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The Value of UML Models

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Gentleware

Gentleware

- **Founded in 2000 by M. Boger**
- **Offspring from University research**
- **Team of 10 Employees**
- **Open Source-based**
  - ArgoUML
  - NSUML, Netbeans, Velocity, xDoclets, DocBook, Ant, Xalan, Xerxes, OCL, CreazyBeans,
- **Profitable**

Poseidon for UML

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- **Launch November 2001**
  - Free Community Edition
  - Over 125.000 downloads
  - 2 Commercial Editions
    - Standard Edition
    - Professional Edition
- **Focus on Usability**
- **Standard-compliant**
- **Flexible Code Generation**

Argo and Poseidon

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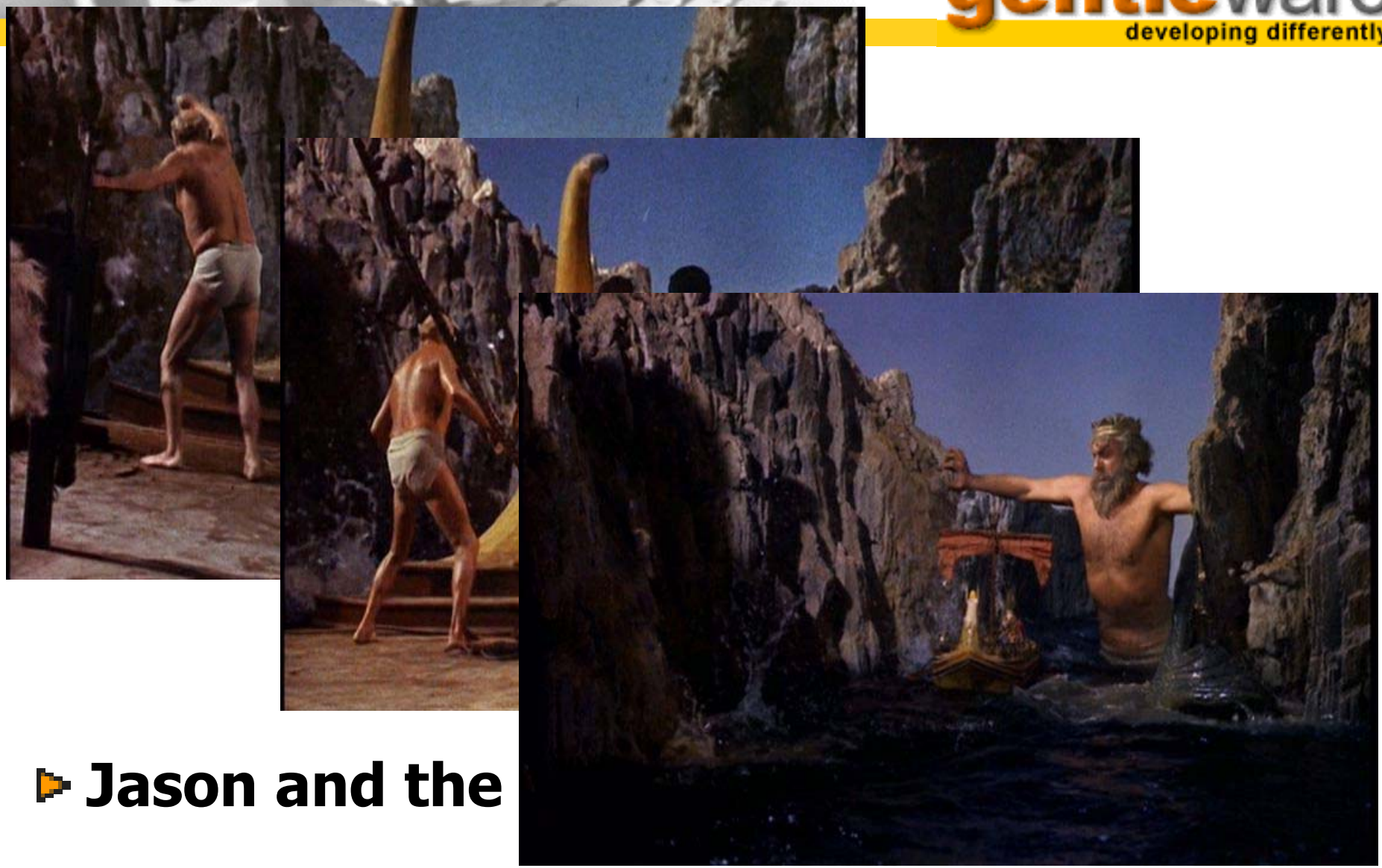
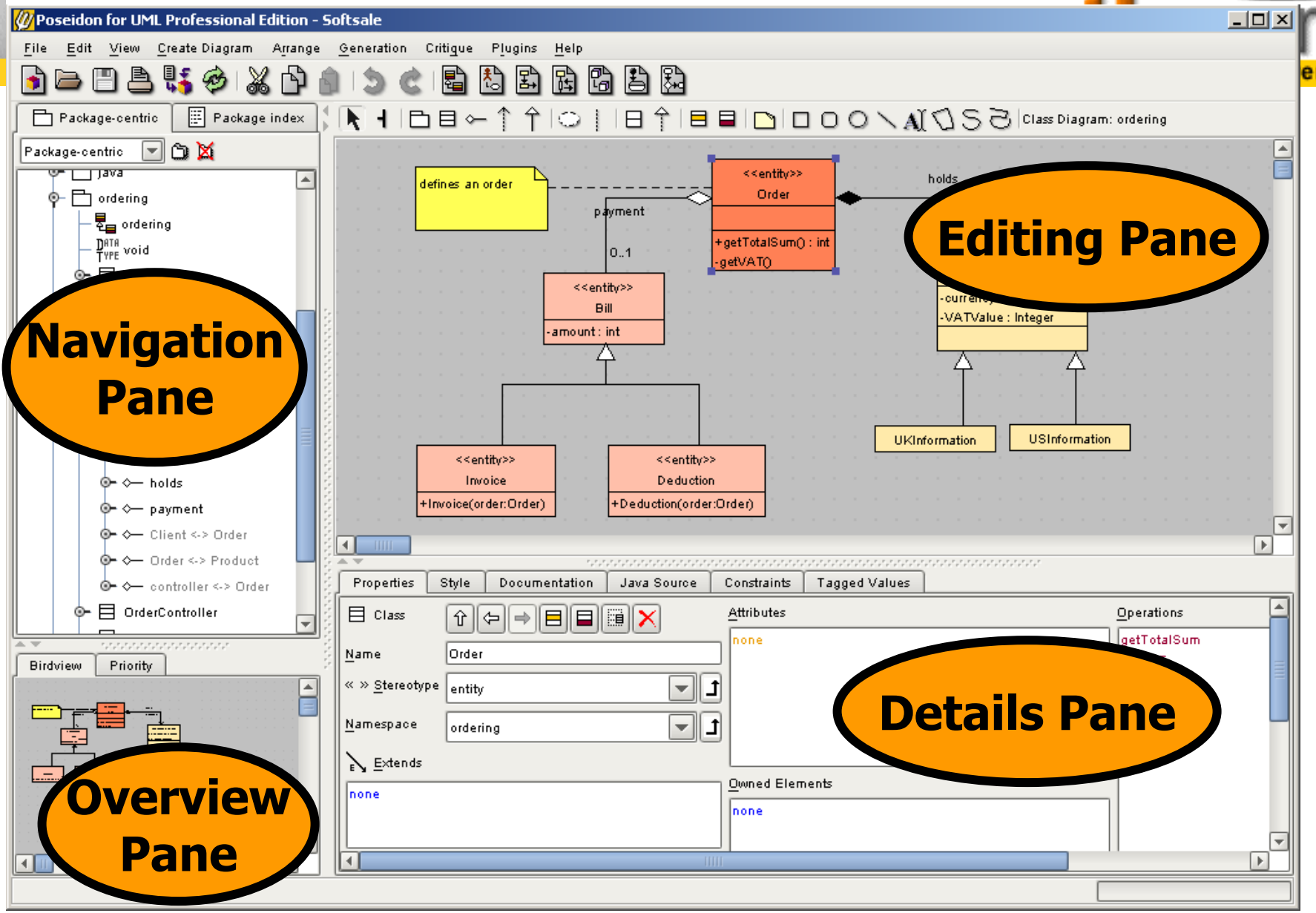


