



# Architecture/Framework Status

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DOE/NSF Review of U.S. ATLAS Physics and Computing Project

FNAL

November 2001

# Outline



- ❄ **Brief overview of Milestones and Deliverables**
  - LUND (Physics Workshop)
    - ⌘ September 2001
  - Data Challenge 0
    - ⌘ December 2001
  - Data Challenge 1
    - ⌘ March 2002 through May 2002
- ❄ **Architecture Review Committee**
- ❄ **Current and near-term activities**
- ❄ **Computing Model Activities**

# Lund (2.0.2) Release



- ❄ Deliverables (next page) for Lund were in place
- ❄ Useful physics studies
- ❄ Useful feedback from physicist users
  - Being assimilated and improvements/responses being worked on
- ❄ Some bugs found
  - Most have since been fixed
  - One major scaling limitation (n-tuple handling) still outstanding
- ❄ A very useful and generally positive exercise

# Lund (2.0.2) Deliverables



- ❄ Two generators (Pythia & Isajet)
- ❄ AtlfastTemp
- ❄ Atlfast OO
- ❄ Lightweight Athena installation
- ❄ G3/DICE with updated detector geometry
- ❄ G4 for physics validation studies (test-beam)
- ❄ G4 with simplified ATLAS geometry
- ❄ Reco able to read new DICE & old TDR data
- ❄ Objy & ROOT read/write for Atlfast & full reco

# Architecture Review Committee



- ❄ Report issued in July 2001
  - 12 month review process
- ❄ Recommend adoption of Athena
  - But with several major concerns
    - ⌘ Transient/Persistent separation
    - ⌘ Use of Python as scripting language
    - ⌘ Use of IDL as data definition language
  - Some of these do not reflect consensus within ARC
- ❄ Several issues became historical by the end of the review
- ❄ But we did alter our priorities as a result of their feedback
- ❄ Detailed response still being compiled

# Major Ongoing Activities (1)



## ❄ Pile-up Support [LBNL]

- ❑ Mixing of generated and background events
- ❑ Requirements document and conceptual design available
- ❑ Detailed design and implementation underway
- ❑ Basic infrastructure in place for 2.4.0 release (November)
- ❑ Goal is prototype for 3.0.0 release (December)

## ❄ Detector Description [LBNL, CERN]

- ❑ Support for time-varying geometry and alignment (and calibrations)
- ❑ Requirements from Pixels, LAr, and Muon systems
- ❑ Conceptual design in place
- ❑ Detailed design and implementation underway
- ❑ Goal is prototype for 3.0.0 release (December)

# Major Ongoing Activities (2)



## ❄ Event Data Model

### □ Framework [BNL, LBNL]

- ⌘ StoreGate data access service
- ⌘ DataHandle & DataLink access mechanisms

### □ Raw Event Data Model [BNL, CERN]

- ⌘ Requirements from Simulation, Reconstruction, Event Filter and Detector Subsystems
- ⌘ Prototypes exist for several detector subsystems

### □ Data Dictionary [LBNL, Anecy]

- ⌘ Automatic code generation from data model specification
- ⌘ Multiple back-end code generators planned
  - Objectivity, scripting and browsing currently available
  - ROOT planned prior to Data Challenge 1

# Major Ongoing Activities (3)



## ❄ Platform support

- ❑ Linux gcc (egcs dropped after release 2.3.1)
- ❑ Solaris by 3.0.0

## ❄ Architecture Web pages

- ❑ <http://www.cern.ch/Atlas/GROUPS/SOFTWARE/OO/architecture>

## ❄ Documentation

- ❑ Separate Developer Guide and User Guide & Tutorial
- ❑ Based on 2.0.0 SRT ATLAS Release
- ❑ Being updated to CMT ATLAS Releases

## ❄ Tutorials

- ❑ Setting up a web-based tutorial (with U. Michigan)

# Simulation and Athena



- ❄ Athena developed as common framework for generation, simulation, reconstruction, event filter, physics analysis
- ❄ Independent Fads/Goofy framework developed by ATLAS simulation group for Geant4 simulation
  - ❑ Potential divergence and duplication of effort
  - ❑ No timescale or technical plan for integration with Athena
  - ❑ Viewed with concern by us and Review Committees
- ❄ Proof-of-principle prototype Geant4 integration with Athena
  - ❑ One developer (Charles Leggett – LBNL) part-time
  - ❑ Valuable feedback from Nevis (Liquid Argon testbeam)

