Assessment Test

1. Which section in the X server configuration file defines the combination of monitors and video cards that you're using on your Linux system?
   - **A.** `Monitor`
   - **B.** `Screen`
   - **C.** `Modeline`
   - **D.** `Device`
   - **E.** `Module`

2. How can you tell whether your system is using `inetd` or `xinetd` as a super server? (Select two.)
   - **A.** Type **`ps ax | grep inetd`**, and examine the output for signs of `inetd` or `xinetd`.
   - **B.** Type **`superserver`** to see a report on which super server is running.
   - **C.** Look for the `/etc/inetd.conf` file or `/etc/xinetd.d` subdirectory, which are signs of `inetd` or `xinetd`, respectively.
   - **D.** Examine the `/etc/inittab` file to see which super server is launched by `init`, which is responsible for this task.
   - **E.** Type **`netstat -a | grep inet`** and examine the output for signs of `inetd` or `xinetd`.

3. How does the `lpc` utility for CUPS differ from its counterpart in BSD LPD and LPRng?
   - **A.** The `lpc` utility is unique to CUPS; it doesn't ship with BSD LPD or LPRng.
   - **B.** CUPS doesn't ship with an `lpc` command, but BSD LPD and LPRng do.
   - **C.** CUPS's `lpc` is much more complex than its counterpart in BSD LPD and LPRng.
   - **D.** CUPS's `lpc` is much simpler than its counterpart in BSD LPD and LPRng.
   - **E.** The `lpc` utility is identical in all three of these printing systems.

4. What file would you edit to restrict the number of simultaneous logins a user can employ?
   - **A.** `/etc/pam.d/login-limits`
   - **B.** `/etc/bashrc`
   - **C.** `/etc/security/limits.conf`
   - **D.** `/etc/inittab`
   - **E.** `/etc/passwd`

5. Which of the following are required when configuring a computer to use a static IP address? (Select two.)
   - **A.** The IP address of the DHCP server
   - **B.** The hostname of the NBNS server
   - **C.** The computer's IP address
   - **D.** The network mask
   - **E.** The IP address of the NTP server

6. What does the following command accomplish?

```
$ wc report.txt | tee wc
```

   A. It launches the `wc` editor on both the `report.txt` and `wc.txt` files; each file opens in its own window.
   B. It displays a count of the windows in which the `report.txt` file is displayed and shows that information in a new window called `wc`.
   C. It creates a count of newlines, words, and bytes in the `report.txt` file and then displays a count of these statistics about the report it just generated.
   D. It cleans up any memory leaks associated with the `tee` program's use of the `report.txt` file.
   E. It displays a count of newlines, words, and bytes in the `report.txt` file and copies that output to the `wc` file.

7. Which of the following characters defines the *end* of an OS or kernel definition in `/boot/grub/grub.cfg`?
   A. `;`
   B. `)`
   C. `}`
   D. `*/`
   E. None of the above; the definition ends with the `title` line beginning the next entry.

8. What does the number `703` represent in the following `/etc/passwd` entry?

```
george:x:703:100:George Brown:/home/george:/bin/tcsh
```

   A. The account's human ID (HID) number
   B. The account's process ID (PID) number
   C. The account's group ID (GID) number
   D. The account's globally unique ID (GUID) number
   E. The account's user ID (UID) number

9. What does the `grep` command accomplish?
   A. It creates a pipeline between two programs.
   B. It searches files' contents for a pattern.
   C. It concatenates two or more files.
   D. It displays the last several lines of a file.
   E. It locates files on the hard disk.

10. Which of the following are journaling filesystems for Linux? (Select three.)
   A. vfat
   B. ReiserFS
   C. Ext2fs

D. Ext3fs

E. XFS

11. You've configured your computer to use SMTP and IMAP via a tunneled SSH connection to your ISP's email server for improved security. Why might you still want to use GPG encryption for your emails on top of the encryption provided by SSH?

A. The SSH tunnel reaches only as far as the first email server; GPG encrypts data on all of the computers all the way to or from your email correspondents.

B. SSH encryption is notoriously poor for email, although it's perfectly adequate for login sessions; thus, adding GPG encryption improves security.

C. SSH doesn't encrypt the headers of the email messages; GPG encrypts the headers to keep snoopers from learning your correspondents' identities.

D. Using GPG guarantees that your email messages won't contain unwanted viruses or worms that might infect your correspondents' computers.

E. Configured in this way, SSH will encrypt the email headers and bodies but not any attachments to your email.

12. Which of the following ports are commonly used to retrieve email from an email server computer? (Select two.)

A. 110

B. 119

C. 139

D. 143

E. 443

13. You're experiencing sporadic problems with a Secure Shell (SSH) login server—sometimes users can log in and sometimes they can't. What might you try immediately after a failure to help diagnose this problem?

A. On the server computer, type **`http://localhost:631`** into a web browser to access the SSH configuration page and check its error subpage for error messages.

B. Type **`diagnose sshd`** to run a diagnostic on the SSH server daemon (`sshd`).

C. Type **`tail /var/log/messages`** to look for error messages from the server.

D. Examine the `/dev/ssh` device file to look for error messages from the server.

E. On the server computer, type **`sshd`** to view SSH's diagnostic messages.

14. What is the function of the `~/.profile` file?

A. It's the user configuration file for the ProFTP server.

B. It's one of a user's `bash` startup scripts.

C. It's the user configuration file for the ProFile file manager.

D. Its presence tells `tcsh` to ignore file modes.

E. It holds the user's encrypted password.

15. You want your computer to remind you to get your car inspected in two years. What is the best way to do this among the specified options?

A. Create a program that repeatedly checks the time and, when two years have passed, displays a message to get your car inspected.

B. Type **`cal` *`day month year`***, where *day*, *month*, and *year* specify the date of the future inspection, to have Linux run a program that you then specify on that date.

C. Create a `cron` job that runs hourly. This job should check the date and, when the correct date comes up, use `mail` to notify you of the need for a car inspection.

D. Use the NTP GUI calendar program to create an alarm for the specified date. The program will then display the message you enter at the specified date and time.

E. Type ***`at date`***, where *date* is a date specification. You can then specify a command, such as `mail` with appropriate options, to notify you of the need to get your car inspected.

16. How would you configure a computer to use the computer whose IP address is 172.24.21.1 as a gateway for all network traffic that's not otherwise configured?

A. **`gateway default 172.24.21.1`**

B. **`gateway 172.24.21.1`**

C. **`route gateway 172.24.21.1`**

D. **`route add default gw 172.24.21.1`**

E. **`gw 172.24.21.1`**

17. What software can you use to drive a Braille display device? (Select two.)

A. Emacspeak

B. BRLTTY

C. A 2.6.26 or later kernel

D. GOK

E. A framebuffer driver

18. Which is true of source RPM packages?

A. They consist of three files: an original source tarball, a patch file of changes, and a PGP signature indicating the authenticity of the package.

B. They require programming knowledge to rebuild.

C. They can sometimes be used to work around dependency problems with a binary package.

D. They are necessary to compile software for RPM-based distributions.

E. They always contain software that's licensed under terms of the GPL.

19. Which utility should you use by itself to rename the file `pumpkin.txt` to `lantern.txt`?

A. `dd`

B. `rm`

C. `cp`

D. `mv`

E. `ln`

20. You want to run a lengthy scientific simulation program, called `simbigbang`, which doesn't require any user interaction; the program operates solely on disk files. If you don't want to tie up the shell from which you run the program, what should you type to run `simbigbang` in the background?

A. **`start simbigbang`**

B. **`simbigbang &`**

C. **`bg simbigbang`**

D. **`background simbigbang`**

E. **`nice simbigbang`**

21. Which of the following commands will install an RPM package file called `theprogram-1.2.3-4.i386.rpm` on a computer? (Select two.)

A. **`rpm -Uvh theprogram-1.2.3-4.i386.rpm`**

B. **`rpm -i theprogram-1.2.3-4.i386.rpm`**

C. **`rpm -U theprogram`**

D. **`rpm -e theprogram-1.2.3-4.i386.rpm`**

E. **`rpm -Vp theprogram-1.2.3-4.i386.rpm`**

22. What tool can diagnose and fix many common Linux filesystem problems?

A. `mkfs`

B. `fsck`

C. `chkdsk`

D. `scandisk`

E. `fdisk`

23. You've just installed MySQL, and you intend to use it to store information about the animals in a zoo, from the anteaters to the zebras. What command are you likely to use first, once you start MySQL?

A. **`CREATE DATABASE animals;`**

B. **`USE animals;`**

C. **`CREATE TABLE animals;`**

D. **`INSERT INTO animals;`**

E. **`UPDATE animals;`**

24. Which of the following commands displays help on *`topic`*, when typed in a Linux shell? (Select two.)

A. **`manual`** ***`topic`***

B. **`man`** ***`topic`***

C. **`? topic`**

D. **`info topic`**

E. **`hint topic`**

25. A computer's hardware clock keeps track of the time while the computer is powered off. In what formats may this time be stored on an *x*86 Linux system? (Select two.)

A. Coordinated Universal Time (UTC)

B. Internet Time

C. Local time

D. 12-hour time

E. Mars time

26. You want to know what kernel modules are currently loaded. What command would you type to learn this information?

A. **`insmod`**

B. **`depmod`**

C. **`modprobe`**

D. **`lsmod`**

E. **`modinfo`**

27. You want to enable all members of the `music` group to read the `instruments.txt` file, which currently has 0640 (`-rw-r-----`) permissions, ownership by `root`, and group ownership by `root`. How might you accomplish this goal? (Select two.)

A. Type **`chown music instruments.txt`** in the file's directory.

B. Type **`chgrp music instruments.txt`** in the file's directory.

C. Type **`chgroup music instruments.txt`** in the file's directory.

D. Type **`chmod 0600 instruments.txt`** in the file's directory.

E. Type **`chown :music instruments.txt`** in the file's directory.

28. You want to create a link to the `/usr/local/bin` directory in another location. Which of the following statements is true?

A. You can do this only if `/usr/local/bin` is on a journaling filesystem.

B. You must own `/usr/local/bin` to create the link.

C. You can create the link only if the link's location is on the same filesystem as the original directory.

D. Only the system administrator can do this.

E. The link will probably have to be a symbolic link.

29. Which of the following, when typed in vi's command mode, saves a file and quits the program? (Select two.)

A. **`:rq`**

B. **`:wq`**

C. `:re`

D. `:we`

E. `ZZ`

30. A user's home directory includes a file called `~/.forward` that consists of one line: `|~/junkme`. What is the effect of this configuration?

