Mass Storage at GridKa

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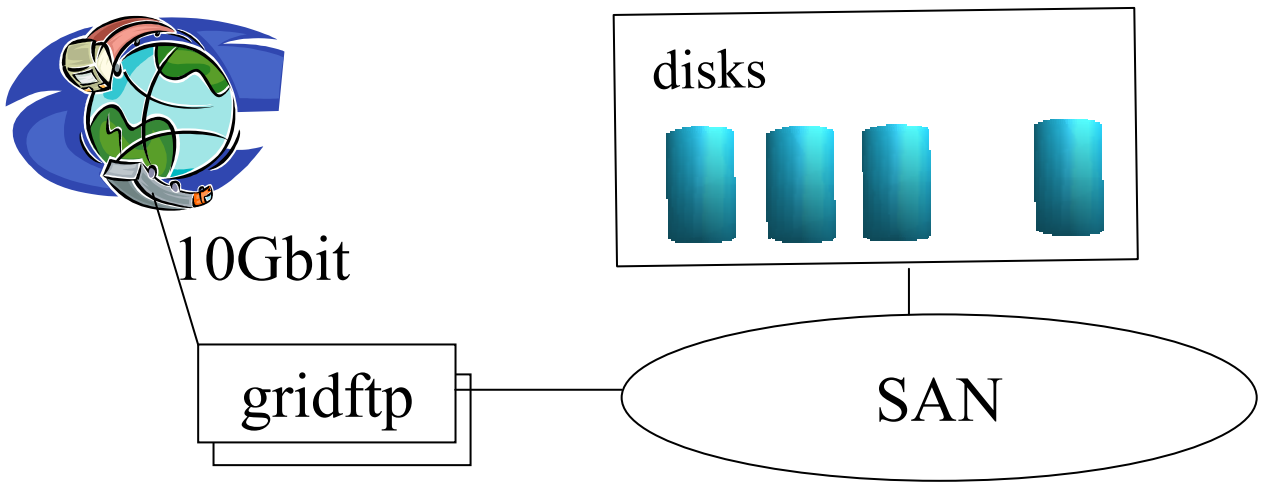
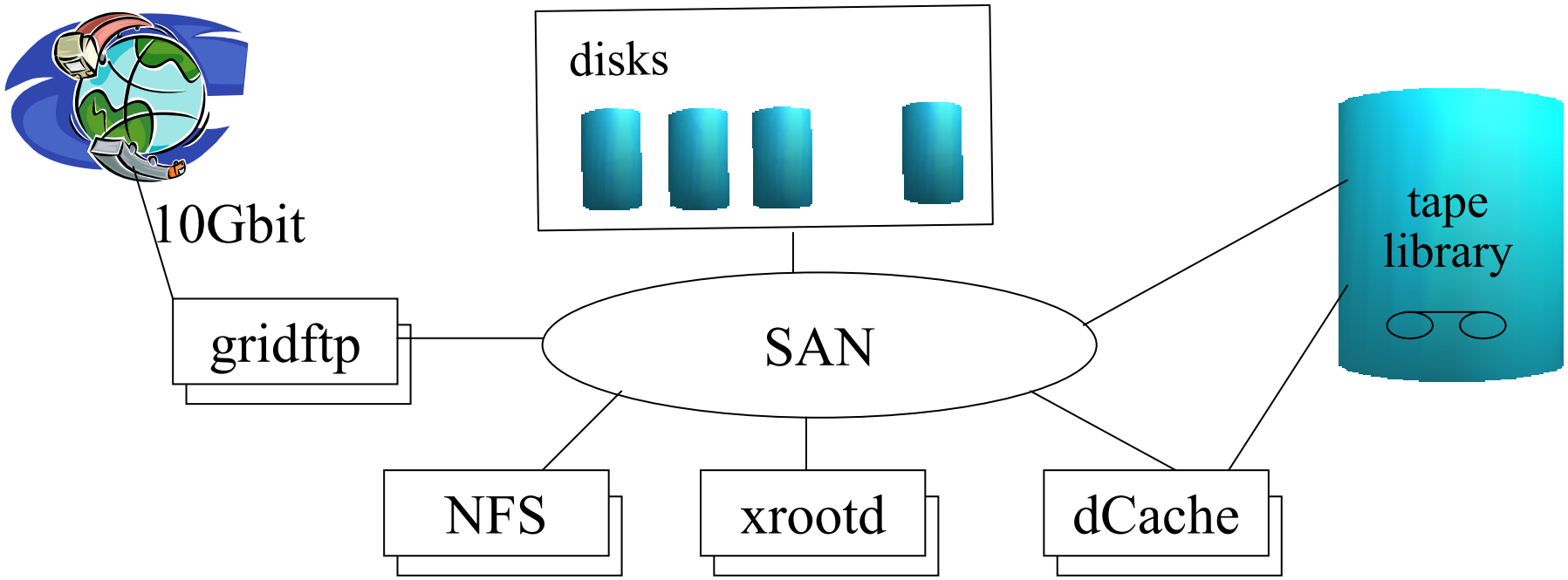
Introduction

- Overview
- What is dCache?
- Pool Selection mechanism
- dCache properties
- LCG connection
- Access to dCache – connection to CERN
- Tape Management
- Conclusion

