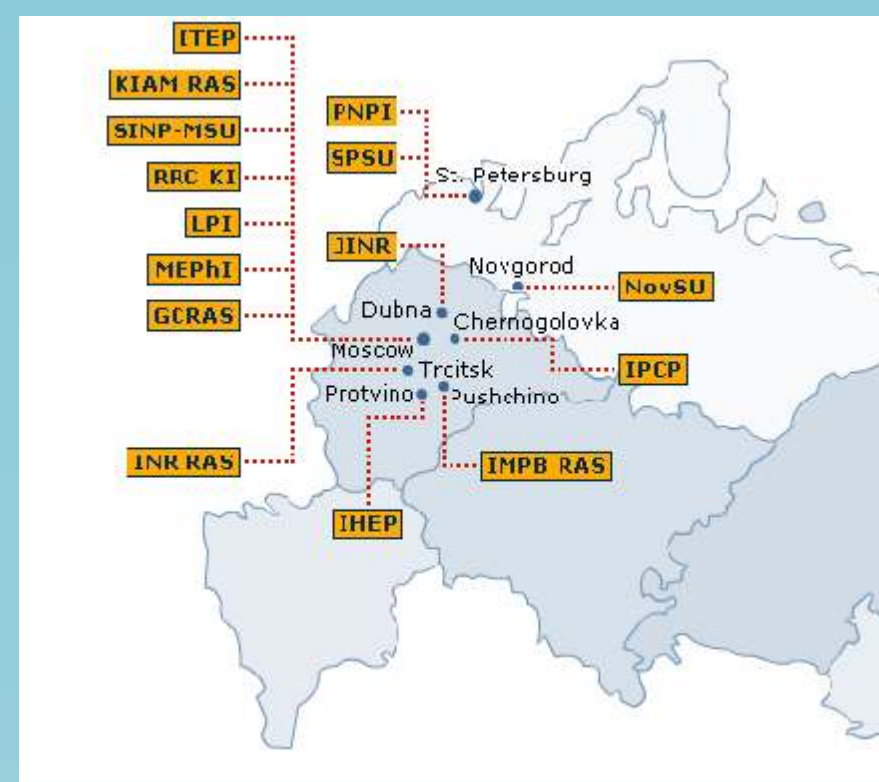


# JINR EXPERIENCE IN DEVELOPMENT OF GRID MONITORING AND ACCOUNTING SYSTEMS

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Different monitoring systems are now extensively used to keep an eye on real time state of each service of distributed grid infrastructures and jobs running on the Grid. Tracking current services' state as well as the history of state changes allows rapid error fixing, planning future massive productions, revealing regularities of Grid operation and so on. Here we describe our longstanding experience in successful development and design of Grid monitoring and accounting systems for global grid segments and for local national grid projects in Russia.

