DPM Evolution: a Disk Operations Management Engine for DPM

Fabrizio Furano, Georgios Bitzes, Oliver Keeble (presenter), Andrea Manzi
Disk Pool Manager

• DPM is a system for managing disk storage at small and medium sites
• Over 70PB stored in the system at around 150 sites
• DPM has just finished a little revolution.
  • We now have our definitive platform for the future
  • This talk will describe that platform
The 3rd Generation DPM

- **1st generation** – derived from Castor disk pool
- **2nd generation** – introduced dmlite
  - Internal framework abstracting many functions, enabling multiple new frontends
- **3rd generation** – introduces Dome
  - DPM 1.9 “Legacy flavour”
  - Legacy services still running
  - DPM 1.9 “Dome flavour”
  - Legacy services retired
    - No more dpmd, dpns, rfio, srm, csec
DPM headnode architecture

Legacy daemons
- dpm (daemon)
- dpm
- srm
- rfio

Legacy clients
- CSec

Communication with DPMd can now be dropped

DOME
DMLite section
- DOME Adapter
- mem cache
- profiler
- mysql
- Xrootd
- WebDAV
- gsiftp
- DMLite core

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DPM 1.9 “Dome flavour”

- Activate Dome, what do you get?
  - SRM free operation
  - Quotas
    - “space token” concept generalised and mapped into namespace
  - Space reporting – used/free via HTTP/DAV
    - Reporting on “space tokens” and subdirectories
  - GridFTP redirection enables scalability
  - Caching hooks
  - Simplified system
  - All internal communication over HTTPS
    - Control and data tunnelling
  - Improved dmlite-shell
What does Dome do?
Disk server (simplified)

DOME
- Timed Logic
- Workers
- AuthN
- Request logic
- Task Executor

Apache HTTPd
- mod_proxy_fcgi
  - Dmlite:
    - IO
    - DiskCatalog
- lcgdm_dav

Requests to HEAD

Ext Pull() requests (configurable script)

Dome_checksum Script (bundled with DOME)

Dome can do IO tunnelling if clients don’t support redirection

CERN
Used/free space: WebDAV

```

<?xml version="1.0" encoding="utf-8"?>
<D:multistatus xmlns:D="DAV:" xmlns:ns0="DAV:">
<D:response xmlns:lp1="DAV:" xmlns:lp2="http://apache.org/dav/props/" xmlns:lp3="LCGDM:">
<D:href>/dpm/cern.ch/home/dteam/</D:href>
<D:propstat>
<D:prop>
<lp1:quota-used-bytes>24677181319</lp1:quota-used-bytes>
<lp1:quota-available-bytes>75322818681</lp1:quota-available-bytes>
</D:prop>
<D:status>HTTP/1.1 200 OK</D:status>
</D:propstat>
</D:response>
</D:multistatus>
```
Going SRM-less with your DPM

DPM/dpns/rfio still used (through DMLite::Adapter and SRM)
DOME used only for dmlite-shell
New powerful dmlite-shell is available
Can report used space per path
Free space reporting is like before (Only SRM can report on free spc)

All the DOME features are enabled
WebDAV reports used AND free spc per path
Quotas are properly enforced
Can create the ATLAS space report
SRM/DPM still report on spacetokens
SRM/DPM/dpns/rfio are now optional

DPM/dpns/rfio/SRM can be uninstalled

1.9.0 in EPEL

Sysadmin
Experiments
DPM team

Site updates the system
Configures quotatokens and primes the space calcs
Activate Dome (config change)
Experiments gradually stop using SRM
Load on SRM goes to zero

Good moment for a minor release

…continuous support…

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TIME
Caching laboratory

- DPM 1.9 with Dome will allow investigation of operating WLCG storage as a cache
- Scenarios
  - Data origin a regional federation of associated sites
  - Data origin the global federation
- A volatile pool can be defined which calls out to a stager on a miss
  - Caching logic implemented in a pluggable way
  - Hybrid cache/conventional setup
- Questions to investigate
  - Cache management logic
  - Different client strategies on miss
    - blocking read, async read, redirection to origin
  - Authentication solutions
  - Workflow adaptation for locality
Summary

• DPM 1.9 “Dome flavour” represents DPM’s platform for the future.

• Full modernisation of the stack complete
  • SRM-less operation supported
  • Improved system management
  • Caching operation possible
  • Significant reduction in maintenance and operation costs
References

- http://lcgdm.web.cern.ch/
- Contact us via GGUS or hep-service-dpm@cern.ch
- Join dpm-users-forum@cern.ch for further discussion
  - https://e-groups.cern.ch/e-groups/EgroupsSubscription.do?egroupName=dpm-users-forum
- DPM Workshop 2016, 23-24 Nov, Paris
  - https://indico.cern.ch/event/559673/