ICV3591
Why you should focus on Linux on z Systems Now with z13

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2015
IBM Systems Technical University

IBM z Systems • IBM Power Systems • IBM Storage

October 5–9 | Hilton Orlando, Florida

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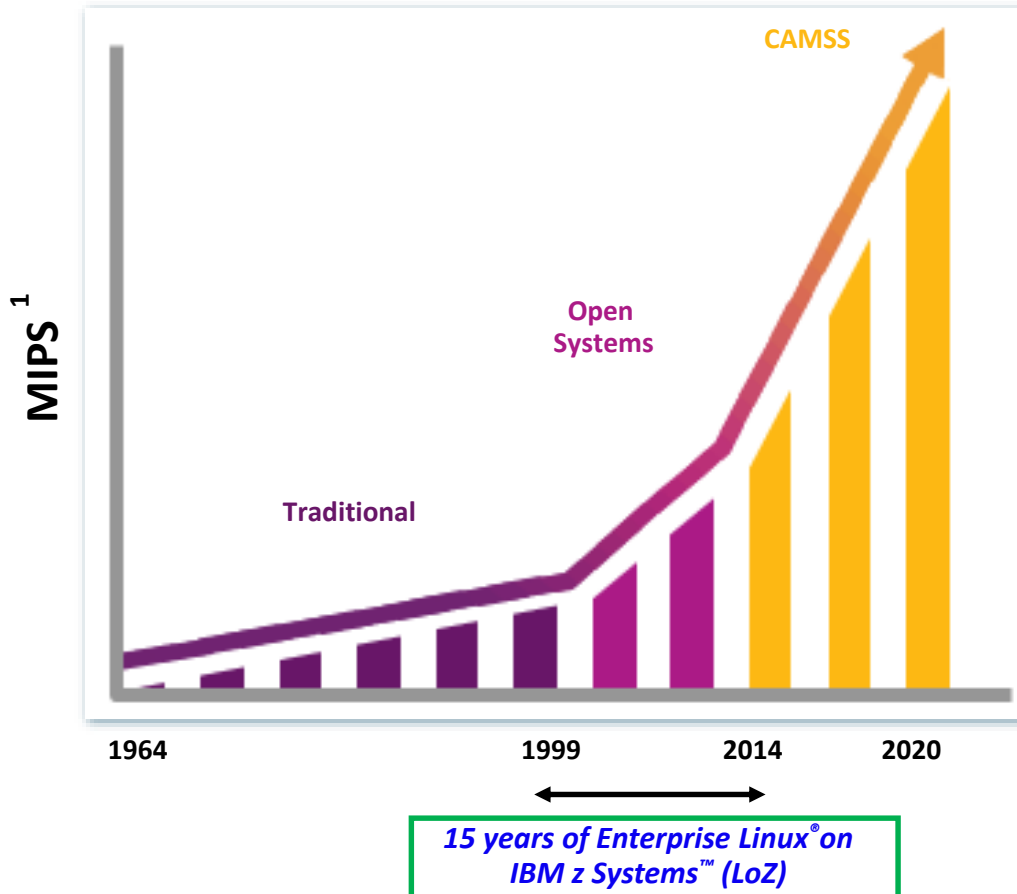
91 percent of surveyed CIOs said that new customer-facing applications are accessing the mainframe

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

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

MIPS [1]

CAMSS

Open Systems

Traditional

1964   1999   2014   2020

15 years of Enterprise Linux® on IBM z Systems™ (LoZ)

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

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
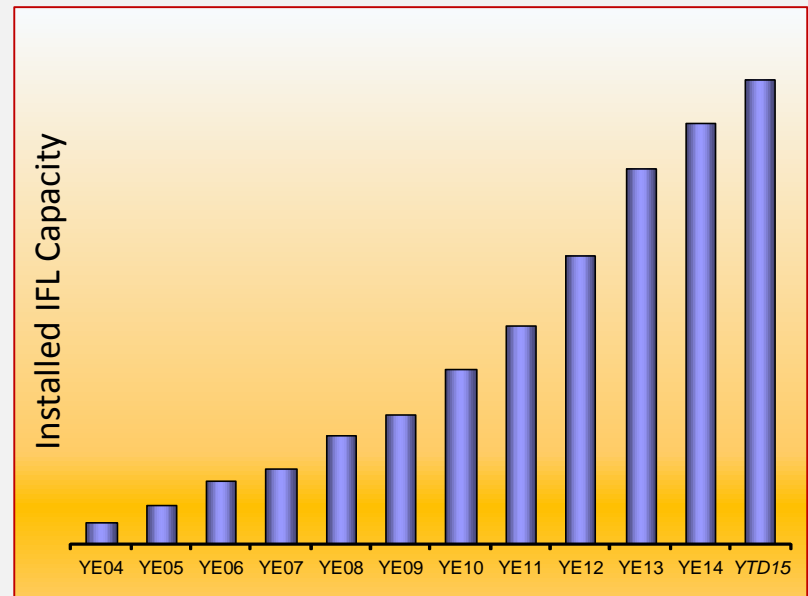- Email
- Java®, Web & eCommerce

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

Linux on IBM z Systems in 2Q2015
Installed Linux MIPS at 45% CAGR*

- 26.7% of Total installed MIPS run Linux as of 2Q15

- Installed IFL MIPS increased by 16% YTY from 2Q14 to 2Q15

- 39% of System z Customers have IFL's installed as of 2Q15

- 79 of the top 100 System z Customers are running Linux on the mainframe as of 2Q15 **

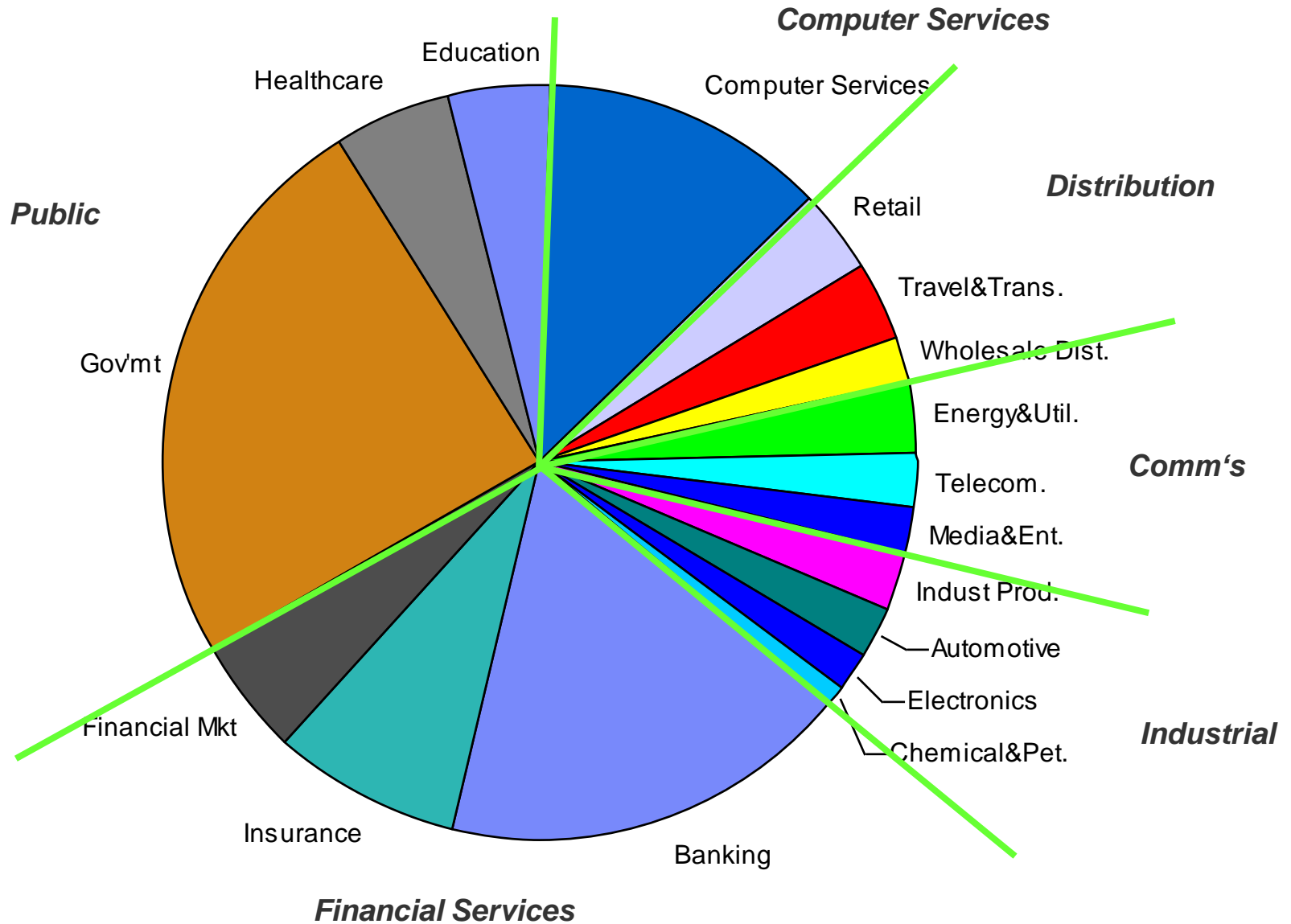- 35% of all z Systems servers have IFLs

Installed Capacity Over Time

Installed IFL Capacity — YE04, YE05, YE06, YE07, YE08, YE09, YE10, YE11, YE12, YE13, YE14, *YTD15*

- 67% of new FIE/FIC z Systems accounts run Linux

Linux on z Systems omnipresent in Industry

IBM

Pie chart segments and labels:
- Education
- Healthcare
- Public — Gov'mt
- Financial Mkt
- Insurance
- Banking
- Financial Services
- Chemical&Pet.
- Electronics
- Automotive
- Indust Prod.
- Industrial
- Media&Ent.
- Telecom.
- Comm's
- Energy&Util.
- Wholesale Dist.
- Travel&Trans.
- Retail
- Distribution
- Computer Services

