SLAC NATIONAL ACCELERATOR LABORATORY

Metalink and Xcache

Wei Yang

Global Logical File Name (gLFN)

- A powerful concept from Federated ATLAS Xrootd (FAX)
  - It gives individual analysis users a location invariant data access path to RUCIO data
    - A logical Name: no local path
    - Generic form of a gLFN: root://xcache//atlas/rucio/scope:file (scope:file → RUCIO DID)
    - root://xcache/**/atlas/rucio**/mc2030_13TeV:AOD.root
- FAX provided this function through its redirection network
  - We deprecated the redirection
- We can continue to use gLFN with the help of RUCIO
  - RUCIO provides a list of data source for file (DID), in Metalink format
  - A plugin to Xrootd/Xcache via the OurN2N incorporate info from the RUCIO metalink
  - Enable us to continue using gLFN

RUCIO and Metalink

RUCIO provides a REST-API for anyone to query to location of a DID

- Can be filtered by access protocol: gsiftp, srm, root, http
- Sort by GeoIP

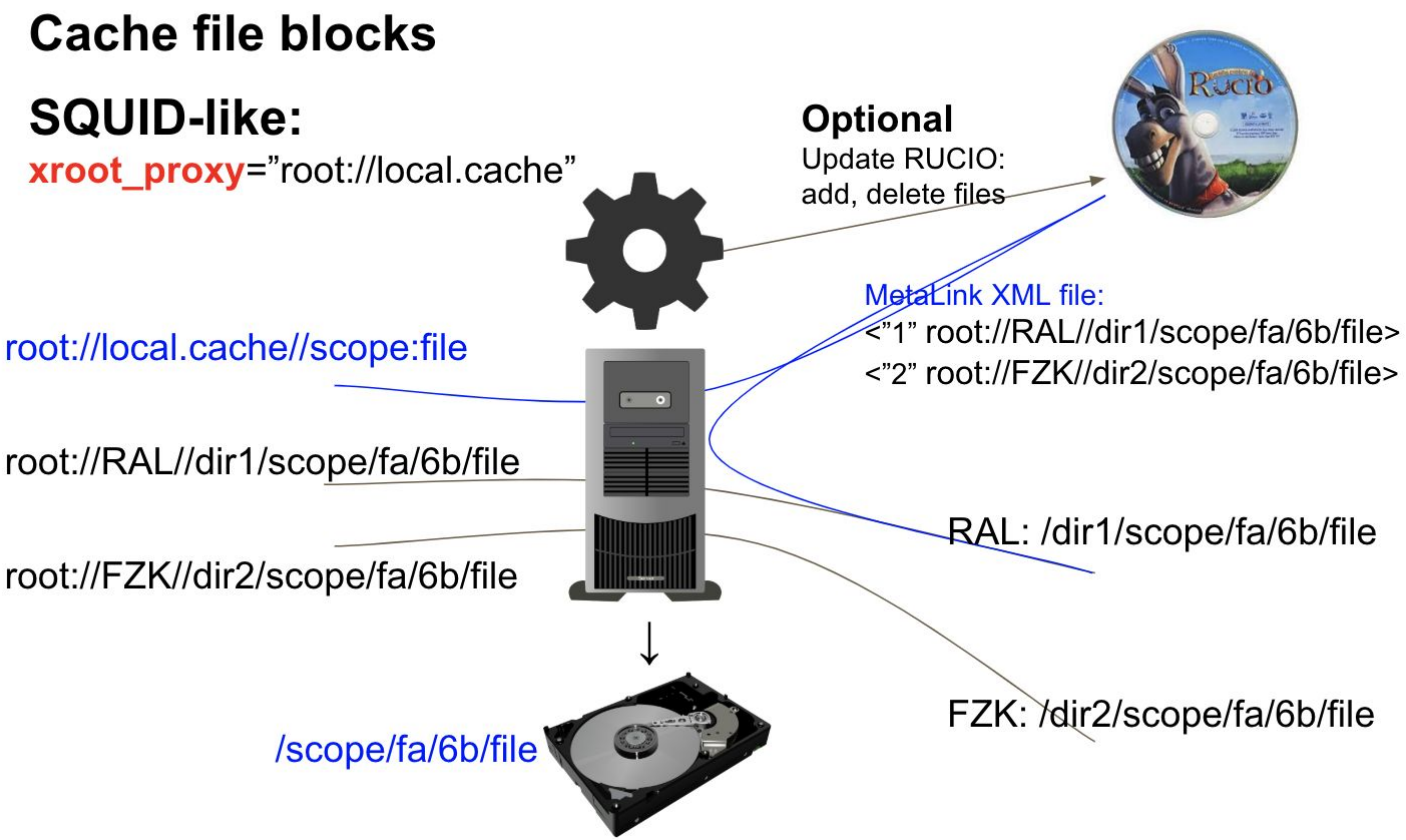
```
<?xml version="1.0" encoding="UTF-8"?>
<metalink xmlns="urn:ietf:params:xml:ns:metalink">
 <file name="TXT.15453826._012258.tar.gz.1">
  <identity>mc15_13TeV:TXT.15453826._012258.tar.gz.1</identity>
  <hash type="adler32">430cf1b4</hash>
  <size>19969184</size>
  <glfn name="/atlas/rucio/mc15_13TeV:TXT.15453826._012258.tar.gz.1"></glfn>
  <url location="RRC-KI-T1_DATADISK"
priority="1">root://sdrm.t1.grid.kiae.ru:1094//t1.grid.kiae.ru/data/atlas/atlasdatadisk/rucio/
mc15_13TeV/4f/fd/TXT.15453826._012258.tar.gz.1</url>
  <url location="UKI-LT2-QMUL_DATADISK"
priority="2">root://xrootd.esc.qmul.ac.uk:1094//atlas/atlasdatadisk/rucio/data17_13TeV/07/d
8/DAOD_EXOT8.16646671._000029.pool.root.1</url>
 </file>
</metalink>
```

