System z – Enterprise Computing: The Present and the Future

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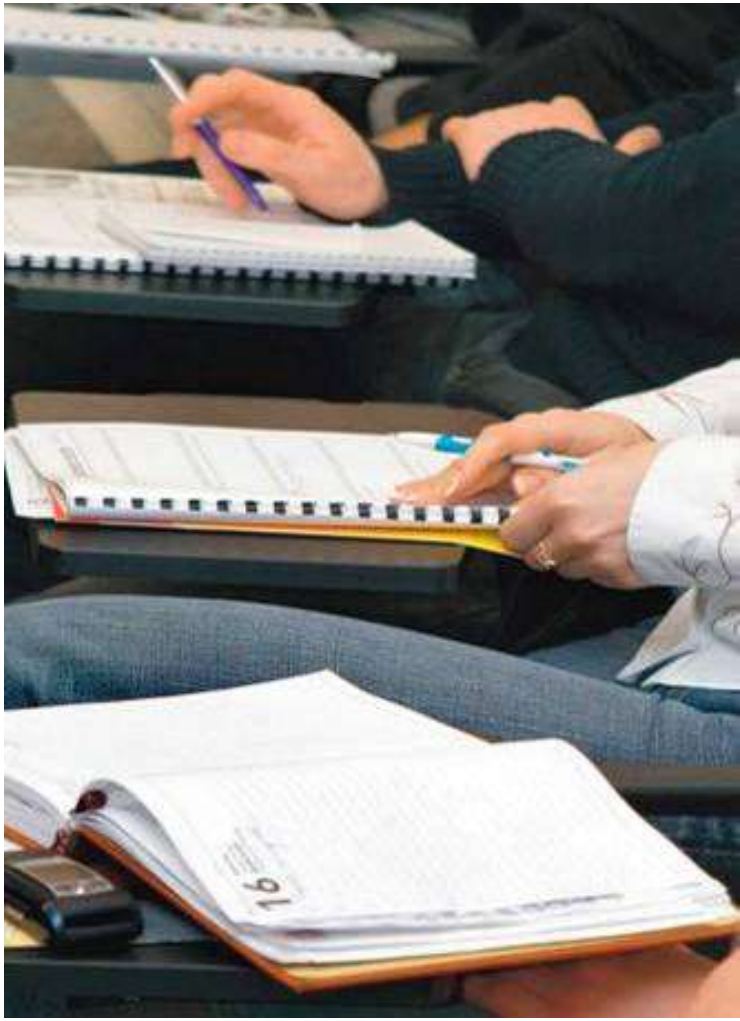
Agenda

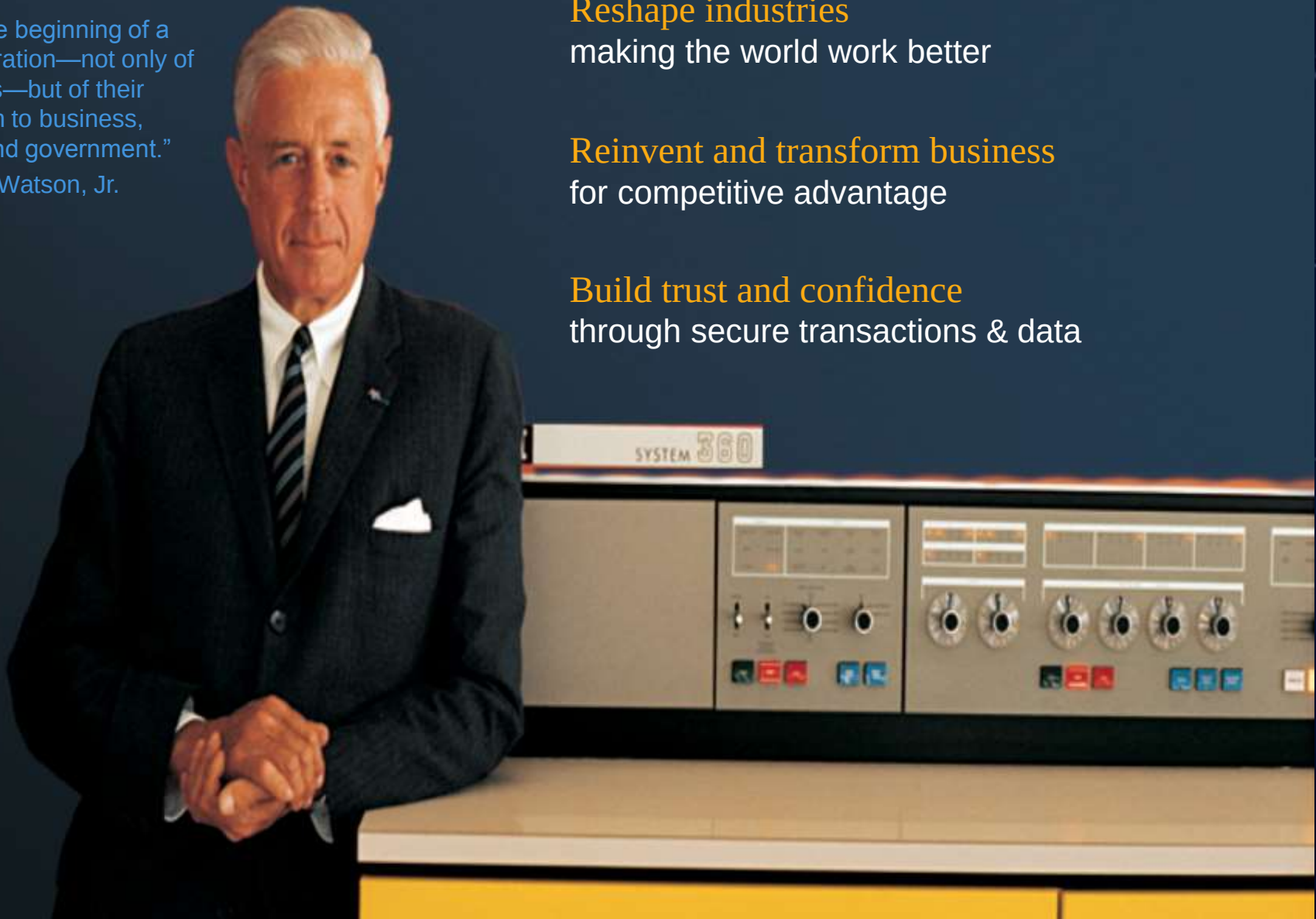
- System z Vitality
- The World is Changing
- Overall System z Strategy
- IBM zEnterprise® - Today & Tomorrow
- Linux on System z
- Cloud
- Analytics
- Mobile/Social
- Security
- Future Futures
- Discussion



The $5 billion bet

($40 billion in today's buying power)

"This is the beginning of a new generation—not only of computers—but of their application to business, science and government."
–Thomas Watson, Jr.



Reshape industries
making the world work better

Reinvent and transform business
for competitive advantage

Build trust and confidence
through secure transactions & data

50 years of Progress

IBM

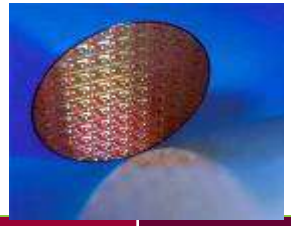
IBM System/360™

PR/SM Virtualization

CICS, DB2, & IMS

Parallel Sysplex

Bipolar to CMOS

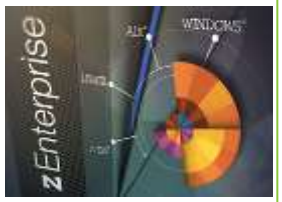


Capacity on Demand

Linux

Java

Hybrid with zBX

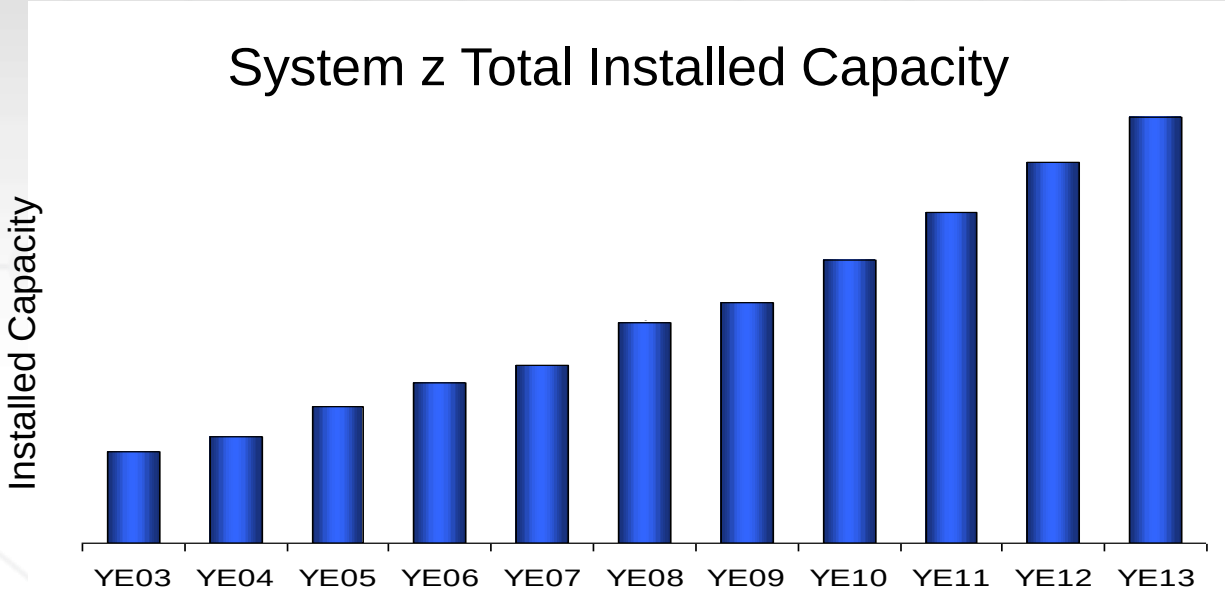


IDAA

IBM zEnterprise EC12 & zBC12

Constant evolution driven through ***co-creation*** *with our clients*

IBM zEnterprise System:
New clients, new workloads, new applications



260+

new accounts since 3Q10 zEnterprise launch, with 40% in growth markets

320+

hybrid computing units shipped since 3Q10

31%

growth in installed IFL MIPS

7,500+

ISV apps run on IBM System z; 90 new ISVs added in 3Q13

[IFL = Linux-on-z Only Engine]
As of 4Q13

System z Academic Initiative: Cultivating the Tech Rock Stars of the Future

68,000+

MTM Students

1000+

A. I. Schools

67+

A. I. Countries

45%

A.I. Growth

The Mainframe is everywhere, making the world work better

Mainframes process

30 billion business transactions per day

Mainframes enable

$6 trillion in card payments annually

80 percent of the world's corporate data originates on mainframes.

91 percent of CIOs said new customer-facing apps are accessing the mainframe

Key trends across the global economy that impact spending on Information Technology

- Uncertain macroeconomic indicators in developed economies
- Unstable long-term economic conditions
- Developing economies now contribute more to world economic growth than developed ones
- Success of China's economy becoming more crucial
- Globalization changes the dynamics of commerce
- Four big trends (cloud, social, mobile, analytics)
- Unrelenting march of commoditization
- Demographic shifts continue as people live longer
- Risks are everywhere, resulting in unpredictability
- Long-term risk management requires continued deployment of advanced security technologies

The world is constantly changing …

Customer expectations have never been higher

They are better informed

They operate in a network of peers

They interact through a multitude of devices

They demand personalized service and offerings

Forward thinking businesses are building competitive advantage through a better customer experience

zEnterprise: Empowering Business Innovation in an era of Digital Transformation

The ultimate **Analytics** engine for instant insight.

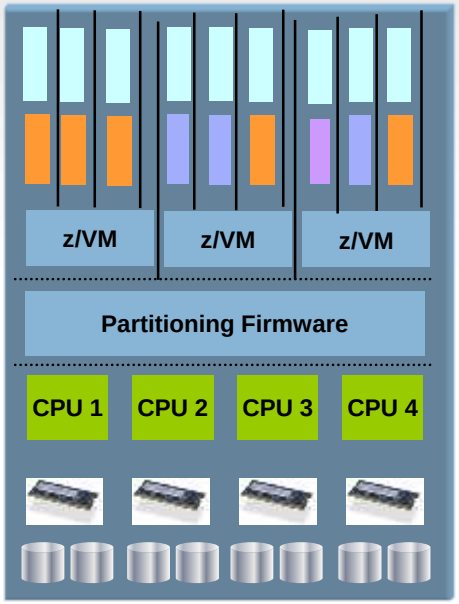
Superior service at lower cost through **Cloud.**

The foundation for a **Mobile** and **Social** enterprise.

A robust and **Trusted** infrastructure.

