

Web Programming Fundamentals

Today's schedule

- Syllabus
- Course Info
- Browsers! The Internet!
- A little bit about HTML and CSS

Syllabus

Fundamentals ?

Web Programming "Fundamentals"

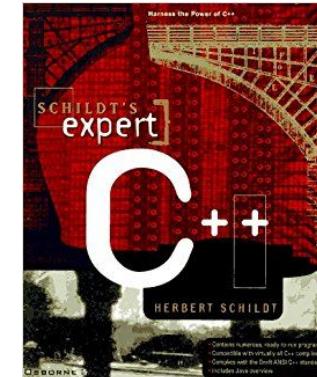
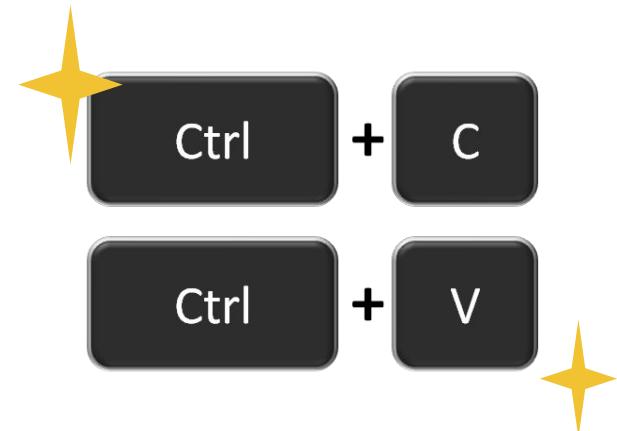
- An introduction to web programming

Q: What does that mean, exactly?

Who are you?

You are:

- A copy/paste programmer of JavaScript, HTML, CSS
(or you've never used these languages)
- A good programmer in at least one real* programming language (Java, C++, etc)
- Frustrated
(maybe)



*In case it's unclear, I'm being facetious

Frustrated?

Every beginner CSS tutorial makes CSS look trivially easy:

```
body {  
    background-color: red;  
}
```



But then when you try to write CSS, literally nothing works:

CSS
IS
AWESOME

A black rectangular box containing the text "CSS IS AWESOME" in a bold, sans-serif font. The box is positioned at the bottom center of the slide.

Frustrated?

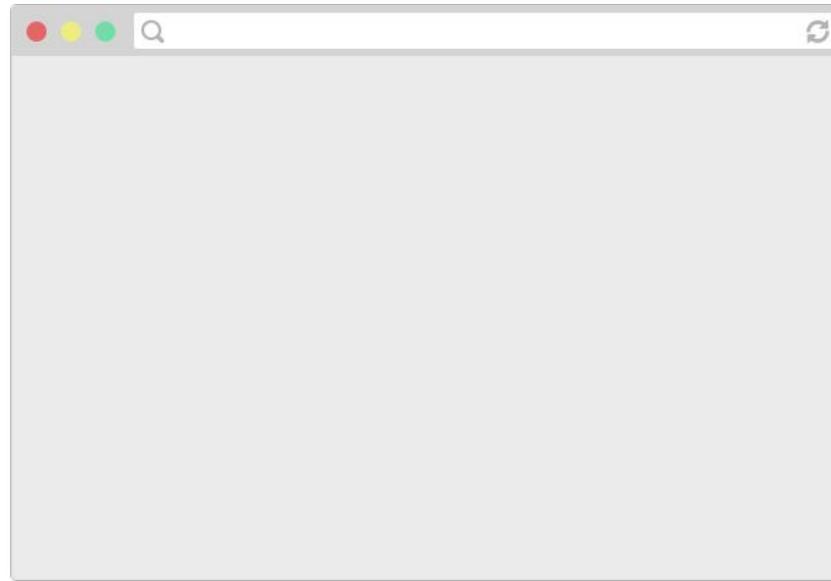
You want to learn JavaScript...



...but you're
overwhelmed by all
the frameworks,
libraries, tools, etc
and have no idea
where to start.

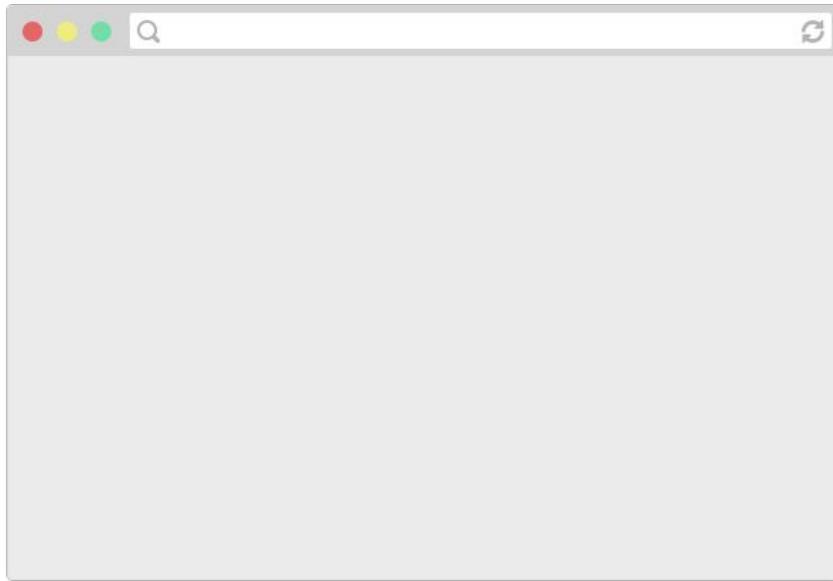
Browsers!
The Internet!
The web!

How do web pages work?



