Classes Lesson 2 MD18

In the next modeling step, you will learn how to model data structures. You will start modeling a class that stores input data of the new Web service. Data structures are modeled with classes that are visualized in class diagrams. Objects, which are instances of these classes, will be used during the modeling process in activity diagrams.

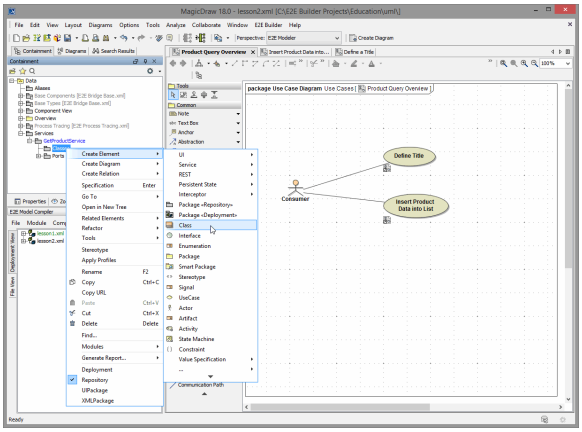
Web Service Interface

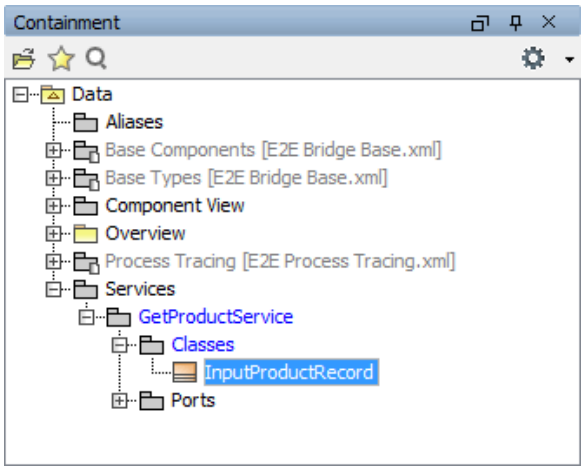
On this Page:

- Defining the Classes
- Defining Dependencies
- Defining the Currency Calculator

Defining the Classes

In the containment tree, select the **Classes** package with the right mouse button and select **Create Element > Class**.

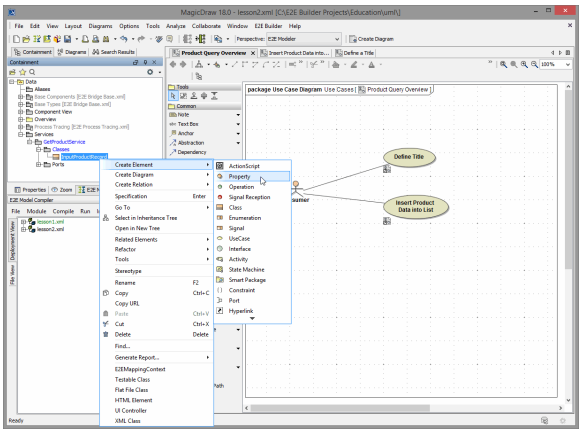


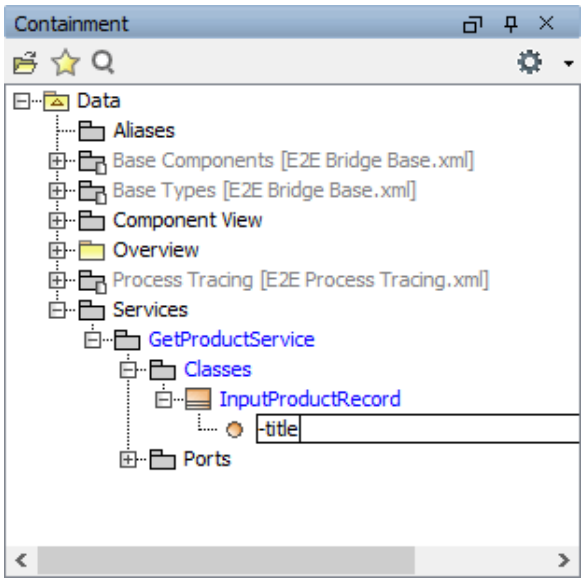


The new class will store data that is entered by the actor. A data record represents a product.

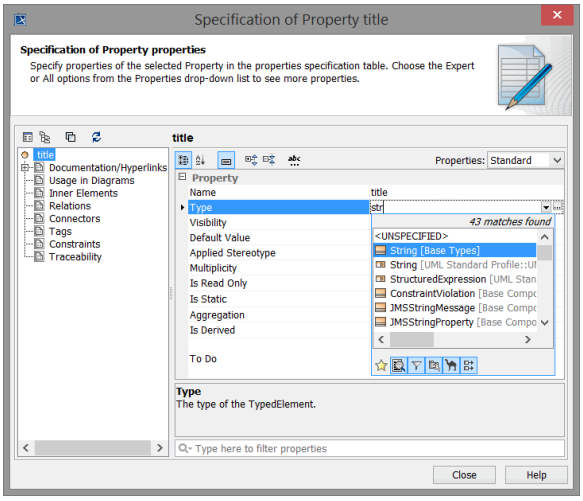
Assign the name **InputProductRecord** to the new class.

In the next step, you will define the properties of the new class by adding attributes. Select the class with the right mouse button and select **Create Element > Property** as shown below.





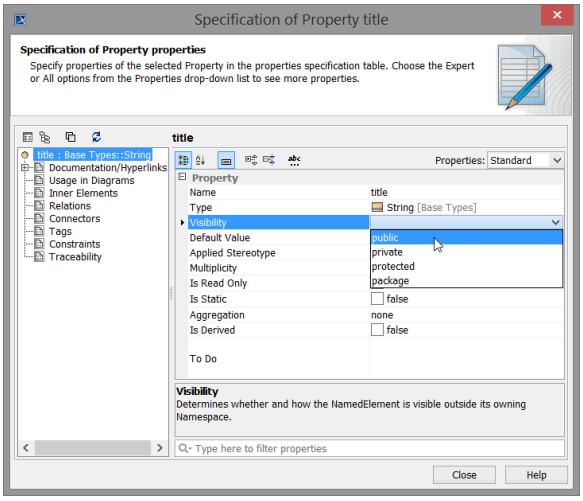
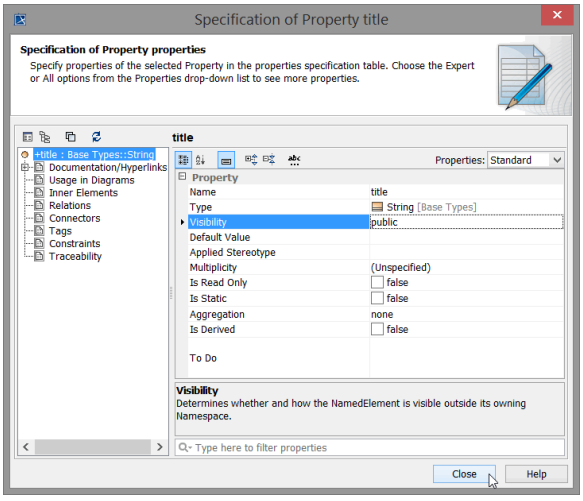
Assign the name **title** to the first attribute of the new class.

