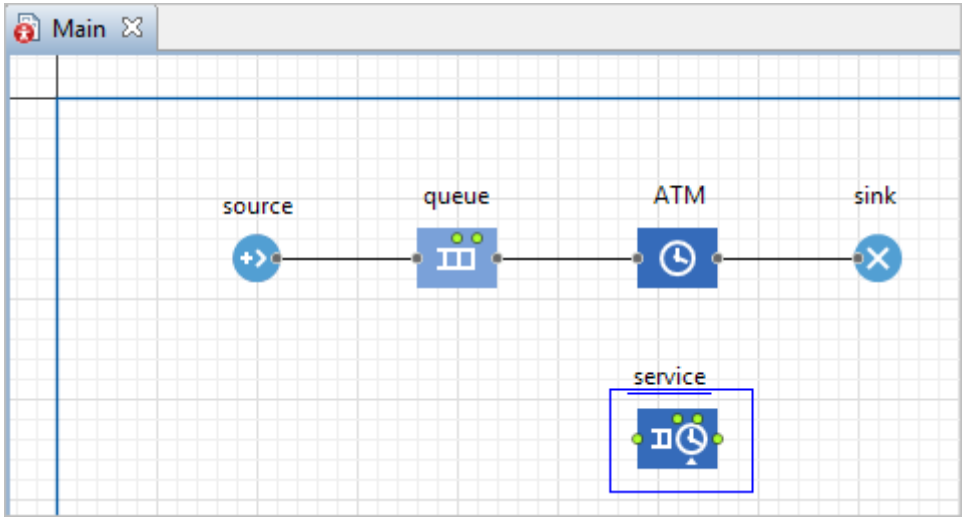
Phase 3. Adding Tellers

Now we will create another part of the system by adding tellers that are working at the bank. Now some clients will come to see tellers, some – to access the ATM. We can model tellers using delays in the same way as we modeled ATM. However, modeling tellers using resources is much more convenient. *Resource* is a special unit that can be possessed by an agent. Only one agent can possess a resource at a time; therefore agents compete for resources.

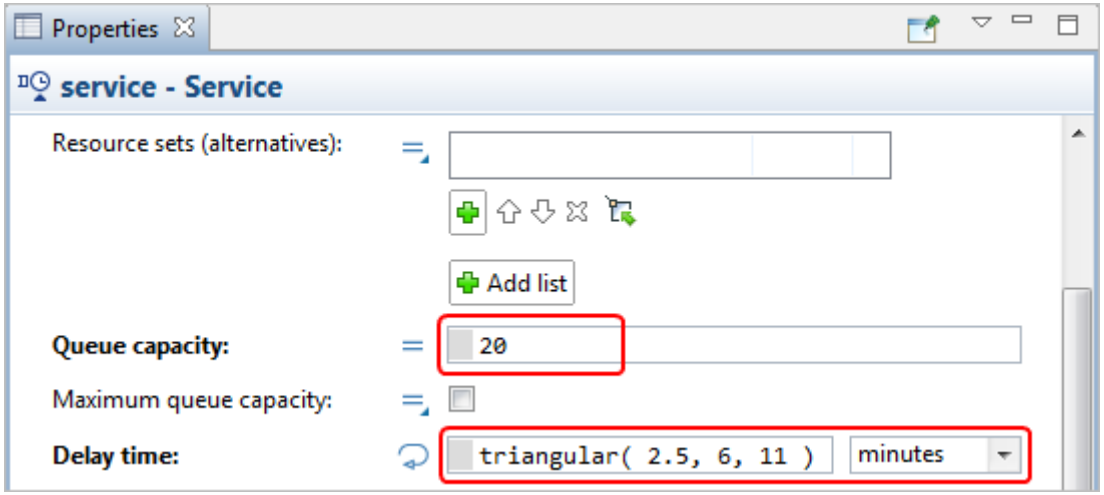
Modifying the flowchart

Simulate service

1. Open the **Process Modeling Library** in the **Palette** view and drag the **Service** block onto our `Main` diagram.

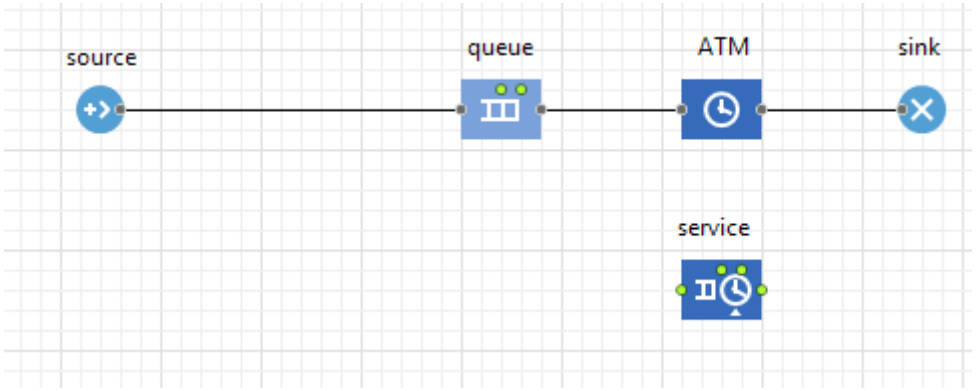


   Service seizes resource units for the agent, delays the agent, and releases the seized units.
2. Go to the **Properties** view of the *service* block.
3. Modify the object properties:
   - There is one queue for all tellers. Set up **Queue capacity** to be of 20 places.
   - We assume that service time is triangularly distributed with the min value of 2.5, average value of 6, and the max value of 11 minutes. Set **Delay time**: `triangular( 2.5, 6, 11 )`

