

Transformation For Growth

Compete in
the Era of
SMART.

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POWER8

Platform of choice for Cloud, Analytics,
Mobile, Social and Security (CAMSS)



ROHIT SOOD

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Power Systems Technical Leader - ISA

IBM

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Business needs are driving infrastructure transformation

Service Providers
69%
of IT cost is server mgmt & admin
(est \$247B)

Big Data Analytics
8 zettabytes
digital content by 2015
(90% unstructured)



Databases



Applications



Instrumented
Devices & Sensors



Mobile



Social

Cloud
80%
of new apps developed
with cloud
characteristics

Big Data / Analytics 83%

Mobile 74%

Cloud 68%

Process 60%

Security 58%

Mobile
25+
average # of mobility
applications deployed by CIOs
in next 2 years

CIOs are turning to innovative technologies to address these challenges



Source: "Hunting and Harvesting in a Digital World - Insights From the 2013 Gartner CIO Agenda Report". Gartner Executive Program Survey of More Than 2,000 CIOs Shows Digital Technologies Are Top Priorities in 2013. <http://www.gartner.com/technology/cio/cioagenda.jsp>



With these opportunities come IT challenges ... requiring alternatives to the PC era of technology

1

Businesses can't Capitalize On data generated at lightning speed

2

IT is running out of space, energy and resources

3

Client Expectations are constantly Changing

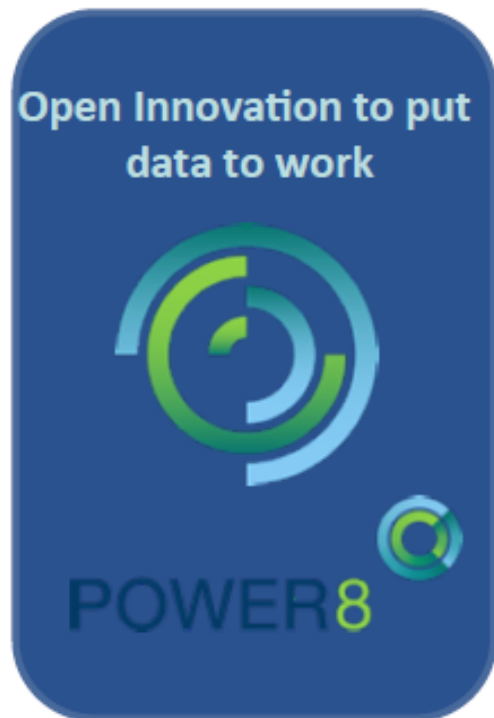


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Introducing...A NEW GENERATION OF IBM Power System



**Designed for
Big Data**



**Superior Cloud
Economics**



**Open
Innovation
Platform**



IBM

\$3B STG R&D Announcement

- July 10, 2014 IBM [announced](#) a new \$3 billion dollar R&D investment to create the next generation of chip technologies that will fuel the systems required for a new era of computing for cloud, Big Data and cognitive systems.
- We're making a clear statement to our clients that IBM is firmly committed to the high value part of the hardware business, demonstrating our Confidence (one of our 3 C's of the sales agenda). These investments will extend IBM's systems leadership in future Power Systems and System z generations.
- We're also underscoring what Ginni said in the in the 2013 IBM Annual Report: "IBM will remain a leader in high-performance and high-end systems, storage and cognitive computing, and we will continue to invest in R&D for advanced semiconductor technology."



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POWER8 Optimized for Key Workloads

**Systems
of Record**



**Analytics and
Big Data**



**Systems of
Engagement**



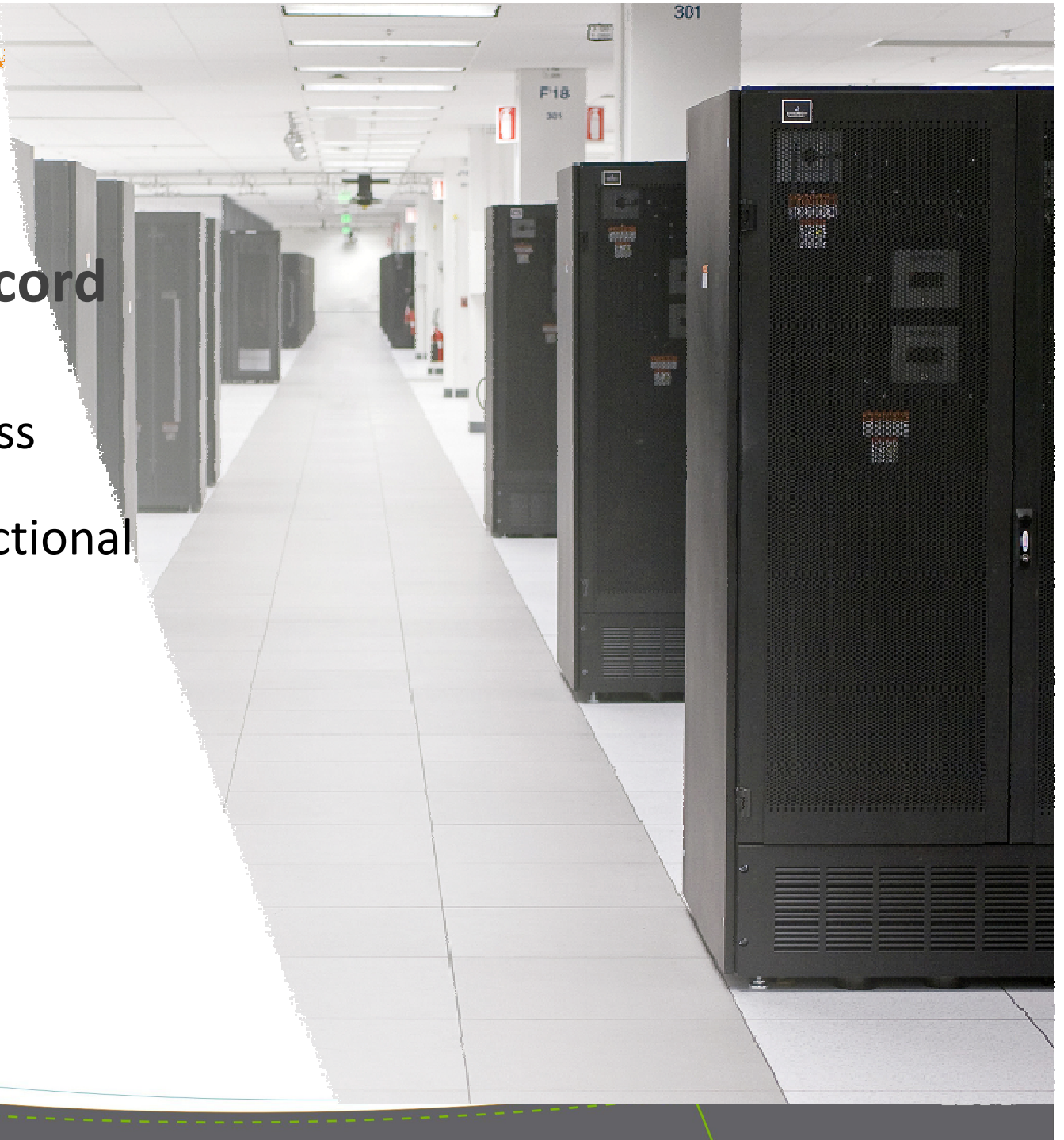
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Systems of Record

- Core to business
- Update transactional
- High volume
- Mixed

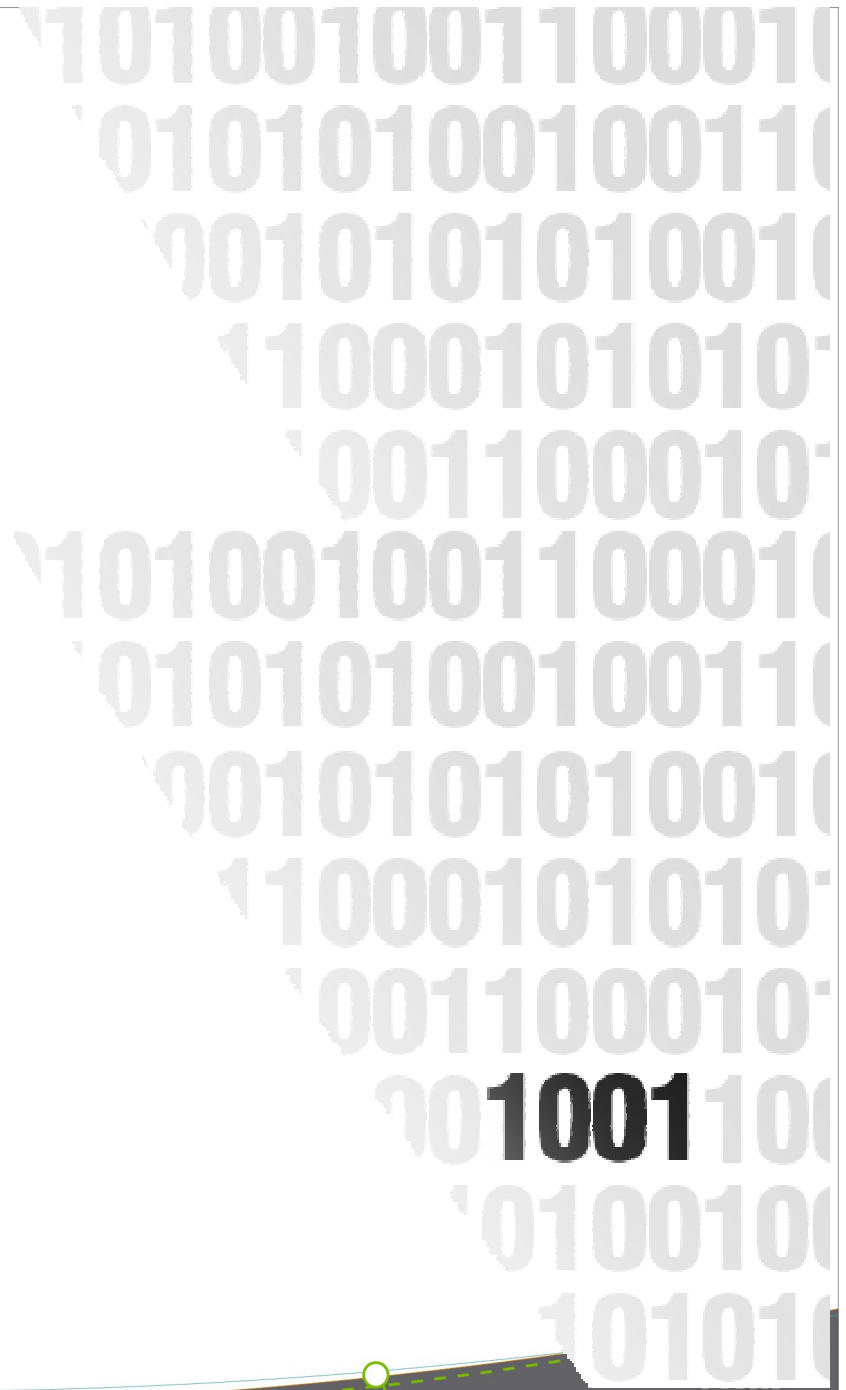


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Analytics and Big Data

- Ubiquitous
- Competitive advantage
- Large data footprint
- Unpredictable



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Systems of Engagement

- Competitive advantage
- Anytime, anywhere
- Untrusted devices
- Exposes internal IT

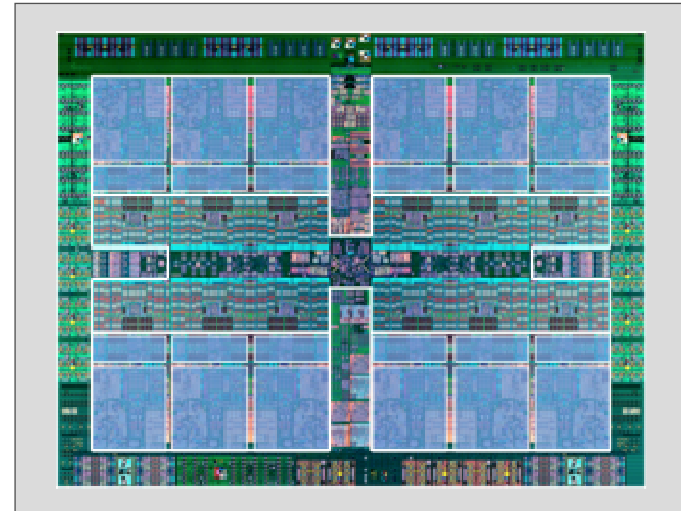
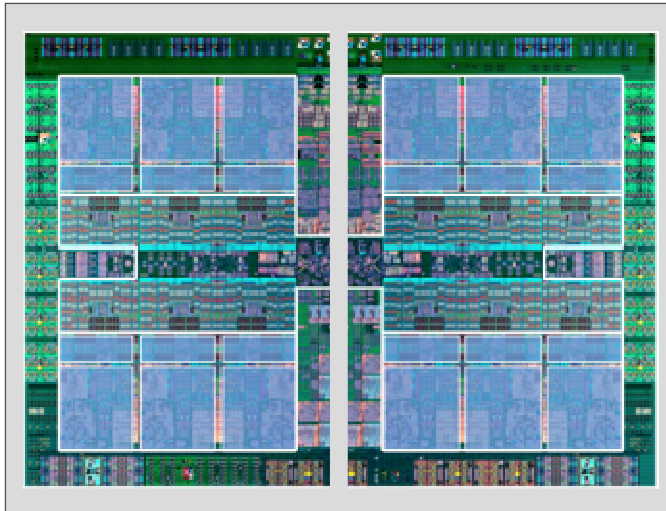


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POWER8 Chips



Scale Out Systems

Dual Chip Module
6 Cores per Chip

Enterprise (Future)