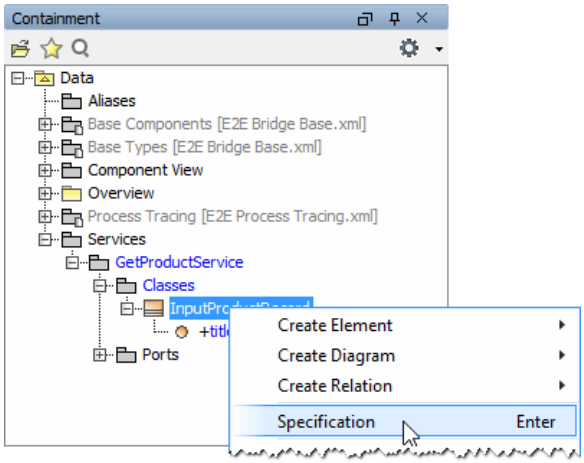
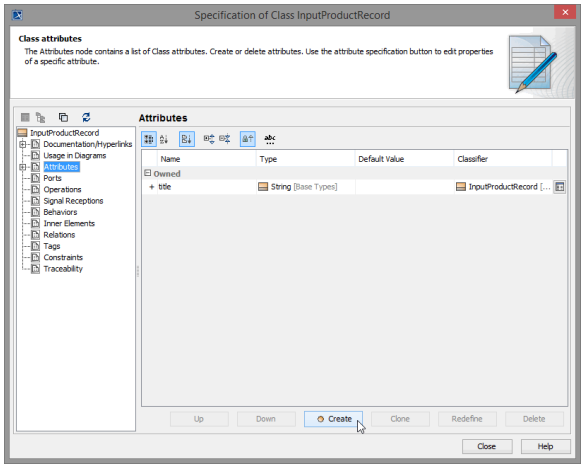
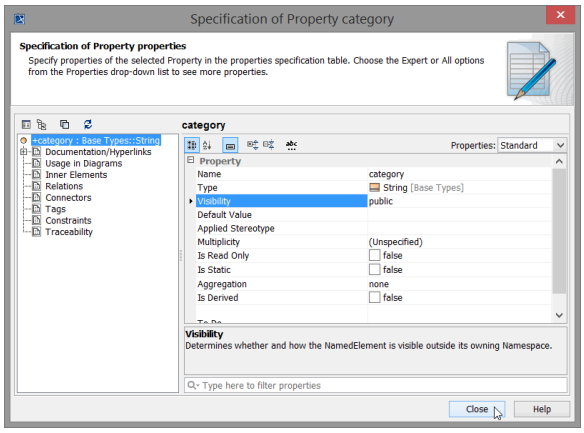


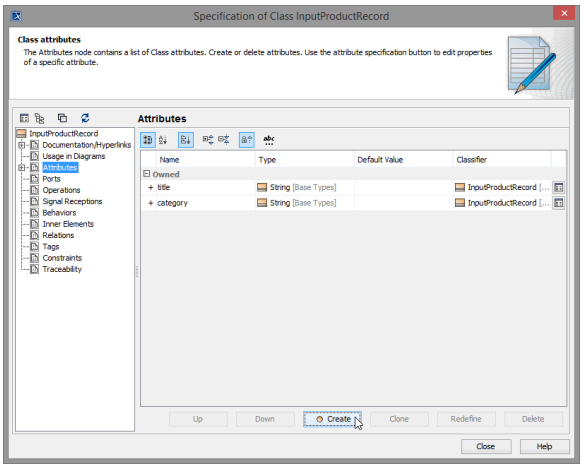
Now, define the new attribute to be of base type **String**.

Double-click the attribute node in the containment tree to open the **Property** specification dialog. Click into the **Type** field and start typing **str** on the keyboard to filter the list. Select **String [Base Types]** with the arrow keys and press **Enter**.

Always make sure to select the E2E base types and **not** the types that are part of the UML standard profile (see **String [UML Standard Profile...]** in the **Type** field.

	Click the pull-down menu **Visibility** and select **public**. Public attributes can be read and modified in activities defined outside the class. Normally, you will use public visibility in E2E xUML service context. You can set the default visibility of a project to **public**, so you will not need to change it every time. How to change the default visibility of a project is described here: Attribute Specification > Visibility.	
	Do not change any other settings and close the dialog.	

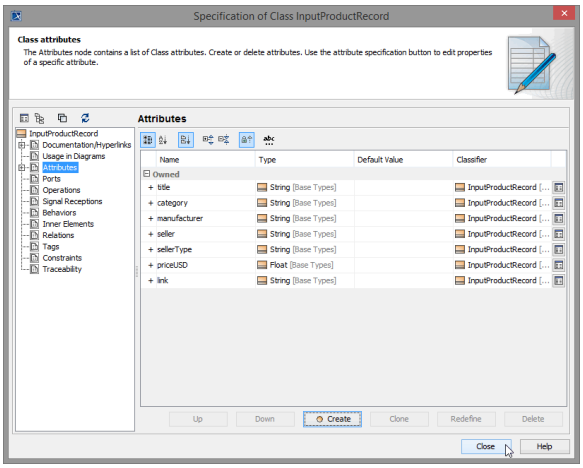
	You will now add the other attributes directly in the **Class** specification dialog. Select the class with the right mouse button and select the menu item **Specification**.	
	Click the item **Attributes** in the left navigation panel. The **Class** specification dialog shows all class attributes in form of an editable table. The previously defined attribute **title** is visible, too. Click the **Create** button to add another attribute.	
	Enter the attribute name **category**, set the type to **String**, and the visibility to **public**. Click the **Close** button to return to the attribute list.	



The second class attribute is defined now.

