1.0   Introduction

Since the release of the first NCSA Mosaic clients in 1993, the
World-Wide Web (also known as the Web) has become an increasingly
popular tool for disseminating information over the Internet.
The HyperText Markup Language (HTML) is used to structure and
format documents for presentation on the Web. HTML enhances
ASCII files with markup tags that permit the display of a variety
of fonts, images, and highlighting options; designate structural
elements such as headers, lists, and paragraphs; and provide
hypertext links to other documents on the Internet. This
tutorial describes HTML tags, provides examples of their use,
offers guidelines for organizing hypertext documents, suggests
what types of documents are suitable for the Web, and explores
the future of HTML.

2.0   Background of the Web

The World-Wide Web initiative originated with the European
Laboratory for Particle Physics (CERN) in 1989 as an attempt to
electronically distribute the literature of high-energy physics
to researchers. [1] The World-Wide Web initiative was based on
the hypertext concept. By creating computer linkages from the
citations of an article to the corresponding source documents,
users would be able to navigate through a body of related
literature online simply by following the "electronic footnotes."
In order to realize such a system, computer protocols and
standards had to be created for describing the structure of
documents, specification of links, and the transmission of
documents over a computer network.

As the World-Wide Web developed, key supporting technologies were
established. The HyperText Markup Language (HTML) describes the
organization of a document so that certain structural elements
can be uniquely identified and accessed over the Internet.
Within an HTML document, links to other information on the
Internet are specified through the use of Uniform Resource
Locators (URLs). The actual process of transferring HTML
documents over the network in the Web is accomplished by
computers employing the HyperText Transfer Protocol (HTTP); the
computers that deliver HTML documents to users of the Net are
usually referred to as "Web servers." Individuals access
documents on Web servers through client software on their local
machines, such as Mosaic, Cello, and Lynx. Since the hypertext
nature of the Web facilitates the browsing of networked
resources, Web client software has generically come to be known

as "browsers." Although it is important to the operation of the
Web, authors of HTML documents don't need understand the details
of the HTTP protocol.
     The Web has evolved beyond being just a hypertext tool: it
is now a hypermedia environment that incorporates images, sound,
and even video. In fact, the diversity of documents found in the
World-Wide Web has fostered the need for ongoing revisions of
HTML. This process is largely supported by ad hoc volunteer
efforts by many individuals around the world who are dedicated to
seeing the Web evolve into a more mature and stable networked
communications tool. As individuals have tried to apply the HTML
tags to a variety of document types, the limitations of HTML have
become very clear. An excellent overview of these limitations
can be found in a recent paper by John Price-Wilkin. [2]
Nevertheless, the Web is a precursor of the networked environment
that will permeate libraries in the future. As HTML tags are
explained in this tutorial, areas that might change with the next
HTML specification are identified.

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3.0 Structure of HTML Documents

An HTML document is simply an ASCII text file that has been
marked up with standardized tags in order to provide structure to
the text (see Section 11 for a discussion of HTML's relationship
to SGML). One of the disadvantages of plain ASCII files is that
they do not provide the reader with information about document
structure or formatting. Whenever you convert a file created in
a word processor to ASCII, the fonts, bullets, bold, italics, and
other formatting information are lost during the conversion.
     Although it utilizes ASCII files, HTML provides information
about a document's structure (e.g., title, headings, and
paragraphs) and format (e.g., bold and italics) through the use
of standardized markup tags.
     In HTML terminology, a document is composed of "elements."
In simple terms, an element can be viewed as being either a part
of a document, such as a title; a formatting code, such as bold;
a hypertext link; or an image. In turn, elements are identified
by markup tags. In general, this paper will simplify HTML
terminology and use "tag" to refer to both elements and actual
markup tags. For the details of HTML's complex document
structure, consult the HyperText Markup Language (HTML), Version
2.0 specification. [3]
     For example, the tag to begin a title is <TITLE>, the tag to
begin a first-level heading is <H1>, and the tag to begin a
paragraph is <P>. The beginning tag is followed by the text of
the title, heading, or paragraph respectively. Most HTML tags
are used in pairs, although some tags can be used singularly.
The beginning tag is usually called the "start tag." The ending
tag is usually called the "end tag." Except for the addition of
a forward slash, the end tag is the same as the start tag. For
example, the tag to end a title is </TITLE>, the tag to end a
first-level heading is </H1>, and the tag to end a paragraph is
</P>.
     Figure 1 presents an example of an HTML document.

Figure 1. Example HTML Document

```
<TITLE>The Title of Your Document is Entered Here</TITLE>
<H1>The Heading of Your Document is Entered Here</H1>
<P>The text of the first paragraph of your document is entered
here.</P>
```

All HTML tags have the same general format shown in Figure 2.

Figure 2. General HTML Tag Format

```
        <TAG>text</TAG>
          |     |     |
Start Tag       |     |
        Content |
                End Tag
```

Tags are not case sensitive. For example, <title> is equivalent
to <TITLE>. (For the convenience of the reader of this paper,
tag names, actual tags, and tag attributes are shown in
uppercase.)
     HTML documents can be created using either:

1.   Regular text editors in which the author enters the
      markup tags by hand or by means of a macro.

2.   Specialized HTML editors that automatically insert the
      appropriate markup tags at locations designated by the
      author.

3.   Conversion programs that take a word processing file
      and translate it into HTML.

Since HTML document editors and conversion programs are still
being developed, the most common method of creating HTML
documents has been to use a text editor and to manually insert
markup tags. Since a relatively small number of tags are used in
HTML, this method is not as tedious as it sounds. Regardless of
the means used to create the document, a solid understanding of
HTML tags is essential for authors preparing documents for the
Web. The simplicity of HTML and the ability to generate such
documents without specialized tools facilitates the ease of entry
into the world of networked hypermedia.
     In this tutorial, an example of creating a "home page" in
HTML will be provided. A home page commonly refers to the first
document a user sees when starting a Web browser. Many users
create their own home pages for organizing information about
their favorite Internet sites. By following the examples in this
tutorial, you should be able to create your own home page.

4.0 Structural Elements

An HTML document consists of at least three essential elements: a
title, a heading, and the text that forms the body of the

document. The body of the document can be in the form of
paragraphs, lists, images, or a combination of elements. Figure
3 presents an example home page.

```
-----------------------------------------------------------------
Figure 3.  Example Home Page
-----------------------------------------------------------------


<TITLE>Jeff's Home Page</TITLE>
<H1>Jeff's Home on the Net</H1>
<P>Your "home page" may include links to other information
sources on the network, information about yourself, and even
your photograph.  HTML provides the flexibility of crafting a
toolbox of networked resources that meets your needs.</P>


-----------------------------------------------------------------
```

4.1 TITLE Tag (<TITLE>)

The TITLE tag (<TITLE>) describes the content of the document.
Rather than displaying the text of the TITLE tag as part of the
document, Web browsers usually display it in an area above the
document window; different types of browsers may display the
title differently.
     The TITLE tag should both describe the content of a document
and provide the reader with an indication of the context of the
document. If the HTML document is part of a multi-document work,
then the parent document might also be part of the TITLE tag.
     For example, the following title would be meaningless on its
own: <TITLE>Introduction</TITLE>. A better title would include
the context of the document, such as: <TITLE>Dead Sea Scrolls
Exhibit--Introduction</TITLE>.
     Providing meaningful titles to hypertext documents
facilitates the web-like linkage of congruent resources. In
HTML, the TITLE tag serves not only as a concise description of a
document, but it also helps users to navigate among a set of
documents that, in actuality, might exist on a number of
different Web servers throughout the world.
     While no limit is placed on the length of this tag, titles
should be kept brief. Since documents may be displayed or
utilized by many different types of client software, there is no
guarantee that lengthy titles will not be truncated, possibly
resulting in the loss of information. A "rule of thumb" is to
keep document titles to less than 64 characters.

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4.2 HEADING Tags (<H1> to <H6>)

HTML provides for six different levels of HEADING tags: <H1>,
<H2>, <H3>, <H4>, <H5>, and <H6>. The most prominent heading is
assigned the <H1> tag. A subsection would be marked with the
<H2> tag. A section within the subsection would be designated
with the <H3> tag.
     The Web browser supplies the appropriate sized font for each
heading level. The font used for an <H1> heading is more
prominent than the font for an <H2> heading, whereas the font
used for an <H2> heading is more prominent than the font used for
an <H3> heading.
     Heading numbers should not be mixed. For example,
<H1>Jeff's Home on the Net</H2> would not be a valid heading

because the number of the end tag is not the same as the number
for the start tag.

Since headings, unlike titles, are displayed by browsers
with the text of the HTML document itself, the <H1> heading is
the most visually prominent text displayed.

The use of a HEADING tag implies a paragraph break before
and after the tag. When a heading is displayed in a Web browser,
adequate white space will be added around the text of the heading
in order to form the paragraph break.

Try to choose the appropriate level heading based upon the
section's place within the document and not based upon the
appearance of the heading when displayed in a browser.

4.3 PARAGRAPH Tag (<P>)

A mild controversy exists among HTML authors about the PARAGRAPH
tag (<P>). Early HTML specifications used the PARAGRAPH tag to
indicate a paragraph break. However, using the tag in this
manner only provided formatting information to browsers (i.e.,
when to add blank space around text). Many HTML users viewed the
PARAGRAPH tag as a start tag "containing" a block of text that
functioned as a paragraph, just as a HEADING tag contained text
that functioned as a header.

