CMS

Grid Model / Performance / Setups / Operations

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1st Regional Operating Centre for Latin America (ROC_LA) Workshop [8th October 2010]







- Overview of the CMS distributed Computing Model
- Some **performance** seen this 2010 year with *p-p* collisions @ 7 TeV
- Review of CMS services that run at the sites
- CMS Tier-2 description and expectations
- How good a CMS site is to run Workflows? Site Readiness
- Computing Shifts
- Tools for Monitoring + Meetings
- Useful <u>educational links</u>

Disclaimer: some plots are real example plots. Sometimes do not represent today's view of site performance

Data Flow of the CMS Experiment



Tier–0 (the accelerator centre)

Data acquisition & initial processing Long-term mass data storage CMS CERN Analysis Facility (latency critical data processing, high priority analysis) Distribution of data → Tier-1 centres

7 Tier-1s *("online" to the DAQ)*

High availability centers Custodial mass storage of share of data Data reconstruction and reprocessing Data skimming MC Simulation Distribute analysis data → Tier-2s **~50** Tier-2s <u>*in ~20 countries*</u>

End-user physics analyses Detector Studies MonteCarlo Simulation → Tier-1 Replication of data between Tier-2s

~50 Tier-3s <u>in ~10 countries</u>

Small centers, mainly located in Universities End-user physics analyses Marginal MonteCarlo Simulation, due to lack of resources Marginally support in Operations

8th March 2010

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CMS Computing Centers Map

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8	AT	BE	BR	CH	CN	CO	DE	EE	ES	FI	FR	GR	HU	IN	IT	KR	ΜХ	NZ	PK	PL	РТ	RU	TR	TW	UA	UK	US		
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Tier-0				1																								1	
Tier-1				1			1		1		1				1					7.000	52434A			1		1	1	8	
Tier-2	1	2	2	2	1		2	1	2	1	4		1	1	4	1			1	2	2	7	1	1	1	4	7	51	
Tier-3				1	1	1	1		1		1	3			6		1	1	-					1		6	28	52	
	1	2	2	5	2	1	4	1	4	1	6	3	1	1	11	1	1	1	1	2	2	7	1	3	1	11	36		

Registered sites in CMS SiteDB (Oct. 2010)

(Perf.1) 2010: Tier-0 \rightarrow Tier-1 transfers

- CMS Primary Datasets (PDs) custodially distributed according to Tier-1 tape pledges
- "Run2010A" data (June \rightarrow September) generated 513 TBs of custodial data
- All 7 Tier-1 sites receiving custodial data (peaks correspond to fills):
 - Averaged data transfer rates lower than expected; increasing trend ; some daily peaks exceeding 500 MB/s



Very good data transfer qualities (*)

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Maximum: 665.65 MB/s, Minimum: 0.00 MB/s, Average: 112.89 MB/s, Current: 167.35 MB/s



(Perf. 2) 2010: Tier-1s processing



- Tier-1 sites functioning well for prompt skimming and reprocessing
- Difficulties to spread the processing load according to pledges because of time constraints and very small amount of work
 - Using MC to maximize resource utilization on Tier-1 level (since 20th of August)



(Perf. 3) 2010: Tier-2s processing



- Approx. 20kjobs running at all the sites (50) at any time (150 kjobs/day done)
- Analysis activities dominant... Around 800 distinct users / month!
- Tier-2 utilization for MC production driven by requests (plus few opportunistic T3s)



CMS software shared area:

- CMSSW software installed automatically in shared area by CMS through Grid interface
- Two coordination teams (EGEE and OSG)

Squid servers:

- Used for distributed database infrastructure, stable and low effort
- Sites need to update to the latest release when announced
- 1 squid server for 800 slots, approx.
- Local WN disk space (needed for caching input files LazyDownload and temporary writing job output), needs to be sufficiently dimensioned:
 - CMS is working hard to restrict *all* file sizes to <10 GB and optimize workflows not to overfill WNs at the sites</p>
 - Normally, transfer limitations hit at 20GB
 - Ideally sites would have 20GB per core of local disk scratch



