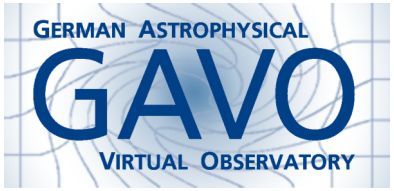
SimDB Implementation & Browser



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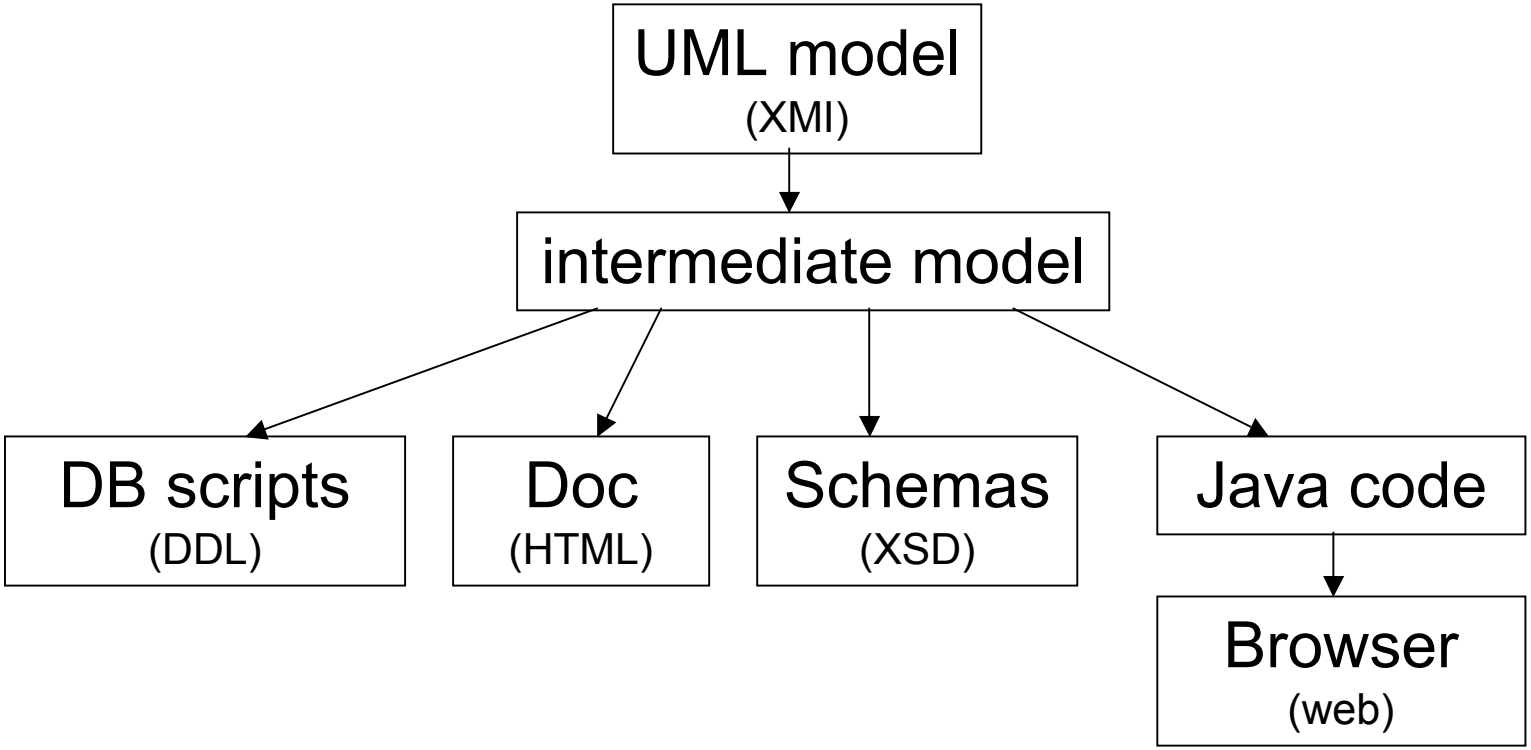
Objectives

SimDB is an interface to describe numerical simulation products (meta data) and SimDAP allows web services on associated simulation data (download, cut out, post processing…)

Our Approach applies the ‘model driven architecture’ : the UML model (SimDB) is the source to generate codes :

- database model
- model documentation
- xml schemas (xsd)
- TAP meta data
- java code
- web application : SimDB-Browser

SimDB pipeline



Constraint : the UML model must be ‘valid’ (unique names, descriptions & cardinalities set)

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SimDB database

Supported databases : Postgres 8.2 & SQL Server 2005

Mapping Rules for DDL scripts :
- Each UML class corresponds to :
    - a database table
    - a view that gathers inherited data like for example :
        Resource <- Experiment
- Inheritance adds a discriminator column (DTYPE)

- The database schema & user creation are out of scope

Note : Custom views & indexes could be added manually

SimDB Java Code

Common code :

- XML marshalling / unmarshalling
- ORM (JPA) to handle database operations
- Intermediate model loaded in memory to inspect generated Classes (UML attributes, references, collections)
- Command Line tool to load XML instances (or Java API) to fill the database

