Customer experiences using Linux on IBM z Systems and LinuxONE

IT simplicity with an enterprise grade Linux platform

Wilhelm Mild

Executive IT Architect
for Mobile, z Systems and Linux
IBM Lab Boeblingen, Germany

IBM®

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
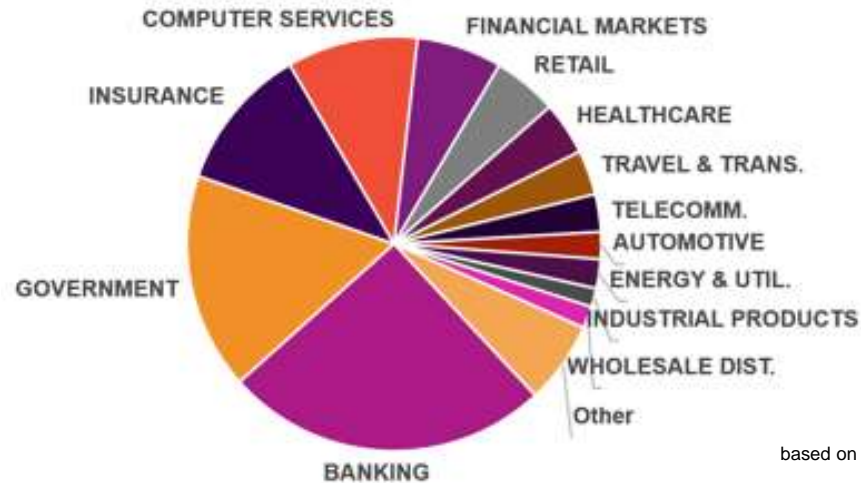of all enterprise applications need the mainframe to complete transactions

Who is using Linux on IBM z Systems

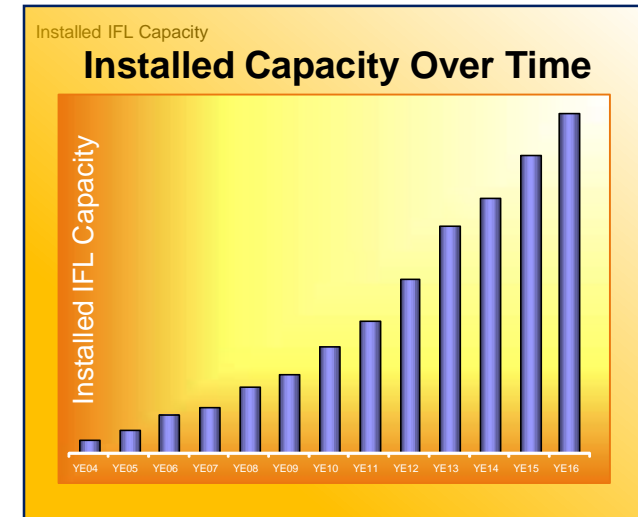## Used in 50 countries across 21 industries around the globe

Most used in:
- Banking and Financial Markets
- Government
- Insurance
- Computer Services
- Retail and Healthcare
- Transportation and Telecommunication

- 93 of the top 100 z Systems clients are running Linux on IBM z (based on total installed MIPS in 4Q2016)

- 48% of z Systems clients have IFLs installed

- Very large installations with up to hundreds of cores/IFLs in USA, Japan, Brazil, Germany, UK and South Africa

- Small installations with 2 IFLs in all countries and on all z Systems models

Installed IFL Capacity

Installed Capacity Over Time

Installed IFL Capacity

YE04 YE05 YE06 YE07 YE08 YE09 YE10 YE11 YE12 YE13 YE14 YE15 YE16

COMPUTER SERVICES FINANCIAL MARKETS RETAIL
INSURANCE HEALTHCARE
TRAVEL & TRANS.
TELECOMM.
AUTOMOTIVE
ENERGY & UTIL.
INDUSTRIAL PRODUCTS
GOVERNMENT WHOLESALE DIST.
Other
BANKING

based on MIPS

2000 In the market since 2000, well accepted and growing
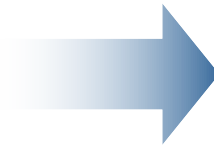2017

The future has begun…

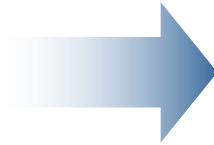**...and a new 'Era of computing' with z Systems**

Trends to Improve Value and reduce Complexity and Costs

Optimize the Overall IT Environment

➢ **Simplify Hardware Infrastructure**

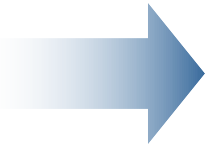➢ **Integrate Redundant Software and Data**

Appl **Appl** **Appl** **Appl**

Microservices

Appl **Appl**

- ▪ **Virtualize**
- ▪ **Deduplicate**
- ▪ **Integrate**
- ▪ **Archive**

➢ **Improve Service Delivery**

Integrated Service Management

Cloud Computing
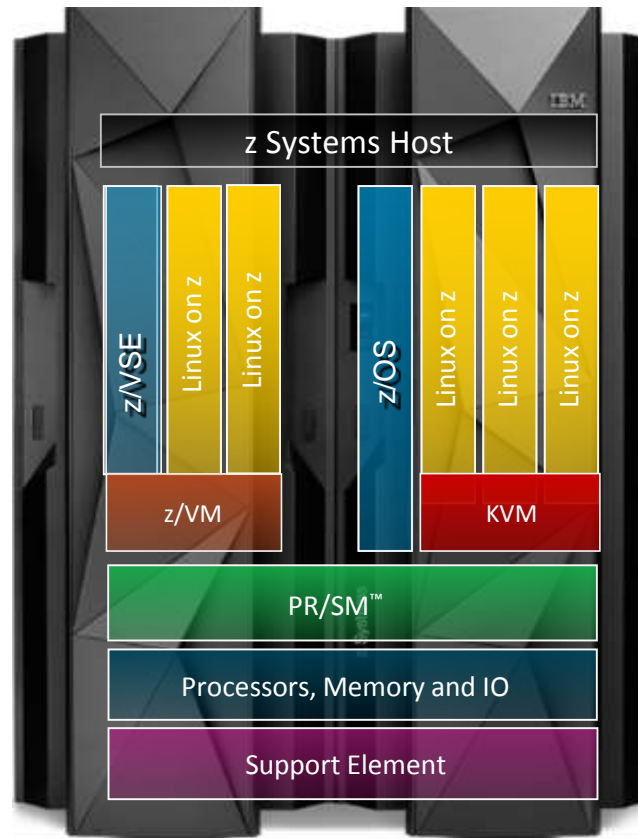
Visibility **Control** **Automation**

Mobile

Virtualization options for IBM z Systems

IBM z/VM

- World class quality, security, reliability - powerful and versatile
- Extreme scalability creates cost savings opportunities
- Exploitation of advanced technologies, such as:
  - Shared memory (Linux kernel, executables, communications)
- Highly granular control over-resource pool
- Provides virtualization for all z Systems operating systems

z Systems Host

z/VSE | Linux on z | Linux on z

z/OS | Linux on z | Linux on z | Linux on z

z/VM

KVM

PR/SM™

Processors, Memory and IO

Support Element
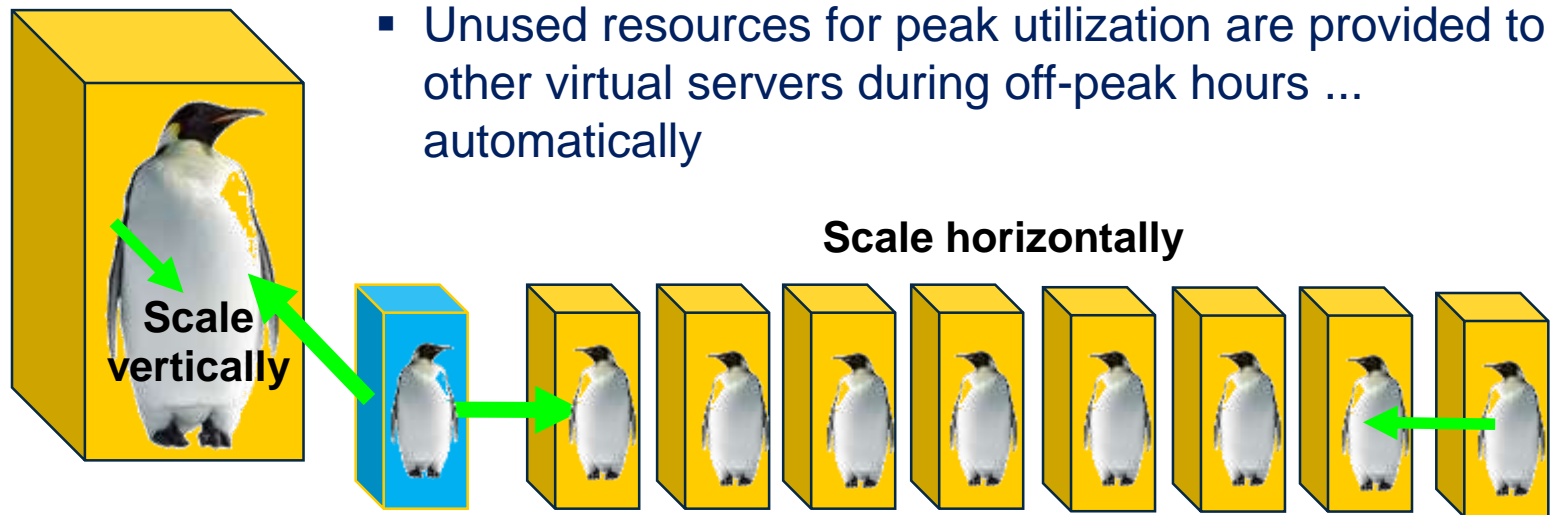
KVM technology for IBM z

- Standardizes configuration and operation of server virtualization
- Leverage common Linux administration skills to administer virtualization
- Provides an Open Source virtualization choice with the adaption to exploit z Systems technologies
- Available in:
  - SUSE SLES 12 SP2
  - UBUNTU 16.04

z/VM Outstanding Scalability

Potential for economic growth and flexible configuration

- Highest levels of resource sharing – including over-commitment, cooperative memory management, I/O bandwidth
- In-memory emulated storage achieves data transfers on memory-speed
- Very fast internal I/O connections, no external networking
- Dynamically add processors, memory, I/O adapters, devices and network cards … no disruption

- Unused resources for peak utilization are provided to other virtual servers during off-peak hours ... automatically

Scale horizontally

Scale vertically

Linux on z Systems has a Continuous Focus on Characteristics the Business benefits from

Security Capabilities:
- Privacy,
- Regulatory requirements,
- Identity management,
- Common Criteria Certification,
- Image Isolation,
- Cryptographic Acceleration,
- Centralized Authentication,
- Physically secure communications with HiperSockets™ and Guest LANs

Consolidation Capabilities:
- Server, Network, Storage, Staff, Skills, Utilities, Environmental, Applications Hosting of different workloads at the same time

Business Resiliency Capabilities:
- High Availability,
- Disaster Recovery, xDR, Serviceability, Reliability
- Storage failover (HyperSwap™), Data replication (Metro / Global Mirror)

## Flexibility / On demand Capabilities:
- Mixed Workloads: Scale-up & scale-out,
- Rapid server (de)commissioning,
- Idle Servers don't consume resources

Operational Simplification Capabilities:
- Virtualization,
- Single Point of Control,
- Single System Image,
- z/OS Similarities/Synergies,
- Resource Sharing