A. The user's incoming mail is forwarded to the `junkme` user on the same system.

B. The user's incoming mail is stored in the `~/junkme` file.

C. The user's incoming mail is sent through the `~/junkme` program file.

D. The user's incoming mail is flagged as spam and deleted.

E. The user's incoming mail is forwarded to the same user on the `junkme` computer.

Review Questions

1. You type a command into `bash` and pass a long filename to it, but after you enter the command, you receive a `File not found` error message because of a typo in the filename. How might you proceed?
   - **A.** Retype the command, and be sure you type the filename correctly, letter by letter.
   - **B.** Retype the command, but press the Tab key after typing a few letters of the long filename to ensure that the filename is entered correctly.
   - **C.** Press the Up arrow key, and use `bash`'s editing features to correct the typo.
   - **D.** Any of the above.
   - **E.** None of the above.
2. Which of the following commands is implemented as an internal command in `bash`?
   - **A.** `cat`
   - **B.** `less`
   - **C.** `tee`
   - **D.** `sed`
   - **E.** `echo`
3. You type **`echo $PROC`**, and the computer replies `Go away`. What does this mean?
   - **A.** No currently running processes are associated with your shell, so you may log out without terminating them.
   - **B.** The remote computer `PROC` isn't accepting connections; you should contact its administrator to correct the problem.
   - **C.** Your computer is handling too many processes; you must kill some of them to regain control of the computer.
   - **D.** Your central processing unit (CPU) is defective and must be replaced as soon as possible.
   - **E.** You, one of your configuration files, or a program you've run has set the `$PROC` environment variable to `Go away`.
4. What does the `pwd` command accomplish?
   - **A.** It prints the name of the working directory.
   - **B.** It changes the current working directory.
   - **C.** It prints wide displays on narrow paper.
   - **D.** It parses web page URLs for display.
   - **E.** It prints the terminal's width in characters.
5. What is the surest way to run a program (say, `myprog`) that's located in the current working directory?
   - **A.** Type **`./`** followed by the program name: **`./myprog`**.
   - **B.** Type the program name alone: **`myprog`**.

C. Type **run** followed by the program name: **run myprog**.

D. Type **/.** followed by the program name: **/.myprog**.

E. Type the program name followed by an ampersand (&): **myprog &**.

6. How does man display information by default on most Linux systems?

A. Using a custom X-based application

B. Using the Firefox web browser

C. Using the info browser

D. Using the vi editor

E. Using the less pager

7. You want to store the standard output of the ifconfig command in a text file (file.txt) for future reference, and you want to wipe out any existing data in the file. You do *not* want to store standard error in this file. How can you accomplish these goals?

A. **ifconfig < file.txt**

B. **ifconfig >> file.txt**

C. **ifconfig > file.txt**

D. **ifconfig | file.txt**

E. **ifconfig 2> file.txt**

8. What is the effect of the following command?

```
$ myprog &> input.txt
```

A. Standard error to myprog is taken from input.txt.

B. Standard input to myprog is taken from input.txt.

C. Standard output and standard error from myprog are written to input.txt.

D. All of the above.

E. None of the above.

9. How many commands can you pipe together at once?

A. 2

B. 3

C. 4

D. 16

E. >16

10. You want to run an interactive script, gabby, which produces a lot of output in response to the user's inputs. To facilitate future study of this script, you want to copy its output to a file. How might you do this?

A. **gabby > gabby-out.txt**

B. **gabby | tee gabby-out.txt**

C. **gabby < gabby-out.txt**

D. **gabby &> gabby-out.txt**

E. **gabby `gabby-out.txt`**

11. A text-mode program, `verbose`, prints a lot of bogus "error" messages to standard error. How might you get rid of those messages while still interacting with the program?

A. **`verbose | quiet`**

B. **`verbose &> /dev/null`**

C. **`verbose 2> /dev/null`**

D. **`verbose > junk.txt`**

E. **`quiet-mode verbose`**

12. How do the > and >> redirection operators differ?

A. The > operator creates a new file or overwrites an existing one; the >> operator creates a new file or appends to an existing one.

B. The > operator creates a new file or overwrites an existing one; the >> operator appends to an existing file or issues an error message if the specified file doesn't exist.

C. The > operator redirects standard output; the >> operator redirects standard error.

D. The > operator redirects standard output; the >> operator redirects standard input.

E. The > operator writes to an existing file but fails if the file doesn't exist; the >> operator writes to an existing file or creates a new one if it doesn't already exist.

13. What program would you use to display the end of a configuration file?

A. `uniq`

B. `cut`

C. `tail`

D. `wc`

E. `fmt`

14. What is the effect of the following command?

```
$ pr report.txt | lpr
```

A. The file `report.txt` is formatted for printing and sent to the `lpr` program.

B. The files `report.txt` and `lpr` are combined together into one file and sent to standard output.

C. Tabs are converted to spaces in `report.txt`, and the result is saved in `lpr`.

D. The file `report.txt` is printed, and any error messages are stored in the file `lpr`.

E. None of the above.

15. Which of the following commands will number the lines in `aleph.txt`? (Select three.)

A. **`fmt aleph.txt`**

B. **`nl aleph.txt`**

C. **`cat -b aleph.txt`**

D. **`cat -n aleph.txt`**

E. **`od -nl aleph.txt`**

16. You have a data file, `data.txt`, to be processed by a particular program. However, the program cannot handle data separated by tabs. The `data.txt` file's data is separated by a tab stop at every eight characters. What command should you use before processing the data file with the program?

    A. **`od data.txt > data1.txt`**

    B. **`expand data.txt >> data.txt`**

    C. **`fmt --remove-tabs data.txt`**

    D. **`expand data.txt > data1.txt`**

    E. **`unexpand -t 8 data.txt`**

17. Which of the following commands will change all occurrences of `dog` in the file `animals.txt` to `mutt` in the screen display?

    A. **`sed -s "dog" "mutt" animals.txt`**

    B. **`grep -s "dog||mutt" animals.txt`**

    C. **`sed 's/dog/mutt/g' animals.txt`**

    D. **`cat animals.txt | grep -c "dog" "mutt"`**

    E. **`fmt animals.txt | cut 'dog' > 'mutt'`**

18. You've received an ASCII text file (`longlines.txt`) that uses no carriage returns within paragraphs but two carriage returns between paragraphs. The result is that your preferred text editor displays each paragraph as a very long line. How can you reformat this file so that you can more easily edit it (or a copy)?

    A. **`sed 's/Ctrl-M/NL/' longlines.txt`**

    B. **`fmt longlines.txt > longlines2.txt`**

    C. **`cat longlines.txt > longlines2.txt`**

    D. **`pr longlines.txt > longlines2.txt`**

    E. **`grep longlines.txt > longlines2.txt`**

19. Which of the following commands will print lines from the file `world.txt` that contain matches to `changes` and `changed`?

    A. **`grep change[ds] world.txt`**

    B. **`sed change[d-s] world.txt`**

    C. **`od "change'd|s'" world.txt`**

    D. **`cat world.txt changes changed`**

    E. **`find world.txt "change(d|s)"`**

20. Which of the following regular expressions will match the strings `dog`, `dug`, and various other strings but not `dig`?

    A. `d.g`

    B. `d[ou]g`

    C. `d[o-u]g`

    D. `di*g`

    E. `d.ig`

Review Questions

1. Which of the following is *not* an advantage of a source package over a binary package?
   A. A single source package can be used on multiple CPU architectures.
   B. By recompiling a source package, you can sometimes work around library incompatibilities.
   C. You can modify the code in a source package, thus altering the behavior of a program.
   D. Source packages can be installed more quickly than binary packages.
   E. You may be able to recompile source code for a non-Linux Unix program on Linux.

2. Which is true of using both RPM and Debian package management systems on one computer?
   A. It's generally inadvisable because the two systems don't share installed-file database information.
   B. It's impossible because their installed-file databases conflict with one another.
   C. It causes no problems if you install important libraries once in each format.
   D. It's a common practice on Red Hat and Debian systems.
   E. Using both systems simultaneously requires installing the `alien` program.

3. Which of the following statements is true about binary RPM packages that are built for a particular distribution?
   A. License requirements forbid using the package on any other distribution.
   B. They may be used in another RPM-based distribution only when you set the `--convert-distrib` parameter to `rpm`.
   C. They may be used in another RPM-based distribution only after you recompile the package's source RPM.
   D. They can be recompiled for an RPM-based distribution running on another type of CPU.
   E. They can often be used on another RPM-based distribution for the same CPU architecture, but this isn't guaranteed.

4. An administrator types the following command on an RPM-based Linux distribution:

   ```
   # rpm -ivh megaprog.rpm
   ```

   What is the effect of this command?
   A. If the `megaprog` package is installed on the computer, it is uninstalled.
   B. If the `megaprog.rpm` package exists, is valid, and isn't already installed on the computer, it is installed.
   C. The `megaprog.rpm` source RPM package is compiled into a binary RPM for the computer.

D. Nothing; `megaprog.rpm` isn't a valid RPM filename, so `rpm` will refuse to operate on this file.

E. The `megaprog.rpm` package replaces any earlier version of the package that's already installed on the computer.

5. Which of the following commands will extract the contents of the `myfonts.rpm` file into the current directory?

A. **`rpm2cpio myfonts.rpm | cpio -i --make-directories`**

B. **`rpm2cpio myfonts.rpm > make-directories`**

C. **`rpm -e myfonts.rpm`**

D. **`alien --to-extract myfonts.rpm`**

E. **`rpmbuild --rebuild myfonts.rpm`**

6. To use `dpkg` to remove a package called `theprogram`, including its configuration files, which of the following commands would you issue?

A. **`dpkg -e theprogram`**

B. **`dpkg -p theprogram`**

C. **`dpkg -r theprogram`**

D. **`dpkg -r theprogram-1.2.3-4.deb`**

E. **`dpkg -P theprogram`**

7. Which of the following describes a difference between `apt-get` and `dpkg`?

A. `apt-get` provides a GUI interface to Debian package management; `dpkg` doesn't.

B. `apt-get` can install tarballs in addition to Debian packages; `dpkg` can't.

C. `apt-get` can automatically retrieve and update programs from Internet sites; `dpkg` can't.

D. `apt-get` is provided only with the original Debian distribution, but `dpkg` comes with Debian and its derivatives.

E. `apt-get` works only with Debian-based distributions, but `dpkg` can work with both RPMs and Debian packages.

8. What command would you type to obtain a list of all of the installed packages on a Debian system?

A. **`apt-get showall`**

B. **`apt-cache showpkg`**

C. **`dpkg -r allpkgs`**

D. **`dpkg -i`**

E. **`dpkg --get-selections`**

9. As `root`, you type **`apt-get update`** on a Debian system. What should be the effect of this command?

A. None: `update` is an invalid option to `apt-get`.

B. The APT utilities deliver information about the latest updates you've made to the APT Internet repositories, enabling you to share your changes with others.

