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# Grid Solutions and Strategies

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# Grid Computing is a Computing Division wide strategy.

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- Grid Computing Facility for farms and storage systems.
- SAMGrid onsite and offsite data and job distribution for all Run II institutions.
- Grid accessible network and storage systems to provide access to increasing number of petabytes of data.
- FermiGrid campus wide grid to integrate Fermilab farms and storage.
- SciDAC funded PPDG, SRM; NSF iVDGL
- Open Science Grid national grid to interface DOE Lab Facilities, common with US LHC, collaborate with similar communities.
- LCG, EGEE, & TeraGrid inter-operation to enable use of these resources by Fermilab user groups.



## Grid Strategies cont.

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- Share computing and storage both at Fermilab and offsite.
  - Leverage commonalities, development and operations across Run II and LHC experiments.
  - Enable more efficient use of resources taking advantage of varying loads and needs.
  - Prepare for future transition of users and resources in support of LHC.
- Work towards common interfaces and solutions for more effective administration, support and use.
- Benefit from collaboration with computer science developers and other communities using and developing Grids.



# Fermilab Grid efforts in support of Run II

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- Evolve SAMGrid to interface to and use (new) common grid services.
- Deploy and support shared central services within FermiGrid.
- Joint projects to develop middleware and services.
- Participate in activities and operation of the OSG.
- Collaborate with LCG and EGEE.
- Outreach to HEP groups using the Grid in South America and Asia.



# Effort spread across Divisions program

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- Data and Storage Management: 8 FTEs
  - CD: 3 FTEs; SRM+PPDG(external funded): 3 FTE; US CMS: 2FTE. Not including SamGrid deployment and support nor LambdaStation(external funded); Including .5FTE support collaboration with LCG.
- Grid Services and Operations: 10 FTEs
  - CD: 2 FTEs; US CMS: 5.5 FTEs; PPDG+Hepic+iVDGL (external funded): 2.5FTE; Including .5 FTE support for collaboration with LCG.
- FermiGrid central Grid services and testbed: 3 FTEs.



# We need to organize the work and priorities .

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- Locally
  - Department Head meetings and regular 1-2 person meetings with the Division Head.
  - Grid and Data Management Coordination meetings ~monthly to review experiment needs and project deliverables and issues.
  - FermiGrid Stakeholder meetings bi-weekly to review progress and planning.
  - Project status reports - either written or presented 2-3 times a a year.
  - Individual project meetings with agendas and minutes ~weekly.
- Broadly
  - Part of OSG Interim Executive board and council; active in all planning and scheduling the activities.
  - Representation on LCG Grid Deployment Board, Network, Storage and Baselines Services working groups
  - Participation in US LHC and US-LCG coordination meetings.



# Middleware and Services

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- Storage and Data movement and management:
  - SRM standard interface for >5 implementations
  - SRM/dCache used by Run II, US ATLAS Tier-1, US CMS Tier-1 and Tier-2s, many Tier-1s in LCG.
  - SAMGrid event based meta-data, data, and job management.
  - LambdaStation developments to integrate management of networks and data movement.
- Administration, Security and Support:
  - X509 certificate based user account and experiment administration and authorization.
  - Accounting of resources accessed through Grid interfaces.
- Testing and Validation
  - Test Virtual Data Toolkit (VDT)



# FermiGrid Central Services

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- Maintain User identification and authorization infrastructures (VOMS, GUMS, SAZ, myproxy) servers for all Fermilab experiments.
- Support central monitoring and information publishing.
- Control non-Fermilab users access to shared resources through single point of entry from OSG.
- Participate in OSG Integration Testbed.
- Provide Grid Operations and Helpdesk support.
- Write support documentation and user guides.





# Successes in Sharing and Interoperation

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- D0 reprocessing using SAMGrid on
  - LCG,
  - US CMS Tier-1
  - FermiGrid-GPFarm gateway
- CDF monte-carlo using (D)CAF+Condor-glideins on
  - Fermigrid-GPFARM gateway
  - LCG/INFN
  - US CMS Tier-1
- LCG and EGEE:
  - SamGrid-LCG Gateway,
  - VDT/gLITE cooperation
  - OSG-LCG information publishing,



## FermiGrid Stakeholder Bilateral Interoperability:

At [Fermilab](#), there are many compute resources operated by personnel in the [Computing Division](#) (CD) for the use of specific stakeholders (experiment and/or virtual organization controlled computing facilities). The FermiGrid Stakeholder Bilateral Interoperability effort facilitates the shared use of the central and experiment / virtual organization controlled computing facilities located at Fermilab by other experiments / virtual organizations at Fermilab.

