Lecture 1:
Intro to Web Programming

Layers of Abstraction

Maharishi University of Management -Fairfield, Iowa © 2020

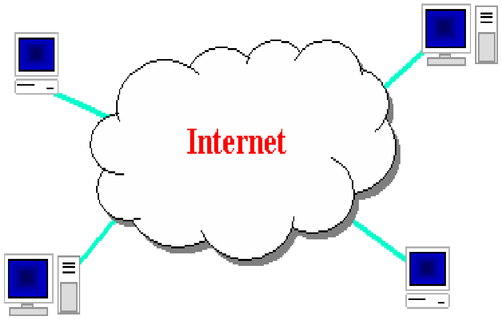
Wholeness Statement

In this lecture we introduce the basic technologies that make up the Internet, the World Wide Web and the Hyper Text Markup Language (HTML). We will see that many technologies are built on top of other technologies.

Life is found in layers and the TM Technique gives us access to the full range of our awareness and thoughts.

The Internet

- A connection of computer networks using the Internet Protocol (IP)
- layers of communication protocols: IP → TCP/UDP → HTTP/FTP/POP/MTP/H...



- What's the difference between the Internet and the World Wide Web (WWW)?
- The Web is the collection of web sites and pages around the world; the Internet is larger and also includes other services such as email, chat, online games, etc.

Uniform Resource Locator (URL)

An identifier for the location of a document on a web site

a basic

```
URL:http://www.abc.com/info/index.html
       ~~~  ~~~~~~~~~~~ ~~~~~~~~~~~
  protocol     host            path
```

- Upon entering this URL into the browser, it would:
- Ask the DNS server for the IP address of www.abc.com
- Connect to that IP address at port 80
- Ask the server to GET /info/index.html
- Display the result page on the screen

More advanced URLs

- **Anchor**: jumps to a given section of a web page
  - http://www.textpad.com/download/index.html#downloads
  - fetches **`index.html`** then jumps down to part of the page labeled downloads
- **Port**: for web servers on ports other than the default 80
  - http://www.cs.mum.edu:8080/secret/money.txt
- **Query string**: a set of parameters passed to a web program
  - http://www.google.com/search?q=happiness+bliss&start=10
  - parameter q is set to "happniess bliss"
  - parameter start is set to 10

Hypertext Markup Language (HTML)

- Describes the content and structure of information on a web page
- Surrounds text content with opening and closing tags
- Each tag and its content is called an element
  - Syntax: `<element>`content`</element>`
  - Example: `<p>`This is a paragraph`</p>`
- Most whitespace is insignificant in HTML (ignored or collapsed to a single space)
- The newest version is HTML5

Structure of a HTML5 page

- The **header** describes the page and the **body** contains the page's contents
  - An HTML page is saved into a file ending with extension **.html**
- **DOCTYPE** tag tells browser the HTML version.
- In this case, HTML5.

```
<!DOCTYPE html>
<html>
  <head>
      <meta charset="utf-8"/>
      <title></title>
  </head>
  <body>
      Page contents
  </body>
</html>
```

Web Page Metadata

- Data about data - Information describes the page itself

```
<meta charset="utf-8"/>
<meta name="description" content="Learn HTML"/>
<meta name="keywords" content="HTML,CSS"/>
<meta name="viewport" content="width=device-width,
initial-scale=1.0"/>
```

- Placed in the **`head`** section of your HTML page
- **`meta`** tags often have both the **`name`** and **`content`** attributes
- HTML5 introduced a method to give web designers control over the viewport (the user's visible area of a web page), through the <meta> tag

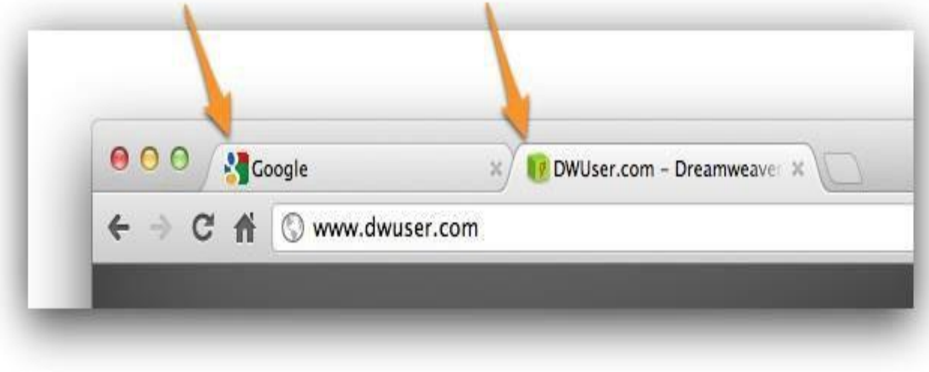
Metadata

Attribute	Value	Description
charset	character_set	Specifies the character encoding for the HTML document
name	application-name author description generator keywords viewport	Specifies a name for the metadata
content	text	Gives the value associated with the http-equiv or name attribute
http-equiv	content-type default-style refresh	Provides an HTTP header for the information/value of the content attribute

