

openArchitectureWare 4.1 EMF State Machines

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Introduction

This example shows how to implement a state machine generator using EMF and openArchitectureWare. Note that the implementation of the state machine in Java is probably the slowest and clumsiest way to implement a state machine. The focus was not on optimizing the performance of the state machine implementation.

This tutorial does not explain too much – it's rather a guide through the example code. We expect that you know how to work with openArchitectureWare and EMF. If that's not the case, you should read and play with the *emfHelloWorld* example first (the tutorial entitled *Generating Code from EMF Models*).

Installation

You need to have openArchitectureWare 4.1 installed. Please consider <http://www.eclipse.org/gmt/oaw/download> for details.

You can also install the code for the tutorial. It can be downloaded from the URL above, it is part of the the EMF samples ZIP file. Installing the demos is easy: Just add the projects to your workspace. Note that in the openArchitectureWare preferences (either globally for the workspace, or specific for the sample projects, you have to select *EMF metamodels* for these examples to work.

In the *emf* examples package, you can find the following three projects

- *oaw4.demo.emf.statemachine*: contains the metamodel
- *oaw4.demo.emf.statemachine.generator*: contains the code generator
- *oaw4.demo.emf.statemachine.example*: contains an example state machine as well as a manually written unit test

Metamodel

The metamodel looks more or less as you'd expect from a state machine metamodel. The following is the representation of the metamodel in Emfatic syntax. You can find it in the *oaw4.demo.emf.statemachine/model* package.

```
@namespace(uri="http://oaw/statemachine",  
prefix="statemachine")  
package statemachine;  
  
abstract class Named {
```

```

    attr String name;
}

class State extends AbstractState {
    val Action entryAction;
    val Action exitAction;
}

class StartState extends AbstractState {
}

class StopState extends AbstractState {
}

class Transition extends Named {
    ref AbstractState[1] target;
    val Action action;
    ref Event event;
}

class Action extends Named {
}

class Event extends Named {
}

class CompositeEvent extends Event {
    val Event[*] children;
}

class StateMachine extends Named {
    val AbstractState[*] states;
    val Event[*] events;
}

abstract class AbstractState extends Named {
    val Transition[*] transition;
}

```

From the .ecore file, you have to generate the implementation classes – as usual with EMF.

Example StateMachine

In the *oaw4.demo.emf.statemachine.example/src* folder you can find an *example.statemachine* file that contains a simple example state machine. You can view it as an EMF tree view after generating the EMF editors.

To generate code from it, run the *example.oaw* workflow file right next to it. It looks as follows:

```
<workflow>
  <cartridge file="workflow.oaw">
    <modelFile value="example.statemachine"/>
    <srcGenPath value="src-gen"/>
    <appProject
value="oaw4.demo.emf.statemachine.example"/>
    <srcPath value="man-src"/>
  </cartridge>
</workflow>
```

As you can see it only defines a number of parameters and calls another workflow file – the one in the generator project. We'll take a look at it below.

Running the example

... is achieved by running the *example.oaw* file. It creates an implementation of the state machine in the *src-gen* folder in the example project. Take a look at the file to understand the implementation of the state machine.

In the *man-src* folder, there's a manually written subclass that implements the actions referenced from the state machine. There's also a unit test that you can run to verify that it works. It also shows you how to use the generated state machine.

The generator

Workflow

The workflow file in *oaw4.demo.emf.statemachine.generator/src* has four steps:

- first it reads the model from the XMI file
- then it verifies a number of constraints
- then it generates the code
- and finally it creates a recipes file

Constraints

A number of constraints are defined. Take a look at their definition in *structure.chk* to learn about the constraints check language.

Transformation

There is a transformation called *trafo.ext* in the *src* folder which adds an emergency stop transition to each state.

Templates

In the *src/templates* folder you can find the code generation templates.

Recipe Creation

In *src/recipe* you there's an *SMRecipeCreator* workflow component that creates recipes for the manual implementation of the state machine. Recipe Creation

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