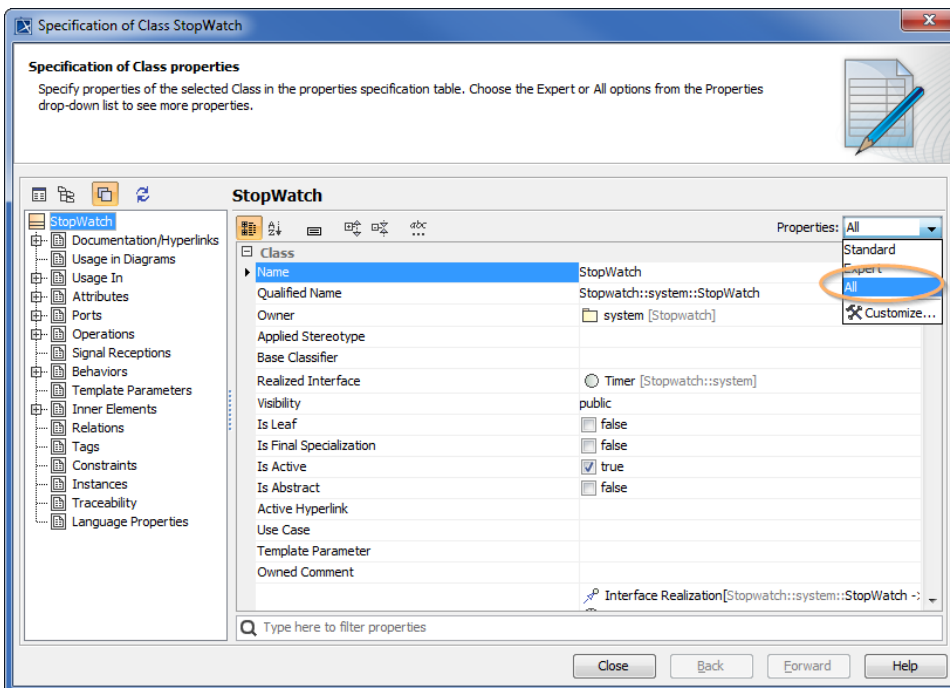# Defining the stopwatch Classifier Behavior

