

The background of the slide is a long-exposure photograph of a multi-lane highway at night. The image shows vibrant light trails from vehicles, with white and yellow streaks for headlights and red streaks for taillights, curving along the road. In the distance, a traffic light with four red lights is visible. A semi-transparent white box with a fine grid pattern is overlaid on the middle of the image, containing the title and subtitle text.

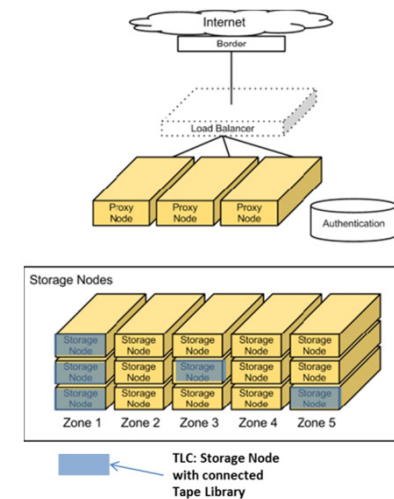
OpenStack SWIFT – Tape Library Connector (TLC)

Object Storage with SWIFT TLC

/// Why do we need SWIFT TLC?



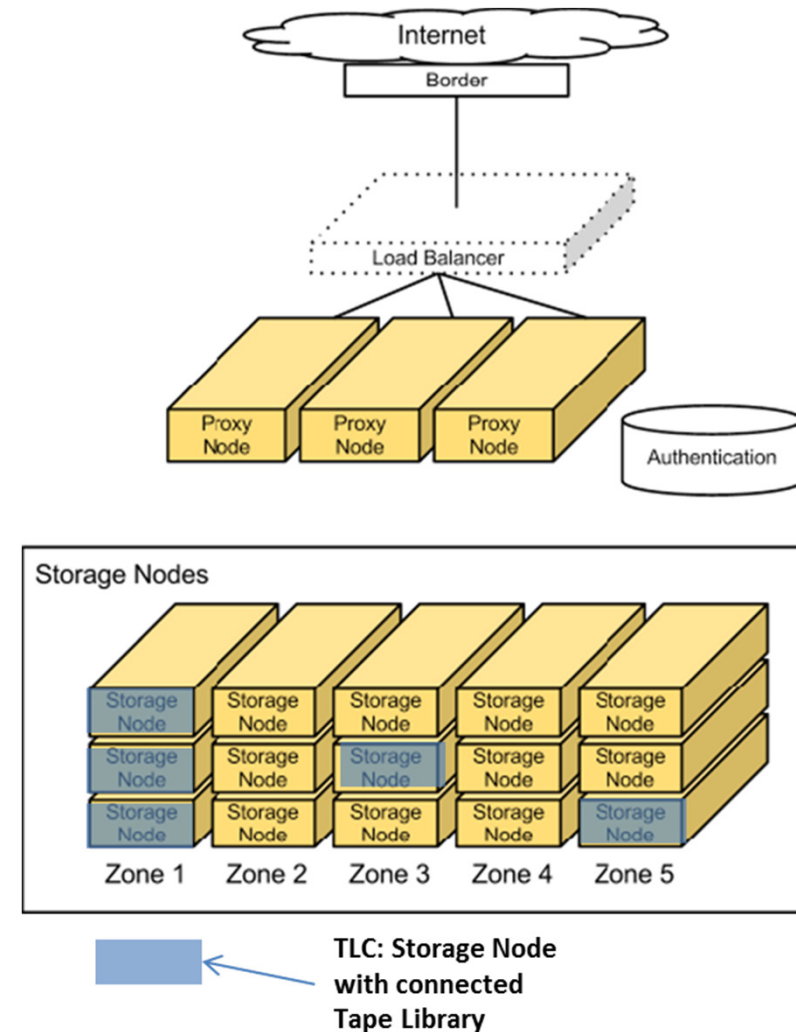
- Long term data storage requirements continue to grow rapidly
- OpenStack is quickly becoming the standard open-source cloud computing solution
- SWIFT is OpenStack's highly scalable object storage system to store large amounts of unstructured data
- Tape Libraries provide the best value for long-term data storage
- SWIFT TLC makes tape look like a standard disk storage node



