

JINR Participation in the Russian National Grid Network Project

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Russian National Grid Network (RGN) was designed to join both supercomputer centers and the main consumers such as high-tech industry and research centers.

The main objectives of the RGN project are:

- secure network linking the resource centers (supercomputers) and major consumers;
- basic Grid services development for the construction of the RGN infrastructure;
- connection of supercomputer centers using the grid gateways;
- web portal to access the system and use its resources (preparation and execution of user jobs, data transfer, licenses management, etc.).

In 2011 major organizations implementing the RGN project were Research Institute “Voskhod”, SINP MSU, JINR, T-Platforms, CC FEB RAS, TESIS Engineering Company.

Main activities of Joint Institute for Nuclear Research in RGN were the following:

- core grid services development,
- computational resources provisioning,
- applications gridification (providing web-interfaces to the specialized software).

Three core grid services were developed by the JINR team: registration service, grid monitoring and accounting, data storage and management system. Five applications were ported to run on RGN resources and web-interfaces for them were created for such object domains as radiation biology, CAE, molecular dynamics, geoinformatics.

Registration service. Main task of the service is to store and provide quasi-static information about resources and grid services in RGN environment (Fig. 1).

Monitoring and accounting service. Main task of the service is to control the availability and real operational state of sites and services (Fig. 2). Monitoring service should also keep information

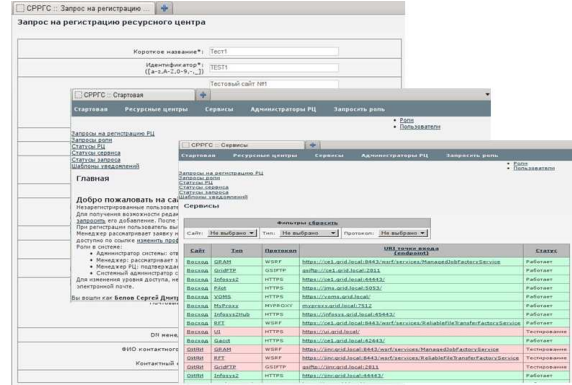


Figure 1: Registration service web interface

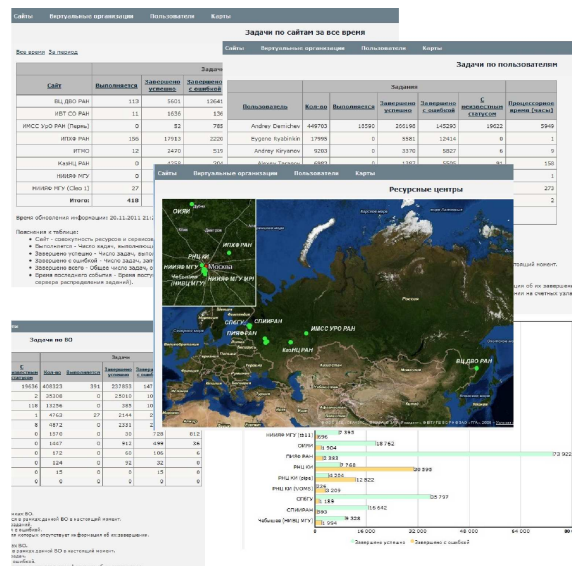


Figure 2: Monitoring and accounting service web interface

about user jobs, cluster structure, properties of resources, history of the different system parameters, etc.

Data storage and management system. Main task of the service is to provide users with convenient and reliable mechanism to manage their data. It is one of the general services of RGN. The service is based on X.509 and GSI and using GridFTP as basic data transfer protocol (Fig. 3). Data management executed via web-interface and

RESTful API. The service takes care about access control, support for different grid storage elements, operations on datasets, replication, backup, etc.

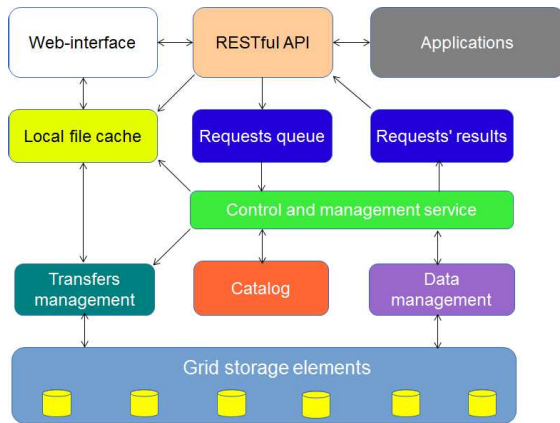


Figure 3: Architecture of the data storage and management system



Figure 4: The POIs interfaces

Problem oriented web interfaces

In order to simplify user's work in RGN infrastructure with particular application, a Problem-Oriented web-Interface (POI) were developed. The POI is a plug-in for RGN graphical user interface service. JINR team has developed POIs for 5 applications:

- **DL_POLY** - parallel molecular dynamics simulation package,
- **Elmer** - open source multiphysical simulation

software,

- **GEANT4-DNA** - Geant4 Monte Carlo simulation toolkit extended with processes for the modeling of early biological damages induced by ionizing radiation at the DNA scale,
- **Fire Dynamics Simulator (FDS)** - low-speed flows simulation with an emphasis on smoke and heat transport from fires,
- **ZondGeoStat** - geophysical and geometrical sounding data processing.

These POIs let users specify a unique job name, choose a particular application version, define an application specific parameters, specify an archive name with input files as well as a name for archive with output files. Apart from that there is a field at the bottom of the web-page where system replies are printed.

For the rest operations like e.g. user authentication and authorization, job management, input and output files uploading and downloading, a RGN graphical user web-interface service (Fig. 4) is used.

References

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