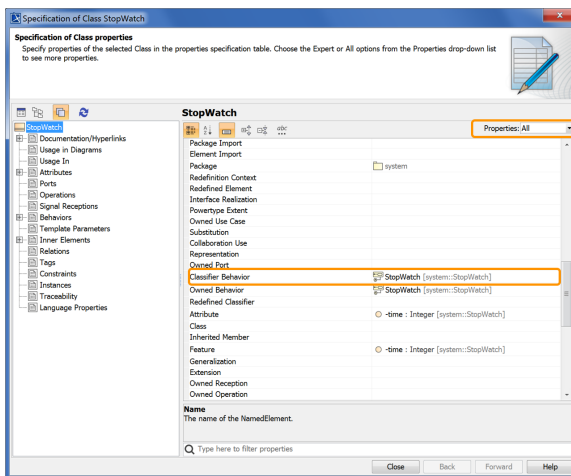


# Creating the Stopwatch state machine

Now that you have created the *StopWatch* Class, next create a State Machine to be its classifier behavior. This State Machine defines the active behavior of a *StopWatch*, which may be executed using Cameo Simulation Toolkit.

To define the State Machine for the *StopWatch* class

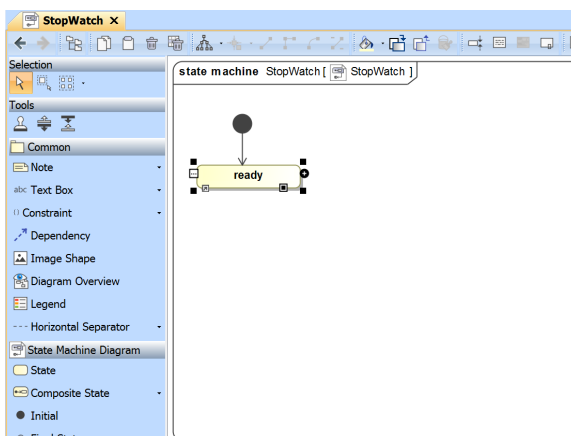
1. Right click on the *StopWatch* symbol on the Class diagram and select **Create Diagram > State Machine Diagram**. A new State Machine element will be created under the *StopWatch* class with a new State Machine diagram.
2. Make sure that the *StopWatch* state machine is the classifier behavior of the *StopWatch* class. To see the classifier behavior of the *StopWatch* class, right click on the *StopWatch* symbol in the Model Browser and select **Specification** from the context menu. The Specification window will open.
3. Select **All** from the **Properties** drop-down menu (see the following figure).
4. Scroll down to see the **Classifier Behavior** row and you will see that the classifier behavior of the *StopWatch* Class is defined by the *StopWatch* State Machine (see the following figure). (If it is not, then click on the **Classifier Behavior** property and choose the *StopWatch* State Machine to be the classifier behavior.)



Now create the States and Transitions for the *StopWatch* State Machine.

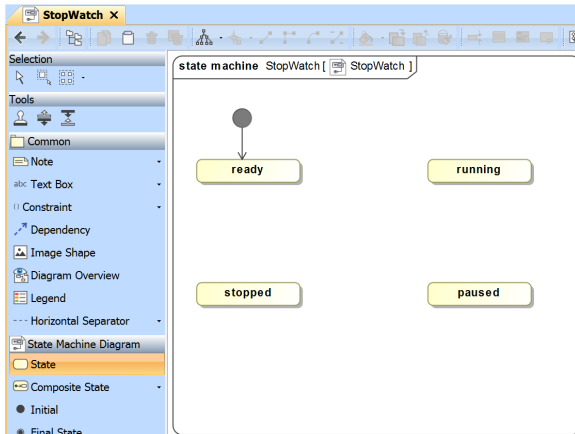
To add the *ready*, *running*, *paused*, and *stopped* States

1. The State Machine diagram is automatically created with an initial Pseudostate having a Transition to a starting State. Name the starting State *ready* (see the following figure).



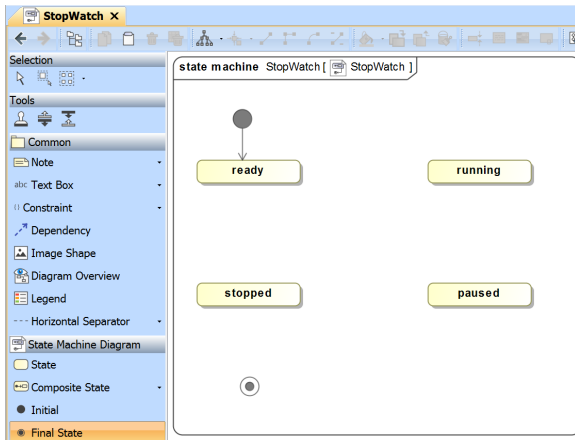
2. Click **State** on the State Machine Diagram toolbar, and then click any area on the diagram to place a State. Name the created State *running* (see the following figure).

