

Creating increaseTime Operation and increaseTime Activity

An **increaseTime** operation is necessary for the StopWatch operation. It is used to increase the value of time by 1 whenever the operation is called. Therefore, we need to create an operation and Activity for the **StopWatch** Class to define this operation the same as we did for a resetTime operation and resetTime Activity.

To create an operation and an Activity for the StopWatch

1. Right-click the **StopWatch** Class in the containment browser and select **New Element > Operation**.
2. Name the new operation "*increaseTime*".
3. Right-click the **StopWatch** Class in the containment browser and select **New Element > Activity**.
4. Name the new Activity "*increaseTime*".
5. Right-click the **increaseTime** Activity in the containment browser and select **New Diagram > ActivityDiagram** to add an Activity diagram to the increaseTime Activity. The new Activity diagram will be created under the **increaseTime** Activity. We will use the default name of this diagram, which is "**increaseTime**".

To increase the time values, the increaseTime Activity will do the following

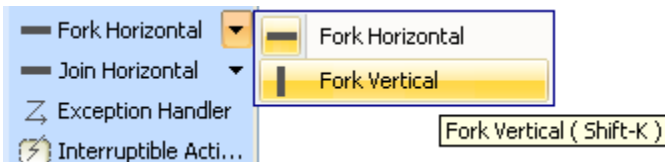
- (i) get the object of the StopWatch using a ReadSelfAction
- (ii) obtain the current time value using the ReadStructuralFeatureAction
- (iii) increment the time value by one using an OpaqueBehaviorAction
- (iv) set the increased time value to the object of the StopWatch using AddStructuralFeatureValueAction
- (v) set the specification of the IncreaseTime Activity to the IncreaseTime Operation

(i) Getting the object of the StopWatch using a ReadSelfAction

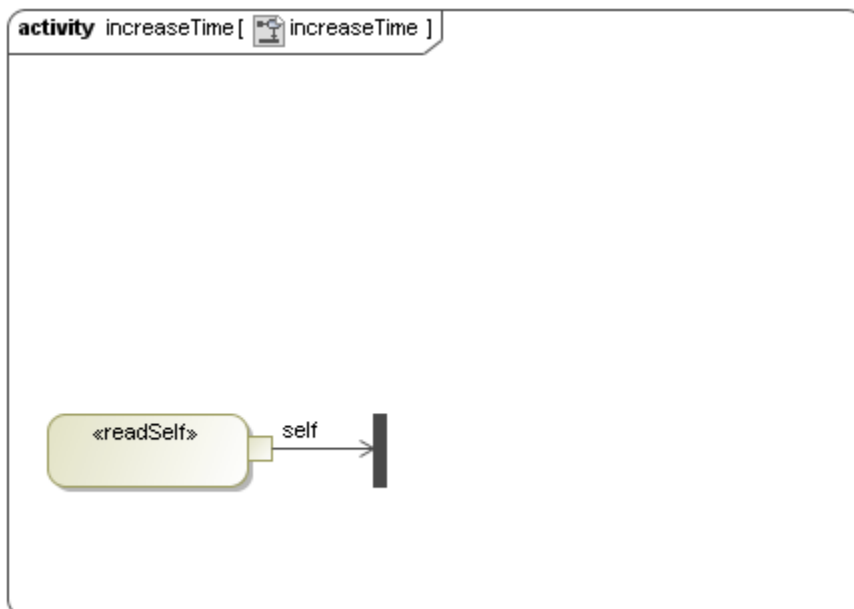
The Object of the StopWatch, which contains the time value, must be obtained by using a ReadSelfAction. To create the ReadSelfAction, you can follow the same steps used to create the ReadSelfAction in the **resetTime** Activity. In this example, the Object, which is the value of the output pin of the ReadSelfAction, needs to be supplied to multiple Actions (ReadStructuralFeatureAction and AddStructuralFeatureValueAction that will be created later). Therefore, a Fork must be added to this Activity.

To add a Fork to an Activity

1. Click **Fork Vertical** on the Activity diagram toolbar.



2. Click the increaseTime Activity diagram to create a Fork.
3. Click **ObjectFlow** on the Activity diagram toolbar to connect the fork and the **self** output pin.

