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EGF Tutorial
Generation Chain

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EGF - Thales Corporate Services - EPM

Agenda

- Principles
- Generation Customization
- Generation Chain Extensibility

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Rationale

- **Objective of the Generation Chain:**
  - Definition, at a high level of description, of executable generations
  - Abstraction: encapsulating the irrelevant technical details of generation
  - Simplicity & Efficiency: Reducing the number of “clicks” (i.e. the number of actions)
    - Only providing the main generation features and next generating
- **Technical principle:**
  - Generation features are captured in a “generation chain” file
  - An EGF fcore file is produced from the generation chain: it contains the translation of the generation chain into factory components
  - Next, the factory components are transparantly executed to produce the expected artifacts

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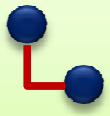
Levels of Generation

Level 1

Designer

Generation Chain

It captures the generation steps
and their features
File type: “generation chain”



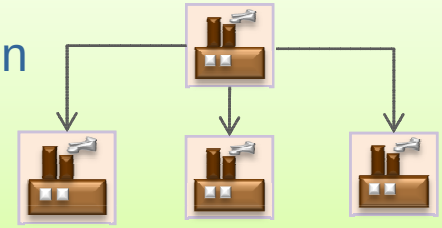
Instantiation
Generated

Level 2

Developer

Factory Components

They contain the logic of generation
File type: fcore



Instantiation
Execution of the generation

Level 3

Result of the generation

The artifacts are generated

EGF: Eclipse Generation Factories – Thales Corporate Services/EPM

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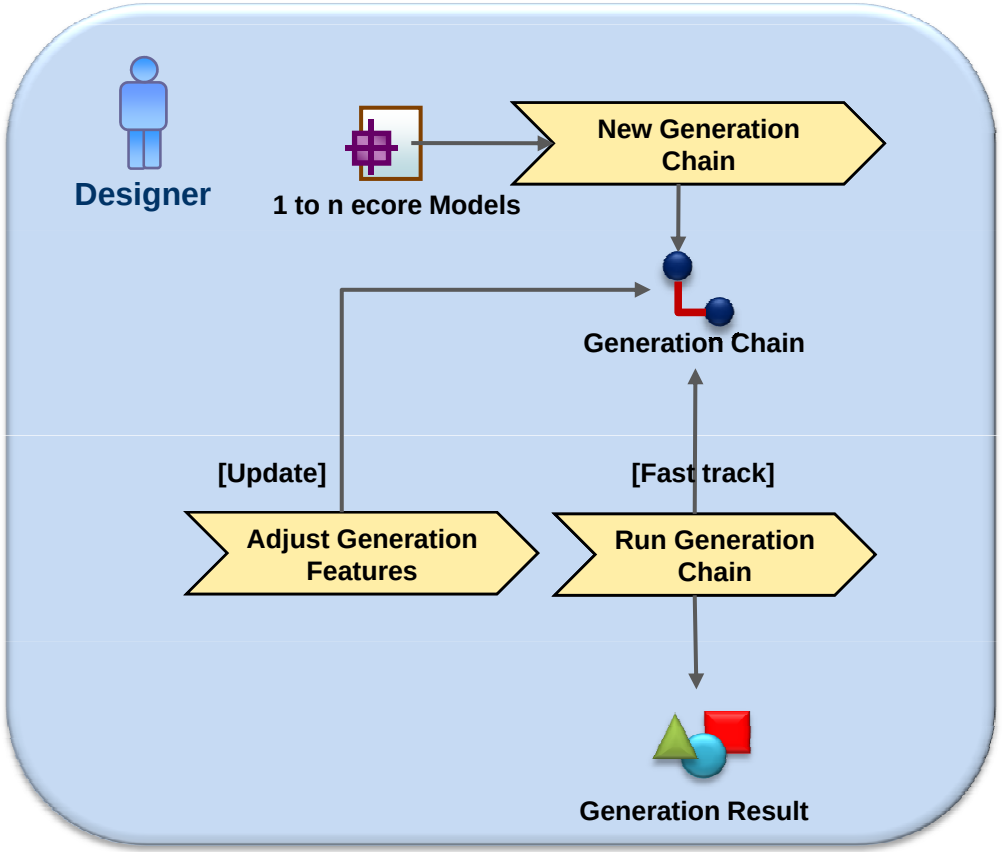
Process



