

Unit of Interchange, Version 1.0

URL

<http://www.wiley.com/compbooks/poole/patterns/UnitOfInterchange.pdf>

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Structural Classification

Macro pattern.

Usage Category

Interchange.

Intent

Provides a consistently structured, identifiable unit of metadata interchange.

Also Known As

- Unit of Work
- Unit of Exchange
- Unit of Transfer

Motivation

CWM metadata interchange via XMI is greatly simplified (particularly in the case of import) when the XMI file contains a single outer-most, or top-level, package. The package should have a predefined set of attributes that further identify the package's content and internal structuring.

Applicability

Use this pattern to organize the highest level of content of CWM metadata within a single XMI file. A software process importing an XMI file tests that the highest level elements in <XMI.content> conform to the Unit of Interchange pattern. If so, then the importing process tests further for an instance of some Domain pattern that the process is particularly interested in. Otherwise, the importing process may ignore the XMI file, or take some other action (such as signaling an exception). Similarly, an exporting process uses the Unit of Interchange pattern as the basis for organizing the high-level content of the XMI file it is writing.

Projection

The Unit of Interchange pattern is based on a sub-graph of the CWM metamodel consisting of the meta classes

- org.omg.cwm.objectmodel.core.Package
- org.omg.cwm.objectmodel.core.Stereotype
- org.omg.cwm.objectmodel.core.TaggedValue

and the associations

- org.omg.cwm.objectmodel.core.ElementOwnership
- org.omg.cwm.objectmodel.core.StereotypedElement
- org.omg.cwm.objectmodel.core.StereotypeTaggedValues

This sub-graph is illustrated in the diagram below:

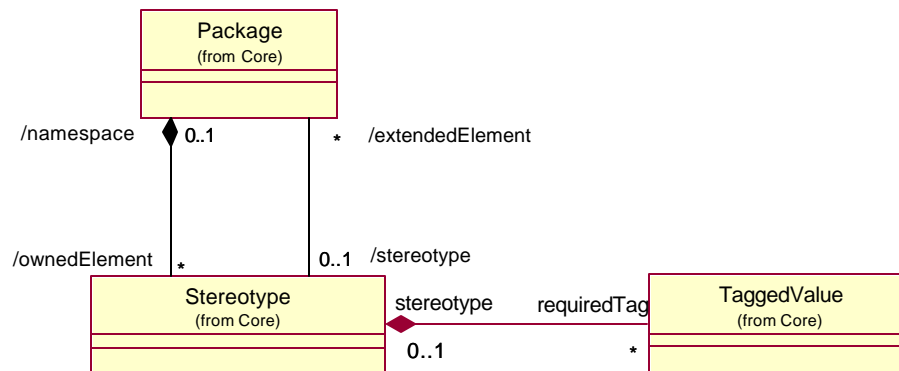


Figure 1: Unit of Interchange Projection

Restriction

Restrictions on instances of the projection are as follows:

- The Package instance is not owned by any Namespace (i.e., it must be the outer-most element of the interchanged metadata).
- The Package instance is extended by an instance of Stereotype. This Stereotype is owned by the Package instance and extends no other model element.
- The single Stereotype extending the Package instance has precisely one requiredTag with TaggedValue.tag set to "version".

These restrictions are formally expressed by the following OCL constraint:

context Package

inv: self.namespace->isEmpty

inv: self.ownedElement->collect(oclType = Stereotype)

->forall(s | s.extendedElement->includes(self) implies

(s.extendedElement->size = 1 and

s.requiredTag->includes(tag = "version") and

s.requiredTag->size = 1))

inv: self.ownedElement->collect(oclType = Stereotype)

->collect(extendedElement->includes(self))->size = 1

Usage

- The name of the single Package instance is user-defined, and not prescribed by the pattern.
- The single Stereotype instance specifies the Domain pattern that the Package content conforms to. The attribute Stereotype.ModelElement::name is set to the Domain pattern's name.
- The single instance of TaggedValue specifies the version of the Domain pattern; that is, TaggedValue.value is set to the relevant version number of the Domain pattern.

