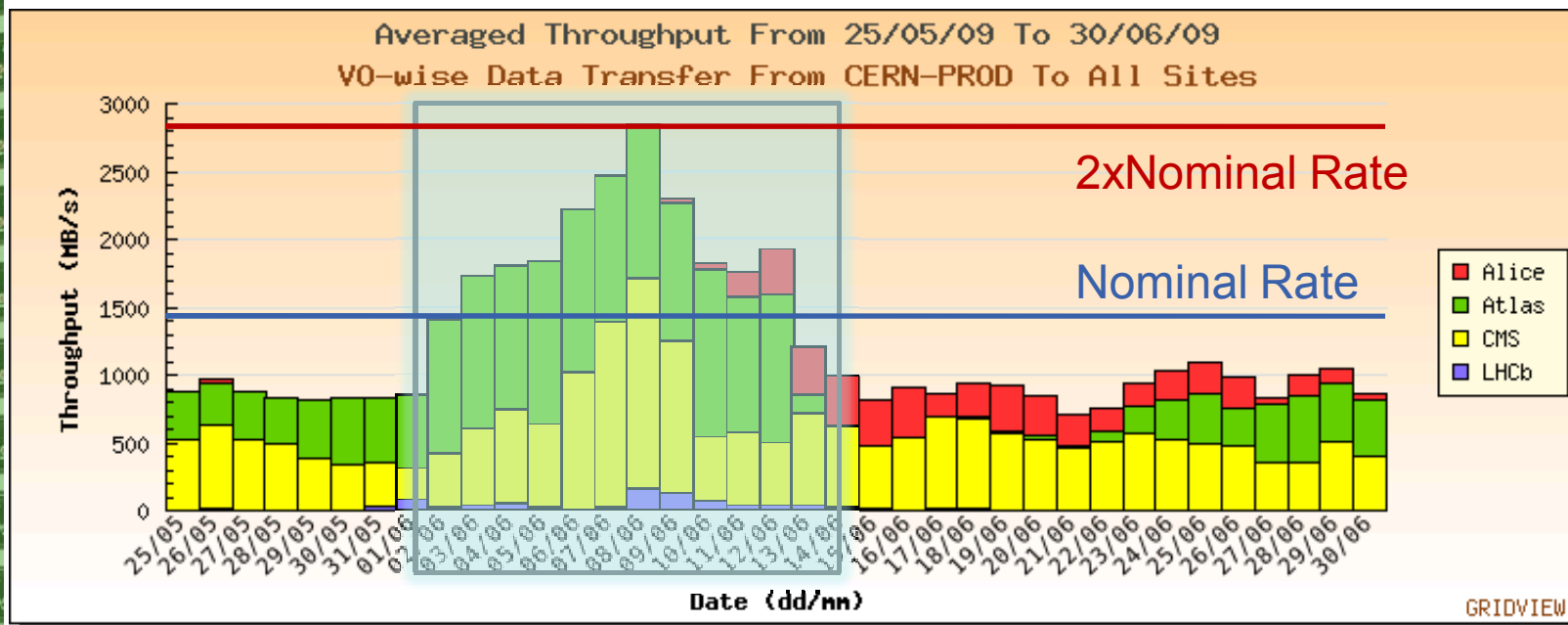# WLCG STEP'09 Tier0 Site Summary

Miguel.Coelho.Santos@cern.ch

STEP'09 Post-Mortem Workshop

- Activity overview

- Incidents

- Support requests

- Considerations & a moment to reflect

Grid Traffic with Tier0 as source

Averaged Throughput From 25/05/09 To 30/06/09
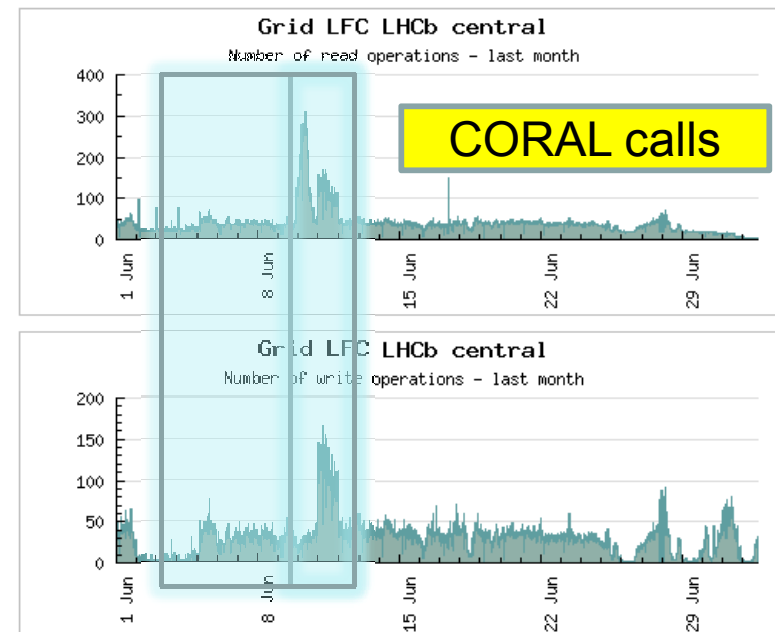VO-wise Data Transfer From CERN-PROD To All Sites

