DATA ANALYTICS REFERENCE DOCUMENT	
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REVISION HISTORY

Revision	Details of Modification(s)	Reason for modification	Date	By
0	Draft release	46376 - Web App Development	2019/01/24 17:33	Gerhard van der Linde

46376 - Web App Development

A free PDF Book on HTML and is good reference resource

Learning Outcomes

- The design, development and deployment of web applications using HTML, CSS and JavaScript
- The architecture of the World Wide Web
- Creating a web application with Data Driven Document Framework (D3)

Course Structure

- 13 Weeks
- Lectures and reading material

Assessment and Marking

- Week 4 - MCQ Assesment (10%)
- Week 8 - MCQ Assesment (20%)
- Week 12 - MCQ Assesment (20%)
- Final Project (50%)

Course Outline

- HTML - Beginning Week 1
- CSS - Beginning Week 3
- JavaScript - Beginning Week 5

Resources

- W3Schools: http://www.w3schools.com/
- HTML Dog: http://htmldog.com/
- W3C Markup Validation Service: https://validator.w3.org/#validate_by_input
- HTML-Validator: https://www.freeformatter.com/html-validator.html

Week 1 - Introduction

- Welcome to Web Application Development
- The Evolution of the World Wide Web
- Hello World Wide Web!

The Evolution of the World Wide Web

- The internet - A global network of computers using various protocols
- The world Wide Web - A way of accessing information over the medium of the internet

- ARPANET - 1969 - 1990
- Tim Berners-Lee
- Cern
- March 1989
- Included HTML - Hypertext Markup Language

Early Web Pages

- Basic Functionality lacking fonts, colour of advanced presentation
- CSS - Cascaded Style Sheets - Created for presentation
- 1990 - HTML
- 1994 - CSS version 1
- 1995 - HTML v2
- 1995 - *JavaScript*
- 1998 - CSS v2
- 1999 - CSS v3 - numerous updates since
- 2014 - HTML v5

Current Web Versions

- HTML v5
- CSS v3
- JavaScript v1.8.5

- Versions are browser dependent
- W3C publishes standards
- Not all browsers support HTML5

Most Popular Browsers

- Google Chrome - 73%

- Firefox - 15.5%
- IE(Edge) - 4.8%
- Safari - 3.5%
- Opera - 1.1%

HTML5 Browser compatibility testing - https://html5test.com

Purpose

- HTML - Structure
- CSS - Presentation
- JavaScript - Behaviour

Hello World Wide Web!

W3schools Try it

hello.html

```
<!DOCTYPE html>
<html>

<body>
<h1>Hello World!</h1>
<p>This is some <b>sample</b> paragraph <i>test</i> text</p>
</body>

</html>
```

Week 2 - HTML Coding

References

Related External Links

W3c validator Service: https://validator.w3.org/#validate_by_input

W3C Recommendations on HTML code structure and doctype declaration

https://www.w3.org/QA/2002/04/valid-dtd-list.html
Note Indentation example on this basic page
http://w3c.github.io/html/syntax.html#the-doctype

Lists

w3Schools resource on lists; note other attributes that can be used in lists
http://www.w3schools.com/html/html_lists.asp

W3.ORG on Lists: https://www.w3.org/TR/html40/struct/lists.html

Semantic Markup

http://www.w3schools.com/html/html5_semantic_elements.asp

Part 1: Installing a Development Environment & HTML document structure

- Find and install notepad++[1)]
- Create a html body framework
- Create a sample html document

template.html

```
<!doctype html>
 <head>
  <title>My Web Page</title>
 </head>
 <body>

 </body>
</html>
```

mypage.html

```
<!doctype html>
 <head>
  <title>My Web Page</title>
 </head>
 <body>
<h1>The History of the World Wide Web</h1>
<h3>Tim Berners Lee and the Development of HTML</h3>
<p>The World Wide Web ("WWW" or simply the "Web") is a global information medium which users can read and write
via computers connected to the Internet. The term is often mistakenly used as a synonym for the Internet itself,
but the Web is a service that operates over the Internet, just as e-mail also does. The history of the Internet
dates back significantly further than that of the World Wide Web.</p>
<h3>Precursors</h3>
<p>The hypertext portion of the Web in particular has an intricate intellectual history; notable influences and
precursors include Vannevar Bush's Memex, IBM's Generalized Markup Language, and Ted Nelson's Project Xanadu.
Paul Otlet's Mundaneum project has also been named as an early 20th century precursor of the Web.
The concept of a global information system connecting homes is prefigured in "A Logic Named Joe", a 1946 short
story by Murray Leinster, in which computer terminals, called "logics," are present in every home. Although the
computer system in the story is centralized, the story anticipates a ubiquitous information environment similar
to the Web.</p>
<h3>1980-1991: Invention and implementation of the Web</h3>
<p>In 1980, Tim Berners-Lee, an English independent contractor at the European Organization for Nuclear Research
(CERN) in Switzerland, built ENQUIRE, as a personal database of people and software models, but also as a way to
play with hypertext; each new page of information in ENQUIRE had to be linked to an existing page. Berners-Lee's
contract in 1980 was from June to December, but in 1984 he returned to CERN in a permanent role, and considered
its problems of information management: physicists from around the world needed to share data, yet they lacked
common machines and any shared presentation software.</p>
 </body>
</html>
```

Part 2: Lists, Semantic Markup, Comments, Indentation and Validation

Ordered HTML List - The Type Attribute

- type="1" The list items will be numbered with numbers (default)
- type="A" The list items will be numbered with uppercase letters
- type="a" The list items will be numbered with lowercase letters
- type="I" The list items will be numbered with uppercase roman numbers

Improve readability of your code

1. use comments
2. indent your code

mylist.html

```
<!-- List begins here -->
<ol type="A">
    <li>item 1</li>
    <li>item 2</li>
    <!-- unordered List begins here -->
        <ul>
            <li>Item 1</li>
            <li>Item 2</li>
        </ul>
    <li>item 3</li>
    <li>item 4</li>
</ol>
```

Validating your code

https://validator.w3.org/#validate_by_upload

Add links to your code

link.html

```
<a href="http://amazon.co.uk">Link</a>
```

To open on in a new tab

target="_blank"

link.html

```
<a href="http://amazon.co.uk" target="_blank">Link</a>
```

mytable.html

```
<!DOCTYPE html>
<html>
<head>
    <title>My Table</title>
</head>
<body>
    <table border="3" cellpadding="5" cellspacing="0"
  align="center" bgcolor="yellow">
        <tr>
            <th width="75">cell 1</th>
            <th width="75" bgcolor="grey">cell 2</th>
            <th width="75">cell 3</th>
```

```
            </tr>
            <tr align="center">
                <td rowspan="2" bgcolor="red">cell 4</td>
                <td colspan="2"><a href="http:\\www.amazon.co.uk">cell 5</a></td>
            </tr>
            <tr align="center">
                <td>cell 8</td>
                <td>cell 9</td>
            </tr>
        </table>
    </body>
    </html>
```

Lab exercise week 2

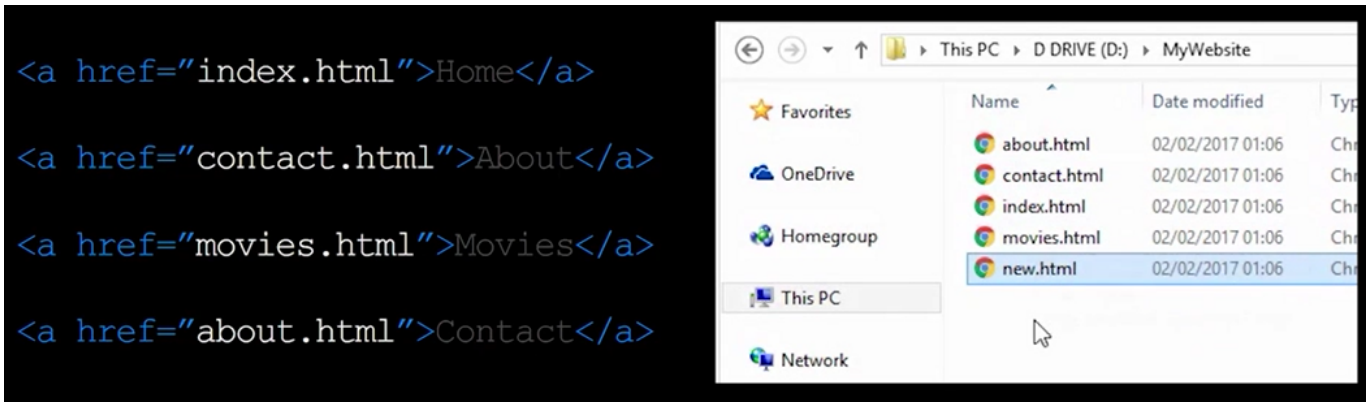
Lab Exercise Week 2 - Introduction to HTML

Week 3 - Linking, Images and Forms

Part 1: Linking to internal webpages

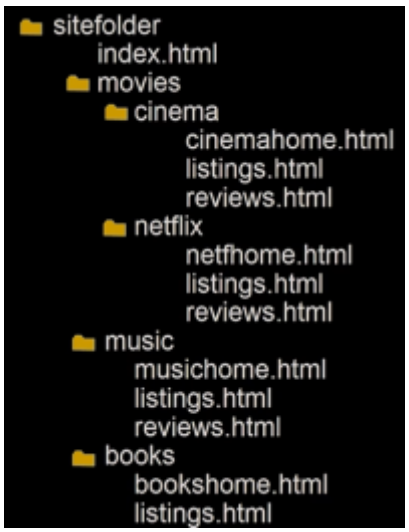
Related External Links

Information from W3C on URLs: https://www.w3.org/TR/WD-html40-970917/htmlweb.html



All files are in the same folder and referenced directly in links.

Directory Structure



Folder and directories are used interchangeably.

Folders are refered to as Chold, Parent, Garndchild and Grandparent similar to family trees.

Understanding *relative URL's* is important when referencing files in folders and subfolder or parent folders.

