

# SAM Tests



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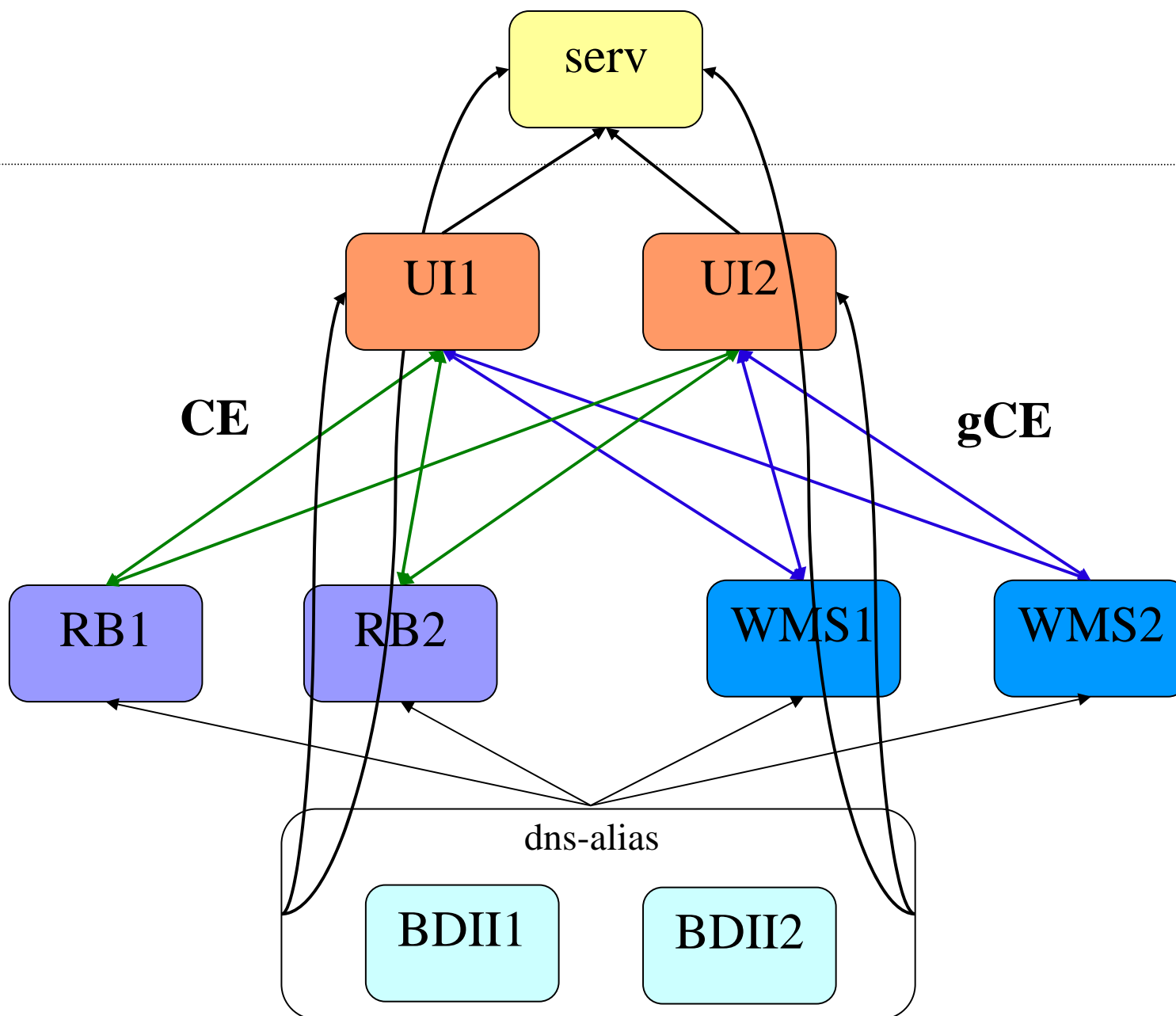
SAM Devel. & Support Team  
CERN IT/GD

WLCG/EGEE/OSG Operations Workshop  
25 Jan. 2007, CERN

# SAM sensors and tests

- about SAM
  - introduction
  - production service at CERN
  - official submissions
    - ops
    - other Vos
- framework structure
- sensors + tests
  - definition
  - existing sensors
  - Jobwrapper tests
  - documentation

- Grid service-level monitoring framework
- used in Grid Operations
- basis for Availability Metrics
- VO-based submissions
  - VO-specific tests
- services tested currently:
  - CE, gCE
  - SE
  - RB
  - sBDII
  - BDII
  - FTS
  - LFC
  - JobWrapper tests

