



World-wide daily computing operations in ATLAS

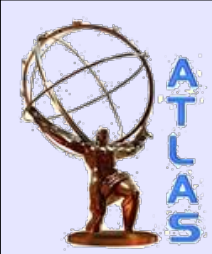
Jaroslava Schovancová (FZU & CESNET)

Xavier Espinal (PIC & IFAE)



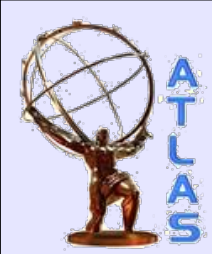
Outlines

- ATLAS Computing resources
- ATLAS Distributed Computing Operations Shifts
- Monitoring tools
- Bug reporting
- Past year experience



ATLAS Computational Requirements

- Event generation at 200 Hz, avg. size 1.6 MB (320 MB/s)
 - ~ 2×10^9 events per year
 - ~ 10 PB of data per year
- Data will be analyzed by ~2000 physicists worldwide
- Large amount of simulated data required
 - detector design optimization
 - physics performance estimates
 - software and computing infrastructure tests
- Funds, electrical power, HR for a single all-purpose lab too high => grid-computing system
- Responsibility for storage, generation, re-processing of data is shared ...

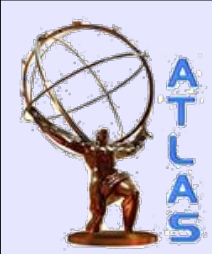


ATLAS Computational Resources

- 1 Tier0 (CERN), 10 T1s (CA, DE, ES, FR, IT, NDGF, NL, TW, UK, US)
- >100 sites worldwide: > 25k cores
 - TiersOfATLASCache.py as of 2009-03-01
- >200 SEs: ca 90 PB of disk space (lcg-infosites)

- Large number of MC tasks
- Millions of file transfers
- User analysis
- SW bugs
- ...