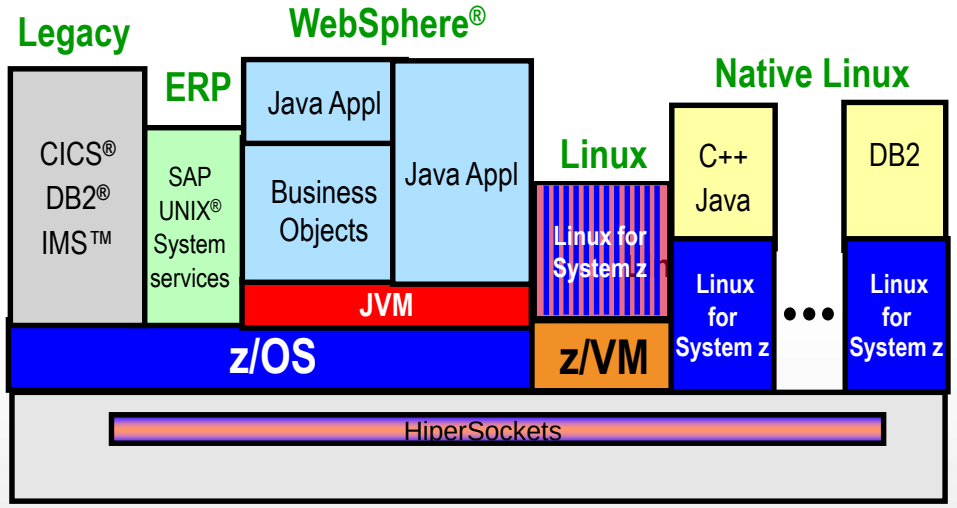
The Ultimate Virtualized System

IBM Mainframe



- **Utilization often > 80%**
- Handles **peak workload utilization of up to 100%** without service degradation for high priority workloads

- Massive, robust consolidation platform
- 60 logical partitions, 100's to 1000's of virtual servers under z/VM
- Virtualization is built in, not added on (Processor and I/O)
- HiperSockets for memory-speed communication, as well as Virtual Hipersockets via Guest LANs in z/VM
- Most efficient hypervisor function available
- Sysplex (Single System Image Clustering)
- Intelligent and autonomic management of diverse workloads and system resources based on business policies and workload performance objectives:



System z Technical Strategic Priorities

Data Server of Choice for Transactions & Analytics

Business Analytics

- Integrated Stack
- Workload-optimized
- OLTP -> HyTAP
- Generate business insights with Big Data style queries

Data-Serving

- Deliver more data … faster
- Support new/popular data formats & Enhance cross platform data access

Stack Performance

- Get workload done faster
- Scale capacity with workload
- Co-optimize hardware & software

Most Secure & Reliable

Security

- Auditable protection of data
- Simplify management & compliance
- Security Analytics
- Cloud security as a service

System Availability

- IT analytics for monitoring & resiliency of the datacenter

Sysplex Availabiity

- Enhanced GDPS
- Active-active solutions
- Asynchronous data replication
- Simplification and autonomics

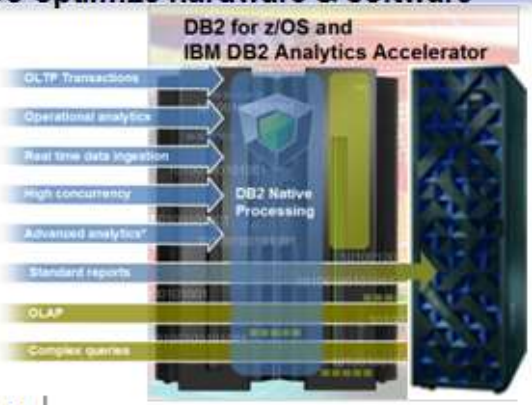
Enterprise Cloud Leadership

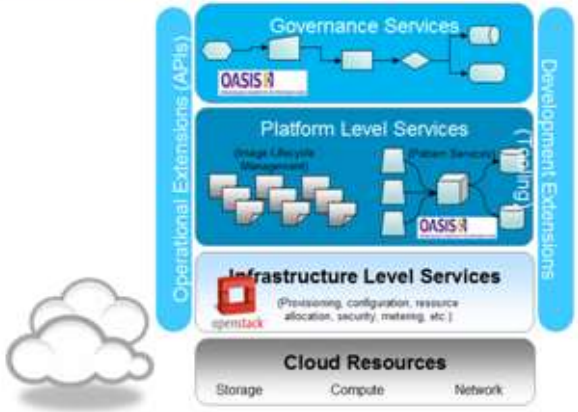
Enterprise Cloud

- Enable cloud-based delivery
- Dynamic shared infrastructure
- Common Cloud Stack
- Isolation for multi-tenancy
- SW defined environment leveraging virtualization
- Streamline deployment/delivery (DevOps, Patterns)
- Develop partnerships with MSP's

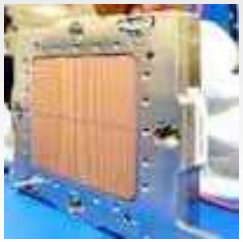
Heterogeneous & Mobile Workloads

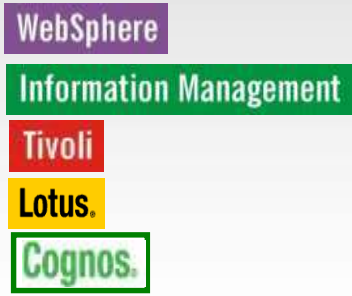
- Linux consolidation
- Integrate mobile workloads
- Industry Solutions
- Extend platform management
- Cross-platform integration





Leveraging the Breadth of IBM Technology





Semiconductor Technology → Microprocessor Design → Systems Design → Virtualization & Operating Systems → Compilers & Java Virtual Machine → Optimized Middleware

IBM Investment in System z spans the platform stack

zEnterprise: Empowering Business Innovation in an era of Digital Transformation

The ultimate **Analytics** engine for instant insight.

Superior service at lower cost through **Cloud.**

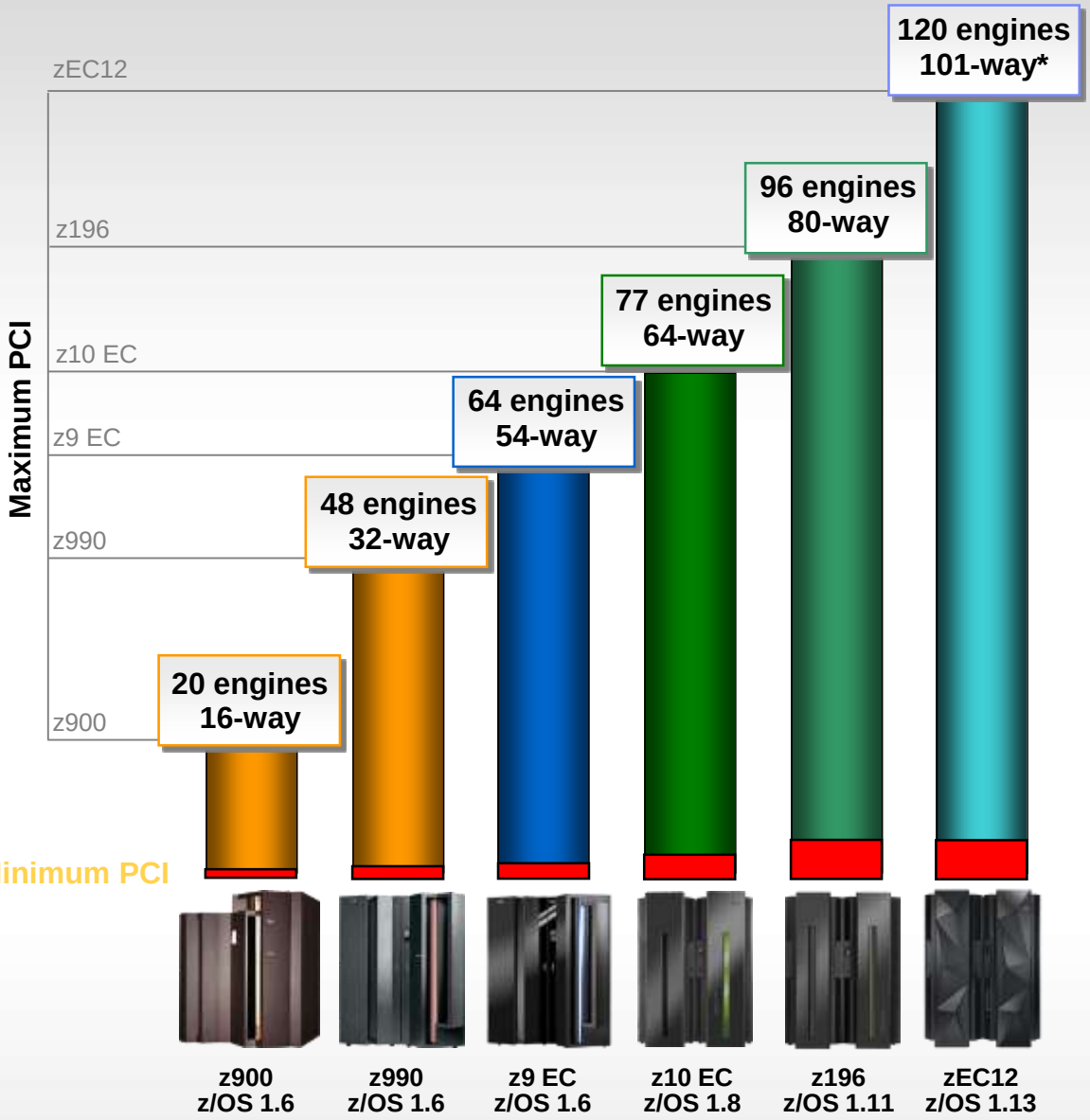
The foundation for a **Mobile** and **Social** enterprise.

A robust and **Trusted** infrastructure.

System z Servers Continue to Scale with zEC12

Each new range continues to deliver:

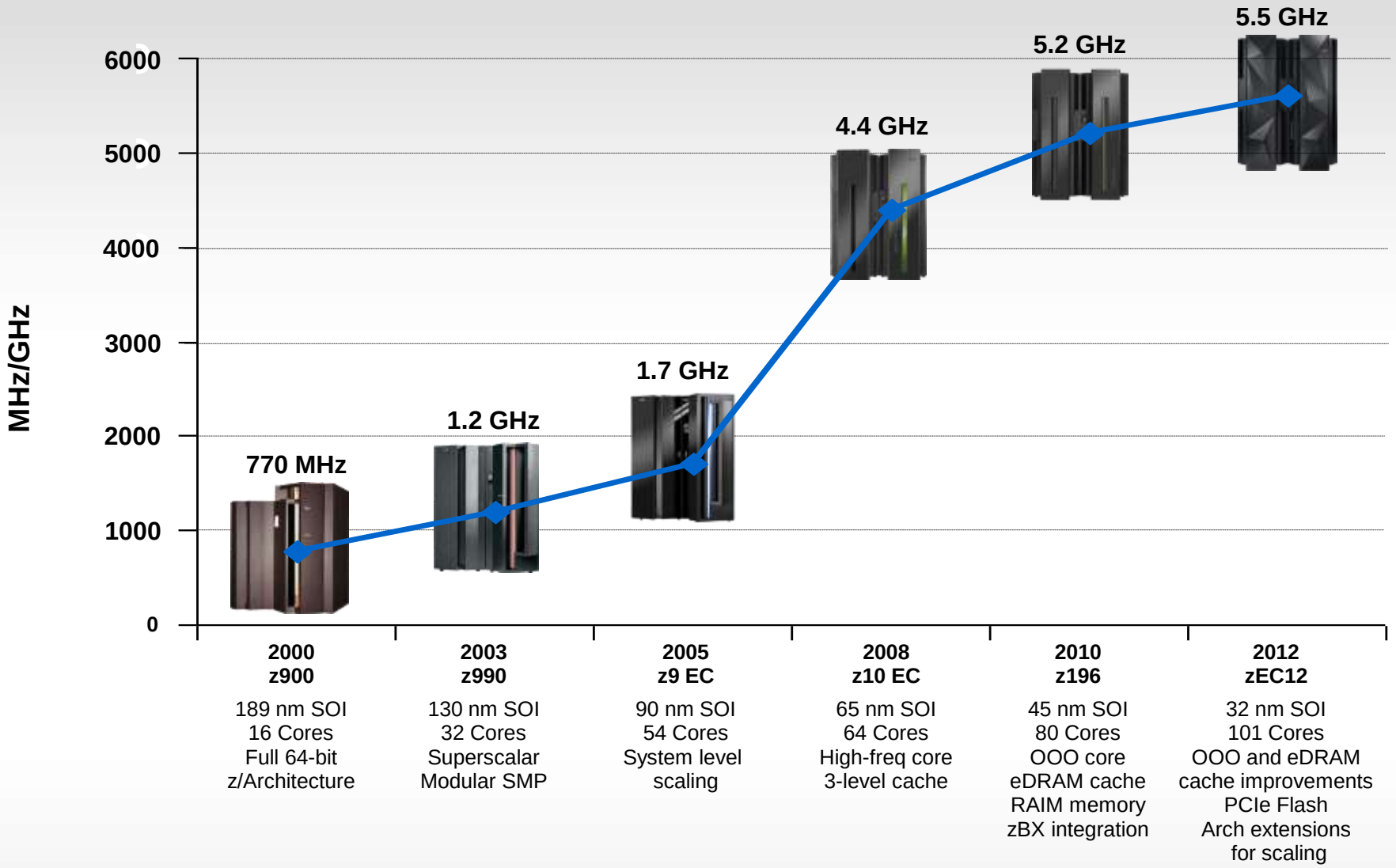
- New function
- Unprecedented capacity to meet consolidation needs
- Improved efficiency to further reduce energy consumption
- Continues to delivering flexible and simplified on demand capacity
- A mainframe that goes beyond the traditional paradigm



