Storage Resource Manager

Timur Perelmutov

Jon Bakken

Don Petravick

Fermi National Accelerator Lab

SRM Collaboration

Jefferson Lab

Bryan Hess
Andy Kowalski
Chip Watson

Fermilab

Don Petravick
Timur Perelmutov

LBNL

Arie Shoshani
Alex Sim
Junmin Gu

EU DataGrid WP2

Peter Kunszt
Heinz Stockinger
Kurt Stockinger
Erwin Laure

EU DataGrid WP5

Jean-Philippe Baud
Stefano Occhetti
Jens Jensen
Emil Knezo
Owen Synge

Storage Resource Managers

SRMs are middleware components that manage shared storage sesources on the Grid and provide:

- Uniform access to heterogeneous storage
- Protocol negotiation
- Dynamic Transfer URL allocation
- Access to permanent and temporary types of storage
- Advanced space and file reservation
- Reliable transfer services

Storage Resource Manager versions

- Two SRM Interface specifications
  - SRM v1.1provides
    - Data access/transfer
    - Implicit space reservation
  - SRM v2.1 adds
    - Explicit space reservation
    - Namespace discovery and manipulation
    - Access permissions manipulation
- Fermilab SRM implements SRM v1.1 specification
- SRM v2.1 by the end of 2004

SRM Protocols and Groups of Functions

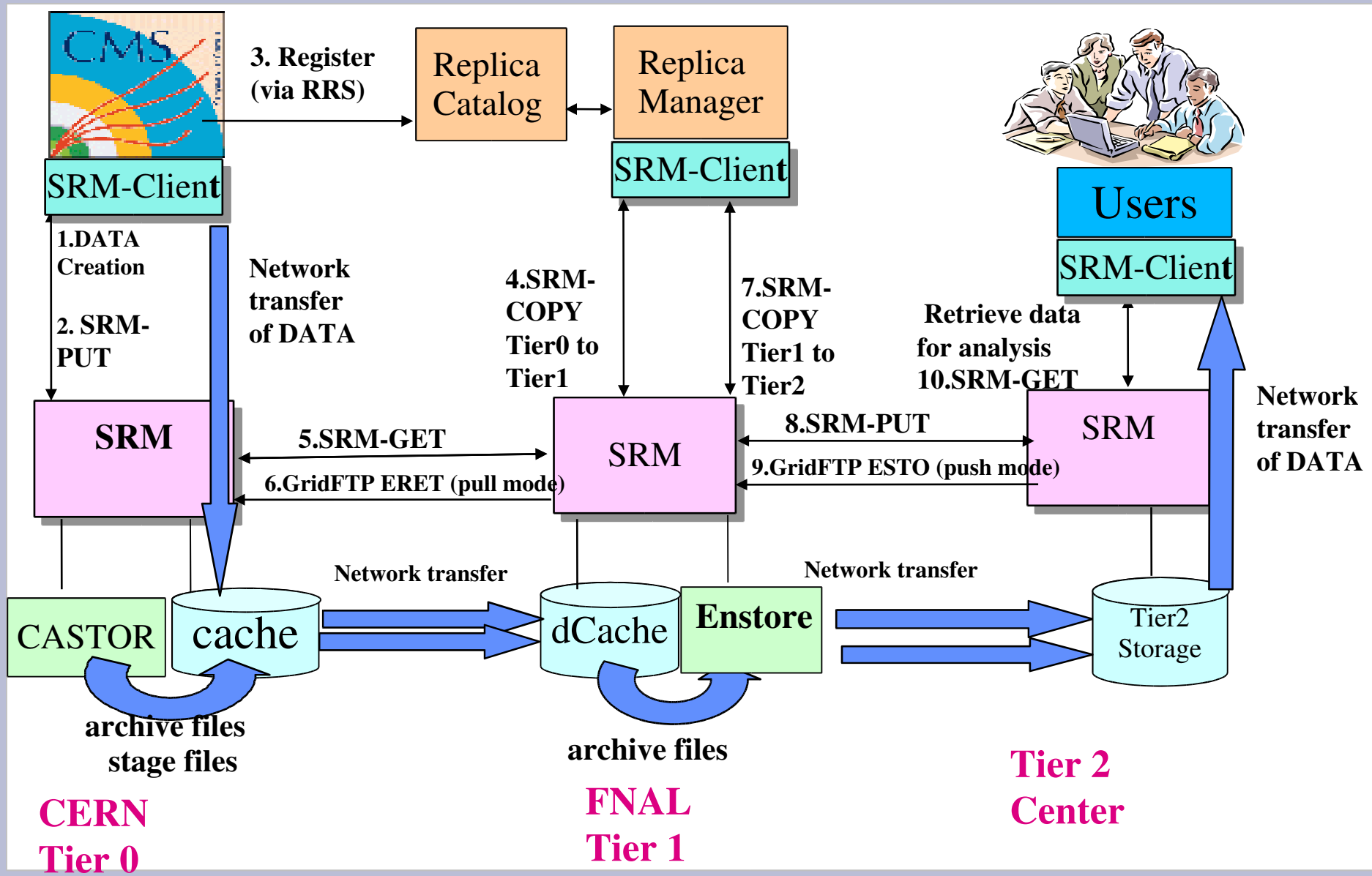
SRM interface consists of the following groups of functions:

- Space Management Functions – SRM v2.1
- Data Transfer Functions – SRM v1.1 and v2.1
- Directory Functions – v2.1
- Permission Functions – v2.1
- Status Functions – v1.1 and v2.1

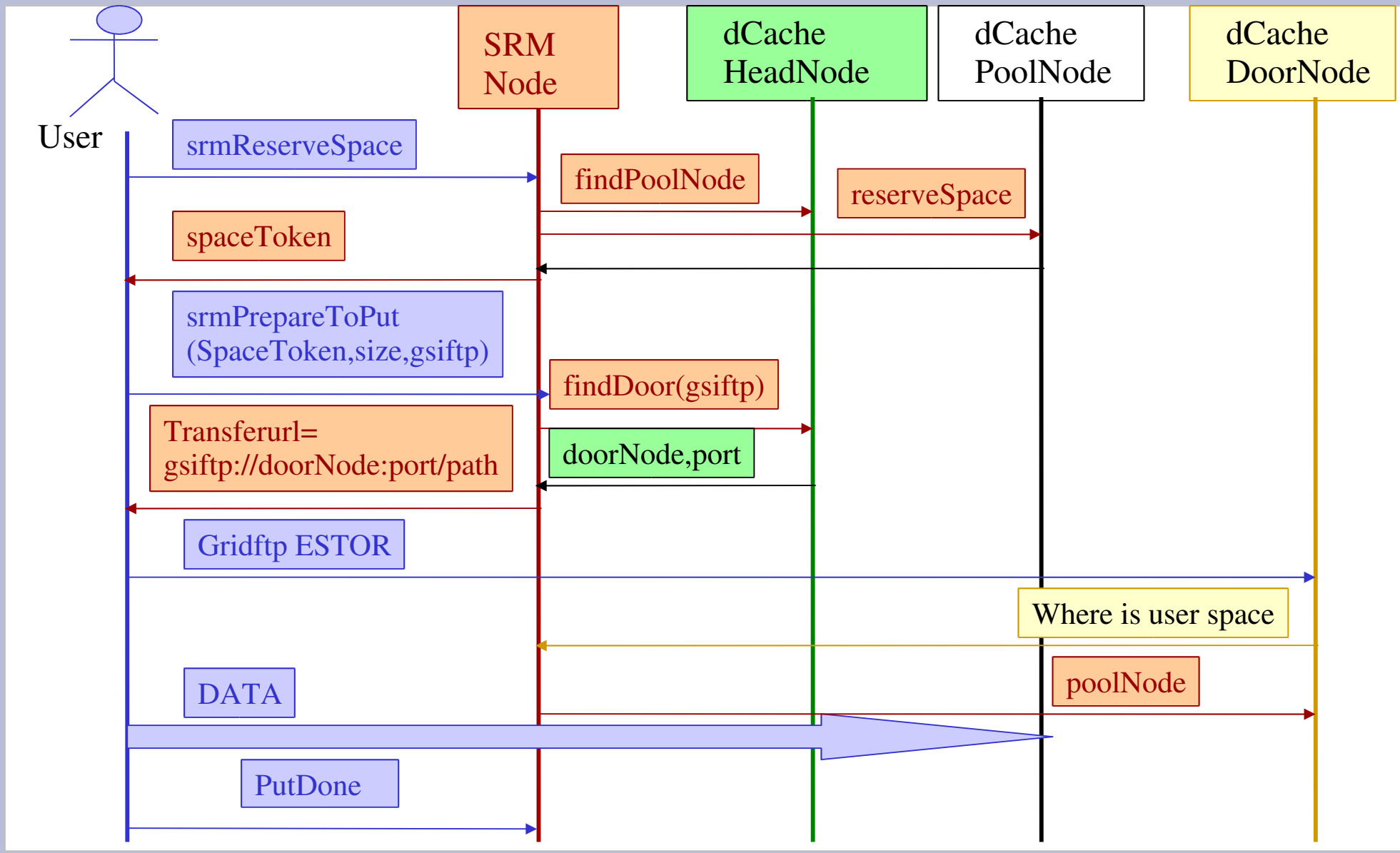
US-CMS DATAGRID

- US-CMS is building a data grid to facilitate physics data analysis at academic institutions across the United States.
- Data grid 3 tier architecture.
  - Tier 0 CERN, Geneva, Switzerland.
