

Private Volume Experiences

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ABSTRACT

The MIS group which supports the accounting function within the Computer Systems Division of Hewlett-Packard has utilized private volumes for over two and one half years. This presentation will discuss actual user experiences as related to the following areas.

1. *Strategy* — where and how to successfully utilize private volumes. A discussion of tapes, system domain discs, and private volumes for storage of files will be included.

2. *Backup* — A comparison between serial disc backup and tape backup

3. *System Integrity* — Enhancing system integrity and lowering exposure to catastrophic errors. Tips to minimize exposure to disc errors and reloads will be included.

4. *Performance* — Performance considerations and trade-offs. Actual measurements on various HP3000 machines will be reported.

5. *Operator Considerations* — Simplifying the operator's assignment and improving the reliability of your data center.

BACKGROUND

The Accounting Systems Group of CSY reports to the CSY Controller and handles all accounting data processing for CSY. Our role within the Accounting Department is to support and develop computerized accounting systems. In addition to support we have become heavily involved and dedicated to:

1. Testing new HP products — both hardware and software. This includes not only doing pre-release testing for functionality and reliability but also utilizing these products to develop our distributed environment.

2. Fully utilizing HP software and hardware to implement a "distributed" data processing environment, i.e., one in which the computing power is where the people and problems are. This includes addressing the problems of system security and operatorless-computers.

We currently have our applications spread across three HP3000 systems, a SERIES 44 and SERIES 40 and SERIES 64 as Alpha test sites, with a total of about 1100 Mb of disc storage (seven of our disc drives are Private Volumes). One 2619A does the printing for all

machines (we use DS/3000 to copy spoolfiles from the Series 40 and 44 to the Series 64). We have one HP125 microcomputer in the department. Our systems group of 11 professionals supports an accounting department of 40 people.

INTRODUCTION

The central objective of utilizing private volumes has been to increase system reliability, maximize computer throughput and minimize total operating costs. The manner in which these objectives have been obtained are described in detail below. However, to fully appreciate the potential of these objectives, a clear understanding of private volumes and serial discs must first be realized. A disc spindle configured as a private volume provides an independent disc domain complete with its own directory. This domain may be moved from computer to computer with the requirements that like disc drives (i.e., 7920's on each system) be available and the same account structure exists. As a serial disc, the spindle assumes the nature of a tape drive. The spindle may be configured as both a serial disc and private volume at the same time. The current status of the drive is then dynamically allocated depending on the disc label of the particular pack which is mounted. This pack would be either a private volume or a serial backup disc.

RELIABILITY

System reliability is enhanced for a number of reasons when utilizing private volumes. As a storage medium, our experience has shown fewer catastrophic read errors from disc as opposed to tape. Although tapes do provide for storage of multiple files, it is certainly less cumbersome to retrieve a single file from disc than tape. And discs provide for direct as well as sequential access. In addition, if a segment of a disc is unreadable, it is possible to salvage the undamaged data, flag the offending tracks through VINIT, and reuse the pack. Only the data in the unreadable area is lost. Another advantage of private volumes is their transportability between machines. By establishing selected groups and accounts that contain critical data for processing, it is possible to freely move disc packs between computers if the primary machine is down. And within the same machine, if a system domain drive becomes inoperative, the system pack may be moved to a private volume spindle, the unit number dial on the

disc drive changed, and you are running with a warmstart. A more subtle advantage to private volumes, is that the master volume contains its own directory of the files in its volume set. This directory is independent of the system directory. In the event of a system failure that requires a reload, simply turn the private volume disc off, and reload the system with no loss of data on the private volumes.

THROUGHPUT

Private volumes provide a means of maximizing the system through put by replacing large sequential files on tapes. First, I/O to a disc is generally faster than that of a tape. By creating groups on private volumes for your production jobs that run at night which normally required tapes, the elapsed run time will decrease. And by having the VMOUNT ON,AUTO parameter activated, there is no wait time as would occur when the operator finally replies to the tape request. By having the private volumes mounted at the start of your nights processing, your operator does not have to be present for the job's execution. The groups mentioned above could be off-loaded during the day and replaced with groups that contain your source files for program development.

COST MINIMIZATION

In this area, both private volumes and serial discs provide a benefit. As mentioned above, by replacing tape files with those on private volumes, the operator does not have to be present for the job's execution. This may provide the possibility of expanding processing to a second or third shift without the requirement for additional support personnel. In addition, since private volumes have a directory that is tied to the group/account structure, it is not possible to have the wrong pack mounted and a data file read into your database as could easily happen with an unlabeled tape. For further insurance, by building a dummy file on the pack at the beginning of a job's execution, if the pack is not mounted, the job can abort in a controlled manner. For example:

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:PURGE CHKMOUNT.PRIVOL.ACCT  
:BUILD CHKMOUNT.PRIVOL.ACCT
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In the above example, these JCL statements would be included in the beginning of the job stream. If the private volume was not mounted, the BUILD statement would fail so that a restart would only require restreaming the job. Backup time is reduced and the procedures simplified by using serial discs. A comparison between 7970 tape drives and a 7925 serial disc backup showed that the 7925 took approximately two thirds the elapsed time of the 7970. In addition, since a 7925 will store over three tape reels of data, the operator intervention for

tape replies are reduced by a factor of 3 to 1. The operator is now required to perform the one task of the serial disc mount and then is free to proceed with other activities for approximately 1/2 hour.

START UP

The System Supervisor manual provides a detailed description of private volumes and serial discs in sections 4:10-4:13 and I:1-I:24. Listed below is a short summary of what it takes to establish a private volume and some tips in the utilization of this feature.

1. Setup the configuration through SYSDUMP. It is a good idea to have the class established for the disc to be both PVDISC and SDISC. This provides greater flexibility.

2. Create the volume set/class

3. Use VINIT to format the pack. Remember to flag those tracks as defective that have been listed on the tag. If you don't have the tag, then print the information with VINIT before you format and init the pack.

4. First span the account and then the group to link the system directory with the directory on the private volume. It is necessary to span at the account level even if only selected groups within the account are on the private volume.

5. For automatic recognition of the pack being mounted, have VMOUNT ON,AUTO set when you restart the system. In dismounting a pack, first do a VSUSER to verify that the volume set is not currently being accessed. Then down the LDEV to prevent further access and insure that the pack can be dismounted by doing a DSTAT and checking that the state is not DOWN,PND.

APPLICATION FITS

- Large temporary files as in sorts. Create a group called SPACE that is an empty disc pack. With a 7925, these provide 120 MB's of free space by just mounting the pack.
- Offset your large nightly batch processing files with the program development source files during the day.
- Large Databases. Some databases, such as those in accounting, are cyclical in nature such that they are initialized every month. By having each month be on a separate pack, prior months can be retained for review if necessary.
- Security sensitive databases such as payroll and accounts payable can be off-loaded from the system and physically secured.
- Redundancy databases and IMAGE log files can reside physically on separate disc drives.