Document Title	Requirements on Operating System Interface
Document Category	Requirement specification (RS)
Document UID	718
Document Status	published
Part of AUTOSAR Standard	Adaptive Platform
Part of Standard Release	R26-11

Document Change History			
Date	**Release**	**Changed by**	**Description**
2026-11-26	R26-11	AUTOSAR Release Management	• Moved content to other AUTOSAR documents
2025-11-27	R25-11	AUTOSAR Release Management	• Updated to C++17 • Minor changes, document clean up
2024-11-27	R24-11	AUTOSAR Release Management	• Minor changes, document clean up
2023-11-23	R23-11	AUTOSAR Release Management	• Changed [RS_OSI_00201], [RS_OSI_00202], [RS_OSI_00203], [RS_OSI_00206] to point to appropriate AUTOSAR_FO_RS_Safety requirements. • Added [RS_OSI_00210], [RS_OSI_00211] about tracing support.
2022-11-24	R22-11	AUTOSAR Release Management	• Changed [RS_OSI_00103] to point to [RS_Main_00060]
2021-11-25	R21-11	AUTOSAR Release Management	• Added [RS_OSI_00209]
2020-11-30	R20-11	AUTOSAR Release Management	• Uptrace to AUTOSAR_FO_RS_Safety document • Clarified Execution Management description • Moved time-triggered execution to AUTOSAR_AP_RS_ExecutionManagement



△

2019-11-28	R19-11	AUTOSAR Release Management	• Updated document structure • Changed Document Status from Final to published
2019-03-29	19-03	AUTOSAR Release Management	• Added: use case for [RS_OSI_00201] and [RS_OSI_00202]
2018-10-31	18-10	AUTOSAR Release Management	• Removed: RS_OSI_00102 and RS_OSI_00105 • Added: [RS_OSI_00207], [RS_OSI_00208].
2018-03-29	18-03	AUTOSAR Release Management	• Removed: RS_OSI_00101, RS_OSI_00200 and RS_OSI_00205. • Added: [RS_OSI_00103].
2017-10-27	17-10	AUTOSAR Release Management	• Minor changes, document clean up
2017-03-31	17-03	AUTOSAR Release Management	• Initial release

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Table of Contents

1 Scope of Document 6

2 Conventions to be used 7
2.1 Document Conventions . . . 7
2.2 Requirements Guidelines . . . 7
2.2.1 Requirements status . . . 7

3 Acronyms and abbreviations 8

4 Requirements Specification 9
4.1 Functional Overview . . . 9
4.2 Functional Requirements . . . 9
4.2.1 Assumption of Use . . . 9
4.2.2 General Requirements . . . 10
4.3 Non-Functional Requirements . . . 10

5 References 11

A Change history of AUTOSAR traceable items 12
A.1 Traceable item history of this document according to AUTOSAR Release R26-11 . . . 12
A.1.1 Added Requirements in R26-11 . . . 12
A.1.2 Changed Requirements in R26-11 . . . 12
A.1.3 Deleted Requirements in R26-11 . . . 12
A.2 Traceable item history of this document according to AUTOSAR Release R25-11 . . . 13
A.2.1 Added Requirements in R25-11 . . . 13
A.2.2 Changed Requirements in R25-11 . . . 13
A.2.3 Deleted Requirements in R25-11 . . . 14
A.3 Traceable item history of this document according to AUTOSAR Release R24-11 . . . 14
A.3.1 Added Requirements in R24-11 . . . 14
A.3.2 Changed Requirements in R24-11 . . . 14
A.3.3 Deleted Requirements in R24-11 . . . 15
A.4 Traceable item history of this document according to AUTOSAR Release R23-11 . . . 15
A.4.1 Added Requirements in R23-11 . . . 15
A.4.2 Changed Requirements in R23-11 . . . 15
A.4.3 Deleted Requirements in R23-11 . . . 16
A.5 Traceable item history of this document according to AUTOSAR Release R22-11 . . . 16
A.5.1 Added Advisories in R22-11 . . . 16
A.5.2 Changed Advisories in R22-11 . . . 16
A.5.3 Deleted Advisories in R22-11 . . . 16

A.5.4 Added Constraints in R22-11 16
A.5.5 Changed Constraints in R22-11 16
A.5.6 Deleted Constraints in R22-11 16
A.5.7 Added Requirements in R22-11 17
A.5.8 Changed Requirements in R22-11 17
A.5.9 Deleted Requirements in R22-11 17

1 Scope of Document

This document specifies the requirements of AUTOSAR Adaptive Platform on the Operating System that is part of the Foundation in the AUTOSAR Adaptive Platform.

