HACK YALE

< INTRODUCTION />

WWW.HACKYALE.COM

WELCOME!

The Agenda

- HackYale
- The Internet
- Rapid fire HTML, CSS, and JavaScript
- Teaching lessons
- Q&A

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INTRODUCTIONS

ZACK RENEAU-WEDEEN

- HackYale director, four-time instructor.
- Senior, Trumbull, Computer Science / Econ major
- Worked at Google, Brewster
- Enjoys “PG-rated movies starring Martin Lawrence”

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THROUGH THE AGES

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"HackYale provides student-run lectures in web development, introductory programming and design."

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CHRONOLOGY

- Huge demand from the start
- Considered expansion
- Settled in as a provider of educational, cultural, and professional resources to Yale students.

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Current Work

WHAT WE'RE UP TO

CURRENT WORK

- Flagship lecture
- Workshops
- Collaboration
- Jobs

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LECTURE

- Once a week + office hours
- Homeworks

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SHOWCASE

- Yale Film Society
- Friends With Wheels
- Inta
- Yale Taxi Stand
- Screw Me Yale
- Yale Travelogue
- Etc.

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The Future

WHAT'S IN STORE

THE FUTURE

Incremental Change

- Meeting demand
- Jobs and opportunities
- Closer partnership with STC, CEID, etc.
- Cultural presence (e.g. blog)
- Moving into the physical realm

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THE FUTURE

Moon Shots

- HackYale Outreach
- Hack University

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THE INTERNET

THE LONGEST LINE EVER

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THE VIDEO WAS GREAT

THANKS, AARON TITUS

HOWEVER, WE'D LIKE TO GET A BIT MORE TECHNICAL AND ADD THE CONTEXT OF WEB DEVELOPMENT

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TERMINOLOGY

Client-server model

- Client == (you and your) browser
- Server == machine sending (or “serving”) you the data and files you request

HOST ~== “server”

- “to host” (code, files, applications) ~== “to serve”

LOCAL == hosted on the machine in question

REMOTE == hosted on a different machine

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REQUEST-RESPONSE CYCLE

(1) Client (browser) makes a "request"

- REQUEST == textual message whose syntax and semantics are defined by HyperText Transfer Protocol (*HTTP*)
- Think of a protocol as a "language"

(2) Server issues a "response"

- RESPONSE == textual message defined by HTTP
- Contains status code. Ex: 404 ("*Not Found*"), 200 ("*Okay*"), 500 ("*Internal Server Error*")

(3) Cycle repeats itself

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KEY TECHNOLOGIES

WEB DEVELOPMENT 101

THE CLIENT-SERVER MODEL

REQUEST FOR

- HTML, CSS, JS
- IMAGE
- DOCUMENT
- ETC...

CLIENT

RESPONSE FROM

SERVER

- REQUESTED CONTENT... OR
- SOME OTHER REASONABLE RESPONSE BASED ON CONTEXT (EX. 404 NOT FOUND)

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ON THE CLIENT SIDE

REQUEST FOR

- HTML, CSS, JS
- IMAGE
- DOCUMENT
- ETC...

RESPONSE FROM

CLIENT

SERVER

HTML
CSS
JAVASCRIPT

- REQUESTED CONTENT... OR
- SOME OTHER REASONABLE RESPONSE BASED ON CONTEXT (EX. 404 NOT FOUND)

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ON THE SERVER SIDE

REQUEST FOR

- HTML, CSS, JS
- IMAGE
- DOCUMENT
- ETC...

RESPONSE FROM

- REQUESTED CONTENT... OR
- SOME OTHER REASONABLE RESPONSE BASED ON CONTEXT (EX. 404 NOT FOUND)

CLIENT

HTML
CSS
JAVASCRIPT

SERVER

PHP
Javascript (with Node.JS)
Ruby (perhaps on Rails)
Perl
Java
Python

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THE FRONT-END IS HOW TO DISPLAY CONTENT FROM THE SERVER

CLIENT

HTML
CSS
JAVASCRIPT

SERVER

PHP, Node.JS, RoR, etc.

