



Introduction of Oct 19 Software Defined Vehicle Sessions

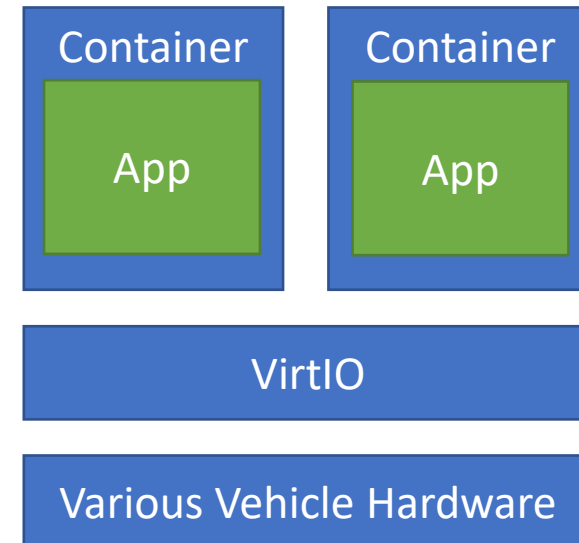
Oct 19, 2022

AGL F2F Workshop @Tokyo

Agenda

Time	Title	Speakers
11:00~11:05	Introduction of Overall Agenda	Jerry Zhao - Panasonic
11:05~12:00	Guest Speech: Software Defined Vehicle and OSS as key enabler for SDV - SBD Automotive	Masahiro Otsuka - SBD Automotive
12:00~13:00	Lunch	
13:00~14:15	SDV Technology Enablers in AGL - Virt-EG Update on VirtIO	Jerry Zhao - Panasonic Mikhail Golubev - OpenSynergy Michele Paolino - Virtual Open Systems Atsuya Nasu - Panasonic
14:15~14:30	Break	
14:30~15:30	SDV Technology Enablers in AGL - Container-EG Update on Container	Ilic Nenad - AWS
15:30~16:00	Break	
16:00~17:00	Guest Speech from SOAFEE/ARM: Software Defined AGL	Rod Watt - ARM

VirtIO & Containers enables software (applications) to be decoupled from hardware





Guest Speech from SBD Automotive - The Software Defined Vehicle and OSS

Oct 2022

Masahiro Otsuka, SBD Automotive



VirtIO - A Common Device Framework to Achieve Software Defined Vehicle

Oct 2022

AGL Virtualization Expert Group Leader

Jerry Zhao, Panasonic Automotive Systems Co., Ltd.

