

The Use of OpenSource in the Grid Computing and Data Acquisition System in High Energy and Particle Physics Research Projects

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Abstract

High-energy physics and astroparticle physics research has been traditionally performed by international collaborations. Open source software is an essential ingredient of the computing infrastructure required to support such research experiments at a global scale and in a development framework of an open collaboration. Components ranging from operating systems, infrastructure, data transfer systems, data storage, data processing and data visualization to project management and human collaboration tools.

In this presentation we will show examples and applications of the usage of open source software and toolkits in two different contexts: a worldwide computing grid for processing the data of the Large Hadron Collider[1] (CERN, Switzerland), the most powerful particle accelerator ever built and the largely distributed data acquisition and data acquisition processing system built for the Pierre Auger Observatory[2] (Malargue, Argentina).

References

- [1] The Large Hadron Collider (LHC) at CERN near Geneva is the largest scientific instrument on the planet. When it begins operations, it will produce roughly 15 Petabytes (15 million Gigabytes) of data annually, which thousands of scientists around the world will access and analyse. The mission of the Worldwide LHC Computing Grid (WLCG) project is to build and maintain a data storage and analysis infrastructure for the entire high energy physics community that will use the LHC. The WLCG is a global collaboration of more than 170 computing centres in 34 countries. LCG-France is the french contribution to WLCG and this project is dedicated to the LHC computing launched in 2004 to provide a funded Tier-1 centre and an Analysis facility

in the Computing Center of IN2P3 @ Lyon supporting the 4 LHC experiments (ALICE, CMS, LHCb, ATLAS) to promote the emergence of Tier-2 and even Tier-3 centres.

- <http://lcg.in2p3.fr> : LCG-France Official Website
- <http://lcg.web.cern.ch/lcg/public> : WLCG Official Website
- <http://public.web.cern.ch/public/en/LHC/LHC-en.html> : LHC Official Website

[2] The Pierre Auger Cosmic Ray Observatory is studying ultra-high energy cosmic rays, the most energetic and rarest of particles in the universe. When these particles strike the earth's atmosphere, they produce extensive air showers made of billions of secondary particles. While much progress has been made in nearly a century of research in understanding cosmic rays with low to moderate energies, those with extremely high energies remain mysterious. The Auger Central Data Acquisition System (CDAS) is a custom built set of applications and its purpose is to operate the Surface Detector with minimal need of human intervention, provide interface with the Fluorescence Detector acquisition system for hybrid triggered events, and recollect, store, and prepare for transfer the auger data set.

- <http://www.auger.org> : Official Website
- <http://www.auger.org.ar> : Southern Site
- <http://auger.in2p3.fr> : IN2P3 Auger's Official Website