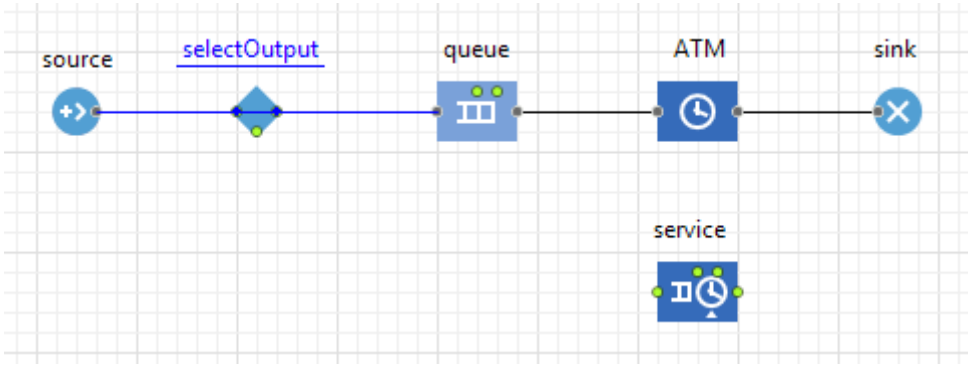


Simulate decision making

1. Move the objects *queue*, *ATM* and *sink* to the right to make space for one new object between *source* and *queue*.

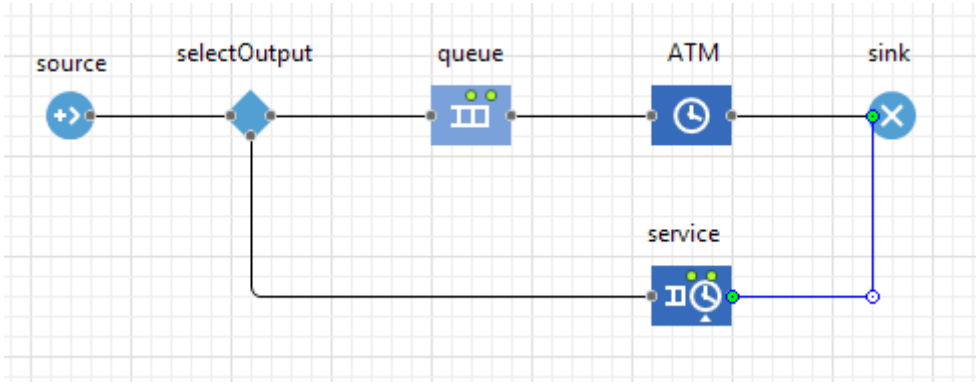


2. Open the **Process Modeling Library** in the **Palette** view and add the **SelectOutput** block in the resulting space. When you place the object on the connector, it will automatically get built in.



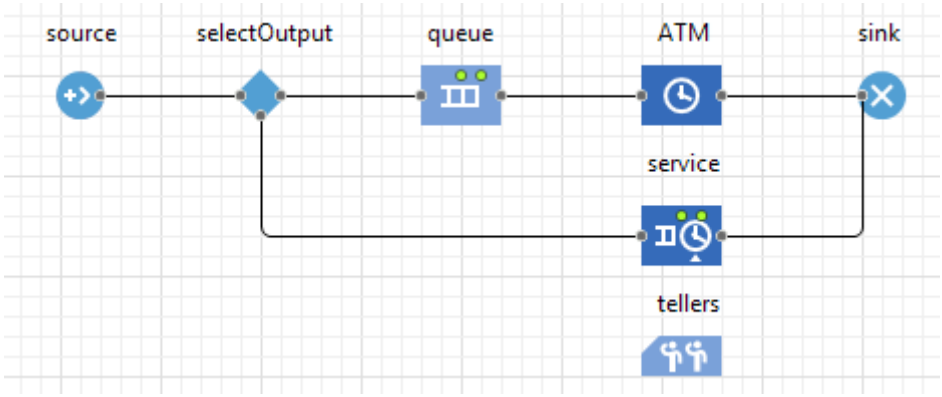
SelectOutput object is a decision making block. The agent arrived at the object is forwarded along one of two output ports depending on the user-defined condition.

3. Select *selectOutput* in the flowchart and go to its **Properties** view. Choose the option *If condition is true* for the **Select True Output** parameter. Make sure that **Condition** is `randomTrue( 0.5 )`.
   This agent routing condition defines that the number of customers competing for ATM and teller service will be approximately equal.
4. Connect *selectOutput* and *service* with other blocks as shown in the figure:

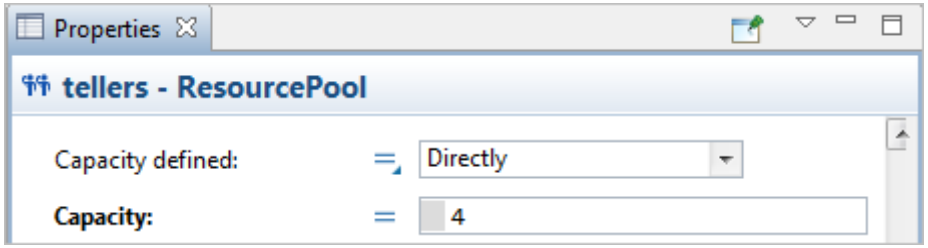


Add resources for the service

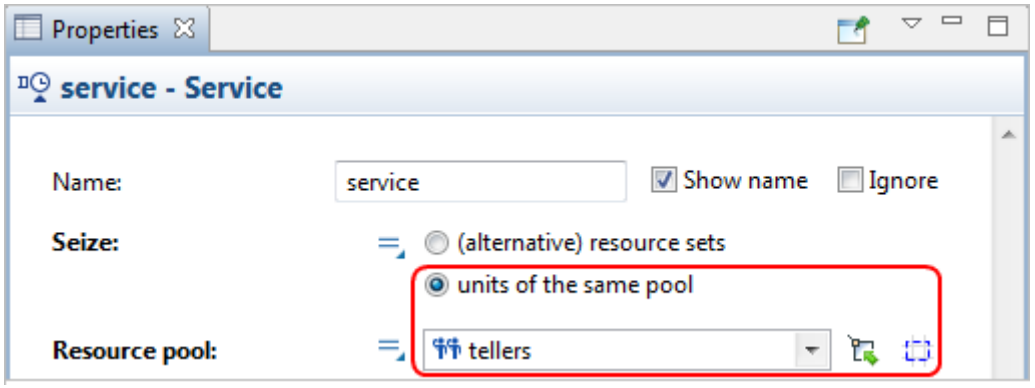
1. Open the **Process Modeling Library** in the **Palette** view and drag the **ResourcePool** block onto our `Main` diagram. **ResourcePool** object is storage for resource units.
2. Place it under *service* and go to its **Properties** view.
3. Name the object *tellers*.



