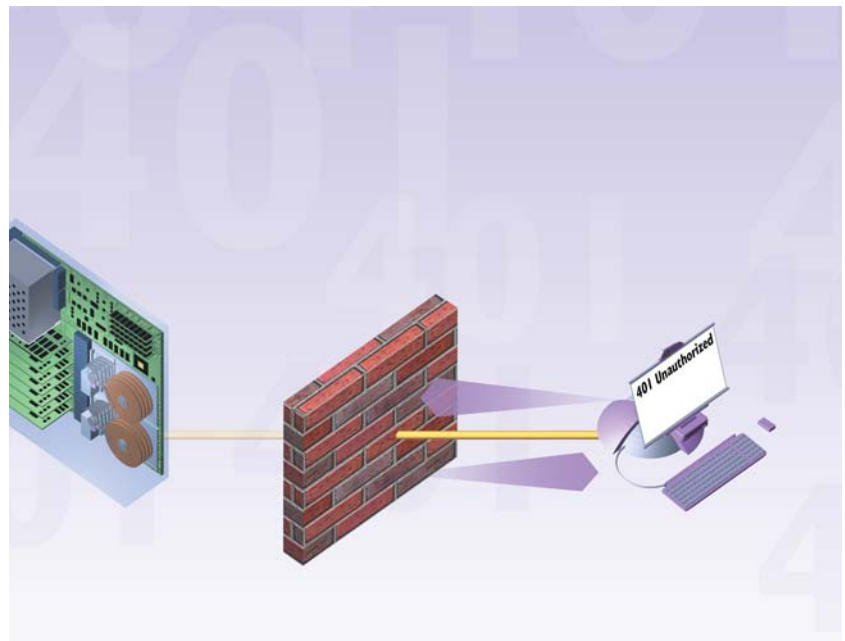CHAPTER

18

How Web Browsers Work

LIKE much of the Internet, the World Wide Web operates on a client/server model. You run a web client on your computer—called a web browser—such as Microsoft's Internet Explorer or Firefox. That client contacts a web server and requests information or resources. The web server locates and then sends the information to the web browser, which displays the results.

When web browsers contact servers, they're asking to be sent pages built with Hypertext Markup Language (HTML). Browsers interpret those pages and display them on your computer. They also can display applications, programs, animations, and similar material created with programming languages such as Java and ActiveX, scripting languages such as JavaScript, and techniques such as AJAX.

Sometimes, home pages contain links to files the web browser can't play or display, such as sound or animation files. In that case, you need a plug-in or a helper application. You configure your web browser or operating system to use the helper application or plug-in whenever it encounters a sound, animation, or other type of file the browser can't run or play.