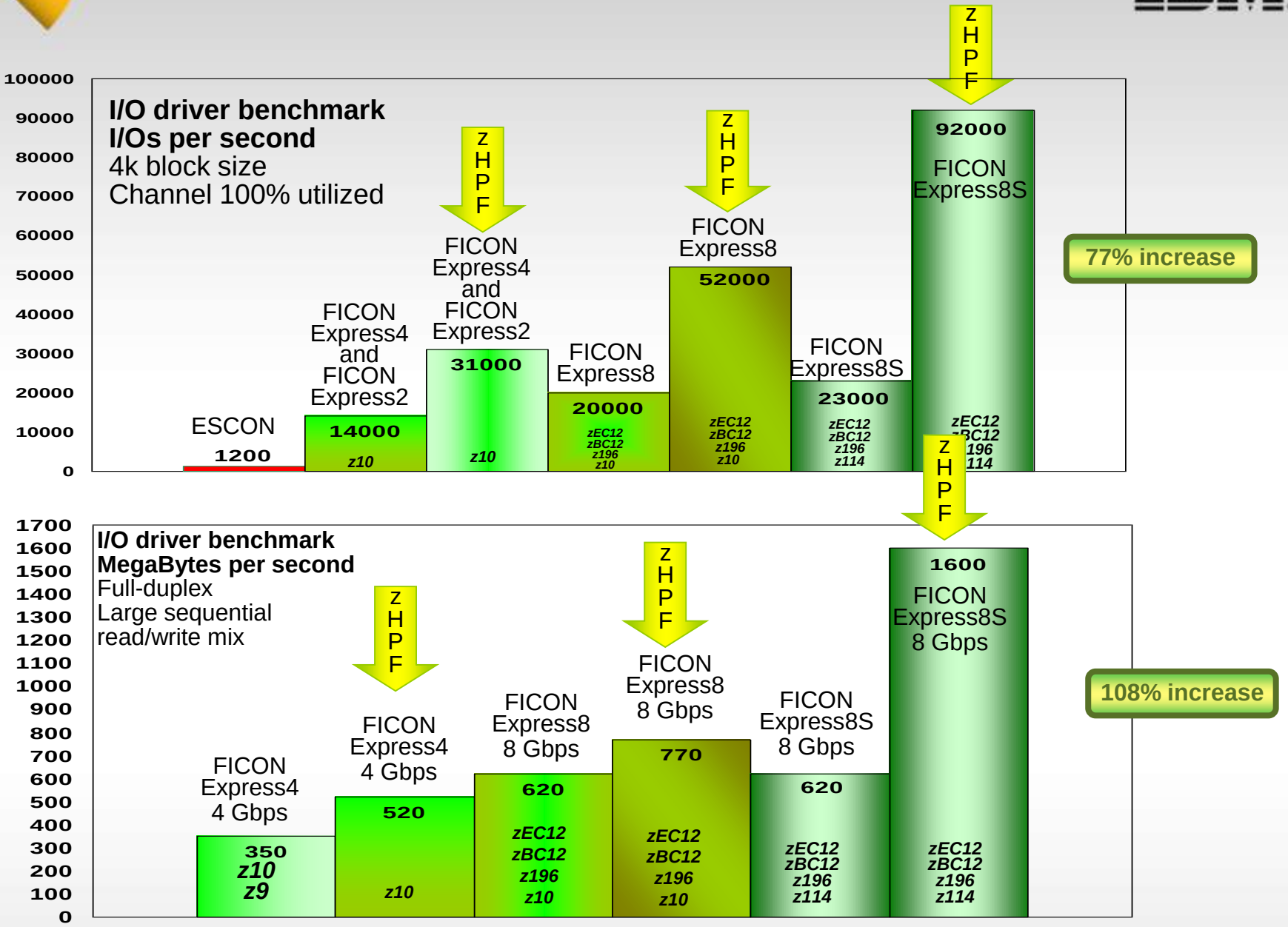
PCI - Processor Capacity Index

*z/OS supports up to a 100-way only

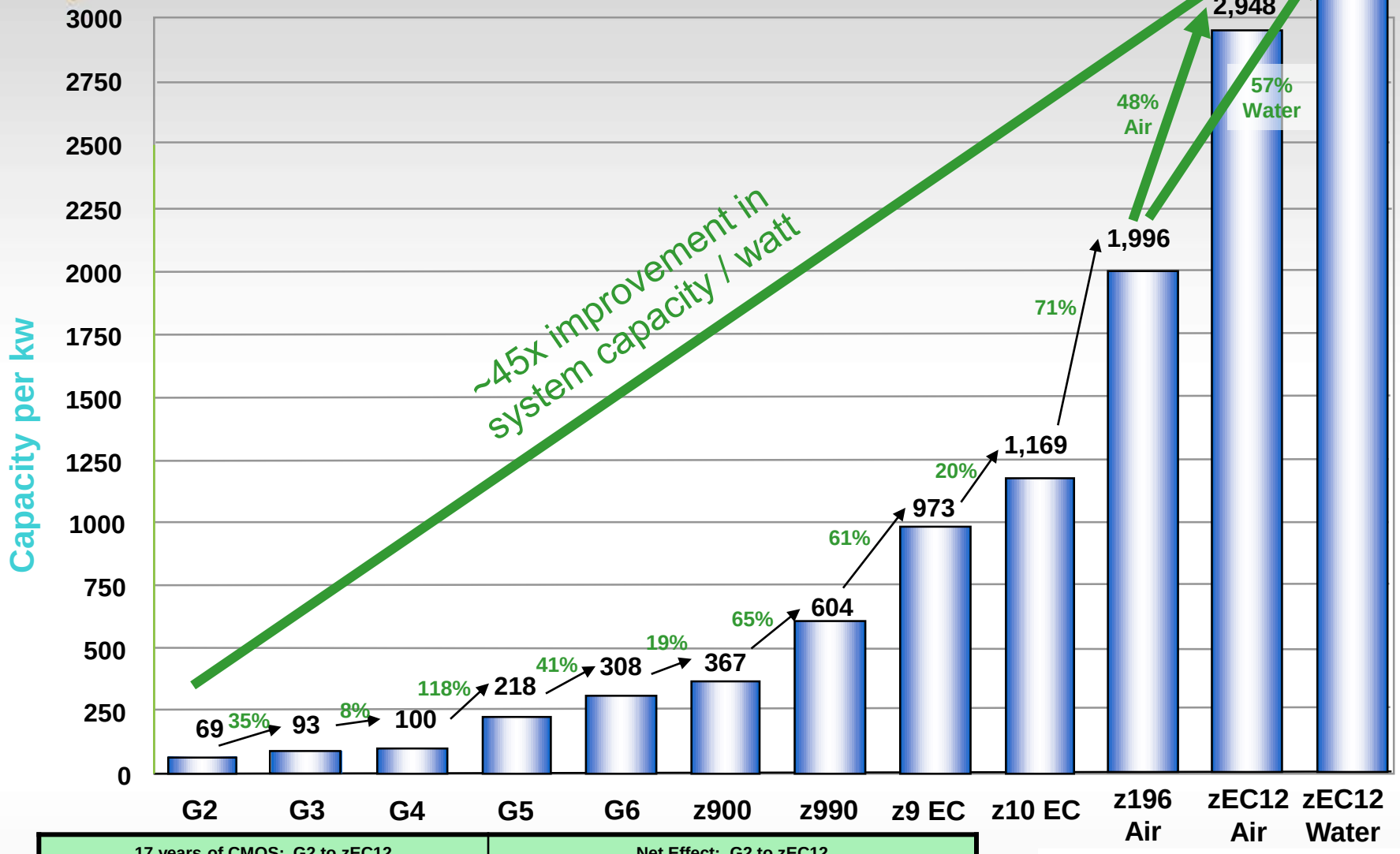
System z processor cycle time trend



FICON Performance



System z capacity per watt improvements



17 years of CMOS: G2 to zEC12		Net Effect: G2 to zEC12	
Power Increase:	**15%** per year	Performance increased by:	**~450x**
Performance increase:	**43%** per year	**Performance / watt increased by:**	**~45x**
Power density increase:	**11%** per year	Performance / floor area increased by:	**~275x**

Note: Latest power data as of 10/1/2012. Max. possible power is used in all calculations: hot room, max plugged I/O power, max. memory power and all engines turned on. Real world max. capacity system is typically about 0.8x this power.

System z overall RAS Strategy: Never Rest

Design objective: Continuous end-to-end availability

	Prior Servers	z9 EC	Z10 EC	z196	zEC12	Future
Unscheduled Outages	✓	✓	✓	✓	✓	✓
Scheduled Outages	✓	✓	✓	✓	✓	✓
Planned Outages		✓	✓	✓	✓	✓
Preplanning requirements			✓	✓	✓	✓
Power/Thermal Management				✓	✓	✓
Application Availability					zAware Flash	IT Analytics

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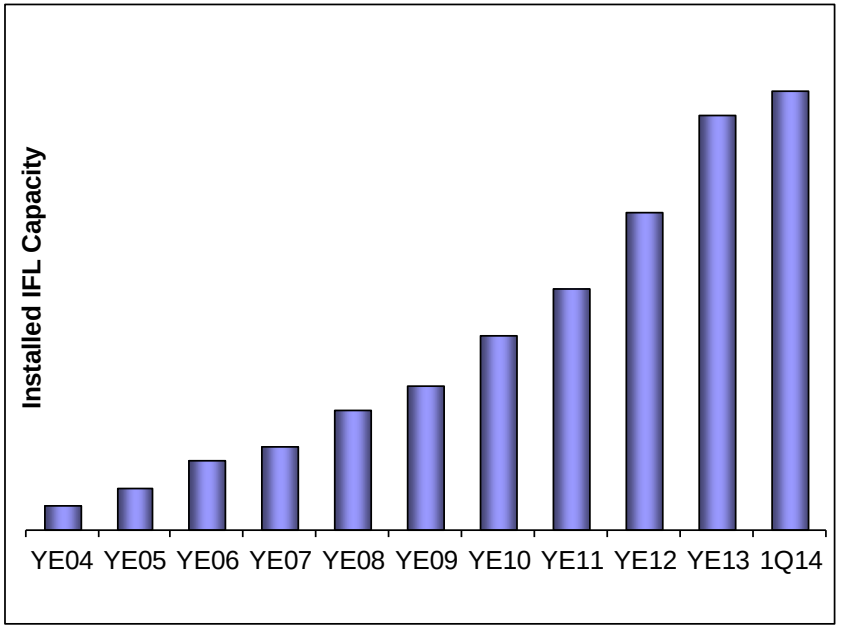
Linux on IBM System z

Linux on IBM System z in 2Q2014

*Installed Linux MIPS at 49% CAGR**

- **26.5% of Total installed MIPS run Linux as of 2Q14**
- **Installed IFL MIPS increased 15% from 2Q13 to 2Q14**
- **39% of System z Customers have IFL's installed as of 2Q14**
- **79 of the top 100 System z Customers are running Linux on the mainframe as of 2Q14 ****
- **56% of new FIE/FIC System z Accounts run Linux (FY10-1Q14)**
- **34% of all System z servers have IFLs**

Installed Capacity Over Time



*Based on YE 2003 to YE 2013
**Top 100 is based on total installed MIPS

Multidimensional Virtualization

Very large Shared Resource Space

Allows for consolidation and tight integration of Large Server Farms

into

VIRTUAL "BLADES"

VIRTUAL "RACKS"

