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DMF & Copan Integration

Agenda

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

DMF & Copan VTL

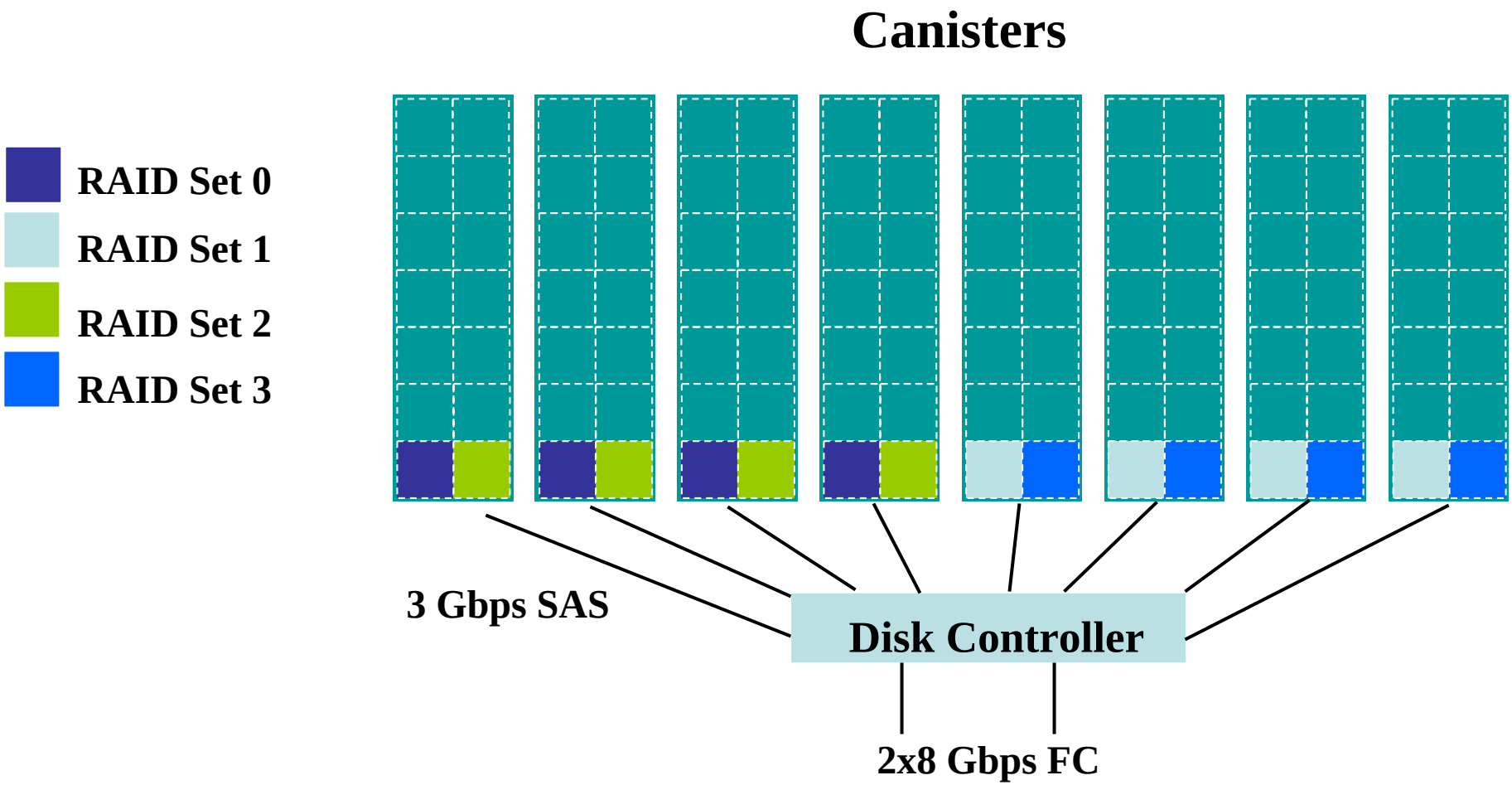
DMF & Copan VTL: Configuration

