

# dCache Beginners Course

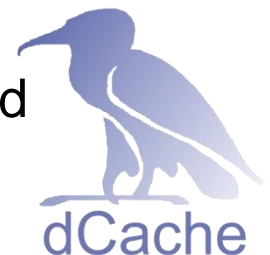
## Space Management, Space Reservation and SRM

Controlling the usage of the resource disk space.

Karlsruhe Institute of Technology (KIT), Steinbuch Centre for Computing (SCC)

# Definitions

- *Space Management* is the process or system of controlling the (total available) space (which can be free or used) for different purposes, for example concepts like space reservation or quotas.
- *Space Reservations* guarantee that for a dedicated purpose disk space is always available.
  - This is stronger than a “space quota”, since quotas enforce just upper limits.
  - Space reservations are the main tool for space management.
- *Space Tokens* are a concrete instance of a space reservation.
- Space reservation and space tokens in dCache are closely modelled after the concepts defined and standardised by the SRM-protocol.
- Somewhere dCache must run the services `spacemanager` and `pinmanager`, in order to offer space management.



# Space Reservation And linkGroups

- Technically, space reservations (and thus space tokens) are made upon *linkGroups*.
- linkGroups are the “highest-level” objects within the pool management system and have the following characteristics:
  1. A linkGroup is “connected” with zero or more pools via its links.
  2. The total available space of a linkGroup is determined by the total available space of all its pools.
    - The admins have to take care that no pool does belong to more than one pgroup that are part of any link of the linkGroup! Otherwise, such pools will be accounted twice...
  3. A linkGroup has properties that specify who is allowed to make space reservations upon it.
    - Possible characteristics are VO group, VO role, Retention Policy and Access Latency.



# Retention Policy

- The *Retention Policy* is a property defined by the SRM-standard, that relates to space reservations (“space tokens”) or files.
- It specifies the quality of the storage that is used for the data and can have the following values:
  - **Replica**

The lowest quality of storage, which usually means that there is only a single copy (“one replica”) per file which is located on a hard disk.
  - **Output**

An intermediate quality of storage, which is better than Replica but worse than Custodial. In the future, dCache might interpret this as having multiple copies (“multiple replicas”) per file which are all located on distinct hard disks.
  - **Custodial**

The highest quality of storage, which usually means that there is at least one copy per file which is located on tape. This does however not exclude additional copies on hard disk.



# Access Latency

- The *Access Latency* is a property defined by the SRM-standard, that relates to space reservations (“space tokens”) or files.
- It specifies how fast data is available (for reading) and can have the following values:
  - **Offline**  
Additional preparation steps which require human interaction might be necessary before the files can be read by clients.
  - **Nearline**  
Additional preparation steps (usually staging from tape) might be necessary before the files can be read by clients, which usually means that all copies are located on tape and none are retained on hard disk.
  - **Online**  
The files are readily available and can “immediately” be read by clients, which usually means that at least one copy is retained on hard disk even if copies are located on tape.



# Space Management in dCache

- With the introduction of space reservations, dCache will distinct between files that are *space managed* and those that are not.
  - Files belonging to any space reservation are space managed.
- The client is responsible for choosing the space reservation a file should belong to.
  - Changing the space token membership afterwards is an extraordinary operation.
- There are yet additional authorisation mechanisms to control access to the space reservations by users.
  - There is a file `LinkGroupAuthorization.conf` which lists FQANs that are allowed to write to a space token.



# Final Chapter Completed!

■ Are there any questions?

