

GS02 – Overview of z/VM, z/VSE, KVM and Linux on IBM z Systems News

European GSE / IBM TU in Leipzig 2016

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IBM Deutschland Research & Development GmbH

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Agenda

- **z/VSE**
- z/VM
- Linux on IBM z Systems
- KVM for IBM z Systems



z/VSE “facelift”



z/VSE Strategy

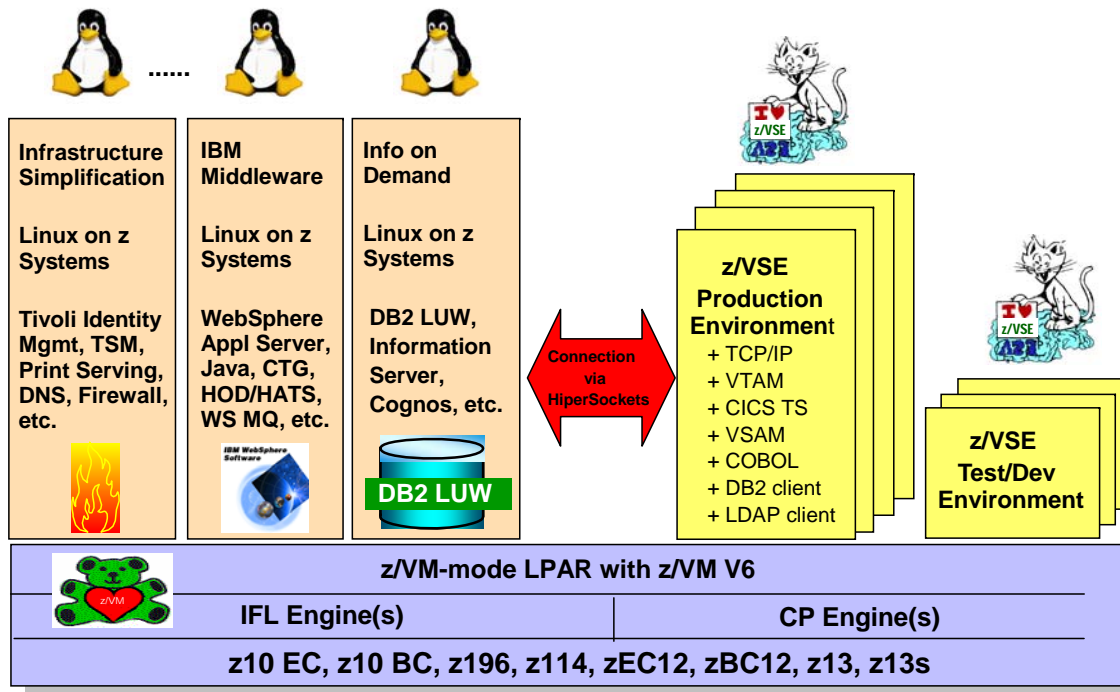
Protect existing z/VSE investments

Integrate using middleware and z/VSE connectors

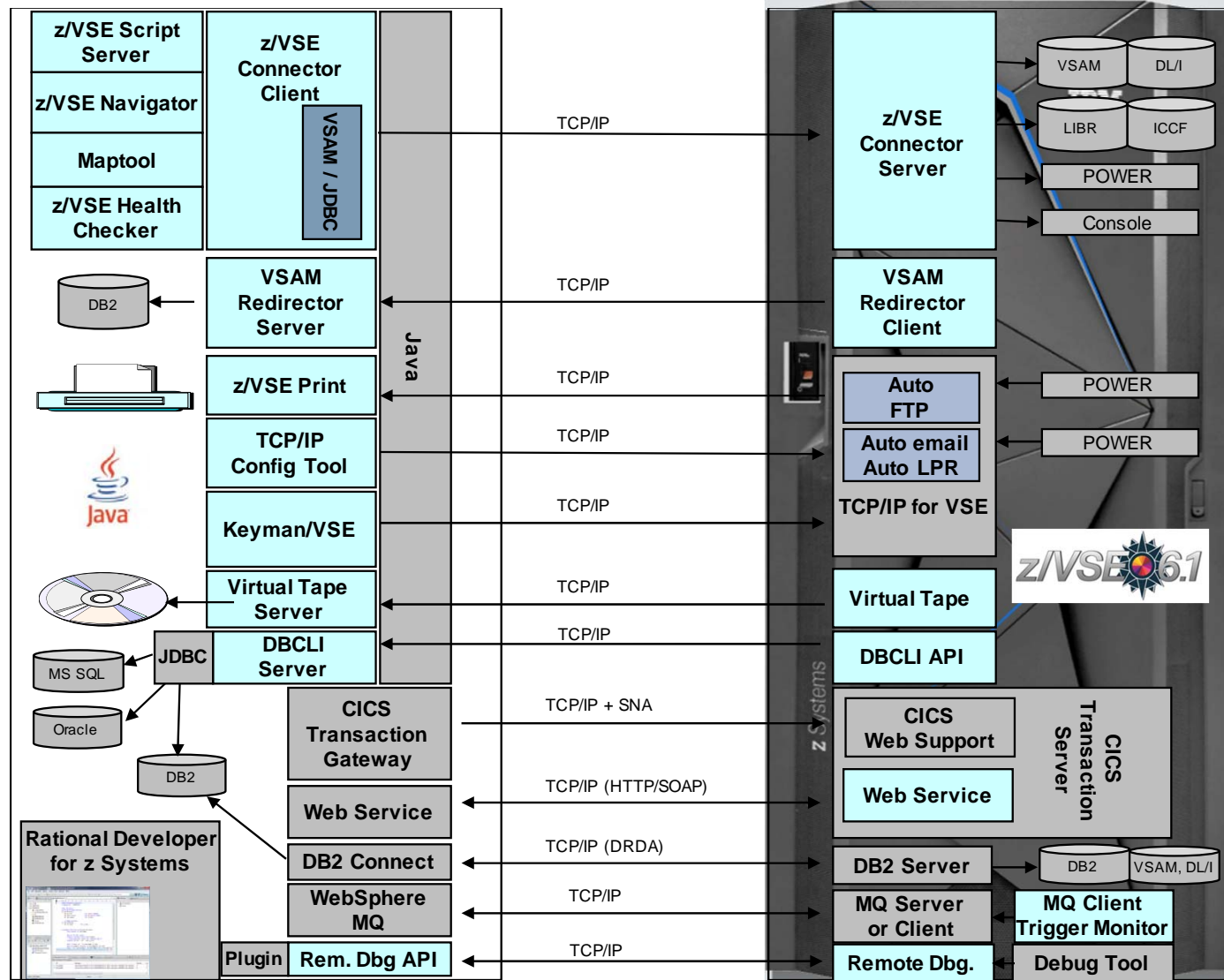
Extend with Linux on IBM z Systems technology & solutions



- **Hybrid Environment** leveraging z/VSE, z/VM, and Linux on IBM z Systems



z/VSE Connectors



z/VSE Roadmap



z/VSE Future: Ann+SoD: 12.4.2016
z/VSE Network Appliance, Migration Pricing Option
*HW exploitation, CICS TS & CICS Explorer,
Easy of use, Networking and Security enhancements*

z/VSE 6.1 GA: 27.11.2015
CICS TS for z/VSE 2.1: CICS Explorer update,
