LCG-1 technology and short term evolution

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Overview

- Introduction and summary of LCG technology
- More detailed description of some of the LCG components
- Short term evolution
- Conclusion

LCG-1: Introduction

- Components of LCG-1
  - VDT from iVDGL
  - Information system
  - Work scheduling from WP1 of EDG
  - Data management from WP2 of EDG
  - Several bits from other EDG WPs
  - Disc based data storage
  - Some essential LCG modifications

Virtual Data Toolkit

- VDT provides Globus 2.2.4
  - GRAM for resource access management
    - Allows job submission and monitoring in a batch system independent way
  - MDS for building the information system
    - Metacomputing Directory Service
  - Data transfer tools
  - Integrated GSI for security
    - GSI is a security infrastructure based on PKI using X.509 certificates
    - Globus implement GSI across their services
- VDT also provides Condor-G 6.5.3
  - WP1 use Condor-G as their underlying job submission service
  - Used for job management and monitoring, but not resource selection

LCG-1: Work scheduling

- EDG provides the work scheduling facility for physics production
  - Based on a client server model
    - The server is called the Resource Broker
    - In LCG-1 there are several Resource Brokers

- A client has the tools to:
  - Submit a job
  - Report the status of jobs
  - Cancel jobs
  - Retrieve specified output from jobs when they are finished

LCG-1: Work scheduling

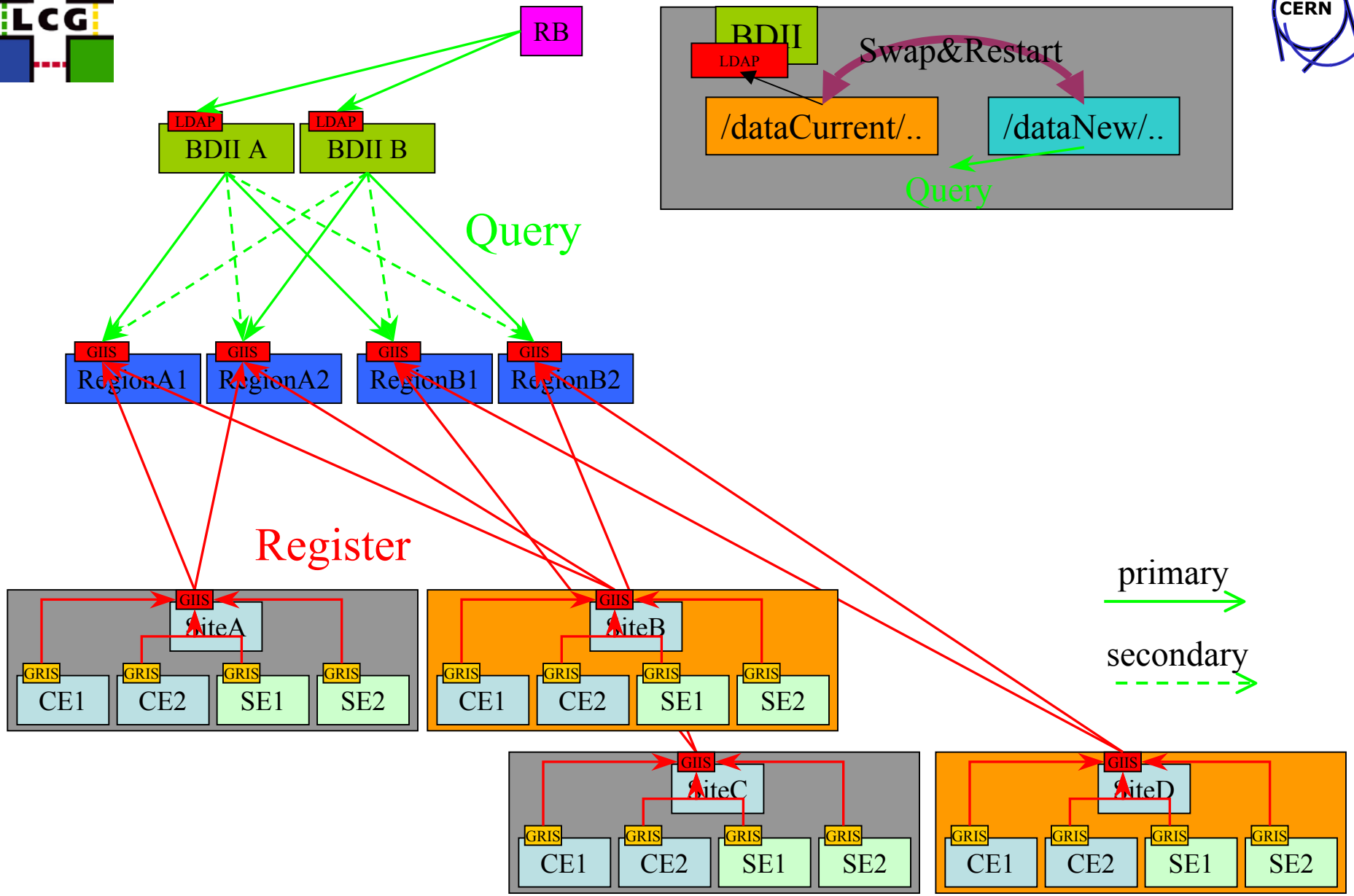
- WP1 also defines a Job Description Language (JDL)
  - JDL is the mechanism to specify characteristics of the job
  - It allows the user to specify requirements that influence where the job will be run
- The broker also stores input & output for a given job
  - The job I/O facilities provided by WP1 are relatively light weight
  - Not the general solution to output data storage and transport

