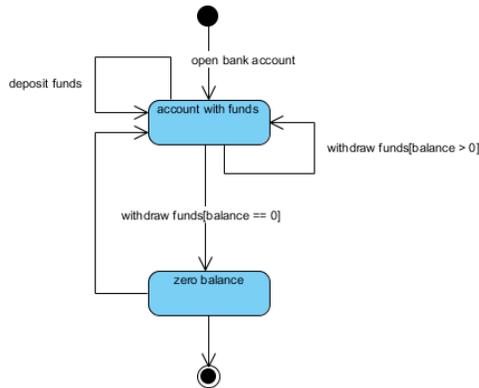


5 Steps to Draw a State Machine Diagram

This tutorial will show you how to draw a simple state machine diagram in 5 steps, using **Visual Paradigm**. We are going to walk through an example which models the behavior of a bank account, following the **Unified Modeling Language (UML)** as shown below.



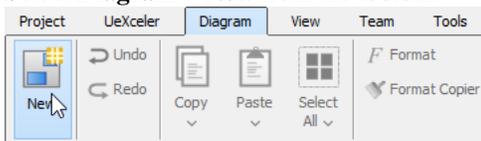
Step 1 – Define States

Generally speaking, a **state** in UML is a condition or situation an object (in a system) might find itself in during its life time. We capture the behavior of the subject object through modeling these various states and transitions between them.

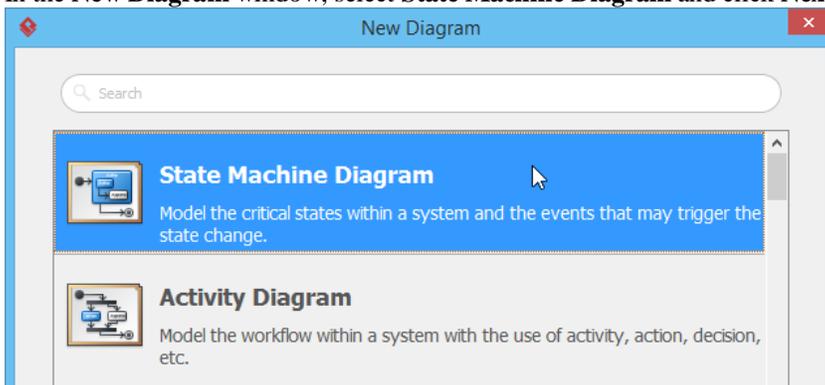
In order for others to understand them more easily, abstraction also takes place for simplicity reason in the modeling process. So it is important to note that a state machine diagram does not necessarily model all possible states, but rather the critical ones only. When we say “critical” states, we mean those that act as stimuli and prompt for response in the external world.

Take our bank account example above. As far as the behavior goes, there really isn’t significant difference when the balance is \$1,000 or \$1,001. However, the state becomes much more meaningful when the balance hits zero.

1. Select **Diagram > New** from the toolbar.

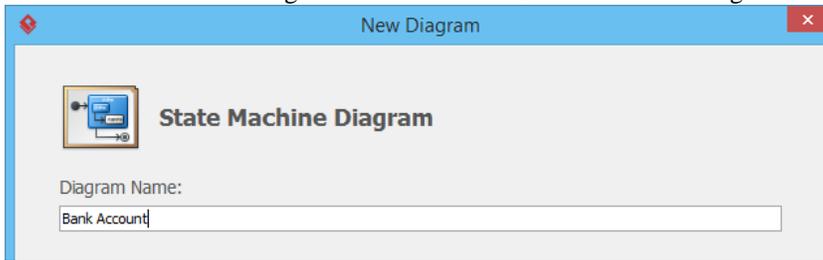


2. In the **New Diagram** window, select **State Machine Diagram** and click **Next**.



Tutorial – 5 Steps to Draw a State Machine Diagram

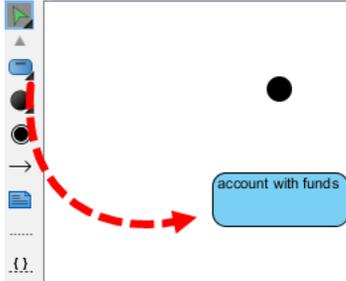
3. Enter *Bank Account* as diagram name and click **OK** to create the diagram.



