Virtual Storage Manager

Steve Blendermann
Storage Technology Corporation
One StorageTek Drive
Louisville, CO 80028-6202
USA

Phone: +1-303-673-3184 Fax: +1-303-661-8462
E-mail: Steve_Blendermann@storagetek.com
Web: http://www.storagetek.com

Presented at the THIC meeting in Denver, CO
July 13, 1999

STORAGETEK

INFORMATION *made* POWERFUL

Virtual Storage Manager

Steve Blendermann
Storage Technology Corporation
One StorageTek Drive
Louisville, CO 80028-6202
USA

Phone: +1-303-673-3184
Fax: +1-303-661-8462
E-mail: Steve_Blendermann@storagetek.com
Web: http://www.storagetek.com

Presented at the THIC meeting in Denver, CO
July 13, 1999

Problems

- Inefficient use of tape media
  - average data set size on tape is 255 MB
  - media capacities range from 1.2 to 150 GB
- Inefficient use of tape transports
  - mount/dismount activity a large portion of transport usage
  - extra transports used to handle peak allocation demands

Inefficient use of transports and media

- Transports
  - mount time of 4.5 seconds
  - thread/load time of 4.5 seconds
  - data transfer time (255 MB) of 25.5 seconds
  - rewind/unload time of 11 seconds
  - dismount time of 4.5 seconds
  - total time is 50 seconds of which 25.5 (51%) is useful work
- Media
  - 255 MB is 21% of 1.2GB cartridge
  - 255 MB is .17% of 150GB cartridge

