Hocheffiziente Lösungen mit IBM z13 und Linux on z Systems

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World's leading businesses run on the mainframe

92
of the top 100 worldwide banks

10
out of 10 of the world's largest insurers

23
of the top 25 US retailers

23
out of 25 of the world's largest airlines

Processing the world's transactions & data

30 billion
business transactions processed on the mainframe per day

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

91 percent
of surveyed CIOs said that new customer-facing applications are accessing the mainframe

55 percent
of all enterprise applications need the mainframe to complete transactions

IBM.
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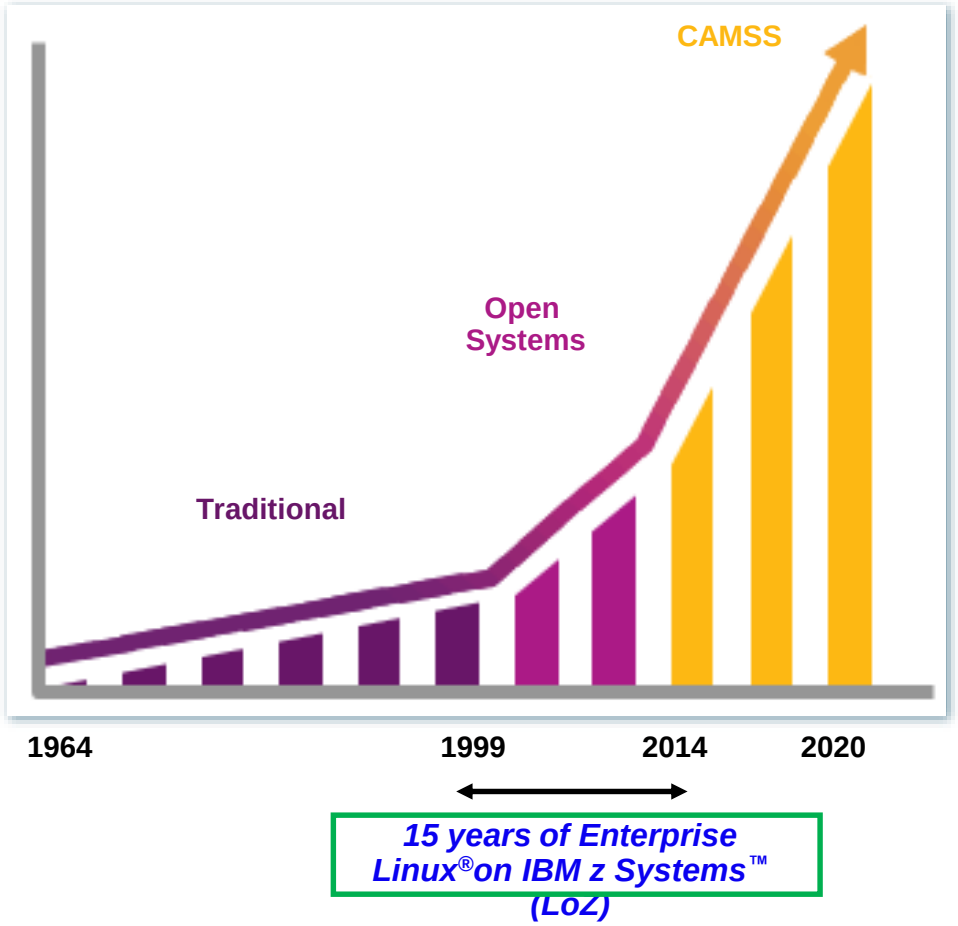
New marketplace dynamics will drive hyper growth opportunity for the IBM Mainframe



Traditional
1964–2014
- Batch
- General Ledger
- Transaction Systems
- Client Databases
- Accounts payable / receivable
- Inventory, CRM, ERP

Linux & Java
1999–2014
- Server Consolidation
- Oracle Consolidation
- Early Private Clouds
- Email
- Java®, Web & eCommerce

CAMSS[2]
2015–2020
- On/Off Premise, Hybrid Cloud
- Big Data & Analytics
- Enterprise Mobile Apps
- Security solutions
- Open Source LoZ ecosystem enablement

1. MIPS :Millions of Instructions per Second or the metric z uses to measure client workload
2. CAMSS: Cloud, Analytics, Mobile, Social, Security

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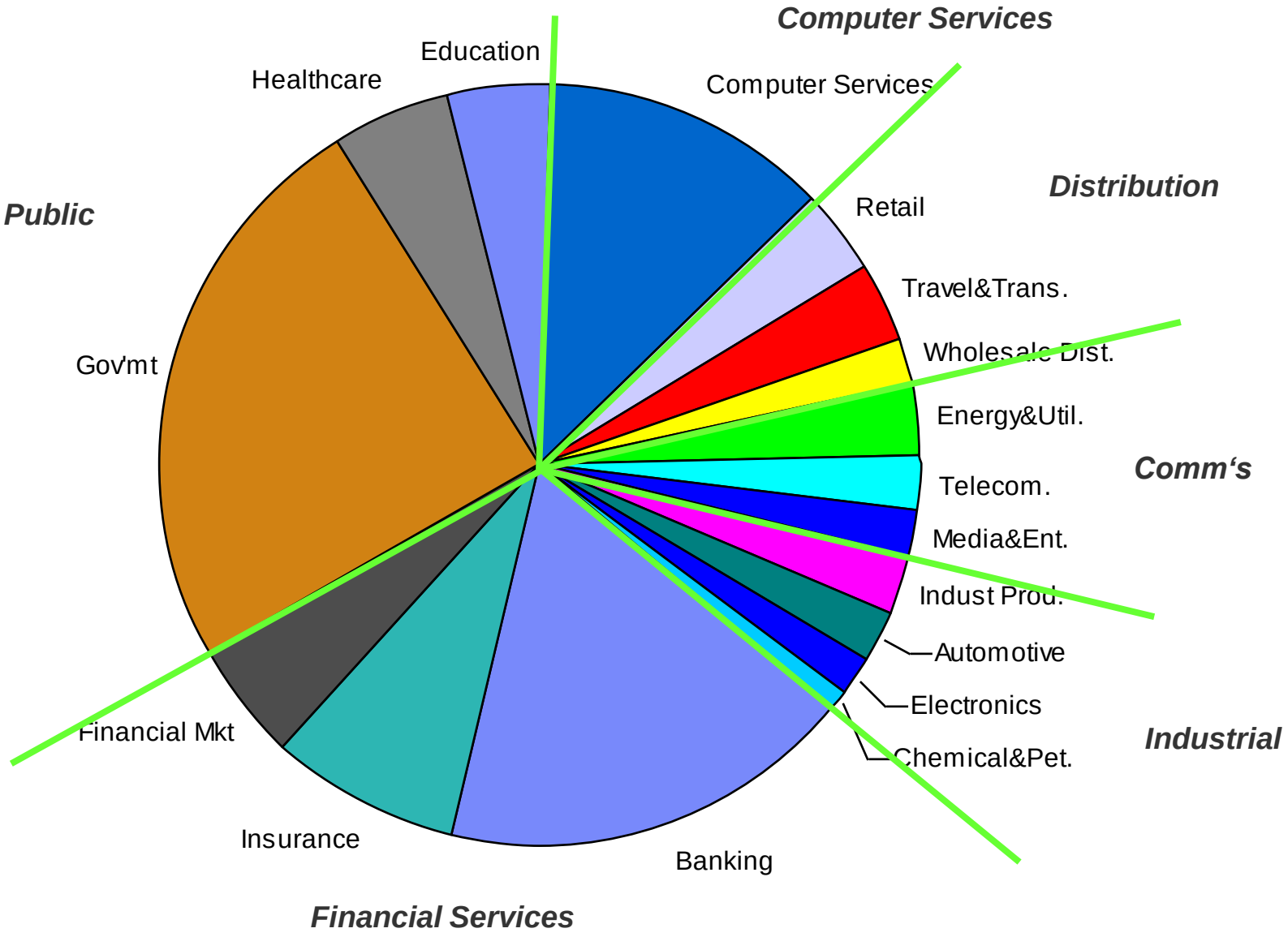
Linux on z omnipresent in Industry



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Linux on z Systems value proposition:

