Phase 2. Creating Agents

The supply chain that we model includes one distribution center, several retailers spread across some country, and a fleet of trucks that deliver the product from the distributor to retailers.

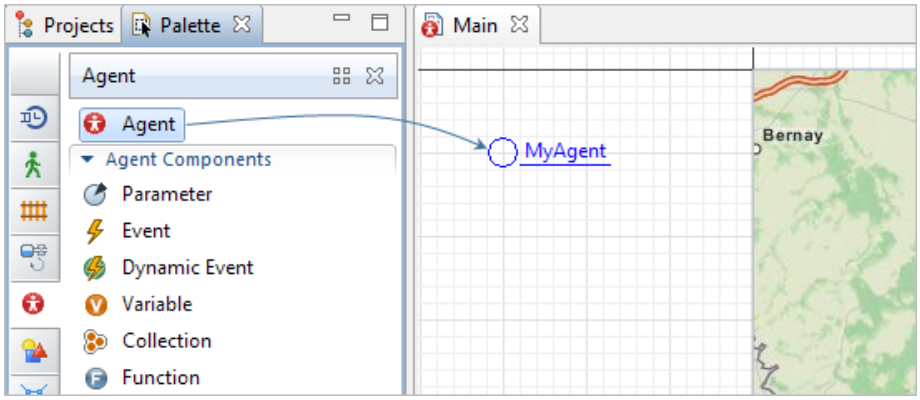
You have three choices when you create an agent: a population, a single agent, and an agent type. Each choice suggests that you create an agent type anyway, but a population or a single agent also represent the agent instances that are placed in some environment, the `Main` agent in our case. Unlike a single agent, a population is a collection of a number of indexed agents.

To make an agent type play the role of environment for other agents, you create those agents on its diagram.

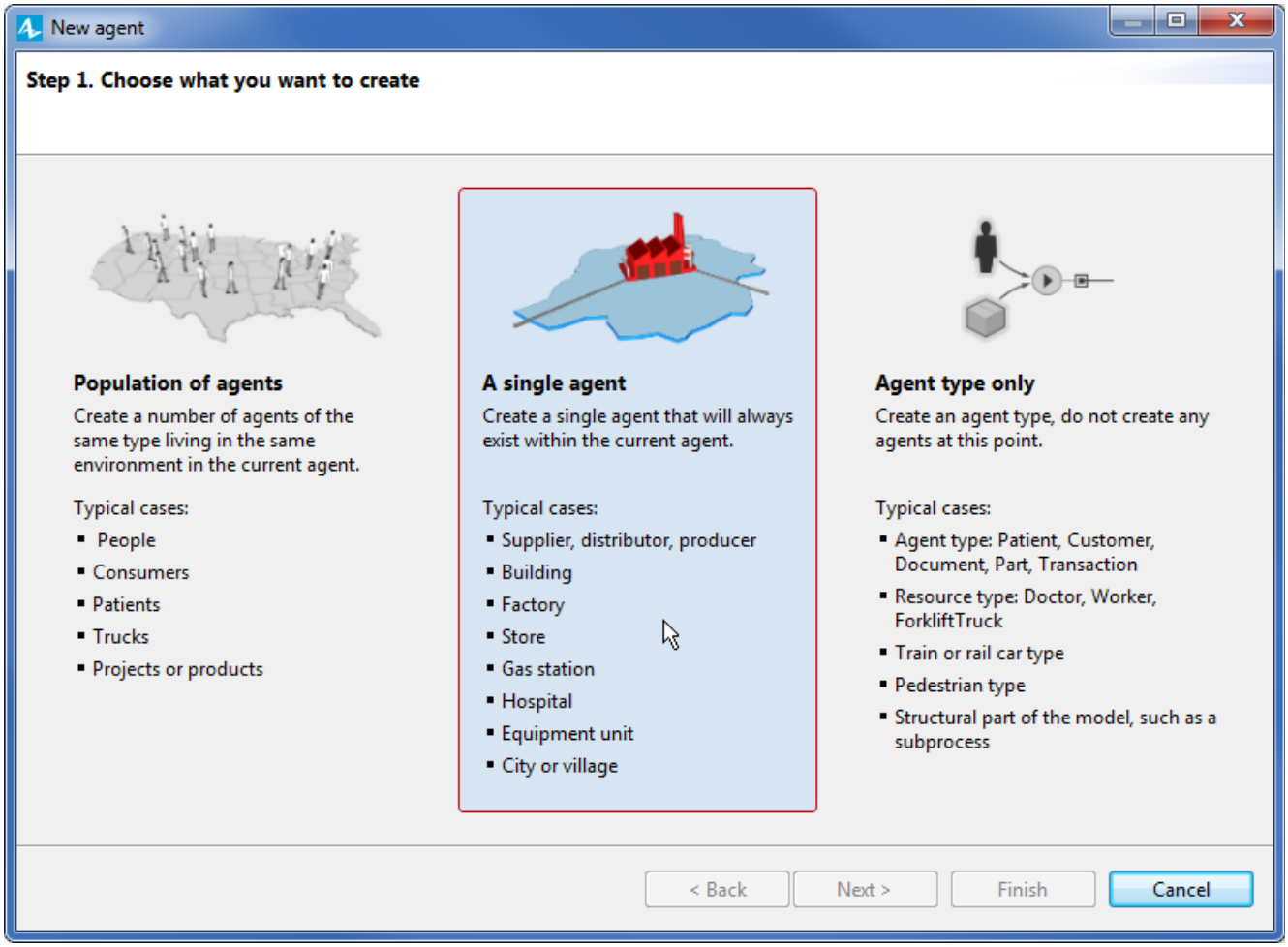
Since we model only one distribution center, let us create it as a single agent.

To create a distribution center

1. Open the **Agent** palette in the **Palette** view. Drag the **Agent** element onto the `Main` diagram. The **New agent** wizard will pop up.

