G03 – Aktuelles aus z/VSE, z/VM, KVM und Linux on z Systems

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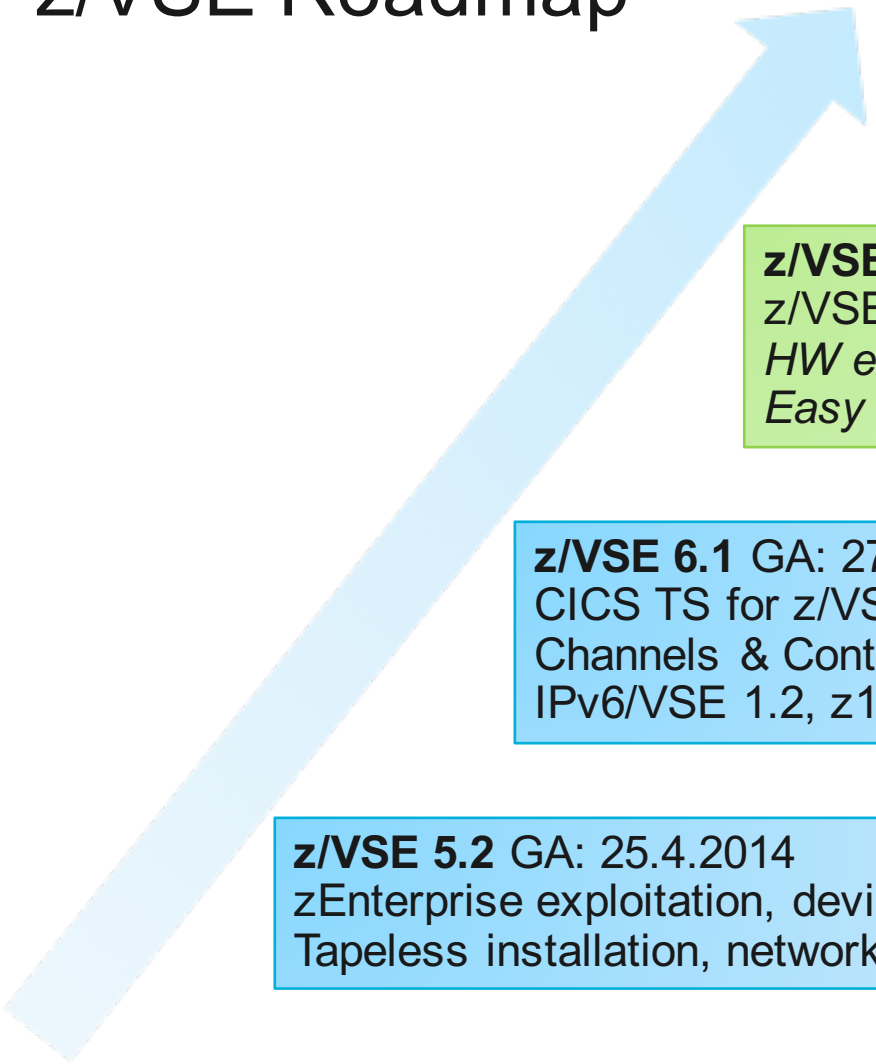
Agenda

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

z/VSE “facelift”

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
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/VSE 6.1 (1/3)

- GA since 27.11.2016
- Hardware support:
  - Architectural Level Set to IBM System z10 (**runs on z10 or newer**)
  - IBM **z13 / z13s** support
    - Crypto Express5S (including more than 16 crypto domains)
    - FICON Express16S for ECKD, channel to channel or FCP-attached SCSI
    - z/VSE Network Appliance (plan GA 30.6.2016)
  - IBM System Storage options
    - IBM System Storage **TS7700** Virtualization Engine **Release 3.3**
    - IBM System Storage **DS8870 Release 7.5**, **DS8880** (DS8884, DS8886)
    - IBM FlashSystem **V9000** with FCP-attached **SCSI** disks

z/VSE 6.1 (2/3)

