efficiently.

POWER8 – Innovating for Tomorrow

CAPI

Industry Innovation

Open interface allows PCIe3 devices to participate in operations at memory speed without risk.

What this means

Gain orders of magnitude application performance with PCI card technology w/o hiring specialized skills

Transactional Mem

Innovation Extended

Borrowed from the mainframe, this technology speeds up memory writes by reducing contention.

What this means

A feature that improved OLTP database performance by 45% on System z is now available on Power.

Native PCIe

Innovation On Power

Integrating PCIe Gen 3 into the processor boosts performance by eliminating logic overhead.

What this means

I/O intensive data applications will run faster due to high bandwidth, low latency communications.

PowerKVM

Innovation On Power

KVM, the open-source virtualization solution, can be used to manage Linux-only systems.

What this means

Data centers can now standardize their clouds with a single open-source virtualization technology.

POWER8 Scale out Servers

POWER8 Scale Out Systems

Power S812L / S822L

Linux · redhat · SUSE · ubuntu

Scale-out Linux server based on open technology

Power S814

AIX · i for Business · Linux

Scale-out technology for mid-sized business solutions

POWER8 architecture

Power S822

AIX · Linux

Scale-out application server for secure infrastructure built on open technology

Power S824

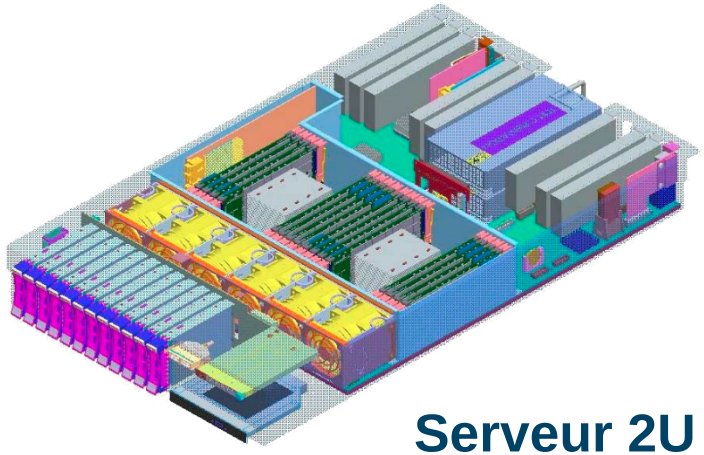
AIX · i for Business · Linux

Scale-out technology server for faster insights from data

Power Systems

IBM

Power S822



Serveur 2U

- Single Socket populated
  - Cores: 6 (3.8 GHz) or 10 (3.4 GHz)
  - Memory: Up to 512 GB
  - PCIe Slots: 6 PCIe Gen3 LP (Hotplug)
- Both Sockets populated
  - Cores: 12 (3.8 GHz) or 20 (3.4 GHz)
  - Memory: Up to 1 TB
  - PCIe Slots: 9 PCIe Gen3 LP (Hotplug)

3 Yr Warranty

- Ethernet: Quad 1 Gbt / (x8 slot)
- Integrated ports: USB (4), Serial (2), HMC (2)
- Internal Storage
  - DVD
  - 12 SFF Bays -- Split Backplane: 6 + 6
  - or 8 SFF Bays & 6 1.8” SSD Bays with Easy Tier with 7GB write cache

PowerVM

AIX

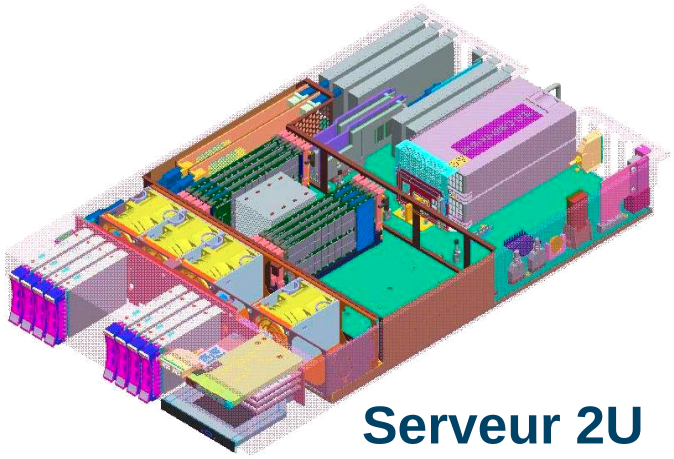
Linux

Scale-out application server for secure infrastructure built on open technology

Power Systems

IBM

Power S812L



Serveur 2U

- **Single Socket**
  - **Cores:** 10 (3.4 GHz) / 12 (3.0 GHz)
  - **Memory:** Up to 512 GB
  - **PCIe Slots:** 6 PCIe Gen3 LP (Hotplug)
- **Ethernet: Quad 1 Gbt / (x8 slot)**
- **Integrated ports: USB (4), Serial (2), HMC (2)**
- **Internal Storage**
  - **DVD**
  - **12 SFF Bays -- Split Backplane: 6 + 6**
  - **or 8 SFF Bays with Easy Tier with 7GB write cache**

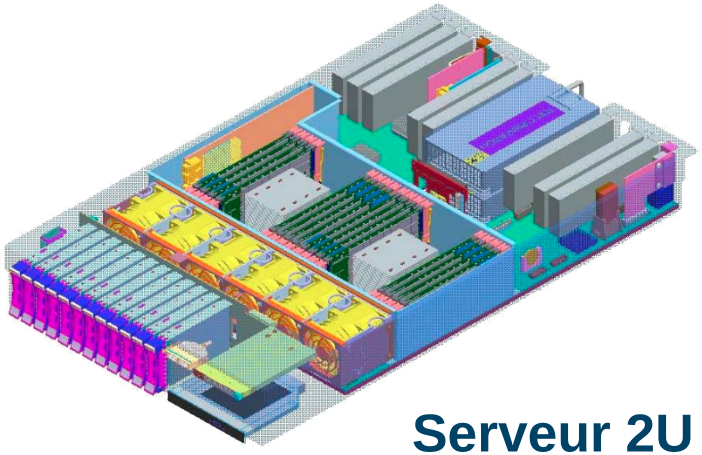
3 Yr Warranty

PowerVM PowerKVM

Linux

Scale-out Linux server based on open technology

Power S822L



Serveur 2U

- Dual Sockets
  - Cores: 20 (3.4 GHz) or 24 (3.0 GHz)
  - Memory: Up to 1 TB
  - PCIe Slots: 9 PCIe Gen3 LP (Hotplug)
- Ethernet: Quad 1 Gbt / (x8 slot)
- Integrated ports: USB (4), Serial (2), HMC (2)
- Internal Storage
  - DVD
  - 12 SFF Bays -- Split Backplane: 6 + 6
  - or 8 SFF Bays & 6 1.8” SSD Bays with Easy Tier with 7GB write cache

3 Yr Warranty

PowerVM PowerKVM

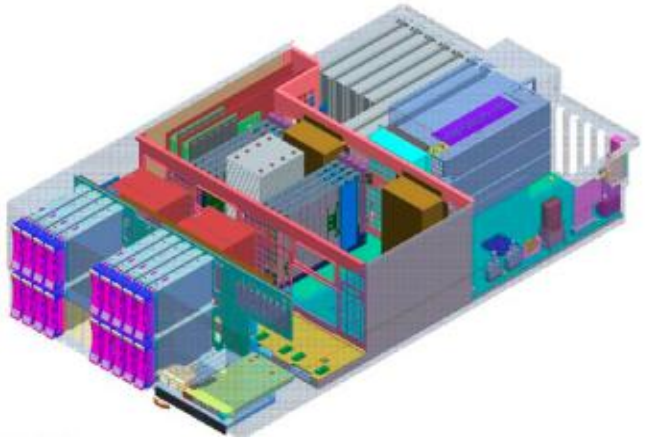
Linux

Scale-out Linux server based on open technology

Power Systems

IBM

Power S814



- Form Factor: 4U or Tower
- Single Socket
  - Cores: 6 (3.0 GHz) or 8 (3.7 GHz)
  - Memory: Up to 512 GB
  - PCIe Slots: 7 PCIe Gen3 Full-high (Hotplug)

- Ethernet: Quad 1 Gbt / (x8 slot)
- Integrated ports: USB (4/5), Serial (2), HMC (2)
- Internal Storage
  - DVD
  - 12 SFF Bays -- Split Backplane: 6 + 6
  - or 18 SFF Bays with Easy Tier with 7GB write cache

Serveur 4U

3 Yr Warranty

PowerVM

AIX

i for Business

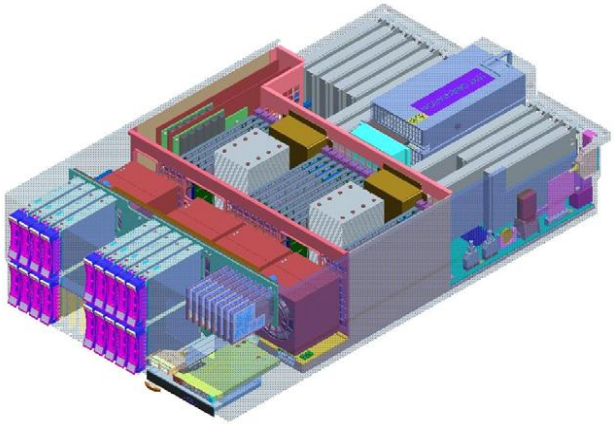
Linux

Scale-out technology for mid-sized business solutions

Power Systems

IBM

Power S824



- **Single Socket populated**
  - **Cores: 6 (3.8 GHz) or 8 (4.1 GHz)**
  - **Memory: Up to 512 GB**
  - **PCIe Slots: 7 PCIe Gen3 Full-high (Hotplug)**
- **Both Sockets populated**
  - **Cores: 12 (3.8 GHz), 16 (4.1 GHz) or 24 (3.5 GHz)**
  - **Memory: Up to 1 TB**
  - **PCIe Slots: 11 PCIe Gen3 Full-high (Hotplug)**

Serveur 4U

3 Yr Warranty

- **Ethernet: Quad 1 Gbt / (x8 slot)**
- **Integrated ports: USB (4/5), Serial (2), HMC (2)**
- **Internal Storage**
  - **DVD**
  - **12 SFF Bays -- Split Backplane: 6 + 6**
  - **or 18 SFF Bays & 8 SSD Bays with Easy Tier with 7GB write cache**

PowerVM

AIX

i for Business

Linux

Scale-out technology server for faster insights from data

Power Systems

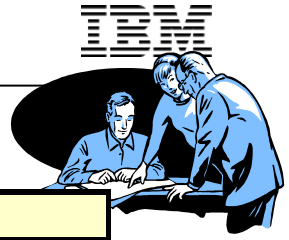
IBM

PCIe Slots - High Level

	4U		2U (no IBM i)	
	1S 4U	2S 4U	1S 2U	2S 2U
Total PCIe slots (all hot swap)	**7**	**11**	**6**	**9**
Required* LAN adapter (available for client use)	**1**	**1**	**1**	**1**
PCIe slots after required* LAN adapter	**6**	**10**	**5**	**8**
However if use high performance, expanded function backplane	**-1**	**-1**	**-1**	**-1**
PCIe slots after required* LAN and if using high performance backplane	**5**	**9**	**4**	**7**

* required for IBM Manufacturing

- **PCIe slots are all Gen3 slots**
- **2U are all low profile and 4U are all full high**
- **There is no PCI expansion drawer announced. There is an SOD.**

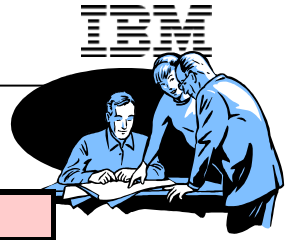


Robust List PCIe Adapters Supported (page 1)

Ethernet NIC	4-port 1GbE RJ45	#5899, #5260	
Ethernet NIC	2-port 10GbE 10GBase-T RJ45	#EN0W, #EN0X, #EL3Z	NEW
Ethernet NIC & FCoE (CNA)	4-port 10GbE+1GbE SR+RJ45	#EN0H, #EN0J, #EL3B	
Ethernet NIC	4-port 10GbE+1GbE SR optical	#EN0S, #EN0T	NEW
Ethernet NIC	4-port 10GbE+1GbE Copper twinax	#EN0U, #EN0V	NEW
Ethernet NIC & RoCE	2-port 10GbE SR optical	#EC29, #EC30, #EL2Z	
Ethernet NIC	2-port 10GbE SR optical iSCSI TOE	#5744, #5280	
Ethernet NIC	2-port 10GbE SR optical	#5284, #5287, #EL2P	
Ethernet NIC	1-port 10GbE LR optical (IBM i native)	#5772	
Ethernet NIC & OpenOnload	2-port 10GbE Copper twinax	#EL39, #EC2J, #EC2G	
Ethernet NIC & RoCE	2-port 40GbE QSFP+	#EC3A, #EC3B	NEW
Fibre Channel	2-port 8Gb	#5735, #5273, #EL2N	
Fibre Channel	4-port 8Gb (FH)	#5729	
Fibre Channel	4-port 8Gb (LP)	#EN0Y	
Fibre Channel	2-port 16Gb	#EN0A, #EN0B	
Communications	2-port Async RS232 **DELETED ***	#5289, #5290	
Communications	1-port Bisync (IBM i)	#EN13, #EN14	
Communications	2-port Async/Bisync (IBM i) (support only -- not orderable as new feature as of today)	#2893, #2894	

* Late change to drop.

