eXstor

eXstor Library & Media Manager

Virtualize your physical tape libraries
in your backup environment

eLMM Overview

Virtualize your physical tape libraries in your backup environment

Derived from IBM Tape System Library Management (TSLM) Version 1.4
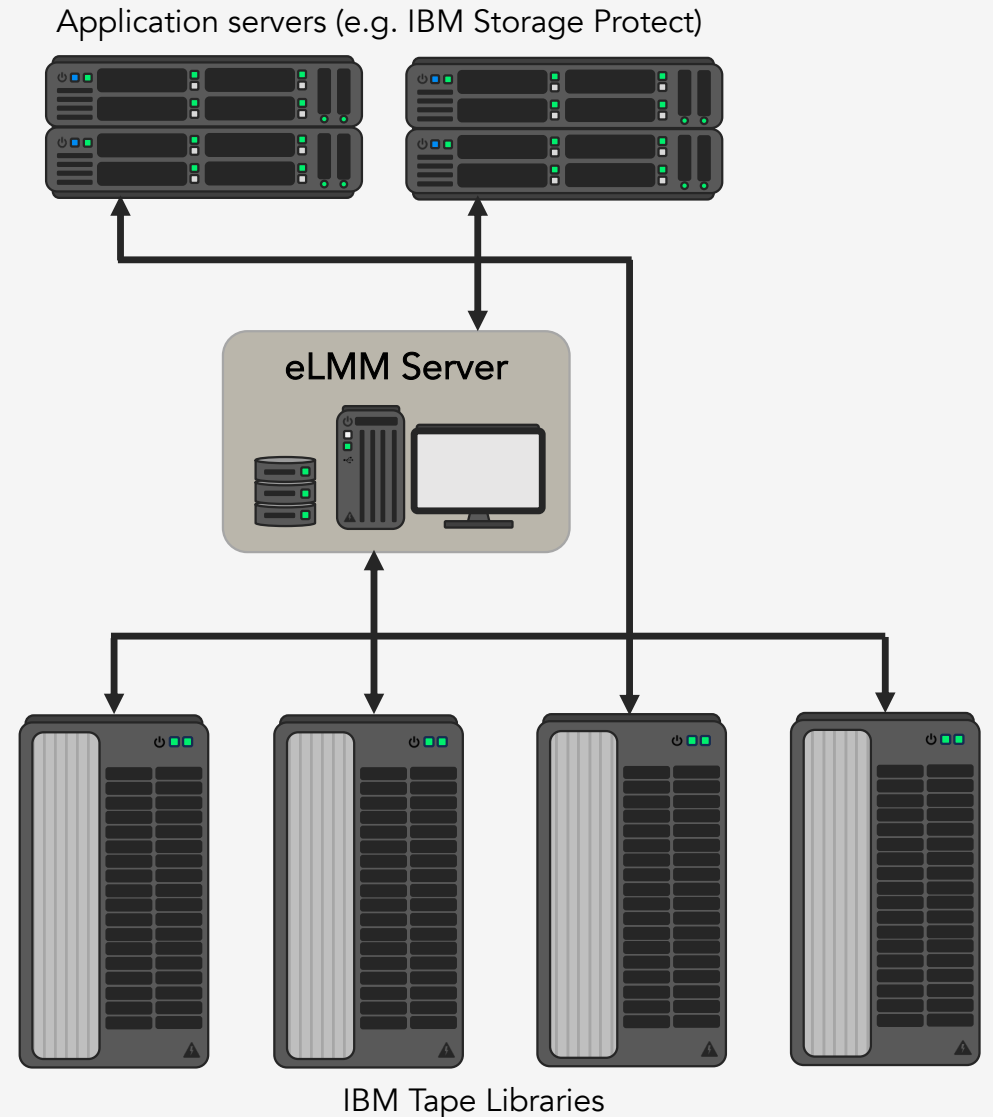
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- eLMM provides a resource management layer between applications such as IBM Storage Protect (formerly TSM) and the tape library hardware
    - Essentially, eLMM decouples tape resources from applications
    - Decoupling simplifies both the aggregation and the sharing of tape resources
