Linux on Power :

Where do we stand for 2016 ?

Alain Cyr

Power Systems Technical Leader IBM Client Center

cyralain@fr.ibm.com

"ZAIUS", the next Google machine fueled with IBM POWER9

April 2016, during OpenPOWER Summit 2016, Google annonced a partnership with Rackspace to develop a new server plateform, based on IBM Power9, code-named ZAIUS.

More information:
http://www.nextplatform.com/2016/04/06/inside-future-google-rackspace-power9-system/
http://www.theregister.co.uk/2016/04/07/open_power_summit_power9/

OpenPOWER™ Google rackspace the #1 managed cloud company

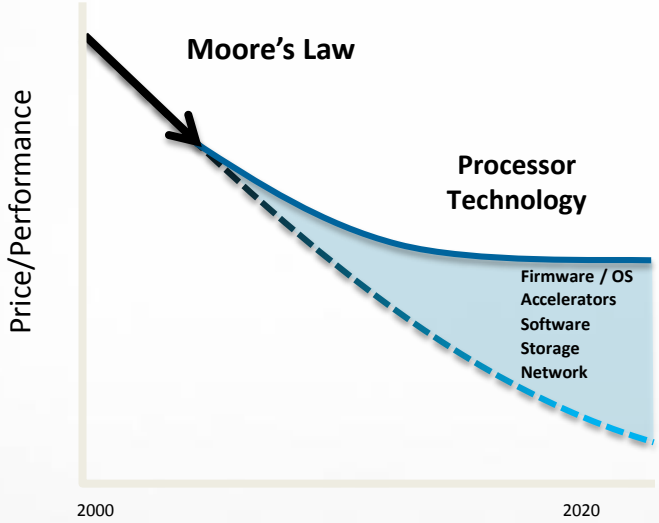
ZAIUS 1.25 OU

- 2x POWER9 CPU
- 32x DDR4 DIMM Slots
- 2x PCIe Gen4 x16 FHFL slots
- 1x PCIe Gen4 x16 HHHL slot
- 1x PCIe Gen4 x16 OCP Mez
- 1x M2 Sata Port
- 1x Sata Port
- 15x 2.5" SAS/SATA/NVME Slots
- BMC w/ GbE LOM
- "Diskless" Option

Fundamental forces are accelerating change in our industry

OpenPOWER™

x86 processor technology alone can no longer provide the price performance gains necessary to sustain Moore's Law



A better processor and full system stack open innovation required

IT consumption models are expanding to:

- Scale-out & Hyperscale Data Centers
- Hybrid Cloud
- Open Solutions

Fueling the OpenPOWER Community

Offering the POWER advantage to emerging Linux Workloads

BigData

Mobile

Linux®

Power Systems

Performance
Virtualization
Resiliency

Cloud

openstack™

Social

OpenPOWER™

Accelerates software innovation

- Over **1,900 Linux ISVs** developing on Power
- 50 IBM Innovation Centers
- Compelling PoCs
- Support for little endian applications

HPC

CHARMM
GROMACS
NAMD
AMBER
RTM
GAMESS
WRF
HYCOM
HOMME
LES
MiniGhost
AMG2013
OpenFOAM
miniDFT
CTH
BLAST
Bowtie
BWA
FASTA
HMMER
GATK
SOAP3
STAC-A2
SHOC
Graph500
llog

Cloud

openstack
TOMCAT
Apache
Chef
STORIX
REFLEXIS
DIASOFT
OneView Commerce
POWERSENSE
IFS
KANA.
Fis
YUCHENG™ Technologies Limited
sky solutions
betasystems
EXIGEN.
ProjectWare
ALPHINAT

Big Data & Machine Learning

hadoop
PostgreSQL
MariaDB
redislabs
SUGARCRM
gpudb
Datameer
Spark
neo4j
EDB ENTERPRISEDB
AsiaINFO
InterSystems
CROSSVIEW.
POLARIS
ZAO
Valogix

Mobile Enterprise

zend
亿阳信通 BOCO Inter-Telecom
php
CSC
RabbitMQ Open Source Enterprise Messaging
Kingdee 金蝶，企业管理专家
SYBASE
Fis
NARI 南瑞集团公司 NARI GROUP CORPORATION
FINEOS
ALPHINAT
comptel
Corent
TEMENOS The Banking Software Company
KUTIR

Major Linux Distros

ubuntu
SUSE
redhat
CentOS
Linux
Power
PowerVM

Power Chip Characteristics & DNA

4X
threads per core vs. x86
(up to 1536 threads per system)

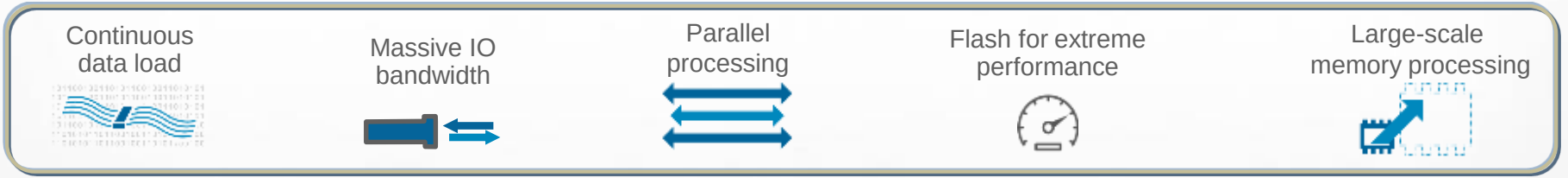
Processors
flexible, fast execution of analytics algorithms

4X
memory bandwidth vs. x86[1]
(up to 16TB of memory)

Memory
large, fast workspace to maximize business insight

4X
more cache vs. x86[2]
(231MB cache per socket)

Cache
ensure continuous data load for fast responses



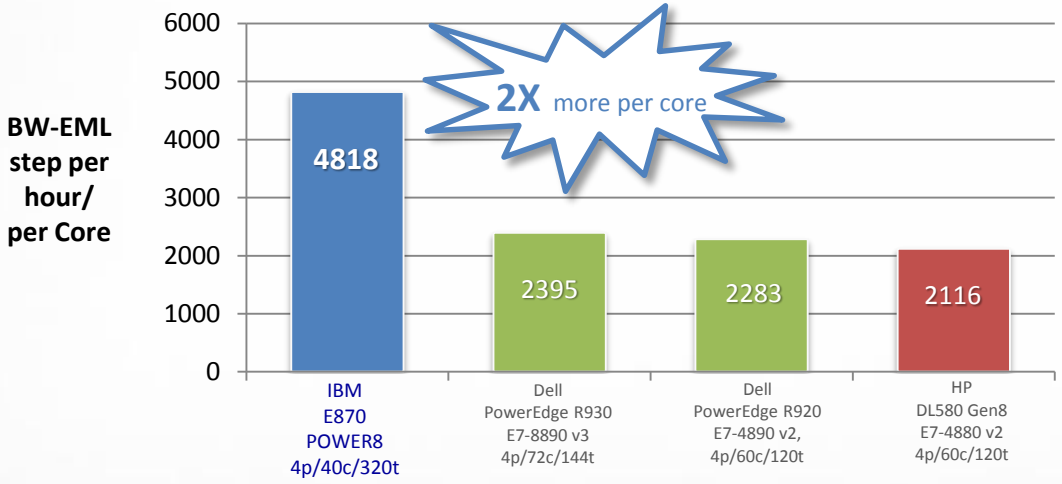
1. Up to 4X depending on specific x86 and POWER8 servers being compared
2. Up to 4.5X more cache comparing Intel e7-8890 servers to 12 core POWER8 servers. See speaker notes for more details

New World Record set by IBM Power E870 on SAP BW Enhanced Mixed Load Standard Application Benchmark with 2 Billion records

IBM | SUSE | SAP

SAP BW Enhanced Mixed Load (BW-EML) Standard Application Benchmark Results, 2 billion initial record load on SAP Hana 1.0: Ad-hoc navigation step per hour/per core

Source: http://www.sap.com//benchmark



"IBM set a world record in the industry leading SAP BW-EML Standard Application Benchmark at 2 billion records ... twice the performance per core over previous benchmarks." >>

Kyle Garman
SVP & Managing Director, Global Strategic Partners
SAP

(1) IBM Power Enterprise System E870 on the SAP BW Extended mixed load standard application benchmark running SAP Netweaver 7.31 application; 4 processors / 40 cores / 320 threads, POWER8; 4.19GHz, 1024 GB memory, 192.750 adhoc navigation steps per hours on SuSE Linux Enterprise Server 11 and SAP Hana 1.0, **Certification #: 2015024** Result valid as of June 1, 2015. Source: http://www.sap.com/benchmark.
(2) Dell PowerEdge R930, on the SAP BW Extended mixed load standard application benchmark running SAP Netweaver 7.31 application; 4 processors / 72 cores / 144 threads, , Intel Xeon Processor E-7 8890 v3 ,2.5 GHz; 1536 GB memory, 172.450 adhoc navigation steps per hours on SuSE Linux Enterprise Server 11 and SAP Hana 1.0, **Certification #: 2015014**
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Sept 2015