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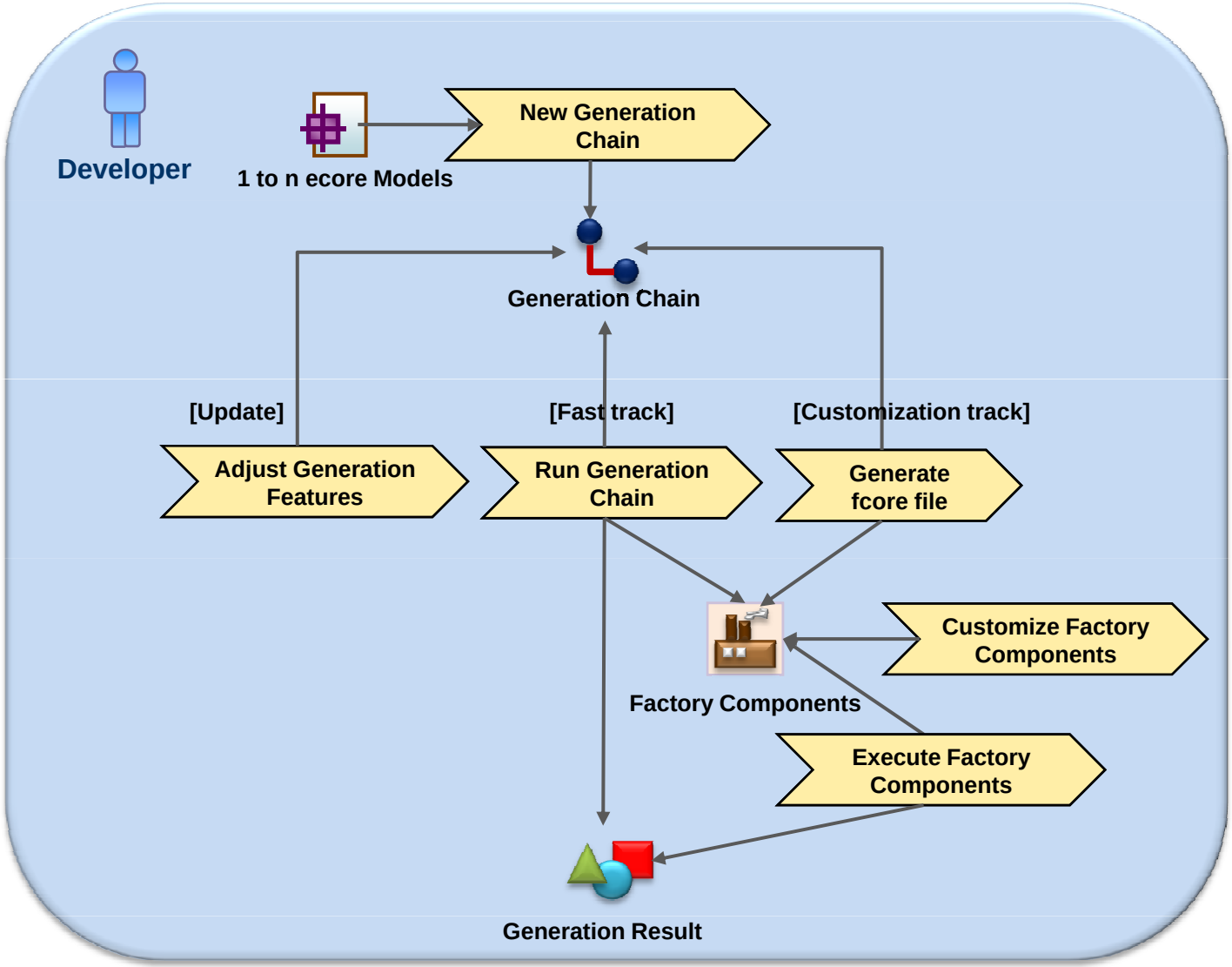
Process



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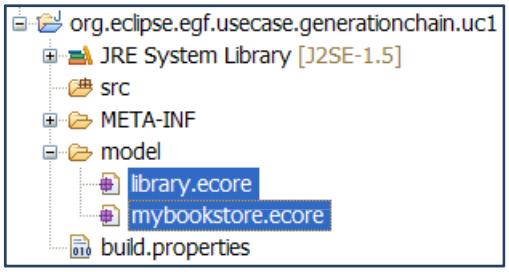
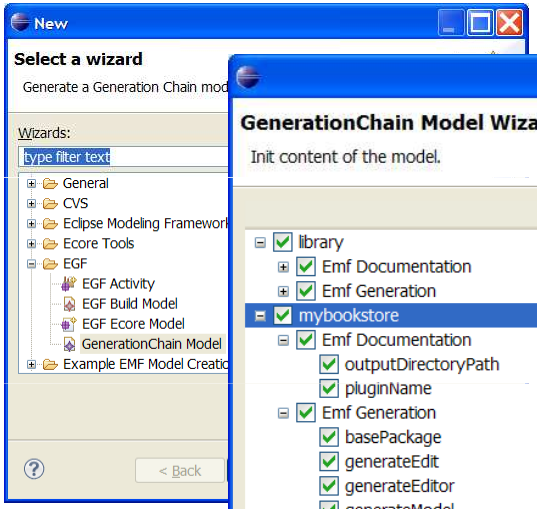
Visualization 1/3