Generated code :

- For each UML class a Java class is generated with annotations (XML & database mapping)

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SimDB Browser

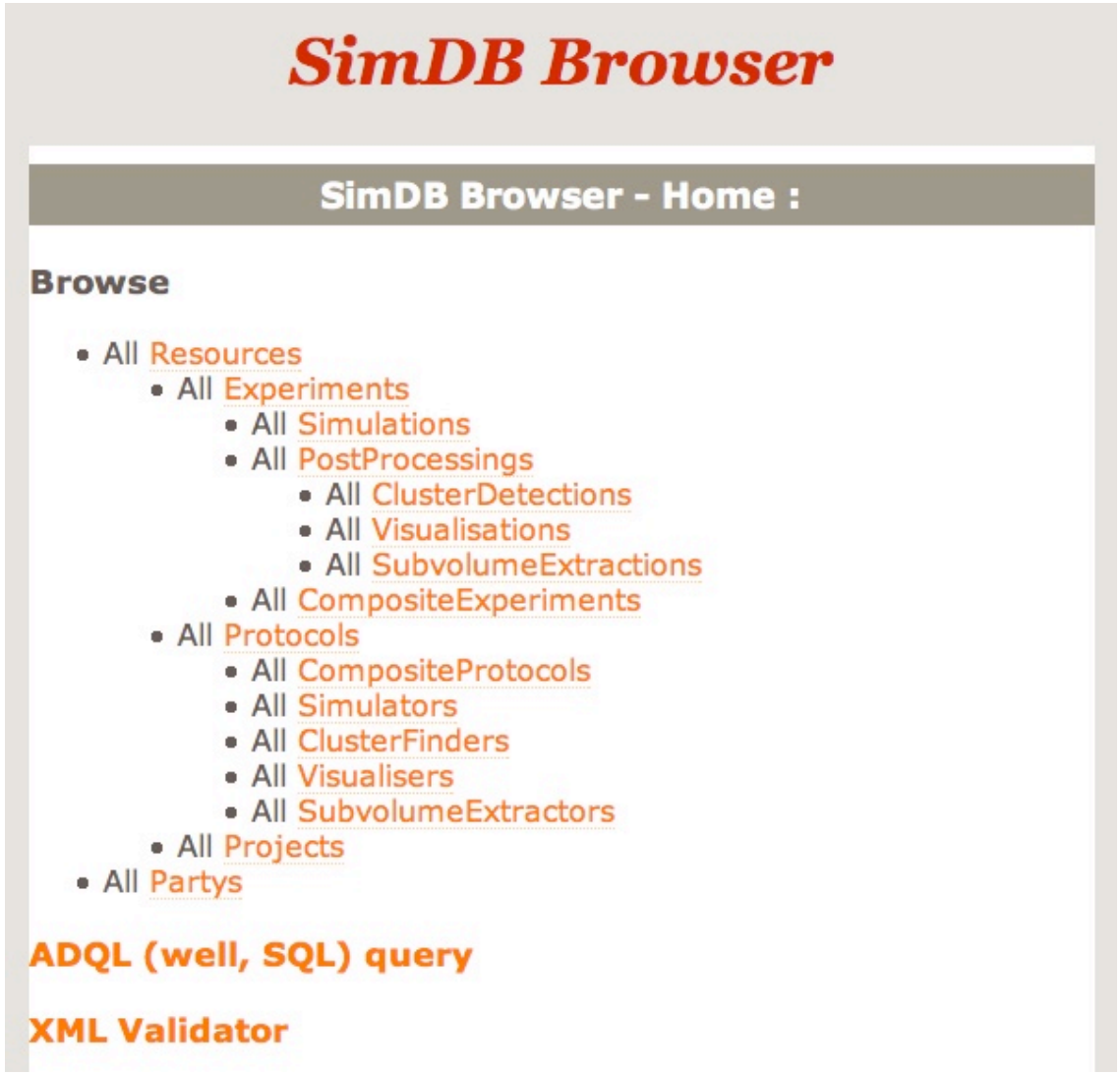
Is a web application to :

- browse the SimDB resources (protocols, experiments…) and navigate through references, referrers & collections
- run SQL queries
- validate XML instances

Use the generated code and the intermediate model (generic)

Demo : http://localhost:8080/simDB-browser/

SimDB Browser Menu



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SimDB Browser List

SimDB Browser

List of Simulator records :

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2 [Simulator] records found for Query :

```
SELECT item FROM Simulator item
```

Envoyer

identity	name	description	created	status	code	version
[1]	Gadget	Gadget is a N-body simulation code ... *gadget description*	Fri Oct 24 12:20:02 CEST 2008	published	http://host/download/gadget	1.2.3
[3]	PDR Code 1.2	The Meudon PDR code 1.2 includes the radiative transfer method described by Gonzalez-Garcia et al. A and A 2007	Fri Apr 25 12:00:00 CEST 2008	published	http://aristote.obspm.fr/MIS	1.2

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SimDB Browser Show

Detail of Simulator : 1 :