New World Record set by IBM Power E870 on SAP BW Enhanced Mixed Load Standard Application Benchmark with 2 Billion records (SAP NetWeaver)

IBM | SUSE | SAP

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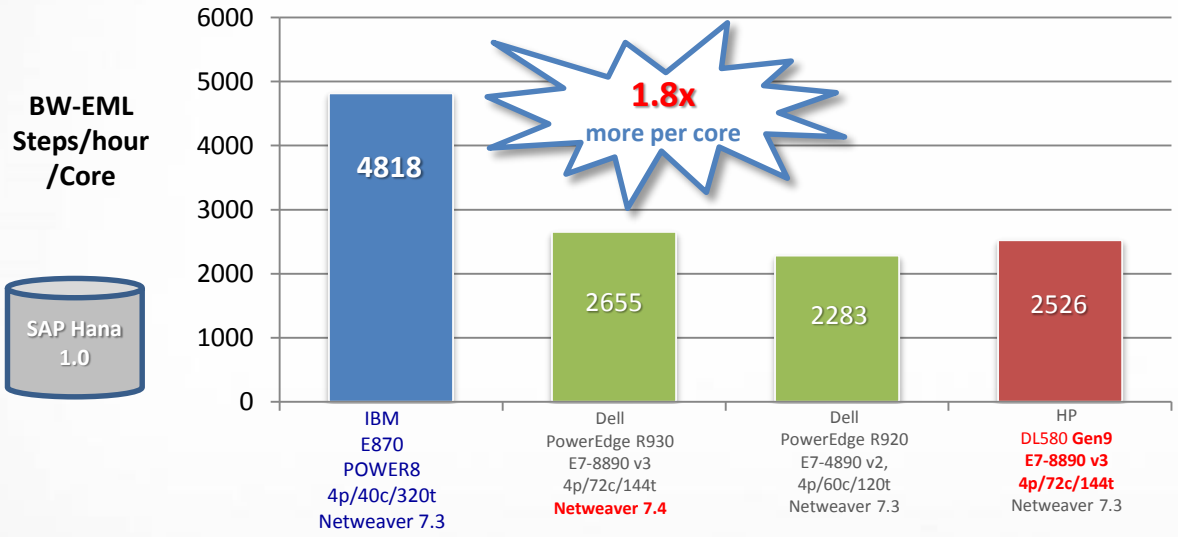
Source: http://www.sap.com//benchmark



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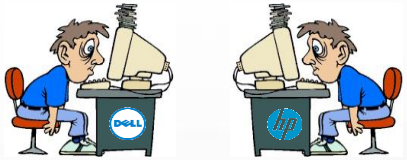

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HANA on POWER Reference Cases

NTT DATA

HR GROUP

CEMAR

CSN
Companhia Siderúrgica Nacional

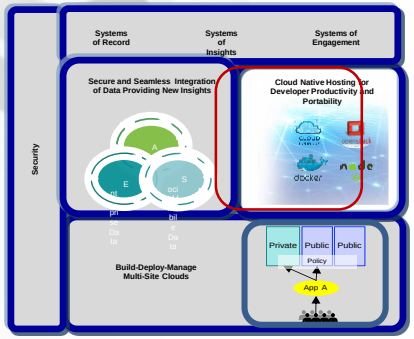
LENTA

TECHNISCHE UNIVERSITÄT MÜNCHEN

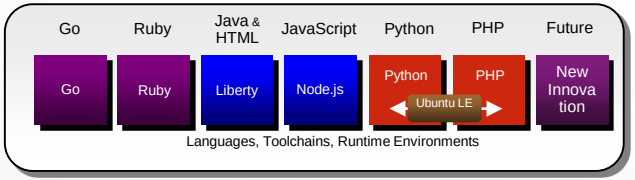
" We have partnered with IBM for a long time with great success, so IBM POWER8 was a natural choice. We chose to test IBM Power Systems for SAP HANA because we feel that it gives us enough performance, power and flexibility to fulfill our customer needs, and is also very cost-effective. "

Helmut Krcmar, Professor of Information Systems at the Technische Universität München and Academic Director of the SAP University Competence Center, Technische Universität München

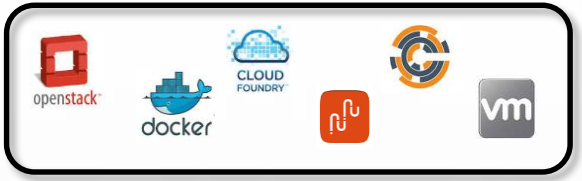
Exceptional cost performance for data and compute intensive workloads



- ✓ Up to **40%** lower cost per TB compared to x86 for Hadoop
- ✓ Extract value from data with 2x better performance per core
- ✓ Over 2x performance per core for Spark compared to x86 Haswell
- ✓ PostgreSQL on POWER8 delivers leadership performance and 40% better price-performance than Intel Xeon E5-2699 v3 Haswell



Build

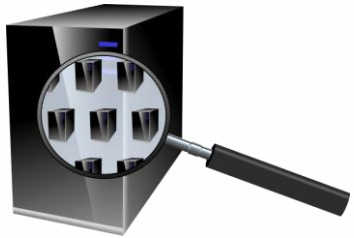


Deploy

Deliver

Dev/Ops

Power Virtualization Options



POWER8

RED HAT ENTERPRISE VIRTUALIZATION

Linux

Q4 2014 Initial Offering

Red Hat Enterprise Virtualization is the first non-IBM virtualization solution for Linux on Power Platform

PowerKVM

Linux

Q2 2014 Initial Offering

PowerKVM provides an **open source choice** for Power Virtualization for Linux workloads. Best for clients that aren't familiar with Power and **Linux centric admins.**

PowerVM

AIX

Linux

i for Business

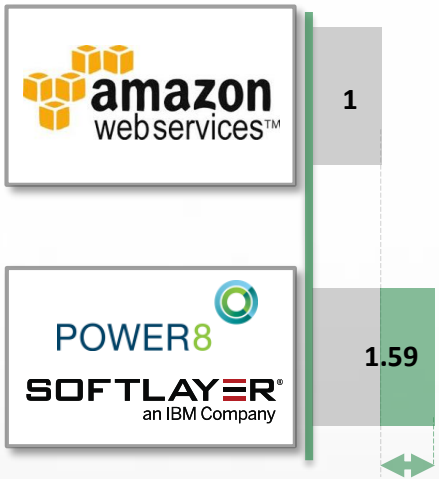
2004 Initial Offering

PowerVM is Power Virtualization that will continue to be enhanced to support **AIX, IBM i Workloads** as well as Linux Workloads

POWER8 in SoftLayer is built for the Waitless World that demands a more efficient and reliable hybrid cloud

POWER8 Linux

1.59X more work at 65% lower cost



Superior Cloud Economics with **1.59X more users** per hour at **65% lower cost**
per user per hour for LAMP application stack

Designed for Data with **1.4X more transactions** per second at **61% lower cost** per transaction for MariaDB workloads

Open Innovation from OpenPOWER to build a more secure, efficient and reliable hybrid cloud with **2X faster per core performance**