The new diagram appears with an initial state (a solid black circle) by default.



4. Drag **State** from the toolbar onto the diagram. Name it *account with funds*.



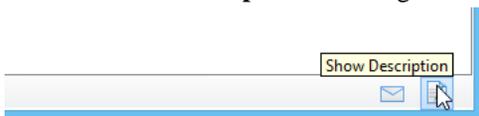
5. Again, drag **State** from the toolbar onto the diagram. Name it *zero balance*.



Step 2 – Describe States

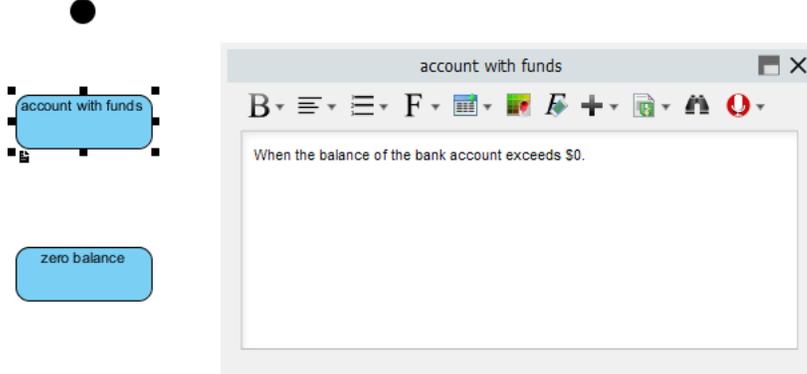
After drawing states in the diagram, you probably want to elaborate what the states are about for others to understand a little better. To do that, we can choose to add documentation to those states.

1. Click on **Show Description** on the right of the statusbar.

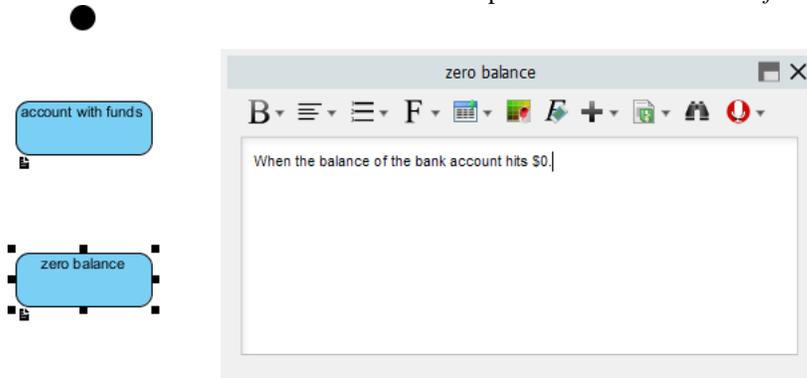


Tutorial – 5 Steps to Draw a State Machine Diagram

2. Drag the title bar of **Description** pane and move it next to the state *account with funds*. Select *account with funds* and enter the description: *When the balance of the bank account exceeds \$0.*



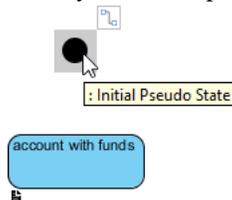
3. Select the **zero balance** state. Enter its description: *When the balance of the bank account hits \$0.*



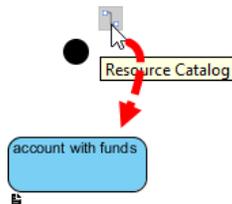
Step 3 – Draw Transitions

Now that we've finished drawing the states, let's turn our attention to describing the relationships between them. To depict a transition between two states, we draw a directed line from the source to the target state.

