Tutorial

State Machine

Tutorial	Actifsource Tutorial – State Machine
Required Time	• 40 Minutes
Prerequisites	• Actifsource Tutorial – Installing Actifsource • Actifsource Tutorial – Simple Service • Actifsource Tutorial – Complex Service
Goal	• Developing an easy to use state machine model • Show possible events in every transition • Restrict transition target to state instances of the own state machine
Topics covered	• Decorating Relation Aspect • Range Restriction Aspect • Selector (forward and reverse selection)
Notation	↳ To do ⓘ Information • **Bold**: Terms from actifsource or other technologies and tools • **Bold underlined**: actifsource Resources • Underlined: User Resources • *UnderlinedItalics*: Resource Functions • `Monospaced`: User input • *Italics*: Important terms in current situation
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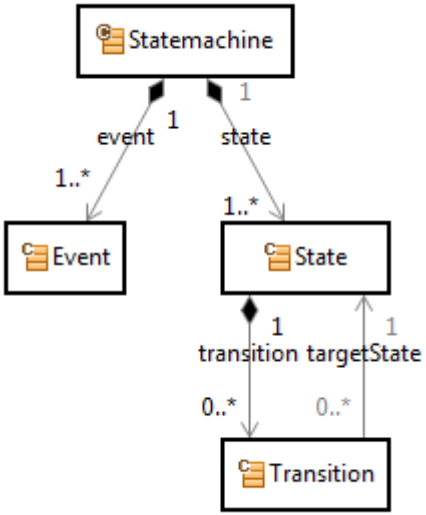
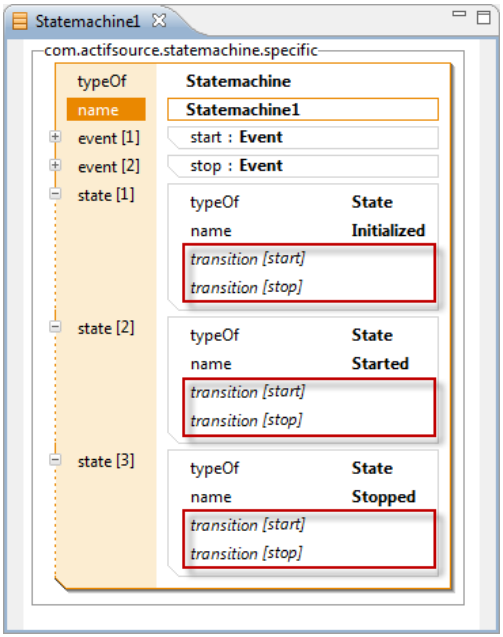
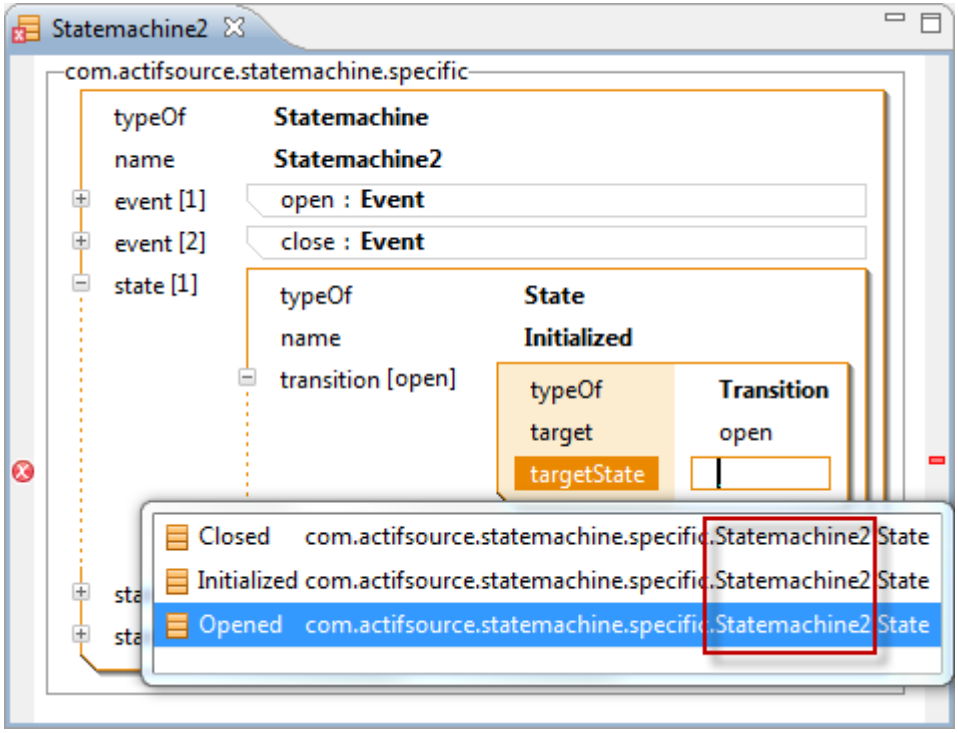
- Create a simple state machine



- Show possible events in every transition

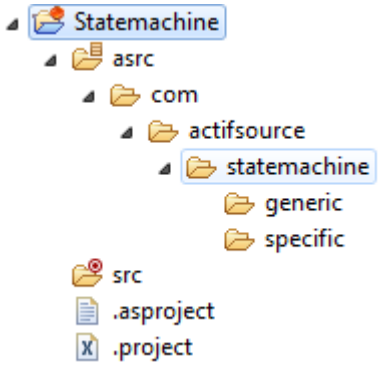


- Restrict transition target to state instances of the own state machine



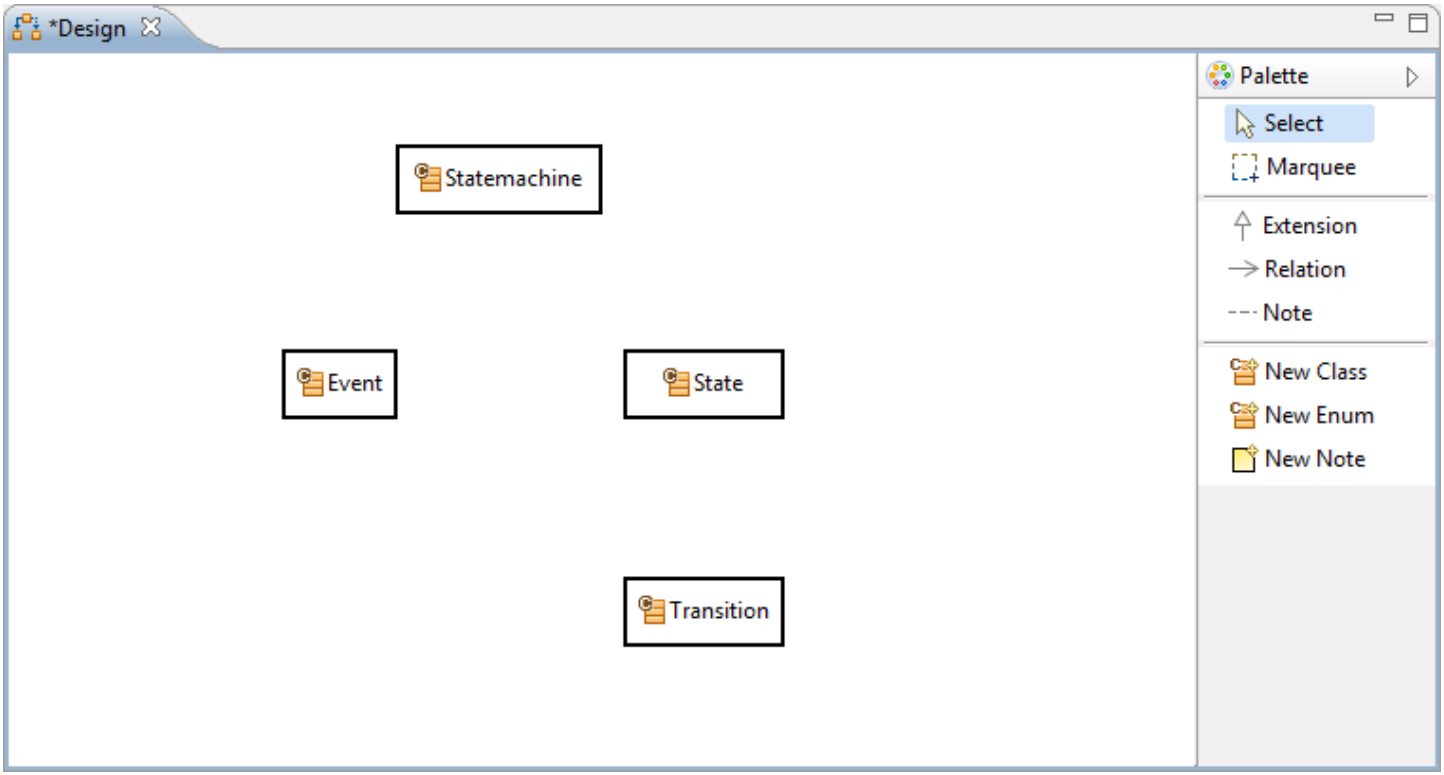
Part I: Preparation

- Prepare a new **actifsource Project** named Statemachine as seen in the *Actifsource Tutorial – Simple Service*
  - Setup the Target Folder *src*
- Use the following package structure