Part 2: Images in HTML

```
# img is a void tag, no open and close, all inside tag
<img src="images/pic1.jpg">
# alt tag
<img src="images/pic1.jpg" alt="Picture Info">
#dimensions is pixels
<img src="images/pic1.jpg" alt="Picture Info" width="100" height="100">
```

Supported file formats

ext	description	comments
.jpeg	joint photographic experts group	technically not a file format but a method to compress images
.jpg		
.gif		8 buts per pixel, not good for photos. Supports animated and transparent images.
.png	portable network graphics	losless compression, supports tranparency

Part 3: Troubleshooting Images and links

Part 4: Forms and Form Controls in HTML

Related Resources Sample code for form controls provided underneath in related code

External Resources W3C resource on Form Controls

https://www.w3.org/TR/2002/WD-xforms-20020118/slice8.html

Part 5: Validation and Input in HTML5

Related Resources

- Forcing a user to input using the REQUIRED attribute
- Forms
- Form Elements
- Form Input Types
- Form Attributes

Part 6: Additional HTML

Related Resources

- Escape Characters in HTML
- HTML Entities
- Inline and Block elements

Lab Exercise

week_3_-_lab_exercise_-_images_links_forms.pdf

Related Resources

- Text sources for excercise
- Image sources for excercise

Week 4 - Cascading Style Sheets

CSS- The Box Model

CSS work by associates styles with HTML elements

Selector decoration → properties value

This rule applies to all paragraphs, denoted by the ***p*** *tag*.

```
p {
   font-family: Arial;
}
```

There can be multiple rules

```
font-family: Arial, Verdana, sans-serif;
```

CSS - Internal CSS

```
<head>
    <title>Using Internal CSS</title>
  <style type=“text/css”>

    body{
    font-family: arial;
    background-colour: yellow;
    }
    h1{
    color:red;
    }
  </style>
</head>
```

CSS SELECTORS

Universal	* {}
Type	h1, h2, h3 {}
Class	.note {} p.note{}
ID	#introduction{}

CSS - Foreground Color

```
h1{
 color: cyan;
}

h2{
color:  #00ffff;
}

h3{
 color: rgb(0,255.255);
}

h4{
    color: rgba(100, 100, 90, 0.5)
}
```

https://www.w3schools.com/colors/colors_names.asp

Typeface

- SERIF
- SANS-SERIF
- monospace

Font size

- font-size: 200%;
- font-size: 2em;
- Font-size: 12px;

Specify a font type not installed on a computer by specifying a url.

```
@font-face{
font-family: 'ChunkyFiveRegular';
src: url('fonts/chuckfive.eot');
}
```

- text-transform:uppercase; # or lowercase or capatilize
- text-decoration: underline;
- text-decoration: none;
- text-indent: 20px
- text-shadow:1px 2px 0px #000000; # right, down, blur, colour

Styling of links

```
a:link {
  color: deeppink;
  text-decoration: none;}
a:visited {
  color: black;}
a:hover {
  color: deeppink;
  text-decoration: underline;}
a:active {
  color: darkcyan;}
```

CSS Box Model

CSS- Width and Height

```
div {
 height: 300px;
 width: 400px;
 background-color: #ee3e80;}

p {
 height: 75%;
 width: 75%;
 background-color: #e1ddda;}
```

- min-width:450px;

- max-width:650px;
- min-height:250px;
- max-height:900px

```
p {
 min-width: 450px;
 max-width: 650px;
}


p {
 min-height: 250px;
 max-height: 450px;
}
```

Overflow

- overflow:hidden;
- overflow:scroll;

```
p.one {
  overflow: hidden;}

p.two {
  overflow: scroll;}
```

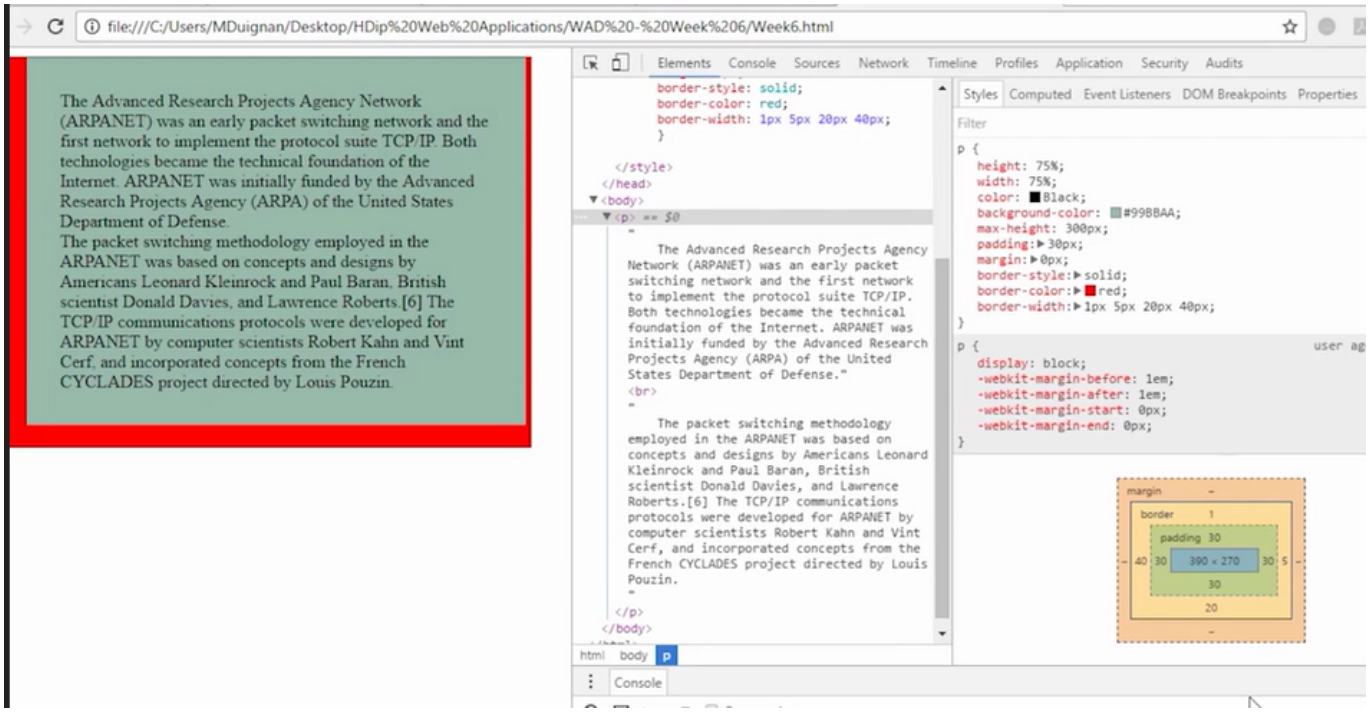
border, margin, padding

- border-width:2px
- border-width:thick # thin and medium
- border-width:1px 4px 4px 4px; # size for each side, clockwise starting top

- border-style: double; # solid, dotted, dashed, groove, ridge, inset and outset
- border-color: red;
- border-color: red pink cyan black; # for each side
- border:3px solid red; # border shorthand, must be in this order, size, style and colour
- padding: 10px

```
p.one {
  border-width: 2px;}

p.two {
  border-width: thick;}

p.three {
  border-width: 1px 4px 12px 4px;}
```

Use inspector




```
p{
    text-align: center # left, right, justify
}
```

Centering content

margin: 0 auto

Week 5 - Positioning with CSS and Introduction to JavaScript

External refernces

- https://www.w3schools.com/cssref/pr_class_position.asp
- https://www.w3schools.com/css/css_positioning.asp

CSS: Layout

- Block level elements begin on a new line
- inline elements: exist between surrounding text

Css - positioning elements

- static (Normal Flow)
- div {position: fixed;}
- div{ position: relative;}
- div{position: absolute;}

Set the position property first then left or right

Fixed Positioning

- An element with position: fixed is positioned relative to the viewport or window
- This means that it will stay in the same place even if the page is scrolled.
- The top, right, bottom, and left properties are used to position the elements.
- A fixed element does not leave a gap in the page where it would normally have been located.

CSS Code

```
.d1{
    position: fixed;
    top: 20px;
    left: 50px;
    background-color: blue;
}
```

HTML Code

```
<div class="d1">
    This is DIV 1
</div>
```

Relative positioning

An element with position: relative is positioned relative to its normal position.

Setting the top, right, bottom, and left properties of a relatively-positioned element will cause it to be adjusted away from its normal position.

Other content will not be adjusted to fit into any gap left by the element.

CSS Code

```
.d1{
    position: relative;
    top: 30px;
    left: 10px;
    background-color: blue;
}
```

Absolute Positioning

An element with position: absolute is positioned relative to the nearest positioned ancestor.

If an absolute positioned ancestors, it uses the document body, and moves along with page scrolling.

Parent container must have a position other than static

CSS Code

```
.d2 {
    position: absolute;
    top: 20px;
    background-solor: blue;
    }
.d3 {
    positioning: relative;
    background-color: orange;
    }
```

HTML Code

```
<div class="d3">
    This is DIV 3
    <div class="d2">
        This is DIV 2
    </div>
</div>
```

Part 2- Float and Clear in CSS

- https://www.w3schools.com/cssref/pr_class_position.asp

How to position block elements beside each other

```
div{
    float:left;
    clear:left
}
```

CSS Code

```
.d1 {
    float: left;
    width 50px;
    height: 50px;
    background-color: red;
    }
.d2 {
    float: left;
    width 50px;
    height: 50px;
    background-color: blue;
    }
.d3 {
    clear: left;
    float: left;
    width 100px;
    background-color: orange;
    }
```

HTML Code

```
<div class="d1">
    This is DIV 1
</div>
<div class="d2">
    This is DIV 2
</div>
<div class="d3">
    This is DIV 3
</div>
```

Part 3: Introduction to JavaScript

JavaScript is not Java. 😬

Place the script tag after the closing HTML body tag

```
<script>
```

```
document.write(“Hello World!”);
alert(“Hello again world”);

</script>
```

```
<script>
var myVar = “Hello from a variable”;

document.write(myVar);

</script>
```

Part 4: The Basics of JavaScript

Statements

Individual step in scripts are known as statements

Statements should end with a smile-colon ;

```
document.write(‘Welcome!’);
```

Comments

Comments explain the code

Help you remember it and others understand it

multi-line comment

```
/* anything between these characters is a comment
and will not be processed */
```

single-line comments

```
// Anything after the two forward slashed
// is also a comment and
// will not be processed
```

Variables

Scripts often need to store bits of information temporarily in order to perform tasks.

These bits of information - or data - are stored in **variables**

Declaring a variable

```
var quantity;
```

```
// keyword -> variable name

quantity = 3
```

Data types

- Numbers
- Strings
- Booleans

Javascript distinguishes between **number, string and true or false** values known as booleans.

Numbers	no integers, logs, shorts or floats, just numbers stored as 64 bit double precisonion float.
Strings	enclosed in quotes or double quotes but they must match.
Boolean	true or false.

Operators

Arithmetic	
Operator	**Description**
+	Addition
-	Subtraction
*	Multiplication
**	Exponentiation (ES2016)
/	Division
%	Modulus (Division Remainder)
++	Increment
–	Decrement

Assignment		
Operator	**Example**	**Same As**
=	x = y	x = y
+=	x += y	x = x + y
-=	x -= y	x = x - y
*=	x *= y	x = x * y
/=	x /= y	x = x / y
%=	x %= y	x = x % y

Comparison	
Operator	**Description**
==	equal to

===	equal value and equal type
!=	not equal
!==	not equal value or not equal type
>	greater than
<	less than
>=	greater than or equal to
<=	less than or equal to
?	ternary operator

Logical	
Operator	**Description**
&&	logical and
||	logical or
!	logical not

Bit operators work on 32 bits numbers. Any numeric operand in the operation is converted into a 32 bit number. The result is converted back to a JavaScript number.

Bitwise					
Operator	**Description**	**Example**	**Same as**	**Result**	**Decimal**
&	AND	5 & 1	0101 & 0001	0001	1
|	OR	5 | 1	0101 | 0001	0101	5
~	NOT	~ 5	~0101	1010	10
^	XOR	5 ^ 1	0101 ^ 0001	0100	4
<<	Zero fill left shift	5 << 1	0101 << 1	1010	10
>>	Signed right shift	5 >> 1	0101 >> 1	0010	2
>>>	Zero fill right shift	5 >>> 1	0101 >>> 1	0010	2

Javascript uses mathematics to perform tasks

```
var width = 3;
var height = 2;

area = width * height;
```

Concatenating strings

There is just one string operator: the + symbol.

It is used to join strings on either side of it

```
var greeting = “Hello”;
var who = “world”;

var message = greeting + who;
```

Basic input and output

```
// writes to the page
document.write('Welcome!');

// popup with the message displayed
alert("my output here ");
```

Adding two numbers using a variable for result

```
var num1 = 3;
var num2 = 4;
var result= num1 +num2;

document.write(result);
```

```
var num1 = 3;
var num2 = 4;

document.write(num1 +num2);
```

Prompting the user for an input

```
// user input
var myInput;
myInput = prompt("Please enter your name:");

// writes a string + input
document.write("Hello " + myInput);
```

Asking for two numbers and then adding together

```
var num1;
var num2;

num1 = prompt("Please enter first number");
num2 =  prompt("Please enter second number");

// convert to a number
num1 = Number(num1);
num2 = Number(num2);

document.write(num1 +num2);
```

```
var num1;
var num2;

num1 = Number(prompt("Please enter first number"));
num2 =  Number(prompt("Please enter second number"));

document.write(num1 +num2);
```

Week 6 - Decisions and loops in Javascript

A script can do different things depending on what values it has been passed.