Creation of Generation Chain

Selection of ecore models



New Generation Chain



For each model, setting the generation features

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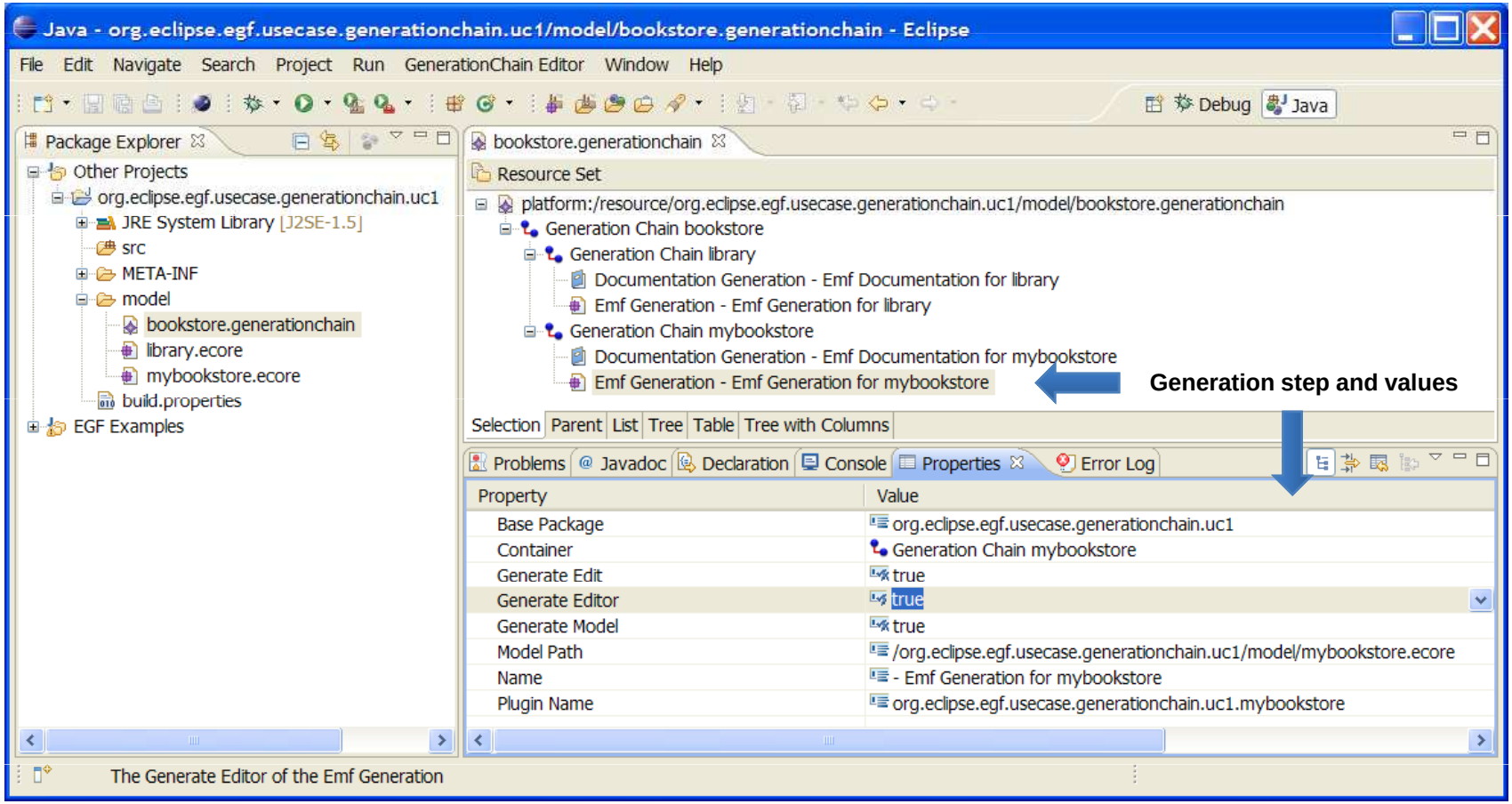
Visualization 2/3