Meet the
IBM LinuxONE Systems

The most trusted, efficient and high performance enterprise-grade Linux platform

IBM LinuxONE
Emperor™

IBM LinuxONE
Rockhopper™

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

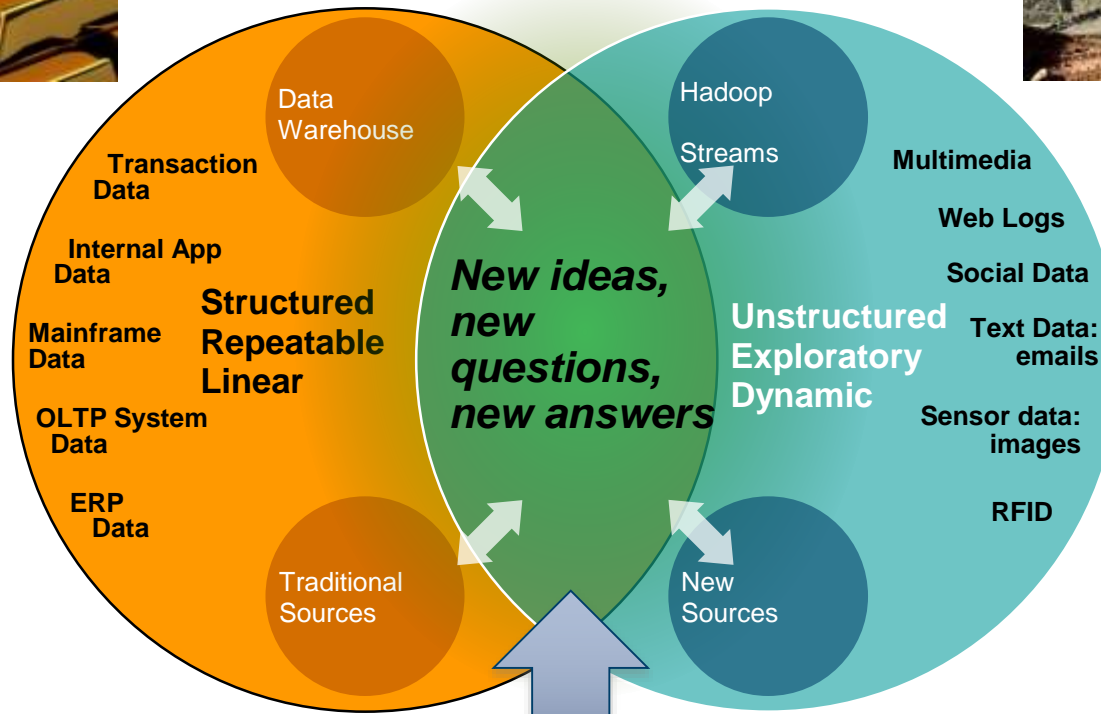# Imagine the possibility of leveraging all of your data assets

Traditional Technique
Structured
Analytical
Logical

Emerging Technique
Creative
Holistic thought
Intuition

Data Warehouse

Transaction Data

Internal App Data

Mainframe Data

OLTP System Data

ERP Data

Structured Repeatable Linear

Traditional Sources

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

New ideas, new questions, new answers

Hadoop

Streams

Multimedia

Web Logs

Social Data

Text Data: emails

Sensor data: images
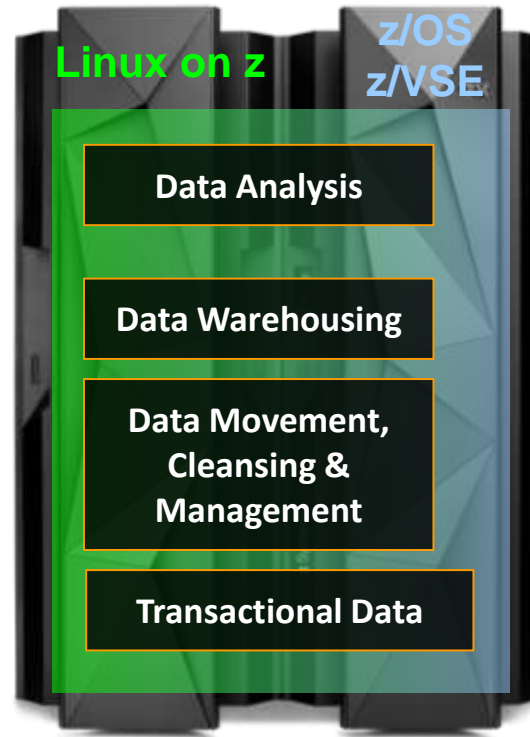
RFID

Unstructured Exploratory Dynamic

New Sources

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

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

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

Linux on z

z/OS z/VSE

- Data Analysis
- Data Warehousing
- Data Movement, Cleansing & Management
- Transactional Data

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

High Availability scenario as Active/Passive with System z
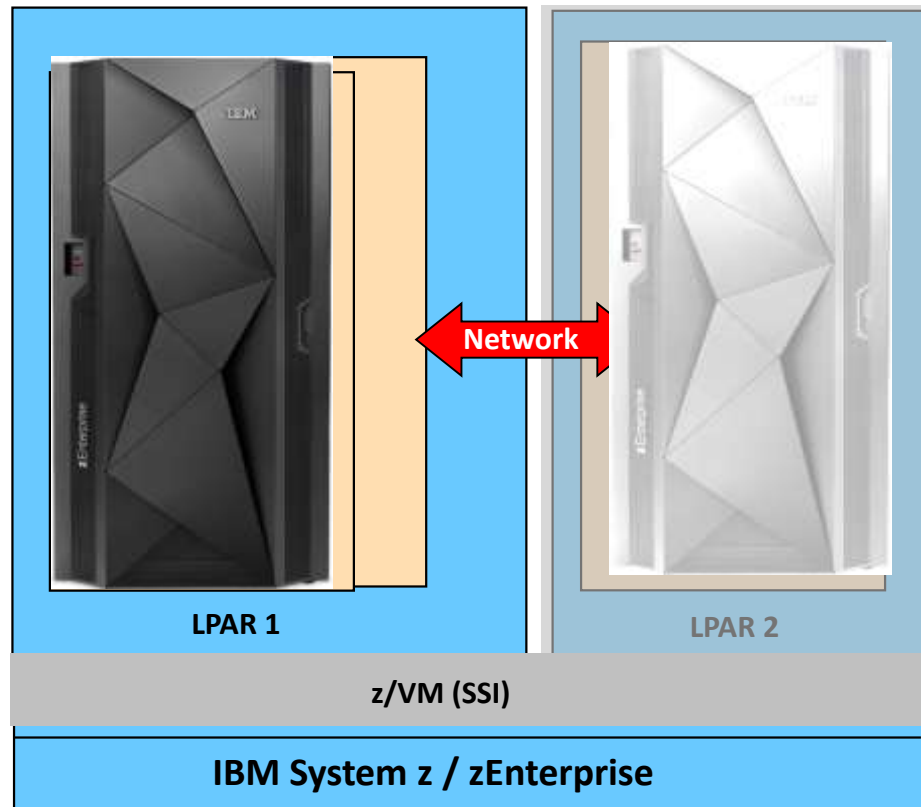
- **Active / Passive Deployment**.
  - Workload normally contained at Site 1, standby server capability at Site 2
  - Primary and secondary disk configurations active at both sites.
  - During fail over, Capacity Upgrade on Demand (CUoD) adds resources to operational site, and standby servers are started. 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.

Network

LPAR 1

LPAR 2

**z/VM (SSI)**

IBM System z / zEnterprise

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.

Network

z/VM (SSI)

**IBM System z / zEnterprise**
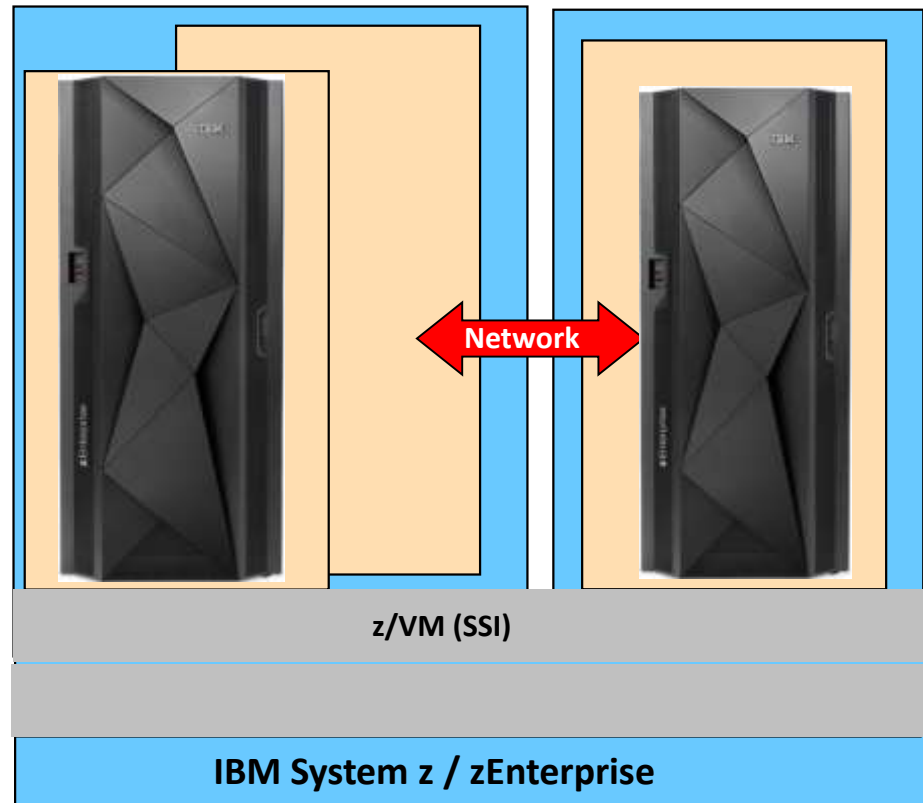
GDPS for Linux on z Systems:
IBM GDPS appliance for Linux on z Systems

