

A virtualized approach to Mass Storage System

Dorin Lobontu, Jos van Wezel and Martin Beitzinger

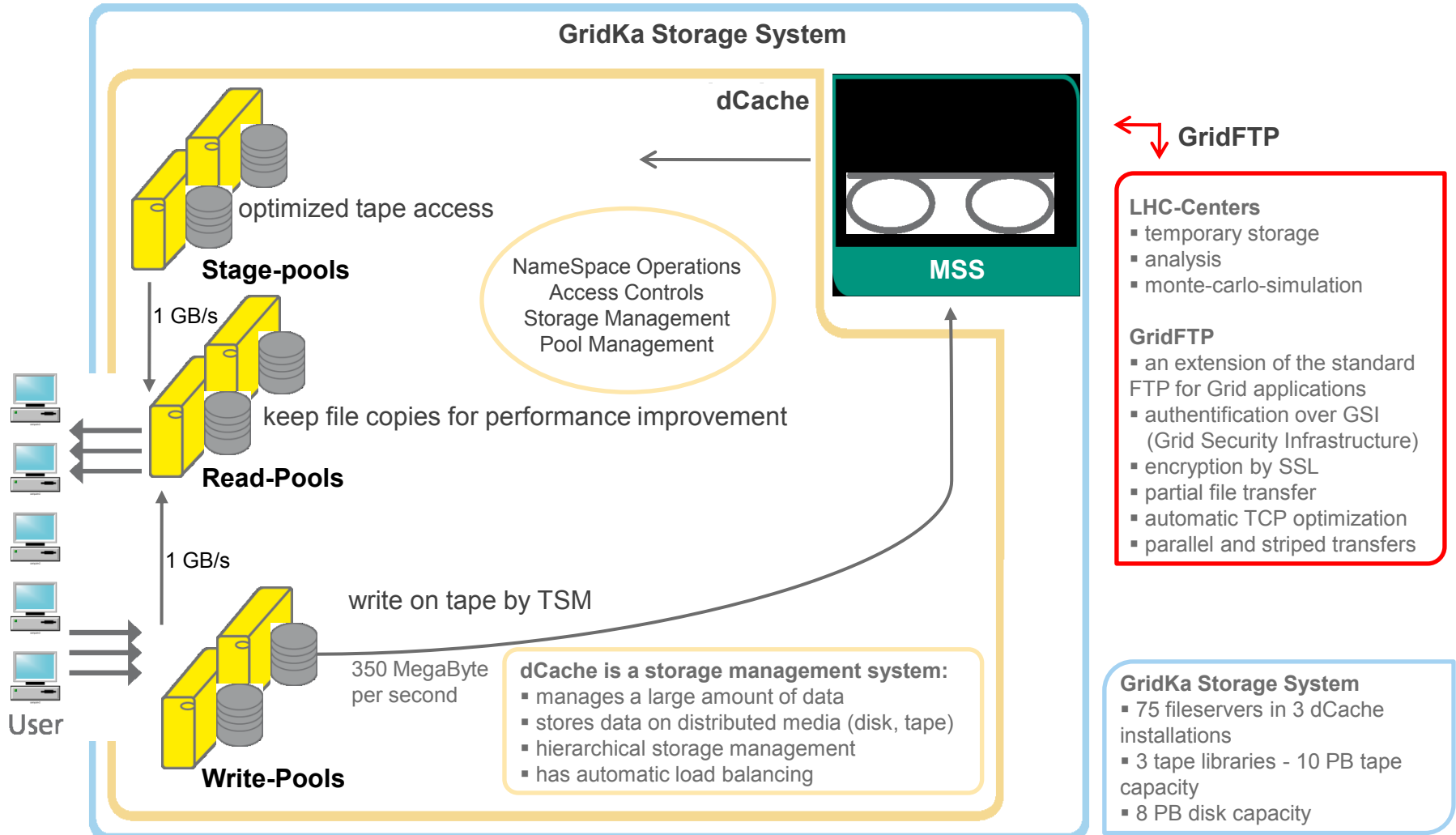
STEINBUCH CENTRE FOR COMPUTING

Presentation Overview

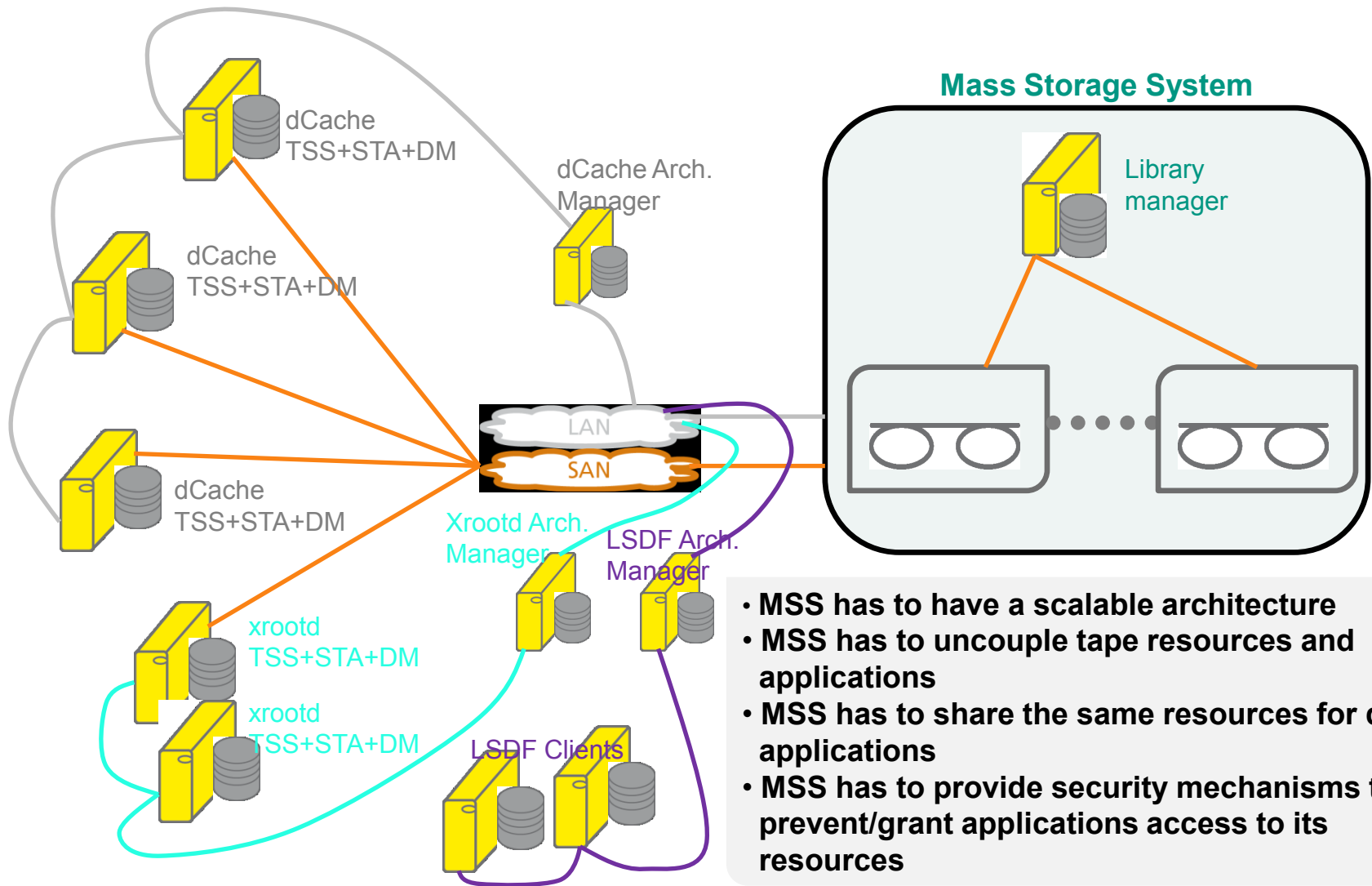
► GridKa Storage Overview

- TSM as Management System for MSS
- Tape Library Virtualization with ERMM
- Tape Reports

GridKa Storage Overview



MSS Requirements



- MSS has to have a scalable architecture
- MSS has to uncouple tape resources and applications
- MSS has to share the same resources for different applications
- MSS has to provide security mechanisms to prevent/grant applications access to its resources