C. The APT utilities download all available upgrades for your installed programs and install them on your system.

D. The APT utilities retrieve information about the latest packages available so that you may install them with subsequent `apt-get` commands.

E. The APT utilities update themselves, ensuring that you're using the latest version of APT.

10. Which of the following commands would you type to update the `unzip` program on a Fedora system to the latest version? (Select all that apply.)

A. **`yum update unzip`**

B. **`yum upgrade unzip`**

C. **`yum -u unzip`**

D. **`yum -U unzip`**

E. **`yum check-update unzip`**

11. How should you configure a system that uses Yum to access an additional Yum software repository?

A. Edit the `/etc/apt/sources.list` file to include the repository site's URL, as detailed on the repository's website.

B. Download a package from the repository site, and install it with RPM, or place a configuration file from the repository site in the `/etc/yum.repos.d` directory.

C. Use the `add-repository` subcommand to `yum` or the Add Repository option in the File menu in `yumex`, passing it the URL of the repository.

D. Edit the `/etc/yum.conf` file, locate the `[repos]` section, and add the URL to the repository after the existing repository URLs.

E. Edit the `/etc/yum.conf` file, locate the `REPOSITORIES=` line, and add the new repository to the colon-delimited list on that line.

12. What is the preferred method of adding a directory to the library path for all users?

A. Modify the `LD_LIBRARY_PATH` environment variable in a global shell script.

B. Add the directory to the `/etc/ld.so.conf` file, and then type **`ldconfig.`**

C. Type **`ldconfig /new/dir`**, where */new/dir* is the directory you want to add.

D. Create a symbolic link from that directory to one that's already on the library path.

E. Type **`ldd /new/dir`**, where */new/dir* is the directory you want to add.

13. You prefer the look of GTK+ widgets to Qt widgets, so you want to substitute the GTK+ libraries for the Qt libraries on your system. How would you do this?

A. You must type **`ldconfig --makesubs=qt,gtk`**. This command substitutes the GTK+ libraries for the Qt libraries at load time.

B. You must uninstall the Qt library packages and reinstall the GTK+ packages with the `--substitute=qt` option to `rpm` or the `--replace=qt` option to `dpkg`.

C. You must note the filenames of the Qt libraries, uninstall the packages, and create symbolic links from the Qt libraries to the GTK+ libraries.

D. You can't easily do this; libraries can't be arbitrarily exchanged for one another. You would need to rewrite all of the Qt-using programs to use GTK+.

E. You must reboot the computer and pass the `subst=qt,gtk` option to the kernel. This causes the kernel to make the appropriate substitutions.

14. A user types **`kill -9 11287`** at a `bash` prompt. What is the probable intent, assuming the user typed the correct command?

A. To cut off a network connection using TCP port 11287

B. To display the number of processes that have been killed with signal 11287 in the last nine days

C. To cause a server with process ID 11287 to reload its configuration file

D. To terminate a misbehaving or hung program with process ID 11287

E. To increase the priority of the program running with process ID 11287

15. What programs might you use to learn what your system's load average is? (Select two.)

A. `ld`

B. `load`

C. `top`

D. `uptime`

E. `la`

16. Which of the following commands creates a display of processes, showing the parent-child relationships through links between their names?

A. **`ps --forest`**

B. **`ps aux`**

C. **`ps -e`**

D. **`ps --tree`**

E. All of the above

17. You use `top` to examine the CPU time being consumed by various processes on your system. You discover that one process, `dfcomp`, is consuming more than 90 percent of your system's CPU time. What can you conclude?

A. Very little: `dfcomp` could be legitimately consuming that much CPU time, or it could be an unauthorized or malfunctioning program.

B. No program should consume 90 percent of available CPU time; `dfcomp` is clearly malfunctioning and should be terminated.

C. This is normal; `dfcomp` is the kernel's main scheduling process, and it consumes any unused CPU time.

D. This behavior is normal *if* your CPU is less powerful than a 2.5 GHz EM64T Pentium. However, on newer systems, no program should consume 90 percent of CPU time.

E. This behavior is normal *if* your CPU has at least four cores, but on systems with fewer cores than this, no program should consume 90 percent of CPU time.

18. You type **`jobs`** at a `bash` command prompt and receive a new command prompt with no intervening output. What can you conclude?
    - **A.** The total CPU time used by your processes is negligible (below 0.1).
    - **B.** No processes are running under your username except the shell that you're using.
    - **C.** The `jobs` shell is installed and working correctly on the system.
    - **D.** The system has crashed; `jobs` normally returns a large number of running processes.
    - **E.** No background processes are running that were launched from the shell that you're using.

19. Which of the following commands are equivalent to one another? (Select two.)
    - **A.** **`nice --value 10 crunch`**
    - **B.** **`nice -n -10 crunch`**
    - **C.** **`nice -10 crunch`**
    - **D.** **`nice 10 crunch`**
    - **E.** **`nice crunch`**

20. Which of the following are restrictions on ordinary users' abilities to run `renice`? (Select two.)
    - **A.** Users may not modify the priorities of processes that are already running.
    - **B.** Users may not modify the priority of their programs launched from anything but their current shells.
    - **C.** Users may not decrease the priority (that is, increase the priority value) of their own processes.
    - **D.** Users may not modify the priorities of other users' processes.
    - **E.** Users may not increase the priority (that is, decrease the priority value) of their own processes.

Review Questions

1. What are common IRQs for RS-232 serial ports? (Select two.)
   - **A.** 1
   - **B.** 3
   - **C.** 4
   - **D.** 8
   - **E.** 16
2. What tool would you use to disable a motherboard's sound hardware if you don't want to use it?
   - **A.** The firmware.
   - **B.** The `alsactl` utility.
   - **C.** The `lsmod` command.
   - **D.** The `lspci` program.
   - **E.** None of the above; onboard sound devices can't be disabled.
3. What is the purpose of `udev`?
   - **A.** To aid in the development of software
   - **B.** To unload Linux device drivers
   - **C.** To load Linux device drivers
   - **D.** To store devices' BIOS configurations in files
   - **E.** To manage the `/dev` directory tree
4. You've just installed Linux on a new computer with a single SATA hard disk. What device identifier will refer to the disk?
   - **A.** `/dev/sda`
   - **B.** `/dev/mapper/disk1`
   - **C.** `/dev/hda`
   - **D.** `C:`
   - **E.** `/dev/sda` or `/dev/hda`
5. Which files contain essential system information such as IRQs, direct-memory access channels, and I/O addresses? (Select three.)
   - **A.** `/proc/ioports`
   - **B.** `/proc/ioaddresses`
   - **C.** `/proc/dma`
   - **D.** `/proc/interrupts`
   - **E.** `/proc/hardware`

6. Typing **`fdisk -l /dev/sda`** on a Linux computer with an MBR disk produces a listing of four partitions: `/dev/sda1`, `/dev/sda2`, `/dev/sda5`, and `/dev/sda6`. Which of the following is true?
   - **A.** The disk contains two primary partitions and two extended partitions.
   - **B.** Either `/dev/sda1` or `/dev/sda2` is an extended partition.
   - **C.** The partition table is corrupted; there should be a `/dev/sda3` and a `/dev/sda4` before `/dev/sda5`.
   - **D.** If you add a `/dev/sda3` with `fdisk`, `/dev/sda5` will become `/dev/sda6`, and `/dev/sda6` will become `/dev/sda7`.
   - **E.** Both `/dev/sda1` and `/dev/sda2` are logical partitions.

7. A new Linux administrator plans to create a system with separate `/home`, `/usr/local`, and `/etc` partitions, in addition to the root (`/`) partition. Which of the following best describes this configuration?
   - **A.** The system won't boot because critical boot-time files reside in `/home`.
   - **B.** The system will boot, but `/usr/local` won't be available because mounted partitions must be mounted directly off their parent partition, not in a subdirectory.
   - **C.** The system will boot only if the `/home` partition is on a separate physical disk from the `/usr/local` partition.
   - **D.** The system will boot and operate correctly, provided each partition is large enough for its intended use.
   - **E.** The system won't boot because `/etc` contains configuration files necessary to mount non-root partitions.

8. Which of the following directories is *most likely* to be placed on its own hard disk partition?
   - **A.** `/bin`
   - **B.** `/sbin`
   - **C.** `/mnt`
   - **D.** `/home`
   - **E.** `/dev`

9. You discover that an MBR hard disk has partitions with type codes of 0x0f, 0x82, and 0x83. Assuming these type codes are accurate, what can you conclude about the disk?
   - **A.** The disk holds a partial or complete Linux system.
   - **B.** The disk holds a Windows installation.
   - **C.** The disk holds a FreeBSD installation.
   - **D.** The disk is corrupt; those partition type codes are incompatible.
   - **E.** The disk holds a Mac OS X installation.

10. You run Linux's `fdisk` and modify your partition layout. Before exiting the program, you realize that you've been working on the wrong disk. What can you do to correct this problem?
    A. Nothing; the damage is done, so you'll have to recover data from a backup.
    B. Type **`w`** to exit `fdisk` without saving changes to disk.
    C. Type **`q`** to exit `fdisk` without saving changes to disk.
    D. Type **`u`** repeatedly to undo the operations you've made in error.
    E. Type **`t`** to undo all of the changes and return to the original disk state.

11. What does the following command accomplish?

```
# mkfs -t ext2 /dev/sda4
```

    A. It sets the partition table type code for `/dev/sda4` to `ext2`.
    B. It converts a FAT partition into an ext2fs partition without damaging the partition's existing files.
    C. Nothing; the `-t` option isn't valid, and so it causes `mkfs` to abort its operation.
    D. It converts an ext2 filesystem to an ext4 filesystem.
    E. It creates a new ext2 filesystem on `/dev/sda4`, overwriting any existing filesystem and data.

12. Which of the following best summarizes the differences between Windows's `FDISK` and Linux's `fdisk`?
    A. Linux's `fdisk` is a simple clone of Windows's `FDISK` but written to work from Linux rather than from Windows.
    B. The two are completely independent programs that accomplish similar goals, although Linux's `fdisk` is more flexible.
    C. Windows's `FDISK` uses GUI controls, whereas Linux's `fdisk` uses a command-line interface, but they have similar functionality.
    D. Despite their similar names, they're completely different tools—the Windows `FDISK` command handles disk partitioning, whereas Linux's `fdisk` formats floppy disks.
    E. The Windows `FDISK` command manages GPT disks, whereas Linux's `fdisk` manages MBR disks.