Power Systems



Robust List PCIe Adapters Supported (page 2)

SAS RAID	4-port no-cache PCIe3 for SSD/HDD	#EJ0J, #EJ0M, #EL3B	
SAS Tape/DVD	4-port tape/DVD PCIe3	#EJ10, #EJ11, #EL60	**NEW**
SAS RAID	4-port huge-cache PCIe3 for SSD/HDD	#EJ0L	
SAS RAID/Tape/DVD	2-port no-cache PCIe1 for HDD	#5901, #5278, #EL10	
Infiniband (IB)	2-port QDR IB SR optical	#5285, #5283	
Graphics	2D graphics for general use	#5748, #5269	
Graphics	3D graphics for RHEL7 (RHEL7 in beta)	#EC42, #EC41	**New soon***
Encryption	Crypto Coprocessor 4765-001	#4807	
USB	4-port USB-3	#EC45, #EC46	**NEW**
Programmable FPGA	PCIe3 FPGA Accelerator	#EJ12, #EJ13	**NEW**

2S2U Scale-out Comparison - S822

	Power 730	Power System S822
Processor	POWER7+	**POWER8**
Sockets	2	**1 (Upgradeable) / 2**
Cores	8 / 12 / 16	**6 / 10 or 12 / 20**
Maximum Memory	512 GB @ 1066 MHz	**512 GB / 1TB @ 1600 MHz**
Memory Cache	No	**Yes**
Memory Bandwidth	136 GB/sec	**192 / 384 GB/sec**
Memory DRAM Spare	No	**Yes**
System unit PCIe slots	6 PCIe Gen2 LP	**6 / 9 PCIe Gen3 LP**
CAPI (Capable slots)	N / A	**Yes (one per socket)**
PCIe Hot Plug Support	No	**Yes**
PCIe Expansion Drawers	Optional PCIe Gen1	**SoD Gen3**
IO bandwidth	40 GB/sec	**192 GB/sec**
Ethernet ports	Quad 1 Gbt in x4 slot	**Quad 1 Gbt in x8 slot**
SAS bays in system unit	3 or 6 SFF-1	**12 SFF-3 Or 8 SFF-3 + 6 SSD**
Integrated write cache	Optional 175MB	**Optional effectively 7GB**
Easy Tier Support	No	**Yes**
Integrated split backplane	No	**Yes (6 + 6)**
Service Processor	Generation 1	**Generation 2**

2S2U Scale-out Comparison - S822L

	Power 730	Power System S822L
Processor	POWER7+	**POWER8**
Sockets	2	**2**
Cores	16	**24**
Maximum Memory	512 GB @ 1066 MHz	**1 TB @ 1600 MHz**
Memory Cache	No	**Yes**
Memory Bandwidth	136 GB/sec	**384 GB/sec**
Memory DRAM Spare	No	**Yes**
System unit PCIe slots	6 PCIe Gen2 LP	**9 PCIe Gen3 LP**
CAPI (Capable slots)	N / A	**Yes (one per socket)**
PCIe Hot Plug Support	No	**Yes**
PCIe Expansion Drawers	Optional PCIe Gen1	**SoD Gen3**
IO bandwidth	40 GB/sec	**192 GB/sec**
Ethernet ports	Quad 1 Gbt in x4 slot	**Quad 1 Gbt in x8 slot**
SAS bays in system unit	3 or 6 SFF-1	**12 SFF-3 Or 8 SFF-3 + 6 SSD**
Integrated write cache	Opt 175MB	**Opt effectively 7GB**
Easy Tier Support	No	**Yes**
Integrated split backplane	No	**Yes (6 + 6)**
Service Processor	Generation 1	**Generation 2**

4U Scale-out Comparison – S814

	Power 720	Power System S814
Processor	POWER7+	**POWER8**
Sockets	1	**1**
Cores	4 / 6 / 8	**6 / 8**
Maximum Memory	512 @ 1066 MHz	**512 GB @ 1600 MHz**
Memory Cache	No	**Yes**
Memory Bandwidth	136 GB/sec	**192 GB/sec**
Memory DRAM Spare	No	**Yes**
System unit PCIe slots	6 PCIe Gen2 FH Opt 4 PCIe Gen2 LP	**7 PCIe Gen3 FH**
CAPI (Capable slots)	N / A	**One**
PCIe Hot Plug Support	No	**Yes**
IO bandwidth	40 GB/sec	**96 GB/sec**
Ethernet ports	Quad 1 Gbt (x4 slot)	**Quad 1 Gbt (x8 Slot)**
SAS bays in system unit	6 or 8 SFF-1 bays	**12 SFF-3 bays** **Or 18 SFF-3 bays**
Integrated write cache	Optional 175 MB	**Optional effectively 7GB**
Easy Tier Support	No	**Yes**
Integrated split backplane	Yes (3 + 3)	**Yes (6 + 6)**
Service Processor	Generation 1	**Generation 2**

4U Scale-out Comparison – S824

	Power 740	Power System S824
Processor	POWER7+	**POWER8**
Sockets	1 (upgradeable) / 2	**1 (upgradeable) / 2**
Max Cores	8 / 16	**8 / 24**
Maximum Memory	512GB / 1TB @ 1066 MHz	**512GB / 1TB @ 1600 MHz**
Memory Cache	No	**Yes**
Memory Bandwidth	136 GB/sec	**384 GB/sec**
Memory DRAM Spare	No	**Yes**
System unit PCIe slots	6 PCIe Gen2 FH Opt 4 PCIe Gen2 LP	**7 / 11 PCIe Gen3 FH**
CAPI (Capable slots)	N / A	**Two**
PCIe Hot Plug Support	No	**Yes**
IO bandwidth	60 GB/sec	**192 GB/sec**
Ethernet ports	Quad 1 Gbt (x4 slot)	**Quad 1 Gbt (x8 Slot)**
SAS bays in system unit	6 or 8 SFF-1	**12 SFF-3 bays** **Or 18 SFF-3 + 8 SSD bays**
Integrated write cache	Optional 175 MB	**Optional effectively 7GB**
Easy Tier Support	No	**Yes**
Integrated split backplane	Yes (3 + 3)	**Yes (6 + 6)**
Service Processor	Generation 1	**Generation 2**

Power Systems

IBM

RAS Feature Overview

● Standard
◙ Optional
▬ Not Available

RAS Item	POWER7+ 710 / 730	POWER7+ 720 / 740	POWER8 models
Redundant / Hot Swap Fans & Blowers	•	•	•
Hot Swap DASD & Media	•	•	•
Hot Swap PCI Adapters	▬	▬	•
Concurrent Firmware Update	•	•	•
Redundant / Hot Swap Power Supplies	•	•	•
Dual disk controllers (split backplane)	▬	◙	◙
Processor Instruction Retry	•	•	•
Alternate Processor Recovery	•	•	•
Storage Keys	•	•	•
PowerVM™/Live Part. Mobility/Live App Mobility	◙	◙	◙
Dynamic Processor Sparing	▬	▬	▬
Redundant Service Processors	▬	▬	▬
Redundant System Clocks	▬	▬	▬
Hot GX Adapter Add and Cold Repair	▬	▬	N/A
Dynamic Service Processor &System Clock Failover	▬	▬	▬
Enterprise Memory (Memory Sparing)	▬	▬	•
Integrated TPMD Function	▬	▬	•
Hot GX Adapter Repair	▬	▬	N / A
Active Memory Mirroring for Hypervisor	▬	▬	▬
Power Pools	▬	▬	▬

Power Systems : des capacités “scale out” ou “scale up”

Scale out ou scale up avec Power Systems

- *Power Systems Scale out*
- *Power Enterprise Systems*

Power Enterprise Systems

- Heritage of high utilization, performance and scalability
- Designed for the most mission-critical applications
- Delivering economic benefits for workload consolidation
- *Statement of direction for POWER8*

Take advantage of these capabilities today

- IBM Power Enterprise System Pools
- Power Integrated Facility for Linux
- IBM Capacity on Demand

Two-Step Process to upgrade to POWER8

Purchase additional IBM POWER7+ capacity today and upgrade it to POWER8 tomorrow

April 2014 POWER8 Statements of Direction.

IBM plans to bring POWER8 capability to the full Power Systems portfolio*, with the intent to deliver the most scalable, highest performing enterprise-class Power System with an advanced version of the POWER8 processor. These enterprise systems are designed to deliver the industry's best per-core performance and will support AIX, Linux and IBM i applications, concurrently.*

The new system architecture incorporates resiliency characteristics of IBM's Power 795 *with the intent to drive substantial improvements in energy efficiency and floor space utilization for mid-sized and large enterprises.*

These systems will use IBM's modular design *to enable mid-size companies (clients) to leverage the innovations in POWER8 processor technology and the latest advancements in enterprise-class systems and Capacity on Demand, to help enable growth seamlessly and affordably.*

IBM also plans to provide upgrade paths from the current POWER7+ Power 770 and 780 servers to enterprise-class POWER8 processor-based servers*. It is intended that clients with multiple systems can leverage PowerVM Live Partition Mobility to help maintain application availability during the upgrade process.*

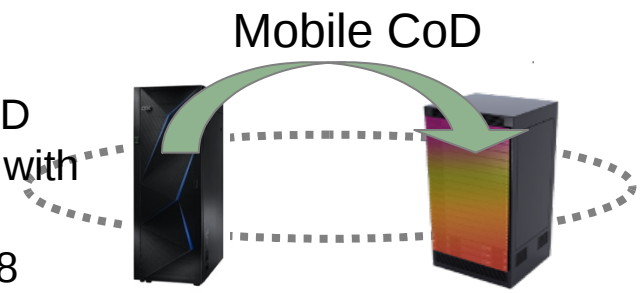
IBM also plans to offer clients an ***option to permanently transfer their Mobile CoD*** *processor and memory activation features from a Power 770, 780 or 795 to a designated POWER8 processor-based Power System within the same Power Enterprise Pool.*

Transition Scenarios for 2-step to POWER8

Single system upgrade

1. Upgrade to POWER7+
2. Model upgrade to POWER8

Power Enterprise Pool for migration or box swap



1. Purchase a POWER7+ server with Mobile CoD
2. Purchase a new POWER8 server & integrate with Power Enterprise Pool
3. Transition capacity & applications to POWER8 via Mobile CoD and PowerVM
4. Use POWER7+ system for HA, etc. or remove from environment

Power 570 & 770 systems can upgrade to POWER7+

POWER7 780
9179-MHC

POWER7 780
9179-MHB

POWER6 570
9117-MMA

→ Power 780+
9179-MHD

POWER7 770
9117-MMC

POWER7 770
9117-MMB

POWER6 570
9117-MMA

→ Power 770+
9117-MMD

Upgrade to POWER7+, deploy a Power Enterprise Pool and your infrastructure is ready for the future

POWER7+ offers leadership performance, resilience and resource sharing today

POWER7+ systems deliver:

- Up to 40% higher application performance
- Crypto accelerator
- Memory expansion accelerator
- Elastic COD

and now with…

New Capability:

- Power Enterprise Pools
- PowerVC: Open, Simplified Virtualization & Cloud Management
- Integrated Flash on every system
- Upgrades to POWER8 (SOD**)

Deploy a flexible, efficient Private Cloud infrastructure with a Power Enterprise Pool

** Statement of Direction for future support. All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Operating Systems

POWER8 Ecosystem

ISV Applications Available on POWER8

All applications which run these OS levels will run on POWER8

AIX 6.1 or 7.1

IBM i 7.1 or 7.2

Red Hat 6

SUSE 11

Ubuntu 14

Additional certification, validation, porting, testing, etc. are not required

Systèmes d'exploitation IBM et Linux

Virtualisé

- AIX 7.1TL3SP1, AIX7.1TL2SP1, AIX7.1TL1SP6
- AIX Version 6.1TL9SP, AIX6.1T8SP1, AIXTL7SP6
- i 7.1TR8, i 7.2

Non virtualisé

- VIOS 2.2.2.3
- AIX Version 7.1 TL3SP3, AIX 6.1 TL9SP3
- i 7.1TR8, i 7.2

	1H / 2014	2H / 2014
RHEL6	RHEL 6.5 P7 Mode in P8	RHEL 6.6 P7 mode in P8
RHEL 7	RHEL 7.0 POWER8 Support	
SLES 11	SLES 11 + SP3 P7 Mode in P8	
SLES 12		SLES 12 (LE) POWER8 Support
Ubuntu (LE)	14.04.00/01 P8 Support	14.04.00/02
Debian	LE Introduction POWER8 Support	LE Update

Power Modes

POWER6 MODE (*and POWER6+ Mode*)*	POWER7 MODE *(No POWER7+ Mode)*	POWER8 MODE
2-Thread SMT	4-Thread SMT, *IntelliThreads*	8-Thread SMT
8 Protection Keys **(16 in P6+ Mode)*	32 Protection Keys User Writeable AMR	32 Protection Keys User Writeable AMR
VMX (Vector Multimedia Extension / AltiVec)	VSX (Vector Scalar Extension)	VSX2, In-Core Encryption Acceleration
Affinity OFF by Default	CPU/Memory Affinity Enhancements ON by Default, HomeNode, 3-tier Memory, MicroPartition Affinity	HW Memory Affinity Tracking Assists, MicroPartition Prefetch, Concurrent LPARs per Core
64-core/128-thread Scaling	64-core / 256-thread Scaling 256-core / 1024-thread Scaling	> 1024-thread Scaling Hybrid Threads Transactional Memory Active System Optimization HW Assists
N/A	Active Memory Expansion	HW Accelerated/Assisted Active Memory Expansion
N/A	P7+ : AME compression acceleration and Encryption acceleration	Coherent Accelerator / FPGA Attach

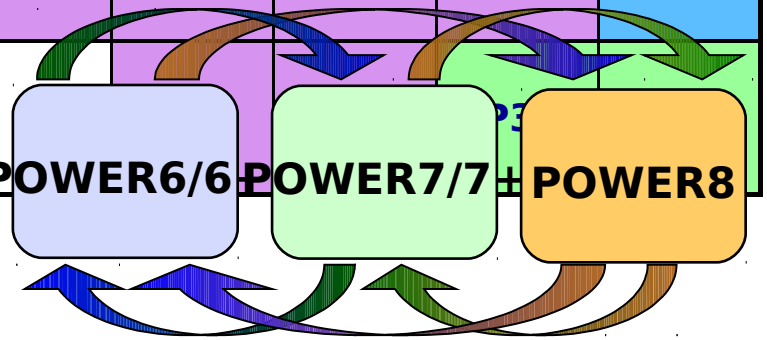
Système AIX: Niveaux supportés

	11 / 2012	2 / 2012	3 / 2013	5 / 2013	8 / 2013	9 / 2013	10 / 2013	12 / 2013	2Q / 2014	3Q / 2014
AIX 6 TL7	SP6		SP7			SP8		SP9		SP10
AIX 6 TL8	SP1	SP2				SP3		SP4		SP5
AIX 6 TL9							SP1		SP3	
AIX 7 TL1	SP6			SP7	SP8			SP9		SP10
AIX 7 TL2	SP1	SP2			SP3			SP4		SP5