Modification of Generation Chain Features

Possibility to change the generation features and add new generation steps



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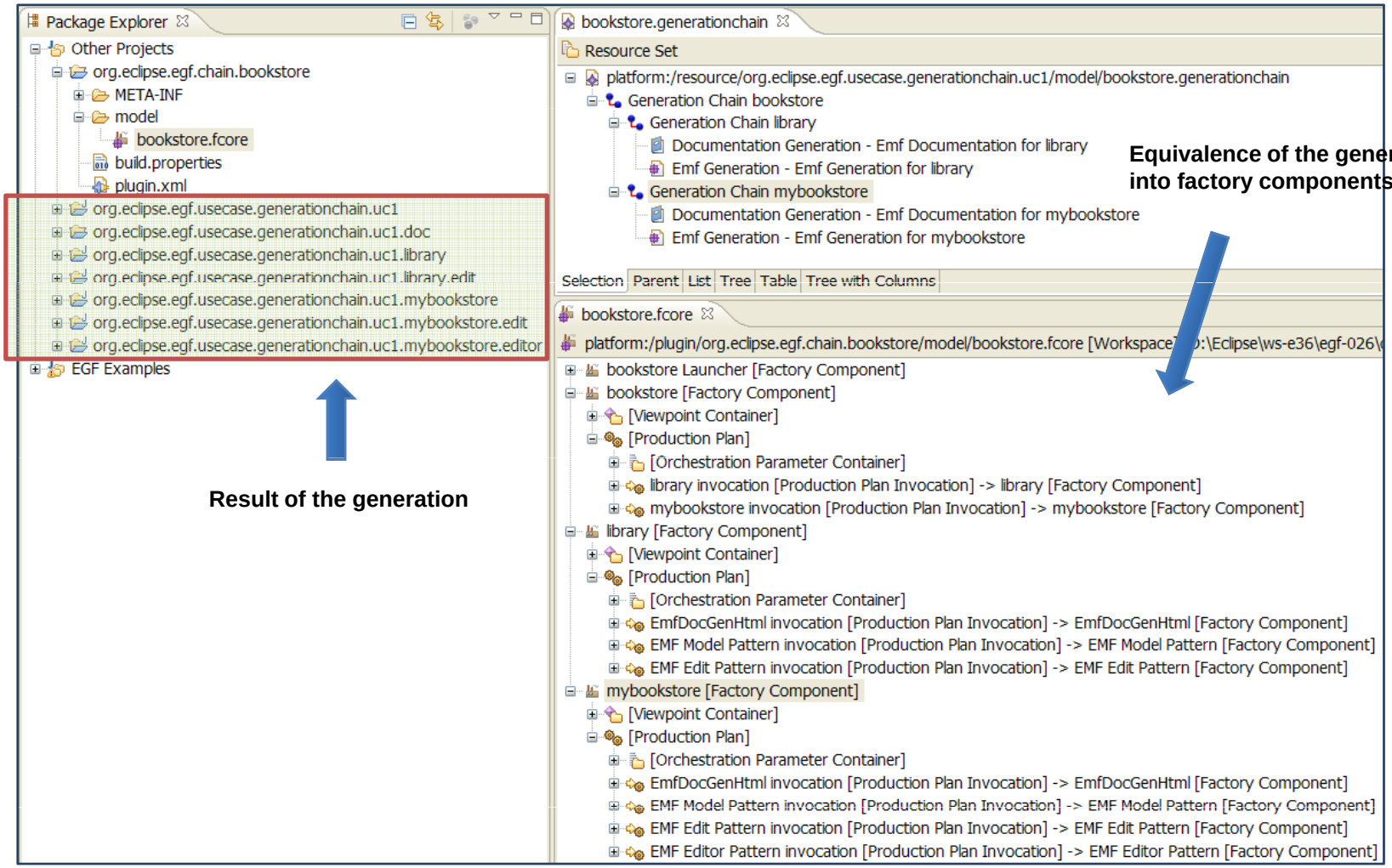
Visualization 3/3

Result of Generation Chain execution



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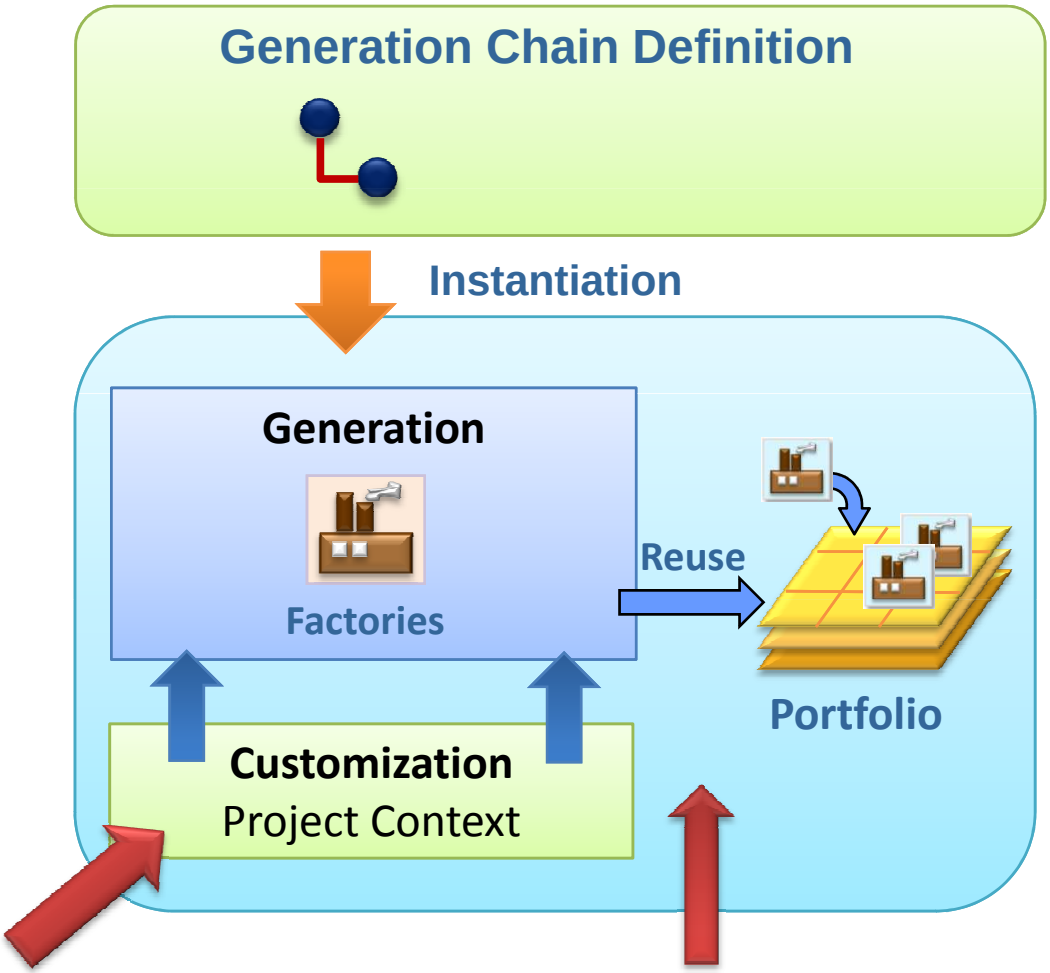
Customization with Generation Chains



How to introduce customization with a generation chain-based development while a generation chain reuses a standard generation stored in a portfolio?

