Agenda

Virtualization @SUSE

Enhancements in XEN/KVM

Virtualization with VMware

Virtualization with Microsoft

What do we test and how
Virtualization @SUSE
SUSE virtualization ecosystem

- Containers
- SUSE CaaS Platform
- High Availability
- Cloud Application Platform
- SUSE Live Patching
- SUSE OpenStack Cloud
- Build Service
- SUSE Enterprise Storage
- SUSE Linux Enterprise Server
- SUSE Manager
SUSE virtualization pillars

Perfect guest
Containers
Host platform
Quality
Documentation
Virtualization host

Full Support for leading open source hypervisors KVM and Xen.

Strong partner support: Intel, AMD, HPE, IBM, Lenovo, Dell, Microsoft, ...
Perfect guest strategy, operating system tuned to run great as a guest on all major hypervisors and clouds (public/private/hybrid)
Containers

OS-level or application virtualization with Linux Containers (LXC) and container engine. Support for Windows Subsystem for Linux (WSL).

![Container logos]
Xen, KVM, ..., VMware, Citrix, Hyper-V
Virtualization, containers (docker)
Virtualization vs. containers

**It’s not either-or!** VMs will stay and so will containers (while some will move)
- Each has its pros + cons
- Customers need guidance (documentation!)

Mixture of: VMs, containers, OSes, apps, orchestration, management, ...
→ “hyperconverged infrastructure”

Various convergence projects: libvirt-lxc, hyper, Kata containers, runv, vIC, ...
→ Both ways!

Unikernels?
WSL?
Documentation
Quality
SUSE virtualization ecosystem
Enhancements in Virtualization stack
SLES 12 SP4 / SLES 15 Virtualization Core

SLES 12 SP4 is an update / SLE15 new family

• Continued support for both Xen and KVM hypervisors
  – The hypervisor layer is still important!
  – Cloud (and all) workloads should “just work”
• Hardware enablement
• New features
• Bug fixes
SLES 15 GA

• TP
  – virtio-gpu
  – Support for AMD Secure Encrypted Virtualization
• Xen: QEMU Guest Agent Is Now Supported on Xen
• Guestfs tools
  – virt-bootstrap: Creating libvirt LXC root file systems
  – Virt-builder-repository (create/update virt-builder repo)
  – Virt-customize set machine-id
  – Various fix (virt-sysrep, virt-resize gpt, etc…)
  – V2v: Vmware: VMX, snapshot; encrypted guest, etc…
• JeOS supported on VT host (including Third party)
XEN: SLES 12 SP4 / SLES 15

Xen 4.10.x

• Highlights include:
  – PVHv2 DomU
    • Light HVM guest
    • PV drivers for I/O and native interfaces
    • Relies on HV extensions (no more PV kernel call or PV MMU)
    • Smaller TCB (Trusted Computing Base) and attack surface
  – L2 CAT for Intel CPUs
    • L2 Cache Allocation Technology
  – AMD: SEV
  – Credit 2 scheduler improvements (soft-affinity)
  – Null scheduler improvements (no overhead)
  – TP: dm_restrict
  – PV calls drivers in Linux
  – VMI improvements
XEN: SLES 15 SP1

Xen 4.11.x / 4.12.x

• Highlights include:
  – Increase security
    • XPTI: PV guests
      • Branch Predictor Hardening: appropriate mitigation used
  – PVH: combine PV and HVM
  – TP: PVH dom0 (dom0=pvh) → increase security
  – PCI config space emulation in XEN
  – Scheduler optimizations
  – More CPU instructions support
KVM
Qemu >= 2.10 (SLE12SP4 / SLE15)

Qemu 2.10 / 2.11
• TLB Purge Enhancements are supported under KVM
• numa CPU quickly lets you assign CPUs to nodes by socket/core/thread id
• Qcow2: support Luks encryption format
• Migration: return-path
• Image locking enable by default!
• Qemu-img resize: pre-allocation
• Various fix in Arm / Power
• > 64 vCPU Windows Guest
• Block devices more information on disk
• Qcow2 shrinking
Qemu 3.0

Qemu 3.0

• Guest-agent: power modes via systemctl
• Migration
  – Postcopy bandwidth (max-postcopy-bandwith)
  – Recovery postcopy migration (migrate-recover QMP)
  – Pause a migration (migrate_pause QMP)
Libvirt >= 3.4 (SLE12SP4 SLES15)

Libvirt

• Highlights include:

  • New CPU models
  • Improved support for ppc64 and aarch64 architectures
  • Loadparm for bootdevices (Z)
  • Update-device (running domain)
  • vIOMMU for virtio devices
  • Apparmor improvement

  • Migration: cache=directsync
  • Hyper-v: virDomainSetMemory and virDomainSendKey APIs
  • Add migrate-getmaxdowntime
  • multiqueue for virtio-blk
  • Xen: vNUMA topology (+cells)
  • Bash completion (>= 4.0)
SLES 12 SP4 Virtualization Architectures

Support for new architectures

• Virtualization capabilities in x86_64 continue to be improved
  – For example, AVX512

• KVM on s390x is now officially supported!

• KVM on Aarch64 is provided, with additional platforms supported

• KVM on Power9 (ppc64le) Tech Preview
SLES 15 Supported Guests (1/2)

SUSE Linux Enterprise Server
- 15, 15 SP1 (upon release)
- 12 SP4, SP3, 12 SP2, 12 SP1
- 11 SP4, 10 SP4

SUSE Linux Enterprise Desktop
- 15

Open Enterprise Server
- 2018 (upon release), 2015 SP1

RedHat Enterprise Linux
- 7.6+, 6.10+, 5.11+
SLES 15 Supported Guests (2/2)

Microsoft Windows Server
- 2019
- 2016
- 2012 R2, 2012
- 2008 R2 SP1, 2008 SP2

Microsoft Windows (Desktop)
- 10, 8.1, 8, 7 SP1
- Best effort support
SUSE Linux Enterprise
Virtual Machine Driver Pack

VMDP >= 2.5.x

– Supported on all SUSE Linux Enterprise Server hosts
– Support for latest Microsoft offerings:
  • Windows Server 2019, 2016, 2012 R2 and Windows 10
– Recent changes in >= 2.5.x:
  • New driver: virtio_rng
  • Copy/paste interaction between Virtual Machine and host
  • New SPICE agent, and updated qemu guest agent
  • Native support of 10gbis NIC
  • Bugfixes
Perfect Guest strategy, operating system tuned to run great as a guest on all major hypervisors
SLES 15 Supported Hosts

- SUSE Linux Enterprise Server
  - 15, 15 SP1 (upon release)
  - 12 SP4, SP3, 12 SP2, 12 SP1
  - 11 SP4
- VMware vSphere (ESXi)
  - 6.7, 6.5
- Microsoft Windows Server
- Citrix Xenserver 7.6/7.1
- Oracle VM 3.4/3.3
Virtualization with VMware

VMware tools / drivers integrated in SLES 12 / 15

- open-vm-tools 10.3.5
  - Wayland support
  - Improve snapshots
  - Improvement for cloud-init
  - Bug fixes

Fully supported by VMware via L3 support agreement
Virtualization with Microsoft

Hyper-V
• Latest drivers and features supported in SLES
  – Linux Integration Services (LIS) package is NOT required
    • SUSE works directly with Microsoft to enhance and improve in-kernel drivers

Azure
• SLES images regularly updated

WSL (Windows Subsystem for Linux)
• SLES and openSUSE images are available
SLES 12 SP4 / SLES 15 Virtualization Limits

KVM limits closely match bare metal limits

- Max physical CPUs/memory: 8192/64TB
- Max virtual CPUs/mem per VM: 288/4TB
  (requires Q35, x2apic CPU feature, …)

XEN limits

- Max physical CPUs/memory: 256/5TB
- Max Dom0 CPUs/memory: 256/500GB
- Max virtual CPUs/mem per VM: 64/511GB
Outlook

SLES 15 SP1

- Continuing support for both Xen and KVM
- Continuing hardware enablement
- Performance improvements in the pvops kernel
- Xen: PVH dom0
- Updating some toolstack (qemu, libvirt etc...)
- Web Management: SUSE Manager 4.0
Virtualization testing
QA Virtualization

Main features

- Live Migration
- Libvirt functionality
- Upgrading host and former VM
- Deploying Guests
- Update Guest to another SP
- Similar perf
QA Virtualization projects

Multiple projects
- Guest installation
- Host upgrade
- Guest Migration
- Guest Upgrade
- PVUSB
- V2V
- Performance
- Third Party Hypervisors
QA Virtualization: technologies used

Multiple tech
– Jenkins
– openQA
– Libvirt-tck
– Mode:
  • Semi-automatic
  • manual
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