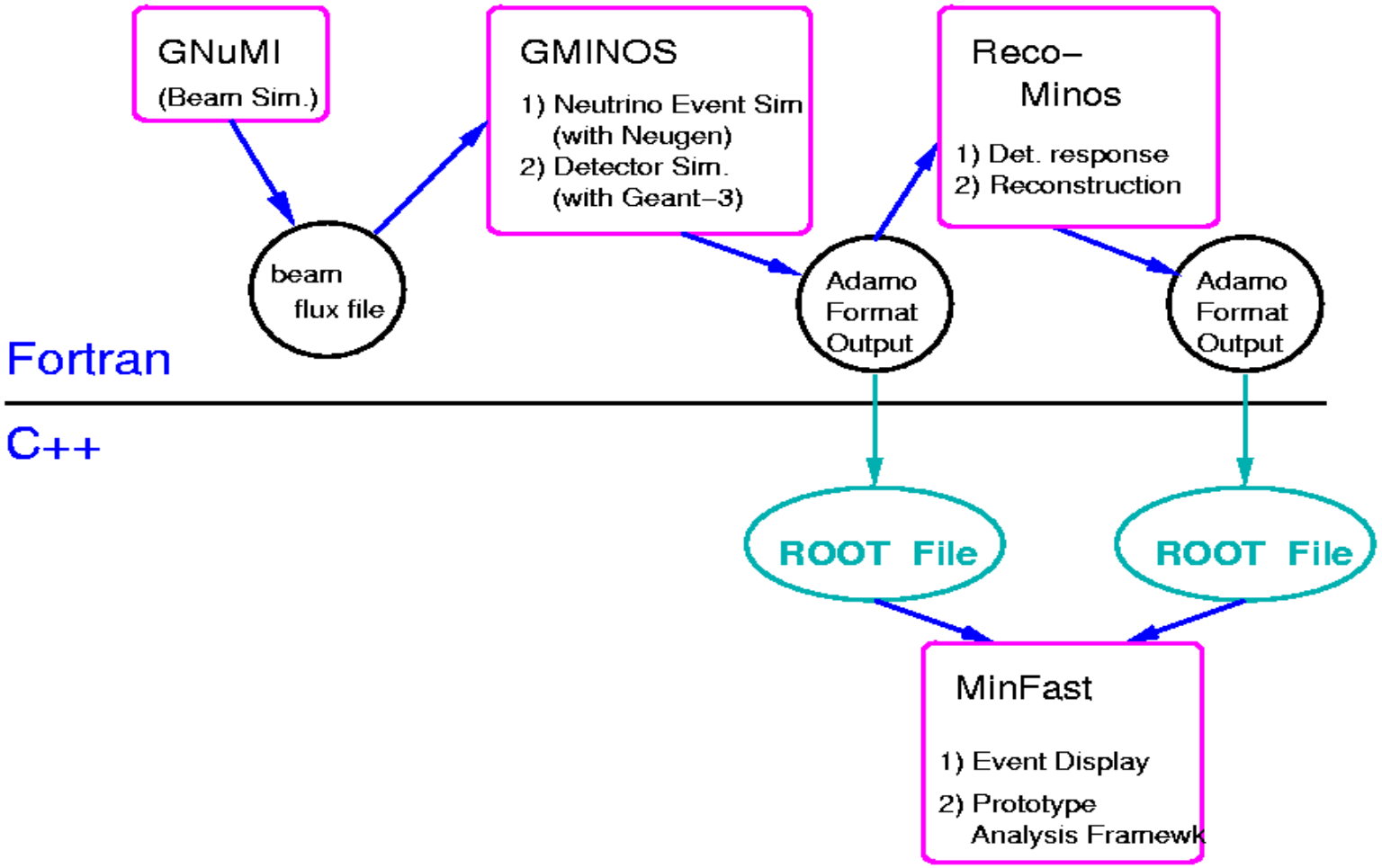
MINOS Offline Computing

J. Urheim

January 2002 Collaboration Meeting

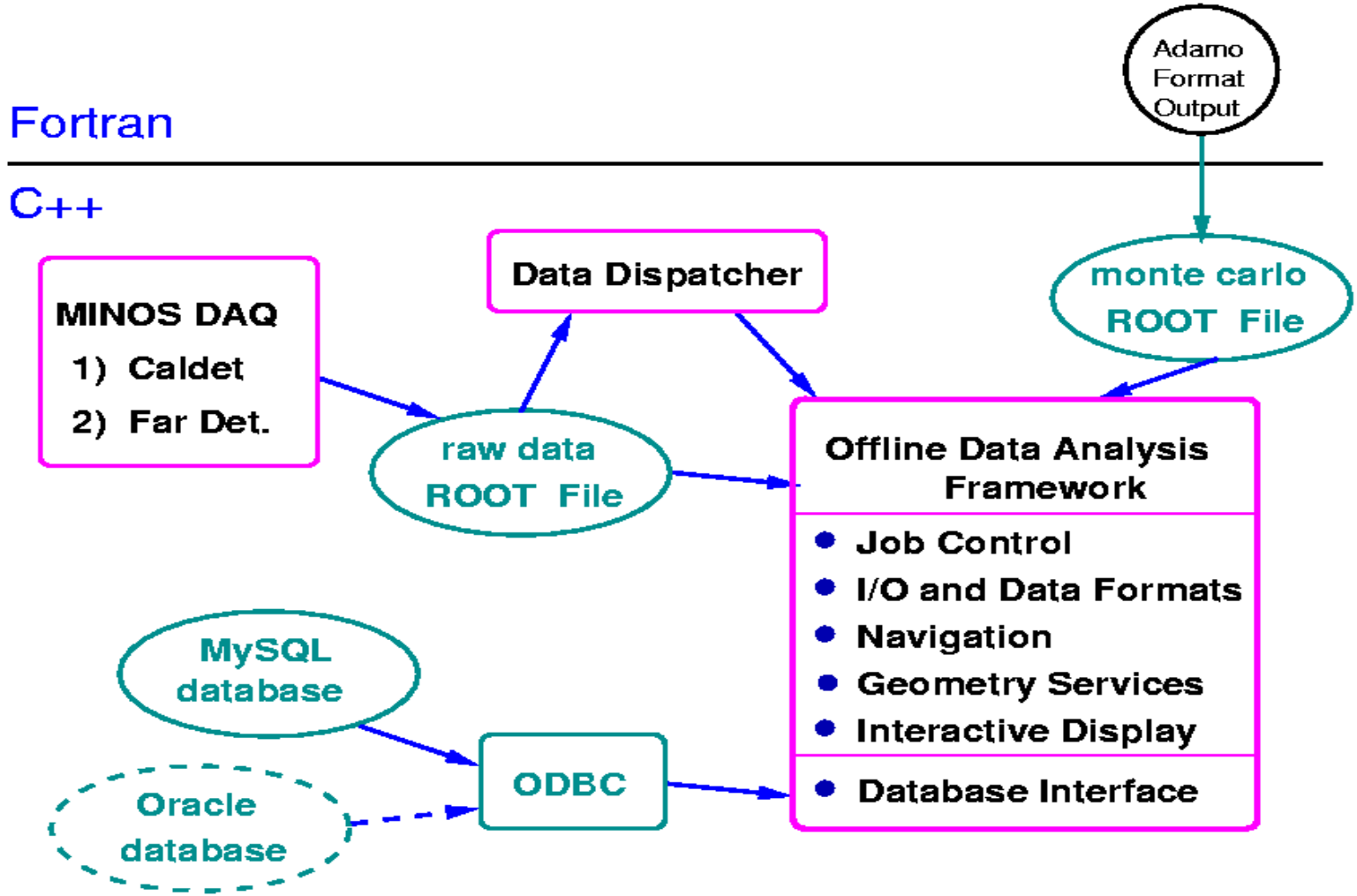
- Review of Progress Made in 2001
- Monte Carlo Effort
- Software Tutorial
- Feedback

Offline Software, ca. 7/00



– **Not much on the C++ side!!!**

Core Offline Software, ca. 12/01



– **These pieces exist and function!**

Major Milestones of 2001

- **Completion of DataBaseInterface (DBI)**
  - Nick West (user interface)
  - Valeriy Onuchin (ODBC/Root interfaces - RDBC)
- **Raw Data Format / Rotorooter, etc...**
  - Robert Hatcher (design and implementation)
  - Sue Kasahara, Mark Messier (persistency, I/O, etc)
- **Plex / Geometry / Commisioning of DB / DBI**
  - Robert Hatcher (heroic effort !!)
- **Event Display**
  - Brett Viren (can’t draw straight lines though)

Milestones of 2001 (cont'd)

- **Calibration & Reconstruction Frameworks**
  - Jim Musser, Roy Lee, Brian Rebel, Caldet crew...