Premier quality of service at lowest platform total cost

1. **IT economic** advantage[1] with:
   - Lowest Linux platform TCO for selected workloads & environments
   - Greenest server allowing upgradeability & investment protection
2. **Highly efficient** scaling with industry-leading levels of resource sharing & utilization
   - Scale up -High server capacity with up to 141 cores running at 5 GHz
3. An **open and standard** environment, with support for key open source software & applications
4. **Integrated SOE/SOR environment** for business processes – including cloud, analytics and mobile
5. Leadership levels of **availability & disaster recovery**, with non-disruptive growth of compute capacity
6. Leading **security** environment – EAL5+ support with high-speed cryptography
7. **Cloud ready** with support for multi-tenancy, rapid provisioning, scaling on demand

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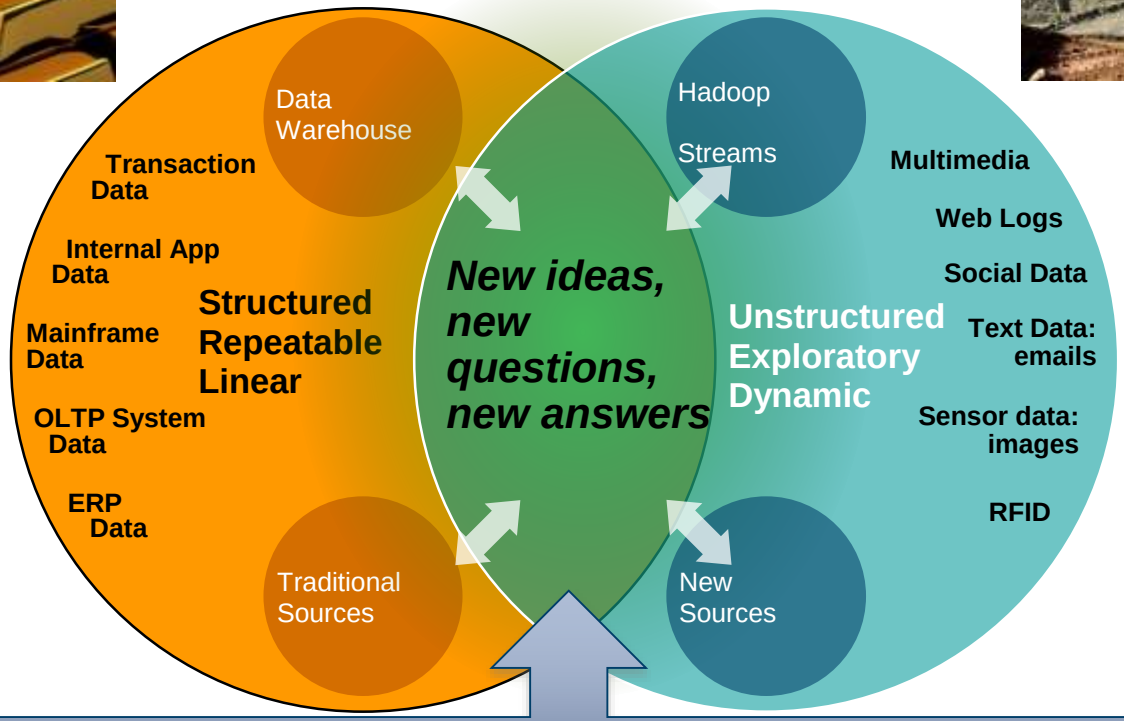
1. April, 2014 IBM Competitive Project Office Benchmark

Imagine the possibility of leveraging all of your data assets

Traditional Technique
Structured
Analytical
Logical

Emerging Technique
Creative
Holistic thought
Intuition

"Here's a question, what's the answer?"



"Here's some data, are there correlations?"

Transformational **benefit comes from integration of new data sources with traditional corporate data**

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Building an Infrastructure for real-time Analytics, Mobile and Cloud
consider end-to-end solutions and operational impacts

Real-time "integration of analytics and transaction processing" increases customer value with every interaction

- Deliver real-time insights at the point of impact
- Manage data lifecycle and governance
- Eliminate redundancy and avoid ETL

IBM Software examples

- Cognos BI
- SPSS
- Query Management Facility

- DB2
- DB2 Analytics Accelerator
- InfoSphere® Warehouse

- InfoSphere Information Server
- InfoSphere Data Replication
- InfoSphere Master Data Mgmt

- DB2
- IMS, VSAM
- Non IBM, e.g. Oracle

"Cognos generates insightful reports and sophisticated dashboards, providing quick and accurate information to senior management. We are now adding more reporting functionality - on business revenue, credit data, loan risks, and so on - to make Cognos the complete decision-support system for Sicoob."

- Paulo Nassar,
IT Processing and Storage Infrastructure Manager, Sicoob

IBM Cognos Business Intelligence and additional analytics software is running on Linux on z Systems

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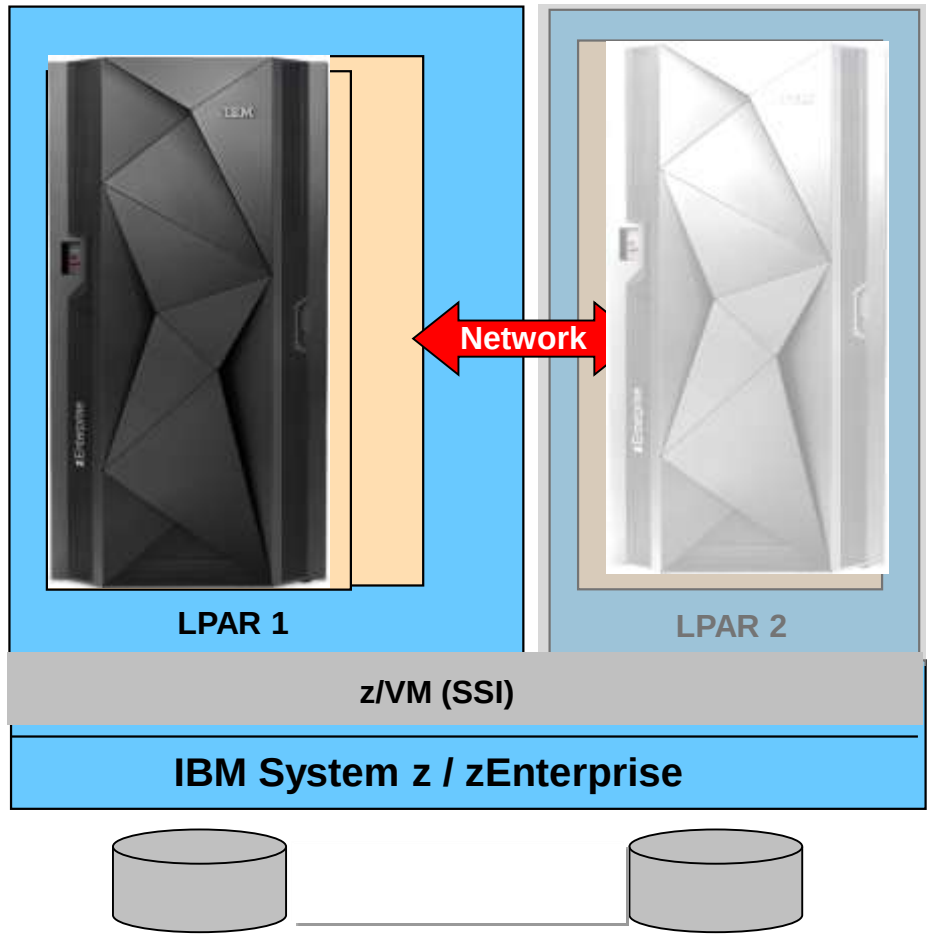
High Availability scenario as Active/Passive with System z

- **Active / Passive Deployment**.
  - Workload normally contained at Site 1, standby server capability at Site 2
  - Primary and secondary disk configurations active at both sites.
  - During fail over, Capacity Upgrade on Demand (CUoD) adds resources to operational site, and standby servers are started. Helps save hardware and software costs, but requires higher recovery time.

- **Hot / Cold scenario**
  - Workload is not split.
  - Each site is configured to handle all operations
  - Cold environment needs longer to get active – often used in DR

- **Hot / Warm scenario**
  - Workload is not split
  - Each site is configured to handle all operations
  - Warm environment is idling.



