Applications Area Report
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Pere Mato

ROOT

In June took place an extensive ROOT program of work review, where the ROOT team and the LHC experiments discussed the desired features for the ROOT 6-00-beta release. The ROOT team is working hard to deliver the ROOT 6-00-beta for the end of November 2013. This beta will provide all features of ROOT 6-00 that the LHC experiment framework developers will need to start using ROOT 6 into their frameworks. Integration of early release pre-views in the experiment's software stack has started and is helping to identify the first problems. The November deadline will give them with 2014 a full year to integrate and fully test ROOT 6-00. The progress is being reported in weekly planning meetings attended by the stakeholders. Currently we are on schedule for the end of November deadline.

Persistency Framework

The CORAL and COOL code repositories have been moved from CVS to SVN. The old CVS repositories have been closed and SVN is now used for committing all new developments. The full code history was migrated to preserve read-only access to historical data for later reference.

New releases of CORAL and COOL have been prepared for ATLAS and LHCb (LCG_65a and LCG_66). LCG_65a is the first release based on the SVN repositories and includes only minor fixes. LCG_66 is the first production release supported for the gcc4.8 compiler on SLC6 and includes important enhancements in both CORAL and COOL for adding support and optimizing query performance on Oracle 12c servers. The main result of the 12c tests is that the "adaptive optimization" new feature of Oracle 12c is better kept disabled in COOL in order to provide stable and predictable performance.

Progress is being made on the port of PyCool to the upcoming ROOT6 major release, which will involve several changes in the pythonization of C++ code and removal of dependencies on Reflex. In addition, progress is made towards new major CORAL and COOL releases with API extensions and new functionalities, most notably the COOL vector payload schema. Work is ongoing to validate COOL query performance for this new use case.

Simulation

On June 28th, the Geant4 10.0-beta release was announced on schedule. The code now incorporates the multi-threading capabilities, which were demonstrated in the previous Geant4-MT prototypes. First performance measurements reveal excellent linear scaling versus the number of worker threads, in the order of O(100) threads measured on the Intel Xeon-Phi co-processor prototype, and good save of memory (~38 MB/thread for a benchmark based on full-CMS geometry). Aiming to reduce memory usage even further for the final release foreseen by end 2013. Many classes were reviewed, and a significant number of revisions were made to ensure thread-safety and simplify the code from the first implementations from the Geant4-MT prototype.

First validation studies reveal excellent statistical agreement in the physics observables for the MT-migrated simplified calorimeter test. Event reproducibility has been measured to 99.9% (1 failure per mille in MT-mode); perfect agreement has been achieved in recent development versions after few additional fixes. Several examples have been migrated to make use of multi-threading.

The new code also introduces many changes and developments in different areas: rewritten the check for overlaps; improved technique for calculating isotropic safety; use of gravity field and magnetic field gradient; elements with natural abundances of isotopes; LEP parametric models now completely replaced with Bertini and FTFP; removed CHIPS models; Bertini Cascade introduces improved multi-body final state momentum distributions. A new version of the Urban multiple scattering is provided, with modified sampling of cosine theta to provide higher stability versus step size; obsolete versions of the model have been removed.

The work of the Geant4 team is now concentrated in refining further the performance and features in view of the final release due in December.

The GENSER team has now completed the migration to the new system based on CMake. All Monte Carlo Generators required by the experiments are now installed automatically together with LCG externals. Releases of generators for LCG_64 and LCG_65 have been made with the new system. The GENSER team has started working on the migration of the tests for the generators to CTest. The LCG librarian will do the future LCG releases centrally. The installation of the generators on AFS and CVMFS will happen together with the rest of the LCG externals.

CernVM

For the file system, the main activity has been the consolidation of version 2.1. Large Grid sites tried out this version and several issues were found and addressed, in particular related to the shared cache for sites serving multiple experiments and host failover. A security hotfix release was immediately deployed in August due to missing option sanitizing the /etc/auto.cvmfs script. Version 2.1.15, including optimizations to improve experience in user space, is currently under stress test by two large sites (RAL and CERN) aiming at a release for deployment at all sites by mid October 2013.

On the appliance side, version 2.7 of CernVM, which is the last one based on SL5 and with Conary as package manager, is ready for release. Its deployment been delayed mostly by changes in the way the CERN ‘Openstack’ infrastructure operates with respect to the previous ‘Ibex’ infrastructure.

A lot of progress has been made on µCernVM, the technology preview for what will become CernVM 3, which has been tested by a diverse sample of users and is now ready for being tested on larger scale. µCernVM now supports CloudInit for contextualization. Work has continued to consolidate the cluster definition features of the online contextualization interface.

The new µCernVM image is now used in the Virtual Analysis Facility, a system integrating all the CernVM ecosystem to instantiate a PROOF cluster on virtualized resources, tested successfully on the Ibex and Openstack cloud systems at CERN, and on the OpenNebula based cloud service at Torino.

SPI

Two major and one minor LCG releases were released this summer. LCG_65 and LCG_65a introduced gcc47 as production compiler and gcc43 support was discontinued. LCG_66 now supports gcc48 as production compiler and contains a major upgrade in the Boost version. At the same time LCG_66 served as a test for the new LCG external build procedures based on CMake. The preparations for LCG_67, containing a different release layout are ongoing and expected to be finished in the next quarter.

The activities of combining the SPI and GENSER build infrastructure are finished. GENSER releases are now being installed in a fully automatized procedure, based on version tracked release definitions.

To facilitate the testing and migration of ROOT 6, SPI provides support to the PF and ROOT teams with dedicated build setups.

On Savannah-to-JIRA migration activities, schedules with the various users are being discussed. The version upgrade from JIRA5 to JIRA6 had a major impact on the migration infrastructure and delayed the progress by at least two months. As of October in total only 47 % of the Savannah projects have been properly addressed.