LCG-1: Data management

- Aim to provide the management necessary to locate and move large datasets around the grid
  - Indexing provided by a Replica Location Service (RLS)
  - The service that uses the RLS is called the Replica Manager
- The Replica Manager is the service that provides the user level tools, e.g.
  - Adding a new file to a storage facility
  - Replicating an instance of a file from one storage facility to another
  - Deleting an instance of a file from storage
  - Querying for the locations all of instances of a file
- LCG-1 only supports simple disc based storage
  - No Mass Storage System support

LCG-1: Information system

- The information system is an important part of LCG-1. It needs to:
  - Provide the Resource Broker with the information necessary to match a job and execution destination together
  - Provide services with details they need to contact each other.
- LCG-1 uses MDS from Globus2 and also the BDII
- Globus MDS2 does have some shortcomings
  - Timeouts not well handled
  - Does not scale well
- For LCG-1 the MDS architecture had to be carefully constructed to provide redundancy and to try to avoid the known problems with the current implementation



Information System Overview

GRAM JobManagers

- The JobManager is a part of Globus that monitors each job.
  - The standard Globus JobManager has serious scaling problems
  - We use Condor-G, which includes a development from the Condor team to improve scaling behavior.

LCG-2: Short term evolution

- The LCG-2 release is being certified now. Significant differences are:
  - Binary components recompiled with gcc-3.2.2
  - GFAL to provide access to MSS.
- LCG-2 is due for release at the end of November
- GFAL is the Grid File Access Library
  - Provides a POSIX I/O interface to heterogeneous Mass Storage Systems in a grid environment.
  - Uses the Storage Resource Manager (SRM)
  - One of several supported file access protocols is used to access the file data.
  - With appropriate SRM implementations and file access protocols, any MSS can be used.

LCG-2: Short term evolution

- CERN and FNAL have working SRM to their MSS, including GSI enabled operation

- Still for the future:
  - GFALFS is a VFS file system implementation of GFAL. In this way programs need not be linked against GFAL to access GRID files.

Conclusion

- Have shown that LCG-1 contains
  - Components for distributing and running jobs across a number of sites
  - An RLS for the indexing and locating user data
  - Has a hierarchical information system
  - A simple storage facility

- The near future
  - The forthcoming LCG-2 release provides more support for MSS