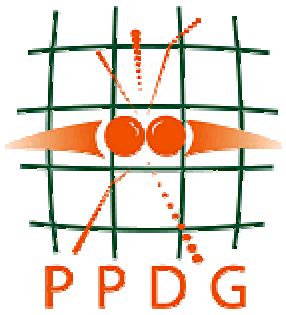
Particle Physics Data Grid Collaboratory Pilot

Quarterly Status Report of the Steering Committee,

April - June 2004

30 July 2004



1 Project Overview

1.1 Highlights

A document summarizing the progress in PPDG and benefits to science over the past year was compiled and is posted at PPDG-45.

All the experiments advanced their production grid usage and capabilities.

The semi-annual collaboration meeting was held in Wisconsin at the end of June where a lot of progress was made on organizing the work towards the PPDG-OSG common project, as defined in our approved 2-year renewal proposal.

1.2 Progress on the Year 3 Plan

All experiments gained benefit to the end applications through the use of Grid technologies; Grid based scheduling and job management was extended for use in all experiments; robust data transfers were taken "for granted"; and progress was made in some of the other more advanced services needed for grid systems.

In general the groups followed the planned paths with delays in reaching the goals being more frequent than changes in direction. We have a high success rate in meeting the early milestones as might be expected. Disruptions to the schedule were affected by such things as personnel leaving or transitioning to other responsibilities; still underestimated efforts to integrate and put into production new technologies; and retrenching from the tasks that required more development and challenges to the most urgent requirements of the applications.

Milestones identified in the Year 3 plan for this reporting period are shown with their status and comments:

Date	Team(s)	Task Name	ction + ilestone ımber	Date Finished
10/03 (10/04)	PPDG & DOESG	Document describing VO management practices	3.8.1	[5]
10/03	JLAB	Replica Catalog Web Service Interface	4.4.2	[12]
11/03 (10/04)	Condor	VDT based on GT3	3.5.1	[7]
11/03	D0	D0 using VDT	3.5.2	4/04 [11]
11/03	BaBar	BaBar using VDT	3.5.3	5/04 Use LCG
12/03	JLAB & STAR	First implementations of site interface to map WSDL/XML onto PBS/LSF/Condor submissions	2.9.3	[9]
12/03	PPDG & DOESG	DOESG-PPDG: MyProxy with credential repository	3.8.2	[10]
1/04	JLab	Prototype LQCD meta data catalog	4.4.3	In test at LQCD
1/04	D0	JIM V1.2 release. Version ready for D0 MC production.	4.5.2	3/04
2/04	ATLAS	Analysis tools that support a three-group analysis effort	4.1.2	4/04
2/04	CMS	Analysis Object Converters	4.3.3	6/04 [15]

Date	Team(s)	Task Name	ction + ilestone umber	Date Finished
2/04	CMS	Grid Analysis Environment Prototypes	4.3.4	6/04 GAE Demo'd at CPT week
3/04	Exec	Review (2) progress of team plans and provide status summary	2.7.9	5/04
3/04	Exec	Decide on annual cross-project documentation or review process	2.7.10	5/04
3/04	Exec	Provide input to GGF PNPA document on requirements of HENP	2.7.11	3/04
3/04	JLAB & STAR	Joint JLAB-STAR First implementation of meta scheduler.	2.9.4	(deferred)
3/04	SRM	Packaging DRM v1.0 for inclusion in VDT	3.4.3	5/04
3/04	PPDG & DOESG	VO membership service	3.8.3	[13]
3/04	PPDG & DOESG	Gatekeeper with callout	3.8.4	[13]
3/04	PPDG & DOESG	Local site user account/registration database	3.8.5	[13]
3/04	ATLAS	Staging/scheduling system for Tier1-Tier 0 connection	4.1.3	4/04
3/04	ATLAS	Coordinated system for reconstruction at Tier 0	4.1.4	4/04
3/04	BaBar	SRB-based distribution of ROOT files	4.2.3	4/04
3/04	BaBar	SRB with VSC	4.2.5	[14]
3/04	CMS	Distributed Grid Database	4.3.7	[15]
3/04	CMS	SOCAT ongoing beyond this timeframe.	4.3.8	[15]
4/04	CMS	p2p functionality, interface to SRB, Dial, dCache, etc.	4.3.5	6/04 Dial, dCache not done
4/04	JLAB	Batch Web service	4.4.4	Prototype testing
4/04	D0	JIM V1.3 release. Deployment to full complement of MC sites.	4.5.3	6/04
5/04	JLAB & STAR	Job Management More robust implementation, …	2.9.5	6/04 in test STAR[17]
6/04	Exec	Semi-annual PPDG collaboration meeting.	2.7.12	6/04
6/04	Exec	Review of 2003-2004 performance of the project.	2.7.13	6/04
6/04	Exec	GGF PNPA document summarizing GGF standards …	2.7.14	(expect 9/04)
6/04	SRB	Second implementation and deployment for BaBar production needs	3.3.3	7/04
6/04	SRM	SRM Replica Registration Service for RLS (obsolete due to RRS validation in STAR)	3.4.5	7/04 [16]
6/04	PPDG & DOESG	Operate VO service in pre-production mode (no SLA) and develop operations plan	3.8.6	[13]
6/04	BaBar	Web services (via Matrix in SRB)	4.2.7	Deferred to fall/04

Date	Team(s)	Task Name	ction + ilestone umber	Date Finished
6/04	CMS	Use cluster scheduler and proof, java implementation	4.3.6	In progress (see CMS report)
6/04	JLAB	Prototype meta-data facility	4.4.5	
7/04	Exec	Review (3) progress of team plans and provide status summary	2.7.15	7/04 (this report)
7/04	SRM	DRM and HRM v2.0 – prototype (v2.1)	3.4.6	7/04
7/04	PPDG & DOESG	Deploy production VO service	3.8.7	[13]
7/04	D0	JIM V2 release. Version for CDF MC production – in progress.	4.5.4	[18]
8/04	Exec	Informational document relating the HENP experiences to GGF	2.7.16	
8/04	STAR	Workload on Grid.	4.6.3	6/04
9/04	SRM	DRM and HRM v2.0 debugged version (v2.1)	3.4.7	
9/04	SRM	Integration of DRM v2.0 with NeST	3.4.8	
9/04	STAR	RRS consolidated, HRM V2.0 deployed to one (or more) new site.	4.6.2	

Comments

[1] from Chip: dependent on SRM v2.1….(please redefine to) 10/03 and we'll see if we can make it -- I expect the next spec version soon, and we would only need (I believe) to tweak our implementation to declare success.

[2] from Adil: ..milestone has slipped by 1.5 months due to my not taking into account ccin2p3 holiday schedules We have tested all the pieces, we just need to run them together. I'm not sure how prod it will be by Oct (maybe flaky

[3] from Ruth: Focus currently on Grid2003 and MonaLisa deployment and integration. Will hold meeting post-sc2003

[4] Wilko: JImport is a tool used at IN2P3 to import Objectivity databases. With the new computing model the BaBar events are stored in root files and there is no need to import Objectivity files anymore. Therefore we decided not to spent any effort on the integration of SRB and JImport.

[5] Doug: Deferred to Oct. 2004 as part of DOESG Phase2. See [13]

[6] In quarterly report, http://www.ppdg.net/docs/ppdg_qtrly_jul-sep-03.pdf

[7] VDT 1.3 was planned for Spring 2004, see http://www.lsc-group.phys.uwm.edu/vdt/newsletter/2004-02.html. Now expected in Fall 2004.

[8] First draft, Jan 2004, http://www.ppdg.net/docs/Papers/PPDG-36-23jan04.pdf

[9] Deferred/delayed, no target date at this time.

[10] Standard myproxy available. Long term key storage planned for Q4/04 at NERSC.

[11] Deferred until after Mar 04 deployment for MC production.

[12] Deferred due to low priority.

[13] Delayed, then lost due to DOESG not getting renewed. Alternative plans/options are being considered.

[14] VSC delayed

[15] Author of SOCATs left and product development dropped.

[16] The goal of this milestone was to validate the RRS model. This goal was achieved by extensive RRS usage in STAR.

[17] STAR is strengthening the "STAR Scheduler" interface for grid jobs and has started running production simulation & subsequent reconstruction via grid submission from the scheduler.

[18] Work on deploying JIM for CDF MC production started 4/04 and is ongoing.

1.3 Papers and Documents

The following reports and papers were posted at http://www.ppdg.net/docs/documents_and_information.htm.

Reports, Documents and Papers		Date/Version
PPDG-46	STAR Unified MetaScheduler and MonALISA	pdf
PPDG-45	Year3 Summary	doc, pdf
PPDG-44	Science Impact of PPDG on Experiments	doc, pdf
PPDG-43	DataMover: Robust Terabyte-Scale Multi-file Replication over Wide-Area Networks	SSDBM'04 pdf

2 Focus Areas and Common Projects

Highlights and summaries of the focus areas and common projects in PPDG are given in this section. Additional details and depth on the topics mentioned here are included in the single team reports in section 4.

2.1 Data Management

BaBar is continuing to advance the use of SRB in production mode data distribution. A new release of SRB 3.1 is supporting this work. About 160,000 root files are currently registered in the SRB accounting to more than 80 TB in size. Those files designated to be at IN2P3 were transferred and BaBar users are accessing these data for their analysis jobs at IN2P3. We achieved transfer rates of about 1TB per day. The focus was to register the files in the SRB, ensure the correctness of the metadata, the transfer of files and the monitoring of the SRB servers.

Work progressed to make the BaBar conditions files available in the SRB. The main effort is to provide the user with tools that makes it very easy to access the SRB and find the proper set of conditions files.

An SRM V2.1.1 service was developed and deployed for testing at JLab. In the next quarter it will be deployed to several other sites for additional testing before going into full production.

LBNL/SDM packaged the DRM and worked with the LBNL lawyer to make it possible to add it to VDT. The DRM, called the Berkeley-DRM, was documented and added to VDT as an experimental package.

