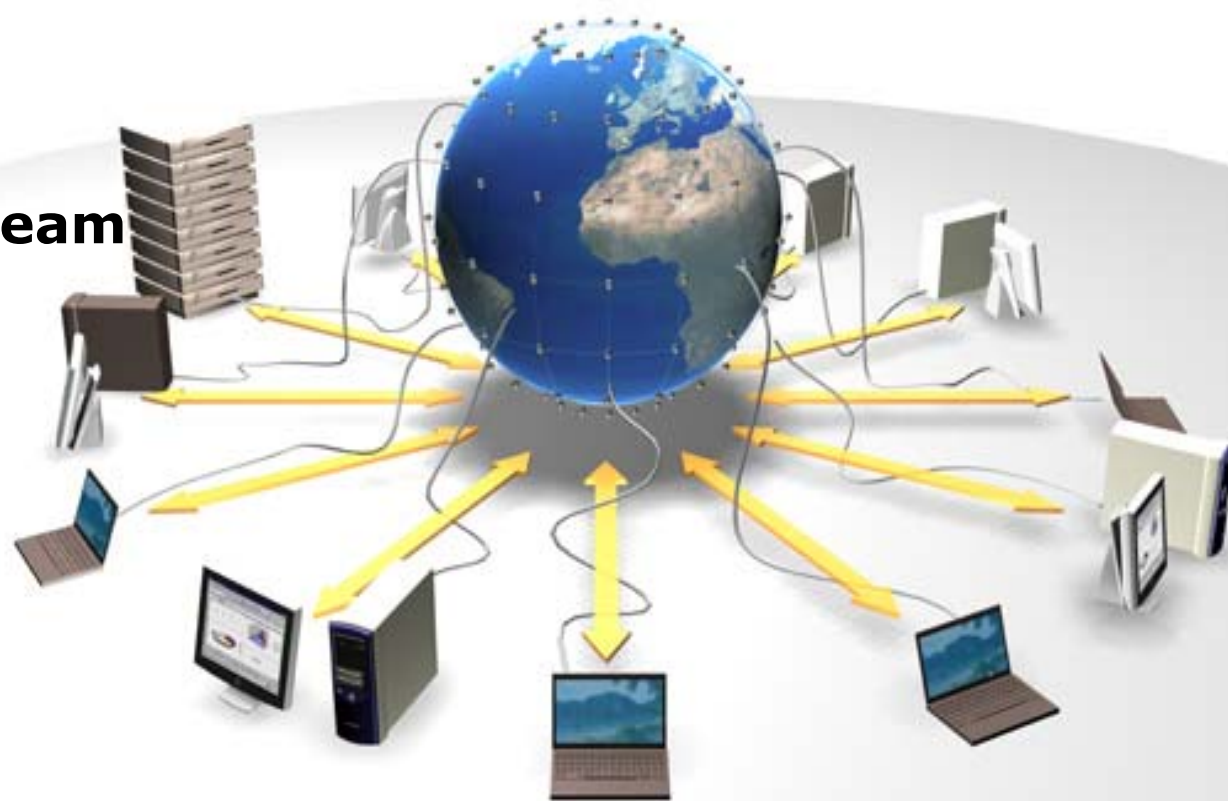


Future Developments in the EU DataGrid

The European DataGrid Project Team

<http://www.eu-datagrid.org>



- Where is the DataGrid project going?
 - How to preserve the work done in DataGrid after the project ends
 - WebServices and Open Grid Services Architecture
 - Where Grid computing is heading in the coming years

Interaction with Sister Projects



◆ CrossGrid



- Using the same security certs.
- Testbed sites install EDG software
 - Extending it for needs of intensive interactive applications
- Participating in the EDG testing activities
- Representatives in each projects architecture & management groups

◆ DataTAG (EDT)



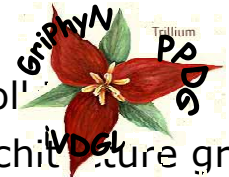
- EDT is deploying EDG sw to investigate inter-operability with US projects (iVDGL, GriPhyN, PPDG)
- Results feedback into EDG software releases
 - (e.g. GLUE compatible information providers/consumers)

