Database and Detector Description Activities

ATLAS Software Workshop

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Notes

- Slightly odd to be giving this talk BEFORE the database working group meeting
- Largely a report of the October database workshop, with addenda for developments in the interim
- Apologies in advance to Stan Bentvelsen, Christian Arnault, Marc Virchaux and others who have contributed to the XML definition and related software if I misrepresent any of their work

Database Workshop 26-28 October

- **Major emphasis was on organizing database efforts within and among subsystems**
  - **Subgoal: every subsystem should have personnel who understand and can use current detector description and event data access software and tools**
- **Less emphasis on architecture and infrastructure, since ATF decisions that strongly influence these activities were still pending at that time**
- **24 attendees**

Agenda in a Nutshell

- Tuesday Morning: Introduction, transient/persistent mapping
- Tuesday Afternoon: Detector Description presentations
- Wednesday Morning: Detector Description hands-on experience, and followup discussions
- Wednesday Afternoon: Event Data Access presentations
- Thursday Morning: Event Data Access hands-on experience, and followup discussions
- Thursday Afternoon: Matters of infrastructure and planning

Infrastructure Presentations

- Architectures and Issues for Data Access “Independent of Database Supplier” (David Malon)
- The D0 Approach: D0OM (Scott Snyder)
- The LHCb Approach: Data Access in Gaudi (Markus Frank)

First talk was to provide context; next talks were intended to describe other experiments’ approaches that were consonant with ATF directions

Architectures … Independent of Database Supplier

- What does “independence …” mean, and how can it be achieved?
- Separation of algorithms and data
  - problems it is intended to address
  - OO issues
  - more and less object-oriented ways to accomplish such a separation
- Transient/persistent mapping
  - partial taxonomy
  - architectures and mapping strategy flexibility
  - other mapping issues
- What features can one assume of an underlying storage product and still remain “independent of database supplier”?

These and other issues have been or will be answered by the architecture folks.

Other Experiments' Approaches

- **The D0 Approach: D0OM**
  - **particularly interesting because of its ability to generate AUTOMATICALLY a persistent class from a transient one**
  - **doesn't work with Objectivity today**
  - **even if automatic converters are found inappropriate in ATLAS for complex data or for data whose representation in storage must be tuned, they may nonetheless be useful for storage of simple objects, for rapid prototyping, and for storage of objects of user-defined type**
- **The LHCb Approach: Data Access in Gaudi**
  - **democratic data storage**
  - **strong influence on the ATLAS architecture**

Detector Description

Presentations by

- **Stan Bentvelsen (AGDD (XML), G4Builder)**
- **Christian Arnault (Generic Model)**
- **Julius Hrivnac (visualization)**
- **Marc Virchaux (Persint visualization)**

Hands-on experience and subsequent discussions

AGDD (XML) Status

XML DTD is currently closely related to G4 geometry definition, and provides a means of specifying:

- geometric solids (box, trd, tubs, cons: G4 parlance)
- boolean combinations thereof (union, intersection, subtraction)
- compositions and aggregations thereof (composition, stackX|Y|Z)
- means to associate a name, an index, a material, additional (inner)structure, and an indication of whether it is sensitive
- means to replicate and position such volumes
- materials definitions, modeled after Andrea's G4 Materials Manager

XML geometries are visualizable today in Persint, in the ATLAS XML-based tools, and in DAWN via G4Builder (Stan's talk)

Generic Model

- Intended to be the model from which application views (simulation, reconstruction, …) are derived
- Consonant with this, G4Builder builds a G4 geometry from the generic model (not from the XML directly)
- Input is from AGDD XML
- Model currently mirrors the elements defined in the DTD
- Traversal of the detector description is based on a visitor pattern
- Understood that the generic model will need to describe the logical organization of the detector

Detector Description: Outcomes

- Many people have now tried their hands at defining geometry in XML, and at visualizing it
- Less experience with the generic model, except by G4Builder
- Significant additional geometry definition work has been done in all of the subsystems
- Feedback from subsystems has led to improvements to the DTD
- Consistent identifier scheme is needed; RD Schaffer will document its current status as input into discussions of how to incorporate identifier specification into XML detector descriptions
- Christian Arnault is addressing issues related to making the generic model reflect the logical organization of the detector

Event Data Access via PASO

Tutorial and hands-on sessions

- **Based on material prepared by the Candlins**
- **Presentation by RD Schaffer on design, and access through PASO**
- **Presentation by Julius Hrivnac on graphics in PASO**

Outcomes:

- **People have been identified to complete the work of getting digits from the TDR data for all parts of the detector**
- **Progress has been made since the workshop**

Sundry Other Database Activities not Reported Elsewhere

- **Particle Physics Data Grid**
  - **a U.S. Next-Generation Internet project, involving Argonne, Berkeley, Brookhaven, Fermilab, Jefferson Laboratory, SLAC, Caltech, the San Diego Supercomputer Center, and the University of Wisconsin**
  - **attempt to define a common computational grid infrastructure for HENP wide-area data access (computational grids are the CS research community's current approach to wide-area high-performance computing)**
  - **ATLAS use cases with ATLAS Objectivity data (currently from tilecal) provide the primary "challenge problem" ("flagship application") for this work**
- **(unrelated to PPDG) Coordination discussions with ATLAS production database leaders (D Ferrere, A Petrilli) are ongoing**