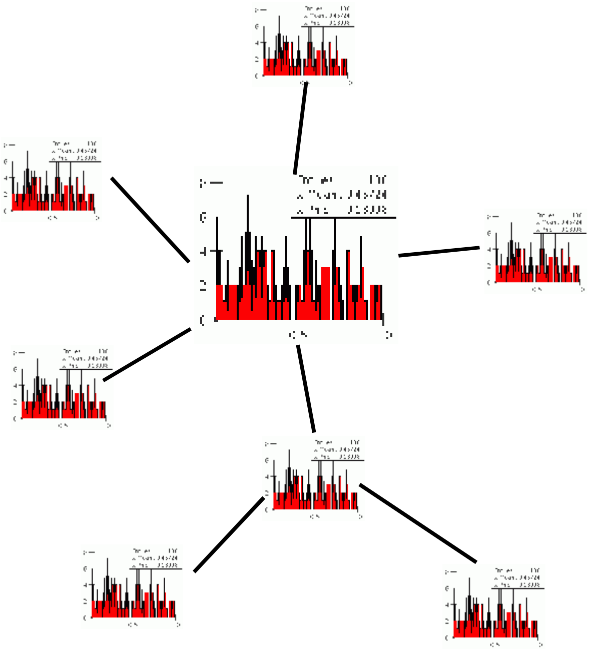
Web Service for Event Metadata

- **Foundations:**
  - ColManWS
  - ColManWSClient
  - AIDA TLD
- **Applications:**
  - API (access from code)
  - WWW (access from browser)
  - GUI (access from studio)
- Distributed Event Metadata Architecture

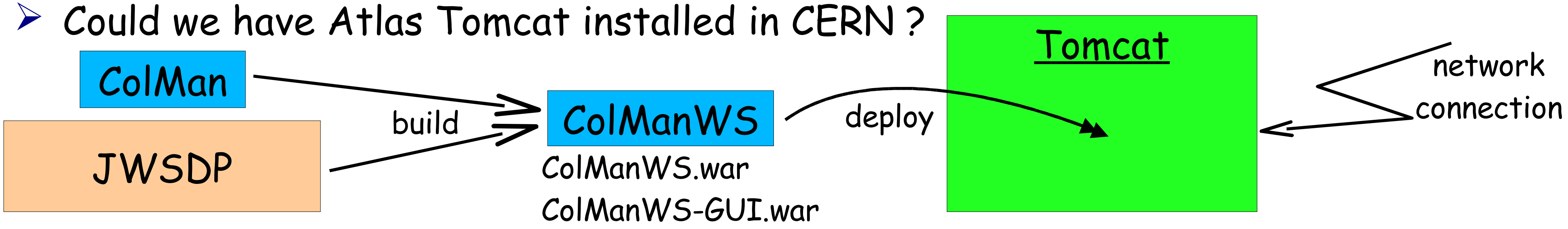
Work is based on AIDA interface to AttributeList implemented by SQLTuple and ColMan packages.



