

# IBM z Systems – Redefining Digital Business

Positioning your enterprise for cloud, analytics  
and mobile computing



# Agenda

- 1. Positioning your enterprise for cloud, analytics and mobile computing**
2. The mainframe and mobile computing: A perfect match  
*Break (15 minutes)*
3. Scoring fast and winning big with analytics on z Systems  
*Lunch (60 minutes)*
4. Implementing hybrid clouds with z Systems  
*Break (15 minutes)*
5. Easy and agile development and administration for cloud, analytics and mobile computing
6. Building the business case for cloud, analytics and mobile computing  
*Wrap up and Q&A*

# Driving forces in the world today – businesses must transform... or fail!

“ *Most C-level executives say the three key trends...*



**Mobile Computing**



**Big Data and Analytics**



**Cloud and new delivery platforms**

*are strategic priorities at their companies.* ”

# Digital business is an unprecedented convergence...

In 2020, we will have **7B people and businesses, and over 30B devices**, all connected to the internet...

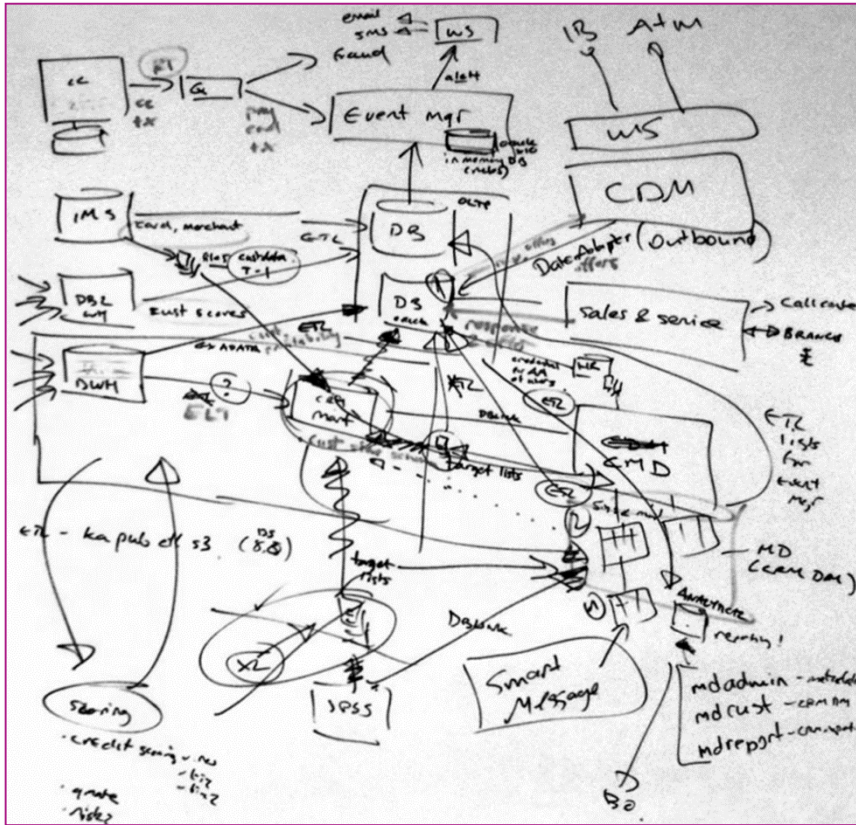
People, businesses, and things are **interacting, communicating, transacting, and even negotiating** with each other

The lines between the physical world and the digital world are **blurring**...

... causing a **disruption** of existing business models...



# Many businesses struggle to position themselves



## Volumes of data

More data is good – but it impacts storage, processing, replication, accuracy and exchange

## Latency

Response times are too slow, information is not readily or easily available

## Architectural complexity

Large amounts of underutilized resources creates management headaches

## Unsustainable Costs

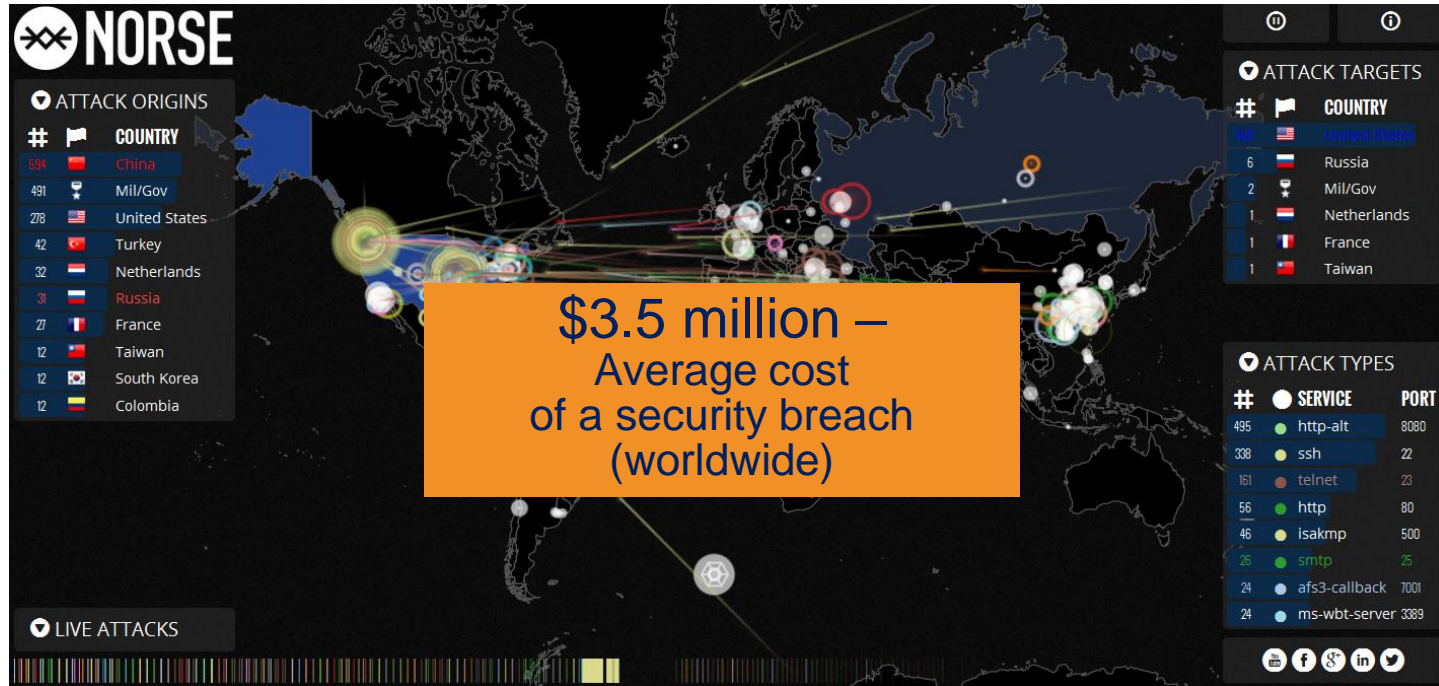
Most businesses struggle to maintain status quo

