OPERATING A TIER1 CENTRE AS PART OF A GRID ENVIRONMENT

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Abstract

Forschungszentrum Karlsruhe is one of the largest science and engineering research institutions in Europe. The resource centre GridKa as part of this science centre is building up a Tier 1 centre for the LHC project. Embedded in the European grid initiative EGEE, GridKa also manages the ROC (regional operation centre) for the German-Swiss federation. The management structure of the ROC and its integration into the regional operation is explained. By discussing existing and future tools for operating and monitoring the grid, the development of a robust grid infrastructure in the German-Swiss region will be shown. Experience in operating the grid from the view of a Tier 1 centre and as a regional operation centre is summarised with respect to integration of grid tools in the German-Swiss federation. In addition, the progress to build a stable grid infrastructure in our region currently consisting of 14 resource centres is pointed out, taking into account the new support structures. The start of the support workflow can either be a user specific problem or a problem detected by regularly performed site functional tests. Different views of the regional grid structure will be highlighted.
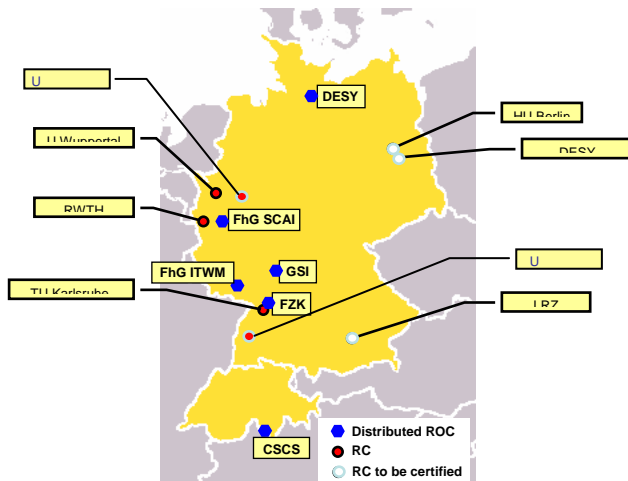
GERMAN-SWISS ROC

Figure 1: Map of the German-Swiss ROC

Operations inside the EGEE project [1] are subdivided into 11 federations as part of the so called SA1 activity [2]. Each federation is managed by its *R*egional *O*peration *C*entre, called ROC, where some of the ROCs are themselves distributed among different centres.

One of these regions is the German-Swiss Region, shown in Figure 1. Currently, it consists of 14 sites, where 3 of them are still in the certification process to join the EGEE production infrastructure. Altogether these 14 sites currently provide more than 2100 CPUs, more than 120 TB of disk space and 3 mass storage systems to the Grid [3]. Five partners funded by EGEE form the distributed German-Swiss ROC (Forschungszentrum Karlsruhe, DESY Hamburg, GSI Darmstadt, Fraunhofer SCAI St. Augustin, Fraunhofer ITWM Kaiserslautern). A sixth centre (CSCS in Manno, Switzerland) will join the ROC within EGEE-II to especially support future Swiss sites and user communities. The LCG Tier 1 centre *GridKa* at Forschungszentrum Karlsruhe is managing and coordinating this ROC.

Table 1: Sites in the German-Swiss Region

Name in GOCDB2	Detailed Name
CSCS-LCG2	CSCS, Swiss National Supercomputing Centre
DESY-HH	Deutsches Elektronen-Synchrotron in der Helmholtz-Gemeinschaft
EKPLCG2	Institut fuer Experimentelle Kernphysik, Universitaet Karlsruhe (TH)
FZK-LCG2	Forschungszentrum Karlsruhe
GSI-LCG2	Gesellschaft für Schwerionenforschung mbH, Darmstadt, Germany
ITWM	Fraunhofer Institut Techno- und Wirtschaftsmathematik
RWTH-Aachen	RWTH Aachen
SCAI	Fraunhofer Institute of Algorithms and Scientific Computing
Wuppertalprod	Universitaet Wuppertal
Uni-Dortmund	Universitaet Dortmund, Institut fuer Physik
Uni-Freiburg	Department of Physics and Computing Centre of University of Freiburg
HU-Berlin	HU Berlin
LRZ	Leibniz-Rechenzentrum (LRZ) Munich
DESY-ZN	Deutsches Elektronen Synchotron, Standort Zeuthen

Several different activities and responsibilities have been identified to operate a Regional Operation Centre. Some main tasks are e.g.

- Operate a production and pre-production service
- Middleware deployment and support
- Grid Operations and support
- Grid security and incident response
- VO, application, and user support
- Grid Management
- Interoperation
- Application to resource provider coordination
- Application / resource provider / middleware provider coordination

Coordination and management of these activities was part of the first phase of the EGEE project and has become more elaborated with respect to the follow up project *EGEE2*. These activities have been reviewed as

"successfully implemented". Some will be refined in EGEE2.

Table 1: Services in Region DECH

Services	Count	VOs	
		Global	Regional
VO Server	10	3	7
RLS/RMC	7	3	4
RB	10	3	7
BDII	10	4	6
UI	>10		

Several grid services have been implemented within EGEE which are now either used at German-Swiss resource centres locally or by the whole community. E.g. a VO server for the regional "DECH" VO is hosted at FhG SCAI. This VO is used as an entry point to the regional EGEE grid structures for people, who want to test the grid without being member of a specific VO. Other services are essential for the performance of the regional production grid structure, like e.g. various resource brokers. Services currently in production in the DECH region are summarised in Table 1.

