INRIA	**ATL Transformation** **Catalogue of Model Transformations**	**Author** **Baudry Julien** **Jul.baudry <*at*> gmail.com**
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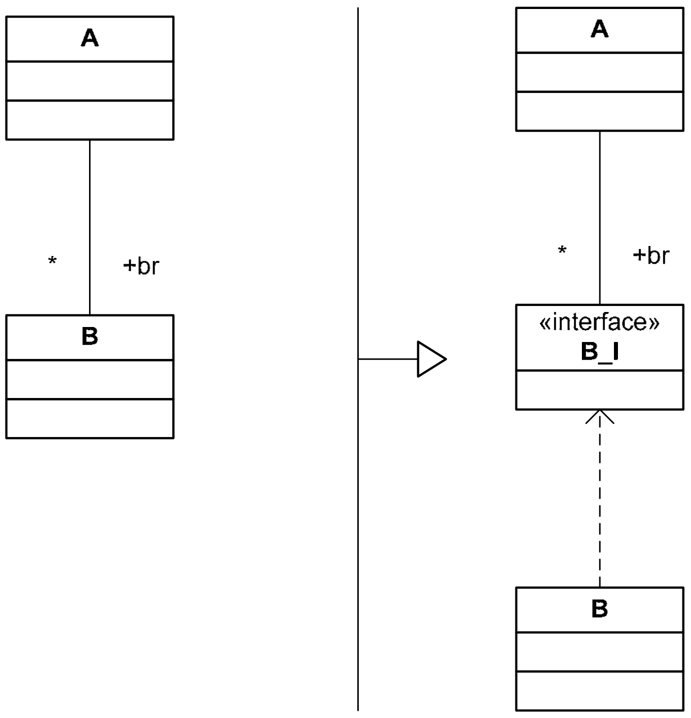
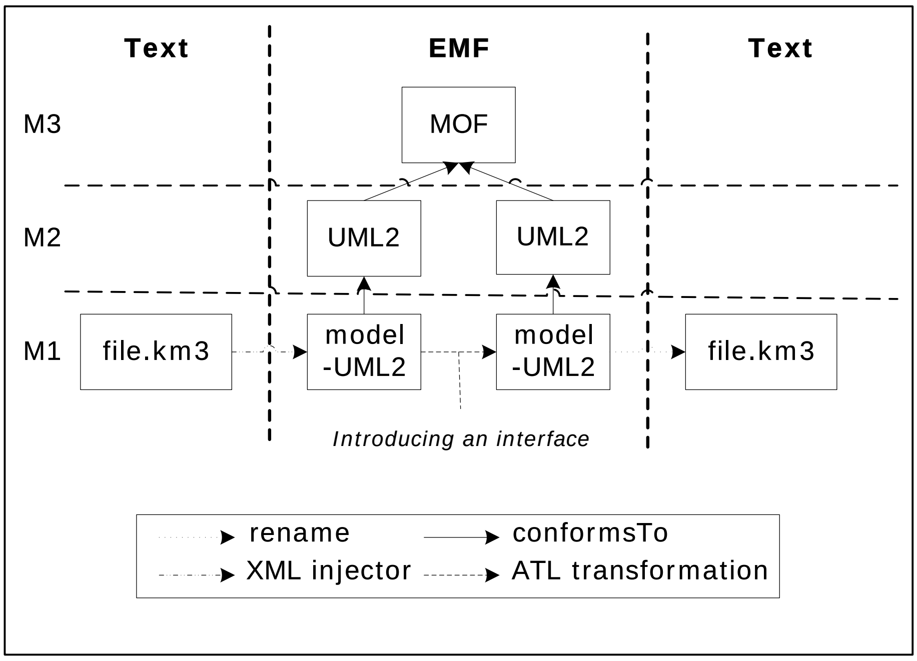
1. ATL Transformation Example: introducing an interface

This example is extract from Catalogue of Model Transformations by K. Lano.
Section 2.6:Introduce interface(s) for supplier class(es), page 16.





2. ATL Transformation overview

2.1. Description

If class A is a client of class B, but only uses some of B's operations, introduce an interface B_I of B which has the subset of operations of B that are used by A. Make A a client B_I instead of B.