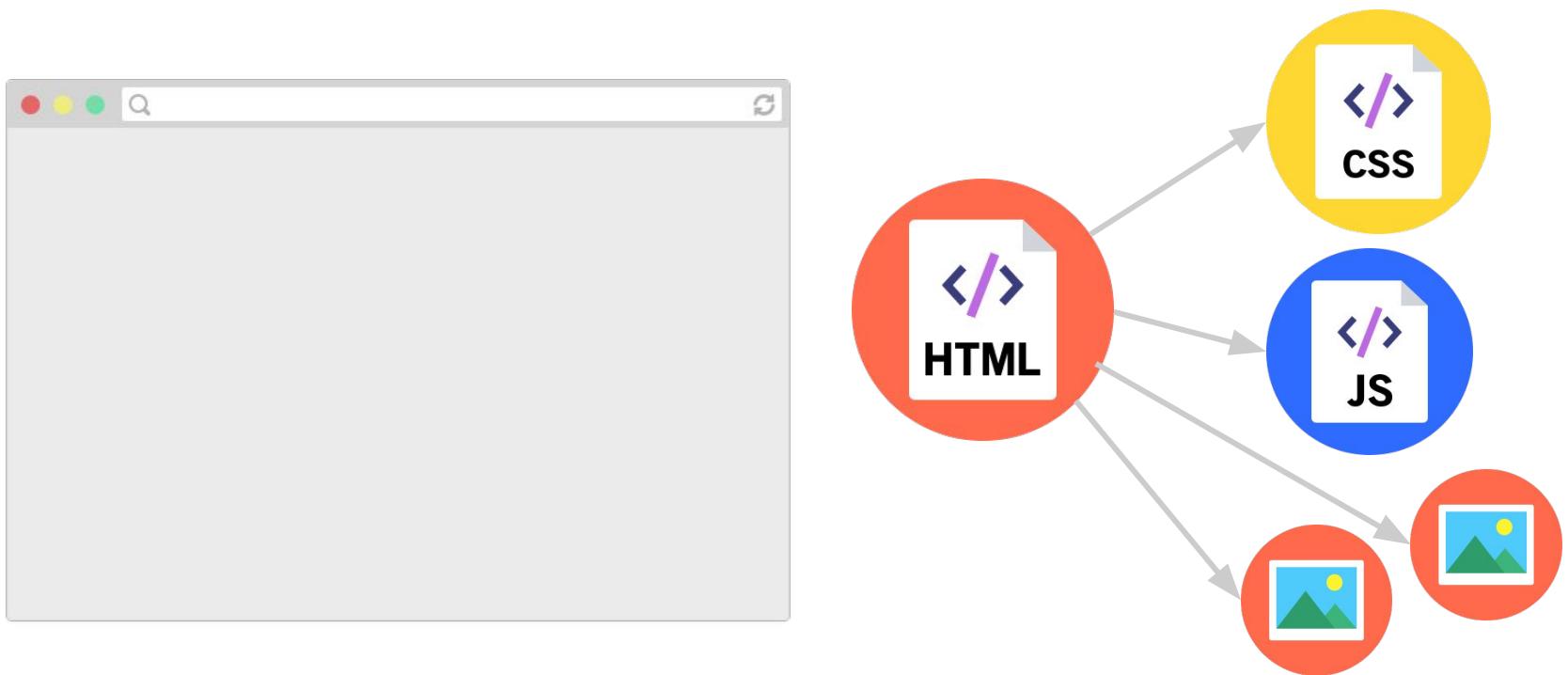
Browsers are applications that can display web pages.
E.g. Chrome, Firefox, Safari, Internet Explorer, Edge, etc.

How do web pages work?



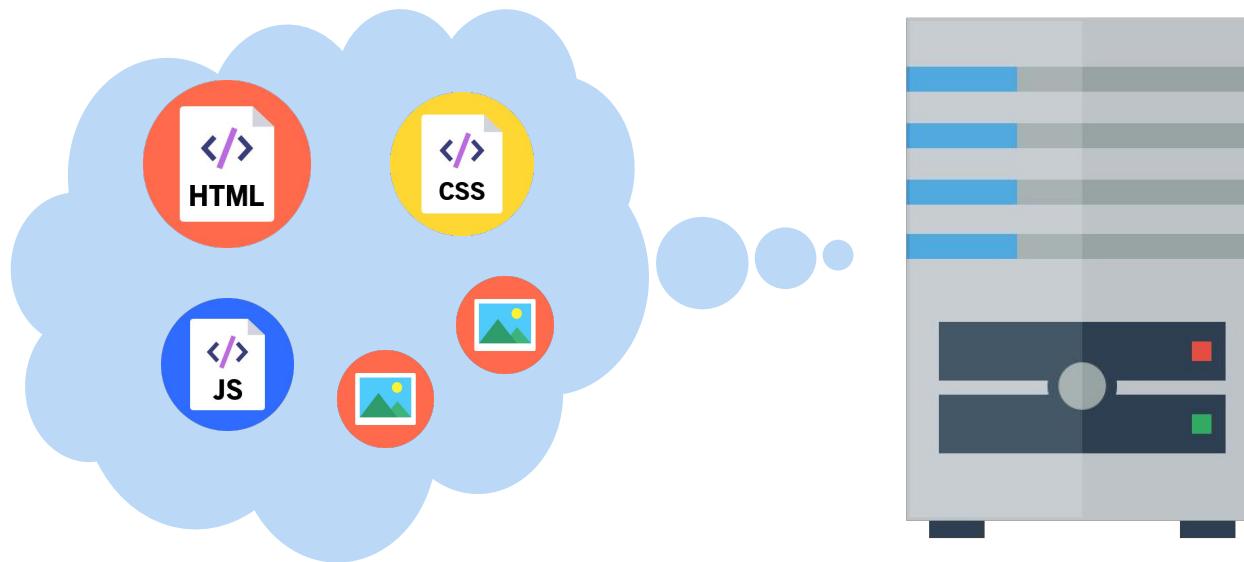
Web pages are written in a markup language called **HTML**, so browsers display a web page by reading and interpreting its HTML.

