# CZAR: Jefferson Lab's Archiving System

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### **Buzzword Conformance**

- > Relational Database
- ≻ SQL
- > CORBA
- Java, Swing, JDBC, XML
- > Distributed System
- Multi-threaded
- Plug-ins
- ≻ C++, Standard Library



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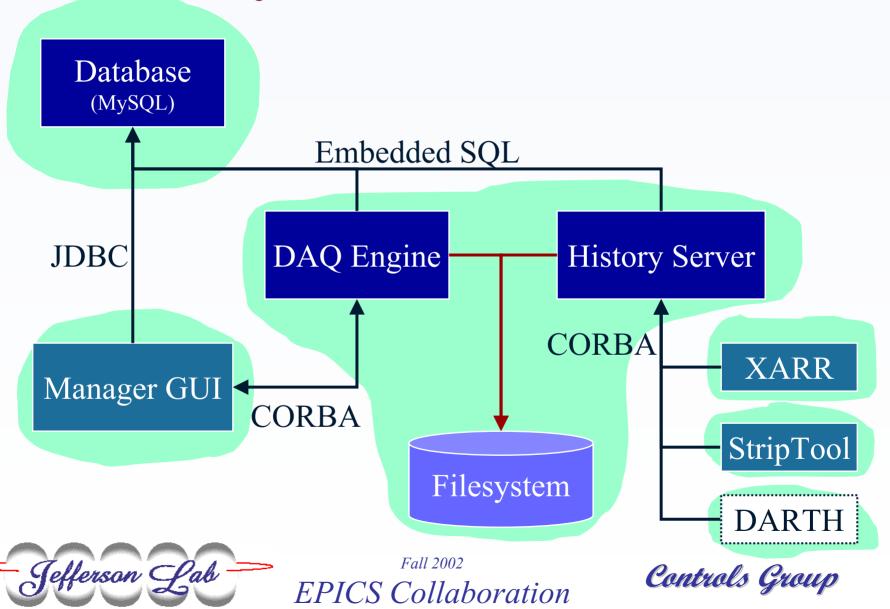
### Components

- Configuration Database
- Data logging engine
- > Data store
- > History data server
- Configuration management GUI
- Engine control / monitor GUI
- > History data retrieval clients



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### **System Overview**



## **Configuration Database**

- > Arbitrary relationships between PVs
  - \* administrative groupings
  - \* logical groupings
  - \* convenience groupings
- Stream" associates PV with DAQ specs
  - journal configuration changes
  - \* multiple, evolving, specs per PV



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## **Data Acquisition Engine**

#### Multi-threaded CA client

- \* runs CA task in separate thread
- SQL client
  - **\*** reads configuration information from database
- CORBA server
  - \* exposes control API
  - \* pushes status events into CosEventService
- DAQ plug-in modules



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# **DAQ Engine Remote API**

- > Activate / Deactivate streams
- > Query stream status
  - \* bytes written, when connected, buffer status
- > Asynchronous status events
  - \* engine state, bytes written, CA activity



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#### **Data Store**

#### Engine

\* streams raw data to disk

#### Converter

- \* runs periodically, or on-demand
- \* "cooks" raw data (convert, compress, index)

#### > Database

- \* connection history
- \* data directory
- file status

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## **History Data Server**

- Multi-threaded CORBA server
- > Accesses data store via CADataStore API
- Consults database for data summary
- Flushes Engine buffers on demand
- > Reads data from file system shared with Engine
- Converts spooled but unprocessed data on demand



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## **History Server Remote API**

- > Supplies archive accessor objects to clients
- Client initializes range in archive accessor
  - \* data summary
    - first, last point
    - before, after point
    - num points

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- \* range accessor object
  - provides data pull interface
  - serves sequences of data in large chunks
  - timestamp, value, status, severity, control info