## Constant security threats

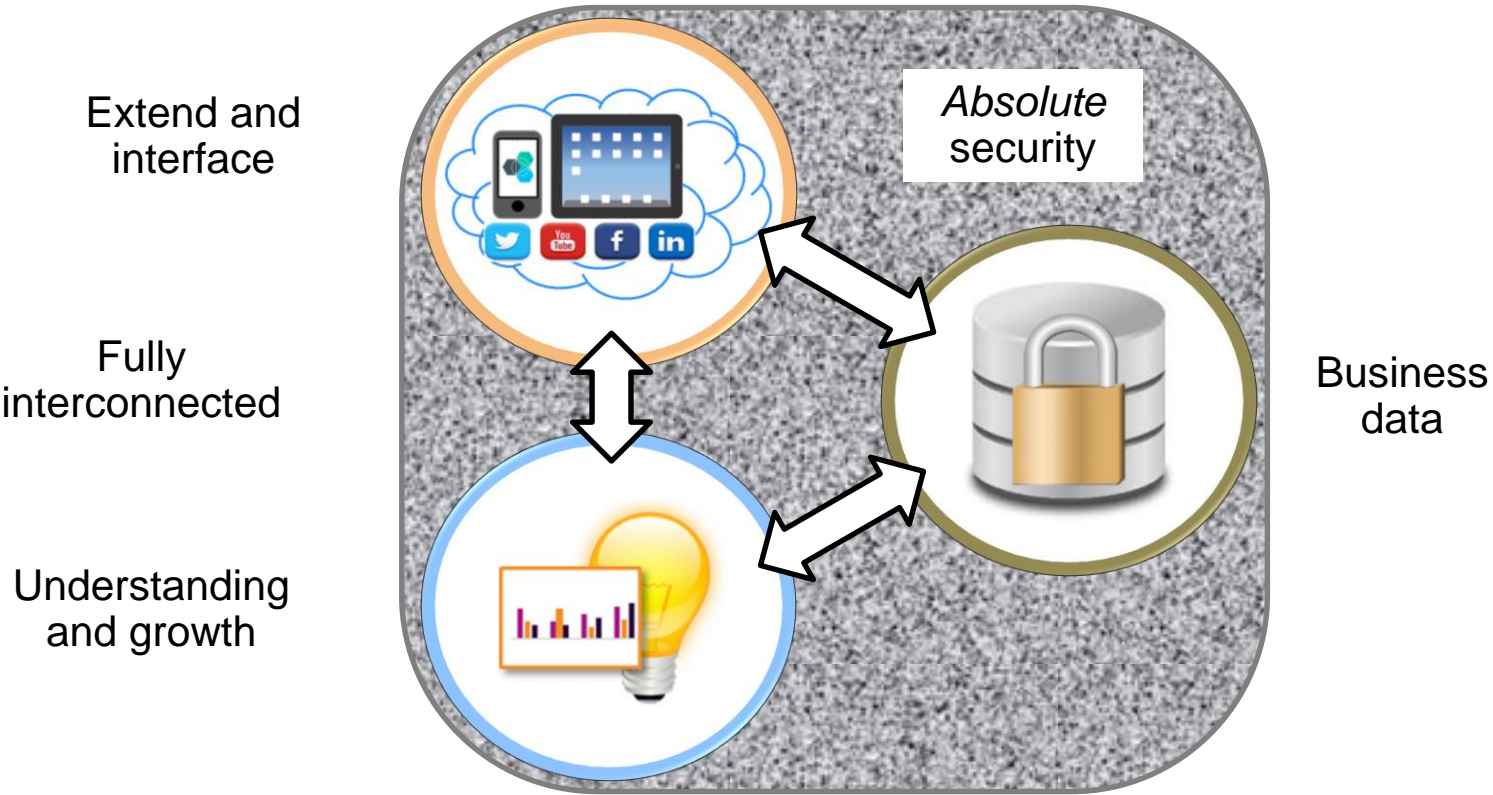
Risk has never been higher, new threats occur every second

# Security is increasingly important... and incredibly costly if ignored!

<http://map.ipviking.com/>



# Embracing digital business involves focusing on a few key areas



# Data and information are at the center of every business

- The trusted, centralized, single version of the truth
- Authoritative / governed / regulated
- Highly secure, with strict access control
- Always available
- Supports major, mission-critical business workloads including transaction processing and batch processing

