

Chapter Two of *Doing Digital History: A Guide to Presenting, Preserving, and Gathering the Past on the Web* by Daniel Cohen and Roy Rosenzweig (University of Pennsylvania Press, forthcoming, 2005), please do not circulate or reproduce.

Chapter Two: Getting Started: The Nature of Websites, and What You Will Need to Create Yours

The wide variety of historical websites are accompanied by an almost equally varied set of methods for producing them. This should come as no surprise; in the equally diverse world of paper, authors, publishers, and printers produce the *Dictionary of National Biography*, a textbook on world history, a scholarly monograph on the Carolingian dynasty, and a popular biography of Susan B. Anthony in significantly different ways. Even the casual reader notices variations among bindings, paper, front and back matter, and other clues about the nature of such works. In their area of specialty, historians often can detect how a work was produced, when, and for what reason from characteristic nuances in the composition and material of printed sources. We can all assess the size and length of a printed work through a cursory glance.

On the web, the seemingly clear window of the browser obscures many of these helpful clues. Type in an address (universal resource locator, or URL, in the acronymic terminology of the Internet that will dot this chapter but we hope not spoil it), and the browser magically pulls a “web page” out of the wide sea of the Internet. Although sometimes colorful, these web pages do not come in all shapes and sizes. The relatively small set of universally available fonts on computers and the low resolution (compared to print) of a web browser window restrict, somewhat, the potential for visual distinction. Moreover, you cannot easily assess from a web page the size of the website to which it belongs, in the way

you do instantly and unconsciously when picking a book from a shelf. A web page is a web page is a web page.

Or so it appears. The truth about these “pages” is that they involve just as much human input as a papyrus or pamphlet, even if they can be reproduced virtually without limit or cost once created. Indeed, web pages probably require more shepherding than such physical manifestations of human expression. After a book page is printed or diary entry recorded, it is “fixed” (to use the U.S. Copyright Office’s favorite word) in a form that will likely survive for generations.

A web page, on the other hand, can fall prey to unique electronic fates: it can be turned off or deleted, altered or corrupted, or become technologically obsolete. Moreover, authors of web pages can produce them in a variety of ways ranging from simple computer files similar to those produced by word processors to highly dynamic compositions that involve complex programming, databases, and the efforts of multiple computers. Visitors searching for information about the history of Douglas County, Kansas, via Google, the popular web search engine, and through the home page of the Douglas County Historical Society, for instance, proceed through two useful “pages” in their browser. Both pages are written in the HyperText Markup Language (HTML) that is the programming lingua franca of the web, and both include some text, an image in the upper left, and the links that are part of most web pages. In this sense these pages do not seem that different, yet the Google results page is the nearly instantaneous creation of roughly 100,000 computers working in tandem, while the Douglas County Historical Society uses 99,999 fewer machines to satisfy web surfers interested in the same topic.¹

This comparison is not meant to belittle the Douglas County Historical Society or

their website. Much the opposite: it points to a fundamental rule that all historians looking to move onto the web should follow, that the technology used to produce a website should be appropriate for the website's content and purpose. The Douglas County Historical Society doesn't need 100,000 computers. Surely it could use this number if it wanted to (having first attained record levels of funding for a local historical society), but it would be more trouble than it would be worth. The number of visitors, type of information being presented, and extent of its site make such a purchase unreasonable. This may seem an obvious point, but new website creators often try to use too much technology for a project, or too little. For example, an archive of 20,000 documents like the New Deal Network could consist of 20,000 individually authored web pages, but it would be much better for it to consist—as it does—of a small computer program that creates those 20,000 pages automatically from a database.² Among other advantages, when the creators of the site want to change the look of every page they only have to make a single change to the program rather than manually edit thousands of pages.

The teacher who wants to supplement a course syllabus with online student interactions could achieve this goal in a number of ways, from an email list to a web-based bulletin board to instant messaging to a blog to commercial course management software. Each has its advantages and disadvantages, and level of required technical proficiency, and you need to understand these differences before committing too many or too few resources to this addition. Guides to creating websites often begin with stern warnings to plan ahead. This strikes us as a case of the cart coming before the horse. How can one plan one's website when you are not sure whether you need a database or not, or even what a database is and what it can and cannot do? By looking “under the hood” of the history web, this chapter

provides background information to help historians make good decisions about which technologies and methods they will need for their particular digital project. This exploration in turn leads to further considerations about funding, staffing, and hardware and software purchases.

The Web, Websites, and Web Pages

An important and useful question to think about before looking at technologies such as databases is: What is a website? Despite a certain amount of variation, historians have a good idea of what a book is and how it is produced. An author, editor, publisher, and printing mechanism are involved in a rough order and with roughly the same results, independent of the topic. Once produced, the book sits on a shelf awaiting readers. It has a firm existence. The comparison between the Google results page and the Douglas County Historical Society home page, however, gives the potential website producer the slightly unsettling feeling that there is no firm process, set of mechanisms, or existence to websites, and that the answer to the question of what a website is depends on what the definition of “is” is.

In the case of the Douglas County Historical Society the home page file was already sitting on a designated computer, waiting to be requested like a book on a specific shelf in a particular library. In the case of the Google web page describing the results of the user’s search for information about Douglas County, this file was composed through the swift, combined efforts of thousands of computers. Like the proverbial tree falling in the forest, the Google page came into existence only when a user wished to view it, and it vanished once the viewer moved on. It is thus difficult to speak of a Google search result as having some fixed existence like a card in an old-fashioned library catalog.

Most historians don't need to worry about the ontological status of expansive websites like Google, which seemingly contain everything and nothing at once, like Jorge Luis Borge's "Library of Babel."³ (We do outline the technologies for producing fairly complex sites below, and in greater depth in the appendix, for those who need to build them.) Although you can produce a website in many ways, beginners should recognize that a website is basically *a collection of web pages*, and a web page is simply *a file produced or stored on one computer in a particular format that is sent to another computer that has requested it*. The producing computer, generally turned on twenty-four hours a day and constantly connected to the Internet, is called a *server*, while the computer requesting a file from the server is called a *client*. The server computer must be running special software to send a file, and the client must have special software (a web browser) to receive and display the file. Beginning with first principles thus reveals that you need very little to become involved in web production: if you have access to a server and can create one or more files to put there for others to request, you can have a website.

Moreover, the decentralized structure of the Internet—designed as a highly distributed network of machines (unlike the centralized telephone switching system of a prior era)—means that the locations of the server and client are essentially irrelevant. Your web browser software (such as Internet Explorer, Netscape, or Safari) cares not about the physical whereabouts or types of servers involved, or the path a file takes to it, as long as it receives that file promptly and in a language it can understand—namely HTML. An open standard associated with HTML, called the Hypertext Transfer Protocol, transmits web pages from one computer to another, but historians need not worry about this except perhaps to recognize its abbreviation, HTTP, which begins every web address.