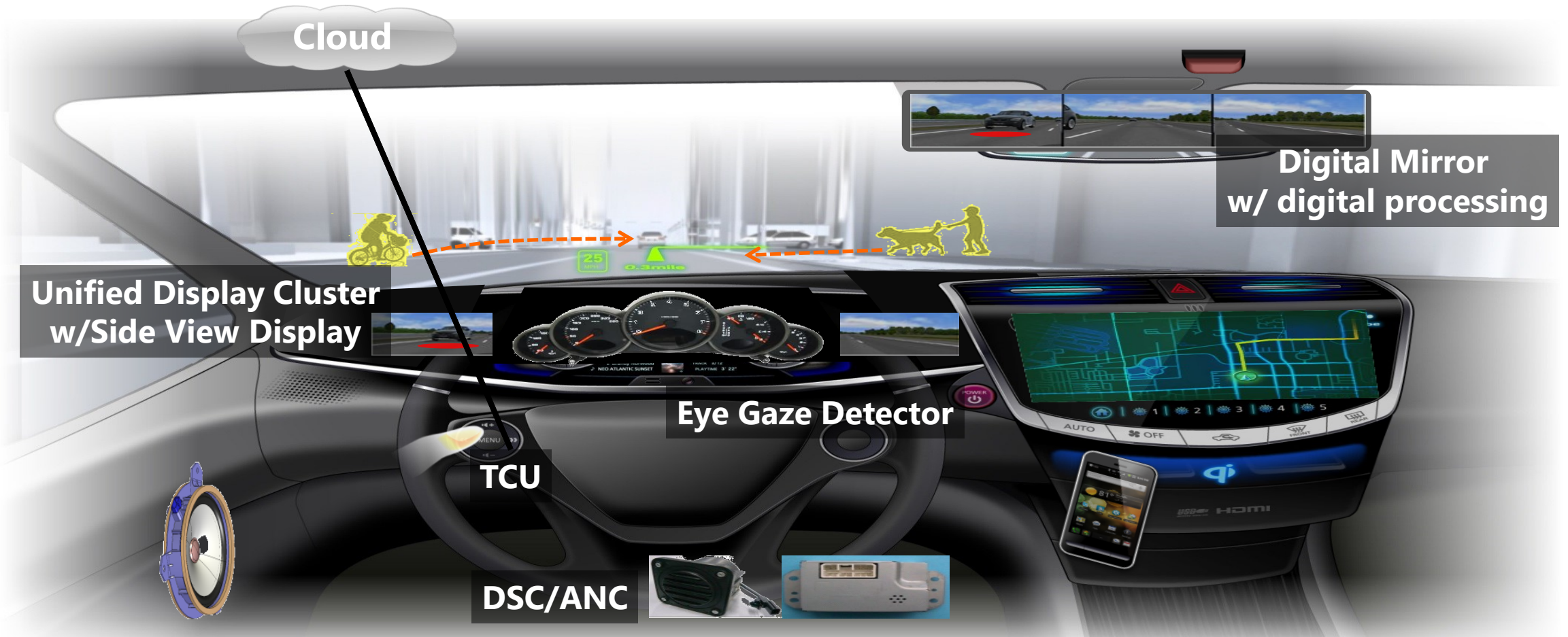
About AGL Virtualization Expert Group

- **Start of the Expert Group:**
The expert group was created from a BoF held in the Munich AGL AMM 2016 meeting and started activities from 2017.
- **Responsibility:**
The AGL Virtualization Expert Group (Virt-EG) is responsible to design and implement virtualization solutions for AGL.
- **EG Members:**
On average 10~20 members from different fields are joining the bi-weekly call. Panasonic started to serve as the leader of Virt-EG since 2020.
- **Interest Points:**
Hypervisors and device virtualization solution. **Nowadays, Virt-EG is focusing on applying and extending standard device virtualization framework VirtIO for diverse AGL use cases to empower evolution to a Software-Defined AGL.**

Device Virtualization for Software Defined Vehicle

Cockpit Digital Transformation

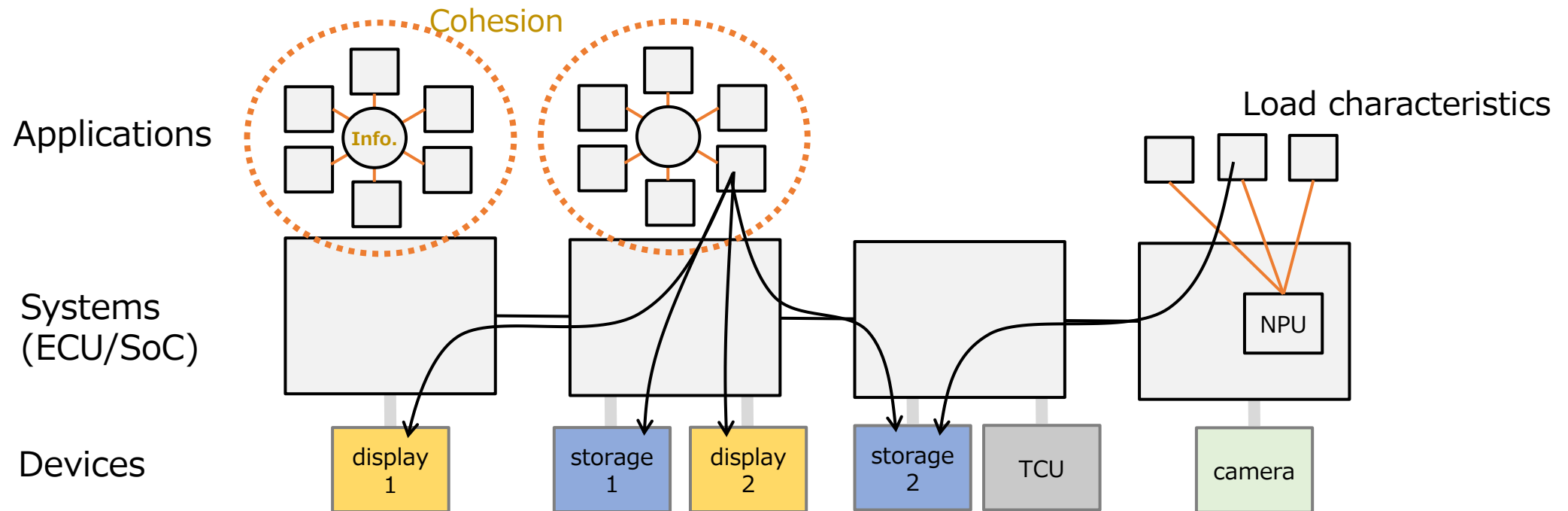
Cockpit is going to be filled with digital instruments.



Device Virtualization: Specific Necessity in Automotive

Common abstraction of diverged devices among car models and location transparency of devices are especially critical for application software asset.

