

The logo for Fabric Infrastructure and Operations (FIO) consists of the letters 'FIO' in a white, sans-serif font, positioned on a dark blue background. To the left of the text is a vertical strip with a green and black pattern resembling a server rack or data center aisle.

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and Operations

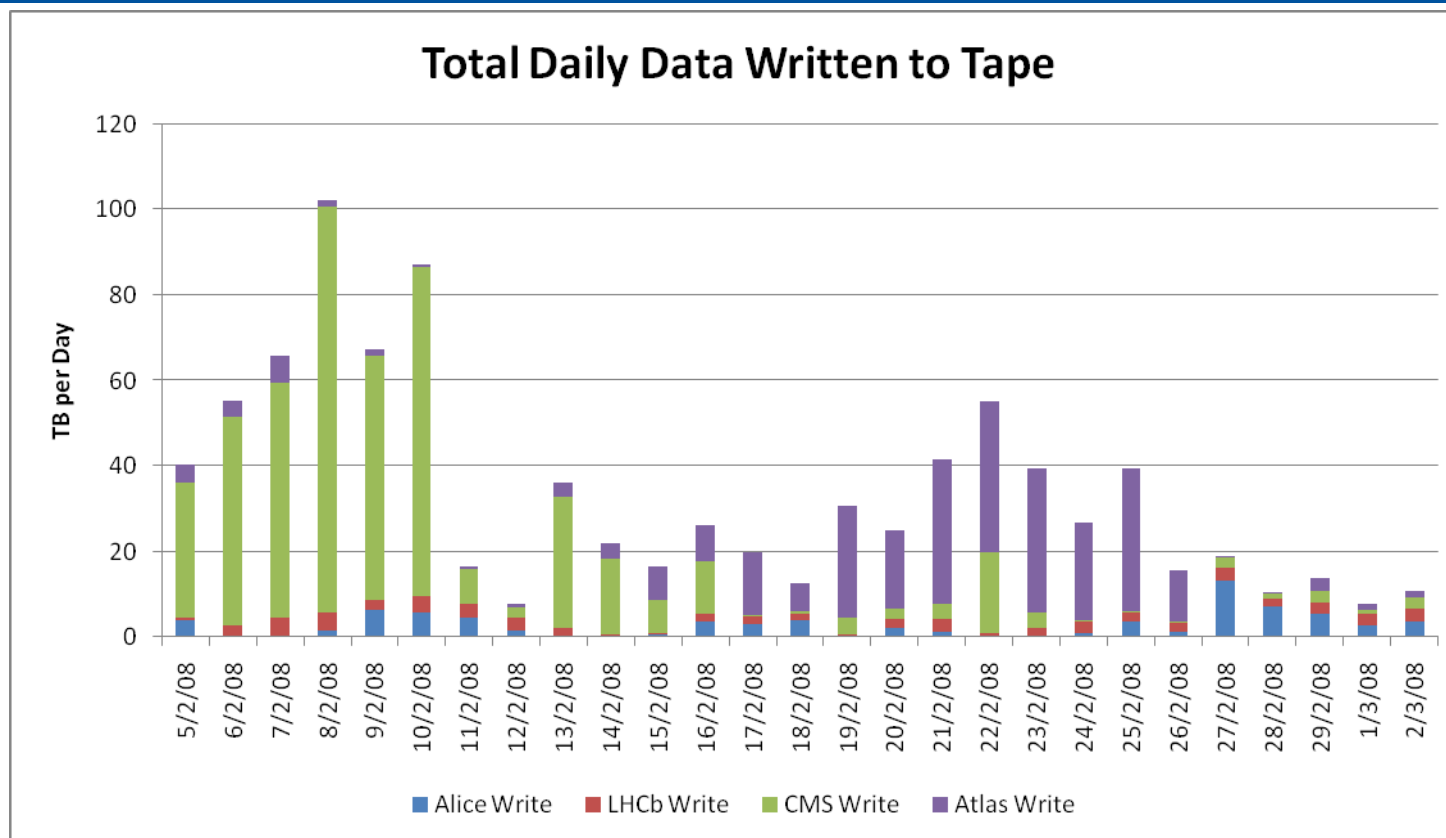
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CCRC Review of Tape at CERN

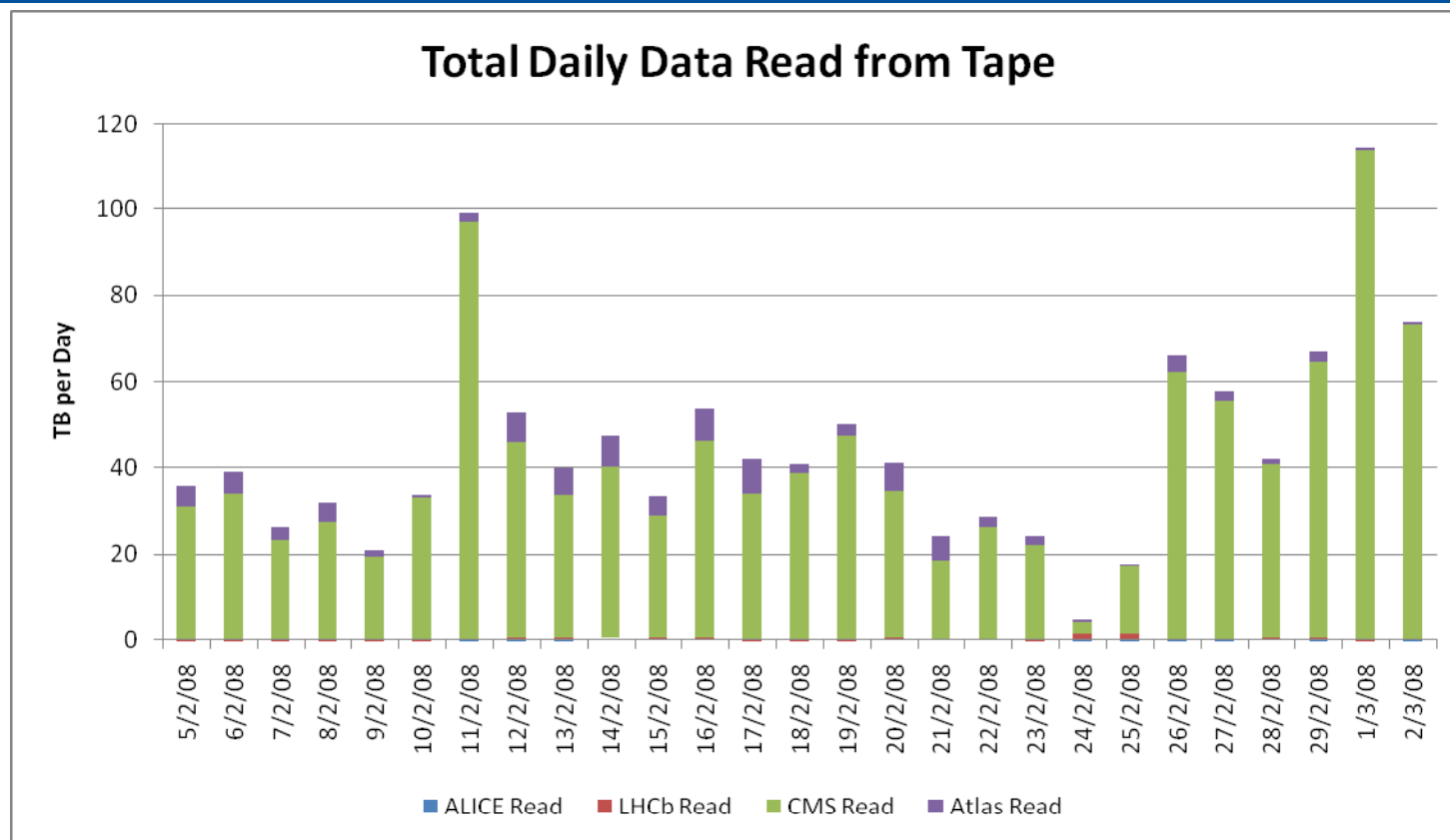
Tim Bell
February 2008



- Tape usage during CCRC
 - Volumes
 - Efficiency
- Review of CCRC from a tape perspective