- **PhEDEx** Transfer service with correctly working **Trivial File Catalog** (TFC):
 - The TFC is essentially a common name space for translating logical file names to physical file name, used by Job Submission Framework as well
 - Data Manager associated with the site approve incoming transfer requests
 - At T1's, the File/Tape families are setup well in advance (LFNs are notified to sites via Savannah ticketing system and assigned to T1's Savannah Squads)
- Site-local-config.xml used to define local protocols used at the site by jobs, sets remote SE stage-out (if needed), describe multiple squids at the site (load balancing),...
- CMS Needs space in the SE to store persistent experimental data for analysis and processing access
 - Additionally we need temporary space for output files before they are merged together and transferred to their final destination
 - Temporary space is currently cleaned up by the local site, according to policies



- In summary, the Tier-2 sites provide:
 - services for local communities
- grid-based analysis for the whole CMS experiment (Tier-2 resources available through the grid)
- Monte Carlo simulation for the whole CMS experiment
- A "nominal" T2 is ~200TB of storage with 400 cpu's, expected to support >40 users
 - The Tier-2 is associated with one or more CMS Physics Groups
 - Sites aren't necessarily expected to provide interactive access/user interface to these users
- Sites are expected to install, configure and run appropriate Grid Middleware...
 - Currently CMS can run on LCG, OSG and NorduGrid
 - Compute Element(s) (CE,CREAM-CE) and a Storage Element(s) (SE), as SRM interface for WAN/LAN transfers
 - Tier-2 sites are expected to provide "working hours" support, this includes running the Grid Middleware
 - ... and to install, configure and run CMS services (help/support/monitors provided)



The CMS Tier-2 :: storage resources

A Tier-2 site must have a minimum of about 200 TB to be a functional site within CMS; such a site could host at least one Physics Group and centrally-controlled analysis data while still providing sufficient resources for their local users

Storage

Usage	Volume (nominal T2)	Volume (smaller T2)
MC production	20TB	10% of storage
Centrally allocated analysis data (RECO)	50 TB	30 TB
Physics group allocated analysis data (up to three groups)	50 TB per group supported	50 TB per group supported
Reserved for local community	50-100 TB	remaining storage
User generated data (~40 users)	0.5-1 TB per user supported	0.5-1 TB per user supported
Temporary stage out	1TB	1TB

Group	Technical Name	European Tier-2 Site(s)	Non-European Tier-2 site(s)
PAG:			
Forward physics	forward	T2_DE_DESY	T2_BR_UERJ, T2_US_Wisconsin
QCD	qcd	T2_DE_DESY, T2_FR_CCIN2P3, T2_HU_Budapest	T2_US_Caltech, T2_US_MIT
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For 2011, the "nominal" Tier-2 is expected to double: ~400TB



The CMS Tier-2 :: CMS data @ the site

- No use of File Catalogue being maintained at sites (e.g. LCG Local File Catalogue)
- CMS uses the namespace in the storage system and the Trivial File Catalogue (TFC) to map from a logical file name (/store/data/myfile) to a physical file name that jobs/transfers can access
- This also means the CMS namespace is clearly defined, such as:

Namespace guidelines

LFN namespace	Type of Data	Who has write permissions
/store	Base path of CMS namespace	na
/store/data	Real data from CMS, transferred to your site using PhEDEx	PhEDEx Operator user/role
/store/mc	Simulated data either transferred to your site using PhEDEx or created at your site	PhEDEx Operator, Central Operations roles
/store/user/username	Output from the users your site supports, identified by username	Person identified by username, restricted by DN
/store/group/groupname	Output from the groups your site supports, identified by group	Member of VOMS role identified by group
/store/results/groupname	Output from /store/group merged and catalogues in central DBS	Central Operations roles
/store/temp	Base path of temporary data in the CMS namespace	na
/store/temp/data	Temporary files produced by central operations during processing data from CMS	Central Operations roles
/store/temp/mc	Temporary files produced by central operations during production of simulated data	Central Operations roles
/store/temp/user	Temporary output from the users, identified by username: each user will write in /store/temp/user/	All CMS users

There are four other "reserved" portions of the namespace: /store/temp/transfer, /store/relval, /store/dqm and /store/lumi. In general you won't need to worry about them.