A Class Element, which can be executed with Magic Model Analyst, must have its Classifier Behavior defined. The Classifier Behavior can be any kind of Behavior such as Activity, State Machine, and Interaction. This tutorial uses the State Machine Behavior to define the Behavior of the stopwatch.
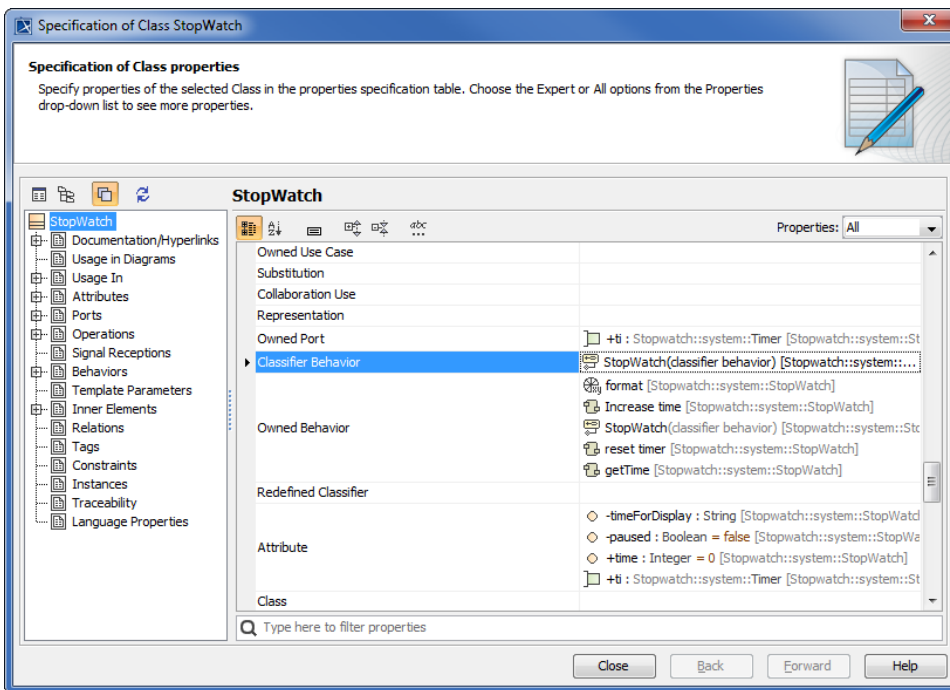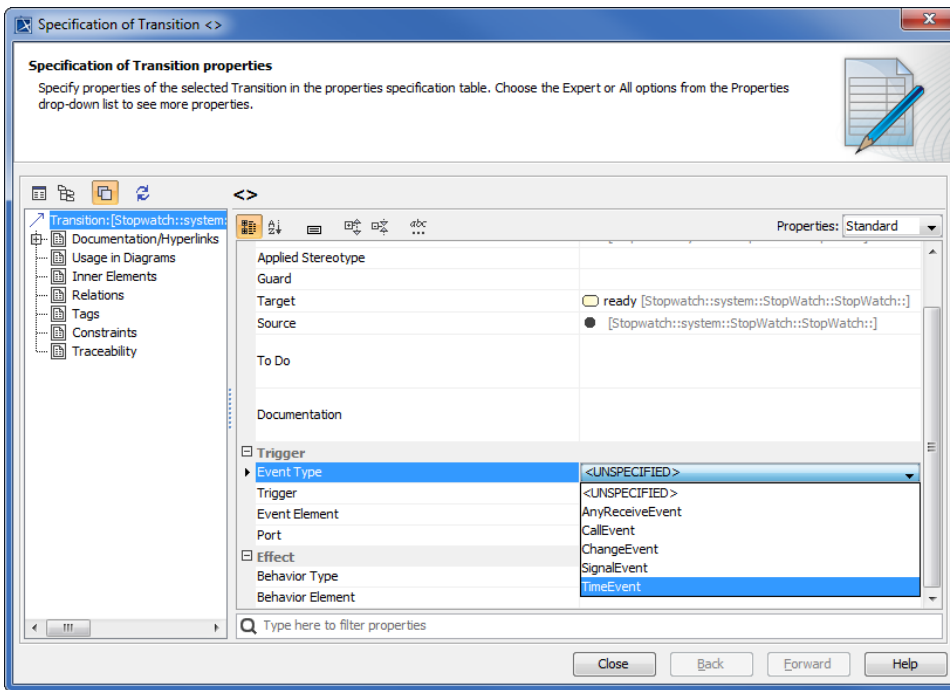
To define the Classifier Behavior for the **StopWatch** Class, you have to create the Behavior on the StopWatch, which will be assigned later as the Classifier Behavior of the **StopWatch** automatically.

To define the Classifier Behavior for the **StopWatch** Class

1. Right-click the StopWatch symbol on the Class diagram and select **New Diagram** > **State-Machine Diagram...**. A new State Machine Element will be created under the StopWatch Class with a new State Machine diagram.
2. Name the State Machine diagram "StopWatch".
3. Make sure that the **StopWatch** State machine is the Classifier Behavior of the **StopWatch** Class. To see the Classifier Behavior of the StopWatch Class, right-click the **StopWatch** symbol on the Class diagram and select **Specification** from the context menu. The Specification window will open.
4. Select **All** from the **Properties** drop-down menu.

5. Scroll down to see the **ClassifierBehavior** row, and you will see that the Classifier Behavior of the StopWatch Class is defined by the StopWatch State Machine.

Specification of Transition <>

Specification of Transition properties

Specify properties of the selected Transition in the properties specification table. Choose the Expert or All options from the Properties drop-down list to see more properties.

<>

Transition:[Stopwatch::system:
- Documentation/Hyperlinks
- Usage in Diagrams
- Inner Elements
- Relations
- Tags
- Constraints
- Traceability

Properties: Standard

Applied Stereotype	
Guard	
Target	ready [Stopwatch::system::StopWatch::StopWatch::]
Source	[Stopwatch::system::StopWatch::StopWatch::]
To Do	
Documentation	
Trigger	
Event Type	<UNSPECIFIED>
Trigger	<UNSPECIFIED>
Event Element	AnyReceiveEvent
Port	CallEvent
Effect	ChangeEvent
Behavior Type	SignalEvent
Behavior Element	TimeEvent

Q Type here to filter properties

Close   Back   Forward   Help

Specification of Class StopWatch

Specification of Class properties

Specify properties of the selected Class in the properties specification table. Choose the Expert or All options from the Properties drop-down list to see more properties.