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WHOA WHOA, BACK UP

OKAY, LET'S WALK AND TALK THROUGH WHAT GOES ON BEHIND THE SCENES WHEN YOU VISIT A WEBSITE LIKE FACEBOOK

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OUR FIRST WEBSITE

AN EXERCISE

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ANATOMY OF A WEBPAGE

HEAD, SHOULDERS, KNEES AND FOOTER

FRONT-END DEVELOPMENT

An interaction between three “languages”

- HTML - HyperText Markup Language
- CSS - Cascading Style Sheets
- Javascript - A programming language, NOT Java

To be a successful developer, you’ll need to learn all three

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IMAGINE FOR A SEC...

THAT A WEBSITE IS A HUMAN BODY

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HTML

The “bones”

- The “content” of the Internet
- Builds the layout, structure and connections
- Easy to learn, easy to master

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THE HTML OF GOOGLE

IN A WEEK, YOU'LL BE ABLE TO MAKE THIS

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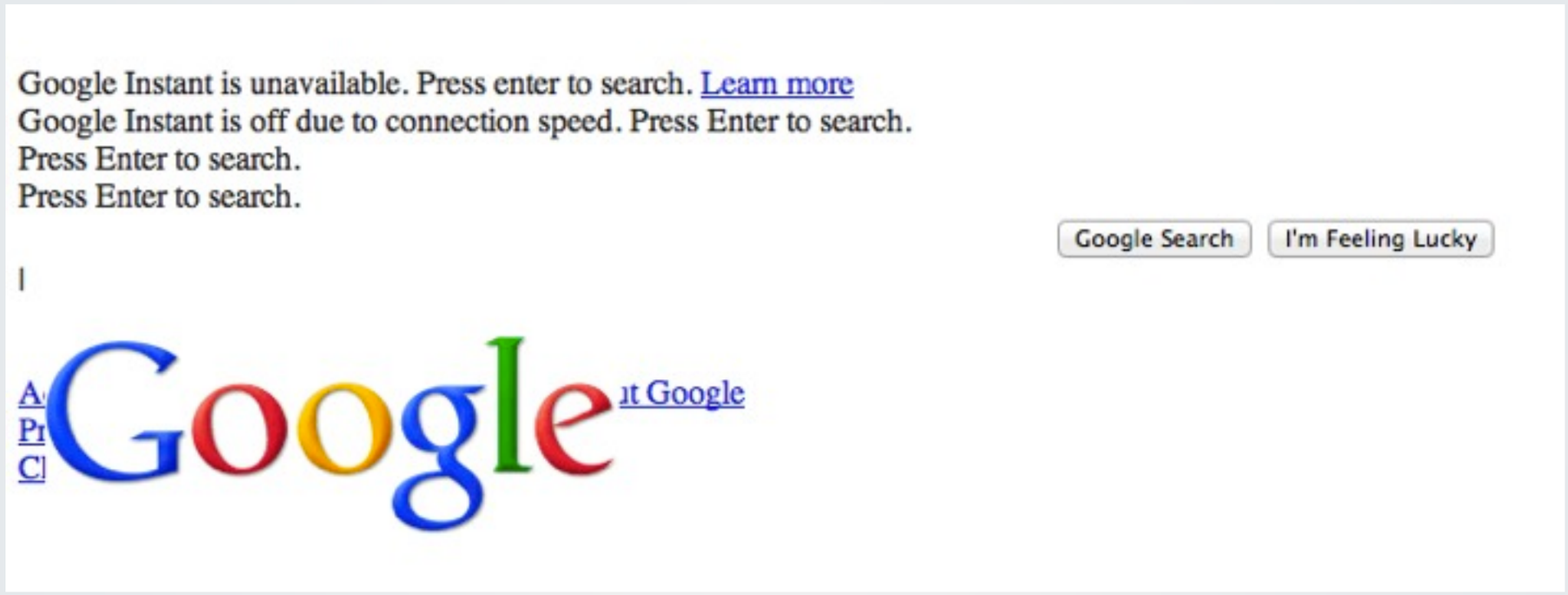
THE HTML OF GOOGLE



IN A WEEK, YOU'LL BE ABLE TO MAKE THIS

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CSS

The “skin” or “physical features”

- The “style” of the Internet
- Defines how HTML elements look
  - Width, height, color, position…
- Easy to learn, difficult to master
- The web designer’s best friend

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JAVASCRIPT

The “muscles”

- The “interaction” or “animation” of the Internet
- Makes HTML elements interact with one another
  - And with other pages!
- Tougher to learn, and unfortunately, tough to master

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HTML: IMPLEMENTATION

TYPE ALONG!