The file sent by the server generally consists of regular text surrounded by HTML passages that tell a browser how to format the regular text, point to other web pages (through links), as well as request additional materials (e.g., images) from the server to complete the page. (On more complicated pages there may also be additional instructions, in non-HTML languages, telling the web browser software to take special actions in response to the activities of the user.) The simple but elegant idea behind HTML is thus to “wrap” passages of text with text markers, or tags, that identify the passage’s contents, much like the front and back cover help to identify the contents of a book. For example, a web author might surround a book title with `<i>` and `</i>` tags, which turn the contents between them into italics when displayed by a web browser. The angle brackets signal the tag format, and the backslash symbol / indicates the end of that format. Those who are curious may look at the “source code” of a web page by selecting that option from their browser’s menu. A typical HTML preamble looks something like this:

```
<html>
<head>
<title>My History Site</title>
</head>
<body bgcolor="#FFFFFF" text="#000000" link="#0000CC" vlink="#800080">
<p>The history of...
```

As you can see, unlike the incomprehensible ones and zeros of the programming code that runs your computer or software applications like a word processor, the World Wide Web code is largely readable text—and new authors of websites should not be afraid to take a peek at it.

Indeed, a significant feature of the web is that anyone who writes a web page also exposes to the world the code used to create it. Historians should find this nicely matches our

discipline's emphasis on the open dissemination of knowledge. Whatever the future brings, the web will likely remain a place built on freely viewable text code, and if historians feel uncomfortable with the technology, they should still feel an affinity toward the underlying principles.

Thinking About Your Website's Genre and Features

Newcomers to the web (as well as some old-timers) are often tempted to focus, sometimes obsessively, on the technology. After all, that most obviously distinguishes the web from our former primary realm of expression—paper—and despite our best efforts we could not get through even the introduction to this chapter without delving into several technical computer terms. Individuals who are used to the world of books and journals often find themselves overwhelmed by the web's technological otherness, and its myriad terms and concepts—HTML, servers, design and graphics software, and a host of other acronyms like FTP and ISP.

After more than a decade of experience with web production, we feel that this temptation to focus primarily on the technology is misplaced. Not only can it be daunting, it can be distracting. If you were thinking about building a house, how much time would you spend concentrating on the type of plumbing you would like to use or the amperage of the electrical service? How long would you spend thinking about the types of wrenches you would use to install the hot water heater? These elements are important—indeed, critical to the construction of a modern house (especially the indoor plumbing)—but few would say that they are what defines a house and makes it what it is.

Although both are honorable professions, we encourage historians to think of

themselves more like architects than plumbers. What kind of house are you building? What is the general area that it will be in? How will its design reflect or differ from the other houses in the neighborhood? Are you building a mansion or a cabin? In the same way that one plans a book with a clear sense of purpose, content, and audience—is it a reference work, a monograph for specialists, a popular introduction to a subject?—you should ask yourself some preliminary questions about the genre and scale of the website you are planning to build, and the key features it will have. These sorts of questions are very different from technical questions such as, “What kind of server should I put my site on—Windows, Macintosh, Linux?” or “Which software is better for website development—Dreamweaver or FrontPage?” or “Which is a better database—Oracle or Access?” These questions should be secondary, not primary. For instance, if you are just posting a syllabus to a website, you don’t even need to use a dedicated web development software program like Dreamweaver. Microsoft Word may be just fine.⁴ The answers to the primary questions lead to answers to many of the secondary, technological questions, such as whether you need a database at all.

In the spirit of beginning with first principles, we might also pose a question you should answer even before thinking about your website’s genre and features: do you really need to spend the time to build a website at all? Although this book is a guide to the *History Web*, and we believe that the web has many virtues to recommend it (as we noted in the introduction), not all historical endeavors require a website. Some historical projects would be better off remaining on paper or in personal computer files, such as research notes that you don’t want exposed to the world. Compared to graphically sophisticated productions such as a full-color, large-format art history book, the web still pales. Other projects might function better by using non-web computer technologies, such as email. Email remains the

most frequently used application on the Internet, and historians should not be embarrassed to stick with that simpler method. Ongoing communications about a historical subject, such as the Sixties-L discussion group or the wide variety of H-Net topics, are often carried out better via email.⁵ Soberly assessing the web's advantages and disadvantages and how they apply to your project will mean a clear-eyed entry into the digital world.

If you believe that a website is indeed desirable, you should then consider what you will need to build it. Again, focusing on the genre of website you plan to build will help you answer secondary questions such as technological requirements. Begin by investigating other websites on your topic, and websites that have a similar mission to yours. For instance, if you are planning a website on the American photographer Weegee, look at other sites on the man and his images, and other historical photography websites. Are you planning a site that is more of a gallery of Weegee's photographs that visitors can wander virtually through (an "exhibit" as we categorized it in chapter one), or a more like an online essay, with a smaller set of images chosen to illustrate a scholarly thesis?

Furthermore, assess what you like and dislike about the sites you visit. How will your site differ from these sites, in scale, features, or content? Contact the creators of the best sites to ask them about their site-building experience. Did they have unforeseen problems that they could help you avoid? Did they discover some shortcuts to getting this kind of material onto the web? What technologies did they find most useful—a good scanner, a web design company, a server host? If you can roughly match your website's ambitions to an existing site—allowing for chapter one's caveat that sites are hard to categorize and compare perfectly—you will begin to understand what you will need for your own creation.

Focus next on the features that will distinguish your site. What do you want, and what

will you need? For a site on the Alhambra, you may want an interactive "zoomable" map that visitors can click on to explore different areas; to serve a diverse audience, including many nonspecialists, you may need a glossary of Arabic terms. Once you have a list of features, arrange them in order of priority. Which features do you absolutely need to launch the site to the public? Which features could wait? Perhaps some could be implemented later—or not at all if you run out of time or resources. Inherent in this analysis, of course, is some sense of how much effort (including technological complexity, staffing, cost, and time) each feature will require, to which we now turn.

Text and Images

Luckily the most prevalent genres of historical websites are also the easiest to produce. Most teaching websites, such as online syllabi and course materials, as well as text-heavy scholarship such as essays, require little technology beyond rudimentary website software. You can safely put your site into this category if you plan on having only text and static images, and a reasonably limited number of pages. As we have already noted, the web is set up to handle text seamlessly (it is, in a sense, text with embellishments), and images can be added to web pages relatively simply.

Many computer programs can help you create the files that comprise such basic websites. These programs require varying levels of HTML or other technical knowledge. HTML “translators” exist for those who would rather not learn the web argot, while other website creators may wish to struggle through their pages in the “original” language. In a beneficial and relatively recent development, many programs that were not designed for web production now allow users to save files as web pages, without knowledge of HTML at all.

