Document Title	Requirements on Persistency
Document Owner	AUTOSAR
Document Responsibility	AUTOSAR
Document Identification No	857

Document Status	published
Part of AUTOSAR Standard	Adaptive Platform
Part of Standard Release	R25-11

Document Change History

Date	Release	Changed by	Description
2025-11-27	R25-11	AUTOSAR Release Management	• Added Remote Persistency • Fixed uptrace to RS Safety • Removed uptraces to RS Main
2024-11-27	R24-11	AUTOSAR Release Management	• No content changes
2023-11-23	R23-11	AUTOSAR Release Management	• Changed document name to include “AP” • Rewrote the document according to new requirements style • Added handling of authentication
2022-11-24	R22-11	AUTOSAR Release Management	• Improved tracing RS Safety and RS Main
2021-11-25	R21-11	AUTOSAR Release Management	• Re-introduced support of finalization of persistent data • Removed support of removal of persistent data • Harmonized names between SWS and RS • Improved formal aspects of requirements

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2020-11-30	R20-11	AUTOSAR Release Management	• Added support for file meta-data • Added up-traces to RS Safety • Adapted to common document structure • Added requirement history
2019-11-28	R19-11	AUTOSAR Release Management	• Statistic data • Initialization/De-initialization • Changed Document Status from Final to published
2019-03-29	19-03	AUTOSAR Release Management	• Updated introduction • Information on wear leveling • Finalization was removed
2018-10-31	18-10	AUTOSAR Release Management	• Restructured document • Added resource handling • Added UCM related requirements
2018-03-29	18-03	AUTOSAR Release Management	• Added requirement on configuration • Removed requirement on authorization
2017-10-27	17-10	AUTOSAR Release Management	• Requirements on Secure Storage • Requirements on Safe Storage
2017-03-31	17-03	AUTOSAR Release Management	• Initial release

Disclaimer

Table of Contents

1 Scope of Document

This document specifies the requirements of Adaptive Applications to the functional cluster Persistency of the AUTOSAR Adaptive Platform. The motivation is to provide a standardized and portable way to store and write data persistently.

2 Conventions to be Used

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].

2.1 Requirements Guidelines

There are no special guidelines for requirements for the functional cluster Persistency.

3 Acronyms and Abbreviations

There are no acronyms and abbreviations relevant within this document that are not included in the [2, AUTOSAR Glossary].

4 Requirements Specification

This chapter describes all requirements driving the work to define the functional clusters Persistency and Remote Persistency.

The functional cluster Persistency will be referenced as “Persistency” in the remainder of this document, and the same simplification is used for the functional cluster Remote Persistency.

4.1 Persistency

4.1.1 Functional Overview

The AUTOSAR Adaptive Platform Persistency provides services for Adaptive Applications and other functional clusters of the AUTOSAR Adaptive Platform. The AUTOSAR Adaptive Platform Persistency is responsible for all aspects which regard the storage/retrieval of data, and therefore it has to deal with:

- Persistently storing data over boot and ignition cycles.
- Accessing data which has been stored persistently.
- Using a unique identifier to access data.
- Reading and writing data from/to files.
- Encryption of persistent data.
- Error detection and correction of stored data.
- Monitoring storage space.

4.1.2 Functional Requirements

Persistency shall fulfill the following functional requirements.

4.1.2.1 Configuration of Persistent Data

[RS_PER_00010] Configurable Layout of Persistent Data ⌈

Description:	Persistency shall support the configuration of the available key-value storages and file storages. **Additional Information:** This configuration includes mandatory parts like the identifiers and location of the storages, and may also include optional parts like pre-configured storage elements (key-value pairs and their data types, and files) as well as redundancy, encryption, and additional information about necessary updates.

⌋

4.1.2.2 Storage of Persistent Data

[RS_PER_00018] Initialization and Shutdown ⌈

Description:	Persistency shall support central initialization and shutdown. **Additional Information:** Application developers control the life cycle of all functional clusters using a central mechanism. This mechanism helps Persistency to prepare and clean up its environment in order to ensure a reliable behavior. E.g. the available storages need to be read from the manifest before any storage can be accessed. And before shutdown, all data of Persistency needs to be persisted.

