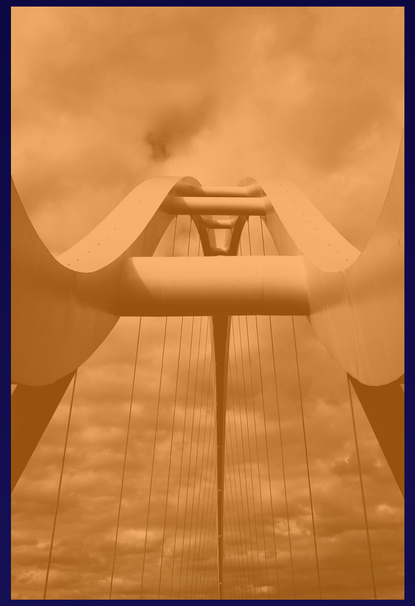
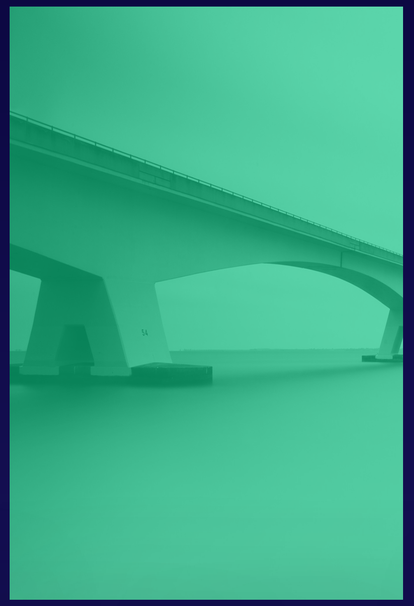
Import CentOS 7 Image

virt-v2v

- Download the **CentOS 7 Generic Cloud** RAW disk image
- Edit the disk image using **guestfish**:
  - Change ‘`root`’ password
  - Enable **SSH** login as root
- Use **virt-v2v** to import the **RAW disk image**
- Connect to the console using **Cockpit**:
  - Patch new VM

In this lesson, we covered:

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Tom Dean
Linux Training Architect

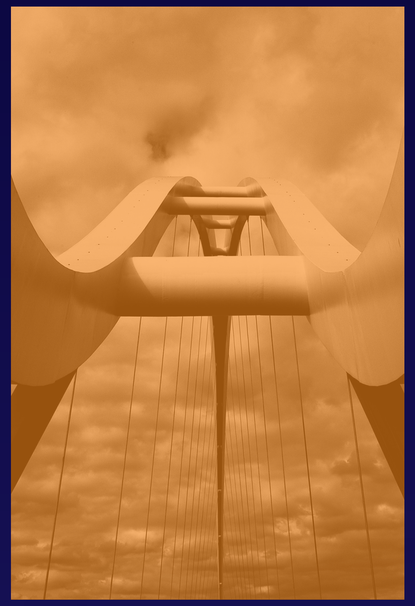
Using virt-clone to Clone a Virtual Machine

Clone CentOS 7 VM

virt-clone

- Clone a virtual machine using **virt-clone**
- Prepare the clone to be made into a **template**:
  - Start clone
  - Patch clone
  - Shut clone down

In this lesson, we covered:



- Cloning a virtual machine using **virt-clone**
- Preparing the clone to be made into a **template**:
  - Starting the clone
  - Patching the clone
  - Shutting the clone down

Tom Dean
Linux Training Architect

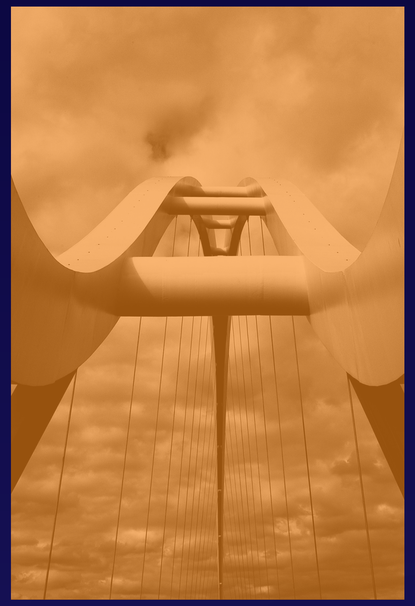
Using virt-sysprep to Create a Virtual Machine Template

Create CentOS 7 Template

virt-sysprep

- **Create** a virtual machine template using **virt-sysprep**
- **Clone** the virtual machine template to a new guest using **virt-clone**
- **Check out** our new cloned guest

In this lesson, we covered:



- **Creating** a virtual machine template using **virt-sysprep**
- **Cloning** the virtual machine template to a new guest using **virt-clone**

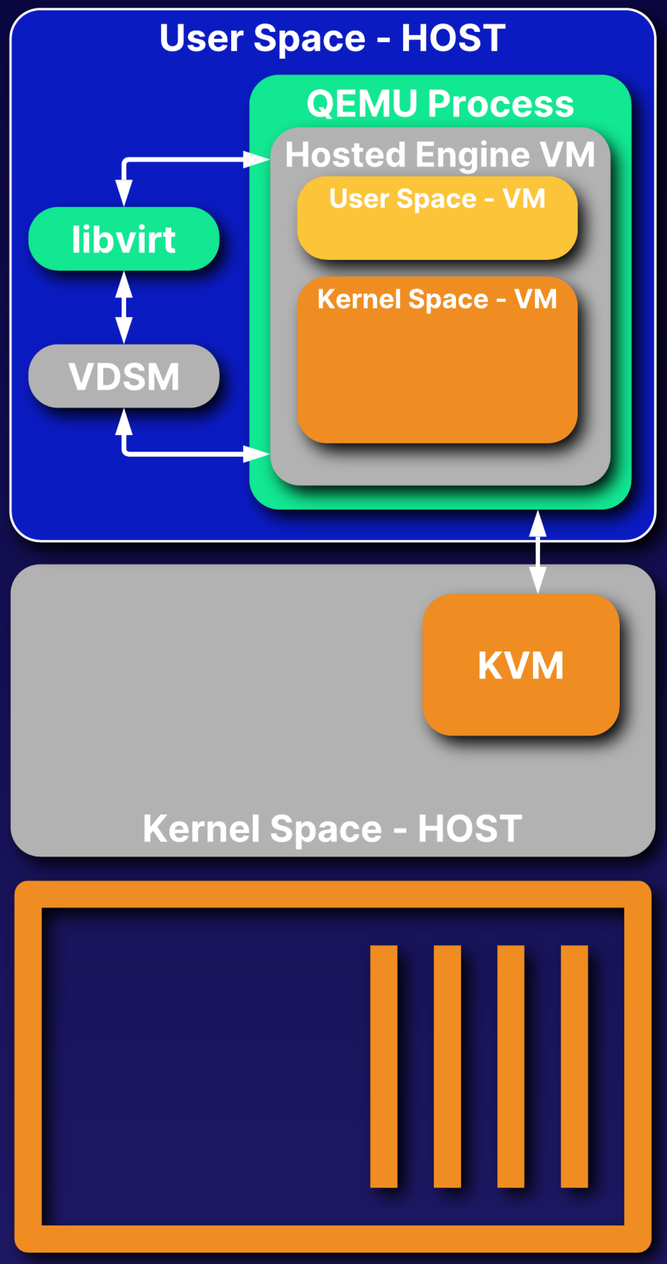
Tom Dean
Linux Training Architect

Introduction to oVirt

oVirt

From the oVirt website:

"**oVirt** is an *open-source* distributed virtualization solution, designed to manage your *entire enterprise infrastructure*. **oVirt** uses the trusted **KVM** hypervisor and is built upon several other community projects, including **libvirt**, **Gluster**, **PatternFly**, and **Ansible**."