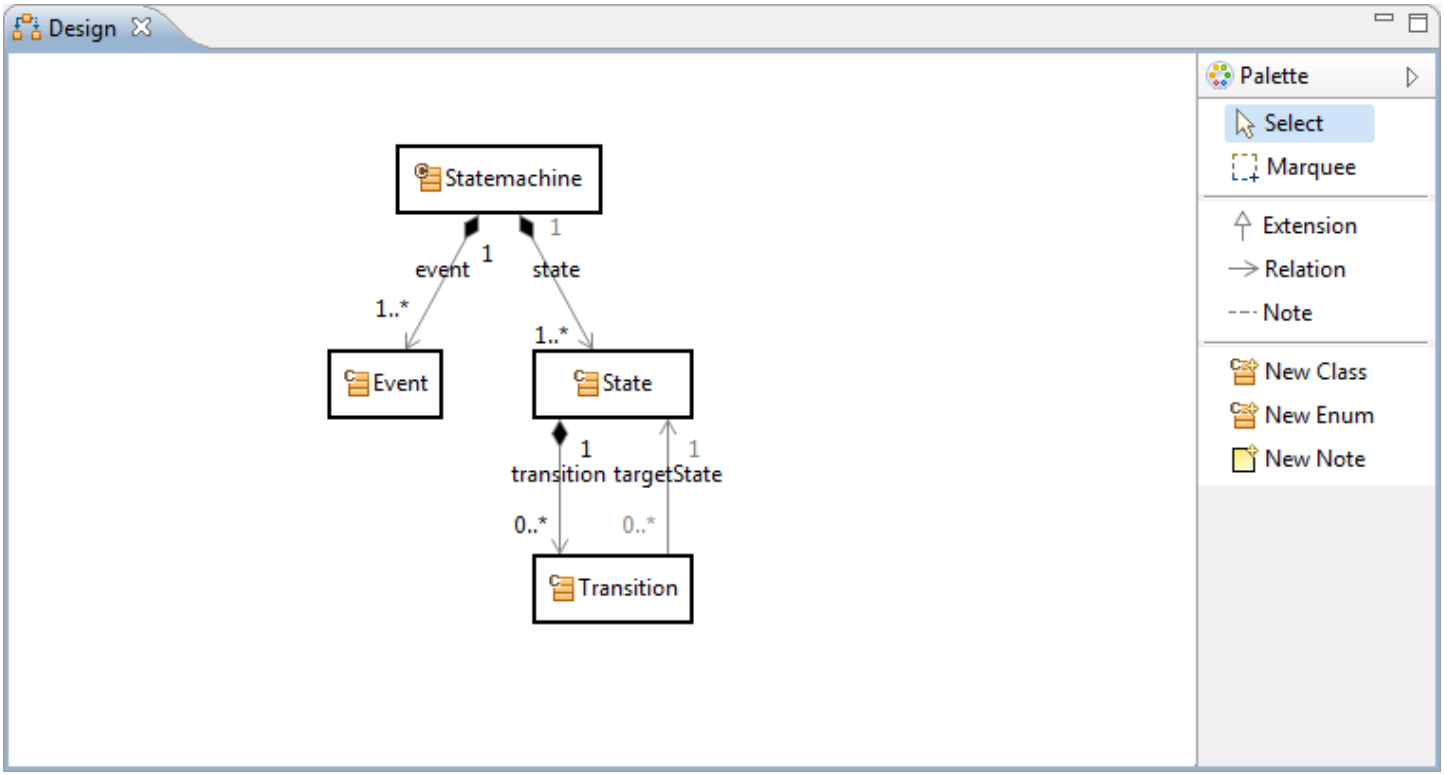


Part II: Create a State Machine

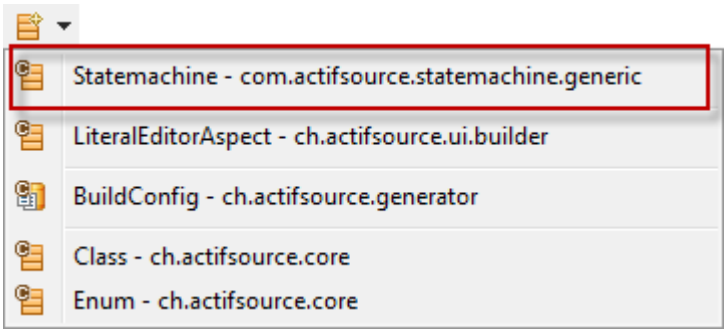
- ⓘ Create a simple state machine
- ⓘ Instantiate the state machine and see its deficits

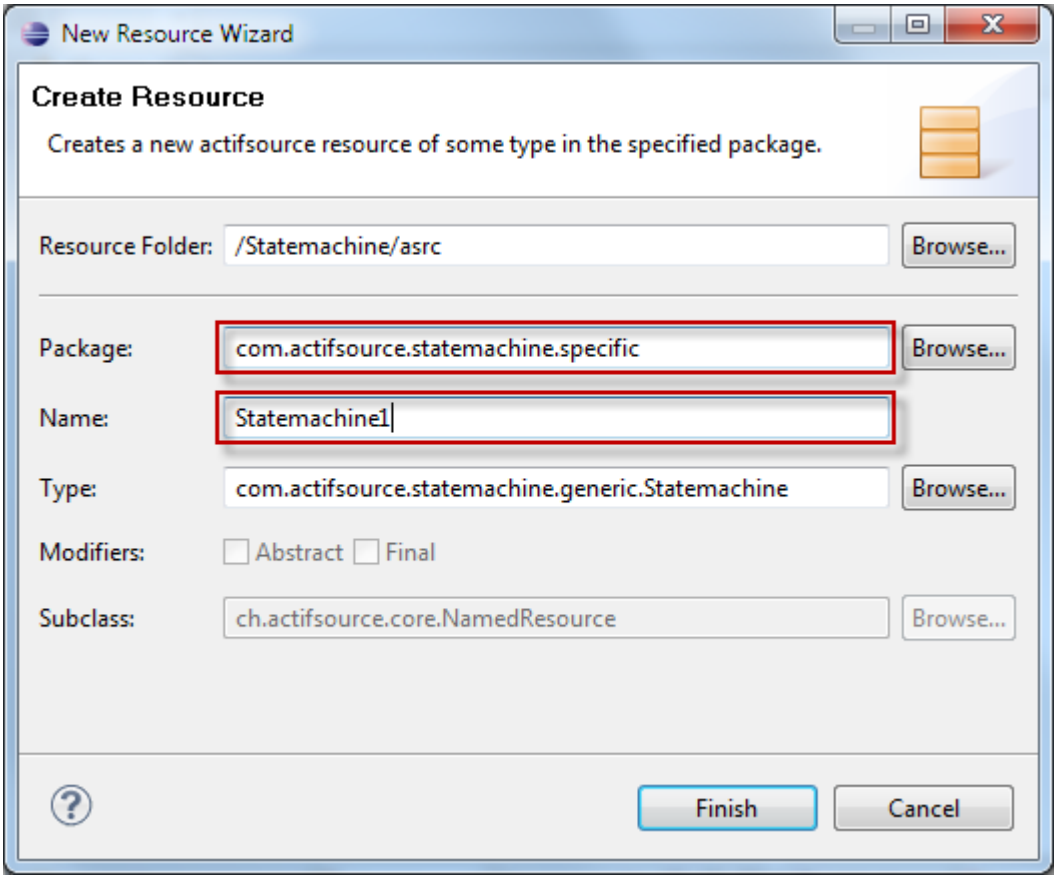


- Create a **Generic Domain Model** named *Design* in the **Package** *generic* using the **DiagramEditor**
- The Design shall contain the following **Domain Classes**
  - Statemachine, Event, State, Transition

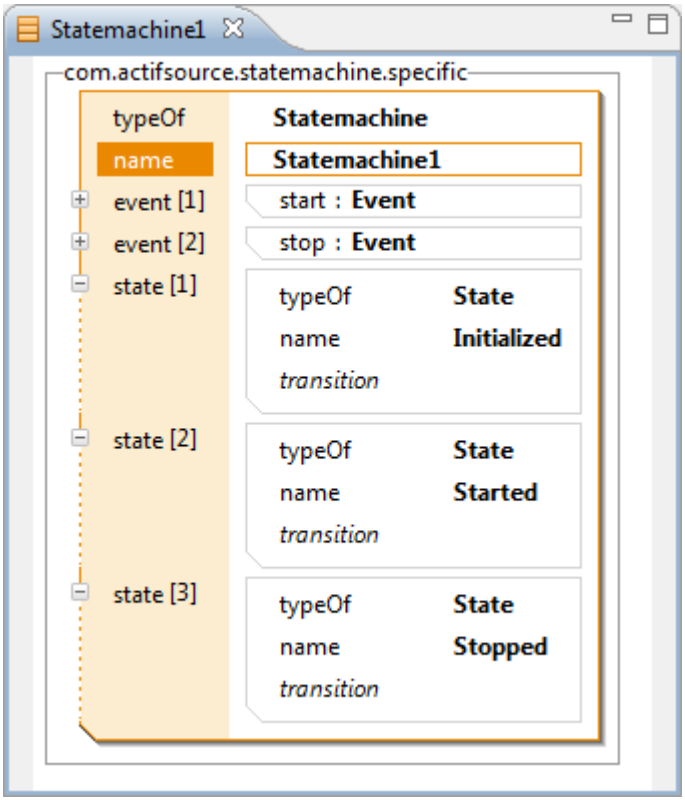


- Insert a **OwnRelation** between
  - Statemachine and Event
  - Statemachine and State
- Insert a **DecoratingRelation** between
  - State and Transition
- Insert a **UseRelation** between
  - Transition and State
- Adjust the **Cardinalities** as shown above
- ⓘ Warning: The layout for the realtions transition and targetState might differ in your editor





↳ Create a Statemachine named Statemachine1 in the **Package** *specific*

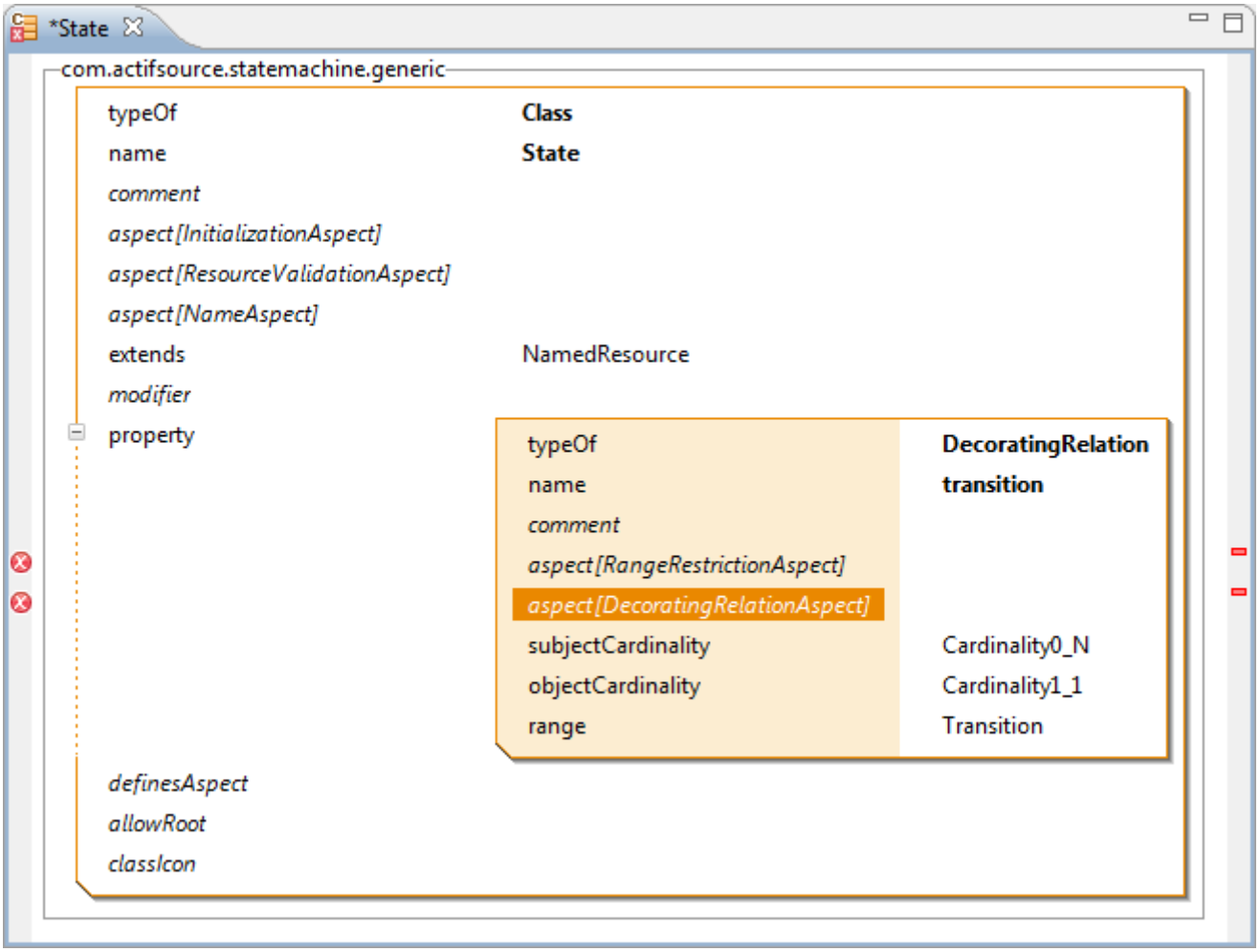


- Add the Events start and stop
- Add the States Initialized, Started and Stopped as shown above
- ⓘ At this stage, the generic model doesn't prevent you from mixing instances from different Statemachines when creating specific States, Events, and Transitions

