CALCULEMUS Network
Task Forces Meeting —
Task 3.1:

Usability of MBase for Writing Mathematical Publications

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First Glance

- Management of mathematical knowledge
- Content language: **OMDoc**
- **Development Graph**
- Implementation based on the **MathWeb** infrastructure
- Demo and prerelease available

Application of MBase

- Usage for writing mathematical documents:
  - Structured repository of mathematical concepts
  - Storing and retrieving mathematical documents
- Potential use:
  - Unification of libraries
  - Repository of (standardized) **XML**–based documents
  - Semantics–based retrieval of distributed mathematical facts
- Possible task in **CALCULEMUS**:
  transforming **MIZAR** content to **MBase**
- Systems intended to use it in the near future:
  1. ActiveMath authoring tool
  2. INKA and Ωmega proof planner
  3. Other **MathWeb** systems

Features

1. Syntactic support for **OMDoc** 1.1
2. Web interface
3. XMLRPC interface
   (libraries for important programming languages exist)
4. Pattern matching ("case" in **Oz**) —
   core of semantics–oriented search
5. Content stored in SQL database
6. Distributions for Linux

Roadmap

- Current state: database for mathematical content
- Ongoing work:
  - Better support for semantics
  - Content exchange between **MBase**–servers
  - **Development Graph** integration
- Future work:
  - Fulfill proof obligations automatically (via **MathWeb**)
  - Syntax transformators
  - Logical morphisms

Development Graph

- Development by Dieter Hutter and Serge Autexier
- Directed (acyclic) graphs with
    1. theories as nodes
    2. morphisms as edges —
       Definition and Theorem Links
- Mechanism for:
    1. Formulating theory links
    2. Proving of relations between theories
- Management of Change:
  Computation of proof obligations after changes
- Realized in the **MAYA** system

Team

- Andreas Franke (student)
- Hagen Fürstenau (student)
- Michael Kohlhase (associated scientist)
- Markus Moschner (staff)

URLs

- **MBase**
  - Homepage: http://www.mathweb.org/mbase
  - Demo: http://mbase.mathweb.org:8080
  - Bugtracking: http://bugzilla.mathweb.org:8000
  - Users mailing list: mbase@mathweb.org
  - Download of prereleases for Linux:
    http://www.mathweb.org/releases/mbase
    ftp://ftp.ags.uni-sb.de/mathweb.org/releases/mbase
- **OMDoc** :
  - http://www.mathweb.org/omdoc/index.html
  - Mailing list: omdoc@mathweb.org
- **Development Graph**:
  - http://www.dfki.de/~inka/maya.html
  - http://www.dfki.de/vse/systems/inka/inka5.html

Idea on OMDoc

- **OMDoc** = **O**pen Markup Format for **M**athematical **Doc**uments
- **XML** based
- Extension of **OpenMath** standard
- Universal format for mathematical documents
- Flexibility for semantical notions
- Separating presentation and content

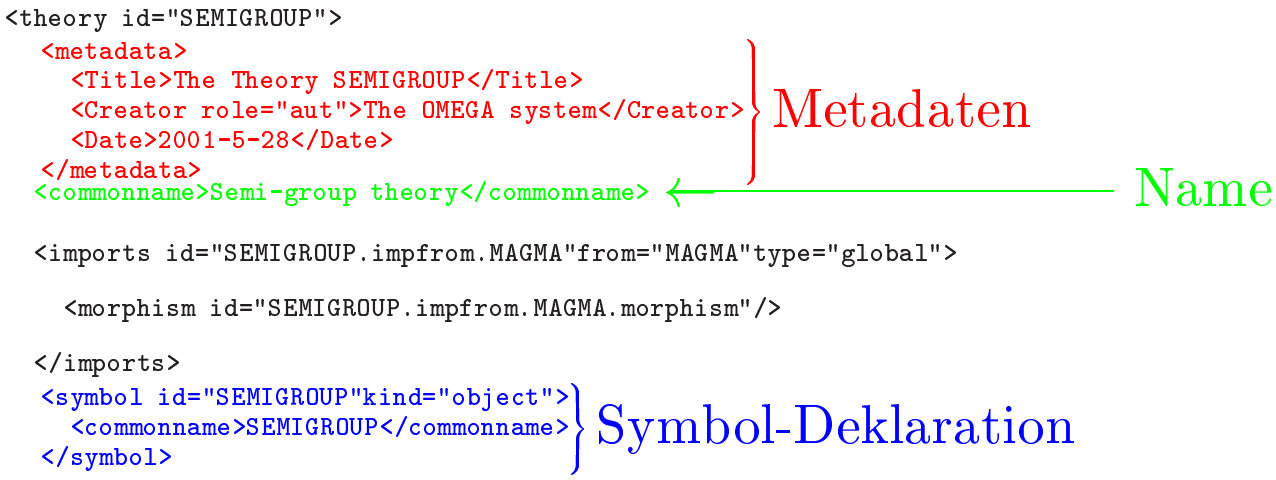
Types of OMDoc items

- Theories and inheritance
- Core mathematical objects:
  - Definitions and symbols
  - Assertions, axioms and proofs
- For Content:
  - metadata: Dublin Core
  - FMP: formal content
  - CMP: natural language content

- ADT: abstract data types
- Auxiliary elements:
  - System specific private data
  - Applets
- Presentation information

Usage of OMDoc

- Examples of use:
  - Mathematical books in **OMDoc**
  - **ActiveMath** group: a web–based learning system for mathematical courses (slightly modified version)
  - **QMath** by Alberto González Palomo — a frontend for **OMDoc** (needs development)
  - Communication standard between Ωmega and TPS
  - Various XSL style files for transformation into other formats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Metadaten
Name
Symbol-Deklaration

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Definition