Service Challenge



Mass Storage Environment

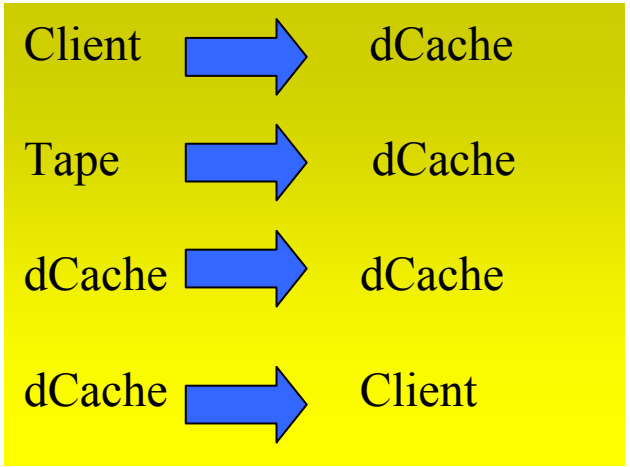


What is dCache?

- Developed at DESY and FNAL
- Disk pool management with or without tape backend
- Data may be distributed among a huge amount of disk servers.
- Automatic load balancing by cost metric and inter pool transfers.
- Data removed only if space is needed
- Fine grained configuration of pool attraction scheme

Pool Selection Mechanism

- Pool Selection required for:



- Pool selection is done in 2 steps
  - Query configuration database :

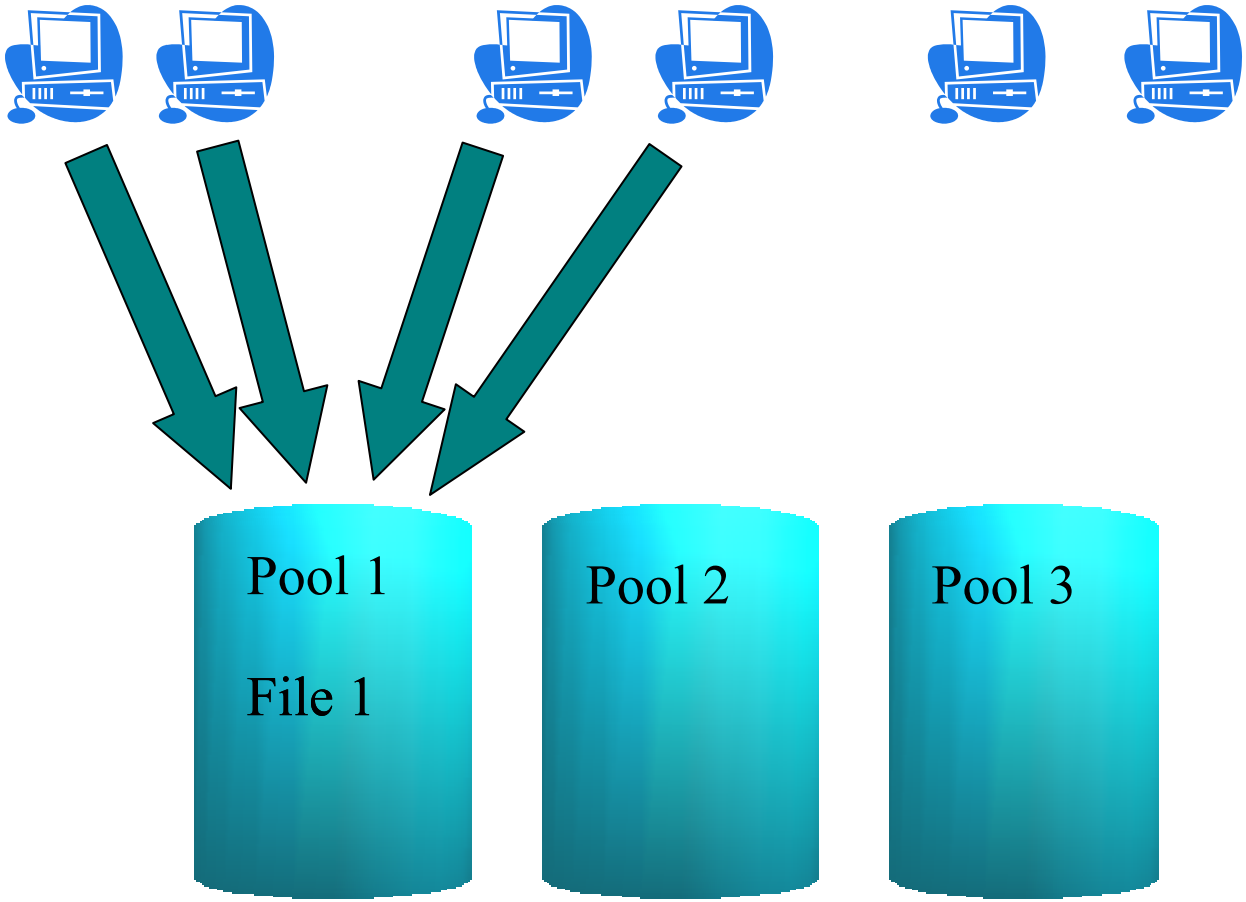
    → which pools are allowed for requested operation (intern/extern)
  - Query 'allowed pool' for their vital functions :