How do web pages work?



The HTML file might link to other resources, like images, videos, as well as **JavaScript** and **CSS** (stylesheet) files, which the browser then also loads.

How do web pages work?

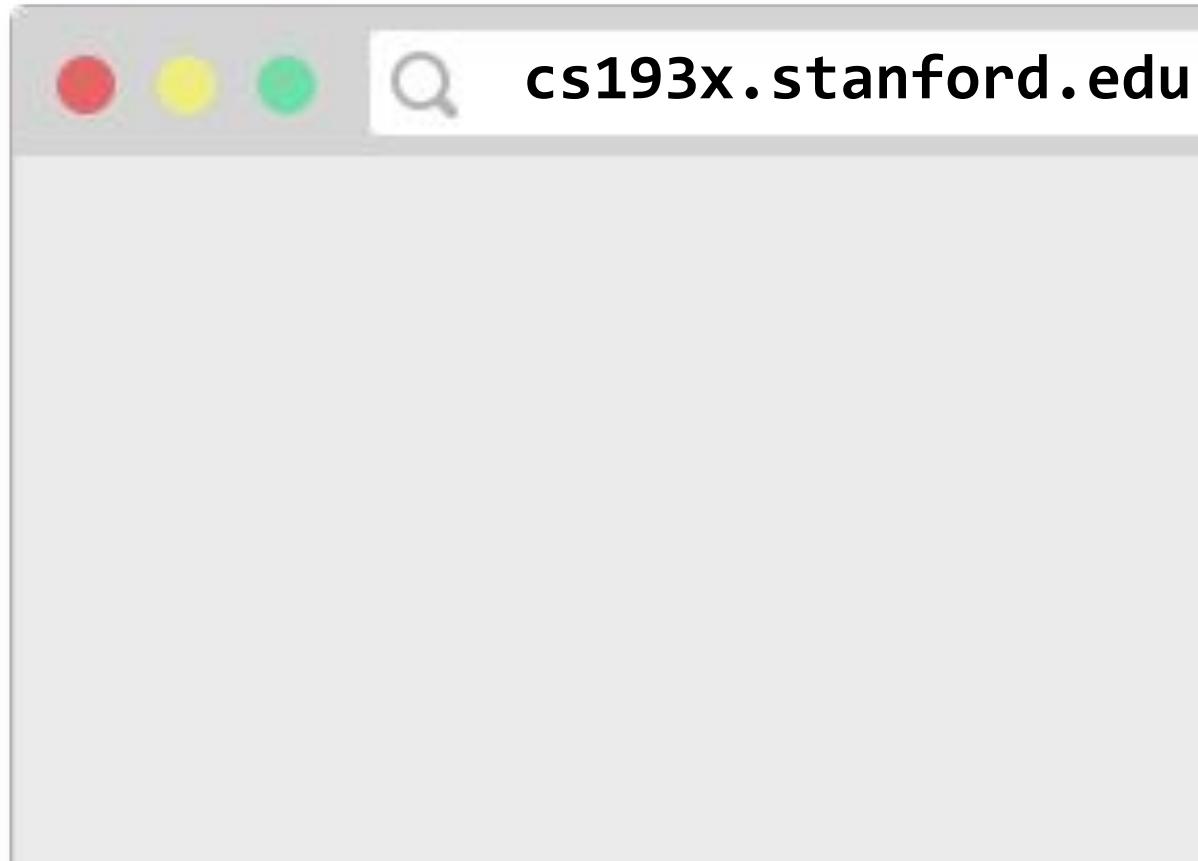


A **web server** is a program running on a computer that delivers web pages in response to requests.

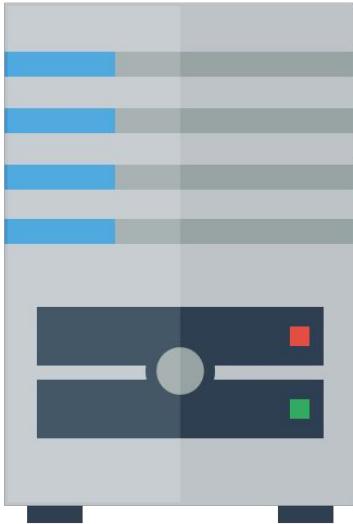
It either stores or generates the web page returned.

How do web pages work?

