Cloud Car
Building a car that gets better every day

Thomas W. Mueller
VP, CTO, Global Head Automotive
24th ReVision Webinar
Our SDV Engineers are laser focused on NextGen E/E solution...

- **1250+ SDV** Engineers (Platform, Cloud, Middleware, Application Migration)
- **2.5+ years of SDV experience**
- **60+ SDV** (CloudCar) Partner enabled
- **1ˢᵗ SOP MY24** Chevrolet Silverado EV
- **>80k Certified Cloud Engineers**

**Other Engagements of relevance**

- **200+ Connectivity**
- **APTIV** 100+ Engineers in cockpit electronics
Industry view..

How to...

build a car that gets better every day?

...or create a car, that

stays digitally relevant for at least 10 years?

...How do YOU ‘Evergreen’ your car?
Changing expectations
Continuous Innovation – Car to deliver features beyond what it had on day 0

Software Defined Platforms are a way to achieve this. OEMs across the world are approaching it in this way and based on the degree and economy of scale, they are at different phases in the journey.

Domain Controllers are the new trend in the industry and OEMs are largely successful in creating a software defined platform by taking control of the complete software in the cockpit.

High Performance Computing (HPC) based architecture is the next wave.
Wipro Cloud Car - Our Vision for SDV

Today:
- >50 ECUs
- Fix Config ECU
- 100% code written in C/C++
- No ECU / DC virtualization, no mixed criticality
- Costly hardware change
- Slow OTA deployments
- No shadow mode: cars do not contribute!
- High TCO for any new / updated Features
- No SoA, no microservices, no containers
- Rigid ECU capacity

Tomorrow:
- ~4 HPC / Zonal Controllers
- Modular, converged HPC
- ~70%+ code written in cloud native
- Full abstraction & virtualization full mixed criticality
- Low cost hardware change
- Daily Life Cycle updates
- Full shadow mode: All cars contribute, every second
- ~30% to 50% reduced TCO for any new / updated features
- ~70%+ of SW in SoA with microservices in containers
- Full SW growth through AutoScaling platforms
The vision for OEM's software-defined vehicle is to establish a Software/ Hardware solution which stays 10+ years relevant

Software-defined vehicle | Vision & objectives for OEM

- Smartphone architecture
  - Apps
    - iOS
    - App Store
    - iCloud
  - Software platform and SDK
    - Middleware / Software Platform
  - Device hardware

- Vehicle architecture
  - Applications
    - Drivetrain
    - ADAS/AD
    - Info- tainment
    - Connect
    - Energy/ charging
    - Comfort
  - Middleware / Software Platform
    - Middleware / OS
    - App Store (e.g. ADAS)
    - OEM Cloud
  - E/E architecture
    - Mechanical layer
    - Sensors/Actuators

Deploy SW features (unknown today) and security updates
Ensure efficient development costs by ensuring to reuse generated code
Enables the interchangeability of hardware

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Deploy SW features (unknown today) and security updates

Enables the interchangeability of hardware
Future-proof SW solutions should be designed to support containerized applications in the car (on-board) as well as in the cloud (off-board)

Software solution | Framework for enabling mixed critical workload across Car and Cloud

Cloud
Cloud Compute Cluster
"in the cloud" / off-board

- Container Orchestrator
- Container Runtime
- Guest OS
- Virtual Machine
- Host OS
- Server

- Container 1
  - app (e.g. IVI)
  - Bin/ library
  - Container Runtime
  - Guest OS

- Container 2
  - app (e.g. ADAS)
  - Bin/library
  - Container Runtime
  - Guest OS

- Container n
  - app (e.g. ADAS)
  - Bin/ library
  - Container Runtime
  - Guest OS

- Virtual Machine
- Host OS
- Server

Car
High Performance Computer (HPC)
"on-board"

- Container Orchestrator
- Container Runtime
- Guest OS
- Hypervisor
- Host OS
- On-board high performance computer
- Sensors / Actuators

Hardware/Software abstraction for cloud & car
Middleware which acts as hardware/software abstraction layer enables efficient and seamless software deployment from cloud to vehicles

Converged on- and off-board solution
The future-proof framework consists of a single platform with a transient structure
The same app, developed with cloud native design principles can run on the car and in the cloud

Auto-scaling of cloud-native workload
The orchestrator of the platform will assign computing capacity in the car or the cloud – Apps can be dynamically shifted in between
SDV Solution Building Block
Overview of all solutions building block

Ecosystems & Platforms
- OEM
  - Product experience
  - OTA / LCM
  - Connected services
  - Ecosystem

Hyperscaler, IoT & Ecosystems
- (HD) Maps
- SmartHome / IoT
- CtyOS
- V2X, ...

Offboard Platform
- OEM API platform

Automated Drive Computing
- ADAS
  - (near real time < 5 – 10 ms)
  - Global / local planner
  - Motion control CNFs
  - ADAS safety CNFs
  - ADAS comfort CNFs
  - Perception / obstacle CNFs
  - Data engine

Cockpit
- Infotainment
  - Tuner CNFs
  - Media Player CNFs
  - AI/ML Brain
  - CarPlay & Android Auto
  - Ecosystem Apps CNFs
  - Android Auto
  - Embedded / GAS

Shared Domain Functions
- Automotive Core
  - (near real time < 1 ms)
  - Braking
  - Steering
  - Body (Climate, Dashboard, …)
  - Powertrain
  - Container Virtualization

- Sensor Domain
  - (near real time < 1 ms)
  - Camera 2D
  - Lidar (3D)
  - Radar (2D)
  - Ultrasonic
  - IMU. Legacy + (new)

SDV LifeCycle & Mgmt Platform
- DevOps / ALM toolchain
- CI / CD pipeline
- Platform & Container Management
- CMDB
- Test Automation
- Source Code Mgmt.
- Code Security
- Platform Security

SDV Lab
- CNF testing (incl. AUTOSAR)
- SIL / HIL verification
- Release build and validation
- Field validation
- Field deployment / Turn up

360° Life cycle support

In-Vehicle SDV Platform
Thank you!

Thomas W. Mueller  
VP, CTO, Global Head Automotive  
Email: thomas.mueller@wipro.com  
Mobile: +1 720 241 4067