- Baseline activity is ~1GB/s

- STEP'09 activity overlap period between 02/06 and 13/06:
  - Mostly ATLAS and CMS
  - Exceeded MoU nominal rate
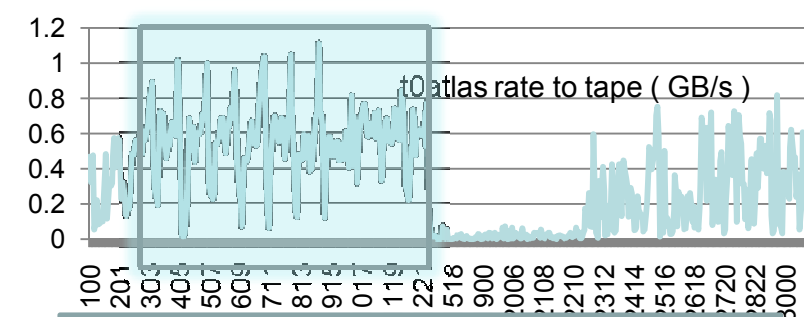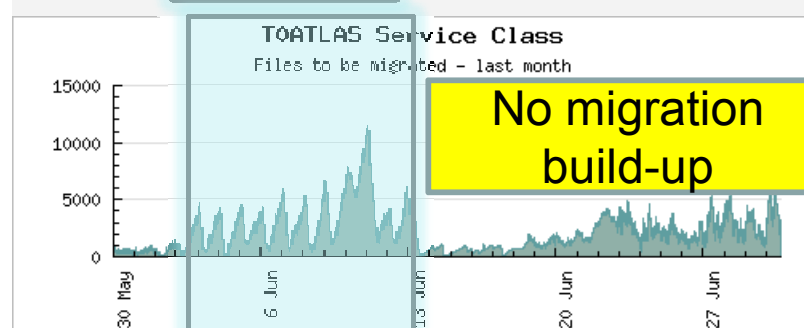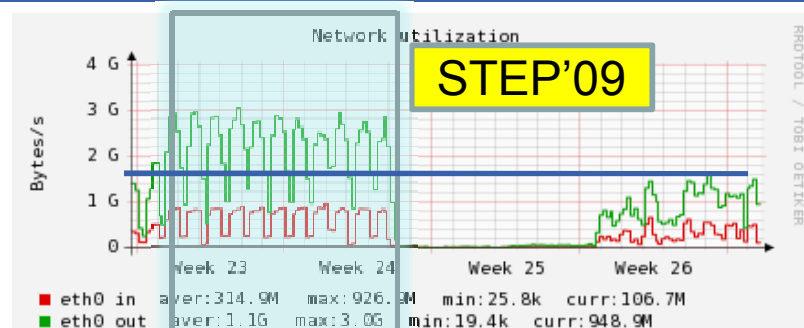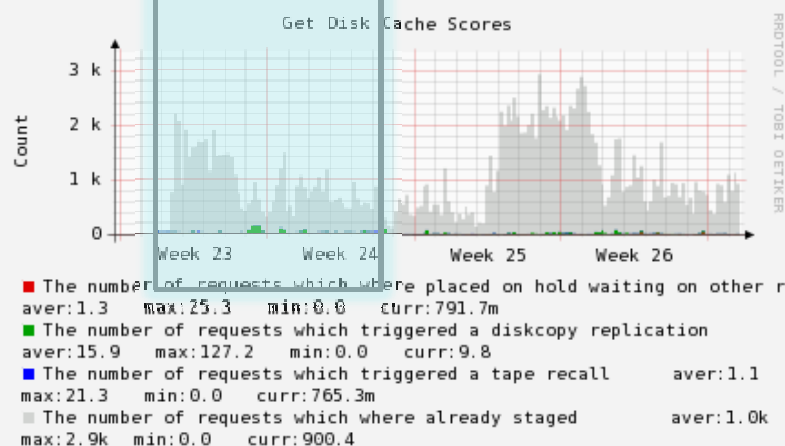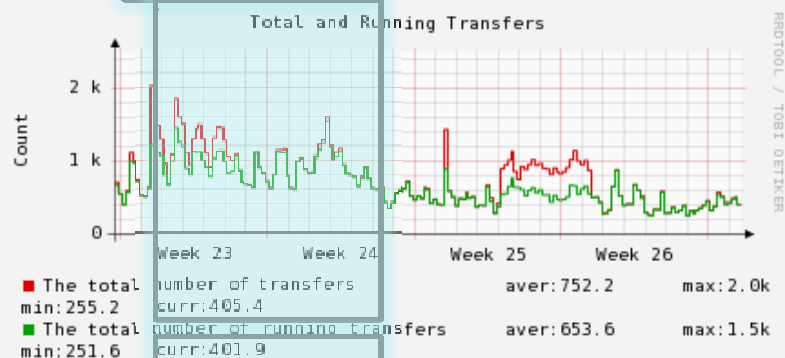 - Reached twice the nominal rate on the 8th

- LFC
- CASTOR
  - CASTORATLAS
  - Tape
- WN+CE
- WMS

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LFC

- No issues apart from large number of calls to LHCb's LFC (known issue in CORAL)

  - Peaks on the number of operations per second for LHCb LFC central catalog when trying to ramp-up production.

    - Peaks of ~300 reads/s
    - Peaks of ~150 writes/s

  - For details about the CORAL issue see Andrew's talk.

  - From then on 'flat' number of LFC calls

Grid LFC LHCb central
Number of read operations – last month

CORAL calls

Grid LFC LHCb central
Number of write operations – last month

CASTORATLAS

STEP'09

No migration build-up

tatlas rate to tape (GB/s)
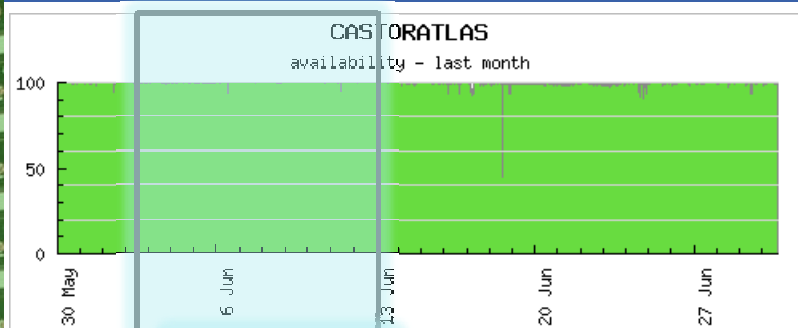
Throughput to tape to be provided in lemon following next CASTOR upgrade

Fabric Infrastructure and Operations

CASTORATLAS

Average read open time of 4s

Average write open time 1.4s

Peaks of 400 running transfers

Peaks of 20 pending transfers

3% of available transfer slots used. Only Tier0 function (t0atlas) exercised? What other functions are missing?