StopWatch

StopWatch
- Documentation/Hyperlinks
- Usage in Diagrams
- Usage In
- Attributes
- Ports
- Operations
- Signal Receptions
- Behaviors
- Template Parameters
- Inner Elements
- Relations
- Tags
- Constraints
- Instances
- Traceability
- Language Properties

Properties: All

Owned Use Case	
Substitution	
Collaboration Use	
Representation	
Owned Port	+ti : Stopwatch::system::Timer [Stopwatch::system::St
Classifier Behavior	StopWatch(classifier behavior) [Stopwatch::system::...
	format [Stopwatch::system::StopWatch]
	Increase time [Stopwatch::system::StopWatch]
Owned Behavior	StopWatch(classifier behavior) [Stopwatch::system::Sto
	reset timer [Stopwatch::system::StopWatch]
	getTime [Stopwatch::system::StopWatch]
Redefined Classifier	
Attribute	-timeForDisplay : String [Stopwatch::system::StopWatc
	-paused : Boolean = false [Stopwatch::system::StopWa
	+time : Integer = 0 [Stopwatch::system::StopWatch]
	+ti : Stopwatch::system::Timer [Stopwatch::system::St
Class	

Q Type here to filter properties

Close   Back   Forward   Help

Next, we are going to create the StopWatch initial and final stages, and the four States (**Ready**, **Running**, **Paused**, and **Stopped**) in the initial stage as well.
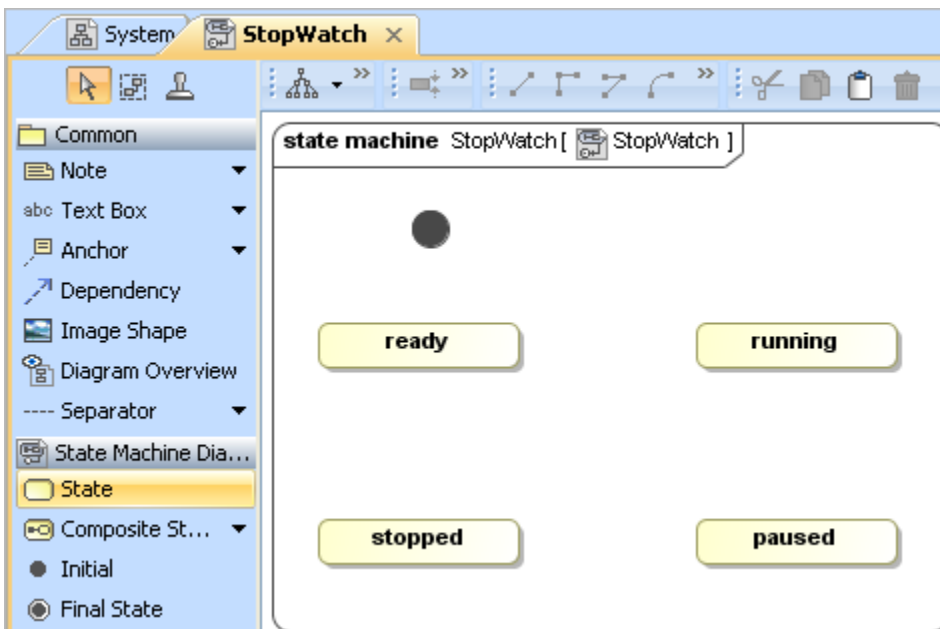
To add an **Initial** stage to the **StopWatch** State Machine

