AUTOSAR MemIf Manual

Document Change Histroy				
Date (YYYY-MM-DD)	Ver.	Editor	Chap	내용(개정 전 -> 개정 후)
2015-04-05	1.0	CY Song		• Initial Creation
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2022-08-18	1.3.8.0	YJ Yun	4.3.1	• ChangeLog 수정

Table of Contenets

1. Overview

Autosar 표준 SRS/SWS 를 기반으로 작성 되었으며, 모듈 사용시 보다 자세한 기능적인 설명이 필요한 경우, 아래 Reference 문서를 참고한다

설정관련 Category 의 해석은 다음과 같다.

- Changeable (C): User 에 의해서 설정 가능한 항목
- Fixed (F): User 에 의한 변경이 불가한 항목
- NotSupported (N): 사용되지 않는 항목

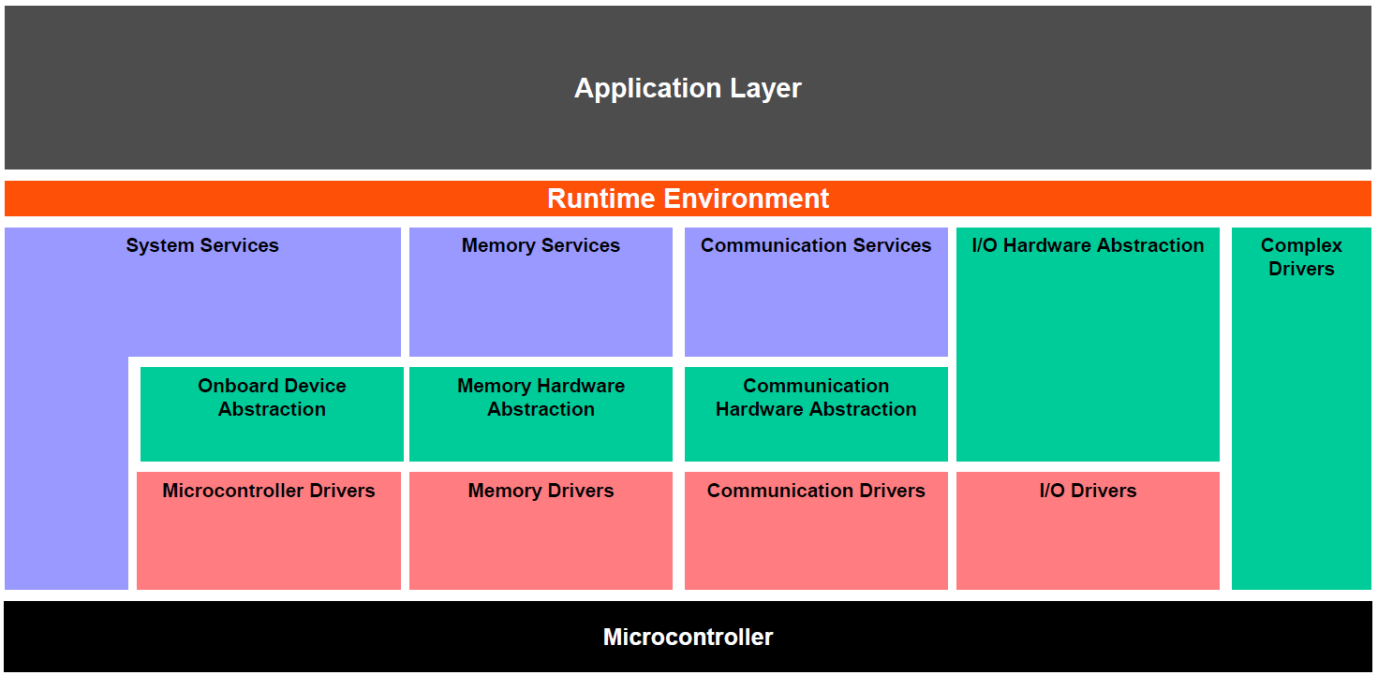
2. Reference

