

AUTOSAR Safety Solutions for Multicore ECUs and ADAS Systems



Elektrobit

Robert Leibinger
5th June 2015



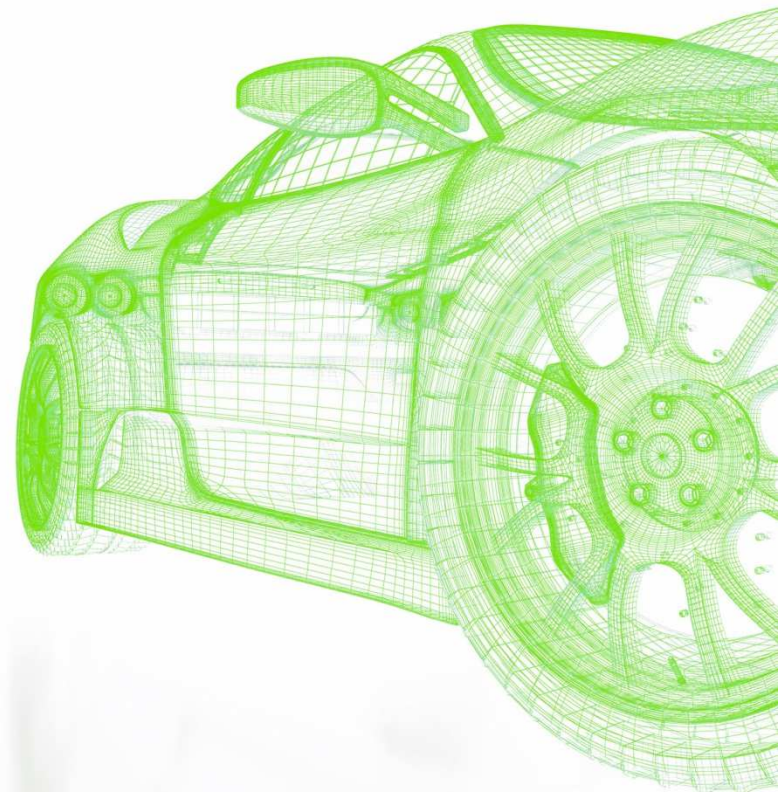
Agenda

Architecture requirements for ADAS ECU

Overview of different architecture approaches

Compare and contrast each architecture

Questions & Answers



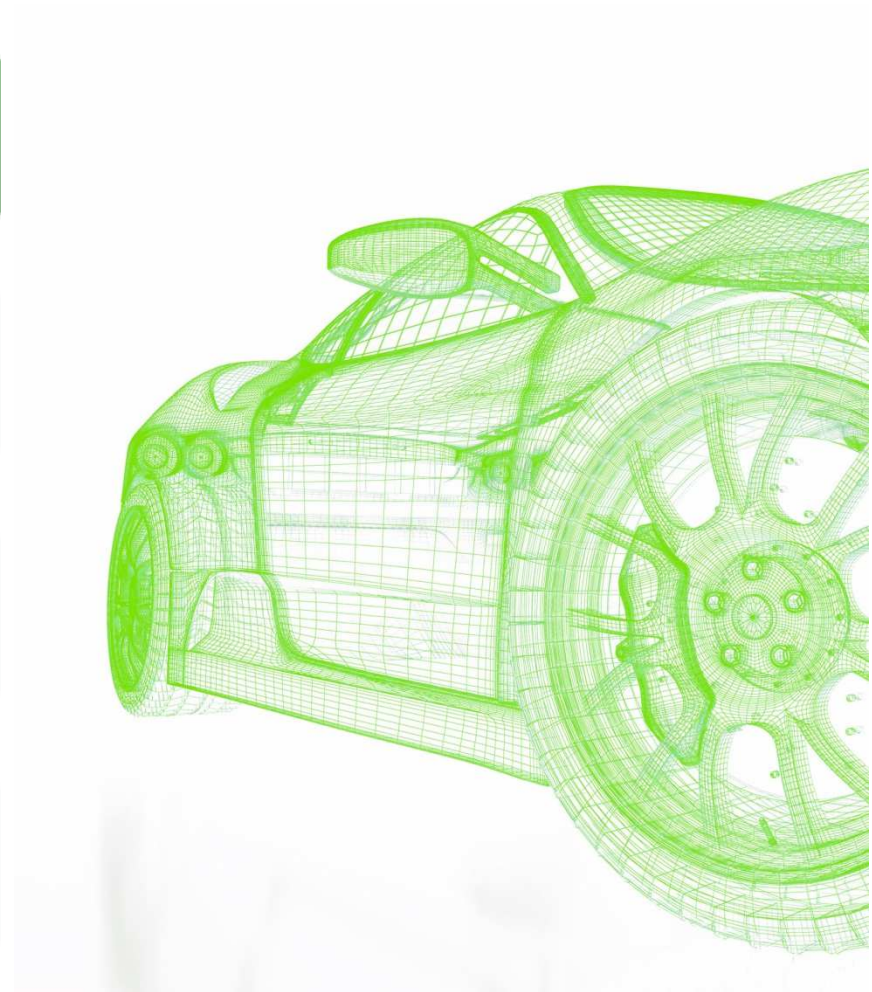
Agenda

Architecture requirements for ADAS ECU

Overview of different architecture approaches

Compare and contrast each architecture

Questions & Answers



Architecture requirements for ADAS ECUs



Dependability:

- Functional Safety (ASIL-D)
- Safety Microcontroller
- Security, Reliability, Availability, Maintainability

Performance:

- Advanced ADAS Algorithms
- AUTOSAR SWC
- Realtime Requirements
- High Performance Multi-Core Microcontroller
- Multi-Microcontroller ECUs
- Support for hardware acceleration (e.g. OpenCL)

Compatibility:

Software Features

- Can, Flexray, Ethernet support
- Standard Diagnostic capabilities (e.g. OBD)
- Network Management (e.g. Partial Network)