Favorites icon ("favicon")

```
<link href="filename" type="MIME type" rel="relationship"/>
<link href="yahoo.gif" type="image/gif" rel="shortcut icon"/>
```

- The link tag, placed in the head section, attaches another file to the page
- In this case, an icon to be placed in the browser title bar and bookmarks
- E.g. https://www.w3schools.com/tags/tryit.asp?filename=tryhtml5_link_sizes



Relative vs Absolute URL

- **Relative URL**
  - index.html (path relative)
  - graphics/image.png
  - ../about.html (directory relative)
  - ../../stories/stories.html
  - /image.png (root relative)
- **Absolute URL**
  - http://www.mysite.com
  - C:\website\images\image.png

- Why won’t the last example work when we move our code to production?

Common Error on Relative URL

- Placing a leading "/" on a relative URL

<img src="../images/smiley.gif" alt="smiley face"/>

http://www.myexample.com

- If Looking for URL:

http://www.myexample.com/mysite/files/index.html

<img src="/images/smiley.gif" alt="smiley face"/>

http://www.myexample.com/images/smiley.gif

Block-level Elements

- A block-level element always starts on a new line and takes up the full width available (stretches out to the left and right as far as it can).

- Examples of block-level elements:
  - <div>
  - <h1> - <h6>
  - <p>
  - <form>

Paragraph: <p>

- Paragraphs of text (block)

```
<p>
Lorem quis lorem.  Pellentesque ultrices
nunc id mauris  posuere pulvinar.
</p>
```

Placed within the body of the page

- More paragraph examples

Headings: **<h1>, <h2>, ..., <h6>**

- Headings to separate major areas of the page (block)

```
<h1>Maharishi University</h1>
<h2>Department of Computer   Science</h2>
<h3>WAP Course</h3>
```

Maharishi University

Department of Computer Science

WAP Course

h1 – page titles

h2 – major section heading

h3 – subsections of h2 elements

Horizontal Rule: <hr />

- A line to separate sections (block)

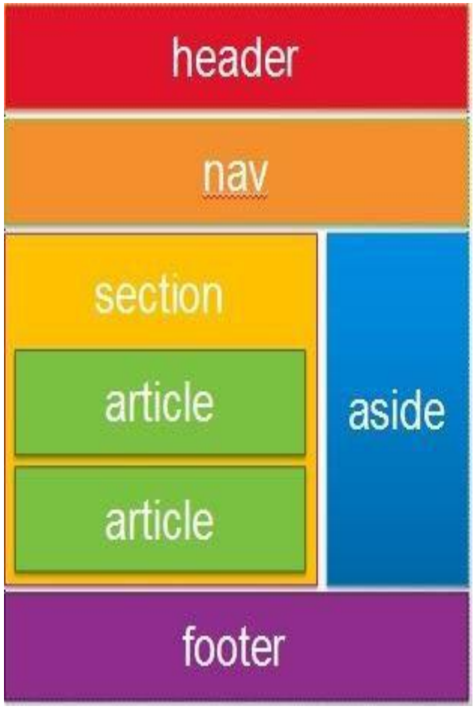
```
<h1>CS472 Web Programming</h1>
<p>Very good, fun course - HTML, CSS, JavaScript,
  JSP, Servlets</p>
<hr />
<h1>CS421 Modern Programming Practices</h1>
<p>Profound course - OOAD, Java8 features</p>
```

New Semantic Elements

They generally have no default outward appearance on the page, instead they give insight into the structure of the page.

- **section**: defines a section in a document.
- **header**: specifies a header for a document or section.
- **footer**: specifies a footer for a document or section.
- **nav**: defines a set of navigation links.
- **aside**: defines some content aside from the content

  it is placed in (like a sidebar).
- **article**: specifies independent, self-contained content.