- Click **Initial** on the State Machine diagram toolbar, and then click any area on the State Machine diagram to place the Initial stage.
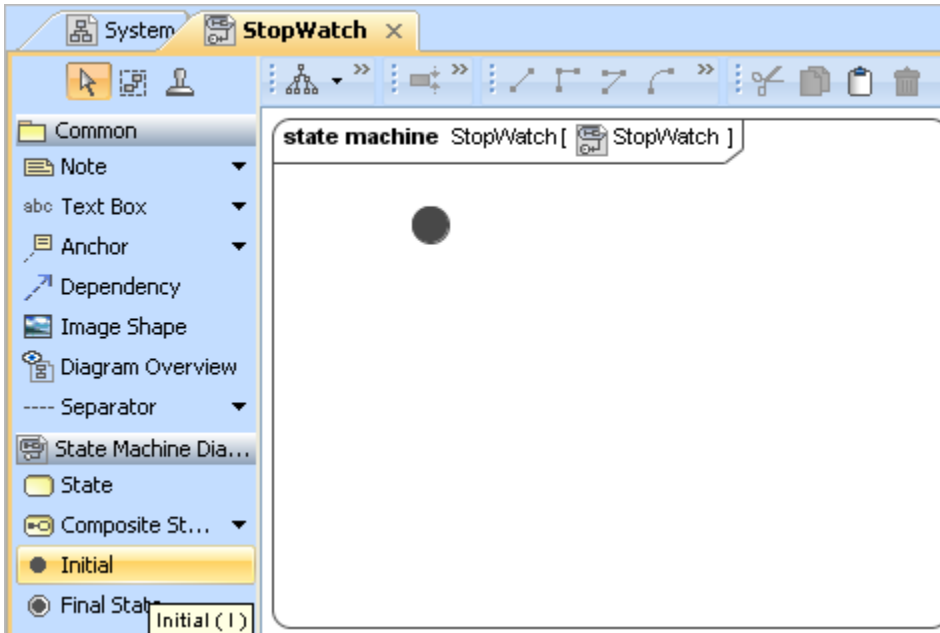

To add the ready, running, paused, and stopped States

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1. Click **State** on the State Machine diagram toolbar, and then click any area on the diagram to place a State. Name the created State *"ready"*.
2. Repeat Step 1 to create the "*running*", "*paused*", and "*stopped*" States.

To add a final stage to the State machine diagram

- Click **Final State** on the State Machine diagram toolbar, and then click any area on the diagram to place the final stage.
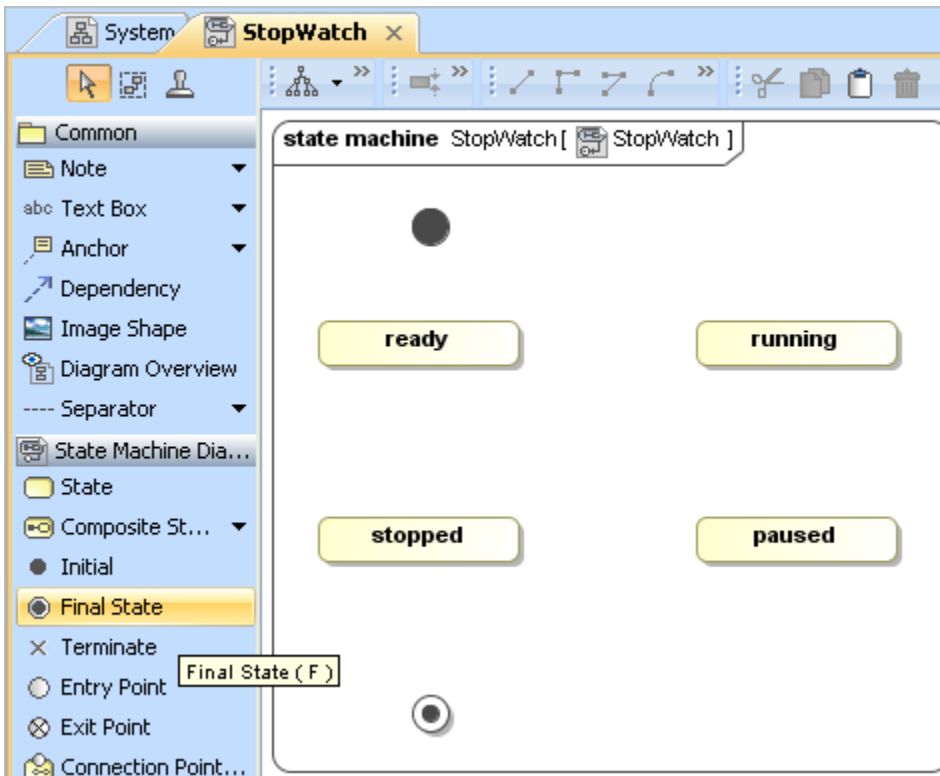
Now that the initial and final stages have been created, you will need to add the transitions between them and among the four States in the initial stage.

