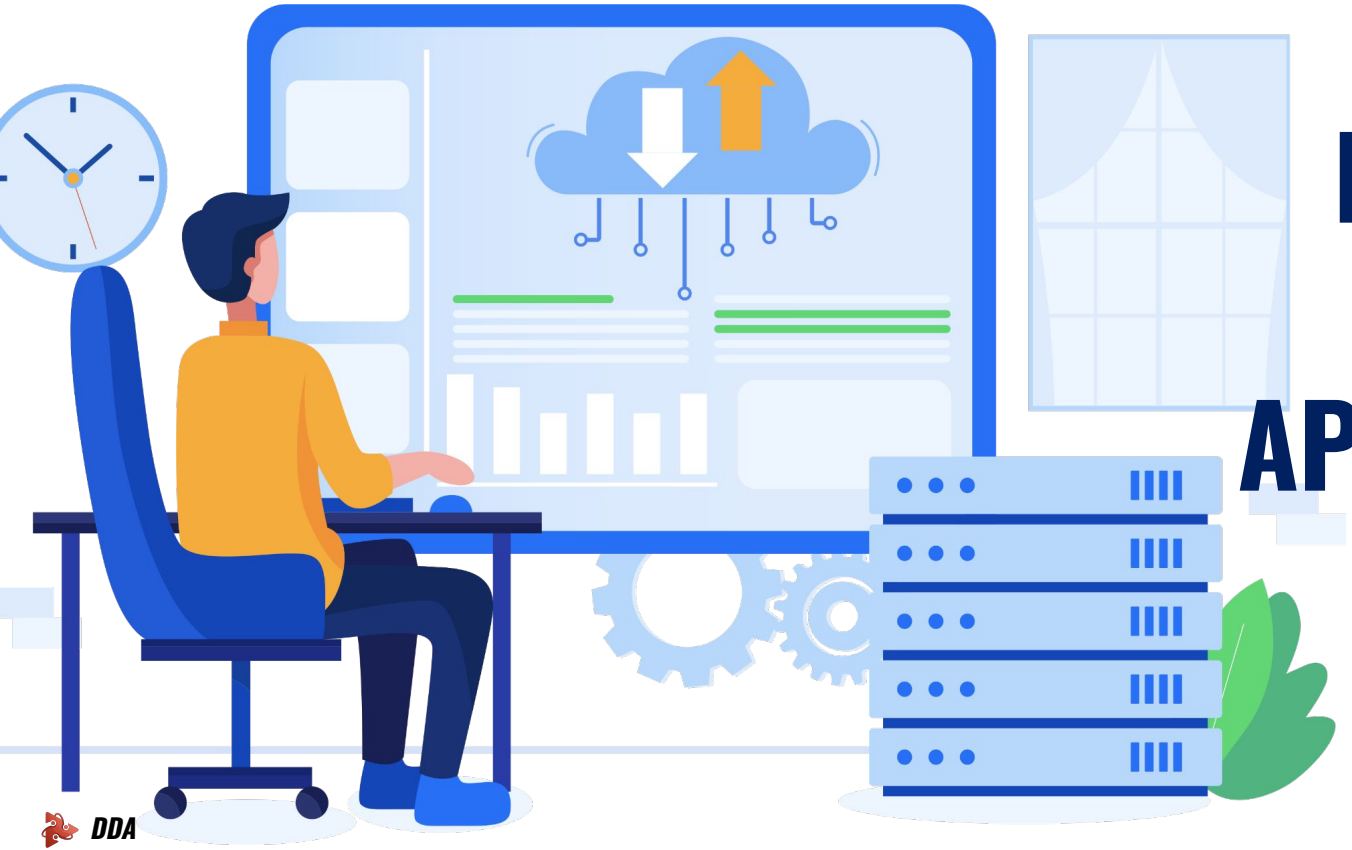


(DDA) 2.2

DEVELOPING DYNAMIC APPLICATIONS

2021

DDA

COVERAGE

Week 6

Learning Objectives

1. Common Mistakes & Errors in Assg 1
2. Web Development Recap
3. Firebase Create & Read using JavaScript
4. Firebase Auth using JavaScript
5. Indexing in Firebase for Efficiency
6. Real-time updates via Web & Unity

Common #ERRORS

Common Errors/Misconceptions

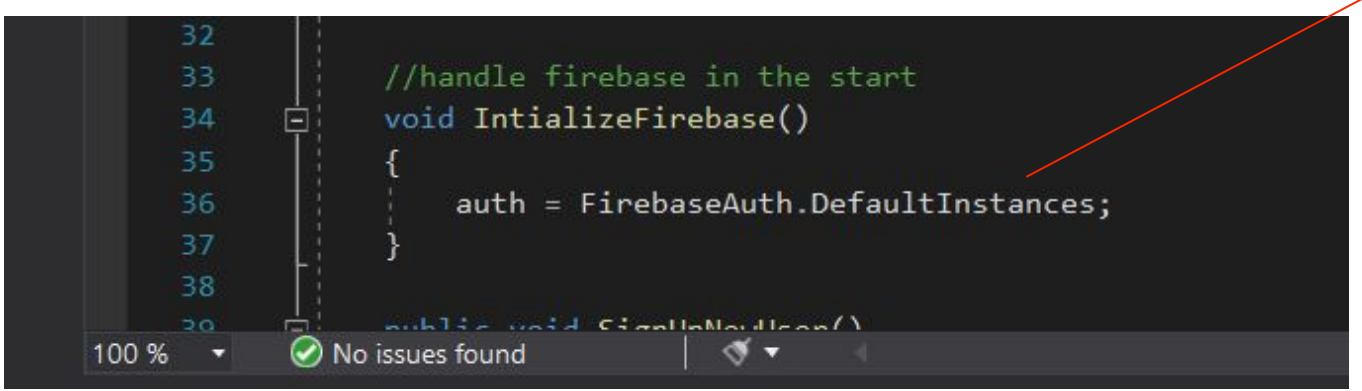
Inconsistencies between nodes naming convention