oVirt is built on `libvirt/QEMU/KVM`

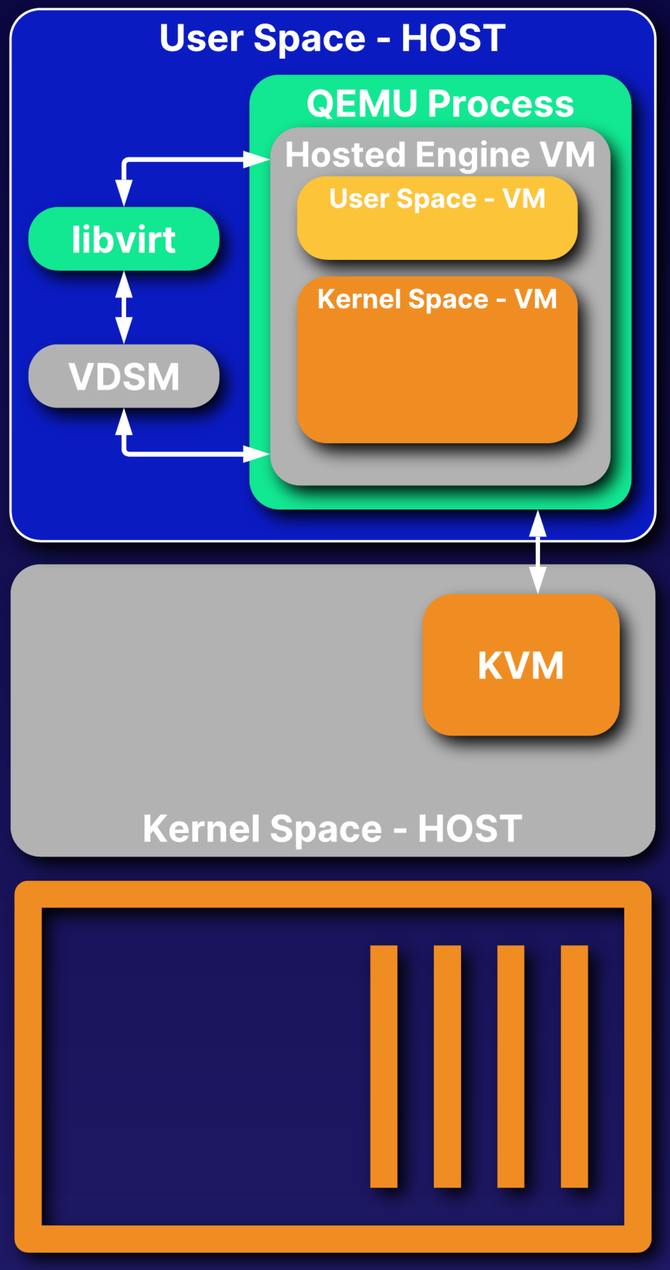
oVirt is the upstream of RHEV

oVirt

From the oVirt website:

What's included?

- Rich ***web-based*** user interfaces for both *admin* and *non-admin* users
- Integrated **management** of *hosts*, *storage*, and *network* configuration
- **Live migration** of *virtual machines* and *disks* between *hosts* and *storage*
- **High availability** of *virtual machines* in the event of *host failure*



If Linux virtualization were a Corvette...

oVirt would be the pit crew that helps you *win the race*

oVirt Functionality

Functionality

ovirt can:

- **Create**, **edit**, **start**, and **stop** guest VMs
- ***Move*** *guest VMs between* ***hosts***
- Provide **console access** for guest VMs
- Provide **operating metrics** for guest VMs
- Display the **current status** of guest VMs
- Manage **virtual networks**
- Manage **virtual storage**
- *Provide* ***disaster recovery***
- ***More***

How Does oVirt Work?

KVM/QEMU/libvirt

KVM

Provides acceleration through access to hardware virtualization extensions

QEMU

Type-2 hypervisor that utilizes KVM for type-1 hypervisor acceleration

libvirt

Toolkit to manage virtualization platforms, like QEMU/KVM

KVM/QEMU/libvirt

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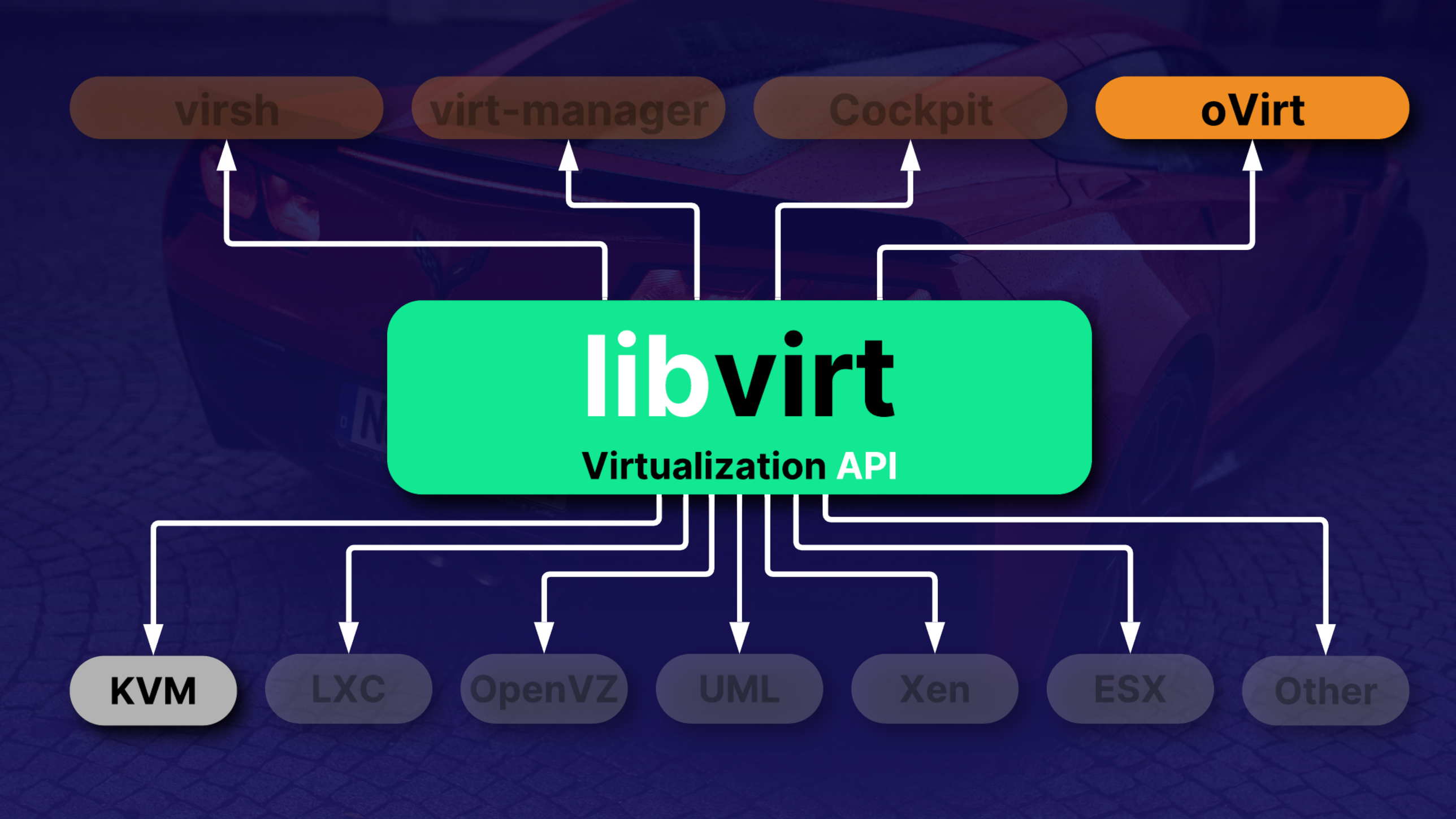
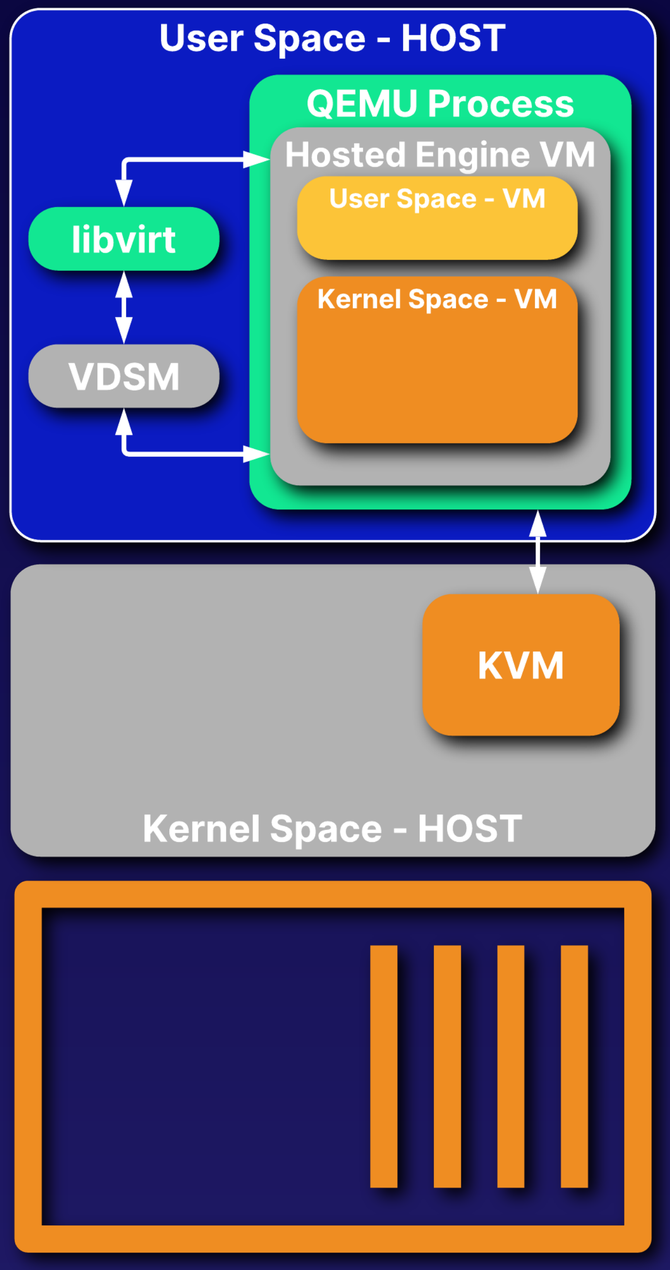

virsh
virt-manager
Cockpit
oVirt
libvirt
Virtualization API
KVM
LXC
OpenVZ
UML
Xen
ESX
Other

oVirt

oVirt is made up of **two** components:

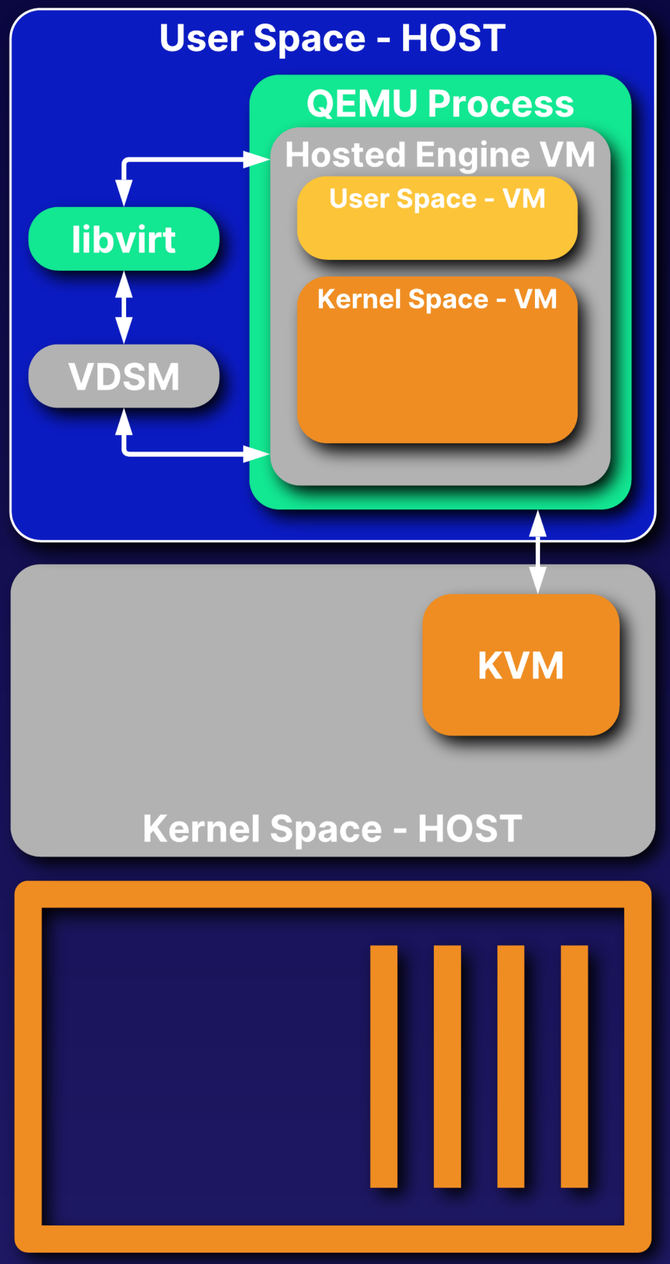
- **oVirt engine:Standalone or self-hosted**
  - **Java** backend
  - **GWT web toolkit** frontend
  - **WildFly** (**JBoss**) application server
  - **PostgreSQL** database



oVirt

oVirt is made up of **two** components:

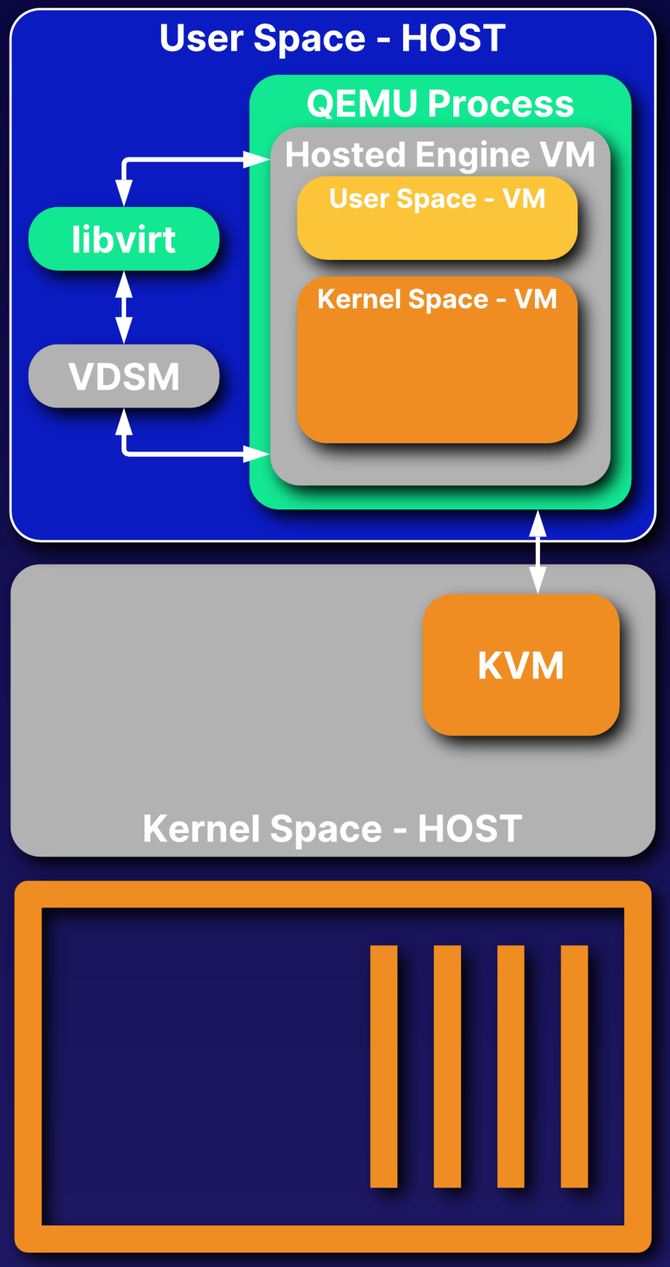
- **oVirt node:**
  - **RHEL**/**CentOS** (predominantly)
  - **QEMU**/**KVM**/**libvirt**
  - **VDSM**:
    - Node management **API**
  - **Gluster**/**PatternFly**/**Ansible**
  - Nodes can be **clustered**



oVirt

oVirt supports many **storage solutions**:

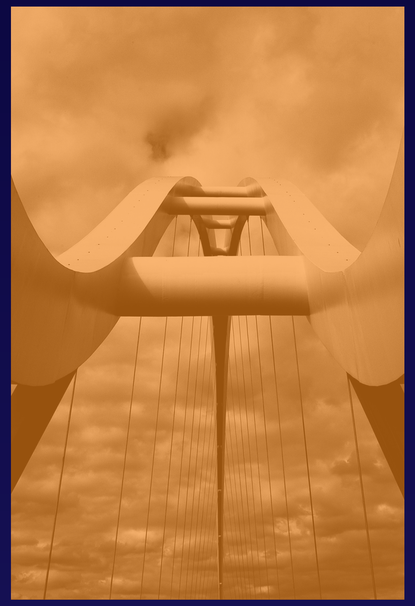
- **NFS**
- **iSCSI**
- **GlusterFS**
- **POSIX**-compliant **filesystem**
- **Fibre Channel**



If Linux virtualization were a Corvette...

oVirt would be the pit crew that helps you *win the race*!

In this lesson, we covered:



- What **oVirt** is
- The functionality of **oVirt**
- How **oVirt** works

Tom Dean
Linux Training Architect

Configuring the CentOS 7 Lesson Environment

We'll need two things to start:

Download the CentOS 7 ISO using the CentOS 7 Minimal ISO.

Create either a CentOS USB installation key or a CD / DVD installation disc.

