

Research Proposal

Extending mdiff for UML and integration of UML in OMDoc

Sönke Holsten

Jacobs University Bremen
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Instructor: Prof. Kohlhase

Preliminaries

- **XML:** Extensible Markup Language (XML) is a meta-markup language used to define special purpose markup languages such as OMDoc, MathML and OpenMath.
- **DTD:** Document Type Definition (DTD) is a XML Schema language used to impose constraints on XML documents.
- **UML:** The Unified Modeling Language (UML) is a standardized, popular modeling language for object-oriented software. It is a visual modeling language, but most tools allow for XML representations of the diagrams to be generated.
- **OMDoc:** OMDoc is an open, semantic markup format for mathematical documents.
- **Xmldiff and Mdiff:** xmldiff is a semantic based differencing tool for XML documents. When comparing two XML documents it makes use of the DTD the XML documents adhere to. Mdiff is a differencing tool that extends concepts from xmldiff and implements them using Scala.

Overview

In my previous work in the fall semester 2007 I investigated and evaluated existing approaches to integrate UML with formal specification languages, which are based on first-order logic and set theory, as to improve the semantics of UML. Although a lot of work has been invested in this area and many such approaches exist, none of them is able to fully integrate UML with a formal method.

This semester I would like to investigate the approach of integrating UML in OMDoc. I believe this approach to be more promising, because in contrast to formal methods OMDoc can easily deal with UML fragments whose semantics is not rigorously specified in UML or cannot be directly specified in OMDoc. During this semester I will research possibilities to establish semantic relationships between UML diagrams in an XML format and their surrounding structures in the OMDoc document.

Current focus

The first steps to be taken are:

- Familiarize with xmldiff and mdiff.

- Familiarize with OMDoc.
- Examine how popular tools such as EMF, Omondo and Rational Rose represent UML diagrams in XML documents, compare these approaches and choose the format that is most convenient for the purpose of integrating it into OMDoc.

Goals

- Currently mdiff does not support any XML representation of UML diagrams, it is therefore my aim to modify the corresponding DTD's such that mdiff is able to difference, patch and merge UML diagrams adhering to them. I also would like to improve certain aspects of the underlying algorithm.
- UML diagrams can be wrapped in an OMDoc document using the `private` element, but no work has been invested to search for possibilities to create relations between the contained UML diagrams and OMDoc elements their surrounding private element is attached to. I will examine what relations are sensible and also consider how these relations are affected when a certain set of change operations is performed on the UML diagrams.

Reading List

1. "OMDoc – An Open Markup Format for Mathematical Documents"
2. "Semantic-based Diff, Patch and Merge for XML-Documents"