Over the years, web browsers have become increasingly sophisticated. Browsers are now full-blown software suites that can do everything from videoconferencing to letting you create and publish HTML pages. Browsers now also blur the line between your local computer and the Internet—in essence, they can make your computer and the Internet function as a single computer system.
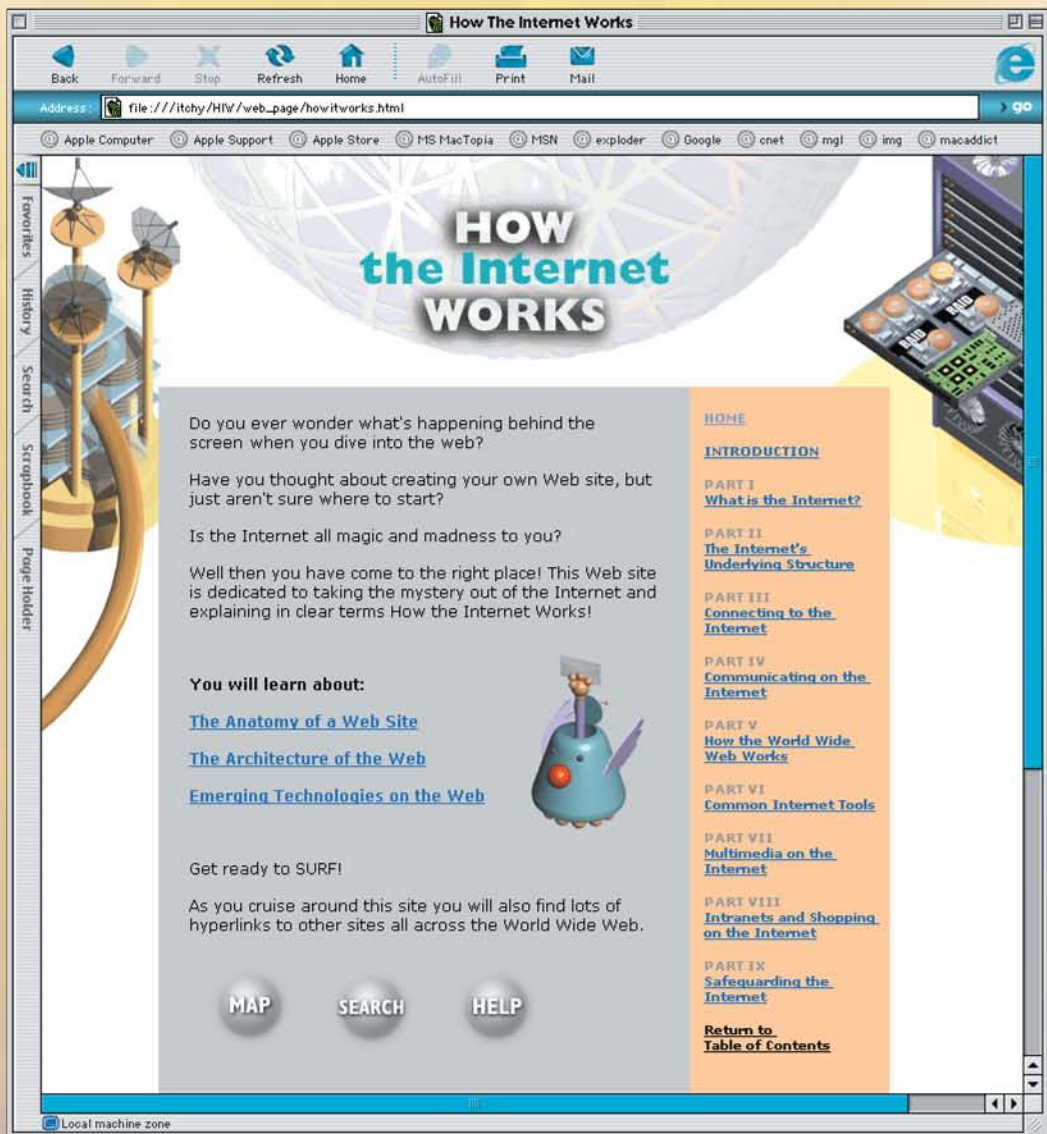
Increasingly, a browser is not just a single piece of software, but an entire suite. The newest version of Internet Explorer, for example, includes security features such as an anti-phishing filter. The Firefox browser has a companion piece of email software called Thunderbird that can be downloaded as well.

When browsing the Internet, one of the most frustrating experiences is the error messages browsers display when they're having trouble contacting a website. Depending on which browser you use, and which version of the browser you're using, those messages might differ. Sometimes browsers display error messages in plain English—but more often they don't. The final illustration in this chapter lists the most common browser error messages—and what they mean.

How a Web Browser Works

1 Web browsers consist of client software that runs on your computer and displays home pages on the Web. There are clients for a wide variety of devices, including Windows, Macintosh, and Unix computers.