◆ NorduGrid



- Using the same security certs.
- Involved in EDG architecture work
 - Good ideas for gatekeeper and MDS configuration
 - Helped develop GDMP and GSI extensions for Replica Catalog
 - Involved in Glue schema work
 - Security policy
- Mware testing
- Working in WP8 (HEP applications)

◆ iVDGL/GriPhyN/PPDG



- Common underlying tool
- US members in EDG architecture group
- Looking for common packaging and toolkit usage solutions

**No strict boundaries with a large cross-fertilization of ideas, software and people
DataGRID is learning from the experiences in these projects**

Plans for the Future

- ◆ Further developments in 2003
 - Deployment of EDG 2.1

- ◆ Interaction with LHC Computing grid (LCG)
 - LCG deploys LCG-1 service in July
 - Main components of EDG 2.0 release build the basis for LCG middleware

- ◆ New EU project
 - Based on the experience of existing grid projects to provide common grid infrastructure for multiple-sciences
 - **EGEE – Enabling Grids for E-Science and industry in Europe**
 - <http://egee-ei.web.cern.ch/egee-ei/2003/>



Open Grid Service Architecture (OGSA)



- ◆ Defined in Physiology of the Grid
 - <http://www.globus.org/research/papers/ogsa.pdf>
 - Original version of the proposal by Ian Foster, Carl Kesselman, Jeffrey M. Nick, Steven Tuecke
- ◆ Grid Services
 - Need for Virtual Organisations
 - General standard for Grid services:
 - Web service that provides a set of well-defined interfaces and that follows specific conventions
- ◆ Now: Standardisation work in Global Grid Forum working group
 - Base for OGSA is called *Open Grid Services Infrastructure (OGSI)*
 - <http://www.gridforum.org/ogsi-wg/>

OGSA Concepts

◆ Naming and bindings

- Every service instance has a **unique name**, from which can discover supported bindings

◆ Information model

- **Service data** associated with Grid service instances, operations for accessing this info

◆ Lifecycle

- **Service instances** created by factories
- Destroyed explicitly or via soft state
- Transient service

◆ Notification

- Interfaces for registering interest and delivering notifications

OGSA Features vs. Web Services



- ◆ Web Services is a **conceptual framework** to access services to build dynamic applications over the Internet, have them executed
- ◆ Dynamic (in the WS scheme) means here we **do not necessarily know the format of all the information** which will be involved along the path done by our application while executing, but **we will access this information anyhow**. This is done through **a query to the UDDI directory**.
- ◆ OGSA is further concerned by
 - The **creation of transient instances of web services**,
 - The management of service instances, to address the real issue of creating and destroying dynamically accessible interfaces to the states of distributed activities.

The Web Service architecture



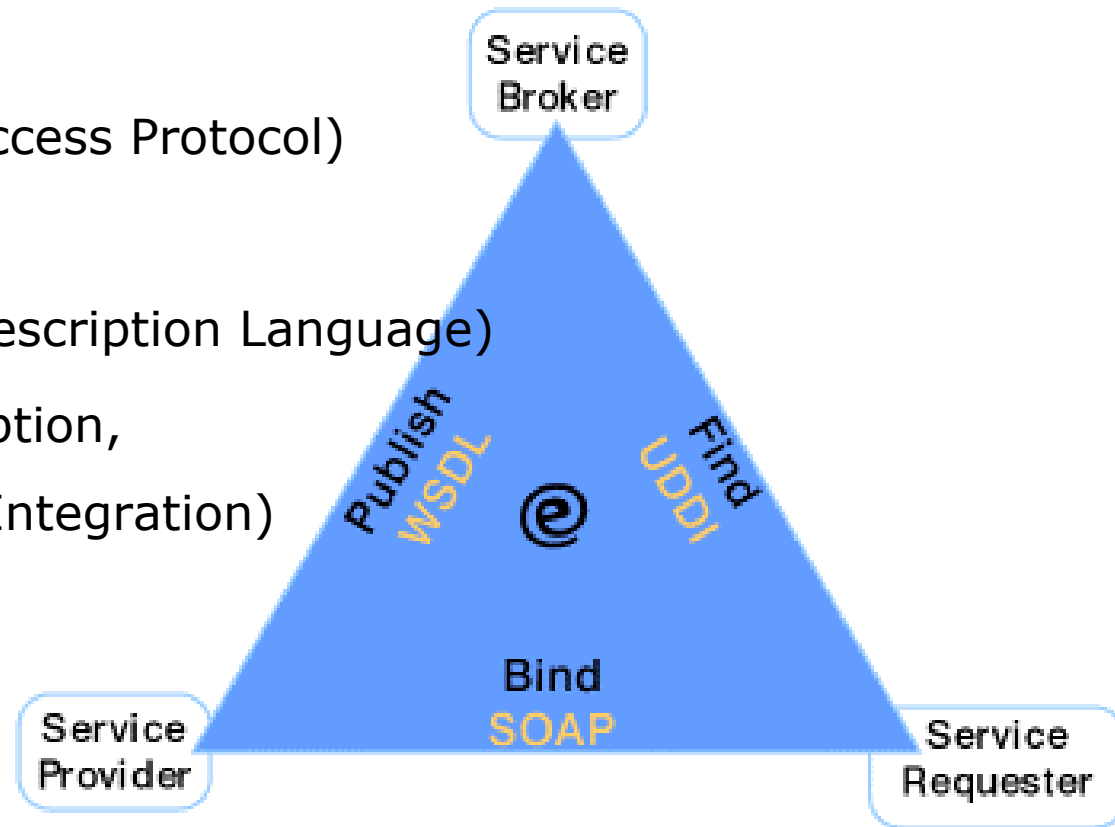
- ◆ Three primary players , pillars
 - 1. Providers of the services
 - 2. Directory functions, i.e. Service Broker
 - 3. Service Requesters