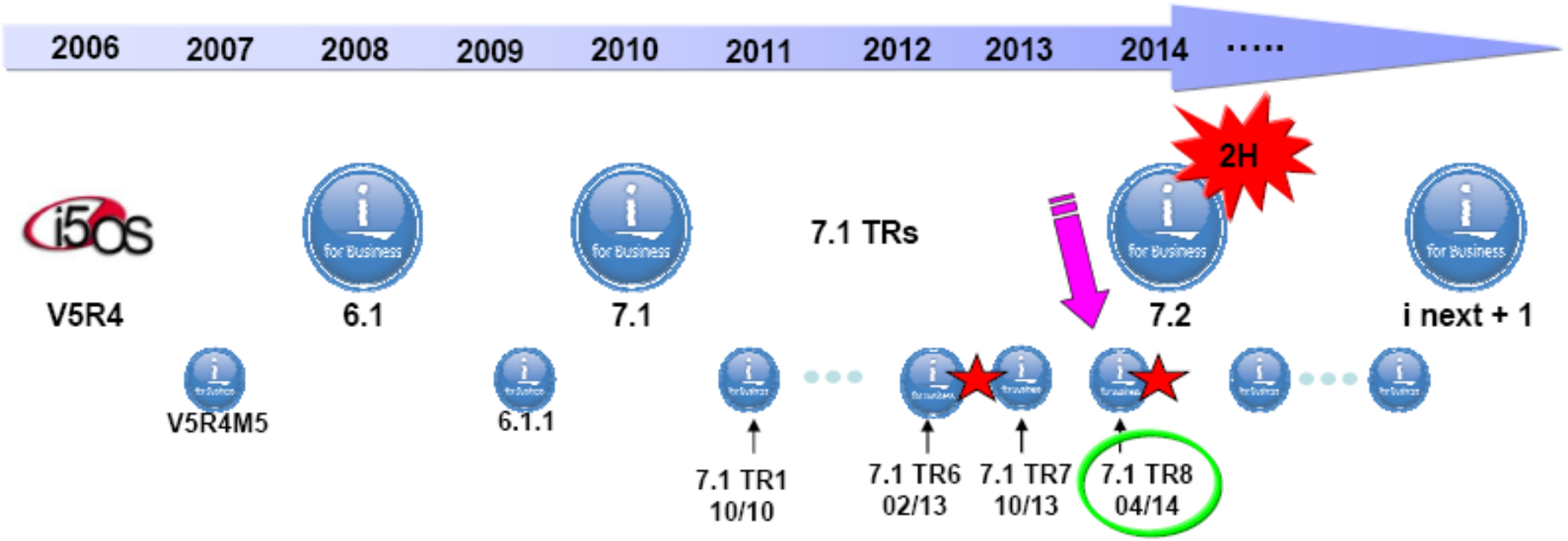
P7 or P6 Modes with Virtual I/O

P7 or P6 Modes with Full I/O Support

P8, P7 or P6 Modes with Full I/O Support



Nouvelle version IBM i 7.2



- ✓ Mise à niveau intermédiaire de Technology Refresh pour l' IBM i 7.1 par le biais de PTFs ★
- ✓ Avantages des Technology Refreshes intermédiaires …
  - Amènent le support des nouvelles fonctions et des nouveaux dispositifs E/S
  - Simples à installer sur la version en cours, ne nécessitant pas un arrêt de production.
- ✓ **Pas de nouvelle version ni en 2012, ni en 2013…. mais en 2014 !!**

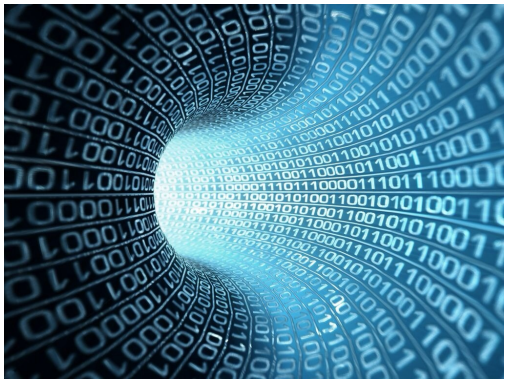
Les nouvelles fonctionnalités ont été incluses dans les différents Technology Refreshes disponibles depuis Octobre 2010

** All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Nouvelle version IBM i 7.2

- Powerful **new features of DB2® for i** ensures security of the data in a modern environment of mobile, social and network access
- **IBM Navigator for i** extends system management capabilities to manage and monitor performance services
- **PowerHA SystemMirror for i Express Edition** introduces HyperSwap improves resiliency value proposition
- Additional flexibility in configuration for **I/O** with new virtualization: Ethernet through SRIOV and WAN over LAN"
- **Backup and Recovery Management Systems** (BRMS) extends Hub function for easier management
- Support for new **POWER8** systems, and new features for POWER8 and POWER7/7+
- **Integrated Security** SSO application suite extended to include FTP and Telnet authentication with Kerberos
- Many enhancements to the portfolio of IBM i products from **IBM Software Group**
- More highlights extending and enhancing the value proposition of IBM i integration

IBM i 7.1 Technology Refresh 7 - Highlights



- Self-managing value proposition of **DB2 for IBM i** extended with improvements for better performance and usability.
  - Very Large DataBase - DB2 for i gets bigger and better
  - Advanced Security controls using DB2 for i
  - DB2 for i as a solution platform
- **RPG IV** now includes more free format options, providing syntax similar to other modern languages such as Java and C++
- Latest **Java 7.1** class libraries now available, running in faster runtime engine

- **Enhancements to Application Runtime Expert** include more flexible scheduling options
- Ruby on Rails support through **PowerRuby**
- **PowerSC ToolKit for IBM i** extends the integrated security of IBM i
- IBM i will support new and enhanced **I/O hardware** options

Les versions IBM i supportées

	IBM i 7.1 TR8
POWER7	Max Scale = 32 cores (SMT4) Max Partition = **64 cores (SMT4)** Threads = ST, SMT2, SMT4 up to 256 threads in single partition
POWER8	Max Scale = 32 cores (SMT8) Max Partition = **64 cores (SMT4)** Threads = ST, SMT2, SMT4, SMT8 up to 256 threads / single partition

	IBM i 7.2
POWER7	Max Scale = 32 cores (SMT4) Max Partition = **96 cores (SMT4)** Threads = ST, SMT2, SMT4 up to 384 threads in single partition
POWER8	Max Scale = 48 cores (SMT8) Max Partition = **96 cores (SMT8)** Threads = ST, SMT2, SMT4, SMT8 up to 768 threads / single partition

IBM i System Support

http://www-947.ibm.com/systems/support/i/planning/upgrade/osmapping.html

Servers	IBM i 5.4 [1]	IBM i 6.1	IBM i 7.1	IBM i 7.2
POWER8	✗	✗	✓ 4	✓
POWER7/7+ PS700/701/702/730/704, Power 710, 720, 730, 740, 750, 760, 770, 780, 795, Pureflex p260/460	✗	✓ 2 / 3	✓	✓
POWER6 JS12, 22, 23/43, 550* 560	✗	✓	✓	✓ 5
POWER6 520, 550*, 570, 595	✓	✓	✓	✗
POWER5/5+ 515, 520, 525, 550, 570, 595	✓	✓	✓	✗
800, 810, 825, 870, 890	✓	✓	✗	✗
270, 820, 830, 840	✓	✗	✗	✗

1 – IBM i V5R4 is no longer marketed or supported other than through extended service contracts
2 – POWER7+ 750/760 do not support native I/O.
3 - IBM i 6.1 in PureFlex must be client of 7.1 or later
4 – Requires Technology Refresh 8
5 – no IOP or HSL support 5

IBM i Entitlement Transfer Offering Group Definitions

Tier	Model	Structure	Processor Group
Large	795 780	Per core	P50 Group 3
Medium	770 760	Per core	P30 Group 2
Small	S824 750 / 740 / 730	Per core	P20 Group 1
	PureFlex/Flex: Flex p260 Compute Node 8/16 - core Flex p460 Compute Node 16/32 – core	Per core and user	P10 Group 6
	PureFlex/Flex: Flex System p260 – 7895-23A	Per core and user	P05 Group 6
	S814 720 6/8-core 710 6/8-core PS701/703 8/16 – core PS702/704 16/32 – core	Per core and user	P10 Group 5
	720 4-core 710 4-core PS700 4-core	Per core and user	P05 Group 4

For the 3Q2013 PureFlex/Flex P05 7895-23A:

- Currently, clients can transfer IBM i processor and user entitlements to the 7895-23A via the software-only path in econfig (transfers within groups 4, 5, 6).
- Initial order path: in order to transfer IBM i processor/user entitlements in the initial order path for 7895-23A, econfig support will start in November 2013.
- Transfers from Groups 1/2/3 to the 7895-23A will not be supported.

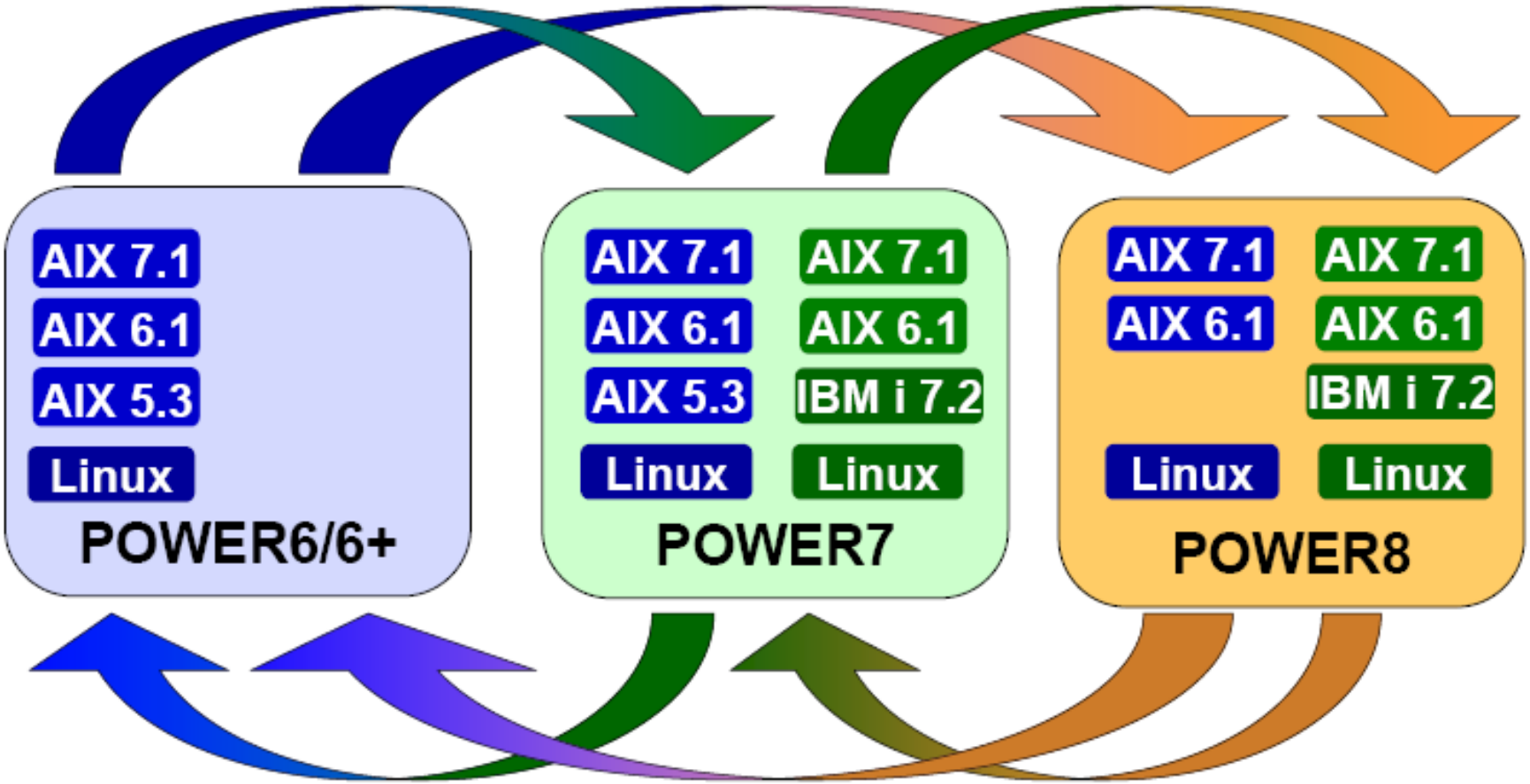
IBM i entitlement transfers can be done…

- within groups 1, 2, and 3
- within groups 4, 5, and 6
- from groups 1, 2, and 3 to group 6 (with the exception of 7895-23A: no transfer from 1/2/3 to the P05 7895-23A)

Les distributions Linux supportées

	1H / 2014	2H / 2014
RHEL6	RHEL 6.5 P7 Mode in P8	RHEL 6.6 P7 mode in P8
RHEL 7	RHEL 7.0 POWER8 Support	
SLES 11	SLES 11 + SP3 P7 Mode in P8	
SLES 12		SLES 12 (LE) POWER8 Support
Ubuntu (LE)	14.04.00/01 P8 Support	14.04.00/02
Debian	LE Introduction POWER8 Support	LE Update

POWER6 / POWER7 / POWER8 Partition Mobility



Leverage POWER6 / POWER7 Compatibility Modes

LPAR Migrate between POWER6 / POWER7 / POWER8 Servers

Can not move POWER8 Mode partitions to POWER6 or POWER7 systems.