=> need for a permanent shift team: ADCOS



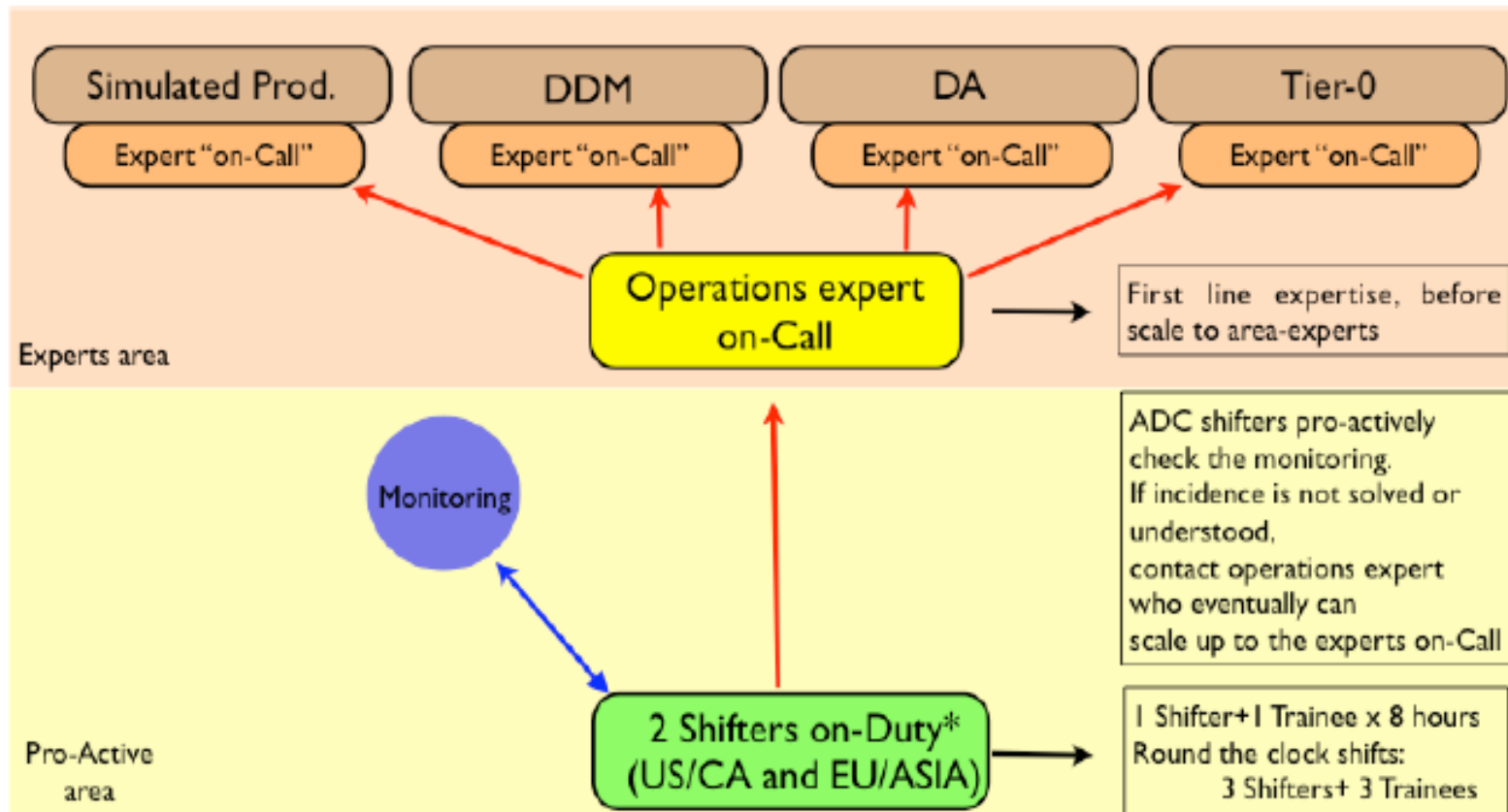
ADCOS at a glance

ATLAS Distributed Computing Operations Shifts (ADCOS)

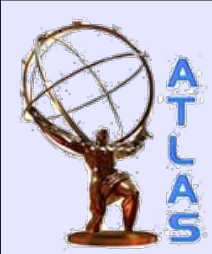
- Monitor ATLAS distributed computing services
- Provide Quality of Services (QoS) for all data processing
- Global shifts since January 2008
- World-wide shifts
- 3 time zones
- 3 shifters
- + trainees per day



ADCoS Infrastructure



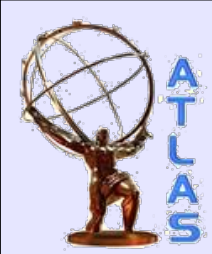
*Starting Phase



Information flow

- On shift
 - Hand-over reports
 - Mailing lists
 - eLog
 - Virtual Control Room
 - Instant messaging (jabber, skype)
- Meetings
 - Weekly meetings
 - Training sessions
- Documentation at ADCOS Twiki page

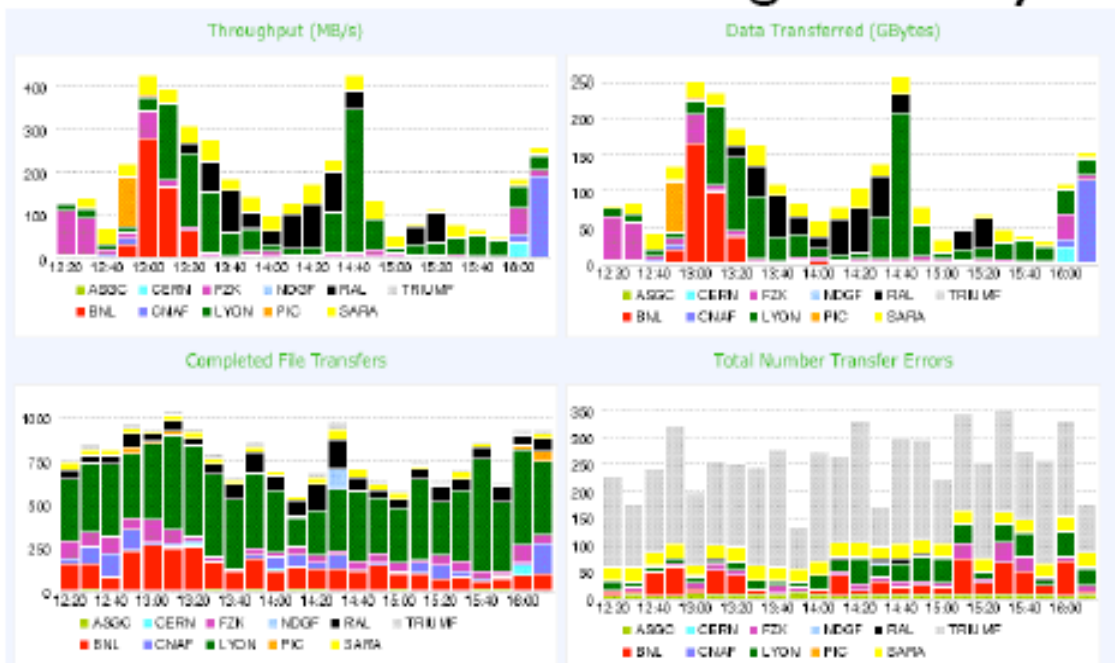
<https://twiki.cern.ch/twiki/bin/view/Atlas/ADCoS>



Monitoring services

- Past year MC production:
 - # jobs: ~21 M (16.2 M success, 77 % eff.)
 - walltime: ~ 3.6×10^{11} s (83 % eff.) => 11k CPU-years
- DDM: DDM dashboard, T0 dashboard
 - T0-T1
 - T1-T1
 - T1-T2
- MC Production: ProdSys dashboard, Panda Monitor
- Central Services: Central Services Monitor
- Sites health: GOC DB, Functional tests