Keep to camelCase 🐫

A better way

players
clans
playerStats
playerLogs

Common Errors/Misconceptions



Error: Intellisense not working + naming is wrong

If your Visual Studio Intellisense is working, it will flag out this error

Fix: FirebaseAuth.**DefaultInstance**
There's no plural form of it

Fix your Intellisense
https://blog.terresquall.com/2020/11/fixing-visual-studios-intellisense-autocomplete-in-unity/

Common Errors/Misconceptions

Ignoring C# Hints

Intellisense in Visual Studio helps you to be a better coder. Check out what's wrong

Error: Not being consistent

Having nodes with spaces might cause potential issues when you are referencing data. You might just forget "there's a space

```
public void initializeFirebase()
{
    dbPlayerStatsReference = FirebaseDatabase.DefaultInstance.GetReference("player Stats");
    dbLeaderBoardReference = FirebaseDatabase.DefaultInstance.GetReference("leaderboards");

}
```

Inconsistencies between nodes naming convention

Keep to camelCase 🐫

A better way

players

Common Errors/Misconceptions

Not Reading The Squiggly Lines
Assuming Class Name is Filename!!!

This doesn't match at all!!

```
1 reference
public async Task CreateNewSimplePlayer(string uuid, string displayName, string userName, string email, string clan)
{
    SimpleGamePlayer newPlayer = new SimpleGamePlayer(displayName, userName, email, clan);
    Debug.LogFormat("Player Details: {0}", newPlayer.Pri
    await dbReference.Child("Players/" + uuid).SetRawJs
    await AddPlayerToClan(uuid, clan);
    UpdatePlayerDisplayName(displayName);
}
```

This scenario, the class name is wrong. Hence C# can't find the class

The constructor name is derived from the **class name** Constructors allows us to do this SimplePlayerStats sp = new SimplePlayerStats();

SimpleAuthManager.cs | SimpleGamePlayer.cs

SimplePlayerStats ▸ SimplePlayerStats()

```
1   using System;
2   using System.Collections;
3   using System.Collections.Generic;
4   using UnityEngine;
5
6   public class SimplePlayerStats
7   {
8       public string userName;
9       public string displayName;
10      public string email;
11      public string clan;
12      public bool active;
13      public long lastLoggedIn;
14      public long createdOn;
15      public long updatedOn;
16
17      public SimplePlayerStats()
18      {
19
20      }
21
22      public SimplePlayerStats(string userName, string displayName, string em
23      {
24          this.userName = userName;
25          this.displayName = displayName;
26          this.email = email;
27          this.active = active;
28          this.clan = clan;
29
30          //timestamp properties
31          var timestamp = new DateTimeOffset(DateTime.UtcNow).ToUnixTimeSecon
32          this.lastLoggedIn = timestamp;
33          this.createdOn = timestamp;
34          this.updatedOn = timestamp;
35
```

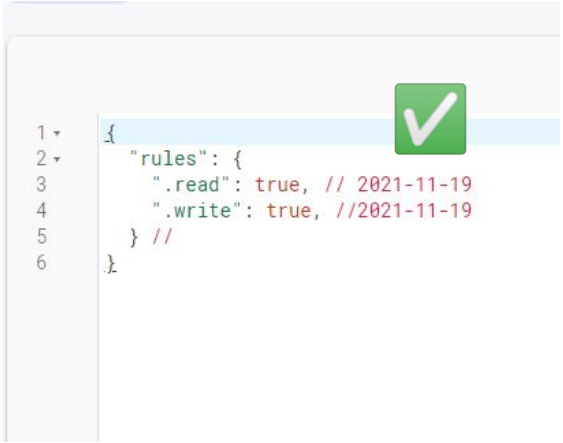
Easy way is to ensure you keep your file name and class names the same

Common mistake, is duplicate file name and just rename the file, not realising the class name needs to be changed too and constructor

Common Errors/Misconceptions

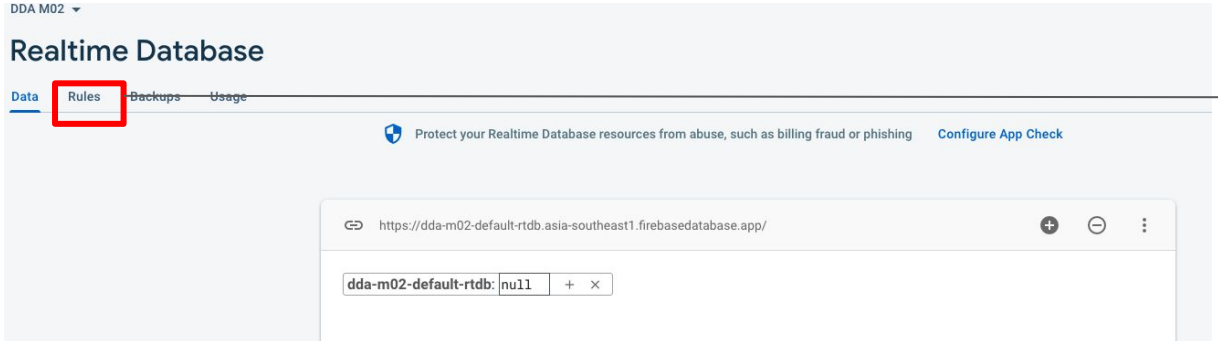
Not using appropriate Firebase Database rules

