

Virtual Storage Manager

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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

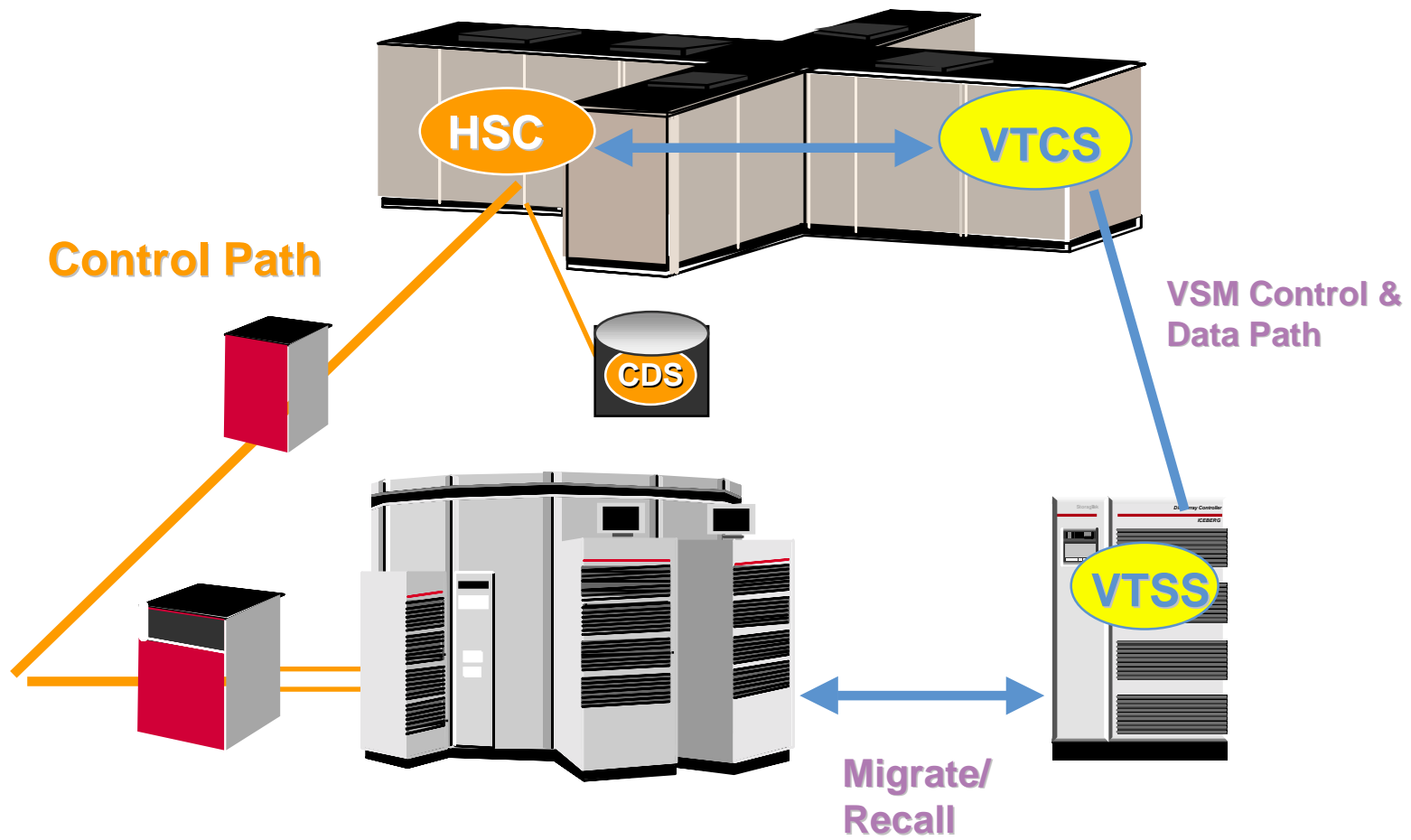
Virtual Storage Manager

- 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)