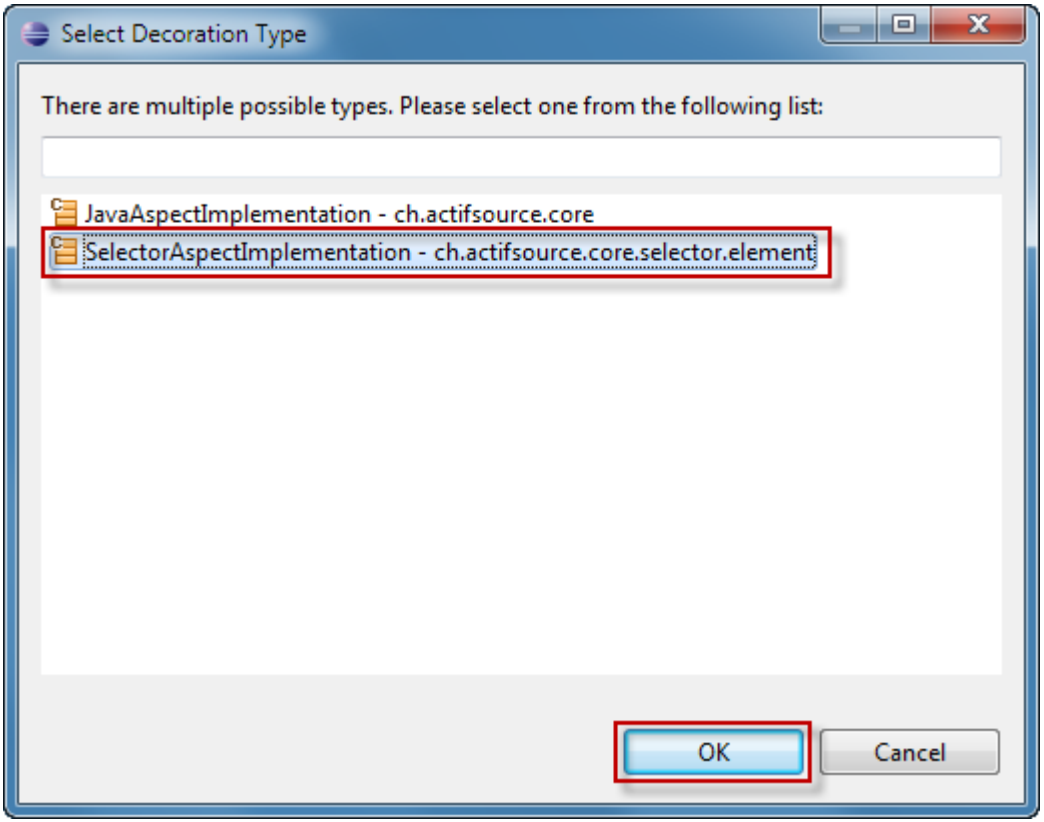
Part III: Decorating Relation Aspect

ⓘ Learn how to decorate a relation with a list of resources in order to prevent the mixing of instances from different Statemachines

Add a Decorating Relation Aspect 12



- In State open the **DecoratingRelation** transition
- Press Enter on *aspect[DecoratingRelationAspect]*

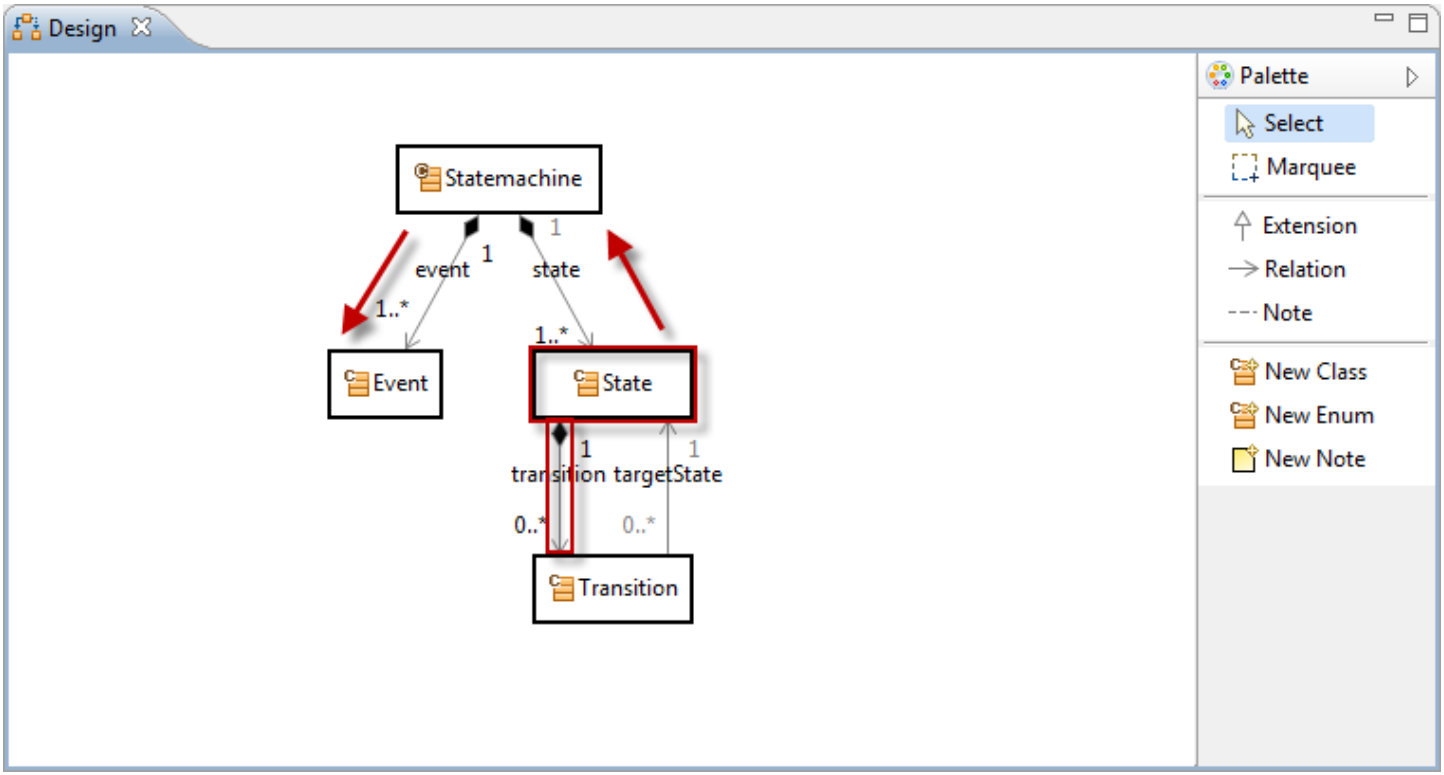


ⓘ Note that you can choose between a *JavaAspectImplementation* and a *SelectorAspectImplementation*
- Selecting the *JavaAspectImplementation* allows you to write Java Code for complex operations
- Selecting the *SelectorAspectImplementation* allows you to use the easy Selector syntax