In total there are more than 25 VOs[*] supported in the German-Swiss ROC, where some of them are still local VOs or have just started to act as global ones.

Statistics about the global usage of grid resources in terms of users und jobs per VO is provided through APEL [4] and centrally collected. A mechanism to provide a more detailed view of this info within the federation will be developed in EGEE2. This is e.g. required to check SLAs, examine resource usage and find bottlenecks in resource capacities. This grid wide accounting system has to take into account very heterogeneous legal bases for protection of data privacy within the European community.

TOOLS FOR OPERATING AND MONITORING THE GRID

Based on regular middleware releases (currently LCG 2.7, soon gLite 3.0) grid services inside the EGEE grid are continuously improved by permanently discussing the user requirements as well as analysing operational problems that occurred in the past. Such problems are reported on a weekly basis in regular meetings, where representatives from each ROC, representatives from experiments (users) and representatives of the central OMC at CERN participate. Thus central or more global problems can be spotted more easily.

As is true for most regions, a regional support platform has been deployed in the DECH region [5] and is successfully used by the support staff of all connected

resource centres to follow up any regional or local operational problems. These could have been reported to the system by users (1), administrators (2) or a central test suite (SFT = Site Functional Tests) (3), as three different entry points for reporting malfunctions.

The central tests are performed every 3 hours by submitting suitable test jobs to each CE (computing element) in the grid. A set of "critical tests" (CT) is used to determine whether critical problems are occurring at a certain site [6]. A respective ticket is opened in the support system by the COD (CIC On Duty) and the corresponding site administrator is obliged to solve the problem in collaboration with his ROC staff where applicable. Currently the German-Swiss ROC is not participating in this COD activity. However this is already foreseen for the upcoming EGEE2 project.

Thanks to this robust operations infrastructure built up as part of the SA1 activity in EGEE and the effort of all involved site administrators and managers, the EGEE grid has reached a high level of reliability compared to the start of the project 2 years ago. This could specifically be noticed for the German-Swiss ROC, where results from the test suites where taken very seriously by all site administrators.

HOW TO BECOME PART OF THE EGEE GRID

Every well managed site in a context of e-science is invited to join the grid. The way to do so is very straight forward, through a couple of managerial steps in order not to compromise the stability of the existing EGEE grid infra structure.

These steps form a general site registration and certification procedure, which is well documented in the official site certification document [7]. The registration procedure precedes the final certification after which a site is part of the EGEE/LCG production grid. By this policy on the one hand it is guaranteed to have reliable contact channels for management, administration and security issues at each site (registration). On the other hand the functionality of the site's setup has been tested with respect to the requirements in production (certification). A detailed description for the policy used in EGEE in general can be found in [8]. The two tier procedure currently used in the German-Swiss region which is strongly related to the general EGEE procedure is described in the following.

Registration Procedure

The Resource Administrator at the candidate site obtains a certificate from an accepted Certification Authority (CA), e.g. the GridKa-CA located at Forschungszentrum Karlsruhe. Afterwards he contacts the corresponding ROC with more detailed information about his site:

1) The full name of the participating institute, applying to become a site,

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[*] Supported VOs in DECH are: hone, ilc, zeus , dteam, alice, atlas, cms, lhcb, babar, dzero, magic, na48, sixt, biomed, egeode, esr, calice, dcms, ildg , dech, ghep and more (e.g. local VOs)

2) The abbreviated name of the site to be published in the Information System,

3) The name, email address and telephone number of the Site manager,

and a digitally signed statement of acceptance of the policy documents.

A ROC DECH representative will create the new site's record in the GOC database (status 'candidate') and write access to this record will be given additionally to the site manager and resource administrator. The Resource Administrator at the candidate site then enters all the remaining information in the GOC database and consequently requests validation by the ROC.

If all required site information has been provided, the ROC DECH security manager checks that the contacts of the site (esp. security) are within reach. The DECH ROC manager changes the site status to '*uncertified*' (which implies 'registered').

Site Certification Procedure

The site administrator applies for DTEAM VO membership and checks completeness of local installation. Then he contacts the DECH ROC and asks for quality testing of the site installation. After successful testing, the ROC then changes site status in the GOC database to '*certified*'. From now on the site will show on the relevant daily reports as part of the production grid.

In addition a site is made aware of security documentation and recommendations. Details can be found in [9].

EGEE is open to all scientific communities. We like to encourage all sites within Germany and Switzerland to join this successful grid infrastructure.

ACKNOWLEDGEMENTS

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[2]   SA1 webpage http://public.eu-egee.org/activities/sa1_details.html

[3]   S. Hermann, H. Marten, Forschungszentrum Karlsruhe, ROC DECH Report, January 2006 http://agenda.cern.ch/askArchive.php?base=agenda&categ=a053729&id=a053729s2%2Ftransparencies

[4]   APEL http://goc.grid-support.ac.uk/gridsite/accounting/

[5]   ROC DECH Support Portal https://dech-support.fzk.de

[6]   Site Functional Test results for DECH region https://lcg-sft.cern.ch:9443/sft/lastreport.cgi?vo=dteam&rg=GermanySwitzerland&so=all

[7]   Site Registration Policy & Procedure http://edms.cern.ch/document/503198

[8]   Sites' entry point to EGEE inside the CIC Portal https://cic.in2p3.fr/index.php?id=rc&subid=rc_config&js_status=2

[9]   LCG Security Recommendations http://proj-lcg-security.web.cern.ch/proj-lcg-security/sites/for_sites.htm