



Virtualization in AVL S&F and ADAS

Automotive Grade Linux Virtualization EG

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AVL High Performance Computing In-Vehicle Server

AVL In-Vehicle Server

FEATURES

- Scalable high performance central processing unit for e.g. ADAS /AD
- Automotive components & ISO26262 conformant
- Variable connectivity for multiple sensor setups
- EMC optimized design

APPLICATION

- Special & customized automation applications
- Ground truth data recording
- Fast prototype & SOP development
- E.g. ADAS/AD sensor fusion & motion control

TECHNICAL DATA

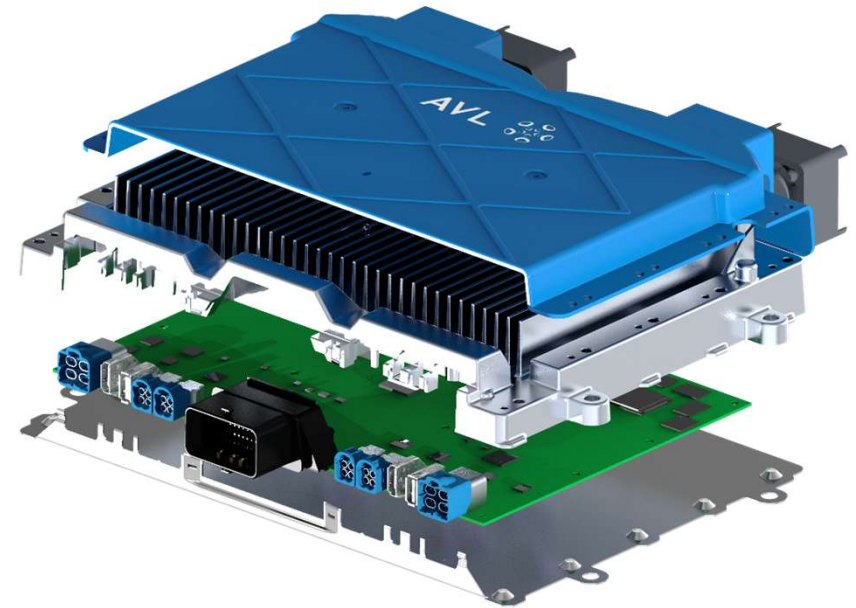
CONTROLLER	Multicore SoC R-Car (45KDMIPS, 345GFLOP/s), multiple hardware accelerators, 16GB LPDDR4 Safety controller (Aurix)
INTERFACES	8x GMSL Camera interface with power over coax 9x CAN / CAN-FD Multiple automotive ethernet 1Gb/s & 100 Mb/s HDMI / PCI-E USB 2.0/3.0
TECHNICAL DATA	Redundant power supply Power consumption: <80W
DIMENSIONS (LXWXH)	320x325x47 mm
COOLING	Air/Water