- 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

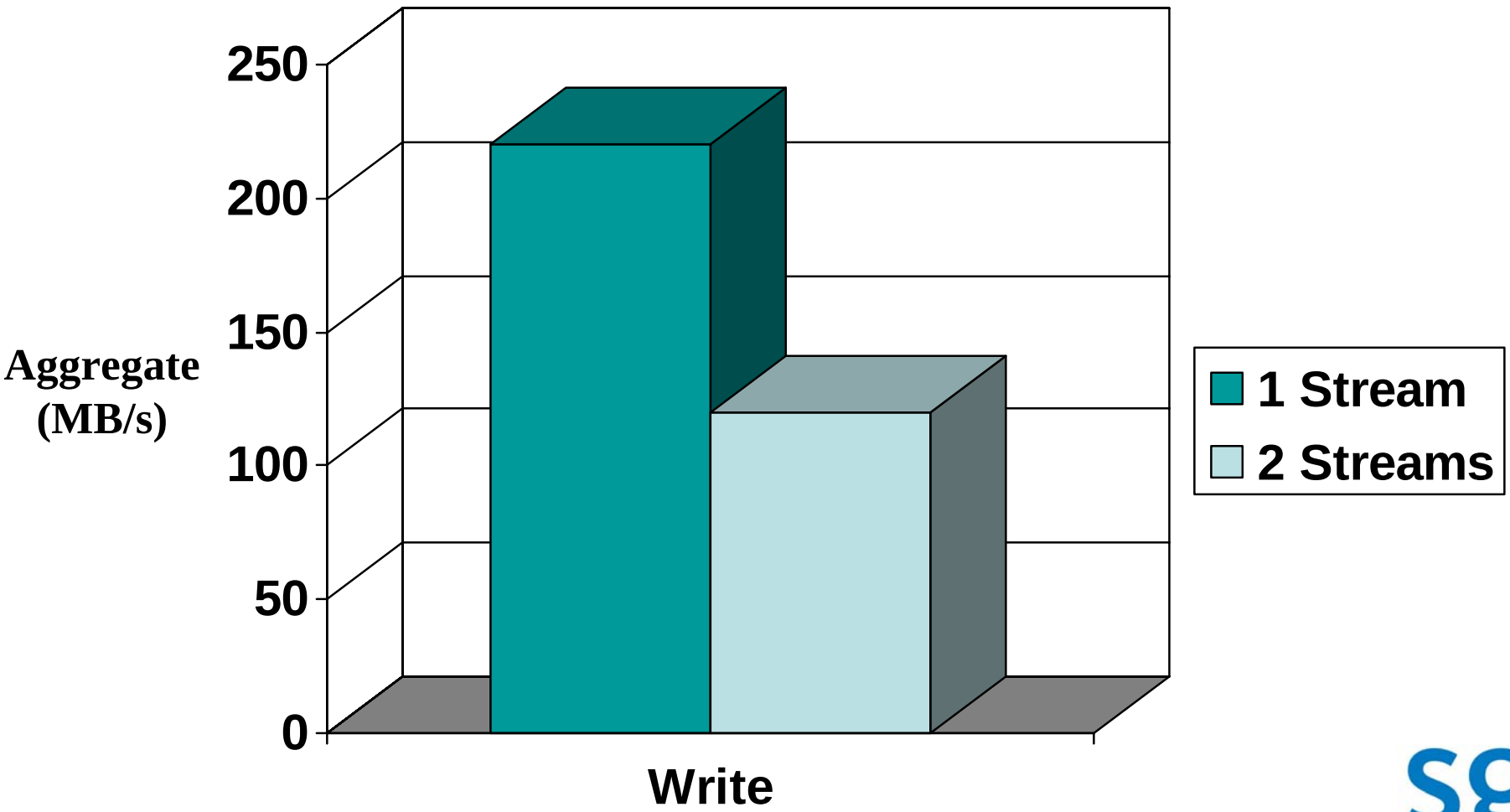
DMF & Copan VTL: Shelf Layout



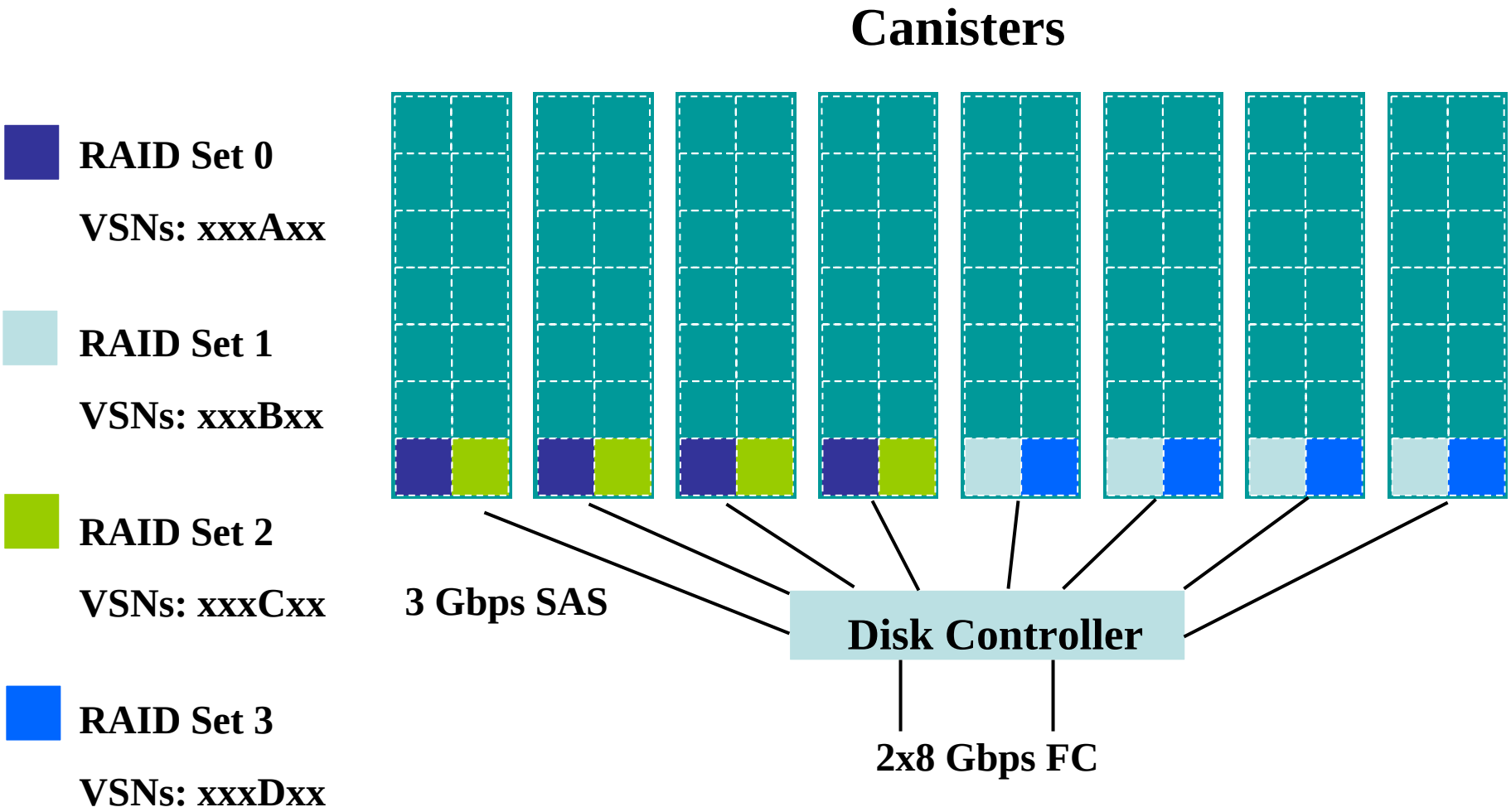
Balance I/O across each half of the shelf for best performance

DMF & Copan VTL: RAID Set Bandwidth

RAID Sets optimized for large, sequential I/O



DMF & Copan VTL: Cartridge Selection



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)