No one can read or write data into Firebase
You will keep getting no data written or read even with very straight forward commands in C#/JS



Allow public read, write access. This is for development purposes. Moving on, we will restrict the access to authenticated users

Common Errors/Misconceptions



Common Error: Everything is ok but database not updated!

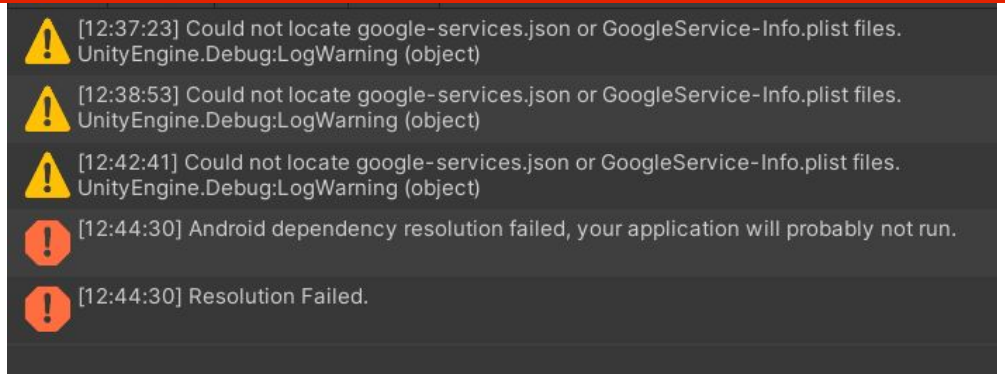
FIX:
Change the rules in your Database
This is because it was not set to test mode earlier and permissions were locked

Setting up public access

The Realtime Database provides a declarative rules language that allows you to define how your data should be structured, how it should be indexed, and when your data can be read from and written to.

Note: By default, read and write access to your database is restricted so only authenticated users can read or write data. To get started without setting up Authentication, you can configure your rules for public access. This does make your database open to me, even people not using your app, so be sure to restrict your database again when you set up authentication.

Common Errors/Misconceptions



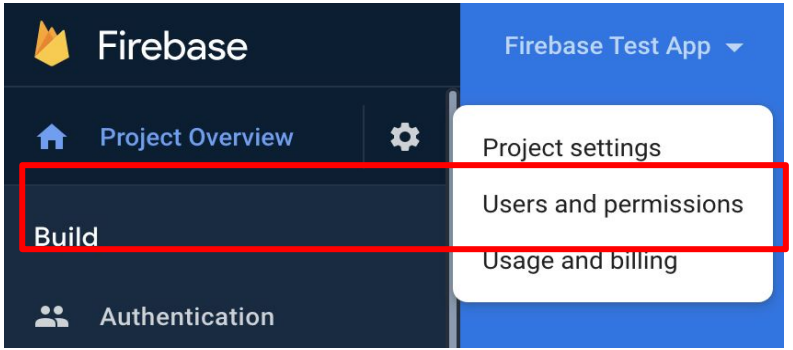
Common Error: Missing JSON

FIX:

Download and place google-services.json into your Unity Assets folder

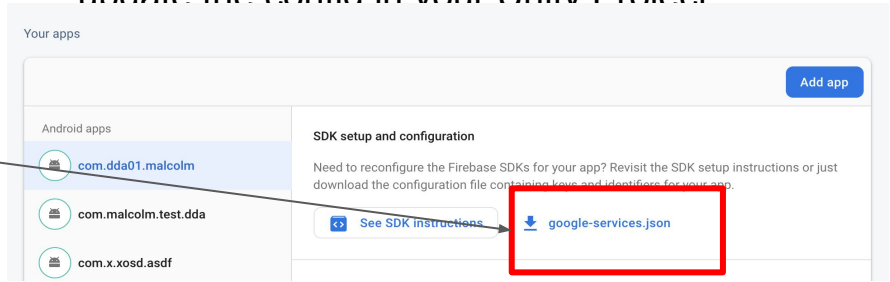
Ensure that you downloaded and place in the .json file. This is an important config file.