Presentation Overview

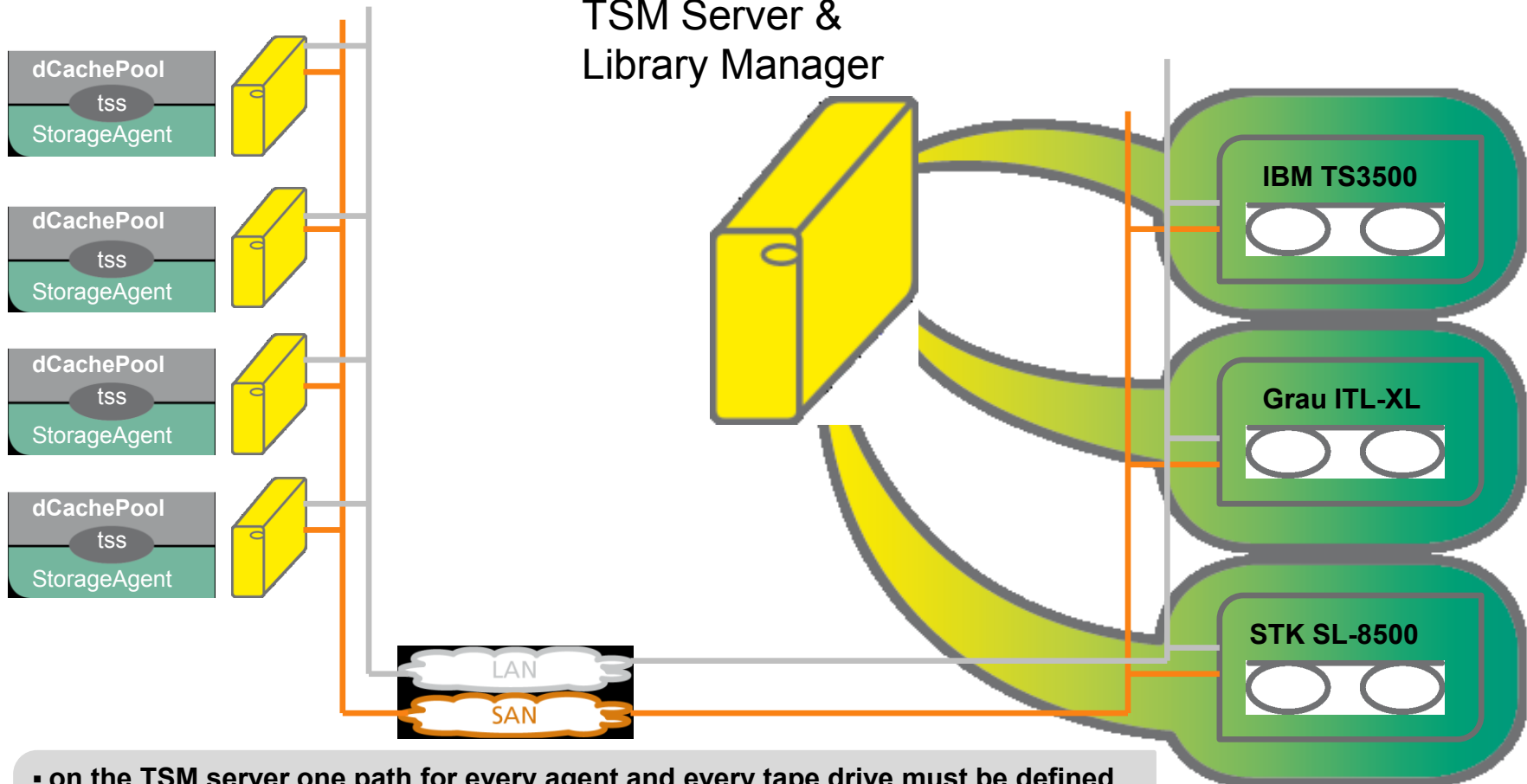
■ GridKa Storage Overview

▶ **TSM as Management System for MSS**

■ Tape Library Virtualization with ERMM

■ Tape Reports

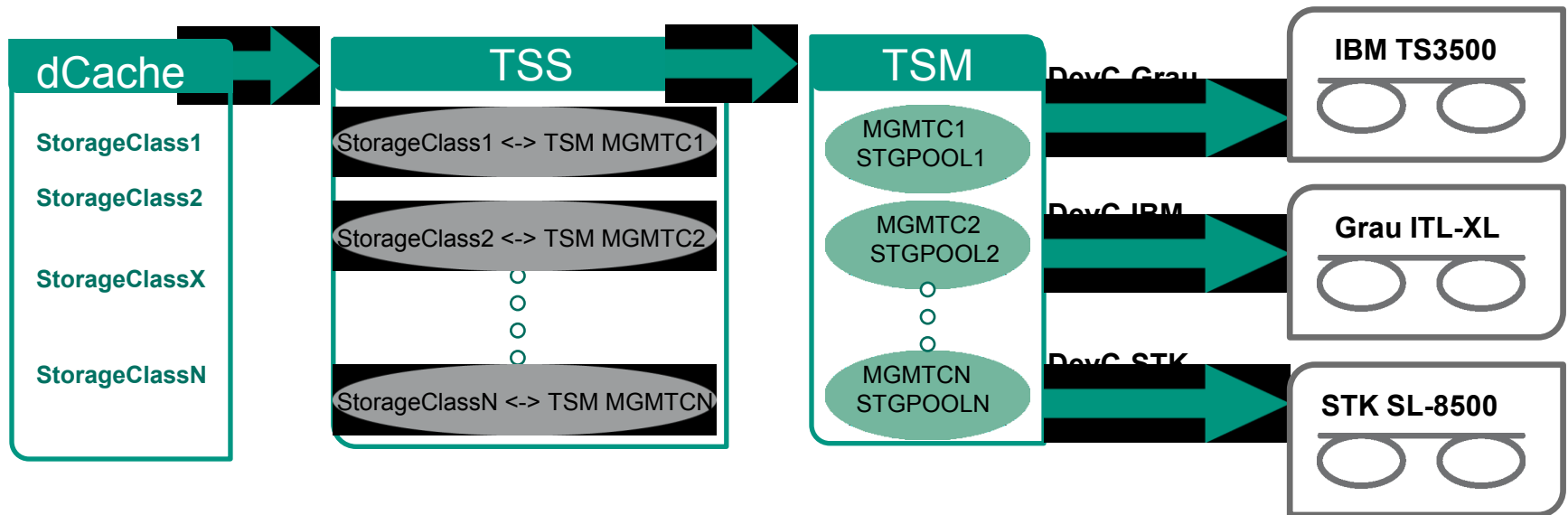
TSM as Library Manager



