AUTOSAR Adaptive Platform
Introduction

Martin Lunt
ASAM General Assembly
March 8\textsuperscript{th} 2017, Stuttgart
Agenda

- Motivation
- Architectural overview
- Organization
- Status and Roadmap
- Collaboration ASAM and AUTOSAR
- Conclusion
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Motivation

Main drivers to develop the Adaptive Platform

Highly automated driving

Car-2-X applications

Open access to vehicle

Stronger interaction
Motivation
Another platform for different applications

AUTOSAR Classic Platform

Platform supporting „Planned dynamics“

Infotainment

<table>
<thead>
<tr>
<th>Real time Requirements</th>
<th>High, in the range of micro-sec</th>
<th>Mid, in the range of milli-sec</th>
<th>Low, in the range of sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Criticality</td>
<td>High, up to ASIL-D</td>
<td>High, at least ASIL-B</td>
<td>Low, QM</td>
</tr>
<tr>
<td>Computing power</td>
<td>Low, ~ 1000 DMIPs</td>
<td>High, &gt; 20.000 DMIPs</td>
<td>High, ~ 10.000 DMIPs</td>
</tr>
</tbody>
</table>
### Agenda

- **Motivation**
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- **Collaboration ASAM and AUTOSAR**
- **Conclusion**
Architectural Overview

Functional Clusters

AUTOSAR Runtime for Adaptive Application

- Operating system
- Bootloader
- Execution Management
- Persistence
- Platform Health Management
- Time Management
- Software Configuration Management
- Security Management
- Diagnostics
- Logging and Tracing
- Hardware Acceleration
- Communications

(Virtual) Machine / Hardware

**AUTOSAR Runtime for Adaptive Applications** = Σ of all Functional Cluster APIs / Services

- API or Service Interface of a Functional Cluster.
- Programming language specific API for a Functional Cluster as specified in SWS
- The first programming language supported by the Adaptive Platform will be C++

Behavioral specification of Functional Cluster
Architectural Overview
Address space virtualization

Each application runs in its own protected address space

Access to platform functionality via libraries

Communication via implementation specific inter process communication (IPC)
Architectural Overview
Service-oriented communication (1/3)

- SW components executed on the adaptive platform will use service-oriented communication.

- Communication paths can be established at design- and at run-time.

- The AUTOSAR Adaptive platform will therefore provide middleware functionality.

Sequence Diagram
Architectural Overview
Service-oriented communication (2/3)

Adaptive Platform Foundation
(Virtual) Machine / Hardware

Operating system
Bootloader

Application
API (libc) Communication API

Communication Management
SOME/IP

Service Consumer
Proxy

Service Implementation
Skeleton

Service Interface Def.

Provided Interface
Events
Methods
Fields

SOME/IP-
Serialization
E2E Protection

SOME/IP Service
Discovery

ara::com implementation pattern
ServiceDiscovery finds all local and remote ServiceInstances in the System.

Available ServiceInstances are represented by Proxies (P1 ... P3) to the Application.

Application can choose which ServiceInstance(s) to use.
## Architectural Overview

### Classic Platform vs. Adaptive Platform

<table>
<thead>
<tr>
<th>Classic Platform</th>
<th>Adaptive Platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on OSEK</td>
<td>Based on POSIX (PSE51)</td>
</tr>
<tr>
<td>Execution of code directly from ROM</td>
<td>Application is loaded from persistent memory into RAM</td>
</tr>
<tr>
<td>Same address space for all applications (MPU support for safety)</td>
<td>Each application has its own (virtual) address space (MMU support)</td>
</tr>
<tr>
<td>Optimized for signal-based communication (CAN, FlexRay)</td>
<td>Service-oriented communication</td>
</tr>
<tr>
<td>Fixed task configuration</td>
<td>Support of multiple (dynamic) scheduling strategies</td>
</tr>
<tr>
<td>Specification</td>
<td>Specification as binding Standard Code as Demonstrator</td>
</tr>
</tbody>
</table>
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Organisation
Feature Teams

SGAP
PL-Subgroup Adaptive Platform

FT-COM
Feature Team Communication Management

FT-EMO
Feature Team OS and Execution Management

FT-DIA
Feature Team Diagnostics

FT-MM
Feature Team Methodology and Manifests

FT-PER
Feature Team Persistency

FT-SAF
Feature Team Safety

FT-DI
Feature Team Demonstrator Integration

SYS
System Team

Feature Backlog Owner

Scrum of Scrum Team
Scrum Teams
Cross Function Team
Organization
Work mode and contributions

Joint expert group meeting

Run
3 – 4 months

Joint expert group meeting

Release
approx. twice a year

Joint expert group meeting

Sprint planning meetings per feature team defined by FBO

Sprint

Continuous development according to Scrum

Feature Backlog

Sprint

Scrum Meetings

Deliverable Increment

refinement

sprint planning

sprint monitoring

sprint review

sprint retrospective

2-5 Days

4 Weeks

AUTOSAR Adaptive Platform
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### Status and Roadmap