CODING IN HTML

To program the nested structure of HTML, we use *tags*

- Tags are just 1-4 letters that refer to something
  - Ex. “p” for “paragraph”; “h1” for “header 1”
- To differentiate tags from plain text, we enclose them in brackets
  - `<p>, <h1>`
  - This *opens* a tag
  - To close a tag, do `</h1>`

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MORE ABOUT TAGS

Tags delineate content blocks

- `<h1>` *I'm inside a tag!* `</h1>`
- Tags have "properties," and these properties are then passed on to the content within the tags
- Mr. `<tag>` says "abide by my laws until further notice"
- Then Ms. `</tag>` says "further notice"

TAGS CAN BE NESTED

```
<div>
    <h1>A sick header</h1>
    <div>
        <p>My sweet paragraph</p>
    </div>
</div>
```

This is how we can create boxes within boxes

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HTML DOCUMENT STRUCTURE

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HTML DOCUMENT STRUCTURE

<!DOCTYPE>

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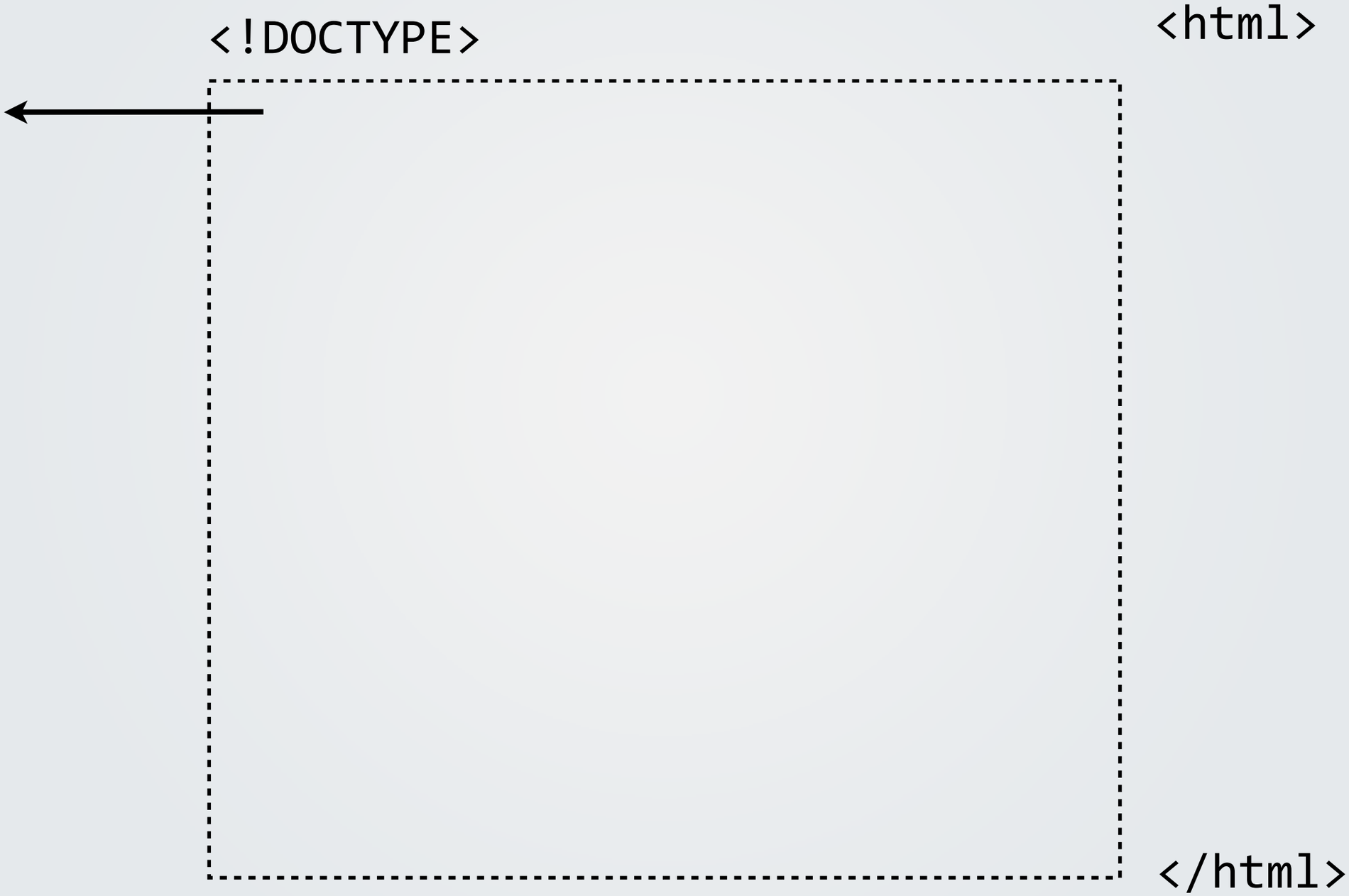
HTML DOCUMENT STRUCTURE