## RDIG monitoring and accounting

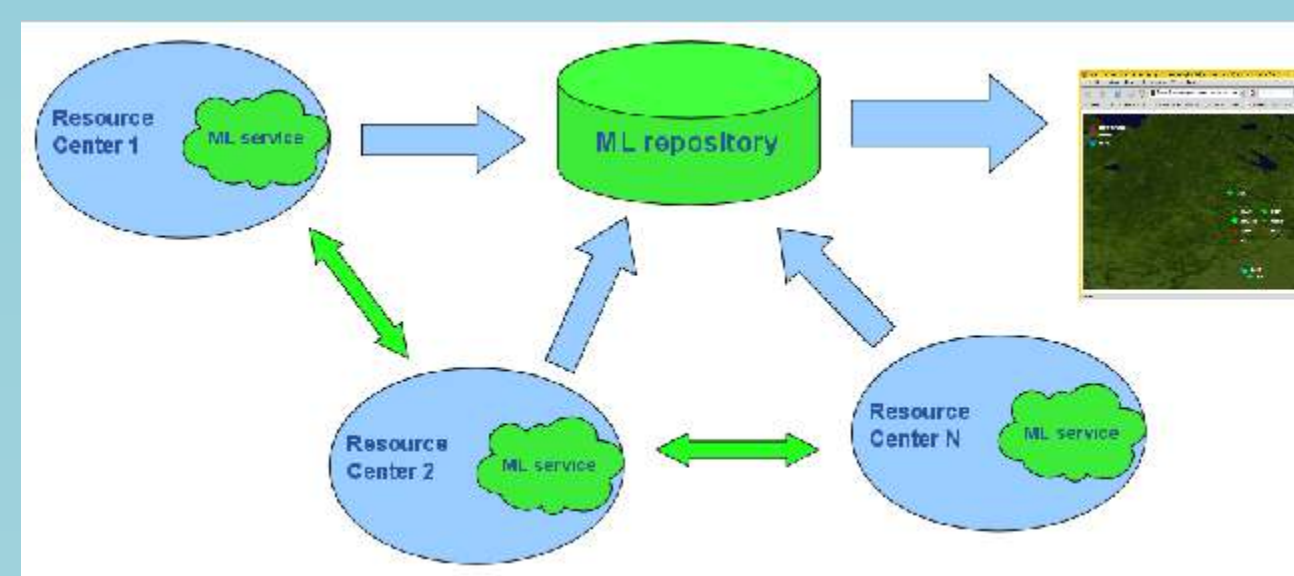
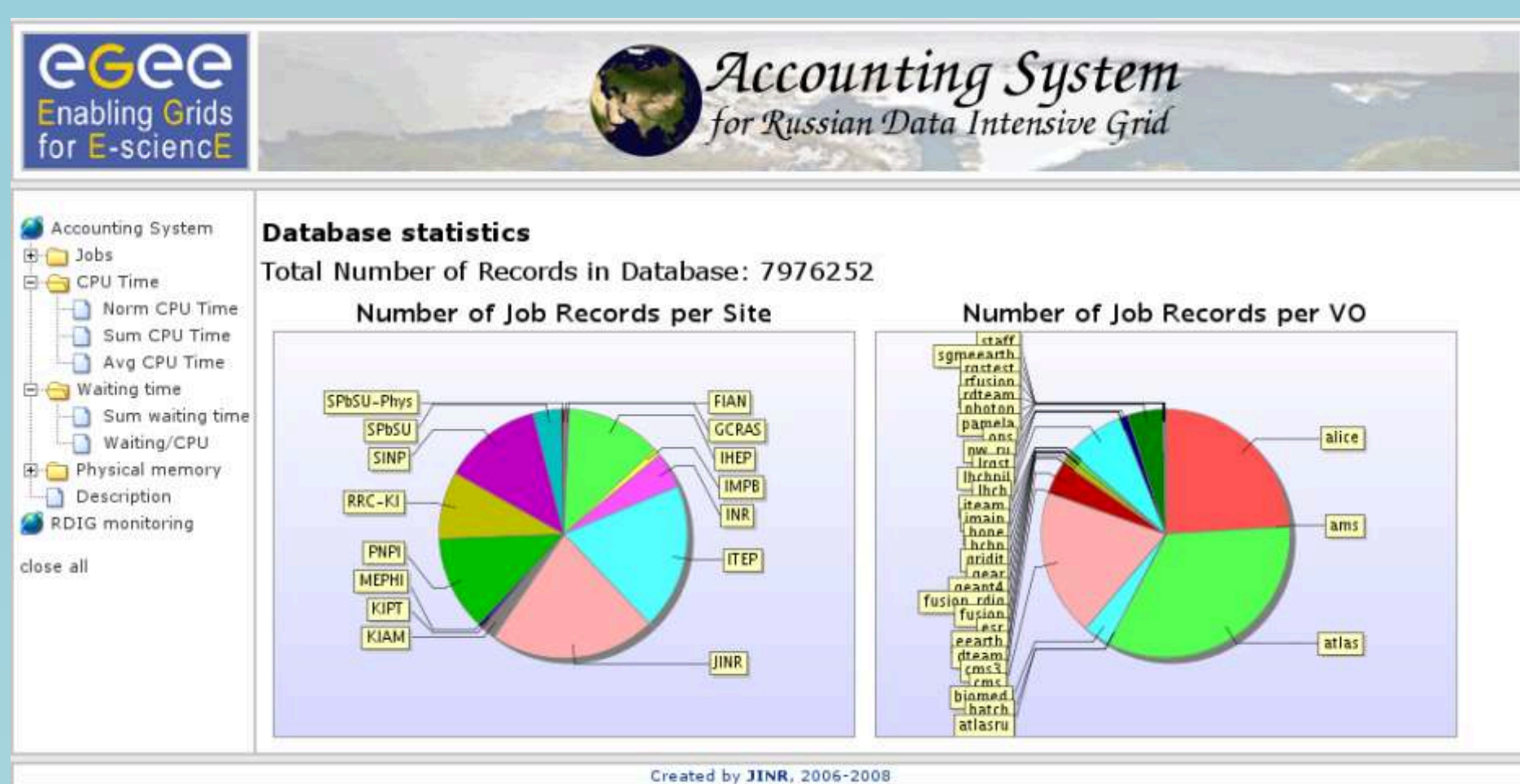