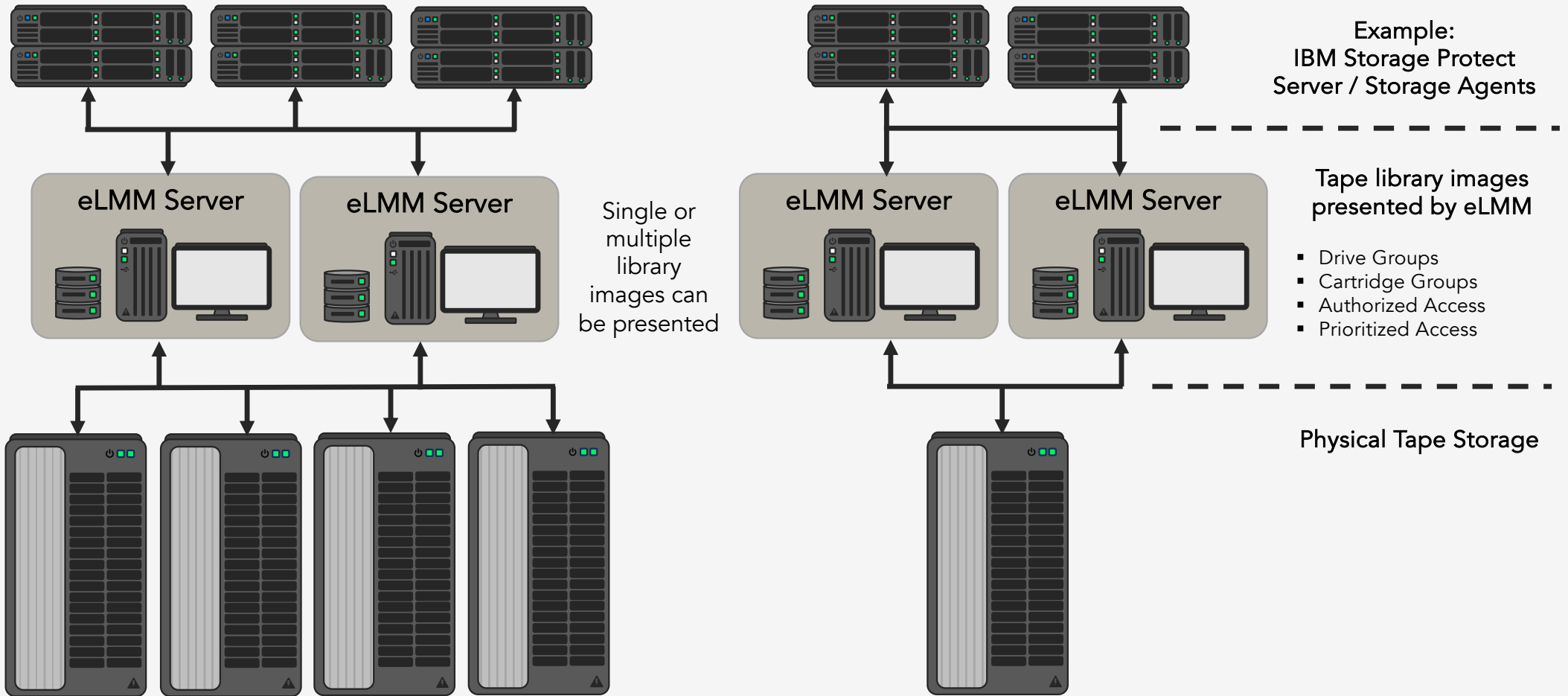
- eLMM provides consolidated, mainframe-class tape media management services
    - Centralized repository, access control and administration
        - Policy-based drive and cartridge allocation and media-lifecycle management
    - Advanced resource utilization reporting and auditing
        - Dynamic sharing of resources across heterogeneous application boundaries
    - Security features to permit or prevent application access to tapes
        - With common scratch pool and private pools for every application