- Jason and the

Screenshot


Poseidon for UML Professional Edition - Softsale
File Edit View Create Diagram Arrange Generation Critique Plugins Help
Package-centric
Package index
Class Diagram: ordering
ordering
void
holds
payment
Client <-> Order
Order <-> Product
controller <-> Order
OrderController
Navigation Pane
defines an order
payment
0..1
<<entity>>
Order
+getTotalSum() : int
-getVAT()
<<entity>>
Bill
-amount : int
<<entity>>
Invoice
+Invoice(order:Order)
<<entity>>
Deduction
+Deduction(order:Order)
-VATValue : Integer
UKInformation
USInformation
Editing Pane
Properties
Style
Documentation
Java Source
Constraints
Tagged Values
Class
Name
Order
Stereotype
entity
Namespace
ordering
Extends
none
Attributes
none
Operations
getTotalSum
Owned Elements
none
Details Pane
Birdview
Priority
Overview Pane

The Value of UML Models

- **What to do with UML Models?**
  - Send to a colleque for implementation
  - Send to a partner for coordination
  - Send to a standardization committee

  - Generate documentation
  - Generate code
  - Generate XML schema

The Value of Interchange

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- **Model Exchange**
  - Communicate from one Organization to another
- **Investment security**
  - Migrate from one Vendor to another
- **Value-adding Chains of Tools**
  - Whiteboard tool
  - Modeling tool
  - Code Generation tools
  - Validation, Testing and Verification tools

XMI

- **XML Metadata Interchange (XMI)**
  - Based on XML
  - Standardized by OMG
  - Used for highly referential Data
  - E.g. Metadata
  - Productions rules for MOF
- **Supported by many Vendors**
- **Saving Format of Poseidon**