TSM Server &
Library Manager

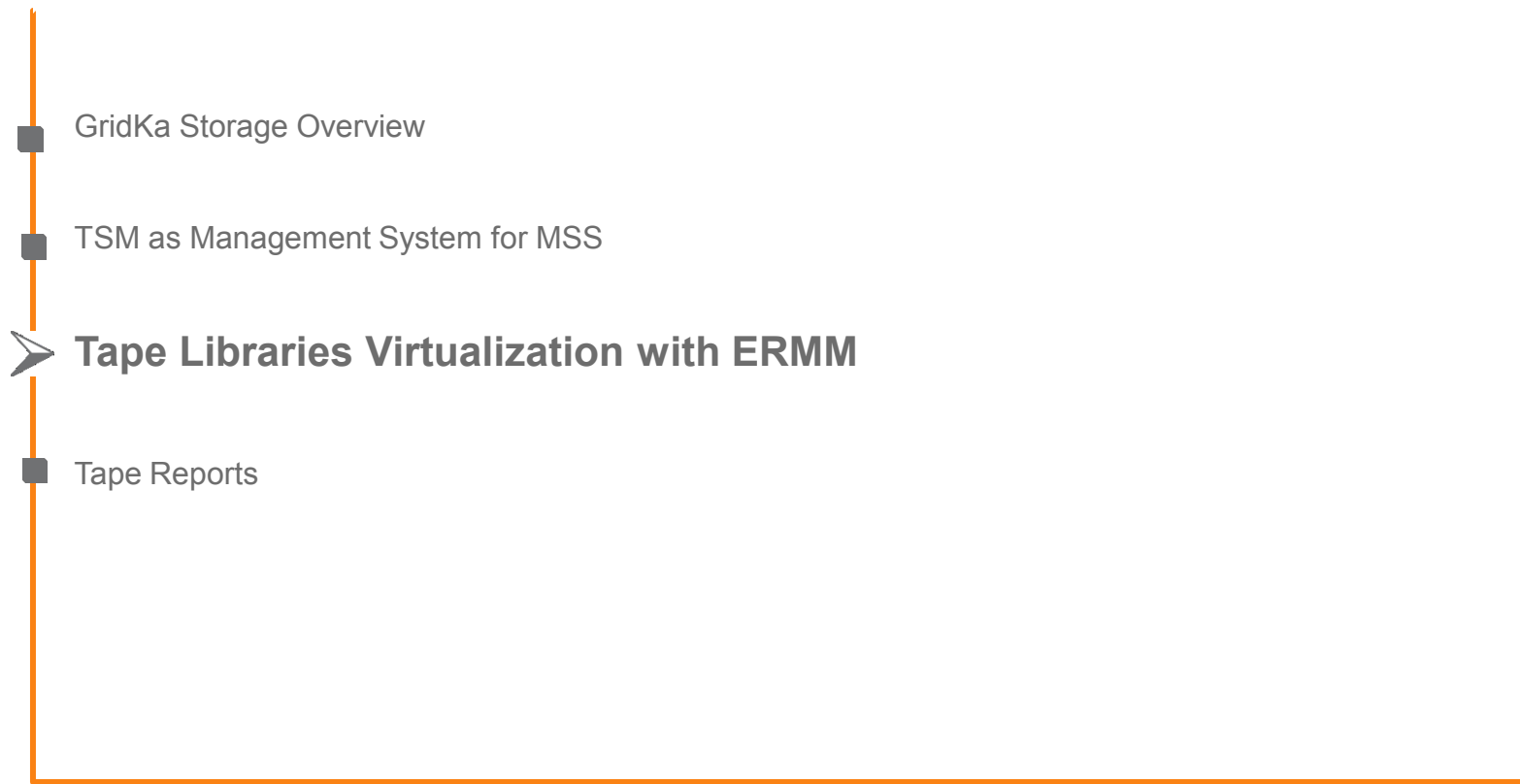
- on the TSM server one path for every agent and every tape drive must be defined (65 agents x 26 drives = 1690 paths)
- these paths must be manually maintained

