Linux Containers Overview & Roadmap

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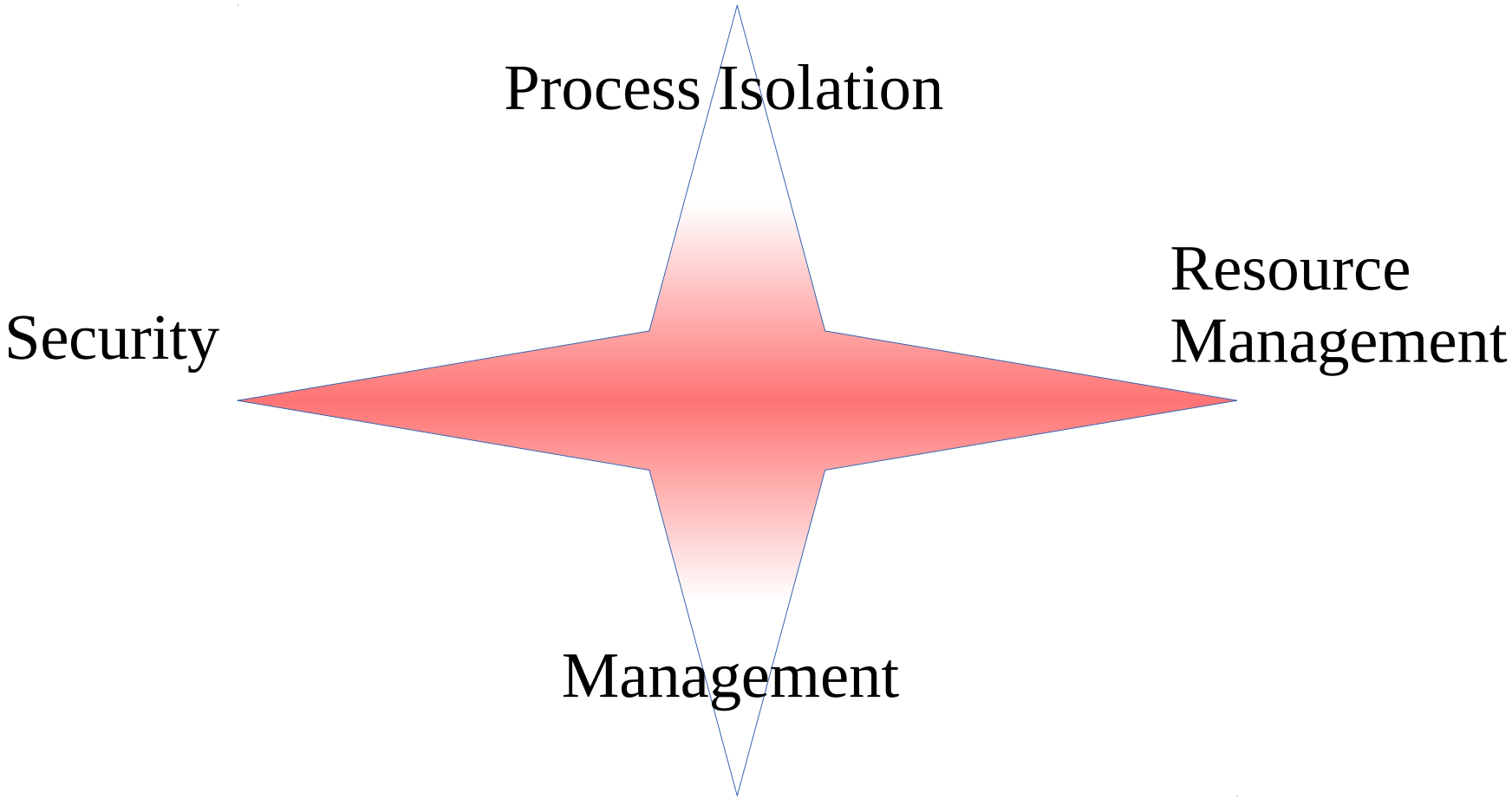
June 12 2013

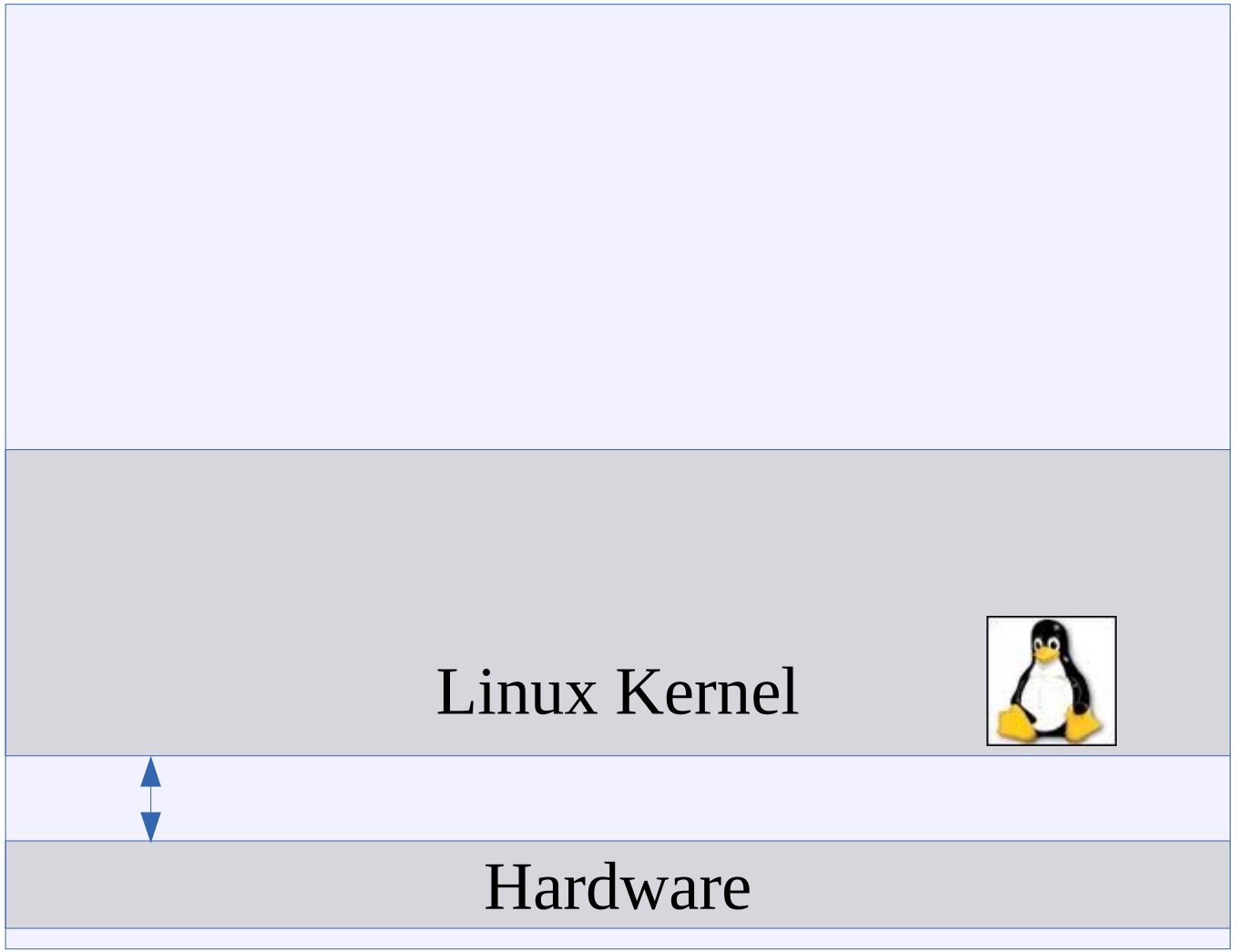
redhat.

