

*Project title:* Analysing trees in PROOF with TTreeReader  
*Supervisor:* Gerardo Ganis

*Project description:*

The Parallel ROOT Facility (PROOF [1]) is widely adopted for LHC data analysis, allowing to exploit a set of distributed resources to speed-up analysis of data stored in ROOT trees [2]. PROOF implements a 3-tier client-master-workers architecture, with the master in charge of dynamic work distribution and collection of the results.

The new version of ROOT, expected for Summer 2014, features a new technology for accessing ROOT trees called TTreeReader. The TTreeReader simplifies the way users can access and navigate a tree by introducing a high-level templated interface to access the tree leaves, which allows to write code naturally cleaner and more readable than currently possible.

The goal of the proposed project is to integrate the new technology into PROOF. In a first stage this will mean studying a generic way to make the TTreeReader object available inside the user code and to use the TTreeReader iterator in PROOF to navigate inside a packet (the PROOF unit of work). Further steps may be the investigation of the full potential of TTreeReader in relation to the specific features introduced by C++11, like for example lambda functions. The new developments may imply a change of interface for the users, and techniques / documentation to facilitate the transition should also be provided.

[1] <http://root.cern.ch/drupal/content/proof>

[2] <http://root.cern.ch/drupal/>

*Student profile:* Computer scientist  
*Project content:* 100% computing  
*Training value:* The student will have the opportunity to get inside a modern software package and to acquire experience with some advanced aspects of C++.  
*Computing skills:* Unix, C++; familiarity with C++11 and with distributed systems could be an advantage