MAINTAINING SYSTEM AND DATA AVAILABILITY ON THE SANTA CRUZ OPERATIONS (SCO) UNIX SYSTEM

BY STEPHEN FORCE

This article describes how to install, implement and use data backup and recovery utilities provided by Santa Cruz Operation's (SCO) Open Desktop (ODT) Release 3.0 (which is SCO UNIX V Release 3.2 Version 4.2.).

Introduction

Data availability in a Santa Cruz Operations (SCO) UNIX system is just as important as in any other major operating system environment. Information systems professionals who have performed data management duties in the mainframe environment can directly apply much of their training, knowledge and experience to UNIX.

Much of the terminology is the same across operating systems. A full volume backup in SCO UNIX is the same as a full volume backup in MS-DOS, MVS, VM, Windows NT, etc. Incremental backups also compare favorably.

This article briefly describes how to install, implement and use data backup and recovery utilities provided by Santa Cruz Operations (SCO) Open Desktop (ODT) Release 3.0 (which is SCO UNIX V Release 3.2 Version 4.2). Even though this article describes how data are backed up and restored on SCO ODT, it applies to all SCO UNIX systems because all commands are character-based and do not require X Windows to work.

This article will explain data back up and restoration on the SCO UNIX system only. It will not cover all UNIX flavors, since they all differ in some way or another. For more information on creating a Santa Cruz Operations (SCO) UNIX Emergency System, see the accompanying article on page 30. For more information on other UNIX systems, please see the applicable documentation.

Strategies

You can back up your UNIX file system to diskette, but this would most probably be too time-consuming and labor-intensive in most situations. Only users with systems having very little data volatility should consider using diskettes as the backup medium.

Currently, most users opt for tape devices. Intel-based systems support several types of tape devices. These devices include SCSI, micro channel and all other popular data transfer architectures.

SCO UNIX inherently supports most tape devices. However, my particular tape device, Colorado Memory System's Jumbo (250MB) Tape Backup System, was a device that was not supported as-is, even though the documentation explicitly said it was. I had to special order a separate software product to get my tape drive working with SCO UNIX (see the accompanying sidebar).

SCO UNIX supports full, partial (incremental) scheduled or unscheduled file back ups. A back up can be done on either all or selected file systems accessible by this particular UNIX system.

Scheduled file back ups can automatically run at your discretion. These are parameter-driven processes that the UNIX system administrator (UNIX-speak for systems programmer) sets up and maintains.

Unscheduled backups can be done by either the system administrator or by an individual user. Scheduled backups should normally run on a reliable and (well known) regular basis, but for users who might require intermediate backups (perhaps the programmer is feeling rather paranoid), a unscheduled backup is possible.

Creating Backups

The recommended way to perform a SCO UNIX file system backup is by starting the character-based **sysadmsh** (system administration shell) shell. Provided by SCO as an extension of AT&T system V UNIX, **sysadmsh** is a high-level menuing interface and invokes the applicable UNIX command (for example, **cpio**) at the proper time, ensuring correct, reliable data backups.[1]

To ensure system-wide data integrity, the system administrator must make sure no other users are active. The best way that I know of is to normally shut down UNIX and then re-start it in single-user mode.

Since most of us deal with a rather

[1] Even though sysadmsh is the better way to perform backups, I heartily recommend all users investigate the UNIX commands invoked. Knowing these commands increases the user's fundamental knowledge of UNIX.

volatile data environment, all examples shown here assume a tape (rather than a diskette) backup and restore.

To create a SCO UNIX file backup, follow these steps:

1. Invoke **sysadmsh** and then select the following menu options:

   Backups Create Unscheduled

2. When the archive file system menu option is displayed, press *F3* to display a list of the available file systems. Then, select /dev/root from the list by moving the highlight using the arrow keys and pressing *enter*. Other filesystems can be specified for back up, but only after adding the appropriate entries to /etc/default/filesys control file.

   It is a good idea to back up the UNIX operating system (root) file system separately from the user data. (This is generally the same philosophy we follow in the mainframe system environment.) This way, if anything ever goes wrong with the UNIX root file system, you can restore all of the data from this backup tape rather then wasting time trying to determine which data should (or should not) be recovered.
3. Select the media device to use by entering the name or by pressing *F3* to display a list of available tape devices.
4. Load a tape volume into the selected drive and press *enter* after highlighting "Archive". Filenames are displayed as they are backed up.
5. If a tape volume runs out of space, you are prompted to insert another volume. The backup utility continues to copy files to the new volume. Repeat this step until the program indicates that the back up is finished.
6. Finally, it is a good idea to label each tape volume with pertinent information, such as:
   - machine name;
   - volume number;
   - backup date;
   - filesystem name; and
   - backup technique.