Key elements of Linux Containers

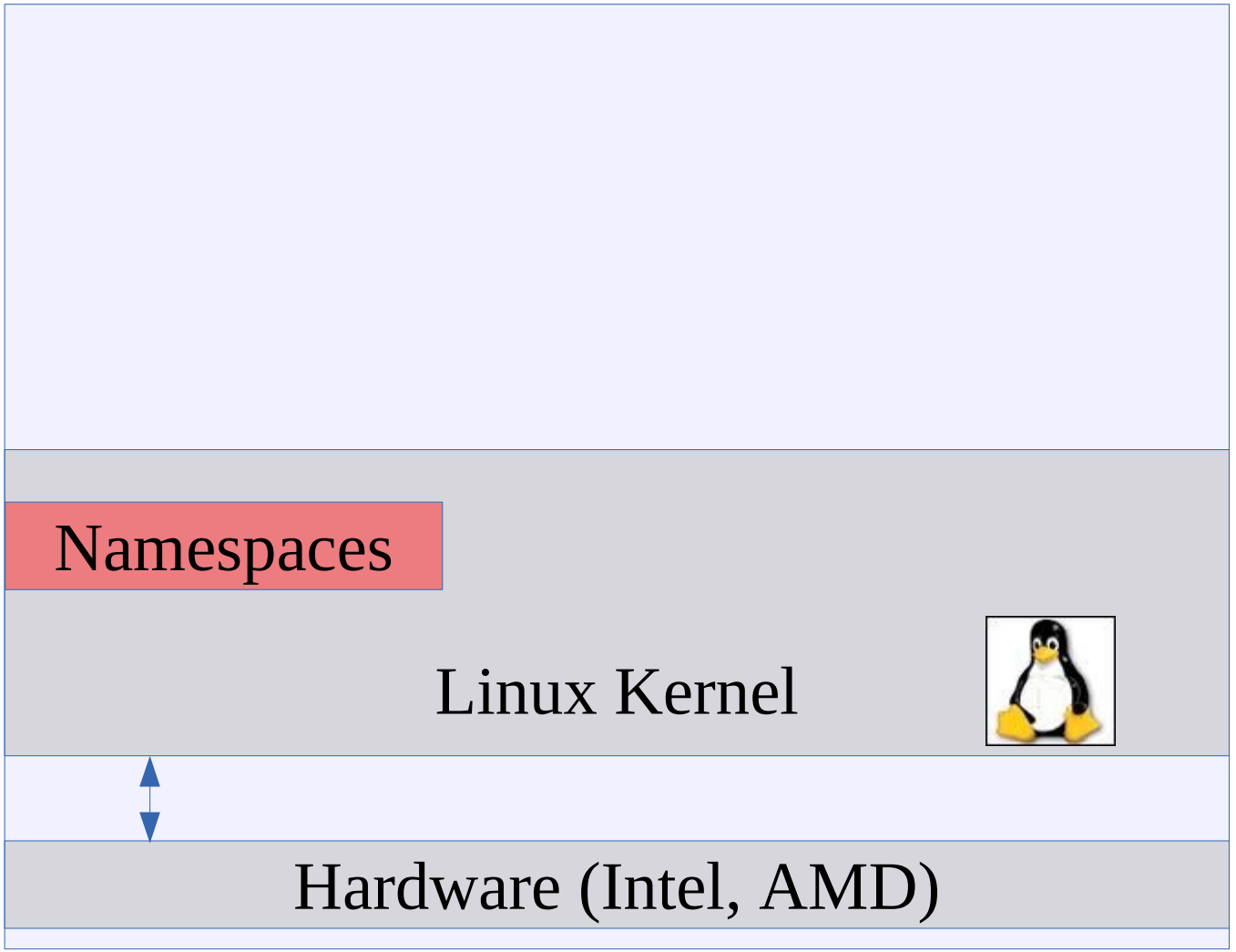


Linux Container Architecture

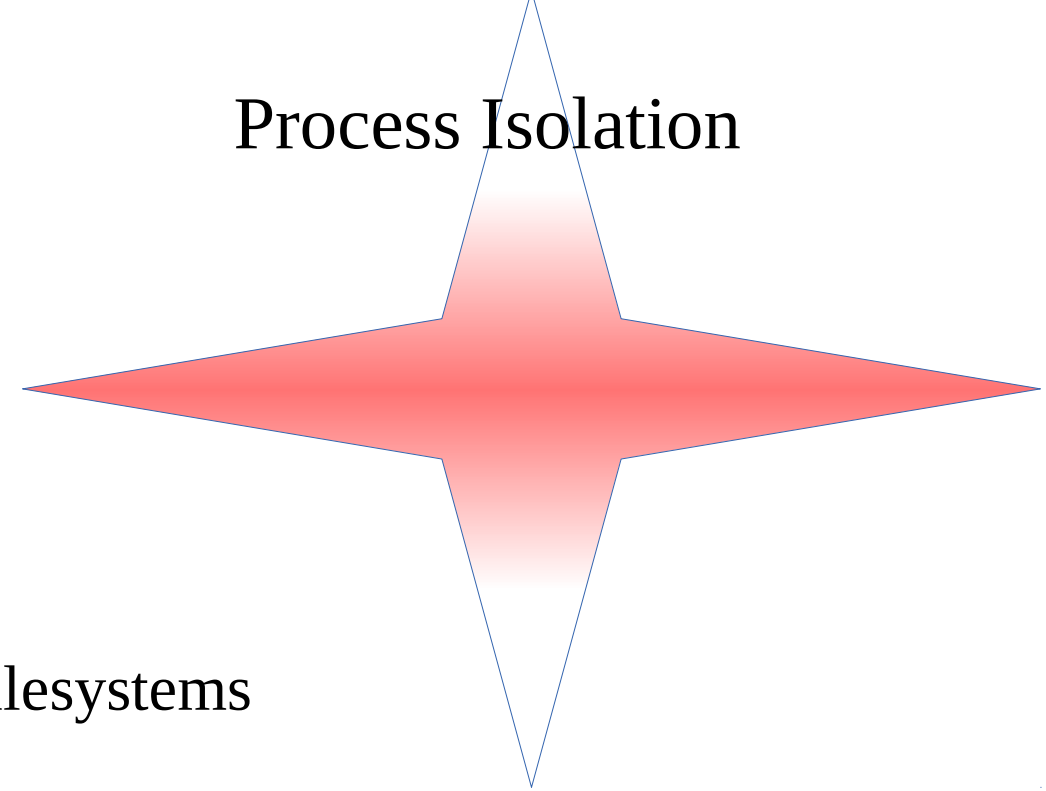
Red Hat Enterprise Linux Container Architecture



Red Hat Enterprise Linux Container Architecture

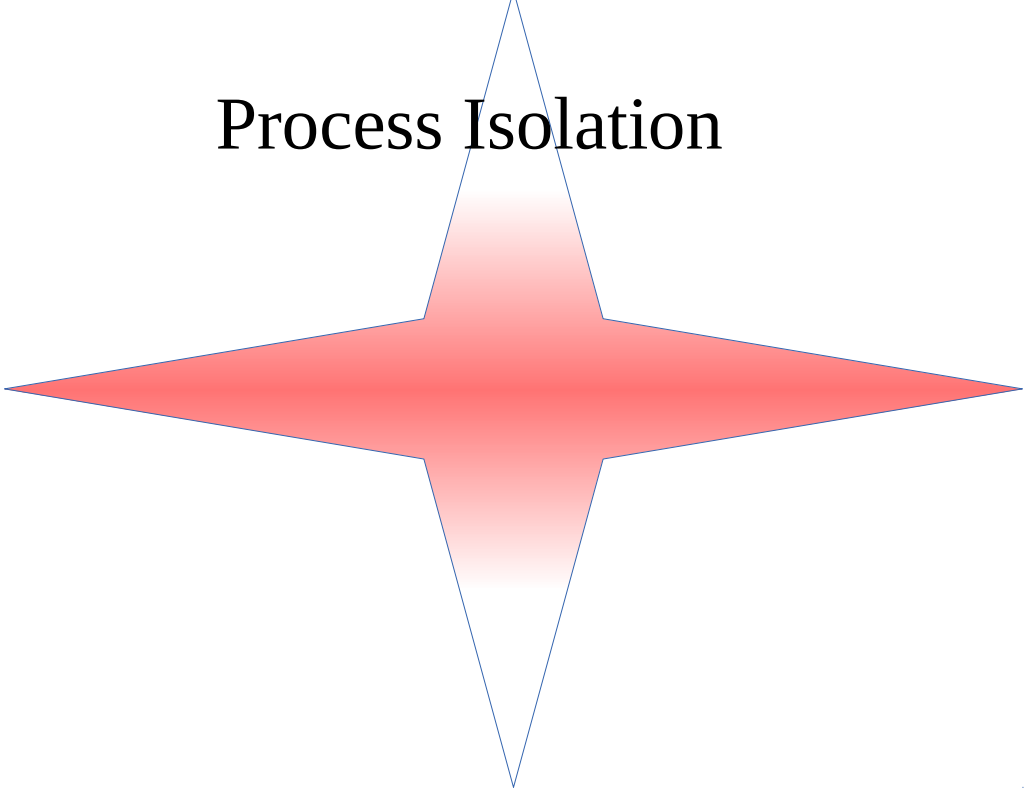


Namespaces



Mount : mounting/unmounting filesystems
UTS : hostname, domainname
IPC : SysV message queues, semaphore/shared memory segments
Network: IPv4/IPv6 stacks, routing, firewall
PID: Private /proc, multiple pid 1's
User: (UID) Just showing up in the Kernel now.