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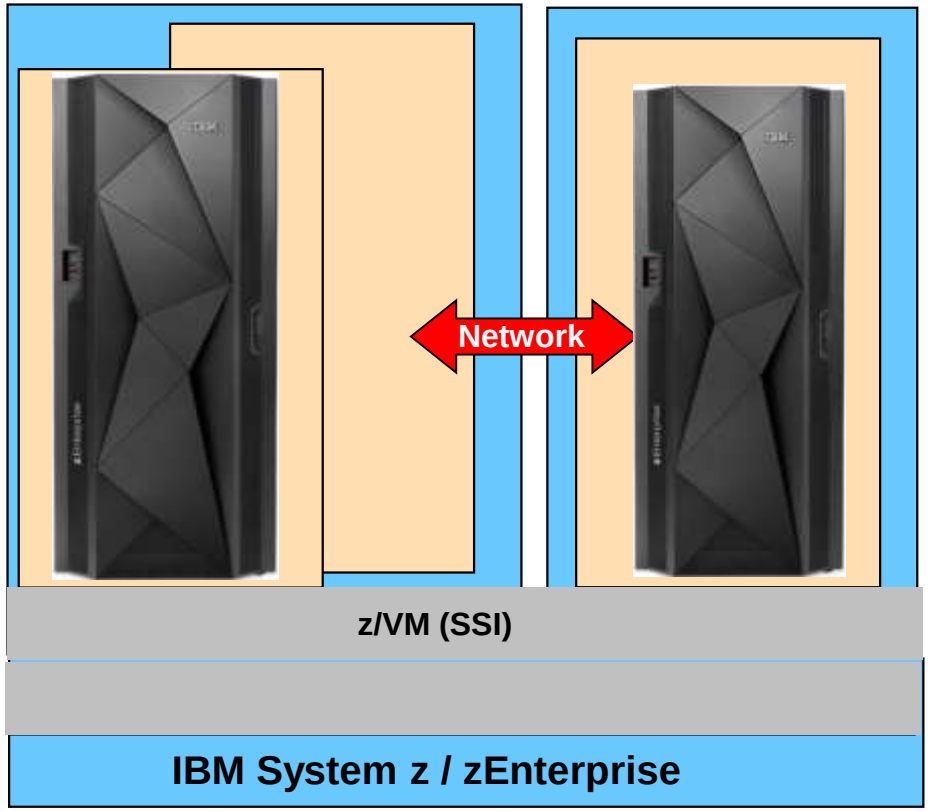
High Availability with an active/active environment on System z

- **Active / Active Deployment -Expendable work.**
  - – Workload is normally split between 2 or more sites
  - – Each site is (over) configured to be able to instantly cover the workload if needed.
  - – During normal operation, excess capacity at each site is consumed by lower priority, work like development or test activities
  - – In a failover situation, low priority work is stopped to free up resources for the production site's incoming work.

- **Capacity Upgrade on Demand (Active / Active)**
  - –Workload is normally split between sites.
  - –Each site is configured with capacity to handle normal operations
  - –Special setup with Capacity Upgrade on Demand (CUoD).
  - –In a failover situation, additional CPUs are enabled at the operational site.



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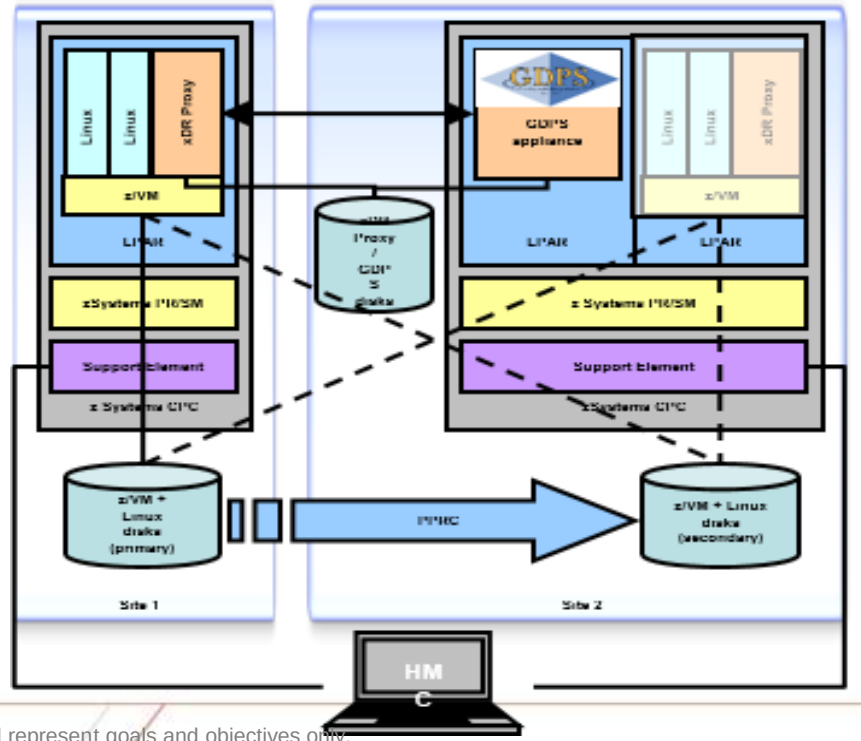
SOD for Linux:*

IBM GDPS appliance for Linux on z Systems

- **The IBM GDPS appliance for Linux on z Systems will provide high availability in case of system, application or network failure**
- In the first half of 2015, IBM intends to deliver a GDPS/Peer to Peer Remote Copy (GDPS/PPRC) multiplatform resiliency capability for customers who do not run the IBM z/OS operating system in their environment.
- This solution is intended to provide IBM z Systems clients who run IBM z/VM and their associated guests, for instance, Linux on z Systems, with similar high availability and disaster recovery benefits to those who run on z/OS.
- **The implementation of the new GDPS Appliance for Linux will offer business continuity for Linux-only environments**.



* All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

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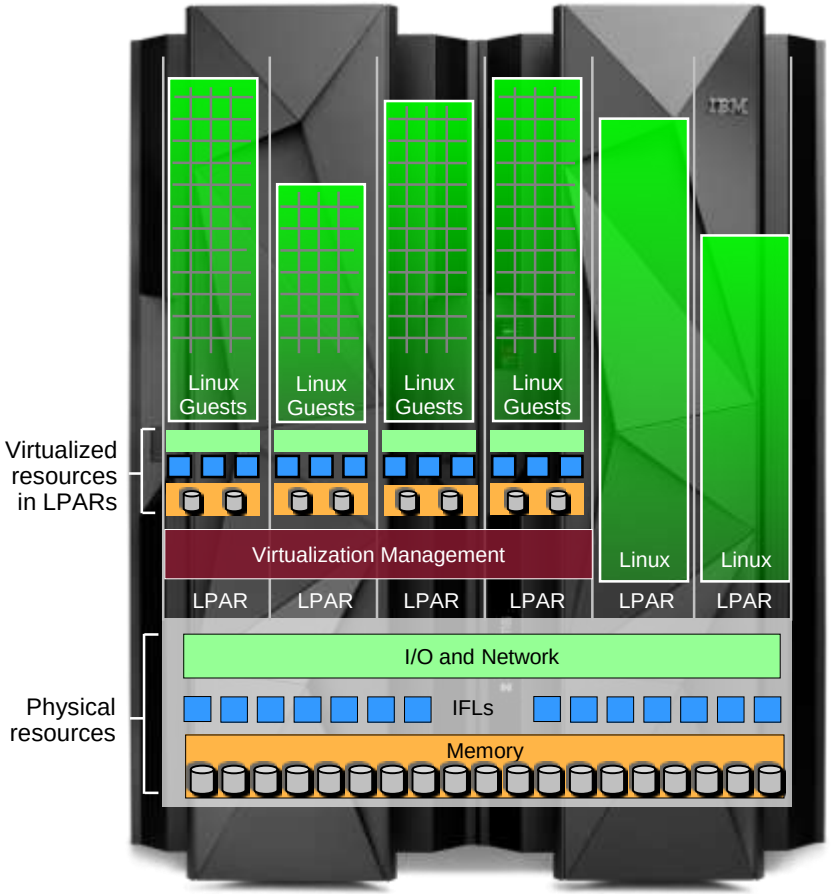
IBM Enterprise Linux Server (ELS) & IBM Enterprise Cloud Server (ECS)

Data center simplicity inside one box

An enterprise grade Linux infrastructure solution

- Proven Linux platform with:
  - Data center simplicity
  - Trusted operations
  - Unrivalled economics
- Allows to start small and grow inside the server
- Server and virtualization capabilities to run a large number of workloads
  - Highly efficient and economical
- Designed from the ground up for enterprise-class workloads
  - Unrivaled levels of qualities of service
- Supports all kind of workload deployments
  - Enables cloud, analytics, mobile computing at an attractive price