- Diversity of Devices due to Various Car Models
- Highly Distributed Architecture
- Conflicts between optimized allocation policies of applications and devices

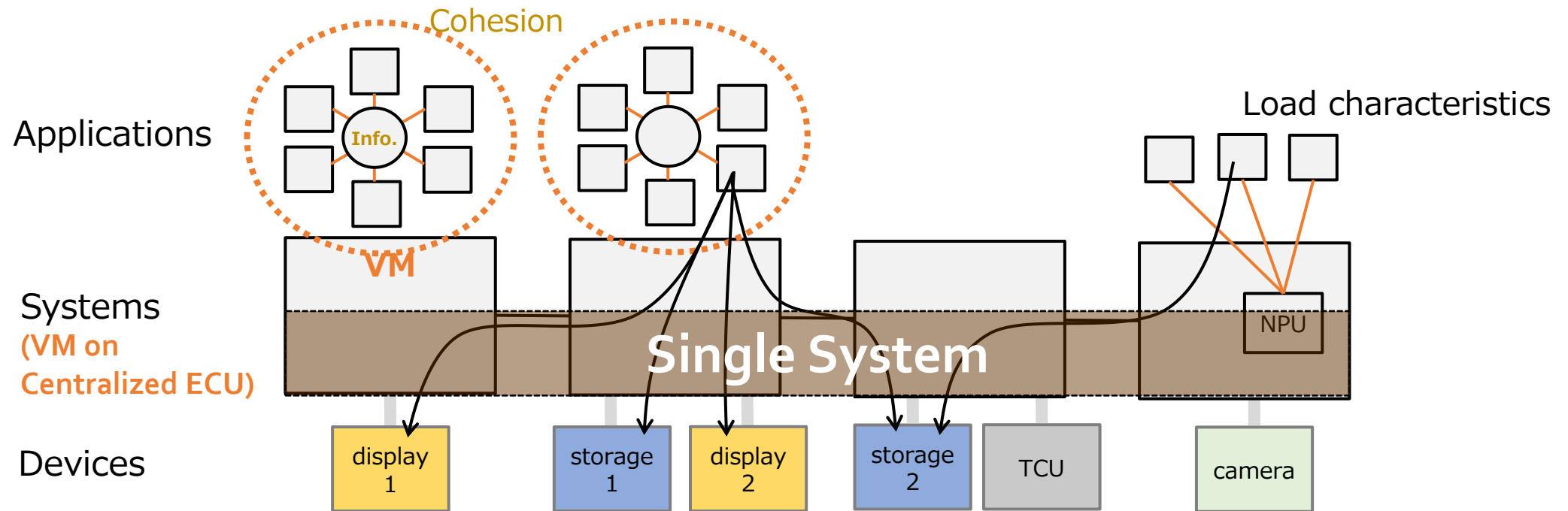


Excerpt from Panasonic's Keynote Presentation at the AGL AMM July 2020

Device Virtualization: Specific Necessity in Automotive

Common abstraction of diverged devices among car models and location transparency of devices are especially critical for application software asset.

- Even for centralized ECU, the same argument applies because the system inside is divided to multiple VMs

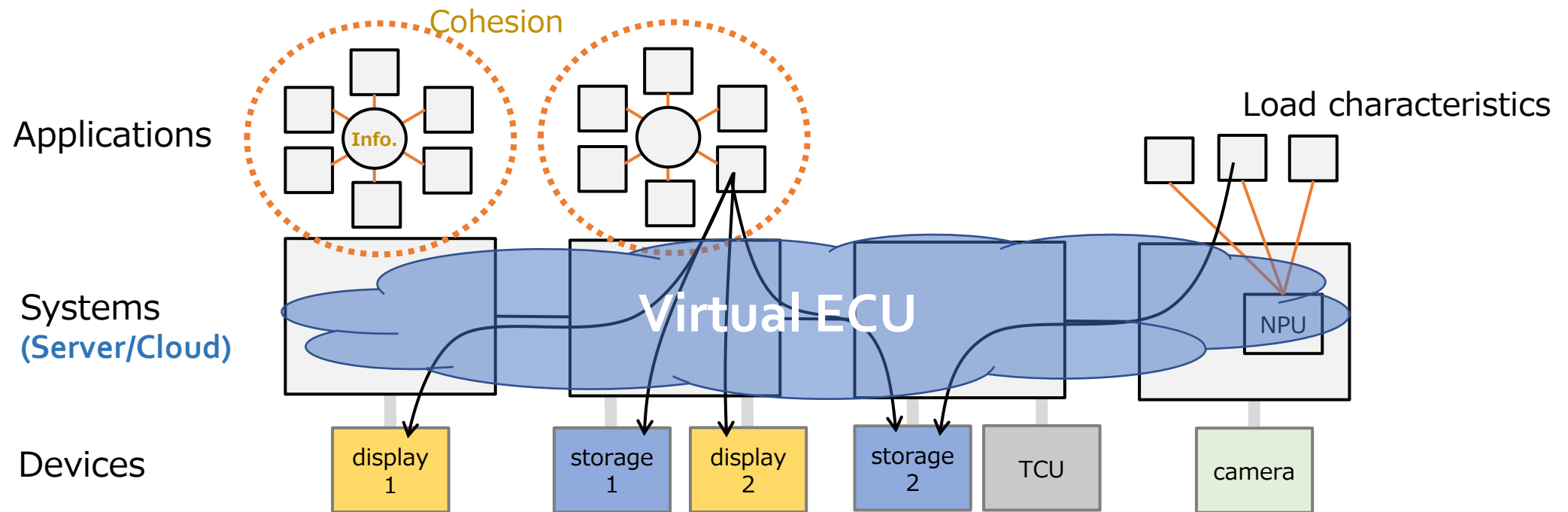


Excerpt from Panasonic's Keynote Presentation at the AGL AMM July 2020

Device Virtualization: Specific Necessity in Automotive

Common abstraction of diverged devices among car models and location transparency of devices are especially critical for application software asset.