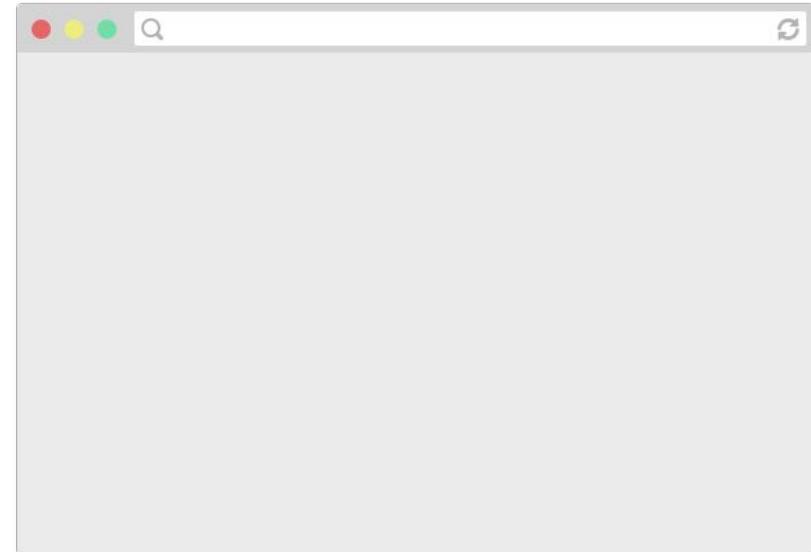
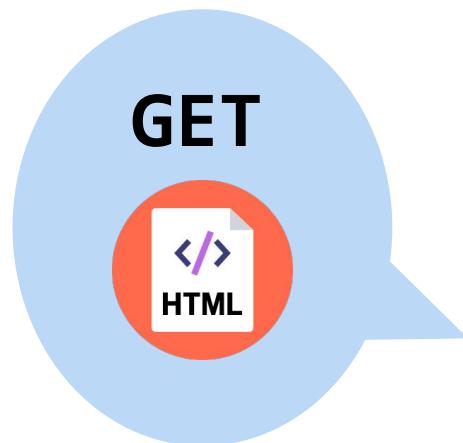
1. You type
in a URL,
which is the
address of
the HTML
file on the
internet.



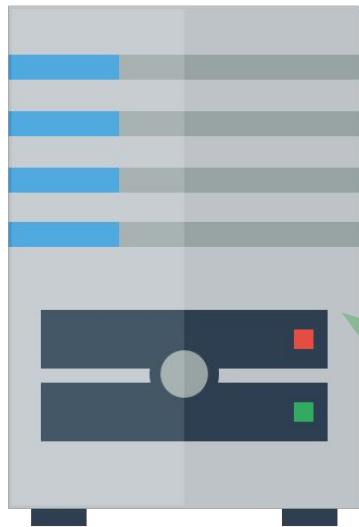
How do web pages work?



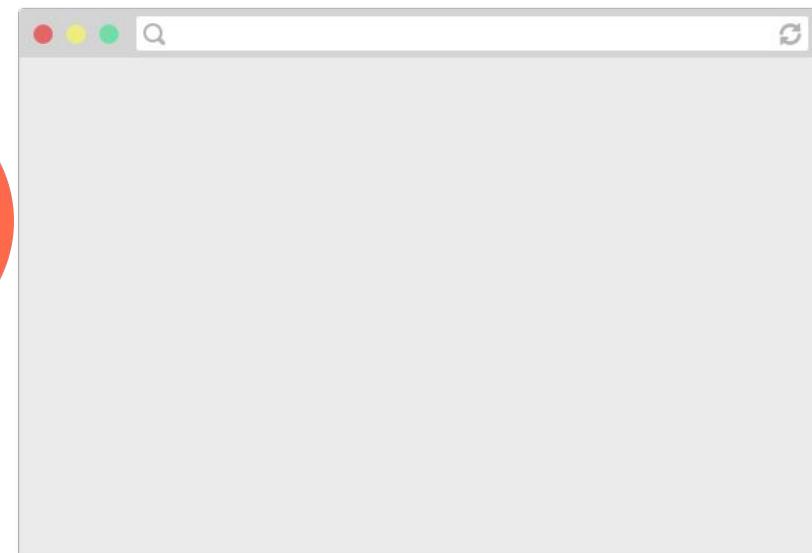
2. The browser asks the web server that hosts the document to send that document.



How do web pages work?



3. The web server responds to the browser with HTML file that was requested.

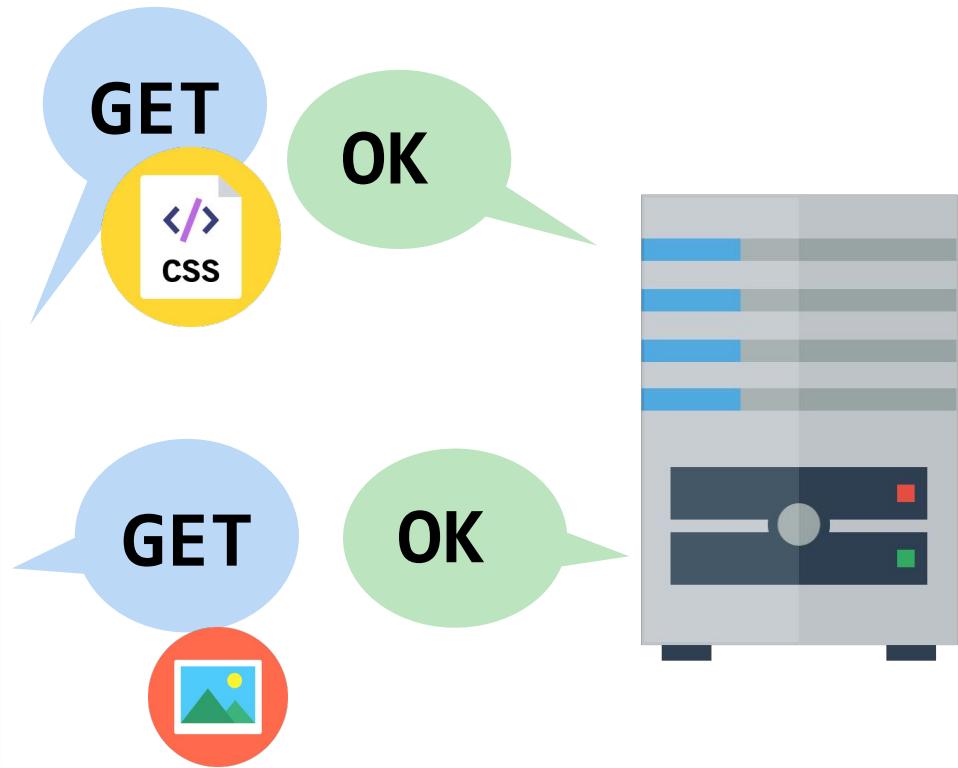
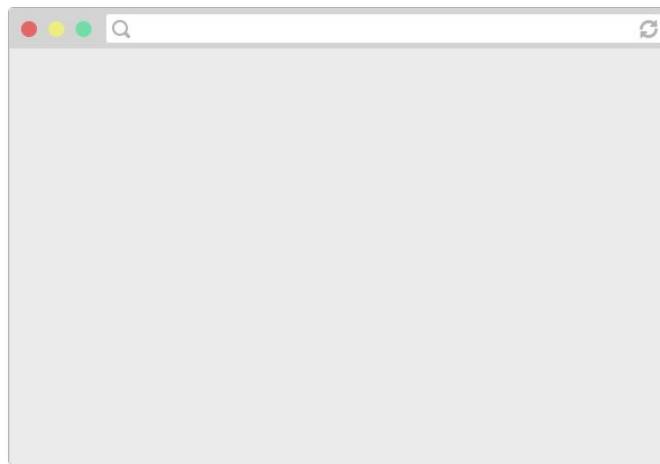