Proximity / Collocation to z/OS data:
- Increased transaction throughput, HiperSockets
- Shared data access
- Integrated storage management

9
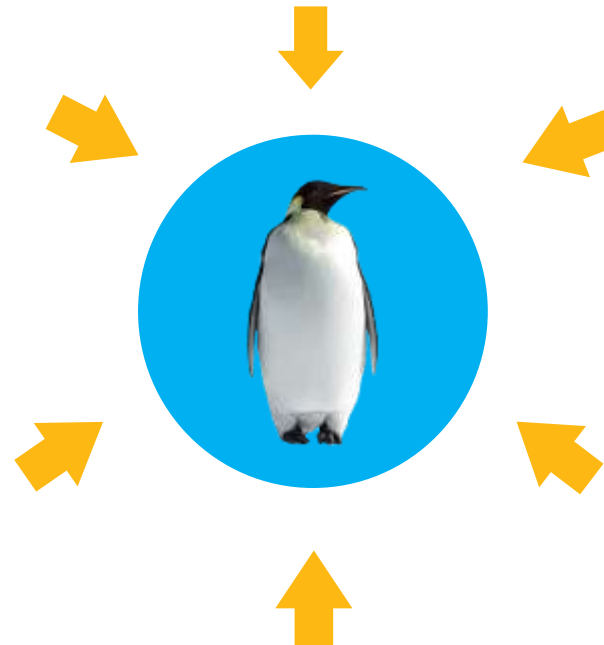
Time came the next OPEN BREAKTHROUGH

The best of
IBM z SYSTEMS

- Dynamic Resource Allocation
- Non-disruptive Scalability
- Continuous Business Availability
- Operational Efficiency
- Trusted Security
- Data and Transaction Serving

The best of
LINUX & OPEN

- Freedom & Agility
- Standards based
- Speed to Innovate
- Developer Productivity
- Community Collaboration
- Open source SW & applications

IBM LinuxONE™

IBM Systems with z Architecture

IBM z Systems

IBM z13

IBM z13s

The world's **fastest processor**
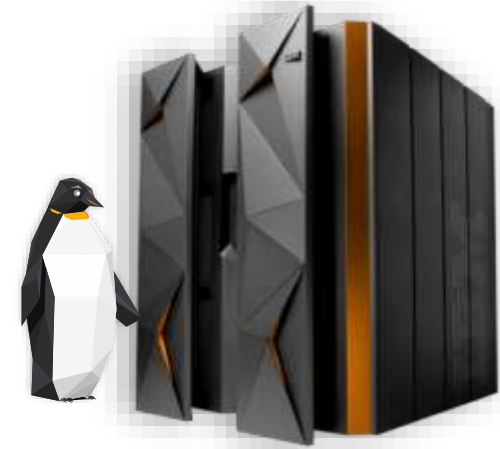
Massive **I/O throughput**
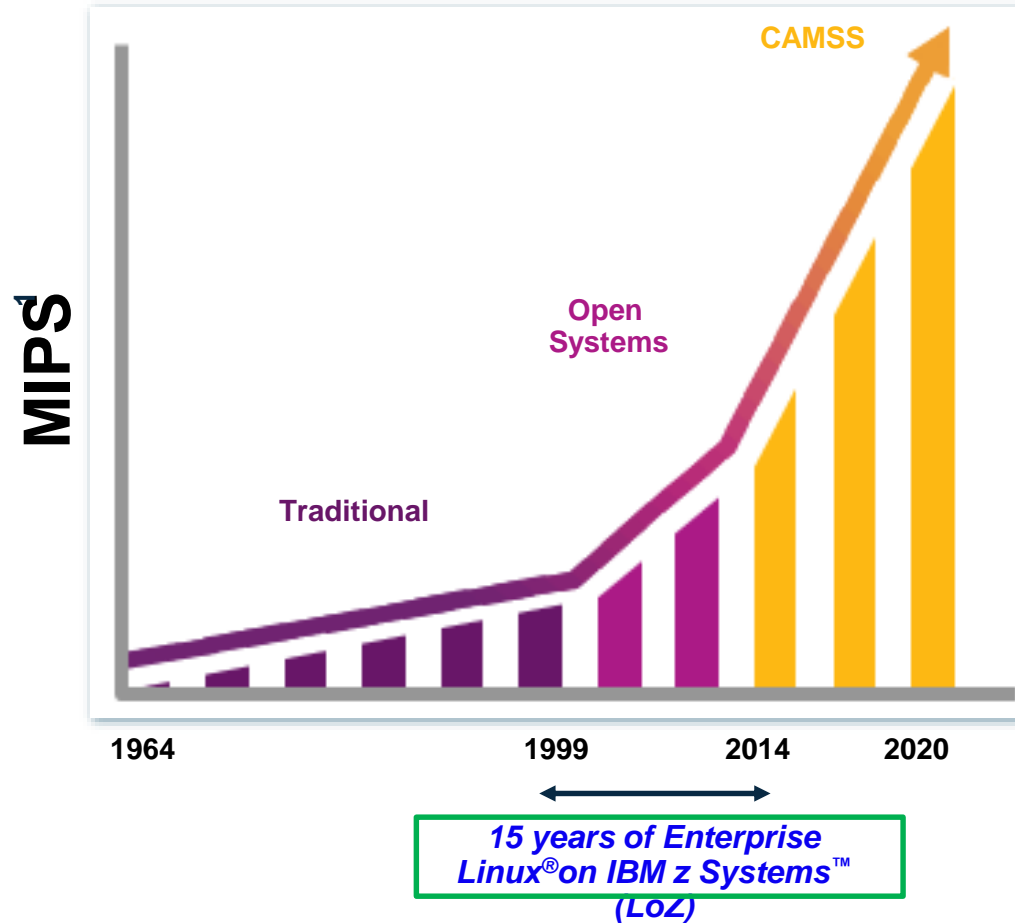
Dedicated cryptographic processors

IBM LinuxONE Systems

IBM LinuxONE Emperor

IBM LinuxONE Rockhopper

New marketplace dynamics 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 enhancement

Chart labels: CAMSS, Open Systems, Traditional, MIPS[1]

Axis: 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

Why IBM z Systems with Linux – scalability per excellence

Improved effectiveness and efficiency

Solutions

Linux Linux Linux Linux

Virtualization Management

Hardware resources

- Operational and management reduction
- Software acquisition and licensing cost reduction
- Maximized hardware utilization
- Network reduction
- Collocation of data and applications
- Floor-space and energy reduction
- Growth inside a server
- Improving security
- Disaster recovery cost reduction and simplicity

IBM z Systems with Linux

Designed to provide unrivaled power, performance, reliability, security and flexibility for all kind of Linux workloads in a single economical server, reducing the complexity of distributed systems.

Costs for a virtualized environment means a 'cloud' of costs

Administration costs

HW Acquisition costs

Network costs

SW License costs

SW Management costs

High availability and Disaster Recovery
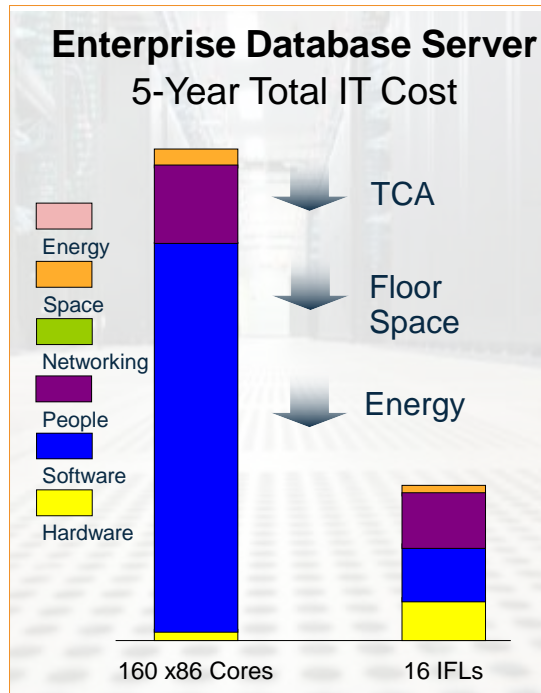
Upgrade / Version costs

Maintenance costs

TOTAL Cost of Ownership
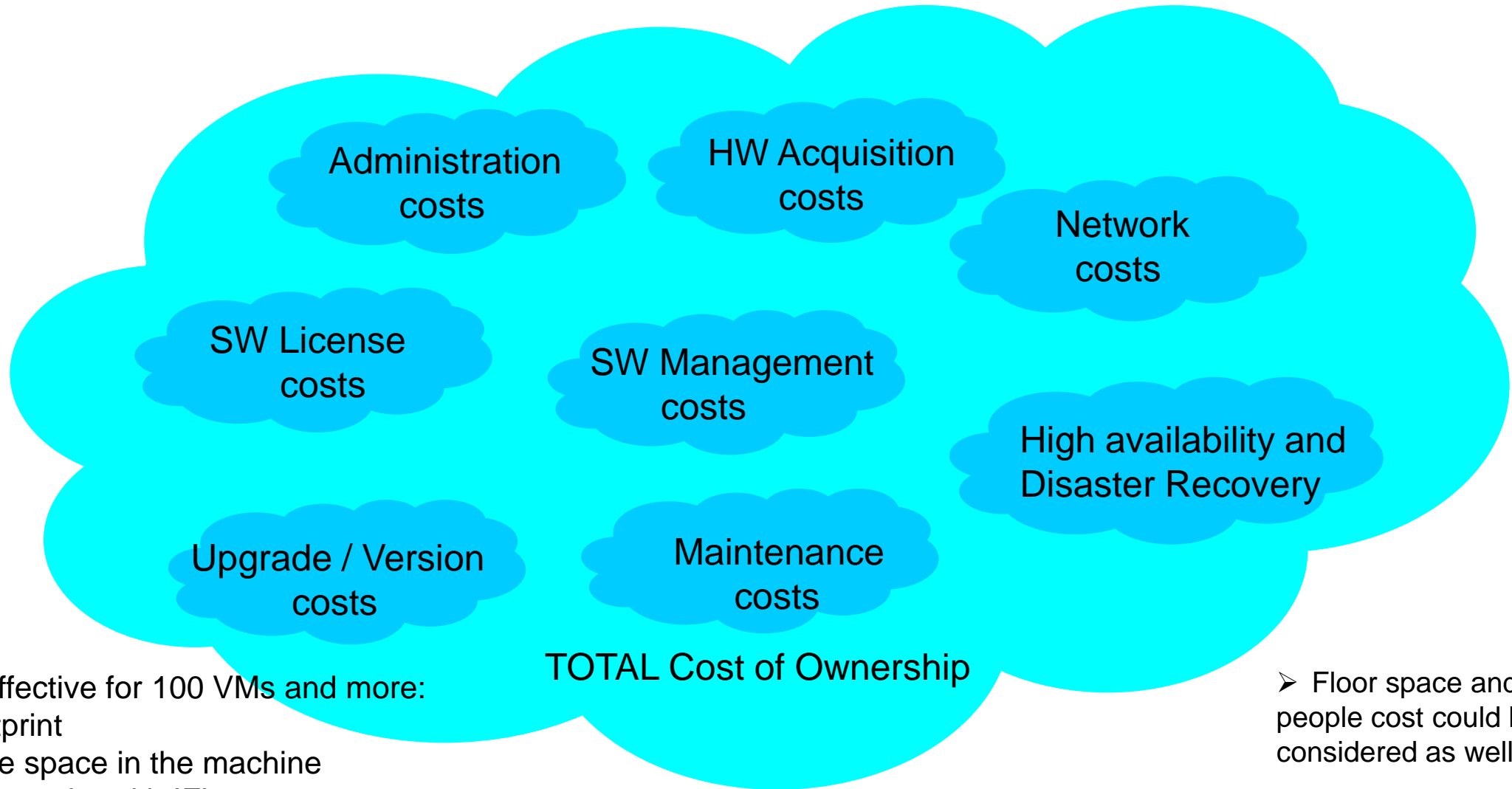
More cost effective for 100 VMs and more:
- New footprint
- Use white space in the machine
- Extend capacity with IFLs

➤ Floor space and people cost could be considered as well.

