



## LCG - Quarterly Status Reports 2007 Q2 (April-July 2007)

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### Executive Summary

## 1 Introduction

This document highlights the major achievements and issues of the quarter, also providing an overview of the individual Quarterly Reports that were submitted by Sites, Experiments and Projects.

All reports were reviewed by a Review Team (A.Aimar, M.Ernst, A.Sansum and L.Robertson). The reviewers then asked for additional information and, in some cases, the reports were modified and re-submitted by the original authors.

For details about the topics summarized in this document please refer to the complete document: “Quarterly Status and Progress Report - 2007Q2” where all individual reports are collected. In addition, all past Quarterly Reports, since 2005Q4, are always available on the [WLCG Quarterly Reports](#) web page.

**Note:** The quarter 2007Q2 was extended until end of July 2007 in order to synchronise more closely with the Overview Board meetings.

## 2 High Level Milestones

During the quarter the high level planning and reporting process has been evolved, better adapted to the operational phase of the project. There are several classes of High Level Milestone: targets to be met by each of the major sites (CERN, Tier-1 sites); targets to be achieved by or for each of the experiments; targets for specific developments or availability of specific software/middleware components.

The LHCC referees have asked for a “dashboard” style of presentation, showing graphically the progress across the different sites. This is now the standard way progress is monitored, the dashboard of High Level Milestones being updated at the beginning of each month.

**Appendix 1 shows the milestones status of all high level milestones due at the end of 2007Q2.** The latest update is always available from the [WLCG Planning Web](#).

## 3 WLCG Service Overview

The main focus for the WLCG services in this quarter continued to be preparation of the needed services for the Experiments’ dress rehearsals and other challenges. Of the so-called ‘residual services’, SRM v2.2 implementations were still not of production quality and their deployment is now not expected before Q4 2007 at the earliest. Services successfully upgraded during this quarter include FTS 2.0 services at the Tier0, LFC and DPM enhancements as well as production distributed database services for ATLAS conditions. Further details are given below.

**FTS** - FTS 2.0, which includes SRM v2.2 support and service enhancements, was deployed at CERN on June 18th, somewhat later than the initial target of April 1st. After one month of production experience it will be released to Tier-1 sites, with the target of deployment at (at least) all CMS Tier-1 sites by mid-September. Ongoing (less critical) developments to improve monitoring piece by piece continue.

**gLite 3.1 WMS** - WMS passed certification and is now in integration. It is being used for validation work at CERN by ATLAS and CMS with LHCb to follow. Developers at CNAF fix any bugs then run 2 weeks of local testing before giving patches back to CERN.

**gLite 3.1 CE** - The CE is still under test with no clear date for ‘completion’. The backup solution is to keep the existing 3.0 CE which will require SLC3 systems. Alternative solutions, such as the CREAM CE, are being discussed.

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**VOMS roles in job priorities** - Mapping to job scheduling priorities has been implemented at Tier 0 and most Tier 1 but behaviour is not as expected (ATLAS report that production role jobs map to both production and normal queues) so this is being re-discussed.

### LFC

The initial set of bulk queries required by ATLAS was deployed in February. ATLAS and LHCb gave new specifications for other bulk operations that are scheduled for deployment this autumn, together with matching GFAL and lcg-utils changes. Support for secondary groups was deployed in April.

**DPM** - SRM 2.2 support was released in November. Secondary groups deployed in April. Support for ACLs on disk pools passed certification. SL4 32 and 64-bit versions were certified, apart from VDT (gridftp) dependencies.

**3D** - All Tier 1 sites are in production mode and validated with respect to ATLAS conditions DB requirements. 3D monitoring integrated into GGUS problem reporting system. Testing to confirm streams failover procedures in next few weeks then will exercise coordinated DB recovery with all sites. Also starting Tier 1 scalability tests with many ATLAS and LHCb clients to have correct DB server resources in place by the Autumn.

**SL4 WNs** - The native SL4 32-bit WN was released to production. More details are in a dedicated section further in this document.

**Outlook for Next Quarters** - During the remainder of the year it is expected that Tier-1 sites will upgrade their FTS services to FTS 2.0. For the time being, this is limited to SL3 systems, although a production release for SL4 is expected by Q4. The R/O LFC services for LHCb should go into production – the backend database replication already being activated. All additional bulk methods for the LFC have been implemented and are currently under test. They should be deployed in production during the 2nd half of this year.

The biggest uncertainty remains around SRM v2.2 production services. A tight schedule suggests first production deployment – following successful testing by the Experiments and the required documentation – in Q4. Some sites, notably those that source dCache through OSG, will not be able to upgrade until Q1 2008, due to the associated OSG release schedule.