~25 migration streams (number of files in-flight to tape)
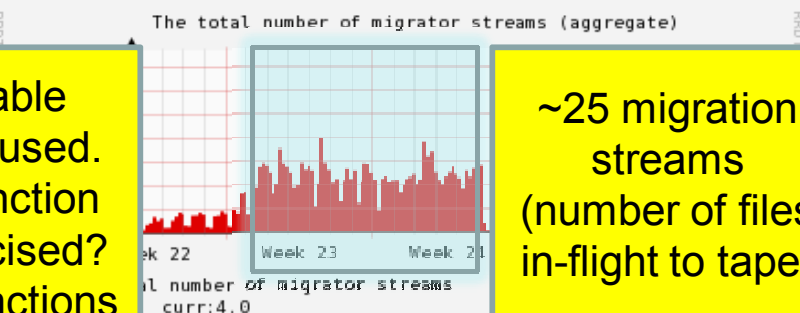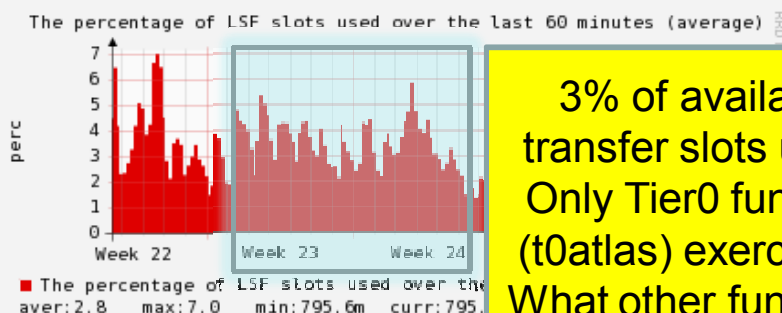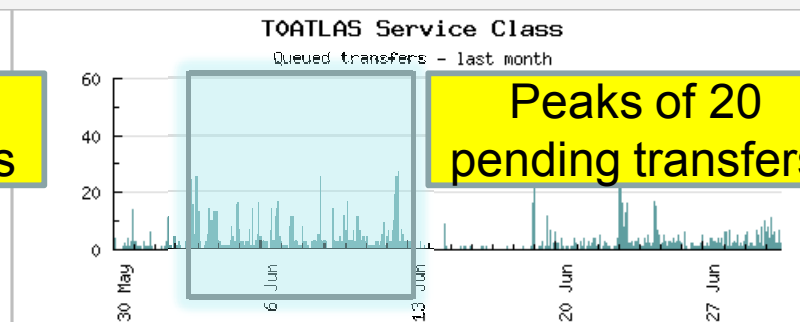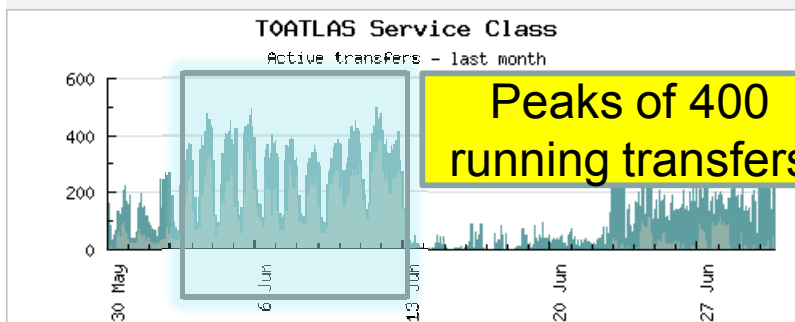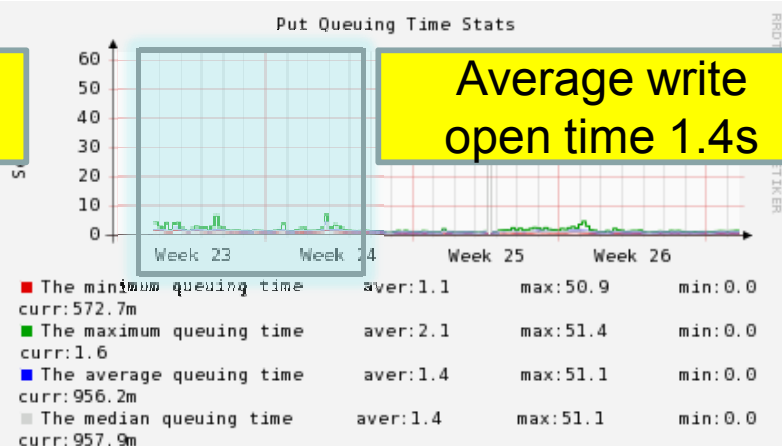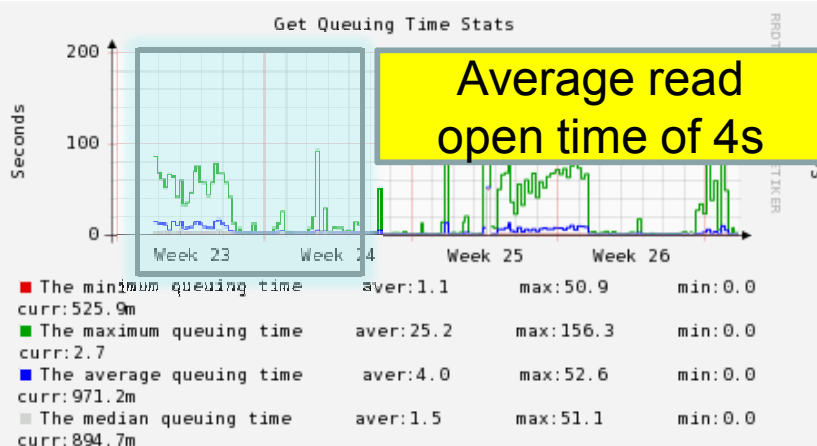
Tape

- Two periods when writing at more than 2GB/s

- 500s of average tape write wait time

- Some large read peaks that introduce read delays

- More details in Vlado's talk

CMS+ATLAS

Recall Peak

Network utilization

	aver	max	min	curr
eth0 in	1.5G	3.0G	323.5M	2.4G
eth0 out	866.6M	2.4G	14.5M	1.4G

Number of jobs (summary)

	aver	max	min	curr
Queued READ jobs	138.0	1.3k	769.2m	66.3
Queued WRITE jobs	13.4	116.7	0.0	1.1
Running READ jobs	31.4	67.0	2.4	24.7
Running WRITE jobs	47.0	76.6	8.2	59.4

Wait Time (average)

