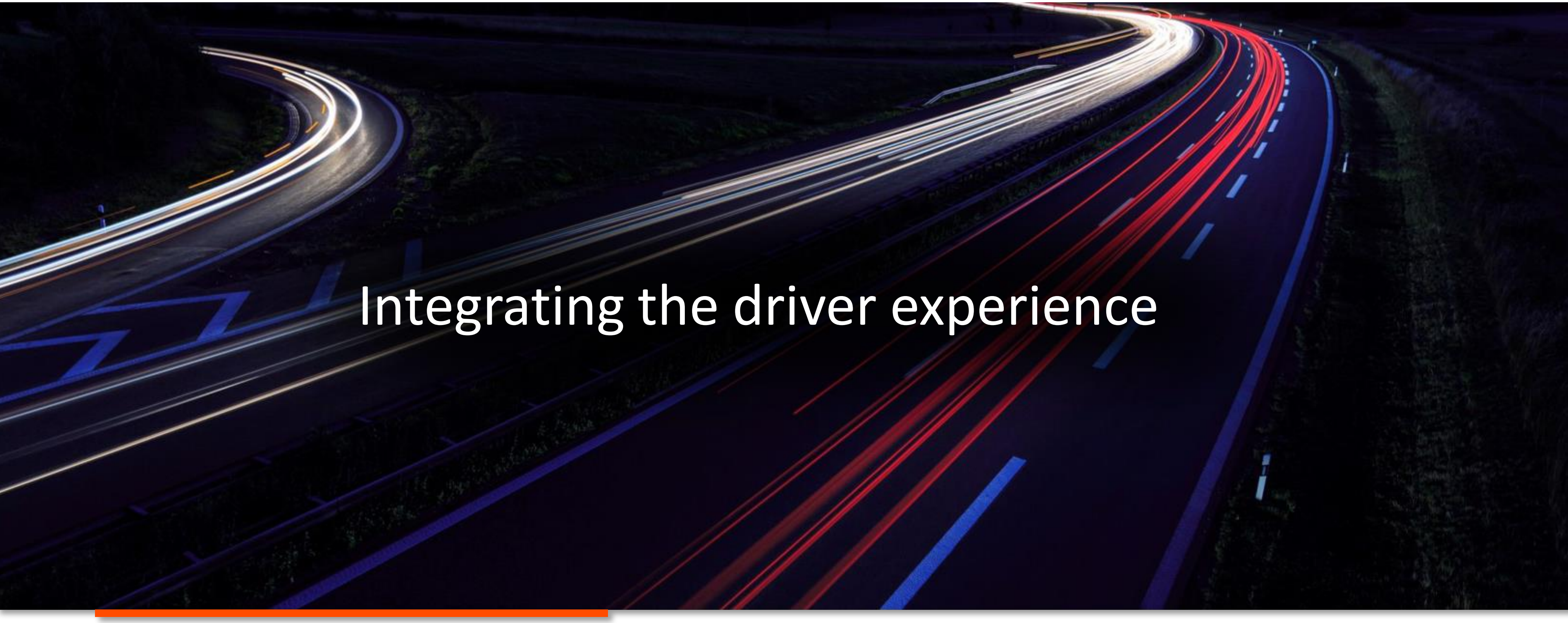
OPENSYNERGY


Integrating the driver experience

Virtio-GPU

2018-10-11 Genivi Bangalor Tech Summit

Matti Moell

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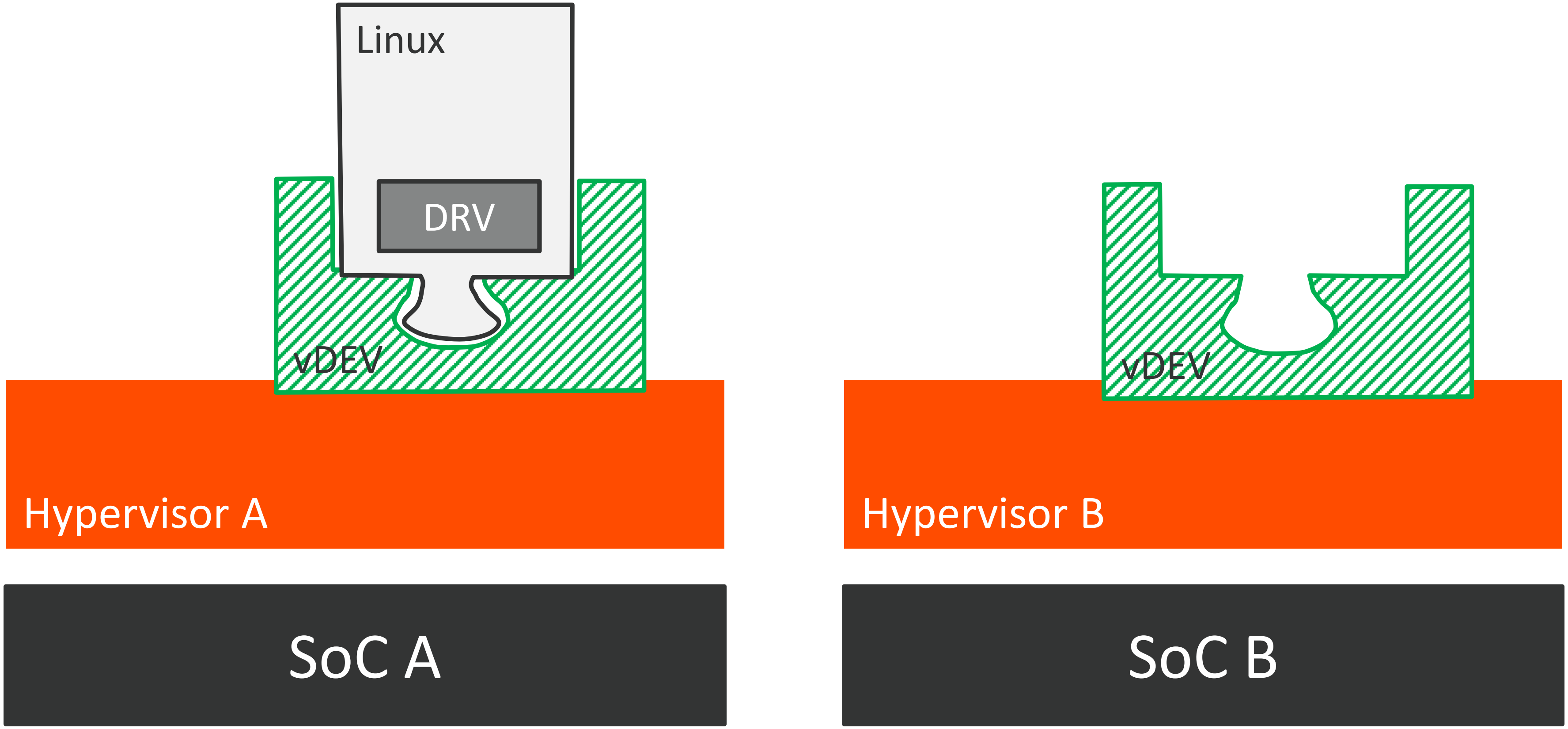
VISION: Run Guests without modifications

A **Virtual Platform** allows the development of virtual machine guests that could be moved among different hypervisor systems and/or HW platforms **without further modification** through establishing an industry standard / de-facto standard.