- New CICS version: **CICS TS for z/VSE 2.1** – First major CICS TS update since 1999
  - Based and **compatible** with CICS TS for VSE/ESA 1.1.1
  - New APIs described in CICS Enhancement Guide
  - Migrations considerations described in migration white paper available at z/VSE website
  - Only available with z/VSE 6.1, replacing CICS TS for VSE/ESA 1.1.1
    - CICS TS for VSE/ESA 1.1.1 still delivered with z/VSE Version 5
  - Features:
    - **CICS Explorer update** capability
    - **Channel & Container** support – Lifts the 32K Commarea limitation
    - Various customer requirements
    - CICS Distributed Data Management (DDM) not supported

z/VSE 6.1 (3/3)

- Networking enhancements
  - **IPv6/VSE 1.2** – new release
    - **Firewall**, OSA Express **failover**, **SSL & TLS1.2**, **virt. IP** address support, **CPU opt**.
  - **TCP/IP for z/VSE 2.1** – new version
    - **Firewall**, **TN3270** service **improved**, **TLS/SSL** enhancements
  - **Configurable QDIO buffers** for HiperSockets and OSA Express devices
- Connectors
  - **MQ Client Trigger Monitor**
- z/VSE 6.1 requires an initial installation
  - Fast Service Upgrade (FSU) from z/VSE V5 not supported
  - **Migration Pricing Option** (MPO) max. **18 months**

z/VSE *Future* (1/2)

- Announcement including *Statements of Direction* since 12.4.2016
- z/VSE Network Appliance (plan GA 30.6.2016)
- Migration Pricing Option (MPO) max. 18 months
  - z/VSE 6.1, CICS TS for z/VSE 2.1 and TCP/IP for z/VSE 2.1
- Statements of direction
  - **HW exploitation**
    - High Performance FICON (**zHPF**) support
    - Elliptic Curve Cryptography (**ECC**) support
  - Future release of **CICS TS for z/VSE**
    - **CICS Explorer** enhancements (including **create & delete**)
    - **Channel and container** enhancements (including **UTF-8 & UTF-16 conversion**)

z/VSE *Future* (2/2)

- Statements of direction (cont.)
  - Support for initial installation using a **SCSI installation disk**
  - Connectors enhancements
    - z/VSE **SOAP** engine to exploit **channels and containers**
    - New z/VSE **REST engine with JSON support**
  - Security enhancements
    - 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**.
  - Product **delivery** of z/VSE on **DVD and electronically** for future upgrades.

z/VSE Requirements

- 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 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	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 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
- **Linux on z Systems**
- z/VM
- 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: 30.7.2016
  - **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 6.7: GA 22.7.2015
    - 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
  - https://access.redhat.com/support/policy/updates/errata/

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 (based on Canonical plans): 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			
	z13s and z13	**zEnterprise - zBC12 and zEC12**	**zEnterprise - z114 and z196**	**System z10 and System z9**
RHEL 7	✔ (1)	✔ (3)	✔ (3)	✘
RHEL 6	✔ (1)	✔ (4)	✔	✔
RHEL 5	✔ (1)	✔ (5)	✔	✔
RHEL 4 (*)	✘	✘	✔ (8)	✔
SLES 12	✔ (2)	✔	✔	✘
SLES 11	✔ (2)	✔ (6)	✔	✔
SLES 10 (*)	✘	✔ (7)	✔	✔
SLES 9 (*)	✘	✘	✔ (9)	✔

✔	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. Please check the IBM exception letter for important information regarding your server. 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.

Current Linux on IBM z Systems Technology (1/6)

- IBM z13 / z13s support
  - **Vector extension facility** (kernel 3.18)
    - Also known as single-instruction, multiple data (**SIMD**)
    - 32 128-bit vector registers are added to the CPU
    - 139 new instructions to operate on the vector registers
    - User space programs can use vectors to speed up allkinds of functions, e.g. string functions, crc checksums, …
  - **CPU multi threading support** (> kernel 3.19)
    - Also known as simultaneous multi-threading (**SMT**)
    - Once enabled the multi threading facility provides multipleCPUs for a single core.
    - The CPUs of a core share certain hardware resource suchas execution units or caches
    - Avoid idle hardware resources, e.g. while waiting for memory

Current Linux on IBM z Systems Technology (2/6)