3. Repeat Step 2 to create the *paused*, and *stopped* states.



To add a Final State to the State Machine diagram

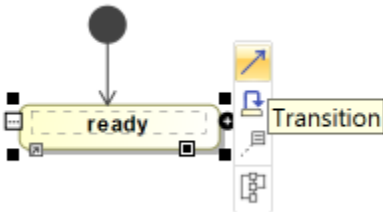
- Click **Final State** on the State Machine Diagram toolbar, and then click any area on the diagram to place the Final State (see the following figure).



Next you need to add Transitions between the States on the State Machine diagram.

To add Transitions to the State Machine diagram

- Click on a State (e.g., the *ready* state) that will be the source of the Transition to be created. The smart manipulator toolbar will open (see the following figure).
- Click the **Transition** icon on the smart manipulator toolbar (see the following figure).

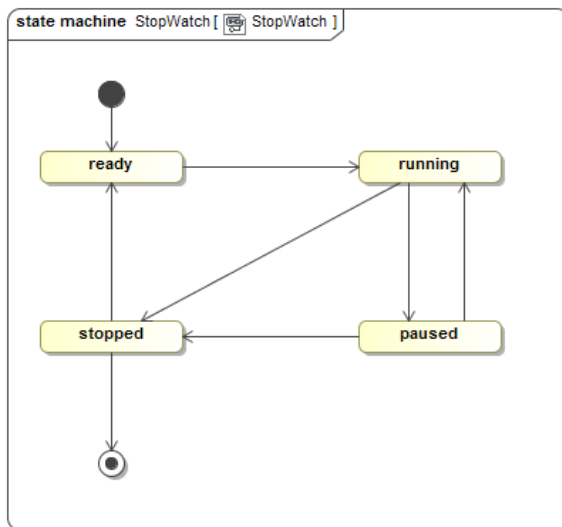


- Click a State (e.g., the *running* State) that will be the target of the Transition (see the following figure).

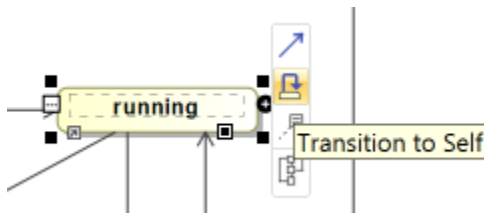


4. Repeat Steps 1 to 3 to create more transitions between the following states (see the following figure):

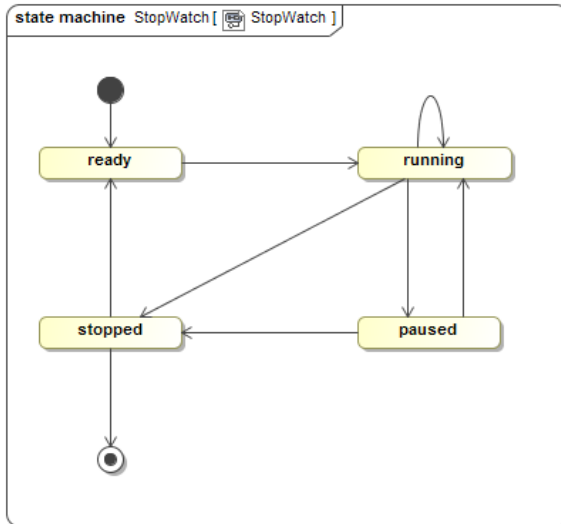
from the *running* State to the *paused* State  
 from the *running* State to the *stopped* State  
 from the *paused* State to the *running* State  
 from the *paused* State to the *stopped* State  
 from the *stopped* State to the *ready* State  
 from the *stopped* State to the final State



5. Create a looping transition to the *running* state by clicking the **Transition to Self** icon on the smart manipulator toolbar (see the following figure).