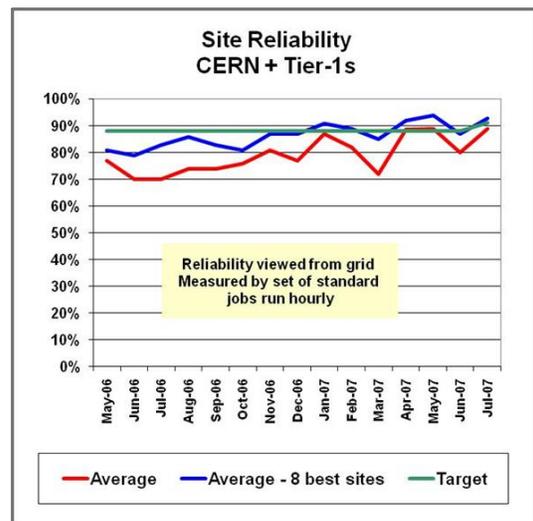
Following a re-evaluation of the implementation of the core Grid services at the Tier0, enhancements to service reliability (elimination of single points of failure, better support for transparent service upgrades) can be expected. This work will be extended to Tier-1 sites and large Tier-2s progressively in 2008.

### 3.1 Global Performance and Reliability

**Site Reliability** - Site reliability metrics were established in 2006 and reported monthly for CERN and 10 Tier-1 sites (NDGF is expected to start participating during the next quarter). During the quarter the average reliability of the 8 best sites each month was above target with the exception of June, when there were many issues mostly due to upgrades and operational problems. The average of all the sites was steady at 89% with the exception of June. The average results are summarised below, and detailed results by site are given in Table 1.

	July	June	May	April
8 best sites	93%	87%	94%	92%
all sites	89%	80%	89%	89%

The performance over the past year is given in the diagram, showing slow but steady improvement for the best 8 sites.



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Site	Month	Jan 07	Feb 07	Mar 07	Apr 07	May 07	Jun 07	Jul 07
	Target	88	88	88	88	88	91	91
ASGC		96	97	95	92	98	80	83
CC-IN2P3		96	74	58	95	94	88	94
CERN		99	91	97	96	90	96	95
GridKa/FZK		85	90	75	79	79	48	75
INFN/CNAF		75	93	76	93	87	67	82
NDGF		n/a	n/a	n/a	n/a	n/a	n/a	n/a
PIC		86	86	96	95	77	79	96
RAL		80	82	80	87	87	87	98
SARA-NIKHEF		93	83	47	92	99	75	92
TRIUMF		79	88	70	73	95	95	97
US ATLAS - BNL		90	57*	6*	89	98	94	75
US CMS - FNAL		84	67	90	85	77	77	92
<b>Sites &gt; Target + &gt; 90% Target</b>		<b>5 + 5</b>	<b>6 + 3</b>	<b>4 + 1</b>	<b>7 + 3</b>	<b>6 + 3</b>	<b>3 + 2</b>	<b>7+2</b>

**Table 1.** SAM test results for 2007 for the Tier-0 and Tier-1s

**Note:** The March values in Table 1 are particularly low because of some problems with the network and with the test system itself. In other situations a test may fail at a particular site while the site is still able to run jobs for one or more experiment (e.g. BNL performed well for ATLAS in March even if did not pass the SAM tests for most of March).

The daily trend of each site from October 2006 through July 2007 is available in the summary of the Sites Availability and Reliability Data document (see [http://cern.ch/LCG/MB/availability/site\\_reliability.pdf](http://cern.ch/LCG/MB/availability/site_reliability.pdf)).

The Management Board continues to focus its attention on site reliability and to review it monthly. Each site must provide, at the Operations meeting, a weekly summary of the problems that have caused each interruption and the solutions applied. Maybe because of this constant scrutiny the sites reliability is slowly improving even if there are some concern in view of major software upgrades and hardware installations that will be performed in 2007 and 2008.

**VO/Sites Specific Reliability** – As anticipated in the previous quarter the Experiments have started to define their own tests that verify and test their operational environment.

Therefore now the Experiments specify their own tests and those tests are integrated into SAM (see Table 2). This will allow the reliability of the site to be calculated in the Experiment’s environment and provide an additional view of the reliability of the site.