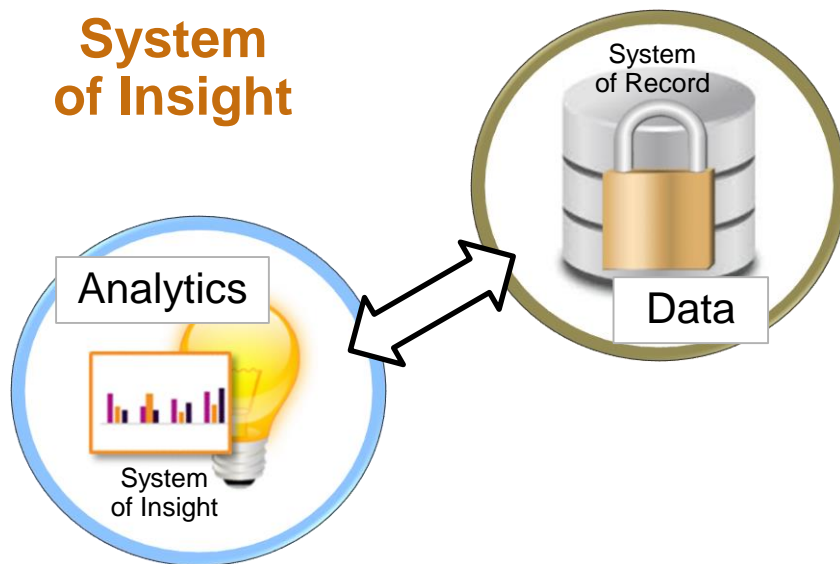
## System of Record





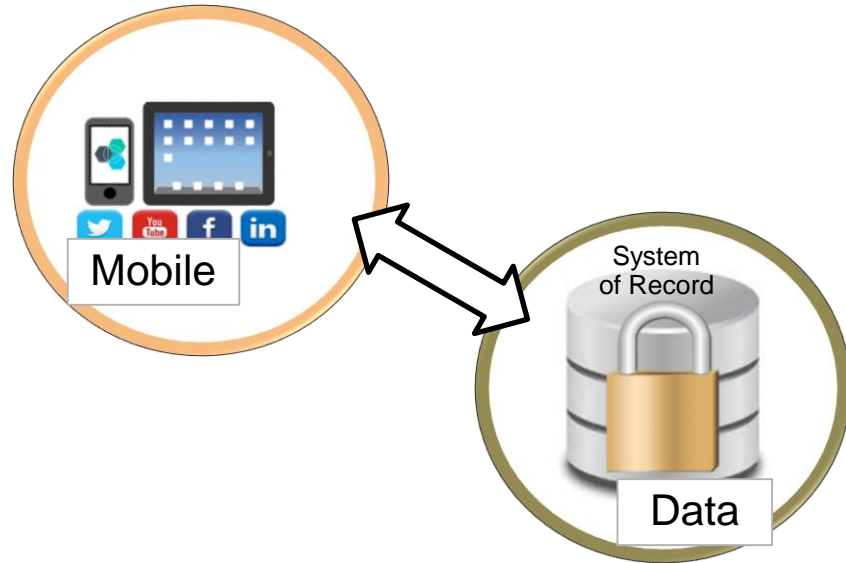
# Deep predictive real-time analytics adds a new dimension to business data and information

- Handle all kinds of data, structured and unstructured, in *huge* amounts
- Ultra-fast response times to complex queries as well as simple queries
- Enhances business value with real-time forecasting and insight



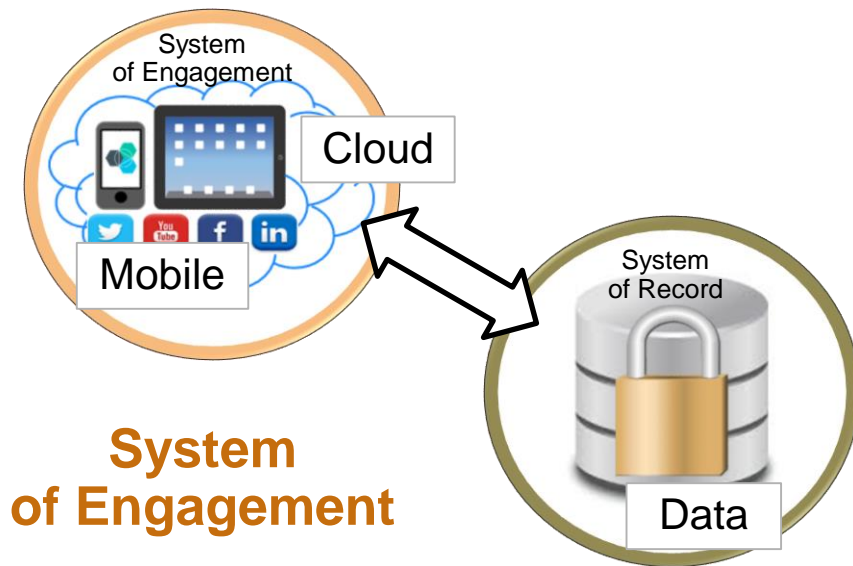
# New interfaces extend the business to connect with the mobile world...

- Agile, social and engaging interfaces to legacy data and transactions on the System of Record
- Always on, and very fast response times
- Unfettered, and engaging support for all devices



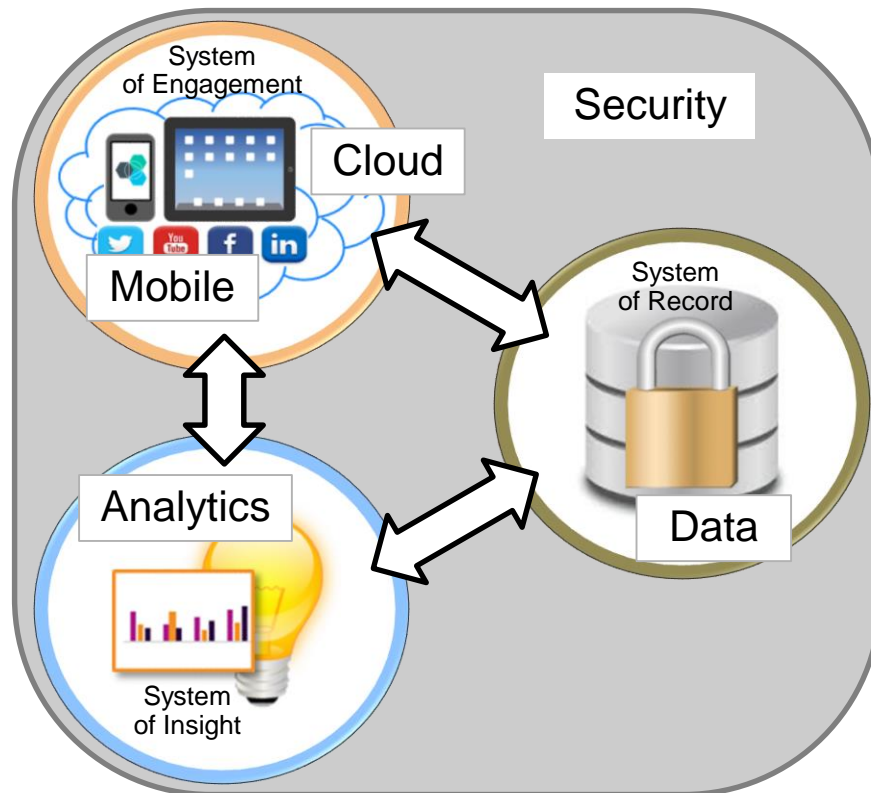
# ...Extension also enables cloud computing and enhanced, hybrid service delivery models

- Driven by client demand, with self-service and ease-to-use
- Immediate response
- Cost-effective, elastic and scalable
- Open architecture



# Security – an imperative – must be pervasive across the entire picture

- Security of data and transactions
- Centralized
- Strict governance and audit control
- Deepest levels of cryptography



# IBM z Systems are the established Systems of Record for businesses today

- Exceptional performance and capacity
- Highest levels of security and availability
- Unmatched reputation for reliability
- Near linear scalability to millions of MIPS

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



# The IBM mainframe is everywhere – it's the data and transaction hub for the global economy



Mainframes process **30 billion** business transactions per day

Mainframes enable **\$6 trillion** in card payments annually

Who uses mainframes?