For instance, Microsoft added this feature in the 2000 edition of Word, and Excel and PowerPoint can now do the same. Undoubtedly the “save as web page” feature will become even more prevalent, and more useful, for those who do not have the time to learn more complicated programs. While they may be less sophisticated than web pages designed from the ground up with dedicated web development software, such pages will be viewable on the web with little fuss.⁶

Like Word, software designed specifically to produce a website runs on your personal computer and allows you to build pages before uploading them to a server. Currently Macromedia’s Dreamweaver (\$399; \$99 with the educational discount) has 75 percent of the market for website development software, and for good reason: it has a visual “what you see is what you get” (often abbreviated WYSIWYG and pronounced WIZ-e-wig) interface that both novices and more advanced designers appreciate, and the ability to automate often onerous tasks in HTML like defining tags and their attributes properly.⁷ Microsoft’s FrontPage (\$199; \$99 with the educational discount) has most of the rest of the WYSIWYG market.⁸ FrontPage has fewer total features than Dreamweaver, and those new to web design may find that a blessing—indeed, most users of FrontPage are novices or nonprofessionals—but the program does a poorer job than Dreamweaver at complying with web standards, which may make sites developed with Microsoft’s program look somewhat different on various computers and browsers, and harder to maintain in the future (see chapter eight on emerging standards such as XHTML).⁹ Free programs for creating basic websites with text and images also exist; they are generally usable, though not fantastic. First Netscape and now its free descendant Mozilla include the Composer HTML editor as part of a web browser package.¹⁰

Although programs such as Dreamweaver and FrontPage do a good job at layout and design, and are more than adequate for most historical websites, they may not allow for pinpoint precision and control of every aspect of every web page. At the high end of the learning curve are programs that work directly in HTML without a graphical interface. Although they allow for the greatest control of the final product, such programs (often just text editors pressed into service for web production) are the most daunting for novices, since they require a comprehensive understanding of HTML. Historians with little background in web production should therefore think twice before using one of these editors. It would be nice to read Dante's *Inferno* in Italian, but you have to decide if the benefits outweigh the hassle of learning Italian (though surely that has other rewards), and whether you might just pick up a translation instead. If you do require the level of precision these programs allow, or if you already know HTML and feel comfortable looking at plain text without a graphical representation of what that text will look like when rendered by a web browser, then you should look into programs such as EditPlus (\$30), UltraEdit (\$35), or BBEdit (for the Macintosh; \$179).¹¹

If you are at a college or university, your institution probably also has web-based software to help you build an online syllabus or course website. Common instances of this “server-side” software (as opposed to software like FrontPage or Dreamweaver that runs on your personal computer) are WebCT and Blackboard. These software packages have much to recommend them. First, they save you from the hassle of installing a program on your own computer. Second, they generally have templates for syllabi, saving you the time it takes to design your online course materials. Third, after you finish typing in the text and adding images, the page is already where it can be visible to other people, such as students (you can

also hide the site from non-students if you wish). And because of licensing agreements, this software is generally free to historians—though it costs universities roughly the equivalent of an assistant professor’s salary to install and license Blackboard or WebCT for a single year. Blogging software, which also runs on servers rather than clients and is discussed in greater detail in chapter six, also makes it easy to move text and images onto the web for courses or other simple history sites.¹²

Server-side software like WebCT, Blackboard, and blogging programs can have significant disadvantages, however. As in the political philosophy of Thomas Hobbes, you trade the ability to do whatever you like for more security and ease of use. The templates save time, but also severely restrict your creativity in building a course website. A distinctive look or layout may be impossible, and video and other forms of multimedia are sometimes difficult to add. Depending on the installation of the software by your institution or blog company, other restrictions may hinder you in a way that you could avoid by using your own software or personal server space (see below for the pros and cons of different web “hosts”).

None of the server or client programs for creating websites provides a powerful way to compose, resize, or modify the images you will use. This task requires a dedicated graphics program, which you generally have to install on your personal computer. After you create (or modify) images in this program, you upload them into your web folder on your server, where they can be attached to specific web pages. By far the most venerable and capable of these image manipulation programs is Adobe Photoshop,¹³ which has an enormous following among professional web designers since it can generate, alter, and enhance not just photographs but also line drawings and more complex graphics. (It can also doctor photographs easily and with almost no trace, which in the future will give historians fits like

Stalin's airbrushers.) Unfortunately, Photoshop costs \$649 (about half that with the educational discount) and runs better on the most powerful (and thus most expensive) computers. Luckily, Adobe also produces a slimmed-down image editing package called Photoshop Elements that includes many of the important features of its more robust sibling for a mere \$99 (\$59 with educational discount).¹⁴ Photoshop Elements should be an easy choice for most historians who need to do a fairly circumscribed set of tasks like resizing, cropping, and compressing images for their website (more on this in the next chapter). In addition to Adobe's offerings, Macromedia's Fireworks has more features than Photoshop Elements but fewer than the senior Photoshop (Fireworks sells for \$299, \$99 with the educational discount).¹⁵ Some historians may prefer to use Fireworks rather than Photoshop or Photoshop Elements because they can buy Fireworks as part of an integrated suite of web design programs (including the leading authoring software Dreamweaver) for \$899 (\$199 with the educational discount). You can find many other image editing software packages (including some free utilities that come with Windows), but Fireworks and the two Photoshops are the most capable programs on the market, and their special features help make images truly web-worthy.

Multimedia

Once you move beyond the text and images associated with most basic history websites into the multimedia found on many exhibition and archive sites, as well as most sites on the history of music and film, you face additional hurdles. Although the web is set up to handle audio and video, it often doesn't do a very good job compared to dedicated platforms (such as a CD or DVD player), and such multimedia does add a major layer of

complexity to any website. Two reasons for this complexity exist. First, moving from static elements like text and images to audio and video involves a quantum leap in file size. Second, audio, video, animation, and other multimedia formats unfold over time, and thus raise the question of *streaming* versus *downloading*. If a video is 100 megabytes, do you really want to make a viewer wait for the entire file to download before beginning its display—about two hours on a 56K modem or fifteen minutes on a high-speed connection? (In 2004, the number of Americans accessing the Internet with a fast broadband connection finally surpassed the number of slow modem users, but that still leaves tens of millions of potential viewers in a poor position to receive large video files.) The alternative, streaming, downloads only the first bit of the movie, and continues to download segments in the background as the viewer begins to watch the film immediately. Impatient viewers clearly prefer this method—yet it means that the website producer has to deal with additional, complicated software on the server.

Unlike the standards that undergird the web, such as HTML, commercial products that use proprietary technology to structure and serve audio and video dominate streaming media. At the current time three main formats predominate, each with more or less a third of the market, depending on who you ask: RealMedia from RealNetworks, one of the pioneers in multimedia during the dot-com boom and still a market leader (though possibly fading); Windows Media from Microsoft; and QuickTime from Apple.¹⁶ RealNetworks, Microsoft, and Apple have each pursued a similar strategy to profit from audio and video, a strategy that luckily benefits consumers but unluckily affects producers of web content: they all give away the means for playing audio and video streamed in their format, but charge producers for the means to stream that content.¹⁷ Fortunately the three large companies have also seen the

benefit of giving away (or licensing at little cost) restricted versions of their media servers so that small website creators (including virtually all historians) can start to use these products for free. If you do not plan on having more than a few people access your audio or video at one time or need to display extremely high-quality formats (e.g., full screen video), then these restricted versions will do.¹⁸

Each of the three major formats has its advantages and disadvantages, making it difficult to choose one format over the others. To non-audiophiles, audio sounds roughly the same on all three; more substantial differences occasionally show up in video playback, which is far more taxing on both the server and client computers. (Indeed, while decent audio can be transmitted over a dialup modem, acceptable video requires much higher speeds.) High-volume sites have often chosen RealNetworks because their server software is extremely sophisticated about the way it pushes audio and video out to a variety of users (it can discern how fast each user's connection is and compensate), and it can handle thousands of streams at the same time. Most viewers and listeners, however, consider RealMedia files to be the lowest (though still acceptable) audio and video quality of the three major formats. Microsoft also has server technology that helps to smooth out playback to large numbers of people, and can also handle far more streams than will likely occur on any but the most popular museum websites. But probably its greatest advantage is Microsoft's preinstallation of the Windows Media Player on 95 percent of the world's computers. PC users have to actively seek out the Real and QuickTime players (of course, Mac users have to seek out the Mac version of the Windows Media Player). For this reason alone Dan Arthurs of StreamingCulture, a site that serves multimedia for numerous arts and humanities organizations, recommends Windows Media for any historian who has to choose a single

streaming format. (With a high-capacity server and an audience that includes a lot of artistic Mac users, StreamingCulture streams audio and video in both Windows Media and QuickTime.)¹⁹