    → find pool with lowest cost for requested operation

LCG Storage Element

- DESY dCap lib incorporates with CERN GFAL library
- SRM version ~ 1.1 supported
- gsiFtp supported

Multiple access of one file



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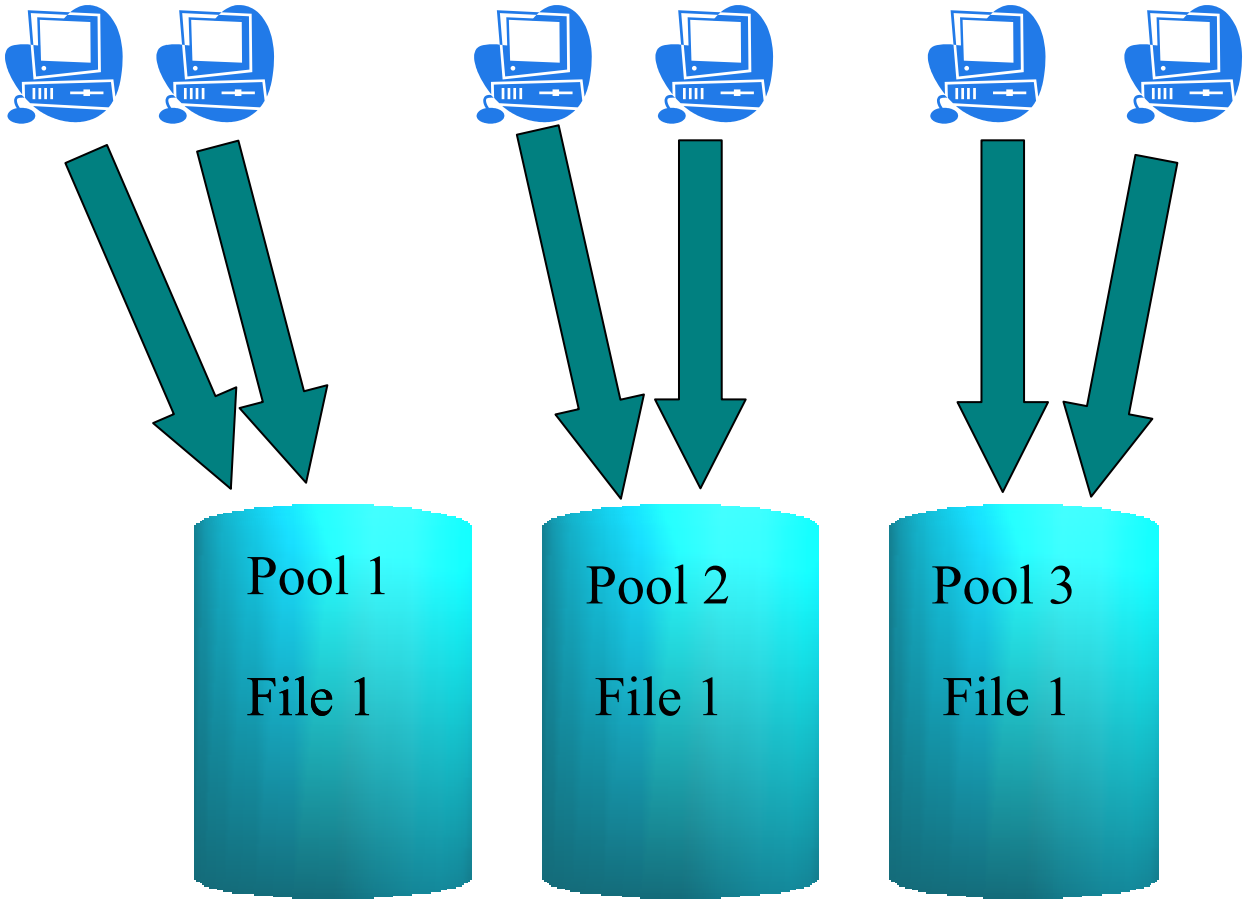


