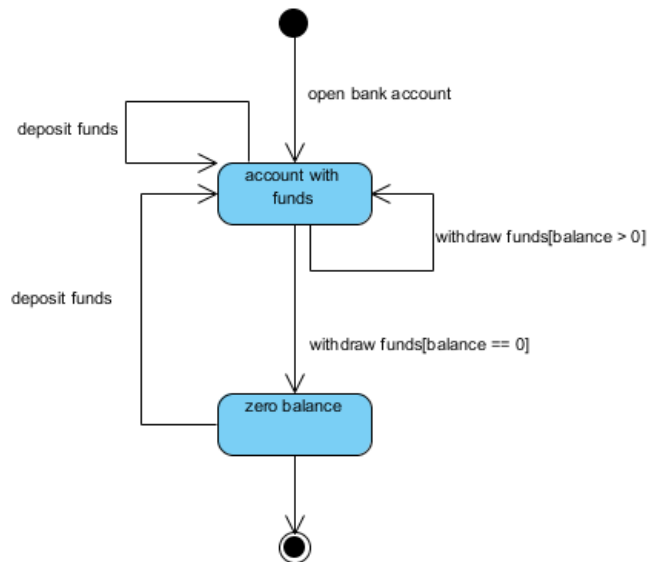


5 Steps to Draw a State Machine Diagram

This tutorial will show you how to draw a simple state machine diagram in 5 steps, using **Visual Paradigm for UML (Modeler Edition)**. 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.



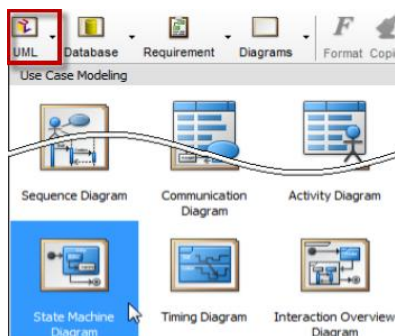
Step 1 – Define States

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.

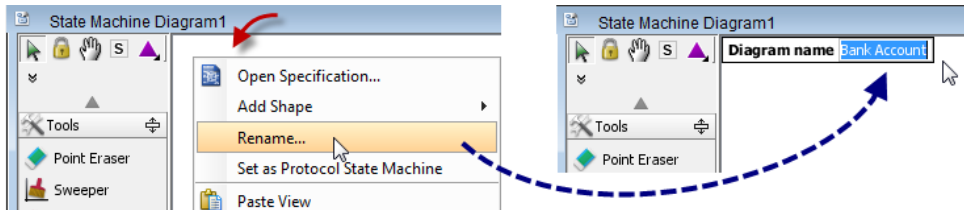
1. Select **UML > State Machine Diagram** from the toolbar at the top.



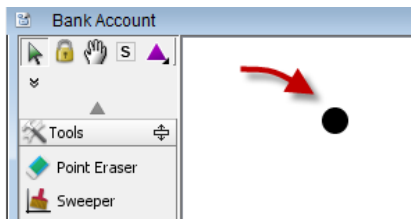
Tutorial – 5 Steps to Draw a State Machine Diagram

2. To rename the new diagram, right-click on any white space in the background and select **Rename...**

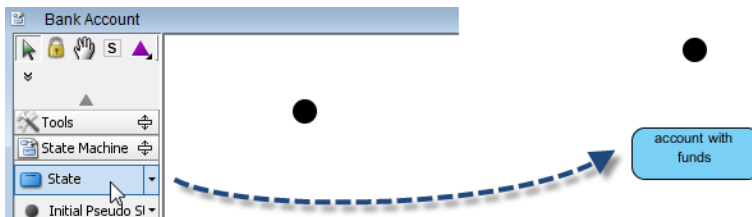
For our example, we'll name it *Bank Account*.



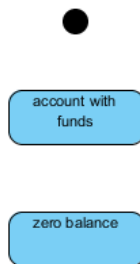
3. Note that the new diagram appears with an initial state (a solid black circle) by default.