Data Bookkeeping System (DBS): DB & user API that indexes event-data data for CMS



The CMS Tier-2 :: CPU resources

- ~50% of the CPU at Tier-2s is regularly used by centrally run production activities
- This MC simulation data will be shipped to the associated Tier-1 centre
- The produced + intermediate files created are automatically <u>removed</u> once the production has completed
- The total nominal power is of 3500 HS06, so ~400 cores would be a nominal size for a Tier-2 site
- 2 GBs/core RAM memory 20GB /core local disk 1 MB/s/core agg. throughput (LAN)





- MC production needs to be shipped to the associated Tier-1
- Normally all production created in a region is shipped to its Tier-1 (data is transferred in chunks left plot)
- 48 Tier-2 sites participated in MC production this 2010 (1.5 PBs MC data avg ~30 TBs/site right plot)



Total: 1,583 TB, Average Rate: 0.00 TB/s



The CMS Tier-2 :: network (2/3)

- Tier-2 sites receive data from Tier-1s for further analysis (1-10 Gbps WAN desirable)
 - 50 sites have received data in 2010 (8.6 PBs of data \rightarrow avg. ~170 TBs/site)



Maximum: 2,015 MB/s, Minimum: 64.48 MB/s, Average: 616.01 MB/s, Current: 580.05 MB/s

Total: 8,606 TB, Average Rate: 0.00 TB/s



The CMS Tier-2 :: network (3/3)

- Significant effort from link certification team; CMS is having serious $T2 \rightarrow T2$ transfers
 - Good for Physics Group skims and replicating data among Tier-2s





CMS SiteDB :: keeping track

• **SiteDB** keeps track of all site contacts and responsibilities, configuration, CMSSW versions, associated T1 and resource pledges

HEPGRID UERJ :: Site De	etails	:	
		Dashboard D85 Discovery DataTransfer Si SiteD8 Navigation :: Site Directory - Person Directory - Reports - R	eDB CondDB TOMon Suppor tesource Pledges – Surveys
Status: CMS Name: T2_BR_UERJ : SAM Name: hepgrid_uerj	ns the OSG grid middleware. If you have a problem using HEPGRID, HERL please open		
a ticket in the Facilities Operations savannah		SiteDB :: HEPGRID_U	JERJ Resourc
To view the pledged resources for HEPGRID_UERJ click here.		Pledge	
		Below is the current resource pledge for <u>HEPGRID UERI</u> .	To edit the pledged resource click h
CMS Contacts	Site Configuration		
<u>ems contacts</u>	<u>Site comgutation</u>	View pledge for	Go
Eduardo Azevedo Revoredo	Site Configuration in CVS		
"Site Admin" "PhEDEx Contact"	T2 BR UERJ	Compute	
tel 1: None, tel 2: None	GOC information	Total processing power available to CMS.	
Jose Afonso Lajas Sanches	GOCDB Link	Cpu 690.0 (kSI2k)	
"Site Admin"	GSTAT information	Job Slots 400.0 (#)	
tel 1: None, tel 2: None	GSTAT	Storage	
Douglas Milanez	Compute Element(s)	Total storage allocated to CMS.	
"Site Admin"	osace64.heparid.ueri.br osace.heparid.ueri.br	Disk Store 380.0 (TB)	
tel 1: None, tel 2: None	Storage Element(s)	Tane Store 0.0 (TB)	
Andre Sznajder	Click to see DBS entries	Constant and the fee local usars and available for transfer fe	
"Data Manager"	se-dcache.hepgrid.ueri.br	via PhEDEx).	g.
tel 1: None, tel 2: None	PhEDEx configuration	Local Store 10.0 (TB)	
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- **Site Readiness** is a regular activity to:
- Measure the reliability of Grid sites when running CMS activities
- Provide sites with the information they need to solve eventual problems
- It runs as part of the CMS computing operations:
- Detailed reports at FacOps meetings and biweekly T2 support meetings
- Look at by Computing Shifters
- Takes into account several sources of information, for each CMS site:
 - Site availability, from CMS SAM tests
 - **Job Robot** success rate
 - Number of **commissioned** (certified) **transfer links** to/from other sites
 - **Data Transfer Qualities** to/from other sites