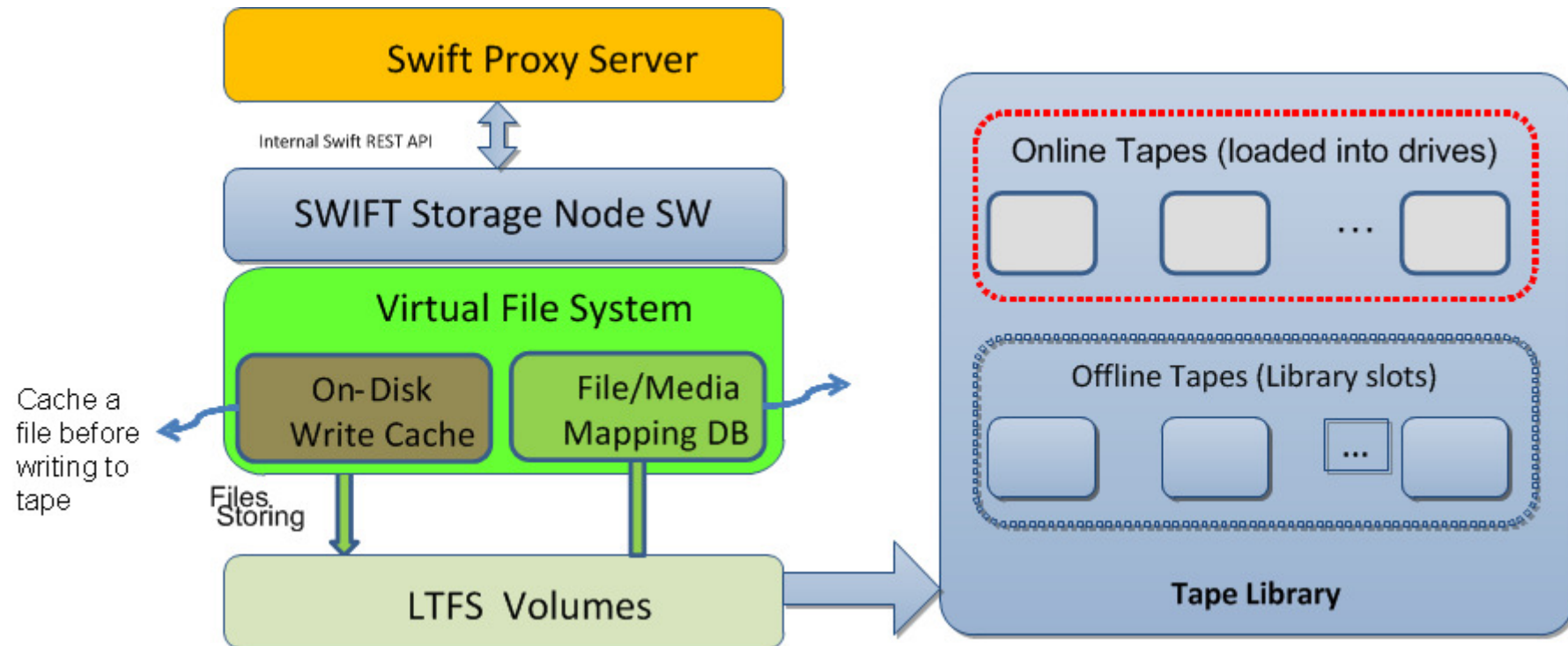
➤ SWIFT TLC enables simple, seamless, transparent tape library integration into an OpenStack SWIFT environment

SWIFT Object Storage TLC:

- Connects a Tape Library as a standard Storage Node into an OpenStack SWIFT Object Storage environment
- Integrates the library seamlessly into a standard SWIFT environment with no modification to core SWIFT code
- Supports standard SWIFT Object Storage functionality and operations (Upload, Download, Delete, Replication, Auditing, Recovery, Versioning, Multi Nodes, Zoning)
- Powerful Tape-specific Auditing Handler to support SWIFT auditing for Tape
- Uses LTFS to store objects on tape