Channels & Containers; TCP/IP for z/VSE 2.1,
IPv6/VSE 1.2, z10 or higher; z Systems exploitation

z/VSE 5.2 GA: 25.4.2014; **end of marketing: 13.4.2017**
zEnterprise exploitation, device support
Tapeless installation, networking / security enhancements

z/VSE 5.1 GA: 11.2011; **end of service: 30.6.2016**
64 bit virtual, zEnterprise exploitation, z9 or higher
z/VSE 5.1.1 GA: 6.2012: CICS Explorer, LFP in LPAR, database connector
z/VSE 5.1.2 GA: 6.2013: TS1140, 64 bit I/O, openSSL, db connector enhancements

z Systems support (or **not**)

VSE Release	z900 / z800	z990 / z890 (eos 10.2016)	z9 EC / z9 BC	z10 EC / z10 BC / z196 / z114 / zEC12 / zBC12 / z13 / z13s
z/VSE 6.1	No	No	No	Yes
z/VSE 5.2 (eom 3.2017)	No	No	Yes	Yes
z/VSE 5.1 (eos 6.2016)	No	No	Yes	Yes
z/VSE 4.3	Yes	Yes	Yes	Yes
z/VSE 4.2	Yes	Yes	Yes	Yes
z/VSE 4.1	Yes	Yes	Yes	Yes
z/VSE 3.1	Yes	Yes	Yes	Yes
VSE/ESA 2.7	Yes	Yes	Yes	Yes
VSE/ESA 2.6	Yes	Yes	Yes	Yes
VSE/ESA 2.5	Yes	Yes	No	No
VSE/ESA 2.4	Yes	No	No	No
VSE/ESA 2.3	Yes	No	No	No