The Distributed Data Management System



Activity Summary (Last 4 Hours)

Click on the cloud name to view list of sites

Cloud	Transfers			Registrations		Errors		Services	
	Efficiency	Throughput	Successes	Datasets	Files	Transfer	Registration	DQ	Grid
ASGC	52%	0 MB/s	167	3	167	152	0		
BNL	84%	25 MB/s	3105	187	3070	612	0		
CERN	100%	2 MB/s	128	0	128	0	0		
CNAF	100%	10 MB/s	1109	42	1106	0	0		
FZK	84%	19 MB/s	1318	45	1370	253	0		
LYON	95%	62 MB/s	9690	1553	8107	546	0		
NDGF	94%	0 MB/s	123	0	123	8	0		
PIC	99%	5 MB/s	225	9	224	3	0		
RAL	95%	30 MB/s	1764	154	1767	88	0		
SARA	55%	27 MB/s	718	108	718	595	0		
TRIUMF	11%	1 MB/s	489	11	488	3892	0		

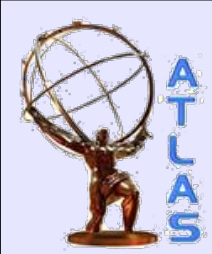


The Distributed Data Management System

TRUMF	11%	1 MB/s	489	11	488	3892	0		
Click on the site name to go to the site page, '+' to see statistics for this site per source NEW									
+ ALBERTA	0%	0 MB/s	0	0	0	0	0	OK	ok
+ ALBERTA-LOG2_DATADISK	0%	0 MB/s	0	0	0	0	0	OK	ok
+ ALBERTA-LOG2_MCDISK	0%	0 MB/s	0	0	0	0	0	OK	ok
- MCGILL	0%	0 MB/s	0	0	0	13	0	OK	unkno
SAM TEST RESULTS (UTC)					SCHEDULED DOWNTIMES (UTC)				
TYPE	ENDPOINT	STATUS	LAST UPDATE		NO DOWNTIMES SCHEDULED				
SE	atlas-se.physics.mcgill.ca	down	2008-05-04 22:29:06						
TRUMF-LOG2_DATADISK	0%	0 MB/s	0			13			
[FTS] FTS State [Failed] FTS Retries [3] Reason [DESTINATION error during PREPARATION phase: [CONNECTION] fai led to contact on remote SRM [http://atlas-se.physics.mcgill.ca:8443/srm/manager2]. Givin' up after 3 tries] Source Host [srm.triumf.ca]									
+ MONTREAL	0%	0 MB/s	0	0	0	0	0	OK	ok
+ SFU	0%	0 MB/s	0	0	0	0	0	OK	ok
+ SFU-LOG2_DATADISK	0%	0 MB/s	0	0	0	0	0	OK	ok
+ SFU-LOG2_MCDISK	0%	0 MB/s	0	0	0	0	0	OK	ok
+ TORON	0%	0 MB/s	0	0	0	78	0	OK	ok
+ TORONTO-LOG2_DATADISK	0%	0 MB/s	0	0	0	3781	0	OK	ok
+ TORONTO-LOG2_MCDISK	0%	0 MB/s	0	0	0	0	0	OK	ok
+ TRIUMF-LOG2_DATADISK	0%	0 MB/s	0	0	0	0	0	OK	unkno
+ TRIUMF-LOG2_DATATAPE	0%	0 MB/s	0	0	0	0	0	OK	unkno
+ TRIUMF-LOG2_MCDISK	96%	1 MB/s	485	9	484	20	0	OK	unkno
+ TRIUMF-LOG2_MCTAPE	0%	0 MB/s	0	0	0	0	0	OK	unkno
+ TRIUMFDISK	0%	0 MB/s	0	0	0	0	0	OK	unkno
+ TRIUMFTAPE	0%	0 MB/s	0	0	0	0	0	OK	unkno
+ UVIC	0%	0 MB/s	0	0	0	0	0	OK	ok
+ VICTORIA-LOG2_DATADISK	0%	0 MB/s	0	0	0	0	0	OK	ok

SE in troubles (GGUS)