Development Process

- Use of standard AUTOSAR formats
- e.g. ECU Extract, Diagnostic Extract

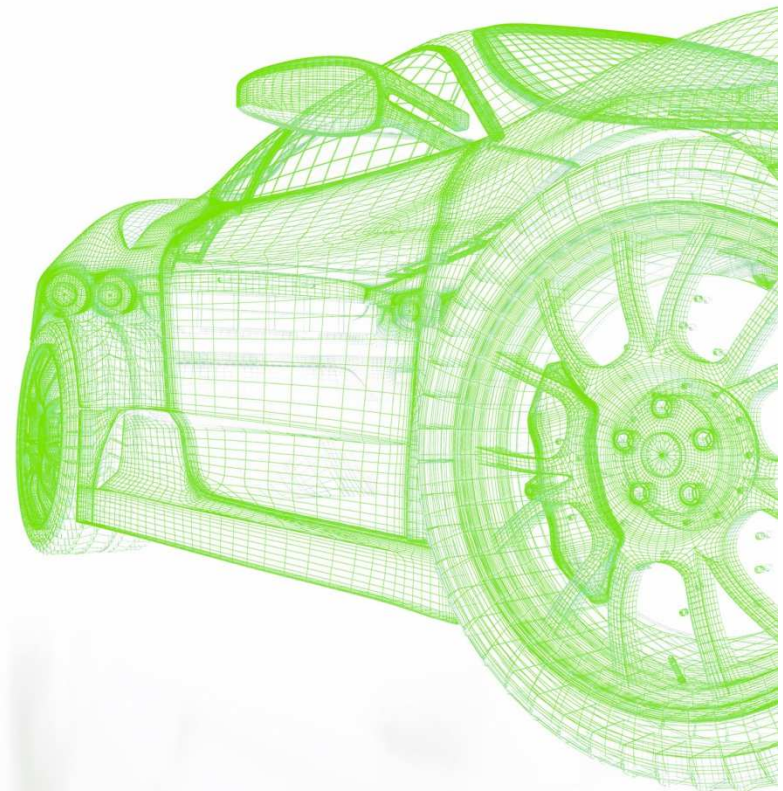
