

# KVM for IBM z Systems

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z Systems Linux and Virtualization Product  
Manager



# Agenda

- IBM z Systems
  - Now and then
  - Linux on z Systems
  - Value
- Virtualization on z Systems
  - Platform Virtualization
  - **KVM for IBM z Systems**
  - IBM z/VM + IBM WAVE



# IBM z Systems - Mainframe

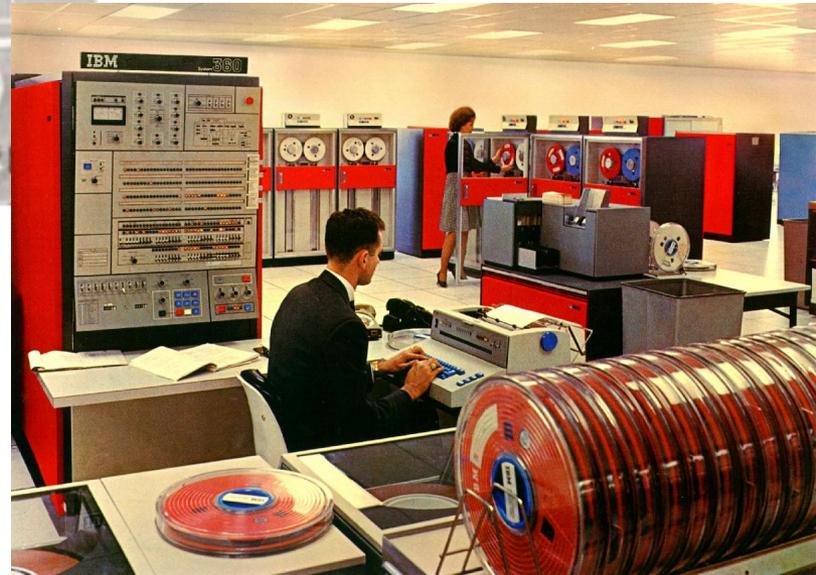
"[System/360] was the biggest, riskiest decision I ever made, and I agonized about it for weeks, but deep down I believed there was nothing IBM couldn't do."

Fisher, Son & Co. 1960  
Tom Watson, Jr.  
IBM President 1952  
IBM President and CEO 1966  
IBM Chairman and CEO 1961-1971



\$5B  
350000 PY

April 7 - 1964



# 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

# IBM z Systems family

IBM z13

IBM zEC12

IBM zBC12

KVM for IBM z Systems

Linux for z Systems

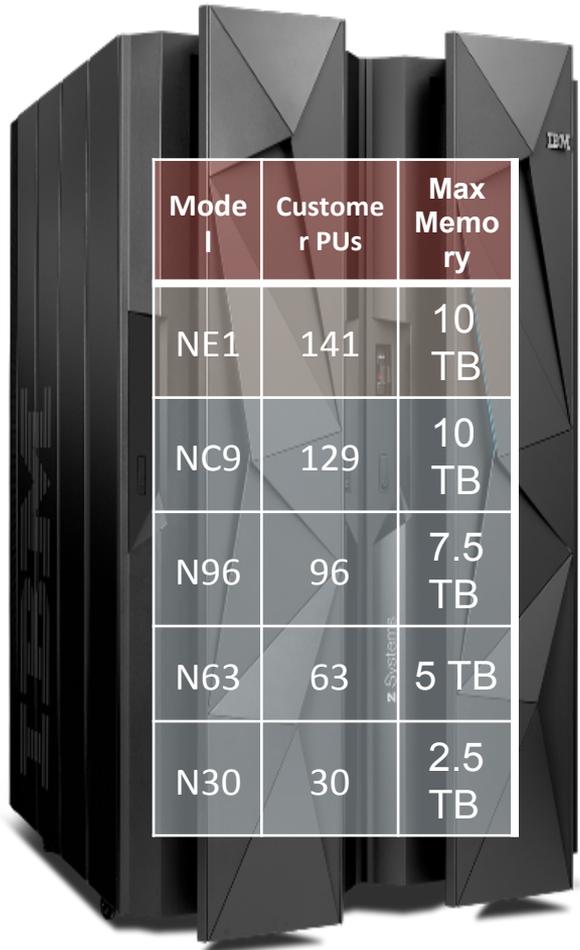
z/VM

z/VSE

z/TPF

z/OS

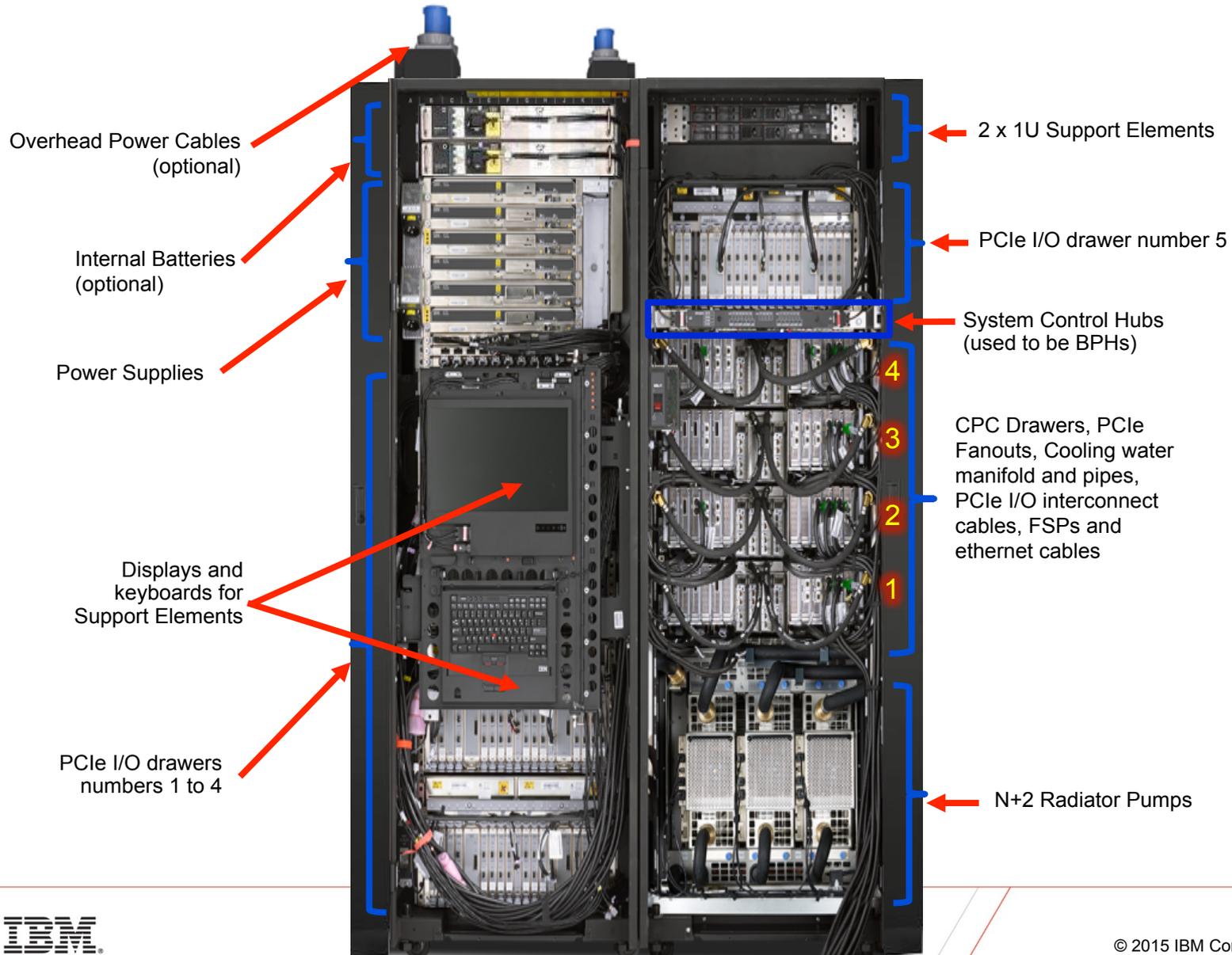
# z13 Overview



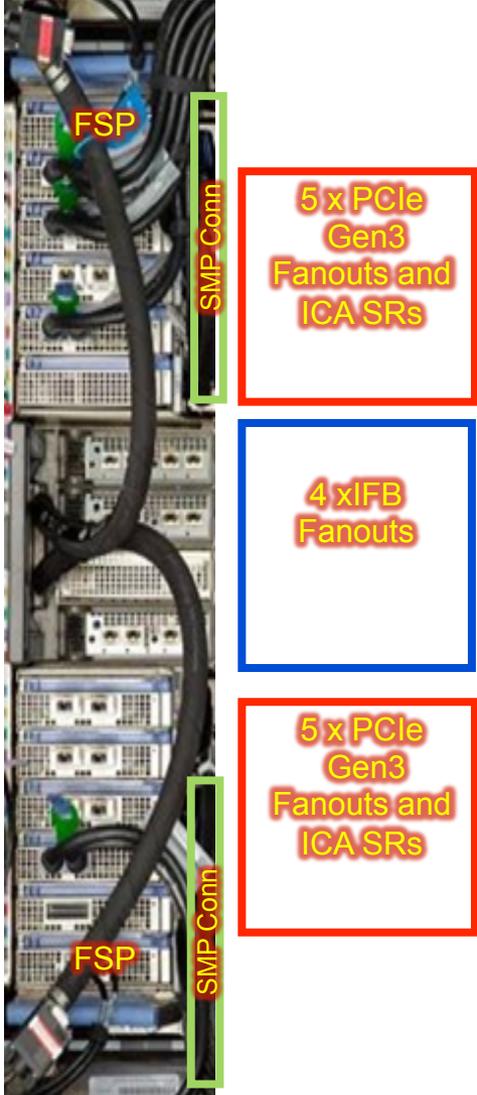
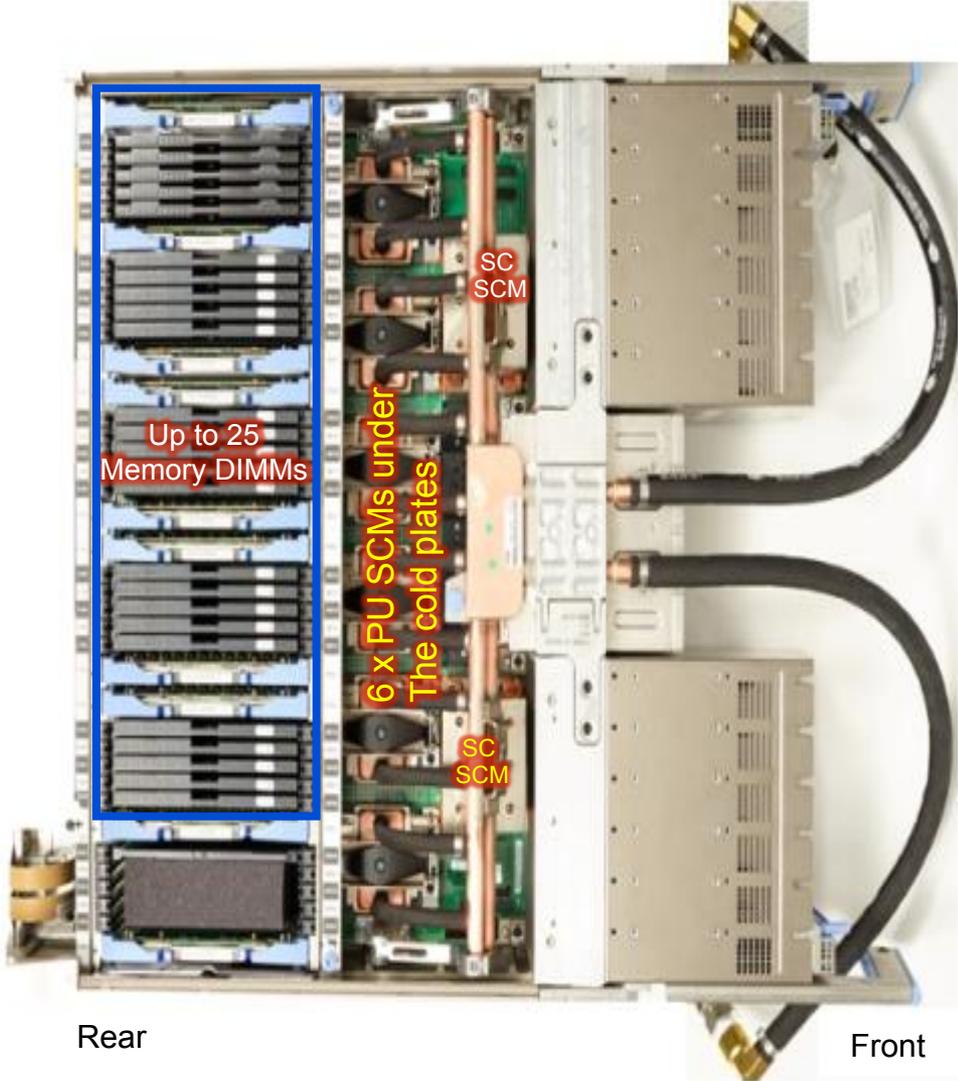
Model	Customer PUs	Max Memory
NE1	141	10 TB
NC9	129	10 TB
N96	96	7.5 TB
N63	63	5 TB
N30	30	2.5 TB

