



# LDAS Software Status

PAC8 Meeting  
May 1-2, 2000  
Caltech

James Kent Blackburn  
California Institute of Technology

LIGO-G000113-00-E

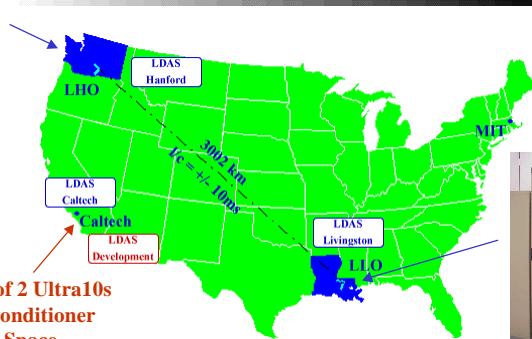
May 2, 2000



# New Development System

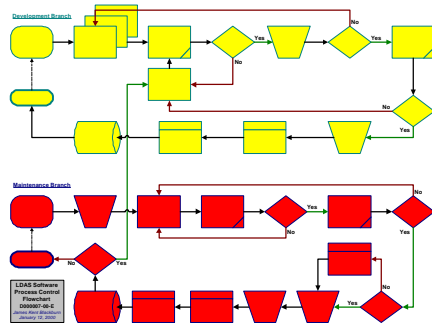


## LIGO Data Analysis System

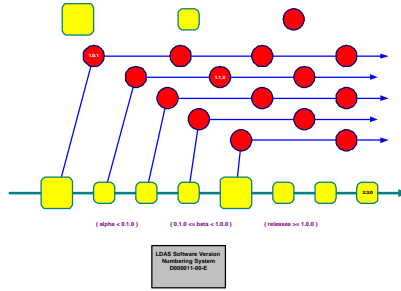


- + Sun 450 instead of 2 Ultra10s
- + Quad PIII data conditioner
- + Extra Hard Disk Space
- + Beowulf Gateway (2 cpu)
- + Beowulf Cluster (16 cpu)