To add a transition from the **Initial** stage to the **ready** State

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1. Click a stage (the **Initial** stage in this example) that will be the source of the transition to be created. The smart manipulator toolbar will open.
2. Click the **Transition** icon on the smart manipulator toolbar.

3. Click a State (the **ready** State in this example) that will be the target of the transition.

4. Repeat Steps 1 to 3 to create more transitions between the following States:

    from the **ready** to **running** State
    from the **running** to **paused** State
    from the **running** to **stopped** State
    from the **paused** to **running** State
    from the **paused** to **stopped** State
    from the **stopped** to **ready** State
    from the **stopped** State to the **Final** stage
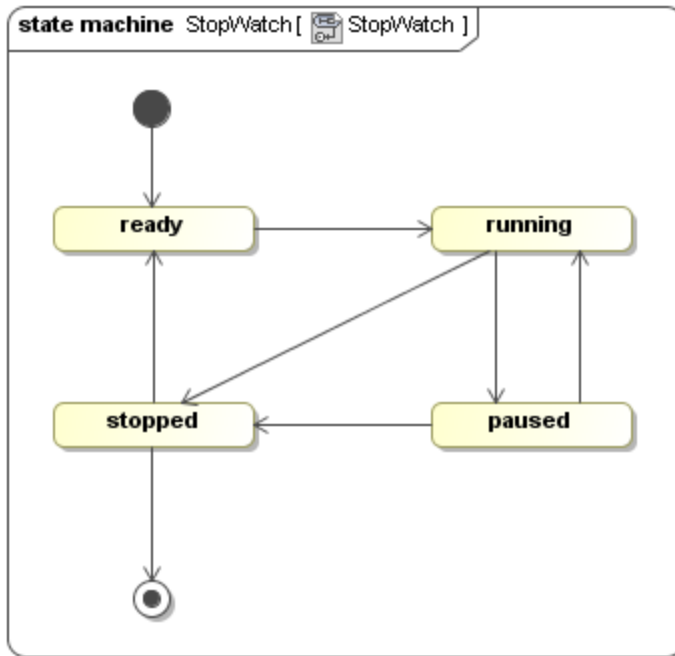
5. Create a looping transition to the **running** State by clicking the **Transitiontoself** icon on the smart manipulator toolbar.
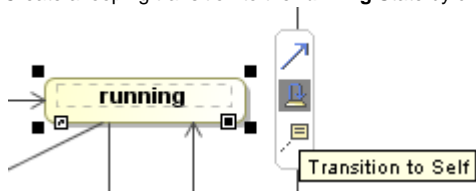

6. Now your StopWatch State machine will look similar to the one shown in the following figure
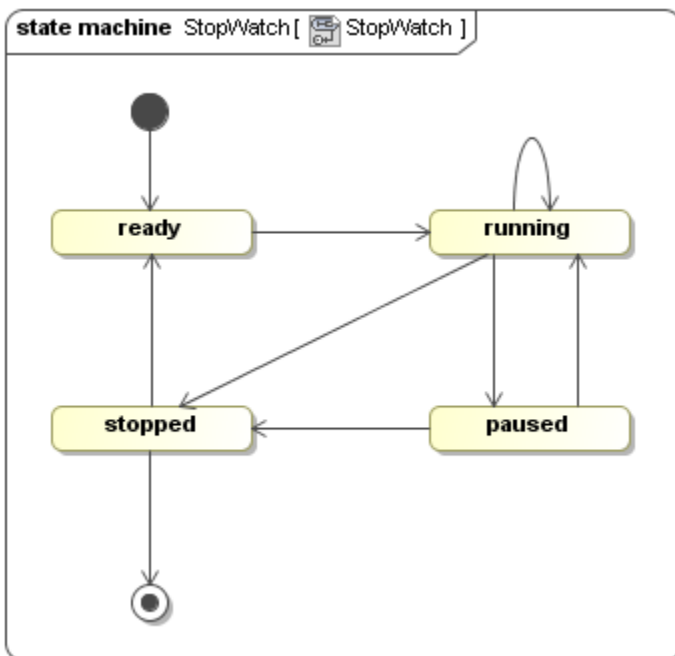
You will see that some of the created transitions have the SignalEvent triggers. These triggers need signal Elements and a package that is required to store those signal Elements. You can add a package and create the signal Elements by using the browser context menu.

