Dynamic PROOF clusters with PoD: architecture and user experience

Anar Manafov

GSI Helmholtzzentrum für Schwerionenforschung GmbH, Planckstr. 1, 64291 Darmstadt, Germany

E-mail: A.Manafov@gsi.de

**Abstract**. PROOF on Demand (PoD) is a tool-set, which sets up a PROOF cluster on any resource management system. PoD is a user oriented product with an easy to use GUI and a command-line interface. It is fully automated. No administrative privileges or special knowledge is required to use it. PoD utilizes a plug-in system, to use different job submission front-ends. The current PoD distribution is shipped with LSF, Torque (PBS), gLite, and SSH plug-ins. The product is to be extended. We therefore plan to implement plug-ins for AliEn Grid, SGE and Condor. Recently developed algorithms made it possible to efficiently maintain two types of connections: packet-forwarding and native PROOF connections. This helps to properly handle most kinds of workers, with and without firewalls. PoD maintains the PROOF environment automatically and, for example, prevents resource misusage in case when workers idle for too long. As PoD matures as a product and provides more plug-ins, it's used as a standard for setting up dynamic PROOF clusters in many different institutions. The GSI Analysis Facility (GSIAF) is in production since 2007. The static PROOF cluster has been phased out end of 2009. GSIAF is now completely based on PoD. Users create private dynamic PROOF clusters on the general purpose batch farm. This provides an easier resource sharing between interactive local batch and Grid usage. The main user communities are FAIR and ALICE. In this presentation we will give an update of the architecture, new development, and on user experience since last CHEP.

1. Introduction

Due to the fast growing amount of data, the complex and CPU intensive computations, and the participation of scientific groups on all continents, the data analysis of present and future experiments in the field of particle and nuclear physics requires the development of a distributed computing infrastructure.

With the start of the Large Hadron Collider (LHC) [1] at the European Centre for Particle Physics (CERN) [2] the demands on distributed computing technology will reach new levels. The worldwide LHC computing Grid (WLCG) [3] has been developed to provide the computing infrastructure for the four LHC experiments ALICE, ATLAS, CMS, and LHCb.

With all its advantages the Grid model anyway introduces a delay in obtaining the results. Users receive them after a given time which is the execution time of the program itself plus an overhead that tends to be bigger than in case of batch systems.

In addition to the Grid-like analysis many experiments provide a local interactive analysis using the Parallel ROOT Facility (PROOF) [4]. PROOF is an extension of the ROOT system [5] for parallelizing the application execution. The default installation of PROOF is a static cluster. But there is an idea to use PROOF in more user-friendly and convenient way – a dynamic cluster on request. This is the reason PROOF on Demand (PoD) [6] development has been started.

PoD is a specially designed solution to provide a PROOF cluster on the fly.

1. Another section of your paper

The first paragraph after a heading is not indented (Bodytext style).

Other paragraphs are indented (BodytextIndented style).

* 1. A subsection

Some text.

* + 1. A subsubsection. The paragraph text follows on from the subsubsection heading but should not be in italic.

References

1. LHC project <http://lhc.web.cern.ch/lhc/>
2. CERN public web page <http://public.web.cern.ch/Public/Welcome.html>
3. J. Shiers, Summary of WLCG Collaboration Workshop 1-2 September 2007, CHEP 2007, Victoria, Canada (2007)
4. The Parallel ROOT Facility, PROOF <http://root.cern.ch/drupal/content/proof>
5. ROOT - An Object Oriented Data Analysis Framework

for more information see <http://root.cern.ch>

1. PROOF on Demand [http://](NULL)pod.gsi.de
2. gLite project <http://glite.web.cern.ch/glite/>
3. Load Sharing Facility (LSF) <http://www.platform.com/>
4. The Scalla Software Suite: xrootd/cmsd <http://xrootd.slac.stanford.edu/>
5. gLite WMProxyAPI <https://edms.cern.ch/document/674643/1>
6. Condor project <http://www.cs.wisc.edu/condor/>
7. Sun Grid Engine (SGE) <http://gridengine.sunsource.net/>