Go to your Firebase Console



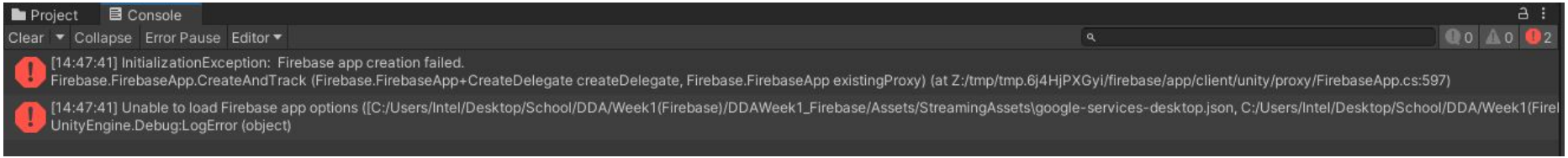
Note*

Once you enable any Firebase service, the config file gets updated. You can redownload and update the config in your Unity Project



Common Errors/Misconceptions

Common Error: JSON filename wrong



FIX:

Double check, triple **check your google-services.json file .**

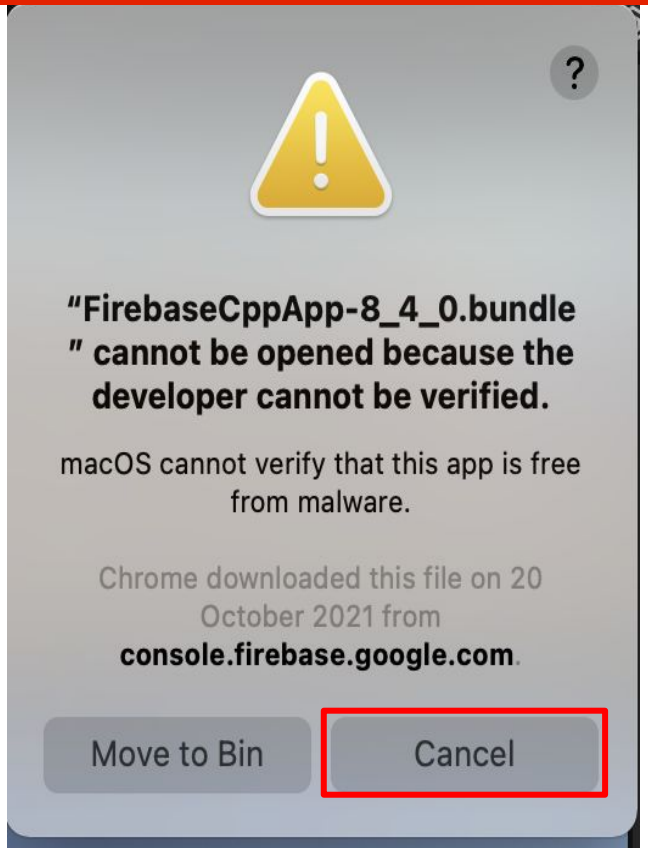
Ensure that it is NOT google-services (1).json.

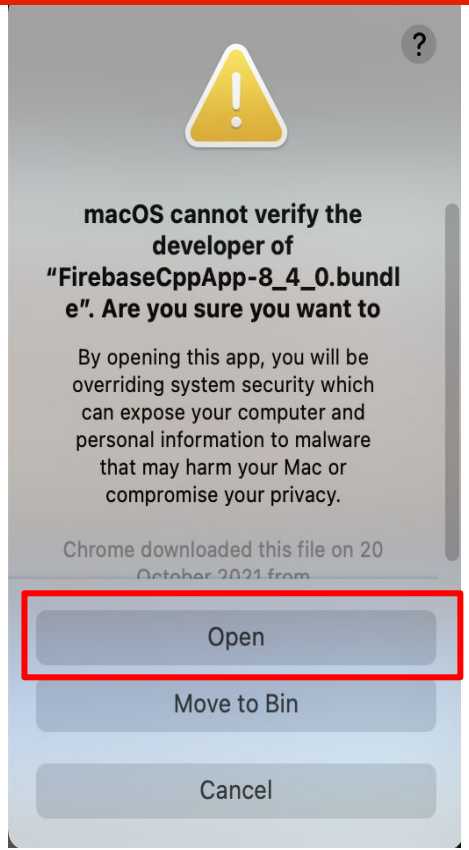
The filename has to be exact.

Firebase will go and seek the file name and create a google-services-desktop.json. Hence the file has to be exact

To ensure you didn't go wrong, delete the one in your project, delete any downloads of google-sevices.json. Re-download the google-services.json file from Firebase

Common Errors/Misconceptions





Common Error: Apple Users MacOS Security Issue

1. **Cancel the bundle issue**

Go to System Preferences > Security > General Tab > Allow FirebaseCpp…

Re-import Firebase SDK or Re-Run project

2. **Click on Open**

Common Errors/Misconceptions

```
6   public class SimpleLeaderBoard : MonoBehaviour {
7
8       public string userName;
9       public int highScore;
10      public long updatedOn;
11
12      //simple constructor
13      public SimpleLeaderBoard() { }
14
15      //constructor with parameters
16      public SimpleLeaderBoard(string userName, int highScore)
17      {
18          this.userName = userName;
19          this.highScore = highScore;
20          this.updatedOn = GetTimeUnix();
21      }
22
23      public long GetTimeUnix()
24      {
25          return new DateTimeOffset(DateTime.UtcNow).ToUnixTimeSeconds();
26      }
27
28      public string SimpleLeaderBoardToJson()
29      {
30          return JsonUtility.ToJson(this);
31      }
32  }
33
```

Common Error: Including MonoBehaviour in your Class

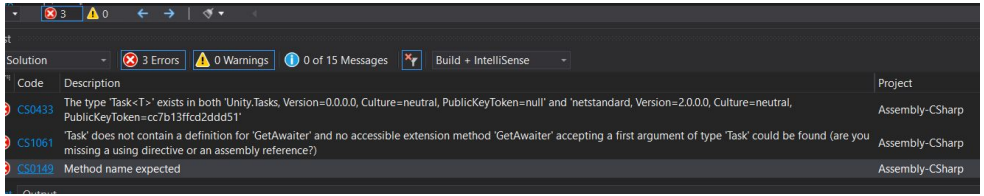
MonoBehaviour provides you with all the Unity capabilities, it inherits all the superpowers of Unity (functions, variables,etc) .

