PLUG-IN

T9 Designing Web Pages

LEARNING OUTCOMES

1. Explain why Web design is not like print design.
2. List the basic steps involved in Web site development.
3. Describe several guidelines you can use to test your interface design.
4. Explain what HTML is.
5. Describe the two main groups of HTML tags.
6. List the basic fonts that all computers use.
7. Describe the basic Web graphic formats.

Introduction

As is the case with many innovations, the Web has gone through a period of extremes. At its inception, the Web was all about information. Visual design was accidental at best. Web pages were clumsily assembled, and Web sites were accumulations of hyperlinked documents lacking structure or coherence. Designers then took over and constructed attractive, eccentric, and often baffling containers for information. The Web became a better-looking place, but many users hit barriers of large graphics, complex layouts, and nonstandard coding. Every site was different, and each required users to relearn how to use the Web, because "real" designers could not be bound by standards or conventions. Instead, designers pushed the boundaries of HTML, using work-arounds and hacks to design on the cutting edge.

Today, Web design is seen much more as a craft than an art, where function takes precedence over form and content is king. Innovative designs using fancy navigational doodads are generally seen as an annoyance standing between the user and what he or she seeks. Large graphic eye candy, no matter how pleasing, is simply wasted bandwidth. Like 1960s architecture, much of yesterday's Web design now makes users wince and wonder how it could ever have been fashionable. Now, if you want to be a Web designer, you also need to be an information architect and usability engineer. Instead of constantly requiring users to relearn the Web, sites are beginning to look more alike and to employ the same metaphors and conventions.

This plug-in introduces the functional aspects of Web design.

The World Wide Web

Like other Internet services, the World Wide Web is not a certain network, based on a certain computer. Instead, it is a way of organizing information so that any computer around the world that operates according to the rules can access it. The rules that specify how to access and transfer files over the Web are called *HTTP,* for *hypertext transfer protocol.*

The Web was a breakthrough in many ways. Perhaps its most important feature, though, is its use of *hypertext.* Text and other content in a Web document can be made to link to any other document, anywhere in the world, that is saved on an HTTP server and connected to the Internet. An *HTTP server* is a computer that is responsible for accepting HTTP requests from clients, known as Web browsers, and serving them Web pages, which are usually HTML documents (which we describe below). Figure T9.1 displays the relationship between HTTP (or Web) server, Web browser, and Web page.

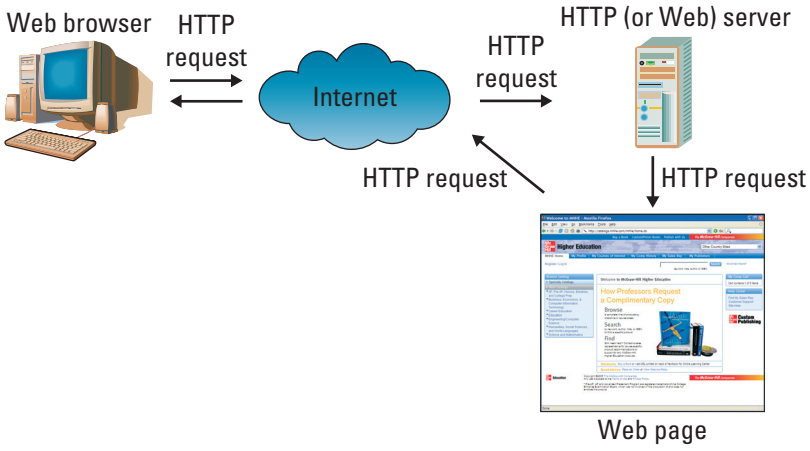


FIGURE T9.1

HTTP Server, Web Browser, and Web Page Relationship

THE WEB IS MEDIA RICH

Anyone who has worked with personal computers in any kind of collaborative project knows that sharing files can be a headache. Too often, you may try to share a file with colleagues or friends, only to find that they are on a different kind of computer or they do not have the software needed to read it. How do developers on the Internet provide files that might be read by anyone, anywhere in the world?

The one sure way is to rely on pure text documents, with no formatting information. Or you could specify that everyone reading your files must get special software that reads the standard formats you will be using for your online documents. Or you could use formats that are commonly used on many different platforms and readable by many different kinds of software. Publishers on the World Wide Web depend on a combination of these three tactics.

The basic format for text published on the Web is *ASCII,* or plain text void of any formatting (such as underlining, bolding, and the like). Actually it is ASCII with a twist; the files contain certain "tags," referred to as *hypertext markup language,* or *HTML,* that help them take on a bit of character when they are pulled up on the reader's screen. The scheme also depends on the reader having special software, called a browser, that is specially made to retrieve and display HTML files and other commonly used formats to help users navigate through the Web.

Any format that cannot be read by the browser, those belonging to particular applications or in a specific medium, such as video, that the browser does not support, can be read by software, called plug-ins, that launches alongside the browser to open those files.

THE WEB IS INTERACTIVE

Unlike material printed in a book or brochure, Web publications can respond to input by the user. A Web site's visitors can communicate with the site's creator and order products online. Sites can play an animation when a user's mouse pointer rolls over an on-screen graphic. Users can ask for exactly the information they need, interacting with databases on the server that send back customized responses. Figure T9.2 displays a typical Web form.

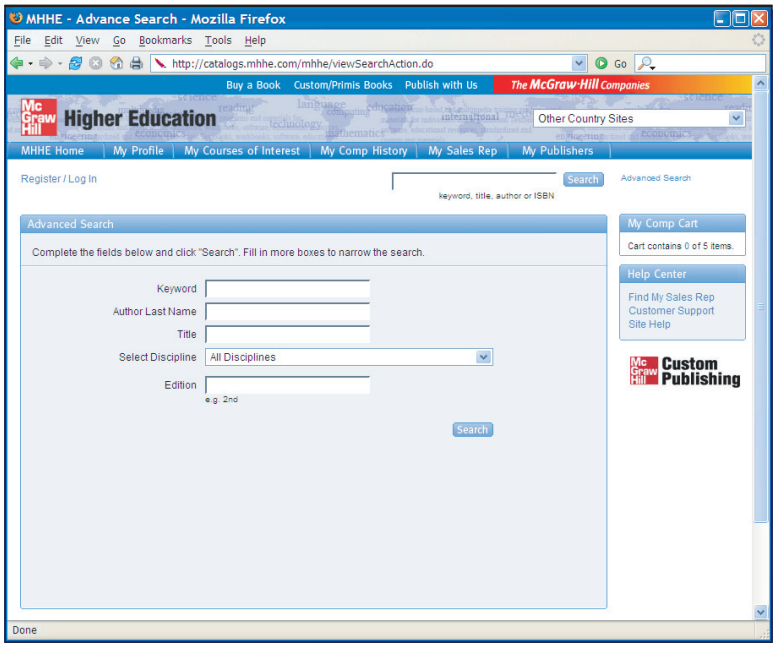


FIGURE T9.2

Typical Web Form

WEB PAGES CAN BE DESIGNED

Thanks to HTML and its ability to support graphics and other media, the World Wide Web is the first service on the Internet that lends itself to any kind of graphic design. That, perhaps more than any other attribute, is what made it the first service on the Internet to grab the attention of the public, publishers, and businesses. Thanks to its use of hyperlinks for navigation, it presents an exciting design problem that challenges Web page creators to produce fluid and friendly interfaces, as well as attractive graphic design, to help visitors find, scan, and enjoy the material published there.

THE WEB IS NONLINEAR

The first thing to remember about your site on the Web is that visitors access each page by hypertext links from another page on your site or from anywhere else on the Web. You could lead the visitor through a controlled series of pages, but that is not what the Web is about; it is about letting the visitor choose his or her own path through the information. Your site will probably be just one among dozens the visitor will view in the space of several minutes. Visitors following a link from another site can land at any page on your site, may stay for just a few seconds, and then launch to another site.

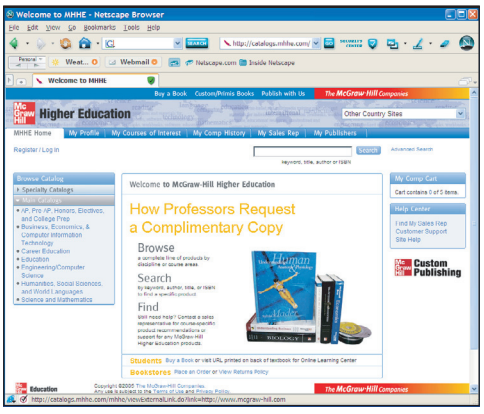
In this context, you have to make each page represent what you are intending; after all, it might be the only one of your pages the visitor sees. Equally important, every page should entice the visitor to explore your site further, and make it easy to do so. How you accomplish this is wide open, of course; there is no single right way to do it. The challenge is finding the method that works best for the content you are presenting and the experience you want to invoke.

THE WEB HAS NO CONTROL

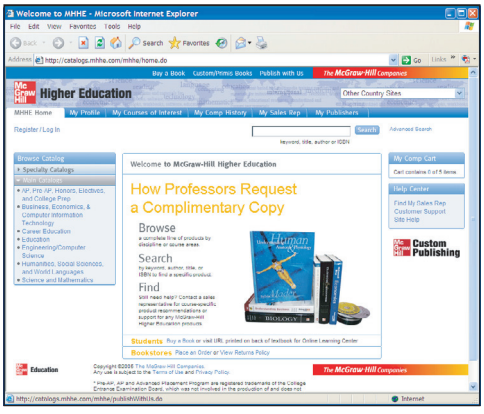
As mentioned earlier, most Web content is in the form of ASCII files, tagged with HTML. The *HTML tags,* which are simple codes placed between brackets within a file, label each element of the document, <P> for paragraph text or <H1> for a first-level heading, for example. The browser software interprets the codes and displays the document on screen accordingly.