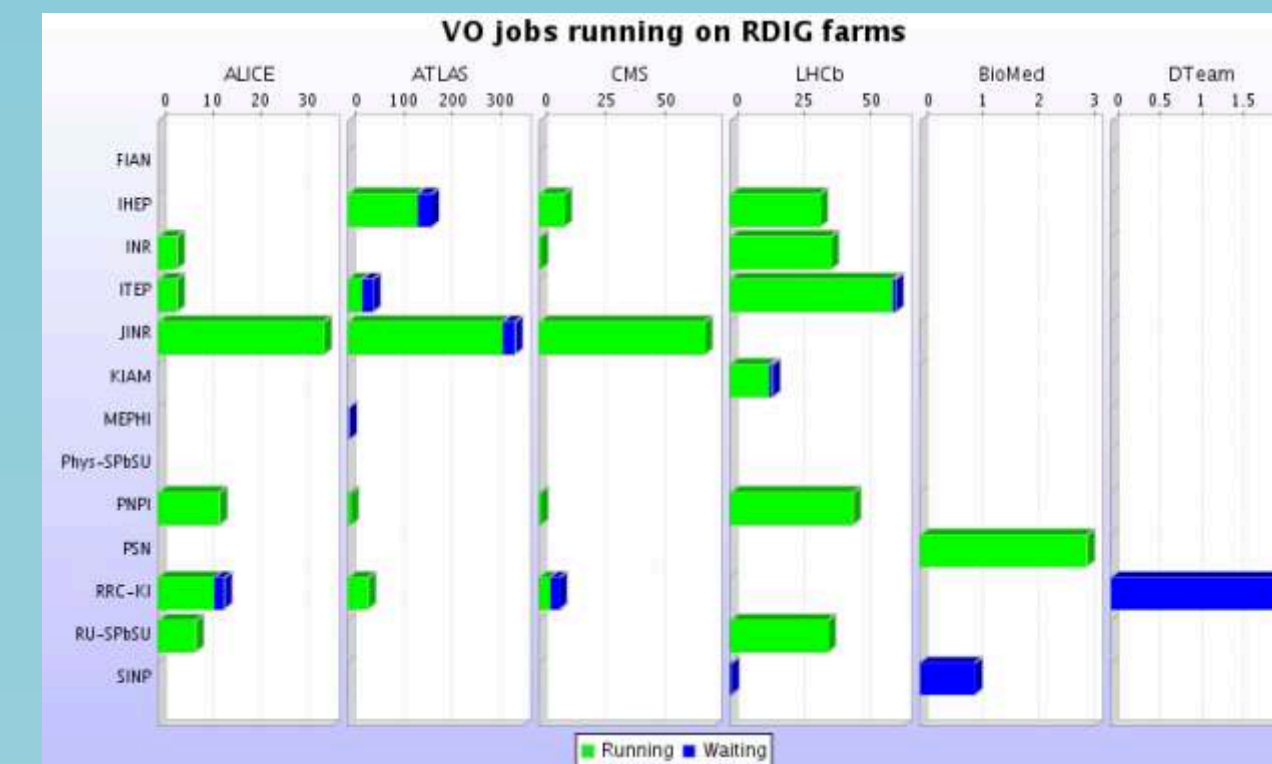
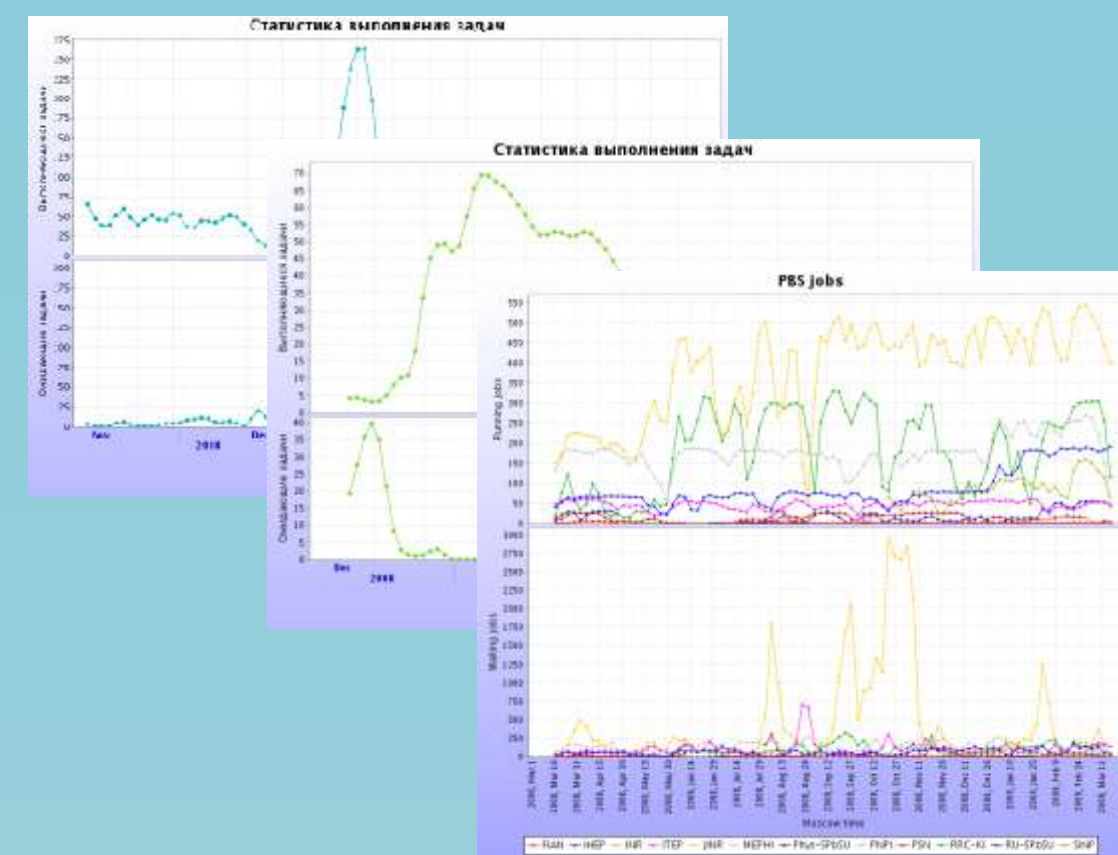