Problems with XMI

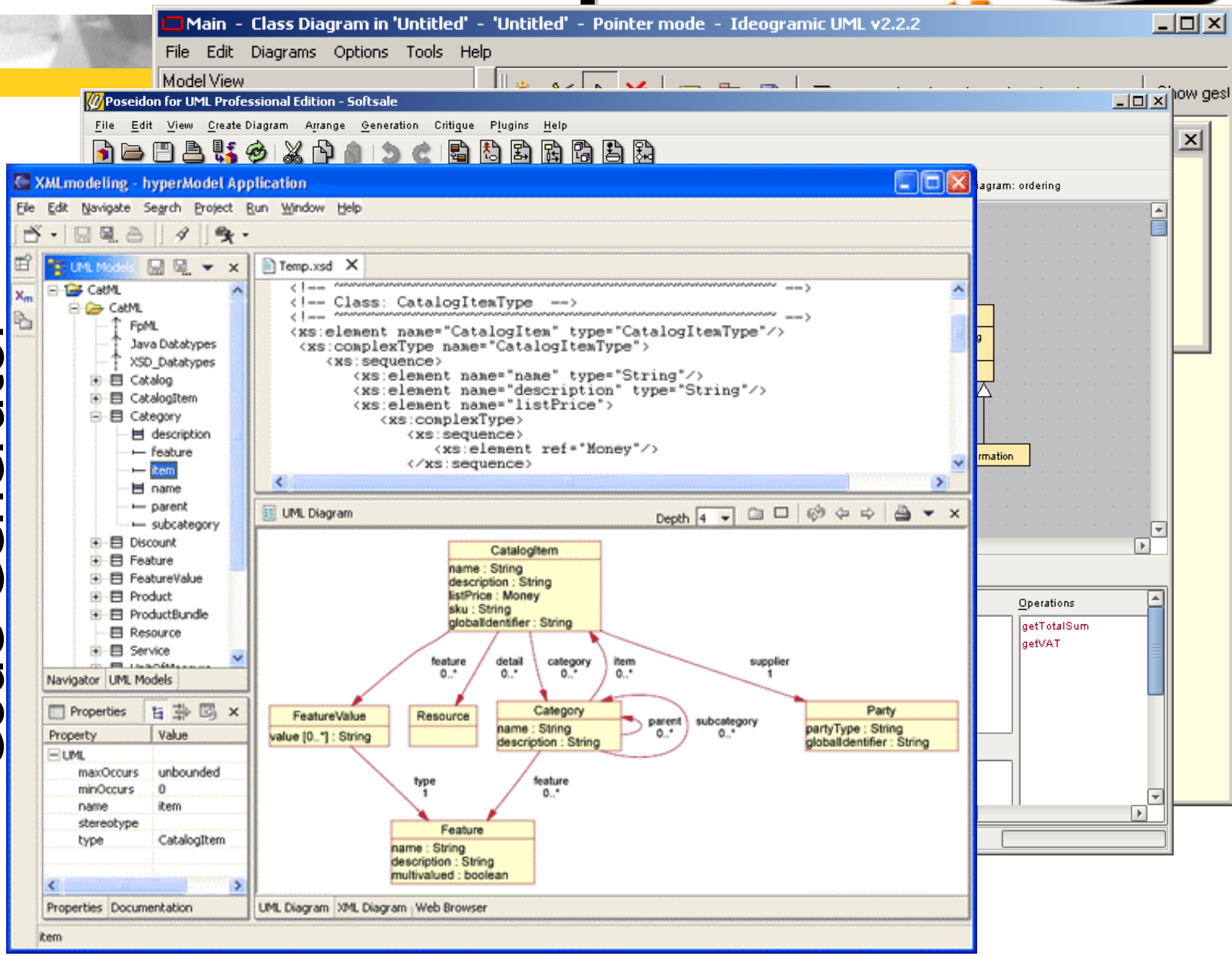
- **Problems with XMI**
  - Different Versions of XMI (1.0 – 1.2)
  - Different Versions of MOF (1.0 – 1.4)
  - Different Versions of UML (1.1, 1.3, 1.4)
  - Different Interpretations
  - Faulty Implementations
- **No Diagram Information**
  - Only the Model Information is included
- **RFP for Diagram Interchange by OMG**

RFP Diagram Interchage

- **RFP for UML 2.0**
- **Three Initial Submissions**
  - Rational
  - Sun, Compuware
  - Gentleware, Telelogic, Adaptive, DaimlerChrysler
- **Joint Revised Submission**
  - First Revised Submission Sept. 9, 2002
  - Final Revised Submission Jan. 6, 2002
  - Supported by TogetherSoft, I-Logix, Softeam, KC