Linux

Flashback

Starting in 2001 IBM invested $1 billion in Linux

IBM

Our leadership in Linux and the Open Community has made Linux an ongoing competitive choice for our clients

Watson

Enabling IBM products

2005–2006 **Application and data serving**

Mainstream for IBM

2010… **Next-generation workloads**

Making Linux better

1999–2004 **Edge and web infrastructure**

Core to the IBM business

2007–2009 **Business-critical workloads**

Who Has Contributed to Linux?

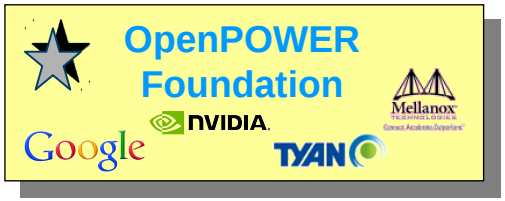
(2005 – 2013)

Company Name	Number of Changes	Percent of Total
None	46,982	17.9%
Red Hat	31,261	11.9%
Novell	16,738	6.4%
Intel	16,219	6.2%
IBM	16,073	6.1%
Unknown	13,342	5.1%
Consultant	7,986	3.0%
Oracle	5,542	2.1%
Academia	3,421	1.3%
Nokia	3,272	1.2%
Fujitsu	3,156	1.2%
Texas Instruments	2,982	1.1%
Broadcom	2,916	1.1%
Linux Foundation	2,890	1.1%
Google	2,620	1.0%
Analog Devices	2,595	1.0%
SGI	2,578	1.0%
AMD	2,510	1.0%
Parallels	2,419	0.9%
Freescale	2,265	0.9%
Cisco	2,259	0.9%
HP	2,158	0.8%
Renesas Technology	2,092	0.8%
MontaVista	2,019	0.8%
Atheros Communications	1,960	0.7%
Wolfson Microelectronics	1,952	0.7%
Marvell	1,752	0.7%
NetApp	1,746	0.7%
Linutronix	1,656	0.6%
Samsung	1,650	0.6%

You know what's cool?

$1 Billion...again

Power Systems intends to invest a billion dollars in solutions for Linux and open source workloads, adding to prior investments by IBM during the last decade on a wide range of open initiatives.



And, we recently opened a Power Systems Linux Center in Montpellier, France, joining our centers around the world dedicated to Linux developers.

Request briefing or training session

Request porting assistance

Learn about Power Systems Linux centers

Beijing, China

Austin, TX

New York, NY

Montpellier, France

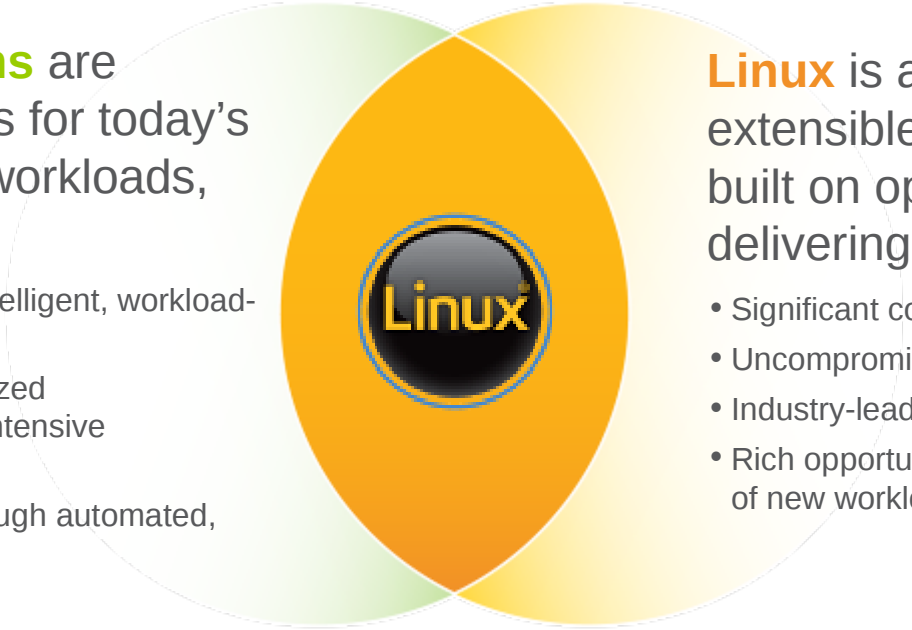
IBM Press Release

Wall Street Journal Coverage

Linux on Power Systems combines the unparalleled performance of Power with the capabilities and cost effectiveness of Linux

IBM Power Systems are the ultimate systems for today's compute-intensive workloads, delivering:

- Dynamic efficiency, with intelligent, workload-based resource allocation
- Business analytics—optimized for big data and compute-intensive applications
- Enhanced compliance through automated, policy-based security



Linux is a robust and uniquely extensible operating system built on open source innovation, delivering:

- Significant cost savings
- Uncompromising stability & security
- Industry-leading flexibility and performance
- Rich opportunities for innovation and enabling of new workloads

Linux on Power Systems integrates these two powerful technologies to deliver the highest levels of:

- Efficiency
- Availability
- Security
- Reliability
- Scalability
- Cost savings

Power Systems

IBM

Power Systems Portfolio 2Q 2014

Power Systems introduces the first generation of systems built with the innovation to transform the power of big data & analytics, mobile and cloud into competitive advantage in ways never before possible

AIX

i for Business

Linux

PowerVM

PowerVC

PowerSC

PowerHA

KVM

redhat

SUSE

ubuntu

POWER7 BUILT ON Power

Flex System
PureFlex System

Power 760

Power 770

Power 780

Power 795

Power 750

PowerLinux™ 7R4

PowerLinux™
7R1/7R2

Power Systems: Innovation to put data to work

- New Innovation brings faster insight to the point of impact for today's data hungry applications
- Better economics for scale out data and cloud infrastructures
- Higher utilization and performance capabilities for scale up computing (to be expanded for Enterprise SOD)
- Delivering open innovation

PowerLinux is RHEL and SLES – Canonical coming for Power8

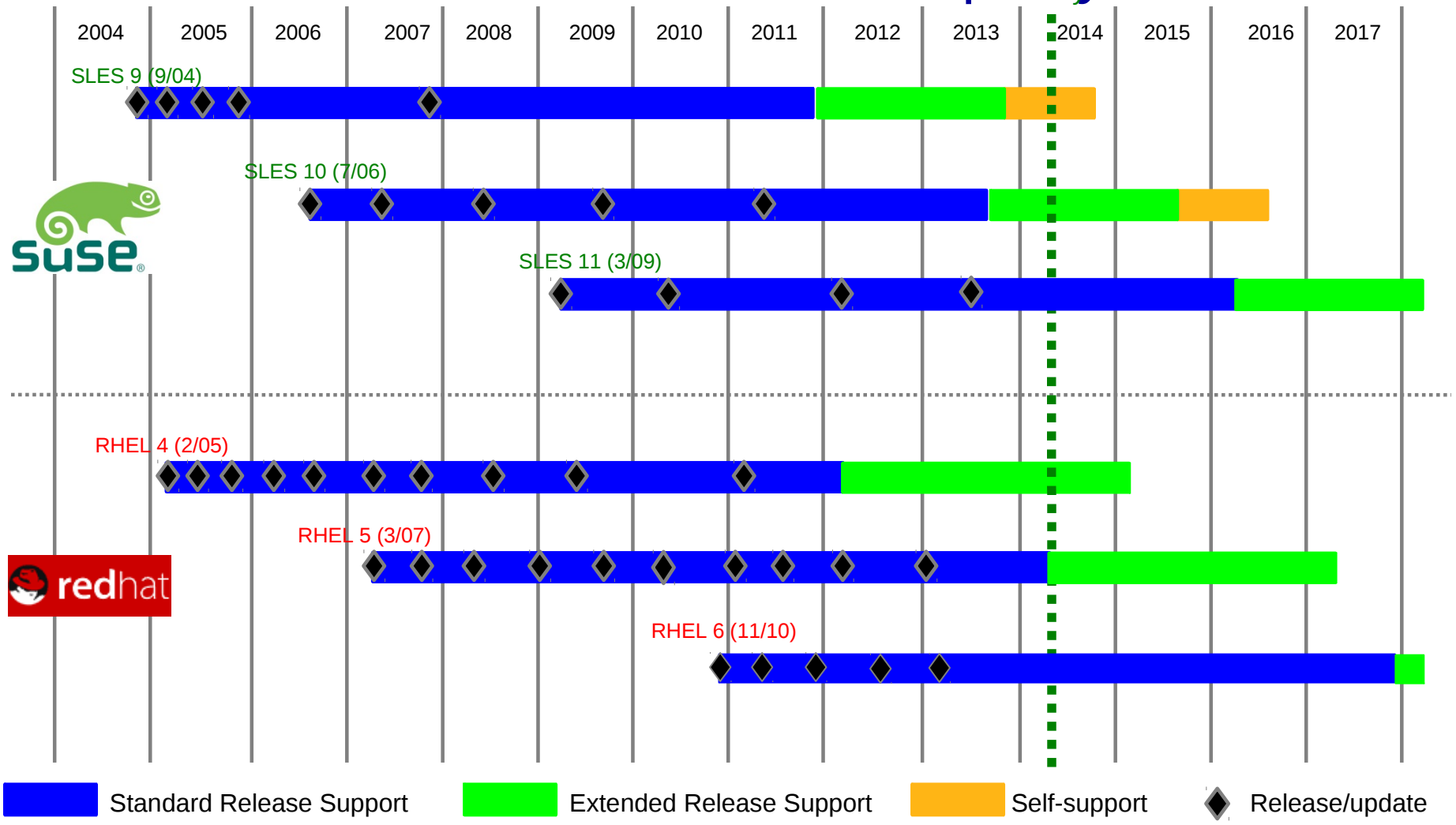
SUSE and Red Hat Enterprise versions supporting POWER7 / Power8 expected to be supported with new Distro Versions (RHEL7, SLES 12, Ubuntu 14.04)

- Built from the same source as x86
- Delivered on the same schedule as x86
- Supported at the same time as x86

- SUSE Linux Enterprise Server 11
  - Full support of POWER7 (native mode)
  - Will run on Power8 in p7compat mode
  - Earliest supported release: SLES 11 base
  - Last update: SP3 GA July 2013
- SUSE Linux Enterprise Server 10*
  - Enabled for POWER7 in P6-compatibility mode
  - Earliest supported release: SP3
  - Last update: SP4 GA April 2011
- Red Hat Enterprise Linux 6
  - Full support of POWER7 (native mode)
  - Will run on Power8 in p7compat mode
  - Earliest supported release: RHEL 6 base
  - Last update: U5 GA December 2013
- Red Hat Enterprise Linux 5*
  - Enabled for POWER7 in P6-compatibility mode
  - Earliest supported release: U5
  - Last update: U9 GA January 2013
- Ubuntu 14.04
  - Enabled specifically for POWER8. 64-bit only.
  - Expected to be available 2Q2014
  - Targeted for new Cloud based deployments

* SLES 10 and RHEL 5 will not be supported on POWER7+ or POWER8 systems

IBM PowerLinux has Linux “release parity”



See for more details:

- Red Hat lifecycle information - https://access.redhat.com/support/policy/updates/errata/
- SUSE lifecycle information - http://support.novell.com/inc/lifecycle/linux.html

New GNU tools available in Advanced Toolchain

•POWER8 already enabled in the latest FSF toolchain

IBM Advance Toolchain for PowerLinux 7.0-0 released!

tuliom | *Aug 29* | *Visits (1030)* 1

By: Tulio Magno Quites Machado Filho.

+1 4 Like 1 Share Tweet 0

The IBM Advance Toolchain for PowerLinux is a set of open source development tools and runtime libraries that allow users to take leading edge advantage of IBM's latest POWER hardware features on Linux.

A new major release is now available, and it features:

- New base toolchain, based on GCC 4.8.1 and glibc 2.18
- POWER8 enablement
- POWER8 Optimized scheduler
- POWER8 Transactional Memory enablement
- POWER8 Crypto Operations enablement
- POWER8 Fusion enablement
- POWER8 optimized system libraries
- GCC now defaults to -mcpu=power7 and -mtune=power8
- GDB 7.6
- OProfile 0.9.9 with ocount

This release requires POWER7 or newer processors.

For download links, more information and documentation, please refer to our **official documentation page**.

For example, the Advance Toolchain 7.0 packages for RHEL 6 are available **here**.
Please let us know if you have any questions about this release.