Single Chip
12 Cores per Chip



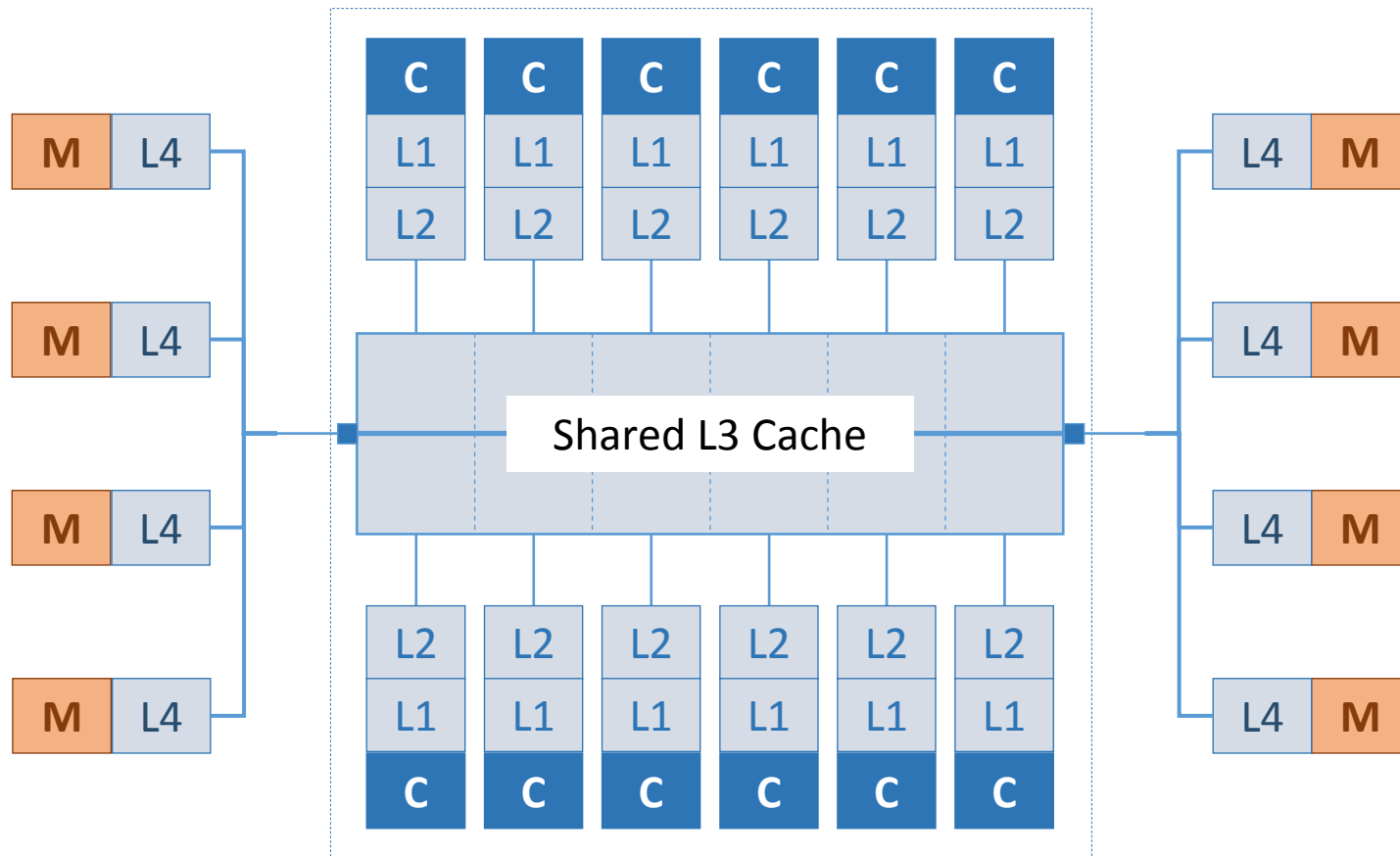
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Cache and Core Speed

Chip Family	Core Frequency (GHz)	L1 and L2 Cache per Core	Approximate Cache per Core (MB)
Intel EN E5-v2 (8+ core)	1.7 – 2.4	64 KB 256 KB	2.81
Intel EP E5-v2 (8+ core)	1.7 – 3.4	64 KB 256 KB	2.81
Intel E7-v2 (8+ core)	2.0 – 3.2	64 KB 256 KB	2.81
POWER8 (8+ core)	3.4 – 4.1	96 KB 512 KB	19.26
System z EC12	5.50	160 KB 2 MB	20.82



POWER8 Cache: Close, Big, and Smart

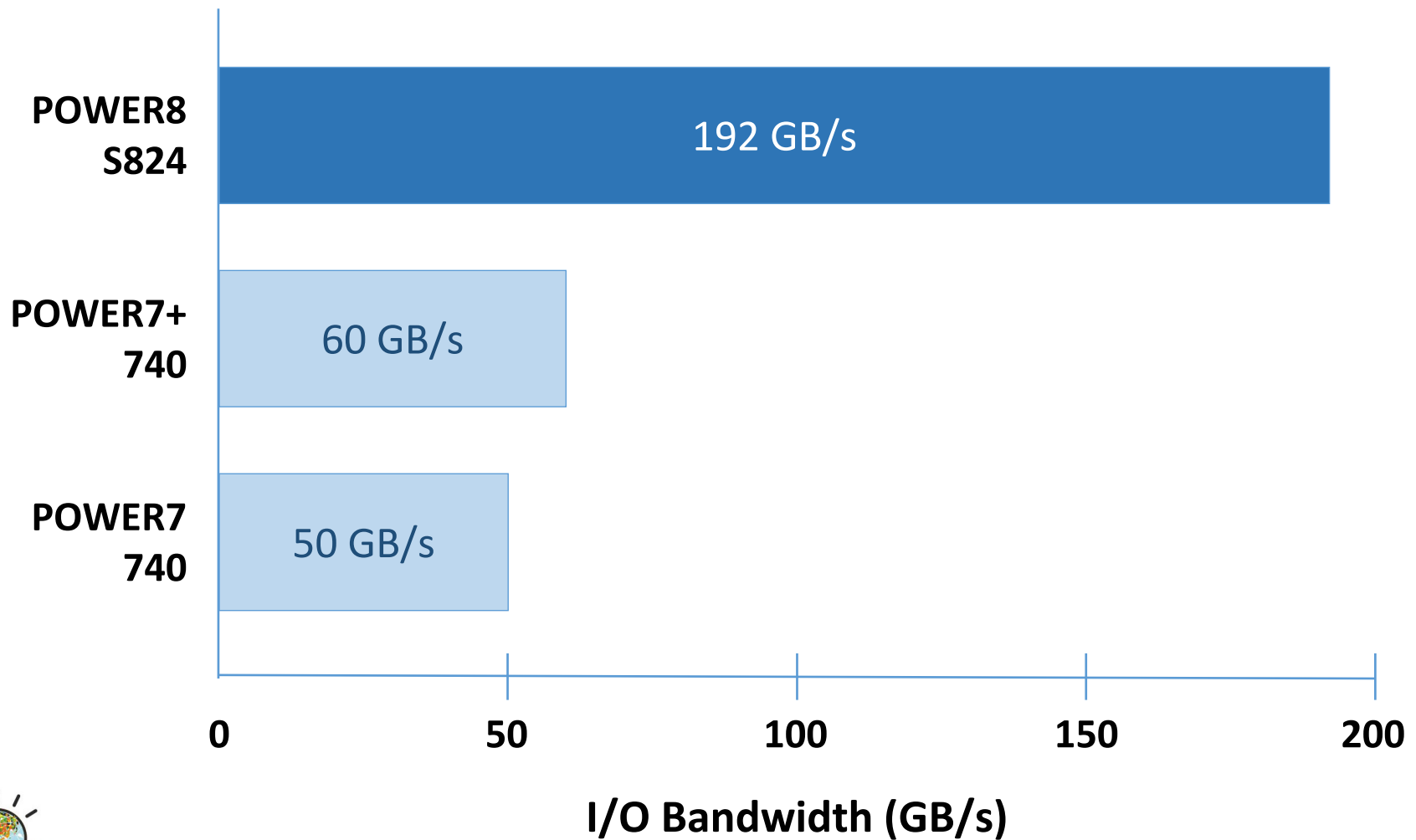


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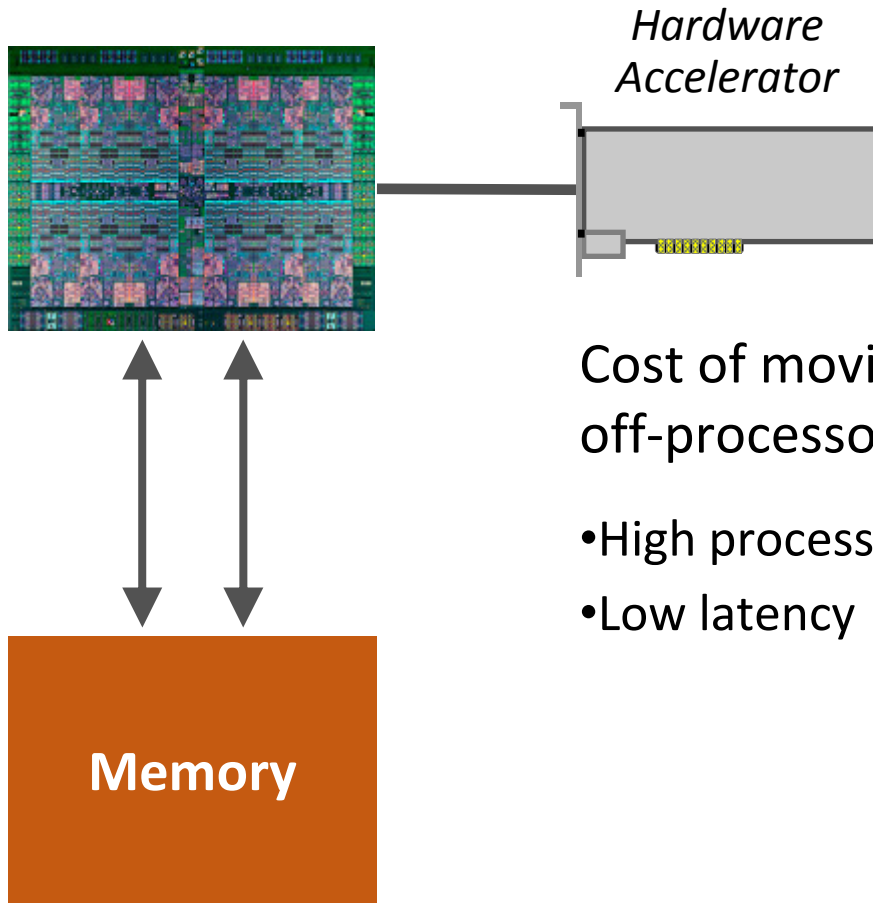
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Max Peak I/O Bandwidth (2-Socket)



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Hardware Accelerators

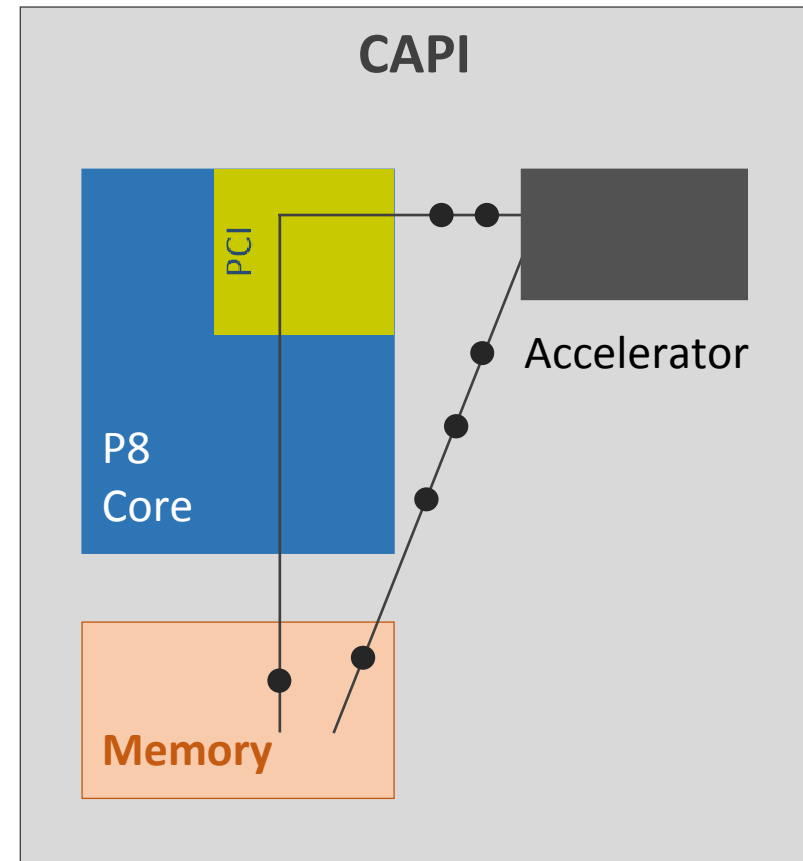
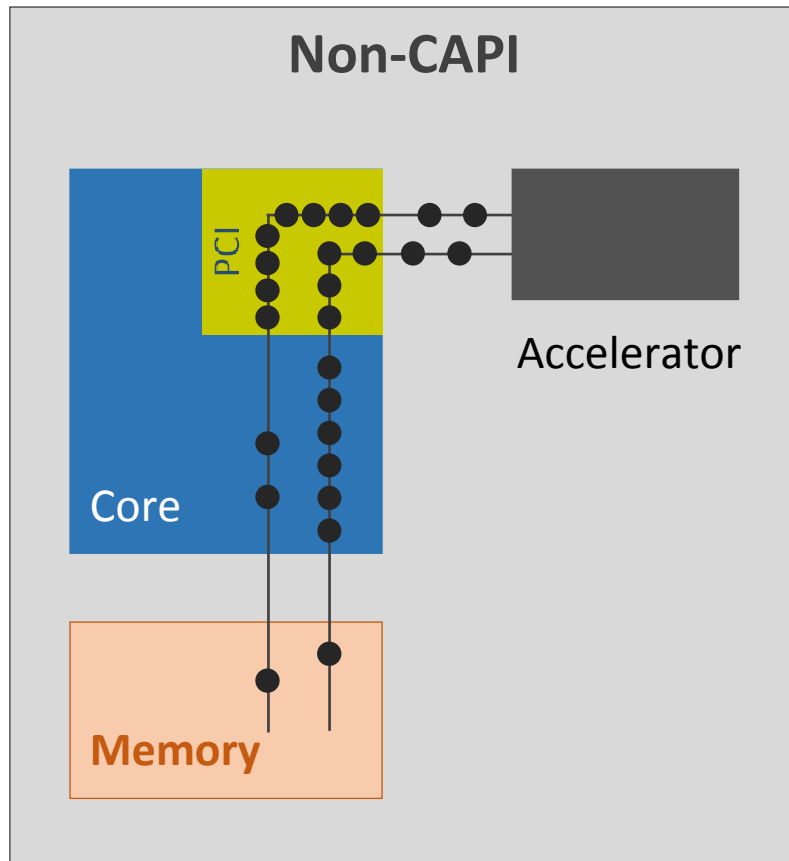


