LCG-SAM Replica Location Service interface

Kors Bos, Dave Evans, Leanne Guy, Peter Kuntsz, Lee Lueking, Gavin McCance, Jeff Templon,

May 21, 2003

Goal: To design and build interfaces which allow D0 (SAM) to use LCG storage and compute resources, and possibly vice versa.

1. Examples of use

Data is processed on LCG Compute Elements (LCG-CE) with input data coming from files cataloged in the SAM Replica Catalog (SAM-RC) and stored at SAM owned storage locations (Sam stations). Jobs, with a list of input file names and application specifications, are submitted through the LCG resource broker and sent to LCG-CE's (initially at NIKHEF). When the job runs, it locates the GUID in the SAM catalog through a SAM-LCG interface. The file is replicated locally on the LCG-CE and processed by the application which generates a) an output file(s), and b) associated metadata description file(s). The metadata is declared to SAM and the output file is copied and registered (location added) into either LCG-LRC or SAM-RC. Similar scenarios can be imagined in which data in LCG owned SE's are processed on SAM CE resources.

2. Use cases

Possible file transfer operations involving both systems (stored=copied and registered)

1. File copied from SAM-SE to LCG-CE (w/ temp disk)
2. File stored from LCG-CE (w/ temp disk) to SAM-SE
3. File stored from SAM-CE (w/ temp disk) or LCG-CE (w/temp disk) to LCG-SE
4. File copied from LCG-SE to SAM-SE
5. File copied from SAM-SE to LCG-SE

3. Details for each use case

We assume that initially, the LRC for VO D0 will be the existing SAM RC. With this in mind, following are the details of the data replication needed to support the use cases outlined above. The interface to be built enables the EDG Replica Manager to talk with the SAM RC. This interface is called SAM-LCG. In the future, when the details of the RLI are completed SAM might become one of a number of federated LRC's.

1. Data from SAM to an LCG-CE with temp disk.
    a. LCG-CE uses EDG Replica Manager to locate replicas of the file in sam through SAM-LCG interface to SAM Replica Catalog (RC), and picks one or uses “get best file”.
    b. LCG-CE uses GridFTP to copy the file from sam location (station) to the desired LCG CE.
2. Data into SAM form LCG-CE: Two possible methods:
    a. Send to a SAM Storage Server (FSS) which forwards both data and metadata to the desired D0 SAM location, or
    b. Use gridFTP to copy the file to the desired physical location, declare the file to SAM, and add the location to SAM with “sam add location”.
3. Adding SAM data to LCG storage location, and declaring to SAM:
    a. Copy to the LCG-SE and register. Copy and register (cr) in EDG terms.
    b. Declare the metadata to SAM
    c. Add LCG location to SAM RC: Sam add location –file=newfile –location=”sfn::/node.domain:/fullpath” . NB each location must be added administratively to the list of valid SAM locations before a file can be related to it.
4. Getting data out of LCG-SE to be used by SAM
    a. SAM identifies LCG location by “sfn::” prefix in SAM-RC.
    b. Get the file with gridFTP.
    c. SAM station takes care of SAM bookkeeping
5. Data copied from SAM SE to LCG-SE
    a. Copy and register file to LCG SE
    b. Add location to SAM.