# Improved Testing & Quality

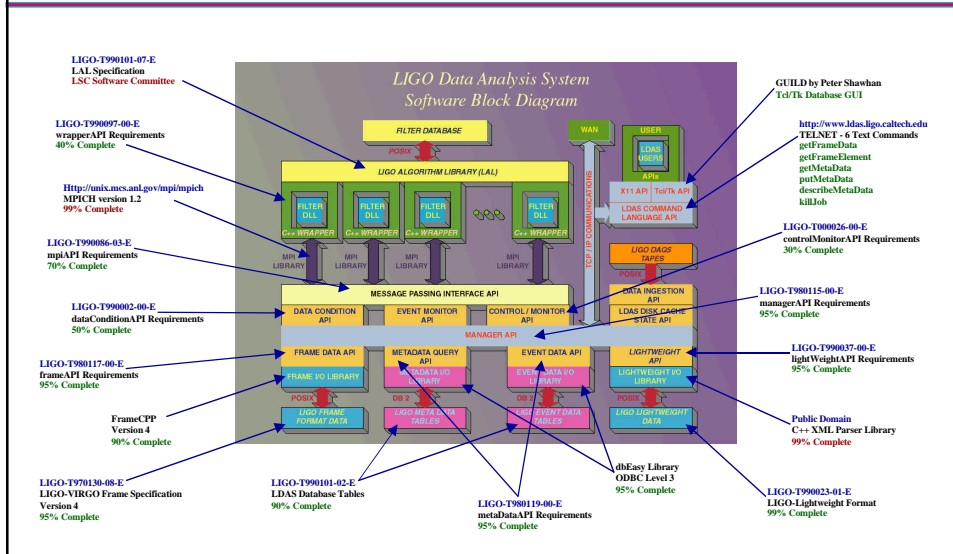


**Flow chart controls how software development & testing are executed!**



**Tree diagram controls release tag numbers found in CVS repository!**

# Implementation Status

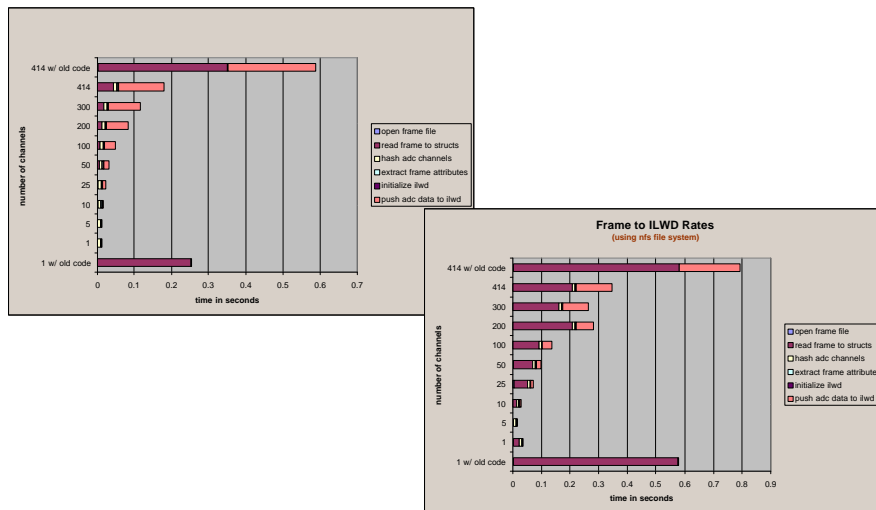


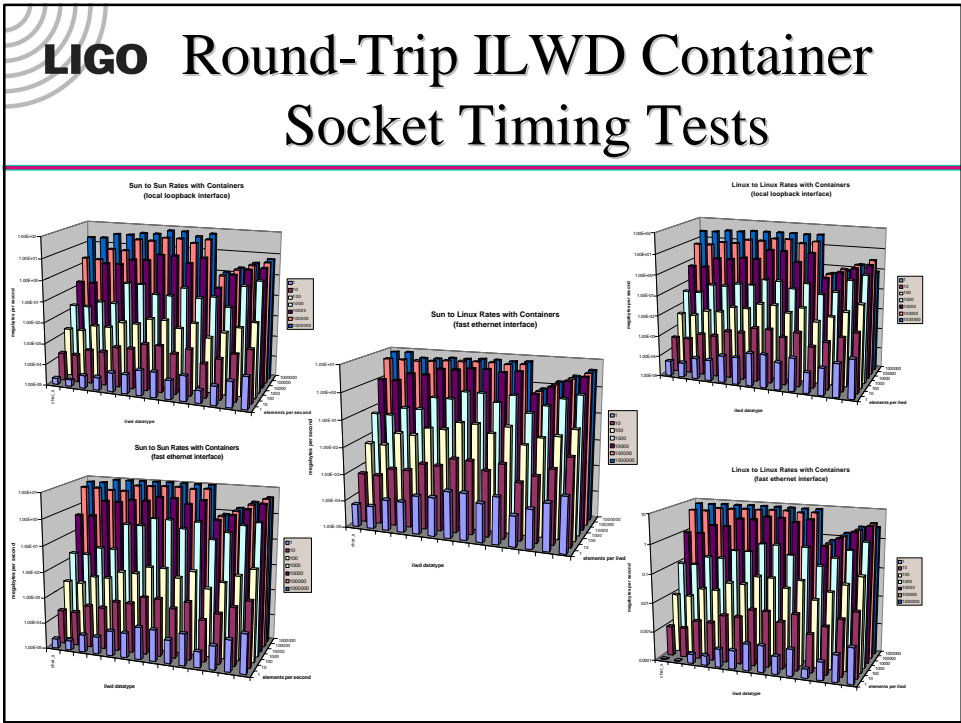
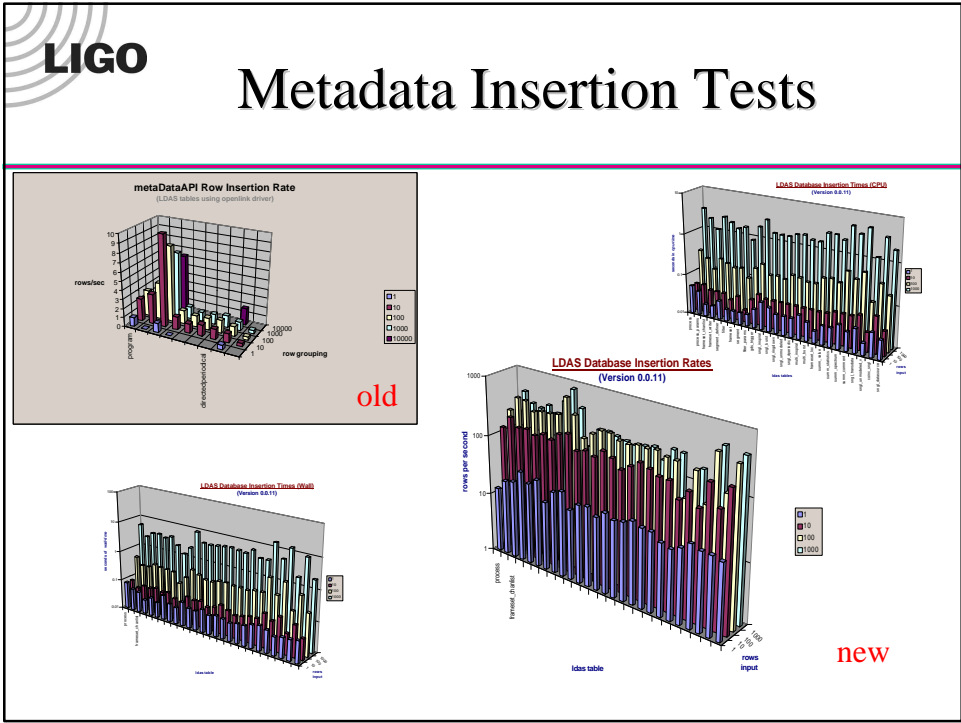


