Model-based real-time applications will increasingly be developed:
- for different kinds of applications and projects
- by different people
- with different model development tools
- in different versions.

To handle the increasing number of models, companywide model management and maintenance is necessary.

The potential for synergies when using models should be exploited better.

The solution:
- LeiKon’s Model Management Platform.
- Versioning and deployment of model master data, model algorithms and model parameter sets for models that were developed by different tools.
- Automatic import of model description data from model development tools.
- Successful installation at an industrial site managing more than 100 surrogate models.

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The problem

Life Cycle Management of model-based Applications

Model-based applications play an increasing role, e.g. in process monitoring, planning and scheduling, and advanced process control. The models differ in the mathematical formulation and in their degree of complexity. During the life cycle of model-based applications testing, deployment and change processes must be supported. Commonly occurring change processes are e.g.: tuning of model parameters, new constraints which must be taken into account or changes of the scope of the applications itself. For transparency, traceability, and also for a continuous improvement process the history of the evolution of the model, changes of model parameters and constraints as well as information on master data like revision dates, authors, storage locations and deployment status are needed. Up to now usually all this life cycle information are not tracked but is – at best – hidden in comments.

The solution

A Model Management Platform

Within CoPro, LeiKon developed a Model Management Platform. In the platform, model-based applications can be assigned to projects. It is possible to track meta data of the projects (e.g. their scope, which plant they refer to) and of the models itself (e.g. authors) as well as the history of changes of a model. For user interaction, a web-based user interface is provided. External tools can be connected by an open service-oriented web API.

A model description consists of functions, given as a file or multiple files which can be uploaded to and downloaded from the Model Management Platform. By uploading a function from an external tool like Matlab, meta data of a function as e.g. its inputs and outputs, their data types and descriptions can be automatically detected and stored. A model also contains model parameters and constraints for each application, which are stored directly in the model management database and can be viewed and changed from the user interface. Changes of functions or parameters lead to new versions that are also handled within the platform. A version is a set of changes to a model’s files, functions and parameters (Fig. 1).

To support deployment and commissioning of model-based applications, the Model Management Platform provides so called “deployment channels”. Channels manage different execution environments (e.g. production and testing). A version can be assigned to a channel. In the first phases of the development of model-based solution, different versions will be executed in a test environment and after the results have been validated the final version can be switched to a production environment by changing the channel. Thus, seamless and faultless deployment and commissioning phases are supported (Fig. 2).

The Model Management Platform is used at an industrial site to manage more than 100 surrogate models representing best demonstrated practice (BDP) curves describing reference values for resource efficient operation. These surrogate models return reference values which show the resource efficient operation under similar operating conditions. The models per plant or per plant unit are centrally stored in the Model Management Platform and can be used online in runtime environments to execute the newest released version of the models.

The summary

Life Cycle Support of model-based Applications

The Model Management Platform supports the life cycle of model-based applications. Beside versioning of models, seamless deployment and commissioning of model-based solutions are supported. The Model Management Platform will close an existing gap using models in online applications. It is the first solution known, which handle all important information related to a model-based application independently of a model development tool in a comprehensive way. Model updates can be imported directly from a development tool via a web-API. A version management enables individual rollbacks. The whole life-cycle of a model-based solution can be documented.

Further information

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