

Variant Generation for PLC Components

The growing demand for flexibility and adaptability in automation systems requires appropriate concepts and methods already in the development stage. By using feature models, the variability of system components can be explicitly modeled. Variants can be derived by simple configuration and automatic generation.

Goal

In the development of software, specifically in the development of PLC programs, software artifacts are often reused. In addition, there are components that need to be made variable depending on the desired product variant (e.g. depending on the desired target platform). Once the static and variable components of a system have been identified, the variability of the system can be explicitly shown in a feature model.

Based on such feature models, during configuration individual features can be added or omitted by simple selection/deselection of a particular variant of the final product. Based on this configuration, the code for the desired product variant will be automatically generated.

The thusly-achieved reuse of software artifacts in combination with a simple adaptability of the dynamic components allows the development effort for all product families to be drastically reduced.

Implementation

The *Feature Modeler* enables explicit mapping of variability using feature modeling. The resulting feature models describe the variable components of a product family along with their interdependencies. The range of all valid product variants is defined in the feature model.

In deriving a product variant, during **configuration** the selection of the features desired in the final product is carried out. Conformity to the feature model thereby ensures that the configured variant is valid.

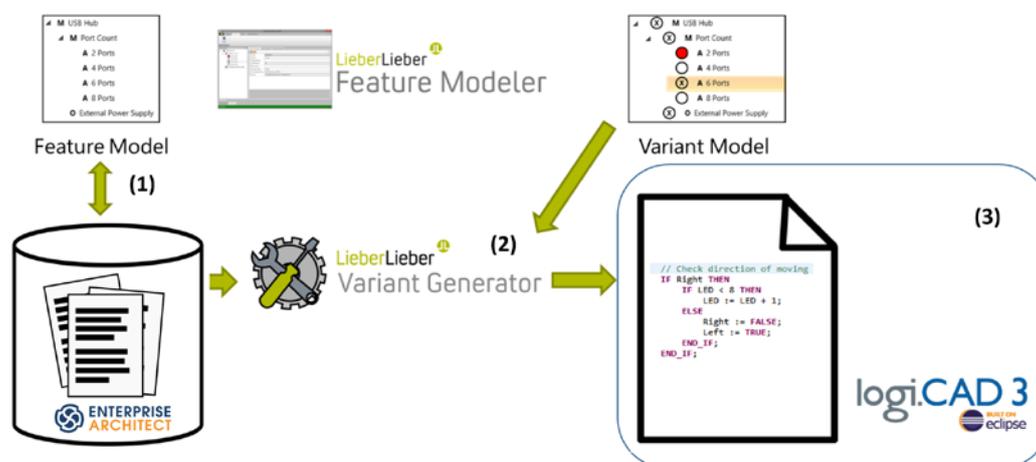
Based on the configuration of the necessary software, artifacts (e.g. Function Blocks) and any additional components are determined by dependencies. These components are combined into a complete PLC program at the time of **variant generation**.

Approach

In the schematic example shown, a feature model is created (1) based on the existing software artifacts. The next step is the configuration of the variant model which will serve as the basis for the variant generation (2). The result (3) is the IEC 61131-3 code variant for subsequent use in logi.CAD 3.

Benefits for Customers

- Considerable **reduction of development effort** in software product families through targeted reuse of components.
- **Easy selection and configuration of components** on the basis of feature models.
- Automatic **generation of PLC codes** for the desired variants.
- **Simplified testing** of entire software product families.



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