dCache & HPSS

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- dCache version 4.2.34, CentOS7

- 109 Dell disk servers

  - 80 R730xd, 29 R740xd

- 30 Dell transfer servers (2x 10Gpbs)

  - 19 R730xd, 11 R740xd

- Total capacity : 20.3PiB (used 18.2PiB)

Storage by VO
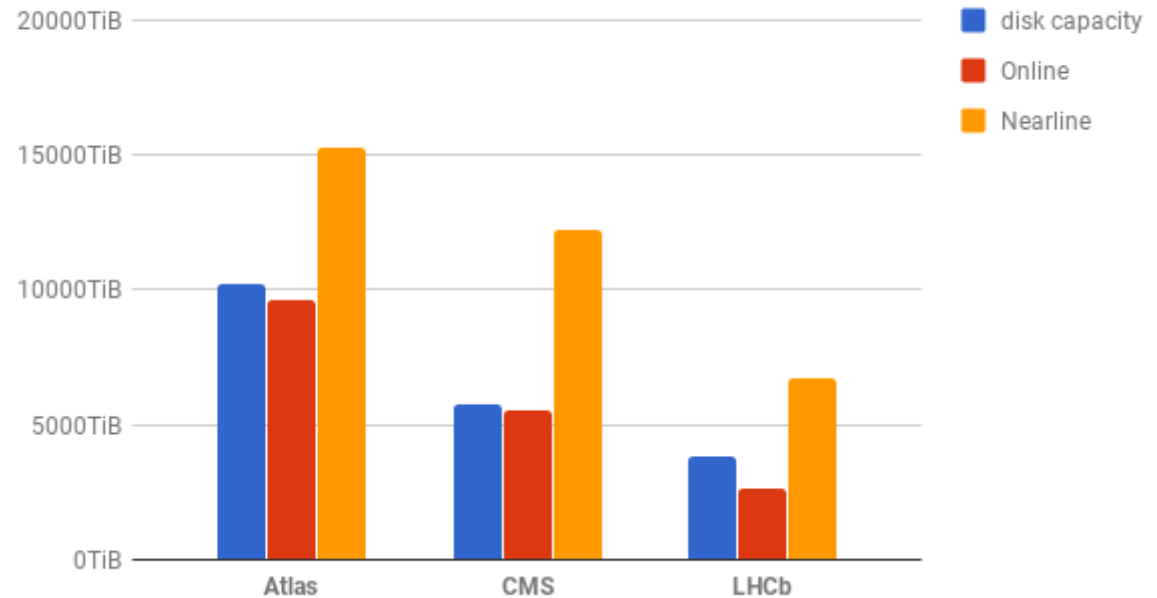
- Atlas :
  - 8 migration pools (8TB per pool)
  - 12 staging pools (10TB, 400 rq max per pool)

- CMS :
  - 11 migration pools (8TB per pool)
  - Staging on analysis pools (100 pools with 60 rq max)
  -

- LCHb :
  - 6 migration pools (6TB)
  - 6 staging pools (6TB)

On Atlas hsm pools :

```
[ccdcamcli06] (pool-atlas-xferout-li218a@ccdcatli218-pool-atlas-xferout-li218a-Domain) ageorget > hsm ls
osm(osm):script
    pnfs                /pnfs/in2p3.fr
    hsmfs               /hpss2/dcache2
    remove              /opt/software/rfio-hpss/prod/bin/rfrm
    c:gets              100
    c:puts              0
    command             /usr/share/dcache/lib/hsmcp.py
    method              treqs
    c:remove            1
    copy                /opt/software/rfio-hpss/prod/bin/rfcp
```