z/VSE release / Hardware status: <http://www-03.ibm.com/systems/z/os/zvse/about/status.html>



z/VSE, z/VM and Linux on IBM z Systems Growth Offering

- Provide z/VSE customers with a Linux environment to expand into new workloads such as Cognitive and Cloud, Analytics, Mobile, Social, Security
- For z/VSE customers acquiring a **z13s*** and z/VSE V5 or V6, the customer can receive all of the following components with the **z13s*** and z/VSE V5 or V6 at the same price as the **z13s*** and z/VSE V5 or V6 :
 - one IFL*
 - incremental 32 GB memory (incremental to memory ordered for the **z13s**)
 - z/VM V6 (base & features) for the IFL (up to 10 Value Units)
 - IBM Wave V1 for the IFL (up to 10 Value Units)
 - z/VM S&S and IBM Wave S&S for the IFL for 3 years
- Requirements:
 - **z13s F01/A02** or larger
 - Direct sales and Business Partner sales
 - Prior special bid approval required
 - All hardware must be ordered at the same time
 - z/VSE V5 or V6 must be licensed at the same time as the server purchase (or earlier)



* Maintenance is not included in this offering



z/VSE Statements of Direction

- **HW exploitation**

- **z/VSE V6.1 is the last** z/VSE release planned to support the IBM System **z10** server family of servers
- Delivery of future upgrades of **z/VSE** on **DVD and electronically only**
- **High Performance FICON (zHPF)** support
 - Input/output intensive applications may especially benefit from a FICON Express16S in an IBM z13 or z13s with the zHPF protocol and IBM DS8880 storage
- **Elliptic Curve Cryptography (ECC)** support
 - ECC hardware acceleration with Crypto Express5S in CCA coprocessor mode will be transparently used

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z/VSE Statements of Direction

- Future release of **CICS TS for z/VSE**
 - **CICS Explorer** enhancements
 - **Define new and change or delete** existing CICS resources
 - **Monitor and control or update** dynamic **storage areas** and global temporary storage queue **statistics**
 - **Channel and container** enhancements
 - **Support UTF-8 and UTF-16** in code page conversion
 - **Add the APPEND** parameter for **PUT CONTAINER**
 - **Add the BYTEOFFSET** parameter for **GET CONTAINER**

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z/VSE Statements of Direction

- **Connectors:**

- **z/VSE SOAP Engine to exploit Channels and Containers**

- The existing z/VSE Simple Object Access Protocol (**SOAP**) implementation **integrates z/VSE CICS applications in a heterogeneous environment using web services**
 - We intend to **lift the 32K COMMAREA restriction**, by exploiting the CICS Channels and Containers API with the SOAP Engine

- **z/VSE REST Engine with JSON support**

- Representational State Transfer (REST) is a software architecture style consisting of guidelines and **best practices for creating web services**
 - z/VSE intends to provide a **REST Engine** that allows clients to **provide RESTful web services running in a CICS environment**
 - The REST Engine will **support** various payload types including **JavaScript Object Notation (JSON) and XML**

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z/VSE Statements of Direction

- **Security and Ease of Use:**

- **Basic Security Manager (BSM) enhancement**

- Basic Security Manager (BSM) to be enhanced with **new Interactive User Interface (IUI) dialogs to manage batch resources in DTSECTAB**, allowing administration for online and batch resource from IUI

- **Tapeless initial installation using a SCSI installation disk**

- Enhance the existing ECKD tapeless initial installation, to support SCSI installation disks as well

- **For more deeper information on z/VSE features (current and future) attend:**

- 25th Oct. 11:15 am - IS01 – z/VSE latest News , Ingolf Salm, IBM R & D
 - 25th Oct. 2:00 pm - IS03 – z/VSE Network Appliance , Ingo Franzki, IBM R & D

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Need something else?