  - Tier 1 consists of 5 regional centers, FERMILAB in Batavia, IL is a North American Center.
  - Tier 2 consists of 25 centres, 5 of these are in North America.
- SRM copy is used as a management protocol and reliable replication service for movement of data from tier 0 to tier 1 centers and from tier 1 to tier 2.

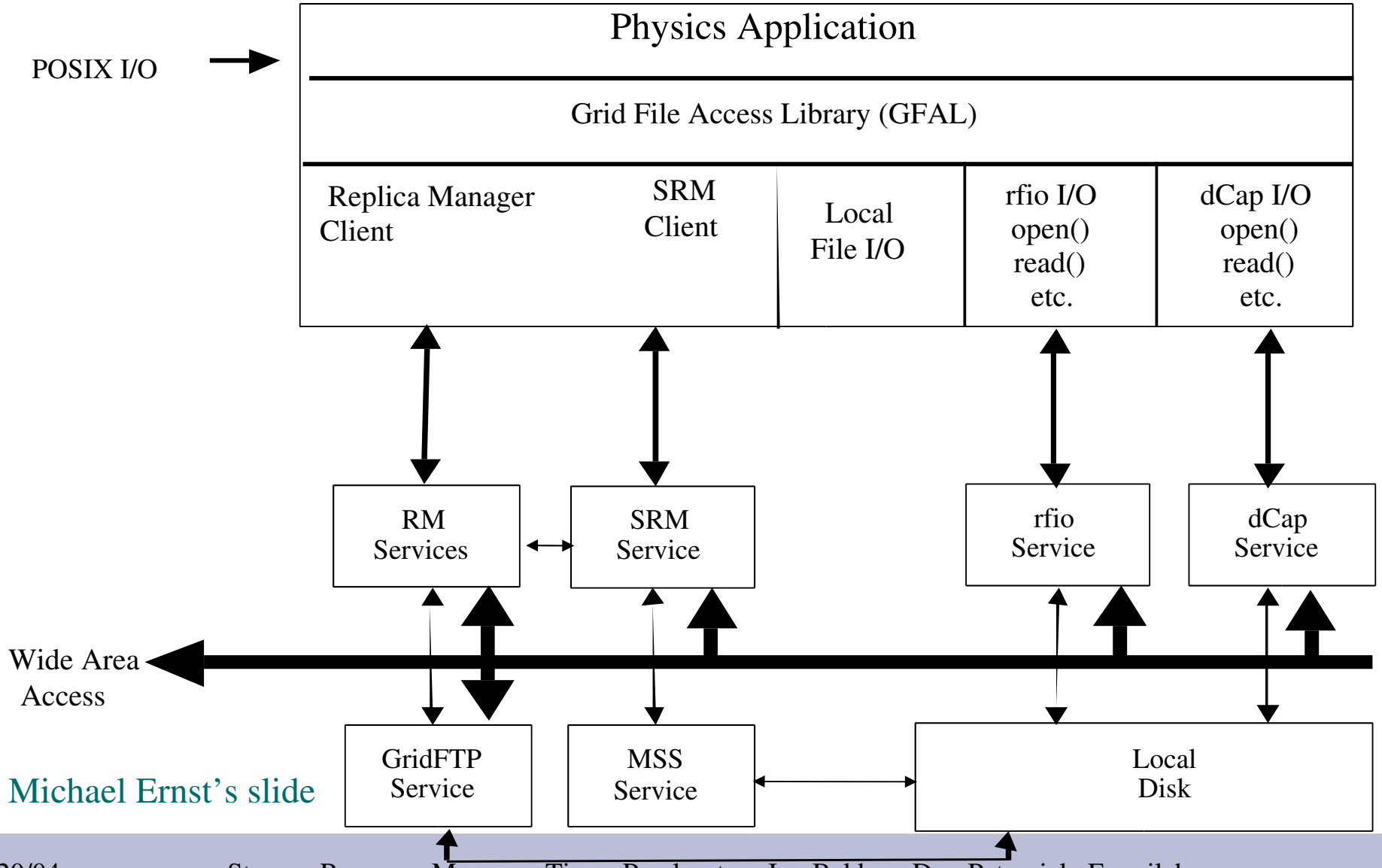
Data life cycle on the grid and a role of SRM on the GRID