Site Availability - SAM tests (I)

- Use of the Site Availability Monitor (SAM) developed by EGEE for Grid operations (adapted for CMS)
 - Framework to run periodic tests on Grid services to check basic site & CMS functionalities

Computing resources

- Can run a job?
- Can use the CMS software?
- Can read local data?

Storage resources

- Can copy data in and out?
- Site is unavailable when fails at least one critical test
- Availability: fraction of time the site is available

(*) Tests run once per hour





8th March 2010

Site Availability - SAM tests (II)

Site Availability, last 24 hours







• Job Robot = a tool to submit test analysis jobs to CMS sites

- A set of agents (preparation, submission, collection)
- Uses CRAB, the CMS analysis job submission tool
- Jobs are submitted as a collection to the gLite WMS
- Reads a dataset at the sites of $\sim\!500~\text{GB}$
- Each day the job success rate per site is measured
- Site is OK if success rate last 24h is
 - > 90% (Tier-1) > 80% (Tier-2)
- Currently running ~25k jobs/day to 57 sites





Commission of Data Transfer links

- For sites to be usable, **data transfer links** need to be operational
- The Debugging Data Transfers (DDT) program, created July 2007, defined the metrics, a procedure/tools to certify links and assisted sites in solving problems
- The minimum requirements to COMMISSION a transfer link are:

5 MB/s sustained for 24h for Tier-2 \rightarrow Tier-1 links **20 MB/s** sustained for 24h for Tier-0 \rightarrow Tier-1 and Tier-1 (\leftrightarrow) \rightarrow Tier-X links

- Each COMMISSIONED link is enabled and is used in production
- Based on the operational needs, site is considered **OK** if

Tier1 sites

T0 \rightarrow T1 should be commissioned \geq 4 commissioned links from/to, respectively, other T1 \geq 20 commissioned links to T2s

<u>Tier-2 sites</u>

 \geq 2 commissioned links to T1 sites \geq 4 commissioned links from T1 sites



- The transfer quality on all active links is presently probed with low rate data transfers
 - All production links are continuously exercised with transfers at 0.5 MB/s/link (Debug)
 - This, added to Production transfers, allows to detect <u>systematic problems</u>, not only at the network level, but also in the data transfer services and the storage infrastructure



• CMS requires transfer qualities >50% on > half of links in relevant flows

Put all together: Site Readiness status



- Sites should be able to become again **READY** quickly:
 - the intermediate WARNING state gives sites reasonable time to recover
 - 2 consecutive days OK brings a **NOT-READY** site to **READY** (3)



Put all together: Site Readiness %

- Lifetimes of production/analysis activities in Tier-1 or Tier-2 sites is ~2 weeks
- Hence, the fraction of time a site has been stable and reliable (R or W) is estimated based on the last 15-days history of Site Readiness status (downtimes are ignored)

Site Readiness %^{15-days}



Tiers readiness constantly monitored

- Favorably evolution for T1s/T2s; Some room for improvement
- Site Readiness is a good first indicator things are ok at the site to run workflows
- Revised weekly at the Computing Operations Meeting





CMS Computing Operations Group

ightarrow CMS Computing Operations steered by 3 projects

Data Operations (coords: Gutsche / Klute)

- Responsible for central data processing and transfers: RAW data repacking and prompt reconstruction at T0, RAW data and MC rereconstruction and skimming at T1's, MC production at T2's
- Ensure central data consistency and data distribution to T0/T1s including custodial storage of primary datasets

Facilities Operations (coords: Kreuzer / Flix)

- Responsible of providing and maintain a working distributed computing fabric with a consistent working environment for Data Operations and Analysis users
- It involves coordination of facilities operation, resource management and liaison to external projects and organizations

Analysis Operations (coords: Wurthwein, Belforte)

Responsible for central data placement at T2s, CRAB server operations, validation, and support, and for metrics, monitoring and evaluation of the distributed analysis system

→ Strong central teams complemented by CMS contacts at Tiers, working in sync



Computing: Central Shifts

Additionally...