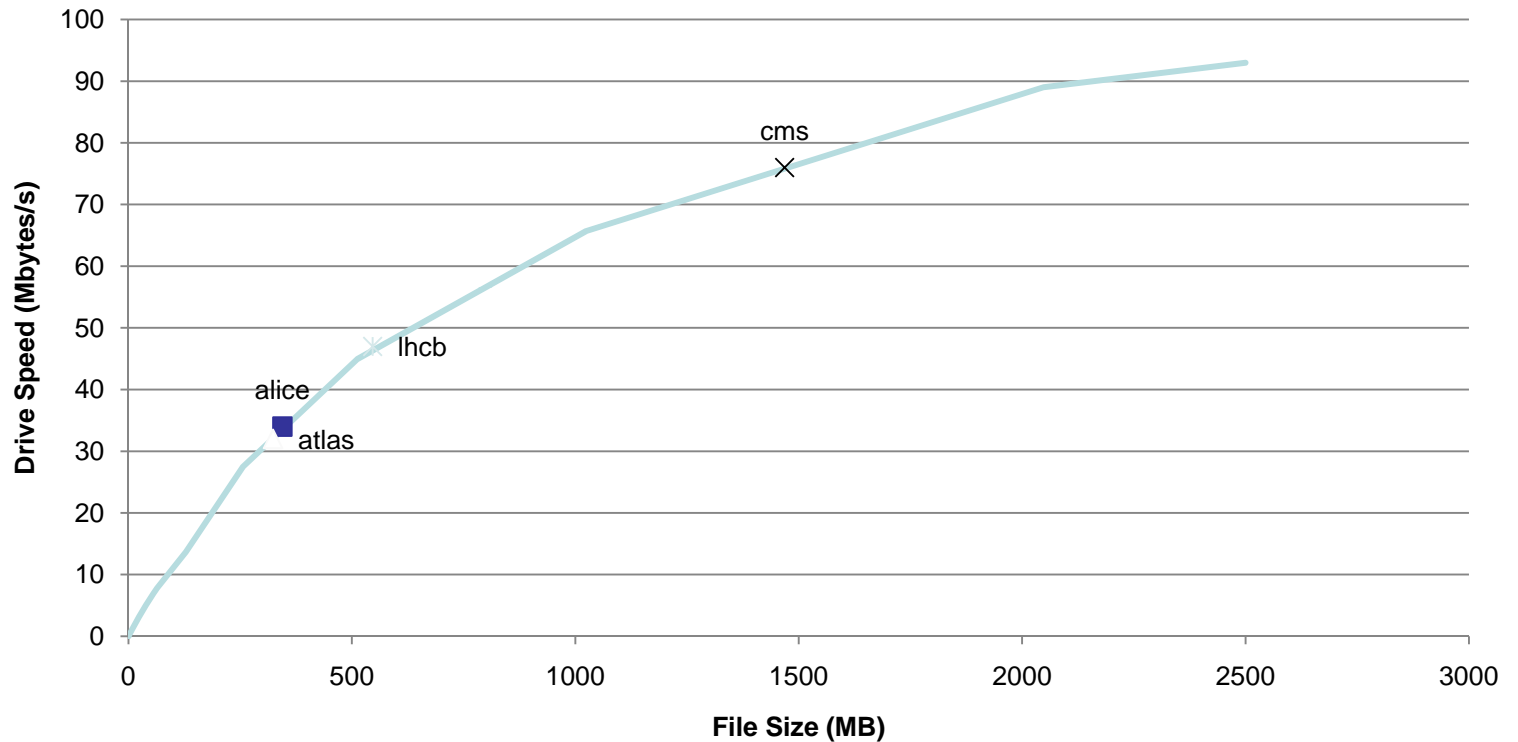


- CMS high volume during 1st two weeks and then Atlas

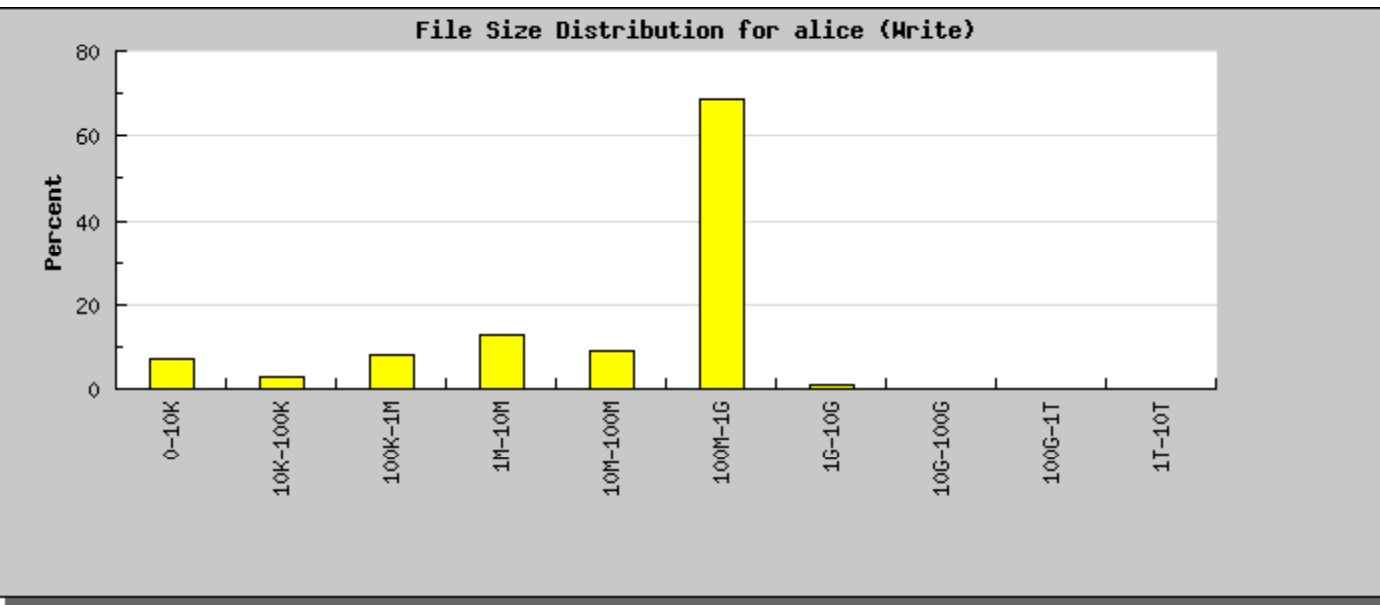
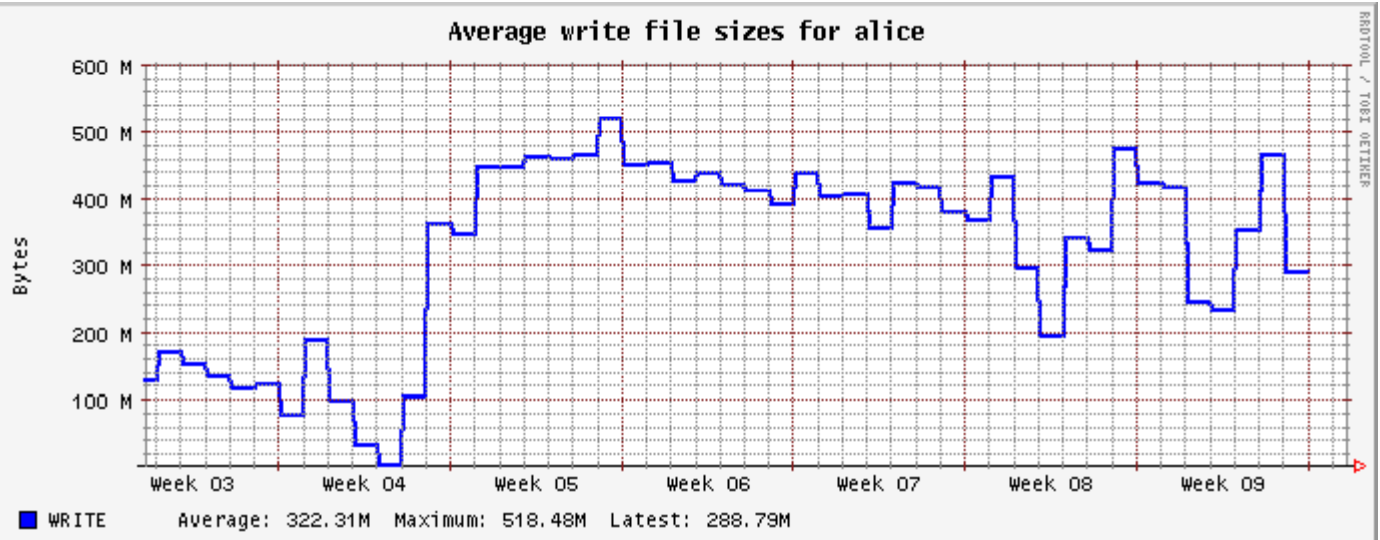