Cost of moving work
off-processor **vs.** benefit

- High processing (e.g. compression)
- Low latency



Coherent Accelerator Processor Interface



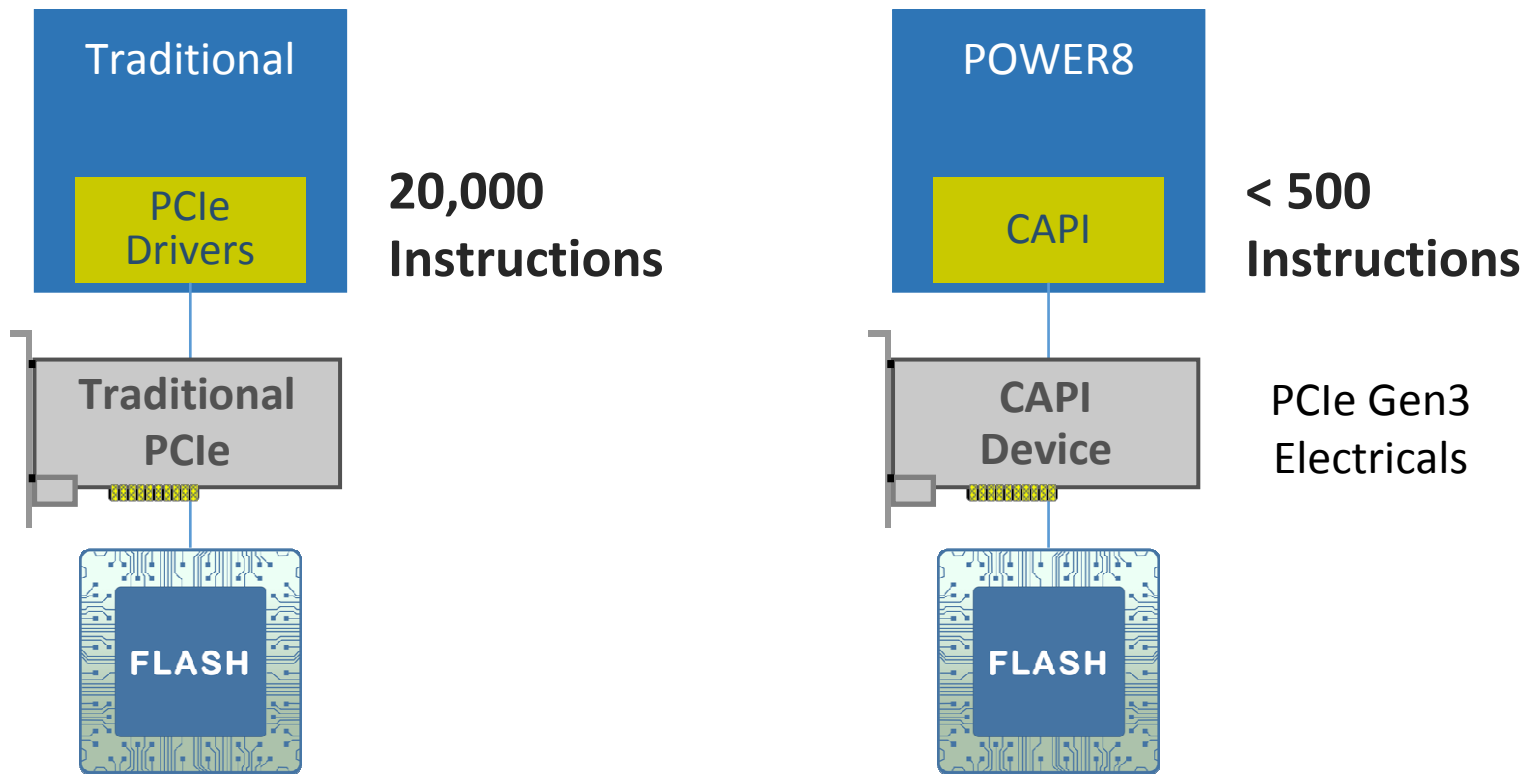
CAPI is a statement of direction as of April 2014

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CAPI Attached Flash Example



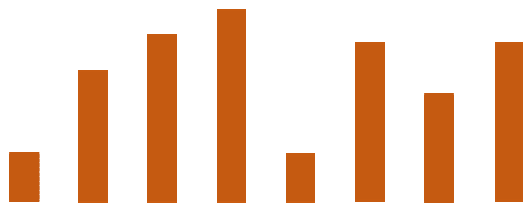
CAPI saves 20-30 hardware threads per 1M I/Os

IBM

Power Systems Drive High Throughput

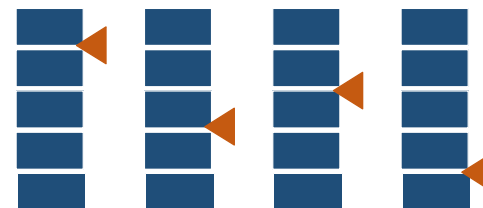
Core Performance

- Cache, interconnect, and threading
- Bandwidth
- Core frequency



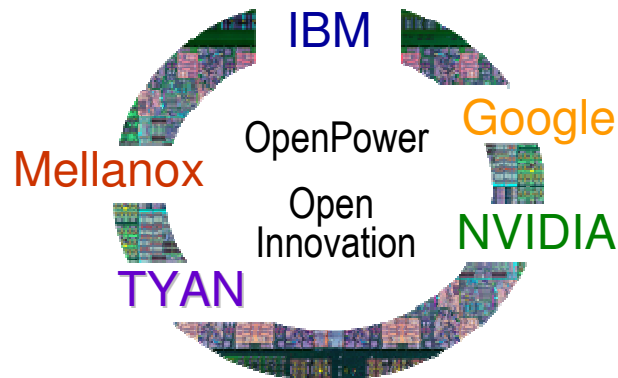
Average Utilization

- Virtualization and availability design
- Software support
- Statistical multiplicity



Open Platform: Ecosystem Leadership Providing Client Choice & Flexibility

OpenPOWER Foundation



- Collaborative innovation for highly advanced systems
- Produce open hardware, software, firmware and tools
- Expand industry skills and investment for Power ecosystem
- Provide alternative architectures

Open Applications and Tools



JavaScript



- Access to industry innovation from a broad community
- Optimize scripting languages & development tools
- Contribute innovation to Linux, KVM and OpenStack
- Lift and shift java apps with LE Canonical Ubuntu & SUSE Linux

Open Management



- Simplified, consistent management
- Deployment on premise or via cloud
- Seamless upgrades
- Software Defined Environments



Giving ecosystem partners a license to innovate

OpenPOWER will enable data centers to rethink their approach to technology.

Member companies may use POWER for custom open servers and components for Linux based cloud data centers.

OpenPOWER ecosystem partners can optimize the interactions of server building blocks – microprocessors, networking, I/O & other components – to tune performance.

Buy
Build
Innovate

Platinum Members



ATERA

Google

IBM



SAMSUNG

Suzhou
PowerCore
Technology

TYAN

IBM

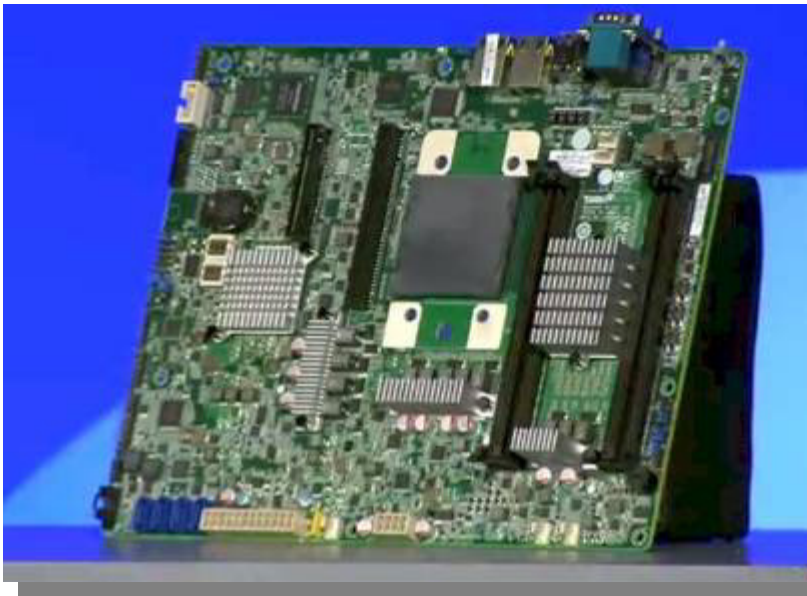
How will the OpenPOWER Foundation benefit clients?

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

What does this mean to the industry?

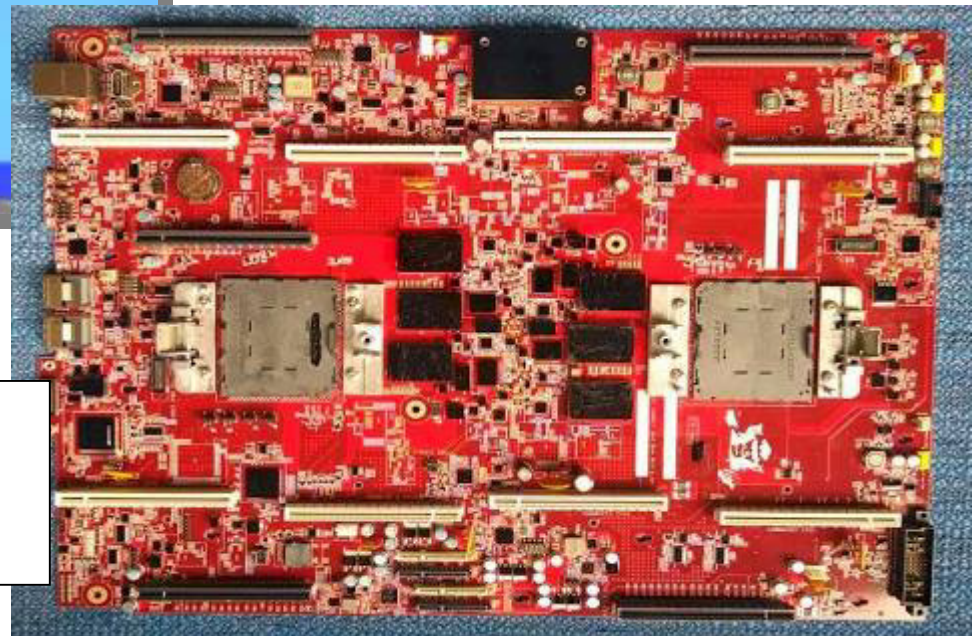
- **Game changer** on the competitive landscape of the server industry
- Will enable and drive innovation in the industry
- Provide more choice in the industry

Non-IBM POWER8 products



The Tyan reference (ATX) board, SP010, measures 12" by 9.6"

- › one single-chip module (SCM)
- › four DDR3 memory slots
- › four 6 Gb/sec SATA peripheral connectors
- › two USB 3.0 ports
- › two Gigabit Ethernet network interfaces
- › keyboard and video
- › intended for developers



The Google reference board

- › two single-chip module (SCM)
- › four modified SATA ports
- › Google use only



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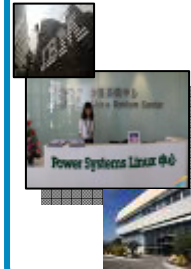
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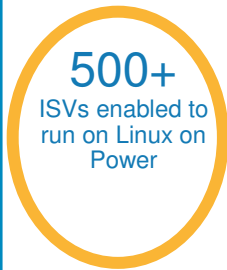
Linux momentum is growing on Power Systems



An open ecosystem, using the POWER Architecture, to share expertise, investments, and server-class intellectual property to serve customers' evolving needs.



Linux Centers. Offering access to hardware technical support, porting assistance, demos, toolkits, hands-on labs
Beijing | Austin | New York | Montpellier | Tokyo



Global Linux ISV Development

NEW. Power Development Cloud gives Linux developers who want to prototype applications access to Power

NEW. 50,000 new developers from Ubuntu development community



Regional Ecosystem Initiative

Recruiting key solutions:
+Open Source Tools
+Middleware
+Industry Solutions

\$1B

in new Linux and open source technologies for IBM Power Systems.

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Fostering open innovation for cloud based applications with Ubuntu and Power Systems



Moving Linux apps to Power has never been easier

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



Vast Majority of x86/Linux applications written in C/C++ will require no source code change, only a recompile



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So, What is important?

Hardware

4. Provide the best solution
Power performance

(2X + over x86)