Agenda

Architecture requirements for ADAS ECU

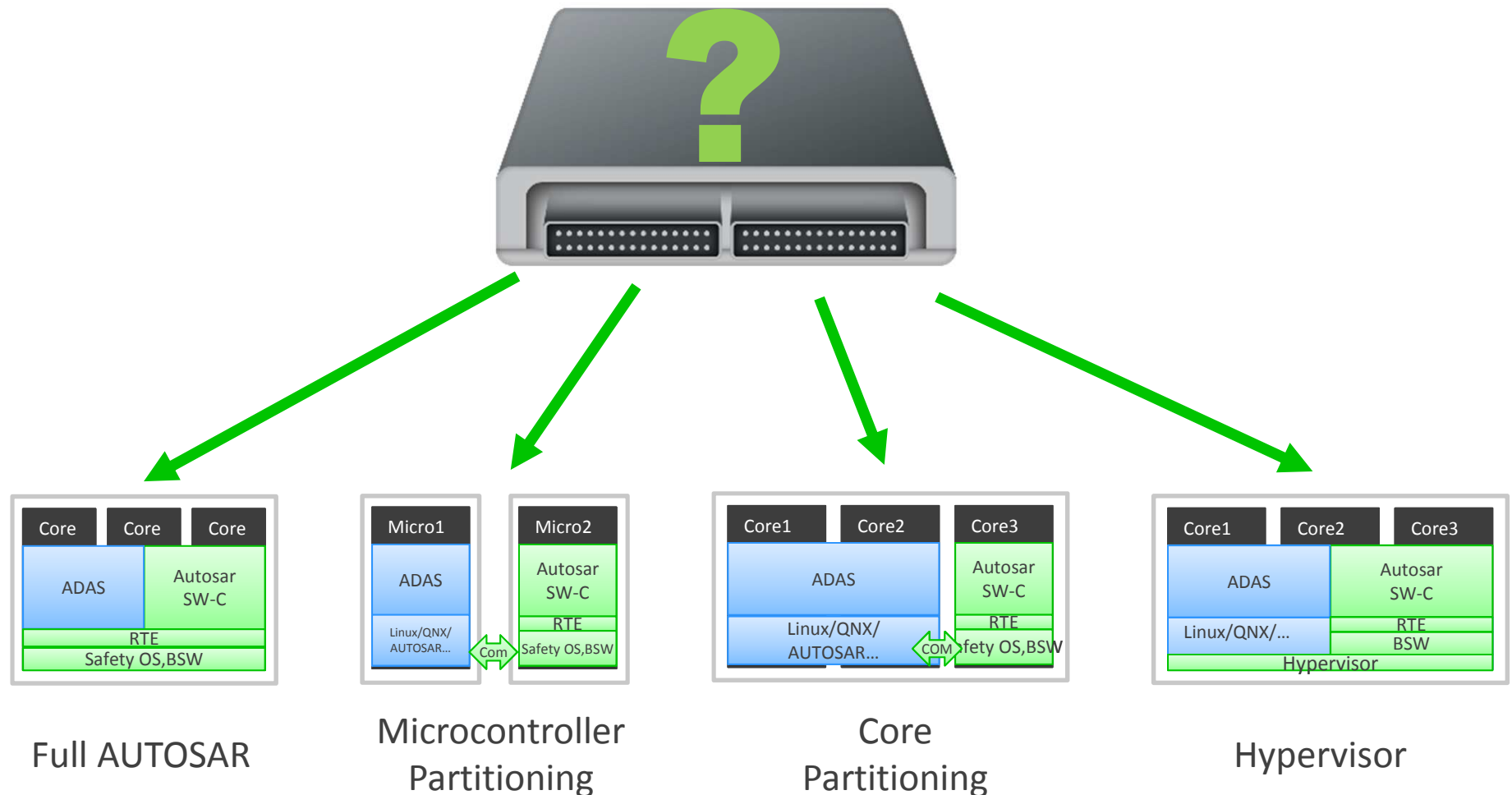
Overview of different architecture approaches