- **Machine Type**
  - 2964
- **5 Models**
  - N30, N63, N96, NC9 and NE1
- **Processor Units (PUs)**
  - 39 (42 for NE1) PU cores per CPC drawer
  - Up to 24 SAPs per system, standard
  - 2 spares designated per system
  - Dependent on the H/W model - up to 30, 63, 96, 129, 141 PU cores
  - 85 LPARs, increased from 60
  - Sub-capacity available for up to 30 CPs
    - 3 sub-capacity points
- **Memory**
  - RAIM Memory design
  - Up to 2.5 TB GB per drawer
  - Up to 10 TB for System and up to 10 TB per LPAR (OS dependent)
    - LPAR support of the full memory enabled
    - 96 GB Fixed HSA, standard
  - Flash Express
- **I/O**
  - FICON Express16S
  - Up to 40 PCIe Gen3 Fanouts @ 16 GBps each and Integrated Coupling Adapters @ 2 x 8 GBps per System
  - 6 Logical Channel Subsystems (LCSSs)
    - 4 Sub-channel sets per LCSS

# z13 Radiator-based Air cooled – Front View



# z13 CPC Drawer Layout Details



# The Linux on z Systems story begun in 2000

## 15<sup>th</sup> anniversary in 2015

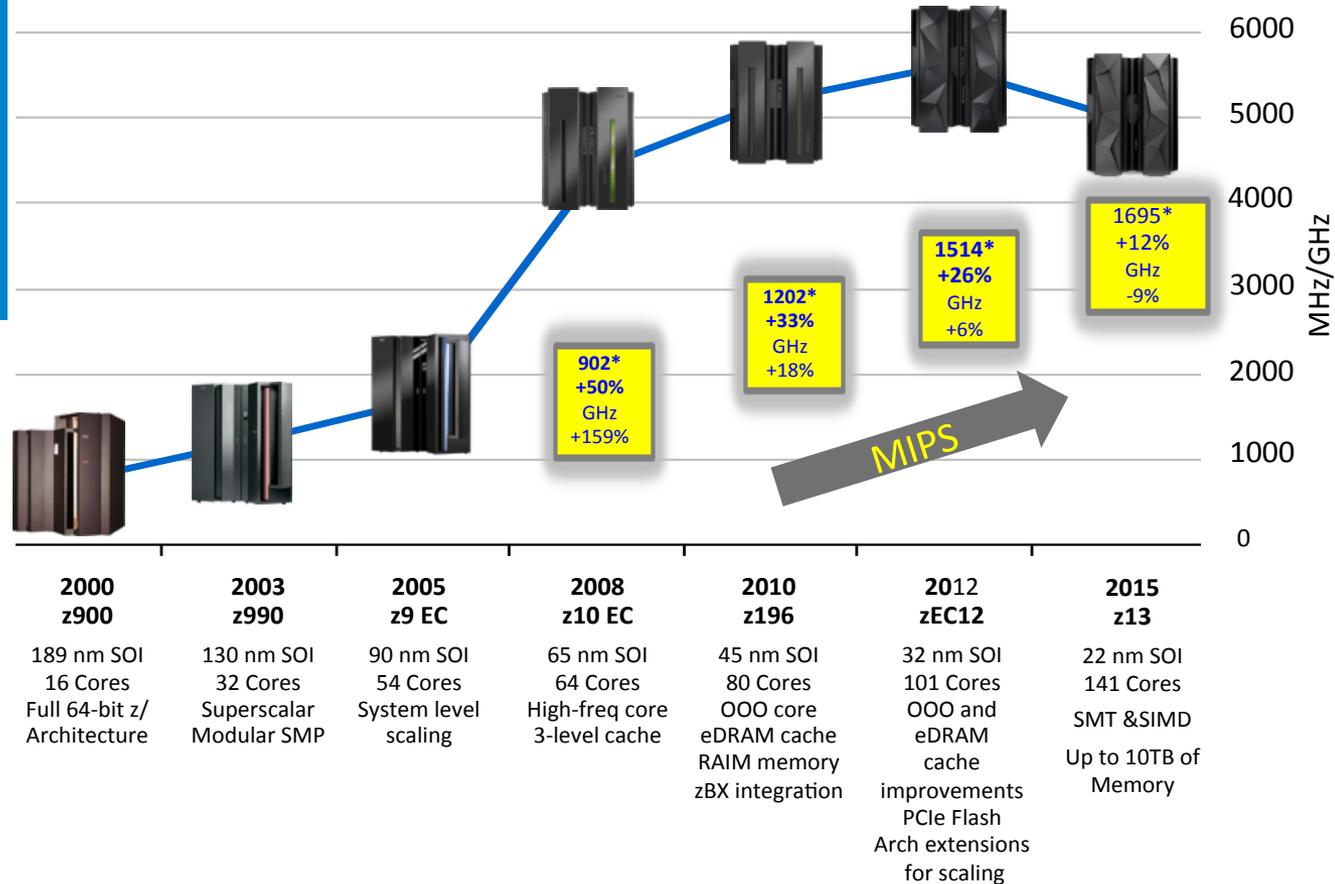
Watch video



A Simple Idea that Changed the World: Linux on z Systems

## The evolution of z Systems technology

- every new server generation adds capabilities and capacity for Linux



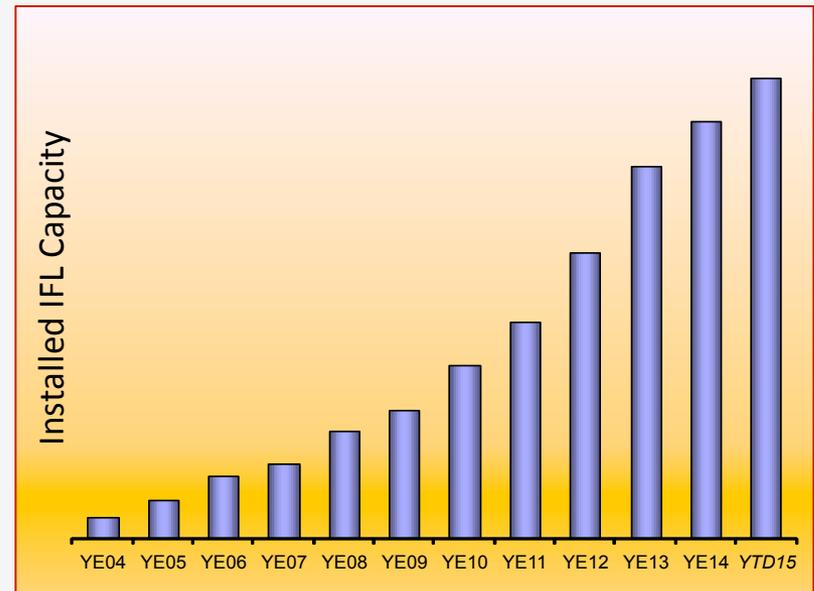
\* MIPS Tables are NOT adequate for making comparisons of z Systems processors. Additional capacity planning required

# Linux on IBM z Systems in 2Q2015

*Installed Linux MIPS at 45% CAGR\**

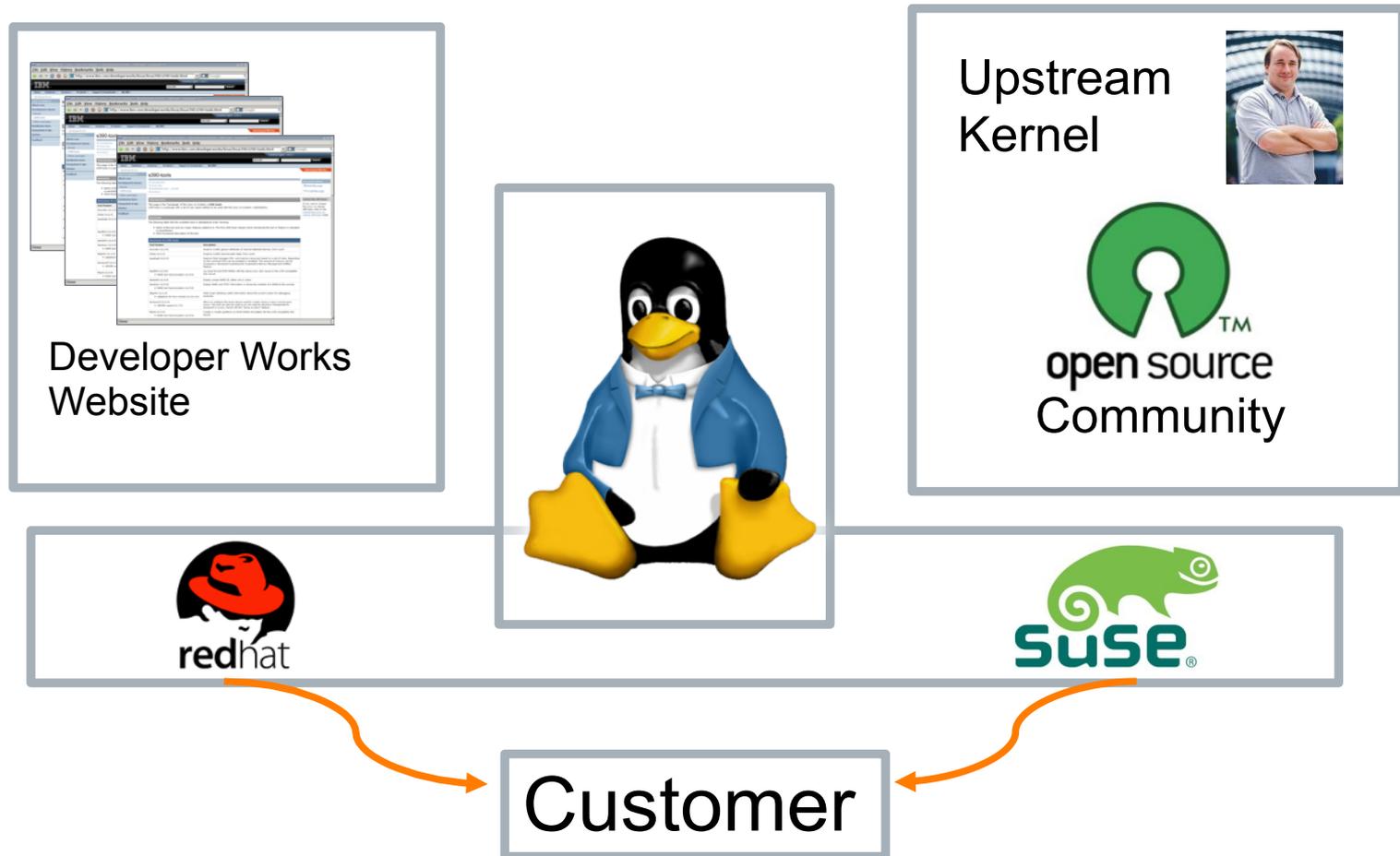
- 26.7% of Total installed MIPS run Linux as of 2Q15
- Installed IFL MIPS increased by 16% YTY from 2Q14 to 2Q15
- 39% of System z Customers have IFL's installed as of 2Q15
- 79 of the top 100 System z Customers are running Linux on the mainframe as of 2Q15 \*\*
- 35% of all z Systems servers have IFLs
- 67% of new FIE/FIC z Systems accounts run Linux