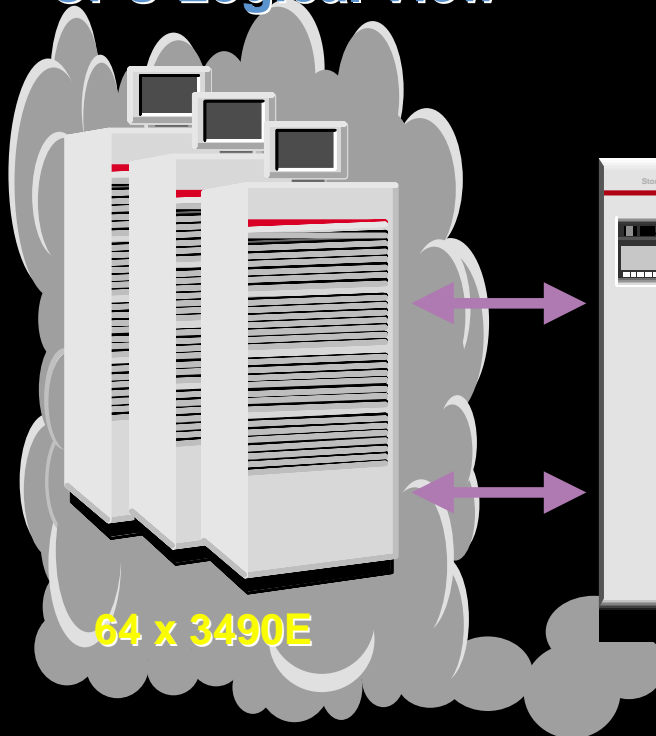
- VTCS is an extension to HSC
- Major responsibilities
 - Influences allocation to virtual tape drives
 - Issues “robotic” commands to the VTSS
 - Manages the Migration/Recall of Virtual Tape Volumes
 - Controls the Use of the VSM-managed Real Tape Drives and Multi-Volume Cartridges
 - Keeps track of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

Virtual Tape Storage Subsystem (VTSS)

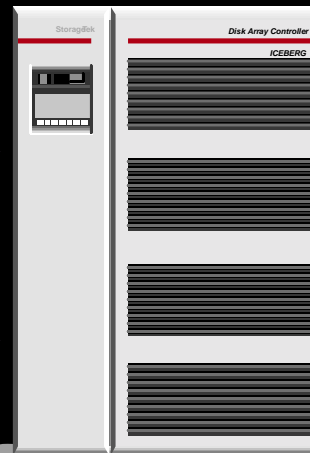
- VTSS is a modified StorageTek Iceberg
 - Based on the RVA T82 manufactured for IBM
- Major responsibilities
 - Interfaces with the host based software (VTCS)
 - Emulates a virtualized robot
 - Provides Virtualized Tape Drives
 - ◆ Emulates the complete 3490-E command set
 - Provides space for resident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

Virtual Tape Storage Subsystem (VTSS)