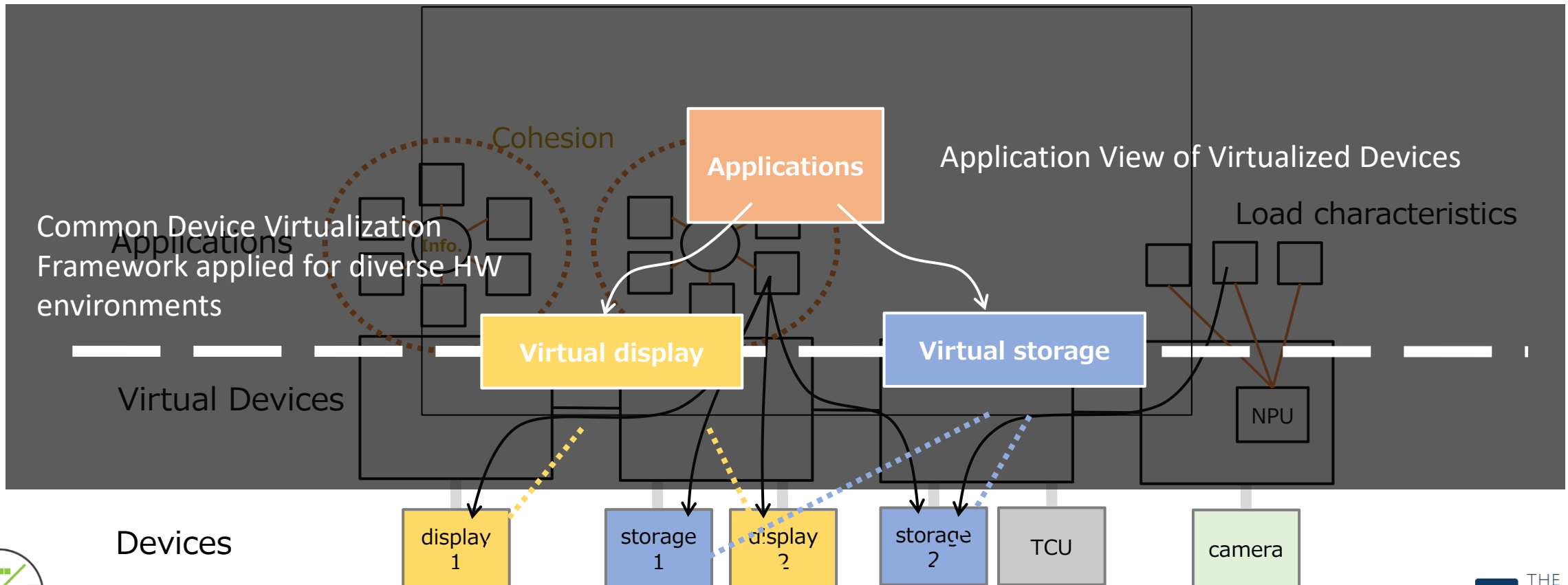
- In addition, same issue will apply to **Virtual ECU constructed in Server/Cloud** where has completely different device natures from the one on the automotive edge.



Excerpt from Panasonic's Keynote Presentation at the AGL AMM July 2020

Device Virtualization: Key to Software Defined Vehicles

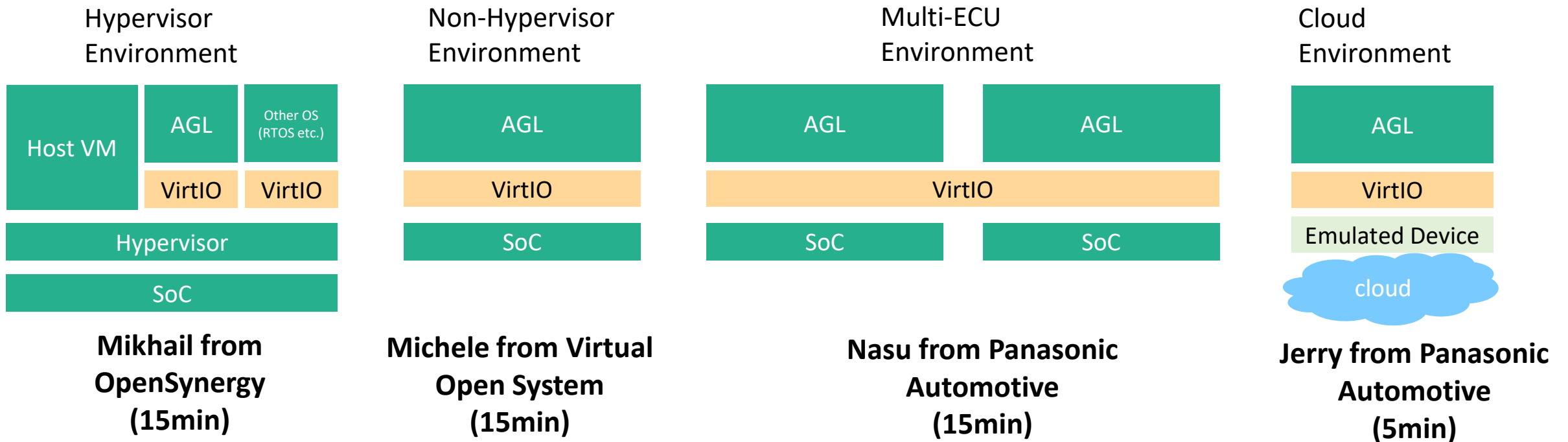
Software Defined Vehicle needs a common device virtualization framework to decouple software implementation from diverse hardware targets across vehicle variants/generations, architectures (single/multiple-ECU) and development environments (real/virtual ECU)