Surro… with Open Source DBs on Power

How … SoftLayer PoC

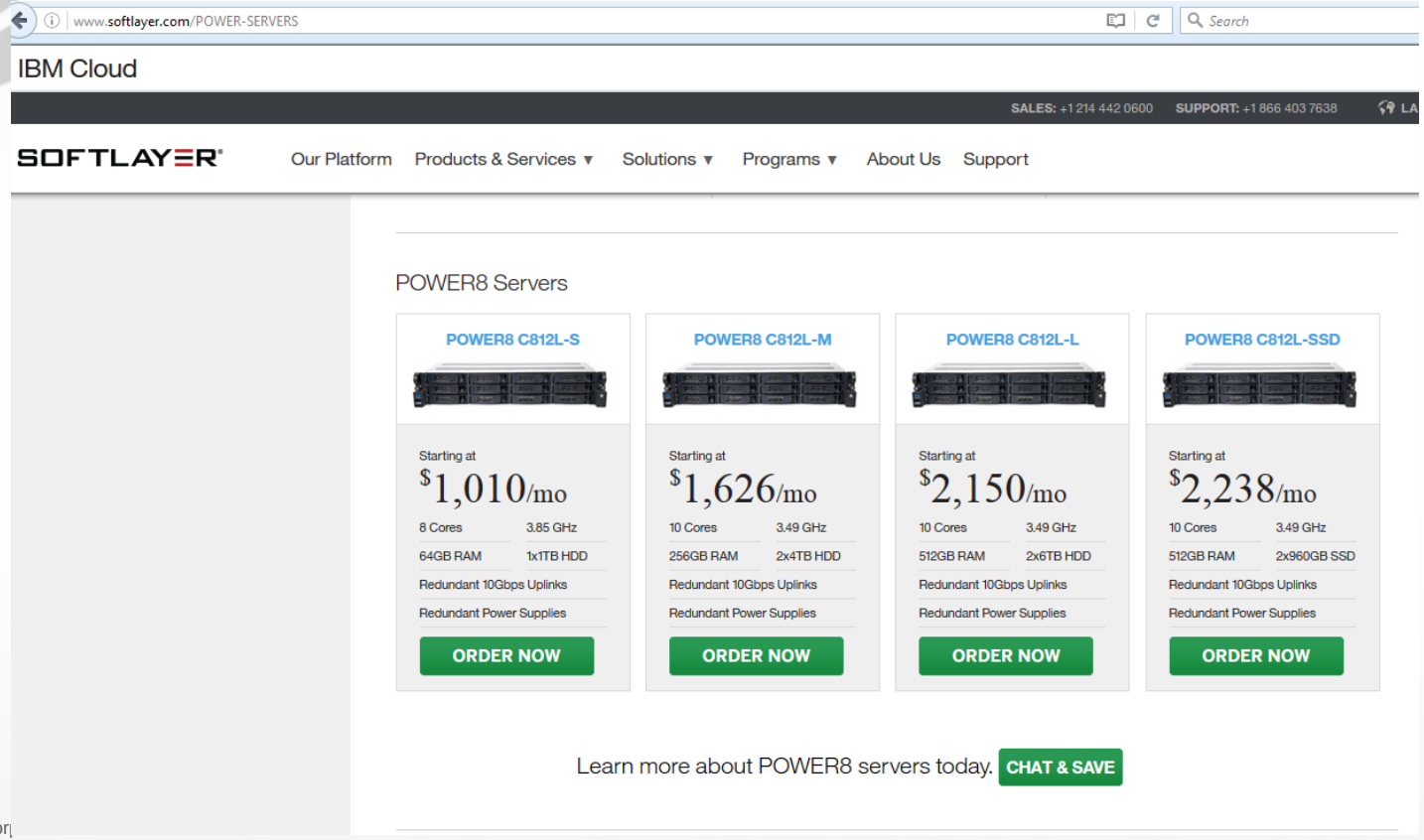
Inst…
p…

https://g01acxwa…
developerworks/library/…
db-softlayer-trs/inde…

These will be updated and simplified as automation for Open Source DBs on Power is made available.

PRE ANNOUNCE
JUST ABOUT TO BE
LAUNCHED

Softlayer on Power



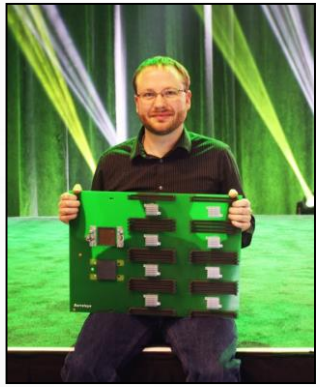
Free PoC Offering

http://www.softlayer.com/power-servers

"Barreleye", the New "RackSpace Machine" *(POWER8 based)*

rackspace®
the #1 managed cloud company

OpenPOWER™

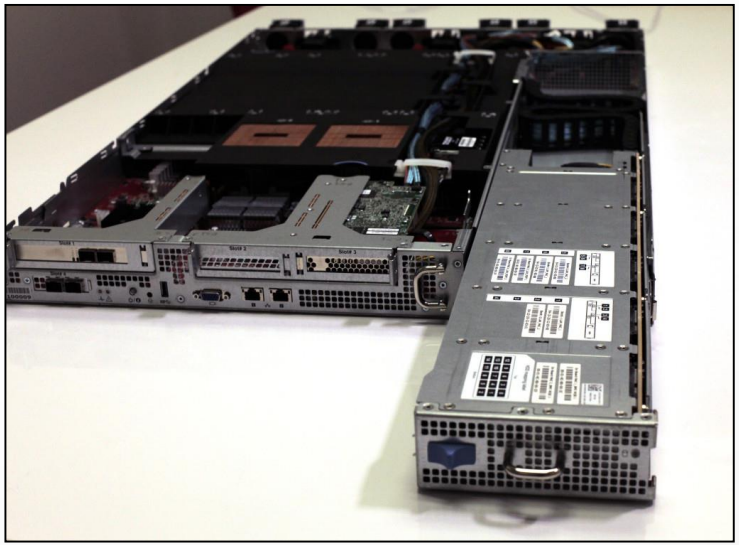


Aaron Sullivan (Director Infrastructure Strategy) shows off Rackspace POWER8 OpenCompute Form Factor Planar

- Founded in 1998
- Founder of OpenStack
- 9 datacenters
- 300.000 Customers WW
- #1 hosting for Internet Retailers
- #1 hosting OpenStack private cloud

"We hope to submit a draft of Barreleye's Open Compute specification before year-end, and aim to put Barreleye in our datacenters for OpenStack services early next year. "

Aaron Sullivan.



RackSpece Barreleys's : 2 socket POWER8 "Turrismo" 10 cores, 15 SSDs

Full article: http://openpowerfoundation.org/blogs/openpower-open-compute-rackspace-barreleye/

Cloud/Managed Services Providers Are now Adopting Power

online.net

WEB CLO

Retournez à la page de g

DEDIBOX® P

DEDIBOX® POWER 8
1.599,00 € HT/mois
Frais d'installation: **1.500,00** €

FONCTIONNALITÉS INCLUSES

- WOPR Special performances

Voir les avis (0)

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ubuntu insights | Cloud and server | Desktop | Phone and tablet | Things | Press centre | Search

teuto.net uses Ubuntu to bring IBM POWER8 to the Public Cloud

By Canonical on 9 June 2015

Deploy Big Data services the easy way

Discover the importance of flexibility in big data infrastructure automation.

