

CZAR: Jefferson Lab's New Archiving System

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Buzzword Conformance

- **Relational Database**
- **SQL**
- **CORBA**
- **Java**
- **Distributed System**
- **Multi-threaded CA**
- **Plug-ins**
- **C++, Standard Library**



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Components

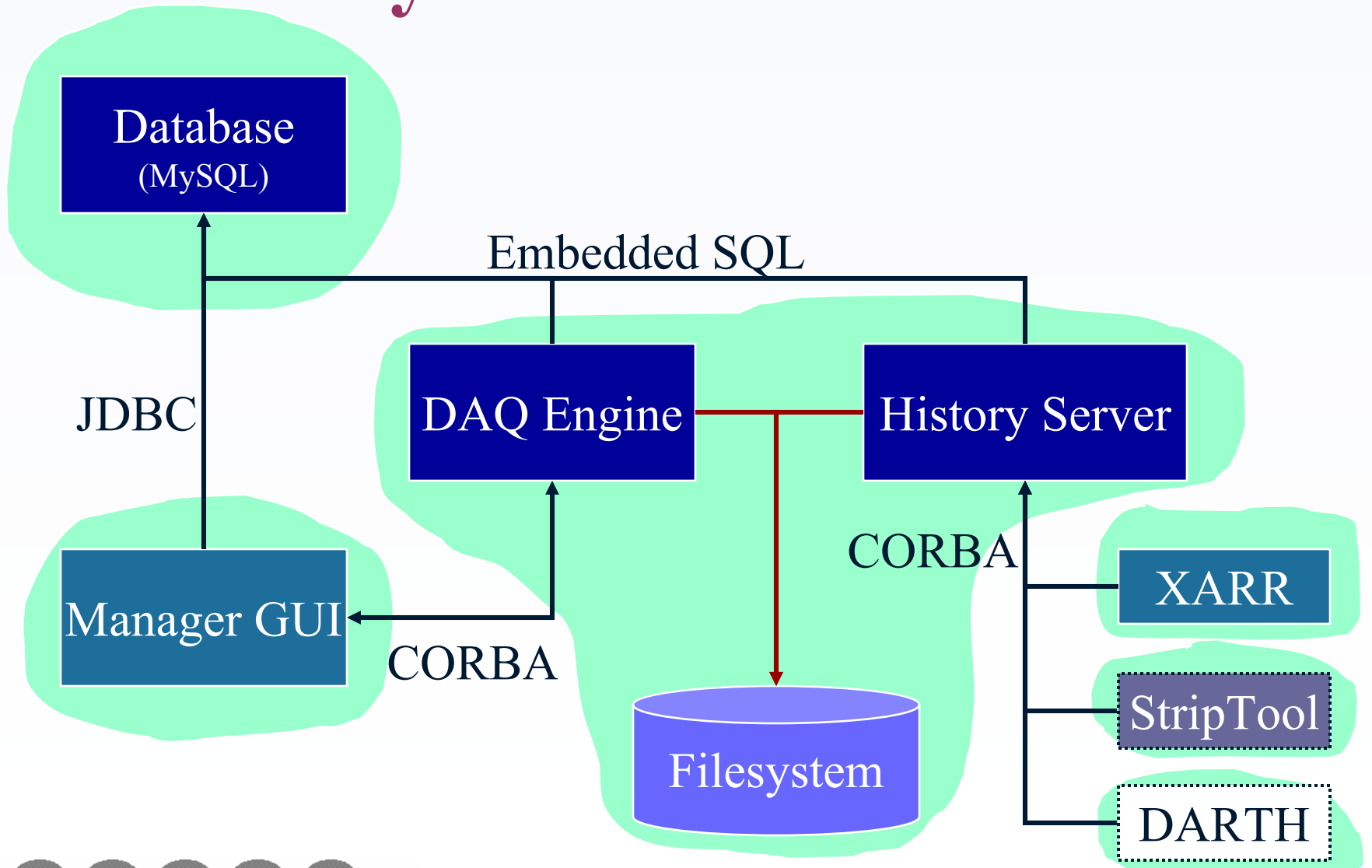
- **Configuration Database**
- **Data logging engine**
- **Data store**
- **History data server**
- **Configuration management GUI**
- **Engine control / monitor GUI**
- **History data retrieval clients**



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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**



DAQ Engine Remote API

- **Activate / Deactivate streams**
- **Enable / Disable per-stream status events**
 - * **connect, disconnect, flush**
- **Query stream status**
 - * **bytes written, when connected, buffer status**
- **Asynchronous status events**
 - * **engine state, bytes written, CA activity**



DAQ Plug-in Modules

➤ Monitor

- * time threshold
- * buffer size
- * maximum buffer age

➤ Trigger

- * ring buffer size
- * causal trigger
- * flush delay



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



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Management 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
- **Multiple simultaneous instances**



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History Clients

- **XARR**
 - * pure CORBA client
- **command-line tools**
 - * specify signal, time range
- **StripTool**
 - * work in progress
- **New java-based tools**



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Status

- **Engine up since January 2002**
 - * ~ 21,000 signals
 - * ~ 2Gb / day raw; ~ 600Mb processed
 - * < 20% CPU (HP B2000, 1GB RAM)
- **XARR**
 - * retrieve 100,000 points: ~ 3 sec.
- **Management GUI 1.0 99% done**
- **Port to Solaris, Oracle: June**



Transportability

- **Entire system**
- **Engine**
- **History server**
 - * **Database structure**
 - * **CADataStore**
 - * **CORBA API**
- **Modular DAQ plug-ins**



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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**
 - * reduce data before transporting



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