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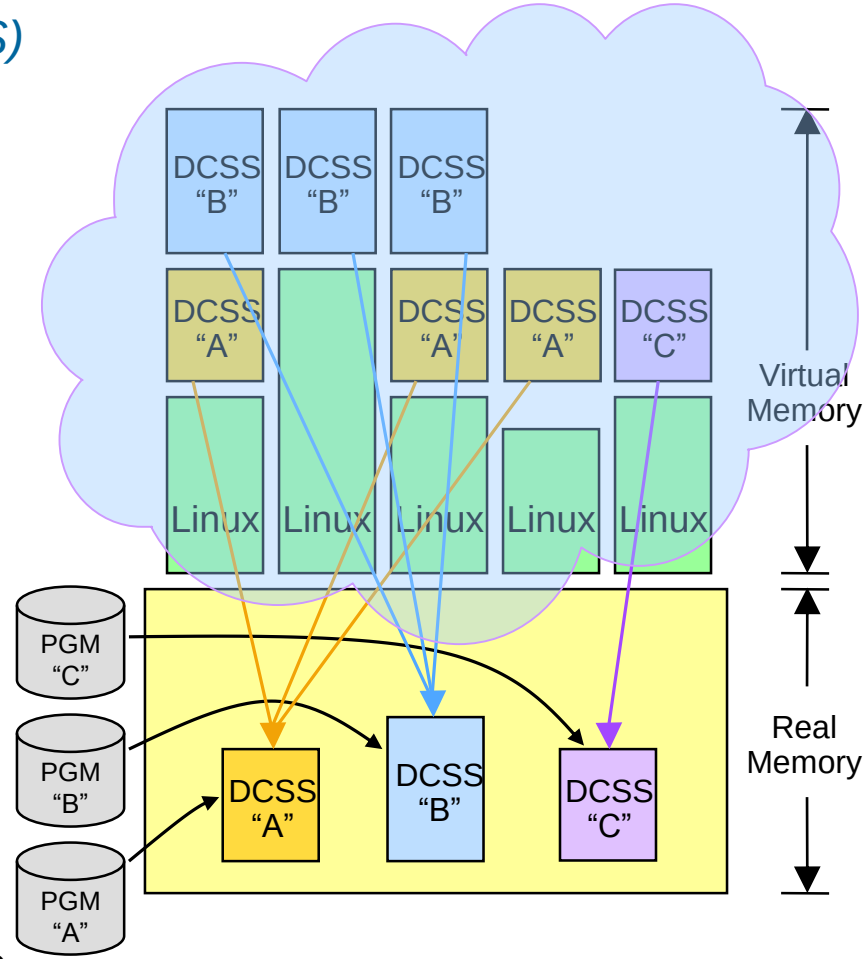
Effective Virtualization with Linux on z and z/VM shared memory

Linux Shared Memory Exploitation for many Virtual machines

z/VM Discontiguous Saved Segments (DCSS)

- **DCSS support is Data-in-Memory technology**
  - Share a single, real memory location among multiple virtual machines
  - Can reduce real memory utilization
- **Use Cases:**
  - **As fast Swap device**
  - **For sharing read only data**
  - **For sharing code (e.g. program executables/libraries)**
- **The large DCSS allows the installation of a full middleware stack in the DCSS (e.g. WebSphere, DB2, etc)**
- **The DCSS becomes a consistent unit of one software level**



http://public.dhe.ibm.com/software/dw/linux390/perf/ZSW03186USEN.PDF
http://www.vm.ibm.com/linux/dcss/dcsslarg.pdf

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IBM Cloud Manager with OpenStack for z Systems

Easy to deploy, simple to use Cloud Management Solution

- **Heterogeneous and integrated management support**
  - z Systems managing Power® and x86 servers
  - Central management across multiple hypervisors & domains
  - All IBM server architectures & major hypervisors supported

Accelerated time to market with pattern support

- Chef-based patterns based on OpenStack® Heat pattern engine is now supported on z Systems
- Workload deployment based on patterns speeds delivery of new services

Hybrid Cloud support

- Hybrid Clouds on and off premise options via SoftLayer support

IBM announcement 17.Feb 2015

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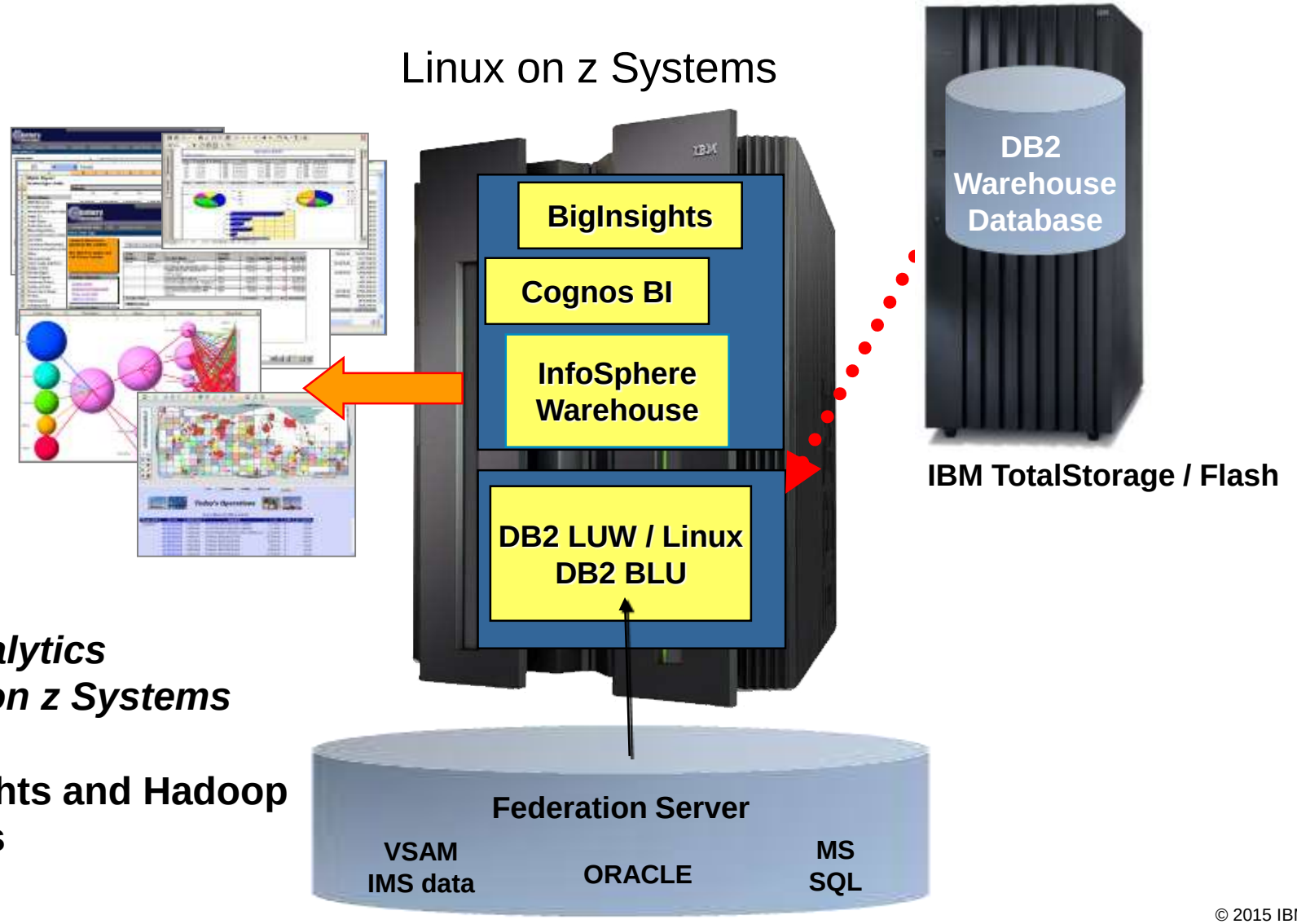
Data: From Database to Information Management

Building an end-to-end BI, Analytics and Real-time Fraud detection environment on z Systems



- ***IBM Data Analytics Accelerator on z Systems***
- ***BI solutions***
- **IBM BigInsights and Hadoop on z Systems**
- **DB2 BLU**

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DB2 BLU Acceleration for Linux on z Systems

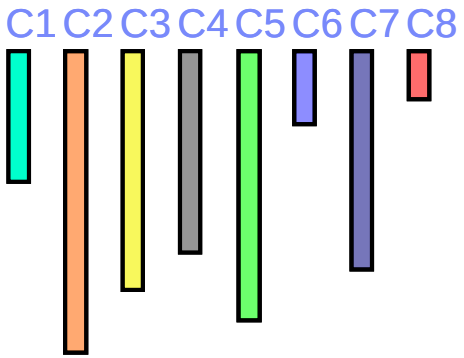
Super simple. Super Fast.