13. What mount point should you associate with swap partitions?
    A. `/`
    B. `/swap`
    C. `/boot`
    D. `/mem`
    E. None of the above

14. Which of the following options is used with `fsck` to force it to use a particular filesystem type?
    A. `-A`
    B. `-N`
    C. `-t`

D. `-C`

E. `-f`

15. Which of the following pieces of information can `df` *not* report?

A. How long the filesystem has been mounted

B. The number of inodes used on an ext3fs partition

C. The filesystem type of a partition

D. The percentage of available disk space used on a partition

E. The mount point associated with a filesystem

16. What is an advantage of a journaling filesystem over a conventional (non-journaling) filesystem?

A. Journaling filesystems are older and better tested than non-journaling filesystems.

B. Journaling filesystems never need to be checked with `fsck`.

C. Journaling filesystems support Linux ownership and permissions; non-journaling filesystems don't.

D. Journaling filesystems require shorter disk checks after a power failure or system crash.

E. Journaling filesystems record all transactions, enabling them to be undone.

17. To access files on a USB flash drive, you type **`mount /dev/sdc1 /media/flash`** as `root`. Which types of filesystems will this command mount?

A. Ext2fs

B. FAT

C. HFS

D. ReiserFS

E. All of the above

18. Which of the following `/etc/fstab` entries will mount `/dev/sdb2` as the `/home` directory at boot time?

A. `/dev/sdb2 reiserfs /home defaults 0 0`

B. `/dev/sdb2 /home reiserfs defaults 0 0`

C. `/home reiserfs /dev/sdb2 noauto 0 0`

D. `/home /dev/sdb2 reiserfs noauto 0 0`

E. `reiserfs /dev/sdb2 /home noauto 0 0`

19. What filesystem options might you specify in `/etc/fstab` to make a removable disk (such as a USB flash drive) mountable by an ordinary user with a UID of 1000? (Select three.)

A. `user`

B. `users`

C. `owner`

D. `owners`

E. `uid=1000`

20. What is the minimum safe procedure for removing a USB flash drive, mounted from `/dev/sdb1` at `/media/usb`, from a Linux computer?

A. Type **`umount /media/usb`**, wait for the command to return and disk-activity lights to stop, and then unplug the drive.

B. Unplug the drive, and then type **`umount /media/usb`** to ensure that Linux registers the drive's removal from the system.

C. Unplug the drive, and then type **`sync /dev/sdb1`** to flush the caches to ensure that problems don't develop.

D. Type **`usbdrive-remove`**, and then quickly remove the disk before its activity light stops blinking.

E. Type **`fsck /dev/sdb1`**, wait for the command to return and disk-activity lights to stop, and then unplug the drive.

Review Questions

1. Why might you type **`touch filename?`**
   A. To move *`filename`* to the current directory
   B. To ensure that *`filename`*'s time stamp holds the current time
   C. To convert `filename` from DOS-style to Unix-style end-of-line characters
   D. To test the validity of *`filename`*'s disk structures
   E. To write cached data relating to `filename` to the disk

2. What parameter can you pass to `ln` to create a soft link? (Select two.)
   A. `-s`
   B. `--soft`
   C. `--slink`
   D. `--symbolic`
   E. `--sl`

3. You want to discover the sizes of several dot files in a directory. Which of the following commands might you use to do this?
   A. **`ls -la`**
   B. **`ls -p`**
   C. **`ls -R`**
   D. **`ls -d`**
   E. **`ls -F`**

4. You want to move a file from your hard disk to a USB flash drive. Which of the following is true?
   A. You'll have to use the `--preserve` option to `mv` to keep ownership and permissions set correctly.
   B. The `mv` command will adjust filesystem pointers without physically rewriting data if the flash drive uses the same filesystem type as the hard disk partition.
   C. You must use the same filesystem type on both media to preserve ownership and permissions.
   D. The `mv` command will delete the file on the hard disk after copying it to the flash drive.
   E. You must use the FAT filesystem on the USB flash drive; Linux-native filesystems won't work on removable disks.

5. You type **`mkdir one/two/three`** and receive an error message that reads, in part, `No such file or directory`. What can you do to overcome this problem? (Select two.)
   A. Add the `--parents` parameter to the `mkdir` command.
   B. Issue three separate `mkdir` commands: **`mkdir one`**, then **`mkdir one/two`**, and then **`mkdir one/two/three`**.

C. Type **`touch /bin/mkdir`** to be sure the `mkdir` program file exists.

D. Type **`rmdir one`** to clear away the interfering base of the desired new directory tree.

E. Type **`mktree one/two/three`** instead of **`mkdir one/two/three`**.

6. Which of the following commands are commonly used to create archive files? (Select two.)

A. `restore`

B. `vi`

C. `tape`

D. `cpio`

E. `tar`

7. You've received a tar archive called `data79.tar` from a colleague, but you want to check the names of the files it contains before extracting them. Which of the following commands would you use to do this?

A. **`tar uvf data79.tar`**

B. **`tar cvf data79.tar`**

C. **`tar xvf data79.tar`**

D. **`tar rvf data79.tar`**

E. **`tar tvf data79.tar`**

8. You want to create a link from your home directory on your hard disk to a directory on a DVD drive. Which of the following link types might you use?

A. Only a symbolic link

B. Only a hard link

C. Either a symbolic or a hard link

D. Only a hard link, and then only if both directories use the same low-level filesystem

E. None of the above; such links aren't possible under Linux

9. What command would you type (as `root`) to change the ownership of `somefile.txt` from `ralph` to `tony`?

A. **`chown ralph:tony somefile.txt`**

B. **`chmod somefile.txt tony`**

C. **`chown somefile.txt tony`**

D. **`chmod tony:ralph somefile.txt`**

E. **`chown tony somefile.txt`**

10. Typing **`ls -ld wonderjaye`** reveals a symbolic file mode of `drwxr-xr-x`. Which of the following are true? (Select two.)

A. `wonderjaye` is a symbolic link.

B. `wonderjaye` is an executable program.

C. `wonderjaye` is a directory.

D. `wonderjaye` has its SUID bit set.

E. `wonderjaye` may be read by all users of the system.

11. When should programs be configured SUID `root`?

A. At all times. This permission is required for executable programs.

B. Whenever a program should be able to access a device file.

C. Only when they require `root` privileges to do their job.

D. Never. This permission is a severe security risk

E. Whenever the program file is owned by the `root` user.

12. Which of the following commands would you type to enable world read access to the file `myfile.txt`? (Assume that you're the owner of `myfile.txt`.)

A. **`chmod 741 myfile.txt`**

B. **`chmod 0640 myfile.txt`**

C. **`chmod u+r myfile.txt`**

D. **`chmod a-r myfile.txt`**

E. **`chmod o+r myfile.txt`**

13. Which of the following umask values will result in files with `rw-r-----` permissions?

A. `640`

B. `210`

C. `022`

D. `027`

E. `138`

14. You see the `usrquota` and `grpquota` options in the `/etc/fstab` entry for a filesystem. What is the consequence of these entries?

A. Quota support will be available if it's compiled into the kernel; it will be automatically activated when you mount the filesystem.

B. User quotas will be available, but the `grpquota` option is invalid and will be ignored.

C. Quota support will be disabled on the filesystem in question.

D. Nothing. These options are malformed and so will have no effect.

E. Quota support will be available if it's compiled into your kernel, but you must activate it with the `quotaon` command.

15. Which of the following commands can be used to summarize the quota information about all filesystems?

A. **`repquota`**

B. **`repquota -a`**

C. **`quotacheck`**

D. **`quotacheck -a`**

E. **`edquota -a`**

16. You've installed a commercial spreadsheet program called WonderCalc on a workstation. In which of the following directories are you *most* likely to find the program executable file?
    A. `/usr/sbin`
    B. `/etc/X11`
    C. `/boot`
    D. `/opt/wcalc/bin`
    E. `/sbin/wcalc`

17. Which of the following file-location commands is likely to take the *most* time to find a file that may be located anywhere on the computer (assuming the operation succeeds)?
    A. The `find` command.
    B. The `locate` command.
    C. The `whereis` command.
    D. The `type` command.
    E. They're all equal in speed.

18. What can the `type` command do that `whereis` can't?
    A. Identify the command as being for *x*86 or *x*86-64 CPUs
    B. Locate commands based on their intended purpose, not just by name
    C. Identify a command as an alias, internal command, or external command
    D. Assist in typing a command by finishing typing it for you
    E. Identify a command as being a binary or a script

19. You want to track down all of the files in `/home` that are owned by `karen`. Which of the following commands will do the job?
    A. **`find /home -uid karen`**
    B. **`find /home -user karen`**
    C. **`locate /home -username karen`**
    D. **`locate /home Karen`**
    E. **`find /home -name Karen`**

20. What can you conclude from the following interaction?

```
$ which man
/usr/bin/man
```

    A. The only file called `man` on the computer is in `/usr/bin`.
    B. The `/usr/bin/man` program was installed by system package tools.
    C. The `/usr/bin/man` program will be run by any user who types **`man`**.
    D. The first instance of the `man` program, in path search order, is in `/usr/bin`.
    E. The user `man` owns the `/usr/bin/man` program file.

Review Questions

1. Where might the BIOS find a boot loader?
   - **A.** RAM
   - **B.** `/dev/boot`
   - **C.** MBR
   - **D.** `/dev/kmem`
   - **E.** The swap partition

2. You want to boot a Linux system into single-user mode. What option might you add to a Linux kernel's options list in a boot loader to accomplish this task?
   - **A.** **`one`**
   - **B.** **`single-user`**
   - **C.** **`1`**
   - **D.** **`telinit 6`**
   - **E.** **`telinit 1`**

3. After the system boots, one of your hard disks doesn't respond. What might you do to find out what's gone wrong?
   - **A.** Check the `/var/log/diskerror` log file to see what's wrong.
   - **B.** Verify that the disk is listed in `/mnt/disks`.
   - **C.** Check the contents of `/etc/inittab` to be sure it's mounting the disk.
   - **D.** Type **`dmesg | less`**, and peruse the output for disk-related messages.
   - **E.** Check the `menu.lst`, `grub.conf`, or `grub.cfg` configuration file.

