



designed. engineered. results.

DMF & Copan Integration

Agenda

- DMF & Copan VTL
 - Hardware Overview
 - DMF performance optimizations

- DMF & Native Copan

DMF & Copan VTL

DMF & Copan VTL: Configuration

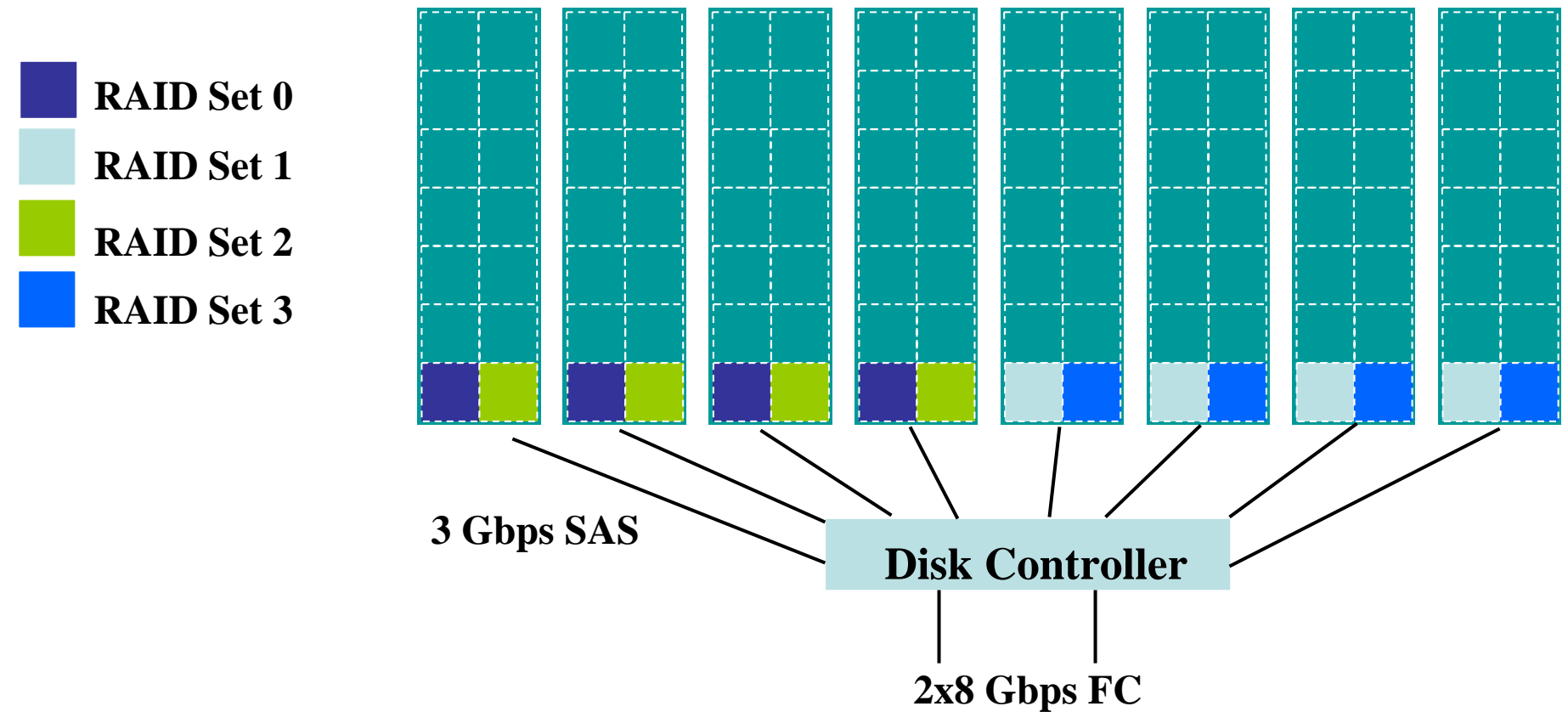
- Each shelf is a separate virtual tape library:
 - 1 Library Server
 - 1+ Drive Group
 - 1+ Volume Group
- Virtual drives per shelf:
 - 12 for 50% power budget
 - 6 for 25% power budget
 - Ensures power budget is not exceeded
 - Minimizes “mount” time

DMF & Copan VTL: Optimization

- There are sites using Copan VTL today
 - DMF treats it as any physical tape library
- With some enhancements, DMF can optimize performance to Copan VTL:
 - Cartridge selection
 - Migration policies