New

IBM

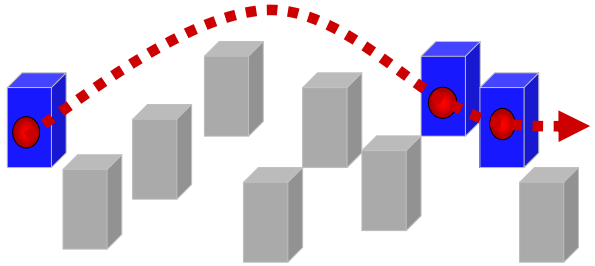
Columnar Everywhere

- Reduce I/O
- Increase data density in RAM
- Increase CPU efficiency



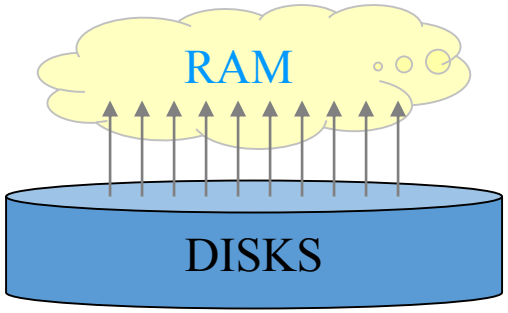
Skip Boring Data

- Queries skip uninteresting data
- Synopses on every column, automatically.
- *"Data Skipping"*



Rethink Memory

- Cache intelligently for analytics
- Predictive I/O with *"Dynamic List Prefetching"*
- Massive I/O reduction



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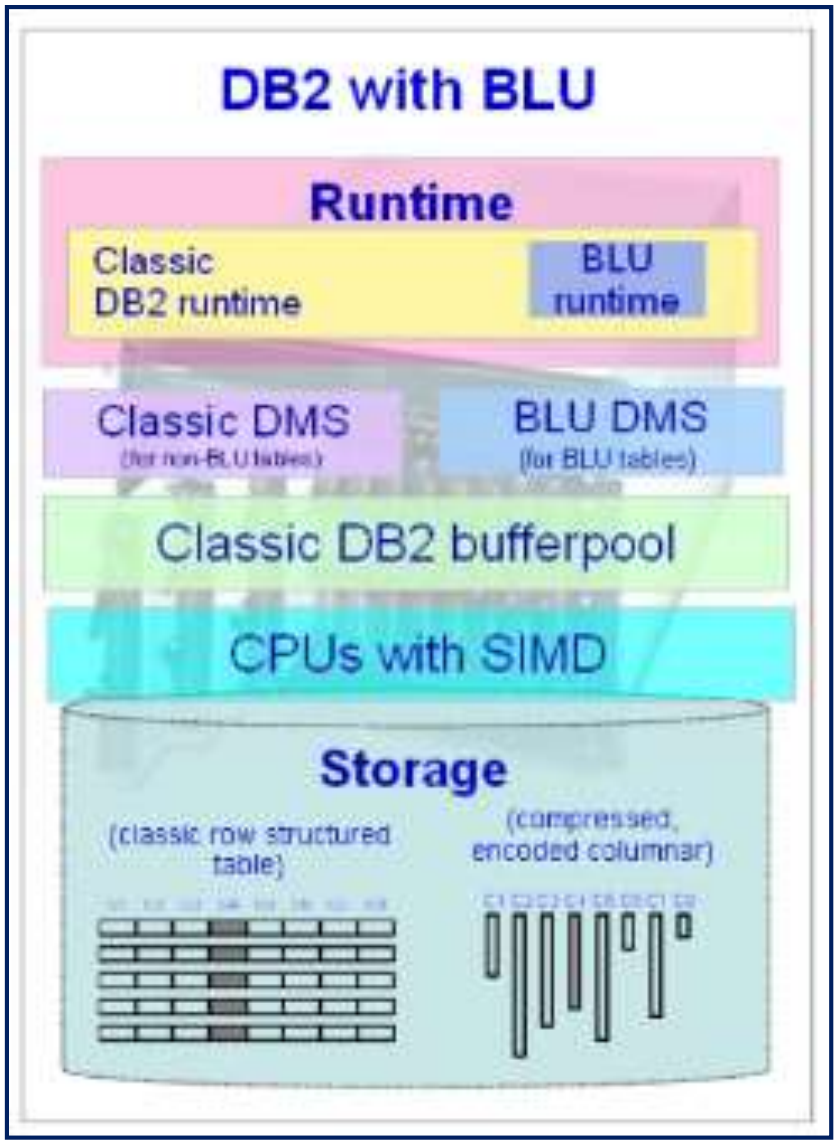
DB2 w/ BLU Acceleration for Linux on z Systems

Super Simple. Super Fast.



New

Solution

- DB2 with BLU Acceleration is the preferred solution for customers who would like to run analytics on z Systems Linux data
- Satisfy requirement for a columnar in-memory db
- Alternative of Linux on z Oracle installations
- Enhanced for distributed consolidations onto z Systems

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Load-and-go simplicity

- LOAD and then… run queries
  - Significantly reduced or no need for …
    - No indexes
    - No storage reclaim (it's automated)
    - No memory configuration
    - No process model configuration
    - No statistics collection (it's automated)
    - No MDC or MQTs
    - No Statistical views
    - No optimizer profiles/guidelines

Simple.

"The BLU Acceleration technology has some obvious benefits: … But it's when I think about **all the things I don't have to do with BLU**, it made me appreciate the technology even more: **no tuning, no partitioning, no indexes, no aggregates**."
-Andrew Juarez, Lead SAP Basis and DBA

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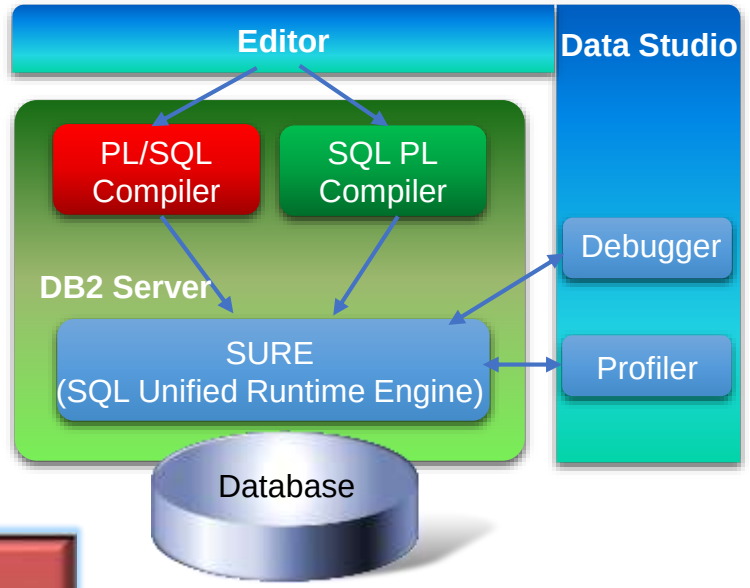
BLU Acceleration runs Oracle Code

- Oracle compatibility with BLU Acceleration
- Built in PL/SQL compiler
- Source level debugging and profiling



Oracle Database	→	DB2
Concurrency Control	→	Native support
SQL	→	Native support
PL/SQL	→	Native support
Packages	→	Native support
Built-in packages	→	Native support
OCI	→	Native support
JDBC	→	Native support
Online schema changes	→	Native support
SQL*Plus Scripts	→	Native support

Not Emulation

BLU inside

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Hadoop: IBM InfoSphere BigInsights for Linux on z Systems

