Experience with C++ and ROOT used in the VX Beam Test

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- **Why?**

  Event structure for VX-data rather complex:

  raw hits → clusters → tracks → vertices

  + global run information

  - **The effort to design an event model using FORTRAN/ZEBRA a la SICB or to use ROOT and its tree structure seemed equivalent.**
  - **With ROOT, we would get experience with C++.**

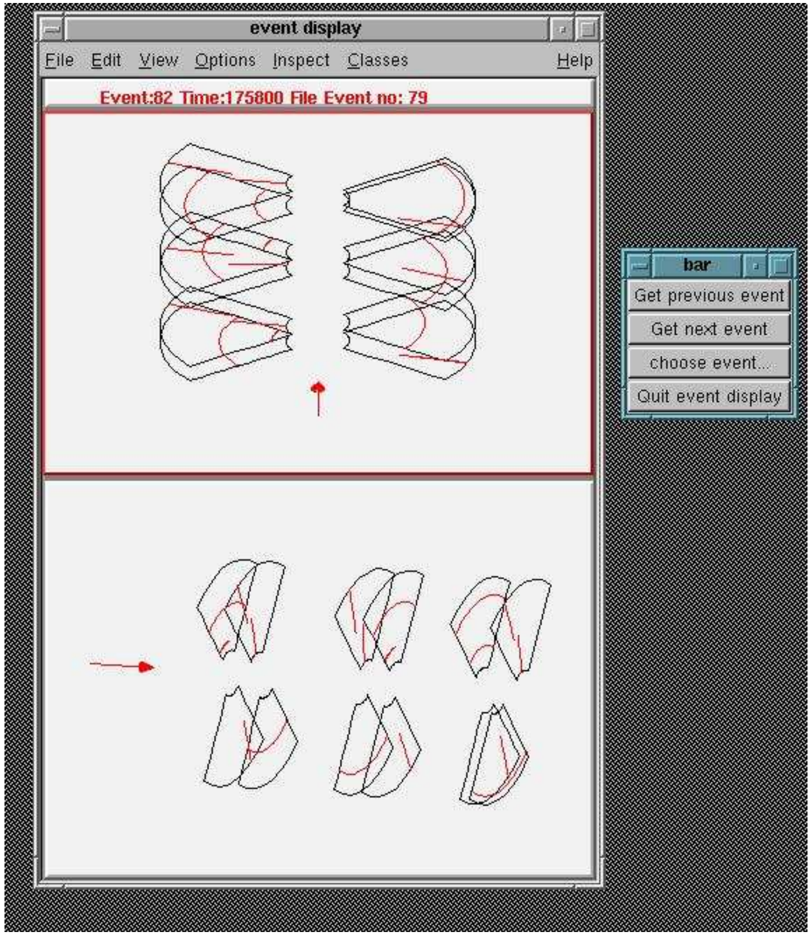
Setup

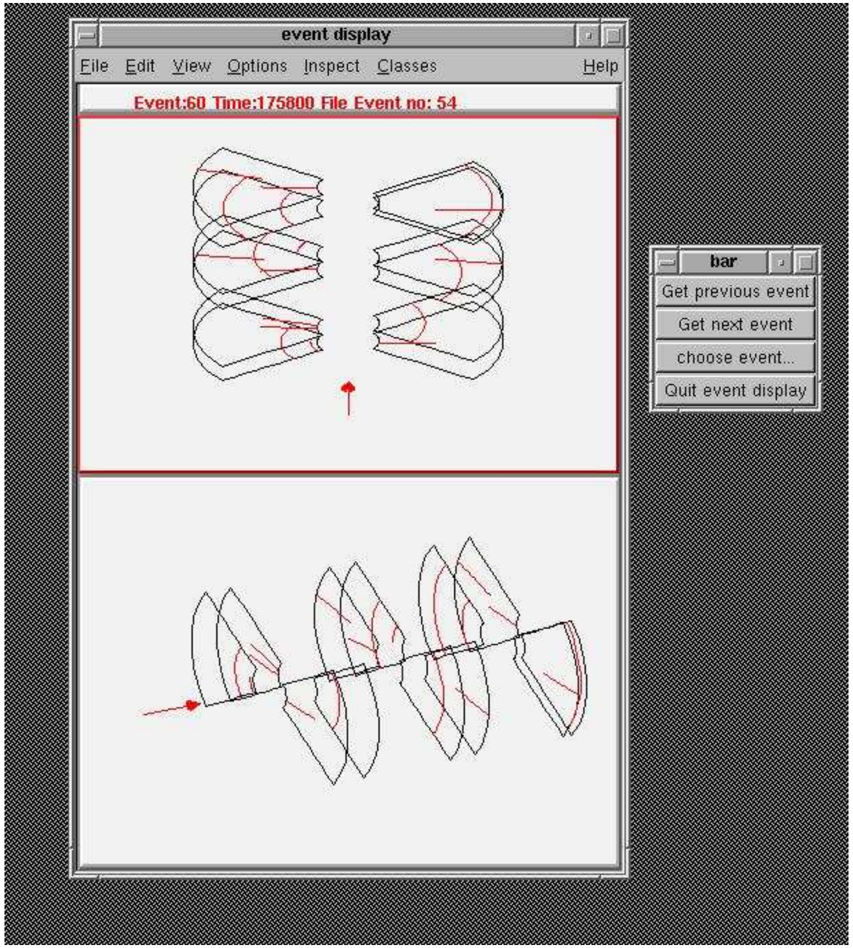
- Present event model based on a 2 hour discussion just before the test beam, implemented by Fons Rademakers.
- We decided not to touch the readout software (CASCADE) which produces a FZ file. The FZ file is copied online into a ROOT tree for monitoring. Same procedure used for offline analysis.
- We decided to use CVS for code management.

General comments

- Expert(s) needed for setting up the structure. Otherwise, FORTRAN-->C++ and no advantage from OO.
- Software tool for creating header files, classes … would be very useful. Could also check coding conventions.
- Most of the “young” people were enthusiastic using C++. Only Liverpool insisted on doing analysis in fortran. A special ASCII file had been written for them with the cluster information. Problem: Alignment and Cluster code developed parallel (C++). ASCII file always behind.
- Event display: graphics seems to be simpler with C++ (O.Cooke).

Event Display





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General Comments cont.

- As a FORTRAN User, you can do a lot of stupid things with C++. My programs had been much more unstable compared to FORTRAN. Maybe my ignorance of C++, or special problem with ROOT …

General Comments about ROOT

- **ROOT contains the standard PAW features and it is easy to plot histograms, etc.**
- **ROOT input is C++, which is for some simple tasks quite an overhead. But macros can be compiled and run very fast.**
- **Direct access to individual branches of a ROOT tree, improves very much the performance. No need for special N-tuples!**
- **Parts of an event (raw, cluster, tracks, vertex) could be in different files, study by Markus Frank.**
- **Documentation how to use ROOT can be found on the WEB, together with NEWS group, SEARCH …**
- **Online oriented people don't like so much ROOT, but don't see any other existing alternative.**

Next Steps

- Based on our experience and the requirements for the next test beams, we (P.Maley) are preparing a URD and are planning to revise our software.
- We think using ROOT is a good playground to learn C++.
- The code developed for the analysis of the vertex detector testbeam data should be the basis for the vertex code in the future LHCb MC and Reconstruction program.