DocGen User's Guide

This document references the DocGen User's Guide as created and maintained in a separate project.

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1 DocGen

The DocGen is a more in depth guide to the purpose and function of DocGen.

For specific information about the different DocGen methods and expression libraries, see Create Viewpoint Methods.

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1.1 DocGen Overview

The Document Generator (DocGen) is a module of MDK plug-in in MagicDraw. It provides the capability to generate formal documents from UML/SysML models in MagicDraw. A "document" is a view into a model, or a representation of model data, which may be structured in a hierarchical way. A document is a collection of paragraphs, sections, and analysis, and the order and layout of the content is important. DocGen operates within MagicDraw, traversing document's "outline", collecting information, performing analysis, and writing the output to a file. DocGen produces a DocBook XML file, which may be fed into transformation tools to produce the document in PDF, HTML, or other formats.

DocGen consists of:

- a UML profile with elements for creating a document framework
- a set of scripts for traversing document frameworks, conducting analysis, and producing the output
- a set of tools to help users validate the correctness and completeness of their documents.

Users need to invest the time to define the document content and format; however, once this is done the document can be produced with a button click whenever the model data is updated. The user never has to waste time numbering sections or fighting with reluctant formatting, as this is all performed automatically during the transformation to PDF, HTML, etc. DocGen can also be extended and queries may be added in a form of reusable analysis functions. Check with your project to see if they have a document framework to use.

1.2 Create Offline Content Using DocGen

If a model is not available in EMS server, an offline document can be created using the DocGen module in MDK plug-in. This section describes how to produce offline, read-only documents in MagicDraw. Note that these documents are not editable like those published in EMS. All changes must be made directly in the MagicDraw model.

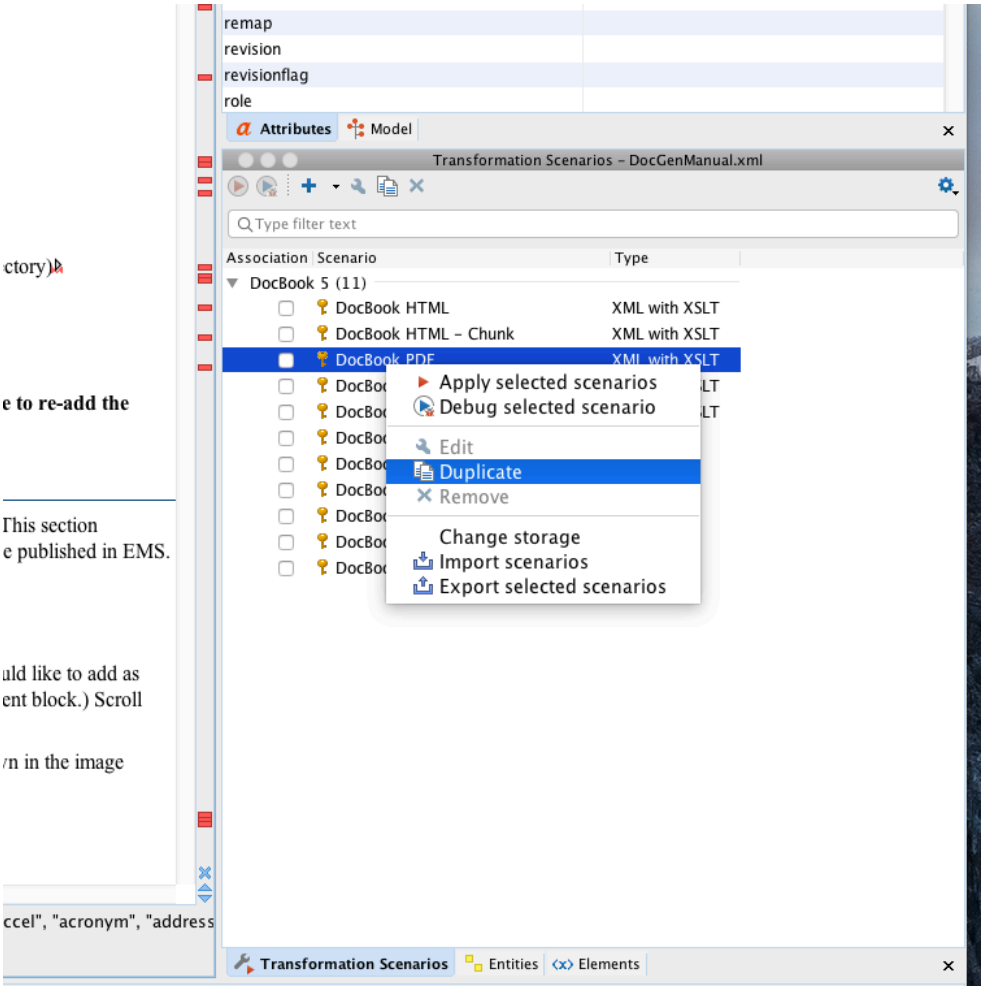
1.2.1 Generate Documents

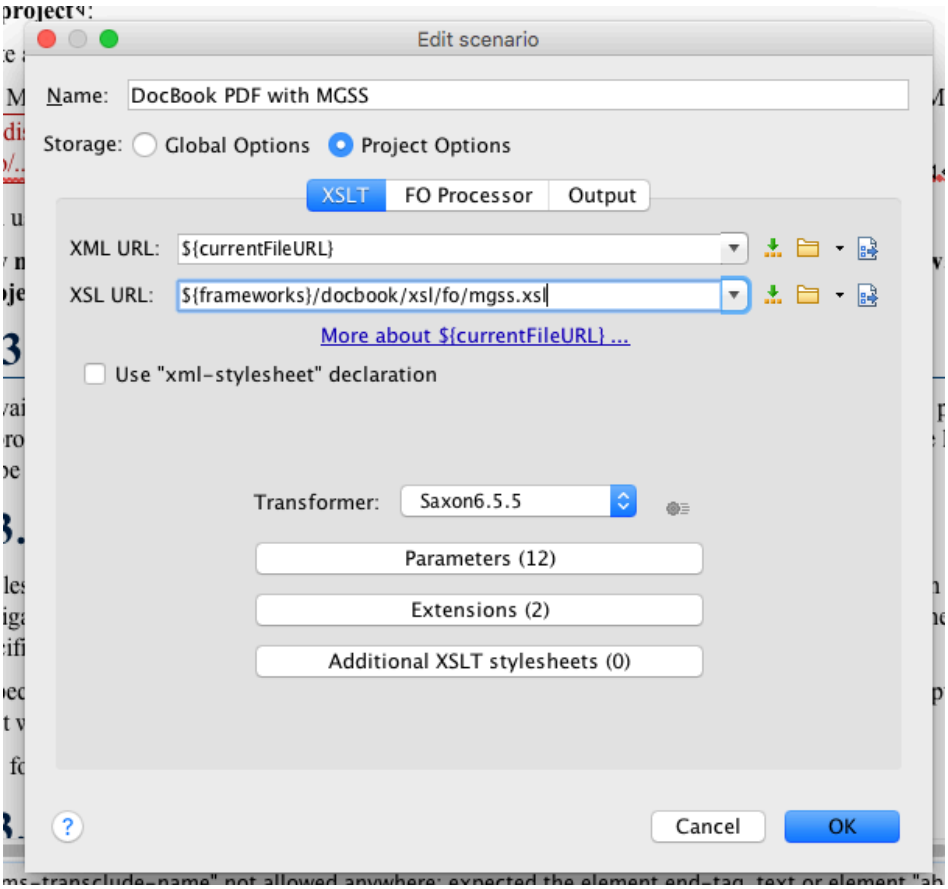
DocGen allow generating a local version of your document without access to EMS server. Select a document, and use a right click menu "DocGen>Generate DocGen3 Document". It will generate a DocBook XML file. Check with your project to see if there is a preferred method of generation. Most practitioners use a .xml viewer such as oXygen to convert the .xml file to a PDF file (or other types of files if they prefer). You can install oXygen from the SSCAE. Note that the document is static. If you want to change the document, changes need to made to the MagicDraw model and document needs to be regenerated.

To open your .xml output with oXygen, first obtain a copy of the mgss.xsl stylesheet from MBEE (if you downloaded the bundled installation of Crushinator from MBEE, you can find mgss.xsl in the install folder under DocGenUserScripts -> DocGenStyleSheet). Open your oXygen install directory, navigate to <oxygen_dir>/frameworks/docbook/xsl/fo, and save mgss.xsl to that directory. This stylesheet will allow the front matter inputs from MagicDraw to be visible on the PDF.

Now you can open your saved .xml output file with oXgen. After opening your file, right click the "DocBook PDF" option within transformation scenarios, as pictured below. In the menu that appears, select "Duplicate." Rename your new scenario as desired. Select

the XSL URL text box and replace "${frameworks}/docbook/xsl/fo/docbook_custom.xsl" with ${frameworks}/docbook/xsl/fo/mgss.xsl," as pictured below, and then click "OK."

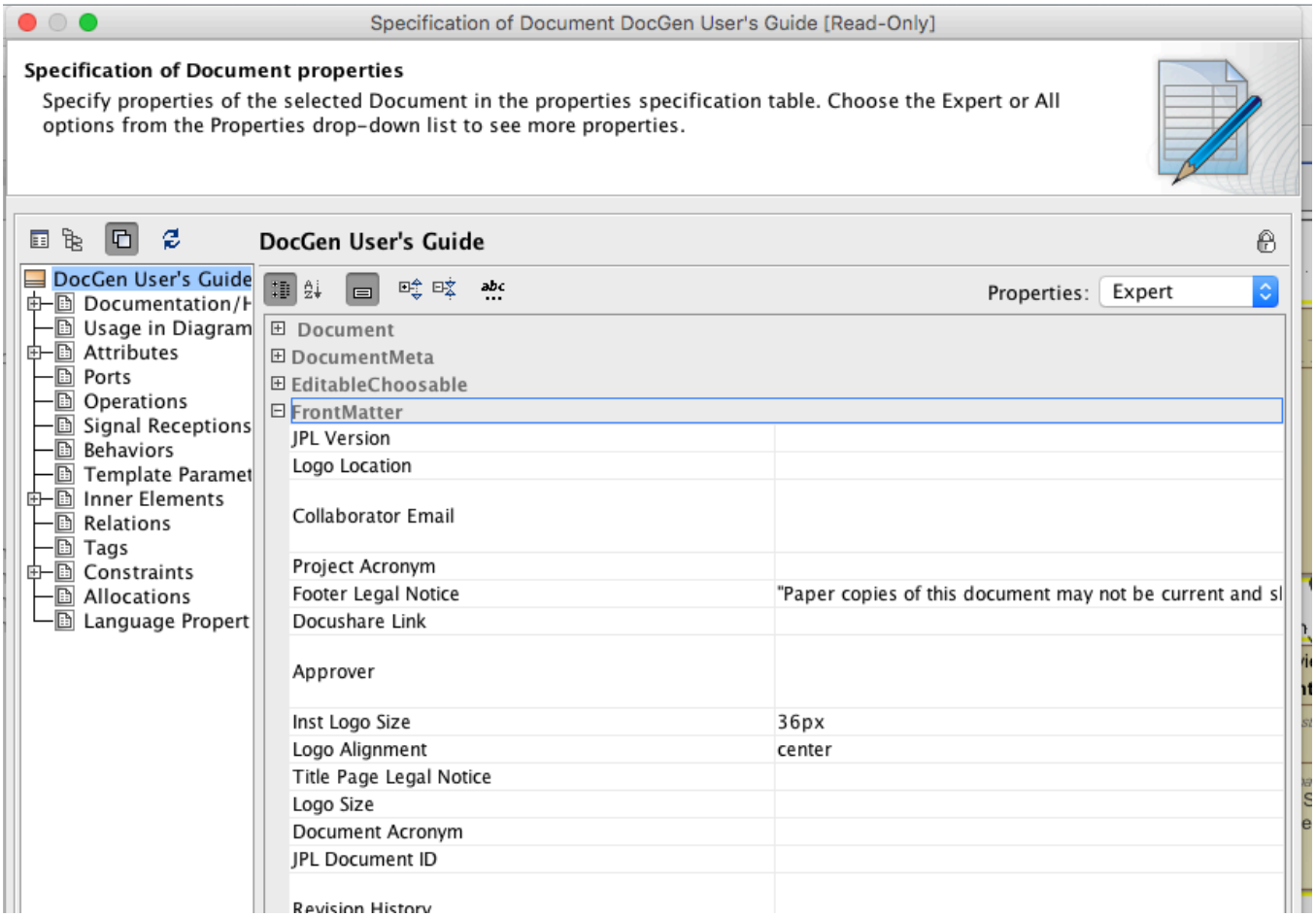

remap
revision
revisionflag
role
Attributes
Model
Transformation Scenarios - DocGenManual.xml
Type filter text
Association
Scenario
Type
DocBook 5 (11)
DocBook HTML
XML with XSLT
DocBook HTML - Chunk
XML with XSLT
DocBook PDF
XML with XSLT
Apply selected scenarios
Debug selected scenario
Edit
Duplicate
Remove
Change storage
Import scenarios
Export selected scenarios
Transformation Scenarios
Entities
Elements


Edit scenario
Name:
DocBook PDF with MGSS
Storage:
Global Options
Project Options
XSLT
FO Processor
Output
XML URL:
${currentFileURL}
XSL URL:
${frameworks}/docbook/xsl/fo/mgss.xsl
More about ${currentFileURL} ...
Use "xml-stylesheet" declaration
Transformer:
Saxon6.5.5
Parameters (12)
Extensions (2)
Additional XSLT stylesheets (0)
Cancel
OK

To generate a new PDF, double-click on your newly created transformation in the Transformation Scenarios window. You can also click the red "play" button if your DocBook PDF is selected as shown below to generate a PDF.

1.2.2 Use the DocGen Stylesheet

The DocGen stylesheet allows the user to input front matter information to a document. To input the information you would like to add as front matter, navigate to the specification window of a document block. (The easiest way is to double click on the document block.) Scroll down in the specification window to the "FrontMatter" section, as shown below.



Here, you can specify a variety of fields such as logo size and location, approvers, legal footers, etc. A reference card for the tags is shown below.

1.3 Create Viewpoint Methods

Creating a viewpoint involves two steps. First, create a viewpoint element. Second, define a viewpoint method diagram for the viewpoint.

After both are created and defined, the viewpoint can be applied to a view. The following subsections explain each step in more details, including the DocGen and expression methods offered by the Cookbook library.

1.3.1 Collect/Sort/Filter Model Elements

Once exposed to a view, elements can can be operated on by three types of viewpoint operators (Collect, Sort, and Filter). These operations can be used to expand or narrow the collection of elements that are used in the viewpoint method.

The following views reveal the View Diagrams, Viewpoint Method Diagrams, and Block Definition Diagrams that - when generated - result in the contained subviews.

Below is an overview table of the DocGen Methods (specifically Collect/Sort/Filter Methods) discussed.

Table 1. DocGen Methods

Method Name	Method Description
CollectOwnedElements Infinite Depth	"CollectOwnedElements" gathers anything owned by the exposed element(s) in the model to be used in the viewpoint method. This specific method deals with infinite depth, which means it collects *all* owned elements, as opposed to those just on a *specified* depth (such as level 1 children). Reference: CollectOwnedElements
CollectOwnedElements Single Depth	"CollectOwnedElements" gathers anything owned by the exposed element(s) in the model to be used in the viewpoint method. This specific method deals with a single depth, which means it collects the children of a *specified* depth, as opposed to *all* children. Reference: CollectOwnedElements
CollectOwners	"CollectOwners" is essentially the opposite of "CollectOwnedElements". It gathers all of the owners (from the containment tree) of the exposed element(s) for use in the viewpoint method. Reference: CollectOwners
CollectThingsOnDiagram	"CollectThingsOnDiagram" will collect all the elements depicted on a diagram. Reference: CollectThingsOnDiagram
CollectByStereotypeProperties List	"CollectByStereotypeProperties" collects the properties of the stereotypes. This specific method collects the properties of the stereotype "List". Reference: CollectByStereotypeProperties
CollectByStereotypeProperties Table	"CollectByStereotypeProperties" collects the properties of the stereotypes. This specific method collects the properties of the stereotype "Table". Reference: CollectByStereotypeProperties
CollectByDirectedRelationshipMetaclasses Direction Out	CollectByDirectedRelationshipMetaclasses action collects elements based on the relationships that other elements use to connect to them. This specific method collects elements based on their "Direction Out" relationships. Reference: CollectByDirectedRelationshipMetaclasses
CollectByDirectedRelationshipMetaclasses Direction In	CollectByDirectedRelationshipMetaclasses action collects elements based on the relationships that other elements use to connect to them. This specific method collects elements based on their "Direction In" relationships. Reference: CollectByDirectedRelationshipMetaclasses
CollectByDirectedRelationshipStereotypes	"CollectByDirectedRelationshipStereotypes" also collects elements based on the *stereotype*of the relationships that connect them to other elements. Reference: CollectByDirectedRelationshipStereotypes
CollectByAssociation	"CollectByAssociation" collects the blocks with aggregation of either composite, shared, or none. Reference: CollectByAssociation
CollectTypes	CollectTypes collects the types of already collected elements. Most times, CollectOwned Elements or CollectOwners are used to collect said elements. Reference: CollectTypes

Method Name	Method Description
CollectClassifierAttributes	"CollectClassifierAttributes" collects attributes of a class. Reference: CollectClassifierAttributes
CollectByExpression	"CollectByExpression" is a more customized approach to querying a model using Object Constraint Language (OCL) . Reference: CollectByExpression
FilterByDiagramType Image	The "FilterByDiagramType" activity goes through a data set and looks at the elements which are diagrams. A Collect operation must be used first to collect elements desired to be filtered. Reference: FilterByDiagramType
FilterByNames	"FilterByNames" activity goes through a data set and finds all the elements within the data set with a particular name or the elements connected to the element with the particular name. A Collect operation must be used first to collect elements desired to be filtered. Reference: FilterByNames
FilterByMetaclasses	"FilterByMetaclasses" activity goes through a data set and finds all the elements that has are defined by a specified metaclass. A Collect operation must be used first to collect elements desired to be filtered. Reference: FilterByMetaclasses
FilterByStereotypes	"FilterByStereotypes" activity goes through a data set and finds all the elements that has are defined by a specified Stereotype. A Collect operation must be used first to collect elements desired to be filtered. Reference: FilterByStereotypes
FilterByExpression	"FilterByExpression" activity goes through a data set and finds all the elements that satisfy (boolean) a Object constraint Language (OCL) expression. A Collect operation must be used first to collect elements desired to be filtered. Reference: FilterByExpression
SortByAttribute	"SortByAttribute" allows the user to sort a data set by the chosen attribute: name, documentation, value. Reference: SortByAttribute
SortByProperty	"SortByProperty" allows the user to sort a data set by a specified property. Reference: SortByProperty
SortByExpression	"SortByExpression" a data set as specified by the Object constraint Language (OCL) expression. Reference: SortByExpression

1.3.1.1 Collect

"Collect..." is a viewpoint operator that separates the elements in an exposed package into ones that will continue to be used and ones that will be ignored. There are a number of collection methods, each of which have their own call behavior action in the side bar of the viewpoint method diagram.

1.3.1.1.1 CollectOwnedElements

CollectOwnedElements gathers anything owned by the exposed element(s) in the model to be used in the viewpoint method. A common use case would be when a group of elements contained within a package need to be exposed to a view. Instead of

individually exposing each element, a user can employ "CollectOwnedElements" within a viewpoint and then expose only the package. The collection method will look at the exposed element and return all the elements that it owns.

The views Single Depth Example and Infinite Depth Example show the output of the Example View Diagram as shown below. Both of these views expose the same Lunchbox, but they conform to different viewpoints. The only difference between the viewpoints is the "DepthChoosable" property: CollectOwnedElements Single Depth has a DepthChoosable of 1, CollectOwnedElements Infinite Depth has a DepthChoosable of 0.

Note that CollectOwnedElements collects part properties as well. For this example we use FilterByStereotypes to only display Block elements in the output.

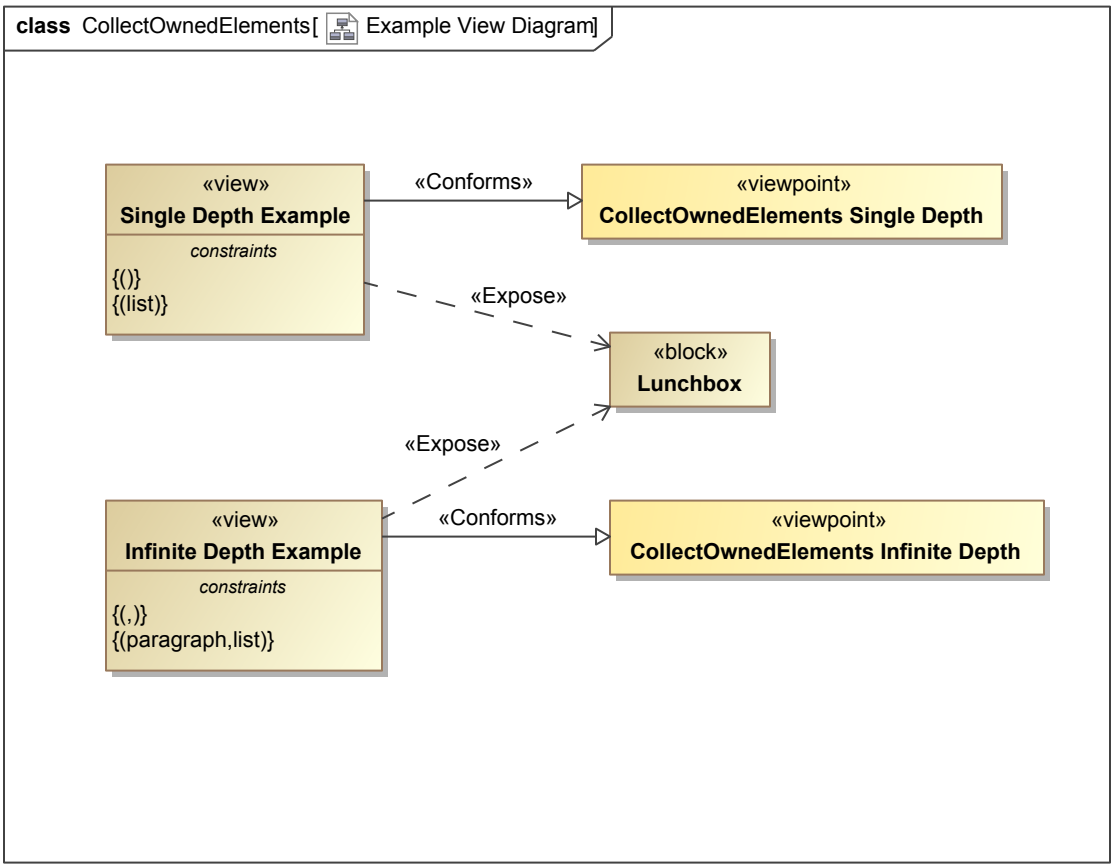


Figure 1. Example View Diagram

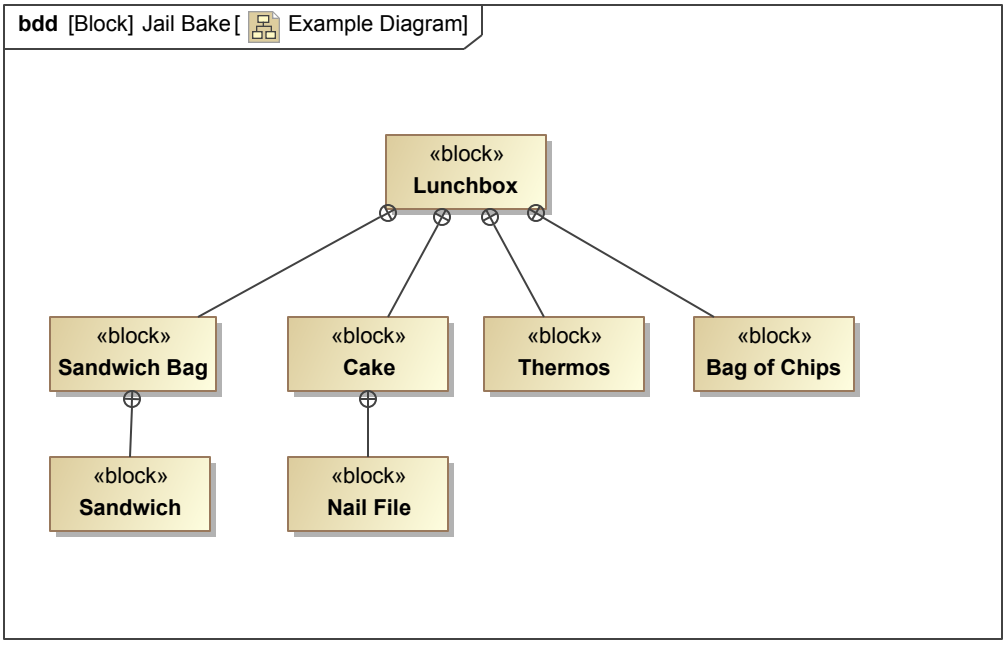


Figure 2. Example Diagram

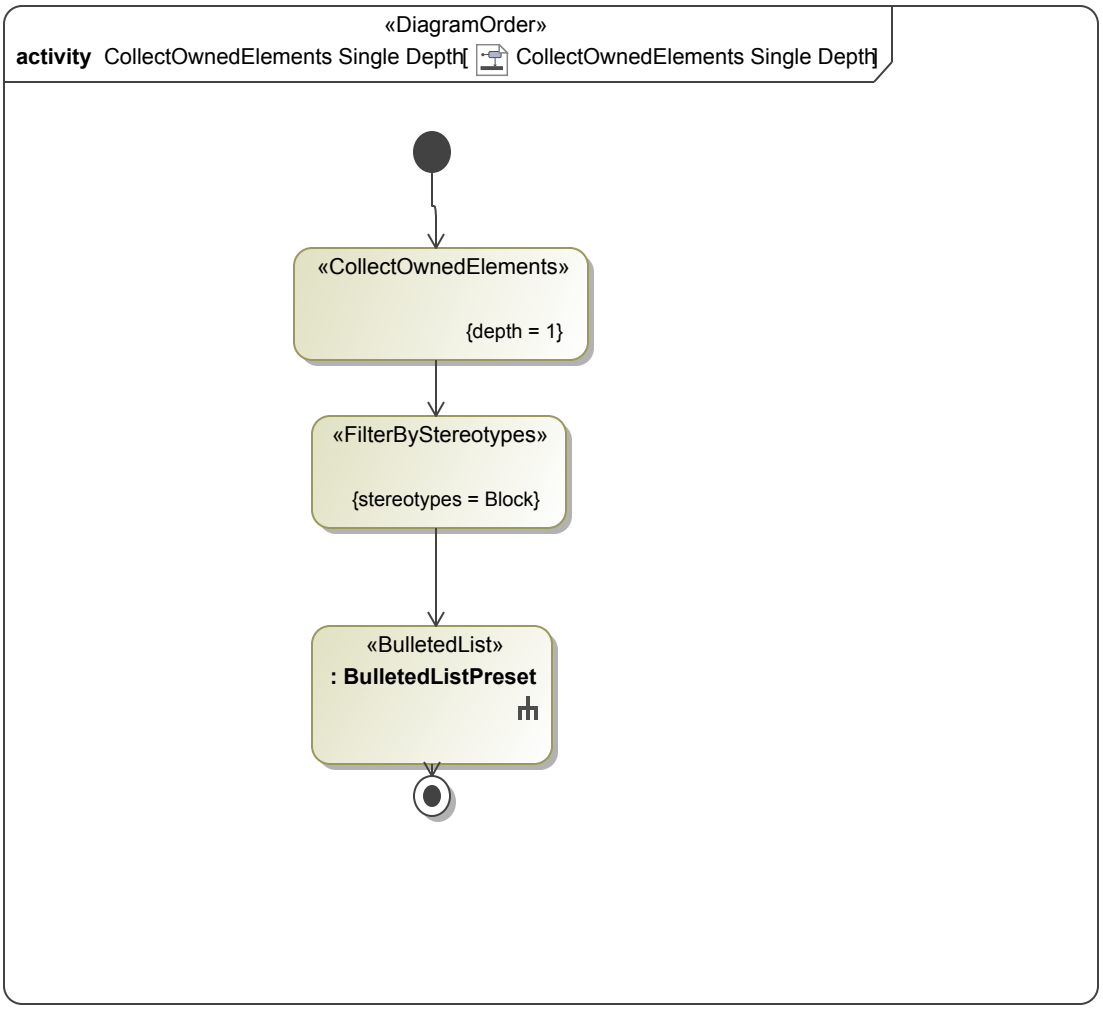


Figure 3. CollectOwnedElements Single Depth

"CollectOwnedElements" gathers anything owned by the exposed element(s) in the model to be used in the viewpoint method.

This specific method deals with a single depth, which means it collects the children of a *specified* depth, as opposed to *all* children.

Reference: CollectOwnedElements

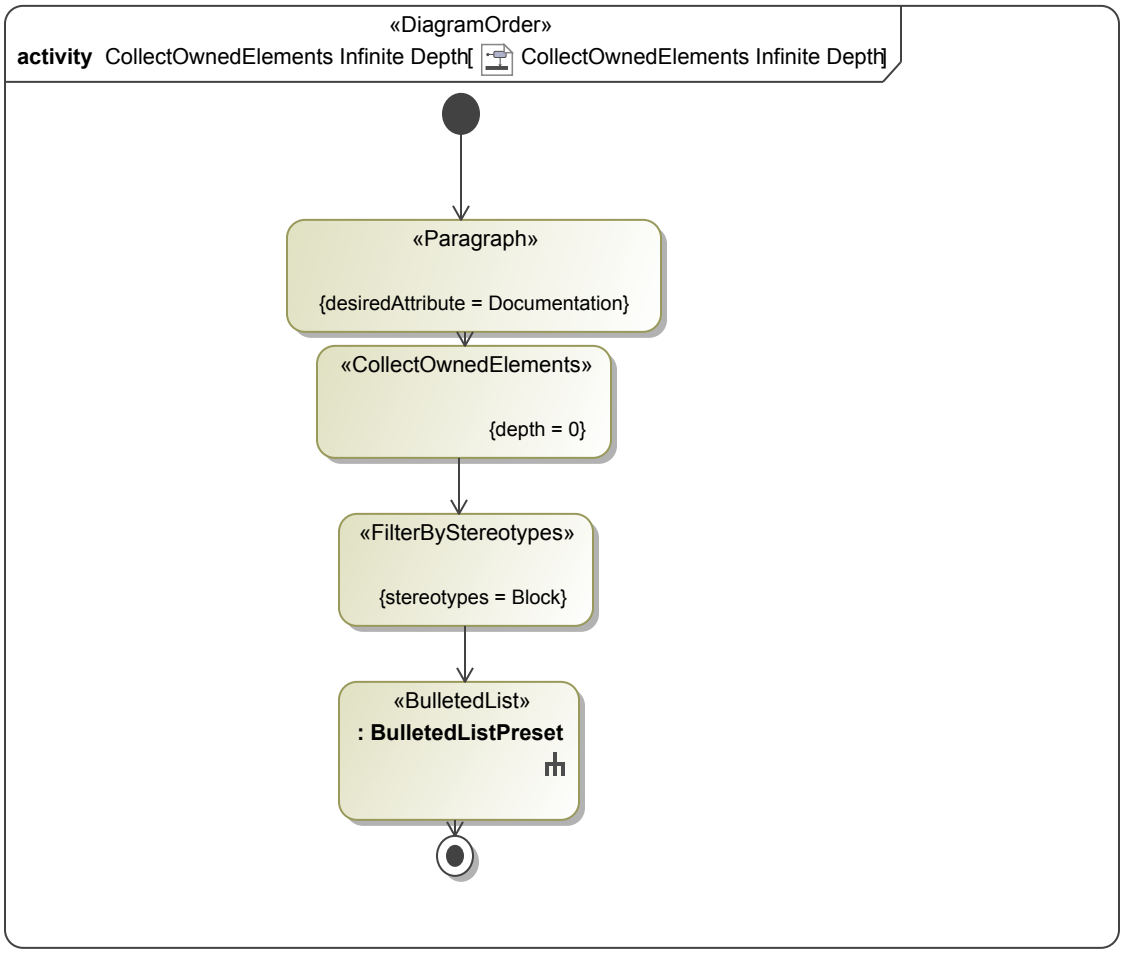


Figure 4. CollectOwnedElements Infinite Depth

"CollectOwnedElements" gathers anything owned by the exposed element(s) in the model to be used in the viewpoint method.

This specific method deals with infinite depth, which means it collects *all* owned elements, as opposed to those just on a *specified* depth (such as level 1 children).

Reference: CollectOwnedElements

1.3.1.1.1.1 Single Depth Example

1. Sandwich Bag
2. Thermos
3. Bag of Chips
4. Cake

1.3.1.1.1.2 Infinite Depth Example

1. Sandwich Bag
2. Sandwich
3. Thermos
4. Bag of Chips
5. Cake
6. Nail File

1.3.1.1.2 CollectOwners

"CollectOwners" is essentially the opposite of "CollectOwnedElements". It gathers all of the owners (from the containment tree) of the exposed element(s) for use in the viewpoint method. Using a different block "Target", this returns the path of ownership in the containment tree. It starts with the direct ownership package (Example Elements) and progresses back to the entire model (Data) because the "DepthChoosable" was set at 0 (infinite).

CollectOwners Example View shows the output of the following diagrams.

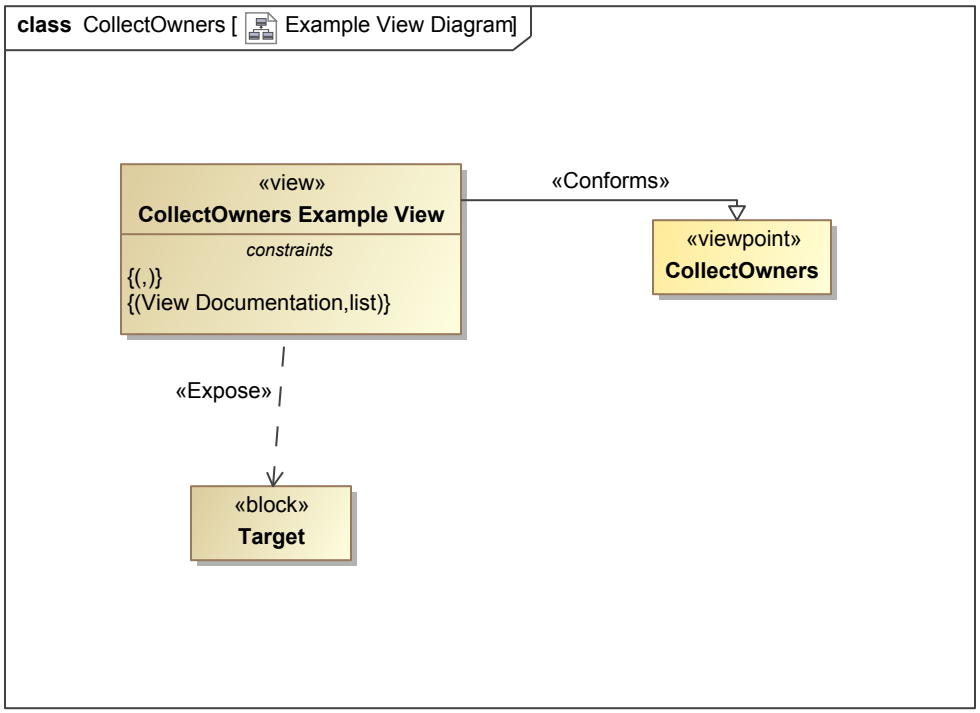


Figure 5. Example View Diagram

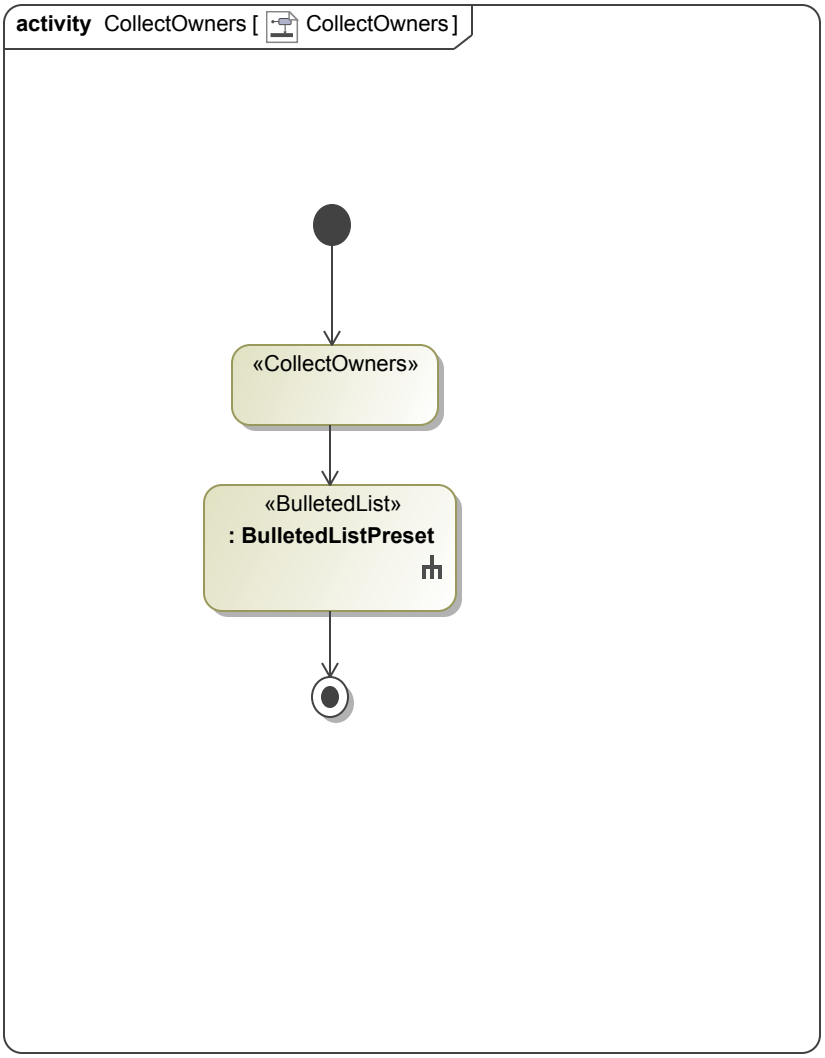


Figure 6. CollectOwners

"CollectOwners" is essentially the opposite of "CollectOwnedElements". It gathers all of the owners (from the containment tree) of the exposed element(s) for use in the viewpoint method.

