

Model Database for Complex Simulink Models

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Abstract

The complexity of automotive control systems is increasing. New tasks, such as the development and test of networked functions, require development and test processes based on a common model platform. BMW uses proprietary Simulink based models for powertrain and vehicle simulation. The wide application of these models in Hardware- and Model-in-the-Loop simulations, on engine and gearbox test stands as well as for driving simulators requires a tool based handling and management of the simulation models. For this reason, BMW is building a model database for version and configuration management of these large heterogeneous models and the associated parameter sets.

The core functionality of the tool is the management of hierarchically structured models. Such models are composed of basic functions, submodels of different hierarchical levels, parameter sets, support tools, scripts and other associated files like template simulations. The model database has to manage the versioning of the file groups (modules or packages of files), their hierarchical relationship (inclusion) and has to manage process-parameters controlling their development status. Models may be partially re-used. The database allows several developers to work on the models concurrently. Modules and complete model builds are unique and can be referenced. The database provides adequate views on models to different users. End users browse the released models to retrieve the required simulation.

An important feature and one of the reasons for BMW to develop this new tool is the integration of model and parameter build and control services. These are functions to automate the modular build-up- and save-process of hierarchically structured Simulink models in coordination with the database; similar functions control and manage parameter modules in coordination with parameter m-files. The hierarchy of a Simulink model and the associated parameter files become represented in the database and the sources are managed accordingly. The database also interfaces with model test and quality assurance processes, where the module status information from the database can be used to direct these processes.

Currently, BMW operates a prototype of the database for a group of selected models and users. The prototype has a client / server architecture allowing the operation in a multi-user environment (e.g. providing access control). The next step is the development of the fully productive solution with interfaces to other databases and an integrated support concept.