- You may submit requirements at conferences (GSE, zUniversity (Edge), VM Workshop, ...)
- **z/VSE** requirements via the Request for Enhancements (RFE) database:
 - <http://www.ibm.com/developerworks/rfe/>
 - Please select the following for z/VSE requirements:
 - Brand = Servers and System Software
 - Product family = zSeries Software
 - Product = z/VSE
 - Component = General, z/VSE, VSE/AF, VSE/VSAM, VSE/POWER, VSE Unique Code, ...
 - Operating system = IBM z/VSE
 - Source = Share, IBM user group, IBM Conference, ..., Other
- **CICS Transaction Server** requirements via the Request for Enhancement (RFE) database:
 - <http://www.ibm.com/developerworks/rfe/>
 - Please select the following for z/VSE-CICS requirements:
 - Brand = WebSphere
 - Product family = Transaction Processing
 - Product = CICS Transaction Server
 - Component = Runtime or Explorer
 - Operating system = IBM z/VSE



z/VSE in the internet

- z/VSE Homepage: www.ibm.com/vse
- **Updated** Redbook: Introduction to the New Mainframe: IBM z/VSE Basics
 - <http://www.redbooks.ibm.com/abstracts/sg247436.html?Open>
- **New** z/VSE Knowledge Center: http://www-01.ibm.com/support/knowledgecenter/SSB27H/zvse_welcome.html
- CICS TS for z/VSE Knowledge Center: http://www-01.ibm.com/support/knowledgecenter/SSB2JE_1.1.1/welcome.html
- z/VSE on Twitter: www.twitter.com/IBMzVSE
- Ingolf's z/VSE blog: www.ibm.com/developerworks/mydeveloperworks/blogs/vse/
 - Use „Tags“ to search for topics
- VSE-L discussion list: <https://groups.google.com/forum/?fromgroups#!forum/bit.listserv.vse-l>



Agenda

- z/VSE
- **z/VM**
- Linux on IBM z Systems
- KVM for IBM z Systems



z/VM Release Status Summary

z/VM Level	GA	End of Service	End of Marktg.	Minimum Processor Level	Maximum Processor Level	Security Level
6.4	4Q 2016			IBM System z196 & z114®		
6.3	7/2013	12/2017 ^[3]		IBM System z10®	-	EAL 4+ OSPP-LS
6.2	12/2011	07/2017 ^[4]	7/2013	IBM System z10®	z13 ^[2]	-
5.4	9/2008	12/2017 ^[1]	3/2012	IBM eServer zSeries 800& 900	zEC12	-

- [1] Announced August 2, 2016
- [2] Announced January 14, 2015
- [3] Announced February 3, 2015
- [4] Announced February 2, 2016