Reference: CollectOwners

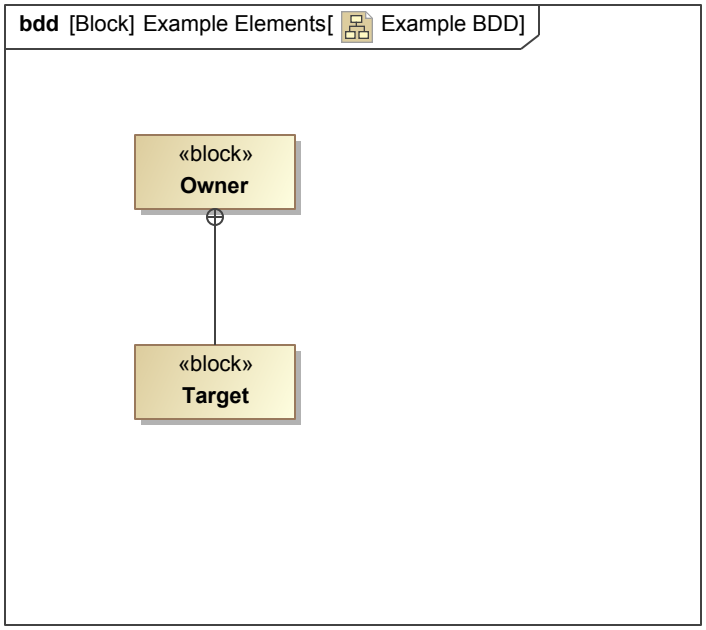


Figure 7. Example BDD

1.3.1.1.2.1 CollectOwners Example View

1. Owner
2. Example Elements
3. CollectOwners
4. Collect
5. Create Viewpoint Methods Examples
6. Models
7. Docgen
8. Data

1.3.1.1.3 CollectThingsOnDiagram

CollectThingsOnDiagram will collect all the elements depicted on a diagram. To demonstrate this, the Example BDD was exposed. Note that the name of each element as well as the viewpoint method itself is listed below. Names are often not automatically created with an element, so these must be inserted in the model. Otherwise a "no content for..." message will appear in the name's spot.

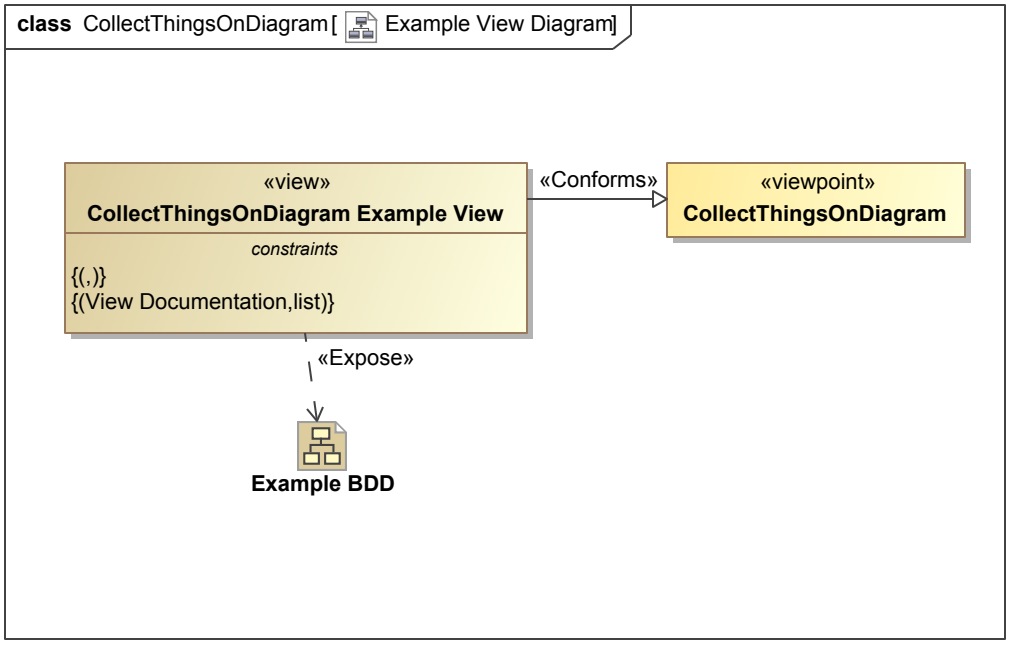


Figure 8. Example View Diagram

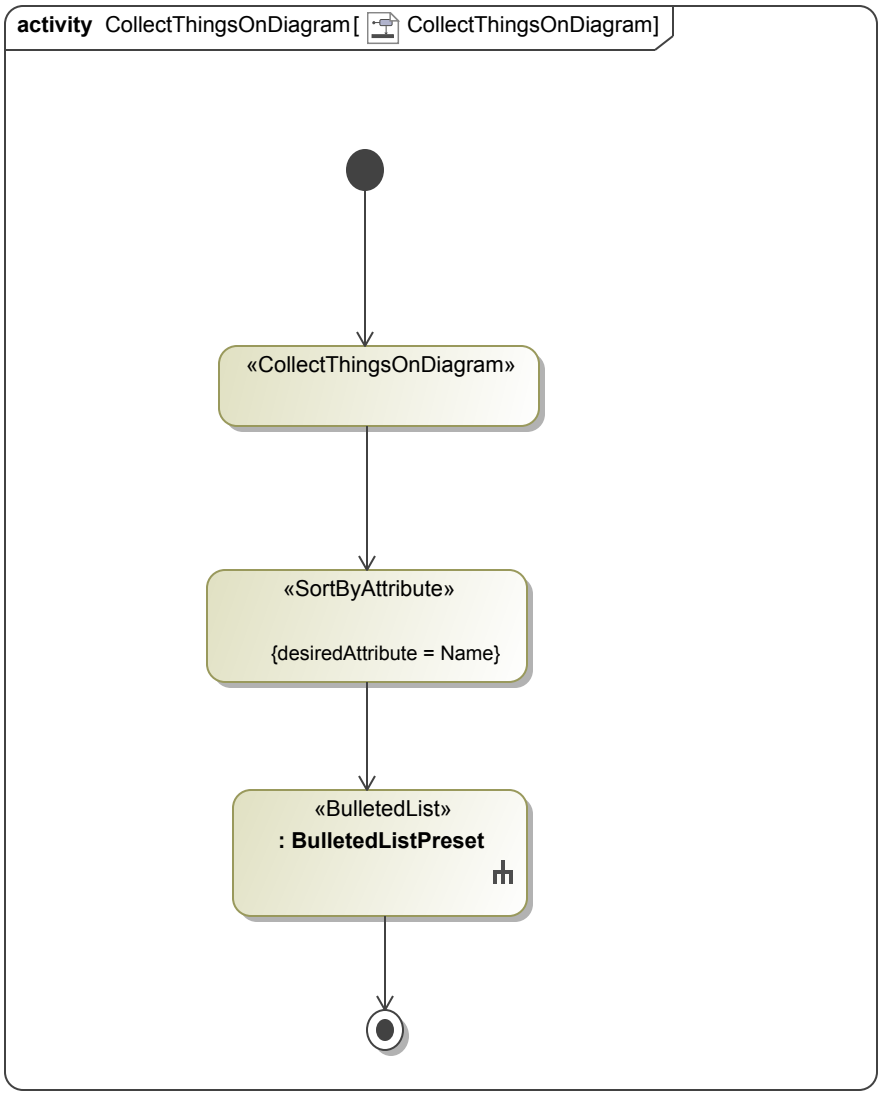


Figure 9. CollectThingsOnDiagram

"CollectThingsOnDiagram" will collect all the elements depicted on a diagram.

Reference: CollectThingsOnDiagram

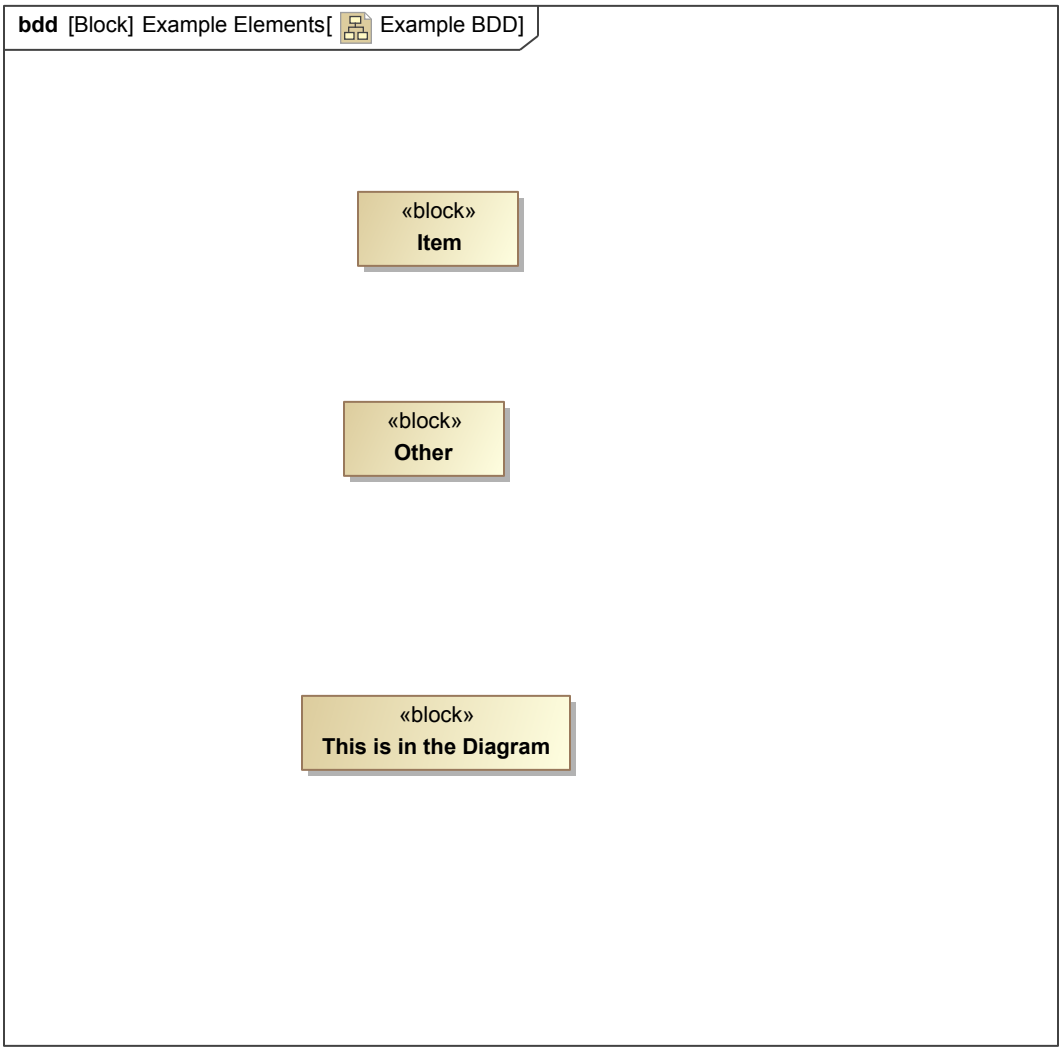


Figure 10. Example BDD

Another element not shown on this diagram will not be picked up by this method.

1.3.1.1.3.1 CollectThingsOnDiagram Example View

1. Example BDD
2. Item
3. Other
4. This is in the Diagram

1.3.1.1.4 CollectByStereotypeProperties

CollectByStereotypeProperties collects the properties of the stereotypes. The following views Bulleted List Example and Table Structure Example show the output of the view structure described in the Example View Diagram below.

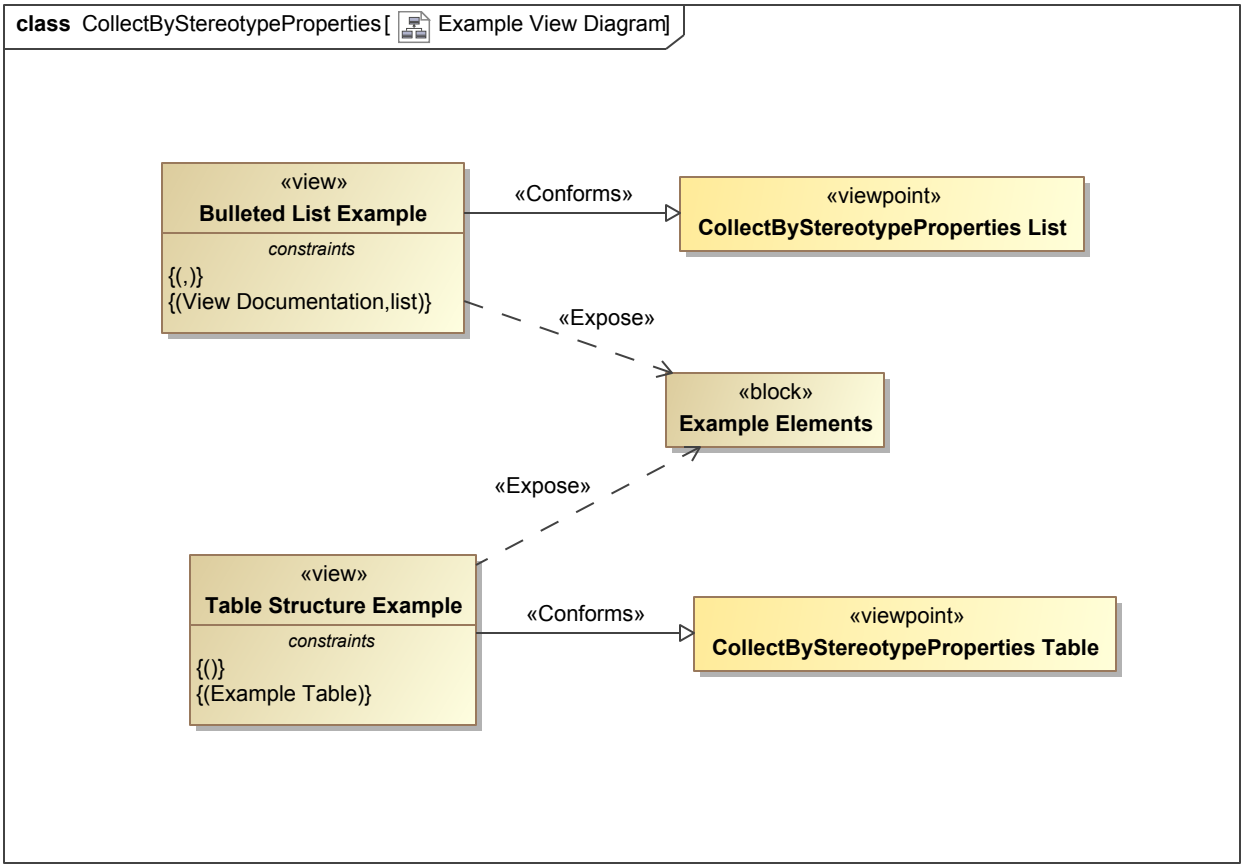


Figure 11. Example View Diagram

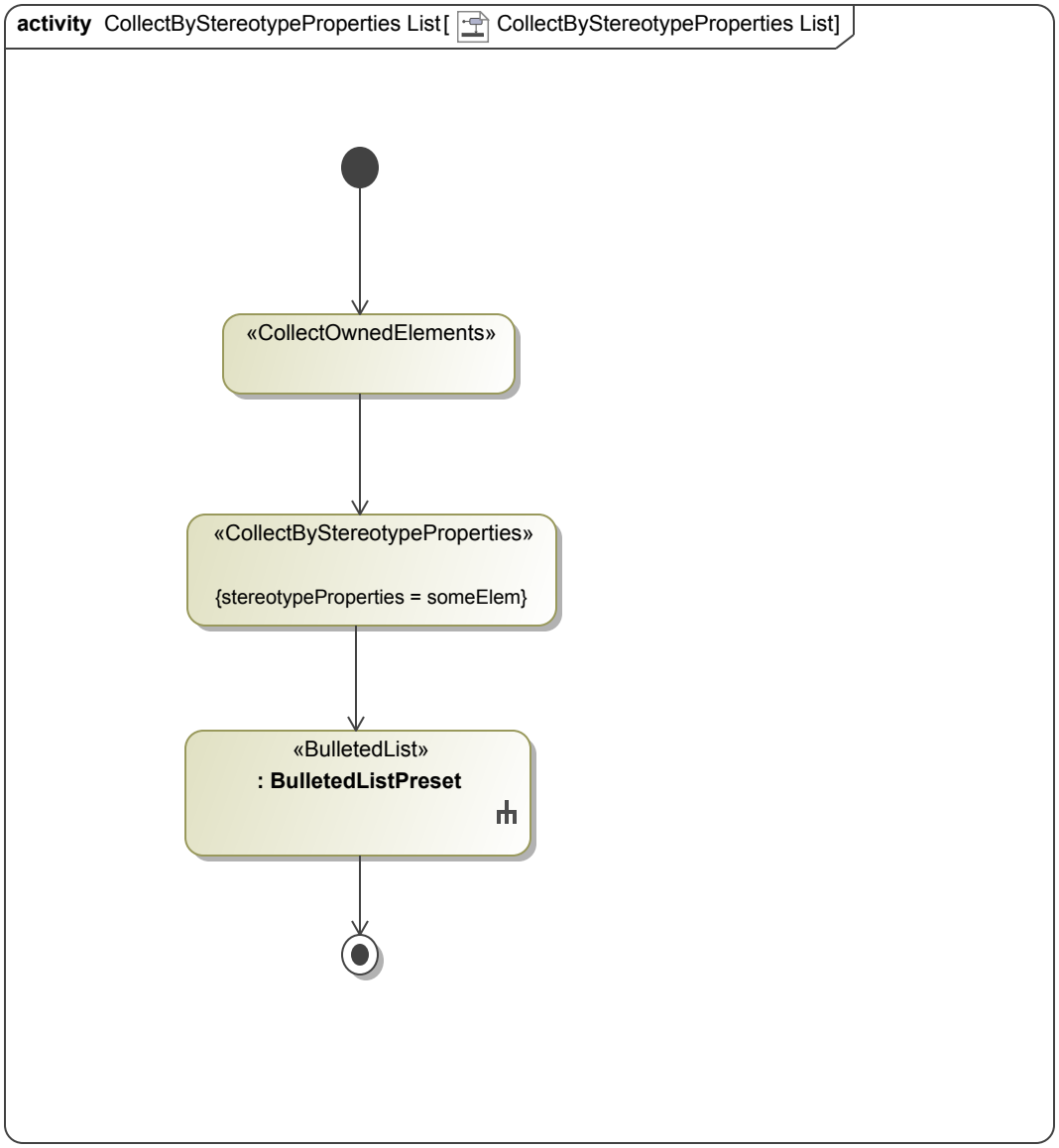


Figure 12. CollectByStereotypeProperties List

"CollectByStereotypeProperties" collects the properties of the stereotypes.

This specific method collects the properties of the stereotype "List".

Reference: CollectByStereotypeProperties

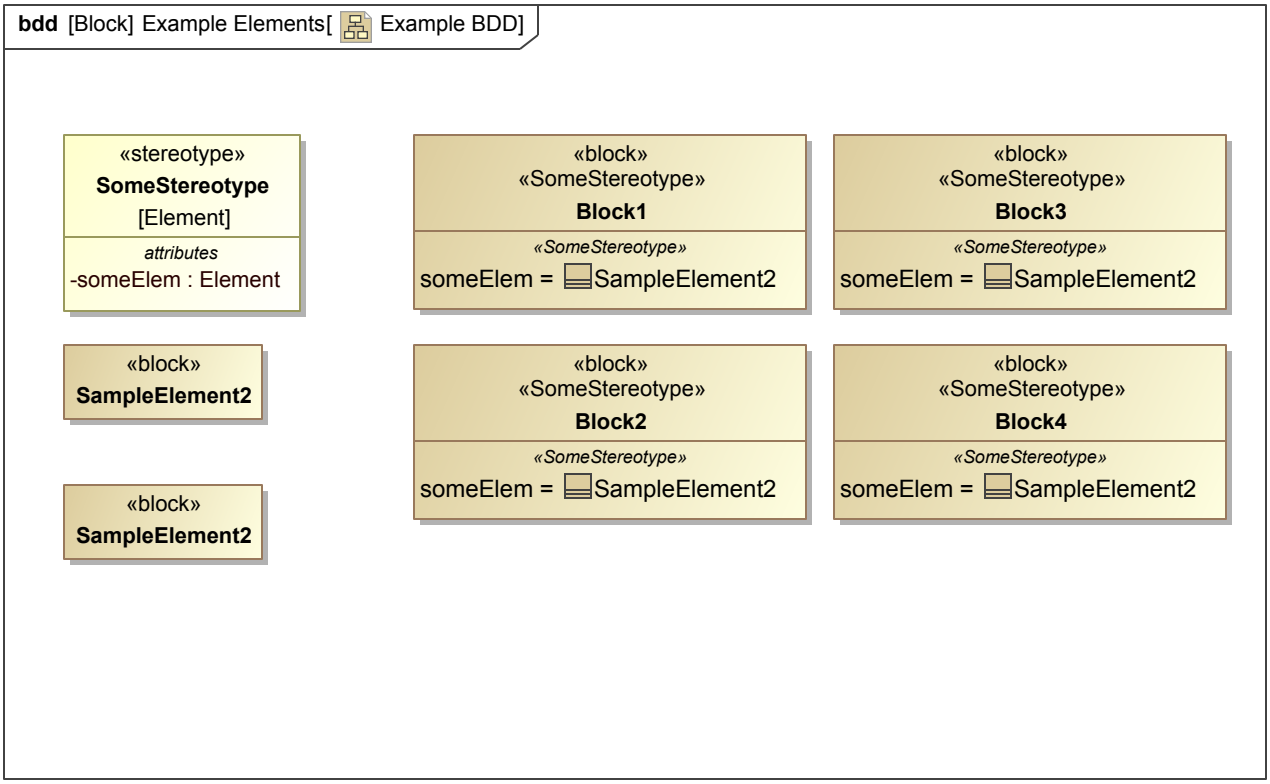


Figure 13. Example BDD

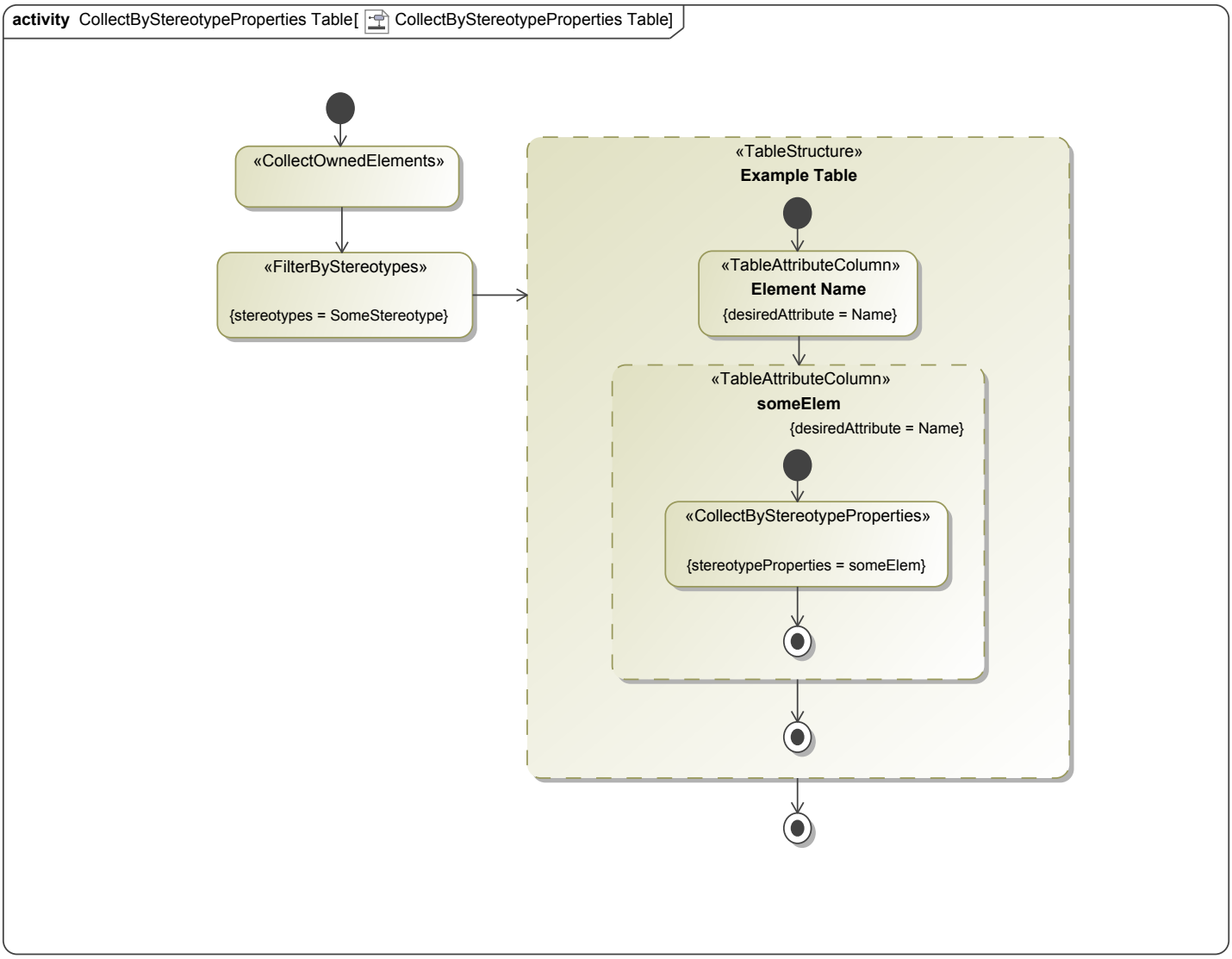


Figure 14. CollectByStereotypeProperties Table

"CollectByStereotypeProperties" collects the properties of the stereotypes.

This specific method collects the properties of the stereotype "Table".

Reference: CollectByStereotypeProperties

1.3.1.1.4.1 Bulleted List Example

1. SampleElement2
2. SampleElement2

1.3.1.1.4.2 Table Structure Example

Table 2. Example Table

Element Name	someElem
Block1	SampleElement2
Block2	SampleElement2
Block3	SampleElement2
Block4	SampleElement2

1.3.1.1.5 CollectByDirectedRelationshipMetaclasses

CollectByDirectedRelationshipMetaclasses action collects elements based on the relationships that other elements use to connect to them. Note that in the example, Helo and Athena are connected to Hera with a "Dependency" (the dashed arrowed line). In other words, Hera depends on Helo and Athena. These are the only dependencies in the example, so if I expose the Example Elements package, collect the owned elements, and then use this operator with the metaclass "Dependency", only Helo and Athena will be collected. Note the origin of the dependency - Hera - is NOT collected with this operator.

Selecting [...] under MetaclassChoosable in the specification will open the element selector, allowing the selection of the desired metaclass. Make sure the metaclass option is selected in the lower left corner or else metaclasses will not show in the search. Also keep in mind that depending on the extensions, plug-ins, etc. that you are using in Magic Draw, there might be multiple metaclasses with the same name (i.e. the built-in one and additional custom ones). Be careful to select the metaclass you are using in the model. The final results of this operator are shown in the following views.

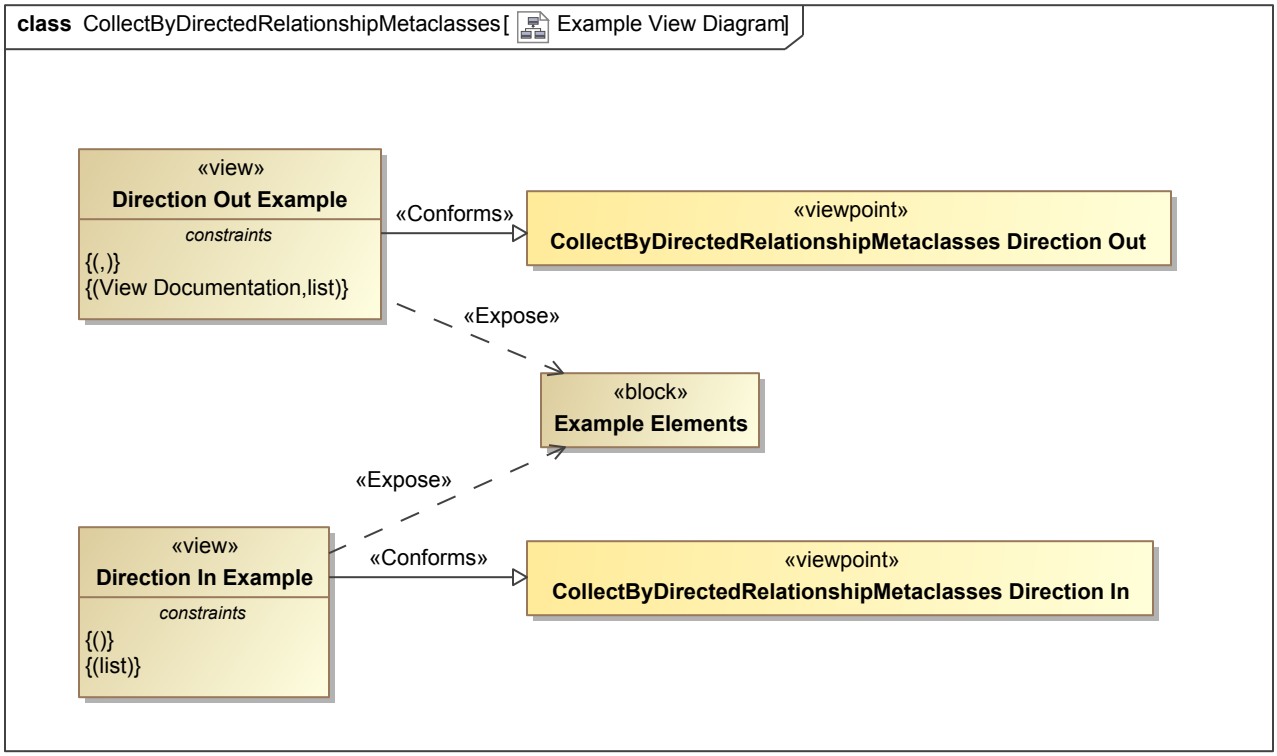


Figure 15. Example View Diagram

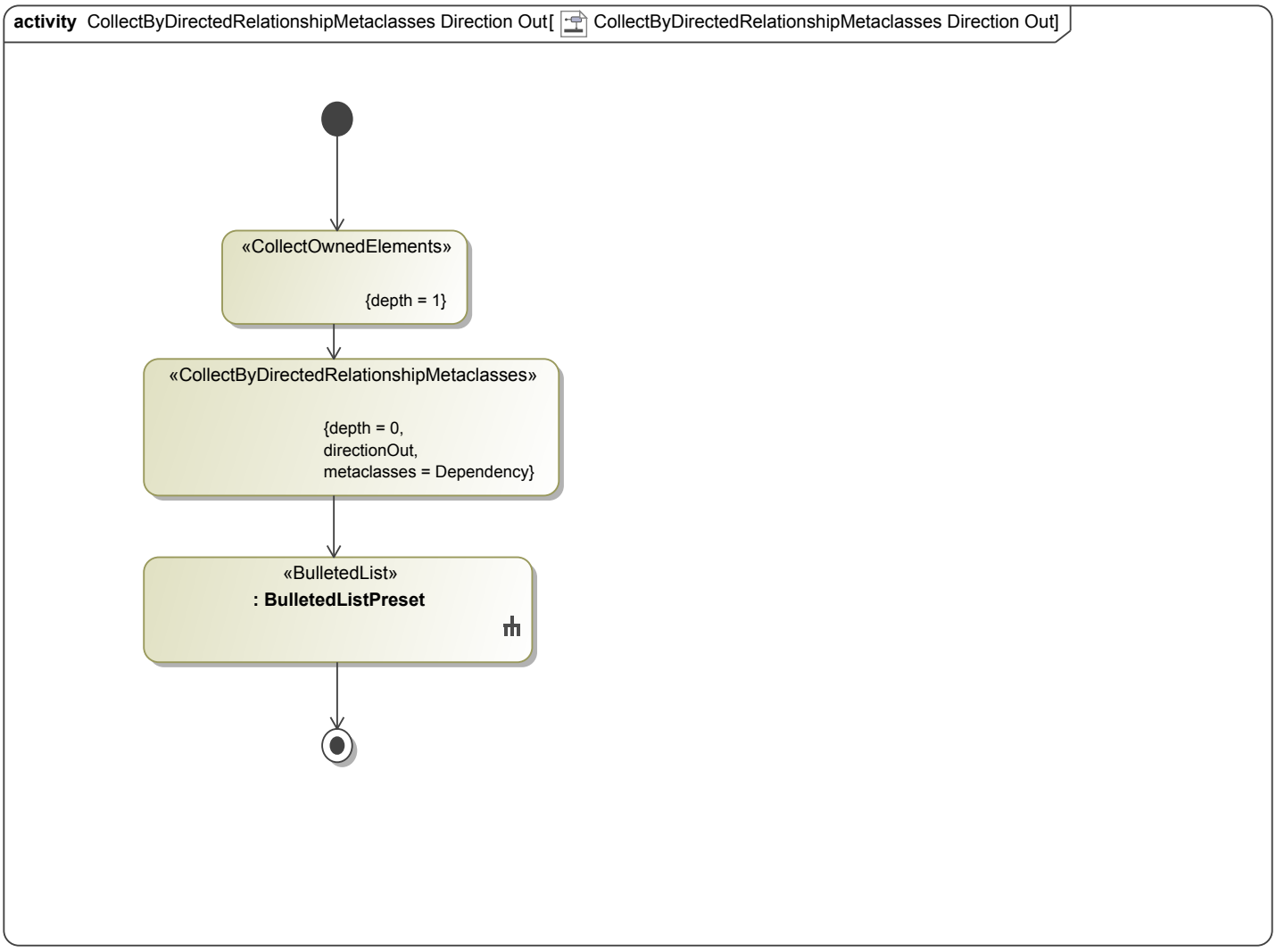


Figure 16. CollectByDirectedRelationshipMetaclasses Direction Out

CollectByDirectedRelationshipMetaclasses action collects elements based on the relationships that other elements use to connect to them.

This specific method collects elements based on their "Direction Out" relationships.

