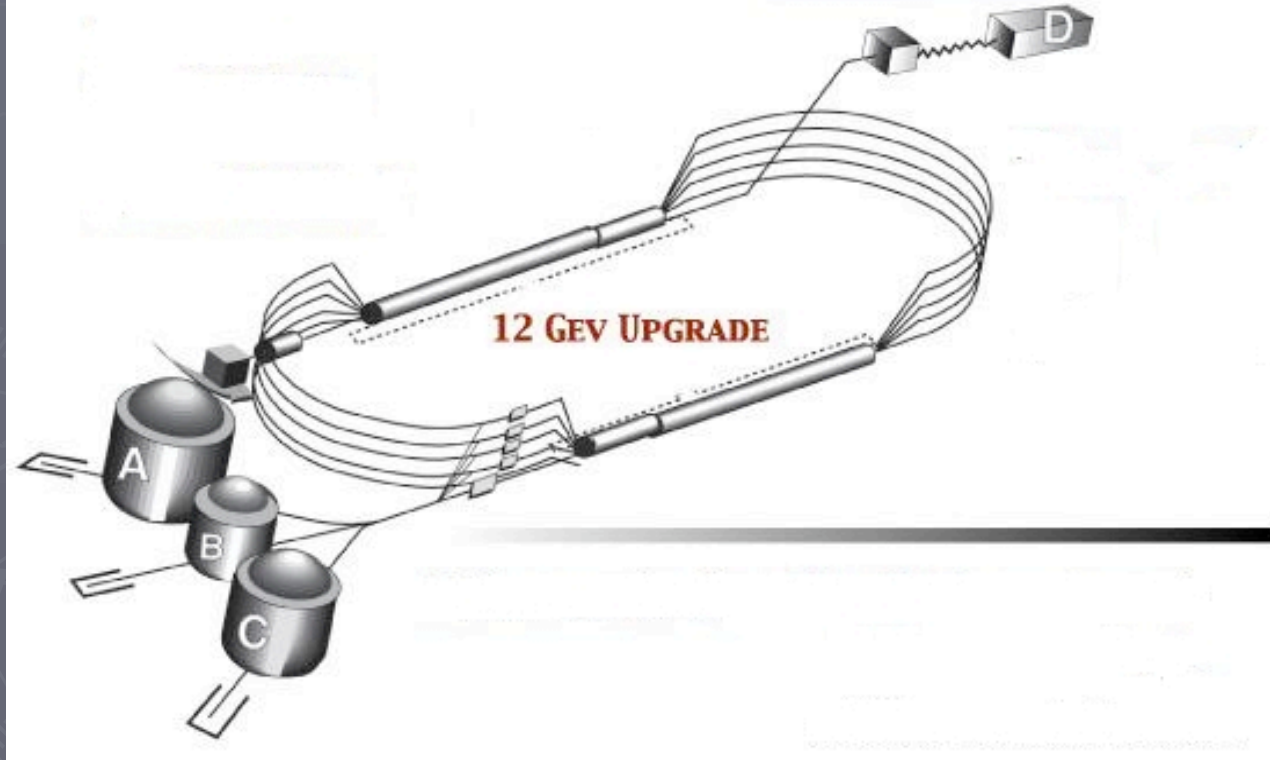
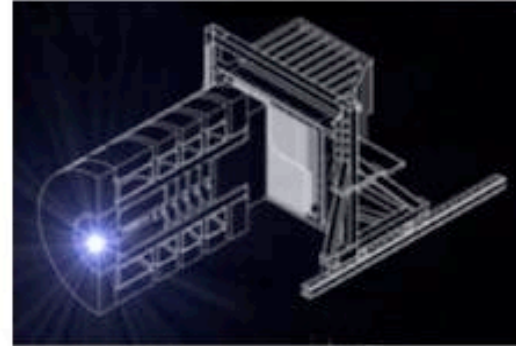


