

Positioning Your Enterprise for Cloud, Analytics and Mobile Computing



Sessions in this track

1. Positioning your enterprise for cloud, analytics and mobile computing

Break (15 minutes)

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

Break (15 minutes)

6. Building the business case for cloud, analytics and mobile computing

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

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



Big Data and Analytics



Mobile Computing



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...

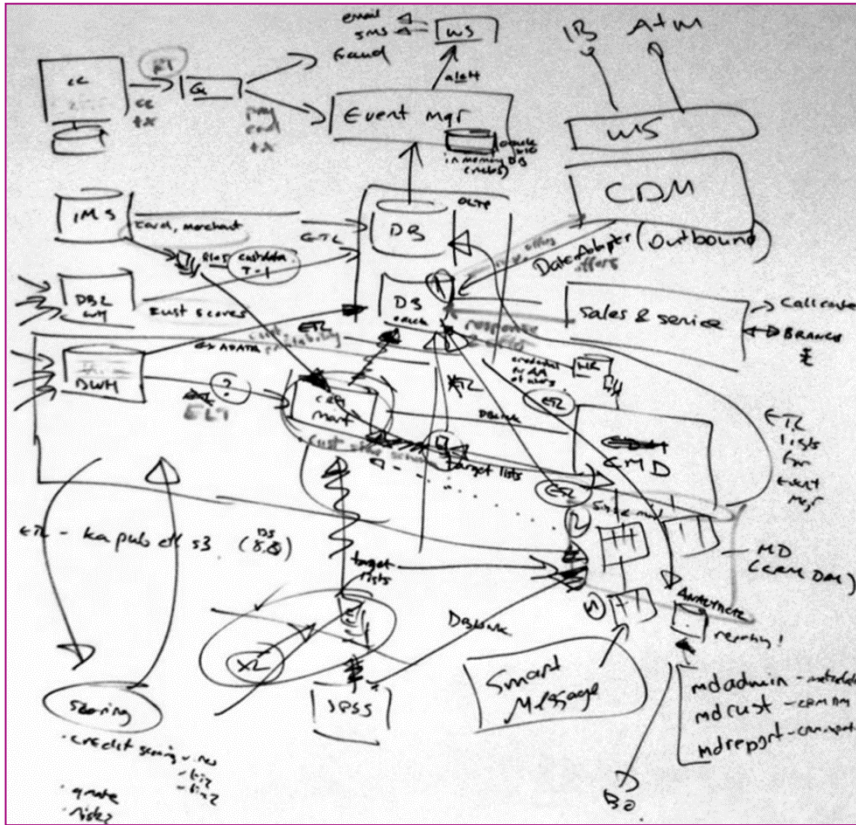
People, businesses, and things are **interacting, communicating, transacting, and even negotiating** with each other

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 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

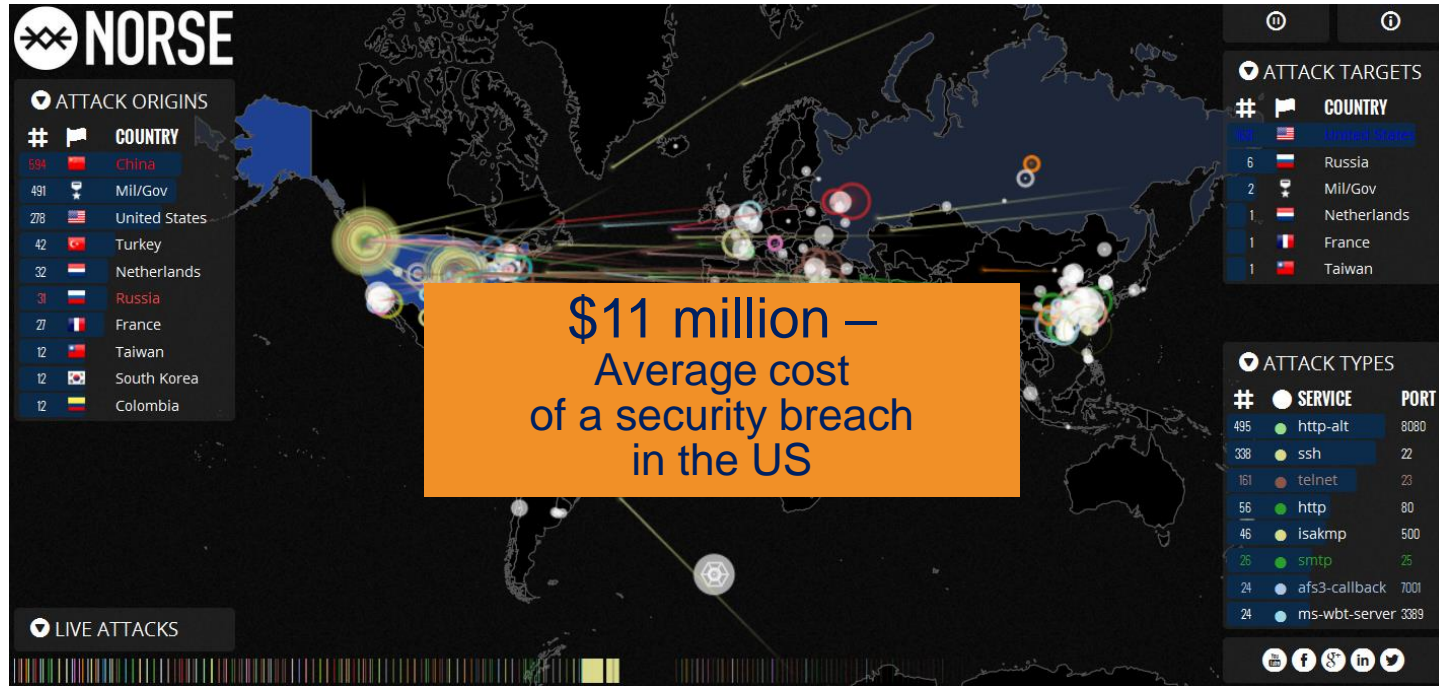
Most businesses struggle to maintain status quo