How do web pages work?

4. The browser reads the HTML, sees the embedded resources and asks the server for those as well.



...



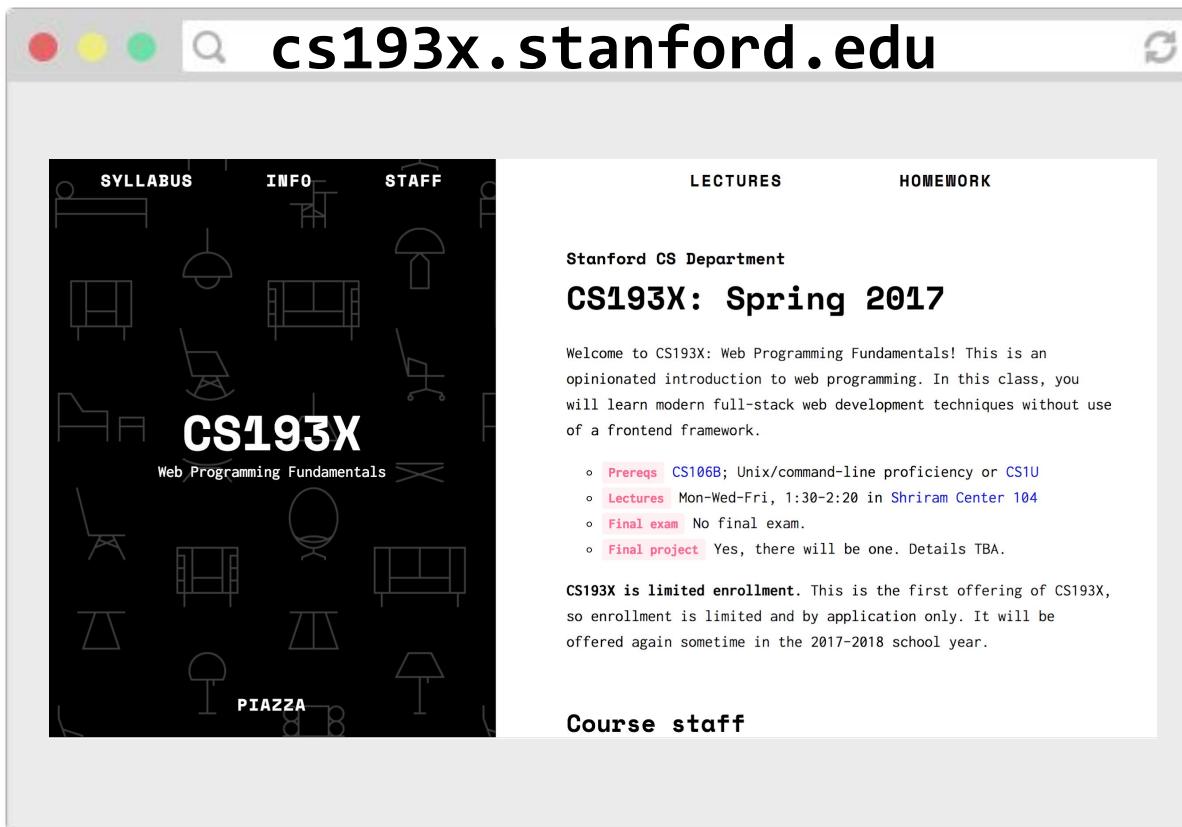
How do web pages work?

5. The web page is loaded when all the resources are fetched and displayed.



P.S.

(That was obviously very hand-wavy. We'll get more detailed when we talk about servers later in the quarter.)



HTML and CSS

HTML and CSS strategy

Assumption: Most people have cursory familiarity with HTML and CSS. Therefore we will:

- **Speed through** the obvious stuff
- **Skip** self-explanatory syntax
- **Skip** the parts you can look up easily through Google

★ **Therefore, be aggressive with questions!** ★

What is HTML?

HTML (Hypertext Markup Language)

- Describes the **content** and **structure** of a web page; not a programming language.
- Made up of building blocks called **elements**.

<**p**>

 HTML is <**emem**>
 <**img** **src**=**"puppy.png"** />

</**p**>

Basic HTML page structure

(i.e. copy/paste boilerplate)

```
<!DOCTYPE html>
<html>
  <head>
    <title>CS 193X</title>
  </head>

  <body>
    ... contents of the page...
  </body>
</html>
```

Saved in a *filename.html* file.