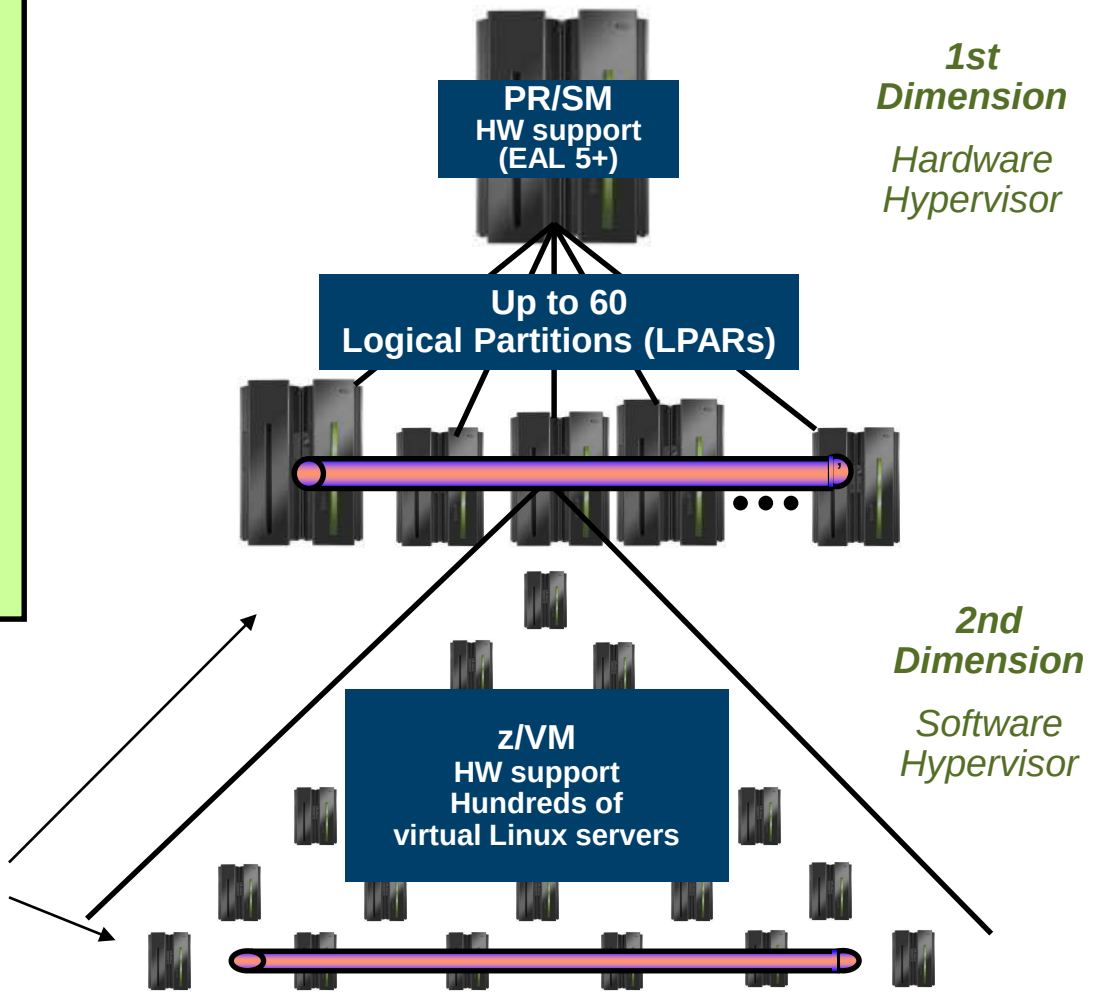
VITUAL NETWORKS

on the same footprint with managed performance, QoS and HW enforced security isolation

High speed (multiple GB/sec) and low latency interconnect

For integration with full integrity/isolation

The power of many
The simplicity of one



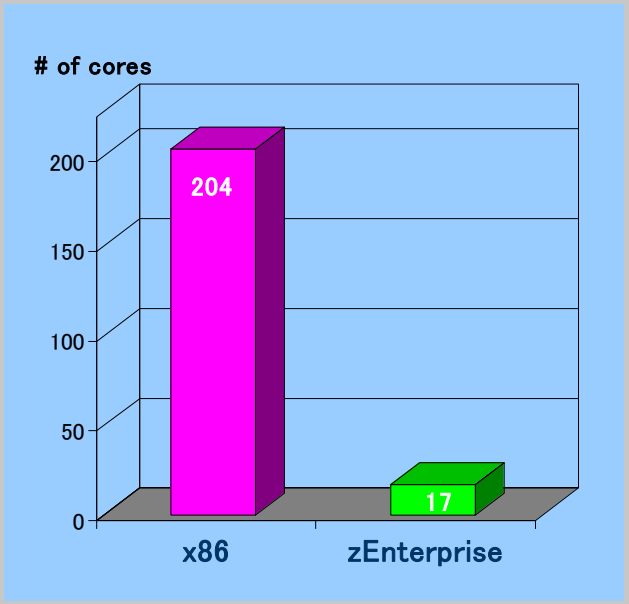
Met Office enormous saving SW licensing & HW lifecycle costs

"Commodity x86-based systems do cost far less to acquire ... But the longer-term costs quickly add up."

-- Richard Cains, technical lead, mainframe team, the Met Office

"By consolidating distributed commodity servers you can save a great deal of money. When we looked at all of the parameters, it just made sense to move the workload to the mainframe."

— Martyn Catlow, portfolio lead for centralized IT infrastructure, the Met Office



- Consolidation ratio 12:1 from 204 x86 cores to 17 IFLs
- Approximately 75 % reduction in licensing costs

Video: www.youtube.com/watch?v=4A0gqWKrK0c

Case study: www.ibm.com/software/businesscasestudies/us/en/corp?synkey=V089291R08250L03

Business challenge:
Met Office uses post-processing systems to tailor its weather forecasts for specific clients' needs. Running these systems on a distributed Linux infrastructure was becoming complex and expensive

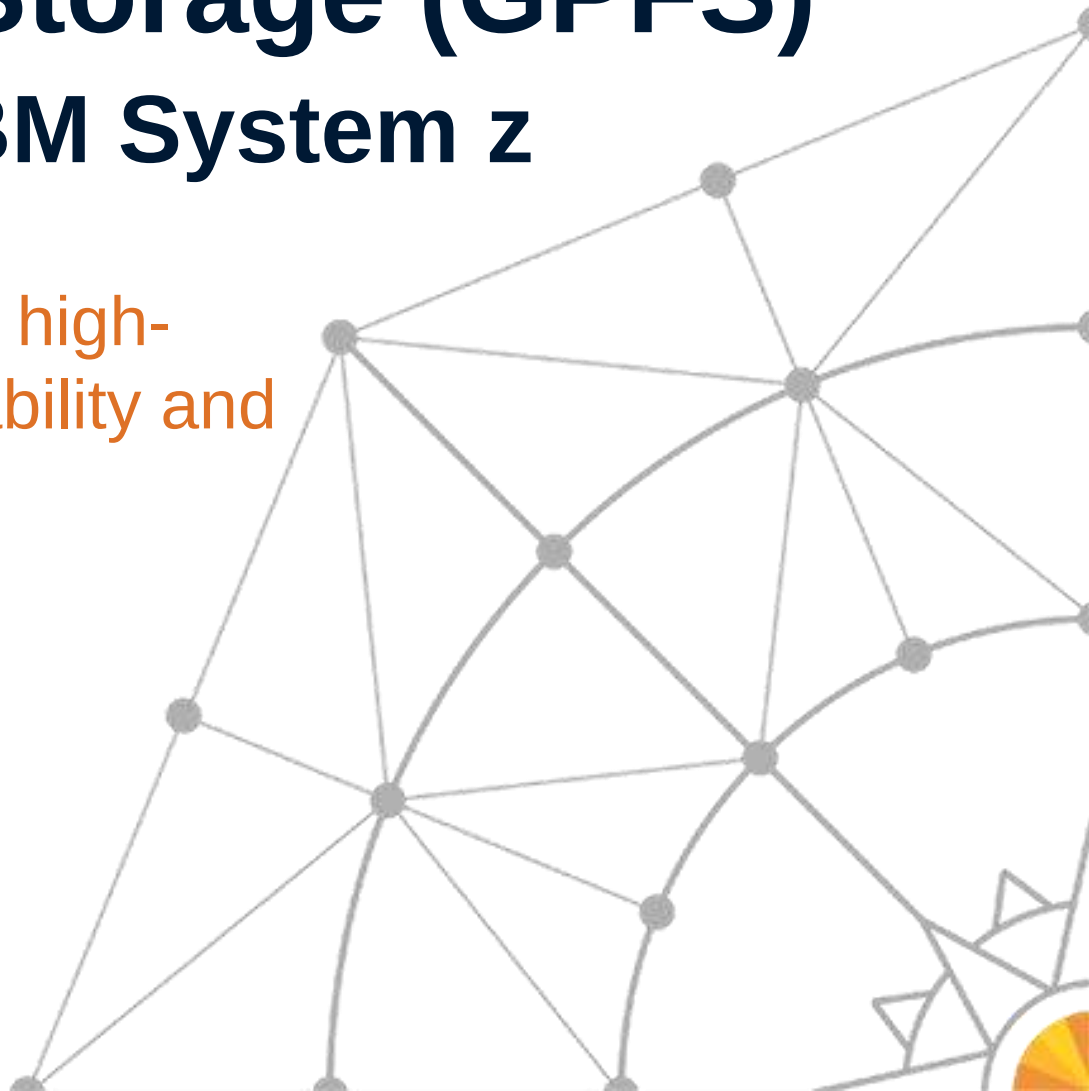
Benefits Realized:

- Software licensing costs cut by a factor of 12
- I/O-intensive workloads performed better on zEnterprise than on commodity servers
- Fewer physical servers means a more manageable Linux landscape and lower HW lifecycle costs

IBM Elastic Storage (GPFS)

for **Linux on IBM System z**

A cluster file system with high-performance, high availability and parallel file access



Positioning

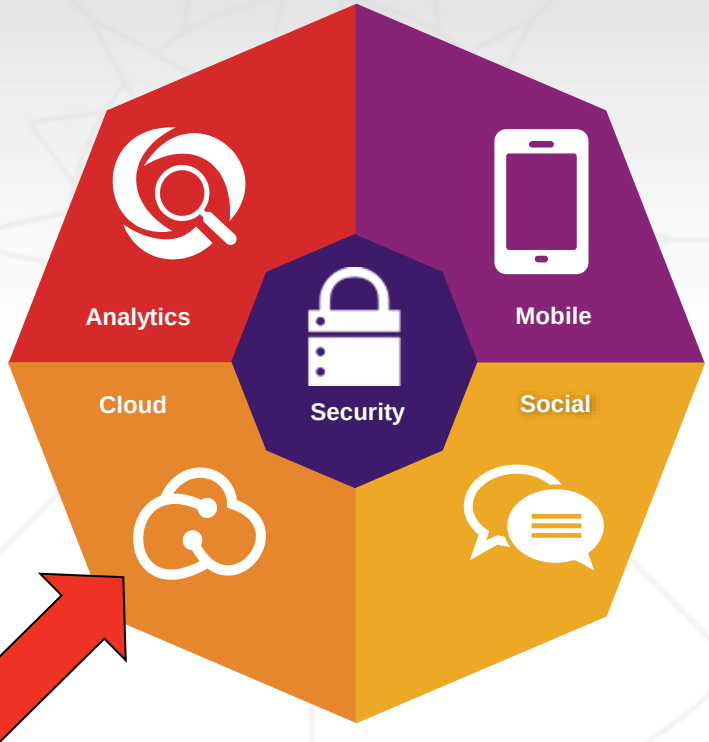
IBM Elastic Storage V1 for Linux on System z will enable enterprise clients to use a high available cluster file system with Linux in LPAR or as Linux on z/VM.

IBM and ISV solutions will provide higher value for Linux on System z clients by exploiting Elastic Storage functionality:

- **A highly available cluster architecture**
  - Improved data availability through data access even when the cluster experiences storage or node malfunctions
- **Capabilities for high-performance parallel workloads**
  - Concurrent high-speed, reliable file access from multiple nodes in the cluster environment
- **Smooth, non disruptive capacity expansion and reduction**
- **Services to effectively manage large and growing quantities of data**

Enable software solutions dependent on Elastic Storage as a more scalable, more available and better performing alternative over NFS, NAS and other competitive clustered file system implementations for Linux on System z.