Total IT Cost Savings

Enterprise Database Server
5-Year Total IT Cost

Energy
Space
Networking
People
Software
Hardware

TCA

Floor Space

Energy

160 x86 Cores   16 IFLs

Virtualization Management
Hardware resources
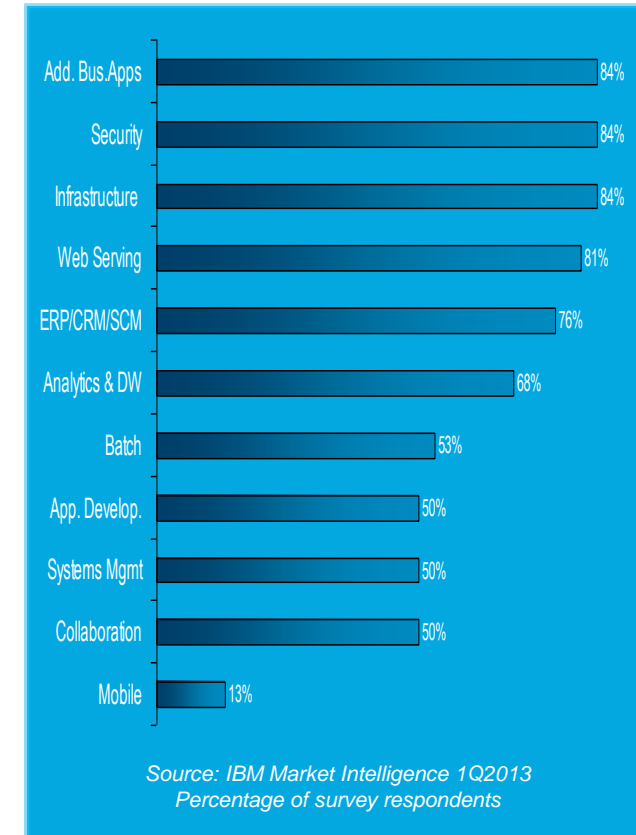
- **Operation & Systems Management**
  - Centralized management enables workload increase to be managed without increasing staff.

- **Savings on software is true for every software when it is licensed per core**
  - Applications, databases, systems management, etc.

- **Floor space & Energy & Networking**
  - Spending less on floor space and power compared to a distributed environment avoids costs each year.

- **Availability (Reliability, DR, etc.)**
  - People using a service do not care about the infrastructure, they are just interested in its availability.

- **It sums up to low total costs**

BEST FIT Workloads to run on Linux on z Systems

✓ **Data services**: Oracle, DB2®, Cognos® , SPARK, SPSS®, InfoSphere™, MongoDB, Postgres, …

✓ **Business applications**: WebSphere® Application Server, WebSphere Process Server, WebSphere Commerce, SAP apps, Oracle apps, Java™, …

✓ **Integration & Security services**: WebSphere MQSeries®, WebSphere Message Broker, IBM Integration Bus, DB2 Connect™, …

✓ **Mobile application hosting**: WebSphere Portal, IBM Worklight®, …

✓ **Enterprise Content Management**: FileNet Content Manager, Content Manager, Content Manager On Demand

✓ **Business Process Management**: Business Process Manager, WebSphere Business Monitor, FileNet® Business Process Manager, WebSphere Operational Decision Management, …

✓ **Development & test**: e.g. of WebSphere/Java applications – Rational® Asset Manager, Build Forge®, ClearCase®, Quality Manager

✓ **Email & collaboration**: Lotus® Domino®, Lotus Collaboration (Sametime, Connections, Quickr™, Forms), …

✓ **New workloads: Blockchain, Docker, SPARK Analytics Open Source consolidation**

Add. Bus.Apps	84%
Security	84%
Infrastructure	84%
Web Serving	81%
ERP/CRM/SCM	76%
Analytics & DW	68%
Batch	53%
App. Develop.	50%
Systems Mgmt	50%
Collaboration	50%
Mobile	13%

Source: IBM Market Intelligence 1Q2013
Percentage of survey respondents

Server Consolidation:

Sicoob adopts IBM z Systems

The Server that Never Sleeps so You Can !

Company Overview	Situation before

▪ **Brazil, Banking**
 	
▪ Credit Unions System for Brazil (Sicoob) is the largest credit union system in Brazil, offering banking and credit services to >2.5 million people
 	
▪ Sicoob's customers are also its owners, so the financial returns benefit their communities rather than enriching shareholders
	▪ **Distributed infrastructure was running all core banking services**
	  – Rapid business growth, parallel growth in the number and range of products/services, and desire for everywhere-and-always-on services
	– **Diverse set of Intel processor-based servers**
	  – Sprawling infrastructure was unreliable, costly, inflexible and difficult to expand
	  – A new physical servers was added to support each new requirement – each time pushing up the complexity, inefficiency and cost
	
	▪ "Ongoing and projected future growth meant that the model of adding new servers one by one was **financially unsustainable**. In addition, the administration of the **infrastructure was becoming increasingly complex and costly**."

www.youtube.com/watch?v=E8cdYINr32M

Server Consolidation:

The Server that Never Sleeps so You Can

- **In the past, we had an infrastructure that involved many, many servers.**
- Due to technical limitations, the servers didn't allow us really high availability.
- My phone rang all the time. I had to sleep with my phone next to me.

Marcos Vinicius
Manager, Technology Infrastructure
Sicoob

We have a pretty interesting story that actually involves my wife.

www.youtube.com/watch?v=E8cdYINr32M

- **The mainframe arrived. We transferred the processing to the mainframe.**
- And out of nowhere my wife ask me, „What happened? The phone doesn't ring in the middle of the night anymore. What happened?"
- So I explained the technological changes, the architectual changes with the arival of the Mainframe..
- My wife give me a big smile and said „ I want to meet this mainframe. I love the mainframe."

Marcos Vinicius
Manager Technology Infrastructure at Siccob

www.youtube.com/watch?v=E8cdYINr32M

Server Consolidation:

> "IBM z Systems offers the lowest cost for processing large amounts of data, hands-down."
> Eduardo Camargo, Executive Vice-President and CIO, EVERTEC Inc.

Business challenge

EVERTEC processes billions of financial transactions annually and must ensure 24/ 7 responsiveness and availability for its systems—or risk failing to provide customers with access to key services. EVERTEC used a distributed platform to support a number of its transaction processing systems. As the company's payment network expanded over the years, the expense and effort of maintaining the under-lying computing infrastructure increased substantially.

Transformation

EVERTEC migrated core Oracle databases supporting its transaction processing systems to a virtualized SUSE Linux Enterprise Server environment, running on an IBM z Systems server. The company has currently migrated approximately 40 databases to the z Systems, with plans to make z System the strategic platform for all Oracle databases.

Business benefits

Offers high performance
and near-total availability to support transaction processing

Reduces costs,
space, and energy use by consolidating from multiple physical servers to a virtualized environment

Takes hours, not days
to provision new workloads, improving responsiveness to business demands

EVERTEC

Ensures leaner, faster processing for billions of transactions

EVERTEC trusts in the leading reliability and security of the IBM® z Systems server running SUSE Linux Enterprise Server for z Systems to support key financial systems and Oracle databases.

Solution components

- IBM® zEnterprise® EC12
- IBM z/OS®
- IBM z/VM®
- IBM z/VSE®
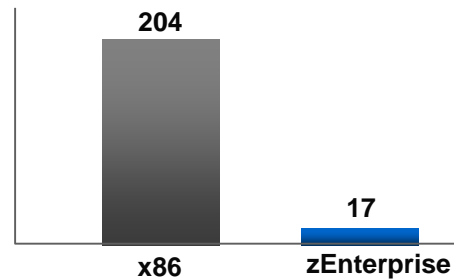- Oracle Database
- SUSE Linux Enterprise Server for z Systems

Share this

Server Consolidation:
LinuxONE & Linux on z Systems IT Economics client successes

MetOffice

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

204	
x86	**17** zEnterprise

Benefits Realized:
- **Consolidation ratio 12:1 from 204 x86 cores to 17 IFLs**
- **Approximately 75 % reduction in Software licensing costs**
- I/O-intensive workloads performed better on z Systems than on commodity servers
- Fewer physical servers means a more manageable Linux landscape and lower HW lifecycle costs

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

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

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

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

L3C LLP

(an MSP cloud environment)

Benefits Realized:
- Using an Infrastructure-as-a-Service (IaaS) model, **IBM Business Partner L3C LLP provides robust reliability, security and affordability of a z Systems server running Linux for its cloud customers**
- Midsized companies can benefit from mainframe-caliber services at a cost that's sized for their business
- Saves customers money by eliminating hardware acquisition and licensing costs
- Reduces customers' economic risk through an innovative "proof of concept" engagement

z Systems hosting a virtualized Linux environment differentiates L3C in level and quality of service.
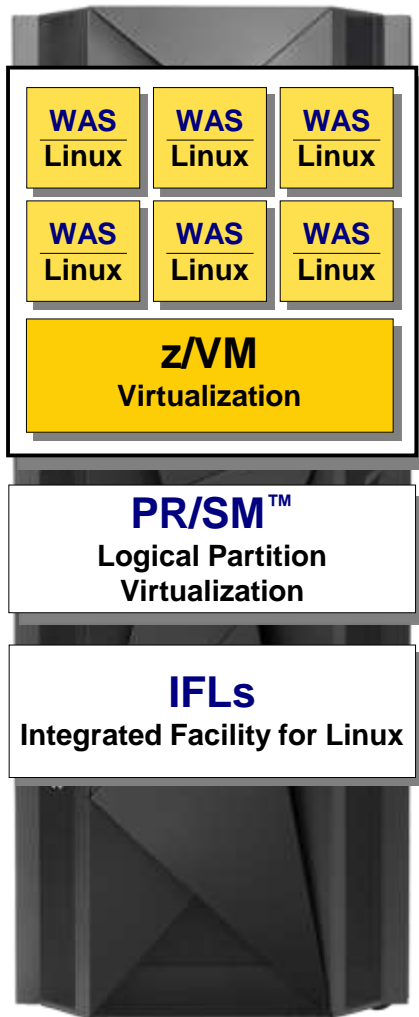" -- Lubo Cheynatov, Founder and co-owner, L3C LLP

" *L3C is able to offer to its clients a significant cost advantage for running their Oracle environments off-premise in the cloud by leveraging IBM's Linux on z capabilities in addition to offering superior Qualities of Service, Availability and Security*

-- Jerry Crossfield VP Business Development, L3C

WAS Server Consolidation:
Benefits of WAS Webhosting on Linux on IBM z Systems

WAS Linux	WAS Linux	WAS Linux
WAS Linux	WAS Linux	WAS Linux

z/VM
Virtualization

PR/SM™
Logical Partition Virtualization

IFLs
Integrated Facility for Linux

- Ability to consolidate many Linux and WebSphere Application Server (WAS) instances to a single server footprint
  - Savings: floor space, electrical, cooling, potential for software license savings

- Better disaster recovery (DR) capabilities since all artifacts grouped by z Systems
  - Ability to shared WAS product binaries across multiple Linux instances hosted by z/VM
  - WAS maintenance updates quickly apply to all

- Ability to create new instances of Linux and WAS very quickly
  - Using z/VM and Cloud functions

- Ability to access applications and data across z Systems secure internal HiperSockets network
  - TCP/IP network mapped to real hardware backplane

Halkbank - Extending banking services on social and mobile channels securely and cost-effectively

The need

Halkbank in Turkey wanted to reach out through new web and mobile channels, and simultaneously satisfy new banking regulations. How could the bank grow rapidly, cost-effectively and without disruption?