A **Computing Shift Person** (CSP) is active **24/7**:

- Few Primary Centres in multiple time zones.
- Many existing secondary CMS Centres worldwide.
 - permanent EVO room.
- Now: ~70 shifters in 3 time-zones distributed in ~10 remote centers around the world participate to 24/7 coverage of CMS Computing infrastructure and workflow monitoring.
 - ▶ 3 shifters/day enough Centres to have them on-duty in a locally convenient time.
- Complemented by a **Computing Run Coordinator** (CRC).
- Procedures for 24/7 coverage of Critical Services are being deployed, with proactive participation of the CRC.
- CRC acting as WLCG liason for daily Operations calls and biweekly T1 Operations meeting.



Ticketing System 1/2

GGUS

Savannah

FAQ/Wiki · Documentation	• Training • Contact • Masthead	LCC Savannah		
GGUS		Logged in as bonacor My Incoming Items My Items	CMS Computing Infrastructure Support - Support	ort: Browse Items
Home · Submit ticket	Registration · Support staff	My Groups	- (.) Display Criteria	
Welcome to Global Grid User Support		My Account Conf Logout	(т) Біаріаў Спіона	
Tickets @ GGUS	Latest news	This Page	Begin Previous Results 184 matching items - Items 1 to	50 Next Results Dend
Information on your GGUS account Submit a new ticket via browser Submit a new ticket via email	News from GGUS 2009-10-02 06:10 UTC I Network maintenance at FZK on Thursday, 2009-10-08 from 16:00 to 16:30 UTC	Clean Reload Printer Version @Related Recipes:	Item ID Summary	Submitted Assigned To Submitted
GGUS tickets for Daniele Bonacorsi ID Status Date Info • 502647 assigned 2009-10-13 Castor at CERN unavailable? • 52048 on hold 2009-10-10-22 TEST • Show my complete ticket flat (open/closed/subscribed) • Search ticket database	News from GGUS 2009-09-30 07:28 UTC • New release of the GGUS portal online News from GGUS 2009-03-19 13:36 UTC • GGUS CHEP'09 Poster • Recently created FAQs (last modified: 2009-09-09 09:09) • News at CIC-Portal	Search in Projects \$ Search	#110213 Commisioning Muon T2-T2 links #110216 WMS setup for cms Role=priorityuser and pool account limit #110274 October exercise: Fix required on Padova CE (deny #110274 /cms/Role=priorityuser) to avoid running on Padova instead of Legnaro	2009-09- cmscompinfrasup- 2913:42 ddt 2009-09- cmscompinfrasup- afanfani 2009-09- cmscompinfrasup- 2916:25 gittevms 2009-10- cmscompinfrasup- 02.09:43 t2/tiegnaro
Latest open tickets ID VO Info	GGUS tools/reports	Hosted Projects Register New Project	#110291 wms202 and wms218 at CEHN show problem in proxy delegation #110300 error with working dir, nomore priorityuser mapping, accessing a	04 11:19 glitewms atantani 2009-10- cmscompinfrasup- atantani
52364 none hi6 52384 none hi6 52382 Incb Cleaning <sapath>//hcb/dsta/CCRC08 52381 Incb Cleaning <sapath>/hcb/dsta/CCRC08 52381 Incb Cleaning <sapath>/hcb/dsta/CCRC08</sapath></sapath></sapath>	 GGUS Report Generator GGUS ticket timeline tool - TTT Escalation reports Metrics reports 	Contributors Wanted Statistics	#110386 Aborted jobs at Padova for users accessing dataset in Legnaro #110539 Grid Aborted at T2_FR_CCIN2P3	05 09:34 t2uspurdue atantani 2009-10- cmscompinfrasup- 12/10gnaro t2/10gnaro atanfani 2009-10- cmscompinfrasup- afanfani
52356 Ihob Could not determine shared area for site at tbib01	GGUS development plans	User Docs: Cookbook	#110555 failures accessing MC files (8001/8020) for instance ppMuX/Summer09	- 2009-10- cmscompinfrasup- afanfani
Scass inco Commune shallow and the state of the stat	Description of development procedures Submit a request for a new feature to GGUS	User Docs: In Depth Guide Get Support	#110517 Some CMSSW version published but not present	2009-10- cmscompinfrasup- 12 16:57 cmsswdeploy aholguin
S2349 none CE problem(s) detected for ca.c.d.umino.pt (UML., S2348 none RGMA problem(s) detected for apis.dsic.upv.es (UPV.,	Plans for upcoming releases Ongoing worklist & Release Notes	Contact Us	#110518 SRMv2 for T3_CO_Uniandes	2009-10- cmscompinfrasup- aholguin 12 17:00 sam
	GGUS Search	GNU/Savane	#110550 Problem with CC-IN2P3 AF	13 13:27 t2frccin2p3