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July 2007 Site / VO	OPS	ALICE	ATLAS	CMS	LHCb
ASGC	83%	0%	84%	84%	
CC-IN2P3	94%	4%	0%	99%	97%
CERN	95%	0%	99%	99%	94%
GridKa/FZK	75%	0%	66%	78%	86%
INFN/CNAL	85%	8%	94%	20%	100%
NDGF					
PIC	96%		100%	100%	95%
RAL	99%	85%	100%	99%	93%
SARA-NIKHEF	92%	13%	94%	99%	95%
TRIUMF	97%		97%		
US ATLAS - BNL	75%		75%		
US CMS - FNAL	92%			100%	

**Table 2.** Comparison between the general SAM tests (OPS) and VO-specific SAM tests of the LHC Experiments

**Job Efficiency Data** - During the second quarter a first set of job reliability metrics has been prepared, for specific job sets by the ARDA project through an analysis of the job logs. The job sets are: (1) ALICE job agents, (2) ATLAS jobs submitted via Ganga, (3) CMS jobs submitted via CRAB, (4) LHCb pilot jobs.

At present only jobs submitted through an EGEE Resource Broker are included, as insufficient logging information is available for jobs submitted by other methods. This work is based on previous developments for the experiment dashboards. This analysis of job logs can be used by site operations and users to help in debugging and understanding why jobs fail.

Since July 2007 the Management Board is reviewing the monthly Job Efficiency Reports that summarize the performance and the efficiency of the jobs submitted by the Experiments at each WLCG Tier-0 and Tier-1 site. Table 3 below shows the Job Efficiency Summary for the month of July.

Site	Submission by	Successful Jobs	Total Jobs	Success Rate
<b>ASGC</b>	<b>Total</b>	<b>1155</b>	<b>1194</b>	<b>96.73%</b>
	ALICE-AGENT	0	0	n/a
	ATLAS-GANGA	0	0	n/a
	CMS-CRAB	1155	1194	96.73%
	LHCb-PILOT	0	0	n/a
<b>CERN</b>	<b>Total</b>	<b>109700</b>	<b>129006</b>	<b>85.03%</b>
	ALICE-AGENT	50462	63848	79.03%
	ATLAS-GANGA	62	66	93.94%
	CMS-CRAB	30829	34547	89.24%
	LHCb-PILOT	28347	30545	92.80%
<b>IN2P3</b>	<b>Total</b>	<b>11720</b>	<b>13300</b>	<b>88.12%</b>
	ALICE-AGENT	2775	3158	87.87%
	ATLAS-GANGA	94	269	34.94%
	CMS-CRAB	1252	1570	79.75%
	LHCb-PILOT	7599	8303	91.52%

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Site	Submission by	Successful Jobs	Total Jobs	Success Rate
<b>INFN-CNAF</b>	<b>Total</b>	<b>33144</b>	<b>37595</b>	<b>88.16%</b>
	ALICE-AGENT	9049	9992	90.56%
	ATLAS-GANGA	4	6	66.67%
	CMS-CRAB	189	279	67.74%
	LHCb-PILOT	23902	27318	87.50%
<b>FNAL</b>	<b>Total</b>	<b>25706</b>	<b>26864</b>	<b>95.69%</b>
	ALICE-AGENT	0	0	n/a
	ATLAS-GANGA	0	0	n/a
	CMS-CRAB	25706	26864	95.69%
	LHCb-PILOT	0	0	n/a
<b>FZK</b>	<b>Total</b>	<b>28124</b>	<b>39501</b>	<b>71.20%</b>
	ALICE-AGENT	16253	21267	76.42%
	ATLAS-GANGA	302	317	95.27%
	CMS-CRAB	5095	7877	64.68%
	LHCb-PILOT	6474	10040	64.48%
<b>PIC</b>	<b>Total</b>	<b>6831</b>	<b>7117</b>	<b>95.98%</b>
	ALICE-AGENT	0	0	n/a
	ATLAS-GANGA	6	6	100.00%
	CMS-CRAB	1008	1028	98.05%
	LHCb-PILOT	5817	6083	95.63%
<b>RAL</b>	<b>Total</b>	<b>10964</b>	<b>17536</b>	<b>62.52%</b>
	ALICE-AGENT	821	7112	11.54%
	ATLAS-GANGA	10	10	100.00%
	CMS-CRAB	171	179	95.53%
	LHCb-PILOT	9962	10235	97.33%
<b>SARA-NIKHEF</b>	<b>Total</b>	<b>26859</b>	<b>32079</b>	<b>83.73%</b>
	ALICE-AGENT	15916	16949	93.91%
	ATLAS-GANGA	264	264	100.00%
	CMS-CRAB	0	0	n/a
	LHCb-PILOT	10679	14866	71.84%
<b>Not available</b>		<b>BNL</b>	<b>NDGF</b>	<b>TRIUMF</b>

**Table 3: Job efficiency – July 2007**

**Monitoring the WLCG Services** - Three monitoring working groups have been agreed and are in operation, addressing various aspects of monitoring with the goals of improving the overall reliability of the WLCG services, and providing more complete information to the site administrators, service managers, and users. They are not development projects but they focus on organizing how current tools and procedure should be defined. More information is available on this web page: [WLCG Monitoring Working Groups](#).