# G4 integration into Athena: Prototype



- ❄ Event generation using standard Athena generators
- ❄ G4 hits and trajectories output to Athena transient store
- ❄ Detector geometry from all ATLAS sources and tools
  - Fads/Goofy, AGDD, G4 classes
- ❄ Physics lists
- ❄ Visualization
- ❄ Integration with Athena services
  - Data Dictionary, Bookkeeping and history services being developed
- ❄ URL <http://annwm.lbl.gov/G4>

# G4 integration into Athena: Status



- ❄ Prototype announced to Computing Coordinator, Simulation Coordinator and CSG
- ❄ Discussed at CSG Meeting of 26 Oct. with a request to be allowed to put code into the ATLAS CVS repository
- ❄ On hold while intense discussions with all parties
  - ❑ No clear strategy
  - ❑ Useful emails with FADS/GOOFY main developer
  - ❑ Talk planned at ATLAS software week

# New Gaudi Versions



## ❄ New functionality generated by ATLAS and LHCb

- ❑ More flexible event loop management
- ❑ Improved Service Management Infrastructure
- ❑ Enhanced scripting support
- ❑ Support for StoreGate backend
  - ⌘ Performance improvement
- ❑ Use of AIDA interfaces (HEP standards)
- ❑ Data Object introspection abstract interface
- ❑ ROOT v3.01 persistency

## ❄ Good collaboration

# GRID enabling Athena



- ❄ Much of effort so far has been on developing middleware
- ❄ Data access and management, job submission, authentication, etc.
  - ❑ ANL and BNL efforts have focussed on this
  - ❑ LHCb also looking at job submission
- ❄ LBNL group begun to look at integration into Athena itself
  - ❑ Initial testbed to incorporate GRID monitoring capabilities
    - ⌘ Collaboration with Valerie Taylor (NorthWest)
  - ❑ Identification of others
    - ⌘ Message logging
    - ⌘ Distributed histogramming
    - ⌘ *Etc.*

# From SRT to CMT



- ❄ Migration from unsupported SRT configuration management and release tool to new CMT tool
- ❄ Not a US-ATLAS deliverable but we've played a major role
  - ❑ Developing policies and procedures
  - ❑ Trial releases to uncover problems and inconsistencies
  - ❑ Providing developer help and consultancy
- ❄ Migration still underway
  - ❑ Converging on stability
- ❄ Nightly builds migrated to CMT and to CERN
  - ❑ Alex Undrus

