E7 Lessons Learned

LDAS

Kent Blackburn

LIGO Laboratory Data and Computing Group

LDAS Job Summary

	Hanford LDAS	Livingston LDAS	MIT LDAS	CIT-TEST LDAS	TOTAL
Total Jobs	63600	48775	280	915	113570
Database Rows	4188188	2789132	1062	2096	6980478

- LDAS ran for full E7 Run: Dec. 28th, 2001 - Jan. 14th, 2002
  - » Approximately one job every 10 seconds (averaged).
  - » Approximately fifty rows every 10 second (averaged).
- Greater than 90% of jobs completed successfully
  - » LHO roughly 92%; LLO roughly 95%; Not checked elsewhere.
- Pre-Release testing revealed 0.3% failure rate!
  - » Pre-release dominated by dataConditionAPI thread problems.
  - » Fraction due to mpiAPI/wrapperAPI communications issues.
  - » Rare Intermittent Issues (difficult to debug) also suspected.

LDAS E7 Failure Modes

- Majority of failure modes easily addressed during the E7 run!
  - » Thread safety in dataConditionAPI cause multiple jobs to be lost at once – *not easily addressed and remains open issue*.
  - » Directory used to store data products filled up twice near end of run - *deleting pre-E7 files fixed each time*.
  - » Locked segments *wrapping* around from Nth frame directory to first frame directory not found by frameAPI - *this only occurred once*.
  - » Twice users killing jobs involving the metaDataAPI caused all jobs using database to fail - *restarting metaDataAPI fixed*.
  - » Known communication issues between mpiAPI and wrapperAPI caused node table to confuse available node list - *restarting mpiAPI fixed*.
  - » Use of stderr and stdout in LAL/LALwrapper cause managerAPI to become unresponsive to requests - *new LAL code submitted to fix*.
  - » Bugs in LAL/LALwrapper cause jobs to fail - *subsequent LAL releases fixed*.
  - » *Pilot errors* in scripts caused job failures - *external user scripts corrected*.

LDAS E7 Failure Modes

- CDS time server drop out - *caused frames to not be available for requested time intervals; new software fixed .*
- The dataConditionAPI failed to collect data from both the frameAPI and metaDataAPI in a timely manor to continue processing -- *This was only an issue for periodic search, which did not run on-line.*

Open Issues Raised Post-Run

- Search codes communicating with LDAS at Unix socket limit (Nagler's Algorithm).
- Inaccuracies in search code's measure of progress makes it difficult to monitor.
- LDAS users from the LSC would like top level visibility into all search codes running on LDAS systems in the form of a GUI
  - » Plans call for super-job control GUI tool visible in control rooms.
- Creators of driver scripts used to control job submittal would like more standardized error reporting
  - » Driver scripts used a job-control library which didn't expose this information.
- LAL/LDAS Software Users Group uncomfortable with responsibilities of allocation and scheduling of resources
  - » Requests made that new LSC Computing Committee review these requests.
- Data Management
  - » Reduced data sets needed now *(All data cannot be available everywhere all the time)*
  - » Replication or distributed access to metadata is needed
  - » HPSS archive (pre-E1 through E7) has reached 30 TB and 300,000 files
    - – 10% of a 1 year 7x24 science run (one more order of magnitude to go)

High priority items needed to get LDAS on track for Science Runs

- Lengthy schedule of LDAS development tasks necessary by Science Runs:
  - » Rework configuration & build rules to support migration towards beta & final releases of LDAS.
  - » Create new diskCacheAPI; pull out this functionality from frameAPI.
  - » Improve reliability of dataConditionAPI (thread issues).
  - » Add common resampling library to LDAS for use in both the frameAPI & dataConditionAPI
  - » Extend system monitoring: *track API shutdowns & restart, core files &debugging, job & database statistics and user account management, improve status information on web pages*.
  - » Add interpolation, Kalman filters, regression and rework intermediate() function in dataConditionAPI.
  - » Reduce memory usage in dataConditionAPI by average of ~ 5x

High priority items needed to get LDAS on track for Science Runs

- Move LDAS API processes onto new dataserver
- Improve documentation, interfaces, and table designs per LSC recommendation
- Implement new TCL channel management interface to better control data sockets.
- Add new detector geometry metadata to LDAS pipeline to better support use of ALLEGRO bar data in stochastic search code
- Add job load monitoring commands to support GriPhyN integration
- Determine archival technology QFS, HPSS, Both?
- Build up LDAS-CIT hardware and software (Scientific LDAS System at Caltech)