UT-BATTELLE

Channel Archiver Introduction

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SNS SPALLATION NEUTRON SOURCE

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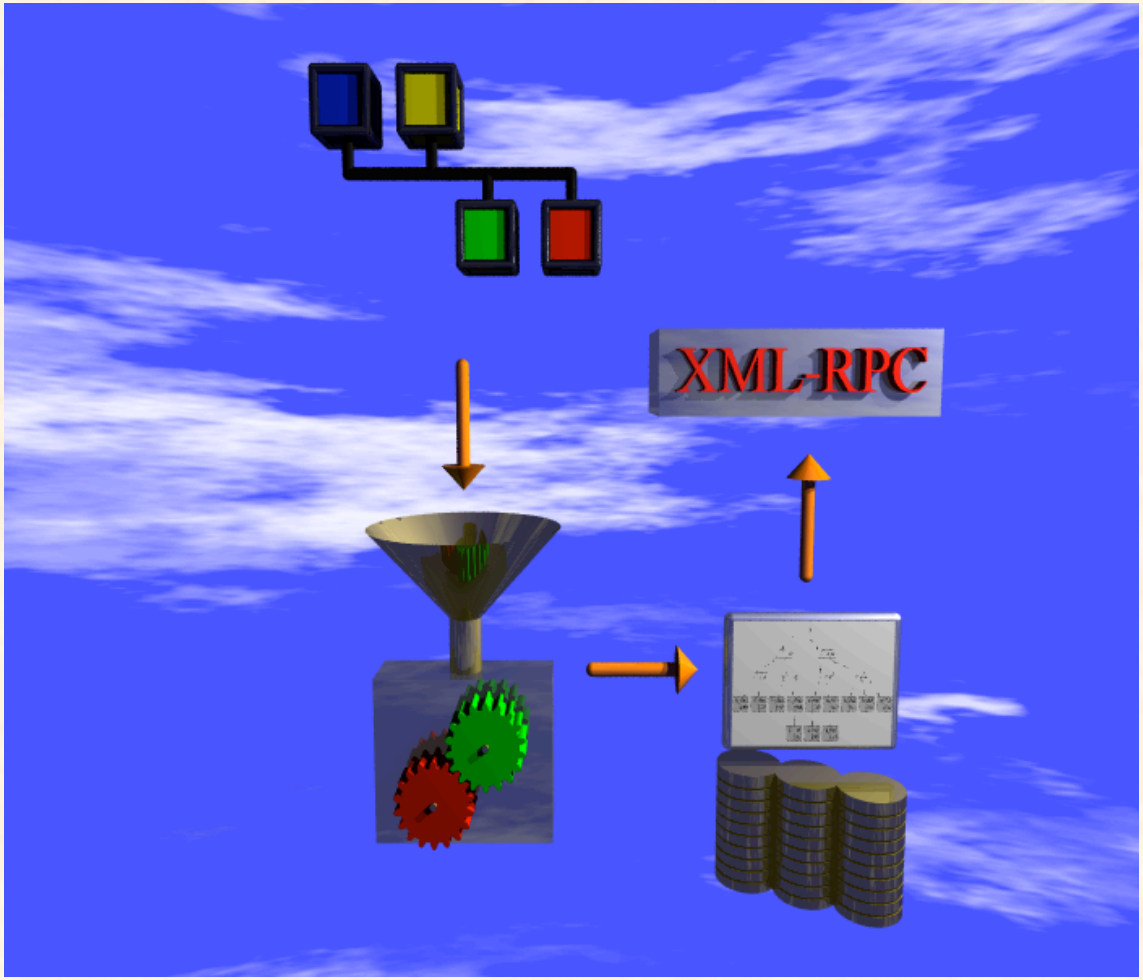
U. S. DEPARTMENT OF ENERGY

Basic Pieces of the Channel Archiver

- ArchiveEngine
  - Collect samples as a CA client
- Network Data Server
  - Serve the archived samples
- Java Viewer
  - Plot, …