Solution

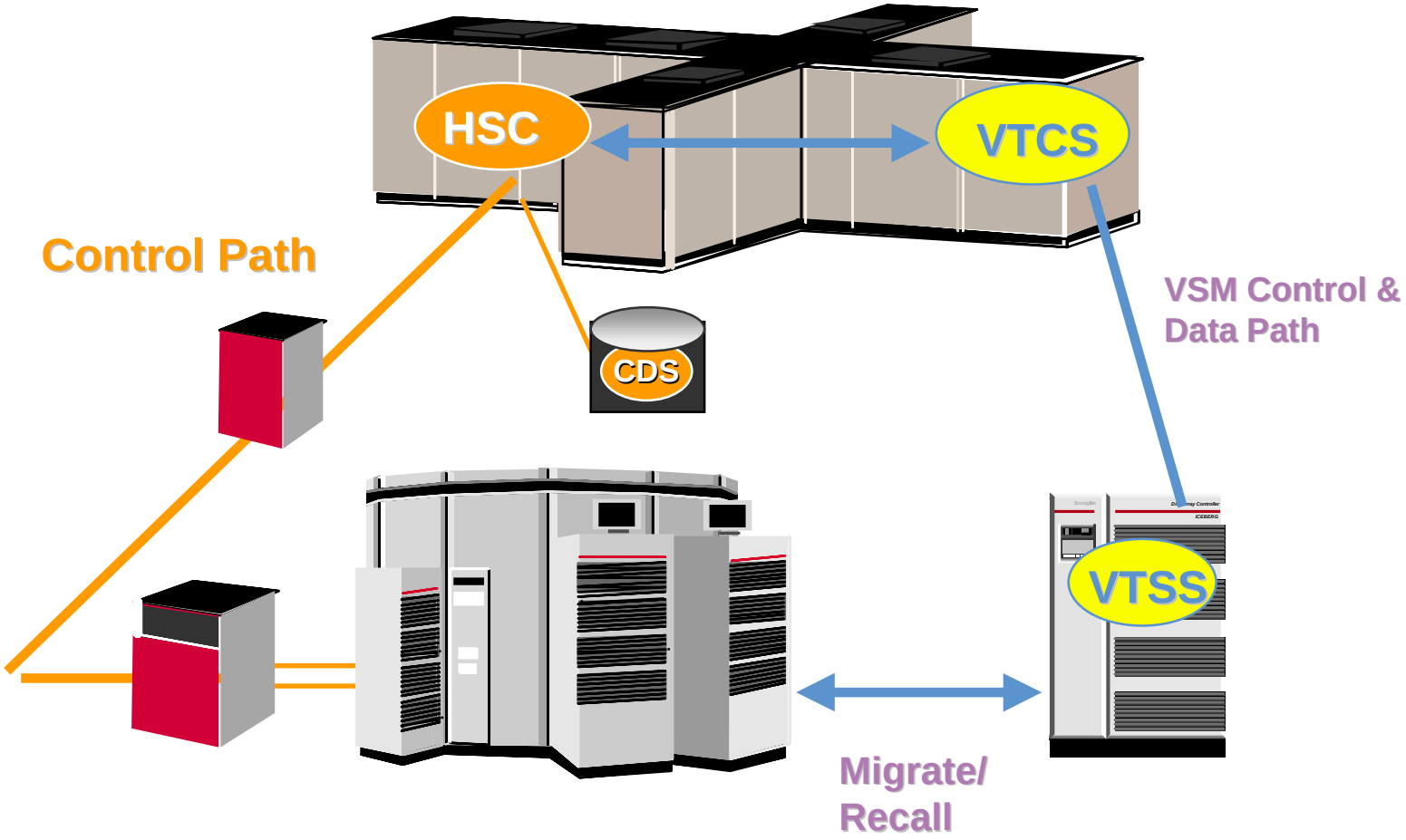
Virtual Storage Manager

- Provides virtual tape transports
- Provides virtual tape cartridges
- Efficiently uses real tape transports
- Efficiently uses real tape cartridges
- Transparent to the host system and to applications

Acronyms

- VSM - Virtual Storage Manager
- VTCS - Virtual Tape Control System
- VTSS - Virtual Tape Storage Subsystem
- VTV - Virtual Tape Volume
- VTD - Virtual Tape Drive
- RTD - Real Tape Drive
- MVC - Multi-Volume Cartridge

VSM Components



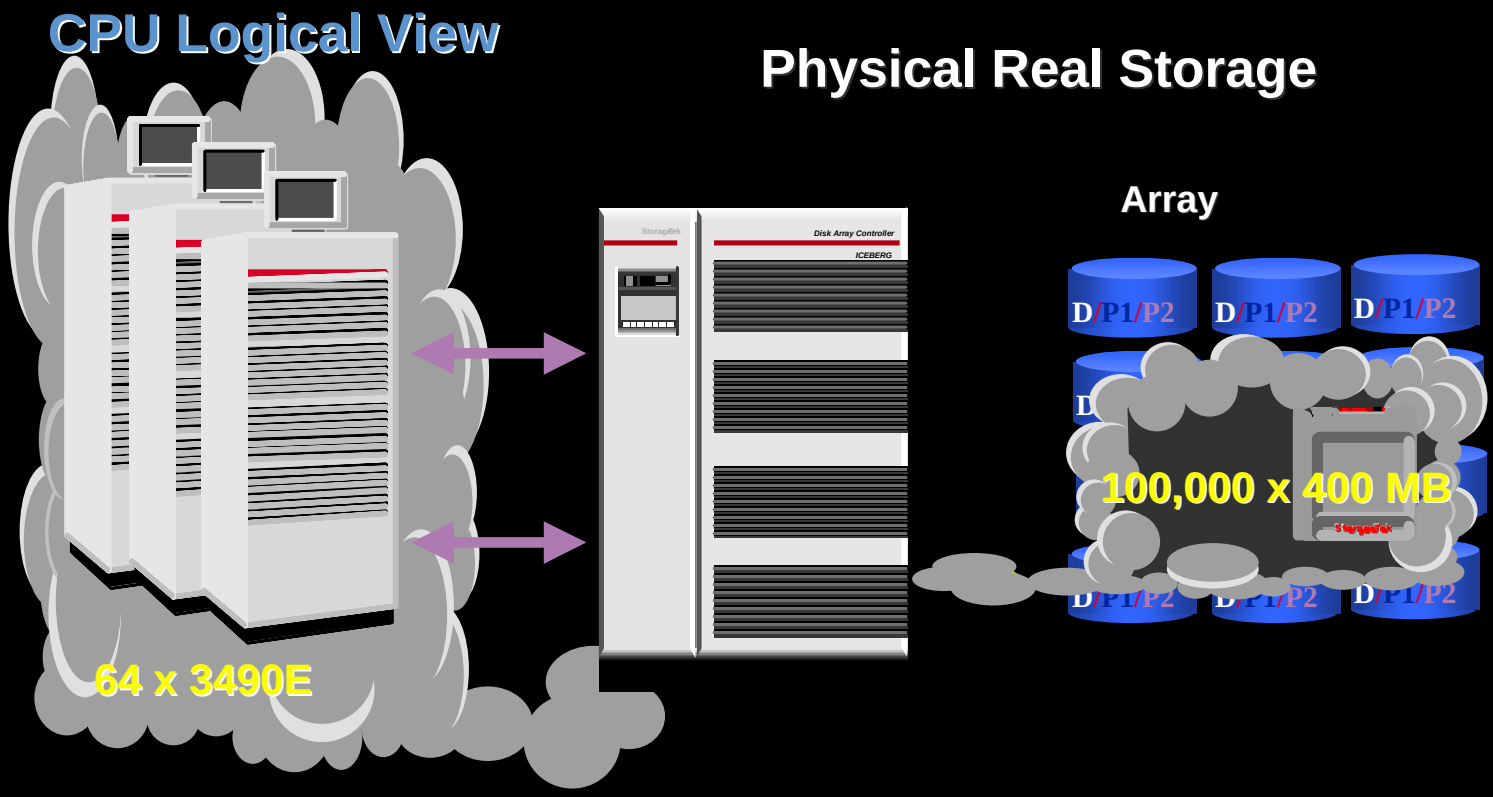
Virtual Tape Control System (VTCS)

