CHAPTER 10

Backup and Disk Management Commands

10.1 THE DF COMMAND

This command displays details about the each of the mounted partition, percentage of free ness, percentage of occupation etc.

```
Filesystem 1K-blocks      Used Available Use% Mounted on
/dev/hdb5 6048288       5163420   577632  90%  /
none       62520        0   62520   0%  /dev/shm
```

10.2 THE DU COMMAND

This command displays disk usage(usually in multiples of 1K blocks).

du command without any argument displays disk usage of all files, subdirectories of current working directory.

du directoryname

This displays disk usage of all files sub-directories of the given directory.

Please note that du command will not display the actual size of the file in bytes. Rather, number of 1K blocks assigned for the file. Try the following and find out the difference.

du filename

ls -l filename

du -b filename

du –h command displays output in human readable form such as 1K. For example see the difference in both the commands outputs :

```
$du
0 ./aaa
3 ./nbv
0 ./xx
51 .
$du -h
0 ./aaa
3.0K ./nbv
0 ./xx
51K .
```

Similarly, the following command gives details of all the files including hidden files.

du –a

du –sh command displays the total size of the c.w.d in number of blocks.

10.3 BACKUPS

We are sure that everyone knows that "Data is more important than SW". After all, by paying some more salary, a SW system can be developed by any one of the trillions of SW programmers. However, the data can not be developed or created; especially time dependent data if it is lost. Thus, in all the applications, at most importance is given to the safe data storage. One of the prime responsibilities of a system administrator is data availability, safety. Normally, to safeguard against viruses, power failures, disk failures, backup's are taken. In UNIX, tar, cpio commands are in wide use.

10.3.1 The tar command

This command is used to join a group of files and prepare an archive file.

tar - vf a.tar directoryname(s)orfilename(s)

This command creates a archive file a.tar by joining the given files or files in the given directories.

tar - vZf a.tZ directoryname(s)orfilename(s)

This command creates compressed tar archive.

tar -cvzf a.tgz directoryname(s)orfilename(s)

This command creates gzipped tar archive.

tar -xvf a.tar

This command extracts all files from the archive.

tar -xvZf a.tZ

This command extracts all files from the compressed archive.

tar -xvzf a.tgz

This command extracts all files from the gzipped archive.

tar -xvf a.tar fileordirectoryname

This extracts the given file or directory from the archive.

tar -xvZf a.tZ fileordirectoryname

This extracts the given file or directory from the archive.

tar -xvzf a.tgz fileordirectoryname

This extracts the given file or directory from the archive.

10.3.2 The cpio command

This is also used for backup purpose. Normally this command requires list of filenames as input and the result is archive file which appears on the standard output.

ls|cpio -o > archivefilename

The above command creates archive having all the files of current directory.

cpio -i <archivefilename

This command restores all the files from the archive file.

cpio -i abc <archivefilename

This command restored the file abc from the given archive file.

cpio -i "*.c" <archivefilename

This command restores all the files with extension c from the archive file.

We can create the archive on the tapes or other devices also.

find . -ctime 2 -print |cpio -ov > /dev/rmt0

This command creates backup file on magnetic tape rmt0 and stores all the files which are created in the recent 2 days.

10.4 THE ZIP AND UNZIP COMMANDS

In Windows world, pkzip and pkunzip (or Winzip) are in very wide use for archiving. Their counterparts in UNIX world is zip and unzip. The archives created in Windows can be used on UNIX system with these commands and vice-versa.

To Create Archive

zip zipfilename filestobezipped

Example

zip a.zip /home/rao/progs

This command creates an archive file a.zip by joining all the files of directory /home/rao/progs.

To extract files

unzip a.zip

This commands extracts all file from a.zip file to current working directory.

unzip a.zip filename

This commands extracts file "filename" from a.zip file to current working directory.

10.5 THE FILE COMPRESSION

In Linux we compress files as and when required. Commands such as compress, gzip, bunzip are available for the same.

compress filename creates filename.Z (Remember on some machines it became obsolete).

uncompress filename.Z creates filename

gzip filename creates filename.gz

gzip –d filename.gz creates filename

bzip2 filename creates filename.bz2

bunzip2 filename.bz2 creates filename

We have commands such as zcat and zmore with which we can see the original content of the compressed file. They work on compressed files which are compressed through either of the above commands (except bzip2). The syntax of these commands are :

zmore compressedfilename

zcat compressedfilename

On some versions, gzcat is available instead of zcat.