Monitoring MC Production



Data: Tier 0 Data: Production Jobs: Production Jobs: Analysis Panda: Production

Tasks Grid jobs Summaries Shifters Functional tests Admin User Guide Feedback

find

view

- by grid
- by cloud
- by dest_cloud
- by executortype
- by executor
- by site
- by cluster
- by task

select cloud

- LYON
- None
- BNL
- FAL
- NDGF
- FZK
- SARA
- TRIUMF
- CNAF
- PIC
- ASGC
- CERN

2009-02-26 17:00:00 — 2009-02-27 05:59:59



cloud	defined	assigned	waiting	activated	running	holding	transferring	success	failure	efficiency
None	210	318	3	5702	449	472	334	341	11800	2.8%
LYON	0	7	0	5456	2191	755	129	10529	573	94.8%
FAL	0	297	0	1454	3304	365	237	7348	571	92.8%
BNL	0	2778	0	326	1265	4088	2902	5384	101	98.2%
NDGF	0	0	0	318	4450	0	0	4949	513	90.6%
CNAF	0	20	0	296	369	92	901	4164	112	97.4%
SARA	0	42	0	734	819	531	1404	3200	450	87.7%
FZK	0	1	0	748	976	107	3087	3342	66	98.1%
TRIUMF	0	0	0	1131	1069	465	684	3136	24	99.2%
PIC	0	247	0	1642	912	329	147	1909	195	90.7%
ASGC	0	20	0	770	20	403	110	0	18	0%
CERN	0	0	0	40	0	1	0	0	0	-
total	210	3730	3	18617	15824	7608	9935	44302	14423	75.4%

CRITICAL WARNING NORMAL GOOD NO_ACTIVITY



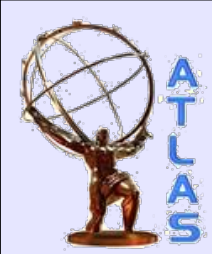


Monitoring MC Production

Production job summary, last 12 hours (Details: [errors](#), [nodes](#))

Cloud Information	Nodes	Jobs	Latest	Pilots (3hrs)	defined	assigned	waiting	activated	sent	running	holding	transferring	finished	failed tot trf other			
Overall Production	9413	9046	02-26 22:38	33154	372 / 0	7417 / 0	3 / 0	17710 / 2	3 / 0	12583 / 0	3621 / 0	13925 / 1493	47634 / 0	15460 / 10937	25%	0%	7%
CA	441	10	02-26 22:38	1876	0	928	0	1161	0	1024	23	318 / 33	1079	5	0%	0%	0%
CERN	1	0	02-25 05:51	163	0	0	0	40	0	0	0	0 / 0	0	0			
DE	2281	398	02-26 22:38	4363	0	78	0	2857	0	2591	80	3874 / 235	6033	199	3%	0%	3%
ES	224	460	02-26 22:38	1276	0	36	0	2548	0	819	2	198 / 0	3947	230	6%	0%	6%
FR	2273	1050	02-26 22:38	5554	288	7	0	6260	2	3411	199	201 / 2	7937	525	6%	0%	6%
IT	539	438	02-26 22:38	1400	0	0	0	955	0	484	34	1711 / 265	5134	219	4%	0%	4%
ND	5	8	02-26 22:10	1746	0	0	0	0	0	1	0	0 / 0	0	4	100%	0%	100%
NDGF	0	0	0	0	0	0	0	0	0	0	0	0 / 0	0	0			
NL	524	1232	02-26 22:38	2466	0	2	0	1892	1	910	200	2094 / 1	4555	616	12%	0%	12%
TW	43	0	02-26 21:44	0	0	331	0	1008	0	0	0	110 / 110	0	0			
UK	1467	2798	02-26 22:38	4979	79	6	0	46	0	697	191	452 / 2	11101	1399	11%	0%	11%
US	1615	2652	02-26 22:38	9331	11	6029	0	942	0	2646	2892	4967 / 845	7848	1326	14%	1%	14%





Monitoring Central Services

Service Level Status overview

ATLAS Distributed Computing Central Services

ADC Central Services






availability: 

[\(more\)](#)

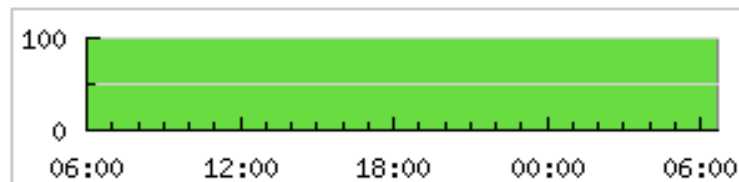
percentage: 100%

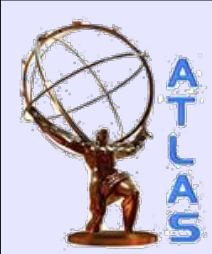
status: **available**

this service consists of:

-  ATLAS_DDM_VOBOXES
-  ATLAS_CC
-  ATLAS_DDM_Tracker
-  ATLAS_DDM_Deletion
-  ATLAS-AMI

availability in the last 24 hours [\(more\)](#):





Monitoring Sites

GOCDB³ version 3.1.2

GOCDB >> Downtime admin >> Downtime info

ACTORS Downtime display

[Home](#)
[Downtime overview](#)
[Add new downtime](#)
[Browse sites](#)
[List sites by ROC](#)
[List sites in scope](#)
[Request a new site](#)
[Browse nodes](#)
[Request a role](#)
[Show Tier1 contacts](#)

 Users
 Sites
 Nodes

[Current Developments](#)
[Help](#)
[Contact us](#)