- VTCS is an extension to HSC
- Major responsibilities
  - Influences allocation to virtual tape drives
  - Issues “robotic” commands to the VTSS
  - Manages the Migration/Recall of Virtual Tape Volumes
  - Controls the Use of the VSM-managed Real Tape Drives and Multi-Volume Cartridges
  - Keeps track of Virtual Volume location in CDS

Virtual Tape Storage Subsystem (VTSS)

- VTSS is a modified StorageTek Iceberg
  - Based on the RVA T82 manufactured for IBM
- Major responsibilities
  - Interfaces with the host based software (VTCS)
  - Emulates a virtualized robot
  - Provides Virtualized Tape Drives
    - Emulates the complete 3490-E command set
  - Provides space for resident Virtual Tape Volumes (VTVs)
    - Transport mechanical actions occur at electronic speeds
  - Contains the migrate / recall engine

Virtual Tape Storage Subsystem (VTSS)



Note: Up to 100,000 Virtual Tape Volumes can reside within each Iceberg machine. The limit for the combination of resident /migrated virtual volumes is a significantly higher number

Migrate/Recall Engine

- A mechanism to move data to and from the VTSS and the real tape drives
- Major responsibilities
  - Emulate an ESCON channel
  - Execute the 3490-E command set
  - Perform error recovery as needed

Migration and Recall Process

- Virtual Tape Volumes are migrated and stacked on real tape cartridges
  - The VTV retains it's original VOLSER
    - No catalog changes
    - No TMS changes
- Stacked real tape cartridges are called Multi-Volume Cartridges (MVCs)
- Migration events occur in response to customer defined criteria and disk buffer utilization considerations

Migration and Recall Process (cont)

- Requests for migrated virtual volumes are first moved from the multi-volume cartridge to the disk cache
- Access to the recalled volume occurs through a virtual tape drive
- It looks like a longer mount

