



The Worldwide LHC Computing Grid project (LCG) integrates thousands of computers worldwide into a global computing resource to store and analyse the huge amounts of data, about 15 million Gigabytes per year, that the experiments at CERN's Large Hadron Collider (LHC) will be collecting from 2007. LCG provides a service which uses the Grid infrastructure operated by EGEE and OSG.



The Enabling Grids for E-science (EGEE) project is funded by the European Commission and aims to integrate current national, regional and thematic Grid efforts, in order to create a seamless Grid infrastructure available to scientists 24 hours-a-day, for the support of scientific research. LCG and EGEE are tightly coupled and provide complementary functions.



Open Science Grid

The Open Science Grid is a national production-quality grid computing infrastructure for large scale science, built and operated by a consortium of U.S. universities and national laboratories. The OSG Consortium was formed in 2004 to enable diverse communities of scientists to access a common grid infrastructure and shared resources.

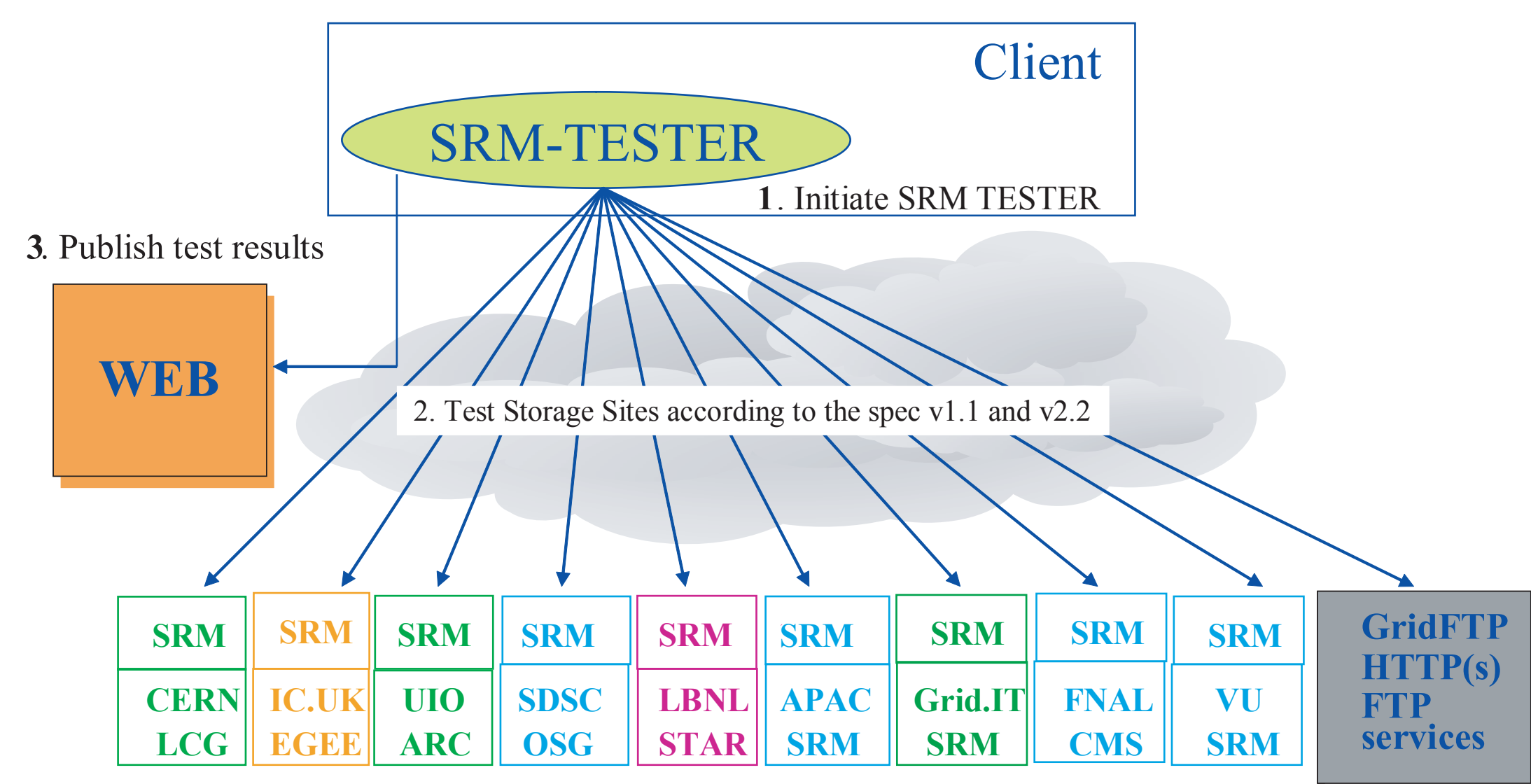
Moving towards a globally interoperable grid

The aim of grid interoperation is to bridge differences between different grid infrastructures and enable virtual organizations to access resources at the institutions independent of the grid project affiliation. Without grid interoperation, collaboration are artificially limited to only one grid or the collaboration themselves have to create multiple virtual organizations and manage the diversity.

Due to the global nature of the Worldwide LCG Project, it requires the integration of many regional grid infrastructures to achieve its goals, and has been active leader in working towards interoperation between grids.

One of the first interoperation activities was between the infrastructure used by the Enabling Grids for E-science (EGEE) project and the Open Science Grid (OSG). The middleware used by both infrastructures was very similar which allowed them to provide common interfaces. After an initial proof of concept was carried out, the changes needed were integrated in the middleware stacks for the respective infrastructures. It took about 6 months for these changes to be included in the official software releases and rolled out across the infrastructures. After this work was done, discussions moved towards grid operations. Policies had to be aligned and modifications were needed in the operational tools. After about another 6 months later, by the grid infrastructures were seamlessly interoperating and virtual organizations were successfully using both infrastructures.