J.Hrivnac/LAL for Atlas SW WS, February 2005 in CERN

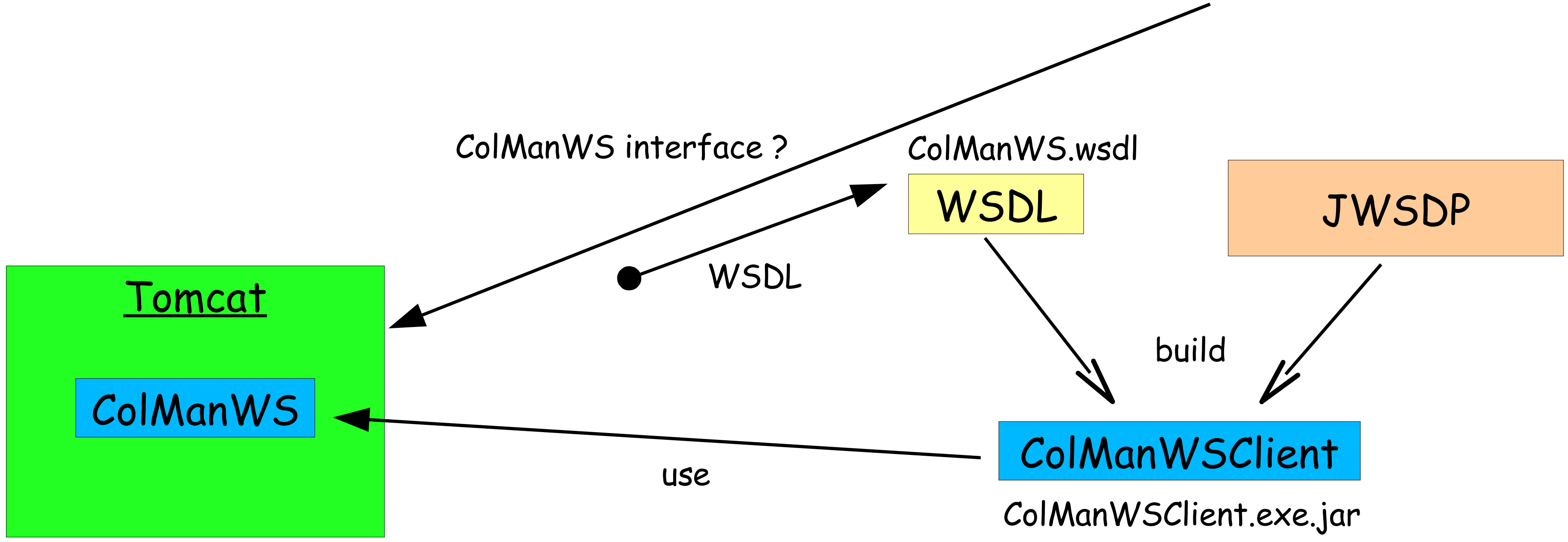
Foundation: ColManWS

- ColManWS is a Web Service wrapper over ColMan, it contains two services:
  - ColMan.war to be used via XML-RPC (for example by ColManWSClient),
  - ColMan-GUI.war to be used directly from the Web Browser.
- ColManWS is build using JWSDP (Java Web Service Development Package) 1.5.
  - JWSDP is one of the best Web Service Frameworks, it is already installed within Atlas release.
  - Other WebService frameworks could be used too, e.g. Axis.
- ColManWS WAR files (ColMan.war and ColMan-GUI.war) are deployed in Tomcat 5.0 Web Container.
  - Tomcat is the most widespread Web Container.
  - Other standard Web Containers could be used too to deploy the same war files.
  - Could we have Atlas Tomcat installed in CERN ?