Reference: CollectByDirectedRelationshipMetaclasses

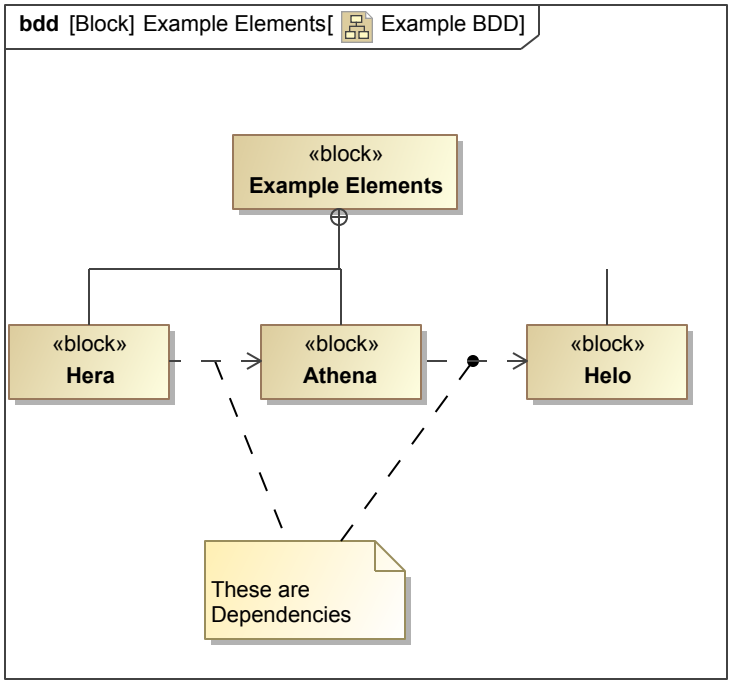


Figure 17. Example BDD

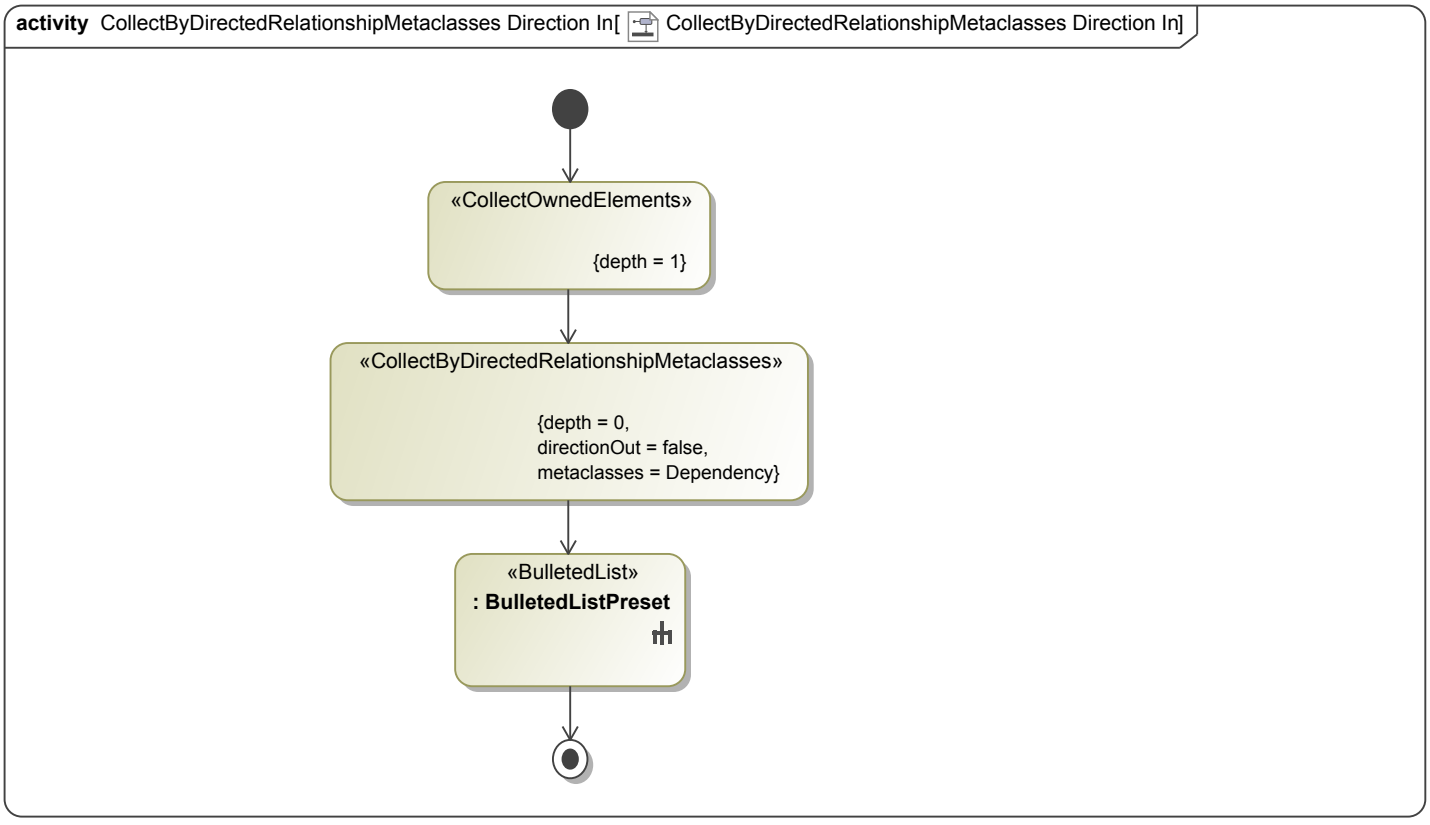


Figure 18. CollectByDirectedRelationshipMetaclasses Direction In

CollectByDirectedRelationshipMetaclasses action collects elements based on the relationships that other elements use to connect to them.

This specific method collects elements based on their "Direction In" relationships.

Reference: CollectByDirectedRelationshipMetaclasses

1.3.1.1.5.1 Direction Out Example

1. Athena
2. Helo

1.3.1.1.5.2 Direction In Example

1. Hera
2. Athena

1.3.1.1.5.3 Direction Out

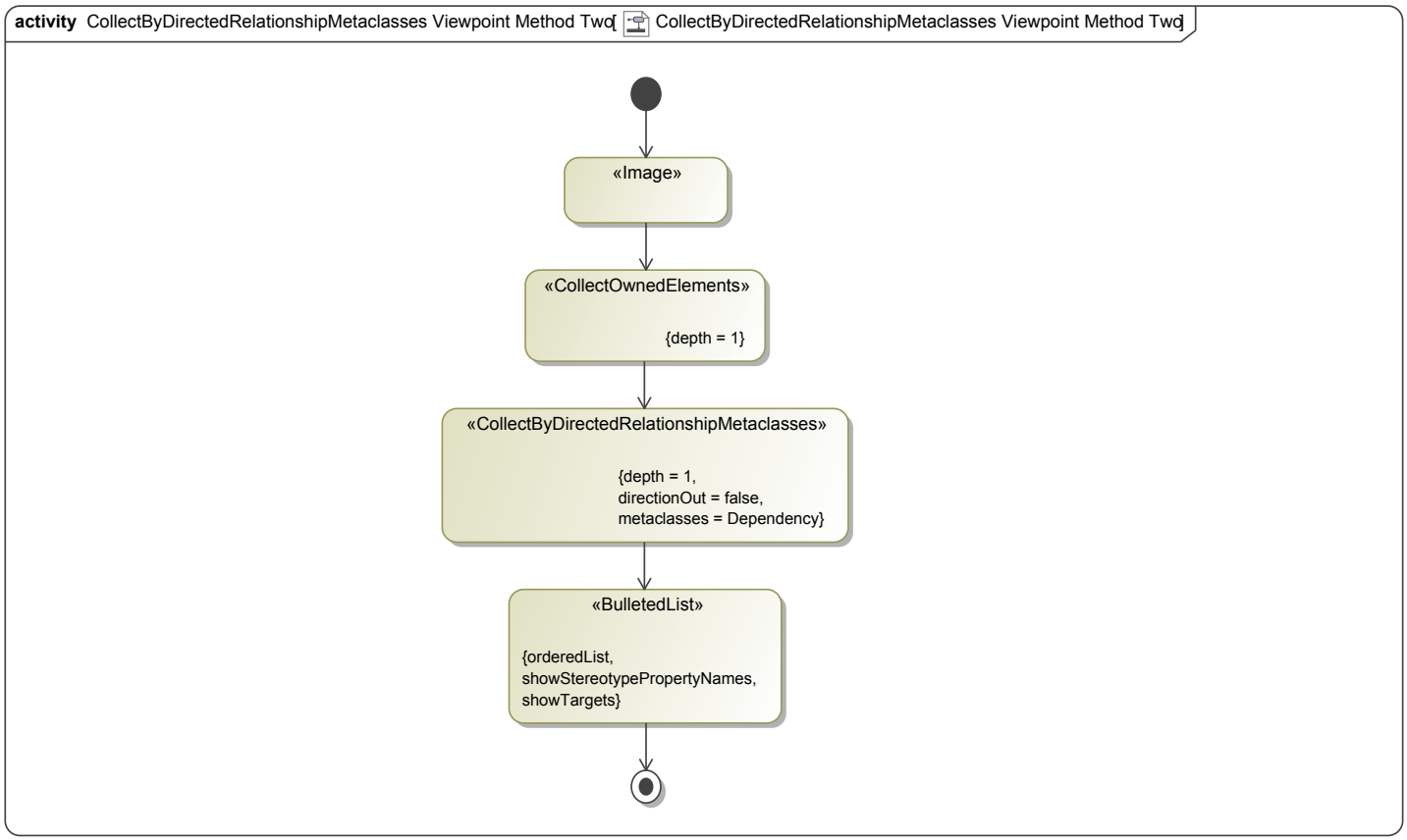


Figure 19. CollectByDirectedRelationshipMetaclasses Viewpoint Method Two

1.3.1.1.6 CollectByDirectedRelationshipStereotypes

CollectByDirectedRelationshipStereotypes also collects elements based on the relationships that connect them to other elements. However, here the collection is by the stereotype of the relationship instead of the metaclass (as in the previous section).

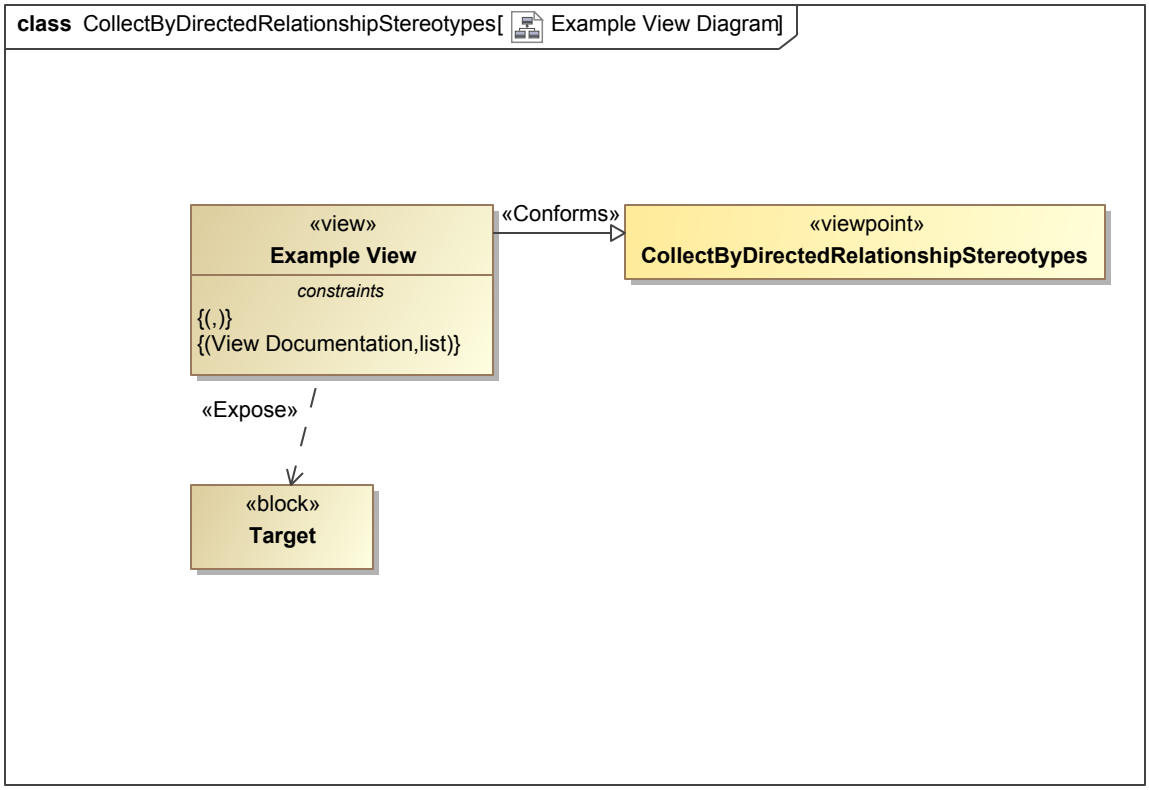


Figure 20. Example View Diagram

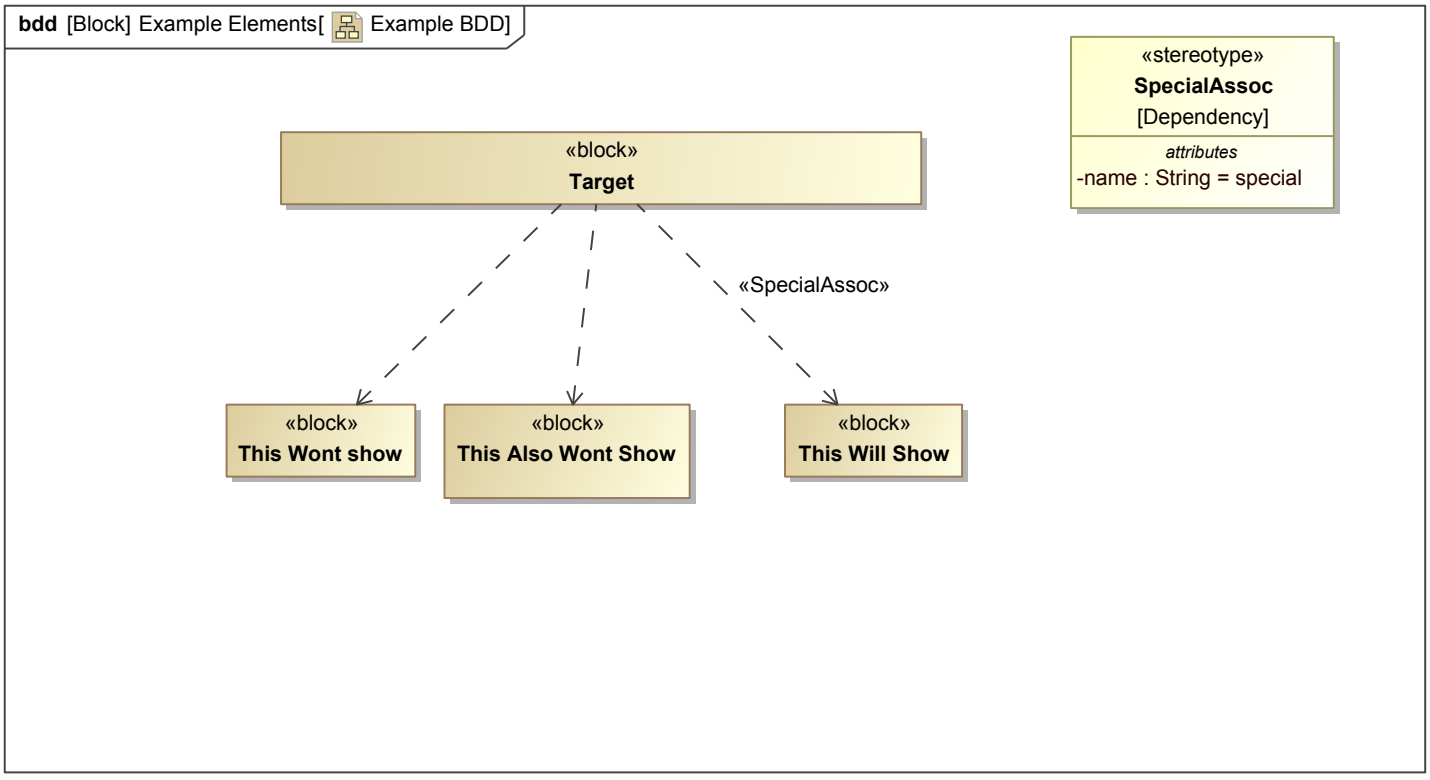


Figure 21. Example BDD

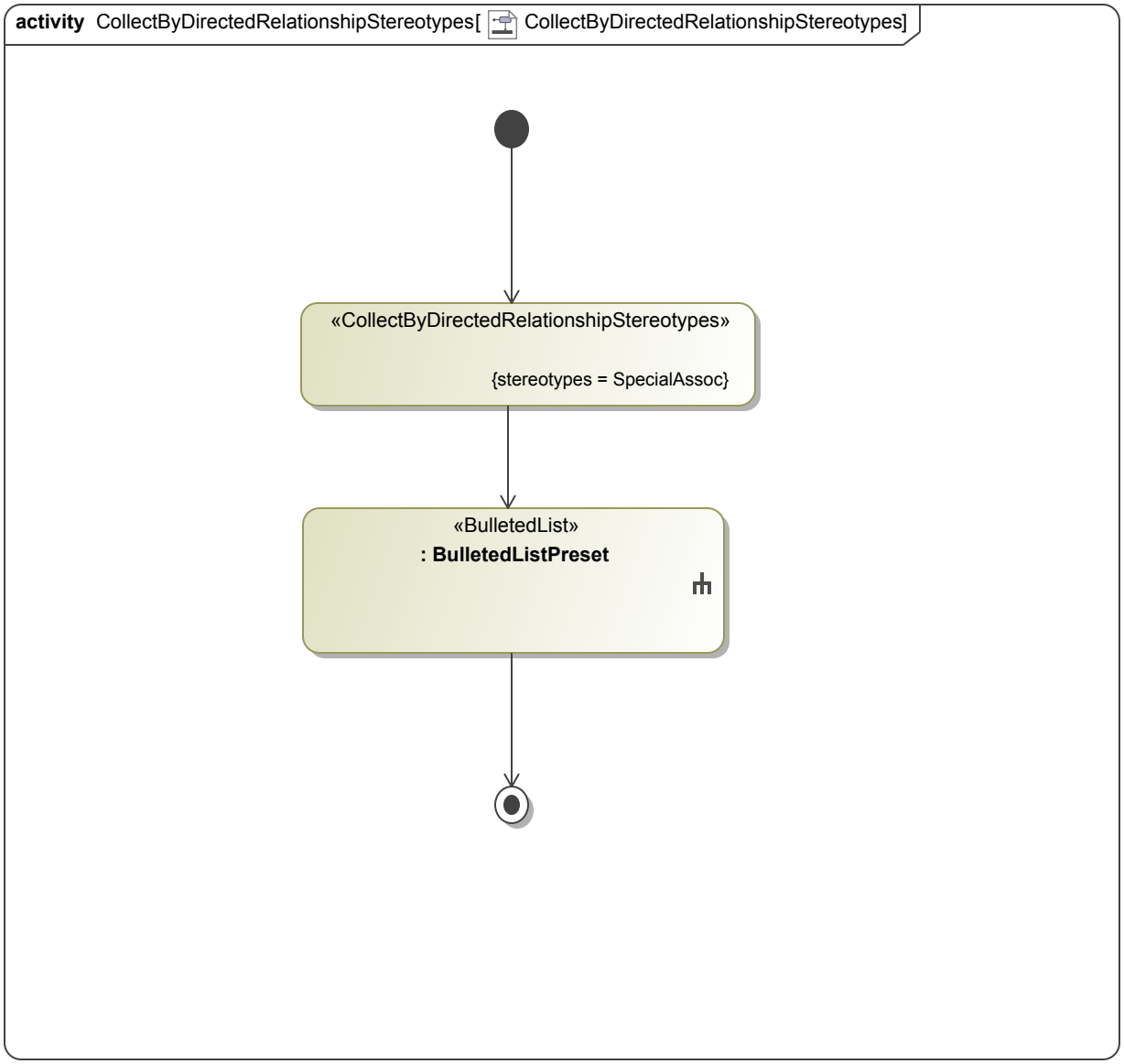


Figure 22. CollectByDirectedRelationshipStereotypes

"CollectByDirectedRelationshipStereotypes" also collects elements based on the *stereotype*of the relationships that connect them to other elements.

Reference: CollectByDirectedRelationshipStereotypes

1.3.1.1.6.1 Example View

1. This Will Show

1.3.1.1.7 CollectByAssociation

CollectByAssociation collects the blocks with aggregation of either composite, shared, or none. In other words, both white diamond associations (shared) and black diamond associations (composite) can be collected by this action. The CollectByAssociation action will then collect only those blocks that have the aggregation type as noted in the specification for CollectByAssociation block.

In the view diagram, this view exposes the Sample Element and conforms to the CollectByAssociation viewpoint method. The result of this viewpoint method is shown in the following view.

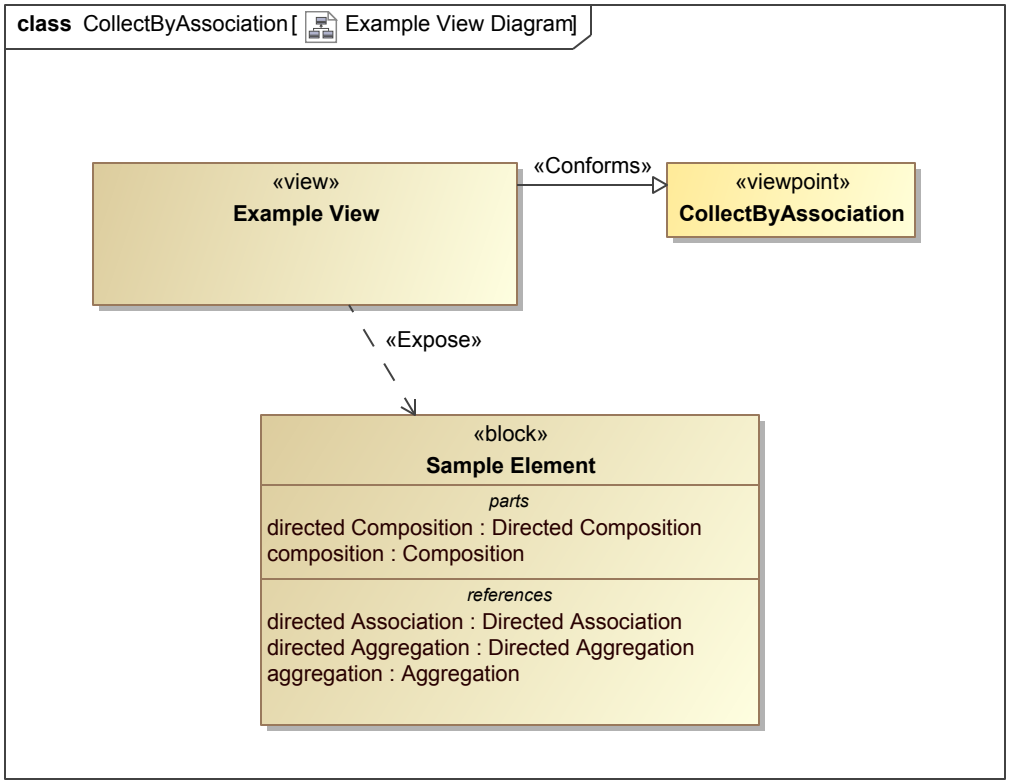


Figure 23. Example View Diagram

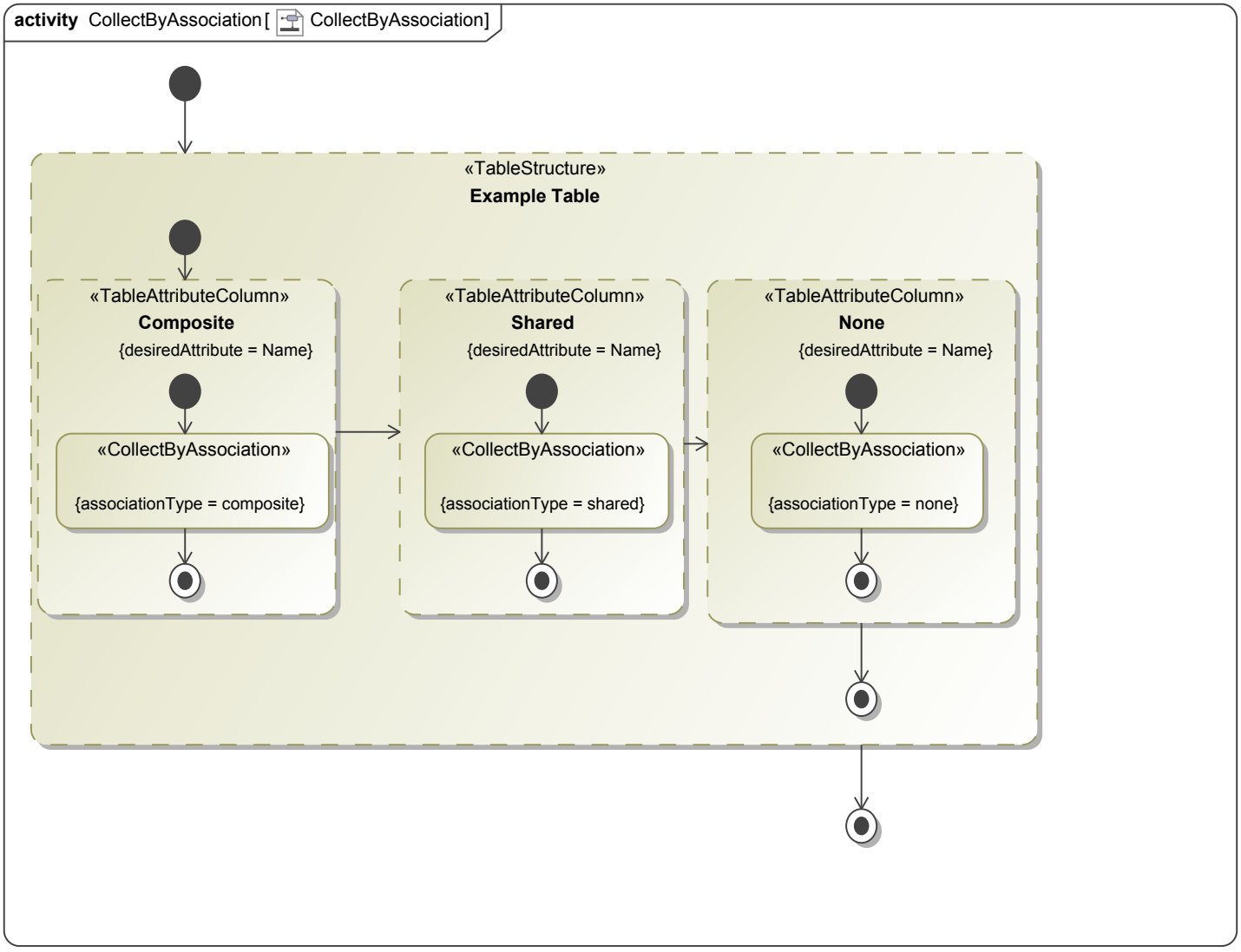


Figure 24. CollectByAssociation

"CollectByAssociation" collects the blocks with aggregation of either composite, shared, or none.

Reference: CollectByAssociation

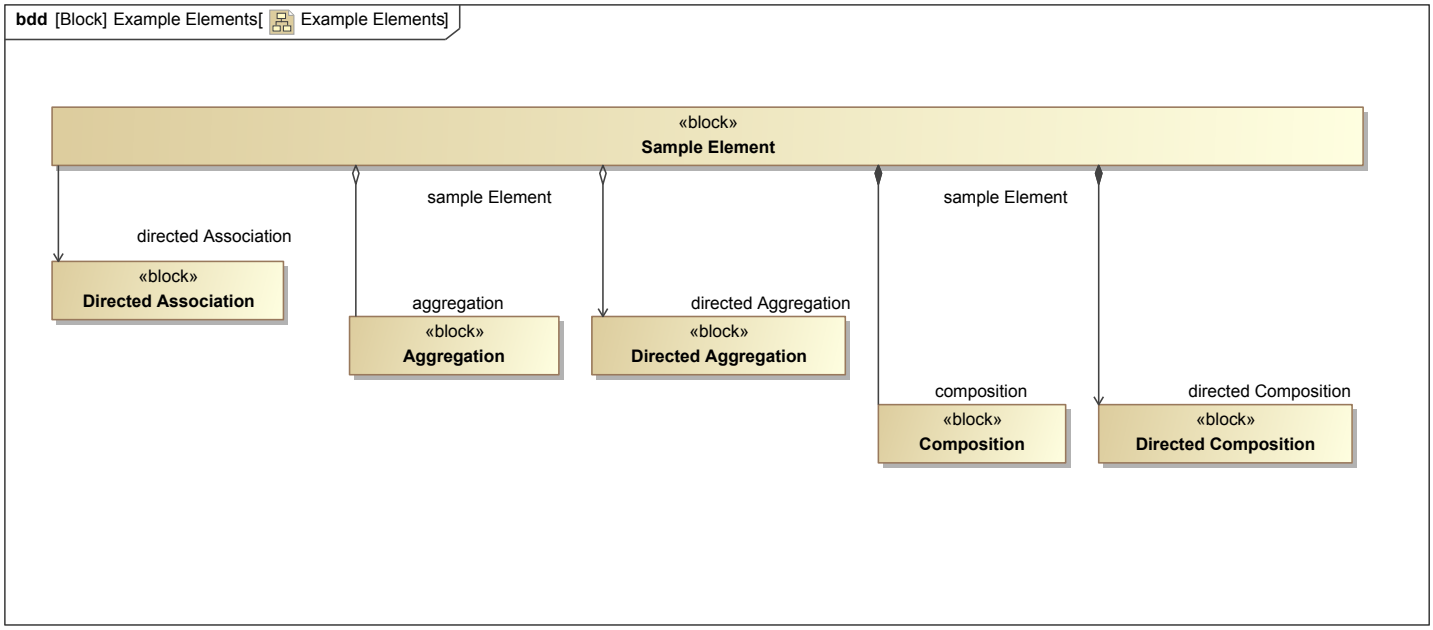


Figure 25. Example Elements

1.3.1.1.7.1 Example View

Table 3. Example Table

Composite	Shared	None
Directed Composition Composition	Directed Aggregation Aggregation	Directed Association

1.3.1.1.8 CollectTypes

CollectTypes collects types. In this case, the CollectOwnedElements or CollectOwners needs to be used to collect elements before CollectTypes. Then, CollectTypes will collect the type associated with each element. The viewpoint method diagram is shown below.

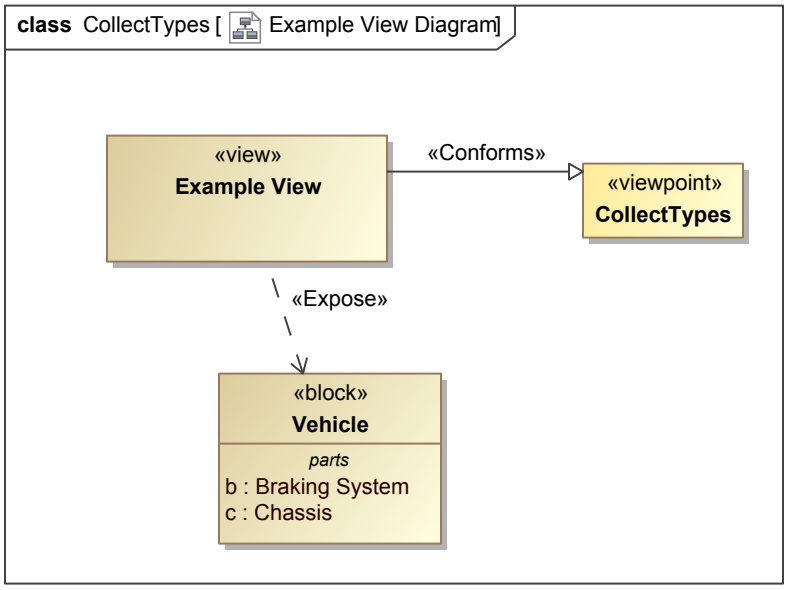


Figure 26. Example View Diagram

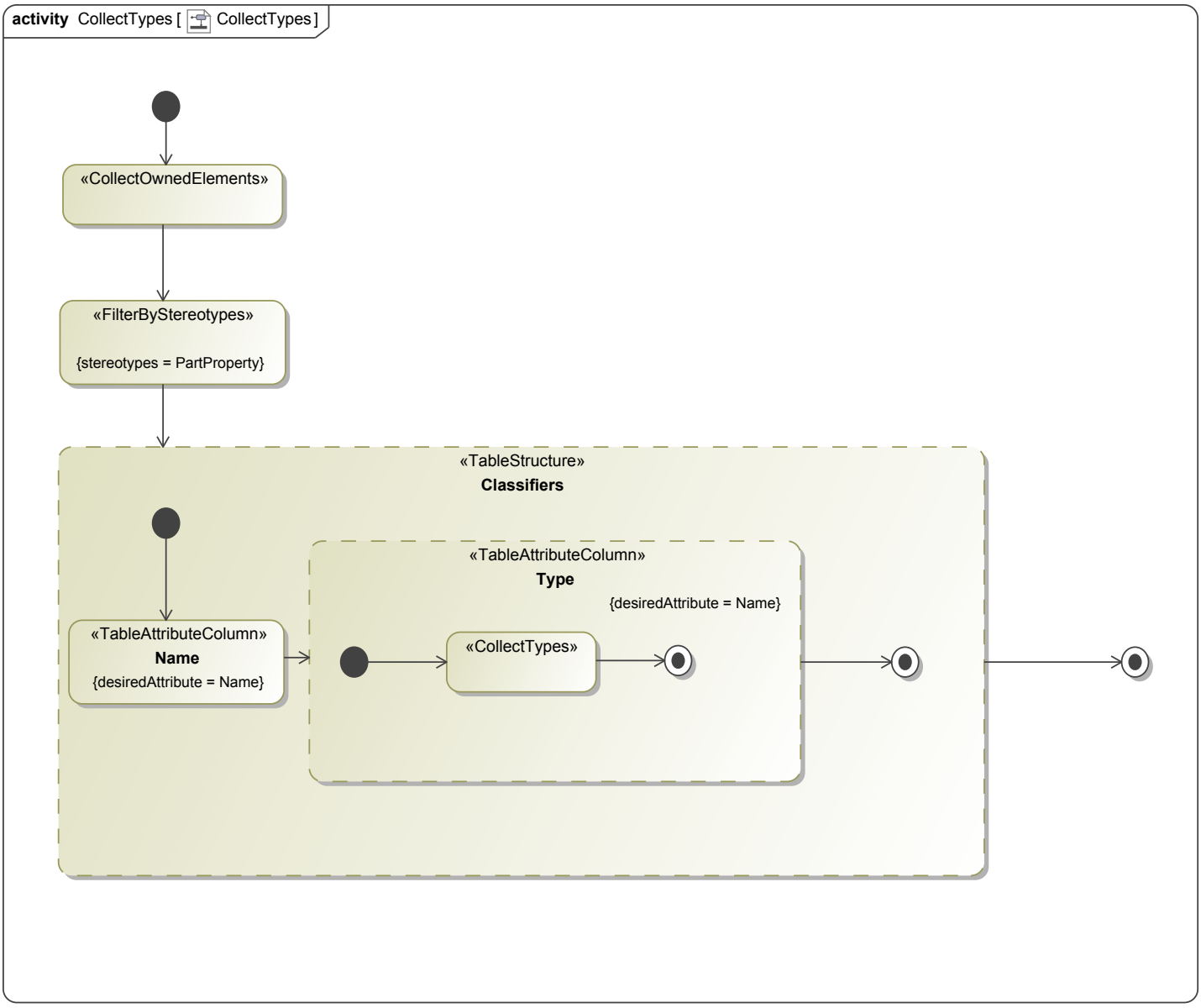


Figure 27. CollectTypes

CollectTypes collects the types of already collected elements. Most times, CollectOwned Elements or CollectOwners are used to collect said elements.

Reference: CollectTypes

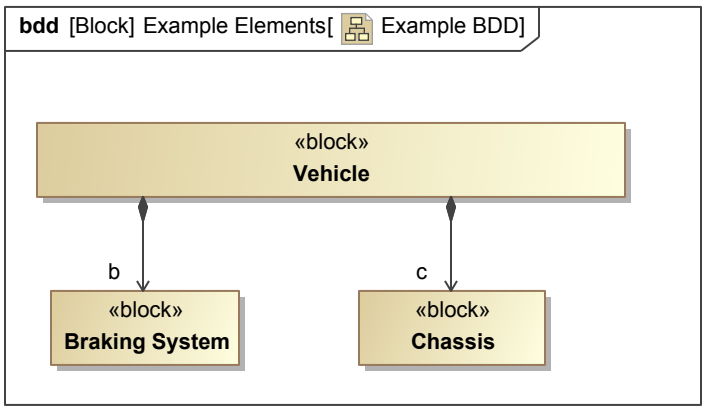


Figure 28. Example BDD

1.3.1.1.8.1 Example View

Table 4. Classifiers

Name	Type
b	Braking System
c	Chassis

1.3.1.1.9 CollectClassifierAttributes

CollectClassifierAttributes collects attributes of a class. To use this operation, we do not need to use CollectOwnedElements or CollectOwners, unlike in previous sections. The results are displayed in the following Example View table.