## Installed Capacity Over Time



# IBM Linux on System z Development

IBM Linux on z Systems Development contributes in the following areas: Kernel, s390-tools, Open Source Tools (e.g. eclipse, ooprofile), GCC, GLIBC, Binutils



# Red Hat Offering Summary

**Take advantage of the latest z13 hardware with Red Hat Enterprise Linux 7**

**Built to meet modern datacenter demands as well as next-generation IT requirements, Red Hat Enterprise Linux 7 lays the foundation for the open hybrid cloud and serves enterprise workloads across converged infrastructures.**

While providing the agility, flexibility and stability to meet new requirements head-on without increasing complexity, Red Hat Enterprise Linux also delivers military-grade security, mission-critical reliability, and the performance and ease-of-use capabilities to efficiently manage and run your environment.

**Reduce TCO by using a single operating system from x86 to Mainframe servers**

**Key Red Hat Enterprise Linux 7 features include:**

- Improved file system enhancements including a default XFS file system that supports up to 500TB, improvements to NFS 4 adding extended attributes with SELinux labels, and LVM supporting whole volume snapshots with rollback.
- Improved interoperability with Microsoft Active Directory domains, allowing Red Hat Enterprise Linux clients to integrate more easily within heterogeneous datacenters.
- Centralized management of processes, services, security, and other resources using Systems allowing enhanced, granular control of your system.
- Refined control over system subscriptions allows you to set support priority, audit systems reliably, and see how you're using your subscriptions at a glance.
- Hardware exploitation thought co-development with IBM

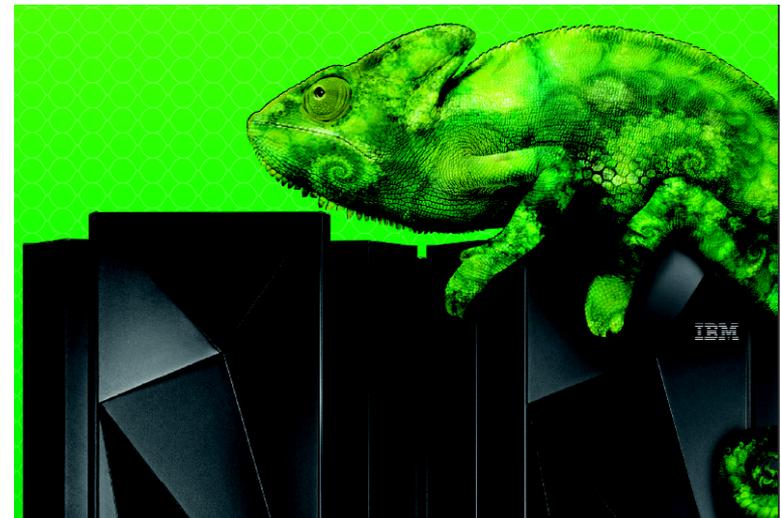


# SUSE Offering Summary

## *for SUSE Linux Enterprise Server for z Systems*

Attractive subscriptions and services are available: **TALK TO US!**

- **Multi year, multiple IFL subscriptions offer monetary value – scale & save**
  - For larger volumes, you get up to 45% of discount per subscription
  - <http://www.suse.com/products/systemz/how-to-buy>
- **SUSE Linux Enterprise High Availability Extension included – prevent outages**
  - Additionally, save more than \$1.800 per IFL compared to distributed systems
  - <http://www.suse.com/products/systemz/features/high-availability.html>
- **Long Term Support Service available – preserve environments**
  - <http://www.suse.com/support/programs/long-term-service-pack-support.html>
- **Starter System for System z – check it out easily**
  - Pre-built installation server
  - <http://www.suse.com/products/systemz/features/starter-system.html>
- **Advanced management tools – improve operational efficiency**
  - Integrated Systems management with YaST, AutoYaST, SMT
  - <http://www.suse.com/products/systemz/features/improve-operational-efficiency.html>



# Linux on IBM z Systems - Test Platforms

[ibm.com/systems/z/os/linux/resources/testedplatforms.html](http://ibm.com/systems/z/os/linux/resources/testedplatforms.html)

Distribution	z13	zEnterprise - zBC12 and zEC12	zEnterprise - z114 and z196	System z10 and System z9
RHEL 7	✓ (1,3)	✓ (4)	✓ (4)	✗
RHEL 6	✓ (1,3)	✓ (5)	✓	✓
RHEL 5	✓ (1,3)	✓ (6)	✓	✓
RHEL 4 (*)	✗	✗	✓ (9)	✓
SLES 12	✓ (2,3)	✓	✓	✗
SLES 11	✓ (2,3)	✓ (7)	✓	✓
SLES 10 (*)	✗	✓ (8)	✓	✓
SLES 9 (*)	✗	✗	✓ (10)	✓

**Note:** This is updated on a regular base, please check web for latest status

# Linux on IBM z Systems

IT simplicity - the real alternative to server sprawl



A full room of servers

versus

One footprint with the size of a refrigerator

**Unmatched total Linux capacity**

*“We don’t have to build exhaustive size of data centers - we can build smaller data centers, we can even use mobile data centers and rapidly provide services to customers.”*

*- Jacques Loubser, General Manager, Business Connexion*

*“Using IFLs, licensing is calculated per engine, rather than per instance, a much simpler approach.”*

*- Kent Swenson, Enterprise Systems Manager, America First Credit Union*

# Easy Workload Integration



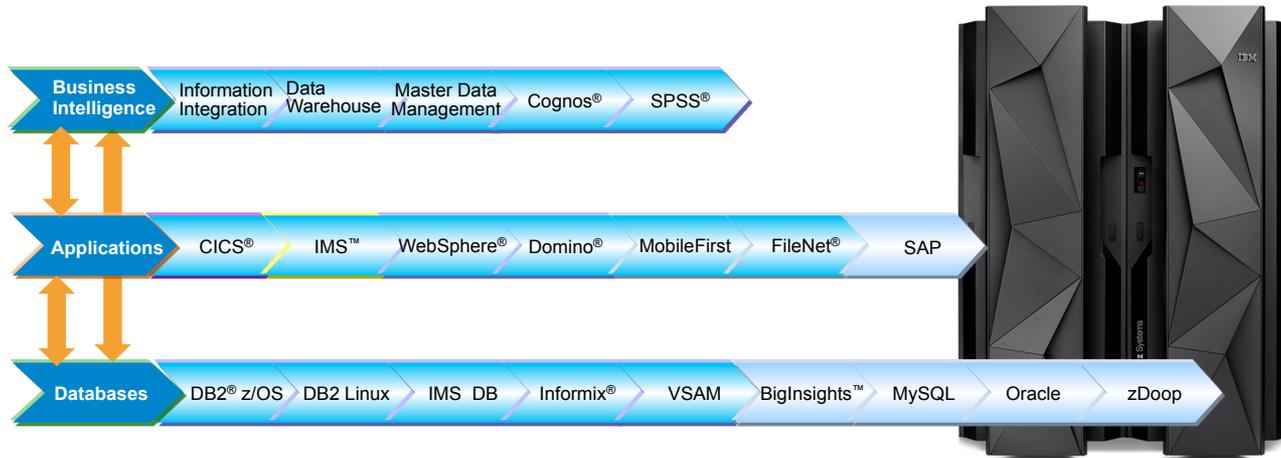
Integrating applications and data from silos allows to realize the full potential of your IT investment

**“...quickly and cost-effectively deploy innovative services on Linux, and integrate them easily with systems and data on z/OS.”**

- Daniele Cericola, ICT Governance Manager, Banca Carige

**“... offers more reliability and performance, and better integration with our backup, monitoring and ETL tools.”**

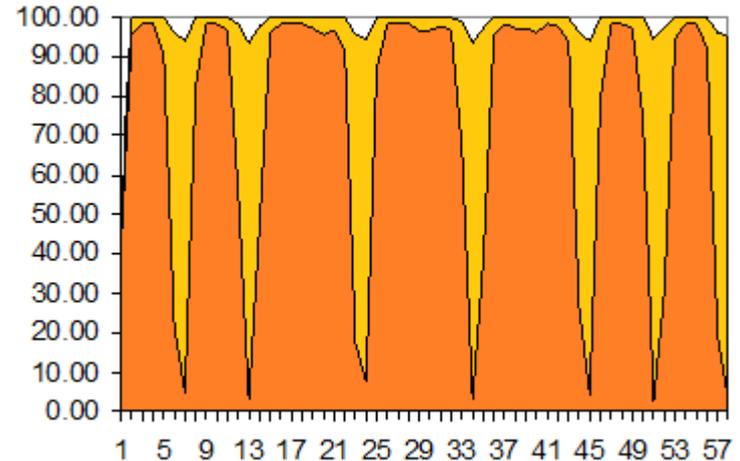
- Paulo Nassar, IT Processing and Storage Infrastructure Manager, Sicoob



# IBM z Systems Workload Management

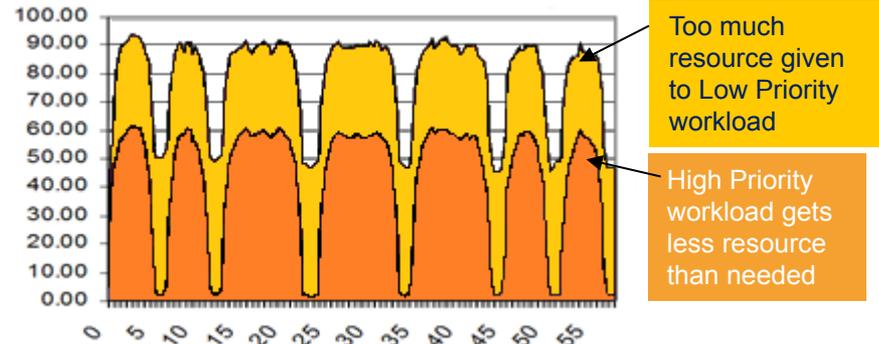
Enables mixing of high and low priority workloads without penalty

- Priority Workload
  - No throughput reduction
  - No response time increase
- Low Priority Workload
  - Soaks up remaining processor minutes
- 1.9% unused processor minutes



## Leading x86 Hypervisor

- Priority Workload
  - 31% throughput reduction
  - 45% response time increase
- Low Priority Workload
  - Soaks up more CPU minutes
- 21.9% unused CPU minutes



