redhat.

NVidia vGPU and Red Hat Virtualization

Virtual High End Workstations and Compute

April 2017

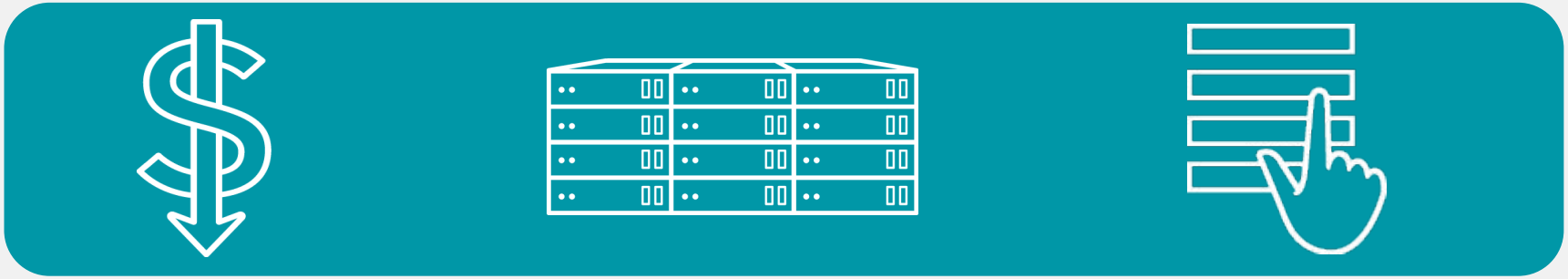
Agenda

- vGPU Overview
- Red Hat and NVIDIA partnership
- Prerequisites and Current Status
- Roadmap
- Demo Video

vGPU ON LINUX

Explained

VIRTUAL TECHNICAL WORKSTATION



Reduce costs for Technical Workstations

- No dedicated hardware per technical workstation is needed
- Centralized Management and Deployment in a Datacenter.

Maximizes physical infrastructure utilization

- Supports both **Linux** and **Windows** workloads
- Utilize one **GPU** across several virtual technical workstations using **mediated device support**

Fast deployment and Self Service

- Resource Management to buy new hardware in time
- Fast deployment process for new virtual technical workstations including Self Service

VIRTUAL TECHNICAL WORKSTATION

vGPU Investments Upstream

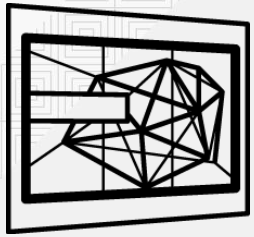
- NVIDIA (GRID)
- Intel (GVT-G)

High-powered technical workstations focus

- Conducive to running Linux or Windows
- Built-in Spice protocol for fast 3D remote displays

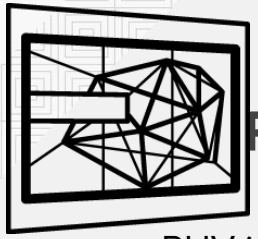
Target Markets

- Oil & Gas
- Energy
- Animation
- Sciences & Education
- Manufacturing & Engineering
- Gaming



USE CASE EXAMPLES

- Oil & Gas
  - Geotopical - Advanced rendering of pipeline/drilling layout/analysis
- Energy
  - Advanced rendering and display of energy simulations
- Animation
  - Enhancing the animation workflow with real-time rendering/display
- Manufacturing
  - CAD/CAM design in auto, aeronautics, etc.
- Sciences
  - Real-time data modeling and rendering (GOES-R Satellite)
- Gaming
  - What us geeks actually care about. Cloud Gaming, Remote Play Game Streaming



REASONS CUSTOMERS LIKE RED HAT VIRTUALIZATION

RHV is built on QEMU-KVM and delivers easier integration and interoperability with existing infrastructure, higher density and performance, and improved economics.

