News from gStore, the GSI Experiment Data Archiving System

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Large data transfers gStore -> lustre/hera

Considerable performance improvements:

1. file transfers automatically parallelized

- tape files: process for each tape volume (max 8)
- cache files: process for each cache data mover (max 20)
- utilize as much as possible of the available I/O bandwith.

Large data transfers gStore -> lustre/hera

2. **tape files are copied directly to lustre/hera**
   - **no detour via gStore read cache**
   - **connection fast enough**
     - **matches tape speed: 250 MByte/s**

Large data transfers gStore -> lustre/hera

Most efficient, if many files are copied with a single ‚gstore' cmd:

- **using wildcard chars**
- **using a filelist**
- **with recursive file operations**
- **or with any combination**

Tape Considerations

Tape Considerations

at GSI:

since 2012: 8.8 PByte capacity

- IBM TS3500, 4 TByte/volume
- 1000 slots per media rack: 4 PByte/sqm
- library expandable to ~50 Pbyte

growth factor last 15 years:

- >300: installed at GSI
- 400: capacity/volume - technical progress

Tape Considerations

IBM

IBM Tape Drive Roadmaps

Gen-4 TS1140	Gen-5	Gen-6
4.0 TB (JC)	8-10 TB (JD)	14-20 TB (JD)
1.6 TB JB 640 GB JA R/O	6-8 TB JC	6-8 TB JC
250 MB/s	Up to 360 MB/s	Up to 540 MB/s

2011: 35 TByte/volume in IBM lab

2012: IBM started project to demonstrate 125 TByte/volume (factor < 4)

Tape Considerations

if 125 TByte/volume:

- **125 PByte/sqm (one media rack)**
- **library expandable to ~1500 PByte**
  - **length ~15 m**

assumed for FAIR:

- **~30 PByte/year**
- **~30 years => 900 PByte**

Tape Considerations

cost development in the past:

~1 / SQRT(capacity increase)

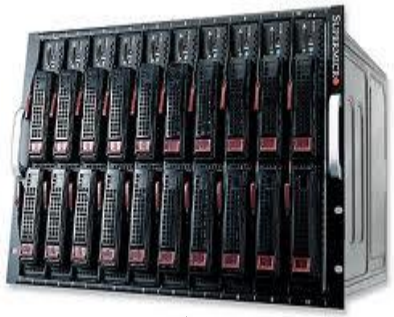
today: tape storage costs ~65 k€/PB

- **all library costs included**

the costs will decrease further!

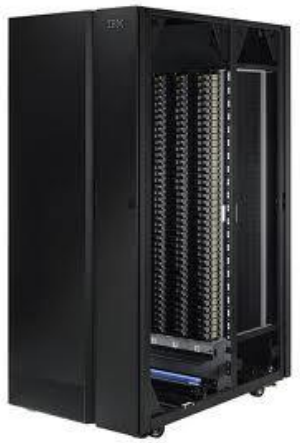
gStore 2013

offline Clients



hera, lustre
5 PB

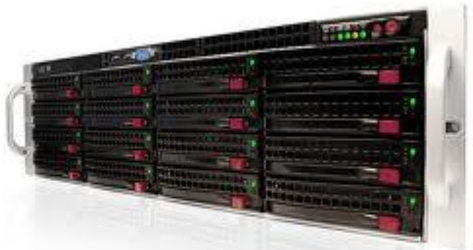
Tape Roboter



<5 GB/s

<5 GB/s

2 GB/s



0.5(1) GB/s

capacity 8.8 PB
expandable: 50 PB

15 gStore Data Movers
240 TB Buffer Storage

online DAQ Clients