On the Web, though, you have less control over how those codes are interpreted. Default specifications are programmed into the browser. For example, for paragraph text (marked with the HTML <P> tag), most browsers use 12-point Times with a line space above. First-level heads (marked <H1>) are displayed as 16-point Times with a space above and below.

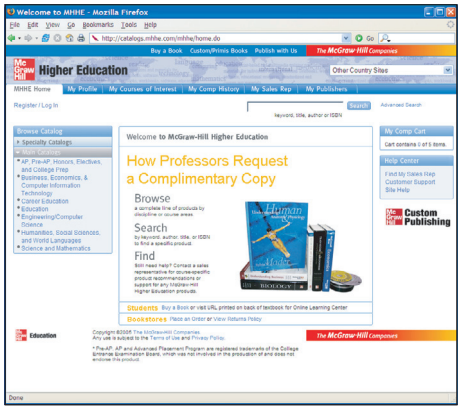
However, you cannot count on the defaults because they can be changed by individual users. Users can pick another favorite font for their default face, and many users set a larger type size for easier reading. Readers can also turn off graphics for faster downloading. Pages also appear different depending on the browser they are viewed in. The three major browsers—Netscape Navigator, Microsoft Internet Explorer, and Mozilla Firefox—use similar settings for most, but not all, tags, and the settings may vary even between different releases of the same browser. Figure T9.3 displays the same Web page viewed in each browser, Netscape Navigator, Microsoft Internet Explorer, and Mozilla Firefox.



Netscape Navigator



Internet Explorer



Mozilla FireFox

FIGURE T9.3

Netscape Navigator, Microsoft Internet Explorer, and Mozilla Firefox

Pages will look different on different platforms. For example, font type looks bigger on Windows computers than on Macintoshes. And the resolution of the user's monitor can make graphics and type appear larger or smaller. In addition, not all browsers are on personal computers. Web surfers can read pages on TVs, palmtop computers, smart phones, text-only devices, and Braille readers. Some of these issues will be discussed in the next section.

DESIGNING FOR THE UNKNOWN

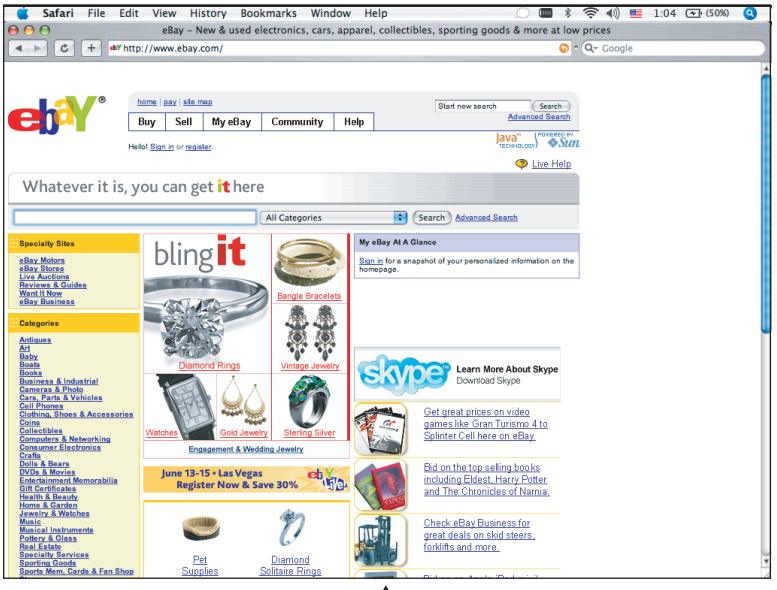
The Web is a unique medium, forcing you to give up control over many things that print media has always allowed. Many elements, such as colors, fonts, and page layout, are determined by the user or the user's browser software.

There is no guarantee that people will see your pages the same way you design them on your screen. Much of Web design is about designing for the unknown; that is, unknown users, unknown browsers, unknown platforms, unknown monitor sizes, and so on.

Unknown Browsers

Hundreds of browsers are in use today. In fact, there are dozens of versions of Internet Explorer alone, once you count all the past releases, partial releases, and various platform versions of each.

These browsers may display the same page differently. This is due in part to built-in defaults for rendering fonts and form elements. Some browsers, such as Lynx, do not display graphics at all. Each browser has its own slight variation on how to interpret standard HTML tags in terms of fonts and sizes. In addition, some



Web page viewed in Safari on a Macintosh

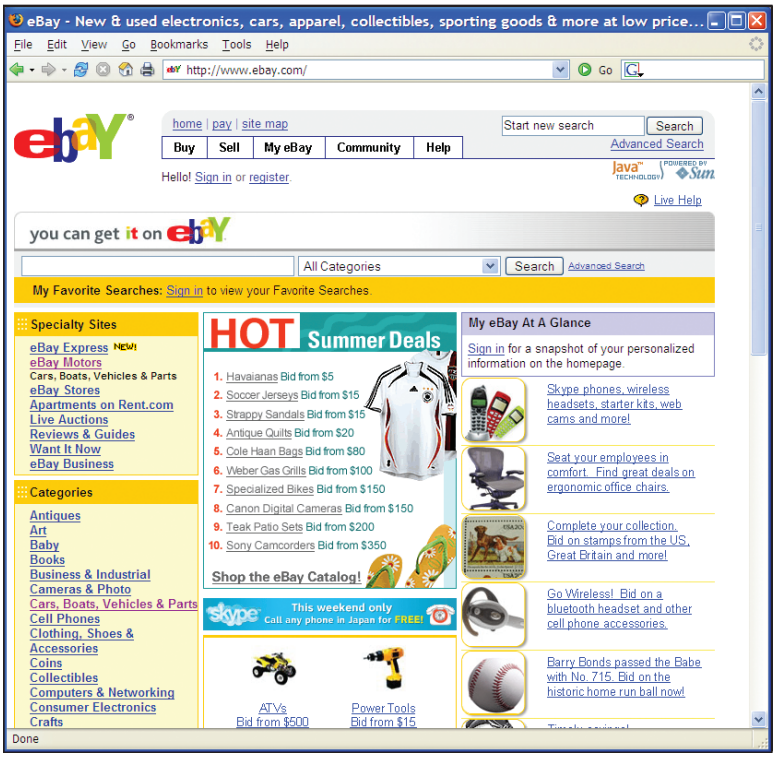


FIGURE T9.4

Web Page Viewed on PC and Macintosh

sets of tags work only in Netscape or only in Internet Explorer (they were created by each company to give their browsers a competitive edge). If you use these tags, users with a competing browser will not see your content the way you intended.

Browser difference has the most impact in the support of Web development technologies such as *Cascading Style Sheets,* or *CSS* (a method for advanced control of text and page formatting), and *DHTML* (a method for adding interactivity and motion to Web pages). While they tend not to be an issue in the latest browser versions, enough out-of-date browsers are still in use that your special effects may be missed by a certain percentage of your audience.

Similarly, it is impossible to know whether your users will have the browser plug-ins necessary to play multimedia files such as Windows Media, or QuickTime movies. If you design a Web page that requires a plug-in, be sure you make it easy for users to download a copy.

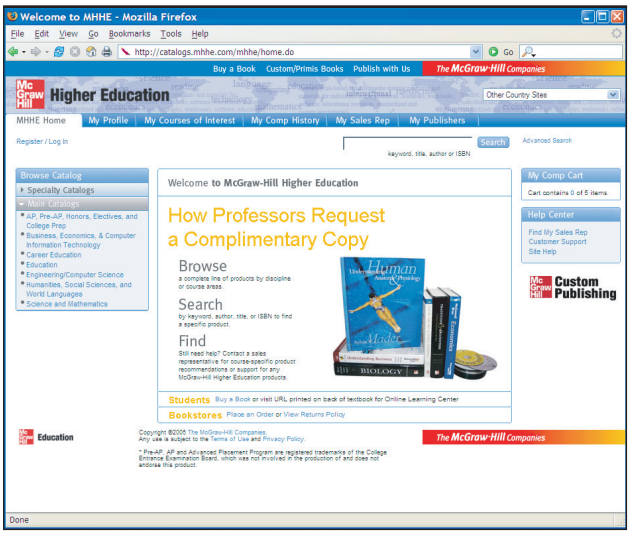
Unknown Platforms

Another variable that affects how users see your pages is the platform, or operating system, of their computers. Although most Web users have personal computers running some version of the Windows operating system, significant numbers view the Web from Macintosh computers and UNIX/Linux systems. Each operating system has its own characteristics and quirks that affect how your page will look and perform. Figure T9.4 displays an example of the same Web page viewed on a Windows computer and on a Macintosh.

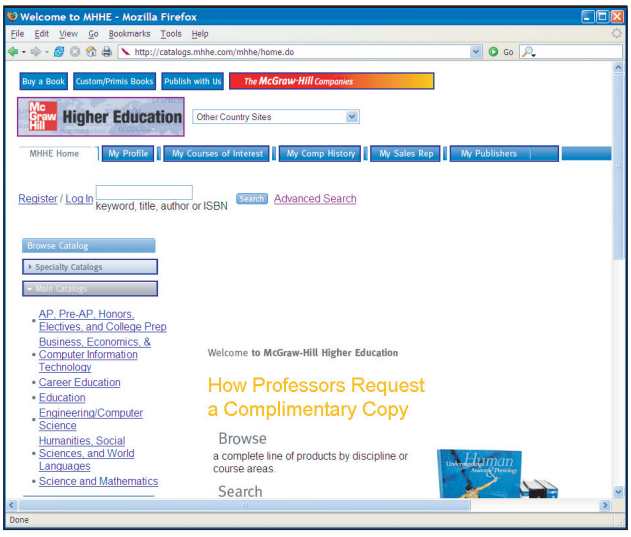
For instance, Windows computers and Macintoshes have different ways of displaying type, leading to the same size type appearing much larger on Windows computers than on Macintosh computers. If you set the type on your Web page to be small on your Windows computer, it may be illegible for Macintosh users.