- **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**.
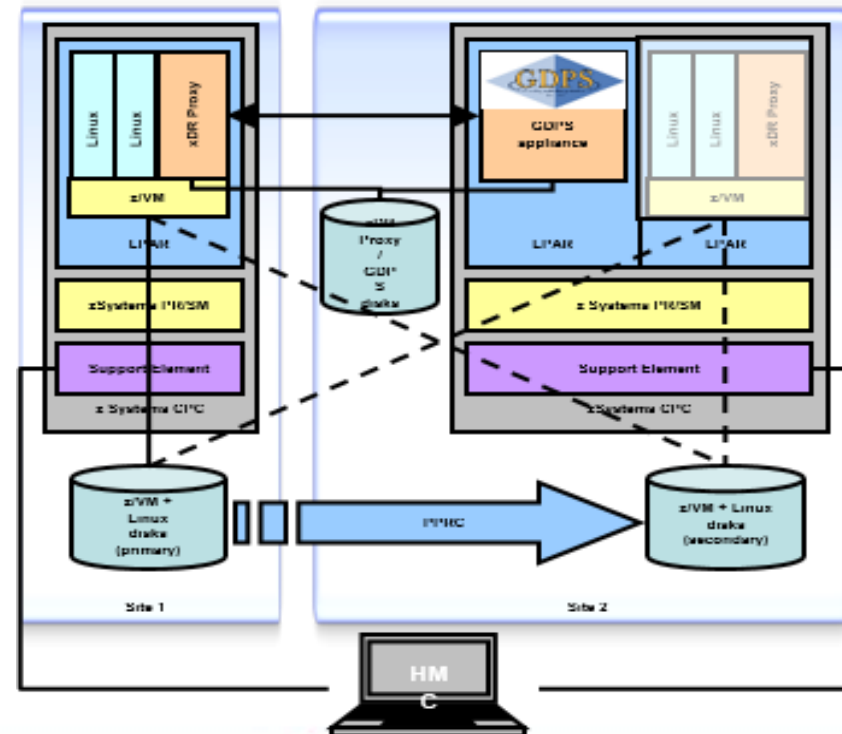
Effective Virtualization with Linux on z and z/VM shared memory

Linux Shared Memory Exploitation for many Virtual machines

z/VM Discontiguous Saved Segments (DCSS)
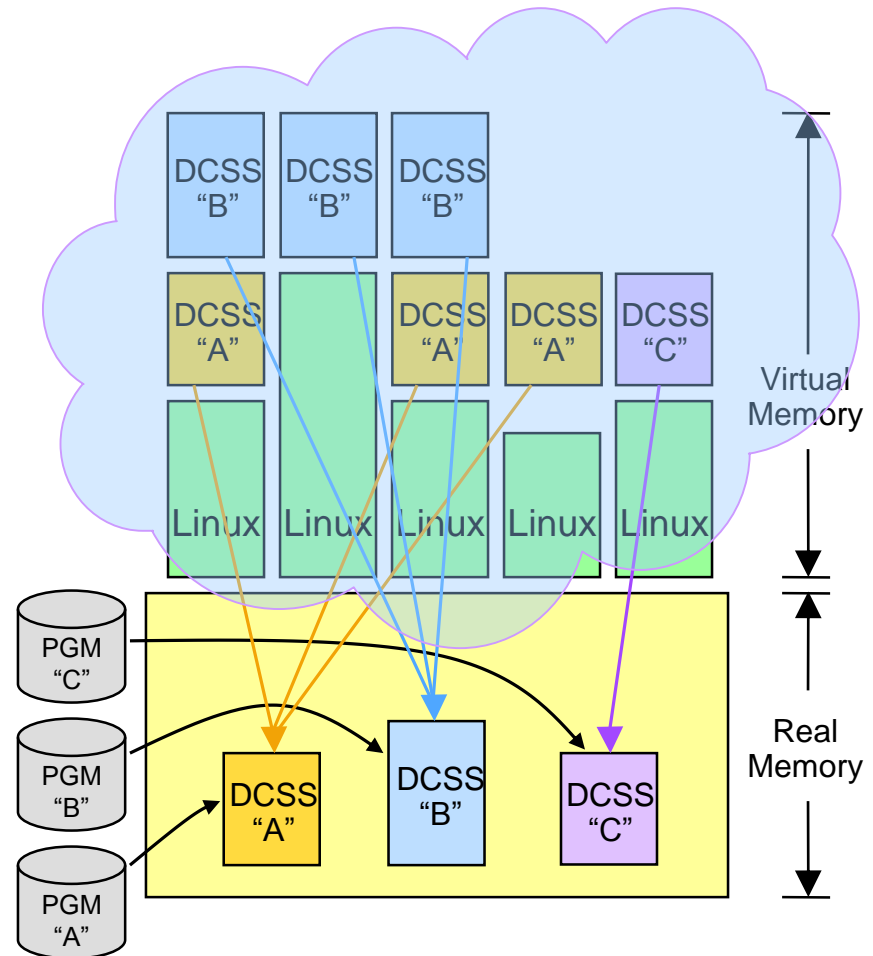
- **DCSS support is Data-in-Memory technology**
  - Share a single, real memory location among multiple virtual machines
  - Can reduce real memory utilization

- **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

IBM Cloud Manager with OpenStack for z Systems

New

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

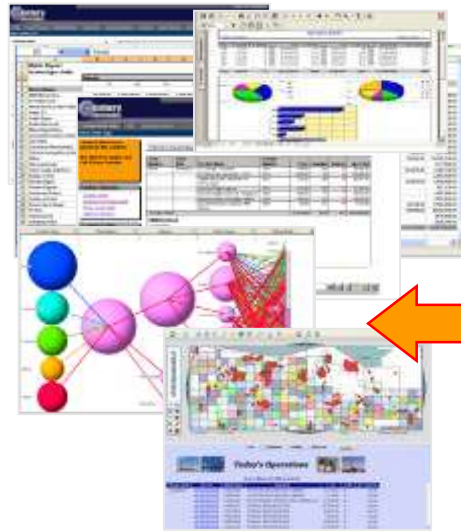**Hybrid Cloud support**

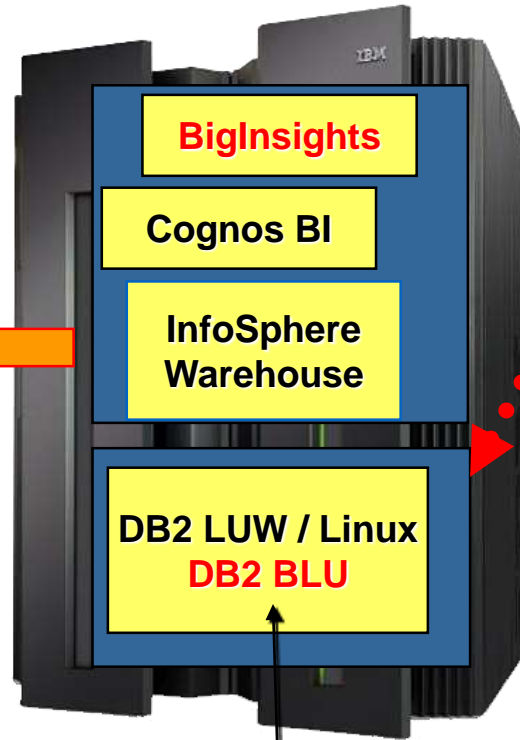- Hybrid Clouds on and off premise options via SoftLayer support

openstack™
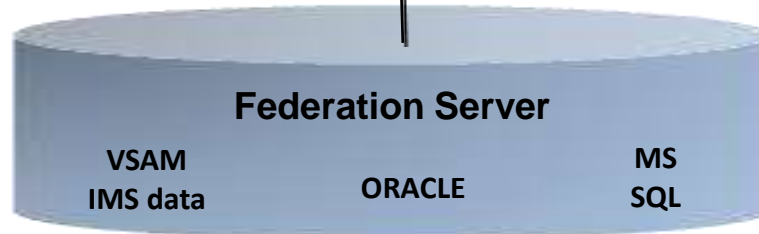
CHEF™

Data: From Database to Information Management

IBM

Linux on z Systems

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

BigInsights

Cognos BI

InfoSphere Warehouse

DB2 LUW / Linux
DB2 BLU

DB2 Warehouse Database

IBM TotalStorage / Flash

Federation Server

VSAM
IMS data

ORACLE

MS
SQL

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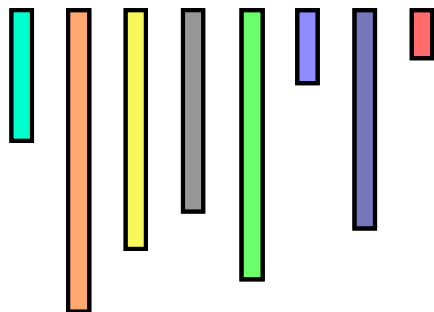- **DB2 BLU**

DB2 BLU Acceleration for Linux on z Systems

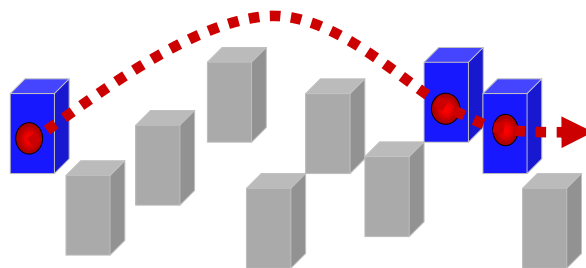## Super simple. Super Fast.