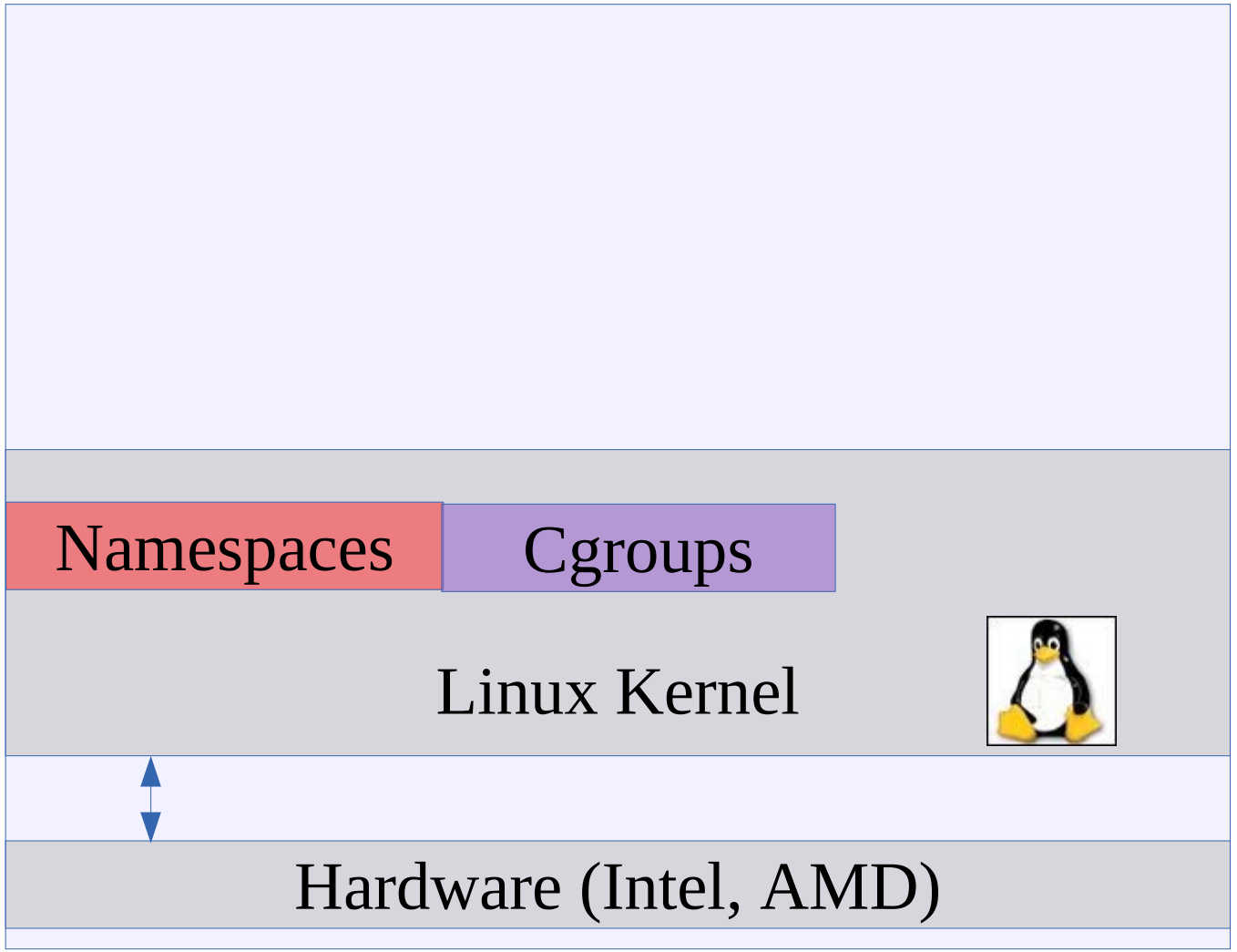
- Not planning on supporting in RHEL7.



Namespace Use

- pam_namespace - RHEL5/6
- SELinux sandbox - RHEL6
- SystemD - Fedora 17
  - UnitFile: PrivateTmp, PrivateNetwork
- Openshift - RHEL6
  - Pam_namespace : Private /tmp

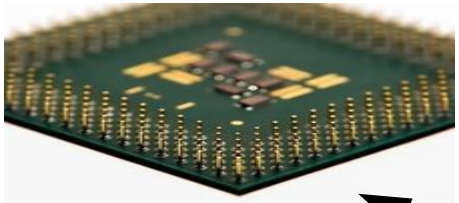
Red Hat Enterprise Linux Container Architecture



