The Center for Accelerator and Particle Physics
at
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SEMINAR

"ROOT: A Data Access and Analysis Framework"

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Abstract

The next generation of experiments in High Energy or Nuclear Physics that will operate at the new Large Hadron Collider (LHC) beginning in 2006 will collect several petabytes (10^{15} bytes) of data per year. These experiments will run for up to two decades and will occupy as many as 6000 physicists doing data analysis on large databases distributed around the world. Several database technologies are under evaluation, as well as the tools to facilitate complex queries in these distributed databases. The selected technology will have to be maintained over many years and be able to process data taken over long periods with evolving class schema.

In view of this challenging environment, the ROOT system has been under development at CERN since 1995. It includes:

- An I/O sub-system to create and structure large data sets.
- A C++ interpreter (CINT) that provides interactive access to the application classes. CINT is also used to create an object dictionary.
- A Graphical User Interface.
- A set of 2-D and 3-D graphics classes.
- A set of classes for histogramming and minimization.
- A query mechanism to perform quick and complex queries.
- A parallel architecture PROOF designed to be GRID aware.

ROOT is currently in use by a large number of Physics experiments as well as in many other fields of science. The system has been developed with the Open Source model. Feedback from a large and growing community is an important aspect of producing a mature, operational system a few years before the LHC starts taking data.

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