Constant security threats

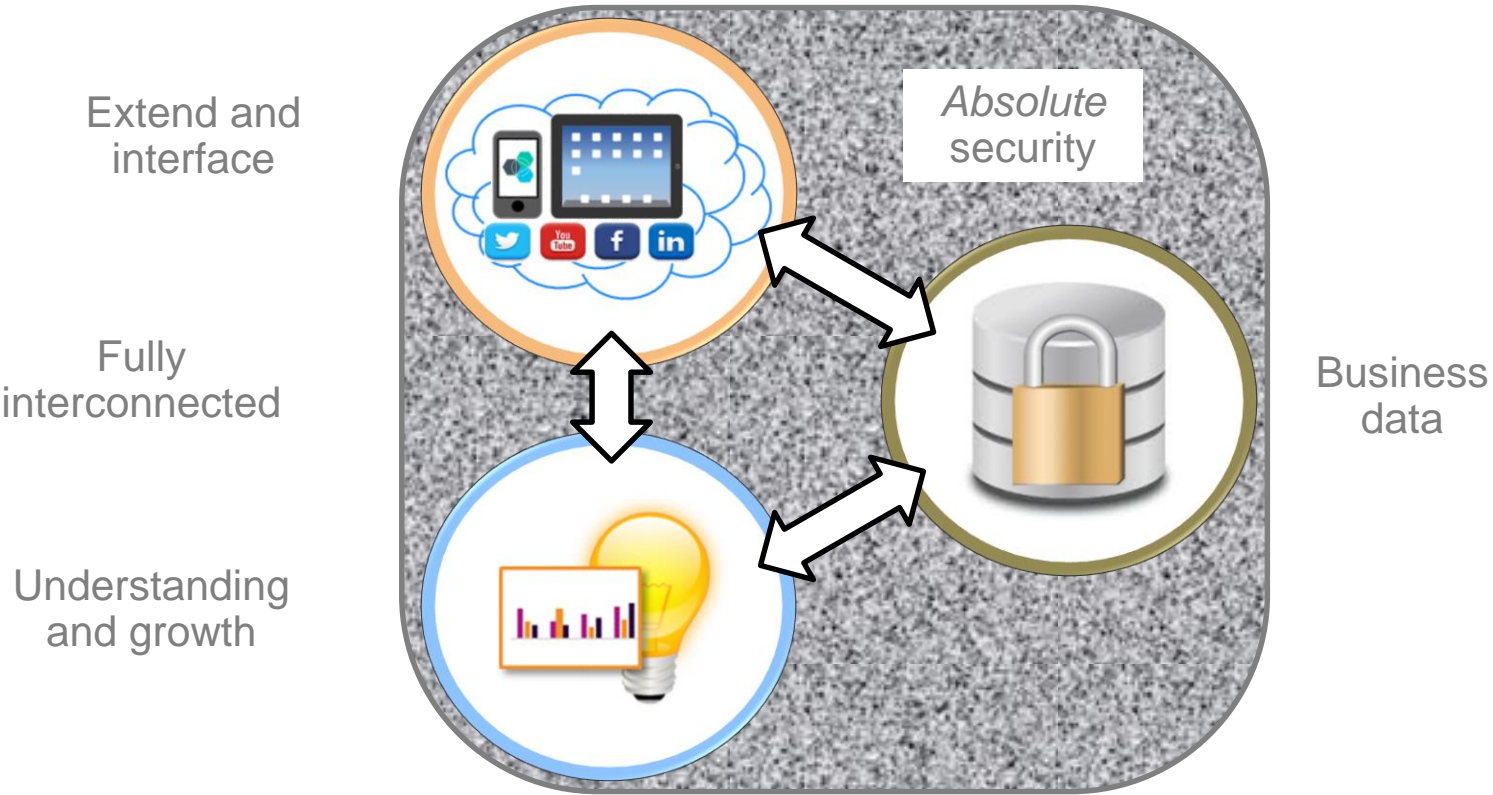
Risk has never been higher, new threats occur every second