↳ Select *SelectorAspectImplementation*

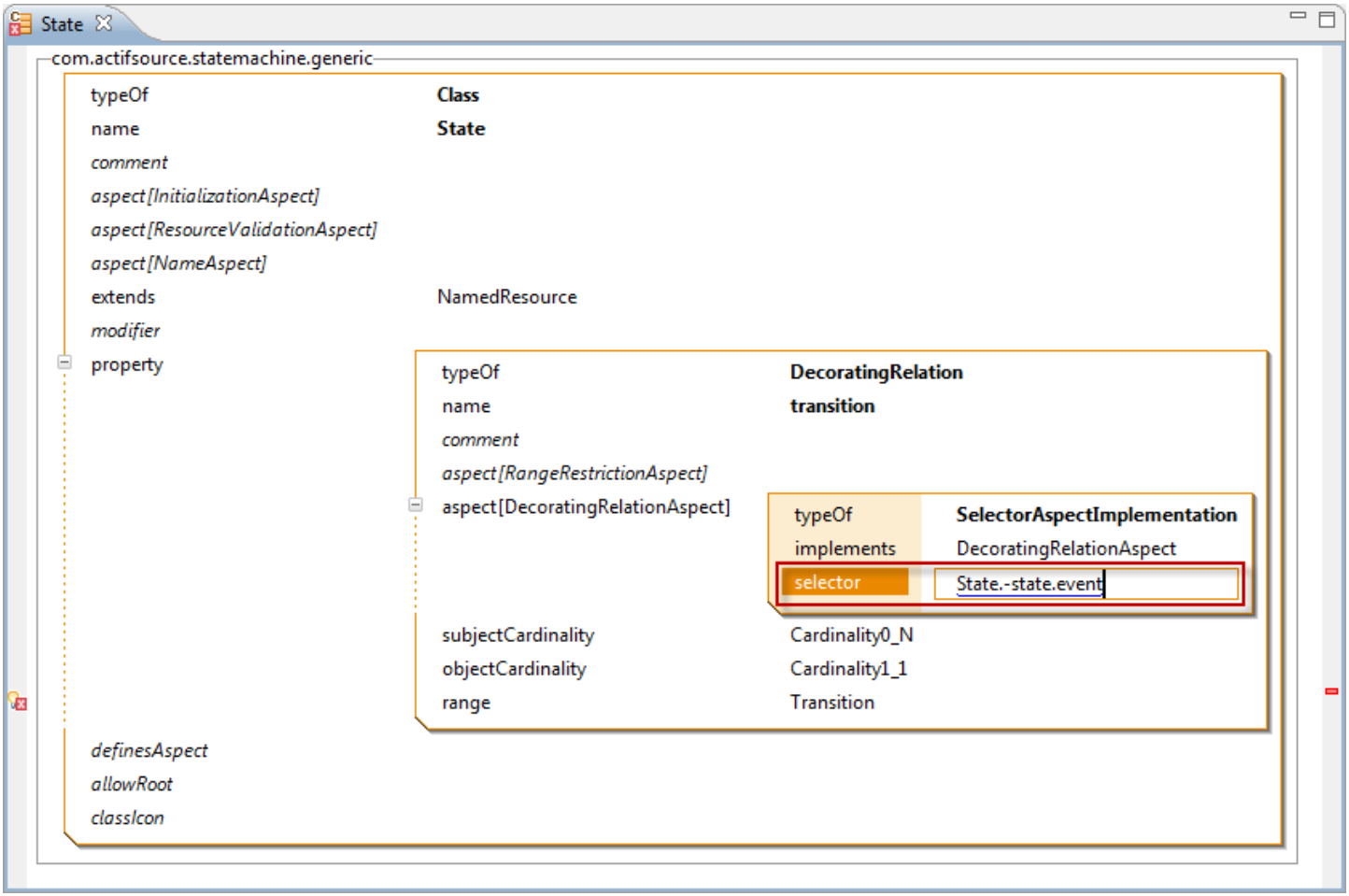
↳ Click *OK*

Add a Decorating Relation Aspect 14



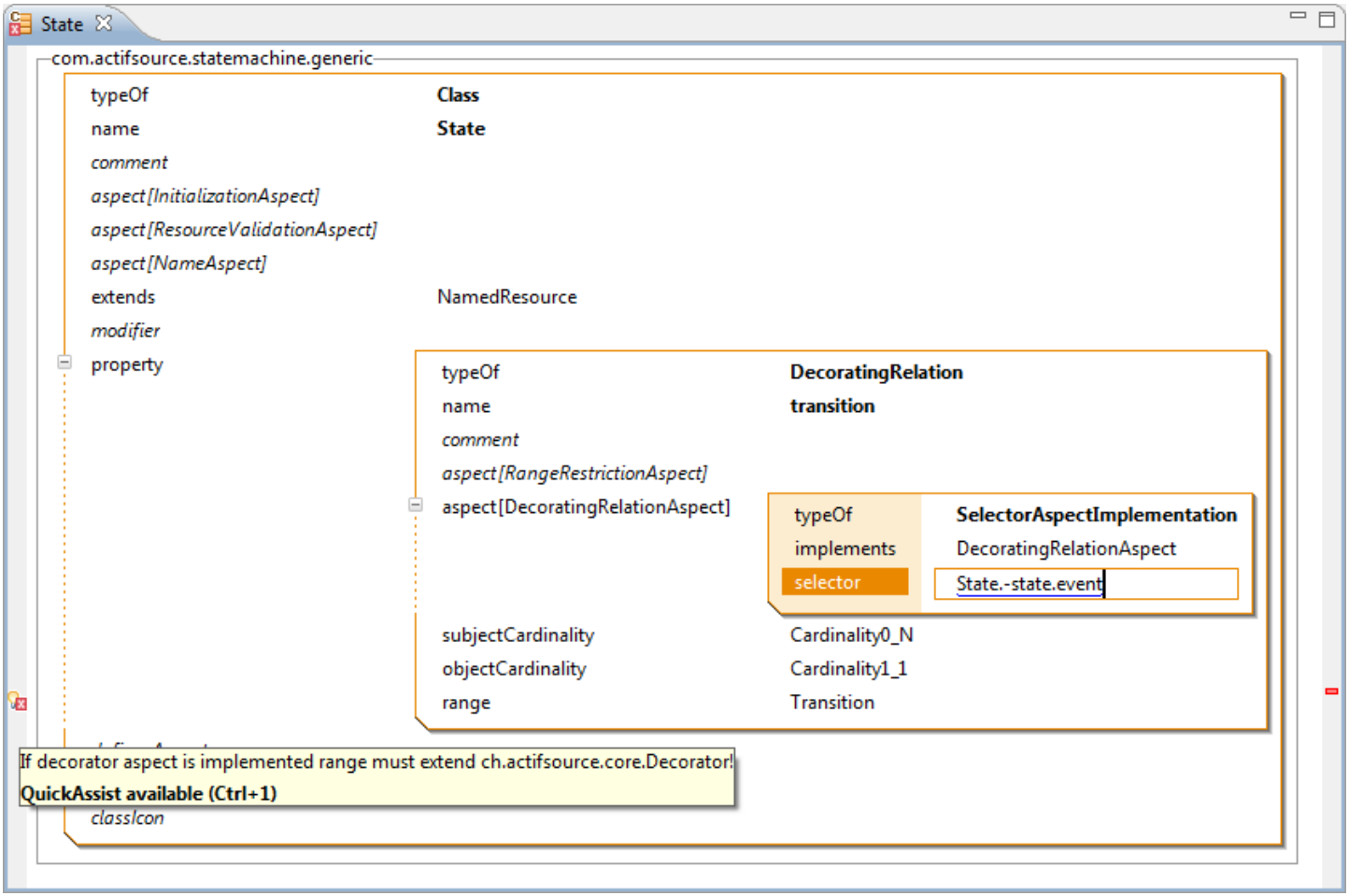
- Let's look at a possible Transition for every Event
- The **DecoratingRelation** transition is found in State
- We have to navigate from State to Event
  - Navigate backwards from State via state to Statemachine
  - Navigate forward from Statemachine via event to Event

Add a Decorating Relation Aspect



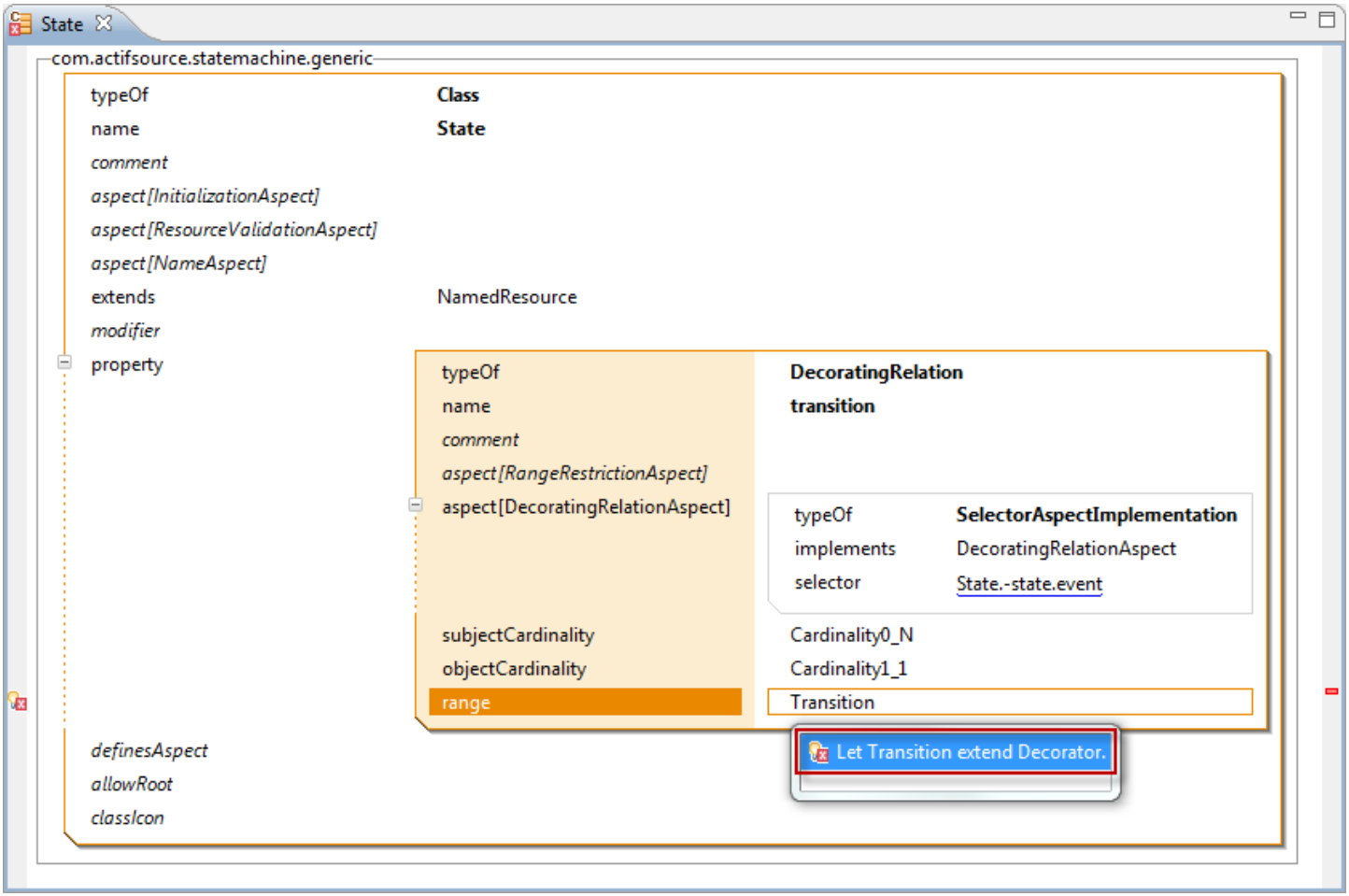
- Enter the Selector `State.-state.event` using Content Assist (Ctrl+Space)
- Note that State.–state navigates backwards from State to Statemachine

Add a Decorating Relation Aspect 16

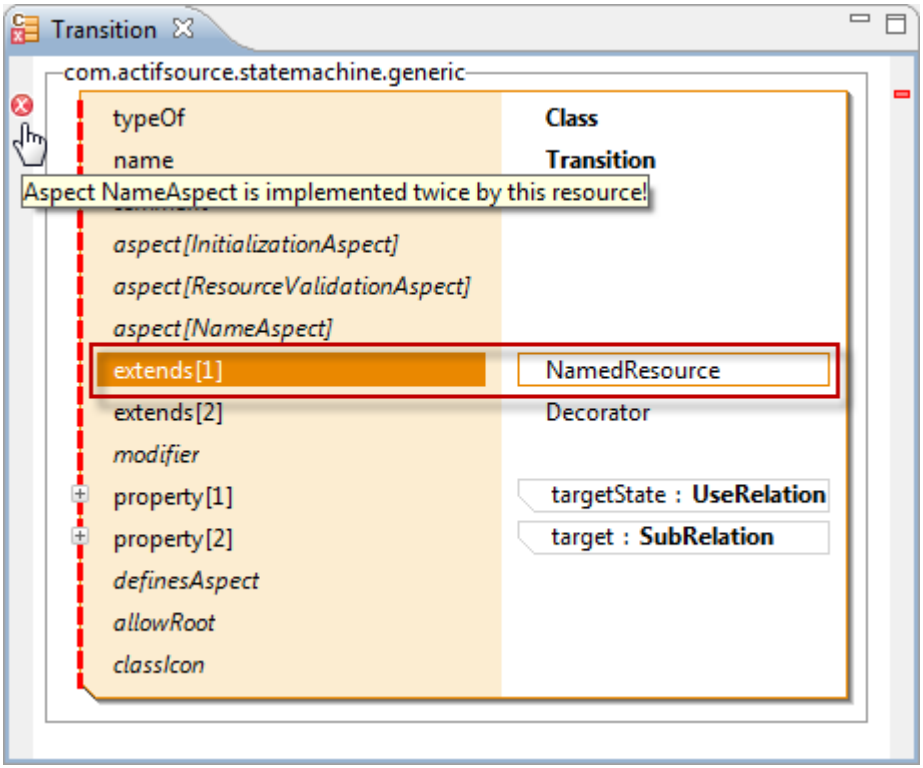


- ⓘ Implementing a *DecoratingRelationAspect* asks for a subclass of Decorator
- ⓘ Decorator has a **useRelation target** which is used to store the specific decorating Resource
  - Shown as: decoratingRelation[target]
- ↳ Open **Quick Assist** by clicking the light bulb or press Ctrl+1