4. What is the first program that the Linux kernel runs once it's booted in a normal boot process?
   - **A.** `dmesg`
   - **B.** `init`
   - **C.** `startup`
   - **D.** `rc`
   - **E.** `lilo`

5. Which of the following is the GRUB 2 boot loader configuration file?
   - **A.** `/dev/grub`
   - **B.** The MBR
   - **C.** `/boot/grub/grub.conf`
   - **D.** `/boot/grub/grub.cfg`
   - **E.** `/boot/grub/menu.lst`

6. How might you identify an initial RAM disk file in GRUB 2?
   A. `initrd /boot/initrd-3.4.2`
   B. `initrd=/boot/initrd-3.4.2`
   C. `initramfs /boot/initrd-3.4.2`
   D. `initramfs=/boot/initrd-3.4.2`
   E. `ramdisk=/boot/initrd-3.4.2`

7. Which command is used to install GRUB Legacy into the MBR of your first SATA hard drive?
   A. **`grub (hd0,1)`**
   B. **`grub-install /dev/sda1`**
   C. **`lilo /dev/sda`**
   D. **`grub-install /dev/sda`**
   E. **`grub-legacy /dev/sda1`**

8. The string `root (hd1,5)` appears in your `/boot/grub/menu.lst` file. What does this mean?
   A. GRUB Legacy tells the kernel that the kernel's root partition is the fifth partition of the first disk.
   B. GRUB Legacy looks for files on the sixth partition of the second disk.
   C. GRUB Legacy looks for files on the fifth partition of the first disk.
   D. GRUB Legacy installs itself in `/dev/hd1,5`.
   E. GRUB Legacy installs itself in `/dev/sdb5`.

9. What line in `/etc/inittab` would indicate that your default runlevel is 5?
   A. `ca:12345:ctrlaltdel:/sbin/shutdown -t1 -a -r now`
   B. `id:5:initdefault:`
   C. `si:5:sysinit:/etc/init.d/rcS`
   D. `l5:5:wait:/etc/init.d/rc 5`
   E. `1:2345:respawn:/sbin/getty 38400 tty1`

10. Which SysV runlevels are reserved by `init` for reboot, shutdown, and single-user mode purposes? (Select three.)
    A. 0
    B. 1
    C. 2
    D. 5
    E. 6

11. You type the following command:

```
$ runlevel
5 3
```

What can you tell about your runlevel status? (Select two.)

A. The current runlevel is 5.

B. The current runlevel is 3.

C. The previous runlevel is 5.

D. The previous runlevel is 3.

E. The runlevel is in the process of changing.

12. A system administrator types the following command:

```
# shutdown -c
```

What is the effect of this command?

A. A previously scheduled shutdown is cancelled.

B. The system shuts down and reboots immediately.

C. The system shuts down and halts immediately.

D. The system asks for confirmation and then shuts down.

E. The system closes all open windows in X without shutting down.

13. What program do you use to start or stop services when using the systemd initialization process?

A. `journalctl`

B. `systemctl`

C. `init`

D. `service`

E. `systemd`

14. You want to change to single-user mode on a running SysV system. What command might you use to do this?

A. **`runlevel 1`**

B. **`telinit 1`**

C. **`shutdown -1`**

D. **`single-user`**

E. **`halt to 1`**

15. What command would you use to change to single-user mode on a running systemd system?

A. `systemctl isolate rescue.target`

B. `systemctl default`

C. `journalctl default`

D. `systemd single`

E. `systemctl start sshd.service`

16. How would you remove two lines of text from a file using vi?

A. In command mode, position the cursor on the first line and type **`2dd`**.

B. In command mode, position the cursor on the last line and type **`2yy`**.

C. In insert mode, position the cursor at the start of the first line, hold down the Shift key while pressing the Down arrow key twice, and press the Delete key on the keyboard.

D. In insert mode, position the cursor at the start of the first line, and press Ctrl+K twice.

E. Using your mouse, select both lines and then press the Delete or Backspace key.

17. In vi's command mode, you type **`:q!`**. What is the effect?

A. Nothing. This isn't a valid vi command.

B. The text `:q!` is inserted into the file you're editing.

C. The program terminates and saves any existing files that are in memory.

D. The program terminates without saving your work.

E. An exclamation point (`!`) overwrites the character under the cursor in the text.

18. What is an advantage of vi over graphical text editors?

A. vi is X based, so it is easier to use than other graphical text editors.

B. vi encodes text in EBCDIC, which is more flexible than Emacs's ASCII.

C. vi's mode-based operations permit it to handle non-English languages.

D. vi includes a built-in web browser and email client; Emacs doesn't.

E. vi is smaller, so it can fit on compact emergency USB flash drive systems and embedded devices.

19. You want to enter insert mode from vi's command mode. How might you do this? (Select three.)

A. Type **`R`**.

B. Type **`i`**.

C. Type **`a`**.

D. Type **`:`**.

E. Press Esc.

20. How do you exit vi's insert mode to type command-mode commands?

A. Press the ~ key.

B. Press the Esc key.

C. Press Ctrl+X followed by Ctrl+C.

D. Press the F10 key.

E. Press the Shift+Insert key combination.

Review Questions

1. When you configure an X server, you need to make changes to configuration files and then start or restart the X server. Which of the following can help streamline this process?
   A. Shut down X by switching to a runlevel in which X doesn't run automatically, and then reconfigure it and use `startx` to test X startup.
   B. Shut down X by booting into single-user mode, and then reconfigure X and use `telinit` to start X running again.
   C. Reconfigure X, and then unplug the computer to avoid the lengthy shutdown process before restarting the system and X along with it.
   D. Use the `startx` utility to check the X configuration file for errors before restarting the X server.
   E. Connect the Linux computer's network port directly to the X server, without using any intervening routers, in order to reduce network latency.

2. Which of the following summarizes the organization of the X configuration file?
   A. The file contains multiple sections, one for each screen. Each section includes subsections for individual components (keyboard, video card, and so on).
   B. Configuration options are entered in any order desired. Options relating to specific components (keyboard, video card, and so on) may be interspersed.
   C. The file begins with a summary of individual screens. Configuration options are preceded by a code word indicating the screen to which they apply.
   D. The file is broken into sections, one or more for each component (keyboard, video card, and so on). The file also has one or more sections that define how to combine the main sections.
   E. The file is a rare binary configuration file that must be accessed using SQL database tools.

3. A monitor's manual lists its range of acceptable synchronization values as 27kHz–96kHz horizontal and 50Hz–160Hz vertical. What implications does this have for the resolutions and refresh rates the monitor can handle?
   A. The monitor can run at up to 160Hz vertical refresh rate in all resolutions.
   B. The monitor can handle up to 160Hz vertical refresh rate depending on the color depth.
   C. The monitor can handle up to 160Hz vertical refresh rate depending on the resolution.
   D. The monitor can handle vertical resolutions of up to 600 lines (96,000 ÷ 160), but no more.
   E. The monitor can handle horizontal resolutions of up to 600 columns (96,000 ÷ 160), but no more.

4. In what section of `XF86Config` or `xorg.conf` do you specify the resolution that you want to run?
   - **A.** In the `ServerLayout` section, using the `Screen` option
   - **B.** In the `Monitor` section, using the `Modeline` option
   - **C.** In the `Device` section, using the `Modeline` option
   - **D.** In the `DefaultResolution` section, using the `Define` option
   - **E.** In the `Screen` section, subsection `Display`, using the `Modes` option

5. What is an advantage of a font server?
   - **A.** It provides faster font displays than are otherwise possible.
   - **B.** It can simplify font maintenance on a network with many X servers.
   - **C.** It's the only means of providing TrueType support for XFree86 4.*x*.
   - **D.** It enables the computer to turn a bitmapped display into an ASCII text file.
   - **E.** It enables X to use font smoothing, which isn't possible with core fonts.

6. What methods do Linux distributions use to start X automatically when the system boots? (Select two.)
   - **A.** Start an XDMCP server from the `Start` folder.
   - **B.** Start an XDMCP server from an `~/.xinitrc` script.
   - **C.** Start an XDMCP server via a system startup script.
   - **D.** Start an XDMCP server via a boot manager.
   - **E.** Start an XDMCP server from `init`.

7. How would you change the text displayed by XDM as a greeting?
   - **A.** Click Configure ➢ Greeting from the XDM main menu, and edit the text in the resulting dialog box.
   - **B.** Pass `greeting="`*`text`*`"` as a kernel option in the boot loader, changing *`text`* to the new greeting.
   - **C.** Edit the `/etc/X11/xorg.conf` file, and change the `Greeting` option in the `xdm` area.
   - **D.** Run `xdmconfig`, and change the greeting on the Login tab.
   - **E.** Edit the `/etc/X11/xdm/Xresources` file, and change the text in the `xlogin*greeting` line.

8. Which of the following features do KDM and GDM provide that XDM doesn't?
   - **A.** An encrypted remote X-based access ability, improving network security
   - **B.** The ability to accept logins from remote computers, once properly configured
   - **C.** The ability to select the login environment from a menu on the main login screen
   - **D.** A login screen that shows the username and password simultaneously rather than sequentially
   - **E.** An option to log into text mode if X should fail to start

9. Which of the following commands tells the X server to accept connections from `penguin.example.com`?
   A. **`xhost +penguin.example.com`**
   B. **`export DISPLAY=penguin.example.com:0`**
   C. **`telnet penguin.example.com`**
   D. **`xaccess penguin.example.com`**
   E. **`ssh penguin.example.com`**

10. To assist an employee who has trouble with keyboard repeat features, you've disabled this function in `/etc/X11/xorg.conf`. Why might this step not be sufficient for the goal of disabling keyboard repeat?
   A. GNOME, KDE, or other desktop environment settings for keyboard repeat may override those set in `xorg.conf`.
   B. The `xorg.conf` file has been deprecated; you should instead adjust the `/etc/X11/XF86Config` file.
   C. Keyboard settings in `xorg.conf` apply only to Bluetooth keyboards; you must use `usbkbrate` to adjust keyboard repeat for USB keyboards.
   D. You must also locate and reset the DIP switch on the keyboard to disable keyboard repeat.
   E. The keyboard repeat options in `xorg.conf` work only if the keyboard's nationality is set incorrectly, which is not often.

11. Which of the following programs may be used to provide computer-generated speech for users who have trouble reading computer displays? (Select two.)
   A. SoX
   B. Braille
   C. Orca
   D. `talk`
   E. Emacspeak

12. You manage a computer that's located in Los Angeles, California, but the time zone is misconfigured as being in Tokyo, Japan. What procedure can you follow to fix this problem? (Select two.)
   A. Run `hwclock --systohc` to update the clock to the correct time zone.
   B. Delete `/etc/localtime`, and replace it with an appropriate file from `/usr/share/zoneinfo`.
   C. Edit the `/etc/tzconfig` file so that it specifies `North_America/Los_Angeles` as the time zone.
   D. Edit `/etc/localtime`, and change the three-letter time zone code on the `TZ` line.
   E. Use the `tzselect` program to select a new (Los Angeles) time zone.

