Web-Based Engineering Courses: Getting Started

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Introduction

The World Wide Web, or simply the Web, was developed in 1989 as a graphical version of the originally text-based Internet. However, few outside of academia and research sites heard of the Web until Marc Andreesen and a few of his friends at NESA at the University of Illinois founded their company Mosaic Communications in Silicon Valley. The company was later renamed Netscape Communications. In 1995, the Netscape Navigator Web browser began the craze we now call Web surfing.

Netscape Navigator, like the browsers that followed it, decodes text files that are written in a markup language called HyperText Markup Language, or HTML. The term *hypertext* refers to the ability to create links between files, allowing a user to use a mouse button to click on a word, phrase, or image and cause the browser to jump to and display another Web page. The term *markup* refers to using *tags* to "mark up" the contents of an HTML file. The tags tell the browser how to format text, display images, and form links to other HTML files.

Some Definitions

- **HTML.** Hypertext Markup Language, the programming used to create Web pages. HTML tags tell browsers how to display the text, images, and links referenced by HTML code (see Table 1).
- **HTTP.** HyperText Transfer Protocol, an Internet protocol for transferring HTML files.
- **Browser.** A program that reads, decodes, and displays text files that contain HTML code. The resulting display is called a Web page. Example browsers include Mosaic, Netscape Navigator, and Microsoft Internet Explorer.
- **Search Engine.** A program that one uses to search millions of Web sites all over the world for information on a given subject. Examples include HotBot and Yahoo!
- **Home page.** That web page on a multi-page Web site that the user is expected to visit first. Links to other pages on the site can start at the home page.
- **Web site.** A collection of related Web pages that are linked together. This paper teaches you how to create your own Web site, which will consist of a home page, which is linked to a course page for each course you teach. Each course page will then be linked to pages that contain information such as the course policies and course outline.

Web Publishing Basics

The first step in putting together a Web site is to specify its layout, that is, specify the required pages, their content, and the links between them. Some might call this *storyboarding* or drawing a flowchart like the one shown in Figure 1.

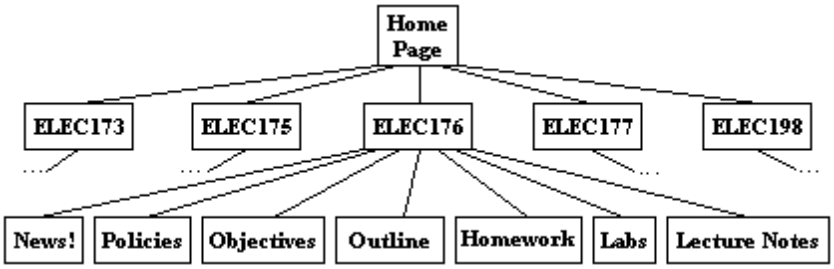

Figure 1. An example professor's Web site layout, containing 41 pages.

Your home page might provide your name, E-mail address and other information. You probably won't want your home address or phone number there, though. Remember that any information you post on your Web site is available to anyone in the world who has access to the Web. A photograph of you should also be added. Of course, you can provide other information; however, as a general rule, you should try to keep your home page simple and uncluttered. It should be short enough to be seen in its entirety on the Web browser without requiring scrolling.

Your home page should include links to other Web pages that are dedicated to specific subjects about you, such as your interests, goals, family, and friends. These Web pages will describe something about you and might include links to still more pages, in particular, pages on other people's Web sites. The ability to include links to other sites is one of the main reasons for creating a course Web page.

More advanced Web pages could include audio or video clips. However, these concepts are beyond the scope of this paper. As it is, the Web site portrayed in Figure 1 would contain 41 Web pages. Creating links and adding graphics are discussed in the next section.

There are several ways in which you can create the individual Web pages:

- Create the files from scratch, using a text editor, such as SimpleText on the Macintosh or Notepad under Microsoft Windows. This paper assumes this is the approach you be using.
- Create the files using a word processor, such as Microsoft Word, that can save the files in HTML format, adding the HTML tags for you. The tags will handle text formatting, as well as graphics and links.
- Use a Web publishing tool that is specifically designed to create Web pages, normally with a WYSIWYG user interface and completely hiding from you the details of HTML. Popular Web publishing tools include Netscape Navigator Gold, PageMill, and Front Page. There can be a bit of a learning curve with these programs, and to get the full power from them, you will probably need to know some HTML anyway.

As explained below, you should create your entire Web site on your own computer, test it, preferably with both Netscape Navigator and Microsoft Explorer, and then transfer all of your Web pages to an Internet server, such as that provided by your school or by your Internet Service Provider (ISP). Once your files are on the server, you should again test your Web site thoroughly.

