Usage of oAW within KIELER Projects

Xpand/Xtend Tutorial

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Overview

- oAW plug-in
  - Basics
  - oAW nature

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- All oAW languages: Common expression language

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  - Collections, Lists, Sets (`Collection[my::Type]`, `List[my::Type]`, `Set[my::Type]`)
  - Properties, Operations, Enums/constants

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- Model types:
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  - Properties, Operations, Enums/constants
- Build-in types:
  - Void
  - Simple types (String, Boolean, Integer)
  - Collection types

Type system and expression language (cont'd)

- Expressions:
  - Arithmetic, boolean (`1+2*3`, `!(true && true)`)
  - Operators: $==$, $!=$, $<$, ...
  - Strings: `''this is a string''`
  - Integer, Real: `10`, `3.4`
  - Collection operations: `collection.select(i|i >3)`, ...

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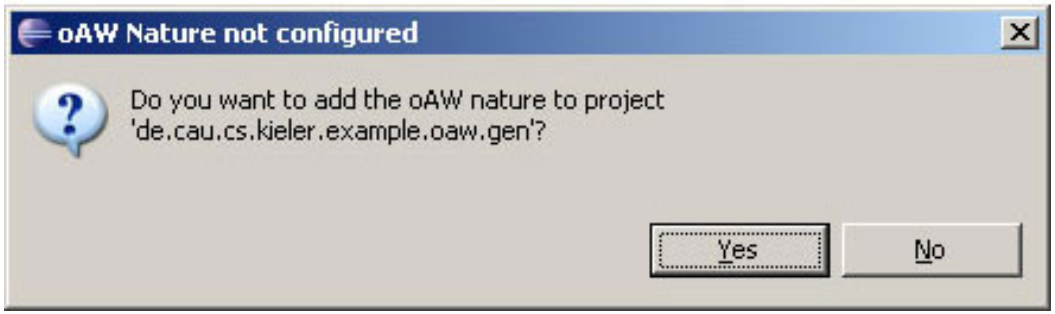
- Details here:
  - http://www.openarchitectureware.org/pub/documentation/4.3.1/html/contents/core_reference.html

oAW nature

- oAW nature available



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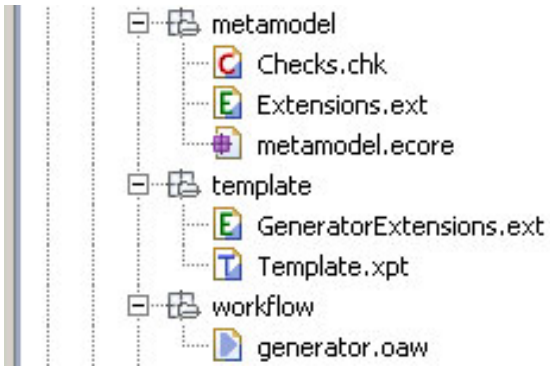
  - File decorations (*.oaw, *.xpt, *.ext, *.chk)



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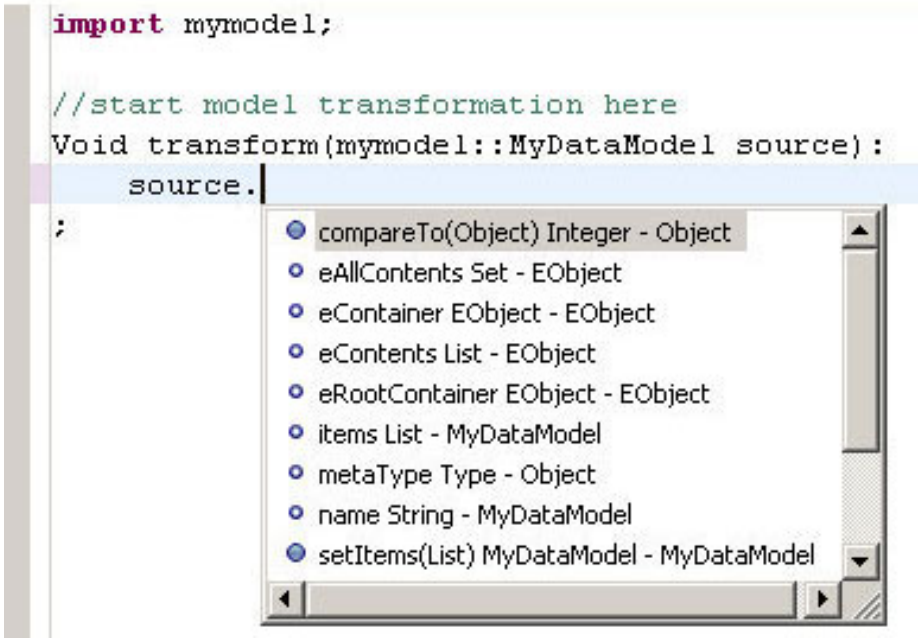

