

Curriculum Foundation Level AUTOSAR Adaptive

Overview and Intro for AUTOSAR Adaptive Systems

1.1 Terms and Principles

AUTOSAR Consortium, distributed systems, operating system, POSIX, AUTOSAR Adaptive Methodology, Manifest, Design vs. Deployment.

1.2 Learning Goals

LG 1-1: AUTOSAR Overview

- The participant remembers the idea/purpose of the AUTOSAR Consortium (**L1**).
- The participant understands that AUTOSAR is divided in three "Platforms": Foundation, Classic and Adaptive (**L2**).
- The participant understands the benefits of Standardization of Interfaces, Formats, Methodology in/with AUTOSAR (**L2**).
- The participant understands the types of AUTOSAR Documents and which to choose for different use cases (**L2**).

LG 1-2: POSIX OS as a basis for the Adaptive Platform

- The participant understands the idea of an Operating System (POSIX) (**L2**).
- The participant knows the idea, that Adaptive is a middleware between OS and applications (**L1**).

LG 1-3: Adaptive Overview

- The participant understands the AUTOSAR Adaptive Platform architecture logical view visual (**L2**).
- The participant understands the benefits for Adaptive Platform vs Classic Platform (**L2**).
- The participant remembers name features/clusters of the Adaptive Platform (**L1**).
- The participant understands how different clusters can be used (API, Service, OS) (**L2**).
- The participant understands the difference between foundational clusters and services (**L2**).

LG 1-4: AUTOSAR Adaptive Applications

- The participant understands what a Software Component is and how it is used within Adaptive (**L1**).
- The participant understands the two different Ports (Required and Provided) (**L2**).
- The participant understands the concept of an executable (**L2**).
- The participant understands that a process is an instance of an executable (**L2**).
- The participant understands the difference between process and thread (**L2**).

LG 1-5: Methodology

- The participant understands the difference between modeling and software development in Adaptive (**L2**).
- The participant knows the domains of development (**L1**).
- The participant understands the process from modeling over generating, development, and deployment of an AUTOSAR Adaptive project (**L2**).
- The participant understands what an `.arxml` is and how it is used in AUTOSAR Adaptive (**L2**).
- The participant remembers the definition of "Manifest" (**L2**).
- The participant understands the difference between modeling elements for design vs. modeling elements for target configuration (manifests), and that they are used to generate different artifacts (source code vs. deployed manifests in the form of configuration files for the target) (**L2**).
- The participant understands the purpose of various manifests:
 - Execution Manifest
 - Machine Manifest
 - Service Instance Manifest
- Specification of the AUTOSAR modeling (meta-model):
 - Basic understanding of class tables
 - Attributes
 - Inheritance (**L2**)

Basic Overview of Functional Clusters in AUTOSAR Adaptive

2.1 Terms and Principles

Log and Trace, Execution Management, State Management, FunctionGroup, Communication Management, Service-Oriented Architecture, SOME/IP, Service Discovery, Binding Mechanisms, secure communication, Platform Health Management, Persistency, Diagnostic Manager, Update and Configuration Management, Identity and Access Management.

2.2 Learning Goals

LG 2-1: Log and Trace

- The participant understands the purpose of the Log and Trace functional cluster (**L2**).
- The participant remembers the configuration parameter options of logging (**L1**).

LG 2-2: Execution Management and State Management

- The participant understands the boot-up of a HPC and the Adaptive Platform (From OS boot to EM and SM) (**L2**).
- The participant understands the difference and need for Execution and State Management (**L2**).
- The participant remembers the basics of the states an adaptive application is in (Execution States) and its relation to EM (Reporting of kRunning) (**L1**).
- The participant understands the FunctionGroup Concept, mandatory states and the use in SM/EM (**L2**).
- The participant remembers that the Machine Manifest collects all Function Groups, and machine related information like Env Vars and more (**L1**).
- The participant understands the mandatory MachineFG, which reflects the state of the (virtual) machine (**L2**).
- The participant understands the concept of function group transitions and the starting/stopping of processes via EM (**L2**).
- The participant understands that State Management is a dedicated C++ application, that has to be developed at least once per project to change the states of functiongroups (**L2**).
- The participant understands the relation of SM and EM (**L2**).

LG 2-3: Communication Management and Protocols

- The participant remembers a service-oriented architecture (**L1**).
- The participant remembers the benefits of service-oriented architecture (**L1**).
- The participant understands SOME/IP, Service Discovery and where it is used in the car (Ethernet, tcp/udp) (**L2**).
- The participant remembers the difference of multicast and unicast in SOME/IP (**L1**).
- The participant understands methods, events, and fields in SOME/IP (**L2**).
- The participant understands the general service discovery mechanism (offer/find, pub, subscribe) (**L2**).
- The participant remembers that events can only be received when the client is subscribed (**L1**).
- The participant remembers that there are various kinds of method calls (Fire/Forget, Request/Response) (**L1**).
- The participant remembers notifier of fields are events, getter and setter methods (**L1**).

- The participant remembers that SOME/IP handles serialization (**L1**).
- The participant understands the different APIs he can use from an Adaptive Application (ara, ara::com, PSE51 C++ stdlib) (**L2**).
- The participant understands the idea of location transparency from a source code communication view and the communication binding at runtime (**L2**).
- The participant remembers the different binding possibilities:
 - Raw Data
 - SOME/IP
 - DDS
 - Inter Process Communication (**L1**)
- The participant understands the difference of inter and intra ECU communication (**L2**).
- The participant remembers the method communication paradigm from a code view (Future/Promise) (**L1**).
- The participant understands what a skeleton/proxy is (**L2**).
- The participant remembers the event-based communication paradigm (EventHandler, Subscription) (**L2**).
- The participant remembers the difference of polling and event driven communication (**L1**).
- The participant remembers that he can restrict/control usage of communication (**L1**).
- The participant remembers that the Adaptive Platform has secure communication capabilities (**L1**).
- The participant remembers the concept of identity and access management, and that it can be used to authorize communication (**L1**).
- The participant remembers that TLS/SecOC/IPsec is supported for SOME/IP (**L1**).

LG 2-4: Platform Health Management (PHM)

- The participant understands the purpose of PHM (**L2**).
- The participant remembers multiple software concepts for safety that are supported from Adaptive (e.g. E2E, Safe Storage, Safe Execution etc.) (**L1**).
- The participant remembers the general idea of platform and health management, e.g. how Applications report their health (**L1**).
- The participation knows about the supported supervision:
 - Timing constraints (Alive & Deadline Supervision)
 - Program sequence (Logical Supervision) (**L1**)

LG 2-5: Persistency

- The participant understands that he should use persistency to access files (portability & "ownership") (**L2**).
- The participant remembers the different types of storage supported by Adaptive (**L1**).
- The participant remembers the features of persistency:

- Deployment-features
- Redundancy
- Crypto (**L1**)

LG 2-6: Diagnostics Management (DM)

- The participant understands the purpose of the diagnostic manager (transport, processing of UDS, event memory) (**L2**).
- The participant understands what types of diagnostics are possible (UDS, SOVD) (**L2**).
- The participant understands the concept of a Diagnostic Extract (**L2**).
- The participant knows that a diagnostic request can be handled internally in DM or handed over to an adaptive application (**L1**).

LG 2-7: Update and Config Management

- The participant remembers the principle idea of an update in Adaptive (**L1**).
- The participant remembers software packages and the relation to software clusters (**L1**).
- The participant remembers that OTA (over the air) and/or diagnostic client can be used to update (**L1**).