

GFSW

GMV FLIGHT SOFTWARE

gmv[®]
INNOVATING SOLUTIONS

SPACE

GFSW – GMV Flight Software

GFSW is a pre-qualified, configurable, robust and low footprint on-board software framework for space missions created upon the expertise gained from previous ESA operational activities such as the Intermediate eXperimental Vehicle (IXV), Space Rider or instruments on Copernicus satellites. **GFSW** is provided pre-qualified and it is tailored for your real time operating system and your target.

GFSW allows **reducing risks and time** in your on-board software development starting from a pre-qualified framework, and **ensuring compatibility** with space ground control systems by using standards: Packet Utilization Service (PUS) and SCOS 2000 database. **GFSW** has been designed following the ECSS standards, ECSS-E-ST-40C, ECSS-Q-ST-80C and ECSS-E-ST-70-41[B/C] for criticality categories from C to A.

For further information:

If you have an application for **GFSW** and would like more information or to discuss your requirements, please contact the team: obs-sw-info@gmv.com



Functionalities

- Software Initialization: initializes the software following a safe order and reporting the results.
- Standard PUS Services complying ECSS-E-ST-70-41[B/C]. Available services allow remote monitoring and control of spacecraft subsystems and payloads. Additionally, using services 5, 12 and 19 it is possible to define the FDIR by configuration allowing late tuning.
 - Service 1: request verification
 - Service 3: housekeeping
 - Service 5: event reporting
 - Service 6: memory management
 - Service 12: on-board monitoring
 - Service 17: test
 - Service 19: event-action
 - Service 20: parameter management
- Timeline management: executes a configurable timeline based on time and events.
- Telemetry management: following the PUS standard.
- Telecommand management: each module is able to register the telecommand and it will be automatically routed and scheduled.
- Supervisor: tasks execution is monitored to detect malfunctioning and errors.
- On-board software update via telecommands.
- Real Time capabilities, including tasks defined based on the Ravenscar profile and communication through the Ceiling Priority and Priority Inheritance Protocols.
- DataPool: on-board database allowing safe communication between different modules.
- Mathlib: qualified mathematical library. Verification in the selected target is included.
- OS Abstraction layer: the operating system is abstracted to allow easy porting to the selected RTOS and target.
- Unused services auto removed to avoid dead code.

Data-package

Data-package, based on ECSS standard, is made available together with the **GFSW** software:

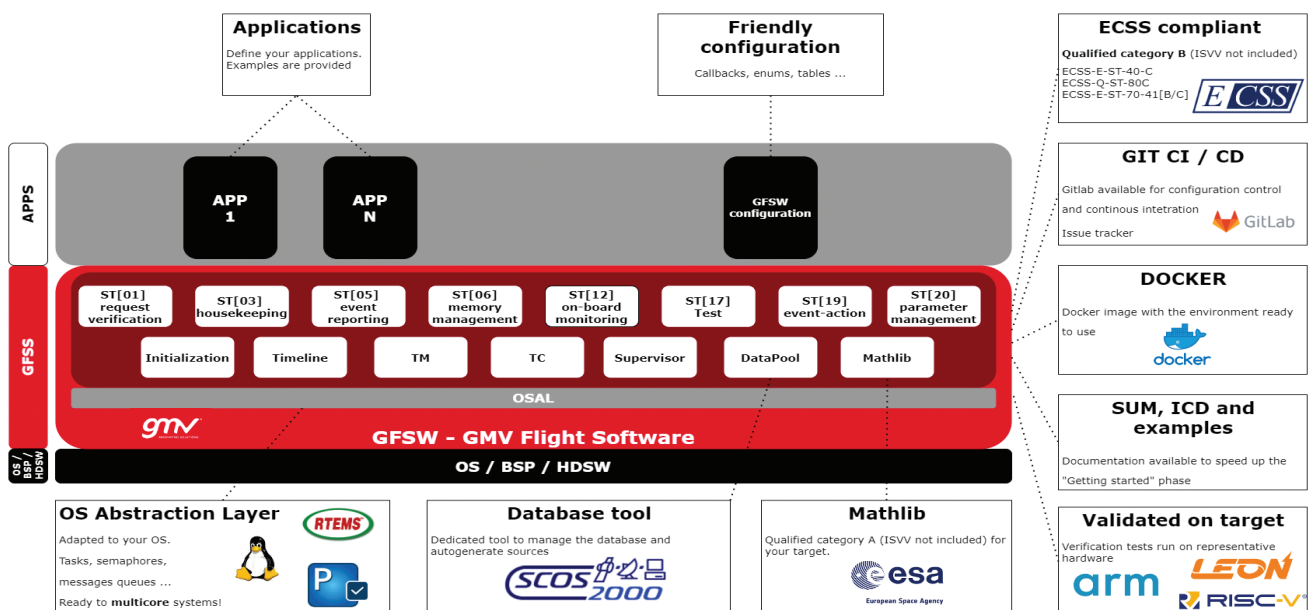
- Software Requirement Specification (SRS)
- Software Design Document (SDD)
- Interface Control Document (ICD)
- Software User Manual (SUM)
- Software Product Assurance Plan (SPAP)
- Software Product Assurance Report (SPAR)
- Software Unit and Integration Test Plan (SUITP)
- Software Unit and Integration Test Report (SUITR)
- Software Verification Test Report (SVR)
- Verification Control Document (VCD)
- Commodity Export Classification Certificate (CECC)

Additional tools

- Git CI/CD – a gitlab project is made available to allow easy integration and communication with external software projects and development teams.
- Docker – development environment is provided as a docker image.
- Examples – several examples are provided together with the software user manual to speed the learning curve for the software developers.
- Database management tool – a specific database management tool is included compatible with the SCOS 2000 database which is extensively use in ground control centers. The tool can automatically generate source code compatible with **GFSW**.

Additional functionalities

Other features such as boot software, additional or tailored PUS services, CSP protocol, file system, gPTP or CANOpen implementations are available on demand.



GFSW product is controlled by the European Union in accordance with dual-use EU Regulation EU 2021/821.