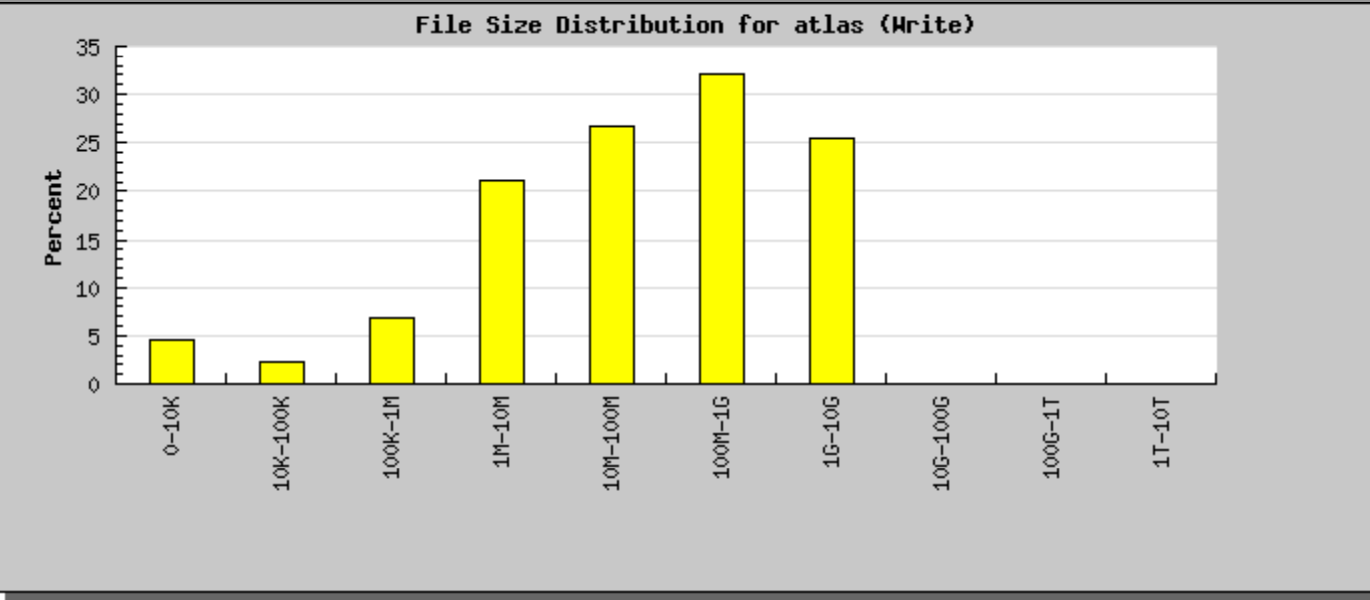
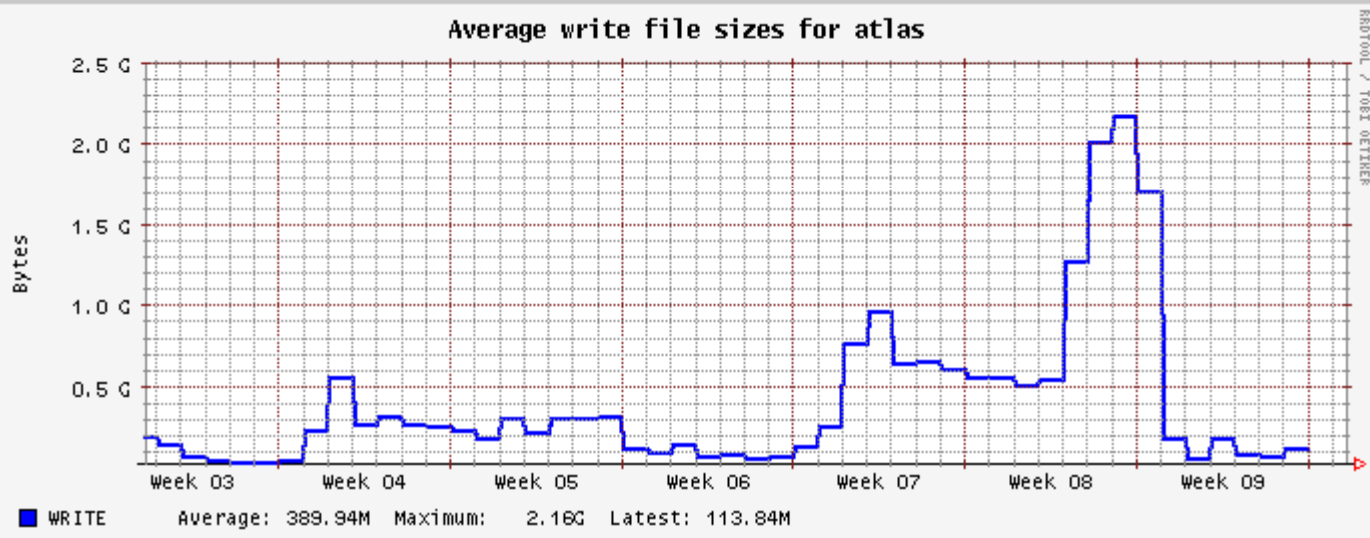
- CMS high volume throughout

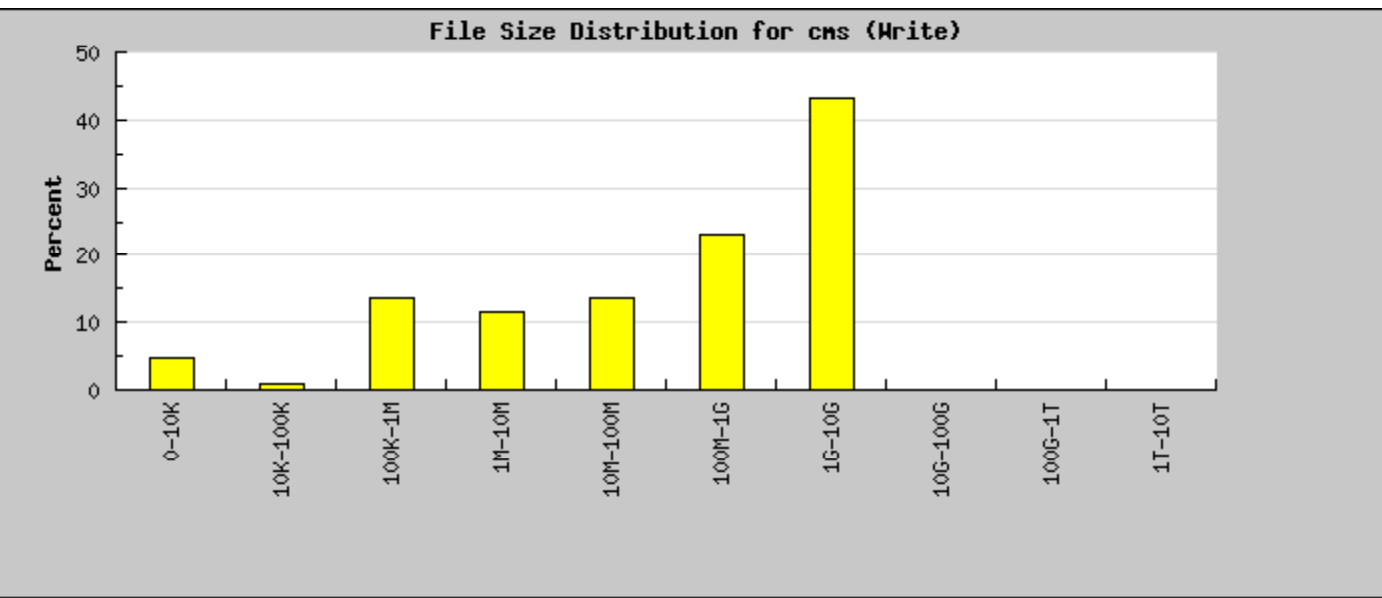
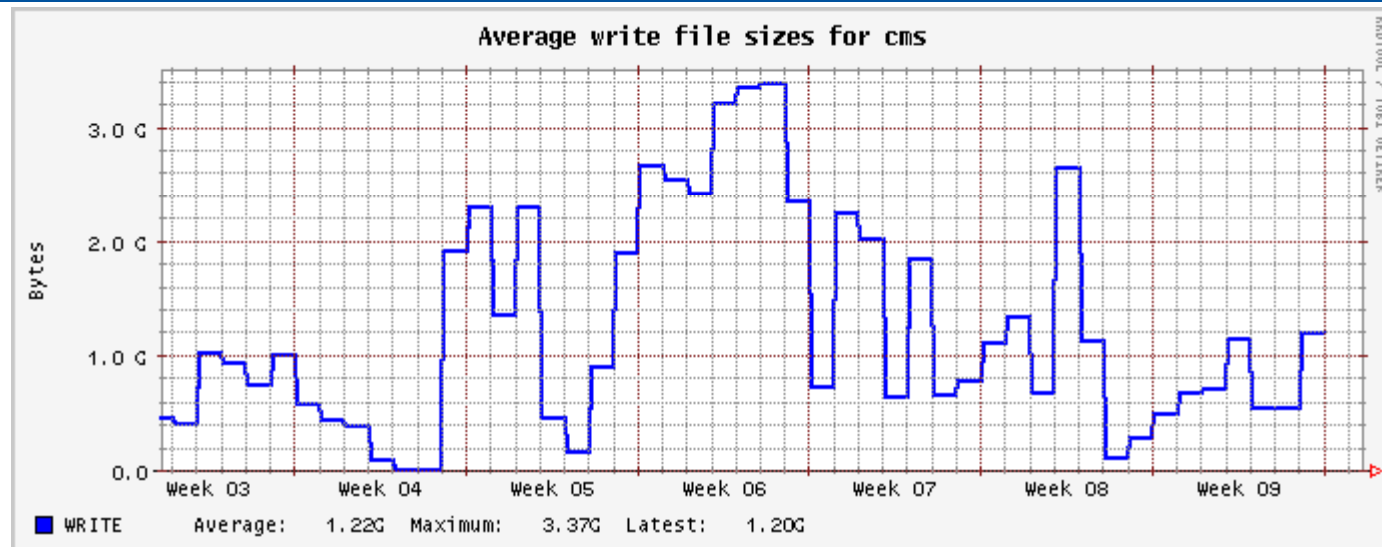
Typical Drive Write Performance