2 A web browser displays information on your computer by interpreting the Hypertext Markup Language (HTML) that is used to build home pages on the Web. Home pages usually display graphics, sound, and multimedia files, as well as links to other pages, files that can be downloaded, and other Internet resources.

```
<html>
<head>          Page Title
<title>How The Internet Works</title>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
</head>          Background Color

<body bgcolor="#FFFFFF" link="#6666CC" vlink="#6666CC">
<div id="Layer1" style="position:absolute; left:60px; top:56px; width:150px; height:330px; z-index:1"><img src="roo
<div id="Layer2" style="position:absolute;         top:36; top:30; width:138px; height:130px; z-index:2"><img src="stripe.gif"
<div id="Layer3" style="position:absolute;                                                                   title_
<div id="Layer4" style="position:absolute;               Layer 1
<div id="Layer5" style="position:absolute; left:                               background-color
<div id="Layer6" style="position:absolute; left:                               background-color
  <p><font size="3" face="Verdana, Arial, Helvet
    what's happening behind the screens when you
  <p><font size="3" face="Verdana, Arial, Helvet
    about creating your own Web site, but just a
  <p><font size="3" face="Verdana, Arial, Helvet
    all magic and madness to you?</font></p>
  <p><font size="3" face="Verdana, Arial, Helvet
    have come to the right place! This Web site is dedicated to taking the mystery
    out of the Internet and explaining in clear terms how the Internet Works!</font></p>
  <p> </p>
  <p><font face="Verdana, Arial, Helvetica,
    about:</b></font></p>
  <p><b><font face="Verdana, Arial, Helvetica,
    Anatomy of a Web Site</a></font></b></p>
  <p><b><font face="Verdana, Arial, Helvetica,
    Architecture of the Web</font></a></font></b
  <p><b><font face="Verdana, Arial, Helvetica,
    Technologies on the Web</font></a></font></b
  <p> </p>
  <p><font face="Verdana, Arial, Helvetica, sans
  <p><font face="Verdana, Arial, Helvetica, sans
    site you will also find lots of hyperlinks b
    Wide Web.</font></p>
</div>
<div id="Layer7" style="position:absolute; left:517px; top:198px; width:150px; height:62px; z-index:7">
  <p><font color="#999999"><b><font size="2" face="Verdana, Arial, Helvetica, sans-serif"><a href="index.html">Cover a
  <p><font color="#9999CC"><a href="Intro.html"><font size="2" face="Verdana, Arial, Helvetica, sans-serif">INTRODU
  <p><font color="#999999"><b><font size="2" face="Verdana, Arial, Helvetica, sans-serif">PART
    I<br>
    <a href="pt01start.html">What is the Internet?</a></font></b></font></p>
  <p><font color="#999999"><b><font size="2" face="Verdana, Arial, Helvetica, sans-serif">PART
    II<br>          Hyperlink
    <a href="part02start.html">The Internet's Underlying Structure</a></font></b></font></p>
  <p><font color="#999999"><b><font size="2" face="Verdana, Arial, Helvetica, sans-serif">PART
    III<br>
    <a href="part03start.html">Connecting to the Internet</a></font></b></font></p>
  <p><font color="#999999"><b><font size="2" face="Verdana, Arial, Helvetica, sans-serif">PART
    IV<br>
    <a href="part04start.html">Communicatin
  <p><font color="#999999"><b><font size="2"
    V<br>
    <font color="#6666CC"><a href="part05st
  <p><font color="#999999"><b><font size="2"
    VI<br>
    <font color="#6666CC"><a href="part06st
  <p><font color="#999999"><b><font size="2"
    VII<br>
    <font color="#6666CC"><a href="part07st
  <p><font color="#999999"><b><font size="2"
    VIII<br>
    <font color="#6666CC"><a href="part08start.html">Intranets and Shopping on
    the Internet</a></font></font></b></font></b>
  <p><font color="#999999"><b><font size="2" face="Verdana, Arial, Helvetica, sans-serif">PART
    IX<br>
    <font color="#6666CC"><a href="part09st
  <p><font color="#999999"><b><font size="2"
    to <br>
    Table of Contents</font></a></font></b></b>
  <p> </p>
  <p> </p>
  </div>
<div id="Layer8" style="position:absolute;
<img src="bot.gif" width="151" height="
<div id="Layer9" style="position:absolute; left:128px; top:922px; width:77px; height:18px; z-index:9"><a href="tech.ht
<div id="Layer10" style="position:absolute; left:215px; top:922px; width:60px; height:17px; z-index:10"><a href="
<div id="Layer11" style="position:absolute; left:313px; top:922px; width:67px; height:18px; z-index:11"><a href="hel
</body>
</html>
```