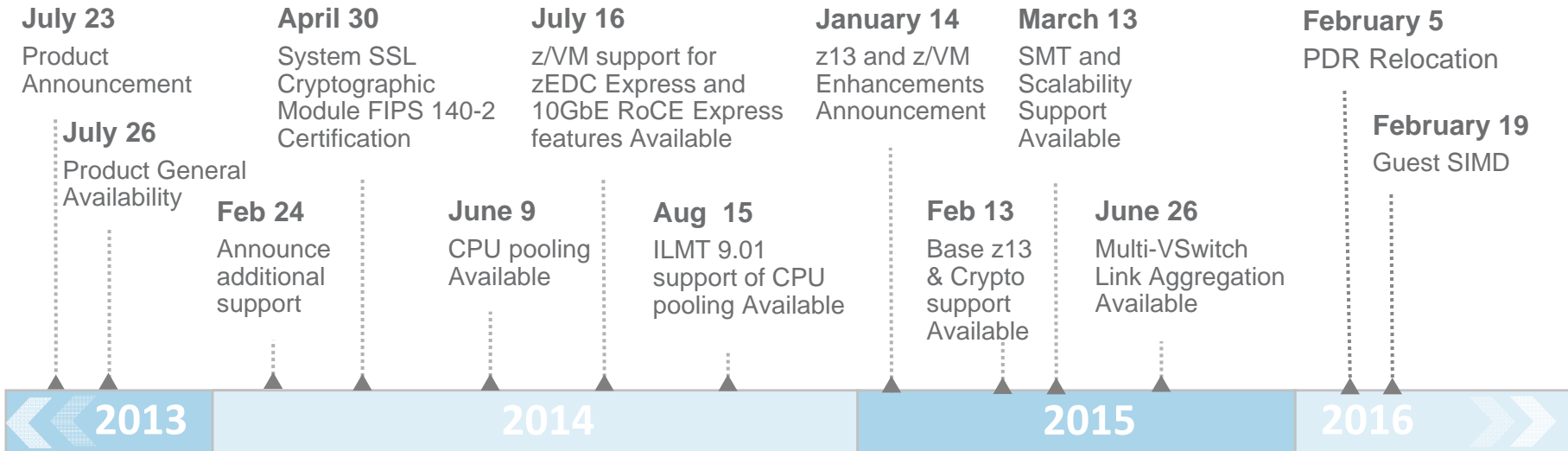
Marketed & Serviced

Serviced, but not Marketed

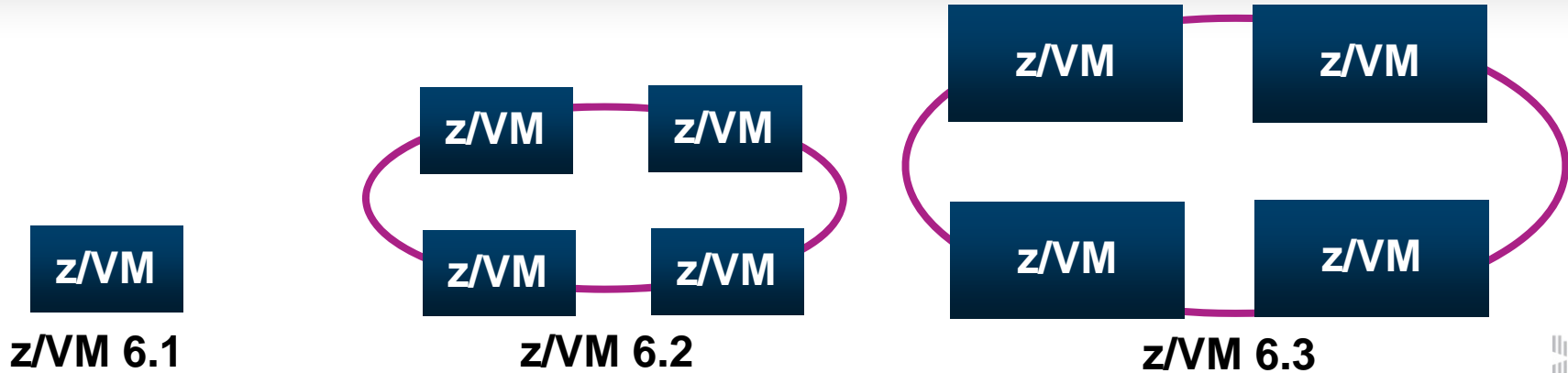
End of Service & Marketing



z/VM Version 6 Release 3



See <http://www.vm.ibm.com/zvm630/>



z/VM 6.3 Feb. 2016 Updates

- **Dynamically Migrate the SSI PDR Volume** – VM65712 PTF UM34736
 - Enhancement to be able to relocate the Single System Image (SSI) Persistent Data Record (PDR) volume **without a planned outage**
 - Avoid the need for a **cluster-wide** shutdown in order to move PDR volume to a new device or new storage server
 - Facilitates moving to a new storage server
 - Does not address unplanned outage of the PDR volume
 - New option on the CP SET SSI command
- **z13 - SIMD Guest Exploitation Support** – VM65733 PTF UM34752
 - Including support by Live Guest Relocation



z/VM 6.3 Feb. 2016 Updates – z13 GA2 / z13s

- **z/VM 6.3 GA2 APARs (February 2016):**

- VM65716: CP Support
- VM65698: Performance Toolkit support
- VM65729: VMHCD support
- VM64844: VMHCM support
- VM65704: EREP support
- VM65736: IOCP support
- HLASM does not require an APAR for support

- **Enhancements and Exploitation Support**

- Guest Exploitation Support for **GA2 Crypto Express5S** (6.2 and 6.3)
- **LPAR Group Absolute Capacity Capping** (mostly only 6.3)
- **Guest Exploitation of SMC-D; Virtual PCI Devices type ISM** (6.3)
- Enhanced Dynamic Memory Management (6.3)



z/VM 6.4 Preview Ann.