**25** of **25** top banks worldwide

**10** of **10** top insurance companies

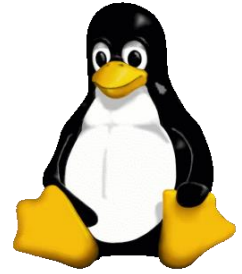
**>90%** of the largest US retailers

**>90%** of the world's largest airlines

Mainframes run **68%** of the world's production workload capacity, but at only **6.2%** of total server spend

# Today's mainframe is a lot *more* than just old legacy business applications and data...

- z Systems fully support **Linux** in addition to z/OS (and VSE, TSO, etc.)
- z Systems are **open platforms**, supporting numerous open standards and interfaces (e.g., SOAP, REST, etc.), and many standards-based languages (e.g., Java)
- IBM continues to **invest billions** in z Systems, not just hardware but middleware and connectivity as well



openstack™  
CLOUD SOFTWARE

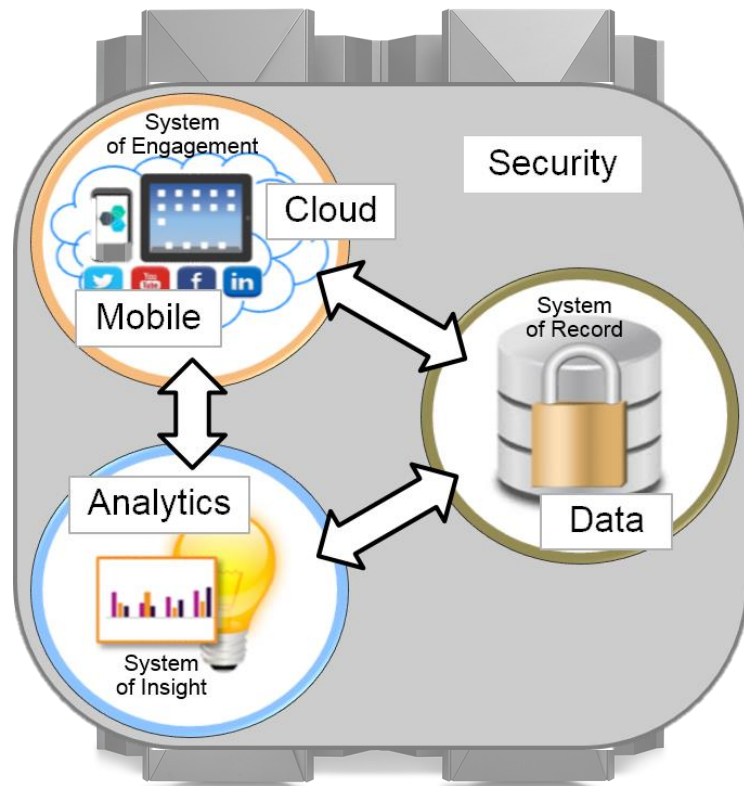


# z Systems platforms are the only ones capable of integrating all facets of digital business

- Undisputed, world-leading **System of Record**
- An unmatched **System of Insight** for **Analytics** and business growth
- The best **System of Engagement** for interface with **Mobile** users and **Cloud** workloads
- Fully interconnected, with top to bottom ultimate **Security**

*Remove the complexity...*

*Reduce the cost...*





# Now we have the most advanced mainframe ever – introducing IBM z13

- ✓ *The most advanced information, data and transaction engine...*
- ✓ *The best platform for cloud, analytics and mobile computing...*



**Let's look at how z13  
is redefining digital business**

# z13 gives you more capacity for integrating data, transactions and insight

Up to **141** configurable cores

Uni-processor = **1,695 MIPS**

**36%** more on-chip cache

Up to **3x** more memory – 10 TB

More logical partitions (85 vs 60)

Increased scale and management for I/O

**2x** improvement in crypto performance

**4x** improvement in zEDC compression



Increase in granularity (90 vs 60 capacity settings)

Simultaneous Multi-threading

Built-in vector processing facility (SIMD)

Increased virtualization of 10GbE RoCE Express

IBM zAWARE support extended to Linux on z

Linux / KVM support\*  
GDPS appliance\*

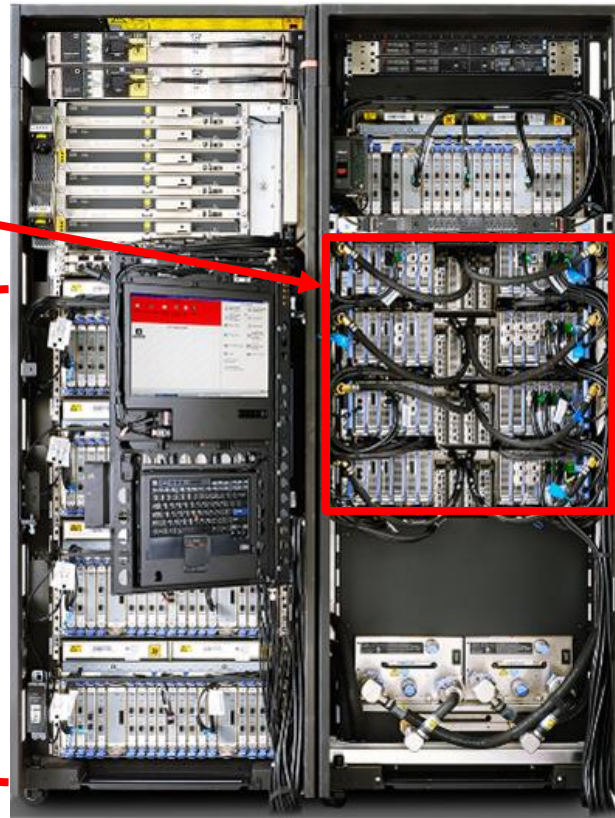
# The new physical design of the z13 improves serviceability