Apple's QuickTime has traditionally been the choice for websites looking to serve the highest quality video, but its slightly less robust server software (compared to Real and Windows Media) means that it cannot handle huge numbers of visitors as elegantly (again, we are talking about hundreds of simultaneous users or more), and video has been known to be choppier than the other two formats during streaming playback.²⁰ On the other hand, since it uses an open encoding standard, unlike the proprietary "codecs" of Real and Windows Media, the QuickTime format may survive for a longer period of time, and achieve a wider adoption across many devices and platforms, than its rivals. None of the three formats is truly adequate for long-term preservation since they compress multimedia so substantially as to lose considerable information from the original. Dan Arthurs strongly recommends saving both the physical media (if any) on which the audio or video was recorded (e.g., Digital Beta or consumer DV) and a high-quality transfer to your computer (more on this in the next chapter), in addition to whichever streaming format (or formats) you select.²¹

Interestingly, all three companies have recently begun to partially support some common and even rival formats. Both QuickTime and Windows Media support the open (and extremely popular) MP3 audio standard—a good neutral choice for digitizing audio—while Real (perhaps oddly) supports QuickTime formats. Since most people have more than one of the three main players (and sometimes all three) on their computers, it is difficult to go wrong—inevitably some of your audience will have to download the free player before viewing your content, and you should always include a link to the specific streaming media

company's site for these downloads. Choosing a specific format for your multimedia does entail a commitment, however; switching to another format later on can be difficult.

Done well, the addition of audio and video to a site can be affecting. The Sonic Memorial Project, an audio history of the World Trade Center and its collapse on September 11, 2001, has an immediacy that pure transcripts lack.²² In addition to the voices of hundreds of survivors, one can listen to longer segments from the Mohawk iron workers who helped to build the twin towers in the 1970s, and now-lost sounds of people on the visitor's deck, in the neighborhood below, and at work in the skyscrapers. The sheer size of its collection of audio files and the creative way that the website allows for visitors to hear audio clips from a wide variety of people in its archive requires (unsurprisingly) a fairly complicated infrastructure, including RealMedia server software and extensive programming by Sonic Memorial's web developer Julian Bleecker.

Few historical projects that require audio will need to reproduce such an effort. Either a "wait until download is complete" system for audio or video files or an installation of the basic (and free) versions of RealMedia, Windows Media, or QuickTime will likely suffice for almost all small- to medium-sized sites that are not receiving thousands of daily hits. Regardless, audio or video on the web must be digital rather than analog, which may involve substantial conversion issues, one of the subjects of the next chapter.

Another popular option for moving beyond static text and images on your website is a commercial product for animation and multimedia called Flash, produced by the Macromedia Corporation, the creators of Dreamweaver.²³ The great technological advantage of Flash versus streaming media software is that it permits files that are small relative to video files (still not tiny, particularly for those viewing the web through a slow modem connection) to

seem like highly advanced graphical experiences, and moreover it allows interactivity with this content. To do its magic, however, Flash requires special software that plugs into your web browser and that takes over the display when it encounters a Flash file; luckily most computers now come with Flash preinstalled with the web browser. Other disadvantages of Flash include its poor accessibility to those with visual disabilities (see chapter four) and the difficulty search engines like Google have finding information within sites heavily reliant on the technology—making it harder for your potential audience to find your online project. Also, like streaming media, Flash’s costs are born by the producers rather than the users: creators of Flash content must buy special production software from Macromedia, and they also must spend the time to learn how to create Flash files, which differ substantially from the files created by an image editing program like Photoshop.

Many of the best historical sites that use Flash combine its potential for interactivity with compelling graphics that help the viewer understand an event or place that would be difficult to describe with mere words. For example, National Geographic’s Remembering Pearl Harbor places its archival photographs, video footage, and first-hand narratives into a timeline and map that the user can click on to go directly to key moments, such as the first sighting of an aircraft off Oahu.²⁴ Using Flash technology, the user can then zoom into the map and choose related historical documents to study further. Just as impressive as Remembering Pearl Harbor in its use of Flash to convey visually the complexity of the past is the Theban Mapping Project, which provides interactive, highly detailed birds-eye maps of the Theban Necropolis and especially the Valley of the Kings, the location of so much important Egyptian archaeology.²⁵ A 3-D recreation of one Pharaoh’s tomb, over 250 zoomable and pannable maps, and links from these interactive maps to over 2,000 images,

provide a rich history of the era of the Rameses and their complex funerary constructions that easily rivals any book on the subject.

Databases and XML

Two advanced technologies that historians will likely need for archival or gallery sites that have hundreds or thousands of artifacts or documents to display, for sites gathering history online, or for running online discussions, are the database and XML. Both are storage systems for materials arranged in a formal manner, and thus are helpful for dealing with caches of documents or other materials that exhibit elements of repetition (a set of notecards or letters, a series of comments about a topic, or a slate of encyclopedia entries). XML and databases have structures for containing critical bits of information about historical objects, such as the author of a document or the dates of a battle. Researchers using sites that employ these technologies can examine the highlighted information in extremely useful ways. For instance, a database or XML archive of a thousand letters to and from Ralph Waldo Emerson could allow very precise searches by a range of dates, correspondents, keywords such as “wonder” or “slavery,” or a combination of all three—thus allowing for more penetrating historical analysis by providing responses to questions such as, “To whom did Emerson write about abolitionism in the 1850s?” A thousand normal web pages with these same letters wouldn’t be nearly as useful since there would be no way of combing through it with such specificity.

In some respects, databases and XML are similar technologies. Each allows you to define information such as “author” or “date” and then encode historical materials using those definitions. Yet they do this task in very different styles. XML is much like an HTML

document: pure text with tags surrounding words or passages, in this case representing the definitions such as author or date. Databases generally store their information in less readable files (that require a database program, not a text editor, to read them), and mandate that the bits of information one wishes to highlight get separated from the main document into distinct “columns” or “fields.” For example, the date of one of Emerson’s letters would remain at the top of the full text of that letter in XML—though wrapped by informational tags—while the same letter in a database version would have the main text of the letter in one column and the date in another. The advantage of XML for archival websites is therefore that it allows *in situ* definitions. If you want to number the paragraphs of Shakespeare’s plays and note where he fashioned new words, XML works extremely well. In short, XML is particularly well-suited for sites that focus on historical text.