2.2. Purpose

This reduces the dependencies in the model and enables separate development of A and B, and permits them to be placed in different layers or tiers of the system.

2.3. Rules specification

Our transformation has the same source and the target metamodel, UML2. We use 2 different names (UML2 and UML2target), but they refer to the same metamodel. We use a second model, an XML file which describes the operation of a class uses by another class.

For example, the following model says that Class A use the b1 and b2 operation, both operation of the class B. And the Class B uses the a1 operation, both operation of the class A.

```
<model>
      <A>
          <B model='example'>
              <b1/>
              <b2/>
          </B>
     </A>
     <B>
          <A model='example'>
              <a1/>
          </A><
      /B>
</model>
```

We use the helper *getOperations ().* This helper returns in a sequence the operations of the class 'class' use by the class 'subClass'.

- For a Model element, another Model element is created :
  - with the same name, visibility and packageableElement_visibility,
  - Linked to the same ownedMember.

- For a Class element, another Class element is created :
  - with the same name, visibility and packageableElement_visibility,
  - with the same properties, isAbstract, isLeaf and isActive,
  - Linked to the same ownedAttribute and ownedOperation.

- For a Association element, another Association element is created :
  - with the same name, visibility and packageableElement_visibility,
  - with the same properties, isAbstract, isLeaf and isDerived,
  - Linked to the same ownedEnd and memberEnd.

- For a LiteralNull/ LiteralInteger/ LiteralUnlimitedNatural element, another LiteralNull/ LiteralInteger/ LiteralUnlimitedNatural element is created :
  - With the same name, and value.

- For a Operation element, another Operation element is created :
  - with the same name and visibility,
  - With the same properties, isAbstract, isLeaf, isOrdered, isQuery, isStatic, isUnique.

- For a XML element, another Operation element is created :
  - With the same name.

- For a Property element, 3 elements are created :
  - A property element :
    - With the same properties isDerived, isDerivedUnion, isLeaf, isOrdered, isReadOnly, isStatic, isUnique,
    - With the same name, visibility, type,
    - With the same lower value and upper value.

- An interface element
  - Named <name of the property>+_interface_+<name of the association which has the input property>,
  - And the operations given by the XML model, using the helper *getOperations ()*.

- An implementation element
  - Named <name of the property>+_implementation_+<name of the association which has the input property>,
  - With the previous implementation as Contract,
  - With the input property as implementingClassifier.

