Answers to Even-numbered Exercises

2. What is the function of the document root? Where is it located by default? How would you change the location of the document root?

   The root of the directory hierarchy that Apache serves content from is called the *document root.* By default it is located at **/var/www/html**. This directory on the server maps to / so it appears to users who are browsing a Web site as the root directory.

4. How would you instruct an Apache server to listen on port 81 instead of port 80?

   In **httpd.conf**, change the directive

   ```
   Listen 80
   ```

   to

   ```
   Listen 81
   ```

   Place the following directives in **httpd.conf**:

   ```
   UserDir website
   UserDir disabled
   UserDir enabled sam
   ```

6. Apache must be started with **root** privileges. Why? Why does this action not present a security risk?

   By default, **httpd** listens on port 80, which is a privileged port. Only a process with **root** privileges can use privileged ports, so you must start Apache with **root** privileges. Starting Apache with **root** privileges does not pose a security risk because Apache uses child processes running as **apache** to serve pages. The original **httpd** process running with **root** privileges remains but does not interact over the network.

8. What does the ServerName directive do? Which value can you use as a ServerName if you want to experiment with an Apache server locally (on the server system)?

The ServerName directive establishes a name for the server.

If you do not need to access an Apache server from other systems, you can specify a ServerName of 127.0.0.1, the address of **localhost**.

10. Why is it more efficient to run scripts using **mod_perl** than to run them through CGI?

Running a CGI script requires system calls to **fork**() and **exec**() to create a new process. Once the process has finished (which, in the case of CGI scripts, is usually very shortly after it has started), it terminates. A script run from a module does not have this overhead because it runs inside the Apache server process.

12. Some Web sites generate content by retrieving data from a database and inserting it into a template using PHP or CGI each time the site is accessed. Why is this practice often a poor idea?

In many cases, the same data is generated each time a given page is accessed, unnecessarily consuming CPU and disk resources for each access. Using resources unnecessarily can result in pages being unavailable when the system load is high.

14. Part of a Web site is a private intranet. Describe how you would prevent people outside the company's internal 192.168.0.0/16 network from accessing this site. The site is defined as follows:

```
<VirtualHost *>
  ServerName example.com
  DocumentRoot /var/www
  <Directory /var/www/intranet>
      AllowOverride AuthConfig
  </Directory>
</VirtualHost>
```

a. Add the following to the <Directory /var/www/intranet> container:

```
Order deny,allow
Deny from all
Allow from 192.168.
```

b. Create **/var/www/intranet/.htaccess** with the following:

```
Order deny,allow
Deny from all
Allow from 192.168.
```

16. What does CGI do? What are the characteristics of a CGI program?

The CGI (Common Gateway Interface) allows external application programs to interface with Web servers.

Any program can be a CGI program if it runs in real time and relays its output to the requesting client.