The solution

Building on more than 25 years of success, Halkbank is deploying new environments on the IBM mainframe to support multi-channel banking and to accelerate internal risk reporting and analytics.

- Single consolidated platform for core banking, risk analytics and new multi-channel offerings, reducing hardware and operational costs.

- Zero unplanned downtime in more than 25 years.

"This platform gives us a great degree of flexibility and scalability, with lower infrastructure costs than for the equivalent distributed environment.

Also, we can include Linux-based systems in the mainframe disaster recovery solution, which reduces complexity and cost."

— *Ayhan Yalkut, z Systems Manager, Halkbank*

Radixx International

Challenge: SaaS Hosting of Core Airline Reservations System

- Mission Critical: Sales, check-in, baggage, etc.

- Outages are unacceptable

- But No Maintenance Window

- Airlines, banks, traditional and alternative payment providers in every time zone

- 210 Online Travel Agents

- 400 Airports

- 90,000 directly connected travel agents

- Rapidly expanding mobile

Radixx Hybrid Cloud

RADIXX
INTERNATIONAL

- **Systems of Record on z Systems**
  - Database/Big Data Apps/Cognos/Data Warehouse
  - MQ
  - APIs
  - Payment processing
  - 172 x86 cores moves to 10 z Systems cores
  - IBM FlashSystem V840

- **Systems of Engagement on SoftLayer Cloud**
  - Client facing IBE
  - Travel Agency Portal

"We are moving from a server farm to z. We are going from 172 x86 cores down to 10 z Systems cores."

—Ron Peri, CEO, Radixx International

Database Consolidation:
Linux on z Systems provides security, availability, and scalability to deploy and consolidate Oracle workloads

While "Linux is Linux", z Systems virtualization technologies provide an enhanced Linux solution

- IT simplicity to run hundreds of workloads on one server

- Workload integration of new and existing enterprise data and applications

- Virtualization management for easy and flexible server provisioning

- High utilization of shared resources

- High productivity through efficient life cycle management

- Integrate your on-premises Oracle databases on Linux for z Systems with the cloud by leveraging Hybrid Integration

- Transform your Linux environment to a virtualized private cloud

Watch the IBM z Systems Cloud Demo:
www.youtube.com/watch?v=gNOWDHquNOo

Database Consolidation:

Oracle 12c In-Memory Database

- **Oracle DB is certified on z Systems and LinuxONE in LPAR and on z/VM**

- **Oracle 12c adds in-memory option**

"Real World" Analytics Reporting with Oracle Database In-Memory
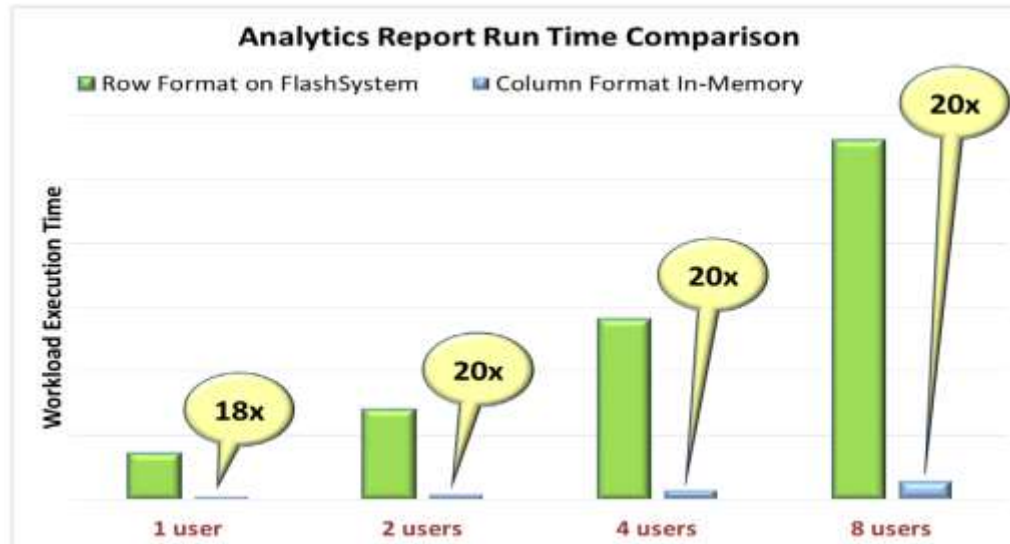
The table queried had **9 Billion rows with 16 numeric columns** and was loaded into the In-Memory area with compression set to "Query Low". The execution time was measured from the start of the first report until the last report had completed for all users..
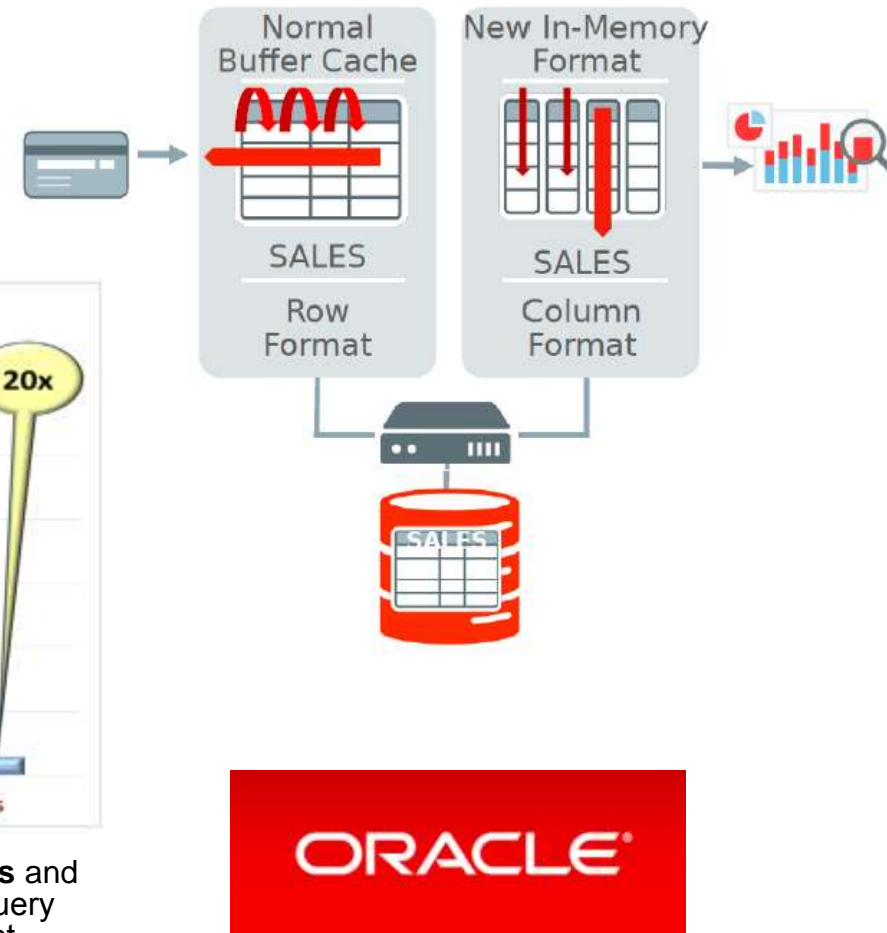
Database Consolidation:
Sparda Datenverarbeitung eG chooses IBM z Systems for banking services

"Over the years, the mainframe transformed from traditional workloads, quite simple, to a universal platform for new workloads as well.

And we see a lot of new applications that are coming to this platform.

Especially for Linux, it's perfect.

The z/Enterprise platform is perfect for consolidating Linux workloads because of the high I/O bandwidth, business continuity with capacity backup features."

"Oracle has been consolidated on this platform we are **using right now only Oracle on the z13 platform***,"*
Bernd Bohne, Sparda-Datenverarbeitung e.G., Manager, Central Systems

"Our online banking services process approximately 1,200 online transactions per second, so we simply cannot afford them to fail. SUSE Linux Enterprise Server, which is involved in a significant part of this workload, makes us confident that this will not happen.

Watch and listen to
- Bernd Bohne, Sparda-Datenverarbeitung e.G., Manager, Central Systems
- Marie Wieck, IBM, General Manager, Application Integration Middleware
- Steve Mills, IBM, Senior Vice President & Group Executive, Software & Systems

ibm.com/systems/z/resources/sparda_bank_video.html

Database Consolidation: Dundee City Council

"You can sum up moving to z Systems in one sentence: it's easy and cost-effective, so go ahead."
Tim Simpson, IT Infrastructure Manager, Dundee City Council

Business challenge

"We were facing major problems. We had an overflowing data center, so we could not physically get any more power into the building without spending significant sums of money, and the air conditioning was grossly overloaded."

Transformation

Dundee City Council knew there had to be a simpler, more efficient way to guarantee 24/7 availability for the Oracle Database environment supporting its critical services than its unreliable distributed server-based approach. Embracing a mainframe strategy proved to be the answer, delivering infrastructure simplification and exceptional reliability at low-cost.