PICTURE

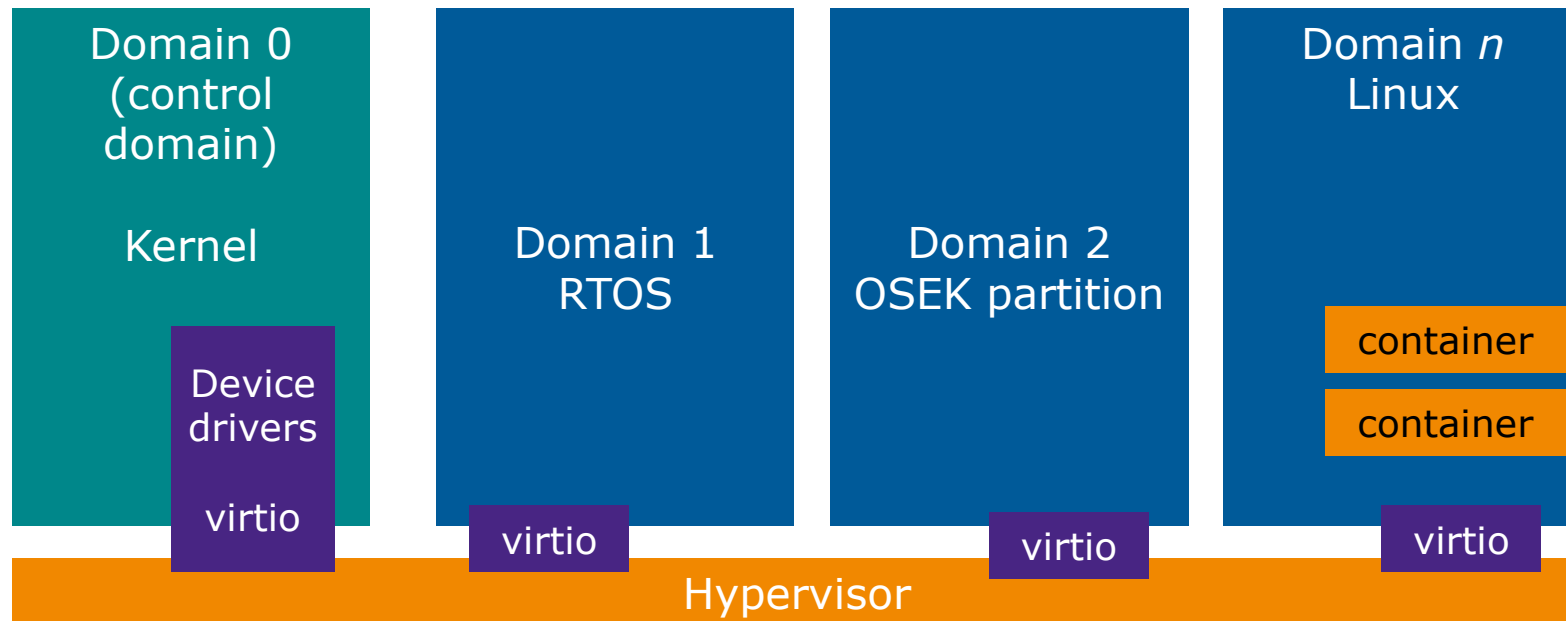


Software

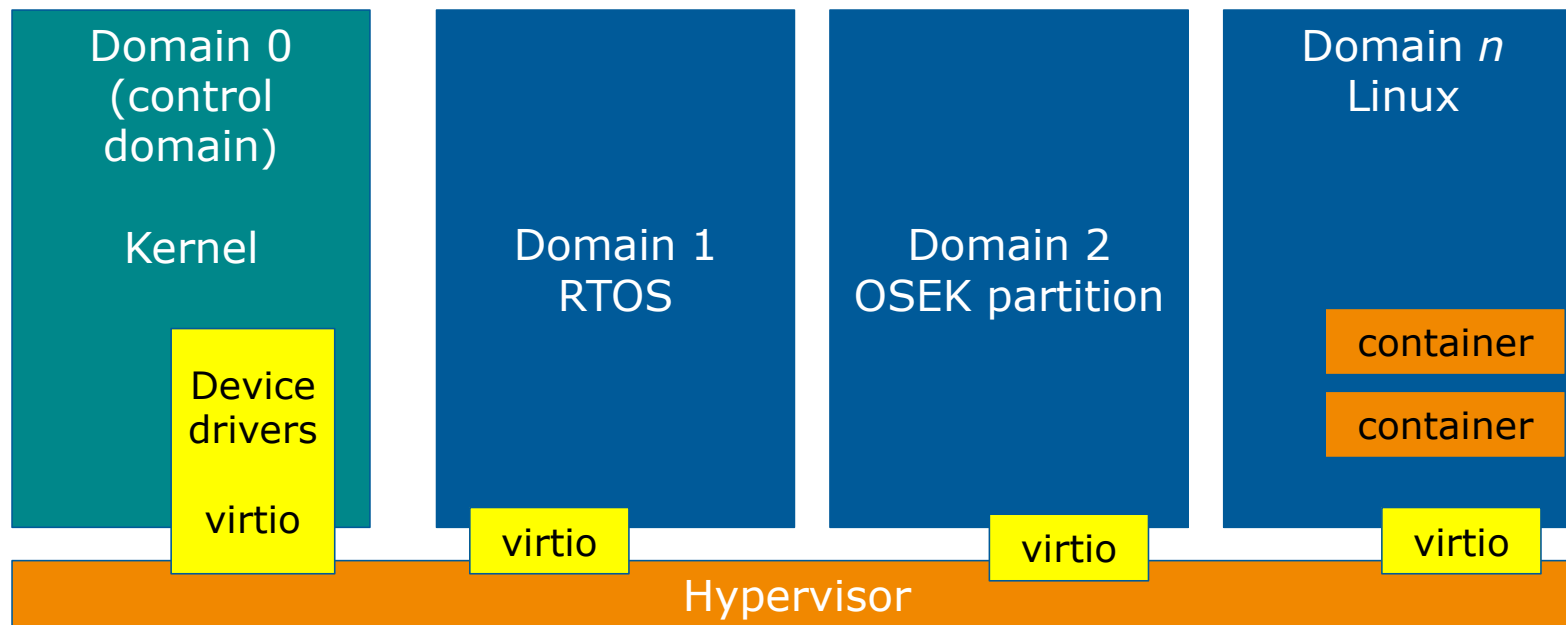
- Two aarch64 HP SoCs
 - Delivered with Linux distro based on AGL on both HP SoCs for rapid prototyping and development
 - With added ADAS/AD specific SW packages
 - ROS
 - Libraries and packages needed for perception
 - With AUTOSAR adaptive demonstrator code (members!)
 - SDKs for aarch64 and x86-64 for application development
- safety controller (Infineon)
 - Deeply embedded
 - AUTOSAR (members!)