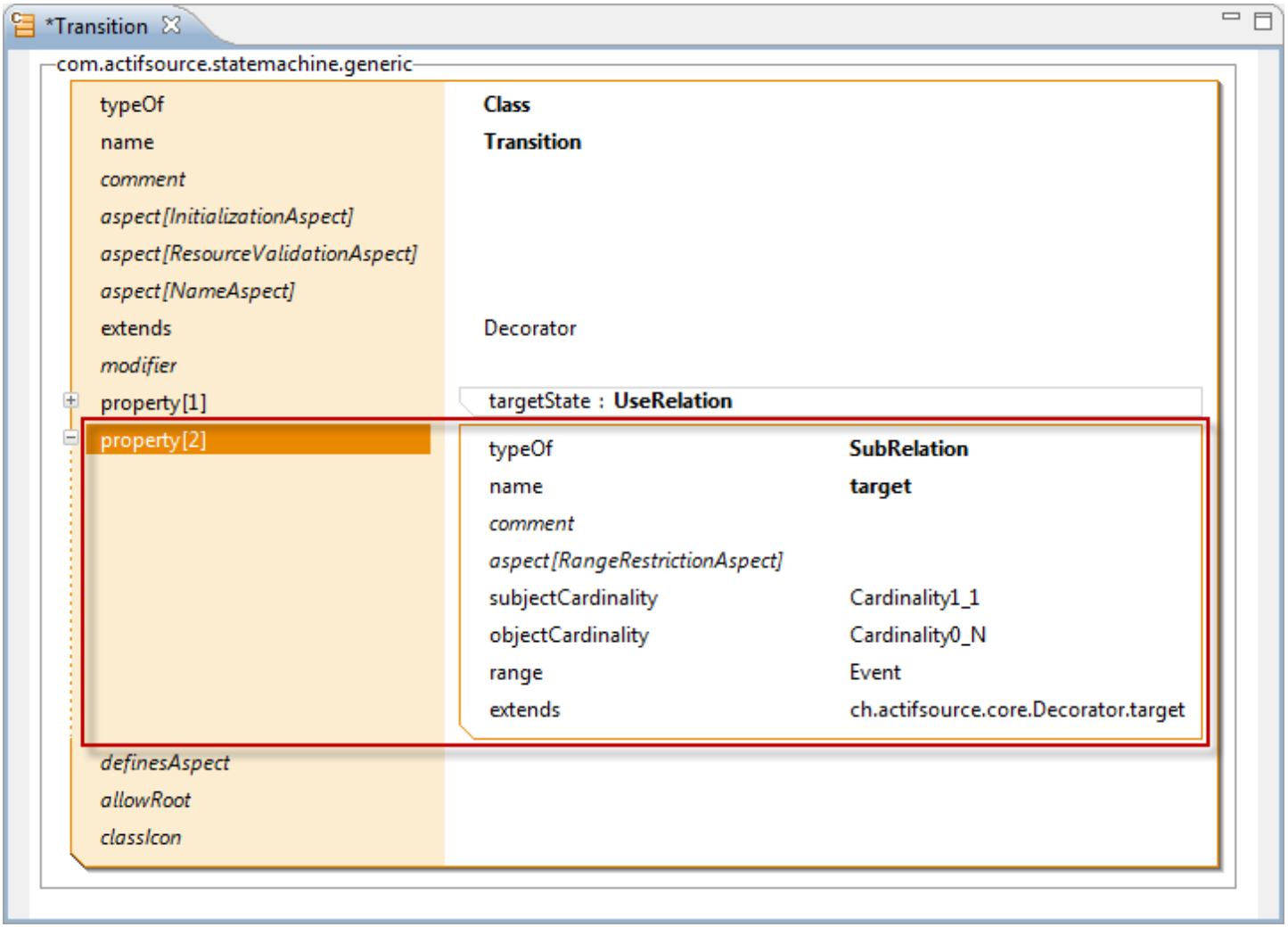
Add a Decorating Relation Aspect 17



↳ Use **Quick Assist** to let Transition extend **Decorator**

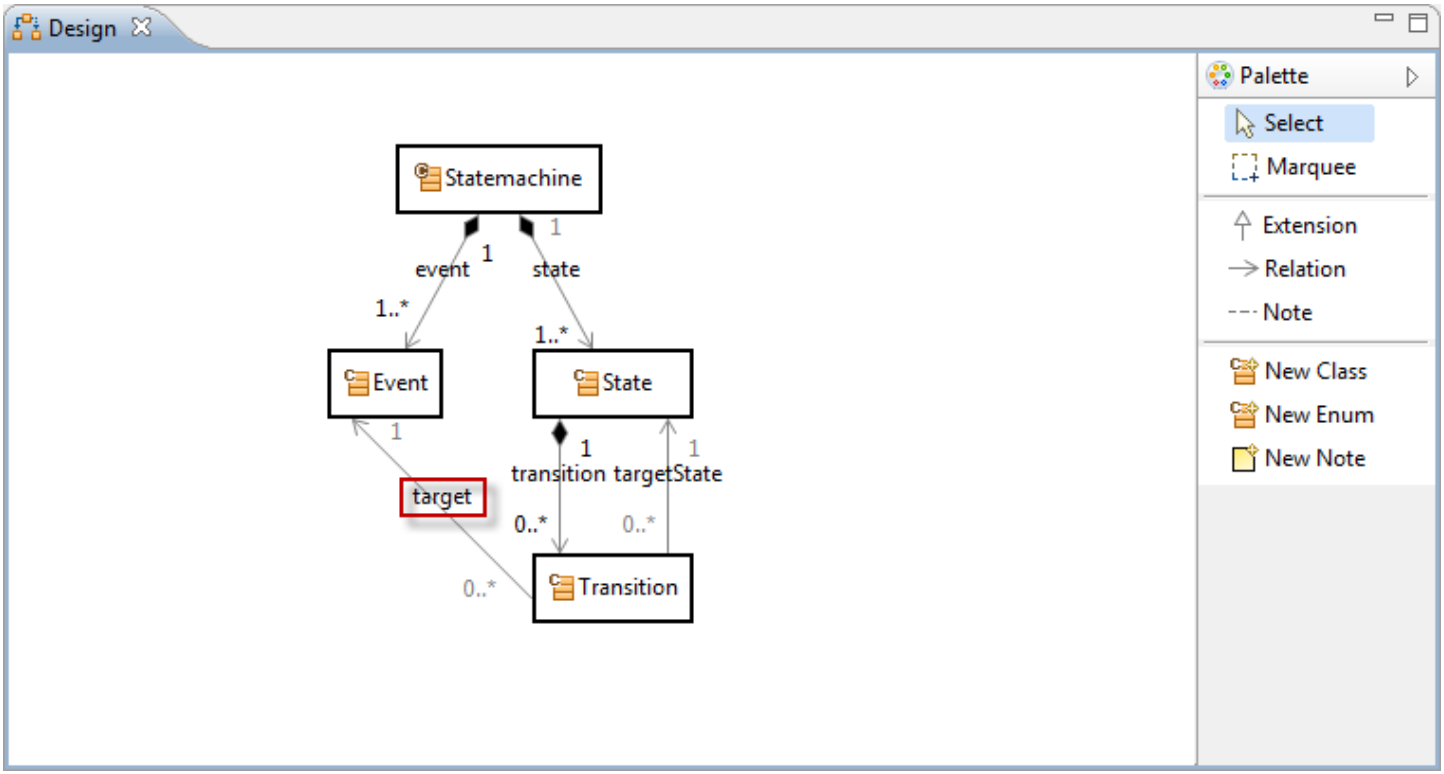


- Open Transition
- ⓘ By default a **Class** extends **NamedResource**
- Remove **extends NamedResource** as **Decorator** already implements a name aspect



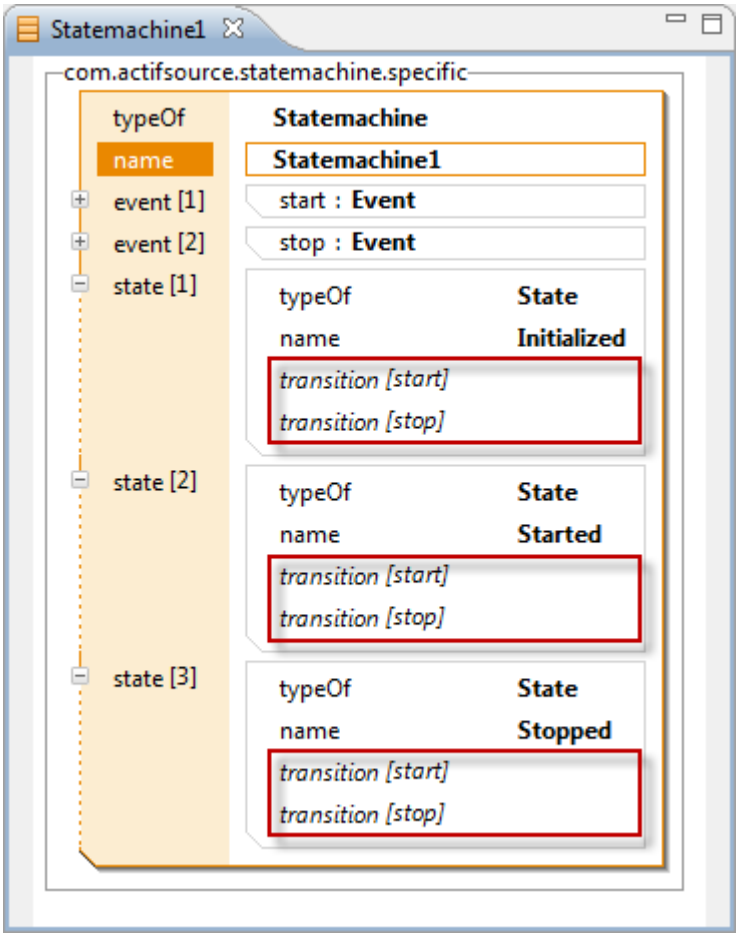
- ⓘ Quick Assist has done the following
  - Added **extend Decorator**
  - Added **SubRelation** target
- ⓘ The **range** of Decorator.target is **Resource** and therefore untyped in the context of your domain
- ⓘ The new **SubRelation** target extends **Decorator.target** but with Event as its **range**
- ⓘ When writing template code, you are able to access Transition.target typed as Event

Add a Decorating Relation Aspect 20

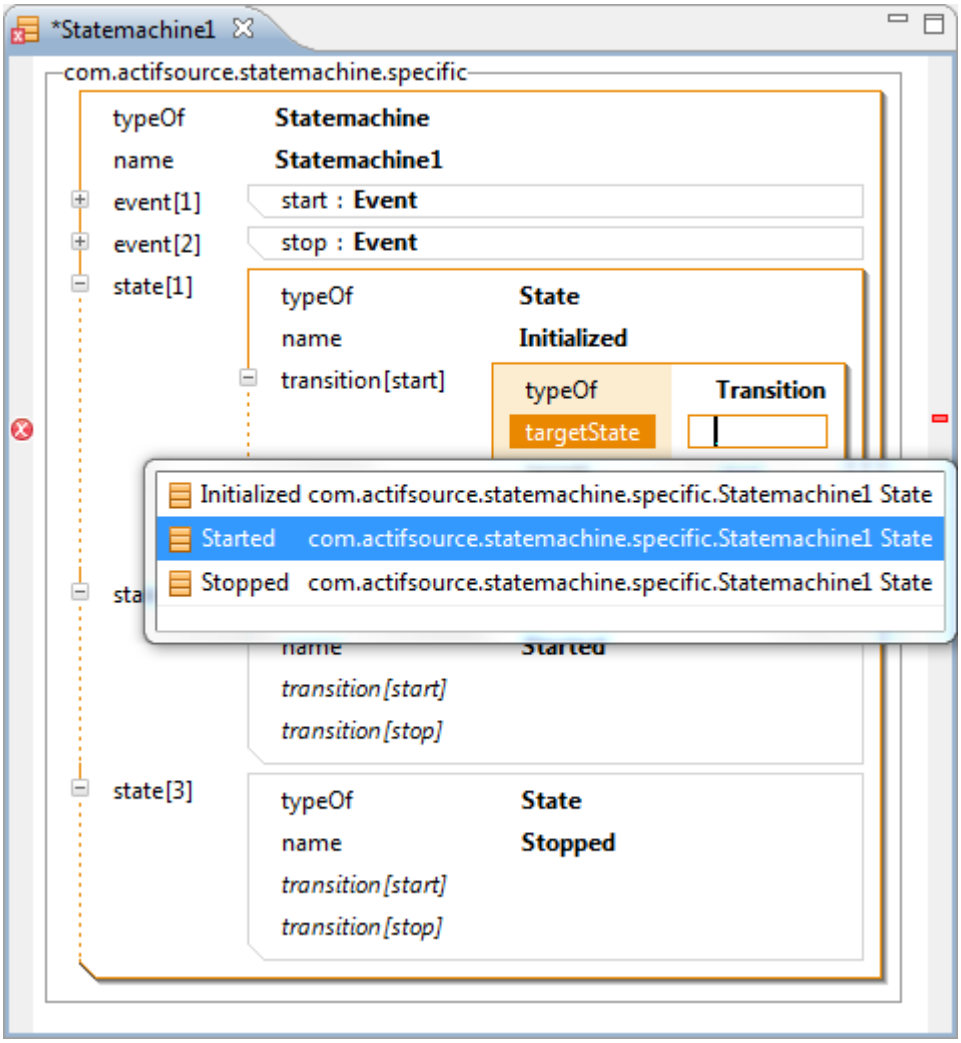


ⓘ Note that the **SubRelation** target has been added in the *Design* **Diagram** automatically