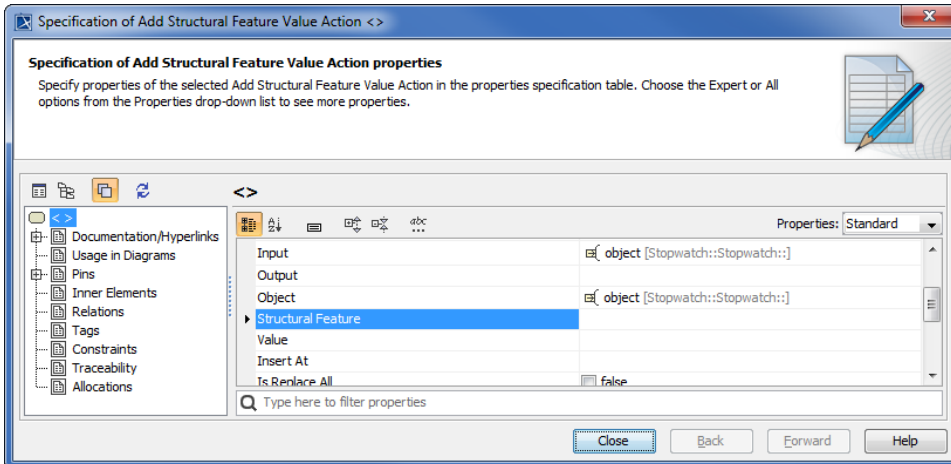


(ii) Obtaining the current time value using a ReadStructuralFeatureAction

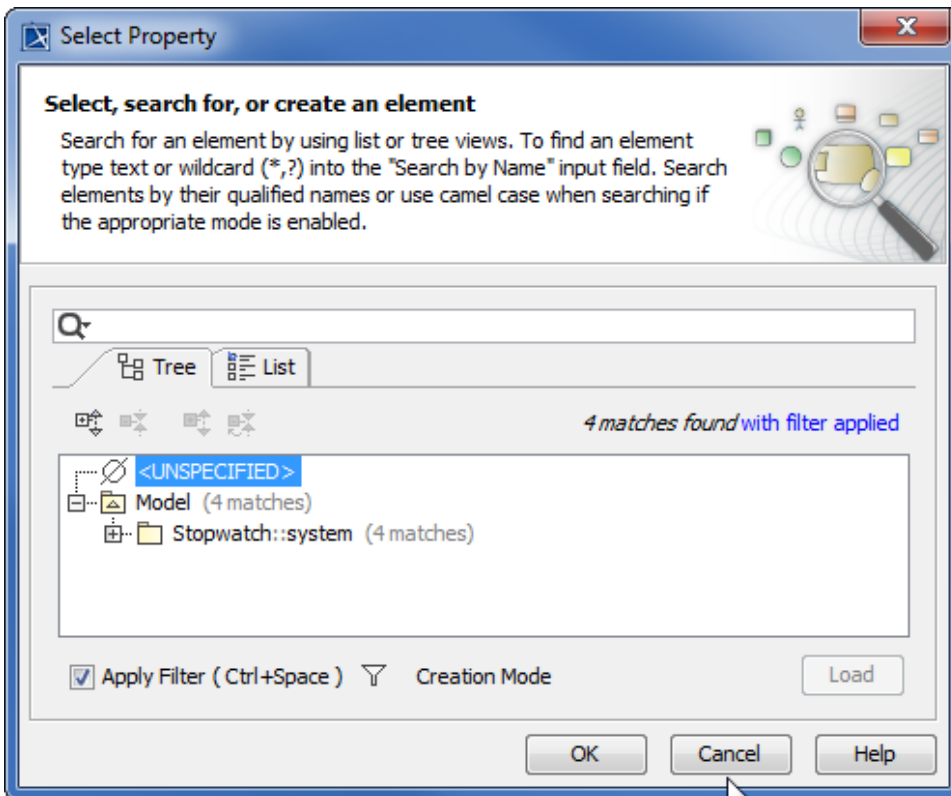
Once you have obtained the object of the Stopwatch, you will need to get the time value.