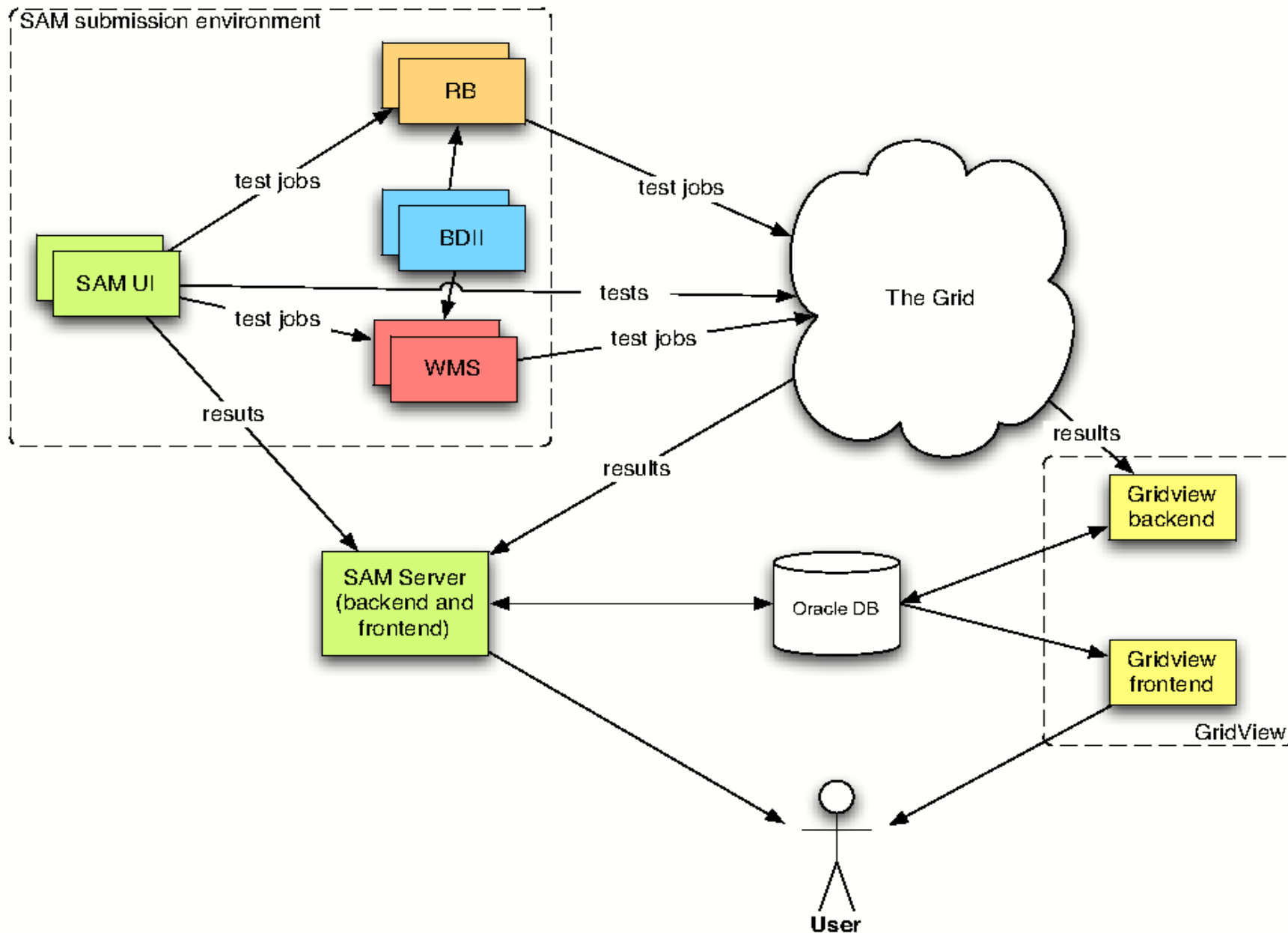


- Official CERN submissions
  - *Production and Certified sites*
  - *ops (+ dteam) VO*
  - *job submitted in every hour*
  - *basis of COD alarms*
  - <https://lcg-sam.cern.ch:8443/sam/sam.py>
- *PPS*
  - *ops VO*
  - *hourly*
  - <https://lcg-sam.cern.ch:8443/sam-pps/sam.py>
- *SAM Admin Portal*
  - *ops VO*
  - *on-demand*
  - *Certified + Uncertified sites*

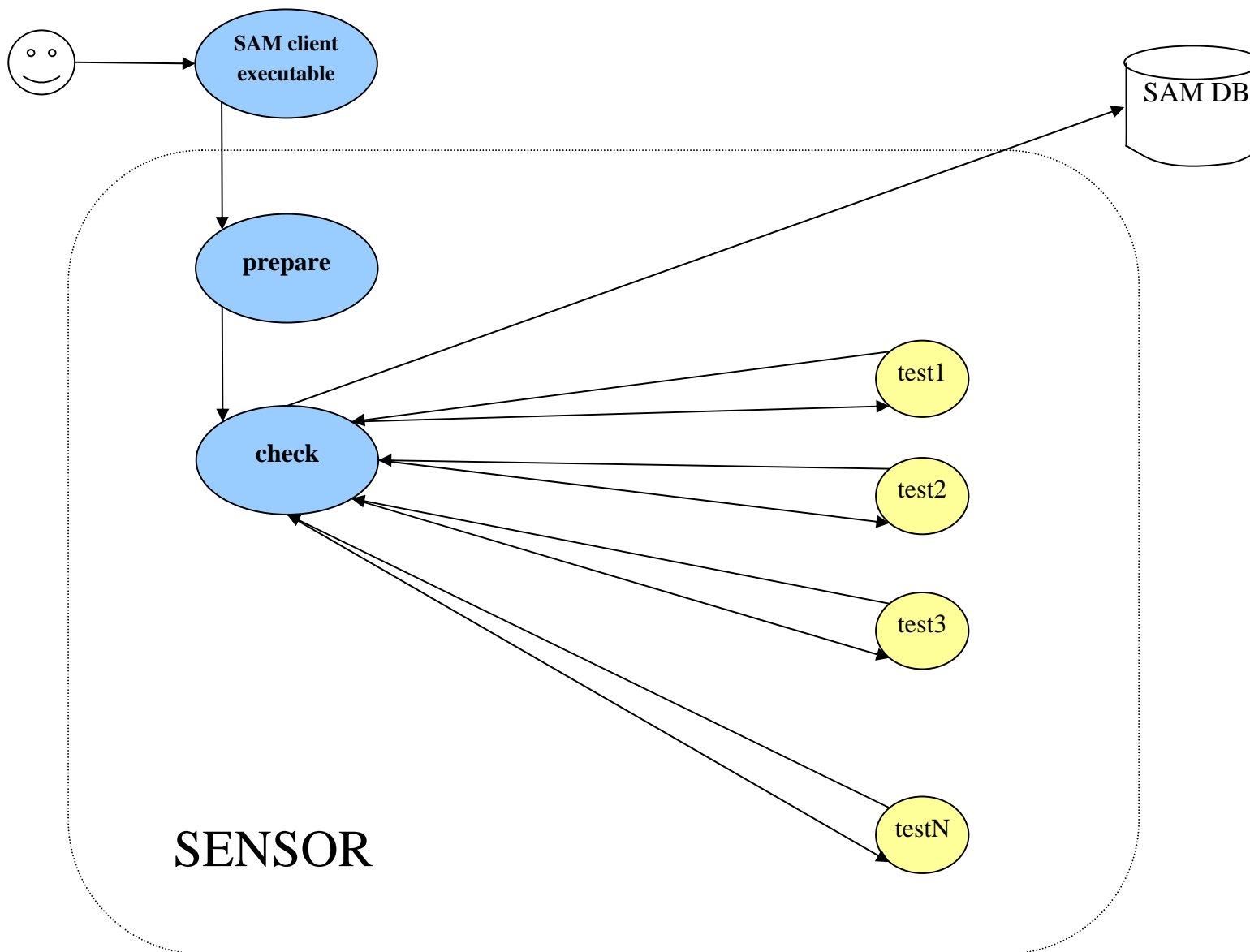
- LHCb
  - CE, gCE, SE
  - VO specific tests
    - used as Critical Tests for the VO!
- Atlas
  - all sensors
  - submitted from SAM UI
- Alice
  - CE, gCE tests
    - RM tests not taken in account (special Alice LFC settings)
  - submitted from SAM UI
- CMS
  - coming soon

