CHAPTER 2: EXPLORING THE UNIX/LINUX FILE SYSTEMS AND FILE SECURITY

TRUE/FALSE

1. A disadvantage of ufs is that it does not support journaling.

   ANS: F REF: 54

2. A directory is a special kind of file that can contain other files and directories.

   ANS: T REF: 58

3. As a general rule, the swap partition should be the same size as the amount of RAM in your computer.

   ANS: T REF: 61

4. If you plan to have multiple users accessing your system, you should consider having a /var partition in which to store some or all of the nonkernel operating system programs that are accessed by users.

   ANS: F REF: 62

5. The command `cd source` uses relative path addressing.

   ANS: T REF: 76

6. UNIX/Linux systems interpret a single dot character to mean the current working directory.

   ANS: T REF: 76

7. The rm -r command can be used to delete a directory that is not empty.

   ANS: T REF: 81

MULTIPLE CHOICE

1. The UNIX file system (ufs) supports ____, which automatically move data on damaged portions of disks to areas that are not damaged.
   a. hot fixes
   b. backups
   c. recovery fixes
   d. extents

   ANS: A REF: 54

2. In Linux, the native file system is the ____, which is installed by default.
   a. ufs
   b. ext fs
   c. ReiserFS
   d. jfs

   ANS: B REF: 54

3. A(n) ____ is used to reduce file fragmentation, because a block of contiguous disk storage can be reserved for a file.
   a. partition
   c. journal

b. node
d. extent

ANS: D REF: 54

4. The root of a file system is denoted by the ____.
   a. dot (.)
   b. dot dot (..)
   c. forward slash (/)
   d. backward slash (\)

   ANS: C REF: 58

5. The two most popular hard disk interfaces are IDE and ____.
   a. ATA
   b. SCSI
   c. EIDE
   d. RAID

   ANS: B REF: 59

6. The ____ partition acts like an extension of memory, so that UNIX/Linux have more room to run large programs.
   a. backup
   b. primary
   c. virtual
   d. swap

   ANS: D REF: 61

7. ____ are programs that perform operations such as copying files, listing directories, and communicating with other users.
   a. Extents
   b. Utilities
   c. Applications
   d. Services

   ANS: B REF: 62

8. If you plan to have multiple users access a system, you can create a ____ partition, which is the home directory for all users' directories.
   a. /root
   b. /etc
   c. /usr
   d. /home

   ANS: D REF: 62

9. You can create a ____ partition to hold files that are created temporarily, such as files used for printing documents (spool files) and files used to record monitoring and administration data, often called log files.
   a. /tmp
   b. /usr
   c. /var
   d. /aux

   ANS: C REF: 62

10. The ____ directory contains executables, which are the programs needed to start the system and perform other essential system tasks.
    a. /boot
    b. /bin
    c. /dev
    d. /etc

    ANS: B REF: 64

11. The ____ directory contains the kernel (operating system) images.
    a. /boot
    b. /bin
    c. /dev
    d. /etc

    ANS: A REF: 64

12. The term ____ refers to a “black hole”; any data sent to this device is gone forever.
    a. void
    b. root
    c. null
    d. console

    ANS: C REF: 66

13. The ____ directory contains configuration files that the system uses when the computer starts.
    a. /boot
    b. /bin
    c. /dev
    d. /etc

    ANS: D REF: 66

14. When using the *mount* command, you use the ____ option to specify a file system to mount.
    a. -f
    b. -d
    c. -t
    d. -m

    ANS: C REF: 70

15. The ____ is shorthand for the home directory, which typically has the same name as the user’s account name.
    a. backward slash (\)
    b. forward slash (/)
    c. dollar sign ($)
    d. tilde (~)

    ANS: D REF: 72

16. If you have configured your prompt so that it does not show your working directory, you can use the ____ command to verify in what directory you are located, along with the directory path.
    a. pwd
    b. who
    c. list
    d. dir

    ANS: A REF: 74

17. To navigate the UNIX/Linux directory structure, you use the ____ command.
    a. nav
    b. cd
    c. mv
    d. jump

    ANS: B REF: 75

18. A(n) ____ path begins at the root level and lists all subdirectories to the destination file.
    a. root
    b. primary
    c. absolute
    d. relative

    ANS: C REF: 75

19. UNIX/Linux systems interpret ____ to mean the parent directory.
    a. dot (.)
    b. dot (..)
    c. backward slash (\)
    d. forward slash (/)

    ANS: B REF: 76

20. You use the ____ command to display a directory’s contents, including files and other directories.
    a. dir
    b. d
    c. pwd
    d. ls

    ANS: D REF: 77

21. The ____ command is used to create a new directory.
    a. cdir
    b. cd
    c. mkdir
    d. mk

    ANS: C REF: 80

22. You can change the pattern of permission settings by using the ____ command.
    a. chperm
    b. chmod
    c. chsec
    d. chown

    ANS: B REF: 84

COMPLETION

1. Most versions of UNIX and Linux support the _____ (ufs), which is the original native UNIX file system.

   ANS: UNIX file system

   REF: 54

2. Computer storage devices such as hard disks are called _____ devices.

   ANS: peripheral

   REF: 59

3. To _____ a file system is to connect it to the directory tree structure.

   ANS: mount

   REF: 63

4. You can use the -a option with the ls command to list _____ files.

   ANS: hidden

   REF: 79

5. A(n) _____ is a special character that can stand for any other character or, in some cases, a group of characters.

   ANS: wildcard

   REF: 79

6. Using the octal permission format, `chmod` _____ `data`, assigns read,write, and execute to owner; execute to group; and execute to other.

