

VODSL

A Proposed Serialisation for VO-DML

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Motivation

- ✦ VO Data Modelling Language is a **Good Thing**TM
 - ✦ encourages reuse, collaboration, patterns of good design style, code generation etc.
- ✦ However creation of VODML seems to have high activation energy (only a few people are doing it)
 - ✦ UML route
 - ✦ different tools have poor interoperability and are expensive
 - ✦ UML very general - profiles help
 - ✦ XML route
 - ✦ does not need fancy tool
 - ✦ much better constrained - can only express the concepts that are desired
 - ✦ but still not very human friendly for writing by hand

Domain Specific Language

reuse

- ✦ concise
- ✦ sensible defaults
- ✦ fully expressive
- ✦ yet more constrained than XMI/UML

```

model example (0.1) "an example model"
include "IVOA.vodsl"

primitive float "a new primitive"
package apackage "example package"
{
  dtype fq extends quantity.AtomicValue {
    value : float "a new float"
  }
  abstract otype base
  {
    bv : boolean @? "Description"
  }
  otype derived extends apackage.base
  {
    sv : quantity.RealQuantity ""
  }
  otype another {
    f1 : apackage.fq @[10] "an array"
  }

  package nestedpackage
  {
    otype another "different package"
    {
      cc : apackage.another as composition ""
      rf references apackage.derived "a reference"
    }
  }
}

```

Primitives

Multiplicities

Description mandatory

Implementation

- Using Eclipse Xtext - a language development package
 - easy to create a domain specific language with full Eclipse editor functionality
 - syntax highlighting/formatting
 - auto-completion
 - validation
 - quick fixes
 - Just write the grammar and the above comes for free! (it can be further customised if the default behaviour is not quite what is desired).
 - compiles to the VODML XML form for compatibility with existing infrastructure

The Grammar

- ✦ Quite small
 - ✦ easy to change syntax
 - ✦ reasonably easy to add new concepts
- ✦ follows VODML concepts and naming
- ✦ some additional editor customisations have also been done

```

grammar net.ivoa.vodml.Vodsl with org.eclipse.xtext.common.Terminals

import "http://www.eclipse.org/emf/2002/Ecore" as ecore

generate vodsl "http://www.ivoa.net/vodml/Vodsl"

/*
 * DSL for VODML - Paul Harrison, Apr 2014.
 */

/**
 * The root model element, comprised of one optional include section
 * and the definition of any number of compound types.
 */
VoDataModel:
  model = ModelDeclaration
  ( includes += IncludeDeclaration ) *
  elements += AbstractElement+
  ;

ModelDeclaration:
  'model' name=ID '(' version=VERSION ')' description=STRING?
  ;

/* avoid terminals here as causes confusion in the LEXing which is greedy so
VERSION returns ecore::EString : INT ( '.' INT)?;

IncludeDeclaration:
  'include' importURI=STRING
  ;

QualifiedName:
  ValidID (=>'.' ValidID)*;

QualifiedNameWithWildcard:
  QualifiedName '.*'?
  ;

ValidID:
  ID;

DefinitionType:
  ObjectType | Enumeration | DataType | PrimitiveType

```

Demonstration

The screenshot shows the Eclipse IDE interface with the following components:

- Project Explorer:** Shows a project named 'models' containing several VODML files, including 'SourceDM.vodsl' which is currently selected.
- Outline:** Shows the structure of the 'SourceDM' package, including a 'source' package and a 'LuminosityMeasurement' class with its attributes (value, error, description, type).
- Editor:** Displays the VODML code for 'SourceDM.vodsl'. The code includes package declarations, imports, and class definitions for 'LuminosityMeasurement' and 'Source'.
- Problems:** Lists 35 errors, all of which are 'Vodsl Problem' types, indicating unresolved references to various data types and definitions from other VODML files.

```

model src ( 1.0 ) "This is a sample data model. It contains the IVOA UML Profile and imports the IVOA_Profile data model with p
It has some sample relationships etc to be used in documentation etc."

include "IVOA.vodsl"

include "PhotDM-alt.vodsl"

package source "this is main package"
{

otype LuminosityMeasurement ""
{

value : quantity.RealQuantity /* utype=ivoa:quantity.RealQuantity*/ "" ;
error : quantity.RealQuantity /* utype=ivoa:quantity.RealQuantity*/ @? "" ;
description : string /* utype=ivoa:string*/ @? "" ;
type : source.LuminosityType /* utype=src:source.LuminosityType*/ "" ;

}

otype Source extends source.AstroObject /* utype=src:source.AstroObject*/ ""
{

name : string /* utype=ivoa:string*/ "" ;
description : string /* utype=ivoa:string*/ @? "" ;
position : source.SkyCoordinate /* utype=src:source.SkyCoordinate*/ "" ;
positionError : source.SkyError /* utype=src:source.SkyError*/ @? "" ;
classification : source.SourceClassification /* utype=src:source.SourceClassification*/ "" ;
luminosity : source.LuminosityMeasurement /* utype=src:source.LuminosityMeasurement*/ @* as composition ""

}