The Russian consortium RDIG (Russian Data Intensive Grid, [www.egee-rdig.ru](http://www.egee-rdig.ru)) was set up in September 2003 to create Grid infrastructure for intensive scientific data operations. Such infrastructure is necessary for the participation of Russian scientists in experiments in high energy physics, in chemical physics and biology, in earth sciences and other scientific applications. Now RDIG federates 15 resource centers (about 3000 CPUs and disk space ~1.6 PB).

**Monitored parameters**  
Following parameters were chosen for Russian Grid segment:

- number of busy, free and down CPUs
- amount of running and waiting jobs for each virtual organization (VO)
- used and available disc space for each VO
- main servers loading (e.g. for Computing Element)
- user jobs monitoring (data from R-GMA and RBs)
- Round Trip Time (RTT) in networks between Resource Centers Available network bandwidth.

Both realtime and history information are provided.



RDIG monitoring is powered by MonALISA (<http://monalisa.cern.ch>)

### Other activities in monitoring area

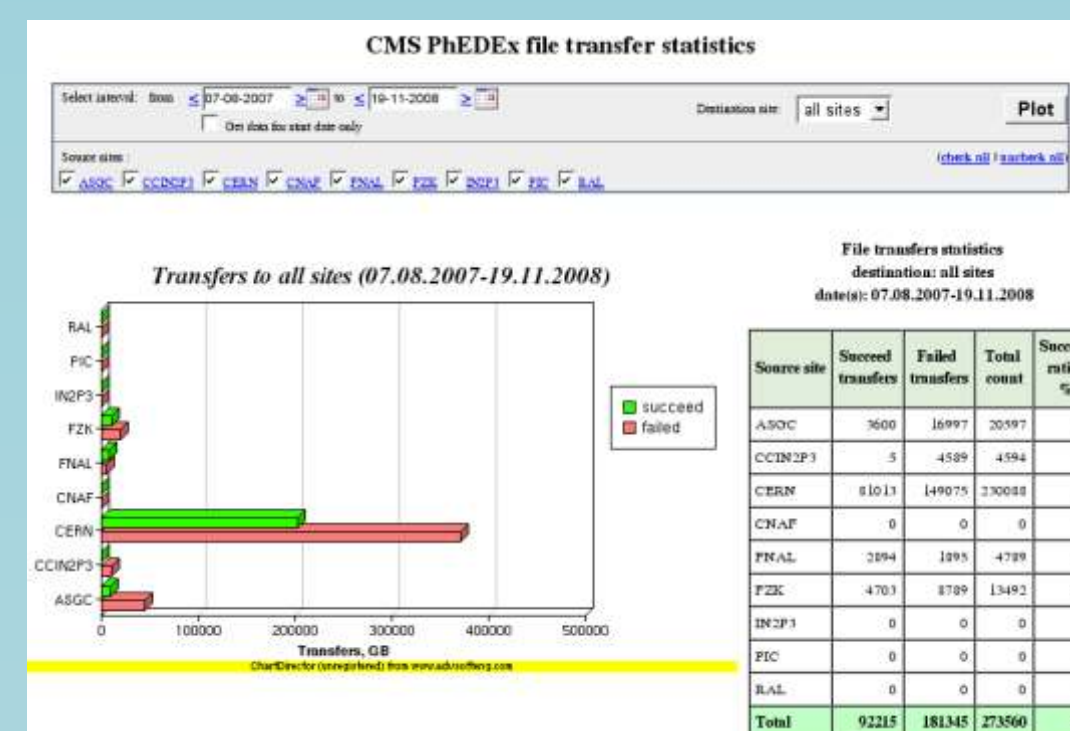
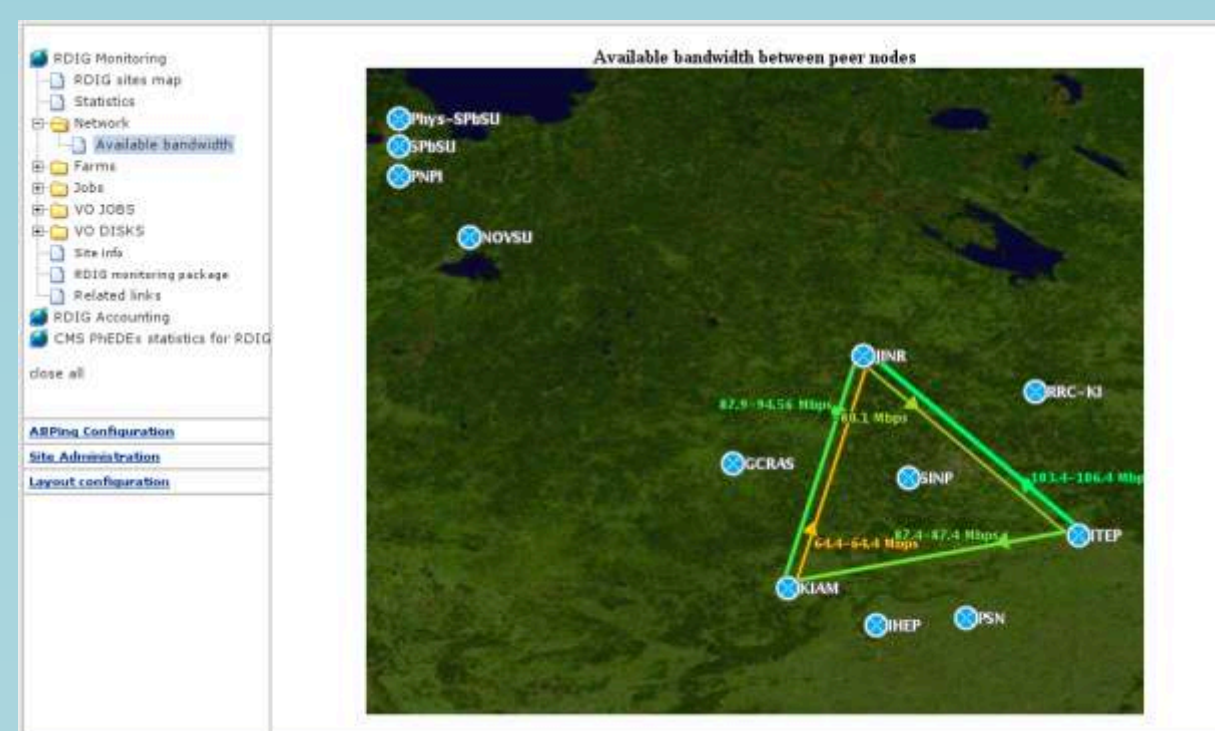
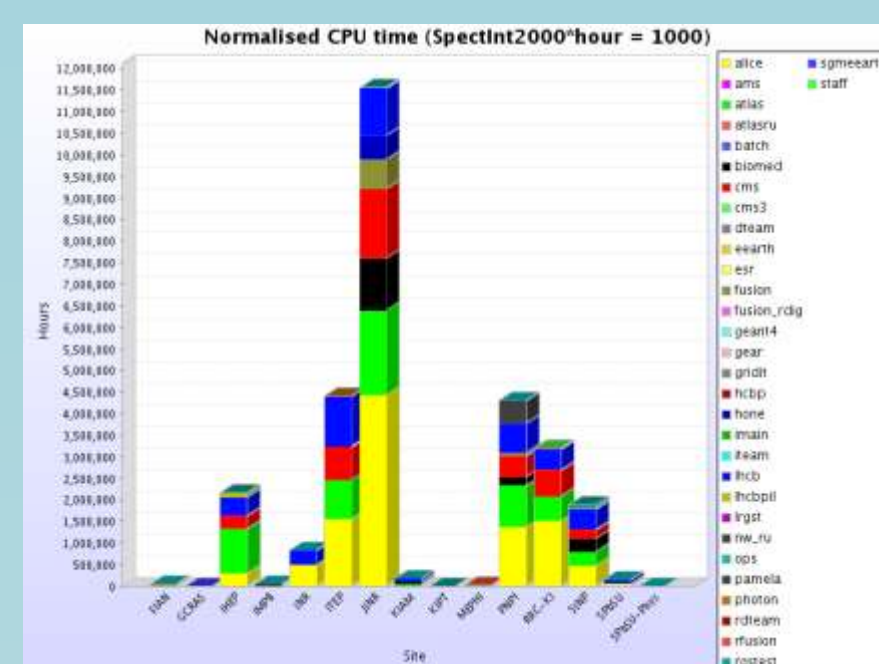
- PhEDEx file transfers monitoring for RDIG
- tracking CMS file transfers to RDIG sites
  - source site, destination site
  - file size
  - start and stop time
  - transfer and validation time
  - transmission speed
  - provides transfers statistics
  - has web page on RDIG monitoring site