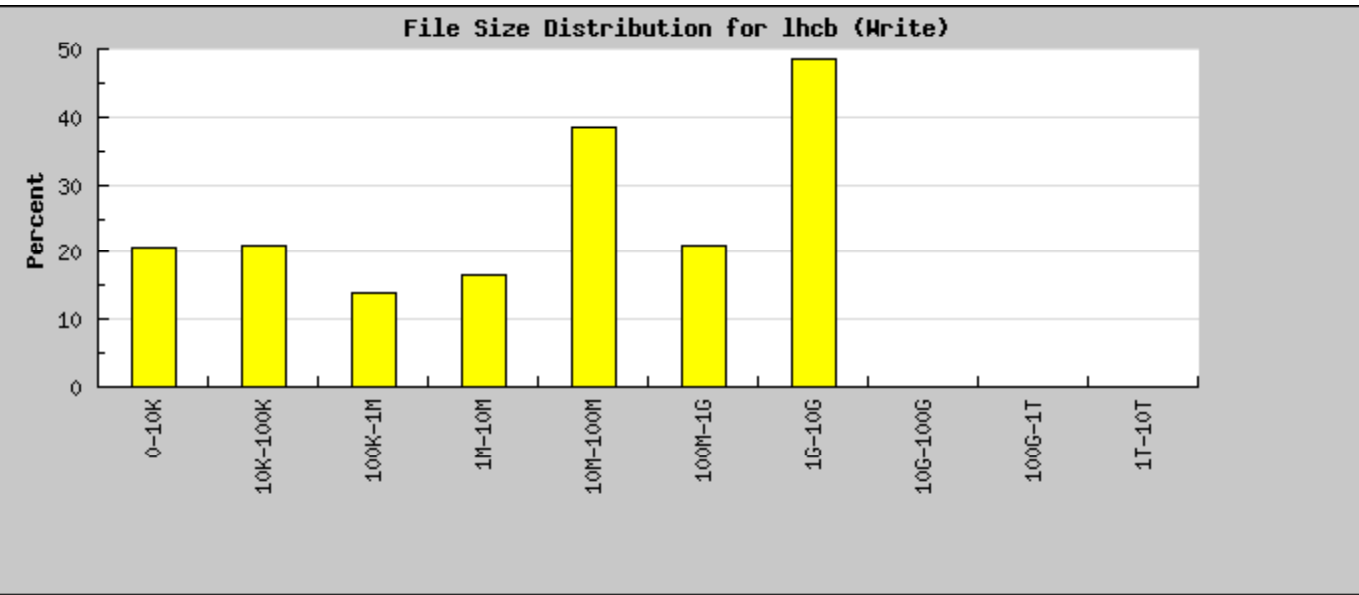
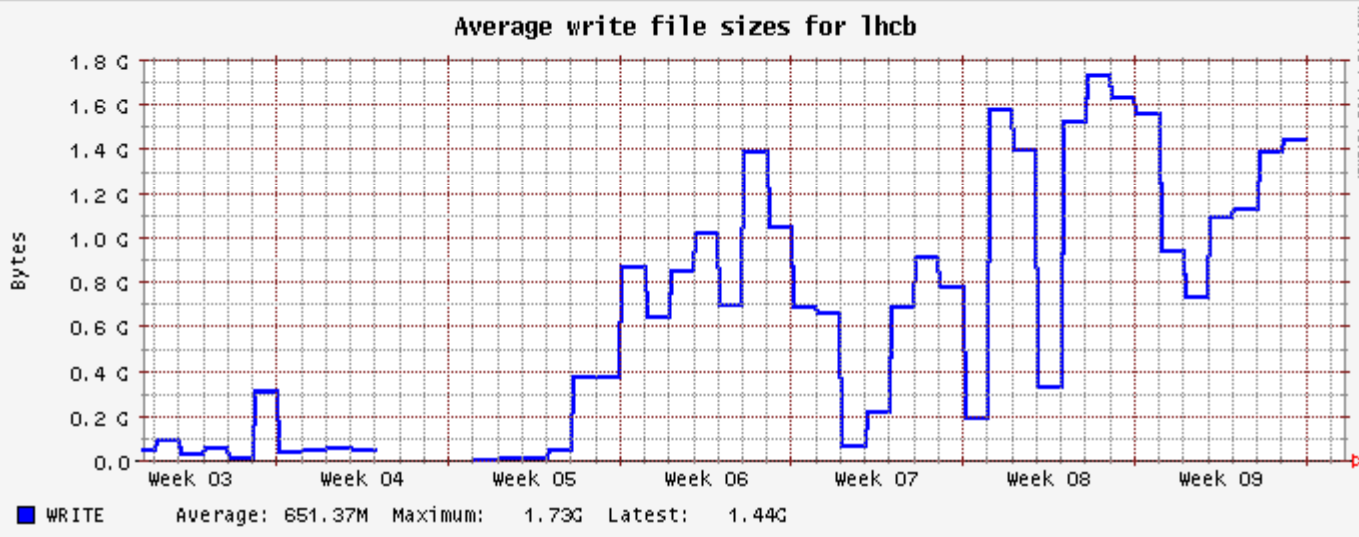


Data	Alice	Atlas	CMS	LHCb
CCRC Feb '08	340 MB	320 MB	1470 MB	550 MB
Jan '08	200 MB	250 MB	2000 MB	200 MB