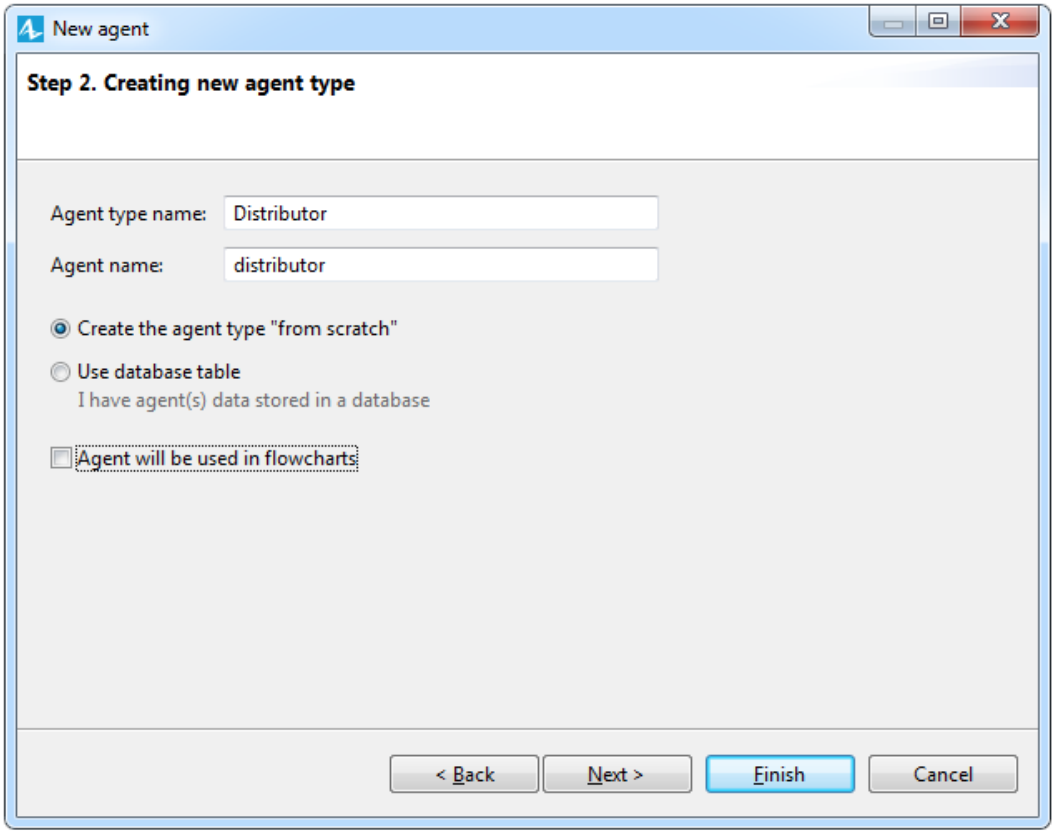


2. Choose to create **a single agent**. The wizard will take you to the next step.

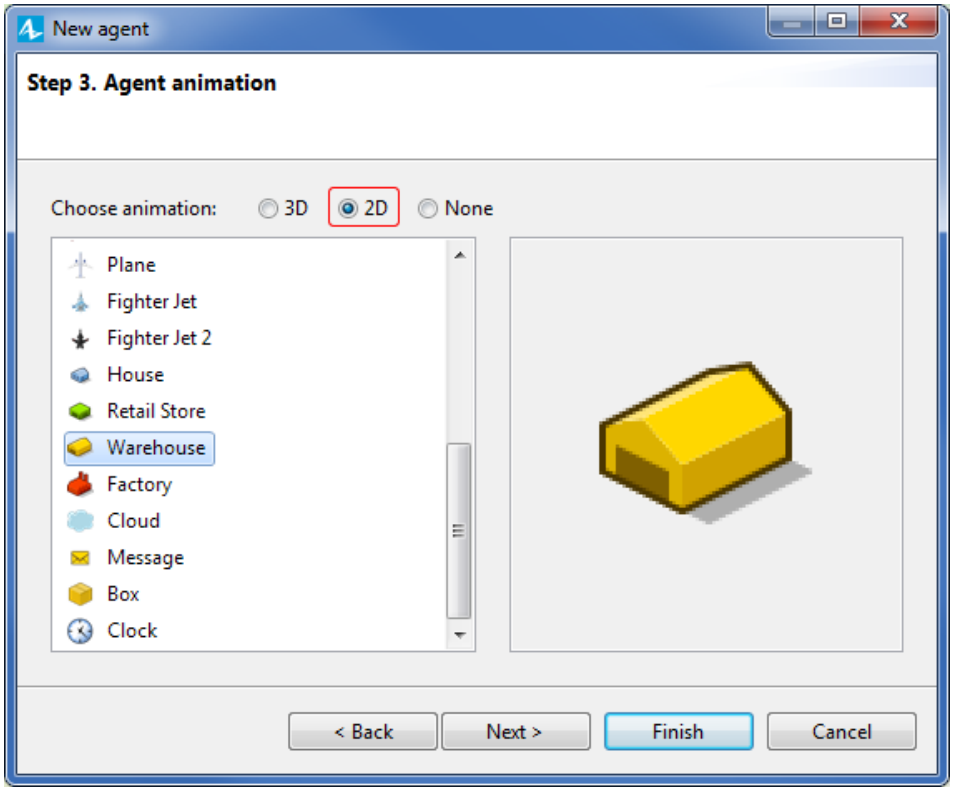


3. We are creating all our agents as new agents from scratch, and do not need to use any templates here.

   Define the **Agent type name**: `Distributor`. The agent's name of this type will autofill with the same name: `distributor`. It is a convenient way to name an agent. Click **Next**.