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[RS_PER_00001] Storage of Persistent Data ⌈

Description:	Persistency shall support persistent storage of data of an Adaptive Application or of another Functional Cluster. **Additional Information:** There are different possibilities for an implementation of Persistency to store data. Persistency could use a file system, in which case it does not have full control over the actual storage on the physical device. Alternatively, it could use a physical device directly, in which case it might have to take care of wear leveling, because these devices have a limited number of write cycles, and some devices don't feature wear leveling in hardware.
Rationale:	Applications need to preserve data from one run-time to the next. This data could be settings, diagnostic data, calibration data, or error logs.

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[RS_PER_00002] Retrieval of Persistent Data ⌈

Description:	Persistency shall support retrieval of persisted data of an Adaptive Application or of another Functional Cluster. **Additional Information:** An Adaptive Application or another functional cluster which stores persistent data needs to restore it after a restart of an Adaptive Application, another functional cluster, or of the whole platform.

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[RS_PER_00003] Key-Value Storage ⌈

Description:	Persistency shall support identification of a value by using a unique key. **Additional Information:** Data needs to be stored in way that it can be easily be accessed by using a unique identifier. The values are characterized by their data type.

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[RS_PER_00004] File Storage ⌈

Description:	Persistency shall support access to file-like structures. **Additional Information:** Data needs to be read and written from files inside folders, and associated meta data (e.g. access time) needs to be available. Files can contain UTF-8 text or binary data.
Rationale:	PSE51 does not contain file system support.

⌋

4.1.2.3 Secure Storage of Persistent Data

[RS_PER_00005] Encryption and Decryption ⌈

Description:	Persistency shall support encryption and decryption of persistent data. **Additional Information:** The encryption and decryption are not visible to the adaptive application or the functional cluster using Persistency. The algorithm and key are subject to configuration.

⌋

[RS_PER_00019] Authentication ⌈

Description:	Persistency shall support authentication of persistent data. **Additional Information:** Persistency shall provide a standardized way to authenticate persistent data and check authenticity of persistent data using a MAC.

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4.1.2.4 Safe Storage of Persistent Data

[RS_PER_00008] Detection of Data Corruption

Upstream requirements: RS_SAF_10037

⌈

Description:	Persistency shall be able to detect data corruption in persistent memory. **Additional Information:** The corruption may be caused by systematic or random failures. To be able to detect corrupted data, some redundancy is needed, which can be anything from a checksum to a full copy. Additionally, an adaptive application can register for receiving information about data corruption. The actual mechanisms used for ensuring data consistency are subject to configuration.

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[RS_PER_00009] Recovery of Corrupted Data

Upstream requirements: RS_SAF_10040

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Description:	Persistency shall be able to recover data that was corrupted. **Additional Information:** To be able to recover corrupted data, a redundant copy of the data is needed. Additionally, an adaptive application can register for receiving information about data recovery. The actual mechanisms and the granularity of redundancy are subject to configuration.

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4.1.2.5 Installation, Update, Roll-back, and Clean-Up of Persistent Data

[RS_PER_00012] Installation ⌈

Description:	Persistency shall support installation of persistent data. **Additional Information:** Persistent storages can be installed with pre-configured values for keys in a key-value storage and pre-configured files in a file storage. The pre-configured data is provided by the manifest.

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[RS_PER_00013] Update ⌈

Description:	Persistency shall support updates of persistent data. **Additional Information:** Persistent storages can be updated, including values in a key-value storage and files in a file storage. The update strategy and updated data is provided by the manifest.

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[RS_PER_00014] Rollback ⌈

Description:	Persistency shall support rollback of persistent data. **Additional Information:** Persistent storages can be reset to the previous content in case an update failed. Downgrade to a previous version is not supported.

⌋

[RS_PER_00016] Cleanup ⌈

Description:	Persistency shall support cleanup after an update of persistent data. **Additional Information:** After an update was finalized, it is possible to clean up the backup data created during an update for a potential rollback.

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4.1.2.6 Resource handling for Persistent Data

[RS_PER_00011] Storage Quota ⌈

Description:	Persistency shall be able to limit the amount of storage used by persistent data. **Additional Information:** The storage space allocated by persistent data is monitored continuously, similar to a file system quota.
Rationale:	Reliable access to data storages.