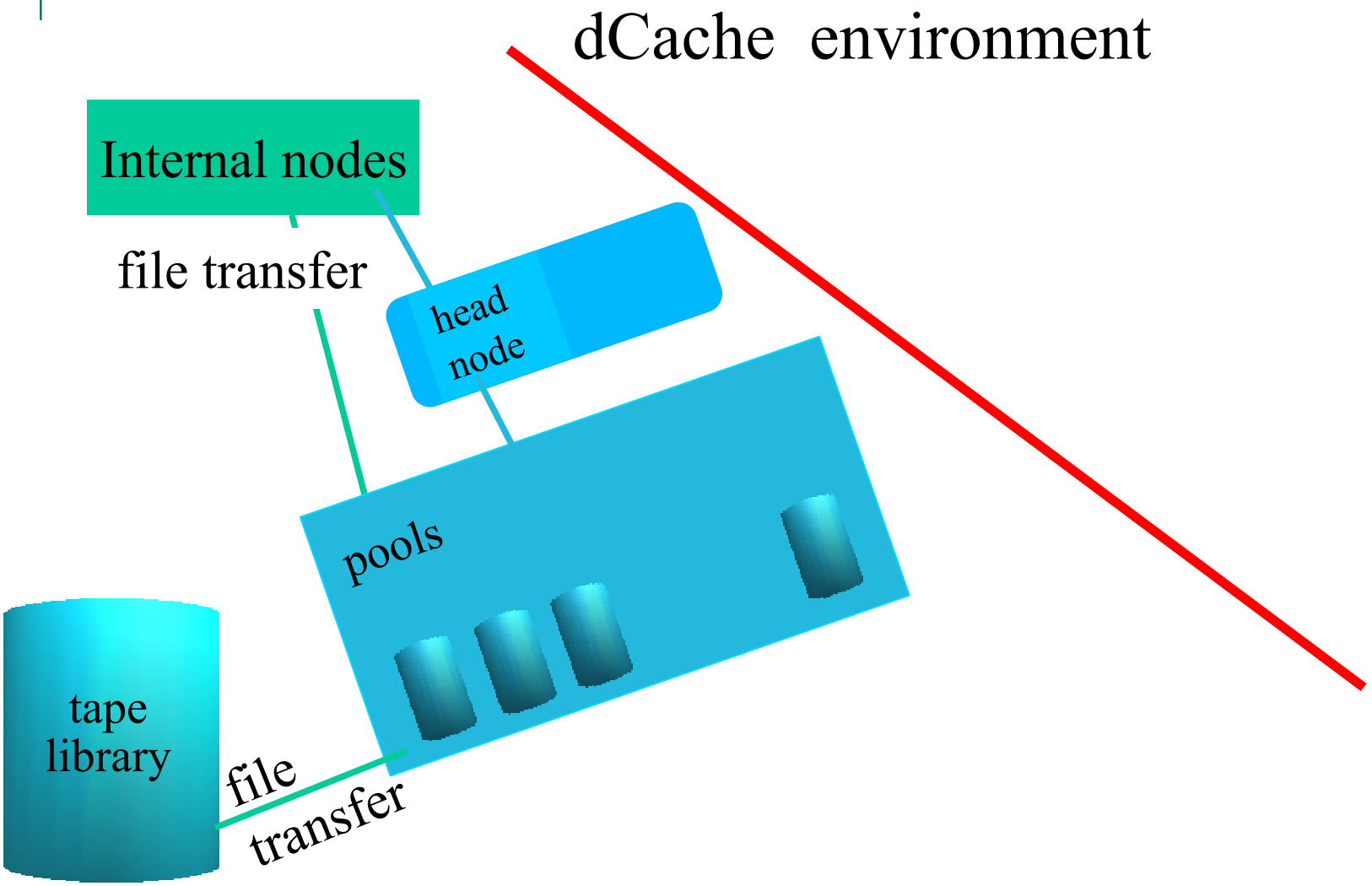
Access to dCache

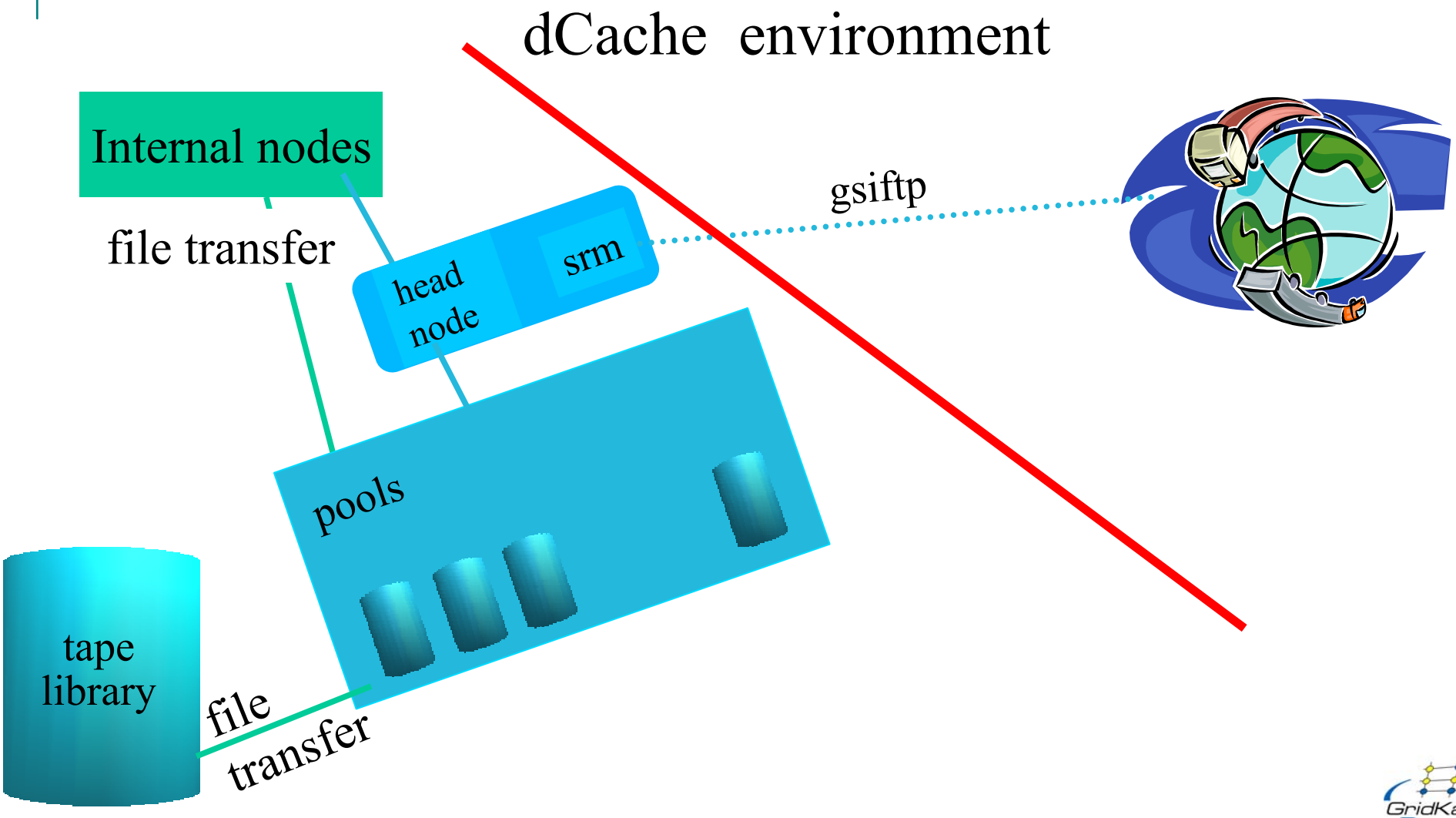
Intern

- Mountpoint
  - ls
  - mv
  - rm
- dCap
  - dccp <source> <destination>
  - dc_open(...)
  - dc_read(...)
- Preload library

Extern

- Gridftp