The advantages of databases include the ease of updating entries (for instance, changing the dates of a hundred documents without editing each one), logging transactions (e.g., when was the last time a visitor viewed a document), and perhaps most important the native ability to search for matching records in a variety of ways (and with a sophisticated language called SQL). Such features make it a natural technology for history sites that involve forums, the gathering and editing of historical materials, or the membership roles of a historical society, as well as many online archives. Because of these innate, robust features and long history of use (even before the web), sites using databases are far more prevalent than sites using XML. Since both technologies require more specialized knowledge that would be somewhat out of place in this introduction to the mainstream web, we have included a longer discussion of databases and XML in the appendix. We also cover how they work in greater depth in subsequent chapters.

Serving Your Website

The unique character of the Internet means that the production, hosting, and distribution of a website can be geographically dispersed with essentially no impact on the experience of the visitor. A web page can be written in one place, uploaded onto a server in another place, and accessed virtually anywhere else. The companion website to *Not For Ourselves Alone*, the historical documentary about Elizabeth Cady Stanton, Susan B. Anthony, and the women's suffrage movement made by Ken Burns (who lives in New Hampshire) and Paul Barnes (who lives in Vermont), was designed and “built” in Portland, Oregon, and is hosted on a server in Arlington, Virginia.²⁶ The options for where to put your website are therefore nearly limitless. The type of “hosting” situation may not be, however, depending on the genre of your website and its associated technical needs.

Almost any server will suffice for those who are building a relatively small site (say, under a hundred pages) that won't change frequently and doesn't involve databases or multimedia. Academic institutions sometimes provide a small area of their web server (or servers), generally around 5-100 megabytes, for affiliated students, faculty, and staff, and you should explore this possibility since institutional web space is generally free, the server software is already set up (and often includes at least a modicum of support from the information technology department), and is likely to be highly reliable since the institution's functioning will depend on it. In most cases, the allotment provided is more than enough for a lifetime of course syllabi, a personal website for your work and family, and even another small site or two. If your marquee project ends up being much larger than you expected, the institution may be willing to allocate you more disk space (a cheap commodity).

A second possibility for hosting your website is your ISP, or Internet Service Provider. If you access the Internet from your home, your ISP may offer space for you on one of its web servers. As with institutional hosting, this space tends to be somewhat limited but still adequate for most uses (again, excepting any website that requires a database or multimedia). The amount of technical support provided varies widely by the ISP, but is generally less than in an institution setting where you can walk into someone's office if something goes wrong. (You can probably walk into the technical support office of an ISP too, but if you live in the United States it will likely require a very long journey, since ISPs tend to outsource their technical support overseas.)

A third possibility is a commercial web host. This option usually involves a monthly cost ranging from around \$5 for an amount of hard drive space comparable to that provided by an institution or ISP, to hundreds of dollars for enormous amounts of storage for extremely large sites. ("Free" web hosts, such as Yahoo's Geocities, exist as well, though they will surround your material with advertisements.)²⁷ Hundreds of companies offer this service; you can locate them through services like the Web Host Directory,²⁸ but word of mouth from people you know is obviously better than trusting online reviews. The amount of data you *transfer* to visitors each month—rather than the amount you *store* on the web server—is generally the more important indicator of your site's monthly cost on a commercial server. (One of the nice things about university servers is that they often do not restrict this data flow.) If you have a site heavy in multimedia files or are planning on thousands of visitors per day, you could end up owing hundreds of dollars per month in additional "bandwidth" costs if you don't plan ahead. But only the largest, most visited history sites will probably encounter such costs. Commercial hosts offer around 25-50 GB of

data transfer a month for about \$10, far more than most historical websites will require. (Data transfer of 50 GB in a single month is roughly equivalent to a 20-page site with small images and no multimedia being thoroughly examined by 50,000 visitors.)

If you are confident that you will receive a high volume of traffic to your site (tens of thousands of visitors per day or more), you should investigate the possibility of a commercial service with just a few sites on one server, or in extreme cases, only one site per server. The latter option is called “dedicated” hosting, and obviously is the most expensive option. You have the advantage of total control of a server —all of its hard drive space, every tick of its processor, the entirety of its wire out to the network. Unfortunately, even the most inexpensive plans for high-quality dedicated hosting begin at around \$200 per month, and go up sharply from there for faster machines and a faster connection to the Internet. For a major site with extensive databases, lots of multimedia, and significant traffic, this cost could easily top \$1,000 per month, including technical support. For instance, at the Center for History and New Media we transfer about 300 GB of information per month to visitors, and need about 150 GB of hard drive space to hold our various websites and associated content. While we currently run our own server, we have explored the possibility of outsourcing it to a commercial host; unfortunately it would cost us at least \$15,000 per year for the same type of server and amount of bandwidth.

Once you begin to consider a dedicated server though a commercial host, you should (like us) probably consider the ultimate step of running your own server. For even \$200 per month, you could buy a decent server of your own in less than a year. Relatively few historical operations, however, have taken this step. Running your own server entails tremendous advantages and disadvantages. For large sites a number of hardware and

software pieces need to come together, and owning a server gives you full control over this configuration. You can install the exact database, programming language, web server software, hard drive storage, backup scheme, connection monitoring and logging, and other elements precisely as you desire. You can upgrade any of these pieces when you want, or choose not to if you are worried about the effects an upgrade will have on your existing web pages or other software on the server. You can give out accounts and space to collaborators in other organizations. You can add storage to your server at a relatively low cost.

You can also wake up every day (or fail to sleep through the night) with fear about computer crashes, glitches, patches, upgrades gone wrong, hackers, and power outages. Owning your own server is much like owning a house —you can paint the walls garish colors if you like but you're also responsible for the lawn, the roof, and the crumbling staircase that may collapse at any minute. Operators of some large sites need to have such responsibility and have the great resources to accept it. For instance, the exceedingly popular Ellis Island website, which includes the manifest records of ships full of immigrants, is held on Hewlett-Packard servers running Oracle database software and connected to the Internet on high-traffic wires—all top-dollar options. For most small- and medium-sized sites, as well as many large sites that do not have advanced features requiring extensive programming and database configuration or a high volume of traffic, it is better to outsource the server to someone else. Let a commercial or institutional host worry about all of the headaches so you can focus on the history.

Although the nature of the Internet collapses space and obscures the distinctions between web servers, each of these four possibilities for web hosting (institutional, ISP, commercial, do-it-yourself), as well as particular hosts of each type, has its advantages and

disadvantages, which you should assess before making a choice. Technical support, as we've already mentioned, can vary widely, though none of the three outsourced host types is uniformly best. While you are paying them monthly fees, some commercial web hosts only answer questions via email, and many take a long time to respond (for certain hosts, up to seventy-two hours). On the other hand, commercial services may provide web interfaces that greatly facilitate the uploading and management of your site (versus the file transfer program you generally have to use in an institutional hosting setting), as well as additional services such as a traffic monitor and special site-related email addresses. If you wish to know how popular your site is, or to have a distinct email address for queries relating to your history site, those additional services can be worth the price (for more on assessing and communicating with your audience, see chapter five). All hosting possibilities (other than running your own server) generally involve the sharing of a server by a number of websites, where the computer owned by the commercial hosting company, your ISP, or your institution splits its hard drive space among the many people who are using it as their host. The number of these subdivisions and the volume of traffic to the other sites on the shared server can sometimes affect the speed and responsiveness of your site.²⁹

Naming Your Site and Presenting It to the World

A more noticeable difference among the four main types of web hosting that may matter more than the snappiness of your site is the way each type of hosting appears to the end user in the address for your website, or URL. While most historical websites, as we noted at the beginning of this chapter, are merely a set of files that can be located on virtually any server, the address to locate those files varies depending on where you host it, and in

what manner. To understand why web addresses can vary so much, we must look at the anatomy of a URL, the unique location in cyberspace every web page has, and how it relates to the structure of the Internet and the servers connected to that network of computers.

