Protocols in the EU DataGrid R-GMA

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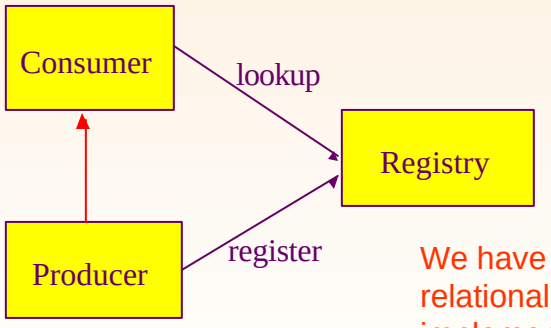
European DataGrid

- EU DataGrid project with 21 partners from a number of countries around Europe is part-funded by the EU.
- It brings together:
  - particle physics,
  - earth observation
  - bio-informatics
  - computer science
- For information and monitoring system, seeing if we can do “better” than MDS/LDAP

Grid Monitoring Architecture (GMA)

- We use it not only for monitoring but also as the basis of an information system

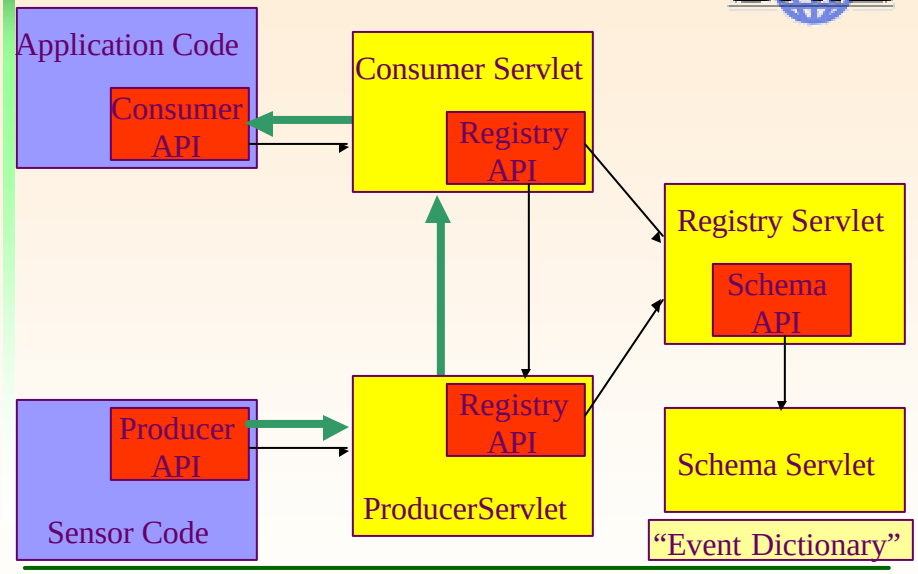


We have chosen a relational implementation

Relational Approach

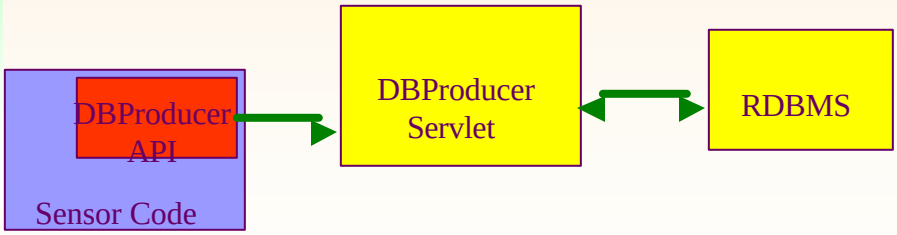
- Not a general distributed RDBMS system, but a way to use the relational model in a distributed environment where ACID properties are not generally important.
- Producers announce: SQL “CREATE TABLE”
  publish: SQL “INSERT”
- Consumers collect: SQL “SELECT”