# Recent Software Enhancements

- ❑ New LDAS Build Script:
  - *New Pre-Build, Build, & Post-Build functionality based on bsh, automake, autoconfig & make*
- ❑ Frame Format:
  - *New Frame Specification: version 4.0!*
  - *FrTOC "table of contents" indexes into frame for faster data access from file!*
  - *This also removes necessity to load full frame!*
- ❑ FrameCPP:
  - *Added static index I/O buffers for frames with same run number to remove necessity to parse every LIGO frame thereby increasing read/write speeds - 1-20 fold over previous versions!*
  - *Tested with VIRGO's help and released version 4.0 compliant FrameCPP Library!*
- ❑ ILWD C++ Object Socket Transmission:
  - *Added more intelligence and buffering to object space code, increase speed of object oriented distributed data transmissions by 10-1000 times that of previous software!*
  - *Now able to send and receive ILWD objects between Sun and Linux!*
- ❑ ODBC Level 3 client library (dbEasy):
  - *Upgraded IBM's DB2 Server: version 6.1*
  - *Added ODBC Level 3 calls to dbEasy (multi-row inserts) resulting in a 10-100 fold improvement in database ingestion rates!*
- ❑ managerAPI (System Start-Up and Restart):
  - *Manager now starts up all other LDAS APIs and has emergency socket command support to restart any API.*

# Frame to ILWD Timing Tests

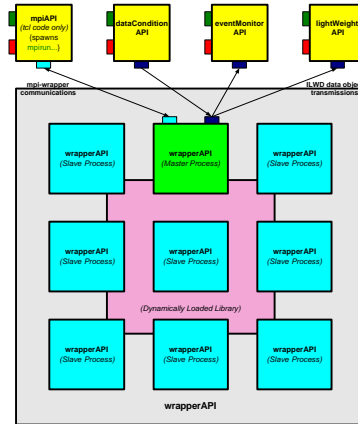




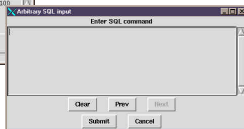
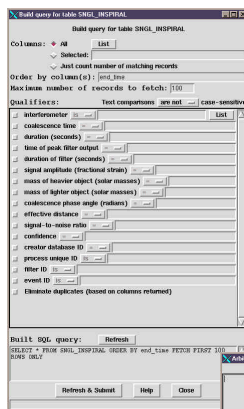
# Current Software Activities