1. Move your mouse pointer over the initial state shape.

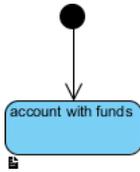


2. Press on the **Resource Catalog** button that appears above the shape. Drag to the state *account with funds*.

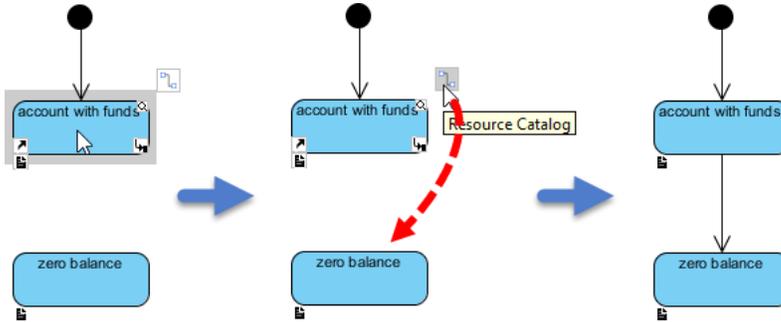


Tutorial – 5 Steps to Draw a State Machine Diagram

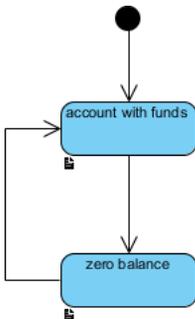
3. Release the mouse button over *account with funds*. A transition will be created.



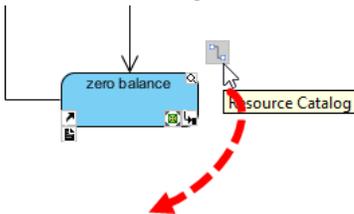
4. Similarly, create a transition from the state *account with funds* to *zero balance*. This time, move your mouse pointer over *account with funds*, then press on and drag the **Resource Catalog** button and release your mouse on the state *zero balance*.



5. Apply the same technique to create a transition from state *zero balance* to *account with funds*. After drawing it, press on the transition connector and drag to the left to make a cup handle shape as shown below.

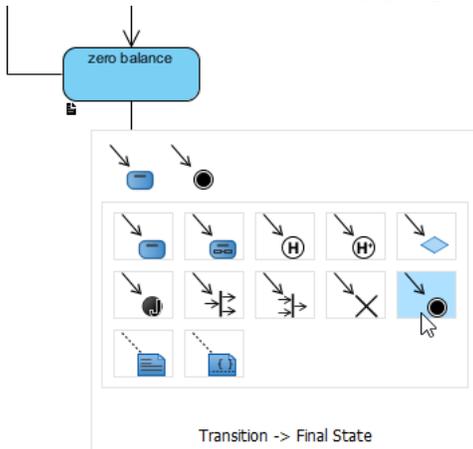


6. Create the final state. This time, move your mouse pointer over the state *zero balance*. Then, press on the **Resource Catalog** button and drag to the empty region below the state.

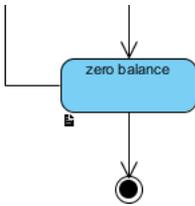


Tutorial – 5 Steps to Draw a State Machine Diagram

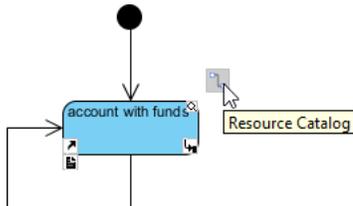
7. Release the mouse button. In the popup pane, select **Transit -> Final State**.



