

Distributed training and testing grid infrastructure

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Motivation

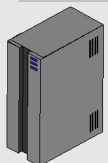
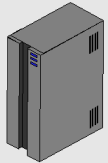
- Grid-technologies have already become standard tools used by scientists in different fields and first of all in high-energy physics.
- The associated steep learning curve may be alleviated within a dedicated education and training process.
- To this purpose the distributed training and testing grid-infrastructure (t-infrastructure for short) was set up with core services at LIT JINR and integrating resources of several organizations from JINR member states.
- It is used for educating and giving practical tutorials to students of UC JINR, University «Dubna», JINR and its member states colleagues as well as for performing obligations in different Grid related activities of local and international projects.

Implementation

- t-infrastructure is based on two types of middleware:
 - gLite (versions 3.1 – x86 arch and 3.2 – x86_64 arch),
 - Globus Toolkit (version 5.0.0).
- Because of specific character of that autonomous infrastructure (non-production purpose) there is no strong need in such gLite services as R-GMA Registry, GOCDB, MON-box, VOBOX, FTS, MyProxy.
- For the same reason all services can be run on virtual machines (OpenVZ is used).
- Some of grid and non-grid services can be shared between both gLite and GT middleware: UI, CA, VOMS.

t-infrastructure schema

Physical layer



RU-JINR

vps101 (CA) vps102 (VOMS) vps104 (LFC) vps105 (CE) vps105 (sBDII) vps106 (SE) vps110, vps111 (WNs)

vps103 (WMS+LB) vps107 (CE) vps107 (sBDII) vps108 (SE) vps109 (tBDII) vps112, vps113 (WNs)

RU-JINR-2

vps114 (jLite + GlassFish server) java application server (GlassFish) and java gLite API (jLite)

RU-JINR-MPI

vps121 (SE) vps117 (CE) vps117 (sBDII) vps118, vps119, vps120 (WNs)

vps115 (Torque server, GRAM5) vps115 (GridFTP) vps129, vps130, (WNs) vps101 (UI) vps116 (GridFTP) vps116 (MyProxy)