The easiest being able to attach a MonoBehaviour script as a Component to your Game Object

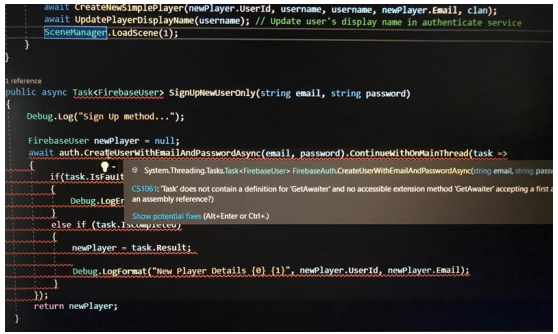
By itself, this issue is fine.
BUT when we are converting between JSON, it's an issue and won't be converted properly

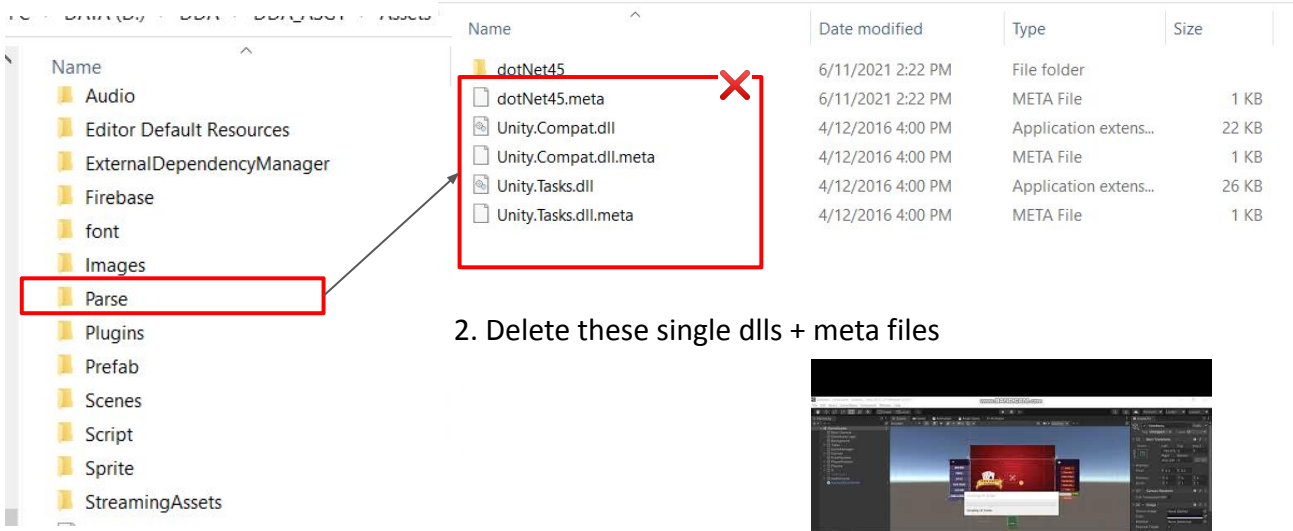
Fix: Take it out!

Fixing Task Issues in Your Unity



Encountering Task issues that say it is conflicting in terms of namespaces etc? You would need to delete the additional Unity tasks dll in your project
Usually happens when you try to add in “using System.Threading.Tasks”





2. Delete these single dlls + meta files

1. Map to your Unity Project Folder

Saving JSON Export

Your file will be a nice json export

1.


```
{
  "clans" : {
    "blue" : {
      "17WL498wuVRdGblZxqksITQsCnt1" : true,
      "IKzk5Rc4b5fKCoh11yYM7ZXpXLd2" : true,
      "OTLyLUJCSOhaOl3hL01nCl9nJDr2" : true,
      "kSTanOTkPlbtEZEClRT0FhwtULo2" : true,
      "vv7V5b3SOqS4r6tS1uZyISG44Xi1" : true
    }
  },
  "leaderboards" : {
    "17WL498wuVRdGblZxqksITQsCnt1" : {
      "highScore" : 2,
      "updatedOn" : 1637639026,
      "userName" : "tester1"
    }
  },
  "playerStats" : {
    "17WL498wuVRdGblZxqksITQsCnt1" : {
      "createdOn" : 1637639026,
      "highScore" : 2,
      "totalTimeSpent" : 30,
      "updatedOn" : 1637639026,
      "userName" : "tester1",
      "xp" : 5
    }
  },
  "players" : {
    "17WL498wuVRdGblZxqksITQsCnt1" : {
      "active" : true,
      "clan" : "blue",
      "createdOn" : 1637639012,
      "displayName" : "tester1",
      "email" : "test999@test.com",
      "lastLoggedIn" : 1637639012,
```