Compare and contrast each architecture

Questions & Answers

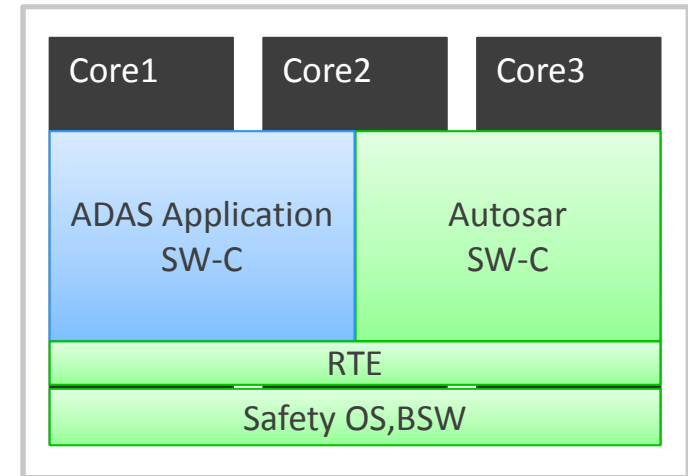


Overview of different architecture approaches



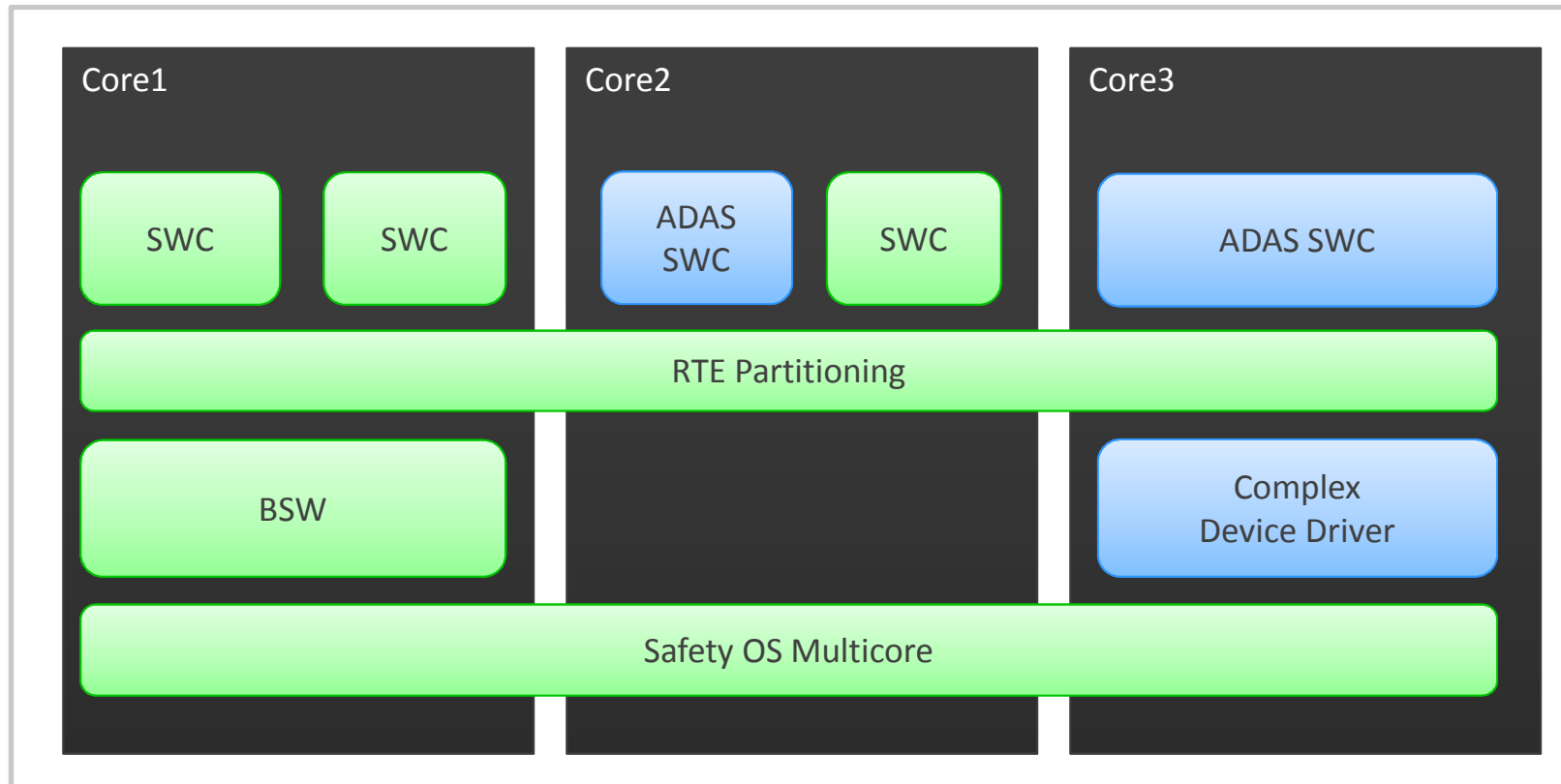
Full AUTOSAR architecture

- Safety Microcontroller
- AUTOSAR Multi-Core Safety OS
- ADAS algorithms as SWC
- Advanced hardware drivers integration as Complex Device Drivers
 - e.g. OpenCL, AVB
 - Proprietary video bus systems



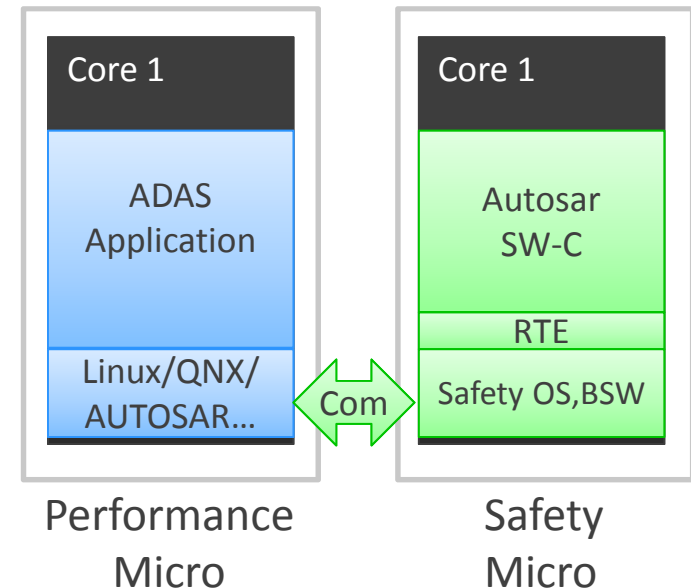