  - Problematic when file needs to be staged first
- SRMCP


dCache environment
Internal nodes
file transfer
head node
pools
tape library
file transfer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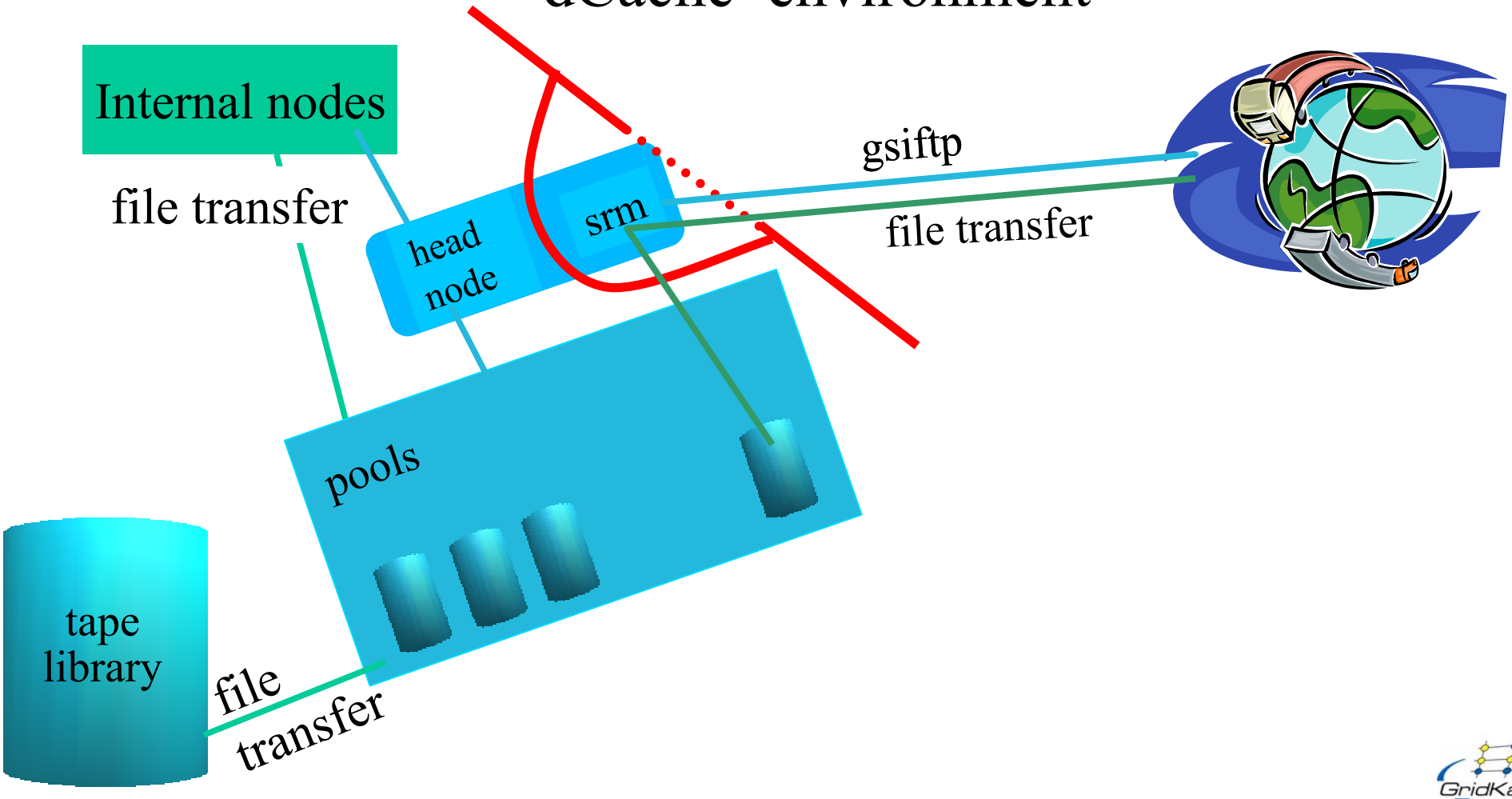