New drawer-based design introduces cables between the drawers

PCIe Gen 3 I/O drawers (1-4)

Same 2-frame base system, with no significant increase in weight

Maintains 27.5 kW box max input power (same as z10 EC, z196, and zEC12)

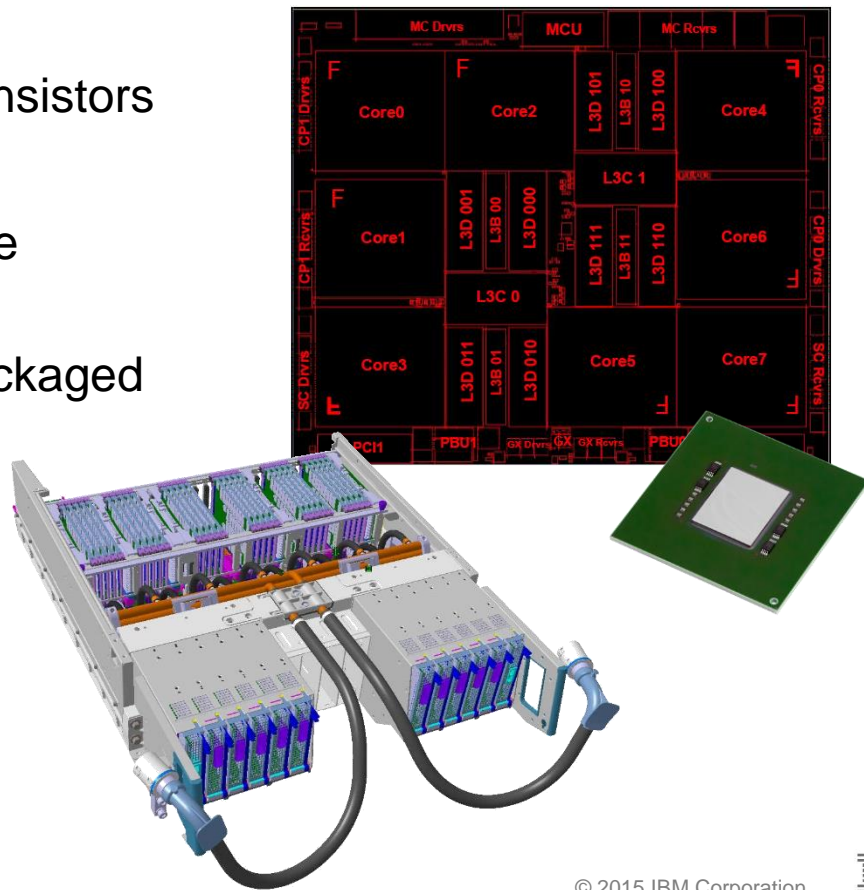


PCIe Gen 3 I/O drawer (5)

Serviceability options –  
Non-raised floor,  
Water cooling,  
High-voltage DC power,  
Top exit power,  
I/O cabling  
– designed to increase flexibility and save space

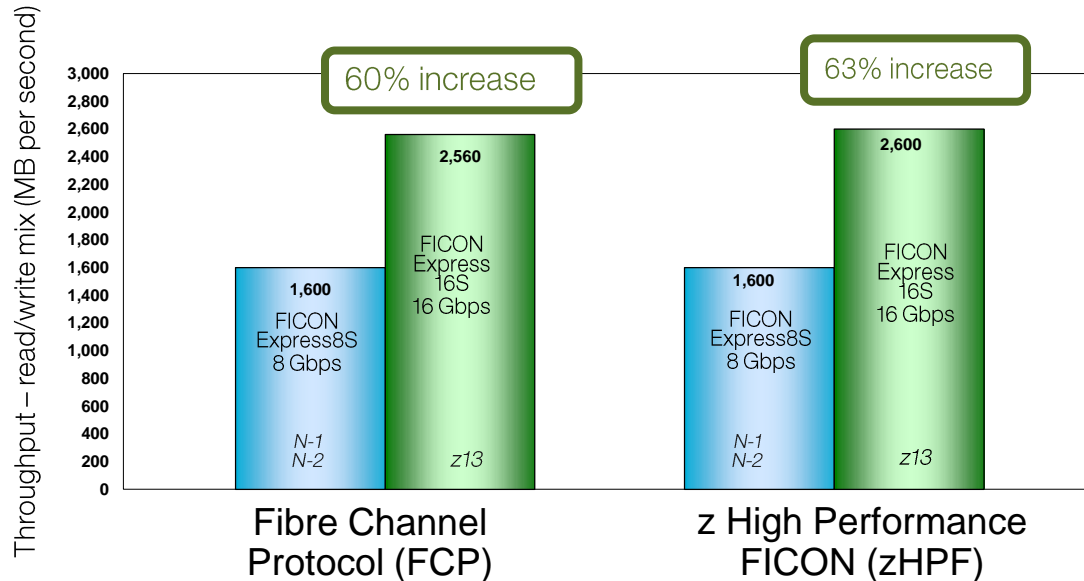
# The new chip design and features yield higher performance

- 22 nm SOI technology – almost 4B transistors
- Up to 8 active cores per chip
- Redesigned cache interface; 36% more on-chip cache
- 4 Drawers total – each with 6 chips packaged in Single Chip Modules
  - 10-12% more capacity per core than zEC12
- Fully configured server delivers more than 111,000 MIPS
  - Over 40% more z/OS processing capacity than zEC12



# Faster I/O means faster response times for transactional and other workloads

PCIe Gen3 in z13 supports faster FICON cards



- Increased bandwidth reduces number of I/O slots used
- Enables greater exploitation of Flash Express, zEDC Express and 10GbE RoCE Express