- IBM z13 / z13s support (cont.)
  - **Extended number of AP domains** (kernel 3.18)
    - AP crypto domains in the range 0-255 will be detected
  - **Crypto Express 5S cards** (kernel 4.0)
    - New generation of crypto adapters with improved performance
  - **z13 cache aliasing** (kernel 4.0)
    - Shared objects mapped to user space need to be aligned to 512KB for optimum performance on z13

Current Linux on IBM z Systems Technology (3/6)

- Compiler Toolchain
  - **zEnterprise 196/114 exploitation** (gcc 4.6)

    - Use option -march=z196 to utilize the new instructions added
    - Use -mtune=z196 to schedule instructions appropriate for the new out-of-order pipeline
    - Re-compiled code/apps get further performance gains through 110+ new instructions
  - **zEC12/zBC12 exploitation CPU** (gcc 4.8)

    - Use option -march=zEC12 to utilize the instructions added
    - Use option -mtune=zEC12 to schedule the instructions appropriate for the pipeline
    - Transactional memory support, improved branch instructions
  - **z13/z13s exploitation CPU** (gcc 5.2)
    - Use option -march=z13 to utilize the instructions added
    - Use option -mtune=z13 to schedule the instructions appropriate for the pipeline

Current Linux on IBM z Systems Technology (4/6)

- PCI Support
  - **Native PCIe feature cards introduced on zEC12 and zBC12**
    - Plugged into an PCIe I/O drawer
    - Managed by an internal firmware processor (IFP)
    - Device driver for PCIe function is located in the operating system
  - **10 GbE RoCE Express, networking card**
    - Uses Infiniband RDMA over Converged Ethernet (RoCE) specification
  - **zEDC Express, data compression / decompression**
    - Implements compression as defined by RFC 1951 (DEFLATE)
    - Comparable to “gzip -1”

Current Linux on IBM z Systems Technology (5/6)

- 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"
  - More details: **attend 19.4.2016 12:15 VM02 – Benutzung von Docker auf z Systems**

Current Linux on IBM z Systems Technology (6/6)

- Miscellaneous features
  - **SE/HMC filesystem** (kernel 3.18)

    - Mount the HMC media drive as a read-only Linux file system
    - Main use case is the installation of a distribution from the HMC DCD driver
  - **Auto port scan resiliency for zfcp** (kernel 3.19)

    - Improves the Fibre Channel port scan behavior
  - **In-kernel crypto: DRBG support** (kernel 4.1)

    - Deterministic random bit generator alias RNG, PRNG
  - **Hot-patch support for function tracing** (kernel 4.0)

    - Use gcc's hotpatch support to generate better code for ftrace function tracing
    - Each function starts with a six byte nop instruction which will be patched at run-time
  - More details: **attend 19.4.2016 11:15 VM01 – Neues zu Linux auf z Systems**

Linux on z Systems in the internet

- 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 z Systems Knowledge Center: http://www.ibm.com/support/knowledgecenter/#!/linuxonibm/liaaf/lnz_r_main.html

Agenda

- z/VSE
- Linux on z Systems
- **z/VM**
- 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
6.3	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	12/2016[1]	3/2012	IBM eServer zSeries 800& 900	zEC12	-

[1] Or later (Announced August 6, 2014)
[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