# Funding Shortfall



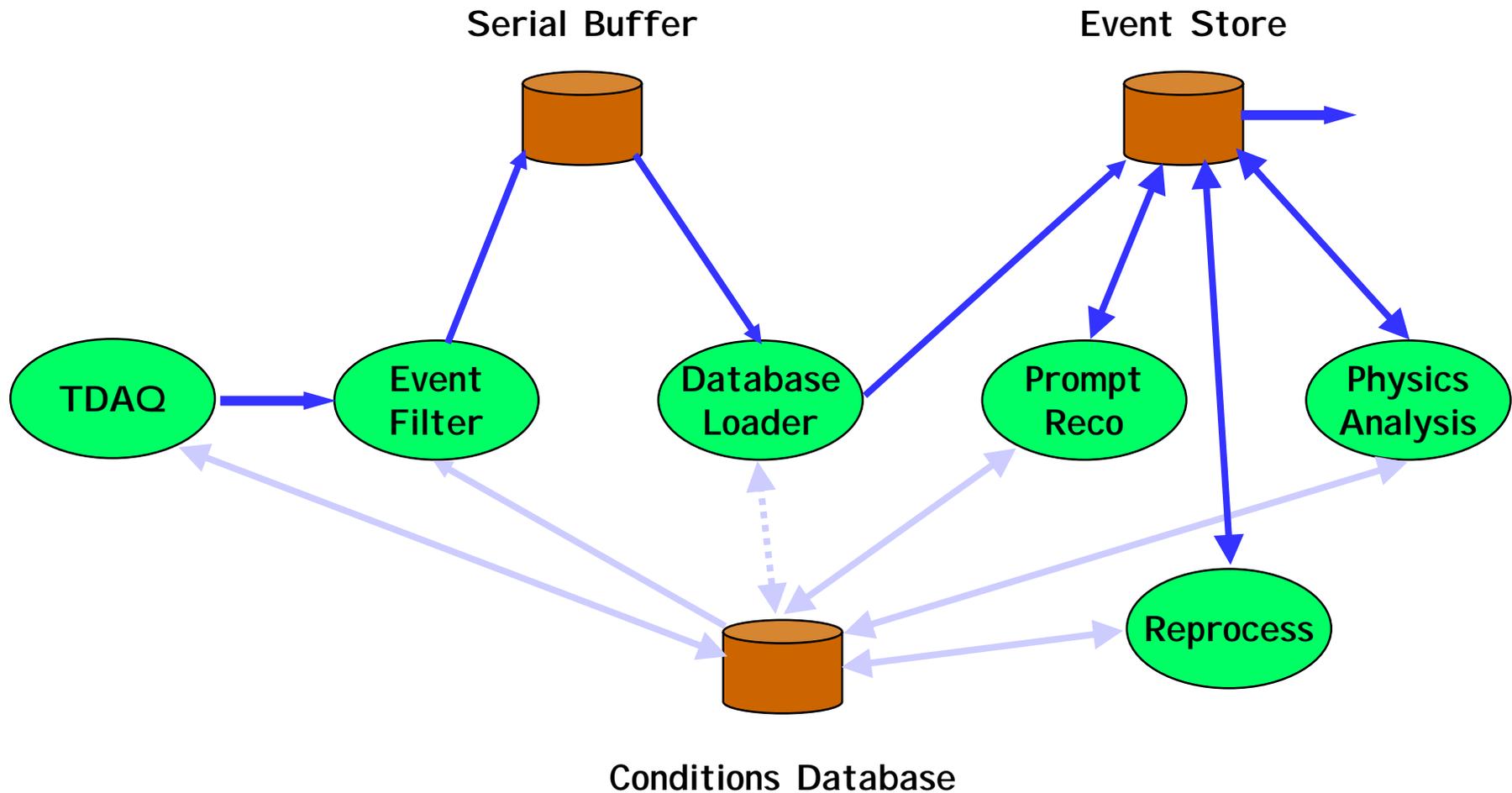
- ❄ **LBNL funds from DOE and NSF reduced for FY02**
  - ❑ Have caused loss of one developer (Chris Day)
  - ❑ Adverse impact on scripting and USDP work
- ❄ **Successfully hired a post-doc as a partial replacement**
  - ❑ Starts on 15<sup>th</sup> Jan 2002
- ❄ **Initial focus will be on the scripting**
  - ❑ LHCb have also extended the work in this area
- ❄ **USDP effort reduced**
  - ❑ Requirements database
  - ❑ Reverse engineering

# Computing Model Discussions



- ❄ Focus is on flow of data from Trigger to Physics Analysis environment and forwards/backwards calibration flows
  - ❑ Not being addressed by NCB rework of global Computing Model
- ❄ Small group from Trigger and Database Groups, and Architecture Team
- ❄ Initial set of questions and issues (“requirements”)
- ❄ Strawman as a starting point to “kick the tyres” and start testing against the requirements
  - ❑ Stages
  - ❑ Latencies
  - ❑ Capacities (bandwidth & storage)
  - ❑ Sources and destinations of conditions information
  - ❑ Event streams. When? Duplication of events?

# Strawman Computing Model



# US ATLAS Presence at CERN



- ❄ LBNL has two developers at CERN full-time
  - Craig Tull and Massimo Marino
- ❄ Goal is to maintain approximately 1-2 people there
- ❄ Has proven to be really useful and beneficial
- ❄ But a strain on maintaining critical mass at LBNL
- ❄ I'd like to encourage this commitment to be augmented by others

# Summary



- ❄ **Good progress on milestones and deliverables**
  - ❑ Some delays haven't yet impacted the overall schedule
  - ❑ Pile-up is expected to be exercised in 2<sup>nd</sup> phase of DC1
- ❄ **Some of the longer term projects coming to fruition**
  - ❑ E.g. StoreGate, Data Dictionary
- ❄ **Coming to end of first phase of development**
  - ❑ Broadening the architectural vision
- ❄ **GRID understanding/integration starting**
  - ❑ Leading up to Data Challenges