# CODA 3

Hall D at Jefferson Lab



Data Acquisition for the 12 GeV Upgrade

# The good news...

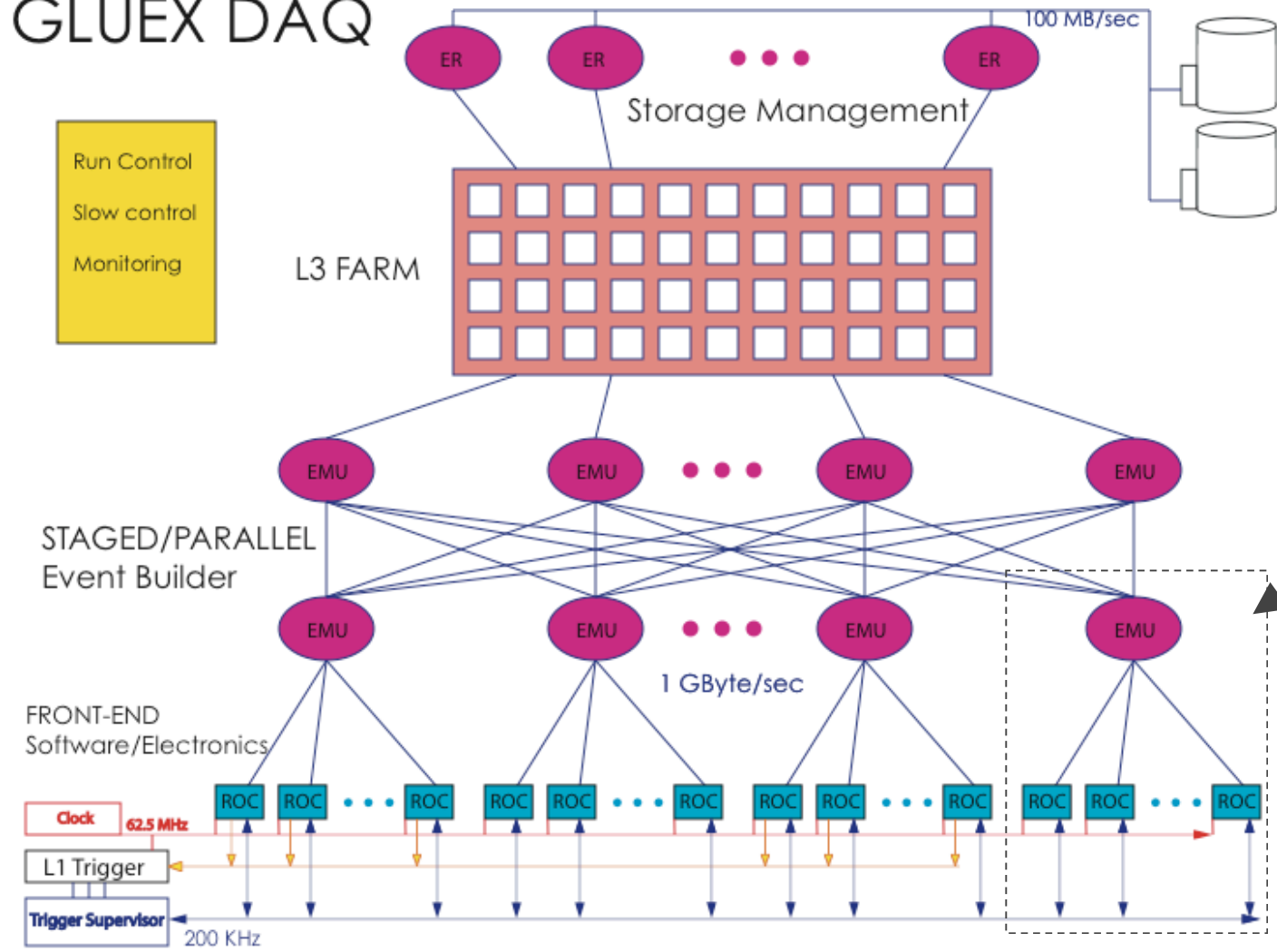
- There is a group dedicated to development and support of data acquisition at Jefferson Lab. This includes Hall D.
- Much of what Hall D needs is generally useful to the whole JLAB experimental program.
- We are not waiting on the 12GeV upgrade.

# In the short term...

- Hall D Requirements drive development
- Replace aging technologies
  - Run Control
  - Tcl-Based DAQ components
  - mSQL
- Maintain cross-platform compatibility
  - Linux, Solaris, OS X, vxWorks
- Support new commercial hardware advances

# HALL D

## GLUEX DAQ



# GlueX - Requirements

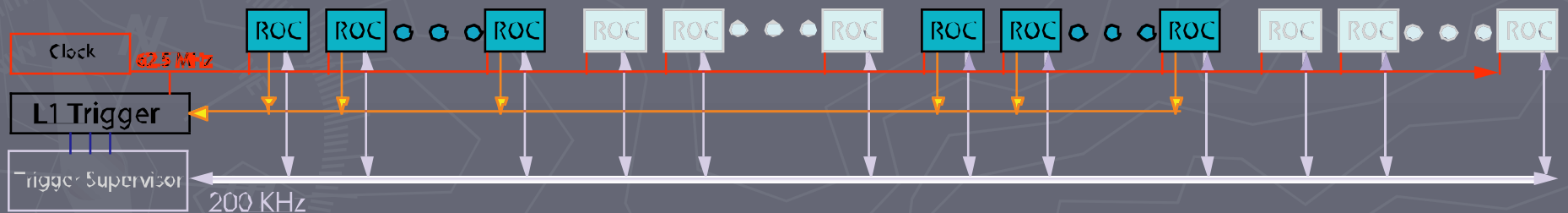
- Pipelined Electronics (ADC, TDC)
  - Dead-timeless system
  - 200 KHz L1 Trigger
- Parallel/Staged Event Building
  - Up to 100 Front-end Crates
  - 1 GByte/s aggregate data throughput
- L3 Online Farm
  - 200+ nodes
  - x10 reduction in data to disk
- Storage Management
  - Ordering/sorting of built events (at 15-20 kHz)
  - 100 MB/s --> 8 TB/day --> 1 PB/year

