Optimization of Italian CMS Computing Centers via MIUR funded Research Projects

In 2012, 14 Italian Institutions participating LHC Experiments (10 in CMS) have won a grant from the ITALIAN MINISTRY OF RESEARCH (MIUR), to optimize Analysis activities and in general the Tier2/Tier3 infrastructure. We report on the activities being researched upon, classified under the broad-brush categories:

1. Testing the level 1 Xrootd federation
2. Optimization of interactive systems
3. Distributed analysis tools
4. Cloud Systems
5. New technologies

The participating sites for CMS are:
- INFN (Pisa, Laboratori di Legnaro)
- Univ. Trieste
- Univ. Torino
- Univ. Bologna
- Univ. Perugia
- Univ. Roma Sapienza
- Univ. Napoli
- Politecnico di Bari
- Univ. Catania

Tools for Distributed Analysis

Italy is committed to the design, development and integration of the next generation tool for CMS Distributed Analysis tool, CRAB3. For the distributed analysis tool sustainability, CRAB3 is integrated with the distributed Analysis tool of ATLAS, PanDA, into a Common Analysis Framework. The efforts are undertaken by CMS, ATLAS and the CERN/IT department. Italy is responsible for design and development of main components in the framework:

- TaskManager backend: needed to provide into PanDA the concept of Analysis Tasks.
- Users Data Management system (AsyncStageOut): it manages and monitors the transfer and publication of CMS analysis jobs outputs.
- CMS component in PanDA: it handles the CMS jobs metadata to allow the later transfer and publication of the outputs, and also to create analysis reports to end-users.

Dynamic provisioning on GRID and Cloud

In the job submission framework of the CMS experiment, resource provisioning is separate from resource scheduling. This is implemented by pilot jobs, which are submitted to the available Grid sites to create an overlay batch system where user jobs are eventually executed. CMS is now exploring the possibility to use Cloud resources besides the GRID, basically considering the same architecture for what concerns the dynamic resource provisioning; instead of submitting pilot jobs, virtual machines (where the pilot jobs run) are created on demand.

At the Padova-Legnaro Tier2 a OpenStack Cloud based testbed has been set up, and here the model has been successfully demonstrated executing CMS CRAB analysis jobs.