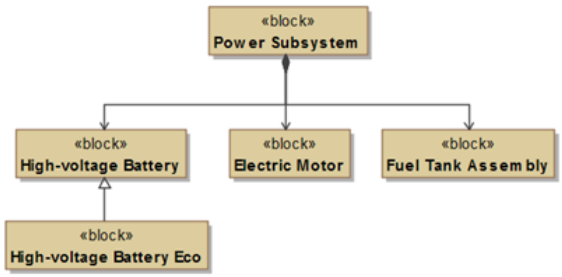
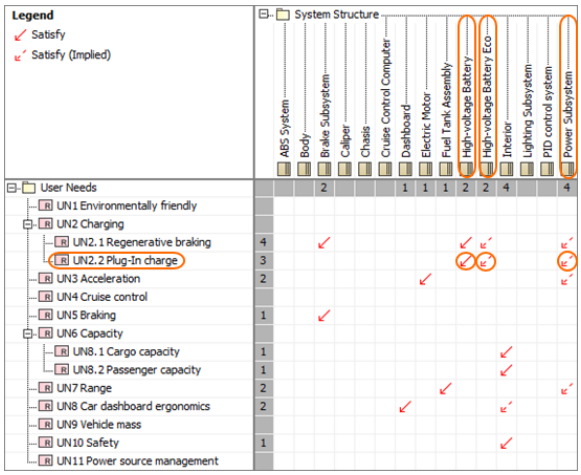
Using Implied Relations

Use the implied relation operation type if you need to specify indirect relations between the elements when going through a definable hierarchy. Implied relation operation collects indirectly associated elements according to the specified **Source**, **Criteria** and **Target** parameters.



The figure above displays composition and inheritance structure between blocks. If a composite block depends on a particular element, the whole block also depends on this element. The same situation exists with inheritance between blocks. Inherited elements indirectly depend on the elements to which the parent element has relations. These indirect relations are referred to as implied relations, and can be displayed in a dependency matrix, as shown in the figure below.



As shown in the figure, the *High-voltage Battery* block satisfies the *Plug-in charge* requirement. According to the composition and generalization, the *Power SubSystem* and *High-voltage Battery Eco* blocks should satisfy this requirement as well. In the matrix, these relationships are shown as implied, and marked with red, dashed arrows.

Implied relations can be created in:

- Matrices
- Relation maps
- Tables
- Derived properties
- Smart packages

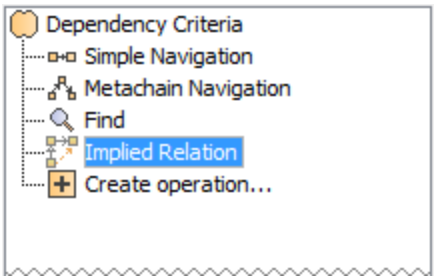
To specify an Implied Relation operation as a criterion

---

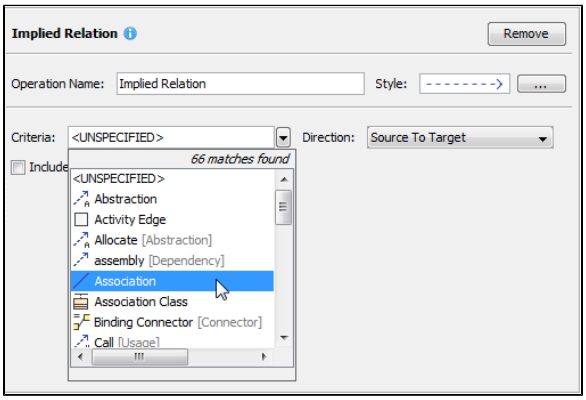
1. Open the dialog for specifying criteria.
2. In the criteria list on the left side of the dialog, select the **Implied Relation** operation. The **Implied Relation** criteria specification panel opens.

Related pages

- Specifying criteria for querying model
  - Getting started with specifying criteria
  - Using Simple Navigation
  - Using Metachain Navigation
  - Using Find operation
  - Creating new operations
    - Calling operations from the model
    - Creating script operations



3. In the **Criteria** drop-down list, select the desired relation.



4. In the **Direction** drop-down list, select the direction of the implied relation:

    - The **Source To Target** direction means that only the outgoing relations, which are pointing from the source element to the target element, are treated as the result of this criterion.
    - The **Target To Source** direction means that only the incoming relations, which are pointing from the target element to the source element, are treated as the result of this criterion.
    - If the **Both** direction is chosen, both cases described above are treated as a valid result.

    > A source is a Contextual element, and a target is the result of the calculation.

5. If you want direct relations to be displayed together with (and the same way as) implied relations, select the **Include Direct Relations** check box. However, be aware that after selecting this check box, there is no way to visually distinguish direct relations from implied relations.
6. If the implied relation is created in a matrix or relation map, optionally modify the style of the relation by clicking  next to the **Style** box to open the **Style** dialog, then select preferred style properties and click **OK**.
7. Click **OK**.