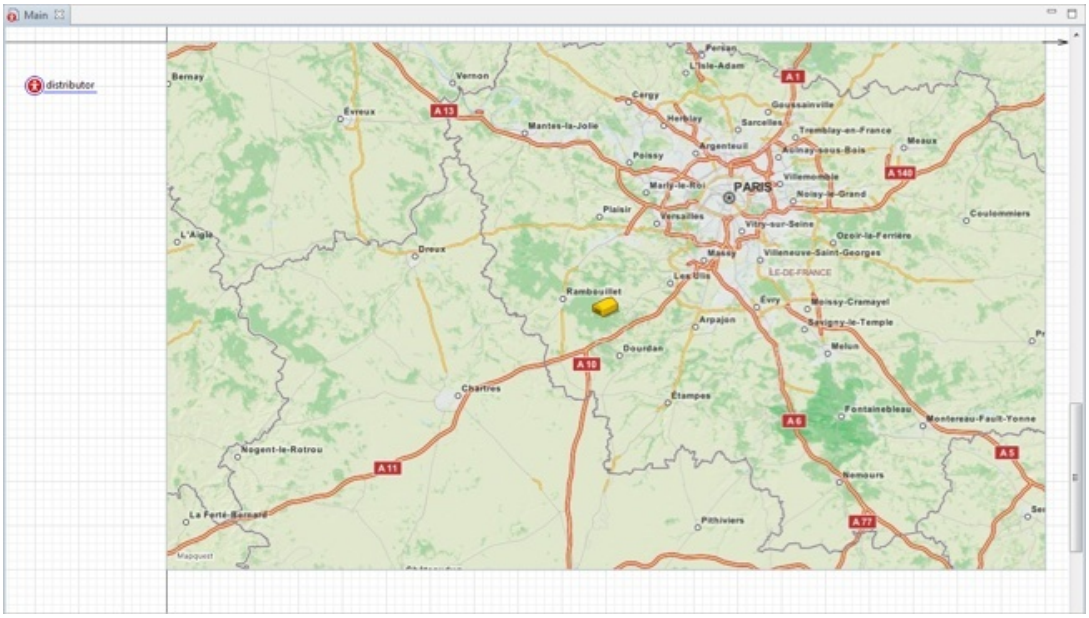


4. Next step is selecting **Agent animation**. There are choices of animation type where 3D animation is the default one. Since we build our model on the map that is 2D, switch to the **2D** animation figures and select the **Warehouse** figure. Click **Finish**.



5. Next step is the **Agent parameters** page. We do not need to create here any parameters for the `Distributor` agent type so we can just skip it. Ordinarily you could choose space for the agent, but in our case the space is already defined with the map: agents that live on `Main` live in the GIS space.

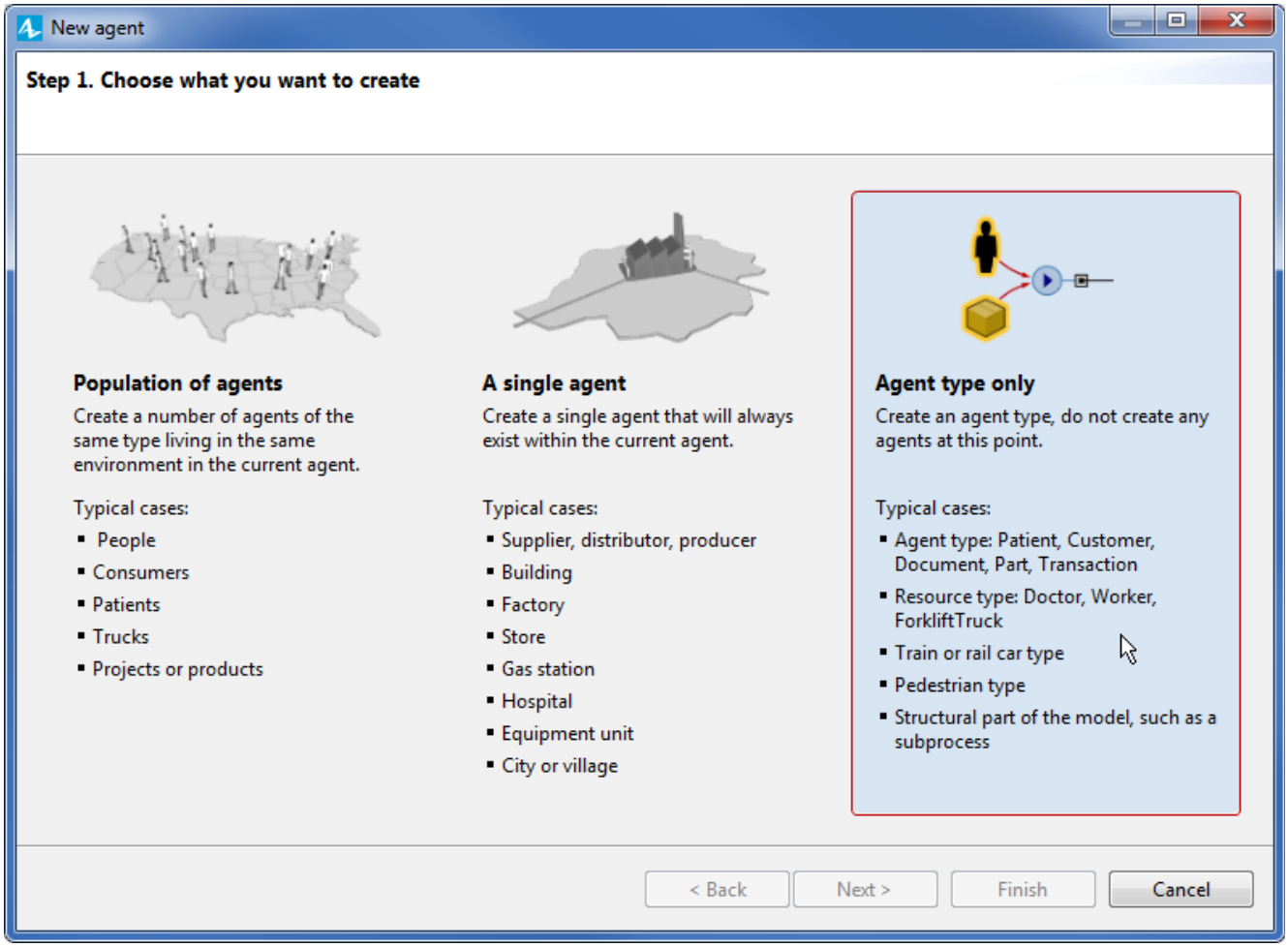
The agent object will appear on the Main diagram there where we have dropped it from the palette. The agent animation figure will be placed in the center of the map (it is the default location for animation on the map, and we will define a specific location for it in the next phase).