New ways of thinking, transformative economics

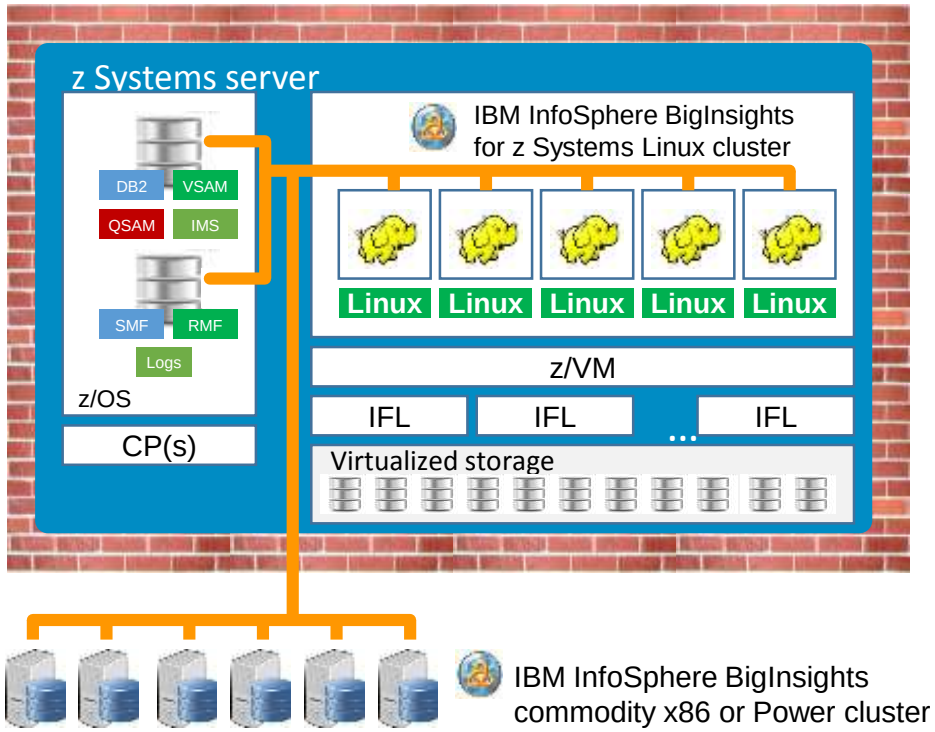
New

Apache™ Hadoop® is an open source software project that enables distributed processing of large data sets across different clusters

- Leverage the power of Hadoop on z Systems
- Drag-and-drop extracts from z Systems sources
- Protect sensitive data
- Faster application delivery
- Seamless interoperability

IBM InfoSphere® System z Connector for Hadoop

Fast and seamless data connectivity between a variety of mainframe data sources and IBM InfoSphere BigInsights



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Enrich data-driven applications with social media data

- Data professionals can now incorporate Twitter's rich data streams into analytic applications using IBM BigInsights for Hadoop on Cloud. BigInsights has social media tooling built-in, allowing you to import data in motion from the **Twitter Decahose**, and gather, analyze and visualize data from multiple sources.

- Soon, data professionals will be able to integrate Twitter data into IBM DataWorks, a cloud-based data refinery service. And entrepreneurs and developers will be able to bring compelling new insights to applications using Watson Developer Cloud and IBM Bluemix platform-as-a-service.

http://www.ibm.com/big-data/us/en/big-data-and-analytics/ibmandtwitter.html

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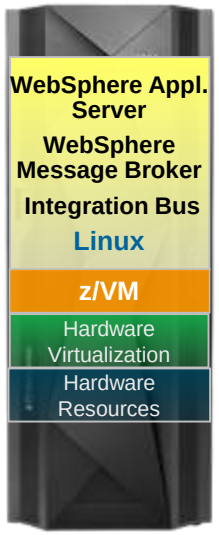
Integration: Web Application Hosting and SOA Integration - IIB



- IIB – IBM Integration Bus - business information to flow between disparate applications across multiple hardware and software platforms.
- Ability to consolidate many Linux and WebSphere Application Server (WAS) instances to a single server footprint
- Better disaster recovery capabilities since all artifacts grouped
- Ability to shared WAS binaries across multiple Linux instances hosted by z/VM virtualization
- Ability to create new instances of WAS very quickly

Traxpay - Germany	**Bank of Tokyo-Mitsubishi UFJ (BTMU)** - Japan
▪ Traxpay looked to redesign the B2B payment process to offer an innovative financial transactions platform, enabled 24/7 ▪ Banking connections are implemented in Java using WebSphere Application Server. Highly secure point-to-point communication links are established with IBM WebSphere MQ ▪ ELS and WebSphere allows to deliver the utmost in online performance, reliability, and security for our customers	▪ BTMU developed a Service Oriented Architecture (SOA) platform to realize this "cloud-banking" concept ▪ It does „*not only enables service linkage on Linux and other systems, but also scalability*“ ▪ SOA platform, leveraging WebSphere Message Broker, has accelerated the ability to build services in response to business issues ▪ 18% increase of re-utilization rate of services* * as of March 2012

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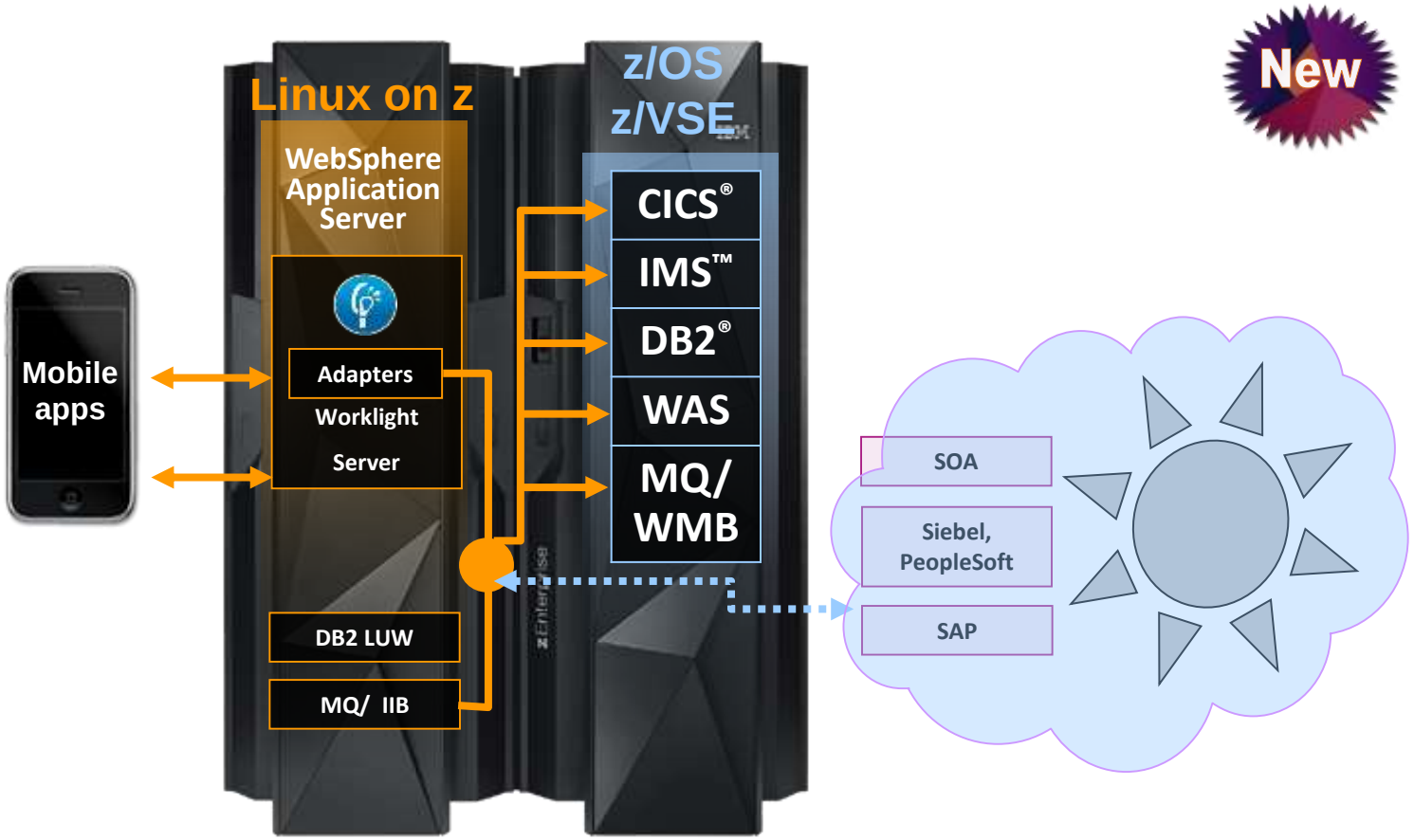
The MobileFirst hub on IBM z13 connecting to Core Systems



IBM zEnterprise®

- **Server side software components and adapters for channeling z Systems to mobile devices** with IBM MobileFirst Server
- **Mobile application support** with WebSphere Application Server on System z
- **Mobile protocol connectivity with cloud, SOA, SAP and core z Systems applications** including CICS, IMS, TPF, MQ, IIB and DB2

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The ultimate JavaScript environment: Node.js

Node.js and Linux on z Systems

High Performance

- Highly scalable, event-driven platform with non-blocking I/O
- Thousands of concurrent connections with minimal overhead
- Unified JavaScript ecosystem for client and server
- Up to 29% better performance over Intel on AcmeAir*
- One of the fastest growing eco-systems

z Systems Connectivity

- Co-locate Node.js applications for reduced latency accessing z/OS data/services

Security and Dependability

- Leverages the trusted environments of z Systems to maximize security and uptime of critical Node.js applications.