# IBM Software products - >1080 available



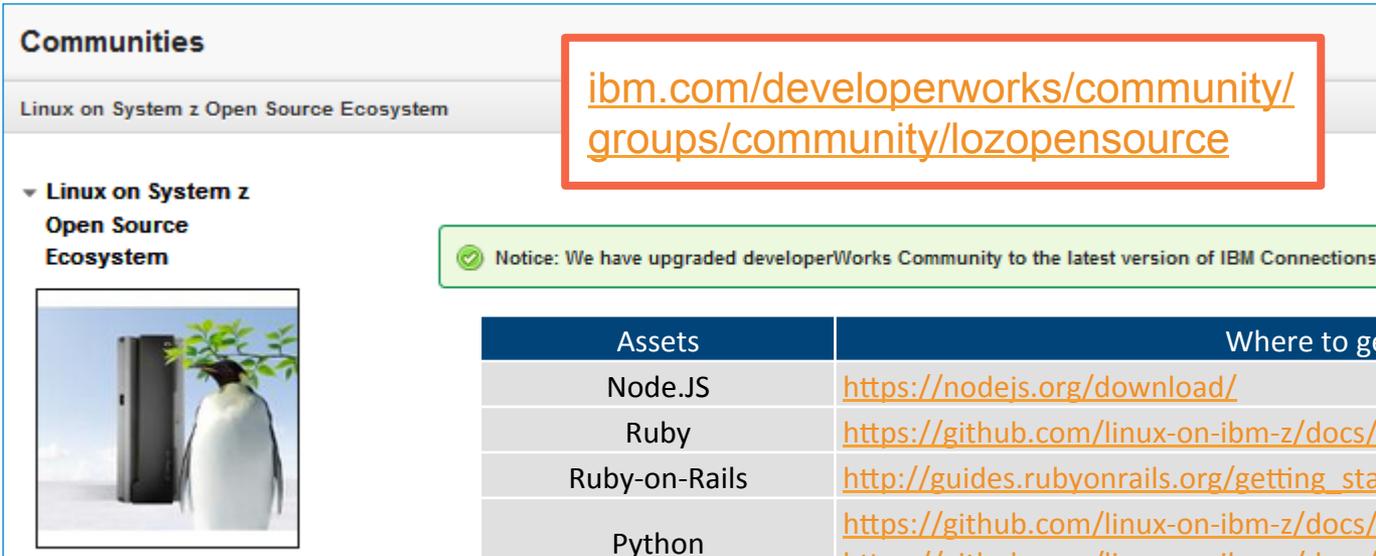
- ✓ **Data services:** [DB2 w/ BLU Accelerator](#), [Cognos](#), [SPSS](#), [InfoSphere: BigInsights](#), [Information Server](#), [Data Replication](#), [Master Data Management](#), [Informix®](#), [Oracle Database](#), ...
- ✓ **Business applications:** [WebSphere Application Server](#), [WebSphere Process Server](#), [WebSphere Commerce](#), [Java](#), ...
- ✓ **SOA & Infrastructure services:** [WebSphere MQ](#), [IBM Integration Bus](#), [DB2 Connect™](#), ...
- ✓ **Mobile application hosting:** [MobileFirst Platform Foundation](#), [WebSphere Portal](#), ...
- ✓ **Collaboration:** [Domino®](#), [Connections](#), [Sametime®](#), [Quicr™](#), [Forms](#), ...
- ✓ **Business Process Management:** [Business Process Manager](#), [WebSphere Business Monitor](#), [FileNet® Business Process Manager](#), [WebSphere Operational Decision Management](#), ...
- ✓ **Enterprise Content and Asset Management:** [FileNet Content Manager](#), [Content Manager](#), [Content Manager On Demand](#), [Maximo](#)
- ✓ **Development & test of WebSphere/Java applications** – [Rational®](#), [UrbanCode™ Deploy](#), [XL C/C++ compiler](#)
- ✓ **Industry Solutions:** [Intelligent Operations Center for Smarter Cities®](#), [Smarter Infrastructure for Social Services - Curam on z Systems](#), [Enterprise Asset Management \(Maximo®\) for Government](#), ...
- ➔ **Cloud:** [Custom Patterns](#), [Cloud Manager with OpenStack®](#), [Infrastructure Suite for z/VM and Linux](#), [Cloud Ready for Linux on z Systems](#), ...

# Open Source Public Community for Linux on z Systems

**Communities**

Linux on System z Open Source Ecosystem

▼ Linux on System z Open Source Ecosystem



[ibm.com/developerworks/community/groups/community/lozopensource](http://ibm.com/developerworks/community/groups/community/lozopensource)

Notice: We have upgraded developerWorks Community to the latest version of IBM Connections.



Assets	Where to get it?
Node.JS	<a href="https://nodejs.org/download/">https://nodejs.org/download/</a>
Ruby	<a href="https://github.com/linux-on-ibm-z/docs/wiki/Building-Ruby">https://github.com/linux-on-ibm-z/docs/wiki/Building-Ruby</a>
Ruby-on-Rails	<a href="http://guides.rubyonrails.org/getting_started.html">http://guides.rubyonrails.org/getting_started.html</a>
Python	<a href="https://github.com/linux-on-ibm-z/docs/wiki/Building-Python-2.7.9">https://github.com/linux-on-ibm-z/docs/wiki/Building-Python-2.7.9</a> <a href="https://github.com/linux-on-ibm-z/docs/wiki/Building-Python-3.4.3">https://github.com/linux-on-ibm-z/docs/wiki/Building-Python-3.4.3</a>
Go (GCCGO)	<a href="https://github.com/linux-on-ibm-z/docs/wiki/Building-gccgo">https://github.com/linux-on-ibm-z/docs/wiki/Building-gccgo</a>
Erlang	<a href="https://github.com/linux-on-ibm-z/docs/wiki/Building-Erlang-on-RHEL7">https://github.com/linux-on-ibm-z/docs/wiki/Building-Erlang-on-RHEL7</a> <a href="https://github.com/linux-on-ibm-z/docs/wiki/Building-Erlang-on-SLES12">https://github.com/linux-on-ibm-z/docs/wiki/Building-Erlang-on-SLES12</a>
oCaml Interpreter	<a href="https://github.com/linux-on-ibm-z/docs/wiki/Building-oCaml-interpreter">https://github.com/linux-on-ibm-z/docs/wiki/Building-oCaml-interpreter</a>
MongoDB	<a href="https://github.com/ibmsoe/mongo.git">https://github.com/ibmsoe/mongo.git</a>
PostgreSQL	<a href="http://www.postgresql.org/ftp/source/">http://www.postgresql.org/ftp/source/</a>
CouchDB	<a href="https://github.com/linux-on-ibm-z/docs/wiki/Building-CouchDB">https://github.com/linux-on-ibm-z/docs/wiki/Building-CouchDB</a>
RabbitMQ	<a href="https://github.com/linux-on-ibm-z/docs/wiki/Building-RabbitMQ-on-RHEL">https://github.com/linux-on-ibm-z/docs/wiki/Building-RabbitMQ-on-RHEL</a> <a href="https://github.com/linux-on-ibm-z/docs/wiki/Building-RabbitMQ-on-SLES">https://github.com/linux-on-ibm-z/docs/wiki/Building-RabbitMQ-on-SLES</a>
Docker	
Chef	

Monday, August 17 • 16:20 - 17:10 <http://sched.co/3qN8>

Building a Rich Open Source Ecosystem for Linux on the Mainframe - Dale Hoffman, IBM



## Case Studies

# Sicoob Saves Millions of Dollars By Virtualizing on the Mainframe

September 2014 | by Jim Utsler

Sicoob has realized substantial cost savings when it comes to energy use, to the tune of some **\$1.5 million** a year

Sicoob is looking at an overall reduction in expenses of more than **\$12 million** simply by consolidating many of its other Intel technology-based assets

**202 IFLs** run on Sicoob's mainframes, with those IFLs hosting around **500 z/VM** virtualized servers running SUSE Linux

**310 physical servers** have since been paired down to 36 servers



Source: [ibmsystemsmag.com](http://ibmsystemsmag.com) SEPTEMBER/OCTOBER 2014

# Radixx International

## Ron Peri CEO Radixx International on Hybrid Cloud & z Economics

### Radixx Overview

- **SaaS Hosting of Core Airline Reservations System**
  - All airline business models
  - Optimized for developing world
- **Mission critical application**
  - One hour down = \$ 1,000,000 loss

***“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*

### Systems of Record move to z Systems

- Database
- Big Data Apps/Cognos/Data Warehouse
- MQ
- APIs
- Payment processing

**Reasons to Change**

- **Scalability**
  - Mobile demand
  - Online Travel Agencies demand
- **Security**
  - Constant Hacking attempts
- **Reliability**
  - Adding servers increased complexity and risk
- **Reducing TCO**