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

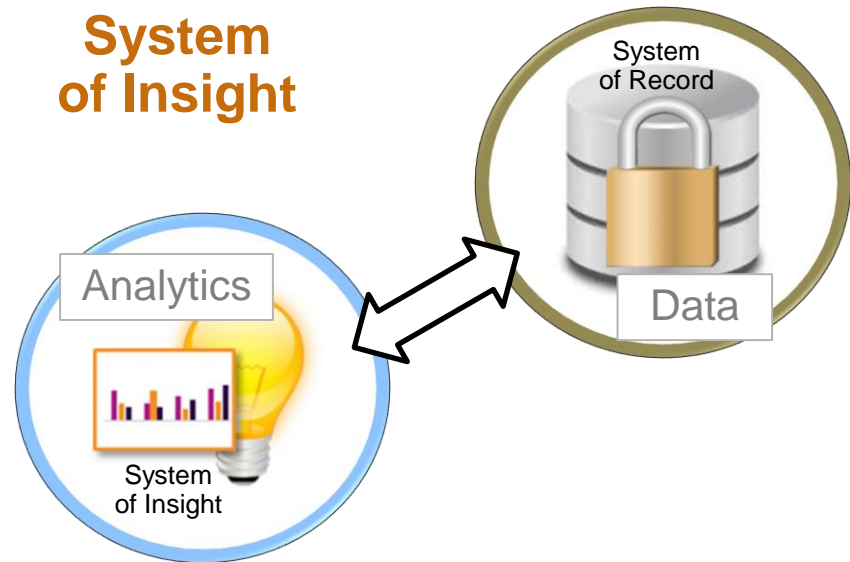
- The trusted, centralized, single version of the truth
- Authoritative / governed / regulated
- Highly secure, with strict access control
- Always available
- Supports major, mission-critical business workloads including transaction processing and batch processing

System of Record



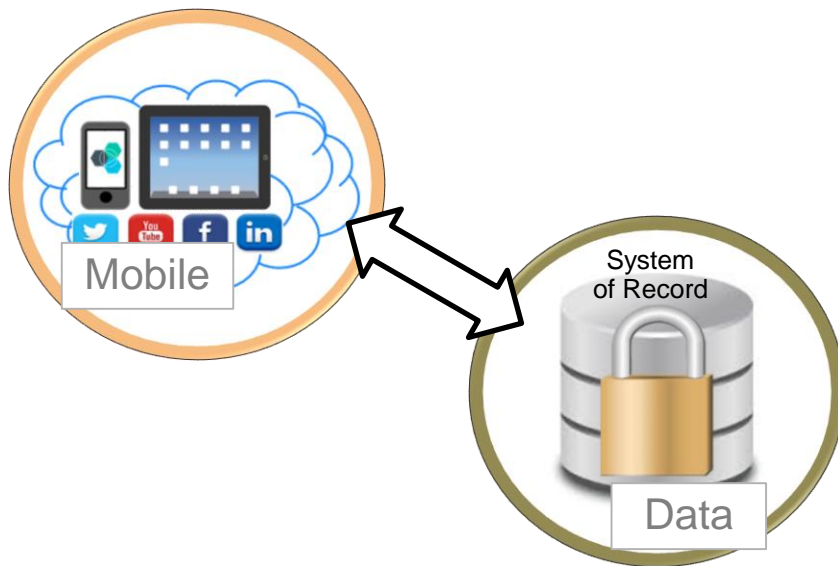
Deep predictive real-time Analytics adds a new dimension to business data and information