Criteria can be other relations than those listed in the **Criteria** drop-down list. In the **Expert** mode, any operation or even a combination of operations can be set as a criterion, e.g., metachain or find operation. In the **Standard** mode, an implied relation operation goes through a predefined hierarchy (a composition and generalization) to collect indirectly associated elements, whereas in the **Expert** mode, you can define your own hierarchy.

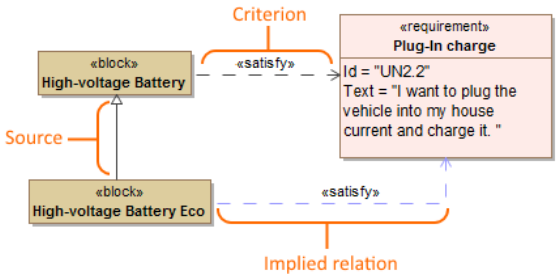
Manipulations in the Expert mode

The **Expert** mode allows you to change the **Criteria**, **Source,** and **Target** parameters of an implied relation operation. Specifying the **Source** and **Target** parameters lets you define your own hierarchy. You also have more flexibility in setting criteria with the ability to choose from a larger scope of operations, or even combine a few of them.

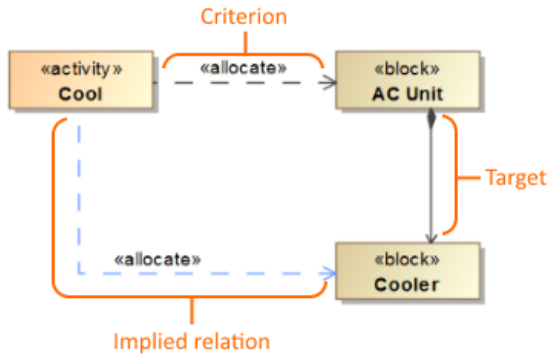
Implied relation operation goes through the **Source** parameter value to recursively collect elements, and uses the **Criteria** parameter value to navigate from the **Source** parameter results to implied elements. In addition, the **Target** parameter value recursively collects implied elements starting from the results of the **Criteria** parameter. The results of this operation are the results of the **Criteria** and **Target** parameters.

The parameters that can be specified in the **Expert** mode:

- **Source**: specifies the operation that recursively collects elements starting from the Contextual element.



  In the example above, the value of the **Source** parameter is a generalization (direction – **Source To Target**). This means that starting from the *High-voltage Battery Eco* block, all generic classifiers are collected. In this case, the *High-voltage Battery* block is the result of the **Source** p arameter. By default, the values of the **Source** parameter are simple navigation operations: a generalization (direction – **Source To Target**) and part (direction - **Source To Target**). Essential ly, when a generalization is selected as the value of the **Source** parameter (direction - **Source To Target**), all general classifiers are recursively collected. And, when the value of the **Source** p arameter is a part (direction - **Source To Target**), all composed part types (blocks) are recursively collected.
- **Criteria**: specifies the operation that navigates to the elements from the results of the **Source** pa rameter. In other words, the value of the **Criteria** parameter is the relation for which implied elements are calculated. In the example above, the value of the **Criteria** parameter is a satisfy (direction – **Source To Target**). It means that starting from the result of the **Source** parameter - the *High-voltage Battery* block, the operation navigates through satisfy relation to collect implied elements. In this case, an implied element is the *Plug-In charge* requirement. Note that, by default, the direction of the criteria is **Source To Target**, and that sub-types are also included.
- **Target**: specifies the operation that recursively collects elements starting from the result of the **C riteria** parameter.

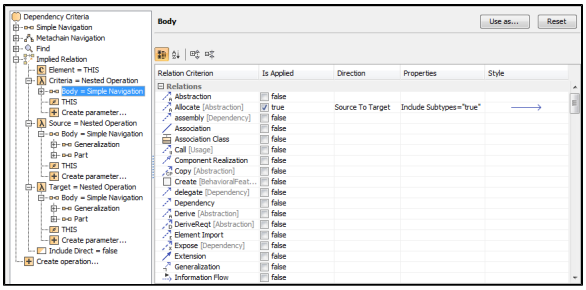


  In the example above, the value of the **Target** parameter is a generalization (direction – **Target To Source**). This means that starting from the *AC Unit* block, all composed blocks are collected. In this case, the *Cooler* block is the result of the **Target** parameter. By default, the values of the **Target** parameter are simple navigation operations - a generalization (direction - **Target To Source**) and part (direction - **Target To Source**).

To specify implied relation parameters in the **Expert** mode

---

1. Once you select implied relation as a criterion, in the lower left corner of the dialog for specifying criteria, click **Expert** to enable the **Expert** mode.
2. In the criteria list on the left side of the dialog, expand the implied relation operation, and select the parameter you want to specify.
3. In the open pane for specifying the parameter, select the value you want to use.



4. When you finish specifying required parameters, click **OK**.

> To set the value of the selected parameter as **null**, click the Reset button.