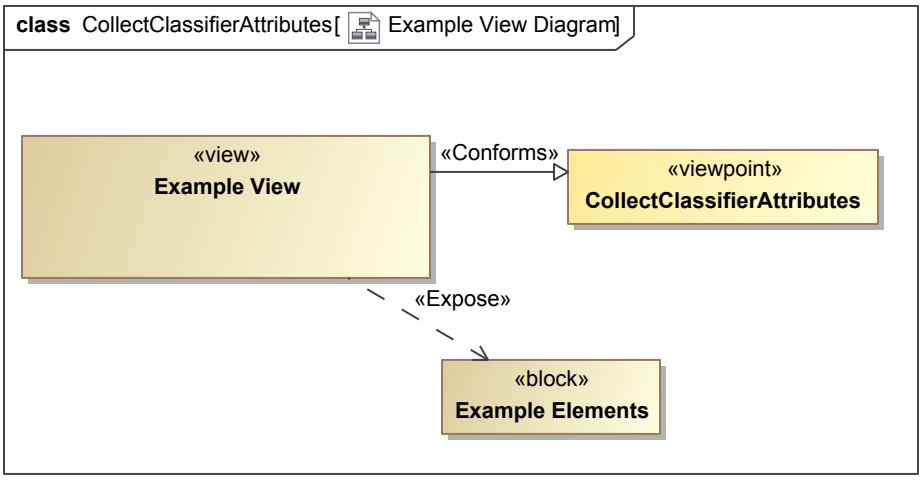


Figure 29. Example View Diagram

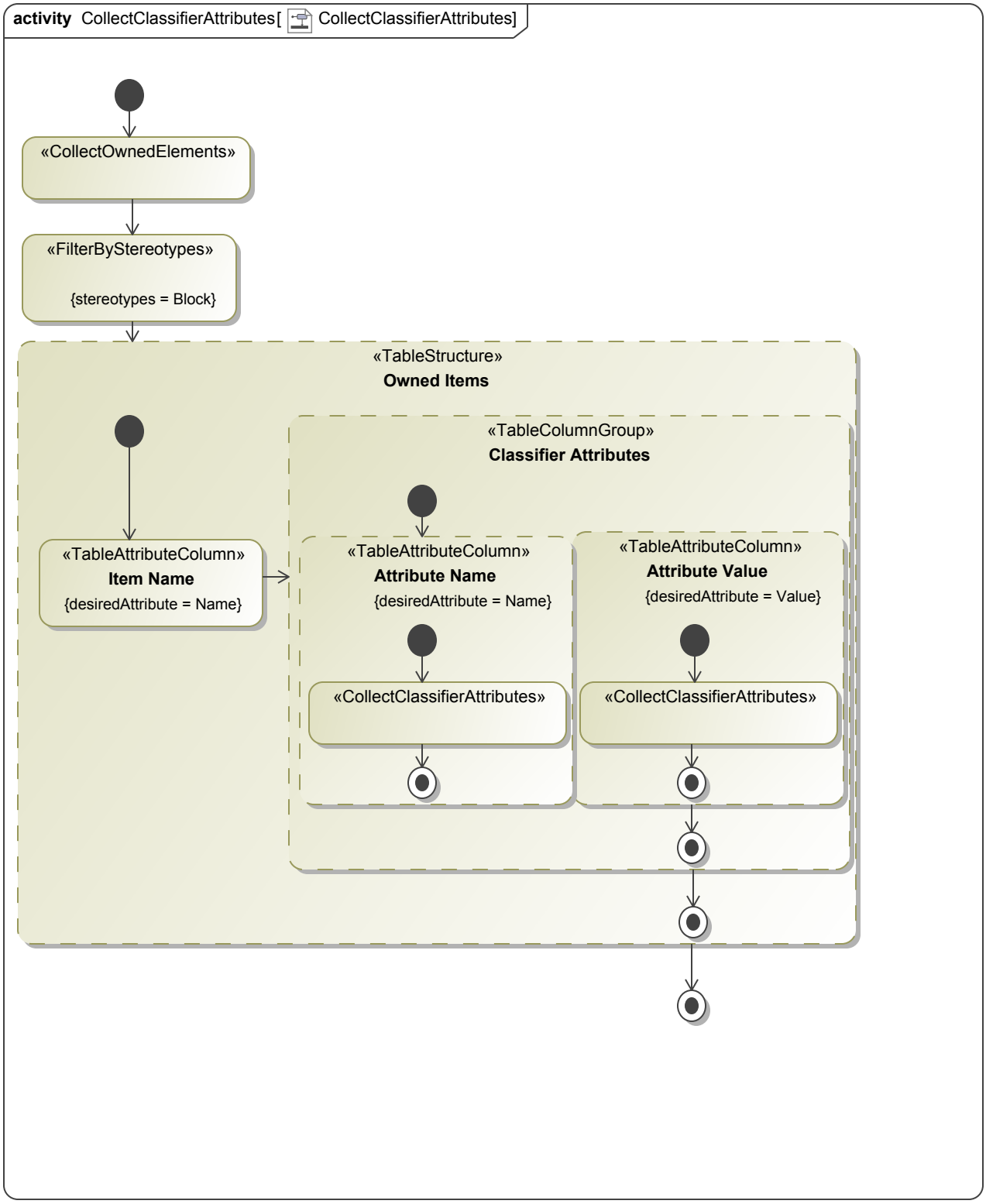


Figure 30. CollectClassifierAttributes

"CollectClassifierAttributes" collects attributes of a class.

Reference: CollectClassifierAttributes

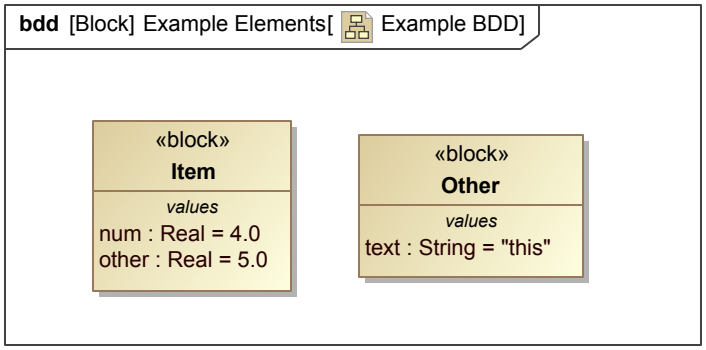


Figure 31. Example BDD

1.3.1.1.9.1 Example View

Table 5. Owned Items

Item Name	Classifier Attributes	
	Attribute Name	Attribute Value
Item	num other	4 5
Other	text	"this"

1.3.1.1.10 CollectByExpression

CollectByExpression is a more customized approach to querying a model using Object Constraint Language (OCL) .

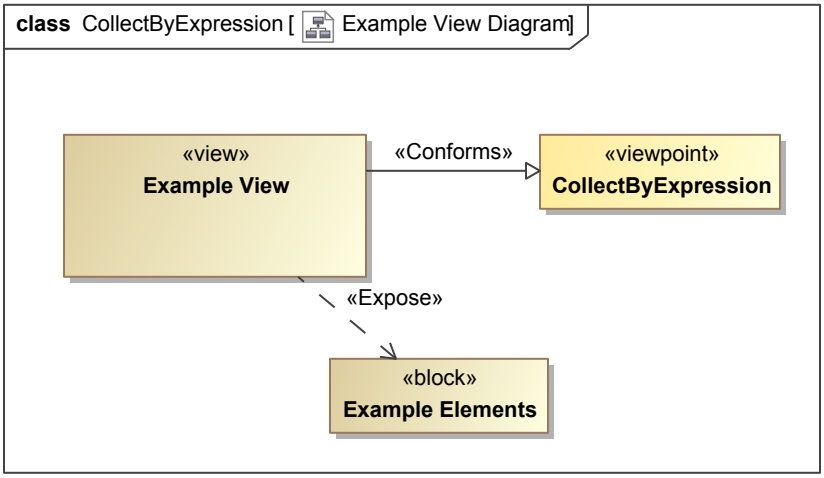


Figure 32. Example View Diagram

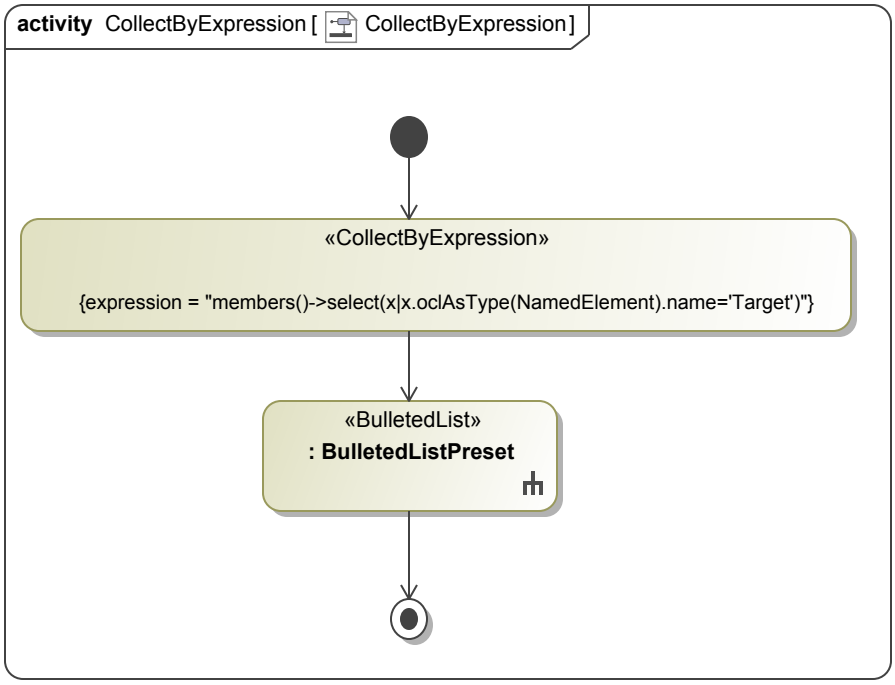


Figure 33. CollectByExpression

"CollectByExpression" is a more customized approach to querying a model using Object Constraint Language (OCL) .

Reference: CollectByExpression

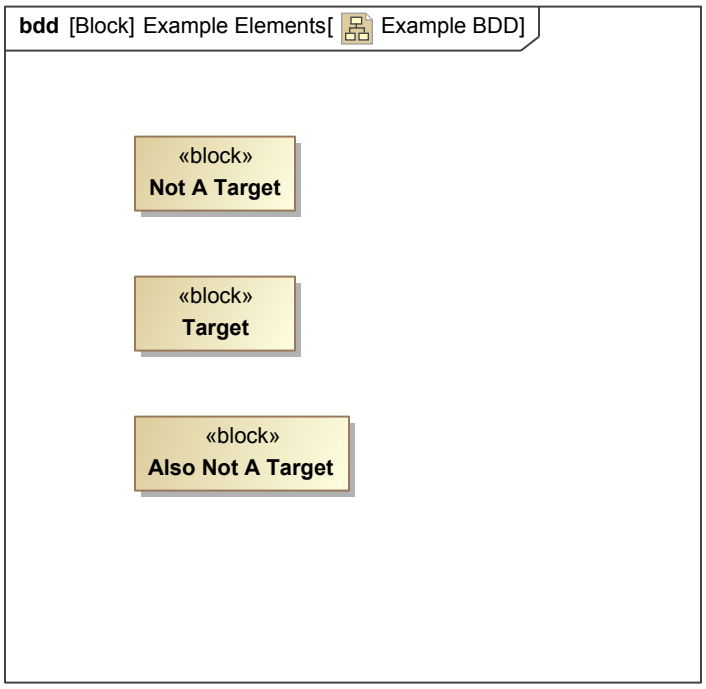


Figure 34. Example BDD

1.3.1.1.10.1 Example View

1. Target

1.3.1.2 Filter

The Filter operations allow the user to narrow fields of data to the data of interest according to one or multiple filter criteria of various types (such as stereotype, name, metaclasses, etc). For most applications, the "FilterBy..." operation needs to have a "CollectBy..." operation preceding it so the filter operation has a data set to look through and filter.

The following sections will take a look at the various Filter operations, what they do, how to set up the operation, and what the output could look like. The examples to follow are simpler than you would likely use with a real project, and they are meant to be simple to explain the basic principles that can be used to create the more complicated outputs you may require.

1.3.1.2.1 FilterByDiagramType

The FilterByDiagramType activity goes through a data set and looks at the elements which are diagrams. The user can decide which type of diagram is of interest to them, and display the names of only those diagrams in their document.

Figure 35. Example View Diagram

Figure 36. Diagrams

Figure 37. FilterByDiagramType Image

The "FilterByDiagramType" activity goes through a data set and looks at the elements which are diagrams. A Collect operation must be used first to collect elements desired to be filtered.

Reference: FilterByDiagramType

1.3.1.2.1.1 Image Example

Figure 38. Diagrams

Figure 39. Some Block

1.3.1.2.2 FilterByNames

We will now illustrate the use of the "FilterByNames" operation, which allows the user to find all the elements within the data set with a particular name or the elements connected to the element with the particular name. In this case, we will use the regular expression "Bat.*" to gather all elements whose names start with "Bat"

Figure 40. Example View Diagram

Figure 41. Example BDD

Figure 42. FilterByNames

"FilterByNames" activity goes through a data set and finds all the elements within the data set with a particular name or the elements connected to the element with the particular name. A Collect operation must be used first to collect elements desired to be filtered.

Reference: FilterByNames

1.3.1.2.2.1 Example View

1. Batman
2. Batgirl

1.3.1.2.3 FilterByMetaclasses

FilterByMetaclasses allows filtering of elements by metaclasses. As with the previous Filter operations, a Collect operation must be used first to collect elements desired to be filtered. In the example below, the CollectOwnedElements will be used again; this time, we will collect the elements owned by the block "Example Elements." The FilterByMetaclasses operation is then used to show the actors in this subset of elements.

After dragging a "FilterByMetaclasses" block onto the diagram, go to the specification window for the "FilterByMetaclasses" block. In this window, check the "true" box under "IncludeChoosable." As with the previous examples, checking this box means we want to include the metaclasses we are going to choose to filter. Next, we go to the "MetaclassesChoosable" section in the specification window, and click the "..." button . A "Select Class" window will appear. In this window, make sure the small box in the bottom left hand corner is selected to allow metaclasses to be shown in the selection box. Now, we can navigate to "UML Standard Profile" -> "UML2 Metamodel" -> select "Actor" -> and click the "+" button. We could also have chosen the "Stereotype" metaclass, for example, or a number of other metaclasses.

Figure 43. Example View Diagram

Figure 44. FilterByMetaclasses

"FilterByMetaclasses" activity goes through a data set and finds all the elements that has are defined by a specified metaclass. A Collect operation must be used first to collect elements desired to be filtered.

Reference: FilterByMetaclasses

Figure 45. Example BDD

1.3.1.2.3.1 Example View

1. Some Actor
2. Another Actor

1.3.1.2.4 FilterByStereotypes

FilterByStereotypes allows filtering of elements by the stereotype(s) applied to them.

Figure 46. Example View Diagram

Figure 47. FilterByStereotypes

"FilterByStereotypes" activity goes through a data set and finds all the elements that has are defined by a specified Stereotype. A Collect operation must be used first to collect elements desired to be filtered.

Reference: FilterByStereotypes

Figure 48. Example BDD

1.3.1.2.4.1 Example View

1. Item

1.3.1.2.5 FilterByExpression

FilterByExpression is a more customized approach to querying a model using Object Constraint Language (OCL). The expression value is simply a boolean written in OCL.

Figure 49. Example View Diagram

Figure 50. FilterByExpression

"FilterByExpression" activity goes through a data set and finds all the elements that satisfy (boolean) a Object constraint Language (OCL) expression. A Collect operation must be used first to collect elements desired to be filtered.

Reference: FilterByExpression

Figure 51. Example BDD

1.3.1.2.5.1 Example View

1. Not Named Block
2. This Also Isn't Named Block

1.3.1.3 Sort

The Sort operations allow a data set to be sorted according to a desired parameter. Data can be sorted either by attribute, property, or expression. These Sort operations are illustrated below. As with the Filter operations, it is necessary for us to Collect elements in some way in order to have a data set to sort.

1.3.1.3.1 SortByAttribute

"SortByAttribute" allows the user to sort a data set by the chosen attribute. The list of attributes that can be sorted include name, documentation, or value. With this operation, only one attribute is choosable at a time for sort. In the "FilterByStereotypes" example, it was highlighted that a Sort operation was necessary if a user would like to alphabetize the output of a viewpoint method.

In the specification window for "SortByAttribute," we choose the "Name" option from the drop-down menu under the "AttributeChoosable" section. Ensure "Reverse" is false.

Figure 52. Example View Diagram

Figure 53. SortByAttribute

"SortByAttribute" allows the user to sort a data set by the chosen attribute: name, documentation, value.

Reference: SortByAttribute

Figure 54. Example BDD

1.3.1.3.1.1 Example View

1. Alpha
2. Beta
3. Gamma

1.3.1.3.2 SortByProperty

Figure 55. Example View Diagram

Figure 56. Example BDD

Figure 57. SortByProperty

"SortByProperty" allows the user to sort a data set by a specified property.

Reference: SortByProperty

1.3.1.3.2.1 Example View

1. Should Be First
2. Should Be Third
3. Should Be Second

1.3.1.3.3 SortByExpression

SortByExpression is a more customized approach to querying a model using Object Constraint Language (OCL).

Figure 58. Example View Diagram

Figure 59. SortByExpression

"SortByExpression" a data set as specified by the Object constraint Language (OCL) expression.

Reference: SortByExpression

Figure 60. Example BDD

1.3.1.3.3.1 Example View

1. Super
2. Not Super

1.3.2 Present Model Data

After the data is collected, filtered, and/or sorted, several operators can be used to adjust how the data will be displayed. The presentation element operators are table, image, paragraph, list, and sections. These are used in the viewpoint method diagram and determine the formatting that will be displayed in the document views.

The following examples all use a common Zoo package, that has an assortment of elements to serve as samples. The examples that deal with OCL use a Robot Zoo package in order to demonstrate different behavior.

Table 6. DocGen Methods

Method Name	Method Description
SimpleTable	The manual demonstrates constructing a "simple" table made of attribute columns is created using the given DocGen Table methods. Reference: Table
ComplexTable	The manual demonstrates constructing a "complex" table made of an attribute column and a table column group using the given DocGEn Table methods. Reference: Table
Generic Paragraph	Paragraph is a presentation element designed to display text. By default (aka the Generic Paragraph), displays the documentation of the exposed elements or of the view itself. Reference: Paragraph
Paragraph of Name	Paragraph is a presentation element designed to display text. The "Paragraph of Name" displays the *name* attribute of the exposed elements or of the view itself. Reference: Paragraph
Paragraph of Documentation	Paragraph is a presentation element designed to display text. The "Paragraph of Documentation" displays the *documentation* attribute of the exposed elements or of the view itself. It will produce the same result of the Generic Paragraph, but is simply another way to specify it. Reference: Paragraph
Paragraph of Default Value	Paragraph is a presentation element designed to display text. The "Paragraph of Default Value" displays the *value* attribute of the exposed elements or of the view itself. Reference: Paragraph
Paragraph Body	Paragraph is a presentation element designed to display text. The *body* is text (can be HTML) that isspecified in the Paragraph specification and then the "Paragraph Body" displays that body. Reference: Paragraph Action with Body

Method Name	Method Description
Paragraph OCL With Targets	Paragraph is a presentation element designed to display text. By using Object Constraint Language (OCL) and establishing targets, a more specified paragraph can be created according to said expression. Reference: Paragraph Action Evaluate OCL
Paragraph OCL Without Targets	Paragraph is a presentation element designed to display text. By using Object Constraint Language (OCL) a more specified paragraph can be created according to said expression, even *without* targets. Reference: Paragraph Action Evaluate OCL
Paragraph OCL For Targets	Paragraph is a presentation element designed to display text. By using Object Constraint Language (OCL), a more specified paragraph can be created according to said expression. Reference: Paragraph Action Evaluate OCL
Bulleted List	"BulletedList" creates lists based on the model elements exposed to the behavior. What information is displayed depends on the options selected in the behavior's specification and the filters applied to the collected data. Reference: List
Image	Image Elements can be displayed in view editor by the use of the "Image" action. An example of an Image Element is a Diagram. Reference: Image
Dynamic Section	"Dynamic sectioning" is the creation of viewpoint method defined sections. They are created using the "Structured Query" activity in the viewpoint method diagram. This specific example shows the creation of a single section. Reference: Dynamic Sectioning
Multiple Sections	"Dynamic sectioning" is the creation of viewpoint method defined sections. They are created using the "Structured Query" activity in the viewpoint method diagram. This specific example shows the creation of multiple sections. Reference: Dynamic Sectioning

1.3.2.1 Table

The sections below go over how to create tables. Tables of varying complexity can be created in MagicDraw, but these tables share some common base components. The left sidebar gives various components for use under "Table Structure."

The first option, TableStructure, is used in all cases to create the table base. The last three options shown under "Table Structure" in the sidebar allow the user to select a type of column based on the information they need to display in each column. TableExpressionColumn uses an OCL expression. TablePropertyColumn allows stereotype properties or value properties of a class to be displayed, depending on the what the user chooses. The TableAttributeColumn allows the user to display the name, documentation, or value of an element. Clicking the small black arrow on the right of these options on the sidebar opens a set of selections where the second one has a dotted outside line on the icon. This dotted outside line selection exists for each of the three column types and allows the user to configure a flow within the column. The TableColumnGroup allows creating a column group with a merged header, as will be illustrated in the Complex Table selection.

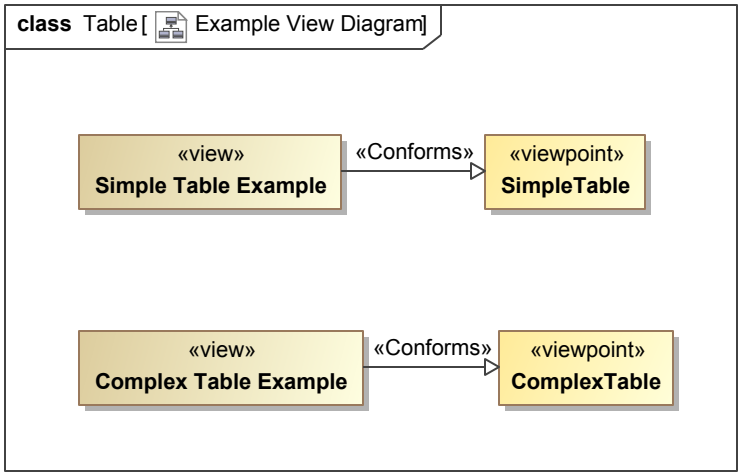


Figure 61. Example View Diagram

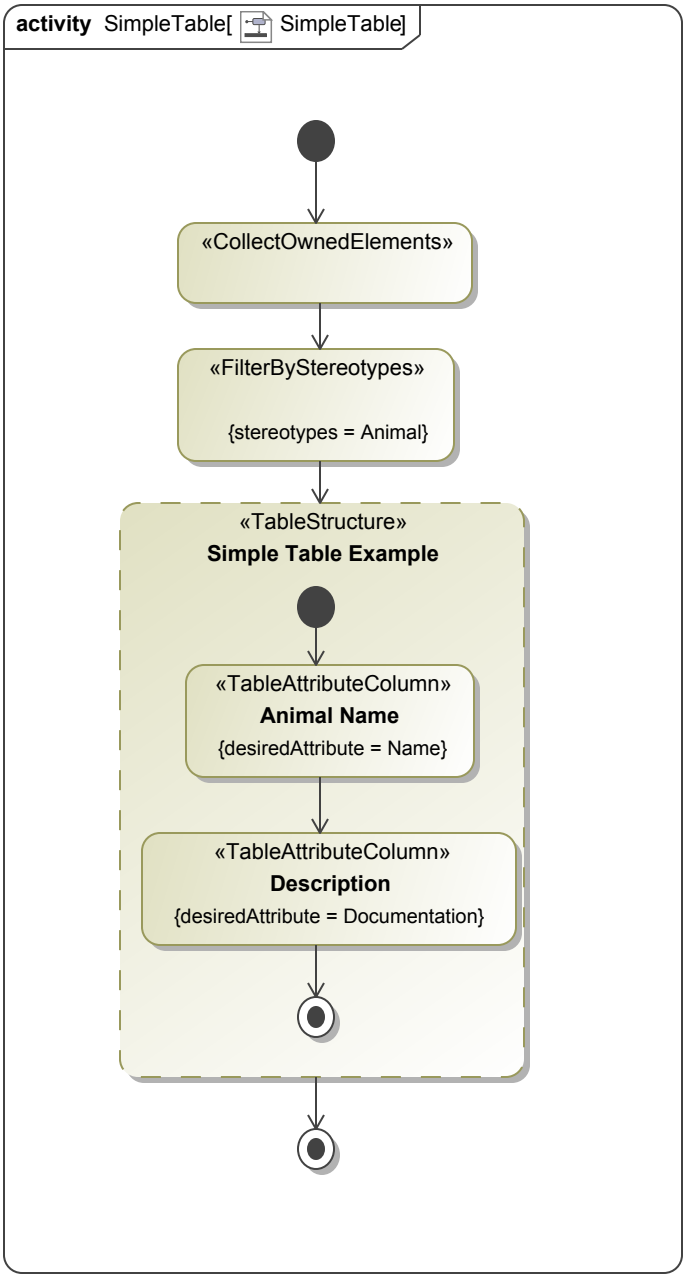


Figure 62. SimpleTable

The manual demonstrates constructing a "simple" table made of attribute columns is created using the given DocGen Table methods.

Reference: Table

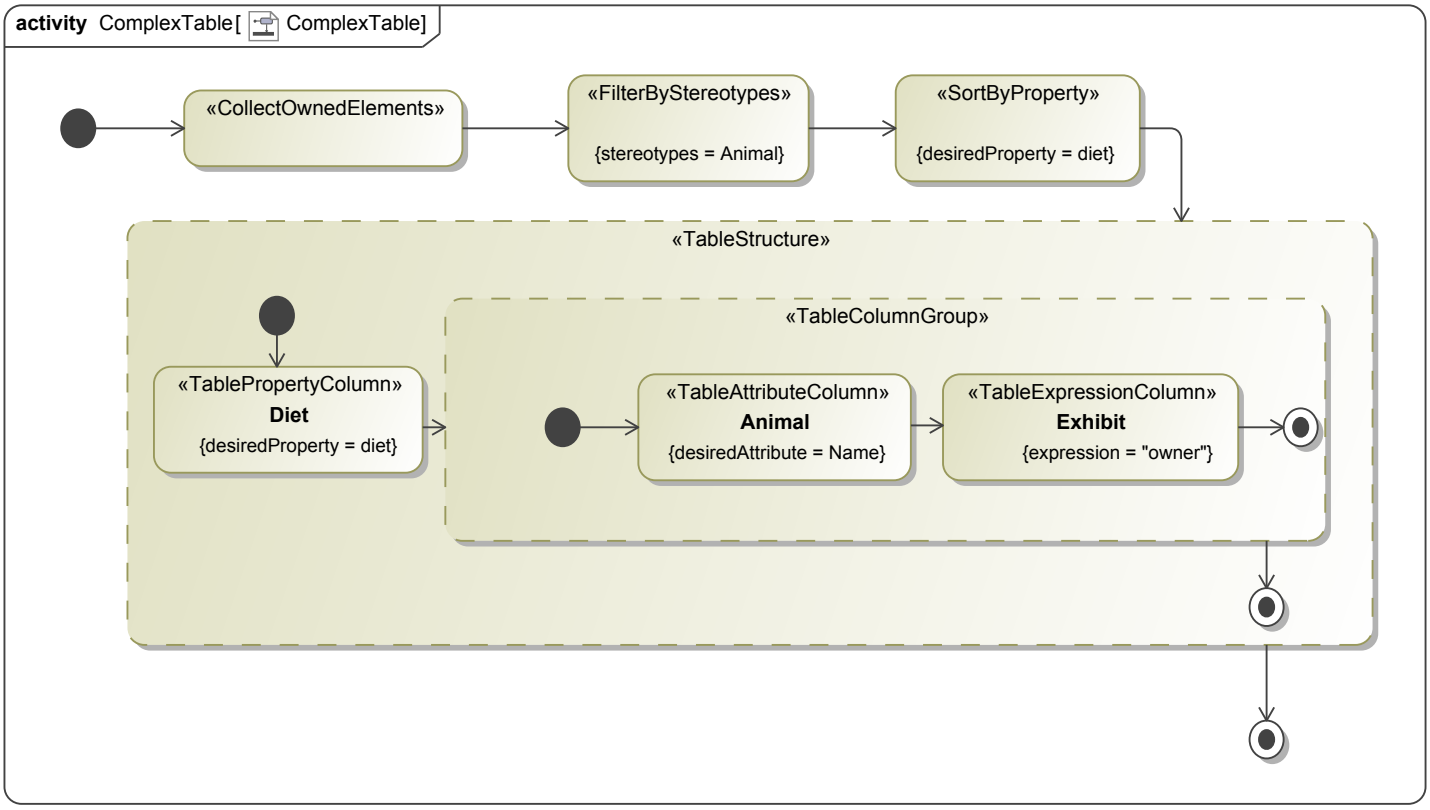


Figure 63. ComplexTable

The manual demonstrates constructing a "complex" table made of an attribute column and a table column group using the given DocGEn Table methods.

Reference: Table

1.3.2.1.1 Simple Table

This viewpoint method is used to create a simple table that shows the name and documentation of all the Animals in the Zoo package. First we collect all elements owned by the Zoo package. Then we filter out all elements that are not <<Animal>>. This leaves the five animal elements, which we pass into a TableStructure.

The first column we create shows the Name attribute of the animal elements. We call this column "Animal Name" which will become the header of the column when we generate the document or reveal on ViewEditor. We select "Name" as the desiredAttribute in the TableAttributeColumn Action.

We do the same thing for the next column "Description" except that we set desiredAttribute to "Documentation" to target a different attribute of the Animal element.

Table 7. Simple Table Example

Animal Name	Description
Ostrich	Ostriches can run up to 70 km/h, the fastest land speed of any bird.
Crocodile	Basically a dinosaur.
Zebra	Zebras feed almost entirely on grasses.
Seal	Mostly blubber.
Arctic Tern	What sound does an arctic tern make?

1.3.2.1.2 Complex Table

Table 8. <>

Diet		
	Animal	**Exhibit**
Carnivore	Crocodile	Africa Exhibit
Carnivore	Seal	Antarctica Exhibit
Carnivore	Arctic Tern	Antarctica Exhibit
Herbivore	Zebra	Africa Exhibit
Omnivore	Ostrich	Africa Exhibit

1.3.2.2 Paragraph

Paragraph is a presentation element designed to display text. Every view requires a viewpoint method, if one is not specified the default method is a single paragraph action targeting the documentation of the view element. This is added automatically without being visible to the user.

This section describes advanced ways you can: create paragraphs, combine paragraphs with other viewpoint method actions, and generate paragraphs using OCL.

Paragraph is a combination of the features of Image and Table. It is similar to an image in that it will display the documentation of any element that is exposed by the view. It also has some advanced expression features that allow it to additionally display the attributes of an element exposed by a view (similar to TableAttributeColumn) or result of an expression (similar to TableExpressionColumn).

In general the results of a paragraph allow greater flexibility to display view editor editable content from that model than information displayed within the rigid constraints of an Image or Table.

The following sections describe various ways a paragraph can be used.

1.3.2.2.1 Paragraph Action with Targets

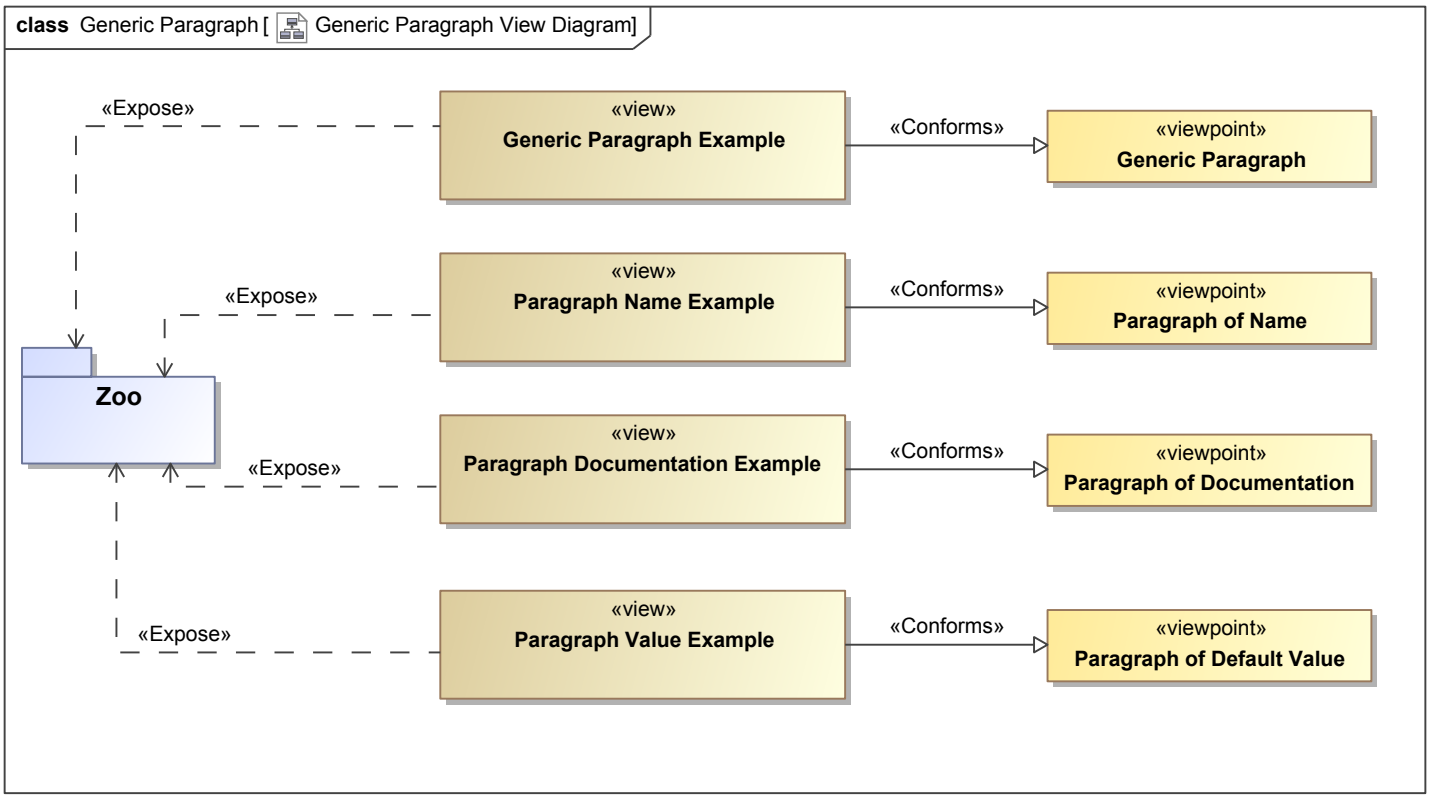


Figure 64. Generic Paragraph View Diagram

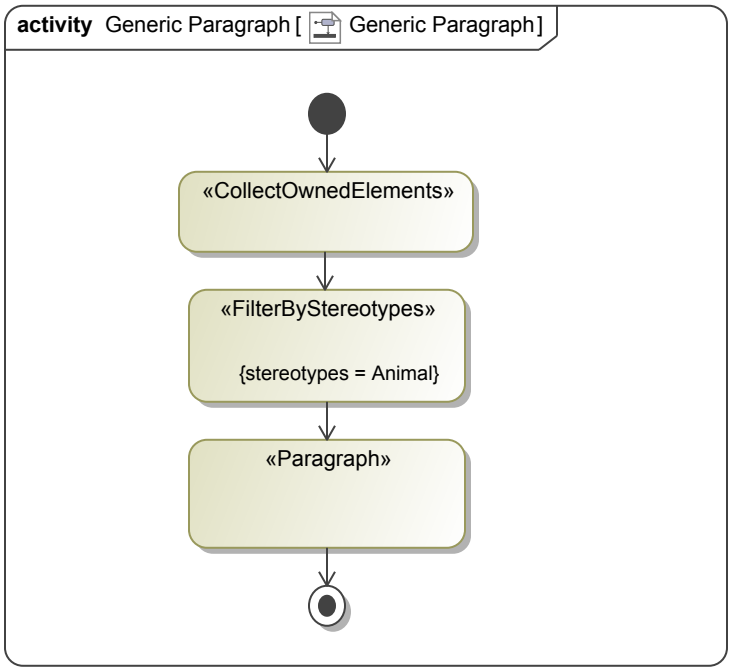


Figure 65. Generic Paragraph

Paragraph is a presentation element designed to display text. By default (aka the Generic Paragraph), displays the documentation of the exposed elements or of the view itself.