Web Dev
#RECAP

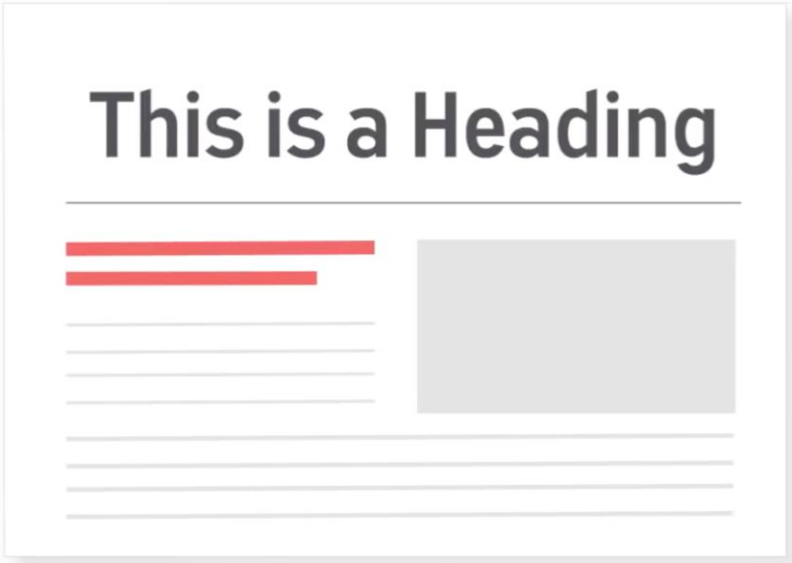
Element Description

What does an element look like

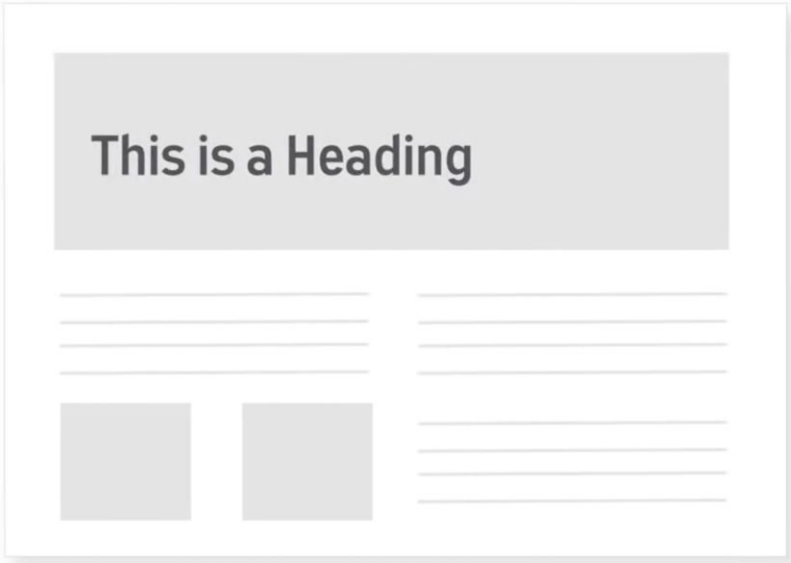
<h1>This is a Heading**</h1>**

<h1> Headings are the center piece of a screen space

Headline in a newspaper



Heading Title in a blog post

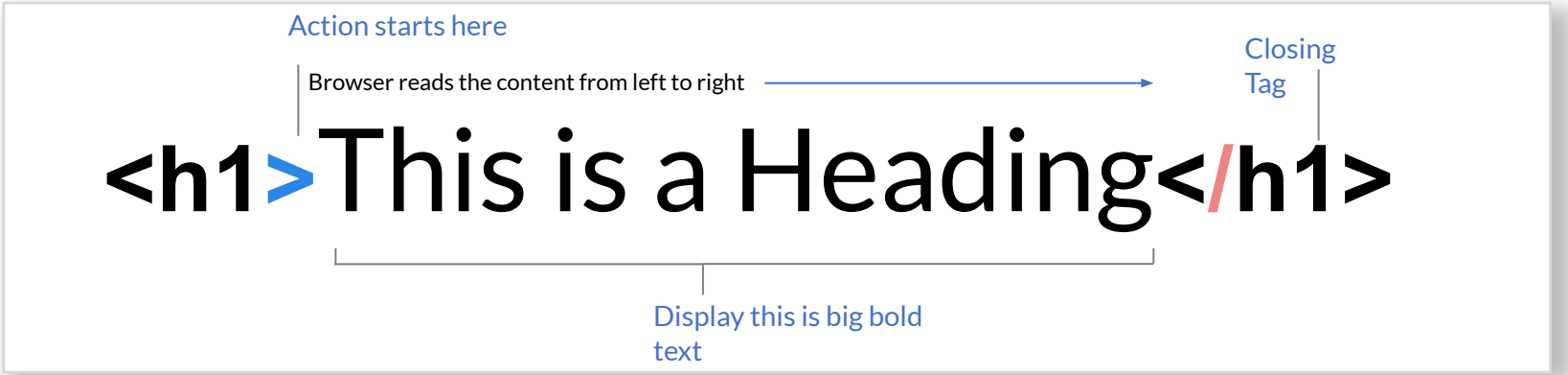


Element Description

What does an element look like

<h1>

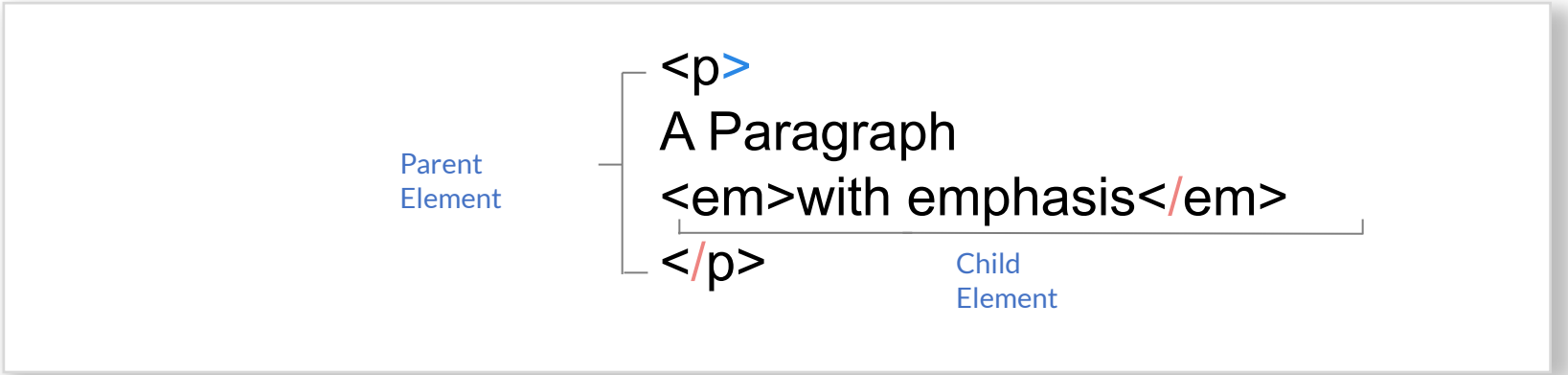
Header Element



Note:
The forward "/" slash when we are closing the tag