To add a new package for the signal Elements

1. Right-click the **Model** node in the containment browser and select **New Element** > **Package**.
2. Name the created package *"signals"*.
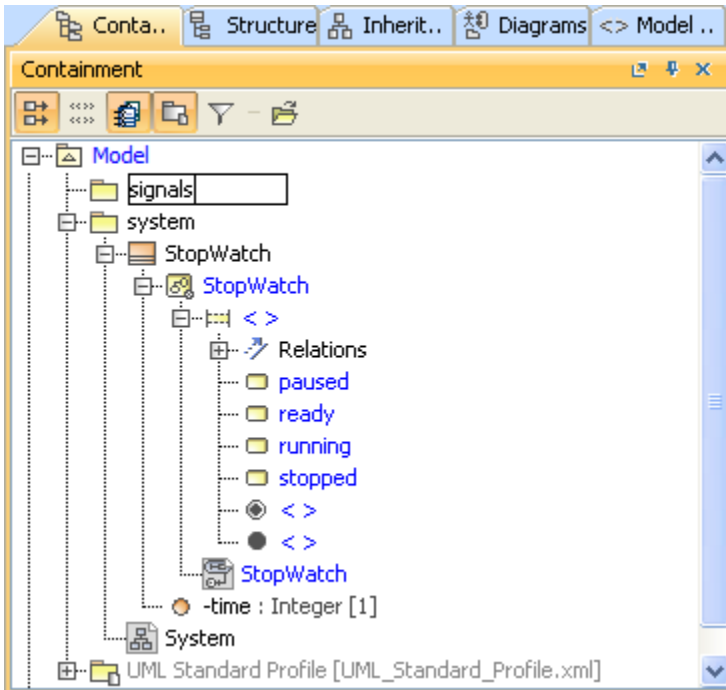
To create signal Elements

1. Right-click the **signals** package and select **New Element** > **Signal**.
2. Name the created signal *"reset"*. The **reset** signal will be created and stored in the **signals** package.
3. Repeat Steps 1 to 2 to create the **split**, **start**, **stop**, and **unsplit** signal Elements.
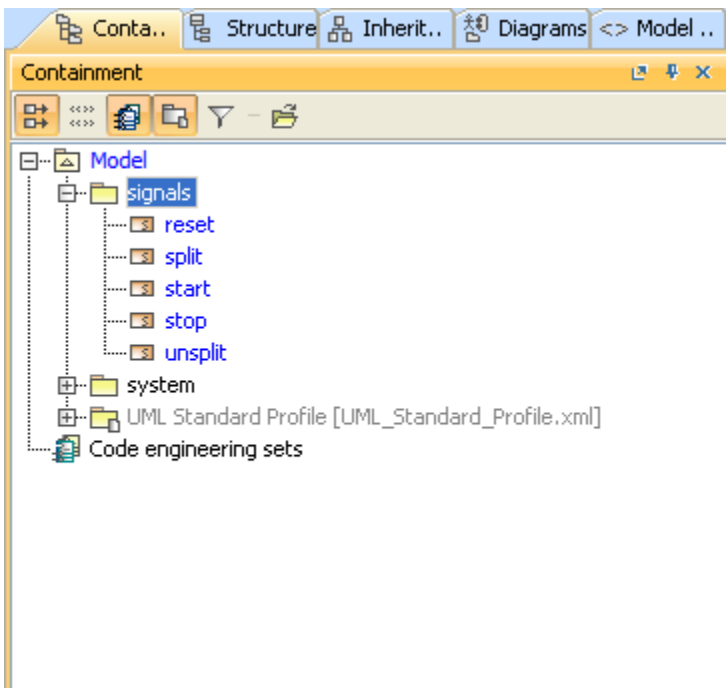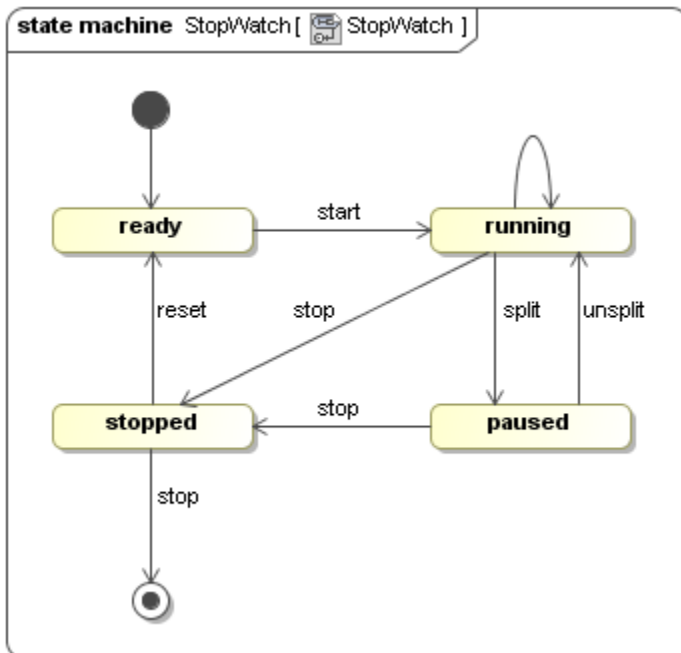