- 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



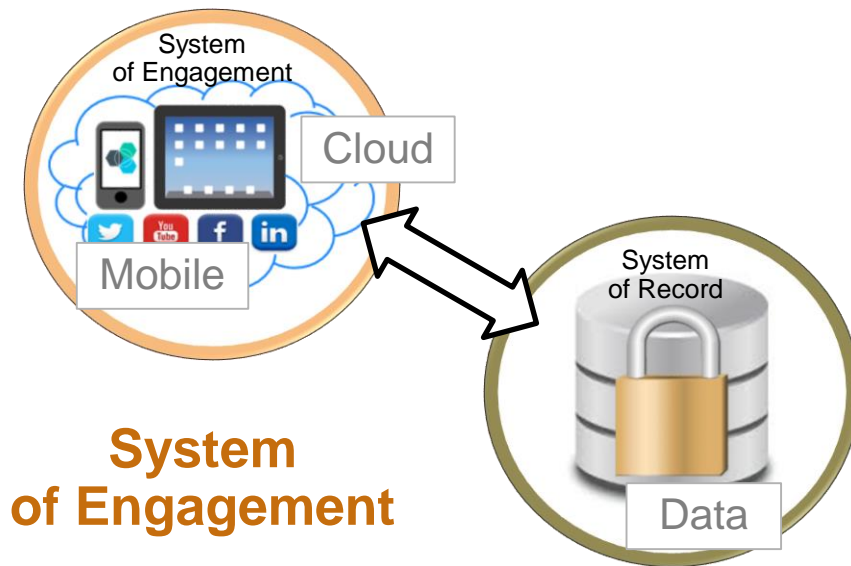
New interfaces extend the business to connect with the Mobile world...

- 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



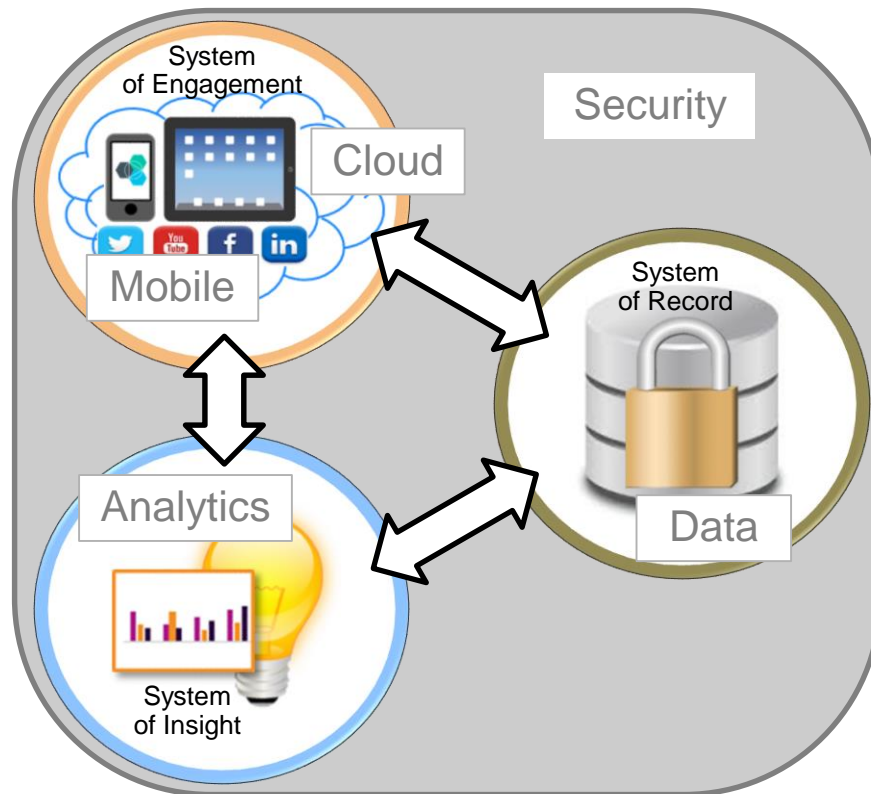
...Extension also enables Cloud computing and enhanced, hybrid service delivery models