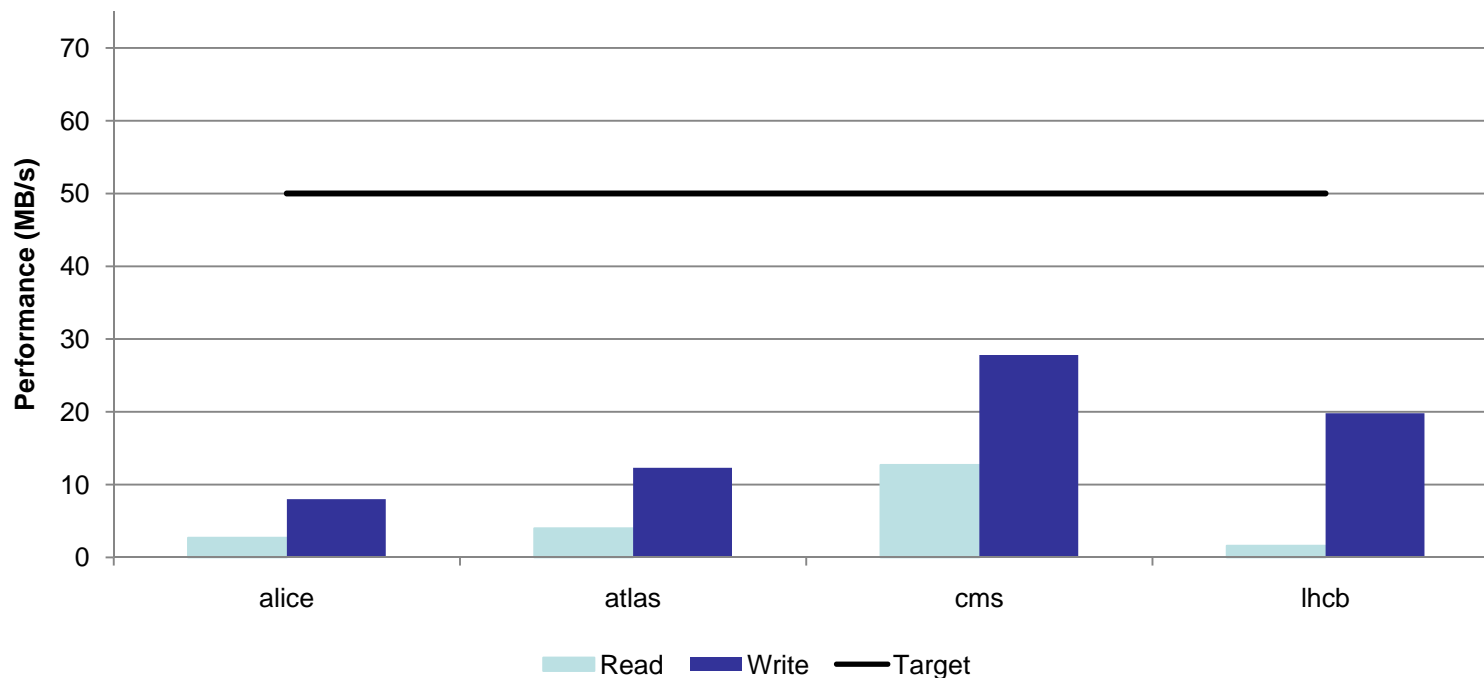




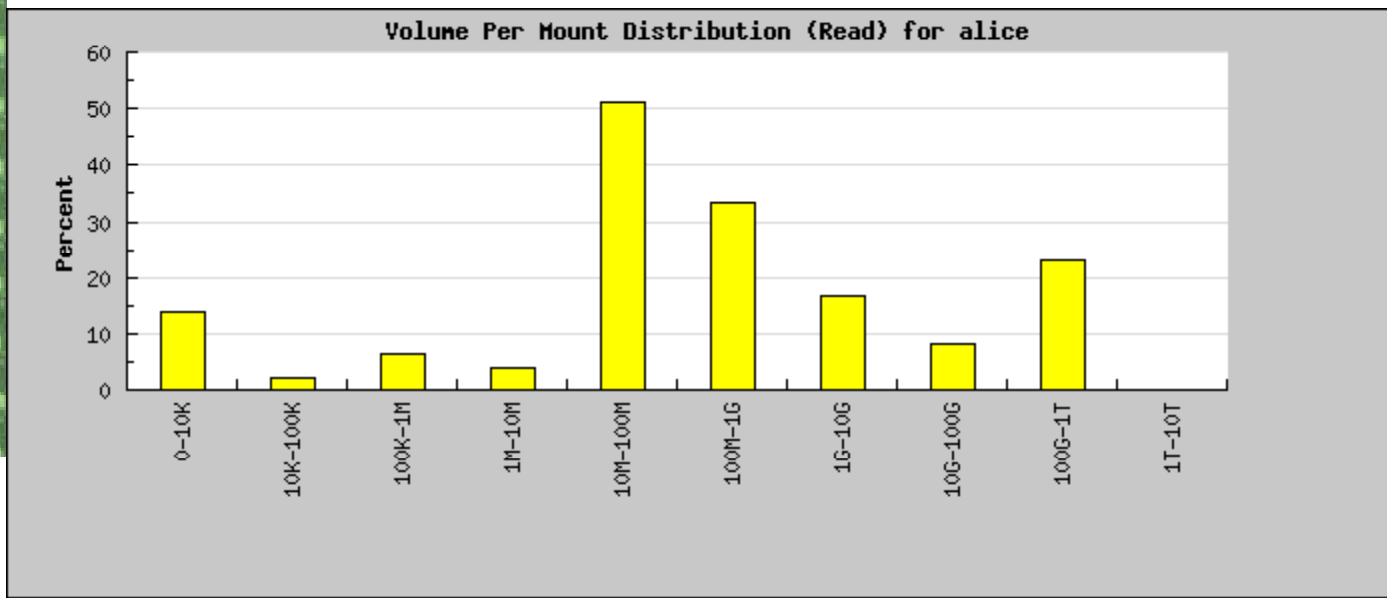
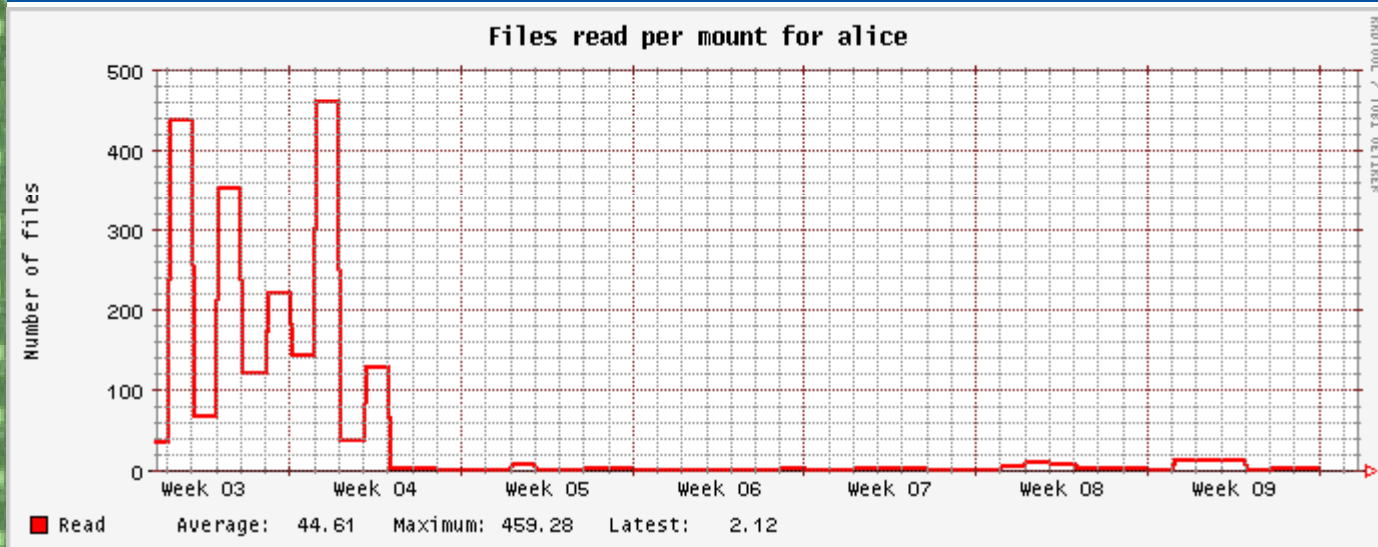


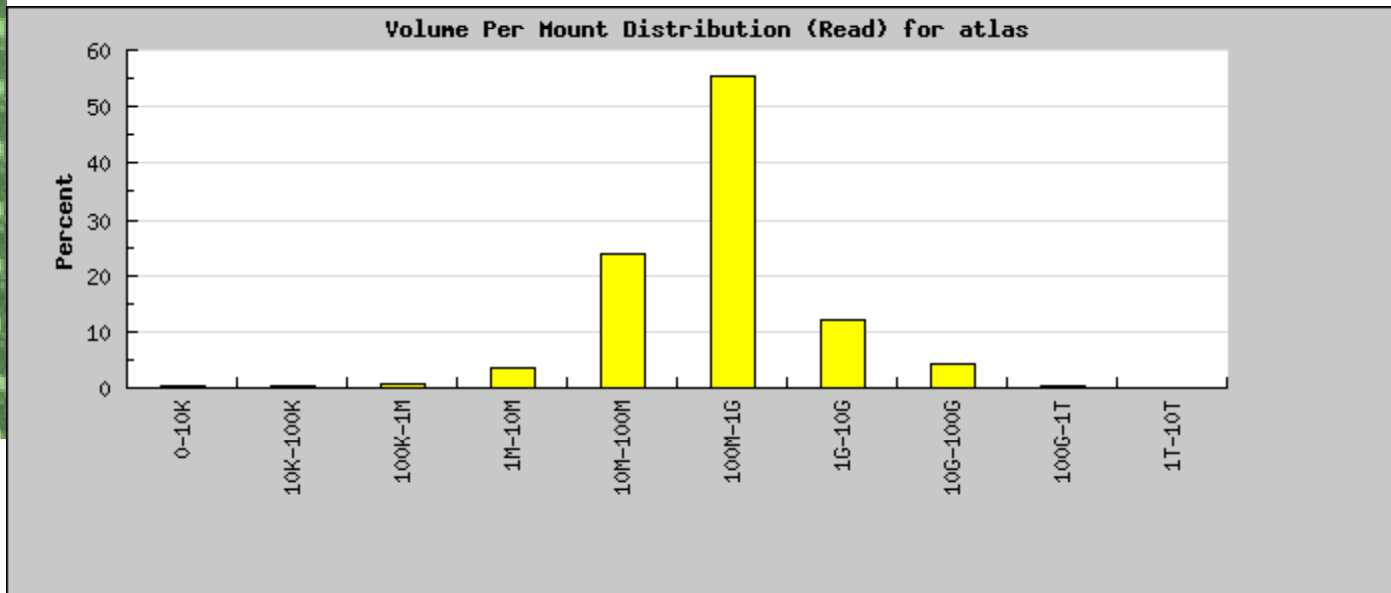
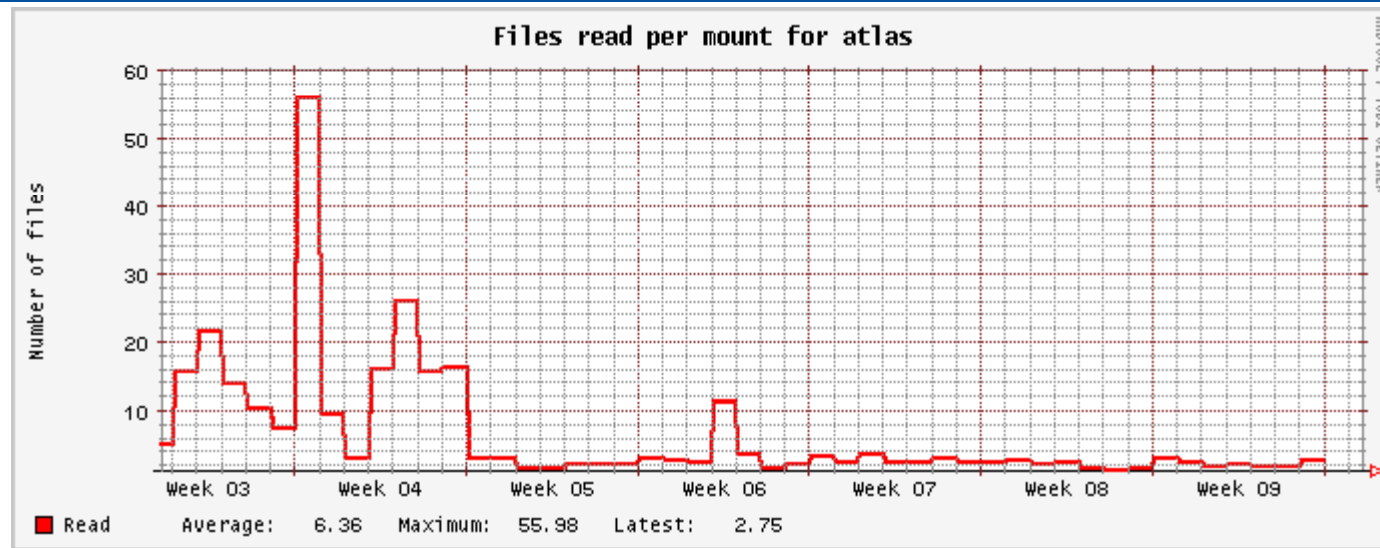