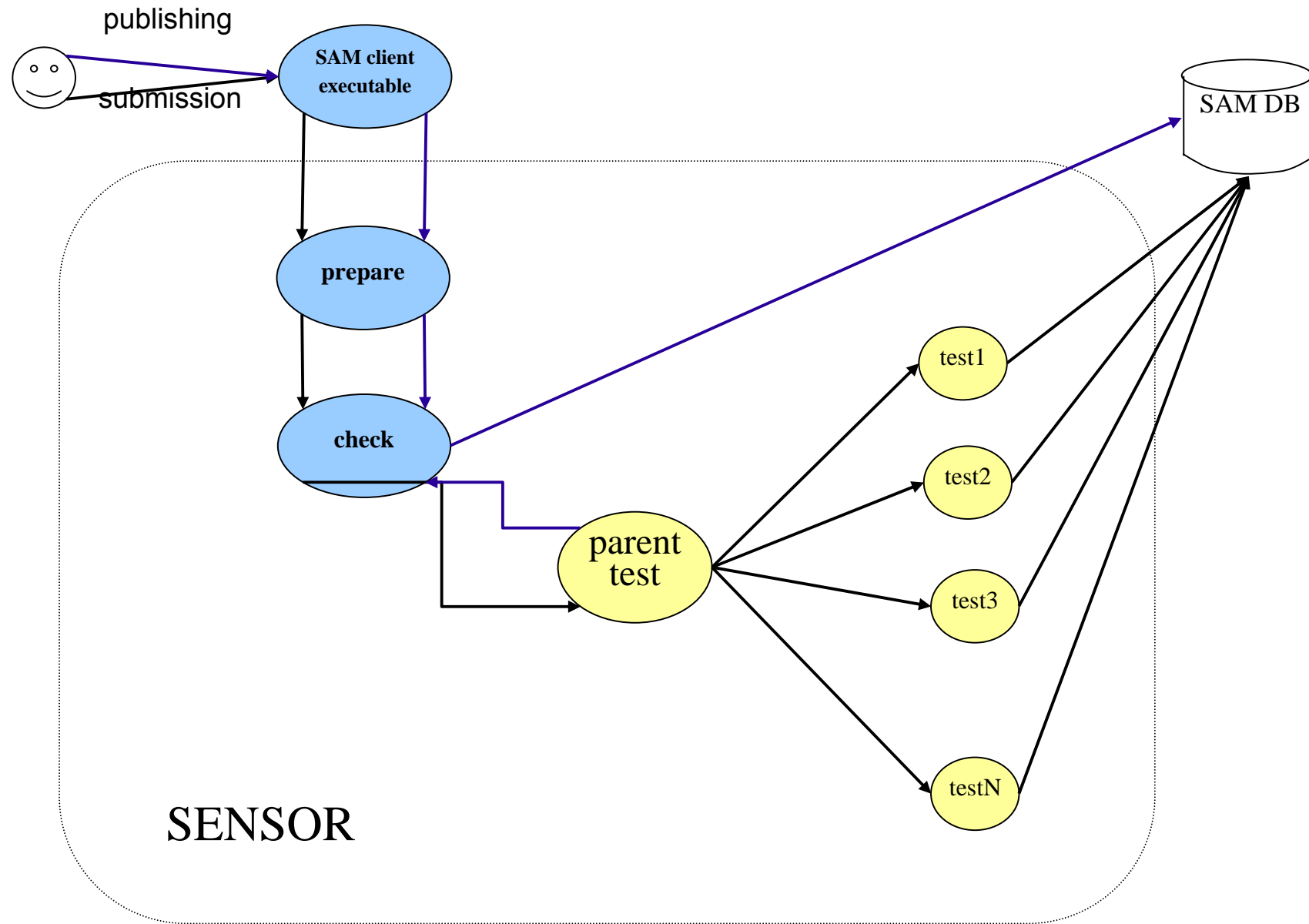
- framework structure
  - client
    - submission framework
    - sensors
      - tests
  - server
    - web services
    - portal
- Oracle DB accessed by web services
- static (GOCDDB) + dynamic (BDIIs) info
- developed
  - server + submission framework: CERN Team
  - sensors + tests: CERN Team + external contributors





- Sensor
  - types
    - per GRID service (CE, gCE, SE, SRM, FTS, LFC, etc.)
    - for multiple services (`host-cert`)
  - container object
    - tests
    - necessary configuration for the tests
    - checks, preparation for the tests
    - definition of the execution test sequence
  - invoked by the SAM command-line tool
  - executing environment for the defined list of contained tests
- Test
  - belongs to a sensor
  - scripts (executables)
    - executed by the sensor





- sensor for each GRID service
  - there are still missing ones at the moment
- plug-in modules → easy to add new ones
- sensor execution:
  - `$SAME_HOME/client/bin/same-exec <SENSOR>`
  - some sensors have to publish results (CE, gCE, FTS)
- `$SAME_HOME/client/sensors/<SENSOR>`
  - additional scripts
    - checks, setting up environment, etc.
  - `tests` directory: `tests`

- simple (bash) scripts
- plug-in modules → easy to add new ones
  - VO-specific tests
- most of the tests display the exact command that it executes
  - failing site can investigate, try to reproduce the error
    - Note: error may only occur for executing VO!
- `$SAME_HOME/client/sensors/<SENSOR>/tests`
  - naming convention
    - `<SENSOR>_<VO>-testname` where `<VO>` is optional, defaults to `ops`

- test failures can come from
  - problems with the site (majority)
    - misconfiguraton
    - hardware errors
    - network errors
    - etc.
  - problems with a central service
  - problems with the framework
    - `lcg-cr` fails → `lcg-del` is still executed for the non-existing file
    - `FTS-infosites` fails → the rest of the tests don't recognize the absence of the `FTS-endpoint` parameter
- recepies & hints:
  - GOC wiki:
    - <http://goc.grid.sinica.edu.tw/gocwiki/SiteProblemsFollowUpFaq>

- job submission: UI→RB/WMS→CE/gCE→WN
  - errors may occur on any level (usually not UI)
- job submission: parent job for the rest of the tests
  - individual tests publish themselves to SAM
  - job submission is published by invoking the SAM cmd-line tool
    - every hour for the CERN submissions (except LHCb)
- job submission failure → job logging info is returned



- examples for site errors
  - Cannot read jobwrapper output, both from Condor and Maradona
    - error on CE
    - [http://goc.grid.sinica.edu.tw/gocwiki/Cannot\\_read\\_JobWrapper\\_output...](http://goc.grid.sinica.edu.tw/gocwiki/Cannot_read_JobWrapper_output...)
  - Cannot plan: BrokerHelper: no compatible resources
    - probably the site-BDII is not publishing results properly
    - [http://goc.grid.sinica.edu.tw/gocwiki/Brokerhelper: Cannot plan. No compatible resources](http://goc.grid.sinica.edu.tw/gocwiki/Brokerhelper:_Cannot_plan._No_compatible_resources)
  - Got a job held event, reason: Unspecified gridmanager error
    - [http://goc.grid.sinica.edu.tw/gocwiki/Unspecified\\_gridmanager\\_error](http://goc.grid.sinica.edu.tw/gocwiki/Unspecified_gridmanager_error)
  - Got a job held event, reason: Globus error 131: the user proxy expired (job is still running)
    - proxy lifetime (12 hours) expired before the job finished running

- CA certificate check (on WN!)
  - algorithm:
    - 1. checking the RPMs
    - 2. if no RPM → checking CA files
  - new CA certificates released by EUGridPMA
    - middleware repository + SAM: immediate upgrade
    - sites have 7 days to upgrade
      - the tests report 'WARN' during this period, 'ERROR' after
- Software middleware version check
  - `lcg-version` command
- Brokerinfo
  - `edg-/glite-brokerinfo` command

- UNIX shell env. vars
  - bash + csh
- Replica Management
  - testing default SE and 3rd-party replication
    - checking `GFAL_INFOSYS` env. var.
    - `lcg-cr` file to default SE
    - `lcg-cp` file back from default SE
    - `lcg-rep` file from def. SE to central CERN SE
    - `lcg-del` file
- Notes:
  - LFC endpoint not connected
    - if the site is using “its own” top-level BDII, then it might not publish it properly



- VO experiment software
  - check `VO_<VO>_SW_DIR` env. var
  - check directory existence
- VO management tags
  - `lcg-Manage-VOtags` command

- RGMA
  - printing RGMA configuration file
    - `$RGMA_HOME/etc/rgma.conf`
  - inserting & querying a tuple
    - using RGMA shell
- Secure RGMA
  - running `edg-java-security-tomcat-test.sh`
- WN
  - getting the hostname of the worker node
- APEL
  - executed on the UI (not on the remote site)
  - RGMA query to get the number of entries per site
- test results from `gstat`
  - `CE-totalcpu, CE-freecpu, CE-waitjob, CE-runjob`

- SE, SRM
  - the same set of tests for both
    - `lcg-cr` file from UI to SE/SRM
    - `lcg-cp` file back to UI
    - `lcg-del` file from SE/SRM
- LFC
  - `lfc-ls` directory listing on `'/grid'`
  - `lfc-mkdir`: creating entry in `'/grid/<VO>'`