A major milestone for future work is the development of a general purpose Replica Registration Service (RRS). Over the last quarter, we have been developing the spec for this service. We have realized that this service makes sense in combination with two other services: the Replica Copying Service (RCS), and the Replica Selection Service (RSS). Together these three services can be invoked by a Replica Management Service (RMS) that provides coordinated CopyAndRegister as well as UnregisterAndDelete capability. We have developed the functional specification for these services and summarized it in a draft document that was released to the PPDG members. There is strong interest from the LCG community to use this base specification in order to standardize on these service. We expect a meeting to coordinate this activity to take place by early September.

PHENIX and RCF personnel developed at testbed for dCache at BNL and evaluated its performance. This will now be put into production for PHENIX and a plan developed for use of dCache on the grid.

2.2 Job Management.

The SAM-Grid infrastructure evolved to include the use of DAGman to schedule "structured" jobs for D0 and CDF. The immediate use is to merge output data from montecarlo jobs. There was also work on the "sand boxing" mechanisms in SAM-Grid to generalize and remove D0-specific aspects, with CDF being the first beneficiary of this work.

A prototype Meta-Job Gateway for submitting CLAS specific jobs was developed and deployed at JLab. The Gateway will accept as input a job description that is loosely based on the uJDL (User Job Description Language) used by the STAR scheduler.

2.3 Production Grids

Preparations were made for the ATLAS Data Challenge 2 (DC2) so that the gce-client and gce-server software elements can accommodate multiple releases of ATLAS applications.

CMS completed Data Challenge 04. The goal of sustaining 25HZ event distribution from CERN to the Tier-1 centers was met for short periods of time. Lessons learned from the data challenge are being addressed in planning for the next round of developments and deployments. CMS continues to use its Production Grid infrastructure to generate monte-carlo events.

The data replication for STAR ran smoothly this quarter using SRM with RRS (Replica Registration Service) and the distributed STAR file catalog. About 10^5 files were transferred and registered in the catalog this quarter. Monte Carlo simulation and subsequent reconstruction for 10^5 events for the 62.4 GeV Au+Au dataset was carried out on the grid this quarter, achieving a major milestone ahead of schedule.

Grid3 continues to be used for production by US-ATLAS (DC2) and US-CMS (DC04).

2.4 Data Analysis Working Group

ATLAS has released DIAL 0.90 and the main component of the prototype ATLAS distributed analysis system (ADA). A web service based on DIAL is running at BNL and providing a prototype interactive analysis service for US-ATLAS users.

The CMS Grid Analysis Environment (GAE) using Clarens as the web service framework is continuing to be developed and expanded with additional services and expanded collaboration with groups at Fermilab and CERN.

2.5 Monitoring

There is continuing development of the MonALISA system (http://monalisa.caltech.edu) and providing support for the all users. There are around 80 MonALISA services running now in different HEP sites as part of several experiments (CMS, ALICE, CDF, Star, DOsar, SCOOP). We also monitor the VRVS system and around 70 services are running to monitor all the VRVS reflectors

2.6 AAA

BNL is deploying VOMRS and VOMS as a registration service for RHIC experiments and also interfacing GUMS with the Globus gatekeeper call-out for authentication/authorization to replace distributed grid-mapfiles.

The GT 3.3 development release made this past quarter includes the SAML-based authorization callout as being defined in the GGF OGSA-Authorization working group.

JLab joined the distributed PKI effort this quarter by having a person assume the role of agent with the PPDG RA in order to register users requesting person and host/service X509 certificates from the DOEGrids certificate authority. At this time all the DOE labs involved with PPDG have personnel participating in this process.

3 Collaborations

3.1 DOE Science Grid/ESnet

Most of the interaction with DOE Science Grid (DOESG) this quarter involved discussions and plans around One Time Password (OTP) systems and plans. Because of the ongoing security incidents on the internet where intruders gain access to one system, install keyboard sniffers to collect passwords and track ssh sessions, a number of DOE sites are investigating or have committed to implementing OTP systems. DOESG effort at NERSC in collaboration with NCSA and ESnet is moving toward storing long term X509 private keys in a myproxy server that will authenticate users via PAM interface to a RADIUS fabric with an OTP system. In this way, using OTP access to myproxy will provide a GSI compatible proxy certificate to enable single sign-on across different grid sites.

While the termination of the DOE Science Grid SciDAC project affects the level of effort for this at NERSC it does not directly affect the ESnet X509 activities and the work to integrate myproxy with OTP and long term credential repository is continuing.

3.2 Trillium and Grid2003

Grid3 continues to operate to the benefit of the stakeholders. CMS simulation production for DC04 used Grid3. US CMS continued event production at 2Million/month is being submitted to Grid3. A Development grid based on Grid3, Grid3Dev, was built during Spring 2004 and is used to test versions of VDT as well as new versions of existing and new services.

Several Joint Steering Meetings were held between PPDG, GriPhyN and iVDGL to prepare for the joint program of work for 2004, including planning for PPDG contributions to the Open Science Grid and other joint activities.

3.3 Global Grid Forum and PNPA Research Group

The PNPA participated in the Production Grid Workshop at GGF11 in Hawaii. This was a good forum for exchange of experiences and lessons learned from deploying Grids in support of production applications. Since that time the group has seen little activity. The requirements document draft has been sent out for comment, with no feedback to date.

The PNPA RG plans to participate in a further workshop on production grids at GGF12 in Brussels.

3.4 Joint Technical Board (JTB)

The Joint Technical Board was disbanded in recognition of other for a which address its mission: EGEE Working Group and Open Science Grid Technical Group collaborations; US ATLAS and US CMS Service Challenges with the LCG under the umbrella of the Open Science Grid; Grid Deployment Board Interoperability working group.;LCG Grid Deployment Area Steering Group.

3.5 Open Science Grid

Discussions and organization for the Open Science Grid continued through Joint Steering Meetings of Trillium, s&c projects, application and computer science groups. PPDG participates in 2 OSG Technical Groups for Storage and Security. An Incident Response Activity was started under the auspices of the Security TG, and members of the Security TG were formally invited as participants in the EGEE Security and Security Middleware working groups. An activity to write a Blueprint for the OSG was started with a productive week of work in July. It was agreed that Grid3 will evolve into the first version of the OSG infrastructure OSG-0. The blueprint activity is giving input to the planning for the OSG-0 release planned for February 2005.

4 Single Team Reports

4.1 ATLAS

Wensheng:

My efforts in this quarter are distributed in these areas.

1. BNL disk space management. Supported its use for production and individual users.

2. Participated acas farm's batch systems design and tuning.

3. Upgraded Magda to accommodate HPSS interface change. Supported Magda users.

4. Transferred data from CERN to BNL. Data management.

5. Tested production system and provided feedback to its developers.

6. General user support at Tier 1.

7. File transfer test on Grid3.

David A:

The major accomplishment over the last quarter is the release of DIAL 0.90. It includes many improvements over the last release including the addition of two important new types of datasets describing ROOT histograms and ATLAS-POOL event collections. This release also provides the packaging so that DIAL may be distributed in binary form to other sites. The release is described at http://www.usatlas.bnl.gov/~dladams/dial/releases/0.90

The DIAL release is the backbone of the first prototype of the ATLAS distributed analysis system (ADA). Work is in progress to provide ATLAS-specific applications to carry out reconstruction. A web service based on DIAL runs at BNL to provide ATLAS users with interactive analysis capabilities. We plan to soon set up other service instances at BNL and other sites soon to support long-running jobs.

Three CS students from SUNY Stony Brook are working with me on the project. Vinay Sambamurthy and Chitra Kannan are providing infrastructure for cataloging. Vinay created a client for the AMI bookkeeping web service and is providing interfaces for the AJDL object repositories. Chitra is maintaining metadata catalogs and providing AJDL interfaces. Vinay also provided a class for authentication based on a list of DN's. Nagesh Chetan has been creating a DIAL/AJDL interface for Condor COD and we expect to soon use this as the basis for the interactive analysis service at BNL.

Jerry:

My work effort during this period was devoted solely towards supporting ATLAS Data Challenge 2 (DC2). This work was an outgrowth of my previous software construction work to provide client and server-side software to support ATLAS Release activities in the areas of "event generation", "simulation", reconstruction", "digitization", and "pile-up". With the advent of DC2, it was realized that the existing software packages "gce-client" and "gce-server" would have to be significantly re-architected to support the quickly changing and evolving ATLAS Releases. Enhancements for the server side software "gce-server" would also need to be made to support the presence of multiple ATLAS Releases at any given site. To work correctly in the DC2 US-ATLAS production grid framework, all changes to the "gce" packages would have to satisfy the following requirements:

- "gce-client" scripts must work correctly independent of whether they were executed independently by a user or called directly from the Capone Production Executor.

- "gce-client" scripts must be capable of recognizing, logging, and responding sanely to all error conditions. Utilizing a production grid has uncovered numerous site storage problems, process performance problems, and file transfer performance problems. Numerous fixes have been incorporated into the client-side code to address each of these issues.

- "gce-server" scripts have been re-architected to ensure a proper environment for the execution of the distributed ATLAS transformation scripts. These scripts have also been enhanced to allow for execution in a multiple ATLAS Release environment.

All of these changes have been incorporated into the "gce-client" and "gce-server" packages for US-ATLAS and are being utilized and stress-tested in the Windmill/Capone Production Grid environment.

4.2 BaBar

The main effort of the SLAC BaBar group was the continuous transfer of BaBar root files from SLAC to IN2P3 using the SRB. About 160,000 root files are currently registered in the SRB accounting to more than 80 TB in size. Those files designated to be at IN2P3 were transferred and BaBar users are accessing these data for their analysis jobs at IN2P3. We achieved transfer rates of about 1TB per day. The focus was to register the files in the SRB, ensure the correctness of the metadata, the transfer of files and the monitoring of the SRB servers. We encountered only a few problems: files were registered with the wrong file size, staging disks filled up and a transfer host was rebooted.

Work progressed to make the BaBar conditions files available in the SRB. The main effort is to provide the user with tools that makes it very easy to access the SRB and find the proper set of conditions files.

