

Use Of XROOTd at BNL

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XROOTd are used

- dCache and XROOTd
- Forwarding Proxy
- Reverse Proxy
- FAX Regional Redirector
- Stash Cache
- Cloud Storage

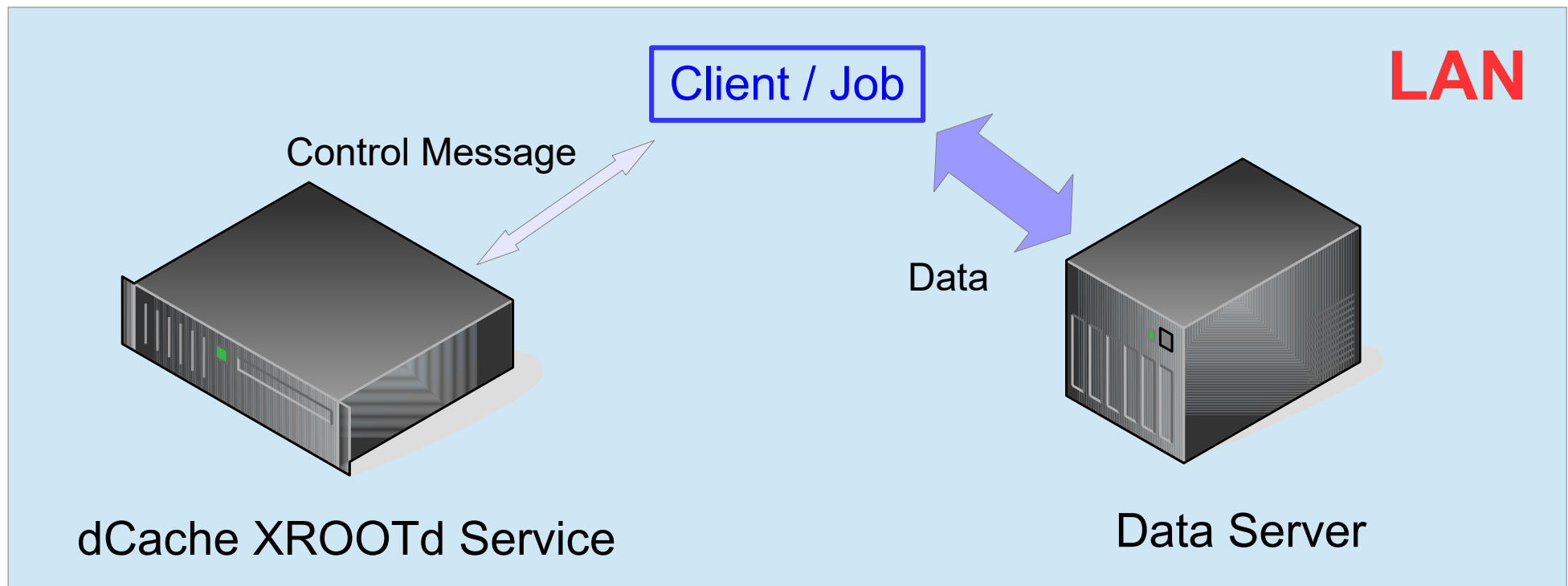
Dcache and XROOTd

- dCache is the main storage for BNL ATLAS Tier 1
- dCache has many interfaces to access data; SRM, GridFTP, NFS3/4.1, dCap, HTTP(s)/WebDAV, and XROOTd
- XROOTd interface is very stable. And, it is the main access protocol used for streaming data from storage internally over LAN and externally over WAN.
 - In terms of accessing data directly within LAN, XROOTd has replaced dCap protocol.
 - Externally, it is currently the only protocol used for streaming.

Accessing data by XROOTd Protocol within LAN

- XROOTd service understand two namespaces

Normal	<code>//pnfs/usatlas.bnl.gov/BNLT0D1/rucio/data15_13TeV/08/ad/DAOD_EXOT4.08608816._000045.pool.root.1</code>
Global	<code>//atlas/rucio/data15_13TeV:DAOD_EXOT4.08608816._000045.pool.root.1</code>



Need of DTNs and Proxy; Accessing Remote Data through Firewall.