Resource Management with Cgroups

Memory

Network



CPU

Block IO

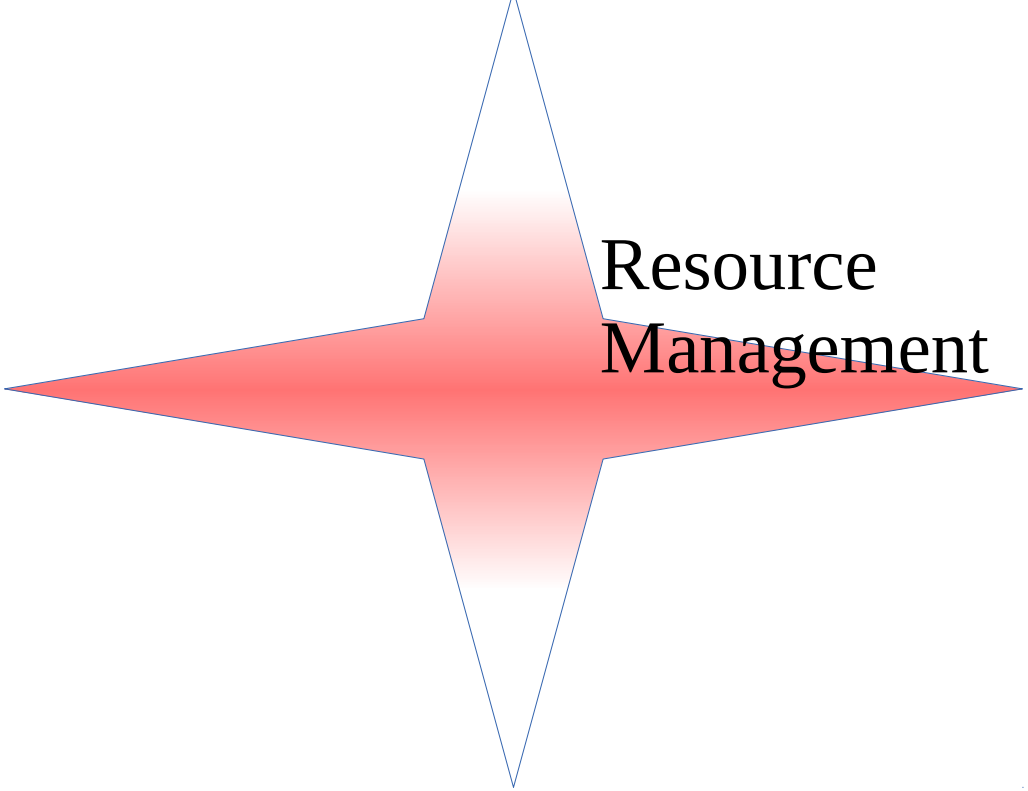
Namespaces

Cgroups

Linux Kernel

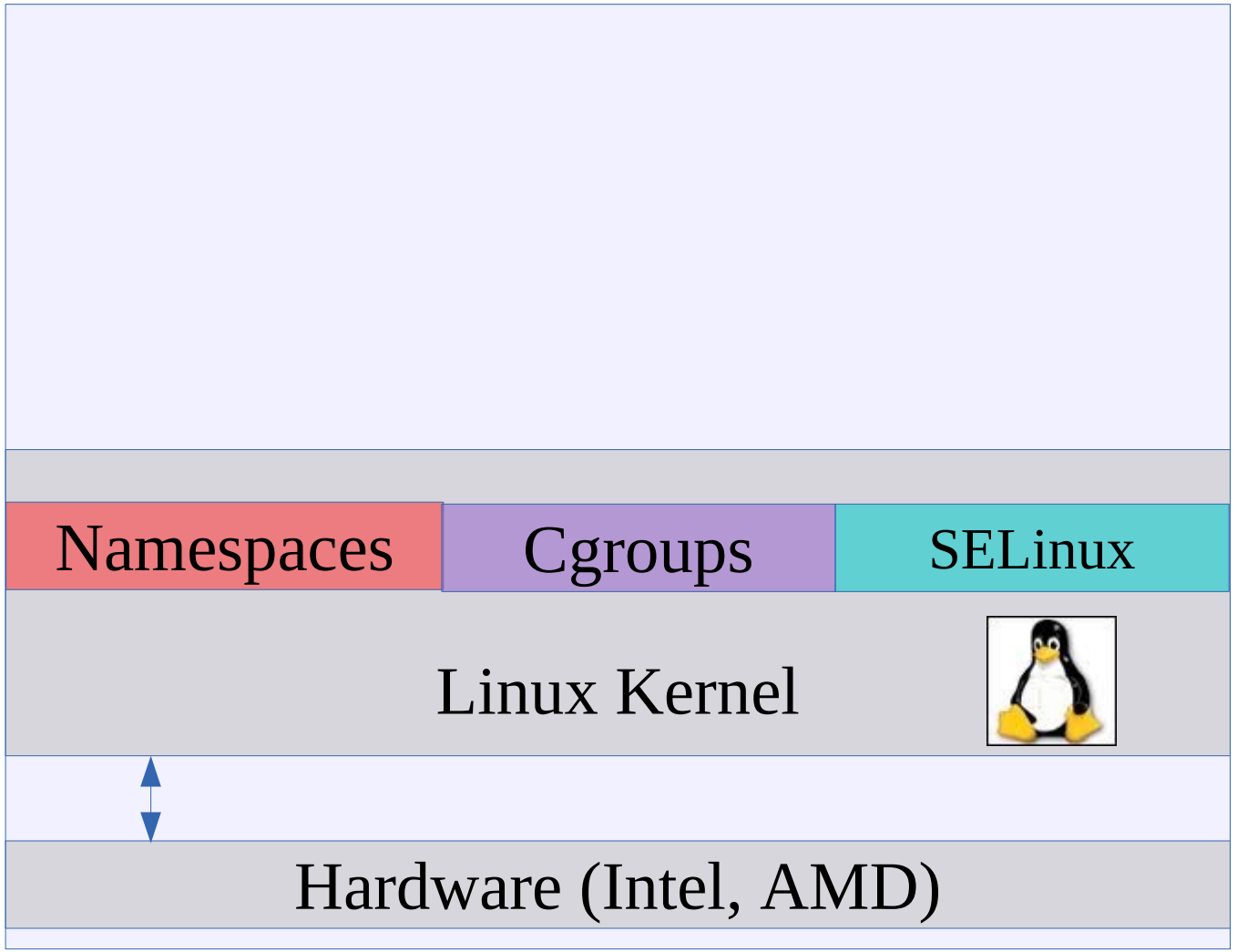
Hardware (Intel, AMD)

Cgroup Use

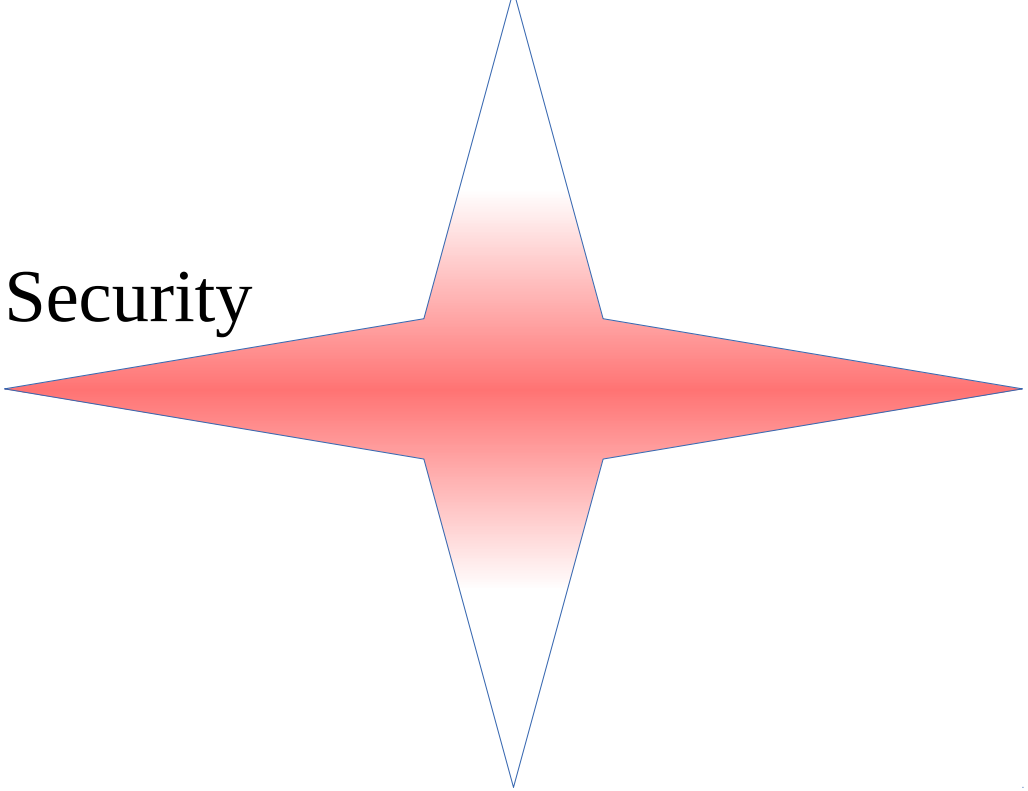


- Libvirt/qemu – RHEL6
- OpenShift - RHEL6
- SystemD - Fedora 18
  - UnitFile: ControlGroup*
- Red Hat Storage Server
  - Gluster - RHEL6

