



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

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)

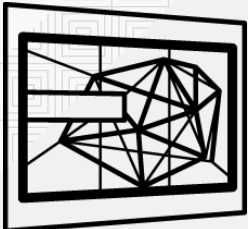
High-powered technical workstations focus

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

Target Markets

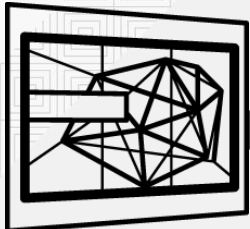
- Oil & Gas
- Energy
- Animation
- Sciences & Education
- Manufacturing & Engineering
- Gaming





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:

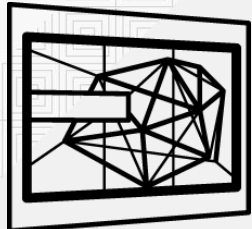
- Higher VM density ([specvirt](#)) yields improved economics.
- Red Hat is a top contributor to KVM development - we can help guide RFE's upstream
- RHV performance meets or beats competing solutions - same workload on same hardware

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

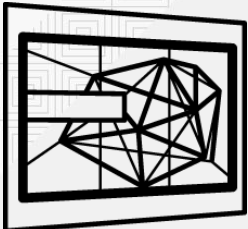
Interoperability:

- 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



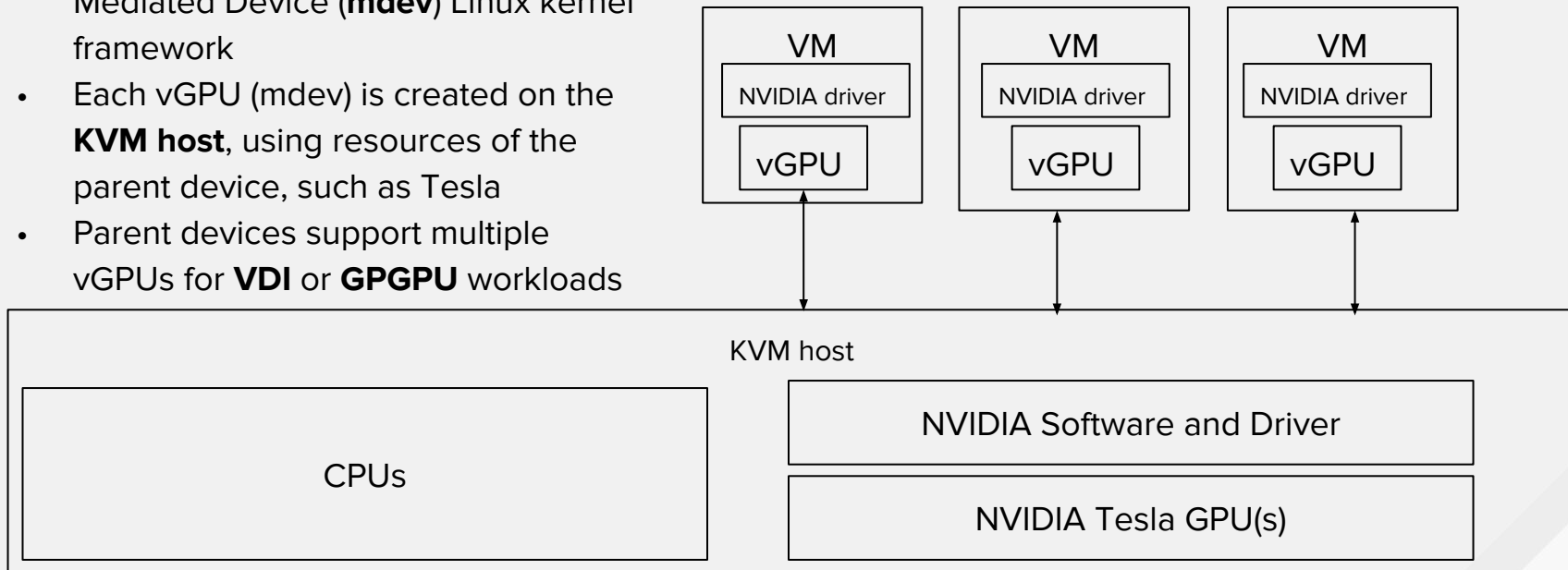
RED HAT AND NVIDIA PARTNERSHIP

- ❖ 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



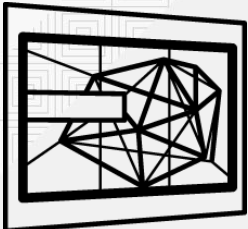
vGPU OVERVIEW

- **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