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Principles of GC customization

- **Means of customization**
  - A customization is realized with patterns which specialize the standard generation, for instance model / edit / editor for the Emf generation

- **Incrementality**
  - When a feature in the generation chain is changed, the fcore is synchronized accordingly
    - Ex: when the emf model editor feature is set to “true”, the model editor generation is invoked, and in reverse is removed when this feature is set to “false”.
  - Protected elements:
    - Patterns in a Pattern Viewpoint
    - Pattern substitution in the “Orchestration Parameter Container” where the patterns for customization replace the standard patterns

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Illustration on EMF Generation

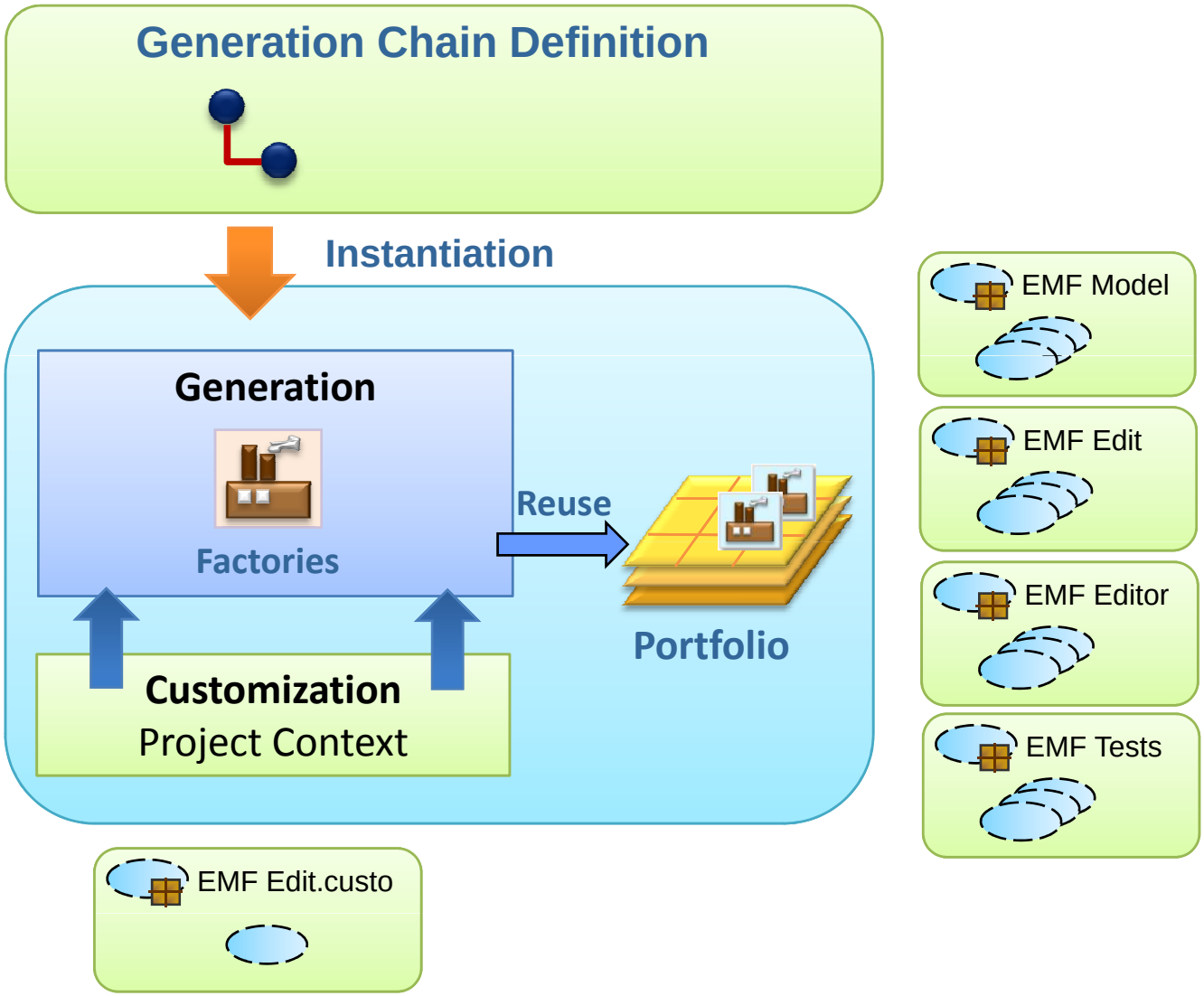

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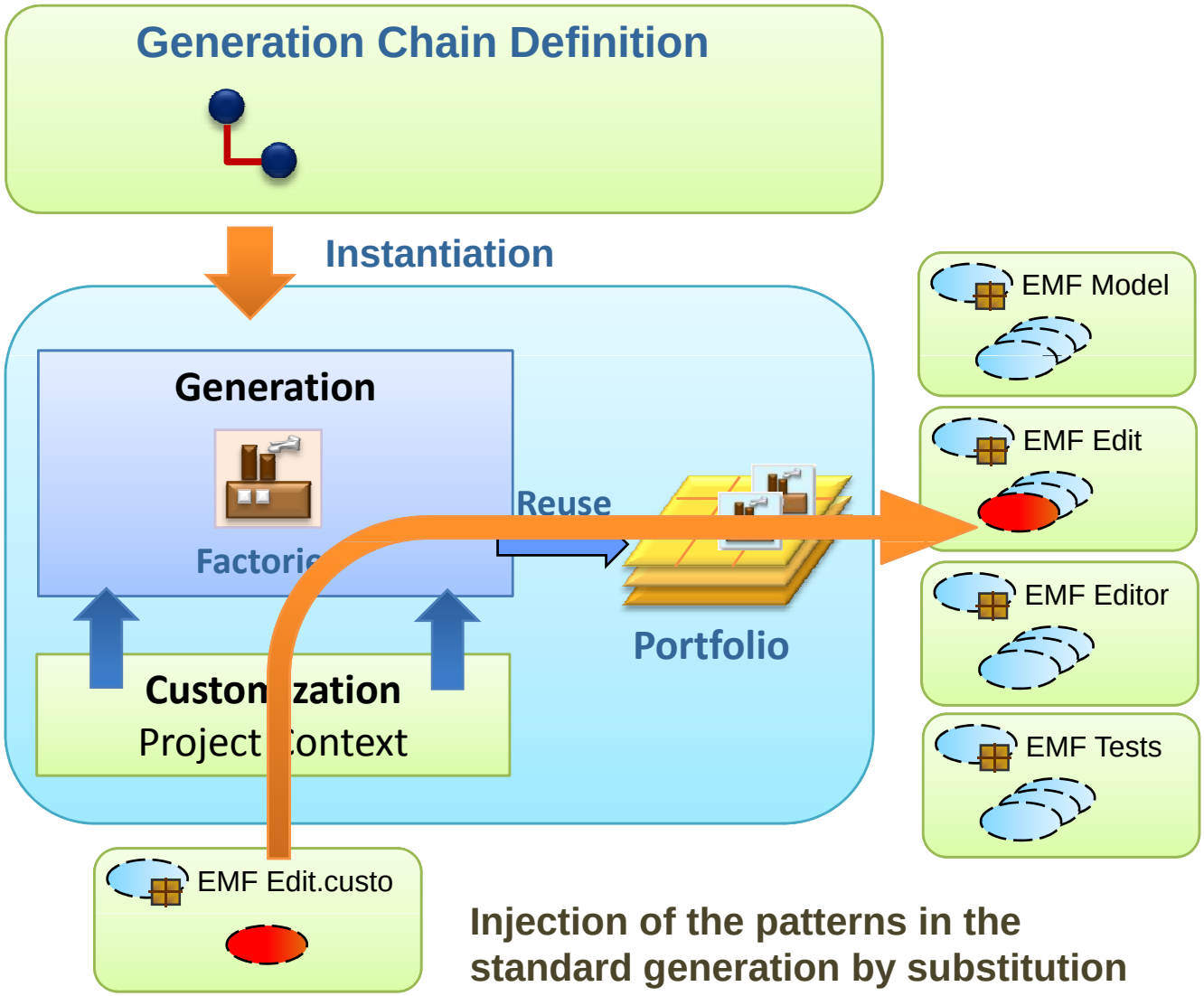
Illustration on EMF Generation