- Preview announcement 216-009, dated February 16, 2016
 - <http://www.vm.ibm.com/zvm640/index.html>
- Planned availability date **4Q 2016**
- A release born from customer feedback
- Key components:
 - Enhanced technology for **improved scaling** and **total cost of ownership**
 - Increased **system programmer and management capabilities**
- New Architecture Level Set (ALS) of **z196 and higher**
 - z Systems servers: z13, z13s, LinuxONE Emperor, LinuxONE Rockhopper, IBM zEnterprise EC12, IBM zEnterprise BC12, IBM zEnterprise 196, IBM zEnterprise 114
- **For more information on z/VM 6.4 attend:**
 - 24th Oct. 12:15 pm - GS03 – z/VM V6.4 News, Rob van der Heij, IBM



Agenda

- z/VSE
- z/VM
- **Linux on IBM z Systems**
- KVM for IBM z Systems



Linux on IBM z Systems Distributions (1/3)

- SUSE:

- **SUSE Linux Enterprise Server 10**

- GA 17.7.2006; Kernel 2.6.16; GCC 4.1.0
 - SLES 10 SP4: GA 12.4.2011; **EOS 31.7.2013; LTSS: 30.7.2016**

- **SUSE Linux Enterprise Server 11**

- GA 24.3.2009; Kernel 2.6.27 (SP4: 3.0); GCC 4.3.3 (SP4 4.3.4)
 - SLES 11 SP4: GA 15.7.2015; EOS 31.3.2019; LTSS: 31.3.2022

- **SUSE Linux Enterprise Server 12**

- GA 27.10.2014; Kernel 3.12; GCC 4.8
 - SLES 12 SP1: GA 15.12.2015;
 - Last SP: EOS 31.10.2024; LTSS: 31.10.2027

- <https://www.suse.com/support/policy.html>

- <https://www.suse.com/lifecycle/>



Linux on IBM z Systems Distributions (2/3)

- Red Hat:

- **Red Hat Enterprise Linux AS 4**

- GA 14.2.2005; Kernel 2.6.9; GCC 3.4
 - RHEL 4.9: GA 16.2.2011; **EOS 29.2.2012; ELS: 31.3.2017**

- **Red Hat Enterprise Linux AS 5**

- GA 15.3.2007; Kernel 2.6.18; GCC 4.1
 - RHEL 5.11: GA 16.9.2014; EOS 31.3.2017; ELS: 30.11.2020

- **Red Hat Enterprise Linux AS 6**

- GA 9.11.2010; Kernel 2.6.32; GCC 4.4
 - RHEL 6.8: GA 10.5.2016
 - Last Update: EOS 30.11.2020; ELS: tbd

- **Red Hat Enterprise Linux AS 7**

- GA 9.6.2014; Kernel 3.10; GCC 4.8
 - RHEL 7.2: GA 19.11.2015
 - Last Update: EOS 30.6.2024; ELS: tbd



Linux on IBM z Systems Distributions (3/3)

- Ubuntu:
 - Canonical and IBM announced on LinuxCon 2015 (17.8.2015) their plans to create an **Ubuntu** based distribution for **z Systems** and **LinuxONE**.
 - <http://www-03.ibm.com/press/us/en/pressrelease/47474.wss>
 - **Ubuntu Server 16.04**
 - GA 21.4.2016; EOS: 4.2021
 - Kernel 4.4; GCC 5.3
 - Ubuntu Lifecycle:
 - Normal releases every 6 months and supported for 9 months
 - LTS releases every 2 years and supported for 5 years
 - LTS enablement stack will provide newer kernels within LTS releases
 - <http://www.ubuntu.com/info/release-end-of-life>
 - https://wiki.ubuntu.com/Kernel/LTSEnablementStack?_ga=1.219828057.1549132454.1460845469
- Others:
 - Debian, Slackware
 - Support may be available by some third party



IBM tested and supported Linux distributions

Distribution	LinuxONE Emperor	LinuxONE Rockhopper			
	z13	z13s	zEnterprise - zBC12 and zEC12	zEnterprise - z114 and z196	System z10 and System z9
RHEL 7	✓ (1)	✓ (1)	✓ (3)	✓ (3)	✗
RHEL 6	✓ (1)	✓ (1)	✓ (4)	✓	✓
RHEL 5	✓ (1)	✗ (10)	✓ (5)	✓	✓
RHEL 4 (*)	✗	✗	✗	✓ (8)	✓
SLES 12	✓ (2)	✓ (2)	✓	✓	✗
SLES 11	✓ (2)	✓ (2)	✓ (6)	✓	✓
SLES 10 (*)	✗	✗	✓ (7)	✓	✓
SLES 9 (*)	✗	✗	✗	✓ (9)	✓
Ubuntu 16.04	✓	✓	✓	✗	✗



Indicates that the distribution (version) has been tested by IBM on the hardware platform, will run on the system, and is an IBM supported environment. Updates or service packs applied to the distribution are also supported. Please check with your service provider which kernel-levels are currently in support.