The latest revision of the HTML specification indicates that
the PARAGRAPH tag represents a paragraph and not a paragraph
break. The value of viewing the PARAGRAPH tag as a container,
rather than a separator, is that a containing tag conveys
structural information, whereas a separating tag simply implies
formatting. Think of the PARAGRAPH tag as containing a block of
text that functions as a paragraph and not as a tag that only
separates one text block from another.

+ Page 11 +

To keep documents in conformance with current HTML practice,
it is best to place the <P> tag at the beginning of each
paragraph.

Note that the end tag (</P>) is optional and is usually left
out.

The use of the PARAGRAPH tag to force the addition of white
space around text that is not a paragraph is strongly
discouraged.

5.0 Presentation Tags

One of the primary hurdles that authors face in preparing HTML
documents is moving from a presentation perspective to a
structural one. Word processors focus the author's energies on
the presentation of a document. When preparing documents in a
word processor, the author considers fonts and other presentation
characteristics such as bold, underlining, italics, and bullets.

HTML was initially designed to allow the author to focus on
a document's content rather than its presentation. The software
that displays HTML documents is responsible for rendering the
document for the appropriate display device. The intention of
HTML, as with other structural markup languages, is to relieve
the author from presentation considerations. HTML documents
should be platform independent: the same HTML document should
look just as good with NCSA Mosaic for the Macintosh as with NCSA
Mosaic for Microsoft Windows.

One of the problems that many people have in learning HTML

is that all Web browsers do not support the same conventions.
For example, early versions of NCSA Mosaic for Microsoft Windows
only supported a limited set of tags. When creating HTML
documents, the author must trade off the present inconvenience
that, if all HTML tags are used, some browsers may only display a
subset of them against the future inconvenience that HTML markup
that is restricted to accommodate current Web browser limitations
will need to be upgraded as these browsers become more
sophisticated.

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     HTML presentation elements are divided into two sets:
logical style and physical style. Logical tags describe the role
that the text plays in a document, such as a citation, a
definition, or an emphasized statement. Physical tags simply
indicate the desired appearance of text, such as bold or italics.
While it is natural in a word processor to indicate when text
should be in bold or italics, the author of an HTML document
should use logical rather than physical elements whenever
possible. As Coombs et al. note:

     Using descriptive markup to identify the logical elements of
     a document not only simplifies composition, maintenance,
     collaboration, and publication, it also enables authors to
     apply a wide range of tools for composition assistance.
     This feature must be exploited if text processing is going
     to fulfill its original promise to significantly assist
     scholarly composition and become more than just improved
     typing. [4]

5.1 Logical Tags

Table 1 describes the major HTML logical tags.

Table 1. Major Logical Tags

     <EM> </EM >   Emphasis, usually italics.
     <STRONG> </STRONG>   Strong emphasis, usually bold.
     <DFN> </DFN>   Definition term, usually bold.
     <CITE> </CITE>   Citation, usually italics.
     <BLOCKQUOTE></BLOCKQUOTE>   Quotation, usually italics.

+ Page 13 +

To see how logical tags are used, let's add a couple of them to
the example home page from Figure 3. Figure 4 shows the modified
home page.

Figure 4. Home Page With Logical Tags

<TITLE>Jeff's Home Page</TITLE>
<H1>Jeff's Home on the Net</H1>
Your <EM>home page</EM> may include links to other
information sources on the network, information about

yourself, and even your photograph. HTML provides the
flexibility of crafting a <STRONG>toolbox of networked
resources</STRONG> that meets your needs.

<BLOCKQUOTE>If a man does not keep pace with his companions,
perhaps it is because he hears a different drummer. Let him
step to the music which he hears, however measured or far
away.</BLOCKQUOTE>

<CITE>Henry David Thoreau. Walden, 1854.</CITE>

Additional logical tags that provide information about the text
contained in the tagged element are <CODE> for examples of
computer programming code, <KBD> for examples of text typed from
a keyboard, <SAMP> to indicate a sample sequence of characters,
and <VAR> to specify the enclosed text as the name of a variable.
Appendix A describes these tags.

5.2 Physical Tags

The BOLD tag (<B>), which is a physical tag, most closely
corresponds to the STRONG tag (<STRONG>), which is a logical tag;
and the ITALICS tag (<I>), which is a physical tag, corresponds
to the EMPHASIS tag (<EM>), which is a logical tag. However, it
should not be assumed that text marked with the EMPHASIS tag will
be in italics. The physical tags can be used to force the
desired type of presentation. Of course, the display device must
be capable of presenting characters in the designated format.
For instance, on a character-screen terminal, text marked with
the ITALICS tag may actually be rendered as bold because italics
cannot be displayed on such a monitor.
     Whenever a Web browser encounters tags that it does not
understand, those tags will be ignored; however, the text within
the tags will still be displayed. Some primitive Web browsers do
not understand logical tags and simply display text enclosed
within logical tags without any highlighting.

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     The seemingly conflicting recommendation to use logical tags
over physical tags--even when all Web browsers do not yet support
the former--reflects the early stage of development of HTML and
the Web itself. As Web technology matures, more scalable
solutions will evolve. The movement away from physical tags
towards logical tags reflects this ongoing evolution.

5.3 PREFORMATTED TEXT Tag (<PRE>)

The PREFORMATTED TEXT tag (<PRE>) instructs Web browsers to
preserve the formatting (i.e., character and line spacing) of the
enclosed text and present it in a standard, monospace font. This
tag is used for text that would become unintelligible if
displayed in a proportional font. Because HTML does not
currently provide for the display of tables or matrices, the
preformatted text element serves as an easy way to display
tabular information in HTML documents.
     Since the PREFORMATTED TEXT tag retains the hard returns of
the original ASCII text, neither the PARAGRAPH tag nor any of the
highlighting tags should be used within preformatted text;
however, hypertext links may be included.

Actually, the easiest way to create an HTML document is
through the use of the PREFORMATTED TEXT tag. By inserting <PRE>
at the beginning of a document and </PRE> at the end of a
document, you can create an HTML file. This quick and dirty
approach creates correspondingly unattractive, but readable,
documents. As with all HTML documents, the file extension must
be ".html" (or ".htm" if the documents are being served from a
Microsoft DOS or Windows machine).

5.4 LINE BREAK Tag (<BR>)

It's often difficult for new HTML users to figure out how to
control the line spacing of a document. Many tags, such as
HEADING tags, add an extra space below their end tags. If you
simply want to simulate the appearance of a carriage return, use
the LINE BREAK tag (<BR>). Figure 5 illustrates the use of the
LINE BREAK tag.

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Figure 5. LINE BREAK Tag Example

<P>Jeff Barry
Cooperative Information Services Librarian
The University of Tennessee Libraries
Knoxville, Tennessee

The LINE BREAK tag is useful in displaying addresses. Notice
that if the LINE BREAK tag was omitted, the Web client would
display the lines as if they flowed together without any
separation. Inserting a regular carriage return in an ASCII text
file has no significance on the way an HTML document is displayed
(except in preformatted text).

5.5 HORIZONTAL RULE Tag (<HR>)

Many document authors take advantage of the HORIZONTAL RULE tag
(<HR>) to provide a visual means of dividing their documents.
Whenever a Web browser encounters a HORIZONTAL RULE tag, it
displays a horizontal divider line across the screen.

Figure 6 presents an example of the HORIZONTAL RULE tag.

Figure 6. HORIZONTAL RULE Tag Example

<TITLE>Jeff's Home Page</TITLE>
<H1>Jeff's Home on the Net</H1>
Your <EM>home page</EM> may include links to other
information sources on the network, information about
yourself, and even your photograph. HTML provides the
flexibility of crafting a <STRONG>toolbox of networked
resources</STRONG> that meets your needs.
<HR>

6.0 Creating Hypertext Links

One of the most exciting aspects of HTML is its ability to create
hypertext links. Links can be created to items within the same
document, to other documents on the same server, or to any
document on the Internet. Links are used to relate one document
to another. The format for specifying a hypertext link consists
of at least three parts: the ANCHOR tag, the network address of
the document to be linked, and the text to be displayed in the
formatted document. Links are anchored to specific text within a
document.

6.1 ANCHOR Tag (<A>)

The first step in creating a hypertext link is to determine the
text that will represent the link. The text provided for the
link should give the user an indication about the content of the
link.
     Since many HTML documents also serve as printed
documentation, hypertext links should provide meaning and
readability in the context of the surrounding text without
incorporating computer specific actions such as clicking a mouse.
Don't create a link that says: "For a hypermedia interface to the
Library of Congress' 1492: An Ongoing Voyage Exhibit, click
here." Rather, make a link that says: "A hypermedia interface to
the Library of Congress' 1492: An Ongoing Voyage Exhibit is
available."
     Enclose text within an ANCHOR tag to designate it as a
hypertext link. The text between the starting tag (<A>) and
ending tag (</A>) will be displayed by the Web browser with
special emphasis, usually underlined and in a separate color from
the other text. Using the ANCHOR tag alone, however, does not
constitute a valid link. A network address, in the form of a
Uniform Resource Locator (URL), that specifies the document to be
retrieved must be included as part of the hypertext link.
     In HTML, many start tags can have optional attributes (a
description of attributes for all tags is provided in Appendix
A). An attribute consists of a name, followed by an equal sign,
followed by a value for that attribute. The value of the
attribute should be enclosed in double quotes. An important
attribute of the starting ANCHOR tag is named HREF (think of
hypertext reference). The value of HREF is the location of the
document to be retrieved.