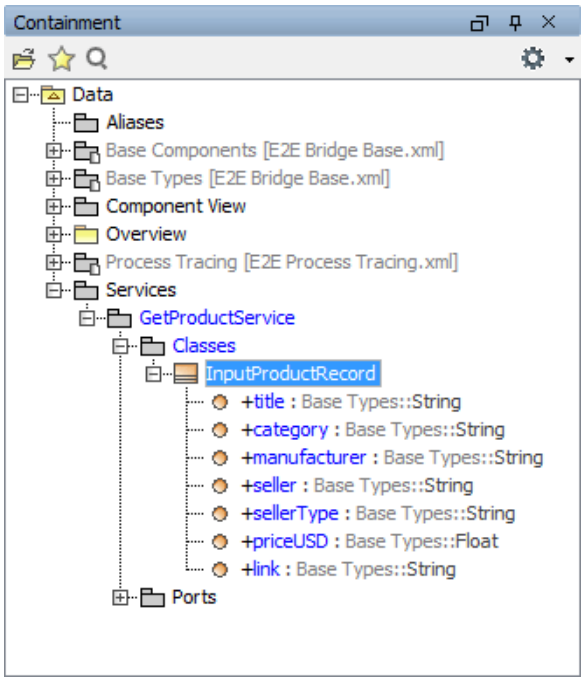
Now, add the following attributes to the class. Pay attention to correct spelling.

Name	Type	Visibility
manufacturer	String	public
seller	String	public
sellerType	String	public
priceUSD	Float	public
link	String	public



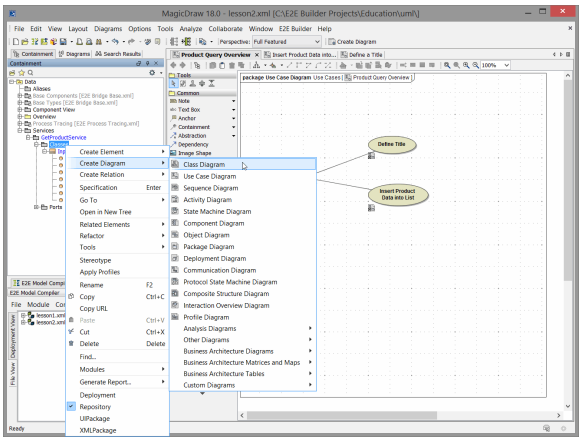
The class **InputProductRecord** with seven attributes is completed.

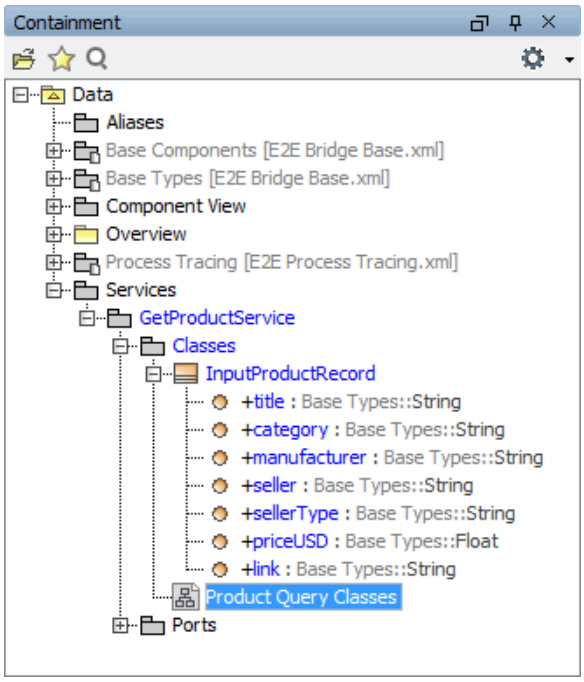
Click the **Close** button.



The new attributes are listed in the containment tree as well.

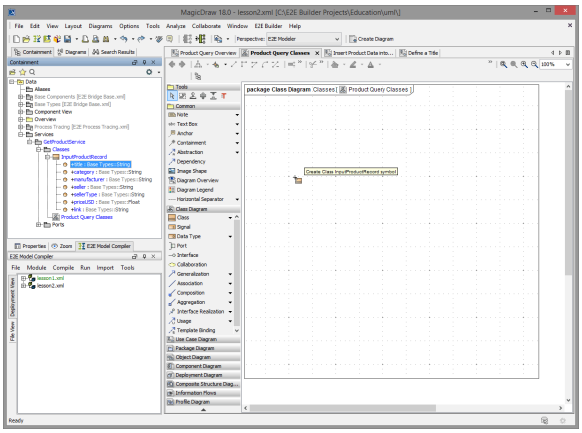
In the next modeling step, you will draw the previously defined class in the diagram pane. Select the package **Classes** in the containment tree and create a new **Class Diagram** as shown below.



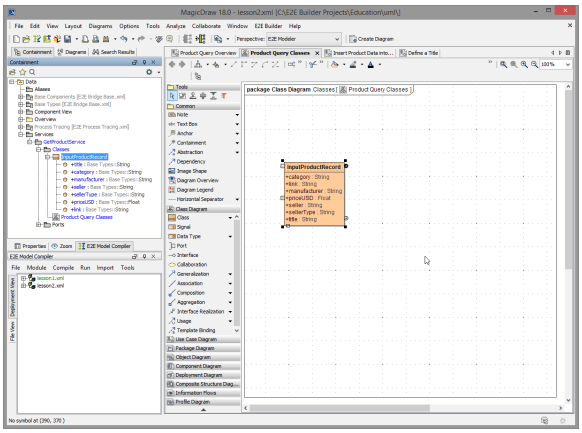


Assign the name **Product Query Classes** to the new class diagram. The new class diagram will be opened in the diagram pane.

Select the **InputProductRecord** class in the containment tree and drag and drop it onto the diagram pane.

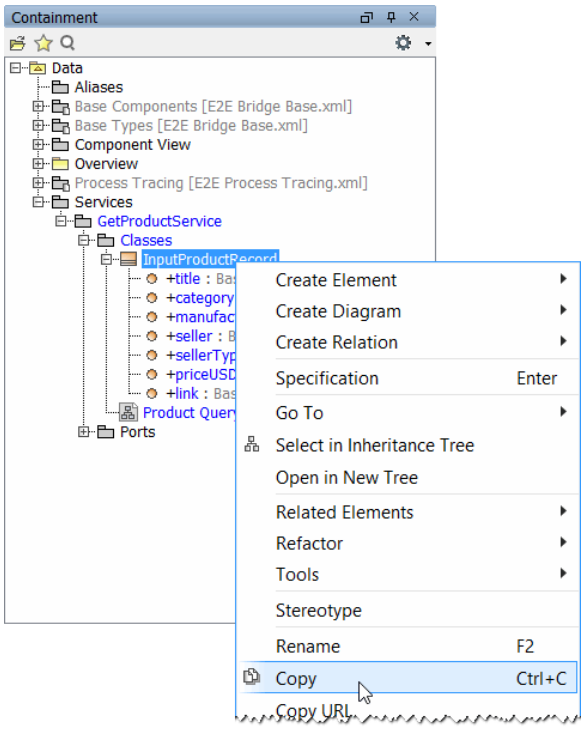


Now, the class with its attributes and attribute types is displayed on the diagram pane. The **+** sign in front of each attribute indicates that their visibility is **public**.