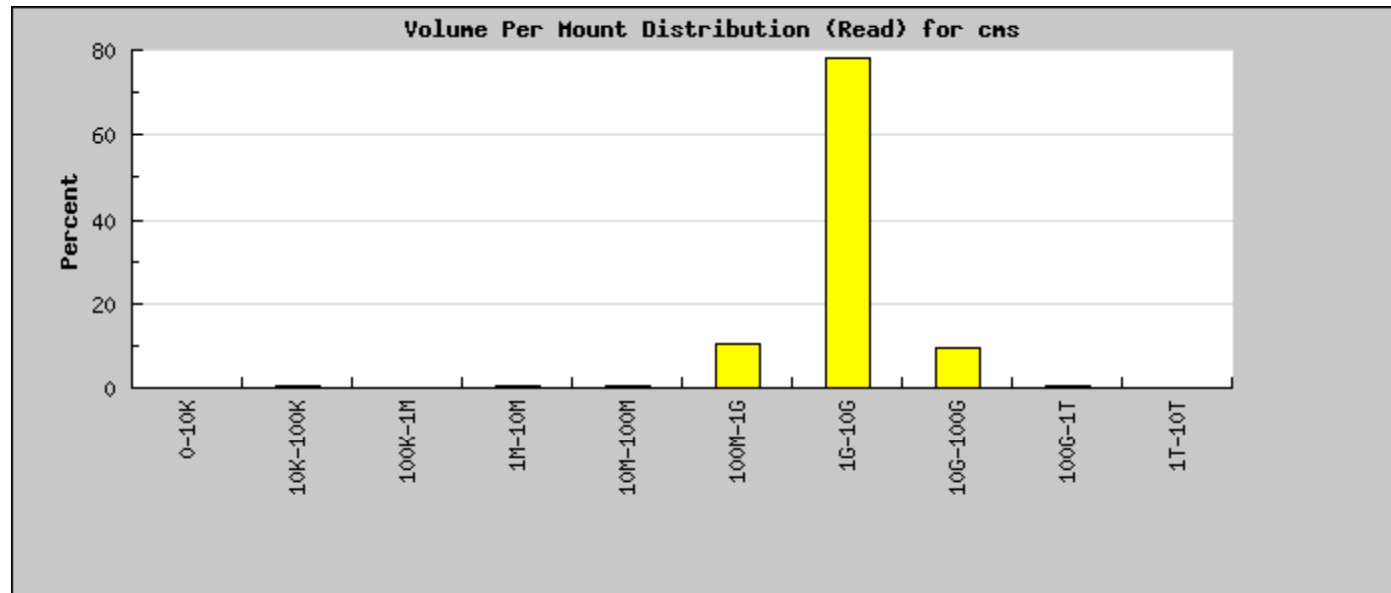
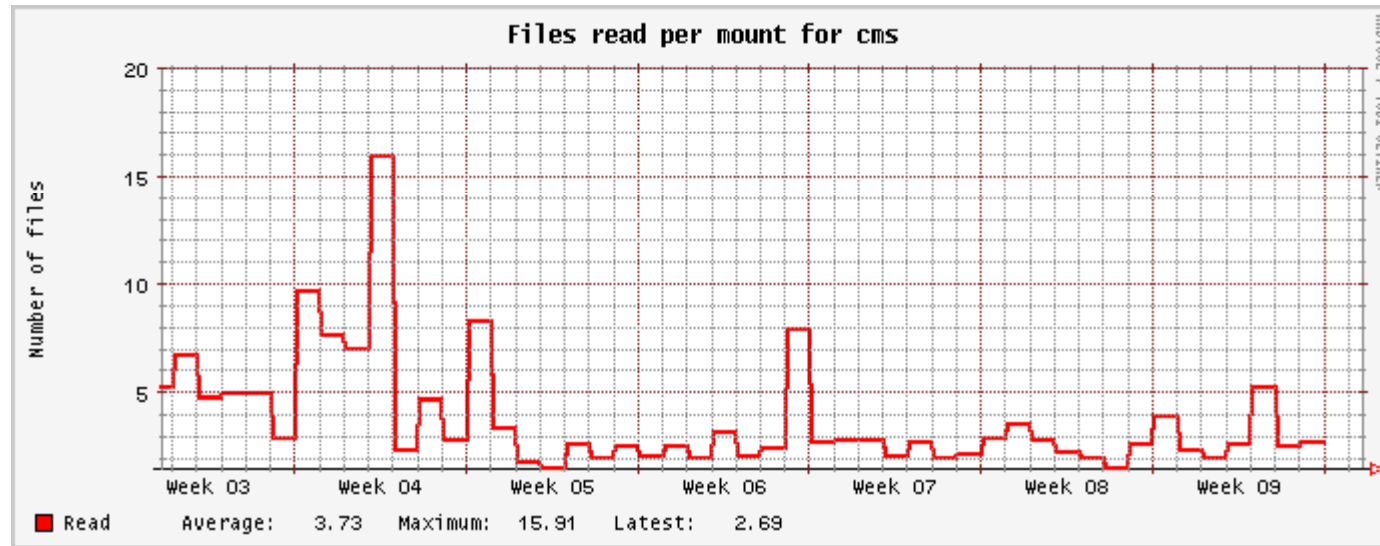
Total Rate Including Mount Time

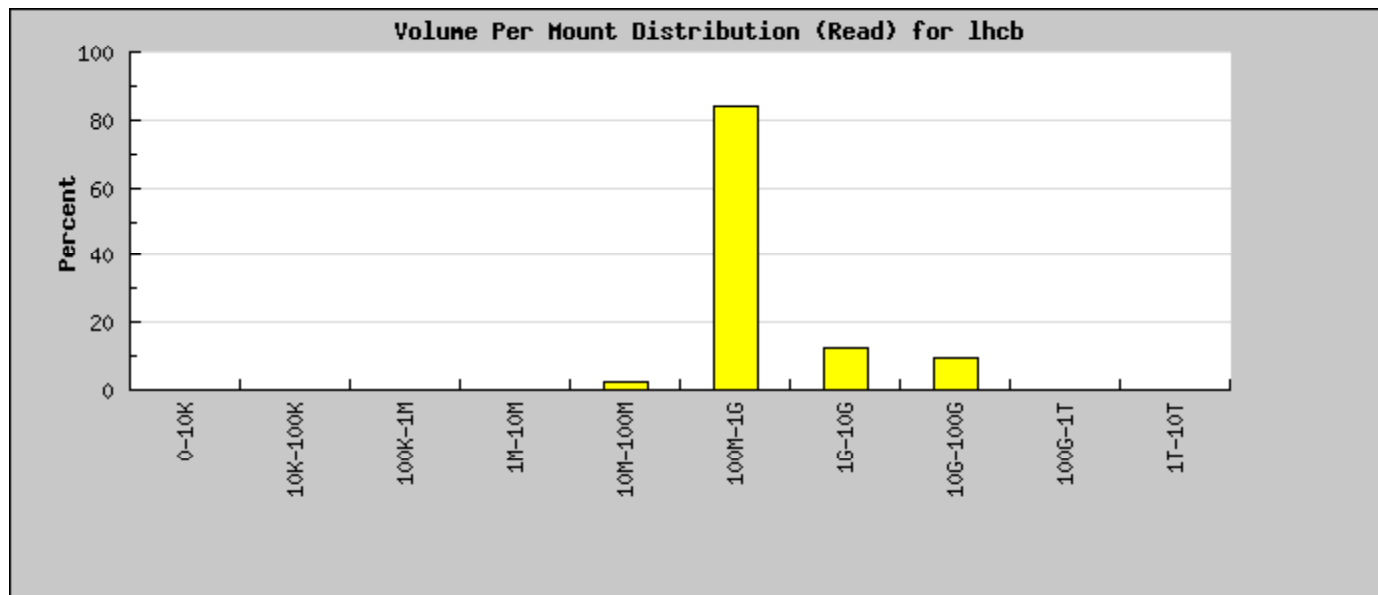
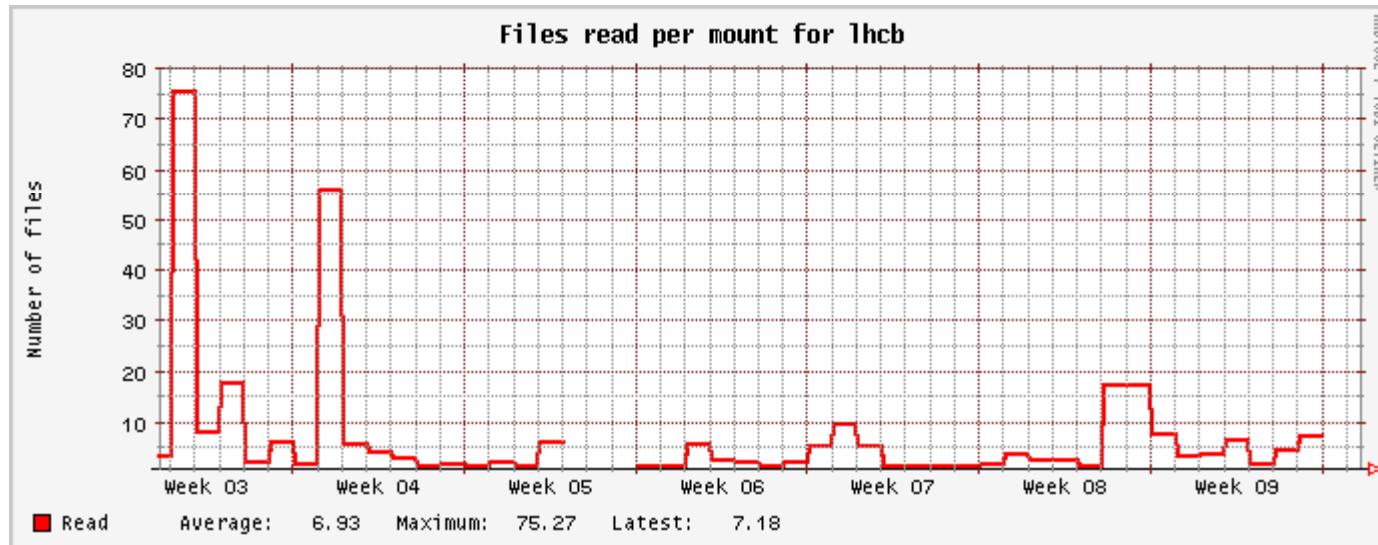