July 23
Product Announcement

July 26
Product General Availability

April 30
System SSL Cryptographic Module FIPS 140-2 Certification

Feb 24
Announce additional support

July 16
z/VM support for zEDC Express and 10GbE RoCE Express features Available

June 9
CPU pooling Available

Aug 15
ILMT 9.01 support of CPU pooling Available

January 14
z13 and z/VM Enhancements Announcement

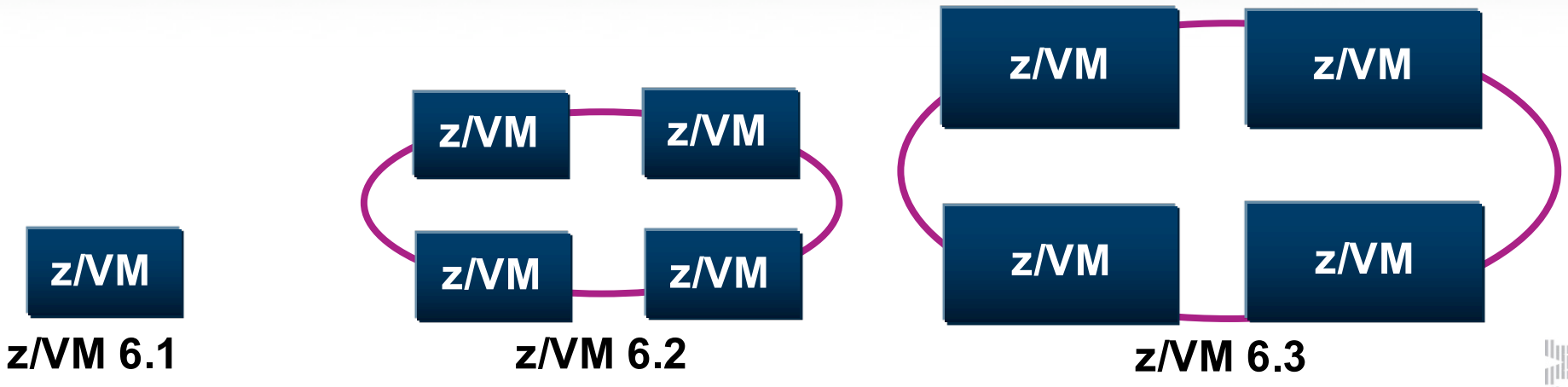
Feb 13
Base z13 & Crypto support Available

March 13
SMT and Scalability Support Available

June 26
Multi-VSwitch Link Aggregation Available

2013 | 2014 | 2015

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



z/VM 6.3 Sep. 2015 Updates

- **Security**:
  - Updates to **RACF** for z/VM V6.3 – APAR VM65719
    - Including Password Encryption upgrade
  - Updates to the **z/VM TLS/SSL Server** – APARs PI40702, VM65717, VM65718
    - Changing default cipher suites and protocols (all releases)
  - More information at http://www.vm.ibm.com/security/
- **SMT Prorated Core Time Support** – APAR VM65680
  - This support enforces capacity limits **using core time rather than thread time** so that a **CPU Pool will not be limited prematurely**.
  - CPU Pooling and ILMT can now be used **without** the need to potentially **adjust the pool values** to be equivalent to non-SMT environment.

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 addressed unplanned outage of the PDR volume
  - New option on the CP SET SSI command
- **SIMD Guest Exploitation Support** – VM65733 PTF UM34752
  - Including support by Live Guest Relocation

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**
- **Electronic and DVD install** (tapeless)
- More details: **attend 19.4.2016 10:00 G09 – Aktuelles zu z/VM**

Agenda

- z/VSE
- Linux on z Systems
- z/VM
- **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
    - And more: **attend 19.4.2016 9:00 G08 – Neues zu KVM for z Systems**

KVM for IBM z 1.1.1 Systems support

Servers	IBM z13™ IBM z13s™ IBM LinuxONE Rockhopper™ IBM LinuxONE Emperor™ IBM zEnterprise® zEC12 IBM zEnterprise® zBC12
Guest Operatingsystems supported	SUSE Linux Enterprise Server (SLES 12 SP1) Ubuntu 16.04 for z Systems – Date TBD
Networking features supported	IBM OSA-Express5S IBM OSA-Express4S IBM OSA-Express3 (zEC12 and zBC12 only)
Crypto Coprocessor supported	Crypto Express4S Crypto Espress5S
Storage devices are supported	ECKD™ DASD DS8000® (FICON®-attached) FCP SCSI disks: XIV® Storwize® V7000, V5000, V3700, V3500 FlashSystems™ SAN Volume Controller DS8000 (FCP-attached) DS8880 (FCP-attached)

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 in the internet

- 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/atsmastr.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/atsmastr.nsf/WebIndex/PRS1381
- List of supported IBM SW: http://www.ibm.com/software/reports/compatibility/clarity/productsOnVe.html

Questions

THANK YOU!