## Parallel Computation!

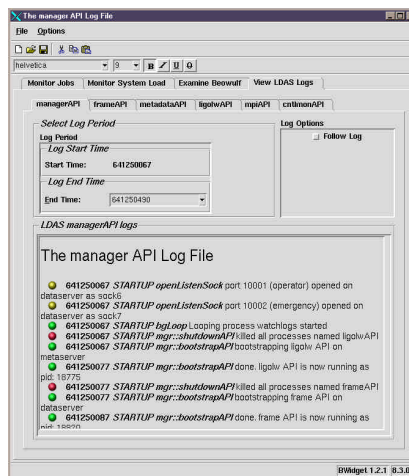
- ⇒ **dataConditionAPI:**
  - ✗ pre-conditions data prior to parallel processing
  - ✗ collaborating with ANU, PSU, & UTB LSC members
- ⇒ **mpiAPI:**
  - ✗ initiates parallel jobs
  - ✗ manages dynamic load balancing
  - ✗ listens to parallel status reports
- ⇒ **wrapperAPI:**
  - ✗ parallel analysis driver code
  - ✗ dynamically loads algorithm libraries
  - ✗ collaborating with UWM LSC members
- ⇒ **controlMonitorAPI:**
  - ✗ GUI interface to LDAS system (*client-side & server-side*)
  - ✗ displays status of parallel jobs
  - ✗ allows additional control of parallel jobs after start-up
  - ✗ provides views of all LDAS log files
  - ✗ provides some simple system administration tasks.
- ⇒ **eventMonitorAPI:**
  - ✗ gathers results from parallel jobs
  - ✗ commits database results to metaDataAPI
  - ✗ initiates new post-parallel processing on resultant data