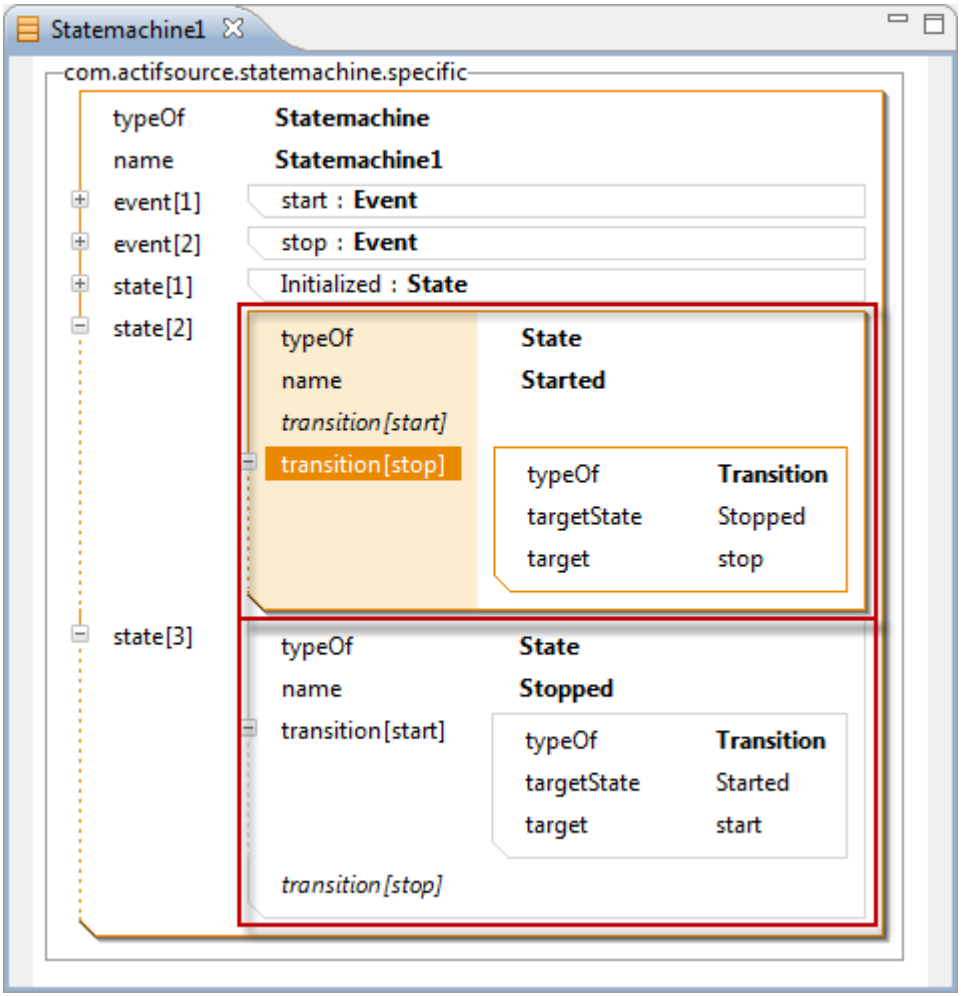
ⓘ Warning: The layout for the realtions transition and targetState might differ in your editor



- Open the specific Statemachine Statemachine1
- Note there is a **decoratingRelation** transition for every Event
- Add new Events and observe the **decoratingRelation** transition



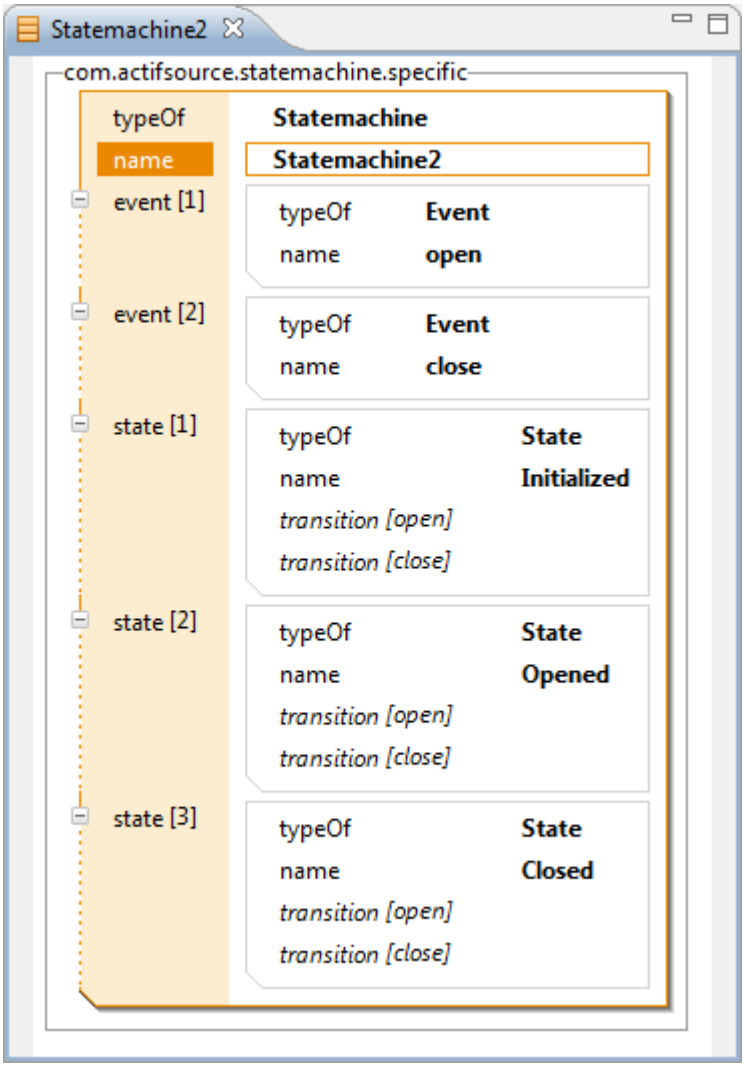
- In the State Initialized create a new Transition for transition[start]
- Select Started as targetState
- ⓘ Note that the relation target has been completed automatically with the specific decorating Event start



↳ Configure the State instances Started and Stopped as shown above

Part IV: 24
Range Restriction Aspect

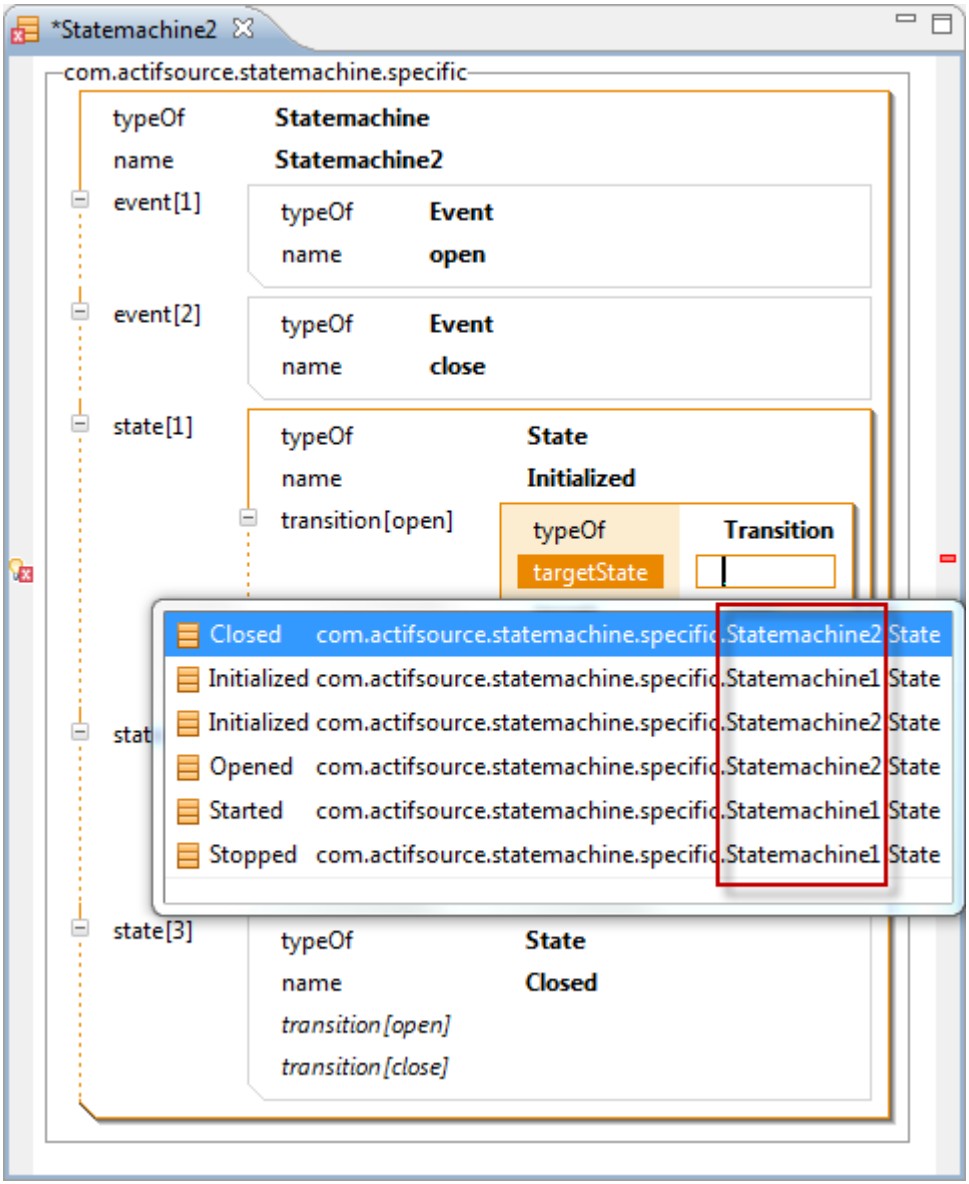
- ⓘ Content Assist (Ctrl+Sapce) in actifsource shows all instances of a desired type; It is often useful to restrict this selection
- ⓘ Learn how to apply range restrictions to filter instances for a given type