**Ron Peri**  
CEO, Radixx International

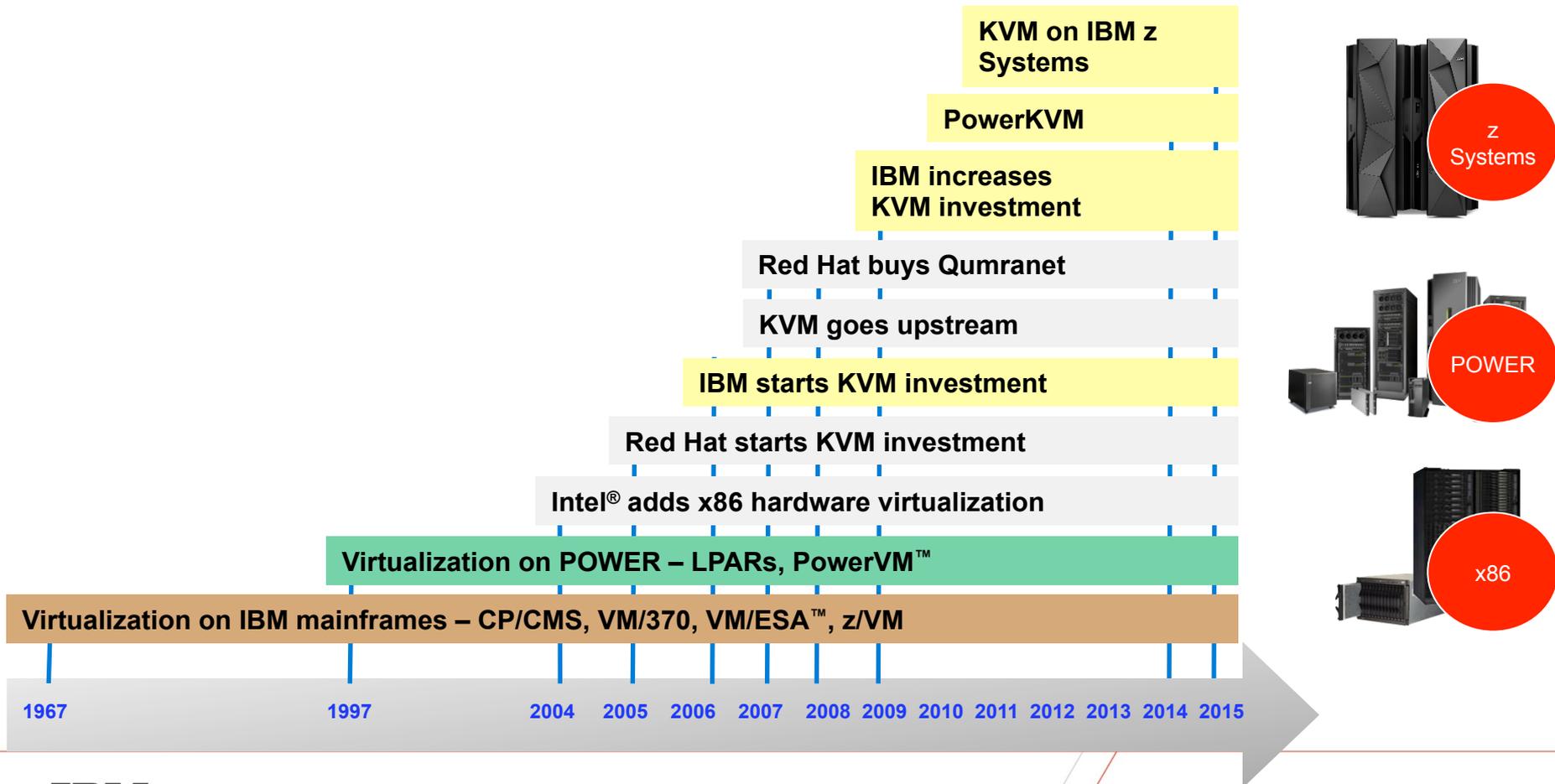
**RADIXX**  
INTERNATIONAL



# Virtualization on z Systems

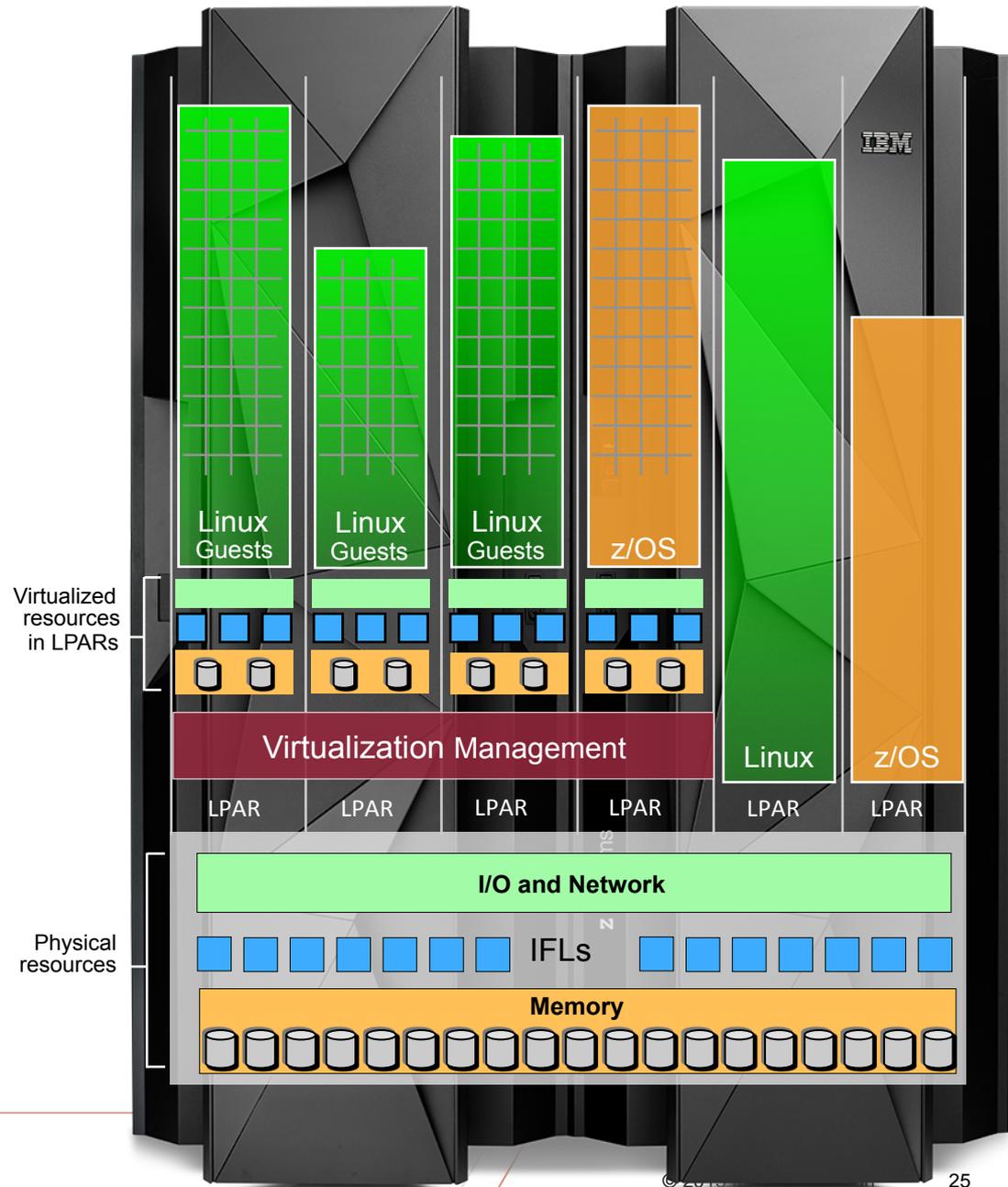
# A Brief History of IBM and Virtualization

*IBM has more than 45 years of experience in server virtualization. Virtualization was originally developed to make better use of critical hardware. Hardware support for virtualization has been critical to its adoption.*



# z Systems platform virtualization

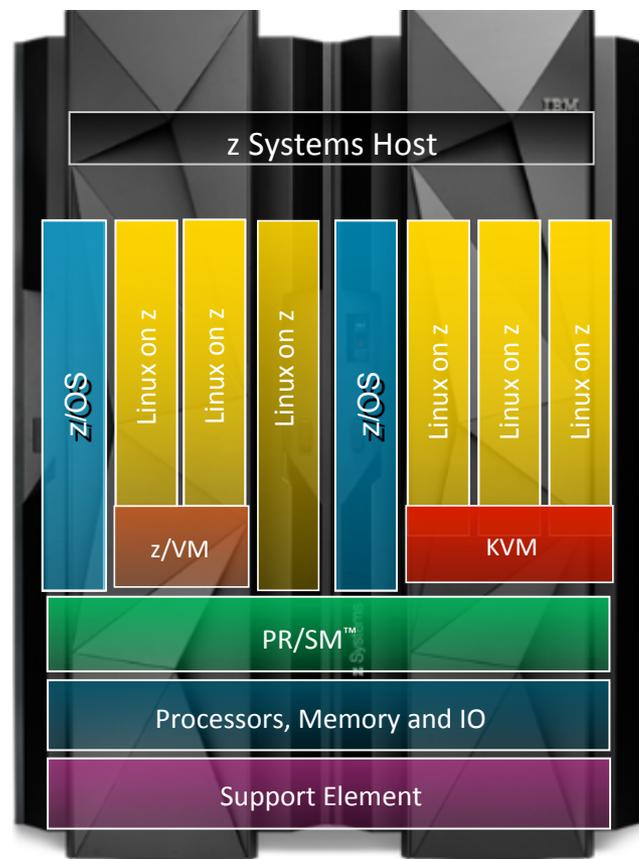
LPAR	Logical Partition = subset of hardware resources, virtualized as a separate computer; up to 85 LPARs can be configured
IFL	Integrated Facility for Linux = core; up to 141 cores (IFLs) on z13
Virtual. Mgmt.	Hypervisor providing efficiency at scale and virtualization management for easy administration, provisioning, automation
Linux Guest	virtual Linux guests running workloads such as mobile, analytics, databases, Java™ apps, etc. -- in a cloud; up to thousands Linux guests can be hosted on a single z13



# KVM for IBM z Systems

## Standardized virtualization for IBM z Systems

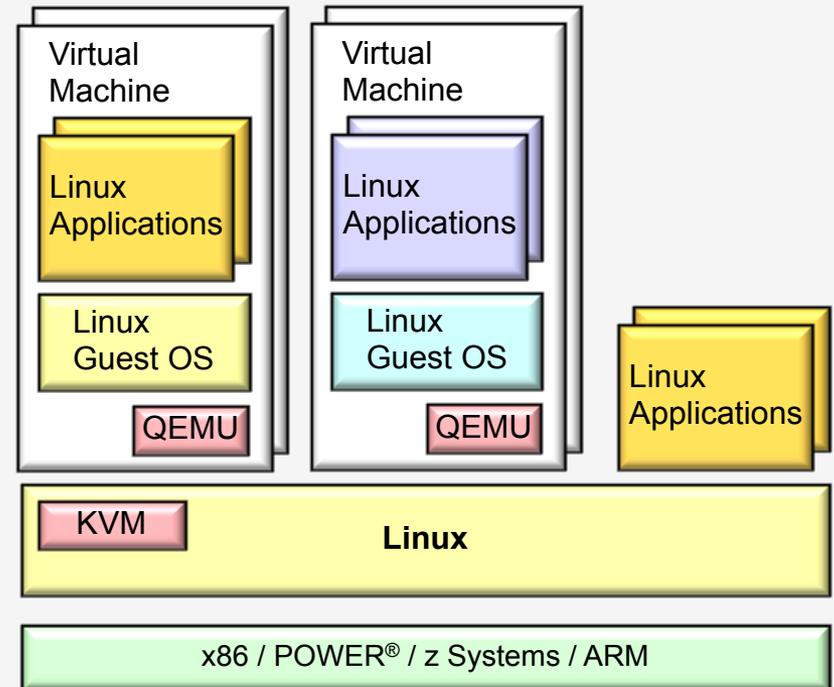
- **Expanded audience for Linux on z Systems**
  - KVM on z Systems can co-exist with z/VM
  - Attract new clients with in house KVM skills
  - Standard KVM interfaces allow for simple startup
- **Support of open source KVM hypervisor for Linux**
  - Provisioning, mobility, memory over-commit
  - Standard management and operational controls
  - Simplicity and familiarity for x86 Linux users
- **Optimized for z Systems scalability, performance, security and resiliency**
- **Flexible integration with cloud offerings**



A new hypervisor choice  
for z Systems

# Kernel Based Virtual Machine (KVM)

- **An open source hypervisor based on Linux**
  - Linux provides the base capabilities
  - KVM turns Linux into a hypervisor
  - QEMU provides I/O device emulation
- **Provides flexibility in technology choices**
  - Open
  - Scalable
  - Economical



## KVM for IBM z Systems

Most KVM for IBM z Systems code is and will be upstream integrated

- E.g. Kernel, QEMU, libvirt

Open

# Infrastructure / Hypervisor Management via CLIs

- Tasks performed by Linux HostOS/Hypervisor Administrator to manage a system
- Boot / Shutdown the Host operating system
- Setup Security and Crypto support
  - Firewalls, SELinux, PAM config
- Manage System Resources
  - load/unload Kernel modules and specify parameters
  - configure systemd
  - Hot Plug Memory and CPUs
  - automate system tasks
- Manage Users and Groups
- Configure Network
  - configure attached devices including bridging, bonding
  - focus on administering connectivity via libvirt between guest/host network
- Configure Storage
  - format/partition devices, configure attached devices including multipathing
  - manage file systems, LVM, tape devices, ....
- Enable FFDC/Problem Determination
  - Configure on panic behavior
  - Show / collect sosreport / logs / logrotate / dumps
- Configure yum repositories to enable system updates
- Performance Measurement and Diagnosis
- Optionally manage client side of services like dns, dhcp, OpenLDAP, ...