SOAP (Simple Object Access Protocol)

interconnects 1,2,3

WSDL (Web Services Description Language)

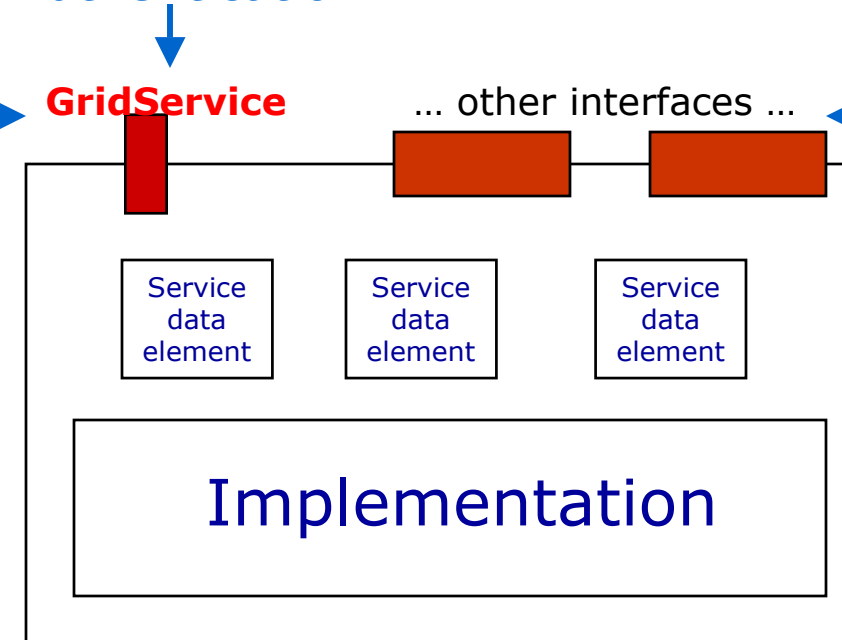
UDDI (Universal Description,
Discovery & Integration)



The Grid Service = Interfaces + Service Data



Reliable invocation
Authentication



Service data access
Explicit destruction
Soft-state lifetime

Notification
Authorization
Service creation
Service registry
Manageability
Concurrency

Hosting environment/runtime
("C", J2EE, .NET, ...)