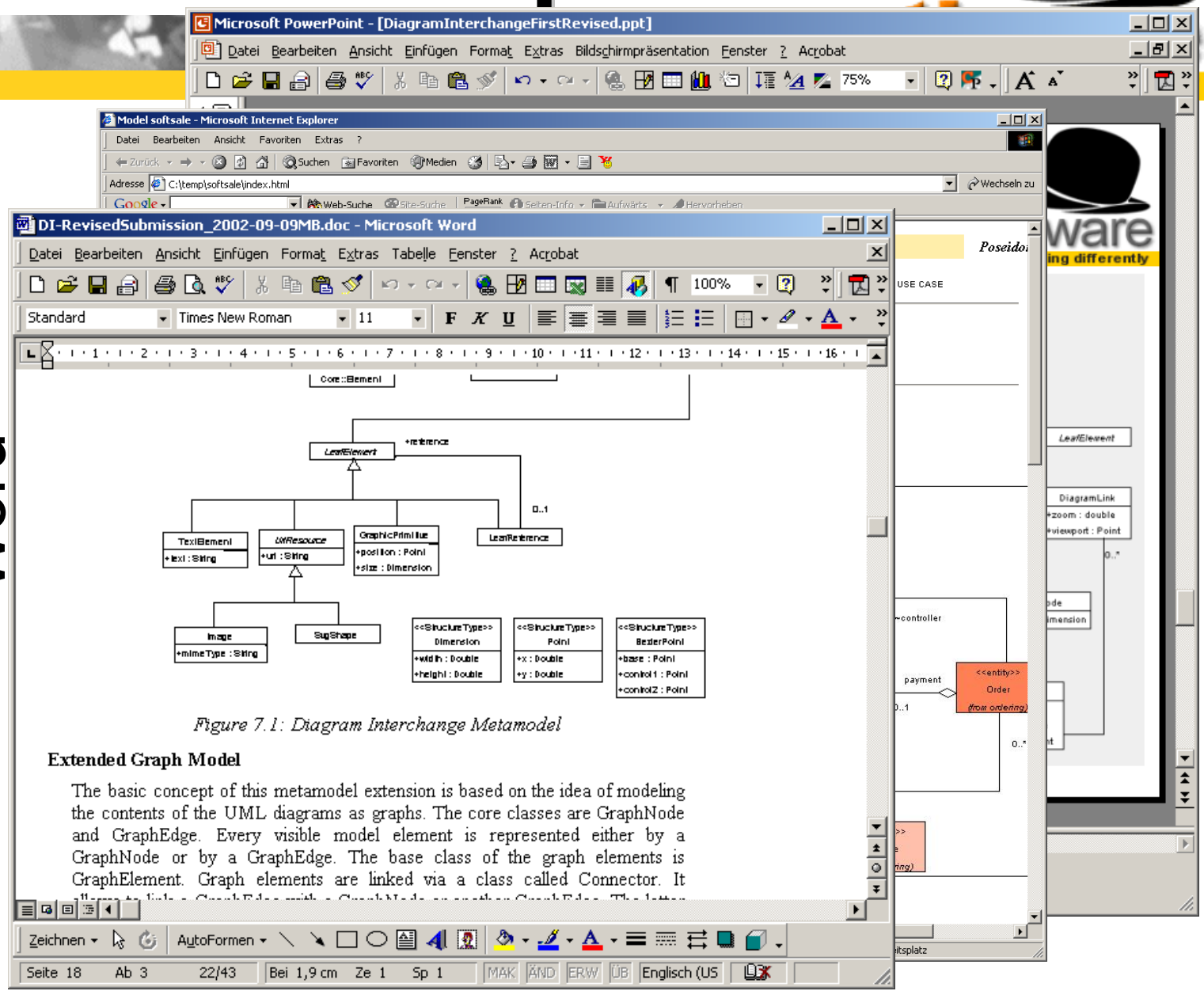
Tool Chain Example

Whiteboard tool,
Modeling tool,
Code Generator



Tool Chain Example

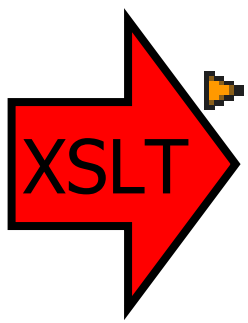
Powerpoint,
Internet Browser,
Word



Responding to Different Needs

- **Model-oriented**
  - Modeling tools, Code Generator
  - Need Layout information
  - Semantic understanding
  - Differing representations
  - Model editing
- **Graphic-oriented**
  - Word Processing, Presentations, Publishing
  - Need precise Graphic
  - No Semantic understanding
  - Exact representation
  - Only graphical editing

- **XMI**
  - Diagram Metamodel
  - Graph-based



- **SVG**
  - Lines and Boxes
  - Graphic-based

Key Ideas

- **Graph-oriented Metamodel for UML and other Diagrams**
- **Unchanged UML Metamodel**
- **Extension of XMI**
  - XMI[UML]
  - XMI[DI]
  - XMI[UML+DI]
- **XMI for Model-oriented tools**
- **SVG for Graphic-oriented tools**

Demo

- View UML model
- Save as XMI [UML+DI]
- Transforme to SVG using XSLT
- View SVG in Browser