To get the current time value using a ReadStructuralFeatureAction

1. Click **Action > Any Action** on the Activity diagram toolbar. The **Select Action MetaClass** dialog will open.
2. Select **ReadStructuralFeatureAction** and click **OK**.
3. Click the **increaseTime** Activity diagram. A new ReadStructuralFeatureAction will be created on the diagram.
4. Right-click the ReadStructuralFeatureAction symbol on the diagram and select **Specification** to open its Specification window.

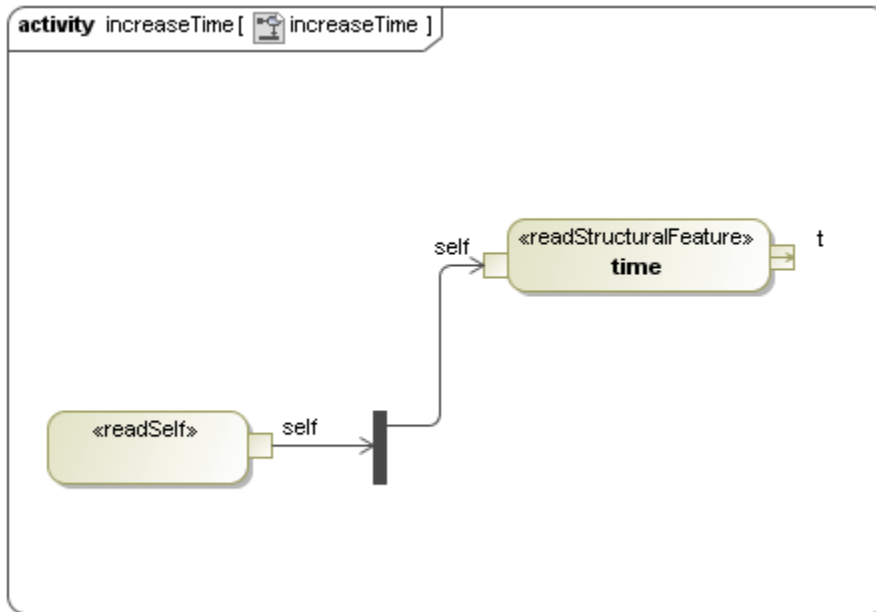


5. Select the **StructuralFeature** row and click the  button. The **SelectProperty** dialog will open.



6. Select the Attribute **time:Integer[1]** of the **StopWatch** Class and click the **OK** button.

- Click **ObjectFlow** on the Activity diagram toolbar to connect the Fork and the **self** input pin of ReadStructuralFeatureAction.