*The Price/Performance
Leader*

vs



Solutions

1. Determine Pain Points
2. Determine Workload
3. Provide a solution

CAMSS

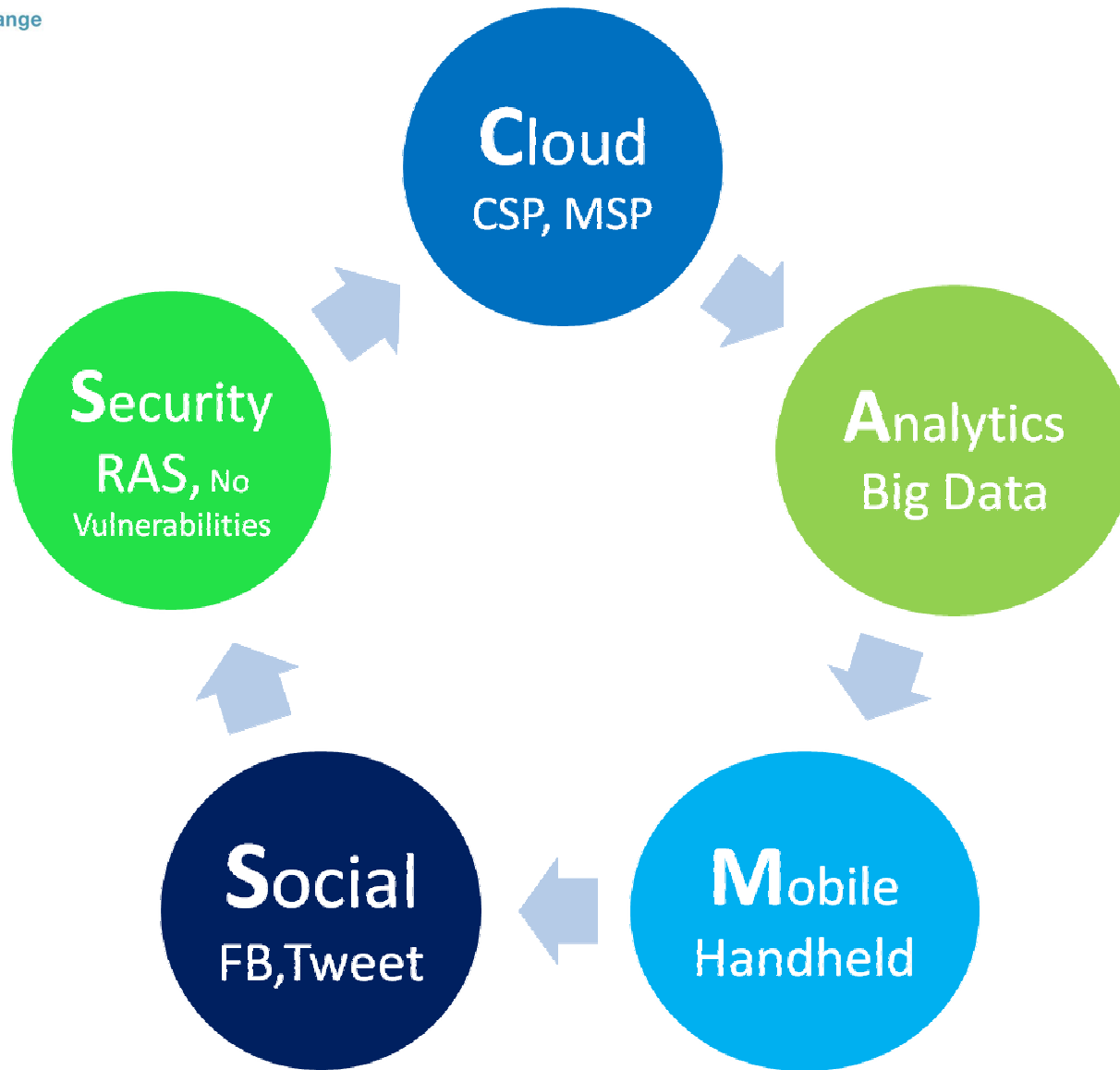


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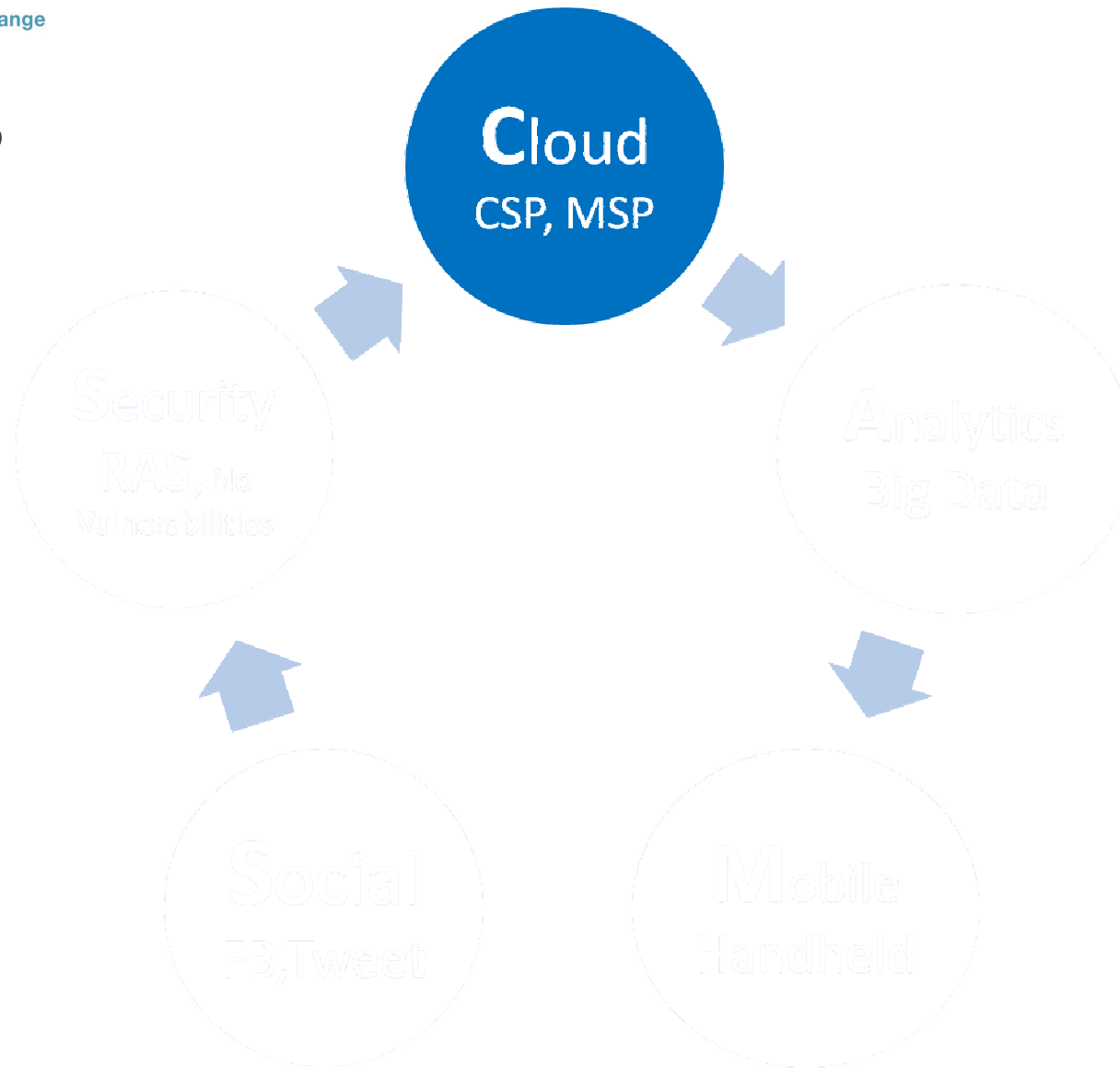


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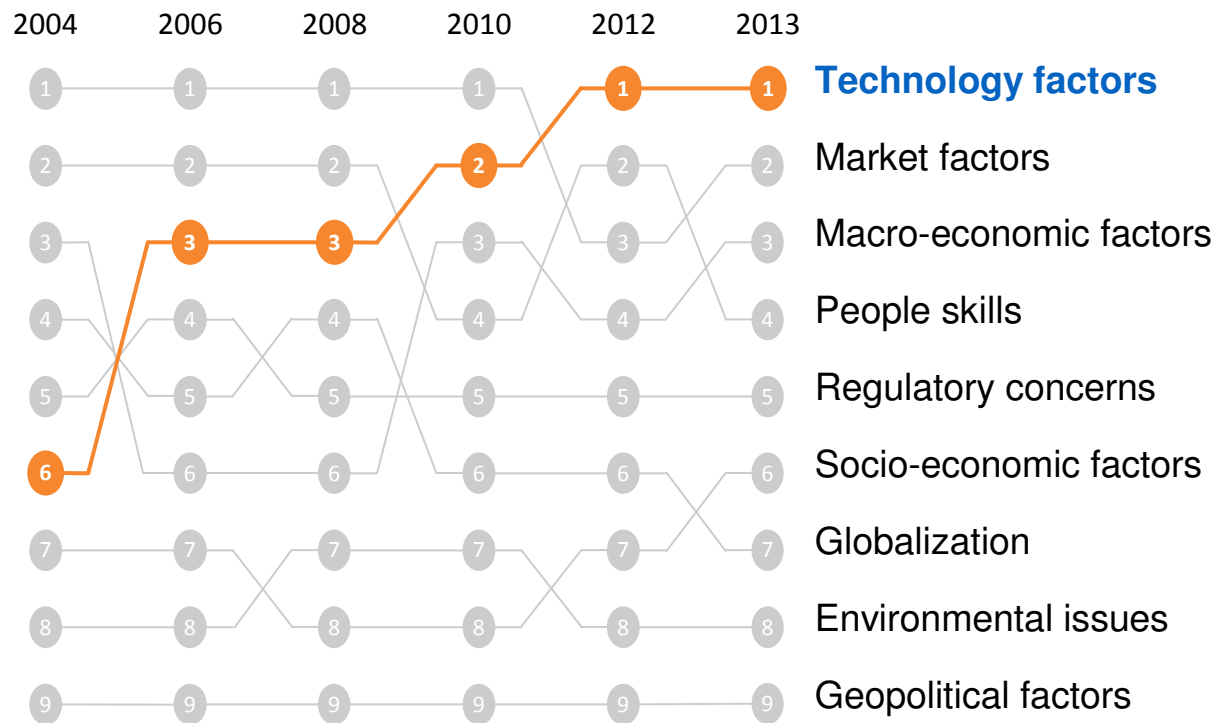


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For two years in a row, CEOs have cited technology as the top external force shaping their businesses



Strategic Reinvention

136% more likely to use cloud to reinvent customer relationships



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Hybrid cloud provides the dynamic foundation and flexibility required

Private Cloud & IT



Benefits:

- Fully customizable
- Robust management
- Secure by design



Public Cloud



Benefits:

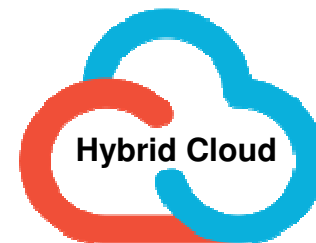
- Low entry cost
- Pay-per-use
- Highly elastic



Dynamic Hybrid



+



Hybrid Cloud

**Best of both worlds.
Better outcomes.**

- ✓ Maximize return on existing IT investments
- ✓ Match workloads to best-fit infrastructure
- ✓ Hit the right balance of risk to speed
- ✓ Meet seasonal capacity without CapEx
- ✓ Add new capabilities quickly

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Power Systems are optimized to deliver scale-out economics and security for the cloud

Speed and Agility

Twice the performance vs x86 for Java Linux workloads



Economic Advantages

Guaranteed 65% system utilization requiring less hardware, energy and cooling to scale out intelligently



Security

Encryption **built into** the foundation



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Simplified Virtualization and Cloud Management



- **PowerKVM – Open Virtualization Choice**
 - Kernel-Based Virtual Machine (KVM) Linux based virtualization for scale out POWER8 Linux Servers
- **PowerVM - Virtualization without Limits**
 - Improved virtualization administration experience including new performance monitoring views and simplified deployment
- **PowerVP - Virtualization Performance**
 - Improved memory and shared processor affinity information for performance optimization of enterprise servers
- **PowerVC – Virtualization Center**
 - Improved scalability and extended capability for faster integration with clients existing PowerVM infrastructure
- **IBM Cloud Manager for OpenStack**
 - Supports PowerVC shared storage pools and PowerKVM for rapid deployment of Open Stack management of cloud solutions

Power**KVM**

Power**VM**

Power**VP**

Power**VC**



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Power Systems delivers...

The Best Enterprise, Private cloud for UNIX/Linux

\$0.67 per hour*

The flexibility and cost of a public cloud in the
security and convenience of your data center



- ✓ Instant elastic capacity to accelerate deployment of new services and dynamically respond to business changes
- ✓ Leading IT efficiency and lower cost with pay as you go and pay for use
- ✓ Trusted security and resiliency that you count on for your most critical applications in your data center
- ✓ Streamlined operations with simple self service interface
- ✓ Flexibility to run the applications you want

"By using IBM System Director, VMControl and SmartCloud Entry, a single portal was introduced to monitor all our power systems, also virtual appliance management such as capture and deploy are totally automated, which saves us huge efforts."

Evergrowing Bank



IBM

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POWER8 delivers lower cloud infrastructure costs

Thirty-four 2-socket Power S822L servers do the job of 100 2-socket x86 (HP DL380) servers running equal virtualized capacity



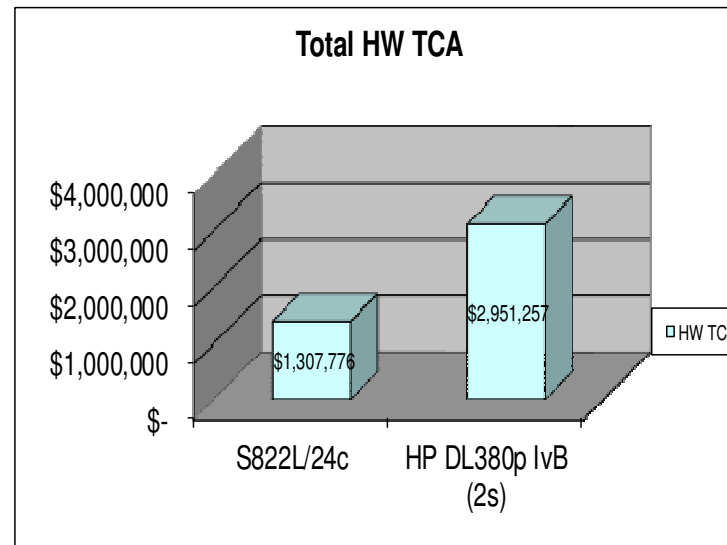
58% lower total HW TCA

66% Fewer Systems & Cores

vs.
Ivy Bridge w/ VMware

Lower SW License Fees
Reduced Management Costs
Reduced Floor Space

- Power S822L**
- TCA/TCO is for 34 servers, 816 cores
 - 3x better virtualized throughput vs. an HP 2 socket Ivy Bridge
 - 2S, 24 cores each
 - POWER8, 3.0GHz
 - PowerVM



- HP DL 380 G8**
- TCA/TCO is for 100 servers, 2400 cores
 - 100 HP servers needed for ~ equal virtualized throughput of 34 Power S822L
 - 2S, 24 cores each
 - Ivy Bridge, 2.7GHz
 - VMware vSphere Ent

Source: Capacity based on IBM Sizing of typical SPECint_rate landscape and 3rd party analysis of system utilization. Pricing from www.hp.com.

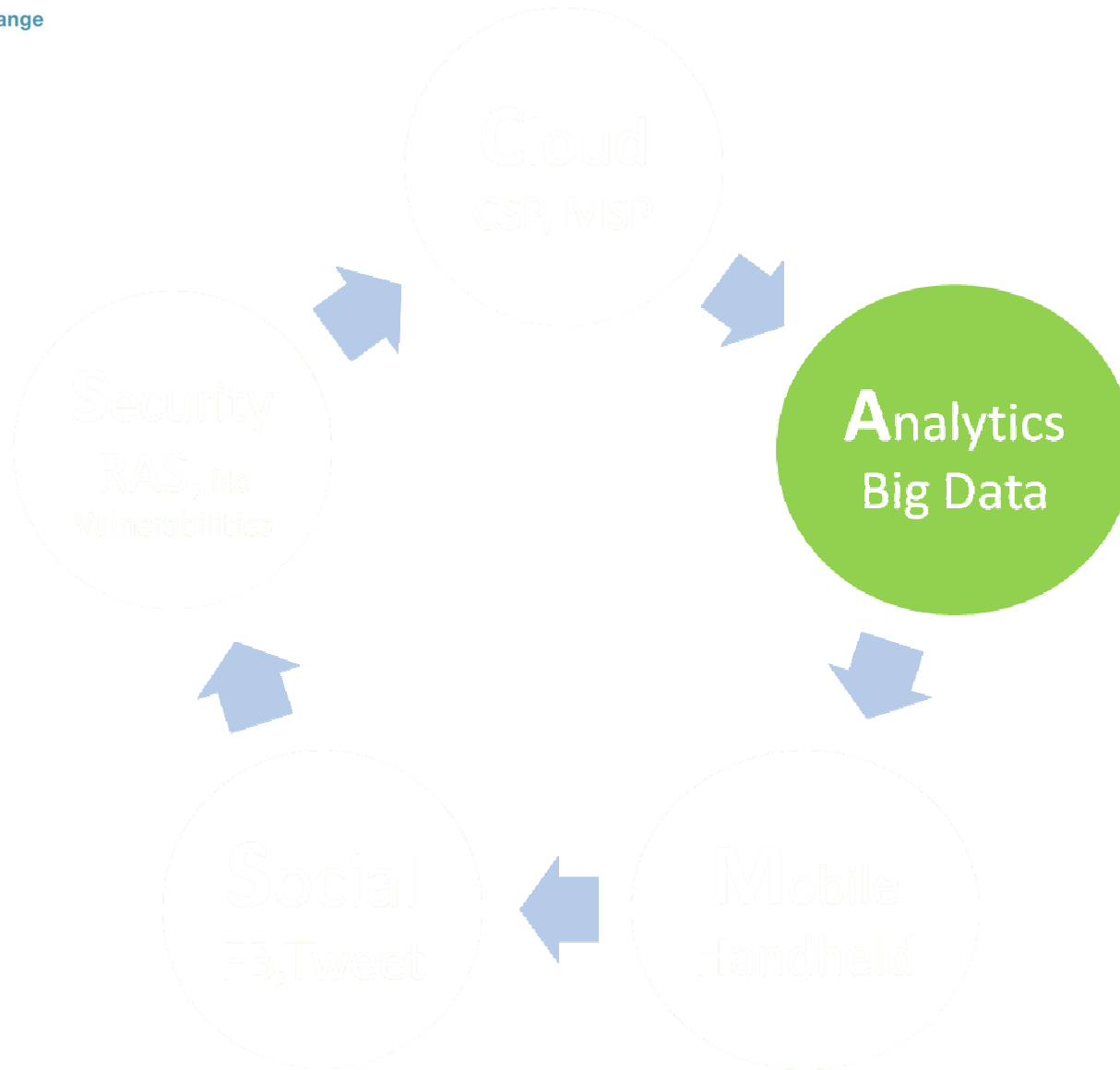
This is an IBM sizing designed to replicate a typical IBM customer workload used in the marketplace. The results are calculated and not an actual customer environment. IBM's internal workload studies are not benchmark applications, nor are they based on any benchmark standard. As such, customer applications, differences in the stack deployed, and other systems variations or 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.