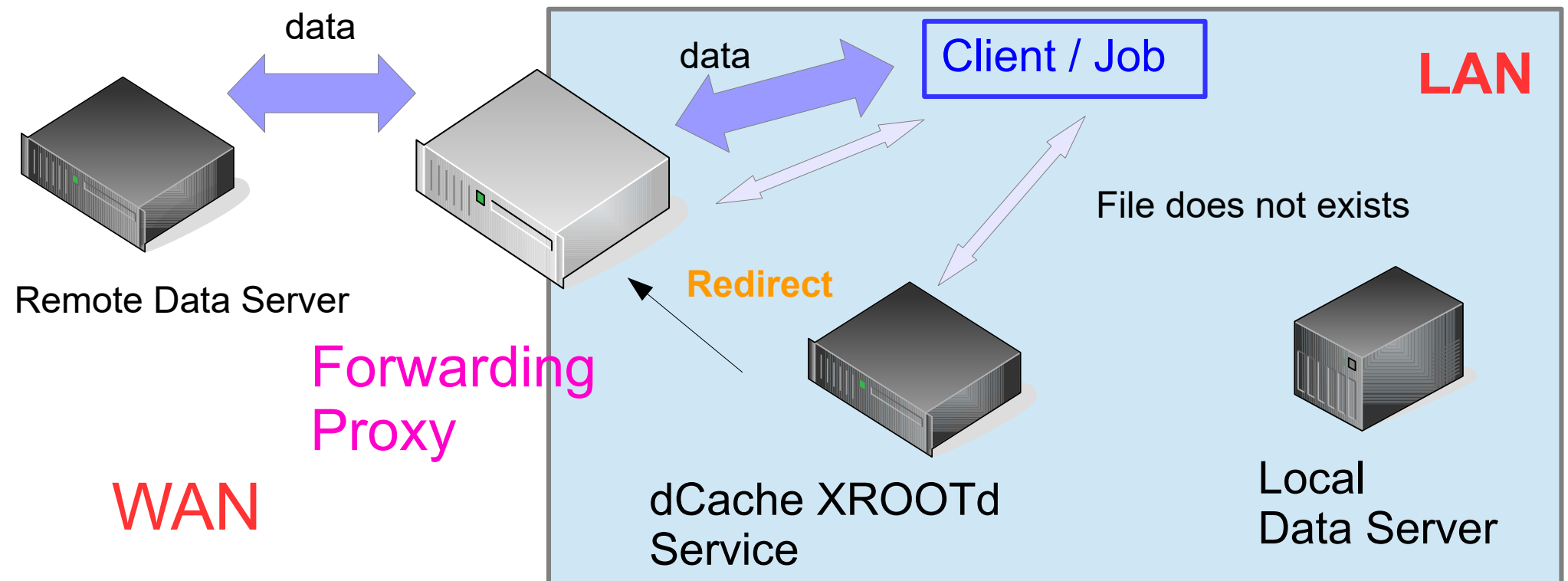
- A site with strong security consideration might have a site-wide firewall(s) to protect internal servers.
 - A site-wide firewall might not be capable to handle high bandwidth, scientific data.
 - Overwhelming amount of data to a site-wide firewall might bring down the firewall service, shutting down the complete WAN access, resulting in becoming own DoS.
 - A site might select number of data transfer nodes (DTNs) with dual interfaces to WAN and LAN to bypass the firewall.
 - All data flowing in & out of a site must go through DTNs to avoid the site-wide firewall.
 - DTNs can be designed to provide exact throughput for WAN
 - One might use the DTNs even if a site does not have a site-wide firewall.

Forwarding Proxy via FAX

- Forwarding proxy services are run on DTNs.
- Forwarding proxy services will direct all WAN data requests from internal clients to a remote site.
- All data flow through forwarding proxy.
- Using FAX with global namespace, a client can access data located at remote sites seamlessly.
 - A local user does not need to know if the files exists locally.
 - A local user does not need to know at which remote sites the files exist.

Forwarding Proxy

- BNL dCache XROOTd service is configured in such a way that the clients redirect to the forwarding proxy if files do not exist locally.
- Forwarding XROOTd proxy is not part of dCache.