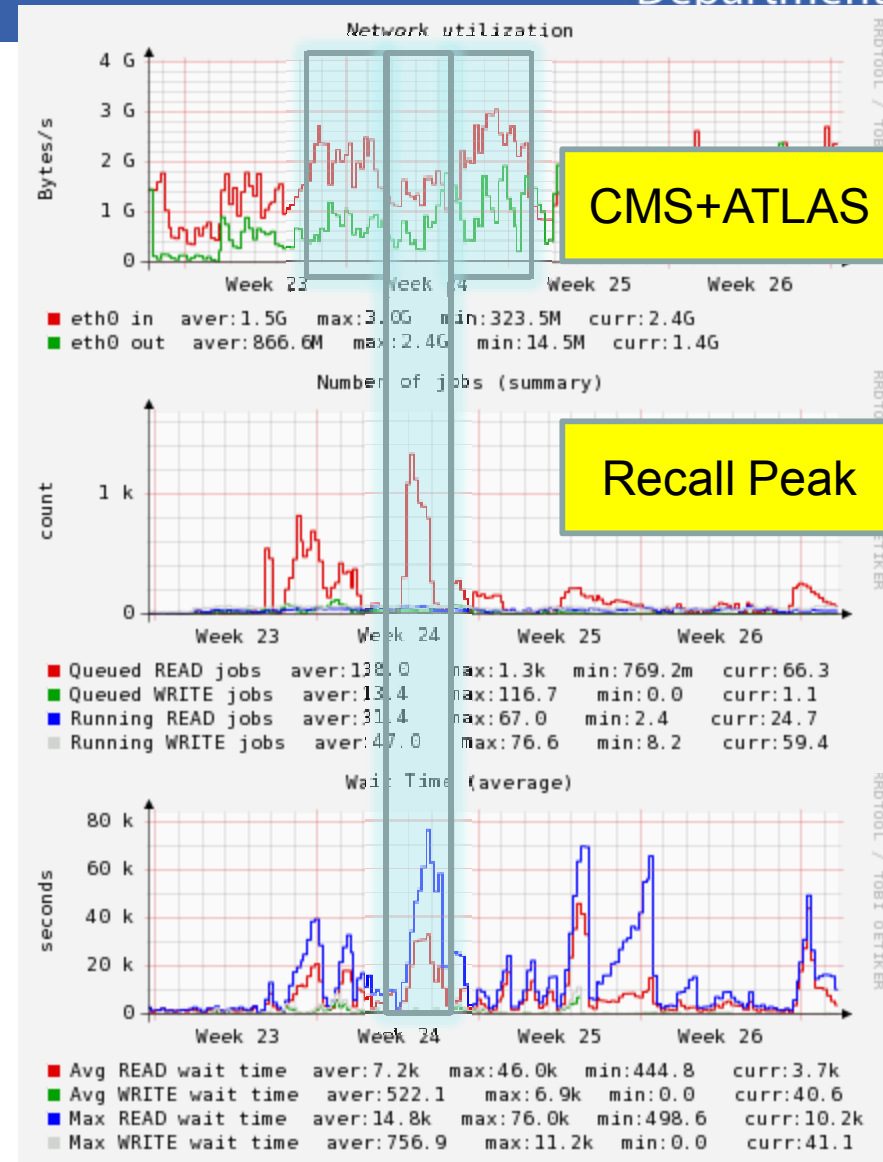|	aver	max	min	curr
Avg READ wait time	7.2k	46.0k	444.8	3.7k
Avg WRITE wait time	522.1	6.9k	0.0	40.6
Max READ wait time	14.8k	76.0k	498.6	10.2k
Max WRITE wait time	756.9	11.2k	0.0	41.1

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BNL throughput discussions

- On the 10th of June BNL could not get it's full share, other ATLAS sites were getting more than their share, and t0atlas pool was at its speed limit.

- T0atlas was at the time using ~40 disk servers to deliver between 2.5GB/s and 3GB/s (60% to 90% throughput increase compared to initial design). More hardware would be required to handle extra throughput increase.
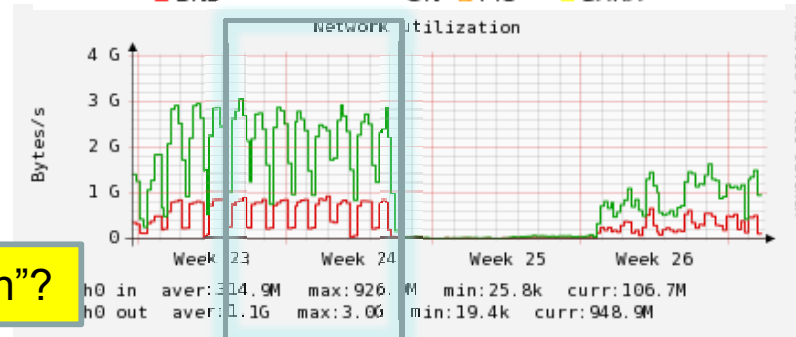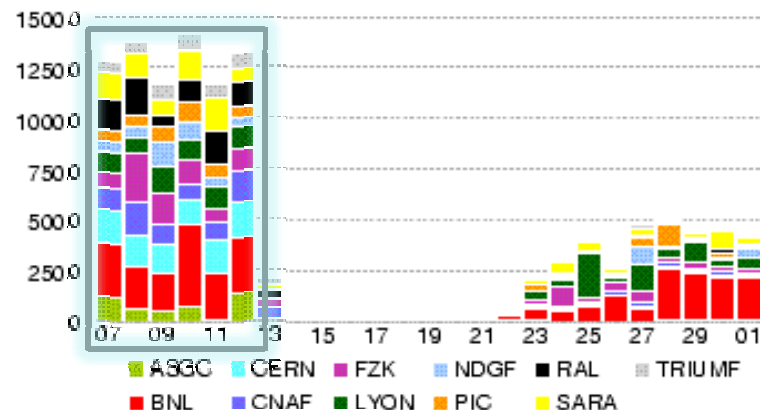
Could other sites be using "BNL's bandwidth"?

- FTS does not throttle channels to only work at nominal rate. Meeting with ATLAS, FTS devs, BNL and CERN recommended that ATLAS channels should reconfigured. To avoid this problem the number of slots per site should be what is needed to achieve nominal rates and not peak (catch-up) rates.

- To assist in understanding the problem it was also agreed to monitor and display on the ATLAS dashboard the average speed per transfer being achieved between different sites.

