SYNOPSYS®

DATASHEET

Silver™

Create and run virtual ECUs

Overview

Silver is a Software-in-the-Loop (SiL) solution to create and run virtual ECUs (vECUs). It provides an early, scalable, cost-effective, and deterministic simulation platform for ECU development, functional test, and validation.

Increasing software complexity further delays the availability of ECUs due to larger and time-consuming iteration cycles. Automotive manufacturers need to test their ECUs as early as possible, ideally before HW is available to meet aggressive time-to-market schedules and with that, reduce costs. Virtual ECUs are key to fast feedback loops and thus ensure the quality of complex control software.

Silver accelerates software development by enabling suppliers and manufacturers to integrate, test, and debug SW, ahead and independent of HW test rigs and prototypes. Silver supports application integration, middleware integration, and operating system integration use cases (Level 1 - Level 3 vECUs, see Figure 1). With that, Silver can isolate software modules, software layers and any combination of software modules in ECU software of any complexity, and enables vertical, horizontal and hybrid integration tests in the early stages of development.

By supporting automotive standards like ASAM XIL, AUTOSAR, FMI, CAN, Ethernet, etc. Silver seamlessly integrates into every ecosystem and test automation framework. To further increase the simulation fidelity with production code drivers, Silver can be coupled with Virtualizer, Synopsys' solution for partial and full binary SW stack integration.

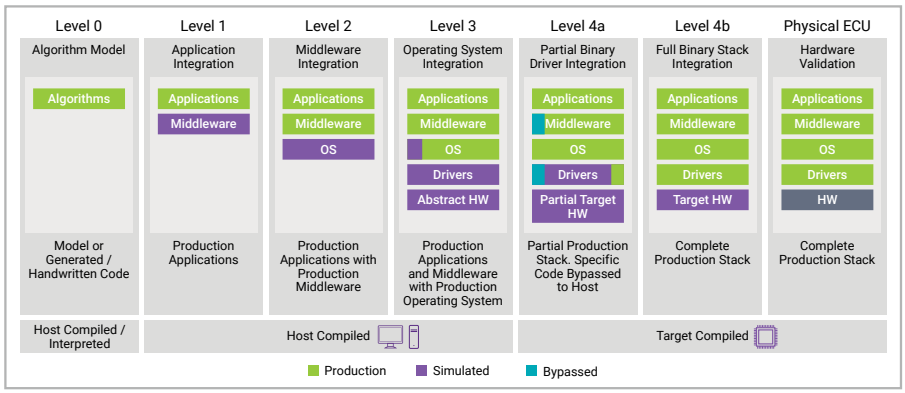

Figure 1: vECU types and abstraction levels

Benefits

- Development and validation tasks move from road and hardware rigs to the workstation. Simulations can be done on an individual PC or on a network
- Build a vECU from Simulink models, C-code, x86 objects or binaries
- Run your partial or full-blown production application software and middleware in a vECU
- Compose a vECU out of multiple binaries to support supply chain workflow and IP protection
- Automated generation of substitution code (e.g., AUTOSAR RTE) for faster vECU bring up
- Vendor-independent AUTOSAR MCAL Plugins for basic software configuration tools (e.g., Elektrobit tresos Studio)
- Protect your IP by exchanging binary simulation components with your supply chain

Features

SiL Execution Platform

- Windows and Linux support
- Enables Level 1 through Level 3 abstraction levels
- Cloud-readiness
- Customizable graphical user interface
- Headless mode enabling regression test use cases
- Open- or closed-loop simulation capabilities
- Silver supports the FMI standard 3.0 for Co-Simulation, FMI standard 2.0 for Co-Simulation and Model Exchange
- Deterministic debugging on source code level with IDE support (e.g., Visual Studio Code, Eclipse, etc.)
- Rapid Control Prototyping
- Customizable simulation run modes (as fast as possible, real-time, etc)
- Create and handle complex, high-fidelity simulation environments featuring entire vECU networks and environment models
- Read and write access for simulation variables during run-time with industry standard data formats like MDF, MF4, DAT, MAT, CSV, etc.
- Virtual bus support and monitoring on network protocol level for CAN, Ethernet, LIN, and FlexRay
- Python 3 scripting support for simulation stimulus
- Silver Remote Scripting API to control Silver remotely via Python
- CTC++ and GCOV Code Coverage measurement
- Powerful Restbus modeling capabilities to compensate software shortcomings

Connectivity

- Connect Silver to Synopsys test automation tools like TPT
- Connect Silver to Synopsys verification tools like Virtualizer
- ASAM XIL support for 3rd party test automation tools (e.g., tracetronic ecu.test)
- Connect Silver to hardware test rigs with standard protocols: CAN, Ethernet, LIN, FlexRay
- Interoperability with traffic and vehicle simulators like IPG CarMaker
- Execute a Silver vECU directly on a HiL platform
- Use measurement, calibration and diagnostic (MCD) tools like CANape or INCA to interact with the Silver vECU

Support

- Free, self-paced foundation trainings
- Instructor-led trainings
- Many example setups and extensive product documentation
- Online forms for problem reporting
- Co-start and engineering services led by tool experts
- Flexible server-based license management incl. borrowing
- ISO26262 tool qualification support