

CMPSCI 105: Lecture #6 Introduction to HTML

©2014-2017 Dr. William T. Verts

Simple Web Files (.txt files)

**This is a simple Web page.
It is just a plain-text file, as
created in Windows Notepad,
or Mac Text Edit,
or UNIX emacs (text editors).
Browsers render it in monospace
as shown in the editor.**

©2014 Dr. William T. Verts

Canonical Web Page (.html files)

```
<!DOCTYPE html>
<HTML>
  <HEAD>
    <TITLE>My Web Page</TITLE>
  </HEAD>
  <BODY>
    Hello!
  </BODY>
</HTML>
```

©2014-2017 Dr. William T. Verts

Tags

- HTML Tags are items inside angle brackets,
- HTML Tags come in two forms:
 - Singleton Tags: `<TAG>` or `<TAG />`
 - Enclosing Tags: `<TAG>...</TAG>`
- Singleton or opening Tags may contain optional *attributes*:
 - `<TAG NAME="value" NAME="value">`
 - Upper/Lower case matters in quoted strings

©2014 Dr. William T. Verts

What Doesn't Matter?

- Whitespace
 - Blanks
 - Tabs
 - Newlines (i.e., the ENTER key)
- Indentation (I indent 4 spaces per level)
- Capitalization, with a few exceptions:
 - I capitalize all HTML tags for readability
 - Standards committees recommend lower case
 - Advanced markup languages demand lower case
 - Quoted strings mix case as needed.

©2014 Dr. William T. Verts

What Comes Next?

- Exploration of different tags and their actions,
- Definitions and encoding of color,
- Inclusion of graphics:
 - Bitmaps (.gif, .jpg, .png)
 - Scalable (.svg)
- Building complicated single-file Web pages,
- Divorcing of style from content:
 - Internal style definitions
 - External style sheets (.css)

©2014 Dr. William T. Verts

The Canonical Web Page Again

```
<!DOCTYPE html>

<HTML>
  <HEAD>
    <TITLE>My Web Page</TITLE>
  </HEAD>

  <BODY>
    Hello!
  </BODY>
</HTML>
```

©2014-2017 Dr. William T. Verts

Document Type Prologue

```
<!DOCTYPE html>

<HTML>
  <HEAD>
    <TITLE>My Web Page</TITLE>
  </HEAD>

  <BODY>
    Hello!
  </BODY>
</HTML>
```

©2014-2017 Dr. William T. Verts

Wrapper

```
<!DOCTYPE html>

<HTML>
  <HEAD>
    <TITLE>My Web Page</TITLE>
  </HEAD>

  <BODY>
    Hello!
  </BODY>
</HTML>
```

©2014-2017 Dr. William T. Verts

Header

```
<!DOCTYPE html>

<HTML>
  <HEAD>
    <TITLE>My Web Page</TITLE>
  </HEAD>

  <BODY>
    Hello!
  </BODY>
</HTML>
```

©2014-2017 Dr. William T. Verts

Definitions

```
<!DOCTYPE html>

<HTML>
  <HEAD>
    <TITLE>My Web Page</TITLE>
  </HEAD>

  <BODY>
    Hello!
  </BODY>
</HTML>
```

©2014-2017 Dr. William T. Verts

Body

```
<!DOCTYPE html>

<HTML>
  <HEAD>
    <TITLE>My Web Page</TITLE>
  </HEAD>

  <BODY>
    Hello!
  </BODY>
</HTML>
```

©2014-2017 Dr. William T. Verts

User Content

```
<!DOCTYPE html>

<HTML>
  <HEAD>
    <TITLE>My Web Page</TITLE>
  </HEAD>

  <BODY>
    Hello!
  </BODY>
</HTML>
```

©2014-2017 Dr. William T. Verts

What else can go in the <HEAD>?

Internal Definitions

```
<HEAD>
  <TITLE>My Web Page</TITLE>

  <STYLE TYPE="text/css">
    style definitions go here
  </STYLE>

  <SCRIPT TYPE="text/javascript">
    JavaScript program code goes here
  </SCRIPT>
</HEAD>
```

©2014 Dr. William T. Verts

What else can go in the <HEAD>?