- Management beyond physical library boundaries
    - Access multiple TS3500s, TS4300, TS4500s and IBM Diamondback as a single library image
   - TS3500s can be connected in a tape shuttle complex

- 3494 Emulation Option on top of an attached IBM tape library

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- eLMM consolidates supported libraries into one or more library images

- eLMM manages supported library resources
  - Application sees library images presented by eLMM
  - Mount and demount operations are processed by eLMM
  - Tape I/O goes directly to tape drives

- eLMM allows dynamic provisioning and sharing of tape resources
  - Control application access to tapes
  - Policy-based drive and cartridge allocation
  - Policy-based media-lifecycle management
  - Support tape shuttle complex for TS3500s

Application servers (e.g. IBM Storage Protect)

eLMM Server

IBM Tape Libraries

eLMM Tape Library Images

Example:
IBM Storage Protect
Server / Storage Agents

eLMM Server

eLMM Server

Single or
multiple
library
images can
be presented

eLMM Server

eLMM Server

Tape library images
presented by eLMM

- Drive Groups
- Cartridge Groups
- Authorized Access
- Prioritized Access

Physical Tape Storage

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- The Library Balancing Feature allows eLMM to manage the workload across different libraries

- All client applications of eLMM have access to all tape drives and scratch cartridges over all libraries that are virtualized within eLMM

- The workload among the different libraries is managed by eLMM, with the workload for scratch mounts between the tape libraries spread as evenly as possible

- Avoid situations where all tape drives are in use in one library, while free drives are available in other libraries

- Library selection based on a weight factors or a round robin algorithm is also possible
    - This will be used when no free drives are available and all new mounts are in blocked mode

Application servers (e.g. IBM Spectrum Protect)
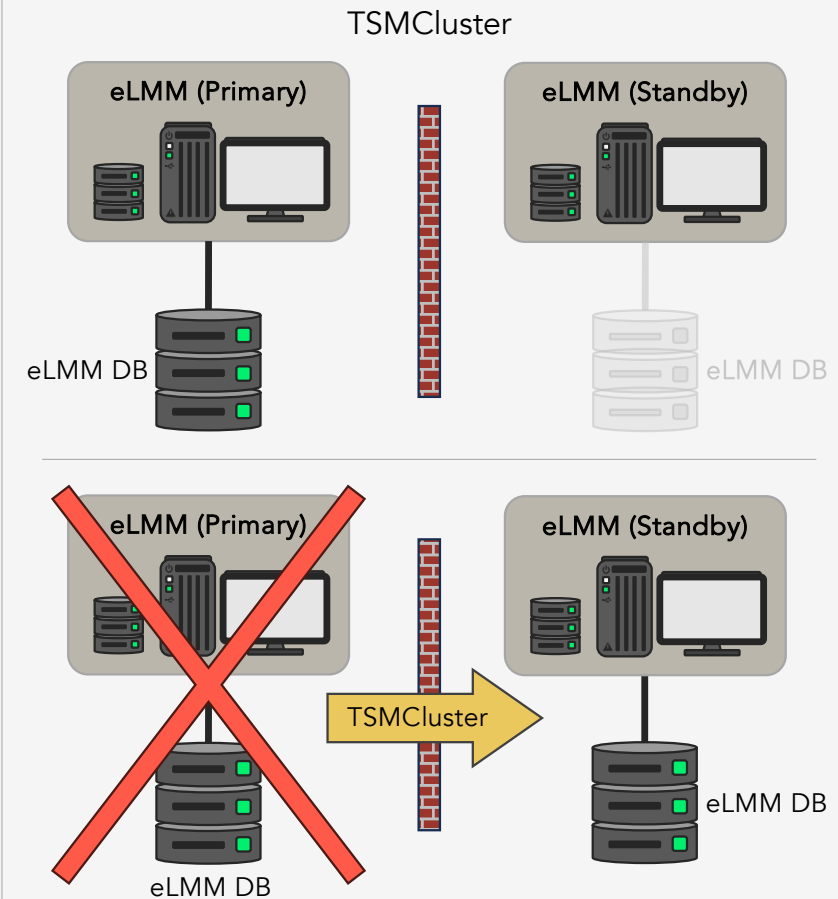
eLMM Server