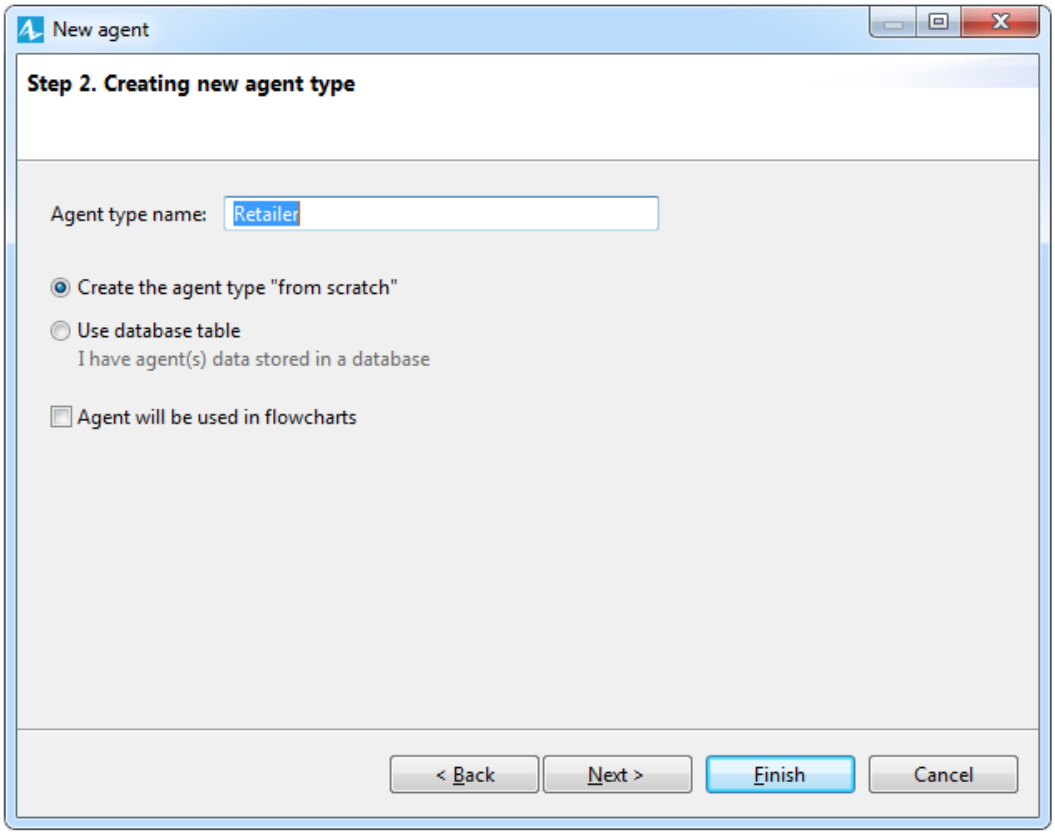
Now we have the distributor, and let us proceed to retailers. This is a GIS model, and since GIS modeling in AnyLogic provides special means to create separate agents, we will now create just an agent type.

To create a retailer type

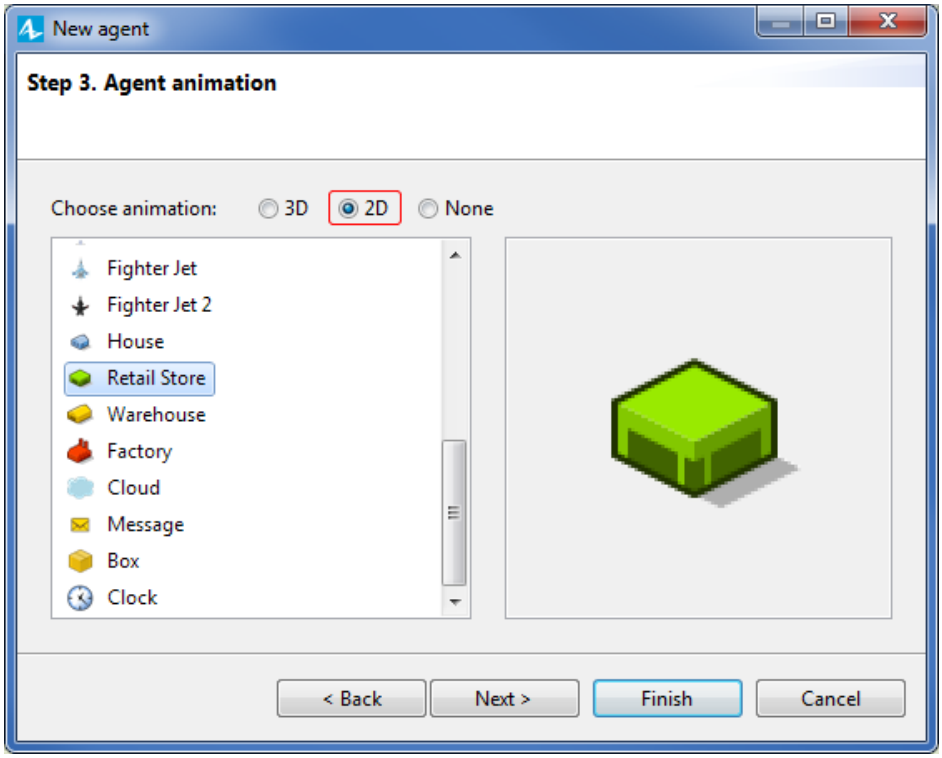
1. Drag the **Agent** element onto the Main diagram. Select **Agent type only** in the **New agent** wizard.



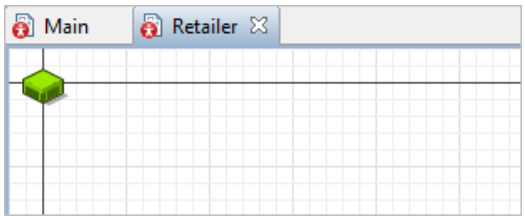
2. Specify the **Agent type name**: Retailer. Click **Next**.



3. Again, select a **2D** animation figure to represent retailers on the map: **Retail Store**. Click **Finish** on this step. There are no parameters we need to create for this agent type.



