CIS 191 Linux Lab Exercise

Lab 9: Backup and Restore
Fall 2008

Lab 9: Backup and Restore

The purpose of this lab is to explore the different types of backups and methods of restoring them. We will look at three utilities often used for backups and learn the advantages and disadvantages of each.

Supplies

- VMWare Server 1.05 or higher
- Benji VM

Preconfiguration

- Labs 6 and Labs 7 completed on a pristine Benji VM

```
[root@benji /]# fdisk -l

Disk /dev/sda: 5368 MB, 5368709120 bytes
255 heads, 63 sectors/track, 652 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

   Device Boot      Start         End      Blocks   Id  System
/dev/sda1   *           1         382     3068383+  83  Linux
/dev/sda2             383         447      522112+  82  Linux swap / Solaris
/dev/sda3             448         511      514080   83  Linux
/dev/sda4             512         652     1132582+   5  Extended
/dev/sda5             512         549      305203+  83  Linux
/dev/sda6             550         556       56196   83  Linux
/dev/sda7             557         581      200781   83  Linux
[root@benji /]#

[root@benji /]# mount
/dev/sda1 on / type ext3 (rw)
proc on /proc type proc (rw)
sysfs on /sys type sysfs (rw)
devpts on /dev/pts type devpts (rw,gid=5,mode=620)
tmpfs on /dev/shm type tmpfs (rw)
/dev/sda5 on /opt type ext3 (rw)
/dev/sda3 on /var type ext3 (rw)
none on /proc/sys/fs/binfmt_misc type binfmt_misc (rw)
sunrpc on /var/lib/nfs/rpc_pipefs type rpc_pipefs (rw)
/dev/sda7 on /home type ext3 (rw,usrquota)


[root@benji /]# cat /etc/fstab
LABEL=/1                /                       ext3    defaults        1 1
devpts                  /dev/pts                devpts  gid=5,mode=620  0 0
tmpfs                   /dev/shm                tmpfs   defaults        0 0
LABEL=/opt              /opt                    ext3    defaults        1 2
```

```
proc                    /proc               proc    defaults        0 0
sysfs                   /sys                sysfs   defaults        0 0
LABEL=/var              /var                ext3    defaults        1 2
LABEL=SWAP-sda2         swap                swap    defaults        0 0
LABEL=/home             /home               ext3    usrquota,defaults 1 2
[root@benji /]#
```

Forum

If you get stuck on one of the steps below don't beat your head against the wall. Use the forum to ask for assistance or post any valuable tips and hints once you have finished. Forum is at: http://simms-teach.com/forum/viewforum.php?f=13

Background
The tar command can be used for gathering up many files into a single tarball file and transferring them to a new location. cpio and dump are two other utilities that do the same thing, but use different syntax.

Part One: TAR
Aside from the cp command, used in backing up a single file, tar is probably the easiest command-line backup utility that comes with UNIX or Linux. It archives many files into a single archive that can be stored on removable media or on another file system. Tar is particularly useful for archiving a directory tree.

TAR archives may be created for a variety of purposes, from backups to packaging files for easy downloads. In this procedure, we will backup the /var/log directory, and then restore a particular file from the archive.

1. Log in as root and change directory to /var/log.
     `cd /var/log`
2. How much disk space is being used by this directory? (hint: du –sh)
3. Record this number.
4. When you make an archive, you must decide what you are going to archive and where you are going to archive it. The "where" can be a device or a file.
5. There are no archive devices on the lab machines, so we will backup these log files to a tarball file.
6. Create the archive in root's home directory:
     `tar cvf /root/logfiles.tar .`
7. Note that the dot (.) references the local directory from where the archive is made.
8. Change directory back to root's home, and view the archive you just made:
     `cd /root`
     `tar tvf logfiles.tar | more`
9. Note the names of the files in the archive. Are they absolute or relative?
10. How large is this tarball? How does it compare to the disk usage recorded above?
11. Extract from this archive the *messages* file:
     `tar xvf logfiles.tar messages`
12. Why doesn't this work?
13. Try again with: `tar xvf logfiles.tar ./messages`
14. How does the *messages* file you just extracted compare with the *messages* file in the /var/log directory? Are they the same? Look at dates, permissions, ownership as well as contents.
15. Create a second tarball by archiving the /var/log directory as an absolute name:
     `tar cvf logfile2.tar /var/log`
16. List the files in this archive and notice how the names are specified. Are they absolute or relative?