IBM Tape Libraries
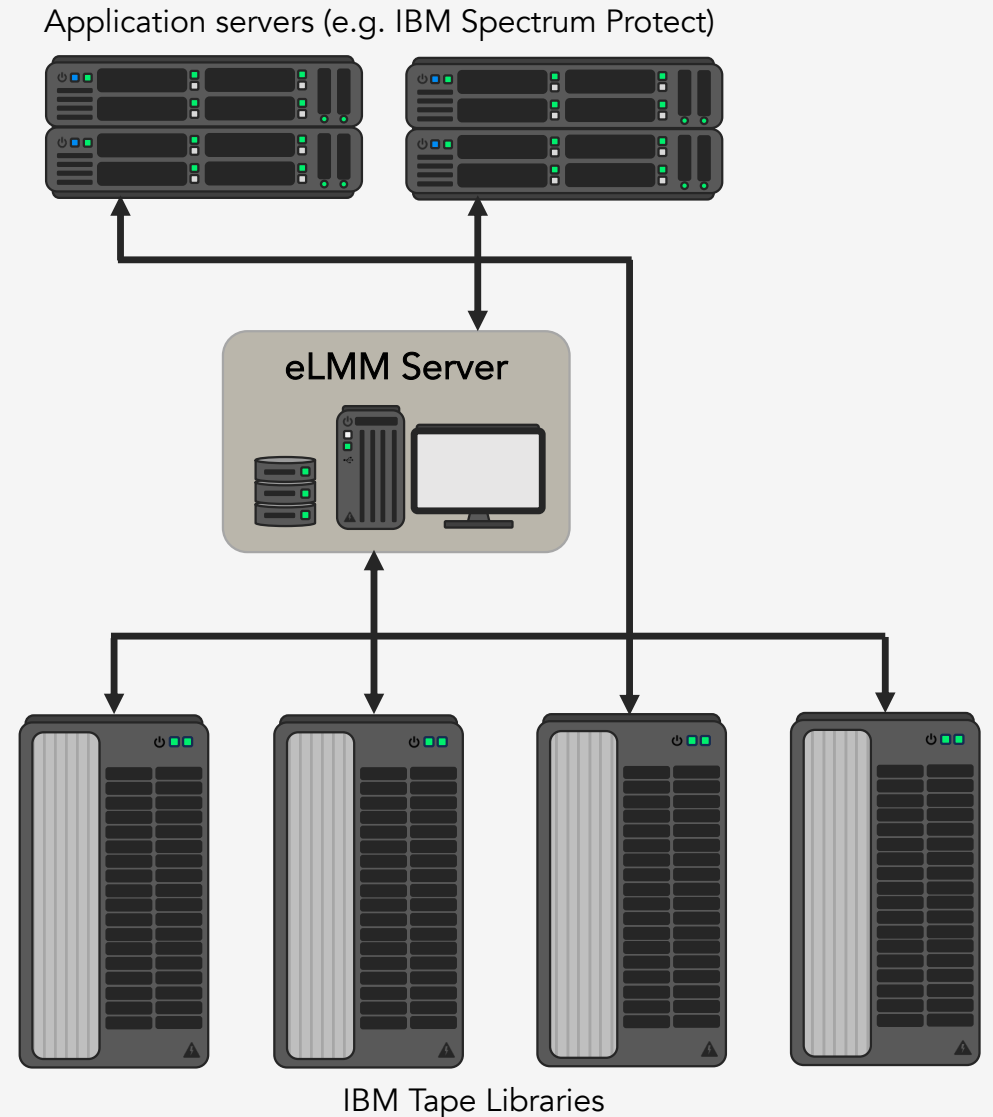
- eLMM provides statistics about
    - Amount of data written during a mount
    - Number of mounts per cartridge
    - Amount of data written to cartridge in total
    - Tape error statistics derived from log sense pages
    - Drive usage by application

- How to use it
    - Use of -hdr and -fmt eLMM command line options to format output and to route it to a file or to put it into a data repository on short intervals
    - Can be easily managed by operating system level scripts
        ```
        - ermmtool lsdca -hdr off -fmt delim=\,
        - ermmtool lsdca -hdr off -fmt delim=\, -begin 2012-06-29T14:32:13 -end 2012-06-29T15:44:26 >>data.csv
        - ermmtool lsdca -hdr off -fmt delim=\, -l -begin 5m >>data.csv
        - ermmtool lsdca -hdr off -fmt delim=\, -x -begin 5m >>data.csv
        ```

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Three options for a clustered installation are available:

The preferred solution is TSMcluster

1. Each eLMM instance has a primary node and a standby node

2. A running eLMM instance can failover to the standby node with a short interruption

3. TSMCluster will cleanup all resources on the failed node

4. With TSMCluster Tools a convenient monitoring is possible

5. Multiple eLMM instances can run in one TSMCluster

6. Long experience with this solution

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2. A classic Db2 HADR configuration can be used to have a secondary eLMM server configured together with the primary as a eLMM HADR cluster (log shipping method, near-sync, deprecated)

Storage LUNs

eLMM (Primary)   eLMM (Secondary)

eLMM DB   eLMM DB

3. eLMM Db2 cluster setup where Db2 database and logs are placed on a shared disk storage (e.g. Storage Scale file system) to be accessible from both cluster nodes (deprecated)

Storage Scale Storage

eLMM (Primary)   eLMM (Secondary)

Storage Scale

Storage Area Network (SAN)

eLMM DB

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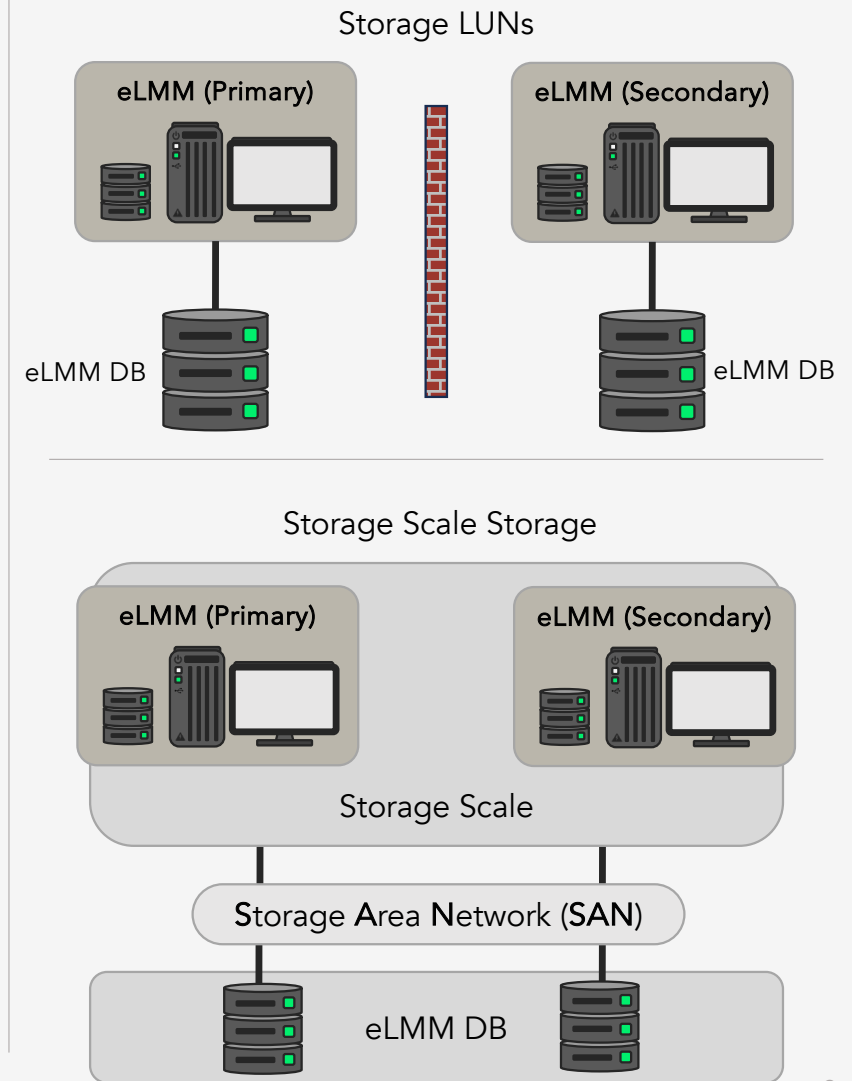
- eLMM Server Operating System
    - AIX 7.2 or 7.3, RHEL 7 or 8, SLES 12 or 15