Pro	Con
Easy integration into OEM/T1 AUTOSAR process	Advanced hardware support needs AUTOSAR complex device drivers
One System	High Performance Safety Microcontroller necessary

Full AUTOSAR architecture



Microcontroller partitioning architecture

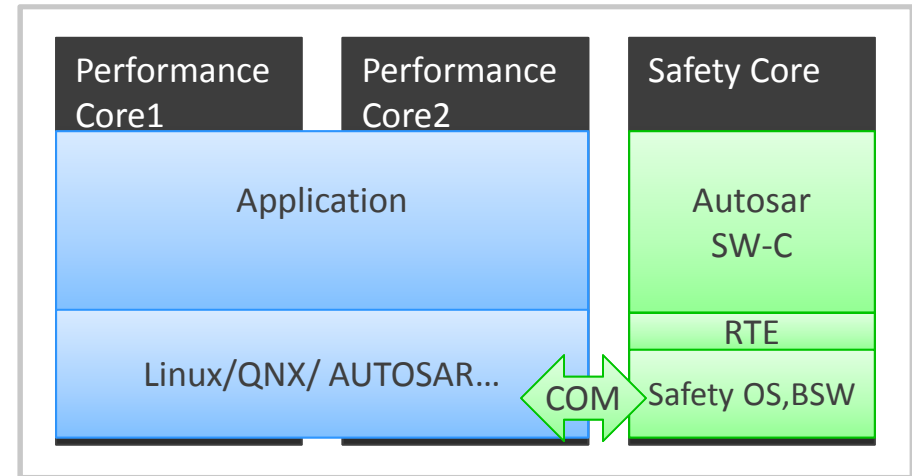
- Partitioning in Safety and Performance Microcontroller
- Separated applications treated as different ECUs during development
- Private Network for communication