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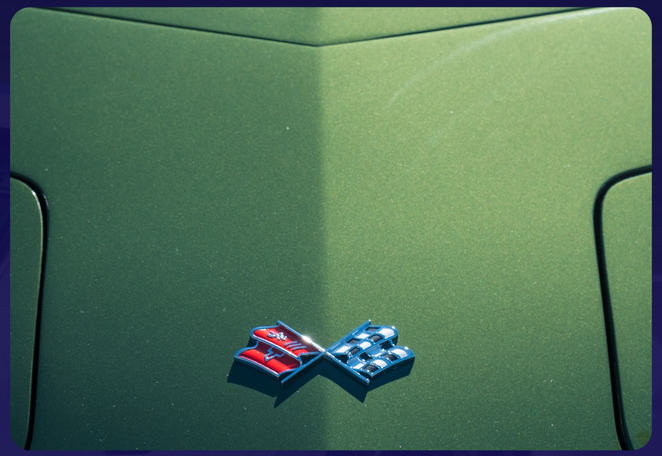
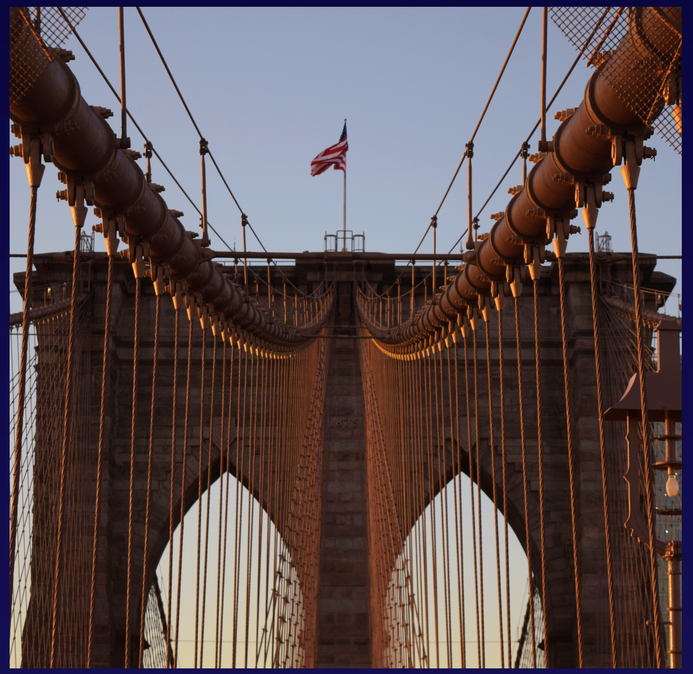


Create either a CentOS USB installation key or a CD/DVD installation disc.

CentOS 7 Installation

- Confirm the **BIOS** is configured to support **hardware virtualization**:
  - Enable **Intel VT-x**/**AMD-V**
- Boot from **USB**/**optical media**
- Perform **CentOS 7** installation:
  - Create a `cloud_user` account and set the `root` password
- Post-installation tasks:
  - Patch system
- Configure **storage** and **NFS**



We now have a CentOS 7 Minimal installation!

Tom Dean
Linux Training Architect

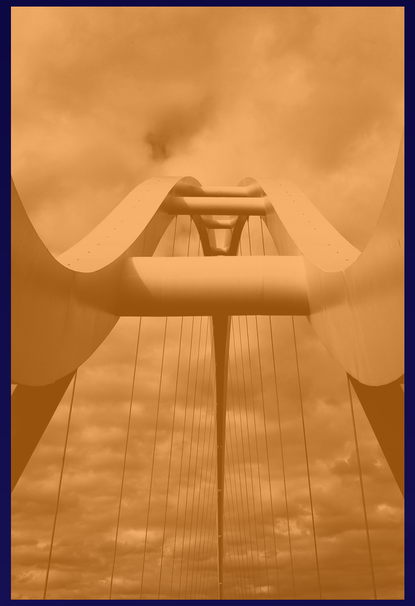
Installing and Configuring oVirt on CentOS 7

Install oVirt

Installation Process

1. **Configure** the **NFS storage**
2. **Install and deploy** the **oVirt hosted engine**
3. **Connect** to the **oVirt hosted engine appliance web interface**

In this lesson, we covered:



- **Configuring** the **NFS storage**
- **Installing and deploying** the **oVirt hosted engine**
- **Connecting** to the **oVirt hosted engine appliance web interface**

Tom Dean
Linux Training Architect

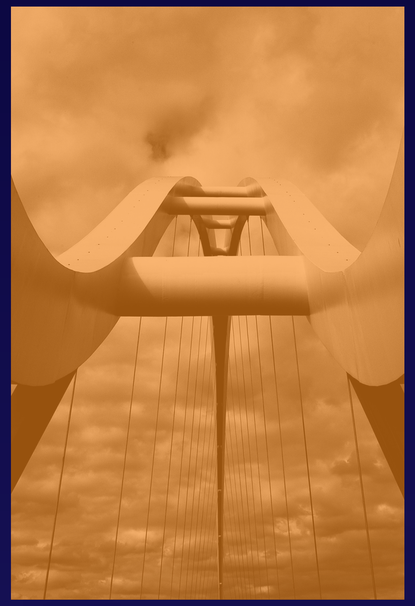
Exploring the oVirt Management Interface

Exploring oVirt

Management Interface

- Connecting to the **oVirt** web interface
- Explore the main page:
  - **VM Portal**
  - **Administration Portal**

In this lesson, we covered:



- Connecting to the **oVirt** web interface
- Explore the main page:
  - **VM Portal**
  - **Administration Portal**

Tom Dean
Linux Training Architect

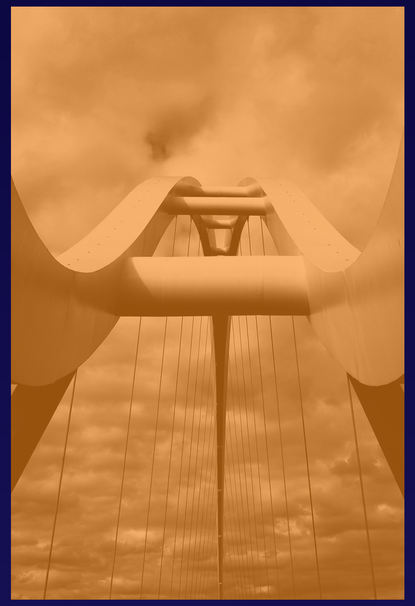
Configuring the oVirt Environment

Configuring oVirt

Configuring the oVirt environment

- Adding a **Private Virtual Network**
- Adding **NFS Storage Domains**:
  - **Local**
- Adding a **Second Host**

In this lesson, we covered:



- Adding a **Private Virtual Network**
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Tom Dean
Linux Training Architect

Managing the oVirt Environment

Managing oVirt

Managing the oVirt environment

- Adding a **New User**
- Managing **Events**
- **Create a Template** from the **oVirt Image Repository**
- **Performing Maintenance** on a Second Host

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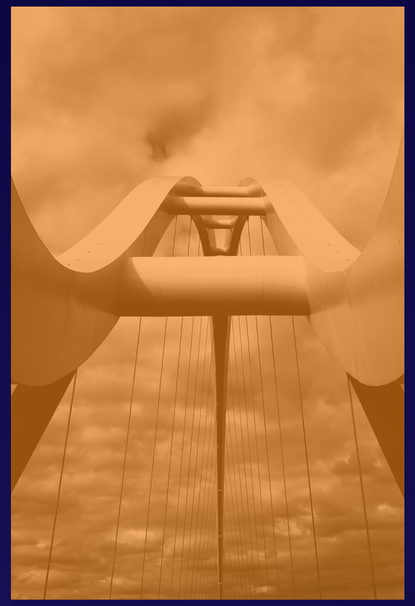
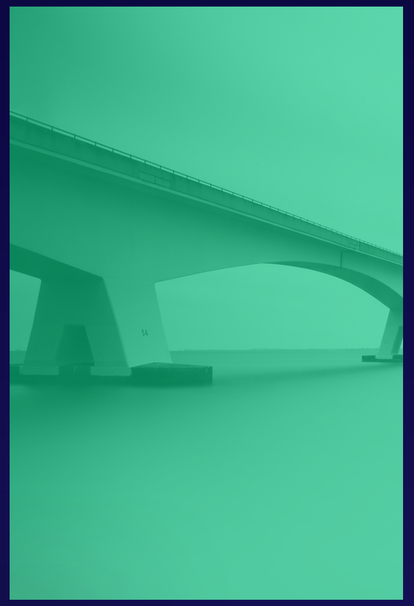

- Adding a **New User**
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Tom Dean
Linux Training Architect

Creating a Virtual Machine Using oVirt

Using oVirt

Creating a virtual machine

- Uploading the **ISO install images** to the **ISO storage domain**
- Creating a new **CentOS 8** virtual machine using the **oVirt Administration Portal**
- Creating a new **CentOS 7** virtual machine using the **oVirt VM Portal**