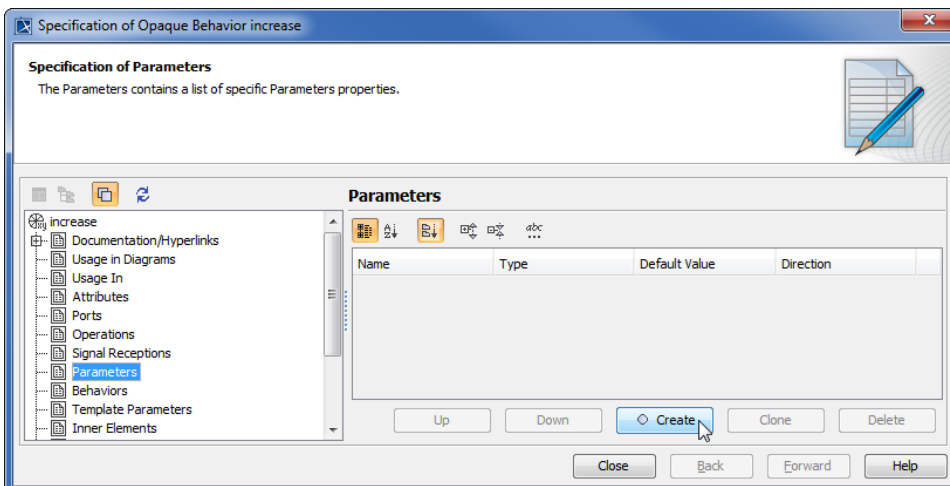


(iii) Incrementing the time value by one using an Opaque Behavior Action

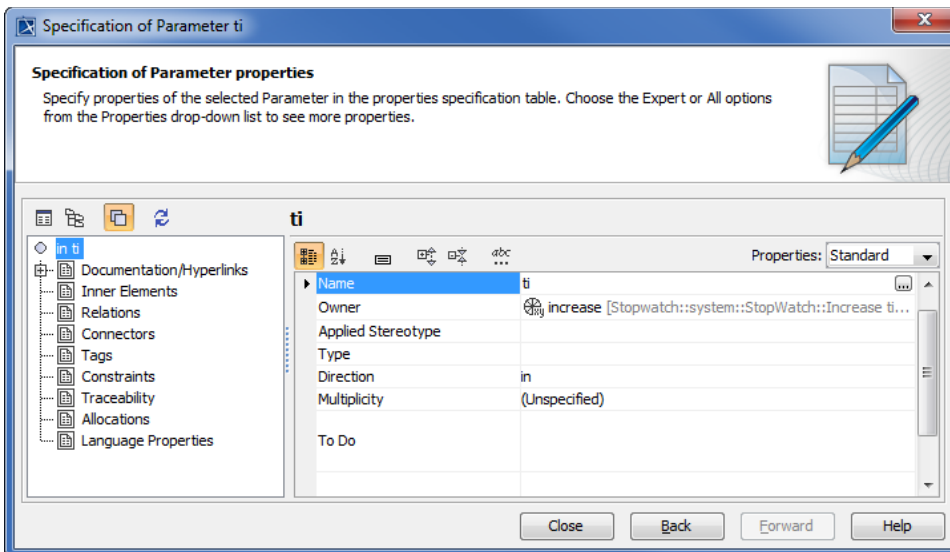
We need an OpaqueBehaviorAction to increase the time value. An OpaqueBehaviorAction receives an integer value as its input parameter and returns the integer value, which is the value of the input parameter that has been incremented by one.

To create an Opaque Behavior for the **increaseTime** Activity

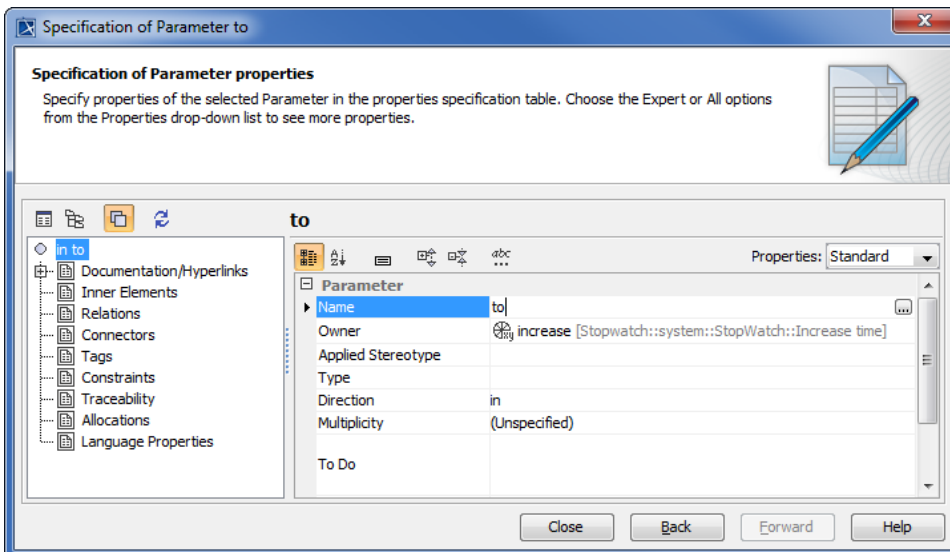
- Right-click the **increaseTime** Activity in the containment browser and select **New Element > Opaque Behavior**. A new Opaque Behavior will be created under the **increaseTime** Activity.
- Name it "**increase**".
- Right-click the **increase** Opaque Behavior in the containment browser and select **Specification** to open its Specification window.
- Select the **Parameters** node in the Specification window and click the **Create** button. A new parameter will be created for the **increase** Opaque Behavior, and the **Parameter** Specification window will open.