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Backup

CICS TS for z/VSE 2.1 - Enhancements

- CICS Explorer update capability
- Channel & Container support - Lifts the 32K Commarea limitation
- CICS requirements
  - More current cypher suites (AES128/256) to CICS Web Support
  - Support for EXEC CICS INQUIRE SYSTEM OSLEVEL
  - Millisecond support in EXEC CICS ASKTIME
  - Millisecond option to EXEC CICS FORMATTIME
- CICS DDM (CICS Distributed Data Management) not supported

CICS Explorer

- Announced 04/03/2012, GA 06/15/2012, new enhancements in CICS TS for z/VSE 2.1
- CICS Explorer monitoring in z/VSE Version 5
  - System management framework for CICS TS
  - Consists of CICS Explorer client and a CICS TS server extension
  - CICS Explorer client
    - Read-only capabilities; Eclipse-based user interface on workstation
    - Connects to CICS TS via TCP/IP - Communication via HTTP requests
    - One CICS Explorer client for z/VSE and z/OS
  - CICS Explorer server extension
    - Delivered as PTF for CICS TS for VSE/ESA 1.1.1
- Integrated into CICS TS for z/VSE 2.1 (z/VSE 6.1)
  - CICS Explorer server extension integrated into CICS TS for z/VSE 2.1
  - Provides updates to CICS resources
    - Update and control CICS resources as you would do with transactions on your CICS terminal
    - Enable / disable CICS resources, change selected CICS definitions, …

Channels and Containers

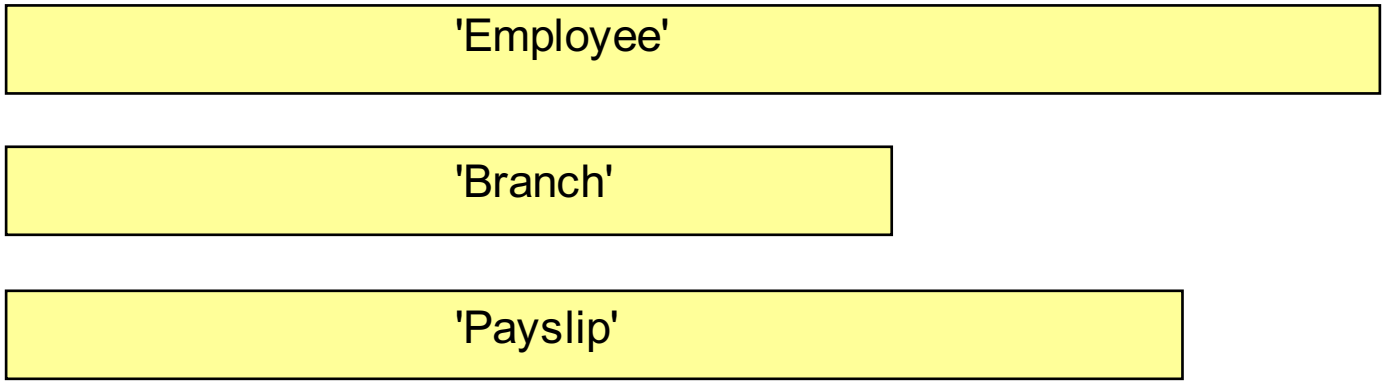
- z/VSE ported channel and container APIs from CICS TS for z/OS 3.1

- Channels and containers lift the 32K Commarea limitation
  - Applicable for both LINK and XCTL, Distributed Program Link (DPL)
  - Affects the exchange of data between CICS tasks
  - Local and transcation routing
  - START with data

- Language support is provided for C, COBOL, HLASM, and PL/I.