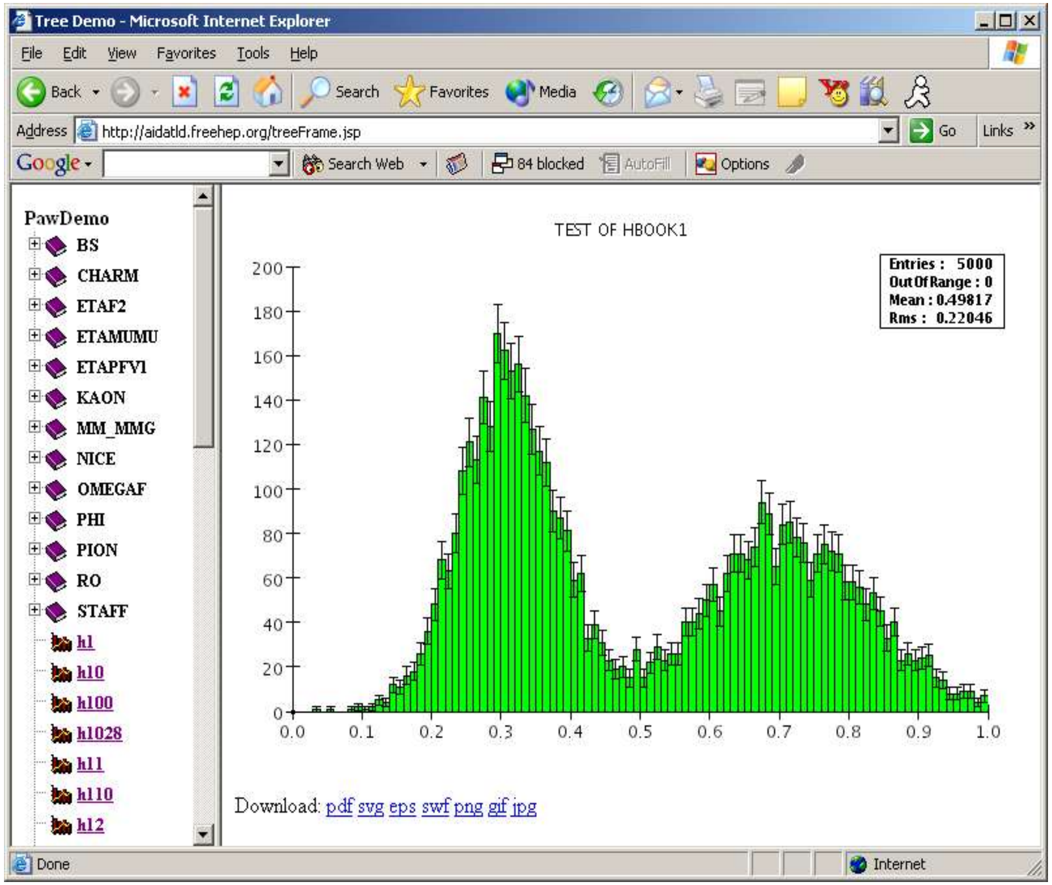
Foundation: ColManWSClient

- ColManWSClient is an example of client to ColManWS.
- Other clients (in many languages) can be easily build from WSDL specification using JWSDP or other Web Service Framework.



Foundation: AIDATLD (AIDA Tag Library)

- AIDA Tag Library allows access to standard AIDA objects from JSP (Java Server pages). If you know AIDA, you can immediateoly use AIDATLD.
- In JSP, one can mix HTML, XML defined by Tag Libraries and pure Java code.
- All processing is performed on the server, steered from the client.



Tree Demo - Microsoft Internet Explorer

Address http://aidatld.freehep.org/treeFrame.jsp

PawDemo
- BS
- CHARM
- ETAF2
- ETAMUMU
- ETAPFVI
- KAON
- MM_MMG
- NICE
- OMEGAF
- PHI
- PION
- RO
- STAFF
- h1
- h10
- h100
- h1028
- h11
- h110
- h12

TEST OF HBOOK1

Entries : 5000
OutOfRange : 0
Mean : 0.49817
Rms : 0.22046

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Done

```
<%@taglib prefix="c"
          uri="http://java.sun.com/jsp/jstl/core" %>
<%@taglib prefix="aida"
          uri="http://java.freehep.org/jsp/aida" %>
<html>
  <head>
    <title>AIDA Tree from XRootd</title>
    </head>
  <body>
    <c:set var="rootDataURI"
           value="root://demo.cern.ch/demo.root"/>
     <c:set var="histoPath"
           value="/h110"/>
 <aida:plotter>
      <aida:region>
        <aida:plot dataSourceURI="${rootDataURI}"
                   plotObjectPath="${histoPath}"/>
        </aida:region>
      </aida:plotter>
    </body>
  </html>
```

Application: API

- ColManWS (ColMan.jar), deployed in Tomcat, exports EventSelector WSDL.
- ColManWSClient uses that WSDL to create everything needed to access ColManWS EventSelector via XML-RPC protocol.
- Similar clients could be created in other languages.
- Processing currently ends with Pool Tokens; once LCG provides a Web Service for their mapping to files, further processing will be possible. (Maybe Clarens Pool-Light catalog Web Service could be used.)

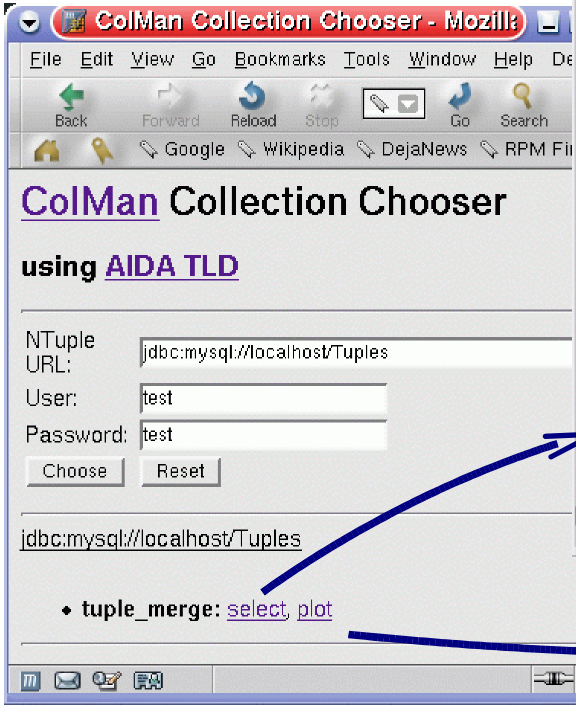
created automatically from ColManWS WSDL

```
Stub stub = (new EventSelector_Impl()).getEventSelectorWSPort();
stub._setProperty(javax.xml.rpc.Stub.ENDPOINT_ADDRESS_PROPERTY, webServiceUrl);
EventSelectorWS selector = (EventSelectorWS)stub;
Object[] tokens = selector.select(collectionUrl,
                                  queryString,
                                  user,
                                  password);
for (Object token : tokens) {
  System.out.println(token);
  }
```