One of the great innovations of the web is the way in which it has made computer technology and networking more accessible, and among the techniques for doing so was a new system that named computers with letters and words rather than the numbers preferred by computer scientists. Each server (not website) on the Internet has a unique Internet Protocol address, or IP address, so that other computers can find it. Currently that address is four one- to three-digit numbers separated by periods. (Since the world is running out of these numbers, there are plans to move to longer designations, just like when the phone company moved from 4-digit dialing to 7-digit, and from 7-digit dialing to 10-digit.³⁰) For example, the IP address for the Smithsonian Institution's National Museum of American History is 160.111.76.139. Shrewdly divining that average human beings have enough trouble remembering the phone numbers of their family members, the creators of the web laid an alphabetical layer on top of this infrastructure of numerical IP addresses. This layer of technology, called the Domain Name System (DNS), translates (or “resolves” in computer-speak) addresses written in a more readable format of characters and words into underlying numerical addresses, which are then sought out by the requesting computer. When someone types “http://www.nmah.si.edu” into their web browser, a request is sent to a special computer called a DNS server, which sends back a numerical IP address that matches those letters and the client computer then requests a web page from the computer that goes by the name of 160.111.76.139.

Without a doubt, DNS is a fantastic innovation that has greatly advanced the use of

the web, since it allows regular people like historians to choose a name that they would like associated with their website. (Regular people like historians cannot assign themselves a numerical IP address.) Like Hebrew or Arabic, “domain names” should be read backward to be understood properly. Let’s return to our example of the Douglas County Historical Society. The URL for the organization is www.watkinsmuseum.org. The string of letters to the far right, “org,” is called the top-level domain (TLD). Common TLDs are “com,” “org,” “net,” “edu,” and “gov,” in addition to the 242 two-letter country codes, such as “uk” for Britain and “fr” for France. More recently, the powers that govern the Internet have added the .museum TLD, which may hold attraction for some readers of this book, although most museums already use .org instead; to qualify for this new TLD you must show the appropriate institutional *bona fides*.

Large companies and organizations called “registries” own and manage the TLDs. For all intents and purposes, you cannot make up your own. The real action is in the *second-level domain* (SLD). The Douglas County Historical Society based their second-level domain on an abridged version of their physical home, the Watkins Community Museum of History. Together with the TLD “org” (which stands, appropriately enough in this case, for non-profit organization), watkinsmuseum.org is commonly referred to as the “domain name” (even though technically it consists of a SLD and a TLD). Like the Douglas County Historical Society, you can register for a domain name with a “registrar.” It is critical that you register your domain with a registrar accredited with the international body responsible for managing domain names and the DNS system, the Internet Corporation for Assigned Names and Numbers (ICANN).³¹ Non-accredited registrars often promise things they can’t really deliver except through technological trickery, like your own TLD or a “free” domain name. Only

ICANN can approve new TLDs (and they have done so very slowly), and registrars must pay registries around \$5-6 per year for each domain they register. If you are being offered a domain name for less than \$6 per year, something funny is probably going on. Having said that, with hundreds of ICANN-accredited registrars, the domain registration business has rapidly become competitive and so you can find decent registrars for around \$10 per year, and even less for multiyear registrations. While the once-monopolistic Network Solutions remains the leading domain registrar, lower prices and equivalent service can be found at Dotster and the oddly named but very cheap GoDaddy (the third and fourth most popular registrars).³² Given the low cost of registering a domain name, you might also want to consider buying other, similar domains to your main name to prevent confusion among possible visitors. For instance, the Douglas County Historical Society could also purchase `watkinsmuseum.com` (and `watkinsmuseum.net`, etc.) if they wanted to be sure that web surfers looking for their site didn't instead end up by accident at another, non-historical website. (Traffic to these extra domains can be redirected automatically by domain registrars to your primary domain.)

Do you need a domain name? This is partly a question of user ease and aesthetics, and partly a question related to your preferred web host. In general your site can only use its own domain name if you go with a commercial hosting service or own your own server, or in unusual cases where an institution or ISP allows you to “point” a registered domain to their server. In order for a domain name to work properly and result in a website appearing in a browser, not only does the DNS server have to list a relationship between a domain and a numerical IP address, but the computer that goes by that IP address also has to be “listening” for requests for that domain name. In other words, you cannot merely register a domain name

and then point it to any old computer. (Some registrars have a feature called domain masking that seems to allow one to do just that, but they are really just inserting all of your web pages in an artificial frame with your URL at the top, and this method can be confusing as visitors go to different pages on your website without the URL changing.)

If you are using a host that can accept your own domain, and if you choose it carefully, a domain name can facilitate the ease with which people find your website and associate it with a specific historical topic. Which would you rather type into your browser, www.institution.org/~username/topicname/home.html — a typical address on an institutional server—or www.topicname.org? This comparison becomes even more stark as you move from the home page of a site into internal pages. For instance, you could place a timeline at yourdomain.org/timeline.html (easy to hand out to others and cite in written materials) rather than www.yourispdomain.net/users/username/topicname/timeline.html. M.M. Eskandari-Qajar’s site on the history of the Qajars in Persia used to be on his ISP’s web server, at home1.gte.net/eskandar/qajtoc.html. After registering a domain name, Eskandari-Qajar, a professor at Santa Barbara City College, moved the whole site to www.qajarpages.org. He is now able to hand out easy-to-remember URLs for sections of his site such as the events calendar and the “frequently asked questions” page.

The American Historical Association ended up with their current domain, www.historians.org, through a more circuitous route. By the time they had decided to register a domain, the early-bird American Hospital Association had already taken the obvious aha.org. So the historians’ AHA had to add a “the” to the domain. Unfortunately, people had trouble remembering or guessing the somewhat inelegant www.theaha.org, and so more recently they bought the simpler www.historians.org. This domain is more memorable, and

also has an appropriate keyword in the domain name, which may help when people are trying to find the association using a search engine (as we will see in chapter five). Other less obvious advantages to having your own domain name rather than using the domain of your web host includes the ability to keep your site at the same URL if you change ISPs or move from one institution to another, and the potential to group multiple projects under a single domain.

With institutional web hosting, the URL instantly conveys the affiliation of the web author. For example, Paul Halsall, who built the extensive Internet Sourcebook we mentioned in chapter one, taught a course at Brooklyn College on Chinese culture, materials for which resided within his personal space on one of CUNY's servers —namely one of several Sun servers in the Atrium Computer Lab. Observant people can see Halsall's username in the URL for the site: acc6.its.brooklyn.cuny.edu/~phalsall/, and everyone who comes to the course website can identify its association with Brooklyn College and CUNY by glancing at the URL. Even though the site has almost a hundred images and a lot of text, it is still relatively modest in extent and Halsall did not need a lot of space to contain it. The Brooklyn College server made a great deal of sense, and to the college's credit the files have not been purged from their server even though Halsall left the college in 1999 to go to the University of North Florida. Today, he continues to maintain his course websites in a simple but effective way on the UNF servers (www.unf.edu/~phalsall/).