Reference: Paragraph

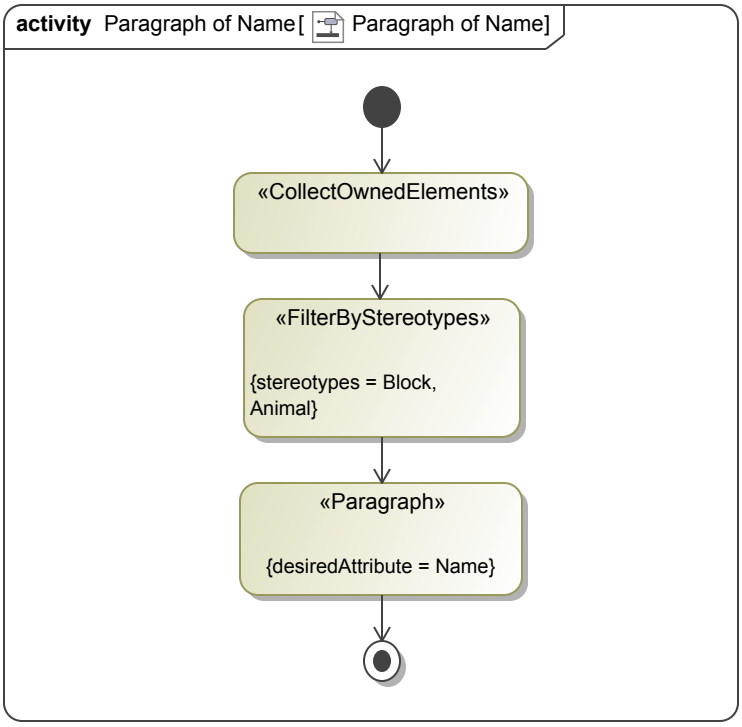


Figure 66. Paragraph of Name

Paragraph is a presentation element designed to display text. The "Paragraph of Name" displays the *name* attribute of the exposed elements or of the view itself.

Reference: Paragraph

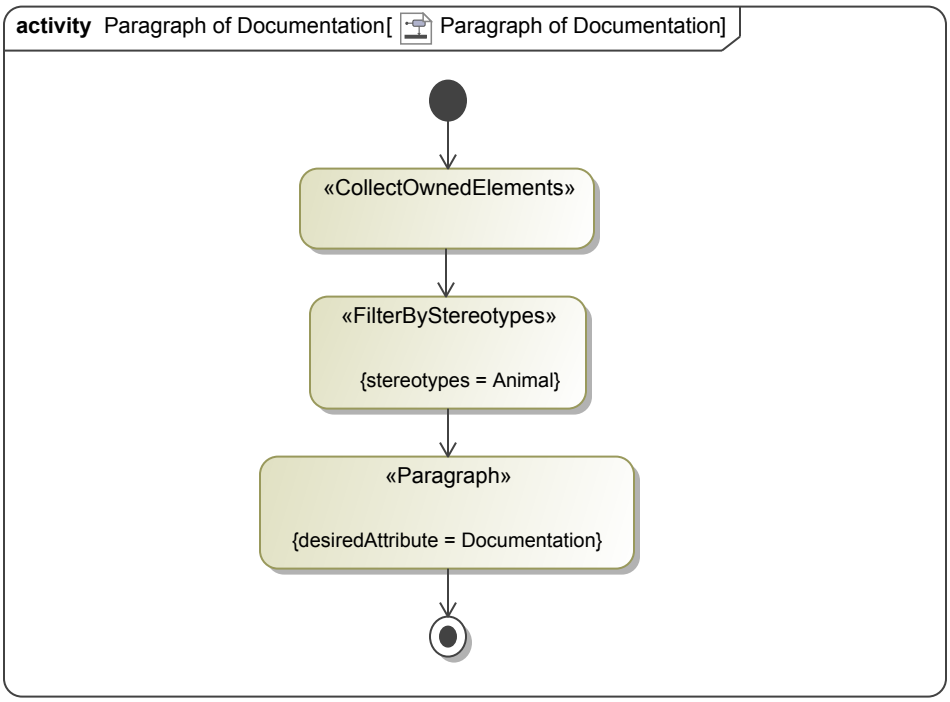


Figure 67. Paragraph of Documentation

Paragraph is a presentation element designed to display text. The "Paragraph of Documentation" displays the *documentation* attribute of the exposed elements or of the view itself. It will produce the same result of the Generic Paragraph, but is simply another way to specify it.

Reference: Paragraph

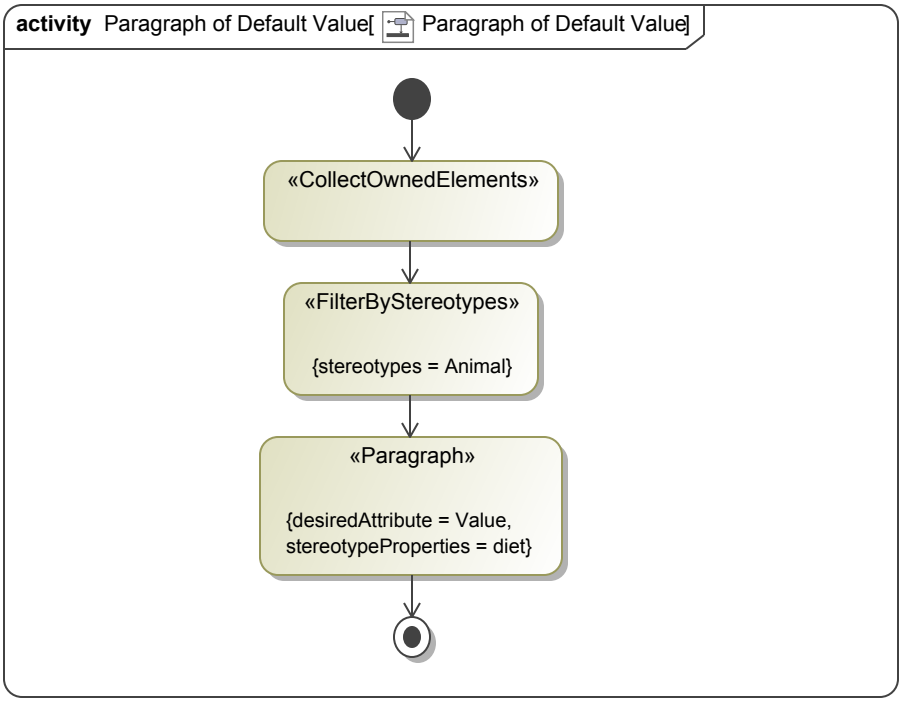


Figure 68. Paragraph of Default Value

Paragraph is a presentation element designed to display text. The "Paragraph of Default Value" displays the *value* attribute of the exposed elements or of the view itself.

Reference: Paragraph

1.3.2.2.1.1 Generic Paragraph Example

Ostriches can run up to 70 km/h, the fastest land speed of any bird.
Basically a dinosaur.
Zebras feed almost entirely on grasses.
Mostly blubber.
What sound does an arctic tern make?

1.3.2.2.1.2 Paragraph Name Example

Africa Exhibit
Ostrich
Crocodile
Zebra
Antarctica Exhibit
Seal
Arctic Tern
hasTitleBlock

1.3.2.2.1.3 Paragraph Documentation Example

Ostriches can run up to 70 km/h, the fastest land speed of any bird.
Basically a dinosaur.
Zebras feed almost entirely on grasses.
Mostly blubber.
What sound does an arctic tern make?

1.3.2.2.1.4 Paragraph Value Example

Omnivore

Carnivore
Herbivore
Carnivore
Carnivore

1.3.2.2.2 Paragraph Action with Body

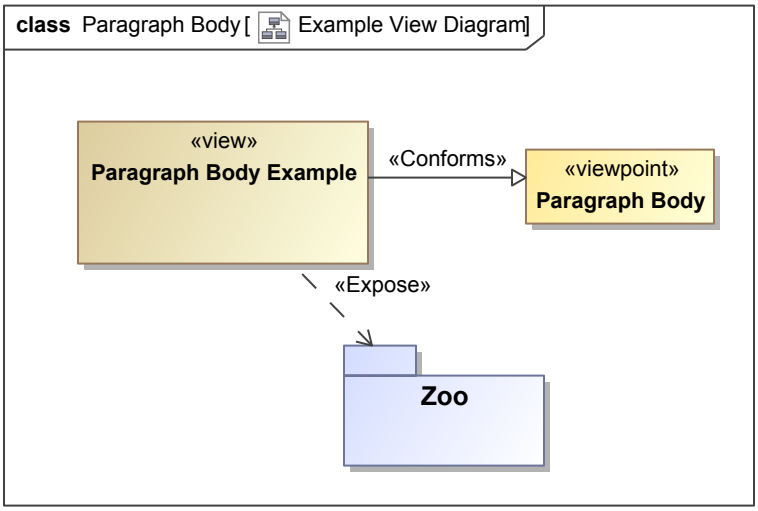


Figure 69. Example View Diagram

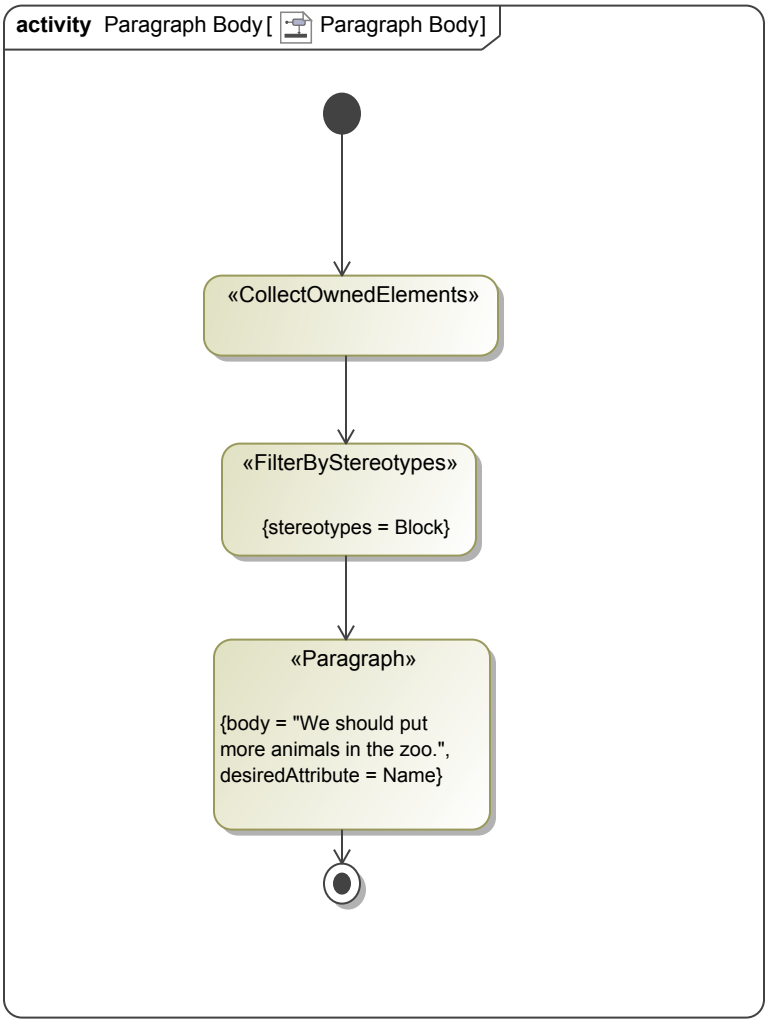


Figure 70. Paragraph Body

Paragraph is a presentation element designed to display text. The *body* is text (can be HTML) that isspecified in the Paragraph specification and then the "Paragraph Body" displays that body.

Reference: Paragraph Action with Body

1.3.2.2.2.1 Paragraph Body Example

We should put more animals in the zoo.

1.3.2.2.3 Paragraph Action Evaluate OCL

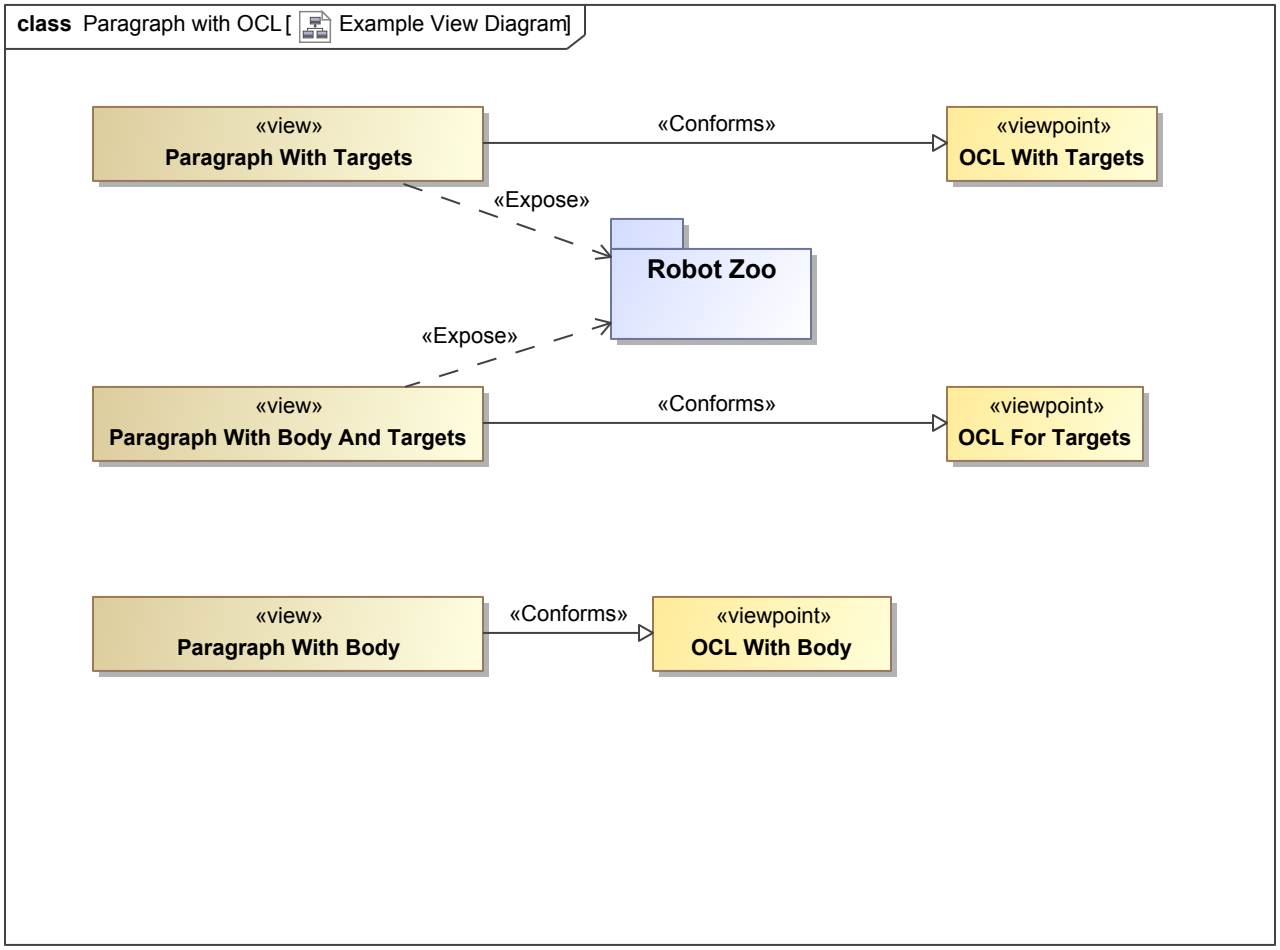


Figure 71. Example View Diagram

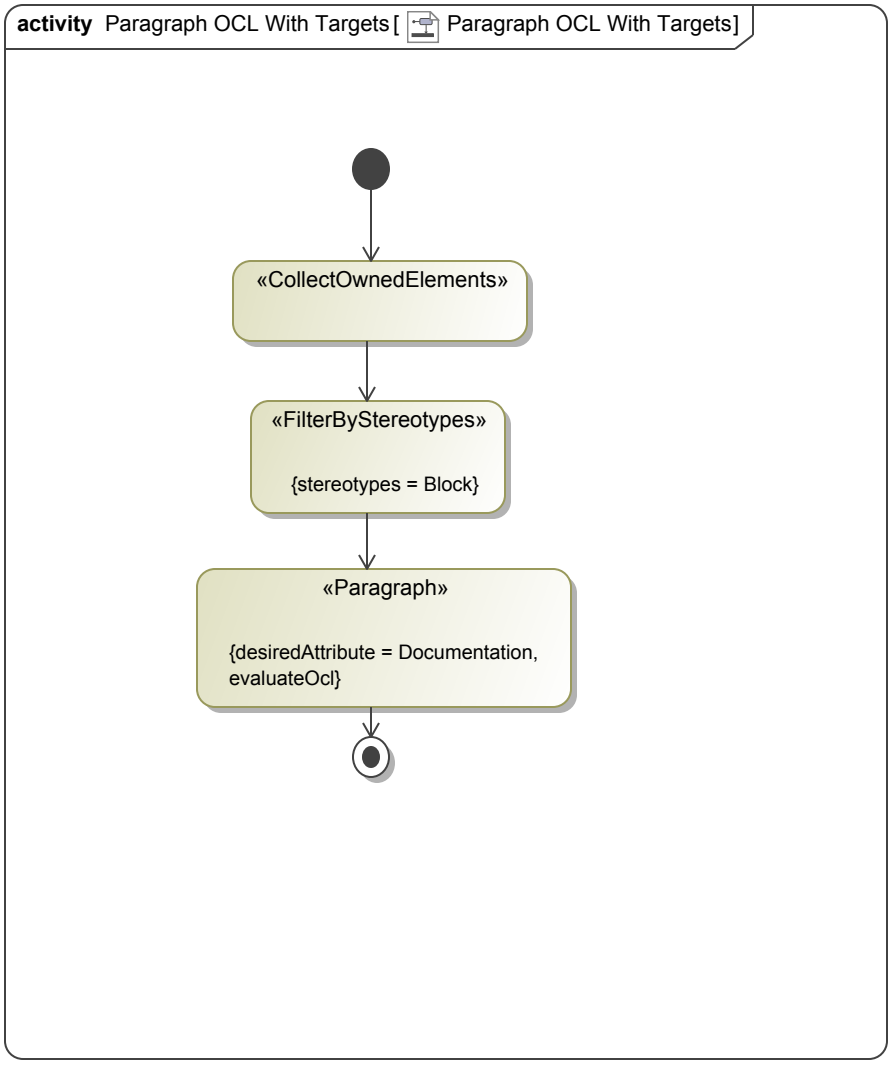


Figure 72. Paragraph OCL With Targets

Paragraph is a presentation element designed to display text. By using Object Constraint Language (OCL) and establishing targets, a more specified paragraph can be created according to said expression.

Reference: Paragraph Action Evaluate OCL

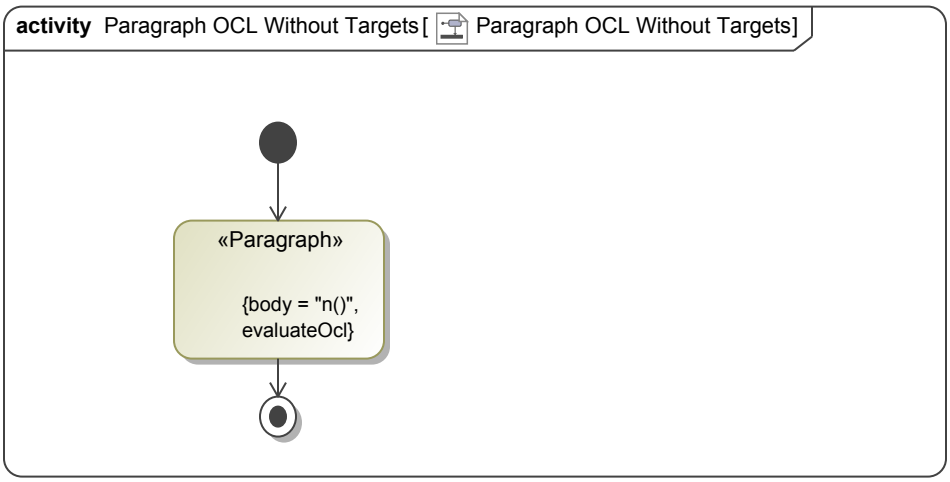


Figure 73. Paragraph OCL Without Targets

Paragraph is a presentation element designed to display text. By using Object Constraint Language (OCL) a more specified paragraph can be created according to said expression, even *without* targets.

Reference: Paragraph Action Evaluate OCL

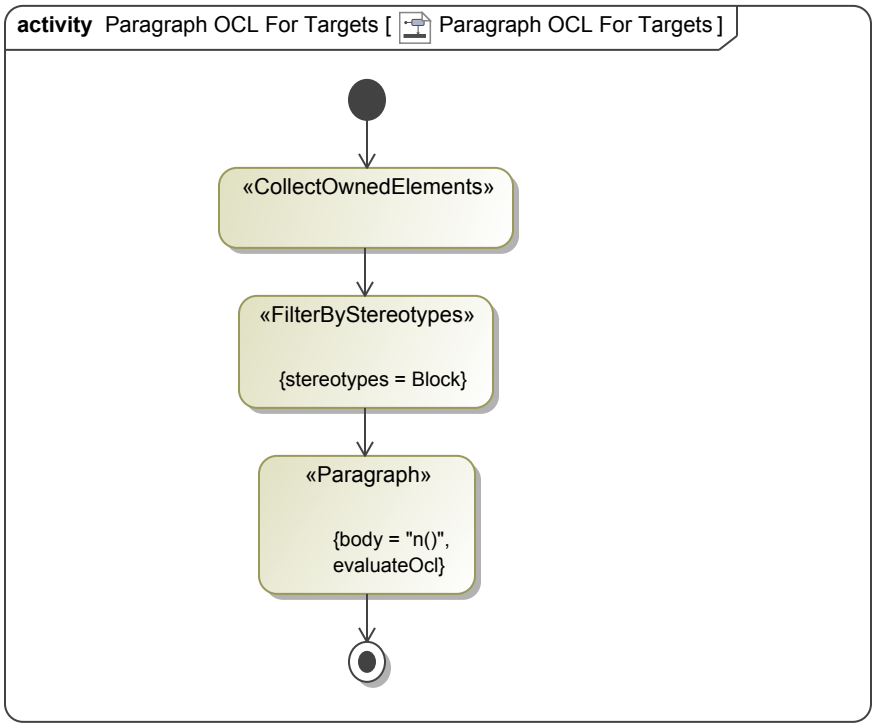


Figure 74. Paragraph OCL For Targets

Paragraph is a presentation element designed to display text. By using Object Constraint Language (OCL), a more specified paragraph can be created according to said expression.

Reference: Paragraph Action Evaluate OCL

1.3.2.2.3.1 Paragraph With Body

Paragraph With Body

1.3.2.2.3.2 Paragraph With Targets

true

false

1.3.2.2.3.3 Paragraph With Body And Targets

Robot Moose

Robot Squirrel

1.3.2.3 List

"BulletedList" creates lists based on the model elements exposed to the behavior. This one presentation element can create either an ordered (numbered) list, like the one shown below, or a bulleted list like those that have been displayed in previous examples. What information is displayed (names, documentation, stereotype property values) depends on the options selected in the behavior's specification and the filters applied to the collected data. For example, when "Show Targets" is "true", the name of the element is listed.

The viewpoint method diagram below shows the diagram that was used to create the below example list. The exposed package was "Zoo" from previous examples and a filter was applied to only identify the <<Animal>> stereotypes. To create this example, "Ordered List" was selected to be "true" in order to create a numbered list. If that option had been false, then the list would be bulleted instead. Inside the bulleted list specification, there are a number of other options. If you click on an option, an explanation appears in the bottom box.

NOTE: "Show Stereotype Property Names" currently doesn't work. It theoretically prints out the stereotype property name before listing its values.

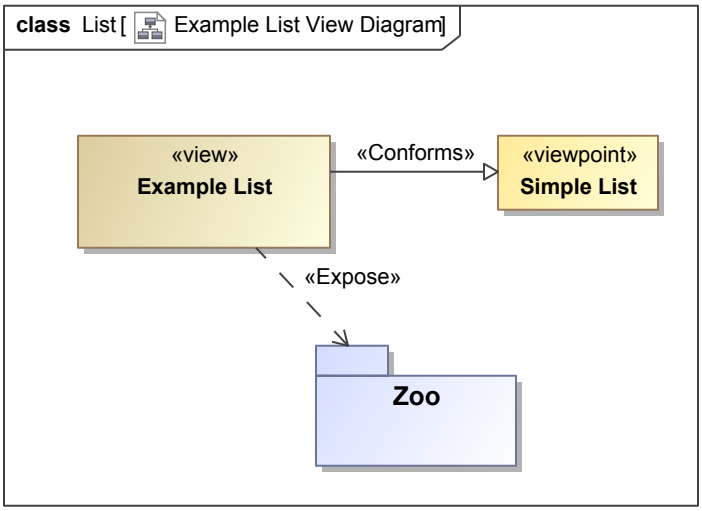


Figure 75. Example List View Diagram

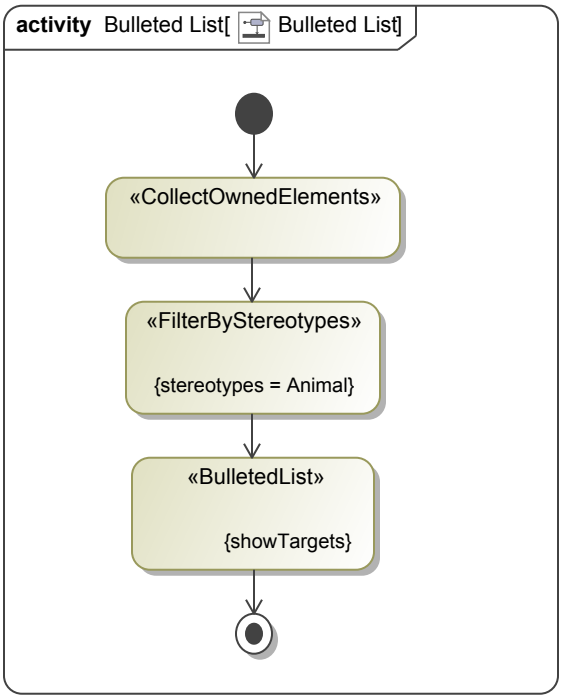


Figure 76. Bulleted List

"BulletedList" creates lists based on the model elements exposed to the behavior. What information is displayed depends on the options selected in the behavior's specification and the filters applied to the collected data.

Reference: List

1.3.2.3.1 Example List

- Ostrich

- Crocodile
- Zebra
- Seal
- Arctic Tern

1.3.2.4 Image

Image Elements can be displayed in view editor by the use of the <<Image>> action. An example of an Image Element is a Diagram. This action will display the image associated with any Image Element followed by its documentation. If multiple diagrams are exposed or collected, a single <<Image>> action will iteratively display them all.

This image will then be updated when the model is updated without need for a new image to be put into the document to reflect changes. It is also possible to add captions and titles to the image, however, these functionalities are not currently working.

The View Diagram and Viewpoint Method Diagram for this operation are shown below.

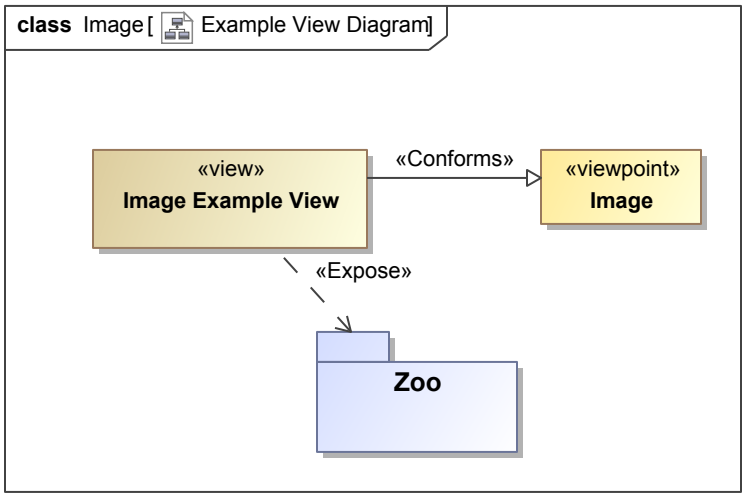


Figure 77. Example View Diagram

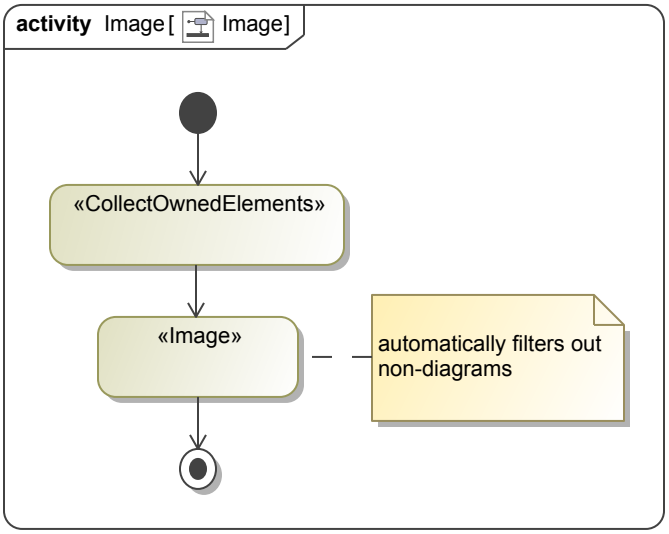


Figure 78. Image

Image Elements can be displayed in view editor by the use of the "Image" action. An example of an Image Element is a Diagram.

Reference: Image

1.3.2.4.1 Image Example View

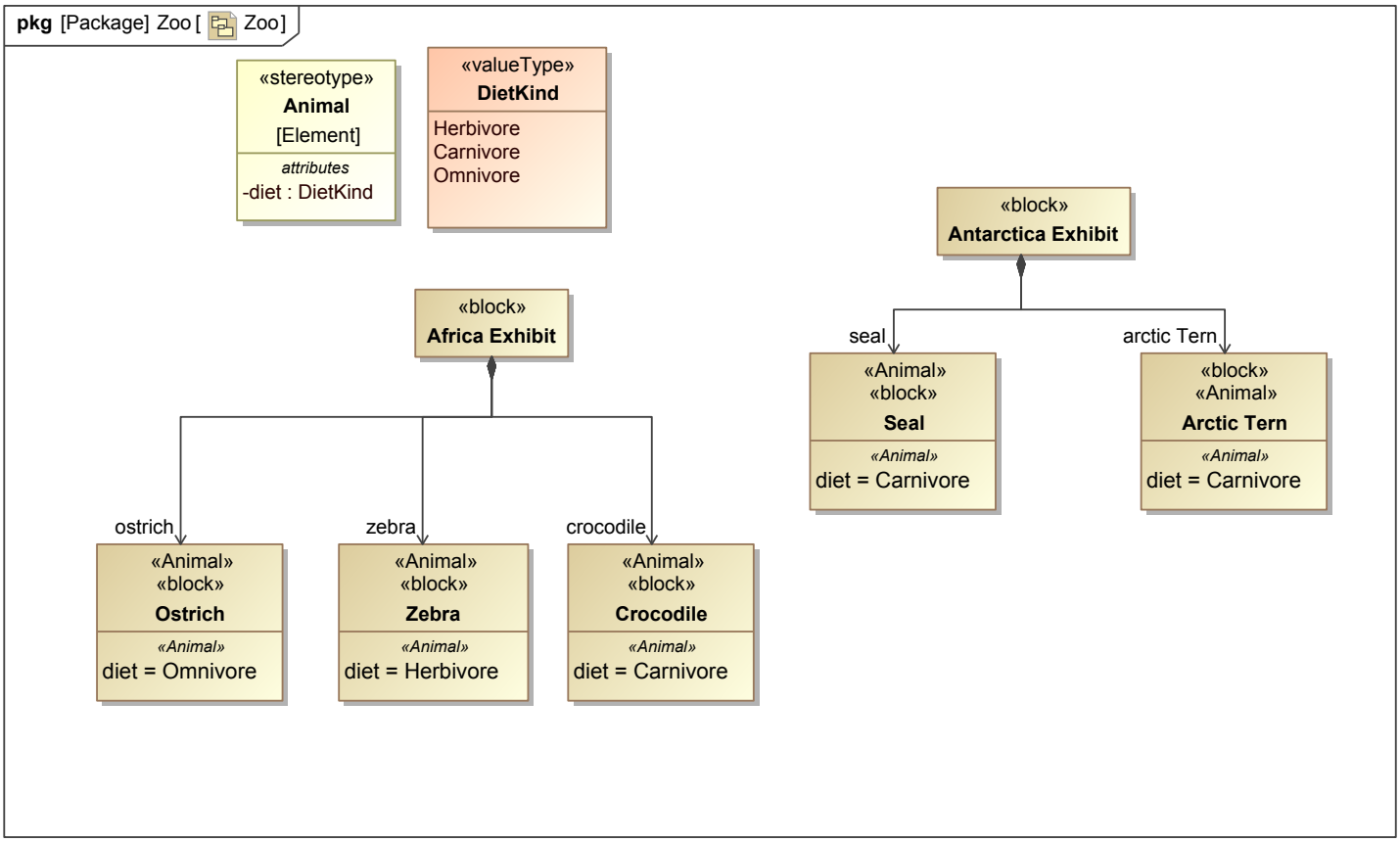


Figure 79. Zoo

#	Name
1	Arctic Tern
2	Crocodile
3	Ostrich
4	Seal
5	Zebra
6	Africa Exhibit
7	Antarctica Exhibit
8	hasTitleBlock

Figure 80. Zoo Animals

1.3.2.5 Dynamic Sectioning

Dynamic sectioning is the creation of viewpoint method defined sections. They are created using the "Structured Query" activity in the viewpoint method diagram.

This section describes two main types of dynamic sectioning: the creation of a single section and the creation of multiple sections. The new dynamic section(s) can be distinguished from a standard <<view>> in the table of contents by a small page symbol, §. Notice that the dynamic section(s) also load into the view at the same time as the parent view.

For these examples, the package "Animals", first introduced in the paragraph examples, was exposed. Each of the five animal elements consists of an element title and some documentation text.

These sections have two main uses, basic organization allowing sections to be broken up. Formally, dynamic sections allow further organization of views while preserving the canonical view hierarchy.