Register for webinar

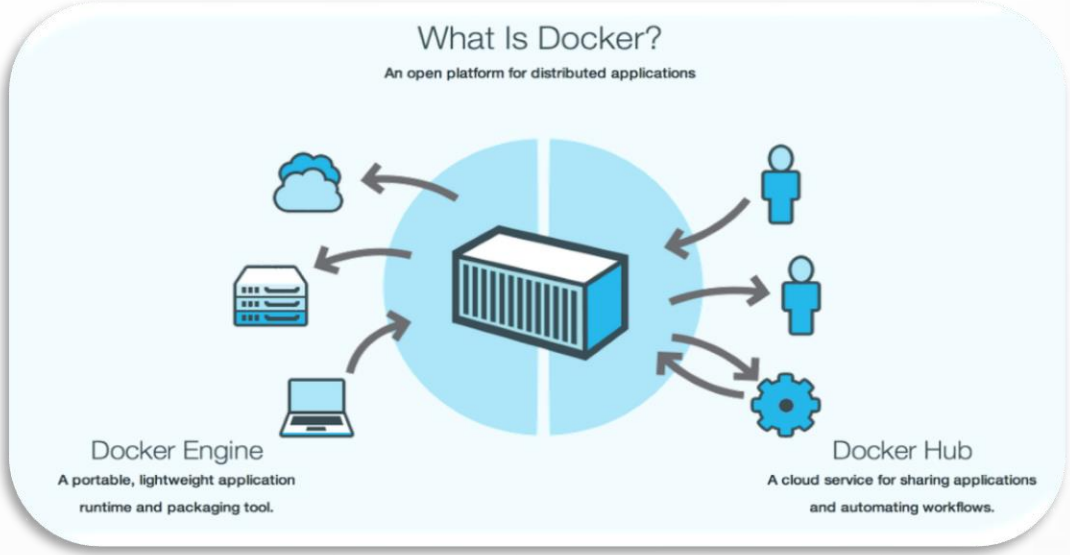
Sign up for email updates

Choose the topics you're interested in

- [x] Cloud and server
- [ ] Desktop
- [ ] Phone and tablet
- [ ] Things

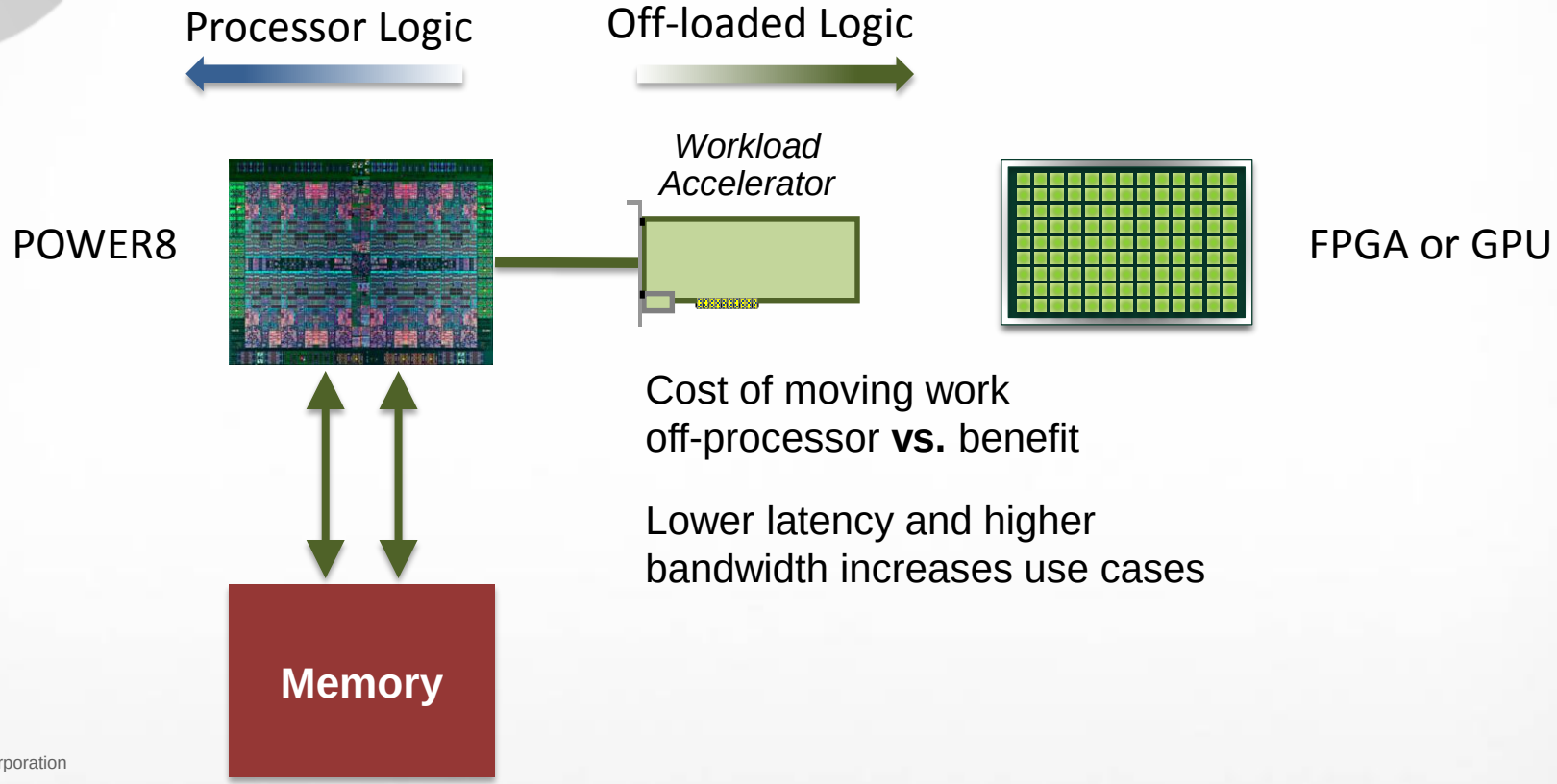
Docker for Power *(since 1H-2015)*

- Container based virtualization
- Very Fast Application Provisioning / Deployment
- Application Versioning



Try Docker on Power : Directly available since ubuntu 15.04, OpenSuse 13.2, SUSE sles12, fedora23

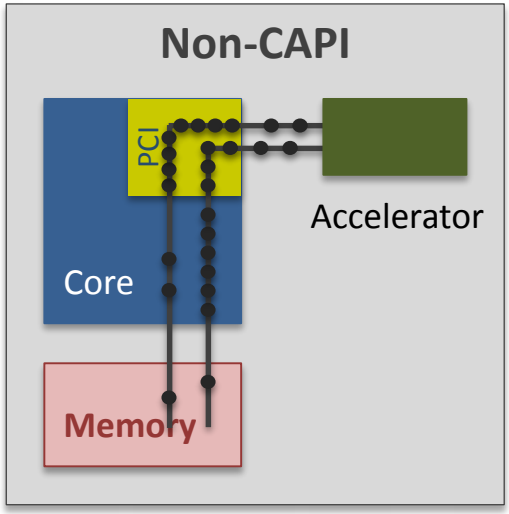
Workload Accelerators

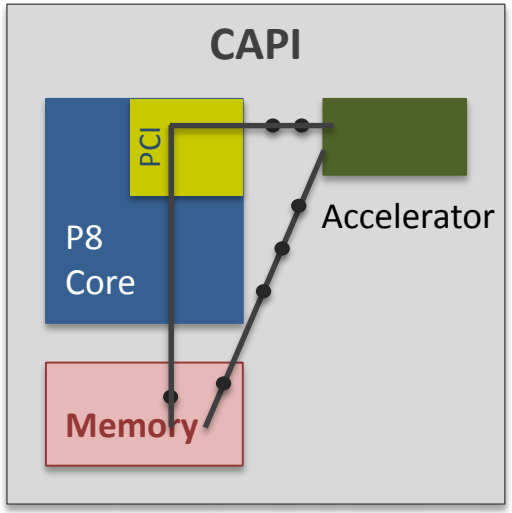


Cost of moving work off-processor **vs.** benefit

Lower latency and higher bandwidth increases use cases

POWER 8: Coherent Accelerator Processor Interface





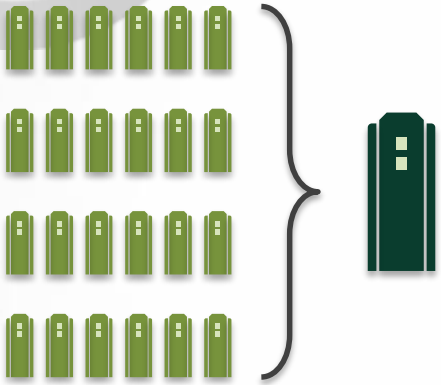
Accelerators challenges:

- Increase Code complexity
- Lock Management (with Memory)
- data-copy needed
- Address Space translation
- Drivers / User to Kernel Space

CAPI Advantages :

- Use standard PCIe3 bus
- Accelerator has direct access to Memory
- Same address Space
- No more data-copy needed
- Simplify programming for application

IBM Data Engine for NoSQL – CAPI Application



2X cost savings

6x less rack space

2U server+2U FlashSystem
vs. typical deployment

Up to **24x** infrastructure consolidation savings vs. x86 for in-memory data

✓ **Reduce server footprint with DRAM-FLASH consolidation**

✓ **100% Redis compliant** *(no application changes)*

redislabs

redis

CAPI

IBM Data Engine for NoSQL

- IBM Power S822L
- CAPI-Attached FPGA Accelerator
- IBM FlashSystem
- Ubuntu Linux
- Redis Software

NVIDIA GPU Acceleration for Java

8x performance improvement

GPU acceleration for Java on segmentation using accelerated machine learning for clustering with Hadoop / Mahout

Best-in-class ingredients

- IBM POWER8
- IBM Java
- NVIDIA CUDA & JCUDA GPU acceleration
- Ubuntu Little Endian Linux for POWER

S822LC Power8 + 2 NVIDIA K80

Power Systems

NVIDIA Tesla

ubuntu Supported by Canonical

Java

mahout

hadoop

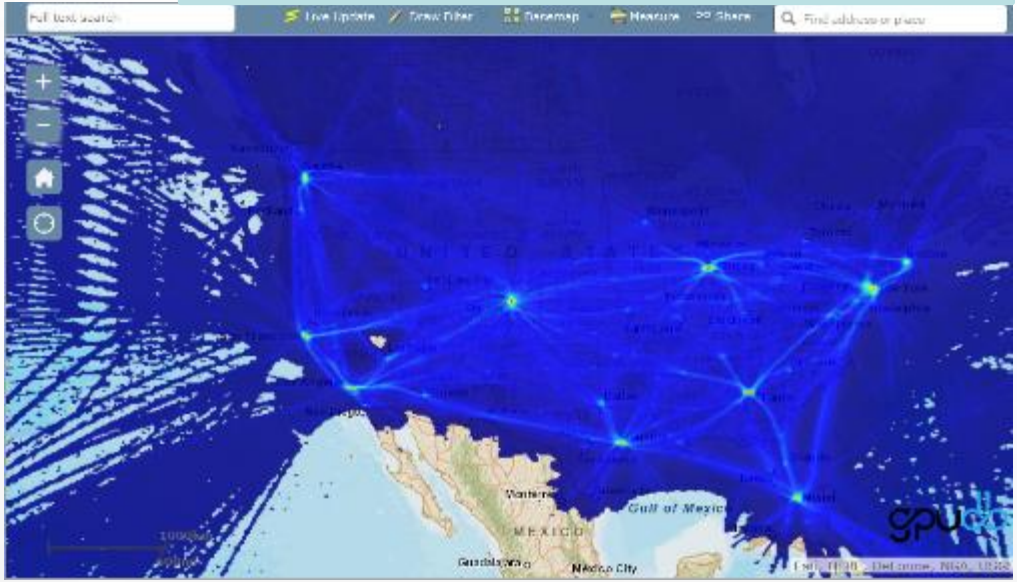
Expanding the List of Accelerated Applications