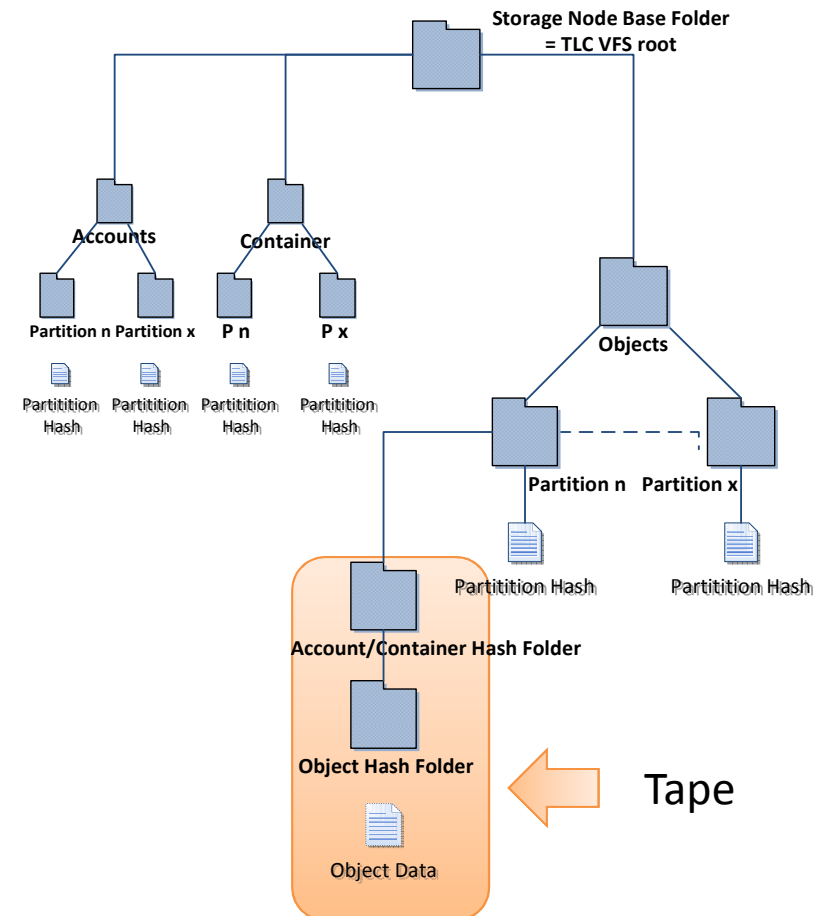


/// Overview – TLC Architecture



TLC VFS:

- Based on FUSE to span the storage capacity of tapes to one large connected file system
- The VFS root folder becomes the mount point for a standard SWIFT Storage Node (exactly like a disk based Storage Node)
- Uses LTFS to store Object data (files) directly on tape in an open format
- Has a transparent, disk based, fast and scalable Data Cache to buffer files before they are written to tape and supporting fast read access
- Stores all VFS file metadata on a disk based Metadata Cache
- Keeps all SWIFT hashes, accounts and containers on disk

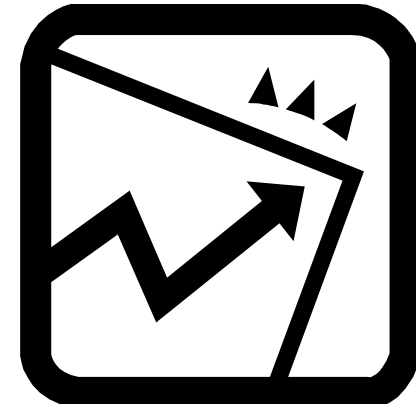


/// Configure SWIFT to use TLC



Modification	File	Comment(Purpose)
increase time out for proxy server [app:proxy-server] node_timeout = 300	/etc/swift/proxy-server.conf	Allow longer read response times for the SWIFT nodes
Add line "vs_cache_dir = /srv/vs_cache"	TLC node: object-server.conf	Set the data cache folder for TLC customized SWIFT auditor handler.
Update entry in [app:object-server] from use = egg:swift#object to use = egg:vs_auditor#vs_object	TLC node: object-server.conf	Register the TLC Auditor to be used for SWIFT, Python egg vs_auditor will be installed by TLC auditor installer
Patch standard SWIFT object	/usr/lib64/python2.6/site-packages/swift/obj/auditor.py	Patch this SWIFT auditor source file to use TLC Tape Auditor for TLC nodes. Done by TLC Auditor installer script
Add TLC node to SWIFT ring e.g. "swift-ring-builder object.builder add r1z3-172.16.56.5:6000/vsnode 7000"	Proxy Server: /etc/swift/object.builder /etc/swift/container.builder /etc/swift/account.builder	Connect the TLC VFS (TLC:/srv/node/vsnode) to SWIFT