- executed for dteam VO
- lcg-infosites
  - check if FTS endpoint is correctly published in BDII
- glite-transfer-channel-list
  - ChannelManagement service
- transfer test
  - transfer jobs following the VO use cases
    - tested T0 → all T1s (outgoing)
    - tested T1 ← other T1s (incoming)
  - checking the status of jobs
  - using pre-defined static list of files
    - SRM endpoints taken from this list (CVS), no dynamic discovery yet
  - Note: test is relying on SRM availability

- BDII (Sinica)
  - accessibility (response time)
  - reliability of data (number of entries)
- sBDII (Sinica)
  - accessibility (response time)
  - sanity checks (partial Glue schema validation)
  - totalCPU, freeCPU
  - waiting jobs
  - SEusedTB, SEavailTB
- RB (RAL)
  - job submission
    - “important” RBs are tested using selected “reliable” CEs
  - measuring the time of matchmaking



- Examples:
  - Timeout after 600 seconds!
    - error due to overloaded hardware
    - solution: new (stronger) hardware with loadbalancing
  - proxy expires in 1-2 minutes
    - middleware problem (RB)
      - patch applied
- problem reporting
  - GGUS: <http://ggus.org/>

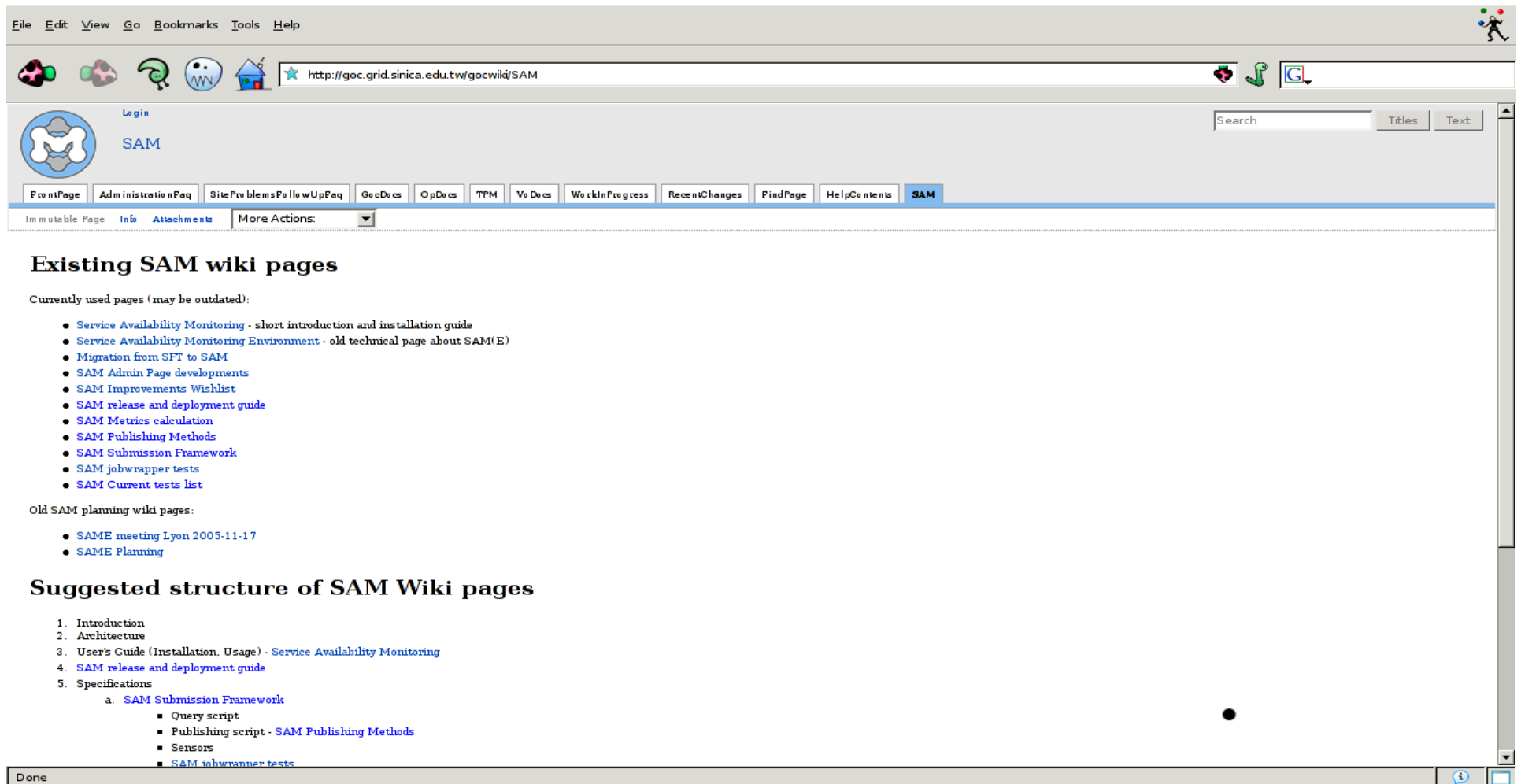
- Requested by experiments
  - motivation
    - SAM jobs might not reach all WNs → broken WN not detected
- simplified set of tests
- test execution by the CE wrapper with every GRID job
  - → all WNs reached
- test results:
  - passed to the job
  - stored in the SAM DB
- installation:
  - modified job-wrapper scripts: part of the release
  - tests: signed tarball installed on the software area

- Operations
  - infrastructure description with unique identification of WNs:
    - relation between CE, batch queues, WNs
    - detection of monitoring queues pointing to “carefully” selected WNs
    - counting WNs at the site without the risk of double counting due to shared batch farms
  - detection of sites with broken WNs
    - basic fabric monitoring for small sites
- Status:
  - wrapper scripts in production
  - tarball with tests has to be installed
  - visualization tools have to be developed

- glite WMS
- MyProxy
- VOMS
- Tier1 DB
- RGMA registry
  - being developed at RAL
- VOBOX
  - basic tests ready by end of Jan. (`gsissh`)

**volunteers are welcome! :)**

- all documentation on GocWiki
  - <http://goc.grid.sinica.edu.tw/gocwiki/SAM>



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http://goc.grid.sinica.edu.tw/gocwiki/SAM

Search Titles Text

FrontPage AdministrationFAQ SiteProblemsFollowUpFAQ GocDocs OpDocs TPM Vo Docs WorkingInProgress RecentChanges FindPage HelpContents **SAM**

Immutable Page Info Attachments More Actions:

## Existing SAM wiki pages

Currently used pages ( may be outdated):

- [Service Availability Monitoring](#) - short introduction and installation guide
- [Service Availability Monitoring Environment](#) - old technical page about SAM(E)
- [Migration from SFT to SAM](#)
- [SAM Admin Page developments](#)
- [SAM Improvements Wishlist](#)
- [SAM release and deployment guide](#)
- [SAM Metrics calculation](#)
- [SAM Publishing Methods](#)
- [SAM Submission Framework](#)
- [SAM jobwrapper tests](#)
- [SAM Current tests list](#)

Old SAM planning wiki pages:

- [SAME meeting Lyon 2005-11-17](#)
- [SAME Planning](#)