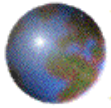
Stakeholder Resources

	CDF	USCMS	D0	GP Farms	OSG	Fermilab Storage
<a href="#">CDE</a>						
<a href="#">USCMS</a>						
<a href="#">D0</a>						
<a href="#">GP Farms</a>						
<a href="#">OSG</a>						

Stakeholder

Key:

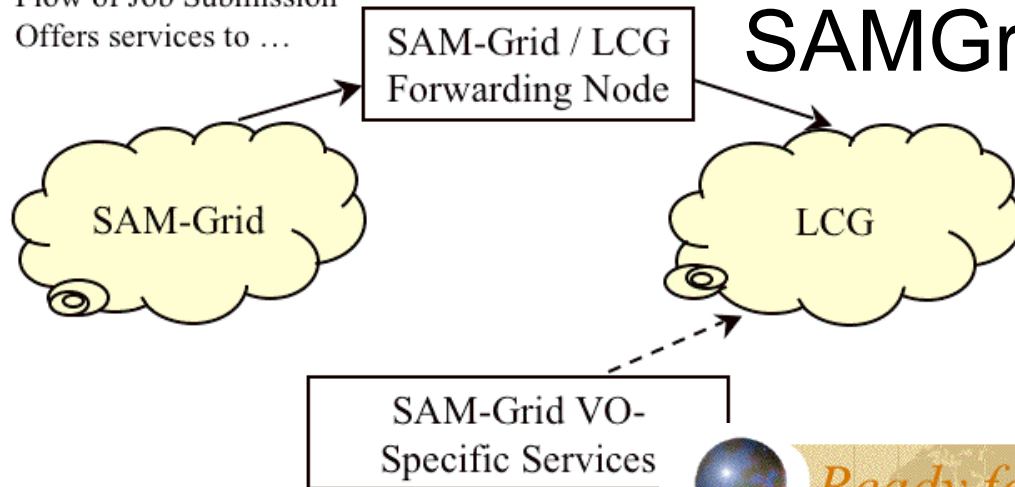
Icon	Description
	Task Completed & Interoperability Verified
	Task Not Completed or Interoperability Not Present
	Task In Process



# Basic Architecture



- Flow of Job Submission
- Offers services to ...



## SAMGrid-LCG Gateway

### Ready for production: improve on...

#### •Main issues to track down:

- Accessibility of the services
- Usability of the resources
- Scalability

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- scratch management: we assume that sites define \$TMP\_DIR in the environment of the job
- service multiplicity: we'll need to add more FW, SAM stations, CE Increase number of LCG CE
- CCIN2P3 hosts the LCG SAM station.
- Jobs running at the LCG sites must be able to contact it: this entails some firewall maintenance

#### More scalable storage management:

- in SAM-Grid output data are first buffered, then stored "durably" or permanently.
- Currently we have 500 GB as a buffer and durable area: we may need more.
- We could learn how to use hps for this...

(combination of 2 slides from original talk)

#### Acronyms:

- VO - Virtual Organization / Experiment
- \$TMP\_DIR: location of space on job execution site.
- CE - Batch queue
- FW - Forwarding Node
- CCIN2P3 - French Laboratory on D0 and LHC

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Gabriele Garzoglio

# LCG/OSG Interoperation Status

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- Progressing very well
  - Intensive activity over the past three weeks
- LCG to OSG
  - Almost there – OSG appears as a single site
  - IS, monitoring, job matches, data transfer
  - A few remaining issues
- OSG to LCG
  - Job submission works
  - Need to still check the rest

## OSG-LCG Interfaces

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## Interoperations Todo

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- LCG jobs need to source the environment
  - Requires RB fix
- Investigate the exp software installation
  - Harmonisation?
- VOs and their management
  - Common operations or monitoring VO?
- CAs
- Accounting
- Operations
  - What happen when sites have problems
  - EGEE has a very proactive operations policy
- Monitoring ☹
  - MonALISA/R-GMA interoperation

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### Acronyms:

VO - Virtual Organization /  
Experiment

CA - Certificate Authority;  
gives out Grid Certificates.

MonaLisa - monitoring tool.

R-GMA - monitoring  
infrastructure

9/14/05

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September 8, 05

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# Risks to Run II

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- Overhead of common solutions for meeting Run II needs.
- Robustness and capability of common middleware components.
- Longevity of interest from and support for CS middleware groups.
- Security constraints on collaboration and sharing.



# Summary

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- Run II starting to use SAMGrid on common grid resources -LCG, FermiGrid, OSG.
- FermiGrid increasing central support for Grid Services across Run II and LHC.
- OSG roadmap provides framework for common solutions in the US and collaboration with LCG, EGEE and other infrastructures.
- We are learning by experience how to have more in common.