Hosting your website on your ISP's server may appear less desirable than an institutional home, but it provides the independence of having your own space without the cost of a commercial host and the yearly domain registration fee. For example, David E. Brown uses personal space on the web server of his ISP, Comcast, for his site on the Fifth

Regiment of the U.S. Colored Cavalry, as the URL (mywebpages.comcast.net/5thuscc/) shows. The modest-sized (about thirty pages) site fits easily within the space the cable company allots. Brown could have registered 5thuscc.org as his domain name for this project and contracted with a commercial hosting service, but the Comcast arrangement works just fine. Of course, should he change Internet service providers he would have to change his site's URL.

Eskandari-Qajar's, Halsall's, and Brown's websites are on very different topics and are hosted in three different ways, but all represent personal historical sites with little need for complicated technology. The nature of web hosting can change significantly as additional technologies we discussed in this chapter (and in more detail in the appendix)—audio, video, databases, XML—become important to your site. Also, if a site grows to gargantuan proportions or receives an extremely high number of visitors, you may have to explore new hosts for your website. The Internet is perfectly structured for such transitions, thankfully; you can transfer your site's files directly from your old host to your new, often in mere minutes.

Funding

We hope you now have a better sense of whether you will be able to build your website on a shoestring budget or need to seek additional resources, and whether you will be able to create all parts of your site yourself. Looking once again at your prioritized list of website features, you should understand which elements—that zoomable map, the introductory video—may seem less desirable, or simply more complicated to implement. Other features, such as the creation of a large database, will clearly require a lot of work (in

both data entry and the technology to serve that information), and in such cases you will naturally begin to think about additional help and resources.

Funding can be difficult to come by, but a necessity for complex or large sites, or sites with unique features. The Sonic Memorial Project, with its extensive multimedia capabilities, storage requirements, and programming, needed significant funding from multiple sources.³³ National Public Radio's Lost & Found Sound, which archives recordings of everyday life from the past and present, received support from the Corporation for Public Broadcasting, the National Endowment for the Arts, the New York State Council on the Arts, the Third Wave Foundation, Creative Capital and others. They also received in-kind support from another well-funded (by the Alfred P. Sloan Foundation) September 11 web history project, the September 11 Digital Archive (run by the Center for History and New Media and the American Social History Project). Special arrangements were made to host the site on a powerful and highly specialized server at George Mason University, and the maintenance of that site and the software it runs on will be a concern—and cost—for years to come. Stephen Railton's Mark Twain in His Times website received similar non-monetary support from within the University of Virginia, including designated graduate research assistants to update it.³⁴ Railton's Uncle Tom's Cabin & American Culture site did receive a \$7,000 grant from the National Endowment for the Arts and a matching amount from UVA's Institute for Advanced Technology in the Humanities (IATH), but still required significant generosity and in-kind support from within his university, including the library's Special Collections division, the E-Text Center, the Digital Media Center, and the English Department where Railton teaches. This sort of cobbling together of resources—frequently non-monetary—is commonplace for historical websites.

Finding resources is difficult, and you should assess potential funding from all available venues before a project begins. You should start with what you know best. Think about funders who might be interested in what you are trying to do—e.g., trying to improve teaching in your own course, enhance student learning in your school district, or make people aware of the history of your local community—rather than the more diffuse areas of “history” or “technology.” Many colleges and universities offer seed grants or technical support for projects proposed by faculty. The Valley of the Shadow (see chapter one) started with a seed grant and support from IATH before it went on to win major national funding. For our own project on the French Revolution (Liberty, Equality, Fraternity), we obtained startup money from the Gould Foundation, a small foundation with no particular interest in new technology but with a passionate devotion to promoting French history. The Alfred P. Sloan Foundation has generously supported our work on the Echo project, in part because of their strong commitment to the history of science, technology, and industry. Many cities and towns have local foundations that care deeply about that community and would support a local history project. Every state and U.S. territory has a humanities council, which receives funds from the National Endowment for the Humanities (NEH) and often raises other funds as well. Their rules vary widely but they often support local history projects.

A few, larger, national foundations have provided significant support for digital history projects. But you need to keep in mind that applications to such foundations are complex and difficult, often requiring weeks of work. NEH, for example, uses a rigorous process of peer review in which the required full documentation can run hundreds of pages. But they have given crucial support to dozens of digital history projects, including a number of our own. If you are interested in NEH support, you need to closely read their guidelines

and also think carefully about the “genre” of your project. NEH is not interested in supporting digital history as an abstract category but rather in digital history projects that further its goals of disseminating the humanities to multiple audiences. Hence, the largest number of projects it has supported have been educational projects, although it has also provided funds for some—DoHistory, for example—through its public programs division. The National Science Foundation (NSF) has also given millions of dollars to digital history projects such as the Perseus Digital Library at Tufts University and the National Gallery of the Spoken Word at Michigan State University.³⁵ But NSF’s goals (and hence the requirements for receiving funding) are quite different from NEH; they seek (as part of their larger interest in computer science and information technology) to support research work in “digital libraries.” That your project will transform our understanding of the Civil War will make little headway at NSF; that it will develop a new method for efficiently searching a million Civil War documents might get them very excited.

Thus, the starting point for seeking money is very similar to the one we have emphasized in chapter one—first, be clear on the goals for your project. Then, figure out a funder who shares those goals. The Institute for Museum and Library Services, another federal agency, offers grants to groups providing “national leadership” for the museum and library fields through a variety of projects, including digital ones. The Mellon Foundation’s Program in Scholarly Communication has provided tens of millions of dollars to “the applications of technology in the development of scholarly resources,” including, for example, two projects to foster online publication in history, the Gutenberg-E Project of the American Historical Association and Columbia University Press and the American Council of Learned Societies History E-Book project. But a project that enhances K-12 education,

however worthy or innovative, is of no interest to them.³⁶ Just as you need to seek appropriate technology, you also need to seek appropriate funders.

Although multi-million dollar grants are alluring, many of the most successful digital history projects have begun with no resources but the passion of their creators. Especially in the early days of the History Web, that initial dedication won these sites equally dedicated audiences, which in some cases then won the hearts of funders. Other sites have remained labors of love. Even on modest (or non-existent) budgets, such sites have contributed significantly to the public understanding of the past. Regardless of your funding needs—and whether you are able to meet them—most historical websites can begin simply, with the choice of a web host, a careful assessment of what you'll need, perhaps the creation of a few web pages outlining your project to the world, and a plan for constructing the site in full. Once you've taken care of these basic elements, you can begin the hard work of putting together primary and secondary sources for your website. In many cases, since so much of what we study remains in non-electronic forms, this means digitizing artifacts and documents.

¹ Douglas County Historical Society, “*Watkins Museum*,” <http://www.watkinsmuseum.org/>.

² New Deal Network, *New Deal Network*, <http://newdeal.feri.org/>.

³ Jorge Luis Borges, *The Library of Babel* (Boston: David R. Godine, 2000).

⁴ Paula Petrik, “MS Word to Web Page: The Syllabus,” *Paula Petrik*, <http://www.archiva.net/mstutorial3web.htm>.