Usage of OGSA (OGSI) - Future



- ◆ Currently: Globus has provided an alpha release
 - <http://www.globus.org/ogsa/>
 - Open for preliminary testing and exploring
- ◆ Supposed to be stable by end of year
- ◆ Several Grid projects and Industry invest into OGSA
 - Web services in general seem to be the current trend
 - Industry partners like IBM support Globus in implementing the standard
 - Many Grid projects currently think of a way of using OGSA or getting ready to adapt the standard
- ◆ For EU DataGrid OGSA is not applicable within the lifetime of the project but several services are already prepared to be OGSA compliant in the future

OGSA and DataGrid



- ◆ Next major version of Globus toolkit (version 3) will be based on OGSA structure
 - Beta release foreseen for Spring 2003
- ◆ DataGrid members are participating to the OGSA specifications
- ◆ Mapping between existing DataGrid middleware components and OGSA and being defined and we are following closely the evolution of OGSA
- ◆ EGEE will 'OGSAfy' existing EDG mware

EGEE: Goals

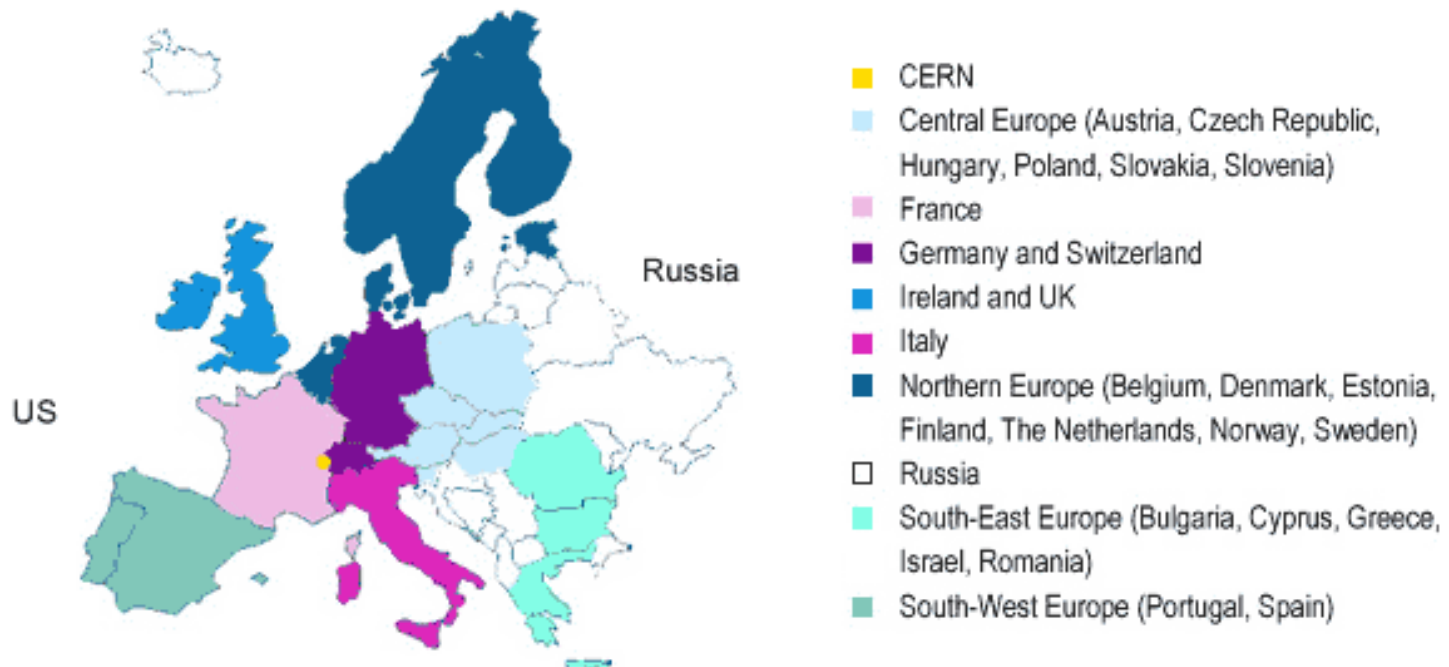
- ◆ Create a wide European Grid **production quality infrastructure** on top of present and future EU RN infrastructure
- ◆ Provide distributed European research communities with “**round-the-clock**” access to major computing resources, independent of geographic location
- ◆ Change of emphasis from grid development to grid **deployment**
- ◆ Support **many application** domains with one large-scale infrastructure that will attract new resources over time
- ◆ Provide **training and support** for end-users

EGEE: Strategy

- ◆ Leverage current and planned national and regional Grid programmes, building on
 - the **results of existing projects** such as DataGrid and others
 - the EU Research Network **Geant** and work closely with relevant industrial Grid developers and **NRENs**
- ◆ Support Grid computing needs common to the different communities
 - **integrate** the computing infrastructures and agree on **common access policies**
- ◆ Exploit **International connections** (US and AP)
 - Provide interoperability with other major Grid initiatives such as the US NSF Cyberinfrastructure, establishing a **worldwide Grid infrastructure**