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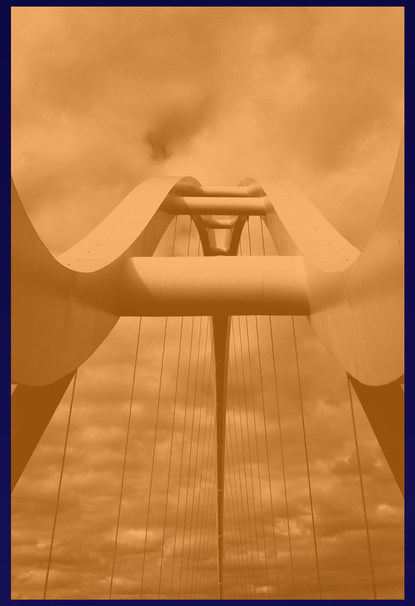

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Tom Dean
Linux Training Architect

Managing a Virtual Machine Using oVirt

Using oVirt

Managing a virtual machine

- Managing the **CentOS 7** virtual machine using the **oVirt Administration Portal**
- Managing the **CentOS 8** virtual machine using the **oVirt VM Portal**

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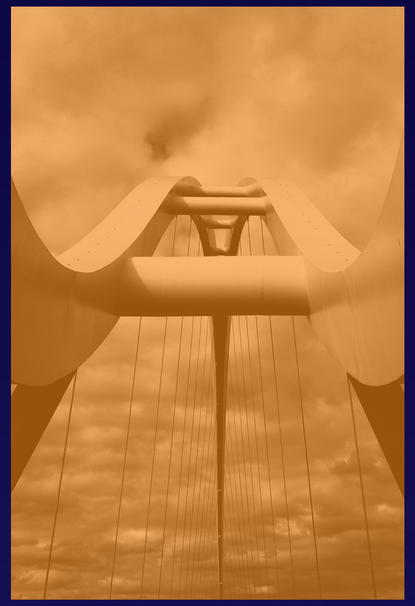


- Managing the **CentOS 7** virtual machine using the **oVirt Administration Portal**
- Managing the **CentOS 8** virtual machine using the **oVirt VM Portal**

Tom Dean
Linux Training Architect

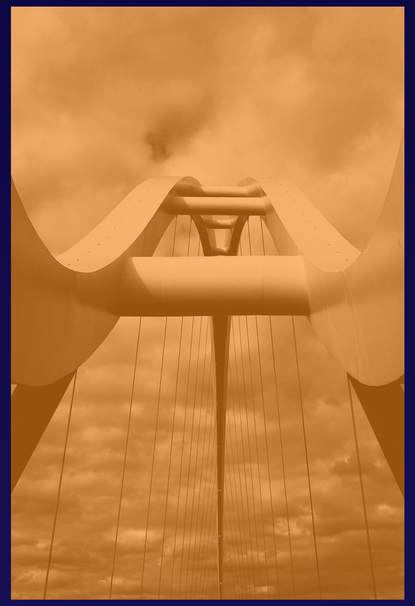
Managing the oVirt Hosted Engine

Using oVirt

Managing the Hosted Engine

- Using the `hosted-engine` command
- **Patching** the hosted engine
- **Moving** the hosted engine to another host
- **Backing up** the hosted engine using `engine-backup`

In this lesson, we covered:



- Using the `hosted-engine` command
- **Patching** the hosted engine
- **Moving** the hosted engine to another host
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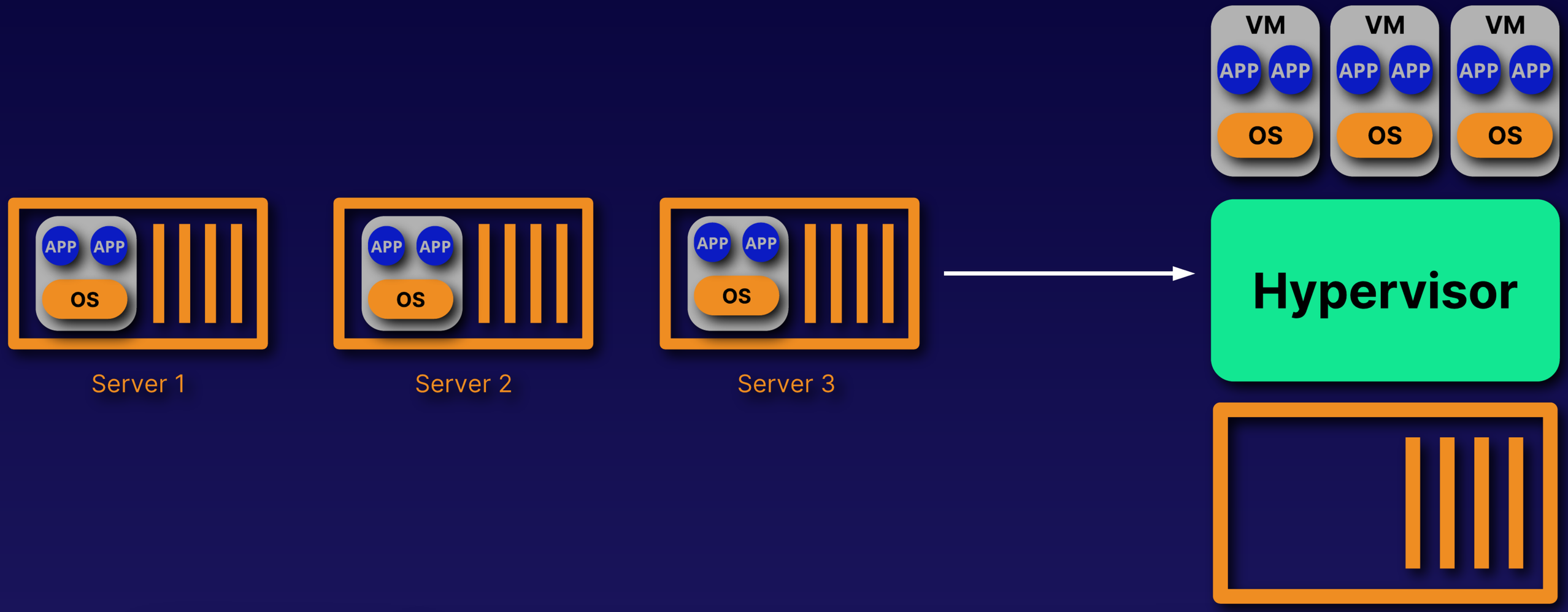
Tom Dean
Linux Training Architect

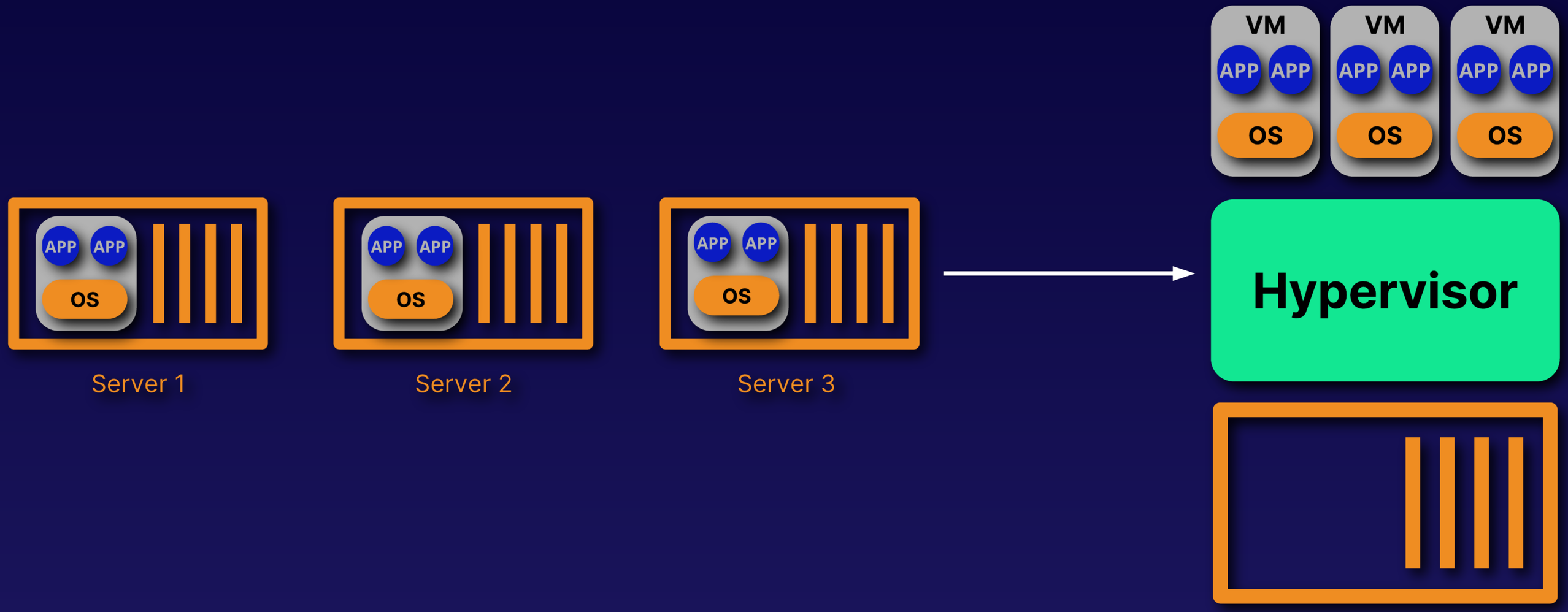
In this lesson, we are going to review what we learned in the **KVM Virtualization on Linux** course.