Red Hat Enterprise Linux Container Architecture

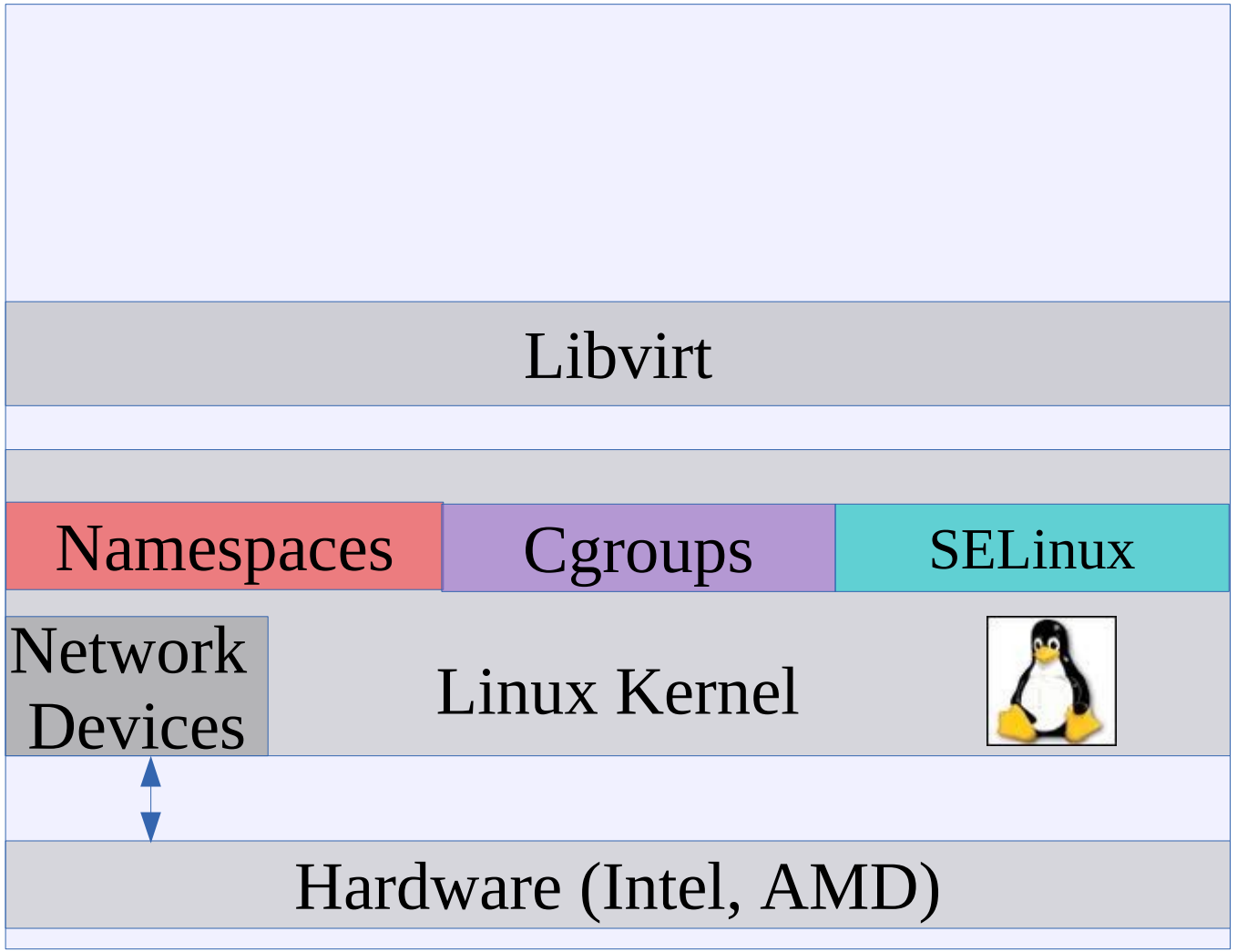


SELinux Use

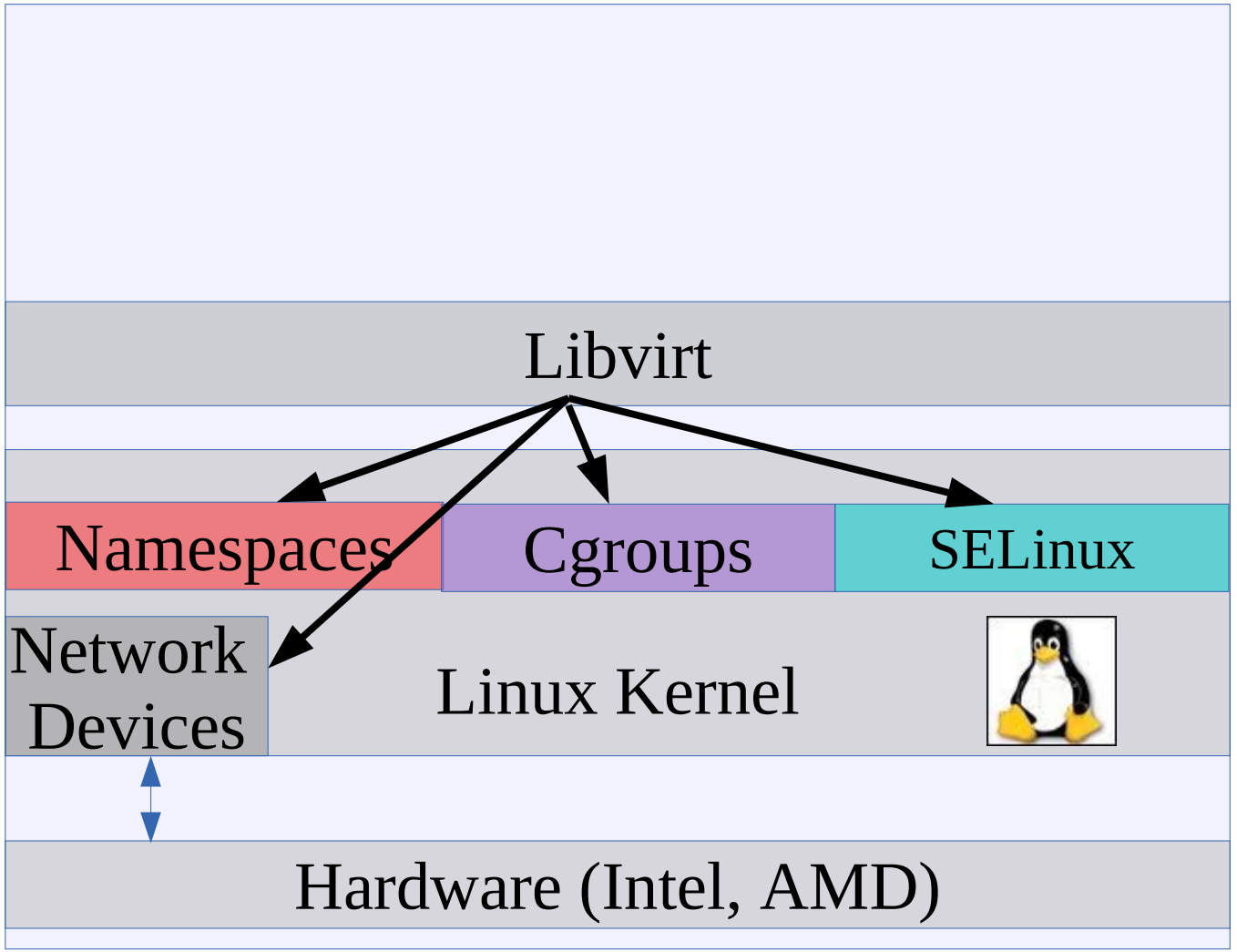


- Targeted - RHEL4
- MLS – RHEL5
- Targeted/MCS - RHEL6
  - sVirt
  - OpenShift
  - sandbox -X

