Integration with pure::variants

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Prerequisites

- The `PureVariantsProfile.md.zip` profile is used.
- A feature model is defined in the pure::variants program.
- A system model (a superset or 150% model) is defined in the modeling tool developed by No Magic Inc., e.g. MagicDraw.

Modeling tool

MagicDraw as a modeling tool is used in descriptions as an example.

Connecting feature and system models

To connect feature and system models

**Note**

This procedure is required when starting the project for the first time.

1. In pure::variants, open the feature model. In the modeling tool, open the system model.
2. In pure::variants, specify the feature project:
   a. In the Variant Project view, right-click your model folder and select New > Family Model.
      
      ![Variant Project view](image)
      
      b. In the Family model name box, type the name of a family model and click Finish.
      c. Create a Component. In the Family Model Editor pane, right-click the created family model and select New > Component.
d. In the **New Element** dialog, type a Component name and click **Finish**.

e. Create a MagicDraw project:
   - If a system model is local, in the Family Model Editor pane, right-click the created Component and select **New > MagicDraw Project**.
     - In the open dialog, specify the `.mdzip` file of your system model as the **file** value. Click **Finish** when you are done.
   - If a system model is in a server, TBD.

3. In the modeling tool, set the `pure::variants` focus. Switch to the modeling tool. In the `pure::variants` window, click the **Open a pure::variants Model** button and browse through your file system to open the `pure::variants` configuration file.

### Specifying the variation points in the system model

In the system model (in a modeling tool), you must specify variation points and define how the feature choices impact the variation point. Variation points can be set on **Blocs**.

To set variation points

1. In the **Block Definition Diagram** (BDD), select a Block (either an element in the Model Browser or a symbol on a diagram pane) for a variation point.
2. Open the shortcut menu of the selected bloc, click Pure Variants and select a variation point to add.

<table>
<thead>
<tr>
<th>Variation point kind</th>
<th>Description</th>
<th>Values to specify</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existence</td>
<td>Select it to control the existence of a model element in variant models. The element can either exist or be removed in a particular variant model depending on a variation condition.</td>
<td>Expression (boolean)</td>
</tr>
<tr>
<td>Primitive Property</td>
<td>Select it to set the values of UML model element properties that accept strings, numbers, booleans as values. Typical examples are default value (numeric), multiplicity (numeric), documentation (string), name (string).</td>
<td>Name of the property that is controlled by this variation point. Expression returning the value for that property.</td>
</tr>
<tr>
<td>Primitive Tag</td>
<td>Select it to set the values of model element properties that accept strings, numbers, booleans as values, in cases when a property is not a standard UML property but defined as a tag in an extension profile. A typical example is a requirement text.</td>
<td>Name of the tag that is controlled by this variation point. Expression returning the value for that tag.</td>
</tr>
<tr>
<td>Element Property</td>
<td>Select it to control the values of those UML model element properties that accept other UML elements as values. A typical example would be a property type, property default value for enumeration-type properties.</td>
<td>Name of the property that is controlled by this variation point. Element Value Specification with a table of pairs: condition-value, where each condition is a boolean expression.</td>
</tr>
<tr>
<td>Element Tag</td>
<td>Select it to control the values of tags that accept other UML elements as values in cases when a property is not a standard UML property but defined as a tag in an extension profile.</td>
<td>Name of the tag that is controlled by this variation point. Element Value Specification with a table of pairs: condition-value, where each condition is a boolean expression.</td>
</tr>
</tbody>
</table>

3. The Edit Expression dialog opens, where you can add an expression to filter a model according to selected features. If you select Element Property or Element Tag as a variation point, the variation point Specification window opens. In the property group list, select the Element Value Specification property and click the Create button to add a condition-value pair, where each condition is a boolean expression and a value is an element. Create as many pairs as are needed. Click the Edit button to open the Edit Expression dialog.
Repeat steps #1 to #3 for all Blocks you want to assign as variation points in your model. Model elements assigned as variation points are marked with a blue variation sign in the Model Browser, as well as their symbols (shapes and paths) on a diagram pane.

Generating of a particular product variant

After you assign variation points, you can generate a particular product variant.

To preview a particular product variant realization

1. In the pure::variants window, click the Enable Transformation Preview button to turn the preview on.
2. Click Select a Variant and select a particular variant from the list. In the model:
   - Items that are not included in a selected variant appear in red.
   - Items depending on the result of a defined expression appear in yellow, meaning the result depends on a property that could be set for an element according to the expression.
To generate a particular product variant

1. In the pure::variants window of the modeling tool, click Select a Variant and select a particular variant from the list.

2. On the main menu, click Tools > Model Transformation.
3. The Model Transformation Wizard opens. In the wizard, select Variant Realization and click Next to proceed to the following step.
4. Select the transformation source - a Package where your system model is stored.
5. Click Finish, when you are done. Models not needed according to a selected variant configuration are removed from the model.

Related pages
- Integration with Big Lever Software Gears
- Creating variants using transformations

Other resources
- Product Line Engineering with Cameo Systems Modeler and pure::variants. A record of the webinar.