Sl. No.	Title	Version
1.	AUTOSAR_SWS_NVRAMManager.pdf	3.2.0
2.	AUTOSAR_SWS_EEPROMAbstraction.pdf	2.0.0
3.	AUTOSAR_SWS_EEPROMDriver.pdf	3.2.0
4.	AUTOSAR_SWS_FlashDriver.pdf	3.2.0
5.	AUTOSAR_SWS_FlashEEPROMEmulation.pdf	2.0.0
6.	AUTOSAR_SWS_CRCLibrary.pdf	4.2.0
7.	AUTOSAR_SWS_MemoryAbstractionInterface.pdf	1.4.0

3. AUTOSAR System

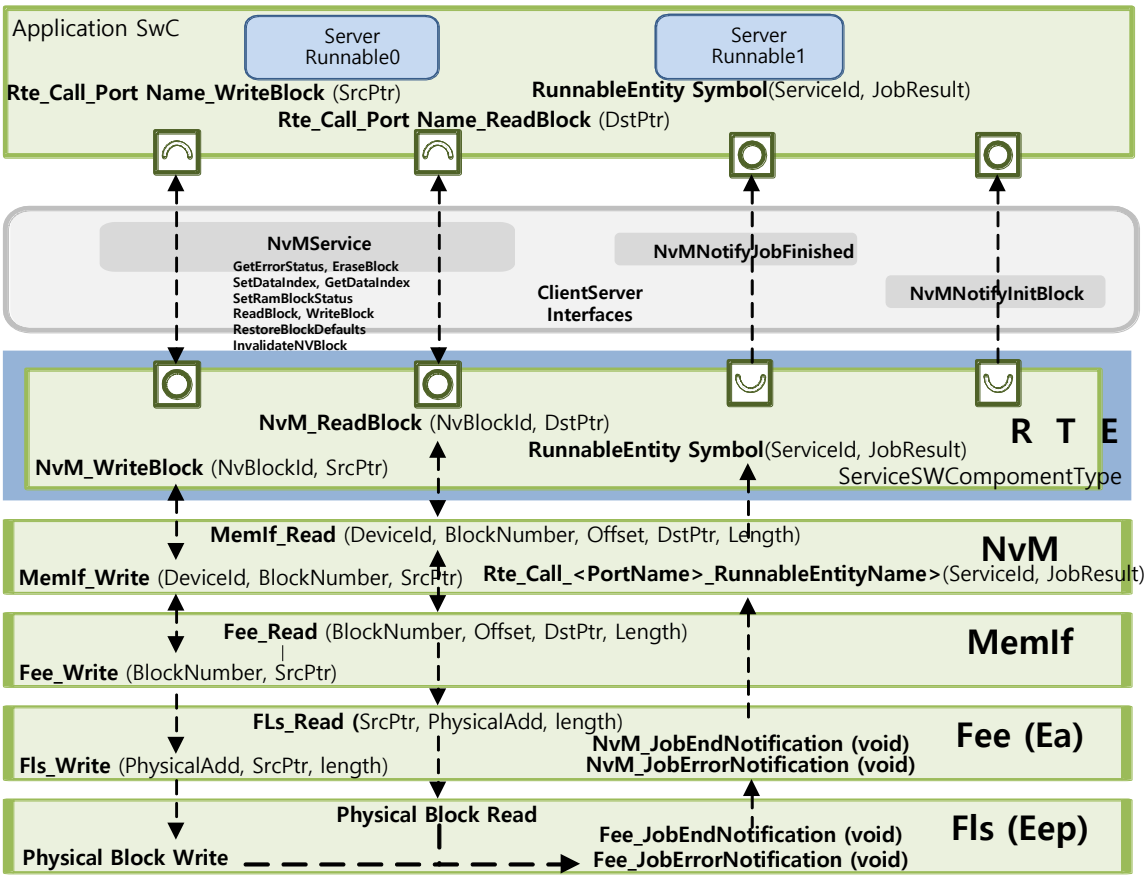
3.1 Overview of Software Layers

AUTOSAR 플랫폼의 Layered Architecture 는 아래와 같다. AUTOSAR 플랫폼은, Service Layer, ECU Abstraction Layer, Complex Device Drivers 및 Microcontroller Abstraction Layer 로 구분될 수 있다.