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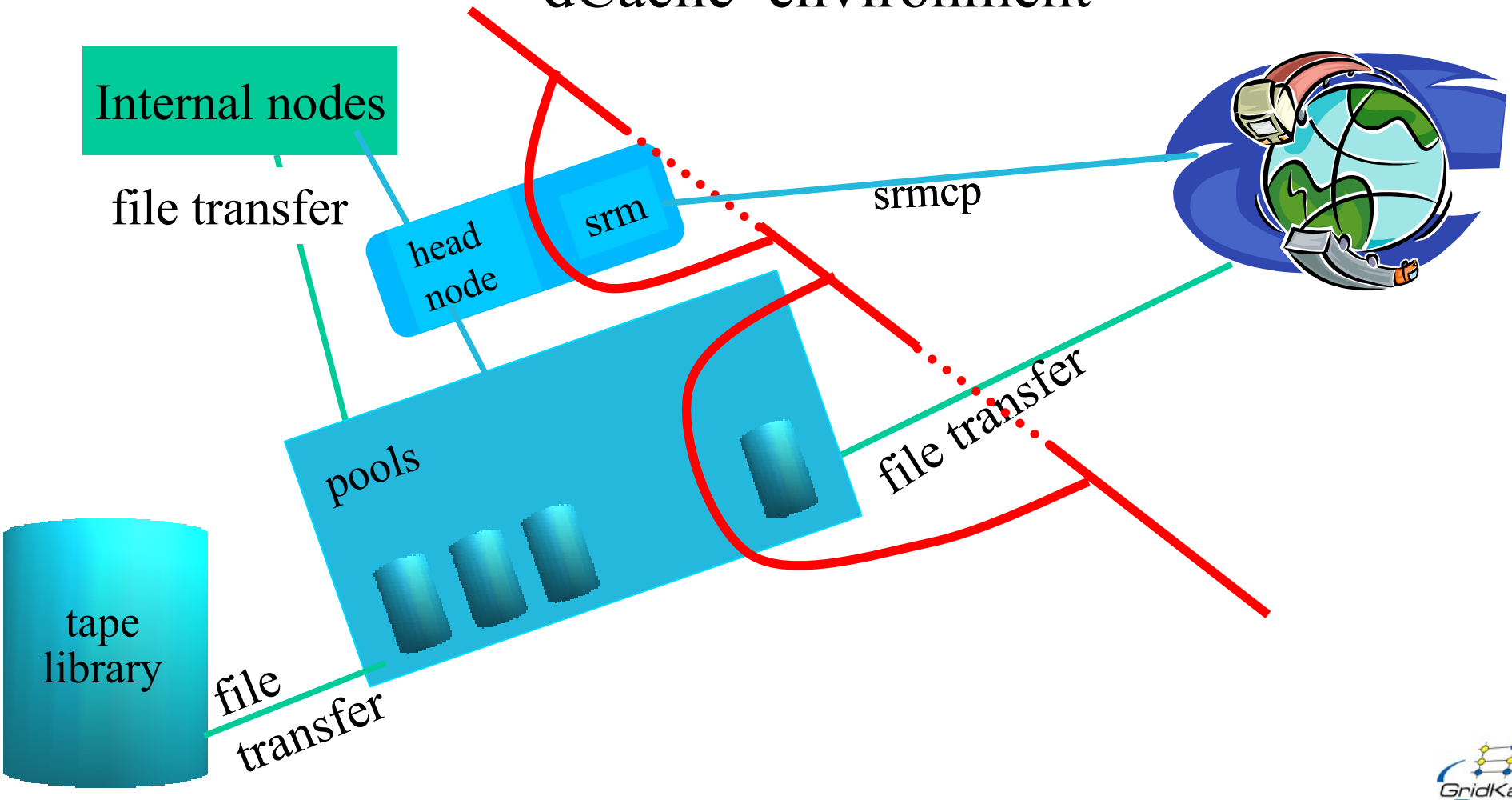
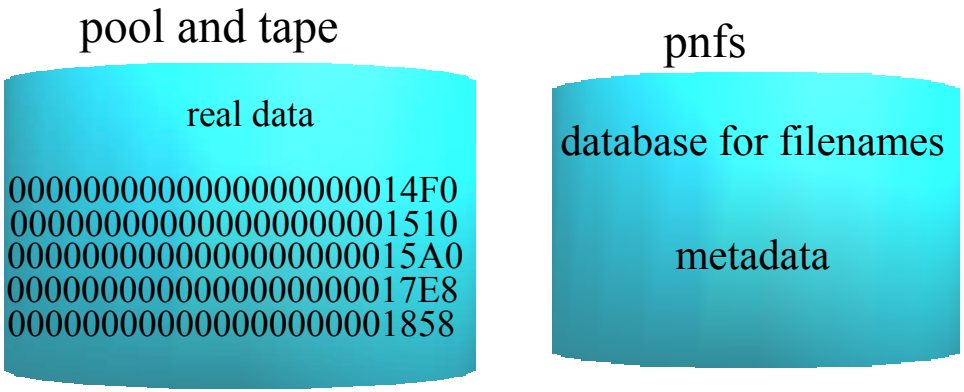


PNFS
Perfectly Normal File System

- gdbm databases
- Experiment specific databases
- Independent access
- Content of metadata:
  - User file name
  - File name within dCache
  - Information about the tape location (storage class…)
  - Pool name where the file is located



gsiftp

- Only registered dCache user!!!
  grid-proxy-init
  globus-url-copy –dbg \
  file:///tmp/file1 \
  gsiftp://srm1.fzk.de/grid/fzk.de/mounts/pnfs/cms/file1
- dCache gridftp client and server in Java
- copy direct into available pool node
  - pool: data is precious
  - (can't be deleted)
  - flush into tape
  - data is cached (can be deleted from pool)

srmcp

- Only registered dCache user!!!