New

Columnar Everywhere

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

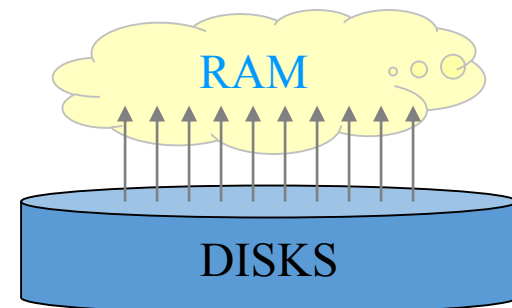C1 C2 C3 C4 C5 C6 C7 C8

Skip Boring Data

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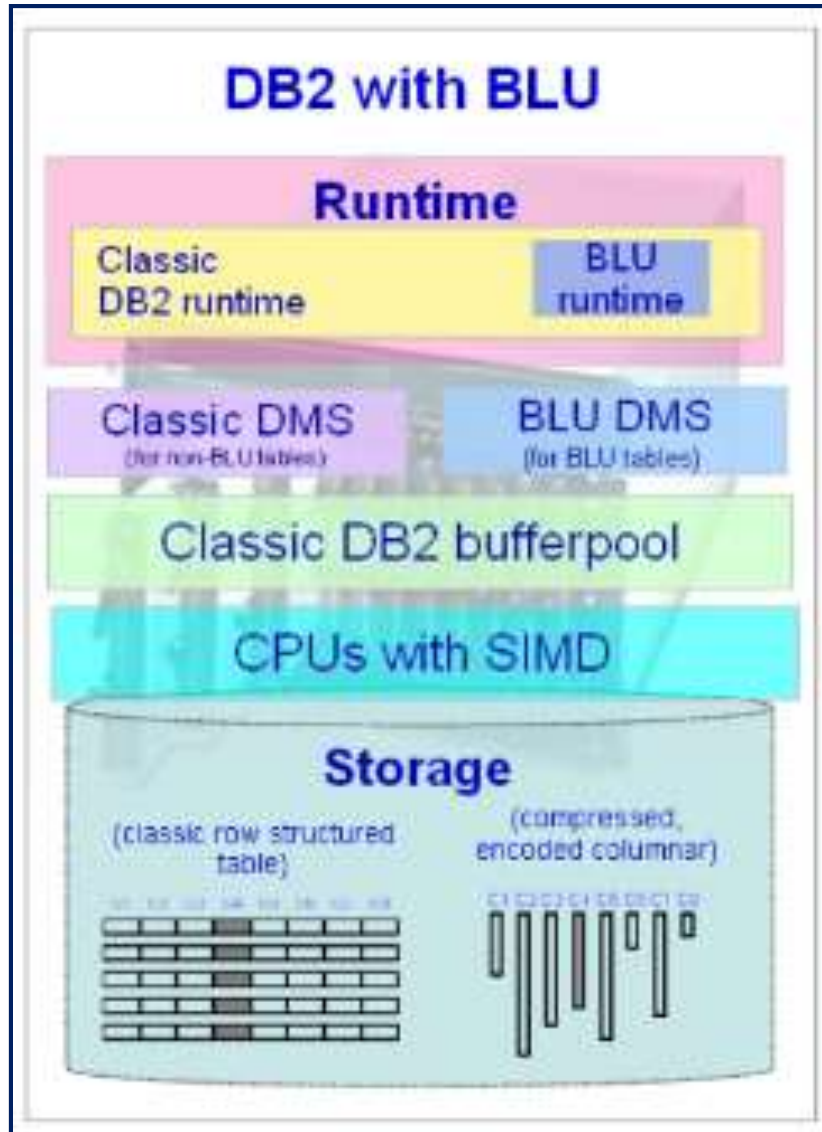- *"Data Skipping"*

Rethink Memory

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

RAM

DISKS

#ibmblu

© 2015 IBM Corporation.

DB2 w/ BLU Acceleration for Linux on z Systems
Super Simple. Super Fast.

DB2 with BLU

Runtime

| Classic DB2 runtime | BLU runtime |

| Classic DMS (for non-BLU tables) | BLU DMS (for BLU tables) |

Classic DB2 bufferpool

CPUs with SIMD

Storage

(classic row structured table) (compressed, encoded columnar)

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

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
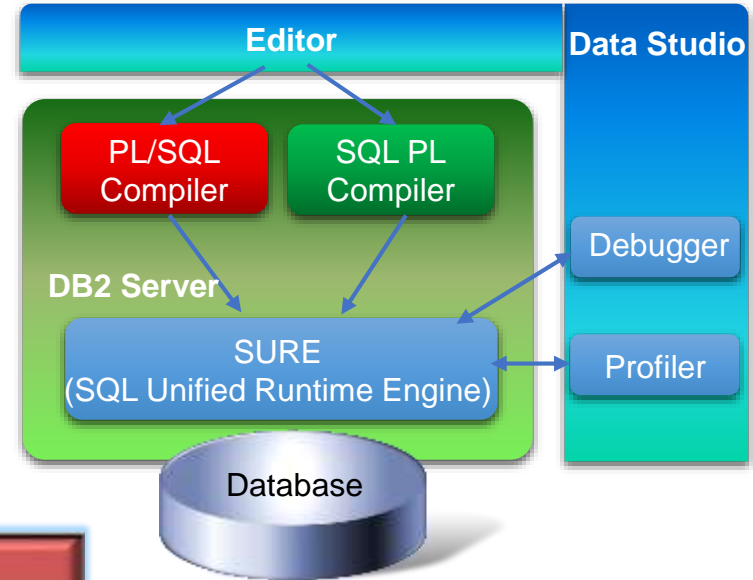
Simple.

Coca-Cola
BOTTLING CO.
CONSOLIDATED

"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

BLU Acceleration runs Oracle Code

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

Editor

Data Studio

PL/SQL Compiler

SQL PL Compiler

DB2 Server

SURE
(SQL Unified Runtime Engine)

Debugger

Profiler

Database

Oracle Database	→	DB2	Not Emulation
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	

BLU inside

Business Analytics Solutions on zEnterprise

•Business analytics capabilities

Business outcomes/benefits

Cognos – Business Intelligence

- Understand current & potential state
- Monitor results & fine-tune your business
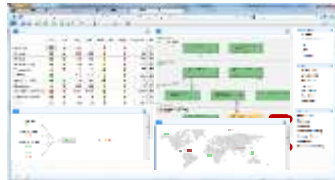- Inform strategy with a view into the future

SPSS – Predictive Analytics

- Predict customer segment & category affinity
- Market Basket Analysis to identify NBO
- Overlay browsing history onto purchase history to profile customers

TM1 – Performance Management

- Reporting, analysis, operational & financial planning and consolidation
- Product profitability across customers, business & channels
- Sales Performance Management to improve efficiency in incentive compensation process

BigInsights – Investigative Analytics

- Gain additional insights from LOGs, social media, streams, machine data, mass archives
- Understand and visualize the context of data in unstructured documents, LOGs and understand customer sentiment

Hadoop: IBM InfoSphere BigInsights for Linux on z Systems
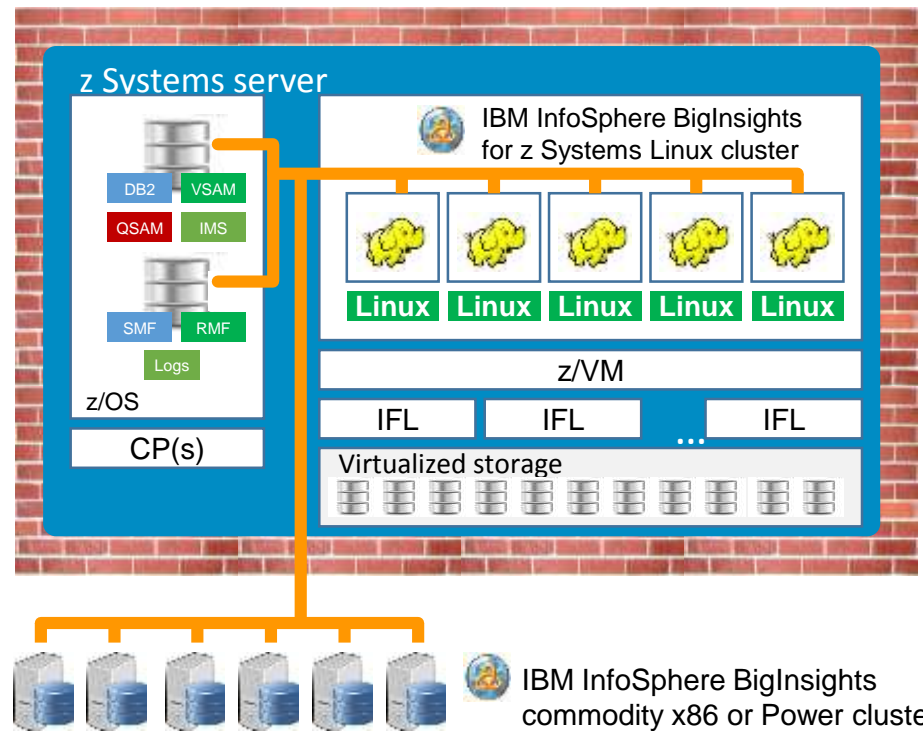## New ways of thinking, transformative economics

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

z Systems server

IBM InfoSphere BigInsights for z Systems Linux cluster

DB2 | VSAM
QSAM | IMS

SMF | RMF
Logs

z/OS

CP(s)

Linux | Linux | Linux | Linux | Linux

z/VM

IFL | IFL | ... | IFL

Virtualized storage

IBM InfoSphere BigInsights commodity x86 or Power cluster

Why BigInsights for Mainframe Customers?