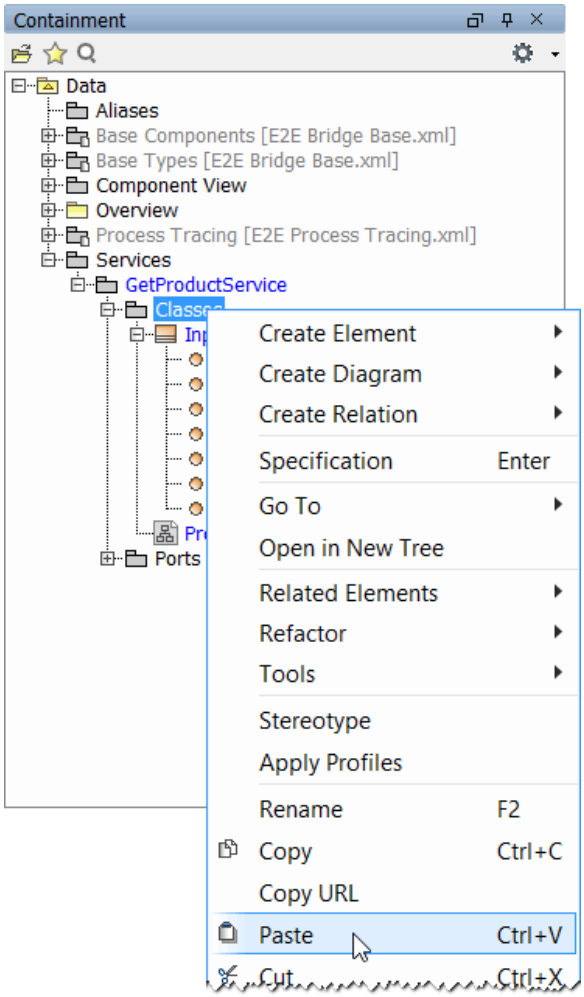


Each instance of the class represents a product. You have defined the attribute **priceUSD** in the class **InputProductRecord**. Later in the example, you will convert the price for each product into another currency. In order to perform this calculation, you will use exchange rates that are provided by another class, you will define later on.

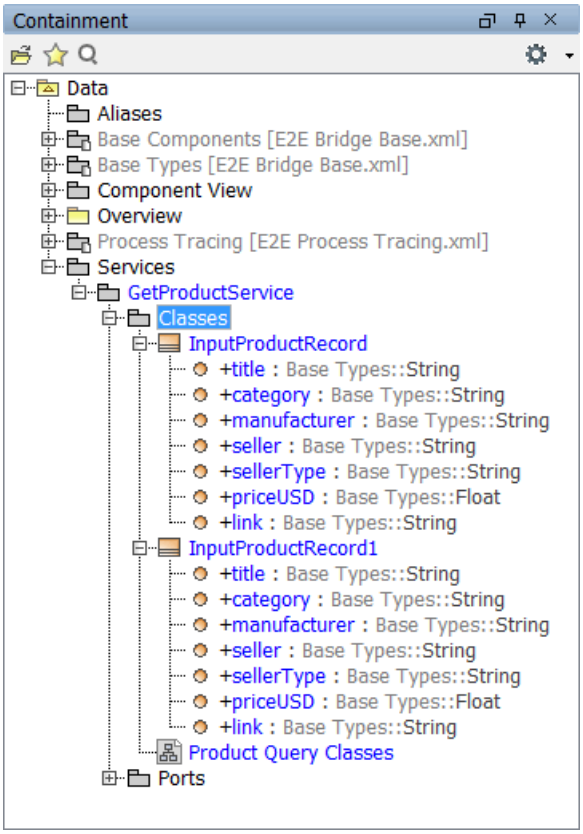
The result of the currency calculation will be stored in an output class identically equal to **InputProductRecord**, but this class will have additional attributes to store the converted price in CHF and the exchange rate.
The easiest way to create the output class is to copy and modify the input class.



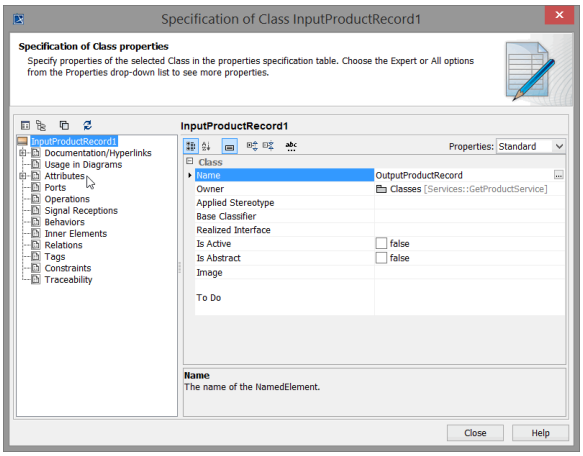
Navigate to the **InputProductRecord** class in the containment tree, select it with the right mouse button, and click **Copy** .



Then, select the package **C lasses** with the right mouse button and click **Paste** .



The new inserted class automatically gets assigned the name of the copied class, with the figure **1** appended to it: **InputProductRecord1**.

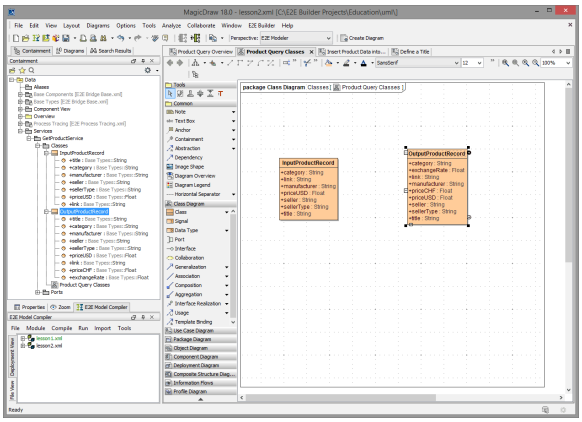


Double-click the class **InputProductRecord1** and rename the class to **OutputProductRecord**.
Switch to the tab **Attributes**.

Click **Create** and add the following attributes.

Name	Type	Visibility
priceCHF	Float	public
exchangeRate	Float	public

Add the new class to the class diagram, which afterwards should look like shown in the picture below.



