Math Exercises Library

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What is it?

- A gf grammar library for *simple* mathematical exercises.
- Part of the wp6 of Molto

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History

All started with the **webALT project**.

The webALT project

http://webalt.math.helsinki.fi/content/index_eng.html

Repository of exercises

- Linear algebra

- Calculus

- Excluding *word problems*

Linguistic team

- Lauri Carlson, Anni Laine, Wanjiku Ng'ang'a (UHEL)
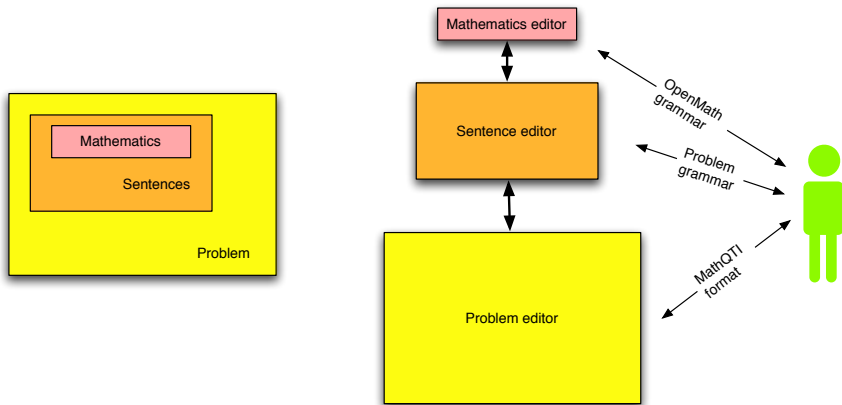
- Glòria Casanellas, Daniel Marquès (Maths4More)

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Types of users

Authors:

People contributing exercises (parsing)

Students:

People using the exercises (linearization).

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Types of users

The library

The Molto math library follow the lines of the webALT library.

OpenMath

http://www.openmath.org/

- "OpenMath is an extensible standard for representing the semantics of mathematical objects"

- Organized into **Content Dictionaries**

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Content Dictionaries

Linear Algebra:

    `linalg1, linalg2`

Arithmetic Functions:

    `arith1, arith2`

Functional Operators:

    `fns1`

Sets:

    `set1`

Transcendental Functions:

    `transc1`

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Small Type System

Light-weight Simple Type System

The Small Type System for OpenMath signatures has been designed according to two requirements.

- Tools which read *new* CDs automatically: Arity checking

- Human beings reading the whole of a CD's fields: not totally formalised (*common sense*).

See http://www.openmath.org/projects/esprit/final/reports/sts.pdf

We tried to adhere to the *Small Type System* as far as possible.

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The wp6 team

Part time:

Katerina Bohmova, Alba Hierro, Francesc Massanés.

Full time:

Sebastian Xambó and myself.

Supported by:

Krasimir, Ramona, Aarne, Thomas, Inari, Lauri, Olga, …

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Layers

The library is organized in 3 layers of increasing complexity:

Ground:

For literal integers and variables

OpenMath:

For *OpenMath* objects

Operations:

Problems, verbalizations, …

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By module type

For each language `X` we have a *concrete* and a *resource* module.

- `LexiconX`
- `GroundX` and `VariablesX`
- `OpenMathX`
- `OperationsX`

Common material is reused.

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What we did?

- Moving code from gf lib 0.9 to 3.2.1
- Code cleaning and modularization
- Extension to other languages

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Some numbers

Layer	Lines
OpenMath	4978
Ground	1055
Operations	885

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By Language

Bulgarian	568	German	588
Catalan	595	Italian	628
English	614	Romanian	735
Finnish	693	Spanish	624
French	642	Swedish	559

Coming soon:

Dutch and Polish

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Transfer

Making the language more natural.

- **Divide** vs. **Compute the division**
- **root 2 of x** vs. **square root of x**

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What to do next?

- Commanding CAS library
- Dialog manager

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Demo

http://localhost:41296

Using MathJax for rendering

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