4. Specify that this resource object has only four resource units, that means, define its **Capacity**: 4.



5. **ResourcePool** object should be connected to resource seizing and releasing objects (**Service** in our case). So we need to modify the properties of the *service* object.
6. Select *service* in the flowchart to open its properties. Choose the option *units of the same pool* the parameter **Seize**. Then specify the resource pool we have created in the option **Resource Pool**. You can either click the down arrow to select the resource pool object from the drop-down list, or you can click the button, located on the right, to select the object in the graphical editor (all inappropiate objects will be greyed out).



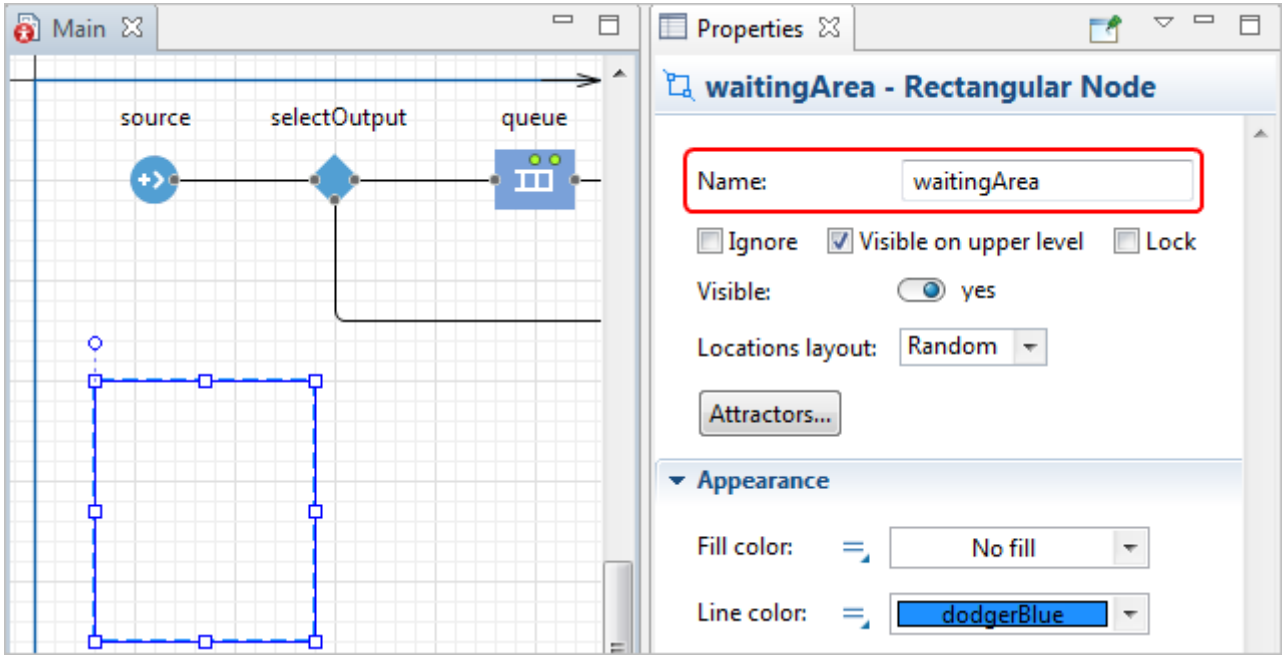
7. Now since the model has changed, we need to alter the model animation as well.

Adding space markup shapes

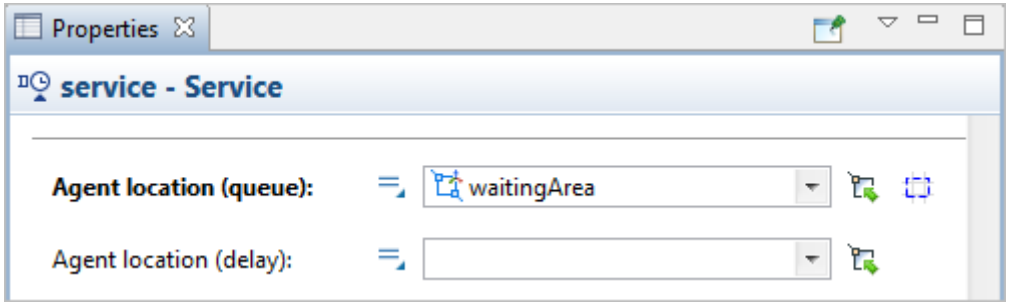
Now we want to draw the area for queueing and a place to get serviced for our clients.

Set up space markup for the queue to tellers

1. This time we will draw a waiting area using a rectangular node. First, open the **Space Markup** palette in the **Palette** view.
2. Double-click the element **Rectangular node** to switch to *the drawing mode*.
3. Click in the graphical editor and drag the rectangle without releasing the mouse button. Release when you have a rectangular node of the required form. You can edit its form later as you need.
4. Name the node *waitingArea*.