ArchiveEngine

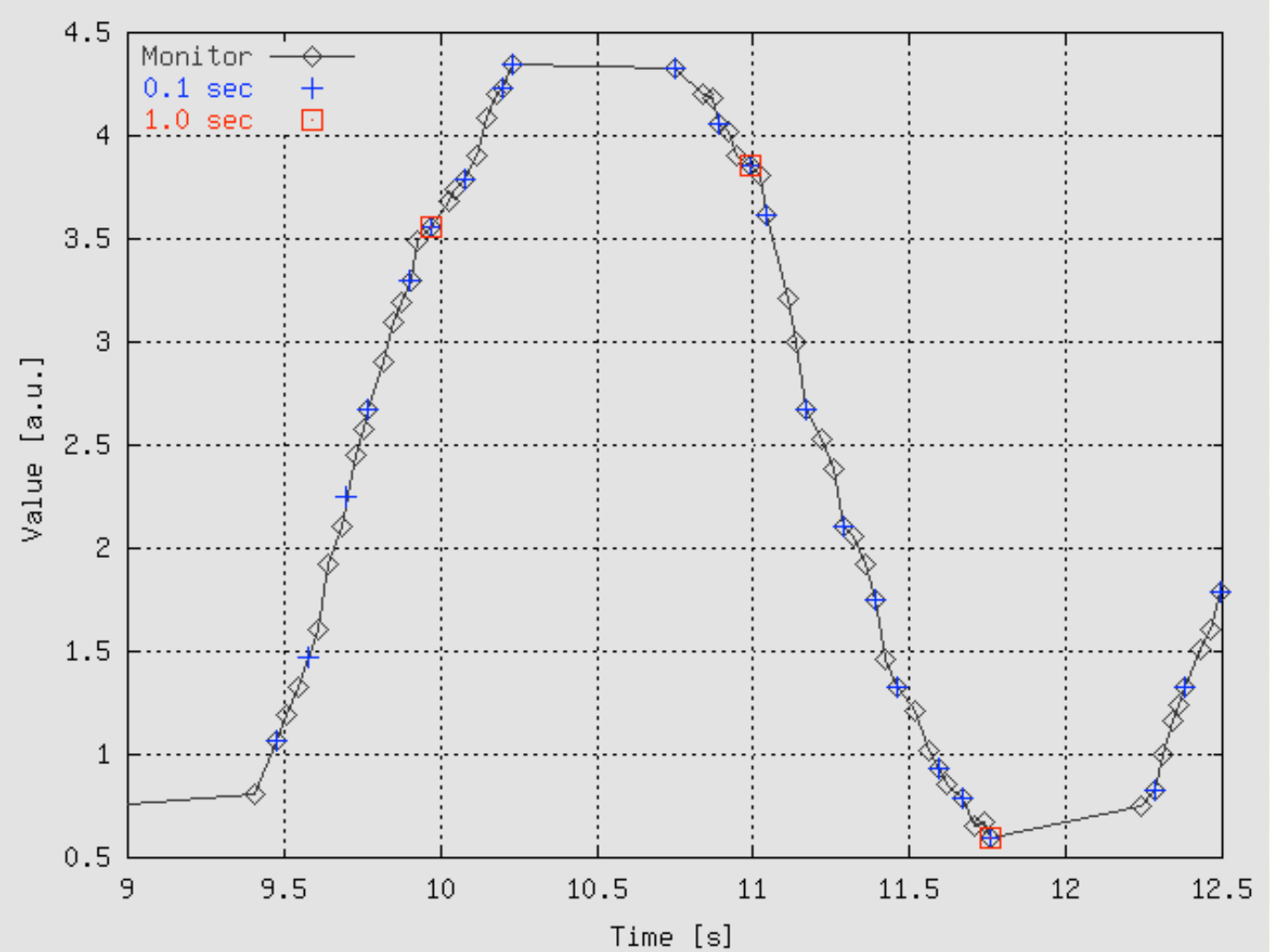
- Receives data via CA, writes to disk
- 'Monitored' Mode
  - Every received sample is written to disk.
    - Limited by memory used to buffer between disk writes. Configurable, based on *estimated* period.
- 'Scanned'
  - Periodically writes the most recent value to disk.
    - Internally uses 'get' or also 'monitor'.
    - Marks repeated values as such to conserve space.