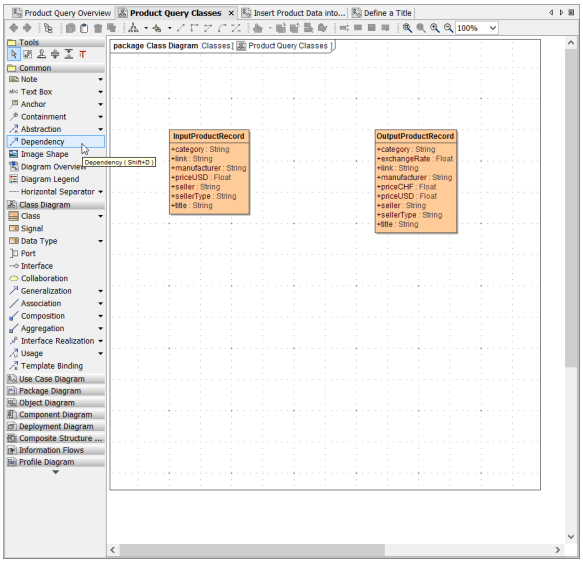
Save the UML model.

Defining Dependencies

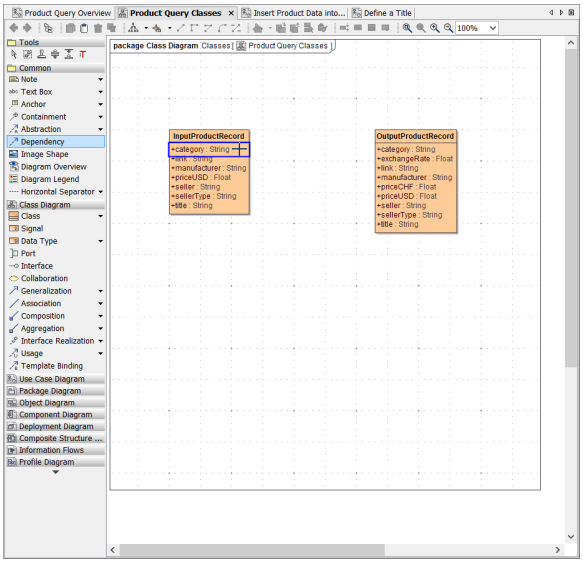
The Web service will return the input product data and additionally the converted price in CHF and the applied exchange rate.

By defining **Dependencies** between the attributes of the input and output class, the input data can easily be mapped to the output data. Thereby, the direction of the **Dependency** defines the direction of the information flow. Later, when implementing the behavior of the service in the activity diagram, you will initiate this mapping by using the <<Mapping>> stereotype in an action.

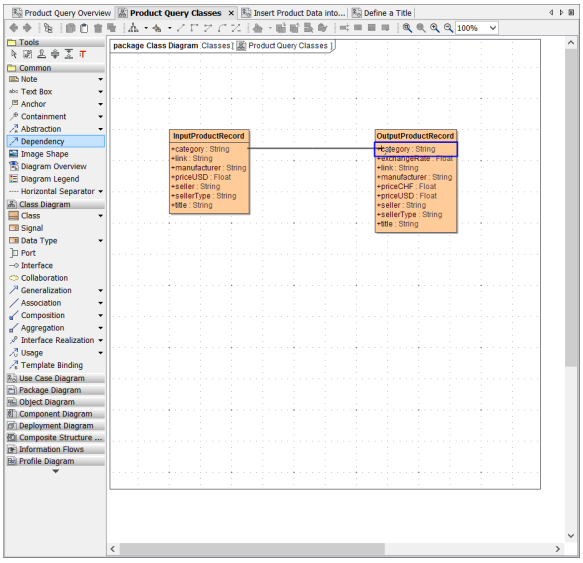
Choose a **Dependency** from the diagram toolbar.

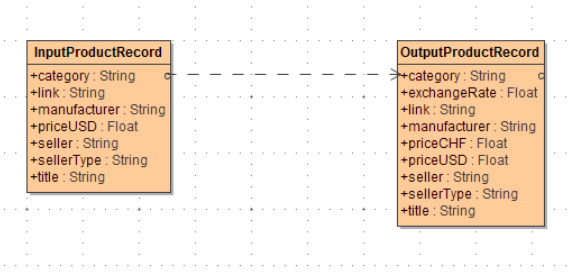


Move the mouse over the first attribute **category** of class **InputProductRecord** until the blue activation frame appears.

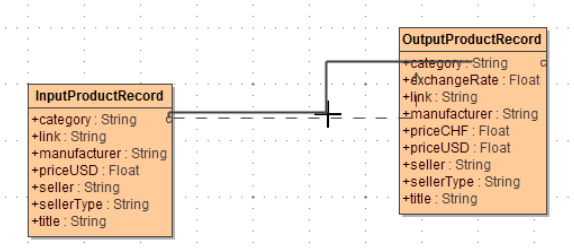


Left-click and drag the dependency line to the corresponding attribute **category** of the other class **OutputProductRecord**. When the blue frame appears, click again to draw the dependency.

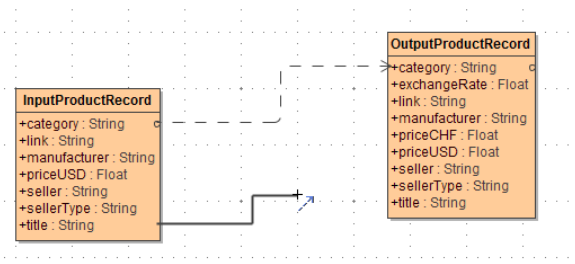




The **Dependency** arrow may not be drawn as a straight line as shown in the example on the left.

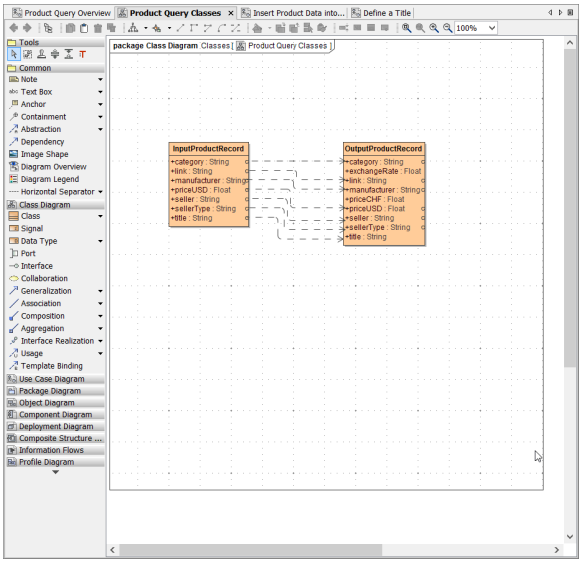


You can reroute the arrow by clicking and dragging the black handles of the line. Alternatively, you can already route the path of the arrow while drawing it (see next step).



Choose another dependency from the diagram toolbar. Click the attribute **title** of class **InputProductRecord**. On your way to attribute **title** of class **OutputProductRecord** click on the diagram pane to curve the line.