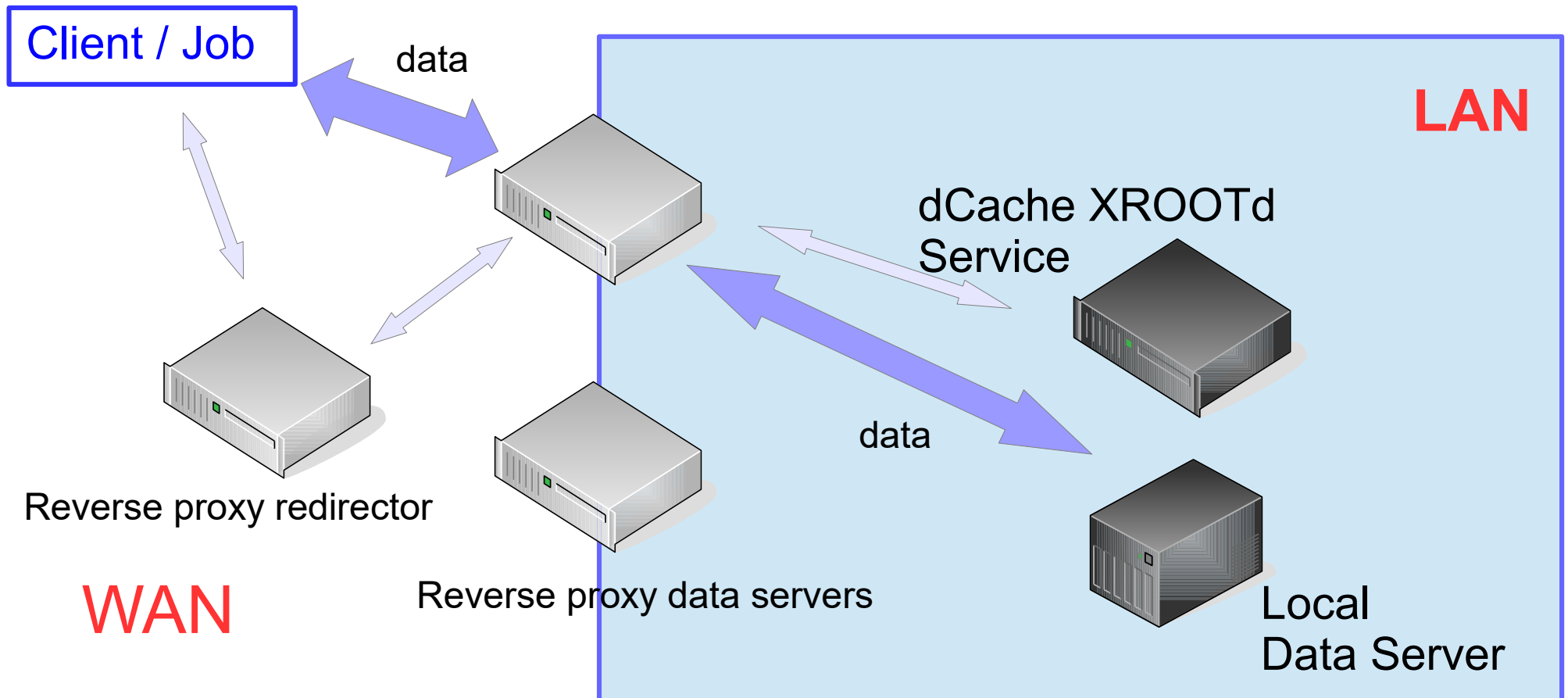
Reverse Proxy

- Reverse proxy services are run on DTNs.
- Reverse proxy services will direct in-coming XROOTd requests to BNL storage from WAN to XROOTd data services run on DTNs.
- XROOTd data services on DTNs will use dCache XROOTd services as a source, allowing access to all data within dCache.
- Reverse proxy services understand both normal and global namespaces.