Engine's XML Configuration File

```
<?xml version="1.0"?>
<engineconfig>
    <group>
        <name>Stuff</name>
        <channel> <name>tx:aiExample</name> <period>10</period> <scan/>    </channel>
        <channel> <name>tx:setpoint</name>  <period>10</period> <monitor/> </channel>
        <channel> <name>tx:room</name>      <period>60</period> <monitor/> </channel>
        <channel> <name>tx:PID</name>       <period>1</period>  <monitor/> </channel>
        <channel> <name>tx:tank</name>      <period>1</period>  <monitor/> </channel>
    </group>
</engineconfig>
```

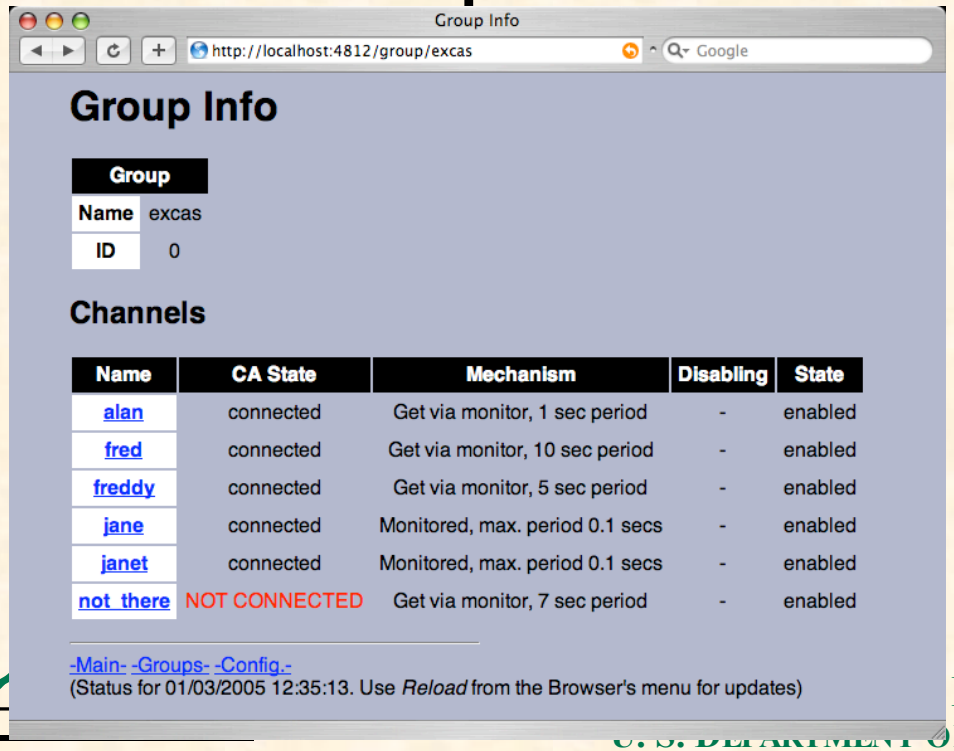
Sampling stores original time stamps!

- Data @ 9.96, 10.98, 11.76 s ?