- Alice and LHCb running with Castor 2.1.4 so expected write rates when migrated are around double
- ATLAS write rates were up to 30 MB/s during Week 8 as file size increased
- CMS write rates have doubled since January
- Read remains inefficient for all VOs

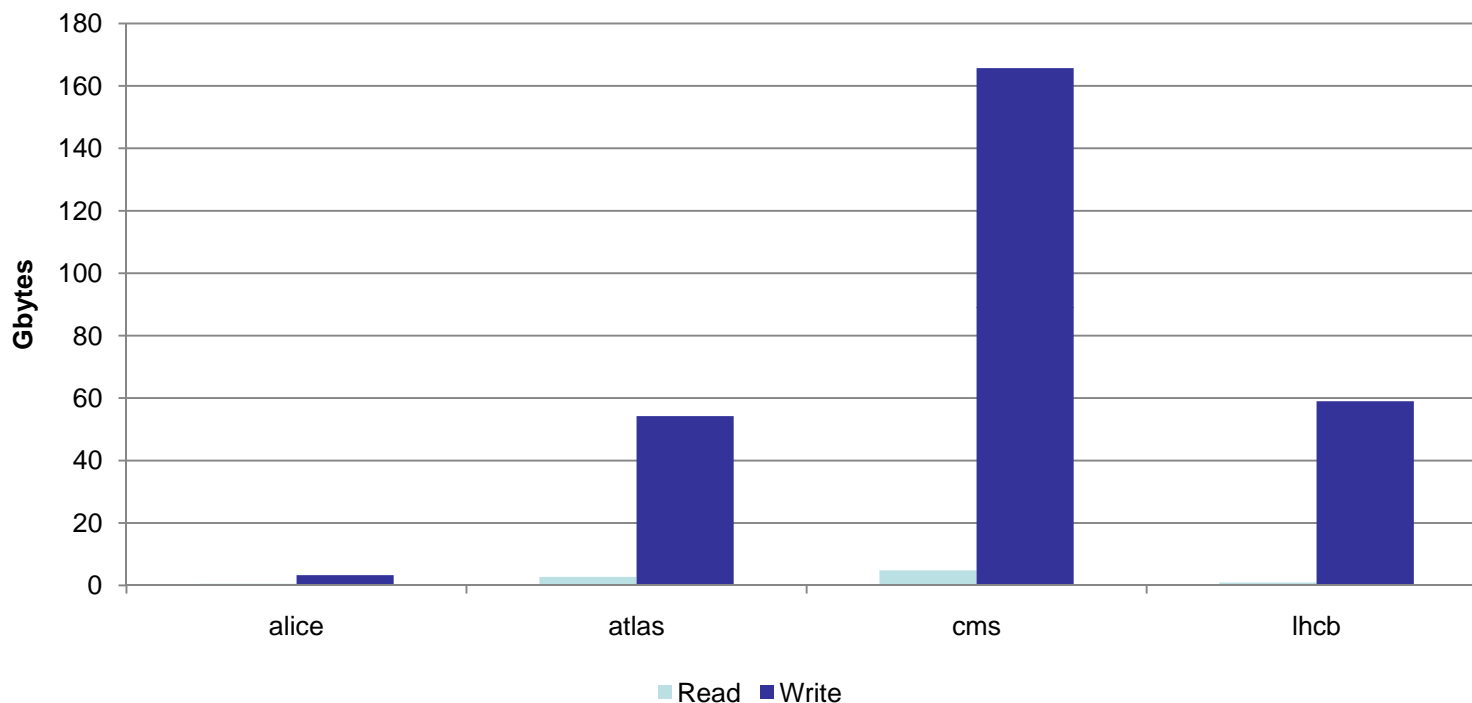






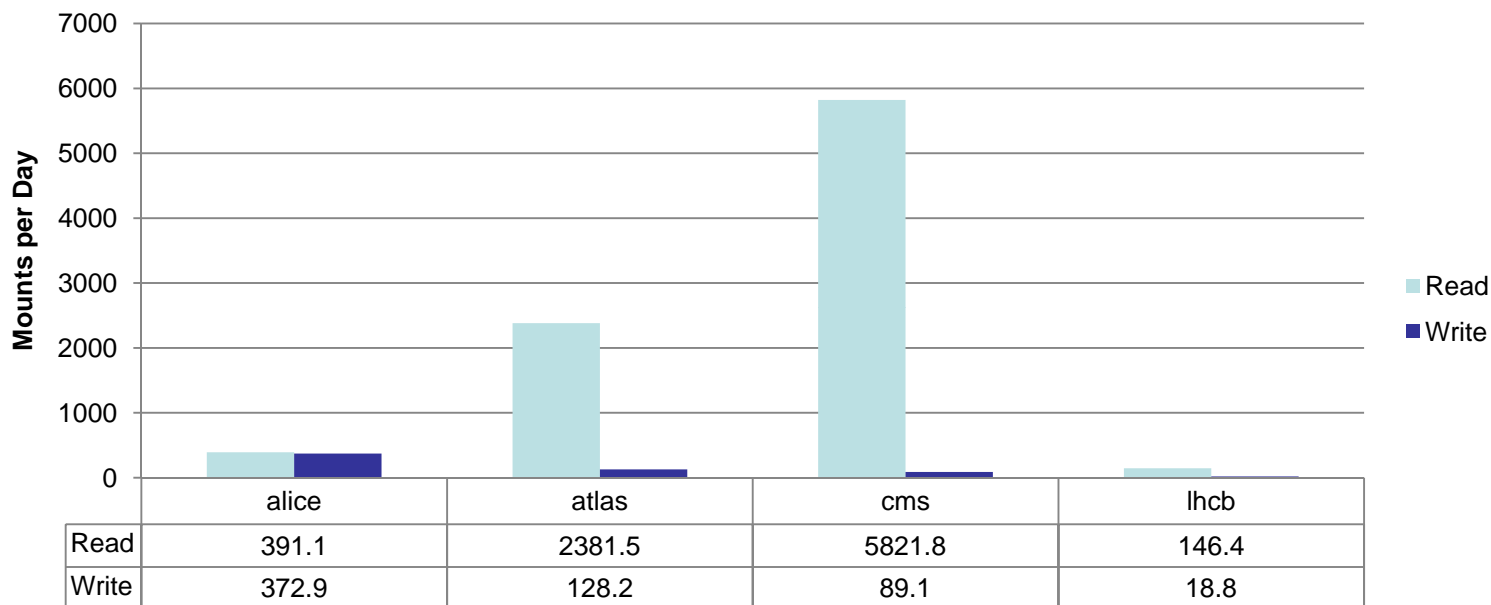


Average Data per Mount



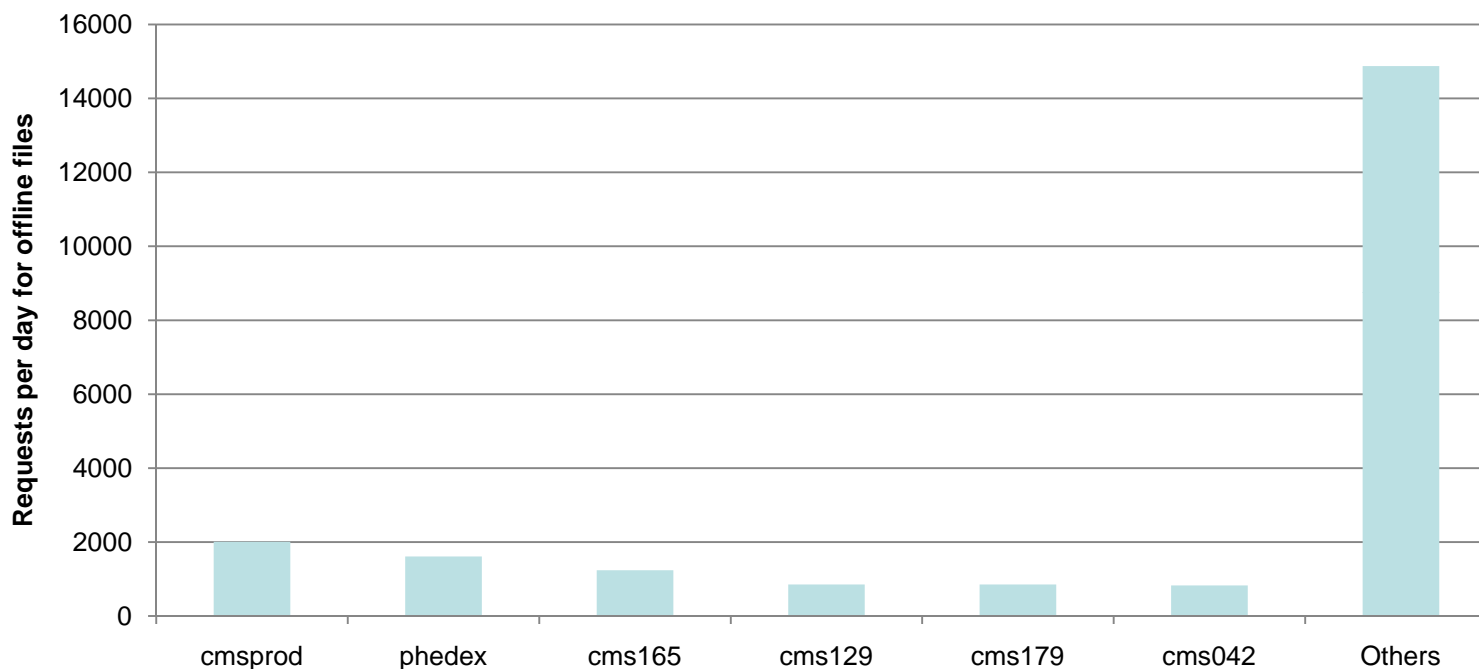
- Write data volumes improving with new policies
- Read data volumes remains a concern
 - Disk cache size versus Garbage collection policy