Application: WWW

- ColManWS (ColMan-GUI.jar), deployed in Tomcat, can be accessed directly from the Web Browser.
- Almost all ColMan and AIDA operations can be made available.

get all AttributeList NTuples
from an SQL database
(either one database or
cluster of databases
via C-JDBC virtual server)


ColMan Collection Chooser - Mozill
File Edit View Go Bookmarks Tools Window Help De
Back Forward Reload Stop Go Search
Google Wikipedia DejaNews RPM Fi
Choose
Reset

ColMan Collection Chooser

using AIDA TLD

NTuple URL: jdbc:mysql://localhost/Tuples

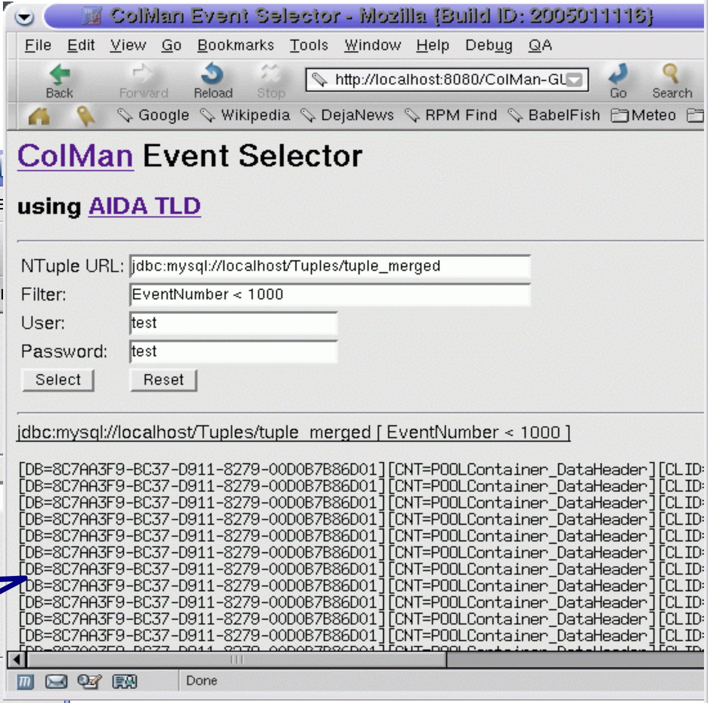
User: test

Password: test

jdbc:mysql://localhost/Tuples

- **tuple_merge:** select, plot

get Tokens for events satisfying a query


ColMan Event Selector - Mozilla {Build ID: 2005011116}
File Edit View Go Bookmarks Tools Window Help Debug QA
Back Forward Reload Stop Go Search
http://localhost:8080/ColMan-GU
Google Wikipedia DejaNews RPM Find BabelFish Meteo
Select
Reset
Done