NOT REGISTERED Downtime display

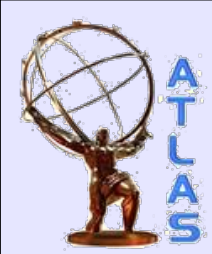
[Register a new account](#)
 Has your certificate changed?
[Request certificate DN change](#)

🕒 2009-02-27, 06:00:15[UTC]
🕒 Time slot: 1 week

This is a complete list of all scheduled downtimes. To view only downtimes under your scope, click [here](#)

[Add a new downtime](#)

Description	Site	Severity	Classification	Start	End	Actions
major electrical works in computer room. Opportunity to deploy a few changes.	EGEE/France/PS-IPGP-LCG2	OUTAGE	SCHEDULED	2009-02-27, 15:29:00 [UTC]	2009-03-11, 14:29:00 [UTC]	🔍 🌐 🗑️
work is in draining for some days, then hardware migration	EGEE/Italy/INFN-CNAF/Egee-wms@01.cnaf.infn.it	OUTAGE	SCHEDULED	2009-02-27, 14:27:00 [UTC]	2009-03-03, 14:27:00 [UTC]	🔍 🌐 🗑️
Move virtual machine to other local array	EGEE/SouthWesternEurope/LIP-Lisbon/ce01-cms.lip.pt	OUTAGE	SCHEDULED	2009-02-27, 09:00:00 [UTC]	2009-02-27, 19:00:00 [UTC]	🔍 🌐 🗑️
Move virtual machine to other local array	EGEE/SouthWesternEurope/LIP-Lisbon/ce01-atlas.lip.pt	OUTAGE	SCHEDULED	2009-02-27, 09:00:00 [UTC]	2009-02-27, 19:00:00 [UTC]	🔍 🌐 🗑️
Campus core router reconfiguration. Service will be interrupted 2-3 times for a few minutes.	EGEE/CentralEurope/BUDAPEST	AT_RISK	SCHEDULED	2009-02-27, 07:00:00 [UTC]	2009-02-27, 17:00:00 [UTC]	🔍 🌐 🗑️
Maintenance [IN PROGRESS]	EGEE/AsiaPacific/KEK-KISTI-HEP	AT_RISK	SCHEDULED	2009-02-26, 23:00:00 [UTC]	2009-03-04, 09:00:00 [UTC]	🔍 🌐 🗑️
Various minor dCache reconfiguration changes, upgrade sm all PostgreSQL DB's on dCache accounting and arm nodes, move the PinManager, upgrade gLite SW on CE's, and upgrade the OS on one Xen Server (affecting availability of site-bdi, Rm and monbox).	EGEE/CERN/ITUMF-LCG2/monbox.triumf.ca EGEE/CERN/ITUMF-LCG2/ce1.triumf.ca EGEE/CERN/ITUMF-LCG2/ce2.triumf.ca EGEE/CERN/ITUMF-LCG2/site-bdi.triumf.ca	OUTAGE	SCHEDULED	2009-02-26, 18:00:00 [UTC]	2009-02-26, 20:00:00 [UTC]	🔍 🌐 🗑️
DNS problems [IN PROGRESS]	EGEE/SouthEasternEurope/BG05-SJGrid	OUTAGE	UNSCHEDULED	2009-02-26, 16:00:00 [UTC]	2009-02-27, 08:00:00 [UTC]	🔍 🌐 🗑️
Severe performance problems with shared filesystem, investigation pending, CE needs to be drained [IN PROGRESS]	EGEE/NorthernEurope/SE-SNIC-TR/arc-cc01.pdc.kth.se EGEE/CentralEurope/HEPHY-UIBK/grid-mon.uibk.ac.at EGEE/CentralEurope/HEPHY-UIBK/hepx4.uibk.ac.at EGEE/CentralEurope/HEPHY-UIBK/grid01.uibk.ac.at EGEE/CentralEurope/HEPHY-UIBK/grid.uibk.ac.at	OUTAGE	UNSCHEDULED	2009-02-26, 14:46:00 [UTC]	2009-02-27, 18:00:00 [UTC]	🔍 🌐 🗑️