13. You're configuring a Linux system that doesn't boot any other OS. What is the recommended time to which the computer's hardware clock should be set?
    - **A.** Helsinki time
    - **B.** Local time
    - **C.** US Pacific time
    - **D.** UTC
    - **E.** Internet time

14. You've developed a script that uses several Linux commands and edits their output. You want to be sure that the script runs correctly on a computer in Great Britain, although you're located elsewhere, since the output includes features such as currency symbols and decimal numbers that are different from one nation to another. What might you do to test this?
    - **A.** Enter the BIOS, locate and change the location code, reboot into Linux, and run the script.
    - **B.** Edit `/etc/locale.conf`, change all the `LC_*` variables to `en_GB.UTF-8`, and then reboot and run the script.
    - **C.** Type **`export LC_ALL=en_GB.UTF-8`**, and run the script from the same shell you used to type this command.
    - **D.** Type **`locale_set Great_Britain`**, and run the script from the same shell you used to type this command.
    - **E.** Type **`export TZ=:/usr/share/zoneinfo/Europe/London`**, and run the script from the same shell you used to type this command.

15. Which character set encoding is the preferred method on modern Linux systems?
    - **A.** UTF-8
    - **B.** ASCII
    - **C.** ISO-8859-1
    - **D.** ISO-8859-8
    - **E.** ATASCII

16. Which of the following describes the function of a smart filter?
    - **A.** It improves the legibility of a print job by adding font smoothing to the text.
    - **B.** It detects information in print jobs that may be confidential as a measure against industrial espionage.
    - **C.** It sends email to the person who submitted the print job, obviating the need to wait around the printer for a printout.
    - **D.** It detects and deletes prank print jobs that are likely to have been created by troublemakers trying to waste your paper and ink.
    - **E.** It detects the type of a file and passes it through programs to make it printable on a given model of printer.

17. What information about print jobs does the `lpq` command display? (Select two.)
    A. The name of the application that submitted the job
    B. A numerical job ID that can be used to manipulate the job
    C. The amount of ink or toner left in the printer
    D. The username of the person who submitted the job
    E. The estimated time to finish printing the job

18. You've submitted several print jobs, but you've just realized that you mistakenly submitted a huge document that you didn't want to print. Assuming that you can identify the specific job, that it's not yet printing, and that its job ID number is 749, what command would you type to delete it from the `okidata` print queue?
    A. The answer depends on whether you're using BSD, LPD, LPRng, or CUPS.
    B. Type **`lpdel -Pokidata 749`**.
    C. Type **`lprm -Pokidata 749`**.
    D. Type **`cupsdisable -Pokidata 749`**.
    E. None of the above; the task is impossible.

19. Which of the following is generally true of Linux programs that print?
    A. They send data directly to the printer port.
    B. They produce PostScript output for printing.
    C. They include extensive collections of printer drivers.
    D. They can print only with the help of add-on commercial programs.
    E. They specify use of the Verdana font.

20. What tool might you use to print a four-page PostScript file on a single sheet of paper?
    A. PAM
    B. `mpage`
    C. 4Front
    D. `route`
    E. `411toppm`

Review Questions

1. When a user account has been locked using the `usermod -L` command, you will see what in the `/etc/shadow` file's record for that user?
   A. An `x` in the password field
   B. An `!!` in the password field
   C. A blank password field
   D. A zero (`0`) at the front of the password field
   E. An `!` at the front of the password field

2. What commands can be used to add user accounts to a Linux system?
   A. `useradd` *`username`*
   B. `adduser` *`username`*
   C. `useradd -c "`*`full name`*`"` *`username`*
   D. `usradd` *`username`*
   E. `passwd` *`username`*

3. An administrator types **`chage -M 7 `*`time`***. What is the effect of this command?
   A. The *`time`* account's password must be changed at least once every seven days.
   B. All users must change their passwords at least once every seven days.
   C. All users are permitted to change their passwords at most seven times.
   D. The *`time`* account's age is set to seven months.
   E. The account database's time stamp is set to seven months ago.

4. What is wrong with the following `/etc/passwd` file entry?
   `sally:x:1029:Sally Jones:/home/myhome:/bin/passwd`
   A. The default shell is set to `/bin/passwd`, which is an invalid shell.
   B. The username is invalid. Linux usernames can't be all lowercase letters.
   C. The home directory doesn't match the username.
   D. Either the UID or the GID field is missing.
   E. The hashed password is missing.

5. You want `sally`, who is already a member of the Production group, also to be a member of the Development group. What is the best way to accomplish this?
   A. Use the `groupadd Development sally` command.
   B. Use the `groupadd Production sally` command.
   C. Manually edit the `/etc/group` file, and change the Development group's record to `Development:501:sally`.
   D. Use the `usermod -G Development sally` command.
   E. Use the `usermod -a -G Development sally` command.

6. What types of files might you expect to find in `/etc/skel`? (Select three.)
   - **A.** A copy of the `/etc/shadow` file
   - **B.** An empty set of directories to encourage good file management practices
   - **C.** A `README` or similar welcome file for new users
   - **D.** A starting `.bashrc` file
   - **E.** The RPM or Debian package management database

7. What would a Linux system administrator type to remove the `nemo` account and its home directory?
   - **A.** **`userdel nemo`**
   - **B.** **`userdel -f nemo`**
   - **C.** **`userdel -r nemo`**
   - **D.** **`rm -r /home/nemo`**
   - **E.** **`usermod -D nemo`**

8. Which of the following system logging codes represents the *highest* priority?
   - **A.** `info`
   - **B.** `warning`
   - **C.** `crit`
   - **D.** `debug`
   - **E.** `emerg`

9. Which of the following configuration files does the `logrotate` program consult for its settings?
   - **A.** `/etc/logrotate.conf`
   - **B.** `/usr/sbin/logrotate/logrotate.conf`
   - **C.** `/usr/src/logrotate/logrotate.conf`
   - **D.** `/etc/logrotate/.conf`
   - **E.** `~/.logrotate`

10. You want to create a log file entry noting that you're manually shutting down the system to add a new network card. How might you create this log entry, just prior to using `shutdown`?
    - **A.** **`dmesg -l "shutting down to add network card"`**
    - **B.** **`syslog shutting down to add network card`**
    - **C.** **`rsyslogd "shutting down to add network card"`**
    - **D.** **`logger shutting down to add network card`**
    - **E.** **`wall "shutting down to add network card"`**

11. Your manager has asked that you configure `logrotate` to run on a regular, unattended basis. What utility/feature should you configure to make this possible?
    A. `at`
    B. `logrotate.d`
    C. `cron`
    D. `inittab`
    E. `ntpd`

12. You've set your system (software) clock on a Linux computer to the correct time, and now you want to set the hardware clock to match. What command might you type to accomplish this goal?
    A. **`date --sethwclock`**
    B. **`ntpdate`**
    C. **`sysclock --tohc`**
    D. **`time --set -hw`**
    E. **`hwclock --systohc`**

13. As `root`, you type **`date 12110710`**. What will be the effect?
    A. The software clock will be set to 7:10 a.m. on December 11 of the current year.
    B. The software clock will be set to 12:11 p.m. on October 7 of the current year.
    C. The software clock will be set to 7:10 a.m. on November 12 of the current year.
    D. The software clock will be set to 12:11 p.m. on July 10 of the current year.
    E. The software clock will be set to July 10 in the year 1211.

14. What will be the effect of a computer having the following two lines in `/etc/ntp.conf`?

```
server pool.ntp.org
server tardis.example.org
```

    A. The local computer's NTP server will poll a server in the public NTP server pool; the first `server` option overrides subsequent `server` options.
    B. The local computer's NTP server will poll the `tardis.example.org` time server; the last `server` option overrides earlier server options.
    C. The local computer's NTP server will poll both a server in the public NTP server pool and the server at `tardis.example.org` and use whichever site provides the cleanest time data.
    D. The local computer's NTP server will refuse to run because of a malformed `server` specification in `/etc/ntp.conf`.
    E. The local computer's NTP server will poll a computer in the public NTP server pool but will fall back on `tardis.example.org` if and only if the public pool server is down.

15. You've configured one computer (`gateway.pangaea.edu`) on your five-computer network as an NTP server that obtains its time signal from `ntp.example.com`. What computer(s) should your network's other computers use as their time source(s)?
    - **A.** You should consult a public NTP server list to locate the best server for you.
    - **B.** Both `gateway.pangaea.edu` and `ntp.example.com`
    - **C.** Only `ntp.example.com`
    - **D.** Only `gateway.pangaea.edu`
    - **E.** None. NTP should be used on the Internet, not on small local networks.

16. Which of the following tasks are most likely to be handled by a `cron` job? (Select two.)
    - **A.** Starting an important server when the computer boots
    - **B.** Finding and deleting old temporary files
    - **C.** Scripting supervised account creation
    - **D.** Monitoring disk partition space status and emailing a report
    - **E.** Sending files to a printer in an orderly manner

17. Which of the following lines, if used in a user `cron` job, will run `/usr/local/bin/cleanup` twice a day?
    - **A.** `15 7,19 * * * tbaker /usr/local/bin/cleanup`
    - **B.** `15 7,19 * * * /usr/local/bin/cleanup`
    - **C.** `15 */2 * * * tbaker /usr/local/bin/cleanup`
    - **D.** `15 */2 * * * /usr/local/bin/cleanup`
    - **E.** `2 * * * * /usr/local/bin/cleanup`

18. You're installing Linux on a critical business system. Which of the following programs might you want to add to ensure that a daily backup job is handled correctly?
    - **A.** `tempus`
    - **B.** `anacron`
    - **C.** `crontab`
    - **D.** `ntpd`
    - **E.** `syslog-ng`

19. What do the following commands accomplish? (The administrator presses Ctrl+D after typing the second command.)

```
# at teatime
at> /usr/local/bin/system-maintenance
```

    - **A.** Nothing; these commands aren't valid.
    - **B.** Nothing; `teatime` isn't a valid option to `at`.
    - **C.** Nothing; you may only type valid `bash` built-in commands at the `at>` prompt.
    - **D.** Nothing; `at` requires you to pass it the name of a script, which `teatime` is not.
    - **E.** The `/usr/local/bin/system-maintenance` program or script is run at 4:00 p.m.

20. How might you schedule a script to run once a day on a Linux computer? (Select two.)

A. Place the script, or a link to it, in `/etc/cron.daily`.

B. Use the `at` command to schedule the specified script to run on a daily basis at a time of your choosing.

C. Create a user `cron` job that calls the specified script once a day at a time of your choosing, and install that `cron` job using `crontab`.