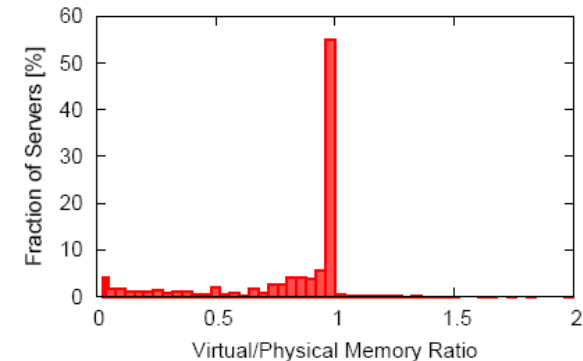
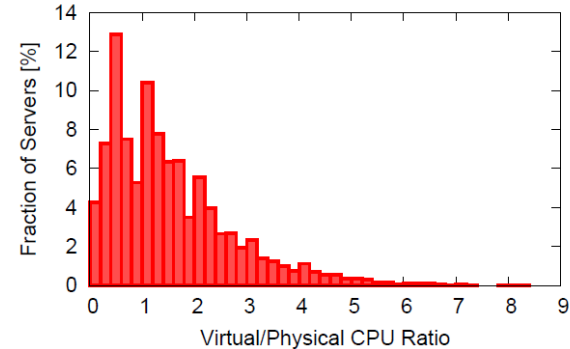
# More memory (up to 10 TB) yields more sustainable business growth

Research on state-of-the-art usage practices at very large-scale virtualized production data center shows:

- Strong tendency to over-commit CPU – (Some workload slow-down is acceptable)
- Memory was *rarely* over-committed – (Insufficient memory results in significant slow-down, paging, error, and possibly failures!)

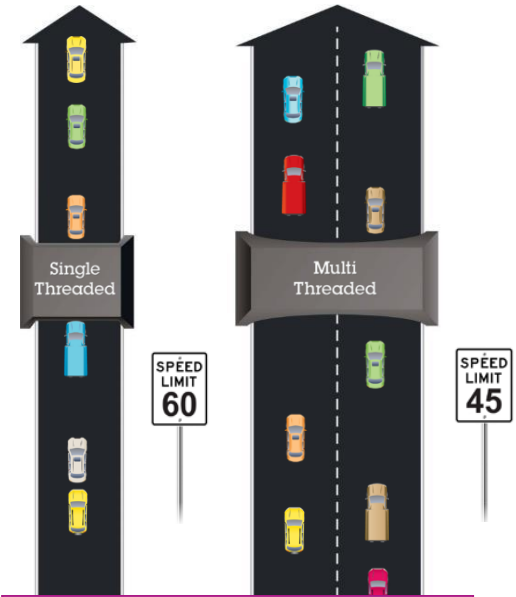
## Memory is more important than CPU

- z Systems – with very large memory – are more efficient platforms
- Big Data needs Big Memory!



# z13 introduces Simultaneous Multi-threading (SMT) for specialty engines (IFL and zIIP)

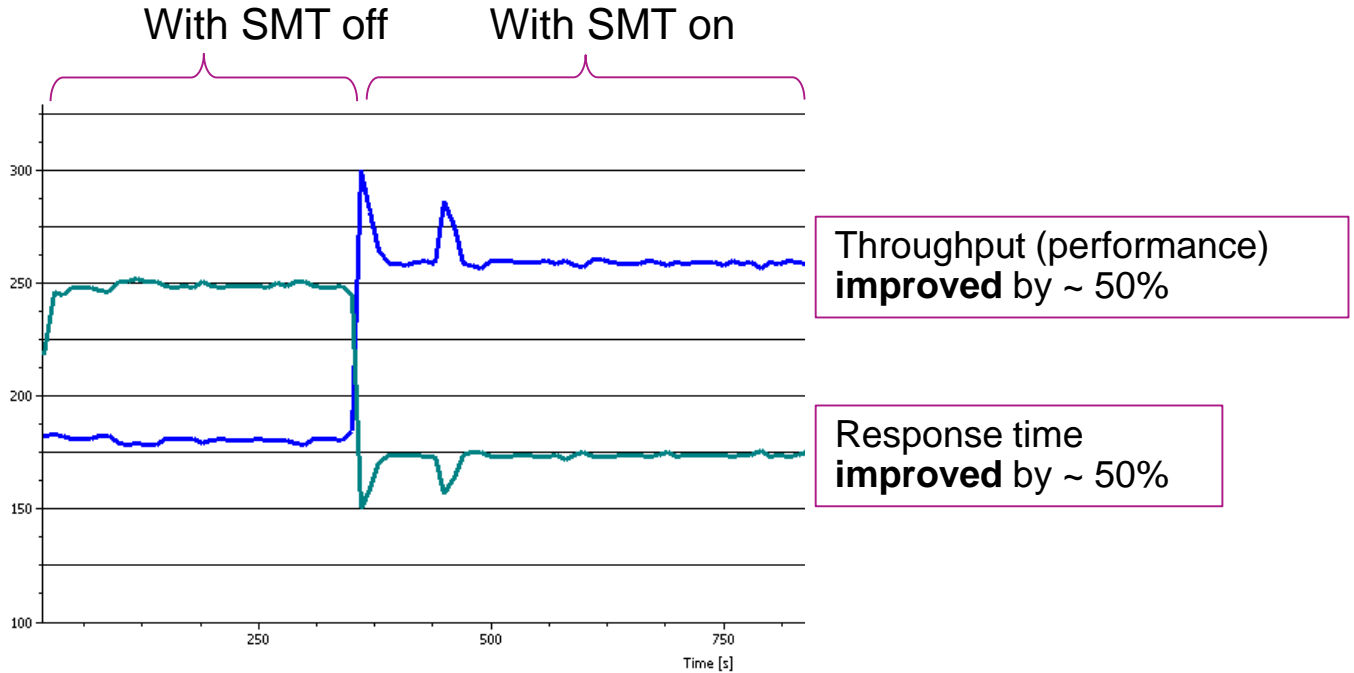
- z13 now supports two instruction **threads** per core
  - Threads share all core resources, each thread has its own unique state information
  - z13 insures that one thread can't lock out the other
- Implemented for IFL and zIIP workloads only
  - Independently implemented for each LPAR – operating system must be explicitly enabled
  - Support up to 32 multi-threaded core (64 threads)
- Architecturally transparent for middleware and applications
  - Some applications may require modifications to work well