- Name the parameter "**ti**", select **Integer** as its type, and select **in** as its direction.



6. Click the **Back** button to return to the Specification window of the **increase** Opaque Behavior.
7. Repeat the same steps used to create the parameter **ti** to create another parameter, which will be a return parameter of the **increase** Opaque Behavior.
8. Name the return parameter **"to"**, select **Integer** as its type, and select **return** as its direction.

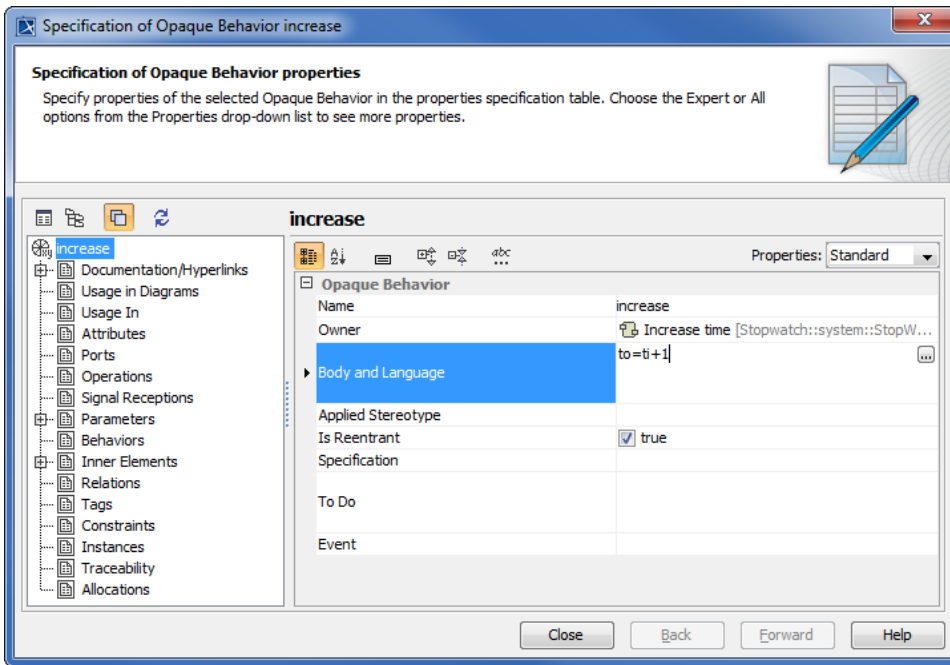


9. Click the **Back** button to return to the Specification window of the **increase** Opaque Behavior.

Once the parameters "ti" and "to" have been created, we will write a simple JavaScript that will be executed during the simulation.

To create a simple JavaScript to be executed in the simulation

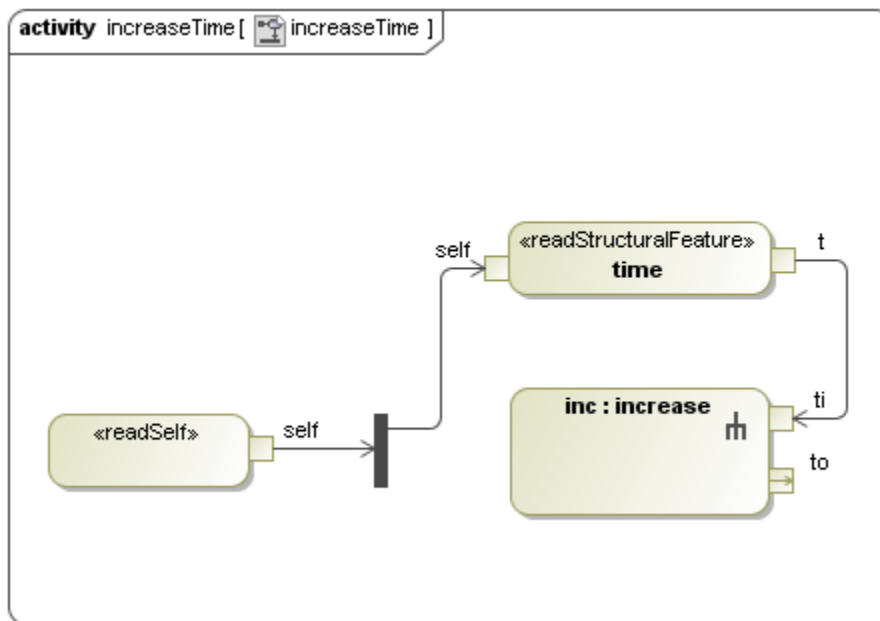
1. Open the **increase** Opaque Behavior's Specification window and select the **increase** Opaque Behavior node on the left-hand side of the dialog.
2. Type a JavaScript into the **Body** row, e.g., **"to=ti+1"**.



