Summary of the DOE-NSF
LHC Software and Computing Mini-Review
August 15, 2006
Washington, DC

Introduction

The 2006 mid-year review of US CMS and US ATLAS Software and Computing (S&C) programs took place on August 15th at URA in Arlington, VA. Present from the agencies were Pepin Carolan, Tom Ferbel, Saul Gonzalez, John O'Fallon, Craig Tull of DOE, and Moishe Pripstein, Randal Ruchti, and Jim Stone of the NSF. Each experiment was given 1.5 hours for presentations and discussions. Jim Shank (Boston) presented the S&C status and plans for US ATLAS and Lothar Bauerdick and Ian Fisk (FNAL) presented for US CMS.

Prior to the review, the agencies distributed a set of topics and questions to be addressed by the collaborations. They were also asked to respond to the recommendations of the previous comprehensive review. The following includes summaries of the review, including common and collaboration-specific items.

US CMS and US ATLAS

The presentations by both collaborations were well prepared and responsive to the charge of the review. The answers to the agencies' questions were provided, as requested, prior to the review.

Both U.S. collaborations continue to play important leadership roles within their respective software and computing organizations. For example, after identifying serious flaws in the then-standard CMS software framework, US CMS launched a project to re-design and deploy a new framework and data model (CMSSW) adequate for LHC running. By all measures, it appears the new software has been a success and is now widely adopted within CMS. U.S. ATLAS has provided similar leadership within ATLAS in the past by developing the Athena software framework and now by developing Panda, a distributed production environment.

The agencies also noted that the many data and service challenges, together with test beams and magnet tests, had provided a platform for end-to-end testing and debugging for both collaborations' software and computing models.

At the time of the review, the severe funding shortfall for the CERN analysis facility (CAF) had not been resolved. If this shortfall persists, it will severely impact the ability of both collaborations to analyze data at CERN. The agencies would like to see this matter and the issue of the difference in Tier-1 computing requirements between ATLAS and CMS resolved as rapidly as possible. (The latter may now be less of a problem because of the delay in the start of the LHC.)

U.S. ATLAS

Overall, there has been much progress in ATLAS software and computing. The BNL Tier-1 facility is ramping up its personnel and equipment according to plan. There is now a roadmap to provide the required bandwidth to the facility on a time scale compatible with LHC operations. The issue of power and cooling costs at BNL, identified at the last comprehensive review, has been resolved temporarily, with U.S. ATLAS absorbing these additional costs into its RP budget.

U.S. ATLAS has made much progress this past year in defining its analysis-support infrastructure. However, the agencies are still concerned that the roles of the analysis support groups (ASG) are not fully defined, nor their relation (if any) to the Tier-2 centers. The ASGs have a challenging role, given that U.S. ATLAS, via its own survey, has expressed its preference for stationing 2/3 of its manpower at CERN. In addition, given the importance of this support activity, the agencies were concerned that the ASG profile is not sufficiently high in the U.S. S&C management charts.

Given its lower maintenance requirements and higher event throughput, the first implementations of Panda show that it is better and more stable than the current ATLAS production tool. Nevertheless, thus far, U.S. ATLAS has been unsuccessful in convincing the collaboration to adopt it.

The U.S. ATLAS team stated that, if the full request for management reserve was not granted by U.S. ATLAS management, they would eventually have to de-scope their core development and support effort to concentrate on user (physicist) support. The agencies were concerned that this strategy would further increase demands on user support since core software performance and usability would suffer. In addition, de-scoping core support requires advanced planning and coordination within the collaboration. With time running out, the agencies hope that the calls to management reserve consider this fact.

U.S. CMS

The remarkable progress in the CMS software framework and the event-data model (CMSSW) shows that the US CMS team leads the collaboration in this important area. This development has not only created the framework for CMS operations, it has also led to refinement of infrastructure needed for software development (e.g., software releases).

The agencies noted that the ongoing re-organization within CMS offers the U.S. many opportunities. After years of contributions to CMS, as the experiment moves to its operational phase, U.S. CMS should continue its vigorous participation and leadership in preparation for data analysis.

The U.S. CMS facilities are ramping up according to plan, with adequate bandwidth and strong Tier-2 centers However, the longstanding shortfall in int'l CMS Tier-1 resources persists and will probably only be resolved at the RRB level. The unresolved CAF shortfall might increase the analysis pressure on national facilities, further exacerbating the CMS Tier-1 problem.

Given the CMS Tier-1 shortfall and the large facility at Fermilab, the agencies were concerned that a larger than expected load might be placed on the U.S. CMS Tier-1 center. The agencies asked U.S. CMS to analyze the Tier-1 data access model (including domestic and international access) and to determine if there are any impacts on the assumptions of available bandwidth.

Finally, the agencies encouraged U.S. CMS to continue to develop the LHC Physics Center (LPC) and to carefully monitor its progress in overall utilization by the U.S. community.

The next comprehensive review will be on January 17-19, 2007 at the University of Texas in Arlington. The review will include external consultants.