zEnterprise: Empowering Business Innovation in an era of Digital Transformation



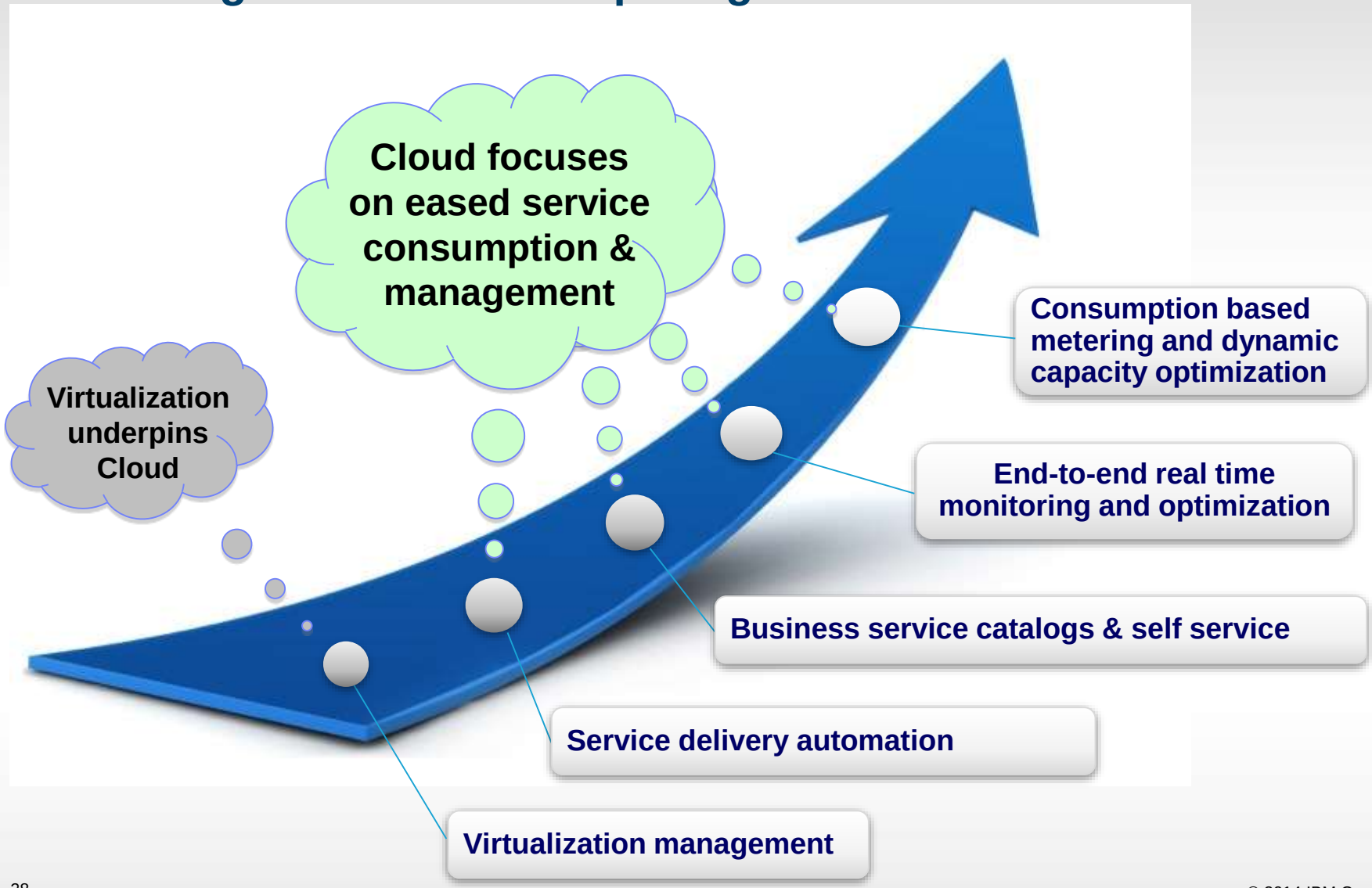
The ultimate **Analytics** engine for instant insight.

Superior service at lower cost through **Cloud.**

The foundation for a **Mobile** and **Social** enterprise.

A robust and **Trusted** infrastructure.

Organizations are now moving beyond virtualization to higher value stages of Cloud Computing



zEnterprise Differentiation for Deploying Clouds on System z

90%+ utilization

Increased Productivity

- Advanced workload management that provisions resources on the fly for 90%+ utilization and maximizes ROI
- Significant software license savings due to zEnterprise power/scale
- 79% less TCA vs. leading public cloud alternatives

100,000 virtual servers

Higher Utilization

- Maintain service levels with up to 100% CPU utilization
- "Shared everything" architecture
- Manage up to 100,000 diverse virtual servers
- Unmatched scalability with 24X more scale than x86

80% less energy

More Efficient Data Center

- Up to 80% less energy than existing distributed servers
- Less floor space
- Fewer parts to manage

Greater Reliability, Availability

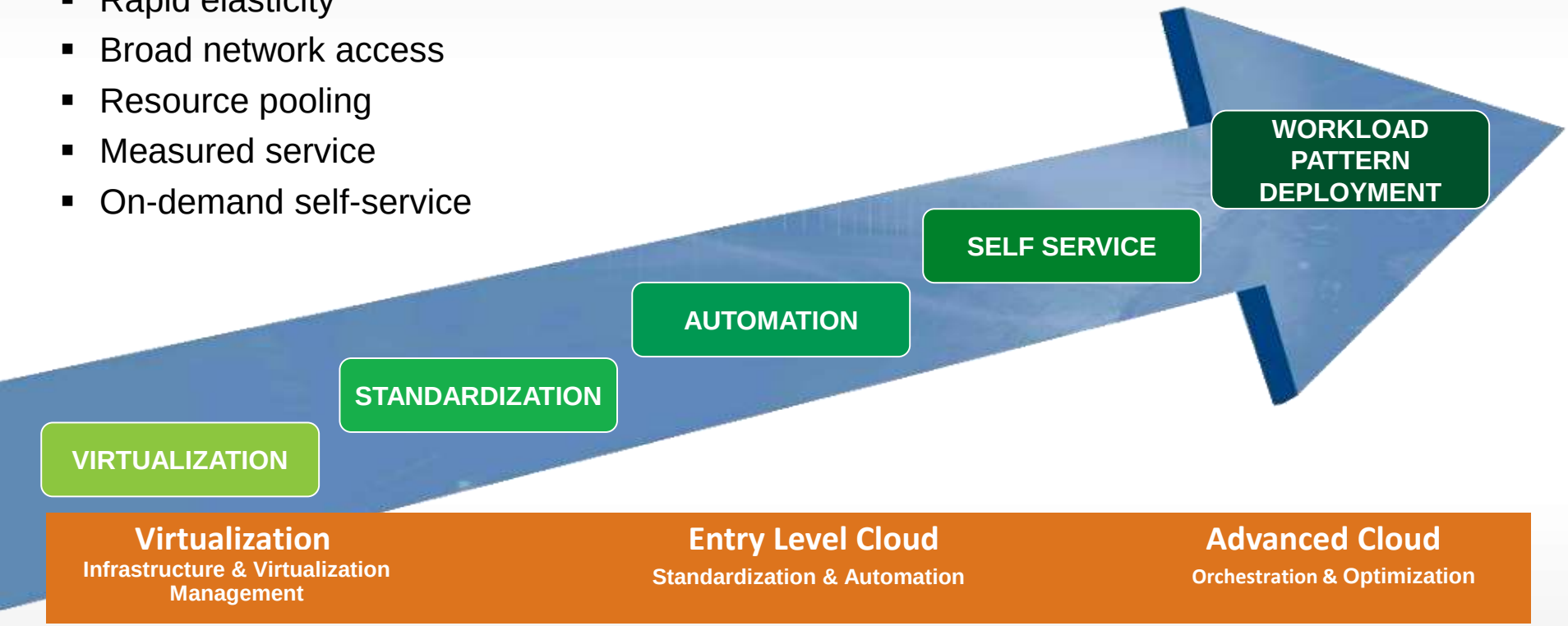
- Built-in hardware redundancy
- Decades of RAS innovation
- Real time capacity on demand to manage growth and handle workload spikes
- Highest security rating for any commercially available server

Cloud Computing - Based on Virtualization and Standardization

We need to understand that Cloud computing is a journey beginning with virtualization and consolidation of environments and ending with workload pattern-based deployment of IT services.

Cloud Computing – Characteristics*:

- Rapid elasticity
- Broad network access
- Resource pooling
- Measured service
- On-demand self-service



* Source: National Institute of Standards and Technology (NIST)

System z Cloud Blueprint

Orchestrate

Advanced Cloud
Orchestration & Optimization

Finally, some customers will want to evolve and optimize their cloud environment to orchestrate application deployment based on reusable workload patterns in order deliver dynamic cloud services.

Automate

Entry Level Cloud
Standardization & Automation

- Customers begin to standardize their environments for faster delivery of services.
- Automation is employed to provision and deprovision virtual guest environments using a shared pool of resources.
- Some customers may choose to allow end-user self service provisioning/deprovisioning.

Integrate

Virtualization
Infrastructure & Virtualization Management

This is where System z drives differentiation!

- Infrastructure Scalability: Consolidate more workloads per core; elastic scaling using Capacity On Demand
- Virtualization Management: More virtual servers in a single footprint
- Security: Highest security rating for tenant isolation
- Reliability & Availability: Unparalleled in the industry

Virtualization and Cloud Portfolio for Linux on System z

Virtualization	Entry Level Cloud	Advanced Cloud
Infrastructure & Virtualization Management	Standardization & Automation	Orchestration & Optimization

zEnterprise: zEC12, zBC12

- Massively scalable
- Characterized by great economics / efficiencies
- Highly secure / available

z/VM 6.3

- Support more virtual servers than any other platform in a single footprint
- Integrated OpenStack support

Linux on System z

- Distributions available from RedHat and SUSE

IBM Wave for z/VM

- A graphical interface tool that simplifies the management and administration of z/VM and Linux environments

Differentiation

xCAT

- Shipped with z/VM 6.3
- Allows customers to set up a rudimentary cloud environment, without acquiring any additional product
- Based on open source code
- Focused on a different layer and not designed for upward integration to SmartCloud suite

Cloud Manager with OpenStack

- A simple, entry level cloud management stack
- Based on OpenStack
- Formelry known as SmartCloud Entry

Standardization

Cloud Ready for Linux on System z

- Image-based cloud service delivery with integrated provisioning, monitoring, service catalog & service desk, storage management, and HA

Cloud Management Suite for System z

- Builds on functionality of Cloud Manager with OpenStack and adds runbook automation and middleware pattern support for workload deployment
- Includes Cloud Orchestrator (formerly SmartCloud Orchestrator)
- Also includes Tivoli Storage Manager and OMEGAMON XE on z/VM and Linux

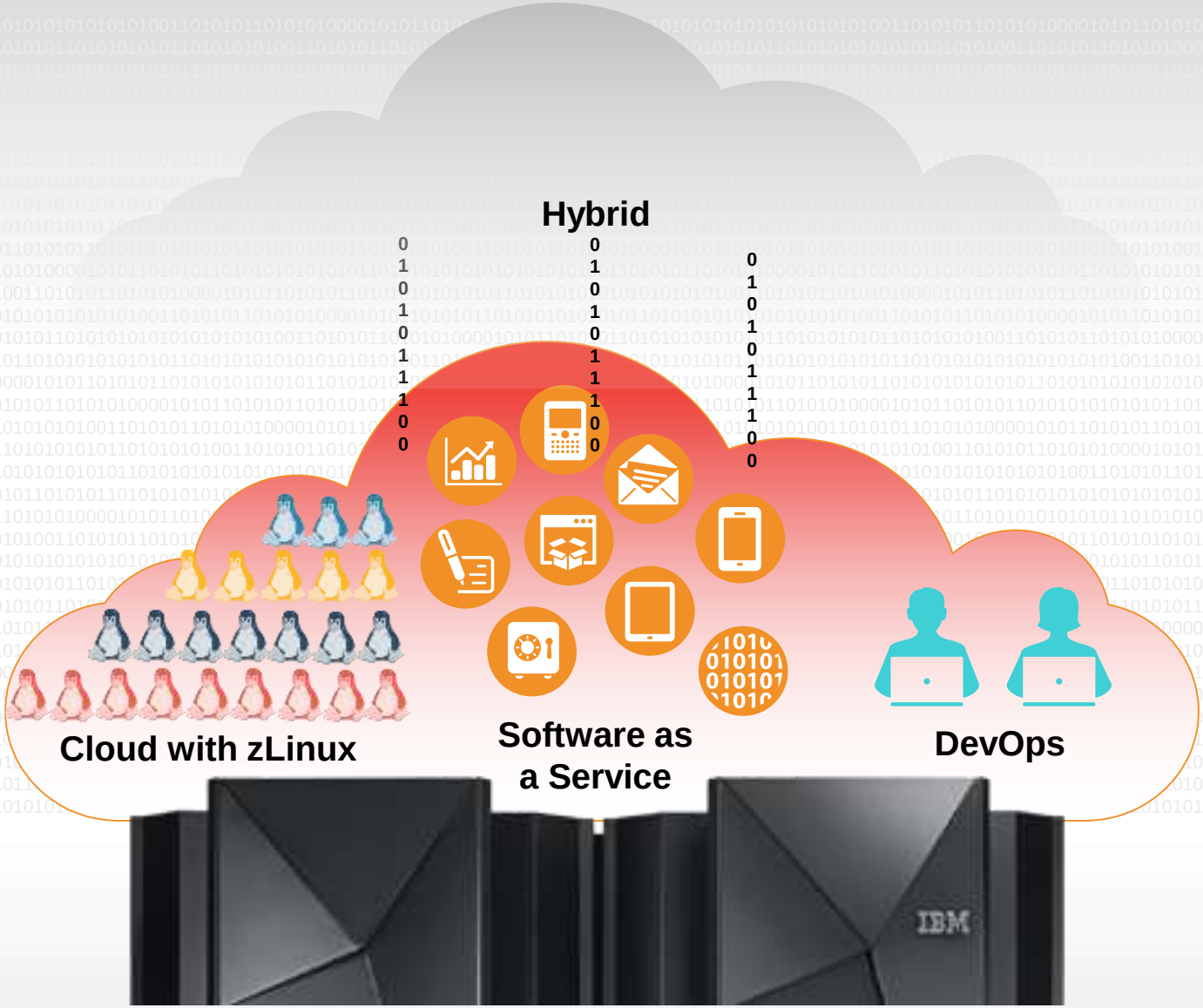
Service Lifecycle Management

Cloud Computing on z/OS

With z/OS, we need to think about cloud just a bit differently…..