Business benefits

Proven 24/7 availability

over 10-year period, ensuring citizens can always access services

10-fold workload increase

managed by the same number of employees, improving efficiency

Lowers energy costs

enabling lower environmental impact and better use of public funding

Dundee City Council

City government discovers the outstanding reliability of Linux on z Systems

Fast-growing enterprises must react quickly to ensure that they can continue to deliver high-quality customer services. "With IBM solutions supporting our mission-critical applications, we can keep the business running smoothly – even as the number of customers and suppliers increases."
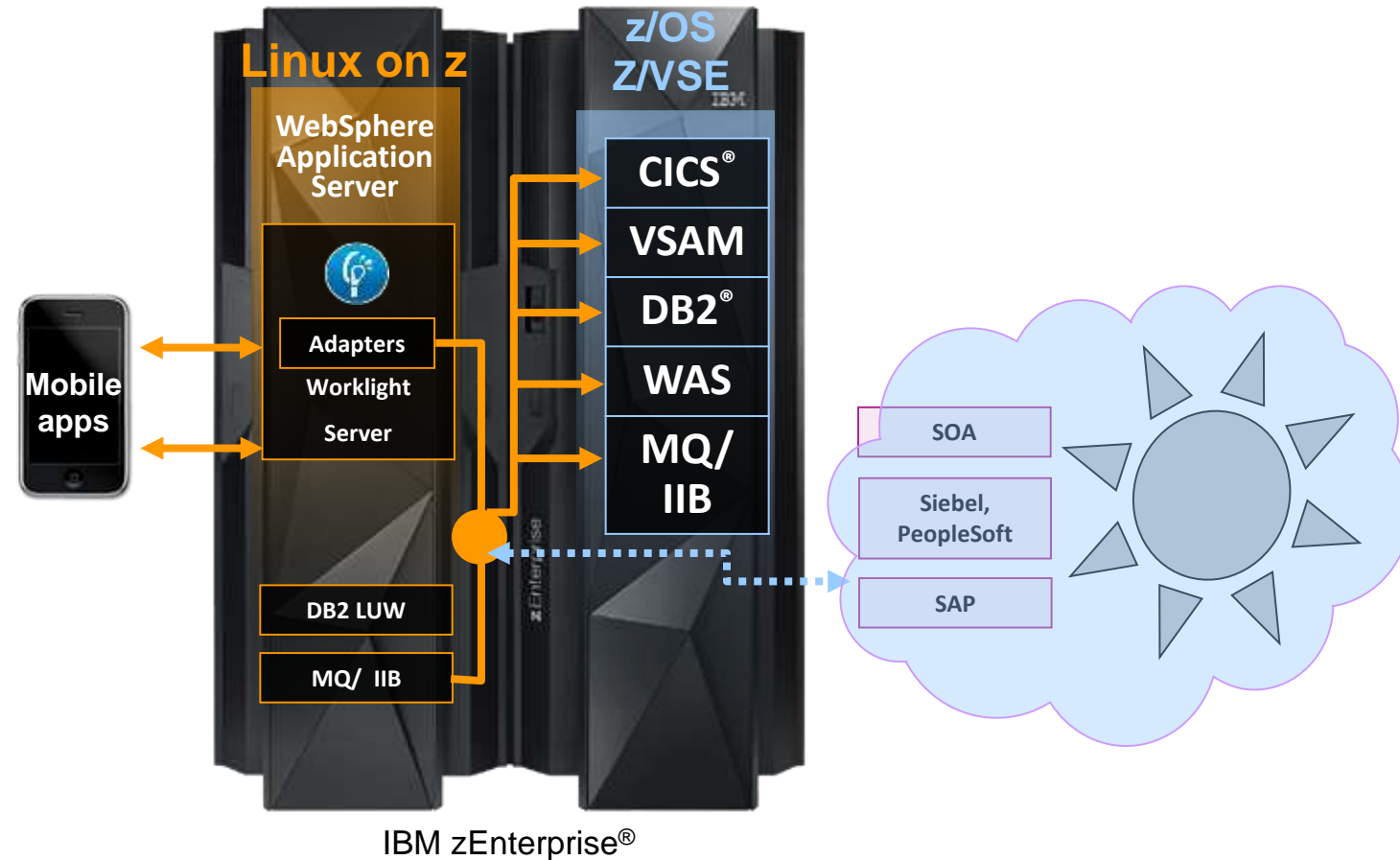
Solution components

- IBM zEnterprise® BC12
- IBM z/VM®
- Oracle Database
- SUSE Linux Enterprise Server
- IBM Global Technology Services

Share this

Mobile on and with z Systems - secure and scalable Mobile services


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

Mobile Apps use existing services on z Systems
– integrate with Analytics and cloud

- IBM MobileFirst Platform Foundation enables s**erver side software components and adapters for channeling z Systems to mobile devices**

- **Mobile application support for iOS, Android, Windows Phone and Blackberry** with WebSphere Application Server on Linux on z Systems

- **Mobile protocol connectivity with core z Systems applications** including CICS, IMS, TPF, MQSeries, IIB and DB2
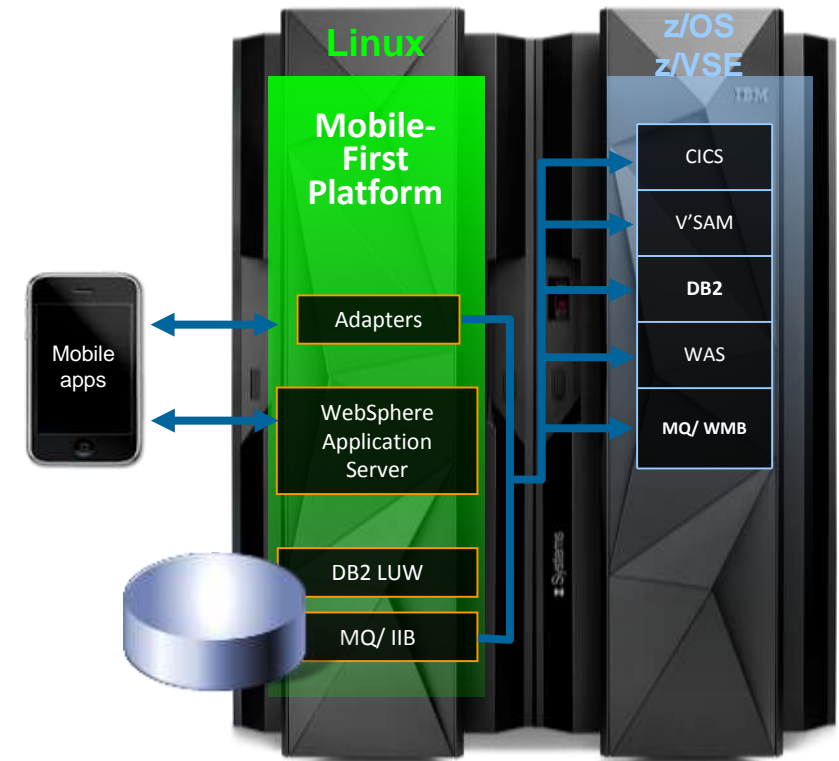
"IBM [MobileFirst Platform Foundation] provides us with ready-to-use adapters that easily connect to existing web services and applications. The solution integrated seamlessly with our existing environment of IBM WebSphere Application Server and IBM DB2 database software, so we could get to work on development sooner rather than later."
- Dominik Weitz, Software Developer, ABK-Systeme GmbH

IBM MobileFirst Platform Foundation, formerly known as IBM Worklight, IBM WebSphere Application Server and IBM DB2 are running on Linux on z Systems

Mizuho Bank, Japan –
with IBM z Systems with Mobile services

Transactions from "Mizuho DIRECT"

x1.7

Year 2008

Transactions from customers visiting branches

Now the difference has widened to 1.7 times and is continuing to grow

0:30 / 4:54

Mizuho Direct's Challenge - Renovate IT infrastructure for aggressive growth and stability

IBM z Systems Japan Channel

https://www.youtube.com/watch?v=IgiMAJRUaLY

IBM

"Whereas previously much of their time was taken up with dealing with user complaints and crashes to the SAL application, now we can focus on other more productive work and simply trust the IBM solution to consistently perform."

—Laila Binti Abdul Majid, Chief Assistant Director at National Registration Department of Malaysia

Business challenge

The National Registration Department of Malaysia custom-built an innovative application – Statistics and Data Extraction Request Management System (SAL) – to automatically manage requests for statistics and data extraction, but found its existing infrastructure lacked the power to reliably support it. Access issues, slow response times and crashes led to high numbers of user complaints, leading to some employees refusing to use the system. This prevented critical information being distributed, uploaded and downloaded for those who needed it urgently.

Solution

By selecting an IBM z Systems server running the z/OS operating system to handle existing workload, an IBM Integrated Facility for Linux (IFL) engine was activated to provide a highly available environment for new SUSE Linux Enterprise Server workloads. The entire project was completed on time, within four months, and with the technical implementation conducted in just two weeks.

Business benefits

Boosting employee productivity by an estimated 50%, dramatically improved response times, increasing utilization

Gained a highly reliable, stable platform making it possible to offer the SAL application 24/7

Significant cost savings by moving to open source technology

National Registration Department of Malaysia

Supporting super-reliable access to business-critical applications with Linux on IBM z Systems

Solution components

- IBM z Systems™
- IBM Integrated Facility for Linux
- IBM z/OS
- SUSE Enterprise Linux Server

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IBM z Systems - secure and scalable data and service collocation

AutoData Norge AS

Success Story

SUSE   z/VSE

AutoData Norge AS

AutoData Norge AS runs SUSE® Linux Enterprise Server for System z® alongside z/VSE on an IBM® zEnterprise® z114 mainframe. The SUSE operating system provides a lower-cost and more flexible platform for creating new web-based applications, helping AutoData to expand its offerings in an efficient manner.

Automotive Spare Parts Distributor AutoData Norge AS added SUSE® Linux Enterprise Server to existing IBM® mainframe running z/VSE® for IBM System z®

Reliable and flexible environment for serving customers

Reduced software maintenance cost by running new workloads on an Integrated Facility for Linux while keeping all licensed MIPS available for z/VSE

Combined
Reliability and long standing experience on z/VSE with Simplicity, support and agility of Linux on System z

"Everything we do is driven by our customers, and SUSE Linux Enterprise Server for System z allows us to be much more responsive to their needs.„ Stein Sandvold Chief Operating Officer AutoData Norge AS

www.suse.com/success/stories/autodata-norge-as.html

Data and services Collocation:

IBM

Supreme Court of Virginia

Legacy LPAR   TCPIP

z/VSE 4.3

- TCPIP (BSI)
- VTAM
- CICS

z VM 6.3

- DB 2
- DLI
- VSAM

VSE Connectors   VSAM Redirector

TCPIP   **LINUX LPAR**

OSA Ports

VSWITCH 1 & VSWITCH 2

z VM 6.3

- DB2 Servers
- Oracle Servers
- Files Servers
- DB2 / WAS *Clones*

SLES 11

- DB 2 9.5 / WAS 8.5 — **PROD**
- DB 2 9.5 / WAS 8.5 — **Demo/Training (QA)**
- DB 2 9.5 / WAS 8.5 — **Testing**
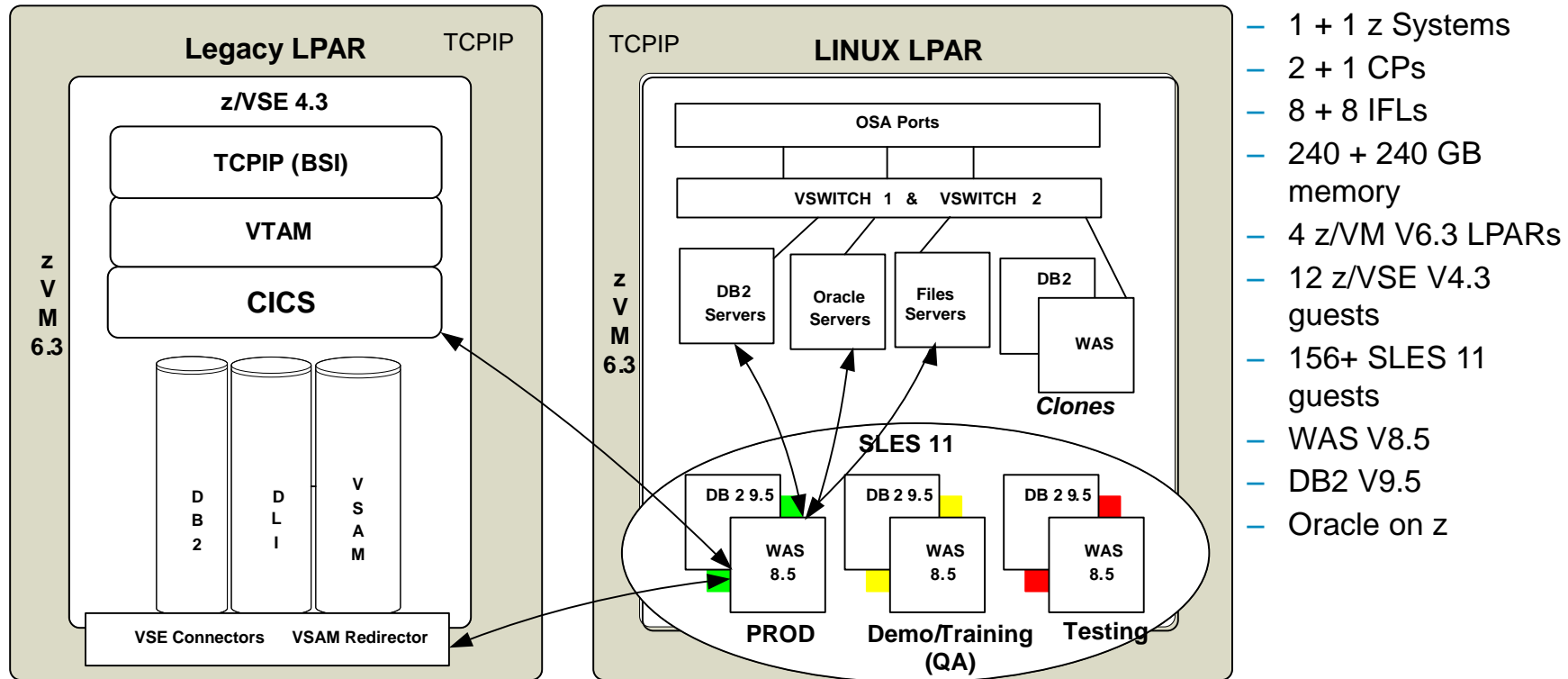
- 1 + 1 z Systems
- 2 + 1 CPs
- 8 + 8 IFLs
- 240 + 240 GB memory
- 4 z/VM V6.3 LPARs
- 12 z/VSE V4.3 guests
- 156+ SLES 11 guests
- WAS V8.5
- DB2 V9.5
- Oracle on z