Business Reasons	Technical Reasons/Product Features
Economies of scale – run the same Hadoop distribution both on and off the mainframe **Strategic flexibility** – run the same Hadoop distribution across multiple platforms – System z, Power, System x, third party Intel-based HW **Perpetual & monthly** license – flexible pricing options **New skills** – levergare new skills becoming readily available around the Hadoop ecosystem	**100% Hadoop compatible** – Complete open source distribution with industry standard Hadoop tools **Big SQL** – leverage common SQL syntax for DB2 for z/OS and Hadoop queries **BigSheets** – integrated spreadsheet based data manipulation and visualization for business users **Text Analytics / AQL** – development language and tooling for accelerated development of text analytic applications **Advanced IDE** – Comprehensive ECLIPSE IDE to accelerate the development of Big Data applications

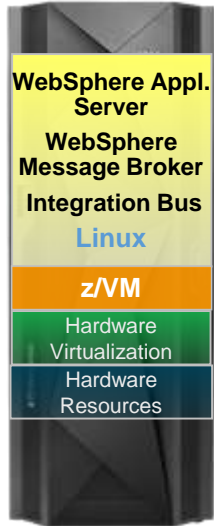# Enrich data-driven applications with social media data

- 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

Integration: Web Application Hosting and SOA Integration - IIB

New

WebSphere Appl. Server
WebSphere Message Broker
Integration Bus
Linux
z/VM
Hardware Virtualization
Hardware Resources

- 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

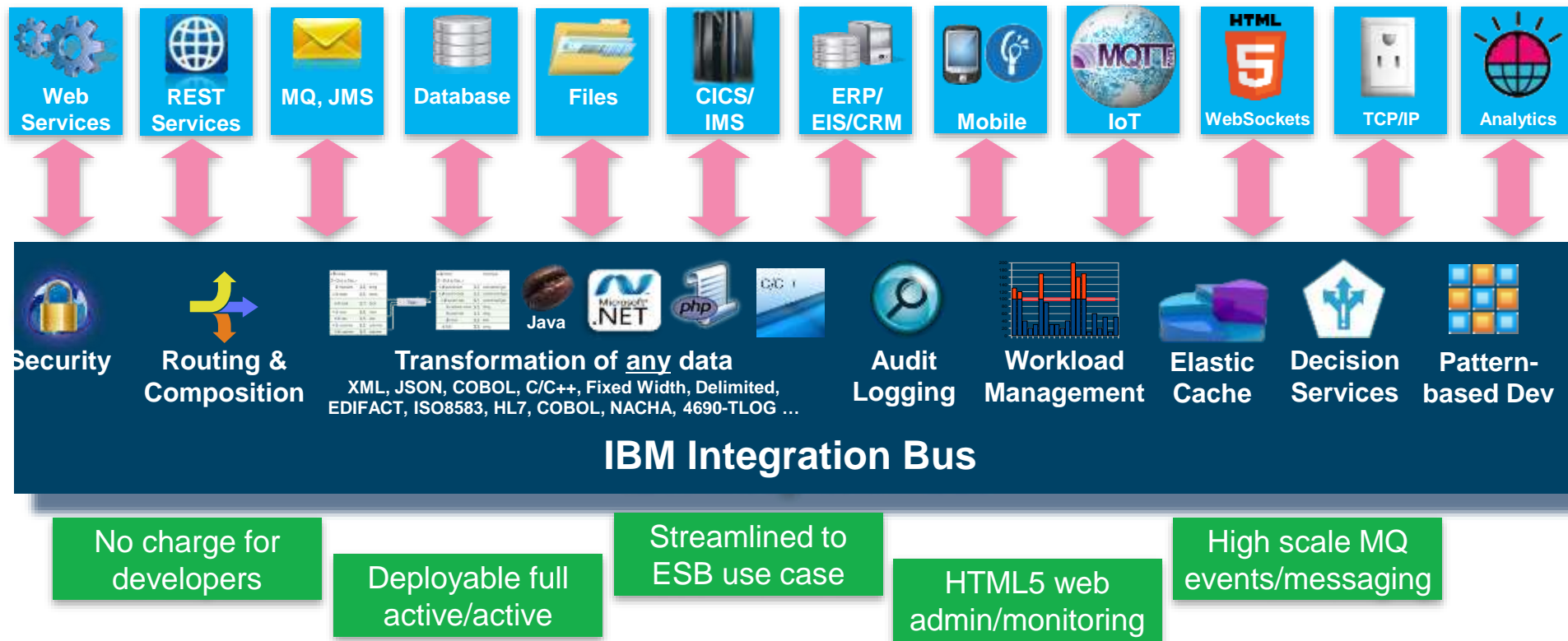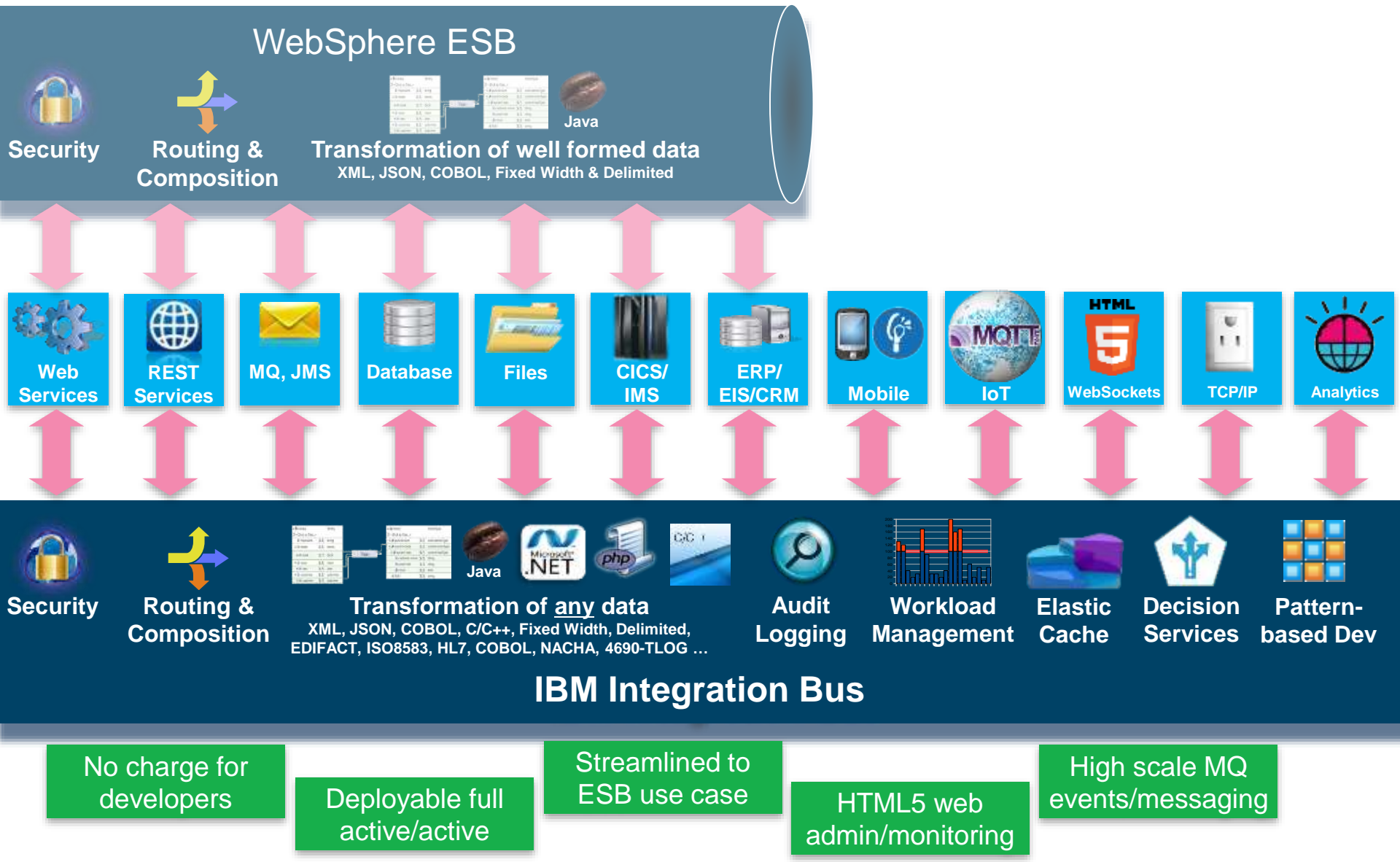| Traxpay - Germany	Bank of Tokyo-Mitsubishi UFJ (BTMU) - Japan
▪ Traxpay looked to redesign the B2B payment process to offer an innovative financial transactions platform, enabled 24/7	▪ BTMU developed a Service Oriented Architecture (SOA) platform to realize this "cloud-banking" concept
▪ Banking connections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

Benefits from the IBM Integration Bus (IIB)

- Flexible integration with Cloud, Analytics and Mobile
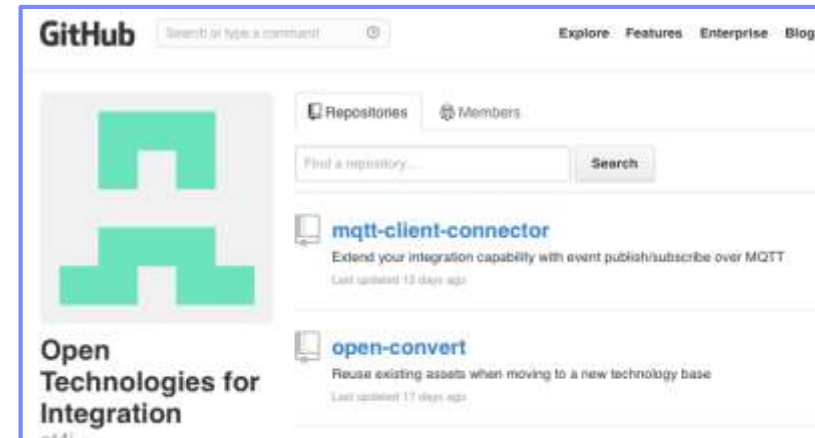- Stanbdard Interfaces,
- Intelligent transformation and routing

| Web Services | REST Services | MQ, JMS | Database | Files | CICS/IMS | ERP/EIS/CRM | Mobile | IoT | WebSockets | TCP/IP | Analytics |

IBM Integration Bus

Security | Routing & Composition | Transformation of any data — XML, JSON, COBOL, C/C++, Fixed Width, Delimited, EDIFACT, ISO8583, HL7, COBOL, NACHA, 4690-TLOG … | Audit Logging | Workload Management | Elastic Cache | Decision Services | Pattern-based Dev

- No charge for developers
- Deployable full active/active
- Streamlined to ESB use case
- HTML5 web admin/monitoring
- High scale MQ events/messaging

Benefit from the IBM ESB strategy

IBM

WebSphere ESB

Security

Routing & Composition

Transformation of well formed data
XML, JSON, COBOL, Fixed Width & Delimited

Java

Web Services	REST Services	MQ, JMS	Database	Files	CICS/ IMS	ERP/ EIS/CRM	Mobile	IoT	WebSockets	TCP/IP	Analytics

IBM Integration Bus

Security

Routing & Composition

Transformation of _any_ data
XML, JSON, COBOL, C/C++, Fixed Width, Delimited,
EDIFACT, ISO8583, HL7, COBOL, NACHA, 4690-TLOG ...