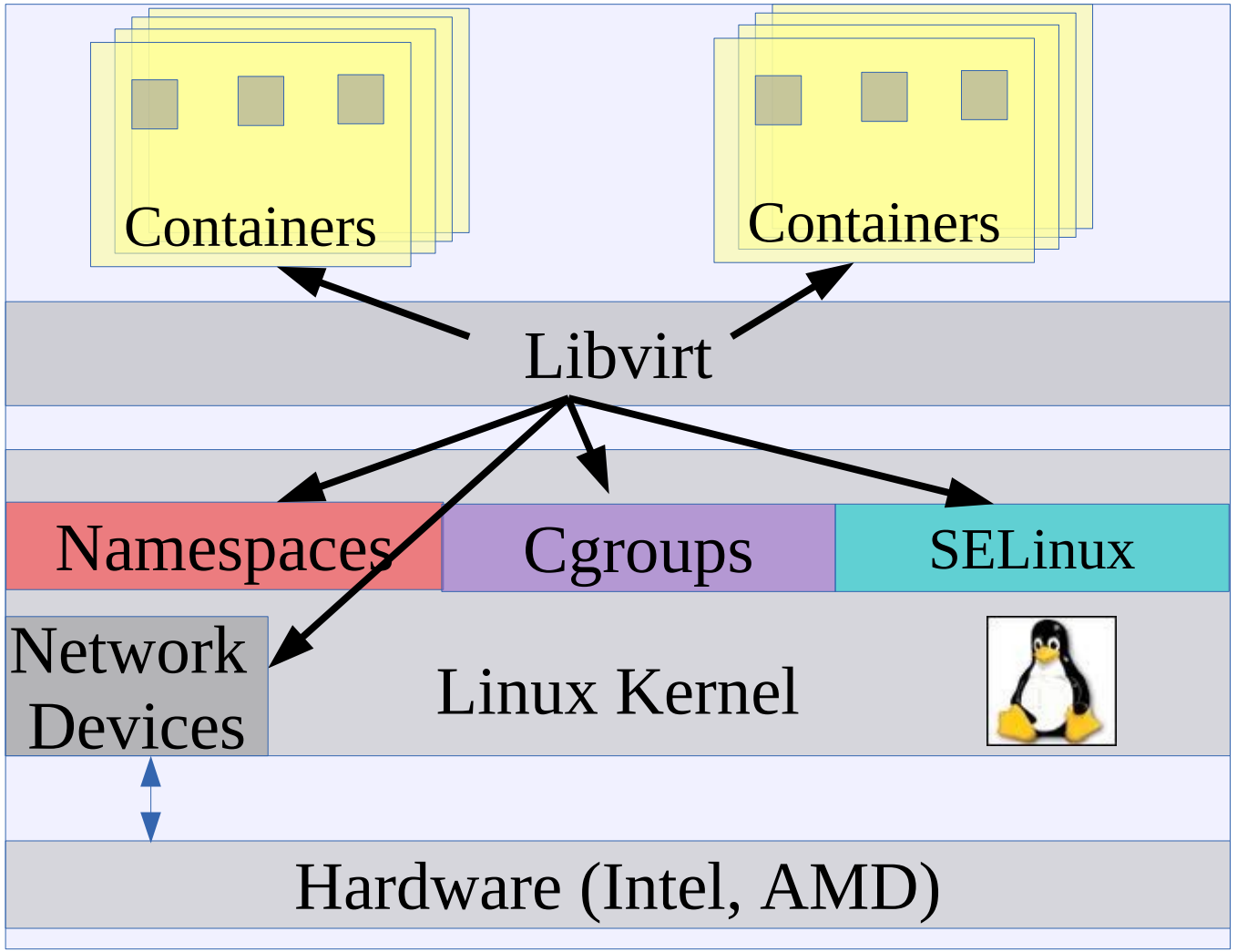
Red Hat Enterprise Linux Container Architecture



Red Hat Enterprise Linux Container Architecture



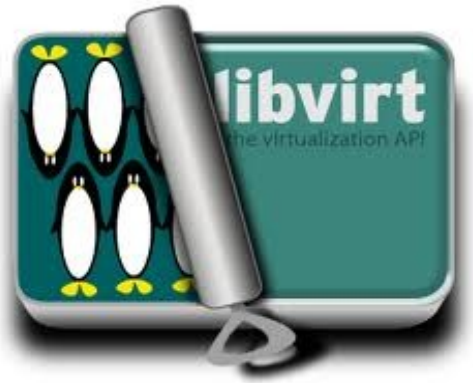
Red Hat Enterprise Linux Container Architecture



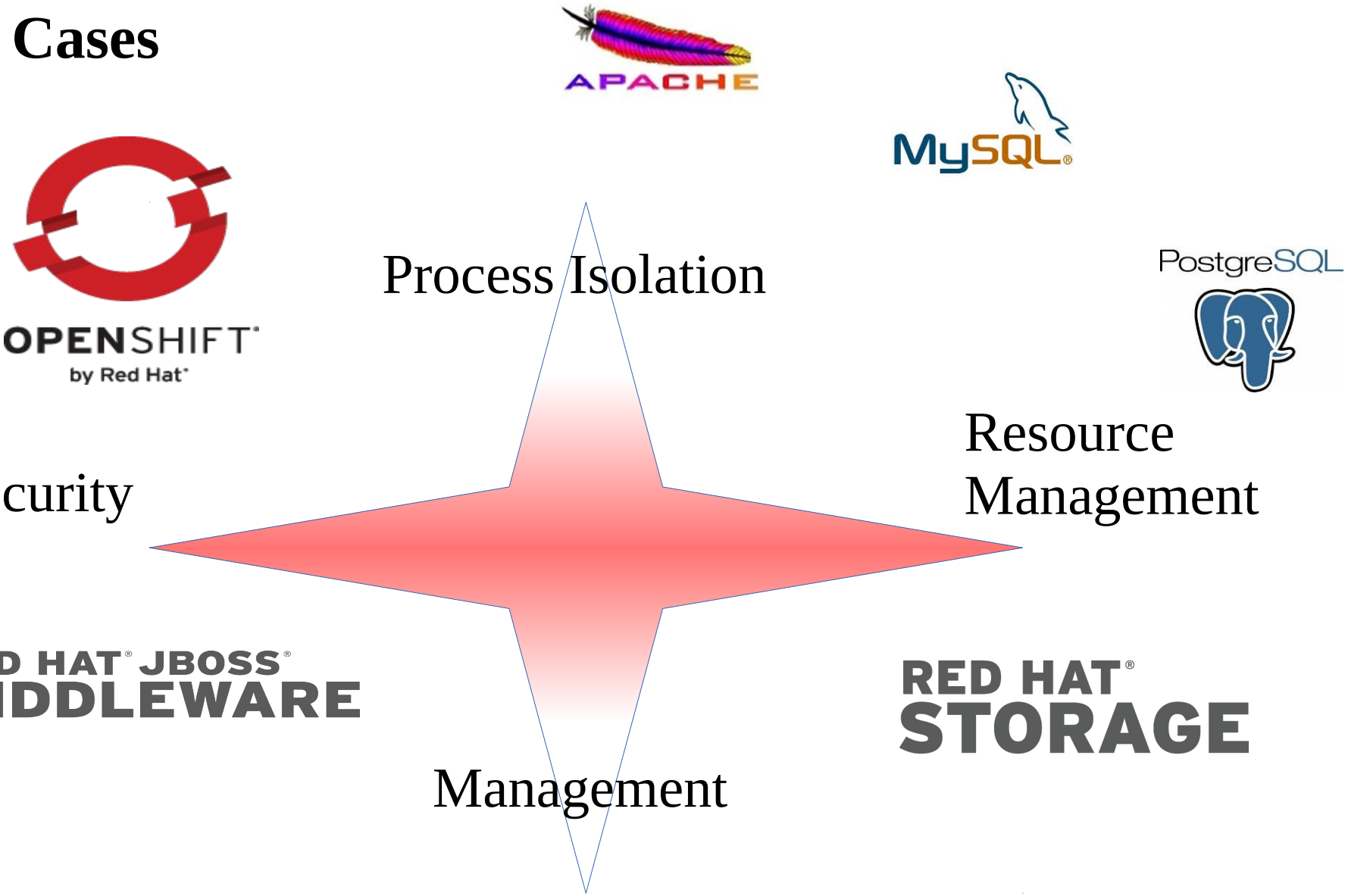
Libvirt Use

- Libvirt - RHEL5, RHEL6
  - Launch Virtual Machines
- Libvirt-lxc – RHEL6.4
  - Launch Containers

