Multi-lingual code generation in Drasil

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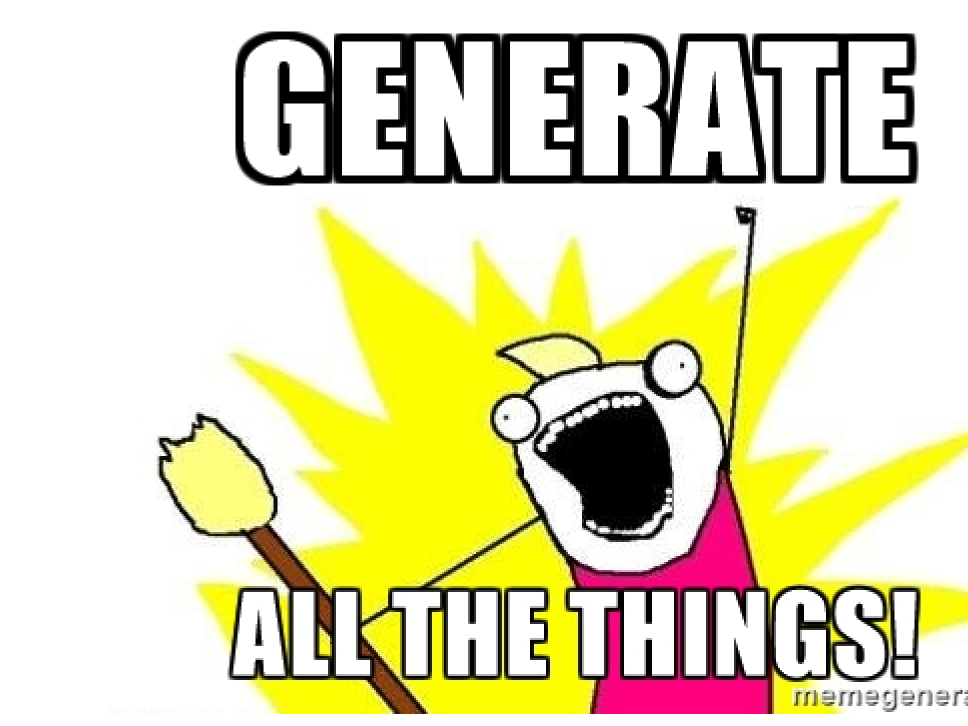
WG 2.11, July 2017 Meeting


GENERATE
ALL THE THINGS!
memegenera

NO

Context

software certification

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software (re)certification

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software (re)certification

- All software artifacts as evidence:
  - requirements, software specification, software design, code, tests, “theory manual”, user manual, build mechanism, . . .
- Massive amounts of knowledge duplication
  - Implies that either
    - non-code artifacts do not get maintained well enough, OR
    - are felt to be an expensive nuisance
  - duplication harms traceability

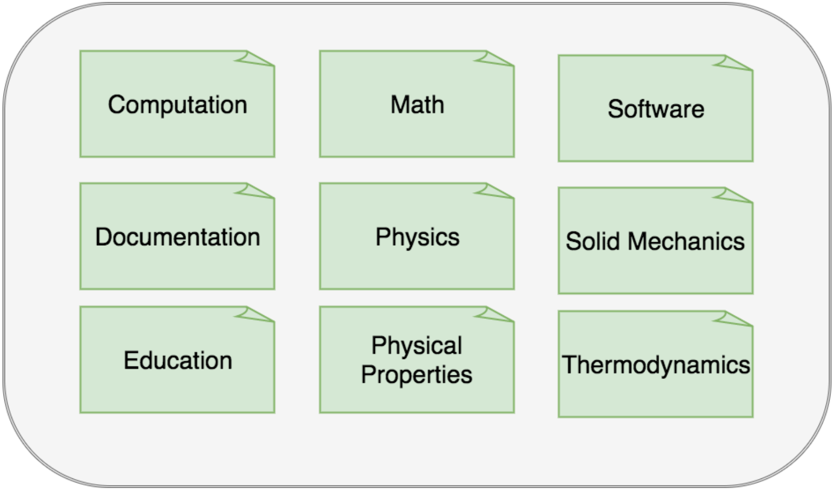
Engineering Software

Or, software that engineers write.