**38%** performance improvement of zIIPs in z13 over zEC12

**32%** performance improvement of IFLs in z13 over zEC12

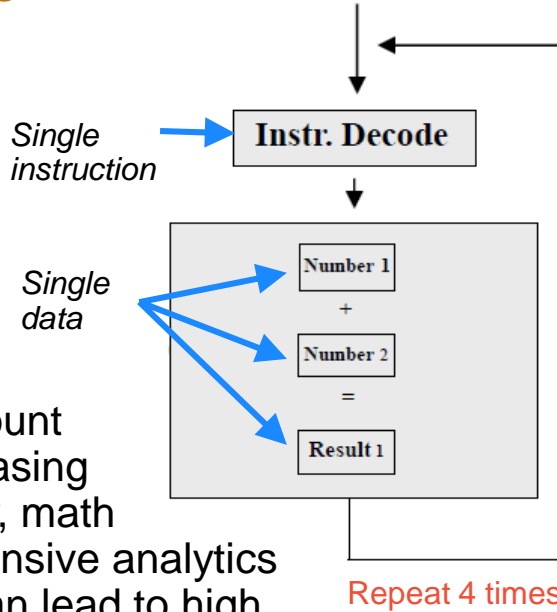
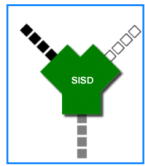
# DEMO: SMT gives significant boost to workloads with zIIP offload





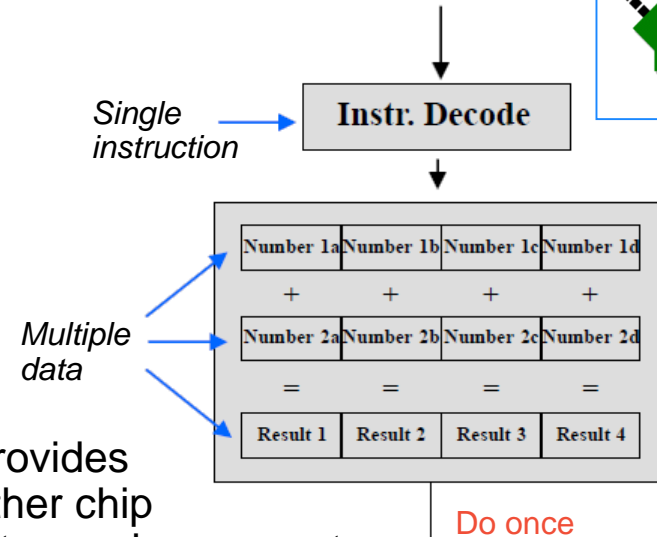
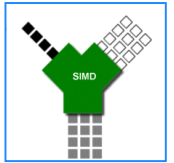
# Vector processing with SIMD speeds up compute-intensive analytical workloads

## Single Instruction Single Data (SISD) - previous



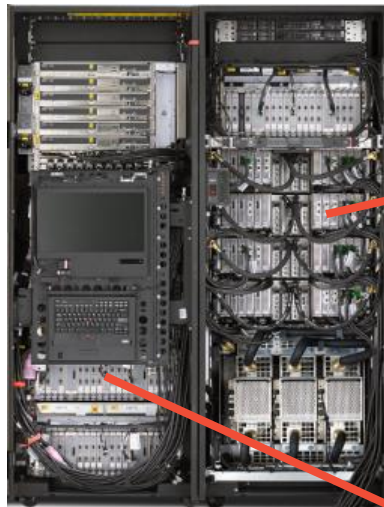
With the amount of data increasing exponentially, math and data-intensive analytics computing can lead to high MIPS usage

## Single Instruction Multiple Data (SIMD) - now in z13

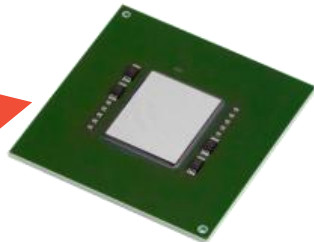


SIMD provides yet another chip architecture enhancement - for analytics and compute-intensive competitiveness on z Systems

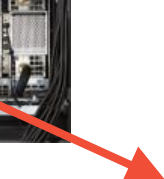
# Enhanced cryptographic features add to z Systems existing reputation for ultimate security



Each core has its own CPACF co-processor



Trusted Key Entry workstation required for management of Crypto Express5S (provides secure key entry)



- The Central Processor Assist for Cryptographic Function (CPACF) has been optimized to provide up to **2x faster** encryption functions
- Hashing functions in CPACF are up to **3.5x faster**

**50%** reduction in cost of ubiquitous encryption

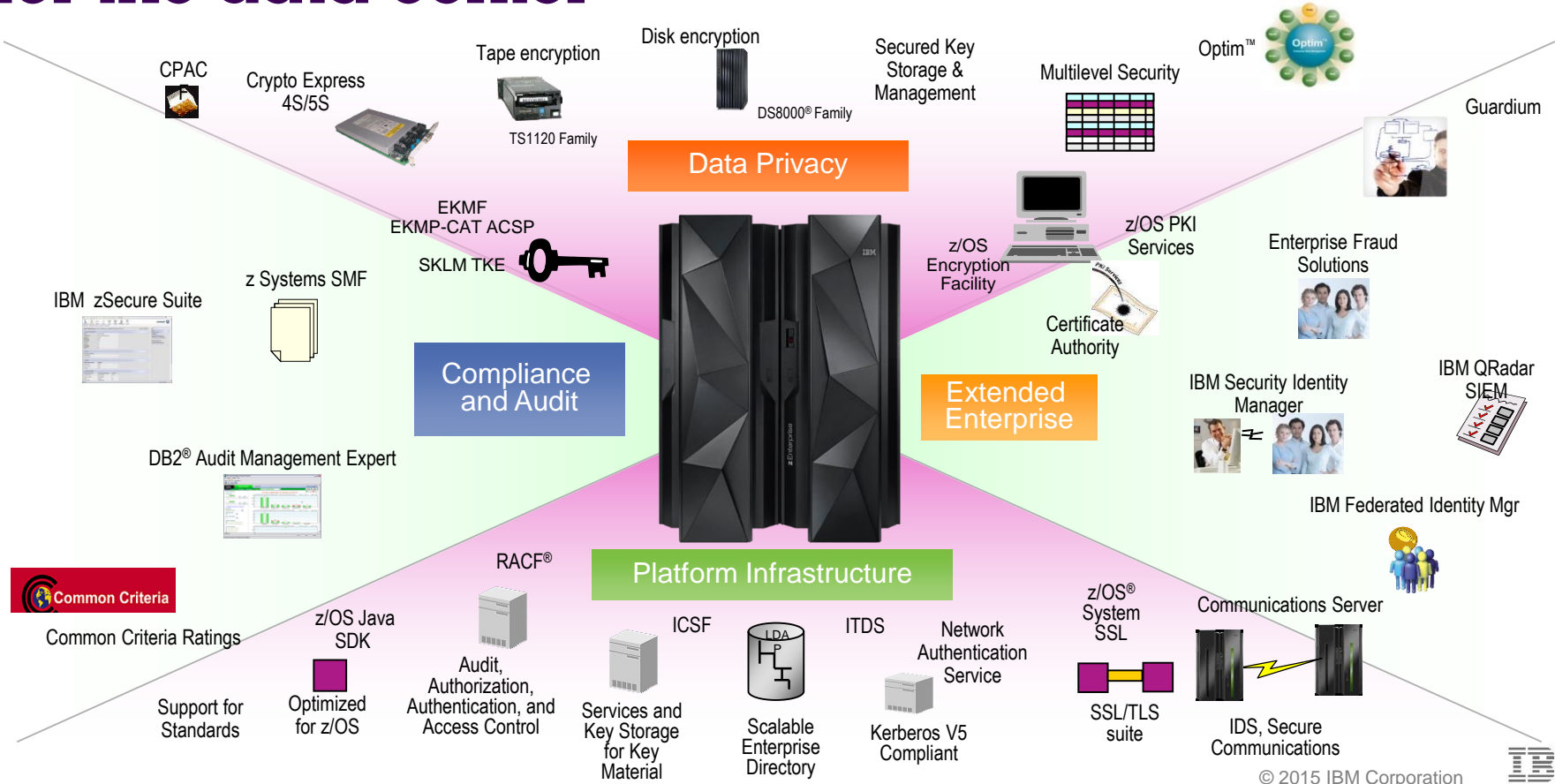
- Crypto Express5S PCIe feature has up to **2x better** performance than 4S
- New crypto algorithms (i.e. Elliptic Curve, SHA3, Visa FPE) hardcoded in feature
- Meets FIPS, ANSI, PKI, and DK standards