ColMan Event Selector

using AIDA TLD

NTuple URL: jdbc:mysql://localhost/Tuples/tuple_merged

Filter: EventNumber < 1000

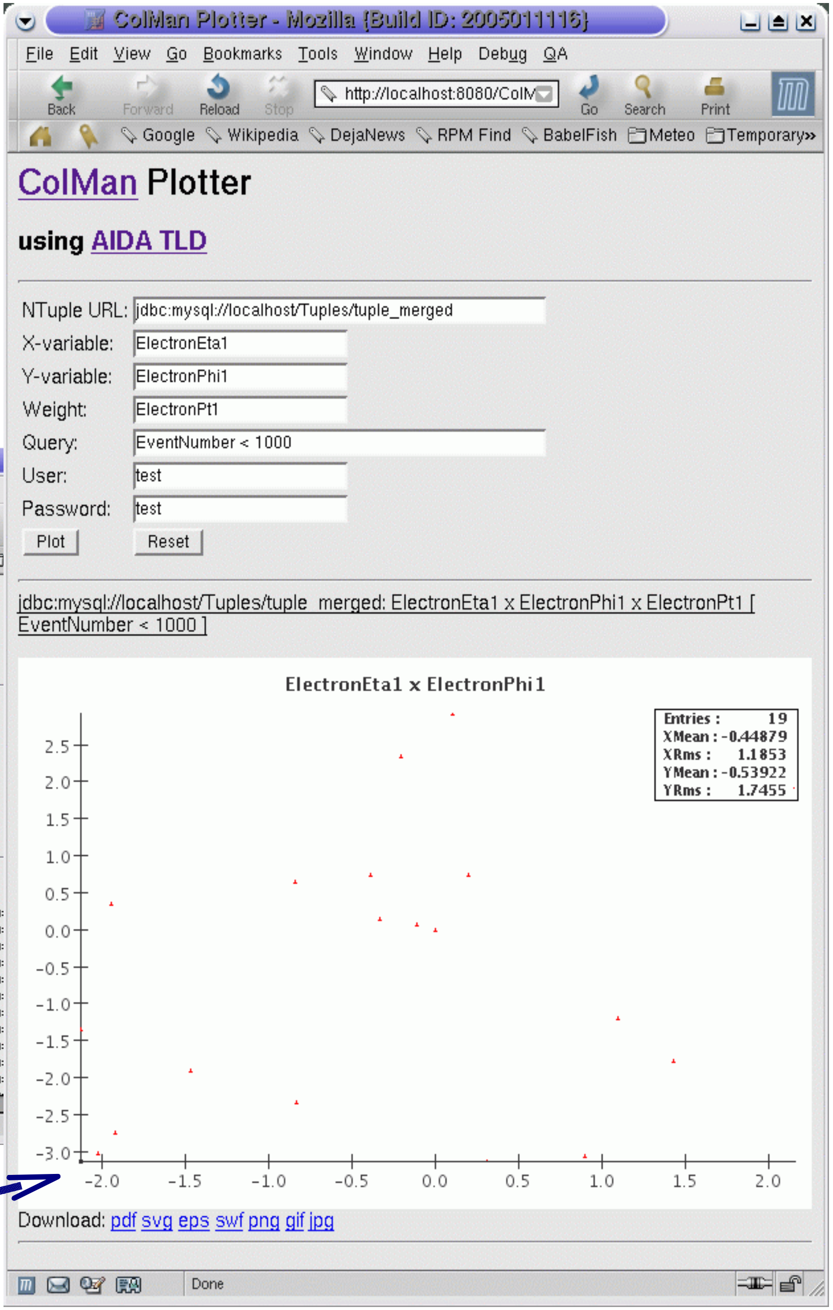
User: test

Password: test

jdbc:mysql://localhost/Tuples/tuple_merged [EventNumber < 1000]

```
[DB=8C7AA3F9-BC37-D911-8279-00D0B7B86D01][CNT=POOLContainer_DataHeader][CLID:
[DB=8C7AA3F9-BC37-D911-8279-00D0B7B86D01][CNT=POOLContainer_DataHeader][CLID:
[DB=8C7AA3F9-BC37-D911-8279-00D0B7B86D01][CNT=POOLContainer_DataHeader][CLID:
[DB=8C7AA3F9-BC37-D911-8279-00D0B7B86D01][CNT=POOLContainer_DataHeader][CLID:
[DB=8C7AA3F9-BC37-D911-8279-00D0B7B86D01][CNT=POOLContainer_DataHeader][CLID:
[DB=8C7AA3F9-BC37-D911-8279-00D0B7B86D01][CNT=POOLContainer_DataHeader][CLID:
[DB=8C7AA3F9-BC37-D911-8279-00D0B7B86D01][CNT=POOLContainer_DataHeader][CLID:
[DB=8C7AA3F9-BC37-D911-8279-00D0B7B86D01][CNT=POOLContainer_DataHeader][CLID:
[DB=8C7AA3F9-BC37-D911-8279-00D0B7B86D01][CNT=POOLContainer_DataHeader][CLID:
[DB=8C7AA3F9-BC37-D911-8279-00D0B7B86D01][CNT=POOLContainer_DataHeader][CLID:
[DB=8C7AA3F9-BC37-D911-8279-00D0B7B86D01][CNT=POOLContainer_DataHeader][CLID:
```

plot selected attributes


ColMan Plotter - Mozilla {Build ID: 2005011116}
File Edit View Go Bookmarks Tools Window Help Debug QA
Back Forward Reload Stop Go Search Print
http://localhost:8080/ColM
Google Wikipedia DejaNews RPM Find BabelFish Meteo Temporary»
Plot
Reset
ElectronEta1 x ElectronPhi1
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-2.0
-1.5
-1.0
-0.5
0.0
0.5
1.0
1.5
2.0
Entries : 19
XMean : -0.44879
XRms : 1.1853
YMean : -0.53922
YRms : 1.7455
Done