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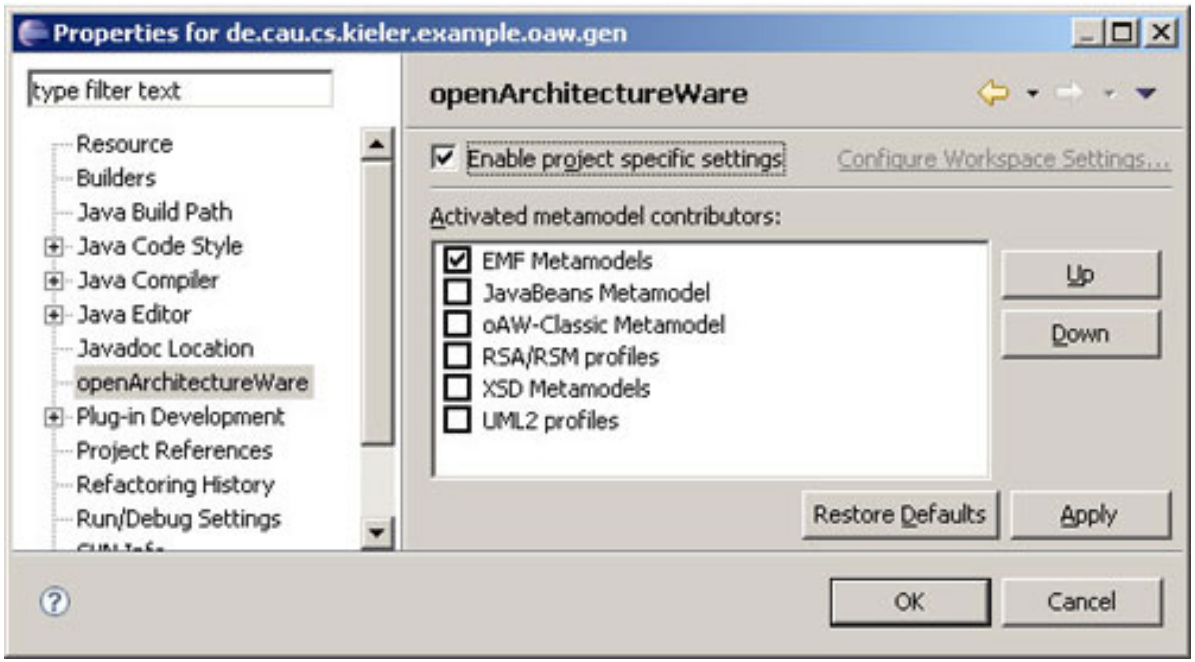
  - File decorations (*.oaw, *.xpt, *.ext, *.chk)
  - Syntax coloring and code completion
  - Meta model awareness



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- Java escape possible

Xpand example file

```
1  «IMPORT mymodel»
2
3  «DEFINE main FOR MyDataModel-»
4     «FILE "My.c"-»
5
6  /* some c comment */
7
8  #include <stdio.h>
9
10 «FOREACH items AS n ITERATOR i-»
11    «IF n.metaType.name.matches("mymodel::MyString") -»
12          String myString«i.counter1-» = "«((MyString)n).text»";
13             printf("String : %s", myString«i.counter1-»);
14    «ENDIF-»
15 «ENDFOREACH-»
16
17 «ENDFILE-»
18 «ENDDEFINE»
```

- Hint: Use ”-≫” to suppress white space!

Xtend

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  - New keywords `create` and `cache`

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- Extensions can be used within the Xpand language
- Became ”full” transformation language (in oAW 4.0)
  - New keywords `create` and `cache`
- Can be escaped to Java code (e.g., for iterative code)

Xtend example file

```
1  import sourcemetamodel;
2  import targetmetamodel;
3
4  //create a new TargetModelType and PropertyType
5  create TargetModelType this transform(sourcemetamodel::MyModel source):
6      let propety = new PropertyType:
7      property.setName("some name") ->
8      property.setValue("some value") ->
9      this.propertylist.add(property)
10 ;
11
12 //iterating over a list
13 Void createItems(BaseEntityType baseEntity,
14         List[sourcemetamodel::MyData] myDataList) :
15    let current = myDataList.last():
16    baseEntity.values.add(currentData.value) ->
17    if (myDataList.size > 1) then
18       createItems(baseEntity, myDataList.withoutLast())
19 ;
```