- **Note: all of above possible only via much behind-the-scenes effort from:**
  - George Irwin (coordination, troubleshooting, etc)
  - Geoff Pearce and the DAQ group
  - Caldet crew, esp. Paul Miyagawa, Ryan Nichol
  - Fardet crew, esp. Brian Rebel, Roy Lee

Major Milestones -- Cont'd

– **Pattern Recognition Software ...**

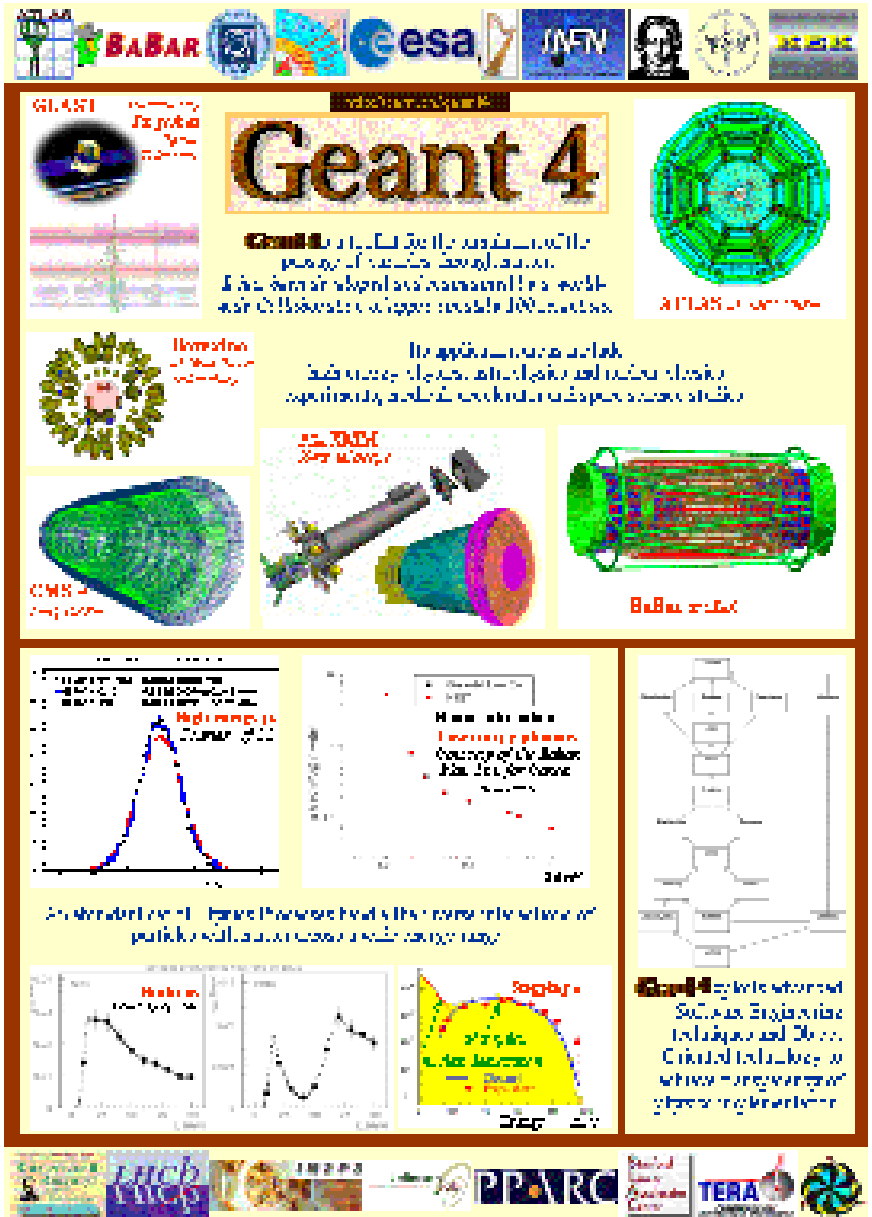
– **Earl = Gandalf ??**

- (actually that would explain a lot ...)