GGUS

- Long tradition of the standard Global Grid User Support system
 - <u>Reaches the WLCG site-admins and the fabric-level experts</u>

Savannah

- Problem tracking, troubleshooting reference, statistics, ...
 - <u>Reaches 'squads' easy to define</u>: CMS contacts at Tiers, tools/services experts, ...
 - More: baseline tool for Offline Computing shifts, integrated with other CMS projects, ...



- CMS requested a Savannah-to-GGUS bridging:
 - Work finalized and being used in Operations (for Tier-1s)
 - 'normal' GGUS tickets are opened with this re-direction:
 - Savannah ticket stays 'on hold'
 - Savannah ticket gets automatically closed when GGUS ticket is closed.
- CMS Computing Run Coordinators (CRC's) to open TEAM or ALARM tickets:
 - TEAM role assigned to all CRC's by default.
 - ALARM role already assigned to core computing experts in CMS (6).
 - Additionally, ALARM role to be provided to the CRC on duty.



- Central **Squid Server Monitors**: <u>http://frontier.cern.ch/squidstats/status.html</u>
 - Individual squid MRTG charts (HTTP Hits/Requests; Traffic; Cached Objects)



CMS

Some tools used in daily Operations

- DashBoard: <u>http://dashboard.cern.ch/cms/index.html</u>
 - single entry point to a large fraction of monitoring data collected from the distributed CMS computing system.



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- DBS: <u>https://cmsweb.cern.ch/dbs_discovery/</u>
 - Provides a DBS QUERY LANGUAGE (DBS-QL), designed to help users to find out CMS data quickly.

Dashboard DBS D	iscovery DataTransfer SiteDB	CondDB TOMon Support	jflix » logout
Home - aSearch - Navigato	r – RSS – Status – Runs – Admin – Tools – He	- Contact - TinyURL	View
ADVANCED K	EYWORD SEARCH		
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		(Search) (1	Reset
MENU-DRIVE	N INTERFACE		
	Physics groups	Any	
	Data tier	Any	
		composed tier, e.g. GEN-SIM:	
	Software releases	** Please wait, while we retrieve your data	
	Data types	Any	
	Brimany dataset/		
	MC generators	Any 🛟	
		Find Reset	



PhEDEx: <u>http://cmsweb.cern.ch/phedex</u>

Provides the data placement and the file transfer system for the CMS experiment

PhEDEx -	CMS Data Transfers	nts <u>Reports</u> <u>Next-gen website</u>	DB Instance: Production <u>»»</u> Jose Flix Sign out Logged in via Certificate
Overview	About Documentation Presentations	HyperNews Forum Support Tracker Developers	Data Service
Info	Activity	Data	
Overview	Rate	Replicas	
About	Rate Plots	Subscriptions	
Documentation	Queue Plots	LoadTest Injections	
Presentations	Quality Plots	Verification	
HyperNews Forum	Routing		
Support Tracker	Transfer Details		
Developers	Deletions		
Data Service	Recent Errors		
Requests	Components	Reports	
Overview	Status	Daily Reports	
Create Request	Processes	Daily Report	
View/Manage Requests	Links	File Sizes	
		Site Usage	
		Group Usage	

