Catching Up With XRootD

FTS/XRootD Workshop

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XRootD Release Notation

- *X*.0.0
  - Major release that can break ABI
    - Every 2 to 4 years
- X.*Y*.0
  - Feature release that can't break ABI
    - 1 to 2 each year
- X.Y.*Z*
  - Patch release to fix bugs & minor enhancements
    - As often as needed

What's Happened Since Last WS

- 13-October-25 **XRootD** Workshop @ PIC Barcelona
  - 17-November-25 Patch Release 5.9.1
  - 27-March-26 Patch Release 5.9.2
  - **09-April-26** **Feature Release 6.0.0**
  - 05-May-26 Patch Release 5.9.3 *start of dual 5/6 tracks*
  - 05-May-26 Patch Release 6.0.1
  - 18-May-26 Patch Release 5.9.4
  - 19-May-26 Patch Release 6.0.2
  - 29-May-26 Patch Release 5.9.5
  - 01-June-26 Patch Release 6.0.3
  - 20-June-26 Patch Release 5.9.6
  - **20-June-26** **Feature Release 6.1.0**
  - 07-August-26 Patch Release 5.9.7
  - 11-August-26 Patch Release 6.1.1
  - **xx-September-26** **Feature Release 6.2.0**
- 14-September-26 **XRootD** Workshop @ CNRS Lyon

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Operational Features 6.0.0 @ 04-09-26 I

- New Rucio-aware plug-in for backups (**libXrdOssArc.so**)
  - See **OssArc** talk from the last workshop
- Extend coverage of context error information
  - Allows plug-ins to provide addition context
    - For example, why an error occurred
  - Proxy plug-in (includes **XCache**)
  - Authorization plug-ins (includes SciTokens)
- Add support for WLCG scoped staging tokens
  - **storage.stage** and **storage.poll**

Operational Features 6.0.0 @ 04-09-26 II

- Allow case where no CRL's exist for CA
  - Use **allow-missing-crl** option on **xrd.tlsca**
    - Otherwise, TLS initialization may fail due to security concern
- Allow writes even is presence of **XCache**
  - Two mechanisms
    - Static redirect when file is opened for writing
      - **xrootd.redirect** *target* **openw**
    - **XCache** directive
      - **pfc.writethrough** {**off** | **on**}
- Add –h option to xrdfs
  - Displays sizes in human readable form

Operational Features 6.0.0 @ 04-09-26 III

- New HTTP g-stream monitoring
  - Enabled via **xrootd.mongstream http**
    - Enables access and error reporting for HTTP requests
- Binary Python wheels distributed in PyPI
  - Makes **pip install xrootd** much easier

Operational Features 6.0.0 @ 04-09-26 IV

- Enhanced **XRootD** **systemd** unit files
  - Add defaults for global and per-unit environment files
  - Wait for file system mounts before starting **XRootD**
  - Enable use of privileged ports by default (e.g. 80, 443)
  - Remove unneeded privileges
  - Use **systemd** to manage directories
    - In /var and /run
      - Set *adminpath*/pidpath within /run

Performance Features 6.0.0 @ 04-09-26 I

- Add file cloning support (ficlone, reflink)
  - Mostly used by EOS
- Implement data integrity checks in HTTP TPC
  - Based on Repr-Digest headers
  - Add **cks.type** and **cks.value** CGI to file open
    - Transfer fails if the final file does not have stated checksum
- Enhance the throttle plug-in
  - Per-user connection limits
  - Configuration reloading

Perfromance Features 6.0.0 @ 04-09-26 II

- Provide ETag value in HEAD request
  - ETag is now supported in **XCache**
    - Used to check if cached file is the same
  - Two new directives to control this:
    - **pfc.httpc** {**off**|**on**}
      - When the validation is on, the ETag, max-age, and must-revalidate HTTP header responses are processed.
    - **pfc.qfsredir** {**off**|**on**}
      - When on, file system queries through redirector only when **pfc.httpc** is also on.
  - Note that Etag is only supported for http origins.

Miscellaneous 6.0.0 @ 04-09-26 I

- Add support for statx syscall to **XrdPosix**
  - Re-enables use of the **POSIX** Preload library
    - Can run standard apps using **XRootD** client
- Move to C++20 standard as baseline
  - Some features require newer GCC on Alma8
    - I.e. devtoolset
  - Use only what's available with the default GCC 8.5
- Drop support for OpenSSL 1.0.x
  - OpenSSL 1.1.1 or later is now required

Miscellaneous 6.0.0 @ 04-09-26 II

- Drop dependency on **Davix**
  - **XrdClHttp** plug-in replaced by new one based on curl
    - Contributed by OSG/Pelican
  - Adds full S3 support
  - Unfortunately, a somewhat turbulent change
    - Caused parallel tracking 6.x and 5.9.x

Security Features 6.0.0 @ 06-20-26 I

- New option to strip sensitive CGI elements on redirection
  - **http.header2cgi** *hdrkey cgikey* [**strip-on-redirect**]
    - Removes *cgikey* from redirect URL should it exist
    - This prevents auth information from being revealed/logged
      - However, may break operations
        - When client is curl w/o --location-trusted option
        - Signed url usage

Performance Features 6.1.0 @ 06-20-26

- Real-time (aka streaming) checksum support
  - See talk on Thursday for details
- Enable redirect plug-in for SENSE[1] in HTTP TPC
  - Used by Software Defined Networking (SDN)
  - Originally only available for non-TPC transfers
- New OSS-type plug-in: libXrdOssMirage.so
  - Simulates a fully loaded file system (see Wed talk for details)
    - Interactive configuration changeable in real time
  - Great for testing and performance measurements
- Add support for OpenSSL 4+

[1]**S**oftware-Defined Network for **E**nd-to-end **N**etworked **S**cience at **E**xascale

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Features 6.2.0 @ 09-xx-26

- Allow **xrdfs** to handle full URL's in all contexts
  - Consistent syntax but old-style idiosyncratic syntax still allowed
  - Required step to re-implement **gfal-***xxx* commands using **xrdfs**
- Add **-4** and **-6** options to **xrdfs**
  - Select which IP stack to use
- Improve **crc***xxx* real-time checksum performance
- Allow **sec.protbind** directive to specify loopback address
  - Needed for certain configurations
  - **sec.protbind** {[=]**localhost** | **loopback** | *dnsname* | *} …

Conclusion

- **XRootD** remains relevant with good support
  - Framework widely used as a core component
    - The tagline – "It's **XRootD** Inside!" applies
- Our core partners (**XRootD** Collaboration)
  - CERN SLAC UCSD
- Community & funding partners *(not a complete list)*
  - OSG WLCG ATLAS EXPERIMENT ALICE CMS LSST dCache GSI NSF

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