# LDAS GUIs



GUI to LIGO's Database

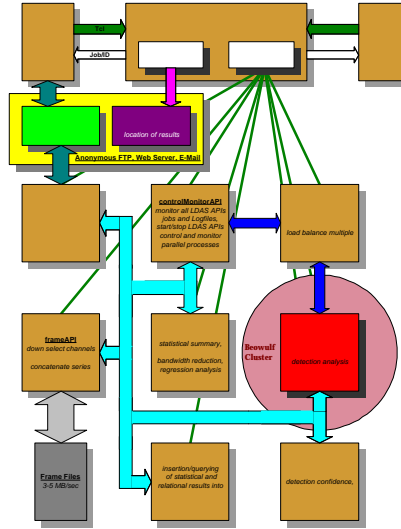


controlMonitorAPI Client GUI

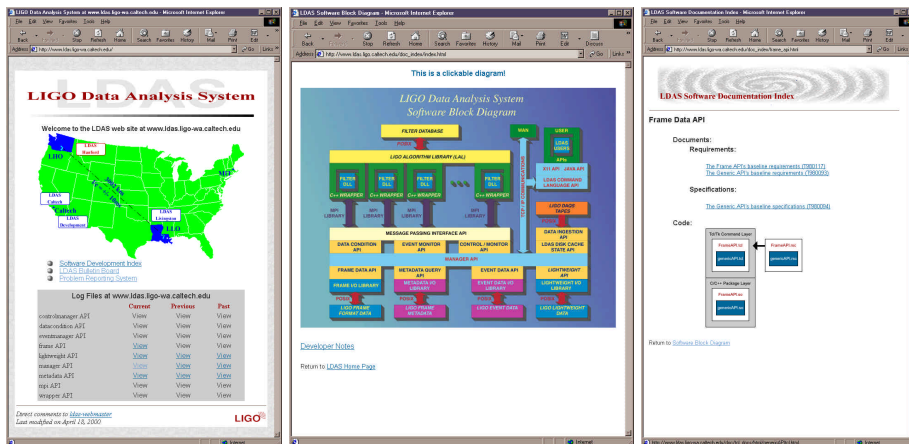
# Mock-Data-Challenges

## 3 Mock Data Challenges This Year!

- **E1 trigger ingestion:**
  - X GDS:dmt, LDAS:managerAPI, lightWeightAPI, metaDataAPI
  - X dmt generates trigger events in LIGO\_LW document file and sends LDAS commands to managerAPI to pick up LIGO\_LW files and ingest triggers into LDAS database.
  - X Run completed April 29th successfully!
- **dataConditionAPI:**
  - X LDAS: managerAPI, frameAPI, metaDataAPI, lightWeightAPI, dataConditionAPI
  - X Frame data will be conditioned in preparation for parallel processing algorithms. Summary statistics about the data will be stored in the LDAS database. Tests will verify signal conditioning algorithms, performance, throughput and system robustness in a series of test planned that will span several days.
  - X Sam Finn (LSC/PSU) placed in charge of requirements and planning. Tentatively scheduled for last week of July.
- **wrapperAPI:**
  - X LDAS: managerAPI, frameAPI, metaDataAPI, lightWeightAPI, dataConditionAPI, mpiAPI, wrapperAPI, controlMonitorAPI, eventMonitorAPI, LSC: LAL based dynamically loaded libs.
  - X Conditioned data is analyzed on the LDAS compute cluster for astrophysical signals. Load balancing and controlling of multiple jobs will be tested. Events detected by algorithms will be post-processed and stored in LDAS database.
  - X Patrick Brady (LSC/UWM) placed in charge of requirements and planning. Tentatively scheduled for late November.



# New LDAS Look on the Web



Lots of *click-able* diagrams!

# LDAS API Status Log Files

The left screenshot shows the 'LDAS API Status at ldas.ligo-wa.caltech.edu' page. It displays the current time as 04/28/00-17:24:55 PDT (04/29/00-00:24:55 GMT) and lists the status of three APIs: manager, ligo, and frame. Each API entry includes its uptime, total memory allocated, current resident set size, and current CPU usage.

- manager API** (running on *dataserver* port 10001):
  - uptime: 0 days + 05:30:14
  - total memory allocated: 6480 KB
  - current resident set size: 6208 KB
  - current CPU usage: 8.8 percent
- ligow API** (running on *dataserver* port 10004):
  - uptime: 0 days + 05:30:33
  - total memory allocated: 27052 KB
  - current resident set size: 15608 KB
  - current CPU usage: 0.4 percent
- frame API** (running on *dataserver* port 10007):
  - uptime: 0 days + 05:30:23
  - total memory allocated: 32224 KB
  - current resident set size: 27208 KB
  - current CPU usage: 1.8 percent
- metadata API** (running on *metaserver* port 10010):
  - uptime: 0 days + 05:30:08
  - total memory allocated: 38688 KB
  - current resident set size: 23368 KB
  - current CPU usage: 0.6 percent

The right screenshot shows 'The manager API Log File' with a list of log entries. Each entry includes a timestamp, a log level (e.g., NORMAL), and a description of an event, such as creating a namespace, opening a channel, or deleting an assistant manager.

# Problem Tracking System

The left screenshot shows the 'gnatweb' query results page. It displays 15 matches found for a search query. The results are presented in a table with columns for PR number, Originator, Arrival Date, Closed Date, and Synopsis.