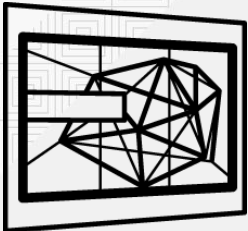
How to build a vGPU server

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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3. libvirt with vGPU support for q

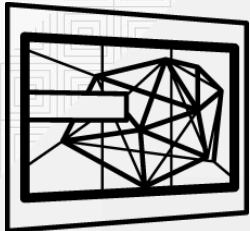
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The drivers are not yet publicly released.

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



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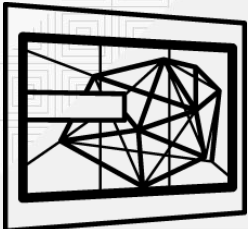
3. libvirt with vGPU support for

Upstream in QEMU since v2.7

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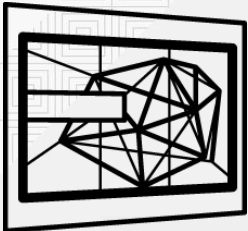
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libvirt changes available upstream.
Being shipped with F25 “virt-preview” release.
Creation of the vGPU devices needs to be done in advance and is not yet managed by libvirt.



CURRENT STATUS

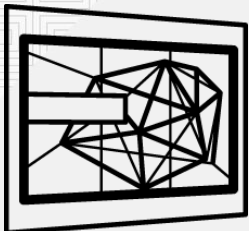
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Landed upstream in Dec 2016 for 4.10 kernel:

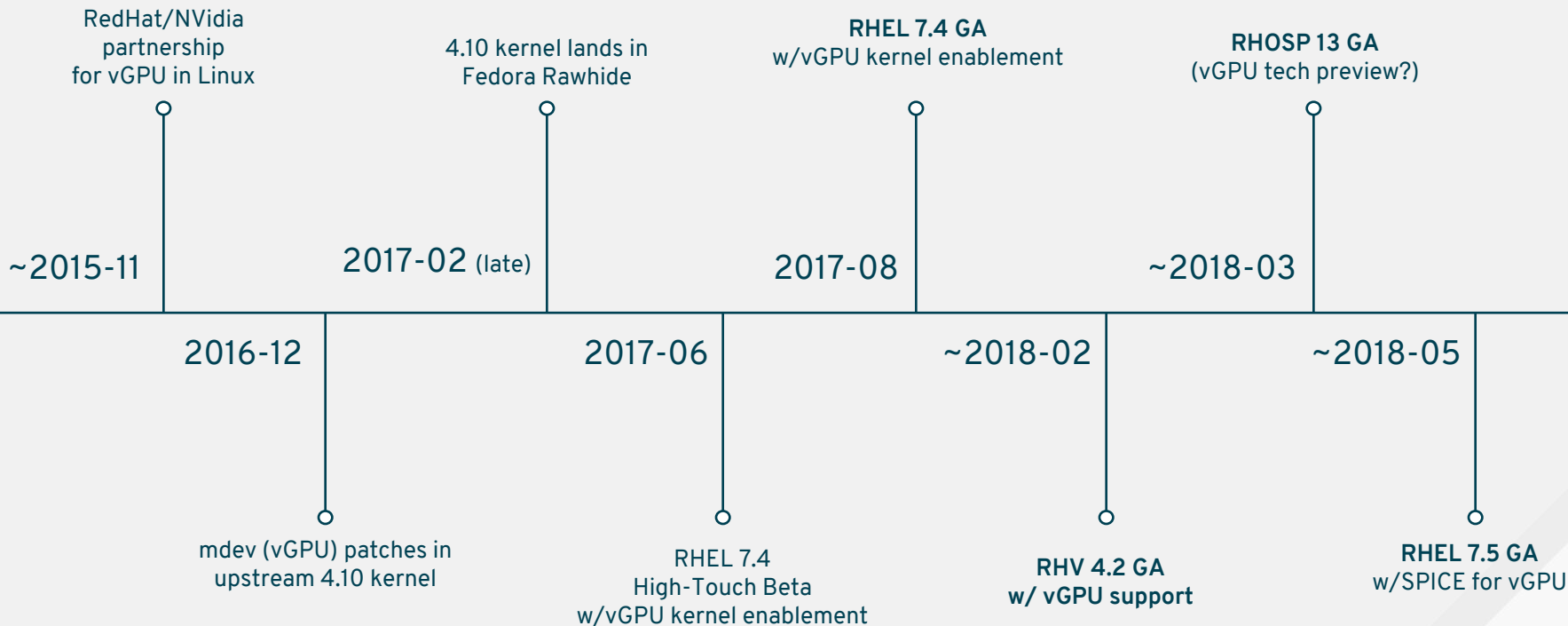
- In Fedora 25 rawhide
- Will be included in RHEL 7.4 kernel