Distributing Data over all Libraries

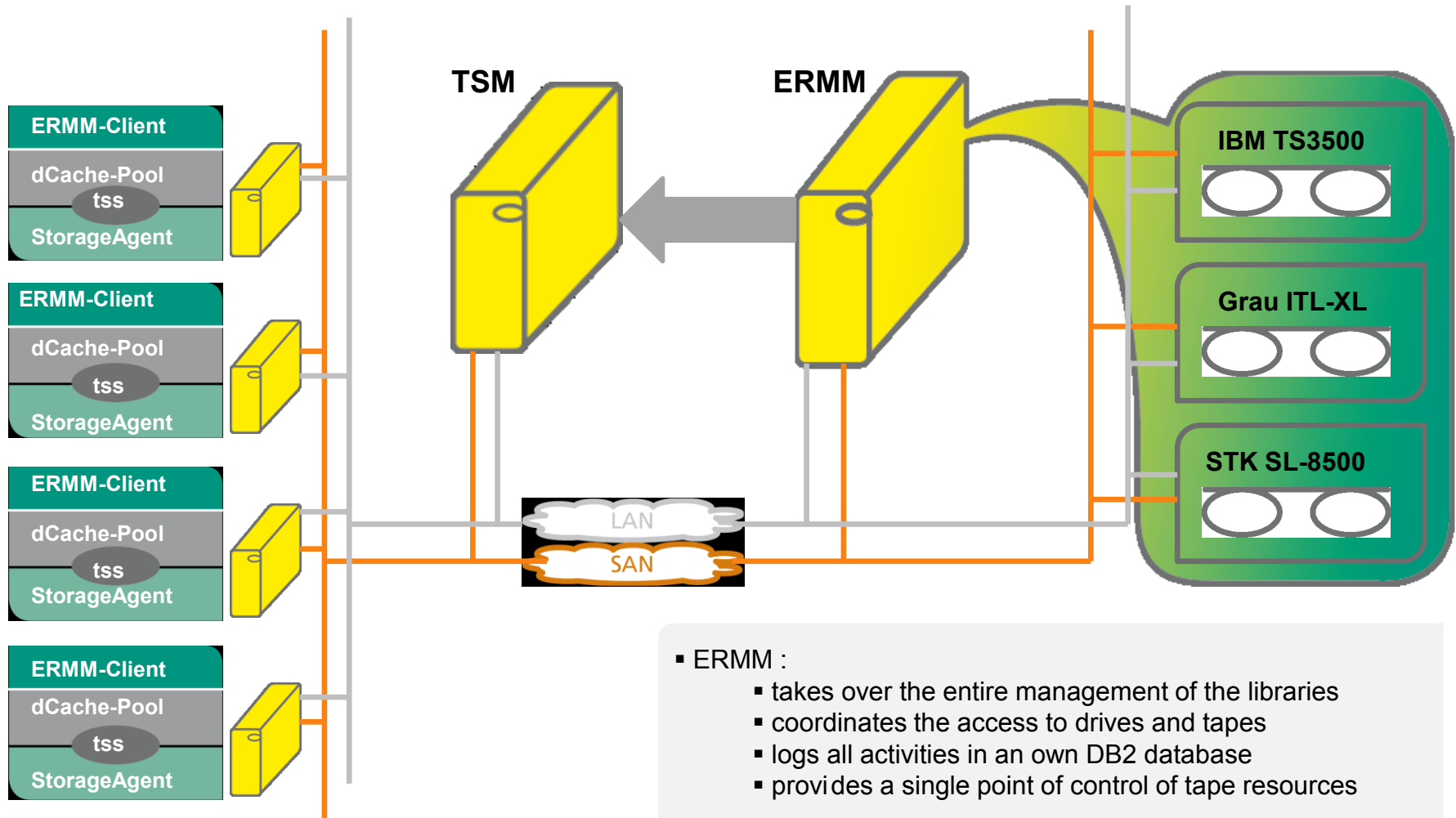


- data is statically distributed by TSS (Tape Staging Server) over the libraries
- drives load-balancing is not possible
- a library crash interrupts the processes assigned to this library