Legend for VIRTIO terms

Device refers to the implementation of the virtual/para-virtual device, also known as Backend or Server

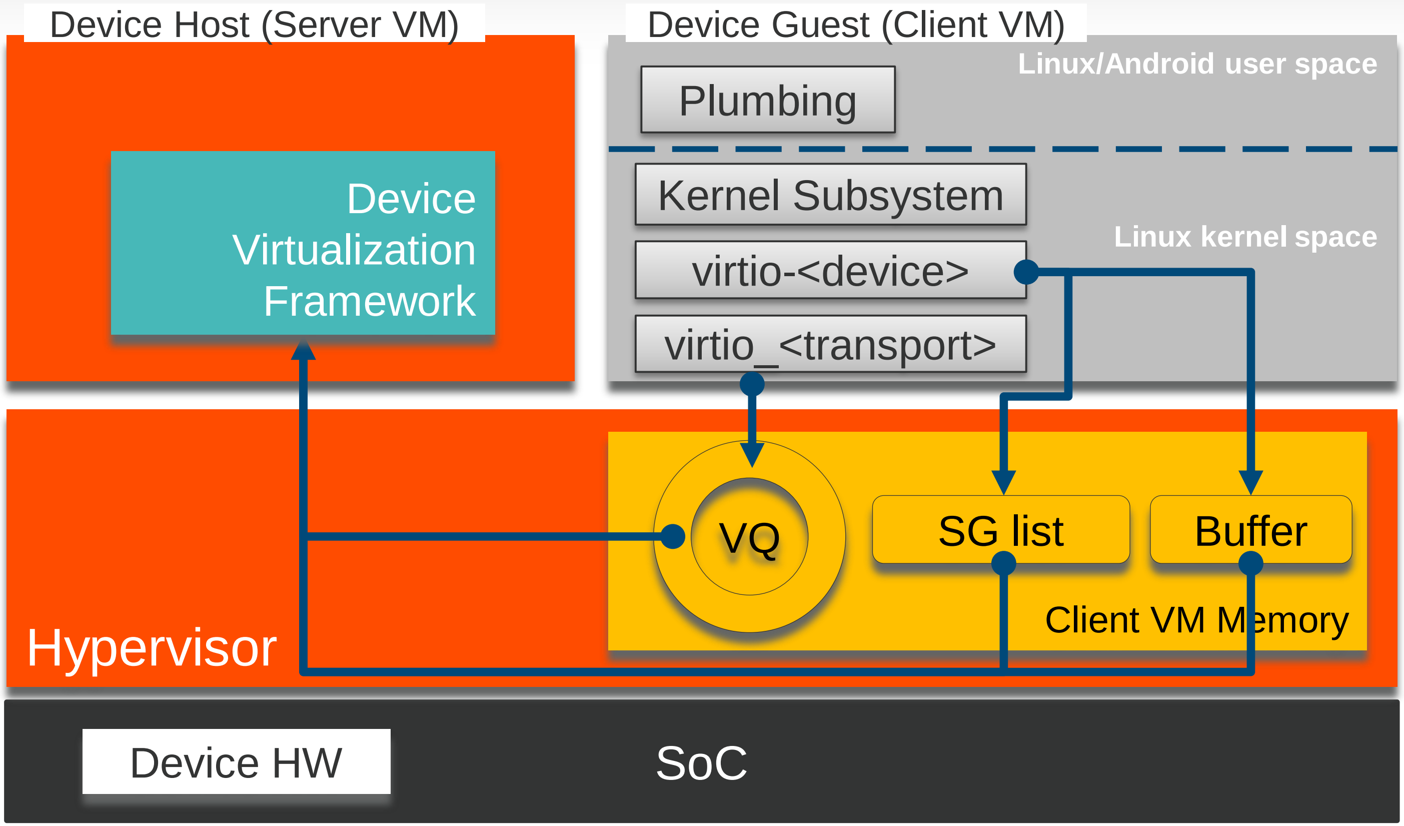
Driver refers to the guest driver, also known as Frontend or Client