     Figure 7 shows an example of an ANCHOR tag with a HREF.

```
-----------------------------------------------------------------
Figure 7.  ANCHOR Tag Example
-----------------------------------------------------------------

<A HREF="http://sunsite.unc.edu/expo/1492.exhibit/Intro.html">
1492: An Ongoing Voyage</A>


-----------------------------------------------------------------
```

Notice that the value of the HREF attribute is always in the form

of a URL.

6.2 Uniform Resource Locators (URLs)

The Web uses Uniform Resource Locators (URLs) as its standard way
of referencing information on the Internet. The use of a
standard addressing scheme by authors of HTML documents allows
computer programs to interpret the address, use the appropriate
Internet protocol (e.g., FTP, Telnet, and HTTP), and automate the
retrieval of the specified item with the "click of a button."
Two forms of specifying URL syntax are available to authors:
absolute URLs that contain the full addressing syntax and partial
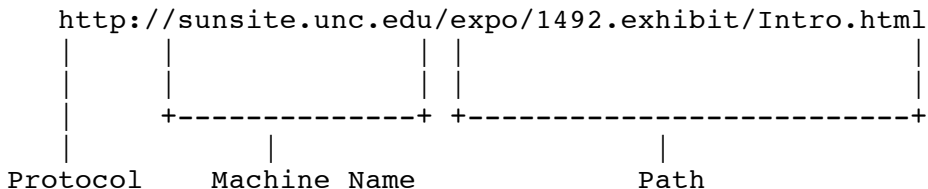URLs.

6.2.1 Absolute URLs

Absolute URLs are the most common type of URL, and they should
always be used to link to documents on Gopher servers. A URL is
divided into three parts: the protocol, the machine name, and the
path (i.e., protocol://machine.name[:port]/path). The first part
of the URL names the Internet protocol used for accessing the
document, such as "ftp," "gopher," "http," "telnet," and other
supported protocols. The second part of the URL identifies the
name of the document server, such as "sunsite.unc.edu." (Some
servers run protocols on nonstandard ports; if so, the alternate
port number, preceded by a colon, follows the machine name.) The
final part of the URL represents the path of the document to be
retrieved. Separating the protocol from the machine name in the
URL is a colon (:) and two forward slashes (//). Separating the
machine name from the path is one forward slash (/).

Figure 8 presents an example of a URL.

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Figure 8. Example URL
----

    http://sunsite.unc.edu/expo/1492.exhibit/Intro.html
      | | | | |
      | | | | |
      | +--------------+ +-------------------------+
      | | |
    Protocol   Machine Name   Path

Occasionally, a reference to a URL has no path (e.g.,
http://www.cityscape.co.uk/). In most instances, this will be an
acceptable URL. Depending upon the configuration of the
particular Web server at that destination, either an index of
files in the server's root directory will be generated or an HTML
document named "index.html" will be retrieved. The document
named "index.html" may not be an index per se, but a default home
page that is delivered whenever a path is not specified.

6.2.1.1 HTTP URL

The URL in Figure 9 specifies the protocol as the HyperText
Transfer Protocol ("http"). The document is located on the

machine with the host name of "sunsite.unc.edu." The
"expo/1492.exhibit/Intro.html" part of the URL represents the
path of that document on the Web server.

```
-------------------------------------------------------------------
Figure 9.  Example HTTP URL
-------------------------------------------------------------------

http://sunsite.unc.edu/expo/1492.exhibit/Intro.html

-------------------------------------------------------------------
```

6.2.1.2 Gopher URL

Figure 10 is an example of a URL pointing to a Gopher server.
This particular server is hosted by the University of Tennessee
Libraries. The URL points to the Smoky Mountain Database, which
contains information about biodiversity and environmental issues
in the Appalachians.

```
-------------------------------------------------------------------
Figure 10.  Example Gopher URL
-------------------------------------------------------------------

gopher://www.lib.utk.edu/11/Information-by-Subject/S%3a/smokies
|         |             | |                                     |
|         |             | |                                     |
|         +-------------+ +-------------------------------------+
|              |                         |
Protocol  Machine Name                  Path

-------------------------------------------------------------------
```

6.2.1.3 Telnet URL

Since the Telnet protocol opens an interactive terminal session,
a path is not needed. The URL in Figure 11 connects via Telnet
to the CARL UnCover system.

```
-------------------------------------------------------------------
Figure 11.  Example Telnet URL
-------------------------------------------------------------------

telnet://database.carl.org/
|        |                 |
|        |                 |
|        +-----------------+
|             |
Protocol  Machine Name

-------------------------------------------------------------------
```

6.2.1.4 Anonymous FTP URL

Documents that reside an anonymous FTP servers can be accessed by
use of a URL like the one in Figure 12.

```
-------------------------------------------------------------------
Figure 12.   Example Anonymous FTP URL
-------------------------------------------------------------------

ftp://ftp.cni.org/pub/LITA/tiip-forum/proceedings.html
 |       |           | |                                        |
 |       |           | |                                        |
 |       |           | |                                        |
 |       +---------+ +-------------------------------+
 |           |                          |
Protocol  Machine Name              Path


-------------------------------------------------------------------
```

It is also possible to link to subdirectories rather than to a
specific document. For example, the URL in Figure 13 links to a
subdirectory that contains the document Principles for the
Development of the National Information Infrastructure in various
formats. The HTML document returned by this link is an index of
the files in that subdirectory. Each file name in the directory
listing becomes a link to the specific document. In this manner,
the Web provides an easy way of retrieving documents from
anonymous FTP servers.

```
-------------------------------------------------------------------
Figure 13.   Example Anonymous FTP Subdirectory URL
-------------------------------------------------------------------
```

<P>The proceedings <A HREF="ftp://ftp.cni.org/pub/LITA/tiip-
forum/proceedings.html">Principles for the Development of the
National Information Infrastructure</A> from ALA's
Telecommunications and Information Infrastructure Policy Forum
are available on the Internet.

```
-------------------------------------------------------------------
```

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6.2.2 Partial (or Relative) URLs

A partial URL specifies the path of a link relative to the
originating document. When encountering a partial URL, the Web
software assumes that the protocol and the machine name for the
destination of the hypertext link are the same as that of the
document that contains the link. (See section 6.3 for examples
of partial URLs.)

6.3 Linking to Other Documents on the Same Server

Hypertext documents on the Web often consist of links among
multiple files on the same server. The following example shows
how partial URLs can be used to create hypertext links to
documents on the same server. The originating document, the
homepage.html file, is in the webfiles directory. The
destination links are the htmlguides.html file, which is also in
the webfiles directory; the editors.html file, which is in the
tools subdirectory of webfiles; and the userguide.html file,
which is in the lbryfiles directory. (Note that the lbryfiles
directory is not a subdirectory of webfiles). The directory
structure for the files is shown in Figure 14, and the marked up
text of the homepage.html file is shown in Figure 15.

```
-------------------------------------------------------------------
Figure 14.   Example Directory Structure
-------------------------------------------------------------------


            +---------------------------------------+
            |                                       |
          webfiles                              lbryfiles
            |                                       |
    +-----------+----------------+             userguide.html
    |           |                |
    |           |                |
homepage.html  htmlguides.html  tools
                                 |
                             editors.html


-------------------------------------------------------------------
```

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```
-------------------------------------------------------------------
Figure 15.   Contents of Homepage.html
-------------------------------------------------------------------


<P>More information about creating documents for the Web can be
found in <A HREF="htmlguides.html">Guides to HTML</A>.   To
facilitate the authoring of HTML documents a number of <A
HREF="tools/editors.html">HTML editors</A> are being developed.
<A HREF="../lbryfiles/userguide.html">Ways of Using Networked
Resources</A> in the library is another document for learning to
use the Internet.


-------------------------------------------------------------------
```

The path of a URL is a hierarchical "naming space" similar to a
directory and file name structure. The conventions used for
referencing names are patterned after the UNIX file system. Each
forward slash (/) in the URL's path statement is a division of
the hierarchy. Items to the left of a forward slash have a
greater precedence in the hierarchy than items to the right of
the forward slash. For example, in Figure 14, editors.html is a
part of tools which, in turn, is a part of webfiles. A
convention for navigating the UNIX filesystem is that following
the change directory command with a space and two periods (cd
..) moves the user up one level in the directory hierarchy.
Consequently, the user could type "cd ../new_directory_name" to
move up one directory level and then move into a new directory
that branches off of that same level. This capability can be
expressed in relative URLs, as shown in the example of moving
from the document homepage.html to the document userguide.html
(../lbryfiles/userguide.html).
     The importance of hierarchical naming and relative URLs is
that their use allows HTML documents to be constructed on one
machine and easily moved to another. This capability is very
useful for authors who do not have user access to a Web server.
Through the use of partial URLs, it is quite common for documents
to be written and marked up on a PC (or Macintosh) and then FTP'd
to a UNIX machine functioning as a Web server. For instance,
four of the Library of Congress' Web exhibits text files were
actually written in Washington, D.C.; the HTML markup of these
files was done in the Netherlands and in Tennessee; and the
resulting HTML files were transferred to a Web server in North

Carolina. The use of relative URLs made this world-wide endeavor
much easier.

6.4 Fragment Identifiers

Fragment identifiers are established by using the NAME attribute
of the ANCHOR (<A>) tag. Normally, the value of the NAME
attribute is a mnemonic for the anchored text. Whenever the NAME
attribute is used, the anchored text can be the destination of a
link, and it is a means of identifying a fragment of the
document. It is possible to create links to specific sections of
a document only when those sections have been anchored and a
value has been given for the NAME attribute. It is a good idea
to use the NAME attribute so that future authors can create links
to specific areas of your documents. (Of course, regular
hypertext links to the documents can always be created.)
     The use of the NAME attribute also permits the creation of
links within the same document. This can be done at the top of a
large file to permit users to quickly access relevant sections of
the document rather than forcing users to scroll through the
entire document.

Figure 16 shows example fragment identifiers.

Figure 16. Example Fragment Identifiers

<P>The <A HREF="documentname#coombs">article by Coombs et al.</A>
is an excellent overview of markup practices for scholarly texts.

<P>More text could go here. Notice how fragment identifiers can
be used to create footnotes.

<HR>

<P><A NAME="coombs">James H. Coombs, Allen H. Renear, and Steven
J. DeRose </A>, "Markup Systems and the Future of Scholarly Text
Processing," Communications of the ACM 30 (November 1987): 933-
947.

7.0 IMG Tag (<IMG>)

One of the most distinctive aspects of many HTML documents is the
use of images as hypertext links and as decorative accents.
Images that are placed within HTML documents are called "in-lined
images." Supported image formats include GIF, JPEG, and bitmaps.
Images can be scanned photos or original graphics created with a
paint program.

     The IMG tag (<IMG>) indicates that an image should be
included in an HTML document. The IMG tag has three attributes.
The most important attribute is SRC (think of source), which has
as its value the URL of the image. The SRC value may be a
partial or absolute URL depending upon the location of the image.

The second attribute of the IMG tag is ALT. The value of ALT is
the text that should be displayed in web browsers that do not
support in-lined images, such as Lynx. The third attribute is
ALIGN, which indicates whether to align the text alongside the
top, middle, or bottom of the image when the document is
displayed. Legal values for ALIGN are "top," "middle," or
"bottom"; the default is "bottom."

Figure 17 shows the use of the IMG tag.