AVL Ajunic Virtualization



AVL Ajunic Virtualization





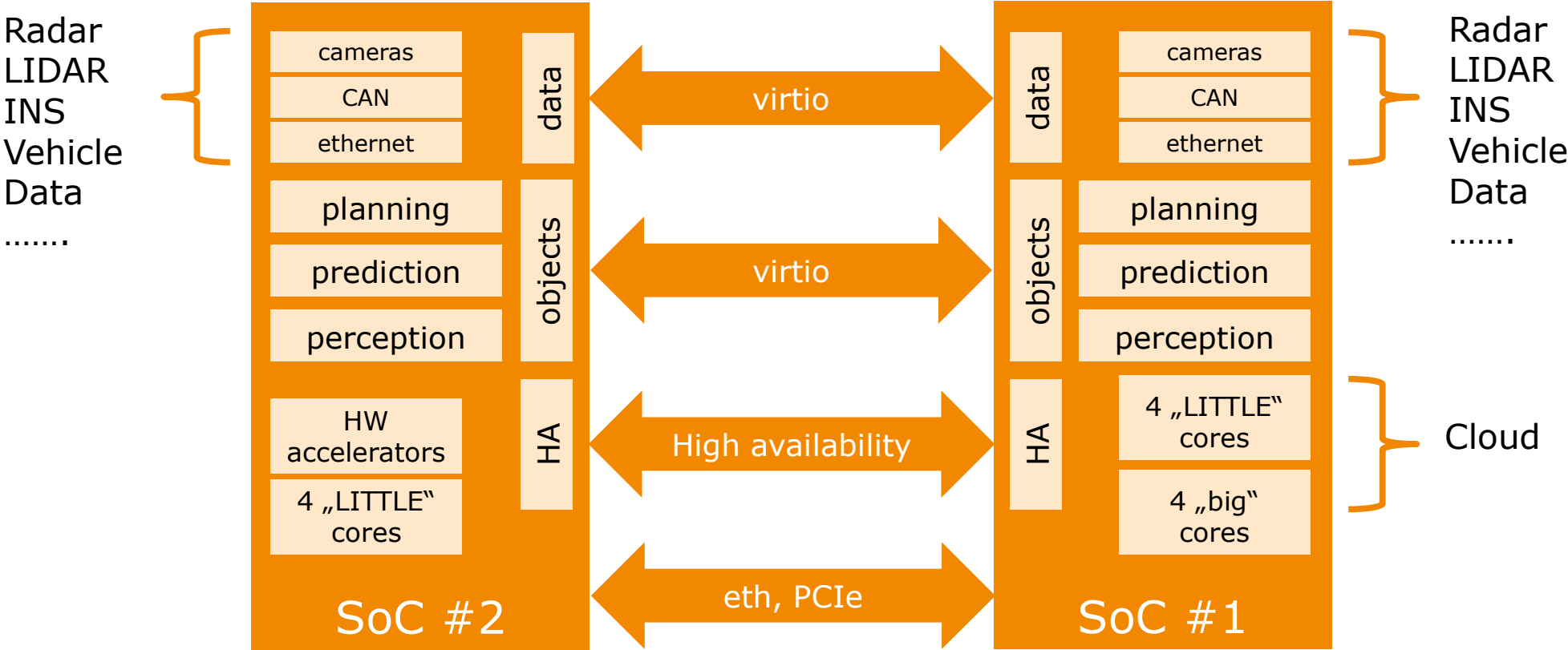
Specific ADAS Virtualization Issues



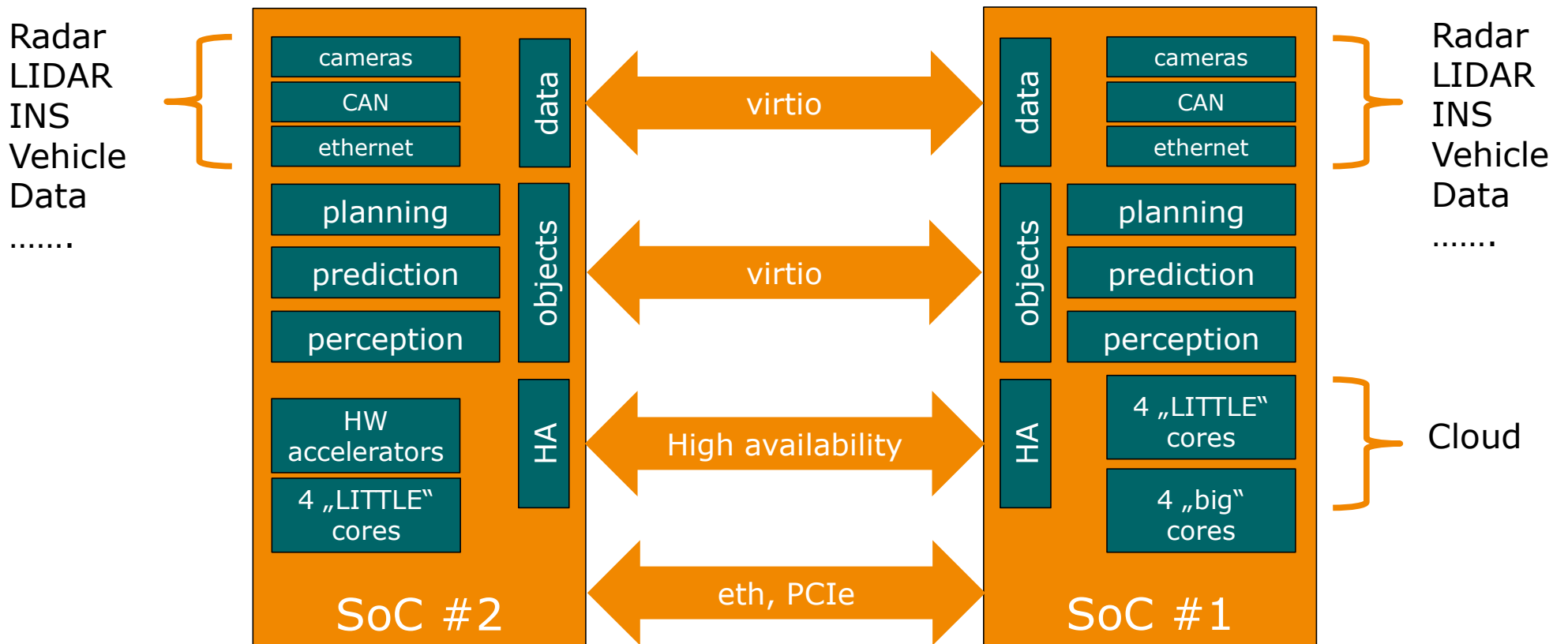
ADAS virtualization considerations

- Security
 - As usual
- Safety
 - Linux is out of scope, BUT
 - For prototyping it is useful to have
 - Different partitions (hypervisor, Linux, RTOS)
 - Isolation between applications in Linux partition(s) (containers)
- Service availability
 - Sensor data availability to both SoCs
 - Heartbeat, failover and fallback for perception, prediction and planning functions

Ajunic internal organization (HP SoCs)



Ajunic internal organization (HP SoCs)



ADAS: what to virtualize (and how)?

- Common data
 - Position
 - Time
- Sensor data
 - Raw
 - Filtered / processed (to reduce data traffic)
- Lanes
 - Curvature
 - Color
 - Type
- Traffic signs
 - Type
 - Sign text
 - Evtl. lane ordering
- Dynamic Objects
 - Type
 - Size
 - Speed
 - Acceleration
 - Further parameters (TBD)

- Ongoing discussion
- Need to determine the general object structure

Applications in Linux Domain (demo)

Cloud Connectivity
• Data collection



ADAS - Lane keeping
• Perception
• Prediction
• Planning
• Control

Driver state
sensing

* All Linux applications running in containers



Thank you!