On CMS hsm pools :

```
[ccdcamcli06] (pool-cms-analysis-li202a@ccdcacli202-pool-cms-analysis-li202a-Domain) ageorget > hsm ls
osm(osm):script
    pnfs                /pnfs/in2p3.fr
    hsmfs               /hpss3/dcache
    remove              /opt/software/rfio-hpss/prod/bin/rfrm
    c:gets              60
    c:puts              0
    command             /usr/share/dcache/lib/hsmcp.py
    method              treqs
    c:remove            1
    copy                /opt/software/rfio-hpss/prod/bin/rfcp
```

hsmcp.py script : parse dCache parameters, call treqs client

Get request :

```
23/06/19 14:11:01 INFO      192287 ['get', '00004B540723AAB44C9F993FDB795D9F8E39', '/data/pool-cms-analysis-li334a/pool/data/00004B540723AAB4
4C9F993FDB795D9F8E39', '-si=size=2974643875;new=false;stored=true;sClass=hpssdata:cms;cClass=-;hsm=osm;accessLatency=NEARLINE;retentionPolic
y=CUSTODIAL;path=/pnfs/in2p3.fr/data/cms/data/store/hidata/HIRun2018A/HIMinimumBias5/AOD/PromptReco-v2/000/327/402/00000/CADDD440-9909-414B-
BB09-6B9BB53BB2D7.root;uid=3033;gid=119;flag-c=1:217de60f;osm://osm/?store=cchpssdcache:/hpss3/dcache/cms/hpssdata/2018/12/00004B540723AAB44
C9F993FDB795D9F8E39&group=cmsgrid&bfid=;store=hpssdata;group=cms;bfid=<Unknown>;', '-uri=osm://osm/?store=cchpssdcache:/hpss3/dcache/cms/hps
sdata/2018/12/00004B540723AAB44C9F993FDB795D9F8E39&group=cmsgrid&bfid=', '-pnfs=/pnfs/in2p3.fr', '-hsmfs=/hpss3/dcache', '-remove=/opt/softw
are/rfio-hpss/prod/bin/rfrm', '-method=treqs', '-c:remove=1', '-copy=/opt/software/rfio-hpss/prod/bin/rfcp']

23/06/19 14:11:01 INFO      192287 python /opt/software/treqs2-client/prod/bin/treqs.py --url http://dcache:dcache@cctreqs2.in2p3.fr/ copy --
quiet -a cmsgrid -f cchpssdcache:/hpss3/dcache/cms/hpssdata/2018/12/00004B540723AAB44C9F993FDB795D9F8E39 -d /data/pool-cms-analysis-li334a/p
ool/data/00004B540723AAB44C9F993FDB795D9F8E39

23/06/19 14:28:18 INFO      192287 Transfer succeeded, transfert agent return: 2974643875 bytes in 4 seconds through em1 (in) and local (out)
 (726231 KB/sec)
```

```
##########################################################
## main processing: get/put/remove

if subcommand == "get": # A stage request
  ...
  cmd = "python %s --url http://dcache:dcache@cctreqs2.in2p3.fr/ copy --quiet -a %s -f %s -d %s" % (treqs_python_client, username, hpssurl, filename )
  ...
  my_logger.info(cmd)
```

