

dCache Workshop DESY
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Xrootd/dCache Implementation



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File transfer methods in 1.7.0



- ◆ wide-area transfer (stream-based)
 - GridFTP (GSI authentication)
 - HTTP
- ◆ local-area transfer (random access)
 - dCap (dCache native protocol, GSI auth. available)
 - **xrootd**



What is xrootd?



- ◆ well-defined protocol, specification freely available
- ◆ client/server suite using the xrootd protocol
 - distributed daemon serving disk data, developed by SLAC
 - client (integrated in ROOT, POSIX wrapper), developed by INFN Padova
- ◆ major design goals
 - fault tolerance (adding or removing servers, failover)
 - performance (TCP connection multiplexing, load balancing)
 - smart client supports server by understanding redirects and doing several retries in case of server failures



Xrootd/dCache features



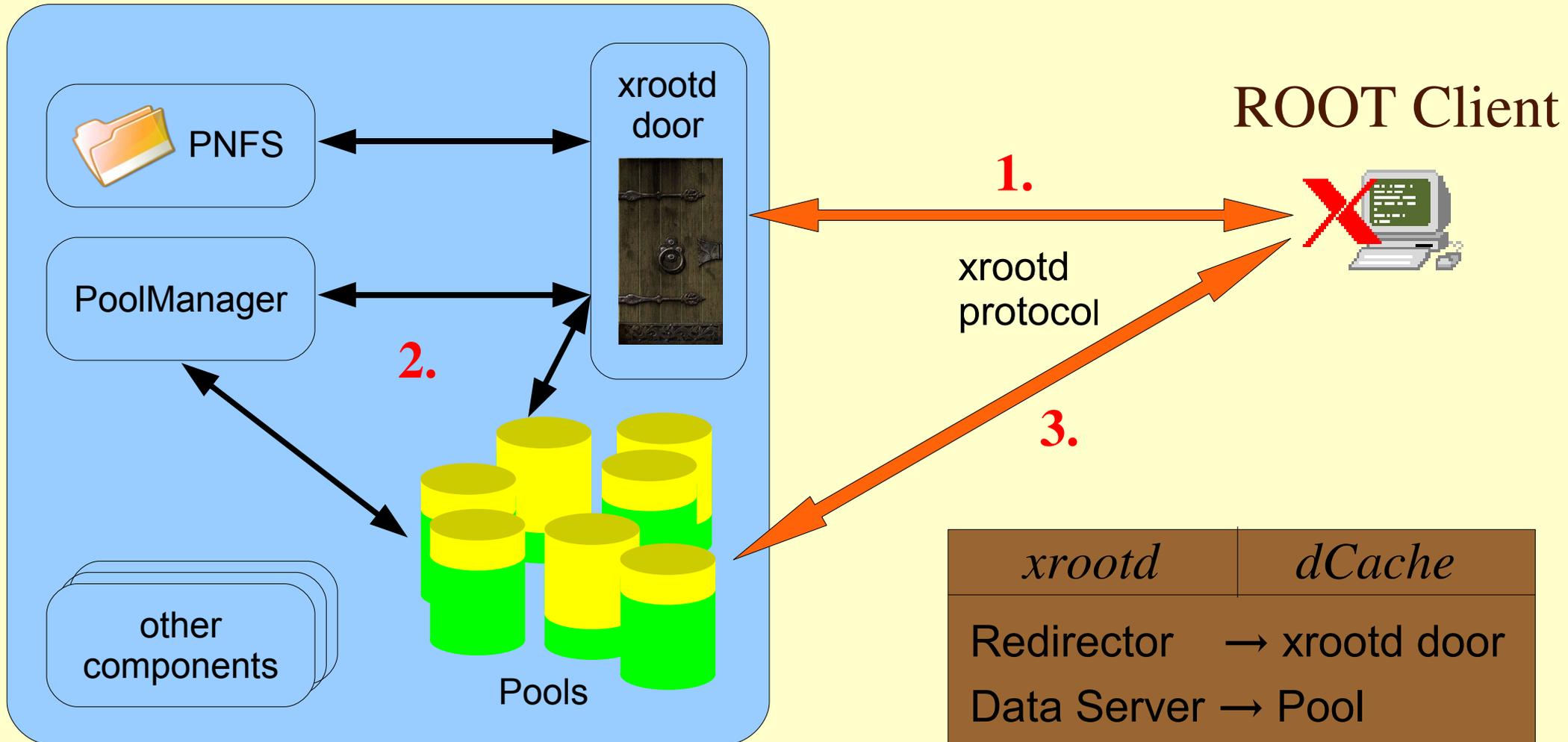
- ◆ dCache SE is a fully functional xrootd-server
 - native implementation of all required protocol methods (xrootd door)
 - from dCache point of view same treatment as other protocols
- ◆ transparency on the client side
 - no code or configuration changes necessary
- ◆ works with main clients
 - ROOT toolkit `TXNetFile::Open("root://dCacheServer:1094/pnfs/pathToFile", "r")`
 - xrscp (basic CLI)
- ◆ xrootd redirection scheme maps to dCache's internal load balancing mechanism, based on load and space of pools



Architectural overview



dCache SE





- ◆ remote policy: Token-based authorization (ALICE)
 - encrypted token attached to xrootd file open request
 - created by external service (e.g. file catalogue)
 - has limited lifetime
 - carries DN of user, permissions (r/w) for a set of files
 - xrootd/dCache decrypts token and applies permissions
 - more authorization methods pluggable
- ◆ local dCache SE policy
 - xrootd access can be restricted to read-only (for each door)
- ◆ authentication: yet to come



- ◆ multiple xrootd doors

- client iterates over server list to find an available door

```
TXNetFile::Open("root://door1,door2,door3/pnfs/pathToFile", "r")
```

- ◆ applying different access pattern

- one xrootd door set read-only

-> allowing public access

- another xrootd door set to read-write, but require authorization

-> centrally controlled write access (file catalogue with ACLs)



- ◆ LHC ALICE experiment
 - analysis applications heavily based on ROOT/PROOF
 - xrootd in use for data management, additional need for interfacing LCG/gLite services (SRM, FTS)
- ◆ evaluation of xrootd/dCache finished successfully
 - GSI Darmstadt, CERN, GridPP
- ◆ close contact to ALICE and fast development cycles
- ◆ xrootd/dCache about to go into production as an ALICE SE during PDC07



Conclusion



- ♦ dCache SE got enhanced by the xrootd access protocol
- ♦ acts as an xrootd-server while making full use of dCache core functionalities (mainly pool selection and namespace handling)
- ♦ first security mechanism added (Token authorization)
- ♦ about to go into production (ALICE service challenge)



- ◆ authentication based on GSI under discussion
 - mapping of DN to local user, rights management
 - reduces the risk of stealing the authorization token to a minimum
- ◆ as user community grows, more protocol features are implemented

If you are interested in a special feature,
contact the developers!