Adil:

Have been working on the completion of a set of tools to replace the existing tools to export and import BaBar non-event data (ie detector conditions data). These data are important for all aspects of data analysis. These new tools will incorporate data imports at remote sites using the SRB (currently not possible with the existing tools). End of July is the target for completion of the tools permitting a wider usage of the SRB in BaBar.

Wilko:

My main effort was to support the data distribution of BaBar root-files from SLAC to IN2P3 using the SRB. The registration of root files in the SRB using the BaBar bookkeeping system has been automated. Currently 160,000 files (~80TB) are registered and about 6000 are added every week. A tool to check the consistence of the file information in the SRB, BaBar-Bookkeeping and the SLAC HPSS was developed.

Some progress was made to monitor the SRB servers and detect if a server is not responding (happens very rarely).

More BaBar conditions were registered in the SRB. I started to write a tool that allows a user to easily access and download the conditions file of interest.

4.3 CMS

Iosef:

I continue to develop the MonALISA system (http://monalisa.caltech.edu) and to provide support for the all users. There are around 80 MonALISA services running now in different HEP sites as part of several experiments (CMS, ALICE, CDF, Star, DOsar, SCOOP). We also monitor the V RVS system and around 70 services are running to monitor all the VRVS reflectors

Many new features were added to the system:
- provides support to monitor applications and it is now used to report different parameters from the CMS-ORCA and PROOF software
- Report information related with the routing path from one site to any other destination
- Support to report NetFlow information
- Improved functionality for the repositories
- Improved GUI for providing statistical analysis for the monitoring information
- Support to report information from the CMS data transfer agents (TMDB)
- Improved 3D graphics for web start client

We monitored completely the entire CMS DC04. More than 50 million monitoring entries were collected and are available at: http://monalisa2.cern.ch:8088/

We interfaced ML to get the traffic and PIPES measurements information from the entire Abilene backbone http://vinci.cacr.caltech.edu:8080/

We also collect traffic information from CERN-US link , CERN- Geant, CERN-Lyon IN2P3

We monitor two segments (US ? Russia and US ? China) for GLORIAD:

http://monalisa-starlight.cern.ch:8000/

I made dedicated repositories for:
ALICE: http://aliens3.cern.ch:8080/
STAR : http://monalisa-starlight.cern.ch:8888/
GRID3: http://monalisa-starlight.cern.ch:8080/
VRVS: http://pccit6.cern.ch:8080/

I made a dedicated pseudo client to provide selected monitoring information using a listener mechanism dynamically from all the discovered sites in a group to higher level services. This is used to build a grid meta scheduler for the STAR experiment

Anzar:

Development:

Newer version of MCRunjob and MOP were released for DPE (CMS Distributed Processing Environment) making it possible to Run Digitization and DST jobs over the GRID. Testing of McRunjob for MOP environment after several major architectural changes were made to core MCRunjob.

My proposed "scriptObject" based design for Runjob became "official". Runjob is now transforming to use this architecture. That makes it much easy to create "generic" jobs, that could then be made to run on GRID/non-GRID environment(s). Make it much easy to integrate non-GRID production/analysis jobs to target GRID environment.

Presented a proposal for a Database based MOP Operations tool called MOPdb, to ease production operations, with a vision to use it for future production/analysis/private production-analysis in future. This was approved as DPE "prototype project" and then became a DPRE Project, work is aggressively progressing.

Developed CALRENS based MOP and McRunjob services. That are being used for MOPdb, MC Generation Service and Grid Enabled Architecture (GAE).

Production GRID:

Troubleshooting and maintenance support for USCMS Production GRID continued. The production of several different type of CMS applications (CMKIN, OSCAR, Digi and DST) is continued on USCMS (exclusive) and Grid3 (opportunistic) resources.

CMS Analysis:

Analysis is next big thing in CMS. I spent lot of time in understanding CMS Analysis tools and components. Understanding procedures to build and use datasets for the Hit, Digi and DST data generated by Production. I developed basic tools to help "Publish" META Data and POOL based File Catalogs that are key to running any type of analysis.

References:

https://whopper.fnal.gov:8443/clarens/OnDemand/cmsprod.html

http://www.uscms.org/s&c/MOP/

http://home.fnal.gov/~anzar/MOP_MASTER/DPE_2_4_2_Production_Operations_Manual.html

Conrad:

General description

My work focuses on creating a Grid-enabled Analysis Environment within the CMS experiment. The GAE group at Caltech uses a Service Oriented Architecture for providing high-performance, user-friendly, pervasive, commodity standards-based access to distributed storage and computational facilities organized in so-called computing grids.

The backbone of the GAE is the Clarens web services architecture developed principally by myself, with two implementations by myself and the GAE group at Caltech collaboration with the National University of Science and Technology in Pakistan.

Collaboration

- Collaboration with NUST delivers a rapidly maturing Java-based implementation of the Clarens framework

- An informal project at Fermilab to build a Monte-Carlo Processing (MCP) Service using Clarens as a technology base was promoted to an official project within the Fermilab CMS computing group.

- The Clarens server and client software has been accepted into the Distributed Processing Environment (DPE) software distribution that is widely used at US CMS Grid sites in the US.

- A collaboration with the CERN-IT Distributed Analysis Environment (DIANE) project was started to explore the performance of the "pull model" for scheduling jobs in a computational Grid. Development of DIANE for a heterogeneous wide area network (WAN) environment proposes to use Clarens as a services framework.

- The BOSS job submission and monitoring project adopts Clarens as a services framework. An initial prototype is produced by collaborators at CERN, Caltech and INFN.

- The Caltech MonaLISA monitoring server was adapted to use the Clarens framework, making a wealth of monitoring information available to all Clarens client applications.

- The gCAVES ROOT-based code-sharing environment developed at the University of Florida was integrated with the ROOT-based Clarens client, making it possible to access data hosted by Clarens servers to be used within gCAVES.

- A Clarens service to access CMS POOL replica location catalogs was created at Caltech.

- A novel file replication and download Clarens service based on the peer-to-peer bittorent protocol was developed at Caltech.

Technical development done by myself

- The performance and stability of the Apache-based Clarens server was significantly enhanced, including a 60% increase in the service transaction rate, as tested on the Caltech tier 2 installation.

- The browser-based Clarens interface was enhanced significantly providing access to the Proxy, Logging, POOL catalog, VO management, Information, Access control management, and BOSS services. This makes it possible for users to access these Clarens services without downloading and installing specialized client software. These interfaces complement the existing

- The so-called 'proxy escrow' service was enhanced to allow the Fermilab MCP service to use stored proxy certificates to submit jobs on the user's behalf.

- The web interface to the proxy service now allows the user to upload a proxy certificate from within a browser for later use by the MCP service or other services.

- It is now possible to use a certificate distinguished name (DN) and password combination to log into a Clarens server from a browser or other clients which do not have access to a certificate/key combination or a proxy certificate.

- Another major new development is a new lookup and discovery ('rendezvous') service, coupled with an automated peer-to-peer service discovery mechanism which can be optionally enabled in all Clarens servers.

The automated discovery is implemented as a modified genetic algorithm that tries to construct the largest possible population of working Clarens servers using server URLs registered in its database as well as URLs obtained from servers that form part of the population.

This service also has a browser-based interface which makes it possible to quickly search for servers that offer a particular service. Service descriptions are in the form of a service name, coupled with a version number. Downloadable WSDL XML service descriptions can also be obtained using the rendezvous service API.

The API allows for service URLs and descriptions to be submitted by third parties using cryptographically signed information by the service provider.

This service uses either the MySQL or SQLite databases, the latter which requires no server setup, thereby greatly easing installation and configuration.

- An Information Service was developed implementing an API developed by the CERN LHCb experiment in the context of the ARDA (distributed analysis) initiative.

CMS Data Challenge '04

As part of this data challenge I transferred 200 GB of CMS DST data to the Caltech proto-tier 2 cluster. For this transfer a high-performance parallel download client was developed.

The data files transferred in this way was made available for download and analysis using a Clarens server hosted on the tier 2 cluster head node. The data as also made available for searching and indexing by the Google search engine.

Demonstrations and publications

- All the existing Clarens service API descriptions was presented to the PPDG CS-11 (interactive analysis) working group for discussion in the form of documentation as well as WSDL description files.

- A brief demonstration was given at the CMS week held at CERN during the first week of May, showing

* Clarens/gCAVES interoperability

* the ROOT and Python Clarens clients and

* the browser-based POOL, File, and VO management interfaces.

Michael:

The most important achievement this past quarter was the development of a Clarens Web Service interface to the BOSS job submission software. Previously there was a Clarens/BOSS interface that allowed a user to track the progress of a submitted job, but it did not allow for job submission. Now jobs can be submitted directly using the Web Browser interface to Clarens. The web service and web browser interfaces are still in the prototype stage, and are not quite ready to be called a generic job submission interface. For that to happen all BOSS-specific features must be removed and made generic. The key point, though, is that it is now possible to submit jobs for analysis using a Clarens interface.

Some time was spent cleaning up the monitoring service code in Clarens (java version) so that it is easier to build and package. The Clarens Monitoring Service is really just a thin layer on top of the existing MonALISA SOAP web service, but can now be used as part of the larger Clarens framework.

I've adopted two summer students to help continue the MonALISA integration into Clarens. This will help us to build intelligent higher level Web Services that can make decisions based on current and past conditions on the grid. I've had to spend some time bringing the students up to speed on the work, but they are catching on quickly and should be able to make some good progress in the coming weeks.

A lot of work went into streamlining the installation and configuration process for the Java Clarens server (jclarens). An RPM installation package is now available, and jclarens should be able to run almost out-of-the-box, with only minor database connection settings required. The web browser interface from Clarens was also modified to work with jclarens, so that users now get the same experience whether they are using the original Python-based Clarens or the newer Java-based Clarens. This required some minor changes to the web service implementations of some of the services to make both Clarens servers behave identically.

I set up a new testbed containing 5 nodes at Caltech to facilitate testing interactions between multiple Clarens servers, and to aid in the development of better integrations between Clarens and the CMS software.

Papers:

Use Cases for a Command Shell for Grid Computing on Production Supercomputing Sites, submitted to Grid2004, http://www.ppdg.net/archives/documents/2004/doc00011.doc.