R-GMA

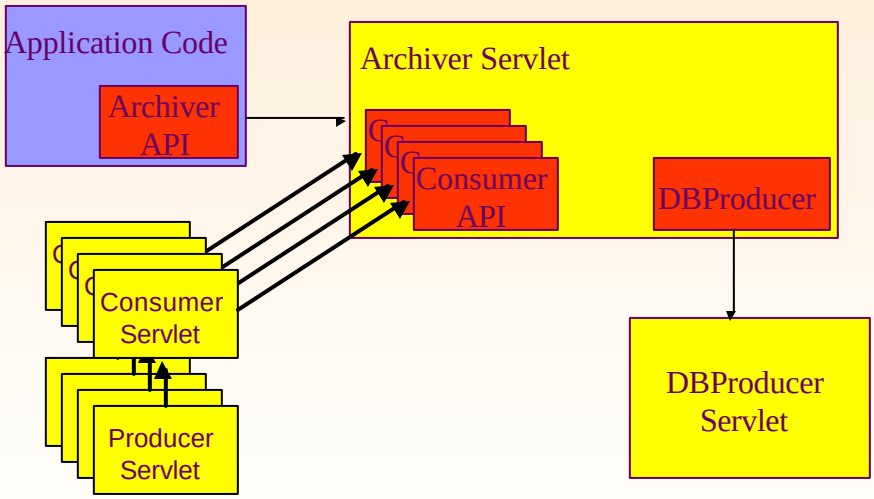


New: DBProducer

- Uses a RDBMS to make produced data persistent
- Consumer cannot tell the difference
- Data inserted like a simple Producer
- Can produce more than one table
- Cannot stream data

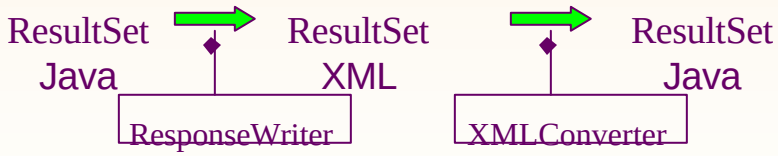


New: Archiver



Communications

- Connect: standard http(s) request parameters
  http://localhost:8080/ProducerServlet/constructProducer?tableName=cpuLoad&flags=1
- Responses are XML containing one of
  - ResultSet
  - Exception
  - Status



ResultSet I

```
<GMA-Response … >
  <ResultSet>
    <rowMetaData>
      <colMetaData>loadavg</colMetaData>
      <colMetaData>timestamp</colMetaData>
    </rowMetaData>
    <row>
      <col>0.15<col>
      <col> … <col>
    <row>
    <row>
      <col>0.15<col>
      <col> … <col>
    <row>
  </ResultSet>
</GMA-Response>
```


ResultSet II

http://localhost:8080/ProducerServlet/getBufferSize?id=41&buffersize=10

```
<GMA-Response>
  <ResultSet>
    <rowMetaData>
      <colMetaData>bufferSize</colMetaData>
    </rowMetaData>
    <row>
      <col>10<col>
    <row>
  </ResultSet>
</GMA-Response>
```

Exception

- Receive either valid ResultSet or Status or Exception
- XMLConverter can throw the Exception received

```
<GMA-Response>
  <Exception>
    <exceptionType>
      RegistrationException
    </exceptionType>
    <Message>
       Registration of cpuLoad failed
    </Message>
  </Exception>
</GMA-Response>
```


Status

- Some requests do not have a natural return code, e.g. registration
- Still want to know if request succeeded
- Return Status Object

```
<Response>
  <Status>
     OK
  </Status>
</Response>
```

getBufferSize

Request Parameters			
Name	Type	Cardinality	Meaning
connectionId	Int	1..1	The connection ID identifying the producer to the servlet.

Returned ResultSet 1..1		
Name	Type	Meaning
bufferSize	Int	The currently set buffer size on the ProducerServlet for the Producer with the given connectionId.

Returned Error	
Name	Meaning
BufferError	An error occurred when trying to retrieve the buffer size.

constructProducer

Request Parameters			
Name	Type	Cardinality	Meaning
tableName	String	1..1	The name of the table to register
fixedColumns	String	0..1	The names of the columns which are fixed and their values, a colon separated list of "=" separated name-value pairs.
flags	Int	0..1	A set of boolean flags encoded in an integer.
tableDesc	SQL	0..1	An SQL CREATE TABLE string for the table being registered.

Returned ResultSet 1..1		
Name	Type	Meaning
connectionId	Int	The ProducerServlet-assigned connection ID.

Returned Error	
Name	Meaning
RegistrationError	The registration of the specified producer did not complete successfully

Comparison with proposed "Simple XML protocol"

- XML between consumer and producer is described by a single DTD/Schema
  - This is more compact though less "XML like"
- XML is only used for the response
  - Otherwise use http parameters – hence would need more if it were separated from http
- Relies upon http(s)

Future Work

- Tidy up what we have!
- Soft state registration of producers
- Dynamic schema evolution
- Add time-stamping
- Robustification of schema and registry
- Query planning and optimisation
- Query tools for registry and schema
- Investigate SOAP
- Integrate GSI security

Final Things

- Released into Testbed1 of EU-DataGrid
  - Need to understand performance issues
- Can we interoperate with other GMAs ?
- What do you guys think?
- Paper on R-GMA Protocols to be submitted soon
- http://hepunx.rl.ac.uk/grid/wp3/ for more