Tags: linux powerlinux power8 power advancetoolchain

•More details at:
•https://www.ibm.com/developerworks/community/blogs/fe313521-2e95-46f2-817d-44a4f27eba32/entry/ibm_advance_toolchain_for_powerlinux_7_0_0_released?lang=en

Power Systems

IBM

Middleware, database and tools portfolio* for Linux on Power

Choose to deploy Open Source or commercial middleware, database or tools

	Open Source	IBM Software	ISV Partner or LDP
Linux	**Management Tools** (HA, Cluster, Backup, Storage, etc.)		
	Development Tools		
	Networking, Email, File/Print, Directory		
	Database and Big Data		DB2, Informix Information Management InfoSphere
	Middleware for Web Serving, Java Apps		Netweaver

All available or enabling for Linux on Power Systems

* Not a complete list of applications available for PowerLinux – intented to provide representative applications in focus areas

Power Systems

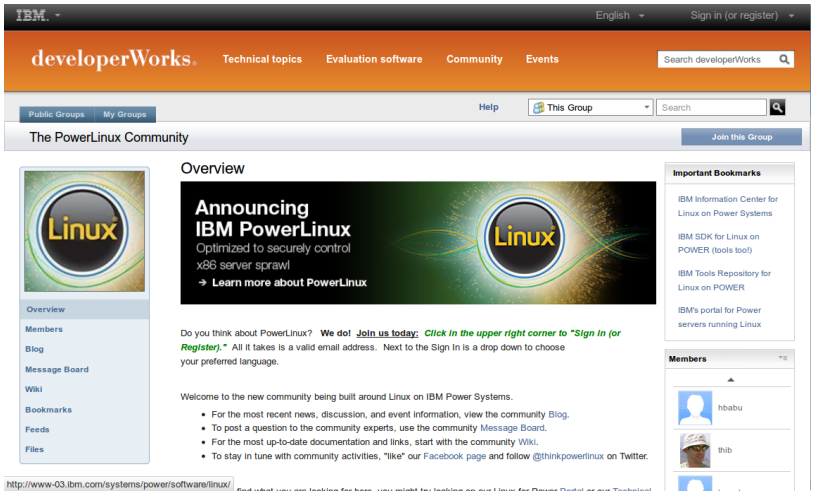
IBM

Learn more about Linux on Power

Power Systems Linux Portal

(Product Information)

www.ibm.com/systems/power/software/linux/



The PowerLinux Community

(developerWorks)

www.ibm.com/developerworks/group/tpl/

twitter

@ibmpowerlinux

Google+

plus.google.com/communities/100156952249293416679

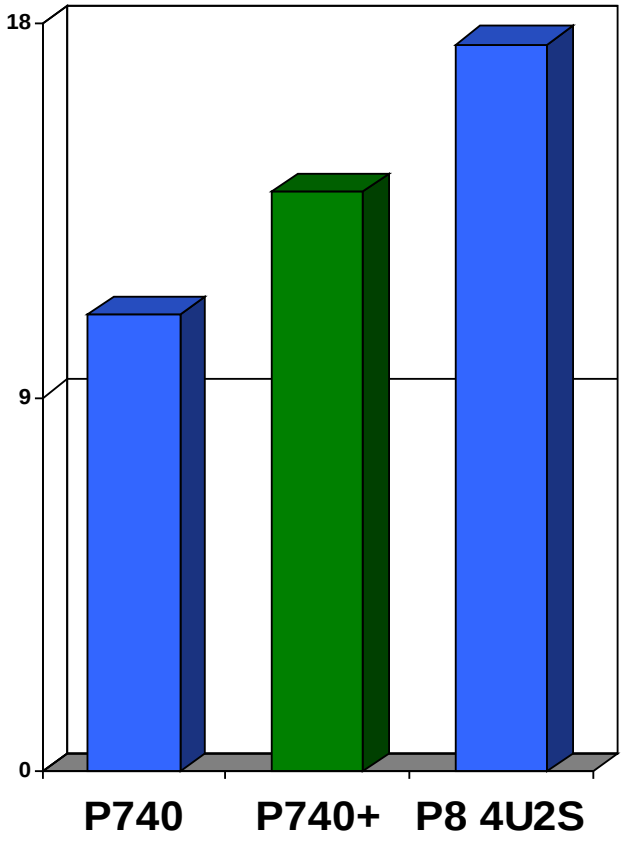
Performance

Power Systems

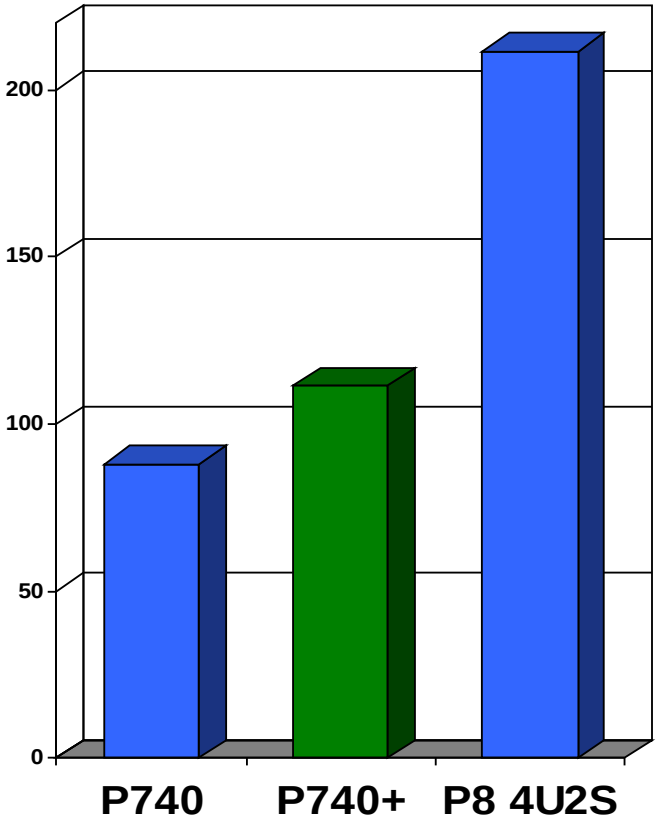
IBM

Power 740 / POWER8 S824 rPerf Comparisons

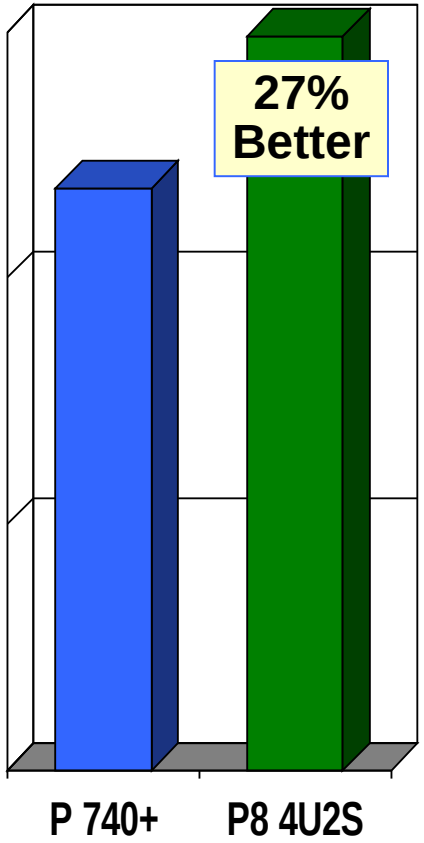
Performance per Core



Performance per Socket



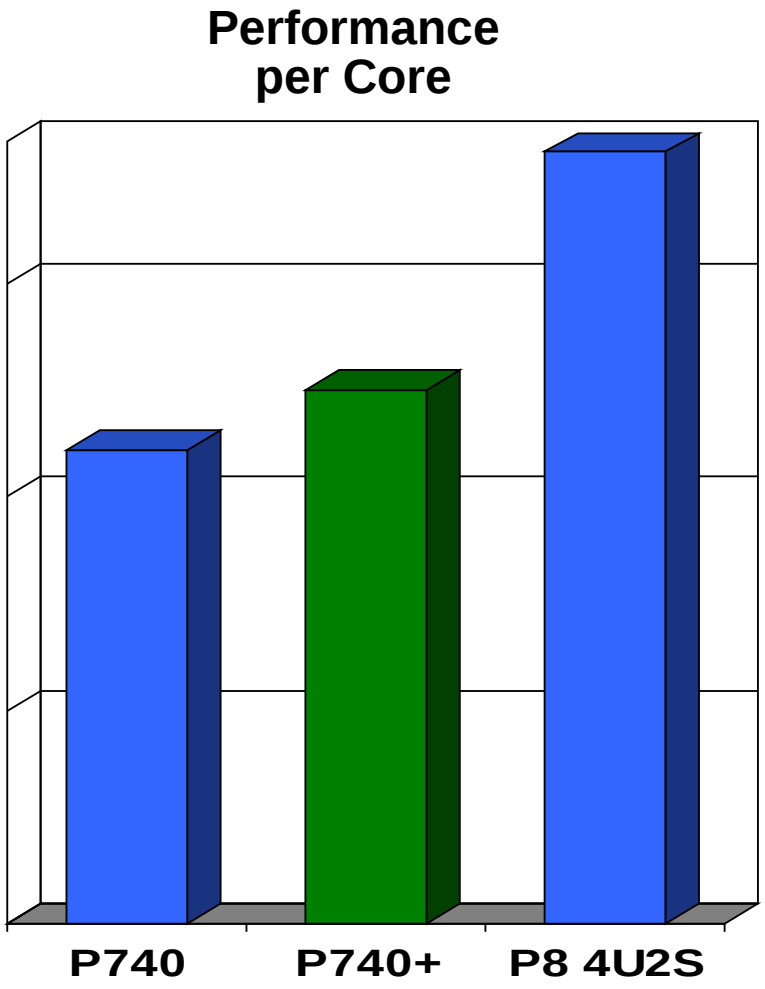
Performance per KW

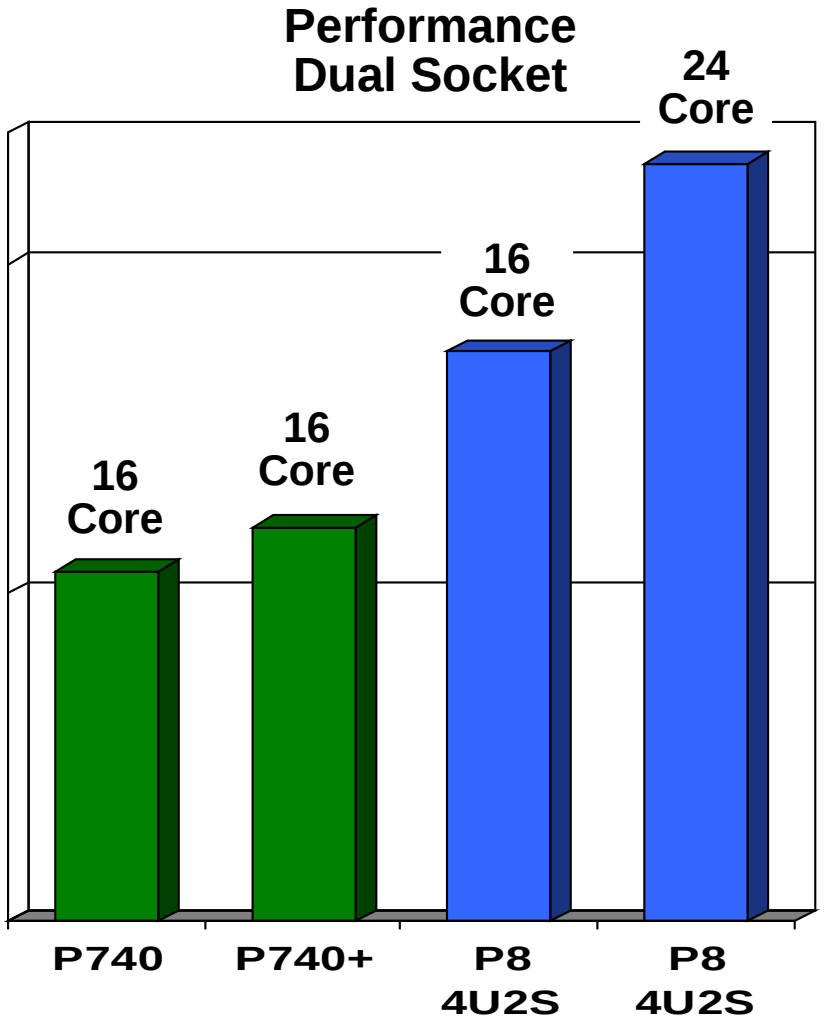


Power Systems

IBM

Power 740 / POWER8 S824 CPW Comparisons



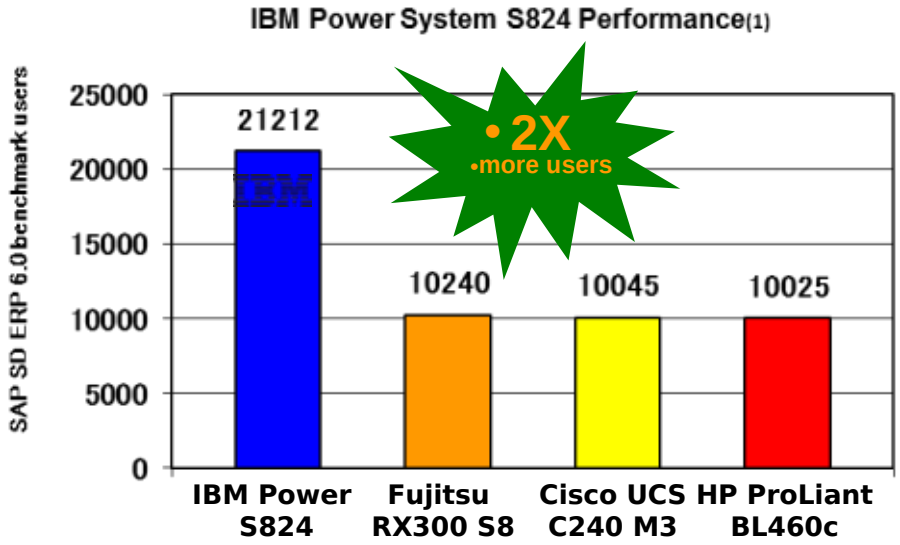


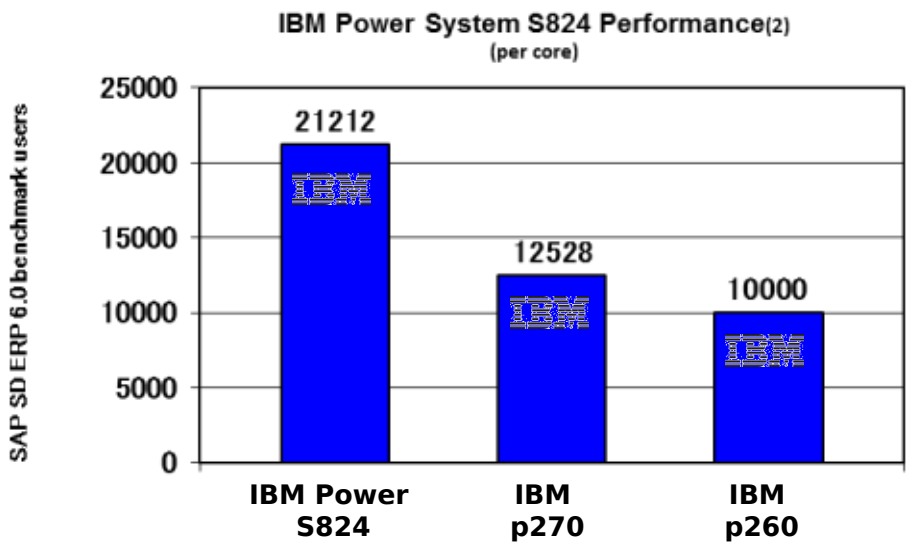
SAP Sales & Distribution 2-Tier ERP 6 Benchmarks

IBM Power System S824 using DB2 10.5 vs. Competition

Over 2 times better 24 core performance than nearest Intel competitive results

Up to 2 times greater performance than previous Power generation





(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 / 192 threads, POWER8; 3.52GHz, 512 GB memory, 21,212 SD benchmark users, running AIX® 7.1 and DB2® 10.5, dialog response: 0.98 seconds, line items/hour: 2,317,330, dialog steps/hour: 6.952,000 SAPS: 115,870 database response time (dialog/update): 0.011 sec / 0.019sec, CPU utilization: 99%, Certification #: 2014016 Results valid as of 3/24/14. Source: http://www.sap.com/benchmark.