Management



Linux Container Use Cases



Containers use cases

Shared RHEL Host Software

- Generic Application Container
- Systemd Application Container

Containers use cases

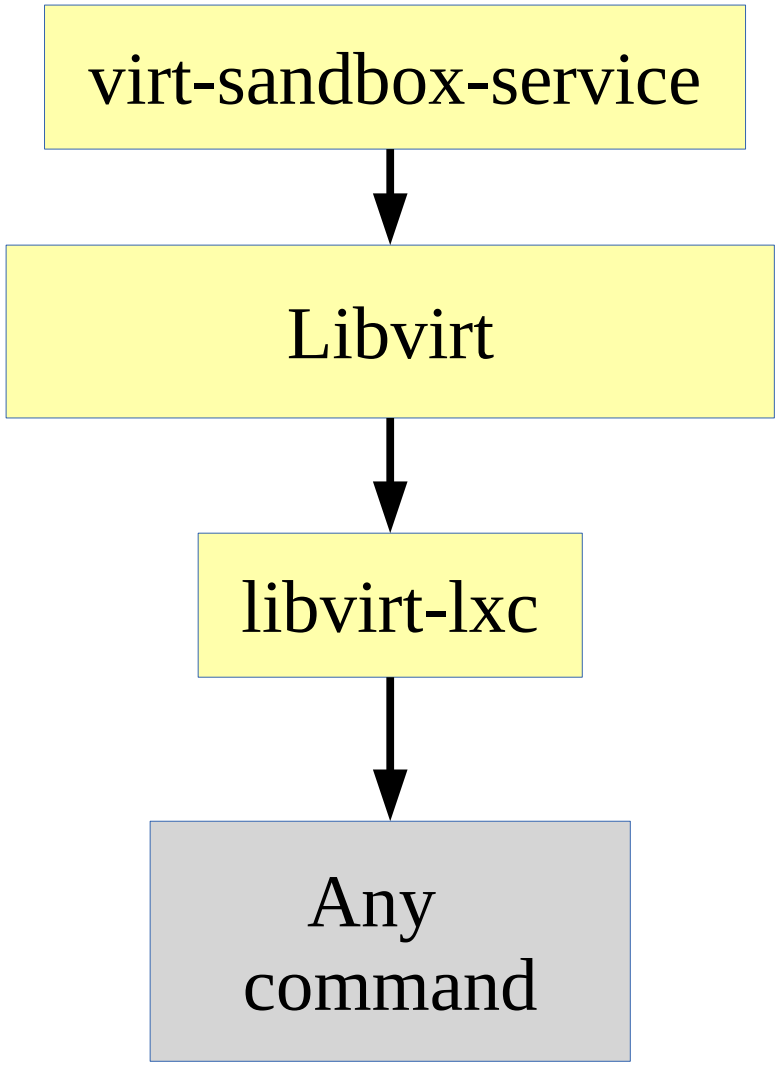
Shared RHEL Host Software

- Generic Application Container
- Systemd Application Container

Unshared OS Software

- Chroot Application Container
- Booted OS Container

Generic Application Container



Planned for RHEL 7.0

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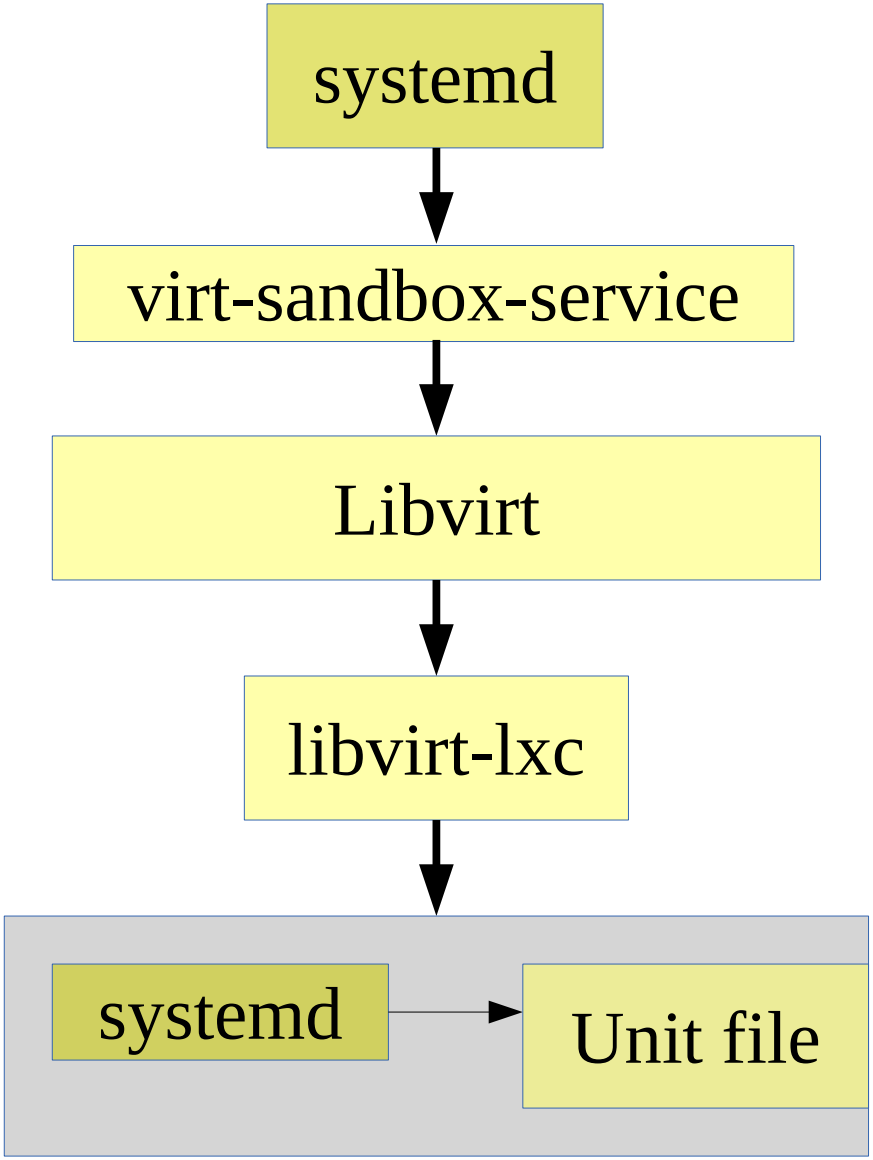
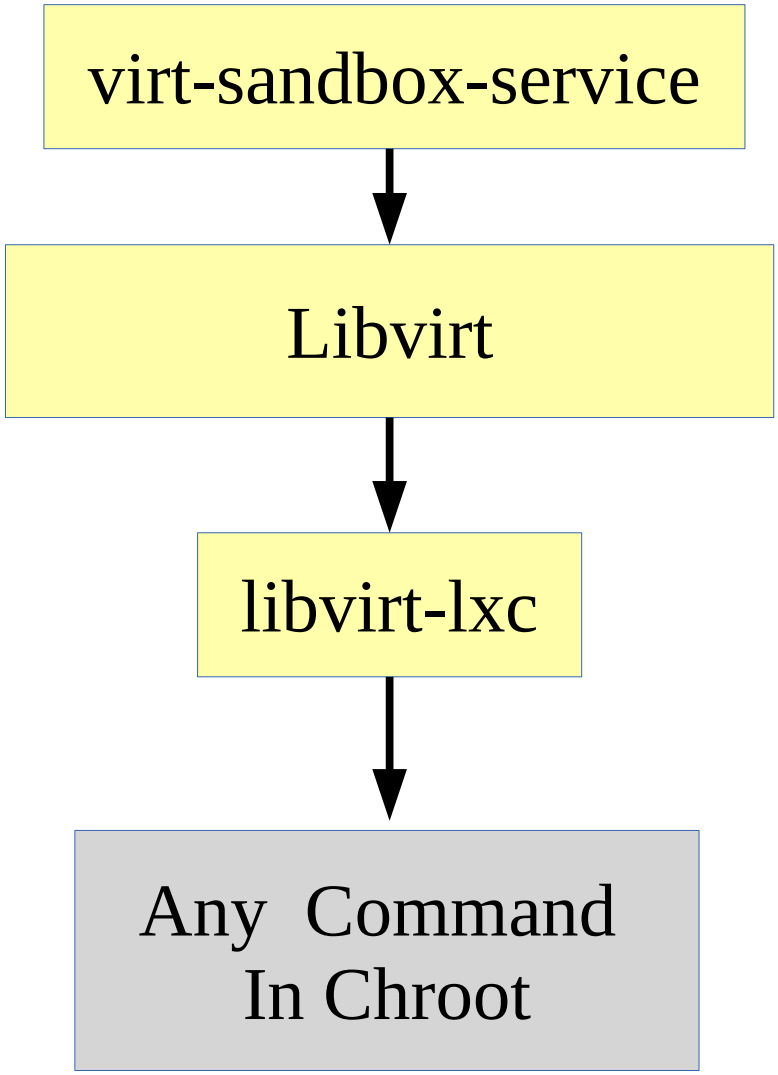
OPENSHIFT by Red Hat®