More Semantic Tags

Main point

The Hyper Text Markup Language uses tags to demarcate different sections of a text. An HTML page always starts with a <html> tag, inside of which it has a <head> tag to describe the page, and a <body> tag of the contents that will actually be displayed. These are the tags you will use for every HTML page. This is a foundational concept

Well begun is half done. Start with a good foundation and build upon that.

Inline Elements

- An inline element does not start on a new line and only takes up as much width as necessary.

- Examples of inline elements:
  - <span>
  - <a>
  - <img>

Images: `<img>`

- Inserts a graphical image into the page (inline)
- Another get request
- The src attribute specifies the image URL
- HTML5 also requires an alt attribute describing the image
- title attribute is an optional tooltip (on ANY element)

```
<img src="../images/WhiteLily.jpg" alt="White Lily"/>
```

- See example: lecture01-examples/image.html

Links: **<a>**

- Links, or "anchors", to other pages (inline)
- href can be absolute or relative URL
- Anchors are inline elements

```
<p>
 <a href="story1.html"><img src="bruce.jpg"
  alt="full story. " />Bruce Wayne, the richest man
  in Gotham City, is the alter ego of Batman.  Bam!
  </a>
</p>
```

- NOTE: In HTML5, you can wrap links around “block-level” elements
- See example: lecture01-examples/link-old.html, lecture01-examples/link-html5.html

Nesting tags

- Tags must be correctly nested
  - a closing tag must match the most recently opened tag
- The browser may render it correctly anyway, but it is invalid HTML
- i.e., bad nesting
- <p> What a <a> lovely </p> day </a>
- Good nesting
- <p> What a <a> lovely </a> day </p>

Line break: <br/>

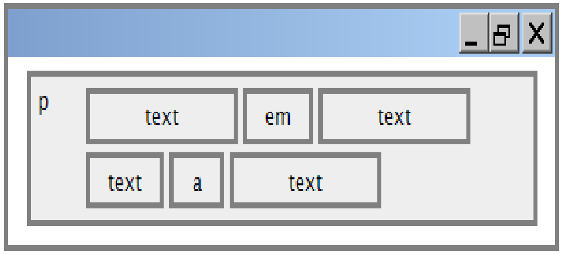
- Forces a line break in the middle of a block element (inline)

```
<p>Teddy said it was a hat, <br /> So I put it on.</p>
<p>Now Daddy's saying, <br /> Where the heck's the toilet plunger
gone?</p>
```

- Warning: Don't over-use `br` (guideline: >= 2 in a row is bad)
- `<br />` should not be used to separate paragraphs or used multiple times in a row to create spacing

Review: Block elements VS Inline elements

- block elements contain an entire large region of content
  - Examples: paragraphs, lists, table cells
  - The browser places a margin of whitespace between block elements for separation, normally a newline
- inline elements affect a small amount of content
  - Examples: bold text, code fragments, images
  - The browser allows many inline elements to appear on the same line
  - Must be nested inside a block element



Comments: <!--   -->

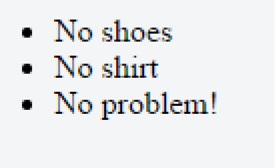
- Comments to document your HTML file or "comment out" text
- Many web pages are not thoroughly commented (or at all)
- Useful at the top of page and for disabling code

```
<!– This is comment   -->
<p>
     WAP courses  are<!-- NOT-->    a    lot
     of fun!
</p>
```

Unordered list: `<ul>`, `<li>`

- `ul` represents a bulleted list of items (block)
- `li` represents a single item within the list (block)

```
<ul>
 <li>No shoes</li>
 <li>No shirt</li>
 <li>No problem!</li>
</ul>
```

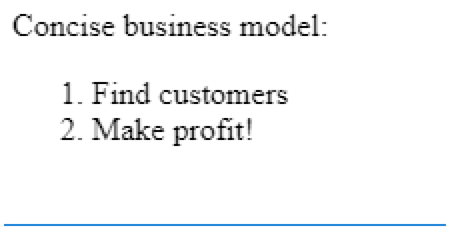


- No shoes
- No shirt
- No problem!