- **2x zBC12 (M01/M02), 1x production, 1x development**
  - Serves 325 courts, 5.000+ users (3.8 million new cases in 2013)
  - Integrating z/VSE, DB2/LUW and WebSphere applications
  - eMagistrate system serves 125 locations, 3100 trans per day
  - eCommerce* applications integrating z/VSE and WebSphere appls

  *VJEFS- Virginia Judicial Electronic Filing System

  Winner of the Governor's 2013 Commonwealth Technology Award

Integration:
Enterprise Integration any-to-any with IIB

New

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

| WebSphere Appl. Server |
| WebSphere Message Broker Integration Bus |
| z/OS |
| Hardware Virtualization |
| Hardware Resources |
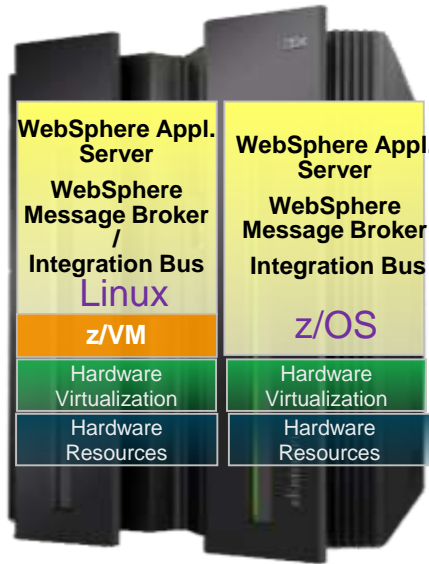
- IIB – IBM Integration Bus - business information to flow between disparate applications across multiple hardware and software platforms.

- 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

- Ability to communicate and access data across HiperSockets

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*"
	▪ SOA platform, leveraging WebSphere Message Broker, has accelerated the ability to build services in response to business issues
▪ Linux on z and WebSphere allows to deliver the utmost in online performance, reliability, and security for our customers	▪ 18% increase of re-utilization rate of services

The Integration Hub with IBM Integration Bus (IIB)

- Flexible integration with Web, Mobile, Cloud, Analytics and IT services
- Standard Interfaces and Open source based Integration APIs
- Intelligent transformation and content based routing
- Universal Integration with high scalability and security incl. workflow & workload management
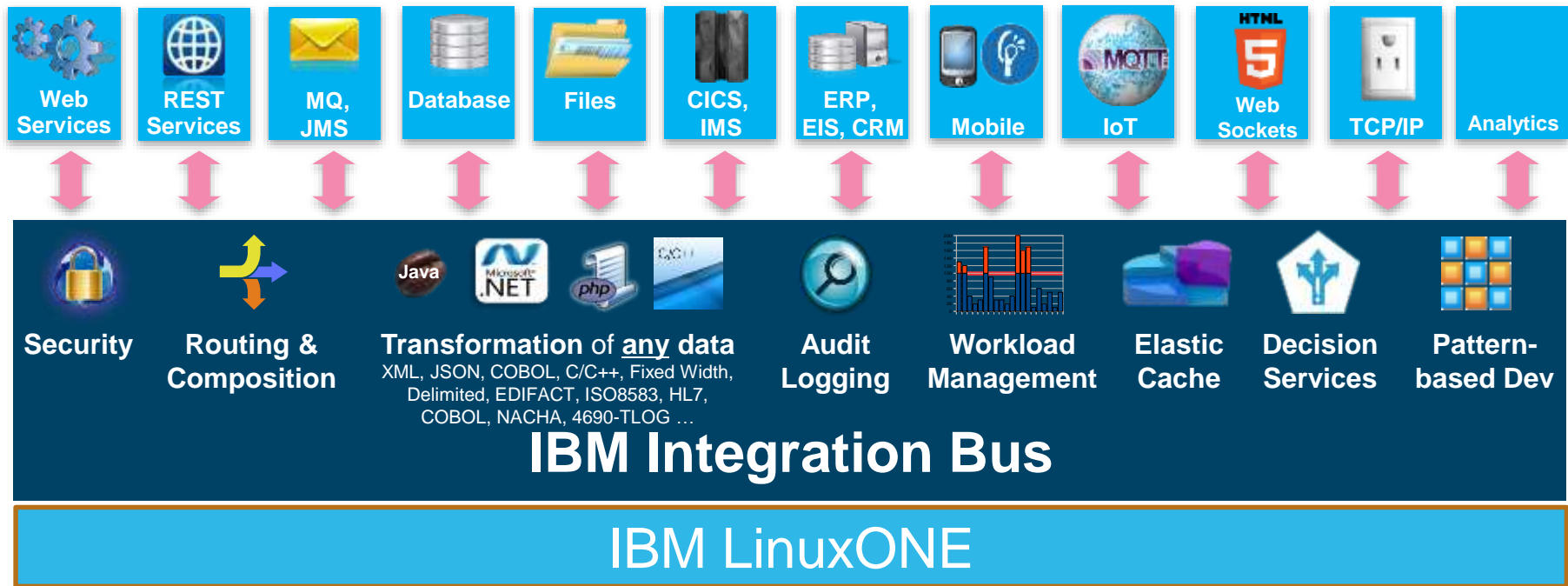
Deployable full active/active

No charge for developers

Streamlined to ESB use case

Scalable in Docker Containers

HTML5 web admin/monitoring

High scale MQ events/messaging

| Web Services | REST Services | MQ, JMS | Database | Files | CICS, IMS | ERP, EIS, CRM | Mobile | IoT | Web Sockets | 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 |

IBM LinuxONE

Business challenge

Spotting an opportunity to reduce costs and simplify intragroup messaging, s IT Solutions Austria set out to consolidate management of SWIFT messages for Erste Group without compromising on security.

Transformation

Today, s IT Solutions Austria relies on a single SWIFT message handling solution, combining INTERCOPE's BOX, IBM® MQ and DB2® solutions, running on IBM z Systems®. As a result, the company makes 65 percent cost savings, increases control and reduces risk, supporting reliable financial services.

Business benefits

65%

saving on costs for SWIFT infrastructure licenses, connectivity and maintenance

Reduces

risk with future-proof, highly secure solution that offers greater control

Supports

reliable financial services by ensuring rapid exchange of SWIFT messages

s IT Solutions Austria

Simplifying for success with an integrated messaging solution that works across borders

s IT Solutions Austria is the IT services provider for Erste Group, one of the largest financial services providers in the Eastern part of the European Union in terms of clients and total assets. Erste Group's key business is retail financial services, covering the entire spectrum from lending, deposit and investment products to current accounts and credit cards.

"s IT Solutions Austria is now able to offer Erste Group a future-ready, fully integrated messaging system."

—Andreas Goerlich, Senior Operations Manager SWIFT, s IT Solutions Austria

Share this

Analytics:
From transactional data to real-time Analytics to Digital Business

consider end-to-end solutions and operational impacts

IBM Software examples

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**

- Data Analytics
- Data Warehousing
- Data Movement, Cleansing & Central Management
- Transactional Data
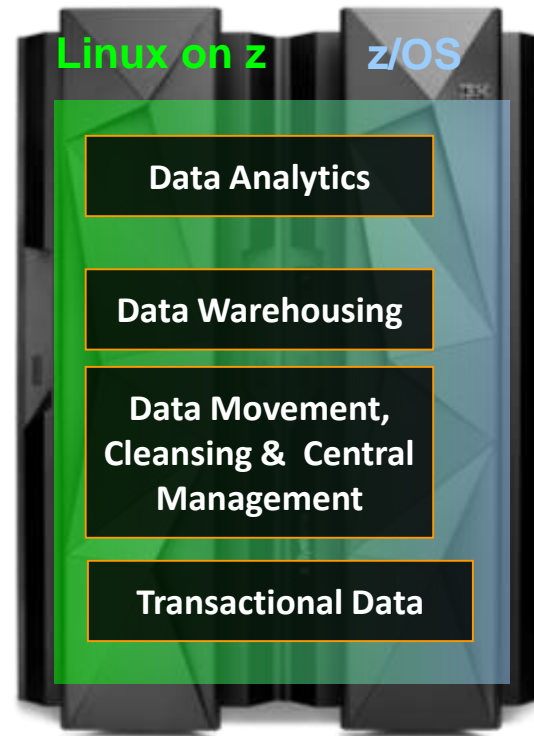
- Cognos BI
- SPSS
- Query Management Facility
- SPARK

- 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

Analytics: The Enterprise Analytics Hub on Linux on z

Build an end-to-end Analytics and Real-time fraud detection environment on Linux on z Systems

Linux on z Systems

Off-prem / Cloud
- Watson Analytics
- SAP
- Siebel, PeopleSoft

Spark

Cognos BI

SPSS

Watson Explorer

dashDB local*

DB2 BLU

Explore & Analyze

IBM DB2 z/OS & Analytics Accelerator

Unstructured Content

Collaboration   Web   Email   File Systems   Content Management   Cloud   More…

Federation Server

VSAM, IMS data   SAG Datacom   CA Datacom

SQL structured & + no-SQL

(DB2, Oracle, Postgres, MariaDB, MySQL, …)
(MongoDB, Cloudant, CouchDB)

* - offering not yet available
    estimated 07/2017

Analytics:
Analytics, Business Intelligence and Predictive Analytics

IBM DB2, IBM InfoSphere, IBM Cognos BI and SPSS

SPSS

Cognos

InfoSphere Warehouse

DB2 LUW

Integrated Solution stack creates compelling value

- Predictive Analytics, Business Intelligence, Data Warehousing on highly scalable, secure and available IBM Enterprise Linux Server

- Low cost, easy to manage

- Simplified and faster access to the transactional data

Siccob - Brazil	**IBM Business Analytics** - USA
▪ Supporting rapid business growth with robust, secure and efficient ELS technology	▪ IBM's strategic analytics platform, designed to empower IBM employees
▪ Created a virtualized Linux landscape running more than 300 production environments, and deployed DB2, InfoSphere DataStage® and Cognos	▪ Offers services for data warehousing and analytics; all data is analyzed using Cognos, which generates reports for distribution
▪ Enabled growth in mobile, internet and branch transactions; avoiding $1.5 million in electricity costs annually	▪ IBM's strategic analytics initiative, which now delivers services to more than 390 teams and ~200,000 end-users
	▪ Delivers $25 million savings over five years; enables further savings

Business challenge

With the explosion of online shopping, mobile devices and social media, the boundaries between retail sales channels are starting to blur. To set itself apart from competitors and win customer loyalty, this retailer in the US wanted to provide a seamless omni-channel customer experience. To do so, it needed central visibility into sales and supply chain data so that it could make sweeping improvements from purchasing to merchandising.