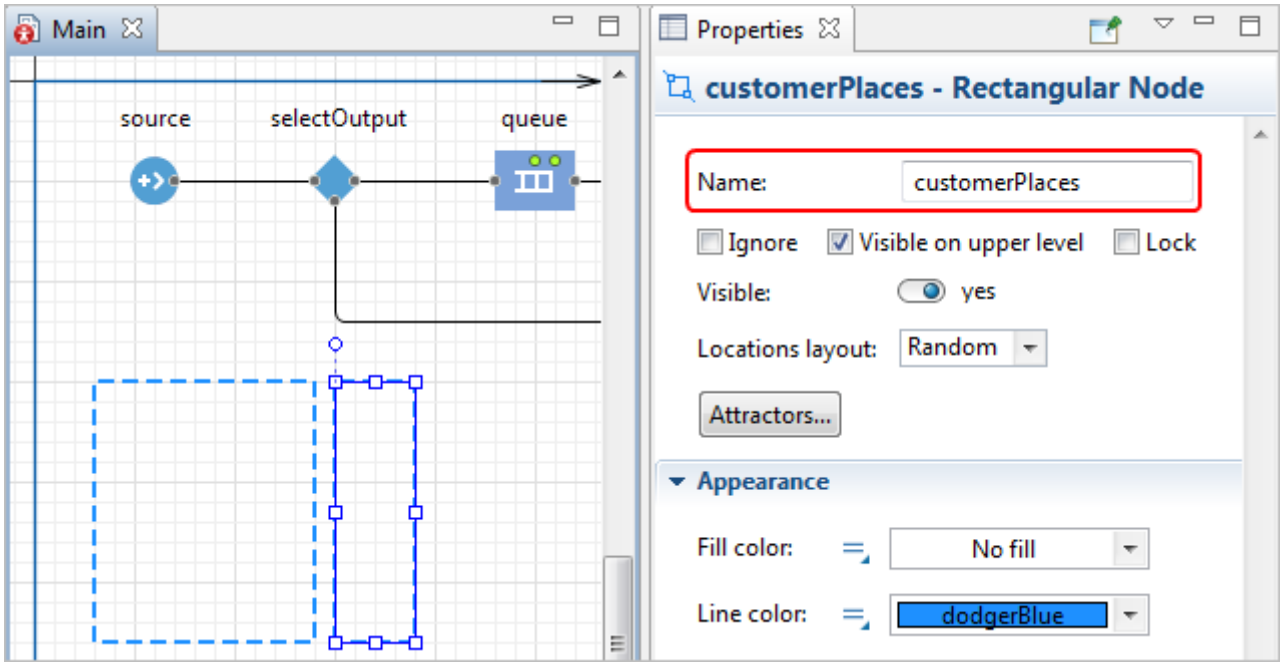


5. Click the *service* block in the flowchart and go to its **Properties** view.
6. Select the node *waitingArea* we have drawn in the **Agent location (queue)** option.

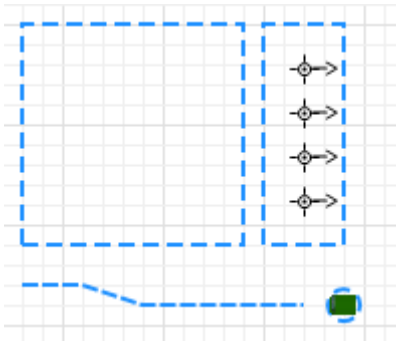


Set up space markup for the customers

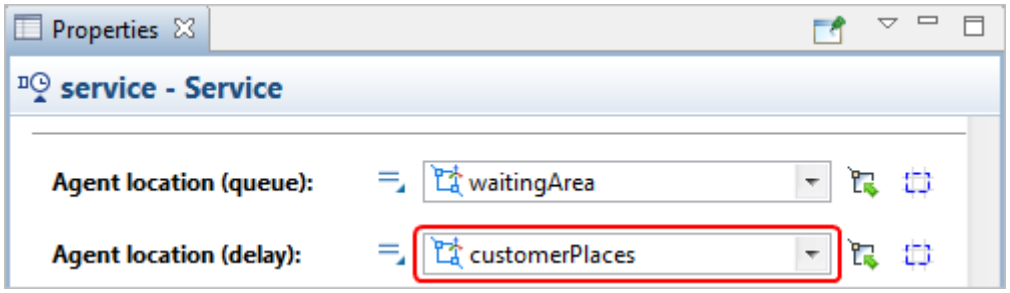
1. The customers need a place to stand somewhere while they are getting serviced by tellers. We will draw an area for this purpose using a rectangular node.
2. First, open the **Space Markup** palette in the **Palette** view, then double-click the element **Rectangular node** to switch to *the drawing mode*.
3. Click in the graphical editor and drag the rectangle without releasing the mouse button. Release when you have a rectangular node of the required form. You can edit its form later as you need.
4. Name the node *customerPlaces*.



5. We will use attractors to define the customers that are getting service. Select the node *customerPlaces* and click the button **Attractors...** in its properties. In the **Attractors** window that will pop-up, specify *4* for the creation mode **Number of attractors** and click **OK**. You will see that attractors appeared in the *customerPlaces* node with the even offset.