- 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

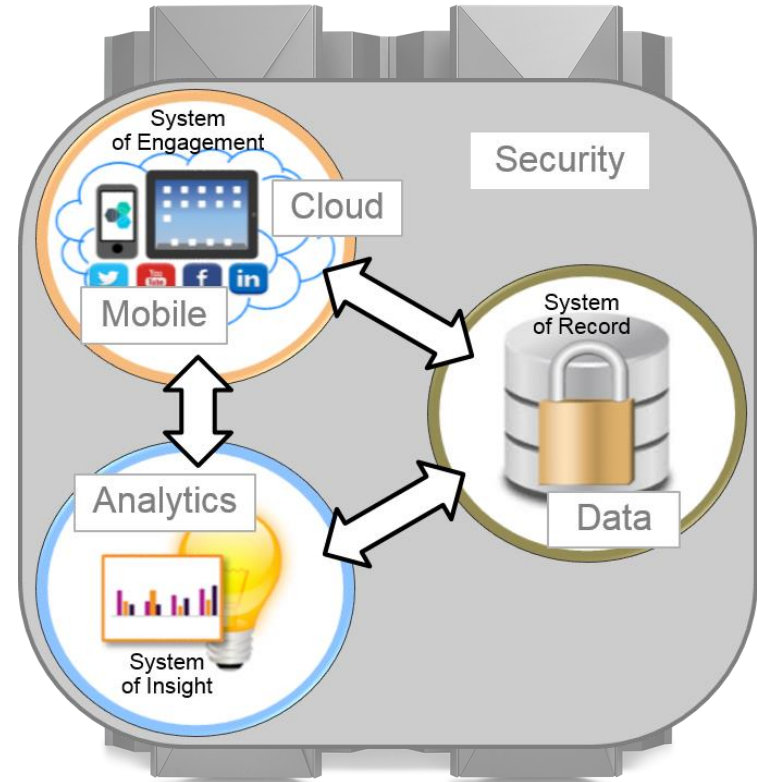


z Systems are the only platforms capable of supporting all facets of digital business

- 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 heart of your cloud, analytics and mobile computing...*



**Let's look at why z13
is the heart of 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*

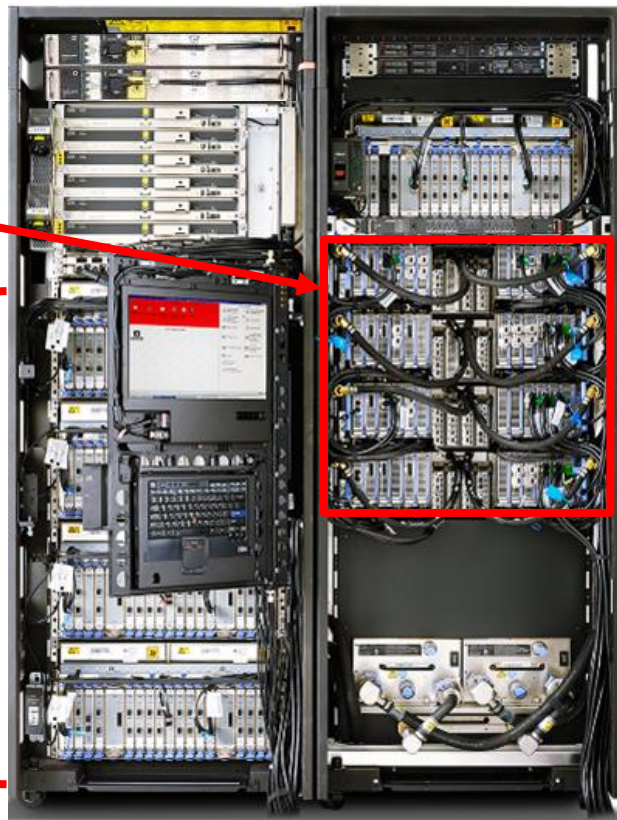
The new physical design of the z13 improves serviceability

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

Now includes a lock on the rear door!



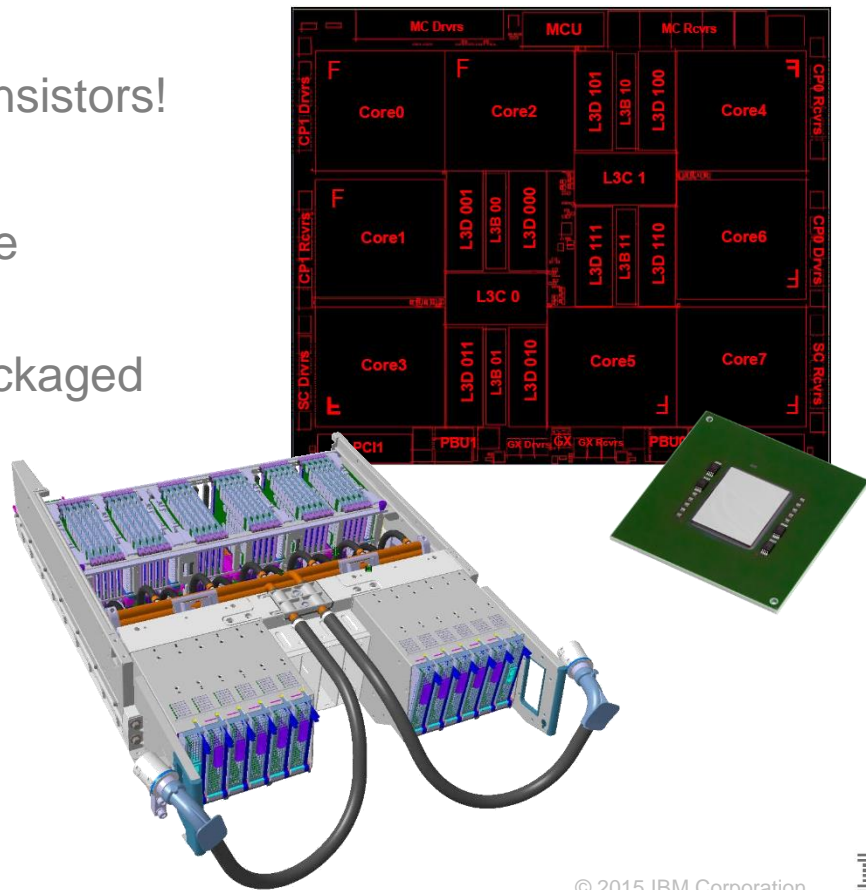
PCIe Gen 3 I/O drawer (5)