unidentified problems on CE's [IN PROGRESS]	EGEE/NorthernEurope/VU-MIP-LCG2/grid.mfsv.it	OUTAGE	SCHEDULED	2009-02-26, 12:37:00 [UTC]	2009-02-27, 23:59:00 [UTC]	🔍 🌐 🗑️
Upgrade of a couple of dCache components. If all goes well, service interruption will not be noticeable.	EGEE/NorthernEurope/NDGF-TJ/arm.mdf.org	AT_RISK	SCHEDULED	2009-02-26, 12:20:00 [UTC]	2009-02-26, 13:20:00 [UTC]	🔍 🌐 🗑️
We are going to move the virtual machine corresponding to this node to another physical machine.	EGEE/SouthWesternEurope/Rediris/Top-bdi.ediris.es	OUTAGE	SCHEDULED	2009-02-26, 10:30:00 [UTC]	2009-02-26, 18:00:00 [UTC]	🔍 🌐 🗑️
Upgrade of some dCache components.	EGEE/NorthernEurope/SE-SNIC-TJ/arm.mdf.org	AT_RISK	SCHEDULED	2009-02-26, 09:10:00 [UTC]	2009-02-26, 10:20:00 [UTC]	🔍 🌐 🗑️
unstable network	EGEE/AsiaPacific/INCP-LCG2/jncncp4.ncp.edu.pl	OUTAGE	SCHEDULED	2009-02-26, 09:05:00 [UTC]	2009-02-26, 17:00:00 [UTC]	🔍 🌐 🗑️
Site bdi query problems	EGEE/SouthWesternEurope/IFCA-LCG2	OUTAGE	SCHEDULED	2009-02-26, 08:57:00 [UTC]	2009-02-26, 17:48:00 [UTC]	🔍 🌐 🗑️
Migration to SL4 [IN PROGRESS]	EGEE/Italy/INFN-PADOVA/voms-01.pd.infn.it	OUTAGE	SCHEDULED	2009-02-26, 08:00:00 [UTC]	2009-03-01, 19:00:00 [UTC]	🔍 🌐 🗑️
service migration to sl4. In the morning we will migrate this host, in the afternoon its replica (at INFN-PADOVA) voms-01.pd.infn.it VO affected: argo, bto, cdf, comchem, egrid, enea, grids, inf, infgrid, ingr, libi, pam, els, planck, thephys and virgo [IN PROGRESS]	EGEE/Italy/INFN-CNAF/voms.cnaf.infn.it	OUTAGE	SCHEDULED	2009-02-26, 07:46:00 [UTC]	2009-02-27, 16:46:00 [UTC]	🔍 🌐 🗑️
dCache upgrade [IN PROGRESS]	EGEE/Germany/Switzerland/KWTH-Aachen	OUTAGE	SCHEDULED	2009-02-26, 07:00:00 [UTC]	2009-02-27, 19:00:00 [UTC]	🔍 🌐 🗑️
While the Tahn a Cloud is offline due to fire at ASGC, we are bringing Australia-ATLAS down to migrate the VO software area to another machine, and rebuild our WUPTe3.	EGEE/AsiaPacific/Australia-ATLAS	OUTAGE	SCHEDULED	2009-02-26, 05:30:00 [UTC]	2009-02-27, 13:30:00 [UTC]	🔍 🌐 🗑️
accident in Data center at ASGC, all production services are affected [IN PROGRESS]	EGEE/AsiaPacific/TW-FIT	OUTAGE	SCHEDULED	2009-02-26, 02:11:00 [UTC]	2009-02-27, 23:59:00 [UTC]	🔍 🌐 🗑️
Network Upgrade, connectivity to outside will be temporarily disrupted. - COMPLETED, Bristol back in production	EGEE/UK/SouthGrid/UKI-SOUTHGRID-BRIS-HEP	OUTAGE	SCHEDULED	2009-02-25, 14:00:00 [UTC]	2009-02-25, 14:45:00 [UTC]	🔍 🌐 🗑️