Reverse Proxy

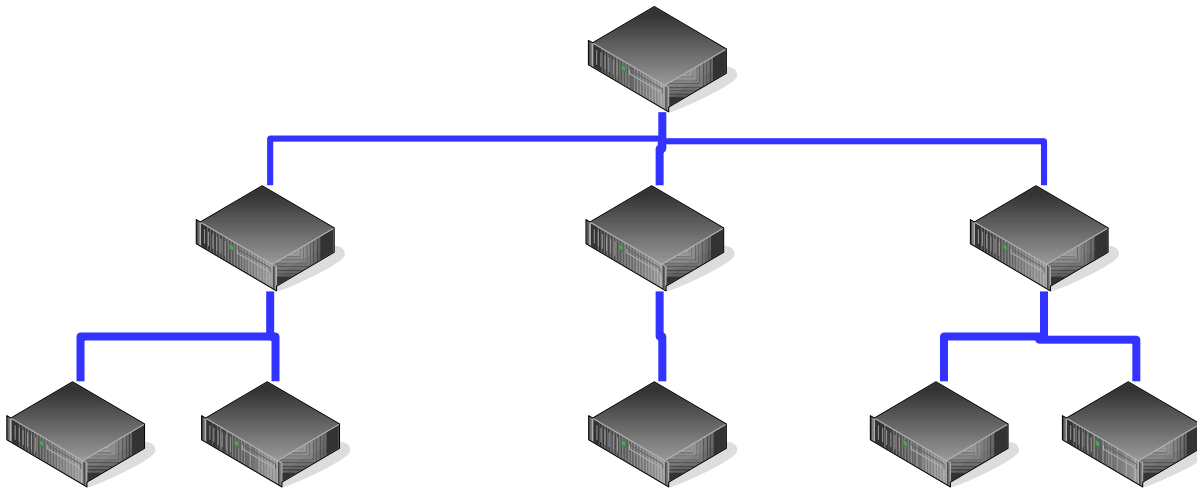
- Still understand both namespaces.

Normal	<code>//pnfs/usatlas.bnl.gov/BNLT0D1/rucio/data15_13TeV/08/ad/DAOD_EXOT4.08608816._000045.pool.root.1</code>
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FAX

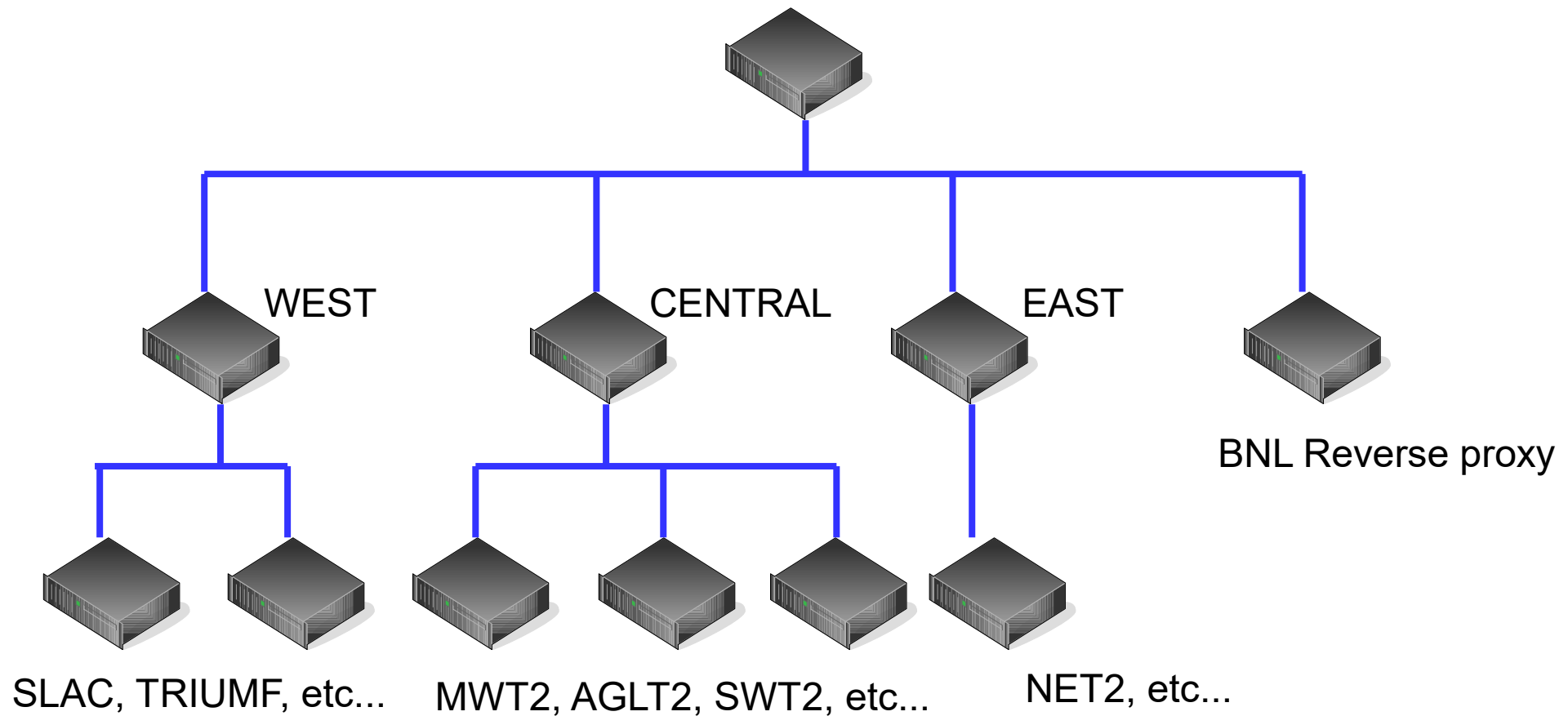
- FAX allows the access to files with the use of Global file name.
 - Auto-file discovery:
 - No need to catalog the physical location of data
- FAX requires Global file name to allow the universal access to data.
 - No need to know different physical paths at different sites
- FAX network is configured in a tiered scheme.