### 3.2 Sites Procurement and Resources

**Procurement and Mid-Term Requirements** - Following the reschedule of the LHC programme for 2007 and 2008, several sites have re-defined their procurement schedule for next few months. In most cases the requirements during 2007 and 2008 are lower than before, offering an opportunity to the funding agencies to fulfil these requirements with the funding that is available.

Some sites had reduced their disk expansion purchases, waiting for the availability of lower prices and for the introduction of new technologies. In view of the steep ramp-up required between mid 2007 and April 2008 there is some concern that delays in procurement may lead to later problems, and the Management Board is monitoring closely the adherence to the MoU pledges. A process is in place to track the site resources compared with the experiments' requirements.

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Appendix 2 shows the Medium Term Planning Table with the values pledged and available at each site compared with the requirements from each experiment (for CPU resources, Disk and Tape capacities).

**Resource Requirements** – The longer-term experiments' requirements for 2008 and site planning for installation of network, disk and tape resources at the Tier-0, Tier-1 and Tier-2 sites continue to be collected in one single Resource Table, for convenience now usually called the “Megatable”. This is the reference for all current procurement and preparation of resources for 2008.

The first version of the Megatable was made available at the end of 2006. It shows the implications of the computing models and the resources planned at sites on relationships between the sites, data transfer performance, and allocation of disk space to the different storage classes at each site. The table is currently, in summer 2007, being reviewed by the sites and by the network experts. In parallel the experiments continue to refine it as the understanding of their computing models develops.

### 4 Summary of Progress

The EGEE infrastructure continues to operate with workloads fairly steady at over 2.5 million jobs per month from WLCG applications. As the reporting of accounting data is extended to Tier-2s the overall picture including OSG and NDGF will become available.

**Middleware Services** - The gLite WMS achieved the performance and reliability criteria set in March, and passed the basic certification process. It is now deployed in production at CERN, phasing out the WLCG Resource Brokers. Full deployment is being prepared, with several updates to issues discovered during the CERN deployment.

The FTS v2.0 pilot service has been validated by the Experiments, and is being used for SRM v2 testing. The service is now ready for deployment to the Tier 1 sites.

The information system (BDII) has been improved in several ways, eliminating the issues that caused problems to the experiments: caching being implemented in the clients, timeouts eliminated, and indexing implemented after an analysis of the query patterns. The result is more than an order of magnitude improvement in response time, and much higher reliability.

R-GMA was not able to support the load introduced at busy sites from the job-wrapper monitoring. R-GMA has now been replaced in SAM and GridView by a simple web service, and is used now only as the data collector for accounting data through the APEL system.

An important issue is the lack of real progress on a replacement CE. There is no production quality replacement for the LCG2-CE. The proposal that is being implemented is to port LCG2-CE to SL4 waiting for the Cream-CE in 2008.

**SL4 Migration** - All components build in ETICS under SL4, and testing is in progress. The WN and UI packages have been released. The Data Management server components also build now in 64-bit versions. Once the SL4 port is complete, a full 64-bit port will be the next priority.

**Certification** - An interoperability testing facility is being implemented in the pre-production service (PPS) to check EGEE-OSG interoperability as part of the certification process.

**Monitoring Activities** - The monitoring working group have a prototype Nagios system under test in the PPS. This provides: a fabric monitoring system for small sites that have nothing, including a full set of grid service sensors; a testbed for new grid service sensors with the agreed interface that has been tested to be usable by many existing fabric monitoring systems; and a demonstration of the feedback of SAM tests into local fabric monitors.

#### SRM 2.2 Deployment

Following the WLCG Storage Workshop in July 2007, a plan for the roll-out of SRM v2.2 in production has been agreed and therefore the milestones previously set have changed slightly. Developers, sites and experiments have reacted promptly to the new plan respecting the newly defined schedule. Developers of SRM services and high-level tools are working closely with sites and experiments.

The SRM 2.2 Roll-out plan covers the remaining critical issues:

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- dCache and CASTOR developers must provide a solid and clear installation and configuration procedure to sites.
- High-level tools such as gfal and lcg-utils must provide a complete interface to low-level SRM functionalities as requested by the experiments.
- Experiments usage patterns must be thoroughly tested.
- Stress tests must be performed as much as possible to avoid serious problems during LHC run.

The SRM 2.2 Roll-out Plan is maintained and updated on the GSSD Web (accessible vi the WLCG Planning Page) and the Management Board monitors its progress every week.