```

Description	Resource	Path	Location	Type
Couldn't resolve reference to DataType 'topl.p1.multiplicities'.	test.vodsl	/models	line: 43 /models...	Vodsl Problem
Couldn't resolve reference to DefinitionType 'Characterisation'.	Cube2.4.1.vodsl	/models	line: 144 /mode...	Vodsl Problem
Couldn't resolve reference to DefinitionType 'ChAxis'.	Characterization....	/models	line: 94 /models...	Vodsl Problem
Couldn't resolve reference to DefinitionType 'CoordSys'.	Cube2.4.1.vodsl	/models	line: 146 /mode...	Vodsl Problem
Couldn't resolve reference to DefinitionType 'daft'.	test.vodsl	/models	line: 19 /models...	Vodsl Problem
Couldn't resolve reference to DefinitionType 'Derived'.	Cube2.4.1.vodsl	/models	line: 145 /mode...	Vodsl Problem
Couldn't resolve reference to DefinitionType 'ImageData'.	Cube2.4.1.vodsl	/models	line: 219 /mode...	Vodsl Problem
Couldn't resolve reference to DefinitionType 'NDPoint'.	Cube2.4.1.vodsl	/models	line: 199 /mode...	Vodsl Problem
Couldn't resolve reference to DefinitionType 'Obs'.	ObsCore.vodsl	/models	line: 67 /models...	Vodsl Problem
Couldn't resolve reference to DefinitionType 'Obs'.	ObsCore.vodsl	/models	line: 75 /models...	Vodsl Problem

