Overview of applications view of the job management middleware

WP1-2/Applications joint session
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Summary

- EDG and LCG provided GRID demonstrators
  - EDG 2.0.3 application testbed / EDG 2.0 devel testbed
  - LCG-1 certification testbed and prototypal LCG-1 GRID computing service
- test code sources and on going application activities
- test results on workload management system
- most relevant currently opened bugs
- outstanding general issues/concerns
- conclusions

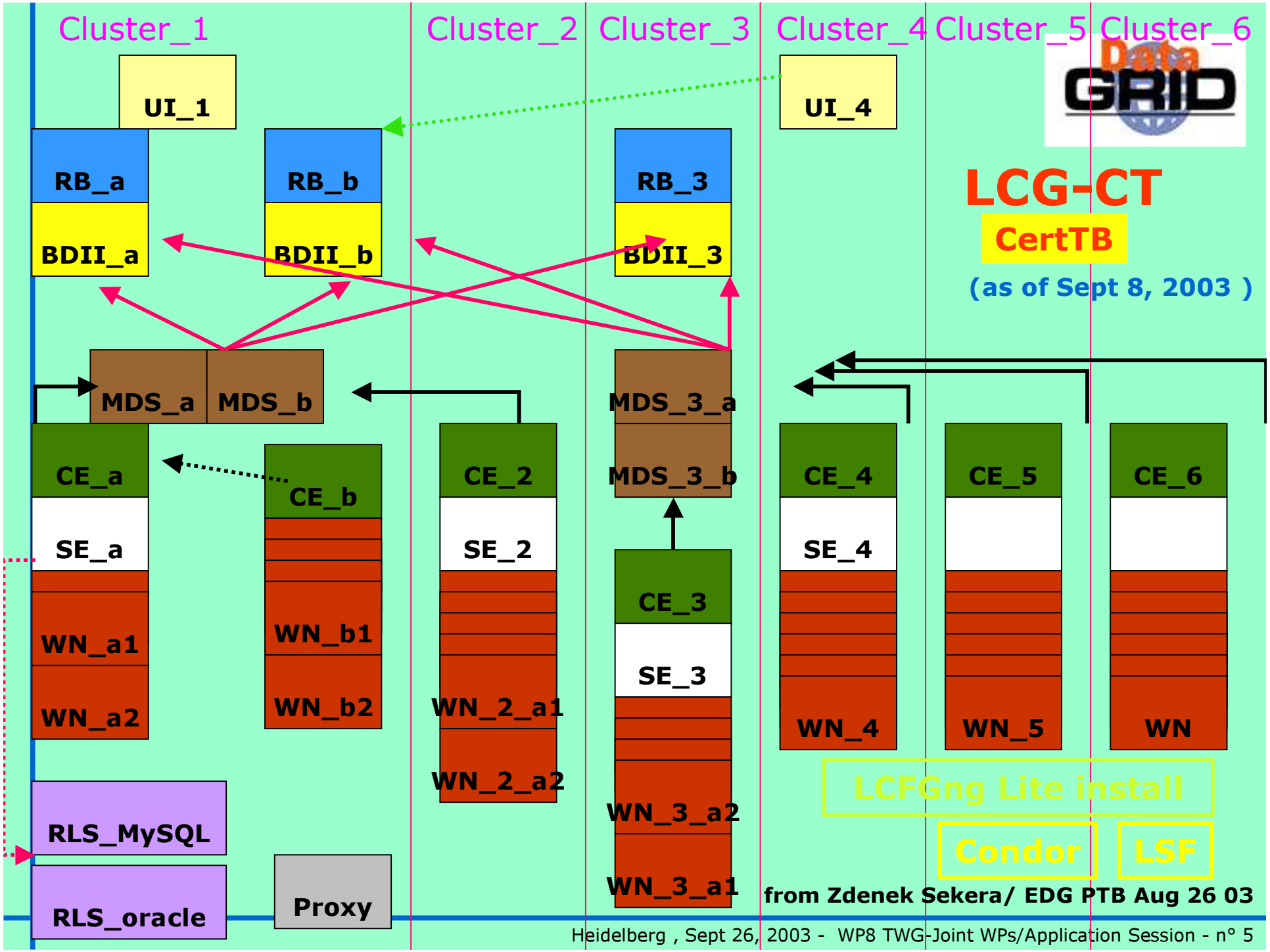
EDG development and application testbeds