# Front-End Issues

- Trigger rate - 200 KHz
  - Block up Events (200 event block -> 2kHz)
  - Move some ROL runtime code to modules (FPGAs)
  - ADCs provide L1 trigger data ( hence we need a distributed high speed clock - 62.5 MHz ??)
- New Trigger Supervisor
  - Perhaps 100+ crates
  - Support pipeline, event blocking
  - Manage flow control into DAQ system backend

# Level 1 Trigger

- Distributed high speed clock
- Subset of ROCs collect sampled ADC data and send it to L1 Trigger in sync
- 12 bit sums/crate x 250MHz --> 3 Gbit/s links
- Trigger decision goes to Trigger Supervisor



# Front-End Issues cont...

- Form-Factor for electronics
  - VME64X
  - New commercial bridge (TSi148) supports 300MB/s on existing VME backplanes
  - Support other Hall DAQ applications
- High speed switched serial interconnect (4Gbit/s links) needed for GlueX L1 trigger
  - Commercial solutions - VXS, ATCA ?
- DAQ - Trigger - Modules : All must be designed to work together.

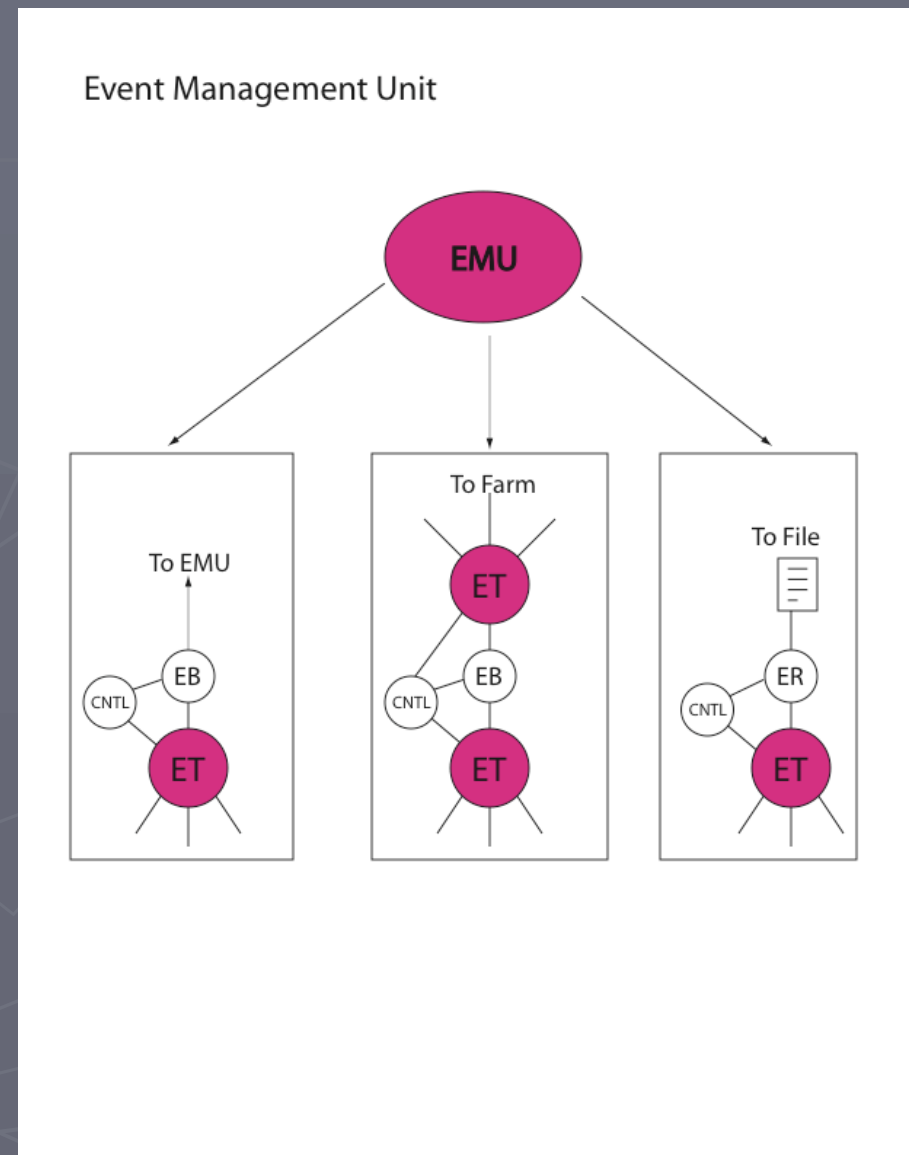


# Staged/Parallel Event Building

- EMU built around the ET system for customizable processing/distribution of event streams.

