7

Answers to Even-numbered Exercises

2. Give a command that displays a long listing of the files in **/bin** in reverse chronological order. Give the command again but this time display the output one screen at a time.

```
$ ls -ltr /bin

$ ls -ltr /bin | less
```

4. List the first 20 lines in **/etc/services** that describe TCP ports.

```
$ grep tcp /etc/services | head -20
```

6. What happens when you use diff to compare two binary files that are not identical? (You can use gzip to create the binary files.) Explain why the diff output for binary files is different from the diff output for ASCII files.

   When you use it to compare binary files, diff displays a message saying the files differ when the files differ or no message when the files are the same. The diff utility compares ASCII files on a line-by-line basis; it is not designed to compare binary files on a byte-by-byte basis. Use cmp to compare binary files in that manner.

8. Are any of the utilities discussed in this chapter located in more than one directory on the local system? If so, which ones?

   No. However, some commands that are built into a shell have counterparts that exist as executable files (e.g., echo).

10. Which command can you use to look at the first few lines of a file named **status.report**? Which command can you use to look at the end of the file?

```
$ head status.report
$ tail status.report
```

12. Display a long listing of the files in the **/etc/pam.d** directory hierarchy that are links.

```
$ find /etc/pam.d -type l -exec ls -l {} \;
```

or

```
$ find /etc/pam.d -type l | xargs ls -l
```

14. Display the **/etc/passwd** file, replacing all colons (**:**) with TABS. Display the **/etc/services** file, substituting one SPACE for each occurrence of multiple SPACES.

```
$ cat /etc/passwd | tr ':' '\t'

$ cat /etc/services | tr -s ' '
```

16. Copy **/bin/bash** to the working directory and make two copies so you have three identical files: **bash1**, **bash2**, and **bash3**. Compress **bash1** using gzip and **bash2** using bzip2. Do not change **bash3**. Which utility does the best job of compressing the file? Which does the worst? How big is **bash2.bz2** compared to **bash3**?

```
$ gzip bash1
$ bzip2 bash2
$ ls -l bash*
```

The gzip utility does not do as good a job as bzip2. The **bash2.bz2** file is about 44 percent as big as **bash3**.

18. Try giving these two commands:

```
$ echo cat
$ cat echo
```

Explain the differences between the output of each command.

The first command causes echo to display the characters **c**, **a**, and **t** on the screen. The second command uses cat to copy the contents of a file named **echo** to the screen. If there is no file named **echo**, cat displays an error message.

20. Find or create files that

a. gzip compresses by more than 80 percent.

The gzip utility compresses most text files by more than 80 percent.

b. gzip compresses by less than 10 percent.

The gzip utility compresses most files that are already compressed, such as **jpeg** files, by less than 10 percent.

c. Get larger when compressed with gzip.

The gzip utility expands a file that has already been compressed with gzip. (To compress a gzipped file a second time, you must remove the **.gz** filename extension.)

d. Use **ls –l** to determine the sizes of the files in question. Can you characterize the files in a, b, and c?

Files with repeated information or inefficiently stored information can be compressed the most. Files that have been compressed already store information efficiently and can be compressed only a small amount, not at all, or negatively (expanded).