Form elements such as scrolling lists and pull-down menus take on the general appearance of the operating system, and therefore appear quite differently (and as different sizes), depending on the computer you view them from. The viewers' platforms also have an effect on the way they see colors. This will be discussed in more detail later in this plug-in.

In addition, there is usually a slight discrepancy between the functionality of browsers across different platforms. In general, browser and plug-in releases for the Macintosh lag behind the Windows versions. Although UNIX was the platform



Web Page with Personal Preferences Selected



Web Page with No Preferences Selected

FIGURE T9.5
Different User Settings

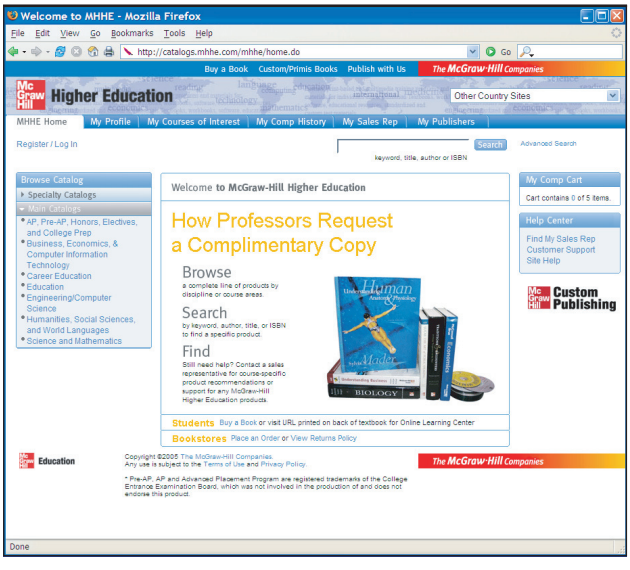
upon which the Web was built, it is often ignored by software developers eager to hit the dominant Windows market.

Unknown User Preferences

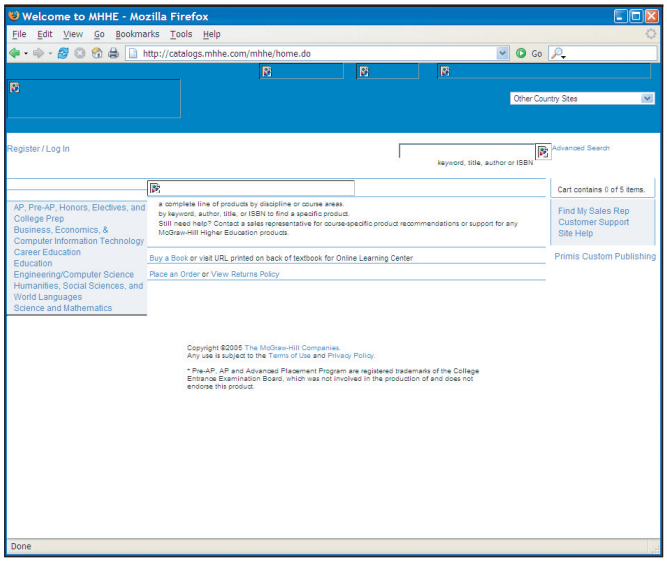
At the heart of the original Web concept lies the belief that the end user should have ultimate control over the presentation of information. For that reason, browsers are built with features that enable users to set the default appearance of the pages they view. The users' settings will override yours (the Web page developer), and there is not much you can do about it. Figure T9.5 shows how the same page might look for different users.

Users also might opt to turn off the graphics completely. There are still people who do this to alleviate the wait for bandwidth-hogging graphics over slow modem connections. Make sure your pages are at least functional with the graphics turned off. The Web page in Figure T9.6 becomes unusable with the graphics turned off because the navigation elements lose their labels.

FIGURE T9.6
Web Graphics Turned On or Off



Web Page with Graphics Turned On



Web Page with Graphics Turned Off

Unknown Window Size and Monitor Resolution

When designing on the Web, you really have no idea how big your "page" will be. The available space, or what is sometimes called "screen real estate," is determined by the size of the browser window when the page is opened.

Web pages are also more fluid than print; they reflow to fill the available space. Although you may prefer the way your page looks when the window is just larger than the headline graphic, users can set the window as wide or narrow as they please. This is one of the most vexing aspects of Web design. Figure T9.7 shows how the elements on the page rewrap to fill the available space when a browser window is resized.

Because browser windows can only be opened as large as the monitors displaying them, standard monitor resolution (the total number of pixels available on the screen) is useful in anticipating the likely dimensions of your page. This is particularly true on Windows computers, since the browser window is typically optimized to fill the monitor.

For instance, one of the lowest standard monitor resolutions is 640 × 480 pixels. After you allow for the space that the browser and all its rows of buttons and scrollbars take up, that leaves a space as small as 623 × 278 pixels for your page. That is not very much space.

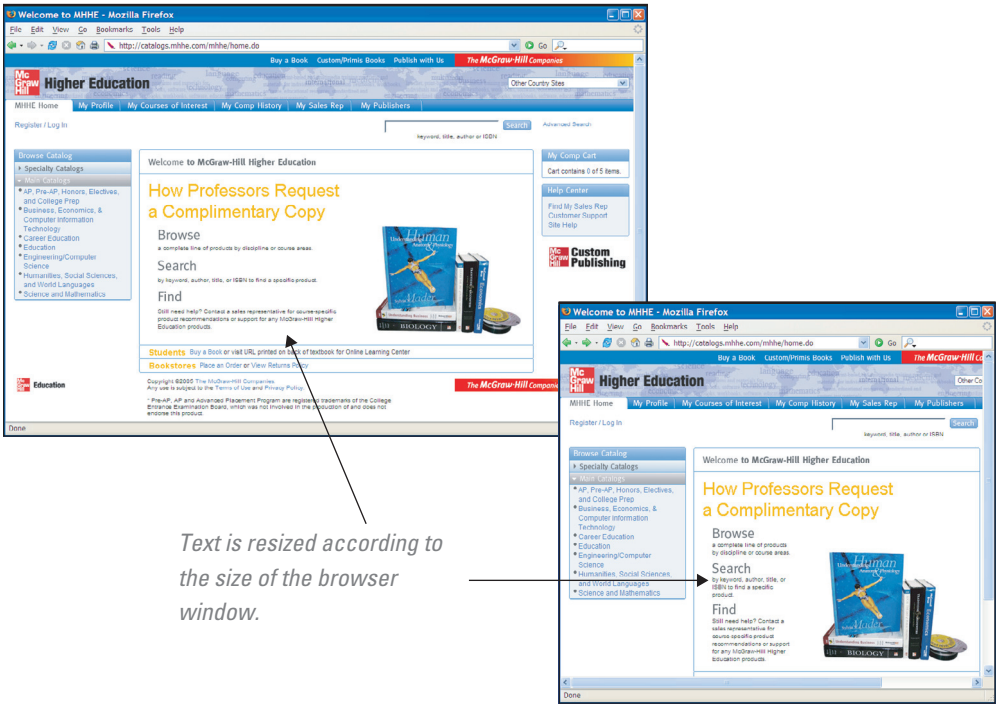
Other common pixel dimensions are 800 × 600, 1024 × 768, and 1280 × 1024 (although they do go even higher). At the highest resolutions, it is difficult to predict the browser window size because users are likely to resize the window smaller or open several pages at once. Most commercial Web sites today are designed to fit in an 800 × 600 resolution.

How do you cope with the unknown window size dilemma? One approach is to use a table to fix the dimensions of your content to a specific pixel width. That way, when the window is resized smaller, the elements do not shift, and users have a better chance of viewing the page as you intended.

However, this solution has its drawbacks. When the window is resized smaller than the contents of the page, the content outside the browser window is simply no longer visible without horizontal scrolling. Users with smaller monitors may not even know it is there.

FIGURE T9.7

Web Page Viewed with Different Size Windows



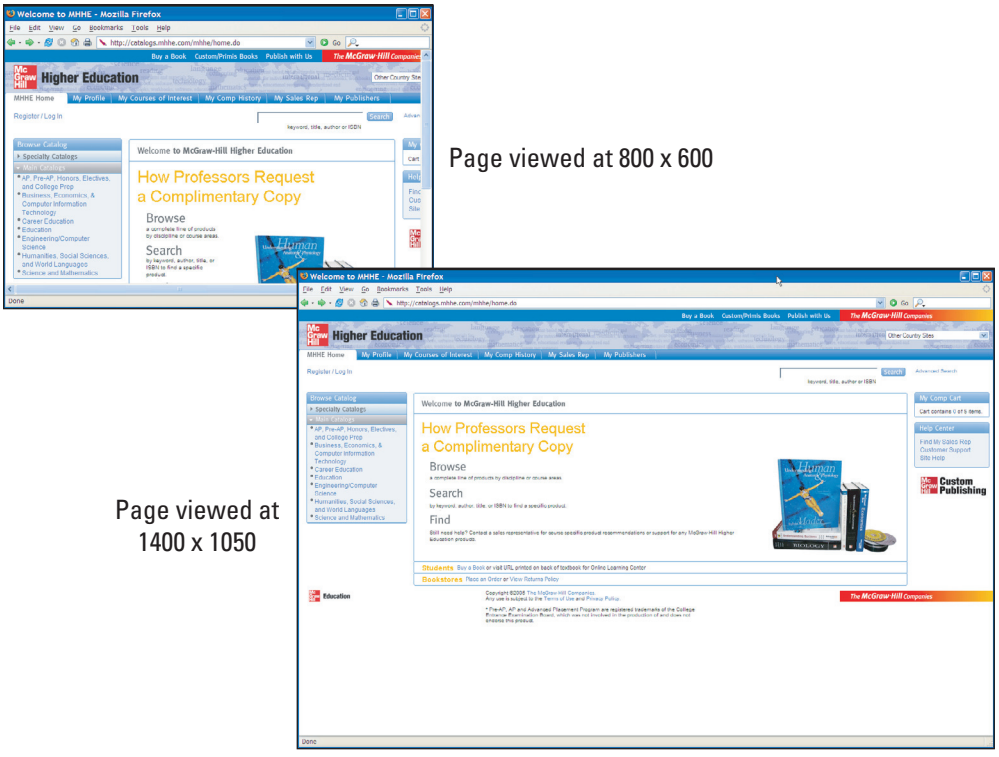


FIGURE T9.8

Web Page Viewed at Different Resolutions

Figure T9.8 shows a Web site that has been designed to fit a 1280 × 1024-pixel browser window. However, if the page is viewed at 800 × 600, you have to scroll down or to the right to see the navigational elements. This is one of the problems of fixing Web pages to a particular width, especially if the width is larger than the lowest common denominator.