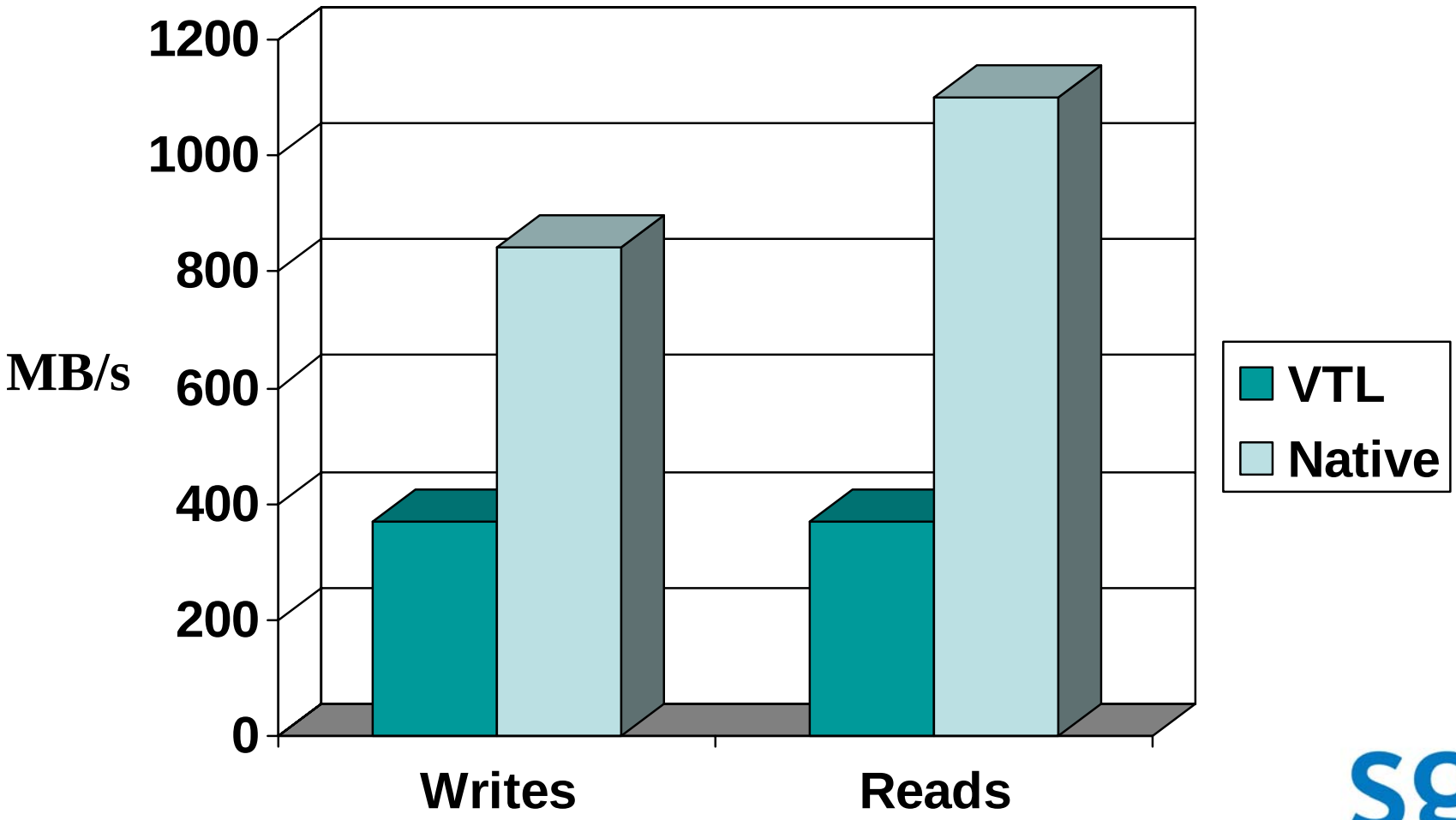
DMF & Copan VTL: Review

- 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

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