3 The coding in the HTML files tells your browser how to display the text, graphics, links, and multimedia files on the home page. The HTML file your browser loads to display the home page doesn't actually have the graphics, sound, multimedia files, and other resources on it. Instead, it contains HTML references to those graphics and files. Your browser uses those references to find the files on the server and then display them on the home page.
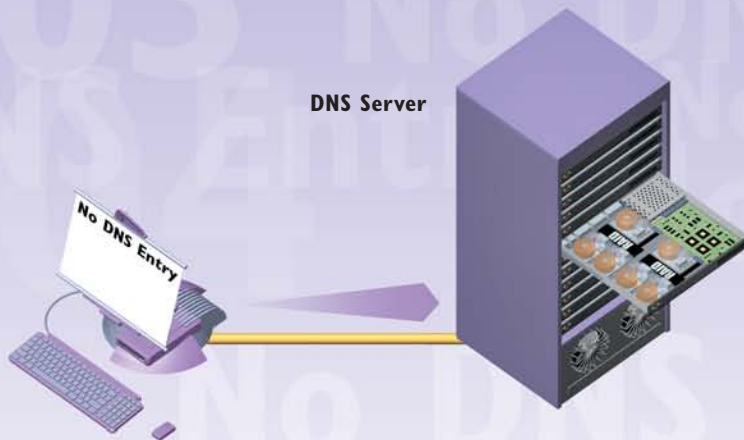
4 The web browser also interprets HTML tags as links to other websites, or to other web resources, such as graphics, multimedia files, newsgroups, or files to download. Depending on the link, it performs different actions. For example, if the HTML code specifies the link as another home page, the browser retrieves the URL specified in the HTML file when the user clicks the underlined link on the page. If the HTML code specifies a file to be downloaded, the browser downloads the file to your computer.

Web browsers can't display some types of files on the Internet, notably some kinds of multimedia files, such as sound, video, and animation files. (A common file type like this is called Flash.) To view or play these files, you need what is called a *helper application* or *plug-in*. You must configure your web browser or operating system to launch these helper applications and plug-ins whenever you click an object that needs them to be viewed. More often than not, when you install the application or plug-in, it will configure itself properly.

The meanings of tags are easily decipherable. Every HTML tag, or instruction, is surrounded by a less-than and a greater-than sign—<P>. Often tags appear in pairs, the beginning tag and the ending tag. They are identical except for a simple slash in the ending tag. So, a paragraph of text frequently is surrounded by tags such as this: <P> Paragraph of text.</P>. Also, tags are not case sensitive. <P> equals <p>.

What Common Browser Error Messages Mean
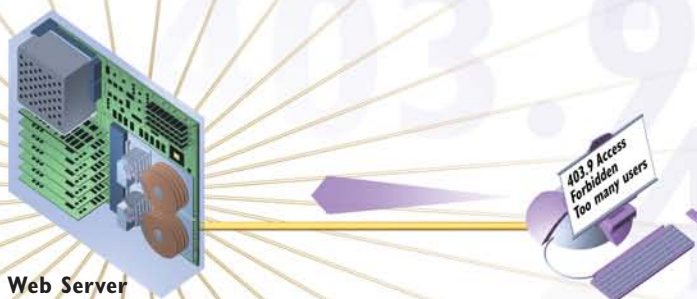
DNS Server