17. See if you can extract the *messages* file from this archive.
18. Where will the file be extracted?
19. Record your work **to turn in:**

```
cd /root
> lab09
ls -l /root >> lab09

echo "logfiles.tar" >> lab09
tar tvf /root/logfiles.tar >> lab09

echo "logfile2.tar" >> lab09
tar tvf /root/logfile2.tar >> lab09
```

20. Clean up by deleting the two logfile tarballs and any subdirectories you may have made.

Part Two: CPIO
Tar is useful for archiving files that are all contained within a few directories, but what happens if you want to archive files that might be spread all over several file systems? For instance, what if you wanted to collect all the files belonging to the group users on the system? Or what if you wanted to back up all files that have been modified in the last week? For that, the best command is cpio.

1. For this procedure, you will have to log on as root, or su to the super-user account.
2. If we were performing the seventh day of a differential backup, then we would want to archive all the files on the root file system that have been modified within the last 7 days. To see which files these are, run the following find command:
   ```
   find / -mount -mtime -7 | more
   ```
3. What does the -mount option do?
4. Since cpio reads its input of filenames from stdin and writes the archive to stdout, we can use a pipeline to archive these files to a level-7 backup:
   ```
   find / -mount -mtime -7 | cpio -voB > /tmp/level-7.bak
   ```
5. Verify the backup with the following command:
   ```
   cpio -vitB < /tmp/level-7.bak
   ```
6. Where would these files be restored if we were to extract this archive?
7. Change to the / directory, and extract this archive:
   ```
   cd /; cpio -vidumB < /tmp/level-7.bak
   ```
8. Notice that the archive file remains even after you extract its contents.
9. Record your work **to turn in:**
   ```
   echo "cpio files backed up" >> /root/lab09
   cpio -vitB < /tmp/level-7.bak >> /root/lab09
   ```

Part Three: DUMP
In this procedure we will use the dump utility to perform a level 0 backup of the root (/) file system. We will add a new drive to serve as our backup device.

1. Add a new SCSI hard drive to the Benji VM. Make it 5GB in size and do not allocate all disk space now (I know some of you will anyway ☺). This will be our virtual backup device.
2. Start up the VM and login as root.
3. Create a single primary partition on the new drive, /dev/sdb.
4. Change directory to /
   ```
   cd /
   ```
5. Run the dump command:
   ```
   dump 0uf /dev/sdb1 /dev/sda1
   ```
6. Note: /dev/sda1 should be your root partition (/, the top of the file tree).
7. When the dump is complete, (about 5 minutes), create a list of all files in this dump, and save some output **to turn in**:
   ```
   echo "dump" >> /root/lab09
   restore -tf /dev/sdb1 | head -100 >> /root/lab09
   ```
8. Change directory to /etc and do a long listing of grub.conf:
   ```
   ls -l grub.conf
   ```
9. Note what kind of file this is. Will a restore bring back a symbolic link, or the file it is pointing to?
10. Move the grub.conf file in /etc to the /tmp directory.
11. To actually restore the files from this archive, you must be in the top directory of the file system, in this case /.
12. Use the interactive mode of the restore program to extract the file you just moved.
    - Hint: use the man page or Lesson Powerpoints to see how this is done.
    - When restore asks you which volume do you want restored, select 1
    - If asked to set owner/mode, select "n".
13. When you are done with the restore, how does the file you restored compare to the file you moved to the /tmp directory? How about the inodes?
14. Record your work **to turn in**:
    ```
    cat /etc/dumpdates >> /root/lab09
    ls -li /etc/grub.conf /tmp/grub.conf >> /root/lab09
    ```

To Turn in

Review your work in lab09 before submitting to make sure you have covered each area of the grading rubric. Then submit your work using:

scp lab09 cis191@opus.cabrillo.edu:lab09.*lastname*

Grading rubric (30 points)

5 points for messages file restored to /root using tar
5 points for correct logfiles.tar and logfile2.tar archives
5 points for backing up 7 day old files with cpio
5 points for backing up the / partition with dump
5 points for correct /etc/dumpdates file
5 points for correct grub.conf files