- GlassBR: Computer whether a given plate of glass will resist a blast force.
- GamePhysics: “Chipmunk” game physics engine.
- SSP: Computation of mixed-soil slope stability.
- SWHS: Solar Water Heating System (w/ phase change material).
- NoPCM: Solar Water Heating System without PCM.
- Tiny: convective and effective heat transfer coefficients.

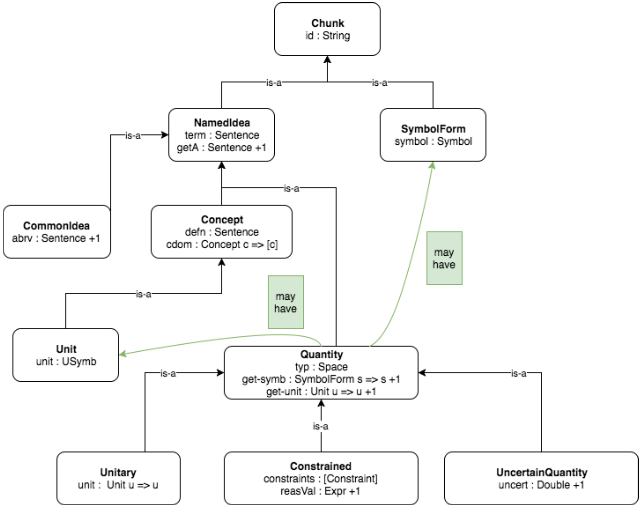
Ontologies

Data.Drasil



Ontologies

Data.Drasil - Language Concepts



Ontologies

Data.Drasil - Language Concepts - Document Language

Show the details already!

GOOL

Generic Object-Oriented Language.

History:

- Lucas Beyak, JC. SAGA: A DSL for Story Management. DSL 2011.
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Currently covers

- Java, C#
- C++
- Python, Lua
- Objective-C
- GOOL

GOOL Design

Requirements

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2. Make the embedded DSL palatable.
3. Eschew language-specific “idiomatic” patterns.
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        - explicit destructors
        - explicit types in IO statements
- when rendering, extra information can be dropped

GOOL Design

Renderer

- uses record that acts as virtual dispatch table:

```
data Config = Config {
  assignDoc :: Assignment -> Doc,
  binOpDoc :: BinaryOp -> Doc,
  bodyDoc :: Body -> Doc,
  blockDoc :: Block -> Doc,
  callFuncParamList :: [Value] -> Doc,
  conditionalDoc :: Conditional -> Doc,
  declarationDoc :: Declaration -> Doc,
  exprDoc :: Expression -> Doc,
  funcDoc :: Function -> Doc,
  -- and many more
}
```

- one for each language (7)
- Text.PrettyPrint used to make rendered code look nice

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  2. smart constructors:

```
bool, int, float, char, string,
true, false,
pubClass, privClass,
pubMethod, privMethod,
print, printLn
```

and so on (about 100).

GOOL Design

Consider the function $f(x, y) = 2x/y$. In GOOL:

```
f :: FunctionDecl
f = pubMethod (methodType float) "f"
  [param "x" float, param "y" float]
  (oneLiner $ return $
    (litFloat 2) #* (var "x") #/ (var "y"))
```

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- documentation in code?
  - commented classes
  - commented functions
  - commented variables

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- Inline code or library calls?

Open Questions

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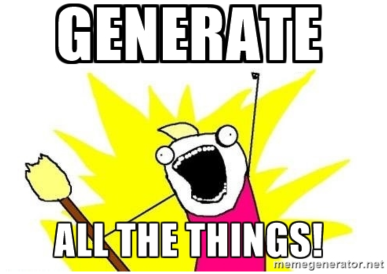
Proper Language(s) of choices.



NO