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[RS_PER_00017] Storage Size ⌈

Description:	Persistency shall be able to report the amount of currently used storage.

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4.1.3 Non-Functional Requirements

Persistency currently does not have any non-functional requirements.

4.2 Remote Persistency

4.2.1 Functional Overview

The Remote Persistency provides global storage services for Adaptive Applications of the AUTOSAR Adaptive Platform via service interfaces. It is responsible for the following functionality:

- Accessing data items from different Adaptive Applications.
- Storing data items over boot and ignition cycles.
- Updating data items via UCM or service interfaces.
- Accessing information about stored data items.

4.2.2 Functional Requirements

Remote Persistency shall fulfill the following functional requirements. Please note that the functionality of Remote Persistency is based on the functional clusters Communication Management and Persistency, and the following requirements therefore assume the availability of the functionality of these two functional clusters.

4.2.2.1 Configuration of Remote Data Items

[RS_PER_00020] Configurable Layout of Remote Data Items ⌈

Description:	Remote Persistency shall support the configuration of a set of remote data items and corresponding storages. **Additional Information:** This configuration includes service interfaces to access the storages from applications, and Persistency interfaces for the underlying key-value storages with pre-defined key-value pairs.

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4.2.2.2 Storage of Remote Data Items

[RS_PER_00021] Initialization and Shutdown ⌈

Description:	Remote Persistency shall support initialization and shutdown. **Additional Information:** As a daemon, Remote Persistency is started and stopped according to the configuration of run levels by the Execution Management. This mechanism helps Remote Persistency to prepare and clean up its environment in order to ensure a reliable behavior. E.g. the available storages need to be opened before they are accessed via the service interface. And before shutdown, all data of Remote Persistency needs to be persisted.

⌋

[RS_PER_00022] Access to Persisted Remote Data Items ⌈

Description:	Remote Persistency shall support central persistent storage of data items of Adaptive Applications. **Additional Information:** Remote Persistency links service interfaces for access to remote data items to a storage based on the Key-Value Storage of Persistency.
Rationale:	Applications need to access and share data items that are updated independently and stored persistently. These data items are typically central settings of the vehicle, but could also be data items that require an independent and central update.

⌋

[RS_PER_00023] Installation and Update of Remote Data Items ⌈

Description:	Remote Persistency shall support installation and update of Remote Data Items. **Additional Information:** Installation of remote data items is handled by the underlying Persistency based on the corresponding configuration. An update is possible via service interfaces or with an update using the Persistency configuration.

⌋

[RS_PER_00024] Access Control for Remote Data Items ⌈

Description:	Remote Persistency shall support access control for Remote Data Items. **Additional Information:** This can be achieved by configuring the access control of the service interfaces as Identity and Access Management (IAM).
Rationale:	Most Adaptive Applications will access their remote data items but not change them, while other Adaptive Application need both read and write access to their remote data items.

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4.2.3 Non-Functional Requirements

The Remote Persistency currently does not have any non-functional requirements.

5 Requirements Tracing

The following table references the requirements specified in the [3, AUTOSAR Safety Requirements], and links to the fulfillments of these.

Requirement	Description	Satisfied by
[RS_SAF_10037]	AUTOSAR shall provide mechanisms to prevent unintended alteration of data.	[RS_PER_00008]
[RS_SAF_10040]	AUTOSAR shall support data recovery mechanisms.	[RS_PER_00009]

Table 5.1: Requirements Tracing

6 References

[1] Standardization Template
AUTOSAR_FO_TPS_StandardizationTemplate

[2] Glossary
AUTOSAR_FO_TR_Glossary

[3] Safety Requirements for AUTOSAR Adaptive Platform and AUTOSAR Classic Platform
AUTOSAR_FO_RS_Safety

A History of Requirements

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

A.1 Requirement History of this Document According to AUTOSAR Release R25-11

A.1.1 Added Requirements in R25-11

[RS_PER_00020] [RS_PER_00021] [RS_PER_00022] [RS_PER_00023] [RS_PER_00024]