Grid Interoperability Now!



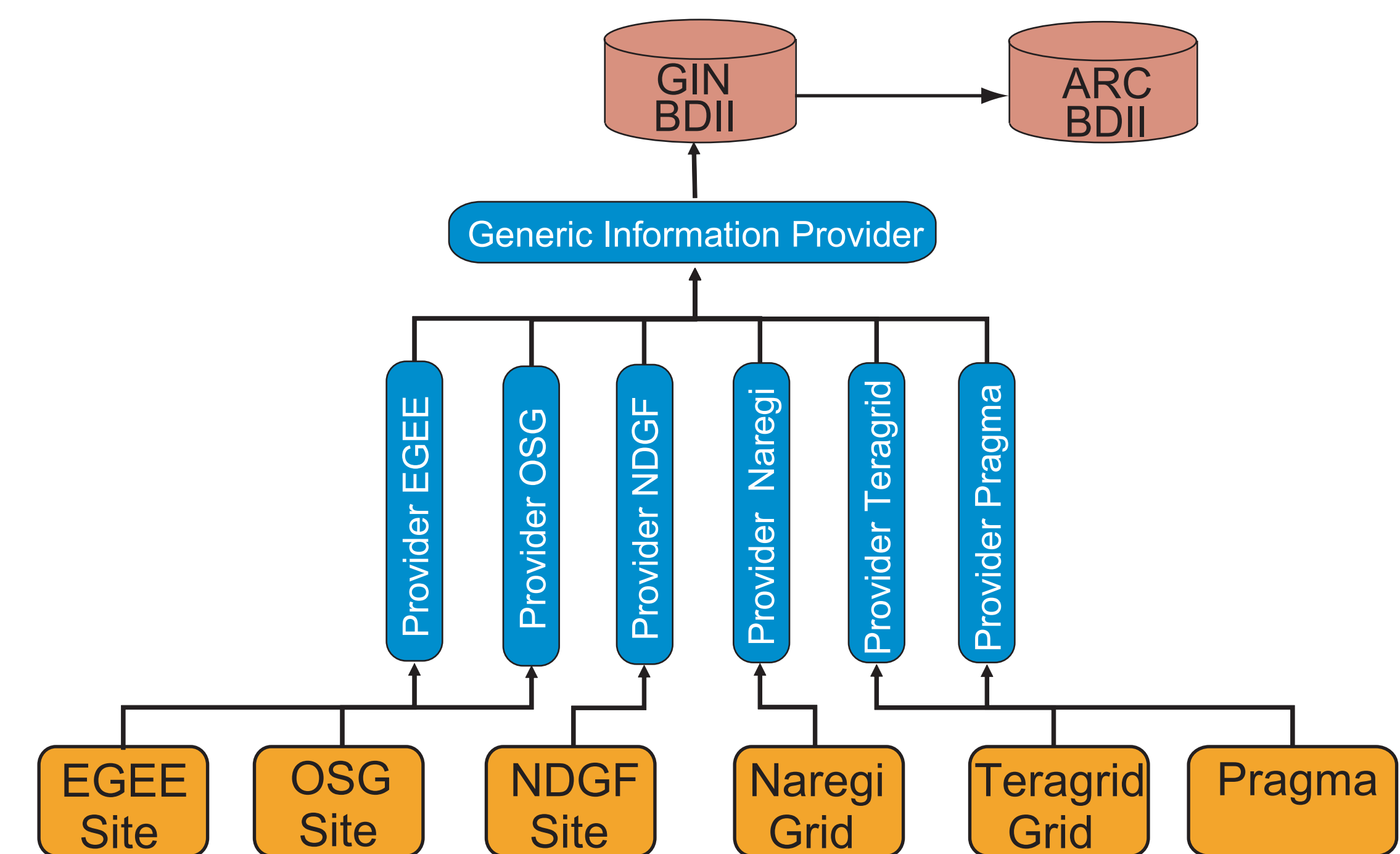
GIN-Data SRM inter-op testing

	ping	put	get	Advisory delete	Copy (SRMs)	Copy (gsiftp)
ARC (UIO.NO)	pass	fail	pass	fail	pass	fail
EGEE (IC.UK)	pass	pass	pass	pass	pass	pass
CMS (FNAL.GOV)	pass	pass	pass	pass	pass	pass
LCG/EGEE (CERN)	pass	pass	pass	pass	N.A.	N.A.
OSG (SDSC)	pass	pass	pass	pass	pass	fail
STAR (LBNL)	pass	pass	pass	pass	pass	pass

Testing Operations (SRM V1.1)Results

Recently within the Open Grid Forum, the Grid Interoperability Now (GIN) Community Group is building upon existing bilateral activities between grids to provide more global interoperability. The GIN group is a focal point where all the infrastructures can come together to share ideas and experiences on grid interoperation. There are four areas within the project; Security, Data, Job submission (Jobs) and Information Systems (Info). WLCG is active within all four, with a major focus on the Info and Data areas.

Within the Info area, we have extended existing bilateral efforts with OSG and NDGF to also include NAREGI, TeraGrid and PRAGMA, allowing for browsing and usage of resources across these grids. Within the Data area, we are actively working on Storage Resource Manager (SRM) interoperability with a wide range of grids, and first results have shown very good interoperability. For the future, it is hoped that the GIN activity will bring us closer to the overall goal of a global grid infrastructure.



Information System Architecture