Engine's Web Server for Status

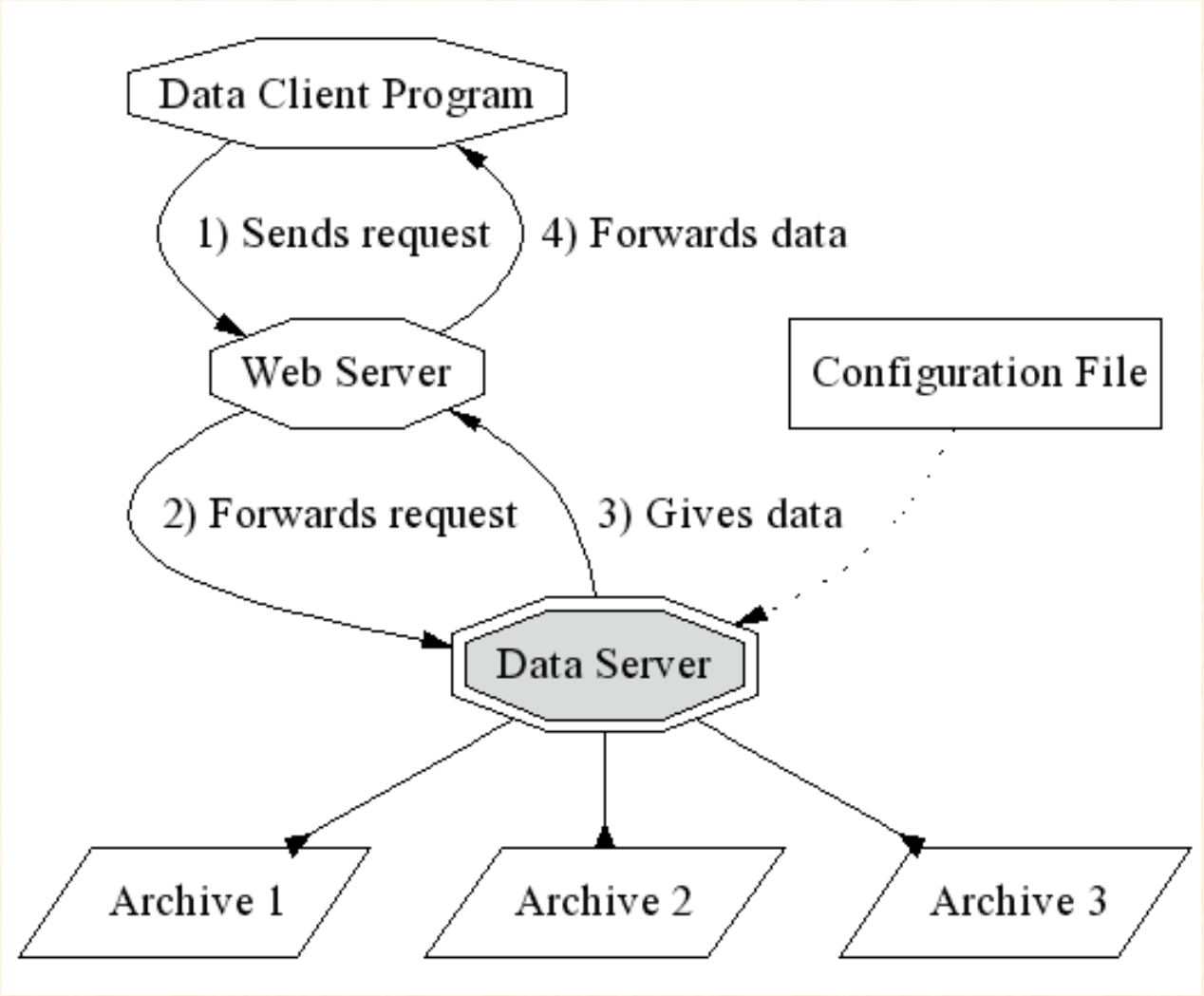
- URL of engine's HTTPD: http://<machine>:<port>
  - Local machine, default port: "localhost:4812"
  - Port set via command-line option.
- Status & Config., not data!
- "Client Pull": Updates on reload



Network Data Server

- Usually a 'CGI' plug-in to a web server
  - Hosted by web server, but the result is 'XML-RPC' protocol for special archive client, not HTML.
- "Real" web server, not the one inside the engine.
  - Good, because we can use security mechanisms as common to web servers, get through firewalls, …
  - Bad, because you have to understand httpd config to get going.