Just Enough HTML

You don't have to know any HTML to create Web pages, since there are many Web publishing tools specifically designed to help you do so. You can also simply display plain text files. However, it is easy to create your Web pages from scratch using HTML, and you need know only a few HTML tags. Although HTML files are case insensitive, tags are typically typed in all capitals. Tags are always contained within the <> characters, as in <H1>. The <HTML> tag identifies a file to a browser as an HTML file. Most tags exist to tell browsers how to format the text in your HTML documents. Other tags establish links to other Web pages. Still others add graphics. Still others provide information about your Web pages so search engines can help Web surfers find your pages. Table 1 describes those tags you can use to create the simplest of Web pages.

Table 1. Common HTML Tags

- <HTML> This tag starts every HTML file. The file ends with </HTML>.
- <HEAD> This tag immediately follows the <HTML> tag. It marks the start of the heading, which can include information used by search engines. In simple Web pages, the heading contains only a title. The </HEAD> tag ends the heading.
- <TITLE> This tag declares the page's title. The title ends with </TITLE>, which is normally followed by the </HEAD> tag. The title appears across the top banner of the browser.
- <BODY> This tag marks the start of the file's body. The body contains the tags and text that actually describe the Web page. The body ends with </BODY>. You can change the page's background color with this tag: <BODY BGCOLOR = "WHITE">
- <CENTER>Interests</CENTER> centers the enclosed text on the page.
- <H1><H2><H3><H4> These tags set the size of text, with the 'H' standing for "heading." <H1> yields the largest text, <H4> the smallest. Every browser has a default, average text size, which it will use if the HTML file does not specify a size. Once a size has been specified, to revert back to the default size, you use </H1>, </H2>, </H3>, or </H4>.
- <B> makes the text that follows it boldfaced. </B> turns off the boldface.
- <I> makes the text that follows it italicized. </I> turns off the italics.
- <P> starts a new paragraph.
-
 (break) starts a new line.
- <UL> (unnumbered list) starts of list of items. Each item should be preceded by the <LI> tag. The list must be concluded with the </UL> tag.
- <HR> draws a horizontal line that nicely separates major sections of the page.
- <IMG SRC = "corvette.jpg"> displays a file called *corvette.jpg*.
- <A HREF = "http://www.uop.edu">UOP</A> creates a hypertext link. <A HREF = "mailto: jking@uop.edu">Send E-mail</A> creates an email link.

So, an HTML file with the title, "My Home Page," and which displays only the test, "I am John Smith, and this is my Web page," would look like:

```
<HTML>
<HEAD>
```

(continued on next page)

```
<TITLE>My Home Page</TITLE>
</HEAD>
<BODY>
I am John Smith, and this is my Web page
</BODY>
</HTML>
```

To display “My Name” in large text, italicized and boldfaced in large letters, you would use:

```
<H1><I><B>My Name</B></I></H1>
```

To add a graphic, you use the <IMG SRC> (image source) tag:

<IMG SRC = "gif/picture.gif"> This tag specifies the location and name of the graphic file. You must make sure you specify the correct location of the graphic file on the server’s hard drive. (This example tag says the file *picture.gif* is in the *gif* subdirectory.) Graphics used in Web pages are typically either “gif” (Graphics Interchange Format) images or “jpg” (Joint Photographic Experts Group) images. Be careful not to use too many graphics, since their files tend to be large, slowing the loading of the Web page.

To add a link to another Web page, you use anchor (<A>) tags:

<A HREF = "interest.htm">My Interests</A>
This tag will display “My Interests,” which will be underlined. If the user clicks on “My Interests,” the browser will jump to the file *interest.htm*. As with graphic files, you must correctly specify the location of the HTML file on the server’s hard drive. After the browser moves to a linked page, you can always return to the previous page by clicking on the browser’s “Back” button, which is usually in the upper left corner of the browser window. If the desired Web page is on another Web server, you must provide a complete Web address, as in <A HREF = "http://www.uop.edu">UOP</A>.

To add a link to your E-mail address, use the following:

<A HREF = "mailto: jking@uop.edu">Send E-mail</A>
This tag will display “Send E-mail,” which will be underlined. If the user clicks on “Send E-mail,” the user’s computer will run its default E-mail program, with the E-mail address included in the link set as the addressee.

Note that browsers ignore carriage returns (Returns or line breaks) and tab characters in word processing documents and text files. They insert their own line breaks to format the text as needed in the given displayed Web page. Browsers ignore all formatting information in word processing documents. Again, you can use any text editor to create an HTML file. You can use any word processor, as long as you save the file in text format (with or without line breaks, since browsers ignore line breaks). Whether you use a text editor or a word processor, you must save the file with the .htm extension **(**.html is used on Unix machines). Again, the browser handles the line breaks; however, you must add <P> tags to separate the paragraphs.