Ordered list: **<ol>**

- `ol` represents a numbered list of items (block)
- We can make lists with letters or Roman numerals using CSS (later)

```
<p>Concise business model:</p>
<ol>
 <li>Find customers</li>
 <li>Make profits</li>
</ol>
```



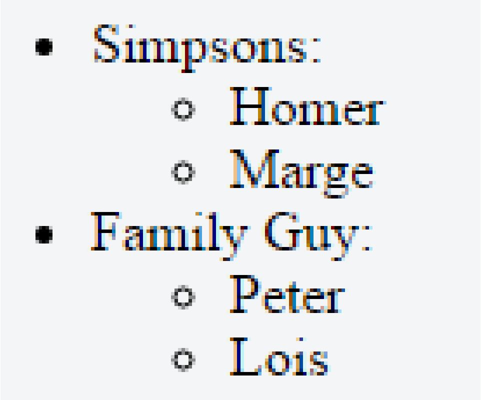
Concise business model:

1. Find customers
2. Make profit!

Nested Lists

- A list can contain other lists

```
<ul>
   <li>Simpsons:
        <ul>
          <li>Homer</li>
          <li>Marge</li>
          </ul>
   </li>
   <li>Family  Guy:
         <ul>
              <li>Peter</li>
              <li>Lois</li>
        </ul>
   </li>
</ul>
```

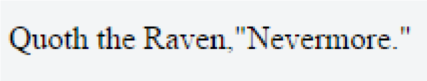


- Simpsons:
  - Homer
  - Marge
- Family Guy:
  - Peter
  - Lois

Inline quotations: **<q>**

- A short quotation (inline)

```
<p>
      Quoth the Raven,<q>Nevermore.</q>
</p>
```



Quoth the Raven,"Nevermore."

Why not just write the following?

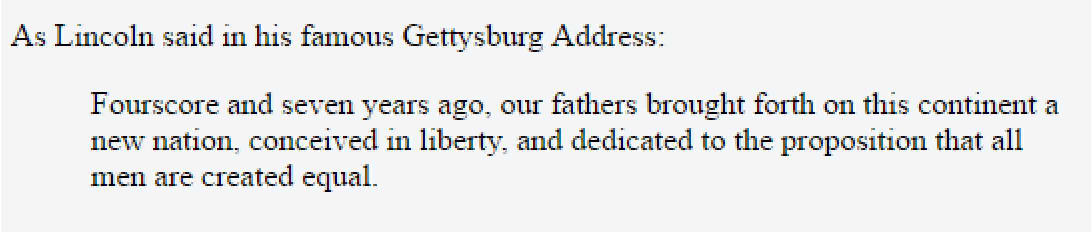
```
<p>Quoth the Raven,“Nevermore.”</p>
```

- Using <q> allows us to apply CSS styles to quotations

Quotations: <blockquote>

A lengthy quotation (block)

```
<p>As Lincoln said in his famous Gettysburg  Address:
</p>
<blockquote>
  <p>Fourscore  and   seven years  ago,   our
   fathers  brought   forth  onthis continent     a
   new  nation, conceived  in liberty, and
  dedicated to  the   proposition  that  all
   men  are  created  equal.</p>
</blockquote>
```



As Lincoln said in his famous Gettysburg Address:

> Fourscore and seven years ago, our fathers brought forth on this continent a new nation, conceived in liberty, and dedicated to the proposition that all men are created equal.

HTML Character Entities

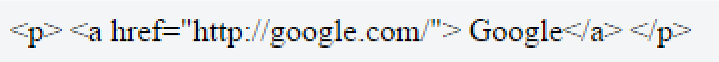
- A way of representing any Unicode character within a web page
- Complete list of HTML entities
- How would you display the text &amp; on a web page?

character(s)	entity
< >	&lt; &gt;
é è ñ	&eacute; &egrave; &ntilde;
™ ©	&trade; &copy;
π δ Δ	&pi; &delta; &Delta;
И	&#1048;
" &	&quot; &amp;

HTML-encoding text

- To display the link text in a web page, its special characters must be encoded as shown below

```
&lt;p&gt;
   &lt;a href=&quot;http://google.com/&quot;&gt; Google&lt;/a&gt;
&lt;/p&gt;
```

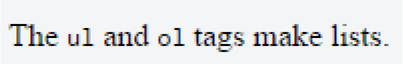


```
<p> <a href="http://google.com/"> Google</a> </p>
```

Computer code: **<code>**

- A short section of computer code (usually shown in a fixed-width font) (inline)

```
<p>
     The <code>ul</code> and
     <code>ol</code>tags make lists.
</p>
```

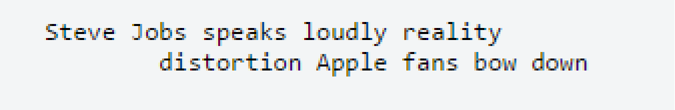


The ul and ol tags make lists.

