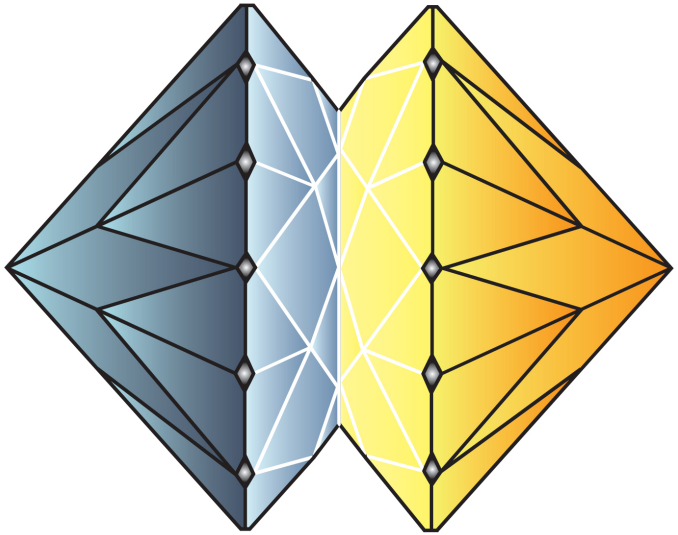


EDGeS: briding Desktop and Service Grids

Miguel Cárdenas on behalf of
EDGeS Collaboration

The EDGeS project receives Community research funding

Summary

- *General Scenario*
- Bridging from DG to EGEE
- Bridging from EGEE to DG
- Application Development
- SG-DG Data Access

General Scenario

- Grid computing infrastructures are used to solve their grand challenge problems, but
  - existing grids are often smaller than many new scientific communities and their complex applications would like to use.
- Originally, the aim of Grid was that anyone (donors) could offer resources for a given Grid, and anyone (users) could claim resources, according to their needs, to solve a computational problems.