Wednesday, August 19 • 12:00 - 12:45 <http://sched.co/3Wcl>

Pushing the limits: 1000 guests per host and beyond - Jens Freimann

Wednesday, August 19 • 16:30 - 17:00 <http://sched.co/3Xlp>

Guest operating system debugging - David Hildenbrand

# OpenStack Infrastructure Management

## SD Infrastructure APIs

- Services and Resources
- Server, Storage and Network
- Broad Ecosystem Forming



OpenStack API

## SD Infrastructure Services

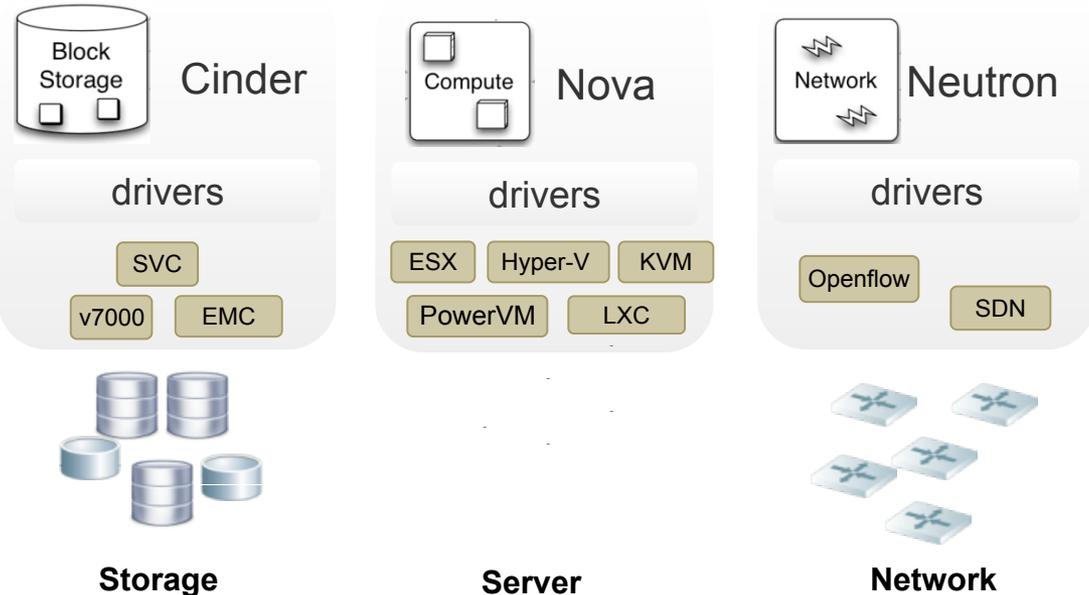
- Software Image Services
- Infrastructure Patterns
- VM Placement Intelligence



IBM differentiation provided via extensions and value added services

## Vendor Led Scalable Model

- Drivers provided by the vendors
- Broad Ecosystem Forming
- Management standardization



Code enabling KVM for IBM z is in the upstream code base since the OpenStack Kilo release  
OpenStack distribution vendors can add support for KVM for IBM z based on that code

<http://docs.openstack.org/developer/nova/support-matrix.html>

# Nova

Feature	Status	Hyper-V	Ironic	Libvirt KVM (ppc64)	Libvirt KVM (s390x)	Libvirt KVM (x86)	Libvirt LXC	Libvirt QEMU (x86)	Libvirt Virtuoizzo CT	Libvirt Virtuoizzo VM	Libvirt Xen	VMware vCenter	XenServer
Attach block volume to instance	optional	✓	✗	✓	✓	✓	✗	✓	✗	✓	✓	✓	✓
Detach block volume from instance	optional	✓	✗	✓	✓	✓	✗	✓	✗	✓	✓	✓	✓
Set the host in a maintenance mode	optional	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Evacuate instances from a host	optional	?	?	?	✓	✓	?	?	✗	✗	✗	✗	✗
Guest instance status	mandatory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Guest host status	optional	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Live migrate instance across hosts	optional	✓	✗	✓	✓	✓	✗	✓	✗	✗	✓	✗	✓
Launch instance	mandatory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop instance CPUs	optional	✓	✗	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓
Reboot instance	optional	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rescue instance	optional	✗	✗	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗
Resize instance	optional	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗
Restore instance	optional	✓	✗	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓
Service control	optional	✗	✗	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗
Set instance admin password	optional	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Save snapshot of instance disk	optional	✓	✗	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗
Suspend instance	optional	✓	✗	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓
Swap block volumes	optional	✗	✗	✓	✓	✓	✓	✓	✗	✓	✓	✗	✗

# OpenStack Enablement

## Open

- Continuous Upstream OpenStack enablement for KVM for IBM z **starting with 'Kilo' driver**
- Allows OpenStack ISVs to add support for KVM for IBM z based on upstream code

## IBM Cloud Manager (ICM)

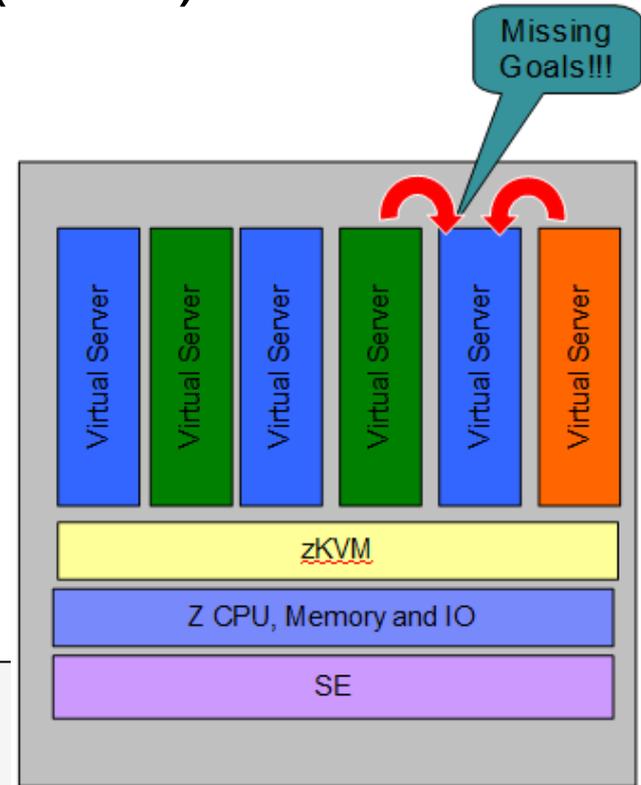
- ICM 4.3 based on OpenStack Kilo release
- ICM 4.3 FixPack in 9/2015 to support KVM for IBM z
- KVM for IBM z: Compute Node support only
  - Nova libvirt driver
  - Neutron Agent for OpenVSwitch
  - Ceilometer support
- Cinder Support
  - for SVC and SV7K
  - for XIV
  - for DS8K (FCP only)

# Hypervisor Performance Manager (HPM)

Manage CPU resources across virtual servers to achieve performance goals

- **Detect** that a virtual server when a member of a Workload Resource Group is not achieving goals
- **Determine** that the virtual server performance can be improved with additional resources
- **Project impact** on all affected virtual servers of reallocating resources
- If good trade-off based on policy, **redistribute processor resources**
- Current support for CPU management, potential to extend to other resources

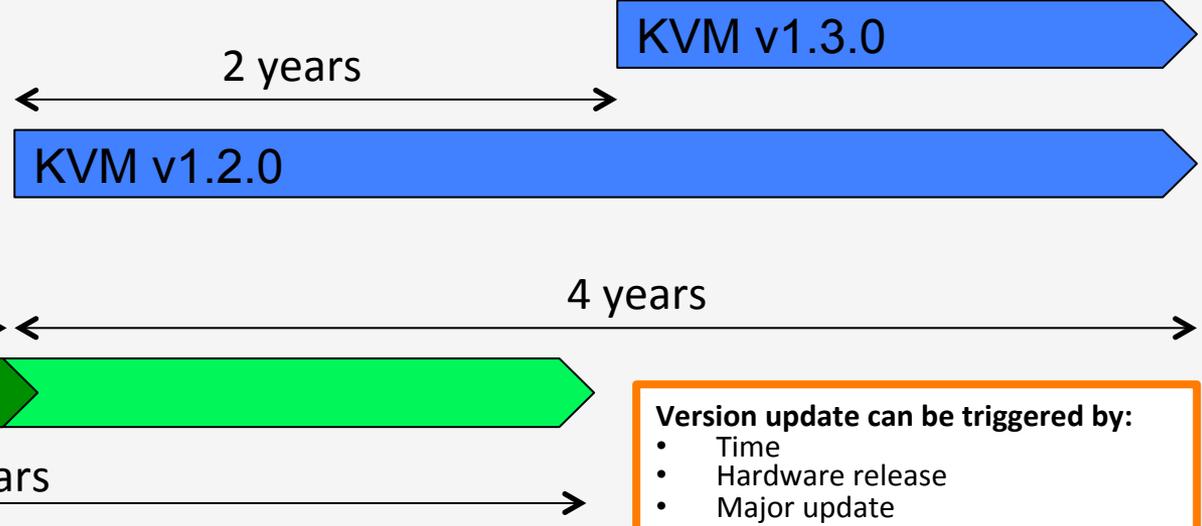
- Shipped as part of the KVM for IBM z with optional enablement
- Single KVM for IBM z instance as management scope
  - HPM will have no knowledge outside of its KVM for IBM z instance
- Controlled through RESTful Web Services APIs and CLI
  - Point of integration with higher-level virtualization management solutions
  - Support for scripting
  - Fully documented external interface
- CLIs provide support for local administration



# Agile release and development plan

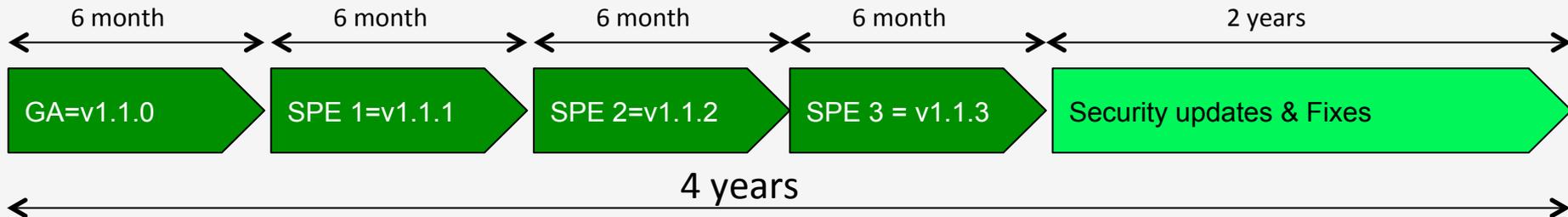
## KVM for IBM z Release cycle

Keep max. 2 Releases in service at the same time



## KVM for IBM z development cycle

- Modification level (SPE) every 6 month for customer & upstream integration
- 2 years with new features, Security updates & Bug fixes up to 4 years



# Pricing, Ordering and support of KVM for IBM z



- **Zero priced IBM product**
- Priced Support and Subscription (S&S) per engine
  - Enables customers to download patches, updates and to utilize IBM WW 24/7 support
- **Program Product ID Number 5648-KVM**
- **Subscription Support Product ID Number 5468-KVS**

## Adding KVM to z/VM environment

- Customers adding KVM for IBM z to a machine that is running z/VM on IFLs may contact special bid pricing as both KVM and z/VM are currently full capacity priced products

## Solution Packages

- Planned packaged offering similar to the Enterprise Linux Server Solution Edition