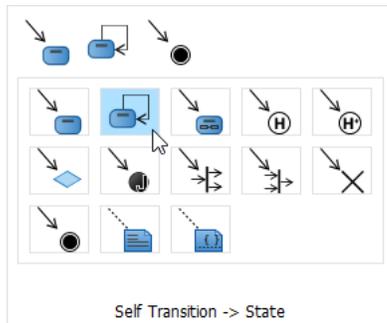
This creates a final state.



8. Click a self-transition on the state *account with funds*. Move your mouse pointer over the state *account with funds* and click on the **Resource Catalog** button.

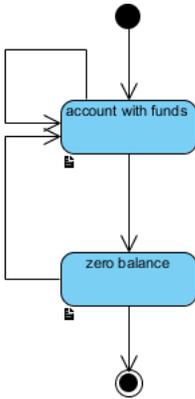


9. Select **Self Transition -> State** in the popup pane.

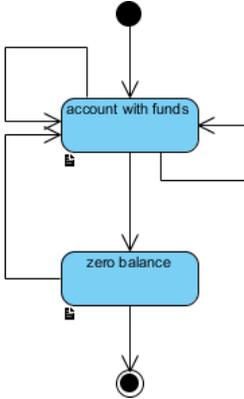


Tutorial – 5 Steps to Draw a State Machine Diagram

10. Move the transition to the left as shown below.



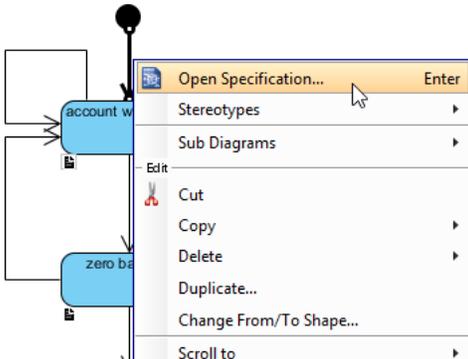
11. Add another self-transition on *account with funds*. Rearrange the line as needed. After drawing all transitions, you should end up with a similar diagram as shown below.



Step 4 – Define Transition Triggers

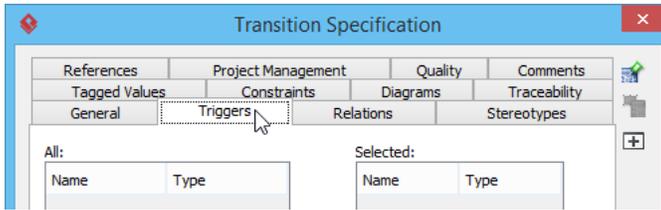
A transition from one state to another takes place when the designated trigger event fires. A trigger event can be an event from the external world or simply a user's interaction.

1. Right click on the transition that connects the **initial** state and **account with funds** and select **Open Specification...** from the popup menu.

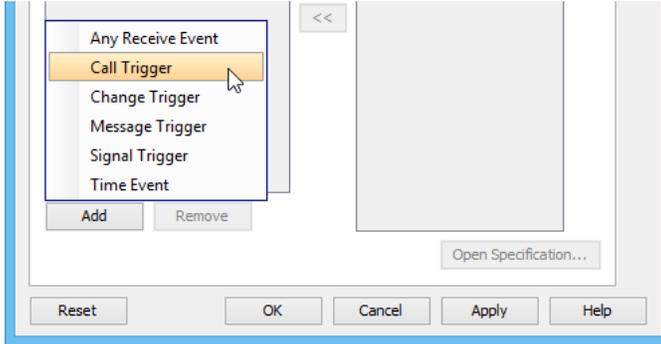


Tutorial – 5 Steps to Draw a State Machine Diagram

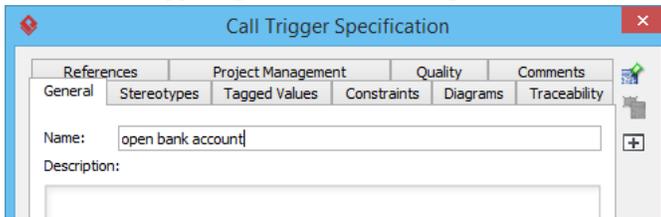
2. Open the **Triggers** tab.