Basic HTML page structure

(i.e. copy/paste boilerplate)

Metadata that
doesn't appear in
the viewport of
the browser

```
<!DOCTYPE html>
<html>
  <head>
    <title>CS 193X</title>
  </head>
```

Contents that
render in the
viewport of the
browser

```
  <body>
    ... contents of the page...
  </body>
</html>
```

E.g. **<title>**
shows up as the
name of the tab

HTML elements

< p >

HTML is < em > awesome ! ! ! < /em >

< img src = " puppy . png " />

< / p >

- An element usually has start and ending tags (< p > and < / p >)
 - **content:** stuff in between start and end tags
- An element can be self-closing (img)
- An element can have attributes (src = " puppy . jpg ")
- Elements can contain other elements (p contains em and img)

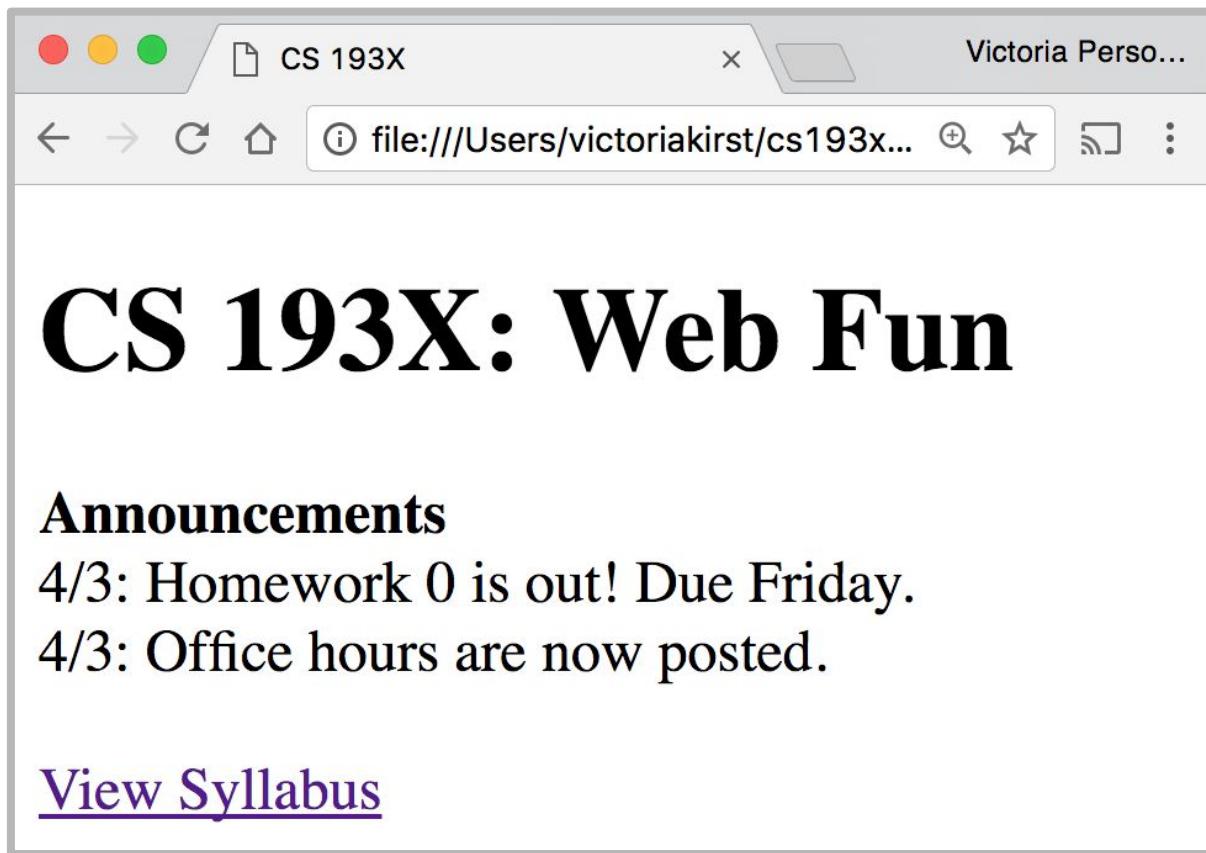
Some HTML elements

(to place within <body>)

Top-level heading h1, h2, ... h6	< h1h1 >
Paragraph	< pp >
Line break	since feeling is first< br /> who pays any attention
Image	< img src="cover.png" />
Link	< a href="google.com" >click here!</ a >
Strong (bold)	< strongstrong >
Emphasis (italic)	He 's my < em >brother</ em > and all

Exercise: Course web page

Let's write some HTML to make the following page:



The screenshot shows a Mac OS X-style web browser window titled "CS 193X". The address bar displays "file:///Users/victoriakirst/cs193x...". The main content area of the browser shows the following HTML structure:

```
<h1>CS 193X: Web Fun</h1>
<h2>Announcements</h2>
<p>4/3: Homework 0 is out! Due Friday.</p>
<p>4/3: Office hours are now posted.</p>
<a href="#" style="color: purple; text-decoration: underline; font-size: 1.5em; font-weight: bold;">View Syllabus
```

Exercise: Course web page

HTML boilerplate

```
<!DOCTYPE html>
<html>
  <head>
    <title>CS 193X</title>
  </head>

  <body>
    ...
  </body>
</html>
```

Plaintext contents of the page

CS 193X: Web Fun

Announcements

4/3: Homework 0 is out! Due Friday.

4/3: Office hours are now posted.