**Update on 8 September 2007:** Because of problems getting the dCache sites properly configured and with the high-level tools such as gfal and lcg-utils, the test slot reserved for LHCb, planned for August, has slipped by about 2 months to October. All targets will be reviewed after the discussions that took place at CHEP at the beginning of September.

## 5 Experiments Preparation

**VO Boxes Service Level Agreements** - The VO Boxes needed by the LHC experiments are installed at all Tier-1 sites and are functioning adequately. However the service level agreements between sites and experiments in order to define how VO Box configurations and data are stored and backed up and how failures are dealt with have not been completed by most of the sites, as can be seen in the high level milestone status in Appendix 1.

**ALICE – The Physics Data Challenge** is running since 2006, and has reached stable operation and is now running above 4,000 concurrent jobs The Full Dress Rehearsal plans will be finalized by mid-September and the goal is to be in full operation by February 2008. ALICE continues to progress in the preparation and maintenance of its software components: Alien has been interfaced to the latest versions of the middleware of the WLCG grid infrastructures (gLite, OSG and ARC for NDGF) and for accessing data xrootd has now interfaces to all the MSS systems (CASTOR, dCache and DPM).

**Full Dress Rehearsal** - All the elements required for the online and the offline data processing have been validated individually. They include the online data calibration (DAQ Detector Algorithms), the transfer of the calibration to the Offline Condition Data Base (DCS, DAQ and HLT File Exchange Servers, Shuttle pre-processors), the quasi-online data processing at the CAF operated by PROOF, the T0-T1 data transfers, the T0 first pass reconstruction (with calibration and alignment), the replication of the ESDs, and the scheduled analysis at the T1s.

The full chain will be build by adding progressively the various elements and a preliminary chain should be ready before the end of the year to be tested during the ALICE commissioning. The full chain will enter in production during at the beginning of the first quarter 2008.

**Resources** - The strict monitoring of the usage of resources in the sites allowed us to update the pledged resources in order to match the installed resources. More than 90% of the updated pledged CPU resources are now delivered but this exercise confirmed that the pledged resources cover only about 50% of the resources required in the Computing-TDR. Production quality storage is not installed in all the relevant sites; the strict monitoring is not yet done for the disk and mass storage resources.

**Grid Services** - The new version of the AliEn file catalog with faster access and improved scalability has been deployed and is used for PDC07. A new AliEn release is planned for September, mainly including bug fixes. The AliEn-ARC interface is undergoing stress tests using the University of Bergen computational cluster. Additional computing capacity allowing for more realistic tests is currently being deployed at Bergen. The xrootd-DPM and xrootd-dCache interfaces have been tested and are being deployed at the sites. The installation procedure has been simplified by providing installers or RPMS. The xrootd-Castor2 interface has been tested at CERN and results indicate that this installation will be a big improvement for data availability at CERN. The interface cannot yet be deployed for production, bug fixes and additional tests are ongoing.

A new release policy of the AliRoot software has been adopted favouring long term stability of the release, allowing parallel development of the HEAD and improving backward compatibility.

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**ATLAS** – The cancellation of the LHC technical run, foreseen for late autumn 2007, led to several activities being rescheduled. Software release 14, initially foreseen for late summer or early autumn 2007, will now take place in late Winter 2007/2008 and will include feedback from the usage of release 13 for the cosmic ray data taking periods in 2007 and 2008, and from the Full Dress Rehearsal tests. The Computing System Commissioning tests will now extend through Winter 2007/2008 and will be progressively included in the Full Dress Rehearsal exercise. The FDR will now consist of several phases, of increasing complexity, between autumn 2007 and spring 2008.

In August ATLAS was able to demonstrate for the first time their whole data chain during the M4 cosmics run. Data from the detectors was taken through the Tier-0 and Tier-1s to be analysed in quasi real-time at Tier-2 sites in Europe and the US.

**CMS** – no report provided

**LHCb** – The experiment will be proceeding with DC06, a generic name for all activities that will last until end 2007 (including physics book simulation, reconstruction, analysis, etc). The main goals are to produce and reconstruct useful data, exercise the LHCb Computing model, and the DIRAC and Ganga frameworks. LHCb will also proceed with the re-processing of background jobs, with SRM v2.2 testing and with validation of the Conditions DB performances with data streaming to all LHCb's Tier-1 sites. There is concern due to the continuing problems encountered with mass storage systems at several sites.