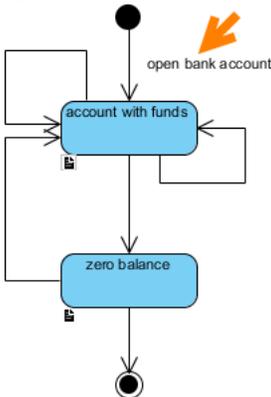
3. Click **Add** and then select **Call Trigger** from the popup menu.



4. In the **Call Trigger Specification**, enter *open bank account* as name and click **OK**.

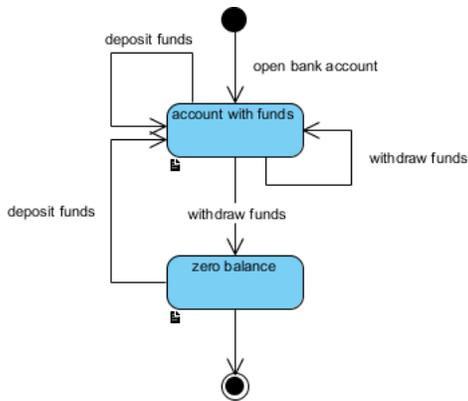


5. Click **OK** again in the **Transition Specification** to return to the diagram. You should see the trigger name appear as the caption transition.



6. Continue to enter the remaining trigger events as shown below.

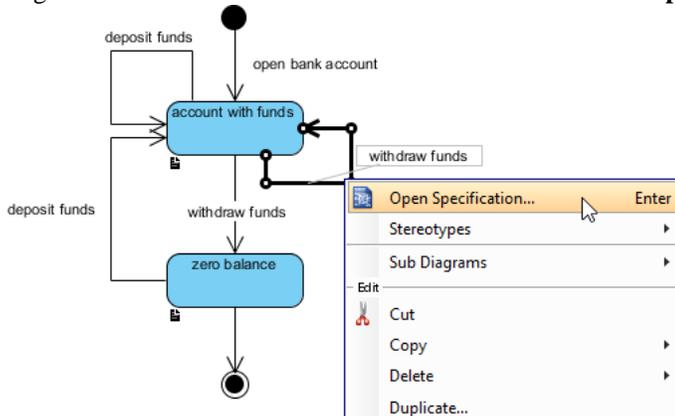
Tutorial – 5 Steps to Draw a State Machine Diagram



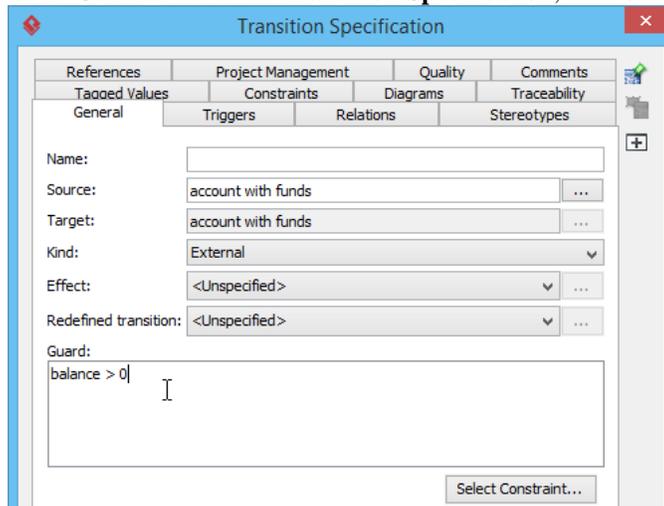
Step 5 – Define Guard Conditions

Sometimes a transition would not be appropriate, although the same trigger event fires. For example, let's just say that someone can withdraw funds only when there are sufficient funds available in the account. So it would be good for us to impose a constraint to check against that before allowing the transition happen. In UML, this constraint is called a **guard condition**. Let's continue with our example.