Unified Diagnostics and Monitoring with IBM SDKs for Java®

- Compatible with latest Joyent Node.js v0.10.* releases

Core Strength

- Node is *FAST*
  and highly concurrent
- Node is built for I/O
- Node is perfect for APIs
- Node powers full-stack JS

Integration with JSON APIs

IBM SDK for Node.js Version 1.1
for Linux on z Systems

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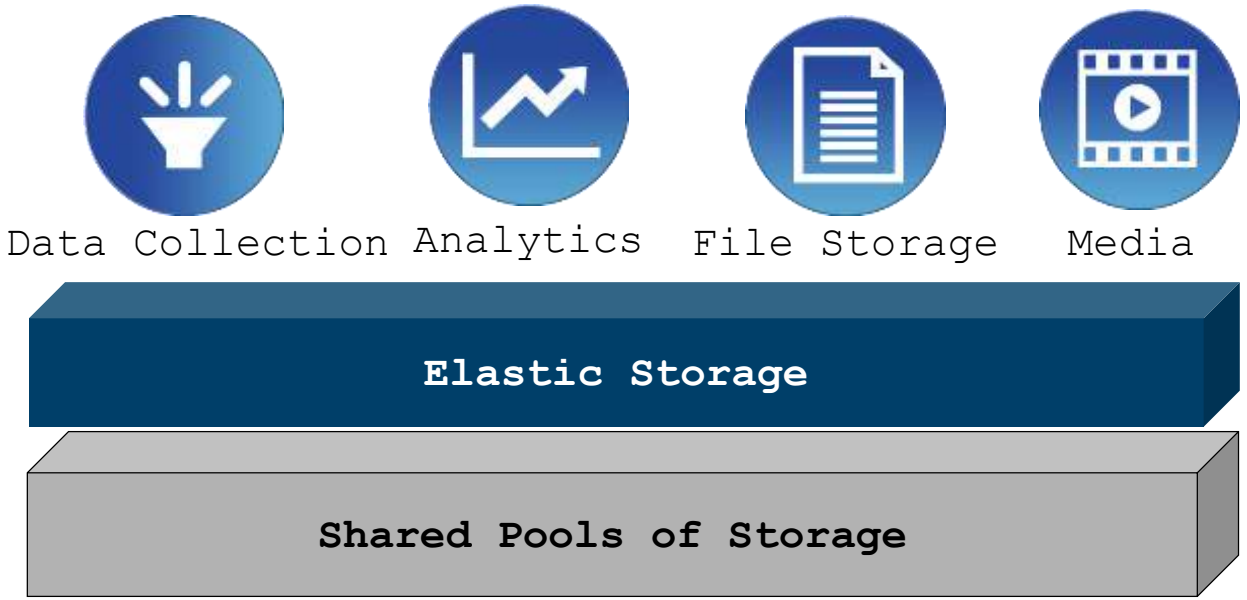
IBM Spectrum Scale for Linux on z Systems

New

Provides fast data access and simple, high available data management



- Streamline Data access
- Centralize Storage Management
- Improve Data Availability

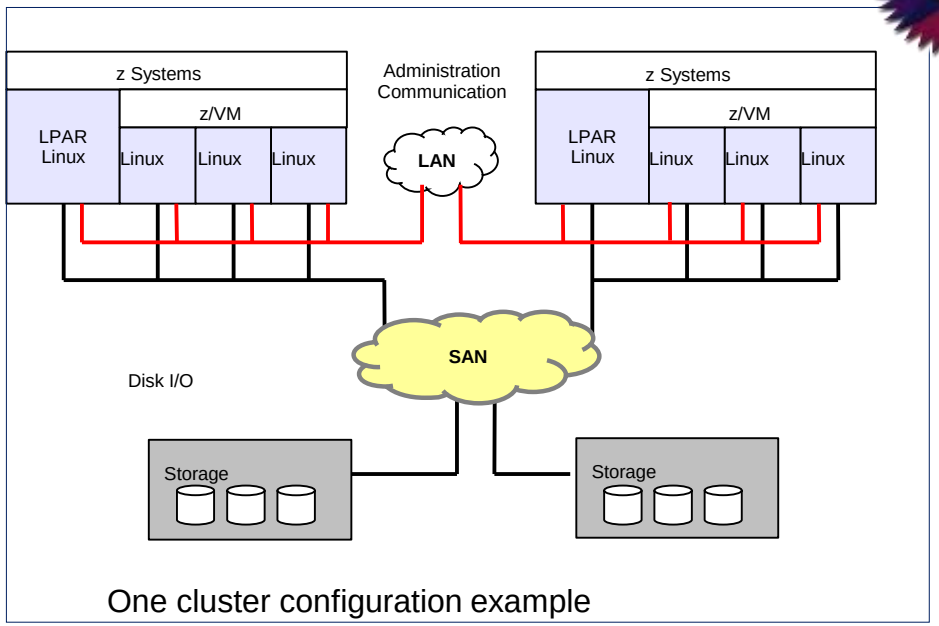
IBM Spectrum Scale for Linux on z Systems

Based on IBM GPFS technology

New

Robust clustered file system

- Concurrent high-speed, reliable data access from multiple nodes
- Extreme scalability and accelerated performance
- Smooth, non disruptive capacity expansion and reduction



One cluster configuration example

Linux instances in LPAR mode or on z/VM, on the same or different CECs

Up to 32 cluster nodes with same or mixed Linux distributions / releases

Support for ECKD™-based and FCP-based storage

Heterogeneous clusters w/ client nodes w/o local storage access running Linux on x86 or POWER®

Supported storage: DS8000®, IBM FlashSystem™, IBM Storwize® V7000, SVC, IBM XIV®,

Supported workloads: WebSphere App. Server, IBM MQ® or similar workloads

Support statements for first version; available since Dec. 2014

* *Elastic Storage is a code name*

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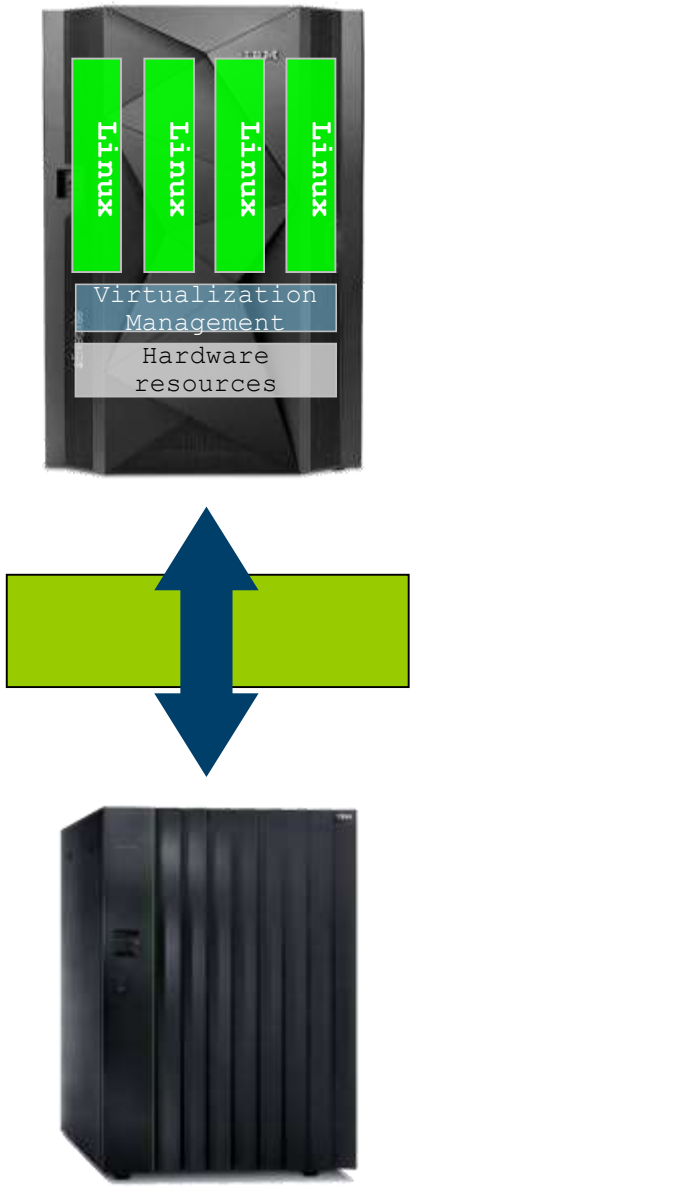
Why IBM Spectrum Scale

- Standard file system interface with POSIX semantics
  - Metadata on shared storage
  - Distributed locking for read/write semantics
- Highly scalable
  - High capacity (up to 2^{99} bytes file system size, up to 2^{63} files per file system)
  - High throughput (TB/s)
  - Wide striping
  - Large block size (up to 16MB)
  - Multiple nodes write in parallel
- High availability
  - Fault tolerance (node, disk failures)
  - On-line system management (add/remove nodes, disks, ...)