Do We Need a New Monte Carlo?

- **Uniformity of Software:**
  - use just one programming language
  - uniform framework
  - uniform use of configuration/calibration constants
- **Ease of use:**
  - GMINOS -> Reco_Minos -> Rerootjob -> root file this is quite painful
  - implementation of simulation and reconstruction elements can be done simultaneously
- **Support for external software packages**
  - GEANT-3 is no longer being supported by CERN

GEANT 4



- written in C++
- O(100) FTE-years of effort
- Broad-based development effort: CERN, SLAC, KEK, ESA, many smaller groups
- Wide user base:
  - **LHC Experiments**
  - **BaBar**
  - **Low energy (I.e., medical physics)**
- **Much of physics process simul'n not fully validated!**
- **Little/no use at FNAL so far**

MINOS Monte Carlo Status: Summary of Nov 29/30 Workshop

J. Urheim, R. Hatcher

January 2002 Collaboration Meeting

Monte Carlo Workshop 11/29-30

- **Coordinated by R. Hatcher**
- **Goal: Organize effort on Minos MC, including:**
  - Beam simulation (M. Messier)
  - Neutrino interactions (Neugen -- H. Gallagher)
  - Detector geometry & particle propag'n (Geant)
  - Detector response (R. Hatcher)
- **Recognize short and longterm requirem'ts**
  - Short-term: timescale relevant for cosmic ray & atmospheric neutrinos: (summer 2002!)
  - Long-term: readiness for beam (summer 2004)
- **Assigned homework!**

Questions

- **What framework issues do we have?**
  - Can we benefit from work done for CDF/D-0 ?
  - Had presentation by M. Paterno on CDF fwk -- conclusion: model of “templated digitizers” used by CDF interesting but probably not appropriate.
- **What to do about beam simulations?**
  - Rewrite in C++ ? -- Mark says “NO WAY”
  - beam MC will continue to write ascii flux files
- **What to do about neutrino interactions?**
  - Neugen++ -- already underway (H. Gallagher) still in early stages of development though
  - we had some discussion about interfaces

Questions - cont'd

- **Other products from HEP community?**
  - Particle/generator classes (StdHep++, HepMC)
  - want to use these, but waiting on standardization
- **What to do about GEANT?**
  - Continue to use Geant-3?
  - Should we use Geant-4 ? (L. Mualem)
  - What about compatibility between Geant-4 and Root ?
  - Geometry specifications via Root or Geant-4 ?
  - What about support from G4 developers?
  - Should we use our own particle transport?
  - What about validation of physics simulations?

Questions - cont'd

- **What about detector response simul'n?**
  - factorizes from "event simulation": means that MC can be rewritten 'adiabatically', starting at the back-end. (framework issues)
  - requires significant detail of simulation:

    energy dep -> scint. photons -> wls photons

    -> p.e.'s -> ADC counts

- **What to do about GEANT?**

Monte Carlo Summary

- **Minos MC development becoming a critical path item.**
  - We need to make *Lots* of progress in 2002
- **There are some critical decisions to be made**
  - Geant-4? How much? Wait for Root Geometry?
- **Stay tuned for news about future wkshps**
  - People who want to contribute to MC are most welcome.

Offline Software Tutorials

- **Mon./Tues. of next week's s/w workshop is devoted to an interactive tutorial on how to use MINOS offline software**
  - **Many thanks to Nick for putting this together!**
- **This is an ambitious first attempt !!**
  - **The "students" will be guinea pigs.**
  - **We hope to repeat this at future meetings...**
- **All material is on the web (WebDocs) !**
  - **Linked from "Minos Companion" page under "Overviews and Tutorials"**

Feedback

- **Offline Software Group needs feedback**
  - **Part of next week's workshop is devoted to "post-mortems" of key framework elements**
  - **We can't do this unless people let us know what they like and don't like about the s/w**
- **Please talk to core group members**
  - **"anonymous" comments can be fed to JU**