KVM

What is Virtualization?



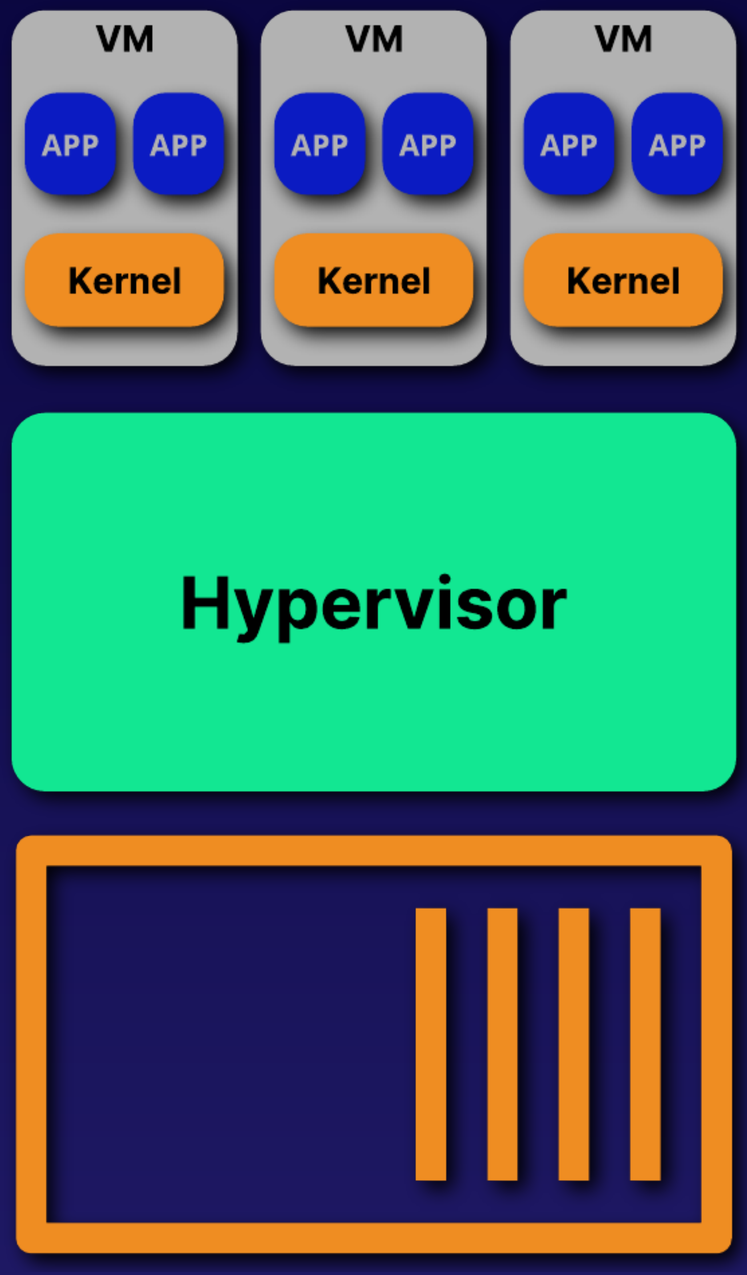
Virtualization allows you to decouple your services and applications from the physical (server) layer and deploy them more efficiently and reliably than the traditional 1:1 service/application-to-physical server relationship.



Virtualization creates a **virtual machine** for the guest operating system to live within, with *virtual resources* instead of *physical resources*. Physical resources can also be mapped to a guest where necessary.

What Is a Hypervisor?

A **hypervisor** is software that sits between the guest (virtual machine) operating system and either the hardware itself or another operating system (host).



The hypervisor provides the resources that the guest operating system requires:

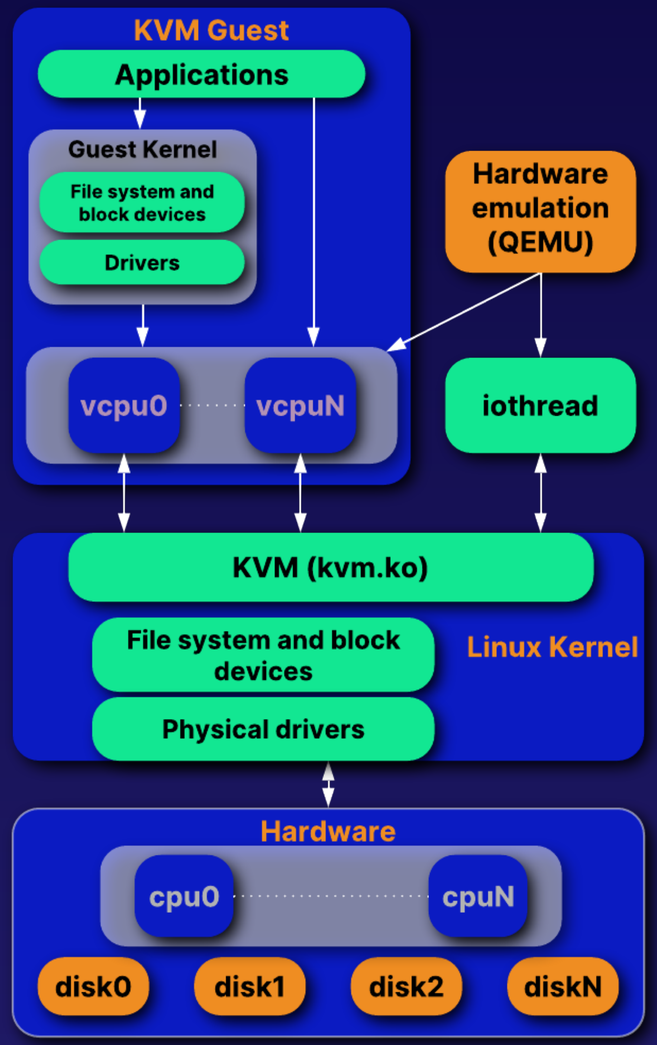
- Virtual CPU(s)
- Virtual Memory
- Virtual Disk(s)
- Virtual Networking

Other resources:

- Virtual media:
  - CD/DVD/ISO images
  - USB
  - Sound
- Video

Mapped physical resources:

- Networking:
  - IP
  - Storage
- GPU(s)



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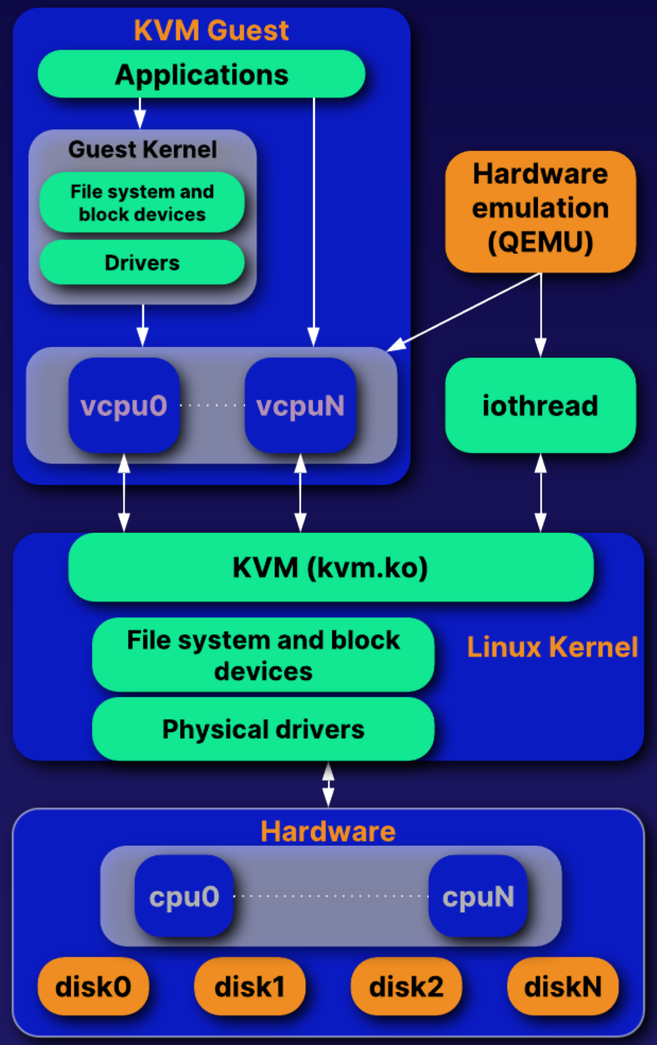