You might choose to tell your users how you would like them to size their screens. Every now and then (although not as often as in the early days of Web design), a friendly note will appear at the top of a Web page that says, "For optimal viewing of this site, please size your browser this wide," followed by a graphical bar of a certain width. The best you can do is hope that users will play along.

Another way to deal with unknown window size is to just accept it as the nature of the medium. It is possible to design for flexibility; good Web pages are functional and not seriously compromised by a certain amount of adjustments.

Unknown Connection Speed

Remember that a Web page is published over a network, and it will need to go zipping through the lines as little bundles of data before it reaches the end user. In most cases, the speed of that connection is a mystery. On the high end, folks with T1 connections, cable modems, ISDN, and other high-speed Internet access may be viewing your pages at a rate of 500 Kbps. On the other end of the scale are people dialing in with modems whose speed can range from 56 Kbps to as slow as 14.4 Kbps.

Many factors affect download times, including the speed of the server, the amount of traffic it is receiving when the Web page is requested, and the general congestion of the Internet lines.

Larger amounts of data will require more time to arrive. When you are counting on maintaining the interest of your readers, every millisecond counts. For this reason, it is wise to follow the golden rule of Web design—keep your files as small as possible!

One of the worst culprits for hogging bandwidth is graphics files, so it is especially important that you spend time optimizing them for the Web. HTML files, although

generally just a few kilobytes (KB) in size, can be optimized as well by removing redundant tags and extra spaces. Audio, video, and multimedia content consume lots of bandwidth. Unless you are designing specifically for high-bandwidth applications, assume the worst when it comes to connection speeds.

Unknown Colors

When you are publishing materials that will be viewed on computer monitors, you need to deal with the varying ways computers handle color. Monitors differ in the number of colors they are able to display. They typically display 24-bit (approximately 17 million colors), 16-bit (approximately 65,000 colors), or 8-bit color (256 colors).

A full-color photograph may contain many thousands of shades of blended colors to produce a smooth image, which is not a problem for 24- or 16-bit monitors. What happens to all those colors on an 8-bit monitor with only 256 available colors? On 8-bit monitors, the image will be approximated out of the set of colors (called a palette) that the browser has on hand. Some colors from that full-color photo will shift to the nearest palette color. Others will be approximated by dithering. *Dithering* is the most common means of reducing the color range of images down to the 256 (or fewer) colors seen in 8-bit GIF images. Be aware that colors may behave differently depending on the monitor used to view them.

Unknown Fonts

Another aspect of Web design that you may find shocking is that you have virtually no control over the fonts used to display your content. The way text appears is a result of browser settings, platform, and user preferences.

Even though there are methods for specifying a font face (style sheets and the HTML <FONT> tag), the font will display only if it is already installed on the end user's computer. It is more like "suggesting" a font than controlling it. There is no guarantee your chosen font will be available. If it is not found on the user's computer, a default font will be used instead.

About the only thing you can be sure of is that you have two fonts to work with—a proportional font (such as Times or Helvetica) that is used for the majority of body text and headlines on a page, and a monospaced font (such as Courier) that is used for code or text tagged with the "preformatted" tag <PRE>.

Technologies are available for embedding fonts into a file, but they are not supported by all browsers. This lack of control over fonts is something you have to get used to. The only way to absolutely control type is to put it in a graphic, but that has its drawbacks and is obviously not appropriate for the main body text on a site.

The Process of Web Design

The ideal Web design process should be flexible enough to accommodate a range of developments. This means a combination of a layered approach, which is where one task is commenced only on the completion of its predecessor, and overlapping, an approach whereby tasks and functions are undertaken at the same time. This may sound confusing, but it is essential to incorporate a series of "layers" or milestones within a project where phases are completed before the next phase commences.

Web sites come in all shapes and sizes—from a single page about a favorite sport, to monstrous sites conducting business worldwide. Regardless of the scale and scope of your Web site, the development process involves the same basic steps:

1. Analyze and plan.
2. Create and organize content.

3. Develop the "look and feel."
4. Produce graphics and HTML documents.
5. Create a working prototype.
6. Test, test, test.
7. Upload to a Web server and test again.
8. Maintain.

ANALYZE AND PLAN

Before designing your Web site, you need to brainstorm and think about defining goals and purposes of the Web site. Here is a great starting point; ask yourself:

- "I want to create a site in order to . . ."
  - Promote a product or service.
  - Tell customers about my company.
  - Tell a story.
  - Teach people a skill.
  - Entertain my audience.
  - Provide a unique resource on a topic.

  You will also want to ask:

- "Who is my target audience?"
- "Who will be using this site?"
- "What will the users (audience) do when they visit my site?"

The structure of a Web site grows from the way you want visitors to, first, understand, and, second, get to the information you post there. This phase should define what information you want to have available, what interactions you want to offer, and your broader marketing goals: the ideas and impressions visitors to the site should take away with them. For example, if you want to create an online snowboarding shop you will want your customers to have access to a complete catalog of available snowboards (content), to be able to order snowboards online (interaction), and to learn that you offer snowboards for every ability (marketing message). All three facets are key in planning any site. The site's final content and the way it presents itself to your users must achieve all these goals.

CREATE AND ORGANIZE CONTENT

The most important part of a Web site is its content. Despite the buzz about technologies and tools, content is still king on the Internet. There must be something of value, whether it is something to read or something to do, to draw visitors, and keep them coming back (often referred to as stickiness).

Once you have content, or at least a very clear idea of what content you will have, the next step is to organize the content so it will be easily and intuitively accessible to your audience. In the business world, the information design may be handled by a specialist in information architecture. It might also be decided by a team made up of designers and the client. However, personal sites require attention to the division and organization of information. Create lists and sketchbooks. Organize your content by importance, timeliness, category, and so on. Decide what goes on the home page and what is divided into sections.

The result of the information design phase is usually a diagram (often called a site map) that reveals the overall "structure" of the site. Pages in diagrams are usually represented by rectangles; arrows indicate links between pages or sections of

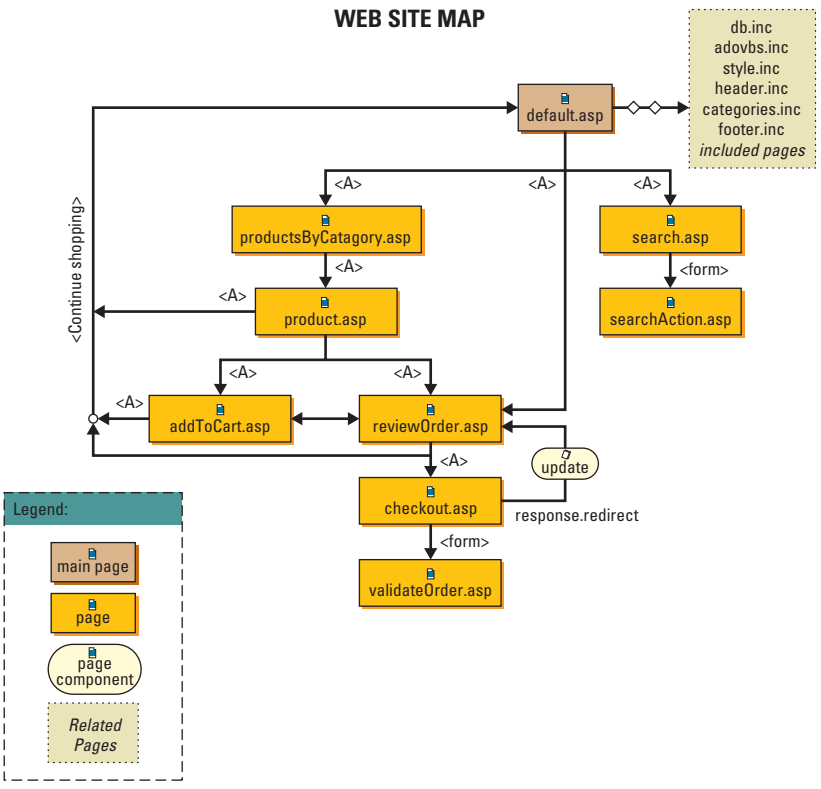


FIGURE T9.9
Web Site Map

the site. A site map gives you a sense of the scale of the site and how sections are related, and aids in the navigation design. Figure T9.9 illustrates a site map.

There is still no topping pen and paper when it comes to starting and documenting the creative process. Before you dig into the HTML, hyperlinks, and images, there is no better way to hash out your ideas than on a notepad, or a napkin, or a whiteboard. Be as creative as you can.

Structuring the Site

A Web site's pages are linked to one another, and to the rest of the Web, by a series of hyperlinks. Any page can link to any other anywhere in the world. Although you cannot control the path a Web user chooses to travel on the Web, it is your job to make the content of a site available and enticing to every visitor who finds his or her way there. That requires both a careful analysis of the content you are presenting, determining its main messages or components, and skills for helping visitors find and understand those messages. Doing this successfully combines the tasks of information architecture, the creation of a structure for the site's information, and interface design, the crafting of tools that help visitors navigate that structure and find information that will be of interest to them.