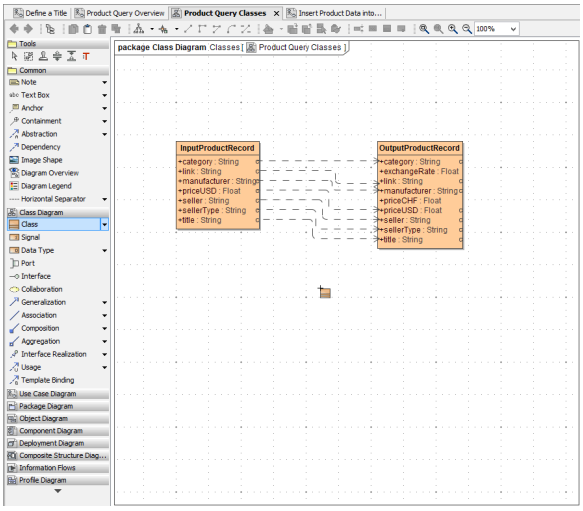
Draw dependencies from all **InputProductRecord** attributes to the corresponding attributes of class **OutputProductRecord**.
Now, the class diagram should look like shown in the picture below.



Save the UML model.

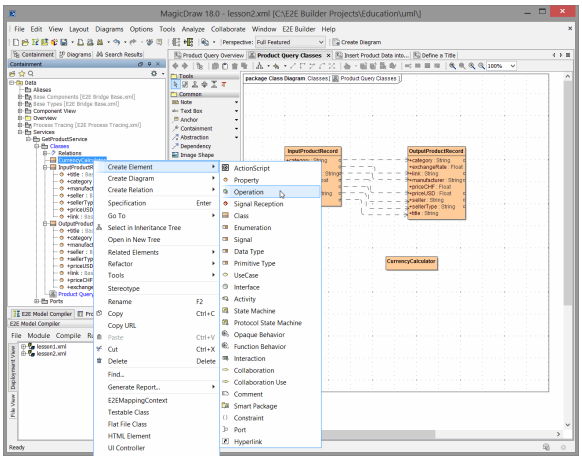
Defining the Currency Calculator

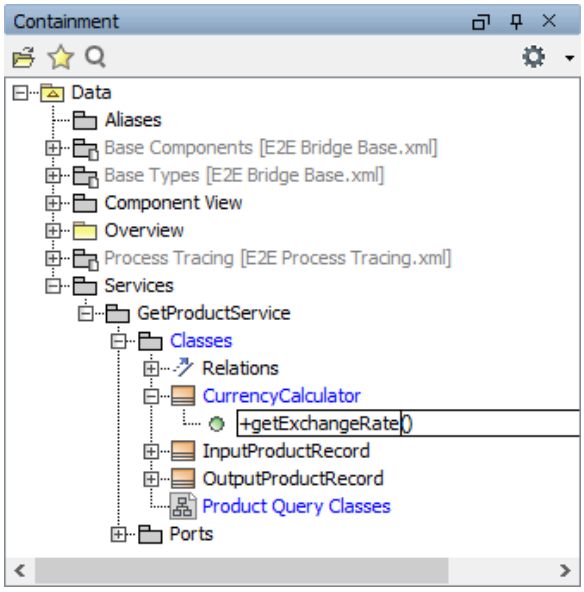
The currency calculator will be implemented in a separate class. In lesson 3, you will extend this class to call an external Web service.

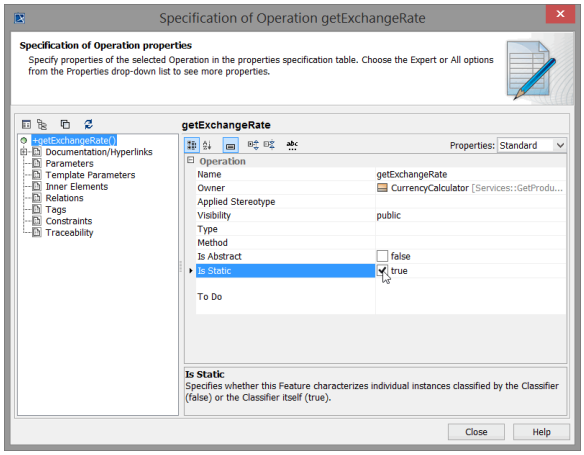


In order to create the class, you will use a different technique. Select the icon **Class** from the diagram toolbar and place it on the diagram pane. Immediately, start typing the name **CurrencyCalculator**. Then, press **Enter** to finish entering the class name.

The class **CurrencyCalculator** will have a class operation that will contain the implementation of the currency calculator. It does not need to have any attributes, yet. Select the class in the containment tree an choose **Create Element > Operation** from the context menu.

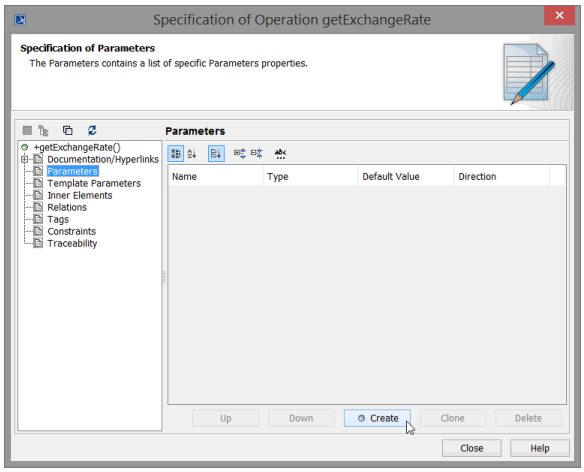


	Enter the name **getExchangeRate**.



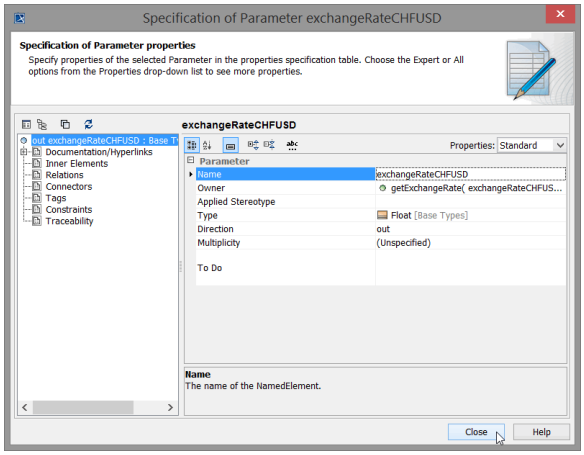
Double-click the **Operation** in order to open the **Specification** dialog. Set the **Visibility** to **public**. Then select the checkbox **Is Static** to set this option to **true**.

If you call class operations, you normally have to create an instance of a class. This instance makes the operation call. If a class operation is defined static, it is not necessary to create a class instance. Static operations can be called directly in the action script.



