CMS and data-transfer protocols

Current status

- Scheduled transfers SE <-> SE
  - PhEDEx: gridFTP, via FTS3
  - ASO: Asynchronous StageOut (CRAB): FTS3, fallback to lcg-cp
- Access from WN's, private machines (i.e. unscheduled)
  - AAA: xrootd for WAN access, direct file access from local CE
- CLI access: file lookup, copy, delete…
  - Used by several tools (production, CRAB) and by users
  - Can use gfal2 if deployed on WLCG+OSG
  - Local access for ~80-90% of WAN transfers in Run-2, AAA for the remaining 20-10%

User-data

- User-data == data created with CRAB or similar tools
- Typical(?) CMS physicist creates ~0.5-1 TB/year, shared with other physicists both local & remote
- Most also download files to their laptops/desktops
    - xrdcp. srmcp, lcg-cp, even some non-grid tools (scp, rsync…)
    - Guesstimate: 100 users * 1 TB/month $\approx$ 40 GB/sec CMS-wide
- Downloading batches of files a common request Uploading less common, but does happen, may increase?
- Expect user-data to become a bigger feature in Run-2
    - (one or more of) webDAV/HTTPS/xrdcp to become important
    - CMS internal review next month: anticipate providing a minimal set of tools for users covering as many use-cases as possible

R&D, speculation

- Opportunistic resources: move data to/from clouds
  - S3 may become useful for 'edge' transfers, non-SE/SE
  - Gateways (non third-party) are a bridging option, i.e. may not need direct SE support for S3 for Run-2
  - Need to understand potential traffic flows & use-cases
  - If offered cloud storage, put gridFTP on it or wing it
- DM expected to evolve significantly by ~Run-3
  - Extend DM to all files used by the collaboration, 'official' vs. user-data distinction to go away
  - Not clear yet what the implications of this will be

Requirements

- Performance
  - gridFTP is a // transfer tech., webDAV/S3 is not
  - Not sufficient to put S3 or webDAV in front of an SE, will not be fast enough for serious use
- CLI for users/tools to look up file existence etc
  - Currently use SRM-based tools in a number of places
  - Can use gfal2 if available everywhere, will need time to migrate, prefer not to do this in run-up to Run-2
    - Will gfal2 be deployed everywhere?
- Can we use a non-SRM SE? Yes, with caveats
  - => Need specific proposal to discuss, details matter

Summary

- Baseline for Run-2
  - gridFTP(FTS3) and xrootd
  - CLI tools, currently SRM, can go to gfal2 if installed everywhere

- Becoming important in Run-2
  - One or more of webDAV/HTTP/xrdcp for user-data
  - Maybe S3 or something for cloud/opportunistic resources
  - Only for edge-transfers: non-SE <-> SE
  - Not performant enough for SE <-> SE

- Longer-term
  - Manage more of the collaborations' data
  - Extend reach to more resources, not just standard SE's