FAX Redirectors

- All redirectors are on RHEV cluster on LHCONe network.
- All redirectors are paired by round-robin alias with each virtual host located in different physical host of the RHEV cluster, allowing redundancy and serviceability without need of many scheduled and unscheduled downtime.
- They are tiered to find
- One pair of the top level North American Redirector.
 - BNL Reverse redirector is attached to this redirector.
- Three distinct pairs of regional redirectors, serving geographically different group of subordinate redirectors; EAST, CENTRAL and WEST
 - All Tier2s and production Tier3 are attached to one of the regional redirector.
- One Tier 3 redirector
 - Search files anywhere on FAX system
 - But, **excluded** from FAX file discovery from other redirectors due to instabilities of Tier3 system.

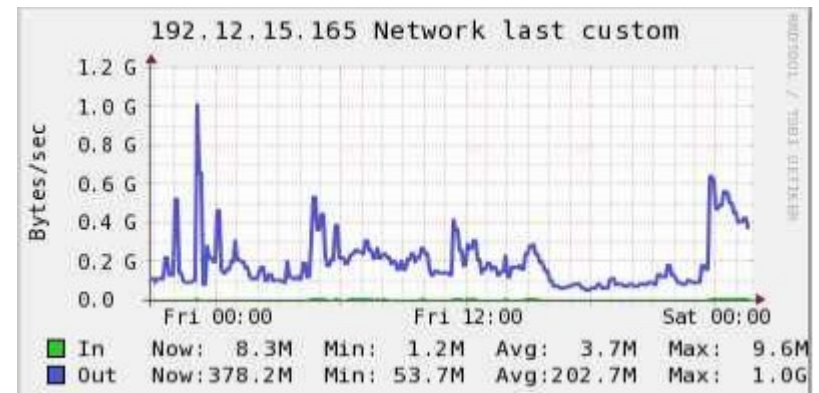
FAX System



A client can access a file from any location of FAX system.