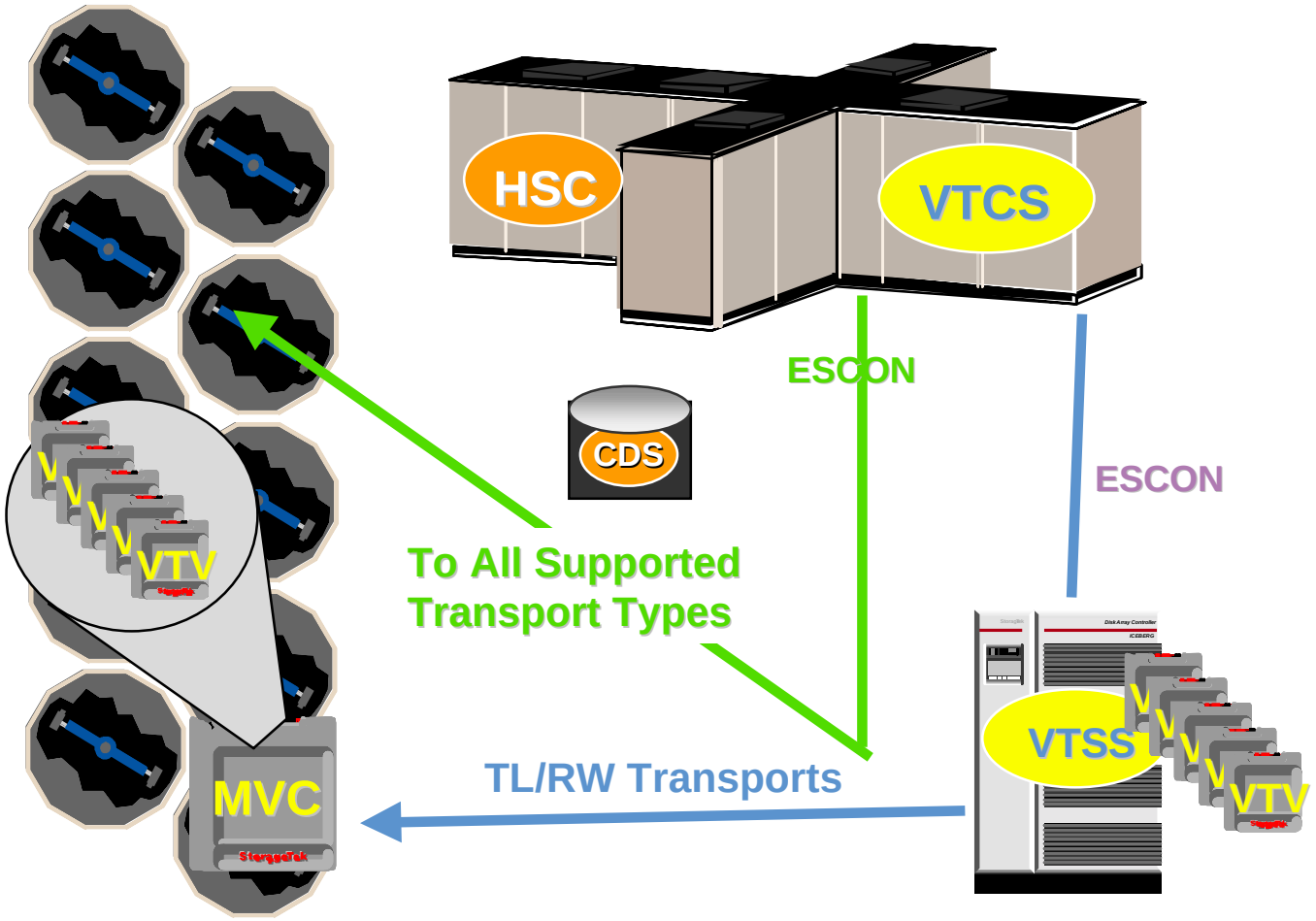
Automated Libraries

- All StorageTek libraries supported by HSC 2.0.1 and HSC 2.1
- No hardware or microcode changes

Real Tape Drives

- All StorageTek Timberline transports
- All StorageTek RedWood transports
- All StorageTek 9840 transports
- No hardware or microcode changes

VSM Architecture - Complete



Efficient use of transports and media

- Virtual Transports
  - mount time of 1 second
  - thread/load time of 0 seconds
  - data transfer time (255 MB) of 25.5 seconds
  - rewind/unload time of 0 seconds
  - dismount time of 1 second
  - total time is 27.5 seconds of which 25.5 (93%) is useful work
- Virtual Media
  - 255 MB is 100% of 255 MB virtual cartridge

Efficient use of transports and media

- Real Transports
  - mount time of 4.5 seconds
  - thread/load time of 4.5 seconds
  - data transfer time (1.2 GB) of 120 seconds
  - rewind/unload time of 11 seconds
  - dismount time of 4.5 seconds
  - total time is 144.5 seconds of which 120 (83%) is useful work
- Real Media
  - 1.2 GB is 100% of 1.2GB cartridge
  - 150 GB is 100% of 150GB cartridge

Questions

? ? ? ? ?