2 Conventions to be used

2.1 Document Conventions

The representation of requirements in AUTOSAR documents follows the table specified in [TPS_STDT_00078], see [1, Standardization Template].

The verbal forms for the expression of obligation specified in [TPS_STDT_00053] shall be used to indicate requirements, see [1, Standardization Template].

2.2 Requirements Guidelines

2.2.1 Requirements status

There are no special requirement guidelines for this document.

3 Acronyms and abbreviations

The glossary below includes acronyms and abbreviations relevant to this Document.

Abbreviation / Acronym:	Description:
Operating System	Software responsible for managing Processes on a Machine and for providing an interface to hardware resources.
Operating System Interface (OSI)	The Functional Cluster within the AUTOSAR Adaptive Platform which specifies the Operating System interface used by Adaptive Applications and by the AUTOSAR Adaptive Platform itself.

Table 3.1: Technical Terms

The following technical terms used in this document are defined in the corresponding document mentioned in the table below.

Abbreviation / Acronym:	Description:
Execution Management	see [2] Requirements on Execution Management
Adaptive Application	see [3] AUTOSAR Glossary
AUTOSAR Adaptive Platform	see [3] AUTOSAR Glossary
Functional Cluster	see [3] AUTOSAR Glossary
Machine	see [3] AUTOSAR Glossary
Process	see [3] AUTOSAR Glossary

Table 3.2: Reference to Technical Terms

4 Requirements Specification

This chapter describes all requirements for the selection of the Operating System for the AUTOSAR Adaptive Platform.

4.1 Functional Overview

The Operating System is responsible for run-time resource management (including time) for all applications on and within the AUTOSAR Adaptive Platform. This includes not only the Adaptive Applications that run on top of ARA provided by AUTOSAR Adaptive Platform, but also the Functional Clusters that constitute the platform, which are also implemented as applications. The Operating System functions in cooperation with Execution Management which is responsible for platform initialization and the start-up / shut-down of applications.

Note that this Operating System Interface requirement specification contains two different categories. The first category contains the requirements that are directly needed by the Adaptive Applications. The other category contains the ones that are needed by the AUTOSAR Adaptive Platform to realize implementation of Functional Clusters, especially the required mechanisms are difficult or inefficient to be implemented by other software entity than the Operating System. The most notable such Functional Cluster requiring the various Operating System mechanisms is Execution Management.

4.2 Functional Requirements

4.2.1 Assumption of Use

This section describes execution environment of the AUTOSAR Adaptive Platform that is directly or indirectly used to run the Adaptive Applications. This execution environment is not requirements to the AUTOSAR Adaptive Platform in the strict sense, but rather assumptions on properties of Adaptive Application running on the AUTOSAR Adaptive Platform. These assumptions are used to motivate the further requirements, and provide hints for Adaptive Application developers to check if their use cases are covered in this specification document and which specific requirements are derived from those use cases.

The Operating System section defines requirements on the Operating System that Processes can consider fulfilled in order to achieve their function.

4.2.2 General Requirements

This section describes APIs that should be exposed to Processes on the AUTOSAR Adaptive Platform that closely relates to the Operating System functionality. Some libraries in the system may be considered by a Developer to be part of the Operating System without strictly-speaking belonging to it, for example the C++ runtime libraries. For the purpose of this section, the Operating System kernel and its libraries are considered to be a single entity.