D. Use `run-parts` to schedule the specified script to run on a daily basis.

E. Type **`crontab -d`** ***`scriptname`***, where *`scriptname`* is the name of your script.

Review Questions

1. Which types of network hardware does Linux support? (Select three.)
   - **A.** Token Ring
   - **B.** Ethernet
   - **C.** DHCP
   - **D.** NetBEUI
   - **E.** Fibre Channel
2. Which of the following is a valid IPv4 address for a single computer on a TCP/IP network?
   - **A.** 202.9.257.33
   - **B.** 63.63.63.63
   - **C.** 107.29.5.3.2
   - **D.** 98.7.104.0/24
   - **E.** 255.255.255.255
3. You want to set up a computer on a local network via a static TCP/IP configuration, but you lack a gateway address. Which of the following is true?
   - **A.** Because the gateway address is necessary, no TCP/IP networking functions will work.
   - **B.** TCP/IP networking will function, but you'll be unable to convert hostnames to IP addresses or vice versa.
   - **C.** You'll be able to communicate with machines on your local network segment but not with other systems.
   - **D.** Since a gateway is needed only for IPv6, you'll be able to use IPv4 but not IPv6 protocols.
   - **E.** Without a gateway address available, you'll be unable to use DHCP to simplify configuration.
4. Using a packet sniffer, you notice a lot of traffic directed at TCP port 22 on a local computer. What protocol does this traffic use, assuming it's using the standard port?
   - **A.** HTTP
   - **B.** SMTP
   - **C.** Telnet
   - **D.** SSH
   - **E.** NNTP
5. What network port would an IMAP server normally use for IMAP exchanges?
   - **A.** 21
   - **B.** 25
   - **C.** 110

D. 143

E. 443

6. Which of the following are *not* Linux DHCP clients? (Select two.)

A. `pump`

B. `dhcpcd`

C. `dhcpd`

D. `dhclient`

E. `ifconfig`

7. Which of the following types of information are returned by typing **`ifconfig eth0`**? (Select two.)

A. The names of programs that are using `eth0`

B. The IP address assigned to `eth0`

C. The hardware address of `eth0`

D. The hostname associated with `eth0`

E. The kernel driver used by `eth0`

8. Which of the following programs is conventionally used to perform a DNS lookup?

A. `host`

B. `dnslookup`

C. `pump`

D. `ifconfig`

E. `netstat`

9. Which of the following commands should you type to add to host 192.168.0.10 a default gateway of 192.168.0.1?

A. **`route add default gw 192.168.0.10 192.168.0.1`**

B. **`route add default gw 192.168.0.1`**

C. **`route add 192.168.0.10 default 192.168.0.1`**

D. **`route 192.168.0.10 gw 192.168.0.1`**

E. **`route host gw 192.168.0.1`**

10. Which of the following commands might bring up an interface on `eth1`? (Select two.)

A. **`dhclient eth1`**

B. **`ifup eth1`**

C. **`ifconfig eth1`**

D. **`network eth1`**

E. **`netstat -up eth1`**

11. What is the purpose of `/etc/hostname`, if it's present on the system?
    A. It holds the hostname of a package repository server.
    B. It holds a list of servers that resolve hostnames.
    C. It holds a list of IP addresses and associated hostnames.
    D. It holds the hostname of the local gateway computer.
    E. It holds the computer's default hostname.

12. Network accesses to parts of the Internet work fine, but several common sites have stopped responding (even when addressed via raw IP addresses). Which of the following tools will be most helpful in diagnosing the source of this problem?
    A. `netstat`
    B. `ping`
    C. `traceroute`
    D. `ifconfig`
    E. `dig`

13. What value identifies an IPv6 address as a link-local address?
    A. The address uses the MAC address of the system.
    B. The address starts with fe80.
    C. The address starts with fee.
    D. The address starts with 2001.

14. How can you learn what programs are currently accessing the network on a Linux system?
    A. Type **`ifconfig -p eth0`**.
    B. Examine `/proc/network/programs`.
    C. Type **`netstat -p`**.
    D. Examine `/etc/xinetd.conf`.
    E. Type **`dmesg | less`**.

15. To diagnose a problem with an IMAP server (`imap.example.com`), you type **`telnet imap.example.com 143`** from a remote client. How can this procedure help you? (Select two.)
    A. You can verify basic connectivity between the client computer and the server program.
    B. By examining the output, you can locate intermediate routers that are misbehaving.
    C. By using an encrypted protocol, you ensure that a packet-sniffing intruder doesn't cause problems.
    D. Once connected, you can type IMAP commands to test the server's response to them.
    E. Once you've logged into the remote system, you can examine its IMAP log files.

16. You're configuring a new system, and your network administrator scribbles its IP address (172.25.78.89), netmask (255.255.255.0), gateway address (172.25.79.1), and DNS server address (10.24.89.201) on a piece of paper. You enter this information into your configuration files and type **`ifup eth0`**, but you find that you can't access the Internet with this computer. Which of the following is definitely true?
    A. Because the DNS server is on a completely different network, it won't function properly for your system. You should ask for the local network's DNS server's IP address.
    B. The netmask identifies the gateway as being on a different network segment than the computer you're configuring, so the two can't communicate directly. You most likely misread one address.
    C. Because the IP addresses involved are private IP addresses, there's no way for them to access the Internet. You must ask for public IP addresses for this system or use only your local private network.
    D. The computer's IP address is a Class B address, but the netmask is for a Class C address. This combination can't work together, so you must obtain a new IP address or netmask.
    E. The `ifup` utility works only for computers that use DHCP, so using a static IP address as specified in the question won't work correctly.

17. What is the purpose of the `-n` option to `route`?
    A. It causes no operation to be performed; `route` reports what it would do if `-n` were omitted.
    B. It precedes the specification of a netmask when setting the route.
    C. It limits `route`'s output to descriptions of non-Internet routes.
    D. It forces interpretation of a provided address as a network address rather than a host address.
    E. It causes machines to be identified by IP address rather than hostname in output.

18. What is the purpose of `/etc/resolv.conf`?
    A. It holds the names of network protocols and the port numbers with which they're associated.
    B. It controls whether the computer's network options are configured statically or via a DHCP server.
    C. It specifies the IP address of a DHCP server from which the computer attempts to obtain an IP address.
    D. It holds the routing table for the computer, determining the route that network packets take to other computers.
    E. It sets the computer's default search domain and identifies (by IP address) the name servers that the computer may use.

19. Which of the following entries are found in the `/etc/hosts` file?
    A. A list of hosts allowed to access this one remotely
    B. Mappings of IP addresses to hostnames

C. A list of users allowed to access this host remotely

D. Passwords for remote web administration

E. A list of port numbers and their associated protocols

20. How can you reconfigure Linux to use DNS queries prior to consulting `/etc/hosts`?

A. Edit the `/etc/resolv.conf` file, and be sure the `nameserver dns` line comes before the `nameserver files` line.

B. As `root`, type **`nslookup dns`**.

C. Edit the `/etc/named.conf` file, and change the `preferred-resolution` option from `files` to `dns`.

D. Edit `/etc/nsswitch.conf`, and change the order of the `files` and `dns` options on the `hosts:` line.

E. As `root`, type **`dig local dns`**.

Review Questions

1. Which environment variable stores the format for the command prompt?
   A. `PROMPT`
   B. `PSI`
   C. `PAGER`
   D. `PS1`
   E. None of these variables store the format for the command prompt.

2. You want to create a shortcut command for the command `cd ~/papers/trade`. Which of the following lines, if entered in a `bash` startup script, will accomplish this goal?
   A. `alias cdpt='cd ~/papers/trade'`
   B. `export cdpt='cd ~/papers/trade'`
   C. `alias cdpt 'cd ~/papers/trade'`
   D. `alias cd 'cdpt ~/papers/trade'`
   E. `env cdpt `cd ~/papers/trade``

3. What is the purpose of the `EDITOR` environment variable?
   A. If it's set to `Y` (the default), the shell environment permits editing of commands; if it's set to `N`, such editing is disallowed.
   B. It specifies the filename of the text editor that `bash` uses by default while you're entering commands at its prompt.
   C. If you type **`edit` *`filename`*** at a command prompt, the program specified by `EDITOR` will be launched.
   D. If it's set to `GUI`, programs call a GUI editor; if it's set to `TEXT`, programs call a text-based editor.
   E. Some programs refer to `EDITOR` to determine what external editor to launch when they need to launch one.

4. In what environment variable is the current working directory stored?
   A. `PATH`
   B. `CWD`
   C. `PWD`
   D. `PRESENT`
   E. `WORKING`

5. If typed in a `bash` shell, which of the following commands will create an environment variable called `MYVAR` with the contents `mystuff` that will be accessible to any created subshells? (Choose all that apply.)
   A. **`export MYVAR='mystuff'`**
   B. **`MYVAR='mystuff'`**

C. **`MYVAR='mystuff'; export MYVAR`**

D. **`echo $MYVAR mystuff`**

E. **`setenv MYVAR mystuff`**

6. What file might a user modify to alter their own `bash` environment?

A. `/etc/inputrc`

B. `/etc/bashrc`

C. `$HOME/bashrc`

D. `$HOME/.profile_bash`

E. `~/.bashrc`

7. What commands might you use (along with appropriate options) to learn the value of a specific environment variable? (Select two.)

A. `env`

B. `DISPLAY`

C. `export`

D. `echo`

E. `cat`

8. Immediately after creating a shell script called `a_script.sh` in a text editor, which method will not work to run the script?

A. Typing **`bash a_script.sh`** at the command line.

B. Typing **`./a_script.sh`** at the command line.

C. Typing **`. a_script.sh`** at the command line.

D. Typing **`source a_script.sh`** at the command line.

E. Any of the above will work.

9. Describe the effect of the following short script, `cp1.sh`, if it's called as `cp1.sh big.c big.cc`:

```
#!/bin/bash
cp $2 $1
```

A. It has the same effect as the `cp` command—copying the contents of `big.c` to `big.cc`.

B. It compiles the C program `big.c` and calls the result `big.cc`.

C. It copies the contents of `big.cc` to `big.c`, eliminating the old `big.c`.

D. It converts the C program `big.c` into a C++ program called `big.cc`.

E. It interprets the `big.c` and `big.cc` files as `bash` scripts.

10. Where are the commands iterated by the loop located within the loop?

A. Within the `then` statement section

B. Between the double semicolons (;;)

C. Within the `case` and `esac` constructs

D. Within the test statement

E. Between `do` and `done` constructs

11. Which of the following lines identify valid shell scripts on a normally configured system? (Select two.)

A. `#!/bin/script`

B. `#!/bin/bash`

C. `#!/bin/tcsh`

D. `!#/bin/sh`

E. `!#/bin/zsh`

12. Which of the following are valid looping statements in `bash` shell scripting? (Select all that apply.)

A. `for`

B. `while`

C. `if-then`

D. `until`

E. `case`

13. Your SMTP email server receives a message addressed to `postmaster`. The `postmaster` username has an alias of `john` on this computer. Assuming that the system is properly configured, who will receive the email message?

A. `postmaster`

B. `john`

C. The account listed in `~/.forward`

D. `root`

E. No user, because an alias was set

14. Which of the following is *not* a popular SMTP server for Linux?

A. Postfix

B. Sendmail

C. Fetchmail

D. Exim

E. qmail

15. You see the following line in a script:

```
mail -s "Error" -c abort < /tmp/msg root
```

What is the effect of this line, if and when it executes?