2.4. ATL Code

```
-- @name  Introducing an interface
-- @version    1.0
-- @domains    Catalogue of Model Transformations
-- @authors    Baudry Julien (jul.baudry<at>gmail.com)
-- @date    2006/08/02
-- @description   The purpose of this transformation is introduce an interface to each
reference
-- @see http://www.dcs.kcl.ac.uk/staff/kcl/tcat.pdf
-- @see section 2.6, page 16
-- @see author of article : K. Lano

module UML2Transformations; -- Module Template
create OUT : UML2target from IN : UML2, MODEL : XML;

-- helper getOperations
-- IN :  UML2!Class, UML2!Class
-- OUT : Sequence(UML2!Operation)
-- this helper returns in a sequence the operations of the class 'class' use by the class 'sub
   class'
helper context UML2!Property def: getOperations(class : UML2!Class,subClass : UML2!Class) :
Sequence(UML2!Operation) =
   XML!Root.allInstances()->asSequence()->first().children
                                 ->select(a|a.name = class.name)->first().children
                                 ->select(a|(a.name = subClass.name)and((a.children-
>select(a|a.name='model')->first().value)=subClass.package.name))
                                 ->first().children
                                 ->select(a|a.oclIsTypeOf(XML!Element));


--@begin rule model
rule model {
   from
      inputModel : UML2!Model
   to
      outputModel : UML2target!Model (
         name <- inputModel.name,
         visibility <- inputModel.visibility,
         packageableElement_visibility <- inputModel.packageableElement_visibility,
         ownedMember <-inputModel.ownedMember
      )
}
--@end rule model
```

```
--@begin rule class
rule class {
   from
      inputClass : UML2!Class
   to
      outputClass : UML2target!Class (
         name <- inputClass.name,
         visibility <- inputClass.visibility,
         packageableElement_visibility <- inputClass.packageableElement_visibility,
         isAbstract <- inputClass.isAbstract,
         isLeaf <- inputClass.isLeaf,
         isActive <- inputClass.isActive,
         ownedAttribute <- inputClass.ownedAttribute,
         ownedOperation <- inputClass.ownedOperation
      )
}
--@end rule class

--@begin association
rule association {
   from
      inputAssoc : UML2!Association
   to
      outputAssoc : UML2target!Association (
            isAbstract <- inputAssoc.isAbstract,
            isDerived <- inputAssoc.isDerived,
            isLeaf <- inputAssoc.isLeaf,
            ownedEnd <- inputAssoc.ownedEnd,
            memberEnd <- inputAssoc.memberEnd,
            name <- inputAssoc.name,
            packageableElement_visibility <- inputAssoc.packageableElement_visibility,
            visibility <- inputAssoc.visibility
      )
}

--@end association

--@begin rule property
rule property {
   from
      inputProperty : UML2!Property
   to
      outputProperty : UML2target!Property (
         isDerived <- inputProperty.isDerived,
         isDerivedUnion <- inputProperty.isDerivedUnion,
         isLeaf <- inputProperty.isLeaf,
         isOrdered <- inputProperty.isOrdered,
         isReadOnly <- inputProperty.isReadOnly,
         isStatic <- inputProperty.isStatic,
         isUnique <- inputProperty.isUnique,
         name <- inputProperty.name,
         visibility <- inputProperty.visibility,
         lowerValue <- inputProperty.lowerValue,
         upperValue <- inputProperty.upperValue,
         type <- outputInterface
      ),
      outputInterface : UML2target!Interface (
         name <- inputProperty.name+'_interface_'+inputProperty.association.name,
         ownedOperation <- inputProperty.getOperations(inputProperty.association.endType-
>excluding(inputProperty.type)->first(),
                                                                     inputProperty.type)
                                                                     ->iterate (a; acc :
Sequence(UML2target!Operation) = Sequence{}|
                                                                                acc-
>including(thisModule.operationXML(a)))
      ),
      outputImplementation : UML2target!Implementation (
         name <- inputProperty.name+'_implementation_'+inputProperty.association.name,
         contract <- outputInterface,
         implementingClassifier <- inputProperty.type
      )
}
--@end rule property

--@begin literal null
rule literalNull {
   from
      inputLiteral : UML2!LiteralNull
   to
      outputLiteral : UML2target!LiteralNull (
         name <- inputLiteral.name,
         value <- inputLiteral.value
      )
}
--@end literal null

--@begin literal integer
rule literalInteger {
   from
      inputLiteral : UML2!LiteralInteger
   to
      outputLiteral : UML2target!LiteralInteger (
         name <- inputLiteral.name,
         value <- inputLiteral.value
      )
}
--@end literal integer

--@begin literal unlimited natural
rule literalUnlimitedNatural {
   from
      inputLiteral : UML2!LiteralUnlimitedNatural
   to
      outputLiteral : UML2target!LiteralUnlimitedNatural (
         name <- inputLiteral.name,
         value <- inputLiteral.value
      )
}
--@end literal unlimited natural

--@begin operation
rule operation {
   from
      inputOperation : UML2!Operation
   to
      outputOperation : UML2target!Operation (
         isAbstract <- inputOperation.isAbstract,
         isLeaf <- inputOperation.isLeaf,
         isOrdered <- inputOperation.isOrdered,
         isQuery <- inputOperation.isQuery,
         isStatic <- inputOperation.isStatic,
         isUnique <- inputOperation.isUnique,
         name <- inputOperation.name,
         visibility <- inputOperation.visibility
      )
}
--@end operation
```

```
--@begin operationXML
lazy rule operationXML {
   from
      inputElement : XML!Element
   to
      outputOperation : UML2target!Operation (
         name <- inputElement.name
      )
}
--@end operationXML
```

3. References

[1] Catalogue of Model Transformations
http://www.dcs.kcl.ac.uk/staff/kcl/tcat.pdf