[RS_OSI_00100] POSIX PSE51 Compliance ⌈

Description:	The minimal OS functionality provided by Adaptive AUTOSAR platform shall be as defined by POSIX PSE51 interface, according to the IEEE1003.13-2003 specification.
Rationale:	The defined functionality of the POSIX profile PSE51 defined by IEEE1003.13 [4] is provided by various off-the-shelf Operating Systems. The PSE51 profile is intended for embedded systems, with a single multi-threaded Process, no file system, no user and group support and only selected options from more general IEEE1003.1 [5], which is the well-known POSIX standard. PSE51 offers functions for basic synchronized I/O, high-resolution timer, signals, semaphores, shared memory and threads. As the envisioned Adaptive Application software components will not require to fork new Processes themselves, and only need limited direct access to files. Hence for Adaptive Applications the PSE51 profile is thought to be sufficient.
Dependencies:	–
Use Case:	Application portability.
Supporting Material:	IEEE1003.13 [4] and IEEE1003.1 [5]

⌋

[RS_OSI_00103] The Operating System Interface shall support C++. ⌈

Description:	The Operating System Interface shall define the OS support of a specific C++ version.
Rationale:	Processes are written in C++ and interfaces are expected to conform to a specific C++ version.
Dependencies:	–
Use Case:	–
Supporting Material:	–

⌋

4.3 Non-Functional Requirements

No content.

5 References

[1] Standardization Template
AUTOSAR_FO_TPS_StandardizationTemplate

[2] Requirements on Execution Management
AUTOSAR_AP_RS_ExecutionManagement

[3] Glossary
AUTOSAR_FO_TR_Glossary

[4] IEEE Standard for Information Technology- Standardized Application Environment Profile (AEP)-POSIX Realtime and Embedded Application Support
https://standards.ieee.org/findstds/standard/1003.13-2003.html

[5] Standard for Information Technology–Portable Operating System Interface (POSIX(R)) Base Specifications, Issue 7
http://pubs.opengroup.org/onlinepubs/9699919799/

A Change history of AUTOSAR traceable items

Please note that the lists in this chapter also include traceable items that have been removed from the specification in a later version. These items do not appear as hyperlinks in the document.

A.1 Traceable item history of this document according to AUTOSAR Release R26-11

A.1.1 Added Requirements in R26-11

none

A.1.2 Changed Requirements in R26-11

Number	Heading
[RS_OSI_00100]	POSIX PSE51 Compliance

Table A.1: Changed Requirements in R26-11

A.1.3 Deleted Requirements in R26-11

Number	Heading
[RS_OSI_00104]	The Operating System Interface shall support the reaction on Process-external stimuli from devices.
[RS_OSI_00105]	The Operating System Interface shall support the start of Execution Management.
[RS_OSI_00201]	The Operating System shall provide mechanisms for system memory budgeting.
[RS_OSI_00202]	The Operating System shall provide mechanisms for CPU time budgeting.
[RS_OSI_00203]	The Operating System should provide mechanisms for binding Processes to CPU cores.
[RS_OSI_00204]	The Operating System shall support authorized operating system object access for the software entities which are allowed to do so.
[RS_OSI_00206]	The Operating System shall provide multi-Process support for isolation of applications.
[RS_OSI_00207]	The Operating System shall provide the capability to share code and data in an implicit manner.
[RS_OSI_00208]	The Operating System shall allow Processes to access only required functionality.

▽

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Number	Heading
[RS_OSI_00209]	The Operating System shall support error handling including unrecoverable errors.
[RS_OSI_00210]	The Operating System shall provide a mechanism to observe scheduling of CPU time to Task, Process
[RS_OSI_00211]	The Operating System shall provide a mechanism to export low-level scheduling and trace information to applications.

Table A.2: Deleted Requirements in R26-11

A.2 Traceable item history of this document according to AUTOSAR Release R25-11

A.2.1 Added Requirements in R25-11

none

A.2.2 Changed Requirements in R25-11

Number	Heading
[RS_OSI_00100]	POSIX PSE51 Compliance
[RS_OSI_00103]	The Operating System Interface shall support C++.
[RS_OSI_00104]	The Operating System Interface shall support the reaction on Process-external stimuli from devices.
[RS_OSI_00105]	The Operating System Interface shall support the start of Execution Management.
[RS_OSI_00201]	The Operating System shall provide mechanisms for system memory budgeting.
[RS_OSI_00202]	The Operating System shall provide mechanisms for CPU time budgeting.
[RS_OSI_00203]	The Operating System should provide mechanisms for binding Processes to CPU cores.
[RS_OSI_00204]	The Operating System shall support authorized operating system object access for the software entities which are allowed to do so.
[RS_OSI_00206]	The Operating System shall provide multi-Process support for isolation of applications.
[RS_OSI_00207]	The Operating System shall provide the capability to share code and data in an implicit manner.
[RS_OSI_00208]	The Operating System shall allow Processes to access only required functionality.
[RS_OSI_00209]	The Operating System shall support error handling including unrecoverable errors.