Put request : parse dCache parameters, call rfcp client

```
24/06/19 10:51:00 INFO      173811 ['put', '0000D17891F274F0442AA0FBBEA9C934932D', '/data/pool-atlas-tapebuffer-li218a/pool/data/0000D17891F2
74F0442AA0FBBEA9C934932D', '-si=size=1322688460;new=true;stored=false;sClass=mctape:atlas;cClass=-;hsm=osm;accessLatency=NEARLINE;retentionP
olicy=CUSTODIAL;uid=3327;path=/pnfs/in2p3.fr/data/atlas/atlasmctape/mc16_13TeV/HITS/e6798_e5984_a875/mc16_13TeV.411075.PhPy8EG_A14_ttbar_hda
mp258p75_ljets_CFiltBVeto.simul.HITS.e6798_e5984_a875_tid18073588_00/HITS.18073588._002073.pool.root.1;writeToken=61;StorageGroup=cchpssdcac
he:0;gid=124;StoreName=mctape;SpaceTokenDescription=ATLASMCTAPE;SpaceToken=61;flag-c=1:ff433148;LinkGroupId=10;store=mctape;group=atlas;bfid
=<Unknown>;', '-pnfs=/pnfs/in2p3.fr', '-hsmfs=/hpss5/dcache', '-remove=/opt/software/rfio-hpss/prod/bin/rfrm', '-method=treqs', '-c:remove=1
', '-copy=/opt/software/rfio-hpss/prod/bin/rfcp']
24/06/19 10:51:00 INFO      173811 sudo -u atlagrid /opt/software/rfio-hpss/prod/bin/rfcp /data/pool-atlas-tapebuffer-li218a/pool/data/0000D1
7891F274F0442AA0FBBEA9C934932D cchpssdcache:/hpss5/dcache/atlas/mctape/2019/06/0000D17891F274F0442AA0FBBEA9C934932D
24/06/19 10:51:02 INFO      173811 1322688460 bytes in 2 seconds through local (in) and p4p1 (out) (645843 KB/sec)
```

```python
elif subcommand == "put": # migration request
    # Is this file a new HPSS file (stored=false) or is it a reflush (stored=true)?
    if stored == 'true':
        # In the case we want to reflush a file, the script is called with uri and not storagegroup
        # Parse uri
        protodummy, uriparams = uri.split('?')
        for uriparam in uriparams.split('&'):
            if uriparam != "":
                key, value = uriparam.split('=')
                globals()[key]=value
        rfcp_url = store
        username = group
    else:
        # Extract rfio server and COS from StorageInfo
        if not globals().has_key('StorageGroup'):
            my_logger.error('StorageGroup is not defined')
            my_syslogger.error('StorageGroup is not defined')
        rfcp_url = "%s%s" %(rfio_server,fullpath)

    rfcp_cmd = "sudo -u %s %s %s %s" % (username, copy, filename, rfcp_url)
```

Total Migration

1.253PB

Total Staging

1.252PB

LCG HSM put nbReq

1,107,232
Put requests

HSM put errors

3,368
migration errors

LCG HSM get nbReq

477,871
get requests

LCG HSM get errors

218
staging errors

Total Migration Atlas

870.469TB
Put Atlas

Total Migration Cms

334.955TB
Put CMS

Total Migration LHCb

77.338TB
Put LHCb
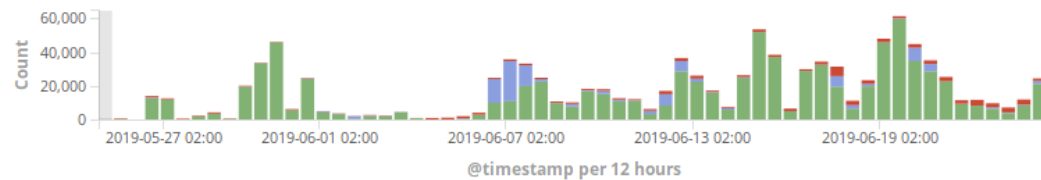
Total Staging Atlas

140.865TB
Get Atlas

Total Staging Cms
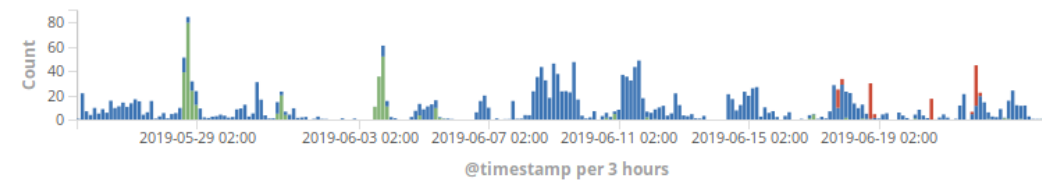
1.047PB
Get CMS

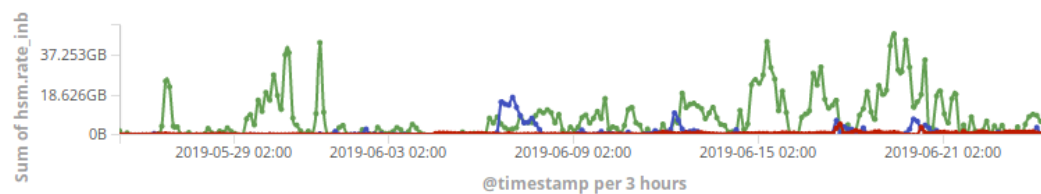Total Staging LHCb

68.479TB
Get LHCb

Migration events

Staging events

HSM migration rate

HSM staging size