•(1.1) Fujitsu RX300 S8 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 E5-2697 processor 2.70 GHz, 256 GB memory, 10.240 SD benchmark users, running Windows Server 2012 SE and SQL Server 2012, Certification #: 2013024

•(1.2) Cisco UCS c240 M3 on the two-tier SAP SD standard application benchmark running SAP enhancement package 5 for the SAP ERP 6.0 application; 2 processors / 24c ores / 48 threads. Intel Xeon E5-2697 processor 2.70 GHz, 256 GB memory, 10.045 SD benchmark users, running Windows Server 2012 DE and SQL Server 2012, Certification #: 2013038

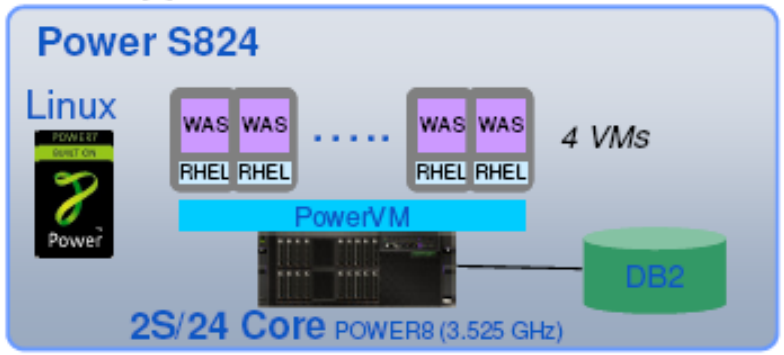
•(1.3) HP ProLiant BL460c Gen8 on the two-tier SAP SD standard application benchmark running SAP enhancement package 5 for the SAP ERP 6.0 application; 2 processors / 24 cores / 48 threads. Intel Xeon E5-2697 processor 2.70 GHz, 256 GB memory, 10.025 SD benchmark users, running Windows Server 2012 DE 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, 12.528 SD benchmark users, running AIX® 7.1 and DB2® 10 .5 Certification #: 3012019 Source: http://www.sap.com/benchmark.

•(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 AIX® 7.1 and DB2® 10, Certification #: 2012035

POWER8 and Linux Deliver Over TWICE the Throughput Compared to Ivy Bridge-EP at 47% Lower Cost

Web Application



Online Banking Workload v3.6

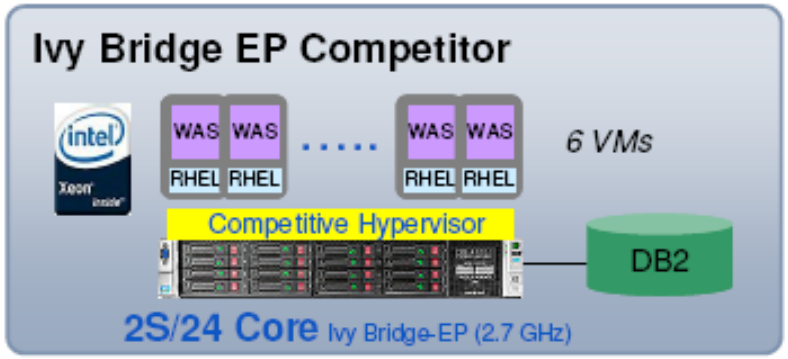
182,672	User Interactions per second
$3.11	per UI per sec

WebSphere on platform
Database off platform

Both Servers configured to achieve maximum throughput

2.1x Faster

47% Lower cost per UI per sec

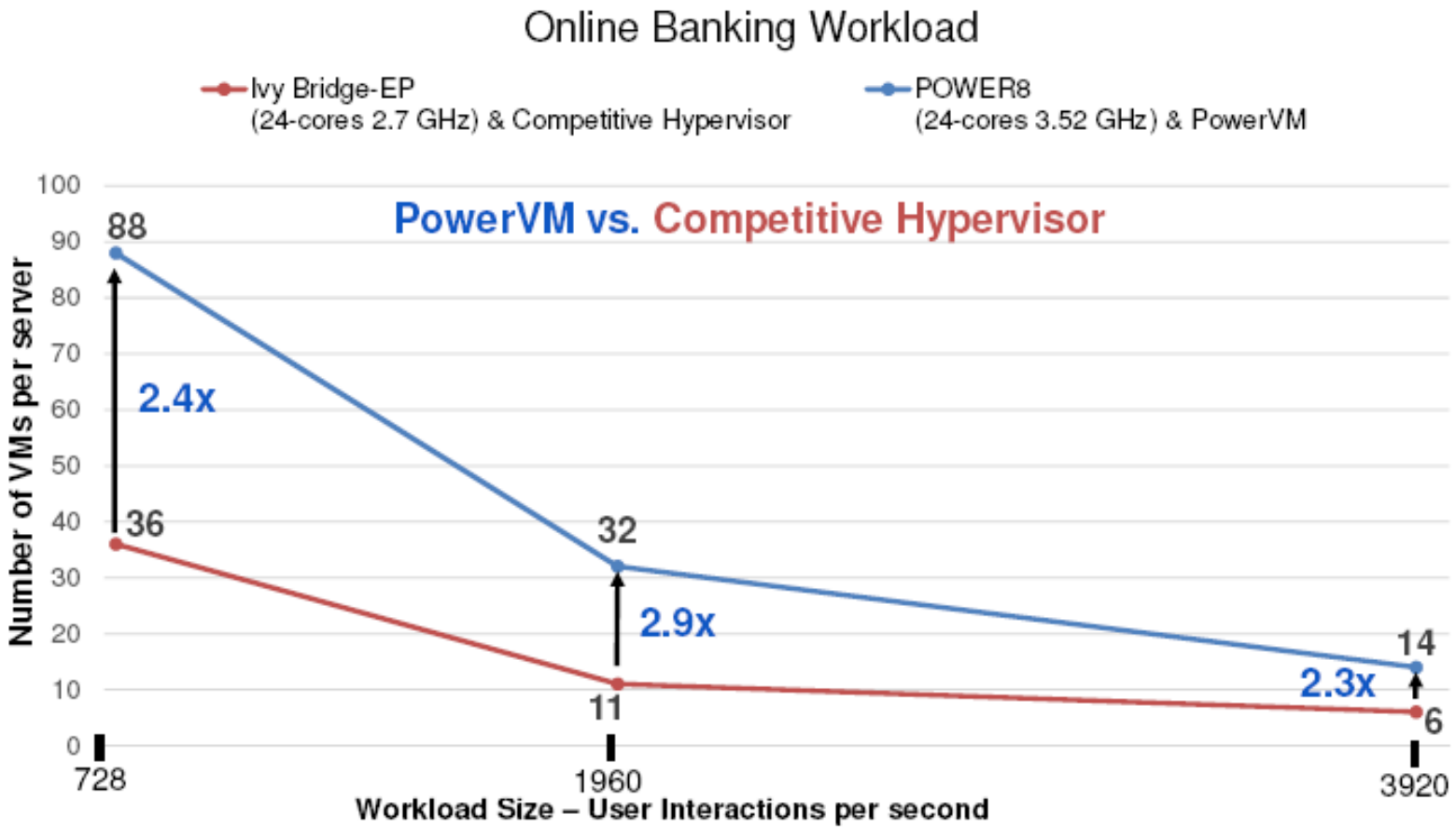


85,939	User Interactions per second
$5.84	per UI per sec

WebSphere on platform
Database off platform

This is an IBM internal study designed to replicate a typical IBM customer workload usage in the marketplace. It consists of a POWER8 S824 with 24 cores, 3.52 GHz, 512GB Memory, RHEL 6.5, WAS 8.5.5.1, DB2 9.7, JDK 7.0 FP1 compared to an Ivy Bridge EP 24 cores 2.7 GHz, 256 GB Memory, RHEL 6.5, WAS 8.5.5.1, DB2 9.7, JDK 7.0 FP1. The results were obtained under laboratory conditions, and not in an actual customer environment. IBM's internal workload studies are not benchmark applications, nor are they based on any benchmark standard. As such, customer applications, differences in the stack deployed, and other systems variations or testing conditions may produce different results and may vary based on actual configuration, applications, specific queries and other variables in a production environment. Prices, where applicable, are based on published US list prices for both IBM and competitor, and the Total Cost of Acquisition (TCA) includes the list HW and SW prices and 3 years of service & support which is then divided by the number of transactions to get $ per user interaction per second.

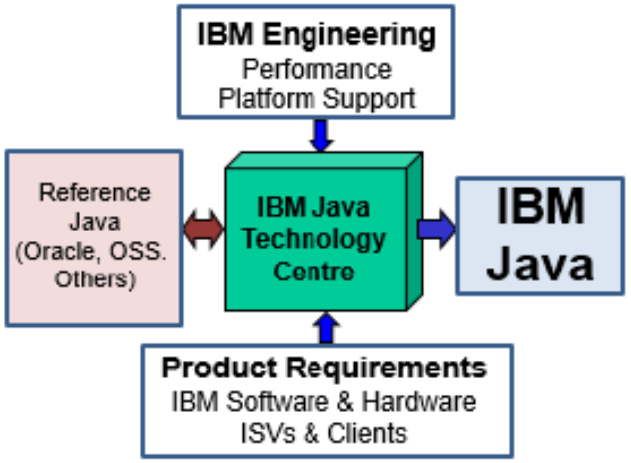
POWER8 Packs Up To 2.9x More Virtual Machines than Intel on Same Number of Cores



This is an IBM internal study designed to replicate a typical IBM customer workload usage in the marketplace. It consists of a POWER8 S824 with 24 cores, 3.52 GHz, 512GB Memory, AIX 7.1 TL3 SP3, WAS 8.5.5.1, DB2 9.7, JDK 7.0 FP1, compared to an Ivy Bridge EP 24 cores 2.7 GHz, 256 GB Memory, RHEL 6.5, WAS 8.5.5.1, DB2 9.7, JDK 7.0 FP1 and a Competitive hypervisor. The results were obtained under laboratory conditions, and not in an actual customer environment. IBM's internal workload studies are not benchmark applications, nor are they based on any benchmark standard. As such, customer applications, differences in the stack deployed, and other systems variations or testing conditions may produce different results and may vary based on actual configuration, applications, specific queries and other variables in a production environment.

WebSphere, AIX and Java Are Optimized for POWER8

- **WebSphere leverages many new optimizations for POWER8**
  - Simultaneous Multi-Threading Scalability
  - Task Restructuring
  - Thread Scheduling/Sorting Changes
  - Thread Pool Parallelism
  - Connection Pool Parallelism



- **Java (JDK) and AIX leverage new optimizations**
  - Transparent Transactional Lock Elision (TLE) where lock-based critical sections are speculatively executed as a transaction without first acquiring a lock
  - Transactional Memory (TM) which allows hardware managed concurrency control to shared data
  - AIX & Java support all SMT modes on POWER8 (single thread to 8 threads/core)
  - AIX supports in-core Vector Scalar Extension (VSX) symmetric crypto instructions which can be exploited by Java applications directly or transparently

Required versions for optimization:
WebSphere 8.5.5.2 AIX 7.1 TL3 SP3 JDK 7.0 FP1

Virtualisation Management

La virtualization sur POWER8 : le choix

PowerKVM

Q2 2014
Initial Offering

PowerKVM est une solution open source pour la virtuallisation sur Power de workloads Linux. Un choix parfait pour les clients non familiers de Power et qui ont des compétences d'administration Linux.

PowerVM

2004
Initial Offering

PowerVM est la solution de virtualisation robuste du monde Power qui continue à optimiser les workloads AIX, IBM i aussi bien que Linux.