4.4 D0

The D0 PPDG team has moved Monte Carlo production for most D0 sites onto SAMGrid and continued to maintain this system at production level. The migration to using VDT, an important milestone, has been completed. Design discussions regarding improvements to bookkeeping for more complex processing scenarios have been ongoing. A SAMGrid testbed has been deployed as part of the Fermilab general purpose farm.

Gabriele:

During the past quarter I've worked on the SAM-Grid and started meeting for the Privilege Project.

The main activities for the SAM-Grid have focussed on

- job scheduling for montecarlo production at DZero: montecarlo data is produced and subsequently merged using SAM-Grid mechanisms. I have participated in the design and implementation of such mechanisms. Currently I am supporting the data production and working on the further deployment of the infrastructure.

- designed and implemented the prototype for scheduling "structured" jobs on the SAM-Grid. Structured jobs are interdependent jobs whose structure is known to the grid job scheduling services. This technique can be used, for example, to submit a single job that produces and merges montecarlo data. The mechanism uses DAGMan with Condor-G for the scheduling and management of the interdependent jobs.

- implementing durable file storage using SAM for CDF: this is the same technique used for merging montecarlo data for DZero. Working with CDF to enable this mechanisms within their computing model for data validation and merging.

- migrated the SAM-Grid infrastructure to use the Virtual Data Toolkit (VDT) distribution of Globus and Condor.

Igor:

In the period of April-June 2004, I have worked on SAM. I continued enhancing the SAM job management so as to optimize scheduling and execution of large-scale D0 Monte-Carlo jobs. Participated in the design, implementation and maintenance of the software module to merge small files (such as D0 thumbnails) produced in the course of running MC requests. Worked with user(s) to resolve issues.

Towards the end of the report period (in June), worked on enhancing the job scheduling and sandboxing mechanism so as to generalize it and separate D0 MC-specific handlers from non-MC handlers, and further from D0-specific jobs. The goal is to provide sufficient modularity so as to incorporate other D0 principal job types and jobs of other experiments, such as CDF, that use SAM.

4.5 JLab

During this quarter we built an SRM server based on the recently finalized v2.1.1 specification. The Jefferson Lab implementation was implemented as a web service and utilizes the Apache Axis Web Server package and Globus Security Package (GSI). The SRM specification itself does not include the WSDL required for a web services base implementation. However, the SRM collaboration developed the WSDL for use in SRM development. This WSDL definition is used by the Jefferson Lab SRM implementation. We plan on working with Fermi Lab to verify the interoperability of the SRM with independently developed clients. User testing is expected to begin in August.

As part of phase 1 for the prototype Grid Job Scheduler using web services, we worked with CLAS to develop a Meta-Job Gateway for submitting CLAS specific jobs. The Gateway will accept as input a job description that is loosely based on the uJDL (User Job Description Language) used by the STAR scheduler. CLAS made changes or additions such that the job description will more closely defined a CLAS reconstruction job. The sole purpose of the Gateway during this phase is to determine the requirements for an appropriate description of a CLAS job and for the interface of the Job Scheduler.

Facilities work was also done on Grid job submissions using web services. In particular, modifying the existing job submission tools (Auger system) at Jefferson Lab to prepare them for integration with a Grid environment. This has included investigating porting Auger to support PBS for deployment at other sites as well as extending Auger's authentication mechanism to allow support for DOE science grid certificates. As part of this, JLab investigated how to integrate Auger with the GSI that comes as part of GT3.

JLab also joined the distributed PKI effort this quarter by having a person assume the role of agent with the PPDG RA in order to register users requesting person and host/service X509 certificates from the DOEGrids certificate authority.

4.6 BNL RCF/ACF

Carcassi:

In April Gabriele Carcassi has started working on site AAA at BNL. His main focus is to provide Vo and siteAAA services for ATLAS, STAR and PHENIX and to collaborate with the Information Technology Department to develop site wide acceptable solutions. A web page for the project has been setup at http://grid.racf.bnl.gov/siteAAA/.

On April he took over the development of GUMS, which has been reimplemented in Java and brought v0.5 to production. In May it has been deployed on some ATLAS gatekeepers and all of STAR and PHENIX gatekeepers. GUMS allows us to centrally manage the grid-mapfiles of all BNL gatekeepers.

He is participating in the joint "Privilege Project" with Fermi Lab, leading the effort at BNL. As part of the project GUMS will be transformed in a authorization web service which can be connected to the standard globus call-out, thus making grid-mapfiles obsolete and allowing account mapping based on extended proxy information. As part of this effort, GUMS v0.6 will be released at the end of June 2004 with a code reorganization that allows such functionalities.

Gabriele Carcassi is also the VO admin for USATLAS, STAR and PHENIX. He has setup a VOMS server for STAR and PHENIX, which is now in production and connected to GUMS. He has worked with Alessandro De Salvo to combine ATLAS and USATLAS vos.

As a joint project with Fermilab, we have investigated and deployed VOMRS, a tool to manage vo information and registration process. The tool is currently installed for STAR and PHENIX, and it will be in production when the VOMRS/VOMS connection will be operational. We are also working with BNL Cybersecurity on this, as the registration process includes a "site admin" role which, in our vision, would be covered by them.

Dantong: (BNL grid incl. ATLAS & RHIC) My contributions mainly focuses on Grid monitoring and High performance data transfer between BNL to CERN and other ATLAS/RHIC collaborators. I am managing USATLAS, STAR/PHENIX Grid gatekeepers and several GridFtp servers. I also collaborate with computer science professors, use their expertise to solve challenges in HEP computing. I submitted several journal and refereed conferences in Grid computing and networks. The detailed works are listed below:

A:

1. Grid server monitoring

It monitors the gatekeeper hosts, operating systems, and core middlewares, such as NFS server, batch system, web server.

2. Core Grid service monitoring.

It will collect the status of core grid services: GridFtp, Grid Monitoring Services and Grid gatekeepers by sending probing jobs periodically. It uses the existing grid3 software with our local customization. http://www.atlasgrid.bnl.gov/gridcat/

B: High Performance Data transfer.

The project is to fill up the BNL OC12 connection with real data read from disk storage between BNL and CERN CASTOR. We use parallel approaches/peers to achieve aggregated high performance. The long term goal is to integrate this high performance data transfer capability into SRM.

I started the early stage of this project. I decomposed the remote disk data transfer into two sections: 1) disk to memory in GridFtp server, 2) wide area network (WAN) data transfer. Eventually, these two steps will be combined to achieve high data transfer rate from disk to disk via WAN.

I evaluated three fast disk I/O solutions.

a). Storage Area Network (SAN) file system.

I deployed the Globus client tools directly on ATLAS file server. The performance of disk I/O met our remote data transfer requirement, but the cost was significant. It also requires that our core file servers be exposed to external network.

b). I connected our proprietary local file system (Panasas) to GridFtp server. The disk I/O performance did not meet our expectation. Further file system tuning needs to be done.

c). I attached multiple parallel disk drives into a GridFtp server. These GridFtp servers demonstrated significant performance/cost improvement over the previous two approaches.

I created two Gridftp servers for remote disk data transfer. We can achieve 35MB/seconds data transfer from CERN castor MSS to BNL local disks. This is a significant performance improvement after CERN/BNL network connection was upgraded. We are investigating factors which prevent us from transferring data in the speed close to physical limitation.

I took part in testing the inter-operability between US Grid hosts and dCache GridFtp door. We could transfer data between client and GridFtp door, but failed to do third-party data transfer. More investigation will be done.

C) Publications.

I wrote three CHEP 04 abstracts.

a) GUMS: "A Scalable Grid User Management System for Large Virtual Organizations" was accepted again as oral presentation. It presents a work-in-progress system, called GUMS, which automates the processes of Grid user registration and management and supports policy-aware authorization at well. The original paper was also published in CHEP03.

b) DLT: "Divisible Load Scheduling for STAR Grid Based Computing" was accepted as post. It discusses divisible load scheduling theory and uses it to model and design Grid scheduling systems such as those arising in large physics experiments.

c) "BNL USATLAS Data Challenge 2 Monitoring System" was accepted as a poster.

I also co-authored three papers and submitted to the leading Grid computing conference and journal.

a) "Design and Analysis of a Dynamic Scheduling Strategy with Resource Estimation for Large-Scale Grid Systems" was submitted to IEEE/ACM Grid Computing 2004 conf (Pittsburgh USA Nov 8th).

b) "A Dynamic Scheduling Strategy for Data Intensive Grid Systems" was submitted to IEEE International Conference on Networks (ICON2004) to be held in Singapore.

c) JOURNAL submission: "Pull-Based Resource Aware Scheduling on Large-Scale Computational Grid Systems" was submitted to IEEE Transactions on Parallel and Distributed Systems.

4.7 STAR

The WSDL efforts in STAR have been delayed by changes in personnel and also partly due to the OGSI -> WSRF related issues, and STAR+JLab have not managed to sustain the collaboration on this front. However, an SBIR award to Tech-X Corp on "An Abstract Job Handling Grid Service for Dataset Analysis" will give this work a boost in the coming year. Tech-X has proven very effective in the related work with SLAC on grid-enabling Java Analysis Studio.

A major milestone was achieved this quarter (2 months ahead of schedule) in running production simulation on the grid. What we did is to use the Scheduler U-JDL (old form i.e. as it is now) and made 2 job descriptions for simulation which would

(1) - run a pure Monte Carlo simulation

- bring the result back to submitter

(2) - run reconstruction on the first stage files (real detector simulation reconstruction)

- bring the results back to submitter

The entire Hijing 1.382 AuAu 62.4 GeV minbias dataset (0< b < 20 fm) 100,000 events Y2004 geoemtry vertex 60, ± 60 was produced that way. All and behold, the success of the reconstruction pass was 90%, the simulation pass (for some odd reasons) was only 75-80% with period of total failure (all may fail in a certain time period ; Lidia would submit by bunch of jobs to really achieve this percentage as otherwise, Grid may suck in all jobs at once). Most problematic were gass-cache issues and firewall issues (it started with miss-configuration / miss-match of opened port and GLOBUS_PORT_RANGE, then all was fine but some ports opening are not behaving as expected and we do not know why yet). The solution (dumb): delete gass-cache periodically to maintain rate, mid-term would involve by-passing the firewall.