Preformatted text: **`<pre>`**

- A large section of pre-formatted text (block)
- a fixed-width font (usually Courier), and it preserves both spaces and line breaks.

```
<pre>
      Steve Jobs speaks loudly reality
              distortion Apple fans bow down
</pre>
```

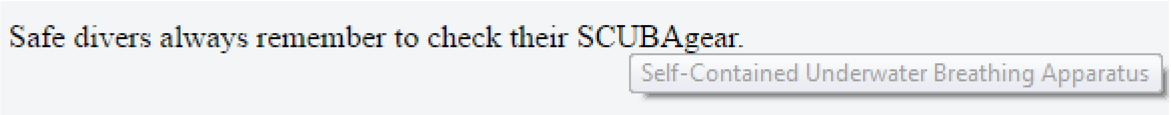


```
Steve Jobs speaks loudly reality
        distortion Apple fans bow down
```

Abbreviations: <abbr>

- An abbreviation, acronym, or slang term (inline)

```
<p> Safe divers always remember to check their
  <abbr title="Self-Contained Underwater Breathing
       Apparatus">SCUBA</abbr> gear.
</p>
```



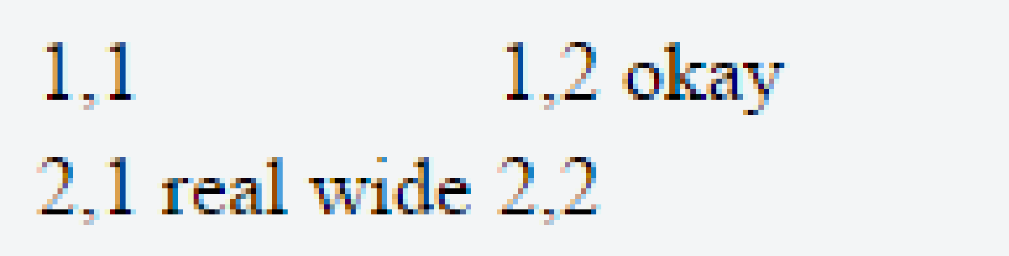
Safe divers always remember to check their SCUBAgear.

Self-Contained Underwater Breathing Apparatus

HTML tables: <table>, <tr>, <td>

- A 2D table of rows and columns of data (block element)

```
<table>
  <tr>
    <td>1,1</td>
    <td>1,2 okay</td>
  </tr>
  <tr>
    <td>2,1 real wide</td>
    <td>2,2</td>
  </tr>
</table>
```

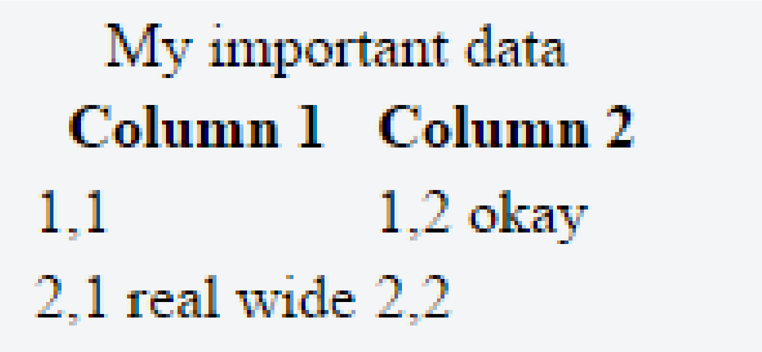


1,1	1,2 okay
2,1 real wide	2,2

- **`table`** defines the overall table, **`tr`** each row, and **`td`** each cell's data
- tables are intended for displaying large row/column data sets

Table headers, captions: `<th>`, `<caption>`

```
<table>
  <caption>My important data</caption>
<thead>
<tr>
    <th>Column 1</th>
    <th>Column 2</th>
  </tr>
</thead>
  <tr>
    <td>1,1</td>
    <td>1,2 okay</td>
  </tr>
  <tr>
    <td>2,1 real wide</td>
    <td>2,2</td>
  </tr>
</table>
```