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*.

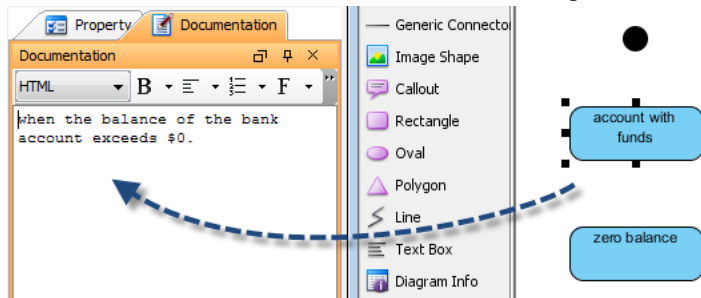


Step 2 – Describe States

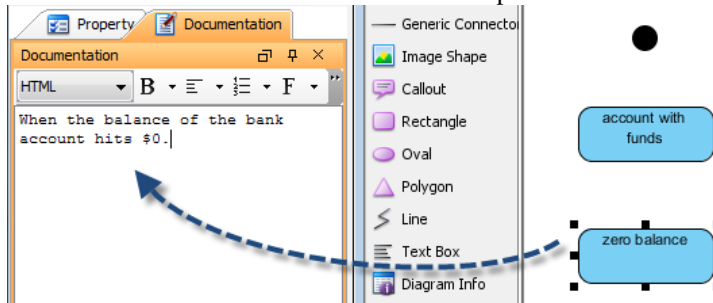
After drawing states in the diagram, you probably want to elaborate what the states are about for others to understand a little better. To do that, we can choose to add documentation to those states.

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1. Select the **account with funds** state. Enter the description in the **Documentation** tab.



2. Select the **zero balance** state. Enter the description in the **Documentation** tab.

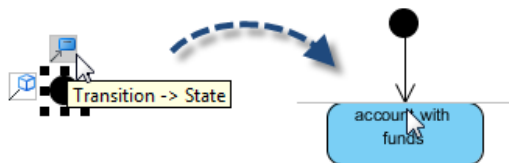


Step 3 – Draw Transitions

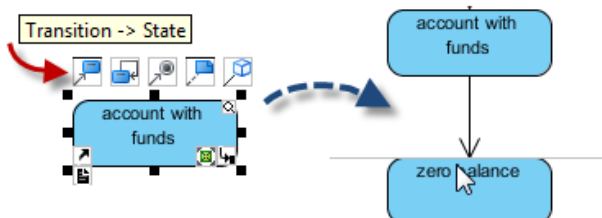
Now that we've finished drawing the states, let's turn our attention to describing the relationships between them. To depict a transition between two states, we draw a directed line from the source to the target state.

In this section, we are going to use the **resource-centric interface**. It appears when you select or place your mouse over a state. They look like a bunch of little icons surrounding the state.

1. Drag the **Transition -> State** icon downwards from the **initial** state and drop over the **accounts with funds** state.