Mounts per Day during CCRC



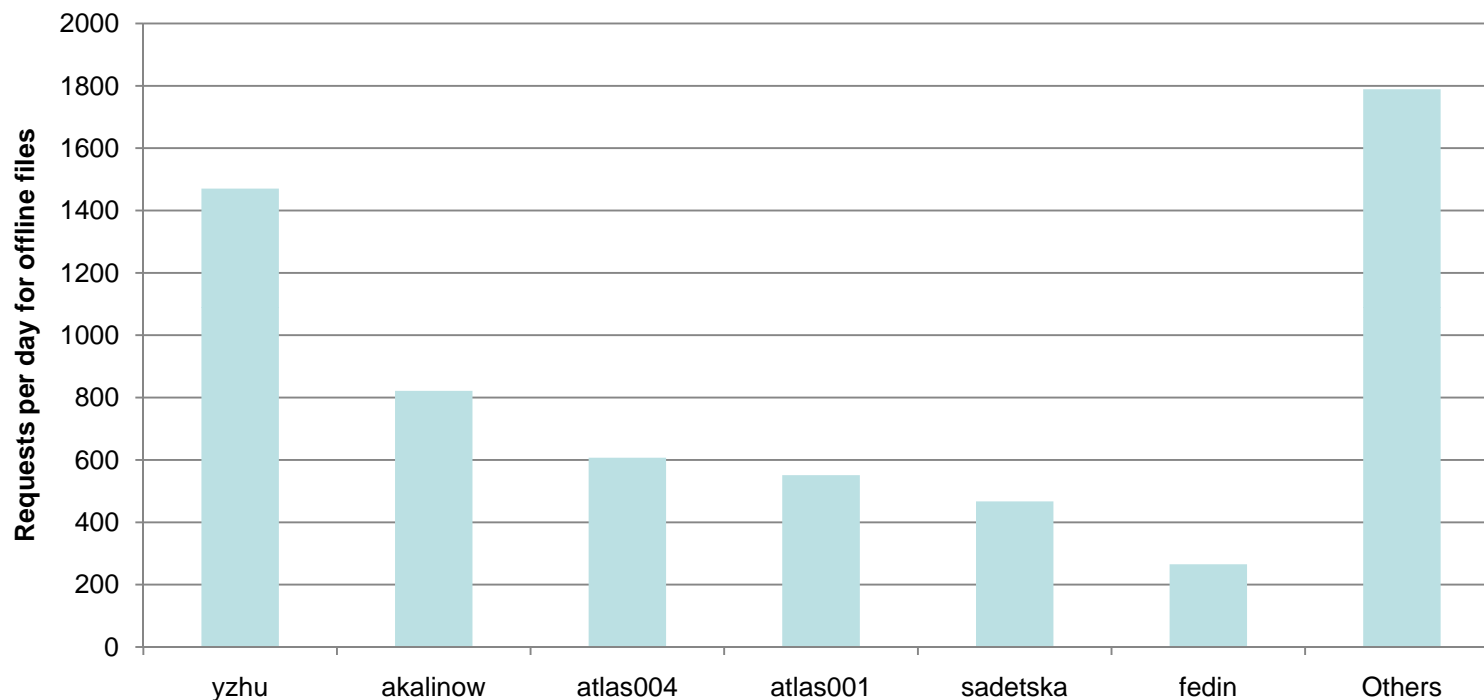
- Random read dominates drive time (90% reading)
- Writing under control of Castor policies
- Reading much more difficult to improve from the Castor side

Offline Requests for CMS during Feb CCRC



- Counts of requests for production files which were not on disk during CCRC period for CMS
- CMS production is under cmsprod and phedex (16% total)
- Requests for tape recalls dominated by non-production
- Full user list available on request

Offline Requests for Atlas during Feb CCRC



- Count of requests for production data files which were not on disk by user
- Requests for tape recalls dominated by non-production

- Service ran well during CCRC
 - One robot failure was handled without significant user impact
 - Tape server and drive maintenance was transparent
 - Peaks of 4GB/s writing, 5 GB/s reading
- Tuning approach successful for write
 - New write policies doubled write performance for CMS and Atlas
 - Atlas performance improved when large simulation files were used
 - LHCb and Alice will improve with Castor 2.1.6
- Read mount share remain high
 - 90% of the mounts but only 45% data transferred compared to write
 - Production users competing for resources with less efficient end users
 - **End users using Tier-0 resources ?**
 - **Is the contents/size of the disk caches correct ?**
- Dedicating tape resources may be required
 - Allocate drives / robots to each VO to ensure fair share
 - Reduce resilience as drive or robot failure has larger impact
 - Monitoring to continue with the implementation of read policies during March through May CCRC

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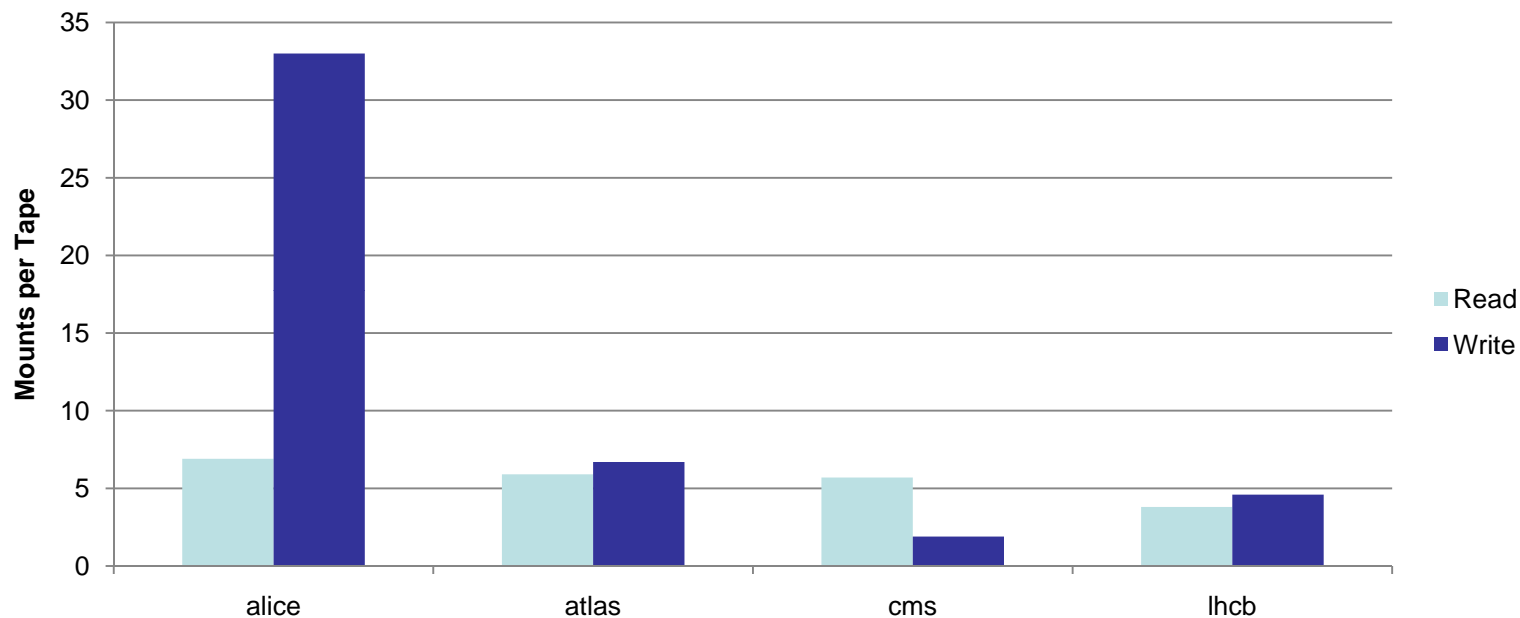
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Backup Slides



- File size
 - Average size of files to/from tape
- Repeat mount rate
 - Average number of times a tape is mounted for each tape touched that day
- Data transfer per mount
 - Average volume of data transferred for each mount
- Total Rate
 - Data read/written per-VO divided by total time on drives including mount, unmount and data transfer.

Repeat Mounts per Tape Touched



- Alice write repeat mounts will drop to at least 5 with Castor 2.1.6
- Atlas write performance limited by smaller files

- Metrics Definition
 - <https://twiki.cern.ch/twiki/bin/view/LCG/MssEfficiencyCERN>
- Tape Efficiency Summary
 - <https://twiki.cern.ch/twiki/bin/view/LCG/MssEfficiencyCERN>