CT1114
Web Development
HTML, CSS, JavaScript

Section 2:
Javascript Variables

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To see error messages, use..

In Firefox, use Tools > Web Developer > Browser Console
In Chrome, use More Tools > Developer Tools > (Console section)

For debugging in Javascript, you can also write directly to the console using **console.log("message");**

HTML

HyperText Markup Language
The language used to define the contents of web pages
Includes text, tables, hyperlinks, images, etc.

HTML is the language used to define webpage CONTENT and STRUCTURE

It is normally downloaded by your browser from a web server, and then interpreted and displayed (rendered) by your browser

Javascript

A programming language that runs in the user's browser, providing interactivity, animation, calculations, and also the ability to change the HTML content of a page after it has been downloaded

Javascript is the language used to define the BEHAVIOUR and INTERACTIVITY of a webpage

It is normally downloaded by your browser from a web server, and then portions of it are executed as appropriate on an HTML page that references it

Reminder: structure of an HTML page with Javascript

```
<!DOCTYPE html>
<html>
  <head>
    <title>A page with a button</title>
    <script>
            function handleClick() {
                    alert("You clicked the button.");
            }
    </script>
  </head>
  <body>
    <button onclick='handleClick();'>Click Me!</button>
  </body>
</html>
```

What JavaScript is

- Scripting language
  - Client side in web-browser
- Consists of lines of executable code
  - Which are (typically) 'just in time' compiled
- Mostly located inside functions
  - Which may run in response to an event (e.g. onclick)
- Designed to add interactivity to HTML pages

What JavaScript isn't

- JavaScript is **not** Java
- Java is a more **fully featured** programming language
  - More complex
  - Used for standalone applications, web services, etc.
  - Not sandboxed by the user's browser
- But Javascript is becoming more and more important and powerful in recent years (and on modern browsers)
- Also when run inside special executables:
  - Server-side programming (e.g. node.js)
  - Stand-alone applications (e.g. nodewebkit, cordova), web services (node.js) etc.

What can JavaScript do?

- Give HTML designers a programming tool
- Can read/write Form contents (text boxes, drop-down lists etc.)
- Can handle (respond to) Events
  - onChange, onMouseOver, onLoad, etc
- Can read/write any attributes of HTML elements (e.g. innerHTML).
- Can even create and destroy elements on the page
  - Animation/games
  - Highly-interactive, responsive, animated user interfaces
  - Drag-drop
  - Etc.

Where to put JavaScript code

- Inside HTML Head
  - Between <script ...> ... </script> tags
  - JavaScript code in functions in the head section will be executed only when CALLED
- Inside HTML Body
  - JavaScript code in the body section (not in functions) will be executed WHILE the page loads (use sparingly- the document is not ready yet!)
- External source files – for re-usable code
  - <script src="filename.js"></script>

JavaScript Syntax

- 'C like' language
  - Like PHP, C++, Java, and others..
- Braces used to denote code blocks { }
- Semi-colons used at the end of lines
- Comments as per C
  - Single line comments // Single line
  - Block comment /* Block comments can span multiple lines */

Variables

- Created with the **var** keyword
  - You can also use **let** and **const** (recently added to the language)
- Syntax
  - var name=value;
  - var num1, num2, num3;
- Like most "scripting" languages, by default variables in Javascript do **not** need to be declared before being assigned a value
  - var num=1;
  - has the same effect as
  - num=1;
  - Variable "num" will be created if it doesn't exist
  - "use strict"; // this is a good idea – this forces declaration before use

Variables

- Variables are used to store data values
- Most commonly, these are either numbers, or strings of text
- They can also be other things such as objects or functions (as we will see later)

Arithmetic in JavaScript

- The same as C / C++ / Java etc
- Basic **Arithmetic Operators**

Addition	+	ans=a+7
Subtraction	-	ans=x-y
Multiplication	*	ans=a*b
Division	/	ans=a/b
Modulus	%	ans=x%y

Exercise

- Modify this HTML page so that, when the button is clicked, the paragraph is modified so that it displays the result of the calculation: 5+7*6

```
<!DOCTYPE html>
<html>
  <head>
  </head>
  <body>
    <p id='myParagraph'>
      Result will display here
    </p>
    <button>Click for result!</button>
  </body>
</html>
```

Parenthesis

- Parenthesis (round brackets) can be used to ensure order of priority in a computation

- $x = \frac{a+b+c}{5}$ how you'd write it in maths

- x=(a+b+c)/5 how you write it in programming

Order of Operations

- Set of rules, decide which operation is performed first

1. () innermost first
2. * / % left to right
3. + - left to right

Order of Operations

- Assuming a=4, b=2, c=5 and d=3, evaluate the following, bearing the order of precedence in mind
  - *(a+b)*(c+d)* =
  - *a+b*c+d* =
  - *(d*(a-b))+c* =
  - *d*a-b+c* =

If we have time

- Modify the Planets code to make it shorter, using variables

- **Q: What could we do to improve it?**
- **Q: Why is shorter code generally considered better anyway?**

Graded Exercise #1

- Make a web page which contains just a button
- When the button is clicked, a Javascript function should be run
- The function should create four variables, named a, b, c, and d, with values as shown on the previous slide
- The function should then carry out the calculations shown on the previous slide, displaying each result using **alert()**
- **Submission deadline: before next lecture**