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HTML DOCUMENT STRUCTURE

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HTML DOCUMENT STRUCTURE

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POPULAR TAGS

`<div>` (“division”) the content blocks of HTML (an empty shell)

```
<div>This content will be in an div block!</div>
```

`<a>` (“anchor”) links

```
<a href=”http://www.hackyale.com”>Home</a>
```

`<img>` images

```
<img src=”http://www.hackyale.com/logo.png” />
```

`<p>` paragraphs

```
<p>This text will be in a nice paragraph</p>
```

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CASCADING STYLE SHEETS (CSS)

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SO YOU'VE BUILT A SITE...

But it's ugly. Not to be mean, but by that I mean:

- Aside from images, not much color
- Not much control of where to put the "boxes"
- Spacing and alignment may not be ideal
- Not too responsive: hovers and clicks don't do anything

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THAT'S WHY WE HAVE CSS!

Style specifies how your HTML elements look

- We want to **select** some elements
- And apply a **style** to them
  - like color, size, alignment...

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WAYS TO SELECT ELEMENTS

By tag name:

- Very easy, just `p`, `img`, `div` or what have you
- Very rarely used, and often to define a global 'feel' for the site
  - For example, make all links red instead of the default blue
  - Make all images have a border
- But what happens when you don't want *all* of the p tags?

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WAYS TO SELECT ELEMENTS

By class name:

- A **class** is an attribute given to one or more HTML elements
  - `<p class="blue-text">Some text</p>`
- Many elements may have the same class
- An element may have many classes
  - Just separate with spaces!
  - `<p class="blue underline">More text</p>`

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WAYS TO SELECT ELEMENTS

By **ID**:

- An ID is an attribute given to **only one** element
  - `<p id="my-only-red-paragraph">ELMO</p>`
- Only one element may have a particular ID
- An element may only have one ID

Why IDs and not classes?

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PRACTICAL USE CASES

Tag name

- To override defaults or define global styles

Class

- The most widely used, allows for nice element selection

ID

- HackYale discourages using IDs in CSS selectors
  - Some other people do too

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CSS SYNTAX

```
p {
  font-size: 18px;
  color: blue;
}
```

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CSS SYNTAX

```
p {
  font-size: 18px;
  color: blue;
}
```

SELECTOR

CSS SYNTAX

```
p {
  font-size: 18px;
  color: blue;
}
```

SELECTOR

DEFINITION BLOCK

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CSS SYNTAX

```
p {
  font-size: 18px;
  color: blue;
}
```

SELECTOR

DEFINITION BLOCK

PROPERTY

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CSS SYNTAX

```
p {
  font-size: 18px;
  color: blue;
}
```

SELECTOR

DEFINITION BLOCK

PROPERTY

VALUE

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CSS SYNTAX

```
p {
  font-size: 18px;
  color: blue;
}
```

SELECTOR

DEFINITION BLOCK

PROPERTY

VALUE

END OF DEFINITION

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JAVASCRIPT

THE CONCEPT

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A PROGRAMMING LANGUAGE

But what does that mean?

Why do we program or write code?

To what end?

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WHAT IS PROGRAMMING?

PROGRAMMING IS THE PROCESS OF
WRITING *functions* THAT TELL COMPUTERS
TO DO WHAT WE TELL THEM TO DO

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FUNCTIONS

A FUNCTION IS A SET OF INSTRUCTIONS THAT TAKE SOME INPUTS AND PRODUCE A PREDICTABLE OUTPUT

EXACTLY LIKE IN ALGEBRA!

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CONCEPT

By defining and using functions, we can tell computers things we want to do. For example...

- Double a number
- Make all text on a web page double its current size
- Make an image change when a user clicks on it
- ...everything a computer does is implemented by a function

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VARIABLES

Sometimes, we want functions to have different outputs when we have different inputs.

- In algebra, you *solve* for a variable.
- But in programming, you get to assign variables values so that we can use those values later.