   ANS: 711

   REF: 86

MATCHING

Match each item with a statement below.

a. /root
b. /usr
c. /sbin
d. /media
e. /lib
f. /proc
g. /var
h. /mnt
i. /tmp

1. houses kernel modules, security information, and the shared library images
2. mount points for temporary mounts by the system administrator reside in this directory
3. is a relatively new recommendation of the FHS
4. this directory occupies no space on the disk
5. home directory for the system administrator
6. programs that start the system, programs needed for file system repair, and essential network programs are stored in this directory
7. temporary place to store data during processing cycle
8. houses software offered to users
9. holds subdirectories that often change in size

1. ANS: E REF: 68
2. ANS: H REF: 68
3. ANS: D REF: 69
4. ANS: F REF: 69
5. ANS: A REF: 69
6. ANS: C REF: 69
7. ANS: I REF: 69
8. ANS: B REF: 69
9. ANS: G REF: 70

SHORT ANSWER

1. Why is it a good idea to partition your hard disk?

   ANS:
   Partitioning your hard disk provides organized space to contain your file systems. If one file system fails, you can work with another.

   REF: 60

2. What is virtual memory?

   ANS:
   A swap partition enables virtual memory. Virtual memory means you have what seem to be unlimited memory resources.Swap partitions accomplish this by providing swap space on a disk and treating it like an extension of memory (RAM). It is called swap space because the system can use it to swap information between disk and RAM. Setting up swap space makes your computer run faster and more efficiently.

   REF: 61

3. What is an inode and what information does it contain?

ANS:
Partitions containing directories and files in the ufs and ext file systems are built on the concept of information nodes, or inodes. Each directory or file has an inode and is identified by an inode number. Inode 0 contains the root of the directory structure (/) and is the jumping-off point for all other inodes.

An inode contains (1) the name of a directory or file, (2) general information about that directory/file, and (3) information (a pointer) about how to locate the directory/file on a disk partition. In terms of general information, each inode indicates the user and group ownership, the access mode (read, write, and execute security permissions, discussed later in this chapter), the size and type of the file, the date the file was created, and the date the file was last modified and read.

REF: 63

4. What are device special files?

ANS:
UNIX/Linux devices are managed through the use of device special files, which contain information about I/O devices that are used by the operating system kernel when a device is accessed. In many UNIX/Linux systems, two types of device special files exist:
- Block special files
- Character special files

REF: 64

5. What is a pathname? How is a pathname specified in UNIX/Linux?

ANS:
All UNIX/Linux files are stored in directories in the file system, starting from the root file system directory. To specify a file or directory, use its pathname, which follows the branches of the file system to the desired file. A forward slash (/) separates each directory name. For example, suppose you want to specify the location of the file named phones.502. You know that it resides in the source directory in Jean's home directory, /home/jean/source. You can specify this file's location as /home/jean/source/phones.502.

REF: 72

6. What command do you use to copy files in UNIX/Linux? How do you use this command?

ANS:
The UNIX/Linux copy command is *cp*, which is used to copy files from one directory to another. The *-i* option provides valuable insurance because it warns you that the *cp* command overwrites the destination file, if a file of the same name already exists. You can also use the dot notation (current directory) as shorthand to specify the destination of a *cp* command.

REF: 81

7. What command do you use to delete files in UNIX/Linux? Describe the usage of this command.

ANS:

To delete files you do not need, use the remove command, *rm*. First, use the *cd* command to change to the directory containing the file you want to delete. Then type *rm filename*. For example, to delete the file "old" in the current working directory, type *rm old*. Depending on your version of UNIX/Linux, you might or might not receive a warning before the file is deleted. However, you can have the operating system prompt to make certain you want to perform the deletion by using the *-i* option. The best insurance, though, is to be certain you want to remove a file permanently before using this command.

REF: 81 | 82

8. Why would you want to set file permissions?

ANS:
Early in computing, people didn't worry much about security. Stolen files and intrusions were less of a concern, in part because networks were rare and there was no Internet. As you have probably learned through the media, friends, and school, times are different and you need to protect your files. Security is important on UNIX/Linux systems because they can house multiple users and are connected to networks and the Internet, all potential sources of intrusion.

Users can set permissions for files (including directories) they own so as to establish security. System administrators also set permissions to protect system and shared files. Permissions manage who can read, write, or execute files.

REF: 82

9. What is the role of GIDs in UNIX/Linux systems?

ANS:
The system administrator assigns group ids when he or she adds a new user account. A group id (GID) gives a group of users equal access to files that they all share. Others are all other users who are not associated with the owner's group by a group id, but who have read and execute permissions.

REF: 84

10. When configuring file permissions in UNIX/Linux systems, what is the role of the sticky bit?

ANS:
On older UNIX and Linux distributions, the sticky bit has been used to cause an executable program (a file you run as a program) to stay resident in memory after it is exited. This action ensures that the program is immediately ready to use the next time around or that it stays ready for multiple users on a server. In current operating systems, the sticky bit is used instead to enable a file to be executed, but only the file's owner or root have permission to delete or rename it. The symbol for the sticky bit is t (used in place of x), such as when you view permissions using *ls -l*. For example,when the sticky bit is set on a file, the permissions might look like: -rwxr-xr-t.

REF: 87