My important data

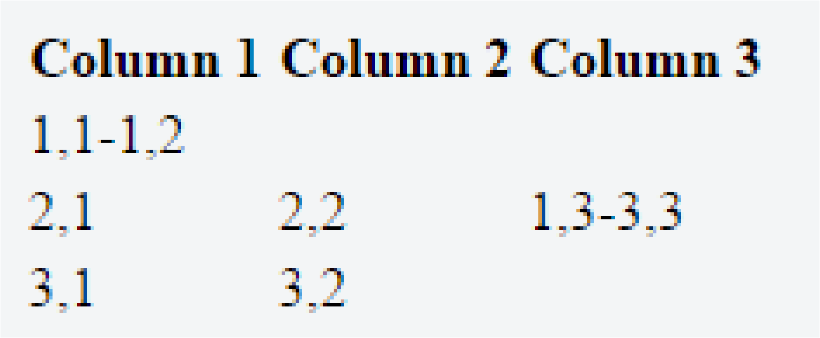
Column 1	Column 2
1,1	1,2 okay
2,1 real wide	2,2

- **th** cells in a row are considered headers; by default, they appear bold
- a **caption** at the start of the table labels its meaning

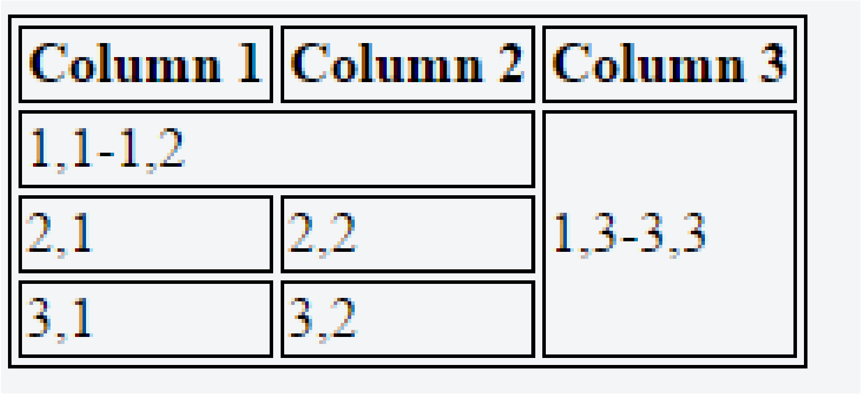
The `rowspan`and `colspan`attributes

- **`colspan`** makes a cell occupy multiple columns; rowspan multiple rows

```
<table>
  <tr>
    <th>Column 1</th>
    <th>Column 2</th>
    <th>Column 3</th>
  </tr>
  <tr>
    <td colspan="2">1,1-1,2</td>
    <td rowspan="3">1,3-3,3</td>
  </tr>
  <tr>
    <td>2,1</td>
    <td>2,2</td>
  </tr>
  <tr>
    <td>3,1</td>
    <td>3,2</td>
  </tr>
</table>
```



Column 1	Column 2	Column 3
1,1-1,2		
2,1	2,2	1,3-3,3
3,1	3,2	



Column 1	Column 2	Column 3
1,1-1,2		1,3-3,3
2,1	2,2	
3,1	3,2	

Don't use tables for layout!

- tables *appear* to be an easy way to achieve grid-like page layouts
- Many "newbie" web pages do this
- But, a table has semantics; it should be used only to represent an actual table of data
- Instead of tables, use `divs`, `widths/margins`, `floats`, `flexbox`, `grid`, etc to perform layout

W3C HTML Validator

- Checks your HTML code to make sure it follows the official HTML syntax
- More picky than the browser, which may render bad HTML correctly

```
<p>
 <a href="https://validator.w3.org/check/referer">
    <img src=http://mumstudents.org/cs472/2013-09/images/w3c-html.png
    alt="Validate" />
 </a>
</p>
```

Note that the validation website expects requests to come from a page that was served by a web server. Will not work with an html page opened from a file. E.g., mumstudents.org web server.

Main Point

More common tags include inline elements, lists, tables. The most important concept is to use tags based on their semantics (meaning), not based on their visual effect (which can easily be changed). By using tags for their meaning, clients (including non visual) will better understand the meaning of your page and use it more effectively.

Clear and settled awareness allows us to better grasp the meaning of information and take the right actions for success.

CONNECTING THE PARTS OF KNOWLEDGE WITH THE WHOLENESS OF KNOWLEDGE

Layers of Abstraction

1. HTML is the basis of web programming, every web page is composed of HTML.
2. To be an effective web programmer you also must understand the deeper underlying realities of HTTP, TCP, and DNS.

---

3. **Transcendental consciousness** is when our mind is in contact with the deepest underlying reality, the unified field.

4. **Impulses within the Transcendental field:** the infinite dynamism of the unified field constantly expresses itself as all of the layers of the universe

5. **Wholeness moving within itself:** In Unity Consciousness, one experiences that all these layers are ultimately composed of pure consciousness, our own pure awareness.