See www.ibm.com/systems/z/os/linux/resources/testedplatforms.html for latest updates and details.



Docker for Linux on IBM z Systems



- Container Support for Docker
 - **Docker provides lightweight containers**
 - Self contained set of files to package an application with all of its dependencies
 - **Applications in containers share the OS kernel**
 - No virtualization – no virtualization overhead
 - **“Build, Ship, and Run Any App, Anywhere”**
 - One implementation of a container solution
 - Maintained by Docker, Inc.
 - Docker Hub cloud-based registry service, see <https://hub.docker.com>
 - **Power tool to build, modify, deploy, run, manage containers**
 - E.g. “docker run hello-world”
- **For more deeper information on Docker for Linux on IBM z Systems attend:**
 - 25th Oct. 12:15pm - VM02 – Docker Container in Linux on IBM z Systems - Neuigkeiten mit Demo, Utz Bacher, IBM R & D



IBM DB2 with BLU acceleration

- **IBM DB2 Advanced Enterprise Server Edition 11.1 provides a comprehensive database solution for the enterprise**
- Incorporates **in-memory columnar technology** as well as **parallel vector processing**, **data compression** and **data skipping** for faster insight without the limitations of in-memory-only systems
- **Supported distributions:**
 - Red Hat Enterprise Linux 7.1 or newer
 - SUSE Linux Enterprise Server 12 or newer
 - Ubuntu 16.04 LTS Server



IBM Spectrum Scale 4.2.1

- **IBM Spectrum Scale is software-defined storage built on IBM General Parallel Filesystem (GPFS) for high performance, large scale workloads on-premises or in the cloud.**
- **Features of Advance Edition:**
 - Asynchronous multisite disaster recovery (DR), enabling active/passive configuration at the fileset level
 - Information lifecycle management (ILM)
 - Support of the IBM Spectrum Protect™ v7.1.4 backup- archive and Space Management client
 - Support for ECKD DASD and FCP attached SCSI disks
 - Heterogeneous clusters with client nodes without local storage access running Linux distributions from Red Hat and SUSE on x86 and Power®, and AIX® on Power
 - Support of the storage systems: IBM System Storage® DS8000® series, IBM Storwize® V7000 Disk Systems, IBM XIV® Storage Systems, IBM FlashSystem™ systems, IBM System Storage SAN Volume Controller (SVC), all other storage hardware using ECKD, and any storage system connected via SVC
- **Supported distributions:**
 - Red Hat Enterprise Linux 6.5 or newer
 - SUSE Linux Enterprise Server 11 SP3 or newer
 - Ubuntu 16.04 LTS Server



Linux on IBM z Systems resources

- Official IBM website: <http://www-03.ibm.com/systems/z/os/linux/index.html>
- Technical references: <http://www.ibm.com/developerworks/linux/linux390/>
- Linux on IBM z Systems **Knowledge Center**:
 - **The central location for finding and organizing information about IBM products**
 - **How to get there:**
 - Search for “IBM Knowledge Center”
 - or go directly to <https://www.ibm.com/support/knowledgecenter/>
 - **How to get to Linux on IBM z Systems stuff:**
 - Search for “Linux z” within IBM Knowledge Center
 - or go directly to https://www.ibm.com/support/knowledgecenter/linuxonibm/liaaf/lnz_r_main.html
 - **Highlights:**
 - Mobile enabled
 - Not only pdf, but also full text view and search
 - Classified by topics
 - Direct links to related information like Redbooks, Whitepapers,...
- **For more deeper information on Linux on IBM z Systems attend:**
 - 24th Oct. 10am - GS11 – Linux on IBM z Systems News, Dr. Manfred Gnirss, IBM R & D



Agenda

- z/VSE
- z/VM
- Linux on IBM z Systems
- **KVM for IBM z Systems**



KVM for IBM z Systems vs. z/VM positioning

- **KVM** for IBM z Systems

- For a **new Linux client** that ... is Open Source oriented; **not z/VM knowledgeable; already uses KVM; has x86 Linux centric admins**, does not need to run Oracle, wants to implement cloud
- For **existing IBM z Systems customers** who ... do **not** have **z/VM**, **but** have **KVM skills** and large x86 environments, does not need to run Oracle, implementing cloud