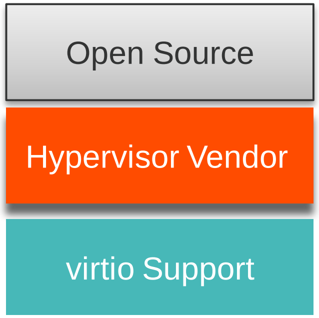
Device Host is the guest that provides the Device to other guests

Device Guest is the consumer of a Device

Guest is a partition or virtual machine

Virtualized device Architecture with VIRTIO





VQ=virt-queue
SG=Scatter Gather

Bulk data transport via DMA-like memory model

- Buffer **allocations** handled by „Driver“ part (client)
- **Direct** R/W access to allocated buffers in the „Device“ part (server)

Metadata transport via virt-queues (ring buffers, asynchronous pipeline)

VIRTIO-GPU

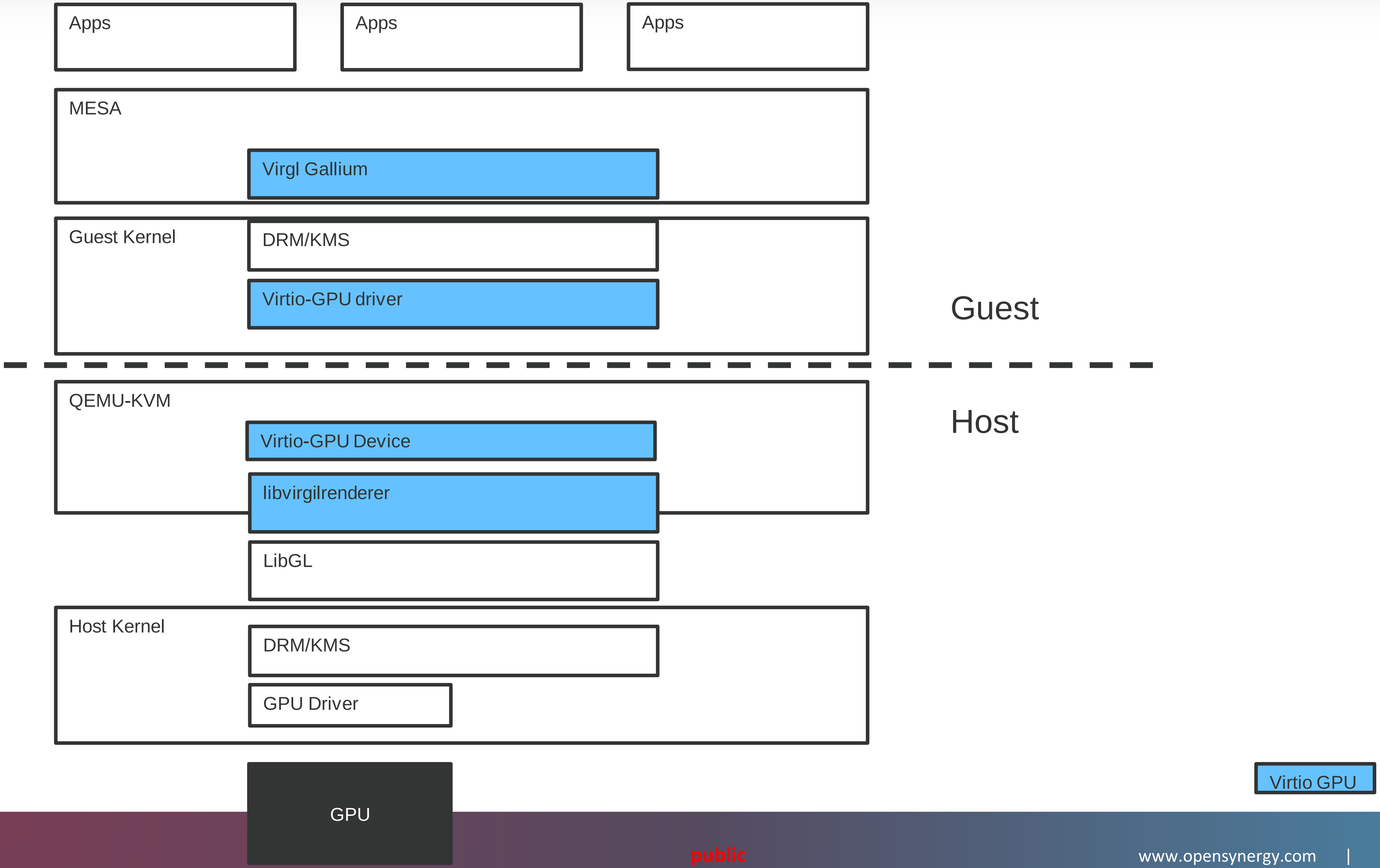
Virtio-GPU 2D

- Virtual Display, much like a VGA port
- Accepted for VIRTIO 1.1
- Framebuffers object are allocated in the driver
- Four Basic Commands
  - Get screen information
  - Attach framebuffer via sg_list
  - Set scan-out by reference
  - Flush scan-out

Virtio-GPU 3D

- Forward sanitized OpenGL Commands