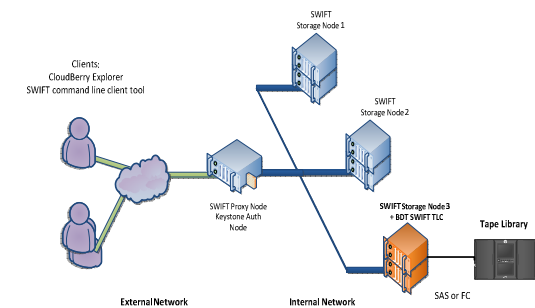
- Extremely simple integration of Tape Libraries into SWIFT environments
 - Simple installer
 - Very lean architecture
 - no knowledge about SCSI and Tape libraries necessary
 - No modification on OpenStack SWIFT necessary
 - No proprietary functionality, uses all default functionality from SWIFT (auditing, replication, load balancing, recovery, zoning, ...)
- Good vertical scale out support – just expand tape library to extend capacity or add tape drives to tape library to increase performance
- Good horizontal scale out support – just add more TLC storage nodes to SWIFT environment
- Fits well into existing mixed environments based on disk based Storage Nodes
- Support for all types of tape libraries, vendor independent, no limitation in supported capacity or drive quantity, support for SAS and FC as well



/// SWIFT TLC Evaluation Package



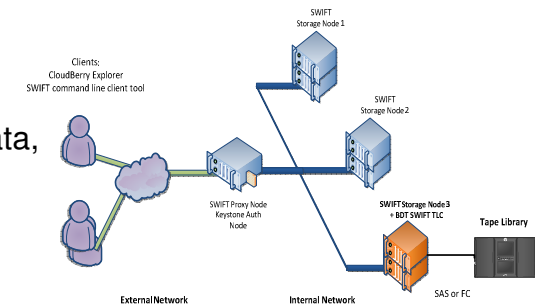
- BDT SWIFT TLC Installer Package
 - Installs TLC software on existing SWIFT Storage node
 - Configures SWIFT to use TLC
- BDT Test Scripts
 - Scripts which could be used for intensive testing
- Tool to demonstrate tape specific SWIFT file auditing and recovery
- SWIFT TLC Installation Guide
- SWIFT TLC Overview Presentation