- Today in cloud environments on distributed servers, or even with Linux on System z, customers would provision a virtual machine with an instance of an operating system to run a single workload.
  - To deploy another workload would mean another virtual machine with another instance of the operating system.
- However, in the context of z/OS, this methodology goes against everything we have come to know and expect about z/OS.
  - On z/OS, you have the ability to run multiple disparate workloads with different service levels for those hosted workloads with isolation or multitenancy.
- Hence our **approach for cloud on z/OS** is not focusing on the provisioning of operating system instances, but rather **the ability to provision multiple workloads in a single z/OS instance.**

System z: The Multidimensional Cloud



App Dev cloud
Maximize efficiency by tapping unutilized resources

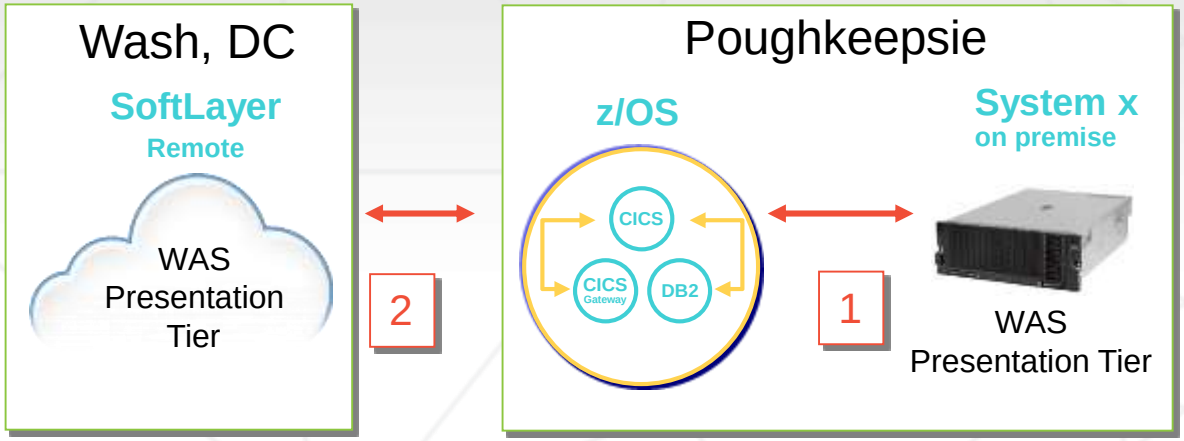
z/OS cloud
Core business operations enabled as cloud services

Hybrid cloud
Maximum flexibility through use of on- and off-premise resources

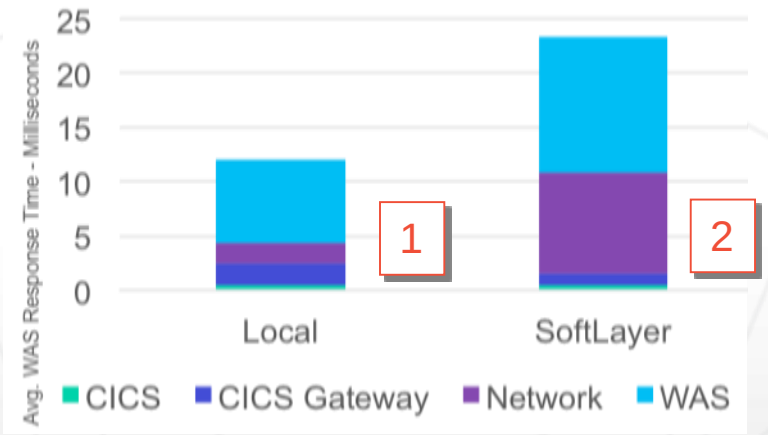
Linux on z cloud
Highly efficient fully virtualized infrastructure

On premise and off premise: System z delivers the performance you need

System z and SoftLayer Study



Latency – On-premise vs. SoftLayer



Results

No surprises or issues in implementing the Hybrid architecture

No major performance impacts from added security

Relatively small performance impact accessing z/OS from SoftLayer

---

15ms increase in network latency for each CICS call

11ms increase in average transaction response time

No significant change in transaction rate or z/OS load

Increasing momentum and investment in cloud solutions on zEnterprise

IBM Wave for z/VM

Simplifies and automates the set up and management of a System z virtualized environment with drag and drop simplicity

Enterprise Linux Server

The power of Enterprise Linux made easy; now integrated with Wave technology

Cloud Management Suite

Easily moves cloud services to System z with standardized, open orchestration; provisions workloads to Linux on z from SmartCloud Orchestrator running on x.

Cloud

Growing MSP uptake with new partnerships around the world

Business Connexion

Efficiently delivering high quality services to clients

Oceanet Technology

L36

IBM Enterprise Cloud System

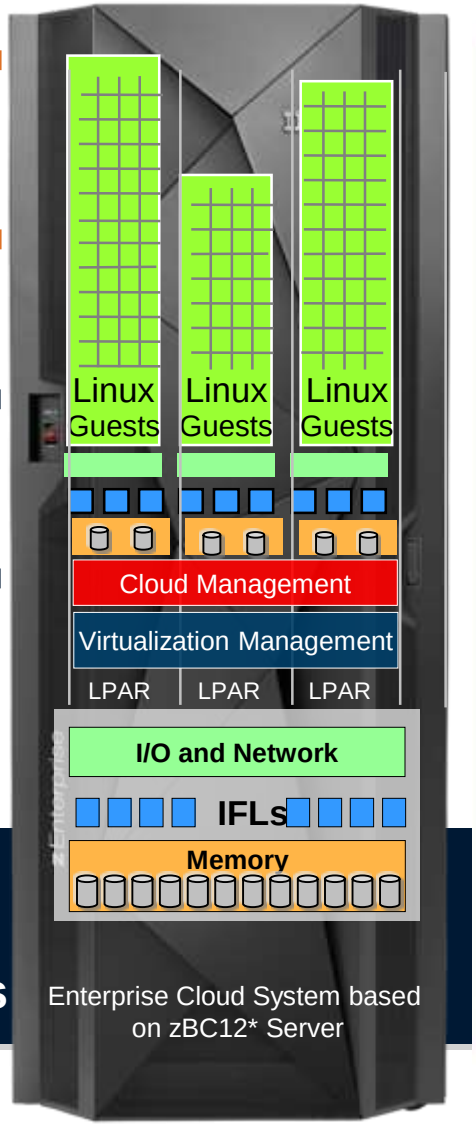
Trusted Cloud. Simply Delivered.

NEW

Standard Linux Environment
- *Red Hat/SUSE*
- *3000+ Applications*

Fully Automated Cloud Management Suite

Hypervisor and Virtualization Management



Utility Pricing and MSP Flexible Financing

Trusted, 24/7 IBM Support

Award Winning Hardware Design

- Factory Integrated
- Delivered in 45 Days
- Production Ready in Hours

- Scale up to 6000 VMs
- Mainframe Availability
- Proven Server Security

zEnterprise: Empowering Business Innovation in an era of Digital Transformation

The ultimate **Analytics** engine for instant insight.

Superior service at lower cost through **Cloud.**

The foundation for a **Mobile** and **Social** enterprise.

A robust and **Trusted** infrastructure.

The ultimate analytics engine for insights in an instant

72%
of respondents plan to analyze transactional data from enterprise applications

80%
of world's corporate data resides or originates on mainframes

Detect Fraud within the current credit card transaction

Personalize offers
based on the customer's location or purchase history

Identify cross sell
opportunities within the current business transaction

With zEnterprise, bring Analytics to the data rather than the data to the Analytics

- Avoid the high cost of ETL
- Centralized data security and governance
- Enable in-transaction analytics

ANALYTICS

Don’t move the data to the analytics Bring analytics to the data!

Why analytics on zEnterprise?

- Access, combine & manage a relevant mix of information
- Central data security and governance
- Deliver insights more quickly and at less cost than alternative solutions
- Provide a single source of data
- Integrated technology for high performance analytics

Operational and analytics applications reside with the data in a single system

IBM analytics @ work in business ***and*** IT

PETROL

Swiss Re

BANCA CARIGE
Cassa di Risparmio di Genova e Imperia

Swiss Mobiliar
Insurance & Pensions

BANCO DO BRASIL

NLB

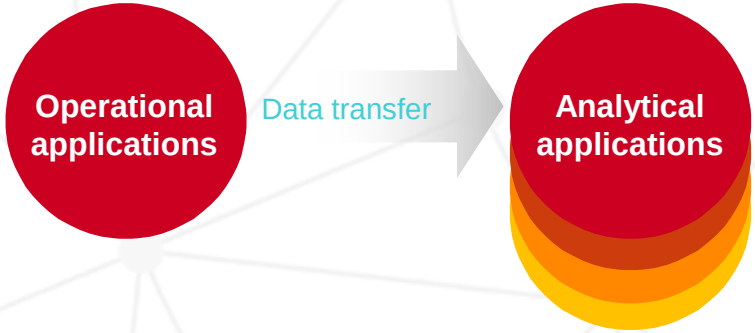
Insight into NOW. Report, predict, decide.

ANALYTICS

Bring analytics to the data rather than the data to the analytics

Extract, Transform and Load (ETL)

1TB ETL per day, Initial copy
plus three derivatives costs > $8 million over 4 years



Multiple copies of data
Transaction and analytics isolation
Significant compute power

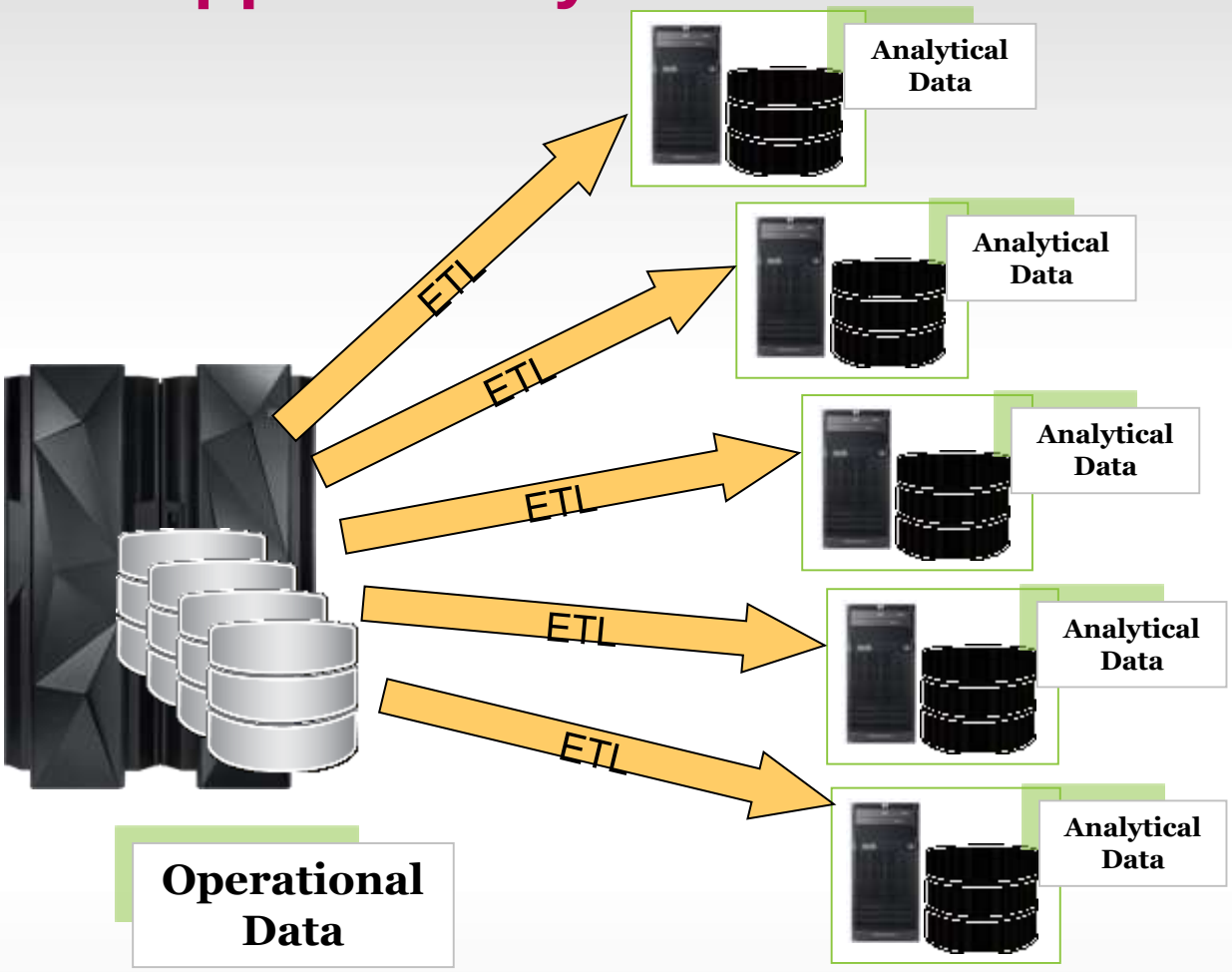
Source: CPO internal study. Assume dist. send and load is same cost as receive and load.. Also, assume 2 switches and 2 T3 WAN connections.