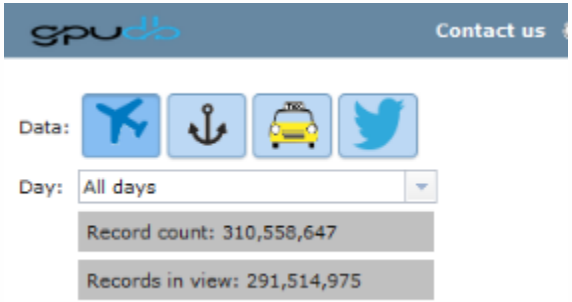
IBM Watson™	Retrieve and rank is 1.7X faster with GPUs
	Healthcare document indexing is 2X faster with FPGAs
Spark	Predicting & avoiding adverse drug reactions 4X faster with GPUs
	Analyzing social degrees of separation while reducing system memory by 4X with CAPI Flash
INTERNET of THINGS Spark	IoT meets analytics in the cloud with GPUs and FPGAs at 10X faster than the normal speed
edico genome	DNA sequence analysis in minutes with FPGAs
gpudb	Fusing real time big data feeds with GPUs
redis neo4j	Massive NoSQL database consolidation resulting in 10X reduction in space and 3X reduction in cost
QRadar	Improved network security through deep packet inspection for live data to identify and isolate threats

GPUdb: A GPU Accelerated, Database Architected for Location, and Visual

Ex: Realtime analytics on 300,000,000 Records

(every commercial flight in the US for 10 months)





- Order of magnitude speedups vs traditional databases

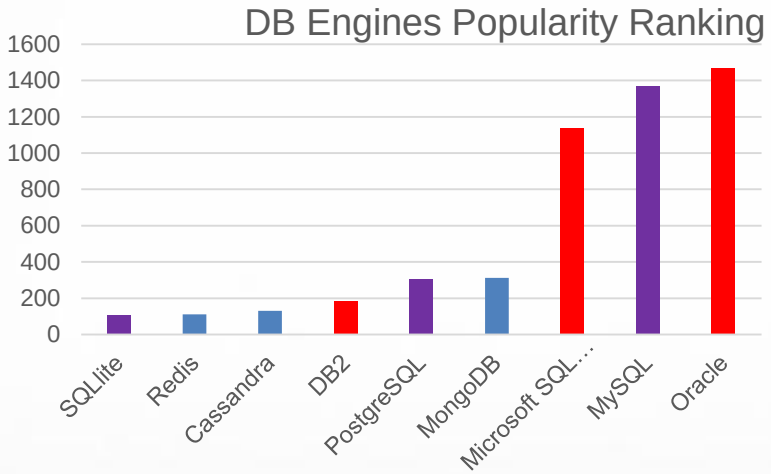
See how compelling for yourself!

GPU Computing on POWER8 – Beyond Just HPC

Cognitive Computing	Data Analytics	Financial Simulations	Life Sciences
			
Data Forensics	**Facial Recognition**	**HPC/Scientific Computing**	**Oil & Gas Seismic Imaging**
			

Database Management Market is in the process of a Dramatic Change

- The past - Relational Databases dominated the operational and analytics database landscapes
- The future - a heterogenous mix of Relational Databases,NoSQL databases and Hadoop/Spark solutions
- These solutions are commercial and open source, and many offer in memory capabilities



- Commercial Relational Databases
- Open Source Relational Databases
- Open Source NoSQL Databases

"By 2018, more than 70% of new in-house applications will be developed on an OSDBMS, and 50% of existing commercial RDBMS instances will have been converted or will be in process..."

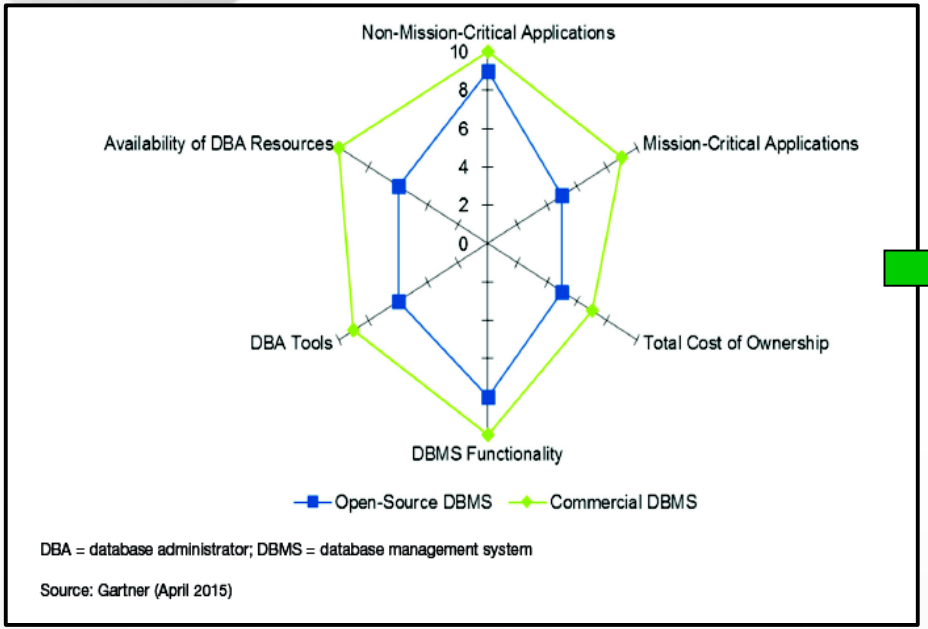
www.db-engines.com/en/ranking as of 4/15/2016

Maturity ?

Gartner

Open-Source DBMS Maturity

2009

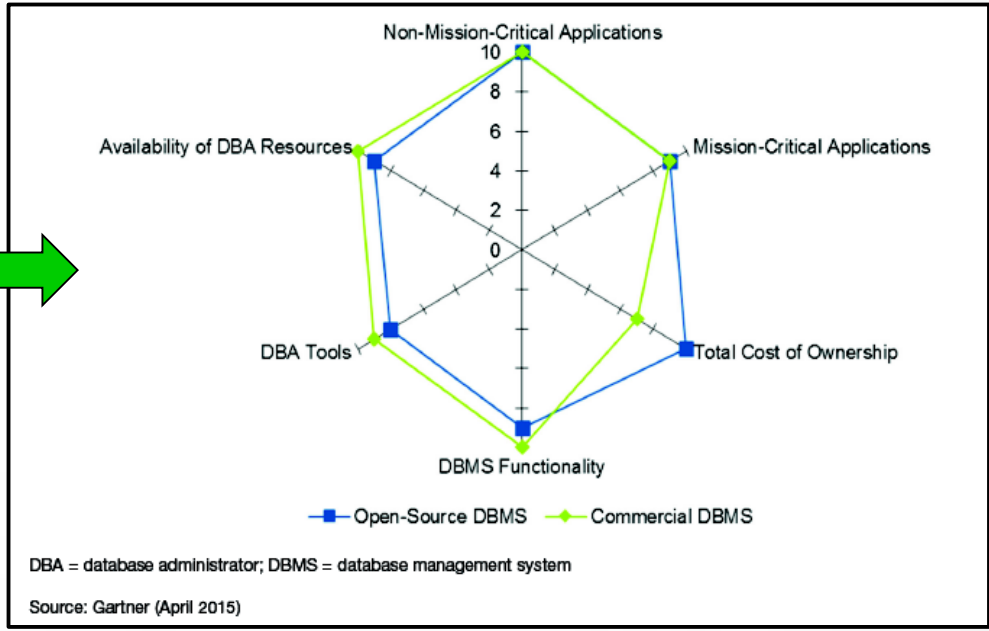


DBA = database administrator; DBMS = database management system

Source: Gartner (April 2015)

Open-Source DBMS Maturity

2015



DBA = database administrator; DBMS = database management system

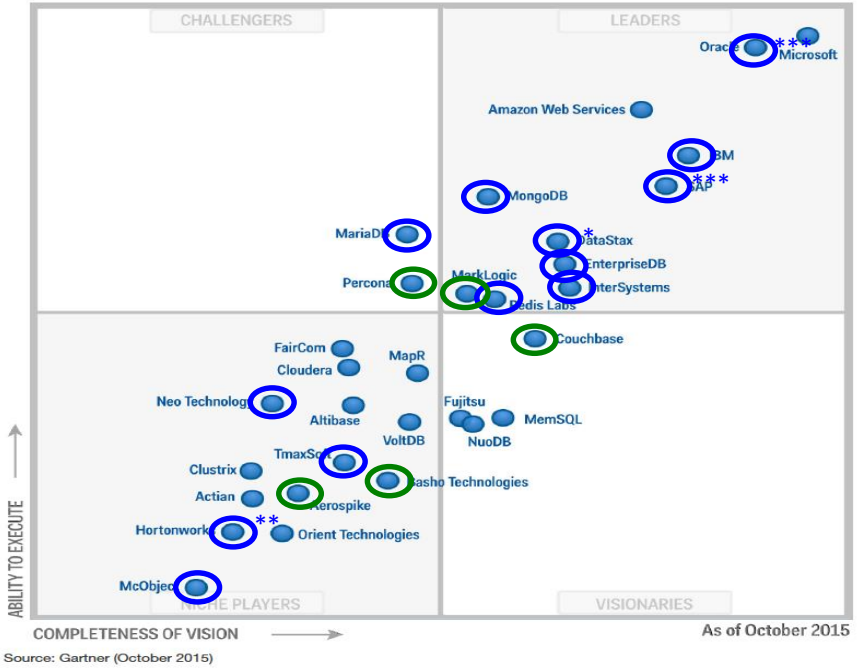
Source: Gartner (April 2015)

