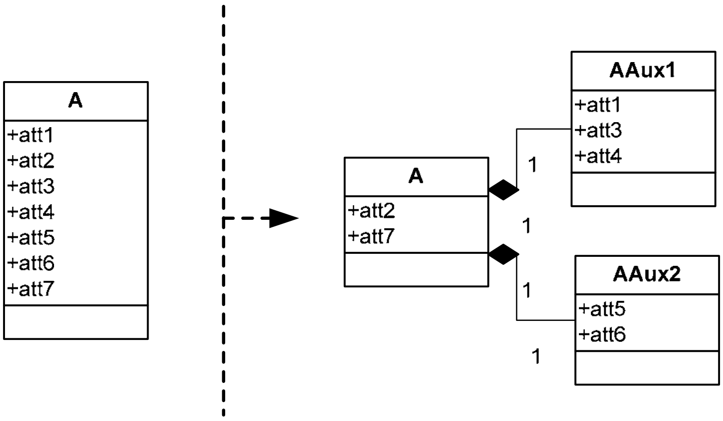
INRIA	**ATL Transformation** **Catalogue of Model Transformations**	**Author** **Eric Simon** **eric.simon3 <*at*> gmail.com**
	Documentation	Aug 10th 2006

1. ATL Transformation Example: Disaggregation

This example is extract from Catalogue of Model Transformations by K. Lano.
Section 2.8: Disaggregation, page 23.



2. ATL Transformation overview

2.1. Description

“A class is factored into component classes.”

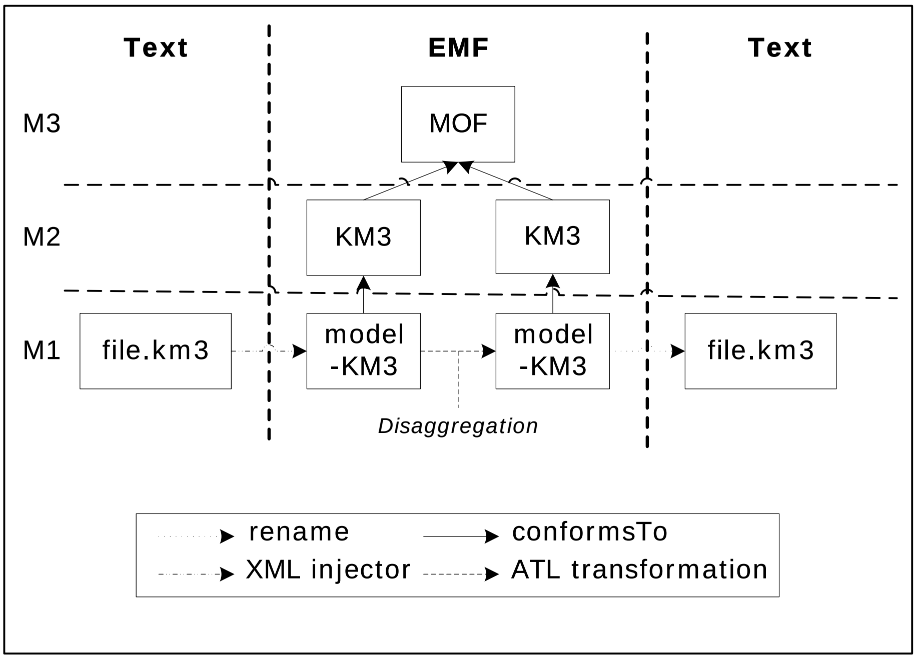


Fig 1. Overview of the transformation

2.2. Purpose

"A class may become large and unmanageable, with several loosely connected functionalities. It should be split into several classes, such as a master/controller class and helper classes, which have more coherent functionalities and data."

2.3. Rules specification

The transformation has the same metamodel for the source and the target: KM3. . However, we choice two different name: KM3 and KM3Target, indeed there is a confusion with the rule ocl: KM3!<nameElement>->allInstances() which returns all the class appertain to the source **and** the target.