Pro	Con
Scalable (combine two or more Microcontroller)	Additional hardware costs
Suitable Microcontroller already available	Need for private communication link
	Complex Flashloader and Startup

Core partitioning architecture

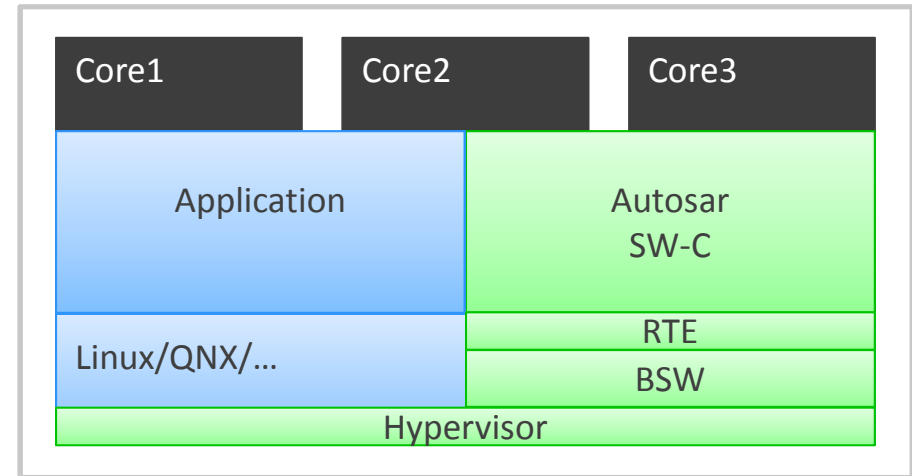
- One Microcontroller with several performance cores and one safety core (typically Lockstep)



Pro	Con
No need for private network hardware	No suitable Microcontroller available today
Performance and Safety in one Micro	

Hypervisor architecture

- Host OS with AUTOSAR guest system on one Microcontroller
- Hypervisor could be part of Guest OS



Pro	Con
Hypervisor as Gateway between different OS	Limited realtime capabilities
Hypervisor as Security Gateway between car and cloud	Limited Performance

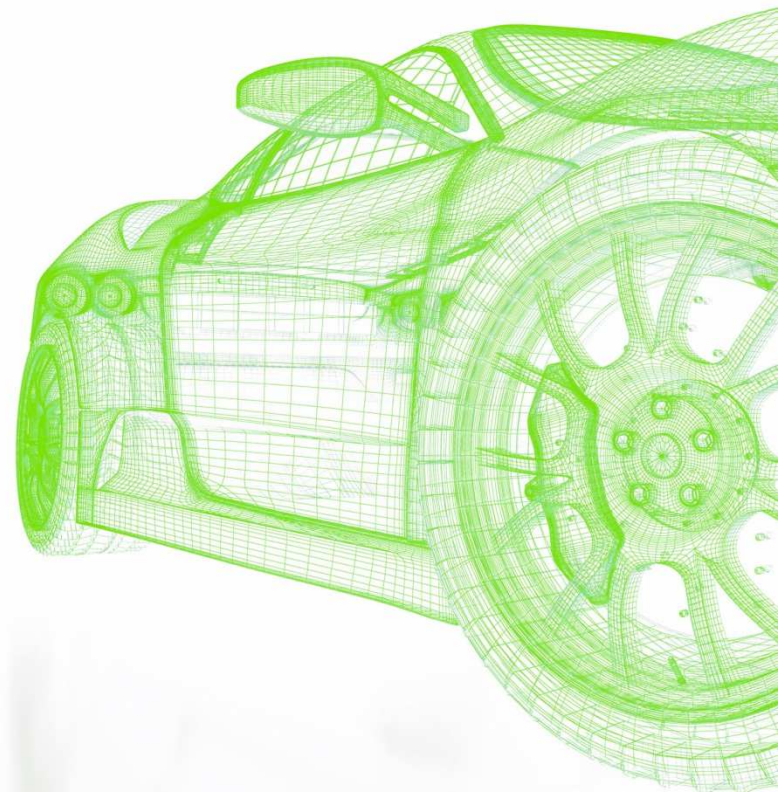
Agenda

Architecture requirements for ADAS ECU

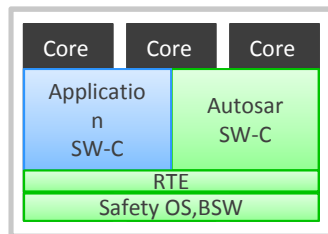
Overview of different architecture approaches