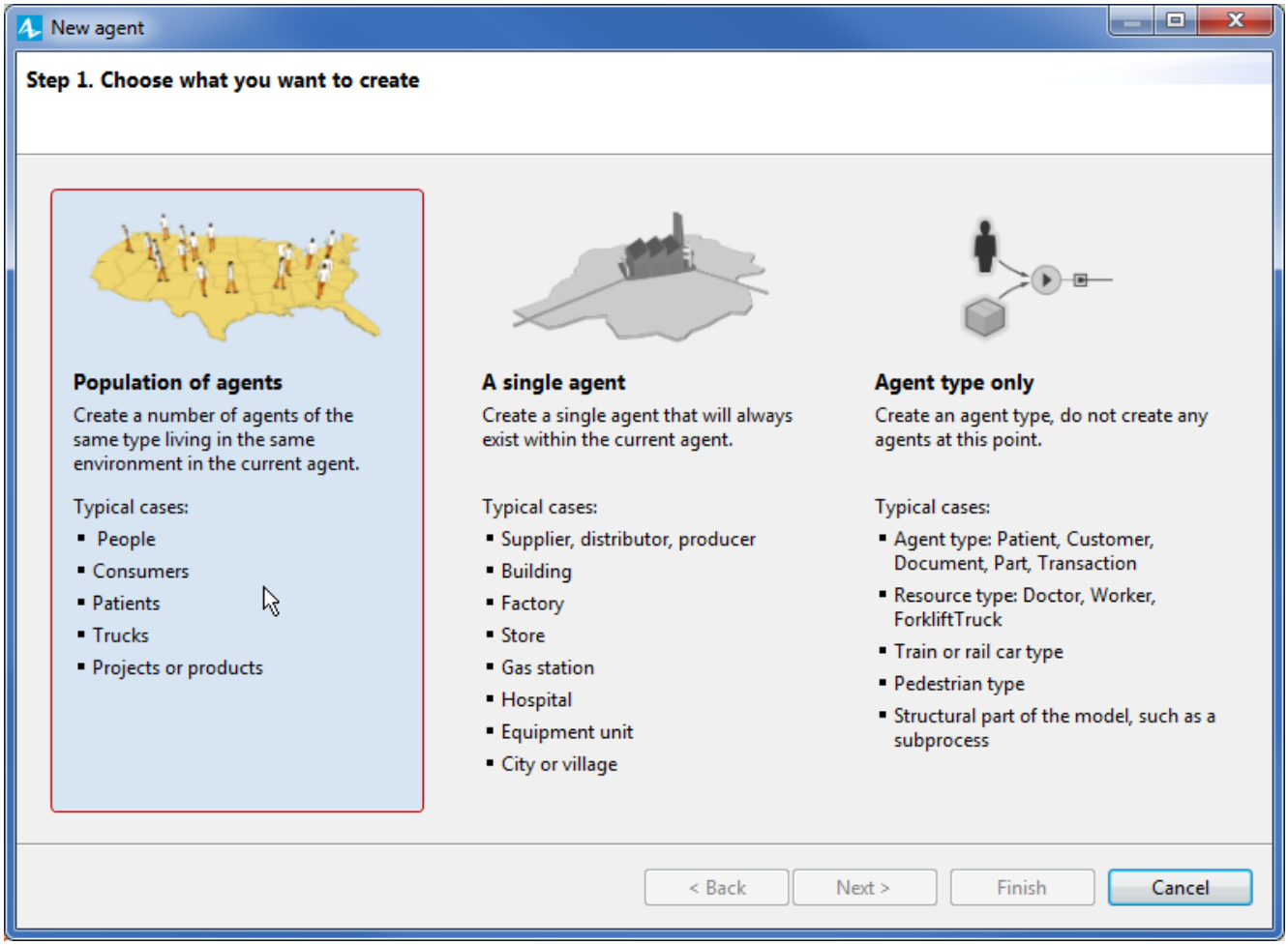
4. After you finish creating this agent type, its diagram will open automatically. The only element we have yet added onto it, is the animation figure. Switch back to the `Main` diagram.



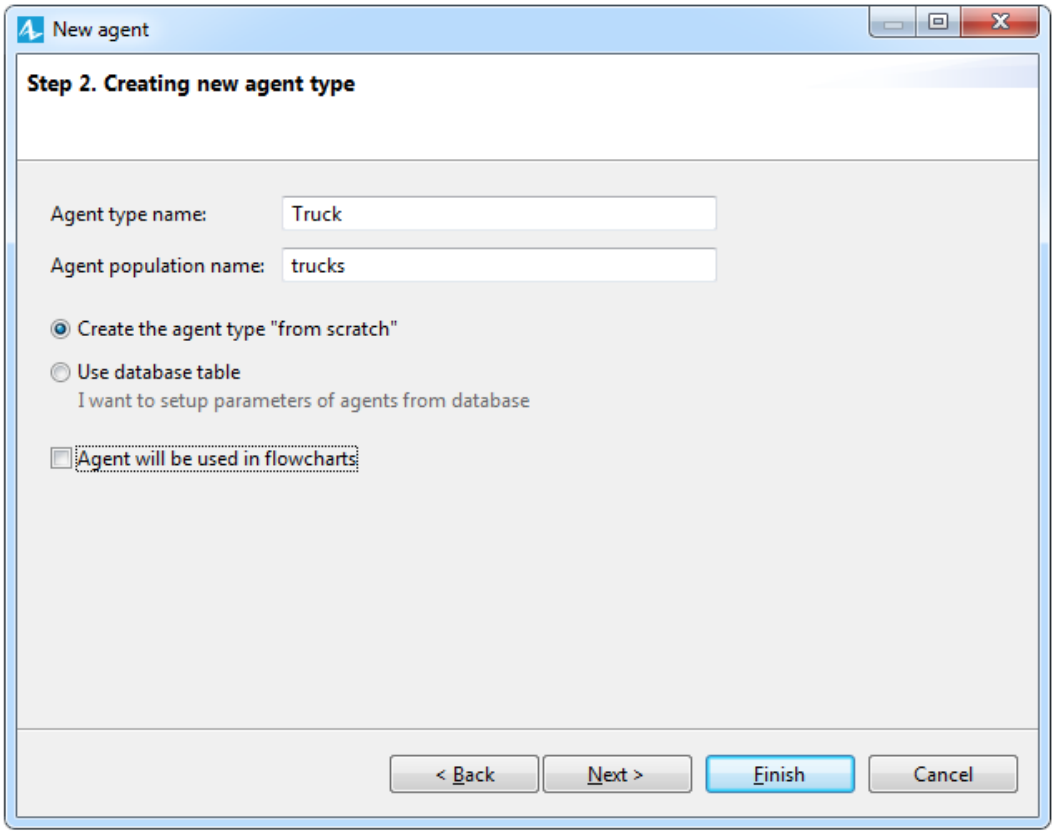
Next, there are trucks that move between the supply chain elements. Let us create the whole fleet at once as a population.