```
-----------------------------------------------------------------
Figure 17.  Example IMG Tag
-----------------------------------------------------------------


<IMG SRC="machu_p.gif" ALT="Ruins at Machu Pitthu, Peru">


-----------------------------------------------------------------
```

When using an image as a link, the IMG tag is inserted alongside
or in place of the text of the anchor. For example, Figure 18
presents anchor links from a small image to a larger photo of
that image.

```
-----------------------------------------------------------------
Figure 18.  Example In-lined Image Linked to a Larger Image
-----------------------------------------------------------------


<A HREF="../full-images/lg.machu_p.gif"><IMG
SRC="machu_p.gif">Ruins at Machu Pitthu, Peru</A>


-----------------------------------------------------------------
```

Whenever a user clicks the small image, the link retrieves the
larger one. Notice that the text is also a link to the image so
that the user may click on either the image or the text to
activate the link. Browsers usually display images functioning
as links with a thicker border than those that surround
decorative images. A frequent mistake that HTML authors make
with this kind of link is to forget to add the ending ANCHOR tag
(</A>).

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     The thumbnail images that are an essential part of so many
Web documents can be created with a number of tools. Most image
viewers include a way to reduce the size of an image. If
scanning from a photo, one might want to consider using a Kodak
Photo CD, which provides five different resolutions (one of which
is excellent for Web documents).

8.0 Lists

The hierarchical structure of the Gopher software has proven to
be very useful, and authors can retain a hierarchical menu when
creating Web documents. A drawback of Gopher is that only
limited information can be provided within the hierarchical menu
itself. Readers normally have to select a Gopher menu item and
then view a README file (or some other documenting file) to
determine the system's scope. Since HTML provides the capability
for hypertext links to be included within text, it's easy to
provide some descriptive information about a document before the

link is selected. In some ways, one can look at the Web as
simply extending the capabilities of Gopher to the next logical
level.
     A good example of using related text with a hypertext link
is NCSA's "What's New" pages (see http://www.ncsa.uiuc.edu/
SDG/Software/Mosaic/Docs/whats-new.html). The entries on the
"What's New" page are simply separated into paragraphs in order
to create a list. Another approach would be to use the HTML list
tags.

8.1 UNORDERED LIST Tag (<UL>)

In HTML, lists are simply sequences of paragraphs that may be
prefaced with special characters. A common means of organizing
home pages is to separate the different items into an UNORDERED
LIST. A bullet preceding each item calls attention to that item.
     The tag to begin an UNORDERED LIST is <UL>. Think of "UL"
as representing "unordered list." The tag to end an UNORDERED
LIST is </UL>. Each item in a list must be preceded by an <LI>
tag. This tag represents the list entry. A list can contain
many separate items. The <LI> tag does not require an end tag.
     In Figure 19, hypertext links to documents on the Internet
are presented as a UNORDERED LIST.

Figure 19. Example UNORDERED LIST

<UL>
<LI> Visit the <A
HREF="http://sunsite.unc.edu/expo/1492.exhibit/Intro.html">1492:
An Ongoing Voyage</A> Exhibit by the Library of Congress to learn
about the early exploration of the Western Hemisphere.

<LI> Biodiversity and environmental issues in the Appalachians
are the themes of the <A
HREF="gopher://www.lib.utk.edu/11/Information-by-
Subject/S%3a/smokies">Smoky Mountain Database</A>.

<LI>The <A HREF="telnet://database.carl.org/">CARL
Corporation</A> provides an excellent interactive service
accessible over the Internet.

<LI> The proceedings <A HREF="ftp://ftp.cni.org/pub/LITA/tiip-
forum/proceedings.html">Principles for the Development of the
National Information Infrastructure</A> from ALA's
Telecommunications and Information Infrastructure Policy Forum
are available on the Internet.
</UL>

8.2 MENU LIST Tag (<MENU>)

A MENU LIST is appropriate for very short items. A MENU LIST
groups the items more closely together, and there is normally
only one item per line. Because of the line length limitations,
a MENU LIST can be considered to be the Web's equivalent of a
Gopher hierarchical menu. To start a MENU LIST, use the <MENU>

tag. Each item in the menu list is designated by the <LI> tag.
To close a MENU LIST, use the </MENU> tag.

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Figure 20 shows an example MENU LIST.

Figure 20. Example MENU LIST

<MENU>
<LI><A
HREF="http://sunsite.unc.edu/expo/1492.exhibit/Intro.html">1492:
An Ongoing Voyage Exhibit</A>
<LI><A HREF="gopher://www.lib.utk.edu/11/Information-by-
Subject/S%3a/smokies">Smoky Mountain Database</A>
<LI><A HREF="telnet://database.carl.org/">CARL Corporation</A>
<LI><A HREF="ftp://ftp.cni.org/pub/LITA/tiip-
forum/proceedings.html">Principles for the Development of the
National Information Infrastructure</A>.
</MENU>

8.3 ORDERED LIST Tag (<OL>)

A third type of HTML list is the ORDERED LIST. The tag to begin
an ORDERED LIST is <OL>. Each item in the list is designated by
the <LI> tag. When an ORDERED LIST is displayed in a Web
browser, the <LI> tag is replaced by an Arabic numeral. The list
items are numbered in the proper order. Authors do not need to
enter the item number when creating an ordered list; HTML ensures
that Web browsers display the numbers automatically. A key
benefit of an ORDERED LIST is that items can be added in the
middle of the list without the author having to manually correct
the numerical order. The end of an ORDERED LIST is identified by
the </OL> tag.

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Figure 21 illustrates a ORDERED LIST.

Figure 21. Example ORDERED LIST

<H1>Creating Hypertext Links in HTML</H1>
<OL>
<LI>Identify the destination of links.
<LI>Determine text to be anchored as the start of a link.
<LI>Surround text with anchor tags.
<LI>Insert within the starting anchor tag the URL of the link's
destination as the value of the HREF attribute.
<LI>Use the NAME attribute so that the anchored text may also be
the destination of a link.
<LI>Be sure to close the anchor with the end tag.
<LI>Test the link in a browser.
</OL>

The only differences in the markup for an UNORDERED and ORDERED
LIST are the tags that open and close the list. Use <UL></UL>
for an UNORDERED List and <OL></OL> for an ORDERED List.

8.4   DEFINITION LIST Tag (<DL>)

A DEFINITION LIST provides information in a glossary format. As
with other types of lists, a DEFINITION LIST begins and ends with
a unique tag. To begin a DEFINITION LIST, use the <DL> tag.
Each term in the list is identified by the <DT> tag. In essence,
the <DT> tag serves the same function as the <LI> tag in an
ORDERED or an UNORDERED LIST.   A DEFINITION LIST also needs a
tag to identify the definition of the term itself: the <DD> tag.

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Figure 22 shows a DEFINITION LIST.

Figure 22.   Example DEFINITION LIST

<H1>Glossary</H1>

<DL>
<DT>URL<DD>Uniform Resource Locator is the standard used to refer
to documents and their locations on the Internet.

<DT>NCSA<DD>The National Center for Supercomputing Applications
created the Mosaic browser, which was instrumental in bringing
greater attention to the World-Wide Web.

<DT>WWW<DD>The World-Wide Web, originating out of CERN in
Switzerland, provides hypertext on the Internet through the use
of HTTP and HTML.

<DT>SGML<DD>The Standard Generalized Markup Language is an
international standard that describes the structure of a
document.

<DT>DTD<DD>A Document Type Definition, specified according to the
rules of SGML (e.g., HTML), describes a document's structure for
the purposes of a particular application such as Web.

<DT>CERN<DD>The Swiss organization that started the World-Wide
Web initiative. The words of the acronym translate into English
as the European Laboratory for Particle Physics.
</DL>

Neither the <DT> nor <DD> tags require end tags. Remember to use
the <DT> and <DD> tags in pairs. Be sure to use the proper
closing tag </DL> for the list.

8.5   Nested Lists

An extremely useful HTML feature is the ability to nest lists. A
nested list can serve as an outline or as a way to show multiple
levels of a hierarchical structure of documents. The nested list

is most often used with an UNORDERED LIST. Depending on the
capabilities of the Web browser, the nested items will be
displayed with different types of bullets from items at higher
levels of the hierarchy.

9.0 Advanced HTML Features

The previous sections of this paper described the tags needed to
create usable HTML documents; this section provides information
about additional structural elements of HTML.

9.1 PROLOGUE

The PROLOGUE appears at the very beginning of an HTML file, and
it identifies that file as being an HTML document. The primary
purpose of the PROLOGUE is to allow software to distinguish HTML
documents from other types of SGML documents. All HTML documents
written according to the current HTML specifications have the
PROLOGUE shown in Figure 23.