Making Decisions

using if statements

```
// if score is greater than 40
if(score > 40){
    document.write('you passed!');
} else {
    document.write('Try again...!');
}
```

Comparison operators

```
== //is equal to
!=  //is not equal to
>  //greater than
< //Less than
>= //greater than or equal to
<= //Less than or equal to
```

Logical Operators

```
// && logical and
if ( score > 75) && (score <95){
    document.write('very good!');
}

//|| logical or
if ( score > 75) || (score <95){
document.write('very good!');
}

// ! logical not
```

Loops

```
for(var i=0; i<3;i++){
    document.write(i);
}
```

initialisation: var i=0 condition: i < 3 update: i++

Decisions and Loops (Code example)

```
var myInput = Number(prompt(“please enter a score:”));

if (myInput > 40 ){
    document.write(“You passed!”);
} else {
    document.write(“Try again!”);
}
```

```
var numIn = Number(prompt(“Please enter a number:”));

for (var i = 1; i <= numIn; i++){
    document.write(i + “<br>");
}
```

Functions

No numbers, no reserved words or variables for a function name

Also it is common to use camelCase

```
function sayHello(){
 document.write(‘Hello’);

}
```

Calling a function

sayHello();

```
function helloWorld(){
    document.write("hello from a function!");
}
helloWorld();
```

Calling a function when a button is clicked

```
<button type="button" name="button" onclick="helloWorld()">Click me!</button>
```

The function being called

```
function helloWorld(){
    document.write("hello from a function!");
}
```

A function being called when you click a button and an alert box appears

```
<button type="button" name="button" onclick="helloWorld()">Click me!</button>
```

```
function helloWorld(){
    alert("hello from a function!");
}
```

Declaring a function that needs information

```
//parameters when defining the function: width, height

function getArea(width, height){
    document.write(width*height);
}

// arguments when calling the function (3, 5)
getArea(3, 5);
```

```
function getArea(width, height){
    alert(width * height);
}

getArea(3, 5);
```

Using Variables

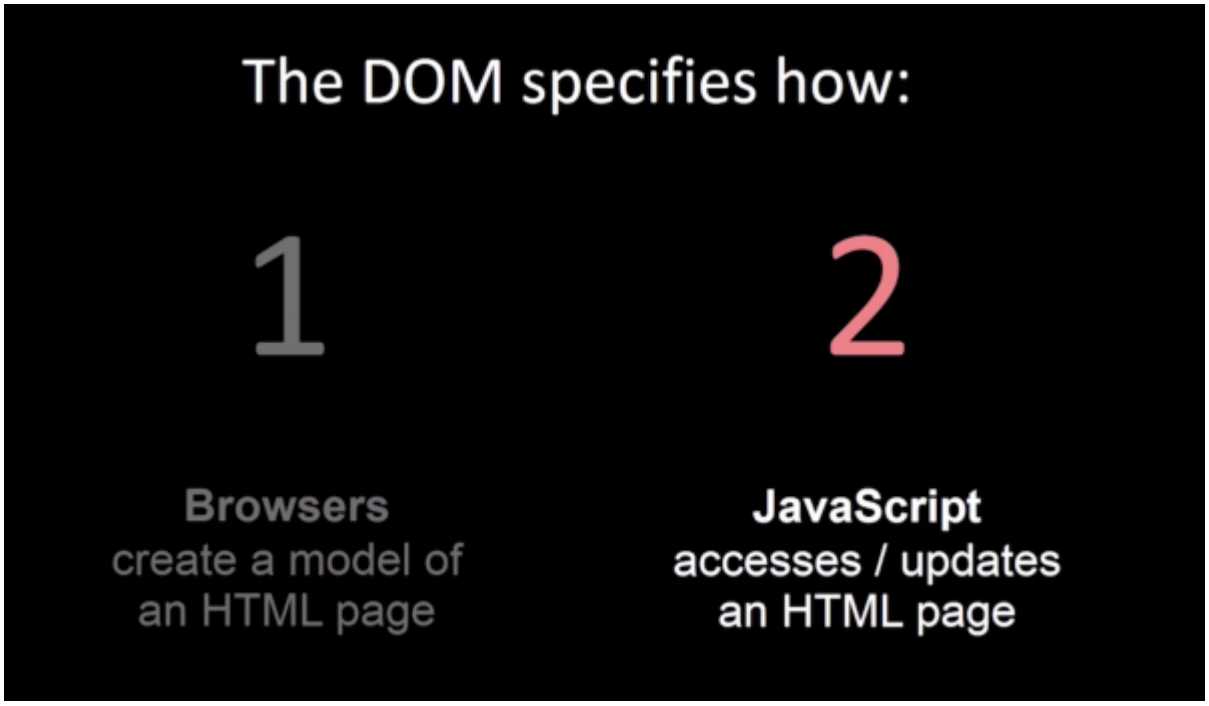
```
function getArea(width, height){
    alert(width * height);
}

var num1 = 10;
var num2 =6;
getArea(num1, num2);
```

Returning from a function

```
function getArea(width, height){
    return width * height;
}
```

```
function getArea(width, height){
    return width * height;
}

var x = getArea(3, 9);
alert(x);
```

Week 7 - The Document Object Model



To access and update the HTML, first you select the element(s), you want to work with.

Here are some of the ways to select elements

They are known as **DOM queries.**

How to specify a heading in JavaScript?

```
<h1>This is my heading</h1>
<h1>This is another heading</h1>
<h1>This is yet another heading</h1>
```

Easiest way is to do this is to assign each one an ID

HTML

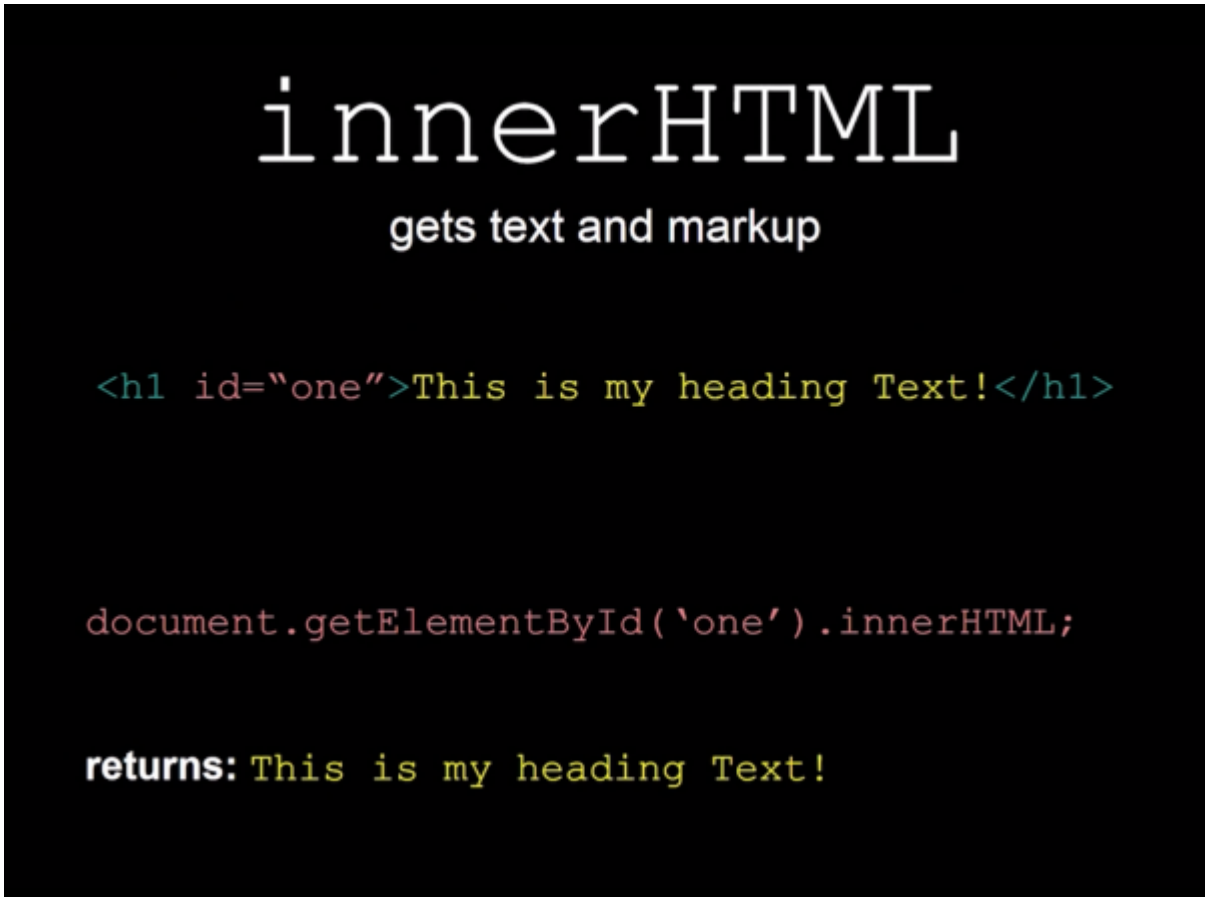
```
<h1 id="one">This is my heading</h1>
<h1 id="two">This is another heading</h1>
<h1 id="three">This is yet another heading</h1>
```

JavaScript

```
// get the element with an id of two
document.getElementById("two");
```

To access and update content you can use:

InnerHTML for text and markup value for input boxes



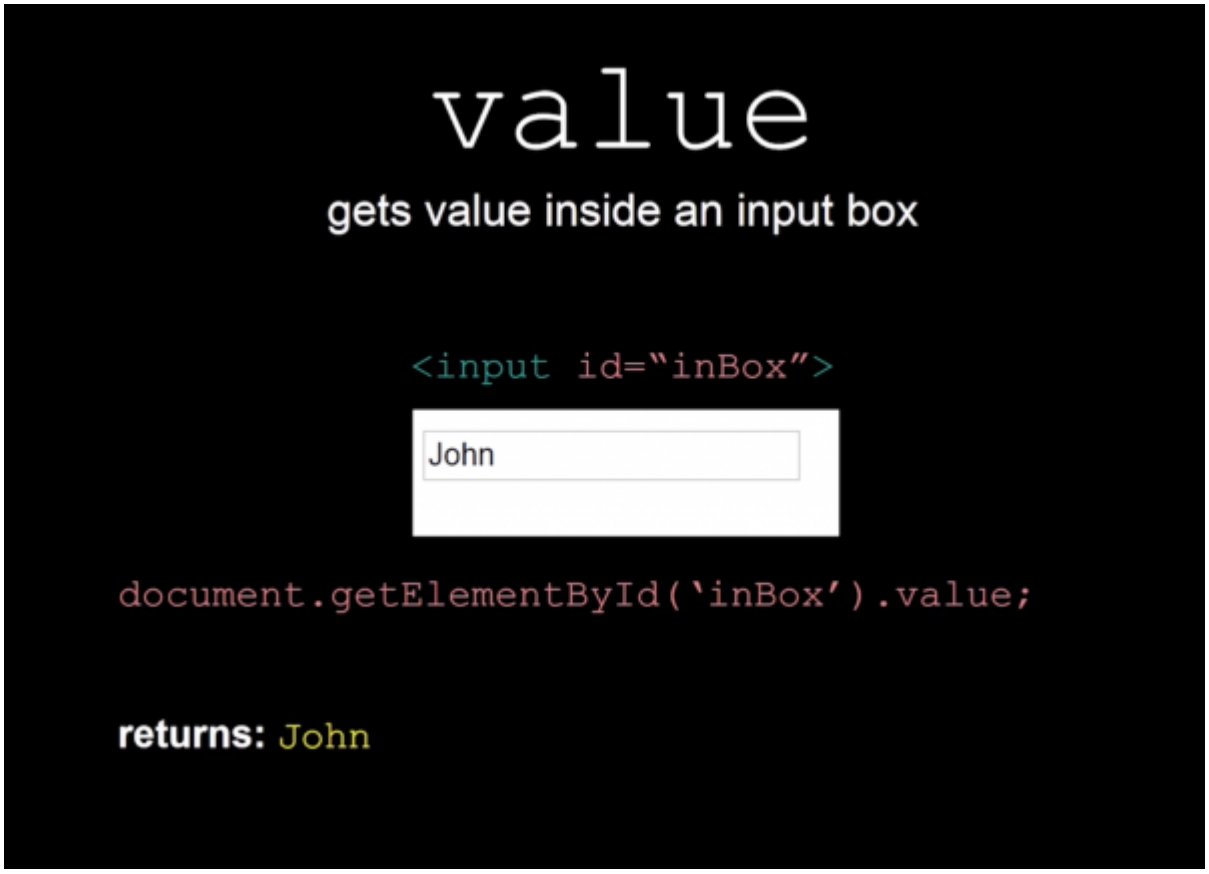
For an Input box

HTML

```
<input id="inBox">
```

JavaScript

```
document.getElementById('inBox').value;
```



Part 1 : Intro to the DOM

Demo

HTML

```
<h1>This is my first heading</h1>
<h1 id="two">This is my second heading</h1>
<h1>This is my third heading</h1>
```

JavaScript

```
// get the element with an id of two and the title
var x = document.getElementById("two").innerHTML;
alert(x);
```

Part 2 : DOM query examples

Demo 2

HTML

```
<input id="in1">
<button onclick="myName()">Check name</button>
<h1 id="result"></h1>
```

JavaScript

```
// gets input text when the button is clicked and updates the h1
function myName(){
   var x = document.getElementById("in1").value;
   document.getElementById("result").innerHTML = "Hello" + x;
}
```

Part 3: Styling with the DOM (A)

Style

DOM Query Selectors

HTML

```
<h1 id="two">My Article Heading</h1>
```

JavaScript

```
document.getElementById("two").innerHTML;
```

changing Style

HTML

```
<h1 id="two">My Article Heading</h1>
```

JavaScript

```
//targeting the color
document.getElementById("two").style.color;
```

Changing the heading color

HTML

```
<h1 id="one">This is a Heading</h1>
<button onclick="change()">Change to red</button>
```

JavaScript

```
// change color to red

function change(){
   document.getElementById("one").style.color ="red";

}
```

Part 4: Styling with the DOM (B)

Changing the background color

HTML

```
<body id="bdy">

<button onclick="changeBackground()">Change background</button>
</body>
```

JavaScript

```
function changeBackground(){
  document.getElementById("bdy").style.background ="yellow";

}
```

Part 5: Styling with the DOM (C)

Demo

HTML

```
<p id="para">
Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut
labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco
laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in
voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat
non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.
</p>

<button onclick="change()">Change me</button>
```

JavaScript

```
function change(){

   document.getElemntByID("para").style.background="green";
   document.getElemntByID("para").style.border="3px dashed red";
   document.getElemntByID("para").style.fontfamily="Arial";

}
```

using a variable for document.getElemntByID

```
function change(){
   var par = document.getElemntByID("para")
   para.style.background="green";
   para.style.border="3px dashed red";
   para.style.fontfamily="Arial";
   para.style.boxShadow="10px 20px 30px grey";

}
```

week_8_excercise.pdf

Week 8 - Working With JavaScript

Part 1: Troubleshooting with the browser

This feature provides some information on troubleshooting your code using Chrome and other browsers

External Resources: https://www.w3schools.com/js/js_debugging.asp

Part 2: Dynamic Typing in JavaScript

External Resources: https://www.w3schools.com/js/js_datatypes.asp
Strings in JavaScript: https://www.w3schools.com/js/js_strings.asp
Numbers in JavaScript: https://www.w3schools.com/js/js_numbers.asp
Booleans in JavaScript: https://www.w3schools.com/js/js_booleans.asp

JavaScript Types

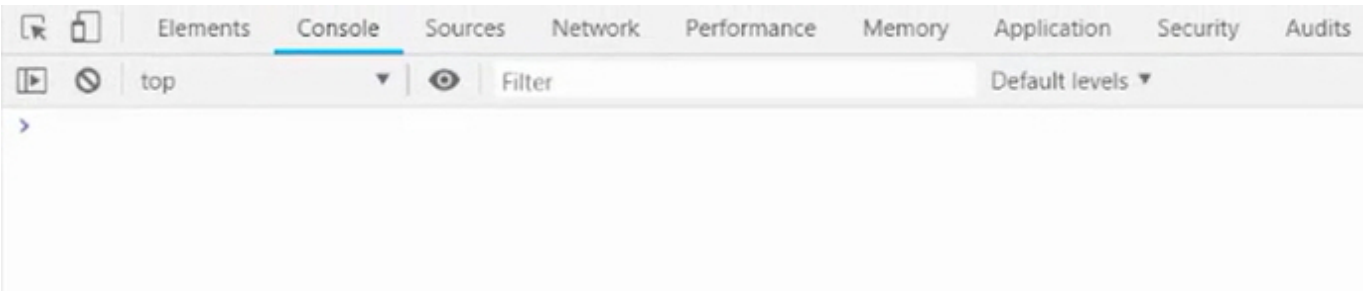
- Number
- String
- Boolean
- Null
- Undefined

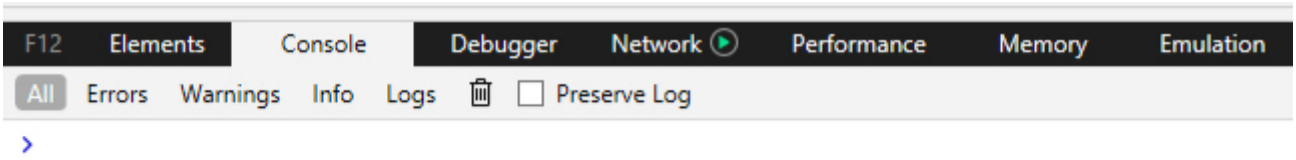
Java script used dynamically typed variables.

Dynamically typed languages assigns variables a type at runtime based on the variables value at the time.
Statically type languages specify what type a variable will use.

Using the built in development console in web browsers to test JavaScript code.

Right click and select developer console, (F12)






```
>myVar="Hello"
<"Hello"
>typeof myVar
<"string"
>myVar=true
<true
>typeof myVar
<"boolean"
>num=0
<0
>num+=1
<1
```

Part 3: Type Coercion In JavaScript

External Resources

Coercion in JavaScript: https://medium.freecodecamp.org/js-type-coercion-explained-27ba3d9a2839

See chapter 1 of book Eloquent JavaScript for information on coercion in JavaScript: https://eloquentjavascript.net/01_values.html

```
>5+10
<15
>"Hello" + " World"
<"Hello World"
>5+"hello"
<"5hello"
>5+"10"
<"510"
>5*"10"
<50
>5/"10"
<0.5
>5-"10"
<-5
>5-"Hello"
<NaN
```

```
>50+true
<51
>50-true
<49
>50-false
<50
>50+false
<50
>"Hello"+true
```

```
<"Hellotrue"
>"Hello"+false
<"Hellofalse"
```

Part 4: Comparison Operators In JavaScript

External Resources

Comparison Operators in JavaScript: https://www.w3schools.com/js/js_comparisons.asp

```
>4==4
<true
>4==41
<false
>4=="4"
<true
>4===4
<true
>4==="4"
<false
>"4"==="4"
<true
>1==true
<true
>0==false
<true
>1===true
<false
>0===false
<false
>4!=5
<true
>5!="Hello"
<true
>4!="4"
<false
>4!=="4"
<true
```

converting_to_numbers_in_javascript.pdf

Week 9 - Introduction to D3

Part 1 - Introduction to D3.js

https://d3js.org/ [2) 3)] Data-Driven Documents

D3.js - Overview

Purpose

D3(Standing for Data-Driven Documents) is a JavaScript library for producing dynamic, interactive data visualizations in web browsers.

Capabilities

- Principal functions allow for selections, transitions an data-binding.
    - D3 can select elements in the DOM programmatically(can use instead of the verbose DOM API)
    - By declaring a transition, styles can be smoothly interpolated/animated over a certain time.
    - Large datasets(e.g JSON/XML format) can be easily bound to svg objects using simple D3.js functions to generate rich text/graphic charts and diagrams.

Technologies

- Built on top of common web standards liek HTML, CSS, JavaScript the DOM and SVG
- Exportable nature of SVG enables graphics created by D3 to be used in print publications.

Origins

- Initially released in 2011(successor to the earlier Protovis framework) - Now used widely (e.g by the New York Times, OpenStreetMap etc.)
- Recent version -v4 has big breaks in the API from previous versions

Part 2 - Introduction to SVGs and XML

Scalable Vector Graphics

D3.js - SVG

- SVG(Scalable Vector Graohics) is an XML format used for drawing
- SVG also has a DOM - there are elements with parents and children and attributes, and you can respond to the same mouse/touch events
- CSS styles and selectors can apply to SVG elements

SVGs have the following structure:

- The

</code>

Demo:

```
<svg width="1000" height="500">
  <rect width="50" height="20" fill="red"/>
</svg>
```

You can use classes

.myClass {border:2px solid black}

```
<svg class="myClass" width="1000" height="500">
  <rect width="500" height="200" fill="red"/>
</svg>
```

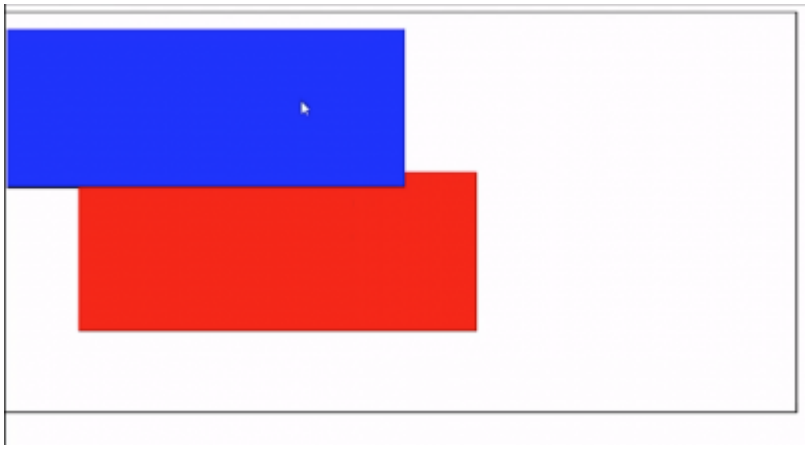
Use x to move from the left

```
<svg class="myClass" width="1000" height="500">
  <rect x="100" width="500" height="200" fill="red"/>
</svg>
```

