

Software engineering 2

report of MOF/XMI

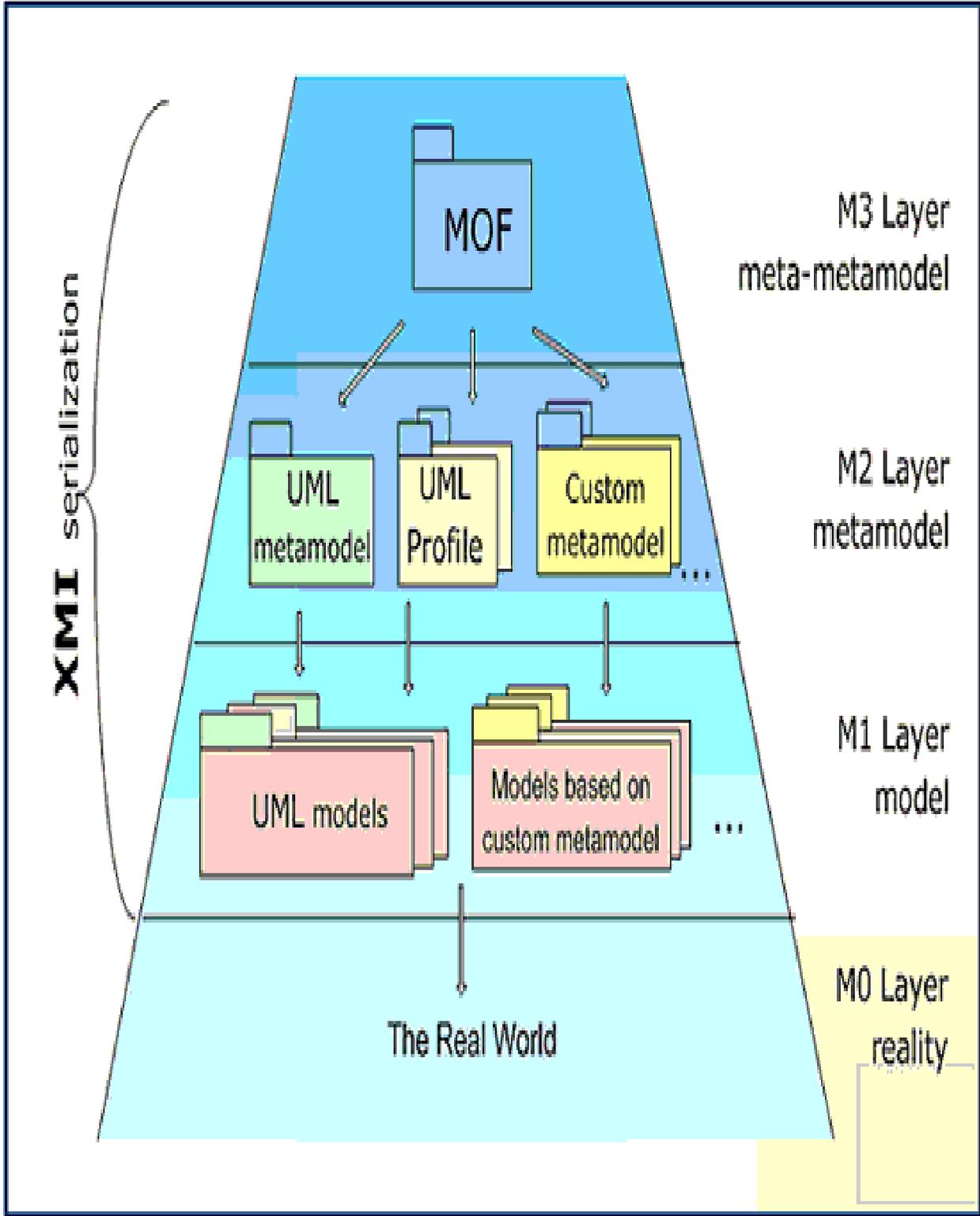


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1.MOF definition

The meta-object facility is an object management group(OMG) standard for model-driven engineering and OMG is originally aimed at setting standards for object oriented systems, and is now focused in modelling and model-based standards and had a goal to establish a common portable and interoperable object model with methods and data that work using all types of development environments and platforms. MOF is originated in the Unified Modeling Language(UML) because the OMG was in need of a metamodeling architecture to define the UML.It is a closed metamodeling architecture and allows a strict meta-modelling architecture.

