Architectures of High Performance Computing

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Evolution of Vehicle Architecture

- ECUs implement dedicated function
- One supplier per ECU
- Limited amount of data shared between ECUs

- Functions integrated per domain
- Multiple application software supplier per ECU
- High-level functionality of sensors and actuators already reduced and moved to Domain Controllers
Architectures of High Performance Computing

Central Computing Platform (Zonal Architecture)

- Integrates cross-domain functions with many communication technologies
- Central point of innovation
- Same platform for many car-lines and generations

Trust and OEM Control!

- Mechatronic ECU: signal oriented only
- Integration ECU: signal and service oriented
- Computing Platform: service oriented only

Commodity sensors and actuators

Take over high-level S/A functions
Challenges for High-Performance Controllers

- Fail-Operational
- Multi-Core
- Hard Real-Time
- Consolidation

Common Vehicle Network Design

- Backend
- Android
- Fail-Safe
- After Market Extensions

μController vs μProcessor

- Autosar Classic Platform
- Autosar Adaptive Platform

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μController

μProcessor
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High-Performance with Multi-Core Systems

Single-Core System Design

Single-Core System Design

Requirement and Constraint Design

Timing, Resource Consumption, Overhead and Load Evaluation

System Design

Crossbar

Multi-Core System Design

Core Allocation
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Integration of AUTOSAR Adaptive with Other OS Options

Benefits of AUTOSAR Adaptive
- Focus on established formats and workflows
- Supported by existing tools (PREEvision, CANoe, CANape, CANdelaStudio)
- Connected with AUTOSAR Classic ECUs
- Easily connected with cloud/backend: DDS, REST, ROS
- Managed by the automotive industry and OEMs
- Possibility to integrate project specific features
- Integrates signal and service world
- Automotive specifics (diagnostics, SOMEIP, timesync,...) directly in POSIX applications

Benefits of other OS options
- Connectivity to smartphones
- GUI frameworks
- Custom access to vehicle network
- Well known by developers in infotainment domain
- Huge App-Store / software community
- Large set of libraries (augmented reality, machine learning, GPU usage, etc.)

Solution: use both!

Next: Hypervisor and Safe ECU architectures
For more information about Vector and our products please visit

www.vector.com

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