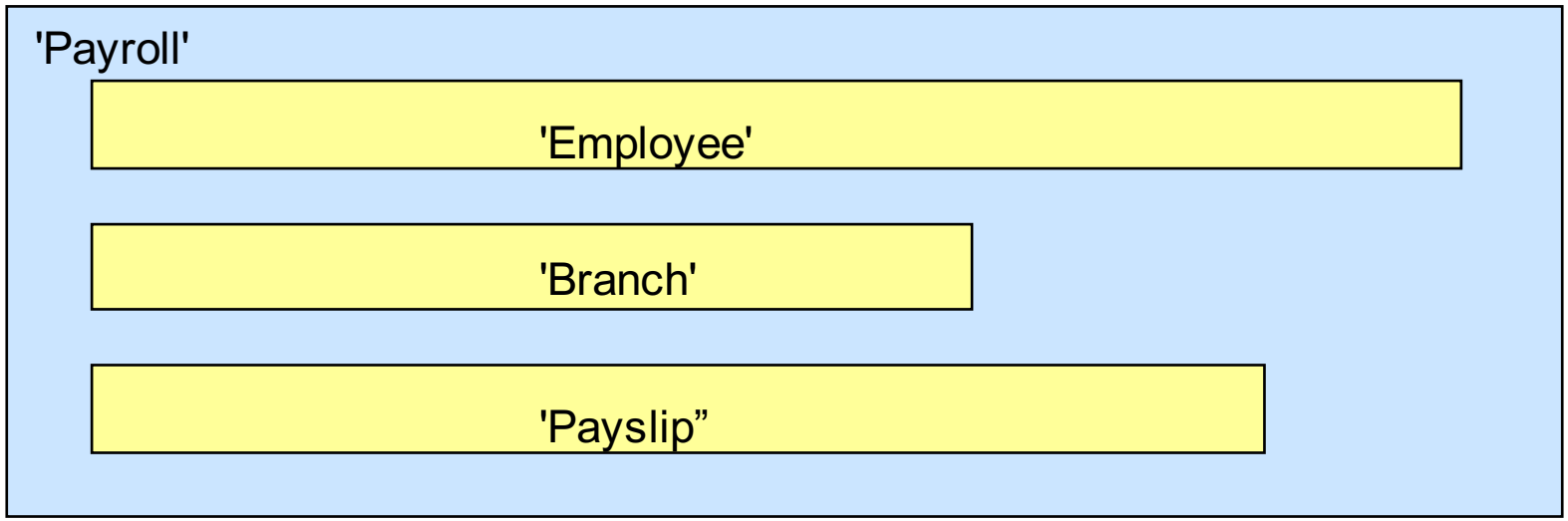
- Channels and Containers limitations
  - In 31 bit virtual storage only
  - No support for
    - External CICS Interface (EXCI), External Call Interface (ECI), CICS Web Support (CWS)
    - Business Transaction Services (BTS)

Containers



- To solve the 32K Commarea problem a new construct will be provided
- Named block of data designed for passing information between programs
  - Like named COMMAREAs
- CONTAINER API
  - Created using (EXEC CICS) PUT CONTAINER, defines the size of the container
  - Read using (EXEC CICS) GET CONTAINER
  - Delete using (EXEC CICS) DELETE CONTAINER, to free storage, if no longer required
- No CICS enforced size limitation
  - Containers are stored within the CICS EDSA (31 bit partition virtual storage)

Channels



- A group of Containers
  - No limit on the number of Containers in a Channel
- A Channel is a sort of program interface
  - Passed on LINK, XCTL, pseudoconversational RETURN, and START commands
- Non-persistent
  - Non-recoverable resource similar to commareas

CICS TS for z/VSE 2.1 - Interface Changes

- Global User Exits (GLUEs)
  - Can create and pass channels and containers to programs they call
- Task Related User Exits (TRUEs)
  - Can create and pass channels and containers to programs they call
- User Replaceable Modules (URM)
  - Can create and pass channels and containers to programs they call
  - URMs may not access contents of application channels
- Monitoring
  - New monitoring group DFHCHNL
  - Changed monitoring group DFHPROG
  - Changed monitoring group DFHTASK
- Statistics
  - New fields in ISC/IRC system entry
  - New fields in Connections and Modenames

z/VSE 6.1 – IBM TCP/IP for z/VSE 2.1

- A new version of CSI's TCP/IP stack – only supported on z/VSE 6.1
  - Levelset based on TCP/IP for VSE 1.5F / 1.5G
  - Replaces IBM TCP/IP for VSE/ESA 1.5F on z/VSE 6.1