1. Right-click on the self-transition withdraw funds and select **Open Specification...** from the popup menu.

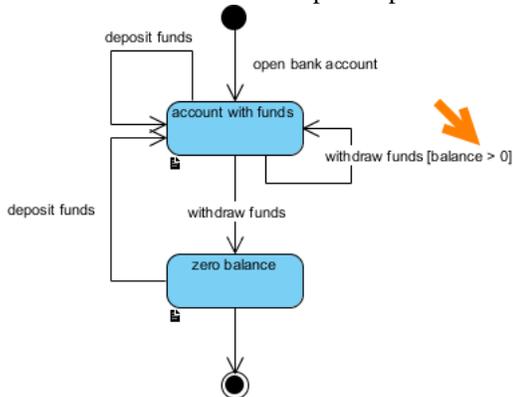


2. In the **General** tab of the **Transition Specification**, enter *balance > 0* as **Guard** and click **OK** to confirm.

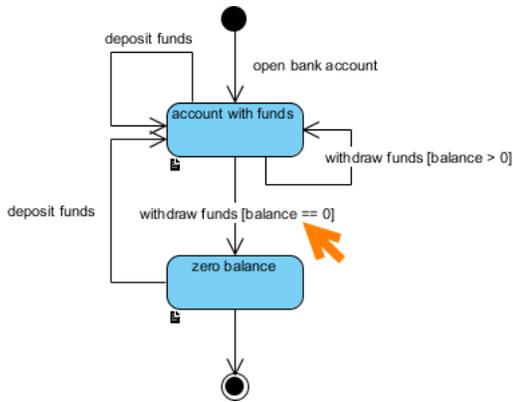


Tutorial – 5 Steps to Draw a State Machine Diagram

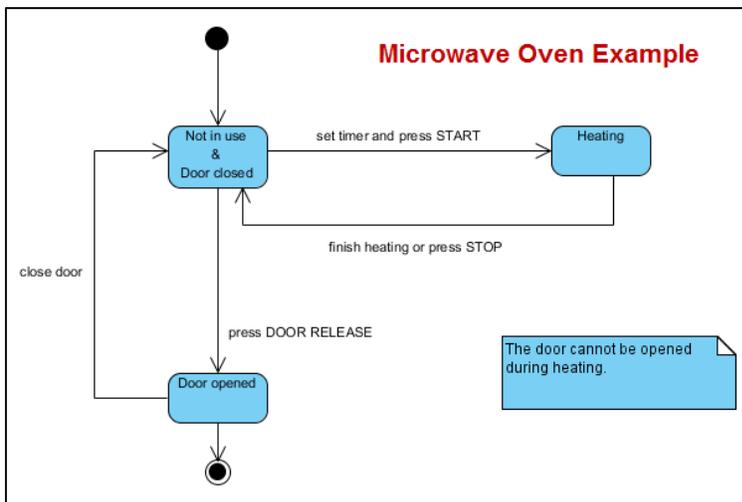
You can see the transition caption updated with guard presented.