Presentation Overview

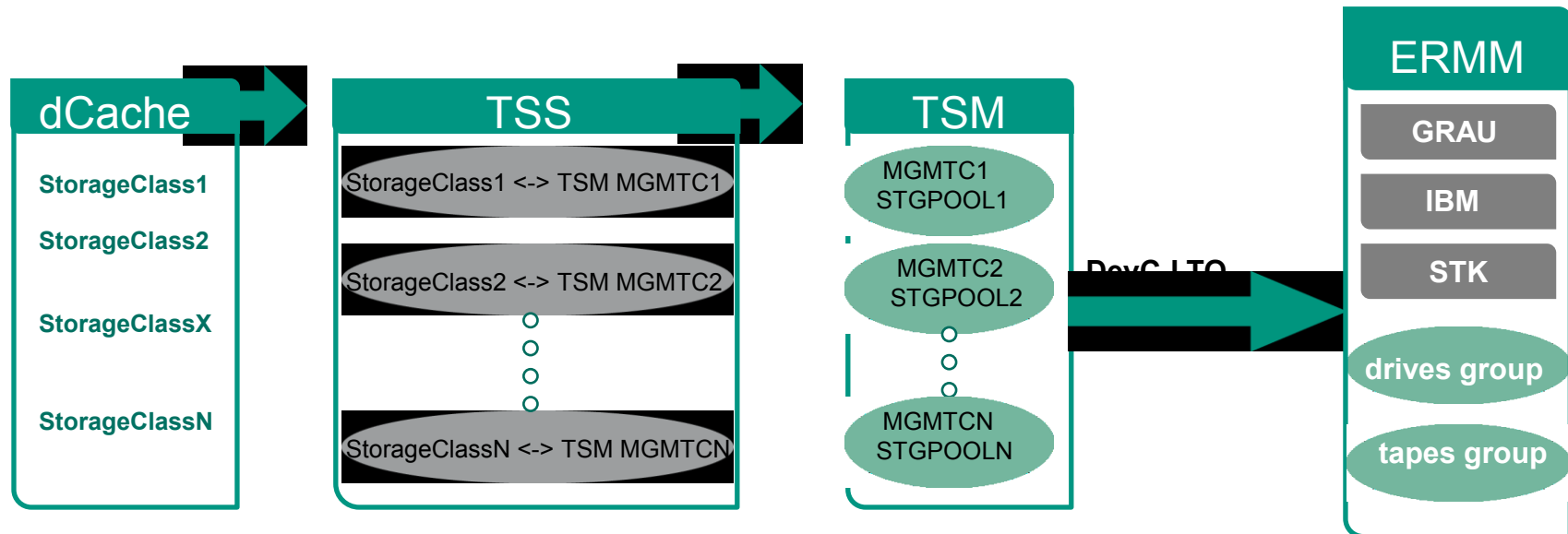


ERMM as Library Manager



- ERMM :
 - takes over the entire management of the libraries
 - coordinates the access to drives and tapes
 - logs all activities in an own DB2 database
 - provides a single point of control of tape resources

Distributing Data over all Libraries

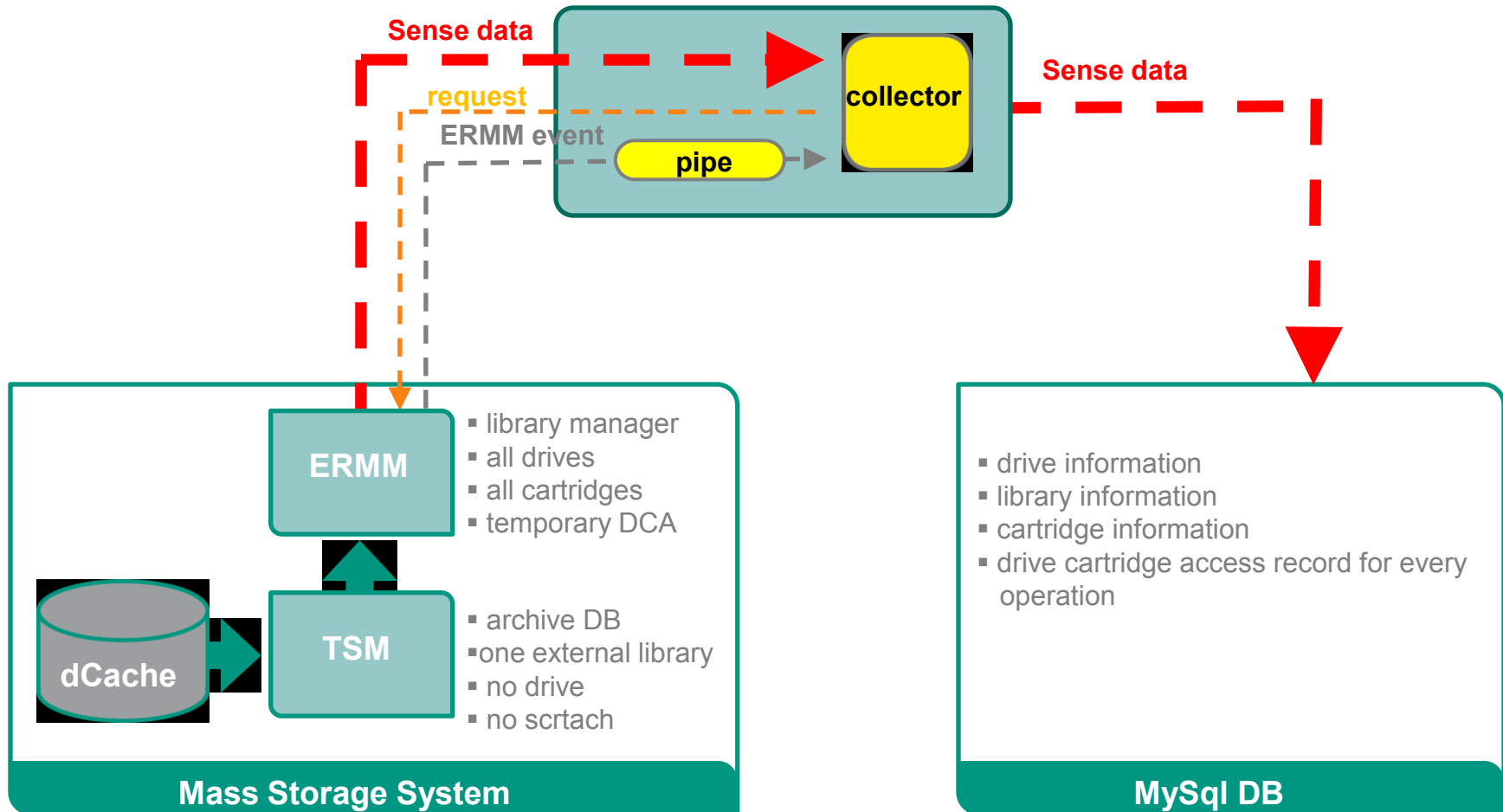


- TSM has only one external library
- TSM defines only one path for every storage agent to the external library
- ERMM maintains dynamically all path from the storage agents to all drives
- ERMM spreads the data over all physical libraries
- ERMM makes dynamic drives load balancing