```
----------------------------------------------------------------
Figure 23.  Standard PROLOGUE
----------------------------------------------------------------

<!doctype html public "-//W30//DTD W3 HTML 2.0//EN">

----------------------------------------------------------------
```

9.2 The Hierarchy of an HTML Document

An HTML document is composed of a hierarchy of structural
elements. At the top of the hierarchy is the HTML element
itself. This element encompasses all other elements; therefore,
the <HTML> tag comes at the beginning of the document (just after
the PROLOGUE) and the </HTML> tag appears at the end of the
document. Below the HTML element in the hierarchy are the HEAD
and BODY elements. The HEAD includes elements that describe the
document, such as TITLE. Additional elements (BASE, ISINDEX,
LINK, and NEXTID) of the HEAD are described in Appendix A. While
the HEAD and related elements are useful to software that
processes HTML documents, their use is not required. The BODY
tag identifies the primary information content of the document.

9.3 Special Characters

Non-ASCII characters can be displayed using HTML. To represent
these characters in an HTML document file, use an ampersand (&)
followed by the designated letter(s) for the desired character.
The ampersand instructs the Web browser to ignore the regular
meaning of a letter and to insert the new character. A full list
of special characters is available from the following URL:
http://info.cern.ch/hypertext/WWW/MarkUp/ISOlat1.html.

10.0 Organizing HTML Documents

Understanding how to use HTML markup tags is only one aspect of
creating an effective hypermedia resource; organizing and linking

the documents is far more time-consuming. Unlike printed
materials designed to be read sequentially, hypertext documents
can be read in an unspecified order. A common effect hypertext
has on readers is the sensation of being "lost in hyperspace."
Without any navigational aids or clues from the author, readers
may lose their sense of orientation as to which documents should
be read next and which documents have already been read.

     All Web clients should provide some sort of navigational
features, such as backtracking and history. Backtracking allows
the user to go back to each previous document until he or she has
regained a "sense of place." The history feature provides a list
of documents that the reader has visited. Clicking on any of the
documents listed in the history should return the reader to that
point. However, HTML document authors should be aware that each
Web browser may implement these features differently and, in some
cases, the navigational aids of a browser may not be fully
reliable. When providing a large number of related hypertext
documents, it is always wise to embed navigational links directly
into the documents. Authors will often provide links in the form
of images for moving forward and backward among related
documents. These links serve as a safeguard against the
possibility that a browser may not support the proper means of
navigation. A good example of this safeguard is the HTML version
of "Entering the World-Wide Web: A Guide to Cyberspace"
(http://www.eit.com/web/www.guide/). In addition to providing
clues as to where to go next, document authors should always
provide the reader with a way to escape out of a series of
documents without using the backtrack button. Most often, this
escape feature is in the form of a link back to the site's home
page.

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     Author-supplied navigational aids may take other forms, such
as a guided tour that suggests the order in which documents
should be read. The Library of Congress' Rome Reborn Exhibit
(http://sunsite.unc.edu/expo/vatican.exhibit/
Vatican.exhibit.html) demonstrates the effects of using a
"virtual tour guide." Another approach is to provide an outline
that provides direct links to selected documents. This outline
technique simply nests links (this strategy was employed for the
Library of Congress exhibits): see the outline documents for
"1492: An Ongoing Voyage" (http://sunsite.unc.edu/expo/1492.
exhibit/overview.html) and the Dead Sea Scrolls Exhibit (http:
//sunsite.unc.edu/expo/deadsea.scrolls.exhibit/overview.html).
     One advanced feature of HTML is the ability to create
graphical images and then specify certain areas of the image as
links to different documents with the ISMAP tag. The University
of Tennessee's Office of Research Services has created an HTML
document that effectively illustrates the use of ISMAP
capabilities (http://solar.rtd.utk.edu/default.html).

11.0 HTML and SGML

HTML is only one type of markup language based on the Standard
Generalized Markup Language (SGML). As an international
standard, SGML provides a way of creating markup languages
tailored for different types of documents. The defining
characteristic of documents marked up using HTML is that they may
contain hypertext links to other documents located on a computer
network. The "grammar" (or set of permissible tags and their

uses) for any SGML-based markup language is defined in a Document
Type Definition (DTD). In the strictest sense, HTML is not a
markup language, but a specific DTD for SGML. Just as HTML
serves the purposes of hypermedia, other DTDs exist for other
purposes. For example, the Text Encoding Initiative (TEI) has
produced a DTD for the markup of humanities text files. It is
possible for gateways to be developed between one DTD and another
DTD; however, any functionality found in one DTD, but not in the
other, would be lost as the document traversed the gateway.

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12.0 What's Ahead for HTML: Solidifying the Standard

After the issuance of the HTML specification as an Internet Draft
in June 1993, the release of several Web browsers resulted in a
dramatic increase of HTML usage as well as the emergence of new
Web capabilities. As it became evident that the 1993 HTML
specification was not providing certain features that authors
needed, an effort to extend HTML was begun. The new
specification that evolved from this effort was known as HTML+.
    However, at the same time, Web browser developers faced
increased difficulties in interpreting the HTML tags being used
by authors; many HTML documents on the Web failed to even comply
with the original specification.
    Some of the conditions that resulted in non-conformance with
the HTML standard were widespread use of rapidly changing
freeware that did not fully support all HTML elements, unclear
(and sometimes conflicting) documentation for authors and
software implementors about how to use and interpret HTML tags,
and authors' persistence in validating HTML documents with one
particular Web browser. As a result, some HTML documents only
looked good on a specific browser. For many users, HTML was
defined not by its specification, but by whatever features their
favorite browser supported.
    With the advent of commercial Web software and the wide
exposure that the Web garnered in many publications, the
scalability of the Web was in jeopardy without a strengthening of
the HTML specification to define a stable standard for current
practice. Based on discussions on Internet mailing lists devoted
to Web and the First International WWW Conference in Geneva (held
in May 1994), a mechanism for recasting the HTML specification
was established. The designation HTML+ was dropped in preference
of a means for identifying different levels of conformance to the
HTML specification.

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Table 2 presents the HTML levels of conformance in HTML, Version
2.0.

Table 2. HTML Conformance Levels

     Level 0   Indicates the minimum conformance level.

     Level 1   Indicates Level 0 features, plus features such as
               highlighting and images.

     Level 2   Includes all Level 0 and Level 1 features, plus

forms.

HTML elements that conform to Level 0 are implemented in every
browser and constitute the basic set of tags needed to create
HTML documents.
        HTML elements that conform to Level 1, but are not in Level
0, may not necessarily be implemented in the same manner in every
browser.
        HTML elements which conform to Level 2, but are not in Level
1, are the tags that are used to create forms.
        Elements that were to be in the former HTML+ specification
will most likely be included in a future HTML 3.0 specification.
The aims of HTML 2.0 are to document valid uses of tags in order
to provide guidance for authors and software developers and to
enable the interoperability of HTML documents among a variety of
Web applications.
        The fact that the process of solidifying the HTML standard
has been a tumultuous one reflects the participatory nature of
the Internet and the difficulties of reaching ad hoc consensus
among a wide range of users. A more formal means for maintaining
the HTML standard was established in July 1994 under the guidance
of the Internet Engineering Task Force (IETF), which has
responsibility for developing and reviewing Internet standards.
The IETF Working Group on HTML is chaired by Tim Berners-Lee, who
has been the creative and inspirational force behind the
World-Wide Web since its inception.

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13.0 Bringing Graphic Design to the Internet

Often, Web providers initially create servers to promote
networked communications to their parent institutions. Tools
such as NCSA's Mosaic have become excellent PR devices for the
Internet. The ability to place scanned images and original
graphics alongside of text can make a strong impression to an
institution's senior officers. Yet, effectively demonstrating
that these tools are worthy of an institutional commitment of
time and funds depends upon a quality presentation.
        Graphical browsers that display images and multiple fonts
have brought graphical design to the Internet; however, the
flexibility that HTML allows authors in controlling the
appearance of their documents is quite limited. Future work on
the HTML standard will likely address these weaknesses with the
use of style sheets that allow authors to "specify formatting . .
. without distorting the logical structure markup." [5] The
visual impact of a document also involves a significant
navigational issue or what Jakob Nielsen refers to as the
"homogeneity problem":

        The differences in graphical design are intended to reduce
        the homogeneity problem in on-line text, which basically is
        that on-line text always looks the same. . . . On-line text
        does not have the variety which traditional text has, due to
        variations in typefont, book size, color, etc., or even the
        basic differences in physical looks between, say a real
        book, a newspaper, and a note written on a napkin in the
        cafeteria during a lunch break. [6]

One HTML example of how the traditional bookcase can be used as a
means of orienting users to different online documents can be
found at Novell Online Services (http://www.novell.com/). On its
home page, Novell has an image of books sitting on a shelf. The
spine of each "book" has a title that matches each service that
is accessible through the company's Web server. A caption reads
"Click on a book to enter the specified area." The image of the
bookshelf employs the ISMAP attribute of the IMAGE element. Each
area of the server has a smaller version of the same "bookcase"
image. The developer of Novell's Web server handled the problem
of homogeneity by creatively using the graphic design elements of
HTML. Navigating through this Web server is as easy as "pulling
a book from the shelf" by clicking on it.

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However, as Nielsen observes:

> One might argue that homogeneity could be desirable because
> it emphasizes the book metaphor and because readers can
> assimilate information faster when they encounter a familiar
> format. Of course, this is true to some extent but we would
> actually want to avoid the book metaphor in our future
