

WP6. Case Study: Mathematics

1st year report

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Date: 2011-03-08

WP 6

- Led by UPC
- Effort: 36 p.m
- The ultimate goal of this package is to have a multilingual dialog system able to help the math student in solving word problems.

The wp6 team

- Sebastian Xambó and myself (UPC)
- gf and language experts from UGOT and UHEL.

Deliverables

D6.1:

Simple drill grammar library

D6.2:

Prototype of commanding CAS

D6.3:

Assistant for solving word problems

Simple drill grammar library

- A grammar library for *simple* mathematical exercises.
- It started as part of the [webALT](#) project (EDC-22253) .

Repository of exercises

- Linear algebra
- Calculus
- Excluding *word problems*

The library

The Molto math library follow the lines of the webALT library. It will follow the **OpenMath** directives

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



- Organized into **Content Dictionaries**

Content Dictionaries

for X in Bulgarian, German, Catalan, Italian, English, Romanian, Finnish, Spanish, French, Swedish:

Arith1X.gf, Arith2X.gf, Calculus1X.gf, Complex1X.gf,
Fns1X.gf, Integer1X.gf, Integer2X.gf, Interval1X.gf,
Limit1X.gf, LinAlg1X.gf, LinAlg2X.gf, Logic1X.gf,
MinMax1X.gf, Nums1X.gf, OpenMathX.gf, PlanGeo1X.gf,
Quant1X.gf, Relation1X.gf, Rounding1X.gf, SData1X.gf,
Set1X.gf, SetName1X.gf, Transc1X.gf, VecCalc1X.gf

Layers

The library is organized in 3 layers of increasing complexity:

Ground:

For literal integers and variables

OpenMath:

For *OpenMath* objects

Operations:

Problems, verbalizations, ...

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.

What we did?

- Moving code from gf lib 1.4 (0.9) to 3.2.1
- Code cleaning and modularization
- Extension to other languages

Some numbers

Old and new

Concept	webALT repo	MOLTO repo
Total lines	20,731	12,544
mathres	1,214	1,162
MathForms	702	665
gf files	158	425
languages	7	10+1

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

Module matrix

Module	Bul	Cat	Eng	Fin	Fre	Ger	Ita	Ron	Spa	Swe
Arith1	11	11	6	11	12	11	11	6	11	6
Arith2	5	5	5	5	5	5	5	5	5	5
Calculus1	5	6	6	5	5	5	5	6	5	6
Complex1	6	6	6	6	6	6	6	6	4	6
Fns1	6	6	6	6	6	6	6	6	5	6
Integer1	4	4	4	4	4	4	4	4	4	4
Integer2	4	4	4	4	4	4	4	4	4	4

Module	Bul	Cat	Eng	Fin	Fre	Ger	Ita	Ron	Spa	Swe
Interval1	19	19	20	39	18	19	19	21	18	20
Limit1	16	15	17	16	15	15	15	18	15	15
LinAlg1	6	6	6	6	6	6	6	6	4	6
LinAlg2	6	6	6	6	6	6	6	6	6	6
Logic1	6	6	6	6	6	6	6	6	6	6
MinMax1	5	5	5	5	5	5	5	5	5	5
Nums1	11	7	6	11	7	6	7	6	7	6
PlanGeo1	6	6	6	6	6	6	6	6	4	6
Quant1	5	5	4	5	5	5	5	4	5	4

Module	Bul	Cat	Eng	Fin	Fre	Ger	Ita	Ron	Spa	Swe
Relation1	4	4	4	4	4	4	4	4	4	4
Rounding1	4	4	4	4	4	4	4	4	4	4
SData1	5	5	4	5	5	5	5	4	5	4
Set1	5	5	5	19	5	6	5	5	5	5
SetName1	5	5	5	5	5	5	5	5	5	5
Transc1	5	5	5	5	5	5	5	5	5	5
VecCalc1	5	5	5	5	5	5	5	5	5	5

Dissemination

CADE 2011

<http://localhost:41296>

(To be added to the regular minibar demo at molto.eu)