The Value of Code Generation

Generate to different Platforms

- Java / General Application
- EJB / Business Application
- C / Embedded Systems

Generate documentation

- HTML
- PDF /DocBook
- Management information / Metrics

The Foundation for MDA

Increased Importance of Code Generation

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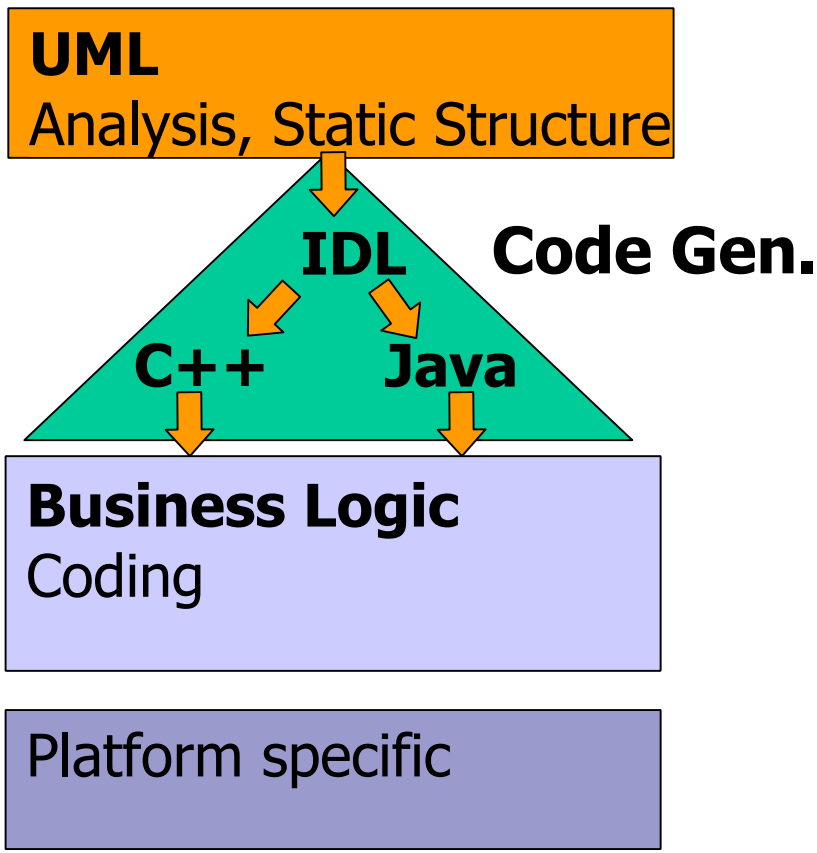
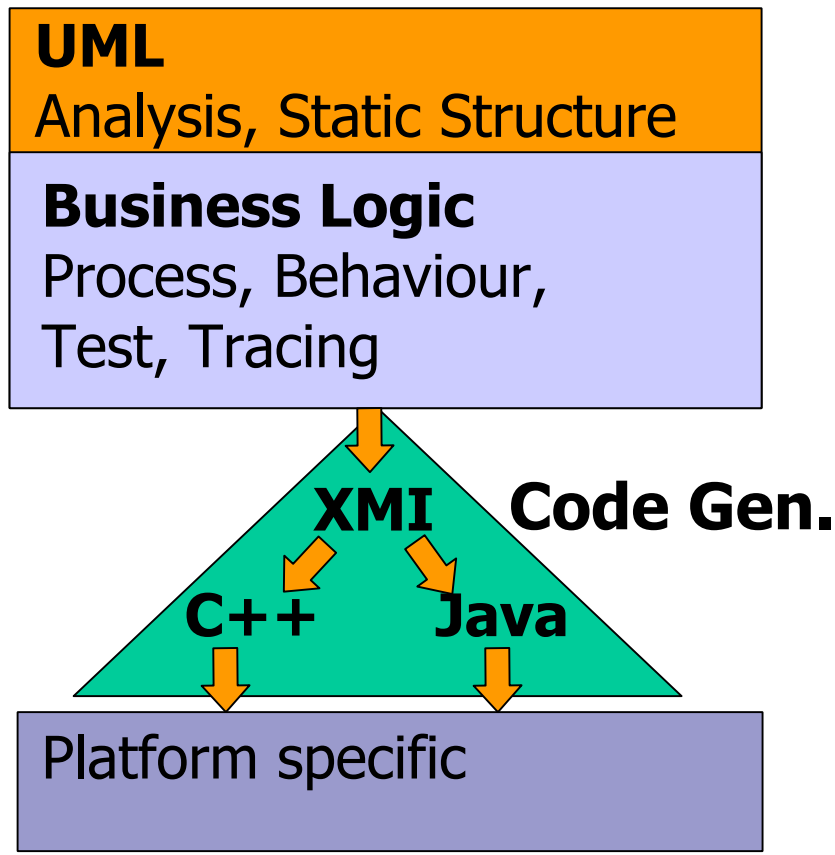
- CORBA



- MDA



Code Generation

- **Template-based**
  - Velocity Project of Apache
  - Template-Language
    - #if
    - #foreach
    - Variables: $var
    - Java Classes: $myClass
  - Design an examle file
    - Java, C++, HTML, XML, XML-Schema
  - Replace variable parts with model info.

Example for HTML

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```
<HTML>
<BODY>
Hello $customer.Name!
 <table>
   #foreach( $product in $catalog.productlist )
     #if ( $customer.hasPurchased($product) )
       <tr>
         <td>
           $product.getTitle(
         </td>
       </tr>
     #end
   #end
 </table>
```

```
<HTML>
<BODY>
   Hello Marko Boger!
   <table>
      <tr>
         <td>
            Poseidon for UML
         </td>
      </tr>
      <tr>
         <td>
            UMLdoc Plugin
         </td>
      </tr>
   </table>
```

How Velocity works

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- Establish Context, use in Templates

Context

clazz	MClassifier clazz = new MClassifierImpl("Car")
attributes	Vector attributes = { kfz , color }
	...

Template

```
public class $clazz.getName() {
#foreach( $attribut in $attributes)
  private $attribut;
#end
}
```

Java

```
public class Car {
  private kfz;
  private color;
}
```

Changing Templates

- **Add simple metric to each class**
  - Count number of methods.
  - If too many, generate a warning in header

```
/** Java class "${className}.java" generated from Poseidon for UML.
 *  Poseidon for UML is developed by Gentleware.
 *  Generated with velocity template engine.
 */
 #if (preparedOperations.size()>10)
     // This class has too many operations. Consider a refactoring.
 #end

#if ($package != "")
package $package;
#end

#renderImports($imports)