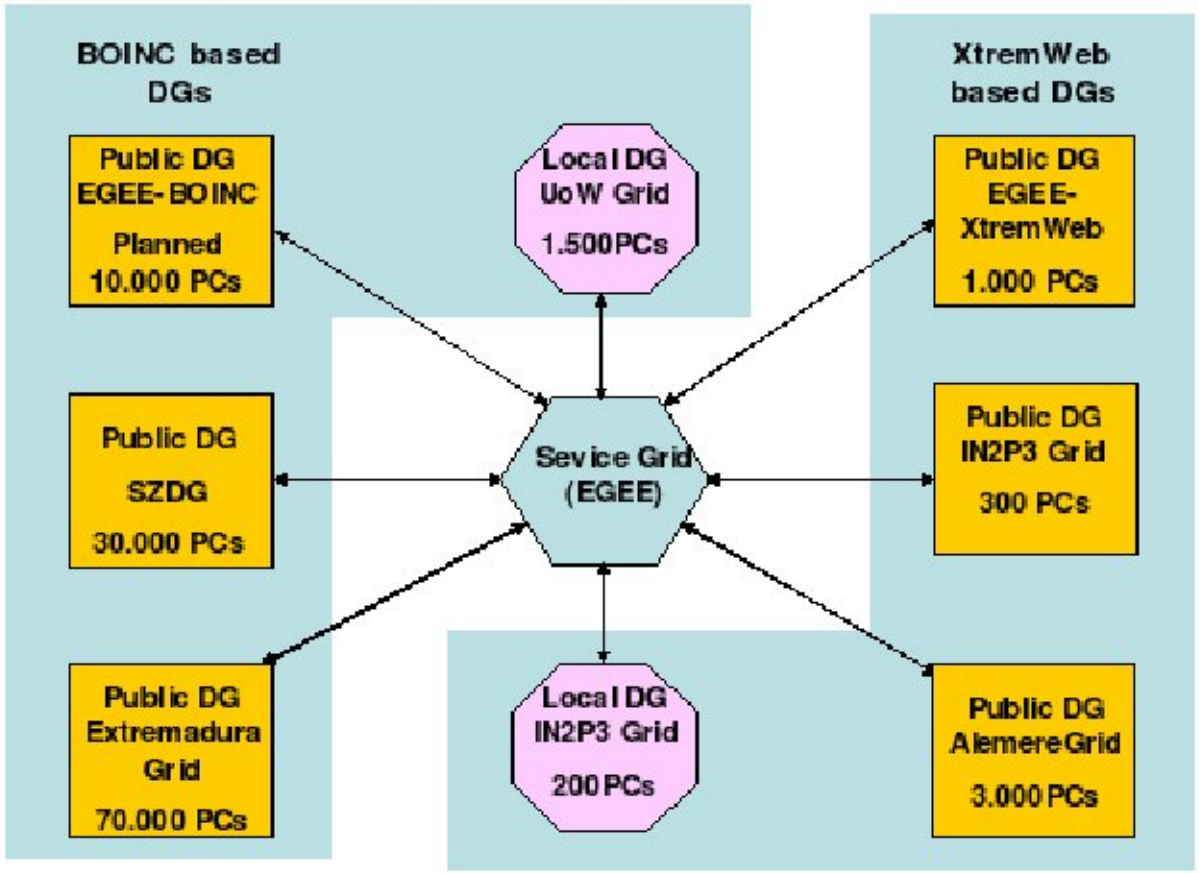
General Scenario

- Service Grids (SGs) create a Grid service that can be accessed by a large number of users, but
  - middleware is usually so complex that it often requires extensive expert effort to maintain.
- Desktop Grids (DGs) has
  - a simple architecture,
  - the ability to integrate dispersed, heterogeneous computing,
  - no special expertise for software.

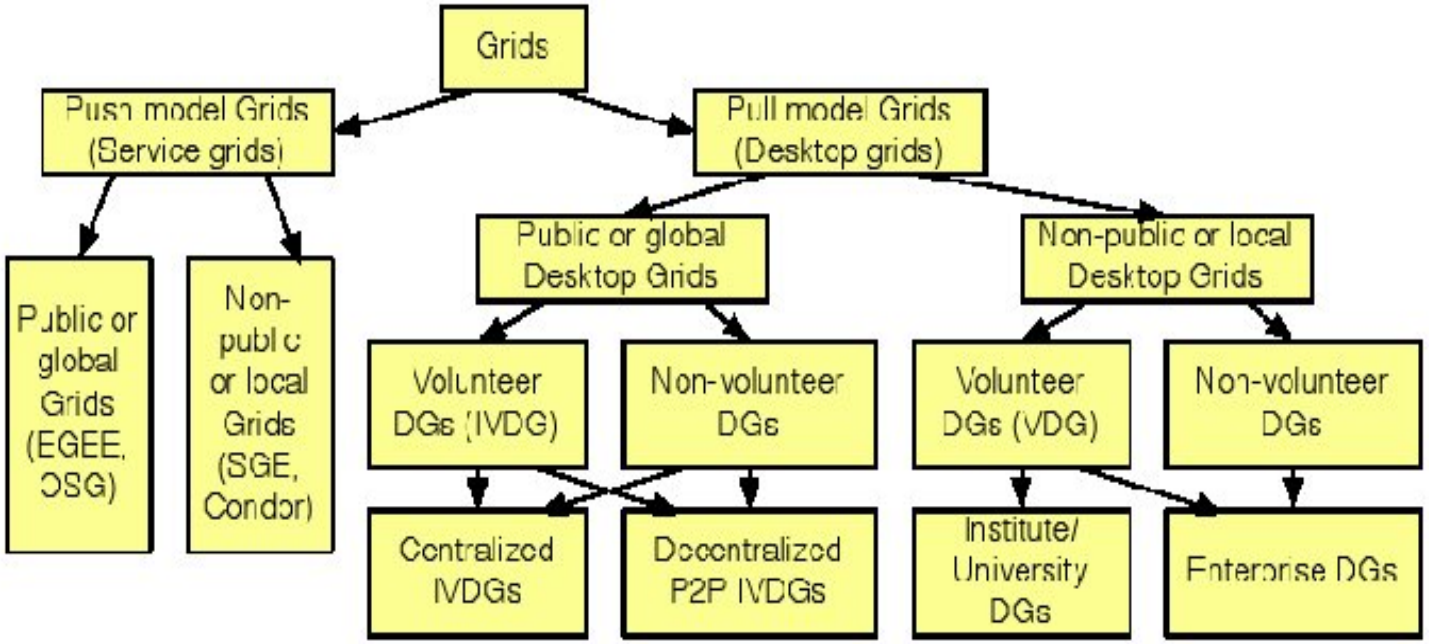
General Scenario

- Until now, these two kinds of Grid systems have been completely separated and hence there has not been a mechanism to be able exploit their individual advantageous features in a hibrid environment.
- The objective of EDGeS is to interconnect these two kinds of Grid systems into an integrated Service Grid - Desktop Grid infrastructure.