VirtIO as A Common Device Virtualization Framework

Overview of Device Virtualization in AGL - Concept

Device Virtualization with VirtIO benefits in establishing a complete and healthy ecosystem for AGL to enhance interchangeability and interoperability in various scenarios.



VirtIO on Hypervisor

- Presenter: Mikhail Golubev, OpenSynergy
- Slides: [Virtual I/O \(VIRTIO\) based virtualization in AGL](#)

VirtIO on Non-Hypervisor

- Presenter: Michele Paolino, Virtual Open Systems
- Slides: [Virtio-loopback: a common device interface between Virt-AGL and Non-Virt AGL](#)

VirtIO on Multi-ECU

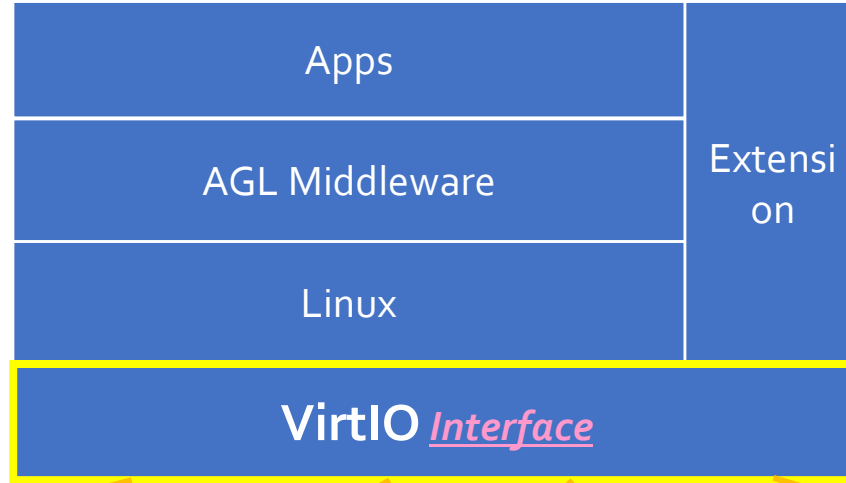
- Presenter: Atsuya Nasu, Panasonic Automotive Systems Co., Ltd.
- Slides: [Introduction of UnifiedHMI](#)

VirtIO with Cloud-Native AGL

Jerry Zhao, Panasonic Automotive Systems Co., Ltd.

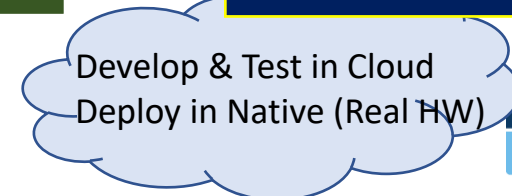
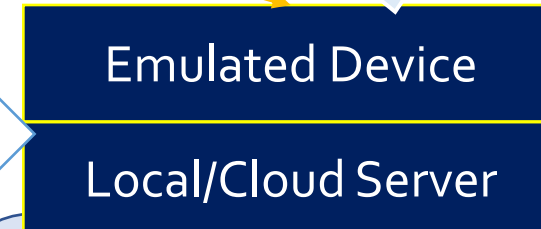
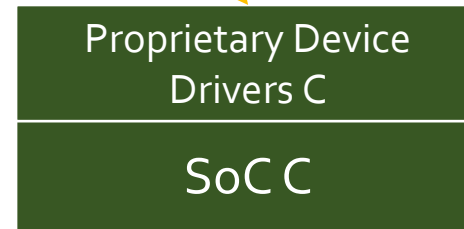
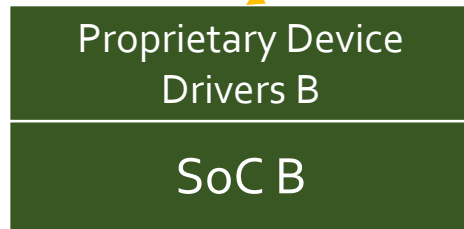
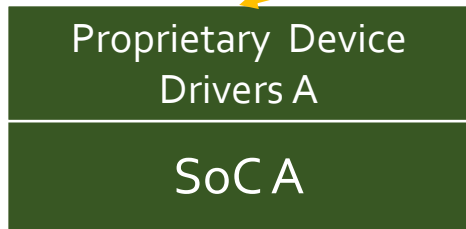
VirtIO with Cloud-native AGL