#renderClassSignature($preparedClassifier)
```

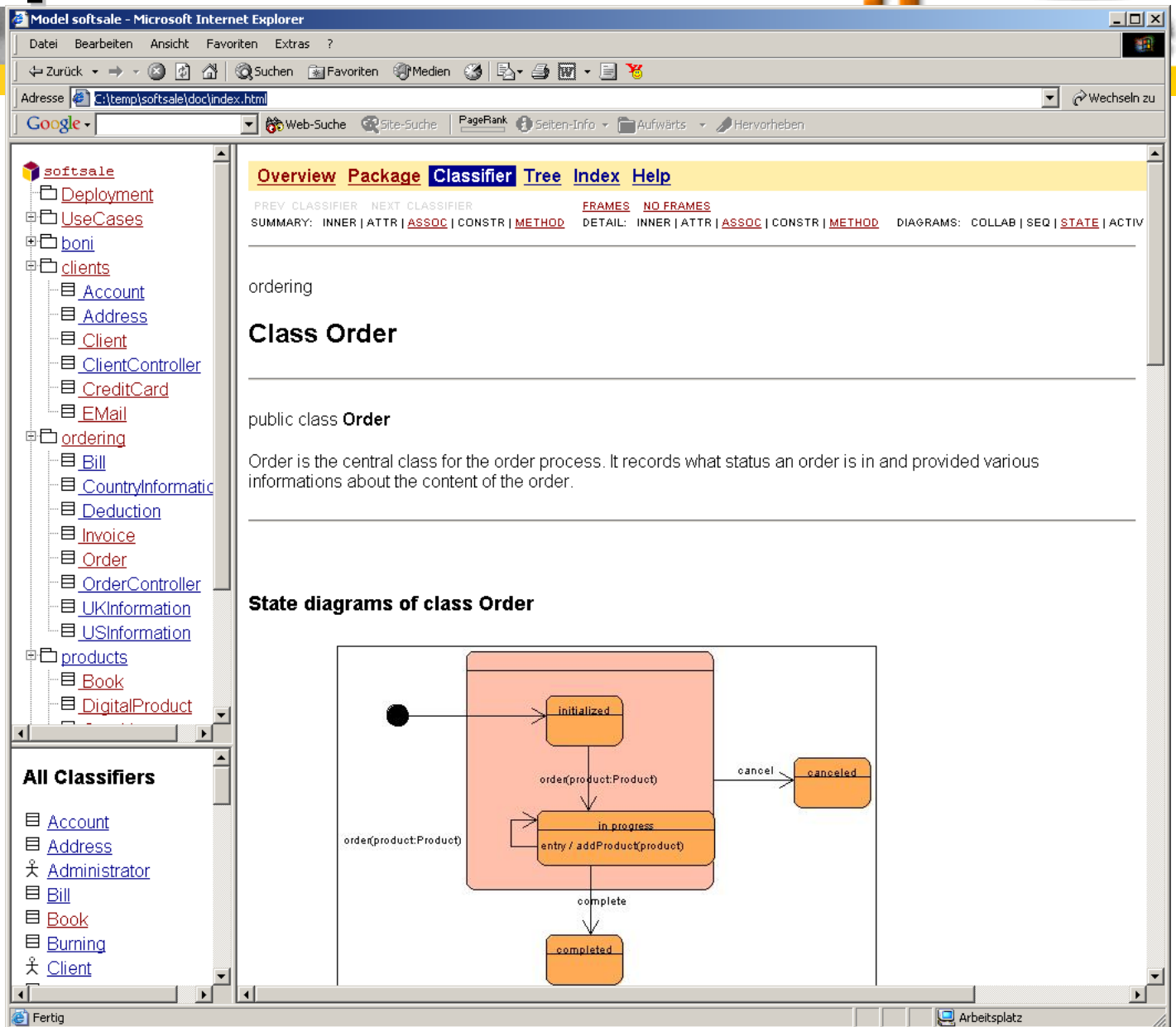
Changing Templates

- **Add log information to Method**
  - Call Logmanager before every method call

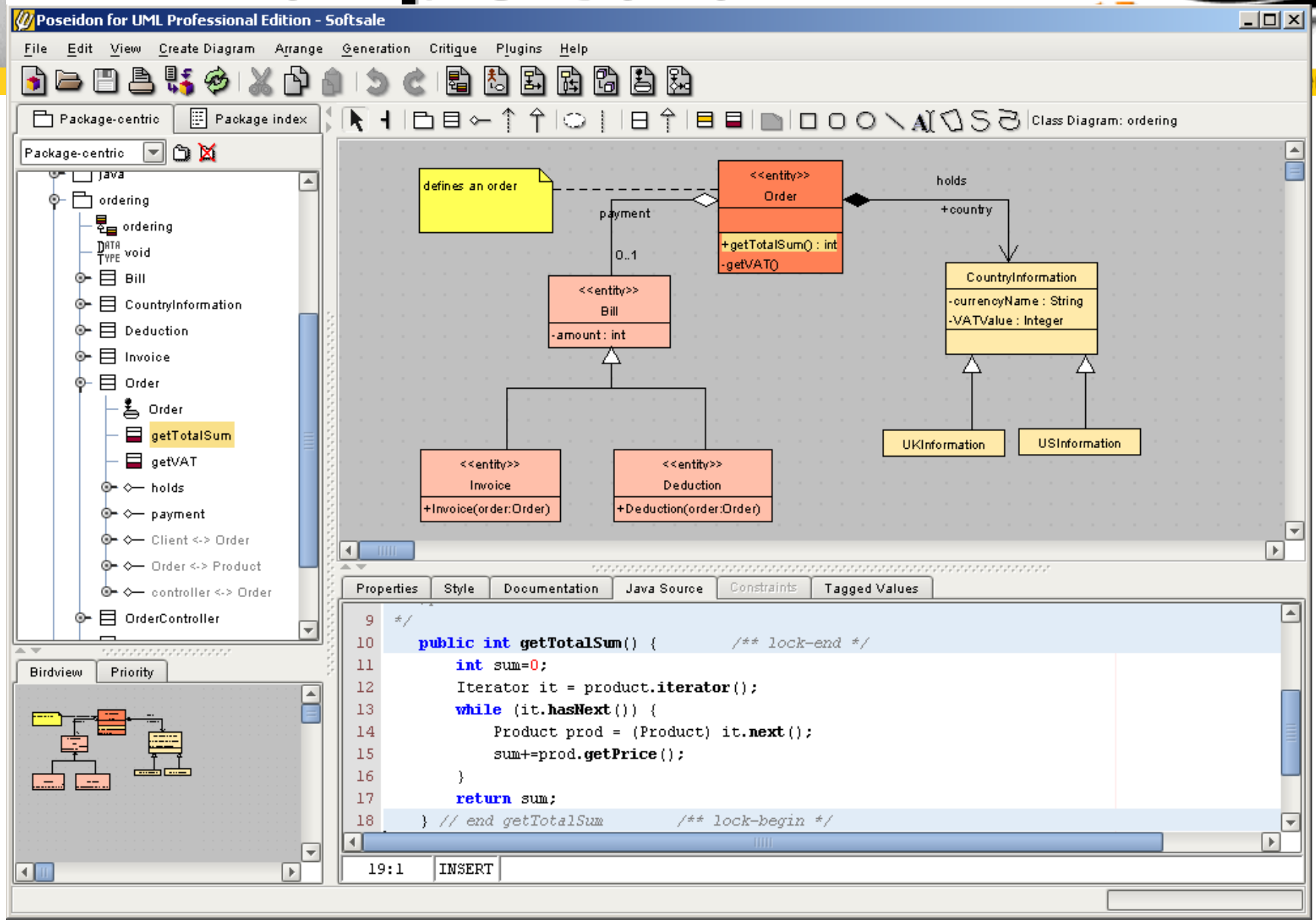
```
#macro (renderOneOperation $currentOp $editable)
   $currentOp.getDocs()
   ${visibility}${static}${final}${returnType} ${name}($inOutPars)$thrownClause {