A.1.2 Changed Requirements in R25-11

none

A.1.3 Deleted Requirements in R25-11

none

A.2 Requirement History of this Document According to AUTOSAR Release R24-11

A.2.1 Added Requirements in R24-11

none

A.2.2 Changed Requirements in R24-11

none

A.2.3 Deleted Requirements in R24-11

none

A.3 Requirement History of this Document According to AUTOSAR Release R23-11

A.3.1 Added Requirements in R23-11

[RS_PER_00019]

A.3.2 Changed Requirements in R23-11

[RS_PER_00001] [RS_PER_00002] [RS_PER_00003] [RS_PER_00004] [RS_PER_00005] [RS_PER_00008] [RS_PER_00009] [RS_PER_00010] [RS_PER_00011] [RS_PER_00012] [RS_PER_00013] [RS_PER_00014] [RS_PER_00016] [RS_PER_00017] [RS_PER_00018]

A.3.3 Deleted Requirements in R23-11

none

A.4 Requirement History of this Document According to AUTOSAR Release R22-11

A.4.1 Added Requirements in R22-11

[RS_PER_NA]

A.4.2 Changed Requirements in R22-11

none

A.4.3 Deleted Requirements in R22-11

none

A.5 Requirement History of this Document According to AUTOSAR Release R21-11

A.5.1 Added Requirements in R21-11

[RS_PER_00016]

A.5.2 Changed Requirements in R21-11

[RS_PER_00001] [RS_PER_00004] [RS_PER_00008] [RS_PER_00009] [RS_PER_00012] [RS_PER_00013]

A.5.3 Deleted Requirements in R21-11

[RS_PER_00015]

A.6 Requirement History of this Document According to AUTOSAR Release R20-11

A.6.1 Added Requirements in R20-11

none

A.6.2 Changed Requirements in R20-11

[RS_PER_00004]

A.6.3 Deleted Requirements in R20-11

none

A.7 Requirement History of this Document According to AUTOSAR Release R19-11

A.7.1 Added Requirements in R19-11

[RS_PER_00017] [RS_PER_00018]

A.7.2 Changed Requirements in R19-11

none

A.7.3 Deleted Requirements in R19-11

none

A.8 Requirement History of this Document According to AUTOSAR Release 19-03

A.8.1 Added Requirements in 19-03

none

A.8.2 Changed Requirements in 19-03

[RS_PER_00001]

A.8.3 Deleted Requirements in 19-03

[RS_PER_00016]

A.9 Requirement History of this Document According to AUTOSAR Release 18-10

A.9.1 Added Requirements in 18-10

[RS_PER_00011] [RS_PER_00012] [RS_PER_00013] [RS_PER_00014] [RS_PER_00015] [RS_PER_00016]

A.9.2 Changed Requirements in 18-10

none

A.9.3 Deleted Requirements in 18-10

none

A.10 Requirement History of this Document According to AUTOSAR Release 18-03

A.10.1 Added Requirements in 18-03

[RS_PER_00010]

A.10.2 Changed Requirements in 18-03

[RS_PER_00002] [RS_PER_00003] [RS_PER_00004] [RS_PER_00008]

A.10.3 Deleted Requirements in 18-03

[RS_PER_00007]

A.11 Requirement History of this Document According to AUTOSAR Release 17-10

A.11.1 Added Requirements in 17-10

[RS_PER_00005] [RS_PER_00007] [RS_PER_00008] [RS_PER_00009]

A.11.2 Changed Requirements in 17-10

[RS_PER_00001] [RS_PER_00002] [RS_PER_00003] [RS_PER_00004]

A.11.3 Deleted Requirements in 17-10

none

A.12 Requirement History of this Document According to AUTOSAR Release 17-03

A.12.1 Added Requirements in 17-03

[RS_PER_00001] [RS_PER_00002] [RS_PER_00003] [RS_PER_00004]

A.12.2 Changed Requirements in 17-03

none

A.12.3 Deleted Requirements in 17-03

none

B Not Applicable Requirements

[RS_PER_NA]

Upstream requirements: RS_SAF_00007, RS_SAF_10027, RS_SAF_10041, RS_SAF_10042

⌈These requirements are not applicable to this specification.⌋