## 6 Applications Area

**Software Releases** - A number of complete software configurations (LCG\_50, LCG\_51 and LCG\_52) have been made available with special emphasis on consolidation and getting as stable as possible for the scheduled LHC technical run. The HyperNews and Savannah services in use by the collaborations have been consolidated. The AA nightly build system has been put in production. All the AA projects have been adapted to use the CMT build and configuration tool and have been standardized on the way to run the tests using the QmTest tool. All projects are built every night in various configurations and platforms. These builds are directly usable by the LHC experiments to validate new versions. The Mac OSX (Intel) and Windows platforms are being finalized.

**Geant4** - Geant4 version 9.0 has been released end of June 2007. Developments for this version include modifications of EM class interfaces for performance improvement, revised geometrical biasing that utilises the coupled transportation in parallel geometries, a revised implementation of geometry tolerances to enable the setting of relative geometrical tolerance at initialization time. The main activity in the Physics Validation has been the comparison of the Bertini Cascade extension of Geant4 to the calorimeter test-beam data. Preliminary results from ATLAS and CMS test-beams consistently show that the hadronic showers get longer and wider, in better agreement with the data. Another important activity has been the Fluka extension of the ATLAS TileCal 2002 analysis, which is aimed to benchmark both Geant4 and Fluka simulations in high-energy calorimetry.

**ROOT** - A number of patch releases of ROOT 5.14.00 have been produced on request of the LHC experiments. At the same time new functionality and improvements has been developed and have been released at the end of June as version 5.16.00. In particular, the repackaging and modularization of the ROOT core libraries have had large impact on the size of the ROOT executable module and its start-up time. Work is also ongoing to substantially reduce the size of dictionaries. The merge of the CINT and Reflex packages is progressing well, and an opportunity to make more fundamental changes in CINT, such as the support for multi-threading, has been taken. New developments in the GUI and remote client servers to browse html pages containing ROOT files and to execute one or more remote sessions and displaying the results on the client laptop are being completed. Other developments are in the area of 2-D and 3-D graphics to visualize histograms with OpenGL, and in the mathematical packages to include random number generation from multi-dimension distributions and improvements in the vector package.

**POOL and COOL** - Several CORAL COOL and POOL releases have been produced on request of the experiments. The main focus for CORAL and COOL were server-side improvements in single-version multi-channel queries, to allow the experiments to do scalability tests with realistic conditions data workloads against the Tier 1 database replicas provided by the WLCG 3D project. Two other important performance improvements were also implemented in COOL 2.2.0: the long standing issue of server-side

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optimization of single-version multi-channel bulk insertion, as well as an improved API to minimise the time spent in client-side data manipulation. With the CORAL 1.9.0 release, support was added for OSX/PPC (OSX/Intel is expected to be added soon). Libraries for OSX/PPC were also built for the first time in COOL 2.2.0, although Oracle support is incomplete due to a bug in the Oracle 10.1 client library, and PyCool could not be ported because of missing support for PyROOT on PPC. The POOL framework released a significant update on the collection implementation, which became available with POOL 2.6.0. The CORAL and POOL project schedules are affected by replacements in the development team.

**MC Generators** - All the Monte Carlo generators requested by the LHC experiments have been moved to the new GENSER structure, within the LCG external area, and have been integrated within the software frameworks of the experiments. Several new tests have been implemented and are now used on the regular bases for the validation of the generators. In particular, a number of tests explicitly requested by the experiments have been added.

## 7 Distributed Database Deployment – 3D

The 2007Q2 quarter for the 3D project was characterised by exercising the database and streams setups at the now complete set of sites with replication and T1 read patterns with increasing rates. Large scale use of the conditions data from experiment grid jobs has not yet been fully achieved by ATLAS and LHCb but both experiments expect this to happen in the next quarter.

ATLAS has confirmed during their extensive replication and reading tests that the replication with all sites can be sustained at rates close to 2 GB/d and that the system can be kept operational also during interventions and temporary problems at some of the target sites. ATLAS has now moved their production conditions data into the 3D setup so that this data is available at all sites. Also LHCb has run stability tests with conditions data without significant problems.

During a 3D workshop hosted at CNAF the 3D project successfully ran an important functional test with many sites involved in order to insure that the procedures for recovering from data corruption or media fault at the replica databases are valid and that a resynchronisation can be executed without affecting other still functional sites. The 3D database and streams monitoring has been extended to provide also monthly/weekly summaries of the database and replication performance at all participating sites.

## 8 ARDA

**Planning** - New plans have been defined for the main projects (i.e. experiments' Dashboard and Ganga). For the ATLAS DDM a more formal plan will be ready in late summer 2007.

**Dashboard** - The activity is continuing supporting all the LHC experiments. The main progress is the delivery of a first prototype of the ATLAS production system monitor, presented at the ATLAS SW week end of June and available for users, and the CMS User Task Monitor.