Strive to only have one <h1> heading in a HTML element

Elements Within Elements

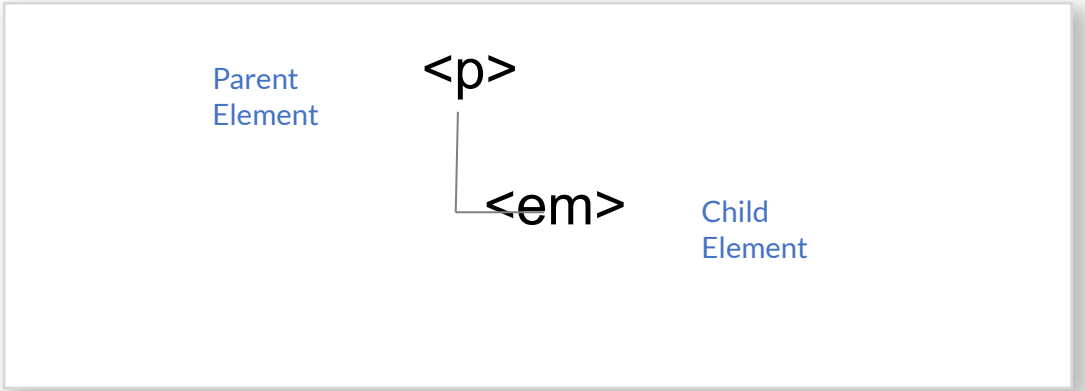
Child parent Relationship
Nested Relationship



Note:
We can always nest multiple elements within
The em tag marks elements as important
Em provides emphasis and contextural meaning

Elements Within Elements

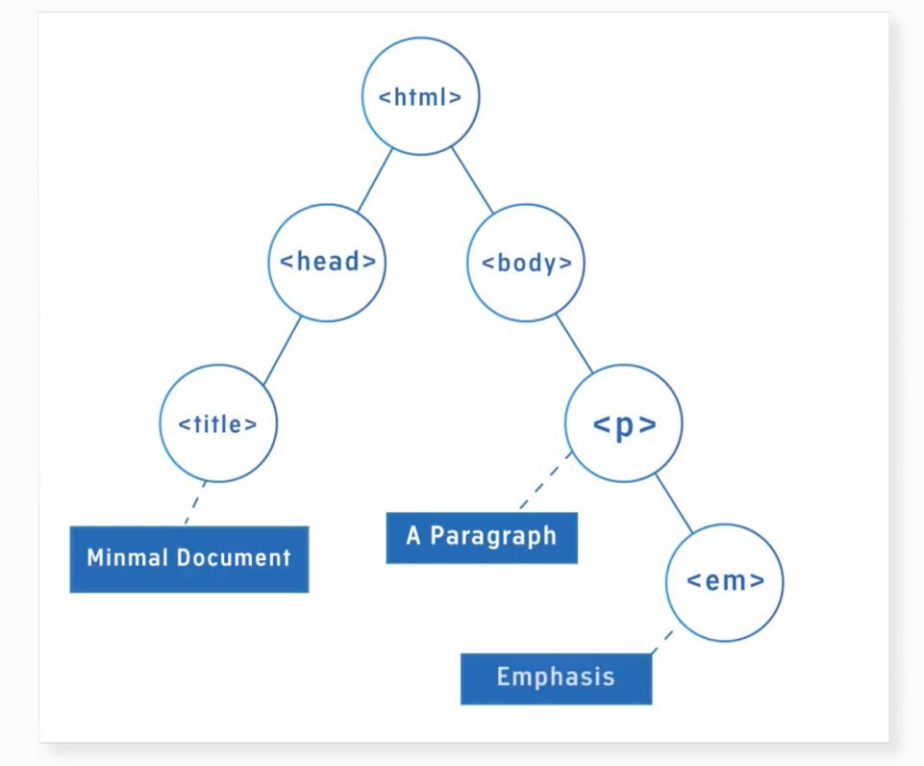
Structure



Note:
Parent: Any element that contains another element
Child: Contained elements