Source: *The State of Open-Source RDBMSs, 2015*, Gartner, Donald Feinberg, Merv Adrian, April 2015

DB Popularity Trends

Rank Apr 2016	Rank Mar 2016	Rank Apr 2015	DBMS	Database Model
1.	1.	1.	Oracle	Relational DBMS
2.	2.	2.	MySQL	Relational DBMS
3.	3.	3.	Microsoft SQL Server	Relational DBMS
4.	4.	4.	MongoDB	Document store
5.	5.	5.	PostgreSQL	Relational DBMS
6.	6.	6.	DB2	Rel
7.	7.	7.	Microsoft Access	Rel
8.	8.	8.	Cassandra	Wi
9.	9.	↑ 10.	Redis	Key
10.	10.	↓ 9.	SQLite	Rel
11.	11.	↑ 14.	Elasticsearch	Search engine
12.	12.	↓ 11.	SAP Adaptive Server	Relational DBMS
13.	13.	13.	Teradata	Relational DBMS
14.	14.	↓ 12.	Solr	Search engine
15.	15.	15.	HBase	Wide column store
16.	16.	↑ 17.	Hive	Relational DBMS
17.	17.	↓ 16.	FileMaker	Relational DBMS
18.	18.	18.	Splunk	Search engine
19.	19.	↑ 21.	SAP HANA	Relational DBMS
20.	20.	↑ 22.	Neo4j	Graph DBMS
21.	↑ 22.	↑ 25.	MariaDB	Relational DBMS
22.	↓ 21.	↓ 19.	Informix	Relational DBMS
23.	23.	↓ 20.	Memcached	Key-value store
24.	24.	24.	Couchbase	Document store
25.	↑ 26.	↑ 30.	Amazon DynamoDB	Multi-model

Gartner Magic Quadrant for ODMS



Gartner Magic Quadrant for Operational Database Management Systems (10/12/15)

- Majority of ISVs in the Gartner Challenger or Leaders Quadrant are on Power and being optimized

- Additional ISVs in the Gartner MQ that are on Linux on Power, showing strong promise

- Another 6 being recruited including Percona, Marklogic, Basho, Areospike, Couchbase

Key

- Ported or Porting on LOP
- * Available in Open Source as Cassandra
- ** Available as IOP instead of Hortonworks
- *** Oracle on AIX, DB2 and SAP on both AIX and LoP
- Recruiting

Focus on a prioritized set of Data Providers for optimization and ecosystem development

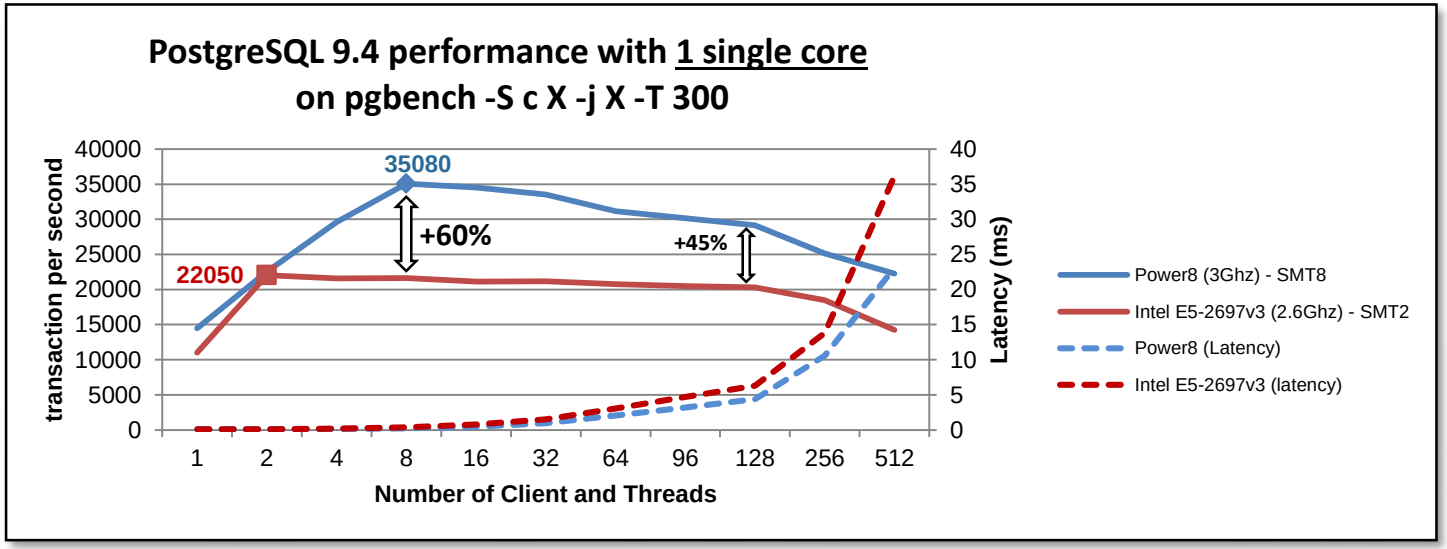
"What performance can I get from a single Power8 core ?"

Traditional-IT Cloud

Benchmark condition:

- 1VM (KVM) binded to 1 Single Processor core
- Ubuntu 14.04.02 with postgreSQL 9.4.1
- pgbench read-only test, scale factor 100 *(pgbench –i –s 100)*
- CPU test => All data in-memory to avoid IO *(using /dev/shm to store data)*

PostgreSQL



Results:

- 1 POWER8 core (@3Ghz) is able to handle **+35000 tps** *(8 concurrent users)*
- 1 POWER8 core (@3Ghz) handles between **60% to 45%** more tps (between 8 and 96 concurrent users)
- Query response time are **~1.5x** faster on POWER8

Cloud & PostgreSQL - IBM Power S822LC ($US) - *vs. HP with Haswell*

Cloud and PostgreSQL

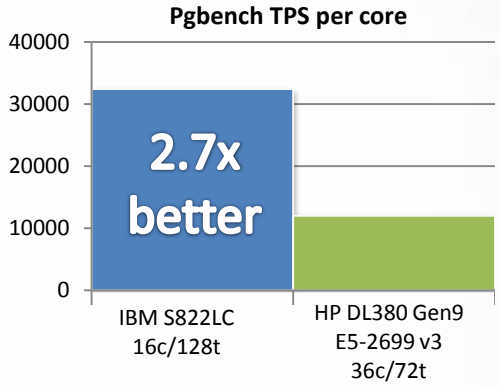
Linux on POWER8
Vs.
Linux on Intel Haswell

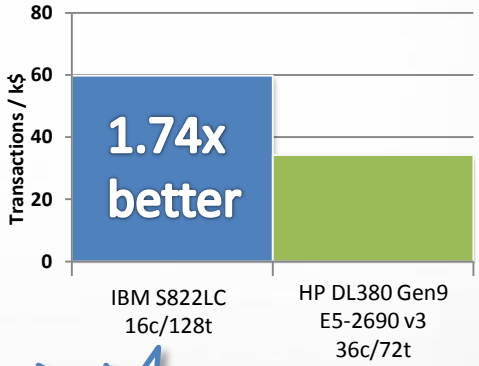
	IBM Power S822LC (16-core, 256GB)	HP DL380 Gen9 (36-core, 256GB)
	$20,872	$29,123
		
	POWER8	intel Haswell

Server web price* -3-year warranty	**$20,872**	**$29,123**
PostgreSQL (relative system performance)	**1250**	**1000**
Price / performance	**$16.70** *(174% better)*	**$29.12**

1.74x better

Server model	IBM Power S822LC	HP DL380 Gen9
Processor / cores	**Two 3.32 GHz, 8-core** (128 threads) **POWER8 processor**	**Two 2.3 GHz , E5-2699, 18-core,** (36 threads) **Haswell processors**
Configuration	2 x 1TB SATA 7.2K rpm LFF HDD, 10 Gb two port, 2 x 16gbps FCA	





