Virtual I/O (VIRTIO) based virtualization in AGL

Mikhail Golubev, 19.10.2022
Agenda

• Enter VIRTIO
• How VirtIO works
• VirtIO devices in AGL
• Demo architecture outline
• Swap on the Fly Demo
Enter VIRTIO

• Developed in 2008 as a hypervisor neutral way of accessing devices

• Provide virtual machines access to Input/Output

• A standardized interface for I/O between virtual machines and hypervisors

• Abstract device functionality instead of hardware

• Drivers are widely available in all major operating systems
  • Linux, Android, BSD, Windows, etc.

• Supported by all clouds and enterprise hypervisors

• Reliable and proven technology

• Versatile abstraction model

• Scalable and high performance

• Multiple interoperable implementations

• Broad ecosystem across multiple industries
How VirtIO works

- Bulk data transport via DMA-like memory model
- Buffer allocations handled by "Driver" part (client)
- Direct Read/Write access to all allocated buffers in the "Device" part (server)
- Metadata transport via Virtual Queues (ring buffers, asynchronous pipeline)
- Virtio Transport is independent from Hypervisor and/or Hardware
VirtIO devices in AGL

* OASIS Consortium standardizes the VIRTIO interface

- Add automotive specific device interfaces to standard
- Provide high quality drivers in upstream Linux kernel
- Prepare virtual machine ecosystem that guarantees guest readiness
  - AGL
  - Android
  - RTOS
  - ...

VIRTIO v1.2*

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VIRTIO v1.3+*

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Demo system architecture overview

- Swap / Upgrade IVI OS independently of hardware vendor
- Migrate existing system to a new hardware

Legend:
- Open Source/Vendor BSP
- OpenSynergy
- Hardware
Swap on the Fly Demo

https://vimeo.com/713301344
Thank you!

Questions?