Use y to move from the top

svg_1.html

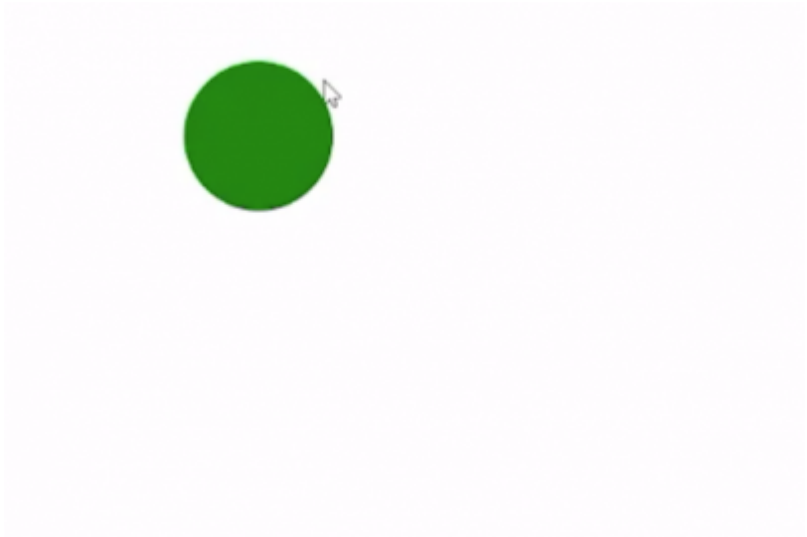
```
<!doctype html>
<html lang="en">
 <head>
  <meta charset="UTF-8">
  <meta name="Generator" content="EditPlus®">
  <meta name="Author" content="">
  <meta name="Keywords" content="">
  <meta name="Description" content="">
  <title>Document</title>
  <style type="text/css">
    .myClass {border:2px solid black}
</style>
 </head>
 <body>
  <svg class="myClass" width="700" height="500">
    <rect x="10" y="10" width="500" height="200" fill="red"/>
    <rect x="60" y="180" width="500" height="200" fill="blue"/>
  </svg
 </body>
</html>
```



Part 3 - Circles in SVGs

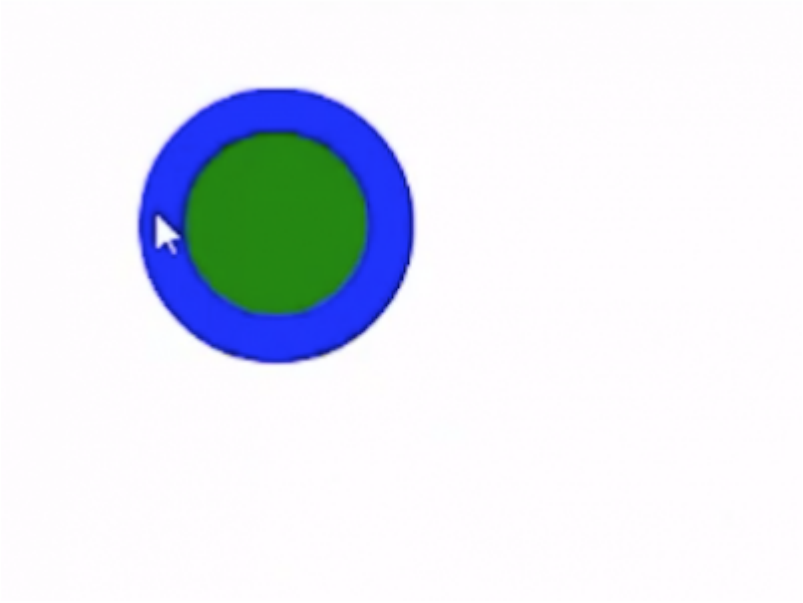
.myClass {border:2px solid black}

```
<svg width="1000" height="1000" class="myClass">
  <circle r="50" cy="100" cx="200" fill="green" />
</svg>
```



Stroke

```
<svg width="1000" height="1000" class="myClass">
  <circle r="50" stroke="blue" stroke-width="20" cy="100" cx="200" fill="green" />
</svg>
```



Part 4 - Using D3 to create SVGs

Using D3 to create SVGs

- Include link reference to D3:

```
<script src="https//d3js.org/d3.v5.min.js"></script>
```

Using D3.js to create elements

- Create an SVG container in the HTML page
- Access the SVG elements using an associated ID

```
<svg width="1000" height="1000" id="mySVG">
```

- The SVG can be targeted using a D3 selector in JavaScript:

```
var svgConatiner = d3.select("#mySVG");
```

- Elements (such as a rectangle) can then be appended to the svg container:

```
var myRectangle = svgContainer.append("rect");
```

The appended element can then have attributes set:

```
myRectangle.attr("x",100 );
myRectangle.attr("y", 100);
myRectangle.attr("height", 50 );
myRectangle.attr("width", 600 );
myRectangle.attr("fill", "orange" );
```

Part 5 - D3: Select, Append, and Attr with method chaining

```
<!DOCTYPE html>
<html>
<head>
 <script src="https//d3js.org/d3.v5.min.js"></script>
```

```
</head>
<body>
  <svg width="1000" height="1000" id="mySvg">
  </svg>

</body>
</html>

<script>
var svgContainer = d3.select("#mySvg");
var myRectangle = svgContainer.append("rect");

myRectangle.attr("x", 100);
myRectangle.attr("y", 100);
myRectangle.attr("height", 50);
myRectangle.attr("width", 200);
myRectangle.attr("fill", "orange");
</script>
```

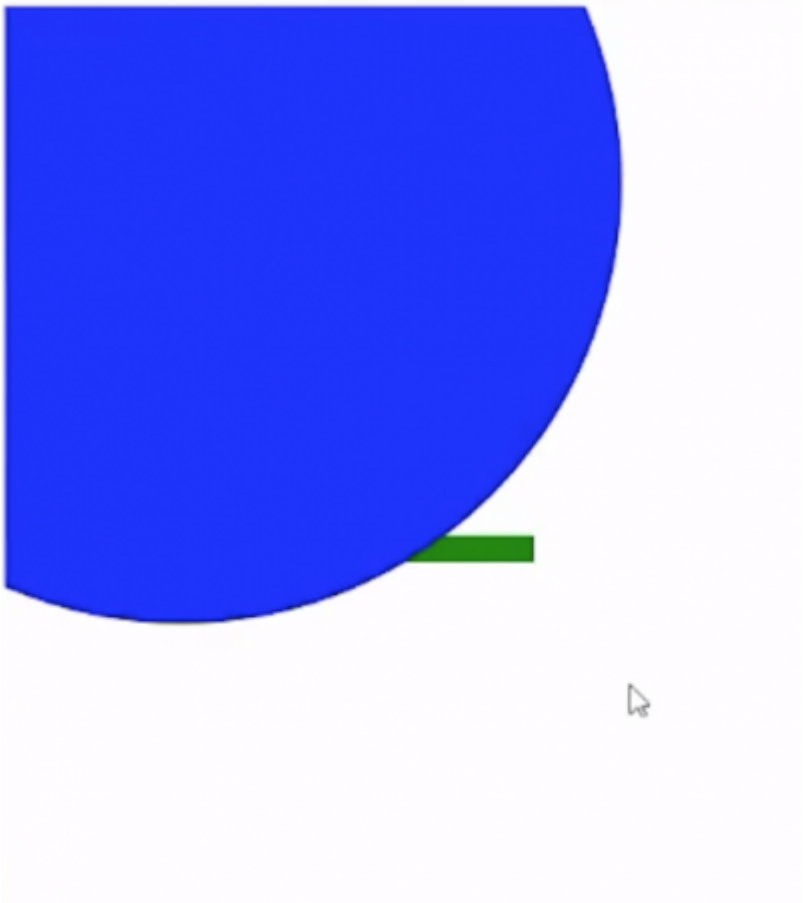
Method chaining

```
<!DOCTYPE html>
<html>
<head>
 <script src="https//d3js.org/d3.v5.min.js"></script>
</head>
<body>
  <svg width="1000" height="1000" id="mySvg">
```

```
  </svg>

</body>
</html>

<script>
var svgContainer = d3.select("#mySvg");
//method chaining
var myRectangle = svgContainer.append("rect")
   .attr("x", 100)
   .attr("y", 300)
   .attr("height", 15)
   .attr("width", 200)
   .attr("fill", "green");
</script>
```

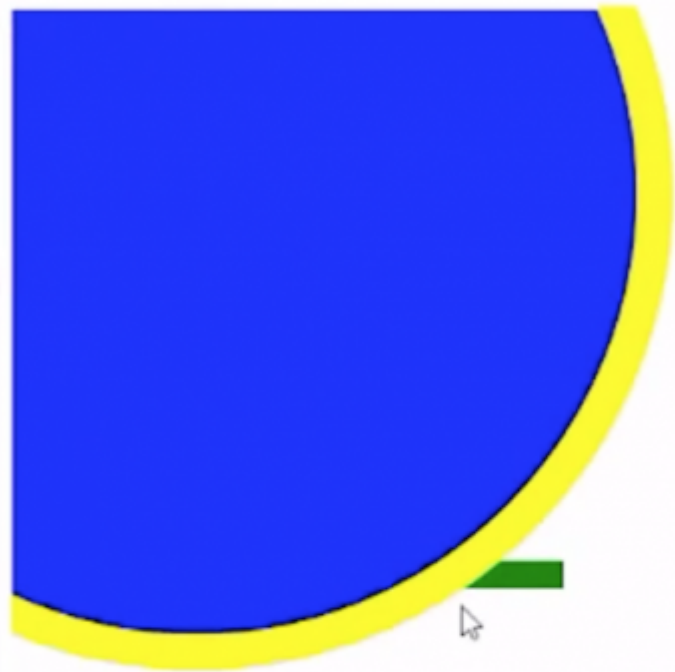
```
<!DOCTYPE html>
<html>
<head>
 <script src="https//d3js.org/d3.v5.min.js"></script>
</head>
<body>
  <svg width="1000" height="1000" id="mySvg">
  </svg>

</body>
```

```
</html>

<script>
var svgContainer = d3.select("#mySvg");
//method chaining
var myRectangle = svgContainer.append("rect")
   .attr("x", 100)
   .attr("y", 300)
   .attr("height", 15)
   .attr("width", 200)
   .attr("fill", "green");

var myCircle = svgContainer.append("circle")
   .attr("cx", 100)
   .attr("cy", 300)
   .attr("r", 250)
   .attr("fill", "Blue");
</script>
```



```
<!DOCTYPE html>
<html>
<head>
 <script src="https//d3js.org/d3.v5.min.js"></script>
</head>
<body>
  <svg width="1000" height="1000" id="mySvg">
  </svg>

</body>
</html>

<script>
var svgContainer = d3.select("#mySvg");
```