3.2 AUTOSAR Memory Stack

MemoryStack 모듈은 NvM / MemIf / Ea / Eep / Fee / Fls 모듈을 의미한다. 여기서 Fee 와 Fls 모듈은 Mcal 에 속하는 모듈로 기본적인 사항은 각 MCU 제조사의 UserManual, Integration Manual 을 참조한다. EEPROM 을 사용하기 위하여 기본적으로 NvM, MemIf 모듈이 필요하며, Internal EEPROM 을 사용하기 위해서는 Fee / Fls 모듈, External EEPROM 을 사용하기 위해서는 Ea / Eep 모듈이 추가로 필요하다. EEPROM 을 사용하기 위한 Autosar layer 및 각 모듈간의 interface 는 다음과 같다.



Write requests (From NvM_Sws_NvM698)
Applications have to adhere to the following rules during write request for implicit synchronization between application and NVRAM manager:

1. The application fills a RAM block with the data that has to be written by the NvM module
2. The application issues the NvM_WriteBlock request which transfers control to the NvM module.
3. From now on the application must not modify the RAM block until success or failure of the request is signaled or derived via polling. In the meantime the contents of the RAM block may be read.
4. An application can use polling to get the status of the request or can be informed via a callback function asynchronously.
5. After completion of the NvM module operation, the RAM block is reusable for modifications.

Read requests (From NvM_Sws_NvM699)
Applications have to adhere to the following rules during read request for implicit synchronization between application and NVRAM manager:

1. The application provides a RAM block that has to be filled with NVRAM data from the NvM module's side.
2. The application issues the NvM_ReadBlock request which transfers control to the NvM module.
3. From now on the application must not read or write to the RAM block until success or failure of the request is signaled or derived via polling.
4. An application can use polling to get the status of the request or can be informed via a callback function.
5. After completion of the NvM module operation, the RAM block is available with new data for use by the application.

4. Product Release Notes

4.1 Overview

이 Chapter 에서는, MemIf Product 에 대한 release 관련 내용을 제공하는데 목적이 있으며, MemIf Software product release version 에 대한 제한사항 및 특이사항을 기술하고 있다.

4.2 Scope of the release

이 문서에 대한 모든 내용은, 다음의 MemIf 모듈에 한정한다.

Module	Autosar version	SWS version	Module version
MemIf	4.0.3	1.4.0	1.3.8.0

※ **Module version 은 각 모듈의 BswModule Description(Bswmd)파일의 Sw version 을 의미한다.**

4.3 Module release notes

4.3.1 MemIf

4.3.1.1 Change Log

- Version 1.3.8.0 (2022-08-20)
  - 신규 기능
    - N/A
  - 개선 사항
    - UNECE Cyber Security 법규 대응을 위한 보안 코딩 개선

원인	UNECE Cyber Security 법규 대응을 위한 보안 코딩 개선
동작 영향	없음
설정 영향	없음
ASW 조치 사항	없음

- Version 1.3.7.0 (2021-12-30)
  - 신규 기능
    - N/A
  - 개선 사항
    - UNECE Cyber Security 법규 대응을 위한 보안 코딩 개선