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

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

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 (z13)

16 GBps



PCIe Gen2
(zEC12/zBC12/
z196/z114)

8 GBps



InfiniBand
(z10/z196/z114/
zEC12/zBC12)

6 GBps



STI (z9)

2.7 GBps



STI (z990/z890)

2 GBps

6 Logical Channel
Subsystems (up from 4),
plus **increase** in number
of devices per channel



Enables greater exploitation
of other technologies
(e.g., Flash Express, zEDC Express,
10GbE RoCE Express, etc.)

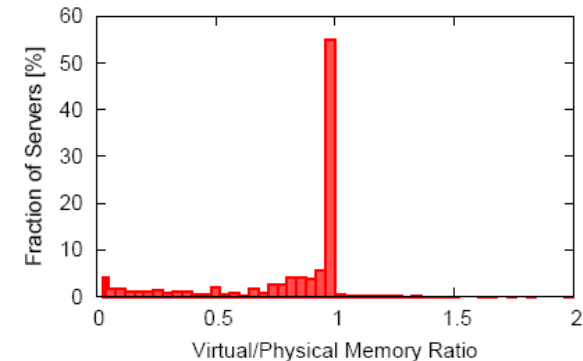
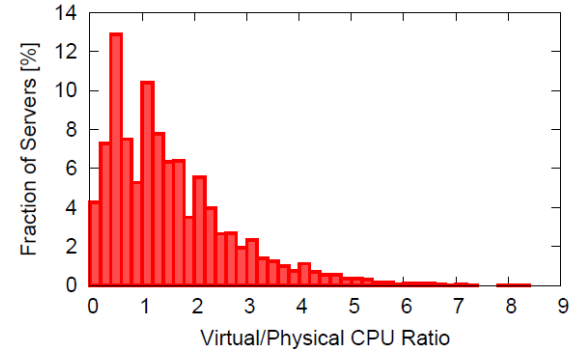
More memory (up to 10 TB) yields more sustainable business growth

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

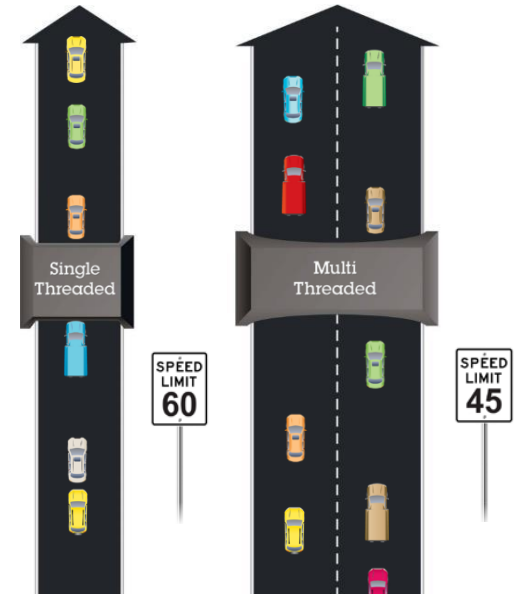
- z Systems – with very large memory – are more efficient platforms
- Big Data needs Big Memory!



Source: IBM Zurich Research Lab, "State-of-the-Practice in Data Center Virtualization: Toward a Better Understanding of VM Usage", by R. Birke, A. Podzimek, L. Chen and E Smirni