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- SSB: <u>http://dashb-ssb.cern.ch/dashboard/request.py/siteviewhome</u>
 - The Site Status Board helps shifters to evaluate realtime status of CMS sites
 - Additionally, it is used to keep track of other values (like Site Readiness...)

Inde															
	X		Exp	ande	d Table		Grid	imap			Alternat	ive views		Adn	nin
t the mouse over a cking on a column	ny column head header will disp	der to get the alay the evolu	descr ition of	iption of that of	of the column olumn over the	last 24 hours									
			SAM T	TESTS			Site u	sage	Phe	dex					
Site Name	<u>Visible</u>	JobRobot	CE	SRM	Production	Analysis	Running	Pending	In rate	Out rate	<u>Links</u> (expand this column)	Maintenance (expand this column)	Under investigation	SiteIssues	
O CH CERN	n/a	n/a	DK	<u>DK</u>	100%(5)	91%(2065)	n/a	n/a	n/a	n/a	n/a	1/2 combined		info	n/a
CH CERN	n/a	97%(300)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1/5 combined	n/a	mark	n/a	n/a
DE KIT	OK	99%(403)	<u>OK</u>	<u>OK</u>	100%(1919)	100%(105)	1115	18	n/a	n/a	2/5 combined	1/2 combined		info	n/a
ES_PIC	OK	100%(500)	<u>OK</u>	OK	100%(330)	n/a	452	48	n/a	n/a	2/5 combined	1/2 combined		info	n/a
FR_CCIN2P3	OK	99%(600)	<u>OK</u>	<u>OK</u>	100%(1805)	100%(1)	932	14	n/a	n/a	2/5 combined	1/2 combined		info	n/a
I_IT_CNAF	<u>OK</u>	n/a	01101	EITO!	100%(581)	n/a	106	<u>61</u>	n/a	n/a	2/5 combined	1/2 combined	mark	info	n/a
TW ASGC	OK	97%(200)	DK	<u>OK</u>	100%(1855)	n/a	494	810	n/a	n/a	2/5 combined	1/2 combined		info	n/a
1 UK RAL	<u>OK</u>	100%(500)	<u>OK</u>	OK	100%(29)	n/a	10	61	n/a	n/a	2/5 combined	1/2 combined		info	n/a
1 US FNAL	<u>OK</u>	100%(1000)	<u>OK</u>	OK	100%(14819)	100%(6454)	13	530	n/a	n/a	2/5 combined	1/2 combined		info	n/a
2 AT Vienna	<u>OK</u>	100%(400)	<u>OK</u>	<u>OK</u>	100%(1248)	100%(38)	407	368	n/a	n/a	2/5 combined	1/2 combined		info	n/a
2 BE IIHE	<u>OK</u>	HEPAL SDD	<u>OK</u>	<u>OK</u>	100%(2386)	100%(4282)	397	315	n/a	n/a	2/5 combined	1/2 combined		info	n/a
2 BE UCL	<u>DK</u>	99%(500)	<u>OK</u>	OK	100%(915)	100%(53)	357	15	n/a	n/a	2/5 combined	1/2 combined		info	n/a
2 BR SPRACE	<u>OK</u>	90%(500)	<u>OK</u>	OK	n/a	99%(129)	82	24	n/a	n/a	2/5 combined	1/2 combined		info	n/a
2 BR LIERJ	(Internet in the second	n/a	<u>OK</u>	EI101	n/a	n/a	n/a	305	n/a	n/a	2/5 combined	1/2 combined	mark	info	n/a
2 CH CSCS	OK	100%(500)	DK	OK	100%(462)	100%(4521)	721	1605	n/a	n/a	2/5 combined	1/2 combined		info	n/a
CN Beijing	<u>OK</u>	98%(400)	OK	OK	100%(1174)	100%(2)	446	829	n/a	n/a	2/5 combined	1/2 combined		info	n/a
2 DE DESY	<u>OK</u>	100%(500)	<u>OK</u>	<u>OK</u>	100%(1535)	100%(4573)	1799	4271	n/a	n/a	2/5 combined	1/2 combined		info	1 Unkers
2 DE RWTH	<u>OK</u>	n/a	<u>OK</u>	OK	100%(511)	100%(66)	5	3079	n/a	n/a	2/5 combined	1/2 combined		info	n/a
2 EE Estonia	<u>OK</u>	5396/400	at the	<u>OK</u>	100%(1)	100%(203)	<u>45</u>	74	n/a	n/a	2/5 combined	1/2 combined	mark	info	1 Unkers
ES CIEMAT	<u>OK</u>	100%(500)	<u>OK</u>	<u>OK</u>	100%(358)	100%(2064)	723	238	n/a	n/a	2/5 combined	1/2 combined		info	n/a
ES IFCA	OK	99%(401)	<u>OK</u>	<u>OK</u>	100%(21)	91%(1344)	436	298	n/a	n/a	2/5 combined	1/2 combined		info	n/a
2 FI HIP	warning 1/2	100%(593)	<u>OK</u>	<u>OK</u>	n/a	100%(2364)	764	602	n/a	n/a	2/5 combined	1/2 combined	mark	info	n/a
FR CCIN2P3	OK	<u>3994(506)</u>	DK	<u>OK</u>	100%(2533)	100%(765)	235	12	n/a	n/a	2/5 combined	1/2 combined		info	n/a
2 FR GRIF IRFU	<u>OK</u>	91%(500)	<u>OK</u>	<u>OK</u>	100%(765)	100%(65)	205	365	n/a	n/a	2/5 combined	1/2 combined		info	n/a
2 FR GRIF LLR	OK	100%(500)	DK	OK.	100%(507)	100%(897)	451	874	n/a	n/a	2/5 combined	n/a		info	n/a





