WN + CE
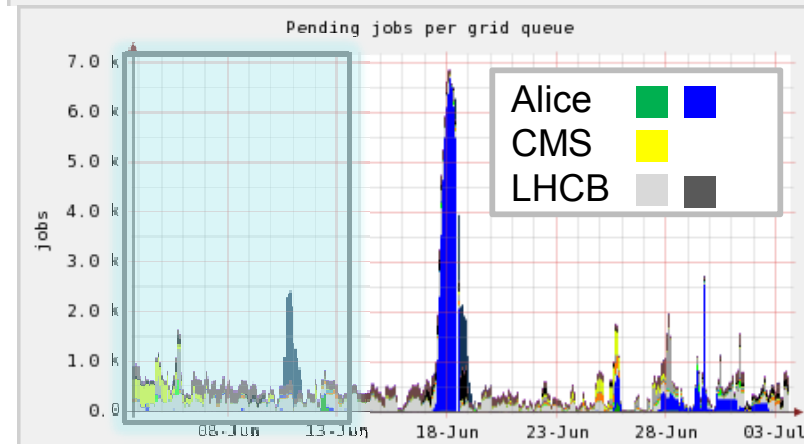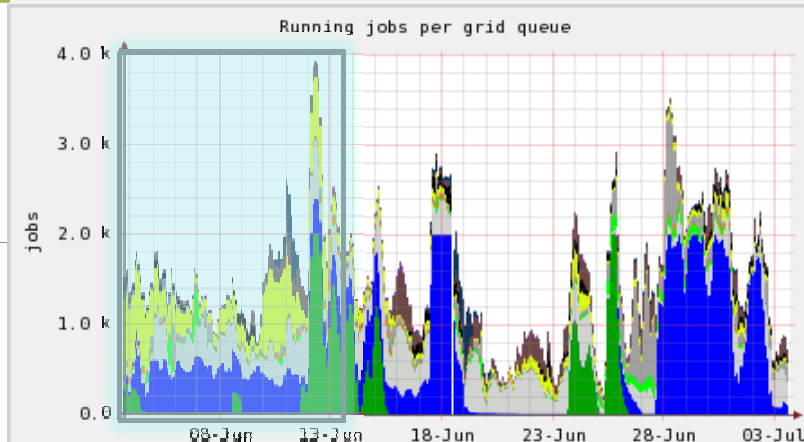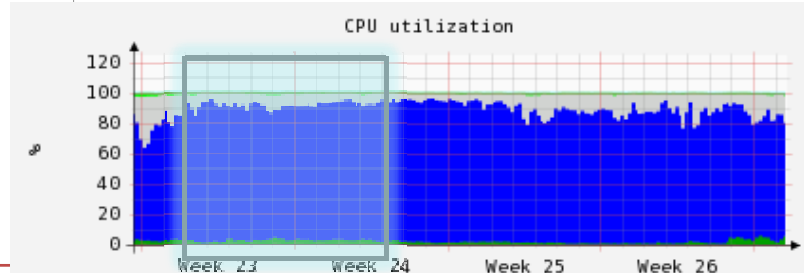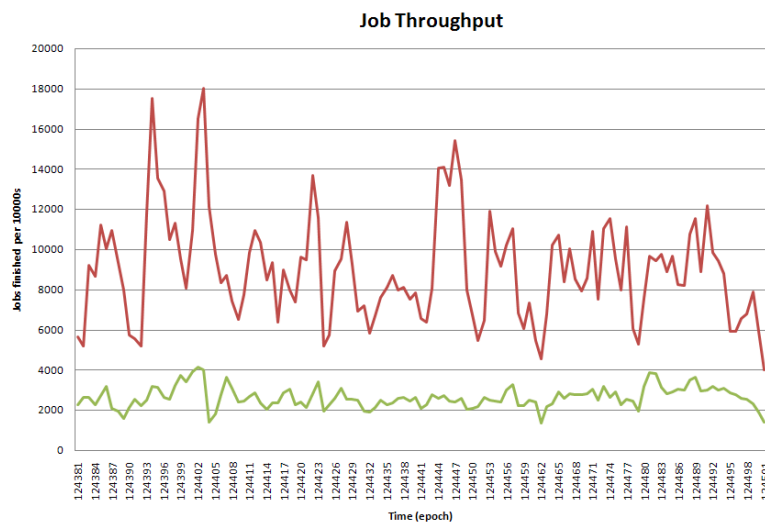
- Jobs finished:
  - 1.1M in total
  - 318K grid jobs
- Normal activity
- High CPU utilization
- Low number of pending grid jobs

WMS

- Load was no different than normal

- The WMS stack remains extremely slow and cannot take advantage of multicore systems

- The stateful service and lack of support for DNS aliases remains a barrier to effective deployment and management as it prevents:
  - Load balancing
  - Transparent interventions
 - Scaling up the service
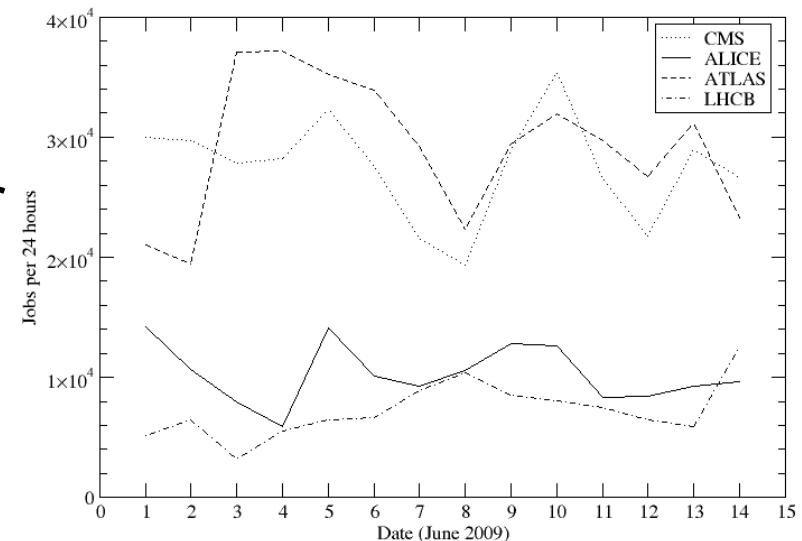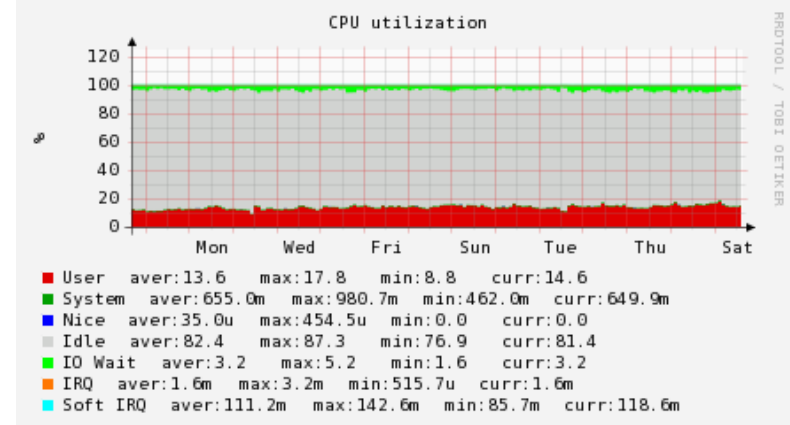
Incidents

- 8 incidents in total
- 50% of the incidents are CASTORLHCB Tape0Disk1 and its fallout.

    https://twiki.cern.ch/twiki/bin/view/FIOgroup/PostMortem20090603
    https://twiki.cern.ch/twiki/bin/view/FIOgroup/PostMortem20090604

- Manual intervention was required - T0export migrations backlog .
- Problems when trying to ramp-up an activity - LFC/CORAL/DIRAC incident.
- New bugs after deploying recent software - CASTORALICE stager crash.
- List of incidents:

    > **Incidents did not stop data taking scenario**

    o 2Jun CASTORCMS t0export migration backlog (migrations restarted, SR 108436 opened).
    o 4Jun CASTORLHCB Tape0Disk1 files garbage collected because of bug in 2.1.8 upgrade (SR 108394 opened)
    o 5Jun CASTORLHCB more Tape0Disk1 files lost upon request from LHCb for CASTOR Dev team to try to manually make Tape0Disk1 files into Tape1Disk1. GC is disabled and migrations stopped.
    o 8Jun CASTORLHCB LHCBRAW migration restarted.
    o 9Jun LFC LHCb overload caused by CORAL calls.
    o 9Jun One CE node used by ALICE was not available.
    o 11Jun CASTORLHCB LHCBRAW almost full because GC disabled. Finished cleaning up and enabled GC.
    o 13Jun CASTORALICE stager crashed (bugs 51471 and 50431). Workaround put in place on all instances.