#### Quality and Process Standards

<table>
<thead>
<tr>
<th>Development Phase</th>
<th>Evolution Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Release</strong></td>
<td><strong>Basic System</strong></td>
</tr>
<tr>
<td>QL0-1</td>
<td>Jira based workflow for planning</td>
</tr>
<tr>
<td></td>
<td>Git repository structure</td>
</tr>
<tr>
<td>QL1-2</td>
<td>Generic framework for integration of quality measures</td>
</tr>
<tr>
<td>QL1-3</td>
<td>Change management for released parts</td>
</tr>
<tr>
<td>QL1-4</td>
<td>Backward compatibility statement defined</td>
</tr>
<tr>
<td>QL0</td>
<td>tbd.</td>
</tr>
<tr>
<td>QL4</td>
<td>Under Development</td>
</tr>
</tbody>
</table>

AUTOSAR follows its proven life cycle model in order to achieve series quality in 10/2018. Intermediate releases are available.
**Status and Roadmap**

**Development in progress**

<table>
<thead>
<tr>
<th>Deliverables</th>
<th>QL</th>
<th>Responsible</th>
<th>Jira Visions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R17-03 Features</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating System</td>
<td>QL0</td>
<td>FT-EMO</td>
<td>AP-60,</td>
</tr>
<tr>
<td>Execution Manager</td>
<td>QL1</td>
<td>FT-EMO</td>
<td>AP-3, AP-4,</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>QL1</td>
<td>FT-DIA</td>
<td>AP-11, AP-15</td>
</tr>
<tr>
<td>Data Logging and Tracing</td>
<td>QL0</td>
<td>FT-DIA</td>
<td>AP-289</td>
</tr>
<tr>
<td>Communication</td>
<td>QL1</td>
<td>FT-COM</td>
<td>AP-4, AP-9,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AP-10,</td>
</tr>
<tr>
<td>(Ethernet, SOME/IP + ara::com)</td>
<td></td>
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</table>

Basic features are available end of March 2017 in our first release.
Features may have achieved different quality levels.
Status and Roadmap

Planned features (adaptations and refinements possible !)

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<th>Deliverables</th>
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<tr>
<td>R17-10 Features</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Package Management</td>
<td>QL2</td>
<td>FT-EMO</td>
<td>AP-387, AP-417, AP-418</td>
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<tr>
<td>Persistency</td>
<td>QL2</td>
<td>FT-PER</td>
<td>AP-376, AP-418</td>
</tr>
<tr>
<td>Hardware Acceleration (OpenCL)</td>
<td>QL1</td>
<td>FT-EMO</td>
<td>AP-388</td>
</tr>
<tr>
<td>Signal Based Com. (CAN)</td>
<td>QL2</td>
<td>FT-COM</td>
<td>AP-384, AP-385</td>
</tr>
<tr>
<td>Cloud Interaction</td>
<td>QL1</td>
<td>FT-COM</td>
<td>AP-383, AP-417, AP-418</td>
</tr>
<tr>
<td>Extension of Execution Management</td>
<td>QL2</td>
<td>FT-EMO</td>
<td>AP-212</td>
</tr>
<tr>
<td>Safe Key-Value Storage</td>
<td>QL2</td>
<td>FT-SAF</td>
<td>AP-382</td>
</tr>
<tr>
<td>E2E Protection</td>
<td>QL2</td>
<td>FT-SAF</td>
<td>AP-381</td>
</tr>
<tr>
<td>Platform Health Management</td>
<td>QL2</td>
<td>FT-SAF</td>
<td>AP-380</td>
</tr>
<tr>
<td>File Encryption</td>
<td>QL1</td>
<td>WP-X-SEC</td>
<td>AP-379</td>
</tr>
<tr>
<td>User Management</td>
<td>QL1</td>
<td>WP-X-SEC</td>
<td>AP-378</td>
</tr>
<tr>
<td>Secure Communication</td>
<td>QL1</td>
<td>WP-X-SEC</td>
<td>AP-418</td>
</tr>
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Further features are on the roadmap for the October release 2017
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ASAM - AUTOSAR - Collaboration

ASAM and AUTOASR already established collaborations in the following areas:

- ASAM MSR-SW
- WP-I (ASAM-Units)
- WP-A2 (ASAM MCD-2-NET)

Why not continuing the collaboration also for the adaptive platform?

- ASAM-representative is invited to join the AUTOSAR Joint Expert Meetings (4 p.a.)
- ASAM needs can be evaluated based on AUTOSAR specifications and concepts.
- Further contacts can be established via the respective representatives at ASAM and AUTOSAR.
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**Achievements**
- AUTOSAR continues to provide well documented standard solutions also for future market needs
- The adaptive Platform is developed based on a scrum process
- AUTOSAR continues to supports the classic platform as well

**Plan**
- End of development phase is supposed to be Oct. 2018
- The development phase will be followed by the evolution phase.
- Intermediate results with feature wise assigned quality levels will be released twice a year.

**Collaboration**
- Use the established contacts between ASAM and AUTOSAR to tackle the upcoming challenges for debugging and measurement.
## End

<table>
<thead>
<tr>
<th>Section</th>
<th>Complete</th>
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</thead>
<tbody>
<tr>
<td>Motivation</td>
<td>✔️</td>
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Thank you very much for your attention!

Questions?