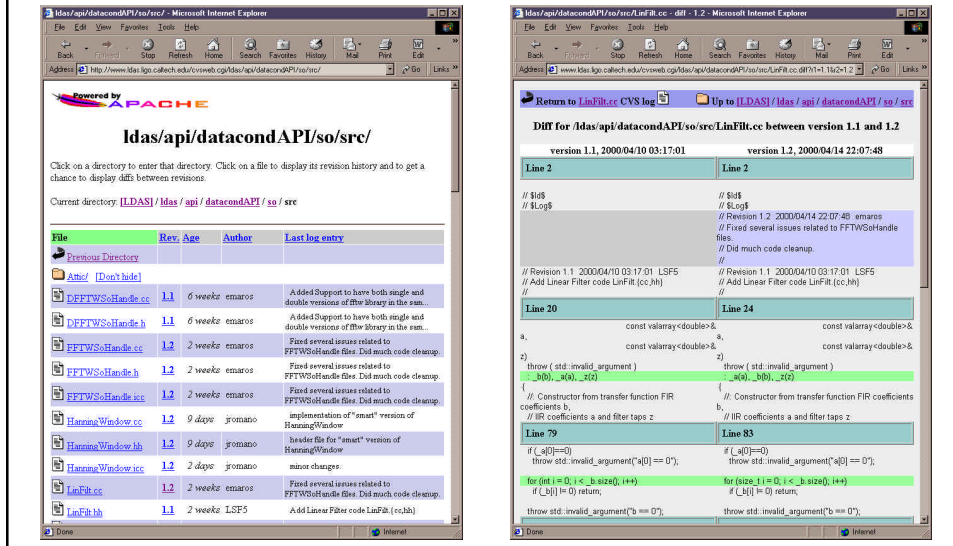
PR	Originator	Arrival Date	Closed Date	Synopsis
114 sst	Peter Shawhan	2000-03-10 14:19:01		hwAPI should make use of masks to indicate null values
113 sst	Peter Shawhan	2000-03-10 14:19:00		metadataAPI should make use of masks to indicate null values
112 sst	Peter Shawhan	2000-03-10 13:19:01	2000-03-10 13:28:28	hwAPI should handle empty led container with ligow?
111 sst	Kevin Blackmore	2000-03-10 12:49:01		API support for name type in database tables and IP/D2 internal data
110 sst	inhaber	2000-03-09 17:04:00		jetStreamAttributes is not implemented for all attributes in some elements
109 sst	Shant Androno	2000-03-08 17:49:00	2000-03-10 14:31:07	not taking to serial fromshantandrono
108 sst	Phi Eberns	2000-03-08 16:49:00		attempt to run 'sudo reboot' on mainline produces error message: can't read /etc/passwd: Bad file number: 9
107 sst	Phi Eberns	2000-03-08 16:34:01	2000-03-08 16:50:11	attempting to reb. anywhere as initial causes terminal to hang and generates huge network load.
106 sst	Phi Eberns	2000-03-08 15:34:00	2000-03-08 16:10:02	password for user 'serial' is null in shell _ssh
105 sst	indj@ligo.caltech.edu	2000-03-08 13:04:00		ind2-m71 kate: disksocket transfer very slow for data 1000000
104 sst	Peter Shawhan	2000-03-08 13:34:01		jetStreamData can be used to MODIFY the database
103 sst	Peter Shawhan	2000-03-08 13:04:00	2000-03-09 09:54:10	Error connecting led containing an empty table to LIGOW_LW
102 sst	indj@ligo.caltech.edu	2000-03-07 16:49:00	2000-03-10 14:29:44	unable to mount fromshantandrono directory on m71
101 sst	Shant Androno	2000-03-06 14:49:00		Change lds.ligo-wa/remote_reports
100 sst	Kevin Blackmore	2000-03-06 13:34:00		Don't remove and patch file in comment.

The right screenshot shows a 3D bar chart titled 'LDAS Problem Reports'. The Y-axis represents the number of reports, ranging from 0 to 40. The X-axis represents time. The chart shows a significant peak in reports, with a legend indicating 'New' (blue), 'Closed' (red), and 'Open' (white) reports.

- Advanced query interface allows very detailed analysis about problems stored in database to be studied on the web!
- Search by text, date, and individual fields(11).
- Reports can easily be customized.



# CVS Repository on the Web



# Concluding Remarks

- ➔ Better process control insures improvements in testing and quality.
- ➔ LDAS Software code has doubled since last PAC meeting as we reach the half way point in the software construction phase.
- ➔ Performance of major infrastructure components greatly improved.
- ➔ Major development focus has moved away from distributed computing infrastructure and on to parallel computing infrastructure.
- ➔ LDAS working closely with Software Committee and LSC to develop dataConditionAPI & wrapperAPI and to schedule collaborative Mock Data Challenges.
- ➔ New web interfaces allow the community to easily learn about LDAS, view status of systems running at sites and access documentation and source code.