

Answers to Even-numbered Exercises

6

2. List the commands you can use to
 - a. Make your home directory the working directory
 - b. Identify the working directory

cd, pwd

4. The `df` utility displays all mounted filesystems along with information about each. Use the `df` utility with the `-h` (humanly readable) option to answer the following questions.

```
$ df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/hda1       1.4G  242M  1.1G  18% /
/dev/hda3        23M   11M   10M  51% /boot
/dev/hda4       1.5G  1.2G  222M  85% /home
/dev/hda7       564M   17M  518M   4% /tmp
/dev/hdc1       984M   92M  842M  10% /gc1
/dev/hdc2       16G   13G  1.9G  87% /gc2
```

- a. How many filesystems are on your Linux system?
- b. Which filesystem stores your home directory?
- c. Assuming that your answer to part 4a is two or greater, attempt to create a hard link to a file on another filesystem. What error message do you get? What happens when you attempt to create a symbolic link to the file instead?

Following are sample answers to these questions. Your answers will be different because your filesystems are different.

a. six b. /dev/hda4 c. In: creating hard link '/tmp/xxx' to 'xxx': Invalid cross-device link. No problem creating a cross-device symbolic link.

6. You should have read permission for the `/etc/passwd` file. To answer the following questions, use `cat` or `less` to display `/etc/passwd`. Look at the fields of information in `/etc/passwd` for the users on your system.
- What character is used to separate fields in `/etc/passwd`?
 - How many fields are used to describe each user?
 - How many users are on your system?
 - How many different login shells are in use on your system? (*Hint: Look at the last field.*)
 - The second field of `/etc/passwd` stores user passwords in encoded form. If the password field contains an `x`, your system uses shadow passwords and stores the encoded passwords elsewhere. Does your system use shadow passwords?

a. colon (:), b. seven, c. d. and e. system dependent

8. Suppose that a user belongs to a group that has all permissions on a file named `jobs_list`, but the user, as the owner of the file, has no permissions. Describe what operations, if any, the user can perform on `jobs_list`. What command that the user can give will grant the user all permissions on the file?

Initially, the owner/user cannot perform any operations involving the file, other than to use `ls` to list it. When the owner/user gives the following command, the owner/user can perform any operation involving the file:

```
$ chmod 7xx jobs_list
```

The `xx` can be any two digits (0-7).

10. Assume that you are given the directory structure shown in Figure 6-2 and the following directory permissions:

```
d--x--x--- 3 jenny pubs          512 Mar 10 15:16 business
drwxr-xr-x 2 jenny pubs          512 Mar 10 15:16 business/milk_co
```

For each category of permissions—owner, group, and other—what happens when you run each of the following commands? Assume that the working directory is the parent of `correspond` and that the file `cheese_co` is readable by everyone.

a. `cd correspond/business/milk_co`

owner: OK; group: OK; other: **permission denied**

b. `ls -l correspond/business`

owner, group, and other: **permission denied**

c. `cat correspond/business/cheese_co`

owner and group: **is directory**; other: **permission denied**

12. Suppose that the working directory contains a single file named **andor**. What error message do you get when you run the following command line?

```
$ mv andor and\or
```

Under what circumstances is it possible to run the command without producing an error?

```
$ mv andor and\or
mv: cannot move 'andor' to 'and/or': No such file or directory
$ mkdir and
$ mv andor and\or
$ ls and
or
```

(The backslash is superfluous.)

14. Do you think that the system administrator has access to a program to decode user passwords? Why or why not (see exercise 6)?

The system administrator cannot decode user passwords. The administrator can assign a new password to a user. Passwords are generally encrypted by a one-way hash so that the system can tell when the correct password is entered, but it cannot regenerate the cleartext password. Fundamentally, the system applies the hash algorithm to the entered password and sees if the result matches the stored, encrypted password. A match means the correct password was entered.

16. Explain the error messages displayed in the following sequence of commands:

```
$ ls -l
total 1
drwxrwxr-x  2 alex    bravo    1024 Mar  2 17:57 dirtmp
$ ls dirtmp
$ rmdir dirtmp
rmdir: dirtmp: Directory not empty
$ rm dirtmp/*
rm: No match.
```

There is a file whose name begins with a period (an invisible file) in the **dirtmp** directory. Use `ls` with the `-a` option to list the file. Remove the file, and then you will be able to remove the directory.

18. How can you remove a file named `-i`? Which techniques do not work, and why do they not work?

Most utilities assume that `-i` is an option, not the name of a file, and therefore do not work properly when called with an argument of a file named `-i`. Many utilities assume that everything on the command line to the right of a `--` option is a filename. Using one of these utilities, you can work with a file whose name begins with a hyphen by marking the end of the options on the command line with the `--` option followed by the filename.