Injection of the patterns in the standard generation by substitution

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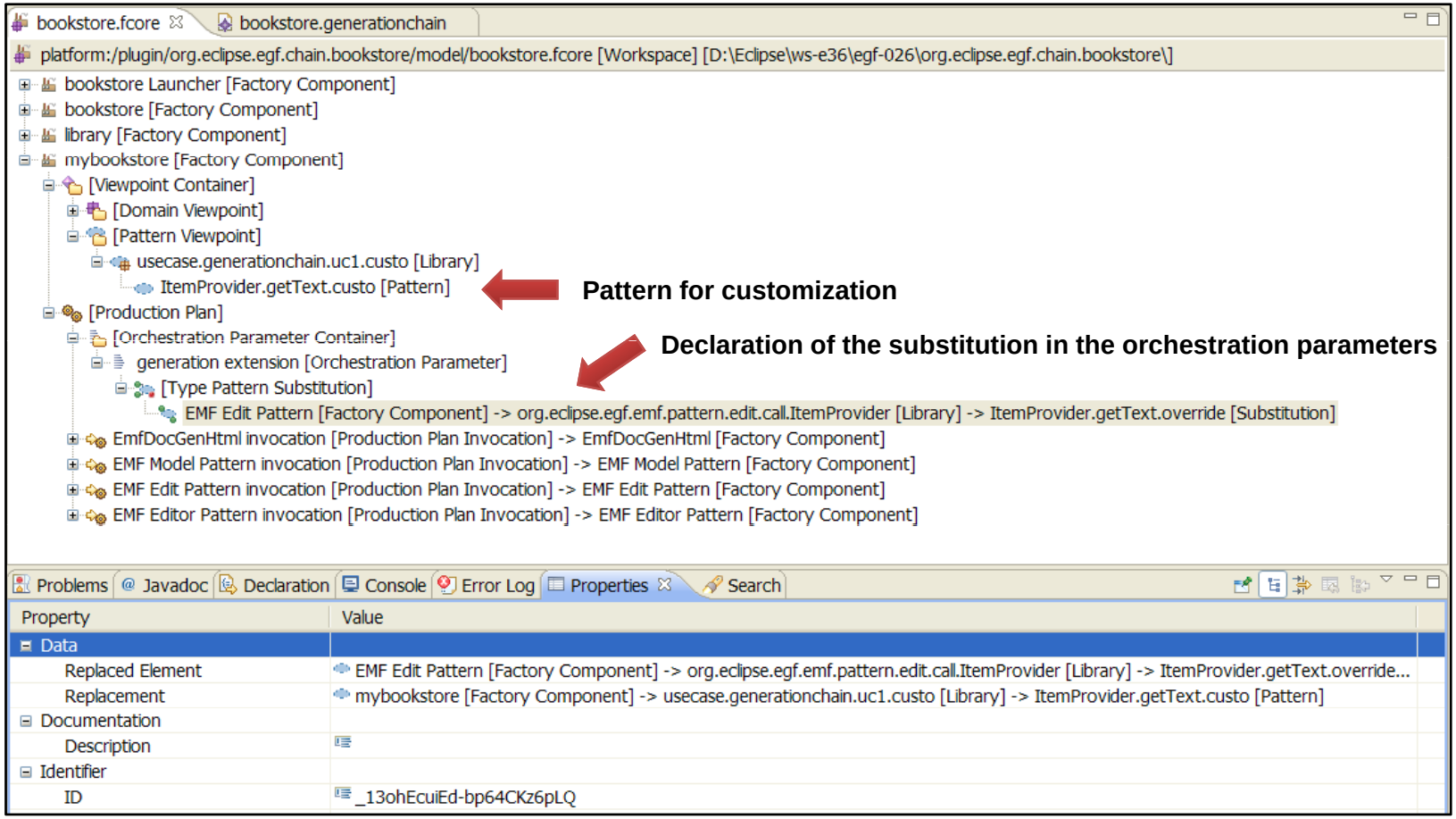
Example of substitution



Refer to the “org.eclipse.egf.usecase.generationchain.uc1” example

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Memo for a Customization with Patterns

- Open the fcore file related to the generation chain. In the Viewpoint container, create a pattern domain which will contain the pattern libraries and patterns for customization.
- Identify the standard patterns to extend. For their location, navigate for instance from the invoked factory component of the fcore file (e.g., EMF Edit) which contains the standard patterns.
- Create the pattern for customization:
  - In order to avoid rewriting everything from scratch in the new pattern, the pattern inherits from the standard pattern.
  - Add the precondition to apply the pattern; add the “imports” defined in the pattern header method; in the method for code generation (e.g., doGenerate) add the customized code.
- For pattern inheritance, in the Manifest of the plug-in which contains the fcore file, add the dependencies toward the plug-in(s) which contain(s) the standard pattern(s)

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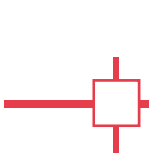

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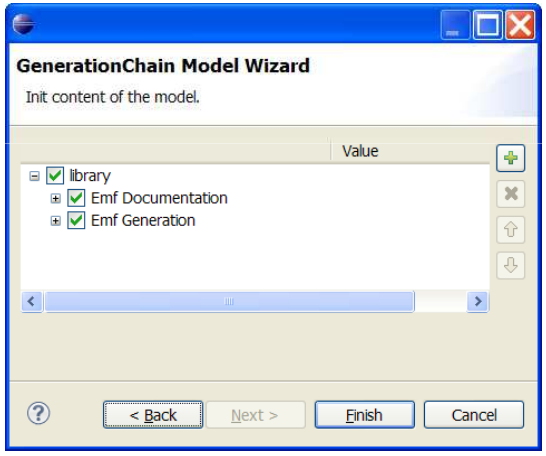
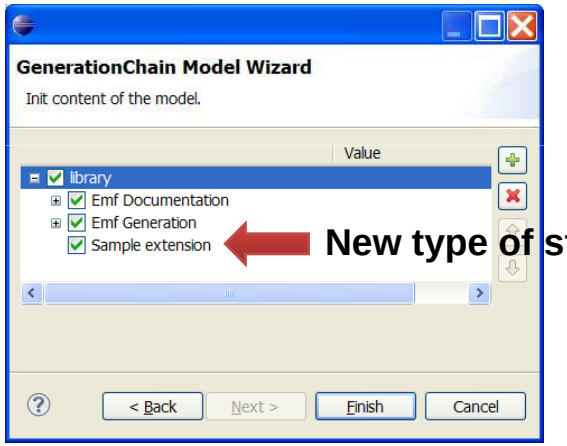
Principle of Generation Chain Extension