원인	UNECE Cyber Security 법규 대응을 위한 보안 코딩 개선
동작 영향	없음
설정 영향	없음
ASW 조치 사항	없음

- Version 1.3.6.0 (2021-10-13)
  - 신규 기능

■ N/A

- 개선 사항

■ Infineon Aurix 2G MCAL 2.0.0 대응

원인	Infineon MCAL 2.0.0 부터는 Fls_17_Dmu_Cfg.h 에서 MemIf_Types.h 가 아닌 MemIf.h 를 Include 하도록 개선됨. 이에 따라 MemIf 도 변경이 필요함
동작 영향	없음
설정 영향	없음
ASW 조치 사항	없음

➢ Version 1.3.5.0 (2020-12-31)

- 신규 기능

■ N/A

- 개선 사항

■ MISRA 적용 및 정당화

원인	MISRA rule 적용
동작 영향	없음
설정 영향	없음
ASW 조치 사항	없음

➢ Version 1.3.4.0 (2019-10-17)

- 신규 기능

■ N/A

- 개선 사항

■ Parameter Definition File Category 수정

원인	소스 코드 오픈
동작 영향	없음
설정 영향	유저가 설정 가능한 설정에 한하여 권한 변경
ASW 조치 사항	Category 가 Changeable 로 변경된 설정 수정 가능

➢ Version 1.3.4 (2015-05-24)

- User Manual 수정

➢ Version 1.3.3 (2015-03-13)

- PDF 에 Parameter 별 속성 추가하여 변경이 필요없는 설정은 수정하지 못하도록 기능 추가

4.3.1.2 Limitations

None

4.3.1.3 Deviation

None

5. Configuration Guide

5.1 MemIf 모듈

5.1.1 MemIfGeneral Container

Parameter Name	Value	Category
DevErrorDetect	True	C
NumberOfDevice[1)]	User Defined (From SRS)	C
VersionInfoApi	False	C

1) External or Internal EEPROM 하나만 사용시 1로 설정.
External and Internal EEPROM 동시에 사용시 2로 설정.

6. Application Programming Interface (API)

6.1 Type Definitions

6.1.1 MemIf_StatusType

Type:	Enumeration		
Range	MEMIF_UNINIT	0x00	The underlying abstraction module or device driver has not been initialized
	MEMIF_IDLE	0x01	The underlying abstraction module or device driver is currently idle.
	MEMIF_BUSY	0x02	The underlying abstraction module or device driver is currently busy.
	MEMIF_BUSY_INTERNAL	0x03	The underlying abstraction module is busy with internal management operations. The underlying device driver can be busy or idle.
Description:	Denotes the current status of the underlying abstraction module and device drive		

6.1.2 MemIf_JobResultType

Type:	Enumeration		
Range	MEMIF_JOB_OK	0x00	The job has been finished successfully.
	MEMIF_JOB_FAILED	0x01	The job has not been finished successfully.
	MEMIF_JOB_PENDING	0x02	The job has not yet been finished.
	MEMIF_JOB_CANCELED	0x03	The job has been canceled.
	MEMIF_BLOCK_INCONSISTENT	0x04	The requested block is inconsistent, it may contain corrupted data.
	MEMIF_BLOCK_INVALID	0x05	The requested block has been marked as invalid, the requested operation can not be performed.
Description:	Denotes the result of the last job.		

6.1.3 MemIf_ModeType

Type:	Enumeration		
Range	MEMIF_MODE_SLOW	0x00	The underlying memory abstraction modules and drivers are working in slow mode.
	MEMIF_MODE_FAST	0x01	The underlying memory abstraction modules and drivers are working in fast mode.
Description:	Denotes the operation mode of the underlying abstraction modules and device drivers.		

6.2 Macro Constants

None

7. Generator

7.1 Generator Option

None

7.2 Generator Error Message

7.2.1 MemIf

7.2.1.1 Error Messages

1) ERR022003: 'Component Name' Component is not present in the input file(s).
   - This error occurs, if any of the component MemIf or NvM is (are) not present in any of the input ECU Configuration Description File(s).

2) ERR022005: The parameter 'Parameter Name' in the container 'Container Name' should be configured.
   - This error occurs, if any of the mandatory configuration parameters mentioned below is not configured in ECU Configuration Description File.