External Files

```
<HEAD>
  <TITLE>My Web Page</TITLE>

  <LINK REL="stylesheet"
        TYPE="text/css"
        HREF="filename.css">

  <SCRIPT
        TYPE="text/javascript"
        SRC="filename.js"></SCRIPT>
</HEAD>
```

©2014 Dr. William T. Verts

What can go in the <HEAD>?

Combinations

```
<HEAD>
  <TITLE>My Web Page</TITLE>

  <LINK REL="stylesheet"
        TYPE="text/css"
        HREF="filename.css">

  <STYLE TYPE="text/css">
    style definitions go here
  </STYLE>
</HEAD>
```

©2014 Dr. William T. Verts

What goes in the <BODY>...</BODY>?

All your Content!

- Text
- Color
- Embedded Graphics
- Tables
- Lists
- Links to any Resource File (Web pages, graphics, sound files, etc.)
- Formatting Directives

©2014 Dr. William T. Verts

Background Colors

- **<BODY BGCOLOR="_____ ">**
 - Fill in the blank with a color name
 - Fill in the blank with a color number
- There are ~~147~~ 148 defined color names
 - Black, Red, LightGray, Moccasin, PapayaWhip, etc.
 - RebeccaPurple added in 2014
 - see Companion book for a complete list
- There are $2^{24} = 16,777,216$ color numbers

©2014-2017 Dr. William T. Verts

<BODY> options

- <BODY>
- <BODY BACKGROUND="*filename*">
- <BODY BGCOLOR="____">
- <BODY BGCOLOR="____"
TEXT="____"
LINK="____"
VLINK="____">
- This method for specifying colors is obsolete!
There's a better way with CSS, covered later.

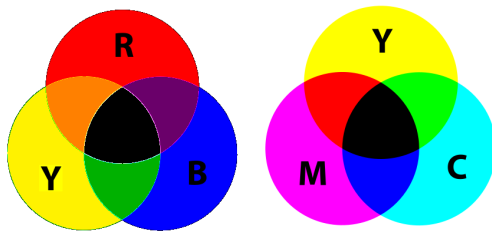
©2014 Dr. William T. Verts

Color

- What are the primary colors for paint?
- What are the primary colors for ink?
- What are the primary colors for displays?
- They're NOT the same!

©2014 Dr. William T. Verts

Reflective Color Models

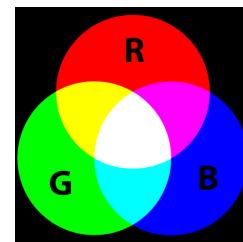


Paint, Crayons, etc.

Ink Jet & Laser Printers

©2014 Dr. William T. Verts

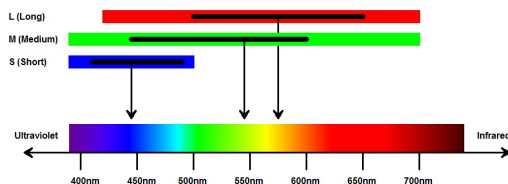
Transmissive Color Model



TVs, Flat Panel Displays, Video Projectors, HTML, etc.

©2014 Dr. William T. Verts

Human Eye Response *Sensitivity of Retinal Cone Cells*



©2014 Dr. William T. Verts

HTML Color Numbers

- Colors are mixtures of Red, Green, and Blue
- Each R or G or B value requires one byte:
 - 0...255 in Decimal
 - 00...FF in Hexadecimal (00 = off, FF = full power)
- HTML color numbers are always in this order:
 - A hash mark #
 - Two hex digits for Red
 - Two hex digits for Green
 - Two hex digits for Blue

©2014 Dr. William T. Verts

Color Examples

- #000000 = Black
- #0000FF = Blue
- #00FF00 = Lime (Green = #008000)
- #00FFFF = Cyan/Aqua
- #FF0000 = Red
- #FF00FF = Magenta/Fuchsia
- #FFFF00 = Yellow
- #FFFFFF = White

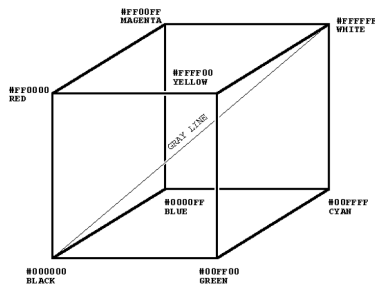
©2014 Dr. William T. Verts

What if R=G=B?