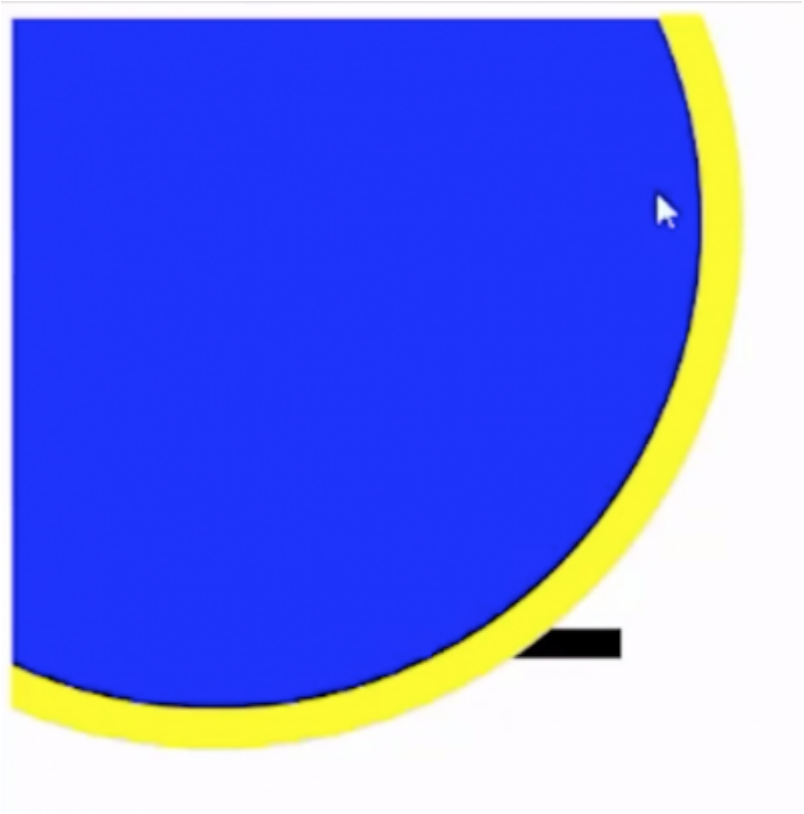
```
//method chaining
var myRectangle = svgContainer.append("rect")
   .attr("x", 100)
   .attr("y", 300)
   .attr("height", 15)
   .attr("width", 200)
   .attr("fill", "green");

var myCircle = svgContainer.append("circle")
   .attr("cx", 100)
   .attr("cy", 300)
   .attr("r", 250)
   .attr("fill", "Blue");
   .attr("stroke", "yellow");
   .attr("stroke-width", 20);
</script>
```



svg_js.html

```
<!DOCTYPE html>
<html>
<head>
 <script src="https://d3js.org/d3.v5.min.js"></script>
</head>
<body>
  <svg width="800" height="800" id="mySvg">
  </svg>

</body>
</html>
```

```
<script>
var svgContainer = d3.select("#mySvg");
//method chaining
var myRectangle = svgContainer.append("rect")
   .attr("x", 200)
   .attr("y", 450)
   .attr("height", 15)
   .attr("width", 200)
   .attr("fill", "green");

var myCircle = svgContainer.append("circle")
   .attr("cx", 180)
   .attr("cy", 300)
   .attr("r", 150)
   .attr("fill", "Blue")
   .attr("stroke", "yellow")
   .attr("stroke-width", 20);

//myRectangle.attr("fill", "Black");
</script>
```



Week 10 - Arrays and External Data in D3

Appending an SVG to HTML elements

appendToDiv.html

```
<!doctype html>
<html lang="en">
 <head>
    <script src="https://d3js.org/d3.v5.min.js"></script>
 </head>
 <body>
```

```
        <div id="svg_area"></div>

    </body>
    <script>
        var svgContainer = d3.select("#svg_area").append("svg")
            .attr("height", 800)
            .attr("width", 800);

        var myRectangle = svgContainer.append("rect")
            .attr("x",50)
            .attr("y",50)
            .attr("height",100)
            .attr("width",100)
            .attr("fill","blue");
    </script>
    </html>
```

Introduction to Arrays

https://www.w3schools.com/js/js_arrays.asp

- Store one or multiple element in one variable.
- Each element is referred to by it's index.

```
var colours = ['Pink','Yellow','Green']
```

```
0: 'Pink'
1: 'Yellow'
2: 'Green'
```

```
//refer to yellow like this:
colours[1];

//some usefull method is arrays
colours.length
3
```

Samples of arrays is JavaScript

```
<script>
var myVar =  10;
var myArray = [1,2,3,4,5,6,7,8,9,10];

alert(myArray[10]);

</script>
```

Using Arrays to Generate SVG using D3

Using var for width

svg_var.html

```
1. <!doctype html>
2. <html>
3.
```

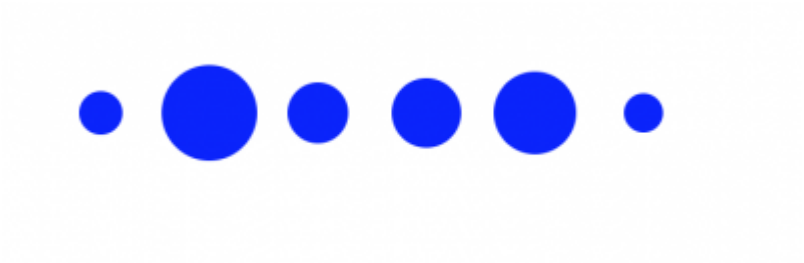
```
    <title>Home</title>
    <script src="https://d3js.org/d3.v5.js"></script>
</head>
<body>
<div id="svg_area"></div>
</body>
</html>
<script type="text/javascript">
var myVar = 600;

var svgContainer = d3.select("#svg_area").append("svg")
    .attr("height", 800)
    .attr("width", 800);

var myRectangle = svgContainer.append("rect")
    .attr("x", 50)
    .attr("y", 50)
    .attr("height", 100)
    .attr("width", myVar)
    .attr("fill", "blue");

</script>
```

Looping through an array with .enter()

svg_arr_loop.html

```
<!doctype html>
<html>
<head>
    <title>Home</title>
    <script src="https://d3js.org/d3.v5.js"></script>
</head>
<body>
<div id="myDiv"></div>
</body>
</html>
<script type="text/javascript">
var myArray = [10, 22, 14, 16, 19, 9];

let svgContainer = d3.select("#myDiv").append("svg")
    .attr("height", 1000)
    .attr("width", 1000);

let circles = svgContainer.selectAll('circle')
    .data(myArray);

// enter loops through
circles.enter()
    .append("circle")
        // function will run and returns i (the index value of the array)
        .attr("cx", function(d, i){return 50 + (i*50);})
```

```
        .attr("cy", 50)
        .attr("r", function(d){return d;})
        .attr("fill", "blue");
</script>
```



myRectangle.enter()

svg_rect_loop.html

```
<!doctype html>
<html>
<head>
    <title>Home</title>
    <script src="https://d3js.org/d3.v5.js"></script>
</head>
<body>
<div id="myDiv"></div>
</body>
</html>
<script type="text/javascript">
var myArray = [100, 220, 20, 160, 190, 90, 320];

let svgContainer = d3.select("#myDiv").append("svg")
    .attr("height", 1000)
    .attr("width", 1000);


let myRectangle = svgContainer.selectAll('rect')
    .data(myArray);

// enter loops through
myRectangle.enter()
    .append("rect")
        // function will run and returns i (the index value of the array)
        // d = data, i = index
        .attr("x", function(d, i){return 50 + (i*110);})
        .attr("y", 50)
        .attr("width", 100)
        .attr("height", function(d){return d;})
        .attr("fill", "blue");


</script>
```

Importing a File Using D3

- Create a CSV File
- Create a Python web server
- Import File [4)]
- Output Result to SVG

temp_data.csv

```
month,temp
January,4
February,5
March,8
April,12
May,18
June,20
July,21
August,23
September,18
October,12
November,7
December,5
```

load_csv_from_file.html

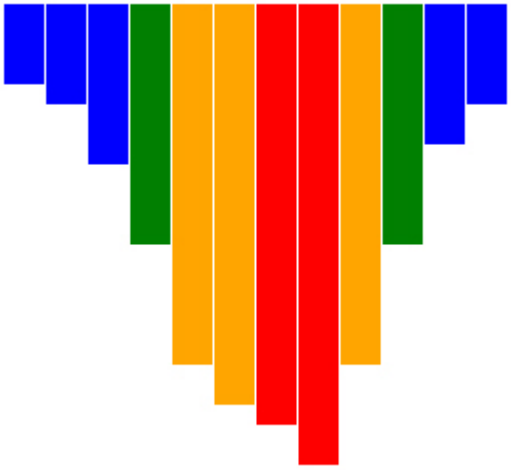
```
<!doctype html>
<html lang="en">
 <head>
   <meta charset="UTF-8">
   <title>Document</title>
   <script src="https://d3js.org/d3.v5.min.js"></script>
 </head>
 <body>
   <div id="myDiv"></div>
 </body>
 <script>
   d3.csv("temp_data.csv").then(function(data) {
   console.log(data);
   });
 </script>
</html>
```

csv

1. Create a csv in excel

2. Create a folder “mypythonwebserver”
3. In terminal, type python -m http.server [5)]
4. start coding. save file to “mypythonwebserver”
5. To view file, open in localhost. e.g http://localhost:8000/d3.html

```
<!doctype html>
<html lang="en">
 <head>
   <meta charset="UTF-8">
   <title>Document</title>
   <script src="https://d3js.org/d3.v5.min.js"></script>
 </head>
 <body>
   <div id="myDiv"></div>

 <script type="text/javascript">
   // import the data
   d3.csv("temp_data.csv").then(function(data) {
   console.log(data);
   // create the svg container using d3 select, append svg to div above
   let svgContainer = d3.select("#myDiv").append("svg")
      .attr("width", 800)
      .attr("height", 800);
    // create a variable and select all rectangles in svg containe as associate with data
    let myRectangle = svgContainer.selectAll("rect")
       .data(data);
    // using d3 enter method to add rectangles
    myRectangle.enter()
       .append("rect")
           .attr("x",function(d, i){
               return 50 + (i*21);
           })
           .attr("y", 50)
           .attr("width", 20)
           .attr("height",function(d){
               return d.temp * 10;
           })
           //.attr("fill", "red");
           .attr("fill", function(d){
               if(d.temp <=10) {return "blue";}
               else if (d.temp<=15){return "green";}
               else if (d.temp <=20){return "orange";}
               else {return "red";}});
           });
 </script>
</body>
</html>
```

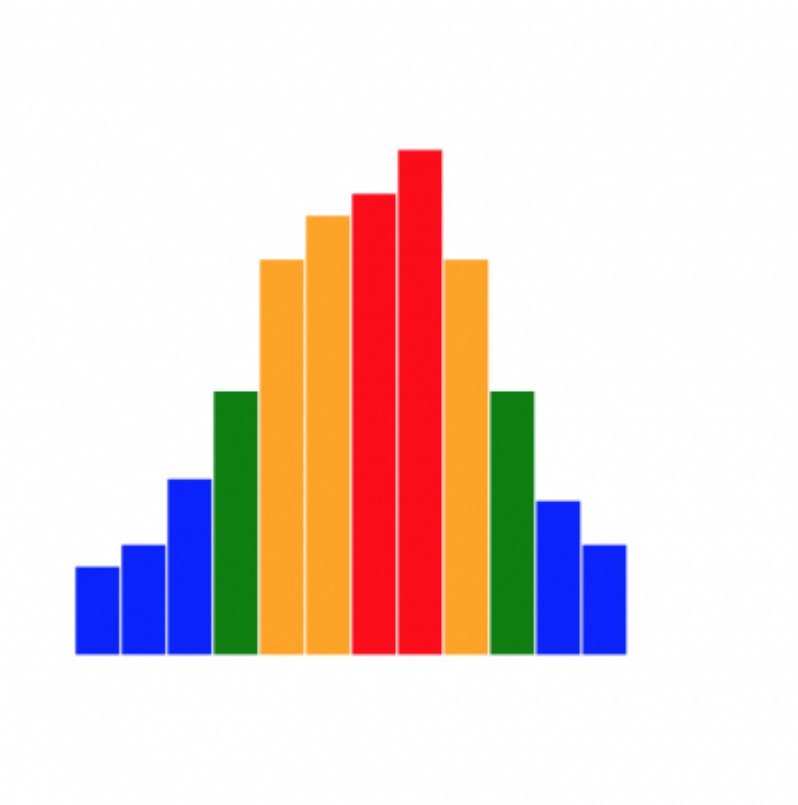


Week 11 - Charts and Labels in D3

Part 1- Baseline correction in D3

```
<!doctype html>
<html lang="en">
 <head>
   <meta charset="UTF-8">
   <title>Document</title>
   <script src="https://d3js.org/d3.v5.min.js"></script>
 </head>
 <body>
   <div id="myDiv"></div>

 <script type="text/javascript">
//d3.csv("temp_data.csv").then(function(data)
// import the data
 d3.csv("temp_data.csv").then(function(data) {
 console.log(data);
 // create the svg container using d3 select, append svg to div above
 let svgContainer = d3.select("#myDiv").append("svg")
    .attr("width", 800)
    .attr("height", 800);
  // create a variable and select all rectangles in svg containe as associate with data
  let myRectangle = svgContainer.selectAll("rect")
     .data(data);
  // using d3 enter method to add rectangles
  myRectangle.enter()
     .append("rect")
         .attr("x",function(d, i){
             return 50 + (i*21);
         })
         .attr("y", function(d){
             return 300 - (d.temp *10);
         })
         .attr("width", 20)
         .attr("height",function(d){
```