## Suggested structure of SAM Wiki pages

1. Introduction
2. Architecture
3. User's Guide (Installation, Usage) - [Service Availability Monitoring](#)
4. [SAM release and deployment guide](#)
5. Specifications
  - a. [SAM Submission Framework](#)
    - Query script
    - Publishing script - [SAM Publishing Methods](#)
    - Sensors
    - [SAM jobwrapper tests](#)

Done

# Impact of the test results



- Critical Tests
- COD alarms
- VO-specific submissions
- Availability Metrics

- set of SAM tests
  - defined by each VO
  - defined for each sensor
- defines the criteria for *availability* of a resource
- CT set manipulation
  - via FCR Admin Portal
  - only by the VO responsables
- CT set display
  - on FCR User Portal (see later)
  - also visible on SAM portal



- Operator on Duty
  - 12 ROCs in a weekly rotation
  - follow-up of site problems
- COD dashboard
  - main tool for CODs to use in the operations
- Critical (ops) SAM tests raise alarms
  - displayed on the COD dashboard
  - processed by the operators
  - alarm masking: focus on the real problems



# COD dashboard



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https://cic.in2p3.fr/index.php?section=cod&page=coddashboard&subpage=monitoring



CIC Home | EGEE Home | EGEE Intranet | Glossary



## CIC OPERATIONS PORTAL



HOME

VO Users

VO management

RC management

ROC management

COD management

OAG management

### COD management

HOME

Contacts

On Duty Dashboard

Resources infos

On Duty Procedures

CIC Management

Operation Metrics

VO infos

Administration

User-support

Broadcast/Publish infos

Identified with the following certificate:  
C=CH  
O=CERN  
OU=GRID  
CN=Judit Novak 0973

GGUS Tickets

Monitoring/Alarms

Scheduled Downtimes

SAM Admin's page

Other Tools

Hand Over

Today is 16/11/2006, it is 14:06 UTC

new alarms	assigned alarms	masked alarms	Total number of alarms
73	38	25	136

### New alarms (73)

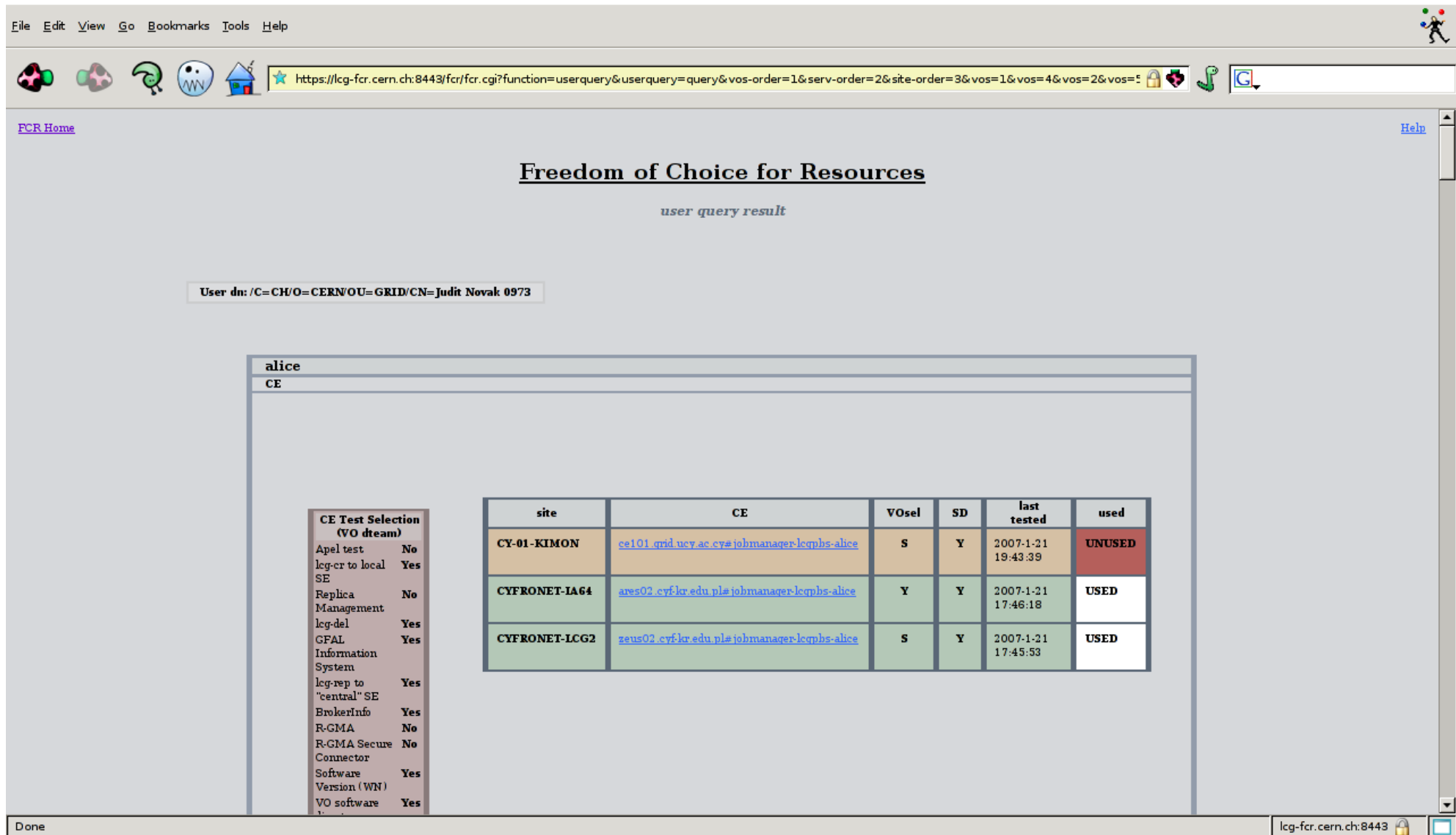
ID	Test	Node	Site	Region	Execution Time (UTC)	Last status
10902	CE-sft-brokerinfo	hb2055.cern.ch	CERN_PPS	CERN	2006-11-15 14:19:54	error
10895	CE-sft-brokerinfo	cg05.ific.uv.es	PPS-IFIC	SouthWesternEurope	2006-11-15 14:19:01	error
10896	CE-sft-brokerinfo	prep-ce-02.pd.infn.it	PPS-PADOVA	Italy	2006-11-15 14:18:57	error
10899	CE-sft-brokerinfo	glite-ce.scai.fraunhofer.de	SCAI-PPS	GermanySwitzerland	2006-11-15 14:19:39	error
10901	CE-sft-brokerinfo	grid1.csl.ee.upatras.gr	PreGR-02-UPATRAS	SouthEasternEurope	2006-11-15 14:14:52	error
10900	CE-sft-brokerinfo	cclegceli07.in2p3.fr	IN2P3-CC-PPS	France	2006-11-15 14:18:04	error
10898	CE-sft-brokerinfo	tb009.grid.sinica.edu.tw	Taiwan-PPS	AsiaPacific	2006-11-15 14:19:34	error
10897	CE-sft-brokerinfo	epbf005.ph.bham.ac.uk	UKI-SOUTHGRID-BHAM-PPS	UK_Ireland	2006-11-15 14:18:58	error
10830	CE-sft-job	chrlegce03.in2p3.fr	IN2P3-LPC	France	2006-11-14 20:52:42	error
11054	CE-sft-job	grid-ce.rzg.mpg.de	MPPMU	GermanySwitzerland	08:59:28	ok
11052	CE-sft-job	ce102.cern.ch	CERN-PROD	CERN	08:53:06	error
11077	CE-sft-job	gridce.pi.infn.it	INFN-PISA	Italy	13:02:55	error
10985	CE-sft-job	pps-ce-fzk.gridka.de	FZK-PPS	GermanySwitzerland	2006-11-15 16:16:42	error
10866	CE-sft-job	snowpatch.hpc.sfu.ca	SFU-LCG2	CERN	2006-11-15 03:55:04	error
10987	CE-sft-job	leg01.usatlas.bnl.gov	BNL-LCG2	CERN	2006-11-15 16:16:44	error
11071	CE-sft-job	ce04.pic.es	pic	SouthWesternEurope	11:59:29	error
11001	CE-sft-job	leg-ce.ecm.ub.es	UB-LCG2	SouthWesternEurope	2006-11-15 17:05:46	error
10697	CE-sft-job	egeece.ific.org.es	IFCA-LCG2	SouthWesternEurope	2006-11-14 11:53:16	error
10958	CE-sft-job	ce-fzk.gridka.de	FZK-LCG2	GermanySwitzerland	2006-11-15 15:36:33	error
11015	CE-sft-job	egee-ce.grid.niif.hu	egee.grid.niif.hu	CentralEurope	2006-11-15 18:57:55	ok
11045	CE-sft-job	grid002.jet.efda.org	EFDA-JET	UK_Ireland	05:57:51	ok
10825	CE-sft-job	t2-ce-01.mi.infn.it	INFN-MILANO	Italy	2006-11-14 19:52:59	error
11034	CE-sft-job	mu6.matrix.sara.nl	SARA-MATRIX	NorthernEurope	2006-11-15 22:10:30	maint
11062	CE-sft-job	bigmac-leg-ce.physics.utoronto.ca	TORONTO-LCG2	CERN	10:51:28	ok
10824	CE-sft-job	mallarme.cnb.uam.es	CNB-LCG2	SouthWesternEurope	2006-11-14 19:52:35	error
11046	CE-sft-job	gridit-ce-001.cnaf.infn.it	INFN-CNAF	Italy	05:58:13	ok
10889	CE-sft-job	heplnc201.pp.rl.ac.uk	UKI-SOUTHGRID-RALFP	UK_Ireland	2006-11-15 12:54:11	maint
11000	CE-sft-job	il01.hpc2n.umu.se	HPC2N	NorthernEurope	2006-11-15 17:05:45	error
11059	CE-sft-job	a01-004-128.gridka.de	FZK-LCG2	GermanySwitzerland	09:59:54	error
10999	CE-sft-job	axon-g01.ieeta.pt	IEETA-PPS	SouthWesternEurope	2006-11-15 16:36:48	error