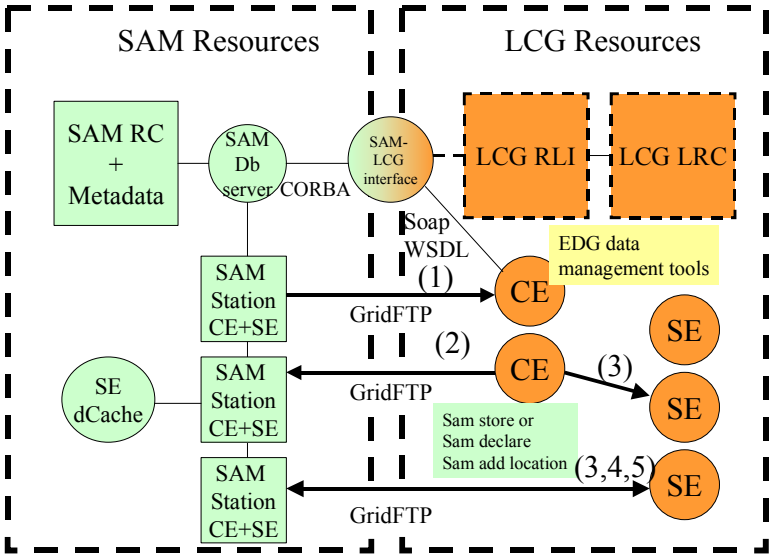

Figure 1. The SAM-LCG interface enables data to be managed and shared between SAM and LCG resources. The initial implementation will use only the SAM Replica Catalog. LCG-RLI and LCG-RLC are possible future additions as indicated by their dashed borders.

4. Implementation Details and Issues:

Several implementation details and possible issues have been discussed. An initial list is presented here.

1. The interface could use the WSDL/SOAP API, or EDG replica management tools (edg-rm) for sam database server interface to LCG-RLS. The first solution is preferred and will be explored initially.
2. The API for the EdgLocalRepliCatalog is available at: http://proj-grid-data-build.web.cern.ch/proj-grid-data-build/edg-rls-server/apidoc/
3. EDG uses "user certificates" for GridFTP transfers, SAM uses server certificates. Will require gridmapfile at each SAM site where data is to be accessed.
4. Need access to LCG info server, probably use the one at NIKHEF or possibly US-CMS at FNAL, if there is one.
5. Network monitoring client and LCG-SE costs may be needed at some point.
6. An SRM interface for SAM is being pursued and will further improve interoperability of the two systems. The time scale for this project is still not defined but might be accelerated if it is of interest to this project.

Acknowledgments

Data Grid is a European project (Sometimes called European Data Grid or EDG) to produce a functional grid to be used by HEP, Bioinformatics, and Earth Sciences across Europe. The LHC Computing Grid (LCG) project intends to use the software from the EDG project for the LHC distributed computing environment required for the LHC experiments. We thank both the EDG and LCG for their contributions to this proposal and for the extensive documentation which makes exploring the use of their software easier.

Glossary:

5.1 Naming Conventions

EDG Acronym	EDG Name	SAM Name or comment
SFN	Storage File Name	*Filename* w/ location
UUID	Universally Unique IDentifier	The SAM *filename* is required to be unique. Could be the *FileID*.
GUID	Grid Unique IDentifier	*Filename*
LFN	Logical File Name	No SAM analogue. Closest concept is *dataset*, or a collection of files referred to by logical name.
TURL	Transport URL	Location is stored as 1) host, station, or MSS with full unix path, or 2) url for network attached files

		(RFIO, dCAP)

5.2 Data Management

EDG Acronym	EDG Name	SAM Name or Comment
DMS	Data Management Services	SAM provides data management and adapters to storage systems.
RMS	Replica Management Services	Provided through SAM Stations in conjunction with SAM DB and Global Optimizer
RFT	Reliable File Transfer	SAM Stager. Uses retries and CRC to assure reliable transfer
SRM	Storage Resource Manager	SAM Station Cache management. Part of SAM station servers. Discussing migrating to the SRM protocol.

5.3 Replica Management

EDG Acronym	EDG Name	SAM Name or Comment
ERM	EDG Replica Manager	SAM CORBA IDL's, SAM user interface, CLI and WEB
RLS	Replica Location Service	Through SAM DB server
LRC	Local Replica Catalog	File Locations table in Central SAM Database
RLI	Replica Location Index	Central Database
RMC	Replica Metadata Catalog	Data_files and other tables in SAM Database
ROS	Replica Optimization Service	SAM Optimizer
RSH	Replica Storage Handler	SAM Station