Linux on Power enables open source virtualization with PowerKVM

	PowerKVM	PowerVM
Managers	PowerVC, OpenStack, libvirt, Open Source Tools	HMC, IVM, FSM, PowerVC, ISD VMControl
Guest VM Types	redhat Linux, suse, ubuntu	AIX, i for Business, redhat Linux, suse
Host Software	Linux MCP/KVM Hypervisor	VIO Server IO Virtualization
Firmware	OPAL Firmware Hardware Abstraction Boot services Standalone Diagnostics	Phyp Firmware - Hypervisor
Hardware	Power 8 Linux only Hardware	P6, P7, P8 Hardware

PowerKVM v2.1

Open Virtualization Choice for Linux-only Scale-out Servers

NEW

- ✓ *Optimize **Linux Workload Consolidation and scale out** of workloads at a lower cost of ownership*
- ✓ *Maintain flexibility and agility by exploiting **Open Source** Community*
- ✓ ***Leverage** traditional **Linux admin skills** on Power Systems to administer virtualization*
- ✓ *Use **open source tools like OpenStack** to manage virtualization*

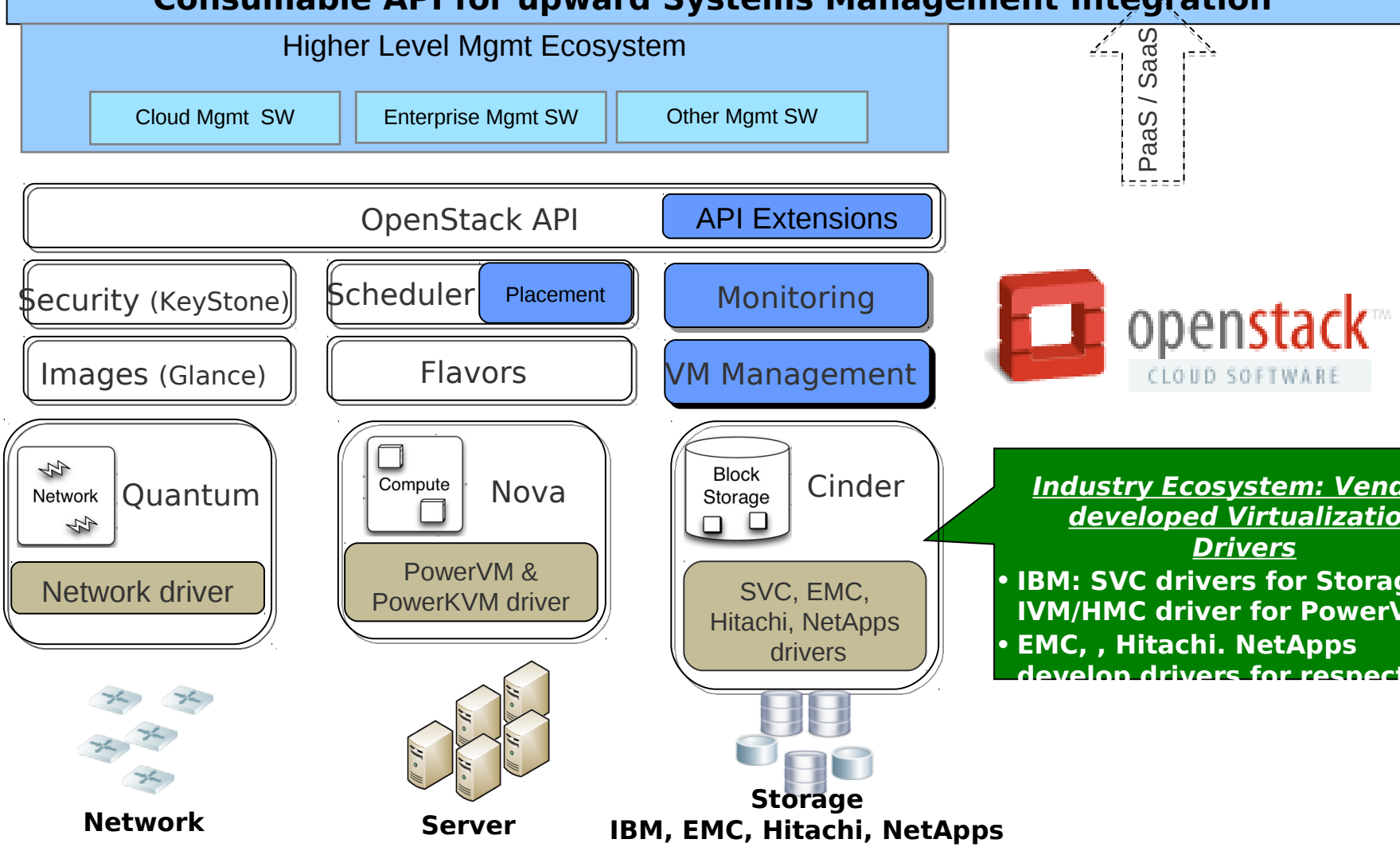
Announce – 4/28 GA – 6/10

- ✓ *Reduces IT Infrastructure costs*
- ✓ *Optimize Linux workload consolidation at a lower cost*
- ✓ *Simplify your virtualization management using open source tools*

- Kernel-Based Virtual Machine(KVM) Linux based virtualization For Scale Out POWER8 Linux Servers
- Processor and memory sharing and over commitment enables higher VM and workload consolidation
- Dynamic addition & removal of virtual devices
- Live VM Migration enables higher availability and allows workload balancing
- Exploits P8 Features like Micro-Threading providing greater scheduling granularity vs x86 virtualization
- Exploits performance, scalability and security built into Linux
- Managed by PowerVC and open source tools which provides flexible familiar Linux admin tools
- Supports Redhat, SUSE, Ubuntu Linux Guests

PowerVC: OpenStack Extensions and Enablement for PowerVM & PowerKVM

Industry Ecosystem for a broad range of server, storage and networking solutions;
Consumable API for upward Systems Management Integration



Les logiciels d'optimisation d'infrastructure

Virtualisation simplifiée et gestion en mode Cloud

Choix élargi et toujours plus de valeur pour l'infrastructure la plus flexible pour les environnements UNIX, Linux et IBM i

PowerKVM	PowerVM	PowerVP	PowerVC	openstack
Open Virtualization for scale-out Linux Systems	Virtualization without Limits	Virtualization Performance	Virtualization Center: Increase IT productivity and agility	IBM Cloud Manager with Openstack

** Will announce in May*

Power Systems

IBM

Power System Software: *Increasing the value of IT infrastructures with new virtualization / cloud capabilities & security and availability enhancements*

Simplifying Cloud / Virtualization Mgmt

The industry's most scalable and flexible virtualization infrastructure for enterprise UNIX, Linux and IBM i private clouds

Enhancement Security/Availability

A track record of excellence with industry leading resilience and securi

✓ PowerVM - Virtualization without Limits

Update

- Enhancements to Shared Storage Pools, improvements to LPM performance and new advice from the VIOS Performance Advisor for Fiber channel, SEA & SSP

✓ PowerVC – Virtualization Center

New

Advanced leadership virtualization management for Power leveraging OpenStack

✓ PowerVP - Virtualization Performance Analyzer

New

Real time, graphical performance information for virtualized workloads health mgmt and optimization

✓ SmartCloud Entry for Power Systems

Update

- OpenStack integration for alignment with emerging cloud standards, interoperability & enhanced 3rd party device support

✓ Update PowerSC - Security and Compliance

- New support for Power Linux Compliance automation and improvements in Trusted Firewall and TNC Patch Management

✓ Update PowerHA SystemMirror

- Added support for active-active HyperSwap with DS8800 & DS8870, Cluster simulator - try your scenario before implementation & SAP HA certification

✓ Update AIX 7.1 TL3, 6.1 TL9

- Enhanced live system backup support, LDAP support with users and groups & AIX versioned WPAR lifecycle management (AIX 7.1 only)

✓ Update IBM i

- Added advanced Security controls using DB2 for i and free format RPG which helps to provide attractive modern development environment & shortened learning curve

PowerVP™

*All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Solutions

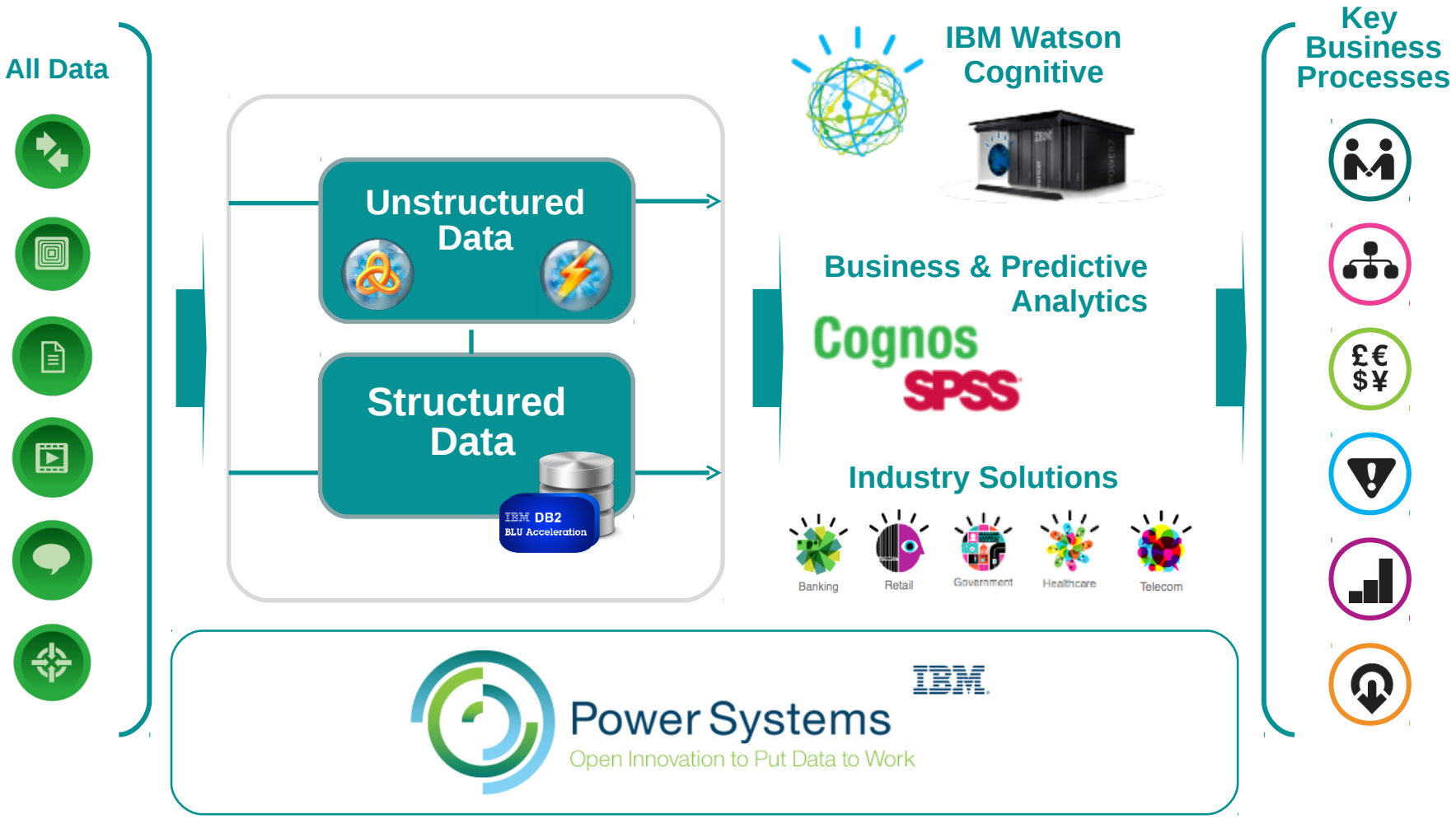
IBM POWER8 conçu pour analyser les données

50X — Plus rapide pour requêtes sur données structurées avec w/BLU Acceleration

2X — Plus rapide pour requêtes Hadoop sur données non structurées

46X — Plus compétitif en prix / performance pour l'analytics et le reporting

IBM pour vous aider à construire une solution sur une plateforme conçue pour le big data & l'analytics



Power Systems

IBM

Power Systems Solutions Optimized for POWER8 – *Delivering innovation to put data to work with Big Data, Analytics, Cloud and Mobile Solutions*

Insights from Data

Leverage systems that optimize big data & analytics performance

New

✓**Analytics: New: Power Ready Platform for BLU Acceleration** (AIX)

- Data warehouse acceleration for "Speed of Thought" analytics with DB2 BLU
- 16-50x faster reporting and analytics

New

✓**Big Data: NEW: Power Ready Platform for Hadoop*** (Linux)

- Storage-dense, optimized platform to simplify & accelerate big data analytics
- InfoSphere BigInsights, Platform, GPFS

New

✓**Analytics: New: Power Ready Platform for Analytics** (mix & match) (Linux, AIX)

- **Cognos** BI solution for customized up-to-date, information access for all users (AIX)
- Manage assets, finances more efficiently
- **SPSS** based predictive analytics to determine next best action to meet business objectives (AIX)
- **DB2 BLU** data warehouse acceleration for "Speed of Thought" analytics (AIX)
- 16-50x faster reporting and analytics (Linux)

Cloud Innovations

Realize the true potential of public, private & hybrid cloud

New

✓**Public Cloud: NEW: Solution Edition for Scale out Cloud** (Linux)

- Linux only, POWER8 scale-out servers with new PowerKVM and PowerVC based 1-button configurations

✓**Private Cloud: Update: Solution Edition for Cloud** (Linux, AIX, i for Business)

- Enhanced w/ new POWER8 scale-out configs, updated PowerVC w/ PowerVM

✓**Public Cloud: Update: Power Systems Solutions for Service Providers** (AIX, i for Business)

- Enhanced with new POWER8 scale-out configs, PowerKVM support, PowerVC enhancements and PAYG+

New

✓**Hybrid Cloud: NEW: SmartCloud Entry for Power Systems** (Linux, AIX)

- Extended base OpenStack capability to support Hybrid cloud deployment

Mobile

Revolutionize the way IT is created and consumed

New

✓**Mobile: NEW: Mobile Scale Out Sales Offering with Worklight & WebSphere Application Server** (Linux, AIX)

- Mobile application platform to speed development and ongoing management of mobile applications
- Efficiently develop, test, connect, run, and manage mobile and omni-channel applications

* POWER7 2Q14, POWER8 2H14

IBM Solution for Analytics - Power Systems Edition

- **Serveur POWER8** : Power S814, Power S822, Power S824
- **Logiciel Système**: AIX Standard ou Enterprise Edition, PowerVM Standard ou Enterprise Edition
- **Option BLU Accélération** : IBM DB2 Advanced Workgroup or Advanced Enterprise Edition
- **Option Analytics** : Cognos BI, SPSS Modeler, SPSS C&DS, SPSS ADM, Infosphere DataStage

Simple à Acquérir

un fournisseur unique pour le serveur, stockage et support

Simple à Déployer

Logiciel, serveur, stockage pré-installés et pré-optimisés

Simple à mettre en oeuvre

Hautement scalable pour couvrir les évolutions des besoins client

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.