Eric:

HRM/RRS Continued production use, roughly 10**5 files, 10 TB transferred and cataloged in the quarter. No major changes in this period. RRS continues to work very nicely. I have also done some work on running the new web services version of SRM.

STAR simulations on the grid: STAR now runs simulations on the grid. My contribution to this effort has been to participate in debugging efforts, allocate local resources for grid computing, and local data management.

I submitted an abstract to CHEP '04 about STAR data replication and it was accepted for an oral presentation.

Levente:

Being new on the team, lots of my time went in a learning curve as per the existing tools, developments of Grid enabled solutions. My main accomplishment in the one and a half months I have worked here is the Development and deployment of Star Scheduler version 1.6.2.

A new module has been implemented in this version of the Scheduler. This represents the first step in ramping up to conversion to the new JDL as defined in http://www.ppdg.net/docs/Papers/PPDG-39-RDL0.4.doc. Its function is to parse XML requests and absolutely validate every dimension of the xml job request format currently being used here for correctness. An internally stored but easily modifiable schema controls the validation that will later be mirrored for the new and common emerging high level JDL. For this module I extensively evaluated three XML validator solutions the lighter weight and most portable solution was chosen. Of the three XML validators one was commercial, one was written by another developer and one was home-grown by me.

As the result of interest in the scheduler by other parties who wish to use and extend its capabilities, by developing new modules, I am completing a reshaping of the scheduler code. This new format helps make parallel development by other parties smoother. Thereby making it easier for other developers to make contributions.

I have added some new generic features requested by our reconstruction team for support of smoother (and more robust) Grid based Monte-Carlo production.

Jerome and I gave interviews talking about our work in a documentary being prepared by the Hungarian ministry of energy to explain our work to nonscientists.

4.8 PHENIX

PHENIX has made progress on a number of projects addressing job submission and data handling.

Scott O'Hare worked together with RCF personnel to establish a dCache testbed and evaluate its performance. He has developed software to include HPSS into the BNL dCache implementation. The results of the studies were communicated to RCF and other experiment personnel. Studies have been initiated on using dCache on the grid. The next steps are to implement a production system within RCF, utilization by PHENIX as a tool for managing multiple TB of disk space, and to develop a plan for grid production use.

Andrey Shevel has researched the use of the BOSS/BODE tool for job monitoring for PHENIX. He performed simple tests at both RCF and the Stonybrook Ramdata facility, and developed a module to incorporate the use of BOSS into jobs submitted via the STAR scheduler. This module has been tested by both PHENIX and STAR personnel.

Alex Withers and Mike Reuter have continued development of the PHENIX grid job submission portal and application of the STAR scheduler for PHENIX simulation jobs. Alex Withers provided a dispatch module for the STAR scheduler to utilize the PBS batch queuing system. Alex and Mike have tested the STAR scheduler along with this new module at University of New Mexico's Los Lobos computing facility, as well as at the RCF at Brookhaven. The job submission portal provides users with all options and switches to specify jobs, and writes XML files for input to the STAR scheduler. Alex collaborated with STAR personnel in definition, testing, and implementation of his new module.

Mike Reuter has demonstrated the use of PACMAN to distribute the PHENIX simulations software as part of jobs that are submitted by the STAR scheduler. This has been tested successfully within the RCF, and tests are currently ongoing for remote sites, beginning with UNM's Los Lobos.

Andrey Shevel will report on PHENIX GRID progress at CHEP in September.

The PHENIX collaborators who are currently involved with the efforts listed above (with widely varying fractions of their time) include: Irina Sourikova, Mike Reuter, Scott O'Hare, Andrey Shevel, Alex Withers, Tim Thomas, David Morrison, Barbara Jacak and Roy Lacey.

4.9 Condor

The Condor Project at the University of Wisconsin, Madison continues to enjoy significant contributions to the PPDG collaboration. Below is a summary of key Condor contributions to PPDG, for the quarter Apr-June 2004.

Condor Events:

The team's annual "Condor Week" was held April 14 - 16 this year in Madison, Wisconsin. CW serves as an annual forum for the Condor team to announce new Condor developments, provide Condor instruction, solicit user feedback, and form new collaborations.

The past quarter saw two significant releases of Condor itself. The team announced the release of the new version 6.7.0 development series in April. Several Condor features debuted in the version 6.7.0 series, notably new high availability features. In parallel, the latest stable series release version 6.6.5 occurred in May, and continues Condor's self improvement process for enterprise class users.

Several Condor research projects also saw recent developments. The Condor team continued to analyze integration of SRM with the Condor NeST project, and began investigation into improvements of the NeST GridFTP server, and improved the overall stability of the NeST server. A new Hawkeye support package was released to extend the modularity and configuration of this monitoring system. Work continued towards the first public release of the Stork data placement scheduling system, including support for the SRB and SRM protocols. Work continued to enhance Condor-G for multiple grid systems, as well as continued maintenance. The team developed the hello-grid stress testing tool. Hello-grid can submit hundreds of thousands of jobs, transfer terabytes of data and use key grid infrastructures such as RLS and GridFTP. The Condor team has been using it to stress test the grid and learn how to better manager grid services. Currently in progress is a test run of 100,000 jobs that will transfer and verify 100MB of data. It will take an estimated two months to complete on the UWCS condor pool.

Collaborations with PPDG Physics Experiment Teams:

CDF: The Condor Team actively supported an order of magnitude scaling exercise, increasing the FNAL Condor pool to 3K virtual machines, utilizing a single head node. Condor provided support for a new CDF Condor pool, implemented using the Condor glide_in tool on top of another batch system. Further Condor has continued to provide day to day support for operational issues.

D0: The team continued to work with D0 to run their jobs on the UW-Madison CS Condor pool. Condor has helped SamGrid to adopt the VDT, and has begun discussions about how to add support for authorization callouts to the VDT on their behalf.

STAR: The Condor team delivered a introductory tutorial on Condor at BNL for the STAR, PHOBOS and PHENIX projects, and performed consulting for STAR's Condor roll-out, including a number of days spent on-site. Condor also assisted STAR with Condor troubleshooting throughout the quarter.

US-ATLAS: Provided continuing support to th US-ATLAS team at BNL.

PPDG Liaisons:

The VDT has released VDT 1.1.14 including DRM/SRM support, and is nearly ready to release VDT 1.2.0. These releases bring additional stability and robustness to the VDT, as well as the latest software versions. In addition, the VDT has added a new tool to help system administrators connect batch jobs with the Globus user that submitted it.

The VDT has improved it's ability to test releases of the VDT, and is sharing the results of it's testing publicly: http://www.cs.wisc.edu/vdt/test-results/index.html

Grid3: Continued developing the grid-exerciser and troubleshooting problems it exposed. Developed gatekeeper-probe tool to report additional information about Grid3 sites. Continued development of Condor-G features in response to Grid3 user experiences.

4.10 Globus – ANL

4.10.1 Coordination and Support

Continuing interactions in terms of coordination and support of the PPDG applications included weekly phone meetings and email lists for Atlas and CMS, following the grid emails lists of D0, and providing support for the Argonne-Chicago ATLAS team in their efforts to perform "data challenge on demand" event generation using VDT, RSL, and Chimera. Support through the discuss lists and Bugzilla are available to all experiments.

4.10.2 Globus Toolkit 2.x Updates, Bug Fixes and Open Issues

We resolved 3 bugs listed in Bugzilla (1291, 1314, 1480) and have one open PPDG-related bug still in our system, 1725. Additional information about Bugzilla bugs can be found at http://bugzilla.globus.org.

Robert Gardner has recently reported an issue with Globus file transfers, although not through bugzilla. It appears that a solution to this problem (the CKSM gridFTP extension) exists in the 3.2 release of the Globus Toolkit.

4.10.3 Globus Toolkit 3.2

The Globus Toolkit 3.2 final was made available for download. The WS Core component in the 3.2 release contains important bug fixes and improvements on existing functionality including better deactivate semantics, a change in the persistent grid service programming model, changes to the security descriptor format, updated third party jars and more. Also introduced is a new terminology to describe two types of components in the Globus Toolkit: Pre-W (pre-web services) components use proprietary protocols for basic service interactions. Services and clients formerly distributed in GT2 are included in the 3.2 distribution as pre-WS components. WS (web services) components use open standards-based protocols for basic service interactions. WS components in GT 3.2 comply with Version 1.0 of the Open Grid Services Infrastructure (OGSI). The intent is for this terminology to ease the transition into later Web Services Resource Framework (WSRF) based releases. The Globus Toolkit 3.2 f inal release and companion release notes may be found at the following URLs:
http://www-unix.globus.org/toolkit/downloads/3.2/

http://www-unix.globus.org/toolkit/releasenotes/3.2/index.html

A Globus Toolkit 3.3 Development Release is available for download. See the download URL for additional information.

http://www-unix.globus.org/toolkit/downloads/development/

Two iterations of a Globus Toolkit Java WSRF Core Preview Development Release are available for download. There is an associated call for testing to accompany this release. See the following URLs for additional information:

http://www-unix.globus.org/toolkit/downloads/development/

http://www-unix.globus.org/toolkit/testing/calls/

4.10.4 GridFTP / XIO

Stripping will be added to the new server code base by mid July. This development effort is well under way. Currently single stripe remote data node transfers are possible and the data module interface is in place.

Dynamically loadable drivers have been added to XIO. This allows for drivers to be created and deployed outside of the XIO framework development environment, thus making 3rd party creation of drivers easier and the memory footprint for simple applications smaller. Additional bug fixes and testing have also been added to XIO making it more robust.

4.10.5 Monitoring and MDS work

The MDS2 scalability analysis work was completed. Netlogger calls were added to the MDS infrastructure to determine bottlenecks, and this performance was compared with similarly annotated versions of Hawkeye and R-GMA. A journal paper will be submitted for publication shortly.

In the last quarter, MDS development work consisted of requirement gathering and architecting the effort to deploy a WS-RF based service in GT4. The planned services include registration, which will allow entities to request notification of changes in information instead of having to poll for such changes, standard notification, indexing, and caching, as well as archive and trigger services.