4. Kernel with mdev patches
 - upstream 4.10-kernel has them included

Red Hat Roadmap for vGPU support

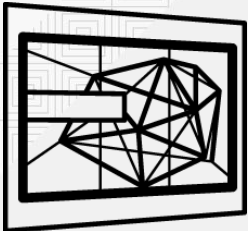


vGPU ENABLEMENT ROADMAP *Subject to change*

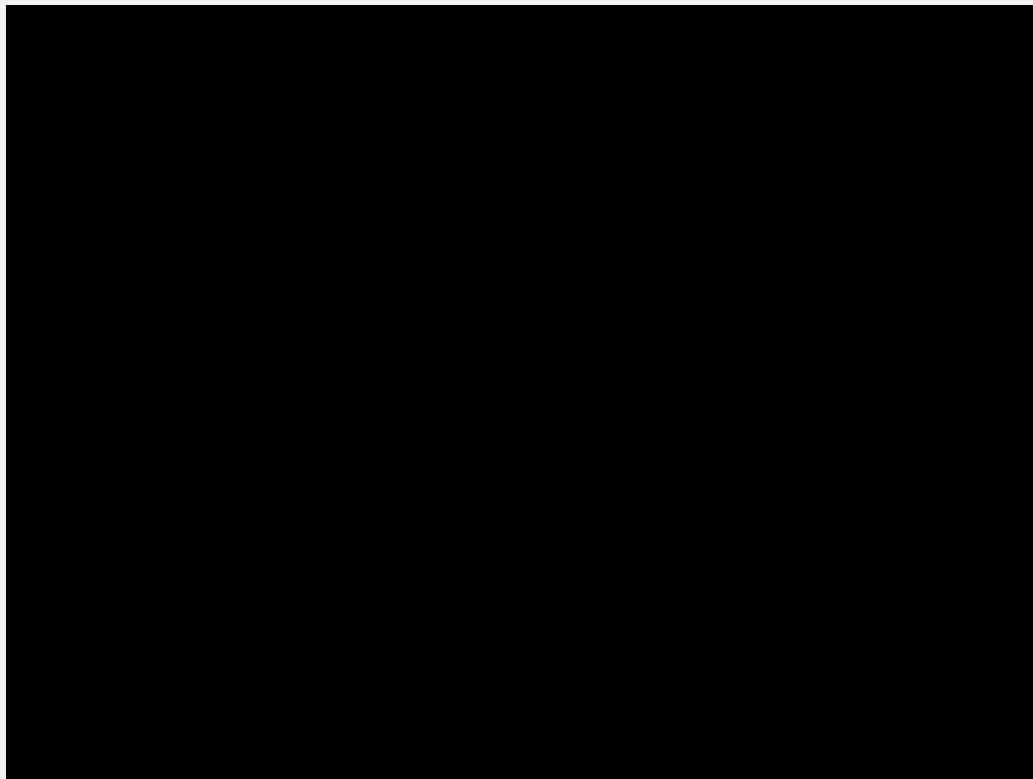


Video

3D graphics workload running on RHEL 7.4 with vGPU



How do vGPU powered VMs behave





THANK YOU



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