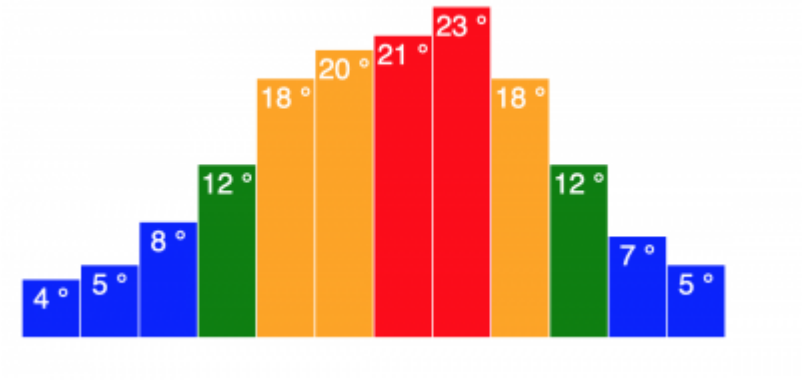
```
34.              return d.temp * 10;
35.          })
36.          //.attr("fill", "red");
37.          .attr("fill", function(d){
38.              if(d.temp <=10) {return "blue";}
39.              else if (d.temp<=15){return "green";}
40.              else if (d.temp <=20){return "orange";}
41.              else {return "red";}});
42.          });
43.
44.  </script>
45. </body>
46. </html>
```



Part 2 - Adding labels in D3

```
<!doctype html>
<html lang ="en">
<head>
    <meta charset="UTF-8">
    <title>Document</title>
   <script src="https://d3js.org/d3.v5.js"></script>
</head>
<body>
<div id="myDiv"></div>
</body>

<script type="text/javascript">

//d3.csv("temp_data.csv").then(function(data)
// import the data
 d3.csv("temp_data.csv").then(function(data) {
 console.log(data);
```

```
 // create the svg container using d3 select, append svg to div above
 let svgContainer = d3.select("#myDiv").append("svg")
    .attr("width", 800)
    .attr("height", 800);
  // create a variable and select all rectangles in svg containe as associate with data
  let myRectangle = svgContainer.selectAll("rect")
     .data(data);
  // using d3 enter method to add rectangles
  myRectangle.enter()
     .append("rect")
         .attr("x",function(d, i){
             return 50 + (i*41);
         })
         .attr("y", function(d){
             return 300 - (d.temp *10);
         })
         .attr("width", 40)
         .attr("height",function(d){
             return d.temp * 10;
         })
         //.attr("fill", "red");
         .attr("fill", function(d){
             if(d.temp <=10) {return "blue";}
             else if (d.temp<=15){return "green";}
             else if (d.temp <=20){return "orange";}
             else {return "red";}
         });

    // Add label text for bar chart
    let mylabel = svgContainer.selectAll("text")
       .data(data);
    // using d3 enter method to add rectangles
    mylabel.enter()
       .append("text")
           .attr("x",function(d, i){
               return 70 + (i*41);
           })
           .attr("y", function(d){
               return 320 - (d.temp *10);
           })
        .attr("text-anchor", "middle")
        .attr("font-family", "sans-serif")
        .attr("font-size", "20px")
        .attr("fill", "white")
        .text(function(d){
            return d.temp + " \u00B0";
        });

             });



</script>
</html>
```



Part 3 - Transitions and Styles in D3

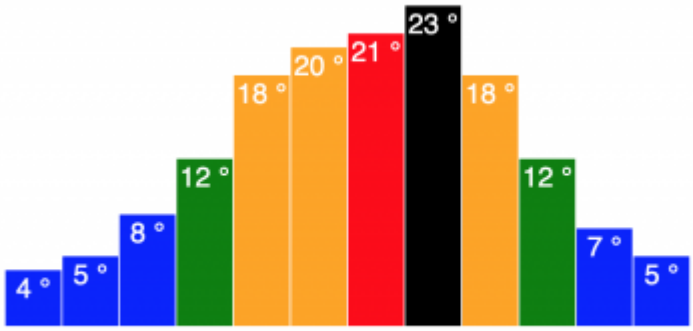
Using CSS to add Style

Using CSS to style SVG rectangles on hover

```
rect:hover{ fill:black;}
```

```
<!doctype html>
<html lang ="en">
<head>
    <meta charset="UTF-8">
    <title>Document</title>
   <script src="https://d3js.org/d3.v5.js"></script>
   <style>
   rect:hover{
       fill:black;
   }

   </style>
</head>
<body>
<div id="myDiv"></div>
</body>

<script type="text/javascript">

//d3.csv("temp_data.csv").then(function(data)
// import the data
 d3.csv("temp_data.csv").then(function(data) {
 console.log(data);
 // create the svg container using d3 select, append svg to div above
 let svgContainer = d3.select("#myDiv").append("svg")
    .attr("width", 800)
    .attr("height", 800);
  // create a variable and select all rectangles in svg containe as associate with data
  let myRectangle = svgContainer.selectAll("rect")
     .data(data);
  // using d3 enter method to add rectangles
  myRectangle.enter()
     .append("rect")
         .attr("x",function(d, i){
             return 50 + (i*41);
         })
```

```
        .attr("y", function(d){
            return 300 - (d.temp *10);
        })
        .attr("width", 40)
        .attr("height",function(d){
            return d.temp * 10;
        })
        //.attr("fill", "red");
        .attr("fill", function(d){
            if(d.temp <=10) {return "blue";}
            else if (d.temp<=15){return "green";}
            else if (d.temp <=20){return "orange";}
            else {return "red";}
        });

    // Add label text for bar chart
    let mylabel = svgContainer.selectAll("text")
       .data(data);
    // using d3 enter method to add rectangles
    mylabel.enter()
       .append("text")
           .attr("x",function(d, i){
               return 70 + (i*41);
           })
           .attr("y", function(d){
               return 320 - (d.temp *10);
           })
        .attr("text-anchor", "middle")
        .attr("font-family", "sans-serif")
        .attr("font-size", "20px")
        .attr("fill", "white")
        .text(function(d){
            return d.temp + " \u00B0";
        });

            });



</script>
</html>
```



Transitions in D3.js

D3's .transition() method allows for easy transitions from one state to another.

Instead of applying changes instantaneously, transitions smoothly change from one state to a desired target state, over a given duration.

Transitions are created using the following code:

```
.transition()
```

Using the .transition() in conjunction with the .duration() method allows us to specify the time taken to change from the starting state to the finishing state.

The default value in 250 milliseconds. To change the default, a value is specified in the parentheses in the method, specifying the transition duration in milliseconds.

Transitions durations are created using the following code:

```
.transition(500)
```

```
<!doctype html>
<html lang ="en">
<head>
    <meta charset="UTF-8">
    <title>Document</title>
   <script src="https://d3js.org/d3.v5.js"></script>
   <style>
   rect:hover{
       fill:black;
   }

   </style>
</head>
<body>
<div id="myDiv"></div>
</body>

<script type="text/javascript">

//d3.csv("temp_data.csv").then(function(data)
// import the data
 d3.csv("temp_data.csv").then(function(data) {
 console.log(data);
 // create the svg container using d3 select, append svg to div above
 let svgContainer = d3.select("#myDiv").append("svg")
    .attr("width", 800)
    .attr("height", 800);
  // create a variable and select all rectangles in svg containe as associate with data
  let myRectangle = svgContainer.selectAll("rect")
     .data(data);
  // using d3 enter method to add rectangles
  myRectangle.enter()
     .append("rect")
         // start of transition
         .attr("fill", "black")
         .attr("x",function(d, i){
             return 50 + (i*41);
         })
         .attr("y", 300)
         .attr("width", 300)
         .transition()
```

```
        .duration(1000)
        // end of transition
        .attr("x",function(d, i){
            return 50 + (i*41);
        })
        .attr("y", function(d){
            return 300 - (d.temp *10);
        })
        .attr("width", 40)
        .attr("height",function(d){
            return d.temp * 10;
        })
        //.attr("fill", "red");
        .attr("fill", function(d){
            if(d.temp <=10) {return "blue";}
            else if (d.temp<=15){return "green";}
            else if (d.temp <=20){return "orange";}
            else {return "red";}
        });

    // Add label text for bar chart
    let mylabel = svgContainer.selectAll("text")
       .data(data);
    // using d3 enter method to add rectangles
    mylabel.enter()
       .append("text")
       .attr("x",function(d, i){
           return 70 + (i*41);
       })
       .attr("y", 300)
       .transition()
       .duration(3000)
           .attr("x",function(d, i){
               return 70 + (i*41);
           })
           .attr("y", function(d){
               return 320 - (d.temp *10);
           })
        .attr("text-anchor", "middle")
        .attr("font-family", "sans-serif")
        .attr("font-size", "20px")
        .attr("fill", "white")
        .text(function(d){
            return d.temp + " \u00B0";
        });

            });



</script>
</html>
```

Week 12 - Adding Scales and Axis in D3

Part 1 - Introduction to Scales in D3

In D3, scales are functions that **map** from an *input domain* to an *output range*.

```
var myScale = d3.scaleLinear();
```

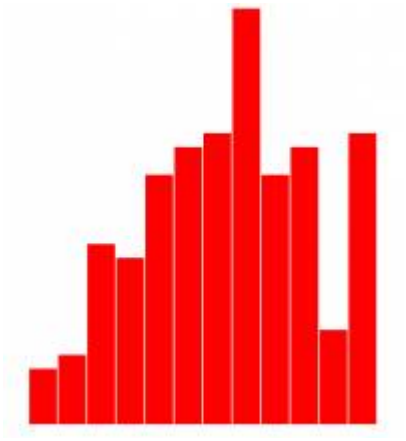
```
//define the scale
var myScale = d3.scaleLinear()
    .domain([0,600])
    .range([0,600]);

//using the scale
myscale(400);
```

Part 2 - Creating Scales in D3

sales.csv

sales.csv

```
month,sales
January,40
February,50
March,130
April,120
May,180
June,200
July,210
August,480
September,180
October,200
November,68
December,210
```

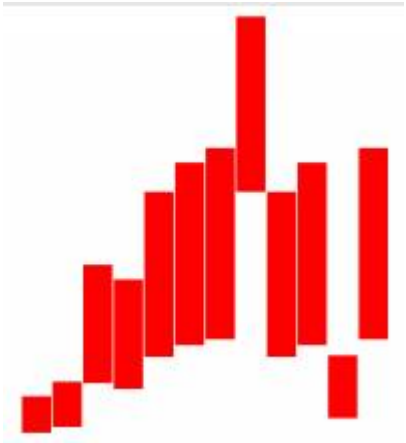


No scaling so add the scaling code.