- EDG 2.0 **devel** testbed (Jul-Aug 2003, 2.0.0 tagged on Aug 28)
  - EDG dev core sites : **CERN**, RAL, NIKHEF, LAL, CNAF, LYON
  - RB in Lyon, Top R-GMA at RAL
  - Many temporary development tags July-Aug ("t20030822_1000")

- EDG 2.0.3 **application evaluation** testbed (mid Sept,…growing)
  - Currently 11 sites (IFAE,RAL,LYON,NIKHEF,CT,PD,RM,FE,UCL,IC,FZK)
  - RB at NIKHEF, Top R-GMA at RAL

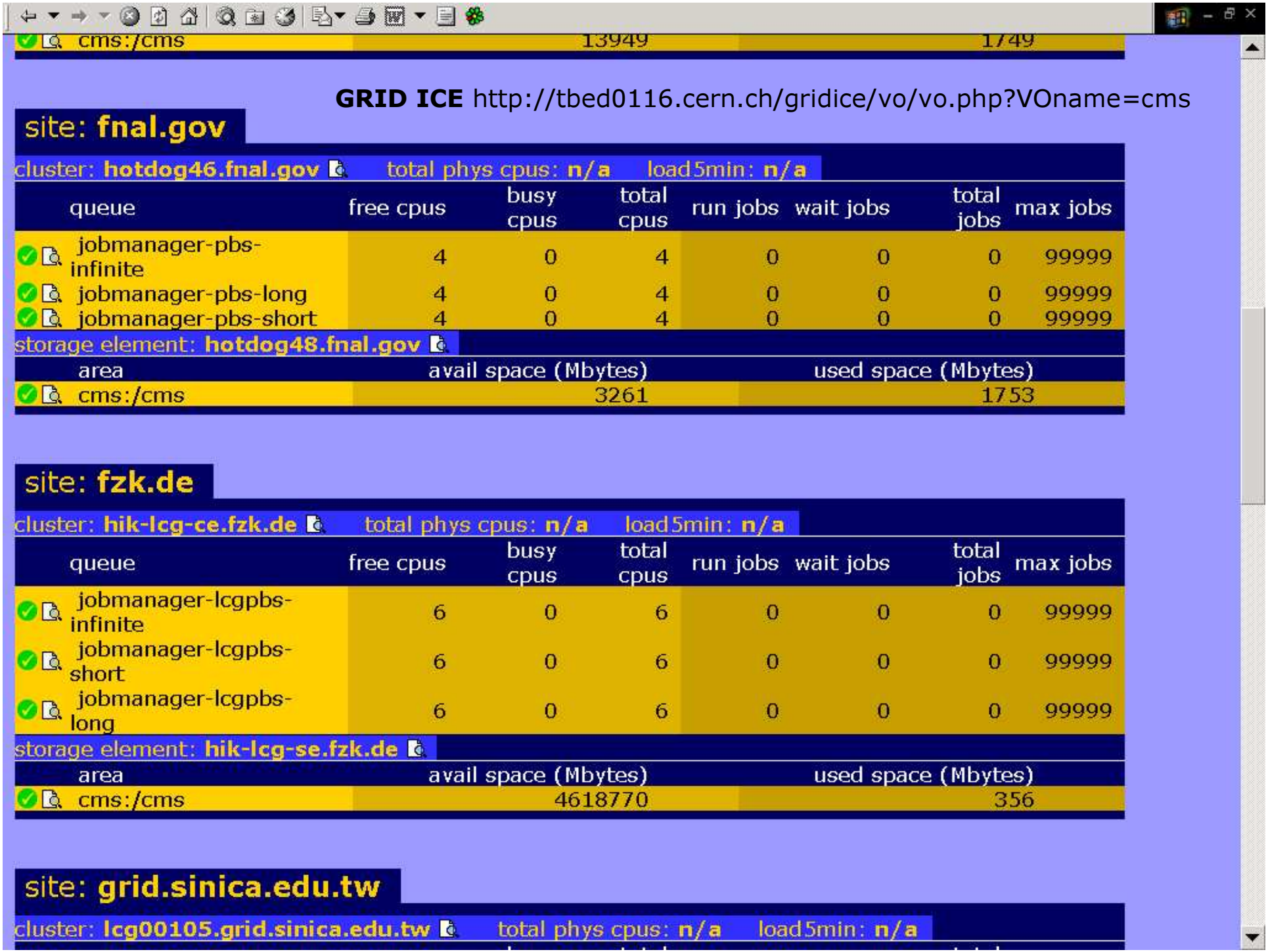
LCG CERN Certification testbed set up (as of Sept 8, 2003) LCG-CT