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VARIABLES AND FUNCTIONS

IF YOU UNDERSTAND THESE TWO CONCEPTS,
YOU'VE CLEARED A MAJOR HURDLE IN
UNDERSTANDING PROGRAMMING

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JAVASCRIPT SYNTAX

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FUNCTIONS

In algebra, we write $f(x) = \ldots$

- f is the name of the function
- x is the input
- … denotes the actual instruction of the function (ex. $x+1$)
- $f(x)$ is shorthand for the output (sometimes called y)

- I hope this sounds familiar.

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FUNCTIONS

In Javascript we write *f = function(x) { ... };*

- *f* is the name of the function
- *x* is the input
- ... denotes the instructions of the function (ex. **return *x+1;***)
- *f(x);* is still the output

- I hope this is still familiar!

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VARIABLES

Only kind of like algebra

- But instead of finding the values of variables, we use variables to **store values**.

- `a = 7;`
- **`a = a + 7;`**
- In algebra, the second statement is impossible. In programming, it *happens all the time*.

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JAVASCRIPT

A BRIEF HISTORY

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Are JavaScript and Java the same thing?

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“Are JavaScript and Java the same thing?”

NO

THE NAME

In 1995, Java was hot stuff, and the Netscape guys wanted their language to be also.

- So they named it JavaScript
- Supposedly this was in exchange for bundling Sun's Java runtime with their market-leading browser: Netscape Navigator.
- Java Applets (e.g. slimezone.com) later fell out of favor, but JavaScript kept kicking.

“Isn’t Javascript that crappy little toy language that was invented in like twenty minutes by some guy at Netscape?”

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“But isn’t Javascript that crappy little toy language that was invented in like twenty minutes by some guy at Netscape?”

Sort of...

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“But isn’t Javascript that crappy little toy language that was invented in like twenty minutes by some guy at Netscape?”

Sort of...

but not really anymore.

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BRIEF HISTORY

Javascript was hurriedly developed by Brendan Eich at Netscape in 1995

- “Mocha” > “LiveScript” > “JavaScript”
- Submitted to Ecma International for standardization in 1996 > “‘ECMAScript”
- Iterated, updated, and enhanced since then
- For more on Javascript’s colorful history, give this a read: http://ask.metafilter.com/195482/Lets-assume-that-I-am-the-stupidest-person-that-ever-lived-Explain-to-me-what-JavaScript-is-what-it-does-and-how-a-moron-would-go-about-learning-it#2813956

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JAVASCRIPT AIN'T PERFECT...

Given the rushed conditions of its development, JavaScript has some downsides

- Too permissive. Doesn't complain
- Type coercion (i.e. == vs. ===)
- Awkward typing
  - `if ( typeof x == 'undefined' ) {...}`

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BUT IT AIN'T BAD NEITHER!

JavaScript has its advantages

- Functions as first class objects
- Closures
- Event loop
- Prototype chain
- Tail recursion (in theory)
- Fast (thanks to Google's V8 engine)

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BUT IT AIN'T BAD NEITHER!

Appreciation for JavaScript has grown in recent years thanks to several key figures

- Douglas Crockford - YUI, Javascript: The Good Parts
- John Resig - jQuery
- Jeremy Ashkenas - Backbone.js
- Ryan Dahl / Joyent - Node.js