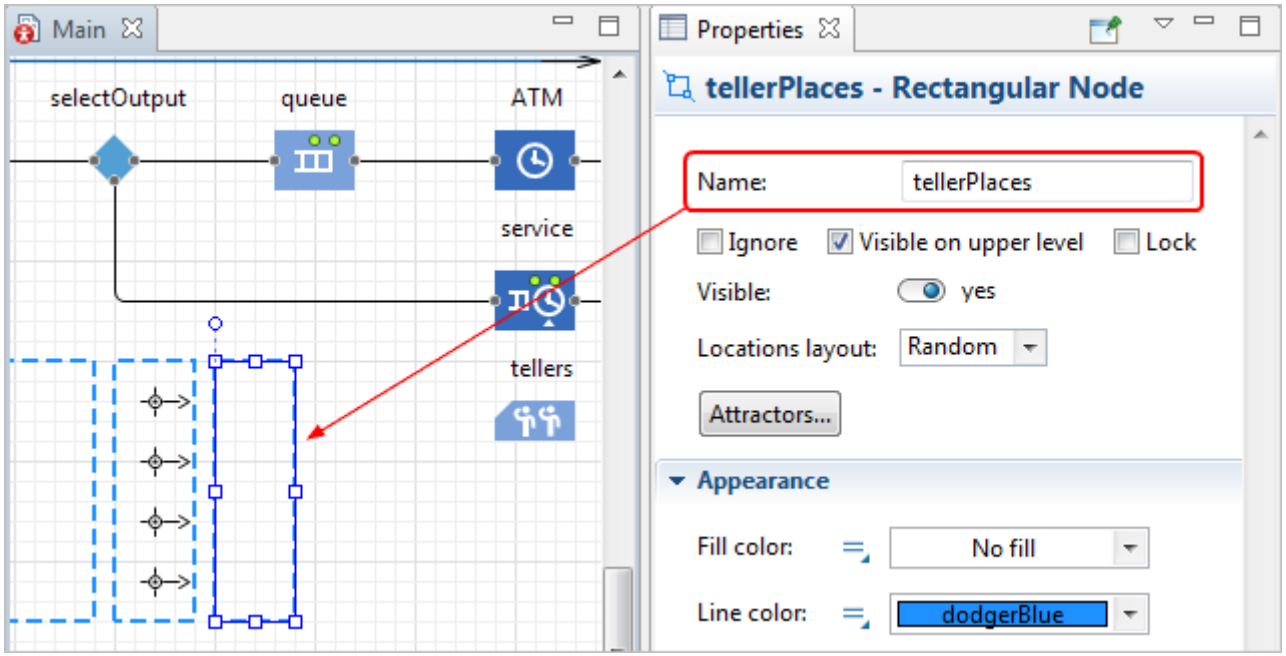


6. Now we need to refer to this area in the flowchart. Click the *service* object in the flowchart and go to its **Properties** view.
7. Select the node *customerPlaces* have drawn in the **Agent location (delay)** option.



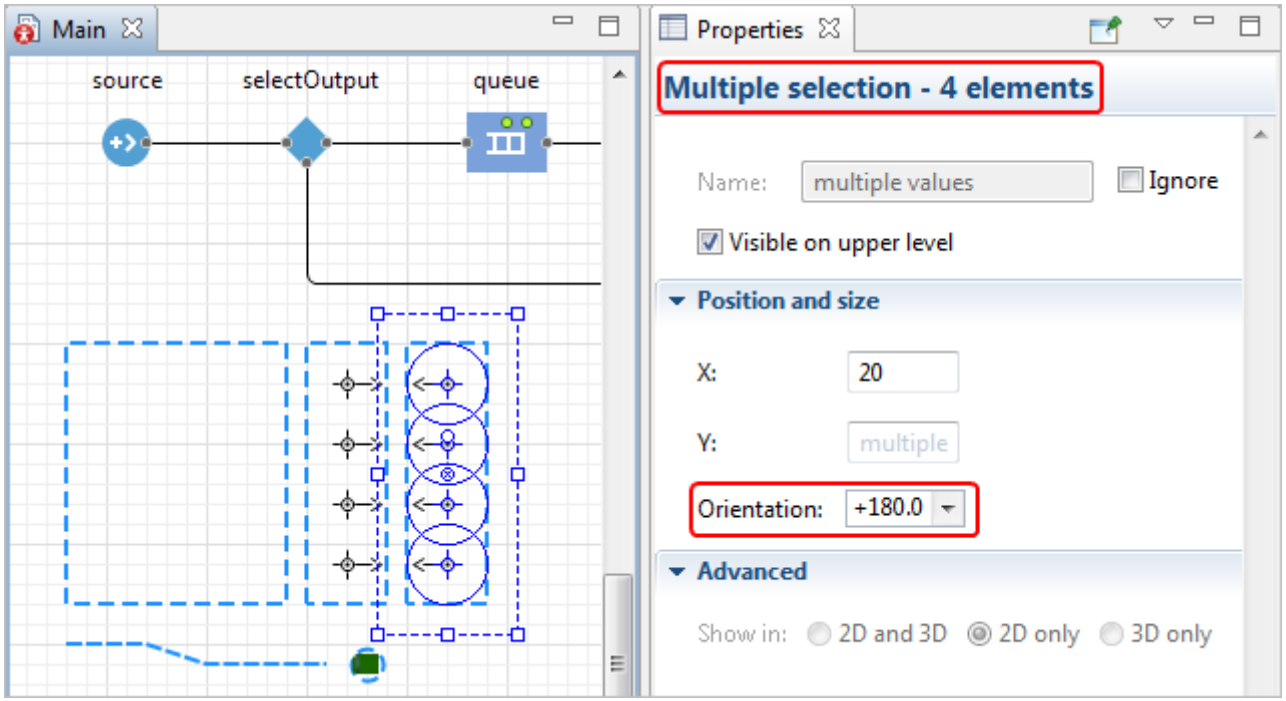
Set up space markup for the tellers

1. In the previous step, we used a point node to draw the ATM. Since we have 4 tellers this time, we will use a rectangular node to draw this service area.
2. First, open the **Space Markup** palette in the **Palette** view, then double-click the element **Rectangular node** to switch to *the drawing mode*.
3. Click in the graphical editor and drag the rectangle without releasing the mouse button. Release when you have a rectangular node of the required form. You can edit its form later as you need.
4. Name the node *tellerPlaces*.

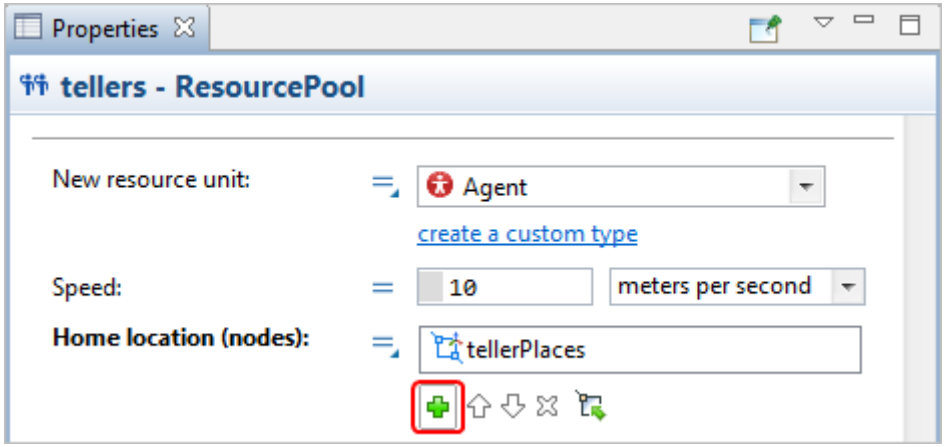


5. We will use attractors to define the tellers. Select *tellerPlaces* and click the button **Attractors...** in its properties. In the **Attractors** window that will pop-up, specify *4* for the creation mode **Number of attractors** and click **OK**.