- Condor-G jobs monitoring
- in collaboration with ARDA Dashboard (CERN)
  - tracking Condor-G jobs
  - on the way to interoperability with Open Science Grid

- dCache local monitoring
- statistics on dCache usage
  - count files, count space
  - file requests statistics
  - data transfer history

### RDIG accounting

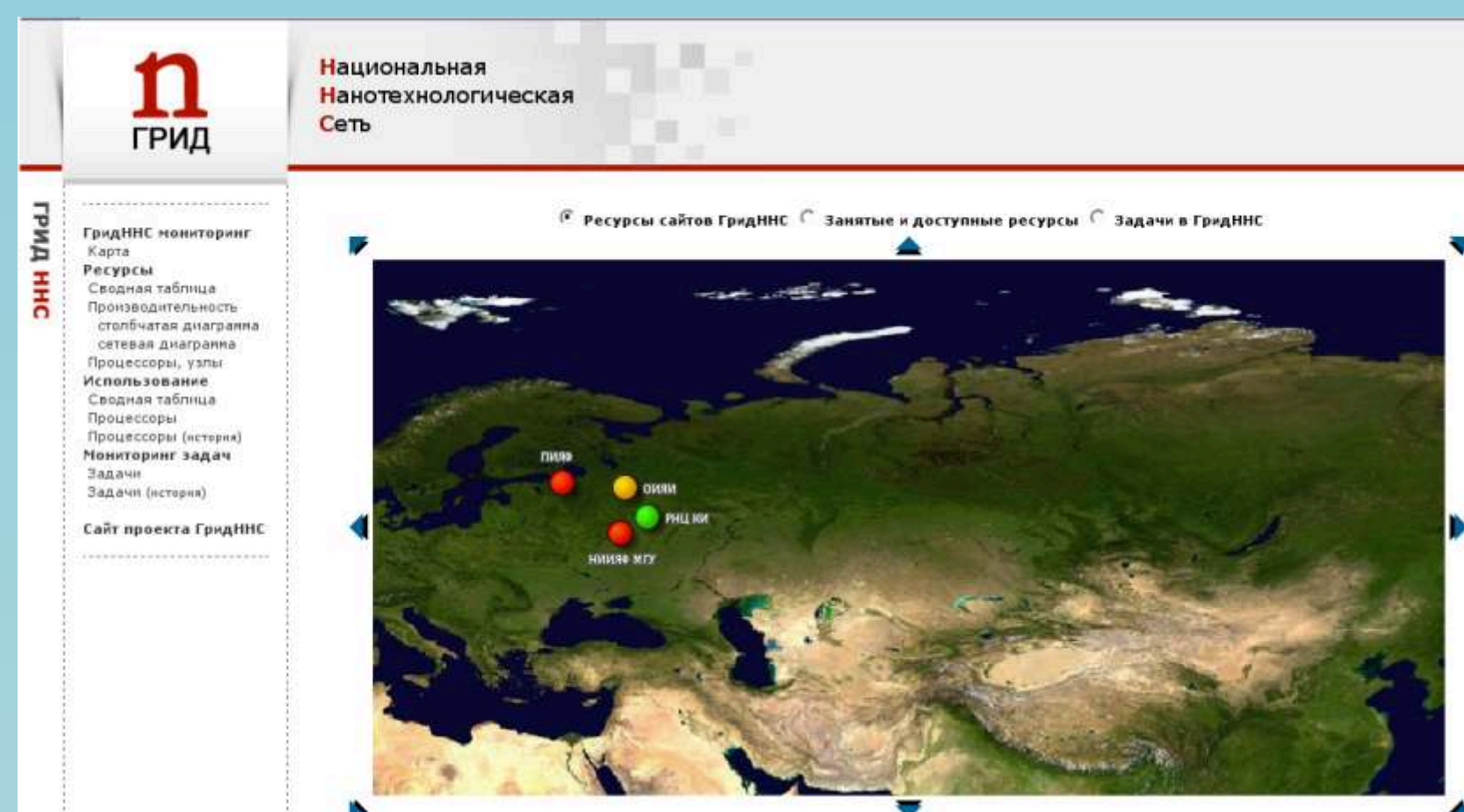
Aim to collect and store data on Grid resources usage (jobs' data per user, per VO)  
Keeps data for RDIG sites  
Works in parallel with central GOC accounting service  
Takes data from R-GMA  
Allows investigate technical problems with jobs accounting (using detailed jobs information)



### Plans

Along with further development of monitoring tools above, we plan to make them well documented and public available.