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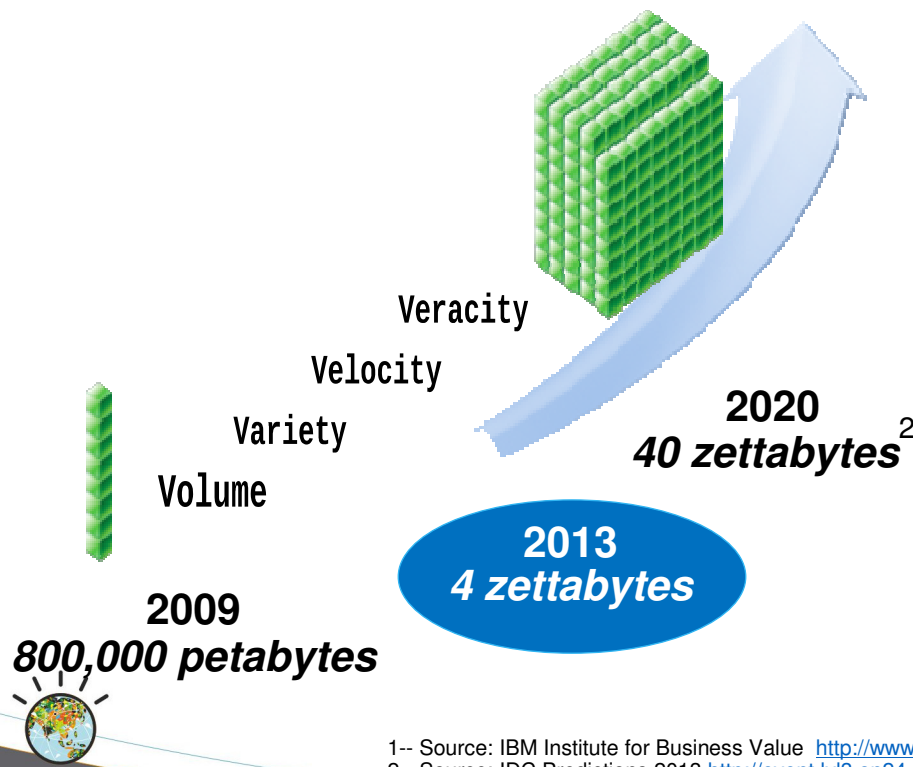
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Businesses are overwhelmed by the volume of data to analyze

50x

as much Data and Content Over Coming Decade



Lack of Insight¹

1 in 3 managers frequently make critical decisions without the information they need

Inefficient Access¹

1 in 2 don't have access to the information across their organization needed to do their jobs

Inability to Predict¹

3 in 4 business leaders say more predictive information would drive better decisions

Uncertainty of Trust¹

1 in 3 business leaders don't trust the information they use to make decisions

1-- Source: IBM Institute for Business Value <http://www.ibm.com/services/us/gbs/thoughtleadership/>








2-- Source: IDC Predictions 2013 <http://event.lvl3.on24.com/event/54/34/13/rt/1/documents/slidepdf/wc20130108.pdf>

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There are Two Main Types of Big Data

Text Documents 	Blogs 	Web Logs 	Mfg. Equipment 
Email 	Weather Data 	Social Media 	Stock Trades 
Mfg. Equipment 	Utility Meters 	Medical Equip. 	Call Data Records 
Point of Sale Data 	Video Cameras 	Audio Devices 	Oil Rigs 

Data at rest

Data is stored on disk
Huge volumes of unstructured data
No pre-defined schemas
Too large for traditional tools to process in a timely manner

Structured and Un-Structured Data

Data in motion

Data is typically not stored
Tremendous velocity
Multiple data sources
Huge volumes of unstructured data
Ultra low latency required



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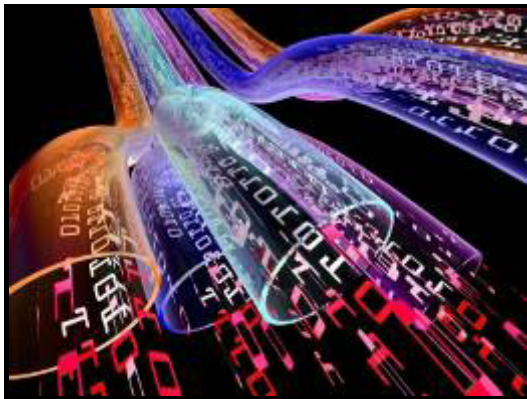
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Infrastructure delivers Big data & Analytics with speed and conviction

Access Matters

Gain new levels of visibility into
customers and operations



Speed Matters

Accelerate insights in real-
time at the point of impact



Availability Matters

Deliver insights to people
and processes when needed



- Scalability (-in, -out, -up)
- Virtualization and resource management
- Optimized data storage
- Data tiering and compression
- Parallel processing

- Parallel processing
- Low-latency resources, such as flash memory
- Scalability (-in, -out, -up)
- Analytics closer to data
- Hybrid in-memory analytics

- Low latency resources
- Scalability (-in, -out, -up)
- Self-healing capabilities
- Continuous resource management and access
- Multisite clustering solutions

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Designed for Big Data: optimized Big Data & Analytics performance

Delivering insights 50x faster

4X

threads per core vs. x86

Processors

flexible, fast execution of analytics algorithms

4X

memory bandwidth vs. x86

Memory

large, fast workspace to maximize business insight

2.4X

more I/O bandwidth than POWER7

Data Bandwidth

bring massive amounts of information to compute resources in real-time

Optimized for a broad range of data and analytics:



Cognos
SPSS

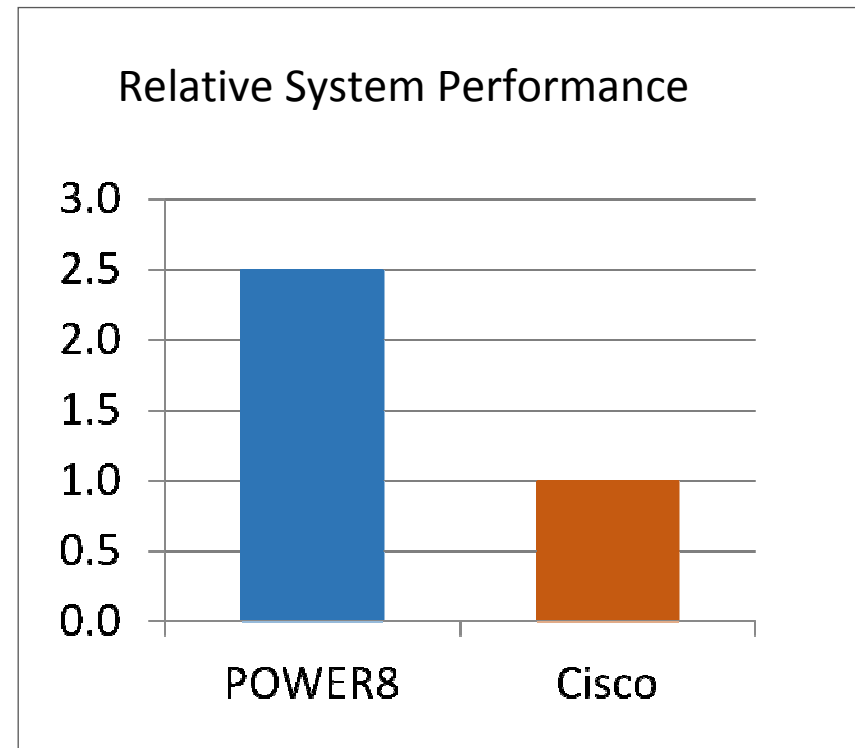


Industry Solutions



POWER8 Delivers 2.5x Performance on Hadoop

- POWER8 S822L will deliver over 2.5x the performance of the best published x86 system
- POWER8 exploits cores, threads, larger caches, and more memory bandwidth
- TeraSort is a Hadoop performance benchmark
 - Sorts a 10 TB dataset in parallel
 - Exercises the Map-reduced framework and Hadoop File System

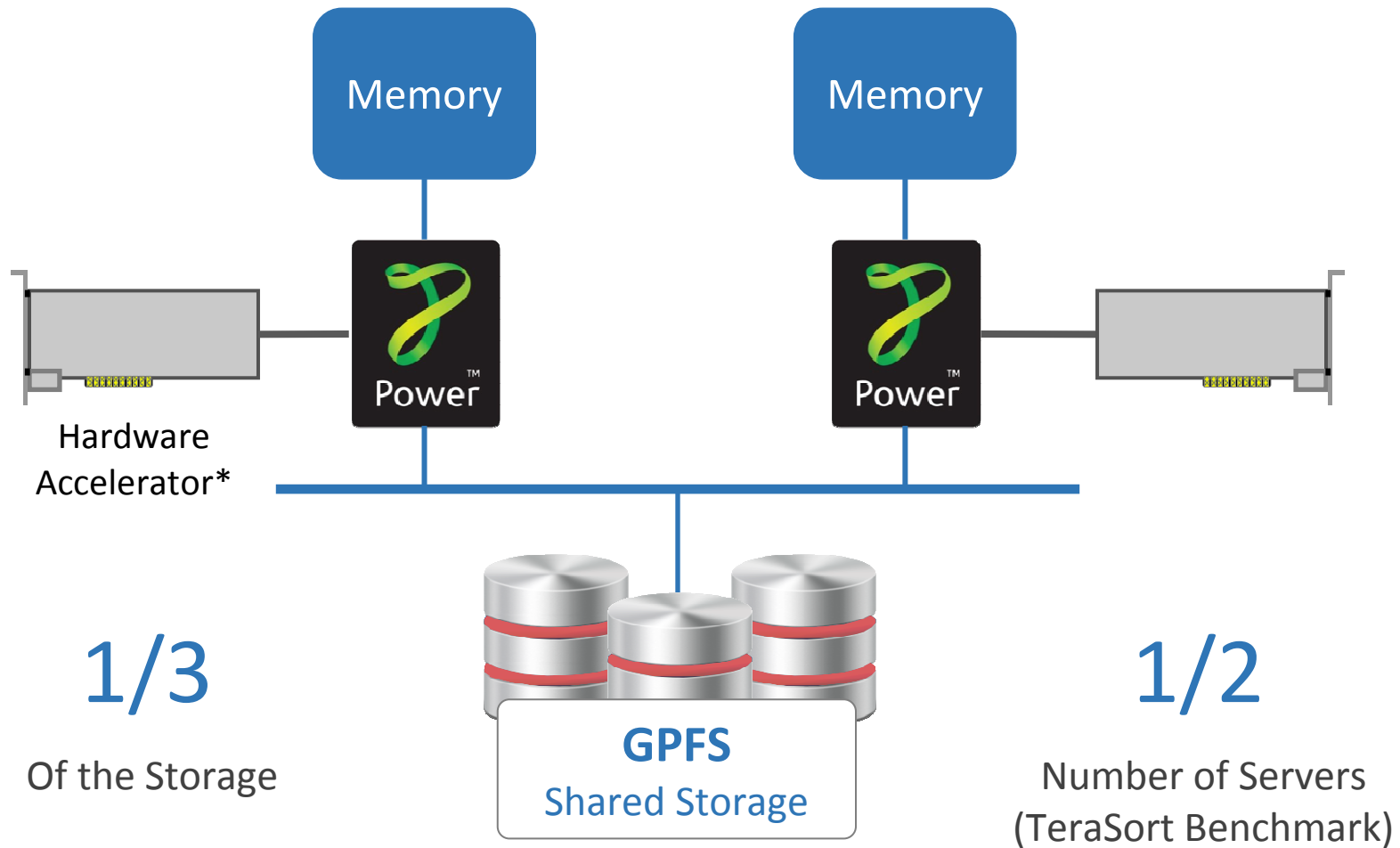


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POWER8 Alternative Hadoop Architecture



* Capability not yet available

IBM



Australian Open Tennis

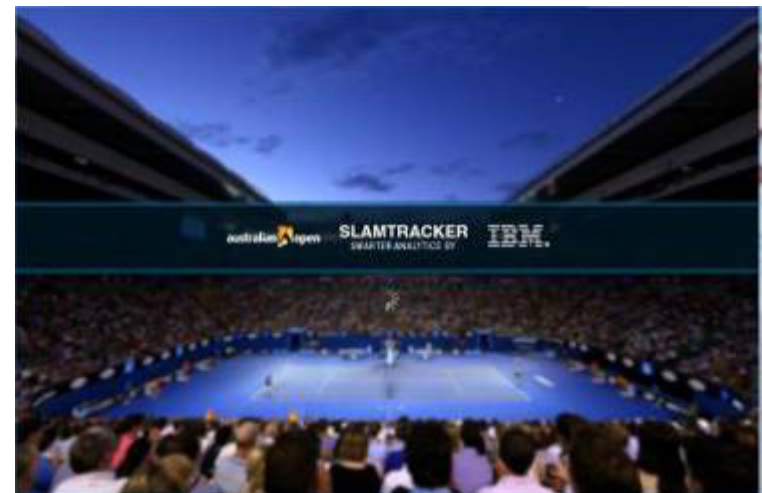
Analytics in action (Social Media)

- Predict, allocate and monitor capacity in the Cloud
 - Analyzing tournament, player and social data
 - Allocating and deallocating appropriate resources
 - Allocating capacity only when needed to save \$\$\$
- Built on:
 - IBM Power Servers
 - IBM InfoSphere BigInsights on top of Apache Hadoop (data at rest)
 - IBM InfoSphere Steams (data in motion)
 - RedHat and SUSE Enterprise Linux
 - KVM

Power's Logical Partitioning (LPAR) divides a server's resources into virtual "logical" partitions, and we continually take advantage of the LPAR mobility aspect of Power Systems. Power allows us to migrate live workloads from one physical frame to another without any impact. If we have a failure on one of our machines, we can do what we call "frame evacuation," and move all the running servers including the databases to another machine, then make a repair, and move them back. You can do this on the fly in the middle of the day, in the middle of a peak match, without any impact to the business and, for us, that is critical. US OPEN (Kunal Singh Sodhi)

[2014 Australian Open Jan 13 through 26](http://www.ausopen.com/index.html)

<http://www.ausopen.com/index.html>



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IBM Slam Tracker

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australian open
MEN'S SINGLES - RLA - SEMIFINALS
R.Nadal defeated R.Federer 7⁷-6⁴ 6-3 6-3
SLAMTRACKER
SMARTER ANALYTICS BY IBM.