# Enterprise-grade Linux further opens the platform and enhances qualities of service

- **IBM zAware for Linux** – *z Systems Advanced Workload Analysis Reporter*
  - IT analytics solution for rapid identification of system issues
- **Spectrum Scale for Linux on z** – *Based on GPFS technology*
  - Shared disk, parallel cluster file system for concurrent high-speed reliable data access
- **GDPS Appliance for Linux on z\*** – *Geographically Dispersed Parallel Sysplex*
  - IBM’s proven solution for Continuous Availability & Disaster Recovery
- **KVM and Docker Support\*** – *Open architecture options for z/VM and Linux*
  - Additional hypervisor and platform choices for running new and existing Linux workloads

“Enterprise-grade ... is about delivering a strategy that enables a consistent architectural model with the support and service necessary for [the] ... complex environment that organizations find themselves in. - Ben Kepes, contributor to Forbes”

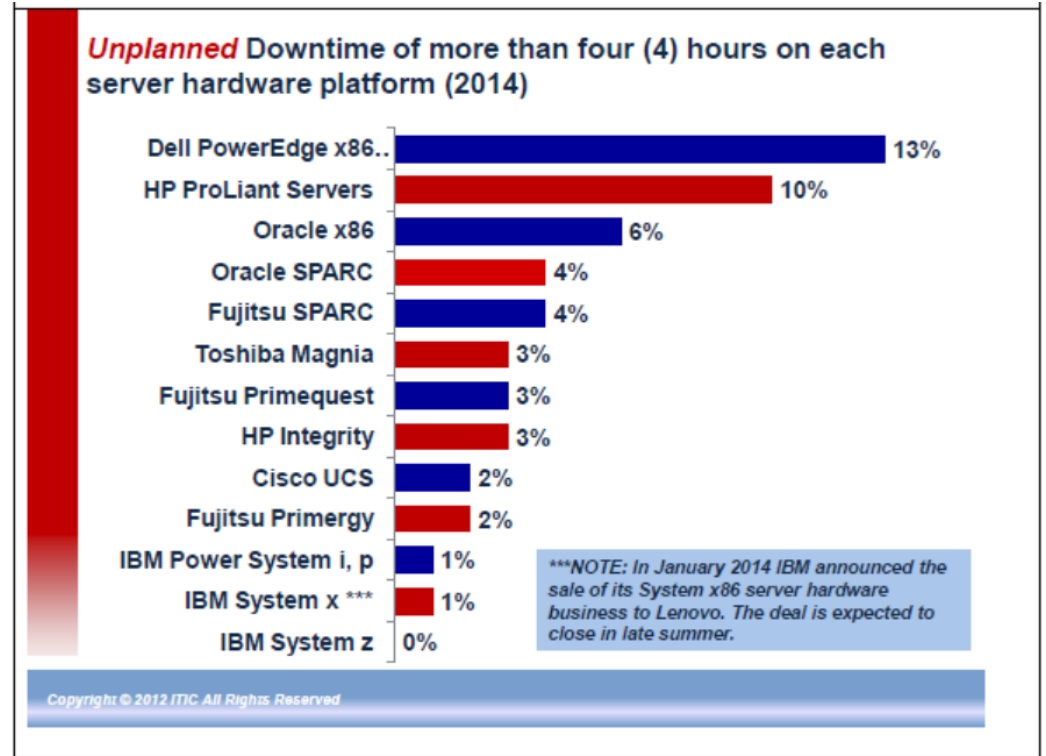
# Leverage z Systems as the enterprise security hub for the data center



# Compared to distributed servers, z Systems servers have minimal unplanned downtime

ITIC survey reports:

- z Systems is only server that had no – **0%** – unplanned system downtime due to any inherent flaws in the hardware
- Conversely, 13% of Dell PowerEdge x86 machines and 10% of HP ProLiant systems racked up downtime exceeding four hours per annum/per server



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# IBM z Systems – redefining digital business...

*Transaction Processing*

*Data Serving*

*Mixed Workloads*

*Operational Efficiency*

*Trusted and Secure Computing*

*Reliable, Available, Resilient*

*Virtually Limitless Scale*

- *The world's premier data and transaction engine enabled for the **mobile** generation*
- *The integrated transaction and **analytics** system for right-time insights at the point of impact*
- *The world's most efficient and trusted **cloud** system that transforms the economics of IT*