Idea


Data Client Program
1) Sends request
4) Forwards data
Web Server
Configuration File
2) Forwards request
3) Gives data
Data Server
Archive 1
Archive 2
Archive 3

Supported Export Options

- **Original Time Stamps: ill-suited for Spreadsheets**
- **“Staircase” interpolation, repeat values**
- **Linear Interpolation for given period**

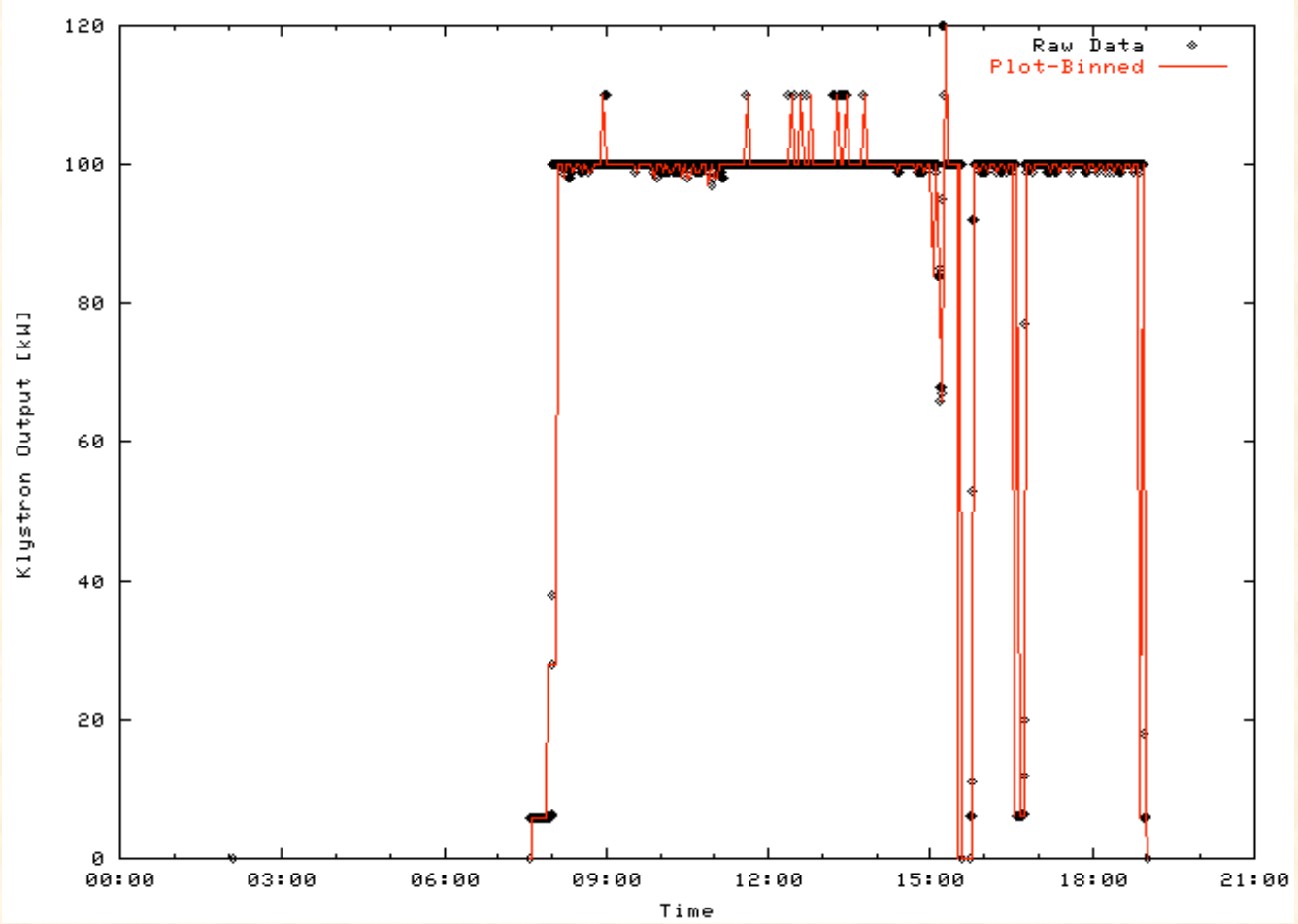
Time	A	B
3/22/00 17:02:28.700	0.071824	#N/A
3/22/00 17:02:28.701	#N/A	-0.086006
3/22/00 17:02:37.401	0.054358	#N/A
3/22/00 17:02:37.511	#N/A	-0.111776
...		