Functional Tests



Data: Tier 0

Data: Production

Jobs: Production

Jobs: Analysis

Panda: Production

Tasks

Grid jobs

Summaries

Shifters

Functional tests

Admin

User Guide

Feedback

find

view

- by grid
- by cloud
- by dest_cloud
- by executortype
- by executor
- by site
- by cluster
- by task

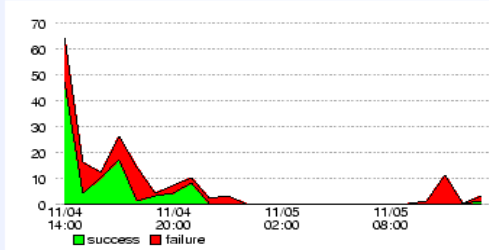
select cloud

- TRIUMF
- PIC
- CNAF
- LYON
- NDGF
- SARA
- BNL
- None
- FZK
- ASGC
- RAL

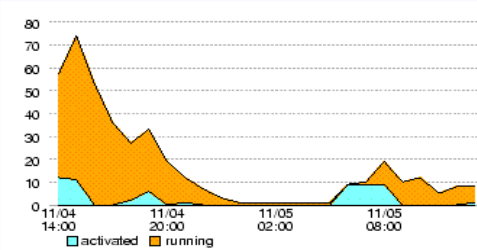
task-flag

functional test

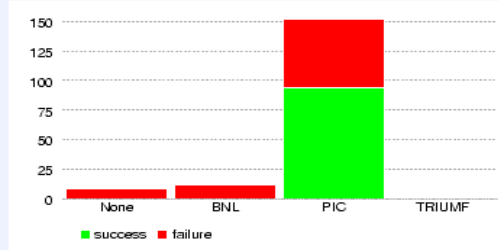
jobs last 24h



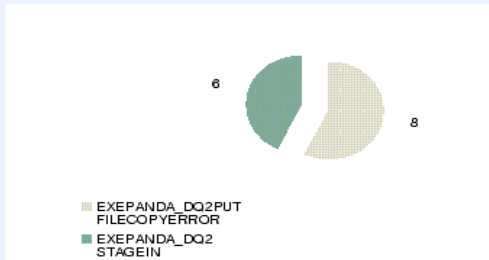
queued jobs last 24h



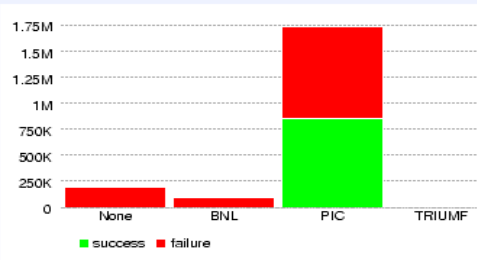
jobs (last 24h)



errors (jobs, last 12h)



walltime (seconds, last 24h)



cloud	defined	assigned	waiting	activated	running	holding	transferring	success	failure	efficiency
TRIUMF	0	0	0	0	0	3	2	357	162	68.8%
PIC	0	0	0	0	3	7	0	191	285	40.1%
CNAF	0	0	0	0	0	0	0	301	20	93.8%
LYON	0	0	0	0	0	0	0	200	17	92.2%
NDGF	0	0	0	0	0	0	0	200	17	92.2%
SARA	0	0	0	0	0	0	0	199	5	97.5%
BNL	0	0	0	0	1	6	0	7	35	16.7%
None	0	0	0	0	1	1	0	0	41	0%
FZK	0	0	0	0	0	0	0	10	0	100%
ASGC	0	0	0	0	0	3	0	0	0	-
RAL	0	0	0	0	0	2	0	0	0	-
total	0	0	0	0	5	22	2	1465	582	71.6%

CRITICAL WARNING NORMAL GOOD NO_ACTIVITY





Functional Tests

ATLAS dashboard

Data: Tier 0 Data: Production Jobs: Production Jobs: Analysis Panda: Production

Tasks Grid jobs Summaries Shifters Functional tests Admin User Guide Feedback

find

view

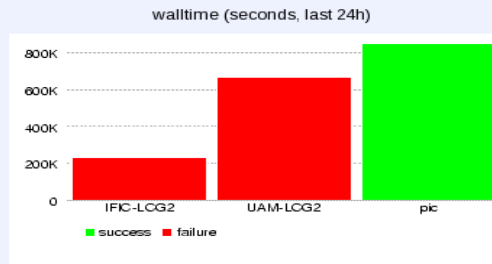
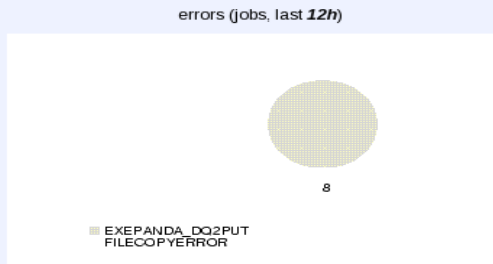
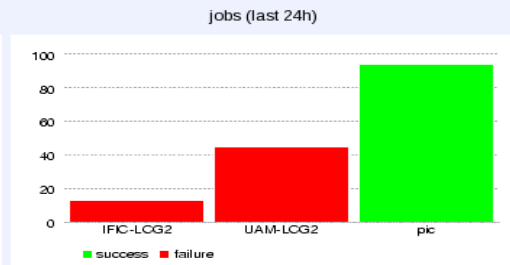
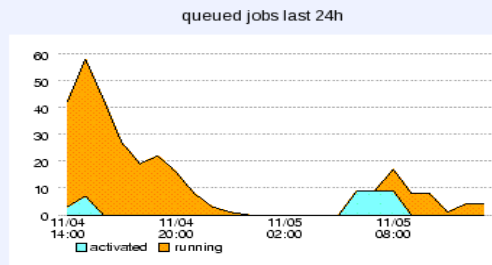
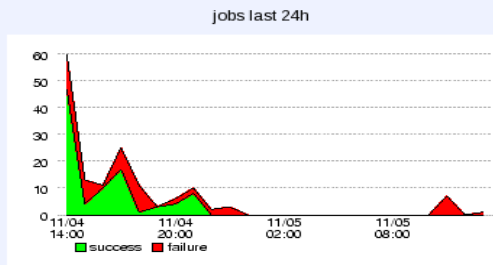
- by grid
- by cloud
- by dest_cloud
- by executortype
- by executor
- by site
- by cluster
- by task

