Introduction to grid technologies and practical usage of gLite middleware

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Introduction

Nowadays it's impossible to imagine natural science research without computer assistance. In each field scientists have a need to simulate complex processes, handle experimental data of store huge amounts of informations. And in many areas like high energy physics contemporary demands to the computational resources are really high and are continuously growing. At the same time technologies are also developing to satisfy researchers' requirements.

As Web arose from academic society twenty years ago, many other technologies are coming from science to industry. Vital for physics distributed computing and Grid technologies are now in use in many areas of science: biology, medicine, climate research, earth sciences, quantum chemistry, space science, etc.. Along with it, such technologies are applied for many commercial applications (e.g. drugs discovery, engineering industry, aircrafts designing, movie industry, financial calculations, cryptography studies).

Initially started in Europe, EGEE project (http://www.eu-egee.org/) was aimed to provide computing support infrastructure for thousands of researchers world-wide, from fields as diverse as high energy physics, earth and life sciences. Now this project covers many institutions outside the Europe. One of of the main consumers of EGEE resources are collaborations on Large Hadron Collider. For the infrastructure creation, grid middleware gLite (http://glite.web.cern.ch/glite/) is developing within the EGEE project. It acts like a glue, uniting distributed computational and storage resources in the Grid, hiding from end users all internal implementation details. So, the complex distributed system, Grid, appears for users as a quite simple virtual environment with computational and storage resources inside.

Russia and JINR member states actively participate in EGEE projects and other grid activities. Along with production sites, there is an educational grid infrastructure aimed for learning and testing purposes. Now this distributed infrastructure consists of six working sites in Russia (Dubna, Protvino), Bulgaria and Uzbekistan, several sites are preparing to join the infrastructure. It is full-featured grid environment based on gLite.

Project aims

1.   To discuss basic Grid concepts, use cases and benefits of Grid technologies for science, especially for high energy physics.

2.   Provide theoretical knowledge on grid infrastructures and several grid middlewares' architectures and services (mostly focusing on gLite);

3.   Obtaining practical skills allow starting unassisted work with gLite, one of the most widespread grid middleware in the world.

◦   security infrastructure: requesting a digital certificate, making a temporary proxy certificate, different manipulations with digital certificates;

◦   job management: job preparation, requirements description, running it in the Grid, controlling, obtaining results;

◦   data management: copying data to and from Grid, other common actions;

◦   operations with metadata catalogs: making file's replicas (exact copies), registration data in special file catalogs, assigning additional access rights and metadata descriptions;

◦   planning productions using grid information systems.

This project is to teach applicants for basic knowledge in Grid technologies, to give essential skills needed for further work in the Grid and for development of grid-enabled applications or deploying and administration of grid infrastructures. It could be useful for physicists interested in deeper understanding of how grids could improve their work (highly actual for high energy physics) and for IT specialists supporting computational infrastructure for scientific research.

The project is mainly based on half-year educational course conducted in Dubna University and JINR University Centre.

Enter requirements

Basic knowledge in Unix/Linux (command line operations, shell scripting and other user-level skills) are expected from applicants.

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