DMF & Copan VTL: Shelf Layout

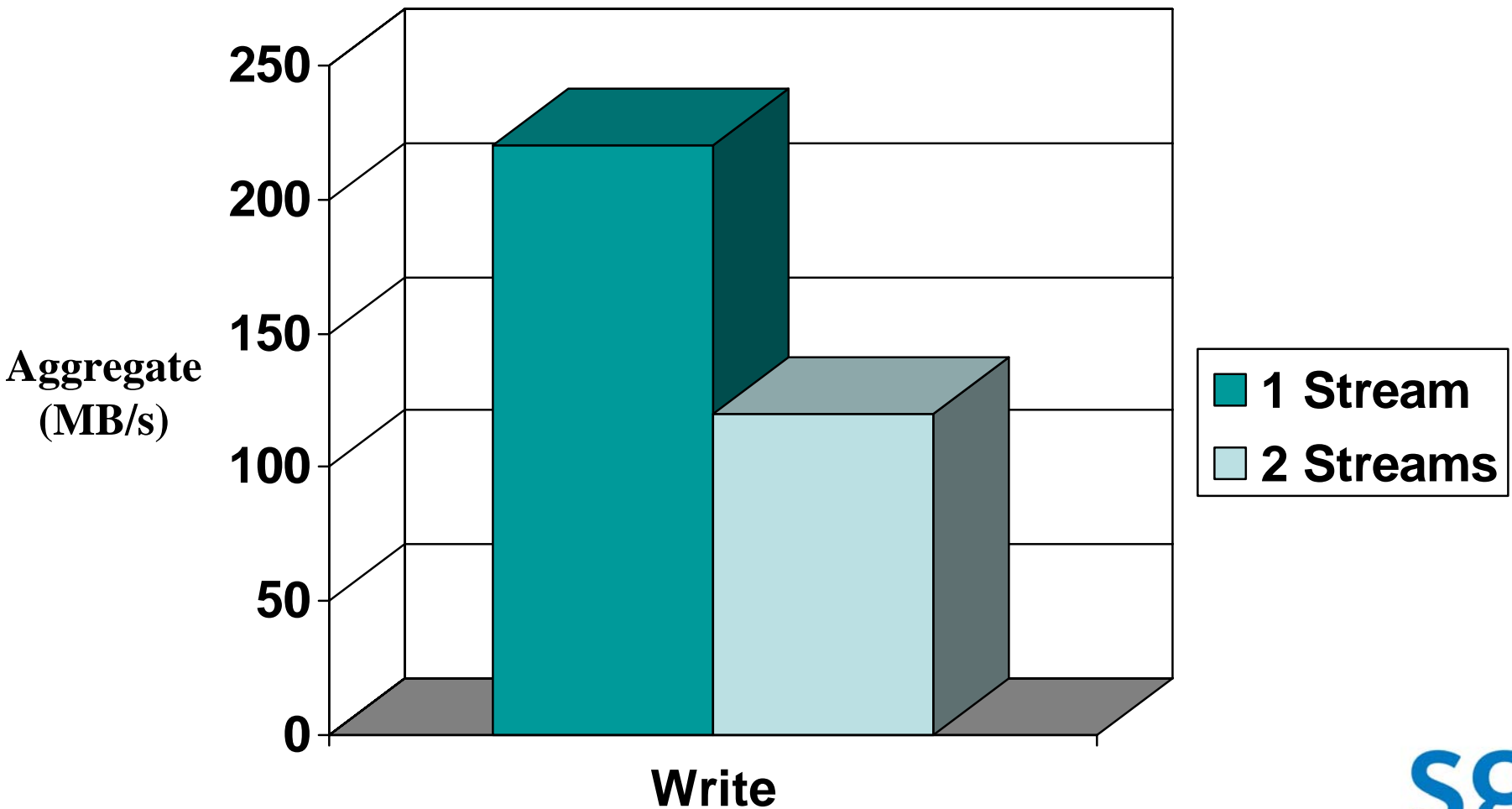
Canisters



Balance I/O across each half of the shelf for best performance

DMF & Copan VTL: RAID Set Bandwidth

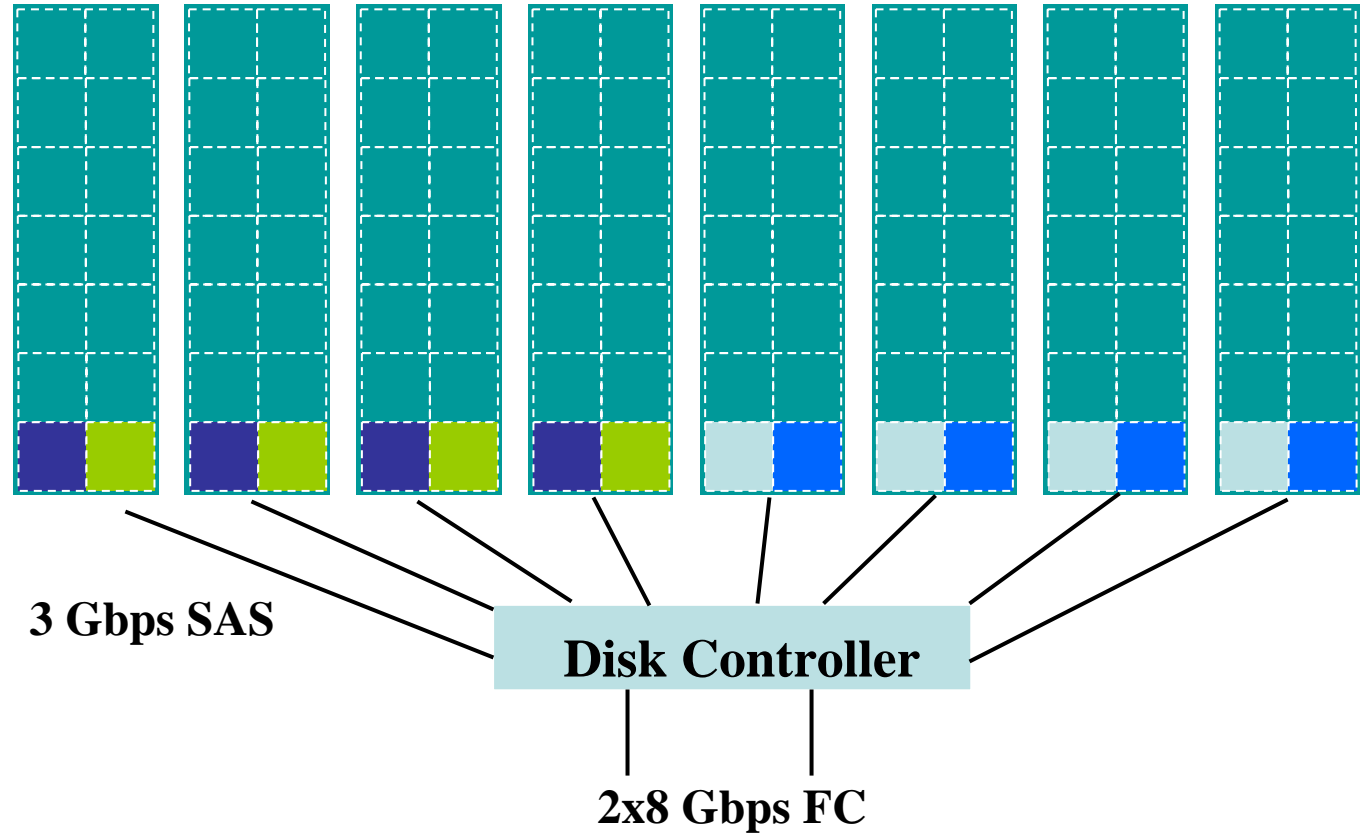
RAID Sets optimized for large, sequential I/O



DMF & Copan VTL: Cartridge Selection

Canisters

- RAID Set 0**
VSNs: xxxAxx
- RAID Set 1**
VSNs: xxxBxx
- RAID Set 2**
VSNs: xxxCxx
- RAID Set 3**
VSNs: xxxDxx



DMF & Copan VTL: Locality

- DMF will fill a VSN on a RAID set before starting another VSN on that set
- When one does fill, DMF will prefer to use another VSN on the same RAID set
 - “once it’s spinning keep it spinning”
- Files migrated at the same time tend to be recalled at the same time

DMF & Copan VTL: Filling a Shelf

- Unlike a physical library, a VTL cannot add cartridges if the library becomes full
- Leads to deadlock situation:
 - No tapes can be freed in there is not an empty tape available for merging
 - Need to reserve 1+ cartridges for merges
- DMF will stop sending migration requests to a shelf that is nearly full

DMF & Copan VTL: Migration Groups

- In a full 8-shelf cabinet:
 - 8 libraries & 104 drives
 - Minimum of 8 DMF VGs
- Difficult & overly complex to write VG selection expressions which will spread data among the VGs

DMF & Copan VTL: Migration Groups

- New concept: Migration group
- Logical VG consisting of:
 - A set of real VGs
 - VG-selection strategy
 - Strategy parameters
- Migration groups can be used for:
 - SELECT_VG expressions
 - dmput
 - site-defined policies

DMF & Copan VTL: Migration Groups

- VG-selection strategies being considered:
 - Round robin
 - Rotate migration requests among the group
 - Fill-and-spill
 - Fill first VG before starting next
 - Load-balancing
 - Distribute migrations among the group based on current load
 - (Perhaps load-balance recalls as well)