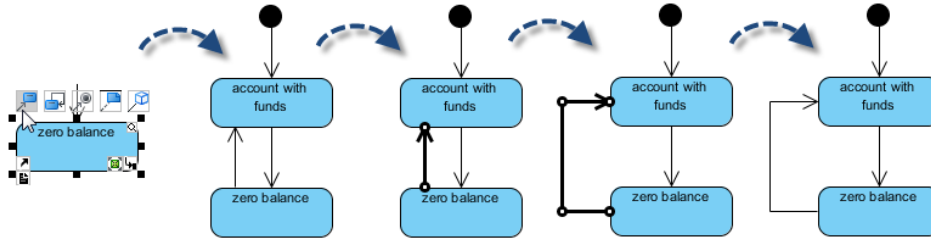


2. Drag the **Transition -> State** icon downwards from **account with funds** and drop over the **zero balance** state.

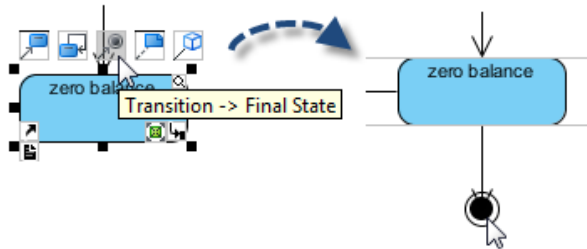


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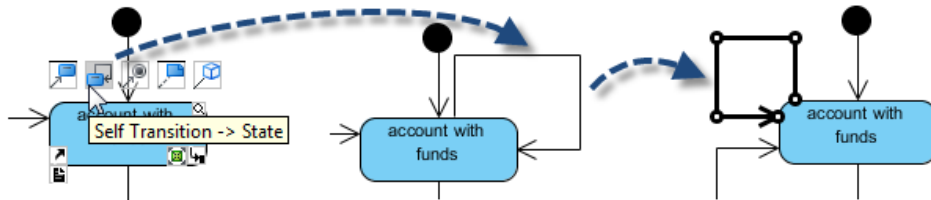
3. Drag the **Transition -> State** icon upwards from **zero balance** and drop over **account with funds**. After drawing it, select the transition line and drag to the left to make a cup handle shape as shown.



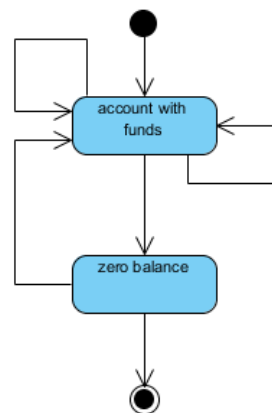
4. Drag the **Transition -> Final State** icon downwards from **zero balance**. Release your mouse at your desired location.



5. Click the **Self Transition -> State** icon from **account with funds**. Then click in any white space in the diagram. Move the transition to the left as shown.



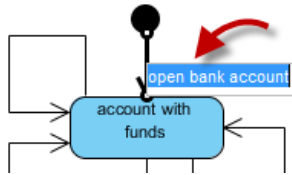
6. Again, select **account with funds** and click the **Self Transition -> State** icon to add another transition. Then click in any white space in the diagram. Rearrange the line as needed.
7. After drawing all transitions, you should end up with a similar diagram as shown below.



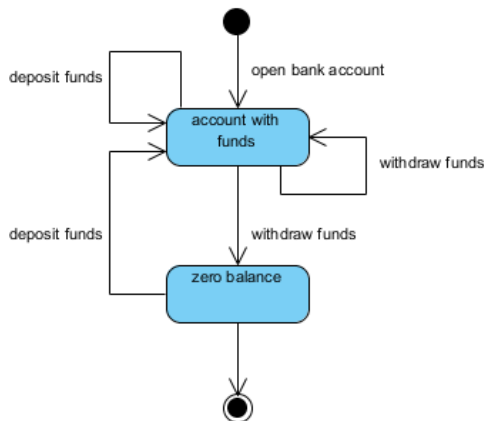
Step 4 – Define Transition Triggers

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. To specify one for a transition, double-click the transition line. In the text box opened (next to the line), enter the name of the trigger.

1. Double-click the transition from the **initial** state to **account with funds**. Type in *open bank account*.



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

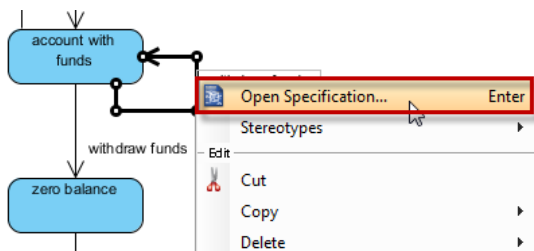


Step 5 – Define Guard Conditions

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**.

