

## CMPSCI 105: Lecture #6 Introduction to HTML

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### 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.

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### Canonical Web Page (.html files)

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

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

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### 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

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### 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.

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### 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)

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## The Canonical Web Page Again

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

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

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## Wrapper

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

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

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## Header

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

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

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## Definitions

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

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

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## Body

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

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

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## User Content

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

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

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## 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>
```

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## 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>
```

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## 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>
```

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## 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

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## Background Colors

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

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## <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.

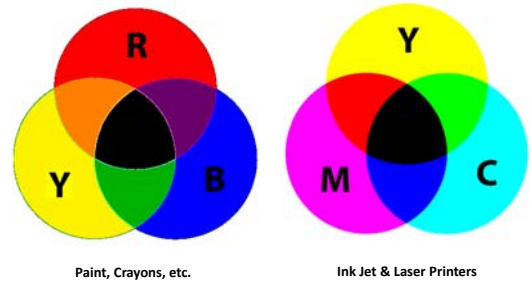
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## Color

- 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!

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## Reflective Color Models

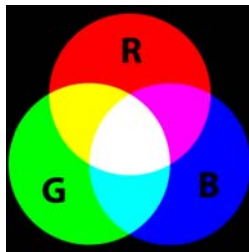


Paint, Crayons, etc.

Ink Jet & Laser Printers

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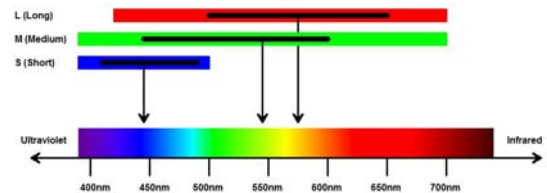
## Transmissive Color Model



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

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## Human Eye Response Sensitivity of Retinal Cone Cells



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## 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

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## Color Examples

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

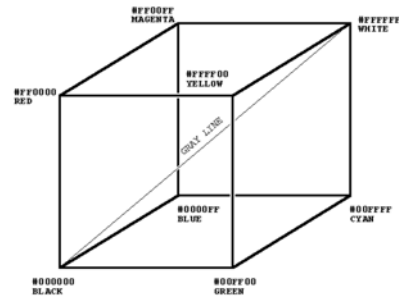
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### What if R=G=B?

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

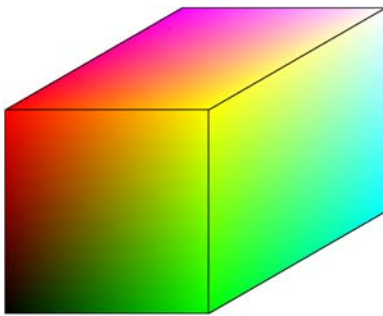
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### Color Cube



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### Color Cube

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


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### 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

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### 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.

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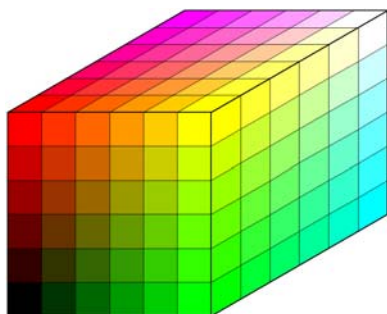
### Older Computers

- 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.

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## Browser-Safe Color Cube

$6^3 = 216$  Colors



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## 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.

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## 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 `ë`, `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;`

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## Example Entities

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

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## Simple Markup Tags

- Comment: `<!-- ... -->`
- Bold: `<B>...</B>`
- Italic: `<I>...</I>`
- Teletype: `<TT>...</TT>` (Monospace)
- Underline: `<INS>...</INS>`
- Strikethrough: `<DEL>...</DEL>`
- Superscript: `<SUP>...</SUP>`
- Subscript: `<SUB>...</SUB>`

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## Multiple Tags: Bold and Italic

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

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## Simple Structural Tags

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

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## Deprecated Tags

- Underline: `<U>...</U>`
- Strikethrough: `<S>...</S>`
- Strikethrough: `<STRIKE>...</STRIKE>`
- Centering: `<CENTER>...</CENTER>`
- Fonts: `<FONT>...</FONT>`

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## Singleton Tags

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

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

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## 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>
```

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## Typesetting Simple Equations

- $E=mc^2$ 
  - `E=mc<SUP>2</SUP>`
  - `E=mc&sup2;`
- $\frac{1}{2}$ 
  - `&frac12;`
  - `<SUP>1</SUP>&fras1;<SUB>2</SUB>`
- $\frac{1}{3}$ 
  - There's no entity to do this!
  - `<SUP>1</SUP>&fras1;<SUB>3</SUB>`

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## Putting it all together

```
<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>
```

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## 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>
```

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## What it looks like

### Welcome!

Welcome to my Web page! I hope you *really* like it! Come back often!  
I'll be changing it frequently.

Here is one of my best links:



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