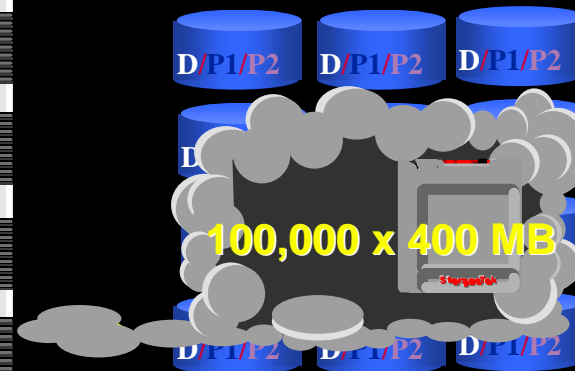
CPU Logical View



Physical Real Storage



Array



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

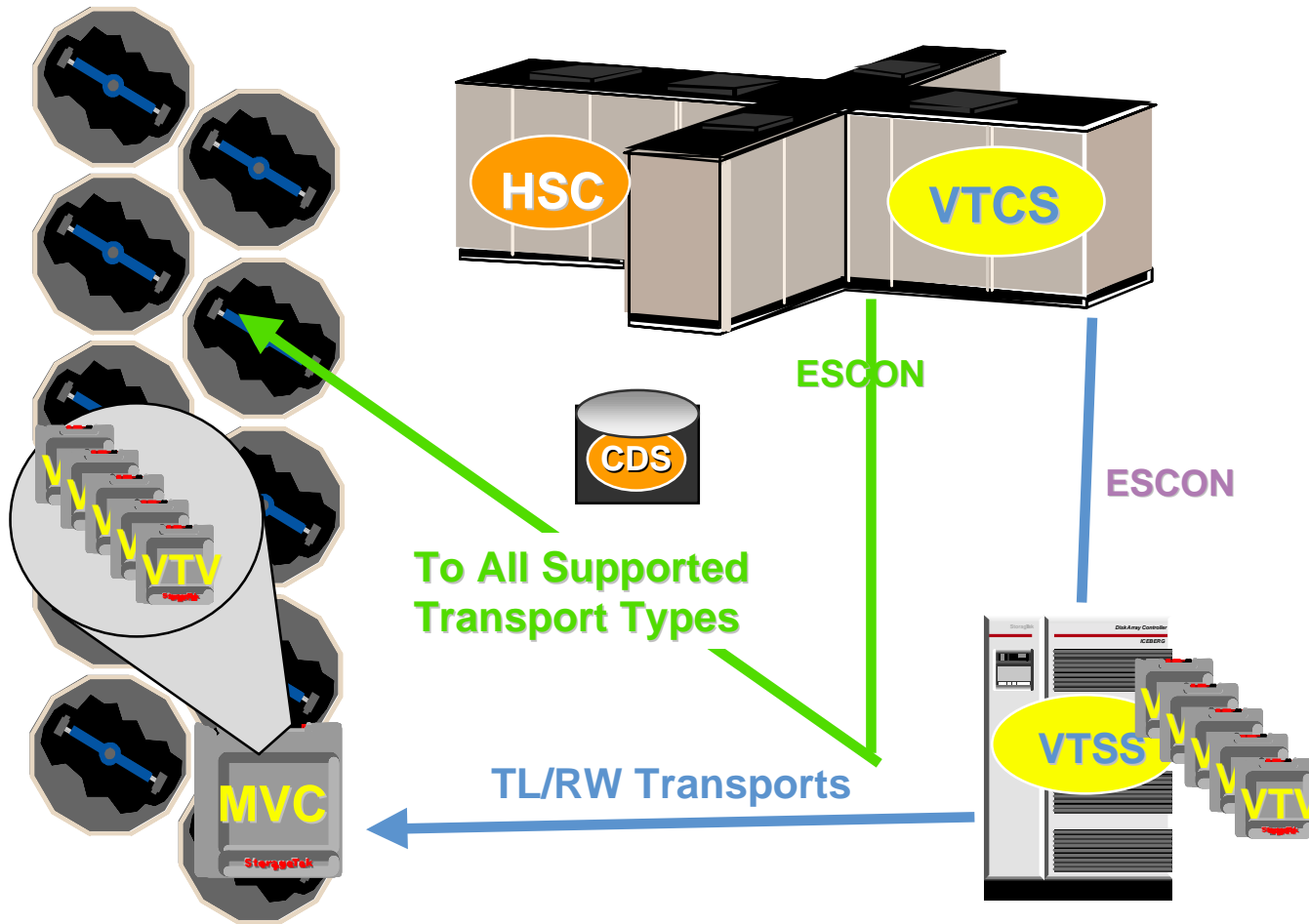
Automated Libraries

- 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

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