Allow for Change

The contents of a Web site will, or should, change constantly. Visitors should feel that your site will hold something new for them each time they visit, giving them a reason to return to the site again and again.

This factor affects the interface as well as the structural design of a site. You should think in terms of rules, or templates, for styling the content, thinking ahead to the uses to which each element might be put. That is not to say that new features cannot have their own individual design, but as with printed media, the site's graphic identity should remain constant while the specific content changes.

With the goals understood, the challenge becomes how to achieve those goals creatively and effectively using the technology of the Web. Despite everything mentioned previously in this plug-in about the Web's current limitations, it is potentially the most flexible of media. Using basic HTML tools, the Web can work like an encyclopedia (random-access reference information), a book (sequential pages), a magazine (graphically presented "departments"), or a promotional brochure (an unfolding "pitch"). Adding multimedia to the mix, it can mimic more familiar electronic media such as television (an active, animated presentation), a slide show (sequential, bite-size messages), or a computer game (mysterious clues). Interactive technologies, such as Shockwave, JavaScript, and Java, can turn a Web page into online software, providing real-time interaction and access to up-to-date, searchable information based on databases. There are countless ways to execute and combine such effects, so it is impossible to suggest specific rules for right and wrong ways to

create a Web site's structure. At the same time, though, a few simple tests can help you gauge the effectiveness of your site plan. Ask yourself these questions:

1. **Have you created a logical structure that represents the view of the information you want to convey?** In most cases, a visitor to your home page should be able to see at a glance what information your site has to offer, a goal best achieved by determining and offering a limited set of content categories. Common wisdom and cognitive psychology experts hold that the set should be limited to no more than seven basic groups, the number of separate items that most people can grasp at one time.
2. **Does the content of each page represent a logical module of information?** The hyperlinked structure of the Web counts on the ability of users to get straight to the information they need, from a variety of different starting points. The best way to achieve that is to limit each page to one topic. Keeping each module of information on its own page also makes updates easy; when the information needs updating, you change it in only one place.
3. **Does the structure pass the three-click test?** No important information should be more than three (mouse) clicks away from the home page and, if possible, no more than three clicks away from any page on the site. On the Web, remember, each click costs the visitor valuable time, so the information you want everyone to see, or the information most likely to be looked for, should be as close as possible to the top of the structure.

Navigation

With the basic site structure and content defined, you will want to make it easy for visitors to find the information they need on your site. On the Web, that means creating a system of hyperlinks that will allow visitors to move around the site efficiently.

You can count on a built-in set of navigation controls that are standard in Web browsers. These include bookmarks, history lists, and Forward and Back buttons. Users depend on the browser's controls for such functions, and you should not confuse the issue by duplicating them in your site's interface.

Creating site-specific navigation tools requires deciding which pages will be linked to what others. Part of this is ad hoc and logical. The other part is more systematic, coming up with a sitewide plan for putting as many pages as possible at the visitors' fingertips, no matter where they are on the site.

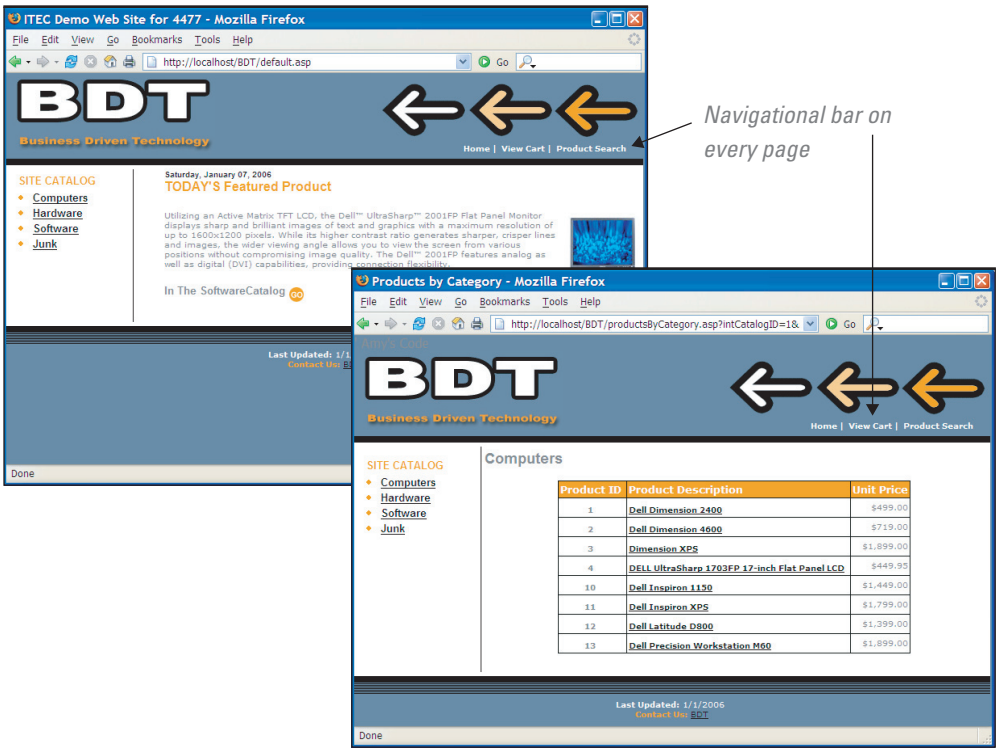
The simplest way to do this is to offer a link to the site's home page from every other page on the site; once users return there, they can find their way back down the hierarchy to any other piece of information on the site. A somewhat more powerful option is a navigation bar, a standard element that lists the site's main sections on every page, offering a deeper level of access with a single click (see Figure T9.10). For more complex sites, a site index or table of contents is a popular tool. In addition, particularly large sites often offer a search function that allows the visitor to look for occurrences of particular words or concepts anywhere on the site.

HTML frames let you divide the browser window into separate, independently scrollable regions, each holding a different HTML file. One popular use for frames is to isolate a site's navigation elements into their own frame, which stays constantly on screen while pages requested by hyperlinks appear in other sections. You can even use frames to create a new window to hold your site's navigation tools.

DEVELOP THE LOOK AND FEEL

After the essential structure of the site is documented and you have decided how to provide access to its different levels, it is time to think about the interface—the way your site presents itself to the user. Interface design is responsible for creating

FIGURE T9.10
Navigation Bar



a strong subjective impression as well as an easily understood overview of how the site works. Ideally, a strong interface seamlessly mixes navigational tools and the graphic identity that gives a Web site its character.

Site navigation was mentioned in the previous section; however, you need to be aware of some navigational design conventions already built into Web browsers. For example, visitors will work on the assumption that at every site they visit, text hyperlinks will look the same. Preferences for whether or not they are underlined and the color they are displayed in can often be set in each browser, but Web users know that blue-colored text that is underlined (and bold text on some nongraphics systems) signals a hyperlink. You need to respect that convention and refrain from coloring any text that is not a link. The flip side is that you can take advantage of that convention to identify links in graphics by showing them as colored text.

Another convention of graphical browsers is to have the pointer turn into a pointing hand when it passes over a hyperlink. You can count on that interface to tip off users that a graphic is "live." Any other clues about how to move around your own Web site, and reasons the visitor might want to, are up to the site's own user interface to convey. The art of interface design is to create an environment that includes the information users need in a quickly assimilated and attractive manner.

As with site architecture, interface design has too many possibilities to be subject to simple rules, yet you can test your ideas against a few guidelines. Ask yourself these questions:

1. **Does the interface convey a look and feel appropriate to your message?** Illustrations, metaphors, and layout should all be combined to convey the image you have named as a goal-friendly, sophisticated, businesslike Web site.
2. **Will the use of your site be obvious to first-time visitors?** A site's use will be more obvious to visitors if you use familiar metaphors and conventions—a map for navigating a geographic area, a labeled door for entering a new area, a

question mark icon indicating a help section, or a beveled interface indicating a clickable button. But there is room for originality. It is almost impossible to know whether what seems like a clear interface to you will be equally obvious to others. The only way to really find out whether your interface is working is with user testing; running tests with people who have never used or seen your site can tell you how likely it is that someone who has no history with the site and its development will understand your solutions. Testing will be discussed in more detail later in this plug-in.

3. **Are cues and feedback consistent?** Any interface has to be learned to some extent. Even when an interface uses only the most time-honored conventions, a visitor starts by testing his or her assumptions about how it will work. If a tool works as expected—if clicking an upward-pointing arrow takes you to the top of the page, for instance—the visitor learns a skill (getting to the top of a page), is encouraged to explore more, and learns to trust the interface. If on another page the upward-pointing arrow behaves differently, that trust is broken, the skill is unlearned, and the visitor is discouraged from exploring. A hallmark of a good interface is that it uses metaphor, location on screen, shape, color, sound, and every other cue consistently.