84%
CHALLENGES

MPH	KM/H
R.NADAL [1] ✓ 7 ⁷ 6 6	
MATCH COMPLETED	
POINTS	1 2 3 4 5
R.FEDERER [6] 6 ⁴ 3 3	
MATCH DURATION	
59 47 37	
TOTAL POINTS WON	
105	86



87%
CHALLENGES

FOLLOW
MATCH
1
2
3
4
5
ANALYZE
ALL COURTS

NADAL'S KEYS TO THE MATCH

- RETURN POINTS
- MEDIUM RALLIES
- WINNERS

FEDERER'S KEYS TO THE MATCH

- MEDIUM RALLIES
- ACES
- POINTS WON

0-0 R.Federer loses the match with a forehand unforced error.

AD-40 R.Nadal wins the point with a forehand winner.

40-40 R.Nadal loses the point with a backhand forced error.

AD-40 R.Federer loses the point with a forehand forced error.

40-40 R.Nadal wins the point with a forehand winner.

30-40 R.Nadal wins the point with a backhand

ACES	1ST SERVE %	DOUBLE FAULTS	WIN % ON 1ST SERVE	WIN % ON 2ND SERVE
3 8	65% 56/86	66% 69/105	73% 41/56	65% 45/69
WINNERS	UNFORCED ERRORS	RECEIVING POINTS WON	BREAK PT. CONVERSIONS	NET APPROACHES
28 34	25 50	40% 42/105	27% 23/86	29% 4/14
		50% 1/2	30% 3/10	55% 23/42



RADIO



and the world #1 will decide

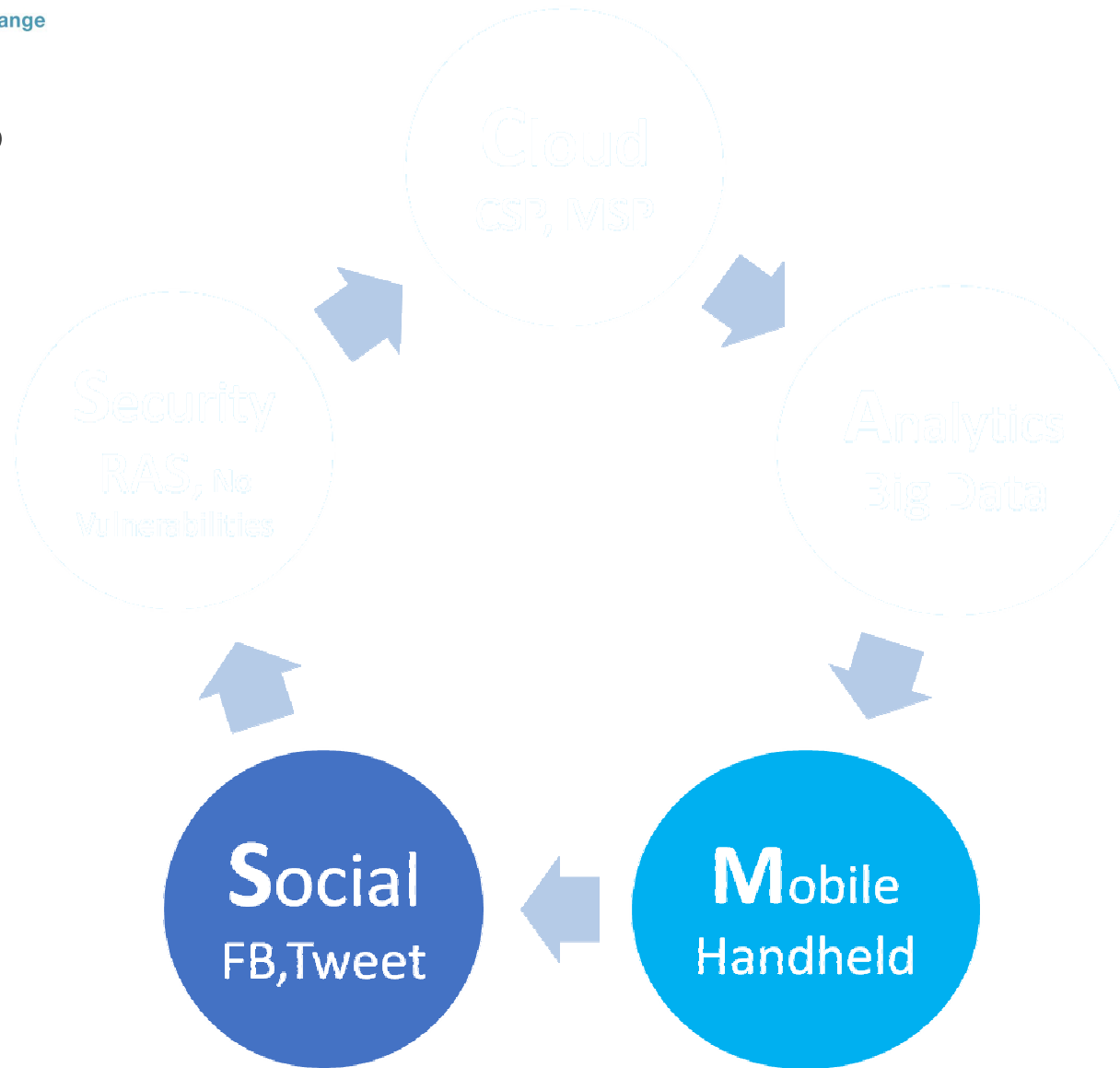
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Compete in
the Era of
SMART.

CAMSS

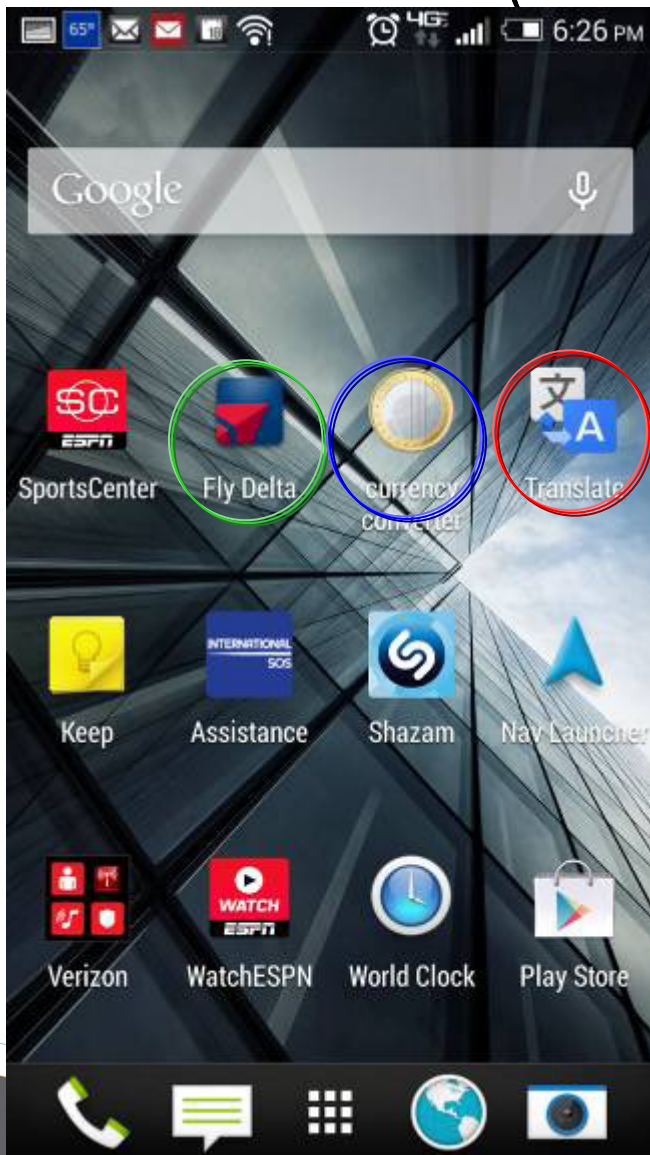


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A Typical Cell (Mobile)

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Key Apps

- Minimal Update
- Daily Update
- On Demand Update

What Apps are
Missing
-Banking
-Finance

Why
-90 out of 100 Top
paid Apps have been
hacked

What is Needed
-Mobile backed by
POWER & Worklight

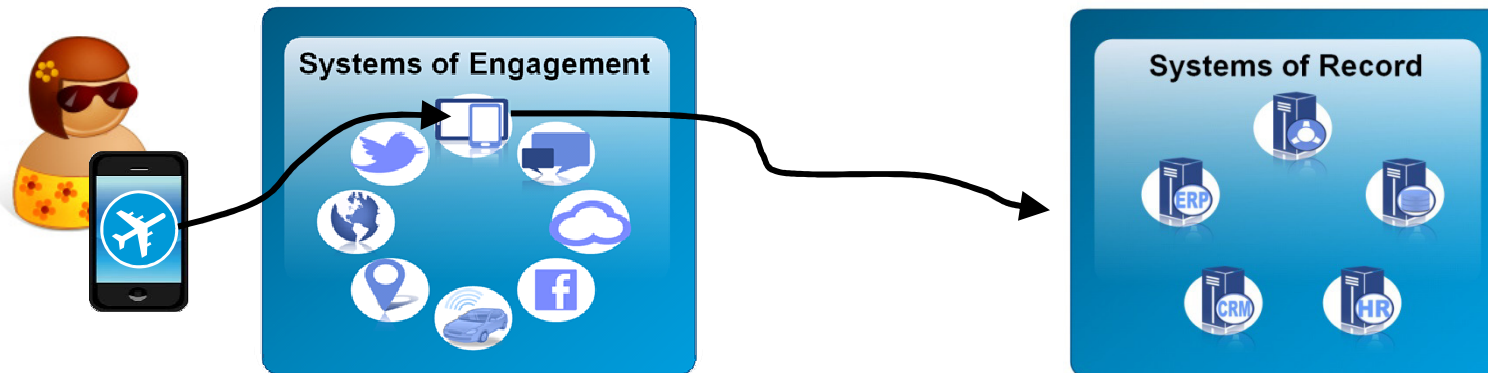
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Systems of Engagement need to be “plugged in” to Systems of Record to deliver real value...

Example: Customer uses Mobile app to interact with Airline



- ✓ Can see my ticket
- ✓ Can find my seat
- ✓ Can see upgrade option
- ✓ Can check flight status
- ✓ Can see in-flight meal

- ✓ Can change my ticket
- ✓ Can move my seat
- ✓ Can buy upgrade
- ✓ Can change flight
- ✓ Can buy my choice of food



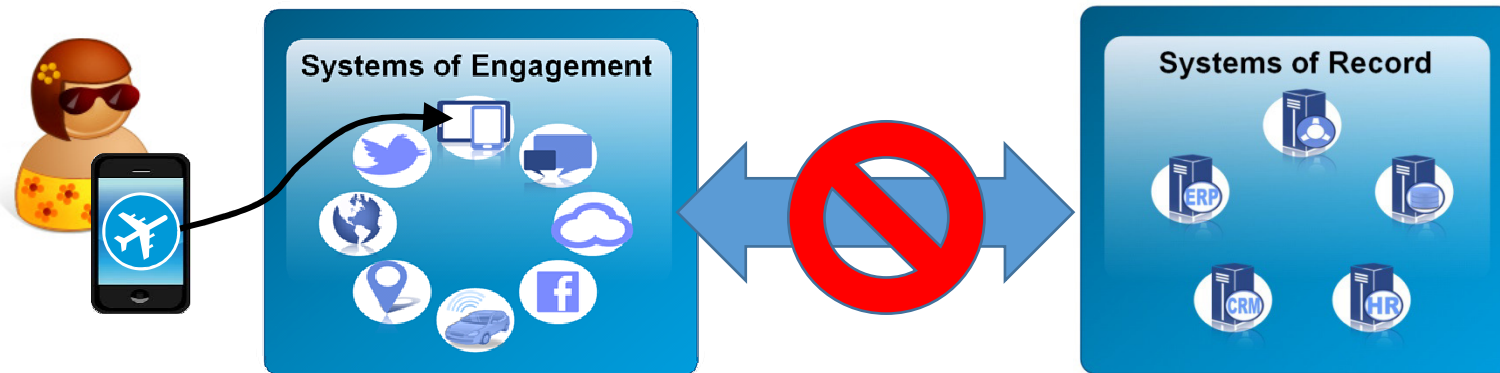
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Loss of that connectivity results in loss of value to the mobile user

Example: Customer uses Mobile app to interact with Airline



- ✓ Can see my ticket
- ✓ Can find my seat
- ✓ Can see upgrade option
- ✓ Can check flight status
- ✓ Can see in-flight meal

- ✗ Can't change my ticket
- ✗ Can't move my seat
- ✗ Can't buy upgrade
- ✗ Can't change flight
- ✗ Can't buy my choice of food



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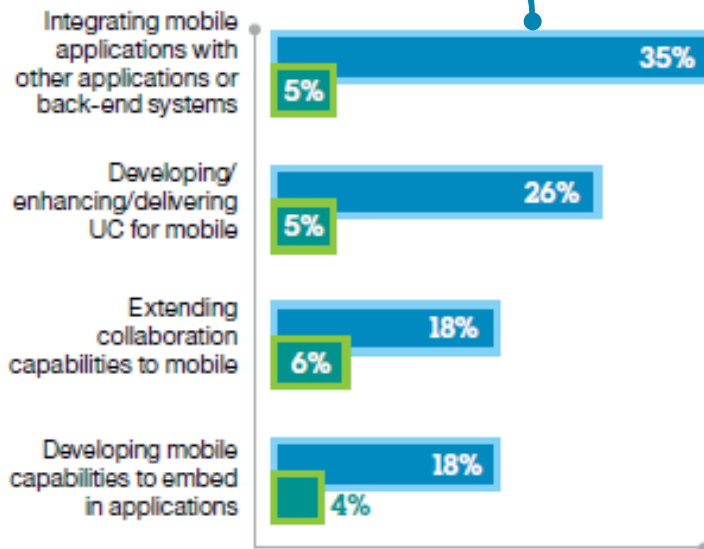
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3 Key Practices of Successful Mobile Organizations