Note

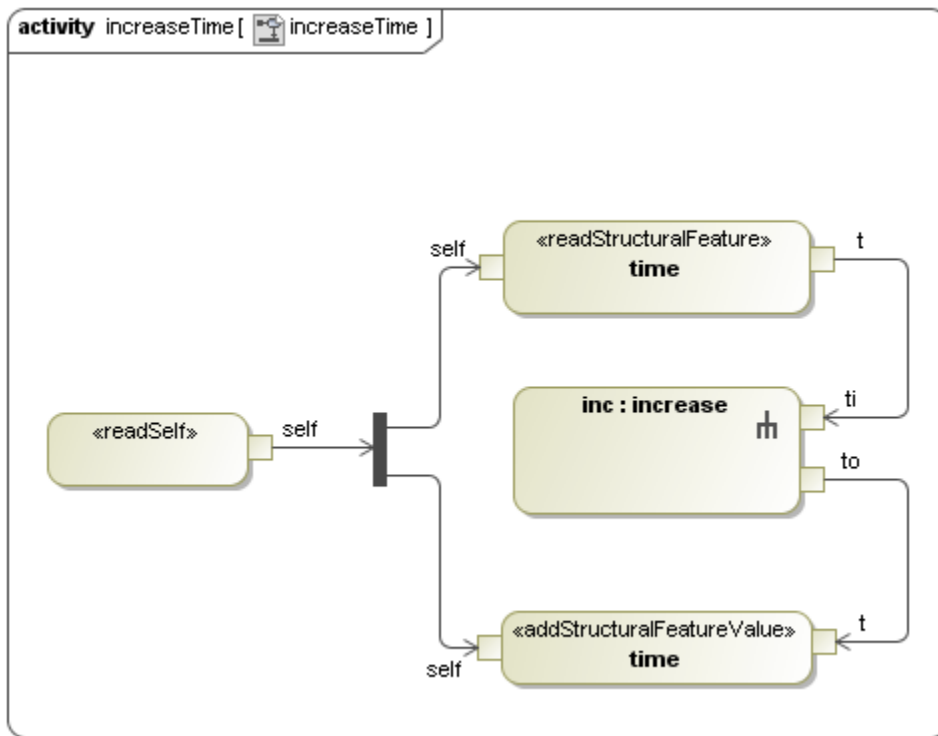
You can use any scripting language that is supported by JSR-223. To specify the scripting language that you are going to use, type it directly in the **Language** row. JavaScript will be used by default if no scripting language is specified.

3. Click **Close** to close the Specification window.
4. Create an OpaqueBehaviorAction on the **increaseTime** Activity by dragging the created **increase** Opaque Behavior from the containment browser to the **increaseTime** Activity diagram. A new OpaqueBehaviorAction will be created with the pins that correspond to the defined parameters **ti** and **to**.
5. Name the created OpaqueBehaviorAction "inc".
6. Click **ObjectFlow** on the Activity diagram toolbar to connect the output pin **t** of the ReadStructuralFeatureAction and the input pin **ti** of the **inc: increase** OpaqueBehaviorAction .