PRODUCE GRAPHICS AND HTML DOCUMENTS

Once the design is set and the content is ready to go, your site enters the production phase. You can use graphic tools, such as Adobe Photoshop or Fireworks, to create all the graphics needed for your site. The content will be formatted into HTML documents by HTML editors, such as Adobe Dreamweaver (see Figure T9.11), or you can write the HTML code by hand using a text editor such as

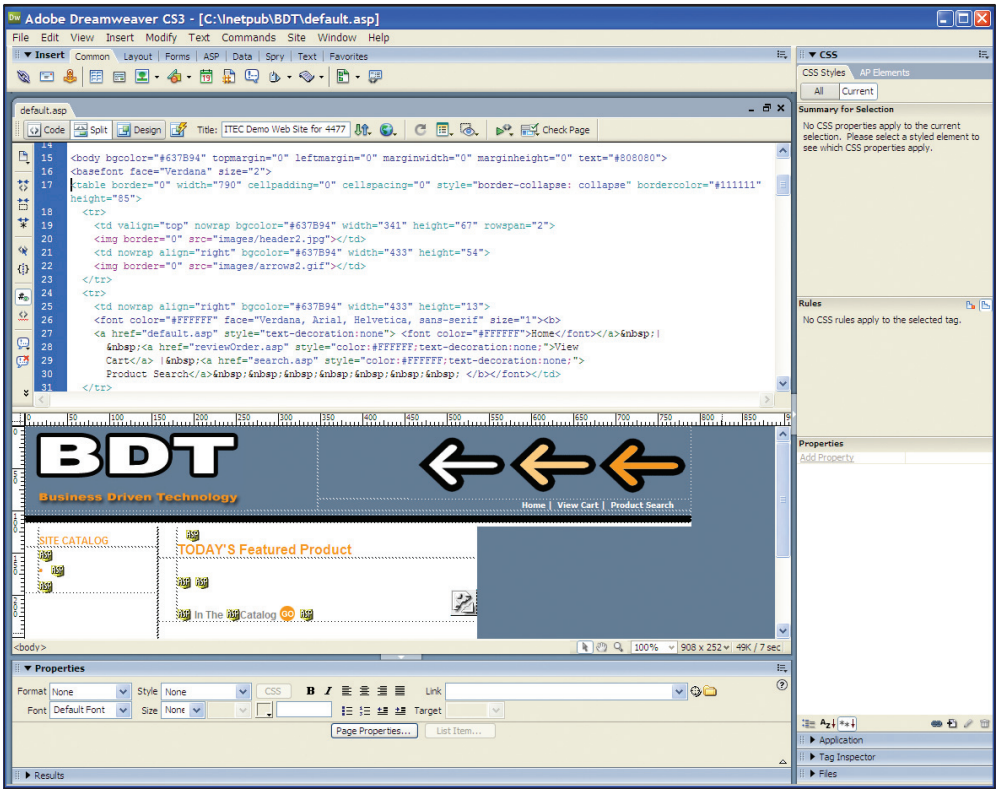


FIGURE T9.11
Adobe Dreamweaver

Notepad. Multimedia elements may also be produced and scripts and programs written. In short, all the elements of your site must be created in this phase.

One very important question to ask in the design phase is, "Does the design accommodate lowest-common denominator systems?" Web sites often depend on graphics to convey important navigation information and content, making the site unusable to visitors who do not have access to graphics. This is not to say that you cannot use graphical navigation systems on your site. It only means that you may sometimes need to provide alternate paths for text-only browsers, and you should take advantage of the methods for accommodating text-only systems that are built into HTML's image tags. Similarly, if your target audience includes users on low-bandwidth systems and older browsers, you should plan interface elements with minimum file sizes and avoid using Shockwave or other specialized media to execute your ideas.

CREATE A WORKING PROTOTYPE

At some point, all the pieces are brought together into a working prototype. This is not necessarily a distinct step; it is more likely to be an ongoing process as the HTML files and graphics are being produced.

Once the pages are viewed in a browser, it is necessary to tweak the HTML documents, graphics, and scripting until everything fits smoothly in place and works as intended.

TEST, TEST, TEST

Just because a page is working well on your computer does not mean it will look (or even work) that way to everyone. As discussed in the beginning of this plug-in, your page will be viewed through seemingly infinite combinations of browsers, platforms, window sizes, and user settings.

For this reason, you need to test your pages under as many conditions as possible. Professional Web design firms build time and resources into the production schedule for rigorous testing. This phase is often called QA (short for "quality assurance"). Check that your site is in working order, that all the links work, and that the site performs appropriately on a wide variety of browsers and platforms. Try viewing your Web pages in the following situations:

- **On another browser.** If you developed your pages using Internet Explorer, open them in Netscape. Hang onto old versions of browsers so you can open the pages in a less technically advanced browser as well.
- **On a different kind of computer than the one on which you developed the pages.** You may need to visit a friend and use his or her computer. If you worked on a Windows computer you may be surprised to see how your pages look on a Macintosh, and vice versa.
- **With the graphics turned off, and with a text-only browser, such as Lynx.** Is your page still functional?
- **With the browser window set to different widths and lengths (be sure to check the extremes).** Try changing the resolution of your monitor to a lower setting.
- **With your monitor set to 8-bit color.** Are your graphics still clear?
- **Over a slow modem connection.** Chances are you have fast Internet access where you are working. Try using a dial-up modem to view your Web page.

User Testing

Another important type of testing is user testing. This process involves ordinary people interacting with your site and seeing how easily they can find information

and complete tasks. User testing is generally conducted as early in the production process as possible so changes can be made to the final site.

An interface that seems perfectly clear to its designer may be extremely opaque to someone who has not been involved in its development, or to someone to whom the color red, or any other interface cue, simply has a different connotation. Since the success of a Web site depends on the ability of a wide variety of users to understand its clues, it is of prime importance that you understand just how a broad range of people react to the interface choices.

Anyone developing a very high profile site might find time spent testing designs with broad-based focus groups a worthwhile investment, but most projects, and most schedules, will not be able to afford such formal testing. However, you should be able to get time with friends, colleagues, and others who will not mind looking over prototypes at different stages of your Web site development. Extra feedback is bound to point out some issues you may have missed.

UPLOAD TO A WEB SERVER AND TEST AGAIN

Once you have a stable, reliable site, it is time to upload it to the final Web server and make it available to the world. You should do one final round of testing to make sure everything was transferred successfully and the pages function properly under the configuration of the final server. Check that the graphics appear and the links are working. This may seem like extra work, but if the reputation of your Web message is riding on the success of the Web site, attention to detail is essential.

MAINTAIN

Another aspect of Web site design to be considered is how it is going to be maintained. A Web site is never truly done; in fact, the ability to make updates and keep content current is one of the advantages of the Web medium.

Maintenance is an ongoing process that happens after the site is created. The refresh rate will likely affect the way you organize information and design the site.

You should also consider the life span of the site. If it is a site promoting a specific event, what happens to the site when the event is over? Even sites that are designed to be around a while will usually require a redesign after a few years to keep up with current technologies and changes in content requirements.

HTML Basics

HTML, the hypertext markup language, was introduced earlier in this plug-in. It was created along with the Web to provide a hyperlinked interface to the content of the Internet. However, to design for the Web, you are going to have to get to know HTML a lot better.

HTML is the backbone on which Web pages are built, and its characteristics determine what you can and cannot do on the Web. Even if you will be working with an HTML editor, you will still need to understand HTML's features in order to design for the Web.

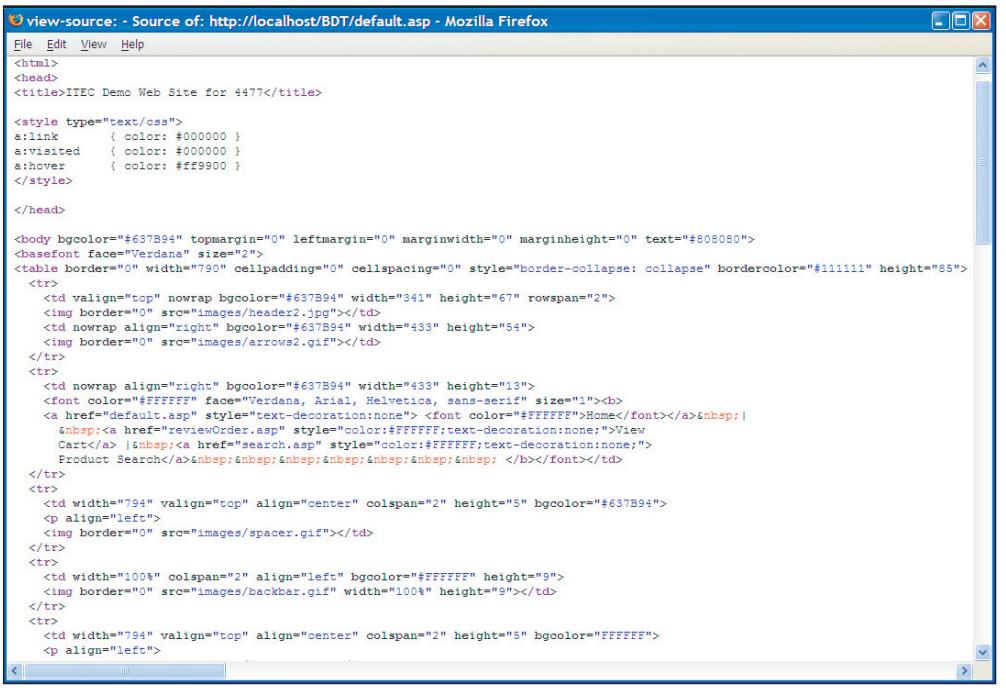
VIEWING THE SOURCE

Basic HTML is not hard to master. Many of the codes it uses are simple descriptive words (e.g., ALIGN = "CENTER") or abbreviations (B for bold, for example) for the effect they create.