Presentation Overview

- GridKa Storage Overview
- TSM as Management System for MSS
- Tape Libraries Virtualization with ERMM
- **Tape Reports**

Collecting Statistics Data



Generate Tape Reports

Complete history of Drive Cartridge Access

- amount of data written/read per mount
- mount and unmount time
- number of soft/hard error per mount

MySql DB



**Statistics generator
(perl program)**



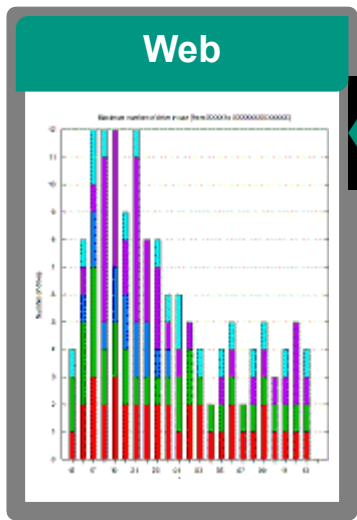
Statistics:

- throuput reports per drive, cartridge, library and time unit
- number of mounts per drive, cartridge, library and time unit
- number of concurrent drives in use per library and time unit
- error reports per drive, cartridge, library and time unit

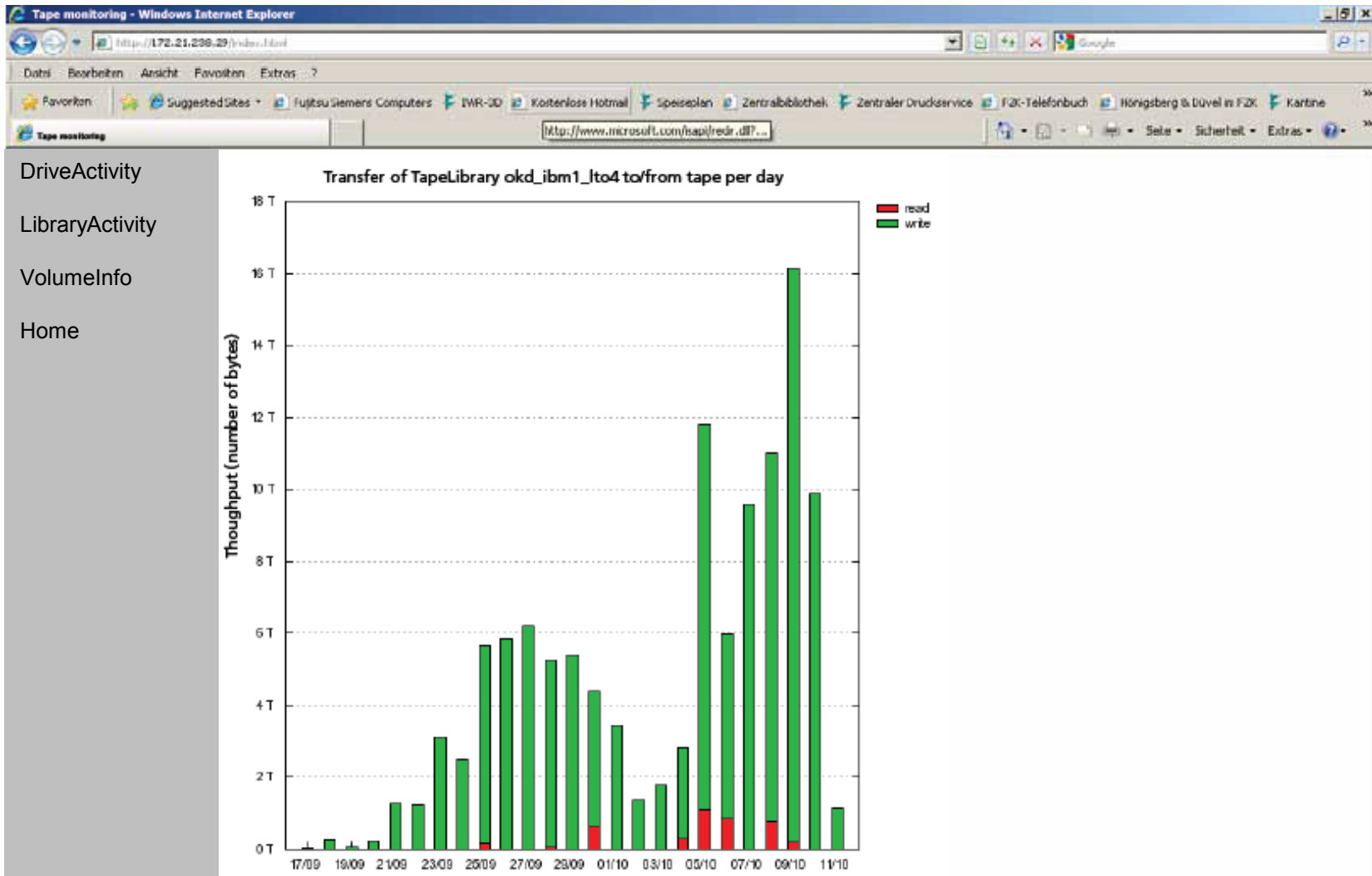


plot generator

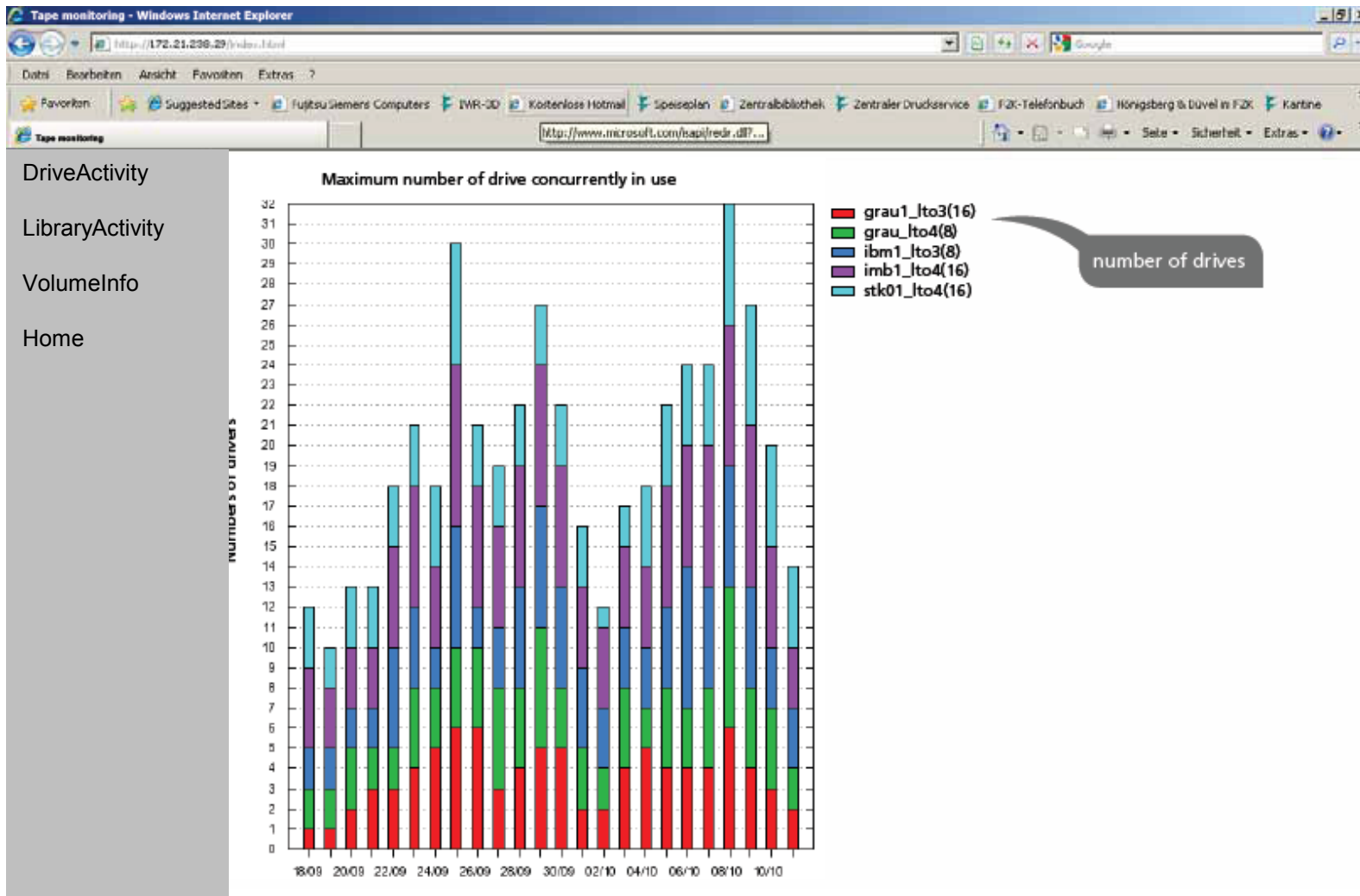
graphics



Activity Reports



Activity Reports



Activity Reports

Tape monitoring - Windows Internet Explorer

http://172.21.236.29/index.html

http://www.microsoft.com/bapi/redir.dif...

DriveActivity

LibraryActivity

VolumeInfo

Home

drive	cartridgepl	softreaderrors	softwriteerrors	hardreaderrors	hardwriteerrors
iwr_grau1_jto4-20002	UQ0553L4	0	0	0	0
iwr_grau1_jto4-20007	UQ0553L4	48	0	0	0
iwr_grau1_jto4-20003	UQ0553L4	864	0	0	0
iwr_grau1_jto4-20008	UQ0553L4	1070	0	0	1
iwr_grau1_jto4-20004	UQ0553L4	102	0	0	0