6. You will see that attractors appeared in the *tellerPlaces* node with the even offset, but they are facing wrong direction. Select all attractors by Shift+clicking and go to their properties. In the section **Position and size**, change the **Orientation** parameter to *+180.0*.



7. Click the *tellers* object in the flowchart and go to its **Properties** view.
8. Select the node *tellerPlaces* we have drawn in the **Home location (nodes)** parameter.



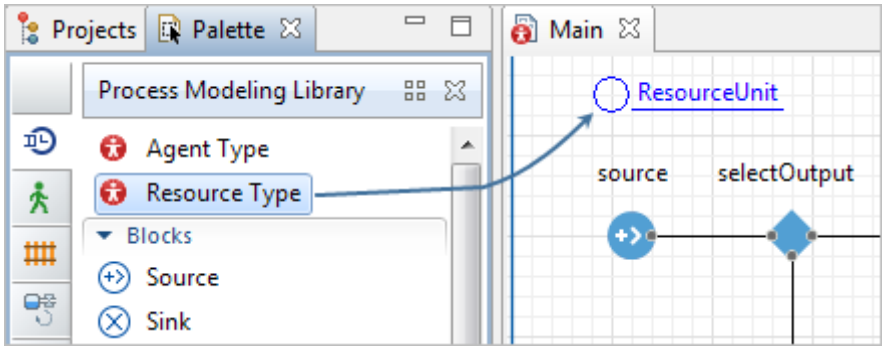
You can run the model now and observe how some customers are getting serviced at the ATM and some go to see tellers.

Adding 3D objects

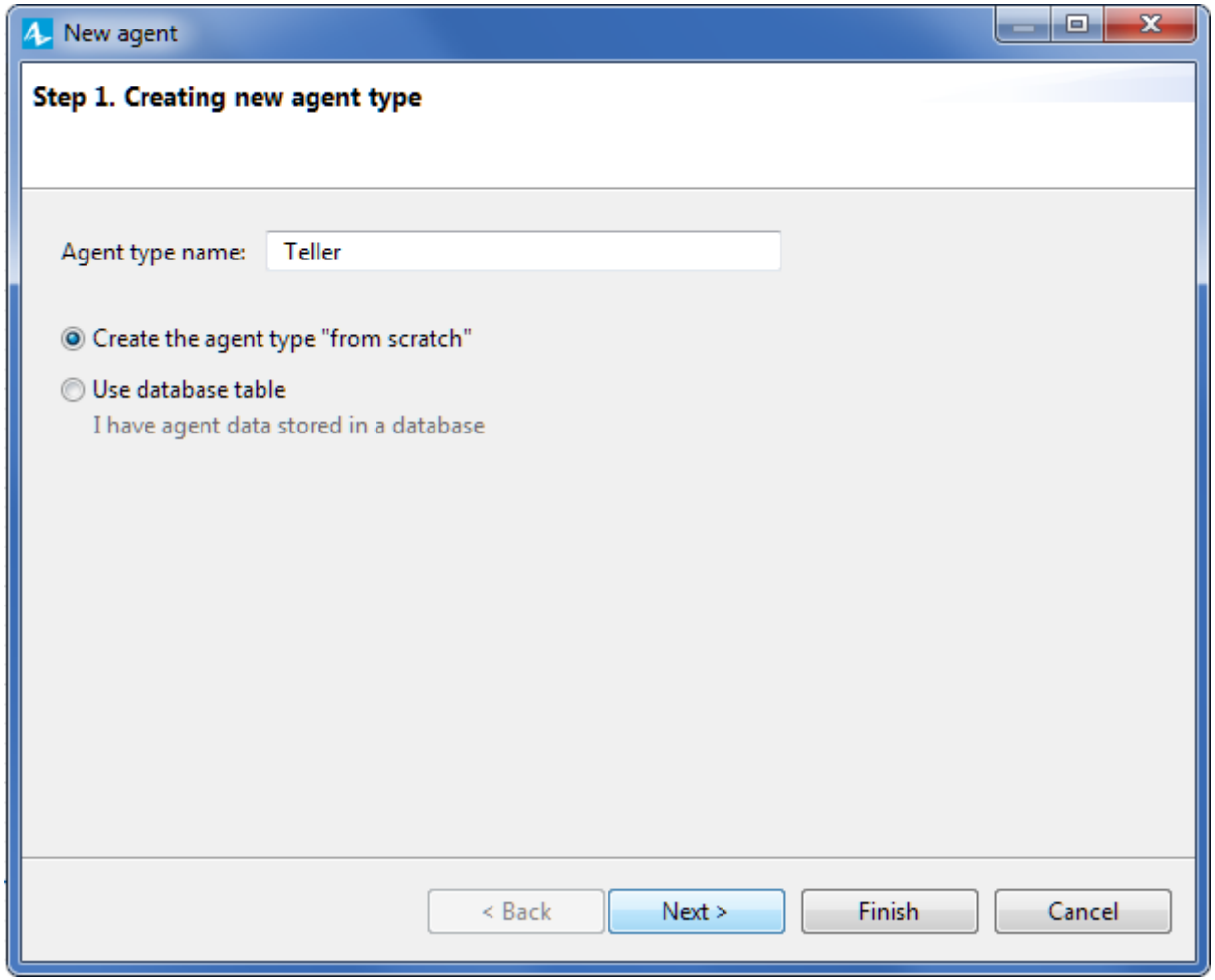
It is time to add teller 3D objects to our model. We will create a new resource type to animate tellers.