The most valuable insights occur when the analysis executes where the data originates

72%
of respondents plan to analyze transactional data from enterprise applications

80%
of world's corporate data resides or originates on mainframes

They adopt an extremely expensive ETL strategy to support analytics



A large European bank:

- 120 database images created from bulk data transfers
- 1,000 applications on 750 cores with 14,000 software titles
- ETL consuming 28% of total distributed cores and **16% of total MIPS**

A large Asian bank:

- One mainframe devoted exclusively to bulk data transfers
- ETL consuming 8% of total distributed core and **18% of total MIPS**

With this strategy, IT costs grow faster than business growth

System z platform direction: from data hub to analytics hub

Differentiate DB2 z/OS + System z HW to integrate analytics with real time OLTP

Superior end/end analytics lifecycle integration

Better business response,
Reduced data movement, reduced complexity, reduced configuration resources,
More accurate, more secure, more available

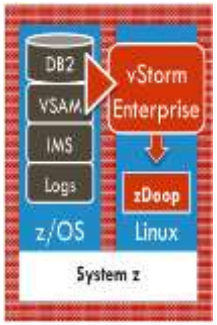
ANALYTICS

Speed time to value & insight
with new analytics offerings on the mainframe

Industries first commercial Hadoop for Linux on System z

NEW

- **Veristorm partnership**
- **Analyze System z data** using Hadoop without ever leaving the box
- **2-2-2**; 2 billion records in 2 hours using 2 IFLs



High Performance Flash Enclosure on IBM DS8870

NEW

- Up to **4x increase** in I/Os per second performance over SSD, **30x** over disk
- Accelerate System z database performance by **up to 3.2x;** Shrink batch times by **up to 10%**
- Faster FlashCopy® replication with **up to 70% better response time** than disk

NEW

Enhanced File Transfer with DS8870 and IBM Sterling Connect: Direct

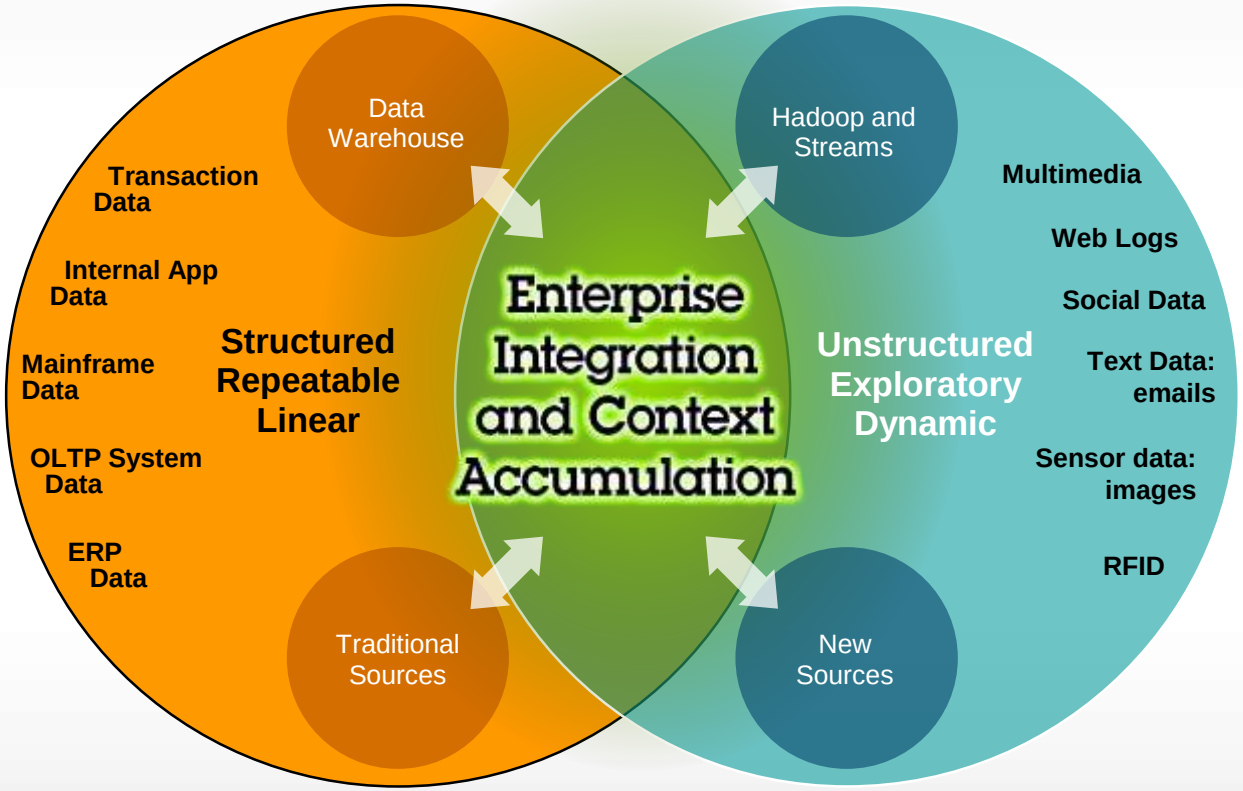
- Cut data transfer CPU cost by up to **50%**
- Reduce transfer time by up to **30%**

ANALYTICS

Imagine the possibility of leveraging all of your data assets from a single system architecture

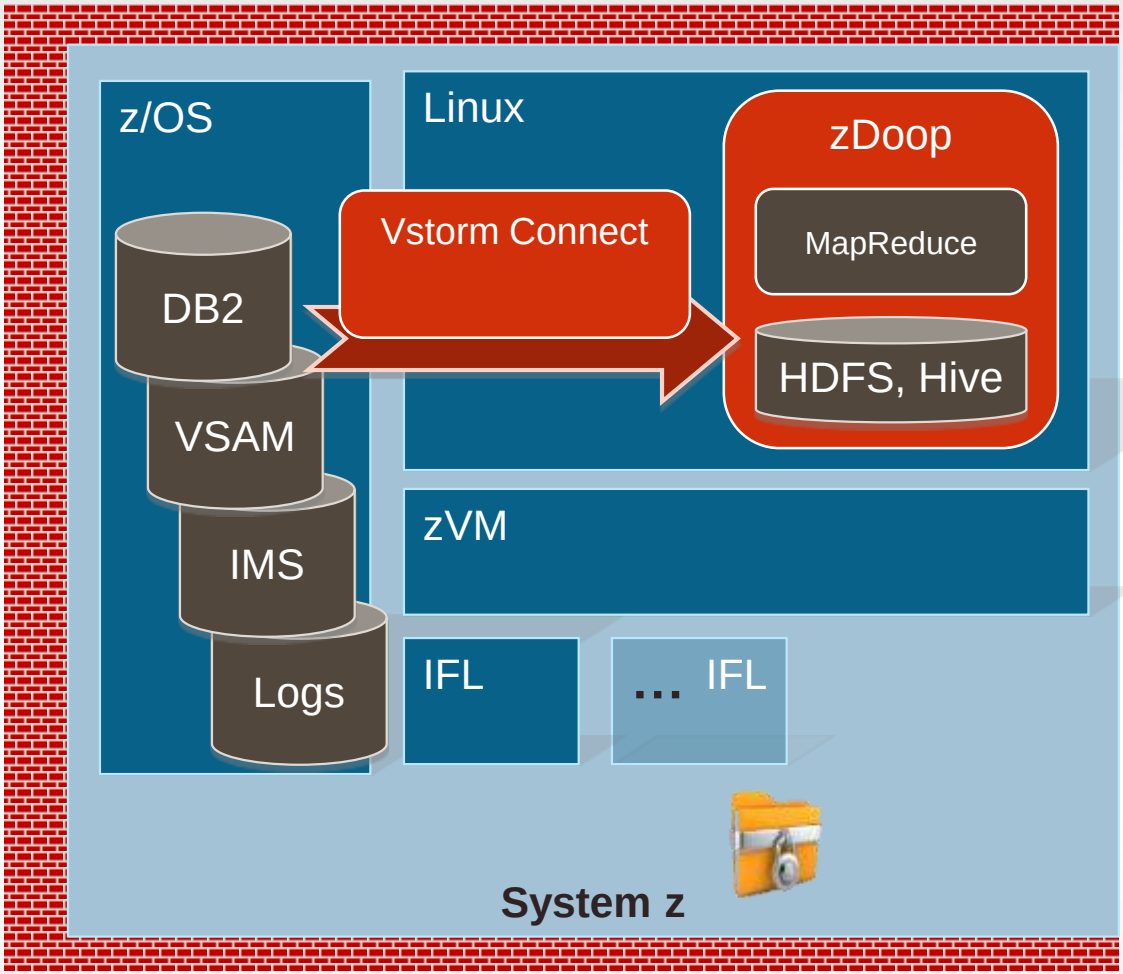
Traditional Approach
Structured, analytical, logical

New Approach
Creative, holistic thought, intuition



Veristorm's vStorm Enterprise

ANALYTICS



- **A secure pipe for data**
  - Data never leaves the box
  - RACF integration – no need for special credentials
  - Data streamed over secure channel using hardware crypto
- **Easy to use ingestion engine**
  - Native data collectors accessed via graphical interface
  - Wide variety of data sources supported
  - Conversions handled automatically
  - Streaming technology does not load z/OS engines or require DASD for staging
- **Templates for agile deployment**
  - Spin up new nodes on demand
  - An ideal cloud deployment platform
- **Mainframe efficiencies**

Two System z use cases for Hadoop

ANALYTICS

Veristorm vStorm Enterprise

On-platform analysis of data that does not fit with relational tools

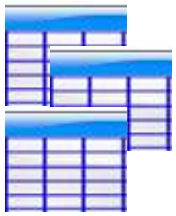
Safely combine z/OS and external data for analysis (e.g. improving claims response time)

vStorm Connect

zDoop

Integrate

Request



VSAM
QSAM
SMF, RMF
System logs
Operator logs
Application logs
etc.

NEW

IBM InfoSphere BigInsights

DB2 z/OS can integrate insights from big data sources to augment analysis (e.g. improve accuracy of fraud detection with “nuggets” from social media)

ANALYTICS

IT is no different! Analytics can be used to improve efficiency and reduce cost

Responsibilities in managing zEnterprise

- ✓ Verify design effectiveness
- ✓ Discover risky components
- ✓ Minimize recovery time in case of service loss
- ✓ Investigate irregularities
- ✓ Forecast resource bottlenecks
- ✓ Prevent service loss
- ✓ Estimate impact of planned business change
- ✓ Prevent occurrence of technical incidents
- ✓ Discover side effects of changes

System z Hybrid Transaction and Analytic Processing:

Everything is online – analytics in the right place

Customer Interaction Data In

- OLTP Transactions
- Operational analytics
- Real time data ingestion
- High concurrency
- Advanced analytics
- Standard reports
- OLAP
- Complex queries
- Historical queries

Operational Data Store

Enterprise Data Warehouse

Analytics Accelerator

Big Data Accelerator

hadoop

Single DB2 z/OS Data Sharing Group

Integrated Transformation/Warehousing

Accelerated Reporting

Real-Time Predictive and Prescriptive Analytics

Business Insight Out

What is happening?

What happened?

What is likely to happen and what do I do about it?

Why did it happen?

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The foundation for a **Mobile** and **Social** enterprise.

A robust and **Trusted** infrastructure.

Mobile Internet users will surpass PC internet users by 2015

The number of people accessing the Internet from smartphones, tablets and other mobile devices will surpass the number of users connecting from a home or office computer by 2015, according to a September 2013 study by market analyst firm IDC.

PC is the new Legacy!