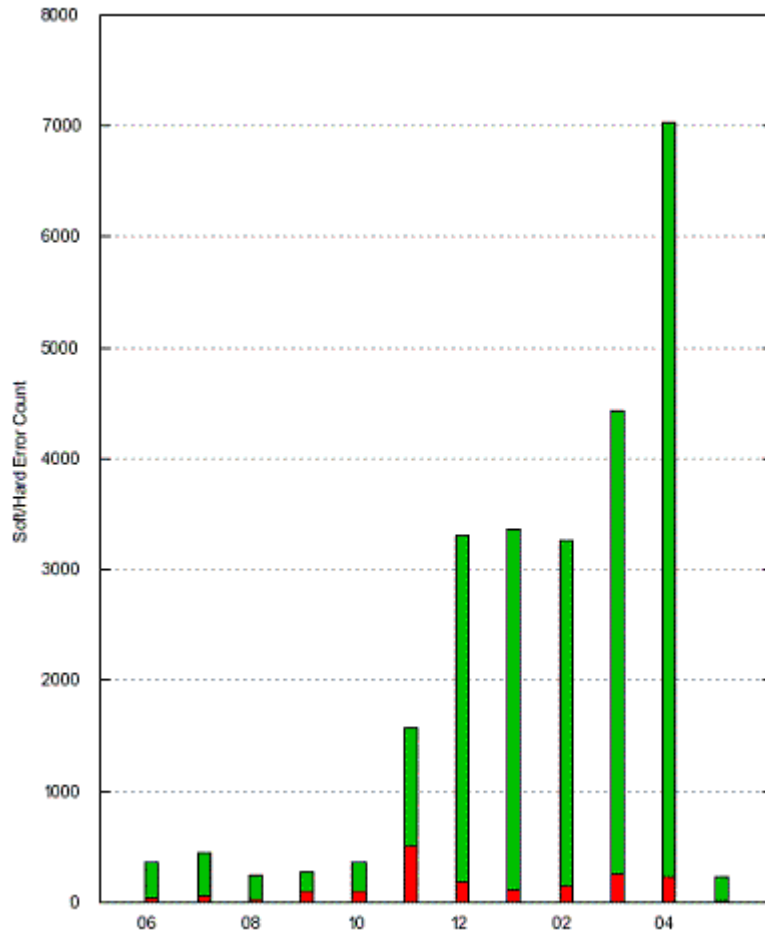
cartridge errors

drive	cartridgepl	softreaderrors	softwriteerrors	hardreaderrors	hardwriteerrors
iwr_grau1_jto4-20008	UQ2279L4	0	0	0	0
iwr_grau1_jto4-20006	UQ2279L4	0	0	0	0
iwr_grau1_jto4-20008	UQ2279L4	0	0	0	0
iwr_grau1_jto4-20001	UQ2279L4	0	0	0	0
iwr_grau1_jto4-20006	UQ2279L4	0	0	0	0
iwr_grau1_jto4-20005	UQ2279L4	2	0	0	0
iwr_grau1_jto4-20004	UQ2279L4	0	0	0	0
iwr_grau1_jto4-20002	UQ2279L4	0	0	0	0
iwr_grau1_jto4-20005	UQ2279L4	789	0	0	0
iwr_grau1_jto4-20005	UQ2279L4	604	0	0	0
iwr_grau1_jto4-20005	UQ2279L4	538	0	0	0
iwr_grau1_jto4-20005	UQ2279L4	101	0	0	0
iwr_grau1_jto4-20007	UQ2279L4	1325	0	0	0

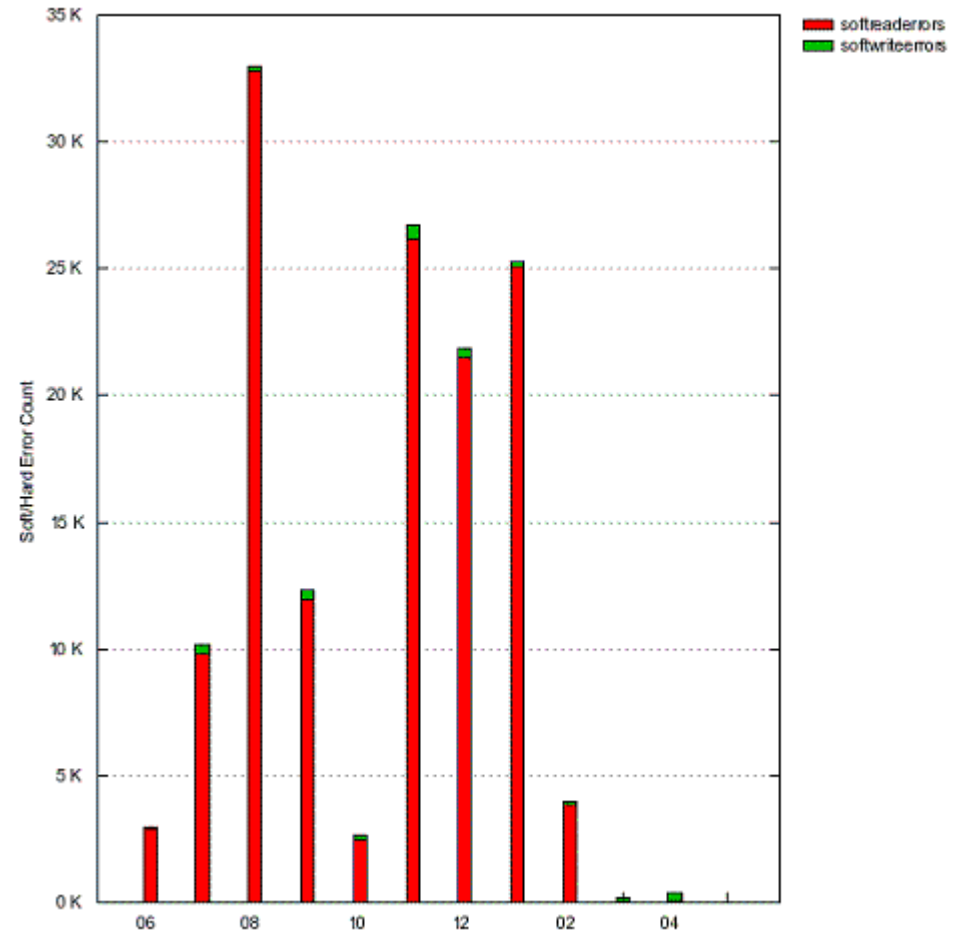
drive errors

Error Reports - per Library per month

iwr_grau1_lto3(16 drives)



iwr_grau1_lto4(8 drives)



Tape Errors

- Since November 2009 about 100 cartridges removed due to increasing **correctable** errors (~25 LTO3 from a total of ~5000
~75LTO4 from a total of ~5000)
- 4 drives(from ~64) replaced due to bad performance and increasing error rate
- Lost 4 cartridges with internal label destroyed
- TSM: ANR8355E Error reading label for volume ...

Thank you for your attention!