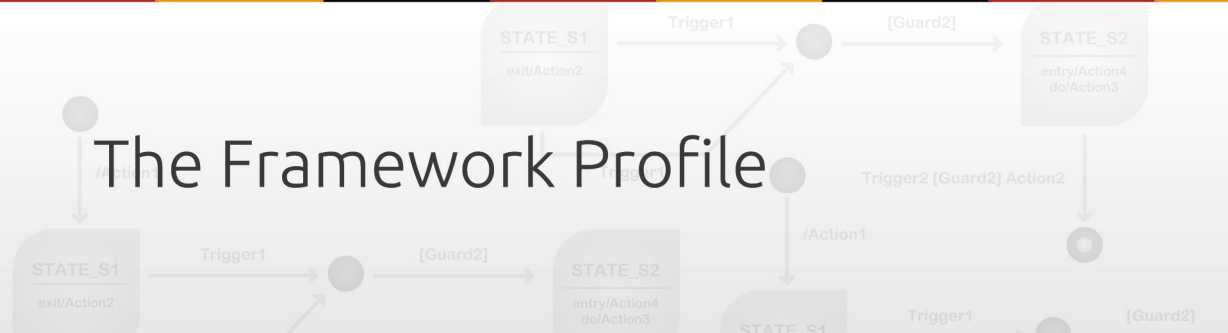# What is the FW Profile?

The Framework Profile (or FW Profile for short) is a specification-level modelling language for software applications. It is partially defined as a restriction of UML, but it removes most of UML's complexity and resolves its semantic ambiguities. The FW Profile promotes a separation of concerns between functional and timing aspects of an application and is specifically aimed at the construction of requirements models for real-time embedded applications. One of its unique features is the support for the specification of reusable software assets (software frameworks) of the kind used when developing software product families.

FW Profile models can be subjected to formal verification using the Spin Model Checker. This makes the FW Profile especially well-suited for use in the safety-critical domains. At P&P Software, we have used the FW Profile for the specification of a new line of medical instrumentation and for the failure handling sub-system of a major European satellite.

C-Language Implementation

The FW Profile is language independent. P&P Software GmbH offers tool support to translate a requirements model expressed with the FW Profile into C code. The **C1 Implementation** is a C-language library providing an implementation of the core modelling concepts of the FW Profile. This includes implementations for State Machines, Procedures (akin to UML's activity diagrams) and RT Containers (encapsulations of threads). The main features of the C1 Implementation are:

- Well-Defined Semantics: clearly and unambiguously defined behaviour.
- Minimal Memory Requirements: core module footprint of a few kBytes.
- Small CPU Demands: one single level of indirection (actions and guards are implemented as function pointers).
- Excellent Scalability: memory footprint and CPU demands independent of number and size of state machine and procedure instances.
- High Reliability: test suite with 100% code, branch, and condition coverage (excluding error branches for system calls).
- Formal Specification: user requirements formally specify the implementation.
- Requirement Traceability: all requirements individually traced to implementation and verification evidence.
- Documented Code: doxygen documentation for all the source code.
- Demo Application: complete application demonstrating capabilities and mode of use.
- Support for Extensibility: an inheritance-like mechanism is provided through which a derived state machine or a derived procedure is created from a base state machine or base procedure by overriding some of its actions or guards.

These characteristics make the C1 Implementation especially well-suited for use in safety-critical, real-time and embedded applications.