   For example:

   myUNIX system
   Tape volume # 1
   January 15, 94
   root filesystem
   Scheduled UNIX root filesystem backup initiated with sysadmsh (single-user)

Restoring Individual Files or Directories From Backups

Use **sysadmsh** to restore individual files or directories from your filesystem backup volumes. You must have on hand the complete set of backup volumes containing the latest version of the files or files you wish to restore. If you are restoring a file that was not changed recently, use the last level 0 backup [2].

To restore a file:

1. Invoke sysadmsh and select:

   Backups Restore Partial

2. Press *F3* to display a point-and-pick list of media devices. A window pops up to confirm the drive is ready.

3. Insert volume 1 of the backup set into the drive. You will then return to the Restore File menu.

4. Enter the name of the desired backed-up file(s) to be restored.

5. Enter the name of the target disk directory where you want to restore the file(s) from the backup volume to.

Note these two important points:

- Remove the leading slash (/) character.
- If you enter the pathname of the original location for the file, the restored file will overwrite any like-named files in the filesystem. If you are not absolutely sure that your backup contains the preferred version of the files, you should restore them to a temporary location, verify the data and then rename them to their correct names.

Here is how to restore files to a temporary location. First, exit **sysadmsh**. Then, at the system prompt, enter these case-sensitive UNIX commands:

[2] For more information on backup levels, see the "Administrating UNIX Operating Systems Services" section in the *SCO ODT System Administration Guide.*

SCO UNIX

Santa Cruz Operations (SCO) provides vast and detailed information along with its Open Desktop UNIX system. Unfortunately, they don't provide a "read-me" file nor CompuServe forum-like features as do other vendors. UNIX is a big time operating system, much like MVS or VM, and SCO expects the person who is doing the system install to be a qualified SCO UNIX specialist. SCO offers technical support advice only on a fee basis.

My company is a SCO developer, and therefore has access to SCO technical support. I learned from SCO that the documentation was in error (in their words a "documentation 'bug' ") and that I had to special-order the tape driver directly from Colorado Memory Systems (CMS).

The driver cost me $99 (plus shipping) which seemed slightly expensive until I actually received it. The CMS UNIX product consists of not only the tape driver, but also fairly complete backup and restore software (with selectable data compression).

This software is an alternative to the SCO UNIX-provided tools and has too much information to be adequately described here. Therefore, CMS SCO UNIX data backup and restore will be the subject of an upcoming article.

By the way, I discovered an interesting bug which I promptly reported to CMS. Why do I always seem to discover bugs, I wonder?

I have a rather interesting SCO UNIX system installation. I develop C programs on my SCO UNIX system, so I have the SCO UNIX Development System product installed. Also, I have evaluated various UNIX products for possible inclusion into articles, so I have various (cool, weird, pain, take your pick) products installed in my UNIX file system which had names longer than 15 bytes in length.

The current CMS SCO UNIX backup utility cannot handle filenames longer than 15 bytes, strangely enough. Most users never have problems with stuff like this. Not me! Anyway, CMS gave me a workaround and promised a fix quickly.

Both the workaround and the fix are covered in the accompanying article.

```
cd /tmp
cpio -iucdrB -I /dev/rct0 /orig/file
```

Substituting the proper tape device and file name(s).

6. The restore utility will search the tape archive for the desired files. Each file name is displayed after it is restored to the specified locations on your hard disk. You will be prompted to switch tape volumes when another volume is needed.
7. Once you know that all the files that you specified have been restored, press *Del* to exit the restore utility. (If you do not press *Del*, the restore utility continues to search to the end of the backup.)

Restoring an Entire Filesystem

To restore an entire filesystem from your tape backup volume, follow these steps:

1. Insert the first tape volume into the tape drive, invoke **sysadmsh**, and select from the menu:

   Backups Restore Full

2. Type in the name of the file system (or press *F3* for a listing of available file systems.)
3. Select the media device (in our case, tape.) The proper blocksize is selected automatically.
4. Press *Enter* on the Restore option. When presented with a confirmation prompt, enter Y.
5. Each restored file name is displayed on the terminal screen. If your backup has multiple volumes, you will be prompted to insert each volume as needed. When the restoration is complete, the total number of restored blocks is displayed.

A Safe Place

All backup tapes and critical disks must be stored in a location that is safe from fire or other disastrous occurrences. This place could be a fireproof safe, offsite storage or a bank vault.

For small shops or at home, another lesser known but rather ingenious place is in your freezer. This might sound rather amazing, but consider this: A household freezer has an Underwriters Lab (UL) one-hour fireproof rating.

Test Your Emergency System

It is vitally important to test your emergency system. To test it, shut down your UNIX system and then reboot from the boot floppy disk you just created. When prompted, insert the root file system disk you also just created and verify the data.

Was this article of value to you? If so, please let us know by circling Reader Service No. 12.

NaSPA member Stephen Force is a contributing editor to the NaSPA publications and is also a consultant. He is a member of the Michigan NaSPA Chapter and can be reached via NaSCOM ID Forcesteq.