> hypertext designs because it seems to limit the conceptual
> models of the search potential of hypertext and non-linear
> navigation of the information system. [7]

For the small information spaces that are often found in
the Web, the homogeneity problem can be resolved through the use
of familiar organizational metaphors. For larger information
spaces, these familiar concepts may not transfer to an electronic
environment. What may be needed for large collections of
research material is nothing less than a Copernican revolution in
the way we look at the written expressions of language. While
the World-Wide Web itself will not likely produce such a radical
change, the Web does foster the environment for such thinking.

14.0 Library Uses of HTML

HTML increases the librarian's ability to deliver value-added
networked information. Rather than only providing printed
materials at Internet training sessions, librarians can prepare
customized HTML documents for each group of users. As new
Internet sites are discovered and added, these documents can
become dynamic guides to network resources. Using HTML as the
medium for a presentation, rather than an overhead transparency
or presentation software, provides a new degree of training
versatility. Configuring Web servers so that subject specialists
and trainers have control over updating their own HTML documents
lessens the system administrator's burden of maintaining
documents stored on the server.

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    Another training impact could be the delivery of hypertext-
based instruction using the Web. Previously, this kind of
instruction has only been available through software such as
HyperCard and ToolBook. While HTML does not have all the
advanced features of these packages, it can be used to create
instructional environments that not only transcend a single
computer platform, but also extend over the campus network and

allow students to use the program from locations other than the library. Also, as teachers develop their own networked instructional multimedia materials, there are opportunities to more effectively integrate library resources into the curriculum. By actively exploring the possible uses of HTML, a library can identify needs that can only be met with networked hypermedia.

In addition to enabling new training methods, HTML is a suitable tool for publishing electronic journals and newsletters. While HTML does not scale to fit the complexity of many publications, it does provide enough flexibility for the ASCII-based electronic journals that are currently in existence. Since many articles in these electronic journals already reference other electronic materials, the use of hypertext links would facilitate the retrieval of related information. Furthermore, HTML would allow electronic journals to expand beyond ASCII limitations and include photographs and other images. Finally, with the movement of electronic journals toward HTML, the electronic resources provided by today's libraries might begin to more clearly resemble the networked environment of the future. Indeed, as Ross Atkinson advises:

> In considering the future of scholarly information exchange, we must therefore take into account not only the facility of the network but also the effects of computers on scholarly reading and writing. Certainly one of the best approaches to such an assessment is to focus on the phenomenon of hypertext because it is through the concept (if not yet the reality) of hypertext that we begin to sense the most fundamental and far-reaching effects of the computer on the communications in general and scholarly information exchange in particular. [8]

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15.0 Conclusion

The Web and HTML bring the reality of hypertext into everyday life for many Internet users. As Web browsers become more sophisticated and pervasive, HTML raises ASCII text to new levels of usability. HTML is becoming a common denominator for accessing electronic services in a networked environment. Through the use of the enabling technologies found in the World-Wide Web, librarians can explore the obstacles and barriers that will need to be overcome in implementing future library services.

Notes

1. T. J. Berners-Lee, R. Cailliau, J. F. Groff, and B. Pollerman, "World-Wide Web: An Information Infrastructure for High-Energy Physics" (Presented at Software Engineering, Artificial Intelligence, and Expert Systems for High Energy and Nuclear Physics, La Londe-les-Maures, France, January 1992). (Preprint available by anonymous ftp; URL: ftp://info.cern.ch/ pub/www/doc/www-for-hep.ps.Z.)

2. John Price-Wilkin, "Using the World-Wide Web to Deliver Complex Electronic Documents: Implications for Libraries," The Public-Access Computer Systems Review 5, no. 3 (1994): 5-21. (To retrieve this article, send the following e-mail message to

listserv@uhupvm1.uh.edu: GET PRICEWIL PRV5N3 F=MAIL.)

3. The latest edition of the HyperText Markup Language (HTML),
Version 2.0 specification is available from the following URL:
http://www.hal.com/~connolly/html-spec.

4. James H. Coombs, Allen H. Renear, and Steven J. DeRose,
"Markup Systems and the Future of Scholarly Text Processing,"
Communications of the ACM 30 (November 1987): 944.

5. Charles F. Goldfarb, The SGML Handbook (Oxford: Clarendon
Press, 1990), 93.

6. Jakob Nielsen, "The Art of Navigating Through Hypertext,"
Communications of the ACM 33 (March 1990): 299.

7. Ibid., 300.

8. Ross Atkinson, "Networks, Hypertext, and Academic Information
Services: Some Longer-Range Implications," College & Research
Libraries 54 (May 1993): 202.

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Appendix A.   HTML Tags

In the following entries, the level description is for HTML 2.0.

1.0   ADDRESS

Tag: <ADDRESS></ADDRESS>

Level: 0

Function:

Used to provide authorship information for HTML documents.
Normally found at the bottom of documents.

Optional Attributes:

None.

Comments:

ADDRESS is a very useful tag that enables users to quickly
identify a document's author. The ADDRESS tag may contain a link
to another HTML document that provides additional information
about the author. The text of this tag typically appears in
italics when displayed.

Example:

<ADDRESS>Jeff Barry jeff@utkux.utcc.utk.edu</ADDRESS>

2.0   ANCHOR

Tag: <A></A>

Level: 0

Function:

The start and end ANCHOR tags surround text that represents a
hypertext link. When used with the HREF attribute, the ANCHOR
tag represents the origin of a link. When used with the NAME
attribute, the ANCHOR tag serves as the destination of a link.

Attributes:

HREF   Specifies, in the form of a URL, the document to be
            retrieved when the link is selected.

NAME   Identifies the text as a specific location within the
            document. It can be the destination of a hypertext
            link.

Level 1 Attributes:

TITLE   The value for this attribute is the title of the
            document given by the URL in the HREF attribute.

URN   Specifies the Uniform Resource Number (URN) for the
            document given by the URL in the HREF attribute.

METHODS   Specifies functions for the document given by the URL
            in the HREF attribute. Prior to link activation,
            METHOD indicates to the user whether the linked
            document is searchable, is an image, or has some other
            special function. Depending on the method indicated,
            links may be displayed differently.   Not all Web
            browsers support this attribute.

Proposed Attributes:

REL   Provides the relationship between the originating
            document and the destination document.

REV   Provides the relationship between the destination
            document and the originating document.

Comments:

For the ANCHOR tag to be functional, one of the attributes HREF
or NAME must be used, or both of these attributes must be used.
The Level 1 and proposed attributes serve advanced uses of HTML
and are by no means required.

Example:

<A HREF="http://sunsite.unc.edu/expo/ticket_office.html">EXPO, a
showcase of online exhibits</A>

3.0 BASE

Tag: <BASE>

Level: 0

Function:

Records the URL of the document for use by partial URLs, which
will be relative to this base URL.

Required Attribute:

HREF   Specifies the URL of the document.

Comments:

The BASE element is only used in the HEAD of an HTML document.
When BASE is not present, relative URLs are resolved against the
URL used to access the document. Use of the BASE element is not
required. The BASE element does not have an end tag.

Example:

<BASE HREF="http://sunsite.unc.edu/expo/deadsea.scrolls/
Intro.html">

4.0 BLOCKQUOTE

Tag: <BLOCKQUOTE></BLOCKQUOTE>

Level: 0

Function:

Renders enclosed text in a distinguishing manner to indicate a
quotation.

Optional Attributes:

None.

Comments:

Specific rendering depends upon the browser, but the text is
usually either in italics or with left and right margins
indented.

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Example:

<BLOCKQUOTE>If a man does not keep pace with his companions,
perhaps it is because he hears a different drummer. Let him step
to the music which he hears, however measured or far
away.</BLOCKQUOTE>

5.0 BODY

Tag: <BODY></BODY>

Level: 0

Function:

The BODY element represents one of the two main hierarchical

divisions of an HTML document (the other division being the HEAD). Essentially, the BODY is the text that is to be displayed.

Comments:

The BODY can include the following elements and types of elements: ADDRESS, ANCHOR, BLOCKQUOTE, FORM, Heading elements (e.g., HEADING 1), Highlighting elements (e.g., <B>, <I>, <EM>, and <STRONG>), HORIZONTAL RULE, IMG, LINE BREAK, List elements (e.g., ORDERED LIST), PARAGRAPH, PREFORMATTED TEXT, and special characters.

Example:

<BODY>
Your <EM>home page</EM> may include links to other information sources on the network, information about yourself, and even your photograph.
</BODY>

6.0   BOLD

Tag: <B></B>

Level: 1

Function:

Indicates that enclosed text should be highlighted using a bold font style.

Optional Attributes:

None.

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Comments:

The BOLD element is a physical tag that only provides formatting information. Preferably, use either the <EM> or <STRONG> tags to denote emphasis or strong emphasis.

Example:

HTML provides the flexibility of crafting a <B>toolbox of networked resources</B> that meets your needs.

7.0   CITE

Tag: <CITE></CITE>

Level: 1

Function:

Renders the enclosed text in a distinguishing style to indicate a citation.

Comments:

Usually displayed in italics.

Example:

<CITE>Henry David Thoreau. Walden, 1854.</CITE>

8.0 CODE

Tag: <CODE></CODE>

Level: 1

Function:

A highlighting feature that renders the enclosed text in a
distinguishing style to indicate a sample of computer code.

Comments:

Usually displayed in a monospace font.

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Example:

<CODE>
#!/usr/bin/perl
print "This is a sample of computer code.\n";
</CODE>

9.0 DEFINITION "DEFINED"

Tag: <DD>

Level: 0

Function:

Indicates that the designated text is a term definition that is
in a definition list.

Comments:

Must follow the content of a <DT> tag. Can only be used within a
DEFINITION LIST (<DL>). Use of a </DD> end tag is optional.

Example:

<DL>
<DT>NCSA<DD>The National Center for Supercomputing Applications
created the Mosaic browser, which was instrumental in bringing
greater attention to the World-Wide Web.
</DL>

10.0 DEFINITION LIST

Tag: <DL></DL>

Level: 0

Function:

Formats terms like a glossary.

Optional Attribute:

COMPACT   Reduces the amount of white space between terms. Used
           as <DL COMPACT>. This attribute has no value.

Comments:

Must be used with the <DT> and <DD> tags to indicate the term to
be defined and the definition of that term. Terms are listed in
the left column, with the definitions in the right column. Long
definitions will wrap to succeeding lines. The <DL> tag must be
followed immediately by the <DT> tag.

Example:

```
<DL>
<DT>URL<DD>Uniform Resource Locator is the standard used to refer
to documents and their locations on the Internet.
</DL>
```

11.0   DEFINITION TERM

Tag: <DT>

Level: 0

Function:

Indicates that designated text is a term to be defined in a
DEFINITION LIST.

Comments:

A <DT> is followed by the term, which is then followed by a <DD>
tag to indicate the actual definition of the term. The defined
term is usually displayed along the left margin. Use of a </DT>
end tag is optional.

Example:

```
<DL>
<DT>WWW<DD>The World-Wide Web, originating out of CERN in
Switzerland, provides hypertext on the Internet through the use
of HTTP and HTML.
</DL>
```

12.0   DIRECTORY LIST

Tag: <DIR></DIR>

Level: 0

Function:

A listing feature that displays short items (20 characters or
less) in columns.

Comments:

Used in conjunction with the <LI> tags to designate the items in
each column. Depending upon its interpretation by browsers and
the length of listed items, the DIRECTORY LIST may yield
unexpected results. This element is seldom used.

Example:

<DIR>
<LI>first column<LI>second column
</DIR>

13.0   EMPHASIS

Tag: <EM></EM>

Level: 1

Function:

The enclosed text will be highlighted.

Comments:

The appearance of text surrounded with the <EM></EM> tags is
determined by the Web browser. However, the text is normally
displayed in italics.

Example:

Your <EM>home page</EM> may include links to other information
sources on the network, information about yourself, and even your
photograph.

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14.0   FORM

Tag: <FORM></FORM>

Level: 2

Function:

Indicates that a form is included within an HTML document.

Comments:

All Web browsers do not support the FORM tag.

15.0   HEADER

Tag: <HEAD></HEAD>

Level: 0

Function:

Contains information describing the HTML document.

Comments:

Elements contained in the HEADER of an HTML document are not
displayed by a browser with the document. Use of a HEADER is
recommended, but not required. The following tags are allowed
within the <HEAD> tag: BASE, ISINDEX, LINK, NEXTID, TITLE.

Example:

<HEAD>
<TITLE>Sample Home Page</TITLE>
</HEAD>

16.0   HEADING 1

Tag: <H1></H1>

Level: 0

Function:

The first level heading, represented in a very large bold font
and centered.

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Comments:

The Web browser determines font representation, although the
above rendering is recommended by the HTML specifications. Do
not use the PARAGRAPH tag (<P>) within or around headings.

Example:

<H1>The most prominent text displayed in a document</H1>

17.0   HEADING 2

Tag: <H2></H2>

Level: 0

Function:

The second level heading, represented in a large, bold font with
no indentation.

Comments:

The Web browser determines font representation, although the
above rendering is recommended by the HTML specifications. Do
not use the PARAGRAPH tag (<P>) within or around headings.

Example:

<H2>Text describing the second level of a document</H2>

18.0 HEADING 3

Tag: <H3></H3>

Level: 0

Function:

The third level heading, represented in a large italic font that
is slightly indented.

Comments:

The Web browser determines font representation, although the
above rendering is recommended by the HTML specifications. Do
not use the PARAGRAPH tag (<P>) within or around headings.

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Example:

<H3>Text describing the third level of a document</H3>

19.0 HEADING 4

Tag: <H4></H4>

Level: 0

Function:

The fourth level heading, represented in a bold normal font and
indented.

Comments:

The Web browser determines font representation, although the
above rendering is recommended by the HTML specifications. Do
not use the PARAGRAPH tag (<P>) within or around headings.

Example:

<H4>Text describing the fourth level of a document</H4>

20.0 HEADING 5

Tag: <H5></H5>

Level: 0

Function:

The fifth level heading, represented in a normal italic font and
indented.

Comments:

The Web browser determines font representation, although the
above rendering is recommended by the HTML specifications. Do
not use the PARAGRAPH tag (<P>) within or around headings.

Example:

```
<H5>Text describing the fifth level of a document</H5>
```

21.0   HEADING 6

Tag: <H6></H6>

Level: 0

Function:

The sixth level heading, represented in a normal bold font and
indented.

Comments:

The Web browser determines font representation, although the
above rendering is recommended by the HTML specifications.   Do
not use the PARAGRAPH tag (<P>) within or around headings.

Example:

```
<H6>Text describing the sixth level of a document</H6>
```

22.0   HORIZONTAL RULE

Tag: <HR>

Level: Level 0

Function:

Indicates to a Web browser that a horizontal divider line should
be displayed at the designated location within the HTML document.

Comments:

No end tag required.

Example:

```
<P>Additional information about the <A
HREF="http://info.cern.ch/hypertext/WWW/TheProject.html">World-
Wide Web Project</A> is available for those interested in
learning more about networked hypermedia.
<HR>

<H2>Example of Using Relative URLs</H2>
```

23.0   HTML Label

Tag: <HTML></HTML>

Level: 0

Function:

Labels the file as being an HTML document.

Comments:

The <HTML> tag comes at the beginning of an HTML document and the </HTML> tag comes at the end. Use of this element is recommended, but not required.

24.0   IMG

Tag: <IMG>

Level: 1

Function:

Indicates that an image is to be included in the HTML document

Comments:

No end tag required.

Mandatory Attribute:

SRC   Identifies the source of the image file using URL
            syntax.

Optional Attributes:

ALIGN   Indicates whether text should be aligned with the top,
            middle, or bottom of the image. Valid values: top,
            middle, bottom.

ALT   Specifies the text that should be displayed by Web
            browsers that do not support images.

ISMAP   Indicates that the image is a graphical map that has
            "hot spots" corresponding to hypertext links.

Example:

<IMG SRC="machu_p.gif" ALT="Ruins at Machu Pitthu, Peru">

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25.0   ISINDEX

Tag: <ISINDEX>

Level: 0

Function:

The inclusion of this tag indicates that the HTML document is searchable, provided that the Web server supports this capability.

Comments:

No end tag required.

26.0 ITALICS

Tag: <I></I>

Level: 1

Function:

These tags indicate that the enclosed text is to be displayed in
an italics font.

Comments:

The <I> tag represents a formatting instruction to Web browsers.
It is recommended that an <EM> tag be used rather than the <I>
tag to indicate emphasis.

Example:

Your <I>home page</I> may include links to other information
sources on the network, information about yourself, and even your
photograph.

27.0 KEYBOARD SAMPLE

Tag: <KBD></KBD>

Level: 1

Function:

Indicates that the enclosed text is a sample of a keyboard entry
that should be highlighted.

Example:

To search the online catalog for a book by its title, type
<KBD>til</KBD> and press the Enter key.

28.0 LINE BREAK

Tag:

Level: 0

Function:

Indicates that a new line is to be started instead of automatic
line wrap.

Comments:

Used to simulate single line spacing when additional white space
is not desired. Use of a </BR> end tag is optional.

Example:

<P>Jeff Barry

Cooperative Information Services Librarian
The University of Tennessee Libraries
Knoxville, Tennessee

29.0 LINK

Tag: <LINK>

Level: 1

Function:

Indicates a relationship between the HTML document and another
document.

Comments:

Used only within the HEADER of an HTML document. The LINK
element is not widely used at the present. Use of a </LINK> end
tag is optional.

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30.0 LIST ITEM

Tag: <LI>

Level: 0

Function:

Indicates that the designated text represents an item in a list.

Comments:

The <LI> tag is used as the item indicator with the following
type of lists: DIRECTORY LIST (<DIR>), MENU LIST (<MENU>),
ORDERED LIST (<OL>), and UNORDERED LIST (<UL>). The <LI> tag has
no attributes. Use of a </LI> end tag is optional.

Example:

<UL>
<LI> Visit the <A
HREF="http://sunsite.unc.edu/expo/1492.exhibit/Intro.html">1492:
An Ongoing Voyage</A> Exhibit by the Library of Congress to learn
about the early exploration of the Western Hemisphere.

<LI> Biodiversity and environmental issues in the Appalachians
are the themes of the <A
HREF="gopher://www.lib.utk.edu/11/Information-by-
Subject/S%3a/smokies">Smoky Mountain Database</A>.
</UL>

31.0 MENU LIST

Tag: <MENU></MENU>

Level: 0

Function:

This tag is used for a list that contains a small number of items.

Comments:

Items in a MENU LIST are often hypertext links to other documents. Like a Gopher menu, each item is usually on a single line.

Example:

```
<MENU>
<LI><A
HREF="http://sunsite.unc.edu/expo/1492.exhibit/Intro.html">1492:
An Ongoing Voyage Exhibit</A>
<LI><A HREF="gopher://www.lib.utk.edu/11/Information-by-
Subject/S%3a/smokies">Smoky Mountain Database</A>
</MENU>
```

32.0 NEXTID

Tag: <NEXTID>

Level: 0

Function:

A tag provided by HTML editors as a unique identifier for ANCHOR tags. Used in the HEAD of an HTML document.

Comments:

This tag is almost never used by authors manually composing HTML documents. All Web browsers do not support this tag. Most users will not encounter this tag.

33.0 ORDERED LIST

Tag: <OL></OL>

Level: 0

Function:

Used for a list that contains items in a designated order.

Comments:

Items in an ORDERED LIST are automatically numbered when displayed in a Web browser.

Example:

```
<OL>
<LI>Identify destination of links.
<LI>Determine text to be anchored as the start of a link.
</OL>
```

34.0 PARAGRAPH

Tag: <P></P>

Level: 0

Function:

Indicates that a block of text forms a paragraph.

Comments:

Formerly used in HTML to separate paragraphs from each other and
from other text elements. The PARAGRAPH element in HTML is now a
container rather than a separator, and the <P> tag should come at
the beginning of a paragraph. The end tag (</P>) is optional.

Example:

<P>The text of the first paragraph of your document is entered
here.

35.0 PREFORMATTED TEXT

Tag: <PRE></PRE>

Level: 0

Function:

Indicates that the formatting of enclosed text should be
preserved and displayed in a standard monospace font.

Example:

<PRE>
$275.43 $128.65 $345.89 $234.96 $674.12
</PRE>

36.0 SAMPLE

Tag: <SAMP></SAMP>

Level: 1

Function:

Used to indicate a sequence of literal characters.

Example:

The PROLOGUE of an HTML document must be exactly as follows:
<SAMPLE><!doctype html public "-//W30//DTD W3 HTML 2.0
//EN"></SAMPLE>

37.0 STRONG

Tag: <STRONG></STRONG>

Level: 1

Function:

Indicates that the enclosed text is a statement with strong
emphasis that should be displayed in an appropriate font.

Comments:

Normally displayed in a normal bold font. Should be used rather
than the physical tag <B> to indicate strong emphasis.

Example:

HTML provides the flexibility of crafting a <STRONG>toolbox of
networked resources</STRONG> that meets your needs.

38.0 TITLE

Tag: <TITLE></TITLE>

Level: 0

Function:

Contains the title of the HTML document.

Comments:

Used only within the HEAD of an HTML document.

Example:

<TITLE>Sample Home Page</TITLE>

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39.0 TYPEWRITER TYPE

Tag: <TT></TT>

Level: 1

Function:

Indicates that the enclosed text should be displayed in a
monospace typewriter font.

Comments:

Not to be confused with the PREFORMATTED TEXT tag (<PRE>). Use
<TT> only to highlight a limited number of characters and not a
block of text.

Example:

The stock number for the catalog is <TT>S/N 030-000-00238-5</TT>.

40.0 UNORDERED LIST

Tag: <UL></UL>

Level: 0

Function:

Displays items in no particular order.

Comments:

Each item in an UNORDERED LIST is specified through use of the
<LI> tag. When displayed in a Web browser, the <LI> tag is
replaced by a bullet or some other marking.

Example:

<UL>
<LI> Visit the <A
HREF="http://sunsite.unc.edu/expo/1492.exhibit/Intro.html">1492:
An Ongoing Voyage</A> Exhibit by the Library of Congress to learn
about the early exploration of the Western Hemisphere.

<LI> Biodiversity and environmental issues in the Appalachians
are the themes of the <A
HREF="gopher://www.lib.utk.edu/11/Information-by-
Subject/S%3a/smokies">Smoky Mountain Database</A>.
</UL>

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41.0   VARIABLE

Tag: <VAR></VAR>

Level: 1

Function:

Indicates that enclosed text is the name of a variable.

Comments:

A logical highlighting element.

Example:

The do while loop will execute as long as the value of
<VAR>counter</VAR> is less than or equal to 100.

Appendix B.   Sample HTML Document

<!doctype html public "-//W30//DTD W3 HTML 2.0//EN">
<HTML>
<HEAD>
<TITLE>Sample Home Page</TITLE>
</HEAD>
<BODY>
<H1>Jeff's Home on the Net</H1>

Your <EM>home page</EM> may include links to other information
sources on the network, information about yourself, and even your
photograph. HTML provides the flexibility of crafting a
<STRONG>toolbox of networked resources</STRONG> that meets your
needs.

<P>Additional information about the <A
HREF="http://info.cern.ch/hypertext/WWW/TheProject.html">World-
Wide Web Project</A> is available for those interested in
learning more about networked hypermedia.
<HR>

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<H2>Example of Using Relative URLs</H2>

More information about creating documents for the Web can be
found in <A HREF="htmlguides.html">Guides to HTML</A>. To
facilitate the authoring of HTML documents a number of <A
HREF="tools/editors.html">HTML editors</A> are being developed.
<A HREF="../lbryfiles/userguide.html">Ways of Using Networked
Resources</A> in the library is another document for learning to
use the Internet.

<H2>Examples of Using Lists in HTML</H2>

<H3>An Unordered List of Internet Resources</H3>

<UL>
<LI> Visit the <A
HREF="http://sunsite.unc.edu/expo/1492.exhibit/Intro.html">1492:
An Ongoing Voyage</A> Exhibit by the Library of Congress to learn
about the early exploration of the Western Hemisphere.

<LI> Biodiversity and environmental issues in the Appalachians
are the themes of the <AHREF="gopher://www.lib.utk.edu/
11/Information-by-Subject/S%3a/smokies">Smoky Mountain
Database</A>.

<LI>The <A HREF="telnet://database.carl.org/">CARL
Corporation</A> provides an excellent interactive service
accessible over the Internet.

<LI> The proceedings <A HREF="ftp://ftp.cni.org/pub/LITA/tiip-
forum/proceedings.html">Principles for the Development of the
National Information Infrastructure</A> from ALA's
Telecommunications and Information Infrastructure Policy Forum
are available on the Internet.
</UL>

<H3>Creating Hypertext Links in HTML</H3>

<OL>
<LI>Identify the destination of links.
<LI>Determine text to be anchored as the start of a link.
<LI>Surround text with anchor tags.
<LI>Insert within the starting anchor tag the URL of the link's
destination as the value of the HREF attribute.
<LI>Use the NAME attribute so that the anchored text may also be
the destination of a link.
<LI>Be sure to close the anchor with the end tag.

```
<LI>Test the link in a browser.
</OL>
```

```
<H3>Glossary of Selected Acronyms</H3>

<DL>
<DT>URL<DD>Uniform Resource Locator is the standard used to refer
to documents and their locations on the Internet.

<DT>NCSA<DD>The National Center for Supercomputing Applications
created the Mosaic browser, which was instrumental in bringing
greater attention to the World-Wide Web.

<DT>WWW<DD>The World-Wide Web, originating out of CERN in
Switzerland, provides hypertext on the Internet through the use
of HTTP and HTML.

<DT>SGML<DD>The Standard Generalized Markup Language is an
international standard that describes the structure of a
document.

<DT>DTD<DD>A Document Type Definition, specified according to the
rules of SGML (e.g., HTML), describes a document's
structure for the purposes of a particular application such as
Web.

<DT>CERN<DD>The Swiss organization that started the World-Wide
Wed initiative.  The words of the acronym translate into English
as the European Laboratory for Particle Physics.
</DL>

<ADDRESS>Jeff Barry jeff@utkux.utcc.utk.edu</ADDRESS>
</BODY>
</HTML>
```

Appendix C. Sources of Information About HTML and the Web

More information about the following topics can be found at the
indicated URLs:

    o   HTTP

         http://info.cern.ch/hypertext/WWW/MarkUp/MarkUp.html

    o   World-Wide Web Initiative

         http://info.cern.ch/hypertext/WWW/TheProject.html

    o   Web-related mailing lists.

         http://info.cern.ch/hypertext/WWW/Administration/
         Mailing/Overview.html

Other useful sources of information include:

    o   A list server, web4lib@library.berkeley.edu, about the
         delivery of library services via the Web (to subscribe,

send an e-mail message to listserv@library.berkeley.edu
          that says "sub web4lib your first name your last
          name").

     o   The World-Wide Web FAQ (Frequently Asked Questions),
          which is maintained by Thomas Boutell. the FAQ is
          posted to the comp.infosystems.www newsgroups and is
          available by anonymous FTP from rtfm.mit.edu in the
          directory /pub/usenet/news.answers/www/faq.

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