10.6 THE MOUNT AND UMOUNT COMMANDS

UNIX operating system supports mount and umount commands to mount devices such as HD's, FD's and CD's as and when required and do the operations. In order to carry out these operations, user should have super user privileges. When we mount a device then the directory tree available on that device becomes integral part of UNIX directory tree such that whatever operations we can do on any UNIX files or directories can be carried out on this mounted files and directories also. It is necessary that the device has to be mounted under an empty directory. More over, only some types of file systems a UNIX kernel allow to mount under a directory. Please check the configuration files of your current kernel capabilities (check /etc/filesystems in the case of Redhat Linux).

For example if we assume that on /dev/hda1 partition Windows 95 is installed and we want the same to be available under directory /mnt (usually /mnt is empty directory), then execute the following command as a super user.

mount –t msdos /dev/hda1 /mnt

Check for command.com file to check whether partition is mounted or not.

To umount the partition

umount /mnt

Now check for command.com flle!.

Once a device is mounted, all the UNIX commands such as cp, mv, rm can be executed on the files in it.

Please check for some messages such as "/dev/hda5 as mounted as /". Some of the partitions are mounted during the mount time. Check files such as: /etc/fstab, /etc/mtab or /etc/vsftab.

10.7 USING FIND FOR BACKUPS

The find command lets us to copy the entire contents of a directory while preserving the permissions, times, and ownership of every file and subdirectory. Because find capabilities to specify complex criteria for files it can create a perfect list of files for cpio, tar, pax and another archiver to backup. Fortunately find has several options that are very useful for structuring the backup :

- -mount Don't descend directories on other filesystems. An alternate name for -xdev, for compatibility with some other versions of find.
- -fstype type File is on a file system of type type. The valid file system types vary among different versions of UNIX; an incomplete list of file system types that are accepted on some version of UNIX or another is: ufs, 4.2, 4.3, nfs, tmp, mfs, S51K, S52K. We can use -printf with the %F directive to see the types of our filesystems.
- -type ***c*** File is of type c :
  - — b block (buffered) special
  - — c character (unbuffered) special
  - — d directory
  - — p named pipe (FIFO)
  - — f regular file
  - — l symbolic link; this is never true if the -L option or the -follow option is in effect, unless the symbolic link is broken. If you want to search for symbolic links when -L is in effect, use -xtype.
  - — s socket

The typical usage is to combine find and the cpio command, as the latter accepts the list of files via standard input. Tar can do this too with -T - option. Typically each mount point is backed up in a separate tar or cpio archive.

cd /usr

find /usr -mount fstype ext3 - | cpio -pdumv /backup/usr080124.cpi

or, using tar:

find /usr -mount fstype ext3 -print0 | tar -null -cvzf /backup/usr080124.tgz

It is also possible to do incremental backups using -newer option

find /usr -newer /backup/usr080124.tgz -mount fstype ext3 -print0 | tar -null -cvzf /backup/usr_delta080124.tgz

We can also try to avoid errors in backing up named pipes, devises, etc using more complex traversal expressions, for example

find / -mount -fstype ext3 \(-type f -or -type l \) > /tmp/root_list.txt

On higher level we might benefit from exclusion of all files that are not changes in RPMs from which system was installed. This is the approach taken by backup built-in in YAST (it uses **tar**, not **cpio**). While tar cannot accept the list of files as standard input it has the -T option which can be used to specify the location of file with list of files to be tarred". Here is how this option is described in the manual :

Instead of giving the names of files or archive members on the command line, we can put the names into a file, and then use the '—files-from=*file-of-names*' ('-T *file-of-names*') option to tar. Give the name of the file which contains the list of files to include as the argument to '—files-from'. In the list, the file names should be separated by newlines. We will frequently use this option when you have generated the list of files to archive with the find utility.

In the file list given by '-T' option, any file name beginning with '-' character is considered a tar option and is processed accordingly. For example, the common use of this feature is to change to another directory by specifying '-C' option :

```
$ cat list
-C/etc
passwd
hosts
-C/lib
libc.a
$ tar -c -f foo.tar —files-from list
```

For example if we want to archive file that has size less then 1000 we can first create of list of such files using find and then use tar to created an archive.

```
find . -size -1K -print > /etc/small-files
tar -cvzT /etc/small-files -f little.tgz
```

We can also compress the archive with gzip of the fly :

tar -zPvcf backup.tar.gz -T *list_of_files_to_be_tarred_or_list_of_locations*

We will want to use the '—label=*archive-label*' ('-V *archive-label*') option to give the archive a volume label, so we can tell what this archive is even if the label falls off the tape, or anything like that.

Unless the file system you are dumping is guaranteed to fit on one volume, we might need to use the '—multi-volume' ('-M') option.

Like find, tar has an option of that prevent it from crossing the file system (partition) boundaries : '—one-file-system' option to prevent from crossing file system boundaries when storing (sub)directories.

10.8 CONCLUSIONS

Backup commands such as tar, cpio are explained in a lucid manner along with compression utilities. Also, we have explained how find command can be used in file backup operations.