ColMan Plotter

using AIDA TLD

NTuple URL: jdbc:mysql://localhost/Tuples/tuple_merged

X-variable: ElectronEta1

Y-variable: ElectronPhi1

Weight: ElectronPt1

Query: EventNumber < 1000

User: test

Password: test

jdbc:mysql://localhost/Tuples/tuple_merged: ElectronEta1 x ElectronPhi1 x ElectronPt1 [EventNumber < 1000]

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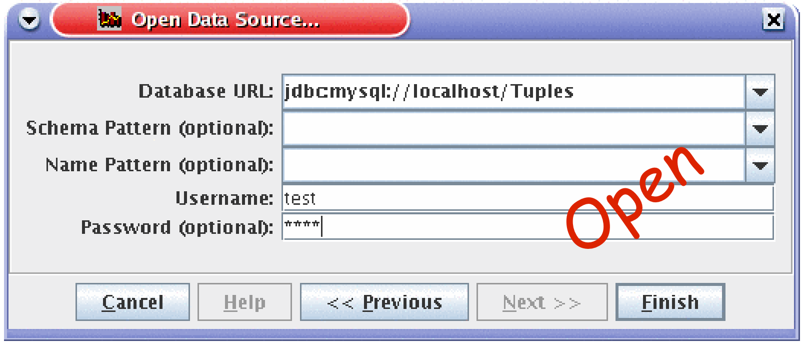
Application: GUI

- Most SQLTuple/ColMan functionality is available remotely from JAS3 via ColMan plugin using JDBC protocol.
- All operations can be performed from GUI or supported (scripting) languages (Java, Python, PNuts,...).



Open Data Source...

Database URL: jdbc:mysql://localhost/Tuples

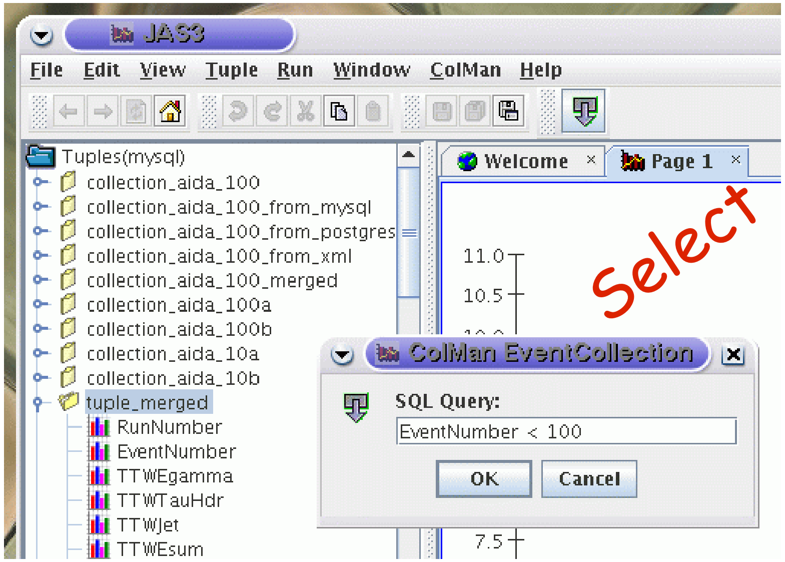
Schema Pattern (optional):

Name Pattern (optional):