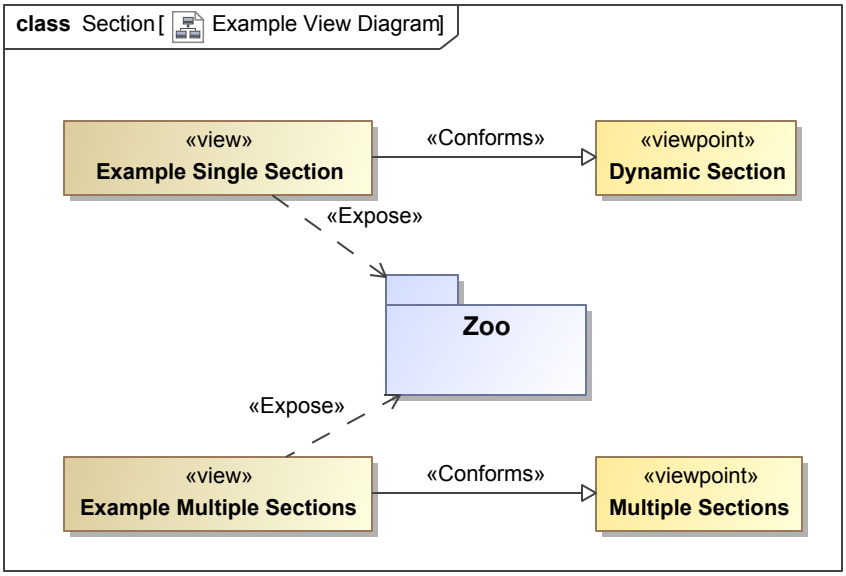


Figure 81. Example View Diagram

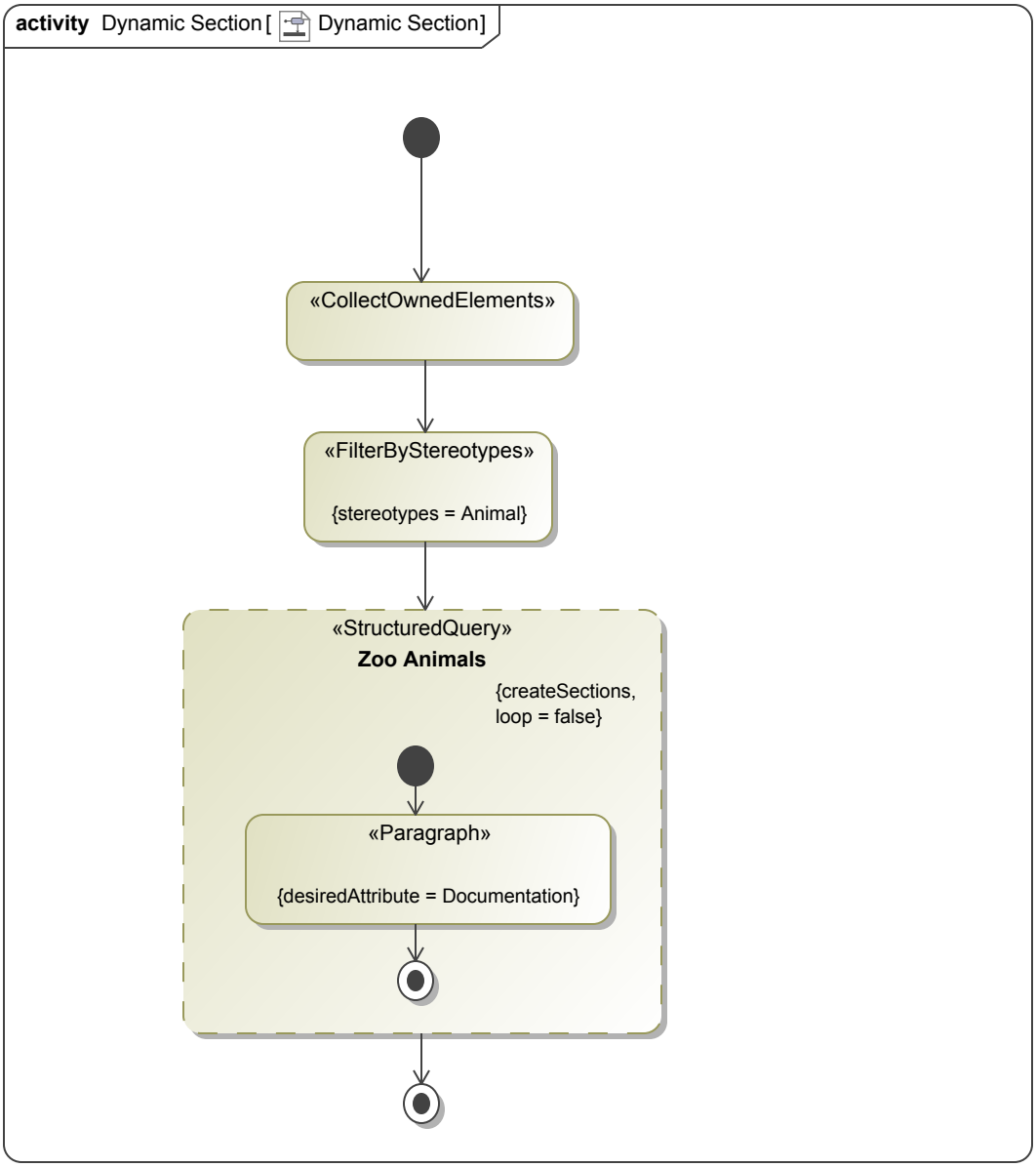


Figure 82. Dynamic Section

"Dynamic sectioning" is the creation of viewpoint method defined sections. They are created using the "Structured Query" activity in the viewpoint method diagram.

This specific example shows the creation of a single section.

Reference: Dynamic Sectioning

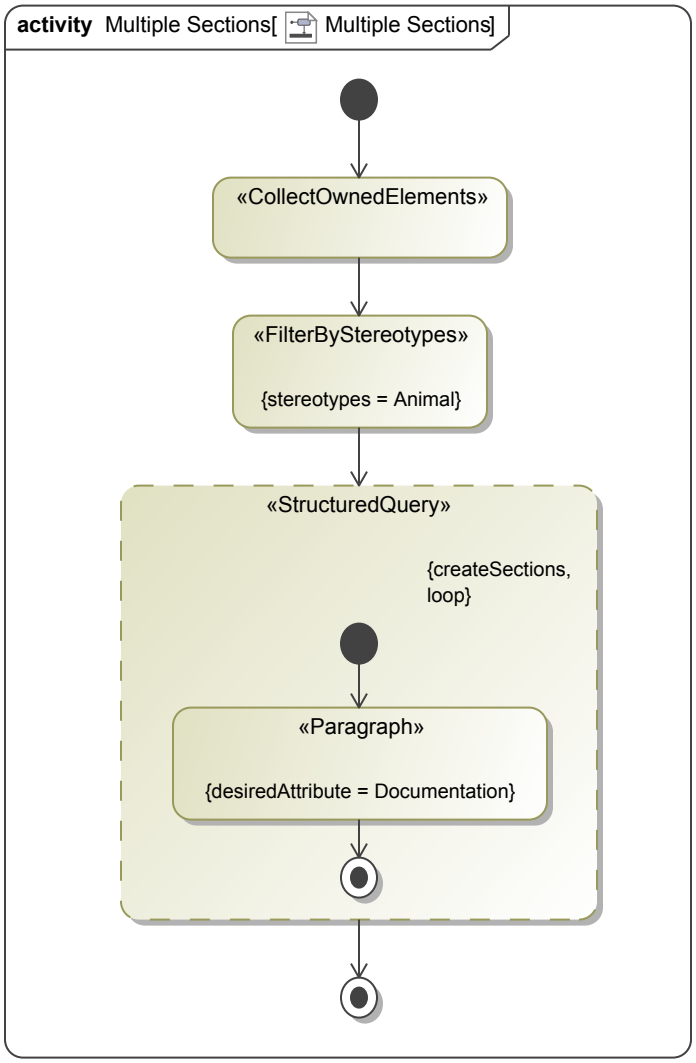


Figure 83. Multiple Sections

"Dynamic sectioning" is the creation of viewpoint method defined sections. They are created using the "Structured Query" activity in the viewpoint method diagram.

This specific example shows the creation of multiple sections.

Reference: Dynamic Sectioning

1.3.2.5.1 Example Single Section

1.3.2.5.1.1 Zoo Animals

Ostriches can run up to 70 km/h, the fastest land speed of any bird.
Basically a dinosaur.
Zebras feed almost entirely on grasses.
Mostly blubber.
What sound does an arctic tern make?

1.3.2.5.2 Example Multiple Sections

1.3.2.5.2.1 Ostrich

Ostriches can run up to 70 km/h, the fastest land speed of any bird.

1.3.2.5.2.2 Crocodile

Basically a dinosaur.

1.3.2.5.2.3 Zebra

Zebras feed almost entirely on grasses.

1.3.2.5.2.4 Seal

Mostly blubber.

1.3.2.5.2.5 Arctic Tern

What sound does an arctic tern make?

1.3.2.6 Tom Sawyer Diagram

DocGen integrates with Tom Sawyer Perspectives to dynamically generate diagrams and present them in Views.

Note: This feature only works in conjunction with View Editor. It is not supported in local document generation.

1.3.2.6.1 Creating a Tom Sawyer Diagram

Tom Sawyer diagrams are implemented in a model by adding the TomSawyerDiagram action to a DocGen activity.

The goal of the following is to generate a Tom Sawyer diagram from the model elements in a Package. In this example the Tom Sawyer diagram created is a Block Definition Diagram, but the following diagram types are also supported:

- Internal Block Diagram
- Package Diagram
- Parametric Diagram
- Requirement Diagram
- Sequence Diagram
- State Machine Diagram
- Use Case Diagram

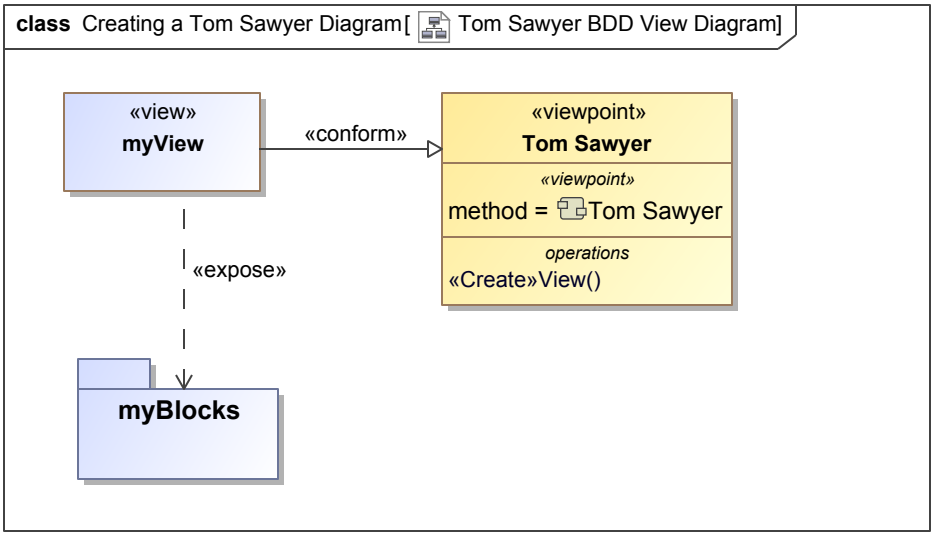


Figure 84. Tom Sawyer BDD View Diagram

As shown above, there is a view named myView where the Tom Sawyer diagram will be created. To accomplish this, myView must be told what elements to include and how to generate a Tom Sawyer diagram.

There are multiple ways to tell myView which elements we are interested in and it depends on both the construction of the Viewpoint method and the type of diagram desired. In this case the package myBlocks is a package that contains four blocks, one being composed of the other three (by way of Directed Composition). Since in this case all the blocks of interest are in the same package and there are no elements in myBlocks which are not desired on the diagram, we simply expose the package (myBlocks) from the view (myView), as shown above.

Next we must construct the viewpoint method for the viewpoint Tom Sawyer.

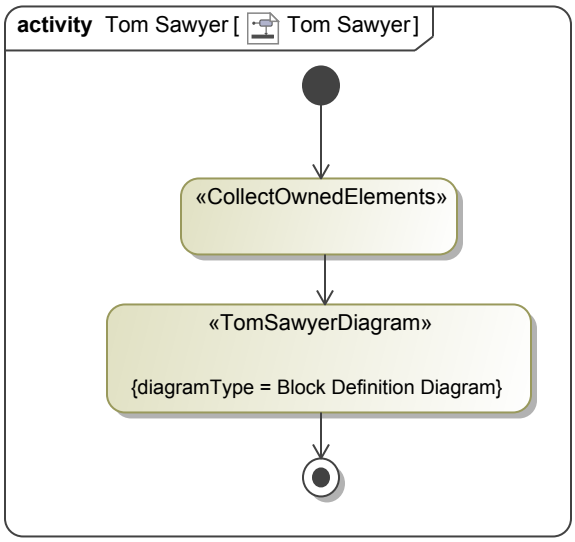


Figure 85. Tom Sawyer

First things first once the viewpoint is created it must be given a viewpoint method. To do this right click on the View() operation on the viewpoint >> Create Method >> Diagram >>Viewpoint Method Diagram.

In this simple example only two actions are needed to generate the Tom Sawyer diagram. First we add the action CollectOwnedElements, this gathers all elements which are owned by the element which has been exposed by the view (the package myBlocks is exposed by myView in this example). See the Collect section of the user guide for more details.

Next we add the action TomSawyerDiagram, as the name suggests this action generates the Tom Sawyer diagram. However, one option must be defined first. In the specification of the TomSawyerDiagram action, set the diagram type to whatever diagram is desired, in this case we set it to Block Definition Diagram.

After this the view can be generated and a Tom Sawyer Block Definition Diagram will be displayed on View Editor. This diagram can then be manipulated through the interface in View Editor.

1.3.2.6.1.1 myView

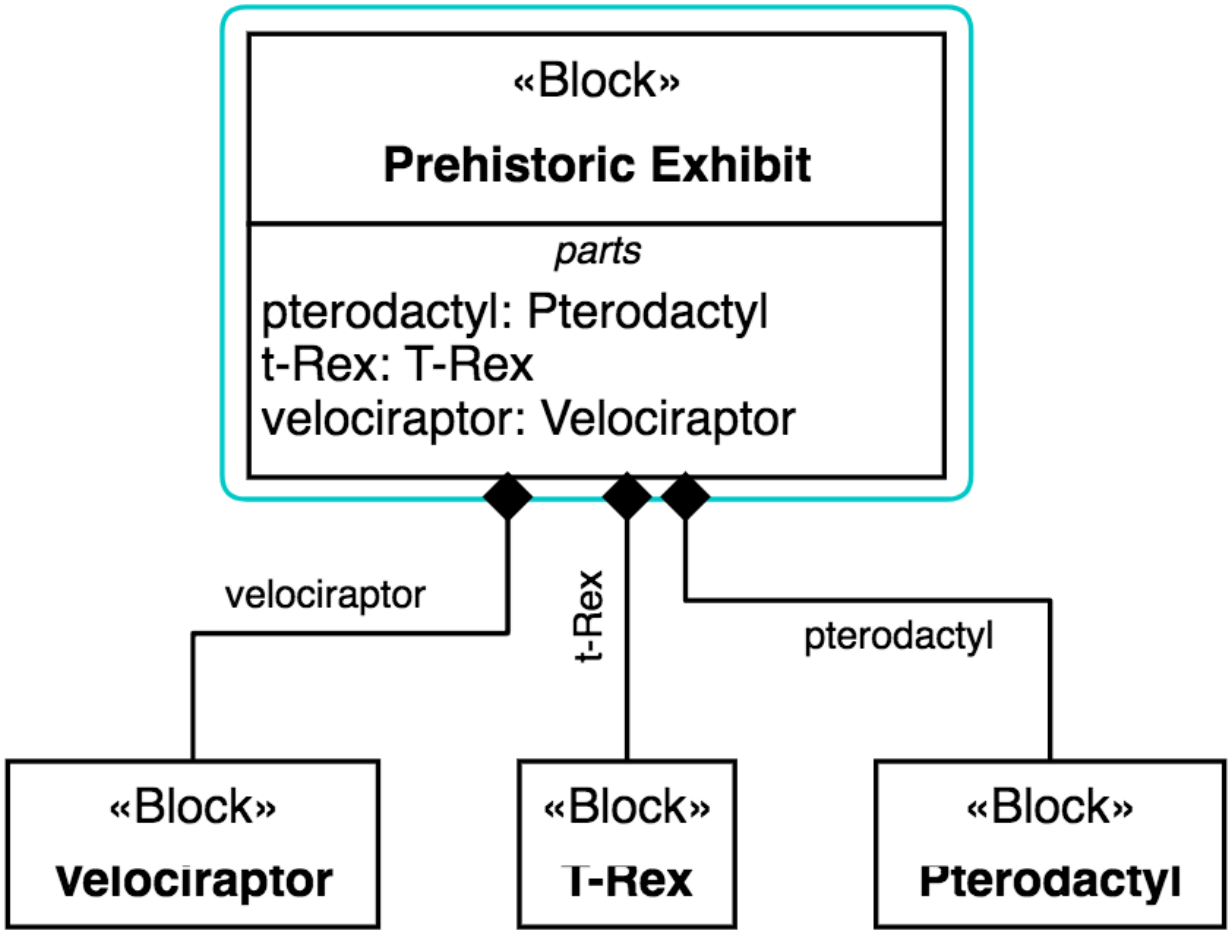


Figure 86. tomSawyerDiagram

1.3.2.6.2 A Common Mistake

As mentioned in the previous section, a view which exposes a package and conforms to a viewpoint whose method only uses a CollectOwnedElements and TomSawyerDiagram action is not the only way to generate these diagrams. More complex collect/filter/sort operations can be added to the activity diagram to generate Tom Sawyer diagrams with the desired elements on it. The following is an example of a common mistake to watch out for when using Tom Sawyer diagrams.

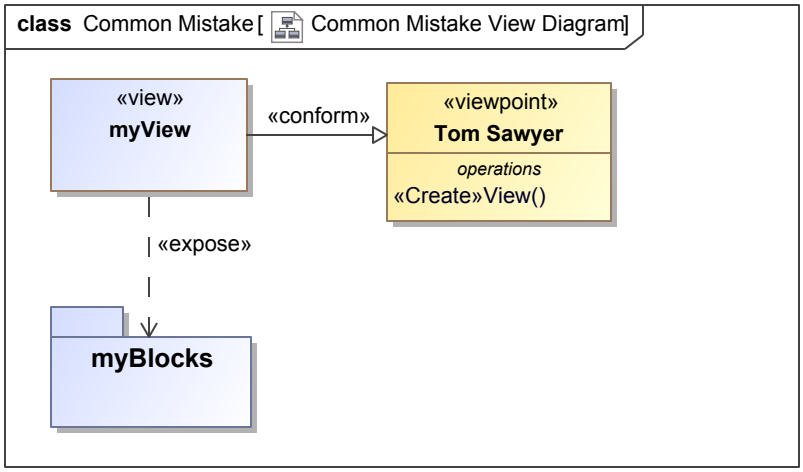


Figure 87. Common Mistake View Diagram

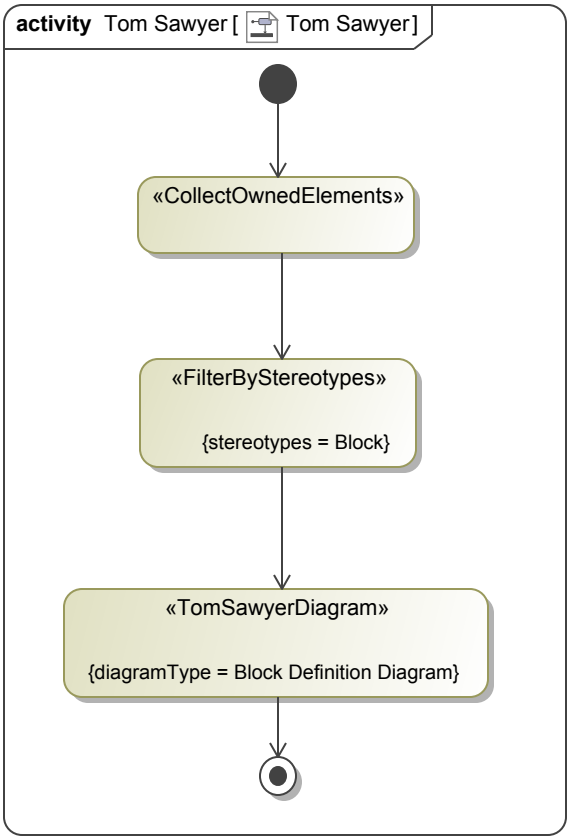


Figure 88. Tom Sawyer

When trying to generate Tom Sawyer Diagrams by exposing a package then collecting, sorting or filtering the contents there are a few things to watch out for. Consider a package, like myBlocks above, that containes a few blocks with relationships between them but also has other elements that are not desired in the Tom Sawyer diagram. It is tempting to simply expose the package from the view then, in the Viewpoint Method Diagram, do CollectOwnedElements then FilterByStereotype then generate the Tom Sawyer diagram, as shown above. This is a mistake since by filtering out everything but blocks the modeler will not pass the relationships between those blocks to the TomSawyerDiagram action and the resulting Tom Sawyer diagram will contain only blocks and no associations.

1.3.2.6.3 Internal Block Diagram

The following is an example of how to generate a Tom Sawyer Internal Block Diagram.

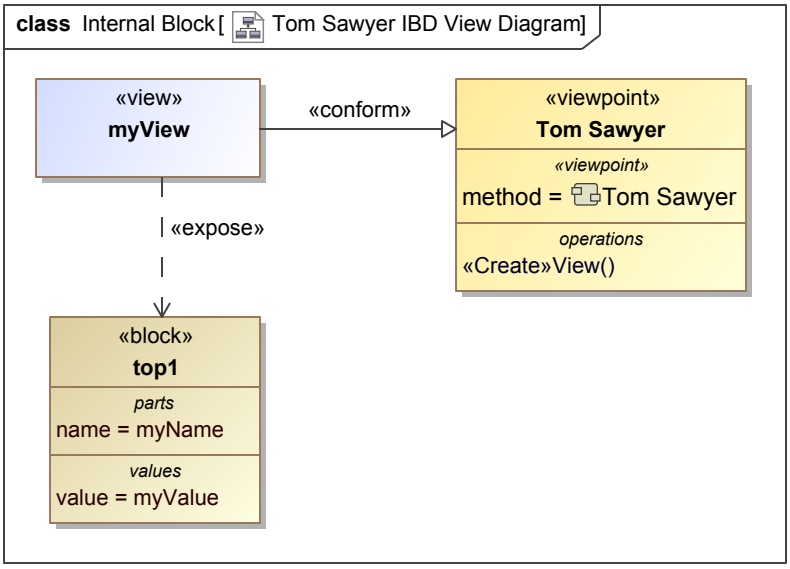


Figure 89. Tom Sawyer IBD View Diagram

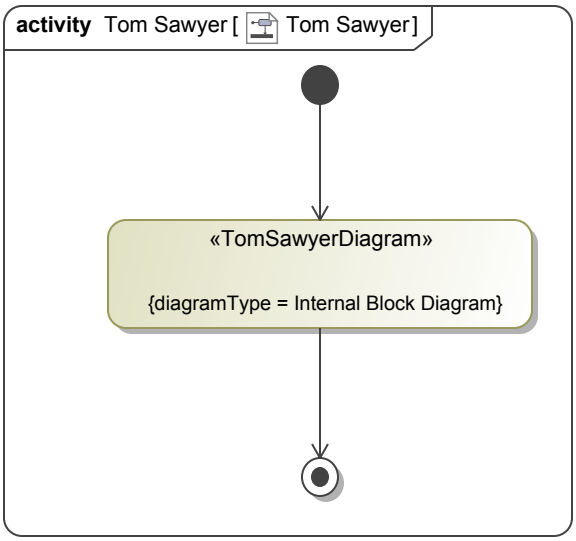


Figure 90. Tom Sawyer

The process of creating a Tom Sawyer Internal Block Diagram is slightly different from that of a Block Definition Diagram. The simplest way to generate a Tom Sawyer Internal Block Diagram is to first expose the desired block from the view in which the diagram will be created. In the example above the block named top1 is exposed by the view named myView and thus the Internal Block Diagram for top1 will be created on myView.

The next step is to create the Viewpoint Method Diagram for the viewpoint to which myView conforms, in this case the viewpoint is named Tom Sawyer. In the Viewpoint Method Diagram the only action needed is TomSawyerDiagram. Note that in the specification of the TomSawyerDiagram action the Diagram Type must be set to Internal Block Diagram AND Collect Related Elements* must be set to True.

*It should be noted that Collect Related Elements must be on for Internal Block Diagrams. Trying to use a Viewpoint Method Diagram in which a CollectOwnedElements is connected to a TomSawyerDiagram when the element exposed by the view is a block will result in an empty diagram regardless of whether Collect Related Elements is True or False. Because of this, it is recommended that modelers generate Internal Block Diagrams using the methodology mentioned in the previous paragraphs.

1.3.2.6.4 Generating from Previous Diagram

An alternative way of generating Tom Sawyer diagrams is to first create the diagram in the model then generate a Tom Sawyer diagram from it. The following is a simple example.

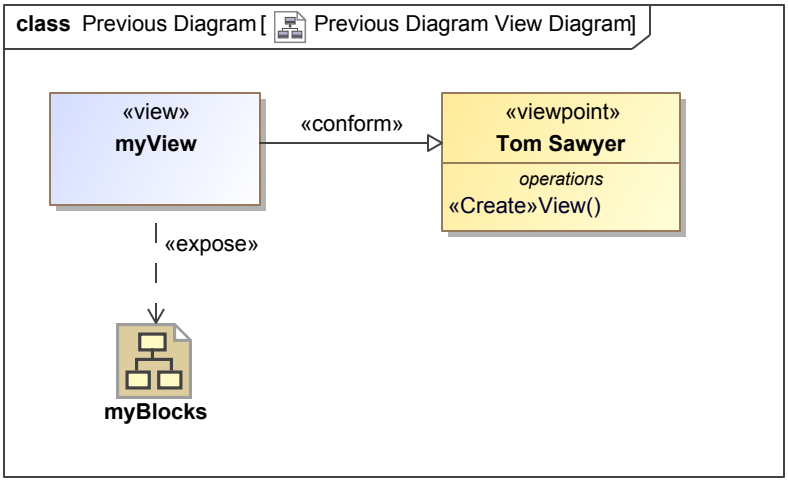


Figure 91. Previous Diagram View Diagram

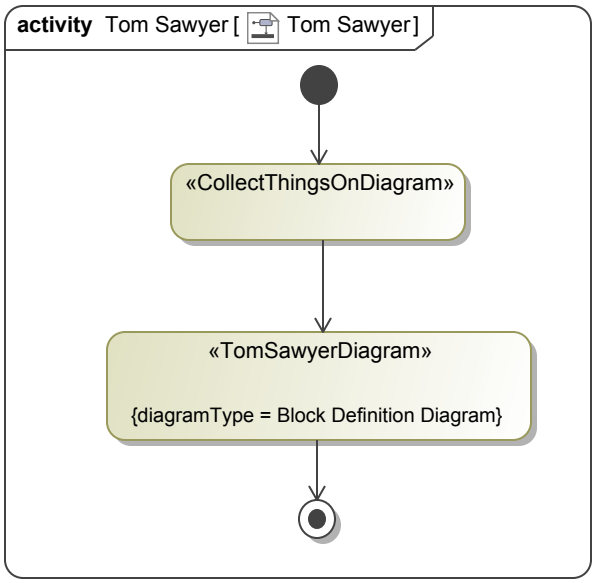


Figure 92. Tom Sawyer

To generate a Tom Sawyer diagram from a previously made diagram, first expose the desired diagram from the view in which the Tom Sawyer diagram will be generated. In the image above, the view, named myView, exposes the diagram myBlocks. The diagram myBlocks is a Block Definition Diagram which was created in the model previously.

Next the Viewpoint Method Diagram of the viewpoint to which the view conforms must be made. In this case the view, myView, conforms to the viewpoint named Tom Sawyer. On the Viewpoint Method Diagram only two actions are needed, first CollectThingsOnDiagram collects all elements which are on the exposed diagram, myBlocks. Next TomSawyerDiagram generates the specified type of diagram. Make sure that the option Diagram Type in the specification of the TomSawyerDiagram action is set to whatever diagram is desired.

1.3.2.7 Plot

Plots can be generated from a SysML model in MagicDraw via the Plot action. The Plot action can be used on a Viewpoint Method Diagram. For more info on Viewpoint Methods and setting up views see, Create Viewpoint Methods.

Plots use a table structure to interpret the data to be used on the generated chart. For more info on creating table structures see, Table. The Plot action interprets table data as follows:

- The first row in the table (Column Headers) is used as the markings on the x-axis of the chart. If the option Hide Headers is set to True in the table structure, then the markings on the x-axis will be the numbers 0, 1, 2, 3, ... Note: the first cell of the first row is NOT used.
- The first column in the table serves as the name of each line to be plotted.

- Each row (other than the Header row) corresponds to a line to be plotted where the name of the line is in the first cell of that row and all following cells contain the y-values of that line. See example below.

Example

Table 9. Table with headers

	x-value 1	x-value 2	x-value 3	x-value 4
Line 1	2	1	3	4

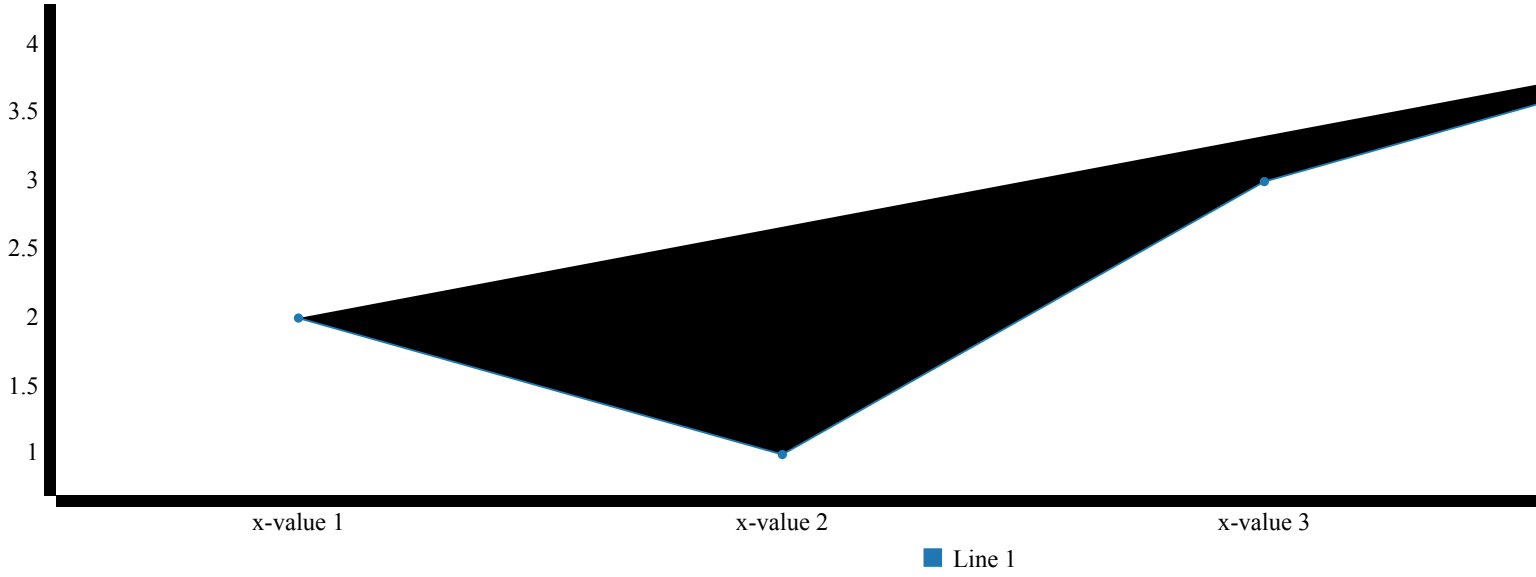


Figure 93. Demo Plot with Headers

When the table headers are included, as shown above, the column headers are used as the points on the x-axis. It should be noted that the table is displayed along with the plot here to show the table structure that the plot is generated from, however, the table does not need to be displayed along with the plot (more on this in the examples).

Table 10. Table without headers

Line 1	2	1	3	4

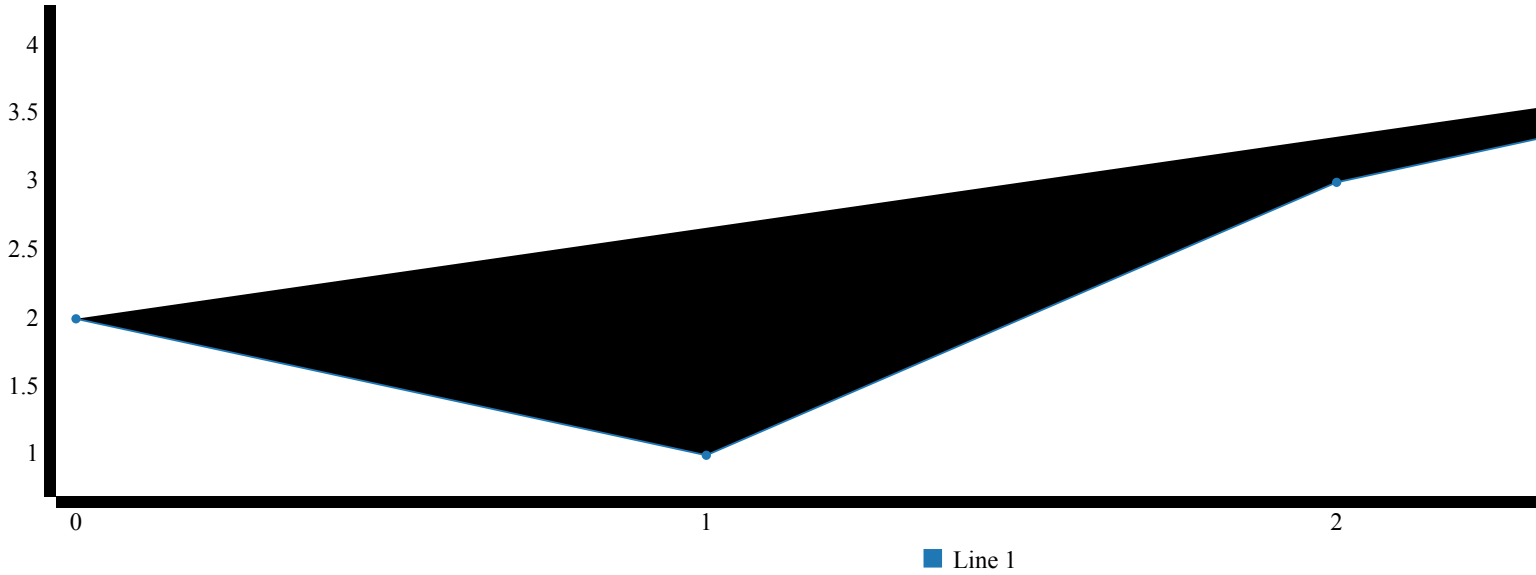


Figure 94. Demo Plot without Headers

When the table headers are not included the default x-axis labels are the numbers 0, 1, 2, 3,... as shown above. It should be noted that the table is displayed along with the plot here to show the table structure that the plot is generated from, however, the table does not need to be displayed along with the plot (more on this in the examples).

1.3.2.7.1 Creating Plots

In this example we will create a line chart using the Plot action in a viewpoint method. We will use a block with value properties to create the table structure for the plot, however, there are many ways to make a table structure any of which can be used to make a plot.

Viewpoint Method Diagram

In this example we will create a line chart using the Plot action in a viewpoint method. We will use a block with value properties to create the table structure for the plot, however, there are many ways to make a table structure any of which can be used to make a plot.

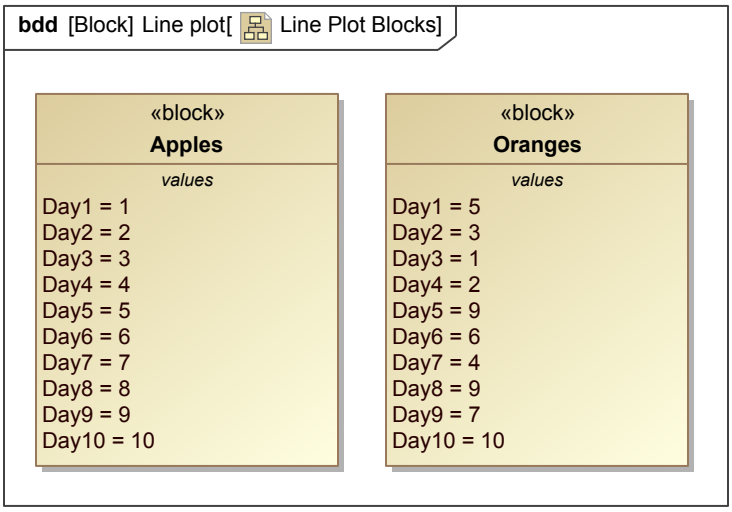


Figure 95. Line Plot Blocks

The above two blocks, Apples and Oranges, are the two blocks in the Line Plot Blocks package. Each block has ten value properties with values that will be used to make a plot. For example these values could be the number of that fruit sold on each day.

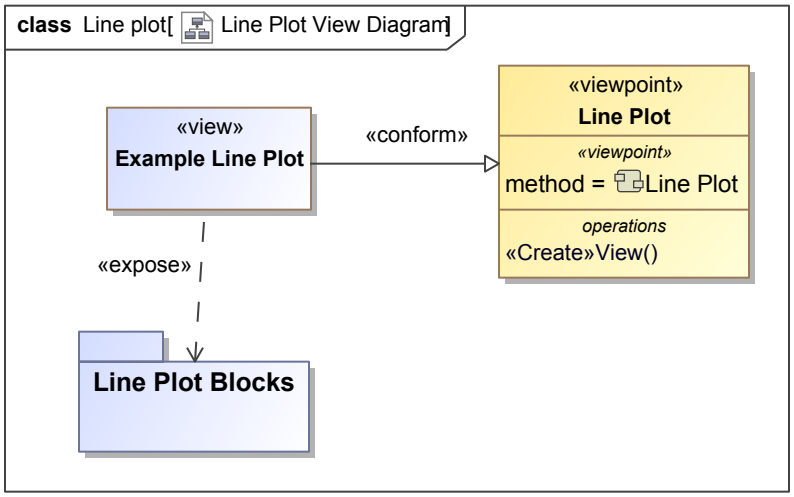


Figure 96. Line Plot View Diagram

To setup our view in which the plot will be displayed, in this case Example Line Plot, we expose the Line Plot Blocks package and conform to a viewpoint.