To create a vehicle fleet

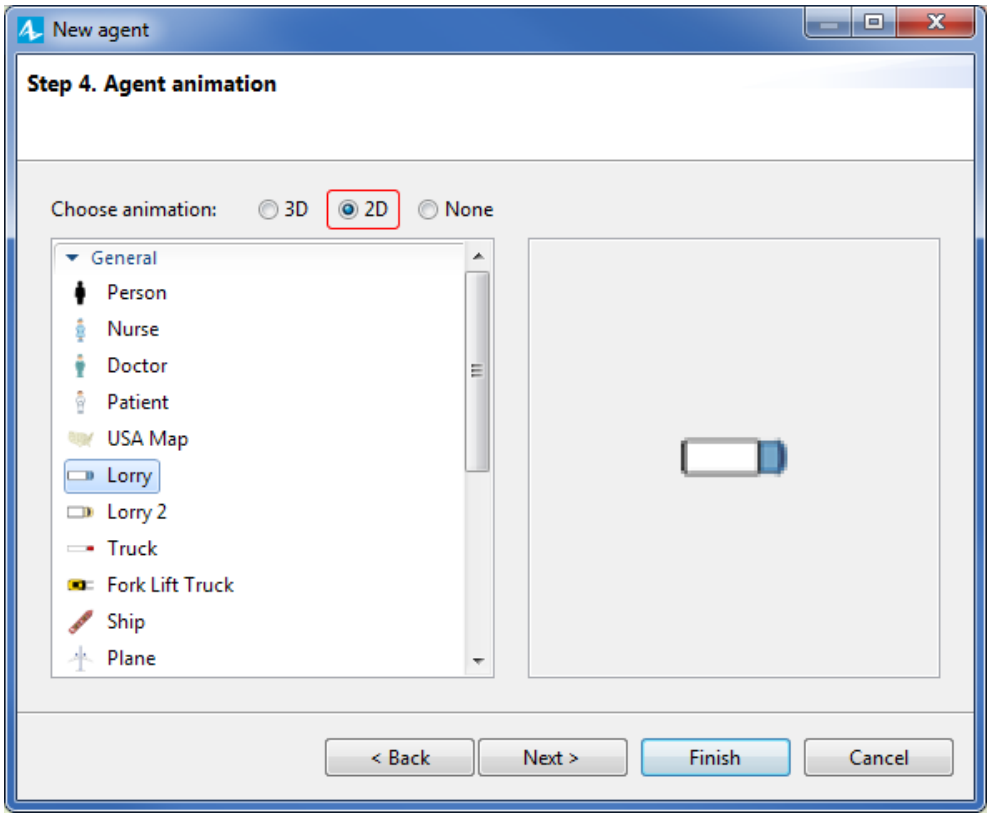
1. Drag the **Agent** element onto the `Main` diagram. This time, choose to create **Population of agents** in the first step.



2. Skip the second step, we are creating a new type of agent for this population. Define the **Agent type name**: `Truck`, and the name of population will autofill as `trucks`. Let us use this name for the population. Click **Next** to process to animation.

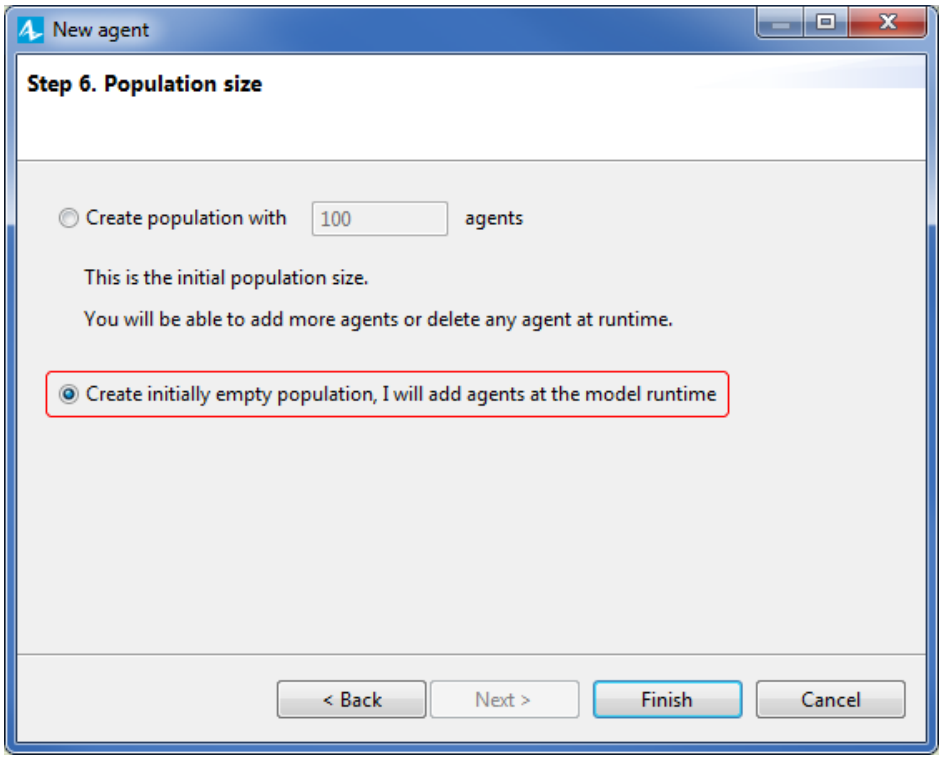


3. Here you choose the animation figure, like you did for other agents. Select a **2D Lorry** figure, for instance, or a **Truck**, and click **Next**.



4. We will skip the **Agent parameters** step again, but we need one step after that, called **Population size**. This step is peculiar to populations only (a single agent is just one agent, and an agent type does not have immediate instances).

   Choose to **create initially empty population**. We will add agents later, with the help of the Process Modeling library functionality.