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Support Requests — Trouble Tickets
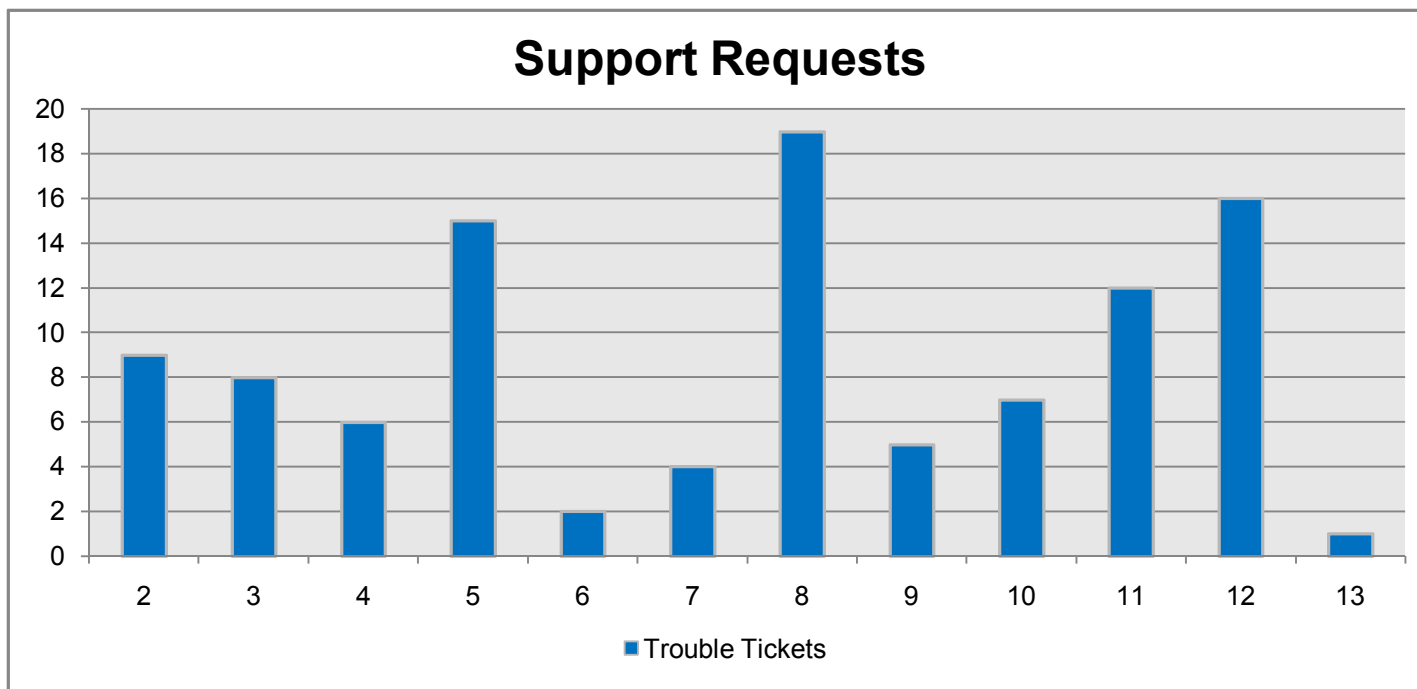
- Average of 8 Support requests per day
- Peaks on Fridays and Mondays

Support Requests

Support Request Breakdown
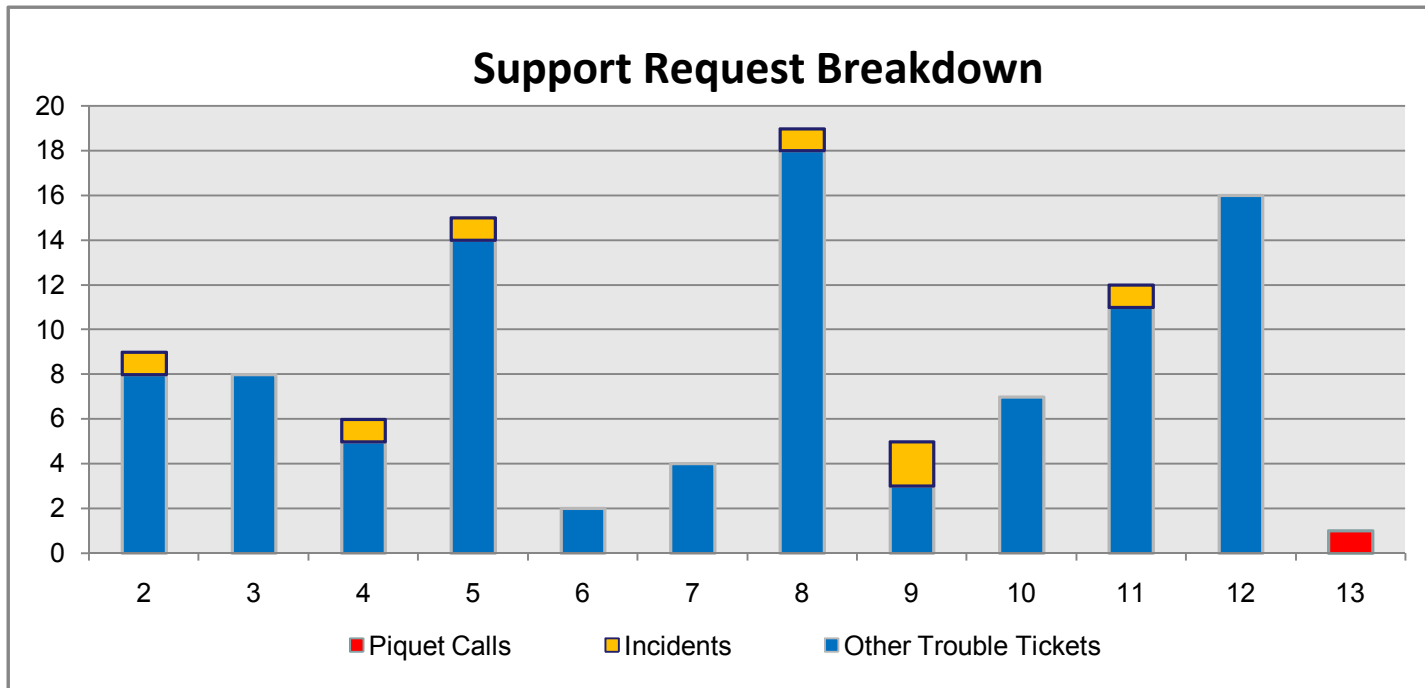
- 2 incidents every three days

- 1 piquet call

- Between the 8th and 14th support provided by 1 SMoD with sporadic help from Service Managers on LSF course (had been scheduled before STEP'09 was decided).