Done

cic.in2p3.fr

- VO-specific test submissions
  - also: VO-specific tests for some VOs
- VO's Critical Tests
  - selected from
    - tests submitted by the VO
    - usually `ops` tests, if there's no SAM submission for the VO
  - determines the status of a resource for the VO
- resource status used in
  - Availability Metrics
  - by VOs to select resources that should be used (FCR)

## checking service status for multiple VOs



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https://lcg-fcr.cern.ch:8443/fcr/fcr.cgi?function=userquery&userquery=query&vos-order=1&serv-order=2&site-order=3&vos=1&vos=4&vos=2&vos=5

FCR Home Help

### Freedom of Choice for Resources

*user query result*

User dn: /C=CH/O=CERN/OU=GRID/CN=Judít Novak 0973

**alice**

CE

	site	CE	VOsel	SD	last tested	used
<b>CY-01-KIMON</b>		<a href="#">ce101.grid.ucy.ac.cy#jobmanager-lcgpbs-alice</a>	S	Y	2007-1-21 19:43:39	UNUSED
<b>CYFRONET-IA64</b>		<a href="#">ares02.cyfkr.edu.pl#jobmanager-lcgpbs-alice</a>	Y	Y	2007-1-21 17:46:18	USED
<b>CYFRONET-LCG2</b>		<a href="#">zeus02.cyfkr.edu.pl#jobmanager-lcgpbs-alice</a>	S	Y	2007-1-21 17:45:53	USED

**CE Test Selection (VO dteam)**

Apel test **No**

lcg-cr to local **Yes**

SE **Yes**

Replica Management **No**

lcg-del **Yes**

GFAL **Yes**

Information System **Yes**

lcg-rep to "central" SE **Yes**

BrokerInfo **Yes**

R-GMA **No**

R-GMA Secure Connector **No**

Software Version (WN) **Yes**

VO software **Yes**

lcg-fcr.cern.ch:8443

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https://lcg-sam.cern.ch:8443/sam/sam.py?sensors=CE&regions=Unknown&regions=CERN&regions=France&regions=UK\_Ireland&regions=GermanySv

## Service Availability Monitoring - CE

2006/11/16 - 10:42:15

### Tests Displayed

ops

- CE-sft-rgma-sc
- CE-sft\_lhcb\_software
- CE-totalcpu
- CE-sft-lcg-rm
- CE-sft-lcg-rm-cp3
- CE-sft-lcg-rm-del
- CE-sft-lcg-rm-cr3

show ops critical tests

Sort by: SiteName

ShowSensorTests

show	stat	description	sum
<input checked="" type="checkbox"/>	NA	no status available	0
<input checked="" type="checkbox"/>	OK	normal status	166
<input checked="" type="checkbox"/>	INFO	useful information	0
<input checked="" type="checkbox"/>	NOTE	important information	0
<input checked="" type="checkbox"/>	WARN	subject may fail soon	1
<input checked="" type="checkbox"/>	ERROR	subject has failed and problem is localized	48
<input checked="" type="checkbox"/>	CRIT	subject has failed and problem is fatal	1
<input checked="" type="checkbox"/>	MAINT	subject is under maintenance	8

### ops tests

testname	desc	crit
js	<a href="#">Job submission</a>	CT
ver	<a href="#">Software Version (WN1)</a>	CT
ca	<a href="#">CA certs version</a>	CT
bi	<a href="#">BrokerInfo</a>	CT
csh	<a href="#">CSH test</a>	CT
rm	<a href="#">Replica Management</a>	CT

