Muon Software
- Status & Plans

Software Workshop

CERN

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Muon Software

- Status & Plans for
  - conventional software
  - Database
  - Simulation
  - Reconstruction
- Testbeam
  - organization
- Summary

[from last Muon Workshop - Eilat (November 15-20 1999)]

Muon “conventional” Software

- simulation & reconstruction fully integrated in ATLAS framework
- some studies still needed in next year
  - CSC s being added
  - more realistic RPC s
  - improvements needed both in simulation and reconstruction
  - don t forget Trigger Technical Proposal
- keep the full chain running !

Muon Database - Recent progress

- Muon Detector Description Model
  - Filling of RPC Hierarchical Geometry from AMDB
    - A bottom-up approach reading top-down data
    - A worthwhile and useful exercise
  - testing of transformation methods
    - Input/decoding of GEANT3 digits
    - Checked digit positions against the new methods
    - Subsequent tuning of model
  - Test of feasibility to port model to AGDD
    - Hierarchy can be coded into XML files
    - Need mechanism for parameterization
    - Need serious identifier mechanism

Muon Database - Future Plans

- The ATLAS Muon Spectrometer Database Task
  - Draft 1.0
  - Identifies what we feel are important
    - tasks to address in the coming year
    - goals to be reached for the long term
  - Explains Recent Detector Description Developments
  - Discusses General issues of
    - Event Model, Calibration, Alignment and Production Data
    - Insulation from Database Technology
    - Development of Application-Independent Interfaces
  - Describe the Task Coordination and Resource Needs
  - Is a Working Document

Muon Database - Future Plans

- Evolutionnary Development - An Example : AGDD
  - AMDB works !
  - Software relies on it and on its interface
    - *muonbox*, GEANT4 simulation, *persint, ...*
  - It must continue to work and develop
    - as needed by the dependent applications
    - until a well-proven replacement exists
  - Any replacement must
    - provide the exact same geometry
    - provide additional functionality which merits the effort
    - not disrupt the current working software (cause a major break)
    - fit in the overall ATLAS framework

Muon Database

- Detector Description in a good shape
  - AMDB versus AGDD
  - AMDB is the baseline
  - AGDD to be worked out
    - understand the implications of using XML & AGDD
- Event Model as well
  - one should use PASO (use existing Event 'package)
- Calibrations & alignment
  - will be considered
- Plans

Muon Database - Plans

- Short term *(coming months)*
  - Completion of Barrel Detector Description
  - Interface of Barrel Description to AMDB
  - Interface of Barrel Description to G4
  - testing against GEANT3 Description
- Medium term *(1-2 years)*
  - Completion of Entire Muon Detector description (2000)
  - completion of Event Digit (2000)
  - Evolution of AMDB to general format
  - Storage of Reconstructed objects
- Long term *(2-5 years)*
  - completion of event model
  - persistency studies and development
  - integration of Alignment/calibration/Production Data in detector store

Muon Simulation

- intensive effort started
  - training
  - set of examples
  - ...
- Questions
  - how to start the new simulations
  - how to launch the testbeam simulations
  - how to deal with the existing software
  - how to compare the new results

Muon Simulation - Plans

- Long time scale (next 5 years)
  - testbeam simulation for the different setups
  - subdetectors/services/dead material simulation for the final description of the subdetectors
  - optimization studies as :
    - performance for the different subdetectors
    - cracks
    - backgrounds
    - materials
  - comparison with real data

Muon Simulation - Plans

- Short time scale (next 1-2 years)
  - testbeam simulations
    - to exercise ourselves on the new software
    - to test the tools we adopted
    - to set the comparison to real data
    - to settle a complete chain
    - organization being setup
      - responsible for each subdetector
      - UML will be investigated in parallel

Muon Simulation - Actions

- Short term actions
  - AMDB to G4 to reconstruction - December 1999
  - AMDB'/AMDB to G4 (G4 vs. G3) acceptance studies - February 2000
  - testbeam simulations H8, X5, test-sites (G4 vs. G3) - June 2000
  - G4 vs. G3 (Phys. TDR figures) - December 2000
  - AMDB+ to G4 (RPC overlaps,...) - June 2000
  - current simulation on testbeam to G4 - February 2000
  - AMDB to G4 for TGC's - February 2000
  - AMDB to G4 for CSC's - February 2000
  - XML to G4 for the barrel (MDT+RPC) (XML vs. AMDB) - April 2000
  - Dead material, feet, shields in G4 with AMDB - March 2000

Muon Reconstruction - Pending issues

- Detector Description
  - CSC's not included in Physics TDR
  - more realistic RPC's
- Alignment
  - reconstruction algorithms do not include alignment corrections
  - it is needed, easy ?
- Event Filter
  - code to be provided
  - discussion needed

Muon Reconstruction - to new Framework

- Wait for new Framework
- Meanwhile
  - Muon reconstruction packages should be ported into PASO
    - Provisional interfacing
    - Services evaluation and improvements
      - DD generic model
      - Event completeness
      - Event access
    - Output side
      - track class definition (in common with ID)
      - refer to "entities list"

Muon Reconstruction - Packages

- Muonbox
  - main package used up to now
  - the only tool facing fully the complexity of the reconstruction in the Muon system
  - will still be needed and will still evolve
  - will be *wrapped* not translated
- AMBER
  - a real OO/C++ package
  - performance not known
  - port to UNIX expected soon
  - maintenance under discussion
- Another package ?

Muon Reconstruction
- Short term (February 2000)

- Release the latest Muonbox version
- Port AMBER to Unix (if maintenance insured)
- wrapping of Muonbox
- Push for completion of GEANT4 from AMDB and test with reconstruction packages

Muon Reconstruction - Medium term (Summer 2000)

- "go to" PASO and evaluation
- Plan for AMBER performance evaluation
- Evaluate if a new reconstruction package is needed
- Common track definition
- AGDD evaluation for reconstruction
- alignment corrections in reconstruction
- working procedure with Event Filter group

Muon Testbeam Software

- From discussion during Muon week
  - first time it is discussed
  - ***testbeam*** software is part of general software
  - discussion *offline*/***testbeam*** should be intensified
    - involvement of *task leaders* in ***testbeam*** discussions
  - responsibility on ***testbeam*** side to be identified
  - Short term projects are already launched
  - Medium term projects (some) are identified
    - simulation, reconstruction, ... around H8 (and others)
    - should be considered as pilot projects for future software
    - time scale should fit ***testbeam***
  - Long term projects should also be addressed

Summary

- Conventional software still in use
- Effort to OO/C++ started
  - Short term defined
  - Long term still depending on decisions on Architecture
- *Testbeam* organization now considered
- Documents (status & plans)
  - first drafts available
- MoU
  - first time it was discussed
  - well received (Amber)
  - how to proceed ?