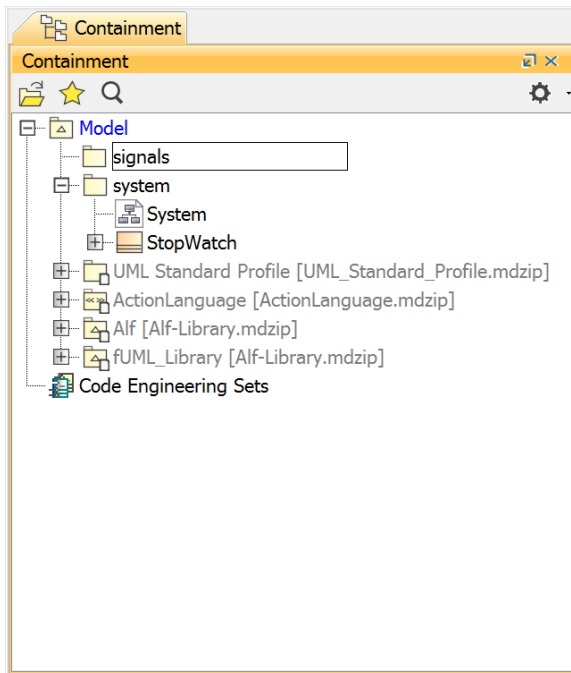
6. Now your *StopWatch* State Machine diagram will look similar to the the following figure.



Some of the Transitions just created will have Signal Event triggers. These triggers reference Signal elements, which will be stored in a separate Package. You can add a Package and create the Signal elements by using the Model Browser context menu.

To add a new Package for the Signal elements

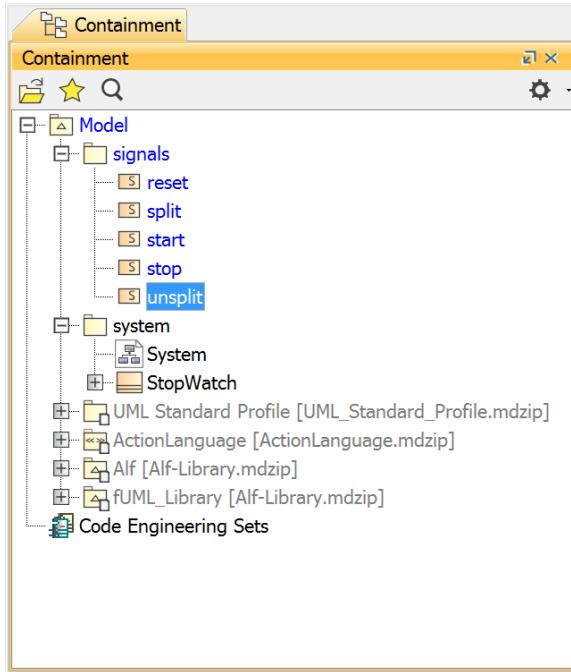
1. Right click on the *Model* node in the Model Browser and select **Create Element > Package**.
2. Name the created Package *signals* (see the following figure).



To create Signal elements

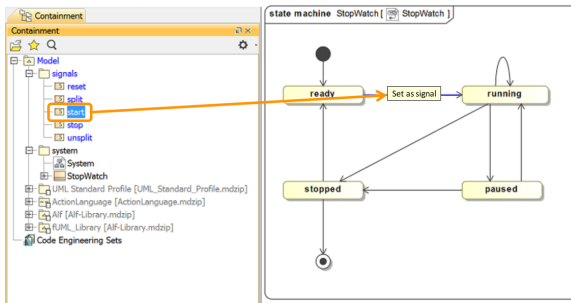
1. Right click on the *signals* Package and select **Create Element > Signal**. (If you don't see an entry for **Signal**, click on **Expert** in the lower left-hand corner of the Create Element window.)
2. Name the created Signal *reset*. The *reset* Signal will be created and stored in the *signals* Package.

- Repeat steps 1 and 2 to create the *split*, *start*, *stop*, and *unsplit* Signal elements (see the following figure).



To create Signal Events for the Transitions on the *StopWatch* State Machine diagram

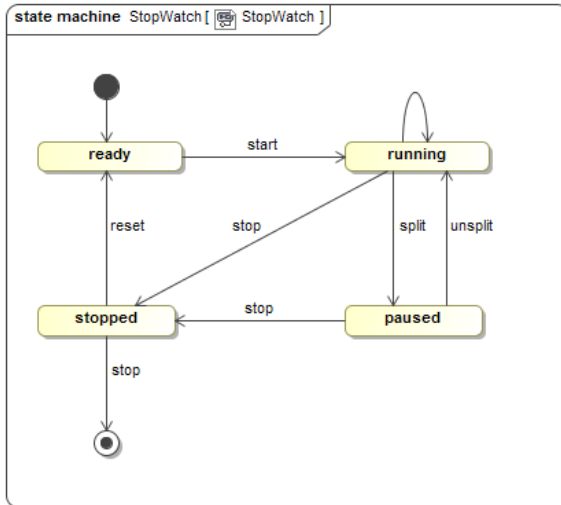
- Drag a signal element from the Model Browser to a transition on the State Machine diagram (see the following figure). The Signal Event will later be specified as the trigger of the Transition.