▽

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Number	Heading
[RS_OSI_00210]	The Operating System shall provide a mechanism to observe scheduling of CPU time to Task, Process
[RS_OSI_00211]	The Operating System shall provide a mechanism to export low-level scheduling and trace information to applications.

Table A.3: Changed Requirements in R25-11

A.2.3 Deleted Requirements in R25-11

none

A.3 Traceable item history of this document according to AUTOSAR Release R24-11

A.3.1 Added Requirements in R24-11

none

A.3.2 Changed Requirements in R24-11

Number	Heading
[RS_OSI_00100]	POSIX PSE51 Compliance
[RS_OSI_00103]	The Operating System Interface shall support C++.
[RS_OSI_00104]	The Operating System Interface shall support the reaction on Process-external stimuli from devices.
[RS_OSI_00105]	The Operating System Interface shall support the start of Execution Management.
[RS_OSI_00201]	The Operating System shall provide mechanisms for system memory budgeting.
[RS_OSI_00202]	The Operating System shall provide mechanisms for CPU time budgeting.
[RS_OSI_00203]	The Operating System should provide mechanisms for binding Processes to CPU cores.
[RS_OSI_00204]	The Operating System shall support authorized operating system object access for the software entities which are allowed to do so.
[RS_OSI_00206]	The Operating System shall provide multi-Process support for isolation of applications.
[RS_OSI_00207]	The Operating System shall provide the capability to share code and data in an implicit manner.

▽

△

Number	Heading
[RS_OSI_00208]	The Operating System shall allow Processes to access only required functionality.
[RS_OSI_00209]	The Operating System shall support error handling including unrecoverable errors.
[RS_OSI_00210]	The Operating System shall provide a mechanism to observe scheduling of CPU time to Task, Process
[RS_OSI_00211]	The Operating System shall provide a mechanism to export low-level scheduling and trace information to applications.

Table A.4: Changed Requirements in R24-11

A.3.3 Deleted Requirements in R24-11

none

A.4 Traceable item history of this document according to AUTOSAR Release R23-11

A.4.1 Added Requirements in R23-11

Number	Heading
[RS_OSI_00210]	The `Operating System` shall provide a mechanism to observe scheduling of CPU time to tasks, processes.
[RS_OSI_00211]	The `Operating System` shall provide a mechanism to export low-level scheduling and trace information to applications.

Table A.5: Added Requirements in R23-11

A.4.2 Changed Requirements in R23-11

Number	Heading
[RS_OSI_00201]	The Operating System shall provide mechanisms for system memory budgeting.
[RS_OSI_00202]	The Operating System shall provide mechanisms for CPU time budgeting.
[RS_OSI_00203]	The Operating System should provide mechanisms for binding processes to CPU cores.

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Number	Heading
[RS_OSI_00206]	The Operating System shall provide multi-process support for isolation of applications.

Table A.6: Changed Requirements in R23-11

A.4.3 Deleted Requirements in R23-11

none

A.5 Traceable item history of this document according to AUTOSAR Release R22-11

A.5.1 Added Advisories in R22-11

none

A.5.2 Changed Advisories in R22-11

none

A.5.3 Deleted Advisories in R22-11

none

A.5.4 Added Constraints in R22-11

none

A.5.5 Changed Constraints in R22-11

none

A.5.6 Deleted Constraints in R22-11

none

A.5.7 Added Requirements in R22-11

none

A.5.8 Changed Requirements in R22-11

Number	Heading
[RS_OSI_00103]	The Operating System Interface shall support C++.
[RS_OSI_00104]	The Operating System Interface shall support the reaction on process-external stimuli from devices.
[RS_OSI_NA]	

Table A.7: Changed Requirements in R22-11

A.5.9 Deleted Requirements in R22-11

none