/// SWIFT TLC Evaluation Setup

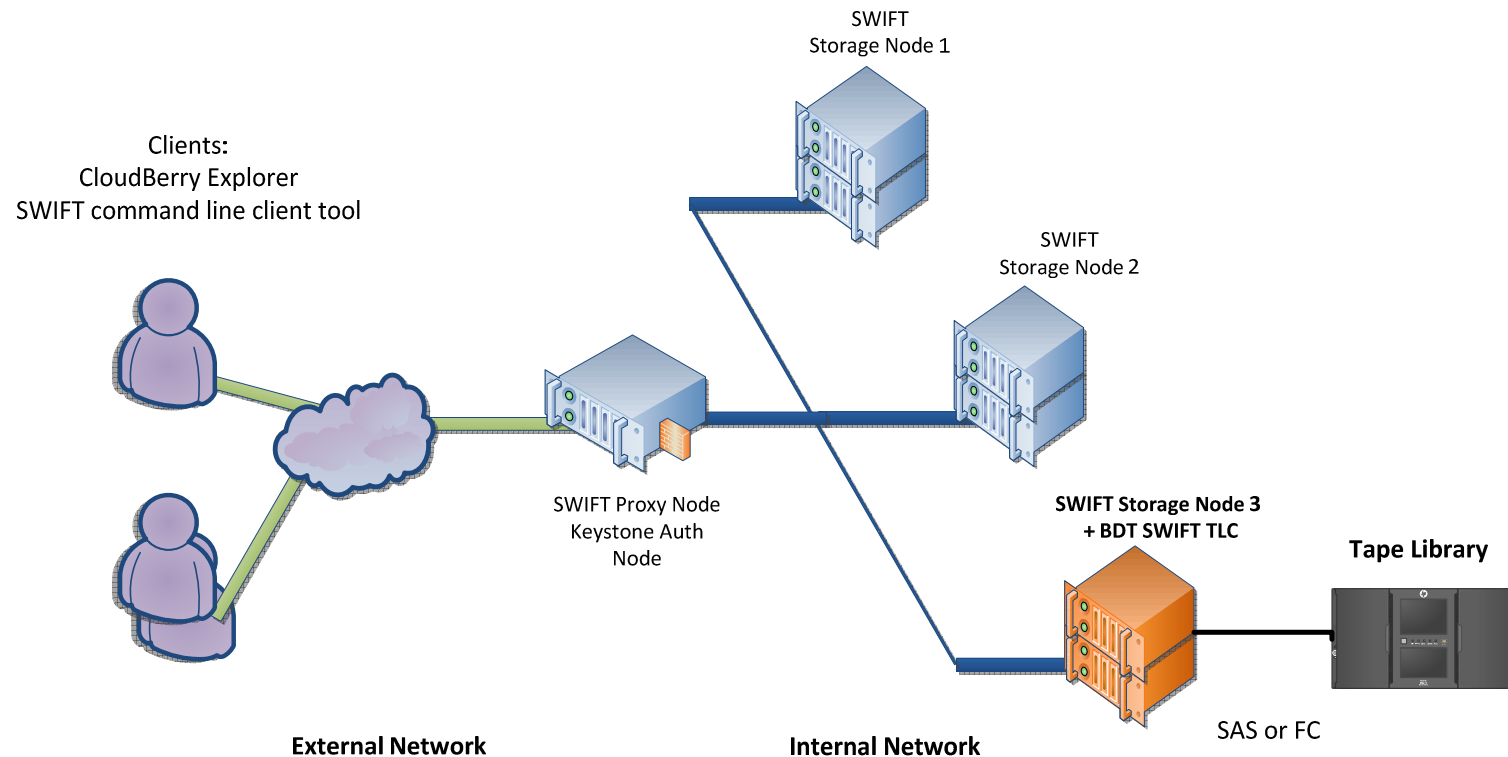


- Setup default OpenStack SWIFT environment with 1 Proxy Server and 3 Storage Nodes, configure SWIFT and verify functionality, use CentOS 7 as Server OS
- Add SAS HBA (e.g. LSI 6Gb SAS 9205-8e) with LSI chip and Tape Support (no RAID disk controller) to Storage Node 3 and attach Tape Library, verify that Tape Library and Tape Drives will be detected from OS (lsscsi -g)
- Possible Hardware Configuration for TLC server:
 - Data Cache: RAID0 1-2TB (SSD recommended)
 - Metadata: RAID5 50-100GB (SSD recommended)
 - Memory: 16GB
 - CPU: Quad-Core (e.g. XEON X5)
 - Tape library: tape library from HP, IBM, DELL, Fujitsu, Overland, Spectra Logic, actidata, BDT
 - Tape drives: 1-2
- Create Storage Volumes for Data Cache and Metadata Cache and mount to this folder
 - Data Cache: /opt/VS/vsCache/diskCache
 - Metadata: /opt/VS/vsCache/meta
- Install BDT TLC software and SWIFT service using installer (refer SWIFT_TLC_Quickstart document)
 - Installer will install everything automatically and configures the SWIFT Storage Node configuration accordingly
- Add TLC VFS root folder (/srv/node/vsnode) to SWIFT ring configuration on Proxy Server and distribute modified SWIFT Ring configuration files to all Storage Nodes



Detailed
Information
available in BDT
SWIFT_TLC
_QuickStart.pdf

/// SWIFT TLC Evaluation Setup Overview



- Default OpenStack SWIFT environment (ideally based on CentOS 7)
 - 1 OS Controller Node with Keystone and SWIFT Proxy Server running (VM possible)
 - 2 default SWIFT Storage Nodes (disk based) (VM possible)
- Default SWIFT Storage Node + BDT SWIFT Tape Library Connector (TLC) with attached Tape Library (MultiStak or FlexStor) (needs to be a physical server), OS: CentOS7