Escape to Java

```
1  //oAW xtend *.ext file
2
3  Void dump(String s) :
4     JAVA package.XtendJavaClass.dump(java.lang.String)
5  ;
6
7  String hasValue(sourcemodel::MyData item) :
8     JAVA package.XtendJavaClass.hasValue(sourcemodel.MyData)
9  ;
```

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8     JAVA package.XtendJavaClass.hasValue(sourcemodel.MyData)
9  ;
```

```
1  //*.java file
2
3  package de.cau.cs.kieler.example.oaw.gen;
4  import sourcemodel.*;   //import EMF generated model code!
5
6  public class XtendJavaClass {
7     public final static void dump(String aString) {
8        System.out.println(aString);
9     }
10
11    public final static boolean hasValue(MyData item) {
12       return (item.values.size > 0);
13    }
14 }
```

Inplace transformation

- Just (actively) modify your ”source” model ...

```
1  import mymodel;
2
3  Void transform(mymodel::MyDataModel source):
4      source.setName("CHANGED NAME :-)")
5  ;
```

Inplace transformation

- Just (actively) modify your ”source” model ...

```
1  import mymodel;
2
3  Void transform(mymodel::MyDataModel source):
4      source.setName("CHANGED NAME :-)")
5  ;
```

- ... and save this (source) slot!

```
1  <component class="org.eclipse.mwe.emf.Writer">
2     <uri value="${source}" />
3     <modelSlot value="source"/>
4  </component>
```

Code generation

1. Read in (source) model

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- $\longrightarrow$ *Workflow* defines these steps
- Readers/Writers for EMF/XML Schema/Java (meta) models available

Code generation

1. Read in (source) model
2. Make meta models available to generator
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4. Write out (target) model/code

- $\longrightarrow$ *Workflow* defines these steps
- Readers/Writers for EMF/XML Schema/Java (meta) models available
- Extendable: Own workflow components (this is quite easy!)

Defining a workflow

```
1  <?xml version="1.0"?>
2  <workflow>
3     <!-- define properties -->
4
5     <!-- load model -->
6
7     <!-- register meta model(s) -->
8
9     <!-- generate code or transform model /> -->
10
11    <!-- write model -->
12 </workflow>
```

Properties

```
1  <property name="srcmetamodel"
2      value="platform:/resource/.../sourcemetamodel.ecore" />
3
4  <property name="dstmetamodel"
5      value="platform:/resource/.../targetmetamodel.ecore" />
6
7  <property name="source"
8      value="platform:/resource/.../My.sourcetype" />
9
10 <property name="target"
11     value="src-gen/generated.targettype" />
```

- Can be modified from within Java program

Read model

```
1  <component class="org.eclipse.mwe.emf.Reader">
2
3      <uri value="${source}" />
4
5      <modelSlot value="source" />
6
7  </component>
```

- Other model readers available

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7  </component>
```

- Other model readers available
- Own workflow component possible

Transform (Xtend)

```
1  <component class="oaw.xtend.XtendComponent">
2
3     <metaModel class="oaw.type.emf.EmfMetaModel">
4        <metaModelPackage value="sourcemodel.SourcemodelPackage"/>
5     </metaModel>
6
7     <metaModel class="oaw.type.emf.EmfMetaModel">
8        <metaModelPackage value="targetmodel.TargetmodelPackage" />
9     </metaModel>
10
11    <invoke value="XtendFileName::transform(source)" />
12
13    <outputSlot value="target"/>
14
15 </component>
```

- Also register meta models here

Transform (Xtend)

```
1  <component class="oaw.xtend.XtendComponent">
2
3     <metaModel class="oaw.type.emf.EmfMetaModel">
4        <metaModelPackage value="sourcemodel.SourcemodelPackage"/>
5     </metaModel>
6
7     <metaModel class="oaw.type.emf.EmfMetaModel">
8        <metaModelPackage value="targetmodel.TargetmodelPackage" />
9     </metaModel>
10
11    <invoke value="XtendFileName::transform(source)" />
12
13    <outputSlot value="target"/>
14
15 </component>
```

- Also register meta models here
- Declare by package or ecore filename (s.b.)