Creating Your Home Page

The following HTML code implements the home page included in Figure 1.

```
<HTML>
<HEAD>
<TITLE>My Home Page</TITLE>
</HEAD>
<BODY BGCOLOR = "WHITE">
<CENTER><H1><I><B>Professor Joe King</B></I></H1></CENTER>
<HR>
<P>My office hours are MTuWThF 9:00-10:00<BR>
<P>I teach the following courses:<BR>
<UL>
<LI><A HREF = "elec173.htm">ELEC173</A>
<LI><A HREF = "elec175.htm">ELEC175</A>
<LI><A HREF = "elec176.htm">ELEC176</A>
<LI><A HREF = "elec177.htm">ELEC177</A>
<LI><A HREF = "elec198.htm">ELEC198</A>
</UL>
<HR>
</BODY>
</HTML>
```

You can type the above HTML code using any text editor, such as Windows Notepad, and then save it as *homepage.htm* in, for example, the *temp* subdirectory on your hard drive (c:). To test the formatting of your page, run your browser, click on *File*, then click on *Open* or *Open File* and enter the location and name of your Web page, for example: *c:\temp\homepage.htm*. However, doing all this just gets you started. Clicking on one of the links will get you nowhere since those pages don't exist yet. You must create the five files yourself: *elec173.htm*, *elec175.htm*, *elec176.htm*, *elec177.htm*, and *elec198.htm*, as shown in Figure 1.

Each of these HTML files will be very similar to your home page, having a title, some explanatory text, and links to your *news*, *policies*, *objectives*, *outline*, *homework*, *labs*, and *lecture notes* pages. **HINT:** Since these pages may not need any graphics or links, they do not need to be HTML files. If you already have these documents in some word processing format, such as Microsoft Word's *.doc*, you can save yourself a lot of work by simply saving the files as text files, with line breaks. Use a *.txt* extension, and your browser will display the files as they appear in the word processor. (Again, most word processors can save your files directly in HTML form.) Since each course (ELEC173, ELEC175, etc.) will have its own set of pages, you should create a separate subdirectory for each set of pages. Therefore, the required links in the file *elec173.htm* would look like:

```
<A HREF = "elec173/news.txt">News!</A>
<A HREF = "elec173/policies.txt">Course policies</A>
<A HREF = "elec173/objectiv.txt">Course objectives</A>
etc.
```

Potential Problems

- **Connection speed**. If your users are at home, it is likely that they are using a modem. At school, browser speed is usually much faster. But whether at home or at school, the speed will vary according to the load on the server and the size of the HTML file. In particular, graphics increase the size of a Web page and therefore increase the time it takes to load the page.
- **Browser differences**. Most users use either Microsoft's Internet Explorer, Netscape's Navigator, or Mosaic. These browsers may display even very standard HTML in different ways. Some non-standard HTML may be displayed by one browser, but ignored by another.
- **Display configuration**. Your users can be using the same browser on the same network and still see your pages differently because the computers they are using have been set up differently.
- **Getting your pages on a server**. Once you have a Web site working on your own computer, for Internet users to have access to your handiwork, your Web pages must be on a server computer that is connected to the Internet. Pulling this off can be a bit complicated, but most Web authors place their pages on either a university's server or an ISP's (Internet Service Provider) server. Either way, the server owner will have to give you instructions on how to transfer your files from your computer to theirs. Moving your Web files from your computer to your school's server involves (1) having an account on the server and (2) running an FTP (File Transfer Protocol) program that moves the files. Moving the files is easy to do, but, if you don't know how to do it, you will have to find someone who can show you how to do it.
- **Server space**. Of course, your pages must be on a server to which on and off-campus users have access, presumably via the Internet. The manager of this server may restrict you to a given amount of hard disk space. Where you will likely feel this restriction is in the number of images you can put on your site. The HTML files themselves are typically very small.

Conclusion

Creating Web pages can be a lot of good, creative fun. Your only limitation is your imagination. When you have a Web site on the Internet, the whole world can find you. Already, millions of people have their own Web sites, and as more and more people join the crowd, the world just gets smaller and smaller. From Florida, which offers high school diplomas via its online Florida High School, to Singapore's Ngee Ann Polytechnic, which offers online electrical engineering degrees, schools the world over are now using the World Wide Web to augment their educational systems. You can too.

See http://www.discovery.com/DCO/doc/1012/world/technology/internet/inet1.html for a history of the World Wide Web. For more information on creating Web sites, see http://wwww.microsoft.com and then click on Web Site Builders. For more information on HTML, see "The Bare Bones Guide to HTML" at http://werbach.com/barebones/. When you're ready to get fancy without learning a lot of HTML, try Netscape Navigator's Composer. Just click on *Communicator*, then click on *Page Composer*, and then click on *Help* for instructions.

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