1st Regional Operating Centre for Latin America (ROC_LA) Workshop















Useful links for documentation

- * Main CMS twiki page: <u>https://twiki.cern.ch/twiki/bin/view/CMS/</u>
- * Computing Model (a bit outdated): <u>https://twiki.cern.ch/twiki//bin/view/CMS/WorkBookComputingModel</u>
- * Operational Procedures for CMS Sites: <u>https://twiki.cern.ch/twiki/bin/viewauth/CMS/SiteOperationProcedures</u>
- * Facilities Operations: <u>https://twiki.cern.ch/twiki/bin/view/CMS/FacilitiesOps</u>
- * Data Operations: <u>https://twiki.cern.ch/twiki/bin/view/CMS/DataOps</u>
- * Analysis Operations: <u>https://twiki.cern.ch/twiki/bin/viewauth/CMS/AnalysisOps</u>
- * The CMS Tier-2 admin guide: <u>https://twiki.cern.ch/twiki/bin/view/CMS/T2AdminGuide</u>
- * CMS Tier-2 Physics Group associations: <u>https://twiki.cern.ch/twiki/bin/view/CMS/CMST2Associations</u>
- * Tier-2 Physics Group Association Process: <u>https://twiki.cern.ch/twiki/bin/view/CMS/CMST2AssociationProcess</u>
- * Physics Groups Tier-2 storage usage: <u>https://cmsweb.cern.ch/phedex/prod/Reports::GroupUsage</u>
- * A review on Tier-2 activities: <u>https://twiki.cern.ch/twiki/bin/viewauth/CMS/Tier2Activities</u>
- * Tier-2 Pool Account mapping and Fair Share Settings: <u>https://twiki.cern.ch/twiki/bin/viewauth/CMS/Tier2BSFairshares</u>