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Data Model serialization : XML

Referrers

- Simulation.protocol

Property	Value
id	1
identity	[1]
name	Gadget
description	Gadget is a N-body simulation code ... *gadget description*
referenceURL	http://host/gadget/index.html
created	Fri Oct 24 12:20:02 CEST 2008
updated	Fri Oct 24 12:20:02 CEST 2008
status	published
code	http://host/download/gadget
version	1.2.3

Reference	Value
mainContact	identity: [3] — name: Volker Springel

Collection	Value
contact	identity: [1] — role: OWNER — party: identity: [3] — name: Volker Springel
parameterGroup	identity: [1] — name: Cosmological Parameters

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SimDB Browser XML


```
- <ns2:aSimulator>
    <identity publisherDID="ivo://www.mpa-garching.mpg.de/gadget2" ivoId="ivo://localhost/SimDB#SimDB:simdb/protocol/Simulator/1"/>
    <name>Gadget</name>
  - <description>
      Gadget is a N-body simulation code ... <i>gadget description</i>
    </description>
    <referenceURL>http://host/gadget/index.html</referenceURL>
    <created>2008-10-24T12:20:02.445+02:00</created>
    <updated>2008-10-24T12:20:02.445+02:00</updated>
    <status>published</status>
  - <contact>
      <identity ivoId="ivo://localhost/SimDB#SimDB:simdb/Contact/1"/>
      <role>owner</role>
      <party ivoId="ivo://localhost/SimDB#SimDB:simdb/Party/3"/>
    </contact>
    <mainContact ivoId="ivo://localhost/SimDB#SimDB:simdb/Party/3"/>
    <code>http://host/download/gadget</code>
    <version>1.2.3</version>
  + <parameterGroup></parameterGroup>
  - <representation>
      <identity publisherDID="ivo://org/gadget/darkMatter" ivoId="ivo://localhost/SimDB#SimDB:simdb/protocol/RepresentationObjectType/1"/>
      <name>dark Matter</name>
    - <description>
        dark Matter particules <i>representation description</i>
      </description>
    - <property>
        <identity publisherDID="ivo://org/gadget/darkMatter/positionX" ivoId="ivo://localhost/SimDB#SimDB:simdb/object/Property/3" xmlId="Property_3"/>
        <name>x</name>
        <datatype>double</datatype>
        <cardinality>1</cardinality>
      - <description>
          X (cartesian) coordinate of the particle in the cubic box <i>property description</i>
        </description>
        <isEnumerated>false</isEnumerated>
        <ucd>pos.cartesian.x</ucd>
      </property>
    - <property>
        <identity publisherDID="ivo://org/gadget/darkMatter/positionY" ivoId="ivo://localhost/SimDB#SimDB:simdb/object/Property/1" xmlId="Property_1"/>
        <name>y</name>
        <datatype>double</datatype>
        <cardinality>1</cardinality>
      - <description>
          Y (cartesian) coordinate of the particle in the cubic box <i>property description</i>
        </description>
        <isEnumerated>false</isEnumerated>
        <ucd>pos.cartesian.y</ucd>
      </property>
    - <property>
        <identity publisherDID="ivo://org/gadget/darkMatter/positionZ" ivoId="ivo://localhost/SimDB#SimDB:simdb/object/Property/2" xmlId="Property_2"/>
        <name>z</name>
        <datatype>double</datatype>
        <cardinality>1</cardinality>
      - <description>
          Z (cartesian) coordinate of the particle in the cubic box <i>property description</i>
        </description>
        <isEnumerated>false</isEnumerated>
```


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SimDB Browser Query

SQL Query :

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Please define your ADQL (well, SQL) query and use the submit button :

submit

```
select s.* from simulation s, protocol p where s.protocolId = p.id and p.name like
'%Gadget%'
```

Results : (10 ms)

id	dtype	name	description	referenceurl	created	updated	status	maincontactid	protocolid	execut
2	Simulation	Run Gadget 001	this run uses parameters ... *simulation description*		2008-10-24 12:20:02.738	2008-10-24 12:20:02.738	published	3	1	2008-1 12:20:

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Current Issues

- External references (ivoId) must be resolved

  <protocol ivoId="ivo://localhost/SimDB#SimDB:simdb/protocol/Simulator/1"/>

- SQL queries are very complicated :
  - ParameterSetting values (Quantity, units)
  - Characterisation values (many Joins)

- Possible Solutions :
  - New or Custom Database Views can help
  - Simplify the SimDB model ?
  - Model Denormalisation (name attribute) ?

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Future work

Web Interface :

- Import XML instances for SimDB resources with user management (rights)
- Query interface TAP compliant
- Better XML validation rules (constraints)
- SimDAP integration

Generalization for other data models :

- Make the common code independent of SimDB
- Update the UML profile

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Conclusion

- SimDB current implementation supports :
- database DDL & operations (add, get)
- Xml serialization
- Browser
- SQL query interface
- Reference issue should be solved asap (help from other WG ?)
- SimDB query (TAP ?) & Web interface can be improved in near future

Questions ?

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