Systemd Application Container



Planned for RHEL 7.0

Chroot Application Container



Support TBD in RHEL 7.*

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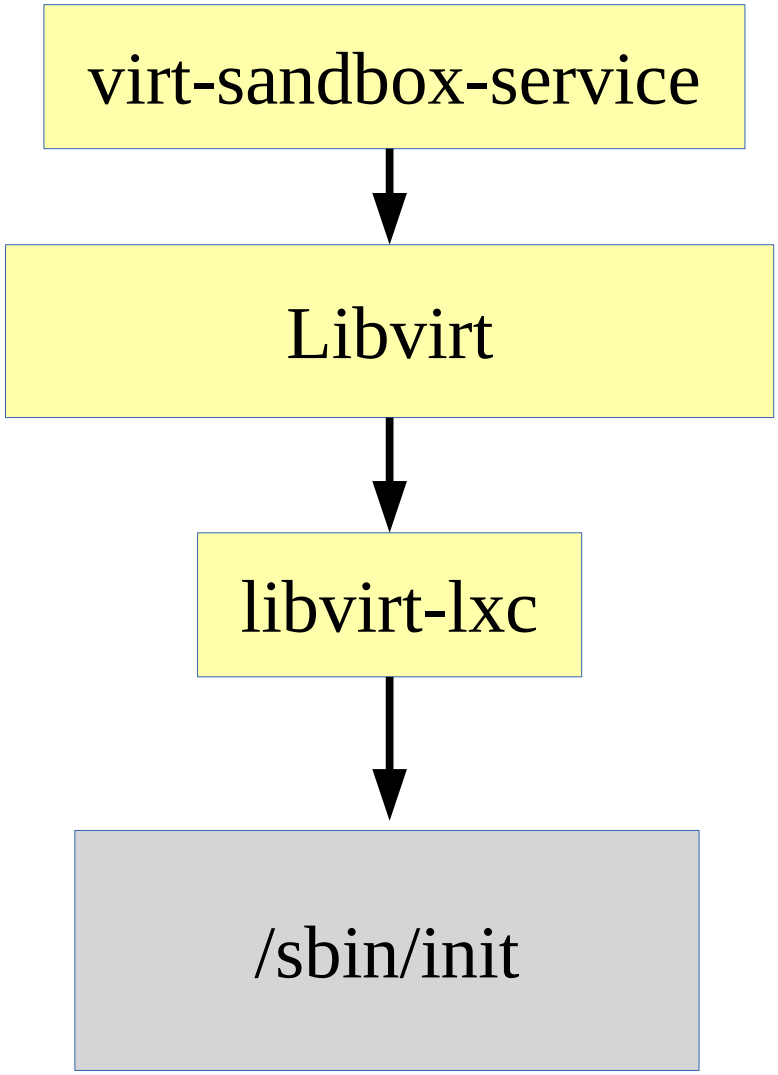
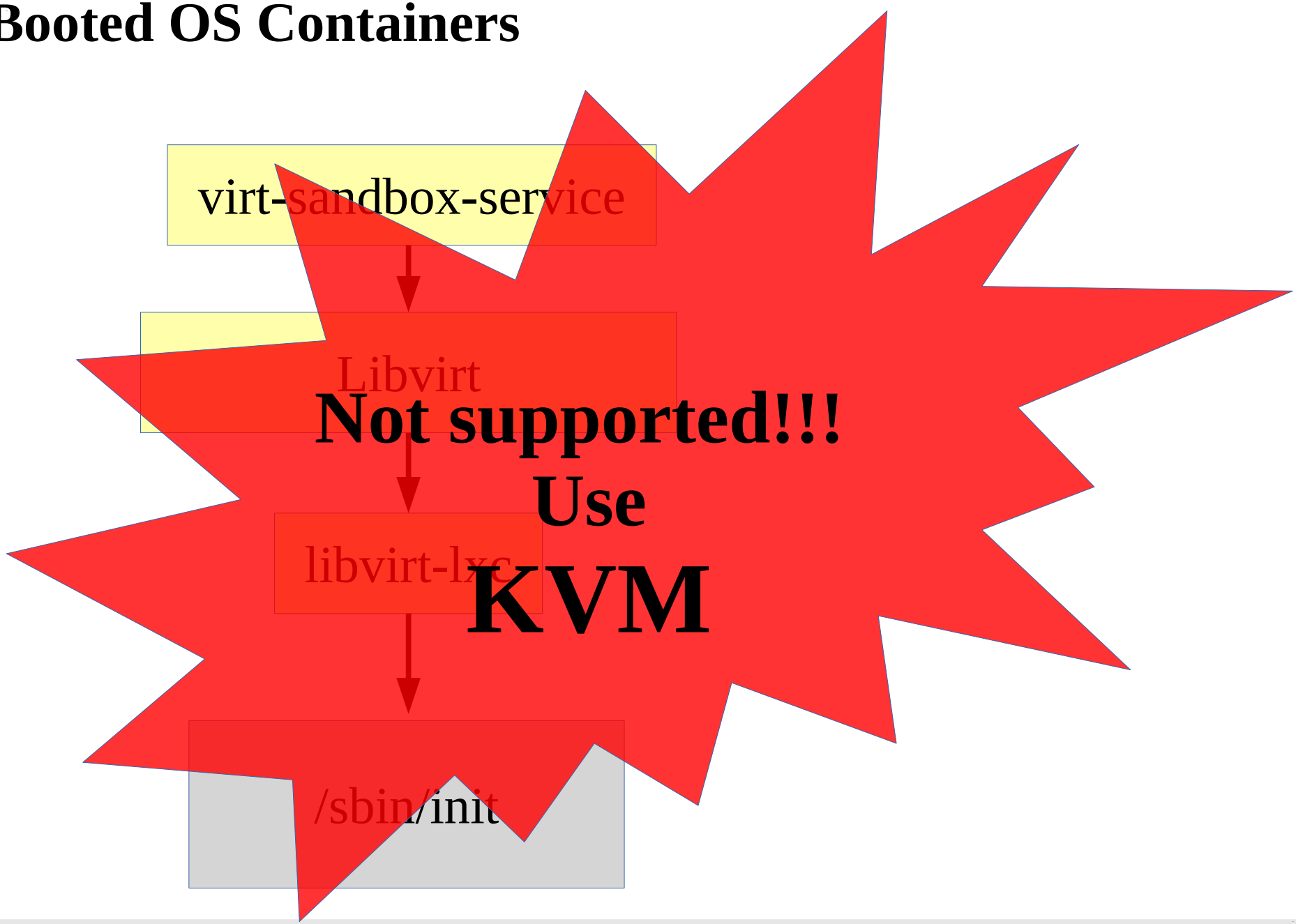
Booted OS Container



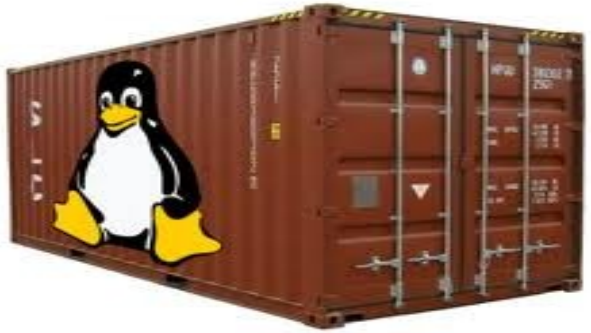
Booted OS Containers



Containers vs KVM Virtualization

When should I use containers and when should I use KVM?

Containers vs KVM Virtualization



- Startup and shutdown speed
- Ease of Maintainance
- Easy to create
- System-wide changes visible in each container
  - For RHEL Shared OS Containers
- Scalability: Number of containers
  - Process Memory Sharing

KVM Virtualization vs Containers

- Boot multiple Different Operating Systems
  - Including Windows
- Separate kernel
  - Better Security
  - Kernel crash does not take down host
- Guest Isolation from host changes
- Full Separation
- Features such as live migration, live storage migration

Linux Containers : Scalability

How many containers can you run?

- Theoritical
  - Scales to 6000 containers and 12000 bind mounts of root filesystem directories
- Practical
  - Running real workloads, containers doing work in parallel

Linux Containers Demo

Future

- Seccomp – Linux syscall restriction
- Better audit support/logging support
- Working UnionFS.
- What's going to break?????

Questions?

Related Summit Sessions

Managing SELinux in the Enterprise

- Wed 4:50 pm, Rm 312

Secure Development Practices

- Thu 1:20 pm, Rm 306

Under the Hood of OpenShift, Turbocharged by RHEL

- Thu 3:40 pm, Rm 304

KVM Hypervisor Roadmap & Technology Update

- Thu 10:40am, Rm 304

Hypervisor Technology Comparison & Migration

- Fri 9:45am, Rm 313

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