It is also a domain specific language used to define metamodels and provides only means to define the structure, or the abstract syntax of a language data, and every model element in every layer, strictly correspond with a model element of the layer above.

In short MOF uses the notion of MOF::Classes as know from object orientation, to define concepts on a metalayer.MOF can be used to define object-oriented metamodels like UML as well as non-oriented metamodels like Petri net or a Web service.

[OMG has defined to variant of MOF:](#)

EMOF for essential MOF and CMOF for complete MOF.

The variant ECORE that has been defined in the Eclipse Modelling Framework is more or less aligned on OMG's EMOF.

2.The four layers of MOF

MOF is composed of four-layered architecture, it provides a meta-model at the top layer called the M3 layer and beyond this layer, it describes the means to create and manipulate models and metamodels by defining CORBA (**Common Object Requesting Broker Architecture**) interfaces that describes those operations.

CORBA is also a standard defined by the Object Management Group(OMG).

Defining the layers of MOF:

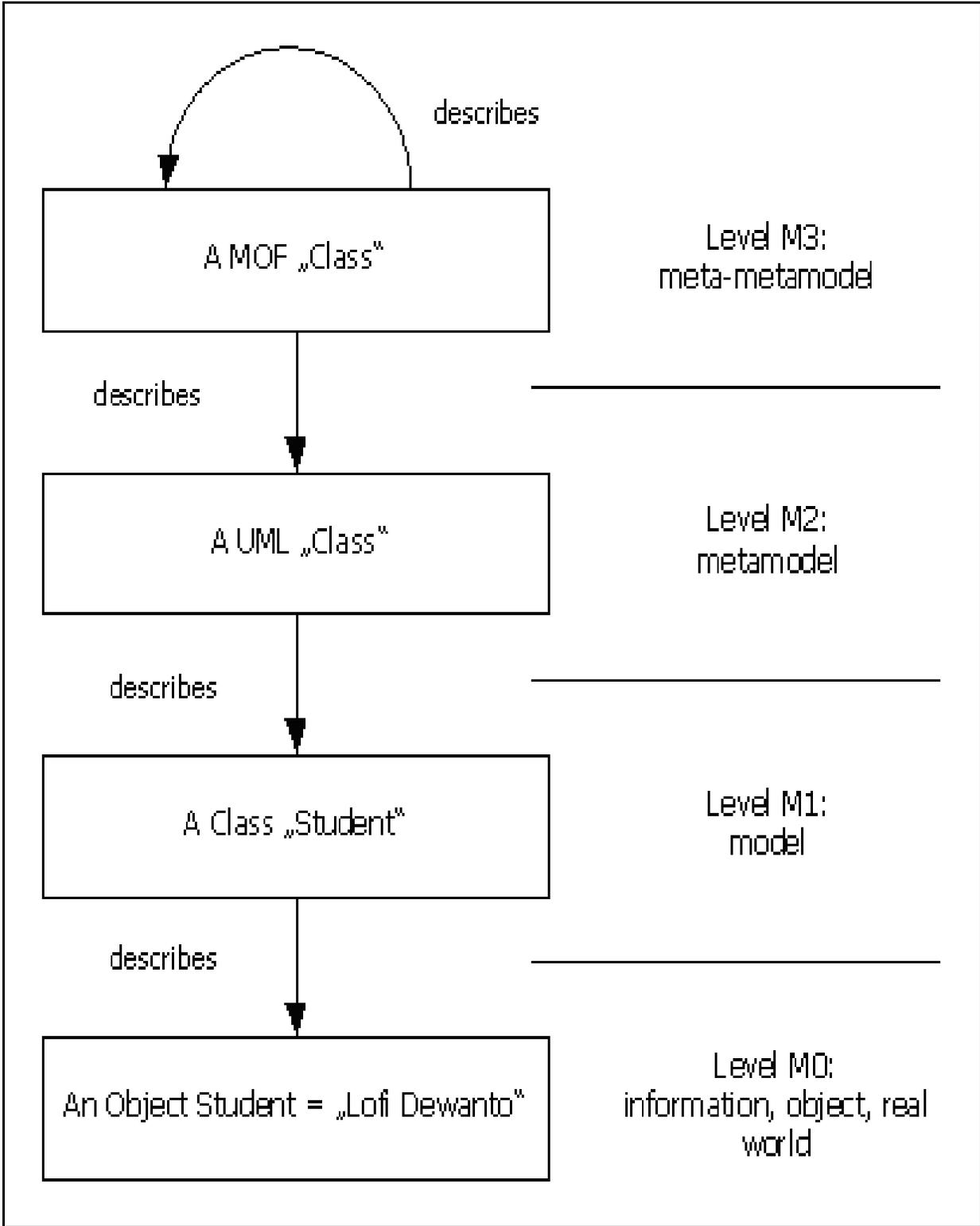
M3-layer : in this layer the M3-model exist which define the language used by MOF to build metamodels called M2-models.