Structure of the new combined infrastructure



Taxonomy of Grid Systems



Bridging from DGs to EGEE

- The DG to EGEE bridging can be achieved by creating a modified version of the Desktop Grid client software that represents itself as a very powerful computer (with hundreds or thousands of processors)

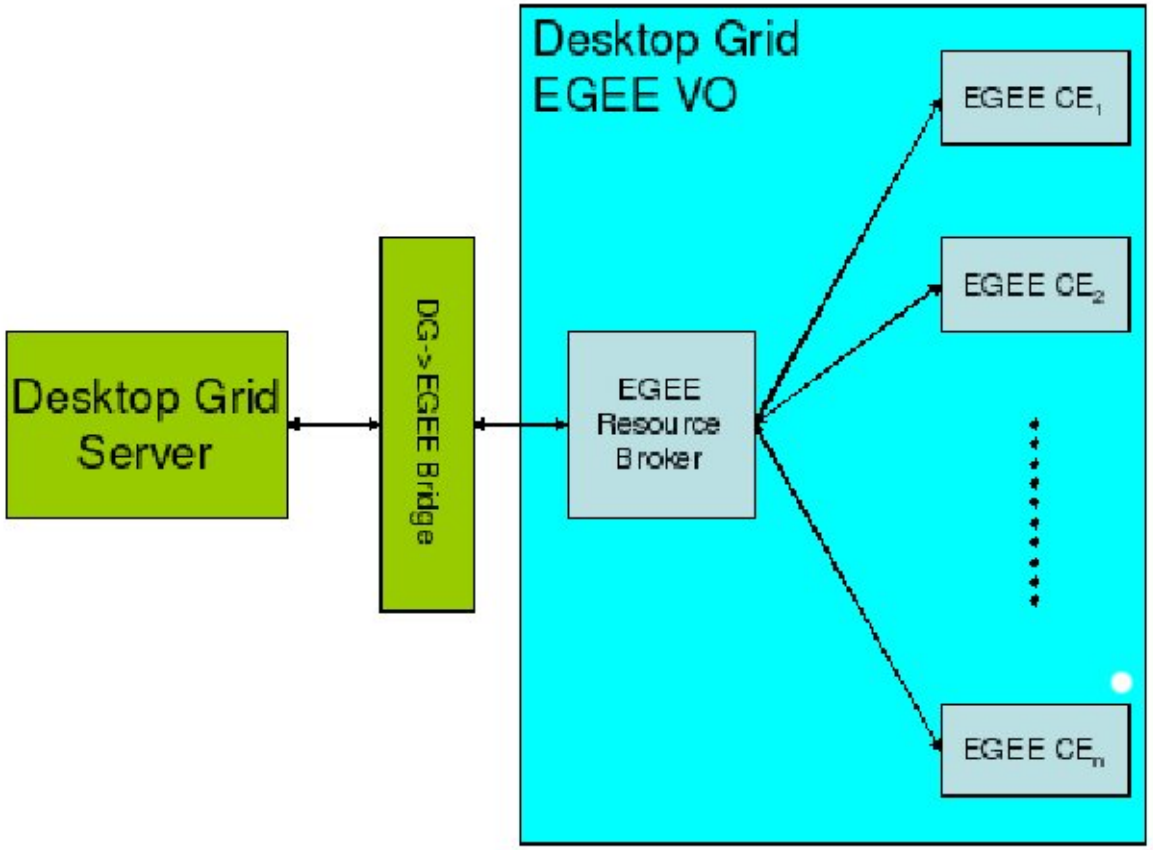
Bridging from DGs to EGEE

- The modified client does not run the work units received from the desktop grid server itself but instead launches a wrapper application that transfers the input data and executables to the EGEE system and executes the job on an EGEE resource.
- The output of the job is also collected by this wrapper application and then sent back to the Desktop Grid server.

Bridging from DGs to EGEE

- Security aspects:
  - Jobs arriving from the DGs system do not have secure proxy certificates.
  - The modified DG client must have its own certificate and it must use this certificate when submitting the jobs to EGEE to identify DG jobs.
  - The bridge should be able to use the proxy renewal mechanism present in EGEE for long-running applications.
  - EDGeS will set up a new VO.