EGEE: Partners

- ◆ Leverage national resources in a more effective way for broader European benefit
- ◆ 70 leading institutions in 27 countries organised into regional federations



EGEE Service Activity (II)



Resource Centers

Month 1: 10 RCs

Month 15: 20 RCs

Region	CPU nodes	Disk (TB)	CPU Nodes Month 15	Disk (TB) Month 15
CERN	900	140	1800	310
UK + Ireland	100	25	2200	300
France	400	15	895	50
Italy	553	60.6	679	67.2
North	200	20	2000	50
South West	250	10	250	10
Germany + Switzerland	100	2	400	67
South East	146	7	322	14
Central Europe	385	15	730	32
Russia	50	7	152	36
Totals	3084	302	8768	936

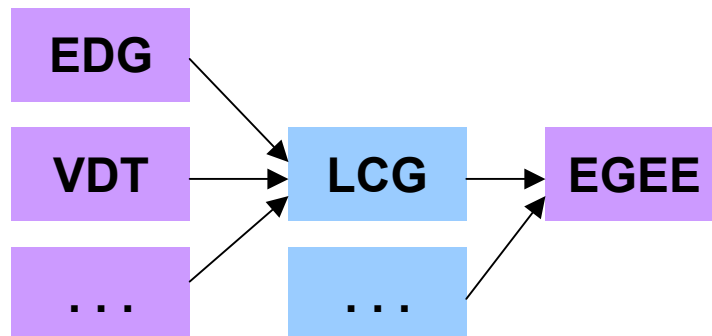
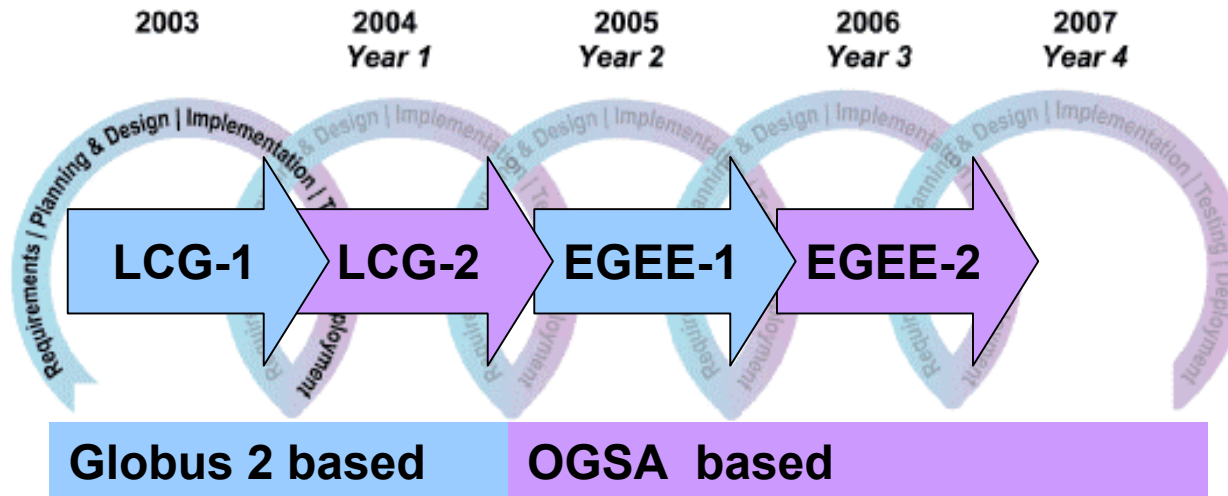
**RCs are not funded via the project
Expect to attract many more RCs**

EGEE and LCG (II)



LCG Deployment Manager will be the EGEE Operations Manager

Production Middleware deployment in EGEE



Outlook



- ◆ The work is not finished
 - Support for release 2.x
 - Application evaluation by December 2003
 - Final review February 2004 (project ends March 2004)
- ◆ The project is following the development of the OGSA paradigm for distributed computing.
- ◆ EDG mware has been taken over by other projects
- ◆ EGEE follow-up project to produce common Grid infrastructure for multiple-sciences