M2-layer : here is the M2-model that make a description of elements of the M1-layer and thus M1-models, those models could be for example written in UML.

M1-layer :here exists the M1-model which for example is our UML model.

M0-layer: this is the last layer or called the data layer and it is used to describe the real-world objects.

And as an example i provided a small schema in the following picture:



3.How to use the MOF

First of all we should describe your type of system, and this is done by using MOF model “language”.

We should do an UML core alignment, which will provide the MOF model with a rich “language” for describing type systems like:

references,operations and exceptions,class and package inheritance and abstract classes,multiplicity,aggregation,composition,containement.

Then we should describe the classes and the associations.

-The class should describes a concept in a type system.

-The association should describes a relationship between concepts.

In the final all those actions should be contained into the same package.

As an example, I found this good basic example which represent a trader, and this is presented in the next section.

4.The example:Trader

This example represents a system of a TRADER that consists of:

-Service types:

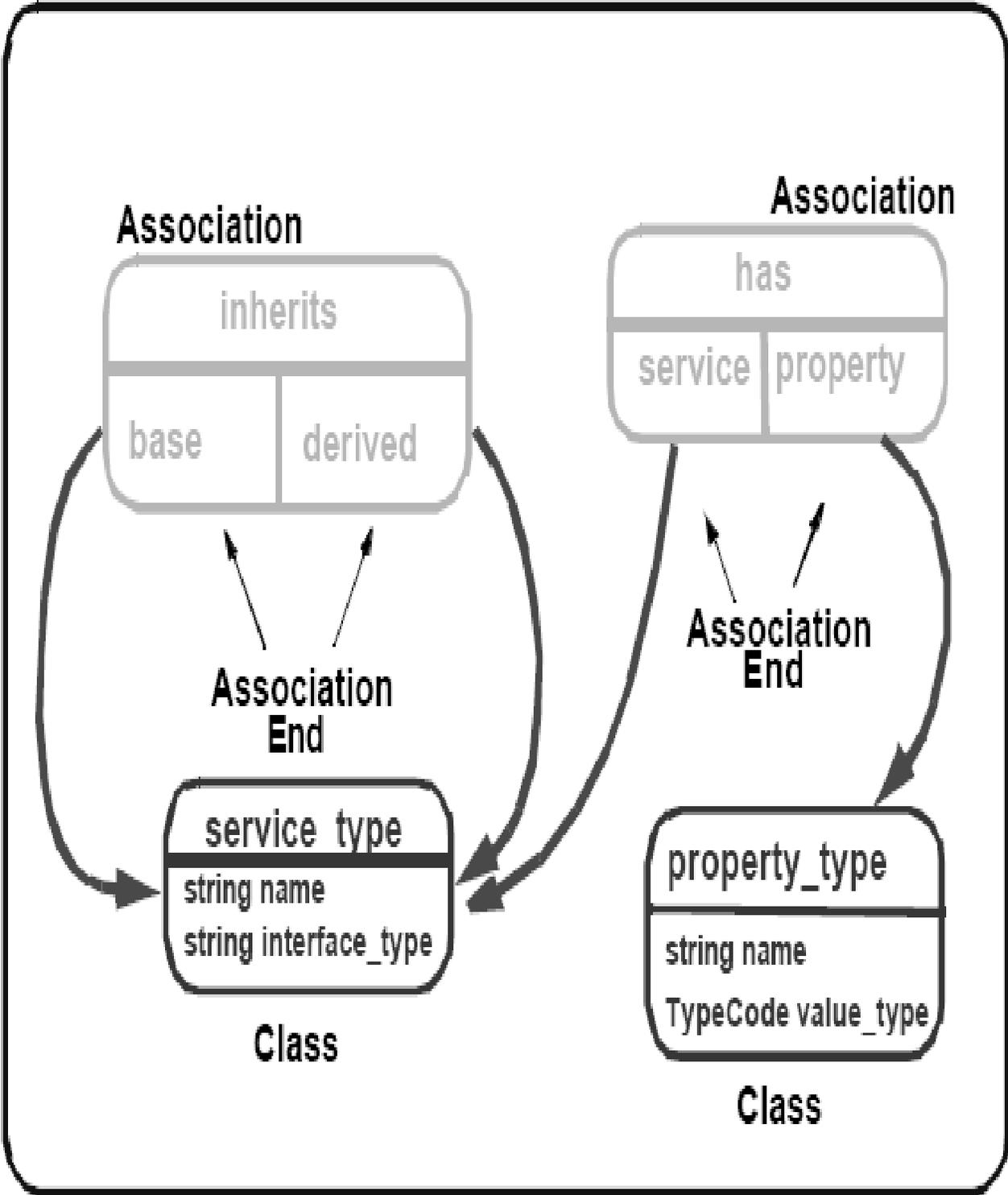
- An interface type.
- Zero or more property types.