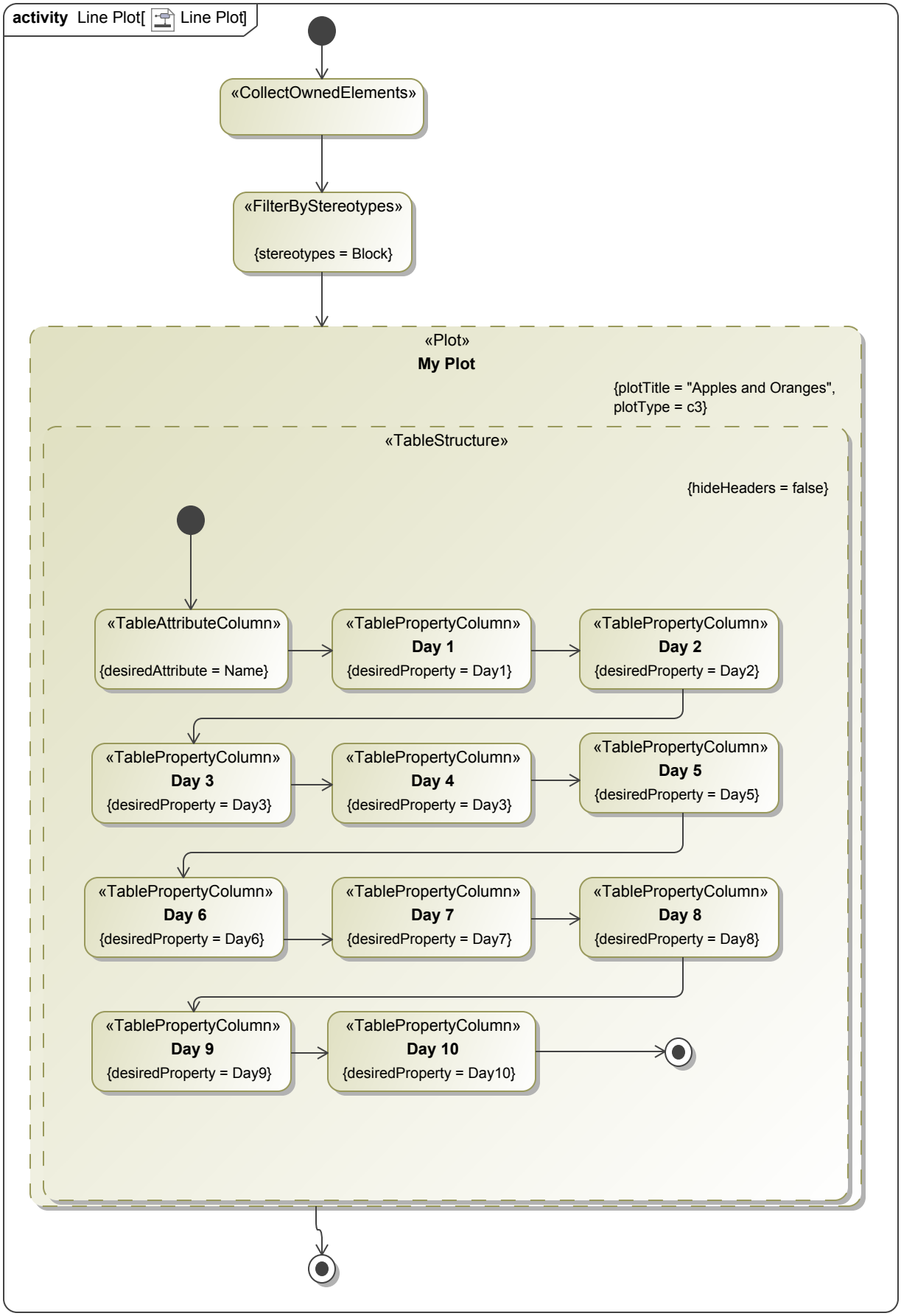


Figure 97. Line Plot

Next we define the method for the Line Plot viewpoint with the above Viewpoint Method Diagram. First we collect the blocks from the Line Plot Blocks package with a CollectOwnedElements and FilterByStereotype (block). Then we create a Plot structure and in its specification, define Plot Title and Plot Type (for line plot set Plot Type to c3). Inside that Plot structure we create a Table structure, this table will be used to create the plot and will NOT be displayed as a table.

In the table structure we set the first column to be the name of the blocks since entries in the first column serve as the names of the line to be plotted. Next we make ten columns with headers (Day 1, Day 2,...) since want our x-axis to be labeled by day. Remember that the headers are the names of the TablePropertyColumn actions. Lastly we set the values of the columns to the value of the properties named Day1, Day2,... on the blocks in the Line Plot Blocks package. See Table for more information on table structures.

See the Example Line Plot for what yields from generating with the above model. Further, see Example Radar Plot for an example of a radar plot using the same data and Example Parallel Axis Plot for an example of a parallel axis plot.

1.3.2.7.1.1 Example Line Plot

The following is the line plot generated from the model in Creating Plots.

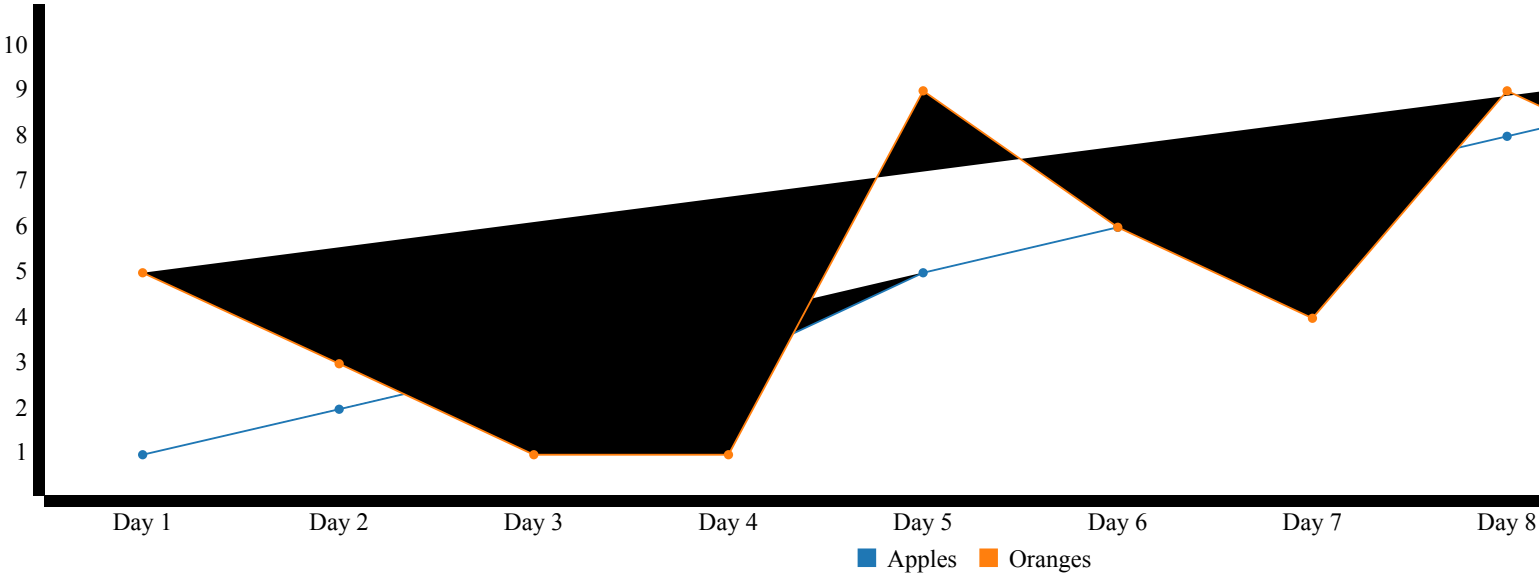


Figure 98. Apples and Oranges

1.3.2.7.1.2 Example Radar Plot

The following radar plot was generated in the exact same way as the Line Chart in Creating Plots, the only difference being that the Plot Type was set to d3-radar in the specification of the Plot structure. The same package of blocks was used.

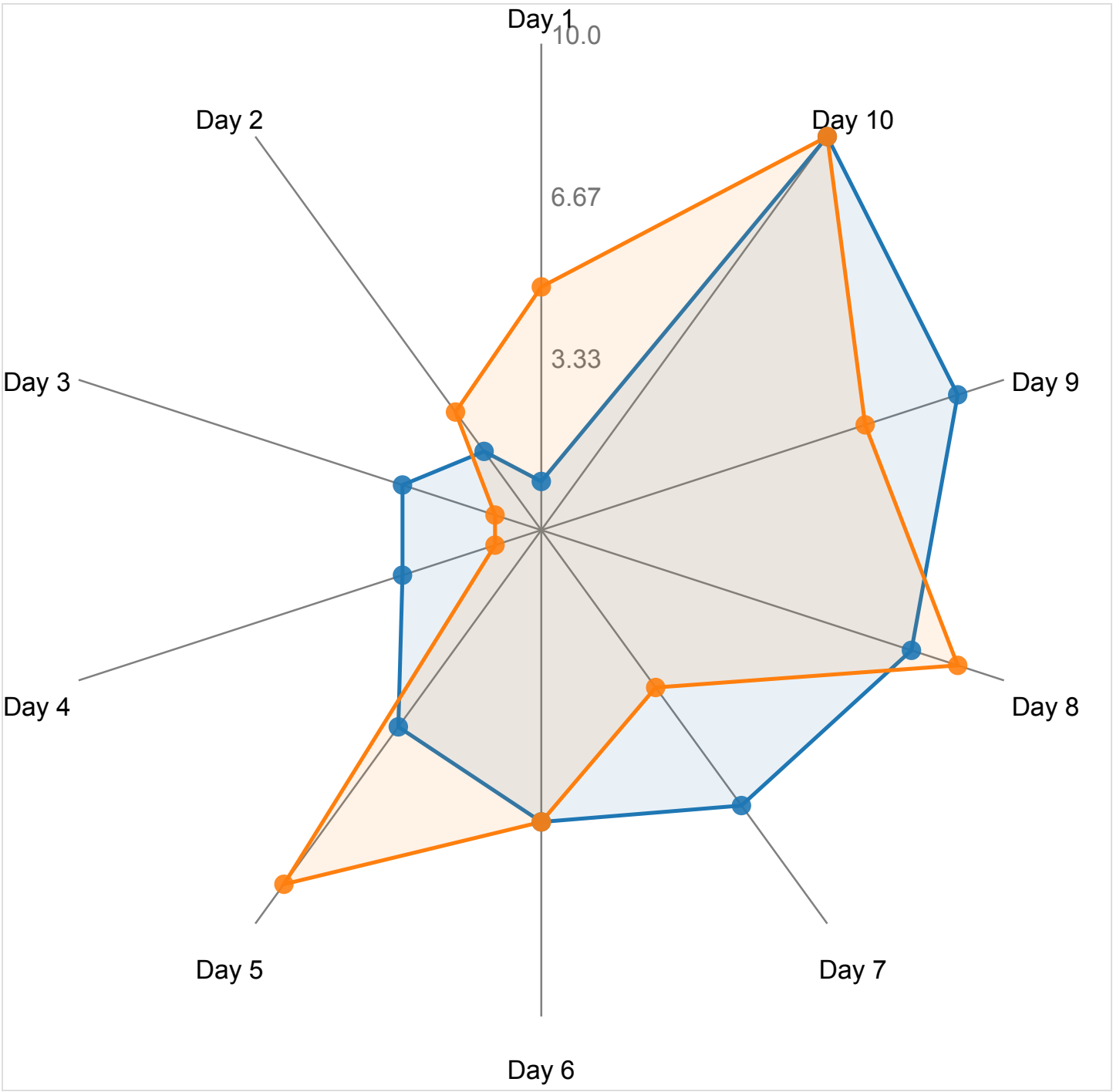


Figure 99. Apples and Oranges

1.3.2.7.1.3 Example Parallel Axis Plot

The following radar plot was generated in the exact same way as the Line Chart in Creating Plots, the only difference being that the Plot Type was set to d3-parallel-axis in the specification of the Plot structure. The same package of blocks was used.

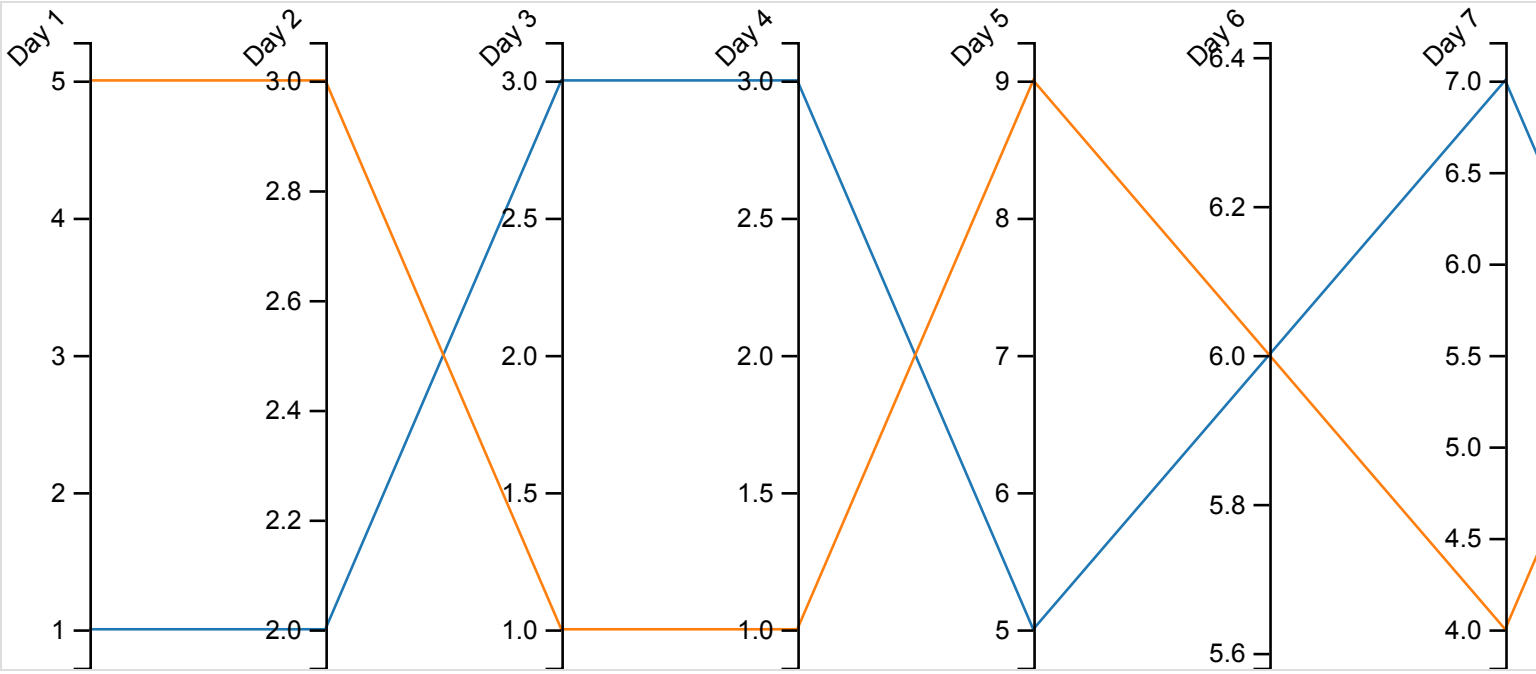


Figure 100. Apples and Oranges

1.3.2.7.2 Customizing Plots

Plots can be customized in many ways such as other plots types, colors, labels, etc. To generate a plot with custom properties the Plot Configuration field in the specification of the Plot structure must be filled with JSON containing the custom options.

A few examples are shown below. These examples were made using the same method and elements as the ones presented in Creating Plots with a few minor changes discussed below.

Note that these plots are created with the C3.js javascript library which has many options. See the full documentation at https://c3js.org/.

Table 11. Apples and Oranges Data

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Apples	1	2	3	3	5	6	7	8	9	10
Oranges	5	3	1	1	9	6	4	9	7	10

For reference this table is the data being used to create the following plots. Again, it is not necessary that the table be generated with the plot, it is used here for clarity.

Donut Chart

To create a donut chart set the Plot Type as c3 in the specification of the Plot structure, then use the following JSON in the Plot Configuration field (also in the specification),

```
{
  "options": {
    "data": {
      "type": "donut"
    },
    "donut": {
      "title": "Apples vs. Oranges"
    }
  }
}
```

Note: in the above JSON the "title" indicates the text to be put inside the donut circle, whereas the Plot Title defined in the specification of the Plot structure will create the bold text beneath the donut.

There is an option in the specification of the Table structure nested in the Plot structure called Hide Headers, in this example that option is set to True. Setting Hide Headers to False in this example yields an extra legend entry, see Common Issues for more detail.

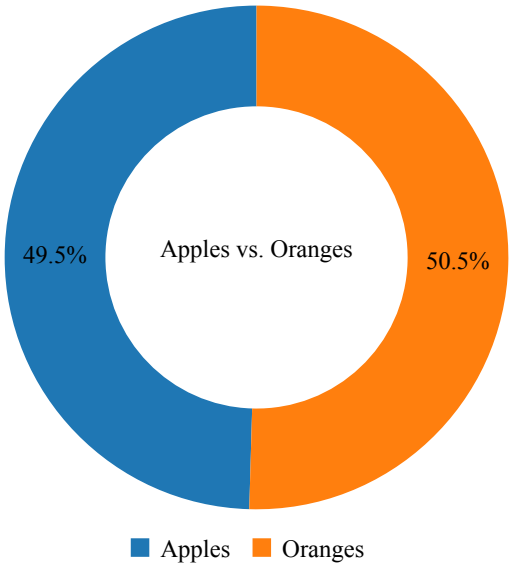


Figure 101. Apples and Oranges

The above plot is the result of using the above JSON in the Plot Configuration field.

Scatter Plot

Creating a scatter plot is similar to creating a donut. Set the Plot Type to c3 then use the following JSON in the Plot Configuration,

```
{
  "options": {
    "data": {
      "type": "scatter"
    },
    "axis": {
      "x": {
        "label": "Days"
      },
      "y": {
        "label": "Number sold"
      }
    }
  }
}
```

In the above JSON multiple custom features are displayed. Setting "type" to "scatter" is the only piece required to create a scatterplot, the other two entries under "axis" set the labels of the x and y axes.

There is an option in the specification of the Table structure nested in the Plot structure called Hide Headers, in this example that option is set to True. Setting Hide Headers to False in this example yields an extra legend entry, see Common Issues for more detail.

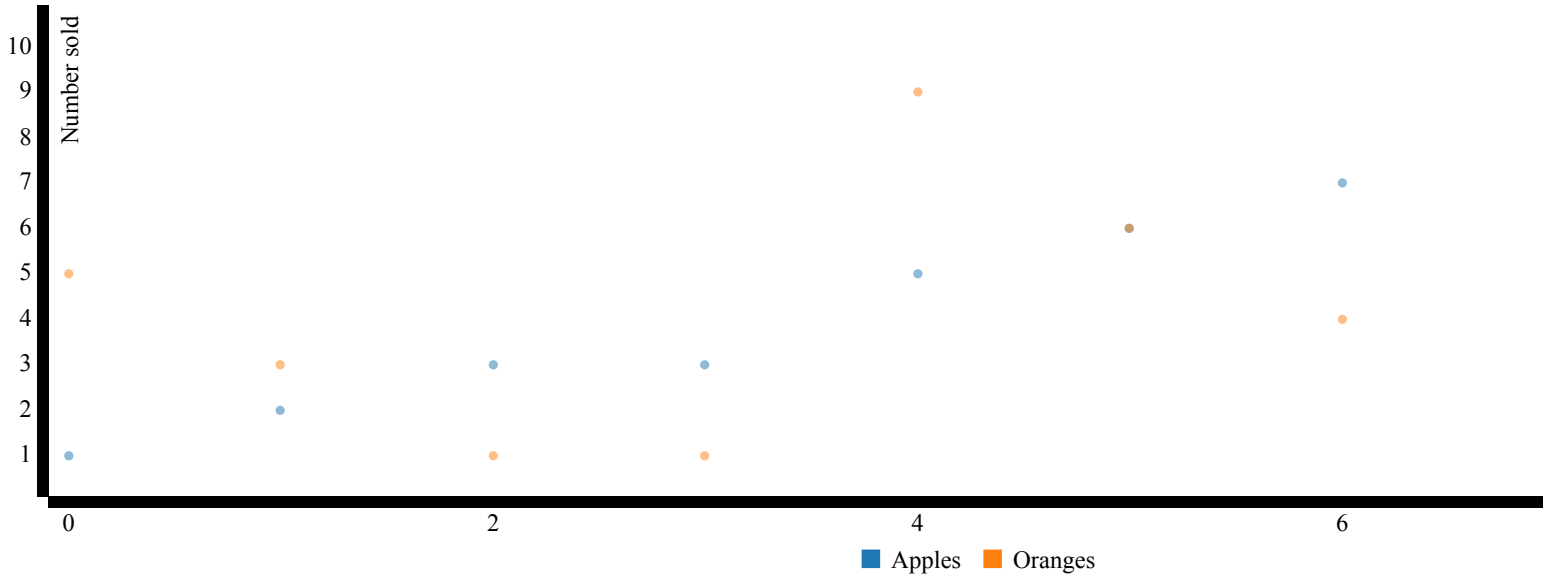


Figure 102. Apples and Oranges

The above plot is the result of using the above JSON in the Plot Configuration field.

1.3.2.7.3 Common Issues

Below are some issues that come up often when dealing with plots.

Headers

There are many reasons a plot does not show up, however, if the title of the plot (as defined in the specification of the Plot structure) generates but the plot itself does not that is often an issue with the headers setting. The two most common headers issues are as follows.

1. **Plot not generating**: In the Viewpoint Method Diagram used to generate the plot, the "x coordinates" are taken as the names of the Table columns however if the actions that create the columns (i.e. TablePropertyColumn, etc.) are unnamed this can lead to strange behavior such as the plot being empty or all the y-values having the same x-value. To avoid this, make sure all column actions are named then use the Hide Headers option in the specification of the Table structure to select whether to use the header names or numbers on the x-axis. Note Hide Headers set to True will result in numbers on the x-axis, whereas False will use the names of the columns on the x-axis.
2. **Extra legend entry**: On certain types of plots, especially custom ones it is possible to have the x-values show up as a data set in the legend. To fix this, set Hide Headers to True.

1.3.3 Other

Table 12. DocGen Methods

Method Name	Method Description
Simulate	Execute Cameo Simulation Toolkit simulation(s) and present results as table(s).

1.3.3.1 Simulate

DocGen has the ability to run Cameo Simulation Tool Kit simulations when generating documents. This may be useful when trying to execute the simulations based on the most recent values and instances in line with generating documents that reference these values.

1.3.3.1.1 Simulate Config

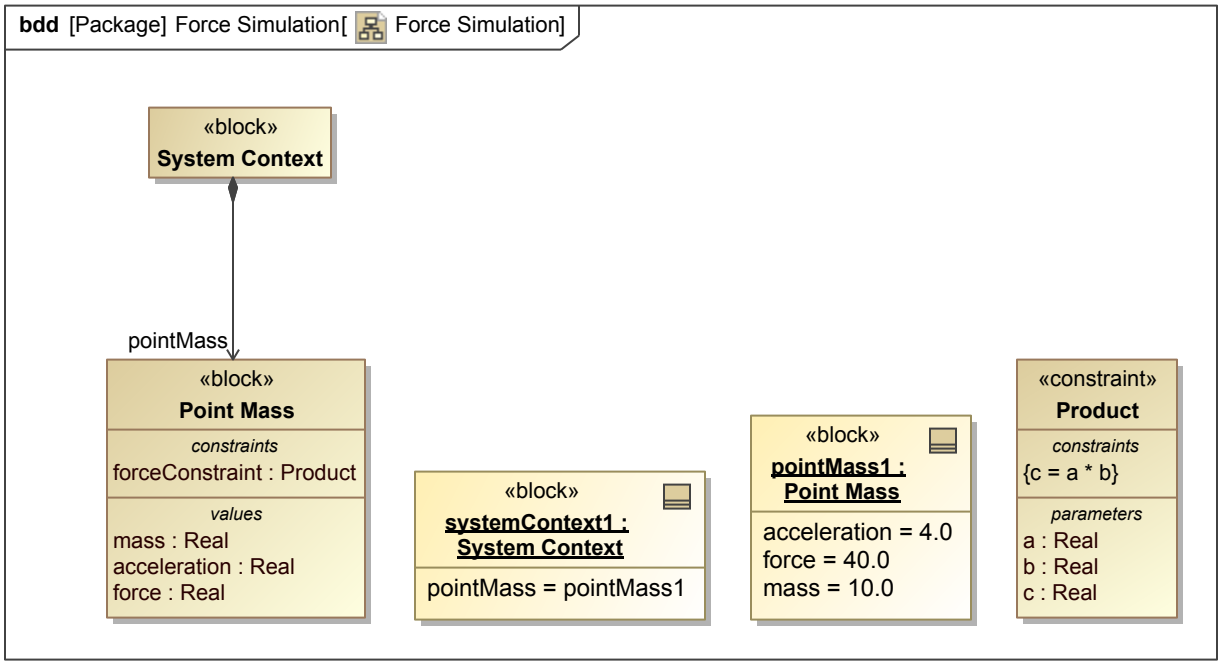


Figure 103. Force Simulation

This example simulation calculates the force applied on a point mass given its mass and acceleration.

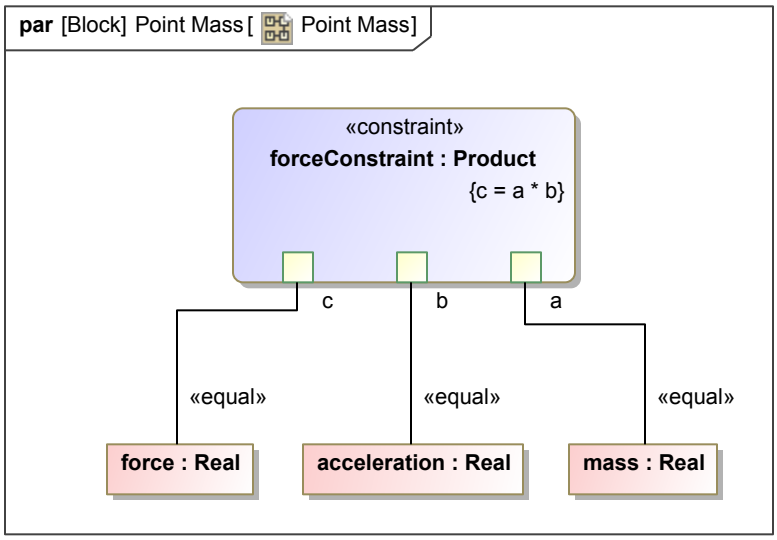


Figure 104. Point Mass

This constraint applies Newton's Second Law of Motion to a point mass.

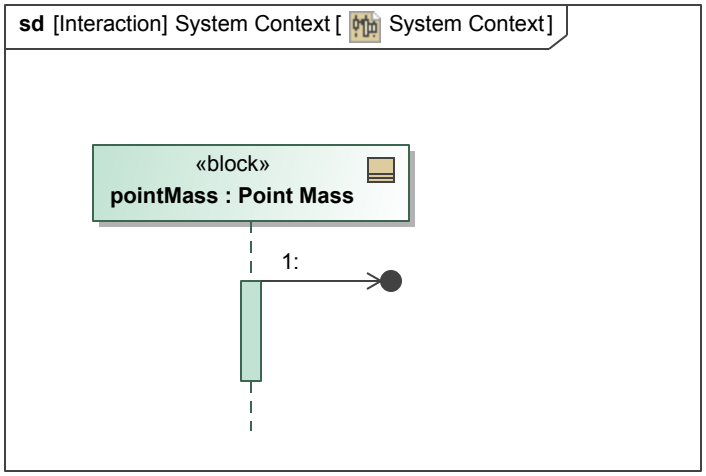


Figure 105. System Context

This sequence diagram specifies how the point mass system should be executed.

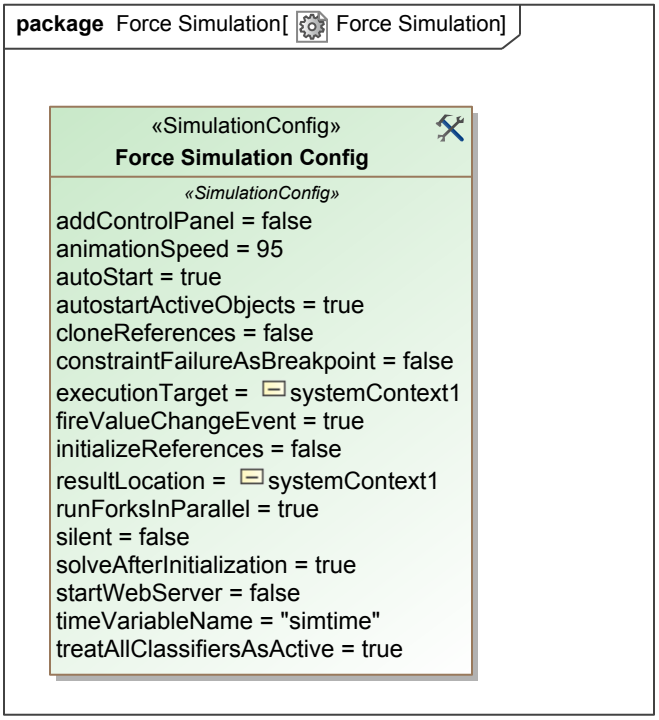


Figure 106. Force Simulation

The SimulationConfig defines the execution target and result location such that it solves the constraint and the solved system is saved in InstanceSpecifications.

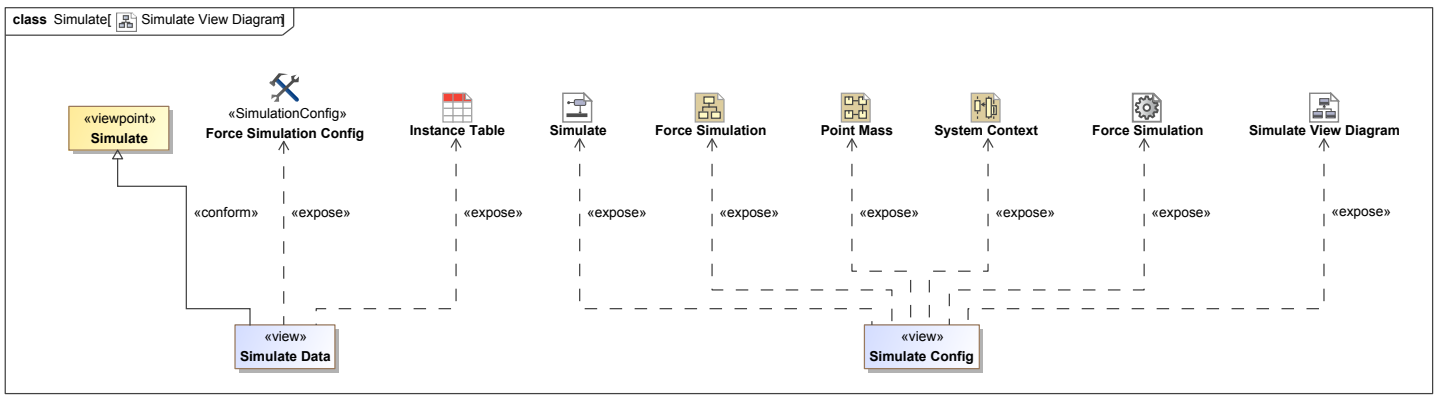


Figure 107. Simulate View Diagram

The view that executes the simulation exposes the simulation target(s), which in this case is a SimulationConfig. The Instance Table is exposed in order to present the results of the simulation. The viewpoint filters out Diagrams inside a StructuredQuery and simulates the filtered set, which is just the SimulationConfig in the case of the example simulation. The viewpoint then filters for only Diagrams inside a StructuredQuery and presents the filtered set as tables, which is just the Instance Table in the case of the example simulation.

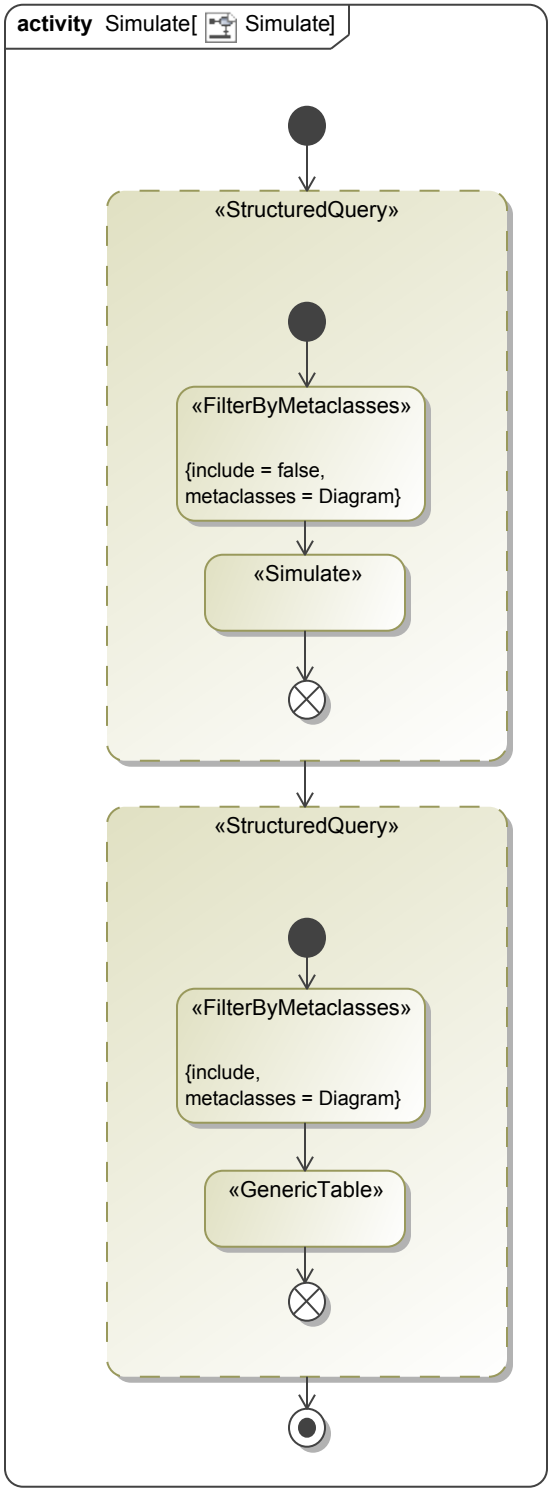


Figure 108. Simulate

Execute Cameo Simulation Toolkit simulation(s) and present results as table(s).

1.3.3.1.2 Simulate Data

Table 13. Instance Table

Name	mass : Real	acceleration : Real	force : Real
pointMass1	10.0	4.0	40.0

1.3.3.2 OpaqueBehavior

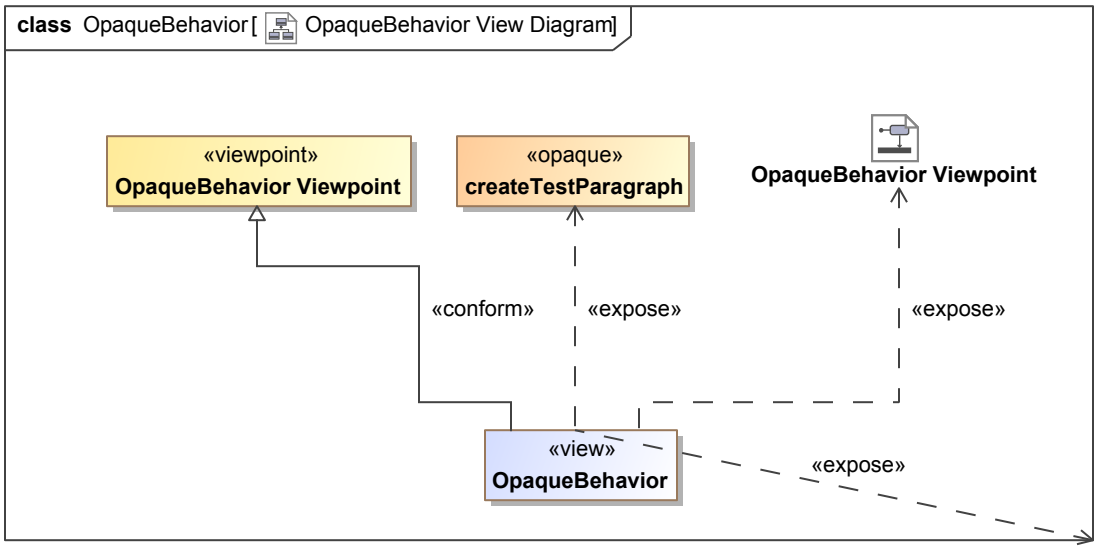


Figure 109. OpaqueBehavior View Diagram

This example View is used to demonstrate how OpaqueBehaviors can be used in DocGen to execute arbitrary code and optionally generate presentation elements in any JSR 223 compliant scripting language, such as Groovy, Scala, Python, etc. These OpaqueBehaviors include the code inside a model element, so they are versioned and transported with the model thus removing the need to have external dependencies to generate views (like plugins, UserScripts, etc.).