- 6 CERN-hosted clusters of Linux 7.3 PCs (7 different CEs)
- Deploying **prototypal LCG-1** (target release expected nov 03):
  - **VDT 1.1.8-9** (Globus 2.2.4)
  - **EDG 2.0** Workload MS (RB..) and Data MS (LRC, RLS..)
  - DataTAG **GLUE Schema v 1.1**
  - LCG-specific modifications, adds and fixes to:
    - **LRMS (PBS, Condor, LSF)**
    - **Globus Gatekeeper**
    - **MDS – BDII LDAP**
    - **Various Globus components**
- Reflecting into **45 different commands** in total for both end users and administrators
- Deploying a prototypal LCG-1 tag (by our test's time – (beg Sept))


Cluster_1
Cluster_2
Cluster_3
Cluster_4
Cluster_5
Cluster_6
UI_1
UI_4
RB_a
RB_b
RB_3
BDII_a
BDII_b
BDII_3
LCG-CT
CertTB
(as of Sept 8, 2003)
MDS_a
MDS_b
MDS_3_a
MDS_3_b
CE_a
CE_b
CE_2
CE_3
CE_4
CE_5
CE_6
SE_a
SE_2
SE_3
SE_4
WN_a1
WN_a2
WN_b1
WN_b2
WN_2_a1
WN_2_a2
WN_3_a2
WN_3_a1
WN_4
WN_5
WN
LCFGng Lite install
Condor
LSF
RLS_MySQL
RLS_oracle
Proxy
from Zdenek Sekera/ EDG PTB Aug 26 03

Prototypal LCG-1 GRID service

- Prototypal LCG-1 **LCG GRID computing service**
- Currently 7 core sites – (3 different continents):
  - CERN, KFKI, FZK, CNAF, FNAL, SINICA, RAL
- Truly World-Wide extended GRID service for LHC Computing
- Deploying **LCG1-1_0_0** - Rolled out on Sept 1, 2003.
- RB at CERN and CNAF, Top-MDS at CERN
- 4 main application VOs supported (Alice,ATLAS,CMS,LHCb)
- Opened to LCs since Sept 15, to experiments this week
- Not yet all experiment-VO s/w installed in all sites



cms:/cms 13949 1749

GRID ICE http://tbed0116.cern.ch/gridice/vo/vo.php?VOname=cms

site: fnal.gov

cluster: **hotdog46.fnal.gov** total phys cpus: **n/a** load5min: **n/a**

queue	free cpus	busy cpus	total cpus	run jobs	wait jobs	total jobs	max jobs
jobmanager-pbs-infinite	4	0	4	0	0	0	99999
jobmanager-pbs-long	4	0	4	0	0	0	99999
jobmanager-pbs-short	4	0	4	0	0	0	99999

storage element: **hotdog48.fnal.gov**

area	avail space (Mbytes)	used space (Mbytes)
cms:/cms	3261	1753

site: fzk.de

cluster: **hik-lcg-ce.fzk.de** total phys cpus: **n/a** load5min: **n/a**

queue	free cpus	busy cpus	total cpus	run jobs	wait jobs	total jobs	max jobs
jobmanager-lcgpbs-infinite	6	0	6	0	0	0	99999
jobmanager-lcgpbs-short	6	0	6	0	0	0	99999
jobmanager-lcgpbs-long	6	0	6	0	0	0	99999

storage element: **hik-lcg-se.fzk.de**

area	avail space (Mbytes)	used space (Mbytes)
cms:/cms	4618770	356

site: grid.sinica.edu.tw

cluster: **lcg00105.grid.sinica.edu.tw** total phys cpus: **n/a** load5min: **n/a**