-Interface type

- The interface implementing the service.

-Properties

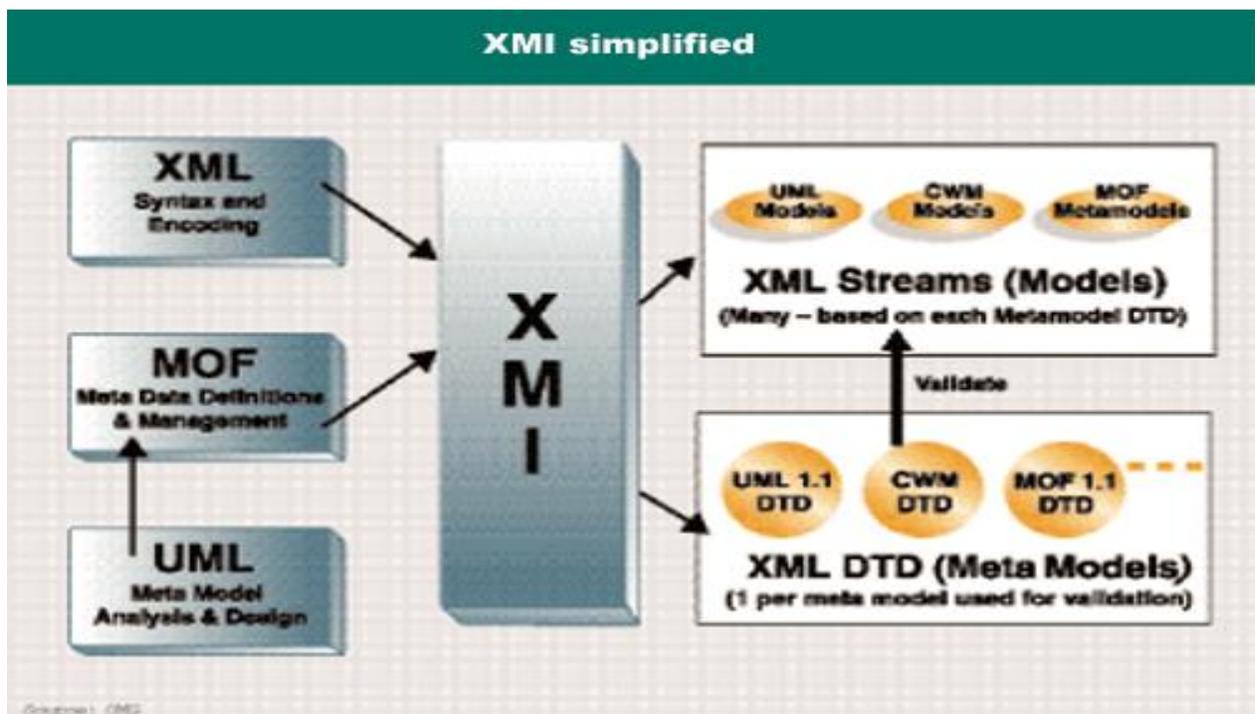
- Name/value pair describing other characteristics of the service.