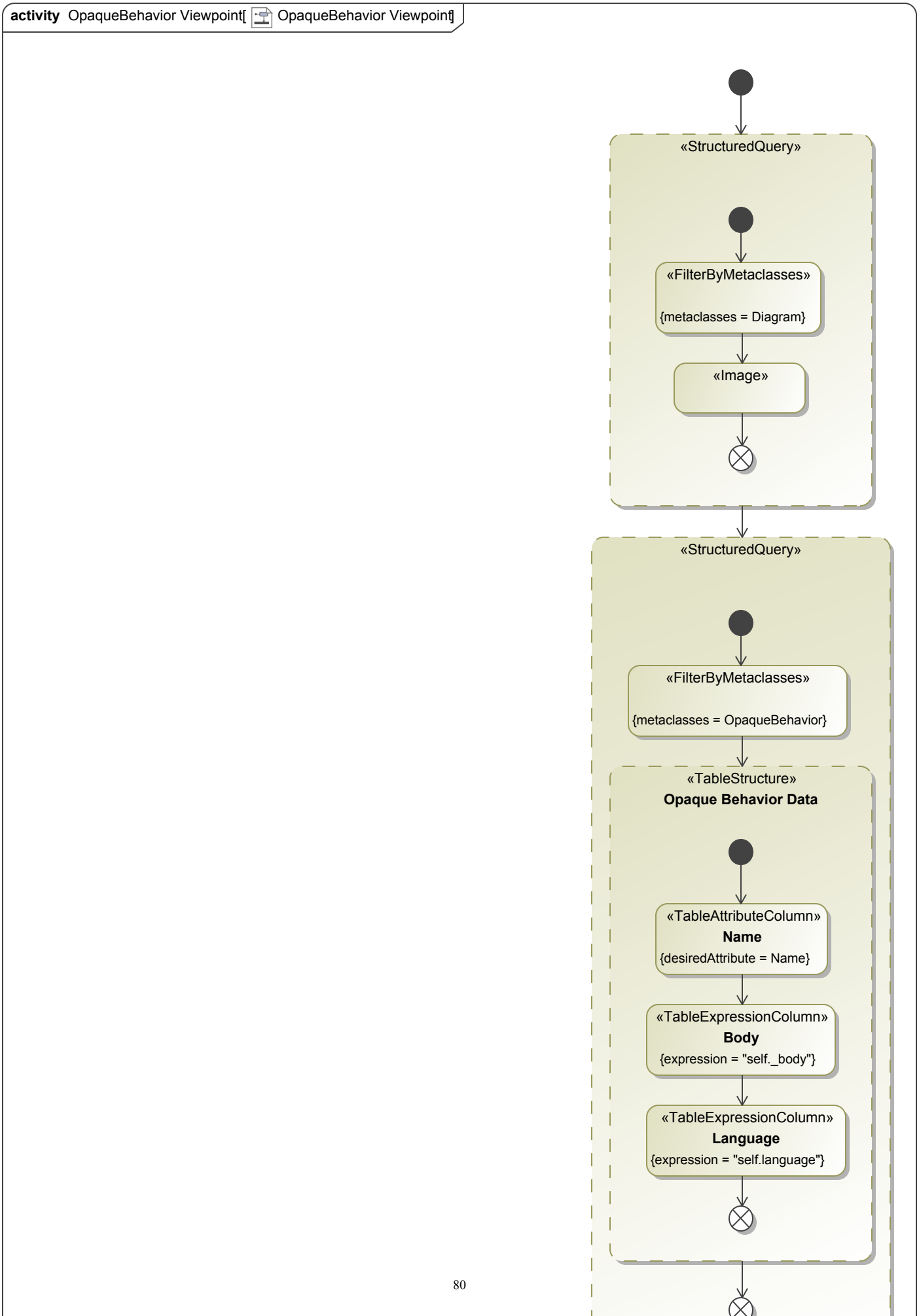

activity OpaqueBehavior Viewpoint[OpaqueBehavior Viewpoint]
«StructuredQuery»
«FilterByMetaclasses»
{metaclasses = Diagram}
«Image»
«StructuredQuery»
«FilterByMetaclasses»
{metaclasses = OpaqueBehavior}
«TableStructure»
Opaque Behavior Data
«TableAttributeColumn»
Name
{desiredAttribute = Name}
«TableExpressionColumn»
Body
{expression = "self._body"}
«TableExpressionColumn»
Language
{expression = "self.language"}

Figure 110. OpaqueBehavior Viewpoint

This Viewpoint demonstrates the usage pattern for an example OpaqueBehavior named createTestParagraph. All OpaqueBehaviors used in DocGen are provided four inputs at runtime:

- **exposedElements**: The list of elements that are exposed to the Behavior as a result of the view generation.
- **forViewEditor**: A boolean value that is true when the target for generation is View Editor, i.e. when it is not a local generation.
- **outputDirectory**: A string with the path to the output directory when using local generation.
- **context**: The gov.nasa.jpl.mbee.mdk.model.BehaviorQuery object that is executing the code. This input is exposed for advanced users, but most use cases do not need it.

In this example, the OpaqueBehavior will create a Paragraph that prints all the values of the variables using Groovy. OpaqueBehaviors can return a single gov.nasa.jpl.mbee.mdk.docgen.docbook.DocumentElement or a collection of them. Any other output will be ignored and the user will be warned in the notification window. Errors in the code will also be presented in the notification window and a full stack trace will be printed to the log file.

See MagicDraw documentation for OpaqueBehaviors for implementation details.

Table 14. Opaque Behavior Data

Name	Body	Language
createTestParagraph	return new gov.nasa.jpl.mbee.mdk.docgen.docbook.DBParagraph('context is "' + context + '". exposedElements are "' + exposedElements + '". forViewEditor is "' + forViewEditor + '". outputDirectory is "'+ outputDirectory + '".')	Groovy

context is
"BehaviorQuery(,callBehaviorAction=com.nomagic.uml2.ext.magicdraw.actions.mdbasicactions.impl.CallBehaviorActionImpl@aa1951dd)".
exposedElements are
"[com.nomagic.uml2.ext.magicdraw.commonbehaviors.mdbasicbehaviors.impl.OpaqueBehaviorImpl@ca48b6ad,
com.nomagic.uml2.ext.magicdraw.classes.mdkernel.impl.DiagramImpl@45bdb0c2,
com.nomagic.uml2.ext.magicdraw.classes.mdkernel.impl.DiagramImpl@74dfc5b7]".
forViewEditor is "true".
outputDirectory is "null".

1.4 Create and Evaluate OCL Constraints

This section is a **brief** introduction to Object Constraint Language (OCL) and how it is used within the MDK. It is important to note that this is not a comprehensive explanation of OCL and at any point during this tutorial if you find yourself wanting a more in-depth explanation of the language, (i.e. specific syntax rules), there are plenty of resources to be found and several are offered in the next section.

1.4.1 What Is OCL and Why Do I Use It?

OCL Primer By Bradley Clement

What Is OCL?

The Object Constraint Language (OCL) is a text language (a subset of QVT) that can be used to customize views and viewpoints in various ways that otherwise may require writing external code in Jython, QVT, Java, etc. OCL is used to define invariants of objects and pre-and post conditions of specified operations. This allows for more advanced querying of model elements and their properties. Throughout this entire section the words "expression" and "operations" will be used extensively. **An OCL "expression" is a statement of OCL "operations" that can be pieced together to get what you want**. These expressions can be quite simple or complex depending on the need.

For example:

1. *n()*

2. *r('analysis:characterizes').oclAsType(Dependency).source.m('mass').oclAsType(Property).defaultValue.oclAsType(LiteralString)*

.value.toInteger()=eval(self._constraintOfConstrainedElement->asSequence()->at(1).oclAsType(Constraint)

.specification.oclAsType(OpaqueExpression)._body->at(1))

Both 1 and 2 are OCL expressions, however, it is obvious to see that number 2 is quite a bit more complex. Number 1 is a single *operation* that stands alone as an *expression*. It is important to note that these expressions are built by stringing along carefully selected operations and separating them with the proper syntax. In the complex example above you will notice a lot of periods (.) and arrows (->). Both of these symbols separate one piece of the expression from the next (there are more than just these two). It will take some practice to understand which to use and when to use it. For a more extensive/advanced explanation of OCL syntax check out this link.

Why Do I Use OCL?

You can use OCL to specify how to collect, filter, sort, constrain, and present model data. Constraints on model elements are the driving force behind MDK and the inter-workings of certain elements presented earlier in this document will be explained via OCL. Several new elements that were created specifically for dealing with OCL expressions within a viewpoint will be introduced as well. For your everyday collect and filters of model elements OCL probably isn't the best choice, however, for more advanced queries of the model it can be your golden ticket. Examples outlining this idea will follow.

OCL syntax can be tricky since it accesses model information through the UML metamodel (see the UML metamodel manual in your Magicdraw installation directory, under manual). Here we try to give some tips on how to write OCL expressions to more easily customize views without having to write external scripts in Jython, Java, QVT, etc. Keep in mind, this topic is more advanced than previous ones discussed earlier in this document. At this point it is assumed that you understand how a viewpoint method diagram works and can walk step by step from one action to the next and comprehend what elements should be expected in the final result. This is important because OCL expressions work the same way.

OCL Resources

For help with OCL, you can try the OCL Cheat Sheet or search the web for example OCL. Some examples will also be given in the sections below. The OCL Cheat Sheet is very helpful once you get a basic understanding of how OCL works, however, until you have gained some understanding it might be confusing. In the following sections some references to this resource will be made with explanations of how it can be useful.

NoMagic's UML metamodel specifies what objects can be referenced in an OCL expression for the different UML types. A pdf manual of the metamodel can be found in your MagicDraw installation in the manual folder. If you use Eclipse, try opening the Metamodel Explorer view from the menu: Window -> Show View -> Other. There may be many metamodels, but look for the com.nomagic.uml2 metamodel. There is a button on the view where you can search for a type, but be careful since there may be more than one UML metamodel. You want MagicDraw's UML metamodel. There is also a button for showing inherited members that can be referenced in OCL.

1.4.2 What are the OCL Black Box Expressions?

Black box operations are often used to simplify expression structure. The following section will cover several of these so that you will recognize them. However, before discussing the black box operations it is important to talk about the viewpoint method action <<TableExpressionColumn>> since it will be used in the following example viewpoint methods.

<<**TableExpressionColumn**>> Applies an OCL expression to the target elements in a <<TableStructure>> that will populate a column of the table displayed in View Editor. This can be used to chain operations on elements and relationships that would otherwise be difficult or impossible.

Make sure to focus directly on this action in the examples. Understanding how they handle OCL expressions is important.

Another critical topic before moving on is the idea of "**casting**" in your OCL expressions. Many times when a result is returned from an OCL operation it will need to be cast as the element expected from the query in order for further operations to be carried out. This is the nature of OCL and just takes getting used to. Often times errors can be fixed by remembering to cast the returned elements. The cheat sheet discussed earlier gives the operations needed for casting. They are shown below and will be implemented and explained in the following examples. Remember to come back and reference these operations while working through the examples.

Below are the OCL black box operations used as shorthand in expressions. They will be demonstrated in the following sections.

- **m(), member(), or members()** returns the owned elements

- **r(), relationship(), or relationships()** returns all relationships owned or for which the element is a target
- **n(), name(), or names()** return the name
- **t(), types()** return all types (Stereotypes, metaclass, and Java classes and interfaces).
- **type()** returns just the type of the element selected.
- **s(), stereotype(), or stereotypes()** returns the Stereotypes. This is basically short for appliedStereotypeInstance.classifier. s() and stereotypes() should return all stereotypes, and stereotype() should just return one.
- **e(), evaluate(), or eval()** evaluates an ocl expression retrieved from an element
- **value()** returns the value of a property or slot
- **owners()** returns owner and owner's owners, recursively
- **log()** prints to Notification Window
- **run(View/Viewpoint)** runs DocGen on a single View or Viewpoint with specified inputs and gets the result

Many of these views reference results of the example viewpoints. These results are similar to those found in the Present Model Data view.

Figure 111. Animals

1.4.2.1 value()

The expression **value()** is a useful tool to get at the value of a property. In the example below the Animals package was exposed to the viewpoint method diagram shown. Inspecting the expression [**self.get('noise').v().v()**] shows **get()** collecting the elements named "noise," in this case all the properties. **v()** is then used twice, once to get the property default value, literal string. It is then used again to get the text of the literal string.

Figure 112. value() View Diagram

Figure 113. Value Black Box Demo

1.4.2.1.1 Example View

Table 15. <>

Animal Noises
meow
quack
moo
ribbit
bark

1.4.2.2 Relationships "r()"

The following is an outline of the operation r(). The viewpoint method below is designed in such a way that it will use r() by itself and also part of a more complex expression. The bullet list below will run through the explanations of the OCL expressions used in the <<TableExpressionColumn>> below.

- **r(), relationship(), or relationships()** returns all relationships owned.
    - **r('likes')** in the first <<TableExpressionColumn>> gets all of the relationships of name or type 'likes'
    - **r('likes').oclAsType(Dependency).target** in the second <<TableExpressionColumn>> gets the 'likes' relationship, casts it as Dependency then collects the target of the relationship (Cat). Keep in mind, when **r()** returns the relationship 'likes,' in order to keep performing operations we have to cast what was returned. This is done by **oclAsType()**. Look over the cheat sheet discussed earlier to become more familiar with these operations.
    - Note: ignore the filters in the viewpoint method diagram, they are unimportant to the concept covered in this section.

- Notice the <<TableExpressionColumn>> activities are where the OCL expressions are defined in the viewpoint method diagram.

Figure 114. relationships() View Diagram

Figure 115. Relationships Black Box Demo

1.4.2.2.1 Example View

Table 16. Relationships

Name of element	Likes Relationships	Likes Target
Dog	likes	Cat

1.4.2.3 Names "n()"

- **n(), name(), or names()** returns the name

For this example, expression "n()" returns the name of the element passed to the action. In this case "Dog."

Figure 116. Names View Diagram

Figure 117. Names Black Box Demo

1.4.2.3.1 Example View

Table 17. <>

Name of Element
Dog

1.4.2.4 Stereotypes "s()"

- **s(), stereotype(), or stereotypes()** returns the Stereotypes. This is basically short for appliedStereotypeInstance.classifier. **s()** and **stereotypes()** should return all stereotypes, and **stereotype()** should just return one.

For this example, Dog is exposed and it's stereotypes populated into a table.

Figure 118. Stereotypes View Diagram

Figure 119. Stereotypes Black Box Demo

1.4.2.4.1 Example View

Table 18. Stereotypes

Name of element	Stereotype of Element
Dog	Block

1.4.2.5 Members "m()"

- **m(), member(), or members()** returns the owned elements
    - m('text') gets the member whose name or type is 'text'

Example:

- Since the element Dog is again exposed, **m('noise')** will get the member whose name is 'noise' and post that name to the Attributes column of some particular table.

- Notice in the <<TableExpressionColumn>> actions of the viewpoint method are using different OCL expressions. The "Attributes" column is returning any member who's name is 'noise'. The expression in the "Attribute Default Value" action is collecting the same property, casting it as a Property and then returning the default value. This is done by: **m('noise').oclAsType(Property).defaultValue**.

Figure 120. Members View Diagram

Figure 121. Members Black Box Demo

1.4.2.5.1 Example View

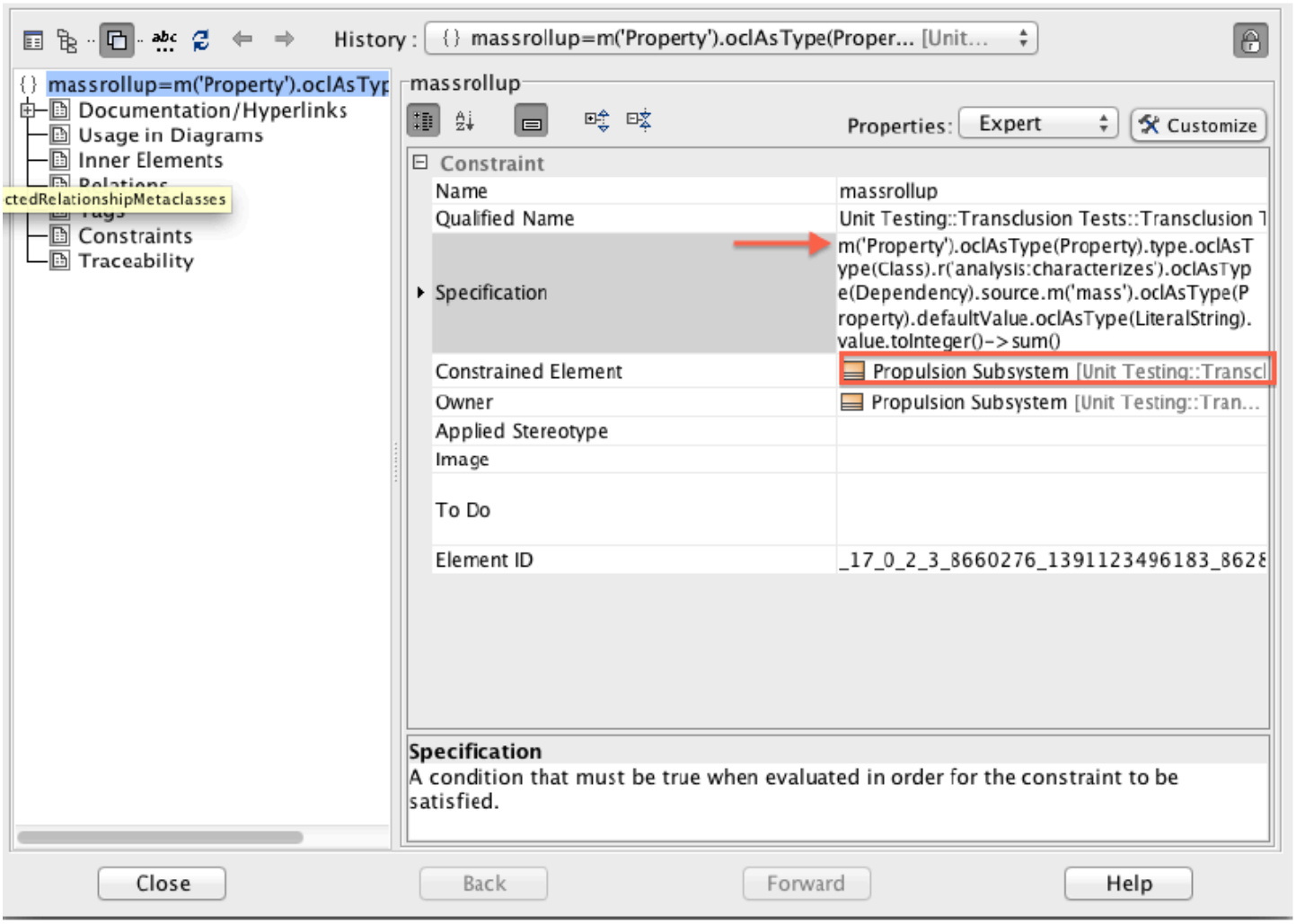
Table 19. Members

Name of element	Attributes	Attribute Default Value
Dog	noise	bark

1.4.2.6 Evaluate "eval()"

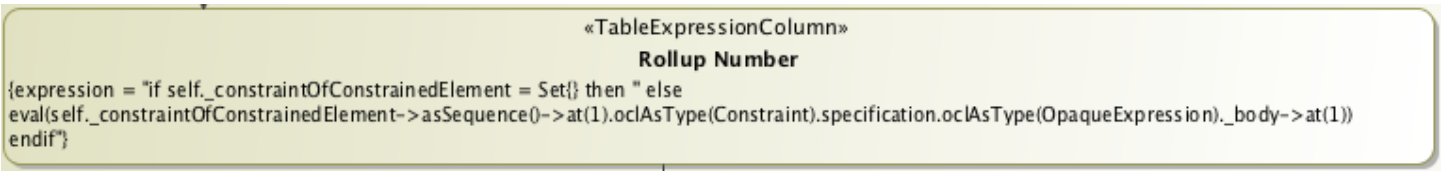
eval() or **e()** evaluates an OCL expression retrieved from an element. This example may seem overwhelmingly complex, however, the main point is to demonstrate the use of the black box expression. The image below shows an element (Propulsion Subsystem) which has a set constraint (red arrow).

This is a constrained element with the constraint specification:



The example expression is long but take the time to try and piece it together to help your understanding. A useful hint is to start with the oclAsType() operations since these will give you a clue as to what was returned by the previous operation.

This is eval() taking in the constrained element and evaluating the constraint:



This is the complete viewpoint method diagram:

Figure 122. Evaluate View Diagram

Figure 123. Evaluate Black Box Demo

Figure 124. Transclusion Test Model

1.4.2.6.1 Example View

Table 20. <>

Component Name	CBE Mass	Rollup Number
Propulsion Subsystem		0
Launch Mass		
Steady-State Power		
On		
Off		
Standby		
Hydrazine Tank		
Launch Mass		
Steady-State Power		
On		
Off		
Standby		
Thruster		
Launch Mass		
Steady-State Power		
On		
Off		
Standby		
Transclusion Test Model		

1.4.2.7 Types "t()"

t() returns the type(s) of the element selected where as, **type()** only returns the type of the element exposed re. Element "Dog" is of type Class and has other types associated with it. We would like to return just the type of element Dog, therefore, we use **type()** in the <<TableExpressionColumn>>.

Note: the other information returned with Class is an artifact of MagicDraw.

Figure 125. Types View Diagram

Figure 126. Types Black Box Demo

1.4.2.7.1 Example View

Table 21. Types

Name of element	Type of Element
Dog	interface com.nomagic.uml2.ext.magicdraw.classes.mdkernel.Class

1.4.2.8 Owners "owners()"

Returns owner and owner's owners, recursively. In the example below, the OCL evaluation tool is used to collect the owners of the element "Dog" In the results of the evaluation box, the owning packages and model are shown. Note: the fist part of the expression (**self.**) is specifying the target element. The operation would work without it since it is just one element being exposed.

The red arrows below show the package hierarchy collected.

Figure 127. Owners View DIagram

Figure 128. Owners Black Box Demo

1.4.2.8.1 Example View

Table 22. <>

Owners
Animals Present Model Data Create Viewpoint Methods Examples Models Docgen Data

1.4.2.9 log()

UNDER CONSTRUCTION

The **log()** black box expression takes the elements collected at any point in an OCL expression and prints them in the notification window in Magic Draw. In this example, the OCL query shown in the OCL Evaluator (discussed later) was run on the "Animals" package. This expression collects the owned elements of the package. Notice, in the comparison of the OCL Evaluation (top) window and the Notification Window (bottom), the elements displayed are the same. The red and blue arrows correspond to the same elements.

Figure 129. Log View Diagram

Figure 130. Log Black Box Demo

1.4.2.9.1 Example View

1.4.2.10 run(View/Viewpoint)

One way to use **run()** is to first collect a viewpoint and then run it on the element selected. The first viewpoint method below has an OCL expression in the <<TableExpressionColumn>> activity: **self.get('testforrun').run(self).** Dissecting the expression shows the viewpoint titled "testforrun" was collected using get(). (**NOTE: get() is a very useful expression when selecting a specific element)**. Next, the operation **run()** took the viewpoint and ran it against all elements that were not filtered out earlier. At this point in the

method, these elements would be classified as "**self**." The second viewpoint method diagram shown below is "testforrun." As each element (self) is passed to the viewpoint via **run()**, their name is collected and returned to the <<TableExpressionColumn>> action.

Figure 131. RunViewViewpoint View Diagram

Figure 132. Run Black Box Demo

1.4.2.10.1 Example View

Table 23. <>

Animals

1.4.3 How Do I Use OCL Expressions in a Viewpoint?

OCL expressions can be used in viewpoint methods in various ways to do various things. The following sections will outline some of these functions.

1.4.3.1 Using Collect/Filter/Sort by Expression

To more easily introduce OCL Expressions into viewpoint methods, several custom actions have been provided and can be found in the tool bar of viewpoint method diagrams along with the other collect and filter actions discussed in previous sections. A brief description of each follows below. Each action's specification window has a designated tag to enter the desired OCL expression.

Viewpoint Elements

<<**CollectByExpression**>> Collect elements using an OCL expression. This works like other collect stereotypes.

<<**FilterByExpression**>> Filter a collection using an OCL expression. This works like other filter stereotypes.

<<**SortByExpression**>> Sort a collection using an OCL expression. This works like other sort stereotypes.

<<**Constraint**>> You can add this stereotype to a comment or an action in an activity diagram to evaluate an OCL expression on the action's results. The expression should return true or false. If false, the constraint is violated, and the violation will be added to the validation results panel. A constraint comment can be anchored to multiple actions to apply to all of the actions' results separately.

<<**TableExpressionColumn**>> Apply an OCL expression to the target elements. This can be used to chain operations on elements and relatonships that would be otherwise be difficult or impossible.

<<ViewpointConstraint>> Allows a constraint to be evaluated at any point in a viewpoint method diagram on any elements passed to the action.

zz<<**CustomTable**>> A CustomTable allows columns to all be specified as OCL expressions in one viewpoint element. Target elements each have a row in the table. Title, headings, and captions are specified as with other tables.

1.4.3.2 Advanced Topics

View Currently Under Construction

1.4.3.2.1 Use of the Iterate Flag

1.4.4 What is the OCL Evaluator and Why Do I Use It?

This tool is **EXTREMELY** helpful since many times your OCL query needs to be pieced together in order to get the results you want. All of the OCL expressions discussed in the above sections can be reproduced in the the OCL Evaluator directly in Magic Draw. For

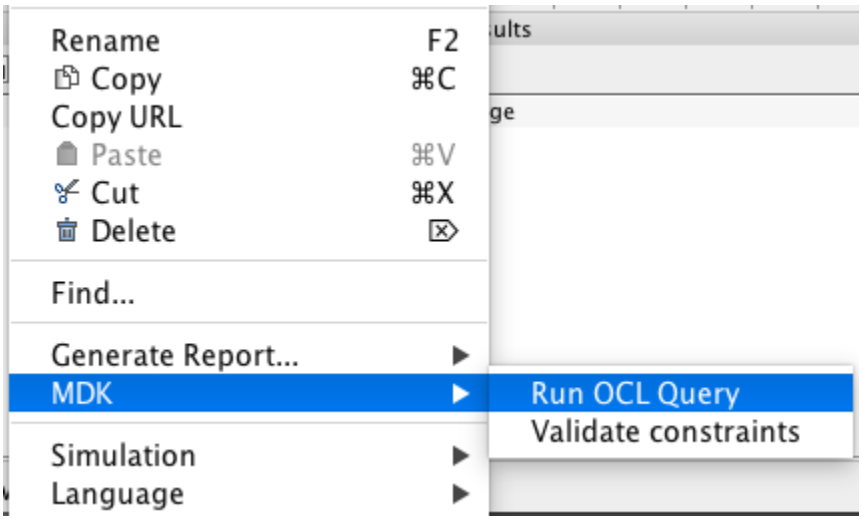
example, the image below demonstrates how the expression used in section "8.2.10 value()" would operate in the OCL Evaluator tool. Notice **.ownedElement** was added to collect the elements of the package. This was not needed in the viewpoint method of 8.2.10 because the elements were already collected and filtered.

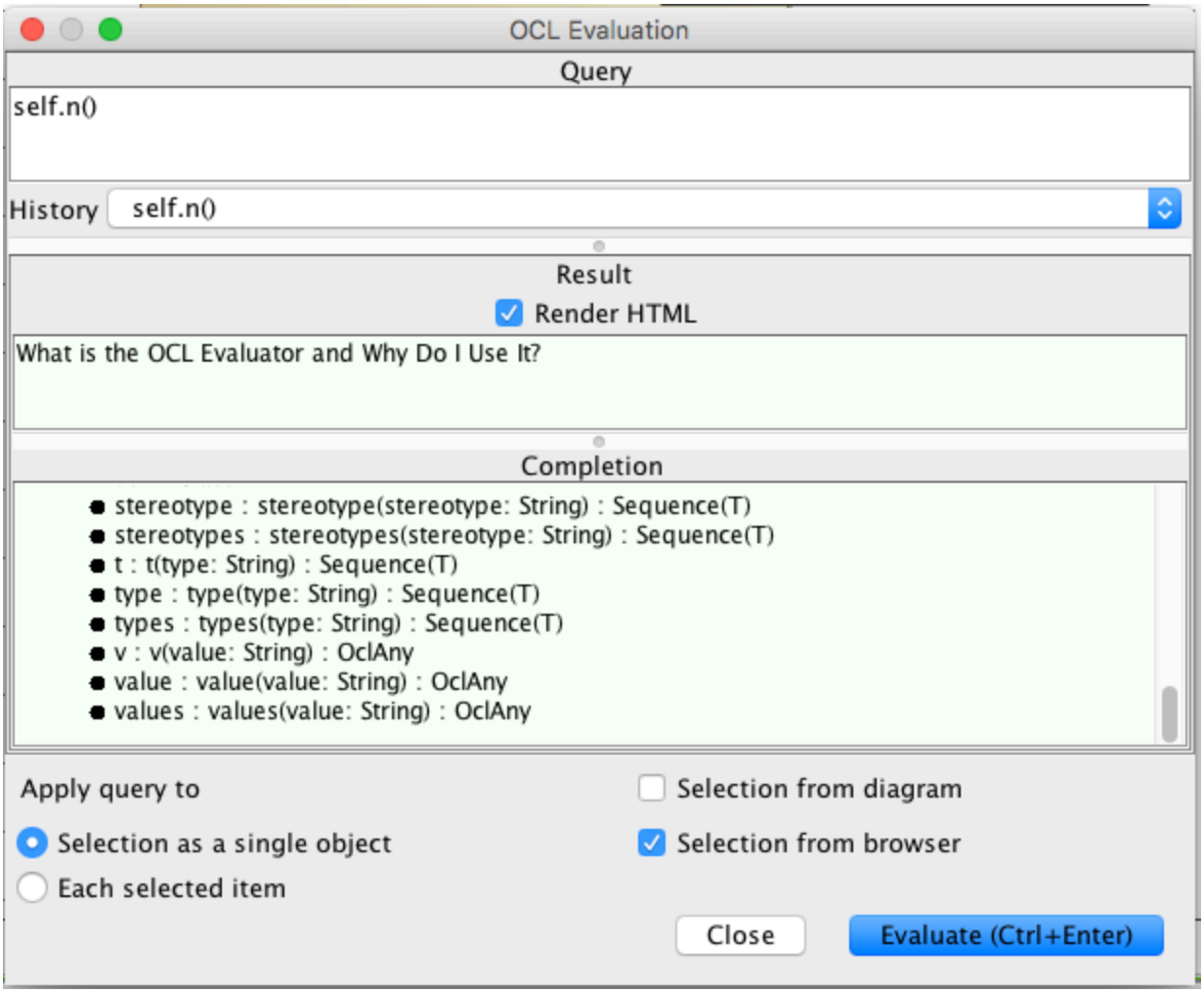
As you can see, this feature allows you to see what results your expression will return without needing to export your view to View Editor. This can save you a lot of time.

To try it for yourself, follow these steps:

1. selecting some model element(s) in a diagram or the containment tree,
2. finding the MDK menu, and
3. selecting "Run OCL Query."
4. You may need to resize the popup window to see the entry fields.
5. Enter an expression in OCL, hit Evaluate, and see the result (or error).

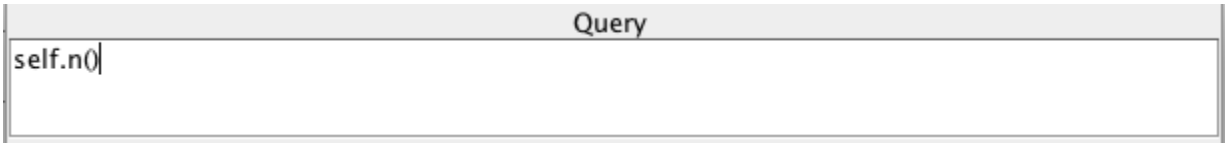
Note: "self.n()" in the below examples is setting the target of the OCL expression.





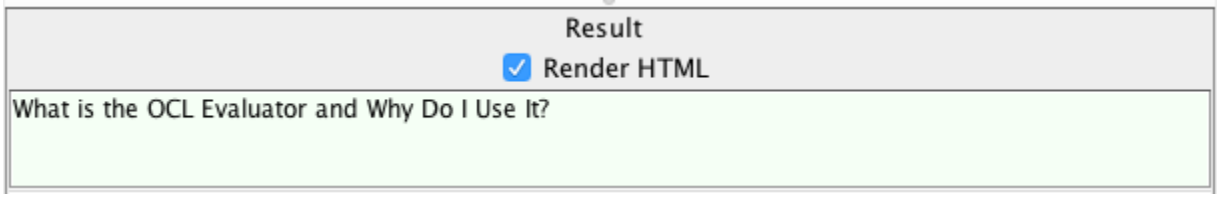
There are four parts to the OCL Evaluator:

1. Expression entry



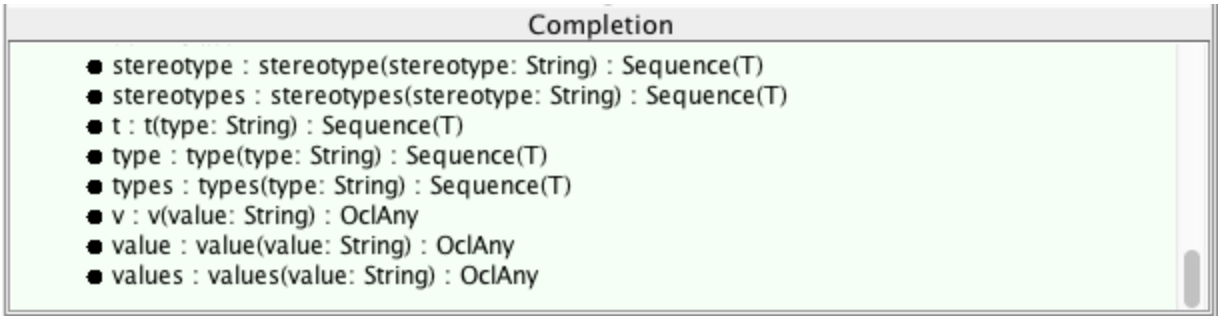
In this area you can enter an OCL query and recall previously evaluated queries by clicking on the arrow on the right hand side of the field.

2. Results



This is where the results of the query are displayed.

3. Query completion suggestions



This field suggests potential options for the current result of your query.

4. Selection location

This allows you to select from which location "self.n()" or the target of the query should be taken from.

1.4.5 How Do I Use OCL Viewpoint Constraints?

In this example the package OCL Viewpoint Contraints contains a <<requirement>> that has two dependency relationships stereotyped <<mission:specifies>>. One of these relationships violates a set pattern for what a requirement can specify. The viewpoint method shown below contains a <<ViewpointConstraint>> action which will validate elements passed in with a specified OCL expression. This is the expression used :

r('mission:specifies').oclAsType(Dependency).target.oclIsKindOf(Relationship).validationReport

A breakdown of the expression:

- starts with selecting the mission:specifies relationship using **r()**

- then casts the values returned as dependencies using .**oclAsType(Dependency)**

- then selects the targets of the dependencies with **.target**

- then casts the returned values as relationships using .**oclIsKindOf(Relationship)**

- finally, signals return of a validation report (first two tables show below) with **.validationReport**

The validation reports are automatically generated and populated with error data. One being a summary and one detailed.

Since the requirement in the OCL Viewpoint Constraints package has a dependency with another type of relationship as the target an error will be thrown.The element which violates this constraint is then sent to table structure and populated into the last table shown below. In this case, "Requirement Name!!" is expected to be the final result.

1.4.6 How Do I Create OCL Rules?

1.4.6.1 How Do I Create Rules on Specific Model Elements? (Constraint Evaluator)

The diagram below contains a <<block>> named "Commented Block." Attached to this element are two constraints...

1. oclIsKindOf(Comment)

2. oclIsKindOf(Class)

Figure 133. How Do I Create Rules on Specific Model Elements?

To validate these constraints directly in the model, select the element and right click, navigate to MDK, Validate constraints. See image below. Obviously, one of these constraints is true and one is false, so only one warning should be thrown. This is shown in the image below. The red arrow points out the failed constraint in the Magic Draw Notification window.

Obviously, one of these constraints is true and one is false, so only one warning should be thrown. This is shown in the image below. The red arrow points out the failed constraint in the Magic Draw Notification window.

1.4.6.2 How Do I Create Rules Within Viewpoints?

1.4.6.3 How Do I Validate OCL Rules in my Model?

There are two methods for validating OCL queries in a model, via a right click and via the MD Validation Window.

To validate OCL rules using the right click menu, select the package containing the elements to be validated and select MDK -> Validate Constraints

1.4.7 How Do I Create Expression Libraries?

1.4.8 How Do I Use RegEx In my Queries?

http://www.vogella.com/tutorials/JavaRegularExpressions/article.html http://docs.oracle.com/javase/7/docs/api/java/util/regex/Pattern.html

1.4.9 How Do I Create Transclusions with OCL Queries?

Table 26. <>

Name	Documentation
How Do I Create Transclusions with OCL Queries?	

Table 27. <>

Name (from constructed Transclusion)	Documentation (from constructed Transclusion)