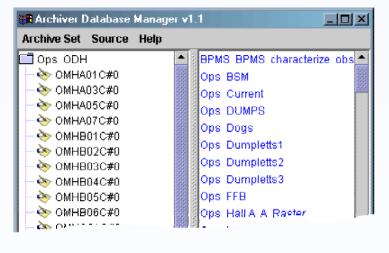
# Managment GUI

- ➢ Java 1.3, Swing, JDBC, CORBA
  - \* truly platform-independent
- > View/manipulate hierarchical ordering
- Specify/modify DAQ parameters
- Enable/disable streams
- > Monitor/control engine
  - flush streams
  - \* display engine status

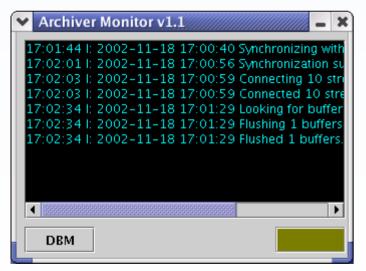


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### AMDM



DAQ Style Selection		X
monitor	This data acquisition module monitors all changes in a signal's value. It accepts the following parameters:	
Accept	<b>threshold</b> Granularity of sampling, measured in seconds. The monitored value will be	
Cancel	recorded no more than once per this interval. If left unspecified, the default behavior is to record every change. See notes below for further discussion.	•



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well as note activities taking place within the system. The Archiver Data



## **History Clients**

#### > XARR

\* Pure CORBA client

#### > hapiget command-line tool

- Script applications
- StripTool
  - \* CORBA client in separate thread
- > DARTH (Java)

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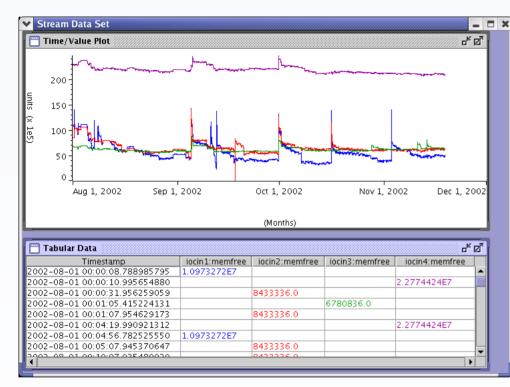
**\* Extensive configuration** 

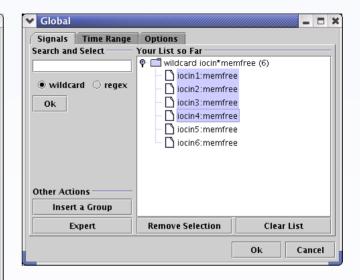
#### Flexible display (graph, table, correlation)

Fall 2002 EPICS Collaboration

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#### DARTH





▼ Global
Signals Time Range Options
Begin
O constant () relative
Evaluate the present month $\checkmark$ , then $\checkmark$
subtract 🔻 3 mont 🔻 .
End
○ constant
Evaluate the present month <b>v</b> , then <b>v</b>
add v 1 month v . v
Ok Cancel



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#### Status

- Engine up since January 2002
  - \* ~ 21,000 signals
  - \* ~ 2Gb / day raw; ~ 600Mb processed
- ▶ Moved from HP-UX  $11 \Rightarrow$  Solaris 8 in June
- > Management GUI (amdm) version 1.1
- ➤ MySQL ⇒ Oracle (Decmber 2002)



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#### **More Status**

- Import config files from ChannelArchiver, old AR
- > New configuration and install scripts
- Init scripts for starting / stopping / inspecting entire system in standard unix fashion
- > HP-UX 11 aCC, Solaris 8 CC, Linux (g++ 3.2)
  > ACE/TAO 5.2.1



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## Transportability

- Entire system
- Engine
- > History server
  - \* CADataStore API
  - \* CORBA API





### Scalability

- > Data store decoupled from data acquisition
  - \* multiple engines can spool data
- > Database indexes, summarizes data
  - \* fast lookup
- File system stores data
  - \* easily shuffle data offline/online
  - \* fast access to binary data
- > History server

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\* reduce data before transporting

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### In the Works

- > Data transformation API
- Support for Oracle
- Specialized data compression (> 80%)
- > Seamless integration with offline storage silo
- > Integration with more clients
- > Improvements, always improvements