No	RegionName	SiteName	NodeName	Status	ops					
					js	ver	ca	bi	csh	rm
1	SouthEasternEurope	<a href="#">AEGIS01-PHY-SCL</a>	<a href="#">ce.phy.hq.ac.ru</a>	ERROR	error	na	na	na	na	na
2	CERN	<a href="#">ALBERTA-LCG2</a>	<a href="#">lcqce02.nic.ualberta.ca</a>	OK	ok	3.0.2	ok	ok	ok	ok
3	CentralEurope	<a href="#">AMD64.PSNC.PL</a>	<a href="#">fanqom.man.poznan.pl</a>	OK	ok	3.0.2	ok	ok	ok	ok
4	France	<a href="#">AUVERGRID</a>	<a href="#">lut15auvergridce01.univ-lpclemont.fr</a>	ERROR	ok	3.0.2	ok	ok	ok	error
5	France	<a href="#">AUVERGRID</a>	<a href="#">lut43auvergridce01.univ-lpclemont.fr</a>	ERROR	error	na	na	na	na	na
6	France	<a href="#">AUVERGRID</a>	<a href="#">obsauvergridce01.univ-lpclemont.fr</a>	ERROR	ok	3.0.2	ok	ok	ok	error
7	AsiaPacific	<a href="#">Australia-UNIMELB-LCG2</a>	<a href="#">lcg-compute.hpc.unimelb.edu.au</a>	OK	ok	3.0.2	ok	ok	ok	ok
8	CERN	<a href="#">BEIJING-CNIC-LCG2-IA64</a>	<a href="#">ce.lcg.sdg.ac.cn</a>	OK	ok	2.7.0	ok	ok	ok	ok
9	CERN	<a href="#">BEIJING-LCG2</a>	<a href="#">lcq002.ihp.ac.cn</a>	OK	ok	3.0.2	ok	ok	ok	ok
10	NorthernEurope	<a href="#">BEgrid-KULeuven</a>	<a href="#">kqce01.ec.kuleuven.ac.be</a>	OK	ok	2.7.0	ok	ok	ok	ok
11	NorthernEurope	<a href="#">BEgrid-UGent</a>	<a href="#">gridce.atlantis.ugent.be</a>	ERROR	ok	2.7.0	ok	ok	ok	error
12	NorthernEurope	<a href="#">BEgrid-ULB-YUB</a>	<a href="#">gridce.uhhe.ac.be</a>	ERROR	ok	3.0.2	ok	ok	ok	error
13	SouthEasternEurope	<a href="#">BG-INKNE</a>	<a href="#">ce1.inrne.bas.bg</a>	OK	ok	3.0.2	ok	ok	ok	ok

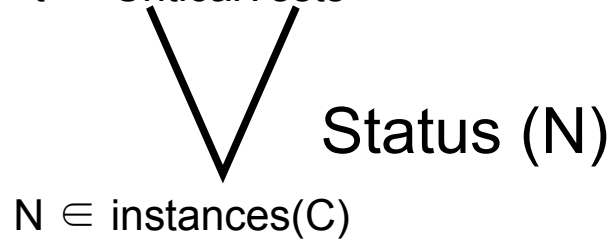
Done lcg-sam.cern.ch:8443

$\wedge$  = boolean AND  
 $\vee$  = boolean OR

Status of node N =

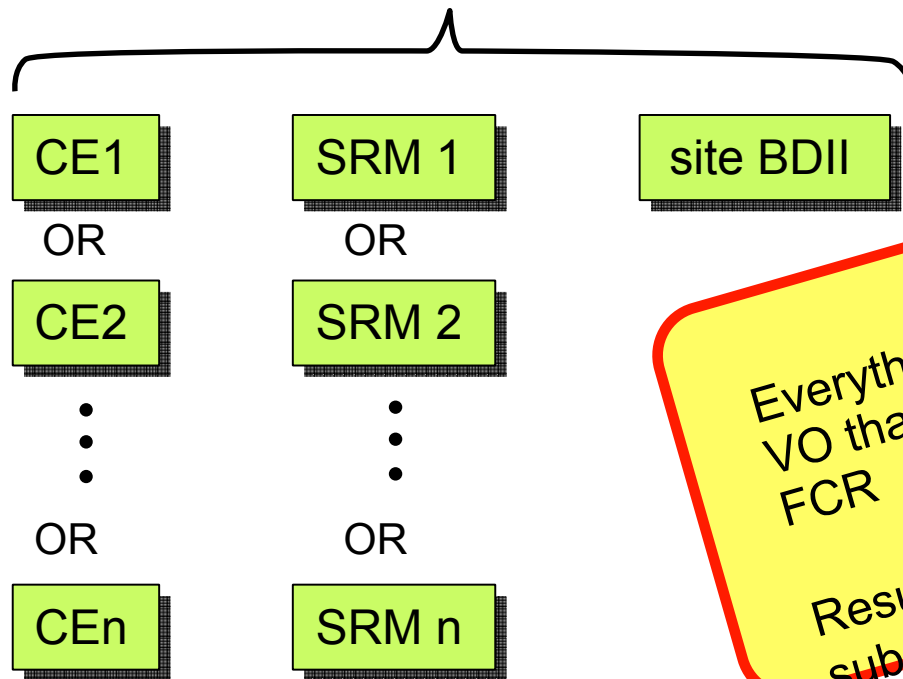


Status of service C =



Status of site S =

AND

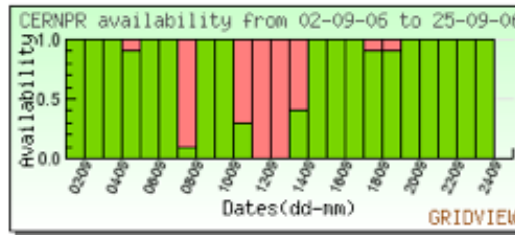


Everything is calculated for each VO that defined critical tests in FCR  
 Results make sense only if VO submits tests!!!

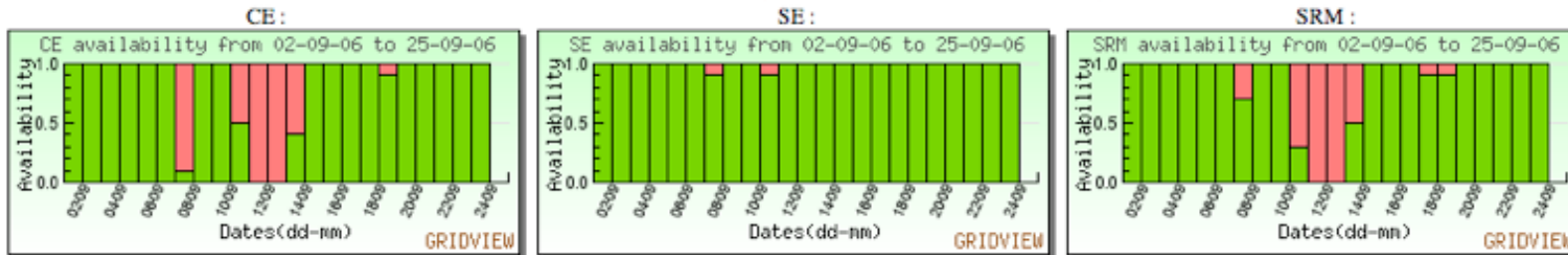
- service and site status in every hour
- daily, weekly, monthly availability
- scheduled downtime information from GOCDB
- details of the algorithm on GOC:

[http://goc.grid.sinica.edu.tw/gocwiki/SAME\\_Metrics\\_calculation](http://goc.grid.sinica.edu.tw/gocwiki/SAME_Metrics_calculation)