Srm Example - srmPrepareToPut



Grid File Access Library and SRM



Michael Ernst's slide

Status of Fermilab SRM Project

- SRM Interface to dCache (disk cache) Storage System
  - Data Transfer Functions (get, put and copy)
  - Load balancing, throttling, fairness
  - Scalable replication mechanism via gridftp
  - Automatic directory creation
  - Fault tolerance and reliability achieved by providing persistent storage for transfer requests and retries on failures
- SRM interface as standalone product, adaptable to work on top of any storage system
- a reference implementation of the SRM interface to a Unix File System

Fermilab SRM Project Plans

- Space Management
- Implementation of SRM Version 2.1 interface
- Integration of SRM in SAM Data Handling System
- Integration with Virtual Organization based Authorization Services, development of Storage Specific fine grain Authorization Services
- Integration of SRM to SAMGrid Data Handling System as the universal interface to a storage
- Research Storage System utilization of Lambda Station Interface optical path allocation and per flow routing
- Monitoring, Administration and Accounting interfaces

Resources

- The Storage Resource Manager Collaboration, http://sdm.lbl.gov/srm-wg/
- Fermilab SRM Project , http://www-isd.fnal.gov/srm
- Patrick Fuhrmann, dCache, Grid Storage Element and enhanced use cases, http://indico.cern.ch/contributionDisplay.py?contribId=233&sessionId=10&confId=0
- DCache, Disk Cache Mass Storage System, http://www.dcache.org/
- US-CMS, http://www.uscms.org/
- Don Petravick, Lambda Station Proposal, http://hppc.fnal.gov/wawg/omnibus-text.pdf
- Arie Shoshany, Replica Registration Service, http://www.ppdg.net/mtgs/28jun04-wb/slides/PPDG-AH-0406-RMS-RRS.ppt
- Robert Kennedy, SAMGrid Integration of SRMs, http://indico.cern.ch/contributionDisplay.py?contribId=460&sessionId=7&confId=0
- Michael Ernst, US-CMS Grid File Access Proposal, http://www.uscms.org/sandc/reviews/doe-nsf/2003-07/docs/GFA-Proposal-Short-v1.0.pdf
- Michael Ernst, Managed Data Storage and Data Access Services for Data Grids, http://indico.cern.ch/contributionDisplay.py?contribId=190&sessionId=7&confId=0
- Philip DeMar, LambdaStation: A forwarding and admission control service to interface production network facilities with advanced research network paths http://indico.cern.ch/contributionDisplay.py?contribId=359&sessionId=11&confId=0