- New white-list firewall
  - Access denied unless
    an IP address is specifically allowed to communicate with the VSE system.
  - Firewall shield loaded during TCP/IP startup (in fail or warn mode - for logging only)
    - Configuration phase contains a list of IP addresses
      - Firewall configuration phase can be reloaded
      - To each IP address range you may specify VSE ports (TCP or UDP)
        and if ICMP (Ping) is allowed
      - Example:
        FIREWALL ALLOW,IPV4BEG=039.101.062.131,IPV4END=039.101.062.131,
        TCPPORTS=PORTGRPA,UDPPORTS=NONE,ICMP=YES
  - FIREWALL commands for administration
    - ON, OFF, LOAD PHASE=<phase name>
    - WARN, FAIL, DEBUGON | DEBUGOFF, MSGON | MSGOFF, REPORT

z/VSE 6.1 – IBM TCP/IP for z/VSE 2.1 …

- Cross memory services for external partition socket requests
  - Socket requests allocated in partition GETVIS instead of system GETVIS
  - TCP/IP partition uses cross memory services (XPCC) to process socket request
  - New program ($BSOCKET) loaded into partition to process external socket request

- New utilities for automation and TN3270 services
  - TN3270 improved recovery
  - External TN3270 server, outside the TCP/IP partition (SERV3270 utility)
  - Multiple TN3270 servers can run at the same time

- Enhanced TLS/SSL cryptography
  - RSA-SHA256 signatures supported
  - RFC5746 implemented to allow usage of TLS extensions to prevent the handshake renegotiation security exposure

- Internal processing improvements

z/VSE 6.1 – IBM IPv6/VSE 1.2

- A new release of BSI's TCP/IP stack – IBM IPv6/VSE 1.2 only supported on z/VSE 6.1

- New (basic) firewall
  - Examines IPv4 packets and IPv6 Ethernet frames
  - Enabled by default
  - VSE Librarian member contains the firewall rules table
    - To disable the firewall, just delete / rename the VSE Librarian member
  - Source IP address, packet protocol, TCP or UDP port, ICMP can be accepted / denied
    - Example: IN IP ALLOW IP 192.168.1.0 255.255.255.0
  - If a packet is denied, it is dropped. A message will be written to SYSLST
  - Default firewall rules allow all packets to be processed by the stack
  - Only Inbound (IN) rules are processed
  - Firewall commands via MSG <syslog id>
    - MSG <syslog id>,D=FIREWALL,RELOAD
    - MSG <syslog id>,D=FIREWALL,LIST
    - MSG <syslog id>,D=FIREWALL,LOGLEVEL n (0=no logging, 4=message to SYSLST)

z/VSE 6.1 – IPv6/VSE 1.2 …

- Automated OSA Express failover using hot swap devices for high availability
  - Automatically recover from OSA Express device failures by using a backup device

- Improved SSL support including TLS 1.2
  and Diffie Hellman (DH) / Elyptic Curve Cryptography (ECC) sockets
  - Update to the latest openSSL implementation
  - Support to establish up to 16 SSL sockets concurrently,
    can improve performance for applications that establish multiple connections
    to z/VSE including TN3270(E), CICS, and web services applications

- Virtual IP address support using virtual network devices
  - Multiple IP addresses can be defined for a single network interface
  - Virtual network interfaces share a single OSA Express device

- Improved stack CPU optimization

z/VSE 6.1 – Network enhancements – configurable QDIO buffers

- Configurable output buffers for HiperSockets and OSA Express devices
  - Up to 64 QDIO (Queued Direct I/O) output buffers

- Configurable intput buffers for HiperSockets and OSA Express devices (since z/VSE 5.1)
  - Up to 64 QDIO input buffers

- To be configured in configuration file (IJBOCONF.PHASE)
  - Requires PFIXed partition 31 bit GETVIS space
    - The limit for PFIX storage has to be defined with the JCL SETPFIX command
- For OSA-Express (CHPID OSD, OSX), HiperSockets (CHPID IQD)

- May improve TCP/IP performance, if z/VSE sends faster than OSA card can transfer

z/VSE Network Appliance (VNA)

- New with z13 GA2 / z13s, available June 30, 2016
- VNA acts as a router for z/VSE
- TCP/IP application uses Linux Fast Path (LFP)
  and connects through HiperSockets to VNA
- Based on z Appliance Container Infrastructure (zACI)
  delivered with z13s and z13 GA2
- z/VSE is first exploiter of zACI

- No Linux license,
  No TCP/IP stack required on z/VSE,
  No z/VM required to connect to the netwo

- Supported on z/VSE 6.1, 5.2 and 5.1