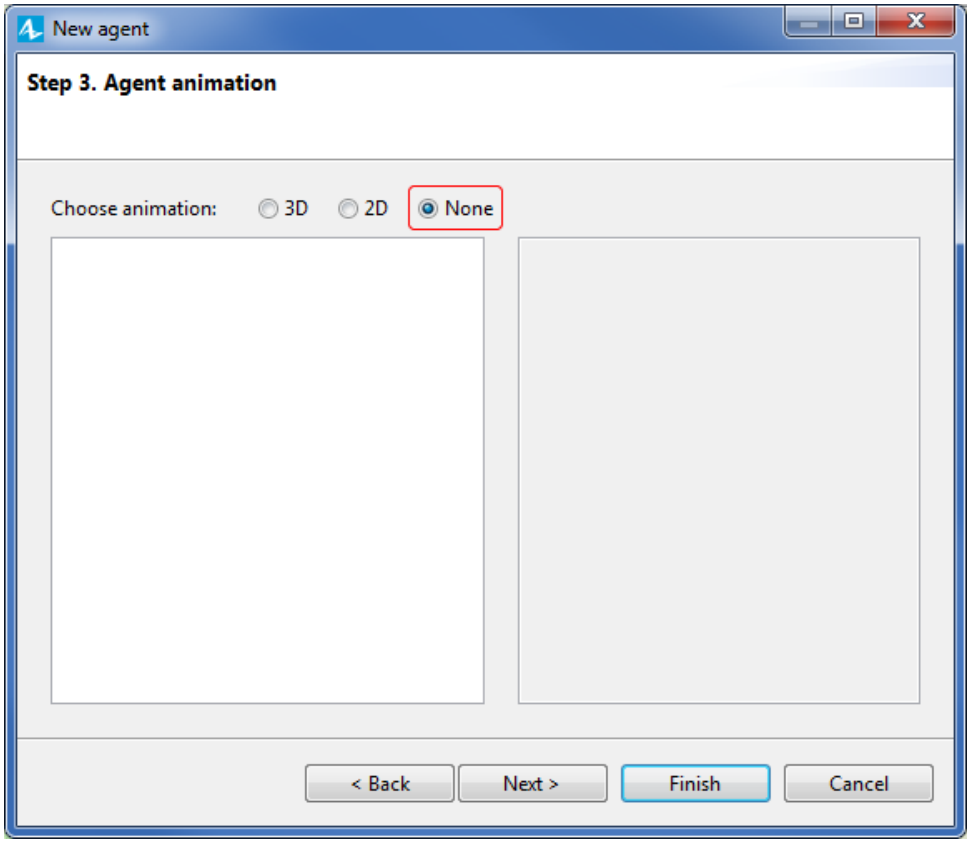


5. Click **Finish**. You will see the population `trucks[..]` residing on `Main` with its animation on the map.

In our model, the delivery process starts when one of the retailers sends a request for the product to be delivered. We will also model the notion of order as an agent.

To create order as an agent

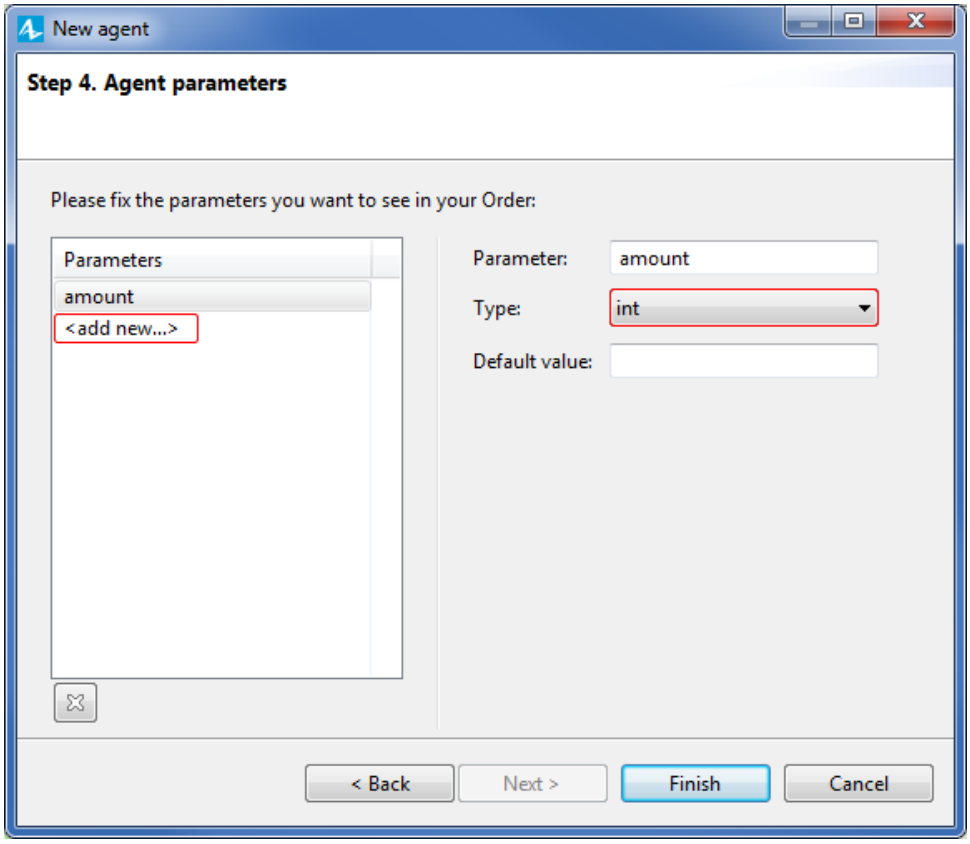
1. Drag the **Agent** element onto the `Main` diagram. Select **Agent type only** in the **New agent** wizard.
2. Define the **Agent type name**: `Order`, and click **Next**.
3. More often, we need to create agents to represent things that have animation, but this time choose animation: **None**. Click **Next**.