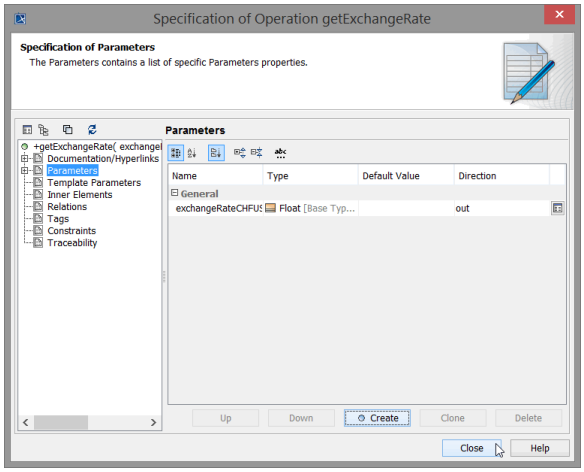
The operation will return the exchange rate CHF/USD.

Switch to the **Parameters** tab and click **Create**.



Assign the name **exchangeRateCHFUSD**, the type **Float [Base Types]**, and set the direction to **out** as the operation will return this parameter.

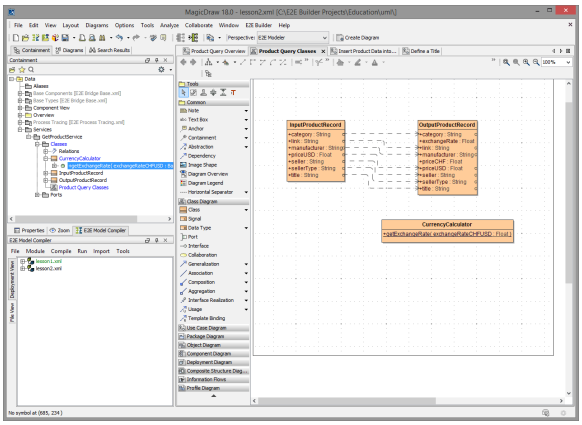
Click **Close**.



The parameter **exchangeRateCHFUSD** is shown in the list **Parameters**.

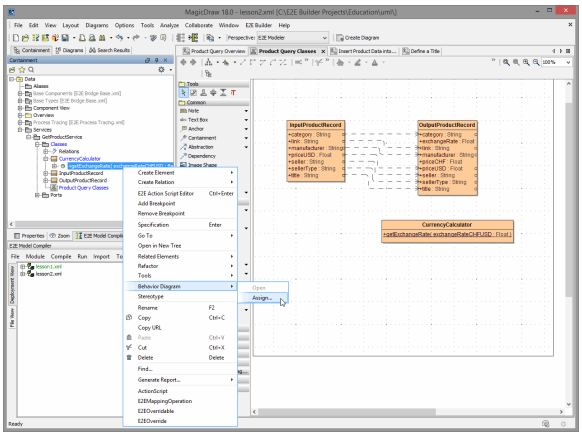
Click **Close**.

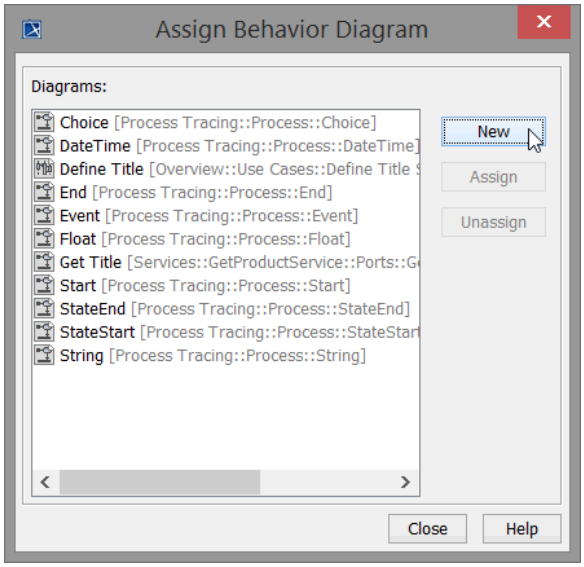
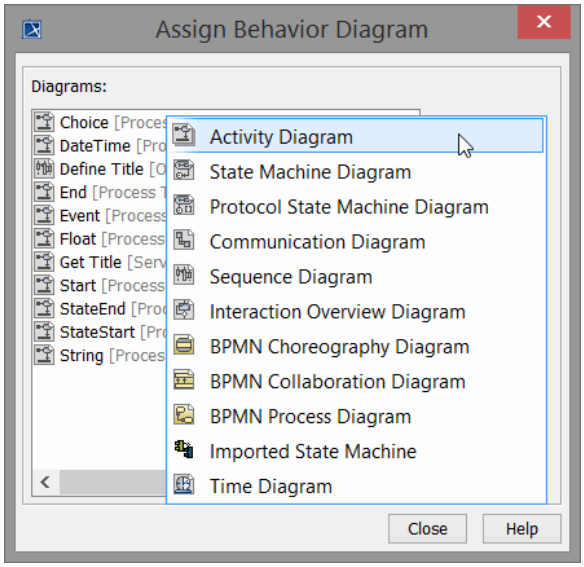
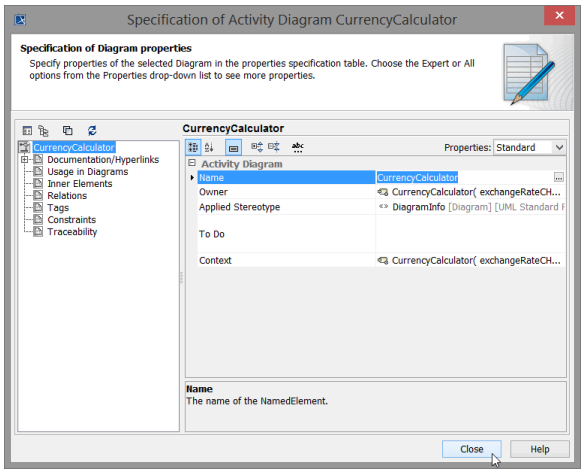
After creating this class, the class diagram should look like shown in the picture below.