Transformation

The retailer uses predictive analytics and propensity-to-buy models to anticipate what customers will buy at what price, helping to keep its product lines fresh and relevant while minimizing inventory. Using the insights, the company can optimize pricing and merchandising in each local market, with consistent, targeted digital marketing and in-store advertising that allow customers to hop between channels with ease and encourage greater loyalty.

Department stores need headlights into what consumers and the fashion industry will do next so that they can stay relevant and draw in customers.

Business benefits

15%
lower advertising costs
by replacing mass marketing with targeted marketing

26%
boost in digital sales
as a result of expanding online product offerings

11%
higher conversion rates
through more fine-tuned digital marketing techniques

Department store retailer in the US

Using predictive analytics to anticipate demand and deliver an omni-channel experience

This department store retailer operates more than 250 stores in 23 states. The company has several private-label brands and employs 25,000 people.

Solution components

- IBM Global Technology Services – Infrastructure Services
- IBM PureData® System for Analytics (powered by Netezza ® technology)
- IBM System Storage® DS8800 ®
- IBM SPSS ®
- IBM z Systems running Linux

Share this

Cognitive – Analytics with Watson Digital Intelligence:
Cognitive Computing = Digital Business + Digital Intelligence

Analytics – Foundation for Digital Business
Watson technology – the Digital Intelligence for Cognitive Computing

z/OS **Linux on z** IBM

Watson Explorer

Structured Data

Databases Data Warehouses

More…

Web Services

Latest version includes **Content Analytics**

Explore & Analyze

Unstructured Content

Collaboration Web Email File Systems Content Management Cloud **More…**

IBM Watson Services

Interpret

- Question Answer
- Relationship Extraction
- Concept Expansion
- User Modeling
- Language Identification
- Machine Translation
- Message Resonance
  … more …

Watson Developer Cloud

ibm.com/watson/developercloud/services-catalog.html

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

Elastic Storage is a code name

Components of HA with Linux on z Systems

Software Provided HA

- Web Srv.
- Appls.
- Database

→

- HA Software
- Clustering
- Automation

Operating System HA

- Linux
- KVM
- z/VM

→ Cluster concepts

→ Mature Hypervisor
Hardware assist for performance and recovery

Network HA

- Network

→ Hypersockets, VSWITCH, OSA

Hardware Provided HA

- z Systems
- Storage (Disk)

→ Spare CPUs

N+1 power supplies

Chip sparring in memory

Concurrent Maintenance

→ Disk mirroring Global/Metro Mirrror

Hyperswap

Multipathing / Failover

55

z Systems Ha and DR scenario

IBM
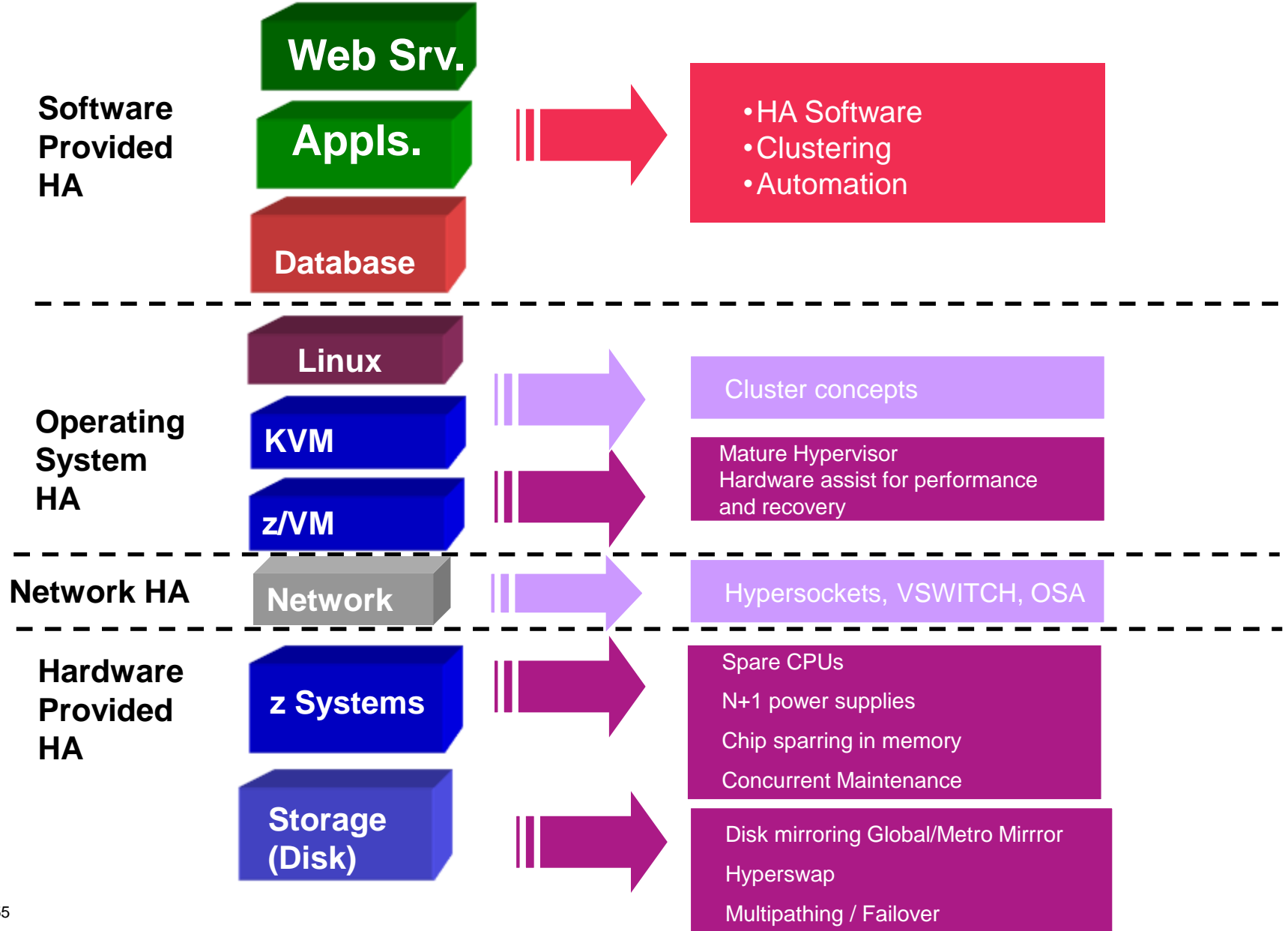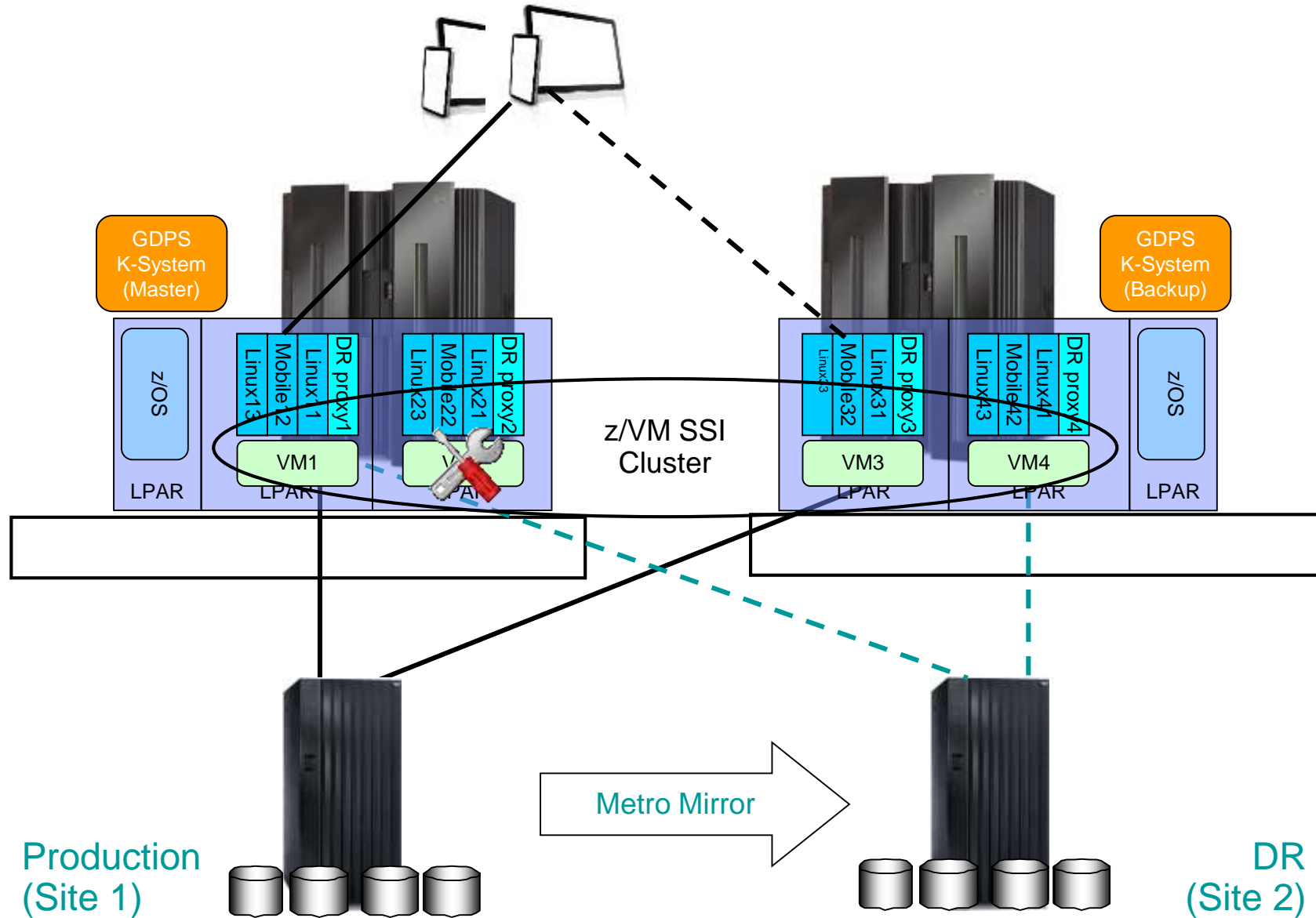
Bern, Switzerland

GDPS/PPRC xDR – active / active
HyperSwap Experience

7-way zOS Parallel Sysplex (CICS, DB2, Websphere) & zVM Cluster (51 Linux Guests)

PTS/CTS   BTS

| CF1 | z/OS Sysplex 3 LPARs | z/VM Linux guests | | z/VM Backup LPAR | z/OS Sysplex 3 LPARs | CF2 |