Drive more value with FlashSystem

Linux on System z & IBM FlashSystem: *Highest Reliability, Maximum Performance*

Linux on System z can help achieve a smarter IT infrastructure that:

- Provides efficiency at scale on a single physical server
- Delivers industry-leading virtualization for effective deployment
- Enables flexible delivery of services through a private cloud
- Delivers real-time information and insight from data
- Provides unmatched security and reliability

Now you can leverage the "Economies of Scale" of Flash

- Accelerate Application Performance
- Gain Greater System Utilization
- Lower Software & Hardware Cost
- Save Power / Cooling / Floor Space
- Drive Value Out of Big Data

Performance of Linux on System z with FlashSystem

I/O bound relational databases, like Oracle, can benefit from IBM FlashSystem over spinning disks.

- **21x reduction in response times***
- **9x improvement in IO wait times***
- **2x improvement in CPU utilization***

System z FiconExpress 8s I/O cards can provide an additional 10% throughput running with FCP

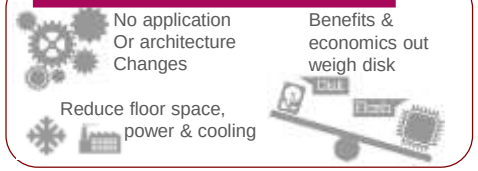
IBM FlashSystem is certified (reference SSIC) to attach to Linux on System z to meet your business objectives

Why IBM FlashSystem for Linux on System z?

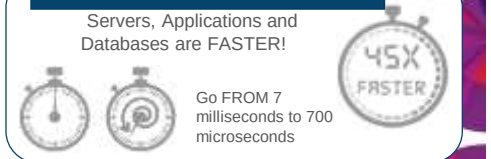
Extreme Performance

Enterprise Reliability

Macro Efficiency



IBM MicroLatency™



* IBM internal test results

IBM zAware V2.0 - Analyze Linux on z Systems

IBM zAware is available with z13 for Linux on z Systems to deliver a creative availability solution to help maximize service levels

- Faster insight into the health of the Linux on z images
- Identify unusual system behavior of the Linux on z images
- Support for Linux on z message log analysis

- User can group multiple systems' data into a combined model: by workload (e.g. for all web servers), by solution (e.g. one model for your cloud), or by z/VM host
- Support for native or guest Linux on z images
- IBM zAware delivered on IBM z13 builds on previous IBM zAware function

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Linux on z13

An Enterprise grade Linux on z Systems solution portfolio

Data and Analytics

IBM InfoSphere BigInsights

IBM DB2 BLU

Cloud

Custom Patterns for Linux on z Systems

PostgreSQL

141 High performance cores

Simultaneous multi-threading

10TB Memory

320 16 GB/sec Channels

2X Cache and I/O Bandwidth

Single instruction, multi data

Mobile

Node.js

Internal Integration

Trusted Computing

Spectrum Scale (GPFS technology)

IBM zAware V2.0

Crypto Express5S

SOD: GDPS Virtual appliance

Openness and Pricing

OpenSource and SOD: KVM

Large memory

Enterprise Linux Server *and* Enterprise Cloud System

Outstanding Capacity

IBM z13

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Open Source Priorities in 2015

Green:
port/test done
open source versions

Databases-Messaging

Dev Languages-Environments

Cloud Infrastructure

Cluster Computing

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Analysts and White Papers

External Web: ibm.com/systems/z/os/linux/resources/doc_wp.html

Title of Paper	Company
IBM zEnterprise is Enterprise Cloud Infrastructure	The Clipper Group
The Enterprise Linux Server – The Best Choice for In-House Linux Clouds	Robert Francis Group
IBM's Mainframe50: The Future of the Mainframe	IDC
Top Ten Reasons to Take a Fresh Look at IBM zEnterprise	HURWITZ
The ETL Problem	Joe Clabby
The Mainframe as a Key Platform for Big Data and Analytics	IDC
Agile Application Development on System z — Is It Keeping Up with Your Business?	The Clipper Group
Healthcare Client Achieves Lower Total Cost of Ownership Through IBM System z	Edidon Group
Government Client Achieves Lower Total Cost of Ownership Through IBM System z	Edidon Group
System z and Managed Service Providers	Solitaire Interglobal
Implementing A Web Interface For The Linux Health Checker	IBM
The business value of IBM zEnterprise System deployments	IDC
Porting applications to Linux on IBM System z	IBM
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Private cloud and mainframes	Forrester
z/VM Migration: Migrating the User Directory and RACF® Environment	IBM

Live Virtual Classes for z/VM and Linux

http://www.vm.ibm.com/education/lvc/

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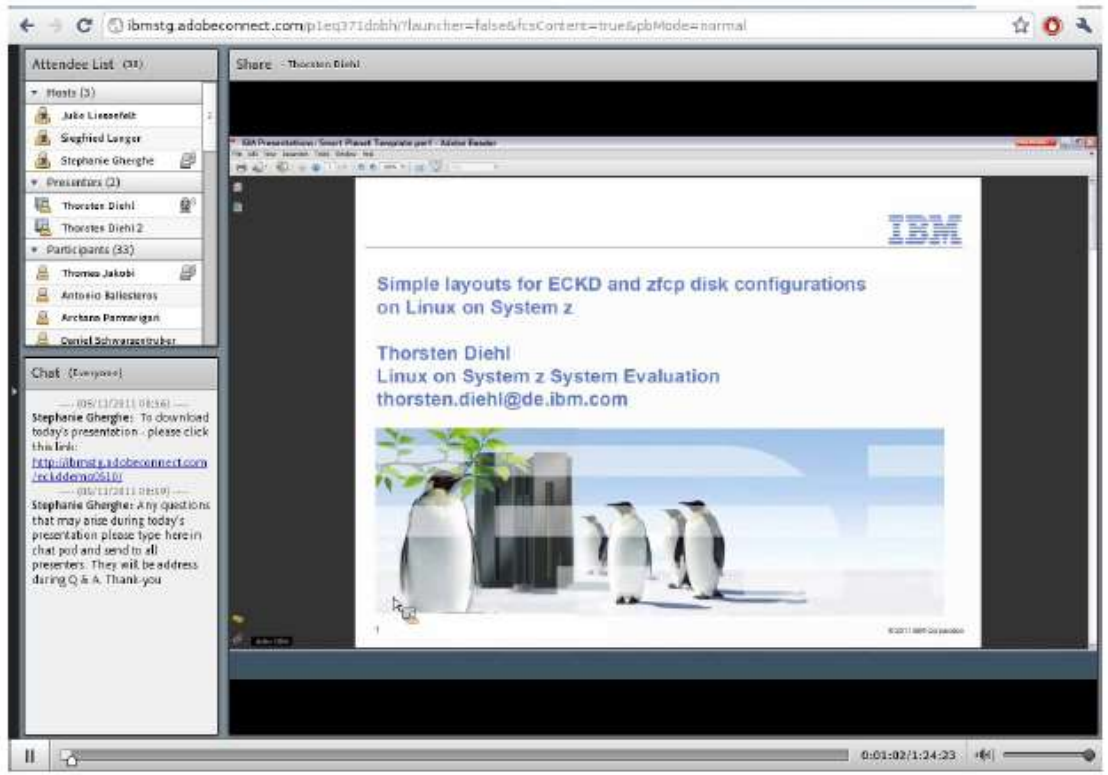

Questions?

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