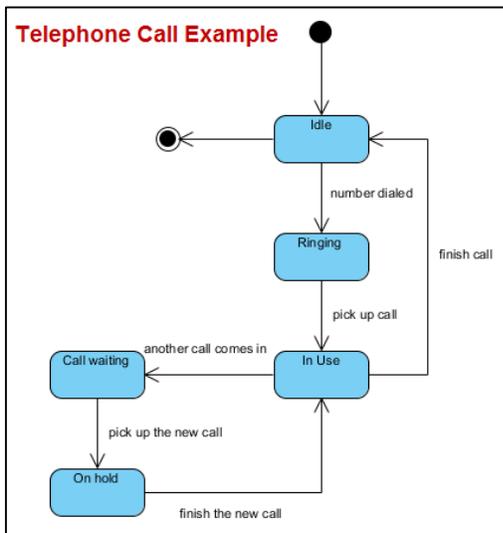
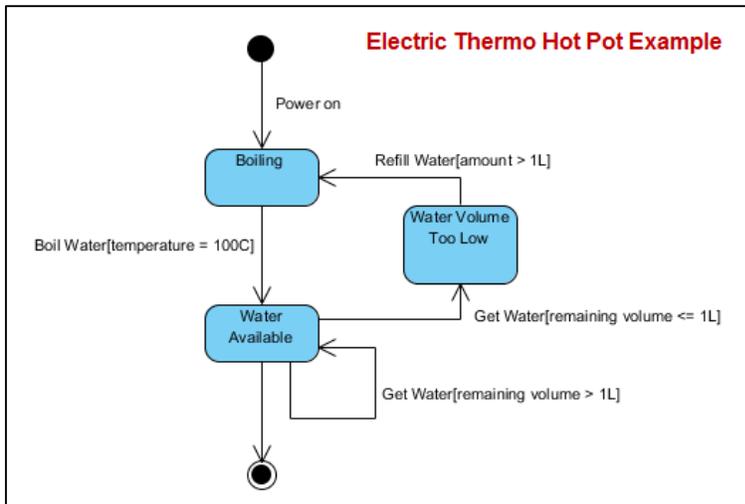
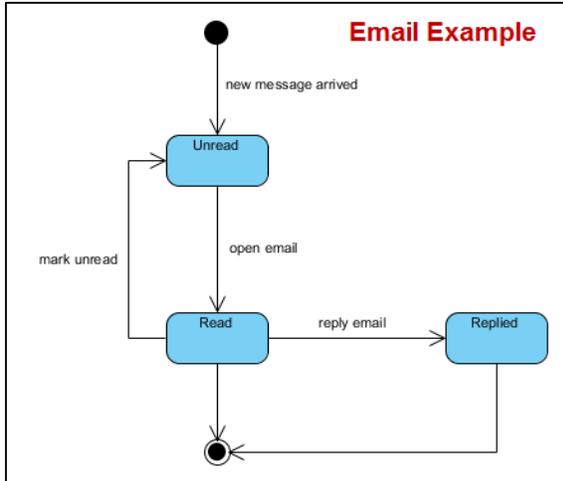
3. Apply the same technique to add the **balance == 0** as guard condition of that connects the state **account with funds** and **zero balance** as shown.



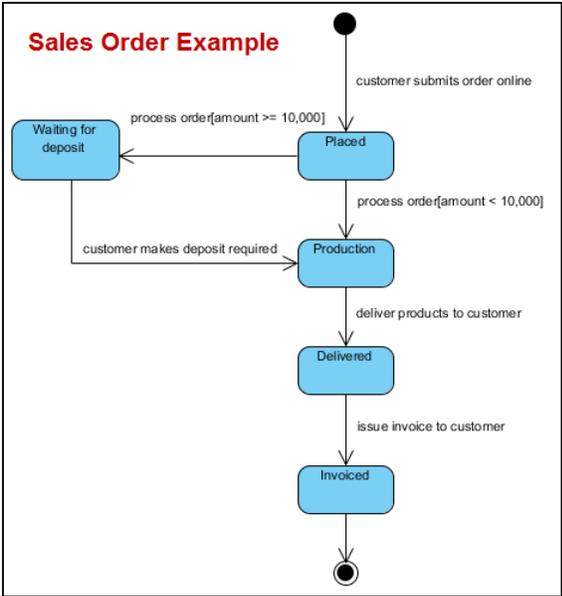
Additional Examples of State Machine Diagrams



Tutorial – 5 Steps to Draw a State Machine Diagram



Tutorial – 5 Steps to Draw a State Machine Diagram



[Return to Visual Paradigm's Website](#)