## Ordering

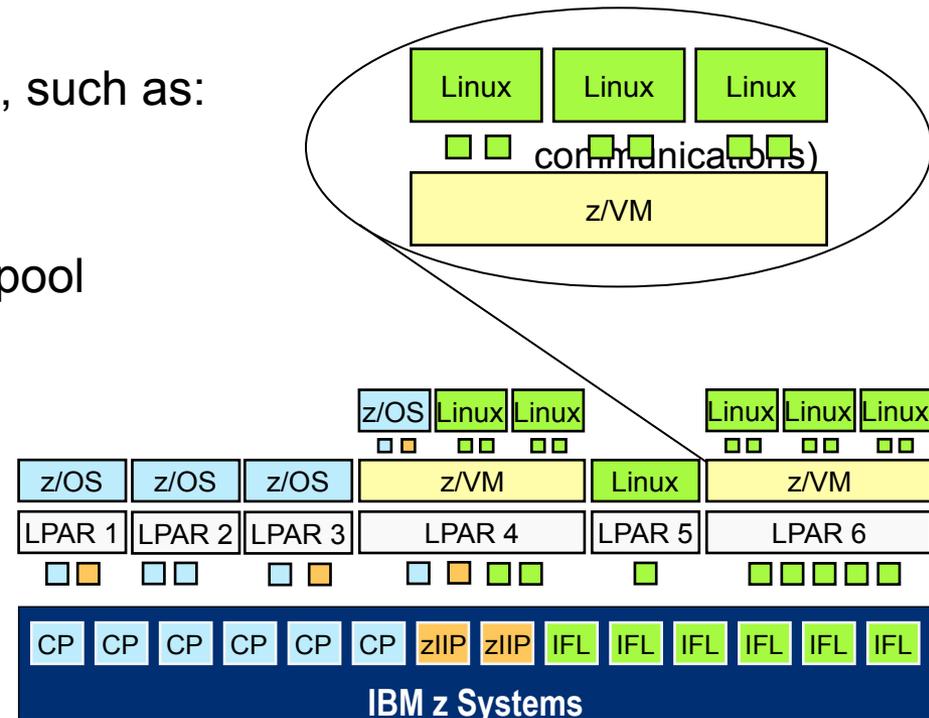
- Customers may order through Shopz

## Fulfillment

- Ordered similar to z/VM (ESW)
- Updates via FixCentral and/or Shopz
- Support from IBM Support Center

# IBM z/VM – Powerful and Versatile Virtualization

- World class quality, security, reliability
- Extreme scalability creates huge cost savings opportunities
  - Software licensing
  - Hardware maintenance and networking
  - Floor space and Energy
- Exploitation of advanced technologies, such as:
  - Shared memory (Linux kernel, executables, communications)
  - Virtual networking (Switches, LANs)
- Highly granular control over resource pool
- Valuable tool for Disaster Recovery and Resiliency plans and processes



# IBM Wave for z/VM

## Simple management with intelligent visualization

- Monitors and manages virtual servers and resources from a single graphical interface
- Simplifies and automates tasks
- Provisions virtual resources (Guests, Network, Storage)
- Supports advanced z/VM capabilities such as Single System Image (SSI) and Live Guest Relocation (LGR)
- Allows delegation of administrative capabilities to the appropriate teams
- Competitive and comparable to other virtualization center solutions
- View and customize reports easily

Reduce time spent on key administrative tasks  
by up to 95%<sup>1</sup>

The screenshot displays the IBM Wave for z/VM management interface. The main window shows a network diagram for a z/VM system named 'DEMO54'. The diagram includes a central 'z/VM' node connected to various components: 'New z/VM Device Pool for DEMO54', 'New HPEP Device Pool for DEMO54', and several virtual network segments (192.168.12.0 and 192.168.11.0). Below the diagram, a table lists tasks performed, including activating z/VM guests and creating device pools.

Task Name	Initiator	Start At	End At	Duration	Status	Progress
Activate z/VM Guests	admin	2011-05-24 10:31:00.0	2011-05-24 10:31:51.0	1 seconds	Done	100%
Create and Associate Device Pool with z/VM System	admin	2011-05-24 10:27:23.0	2011-05-24 10:27:24.0	1 seconds	Done	100%
Create and Associate Device Pool with z/VM System	admin	2011-05-24 10:27:23.0	2011-05-24 10:27:24.0	1 seconds	Done	100%
Create and Associate Device Pool with z/VM System	admin	2011-05-24 10:27:23.0	2011-05-24 10:27:24.0	1 seconds	Done	100%
Create and Associate Device Pool with z/VM System	admin	2011-05-24 10:14:16.0	2011-05-24 10:14:17.0	1 seconds	Done	100%
Create and Associate Device Pool with z/VM System	admin	2011-05-24 10:14:16.0	2011-05-24 10:14:17.0	1 seconds	Done	100%
Add new Manage Entity	admin	2011-05-24 10:05:21.0	2011-05-24 10:05:22.0	1 seconds	Done	100%

A simple, intuitive graphical tool providing management, provisioning, and automation for a z/VM environment, supporting Linux virtual servers

# For More Information

- **KVM for IBM z Systems [Webpage](#)**

- Data Sheet
- FAQs

- **[IBM z Systems](#)**

- **[Linux on z Systems](#)**

- [Customer success stories](#)

- **[IBM z/VM](#)**

- **[IBM Wave](#)**

- **Demos and Redbooks Planned**

- **Events**

- SHARE, LinuxCon, KVM Forum, Linux Distribution Partner Events, Insight 2015, VMWorld, IBM Systems Tech University

- **Publications - [ibm.com/support/knowledgecenter](http://ibm.com/support/knowledgecenter)**

- KVM for IBM z Systems: Planning and Installation Guide SC27-8236-00
- KVM for IBM z Systems: Administration Guide SC27-8237-00
- KVM Virtual Server Quick Start SC34-2753
- KVM Virtual Server Management SC34-2752
- Device Drivers, Features, and Commands for Linux as a KVM Guest SC34-2754

The screenshot shows the IBM website for KVM for IBM z Systems. The page features the IBM logo and navigation menu at the top. The main heading is "KVM for IBM z Systems" with the subtitle "Open source virtualization hypervisor". Below this, there is a paragraph describing KVM for IBM z Systems as an open source virtualization for the IBM mainframe. To the right, there is a "Contact an IBM Sales Specialist" section with an "Email IBM" button and a "Find a Business Partner" link. Below that, there is a "Browse z Systems" section with links for Hardware, Software, Solutions, and Operating systems. The "Highlights" section lists three key points: Open virtualization, Quality of service, and Operational efficiencies. The "Benefits" section lists four points: Reduce operating costs, Simplify systems management, Accelerate cloud deployments, and Meet changing server demands. The "Events and webcasts" section features two items: "LinuxCon, the premier Linux event" and "Secure mainframe development in the cloud".

The banner for LinuxCon North America features the Linux logo (a penguin) on the left. The text "LINUXCON" is prominently displayed in large white letters, with "NORTH AMERICA" underneath it. Below the text, it says "August 17 - 19, 2015" and "Sheraton Seattle, Seattle, WA". At the bottom, there is a hashtag "#linuxcon" and social media icons for Twitter, Facebook, LinkedIn, and Google+.

# Thank you !

## Event Presence

IBM is a Platinum Sponsor of [Linux Con NA](#) in Seattle

Monday August 17, 2015 9:10am

[IBMz Keynote: "Rethink your IT: Why an Open Infrastructure Matters"](#) – Ross Mauri, General Manager, z Systems, IBM Corporation

Monday August 17, 2015, 4:20 pm

[Building a rich Open Source Ecosystem for Linux on the Mainframe](#)– Dale Hoffman, manager of the IBM z Systems Technical Strategy.

Wednesday, August 19, 2015, 12:00 pm

[Pushing the limits: 1000 guests per host and beyond](#) - Jens Freimann, Software Engineer, IBM

Wednesday, August 19, 2015, 4:30 pm

[Guest operating system debugging](#) - David Hildenbrand , Software Engineer, IBM

## Expo Hall

IBM Booth #106 to see IBM z Systems and the z13 in action!

- Learn more about Linux on IBM z Systems.
- Running demos every thirty minutes showing Open Source applications running on z Systems



Backup

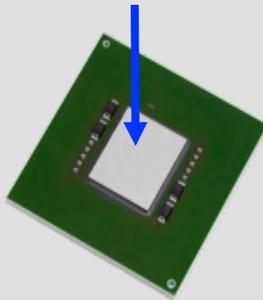


# z13 SCM Vs zEC12 MCM Comparison

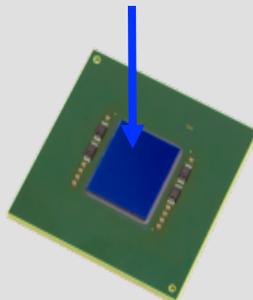
## z13 Single Chip Modules (SCMs)

- **Processor Unit (PU) SCM**
  - 68.5mm x 68.5mm – fully assembled
  - PU Chip area 678 mm<sup>2</sup>
- **System Controller (SC) SCM**
  - 68.5mm x 68.5mm – fully assembled
  - SC Chip area 678 mm<sup>2</sup>
  - 480 MB on-inclusive L4 cache per SCM
- **Processor Drawer – Two Nodes**
  - Six PU SCMs for 39 PUs (42 PUs in Model NE1) per drawer
  - Two SC SCMs (960 MB L4) per drawer

Single PU Chip  
without  
Module Thermal Cap

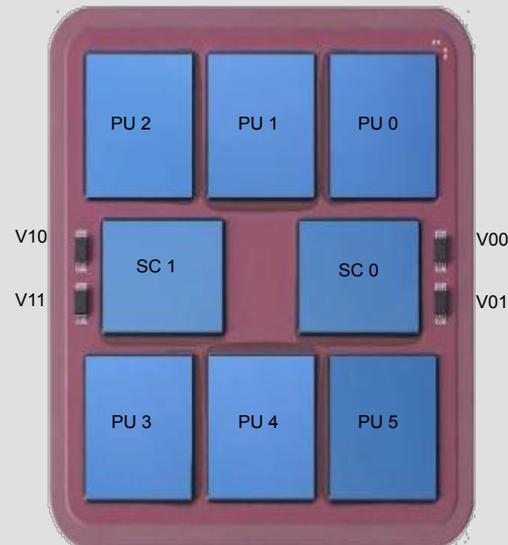


Single SC Chip  
without  
Module Thermal Cap



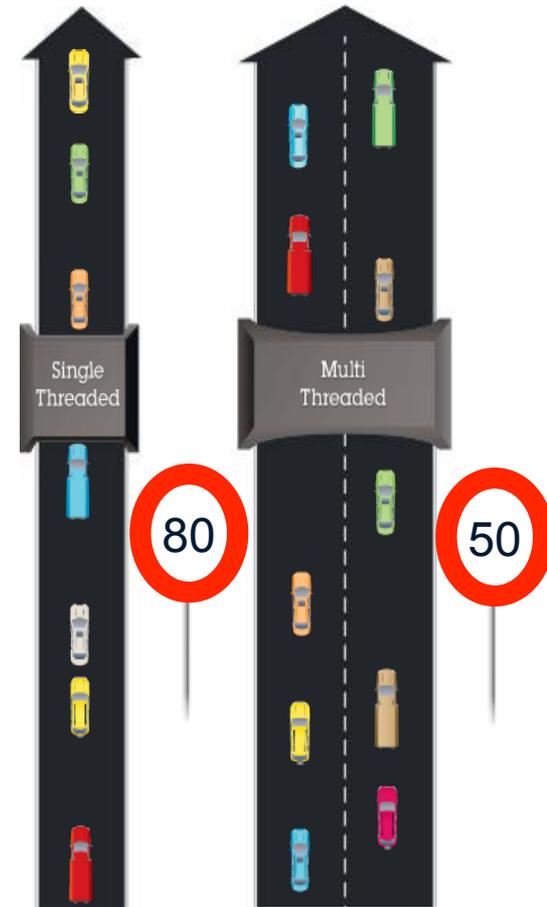
## zEC12 Multi Chip Module (MCM)

- **Technology**
  - 96mm x 96mm with 102 glass ceramic layers
  - 7,356 LGA connections to 8 chip sites
- **Six 6-core Processor (PU) chips**
  - 27 active processors per MCM (30 in Model HA1)
  - PU Chip size 23.7 mm x 25.2 mm
- **Two System Controller (SC) chips per MCM**
  - 192 MB L4 cache per SC, 384 MB per MCM
  - SC Chip size 26.72 mm x 19.67 mm
- **One MCM per book, up to 4 books per System**



# Simultaneous Multithreading (SMT)

- Simultaneous multithreading allows instructions from one or two threads to execute on a zIIP or IFL processor core.
- SMT helps to address memory latency, resulting in an overall capacity\* (throughput) improvement per core
- Capacity improvement is variable depending on workload. For **AVERAGE** workloads the estimated capacity\* of a z13:
  - zIIP is 38% greater than a zEC12 zIIP
  - IFL is 32% greater than a zEC12 IFL
- SMT exploitation: z/VM V6.3 + PTFs for IFLs and z/OS V2.1 + PTFs in an LPAR for zIIPs
- SMT can be turned on or off on an LPAR by LPAR basis by operating system parameters. z/OS can also do this dynamically with operator commands.
- Notes:
  1. SMT is designed to deliver better overall capacity (throughput) for many workloads. Thread performance (instruction execution rate for an individual thread) may be faster running in single thread mode.
  2. Because SMT is not available for CPs, LSPR ratings do not include it.