Utilize VirtIO as a well-defined device HAL even for non-virt AGL may further helps to reduce fragmentation across SoCs and encourage "AGL-ready BSP"



Maximized commonality of AGL Software among SoCs, virt/non-virt, cloud/non-cloud environment

Use VirtIO as Common I/F with Cloud-based AGL to enhance interchangeability between cloud-AGL and native-AGL



Virtual AGL Running On MacBook

- EG Member Francois from the company Shokubai has created a demo to run the AGL with VirtIO on the top of MacBook with Apple MacOS 13 virtualization framework.
- This can be done without any changes to AGL thanks to VirtIO.

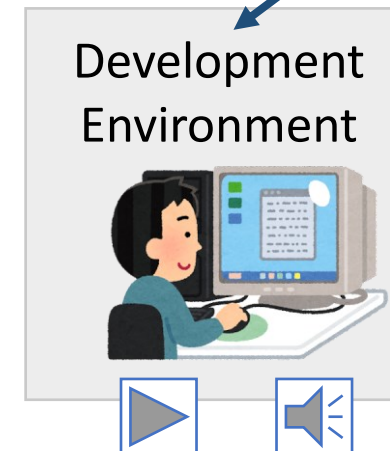
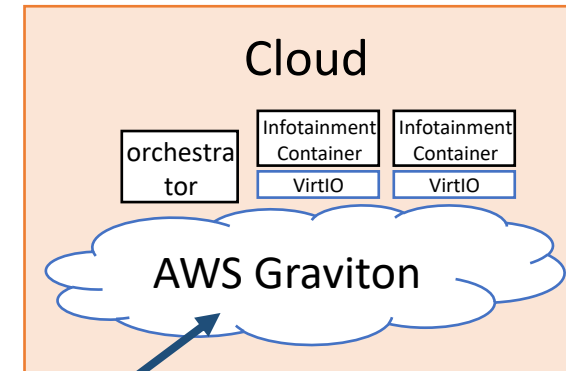
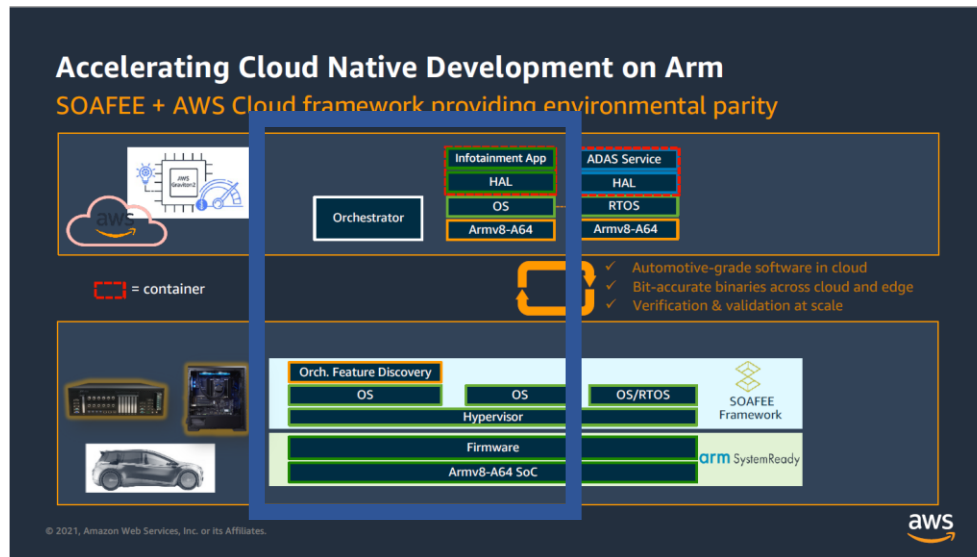


<https://www.youtube.com/watch?v=5DT-l2sWeVY>

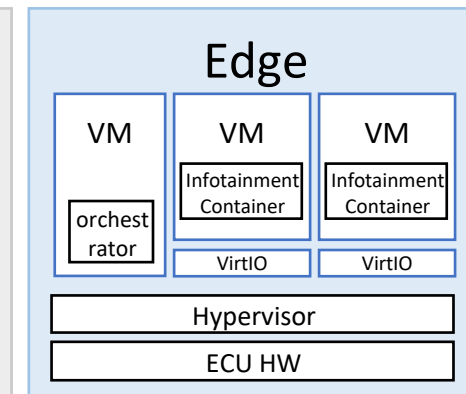
Cloud-native AGL Work between Virt-EG & Container-EG