To create signal Events for the transitions on the StopWatch State Machine diagram

- Drag a signal Element from the containment browser to a transition on the State Machine diagram. The signal Event will later be specified as the trigger of the transition.
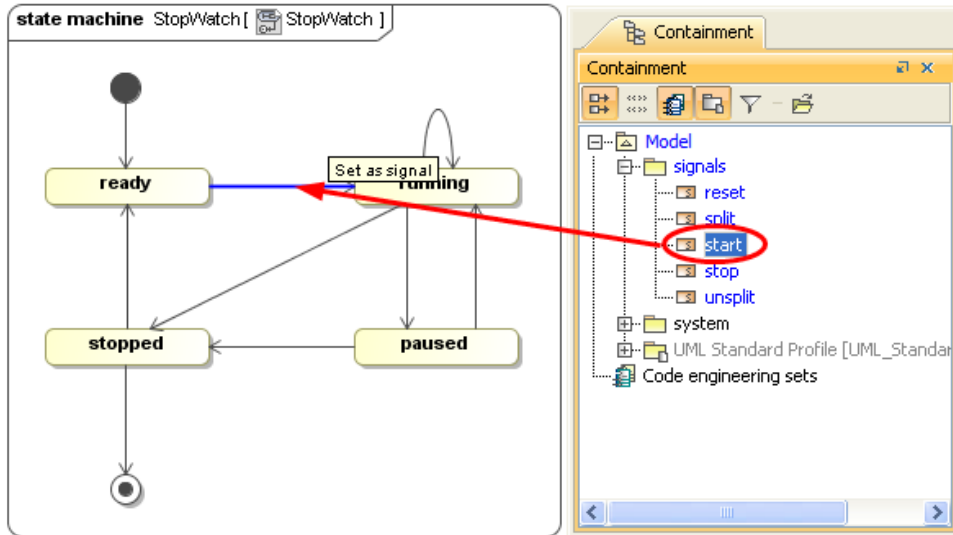
To create a signal Event for each transition

1. Drag the **start** signal to the transition between the **ready** and **running** States.
2. Drag the **split** signal to the transition between the **running** and **paused** States.
3. Drag the **stop** signal to the transition between the **running** and **stopped** States.
4. Drag the **unsplit** signal to the transition between the **paused** and **running** States.
5. Drag the **stop** signal to the transition between the **paused** and **stopped** States.
6. Drag the **reset** signal to the transition between the **stopped** and **ready** States.
7. Drag the **stop** signal to the transition between the **stopped** and **Final** States.

Now each and every transition between the States has its own signal Event. Next, you will also need to create a signal Event for the **transitiontoself** of the running State. The signal Event that will be created as the trigger for the **transitiontoself** is called **TimeEvent**.

To create a signal Event for the **transition to self** of the running State

1. Right-click the **Transitiontoself** of the running State and select **Specification** to open its Specification window.