- Incidents and Piquet calls handled timely.

- Next slide about other tickets.

Support Requests

Support Request Breakdown

Legend: ■ Piquet Calls ■ Incidents ■ Vobox ■ Change Requests ■ Other Trouble Tickets
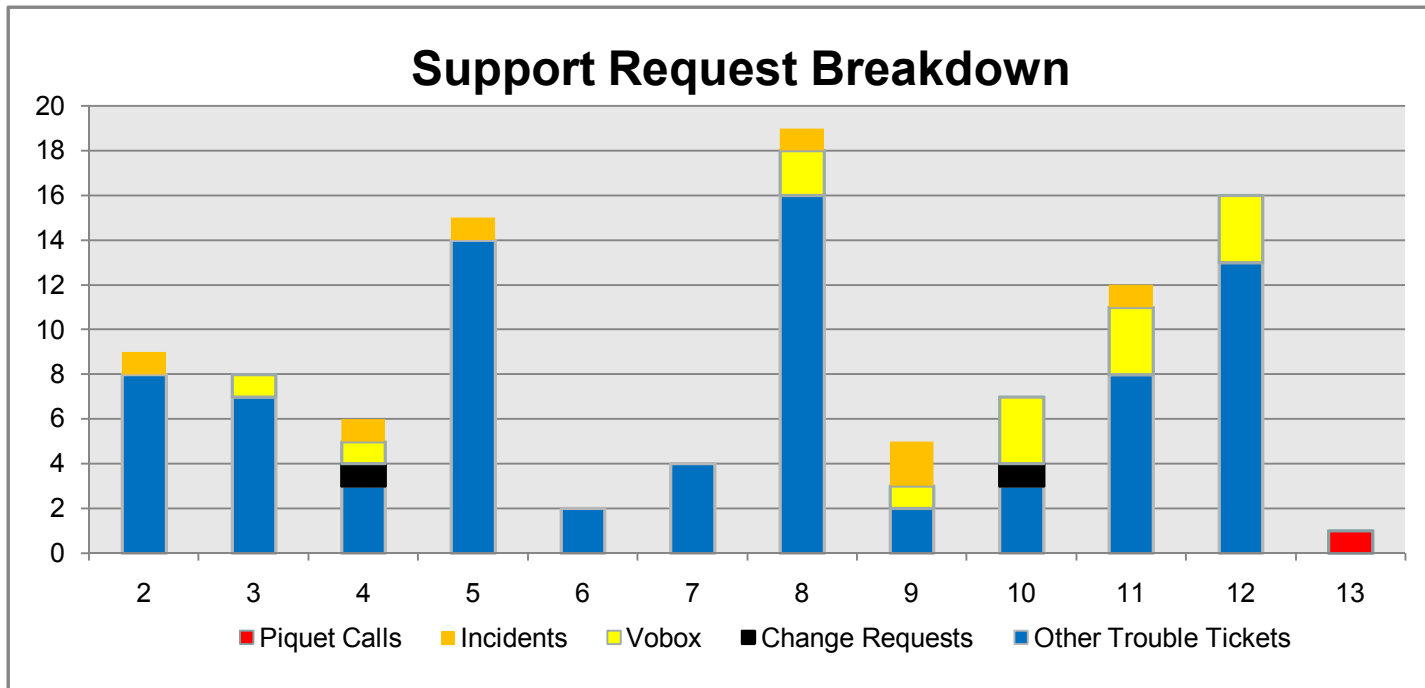
- On the 2nd week there was a large number of vobox requests:
  - Access to templates
  - Login access to servers
  - Miscellaneous Server requests
- Low number of requests for change during STEP'09, with exception for xroot upgrades on CASTORALICE.

Unusually low?

Some considerations on STEP'09

- Tested Tier-0 activities work. more overlap would have been good!

- Ramp up was smooth for activities that had been exercised in the past - Tier0 activities- and bumpy for newer activities (LHCb LFC/CORAL example). What activities will there be during data taking which have not been exercised yet?

- Low number of requests for change. Focus on achieving STEP'09 targets created stability?

- On the experiment side the show was being run by a few experts that understand the system. Once there is real data, what support effort will be demanded by regular users?

- What should Tier0 expect in terms of analysis activity?

Some considerations on STEP'09

- Should WLCG be making MoU targets available through an application friendly interface so these targets can be queried and displayed together with activity monitoring?

- There are still important software issues that need to be addressed:
  - CREAM CE operability
  - Separation of Preparation and Transfer phases in FTS
  - WMS stability and scalability
  - CASTOR operability, namely inconsistencies and bugs that require time costly investigations by Ops and Devs, manual interventions and workarounds

In preparation for real data, should focus be given to software developments that enhance stability, operability and scalability of essential services or will sites be asked to deploy feature rich releases?
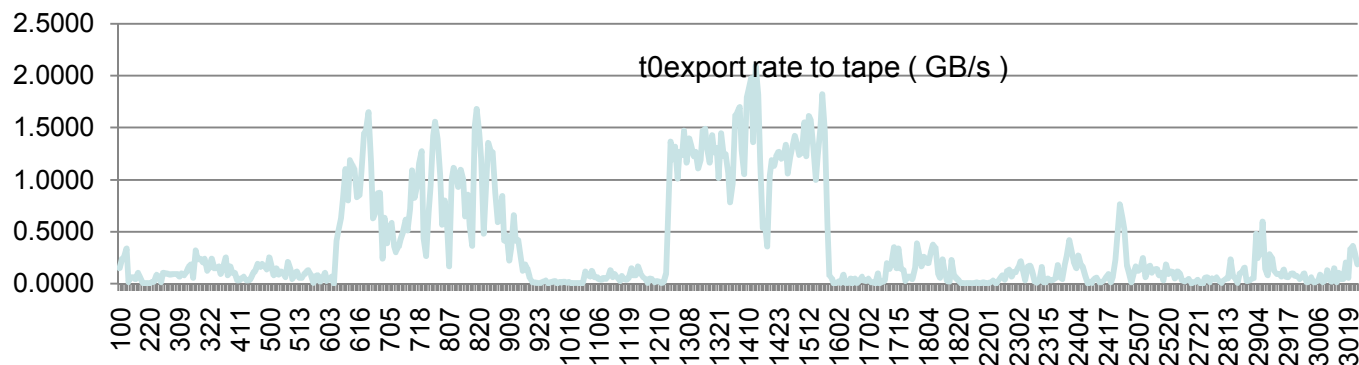
Questions