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- Virtual Memory
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Mapped physical resources:

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  - Storage
- GPU(s)

Other resources:

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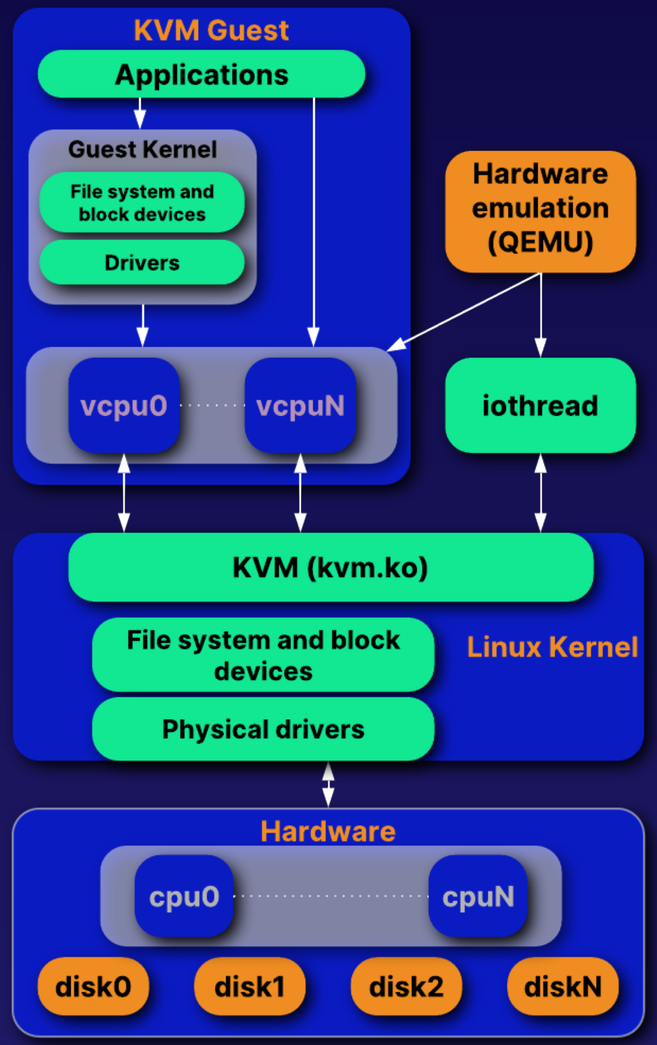
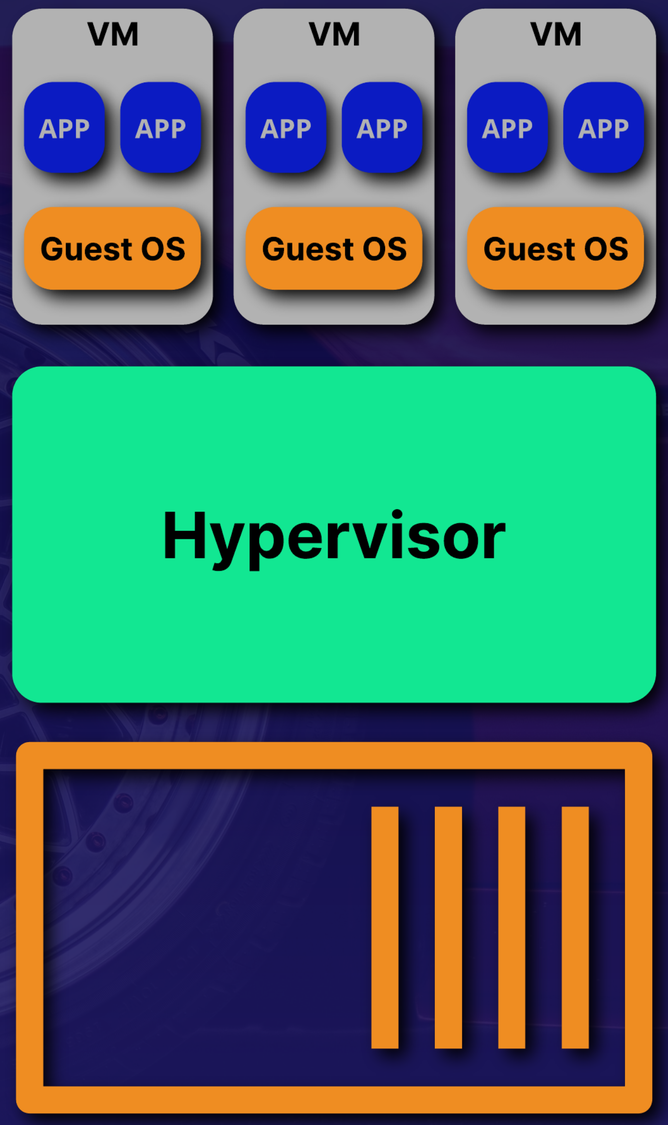
  - Sound
- Video



Type-1 vs. Type-2 Hypervisors

Type-1 Hypervisor:

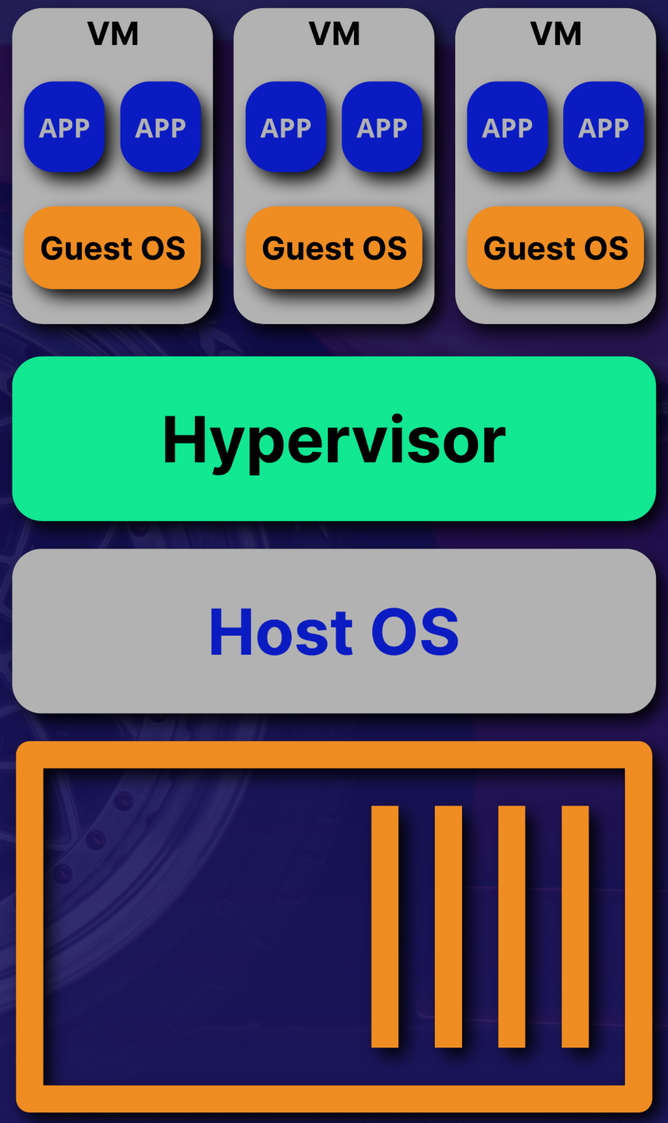
- Sits directly on the hardware
- It *is* the host **operating system**
- Example: VMWare ESX / KVM



Type-1 vs. Type-2 Hypervisors

Type-2 Hypervisor:

- Runs on top of a host operating system
- Example: VirtualBox / QEMU

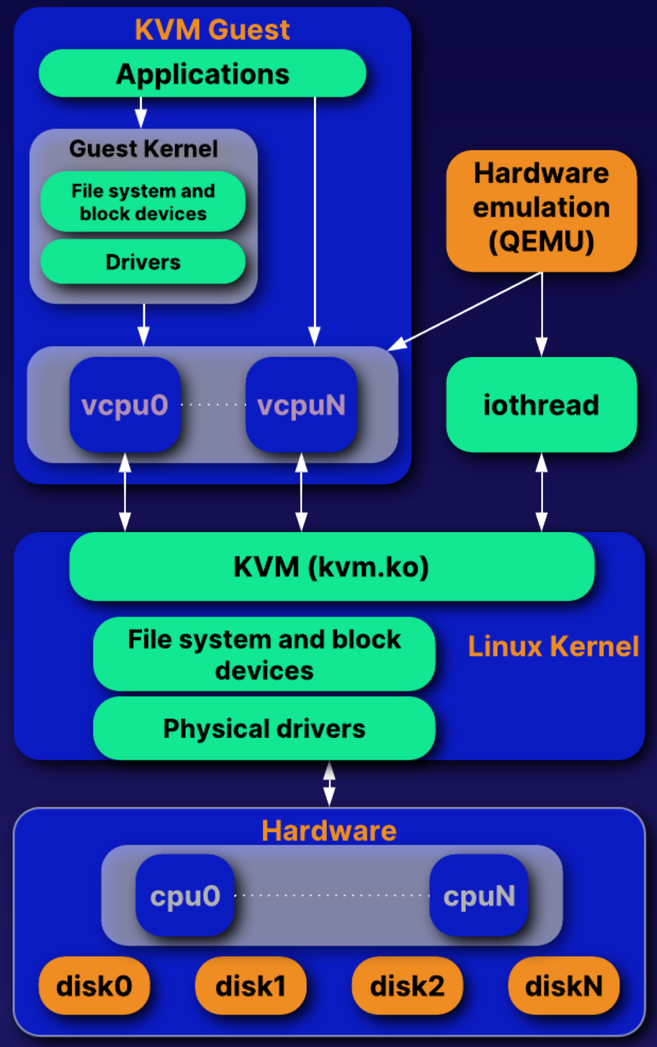


What Is KVM?

KVM

KVM: Linux Kernel Module

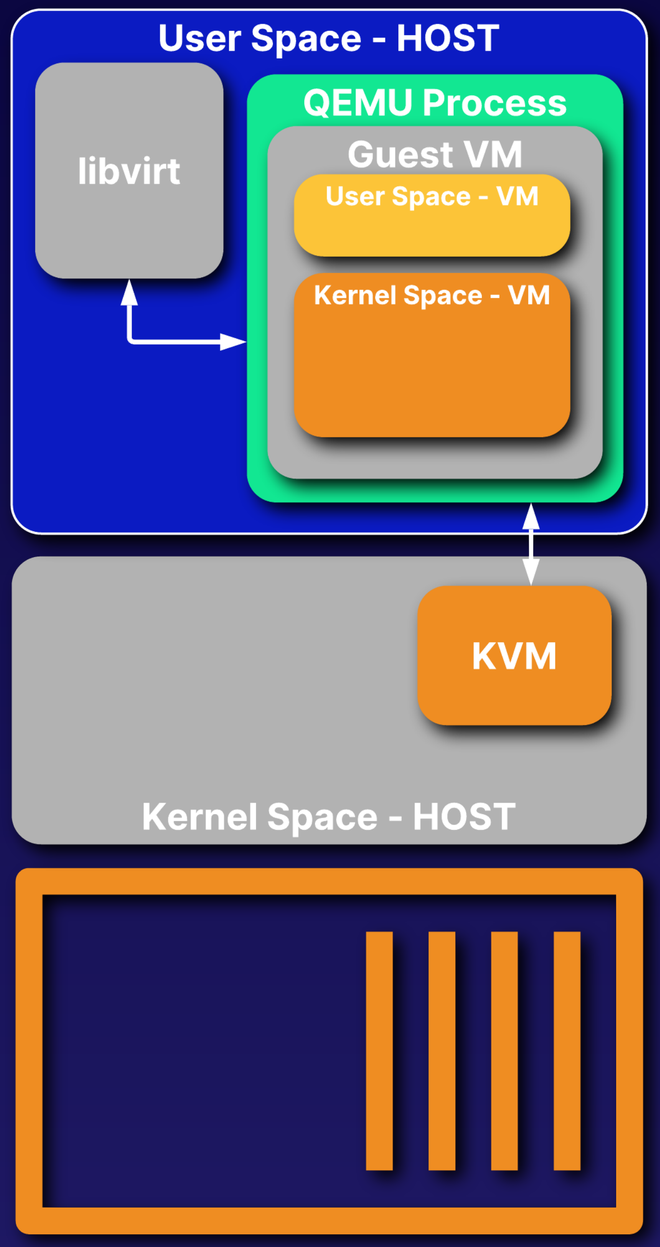
- Allows the kernel to function as a **type-1** hypervisor
- Was merged into the kernel mainline as of **2.6.20** (in February 2007)
- Provides the `/dev/kvm` interface
- Requires **hardware virtualization extensions**:
  - **Intel VT-x**
    - **vmx** extension
  - **AMD-V**
    - **svm** extension



What Is QEMU?

QEMU

QEMU is a **type-2** hypervisor that runs in **user space**. When used with **KVM**, it accelerates the performance of a **QEMU** guest, and the combination becomes a **type-1** hypervisor.



QEMU creates one process for every **VM** and a thread for each **vCPU**.

These run in the Linux scheduler.

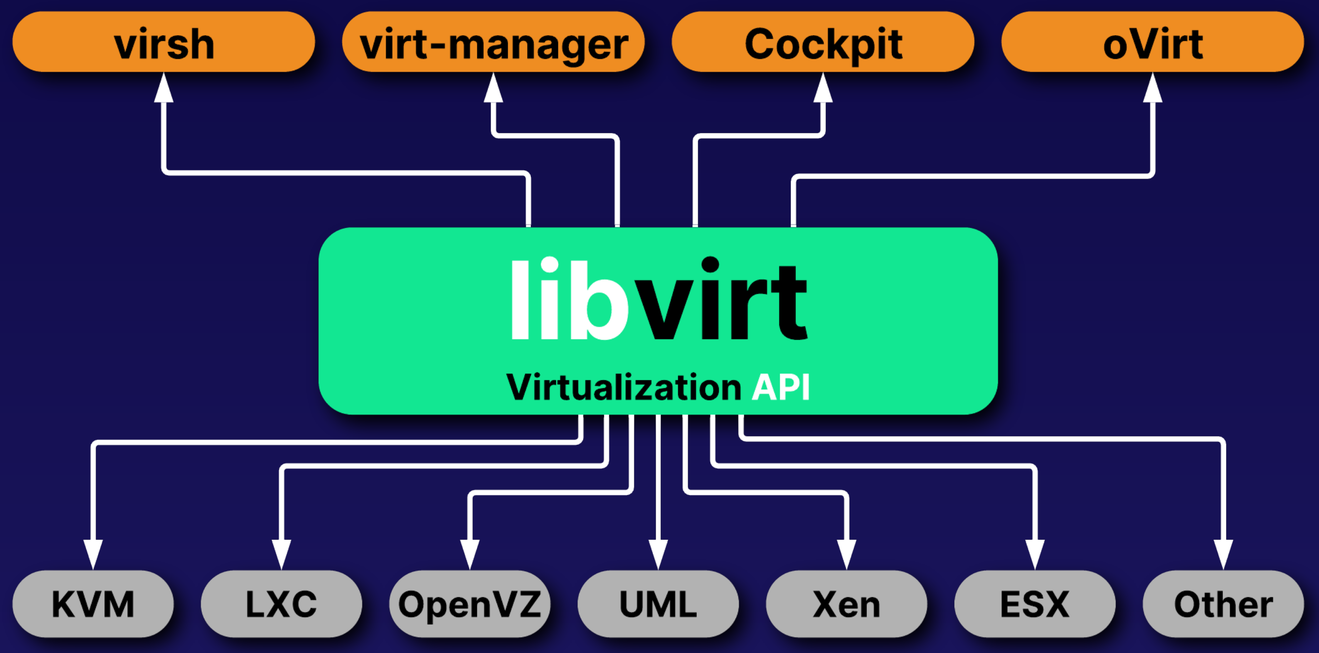
A **virtual machine** is a collection of processes running on the host.

What Is libvirt?

What's libvirt?

From the libvirt project:

- A toolkit to manage **virtualization** platforms
- Accessible from C, Python, Perl, Java, and more
- Licensed under **open-source** licenses
- Supports **KVM**, **QEMU**, **Xen**, **Virtuozzo**, **VMWare ESX**, **LXC**, **bhyve**, and more
- Targets **Linux**, **FreeBSD**, **Windows**, and **OS X**
- Used by many applications



(https://libvirt.org/)

How Does It Work?

KVM/QEMU/libvirt

KVM

Provides acceleration through access to hardware virtualization extensions

QEMU

Type-2 hypervisor that utilizes KVM for type-1 hypervisor acceleration

libvirt

Toolkit to manage virtualization platforms, like QEMU/KVM

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If Linux virtualization were a Corvette...

KVM would be the powerful engine under the hood.

KVM