Performance & Scalability:

- Higher VM density (specvirt) yields improved economics.
- Red Hat is a top contributor to KVM development - we can help guide RFE's upstream
- RHV performance meets or beats competing solutions - same workload on same hardware

Automation & Seamless Deployments:

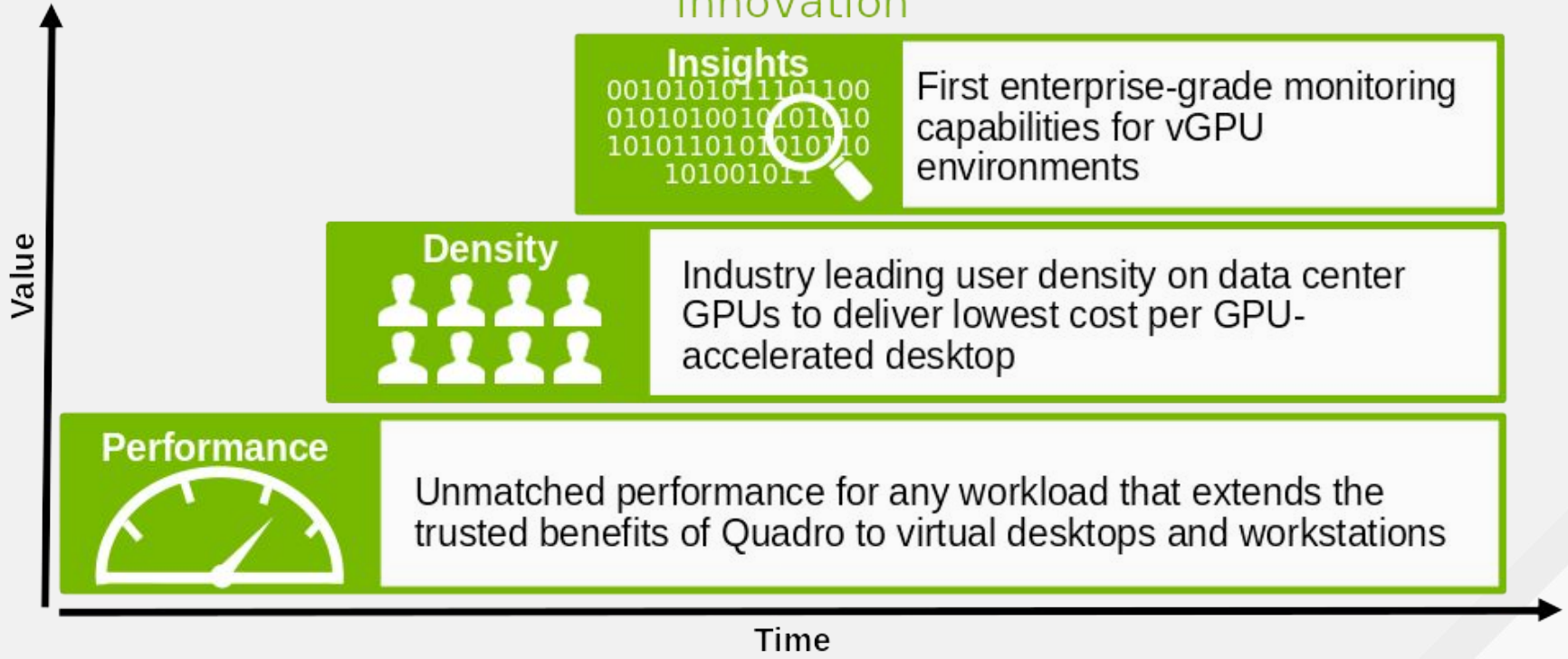
- Customer can re-use many RHEL7 security practices for their RHV infrastructure
- RHEL runs better on RHV - no additional guest agents required... better compatibility story with hosting new major/minor RHEL releases

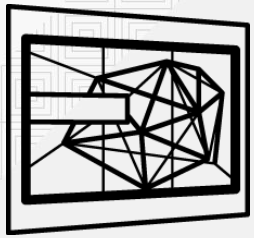
Interoperability:

- RHV supports both Windows (full SVVP) and Linux workloads.
- RHV integrates and supports multiple directory services, including Microsoft Active Directory, Red Hat IdM, and Red Hat Directory Server

THE NVIDIA GRID PLATFORM

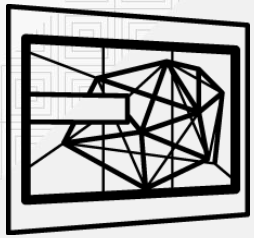
Leveraging software and hardware updates for faster innovation





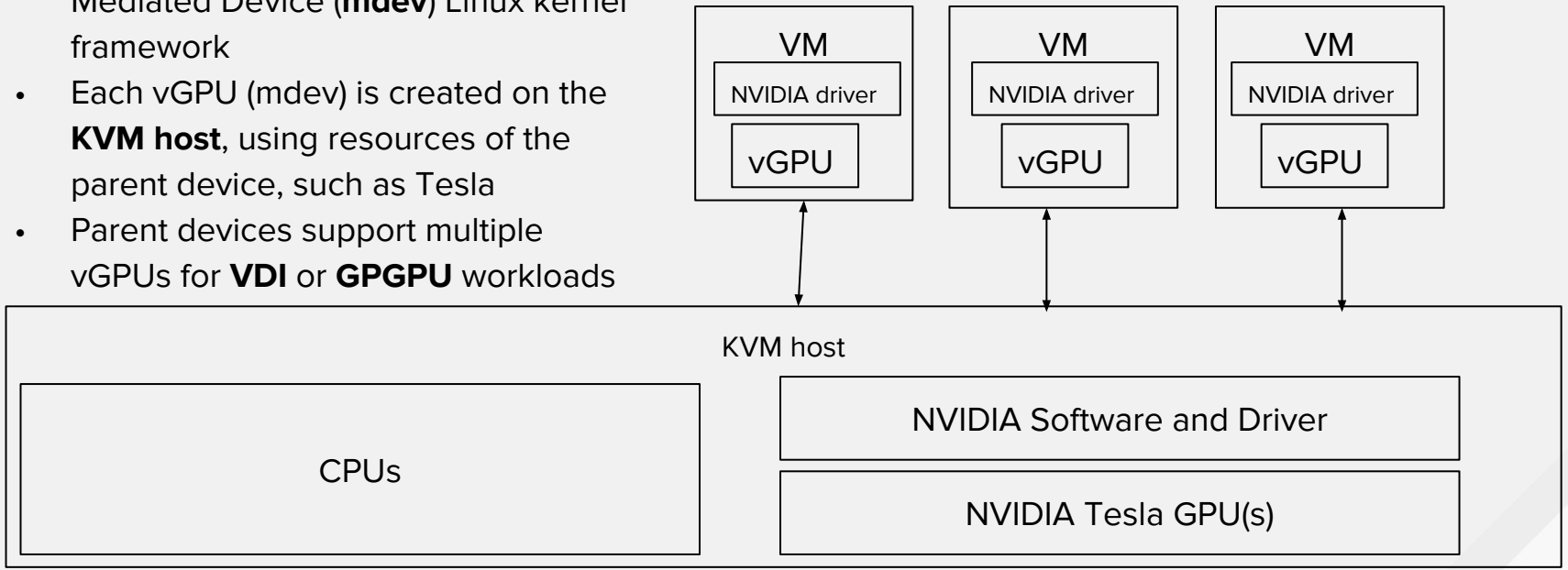
RED HAT AND NVIDIA PARTNERSHIP

- Red Hat and NVIDIA joined engineering forces to provide the vGPU kernel requirements for mediated device support that have been accepted upstream
  - Kudos to the upstream community that contributed code and reviews during that process.
  - the mdev support is being used by other vendors as well.
- Design an easy to consume driver framework from Red Hat and NVIDIA (including nvidia.ko)
- Elements of the “complete stack” are proprietary and provided by NVIDIA (Drivers, etc.)
- Integrate into Red Hat product strategies with KVM, libvirt, RHV and OpenStack