(iv) Setting the increased time value to the object of Stopwatch using AddStructuralFeatureValueAction

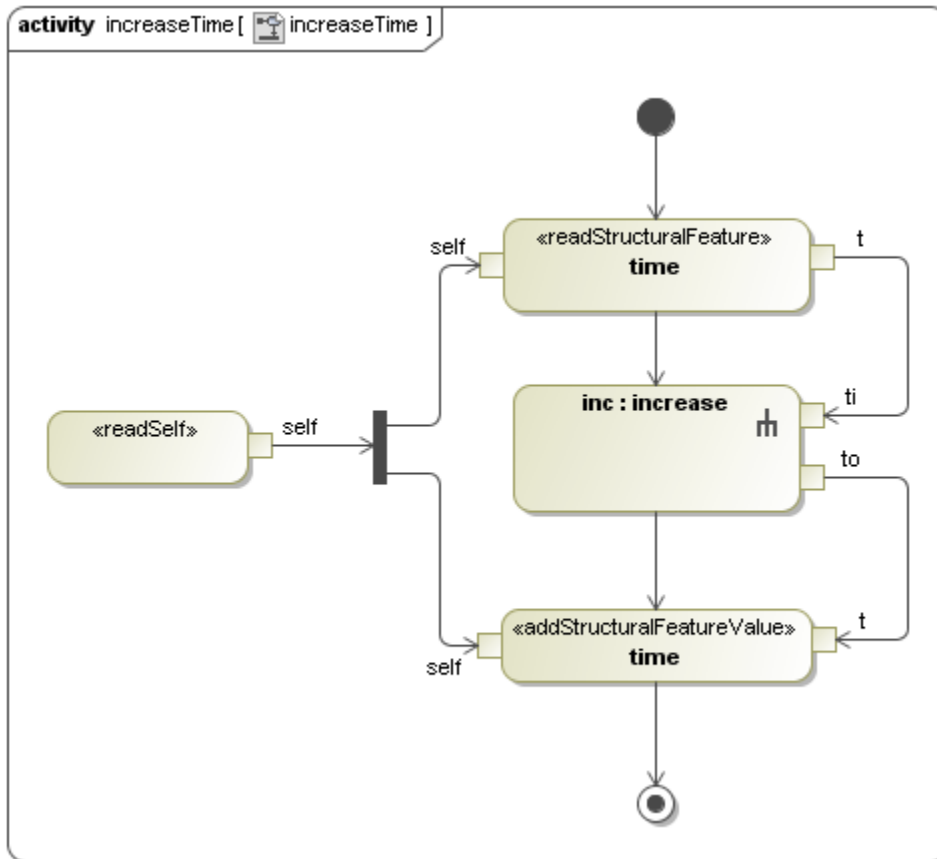
Once the time value has been increased using the **inc:increase** OpaqueBehaviorAction, you need to set it back to the Object of **StopWatch**. To do this, you can follow the same steps used to create the AddStructuralFeatureValueAction on the **resetTime** Activity.



To set the increased time value to the object of Stopwatch


1. Follow the same steps used to create the AddStructuralFeatureValueAction on the **resetTime** Activity diagram.
2. Get the AddStructuralFeatureValueAction to set the value to the time:Integer of Stopwatch. Make sure that the **IsReplaceAll** of the AddStructuralFeatureValueAction is set to **true**.
3. Click **ObjectFlow** on the Activity diagram toolbar to connect from the output pin **to** of **inc:increase** OpaqueBehaviorAction to the input pin **t** of the AddStructuralFeatureValueAction (see the steps required for resetting the time value of the Stopwatch object to zero with AddStructuralFeatureValueAction in [Creating resetTime Operation and resetTime Activity](#)).

4. Add an Initial Node and an Activity Final stage to the increaseTime Activity and click **ControlFlow** on the Activity diagram toolbar to connect between the Actions.



(v)Setting the specification of the increase time Activity to the IncreaseTime Operation

To set the specification of the increaseTime Activity to the increaseTime operation

1. Open the Specification window of the **increaseTime** Activity by right-clicking the **increaseTime** Activity in the containment browser and select **Specification**.
2. Select the **Specification** row and click the  button. The **Select Element** dialog will open.
3. Select the **increaseTime** operation of the **StopWatch** Class as the specification of the Activity.
4. Click **OK** to close the **Select Element** dialog.
5. Click **Close** to close the Specification window.