Java .NET php C/C ↑

Audit Logging

Workload Management

Elastic Cache

Decision Services

Pattern-based Dev

No charge for developers

Deployable full active/active
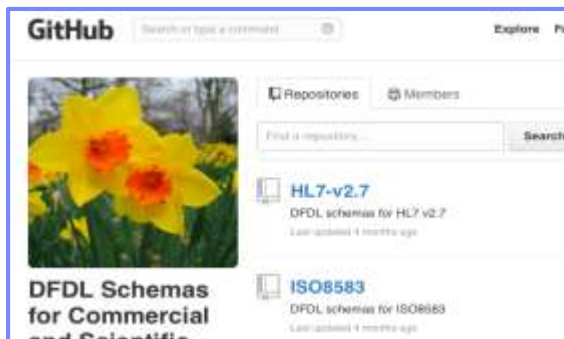
Streamlined to ESB use case

HTML5 web admin/monitoring

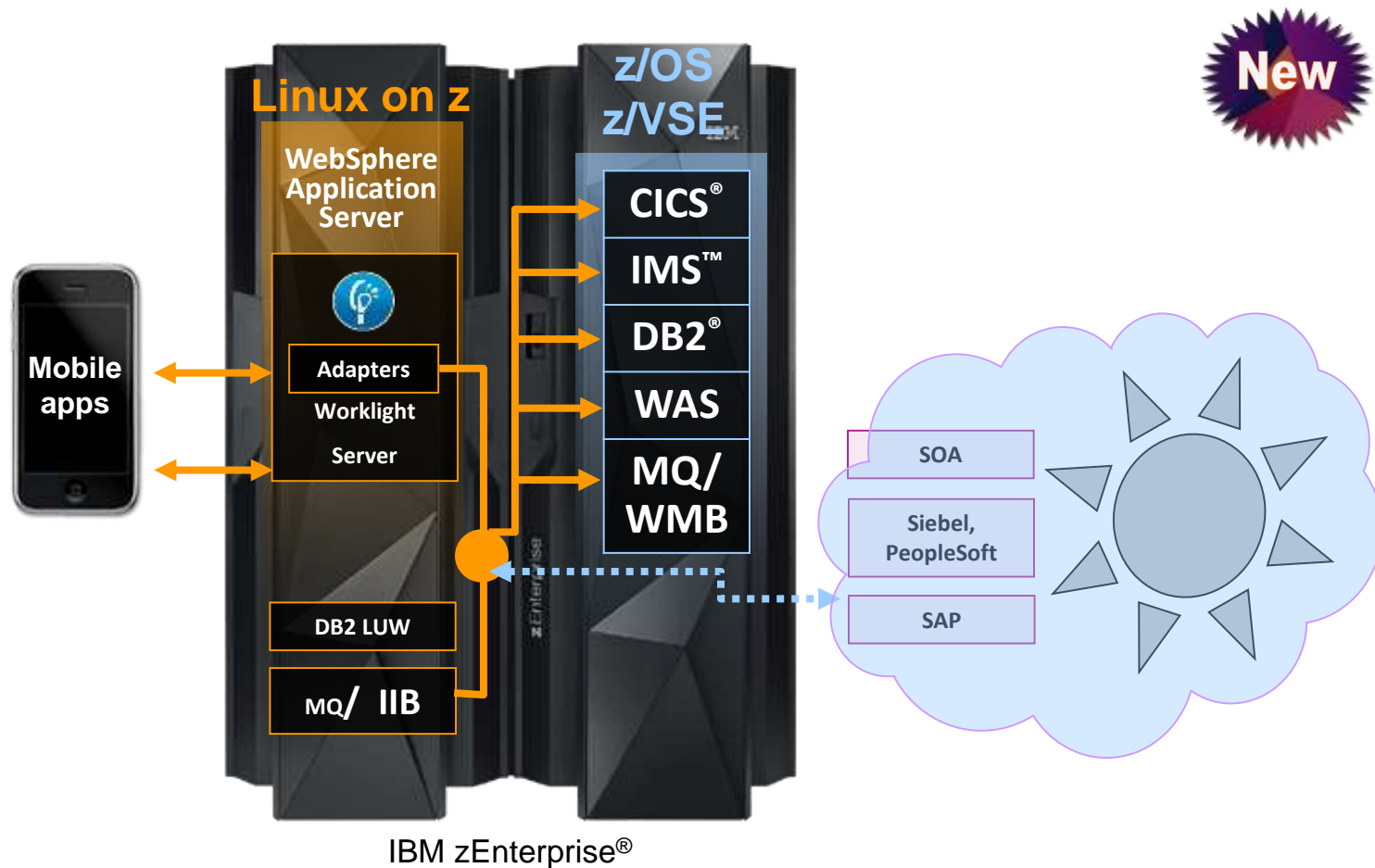High scale MQ events/messaging

Open technologies with IBM Integration Bus (IIB)

- Removal of MQ as a Pre-req - First class support for MQ, but no long a must have

- New IIB initiative to develop integration components as open source
  - Part of continuing tradition of IIB supporting open standards
  - Source freely available on popular Github website under flexible Eclipse Public License
  - Community contributions (including modifications) actively encouraged!
  - Fully supported technologies delivered into IIB as appropriate

- Varied initial contributions targeting transferrable, embeddable assets
  - MQTT Client connectors
    - Easy-to-use inbound and output connectors to MQTT servers
    - Uses open framework for platform-independent connectors
  - DFDL Schemas for popular industry formats
    - E.g. HL7, ISO8583, IBM4690-TLOG, NACHA, PCAP, EDIFACT
  - Chef cookbooks for simplified IIB provisioning
    - Customizable scripts allows building of complete IIB environments
  - Tools for easier conversion between integration products
    - Initially targeting WESB to IIB
  - Source for common integration patterns (e.g. event filter)

The MobileFirst hub on IBM z13 connecting to Core Systems

IBM

New

Linux on z

z/OS z/VSE

WebSphere Application Server

Mobile apps

Adapters

Worklight

Server

CICS®

IMS™

DB2®

WAS

MQ/WMB

DB2 LUW

MQ/ IIB

SOA

Siebel, PeopleSoft

SAP

IBM zEnterprise®

- **Server side software components and adapters for channeling z Systems to mobile devices** with IBM MobileFirst Server V7

- **Mobile application support** with WebSphere Application Server on z Systems

- **Mobile protocol connectivity with cloud, SOA, SAP and core z Systems applications** including CICS, IMS, TPF, MQ, IIB and DB2

The ultimate JavaScript environment: Node.js

New

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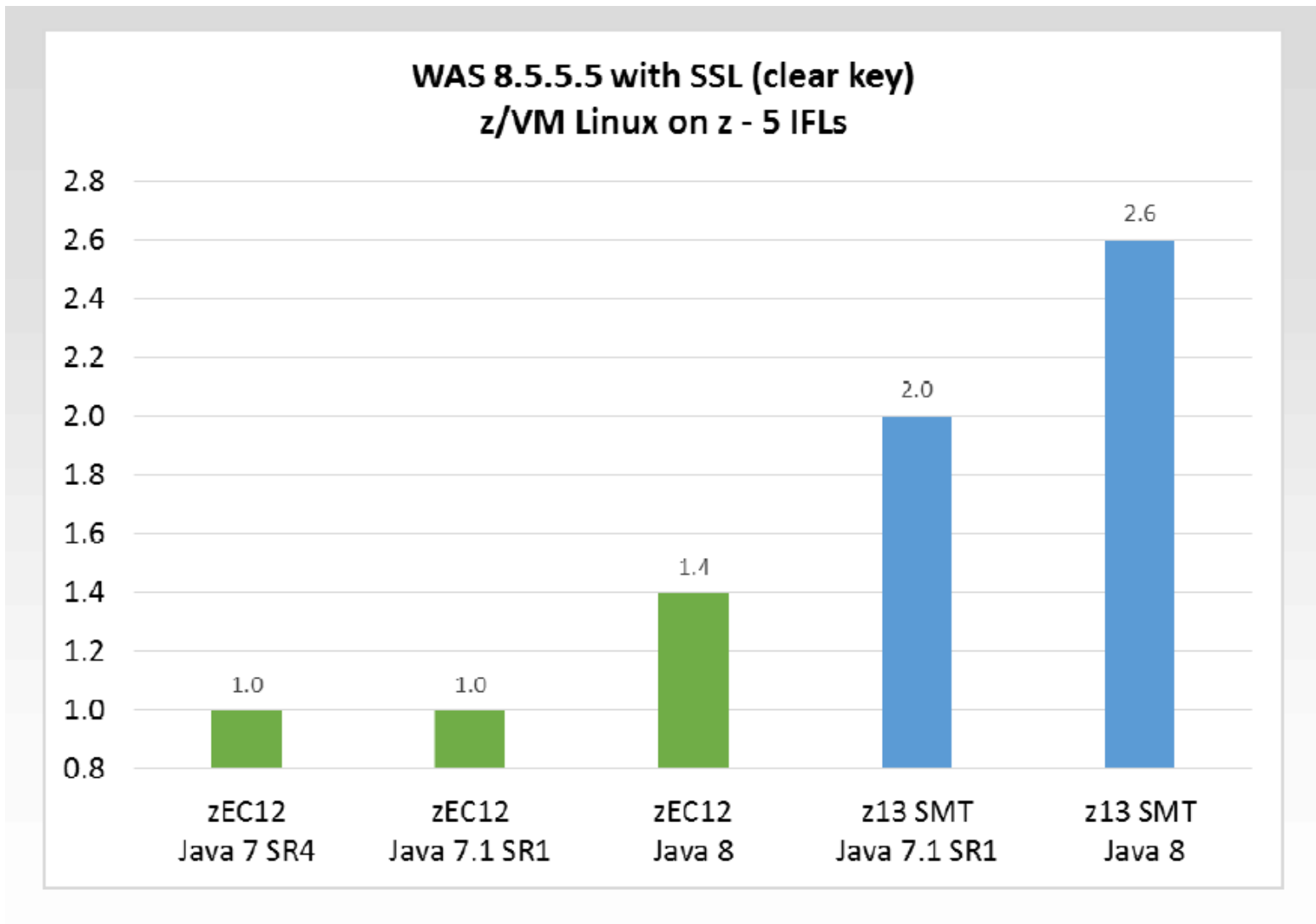
IBM SDK for Node.js Version 1.1
for Linux on z Systems