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

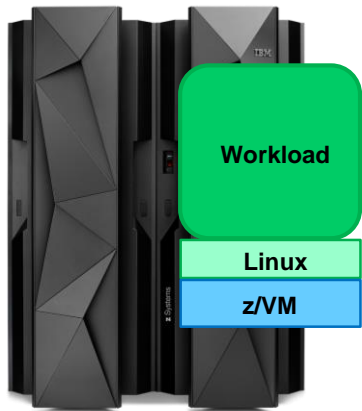


38% performance improvement of zIIPs in z13 over zEC12

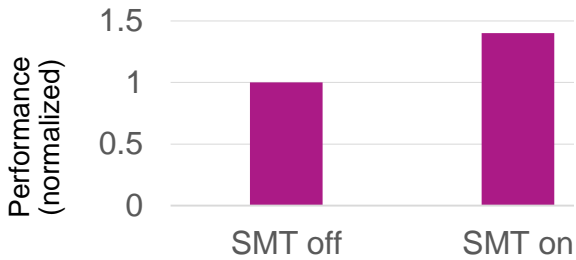
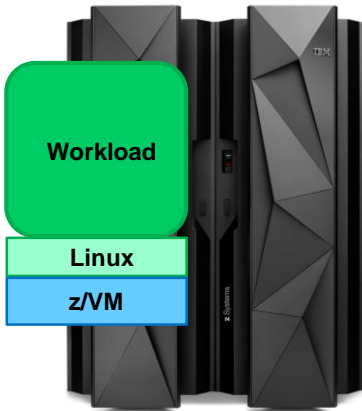
32% performance improvement of IFLs in z13 over zEC12

DEMO: SMT gives significant boost to Linux workloads at no additional cost

z13 (SMT off)



z13 (SMT on)



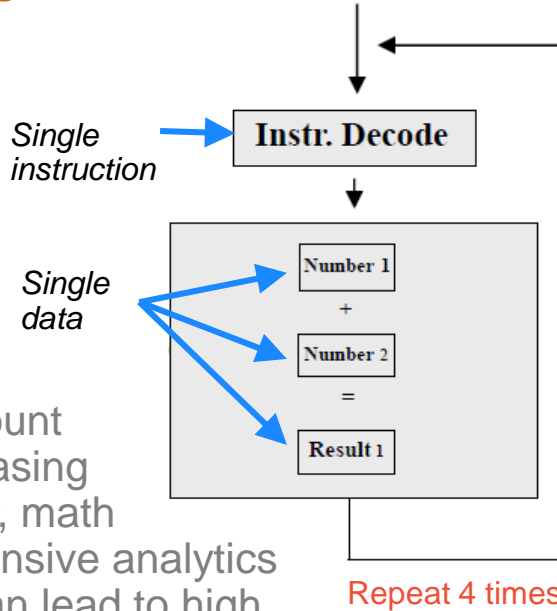
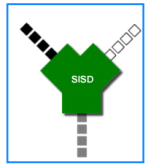
Competitive Project Office

Note: The improvement ratios from one thread to two threads are workload and configuration dependent and can vary widely.



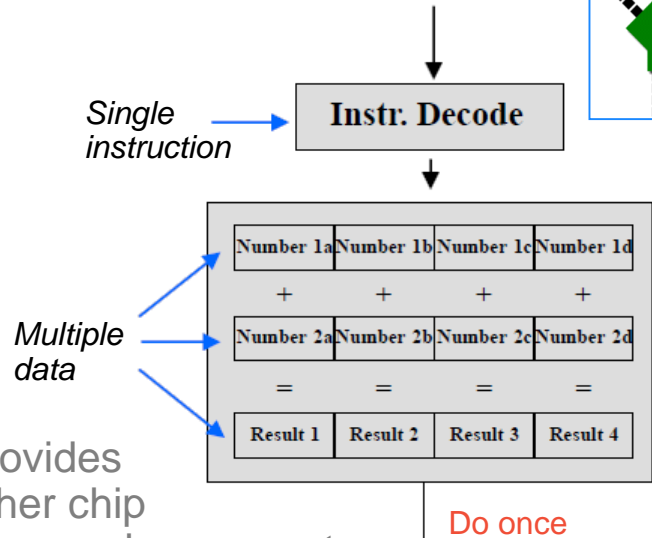
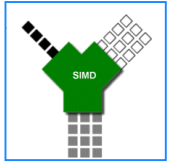
Vector processing with SIMD speeds up compute-intensive analytical workloads

Single Instruction Single Data (SISD) - previous



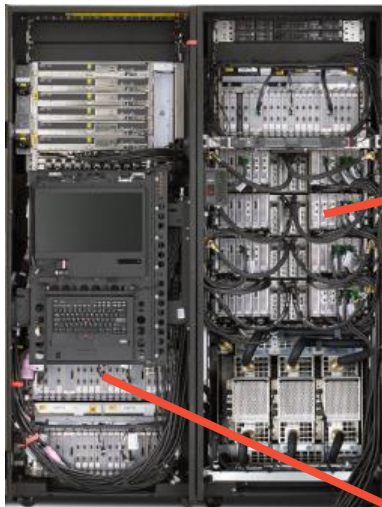
With the amount of data increasing exponentially, math and data-intensive analytics computing can lead to high MIPS usage

Single Instruction Multiple Data (SIMD) - now in z13

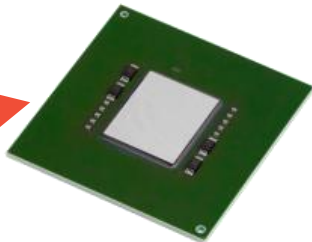


SIMD provides yet another chip architecture enhancement - for analytics and compute-intensive competitiveness on z Systems