Username: test

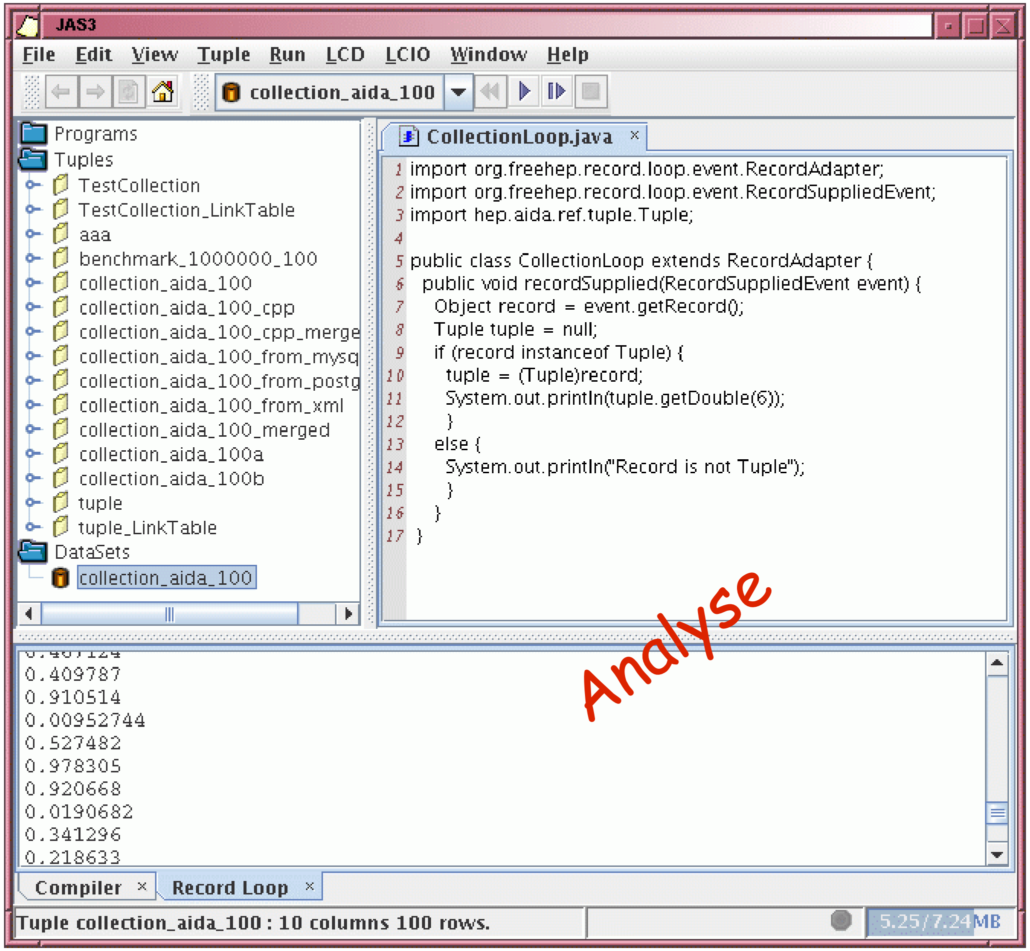
Password (optional): ****

Open



SQL Query: EventNumber < 100

Select



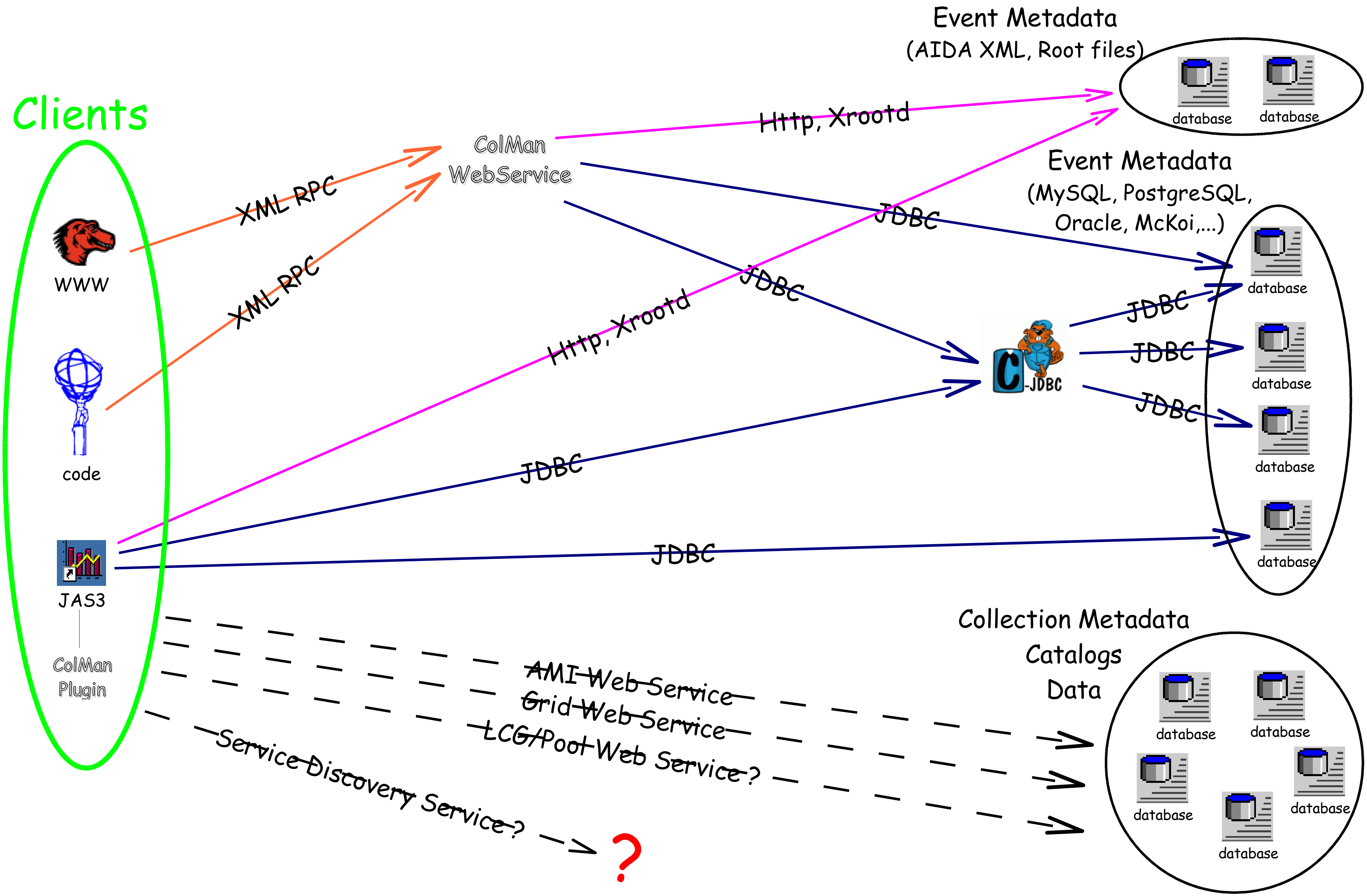
```
import org.freehep.record.loop.event.RecordAdapter;
import org.freehep.record.loop.event.RecordSuppliedEvent;
import hep.aida.ref.tuple.Tuple;

public class CollectionLoop extends RecordAdapter {
  public void recordSupplied(RecordSuppliedEvent event) {
    Object record = event.getRecord();
    Tuple tuple = null;
    if (record instanceof Tuple) {
      tuple = (Tuple)record;
      System.out.println(tuple.getDouble(6));
      }
    else {
      System.out.println("Record is not Tuple");
      }
    }
 }
```

```
0.409787
0.910514
0.00952744
0.527482
0.978305
0.920668
0.0190682
0.341296
0.218633
```

Tuple collection_aida_100 : 10 columns 100 rows.

Analyse

Distributed Event Metadata



Distributed Event Metadata

- Distributed architecture is sometimes claimed to be slow. That is almost always because the wrong technology is used (for example SOAP to access bulk data).
- There are many standard protocols for distributed operations: SOAP, XML-RPC, JDBC, RMI, HTTP, Xrootd, etc. The right one should be chosen with respect to its
  - functionality,
  - performance,
  - interoperability.
- All functionality should be available using non-proprietary standard protocol.
- GAE Clarens (from CMS) already has a lot of that functionality, could we reuse it ? Or maybe ARDA ?

Summary, Links

- Various ways of distributed access to Event Metadata are ready to be deployed; new clients can be quickly implemented.
- Standard solutions are heavily (re)used, there is very little of new code.
- All that works on any Linux, MacOSX, Windows etc. and it doesn't care what gcc & glibc happens to be installed. (Most of it actualy works even on PDA and Mobile Phones.)
- More:
  - ColManWS:
    - http://home.cern.ch/hrivnac/Activities/Packages/ColManWS
  - ColManWSClient:
    - http://home.cern.ch/hrivnac/Activities/Packages/ColManWSClient
  - AIDATLD:
    - http://aidatld.freehep.org
  - JAS3:
    - http://jas.freehep.org/jas3
  - SQLTuple, ColMan, AIDA, C-JDBC,... in Dec'04 SW WS presentation.