**Ganga** - In July 2007 CERN hosted the 3rd Ganga developers' day. It was 5-days rich of discussions and planning attended by ~15 persons. One of the immediate results is the programme of work, reflected in the milestones reported in the Quarterly Report (see ARDA-07-01). ARDA also invested on Ganga tutorials and the number of users having tried the tool at least once basically doubled (now it is over 700 persons). Ganga, that manages grid jobs for final users, is routinely used by 80 users (ATLAS VO), 30 users (LHCb VO) and around 30 users (non HEP VOs). The tool was also reviewed by users, in Munich at the ATLAS software week in April 2007, with excellent feedback. During this period the usage of this tool has grown also in number of jobs on a single EGEE site (for example, in IN2P3 – Lyon the number of jobs doubled during this period arriving to ~10k jobs/month with an efficiency higher than 90%).

**Job Reliability** - Starting this June, ARDA publishes the status of the reliability of all major WLCG sites (EGEE and OSG) using programs run by the 4 LHC experiments. These data reflect the actual efficiency as seen by real users, as opposed to the functionality tests run for example by monitoring systems like SAM. Dashboard and SAM data nicely complement each other and are the basis of evaluating the performance of the major WLCG sites and are now providing important information to the Management Board.

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**Appendix 1: High Level Milestones End of the Quarter (7 August 2007)**

The cells of the dashboard are coloured in order to indicate the milestones status at each site:

**Colour Schema** - green = achieved; orange = overdue by less than one month; red = overdue by more than one month; white = not yet due.

WLCG High Level Milestones – 2007														
7-Aug-07			Done (green)				Late < 1 month (orange)				Late > 1 month (red)			
ID	Date	Milestone	ASGC	CC IN2P3	CERN	FZK GridKa	INFN CNAF	NDGF	PIC	RAL	SARA NIKHEF	TRIUM F	BNL	FNAL
<b>24x7 Support</b>														
WLCG -07-01	Feb 2007	<b>24x7 Support Definition</b> Definition of the levels of support and rules to follow, depending on the issue/alarm	Green	Green	Green	Red (Sep 2007)	Green	Red (Jun Aug 2007)	Red (Sep 2007)	Red	Red	Green	Green	Green
WLCG -07-02	Apr 2007	<b>24x7 Support Tested</b> Support and operation scenarios tested via realistic alarms and situations	Red	Green	Green	Red	Red	Red	Red (Oct 2007)	Red	Red	Red	Green	Green
WLCG -07-03	Jun 2007	<b>24x7 Support in Operations</b> The sites provides 24x7 support to users as standard operations	Red	Green	Green	Red	Red	Red	Red (Sept 2007)	Red	Red	Red	Green	Red
<b>VOBoxes Support</b>														
WLCG -07-04	Apr 2007	<b>VOBoxes SLA Defined</b> Sites propose and agree with the VO the level of support (upgrade, backup, restore, etc) of VOBoxes	Red	Red	Green	Red	Red	Red (Jun Aug 2007)	Red	Red	Red	Green	Green	Green
WLCG -07-05	May 2007	<b>VOBoxes SLA Implemented</b> VOBoxes service implemented at the site according to the SLA	Red	Red	Red	Red	Red	Red	Red	Red	Red	Green	Green	Red
WLCG	Jul	<b>VOBoxes</b>										n/a	n/a	

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-07-05b	2007	Support Accepted by the Experiments	ATLAS																		
			CMS																	n/a	n/a
			LHCb																		n/a
<b>Accounting</b>																					
WLCG-07-08	Mar 2007	<b>Accounting Data published in the APEL Repository</b> The site is publishing the accounting data in APEL. Monthly reports extracted from the APEL Repository.																			
<b>3D Services</b>																					
WLCG-07-09	Mar 2007	<b>3D Oracle Service in Production</b> Oracle Service in production, and certified by the Experiments																			
WLCG-07-10	May 2007	<b>3D Conditions DB in Production</b> Conditions DB in operations for ATLAS, CMS, and LHCb. Tested by the Experiments.																			
<b>Procurement</b>																					
WLCG-07-16	1 Jul 2007	<b>MoU 2007 Pledges Installed</b> To fulfill the agreement that all sites procure the 2007 MoU pledged by July 2007																			
<b>FTS 2.0</b>																					
WLCG-07-18	Jun 2007	<b>FTS 2.0 Tested and Accepted by the Experiments</b> In production at CERN and accepted tested by each Experiment																			
WLCG-07-19	Jun 2007	<b>Multi-VO Tests Executed and Tested by the Experiments</b> Scheduled at CERN for last week of June																			