⁵ The Sixties Project, “The Sixties-L Discussion List,” *The Sixties Project*, http://lists.village.virginia.edu/sixties/HTML_docs/SIXTIES-L.html; H-Net: Humanities and Social Sciences Online, *H-Net*, <http://www.h-net.org/>.

⁶ Petrik, “MS Word to Web Page.”

⁷ Macromedia, “Macromedia Dreamweaver MX,” *Macromedia*, <http://www.macromedia.com/software/dreamweaver/>.

⁸ Microsoft, “Microsoft Office: FrontPage,” *Microsoft*, <http://www.microsoft.com/frontpage/>.

⁹ Jeffrey Zeldman, *Designing with Web Standards* (Indianapolis: New Riders, 2003), 119-120.

¹⁰ *Mozilla.org – home of mozilla, firefox, thunderbird, and camino*, <http://www.mozilla.org/>.

¹¹ *EditPlus Text Editor, HTML Editor, Programmers Editor for Windows*, <http://www.editplus.com/>; IDM Computer Solutions Inc., “UltraEdit,” *IDM Computer Solutions Inc.*, <http://www.ultraedit.com/>; Bare Bones Software, “BBEdit,” *Bare Bone Software*, <http://www.barebones.com/products/bbedit/>.

These programs can color-code and automatically generate certain commonly used HTML tags, which greatly facilitates the web design process. If you or others are planning on doing some website programming with databases, XML, or scripting languages (see below), one of these advanced text editors is even more helpful, though Dreamweaver can handle modest chunks of such code. Notepad, the venerable free program that comes with all Windows computers, can also function as a rudimentary web editor for those who really know what they are doing or for those who just need to make a quick edit or two to web pages that have already been built in Dreamweaver or FrontPage.

¹² Specific blogging programs and hosts are covered in chapter six. For a comprehensive list of both software and hosts, see *Weblogs Compendium*, “Blog Tools” and “Blog Hosting,” *Weblogs Compendium*, <http://www.lights.com/weblogs/tools.html> and <http://www.lights.com/weblogs/hosting.html>.

¹³ Adobe, “Photoshop: Professional photo editing software,” *Adobe*, <http://www.adobe.com/products/photoshop/>.

¹⁴ Adobe, “Adobe Photoshop Elements: Photo editing software,” <http://www.adobe.com/products/photoshopel/>.

¹⁵ Macromedia, “Macromedia Fireworks MX,” *Macromedia*, <http://www.macromedia.com/software/fireworks/>.

¹⁶ Market share from one 2004 report shows Microsoft and Apple essentially tied for first place, followed by Real: Microsoft Media Player, 38.2%; Apple QuickTime, 36.8%; RealNetworks Real Player, 24.9%. Michael Singer, “Apple Readies Next-Gen MPEG-4 Part 10,” *InternetNews*, June 11, 2004, <http://www.internetnews.com/infra/article.php/3366831>.

¹⁷ This is not true for the several open source multimedia formats, such as Ogg Vorbis (<http://www.vorbis.com/>) for audio, but very few people have downloaded the necessary programs to create, listen to, or watch these marginal formats.

¹⁸ *RealNetworks*, <http://www.realnetworks.com/>; Microsoft, “Windows Media,” *Microsoft*, <http://www.microsoft.com/windows/windowsmedia/>; Apple, “QuickTime,” *Apple*, <http://www.apple.com/quicktime/>.

¹⁹ Dan Arthurs, e-mail message to author, August 20, 2004.

²⁰ filmmaking.net, “the faws: What streaming video/audio formats are available?” *filmmaking.net*, <http://www.filmmaking.net/faq/showfaq.asp?id=181>; O’Reilly Online Catalog, “Designing Web Audio: Chapter 5: Introduction to Streaming Media,” *O’Reilly Online Catalog*, <http://www.oreilly.com/catalog/sound/chapter/ch05.html>; Catalyst, “Tips and Tricks: Streaming Media Options for the World Wide Web,” *Catalyst*, <http://catalyst.washington.edu/webbeats/streamingvideoplayers.html>.

²¹ Dan Arthurs, e-mail message to author, August 20, 2004.

²² *The Sonic Memorial Project*, <http://www.sonicmemorial.org/>.

²³ Macromedia, “Macromedia Flash MX,” *Macromedia*, <http://www.macromedia.com/software/flash/>.

²⁴ National Geographic Society, “Remembering Pearl Harbor,” *National Geographic*, <http://plasma.nationalgeographic.com/pearlharbor/>.

²⁵ *Theban Mapping Project*, <http://www.thebanmappingproject.com/>.

²⁶ Public Broadcasting Service, “Not for Ourselves Alone: The Story of Elizabeth Cady Stanton and Susan B. Anthony,” *PBS*, <http://www.pbs.org/stantonanthony/>.

²⁷ Yahoo!, *Yahoo! GeoCities*, <http://geocities.yahoo.com/>.

²⁸ *Web Host Directory*, <http://www.webhostdir.com/>.

²⁹ For instance, if a university’s web server has 100 gigabytes of hard drive space, and the school gives 10 megabytes of website space to each student or faculty member, they can simultaneously host 10,000 people on that server. While this is economical for the university, however, common sense dictates that there may be problems with hosting so many sites on one machine. Not only do those 10,000 students and professors share hard drive space (not a problem), they also are sharing the total

speed, activity, and Internet connection of that computer. Powerful though it may be, if there are 100 very popular sites within the combined production of those 10,000 people (as one would hope at a thriving university), then the “traffic” to *all* of the sites becomes slower, as if everyone in a large lecture hall asked a question of the professor at the same time. Generally this is not a major issue given the “question-answering capacity” of modern servers, but it does matter in certain circumstances. If you are worried about the complications of sharing of a server, be sure to ask your host (institution, ISP, company) about how many sites or individuals they host on a single server, and what the overall server load (“traffic”) is for that server. Also ask for some sites on the server and try them *at different times of the day* in your browser. How responsive do the sites seem? If you can’t tell the difference and the sites load easily, you should be fine (unless you are planning a major site with major traffic).

³⁰ A new protocol for Internet addresses, called IPv6, uses a longer set of numbers and letters, and will likely supplant the current IPv4 in the future. See *IPv6: The Next Generation Internet*, <http://www.ipv6.org/>.

³¹ A constantly updated list of accredited registrars can be found at *InterNIC*, <http://www.internic.net/alpha.html>.

³² *Dotster*, <http://www.dotster.com/>; *GoDaddy.com*, <http://www.godaddy.com/>.

³³ *The Sonic Memorial Project*, <http://www.sonicmemorial.org/>.

³⁴ Stephen Railton, *Mart Twain in His Times*, <http://etext.lib.virginia.edu/railton/>.

³⁵ National Gallery of the Spoken Word, “AODL Grant Info,” *National Gallery of the Spoken Word*, <http://www.ngsw.org>; audio collections created by this project can be found at <http://www.historicalvoices.org>.

³⁶ The Andrew Mellon Foundation, “Libraries and Scholarly Communication,” *The Andrew Mellon Foundation*, <http://www.mellon.org/programs/highered/libraries/libraries.htm>. Mellon also has a program in “teaching and technology” but it focuses on higher education.