The quickest way to become acquainted with HTML is to take advantage of a command you will find in almost any browser; View Document Source lets you see the HTML that makes up any page you read on the Web. When you compare

FIGURE T9.12

View Document Source




```
<html>
<head>
<title>ITEC Demo Web Site for 4477</title>

<style type="text/css">
a:link      { color: #000000 }
a:visited   { color: #000000 }
a:hover     { color: #ff9900 }
</style>

</head>

<body bgcolor="#637B94" topmargin="0" leftmargin="0" marginwidth="0" marginheight="0" text="#808080">
<basefont face="Verdana" size="2">
<table border="0" width="790" cellpadding="0" cellspacing="0" style="border-collapse: collapse" bordercolor="#111111" height="85">
  <tr>
    <td valign="top" nowrap bgcolor="#637B94" width="341" height="67" rowspan="2">
    <img border="0" src="images/header2.jpg"></td>
    <td nowrap align="right" bgcolor="#637B94" width="433" height="54">
    <img border="0" src="images/arrows2.gif"></td>
  </tr>
  <tr>
    <td nowrap align="right" bgcolor="#637B94" width="433" height="13">
    <font color="#FFFFFF" face="Verdana, Arial, Helvetica, sans-serif" size="1"><b>
    <a href="default.asp" style="text-decoration:none"> <font color="#FFFFFF">Home</font></a> |
       <a href="reviewOrder.asp" style="color:#FFFFFF;text-decoration:none;">View
      Cart</a> | <a href="search.asp" style="color:#FFFFFF;text-decoration:none;">
      Product Search</a>        </b></font></td>
  </tr>
  <tr>
    <td width="794" valign="top" align="center" colspan="2" height="5" bgcolor="#637B94">
    <p align="left">
    <img border="0" src="images/spacer.gif"></td>
  </tr>
  <tr>
    <td width="100%" colspan="2" align="left" bgcolor="#FFFFFF" height="9">
    <img border="0" src="images/backbar.gif" width="100%" height="9"></td>
  </tr>
  <tr>
    <td width="794" valign="top" align="center" colspan="2" height="5" bgcolor="FFFFFF">
    <p align="left">
```

the tags in the HTML file to the results in the browser, you will begin to understand what can be done and how it is accomplished. Figure T9.12 displays the View Document Source of one Web page.

HTML 101

HTML is not a file format in the sense that QuarkXPress or Microsoft Word have file formats. As explained earlier, HTML documents are ASCII-text only, and can be read by practically any application. HTML is actually a set of codes, or tags, that are embedded in these text files, between angle brackets.

Most people think of HTML as a language that describes the layout of text in an HTML file, but that is not exactly right. HTML tags can affect the layout of the file, but HTML is actually a structural markup language. It was designed to name the different elements of a document so that the browser can deal with them appropriately; HTML does not specifically specify layout.

There are many different types of elements in an HTML page, not just the ones that actually appear as text in the browser window. In addition to paragraphs, headings, and other text, HTML tags label elements such as scripts (the <SCRIPT> tag), multimedia objects and embedded programs (the <OBJECT> tag), hypertext anchors (the <A> tag), and other special elements. The browser tells it how to interpret and handle each tag, whether that means to display it in the page or take another action, like loading a script or image file. Review Plug-In T10 "Creating Web Pages Using HTML," for an in-depth look at HTML.

TYPES OF TAGS

HTML started out as an extremely simple application of tags, enough to tag the key parts of very basic documents, plus an extra feature that identified text anchors for hyperlinks. The first additions were to support graphics and interactive forms. When Netscape, the first commercial Internet browser maker, entered the world, HTML's growth went into hyperdrive. Tags appeared for features such as tables, frames, background colors, and interactive scripts.

STRUCTURAL TAGS	
File	<HTML> <HEAD> <BODY> <META> <TITLE>
Section level	<DIV> <DIR> <DL> <MENU> <OL> <UL>
Paragraph level	<BLOCKQUOTE> <P> <DD> <DT> <U>
Phrase level	<ABBR> <ACRONYM> <CITE> <CODE> <DEL> <DFN> <EM> <INS> <KBD> <PRE> <Q> <SAMP> <SPAN> <STRONG> <VAR>
Headings	<Hl> <H2> <H3> <H4> <H5> <H6>
Rules	<HR>
Form elements	<FORM> <BUTTON> <FIELDSET> <INPUT> <LABEL> <LEGEND> <OPTGROUP> <OPTION> <SELECT> <TEXTAREA>
Table elements	<TABLE> <CAPTION> <COL> <COLGROUP> <TBODY> <TD> <TFOOT> <TH> <THEAD> <TR>
Frameset elements	<FRAMESET> <FRAME> <IFRAME> <NOFRAMES>
Interactive elements	<A> <AREA> <MAP> <SCRIPT> <NOSCRIPT> <PARAM>
Additional code and media	<APPLET> <EMBED> <IMG> <UNK> <OBJECT>
STYLE TAGS	
Line	 <NOBR> <WBR>
Font	<FONTface=>>
Font size	<BIG> <SMALL> <FONT size=>
Font color	<BODY alink=> <BODY link=> <BODY text=> <BODY vlink=> <FONT color=>
Font style	<B> <I> <S> <STRIKE> <SUB> <SUP> <TT> <U>
Placement	<CENTER> <IMG align=>
General style information	<STYLE>

FIGURE T9.13
Structural and Style Tags

There are two types of tags: (1) those that belong in the head of an HTML document, supplying general information about the file, and (2) those that belong in the body, tagging the content that is shown in the browser window. The most useful breakdown is to think of the tags as falling into two main groups (refer to Figure T9.13):

1. **Structural tags,** which label the parts of a document: headings, paragraphs, lists, tables, images, and so on.
2. **Style tags,** which tell the browser exactly how to present the labeled text.

For the most part, "official" HTML, defined by the *World Wide Web Consortium* (the organization that monitors and guides the development of the Web), or the *W3C,* sticks tightly to structural tags. This is in keeping with the basic tenets to use the markup language to specify only the structure of a document and leave it to the piece of software that reads the file to format it according to that system's capabilities and the user's preferences.

Many of the style tags were added by browser manufacturers eager to fulfill designers' demands for more control over the look of documents. In the Web's early

days, the degree of control offered by such tags was about the only way to exert any influence over Web page layout. Most of those tags have served their purpose and should fade away over time, replaced by the control offered by style sheets. Style sheets are explained in Plug-In T11, "Creating Web Pages Using Dreamweaver."

THE ANATOMY OF A TAG

An HTML tag usually has several parts. The "start tag" tells the browser that a particular element is about to begin; text following the tag should be treated according to the rules for that element. Most HTML codes also use an "end tag," which signifies the end of the element. The end tag is usually a repeat of the start tag, preceded by a slash (/) character. For example, the beginning of an ordered list is marked by the <OL> tag and the end by the </OL> tag.

In addition, many tags have optional or required "attributes," which give the browser additional information about how the tag should be interpreted. The "attributes" follow the start tag, inside the start tag's bracket delimiters. Attribute names are often followed by an equal sign (=) and then the attribute's "value." Figure T9.14 displays the parts of an HTML tag.

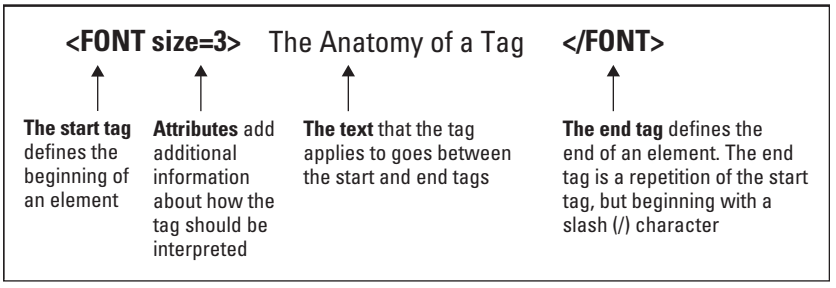


FIGURE T9.14
Anatomy of an HTML Tag

Basic Fonts

Most file formats do not actually save fonts in the file itself. Instead, most files simply include information about what fonts are used in the document. To be displayed, those fonts must be installed in the system of the computer displaying the file. If the right font is not there, the system uses a default typeface, usually Courier on Macintosh and Arial on Windows computers.

Since there is no way of knowing which fonts each visitor to your site will have installed, it does little good to specify a font in the file. Accordingly, early HTML did not include any commands for specifying fonts. HTML 2.0 (the current version is HTML 4.01) did, however, assume the reader had at least two fonts installed: a regular text font and an alternate, monospaced font, used for special purposes. To display text at all, though, a browser needs to select some typeface to display it in. Since Times and Courier ship with almost every operating system, most browser manufacturers assign those two typefaces as the default text and monospaced typefaces, respectively, and then allow individual users to assign new defaults in their own browsers.

While *style sheets* provide control over most aspects of type layout, they cannot affect the requirement of typography, the ability to choose the typeface the text will be set in.

Macintosh and Windows computers ship with different sets of fonts, and the only faces they have in common are Times (called Times New Roman in Windows), Courier (Courier New in Windows), and Symbol. Additional fonts are distributed with Internet Explorer and are available free from Microsoft's Web site (www.microsoft.com/typography/default.mspx) for both the Windows and Macintosh platforms (see Figure T9.15).

FIGURE T9.15
Standard Fonts for Macintosh and Windows Platforms

Macintosh	Windows	Free Web Fonts
Courier	Arial	Arial Black
Times	Courier New	Comic Sans
Charcoal	Times New Roman	Georgia
Chicago	Wingdings	Impact
Geneva	Symbol	Monotype
Helvetica		Trebuchet MS
Monaco		Verdana
New York		Webdings
Palatino		
Symbol		

Web Graphics

The explosion of the World Wide Web can be traced to one event, the creation of Mosaic, the first browser able to display graphics. Finally, information on the Internet could have color and personality. Suddenly, the Internet became more than a way to exchange useful information and e-mail; it became an entertainment medium. Graphics, like text, are subject to tight limits on the Web. The first is size; since files are transmitted at about 1K per second over a slow modem connection, graphics file sizes are realistically limited to 30K or less (about 30 seconds of download time), and the smaller the better. Second, is format; most browsers are set up to handle GIF and JPEG-compressed formats that have gained popularity mostly through their use on the Web. Handled creatively, graphics can turn your Web page into a stylized interface matching anything available in print. Handled badly, they can make your Web page unreadable.