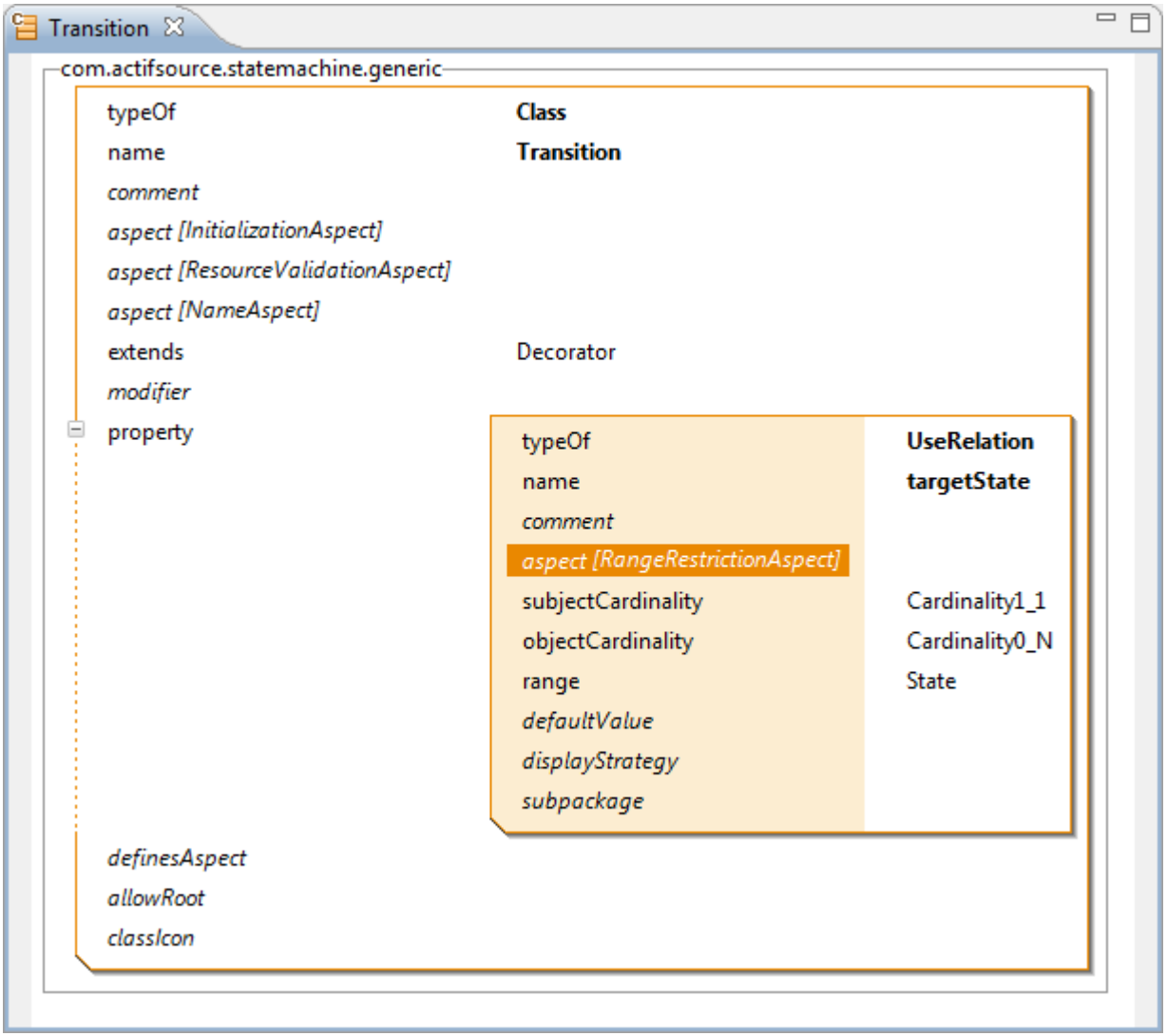
ⓘ Let's discover the needs for a range restriction aspect

- Create a Statemachine named Statemachine2 in the **Package** *specific*
- Add the Event instances open and close
- Add the States instances Initialize, Opened and Closed

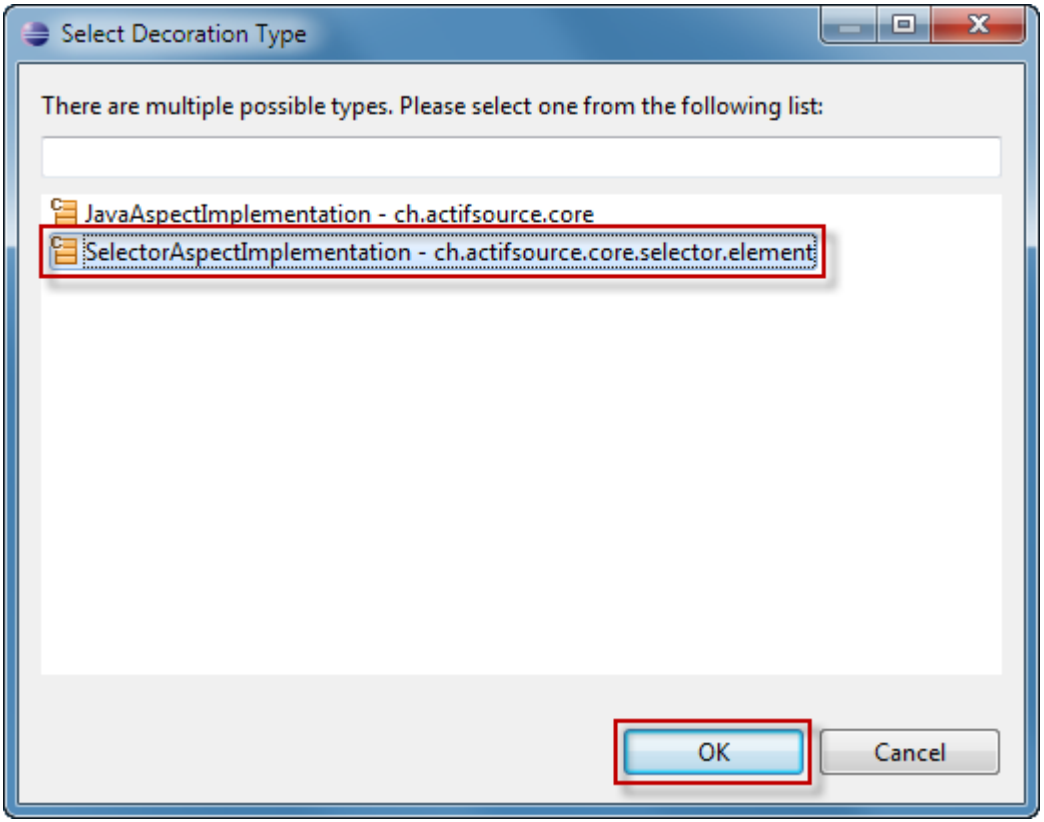
Without Range Restriction



- Create any new Transition
- Use **Content Assist** (Ctrl+Space) to add a targetState of type State
- Note that all instances of State are listened instead of just the ones from Statemachine2



- In Transition open the **useRelation** targetState
- Press Enter on *aspect[RangeRestrictionAspect]*



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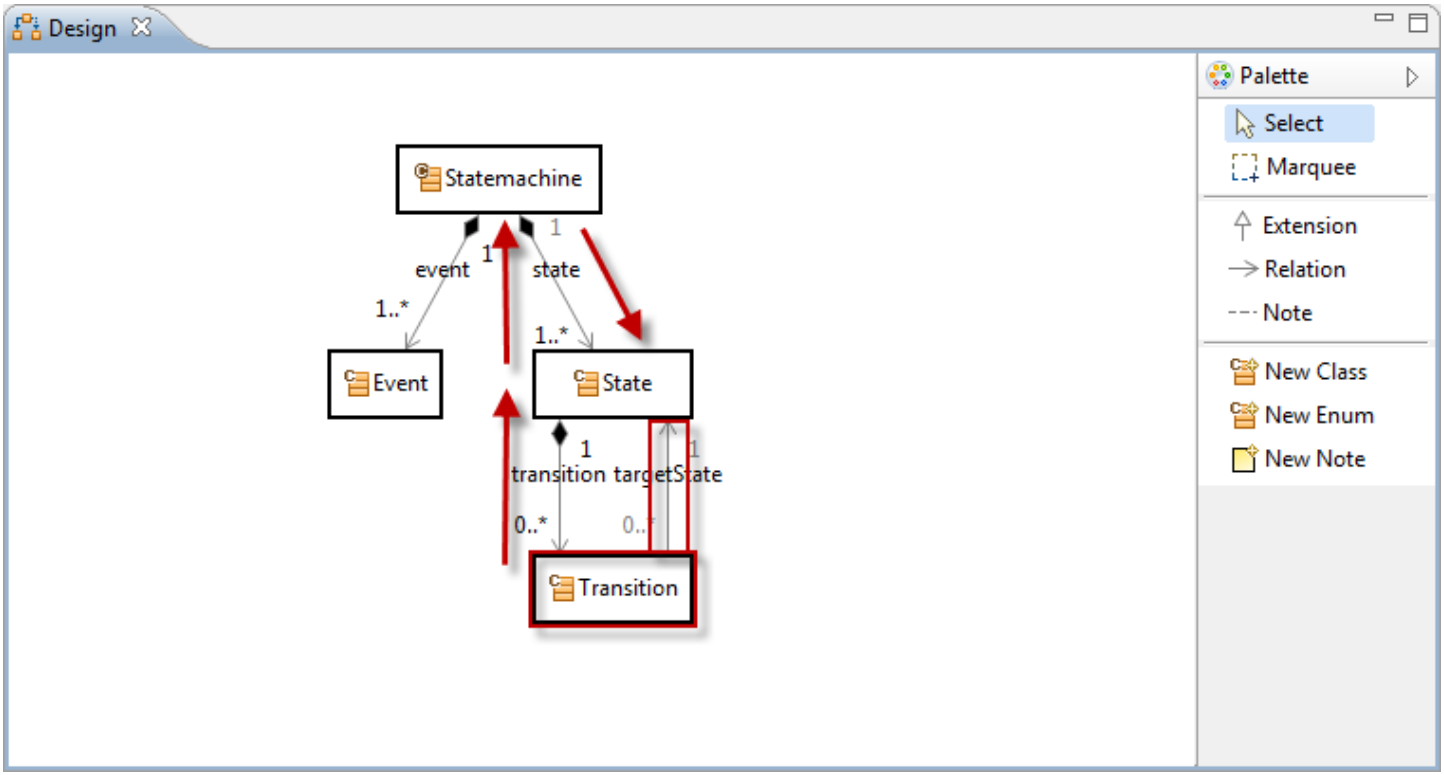
- Selecting the *JavaAspectImplementation* allows you to write Java Code for complex operations
- Selecting the *SelectorAspectImplementation* allows you to use the easy Selector syntax