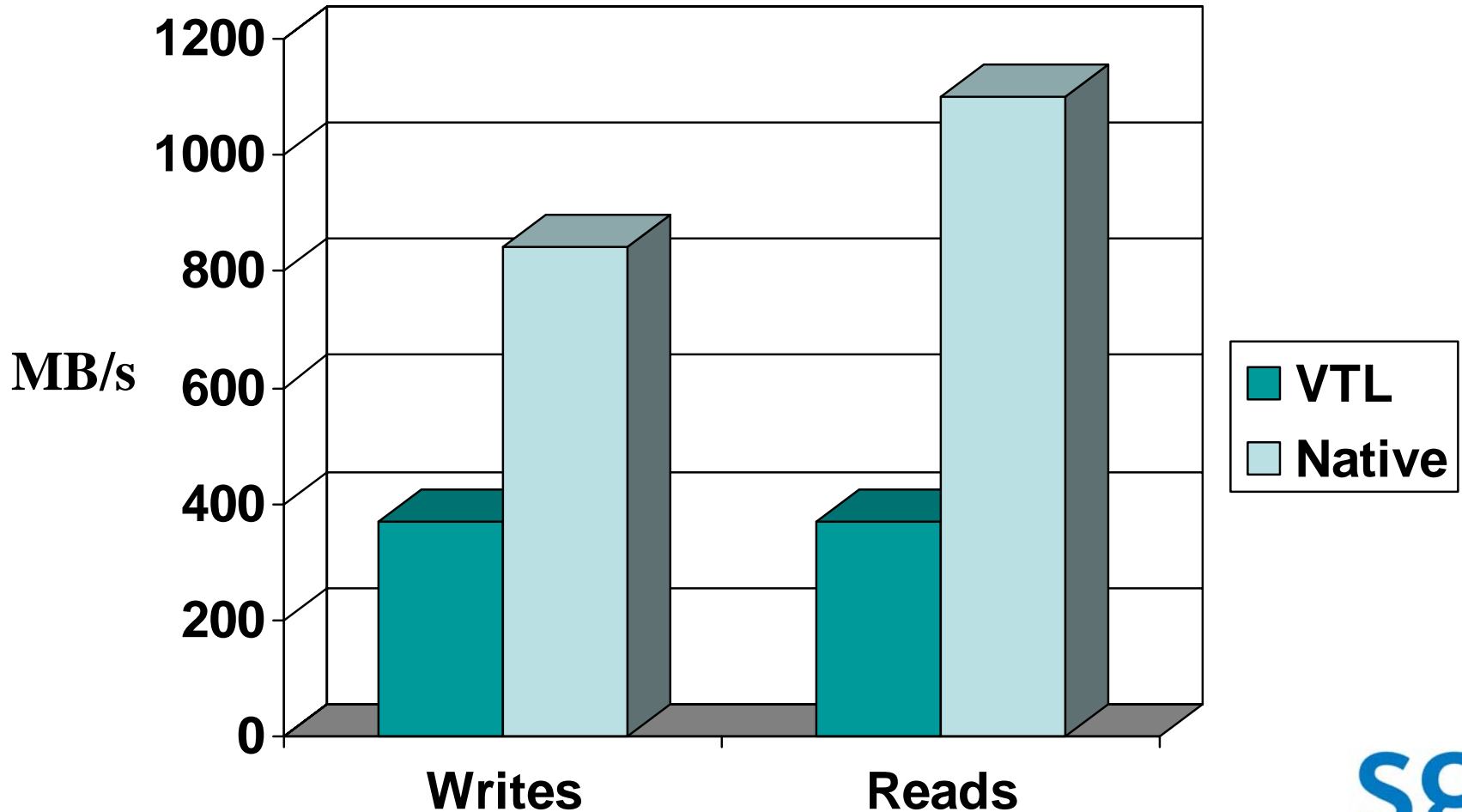
DMF & Copan VTL: Review

- Migration groups:
 - Load-balance across all shelves
- VSN Selection:
 - Load balance across each half of a shelf
 - Large, sequential I/O to a single RAID set
 - Data locality
- Manage shelf free space

DMF & Native Copan

VTL vs Native Copan

Bandwidth per shelf:



DMF & Native Copan

- Future release
- Each RAID set is a mountable disk-based MSP
- 2x write bandwidth / 3x read bandwidth compared to VTL solution



www.sgi.com

©2002 SGI. All rights reserved. SGI, IRIX, and the SGI logo are registered trademarks and SGI SAN Server, XFS, and CXFS are trademarks of Silicon Graphics, Inc., in the U.S. and/or other countries worldwide. MIPS is a registered trademark of MIPS Technologies, Inc., used under license by Silicon Graphics, Inc. UNIX is a registered trademark of The Open Group in the U.S. and other countries. Intel and Itanium are registered trademarks of Intel Corporation. Linux is a registered trademark of Linus Torvalds. Windows is a registered trademark or trademark of Microsoft Corporation in the United States and/or other countries. All other trademarks are the property of their respective owners.

(10/02)