- For each *Metamodel* element, another *Metamodel* element is created with the following elements:
  - the attribute *location* is the same,
  - the reference *contents* is the same.
- For each *Package* element, another *Package* element is created with the following elements:
  - the attribute *name* is the same,
  - the reference *contents* is the same.
- For each *DataType* element, another *DataType* element is created with the following elements:
  - the attributes *name* and *location* are the same,

- For each *EnumLiteral* element, another *EnumLiteral* element is created with the following elements:
  - the attributes *name* and *location* are the same,
  - the references *enum* and *package are composed by the same source.*
- For each *Enumeration* element, another *Enumeration* element is created with the following elements:
  - the attributes *name* and *location* are the same,
  - the reference *literals* and *package* are composed by the same source.
- For each *Class* element
  - another Class element is created with the following elements:
    - the attributes name, location and isAbstract are the same,
    - the references supertypes and package are the same one as the source,
    - the reference *structuralFeatures* owns the attribute which have not a metadata.
  - the *Class* elements contained by the set are created with the following elements:
    - the attributes name, location and isAbstract are the same,
    - the references supertypes and package are the same one as the source,
    - the reference *structuralFeatures* owns the attribute which have for metadata the name of this *Class* element.
- For each *Attribute* element, another *Attribute* element is created with the following elements:
  - the attributes *name*, *lower*, *upper*, *isOrdered* and *isUnique* are the same source value,
  - the references *package*, *owner* and *type*, are filled in with the same value respectively.
- For each *Reference* element, another *Reference* element is created with the following elements:
  - the attributes *name*and *isContainer* are the same,
  - the references *type, opposite, owner* and *package* are the same;