Compare and contrast each architecture

Questions & Answers

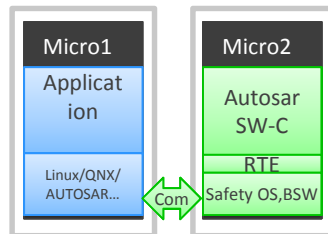


Compare and contrast each architecture



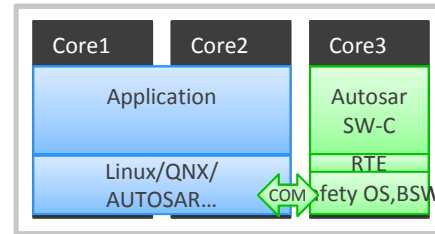
Full AUTOSAR

Safety or Performance



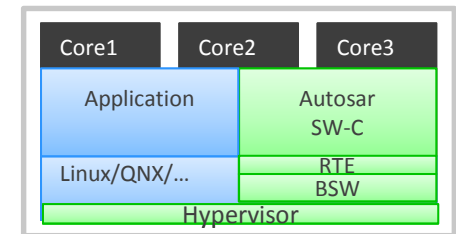
Microcontroller Partitioning

Safety & Performance



Core Partitioning

Safety & Performance optimized



Hypervisor

Security Architecture

Software Architectures define next generation Microcontroller Architectures

AUTOSAR is part of each architecture as a common standard for

- **Basic Software, Safety and Security in ECUs**
- **Synchronized development process between OEM and T1**

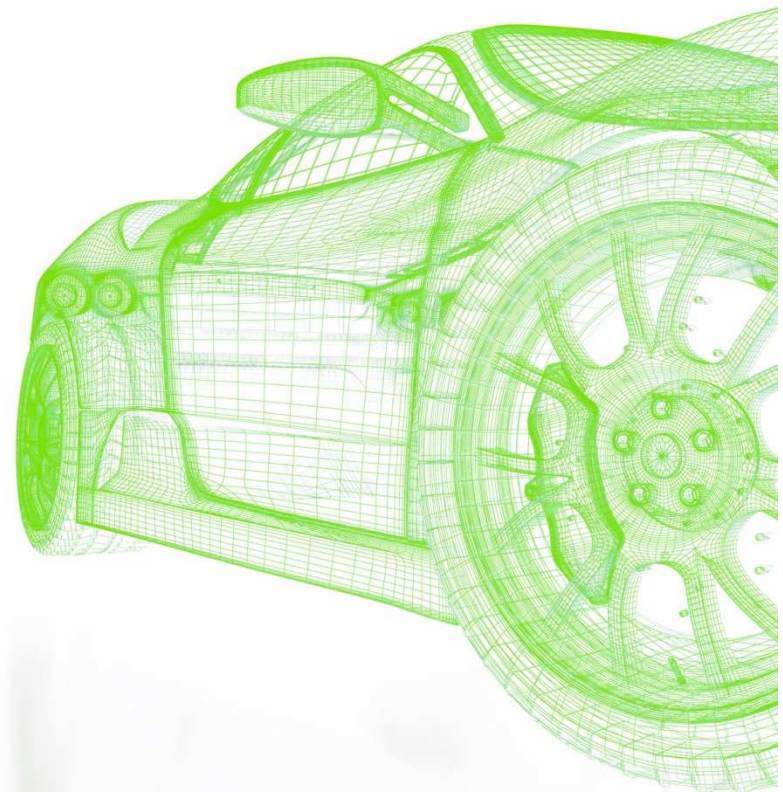
Agenda

Architecture requirements for ADAS ECU

Overview of different architecture approaches

Compare and contrast each architecture

Questions & Answers



Thank you

Contact us!

 Elektrobit



Robert.Leibinger@elektrobit.com
automotive.elektrobit.com