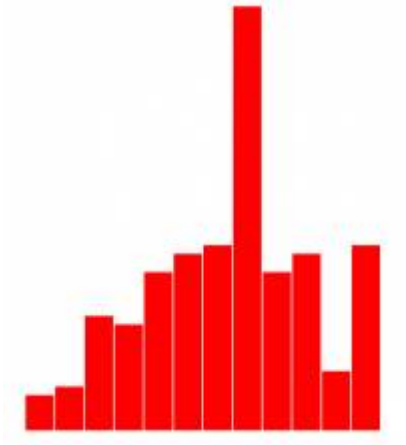
```
var yScale =d3.scaleLinear()
  .domain([0,480])
  .range([0,300]);
```

Then apply the scaling in one spot only

```
1.     myRectangle.enter()
2.       .append("rect")
3.         .attr("x",function(d,i){
4.           return (50+(i*21));
5.           })
6.         .attr("y",function(d){
```



```
            return 300-(d.sales);
          })
        .attr("width",20)
        .attr("height",function(d){
            return yScale(d.sales);
          })
        .attr("fill","red");

    });
```



Then in both spots...

```
    myRectangle.enter()
      .append("rect")
        .attr("x",function(d,i){
          return (50+(i*21));
          })
        .attr("y",function(d){
            return 300-yScale(d.sales);
          })
        .attr("width",20)
        .attr("height",function(d){
            return yScale(d.sales);
          })
        .attr("fill","red");

    });
```

Automatic Scaling

Use the d3.max feature to find the biggest number in the list to use in automatic scaling.

filename.py

```
    //convert to numbers for d3.max to work properly in scaling
    data.forEach(function(d){
      d.sales = Number(d.sales);
    })
    // create a scale for y
    var yScale =d3.scaleLinear()
      .domain([0,d3.max(data, function(d){
        return d.sales;
      })])
```

In order for this to work however, all the strings need to be converted to numbers first. See the code lines two and three to tae care of this.

Then on line 7 use **d3.max()** and *function(d)* to set the max value for scaling taken automatically from the dataset.

Final Full Code

scaled_svg.html

```
<!doctype html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <title>D3 Scaling</title>
  <script src="https://d3js.org/d3.v5.min.js"></script>
</head>
<body>
  <div id="myDiv"></div>
  <script type="text/javascript">
    // import the sales data
    d3.csv("sales.csv").then(function(data) {
    console.log(data);
    // create a scale for y
    var yScale =d3.scaleLinear()
      .domain([0,480])
      .range([0,300]);
    // create the svg container using d3 select, append svg to div above
    let svgContainer = d3.select("#myDiv").append("svg")
    .attr("width", 1000)
    .attr("height", 1000);
    //ceate a rectangle
    var myRectangle = svgContainer.selectAll("rect")
      .data(data);
    //add attributes to rectangle
    myRectangle.enter()
      .append("rect")
        .attr("x",function(d,i){
          return (50+(i*21));
          })
        .attr("y",function(d){
            return 300-yScale(d.sales);
          })
        .attr("width",20)
        .attr("height",function(d){
            return yScale(d.sales);
          })
        .attr("fill","red");

    });
  </script>
</body>
</html>
```

Part 3 - Creating Axes in D3

This section covers the code to generate the axis on the graph. The code that is used to do this is as follow:

```
var xAxis = d3.axixTop();
var xAxis = d3.axixBottom();
var yAxis = d3.axixLeft();
var yAxis = d3.axixRight();
```

Code to define the axis.

```
var xAxis = d3.axisBotom()
  .scale(myScale);
```

Now the axix needs to be positioned on the screen. Todo this we need to append the axis to the svg container.

```
    //append the axix to the svg container referincing the svg group **"g"**
    svg.append("g")
```

```
    .call(xAxis)
```

now that the axix exist we need to add and start drawing it to the screen with **call(xAxis)**

Position the axix using transformations. The translate values determines how many pixels to move the axis horizontally and vertically, so in example ten pixels from the left and 45 down.

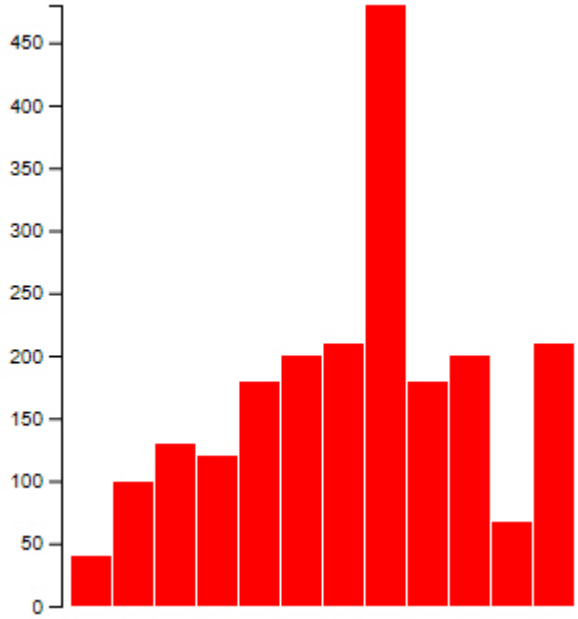
```
//append the axix to the svg container referincing the svg group **"g"**
svg.append("g")
  .attr("transform", "translate(10, 45)")
  .call(xAxis)
```

Full Axis Code implemented

d3js_axis.html

```
<!doctype html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <title>D3 Scaling</title>
  <script src="https://d3js.org/d3.v5.min.js"></script>
</head>
<body>
  <div id="myDiv"></div>
  <script type="text/javascript">
    // import the sales data
    d3.csv("sales.csv").then(function(data) {
    console.log(data);
    //convert to numbers for d3.max to work properly in scaling
    data.forEach(function(d){
      d.sales = Number(d.sales);
    })
    // create a scale for y
    var yScale =d3.scaleLinear()
      .domain([0,d3.max(data, function(d){
        return d.sales;
      })])
      .range([300,0]);
    //create y Axis
    var yAxis = d3.axisLeft()
        .scale(yScale)
    // create the svg container using d3 select, append svg to div above
    let svgContainer = d3.select("#myDiv").append("svg")
    .attr("width", 1000)
    .attr("height", 1000);
    //ceate a rectangle
    var myRectangle = svgContainer.selectAll("rect")
      .data(data);
    //add attributes to rectangle
    myRectangle.enter()
      .append("rect")
        .attr("x",function(d,i){
          return (50+(i*21));
          })
        .attr("y",function(d){
            return yScale(d.sales);
          })
        .attr("width",20)
        .attr("height",function(d){
            return 300-yScale(d.sales);
          })
        .attr("fill","red");
    //To ensure that the axis is shown on top we do it here after the bars are drawn
    //We will be appending "svgContainer" declared above on line 28
    svgContainer.append("g")
      .attr("transform", "translate(45,0)")
      .call(yAxis);
    });
  </script>
</body>
```

```
</html>
```

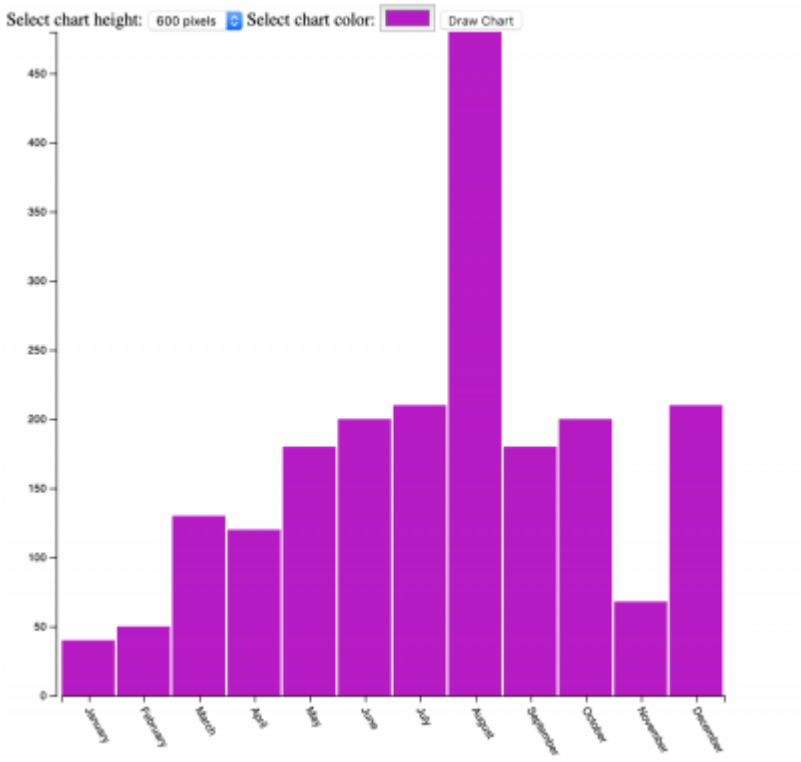


Week 13 - Allowing the user to specify chart settings

d3js_user_input.html

```
<!doctype html>
<html lang ="en">
<head>
  <meta charset="UTF-8">
  <title>D3 Scaling</title>
  <script src="https://d3js.org/d3.v5.min.js"></script>
</head>
<body>
Select chart height:
<select name="" id="chartHeight">
    <option value="300">300 pixels</option>
    <option value="600">600 pixels</option>
    <option value="900">900 pixels</option>
</select>

Select chart color:
<input type="color" id="colorPicker">

<button onclick="drawChart()">Draw Chart</button>
  <div id="myDiv"></div>

</body>

<script type="text/javascript">

function drawChart(){
  // import the sales data
     d3.csv("sales.csv").then(function(data) {
     console.log(data);

     // values for bar chart
     var height = document.getElementById('chartHeight').value;
     var width = 600;
     var dataCount = data.length;
     var gap = 2;
     var chartColor = document.getElementById('colorPicker').value;
```

```
          //convert to numbers for d3.max to work properly in scaling
          data.forEach(function(d){
            d.sales = Number(d.sales);
          })
          // create a scale for y
          var yScale =d3.scaleLinear()
            .domain([0,d3.max(data, function(d){
              return d.sales;
            })])
            .range([height,0]);
           // create a scale for x
           var xScale = d3.scaleBand()
               .domain(data.map(function(d){
                   return d.month;
               }))
               .range([0, width])
          //create y Axis
          var yAxis = d3.axisLeft()
              .scale(yScale)
              //create y Axis
         var xAxis = d3.axisBottom()
              .scale(xScale);

         //removes previous code
         d3.select("#myDiv").selectAll("*").remove();
          // create the svg container using d3 select, append svg to div above
          let svgContainer = d3.select("#myDiv").append("svg")
          .attr("width", 1000)
          .attr("height", 1000);
          //ceate a rectangle
          var myRectangle = svgContainer.selectAll("rect")
            .data(data);
          //add attributes to rectangle
          myRectangle.enter()
            .append("rect")
              .attr("x",function(d,i){
                return (50+(i*(width/dataCount)));
                })
              .attr("y",function(d){
                 return yScale(d.sales);
                })
              .attr("width",(width/dataCount -gap))
              .attr("height",function(d){
                 return height-yScale(d.sales);
                })
              .attr("fill",chartColor);
          //To ensure that the axis is shown on top we do it here after the bars are drawn
          //We will be appending "svgContainer" declared above on line 28
          svgContainer.append("g")
            .attr("transform", "translate(45,0)")
            .call(yAxis);

          svgContainer.append("g")
            .attr("transform", "translate(50," +height+")")
            .call(xAxis)
            .selectAll("text")
                .attr("transform", "rotate(60)")
                .attr("text-anchor", "start")
                .attr("x", "9")
                .attr("y", "3");
          });
       }
        </script>

      </html>
```



1)

https://notepad-plus-plus.org/

2)

https://gist.github.com/tomerd/1499279

3)

https://gist.github.com/paulinm/10556397

4)

http://learnjsdata.com/read_data.html

5)

https://docs.python.org/3/library/http.server.html