- Support for OpenGLES 3.1, OpenGL 4.1, Vulkan support in development
- Based on open-source libvirgilrenderer on the host (BSD licensed)
- Based on Mesa driver for guest
- Shaders are transferred in intermediate format (TGSI)

Virtio GPU Architecture (QEMU)



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Virtio GPU Overview

Virgl Gallium

- Implements Gallium driver for mesa
- Generate virtio-GPU Command stream
- Conververts GLSL into TGSI

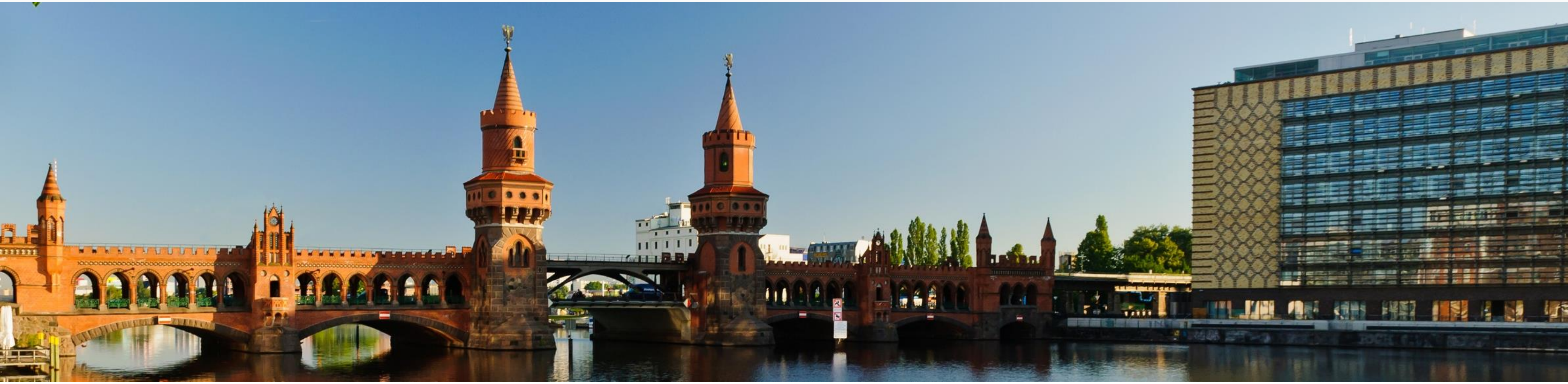
Virtio-GPU driver

- Screen metadata
- Modesetting
- Context Mangement
- 3D resource management
- DMA transfer initiation
- Command stream submission
- Fencing

libvirgilrenderer

- Gallium to GL interface conversion
- TGSI->GLSL
- Host side context lifecycle management
- OpenGL version arbitration
- Issues OpenGL commands to native LibGL

OPENSYNERGY



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