Stash Cache

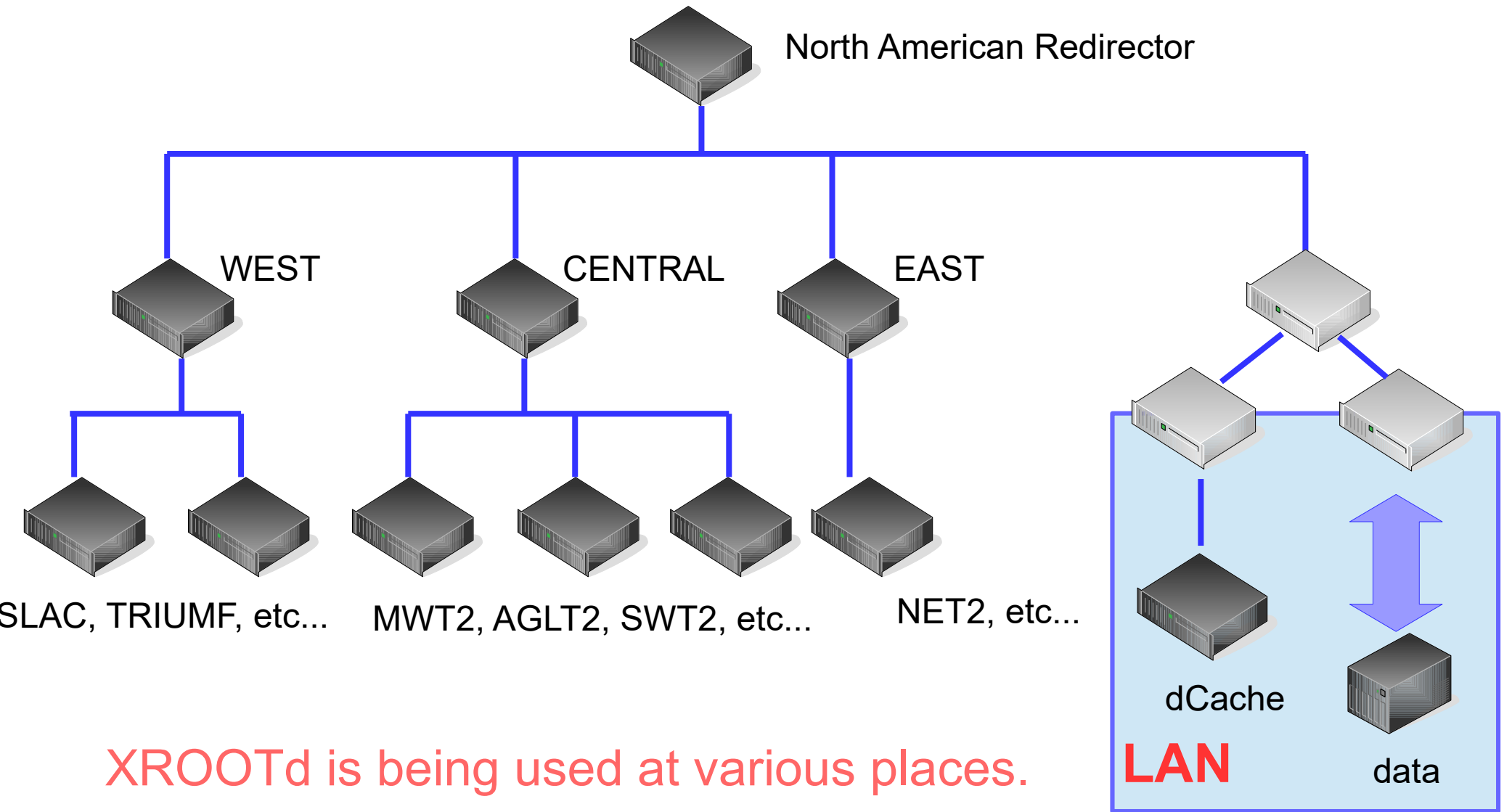
- OSG Data cache
- See the following presentation for the detail.
https://indico.cern.ch/event/330212/contributions/1718788/attachments/642386/883836/StashCache_at_UCSD_Xrootd_workshop.pdf
- BNL hosts one of its cache.
 - 5TB
 - 10Gbps limit
- No management of data



Cloud Storage

- Possible use of XROOTd for popular cloud storage like Owncloud/Nextcloud.
- See the presentation on Thursday

Summary



XROOTd is being used at various places.

BNL