Create a new resource type

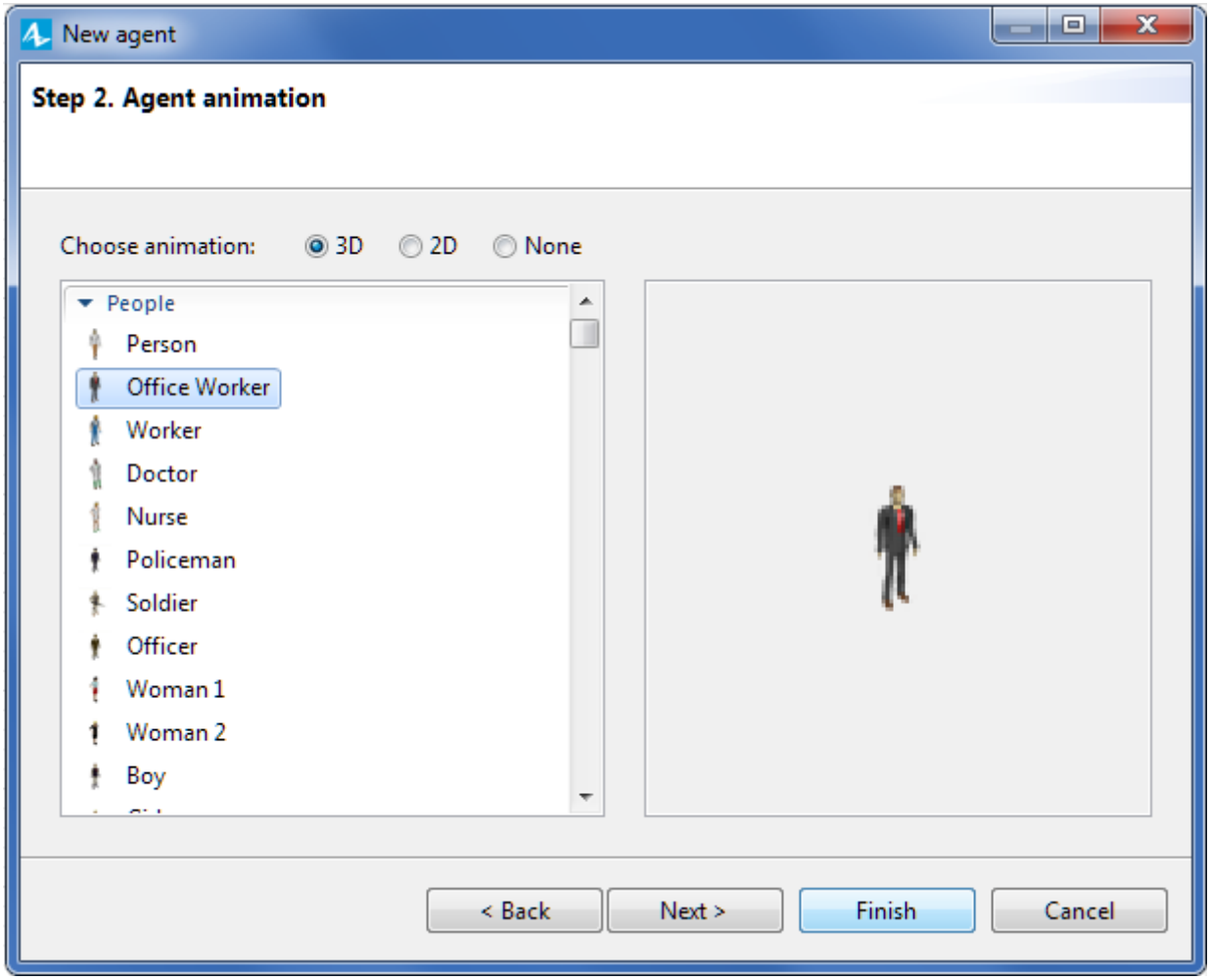
1. Open the **Process Modeling Library** in the Palette view.
2. Drag the element **Resource type** into the graphical editor.



3. The **New agent** wizard will open on the **Creating new agent** step. Enter *Teller* as the **Agent type name** and leave the **Create the agent type "from scratch"** selected. Press **Next**.



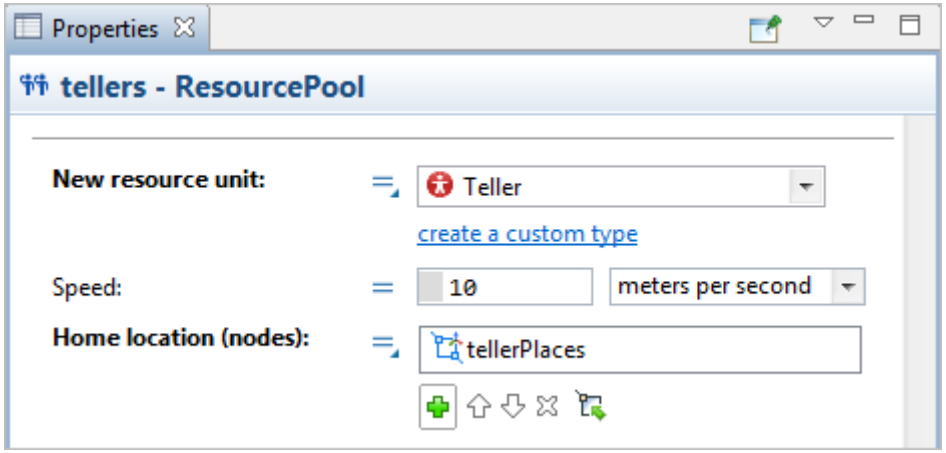
4. In the next step select **3D** as the animation type and select *Office worker* from the list of the 3D figures.



5. Click **Finish**. The new `Teller` diagram will open. You can find the *Office worker* 3D figure in the axis origin. Switch back to `Main` diagram.