LCG-1 vs EDG-2

- DMS ROS is not foreseen in LCG
- VOMS is not yet deployed (not even in EDG-2)
- WMS-DGAS Accounting System is not deployed yet (not even in EDG-2)
- InfoSys R-GMA is not foreseen in LCG-1 (using MDS-BDII)

edg-brokerinfo
edg-fetch-crl
edg-find-resources
edg-fmon-agent
edg-fmon-server
edg-gridftp-exists
edg-gridftp-ls
edg-gridftp-mkdir
edg-gridftp-rename
edg-gridftp-rm
edg-gridftp-rmdir
edg-job-attach
edg-job-cancel
edg-job-get-chkpt
edg-job-get-logging-info
edg-job-get-output
edg-job-list-match
edg-job-status
edg-job-submit
edg-local-replica-catalog
edg-local-replica-catalog-admin
edg-lrc

edg-lrc-admin
edg-mkgridmap
edg-mkgridpool
edg-replica-manager
edg-replica-manager-configure
edg-replica-metadata-catalog
edg-replica-metadata-catalog-admin
edg-replica-optimization
edg-replica-optimization-admin

edg-rgma
edg-rgma-config
edg-rgma-db-setup
edg-rgma-munge-schema
edg-rgma-pulse

edg-rm
edg-rmc
edg-rmc-admin
edg-ros
edg-ros-admin
edg-ros
edg-se-webservice

ldapsearch –h .. –p ...

edg-service-mysql-setup.pl
edg-service-publisher-gen.pl
edg-template-conf.pl
edg-testbed-test
edg-vo-env

edg-voms-admin
edg-voms-admin-local
edg-voms-ldap-sync
edg-voms-mkgridmap
edg-voms-proxy-init

edg-wl-dgas-hlr-resourceInfoClient
edg-wl-dgas-hlr-transInfoClient
edg-wl-dgas-hlr-userInfoClient
edg-wl-grid-console-shadow

edg-wl-logev

- WMS commands
- DMS commands
- (InfoSys commands)
- SiteAdmin and Fabric
- MassStorage-SE
- Security-VOMS

Test code sources

LCs July-Sept 03 LCG / EDG testing:

- Full general purpose generic-HEP-application test suite from Jean-Jacques Blaising: (PERL)
  - Gets info on GRID current status (GRID config file) and creates JDL accordingly
  - Submits jobs, monitor status, retrieve output, report results
- Various LC testing JDLs and scripts (/bin/bash, PERL)
  - general and intensive stress tests
- Official EDG WP6-SC (edg-site-certification) PERL-oo test suite
  - Basic job submission, output retrieve
  - Basic Data Management tests, Filename registration and file copy
  - My Proxy tests
  - Match-Making specific tests

(http://marianne.in2p3.fr/datagrid/TestPlan/TESTSTATUS/EDG_20_TEST_STATUS.html)

First very preliminary results from EDG 2.0.3 Application testbed

- Basic Job submission, monitoring, cancel, output retrieval works ok

- 8 streams x 50 medium-sized jobs storm showed a small percentage (~3 %) of
  - Current Status: Aborted
  - Status Reason: Cannot plan (a helper failed) or
  - Current Status: Done (Cancelled)
  - Status Reason: Cannot read JobWrapper output, both from Condor and from Maradona.

LCG-CT WMS tests and results (1/2)

- Tested basic job submission and output retrieve “Hello World” [OK]
- Test submission of 50 jobs with Input and Output sandboxes with and without retryCount=0 [OK]
- Test of 250 jobs with long sleep, no resubmission (MyProxy) [OK]
- 5 job with 2GB Input&Output sandboxes, no resubmission, with and without parallel streams [OK]
- Match-making tests:
  - Three files on one SE, job matches to associated close CE [OK]
  - Three file on one SE, add application tag, job matches close CE [OK]
  - Access a file from a SE from job with file protocol; compute checksum [OK]

LCG-CT WMS tests and results (2/2)

- Submit JJ-HEP generic application on all available GRID CEs, retrieve output, register files on iteam VO LRC via RLS from the running script on the WN, copy them on close SE.
  [Resources previously discovered by query to InfoSys]

  [OK]

- Submit a numeric iterative calculation on all available GRID CEs, use BrokerInfo to find CloseSE and mount point, copy files there and register into iteam LRC through RLS

  [OK]

RB Stress Tests by Massive Job Submisison on the LCG-CT

- RB never crashed
- ran without problems at a load of 8.0 for several days in a row 20 streams with 100 jobs each (typical error rate ~ 2 % still present)
- RB stress test in a job storm of 50 streams , 20 jobs each :
  - 50% of the streams ran out of connections between UI and RB. (configuration parameter – but machine constraints)
  - Remaining 50% streams finished normal (2% error rate)
  - Time between job-submit and return of the command (acceptance by the RB) is 3.5 seconds. (independent of number of streams)
- NOTE:

  RB interrogates all suitable CE's : wide area delay-killer (interactive work) ?