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BDII														
WLCG -07-21	Jun 2007	<b>BDII Guidelines Available</b> On how to install BDII on a separated node	EGEE - SA1											
WLCG -07-22	Jun 2007	<b>Top-Level BDII Installed at the Site</b> For each Tier-1 site												
GlEXEC														
WLCG -07-24	Jul 2007	<b>Decision on Usage of glEXEC and Guidelines to Follow</b>	GDB											
Site Reliability - June 2007														
WLCG -07-12	Jun 2007	<b>Site Reliability above 91%</b> Considering each Tier-0 and Tier-1 site	March											
			April											
			May											
			June											
MSS Main Storage Systems														
WLCG -07-25	Jun 2007	<b>CASTOR 2.1.3 in Production at CERN</b> MSS system supporting SRM 2.2 deployed in production at the site	CERN Tier-0											
WN and UI														
WLCG -07-31	Jun 2007	<b>WN Installed in Production at the Tier-1 Sites</b> WN on SL4 installed on each Tier-1 site, with the configuration needed to use SL4 or SL3 nodes	July 2007	July 2007		July 2007	n/a	July 2007	July 2007	July 2007				
WLCG -07-32	Jun 2007	<b>UI Certification and Installation on the PPS Systems</b>	EGEE - SA1-PPS done: Jul 2007											
WLCG -07-33	Aug 2007	<b>UI Tested and Accepted by the Experiments</b>	ALICE			ATLAS			CMS			LHCb		
Xrootd														
WLCG -07-41	Jul 2007	<b>xrootd Interfaces Tested and Accepted by ALICE</b>	ALICE											

## Appendix 2: Tier-0 and Tier-1 Capacity Available and Required

2Q2007	Tier 1 Capacity: Available vs. Required (Scheduled)								
WLCG Site	CPU KSi2K			Disk TB			Tape TB		
	2006/7 pledge	Installed	Required	2006/7 pledge	Installed	Required	2006/7 pledge	Installed	Required
ASGC	950	640	447	400	360	97	500	280	157
CC-IN2P3	1170	1170	1448	520	479	354	535	535	370
FZK/GridKa	1030	1864	1562	280	369	430	393	1007	544
INFN/CNAF	1800	1300	1416	850	400	489	850	500	447
NDGF	520	595	657	160	140	227	240	112	453
PIC	250	480	495	140	88	122.9	158	167	150
RAL	980	810	729	450	318	188	664	384	185
SARA-NIKHEF	306	774	1039	170	148	187	143	52	171
TRIUMF	150	305	183	12	24	27	12	12	35
US-ATLAS BNL	1120	1120	831	520	520	79	300	1000	165
US-CMS FNAL	728	2250	720	100	720	280	250	500	406
US-ALICE		180	254		45	78		35	0

TOTALS	9004	11488	9781	3602	3611	2558.9	4045	4584	3083
<b>CERN Tier-0</b>	2400			230			1500		
<b>CERN CAF</b>	1000			540			0		
<b>CERN Total</b>	3400	3174	7022	770	1290	864	1500	3000	1791

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2Q2007	Scheduled Capacity Required by LHC Experiments and Site Disk Allocations															
WLCG Site	ALICE				ATLAS				CMS				LHCb			
	CPU	Disk	Alloc.	Tape	CPU	Disk	Alloc.	Tape	CPU	Disk	Alloc.	Tape *	CPU	Disk	Alloc.	Tape
ASGC					267	27	67	41	180	70	218	116				
CC-IN2P3	321	165	18	136	467	52	271	91	180	70	109	116	480	67	81	27
FZK/GridKa	752	242	62	331	364	51	132	89	180	70	110	106	266	67	65	18
INFN/CNAF	488	229	22	160	260	33	74	51	420	160	110	218	248	67	51	18
NDGF	467	203		425	190	24		28								
PIC					190	29	26	42	180	70	26	92	125	23.9	36	16
RAL	23	11	21	10	260	40	114	71	180	70	120	84	266	67	64	20
SARA-NIKHEF	146	75	3	63	450	45	41	85					443	67	39	23
TRIUMF					183	27	23	35								
US-ATLAS BNL					831	79	520	165								
US-CMS FNAL									720	280	700	406				
US-ALICE	254	78		0												

TOTALS	2451	1003	126	1125	3462	407	1268	698	2040	790	1393	1138	1828	359	336	122
CERN Tier-0	53	14		66	1900	80		400	1900	100		800				
CERN CAF	26	3		0	800	200		60	1900	400		400				
CERN Total	79	17	286	66	2700	280	390	460	3800	500	331	1200	443	67	179	65