Data transfer requirements

Extracts from the Computing Plan
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Data types in IGWD format

- Online frames - not stored
- Full bandwith raw data (4 TB/day ; 7 day buffer, Local)
- Raw data stream (2 TB/day; 6 month buffer, Local)
- RDS data (30 GB/day , Local/Exported)
- Trend data (4 GB/day, Local/Exported)
- Minute trend data (70 MB/day, Local/Exported)
- h(t) (7 GB / day, Local / Exported)
- aLIGO RDS (60 GB/day, Exported)
- aLIGO h(t) (15 GB/day, Exported)
- MDC data sets (3 TB/year)

Data Distribution Model

- Data which cannot be easily reproduced has to be stored at least 2 external CC, in particular the raw, RDS and h(t) data.
- These data are processed online by in-time applications and stored at EGO for a typical period of 6 month. No permanent backup at EGO .
- Most CPU intensive data analysis jobs will run in a distributed environment have to be able to access data.
- All acquired and commissioning data will be permanently stored on tape
- Data of the current run will be stored on disk.

Data transfer: requirements

- check data consistency before transfering
- monitoring web pages
- **Bulk data transfers with 1 day maximum latency:**
  - ADV raw data (Cascina -> CCs)
  - ADV RDS and trend data (Cascina -> CCs)
  - ADV h(t) (Cascina ->CCs)
  - aLIGO RDS (LIGO -> CCs)
  - aLIGO h(t) (LIGO -> CCss)
  - ADV RDS (Cascina -> LIGO)
- **Low latency data transfer with few 10s of seconds latency**
  - aLIGO h(t) (LIGO->Cascina)
  - Virgo h(t) (Cascina ->LIGO)

Bulk Data Transfer

- Should be as uniform as possible
- Has to enforce our requirments to CCs (just as other HEP experiements)
- **Topology.** Do we need interception of LIGO data ?
  - Yes, 'star shaped' topology
  - No, '3rd party', distributed
- **a/Synchronous.**
  - Yes, easier for endpoint pipelines, but not optimal for small files possible blocking
  - No, more arranging is necessary on endpoint, but higher efficiency is reachable
- **Location Database**
  - Transferred file has to be included independently of the overlying distributed file catalogs used by the job submission framework.

Data Transfer Requirements

- Data existence has to be checked (once per day)
- Data consistency (checksum) has to be checked (once per week)
- Consistency of file catalogs vs physical files (once per day)
- Interaction of Data Locator Service with job submission framework's file catalog

Possibilities I

- **Dirac**
  - Has convenient data trasfer utilities, but missing the framework for a transfer service
  - Can use FTS for more serious filt transfer, but that would involve 3rd party assistance, administration and oracle databases, etc...
  - In terms of single data registering, up/download replication is not really different from native EGI utils
  - Supports replicas but only one source copy possible
  - Some expertize in Virgo
  - Questions:
    - Can Dirac File Catalog be seen from outside ?
    - Paralell, multi endpoint copies ?
    - Checksum recalculation by clients ?
    - Data transfer as-a-service ?

Possibilities II

- **LDR**
  - Built on globus/gridftp
  - Used by LIGO - compatible
  - Needs uniform interfaces at remote ends
  - Supports replicas but only one source copy possible
  - Restricted set of OSes (debian)
  - Not too much administration expertize in Virgo
  - Questions:
    - Either branch the development or send upstream patches.. will be accepted ?
    - How to interface wih file catalogs ?

Possibilities III

- **Custom developments (based on EGI utils)**
  - Can do everything we want
  - Still needs a lot of development to make it robust and failure tolerant
  - Backend is changing (lcg-util -> gfal transition)
  - Developers are moving (Alberto has less time for it)

Possibilities IV

- **Don't choose the tool, but choose the protocol and find tools for that. What about bittorent ?**
  - Cool - (Wow, Virgo is using bittorent for data transfer)
  - Can do everything we want...
  - SSL auth, automatic checksum calculation by definition
  - Distirbuted up and download -> no site downtime !, small sites can help-in seeding only a subset of the data
  - Expertize: very easy to use millions of teenagers is using it every day
  - Nice GUIs, command line utils for all OSes, web monitor, web control
  - Torrents can contain metadata information, easy to query
  - Once torrent is announced (udp::://tracker.virgo.infn.it) everything is done.
  - 'Watch directory' configuration at the CCs
  - Streaming extension will be available soon !
  - Questions:
    - Ramp-up time, end speed
    - Does fragmented download causes any problem on CCs ?