Time	A	B
3/22/00 17:02:28.700	0.071824	#N/A
3/22/00 17:02:28.701	0.071824	-0.08601
3/22/00 17:02:37.401	0.054358	-0.08601
3/22/00 17:02:37.511	0.054358	-0.11178
3/22/00 17:02:39.411	0.139948	-0.11178

Time	A	B
3/22/00 17:02:28.700	0.071824	#N/A
3/22/00 17:02:28.701	#N/A	-0.08601
3/22/00 17:02:30.000	0.069216	-0.08981
3/22/00 17:02:32.000	0.065201	-0.09566
3/22/00 17:02:34.000	0.061186	-0.10151
3/22/00 17:02:36.000	0.057171	-0.10736

Export for plot

- Creates "Plot-Bins" of requested width.
- Bins with >2 values replaced by: Initial, min, max, final.
- Result: Plots with hardly any visual difference, but a lot less data.



ArchiveDataServerStandalone

- Combines the data server with a simple web server ('abyss') into server for single archive:

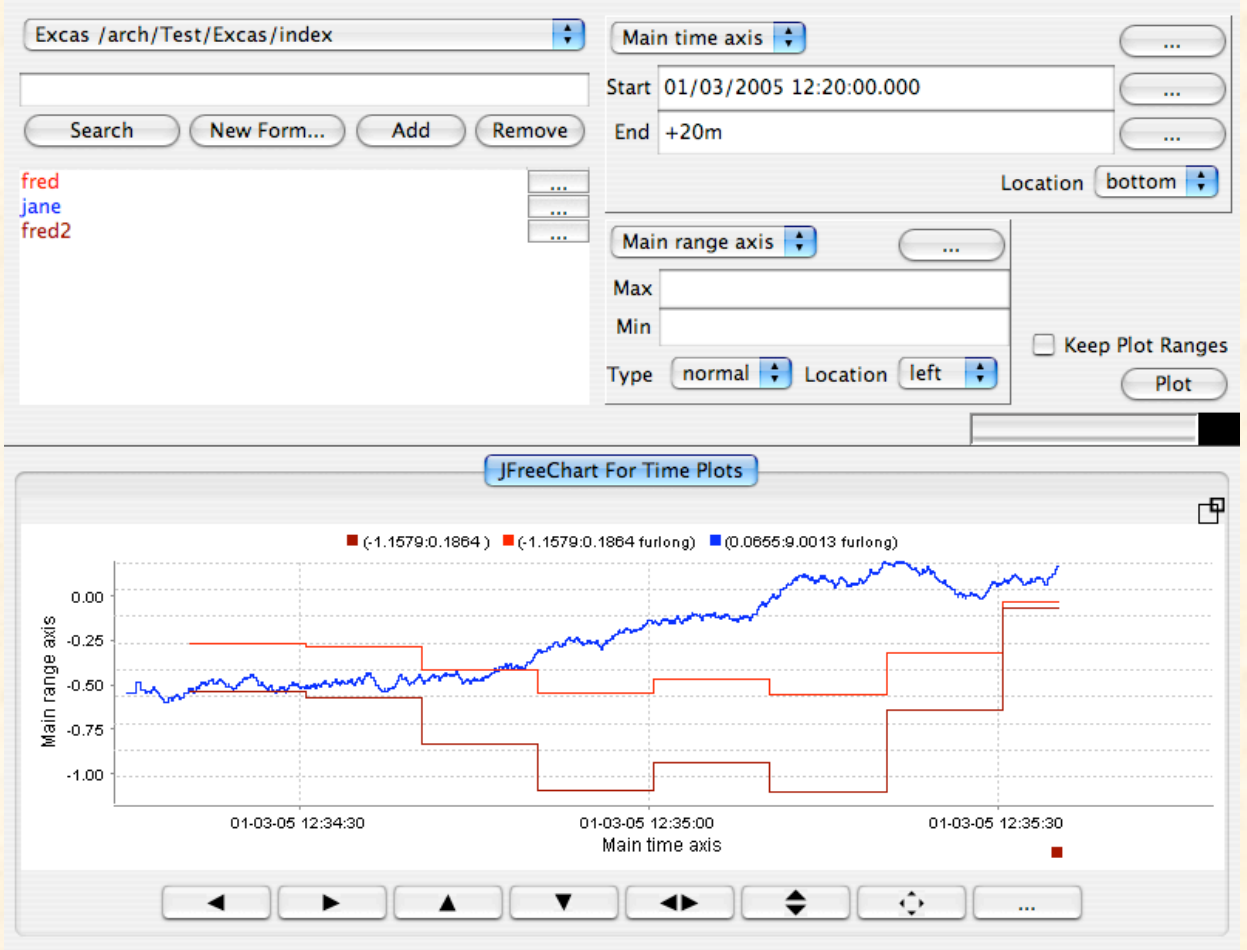
```
cd /ade/training/ubuntu_stuff/ext/src/ChannelArchiver/DemoData

ArchiveDataServerStandalone abys.conf
                            /ade/training/groups/tx/whereever/index
```