## Overall Service Availability for site CERNPR : Daily Report

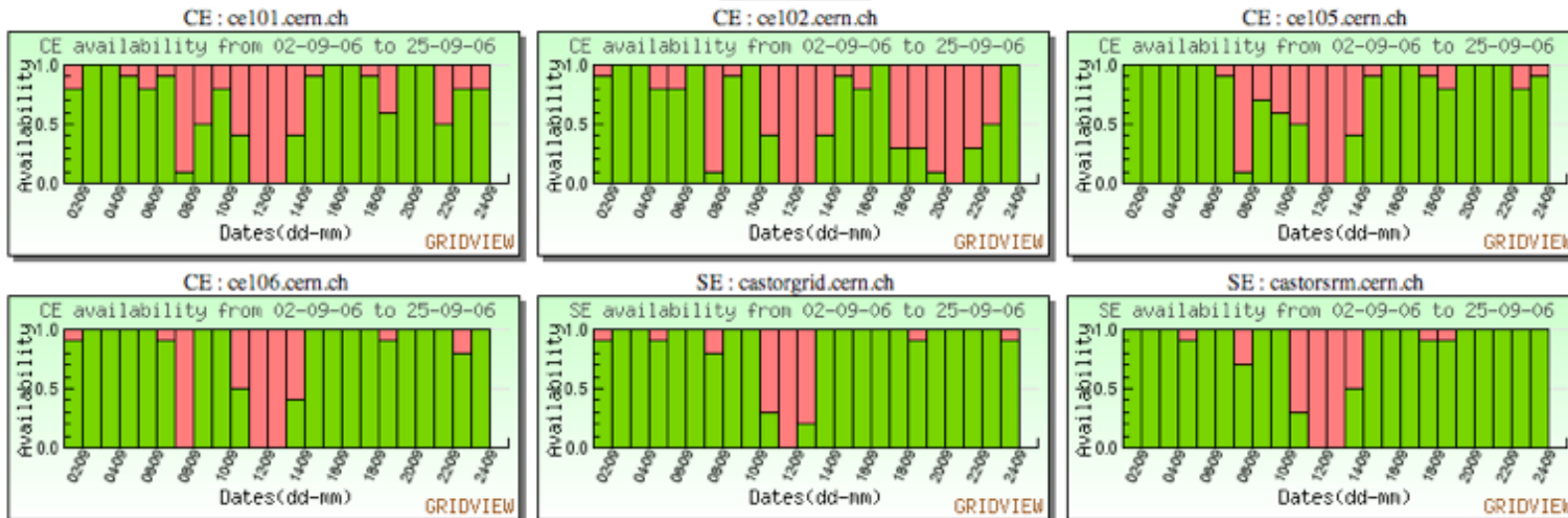


## Individual Service Availability for site CERNPR : Daily Report



## Service Instance Availability for site CERNPR : Daily Report

### Site Services





Availability of T0 and T1 sites including downtime and unscheduled downtime.

http://lcg-sam.cern.ch:8080/sqlldb/site\_avail.xsql

Workbook1

Date	BNL-LCG2	CERN-PROD	FZK-LCG2	IN2P3-CC	INFN-T1	RAL-LCG2	SARA-MATRIX	TRIUMF-LCG2	Taiwan-LCG2	pic																					
1/9/06	0	0	1	1	0	0	0.9	0	0.1	0	0	1	1	0	0	0.9	0	0.1	1	0	0	0.5	0	0.5	0	0.5					
2/9/06	0	0	1	0.9	0	0.1	0	0	1	0	0	1	1	0	0	0.7	0	0.3	1	0	0	0.8	0	0.2	0	0	1	1	0	0	
3/9/06	0	0	1	1	0	0	0	0	1	0	0	1	1	0	0	0.3	0	0.8	1	0	0	0.9	0	0.1	0	0	1	1	0	0	
4/9/06	0	0	1	1	0	0	0.3	0	0.8	0	0	1	1	0	0	0.6	0	0.4	0.88	0	0.13	0.4	0	0.6	0	0	1	0.8	0	0.2	
5/9/06	0	0	1	1	0	0	0.3	0	0.7	0	0.1	0.9	1	0	0	0.7	0	0.3	0.83	0	0.17	0.8	0	0.2	0	0	1	0.7	0	0.3	
6/9/06	0	0	1	1	0	0	0.5	0	0.5	0	1	0	0.6	0	0.4	0.5	0	0.5	0.5	0	0.5	0.3	0	0.8	0	0	1	1	0	0	
7/9/06	0	0	1	1	0	0	0.9	0	0.1	0	1	0	1	0	0	0.5	0	0.5	0.71	0	0.29	0.7	0	0.3	0	0	1	0.4	0	0.6	
8/9/06	0	0	1	1	0	0	1	0	0	0	0.8	0.2	0.9	0	0.1	0.8	0	0.3	0.79	0	0.21	0.3	0	0.7	0	0	1	1	0	0	
9/9/06	0	0	1	0.3	0	0.7	0.5	0	0.5	0	0.5	0.5	0.8	0	0.2	0.2	0	0.8	0.29	0	0.71	0.2	0	0.8	0	0	1	0.7	0	0.3	
10/9/06	0	0	1	1	0	0	0.6	0	0.4	0	0	1	1	0	0	0.7	0	0.3	1	0	0	0.9	0	0.1	0	0	1	1	0	0	
11/9/06	0	0	1	0.9	0	0.1	0	0	1	0	0	1	1	0	0	0.8	0	0.3	1	0	0	0.3	0	0.7	0	0	1	1	0	0	
12/9/06	0	0	1	0.3	0	0.7	0.3	0	0.7	0	0	1	1	0	0	0.3	0	0.7	1	0	0	0.5	0	0.5	0	0	1	0.7	0	0.3	
13/9/06	0	0	1	0	0	1	0.3	0	0.7	0	0	1	1	0	0	0.5	0	0.5	0.92	0	0.08	0.7	0	0.3	0	0	1	1	0	0	
14/9/06	0	0	1	0.2	0	0.8	0.8	0	0.3	0	0.5	0.5	1	0.5	0	1	0	0	1	0	0	0.8	0	0.3	0	0	1	1	0	0	
15/9/06	0	0	1	1	0	0	0.8	0	0.3	0	0	1	1	0.8	0	1	0	0	1	0	0	0.6	0	0.4	0	0	1	1	0	0	
16/9/06	0	0	1	1	0	0	0.9	0	0.1	0	0	1	1	0	0	1	0	0	1	0	0	0.2	0	0.8	0	0	1	1	0	0	
17/9/06	0	0	1	1	0	0	1	0	0	0	0	1	1	0	0	1	0	0	1	0	0	0.7	0	0.3	0	0	1	1	0	0	
18/9/06	0	0	1	1	0	0	1	0	0	0	0	1	1	0	0	1	0	0	1	0	0	0.6	0	0.4	0	0	1	1	0	0	
19/9/06	0	0	1	0.9	0	0.1	0.9	0	0.1	0	0	1	1	0	0	1	0	0	0.92	0	0.08	0.2	0.6	0.3	0	0	1	0.6	0	0.4	
20/9/06	0	0	1	0.9	0	0.1	0.3	0	0.7	0	0	1	1	0	0	0.9	0	0.1	0.58	0	0.42	0	0.7	0.3	0	0	1	0.7	0	0.3	
21/9/06	0	0	1	1	0	0	0.3	0	0.7	0	0	1	0.8	0	0.3	0.1	0	0.9	0.96	0	0.04	0	0	1	0	0	1	1	0	0	
22/9/06	0	0	1	1	0	0	1	0	0	0	0	1	1	0	0	0.8	0	0.3	1	0	0	0	0	1	0	0	1	1	0	0	
23/9/06	0	0	1	1	0	0	0.6	0	0.4	0	0	1	0.6	0	0.4	0.6	0	0.4	0.96	0	0.04	0	0	1	0	0	1	1	0	0	
24/9/06	0	0	1	1	0	0	0.9	0	0.1	0	0	1	0	0	1	0.4	0	0.6	1	0	0	0	0	1	0	0	0.3	0.8	0.9	0	0.1
Average	0		0.85		0.58		0		0.9		0.67		0.89		0.42		0		0.87												

For each site, there are [0-1] values in 3 columns representing:

- GREEN: the availability of the site.
- ORANGE: the scheduled downtime.
- RED: the unscheduled downtime.

Sheet1

Thanks for your attention!