4.10.6 Security

The GT 3.3 development release made this past quarter includes the SAML-based authorization callout as being defined in the GGF OGSA-Authorization working group. More information on this callout may be found at the following url:

http://www-unix.globus.org/toolkit/testing/calls/TestingCallAuthz.pdf

4.10.7 Training, Presentations and Papers

The following Globus related tutorial was given at GGF11:

1. The Globus Toolkit ?Ecosystem? (and how to make it work for you) Instructor: Lee Liming, Argonne National Laboratory: http://www-unix.mcs.anl.gov/~liming/ggf11/ecosystem-ggf11.ppt

The following Globus related papers were accepted for publication:

1. Performance and Scalability of a Replica Location Service. A.L. Chervenak, N. Palavalli, S. Bharathi, C. Kesselman, R.Schwartzkopf. To appear in Proceedings of the International IEEE Symposium on High Performance Distributed Computing, June 2004.

2. X.509 Proxy Certificates for Dynamic Delegation. V. Welch, I. Foster, C. Kesselman, O. Mulmo, L. Pearlman, S. Tuecke, J. Gawor, S. Meder, F. Siebenlist. 3rd Annual PKI R&D Workshop, 2004.

4.11 SRM

Participants: Alex Sim, Junmin Gu, Viji Natarajan, Arie Shoshani, Kurt Stockinger

The following tasks/enhancements were accomplished over the last quarter.

1. File authorization checking for the shared files was added to the HRM

In order to permit file sharing from the disk cache, but support authorization, it is necessary to check whether a user has permission to read a file that was previously downloaded from HPSS to the HRM disk. This can be done by performing an "ls" through PFTP to HPSS. This feature is needed in the HRM installation at BNL for the STAR project. The feature was implemented and will be installed with the next release.

2. GSI enabled HSI integration

A new GSI-enable HSI is now available at the BNL installation. We added the capability to use this feature for accessing information about files through HSI in a secure fashion.

3. Comparing user provided file size after file retrieval from HPSS

We had experience with faulty hardware where files transferred from HPSS did not take place, but the PFTP reported success. This generated files with zero size. Since the file size in this application was available in the fie catalog, we added a settable feature where the HRM compares the provided file size with the actual size after transfer. If a mismatch is detected, the HRM will retry several times before recording an error. We found that this prevented all such transient errors.

4. SRM-WSG and SRM-GWS packaging

During this quarter we have developed and deployed gateways from a web-based interface (based on the SRM 1.1 WSDL spec) to the CORBA-based implementation of our SRMs. There were two such gateways required: Web-Service Gateway (WSG) to access the SRMs, and a Gateway to Web-Service (GWS) when the SRM calls other SRMs. This made all of our SRMs work as web-services.

5. DRM in VDT experimental package

We packaged our DRM and worked with the LBNL lawyer to make it possible to add it to VDT. The DRM, called the Berkeley-DRM, was documented and added to VDT as an experimental package.

6. BNL facility involvement in STAR/SRM for consideration of production deployment

BNL has launched an effort to evaluate the possibility of supporting the DRM, HRM, and the DataMover provided by LBNL by the production team. To this end, a new person was assigned to do this task. We have been helping her catch up with the concepts and features of these products, guiding her through installations, etc. By now, she was capable of installing most of the software on her own.

RMS/RRS spec...

A major milestone for future work is the development of a general purpose Replica Registration Service (RRS). Over the last quarter, we have been developing the spec for this service. We have realized that this service makes sense in combination with two other services: the Replica Copying Service (RCS), and the Replica Selection Service (RSS). Together these three services can be invoked by a Replica Management Service (RMS) that provides coordinated CopyAndRegister as well as UnregisterAndDelete capability. We have developed the functional specification for these services and summarized it in a draft document that was released to the PPDG members. There is strong interest from the LCG community to use this base specification in order to standardize on these service. We expect a meeting to coordinate this activity to take place by early September.

4.12 SRB

Wayne:

The SDSC SRB team released version 3.1 of the Storage Resource Broker on April 19, 2004. Most of the new features fall into the following categories:
- data integrity and backup,
- authentication,
- improved installation and administration and
- a new Trash Can system.

The download page is: http://www.npaci.edu/DICE/SRB/tarfiles/main.html

See the SRB home page for more information: http://www.npaci.edu/dice/srb

More details on the contents of the release are described in
http://www.npaci.edu/DICE/SRB/CurrentSRB/ReleaseNotes3.1.html

SDSC collaborated with the UK eScience data grid on support for the CMS pre-production data challenge. The activities included diagnosis of load related problems associated with the e-Science database implementation. SDSC is also collaborating with the UK eScience data grid on the integration of the Storage Resource Manager interface on top of the Storage Resource Broker. A design meeting was held in Edinburgh.

Milestones:

June-04 ? Support for SRB production system for data distribution for BaBar. The amount of data currently registered by BaBar into the SRB is 80 TBs. The system is running well with SRB data grids installed at SLAC and IN2P3. The SRB is used to manage data replication between SLAC and IN2P3.

Two SRB data grids are setup at SLAC with one used for BaBar data (the catalog contains about 175,000 files) and a second used for BaBar conditions files which are only about 1000 files with a size on the order of 50 GB.

Plans to federate the SLAC and IN2P3 MCAT metadata catalogs have been made. A test installation will be tried first. All the BaBar conditions are being made available through the SRB. This is more or less working, with SLAC writingsome more tools that makes it easy for users to find the correct set of conditions files.

The persons managing the systems are Matteo Melani, Wilco Kroger, and a student (SLAC), Jean-Yves (in2p3), and Liliana Martin from Paris.

December-04 ? Use of enhanced GridFTP. Discussions have been held with Bill Allcock on the availability of the GridFTP XIO interface for developing a GridFTP interface to the SRB.

January-05 ? Integration of SRB replica information into the RLS system. Discussions have been initiated with the eScience group on how the federation of name spaces should be implemented between the RLS and SRB.

June-05 ? RLS to make SRB calls to move data from one site to another. To be done

Papers:

Reports were written on distributed data management for two international conferences:

1. Moore, R., ?Digital Libraries and Data Intensive Computing,? 2nd China Digital Library Conference, Beijing, China, September 2004.

2. Moore, R., ?Integrating Data and Information Management,? International Supercomputer Conference, Heidelberg, Germany, June 2004.

4.13 IEPM, Network Performance Monitoring

4.13.1 Web/Grid Services

The web services access to the IEPM-BW single and multi-stream TCP throughput (from iperf), and to bandwidth capacity and utilization (from ABwE) has been upgraded to use the latest NMWG response (May 4 '04) and request (Mar 25 '04) schema. We continue to support the older schema for MonALISA. We have added access to the PingER Round Trip Times (RTT) for the most recent month of measurements from SLAC. To facilitate this we upload the PingER data into the Oracle database. We have also added web services support to access the IEPM-BW traceroute hop information. The documentation for the web services has been updated. We updated the web service client examples that provide interactive access the IEPM-BW data. We have also added a client example for the PingER data. A presentation on the status of the SLAC web services was made at GGF10 in Berlin.

We co-authored updates for and submitted the GGF NMWG recommendation entitled *A Hierarchy of Network Performance Characteristics for Grid Applications and Services,*

4.13.2 Bandwidth/Throughput measurement (IEPM-BW)

We extended our traceroute analysis and visualization tool to add: drill down to view the bandwidth anomalous detection plots; detection of multiport end hosts, hop stuttering, 30 hop timeouts, added AS caching and timeouts, and annotations. We wrote and published *Correlating Internet Performance Changes and Route Changes to Assist in Trouble-shooting from an End-user Perspective*. We presented the above paper at the Passive and Active Monitoring Workshop, Antibes, Juan-les-Pins, France, April 19-20, 2004.

We added an IEPM-BW monitoring host at NIIT in Pakistan.

4.13.3 Lightweight Bandwidth Estimation

We extended ABwE to provide measure the RTT and to redesign and implement the internal protocol to allow it to be work better with typical security constraints. It is now deployed on more than 100 nodes (over 70 on PlanetLab and 40 on IEPM-BW).

4.13.4 Bandwidth performance anomalous events

To address the problem of too many network performance plots to manually review in order to detect important anomalies, we designed and developed an implementation of an enhanced version of the NLANR "plateau" algorithm. We created a library of interesting anomalous events from our IEPM-BW monitoring data. We evaluated the performance of the modified algorithm in terms of events captured versus false positives. We wrote a paper describing this work. It was accepted for publication through the SIGCOMM Network Trouble Shooting conference in Portland OR in September 2004. Our next steps will be to integrate this into IEPM-BW and to improve the algorithm.

4.13.5 PingER

We extended the PingER monitoring to include a monitoring sites at NIIT in Rawalpindi, Pakistan in Rio de Janeiro and Sao Palo. We extended the time series plots to add TCP throughput and also to better enable access to the data (see for example http://pinger.fnal.gov/cgi-bin/graph_pings.pl?src_regexp=slac.stanford.edu&dest_regexp=slac.stanford.edu). Much work went into updating remote hosts that were no longer pingable. In particular recovering all Australian hosts (blocked at WU, Seattle), Africa and Alaska. We also added monitoring hosts hosts in Pakistan and Brazil and ensuring hosts were correctly entered into the database.

We attended the Internet2 "Extending the Reach of Advanced Networking - International Workshop" in Arlington VA 22 April 2004, and gave 2 talks:

- End to end Internet Performance Today
- Pinger: Methodology, Uses and Results

We prepared a report on Internet performance to Bangladesh for Professor H. Cerdeira of ICTP to present on her trip to Bangladesh.

4.13.6 Outreach

We worked with DESY to understand the throughput performance for various HENP applications, and with NASA to assist GLAST in achieving adequate throughput to GSFC. We worked with BaBar and IN2P3 to try new TCP stacks with real BaBar data transfers. To aid in this we set up a host at SLAC for outside users to use for high speed transport testing.

We worked with the MIT Haystack project to assist them in achieving higher throughput performance.