1 Integration

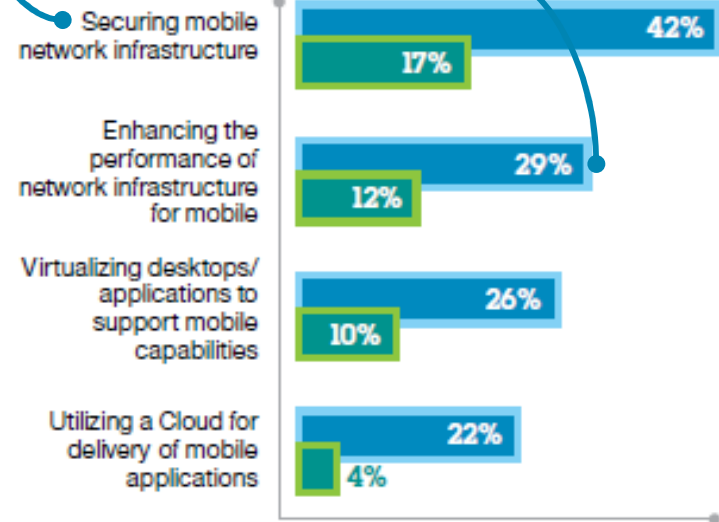
Mobile infrastructure integration initiatives



Mobile Technology Leaders All others

2 Security

Mobile infrastructure optimization initiatives



Mobile Technology Leaders All others



Source: IBM Global IT Study on Mobile Infrastructure 2013

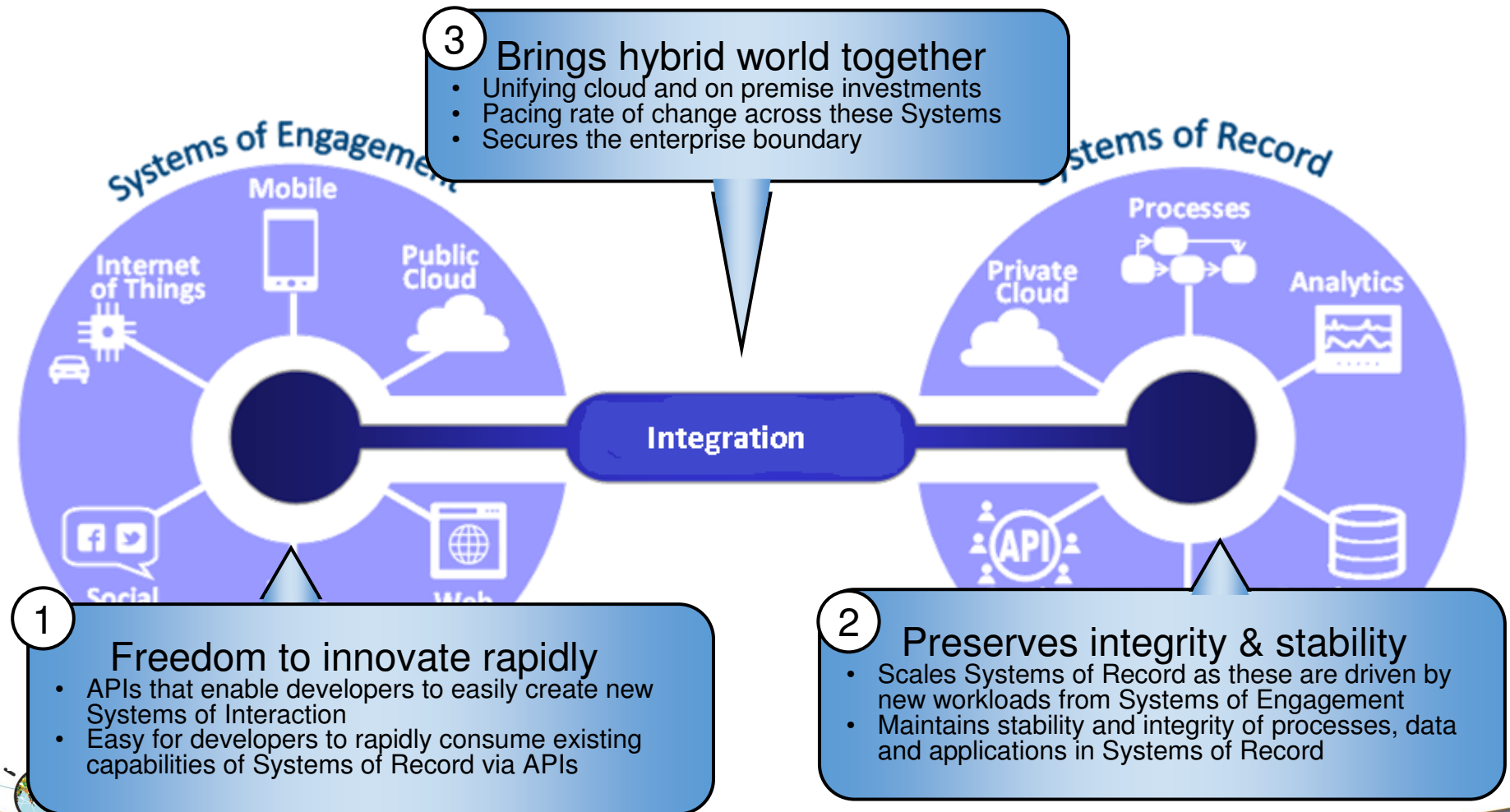
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IBM can deliver on all three client goals



Why Are Power's DNA Values Important To Mobile?

Security

- Mobile devices provide yet another access point into an enterprises network
- Enterprises need to support BYOD
- A trusted compute platform required to support this new word of "Systems of Interaction"

Reliability Availability Serviceability

- Like retail web sites – mobile applications are expected to be "always on" - transferring that same dependency to the Systems of Interaction that drive them.

Virtualization Scale – Up Scale - Out

- Power's ability to dynamically shift CPU / RAM resources in response to sudden shifts in workload are key for the Mobile environment where a single tweet or other social event can trigger sudden shifts in the number of Mobile device transactions.
- As the demand for more mobile device enablement services continues to increase – enterprise must be positioned to grow their compute platforms

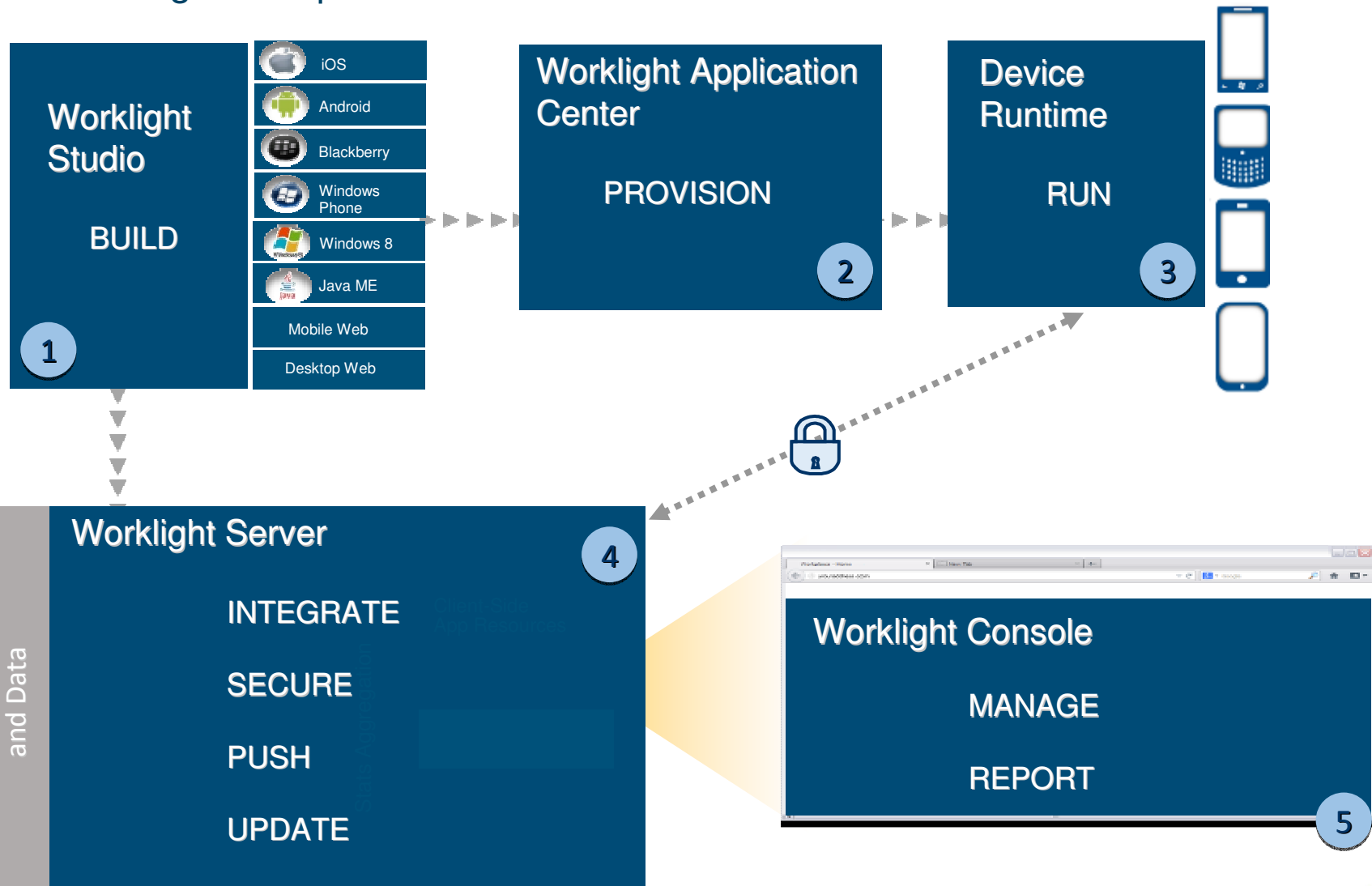


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IBM Worklight Components



* Runs on Power Systems (AIX, Linux) and integrates with AIX, IBM i & Linux data and applications

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The average data breach in the US costs more than **\$11M**

Source: Ponemon Institute 2013 Cost of Cyber-Crime study

A typical security attack goes unnoticed for nearly **8 months**

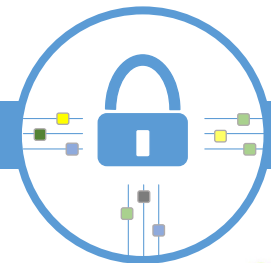
Source: <https://www.mandiant.com/news/release/mandiant-releases-annual-threat-report-on-advanced-targeted-attacks1/>

42% of security breaches are caused by configuration errors Source: IBM

Security Services Cyber Security Intelligence Index, 7/2013

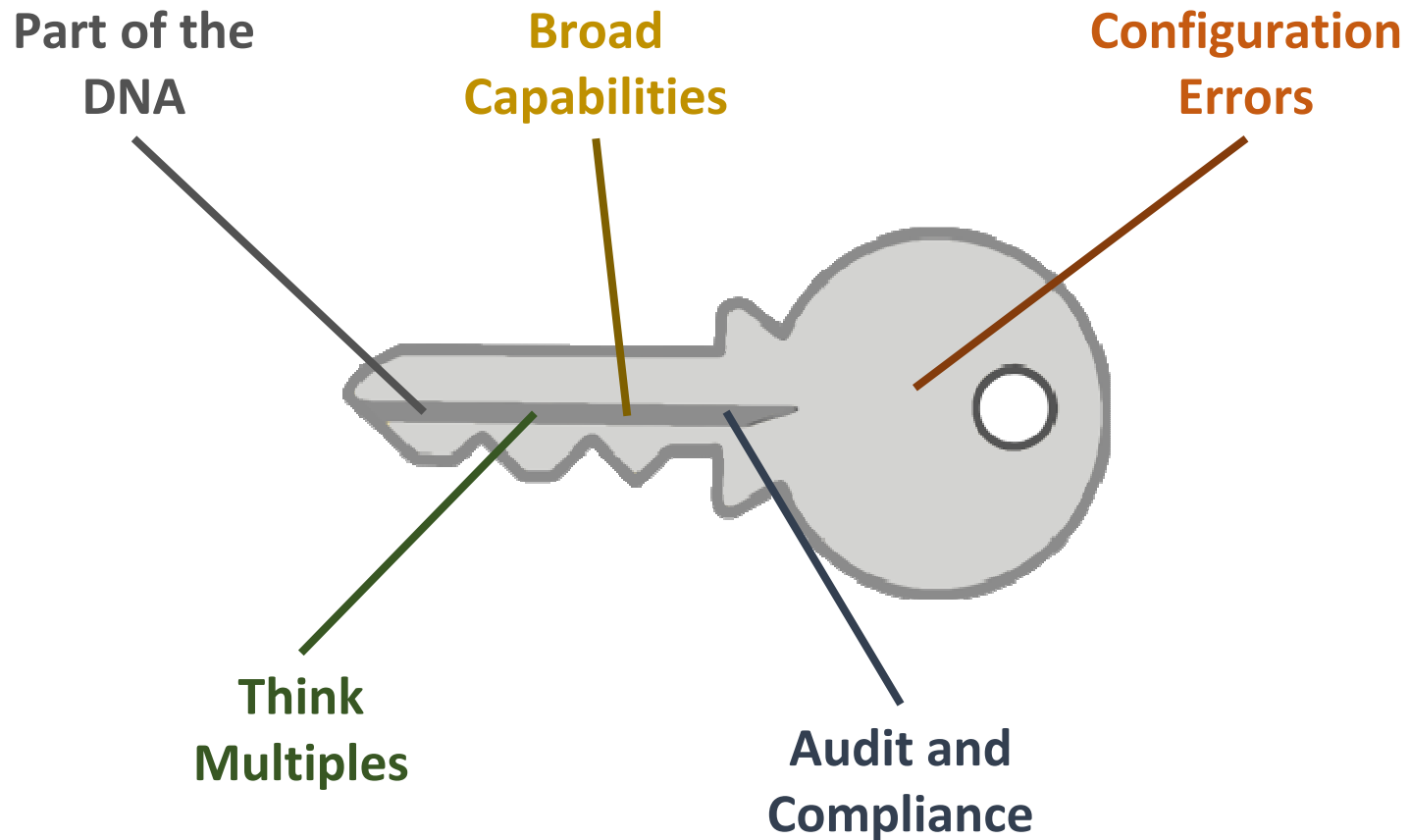
Mobile phone based malware grew by **2,577%** in 2012

Source: <http://www.imsi.com/us/news/bizarre-facts-information-security/>

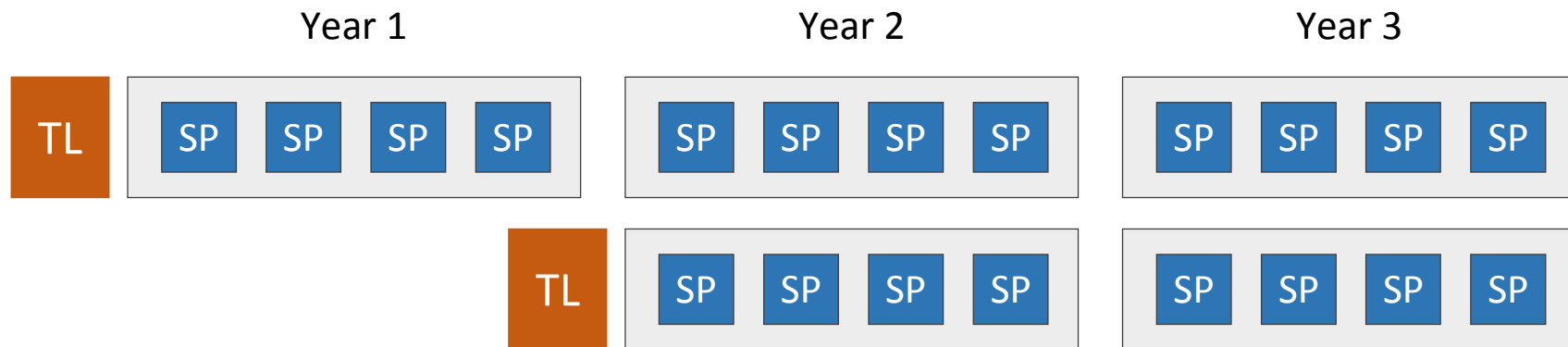


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Five Keys to Improving Security