- … as long as you only run one per machine. Otherwise need different abys.conf
- Then run viewer:

```
archiveviewer -u http://localhost:8080/RPC2 &
```

Java Data Viewer

- Search PV names
- Plot, zoom, pan
- Multiple axes
- Formulas
- Export spreadsheet-type text files.



One Archive = Directory with ...

- Data files
  - '20060120', …
- Index File
  - 'index'
- Do not separate these! Data will be lost!
- One typically gets more then one
  - Stop & restart in new directory every week limits possible data loss.
  - Split config into one engine per sub-system

How do I look at more than one Archive?

- Create 'list' index file
  - Basically XML file that lists individual index files.
  - Point data server to that one.
  - Degrades since each query looks everywhere until something's found.
  - Problems when same channel in more then one sub-archive.
- Run ArchiveIndexTool on 'list' index file
  - Creates binary index with info from sub-indices.
  - Optimal for retrieval, but creation takes some time.
  - Need to re-run index tool when sub-archives change.

Features support long-term history, not data acquisition for experiments

- 'Monitored' (with buffer limit) and 'scanned'
- 'Disabling' feature for groups allows suspension of sampling
  - Example: Skip power supply data while PS is off.
- Not implemented:
  - 'On demand' snapshots to save/restore settings
  - 'triggered': Save A, B, C, … whenever X=2
    - Also not implemented: pre/post trigger to get detailed samples on some event, while ignoring the rest.
  - More detailed correlation: Wait for matching time stamps on channels A, B, C, …, and X=2, …

Missing Data Management Features

- Index type in between 'list' and 'binary'
  - Not as complete as the 'binary' index, but with acceptable creation/update time to allow looking at "everything"
- Any type of data compression
  - (Convenient) ways of deleting selected channel or time range
  - Replace samples with slower-sampled average or other statistical data.

More Stuff

- ArchiveExport
  - Command-line data extraction
- ArchiveDaemon
  - Starts/stops/restarts engines automatically
- Scripts for copying data, headaches with managing terabytes of data, …
- Documentation, Snapshots: http://www.aps.anl.gov/epics, Extensions, ChannelArchiver.

Acknowledgements

- Bob Dalesio implemented the first version
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