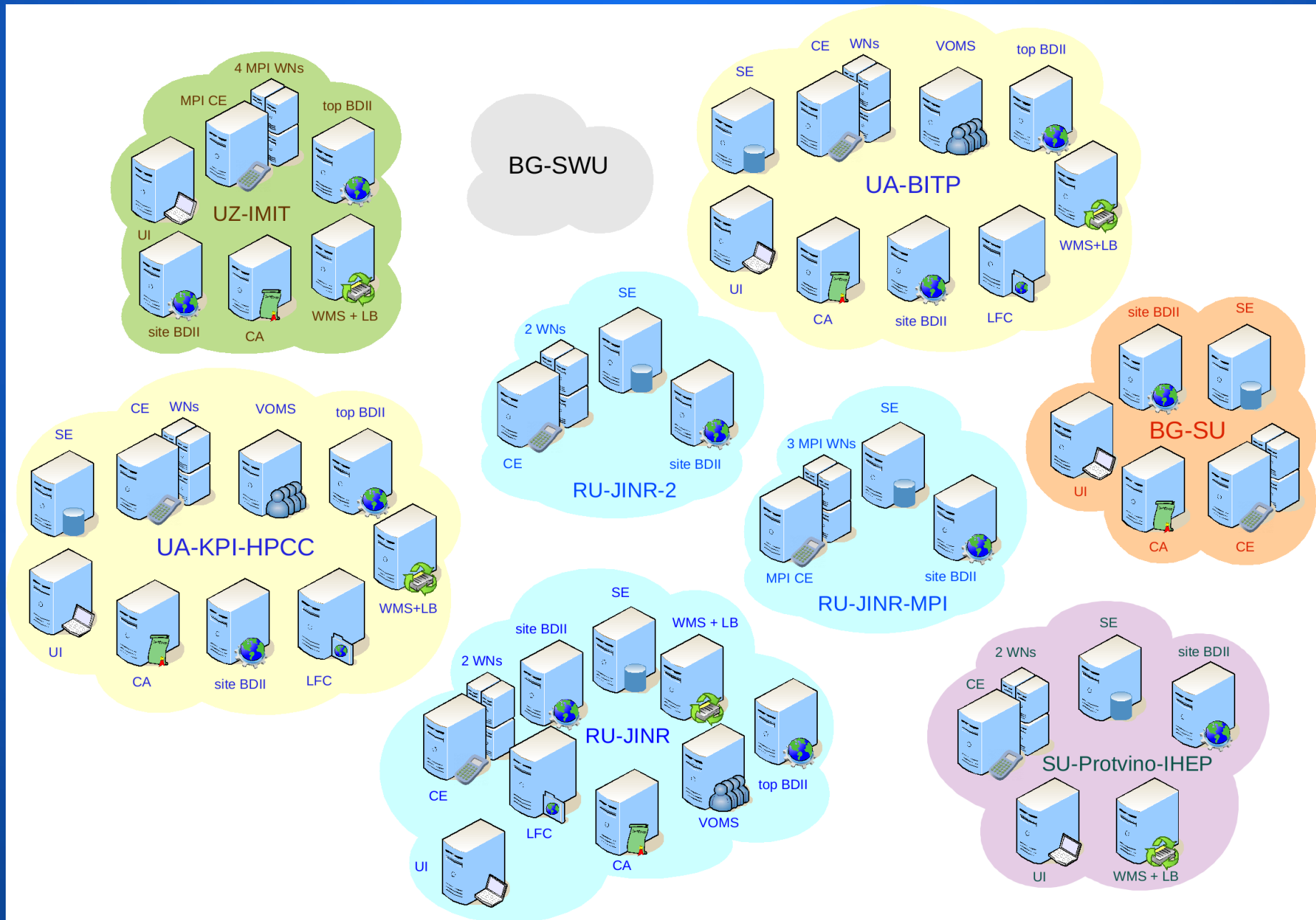
GT5 testbed

vps122 (web- and MonALISA server) **monitoring server**

vps123 (CE) vps123 (sBDII) vps124, vps125, vps126 (WNs) **EGEE SA3 testbed**

Virtual layer

gLite based testbed schema



Grid education activities

- Semestral educational course in Dubna University
 - 4 years of successful experience, more than 300 students
 - Grid basics
 - practical work in gLite middleware
 - scientific research activities of students
- Semestral educational course in JINR University Center
 - focus on research activities
 - train physicists for their practical work in the Grid
 - introduction and practical course for students of international schools
- Grid administrators training courses (on demand)
 - admins from Ukraine, Romania, Belarus, Uzbekistan, Azerbaijan, North Korea and Republic of South Africa have been trained for the moment



Research and development projects

- Previous:
 - Grid-oriented applications development on the basis of SOA
 - grid-oriented application for data quality processing (parsing, cleansing, standardization, enrichment etc.) on a large volumes of data
 - grid service for minimum spanning tree computation
 - Grid service for storage and processing of stream video
 - Molecular dynamic simulation on parallel Grid clusters using MPI technology (DL_POLY package)
- Current&new
 - gLite services testing within EGEE SA3 activity (gLite clusters for parallel computations)
 - image and video processing
 - CAE simulation
 - molecular electronic structure calculations (quantum chemistry) with high accuracy on Grid CEs with MPI support (molpro package)

and other projects..

Ongoing work and future plans

- There is ongoing work on grid technologies educational portal (including distributed learning facilities):
 - detailed user guide in Russian on working with educational grid infrastructure
 - lectures, methodical materials (in Russian)
 - interactive tests for each topic
 - full-featured web access to the Grid infrastructure
- Making the courses on the other grid environment – Globus Toolkit 5
- Educational course on grid applications and services development
- Evaluation of modern virtualization technologies and migration JINR educational infrastructure to them (e.g. OpenNebula)
- new sites integration to the infrastructure
- R&D activity in different grid-related areas

More information



<https://gridedu.jinr.ru>

- Grid trainings information,
- some guides for administrators,
- probing and testing infrastructure,
- map of distributed gLite testbed,
- shell access to gLite user interface.

The screenshot shows the homepage of the 'Wiki on Grid Educational Infrastructure'. The page has a blue header with the site title and a search bar. Below the header, there is a navigation menu with links like 'Monitoring', 'RecentChanges', 'gLiteOnOpenVZ', 'AdminGuideOnIntegration', and 'FrontPage'. The main content area is titled 'FrontPage' and contains text about the wiki's purpose: 'This wiki is intended for providing an information about current activities and available options for education in grid technologies based on distributed educational, training and testing infrastructure (t-infrastructure for short) located mainly at JINR.' It lists several aims, such as providing training courses for various user groups and system administrators. The page also mentions that the existing grid training infrastructure is the result of implementation of experience gained during past several years in building testbeds for different trainings on grid technologies. A list of training courses is provided, including one on LCG/gLite for JINR and JINR member-states colleagues, a semestrial course on LCG/gLite for students of Dubna University, an admin elective term course on ARC for students of University Centre of JINR, a demonstration of LCG/gLite installation for system administrators, and middleware evaluation. Finally, it states that in 2006 the grid training, probing and testing infrastructure had been set up at JINR with usage of virtualization technologies (OpenVZ) and since then it is running on permanent basis. The page concludes with a list of infrastructure components: distributed grid infrastructure based on gLite middleware, Virtual Organisation Management Service (VOMS) hosting VO edu, local Certification Authority (CA) for issuing host and user certificates, monitoring and wiki server, java application server (GlassFish) with installed java gLite API - jLite, and EGEE SA3 testbed.

Acknowledgement

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