25% more VMs

PostgreSQL

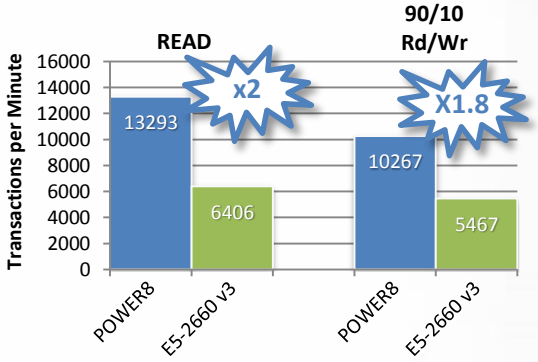
Pricing is based on web pricing for S822LC http://www-03.ibm.com/systems/power/hardware/s822lc-commercial/buy.html and HP DL380 http://h71016.www7.hp.com/dstoreHPE/MiddleFrame.asp?page=config&ProductLineId=431&FamilyId=3852&BaseId=45450&oi=E9CED&BEID=19701&SBLID

MariaDB on POWER8 delivers up to ***40% better price-performance*** *and up to* ***2X performance per core*** than Intel Xeon E5-2660 v3 Haswell

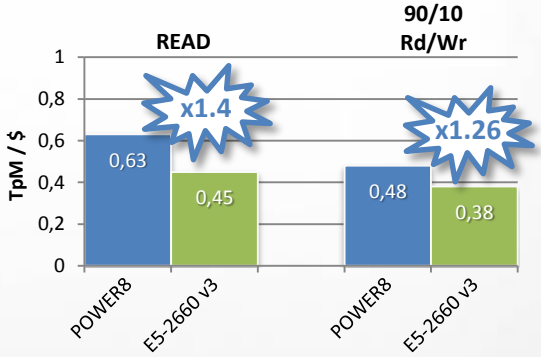
Reduce operating costs with less systems

MariaDB

- POWER8 delivers leadership performance vs E5-2660 v3
  - 2.07X Rd transactions/min per core
  - 1.87X Rd/Wr transactions/min per core



- Reduce operating costs running Open Source DB with Power S822L vs Intel Xeon based system
  - Up to 1.40X better Price-Performance



- Results are based on IBM internal testing of single system image systems running Sysbench OLTP version.05 @ 32M and are current as of May 29, 2015. Performance figures are based on running a 32 million record workload . Individual results will vary depending on individual workloads, configurations and conditions.
- IBM Power System S822L; 20 cores / 160 threads, POWER8; 3.4GHz, 128 GB memory, MariaDB 10.1, RHEL 7.1, RHEV
- Competitive stack: Dell R730; 20 cores / 40 threads; Intel E5-2660 v3; 2.6 GHz; 128 GB; , MariaDB 10.1, RHEL 7.1, RHEV

Cloud & MariaDB - IBM Power S822LC ($US) - vs. HP with Haswell

Power Systems

Welcome to the Waitless World

IBM

Cloud and MariaDB

Linux on POWER8 Vs. Linux on Intel Haswell

	IBM Power S822LC (20-core, 256GB)	HP DL380 Gen9 (24-core, 128GB)
Server web price* -3-year warranty	**$22,233**	**$19,031**
MariaDB (relative system performance)	**16,480**	**9,697**
Price / performance	**$1.35** *(142% better)*	**$1.96**

1.45X better

24-core Intel x86 System

Supporting 12 VMs

Total throughput = 9,697 tps

Average throughput per VM = 808 tps

HP DL380 – 24-core/48 thread with 128 GB MEM

VM	VM	VM	VM	VM	VM
VM	VM	VM	VM	VM	VM

66% more VMs

20-core POWER8 System

Supporting 20 VMs

Total throughput = 16,480 tps

Average throughput per VM = 823 tps

IBM Power S822LC – 20-core/160thread with 256 GB MEM

VM	VM	VM	VM	VM
VM	VM	VM	VM	VM
VM	VM	VM	VM	VM
VM	VM	VM	VM	VM

Server model	IBM Power S822LC	HP DL380 Gen9
Processor / cores	**Two 2.92 GHz, 10-core** (160 threads) **POWER8 processor**	**Two 2.6 GHz, 12c E5-2690 v3** (48 threads) **Haswell processors**
Configuration	10 Gb two port, 2 x 16gbps FCA	

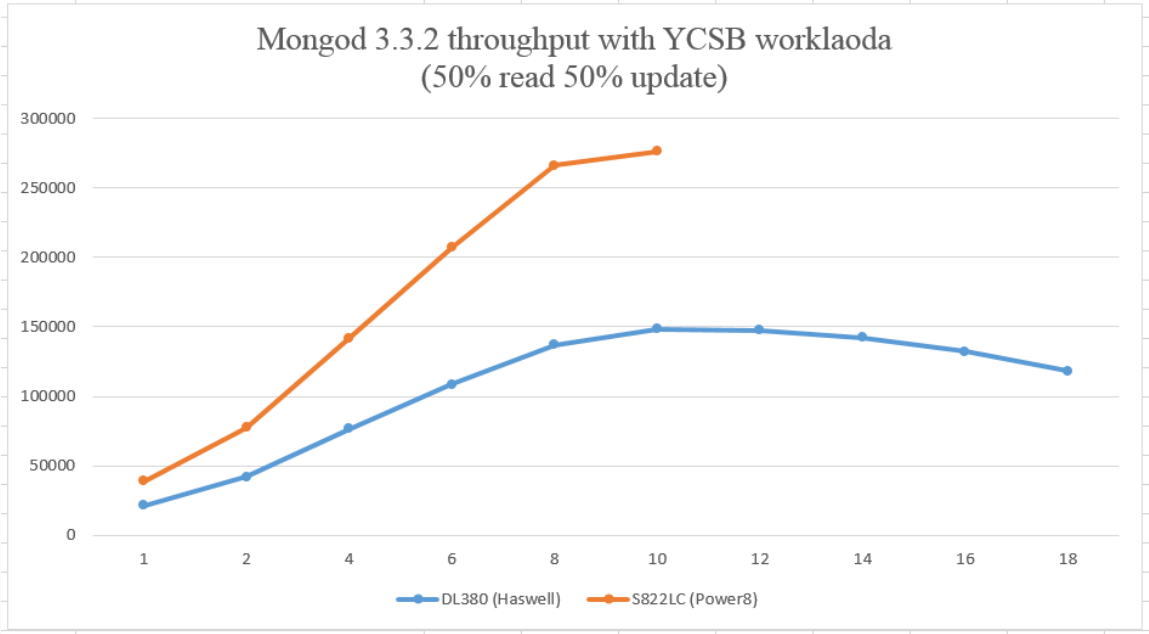
Pricing is based on web pricing for S822LC http://www-03.ibm.com/systems/power/hardware/s822lc-commercial/buy.html and HP DL380 http://h71016.www7.hp.com/dstoreHPE/MiddleFrame.asp?page=config&ProductLineId=431&FamilyId=3852&BaseId=45450&oi=E9CED&BEID=19701&SBLID

MongoDB performance POWER8 vs Haswell-EP

mongoDB

POWER8 Throughput at 1.86x of Haswell

Better



MongoDB (3.3.2)
POWER8, S822LC 3.32 GHz), RHEL 7.2
Haswell: DL380 2.30GHz,, RHEL7.2
Run multiple YCSB clients. Varied numbers of threads in the clients and measured the average

Full POWER8 Line

redhat SUSE ubuntu Supported by Canonical fedora openSUSE debian

Designed for big data

Power S812LC

New

- 8, 10 Cores
- 2.92 – 3.32 GHz
- 14 LFF drives
- KVM, Bare metal

Ideal for data in the cloud

Power S822LC

New

- 16, 20 Cores
- 2.92 – 3.32 GHz
- 0-2 NVidia GPUs
- KVM, Bare metal

Power S812 (+L)

- 10, 12 Cores
- 3.0 – 3.52 GHz
- KVM, PowerVM, Bare metal

allegiant etisalat BNP PARIBAS BON TON pets at home OVH.com online

Power S822 (+L)

- 16, 20, 24 Cores
- 3.0 – 4.15 GHz
- KVM, PowerVM, Bare metal

LSU RICE

Power S824 (+L)

- 16, 20, 24 Cores
- 3.0 – 4.15 GHz
- 0-2 NVidia GPUs
- KVM, PowerVM, Bare metal

Australian Government myGov

- S822/S822L nodes
- Storwize V7000
- OpenStack Mgmt
- PowerVM, KVM (1H16)

Power E850

- 16 to 48 Cores
- 3.0 – 3.7 GHz
- 4TB memory
- PowerVM

Pratt & Whitney CTAC

Australian Government Department of Human Services

Power E870

- 8 to 80 Cores
- 4.0 - 4.19 GHz
- 8TB memory
- PowerVM

YPF AstraZeneca

Power E880

- 8 - 192 Cores
- 4 - 4.35 GHz
- 16TB memory
- PowerVM

'LC line' Scale-out & Linux Only Lines 'L line' PurePower Power Enterprise and IFLs

New

Clients value open innovation and TCA

Clients value performance and price/performance

Clients value converged infrastructure

Clients value enterprise class features, robustness

70 PVUs for IBM SW on any Core running Linux

OpenPOWER

docker openstack PowerVC PowerKVM PowerVM

AIX i for Business Linux

Power LC Line Linux only models

OpenPOWER™

S812LC

S822LC

NVIDIA.