To create a Signal Event for each Transition (see the following figure)

- Drag the *start* Signal to the Transition between the *ready* and *running* States.
- Drag the *split* Signal to the Transition between the *running* and *paused* States.
- Drag the *stop* Signal to the Transition between the *running* and *stopped* States.
- Drag the *unsplit* Signal to the Transition between the *paused* and *running* States.
- Drag the *stop* Signal to the Transition between the *paused* and *stopped* States.
- Drag the *reset* Signal to the Transition between the *stopped* and *ready* States.

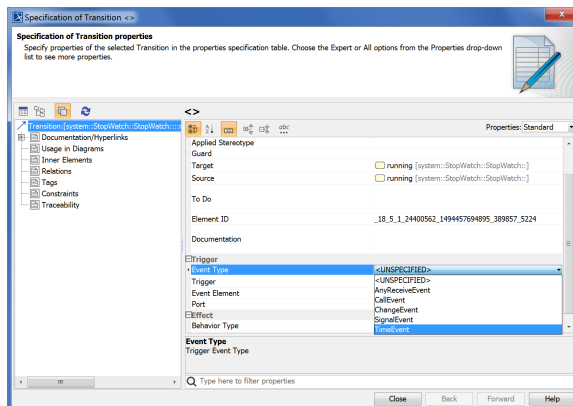
7. Drag the stop Signal to the Transition between the *stopped* and final States.



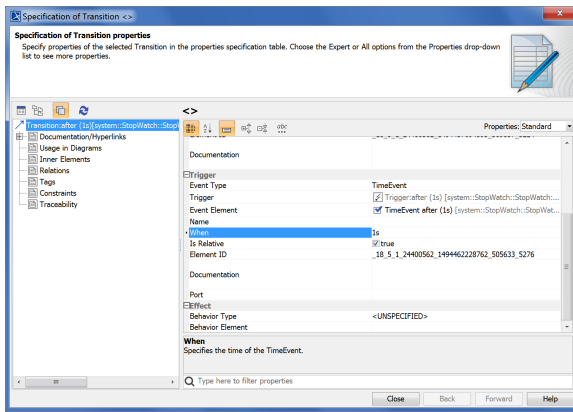
Now each and every Transition between the States has its own Signal Event. Next, you will also need to create a Time Event for the **Transition to Self** of the *running* State.

To create a Time Event for the **Transition to Self** of the *running* state

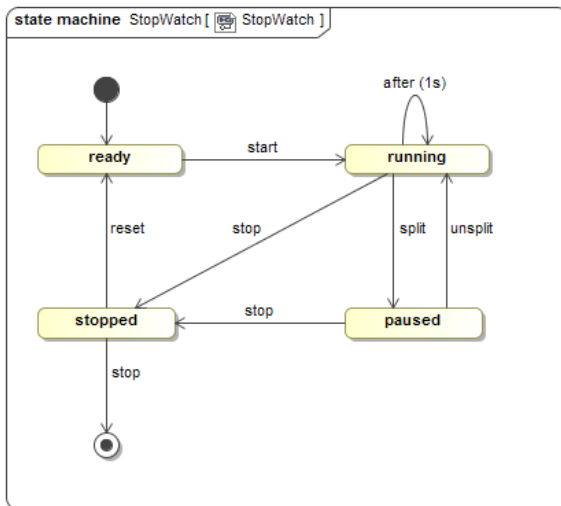
1. Right click the **Transition to Self** of the *running* state and select **Specification** to open its Specification window.
2. Click the **Categorized View** button to open the properties of the transition in the categorized view (see the following figure).
3. Click the **Event Type** row in the **Trigger** category and select **TimeEvent** from the drop-down menu (see the following figure).



4. Click the **When** row in the **Trigger** category and type "1s" to specify that the Time Event will occur every second (see the following figure).
5. Check the **Is Relative** box, so it is *true* (see the following figure).



6. Click **Close**. Your State Machine should look similar to the following figure.



Next: [Defining the Stopwatch operations using Alf](#)