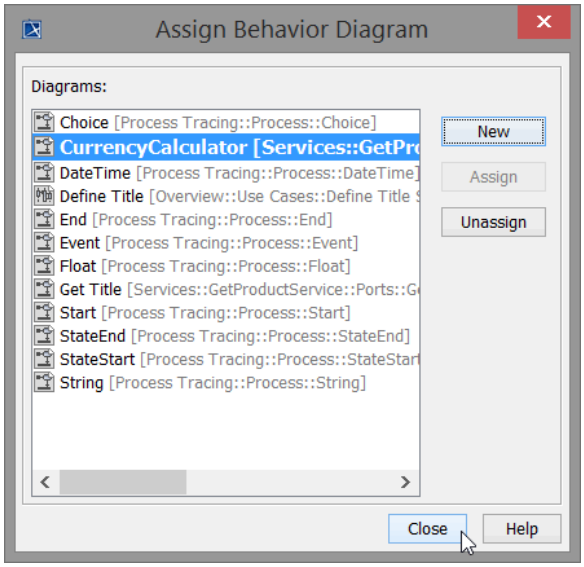
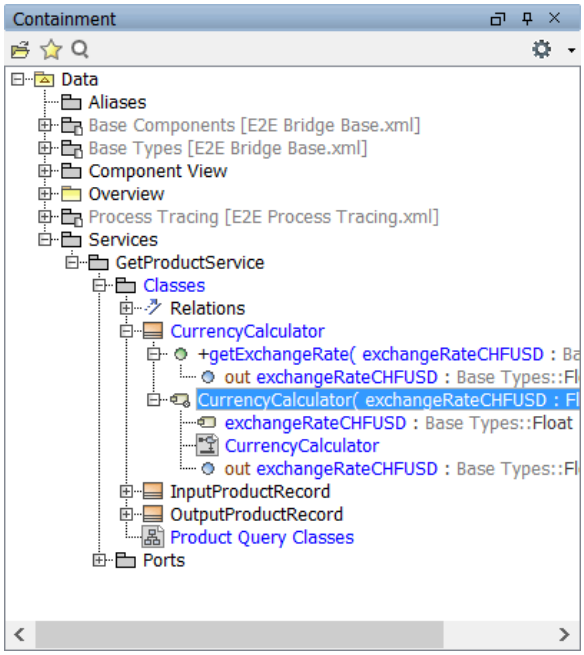


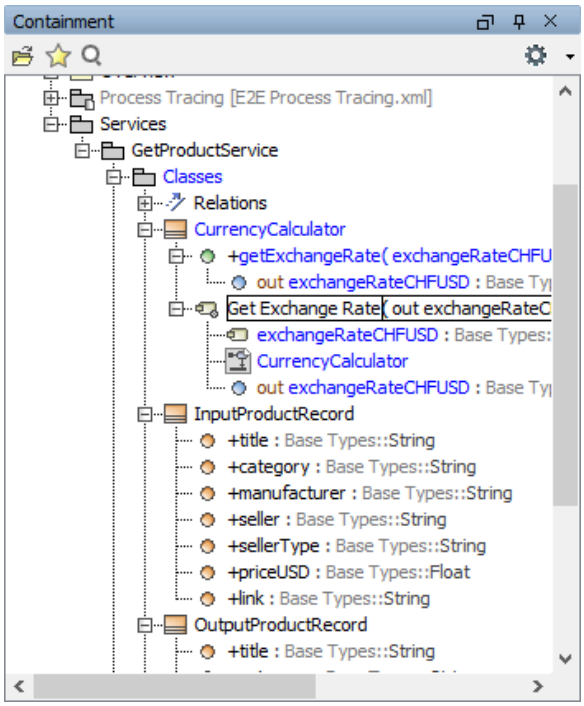
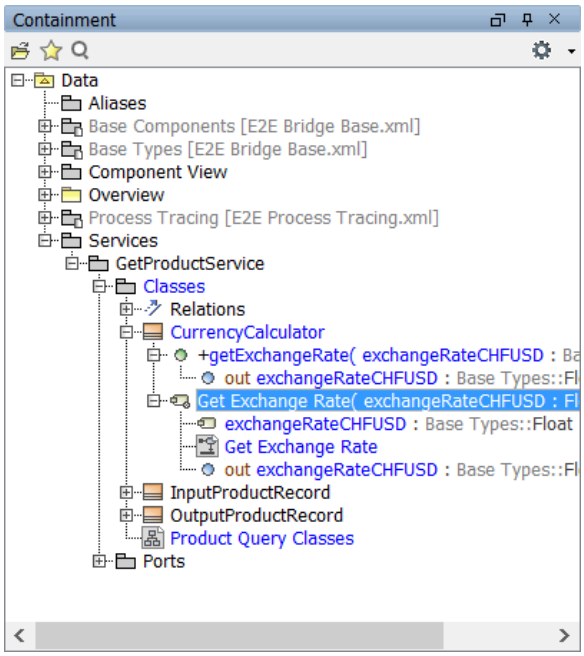
Activities implement the behavior of operations. Each class operation has to be assigned to its implementing activity diagram. When the operation is called, the assigned activity diagram will be executed.

The activity diagram implementing the class operation **getExchangeRate** has not been created yet. In the next step, you will directly assign a new activity diagram to the operation **getExchangeRate**. Select the operation **getExchangeRate** in the containment tree with the right mouse button and choose **Behavior Diagram > Assign...**.

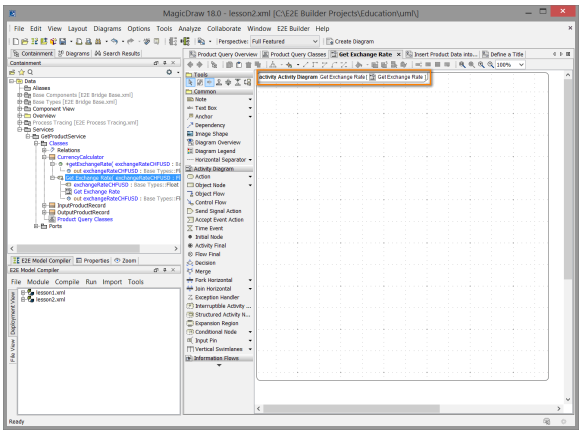


	The **Assign Behavior Diagram** dialog displays a list of existing activity diagrams that can be assigned to the operation. However, this operation gets assigned a new activity diagram. Click the **New** button.
	Choose **Activity Diagram** from the drop down list.
	The **Specification** dialog of the new activity diagram opens. MagicDraw automatically creates an activity diagram and gets the name from the context of the operation: **CurrencyCalculator**. Click **Close**.

	The new activity diagram **CurrencyCalculator** is now listed in the **Assign Behavior Diagram** dialog. It is displayed in bold indicating that this is the activity diagram assigned to the operation. Click **Close**.
	Expand the activity **CurrencyCalculator** in the containment tree. The activity has been created automatically and contains the activity diagram having the same name. MagicDraw uses the activity diagram name as default name for the activity. Furthermore, all parameters and activity parameter nodes are created automatically, according to the class operation parameters.

	As the name of an activity should always correspond to the operation it specifies, select the activity **CurrencyCalculator** in the containment tree and rename it to **Get Exchange Rate**.
	Note that MagicDraw renamed the corresponding activity diagram as well.

The created activity diagram is displayed in the diagram pane:



If you double-click the operation **getExchangeRate** in the containment tree, the assigned activity diagram **Get Exchange Rate** will always be opened in the diagram pane.

The implementation of the operation **getExchangeRate** will be explained later when you will be specifying the Activities.

Save the UML model.