4.13.7 Advanced TCP Stack and UDP Evaluation

We worked with the developers of LTCP, H-TCP, UDT, altAIMD and FAST to get the latest kernels and code and ensure they were ported to an acceptable (from security viewpoint) version of Linux.

4.13.8 Proposals and Representation

We submitted proposals to the DoE Office of Science:

- *Measurement and Analysis for the Global Grid and Internet End-to-end performance (MAGGIE)* - with LBNL, Internet2, PSC, and U Delaware
- *INCITE Ultra – New Protocols, Tools, Security, and Testbeds for Ultra High-Speed Networking* - with Rice and LANL
- *TeraPaths: A QoS Enabled Collaborative Data Sharing Infrastructure for Peta-scale Computing Research* with BNL, U Michigan, Stony Brook University and the University of New Mexico.
- Automatic and Continuous Buffer Tuning for Data Transfers in High-Energy Physics - with LANL

We also submitted proposals on*:*

- *Understanding Effective Connectivity to and within Africa (AfricaPingER)* together with eJDS/ICTP, NITDA and FOSSFA - submitted to IDRC/Canada
- *Gateway to Science and Development: an Innovative Integrated Approach to the Enhancement of Science in Developing Countries with applications to Disaster Prevention and Evaluation of Natural Resources* together with ICTP, Aidworld Humanitarian ICT, CONAE, National

Academy of Sciences, Kharkov, Ukraine, STAC Vietnam and the VUB, Belgium - submitted to the EU INCO

- *Middleware for Optimized Network-Aware Data Dissemination (ONADD)* with GATech - submitted to NSF

We successfully set up a formal collaboration on network monitoring with the NIIT in Rawalpindi, Islamabad. A formal MOU was signed, and we are now actively working together with regular fortnightly phone meetings.

We attended:

- The three day Joint Engineering Task (JET) Force Roadmap Workshop, JLab April 13-15, 2004 and gave a talk on WAN Monitoring. The JET is a sub-group of the inter-agency Large Scale Networking (LSN). They wanted input and the creation of what is needed for high-performance networking for the next 3 years.

- The CAIDA arranged workshop on "Archiving Data for Internet Measurement Meta Data" and gave a talk SLAC Measurement Data.

- The Grid Performance Workshop UCL, May 12-13, 2004 and gave a talk on Network Monitoring today: why, how, challenges, infrastructures, federations and the Grid

4.13.9 IPv6

We continue to maintain the PingER6 monitoring infrastructure with currently about 30 remote hosts. ABwE has been ported to IPv6 and is now successfully running on about 5 sites (CERN, CESnet, SOX/Atlanta, GATech, SLAC).

5 Appendix

5.1 List of participants

TEAM	Name	F	Current Role CS	Systems and Production Grids	Job Mgmt	Data Mgmt	AAA	Grid Analysis and Catalogs	Other: Web Services, Evaluations Interoperation, etc.
Globus/ANL	Ian Foster	Y	Globus Team Lead, GriPhyN PI, iVDGL, GriPhyN			x			
	Mike Wilde	N	GriPhyN coordinator, ATLAS-CS liasion	x		x			
	Willliam Allcock	Y	GridFTP	x		x			x
	Von Welch	N	CAS				x		
ATLAS	John Huth	N	ATLAS Team lead, GriPhyN Collaborator	x					
	Torre Wenaus	N	LCG Applications liason		x	x		x	
	L. Price	N							
	D. Malon	N	Database/POOL Liason					x	
	A. Vaniachine	N						x	
	E. May	N	Testbed applications	x		x			
	Kaushik De	N	Testbed applications	x					
	David Adams	Y	Distributed analysis					x	
	Wensheng Deng	Y	Metadata catalogs			x		x	
	R. Gardner	N	IVDGL coordinator, Atlas Grid Tools		x	x			x
	G. Gieraltowski	Y	Interoperability	x				x	x
	Dantong Yu	Y	Monitoring and VO	x			x		
	Gabrielle Carcassi	Y		x	x				
BaBar	Richard Mount	N	PPDG PI, BaBar Team co-Lead						
	Tim Adye	N	BaBar Team Co-Lead						
	Robert Cowles	N					x		
	Andrew Hanushevsky	Y				x			
	Adil Hassan	Y				x			
	Les Cottrell	N	IEPM Liaison	x					
	Wilko Kroeger	Y				x			
CMS	Lothar Bauerdick	N	CMS Team Lead. GriPhyN collaborator						
	Harvey Newman	N	PPDG PI. GriPhyN collaborator, Co-PI iVDGL						
	Julian Bunn	N	CMS Tier 2 manager, GriPhyN & iVDGL collaborator	x				x	
	Conrad Steenberg	Y	CS-8:Analysis Tools, GriPhyN collaborator					x	x
	Frank Lingren	Y	CS-8:Analysis Tools, GriPhyN collaborator					x	x
	Iosif Legrand	N	CS-8:Monitoring Tools						x
	Vladimir Litvin	N	GriPhyN collaborator		x				

	Michael Thomas	Y	CS11					X	X
	James Branson	N	CMS Tier 2 manager	x					
	Ian Fisk	N	CMS Level 2 CAS manager, iVDGL liaison	x					
	James Letts	Y	Working on VDT testing scripts	x					
	Saima Iqbal	N	web technology evaluation					x	
	Suresh Man Singh	N	grid deployment	x					
	Anzar Afaq	Y		x	x			x	
	Greg Graham	N		x	x			x	
Coordination	Ruth Pordes	Y	PPDG coordinator			x			
	Doug Olson	Y	PPDG coordinator			x	x	x	
	Miron Livny	Y	PPDG coordinator		x	x	x	x	
	Joseph Perl	Y	CS-11 co-coordinator					x	
D0	Wyatt Merritt	N	D0 team Lead	x	x				
	Igor Terekhov	Y	JIM Team Lead	x	x				
	Andrew Baranovski	Y		x					
	Gabriele Garzoglio	Y		x	x	x			
	Sankalp Jain	Y	Through contract with UTA CSE Department	x	x				
	Aditya Nishandar	Y	Through contract with UTA CSE Department	x	x				
SRM/LBNL	Arie Shoshani	y	SRM Team Lead. GriPhyN collaborator			x			
	Alex Sim	Y				x			
	JunminGu	Y				x			
	Viji Natarajan	Y				x			
SRB/UCSD	Reagan Moore	Y	SRB Team Lead. GriPhyN collaborator			x			x
	Wayne Schroeder	Y	CS-8: Web Services			x			x
JLAB	William Watson	Y	JLAB Team Lead			x			x
	Sandy Philpott	N	facilities	x			x		
	Andy Kowalski	N				x			
	Bryan Hess	Y	Web Services			x			x
	Ying Chen	Y	Web Services	x		x			x
	Walt Akers	N	Web Services	x		x			
STAR	Jerome Lauret	N	STAR Team Lead	x	x				x
	Dave Stampf	N		x					
	Richard Casela	N		x					
	Eftratios Efstathiadis	N		x					
	Eric Hjort	Y		x		x			
	Doug Olson	N		x		x			x
	Levent Hajdu	Y	Star scheduler and JDL	x	x	x			
Condor/U.Wisconsin	Miron Livny	Y	PPDG PI, PPDG Coordinator. GriPhyN collaborator	x	x	x			x
	Peter Couvares	Y			X		x		
	Alan DeSmet	Y			x		x		
	Alain Roy	N			x				

	Todd Tannenbaum	Y			x				
	Jeff Weber	Y	CDF, D0 support	X					
Globus/ISI	Carl Kesselman	N	Globus/ISI lead						
	Ann Chervenak	N				x			
PHENIX	David Morrison	N	Team lead						
CDF	Frank Wuerthwein	N							
	Rick Snider	N							
ALICE	Larry Pinsky	N							

5.2 Meetings

The following table shows the meetings held this quarter. The calendar at http://www.ppdg.net/calendars.htm has links to the agendas and minutes.

Apr 1	**10 a.m. - 11 a.m.**	**PPDG CS-11 phone meeting**
Apr 14	**12:30 p.m. - 2 p.m.**	**PPDG weekly meeting**
Apr 29	**10 a.m. - 11 a.m.**	**PPDG CS-11 - grid data analysis phone meeting**
May 5	**12:30 p.m. - 2 p.m.**	**PPDG weekly meeting**
May 10	**11 a.m. - 12 p.m.**	**JLab-PPDG annual review telecon**
May 10	**1 p.m. - 2 p.m.**	**PPDG-STAR annual review telecon**
May 12	**2:30 p.m. - 3:30 p.m.**	**PPDG-BaBar annual review telecon**
May 13	**10 a.m. - 11 a.m.**	**PPDG-SRM annual review telecon**
May 13	**2 p.m. - 3 p.m.**	**PPDG-Globus annual review telecon**
May 13	**3 p.m. - 4 p.m.**	**PPDG-SRB annual review telecon**
May 14	**10 a.m. - 11 a.m.**	**PPDG-D0 annual review telecon**
May 20	**All Day**	**Joint Trillium Steering Meeting, U of Chicago**
May 21	**All Day**	**Joint Trillium Steering Meeting, U of Chicago**
May 26	**12:30 p.m. - 2 p.m.**	**PPDG weekly meeting**
May 27	**10 a.m. - 11 a.m.**	**PPDG CS-11 - grid data analysis phone meeting**
Jun 2	**12:30 p.m. - 2 p.m.**	**PPDG weekly meeting**
Jun 10	**10 a.m. - 11 a.m.**	**PPDG CS-11 - grid data analysis phone meeting**
Jun 16	**12:30 p.m. - 2 p.m.**	**PPDG weekly meeting**
Jun 28	**All Day**	**PPDG Collaboration Meeting, Williams Bay, WI**
Jun 28	**8:00 p.m. – 10:00pm**	**PPDG Steering Meeting**
Jun 29	**All Day**	**PPDG Collaboration Meeting, Williams Bay, WI**
Jun 29	**8:30 a.m. – 11:30 a.m.**	**Joint Steering Meeting**
Jun 30	**12:30 p.m. - 2 p.m.**	**PPDG weekly meeting**

5.3 Related Publications

"Design and Analysis of a Dynamic Scheduling Strategy with Resource Estimation for Large-Scale Grid Systems" was submitted to IEEE/ACM Grid Computing 2004 conf (Pittsburgh USA Nov 8th).