        LogManager.log.info("calling method ${name}()");
        #renderMethodBody($currentOp.getMethodBody() $currentOp.hasReturnType())
   } // end ${name}
#end
```

Example: UMLdoc

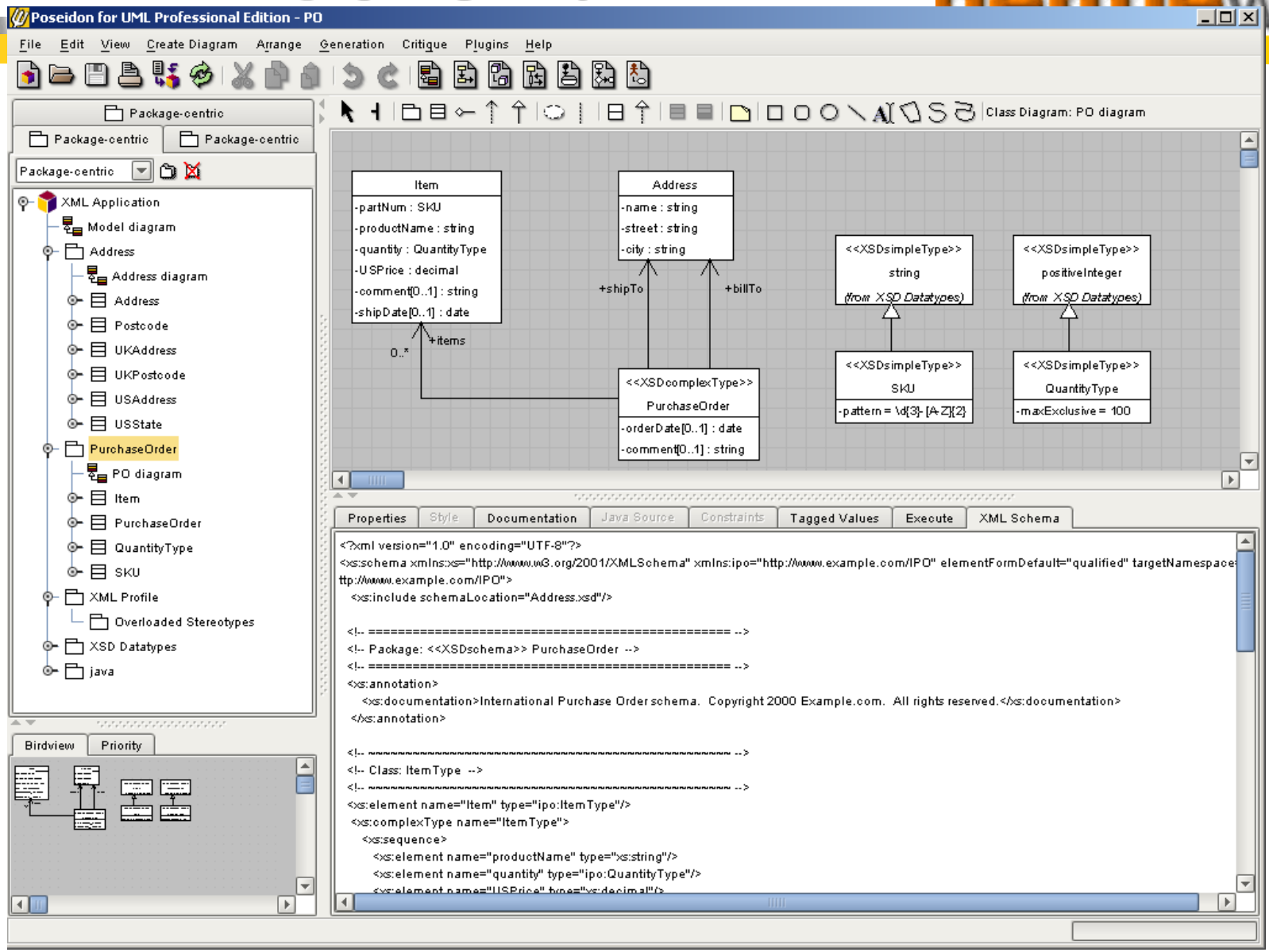
- HTML
  - generated
  - including JavaScript
  - Simple templates



Example: Java



Example: XML Schema



Example: State Chart