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

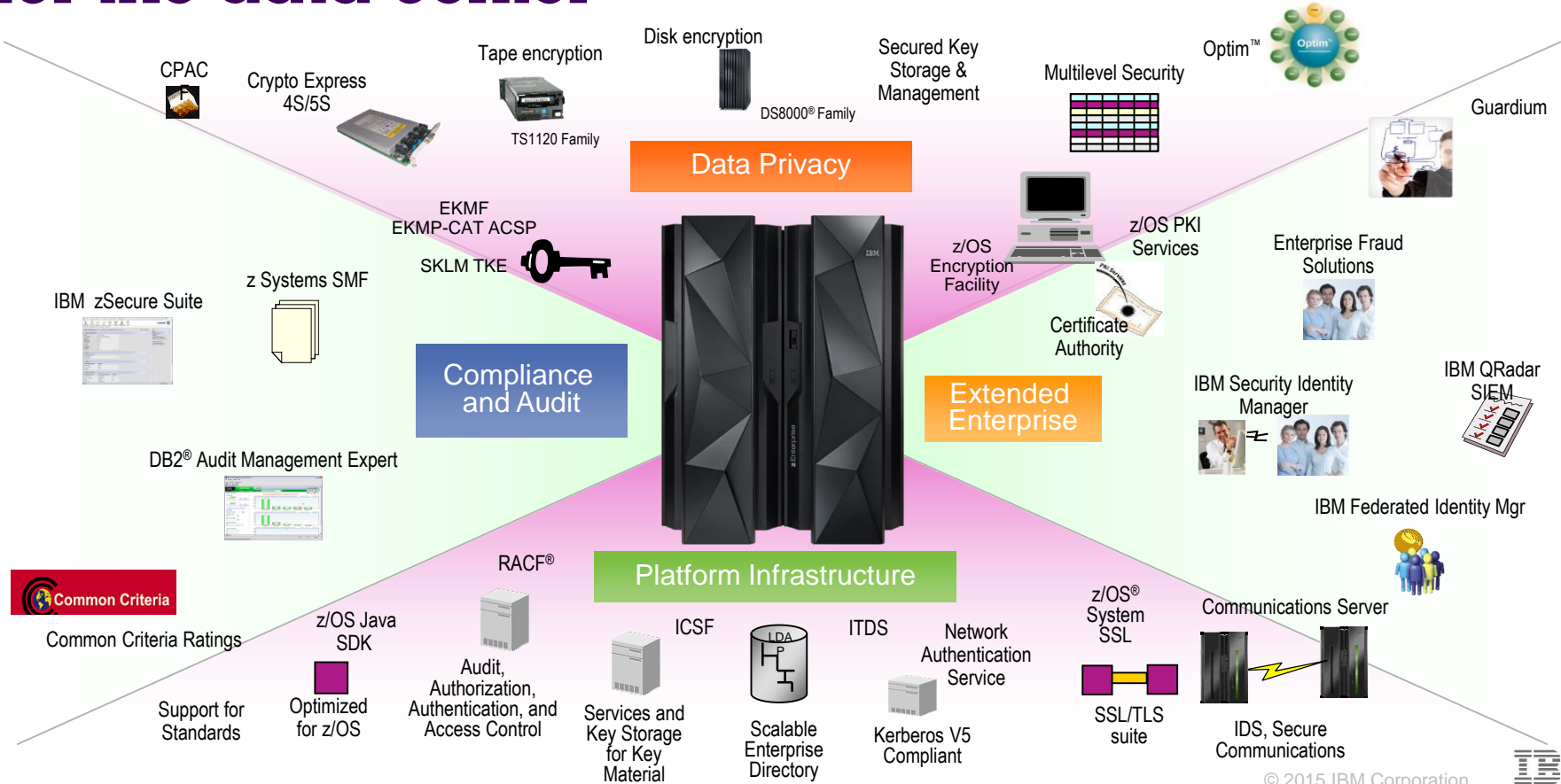
- Crypto Express5S PCIe feature has up to **2x better** performance than 4S
- New crypto algorithms (i.e. Elliptic Curve, SHA3, Visa FPE) hardcoded in feature
- Meets FIPS, ANSI, PKI, and DK standards

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
- **Elastic Storage for Linux on z** – *Based on GPFS technology*
 - IT analytics solution for rapid identification of system issues
- **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



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z Systems are the hub of the data center and the heart of digital business...

Transaction Processing

Data Serving

Mixed Workloads

Operational Efficiency

Trusted and Secure Computing

Reliable, Available, Resilient

Virtually Limitless Scale

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