Container Name	Parameter Name
BSW-IMPLEMENTATION	AR-RELEASE-VERSION
	VENDOR-ID
	SW-VERSION
BSW-MODULE-DESCRIPTION	MODULE-ID
MemIfGeneral	MemIfDevErrorDetect
	MemIfNumberOfDevices
	MemIfVersionInfoApi

3) ERR022006: The value configured for the parameter ‘Parameter Name’ in the container ‘Container Name’ should follow the pattern: <Pattern>.
   - This error occurs, if the parameter ‘Parameter Name’ is not configured as per the pattern.

Parameter Name	Container Name	Pattern	Example
AR-RELEASE-VERSION	BSW-IMPLEMENTATION	4.[0-9]+.[0-9]+	4.0.3
SW-VERSION		1.[0-9]+.[0-9]+	1.0.0

4) ERR022051: Value of the parameter 'FlsDriverIndex' in the container 'FlsGeneral' should follow value of the parameter 'EepDriverIndex' in the container 'EepGeneral'.
   - This error occurs, if the value of the parameter FlsDriverIndex in the container FlsGeneral which is fetched through reference choice container NvMFeeRef of NvM module does not follow the value of the parameter EepDriverIndex in the container EepGeneral which is fetched through reference choice container NvMEaRef of NvM module.

5) ERR022052: Number of drivers <EA/FEE> configured <No of Drivers> should be same as the value of the parameter 'MemIfNumberOfDevices' in the container 'MemIfGeneral.
   - This error occurs, if the value of the parameter MemIfNumberOfDevices is not the same as number of drivers configured.

6) ERR022053: Values of the parameter 'EepDriverindex' in the container 'EepGeneral' should start with <0>.
   - This error occurs, if the value of the parameter EepDriverIndex in the container EepGeneral doesn't start with zero.

7) ERR022054: Values configured for the parameters 'EepDriverIndex' and 'FlsDriverIndex' in the container 'EepGeneral' and 'FlsGeneral' respectively should be sequential.
   - This error occurs, if the values of the parameters EepDriverIndex and FlsDriverIndex in the container EepGeneral and FlsGeneral respectively are not sequential.

8) ERR022055: The Driver indices 'EepDriverIndex' in the container 'EepGeneral' and 'FlsDriverIndex' in the container 'FlsGeneral' configured should be unique.
   - This error occurs, if the values of the parameters EepDriverIndex and FlsDriverIndex in the container EepGeneral and FlsGeneral respectively are not unique.

9) ERR022056: Values of the parameter ‘FlsDriverindex' in the container 'FlsGeneral' should start with <0>, since the choice container ‘NvMEaRef’ is not configured in any of the NvM Blocks.
   - This error occurs, if the value configured for the parameter 'FlsDriverIndex' in the container 'FlsGeneral' does not start with 0 since the choice container ‘NvMEaRef’ is not configured in any of the NvM Blocks.

7.2.1.2 Warning Messages

None

7.2.1.3 Information Messages

1) INF022015: AUTOSAR Release version <Version> configured for the parameter 'AR-RELEASE-VERSION' in provided MDT file is not correct. AUTOSAR Release version should be one of the following: <Versions>.
   - This information occurs, if the value of the element AR-RELEASE-VERSION present in the Bsw Module Description template is configured other than 4.0.3.

2) INF022051: The value configured for the parameter 'MemIfNumberOfDevices' in the container 'MemIfGeneral' should be less than or equal to 2.
   - This information occurs, if number of MemIfNumberOfDevices is greater than 2.

8. Appendix

8.1 Bswmd (Bsw Module Description)

8.1.1 Bsw 모듈 version 설정

각 모듈을 컴파일할 때, version 정보가 맞지 않으면 Compile 에서 Error 를 발생시킨다.
이때는 Bswmd 의 다음과 같이 BswImplementation Container 에서 version 정보를 수정해야 한다.