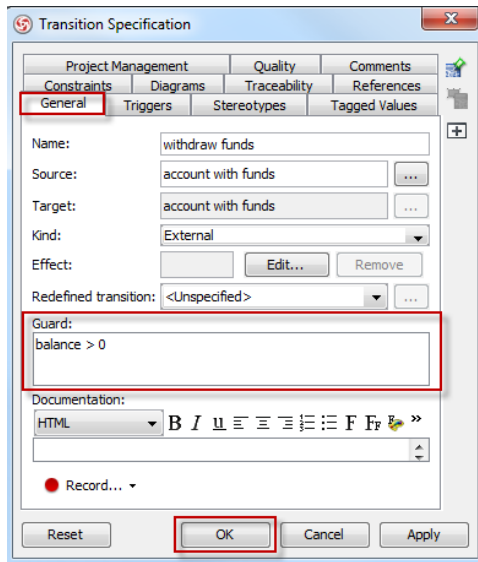
Let's continue with our example.

1. Right-click the transition and select **Open Specification...**

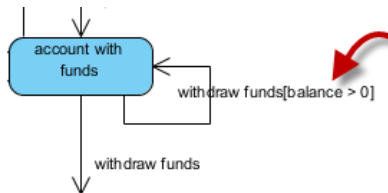


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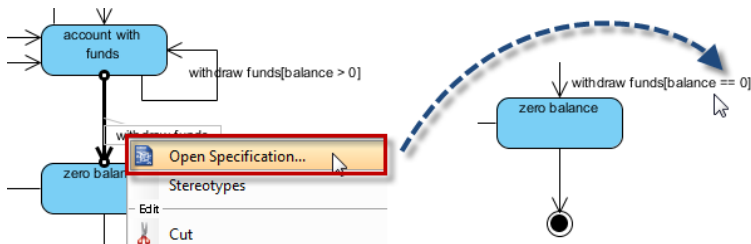
2. In the dialog box opened, go to the **General** tab. Enter *balance > 0* in the **Guard** field. Click **OK**.



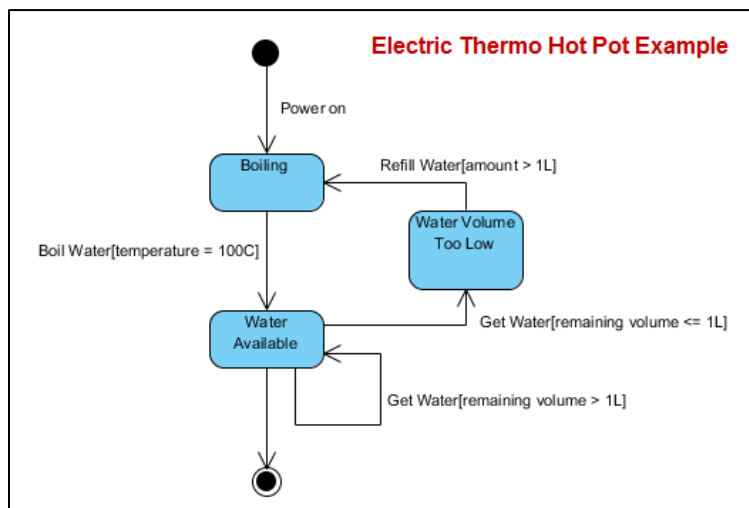
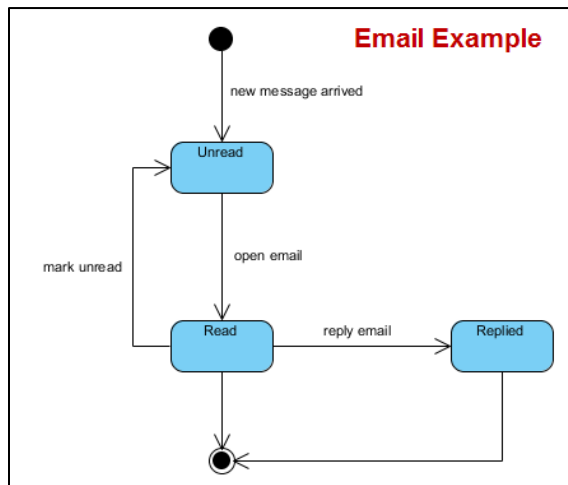
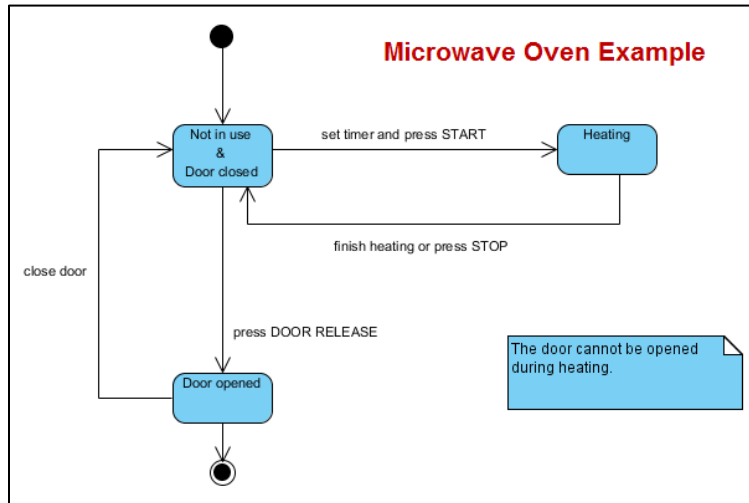
3. You should then see the transition label updated with the guard condition – **balance > 0**.