Fabric
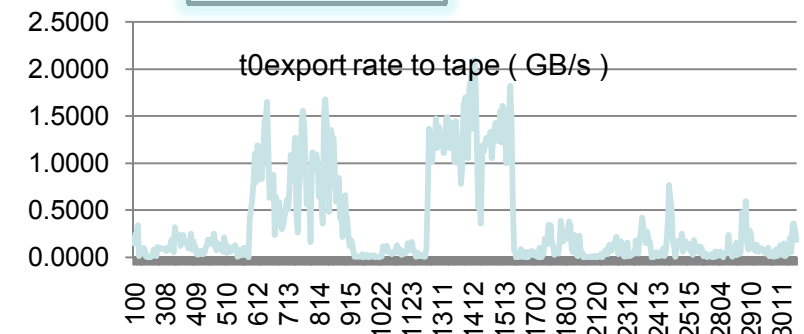Infrastructure
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Backup slides

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t0export rate to tape (GB/s)
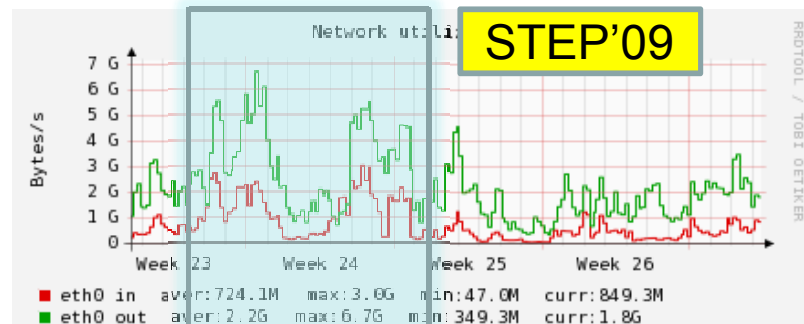
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Switzerland
www.cern.ch/it

CASTORCMS

STEP'09

Tape Migrations

t0export rate to tape (GB/s)

Plot to be provided in lemon following next CASTOR upgrade
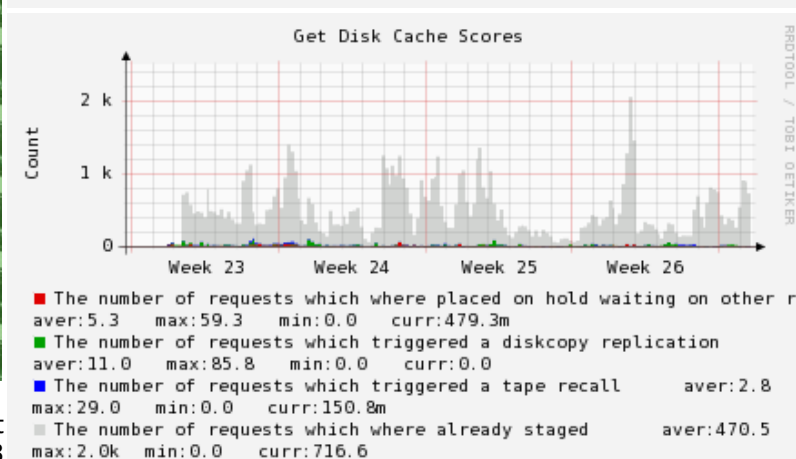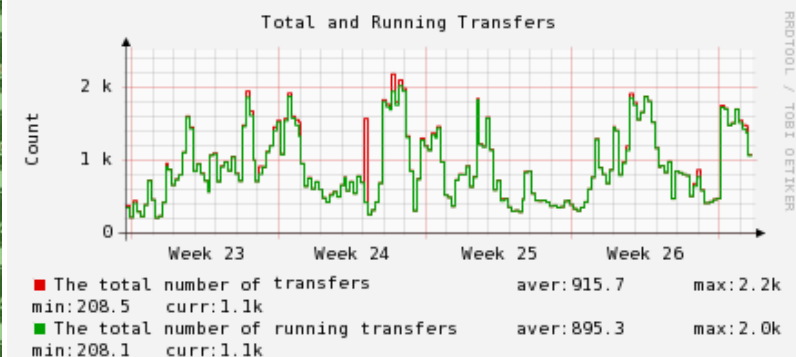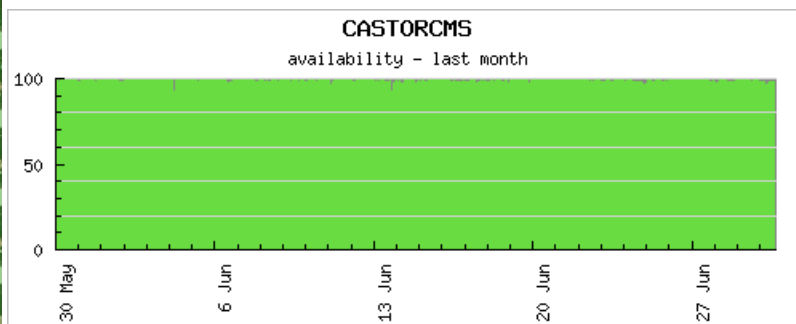
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CASTORCMS

Average read open time of 2s

Average write open time 2.1s

Get Queuing Time Stats

- The minimum queuing time   aver:1.4   max:3.8   min:0.0 curr:1.5
- The maximum queuing time   aver:14.9   max:235.2   min:0.0 curr:5.8
- The average queuing time   aver:2.1   max:19.1   min:0.0 curr:1.8
- The median queuing time   aver:1.7   max:5.4   min:0.0   curr:1.8

Put Queuing Time Stats

- The minimum queuing time   aver:1.5   max:26.1   min:0.0 curr:1.5
- The maximum queuing time   aver:2.8   max:50.7   min:0.0 curr:9.0
- The average queuing time   aver:2.1   max:46.4   min:0.0 curr:3.9
- The median queuing time   aver:2.0   max:46.3   min:0.0 curr:3.2

T0EXPORT Service Class — Active transfers – last month

Peak of 2K running transfers

T0EXPORT Service Class — Queued transfers – last month

Peak of 3K pending transfers

The percentage of LSF slots used over the last 60 minutes (average)

4% of available transfer slots used. Only Tier0 function (t0export) exercised?

- The percentage of LSF slots used over the ... aver:2.0   max:4.9   min:524.2m   curr:3.5

The total number of migrator streams (aggregate)

~50 migration streams (number of files in-flight to tape)

The total number of migrator streams ... n:81.8m   curr:8.0

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STEP'09 Tier0 Site Summary- 22

CREAM CE

- Availability
  - 2 incidents (17th and 30th June, after overlap period)

- Issues
  - Local configuration issues (ex: NFS config)
  - Service not production ready
    - Need to be published as 'special' instead of 'production'
    - Bug in sandbox cleanup tool (filling up /opt)
    - Few other bugs