Generate (XPand)

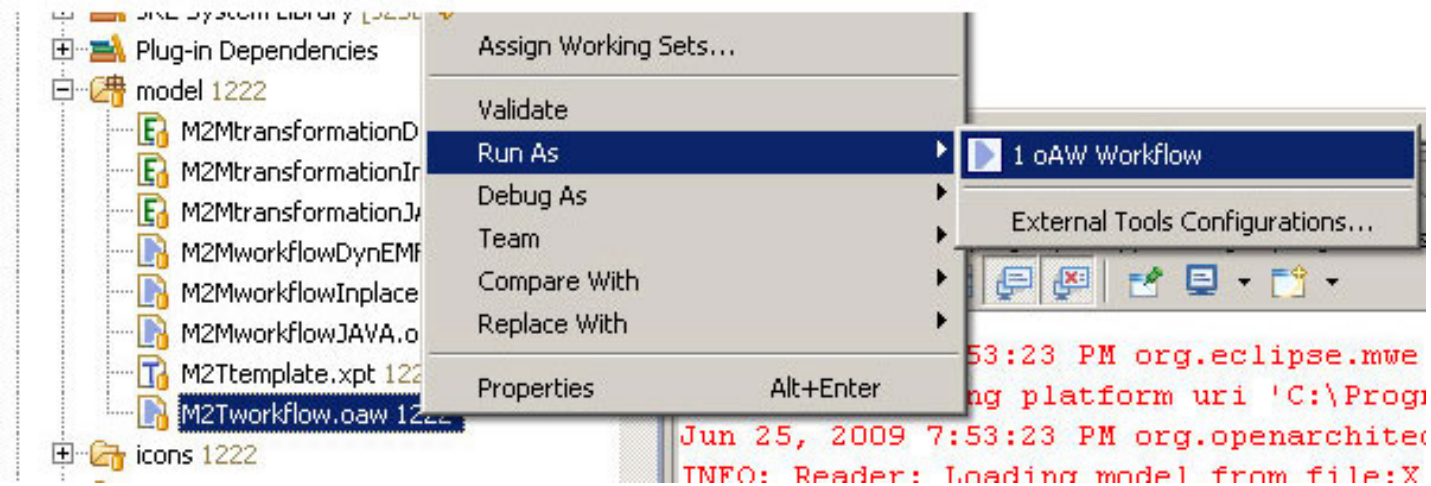
```
1  <component class="org.openarchitectureware.xpand2.Generator">
2
3     <metaModel class="oaw.type.emf.EmfMetaModel">
4        <metaModelFile value="${sourcemetamodel}" />
5     </metaModel>
6
7     <metaModel class='org.eclipse.m2t.type.emf.EmfRegistryMetaModel' />
8        <expand
9           value="SubDir::TemplateFileName::main FOR model" />
10       <outlet path="${src-gen}" />
11
12 </component>
```

Write model

```
1  <component class="org.eclipse.mwe.emf.Writer">
2
3     <uri value="${target}" />
4
5     <modelSlot value="target"/>
6
7  </component>
```

How to run a workflow file?

1. Start from Eclipse *Workbench*!



How to run a workflow file?

1. Start from Eclipse *Workbench*!
2. Start from command line! `java`

```
org.openarchitectureware.workflow.WorkflowRunner
path/workflow.oaw
```

How to run a workflow file?

1. Start from Eclipse *Workbench*!
2. Start from command line!
3. Start from Java program/plug-in!

```
1  Map<String,String> properties = new HashMap<String,String>();
2  Map<String, Object> slotContents = new HashMap<String, Object>();
3
4  String WorkflowFile = "myWorkflow.oaw";
5  properties.put("sourcemodel", PluginRoot + "My.mymodel");
6  properties.put("metamodel", PluginRoot + "model/sourcmetamodel.ecore");
7  properties.put("src-gen", GenFolder);
8
9  boolean success = false;
10 try {
11      WorkflowRunner runner = new WorkflowRunner();
12      success = runner.run(WorkflowFile, null,
13                           properties, slotContents);
14 } finally {}
```

How to run a workflow file?

1. Start from Eclipse *Workbench*!
2. Start from command line!
3. Start from Java program/plug-in!
4. Start from Ant task

To go further

1. www.openarchitectureware.org
2. www.openarchitectureware.org/forum
3. www.ibm.com/developerworks/library/os-eclipse-dynamicemf/
4. oAW example project
5. SVN: /trunk/common/examples/program-s/de.cau.cs.kieler.example.oaw
6. blog.efftinge.de/2006/04/model2model-transformation-with-xtend_15.html

Thank you for your attention and participation!

Any questions or suggestions?