Configure flowchart to use the new resource type

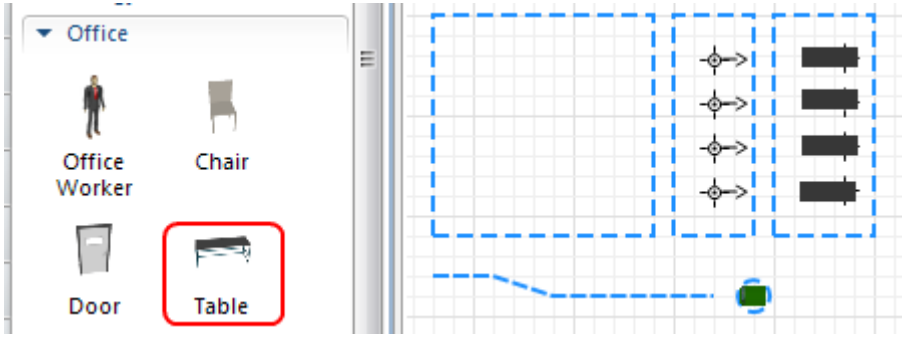
1. On the `Main` diagram, select the block *tellers* in the graphical editor.
2. In its properties, specify `Teller` as the **New resource unit**.



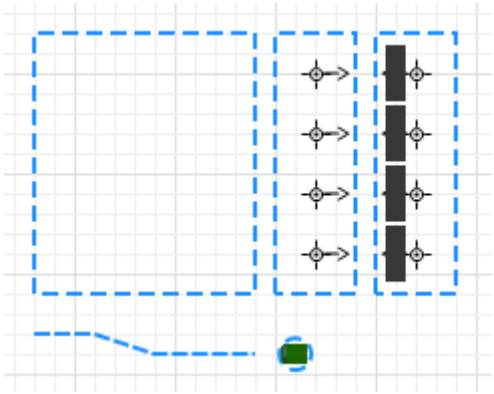
3. Run the model and observe customers and tellers.

Add tables for the tellers

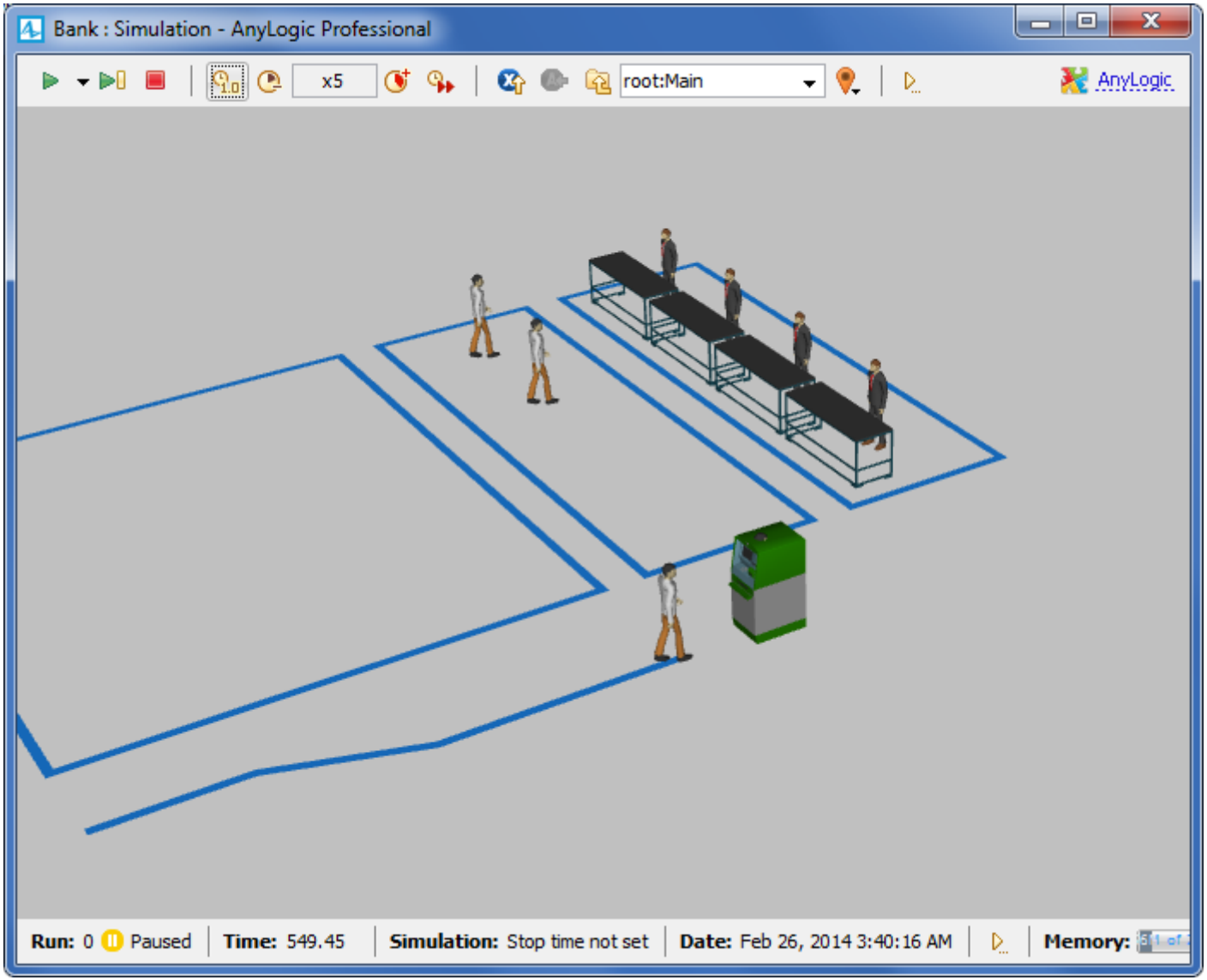
1. Open the **3D Objects** palette in the **Palette** view.
2. Drag four **Table** 3D figures from the **Office** section of this palette onto the node shape called *tellerPlaces* in the graphical editor.
3. Place them at the attractors since attractors are the places where the tellers stand.



4. You can see that their orientation is wrong. Select all tables by Shift-clicking and go to the **Properties** view.
5. In the section **Position**, change the parameter **Rotation** to *-90.0* degrees.
6. If necessary, rearrange all eight attractors and four tables so that they are reasonably lined up.



Now you can run the model and observe in 3D how some customers go to the ATM and other get service at the tellers tables.



Reference model: Bank - Phase 3

« Phase 2, Creating model animation

» Phase 4, Adding statistics collection