Although only a proof of concept, already as easy as other routes to VODML

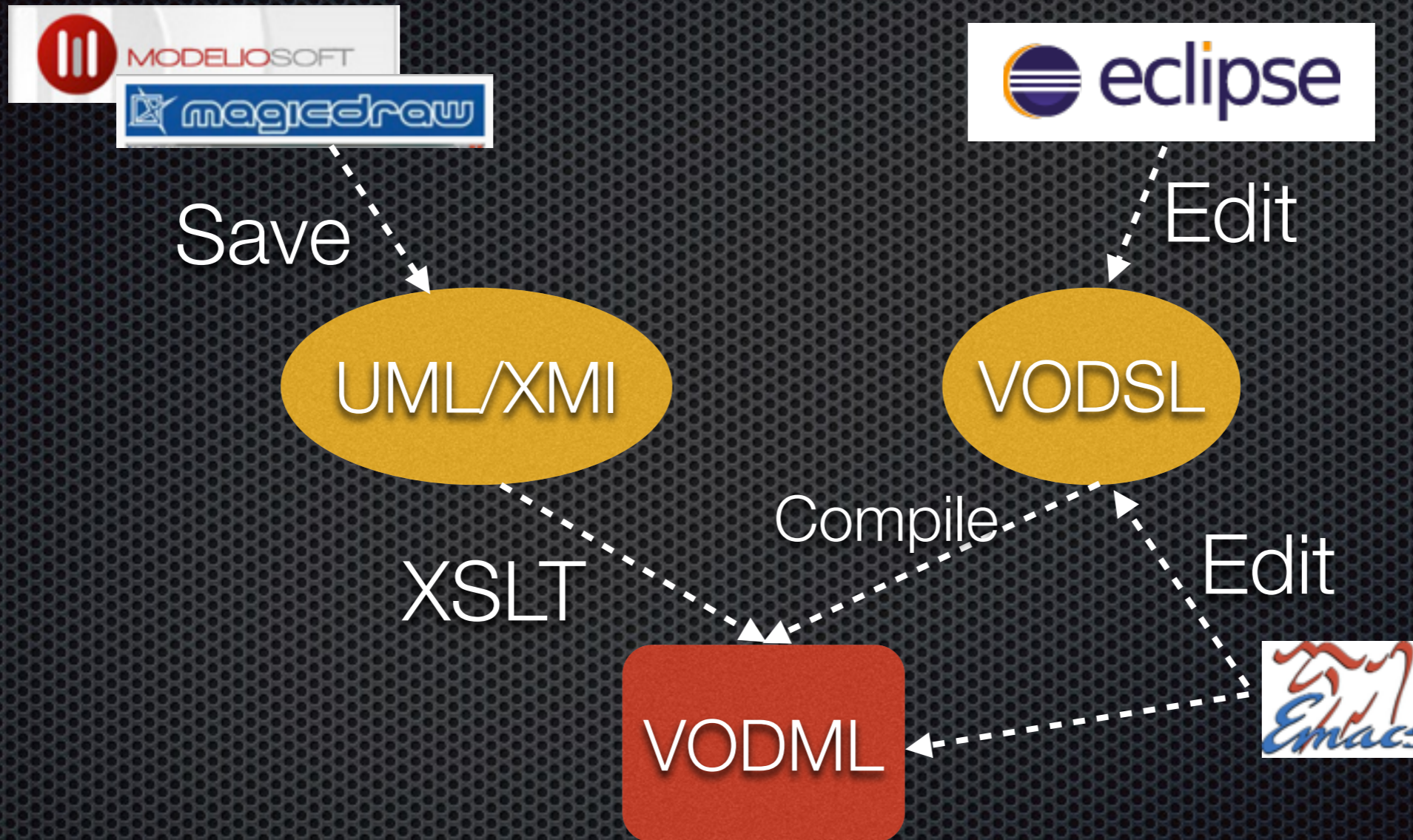
Features

- ✦ Can be distributed as an eclipse plug-in - free and easy editing of data models.
- ✦ Models be written without Eclipse - more concise than XML
 - ✦ should be possible to package the compiler “stand-alone” to compile to XML serialisation on the command line.

