AUTOSAR Acceptance Tests

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AUTOSAR Acceptance Tests

**Overall Test Activities**

- Unit Tests
- Standard Acceptance Tests
- OEM Specific Qualification Tests
- Project Specific Tests

- **Code coverage**
- **Test of configurable stack**
- **Configuration Combination**

**AUTOSAR Acceptance Tests Objective:** Minimize test effort

- Common test development and maintenance
- Methodology and extensibility
- Exchange of trustable test execution results

- Limited to test behavior available to applications or on the bus
- Limit maintenance effort for users and AUTOSAR

1. Compatibility with EE architecture?

2. Compatibility with applications?
Acceptance Test Specifications

- Organized per Test Suite

  - General Test Objective and Approach
    - Test System
    - Test Configuration
    - Test Case Design

  - Re-usable Test Steps
    - Complex set of test steps that can be later reused in test cases

  - Test Cases
    - Set of test cases, each described using the same template. See next slides.
### Test Case Example (1/2)

<table>
<thead>
<tr>
<th>Test Objective</th>
<th>Test Intra-ECU C/S argument rescaling - ClientServerInterfaceMapping Linear Scaling</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>ATS_RTE_00145</td>
</tr>
<tr>
<td>AUTOSAR Releases</td>
<td>4.0.3</td>
</tr>
<tr>
<td>Affected Modules</td>
<td>RTE</td>
</tr>
<tr>
<td>State</td>
<td>reviewed</td>
</tr>
<tr>
<td>Trace to Requirement on Acceptance Test Document</td>
<td>ATR: ATR_ATR_00028</td>
</tr>
<tr>
<td>Trace to R4.1.1 Item</td>
<td>RTE: SWS_Rte_03818</td>
</tr>
<tr>
<td></td>
<td>RTE: SWS_Rte_03819</td>
</tr>
<tr>
<td></td>
<td>RTE: SWS_Rte_03829</td>
</tr>
<tr>
<td>Requirements / Reference to Test Environment</td>
<td>Use Case 03.01 : Intra-ECU C/S Communication</td>
</tr>
<tr>
<td>Configuration Parameters</td>
<td>1 SWC Client</td>
</tr>
<tr>
<td></td>
<td>The Operation uses parameter with ClientType LowerLimit = 0, UpperLimit = 100 ComputationMethod : PhyToInt : Identical</td>
</tr>
<tr>
<td></td>
<td>1 SWC Server</td>
</tr>
<tr>
<td></td>
<td>The Operation uses parameter with ServerType LowerLimit = 200, UpperLimit = 1200 Computation Method: PhyToInt : Linear (10*x+200) Both are using uint32 types</td>
</tr>
<tr>
<td></td>
<td>1 ClientServerInterfaceMapping maps the client to the server</td>
</tr>
<tr>
<td>Summary</td>
<td>The Test Manager starts the Client, which calls the server The Test Manager checks that server was invoked with the converted values.</td>
</tr>
<tr>
<td>Needed Adaptation to other Releases</td>
<td>Configuration: [n/a] Client-server argument rescaling does not exist in R3.2.2.</td>
</tr>
<tr>
<td>Needed Adaptation for Release [3.2.2]</td>
<td>Test Steps: [n/a] The test case shall be removed</td>
</tr>
</tbody>
</table>

- Short description of the test objective.
  also used as title of test case

- List of CP releases for which this test case specification is applicable

- Traceability to AUTOSAR ATR Requirements

- Traceability to SWS items relevant for the tested functionality

- Requirements on configuration
  - Focus on key parameters
  - Upstream template parameters if possible

- Description how the test case works

- Hints on the adaptations needed to adapt the test case to other CP releases
**Test Case Example (2/2)**

Sequence of test steps that shall be executed.

Steps are organized as an action and a pass criteria.

When one of the pass criteria fails, the test case fails.

Point of control & observation The actions and pass criteria can be preceded by an indication on where the action has to be performed (resp. where the pass criteria has to be observed).

<table>
<thead>
<tr>
<th>Pre-conditions</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Test Execution</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Test Steps</strong></td>
<td><strong>Pass Criteria</strong></td>
</tr>
<tr>
<td><strong>Step 1</strong></td>
<td>[CP]</td>
</tr>
<tr>
<td></td>
<td>start Tester_Client_1</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td>[SWC&lt;Tester_Client_1&gt;]</td>
</tr>
<tr>
<td></td>
<td>invoke the operation (Rte_call) with argument value 0</td>
</tr>
</tbody>
</table>
|  | [SWC<Tester_Server>]
|  | server has been invoked with converted argument value 200 |
| **Step 3** | [SWC<Tester_Client_1>] |
|  | invoke the operation (Rte_call) with argument value 100 |
|  | [SWC<Tester_Server>]
|  | server has been invoked with converted argument value 1200 |
| **Step 5** | [CP] |
|  | terminate Tester_Client_1 |
| **Post-conditions** | None |

Pre-conditions mandatory to execute the test case

Post-conditions mandatory to restore a working environment
Usage of Acceptance Tests

- AUTOSAR provides acceptance test specifications
  - Activities remain on user side

- Different business models
  - Not enforced by AUTOSAR

Test case selection

Test setup
Configurations
Implementation
Execution
Usage of Acceptance Tests

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- Different business models
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  - For example
    - Execution by OEM

Test case selection
Test setup
Configurations
Implementation
Execution

OEM

Stack vendor
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  - For example
    - Execution by OEM
    - Execution by stack vendor

Test case selection
- Test setup
- Configurations
- Implementation
- Execution

OEM

Stack vendor
Available Test Suites

- Communication (CAN, LIN, FlexRay)
- Diagnostics
- NVRAM
- Mode Management
- RTE

- Maintenance
- Extension on
  - Communication (CAN, LIN, FlexRay)
  - Mode Management
  - RTE
  - Ethernet (UDP, TCP, IPv4)
Ethernet Test Suites

- New test suites for UDP, TCP, and IPv4 in R1.1.0
  - Limited to features supported by AUTOSAR
  - Test method limited to features available in AUTOSAR

- Test cases are traceable toward AUTOSAR specification and toward IETF RFCs

- Test cases design

  Protocol and Service Primitive
  - Close Socket
  - Create and Bind
  - Send Data
  - Receive and Forward
  - ...

  Test System
  Ethernet
  SUT
  TCP/IP
  Implementation under test
  Ethernet
Next Steps

➢ Further extension of the test suites

➢ You can contribute by
  ▪ Providing some of your test cases for standardization
  ▪ Supporting WP-T in reviews
  ▪ Providing feedback as users of existing test suites

➢ Acceptance Tests will be considered in concept handling process
  ▪ Reduce time to provide test cases for new features
Thank you for your attention!

More Information about AUTOSAR:
http://www.autosar.org

For information only (see disclaimer)

Published Releases