- Establish a reference environment of cloud-native AGL
- Make VirtIO & Orchestration work on both cloud and edge AGL instances, and enable developer to develop HMI services on cloud environment which graphic & audio can be verified on local clients
- Organize demos & presentations and contribute work to AGL

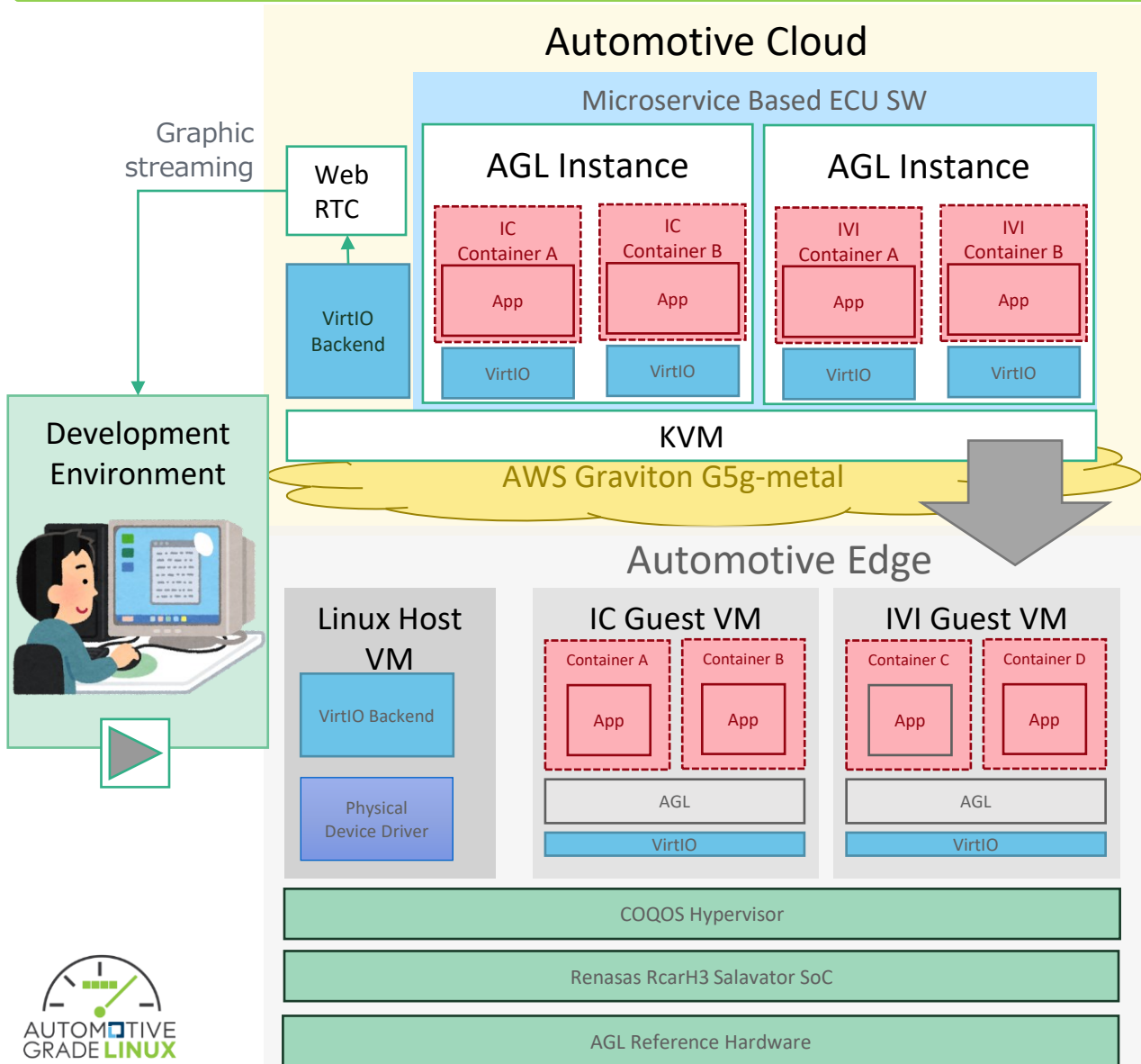
Instrument Cluster & IVI which are most related to UI/UX and need rapid development & OTA are one of the automotive devices that enjoy benefits from cloud-native most.