2. Click the **Categorized View** button to open the properties of the transition in the categorized view.
3. Click the **EventType** row in the **Trigger** category and select **TimeEvent** from the drop-down menu.
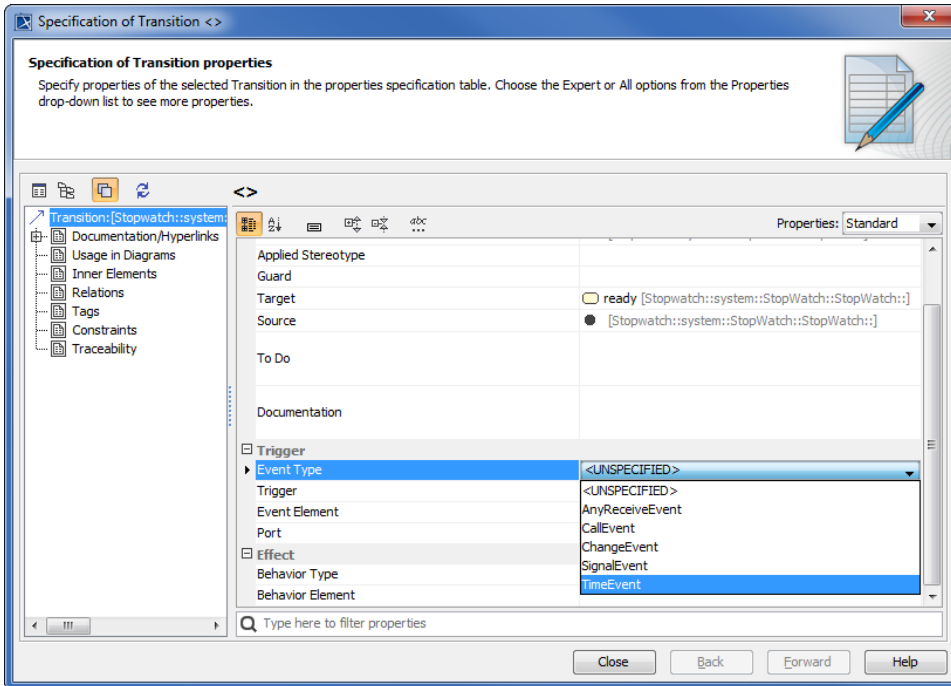
4. Click the **When** row in the **Trigger** category and type *"1s"* to specify that the trigger will send the time Event every second.
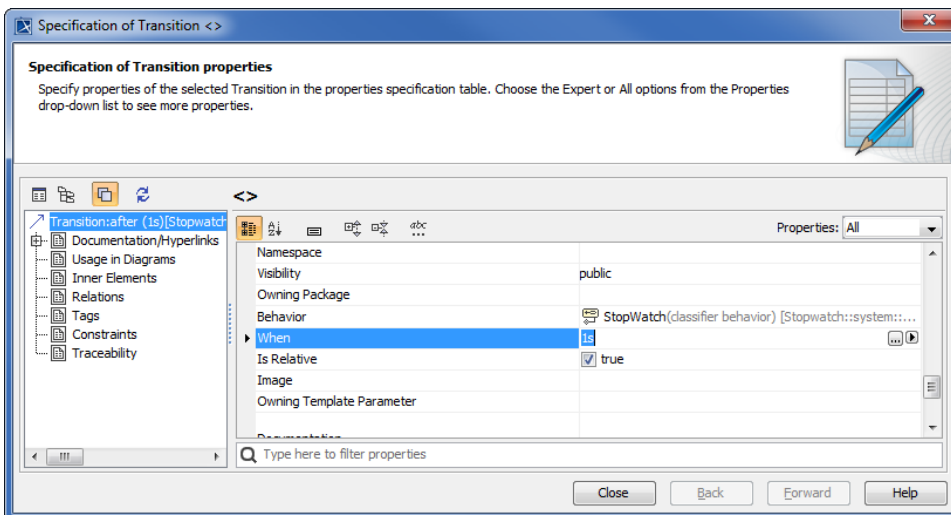
5. Click **Close**. You will see all of the created stages, States, transitions, and signal Events are shown on the StopWatch State Machine diagram.