Small screens – a big opportunity for business growth

90 seconds
average response time to a text

10 billion+
devices accessing information

Create new services

Access new markets

Deliver timely information

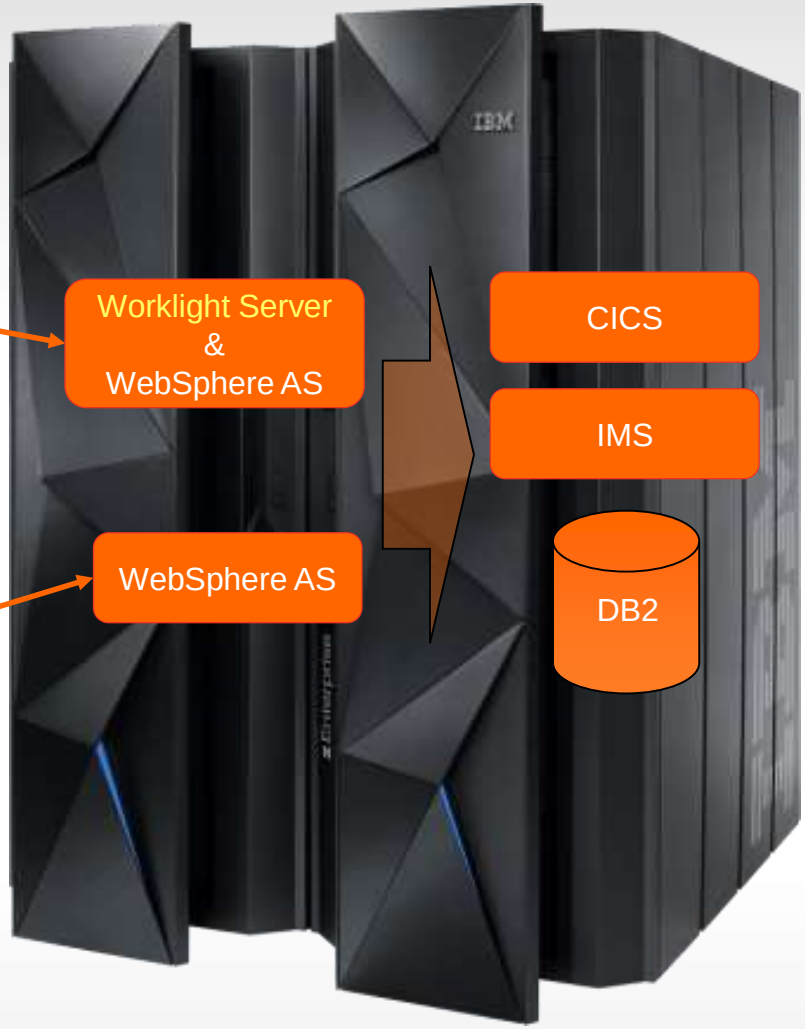
FNB

>150 million
monthly mobile banking transactions

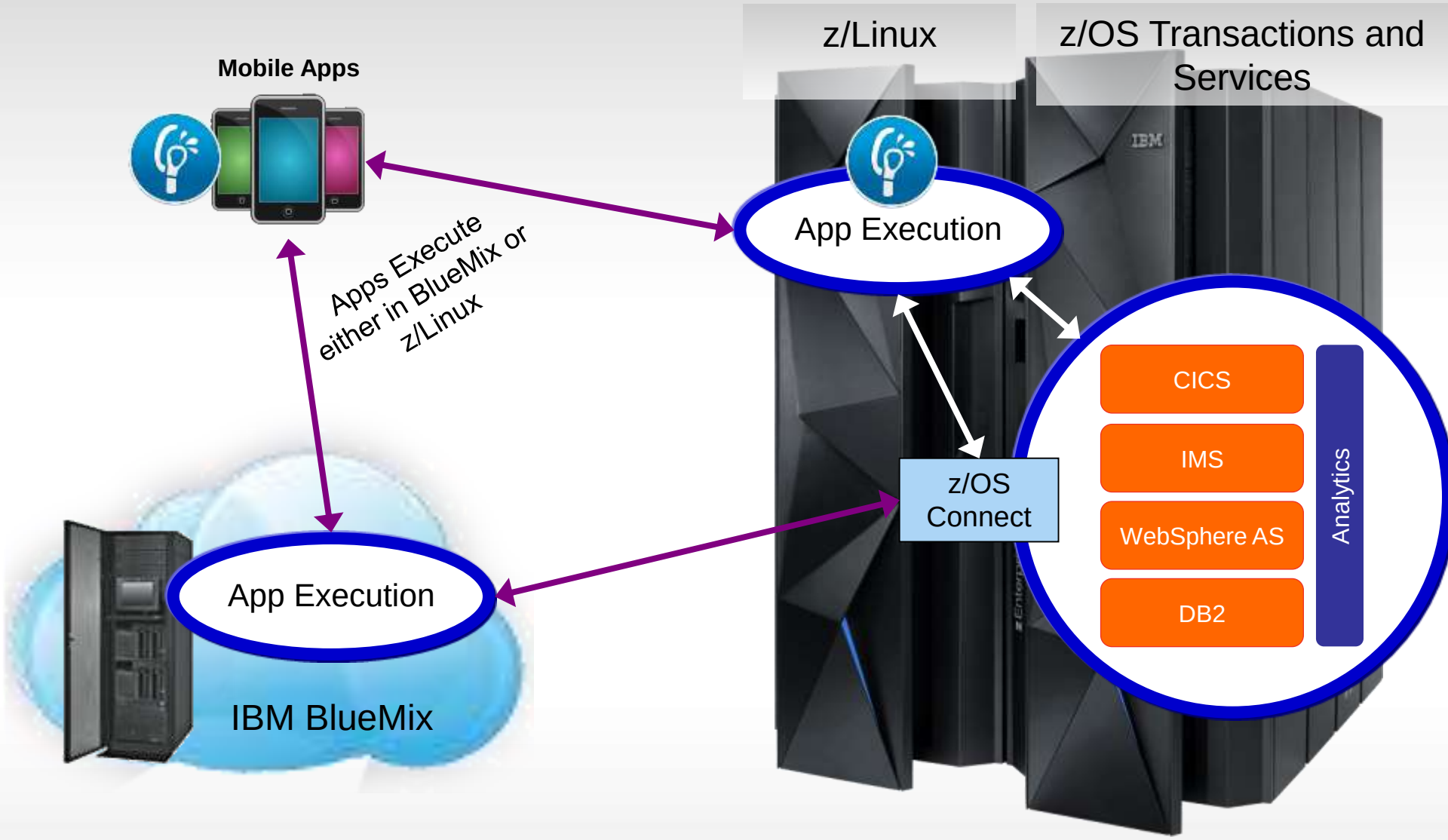
< 30 ms
response time

We view Mobile as simply a new Channel to access Enterprise transactions and data

"Legacy" Web



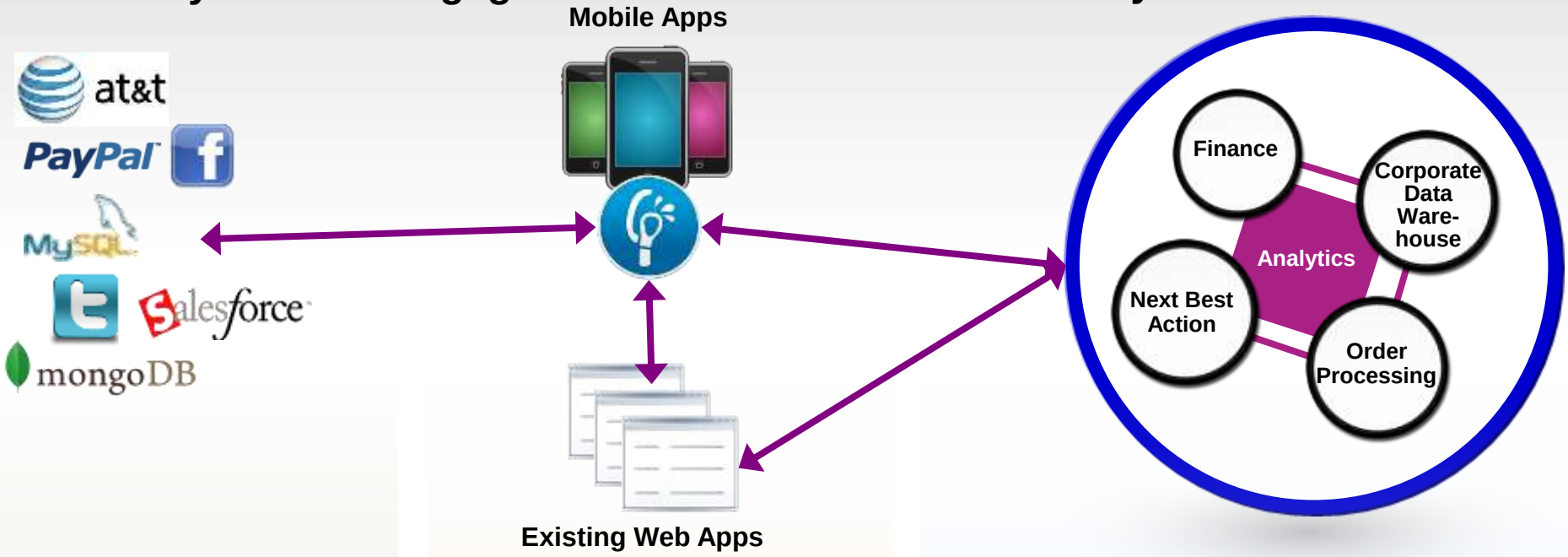
System z Mobile Strategy – From 10,000 feet



System z bridges Systems of Record and Systems of Engagement

Systems of Engagement

Systems of Record



Cloud APIs

Systems of Engagement support rapid app development and growth

Linux on z

z/OS

Systems of Record are well integrated, trusted repositories of data and services

Bridging Systems of Record and Systems of Engagement to enable the mobile enterprise

IBM

Mobile

Mobile Interfaces

OS device variety

Screen size variety

Various smartphones

Tablets

Systems of Engagement

Web application server

Mobile application runtime server

Security components

Back-end access services

Caching to back-end services

Systems of Record

Databases and data sources

Enterprise applications & transactional services

Client Tier Devices

Middle Tier Server

Back-end Data & Services

Systems of Engagement are cloud-based, decentralized, support rapid app development

Systems of Record are well integrated, trusted repositories

MOBILE MAINFRAME APP THROWDOWN

Will you be our mobile champ?

CICS | IMS | WAS | DB2

Open to existing System z clients

The challenge: Build a proof-of-concept demonstrating mobile enablement of your existing mainframe apps.

Get IBM help to build your mobile PoC

Call us 'Coach': We provide getting started guides and access to IBM zMobile Experts for questions and queries.

Win a week with IBM experts & more

Make it real: Win help from IBM to bring your mobile app to life.

ibm.biz/mmathrowdown

No submission of code required, only screenshots.
Entries must be complete and submitted by **17 Sept 2014**.

zEnterprise System delivers a security ready infrastructure

Intrinsic platform security and privacy

- Cryptography built into processor chip and Crypto Express4S
- Secure your critical information assets (or data) throughout their life cycle
- Simplified setup and management with ***new TKE 7.3***

Spanning multiple industries

- ***Enhanced*** digital signature cryptography (PKCS#11) to protect data
- Payment card industry solutions with EMV support for credit and debit cards

Leveraging operating system security

- Qualities needed by enterprises adopting cloud application architectures
- Wide range of cryptographic primitives exploited by operating system and middleware to help secure and accelerate workloads

System z exclusive cryptography

- ***z/OS V2.1 Crypto as a service***
- Blends the speed of processor based crypto with the security of the Crypto Express coprocessor

Total isolation of workloads and data

- EAL5+ means the highest levels of protection on commercial server for secure isolation of LPARs
- EAL4+ for z/OS and z/VM

New z/OS V2.1 ready to protect data, reduce risk and strengthen customer trust

**** Green indicates new for zEC12***

[1] Based on input from a Financial Service Provider and ROI business value tools by IBM SWG

Elements of the System z Enterprise Security Hub

An Ecosystem that leverages the System z HW

Guardium

Optim™

CPACF

Crypto Express 4S

Tape encryption

TS1120 Family

Disk encryption

DS8000® Family

Secured Key Storage & Management

EKMF
EKMP-CAT
ACSP

SKLM
TKE

z/OS Encryption Facility

Multilevel Security

Data Privacy

System z SMF

IBM Tivoli Security Compliance Insight Manager

z/OS PKI Services

Enterprise Fraud Solutions

Certificate Authority

IBM Tivoli® zSecure Suite

Compliance and Audit

Extended Enterprise

Tivoli Identity Manager

DB2® Audit Management Expert

Common Criteria

Tivoli Federated Identity Mgr

Platform Infrastructure

Common Criteria Ratings
Support for Standards

z/OS Java SDK
Optimized for z/OS

RACF®
Audit, Authorization, Authentication, and Access Control

ICSF
Services and Key Storage for Key Material

ITDS
LDAP
Scalable Enterprise Directory

Network Authentication Service
Kerberos V5 Compliant

z/OS® System SSL
SSL/TLS suite

Communications Server
IDS, Secure Communications

zEnterprise: Unmatched security and availability for trusted computing

$5.5M

The average cost of a security breach

$500K

The average cost of system failure

Highest
Assurance level of security with Common Criteria certification (EAL 5+)

Encryption
of data at rest, in flight, and in use

Enterprise Key Management
across mainframe and distributed

IT Analytics
to spot potential failures and capacity needs before they occur

99.999%
Design point for application availability

Zero
Second recovery point objective across thousands of miles

NEW

InfoSphere Guardium V9.1

Ensure data integrity by protecting high-value data and automating compliance policies

Security

VISA

Exploit zEnterprise to secure billions of credit and debit card payments every year

ICBC

Ensure availability with real time failover from Shanghai to Beijing

IBM's consistent, sustained investments in System z

System z

Freedom through design

- Annual investments in System z continue to exceed $1B
  - Internal investment in development and external partnerships for the ecosystem
- Development projects that span next 7 years in place
- Focus investment areas are:
  - Analytics for instant insight
  - Superior Service through Lower cost with Open Cloud management
  - Increase performance and system capacity for varied workloads
  - The foundation for a Mobile Enterprise
  - A Robust and Trusted infrastructure

The Future of Next Gen Mainframe Systems

Atomic level storage

Cognitive Systems

Optical circuits

Neuro Synaptic chip

Greater parallelism

Hybrid clouds

Natural intuitive interfaces

Self check-pointing and invisible failover

Tamper proof processing

Thank You