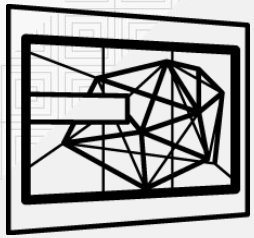
vGPU OVERVIEW

- **vGPUs** are enabled through the Mediated Device (**mdev**) Linux kernel framework
- Each vGPU (mdev) is created on the **KVM host**, using resources of the parent device, such as Tesla
- Parent devices support multiple vGPUs for **VDI** or **GPGPU** workloads



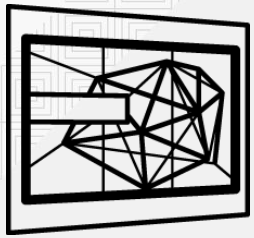
How to build a vGPU server

Explained



PREREQUISITES

1. NVidia Software for operating the hardware
   - Can be obtained from NVIDIA.
2. QEMU with VFIO “sparse mmap” support
3. libvirt with mdev support for QEMU
   - For creating and attaching vGPU devices to qemu-processes
   - vGPU Lifecycle Management
4. Kernel with mdev patches applied
   - upstream 4.10-kernel has them included



CURRENT STATUS

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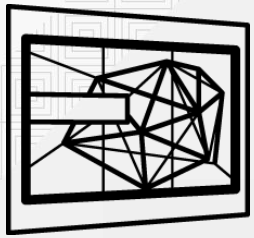
The drivers are not yet publicly released.

In case access is required, please contact NVIDIA for the prerequisites for accessing these prerelease drivers.



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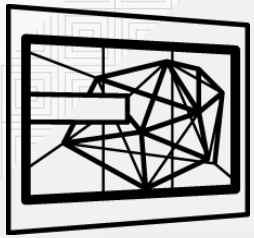
Upstream in QEMU since v2.7



CURRENT STATUS

libvirt changes available upstream.
Being shipped with F25 “virt-preview” release.
Creation of the vGPU devices needs to be done in advance and is not yet managed by libvirt.

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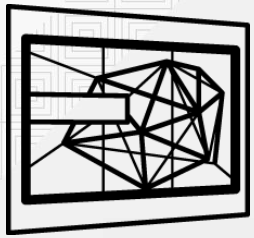

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Landed upstream in Dec 2016 for 4.10 kernel:
- In Fedora 25 rawhide
- Will be included in RHEL 7.4 kernel

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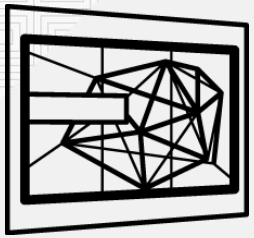
Red Hat Roadmap for vGPU support



vGPU ENABLEMENT ROADMAP

Subject to change

Q4-2015
RedHat/NVidia partnership for vGPU in Linux

Q4-2016
mdev (vGPU) patches in upstream 4.10 kernel

Q1-2017
4.10 kernel lands in Fedora Rawhide

Q2-2017
RHEL 7.4
private Beta
w/vGPU kernel enablement

Q3-2017
RHEL 7.4 GA
w/vGPU kernel enablement

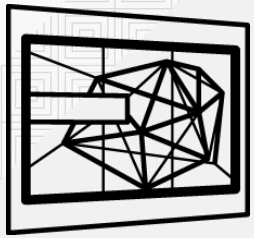
Q1-2018
RHV 4.2 GA
w/ vGPU support

Q2-2018
RHOSP 13 GA
(vGPU tech preview)

Q2-2018
RHEL 7.5 GA
w/SPICE for vGPU

Video

3D graphics workload running on RHEL 7.4 with vGPU



How do vGPU powered VMs behave

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