*Which approach is designed for the highest volume\*\* of traffic?  
Which road is faster?*

*\*\* Two lanes at 50 carry 25% more volume if traffic density per lane is equal*

\*Capacity and performance ratios are based on measurements and projections using standard IBM benchmarks in a controlled environment. Actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload.

# SIMD (Single Instruction Multiple Data) processing

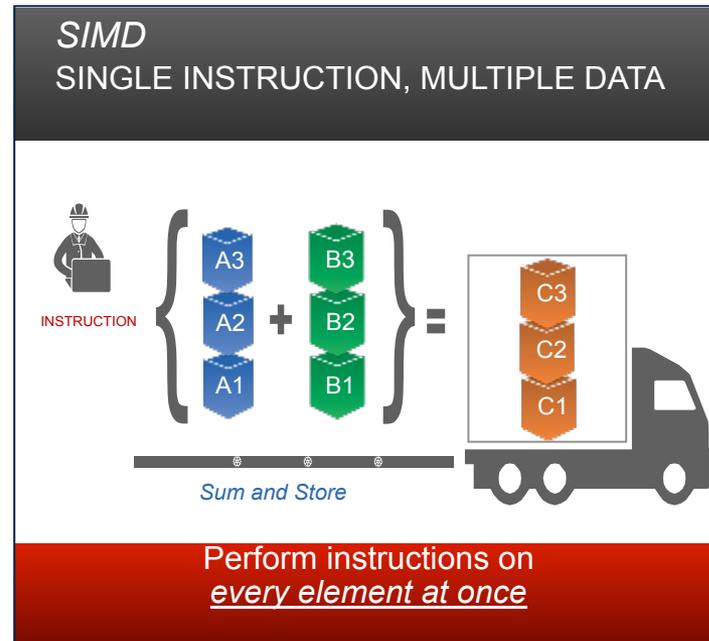
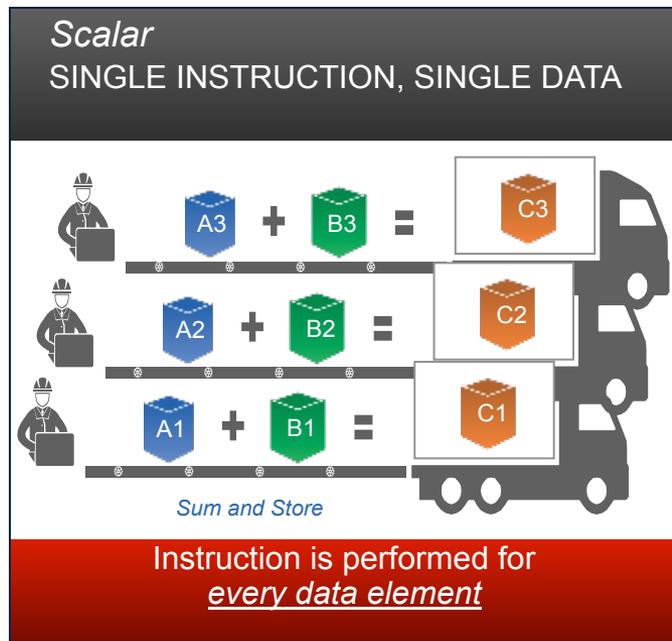
## Increased parallelism to enable analytics processing

- Competitive advantage: In transaction vector processing.
- Smaller amount of code helps improve execution efficiency
- Process elements in parallel enabling more iterations
- Supports analytics, compression, cryptography, video/imaging processing



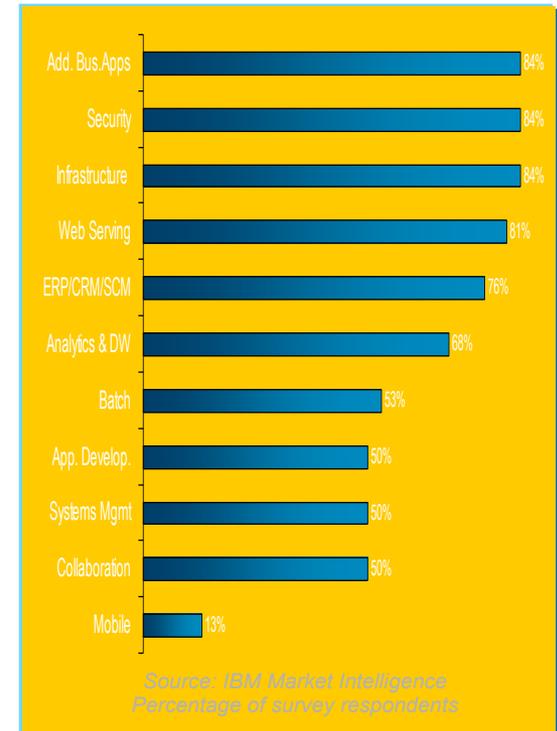
### Value

- ✓ Enable new applications
- ✓ Offload CPU
- ✓ Simplify coding



# Recommended Workloads for Linux on z Systems

- ✓ **Data services:** **DB2 w/ BLU Accelerator**, **Cognos**, **SPSS**, **InfoSphere**: BigInsights, Information Server, Data Replication, Master Data Management, Informix®, **Oracle Database**, Information Builders WebFOCUS, ...
  - ✓ **Business applications:** **WebSphere Application Server**, WebSphere Process Server, WebSphere Commerce, Java, ...
  - ✓ **SOA & Infrastructure services:** **WebSphere MQ**, **IBM Integration Bus**, DB2 Connect™, ...
  - ✓ **Mobile application hosting:** **MobileFirst Platform Foundation**, **WebSphere Portal**,
  - ✓ **Collaboration:** **Domino®**, **Connections**, Sametime®, Quickr™, Forms, ...
  - ✓ **Business Process Management:** **Business Process Manager**, WebSphere Business Monitor, FileNet® Business Process Manager, WebSphere Operational Decision Management, ...
  - ✓ **Enterprise Content and Asset Management:** **FileNet Content Manager**, Content Manager, Content Manager On Demand, **Maximo**
  - ✓ **Development & test:** e.g. of WebSphere/Java applications – Rational®, **UrbanCode™ Deploy**, **Node.js**, **XL C/C++ compiler**
  - ✓ **Industry Solutions:** Intelligent Operations Center for Smarter Cities®, Smarter Infrastructure for Social Services - Curam on z Systems, Enterprise Asset Management (Maximo®) for Government, Smarter Analytics™ Anti-Fraud Infrastructure for z Systems, z Systems Smarter Analytics for Retail
- ➔ **Cloud:** **Custom Patterns**, **Cloud Manager with OpenStack®**, **Infrastructure Suite for z/VM and Linux**, Cloud Orchestrator, Cloud Ready for Linux on z Systems, **IBM Wave for z/VM**, xCat, ...



# Clients run many workloads on Linux on z Systems



Database deployment



Web application and SOA infrastructure



Real-time insights



... and much more

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

- [BTMU](#)
- [Nationwide](#)
- [Halkbank](#)
- [Renfe](#)
- [Bank New Zealand](#)

- [Sicoob](#)
- [White Cube](#)
- [Bankia](#)
- [Miami-Dade County](#)
- [IBM](#)

- [Major utility organization](#) (SAP)
- [ABK-Systeme GmbH](#) (MobileFirst)
- [Banca Carige](#) (MobileFirst)
- [German Pension Fund](#) (Content Mgt)
- [BCBS Minnesota](#) (SAP)
- [Porto Alegre](#) (Maximo)
- [City a. County of Honolulu](#) (Maximo)
- [IBM](#) (Connections/Notes)



# IBM Cloud Manager Features

## Self Service Dashboard for Cloud Tenants and Admins

- Configure and deploy Cloud Workloads
- Monitor Activity /Reports

## Virtual Image Deployment and Management

- View Virtual Appliance Properties
- Edit Virtual Appliance Properties
- Deploy Virtual Appliance
- Basic, minimal configuration options, including name, description, project, processor information, and memory are displayed
- Advanced, all of the configuration options available for the virtual appliance are displayed.

## Workload management

- Start/Stop
- Create/Copy /Workload definitions
- Resize

## Cloud Instances/Projects

- SCentry Project allows for the grouping of Workloads and Appliances for controlling access.

## Budgeting/Accounting

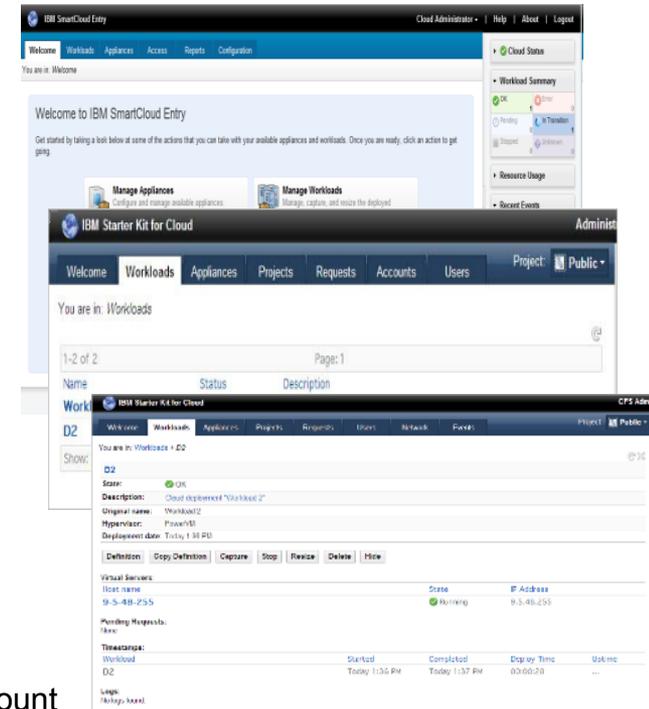
- Accounts can be created by admins and users can be associated with an account
- Accounts are charged w/ funds and debited as used
- Charges determined by admin per resource allocated
- Delinquent accounts can be handled via policy (remove workload resources, shutdown or do nothing but notify)

## Metering provides records of allocated resources, state and sizes and who allocated them

- Can be used by external/3rd party reporting tools; consumable w/ ITUAM

## Approvals can be turned on for new deploys and/or resize operations

- If Enabled, users operation is put in as a request
- Admins get emails and can look at open requests
- Approver can approve or reject request and can modify parameters during approval



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FlashSystem	PowerVM	z/Architecture*	z Systems
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ibm.com	RACF*	z/TPF*	
IBM (logo)*	VM/ESA	z/VSE*	

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