Want to start: -> IBM Mobile Test Drive

- **Partner with IBM resources to work on a Mobile Test Drive of your choice:**
  - Select an entry point such as building a **mobile front end for an existing 3270 application**, composing a **Bluemix mobile app** connected to a system of record, assessing the benefits of **Mobile Workload Pricing**, leveraging API enablement using **API Management or z/OS Connect**, and others

- **Benefits:**
  - Work with IBM mobile specialists to **review existing mobile projects, priorities and requirements**
  - Leverage **best practices and subject matter expertise** for input into your enterprise mobile infrastructure strategy and enterprise mobile roadmap
  - Learn what others are doing to **accelerate time to value and differentiate their business with mobile projects** by integrating high value enterprise data and transactions

- **Who should be interested?**
  - Clients that are looking to **leverage existing z Systems data and applications via mobile channels** to drive more value from mobile initiatives

- **What is the commitment?**
  - **1-2 days Discovery** that IBM mobile experts facilitate with your business and technical team, followed by a **deeper Mobile Test Drive**, for **up to a two weeks engagement**

- **How much will it cost?**
  - We will provide **no-cost** technical expertise and access to resources during the Proof-of-Concept

Contact: Nathan Brice (nbrice@uk.ibm.com)

Z13 and Java 8 performance boost
WAS Liberty 8.5.5.5 – SSL enabled DayTrader

WAS 8.5.5.5 with SSL (clear key)
z/VM Linux on z - 5 IFLs

(Controlled measurement environment, results may vary)

IBM Spectrum Scale for Linux on z Systems

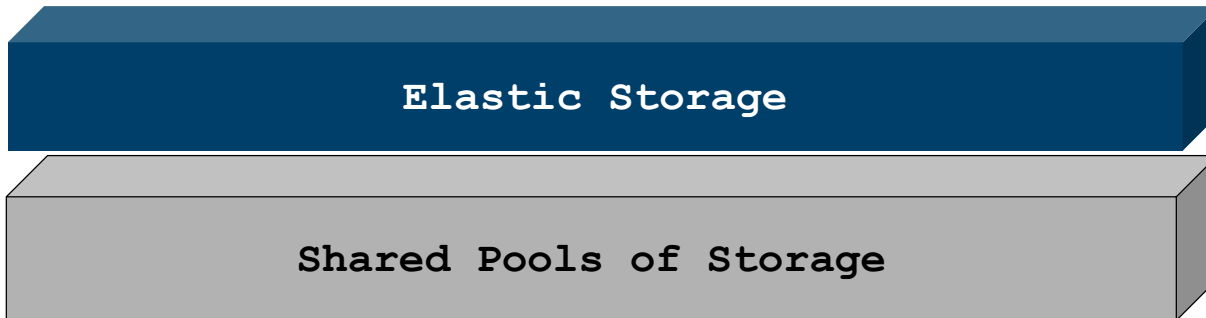*Provides fast data access and simple, high available data management*

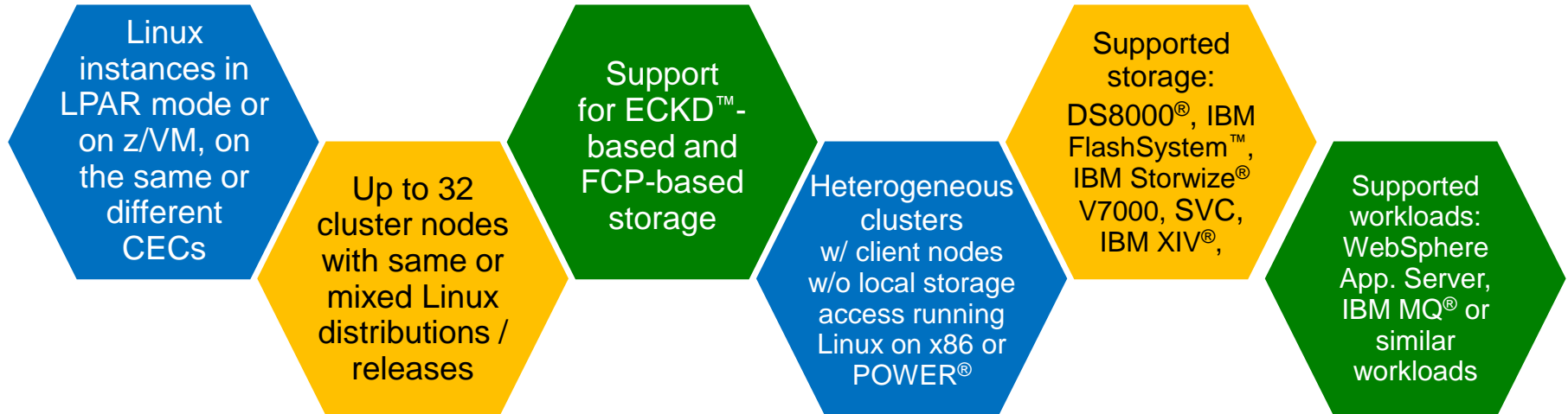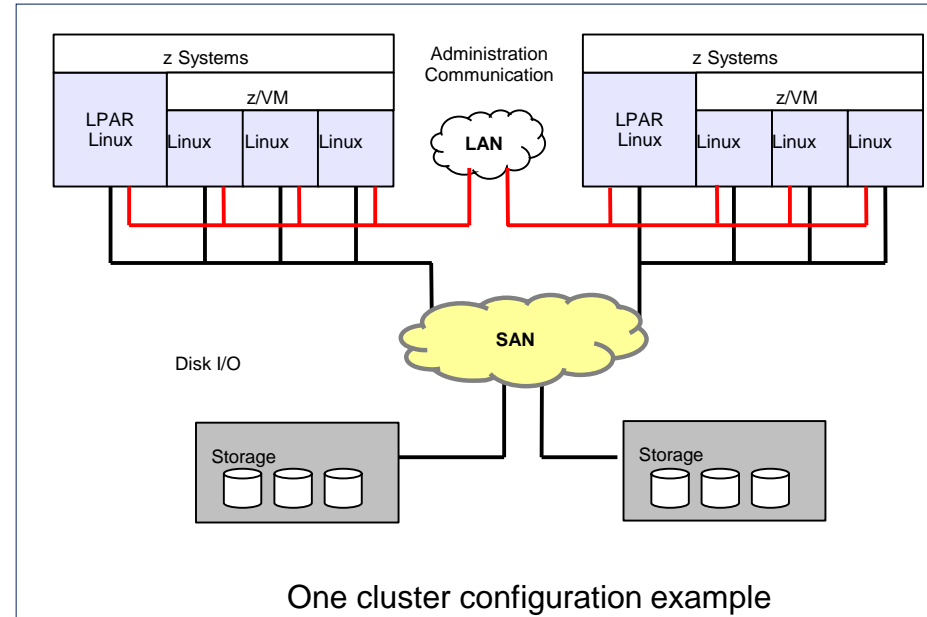Data Collection   Analytics   File Storage   Media

Elastic Storage

Shared Pools of Storage

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

IBM Spectrum Scale for Linux on z Systems
## Based on IBM GPFS technology

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

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, …)
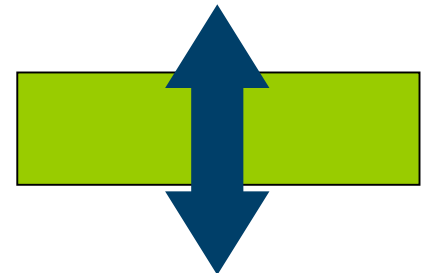
Drive more value with FlashSystem

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*

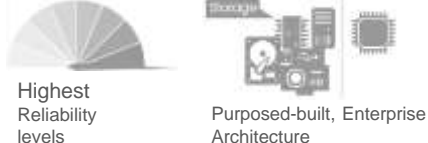*System z FiconExpress 8s I/O cards can provide an additional 10% throughput running with FCP*

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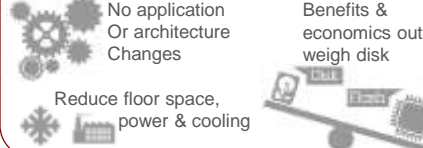

Why IBM FlashSystem for Linux on System z?
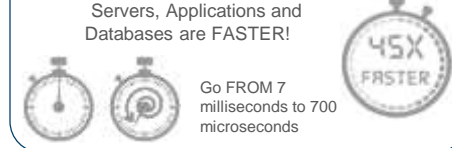
Extreme Performance

Cut IO Wait Time **80%+**

Latency Under 100 Microseconds

3X INCREASE IOPS

Enterprise Reliability

Highest Reliability levels

Purposed-built, Enterprise Architecture

Macro Efficiency

No application Or architecture Changes

Benefits & economics out weigh disk

Reduce floor space, power & cooling

IBM MicroLatency™

Servers, Applications and Databases are FASTER!

Go FROM 7 milliseconds to 700 microseconds

45X FASTER

* IBM internal test results

IBM zAware V2.0 - Analyze Linux on z Systems

New

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

IBM zAware Web GUI to monitor results

z13 IBM zAware host

IBM zAware Host Partition | z/OS | Linux on z

IBM zAware monitored client

z/OS | Linux on z | Linux on z

z/VM

- 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

Quality of Service

IBM.