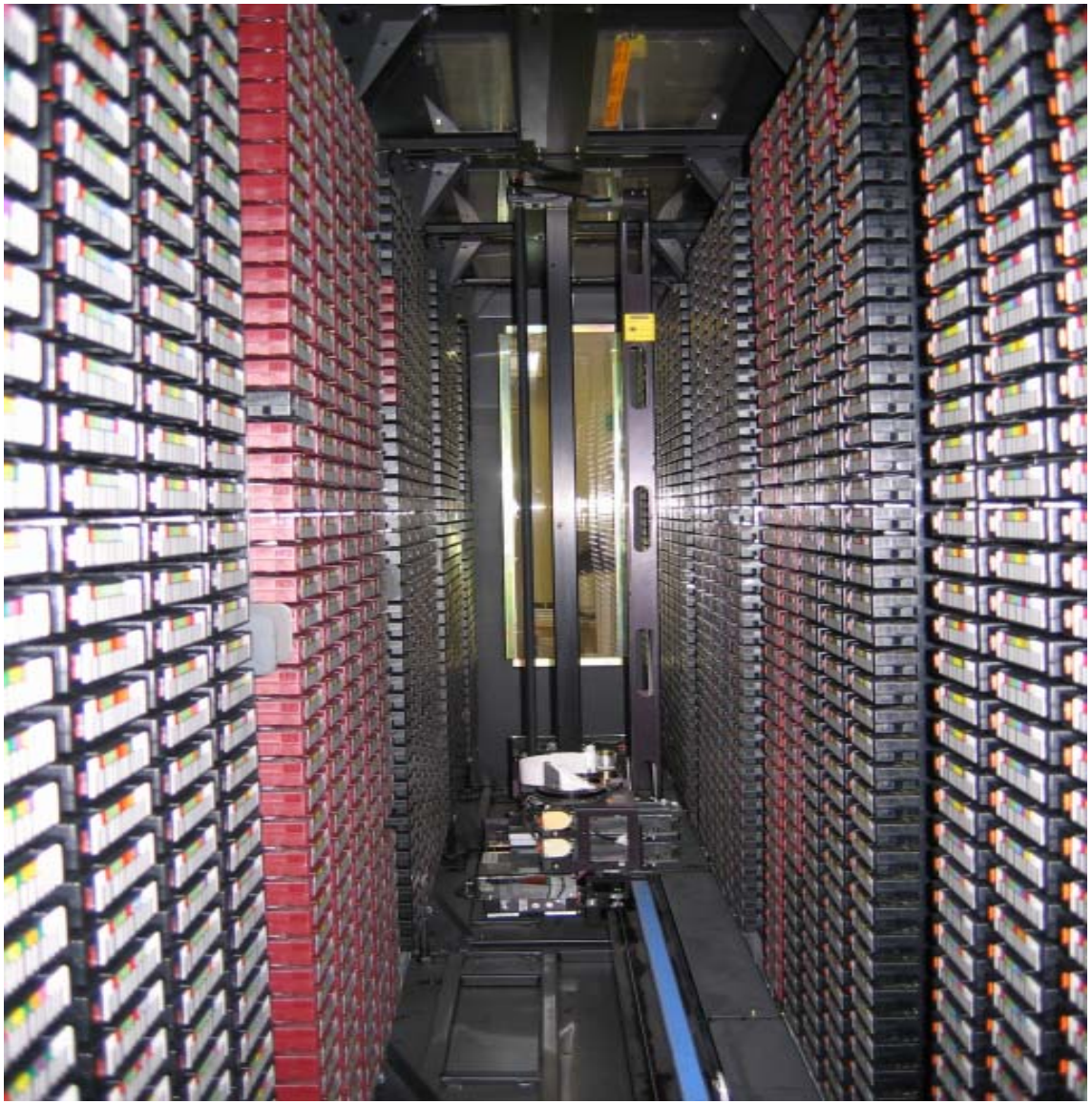
```
grid-proxy-init
srmcp –debug=true \
  srm://srm.web.cern.ch:80//castor/cern.ch/grid/dteam/castorfile \
  srm://srm1.fzk.de:8443//pnfs/gridka.de/data/ressmann/file2

srmcp –debug=true \
 srm://srm1.fzk.de:8443//pnfs/gridka.de/data/ressmann/file2
 file:////tmp/file2
```

Firewall issues

- Connection to headnode: Ports 8443 and 2811
- Port Range to pool nodes: 20.000 to 50.000