select site

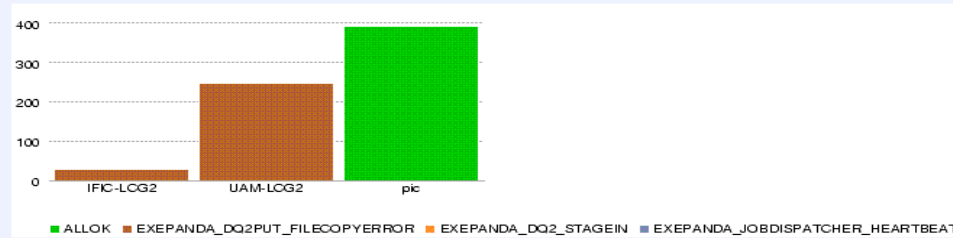
- UAM-LCG2
- IFIC-LCG2
- pic

cloud

- PIC
- task-flag
- functional test



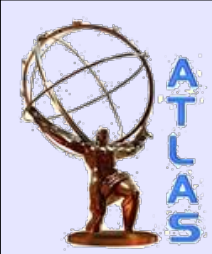
You are watching functional tests jobs. The plot below shows where they ran in the last two weeks. Click the plot to get to the error detail. (large plot)



site	defined	assigned	waiting	activated	running	holding	transferring	success	failure	efficiency
× UAM-LCG2	0	0	0	0	0	0	0	0	255	0%
× pic	0	0	0	0	3	6	0	191	1	99.5%
× IFIC-LCG2	0	0	0	0	0	1	0	0	29	0%
total	0	0	0	0	3	7	0	191	285	40.1%

CRITICAL WARNING NORMAL GOOD NO_ACTIVITY





Bug reporting

- GGUS/US RT - site related issues
 - GGUS TEAM tickets introduced in 2008
 - 738 GGUS tickets in the past year (>2 tickets/day)
- Savannah
 - DDM ops - data replication (>1000 tickets)
 - Validation - SW issues (>2200 tickets)
- eLog: spread information among the ADCOS Team
 - >2500 eLogs
- Alarms to Experts

ADC shifts

- Remote Shifter
- Shifter at CERN
- Information flow

MC expert DDM expert CS expert

Expert on-call

- I/F with Area Experts (working hours) or Expert on-Call for 24/7
- Log the error in ATLAS eLog
- Evaluate urgency:
- Call the expert outside working hours ?
- Hold the problem ?

Expert Shifter

Known Solution?

- Provide:
 - First hand expertise
 - Guide shifter for the action
 - Triage the incidence
 - Log the error in ATLAS eLog
- Action:
 - Turn sites/cloud offline
 - Site Services interventions ?

- Action !
- Report problems:
 - GGUS for site problems
 - Set sites/clouds offline for MC production
 - Task failures:
 - Submit validation bugs
 - Report heavy failing tasks
- Log action in ADCoS eLog

- Escalate to:
 - Expert Shifters!
 - Expert on-Call! IF no answer after Xh

Unknown Solution?

Unknown Solution?

Known Solution?

MC

DDM

Known Solution?

- Action !
- Report problems:
 - DDM Savannah bugs for transfer problems
 - GGUS for site problems (SRM, FTS, etc.)
- Log action in ADCoS eLog

- Shifters:**
Follow ATLAS Distributed Computing Activities:
- MC Production: Validation, Clouds & Sites
 - DDM: T0=>T1=>T2 Transfer and Critical Data
 - Central Services: Report problems
 - Periodicity: 2 day-shifts (~8 days/month)

- Expert Shifters:**
Overall Monitor of ATLAS Distributed Computing Activities:
- Alert & guide shifters: MC, DDM
 - Take over the problems escalated by the shifters:
 - Interface with Area-Experts
 - Interface with Expert on-Call
 - Periodicity: 1 week-shifts (~1 week/month)

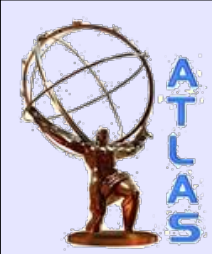
- Experts on-Call**
Handle problems raised by the shifters:
- Interface with area experts
 - Interface with CERN IT
 - Last escalation step

Categorize

Senior Shifter



- Basic checklist:**
- DDM:
 - T0=>T1 exports: spot lower efficiency sites (RED)
 - T1=>T1 and T1=>T2 exports: chase sites in RED
 - Open GGUS in case of site problems
 - File Savannah Bug for DDM related problems
 - Escalate in case of Central Services problems
 - Stay tuned for critical data announcements
 - MC production:
 - Chase bad performing validation tasks:
 - Submit Savannah bug when required
 - Spot dramatic tasks and report the problems:
 - Submit validation tasks
 - Turn site offline
 - Contact MC expert
 - Spot bad performing sites:
 - File GGUS in case of site problems
 - Contact cloud responsible



The ADCOS Team

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