- **z/VM**

- For a **new client** that needs a **highly secure and scalable** cloud infrastructure; needs to improve productivity by **hosting** non-Linux workloads such as **z/OS, z/VSE, and z/TPF on IBM z Systems**; needs to run Oracle
- For **existing IBM z customers** who have invested in an **existing z/VM** environment; have **z/VM skills** or want to consolidate and **use IBM Wave to manage LinuxONE or z Systems** in order to streamline system administration and management; needs to run Oracle



KVM for IBM z Systems Roadmap (1/2)

- **KVM for IBM z Systems v1.1.0**

- GA 9.2015
- **Industry standard KVM hypervisor** enables single cross-platform virtualization to help simplify systems management
- **Optimized for z Systems** and **LinuxONE** architecture
- **Coexists** with z/VM virtualization environments, Linux on IBM z, z/OS, z/VSE, z/TPF
- **Enable better utilization by sharing physical I/O** resources among virtual servers to reduce cost
- **Eliminate downtime by dynamically modifying I/O** device configuration for virtual servers so business applications remain active
- **Live virtual server workload migration** for minimal impact to your business while workloads are relocated
- **Save on storage cost** with copy-on-write virtual disks by not needing full disks until used
- **Policy-based goal-oriented monitoring and management** of virtual server CPU resources so critical workloads receive priority
- **Memory and CPU overcommit** to achieve higher VM density per virtual host, increasing consolidation ratios and providing a more efficient scale up – scale out model for savings and a lower cost per application versus alternative solutions



KVM for IBM z Systems Roadmap (2/2)

- **KVM for IBM z Systems v1.1.1**
 - GA 18.3.2016
 - New features:
 - z13/z13s **SIMD** and **SMT** support
 - Secure and protect business data with Crypto exploitation that leverages **hardware acceleration for cryptographic functions** and increased randomness



KVM for IBM z 1.1.1 Systems support

Servers	<p>IBM z13™ IBM z13s™ IBM LinuxONE Rockhopper™ IBM LinuxONE Emperor™ IBM zEnterprise® zEC12 IBM zEnterprise® zBC12</p>
Guest Operating Systems supported	<p>SUSE Linux Enterprise Server (SLES 12 SP1) Ubuntu 16.04 for z Systems</p>
Networking features supported	<p>IBM OSA-Express5S IBM OSA-Express4S IBM OSA-Express3 (zEC12 and zBC12 only)</p>
Crypto Coprocessor supported	<p>Crypto Express4S Crypto Express5S</p>
Storage devices are supported	<p>ECKD™ DASD DS8000® (FICON®-attached) FCP SCSI disks: XIV® Storwize® V7000, V5000, V3700, V3500 FlashSystems™ SAN Volume Controller DS8000 (FCP-attached) DS8880 (FCP-attached)</p>

Note: Refer to the KVM for IBM z Systems: Planning and Installation Guide (SC27-8236) for the most current information



KVM for IBM z Systems resources

- Portal <http://www.ibm.com/systems/z/solutions/virtualization/kvm/>
- Product Documentation at http://www-01.ibm.com/support/knowledgecenter/linuxonibm/liaaf/lnz_r_kvm.html
 - KVM for IBM z Systems: Planning and Installation Guide SC27-8236-00
 - KVM for IBM z Systems: Administration Guide SC27-8237-00
 - Linux on z Systems: Virtual Server Management SC34-2752
 - Linux on z Systems: Virtual Server Quick Start SC34-2753
 - Linux on z Systems: Device Drivers, Features, and Commands for Linux as a KVM Guest SC34-2754
 - Linux on z Systems: Installing SUSE Linux Enterprise Server 12 as a KVM Guest SC34-2755
- Redbook: Getting Started with KVM for IBM z Systems
<http://www.redbooks.ibm.com/redpieces/abstracts/sg248332.html?Open>
- Performance Data / Planning Tools
 - Limits: <http://www.ibm.com/support/techdocs/atmastr.nsf/WebIndex/PRS5331>
 - Large Systems Performance Reference (LSPR):
 - <https://www-304.ibm.com/servers/resourceLink/lib03060.nsf/pages/lSprITRKVMonZv110?OpenDocument>
 - zPCR
 - <http://www-03.ibm.com/support/techdocs/atmastr.nsf/WebIndex/PRS1381>
- List of supported IBM SW: <http://www.ibm.com/software/reports/compatibility/clarity/productsOnVe.html>
- **For more deeper information on KVM for IBM z Systems attend:**
 - 25th Oct. 9 am - GS10 – KVM on IBM z Systems News, Tony Gargya, IBM R & D



Questions

THANK YOU!



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