No DNS Entry

Server Does Not Have a DNS Entry—When you type a URL in your browser to visit a site, your computer contacts a server called a Domain Name System (DNS) server. The DNS server translates the URL into the IP number that computers can understand—and after it does that, your browser can go to the site. (For more information about DNS servers, see Chapter 5, "How Internet Addresses and Domains Work.") If you get an error message telling you the server doesn't have a DNS entry, it means that the server doesn't have a listing for the URL you typed. This usually means either you typed the URL incorrectly or something is wrong with the DNS server. Check the URL and retype it.
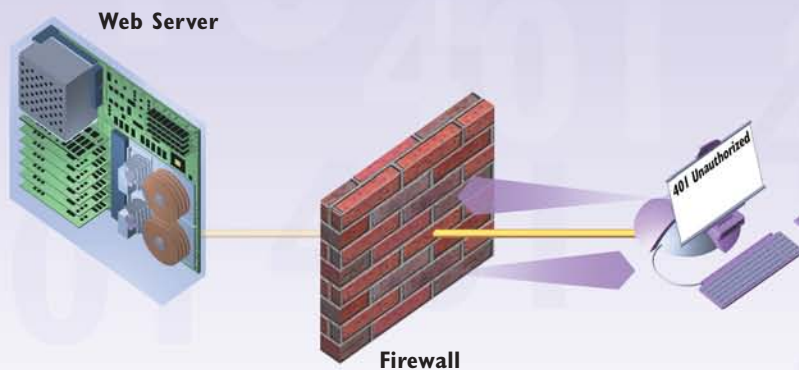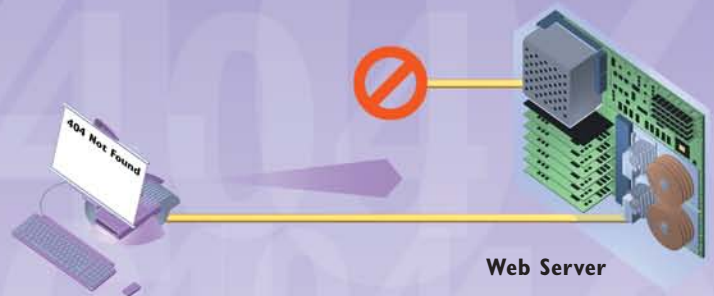
503 Service Unavailable—This is a catch-all error message for a variety of problems, but all of them mean that the website is incapable of contact by your browser. The problem might be the site's server has crashed because of too much traffic or there's network congestion.

Web Server

503 Service Unavailable

Web Server

403.9 Access Forbidden Too many users

403.9 Access Forbidden. Too Many Users Are Connected—Some websites recognize that if they get too much traffic at once, the entire site can be brought down and no one will be able to visit. Those sites put a limit on the number of people who can come to the site at once—that way, the site is always available, even if not everyone who wants to visit can get in. If you get this "Too Many Users Are Connected" message, it usually means that the website is up and running, but you can't get in because the maximum number of people are already on the site. Keep trying—when one person leaves, another can come in, and it might be you.

404 Not Found—When you get this message, you've arrived at the correct website, but the specific page you're looking for can't be found. That specific page might have been deleted from the site or moved—or you might have typed the location incorrectly.

404 Not Found

Web Server

Web Server

401 Unauthorized or 403 Forbidden—If you get either of these error messages, you're trying to enter a website that allows only certain people in—and it's not allowing you to enter. Typically, these types of websites are password protected and also might allow only visitors who are from certain domains, such as zd.com. If you've entered a password, you might have entered it improperly, or you might not be in a domain that's allowed to enter the website.

401 Unauthorized

Firewall

Spinning hourglass—This isn't an error message your browser displays—instead, your Windows cursor turns into a spinning hourglass. The spinning hourglass tells you that your browser is trying to make a connection to a website. If it keeps spinning and a connection is never made, it can mean that an Internet router someplace between where you are and where you're trying to visit has crashed and you can't make the connection. It can also mean that you've lost your local Internet connection for some reason.

Router

Web Server