"A Dynamic Scheduling Strategy for Data Intensive Grid Systems" was submitted to IEEE International Conference on Networks (ICON2004) to be held in Singapore.

"Pull-Based Resource Aware Scheduling on Large-Scale Computational Grid Systems" was submitted to IEEE Transactions on Parallel and Distributed Systems.

Use Cases for a Command Shell for Grid Computing on Production Supercomputing Sites, submitted to Grid2004, http://www.ppdg.net/archives/documents/2004/doc00011.doc.

The Globus Toolkit ?Ecosystem? (and how to make it work for you), Tutorial at GGF11, Instructor: Lee Liming, Argonne National Laboratory: http://www-unix.mcs.anl.gov/~liming/ggf11/ecosystem-ggf11.ppt

Performance and Scalability of a Replica Location Service. A.L. Chervenak, N. Palavalli, S. Bharathi, C. Kesselman, R.Schwartzkopf. To appear in Proceedings of the International IEEE Symposium on High Performance Distributed Computing, June 2004.

X.509 Proxy Certificates for Dynamic Delegation. V. Welch, I. Foster, C. Kesselman, O. Mulmo, L. Pearlman, S. Tuecke, J. Gawor, S. Meder, F. Siebenlist. 3rd Annual PKI R&D Workshop, 2004.

GGF NMWG recommendation entitled *A Hierarchy of Network Performance Characteristics for Grid Applications and Services*,

Correlating Internet Performance Changes and Route Changes to Assist in Trouble-shooting from an End-user Perspective, Passive and Active Monitoring Workshop, Antibes, Juan-les-Pins, France, April 19-20, 2004, SLAC Pub 10341.

Experiences in Traceroute and Available Bandwidth Change Analysis, Logg, Cottrell, Navratil, SLAC, SIGCOMM, Sept. 2004, http://www.slac.stanford.edu/grp/scs/net/papers/sigcomm2004/nts26-logg.pdf.

DataMover: Robust Terabyte-Scale Multi-file Replication over Wide-Area Networks, Alex Sim, Junmin Gu, Arie Shoshani, Vijaya Natarajan, Proceedings of the 16th International Conference on Scientific and Statistical Database Management (SSDBM 2004), Greece.

5.3.1 CHEP'04 Abstracts

"*A Scalable Grid User Management System for Large Virtual Organizations*", G. Carcassi, et al., BNL, submitted to CHEP'04.

"*Divisible Load Scheduling for STAR Grid Based Computing*", D. Yu, BNL, submitted to CHEP'04.

"*BNL USATLAS Data Challenge 2 Monitoring System*", D. Yu, et al., BNL, submitted to CHEP'04.

Storage Resource Manager, T. Perelmutov, et al., FNAL, submitted to CHEP'04.

Testing the CDF Distributed Computing Framework, V. Bartsch, Oxford, et al., submitted to CHEP'04.

ATLAS Distributed Analysis, D. Adams, BNL, submitted to CHEP'04.

Networks and Grids for High Energy and Nuclear Physics, H. Newman, Caltech, submitted to CHEP'04.

BNL USATLAS Data Challenge 2 Monitoring System, J. Smith, et al., BNL, submitted to CHEP'04.

Grid3: An Application Grid Laboratory for Science, J. Rodriguez, U.Fl., et al., submitted to CHEP'04.

Breaking the 1 GByte/sec Barrier? High speed WAN data transfers for science, J. Bunn, et al., Caltech, submitted to CHEP'04.

Experience with dCache Distributed Storage at Brookhaven, O. Rind, BNL, et al., submitted to CHEP'04.

Grid Enabled Analysis for CMS: prototype, status and results, F. Van Lingen, Caltech, et al., submitted to CHEP'04.

The Clarens Grid-enabled Web Services Framework: Services and Implementation, C. Steenberg, et al., Caltech, submitted to CHEP'04.

Experience with Deployment and Operation of the ATLAS Production System and the Grid3+ Infrastructure at Brookhaven National Lab, X. Zhao, et al., BNL, submitted to CHEP'04.

Distributed Filesystem Evaluation and Deployment at the US-CMS Tier-1 Center, L. Giacchetti, FNAL, et al., submitted to CHEP'04.

Secure Grid Data Management Technologies in ATLAS, M. Branco, CERN, et al., submitted to CHEP'04.

Managed Data Storage and Data Access Services for Data Grids, J. Bakken, FNAL, et al., submitted to CHEP'04.

Virtual Organization Membership Service eXtension (VOX), Y. Wu, FNAL, et al., submitted to CHEP'04.

The Open Science Grid (OSG), R. Pordes, FNAL, et al., submitted to CHEP'04.

The CMS User Analysis Farm at Fermilab, H. Wenzel, et al., FNAL, submitted to CHEP'04.

Lattice QCD Data and Metadata Archives at Fermilab and the International Lattice Data Grid, E. Neilsen, et al., FNAL, submitted to CHEP'04.

FroNtier: High Performance Database Access Using Standard Web Components in a Scalable Multi-tier Architecture, L. Lueking, FNAL, submitted to CHEP'04.

Production Experience of the Storage Resource Broker in the BaBar Experiment, A. Hasan, SLAC, et al., submitted to CHEP'04.

Middleware for the next generation Grid infrastructure, E. Laure, CERN, et al., submitted to CHEP'04.

Job Interactivity using Steering Service in Grid Enabled Analysis Environment, A. Anjum, NIIT, et al., submitted to CHEP'04.

Job Monitoring in Interactive Grid Analysis Environment, A. Anjum, NIIT, et al., submitted to CHEP'04.

Predicting Resource Requirements of a Job Submission, A. Anjum, NIIT, et al., submitted to CHEP'04.

JIM Deployment for the CDF Experiment, M. Burgon-Lyon, Glasgow, submitted to CHEP'04.

Use of Condor and GLOW for CMS Simulation Production, S. Dasu, U. Wisc, et al., submitted to CHEP'04.

The STAR Unified Meta-Scheduler project, a front end around evolving technologies for user analysis and data production., J. Lauret, BNL, et al., submitted to CHEP'04.

The Grid Collector: Using an Event Catalog to Speedup User Analysis in Distributed Environment, K. Wu, LBNL, et al., submitted to CHEP'04.

A Condor-based, Grid-aware batch software for a large scale Linux Farm, T. Wlodek, et al., BNL, submitted to CHEP'04.

Production mode Data-Replication framework in STAR using the HRM Grid, E. Hjort, LBNL, et al., submitted to CHEP'04.

Tools for GRID deployment of CDF offline and SAM data handling systems for Summer 2004 computing, A. Kreymer, FNAL, submitted to CHEP'04.

Storage Resource Managers at Brookhaven, R. Popescu, et al., BNL, submitted to CHEP'04.

Wide Area Network Monitoring system for HEP experiments at Fermilab, M. Grigoriev, FNAL, et al., submitted to CHEP'04.

LambdaStation: A forwarding and admission control service to interface production network facilities with advanced research network paths, P. Demar, et al., FNAL, submitted to CHEP'04.

Globally Distributed User Analysis Computing at CDF, A. Sill, Texas Tech., et al., submitted to CHEP'04.

Experience producing simulated events for the DZero experiment on the SAM-Grid, G. Garzoglio, FNAL, et al., submitted to CHEP04.

Cross Experiment Workflow Management: The Runjob Project, P. Love, Lancaster, et al., submitted to CHEP'04.

The Condor based CDF CAF, F. Wuerthwein, UCSD, et al., submitted to CHEP'04.

Development and use of MonALISA high level monitoring services for Meta-Schedulers, E. Efstathiadis, BNL, et al., submitted to CHEP'04.

Interactive Data Analysis on the Grid using Globus 3 and JAS3, T. Johnson, SLAC, et al., submitted to CHEP'04.

Global Distributed Parallel Analysis using PROOF and AliEn, F. Rademakers, CERN, et al., submitted to CHEP'04.

Building Global HEP Systems on Kerberos, M. Crawford, FNAL, submitted to CHEP'04.

SAMGrid Monitoring and Information Service and its Integration with MonALisa, A. Lyon, FNAL, et al., submitted to CHEP'04.

Application of the SAMGrid Test Harness for Performance Evaluation and Tuning of a Distributed Cluster Implementation of Data Handling Services, A. Lyon, FNAL, et al., submitted to CHEP'04.

SAMGrid Integration of SRMs, R. Kennedy, FNAL, et al., submitted to CHEP'04.

The SAMGrid Database Server Component: Its Upgraded Infrastructure and Future Development Path, S. Veseli, et al., FNAL, submitted to CHEP'04.

Mis-use Cases for the Grid, D. Skow, FNAL, submitted to CHEP'04.

The status of Fermilab Enstore Data Storage System, A. Moibenko, et al., FNAL, submitted to CHEP'04.

CHOS, a method for concurrently supporting multiple operating system, S. Canon, LBNL, submitted to CHEP'04.

Generic logging layer for the distributed computing, V. Fine, BNL, et al., submitted to CHEP'04.

SAMGrid Experiences with the Condor Technology in Run II Computing, I. Terekhov, FNAL, submitted to CHEP'04.

Grid2003 Monitoring, Metrics, and Grid Cataloging System, B. Kim, UFL, et al., submitted to CHEP'04.

Distributed Computing Grid Experiences in CMS DC04, A. Fanfani, INFN, et al., submitted to CHEP'04.

ATLAS Production System in ATLAS Data Challenge 2, L. Goossens, CERN, et al., submitted to CHEP'04.

Resource Predictors in HEP Applications, S. Grinstein, Harvard, et al., submitted to CHEP'04.

PHENIX Job Monitoring/Submission In Transition To The Grid Infrastructure, A. Shevel, SUNY SB, et al., submitted to CHEP'04.

MonALISA: An Agent Based, Dynamic Service System to Monitor, Control and Optimize Grid based Applications, I. LeGrand, et al., Caltech, submitted to CHEP'04.