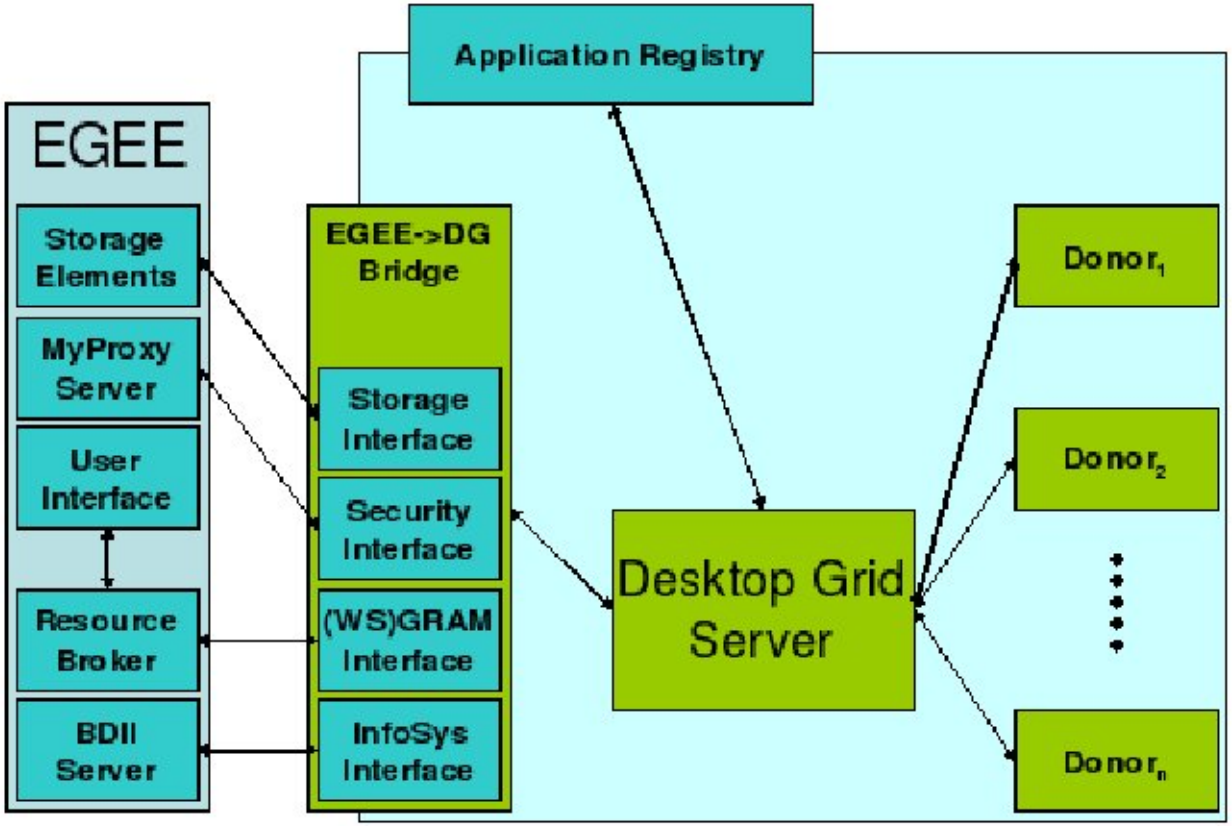
Bridging from DGs to EGEE



Bridging from EGEE to DGs

- To make the bridge capable of transferring jobs to the DG, the bridge must provide a GRAM interface.
- Using this interface, the EGEE VOs Resource Broker (RB) can talk to the DG.
  - Every job submitted from EGEE to DG will generate a single work unit.
  - Direct mapping between the EGEE job and the Desktop Grid work unit allows verifying that the submitted job has all parameters set for the execution.

Briding from EGEE to DGs



Bi-directional bridge

- Based on the gained experience, a bidirectional bridge will be designed ending the project. End 2009.
  - Bridging from DGs to EGEE. June 2008.
  - Briding from EGEE to DGs. December 2008.
- Standardisation. Based on these activities a hard work with the standardisation bodies, such as OGF, has been launched.
  - Integrating Service and Desktop Grids (ISDG) at OGF23 in Barcelona

SG-DG Data Access

- One key component to EDGeS is the ability to satisfactorily handle the data requirements that arise when transferring jobs between service and desktop grids
- Data Access activity, will be working to build Peer-to-Peer data sharing mechanisms for data propagation.

SG-DG Data Access

- When considering applying P2P data access technologies to the scientific application domain, two broad challenge areas must be addressed: social acceptability and technological challenges.
  - Mixing Peer-to-Peer with volunteer computing could, in the event of malicious attacks on the network, cause irreparable damage to the volunteers' trust in the network and thereby adversely effect their willingness to continue donating resources.

SG-DG Data Access

- Scalability for large P2P networks has evolved into two general categories: Distributed Hash Tables (DHTs) and super-peer topologies. Both of these approaches are valid and have their unique advantages and disadvantages depending on the problem one is trying to solve, generally with a trade-off between speed, accuracy, and flexibility -finding the correct balance for each individual situation is the important factor.

SG-DG Data Access

- Security is a much larger issue.
- Due to the sensitive and vulnerable nature of Desktop Grids, it is critical that not only are peer nodes secure from malicious attacks, but also that data integrity and reliability is ensured.

Conclusions

- The issues discussed in this paper include security and bridging techniques for translating SG primitives into their DG counterparts and vice versa, as well as proposed distributed data access and scalability solutions.
- The bridging solutions discussed were already prototyped to evaluate their advantages and disadvantages of possible approaches in order to select the ones that will be elaborated by the project.
- These prototypes and preliminary results of the evaluation were also presented.

EDGeS

Muito Obrigado
Gracias
Thanks
www.edges-grid.eu