Web-Based Modeling Tool and Code Generator

A web-based modeling tool is freely available to help design FW Profile state machines and to automate the generation of the C-code which configures them. Note that the code which implements the state machine behaviour is invariant (it is independent of the state machine topology and of its actions and guards) and is therefore provided by the C1 Implementation; users only need to provide the code which configures a state machine.
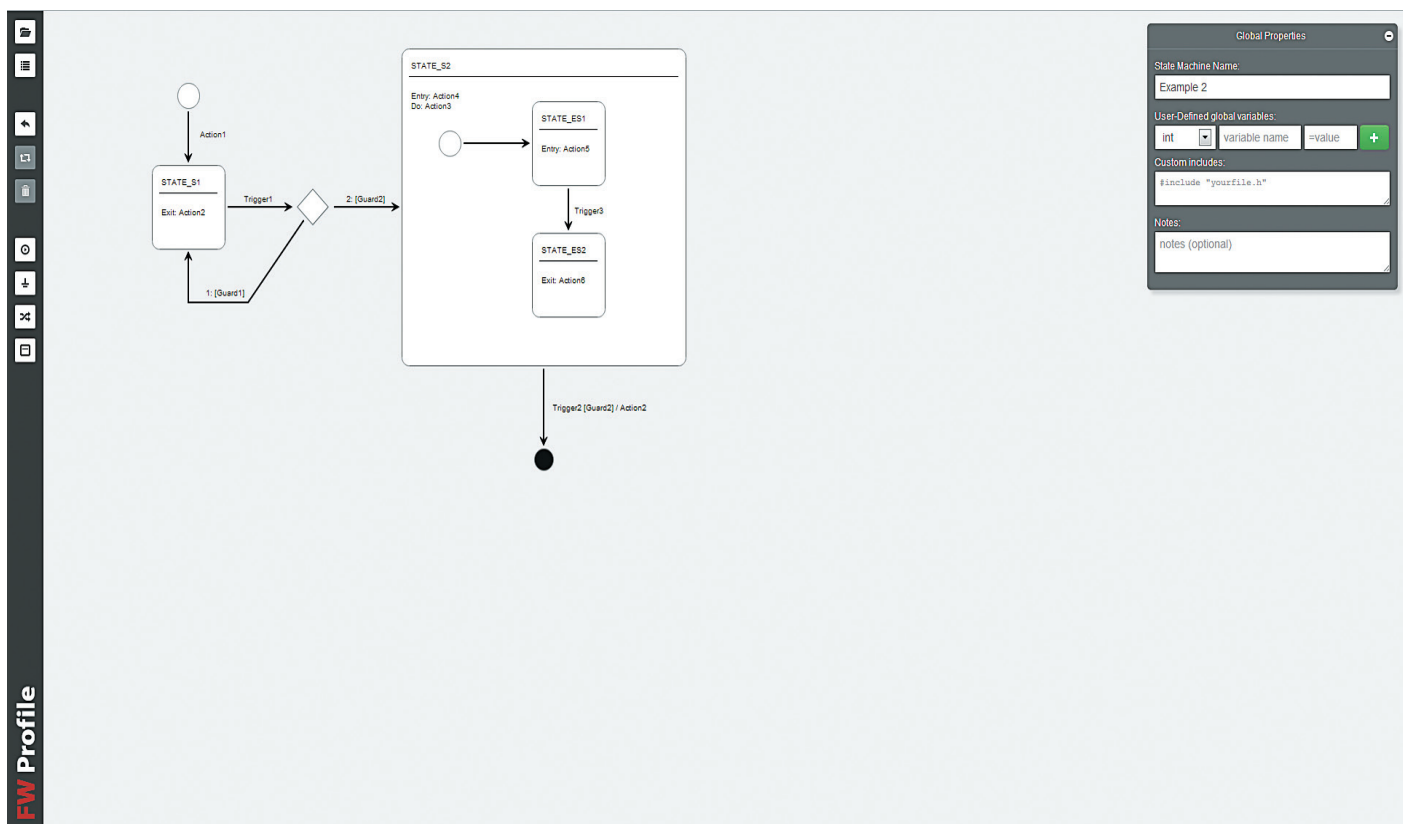
Licensing Condition

The C1 Implementation of the FW Profile is available as free and open software under the terms of the GNU General Public License (GNU GPLv3) and on a Commercial Licence.