## Examples:

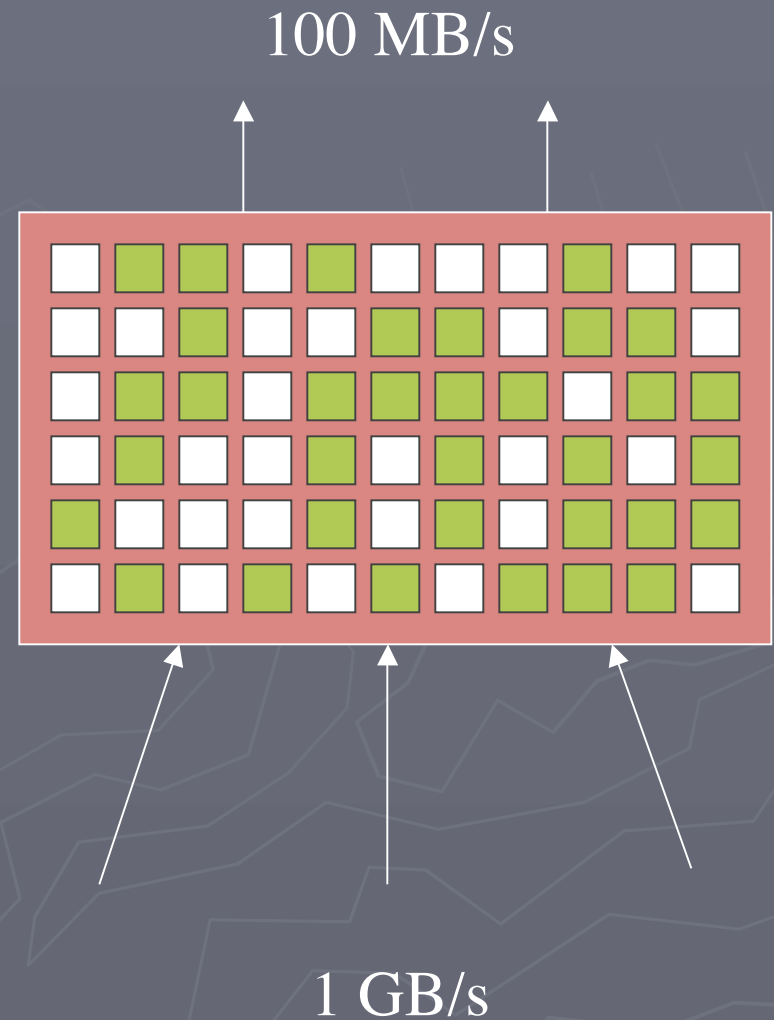
- Data Concentrator for ROCs
- Sub-Event builder
- Farm distribution point
- Event Recorder
- User Processes can attach to any EMU in the system



# L3 Farm

- Can be used for analysis or filtering
- Support 100s of nodes
- Nodes can come and go during event taking

- 
- Do other experimental halls need this (Hall B)?
  - Do filtered events need to be time ordered?



# RunControl / Monitoring / Slow Controls

- First generation Java Agent RunControl is here
  - Robust fault tolerance
  - Process abstraction through COOL language
- Integration of foreign processes
  - DP, vxServer, shells
  - EPICS, CAEN OPC coming
  - Move toward full integration of Slow Controls
- Web Interface for remote monitoring.
- Extended and customizable graphing and DAQ system monitoring capabilities
- Basis for Cmsg - CODA messaging system currently under development

# Other Issues

- Integrate existing Hall requirements into a single supportable distribution.
  - Transition toward Hall D requirements.
- Maintain cross platform compatibility
  - SUN, LINUX, VxWorks
  - 64bit Arch - Opteron, G5 (Mac X)
  - Embedded Linux (on Single Board Computers)
- Move to database independence
  - Proxy Server (JDBC) to support User's database choice
- User Hooks into the DAQ system
  - JAVA
  - Updated Tcl support
  - Others...??

# Summary

- CODA version 3 is now being molded - nothing is irreversible.
- Our plan is to phase in new tools to provide a smooth transition from CODA2 --> CODA 3
- Much software support for Hall D requirements are on a short term timeline (2-3 years).
- Front-End (hardware) support is longer term and may go through a “revision 1” iteration for use in existing experiments.