- #000000 = Black
- #696969 = DimGray/DimGrey
- #808080 = Gray/Grey
- #A9A9A9 = DarkGray/DarkGrey
- #C0C0C0 = Silver
- #D3D3D3 = LightGray/LightGrey
- #FFFFFF = White

©2014 Dr. William T. Verts

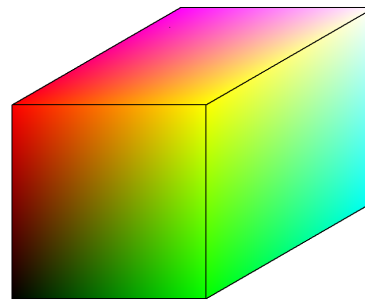
Color Cube



©2014 Dr. William T. Verts

Color Cube

$$2^{24} = 16,777,216 \text{ Colors}$$



©2014 Dr. William T. Verts

What is the color #D42EEF?

- **D4**: $D \times 16^1 + 4 \times 16^0 = 13 \times 16 + 4 \times 1 = 208 + 4 = 212$
- **2E**: $2 \times 16^1 + E \times 16^0 = 2 \times 16 + 14 \times 1 = 32 + 14 = 46$
- **EF**: $E \times 16^1 + F \times 16^0 = 14 \times 16 + 15 \times 1 = 224 + 15 = 239$
- 212 = High Red (Dominant digit = **D**, high)
- 46 = Low Green (Dominant digit = **2**, low)
- 239 = High Blue (Dominant digit = **E**, high)

#D42EEF Close to Magenta

©2014 Dr. William T. Verts

Older Computers

- Older computers (prior to around 2000) didn't normally support millions of colors...
- ...but could support up to 256 colors (in a palette), so...
- ...how do they handle Web pages containing lots of colors?
- Answer: Pick no more than 256 colors, evenly distributed through the color cube, so any arbitrary color is "close enough" to one of them,
- Define those colors the same way in all browsers.

©2014 Dr. William T. Verts

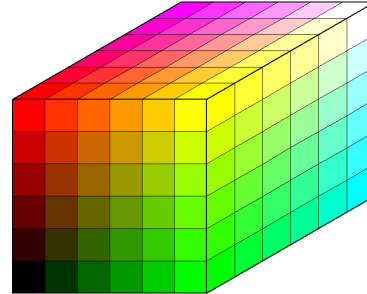
Older Computers

- The largest cube that fits in 256 is $6 \times 6 \times 6 = 216$.
- Pick 216 colors evenly distributed throughout the big color cube to put in the palette.
- These are known as "Browser Safe" colors.
- Hex values for R, G, and B are picked from the set **00**, **33**, **66**, **99**, **CC**, and **FF** (see Companion).
- Examples:
 - Color **#FE359A** maps onto **#FF3399**,
 - Color **#33CC66** is browser safe and is unchanged.

©2014 Dr. William T. Verts

Browser-Safe Color Cube

$$6^3 = 216 \text{ Colors}$$



©2014 Dr. William T. Verts

For Web Designers

- Two Choices:
 - I don't care about my users, I'll use whatever colors I want or need. If they look a little different in older computers, so what? There aren't too many of those machines left anyway.
 - I'll use only browser safe colors in my Web pages to make them look the same everywhere, even on obsolete equipment. Somebody somewhere will appreciate all the effort.

©2014 Dr. William T. Verts

What about Special Characters?