[K]   P 50
             proxy

[K]
[proxy

8 km

P P   S S

site-1   *site-2*

GDPS Freeze Policy: SWAP,GO   z/OS, NV 5.3, SA 3.3, GDPS 3.7, z/VM 6.1
                                      Linux SUSE SLES 10.2, SA MP 3.1

planned & unplanned HyperSwap

K
proxy
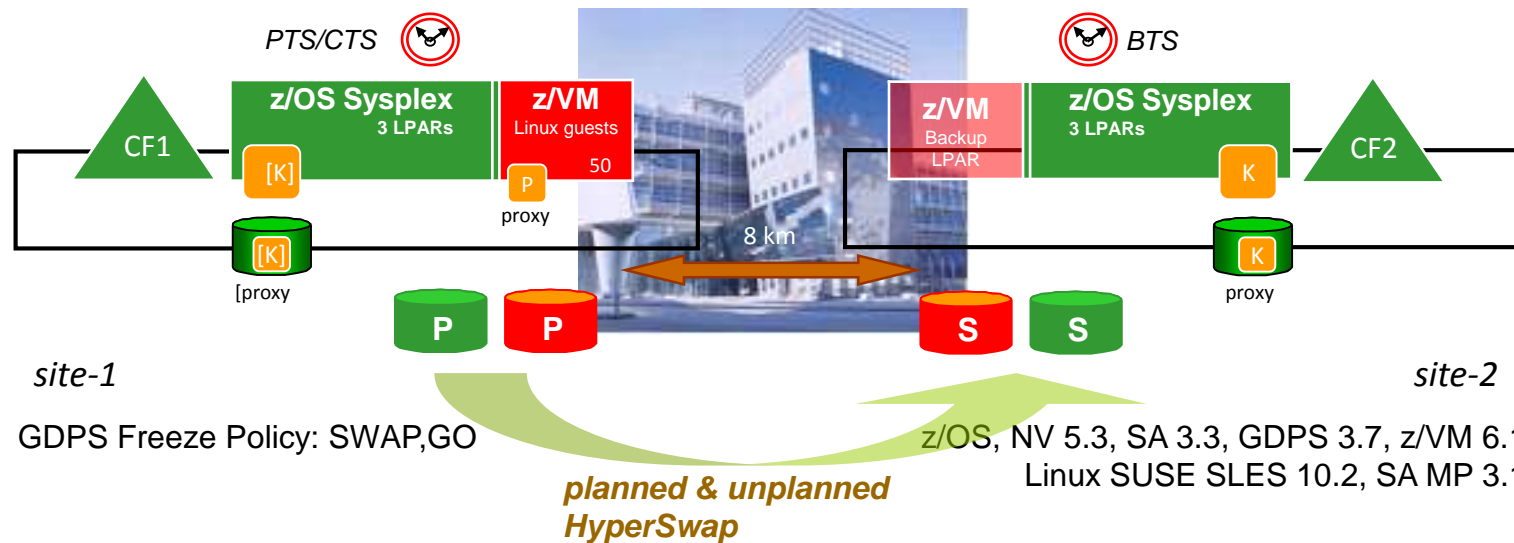
Business Requirements:

No data loss (RPO 0 sec)

Continuous data availability for z/OS
  and Linux hosted by z/VM

Coordinated disaster recovery for
  heterogeneous z Systems
  applications (RTO < 2 hours)

z/OS PPRC Pairs	z/OS LSS	z/VM PPRC Pairs	z/VM LSS	Planned HS RESYNC UIT	Planned HS SUSPEND UIT	Unplanned HyperSwap UIT
414 (3390-9,-54)	4	382 (3390-9,-54)	2	59 sec	16 sec	6 sec

UIT = User Impact Time (seconds)

"The great thing about IBM GDPS (Geographically Dispersed Parallel Sysplex) in combination with SUSE Linux Enterprise Server and all Linux workloads including Oracle Database software is that it just works reliably."

Oliver Röthinger, System Programmer and Administrator z/VM and Linux on z Systems, Sparda-Datenverarbeitung eG

Business challenge

Sparda-Datenverarbeitung eG (SDV) needed a reliable and cost-efficient platform with minimum downtime to operate large databases and state-of-the art software for banks.

Transformation

Geographically Dispersed Parallel Sysplex™ (GDPS®) is an IBM z/OS feature that provides a coordinated Disaster Recovery solution for customers running a multi-tiered architecture including the IBM z/VM hypervisor, Linux on System z and z/OS on System z. IBM GDPS enables SDV to move Linux services from one physical IBM System z server to another within seconds, helping to minimize failover and recovery time.

Business benefits

Offers excellent availability
by providing automated failover within seconds

Reduces total cost of ownership
by about 50%, cuts administration effort and enables a team of three to manage 120 servers

Accelerates deployment of new systems

Sparda-Datenverarbeitung eG

Leveraging a world-class enterprise computing system to ensure 24x7 customer service

Sparda-Datenverarbeitung eG deployed two IBM z Systems with IBM z/VM virtualization technology to consolidate Oracle Database and application servers on SUSE Linux Enterprise Server.

Solution components
- IBM z/OS®
- IBM z/VM®
- IBM DB2 for Linux
- IBM WebSphere Application Server
- IBM Tivoli Storage Manager
- IBM Tivoli System Automation for Multiplatforms
- IBM Tivoli System Automation for z/OS
- Oracle Database
- SUSE Linux Enterprise Server

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The IBM LinuxONE Solutions

IBM LinuxONE solutions are designed for the new app economy.

LinuxONE offers the ultimate flexibility to create solutions for mobile, cloud, analytics and devops — on your terms.

Mobile

Discover how you can build a premier mobile solution for your business to deliver a better experience for your clients

📄 Read the solution brief (193KB)

Analytics

Discover how to build insight at the point of impact by bringing analytics to the business transaction and operational data.

📄 Read the solution brief (187KB)

See IBM LinuxONE in action

▶ Watch the analytics demo (00:18:26)

Cloud

Create a dynamic infrastructure to ensure greater flexibility in meeting new business demands while driving greater efficiency in IT service delivery.

📄 Read the solution brief (179KB)

DevOps

The speed of a start-up. Transforming software delivery for enterprise innovation with real business outcomes.

📄 Read the solution brief (270KB)

Interested in open solutions?

⊙ See our open source ecosystem

http://www-03.ibm.com/systems/z/solutions/mobile.html

IBM LinuxONE and Linux on z Systems
Open Source & ISV Ecosystem Community

- One stop shop to find out what is available
  - https://www.ibm.com/developerworks/community/groups/community/lozopensource/

- Information on all open-source software
  - Recipes for building the software on LinuxONE and IBM z
  - Pointers to binaries if available
  - Other related news and information

- Build recipes and how-tos on GitHub
  - https://github.com/linux-on-ibm-z/docs/wiki/

- Open to every one interested in LinuxONE and IBM z
  - Users can post questions/comments
  - Provide feedback to the Open Source & ISV Ecosystem team

- **We look forward to hearing from you!**

IBM LinuxONE Community Cloud

https://www.ibm.com/linuxone/try

ISVs
- Available for ISV through PartnerWorld
- Hosted by IBM in Dallas, Boeblingen and Beijing
- Port, test, benchmark key applications
- Available Now

Students & Developers
- Free access to Developers Students, and Entrepreneurs
- Hosted by Partnership Universities: Syracuse, Marist and others
- Get a LinuxONE virtual machine in minutes
- Available November 2015

Clients
- Remote access environment free of charge for limited time
- Client Sandbox for Proof of Concept work to verify and test new apps and try new technologies
- Available Now

Open Access
COMMUNITY CLOUD

IBM **LinuxONE**™

IBM z13 and LinuxONE – Fit for Cognitive computing
An Enterprise grade solution portfolio

Data and Analytics

IBM InfoSphere BigInsights

IBM DB2 BLU

SPARK

Cloud
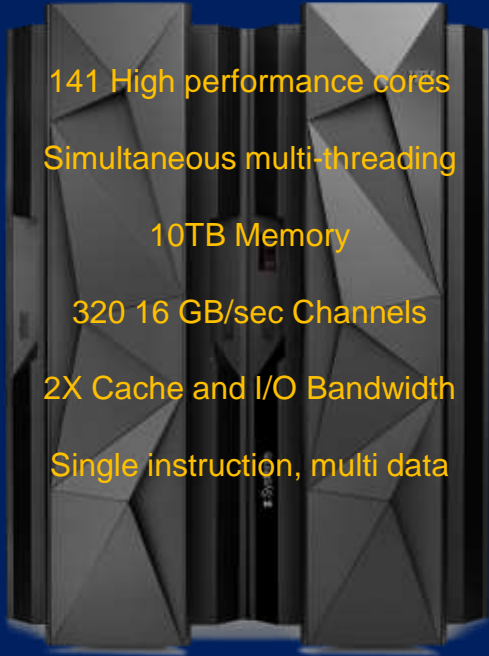
Custom Patterns for Linux on z Systems

Cloudant

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

GDPS Virtual appliance

Openness and Pricing

OpenSource and KVM

Large memory

High scalability

Security

Outstanding Capacity

IBM z13

Cases ordered by Industry (country, publication date, *validation date*)

Banking & Financial Market
- ZB, National Association (USA, **Sep 2016**)
- ABK-Systeme GmbH (Germany, **Mar 2016, *val. Sep'16***)
- Sicoob (Brazil, **Jan 2016, *val. Oct'16***)
- Mizuho Bank (Japan, Oct 2015, ***val. Oct'16***)
- Sparda-Datenverarbeitung eG (Germany, Dec 2014, ***val. Jan'16***)
- ABK-Systeme GmbH (Germany, Sep 2014, ***val. Sep'16***)
- Halkbank (Turkey, Mar 2014, ***val. Apr'16***)
- Traxpay (Germany, Jul 2013, ***val. Dec'16***)
- Rizal Commercial Banking Corporation (Philippines, Jul 2013, ***val. Jan'16***)
- Bank of Tokyo-Mitsubishi UFJ (BTMU) (Japan, Mar 2013, ***val Dec'16***)
- Bankia (Spain, 2012)
- South American Bank (LA, Jun 2011, ***val. Sep'16***)

Computer Services
- s IT Solutions Austria (Austria, **Sep 2016**)
- IBM (USA, Nov 2015)
- EVERTEC (Puerto Rico, Aug 2014, ***val Nov'16***)
- L3C LLP (UK, Aug 2014)
- IT services provider (EU, Oct 2014, ***val. Dec'16***)
- Business Connexion (South Africa, Apr 2014)
- gkd-el (Germany, Jan 2009, ***val. Sep'16***)

Education
- University of North Carolina (USA, 2009)
- University of Arkansas (USA, Jul 2009)

Energy & Utilities
- Major utility organization (Brazil, Jun 2015, ***val. Aug'16***)
- Kenya Power and Lighting Co. Ltd. (Kenya, Nov2014, ***val. Dec'16***)
- Embasa (Brazil, Jul 2011, ***val. Jul'16***)

Government
- California DMV (USA, Jul 2016, ***val. Dec 2016***)
- Dundee City Council (UK, Jul 2016, ***val. Jan 2017***)
- New York Municipal (USA, Apr 2014)
- Met Office (UK, Apr 2014)
- A city in China (GCG, Apr 2013, ***val. Oct'16***)
- City and County of Honolulu (USA, 2012)
- National Registration Dept. of Malaysia (Malaysia, Dec 2010, ***val. Jan'17***)

Industrial Products
- Manufacturing company (USA, **Apr 2016, *val. Oct'16***)
- Baldor (USA, 2013)

Insurance
- Austrian insurance company (Austria, Mar 2012, ***val. Dec'16***)

Retail
- Department store retailer (USA, Nov 2015, ***val. Jan'17***)

Telecommunication
- Vodafone (Spain, **Feb 2016, *val. Oct'16***)

Travel & Transportation
- Radixx International (USA, Jun 2015)
- Travelport (USA, Jan 2015)
- European Railway Operator (Europe, Sep 2014, ***val. Oct'16***)

Other
- White Cube (UK, 2013, ***val. Jan'16***)

Questions?

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