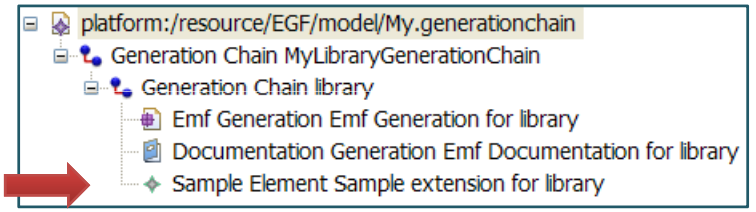
- **Objective**
  - Ability to extend generation chains with new types of generation chain step
  - Introducing new types of generations (e.g. diagram, test generation)
- **Impacts**
  - New step type in the user interface of generation chain creation
  - New step type in the generation chain model
  - Association of a generation to the new type of step



Extension of the creation UI



New type of model element



Generation Chain Extension

```
<plugin>

   <extension point="org.eclipse.emf.ecore.generated_package">
      <package
            uri="http://www.eclipse.org/egf/1.0.0/generationChainSampleExtension"
            class="org.eclipse.egf.portfolio.genchain.extension.SampleExtension.SampleExtensionPackage"
            genModel="model/sampleExtension.genmodel"/>
   </extension>

    <extension point="org.eclipse.egf.portfolio.genchain.elements">
        <helper id="sample.extension" class="org.eclipse.egf.portfolio.genchain.extension.MySampleExtension"/>
    </extension>
  <extension
        point="org.eclipse.egf.core.fcore">
     <fcore
           id="egf/sampleExtension.fcore">
     </fcore>
  </extension>

</plugin>
```

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        <helper id="sample.extension" class="org.eclipse.egf.portfolio.genchain.extension.MySampleExtension"/>
    </extension>
   <extension
         point="org.eclipse.egf.core.fcore">
      <fcore
            id="egf/sampleExtension.fcore">
      </fcore>
   </extension>

</plugin>
```

Declaration of the model extending the generation chain model

Generation Chain Extension

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<plugin>

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   <extension
         point="org.eclipse.egf.core.fcore">
      <fcore
            id="egf/sampleExtension.fcore">
      </fcore>
   </extension>

</plugin>
```
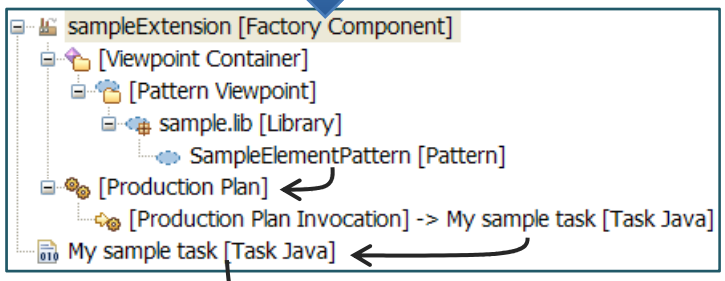

Factory Component used for the extension



- The "SampleElementPattern" Java pattern declares the behavior to be applied. It invokes the production plan here.

- Production Plan = Generation Behavior

Here, it just applies a simple task implemented by a Java Class.

```
public class MySampleTask implements ITaskProduction {

    public void preExecute(ITaskProductionContext productionContext, IProgressMonitor monitor) throws I

    }

    public void doExecute(ITaskProductionContext productionContext, IProgressMonitor monitor) throws In
        System.out.println("My sample task is executed.");
    }

    public void postExecute(ITaskProductionContext productionContext, IProgressMonitor monitor) throws

    }

}
```

Generation Chain Extension

```
<plugin>

   <extension point="org.eclipse.emf.ecore.generated_package">
      <package
            uri="http://www.eclipse.org/egf/1.0.0/generationChainSampleExtension"
            class="org.eclipse.egf.portfolio.genchain.extension.SampleExtension.SampleExtensionPackage"
            genModel="model/sampleExtension.genmodel"/>
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   </extension>
  <extension
        point="org.eclipse.egf.core.fcore">
     <fcore
           id="egf/sampleExtension.fcore">
```

Java Class for extension

```
public class MySampleExtension extends ExtensionHelper {
    private static final URI PATTERN =
        URI.createPlatformPluginURI("org.eclipse.egf.portfolio.genchain.extension/egf/sampleExtension.fcore#_fMAHcKYjEd-c68Bv_MO43Q",

    @Override
    public String getLabel() {

        return "Sample extension";
    }

    @Override
    public List<Substitution> getSubstitutions() {
        EGFResourceSet set = new EGFResourceSet();
        List<Substitution> substitutions = new ArrayList<Substitution>();
        final Substitution substitution = PatternFactory.eINSTANCE.createSubstitution();
        final Pattern pattern = (Pattern) set.getEObject(PATTERN, true);
        substitution.getReplacement().add(pattern);
        substitutions.add(substitution);
        return substitutions;
    }

    @Override
    public EcoreElement createEcoreElement(Map<String, String> properties) {

        final SampleElement sampleElement = SampleExtensionFactory.eINSTANCE.createSampleElement();
        String modelPath = properties.get(MODEL_PATH);
        sampleElement.setModelPath(modelPath);
        return sampleElement;
    }
}
```

Id declaration of the pattern explained in the previous slide

Label for instance used in the creation user interface

The sequence to declare that the pattern is applied over a generation chain model when the generation chain is executed

Model action to be applied when a new step of this type is created

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