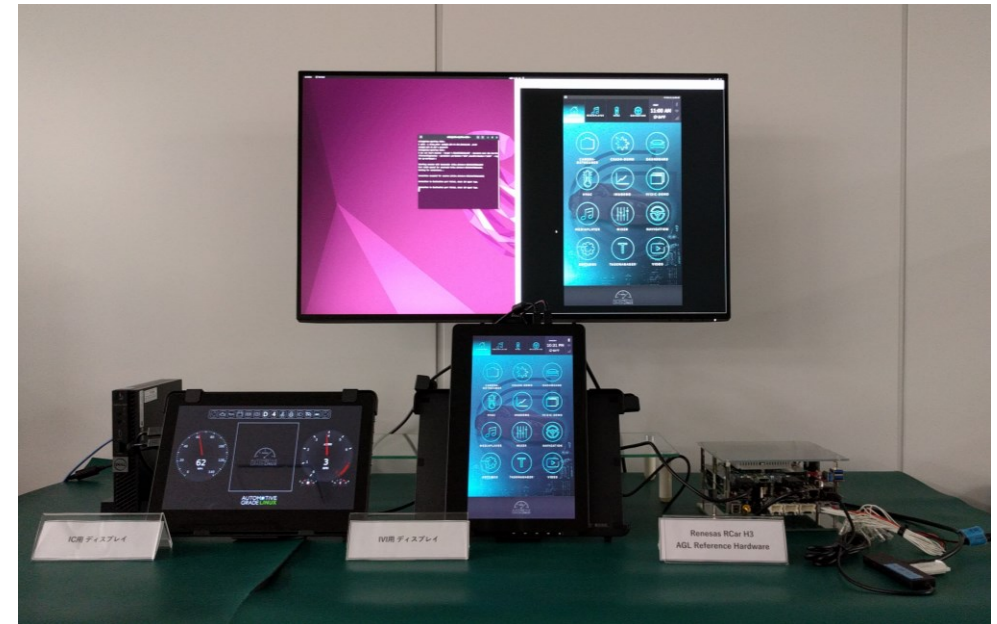
Graphic & Sound are necessary for development with Cloud



Advance Notice: Step 1 MVP to be shown in CES AGL Booth



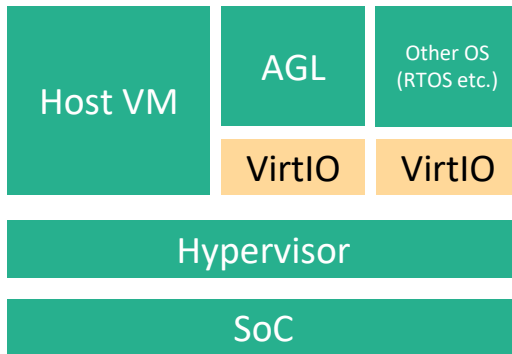
Thanks to **VirtIO**, same **AGL binary** is working on both AWS Cloud (Graviton) and AGL Reference Hardware.



Closing Mark

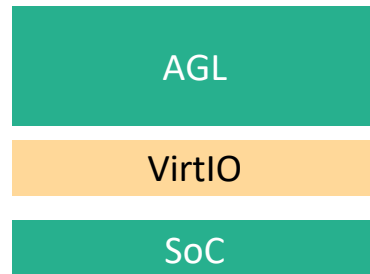
Overview of Device Virtualization in AGL - Summary

Hypervisor Environment



(Steady Progress) Most of basic & multi-media device for common use case has been supported in AGL. Further extension and support for more advanced use case in progress.

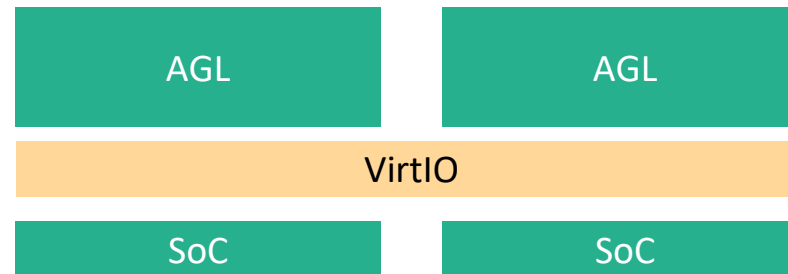
Non-Hypervisor Environment



(Activity started) Detailed design of loop-back features have been done and under review from EG members. Move to virtio-blk and virtio-input support next.

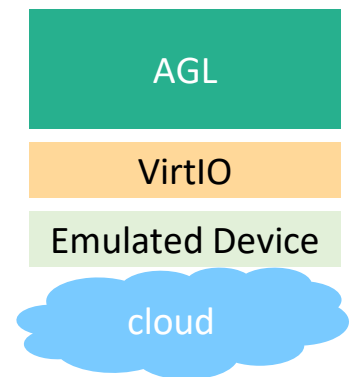
(Activities Started) Already have an open source github for "Unified HMI" (Virtual Display) and starting work to integrate with AGL UCB aiming at OO/PP.

Multi-ECU Environment



(New Activities) Being work together with container-EG and going to show demos in ALS/CES

Cloud Environment



Welcome to AGL Virt-EG

Join the AGL Virt-EG biweekly call to discuss and contribute to define the future of automotive together with us!

<https://wiki.automotivelinux.org/eg-virt>

Q&A



Guest Speech from ARM: Software Defined AGL with SOAFEE

Oct 2022

Rod Watt, ARM