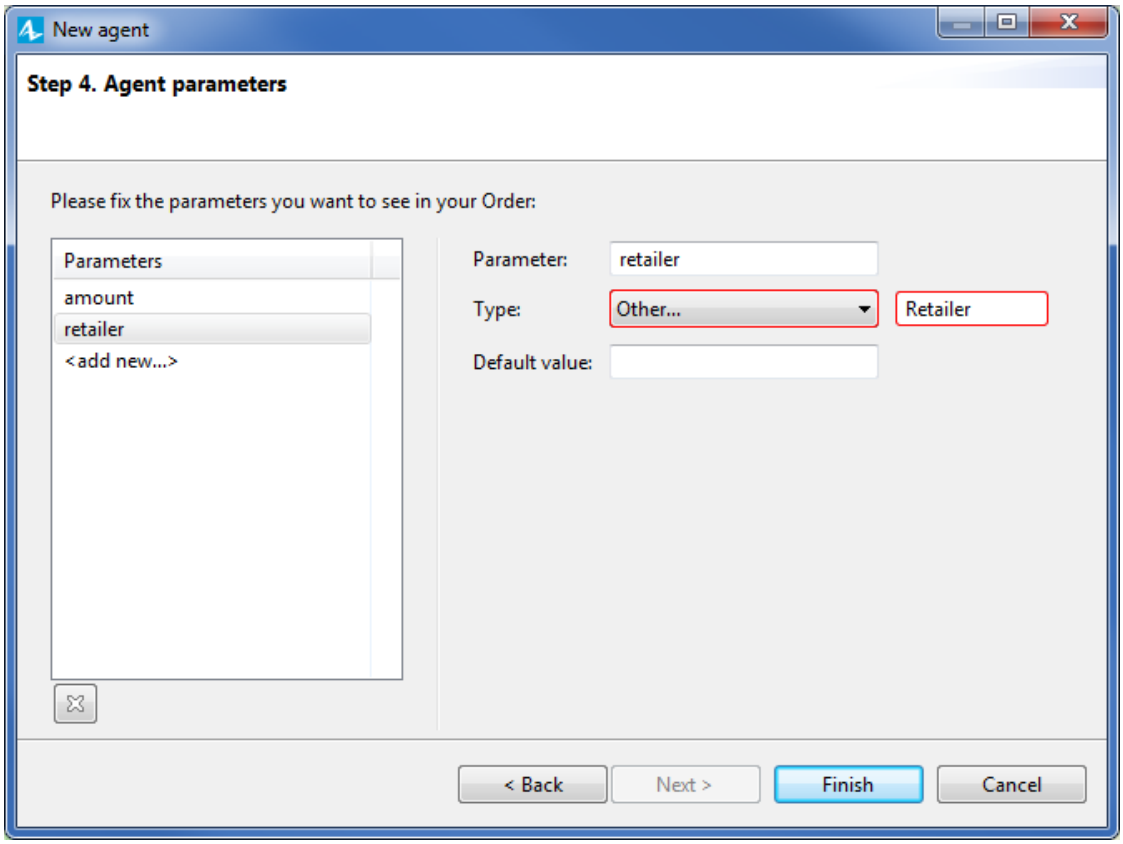
4. This time we will use the **New agent** wizard to create parameters for the agent. On the left, you can see the **Parameters** section. Click **<add new...>** there to add a parameter. The parameters' properties will appear on the right side of the wizard page.

   Specify the name in the **Parameter** field: `amount`, and then choose the **Type** below: `int` (an integer number).

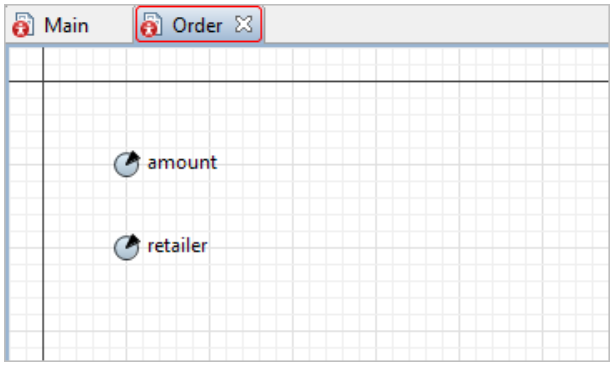
   We will use this parameter when we define how the orders are generated: the amount of product a retailer demands from the distributor.



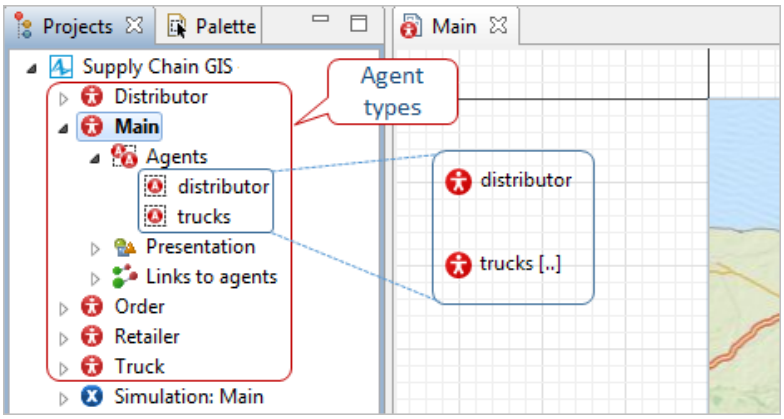
5. Again, click **<add new...>** in the **Parameters** section. This time, we will create a parameter that defines a retailer, so let us name it `retailer` and define its type correspondingly: `Retailer`. This is a custom agent type in our model, and to use it as a parameter type, we first choose **Other...** in the **Type** drop-down list, then we specify `Retailer` in the edit box manually.



6. Click **Finish**. The `Order` agent diagram will open, and we can see what we have created in the wizard.



Go back to the `Main` diagram where we will continue developing our model. If you open the **Projects** view now you will see the agent types are the second level under the model itself. Some agents live on the `Main` diagram, i.e. `Main` plays the role of environment for those agents. You can open any agent type from the model tree to add elements on its diagram the same way we have been adding them on Main.



If you run the model now, you will see the distributor on the GIS map in its default location. The trucks population is still empty and we have not yet created retailers.

We will place the agents in particular locations on the map and create retailers in the next phase.

Reference model: Supply Chain GIS - Phase 2

Phase 1. Configuring the GIS map

Phase 3. Placing agents in GIS space