- eLMM Client Operating System
    - AIX 7.2 or 7.3, RHEL 7 or 8, SLES 12 or 15
    - Windows 2016 or Windows 2019

- Latest Version of eLMM is **V1.5.0.0** with **Db2 11.5.8**

- Note: IBM Tape System Library Manager 1.4.x will have End of Marketing end of April 2024
  See IBM announcement on 23rd of January 2024

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- eLMM is compatible with IBM Tivoli Storage Manager / IBM Storage Protect V6.3 to V8.1
  - TSM / Storage Protect is a typical application for TSLM

- IBM System Storage TS3500 Tape Library
  - With or without a IBM TS3500 Tape Library Shuttle Complex

- IBM System Storage TS4300, TS4500 Tape Library and IBM Diamondback

- IBM Linear Tape Open (LTO) Ultrium drives (LTO3 to LTO9)

- IBM Enterprise Tape drives (TS1120 to TS1160) and the new TS1170

- IBM System Storage TS7600 series products with ProtecTIER version 3.1.8

eLMM in a
IBM Storage Protect
environment

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- No need to define drives and drive paths (only a library path is required)!

- Changes in the tape resource configuration are <u>automatically</u> handled by eLMM
  - Such as new or replaced tape drives, libraries and cartridges

- How to define eLMM managed resources:
  1. `define library <libname> libtype=external`
  2. `define path <servername> <libname> srctype=server desttype=library`
     `externalmanager=/opt/eLMM/client/tsm/elm`
  3. `define devclass <devclassname> library=<libname> devtype=3592 mountretention=5 mountlimit=20`
  4. `define stgpool <stgpoolname> <devclassname> maxscratch=500`

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- Environment
  - 4 x TS3500 Tape Library (in two datacenters)
  - 48 TS1150 tape drives per library (a total of 192 tape drives)
  - 16 TSM Server with access to all tape drives via 2 I/O paths (no storage agents)

- Paths to create and maintain without eLMM: 4 x 48 x 16 x 2 = 6144
  - If there are changes in the configuration these have to be configured into Storage Protect manually

- Paths to create and maintain with eLMM: 16
  - On each Storage Protect server there is only one External Library Manager for the tape libraries
  - eLMM automatically manages changes in the configuration

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- **Dynamic provisioning of resources and simplified IBM Storage Protect setup**
    - Easy addition and removal of tape drives to Storage Protect storage pools (incl. LAN-free)
        - No updates required for SP servers or other applications (such as drives and drive paths)
        - All changes are handled automatically inside eLMM

- **Enhanced access control for library resources**
    - Enables cross library scratch pools and drive pools
    - eLMM allows to share the drives across all Storage Protect servers while it strictly separates the cartridges of each Storage Protect server
    - Customers usually implement a common scratch pool and private pool for each Storage Protect Server (but scratch pools can also be separated)

- **Advanced utilization reporting and auditing**
    - eLMM provides statistics on how often a cartridge was mounted and how much data was transferred for the whole cartridge life cycle

- **Additional operational benefits**
    - Dismount of cartridge when Storage Protect server goes down (to free tape drive)
    - Various automatic retry mechanisms to cope with temporary errors
    - Audit Tape Library even if tape cartridges are mounted and processes are running

*e***X***stor*

- eLMM is a robust middleware that is designed to:
  - Reduce complexity by centralizing tape library and media management
  - Enable consolidation to a single library image of up to 300,000 cartridges
  - Provide added value for Storage Protect environments including simplified path management
  - Protect investment and enable new tape technologies for applications which only support the 3494 protocol
  - Consolidate tape resources and helps to optimize their utilization

- eLMM is based on proven technology
  - IBM eRMM Service Offering has been in use by customers since 2005
  - Renamed to IBM TSLM since 2014
  - eLMM is derived from IBM TSLM 1.4

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- **eLMM additional Hardware Support**
    - S3-to-Tape Interface
    - Quantum Tape Libraries
    - LTO-10 support (4q2024)

- **eLMM additional OS support**
    - Redhat Enterprise Server 9 (RHEL9)
    - Ubuntu Server 22 and 23
    - Windows Server 2022

- **eLMM additional Database support**
    - Open database interface for support of MySQL, MariaDB..

Contact

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