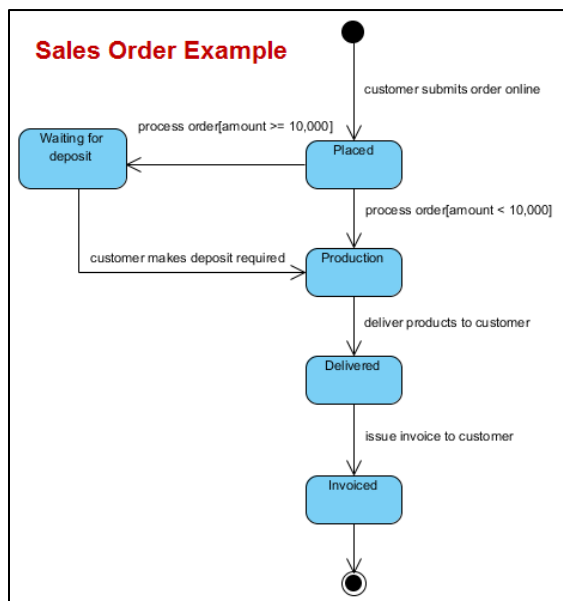
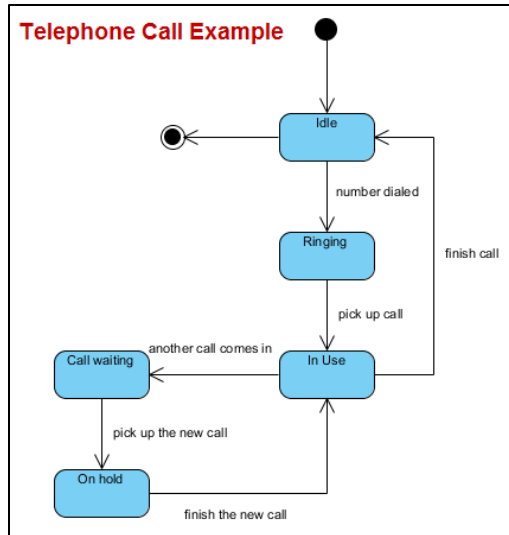
4. Right-click the transition from **account with funds** to **zero balance**. Repeat the same steps to add the **balance == 0** guard condition as shown.



Additional Examples of State Machine Diagrams



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