- New designs built in cooperation with OpenPOWER partners
- Specifically developed for new workloads and deployments
- S812LC is designed for Big Data and Analytics (Hadoop, Spark)
- S822LC designed for Commercial and High Performance Computing
- GPU acceleration is available for HPC clusters (S822LC for HPC)

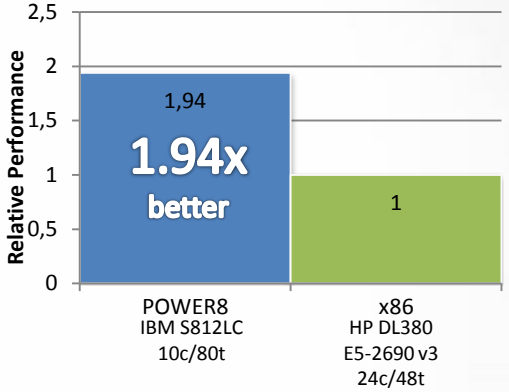
PowerKVM redhat fedora SUSE openSUSE ubuntu Supported by Canonical debian

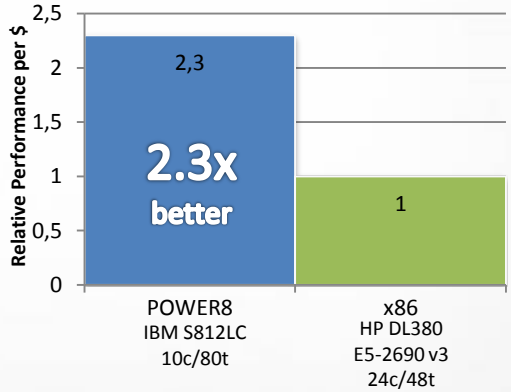
Big Data with Spark - IBM Power S812LC ($US) - *vs. HP with Haswell*

Big Data

Linux on POWER8 Vs. Linux on Intel Haswell

	IBM Power S812LC (10-core, 256GB)	HP DL380 Gen9 (24-core, 256GB)
	$12,999	$16,004
		
	POWER8	intel Haswell





	IBM Power S812LC	HP DL380 Gen9
Server web price* -3-year warranty	**$12,999**	**$16,004**
SparkBench (relative system performance)	**1,940**	**1,000**
Price / performance	**$6.70** *(230% better)* — 2.3x better	**$16.00**

Server model	IBM Power S812LC	HP DL380 Gen9
Processor / cores	**One 2.92 GHz, 10-core** (80 threads) **POWER8 processor**	**Two 2.6 GHz , E5-2690, 12-core,** (24 threads) **Haswell processors**
Configuration	**256** GB memory, 2 x 1TB SATA 7.2K rpm LFF HDD, 10 Gb two port	

All results are based on IBM Internal Testing of 10 SparkBench benchmarks consisting of SQL RDD Relation, Twitter, Pageview Streaming, PageRank, Logistic Regression, SVD++, TriangleCount, SVM, MF, SQL Hive
IBM Power System S812LC 10 cores / 80 threads, POWER8; 2.9GHz, 256 GB memory, Ubuntu 15.04, Spark 1.4, OpenJDK 1.8
Intel Xeon HP DL380; 24 cores / 48 threads, E5-2690 v3; 2.3GHz , 256 GB memory. Ubuntu 15.04, Spark 1.4, OpenJDK 1.8
Pricing is based on web prices for S812LC (http://www-03.ibm.com/systems/power/hardware/s812lc/buy.html) and HP DL380 (http://h71016.www7.hp.com/dstoreHPE/MiddleFrame.asp?page=config&ProductLineId=431&FamilyId=3852&BaseId=45441&oi=E9CED&BEID=19701&SBLID=)

The Momentum is there, there is no turning back !

OpenPOWER™

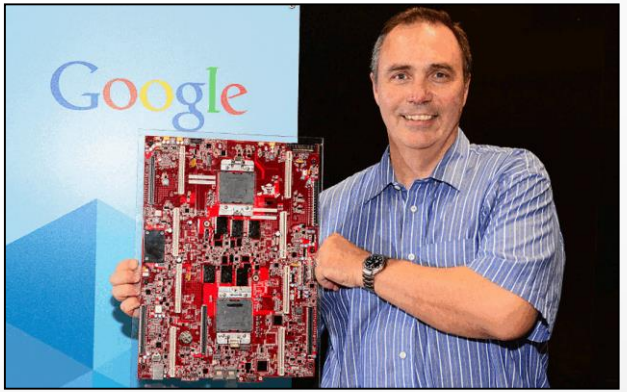
Google

"People ask me if we would switch to Power, and the answer is absolutely."

*Hölzle said emphatically and unequivocally. "**Even for a single generation**." And the reason is simple: A 20 percent advantage, to pick a number that he threw out, on a very large number of systems that Google deploys every year, "**is a very large number. And after that, if conditions change, we might switch back.**"*

Urs Hölzle is senior vice president of the Technical Infrastructure team

From : http://www.theplatform.net/2015/04/29/google-will-do-anything-to-beat-moores-law/



Gordon McKean presenting the Google POWER Motherboard during the OpenPOWER summit 2014

Questions ?

Try it and see! 50+ IBM Centers Fuel Linux on Power

Power Systems

- ✓ The apps that you use
- ✓ On the industry standard OS that you love
- ✓ With the performance that you need

Search: linux, power, ibm innovation center

Engage with us : PSLCmop@fr.ibm.com

Power Systems Linux Center Montpellier

CentOS on POWER8

- CentOS is a community governed by board, not a company.
- CentOS is a downstream clone of Red Hat Enterprise Linux (RHEL), that is rebuilt from publicly available source.

- IBM is participating to the CentOS community and growing it
  - ISO of CentOS 7 (derivate from a RHEL 7.2)
    http://mirror.centos.org/altarch/7/isos/ppc64/
    http://mirror.centos.org/altarch/7/isos/ppc64le/
  - Fix problems and recruit community members

- IBM has no plans at this time to:
  - Provide fee-based support (TSS) for CentOS, i.e. customers will need to self-support or engage a partner
  - Perform System Test or certification of the release as we do for RHEL
  - Develop CentOS-unique features not included in RHEL

Key ISV Quotes from Power 8 Launch

http://www-03.ibm.com/systems/power/solutions/quotes/

CANONICAL

We believe … POWER8, with Ubuntu 14.04 LTS, Ubuntu OpenStack and Juju will deliver the scale, reliability and performance customers are looking for.

Mark Shuttleworth, Founder

STORIX

"Storix, Inc. has been a IBM 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…, our benchmark tests exceeded expectations for the speed of backups. And **with 50% more cores and twice the number of threads per core,** encryption processing no longer effects backup and recovery speeds."

David Huffman, CEO

zend The PHP Company

"Creating the most compelling client facing apps is essential to a company's competitiveness today, and IBM gets this…Zend is excited to partner with IBM ….and to enable this compelling new option for the **community of 5 million PHP web application developers."**

Andi Gutmans, CEO

SkySQL

"with IBM's POWER8 systems running Linux, enable SkySQL to deliver a well-integrated offering with world-class performance. There is no better solution for the demands of cloud, analytic, mobile and social deployments."

Patrik Sallner, CEO

SUGARCRM

"SugarCRM and IBM Power Systems running Linux will be an exceptional platform for our customers…. Recent performance testing resulted in an **increase of up to 2x over** …superior price/performance advantage …"

Clint Oram, Founder & CTO

redislabs

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, CEO

ZATO

Zato's platform for data liquidity …accelerating medical text processing, automated coding, and reporting of quality measures by leveraging the **P8 revolutionary hardware architecture …to deliver extraordinary gains in processing throughput."**

Paul McOwen, COO

ISVs are critical to the expanding ecosystem on POWER

"IBM is an important part of Canonical's Server and Cloud partner ecosystem. We believe IBM's launch of Power8, with Ubuntu 14.04 LTS, Ubuntu OpenStack and Juju will deliver the scale, reliability and performance customers are looking for.

– Mark Shuttleworth, Founder of Canonical, Ltd.

CANONICAL

"IBM's POWER8 System, running Linux, is purpose-built for web-scale, delivering the technology to harness the power of automation, cloud, and big data."

– Ken Cheney, Vice President of Business Development, Chef Software

CHEF

"Our Business-Ready Performance Management Solution utilizes many of the features of IBM POWER8 technology such as high data processing capacity, high data security, reliability and availability in which clients come to expect from their Business Analytics solutions."

– Gary Shiller, Vice President, Sky Solutions

sky solutions

"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

redislabs