AIX Service Strategy



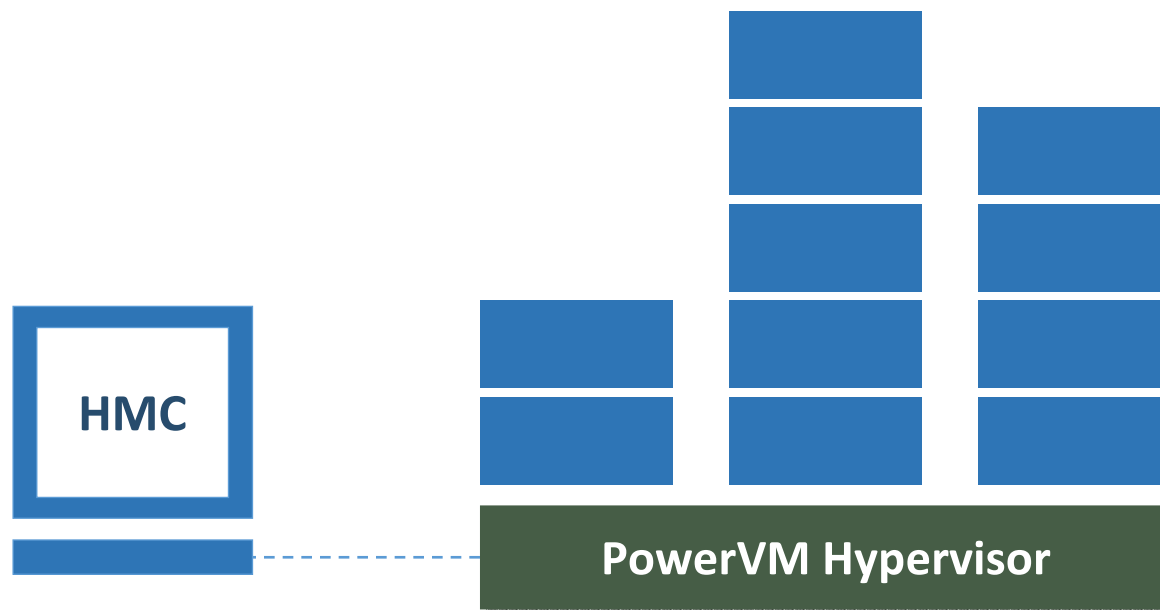
Technology Level - New features, new device support, cumulative fixes

Service Pack - New device support, cumulative fixes

- Common to patch only 1-2 times per year
- Lowers cost, risk, and outages



Security is Part of the DNA of PowerVM

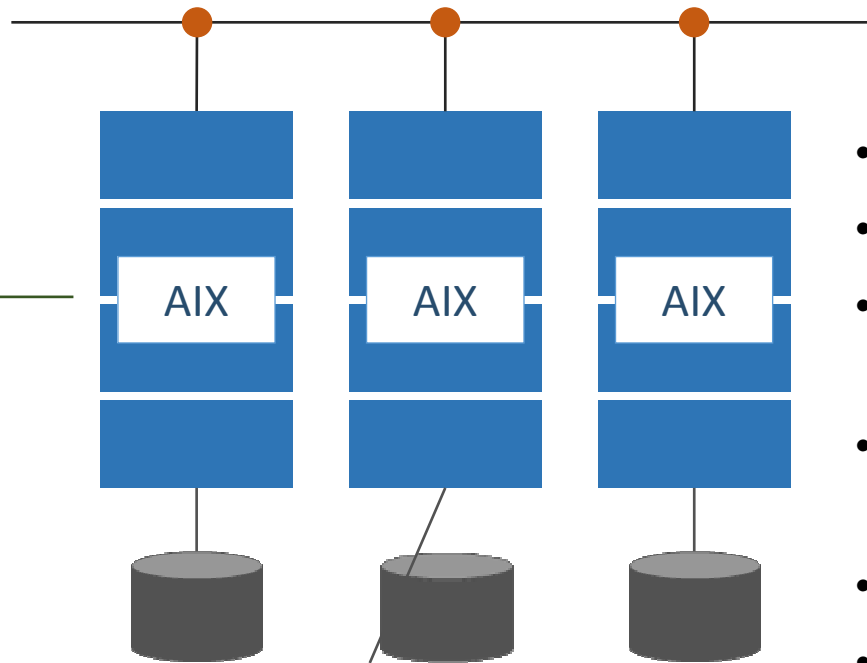
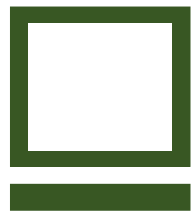


- Independent HMC users
- Digitally signed Hypervisor
- No device drivers or user logins in Hypervisor
- Hardware enforced isolation
- **ZERO** PowerVM reported vulnerabilities or exposures



AIX Security Examples

- IP filters
- Secure FTP
- Open SSH
- VPN support



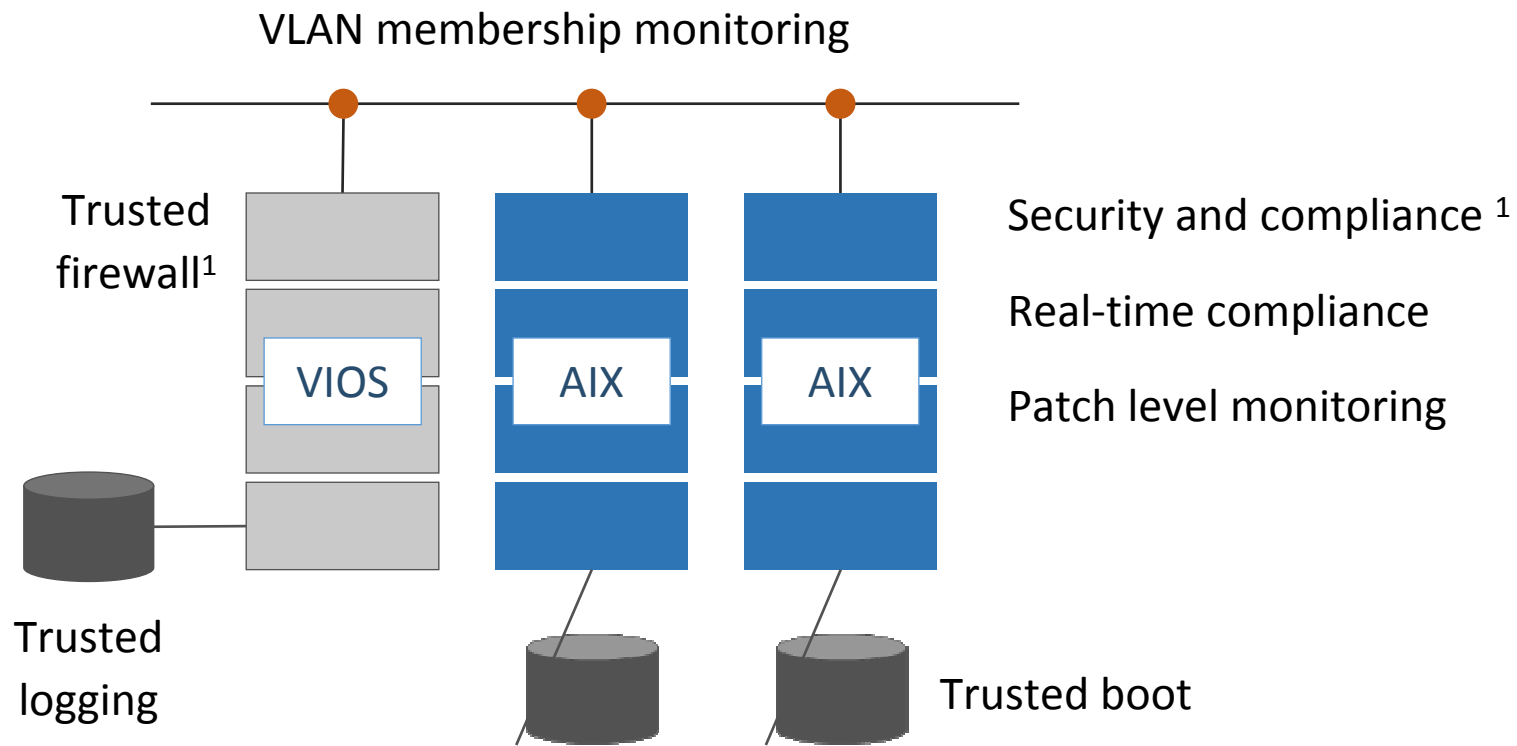
- Role based access controls
- Access control lists
- Multi Level Security

- AIX Security Expert
- Centralized settings
- File permission manager
- POWER8 on-chip Encryption
- Trusted execution
- Auditing

- Encrypted file system



Power Security and Compliance (PowerSC)

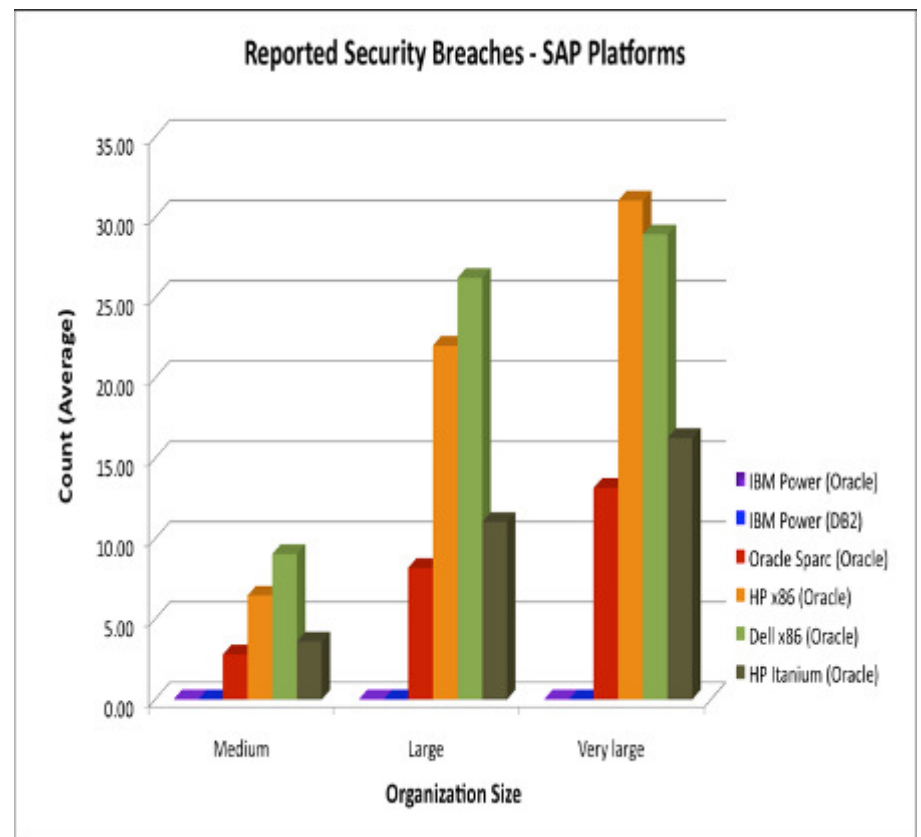


1. Also available for Linux

Security of critical workload (SAP) deployments on Power is beyond reproach

0 reported security breaches with SAP and IBM DB2 or Oracle DB on Power

- SAP on Power versus competitive SAP deployments study with over 54,150 clients analyzed
- The security for ERP systems, including SAP, can be very challenging – by nature, the mixture of application modules, user profiles, plug-in components and so on, provide many avenues for security breaches



Source: Business Impacts on SAP Deployments; Solitaire Interglobal Ltd (All rights reserved); January 2013.

Server virtualization security is critical for DB workloads since many are run in virtual environments

0 reported security breaches on the PowerVM hypervisor

- The PowerVM hypervisor has never had a reported security vulnerability and provides the bullet-proof security that customers demand for mission-critical workloads
- The VIOS, which is part of the overall virtualization has had 0 reported security vulnerabilities
- **Dare to compare – search any security tracking DB and compare Power against x86**

Search term or Hypervisor (unfiltered)	NIST NVD Results	Processor Architecture
VMware	640	x86
Xen	153	x86
VMware ESX	95	x86
KVM	58	x86
VMware vSphere	48	x86
Windows Server 2012	43	x86
Oracle VM	24	x86
Hyper-V	3	x86
PowerVM	0	POWER

Source: National Vulnerability Database, <http://nvc.nist.gov/home.cfm>, July 2013.

NVD is the U.S. government repository of standards based vulnerability management data. This data enables automation of vulnerability management, security measurement, and compliance. NVD includes databases of security checklists, security related software flaws, misconfigurations, product names, and impact metrics. NVD is a product of the NIST Computer Security Division, Information Technology Laboratory and is sponsored by the Department of Homeland Security's National Cyber Security Division.

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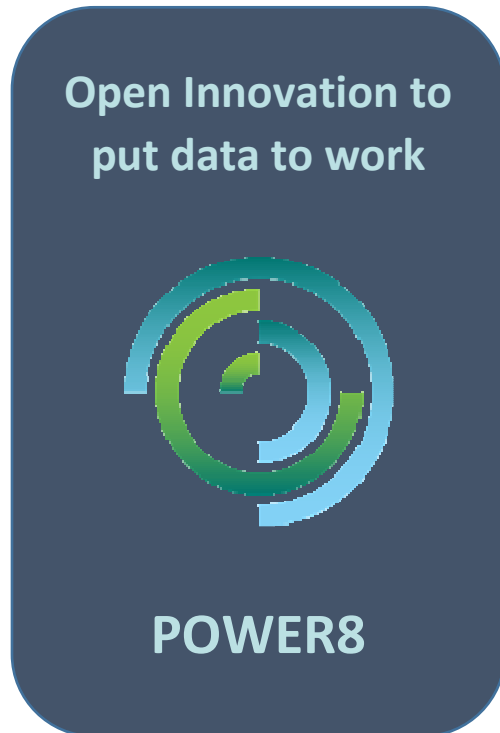
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Power to the New CAMSS workload



Summary



Optimized for Key Workloads

Superior Cloud Economics

Open Ecosystem



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Thank You



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IBM System & Technology Group
India South Asia

...any Question ?



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