Cache entry degeneration

“Degeneration”: borrow from Atom physics 101: electron orbitals with the same energy level

- Note in the previous metalink: The two “URL location” lines map to the same “gLFN” line
- Regardless of which data source we end of using, we use a single cache entry for the file, based on the gLFN path
- If someone does not use a gLFN but use a PFN
  - **export xroot_proxy=root://xcache; xrdcp root://ral.ac.uk//path/scope:file**
    - Or just use root://xcache//root://ral.ac.uk/path/scope:file (forward proxy)
  - In this case, gLFN is derived from the PFN
    - We can do this because ATLAS RUCIO use deterministic path at site

Xrootd Read-Only Cache



Implementation

Implemented as a XrdOucName2Name plugin:

- XrdOucName2Name::lfn2pfn():
  - If the corresponding cache file is a completed file, generate a metalink with file://
    - Now this uses the new XrdPosixCache Interface
  - If the “lfn” is a gLFN, request a metalink from RUCIO
  - If the “lfn” is a root URL, generate a metalink with the root URL
  - XrdCl will then read the Metalink from root://localfile:1094//metalinkfile
- XrdOucName2Name::pfn2lfn():
  - Return the location of the cache entry on local disk
- Note: the metalink is cached (in memory) to reduce RUCIO query.
  - since ATLAS moves data around, the cached metalink is deleted after 24 hours

Implementation, additional things

XrdCl uses “virtual mega redirector” to handle a list of data source

- Determine whether a data source is bad and move on to the next one
  - It isn’t always easy
- Needs to deal with all sorts of “creative” setup / failure mode at data sources
- We are in good shape now

XrdOssStatInfo_t XrdOssStateInfoInit() { … return XrdOssStatInfo; }

- Is implemented to make this plugin clusterable.