



Data Conditioning in LDAS: Report on the First Mock Data Challenge

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LDAS MDC Overview

- LDAS: LIGO system for data analysis
 - » System? Function, not components
 - » Integrates with
 - CDS
 - Analysts
- System provides ...
 - » Resources, management for
 - 24x7 automated analysis
 - Complex, non-automated analysis involving full data stream from multiple IFOs
 - » Data management for analysis
- Components
 - » Hardware: Computers, disks, tapes, networks, etc.
 - » Software: Data & hardware management, validated “science” software components
 - » Data: Data, databases
 - » User interfaces: Web, X GUIs; command-line interface, etc.
- LDAS System, Integration Tests
 - » Internal: hardware, software, data, user interfaces
 - » External: detector data stream, analysts



First MDC: datacondAPI

- datacondAPI provides data conditioning functionality for analysis
 - » Data conditioning? Preparing data stream for analysis
 - » Examples
 - Regression of instrumental, environmental artifacts
 - Drop-out/veto management
 - Band selection; doppler demodulation
 - Calibration; power spectrum estimation & other statistical characterization; etc.
 - » Programming environment: LIGO's custom matlab
- Analysis programs request data conditioned in problem-specific ways
 - » E.g., bandwidth about frequency, estimated power spectra to given accuracy, resolution, etc.
 - » datacondAPI processes data as requested, communicating with other APIs to acquire data and other necessary resources



Current datacondAPI Development Team

- Australian National University
 - » *Philip Charlton*, Antony Searle
- LIGO/CIT
 - » Kent Blackburn, *Philip Charlton*, Phil Ehrens, Albert Lazzarini, Ed Maros, Isaac Salzman
- Penn State
 - » LSF, Eric Rotthoff, Charlie Shapiro, Natalie Hepler
- University of Texas, Brownsville
 - » Joe Romano, Warren Anderson, Art Gonzalez
- Project Start
 - » 15 December 1999
- *Modus Operandi*
 - » Weekly planning telecons
 - Review, reassess, refocus
 - » Web site
 - Minutes, resources
 - » Mailing list
 - Discussion between telecons
 - » “Weekly Report”
 - Saturday AM automated digest of accomplishments, open issues, schedule reassessment
- First Mock Data Challenge
 - » 31 July - 6 August 2000



MDC Scope

- Documentation availability, completeness
- Correctness, accuracy of conditioning software
 - » PSD estimation, linear filtering, resampling, filter design, (I)dft, basebanding, etc.
 - » Error handling, recovery
- System integration
 - » Can functionality be accessed from user commands issued to manager?
 - » Is science integrity maintained through implementation?
- Performance statistics
 - » Speed of DFT/IDFT, resampling, etc.
- Pipeline tests
 - » Executing complex, compound analysis chains
 - Writing, executing data conditioning *programs* in LDAS
 - » Ability to multi-task/process
- Long-term operations
 - » Can LDAS, data conditioning API operate unattended in a production mode for several days?



Outcome: Executive Summary

- Documentation: Pass
 - » Missing documentation, automatic documentation generation system problems identified, being corrected
- Scientific Correctness: Pass
 - » At atomic, action level, including error handling & reporting
- Performance Statistics: Pass
 - » Accumulated for DFT, IDFT, linear filtering, resampling
- Pipeline Test: Pass
 - » Multi-tasking/processing test revealed linux kernel bugs; expect mid-week resolution
- Long-term Ops: Pass

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30 April - 2 May 2001

Finn/Penn State/LIGO Review

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Next steps for datacondAPI

- LDAS integration
 - » Pipeline to metadatabase, wrapperAPI
- Additional functionality
 - » Driven by upper limit group requirements
- E3 run testing and analysis
 - » datacondAPI driving E3 seismic noise investigation



August '00 MDC Summary

- **Mock Data Challenge**
 - » Data conditioning S/W science validation
 - » LDAS System Integration Test
- **Important Milestones**
 - » First LDAS System Integration Test
 - » First integration of university-based LSC S/W into LDAS
 - » First integration of analysis S/W into LDAS envelope
 - » First use of LDAS for data analysis activity