SRM Disk Version

- FNAL is currently developing a standalone SRM Disk version.
- The client uses a java version of gridftp
- The server uses a standard globus gridftp.
- It is far from production ready and needs:
  - SQL Database
  - jdbc driver
- http://www-isd.fnal.gov/srm/unix-fs-srm/



Tape Management

- Tivoli Storage Manager (TSM) library management

- TSM is not developed for archive
  - ➢ Interruption of TSM archive
    - ➢ No control what has been archived

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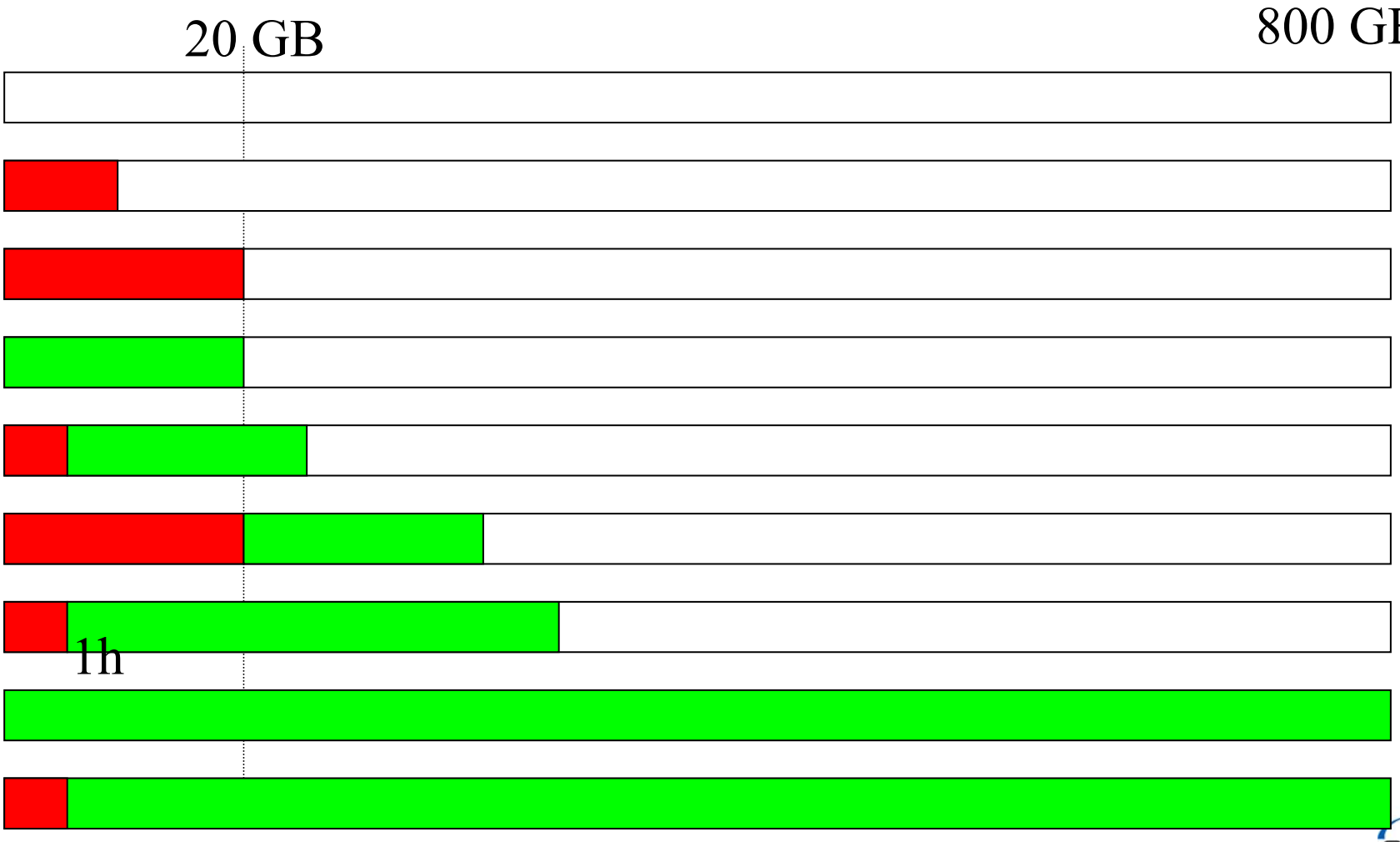
dCache tape access

- Convenient HSM connectivity (done for Enstore, OSM, TSM, bad for HPSS)
- Creates a separate session for every file
- Transparent access
- Allows transparent maintenance at HSM

dCache pool node



dCache tape management

- Precious data is separately collected per 'storage class'
- Each 'storage class queue ' has individual parameters, steering the tape flush operation.
  - Maximum time, a file is allowed to be 'precious' per 'storage class'.
  - Maximum number of precious bytes per 'storage class,
  - Maximum number of precious files per 'storage class,
- Maximum number of simultaneous 'tape flush' operations can be configured

Conclusion and Future Work

- Low cost read pools
- Reliable write pools
- Write once never change a dCache file
- Single point of failure
- Working SRM connection between CERN and FZK
- Connection to openlab at CERN
- Adding 15 Pool nodes for the 10 Gbit test from SRM to SRM
- Adding tape drives to increase throughput
- More at www.dcache.org

Thank you for your attention!

Questions?