## GridNNN - Grid for National Nanotechnology Network



Goal is to provide for geographically distributed nanotechnology research groups some remote facilities: information infrastructure, telecommunications, parallel computational resources

### Monitoring

- Central service to monitor:
- grid infrastructure
  - grid services
  - user jobs

### Project participants:

- SINP MSU
- RRC KI
- JINR
- PNPI RAS

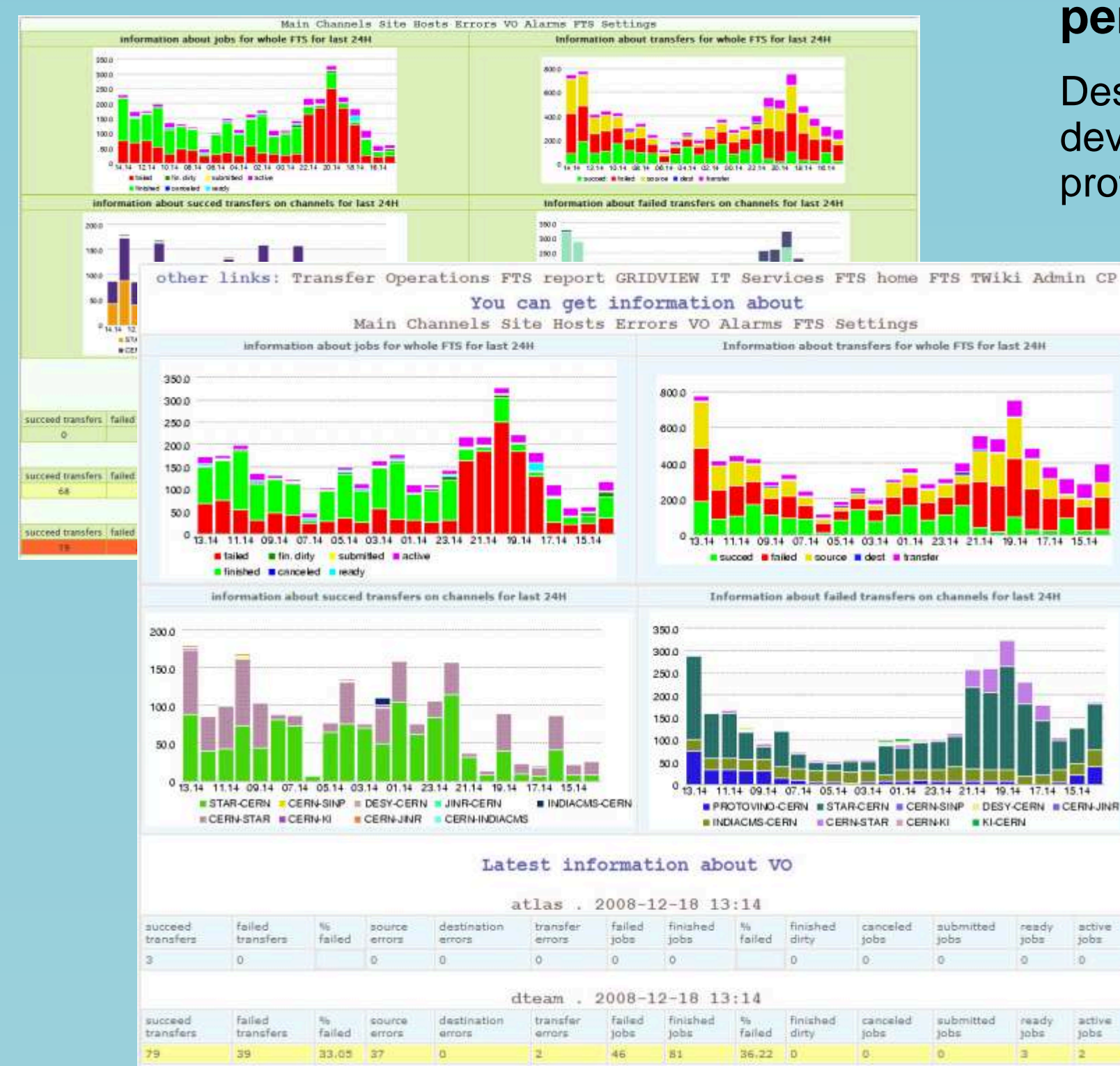
### Accounting:

collect information on CPU resource usage from resource provider from user side

## FTS monitoring system

Main task: Increase reliability, usability and performance of the FTS.

Designed using the general FTS monitoring tools developing strategy. Integrates functions of previous prototypes and monitoring system.

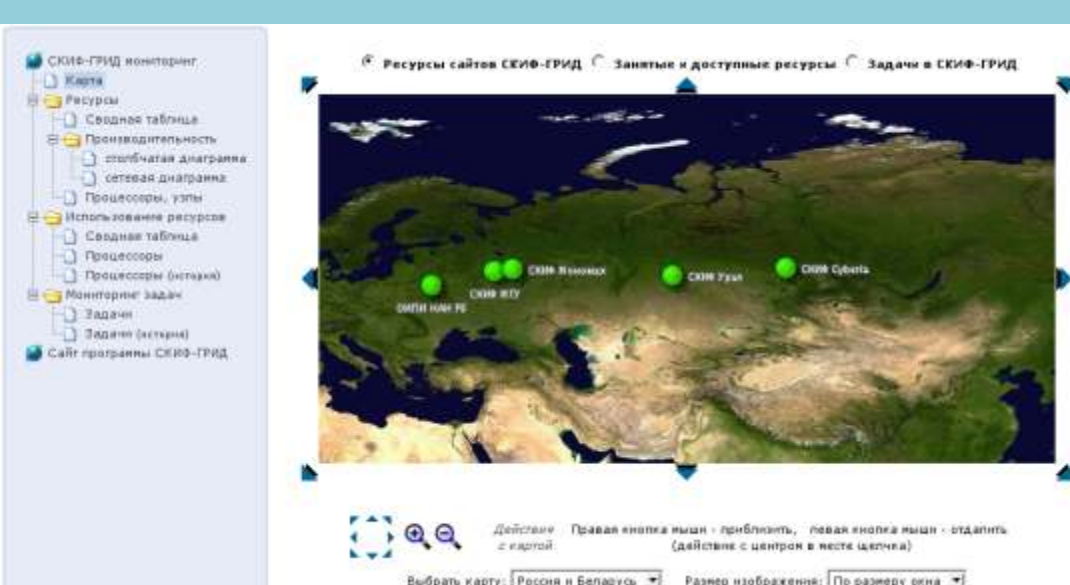


Different design schema of the main page interface

New version of system is more integrated into the FTS schema, so we don't have to parse log files, and has extra features:

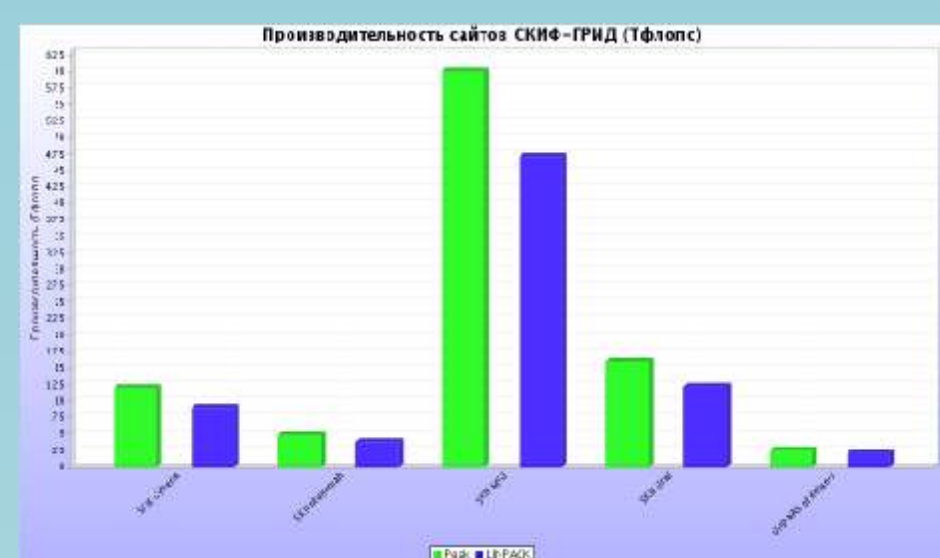
- Module based structure
- 2 dimensions of error representation error categories and specific errors
- Views for 4 different users group (FTS operations, Storage site admins, VO admins, Management)
- 5 monitored objects (channels, sites, host, errors, VOs)
- Different time views: latest, information for last 24 hours or any period in days
- General and detailed information
- Different filters and possibilities of aggregation or separation of data
- Information representation: tables, charts and graphics
- Possibility of errors correlation analysis
- Different ratings: most popular errors sites, channels, VO with biggest error amount etc.
- Advanced admin panel
- Alarm mechanism
- Expert system module.

## SKIF-GRID - Program of the Belarusian-Russian Union State



### Goal of SKIF-GRID:

HPC infrastructure for parallel computations, federation of Russian and Belorussian supercomputer centers



The importance of "SKIF-GRID" program is determined by necessity of high performance computation technologies implementation, its adaptation to technological and organizing structure of the states, the problems of information security in some special applications.

Also the importance of the program is based upon the will to attain a world level in high performance computation area to develop the supercomputers of high quality.

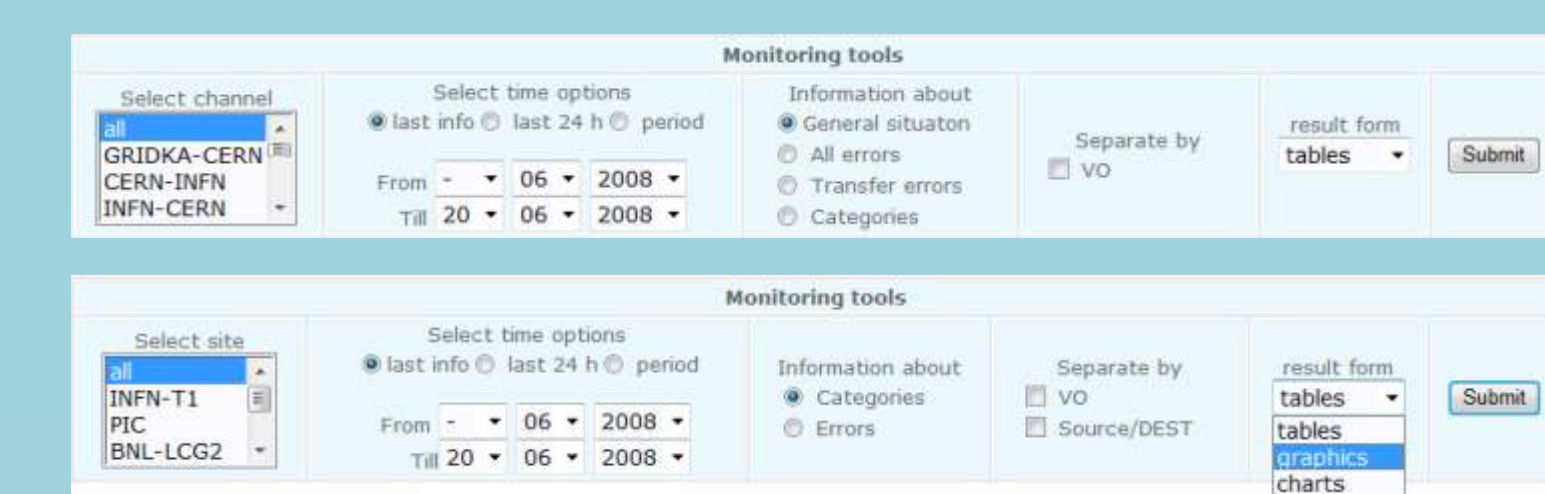
Within last several years the most perspective direction to organize the high performance computation is GRID-technologies.