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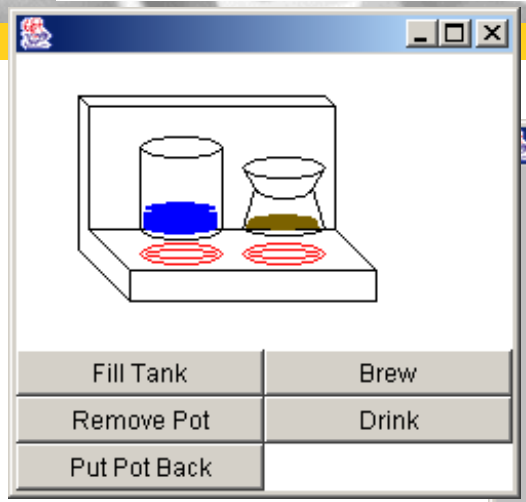

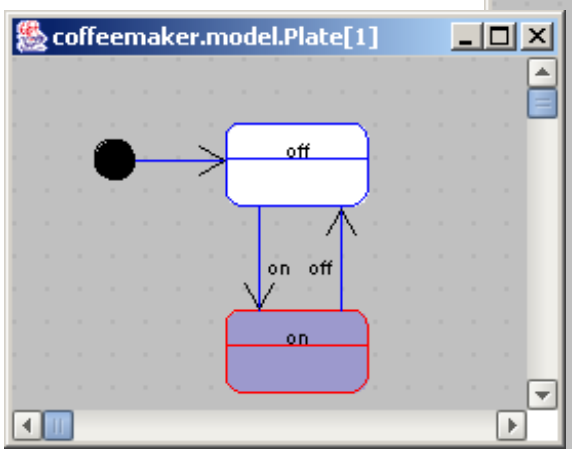

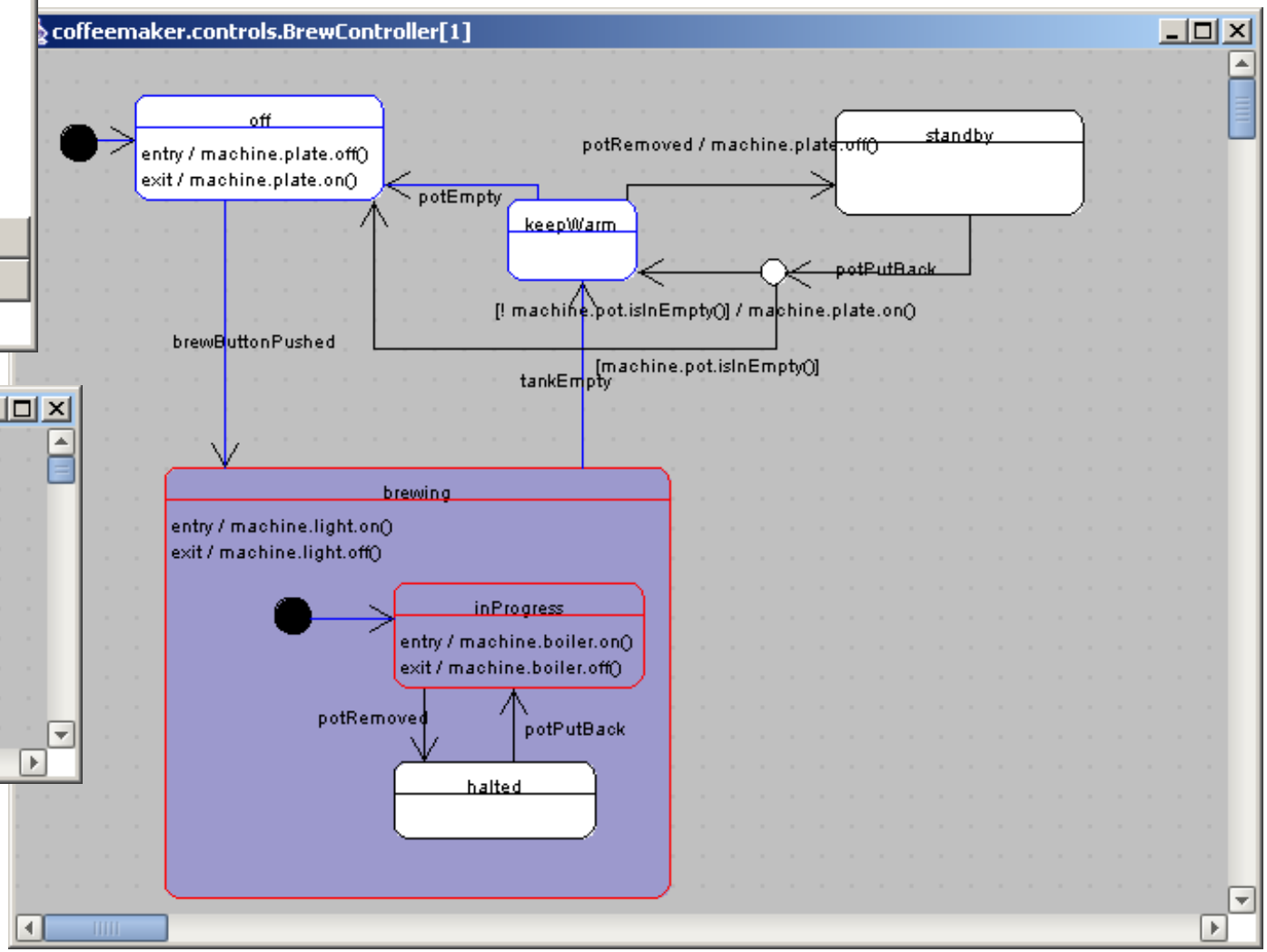

Poseidon CD

- **CD**
  - All submisssions
    - Infrastructure
    - Superstructure
    - OCL
    - Diagram Interchange
  - Poseidon for UML
    - Community Edition
    - Professional Edition
- **Website**
  - www.gentleware.com/ projects/diagraminterchange/