Preliminary full simulation and reconstruction tests with ALICE on the CERN LCG-CT (beginning of Sept 03)

- Aliroot 3.09.06 (including HBT correl.) fully reconstructed events
- CPU-intensive, RAM-demanding (up to 600MB ,160MB average) ,long lasting jobs (average 14 hours)
- Outcome:
  - > 95 % successful job submission, execution and output retrieval in a lightly loaded GRID environment
  - ~ 95 % success (first estimate) in a highly job-populated testbed with concurrent job submission and execution (2 streams of 50 AliRoot jobs and concurrent 5 streams of 200 middle-size jobs)
  - My Proxy renewal successfully exploited [OK]

Currently(Sept 19) opened EDG WMS bugs (also effecting LCG) (no show-stoppers)

http://marianne.in2p3.fr/datagrid/bugzilla/

- 1103 : considering working (already used) CEs in re-submission if no others available
- 1105 : mechanism should be provided to restart daemons that aren't running anymore
- 1362 : hanging LB clients if LB responsive but other RB component down – should give appropriate error message, not hang
- 1465 : purger scripts queries the LB without using a proxy (su)
- 1643 : resubmission even when proxy expired
- 1716 : in some specific cases the LB doesn't give the right job status
- 1792 : edg-job-status jobId-status max retrieval number (>1100..)
- 1798 : /etc/init.d/edg-wl-ns restart does not work (needs a sleep)
- 1770 : Jobs queues drain if the replica catalog is down

Currently(Sept 19) opened EDG WMS bugs: 18 (also effecting LCG) (no show-stoppers)

http://marianne.in2p3.fr/datagrid/bugzilla/

- 1824: delay to get information from edgbroker-info after NS and WL daemon restart
- 1918: tmpwatch erases wm files in /tmp - /var should be used
- 1932: edg-job-get-logging-info -o --logfile prints log-info to the screen (same for edg-job-status, list-match)
- 1934: use of commas for edg-job-* commands working but not advertised in help menu
- 1938: Complaining lob messages from edg-wl-interlogd
- 1125: Option –c : even if –c is useed, still UI seeks default config file
- (1843) : edg-find-resources doesn't have a --help option (UI, but not WP1)
- 1848: A replacement for the old getSelectedFile method is needed

  given Input File users gets URL/filename (BrokerInfo)

General issues and concerns (1/2)

- Some RGMA timeout wrongly set
  - 1 site managed to block the whole GRID for 1 day since port 8080 of MonBox wasn't accessible – It should be now fixed in RGMA
- GOUT empty quite often completely blocked all submissions
- Cryptic error messages like "A helper failed"
  - Help user to tell expectable error messages (somebody switched off a given WN) from system services critical conditions – Work on going..
- A mechanism should be provided for a sys admin to delete all jobs of a given user (LCG-CT) (super user – ref bug 1465)

General issues and concerns (2/2)

- GUI & JDL editor not fully exploited and tested yet – (!)
- MPI not fully exploited and tested yet – (!)
- Check pointing not tested yet - (!)
- **Gang-matching** not working at time it was tested (1442: **should be fixed by now** in 2.0.18, but EDG 2.0.3 includes 2.0.15-2)
- Old relevant pending bug : wrong ClassAd (*other.CEId*) could block the RB – (now **fixed** in 2.0.18)
- Outbound connectivity for the Worker Nodes – issue for GDB

Conclusions

- Broker seems a lot more stable, but still has some failures, and has to be tested for **scalability :** this could be the next relevant issue (RB polling all CEs…..)
- Many new features (check pointing, interactive jobs, gang matching, output data, access cost ranking, accounting, …) largely untested and some not integrated
- Looking forward for **VOMS integration** and **VO-based users-resources matching**