5.The relation between MOF and XMI

XMI is a supporting standard of MOF by defining an XML-based exchange format for models on the M3,M2,or M1 layer.

MOF-based metamodel is a UML, and XMI is a way to save UML models in XML, and XML was may be the key to get real value from UML tools,in other words XMI shows how to save any MOF-based metamodel in XML.

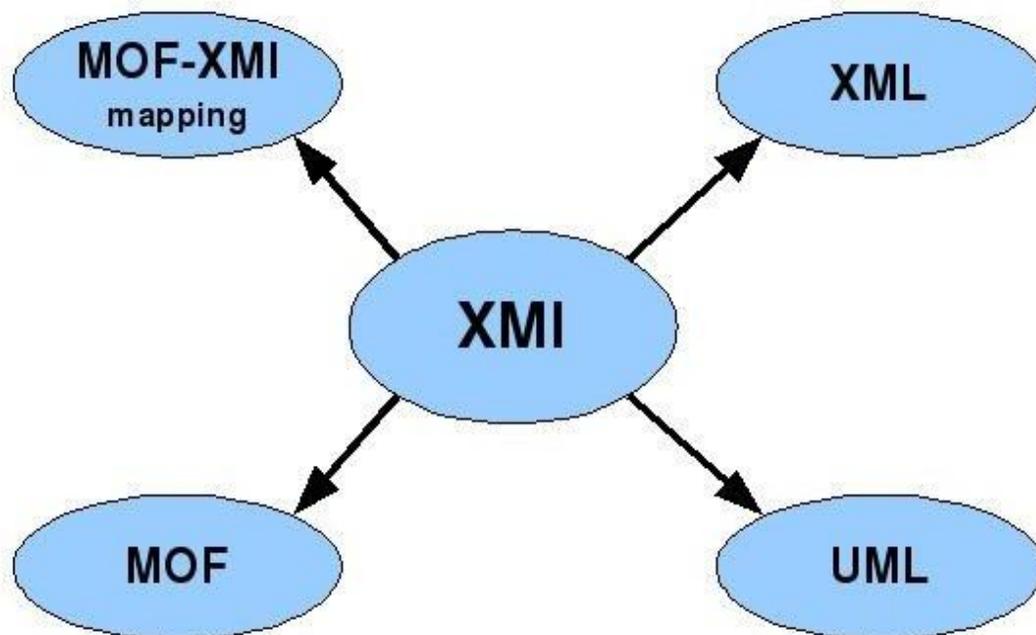


6.XMI Definition

XML Metadata Interchange (XMI) is a standard created by the Object Management Group (OMG), the standard is used for metadata, based on metamodels that can be described using MOF,

currently XMI is mostly used for exchanging UML models.

XMI is built from four standards, XML, UML, MOF, and MOF Mapping, the image below shows the relations.



7. Structure

The XMI standard consists of a number of rules and guidelines:

- Rules for generating XML Document Type Definitions (DTDs) from MOF based metamodels
- Rules for generating XML Documents from MOF based metadata, and MOF based metadata from XML Documents
- Design guidelines for XMI-related DTDs and XML data
- Actual DTDs supporting UML and MOF

The main goal of XMI is to map between MOF metamodels (model descriptions) and XML DTDs; and at the same time between MOF metadata (model instances) and XML documents.

8. How XMI is used

A XMI document consists of an xmi file and a dtd file, the xmi file contains an instance of the model and the dtd file contains the model itself.

This makes it possible for XMI to describe all the levels of MOF, from the meta model (M3) to an instance of a model (M1).

Generally XMI is used to represent UML models, EMF, Rational Rose and other uses xmi to save UML models.

9. References

MOF detailed description

http://en.wikipedia.org/wiki/Meta-Object_Facility

XMI and MOF mini tutorial

<http://homepages.inf.ed.ac.uk/perdita/XMI/tutslides2up.pdf>

XML study notes

<http://xml.coverpages.org/wrightson-xminotes.html>

XML Metadata Interchange

<http://en.wikipedia.org/wiki/XMI>

The Tao of Modeling Spaces

http://www.iot.fm/issues/issue_2006_11/article4/

(Meta Object Facility(MOF) 2.0 XMI Mapping Specification, v2.1.1)

<http://www.omg.org/cgi-bin/apps/doc?formal/07-12-01.pdf>