[View Syllabus](#)

[JSBin](#)

Solution

```
<!DOCTYPE html>
<html>
  <head>
    <title>CS 193X</title>
  </head>
  <body>
    <h1>CS 193X: Web Fun</h1>
    <strong>Announcements</strong><br/>
    4/3: Homework 0 is out!<br/>
    4/3: Office hours are now posted.<br/>
    <br/>
    <a href="http://cs193x.stanford.edu/syllabus">
      View Syllabus
    </a>
  </body>
</html>
```

That was weird

- We saw that HTML whitespace collapses into one space...

```
<h1>CS 193X: Web Fun</h1>
<strong>Announcements</strong><br/>
4/3: Homework 0 is out!<br/>
```

- Except weirdly the `<h1>` heading was on a line of its own, and `` was not.

Hmmm... strange...

Oh well, it works! Let's move on!!!

CSS

CSS

CSS: Cascading Style Sheets

- Describes the **appearance** and **layout** of a web page
- Composed of CSS **rules**, which define sets of styles

```
selector {  
    property: value;  
}
```

CSS

A CSS file is composed of **style rules**:

```
selector {  
    property: value;  
}
```

selector: Specifies the HTML element(s) to style.

property: The name of the CSS style.

value: The value for the CSS style.

Saved in a *filename.css* file.

CSS

// NOT REAL CSS

```
fork {  
  color: gold;  
}
```

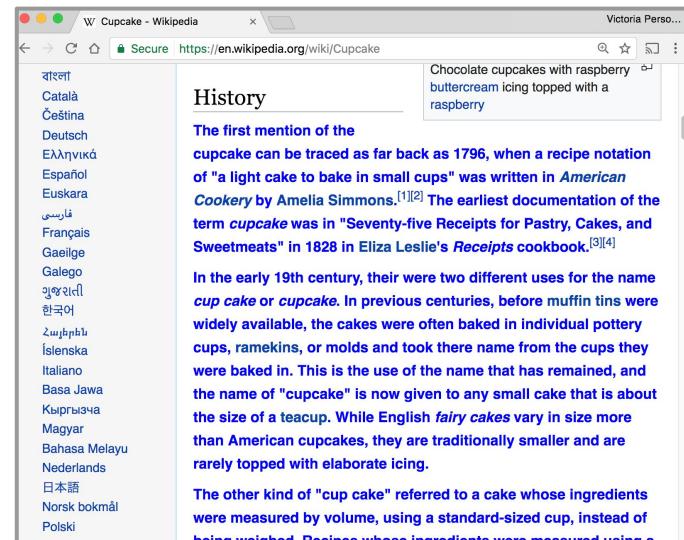
"All forks on the table
should be gold"



CSS

```
p {  
    color: blue;  
    font-weight: bold;  
}
```

"All <p> elements on the page
should be blue and bold"



Linking CSS in HTML

(i.e. copy/paste boilerplate)

```
<!DOCTYPE html>
<html>
  <head>
    <title>CS 193X</title>
    <link rel="stylesheet" href="filename.css" />
  </head>

  <body>
    ... contents of the page...
  </body>
</html>
```

Some CSS properties

There are over [500 CSS properties](#)! Here are a few:

Font face (mdn)	font-family: Helvetica;
Font color (mdn)	color: gray;
Background color (mdn)	background-color: red;
Border (mdn)	border: 3px solid green;
Text alignment (mdn)	text-align: center;

Aside: [Mozilla Developer Network](#) (MDN) is the best reference for HTML elements and CSS properties

- The actual W3 spec is very hard to read (meant for browser developers, not web developers)

Main ways to define CSS colors:

140 predefined names ([list](#))

```
color: black;
```

[rgb\(\)](#) and [rgba\(\)](#)

```
color: rgb(34, 12, 64);
```

```
color: rgba(0, 0, 0, 0.5);
```