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DEMO

FIRE UP THE CONSOLE

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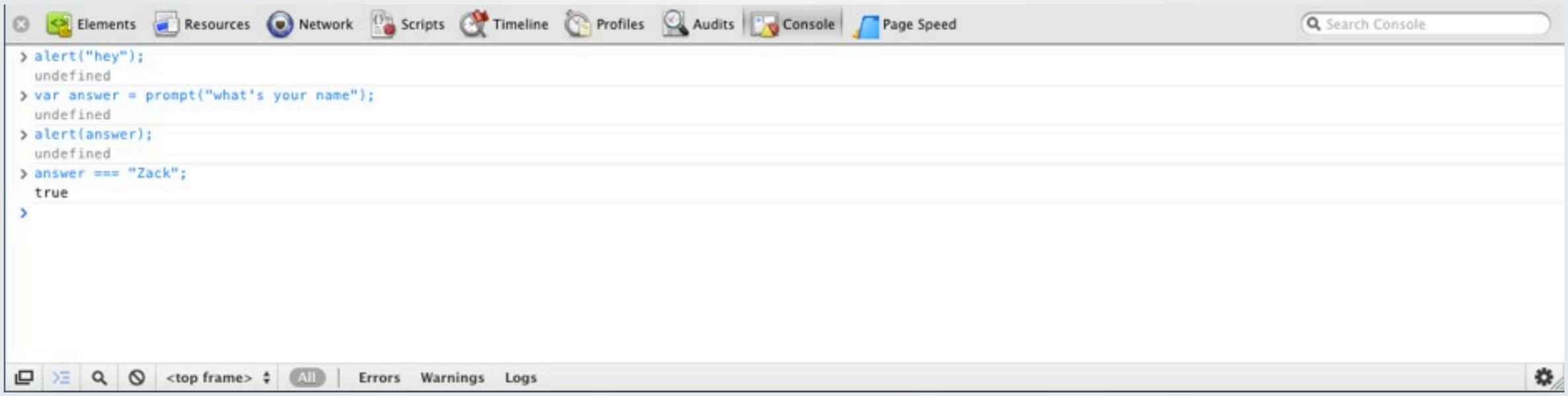
CHROME CONSOLE

command + option + j
or
view -> developer -> javascript console



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VARIABLE SYNTAX

```
var a = 7;
```

- var tells the computer that a is variable
- = means to **store**. In this case, the number 7
- All Javascript statements end in a semicolon.

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VARIABLE SYNTAX

```
a = a + 7;
```

- Don't need to resay that a is a variable.
- = means to **store**. In this case, the number 7
- All Javascript statements end in a semicolon.

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OTHER EXAMPLES

We covered a lot of examples in class, that I'll list here.

- `var f = function(x) { return 2 * x };`
- `var numCatz = 7;` vs just `numCatz = 7;`
- `var numDogz = "7";` and `numDogz + numCatz;`
- `typeof numCatz;` and `typeof f;`
- `var g = function(func) { return func(2); };`
- `var ps = document.getElementsByTagName("p");`

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THE CONCEPTS

The concepts covered in the examples (respectively)

- Defining functions
- The use of the keyword ‘var’
- The difference in addition between string and numbers
- Types in Javascript (‘var’ is not a type. A variable only gets a type when it is assigned a value). Functions are a type!
- Functions can be inputs to other functions
- Getting elements on your HTML page (in this case, all paragraphs)

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UNDERSTANDING THE CONCEPTS

It is *incredibly* important that you understand all of the previous concepts, even if you have programmed before. Javascript does things a bit differently than C or Java, and when we start talking about more advanced things (like callbacks and the Event Loop), we're going to take these things as a given. Use Google or come to office hours...it's just 6 concepts!

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INCLUDING JAVASCRIPT

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SIMILAR TO CSS

```
<!DOCTYPE html>
<html>
<head>
   <!-- some HTML -->
</head>
<body>
    <!-- some more HTML -->
    <script src="main.js"></script>
</body>
</html>
```

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WHAT ARE THE DIFFERENCES?

```
<!DOCTYPE html>
<html>
<head>
   <!-- some HTML -->
</head>
<body>
    <!-- some more HTML -->
    <script src="main.js"></script>
</body>
</html>
```

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CSS

```
<html>
<head>
    <!-- some HTML -->
    <link rel="stylesheet" href="/style.css">
    <!-- some more HTML -->
</head>
<body>
    <!-- even more HTML -->
</body>
</html>
```

JAVASCRIPT

```
<!DOCTYPE html>
<html>
<head>
   <!-- some HTML -->
</head>
<body>
    <!-- some more HTML -->
    <script src="main.js"></script>
</body>
</html>
```

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LEARNINGS

FIRE UP THE CONSOLE

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STRAIGHTFORWARD

One mistake and it was clear

- Have workshops for esoteric topics, not full classes.
- Focus on the products.
- Be lively.

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LESS OBVIOUS

Some non-obvious, subtler lessons

- Have class when people *aren't* working.
- Avoid insecurity.
- Prepare to improvise.

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STILL WORKING ON

Some things we haven't quite figured out yet

- Ensuring long-term commitment.
- Biting off the right amount.

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HOMEWORK

YOU THOUGHT WE WERE DONE

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HOMEWORK

Begin your education

- Complete project 1 at https://dash.generalassemb.ly

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THANKS!

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QUESTIONS? ZACK@HACKYALE.COM

WWW.HACKYALE.COM