# Applications Area Report
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## ROOT

ROOT development has been making progress in the last three months on the following fronts: I/O plugins for Amazon S3 and Google Storage have been implemented; the Cling interpreter has been delivered to the LLVM community, this was a major first step in integrating Cling into ROOT which is foreseen for end of 2012; the iOS (iPad, iPhone, iPod) version have been finished, including high quality graphics. A number of demo programs have been developed.

Several patches to the 5.30 version have been released during last quarter. Details are available at http://root.cern.ch/drupal/content/root-version-v5-30-00-patch-release-notes

## Persistency Framework

New releases have been prepared for the two new configurations (LCG_60d and LCG_61a) released this quarter, motived by the upgrades to the latest version of ROOT. The LCG_60d release also includes the upgrade to a newer frontier_client with important performance optimizations. LCG_61a release includes performance optimizations in CORAL (reducing the number of Oracle data dictionary queries), improvements in the internal handling of transactions in COOL (to prepare to expose transaction control in the user API), as well as minor patches to port all packages to the gcc46 compiler and SLC6. A third configuration LCG_59d, using ROOT 5.26.00g, did not trigger the rebuild of any PF package instead. Several long-standing issues in the automatic nightly builds and tests of the software have also been fixed. The CORAL server and MySQL server for nightly tests have been moved to a fully quattorized node in the computer centre.

Support is being provided to CMS to follow up the incidents that affected the CMS online Oracle databases in Q3 2011. On the client side these incidents triggered ORA-25408 errors, signaling that update transactions were lost in an unrecoverable way. The present understanding is that these problems are caused by server-side or network issues external to CORAL, but possible enhancements to CORAL to better handle these issues are still being investigated. Support is also being provided to ATLAS to understand and work around the problems they are observing in accessing their Oracle conditions data from T0 jobs. The causes for the spikes of high load observed on the database servers are not yet understood and are being investigated. As a workaround, the use of the Frontier/Squid or CORAL server/proxy caching technologies is being considered. Initial tests with Frontier led to the observation of a discrepancy between physics results, due to a bug in ATLAS software, which is now being addressed.

The validation of COOL query performance on Oracle 11g servers has started. Tests have shown that a different execution plan with non-scalable performance is obtained on 11g servers out-of-the-box. It seems that adequate performance and scalability on 11g servers can only be obtained by forcing the use of the 10g query optimizer.

## Simulation

Main effort was dedicated to developments scheduled for the December release: a new feature for layering geometries, allowing to overlay additional geometry setups and

undertake tracking in parallel in each one; geometries of different detail can be defined to different particle types; the feature is well suited for the realization of support structures in HEP experiments.

Many physics improvements have been made, including the extension of the FTF hadronic model to anti-nucleon and light anti-ion projectiles, and a fix to the kaon cross-sections used in the Bertini Cascade model allowing it to interact kaons above 6-7 GeV. Work is currently going on to develop pi- capture and gamma-nuclear processes in Bertini as potential replacements of the only current production implementation, which is based on the CHIPS model. Improvements to the Bremsstrahlung model are going on, with the goal to address the discrepancy in the EM lateral shower shape reported by ATLAS and CALICE.

Improvements were also made to the multi-threaded prototype of Geant4 (Geant4-MT) in identifying and considerably reducing some CPU penalty induced by the dynamic libraries with the GCC compiler. Geant4-MT is now ready for release to Alpha-testers.

The new CMake build infrastructure has been integrated with the CPack tool for creating native installers on different systems; also integrated the use of the CTest test execution system and the CDash tool for presenting the results of test runs.

The Geant4 Workshop was held at SLAC from September 19-23rd, where several topics (included those cited above) were presented and discussed.

A 2-days Workshop on Simulation of LHC detectors has taken place at CERN on October 6-7th, organized in the context of the LPCC (LHC Physics Center at CERN) initiative. The workshop has featured presentations from the experiments, Geant4 developers and members of the Geant4 SFT team; the requirements from the LHC experiments to drive the future work of the Physics Validation Project have been largely discussed and formalized; all information can be found from the Workshop's agenda.

The final note for the HELIOS diffraction benchmark (CERN-LCGAPP-2011-02) is now available from the AA document area and project website.


## SPI

The project delivered a new release cycle (LCG_61), which included major cleanups in the LCGCMT infrastructure, removing deprecated or superseded externals, and major update in Python modules. Three minor releases (59c, 60d, 61a) with critical bugfixes have been provided. Internal procedures have been further streamlined. All necessary steps for building a release can now be carried out by the release managers themselves, without relying on particular project developers to intervene.

The migration of the external software to gcc45 on both SL5 and 6 was completed. The migration to gcc46 has been finished for SL5, but is still unfinished for SL6. The integration of SL6 into the overall CERN infrastructure is still not completed and slightly slowing down the SPI activities. In parallel, efforts started to port the LCG/AA stack to Mac OS X 10.7 (Lion).

Together with CERN IT the SPI project was looking into the licencing situation of the Intel Compiler suite. CERN is in the process of purchasing a few licenses that can be used by the LCG/AA.

The Savannah issues backlog, accumulated during past years, got further reduced. It is expected to finish this task by early 2012. For the long-term prospects, the team in CERN IT being responsible for the new central JIRA service is forming now. SPI works in close collaboration with them and a concrete roadmap for the technical setup of the service will be reported to the AF soon.