Google Summer of Code – Graphical editor of XML files with Blockly

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Ensembl Compara / eHive

EMBL-EBI

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eHive *PipeConfig* files

Perl modules:

- Prone to syntax errors (missing comma, missing semicolon, etc)
- No validation tool
- Fake keywords like WHEN, INPUT_PLUS to extend the language
- Can do naughty things like

```
if (($self->o('division') !~ /^#:subst/)
    and (my $tl = $self->default_options()->{'taxlevels_'.$self->o('division')})) {
       if (stringify($self->default_options()->{'taxlevels'})
           eq stringify($self->o('taxlevels'))) {
               $analyses_by_name->{'group_genomes_under_taxa'}->{'-parameters'}
                                                                ->{'taxlevels'} =
$tl;
       }
}
```

Alternatives to Perl

Considered XML and JSON with these goals:

1) There must be a schema specification and a validator

2) We want an editor that understands the schema

- Investigated XML and XSD or RelaxNG (RNG)
- Investigated JSON

Blockly

- Library developed by Google

- Programming editor using visual blocks (used to teach programming)

- Very versatile: can define your own block and rules, has an API / hooks to export a diagram to code

https://studio.code.org/s/course1/stage/18/puzzle/
https://blockly-demo.appspot.com/static/demos/code/
http://ens-lg4.github.io/MenulyJSON/
http://muffato.github.io/eHive-Blockly/

Relax NG

Schema definition for XML files

- The attributes of each node element
- Where free text can be placed
- How elements can be nested

- Used by the LRG project !

RNG / XML example

RNG

```
<?xml version="1.0" encoding="UTF-8"?>
<grammar xmlns="http://relaxng.org/ns/structure/1.0">
  <start>
    <element name="contact">
      <element name="name">
        <text/>
      </element>
      <element name="phone_number">
        <text/>
      </element>
      <element name="email">
        <element name="username">
          <text/>
        </element>
        <element name="hostname
          <text/>
        </element>
      </element>
    </element>
  </start>
</grammar>
```

XML

```
<contact>
  <name>Matthieu</name>
  <phone_number>01223494631</phone_number>
  <email>
    <username>muffato</username>
    <hostname>ebi.ac.uk</hostname>
  </email>
</contact>
```

Block patterns in RNG

- <optional> <...A...> </optional> **A?**
- <oneOrMore> <...A...> </oneOrMore> **A+**
- <zeroOrMore> <...A...> </zeroOrMore> **A***
- <choice> <...A...> <...B...> … </choice> **A|B|...**
- <interleave> <...A...> <...B...> … </interleave> **A & B & …**

- Can be nested: **(A | B+) & C* & (D? | (E+ & A))**

valid patterns: A, DBBCC, AAEE

GSoC project

- Parse the RNG file and define Blockly blocks
- Define Blockly rules for the block connections
- Write an extra validator for the rules that could not be modelled in Blockly
- Code to export a diagram to XML
- Code to import an XML file to a diagram

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Demo time !

https://ensembl.github.io/XML-To-Blockly/

Conclusions

Some work left to do:

- Import of an XML file
- Interface improvements (zoom, collapse, etc)
- Scalability of the interface for large pipelines ??

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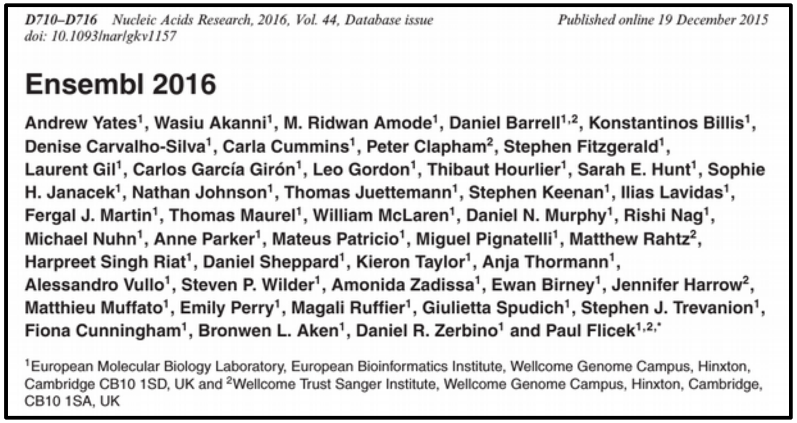
Leo



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