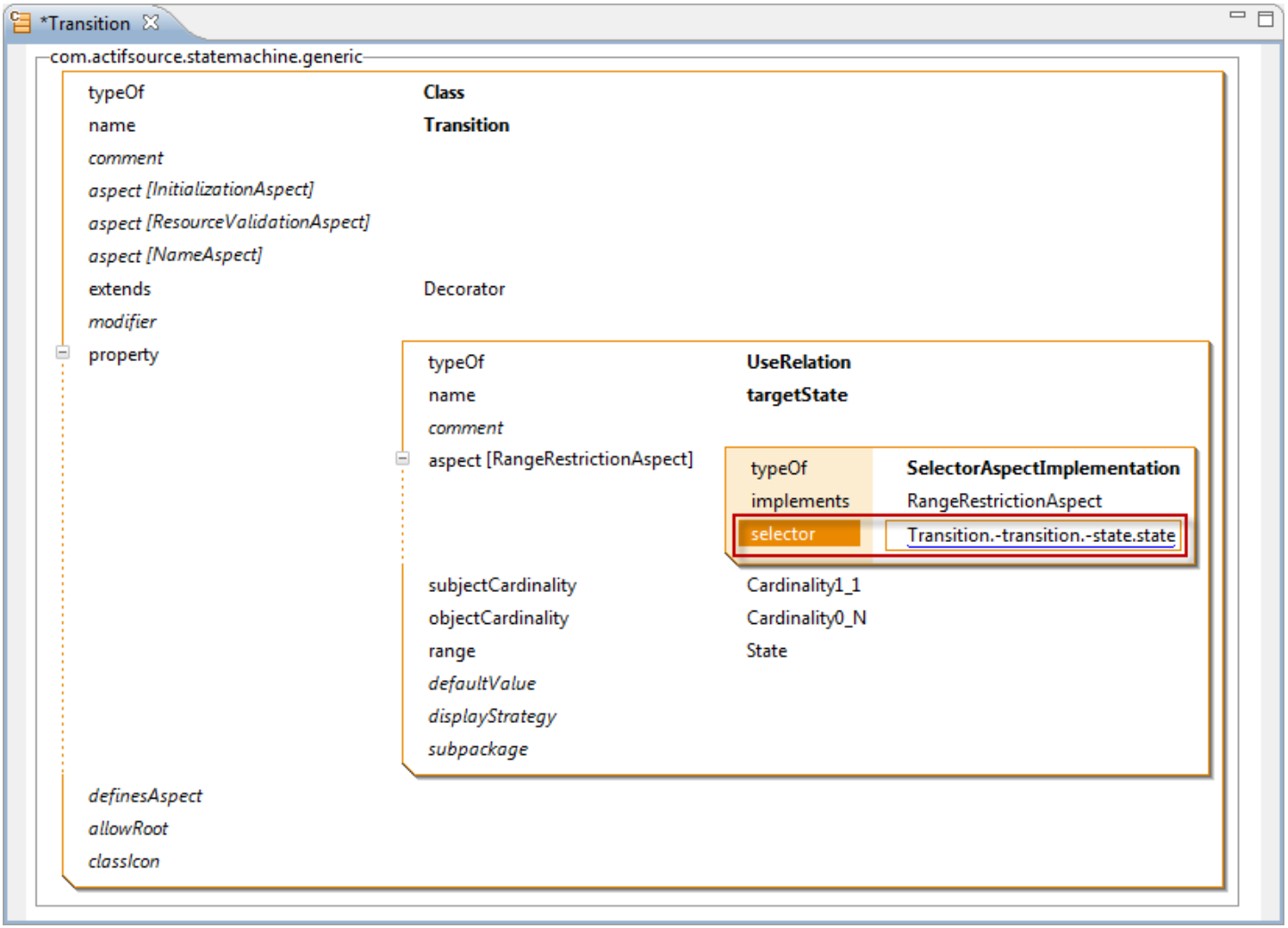
↳ Select *SelectorAspectImplementation*

↳ Click *OK*

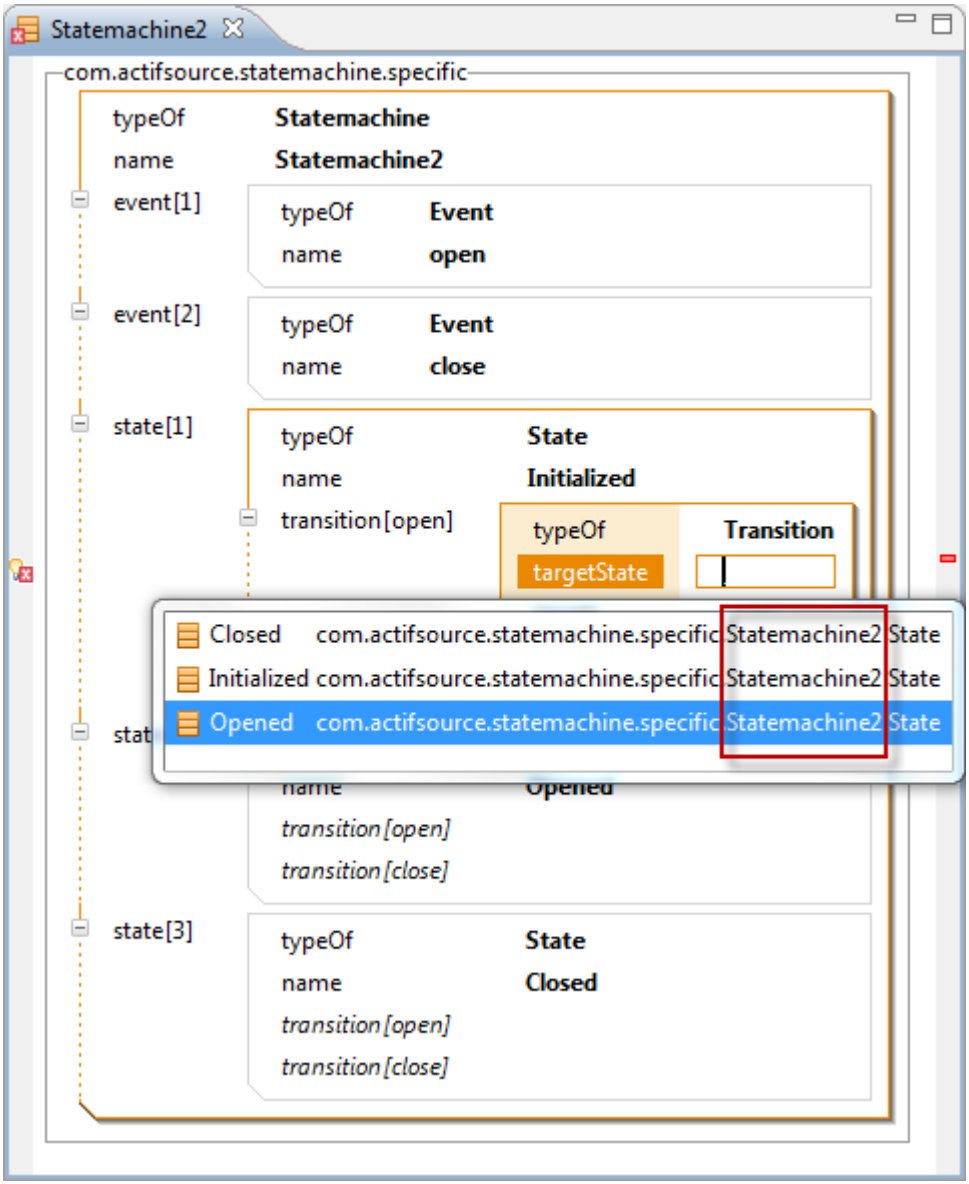


- Let's restrict the **range** of targetState to instances of States owned by the own Statemachine
- The **useRelation** targetState is found in Transition
- We have to navigate from Transition to all States of the Statemachine
  - Navigate backwards from Transition via transition to State
  - Navigate backwards from State via state to Statemachine
  - Navigate forward from Statemachine via state to State

Add a Range Restriction Aspect

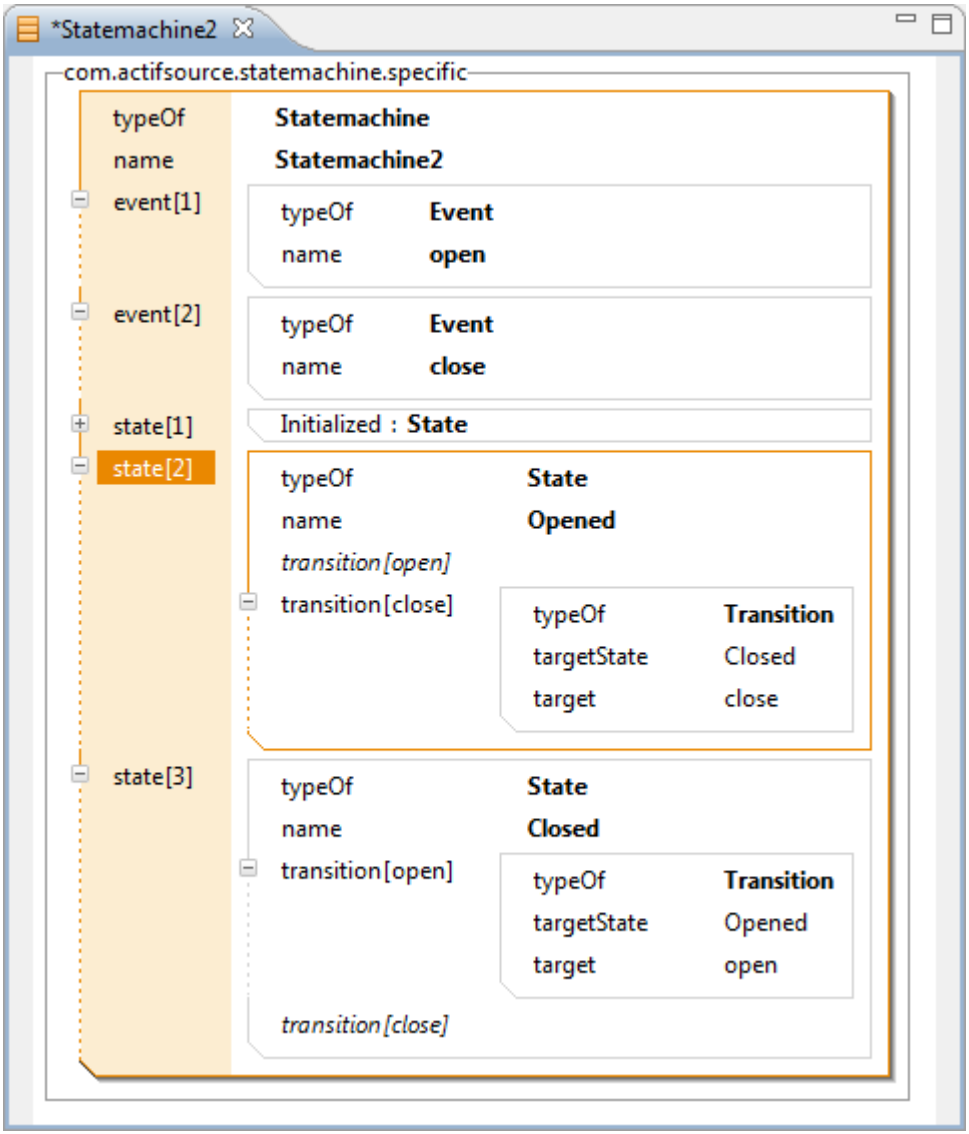


↳ Enter the Selector `Transition.-transition.-state.state` using Content Assist (Ctrl+Space)



↳ Use **Content Assist** (Ctrl+Space) again to add the targetState Opened of type State

ⓘ Note that only instances of State from Statemachine2 are listed



- Get familiar with **Decorating Relations** and **Range Restrictions**
- Write an **actifsource Code Template** to generate a state machine