- If HTML uses `<`, `>`, and `"` in its tags, how can I put those characters into my text?
- How do I put foreign language characters (such as `è`, `ñ`, `ô`, `Ç`, `Ð`) into my text?
- How do I put special symbols (such as `©`, `½`, `×`) into my text?
- Answer: Use "HTML Entities" (see Companion)
 - Named Entities: `&name;`
 - Numeric Entities: `&#number;`

©2014 Dr. William T. Verts

Example Entities

- | | | | |
|----------------------|---------------------------|----|-------------------------|
| • <code><</code> | <code>&lt;</code> | or | <code>&#60;</code> |
| • <code>></code> | <code>&gt;</code> | or | <code>&#62;</code> |
| • <code>"</code> | <code>&quot;</code> | or | <code>&#34;</code> |
| • <code>&</code> | <code>&amp;</code> | or | <code>&#38;</code> |
| • <code>©</code> | <code>&copy;</code> | or | <code>&#169;</code> |
| • <code>½</code> | <code>&frac12;</code> | or | <code>&#189;</code> |
| • <code>Ë</code> | <code>&Euml;</code> | or | <code>&#203;</code> |
| • <code>ë</code> | <code>&euml;</code> | or | <code>&#235;</code> |

©2014 Dr. William T. Verts

Simple Markup Tags

- Comment: `<!-- ... -->`
- Bold: `...`
- Italic: `<I>...</I>`
- Teletype: `<TT>...</TT>` (Monospace)
- Underline: `<INS>...</INS>`
- Strikethrough: `...`
- Superscript: `^{...}`
- Subscript: `_{...}`

©2014 Dr. William T. Verts

Multiple Tags: Bold and Italic

- Good:
 - `<I> ... </I>`
 - `<I> ... </I>`
- Bad:
 - `<I> ... </I>`
 - `<I> ... </I>`
- Don't cross the streams! Treat tag-pairs as parentheses.

©2014 Dr. William T. Verts

Simple Structural Tags

- Paragraphs: `<P>...</P>`
- Headings:
 - `<H1>...</H1>` (Largest)
 - `<H2>...</H2>`
 - `<H3>...</H3>` (Normal Size)
 - `<H4>...</H4>`
 - `<H5>...</H5>`
 - `<H6>...</H6>` (Smallest)

©2014 Dr. William T. Verts

Deprecated Tags

- Underline: `<U>...</U>`
 - Use `<INS>...</INS>` instead
- Strikethrough: `<STRIKE>...</STRIKE>` or `<S>...</S>`
 - Use `...` instead
- Centering: `<CENTER>...</CENTER>`
 - Use styles instead
- Fonts: `...`
 - Use styles instead

©2014-2017 Dr. William T. Verts

Singleton Tags

- Break Line: `
` or `
`
- Horizontal Rule: `<HR>` or `<HR />`
- In-Line Images:


```
<IMG SRC="filename">
<IMG SRC="filename"
WIDTH="number"
HEIGHT="number"
ALT="text" TITLE="text">
```

©2014 Dr. William T. Verts

Links (Making Text into HyperText)

- You need two things:
 - Something to click on (image or text or both)
 - Somewhere to go when you click it.
- The Anchor Tag:


```
<A HREF="http://www.cnn.com/">
  Click here for the News
</A>
```

©2014 Dr. William T. Verts

Typesetting Simple Equations

- $E=mc^2$
 - `E=mc²`
 - `E=mc²`
- $\frac{1}{2}$
 - `½`
 - `¹&fras1;₂`
- $\frac{355}{113}$
 - There's no entity to do this!
 - `³⁵⁵&fras1;₁₁₃`

©2014-2017 Dr. William T. Verts

Putting it all together

```
<!DOCTYPE html>
<HTML>
  <HEAD>
    <TITLE>My Spiffy Web Page</TITLE>
  </HEAD>
  <BODY BGCOLOR="#FF8000" TEXT="Blue">
    <H1>Welcome!</H1>

    <P>
      Welcome to my Web page!
      I hope you <B><I>really</I></B> like it!
      Come back often!
      I'll be changing it frequently.
    </P>
```

©2014-2017 Dr. William T. Verts

Putting it all together

```
<P>
  Here is one of my best links:<BR>
  <A HREF="http://www.cnn.com/">
    <IMG SRC="CNNimage.gif">
  </A>
</P>
<HR>
<P>
  Copyright &copy; 2014 W. T. Verts
</P>
</BODY>
</HTML>
```

©2014 Dr. William T. Verts

What it looks like



©2014 Dr. William T. Verts