[Hex values](#)

```
color: #00ff00;
```

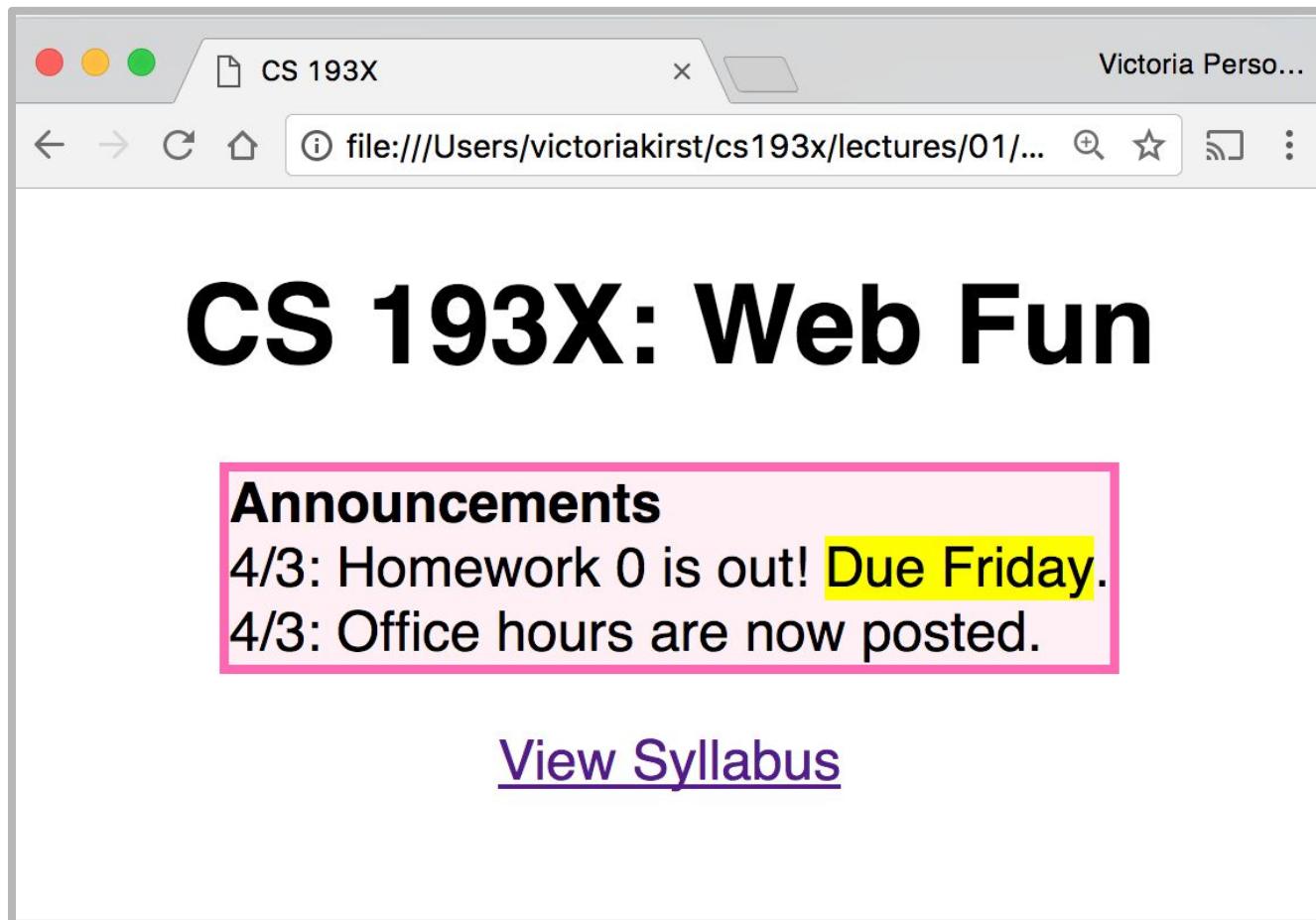
```
color: #0f0;
```

```
color: #00ff0080;
```

- The "a" stands for **alpha channel** and is a **transparency** value
- Generally prefer more descriptive over less:
 1. Predefined name
 2. rgb / rgba
 3. Hex

Exercise: Course web page

Let's write some CSS to style our page:



Exercise: Course web page

Let's write some CSS to style our page:

Font face: Helvetica

Border: hotpink 3px

Background color:

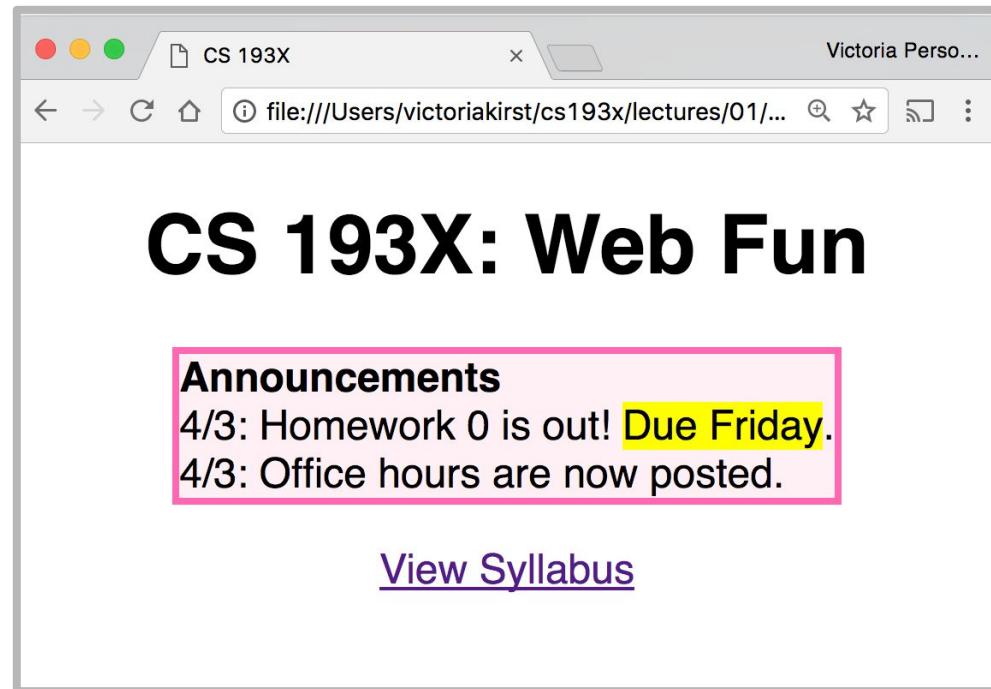
lavenderblush

Highlight: yellow

- Box is **centered**

- Header and link are **centered**

- Box contents are **left-aligned**



[JSBin](#)

CSS exercise debrief

Some key techniques:

- Add invisible containers in HTML to select groups of elements in CSS.
- Apply styles to parent / ancestor element to style parent and all its children. (Will talk more about this later.)

But we encountered **more weirdness...**

- Couldn't set `text-align: center;` to the `<a>` or `` tags directly, but could center `<p>` and `<h1>`
- Had to set a `width` on the box to make it hug the text ... any other way to do this?
- How to center the box?! How do you highlight?!

Q: Why is HTML/CSS
so bizarre??

A: There is one crucial set of rules we haven't learned yet...

block vs **inline** display

MIT License

Copyright (c) 2017 Victoria Kirst (vrk@stanford.edu)

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.