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

Mobile

Node.js

Internal Integration

141 High performance cores

Simultaneous multi-threading

10TB Memory

320 16 GB/sec Channels

2X Cache and I/O Bandwidth

Single instruction, multi data

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

Clients run many workloads on Linux on z Systems

Databases	WebSphere Application Server WebSphere MQ IBM Integration Bus	SPSS Cognos Warehouse BigInsights Info.Server Master Data Mgmt	MobileFirst Platform Foundation SAP Content Mgt Tivoli® Storage Mg Maximo Connections / Notes
Virtualization Management	**Virtualization Management**	**Virtualization Management**	**Virtualization Management**
Hardware resources	**Hardware resources**	**Hardware resources**	**Hardware resources**
Database deployment	**Web application and SOA infrastructure**	**Real-time insights**	**… and much more**

Database deployment
- Sparda-Datenverarbeitung eG (DB2, Oracle)
- EVERTEC (Oracle)
- L3C LLP (Oracle)
- Dundee City Council (Oracle)
- Met Office (Oracle)
- America First Credit Union (DB2)
- SinfoniaRx (DB2)

Web application and SOA infrastructure
- BTMU
- Nationwide
- Halkbank
- Renfe
- Bank New Zealand

Real-time insights
- Sicoob
- White Cube
- Bankia
- Miami-Dade County
- IBM

… and much more
- ABK-Systeme GmbH (MobileFirst)
- Banca Carige (MobileFirst)
- German Pension Fund (Content Mgt)
- BCBS Minnesota (SAP)
- Baldor (SAP)
- Porto Alegre (Maximo)
- City a. County of Honolulu (Maximo)
- IBM (Connections/Notes)

More cases: **ibm.com**/systems/z/os/linux/success/index.html

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IBM z13 and Linux – the success continues
The enterprise grade Infrastructure **stack for Linux solutions - growth**

z13 [1]

Up to 10 TB	>3X more available memory
Up to 141	Configurable cores
Up to 85	Configurable LPARs
IBM zAware	Maximize service levels
Larger Cache	More workloads per server
Crypto Express5S	Performance and function
SMT2, SIMD	Enhanced performance

Enterprise grade Linux solution:

SOD: IBM GDPS® appliance	Continuous availability & Disaster recovery
IBM Spectrum Scale (IBM GPFS technology)	Clustered file system
SOD: KVM for z Systems	Open source virtualization
IBM Infrastructure Suite	Management suite for z/VM and Linux
IBM Wave for z/VM	Intuitive virtualization management
IBM z/VM	Virtualization with efficiency at scale
IBM z13	Unmatched server technology & capacity

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

[1] Total capacity improvement over zEC12 of 40+ percent

IBM z Systems and LinuxONE Virtualization Options

IBM z Systems now has three strategic virtualization platforms

- IBM z/VM®
- IBM® Processor Resource/System Manager (PR/SM™)
- **KVM for IBM z Systems**

KVM

NEW

KVM for IBM z provides an open source choice for IBM z Systems virtualization for Linux workloads. Best for clients that are not familiar with z/VM and are Linux centric admins.

z/VM

z/Proprietary Server Virtualization that is completely integrated into the full stack. Complete hardware awareness. Supported on all IBM z Systems servers. z/VM will continue to be enhanced to support Linux Workloads.

PR/SM

Divide one physical server into up to 85 logical partitions (LPAR) running a mix of multiple z/OS, z/VM, Linux, KVM for IBM z, Transaction Processing Facility (TPF) and z/VSE instances isolated and secured in parallel. Share resources across LPARs or dedicated to a particular LPAR. Running a mix of multiple z/OS, z/VM, Linux, TPF, KVM for IBM z and z/VSE instances isolated and secured in parallel.

IBM and Canonical plan Ubuntu support on LinuxONE and IBM z Systems Mainframe

- At LinuxCon 08/2015 in Seattle, Canonical and IBM announced plans to create an Ubuntu distribution for LinuxONE and z Systems. The collaboration with Canonical brings Ubuntu scale-out and cloud expertise to the IBM z Systems platform, further expanding its reach and support.

Unleash the full potential of Linux

IBM **LinuxONE**

https://insights.ubuntu.com/?p=20829

Virtualization options and Docker on z Systems
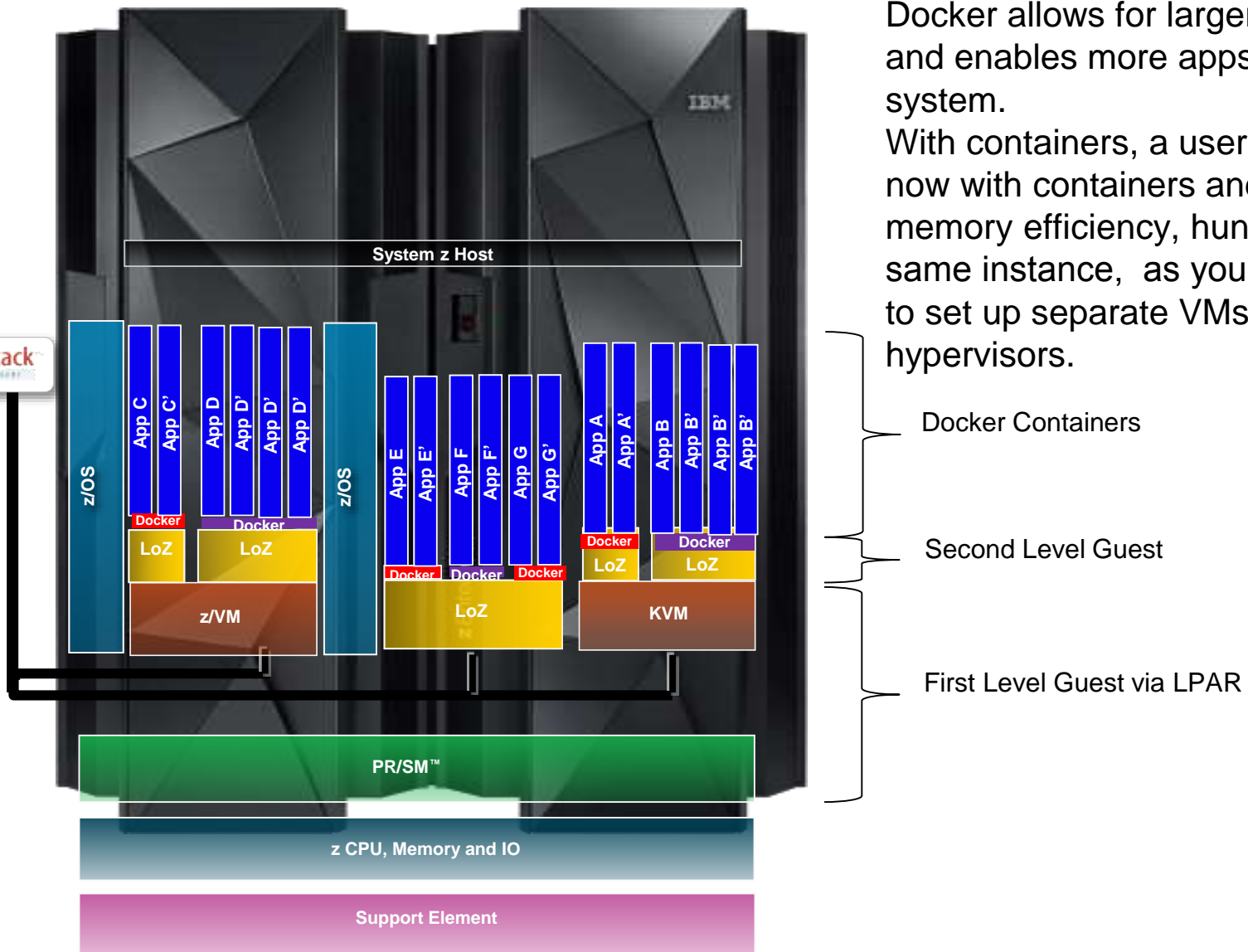
Docker allows for larger density and enables more apps in one system.
With containers, a user could run now with containers and its memory efficiency, hundreds of the same instance, as you don't have to set up separate VMs with hypervisors.

Docker Containers

Second Level Guest

First Level Guest via LPAR

Open Source Priorities in 2015

Databases-Messaging

Dev Languages-Environments

Cloud Infrastructure

Interpreter

GCC

Compiler
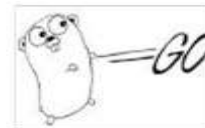
Cluster Computing

Details in Session ICV5170 on Tuesday October 6, at 3:15 PM

Analysts and White Papers

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
Tracked, Hacked and Attacked	Solitaire Interglobal
Private cloud and mainframes	Forrester
z/VM Migration: Migrating the User Directory and RACF® Environment	IBM

IBM Systems > z Systems > z/VM >

Live Virtual Classes

Note: Recordings of past virtual classes can be found under the various tabs.

z/VM

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Notify me

Contact z/VM

| Upcoming | z/VM | KVM on z Systems | Linux on z Systems | z/VSE |

Title	Date	Abstract	Replay Link
Docker and z Systems 📄	September 23, 2015	Docker is an open-source infrastructure for quickly building, deploying and managing applications, running on many platforms including Linux on z Systems. This session gives an overview of Docker, its concepts, and its usage in light of Linux on z Systems.	Click here
Java on IBM z13 - A Performance Update 📄	July 1, 2015	This session will explain and quantify the benefits of the new z13 technologies for Java and highlight the conditions when your own applications can best exploit the new features.	Click here
Hybrid Cloud with z Systems and SoftLayer 📄	June 24, 2015	After a brief introduction of Hybrid Cloud, its concepts, and the demo architecture and infrastructure, a Hybrid Cloud landscape is demonstrated on a life environment, based on a simple 2-tier workload running on top of the Cloud infrastructure.	Click here
Cloud Computing Solutions on z Systems 📄	May 13, 2015	This session is about Hybrid Cloud Computing - getting the best of both worlds, the cost efficiency of public cloud with the security and the flexibility of a private cloud.	Click here
Linux on z Systems - What's New? 📄	April 15, 2015	This session will give you a broad view of the next features of the kernel for Linux on z Systems and what these features can do	Click here

Questions?

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IBM

YOUR OPINION MATTERS!

1 **2** **3** **4**

Submit four or more session evaluations by 5:30pm Wednesday to be eligible for drawings!

*Winners will be notified Thursday morning. Prizes must be picked up at registration desk, during operating hours, by the conclusion of the event.

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Global Skills Initiative