Parameters

M2 Parameter	M1 Value	Comments
Package.ModelElement::name	User-defined.	Value is arbitrary; up to the user.
Stereotype.ModelElement::name	User-defined.	Value should be the name of some published Domain pattern that the Package content realizes.
TaggedValue.tag	"version"	Value is fixed.
TaggedValue.value	User-defined.	Value is the version of the Domain pattern, usually expressed in the forma m.n (e.g., "1.0").

Commentary

In normal usage, it is generally expected that an XMI file will contain a single instance of the Unit of Interchange pattern. However, there is nothing incorrect with having multiple occurrences of Unit of Interchange within a given XMI file. Each represents a discrete unit of interchange.

Consequences

TBD

Known Uses

TBD

Related Patterns

Since the content of a given Unit of Interchange Package is expected to conform to some specified Domain pattern, Unit of Interchange is fundamentally related to all possible Domain patterns.

Sample Solution

The instance diagram below illustrates an occurrence of the Unit of Interchange. In this example, the name of the Package instance is "Analysis" (a name chosen by the author of the metadata). The content of the Package instance conforms to version 1.0 of a published pattern known as "Multidimensional Dataset".

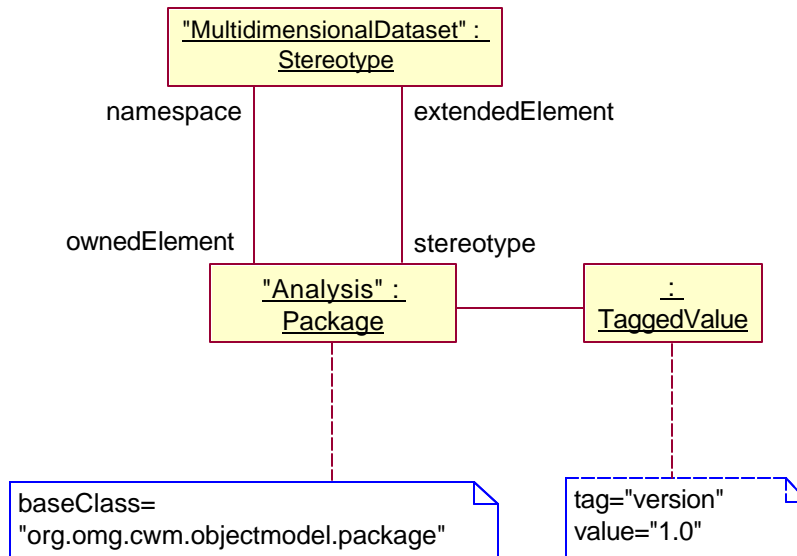


Figure 2: Unit of Interchange Example: Instance Diagram

The following is an XMI fragment representing the Unit of Interchange instance diagram in Figure 2:

```
<?xml version="1.0" encoding="UTF-8"?>
<XMI xmlns:CWM="org.omg.java.cwm.objectmodel.core"
      xmlns:CWMOLAP="org.omg.java.cwm.analysis.olap"
      xmlns:CWMREC="org.omg.java.cwm.resource.record"
      xmlns:CWMTFM="org.omg.java.cwm.analysis.transformation"
      xmlns:CWMMDB="org.omg.java.cwm.resource.multidimensional"
      xmi.version="1.1" timestamp="Wed Jan 23 18:25:50 EST 2002">
  <XMI.header>
    <XMI.documentation>
      <XMI.exporter>Generic CWM Framework</XMI.exporter>
      <XMI.exporterVersion>1.0</XMI.exporterVersion>
    </XMI.documentation>
  </XMI.header>
  <XMI.content>
    <CWM:Package xmi.id="_1" name="Analysis">
      <CWM:Namespace.ownedElement>
        <CWM:Stereotype xmi.id="_1.1" name="MultidimensionalDataset"
          baseClass="org.omg.java.cwm.objectmodel.package"
          namespace="_1" extendedElement="_1">
          <CWM:Stereotype.requiredTag>
            <CWM:TaggedValue xmi.id="_1.1.1" tag="version" value="1.0"
              stereotype="_1.1"/>
          </CWM:Stereotype.requiredTag>
        </CWM:Stereotype>
      </CWM:Package>
    </XMI.content>
  </XMI>
```

Figure 3: Unit of Interchange Example: XMI Fragment