GRAPHIC FORMATS

Mosaic, the first Web browser that supported graphics, supported just one format for in-line images: GIF, an 8-bit, compressed format. GIF is still the basic format for online graphics; however, current browsers also support JPEG, another highly compressed format. A third format, called PNG, combines some of the best features of GIF and JPEG. Like JPEG, PNG supports 16.7 million colors and compresses photographic images to smaller sizes than GIF does. It allows for transparent backgrounds and interlacing (this is explained below), and it even improves on those features by allowing for various degrees of transparency (explained below) and for two-dimensional interlacing, which transmits a rough overall view of the image faster than the one-dimensional scheme used by GIF. Since direct support for PNG has only recently been added to browsers, its use is still risky on the Web.

GIF and JPEG each have particular characteristics that make them appropriate for some types of images and not for others, but between the two of them they handle most images quite well (see Figure T9.16). As a rule, images that use few, flat colors are usually best saved as GIF. For complex images, such as photographs, that use many shades and gradations between colors, JPEG can provide significantly smaller file sizes than GIF can. JPEG can also support 24-bit color (up to 16.7 million colors), while GIF can support only 8-bit (256 colors).

The GIF and JPEG formats also differ in their support of three important features: interlacing, transparency, and animation. *Interlacing,* a feature of GIF89a, allows the browser to download and display the image in alternate lines, so that a rough version of the entire image becomes visible quickly, and visitors can view and interact with it without waiting for the entire file to download. *Transparency*

Graphic Format Considerations

	GIF87a	GIF89a	JPEG	PNG
Native support for most browsers	X	X	X	
Lossless compression	X	X		X
Supports transparent backgrounds		X		X
Supports interlacing	X	X		
Supports animation		X		
Maximum number of colors	256	256	16.7 million	16.7 million

FIGURE T9.16
Graphic Formats

allows you to specify that one of the colors in an image (usually the background color) should be treated as invisible, allowing you to create irregularly shaped images that float in space.

Choosing the Best File Format

Part of the trick to making quality Web graphics that download quickly is choosing the right file format for the job. Figure T9.17 provides a good starting point.

LIMITED COLOR PALETTES

Most graphics are created in 24-bit color but, unfortunately, most Web surfers do not view images that way. As your graphics enter a less-optimal viewing environment, the visitor's own screen, you will need to remember that they will be viewed according to the rules of that world, not yours. Many users will view graphics at a different bit depth or on platforms other than the one you used to create them. The same graphics look much different on a Macintosh than on a PC, or in 8-bit rather than 24-bit color.

Netscape Navigator, Internet Explorer, and Firefox have their own ideas about what colors to use on 8-bit displays, a 216-color palette, referred to as the *browser-safe palette,* which they apply to every graphic displayed on such systems. The browser-safe palette contains only 216 colors out of a possible 256, because the remaining 40 colors vary on Macintoshes and Windows computers. By eliminating the 40 variable colors, this palette is optimized for cross-platform use.

Also, the 256-color allowance on an 8-bit monitor has to cover all the images that are shown on screen at one time. Once 256 colors have been used, any remaining colors will simply be mapped to the closest equivalent among the first 256, or

FIGURE T9.17
File Format Comparison

If your image...	Use...	Because...
is graphical, with flat colors	GIF	it will compress more efficiently and keep colors flat and crisp, resulting in higher quality images at smaller file sizes.
is photographic or contains gradations of colors, such as watercolor painting	JPEG	the JPEG compression works best on images with blends of colors, and it can portray images with millions of colors, resulting in better image quality at smaller file sizes.
is a combination of flat and photographic art, such as a banner with text on a flat background and a small photographic image	GIF	in most cases, it is better to preserve your flat colors and crisp edges and to tolerate a little dithering in the photographic edges than to turn the whole image over to JPEG compression.
is a postage stamp- or icon-sized photograph	GIF or JPEG	although JPEG is better suited for photographic images, when the image dimensions are really small, GIF usually creates smaller file sizes with acceptable image quality. It is advisable to try both and find the one that works best for your particular image.
includes a transparent area	GIF	it is the only file format that supports transparency.
needs to be animated	GIF	it is the only format that supports native animation.

approximated by dithering (dithering was explained earlier in this plug-in) two or more available shades. If you are using many photographic illustrations with different palettes, you can optimize your palettes in an image-processing program. One method is to combine all the images you expect to show on a single page into a single Photoshop document, and then convert it to an 8-bit indexed color image with an adaptive palette with no dithering. As with so many aspects of Web design, no matter how many precautions you take, the only way to make sure all your preparations work is to test the results on a variety of systems.

PIXELS, NOT INCHES

If you have ever used pixel-based images such as TIFFs in print design, you are familiar with the term *resolution,* the number of pixels per inch. For print, an image typically has a resolution of 300 dots per inch (or dpi).

On the Web, images need to be created at much lower resolutions; 72 dpi has become the de facto standard, but in reality, the whole notion of inches and even dots per inch becomes irrelevant in the Web environment. In the end, the only meaningful measurement of a Web graphic is its actual number of pixels.

When a graphic is displayed on a Web page, the pixels map one-to-one with the display resolution of the monitor. Because the monitor resolution varies by platform and user, the image will appear larger or smaller depending on the configuration.

TOOLS OF THE TRADE

What follows is a brief summary to the most popular graphics tools among professional Web designers. It is by no means an exhaustive list.

- **Adobe Photoshop/ImageReady.** The industry standard for Web graphics creation is Adobe Photoshop. It is the tool of choice of most graphic designers. Starting with Version 5.5, Photoshop includes many Web-specific features such as a "Save to Web" option that shows previews of your graphic in different file formats and at different compression rates.

  Adobe's ImageReady, which comes with Photoshop, does special Web tricks such as animation and rollover effects. ImageReady also provides sophisticated tools for optimizing image file size.
- **JASC Paint Shop Pro.** If you work on a PC and are on a budget, you might want to try Paint Shop Pro, which has many of the same features as Photoshop, but at a much lower cost ($99 as of this printing). It comes with Animation Shop for creating animated GIFs.
- **Adobe Fireworks.** This is one of the first graphics programs designed from the ground up to address the special requirements of Web graphics. It has tools for creating both vector (line-based) and raster (pixel-based) images. Its features include side-by-side export previews, animation and rollover tools, advanced image-slicing tools, great file optimization, and more. It is also well integrated with Adobe Dreamweaver, the industry standard Web-authoring tool.

PLUG-IN SUMMARY

You don't need to know a lot about the technical underpinnings of the World Wide Web to design great Web pages. It will help, however, to have some knowledge of what the Web is, how it relates to other parts of the Internet, and the design constructs of the Web. The Web is nonlinear, page layout is not necessarily under the designer's control, HTML's capabilities are changing all the time, download time sets the standards, and the tools are improving, quickly!

Web sites come in all shapes and sizes—regardless of the scale and scope of a Web site, the development process involves the same basic steps:

1. Analyze and plan.
2. Create and organize content.
3. Develop the "look and feel."
4. Produce graphics and HTML documents.
5. Create a working prototype.
6. Test, test, test.
7. Upload to a Web server and test again.
8. Maintain.

MAKING BUSINESS DECISIONS

1. Resize Your Window

If you have a browser and access to the Web, get a feel for how Web pages respond when the browser window is resized. Make sure your browser window is not optimized to fill the screen.

a. Go to www.w3c.org. Make the browser as wide as your monitor will allow. Now make it extremely narrow. How many lines of text are at the top? What happens to the headline?

b. Now look at www.cnn.com. Play around with the width of the browser. Do you notice how the text and page elements always fill the width of the screen? What happens when the page gets very narrow? Can you see the information in the right column?

2. Designing "Above the Fold"

Newspaper editors know the importance of putting the most important information "above the fold," that is, visible when the paper is folded and on the rack. This principle applies to Web design as well. Web designers have adopted the phrase to refer to the first screenful of a Web page. It is what users will see without scrolling, and it bears the burden of holding their attention and enticing them to click further. Some elements that you typically see above the fold include:

- The name of the site and the logo.
- The primary message.
- Some indication of what the site is about (e.g., shopping, directory, magazine, etc.).
- Navigation to key parts of the site.
- Crucial calls to action, such as "Register Now."
- Any other important information, such as a toll-free number.
- An advertising banner (advertisers may require it).

However, how much is a "screenful"? Unfortunately, this varies by browser window size. Your available space could be as small as 623 × 278 pixels in a browser on a 640 × 480 monitor.

In general, the level of confidence in what will be seen on the first "page" is highest in the top-left corner of the browser window and then diminishes as the pages move down and to the right. When the browser window is made very small, the bottom and the right edge are the most likely to be cut off. One strategy for page layout is to put your most important elements and messages in that top-left corner and work out from there through hierarchies of importance.

Locate three Web sites that you think do an excellent job of designing above the fold and three Web sites that do not.

3. Playing with Preferences

See how bad you can get your favorite Web pages to look. Keep in mind that some users may be doing this to you!

- Launch your browser. Select **Edit, Preferences** from the menu.
- Select **Appearance** (Netscape) or **Web Content** and **Language/Fonts** (Internet Explorer).
- Go crazy setting new text and background colors. Change the size and fonts of the text. Be sure to check or uncheck boxes so that your preferences will override the document's settings. Try turning off image display.

Now look at some Web pages. How do you like their makeover?

4. Know Your Audience

In this plug-in, you have learned to consider a lot of unknown factors when designing a Web page. But a known factor when you begin the design process should be your target audience. In professional Web development companies, researching the characteristics and needs of the target audience is one of the most important parts of the design process.

A good understanding of your audience can help you make better design decisions. Below are a few scenarios for you to analyze and make design recommendations for based on the considerations presented in this plug-in.

Scenario 1: A site that sells educational software.

Scenario 2: A site with resources for professional graphic designers.

Scenario 3: A site used to share company information for in-house use only (also known as an intranet).