### Monitoring (under development):

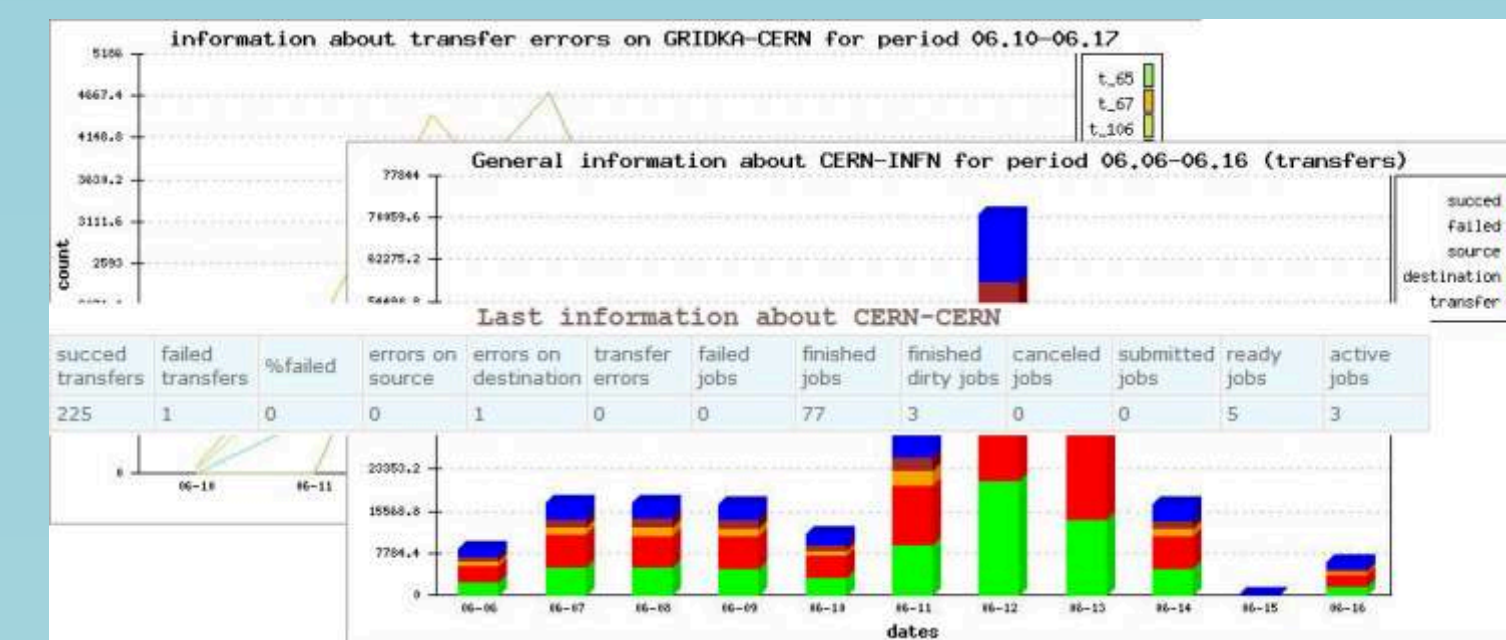
- Centralized monitoring site
- Supercomputer resources
- User jobs
- Network channels

### Software:

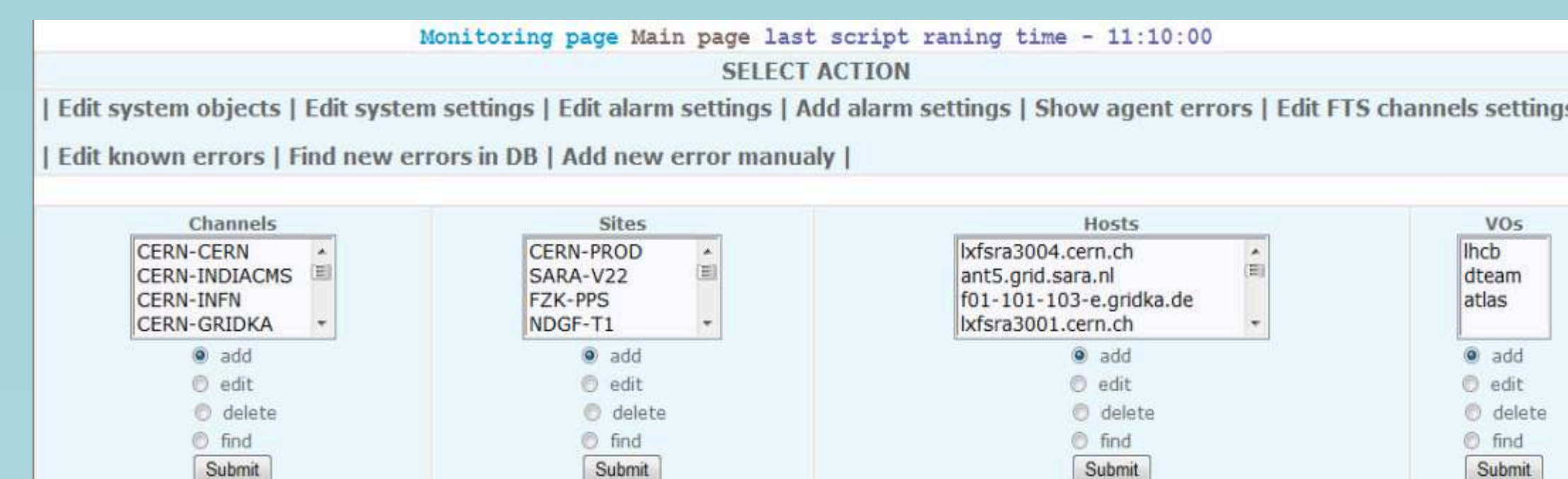
- X-COM
- UNICORE
- AntMon, Ganglia



"Channels" and "Sites" modules interface



Reports in the system



### Administrator panel

- System objects management
- Alarm triggers management
- Expert system objects management (rules, knowledge, states, actions)
- System settings (design schemas, alarm mechanism, information about hosts, caching of an images)
- ...

### Alarm mechanism

4 types of objects: channels, sites, hosts, VO  
3 types of alarm triggers  
Flexible mechanism  
Convenient way for administrator to work with system only if something really serious had happened