A. An email is sent to the user `Error`, the script is aborted using `root` privileges, and error messages are written to `/tmp/msg`.

B. An email with the subject of `Error` and the contents from `/tmp/msg` is sent to the local users `root` and `abort`.

C. An email with the subject of `Error` and the contents of `/tmp/msg` is sent to the local user `root`, and then the script is aborted.

D. An email is sent with `Error` priority to the local user `root`, and the email system is then shut down with error messages being stored in `/tmp/msg`.

E. An email with the subject of `Error` and contents of `/tmp/msg` is sent to `root`, and information on this is logged with priority `abort`.

16. Your Internet connection has gone down for several hours. What command can you use to check if there is a long list of jobs in the email queue?

A. `service sendmail status`

B. `lp -d queue ~/Maildir`

C. `sendmail -bq`

D. `mailq`

E. `ls /var/spool`

17. You examine your `/etc/aliases` file and find that it contains the following line:

```
root: jody
```

What can you conclude from this?

A. Email addressed to `jody` on this system will be sent to the local user `root`.

B. Email addressed to `root` on this system will be sent to the local user `jody`.

C. The local user `jody` has broken into the system and has acquired `root` privileges.

D. The local user `jody` has permission to read email directly from `root`'s mail queue.

E. The administrator may log in using either username: `root` or `jody`.

18. You've just installed MySQL and run it by typing **`mysql`**. How would you create a database called `fish` to store data on different varieties of fish?

A. Type **`NEW DATABASE fish;`** at the `mysql>` prompt.

B. Type **`CREATE DATABASE fish;`** at the `mysql>` prompt.

C. Type **`NEW DATABASE FISH;`** at the `mysql>` prompt.

D. Type **`DATABASE CREATE fish;`** at the `mysql>` prompt.

E. Type **`DB CREATE fish;`** at the `mysql>` prompt.

19. Which of the following are true statements about SQL tables? (Select two.)

A. Multiple tables may exist in a single SQL database.

B. Tables may be combined for cross-table searches using the `DROP` command.

C. Tables consist of rows, each of which holds attributes, and columns, each of which defines a specific database item.

D. Careful table design can reduce the amount of data entry and database storage size.

E. Tables are stored on disk using a lossy compression algorithm.

20. What is the effect of the following SQL command, assuming the various names and data exist?

```
mysql> UPDATE stars SET magnitude=2.25 WHERE starname='Mintaka';
```

A. It returns database entries from the `stars` table for all stars with `magnitude` of `2.25` and `starname` of `Mintaka`.

B. It sets the value of the `stars` field in the `magnitude` set to `Mintaka`, using a precision of `2.25`.

C. It sets the value of the `magnitude` field to `2.25` for any item in the `stars` table with the `starname` value of `Mintaka`.

D. It combines the `stars` and `magnitude=2.25` tables, returning all items for which the `starname` is `Mintaka`.

E. It updates the `stars` database, creating a new entry with a `starname` value of `Mintaka` and a `magnitude` of `2.25`.

Review Questions

1. Typing **`lsof -i | grep LISTEN`** as `root` produces three lines of output, corresponding to the `sendmail`, `sshd`, and `proftpd` servers. What can you conclude about the security of this system?

   A. Everything is OK; the presence of `sshd` ensures that data are being encrypted via SSH.

   B. The `sendmail` and `sshd` servers are OK, but the FTP protocol used by `proftpd` is insecure and should never be used.

   C. The `sendmail` server should be replaced by Postfix or qmail for improved security, but `sshd` and `proftpd` are fine.

   D. Because `sendmail` and `proftpd` both use unencrypted text-mode data transfers, neither is appropriate on a network-connected computer.

   E. No conclusion can be drawn without further information; the listed servers may or may not be appropriate or authentic.

2. As part of a security audit, you plan to use Nmap to check all of the computers on your network for unnecessary servers. Which of the following tasks should you do prior to running your Nmap check?

   A. Back up `/etc/passwd` on the target systems to eliminate the possibility of it being damaged.

   B. Obtain the `root` passwords to the target systems so that you can properly configure them to accept the Nmap probes.

   C. Obtain written permission from your boss to perform the Nmap sweep.

   D. Configure `/etc/sudoers` on the computer you intend to use for the sweep, to give yourself the ability to run Nmap.

   E. Disable any firewall between the computer that's running Nmap and the servers you intend to scan.

3. Your login server is using PAM, and you want to limit users' access to system resources. Which configuration file will you need to edit?

   A. `/etc/limits.conf`

   B. `/etc/pam/limits.conf`

   C. `/etc/security/limits.conf`

   D. `/etc/security/pam/limits.conf`

   E. `/usr/local/limits.conf`

4. Which of the following tools might you use to check for open ports on a local computer? (Select three.)

   A. Nmap

   B. `netstat`

   C. `lsof`

D. `portmap`

E. `services`

5. Which of the following commands will locate all of the program files on a computer on which the SUID bit is set?

   A. **`find / -type SUID`**

   B. **`find / -perm +4000 -type f`**

   C. **`find / -perm +SUID -type f`**

   D. **`find / -type +4000`**

   E. **`find / -suid`**

6. The `/etc/sudoers` file on a computer includes the following line. What is its effect?

   ```
   %admin ALL=(ALL) ALL
   ```

   A. Members of the `admin` group may run all programs with `root` privileges by using `sudo`.

   B. Users in the `admin` user alias, defined earlier in the file, may run all programs with `root` privileges by using `sudo`.

   C. The `admin` user alias is defined to include all users on the system.

   D. The `admin` command alias is defined to include all commands.

   E. The user `admin` may run all programs on the computer as `root` by using `sudo`.

7. Which command would you type, as `root`, to discover all the open network connections on a Linux computer?

   A. **`lsof -c a`**

   B. **`netstat -ap`**

   C. **`ifconfig eth0`**

   D. **`nmap -sT localhost`**

   E. **`top -net`**

8. A server/computer combination appears in both `hosts.allow` and `hosts.deny`. What's the result of this configuration when TCP wrappers runs?

   A. TCP wrappers refuses to run and logs an error in `/var/log/messages`.

   B. The system's administrator is paged to decide whether to allow access.

   C. `hosts.deny` takes precedence; the client is denied access to the server.

   D. `hosts.allow` takes precedence; the client is granted access to the server.

   E. The client is granted access to the server *if* no other client is currently accessing it.

9. When is the `bind` option of `xinetd` most useful?

   A. When you want to run two servers on one port

   B. When you want to specify computers by name rather than IP address

   C. When `xinetd` is running on a system with two network interfaces

D. When resolving conflicts between different servers

E. When `xinetd` manages a DNS server program

10. You've discovered that the Waiter program (a network server) is running inappropriately on your computer. You therefore locate its startup script and shut it down by removing that script. How can you further reduce the risk that outsiders will abuse the Waiter program? (Select two.)

A. By blocking the Waiter program's port using a firewall rule

B. By reading the Waiter program's documentation to learn how to run it in stealth mode

C. By tunneling the Waiter program's port through SSH

D. By uninstalling the Waiter package

E. By uninstalling any clients associated with Waiter from the server computer

11. You want to use `xinetd` access controls to limit who may access a server that's launched via `xinetd`. Specifically, only users on the 192.168.7.0/24 network block should be able to use that server. How may you do this?

A. Enter **`hosts_allowed = 192.168.7.0/24`** in the `/etc/xinetd.conf` configuration file for the server in question.

B. Enter **`only_from = 192.168.7.0/24`** in the `/etc/xinetd.conf` configuration file for the server in question.

C. Enter ***`server`* `: 192.168.7.`**, where *server* is the server's name, in the `/etc/hosts.allow` file.

D. Enter ***`server`* `: 192.168.7.`**, where *server* is the server's name, in the `/etc/hosts.deny` file.

E. Type **`iptables -L 192.168.7.0`** to enable only users of 192.168.7.0/24 to access the server.

12. Of the following, which is the best password?

A. `Odysseus`

B. `iA71Oci^My~~~~~~`

C. `pickettomato`

D. `Denver2Colorado`

E. `123456`

13. Which of the following types of attacks involves sending bogus email to lure unsuspecting individuals into divulging sensitive financial or other information?

A. Phishing

B. Script kiddies

C. Spoofing

D. Ensnaring

E. Hacking

14. Ordinary users report being unable to log onto a computer, but `root` has no problems doing so. What might you check to explain this situation?
    A. A misbehaving `syslogd` daemon
    B. A login process that's running as `root`
    C. The presence of an `/etc/nologin` file
    D. The presence of an SUID bit on `/bin/login`
    E. Inappropriate use of shadow passwords

15. Which servers might you consider retiring after activating an SSH server? (Select two.)
    A. SMTP
    B. Telnet
    C. FTP
    D. NTP
    E. Samba

16. You find that the `ssh_host_dsa_key` file in `/etc/ssh` has 0666 (`-rw-rw-rw-`) permissions. Your SSH server has been in operation for several months. Should you be concerned?
    A. Yes
    B. No
    C. Only if the `ssh_host_dsa_key.pub` file is also world-readable
    D. Only if you're launching SSH from a super server
    E. Only if you're using a laptop computer

17. For best SSH server security, how should you set the `Protocol` option in `/etc/ssh/sshd_config`?
    A. `Protocol 1`
    B. `Protocol 2`
    C. `Protocol 1,2`
    D. `Protocol 2,1`
    E. `Protocol *`

18. Why is it unwise to allow `root` to log on directly using SSH?
    A. Disallowing direct `root` access means that the SSH server may be run by a non-`root` user, improving security.
    B. The `root` password should never be sent over a network connection; allowing `root` logins in this way is inviting disaster.
    C. SSH stores all login information, including passwords, in a publicly readable file.
    D. When logged on using SSH, `root`'s commands can be easily intercepted and duplicated by undesirable elements.
    E. Somebody with the `root` password but no other password can then break into the computer.

19. You've downloaded a GPG public key from a website into the file `fredkey.pub`. What must you do with this key to use it?
    A. Type **`inspect-gpg fredkey.pub`**.
    B. Type **`gpg --readkey fredkey.pub`**.
    C. Type **`import-gpg fredkey.pub`**.
    D. Type **`gpg --import fredkey.pub`**.
    E. Type **`gpg-import fredkey.pub`**.

20. You want to send an encrypted message to an email correspondent. You both have GPG. What do you need to exchange before you can send your encrypted message?
    A. Your correspondent must obtain your GPG public key.
    B. Your correspondent must obtain your GPG private key.
    C. You must exchange private keys with your correspondent.
    D. You must obtain your correspondent's GPG private key.
    E. You must obtain your correspondent's GPG public key.