BLU Acceleration

New

Base Colonne In Memory

IBM Research & Development Lab Innovations

- **Dynamic In-Memory**
  Base Colonne In-memory avec déplacement dynamique des données non utilisées sur disque
- **Actionable Compression**
  Première technologie de compression de l'industrie préservant l'ordre des données , et donc d'utiliser les données sans décompression
- **Traitement parallèle vectoriel**
  parralélisme Multi-coeur & SIMD (Single Instruction Multiple Data)
- **Data Skipping**
  « Saute » le traitement des données non utiles

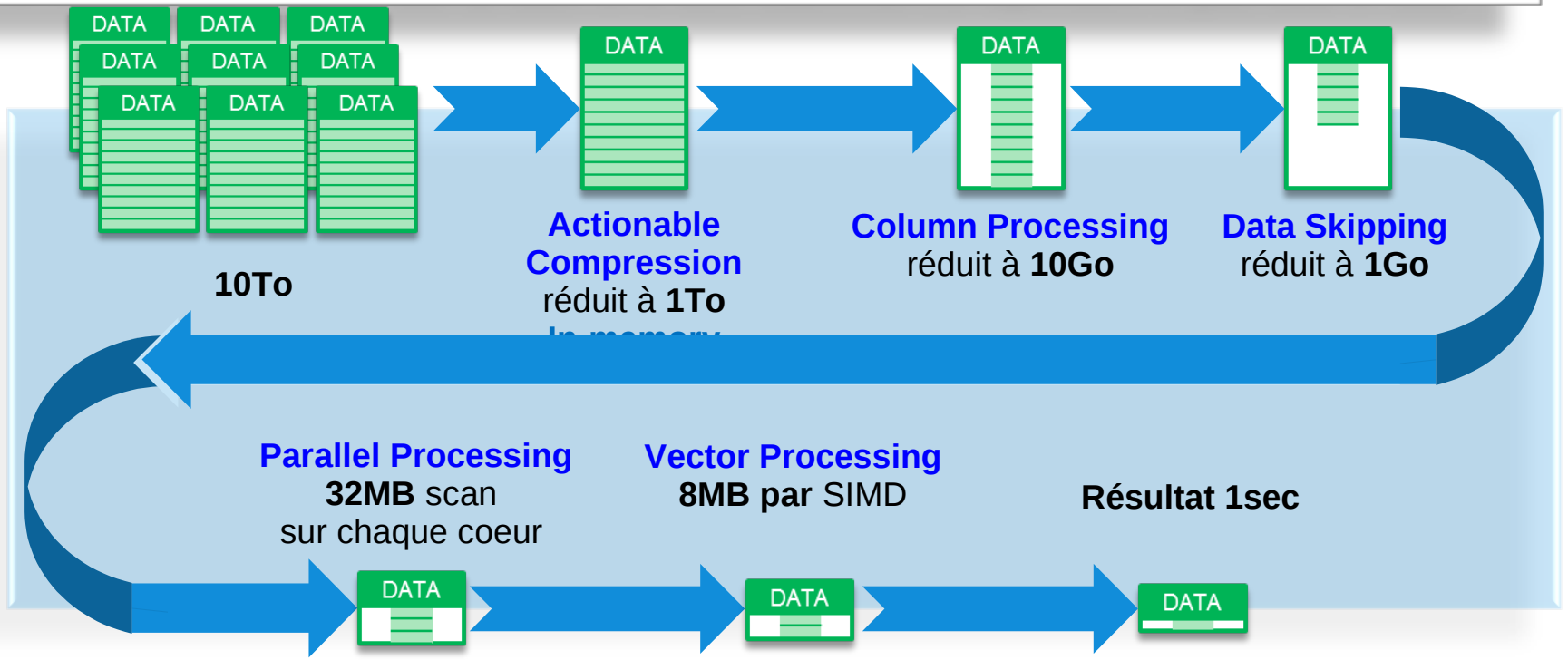
BLU Acceleration

Super Fast, Super Easy—
Create, Load and Go!

Pas d'Index, pas d'Aggrégats, pas de Tuning, **Pas de modification** SQL , pas de changement du Schéma de la database

BLU Acceleration : *query de 10 To en qq secondes*

- Système: **32 coeurs, 1To de mémoire, table de 10To avec 100 colonnes et 10 ans de données**
- Query: **Combien de "ventes" avons nous fait en 2010?**
  - `SELECT COUNT(*) from MYTABLE where YEAR = '2010'`
- Résultat: **en secondes(ou moins) car chaque coeur examine l'équivalent de 8MB seulement**



Power Systems

IBM

IBM Solution for Hadoop

IBM InfoSphere Streams for Low-Latency Analytics

Donnée en mouvement

- Besoin en latence très faible
- Immense capacité I/O
- Packaging dense

PowerLinux rack

OR

Flex System Compute Node

IBM InfoSphere BigInsights for Hadoop-based Analytics

Donnée statique

- Enterprise-ready,
- out-of-the-box solution
- Démonstration disponible à Montpellier

New!

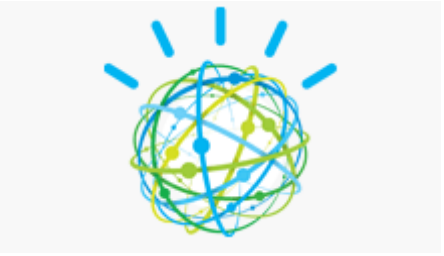
Platform Symphony

- Industrialisez votre solution
- Meilleures performances x4
- Multi tenancy (plus de sécurité)

Open Source Apache Hadoop

Donnée statique

- Adapté à PowerLinux et exploite l'architecture POWER
- Utilisé par Watson



PowerLinux rack servers

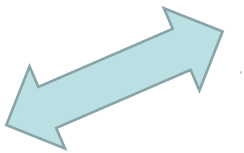
Management Node

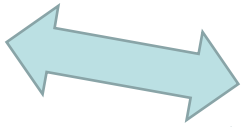
Data Nodes

Adaptation de l'offre POWER8 au Cloud

19 Mai 2014 : IBM Smart Cloud Entry change de nom pour devenir **IBM Cloud manager with Openstack** et devient une plateforme de choix pour le cloud Hybride

- Simple
- Support de POWER8 et POWER KVM
- Basé sur OpenStack Ice House
- Gestion intelligente des ressources





ISVs : un rôle essentiel dans l'écosystème IBM POWER

Données & Analytics

hadoop
redis
MySQL
mongoDB
EDB ENTERPRISEDB
splunk>
AsiaINFO
Zettaset
Information Builders
inspur 浪潮
Guidewire
Datameer Powerfully Simple
Zato
CHILIAD

Cloud

openstack CLOUD SOFTWARE
TOMCAT
ubuntu
Apache
JBoss by Red Hat
Netweaver
SUGARCRM COMMERCIAL OPEN SOURCE
HA High Availability
DNS
BLOOMBASE
STORIX
FINEOS
CiRBA
TEMENOS The Banking Software Company
samba
f5 NETWORKS
SAP
Neusoft 东软
OpenLDAP
神州数码 Digital China
REFLEX
YUCHENG Technologies Limited
Platform Computing an IBM Company
perl
EUCALYPTUS
ALPHINAT
Sichuan Yinhai Software

Mobile

Zend The php Company
php
SYBASE An SAP Company
kony
RabbitMQ Open Source Enterprise Messaging
fiserv.
ACI

Focus 2014

- Leverage IBM Ecosystem - Differentiate
- Gain Platform share in Big Data, Mobile and Cloud
- Build Regional ISV Ecosystem
- Develop Open Software Linux community for Power
- Create incremental value around existing Power base

ubuntu
SUSE
redhat

Disponible sur tous serveurs Linux Power

Linux
Power
PowerVM

Synthèse Solutions Power Systems

150+ Logiciels IBM disponibles sur Linux on POWER

Power Solutions at Launch

Statement of Direction

Analytics

- New — **BLU Acceleration – Power Sys Ed's** pre-installé & optimisé sur serveurs P8 entry
- **Cloud Delivery of Analytics** Focus Public cloud
- **SWG IFL Play** Cognos
- Update — Solution for Analytics – Power Sys Ed's **Cognos & SPSS** pre-installé & optimisé sur serveurs P8 entry
- SOD — *GPU Java Acceleration + SWG Co-optimization pour applications Java*
- SOD — *Applications ready sur Clusters BigData*

Big Data

- New — **Big Data Reference Config** w/ BigInsights, scale –out servers, shared storage
- SOD — **Big Data Solution** Stack BigInsights pré-installé, optimisé sur serveurs P8 scale-out

Mobile & Java Apps

- **SWG IFL Play** Worklight + WAS
- New — **Mobile on Power TI Incentive** Worklight et/ou WAS sur Power
- **Cloud Delivery of Mobile Apps** Focus Cloud privé & MSP
- SOD — *Infrastructure NoSQL / keyvalue store optimisée stockage flash*

Cloud & MSPs

- New — **Solution Edition for Scale Out Cloud** avec support PowerKVM & Linux pour cloud public / MSP space
- **Support SoftLayer** pour Power - Watson as a service initialement
- SOD — *Plateforme Cloud SoftLayer. Watson as a Service*
- Update — **ution Edition for Cloud** **liorée** avec configs en 1 lick sur POWER8
- **Solution Edition for Service Providers** w/ PAYG+, OpenStack & PowerKVM support
- Update

Power Systems

IBM

Le monde ouvert avec IBM : Gagner en expertise

MOP Power Systems Linux Center Capabilities & Focus

Objective: Opening of the Power Linux Center for Europe

Strategic Focus on:

- Big Data
- Cloud
- Mobile
- Social Media

Providing Support for (mapped with WWW Landing Pages)

- Access to platforms (HW + SW + Support)
- Education / Training
- Customer architecture design
- General Developer Resources Support (*)
- ISV Resources Support (*)

(*) Not available at initial launch phase. To be announced later.

Capabilities :

- **Talk and Teach**
  - Customer, BP, CSI & ISV Briefings, Demos, Videos
- **Design**
  - Pre-sales Customer support
- Customer Consultancy
  - Architecture Design Workshops
- **Prove**
  - Linux on Power Benchmark & PoCs
  - Remote Power Linux Platform access

+ Second level of support for technical IIC, IMTs (Infrastructure, Virtualization, OS, Compilers, Certification programs, …)

Team :

Marie-Line Reynier
Power Systems Linux Center Program Manager ((+ Business contact and Bus Dev)

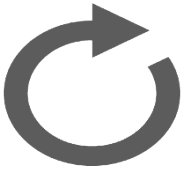
Sebastien Chabrolles
Technical Leader
Linux on Power Specialist

Julien Limodin
(Jan 20th, 2014)
Linux on Power Specialist
(Middleware knowledge, Mobile & Java skills, Cloud)

Fabrice Moyen
Linux on Power Specialist

Christophe Menichetti
(Mid February, 2014)
1 Power Architect
(Big Data knowledge / Competitive knowledge)

Le premier processeur conçu pour Big Data



Processeur	Mémoire	Attachement IO	Stockage
Des coeurs , des threads et des algorithmes	Large mémoire et bande passante pour accomoder les volumes de données en temps réel		Accès rapide aux données à haute priorité

Power Systems

4X de threads par coeur que x86 Avec une fréquence 30% plus élevée	4X la bande passante de x86 avec 30% de capacité mémoire supplémentaire	5X la bande passante IO de POWER7. Incommensurablement supérieure à x86	Plus de 26 TB de stockage flash interne. Tiering automatique des niveaux de stockage HDD and SSDs

CAPI accélère encore les possibilités

3X accélération de requêtes avec DB2 sur Power/Linux et Nvidia GPUs	Flash Systems permettant jusqu'à 80 TB de mémoire	Accélération des stockages distribués RDMA délivrant 10X rendement pour le stockage en mémoire	Compression intelligente autorise 4X plus de capacité et une amélioration de 2X en bande passante réelle

Pourquoi Power ? Prêt maintenant pour les projets de demain

Les Power Systems évoluent en scale out ou en scale up, ils sont optimisés pour un large spectre d'applications à haut débit et offrent une performance économique supérieure pour le Cloud

Designed for Big Data

Superior Cloud Economics

Open Innovation Platform

Leadership et innovation	• Investissement soutenu avec stratégie à long terme • Innovation pour les projets Clients e.g. IBM Watson • La plate-forme de référence pour les projets haut débit
Simplicité et rapidité	• Déploiement de projets 58% plus vite qu'en x86 [1] • Simplification de l'infrastructure
Flexible et efficace	• Performance 40% supérieure par core, 88% d'utilisateurs SAP en plus par core que x86 [2] • Plus haute disponibilité (99.997%) et 10 fois moins de problèmes de sécurite qu'avec des serveurs standards[4]
Compétitivite économique	• Une solution PowerLinux et PowerVM coûte 41% moins cher à l'achat qu'une solution x86/VMware[6]
Experience client	• Sécurité intégrée construite dans le stack matériel et logiciel • Supporté par 4,900 ISVs et plus de 21,000 solutions

1. Does Your Virtualization Platform Matter?; Solitaire Interglobal Ltd (All rights reserved); April 2012 (Link)
2.. *http://www.sap.com/benchmark*, http://www.sap.com/solutions/benchmark/sd2tier.epx
3. ITIC Fall 2011 Global Server Hardware and Server OS Reliability Survey; ITIC; November 2011. (Link)
4. Is your platform secure? Really?; Solitaire Interglobal Ltd (All rights reserved); January 2013. (Link)
5. IBM PowerLinux solutions; substantiation notes (Link)

Conclusion

Designed for Big Data

POWER8 est le premier serveur conçu spécifiquement pour analyser la donnée

CAPI Technology

Superior Cloud Economics

Excellent avantage prix/performance et sécurité préservée pour déplacer les applications data-centric vers le cloud

POWER8

Open Innovation Platform

Au coeur d'un écosystème ouvert pour changer la façon dont l'IT est développé et mis à disposition

OpenPOWER™

Systèmes
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

Cognos. software

SPSS

New. IBM Solution for Hadoop: Power Systems Edition

hadoop

Update. BLU Acceleration Solution - Power Systems Edition

Update. Power Systems Solution Edition for Service Providers

Virtualization, Cloud, Linux

PowerKVM

openstack

ubuntu

redhat

SUSE