Futures

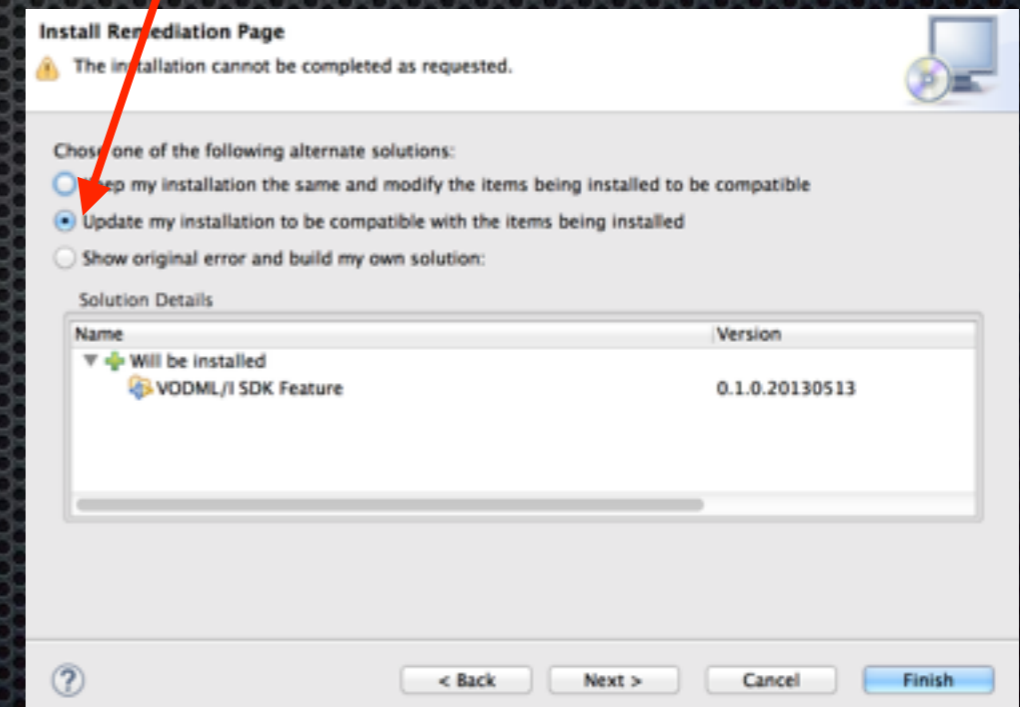
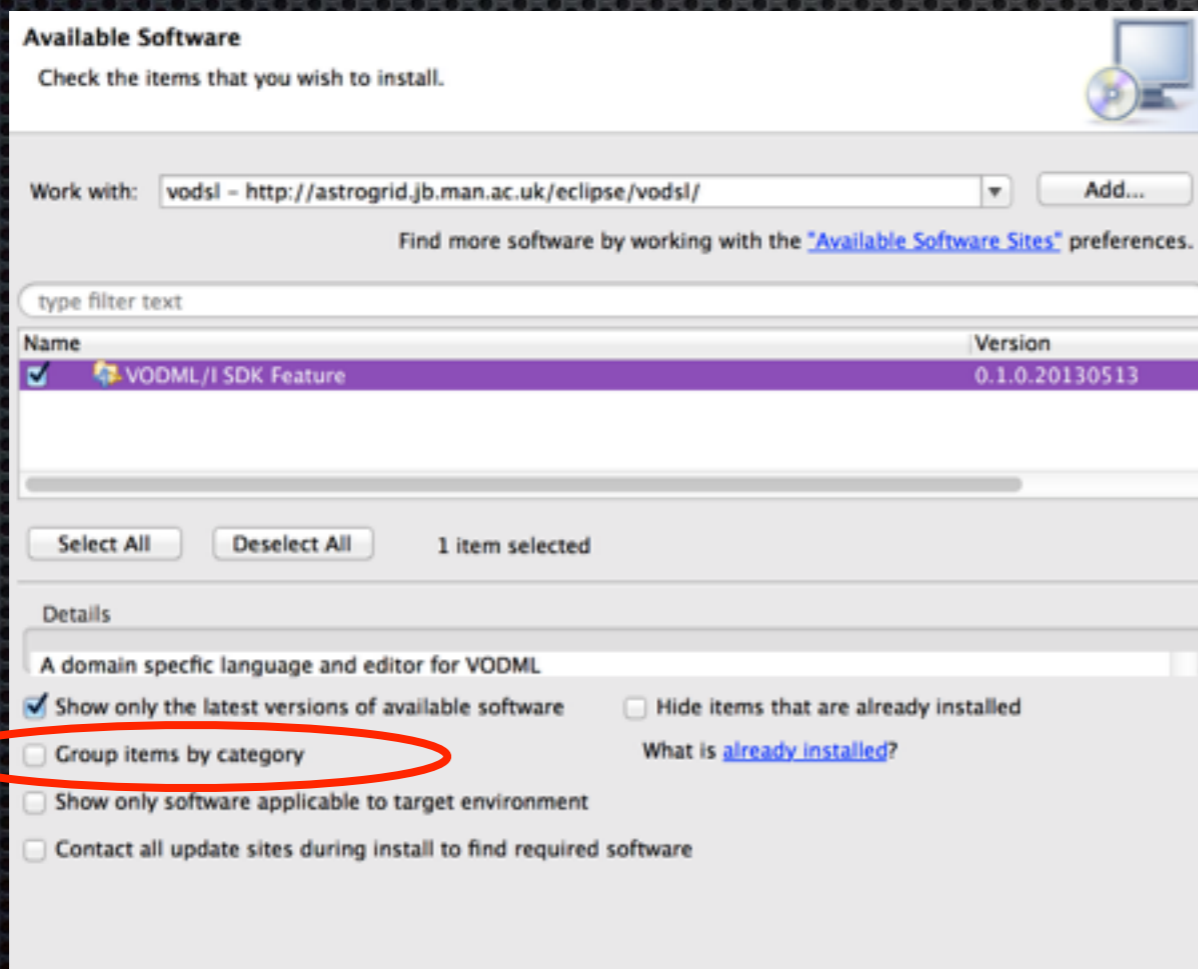
- ✦ Integrate with a graphical editor within Eclipse (initially as a view-only display)
- ✦ Add more validation (implement more of the rules of VODML) at the moment only type existence checking is done.
- ✦ Possibly compile directly to other forms (i.e. it might be easier than going via the XML intermediate)
 - ✦ Java classes
 - ✦ SQL etc.
- ✦ Could extend the language to include service interface definitions!

Ecosystem



Try it for yourself

- ✦ Need Eclipse Luna (4.4) - i.e. the upcoming or “developer” version as a base
- ✦ Use <http://astrogrid.jb.man.ac.uk/eclipse/vodsl/> as update site
- ✦ For installation remediation choose “update”



Un-tick