Applications Area Report
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AA Planning

The SFT group has prepared and submitted a short document addressing the challenges posed to HEP software due to the emergence of new CPU architectures to the Open Symposium on European Strategy for Particle Physics in Krakow. This strategy document sets the bases for a new program of work, implying a paradigm shift towards software parallelization, motivated by the need to fully exploit the full potential of new CPU architectures.

ROOT

The ROOT team released a new version of ROOT v5-34-00 on June 5th. One interesting new feature of this release is the ROOT I/O package rewritten in Javascript. This allows the browsing and displaying of histograms in any ROOT file hosted on a web server, without any server side plugins. This is still work in progress (more histogram plotting options, etc.), but an exciting demo can already be seen here (http://root.cern.ch/js/). Also this new version came with a first version of a native graphics back-end for MacOS X using Cocoa that does not depend on X11 anymore. For a complete description of all new features see the release notes.

ROOT 5.34 is the last production release before the major release of ROOT 6 scheduled by the end of the year. It was agreed with the experiments that this version would be a 'Long Term Support' version, in which new features will be back ported from the trunk on request by the experiments.

Persistency Framework

New releases of CORAL and COOL have been prepared for LHCb (LCGCMT_63), mainly motivated by the upgrade to ROOT 5.34. The CORAL release includes major improvements in the handling of connection instabilities (CORAL is now able to reconnect transparently if network glitches do not break a transaction context), as well as important fixes in the cleanup of stale OCI sessions (avoiding crashes reported in a few uncommon situations). This is also the first release on SLC6 and the first release where support for the LFC replica service component of CORAL has been dropped. Finally, the code base of CORAL and COOL has been ported to gcc47.

CORAL and COOL code bases has been patched in order to address the issues (more than 700) reported by the Coverity static code analyzer. There are now no pending issues reported by Coverity left in CORAL or COOL.

Investigated possible use of Kerberos authentication for Oracle databases. A test setup was successfully prepared to connect to a test database using the standard Kerberos ticket from the CERN KDC (i.e. the one also used for AFS).

Support was provided to LHCb about the problems they experienced when trying to connect to Gridka databases using CORAL. The problem is now understood as being due to the Oracle character set used at Gridka, which is different from the one used at

CERN. Two possible solutions have been suggested and the issue is now being followed up within LHCb.

Simulation

The new 9.6-beta preview release of Geant4 has been provided in June as scheduled.
The release included several non-physics developments and fixes: it corrects issues of event reproducibility for cases when starting from an intermediate event; checking of energy/momentum conservation for large errors is now enabled and hadronic processes now trigger re-sampling of the interaction if the default limits for energy/momentum conservation are exceeded.

Physics enhancements include: improved description of diffraction cross-section and final state in the FTF physics model; a new model of gamma-nuclear and electro-nuclear interactions, gamma-nuclear reactions use the Bertini cascade; adoption of the Bertini model for nuclear capture at rest of pi-, K-, and Sigma-; improved cross-section for light ions; new total cross-section sets based on SAID data-base; handling of heavy-ion collisions with new version of the INCL cascade model. New data set G4EMLOW-6.27 includes Bremsstrahlung data files from NIST with extended grid, and probabilities of scattering off electrons. The new neutron data set G4NDL-4.1 converts data from ENDF/B-VII.r1 for most isotopes. Regarding EM physics, the WentzelVI model is now used for multiple scattering of e+ and e- above 100 MeV in all physics-lists for HEP applications. Energy range of dEdx and other tables has been extended for monopoles with large mass, as required for the interpolation of dEdx for super-heavy monopoles.

Validation of the last beta release has been performed on the GRID, and carried out using resources at CEA, CERN, and KEK, plus additional machines at LLR and Nikhef.

Other technical features include: a default description for each hadronic process, where model or cross-section can now be printed in HTML by invoking new Description() methods. The new prototype of the multi-threaded Geant4 code, Geant4-MT, is now ready and based on the last production release 9.5.p01. It will be released in August.

Two new notes have been published, both dealing with dedicated studies using the Simplified Calorimeter testing suite. The first describes the findings on the role of neutrons for the lateral hadronic shower profile (CERN-LCGAPP-2012-02); the second describes the technical implementation of the "shower moments analysis" and contains instructions on how to extend it (CERN-LCGAPP-2012-01).

Following the 2012 planning meeting for Generator Services held last Spring, it was acknowledged experiments are satisfied with the way the project is currently running and are using the GENSER repository in all the productions.

SPI

Two new LCG configurations, LCG 63 and LCG 64, were released in June. Both of them contain the new ROOT 5.34 and major upgrades in the Python externals. The latter release as well contains simplifications in the CMT interface. These will facilitate the future maintenance. As a major achievement, LCG releases are now provided for Scientific Linux 6 as well. As of today, 12 different build configurations are supported. Discussions about possible discontinuations have started. In the same period, a new HEPSOFT 0.5 release, aimed at theorists' use cases, has been released. It is based on the same external versions as LCG 62.

Earlier the year, a Mac cluster based in CERN IT was proposed. Preparations for this service are now ongoing in CERN IT. In the meantime, the porting of the LCG configurations and HEPSOFT to MacOS X Mountain Lion has started.