2.4. ATL Code

```
module Disaggregation; -- Module Template
create OUT : KM3 from IN : KM3;

-- @comment this helper returns the metadata "commentsBefore" of name : <name>
helper context KM3!Attribute def: getMetadata(name : String) : String =
   let comment : String = self.commentsBefore->select(e | e.startsWith('-- @' + name + ' '))-
>first() in
   if comment.oclIsUndefined() then
      OclUndefined
   else
      comment.substring(6 + name.size(), comment.size())
   endif;

-- @comment this helper returns the class set of the metadatas
helper context KM3!Class def : getClass : Set(String) =
   KM3!Attribute->allInstances()->select(c|c.commentsBefore->notEmpty())->iterate(a; acc :
Set(String) = Set{}| acc->including(a.getMetadata('label')))
   ;
2.4.1.  --@begin rule Metamodel
rule Metamodel {
   from
      inputMm:KM3!Metamodel
   to
      outputMm:KM3!Metamodel (
         location <- inputMm.location,
         contents <- inputMm.contents
      )
}
-- @end rule Metamodel

2.4.2.  -- @begin rule Package
rule Package {
   from
      inputPkg:KM3!Package
   to
      outputPkg:KM3!Package (
         name <- inputPkg.name,
         contents <- inputPkg.contents
      )
}
-- @end rule Package

2.4.3.  -- @begin rule DataType
rule DataType {
   from
      inputData:KM3!DataType
   to
      outputData:KM3!DataType(
         name <- inputData.name,
         location <- inputData.location
      )
}
-- @end rule DataType

2.4.4.  -- @begin rule Enumeration
rule Enumeration {
   from
      inputEnum:KM3!Enumeration
   to
      outputEnum:KM3!Enumeration (
         name <- inputEnum.name,
         location <- inputEnum.location,
         package <- inputEnum.package,
         literals <- inputEnum.literals
      )
}
-- @end rule Enumeration


2.4.5.  --@begin rule EnumLiteral
rule EnumLiteral {
   from
      inputL:KM3!EnumLiteral
   to
      outputL:KM3!EnumLiteral (
         name <- inputL.name,
         location <- inputL.location,
         enum  <- inputL.enum,
         package <- inputL.package
      )
}
--@end rule EnumLiteral

2.4.6.  -- @begin rule Class
rule Class {
   from
      inputC:KM3!Class
      (not (inputC.structuralFeatures->select(r|r.oclIsTypeOf(KM3!Attribute))-
>exists(a|a.commentsBefore->notEmpty())))
   to
      outputC:KM3!Class (
         isAbstract <- inputC.isAbstract,
         supertypes <- inputC.supertypes,
         name <- inputC.name,
         location <- inputC.location,
         package <- inputC.package,
         structuralFeatures <- inputC.structuralFeatures
      )
}
-- @end rule Class

2.4.7.  -- @begin rule Attribute
rule Attribute {
   from
      inputAttr : KM3!Attribute
   to
      outputAttr : KM3!Attribute (
         package <- inputAttr.package,
         name <- inputAttr.name,
         lower <- inputAttr.lower,
         upper <- inputAttr.upper,
         isOrdered <- inputAttr.isOrdered,
         isUnique <- inputAttr.isUnique,
         owner <- inputAttr.owner,
         type <- inputAttr.type
      )
}
-- @end rule Attribute

2.4.8.  -- @begin rule Reference
rule Reference {
   from
      inputRef : KM3!Reference
   to
      outputRef : KM3!Reference (
         package <- inputRef.package,
         name <- inputRef.name,
         lower <- inputRef.lower,
         upper <- inputRef.upper,
         isOrdered <- inputRef.isOrdered,
         isUnique <- inputRef.isUnique,
         owner <- inputRef.owner,
         type <- inputRef.type,
         isContainer <- inputRef.isContainer,
         opposite <- inputRef.opposite
      )
}
-- @end rule Attribute

2.4.9.  -- @begin rule Disaggregation
rule Disaggregation {
   from
      inputC : KM3!Class
      (inputC.structuralFeatures->select(r|r.oclIsTypeOf(KM3!Attribute))-
>exists(a|a.commentsBefore->notEmpty()))
   using {
      subClasses : Set(String) = inputC.getClass;
      }
   to
      outputPrimaryClass : KM3!Class (
         isAbstract <- inputC.isAbstract,
         supertypes <- inputC.supertypes,
         name <- inputC.name,
         location <- inputC.location,
         package <- inputC.package,
         structuralFeatures <- inputC.structuralFeatures->select(a| not
a.oclIsTypeOf(KM3!Attribute)),
         structuralFeatures <- inputC.structuralFeatures->select(a|
a.oclIsTypeOf(KM3!Attribute))->select(a|a.commentsBefore->oclIsUndefined()),
         structuralFeatures <- subClasses->iterate(a; acc :
Sequence(KM3!Reference)=Sequence{}| acc->append(thisModule.composition(inputC,a)))
      )
}
-- @end rule Disaggregation

-- @comment this lazy rule creates a auxiliarie class and this link with the root element for
each element in the metadata.
-- @begin rule composition
lazy rule composition{
   from
      inputC : KM3!Class,
      Name : String

   to
      outputRef1 : KM3!Reference (
         package <- inputC.package,
         name <- 'ref1'+Name,
         lower <- 1,
         upper <- 1,
         isOrdered <- false,
         isUnique <- false,
         owner <- inputC,
         type <- subClass,
         isContainer <- true,
         opposite <- outputRef2
      ),
      subClass : KM3!Class (
         isAbstract <- false,
         name <- Name,
         location <- inputC.location,
         package <- inputC.package,
         structuralFeatures <- inputC.structuralFeatures->select(a|
a.oclIsTypeOf(KM3!Attribute))->select(a|a.commentsBefore->notEmpty() and
a.getMetadata('label') = Name)
      ),

      outputRef2 : KM3!Reference (
         package <- inputC.package,
         name <- 'ref'+inputC.name,
         lower <- 1,
         upper <- 1,
         isOrdered <- false,
         isUnique <- false,
         owner <- subClass,
         type <- inputC,
         isContainer <- false,
         opposite <- outputRef1
      )
}

-- @end rule composition
```

3. References

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