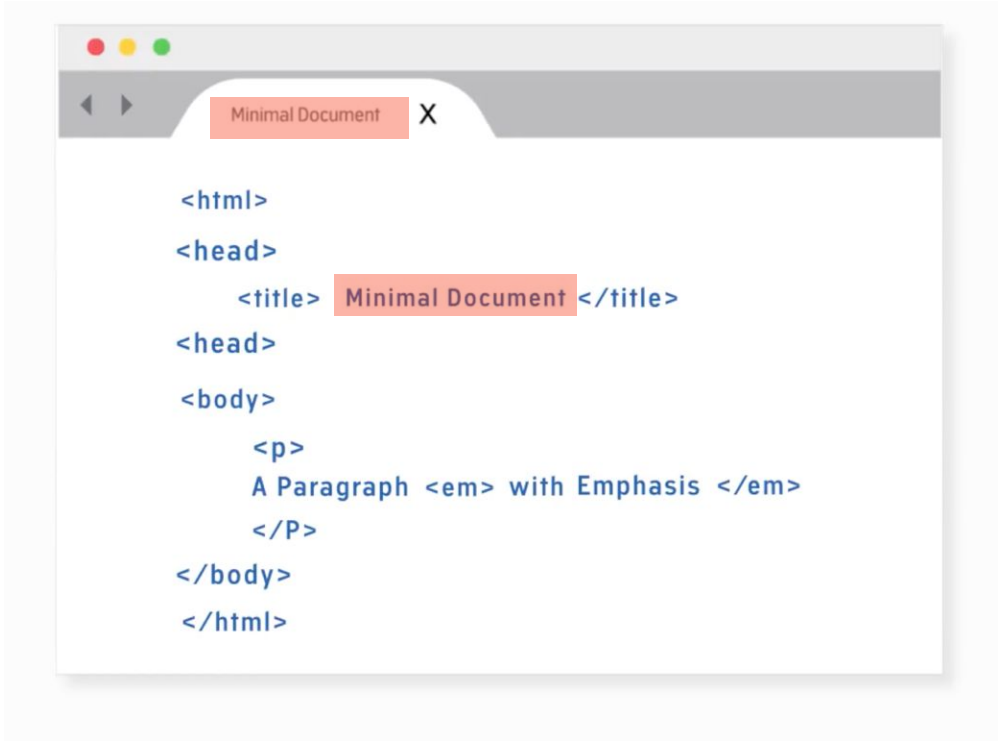
Elements Within Elements

Structure



Elements Within Elements

Structure



Other Key Elements

Required Elements

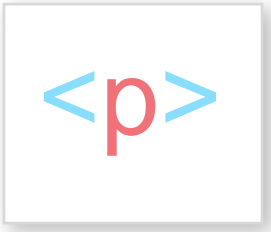
<html> <body> <head>

Paragraph Element

Heading

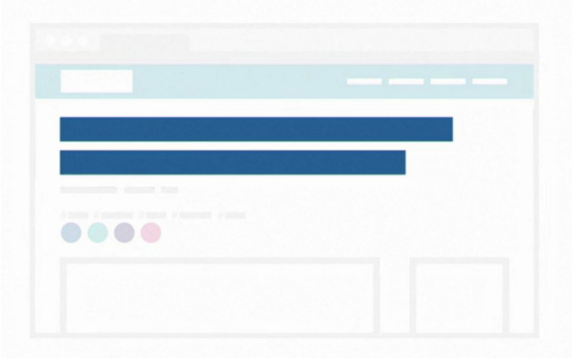
Before you begin to decide to start coding, you must first understand what it is used for. This is **just** a paragraph with several elements intact

- First Item
- Second Item
- Third Item



<p>
Paragraph Element
Creates space above and below elements
Block level element
Paragraph Element
used for blocks of text when there's two or more sentences

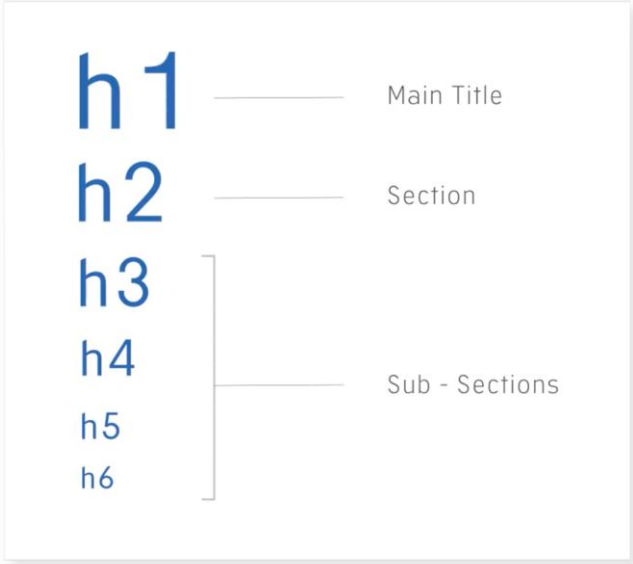
Headings <h...>



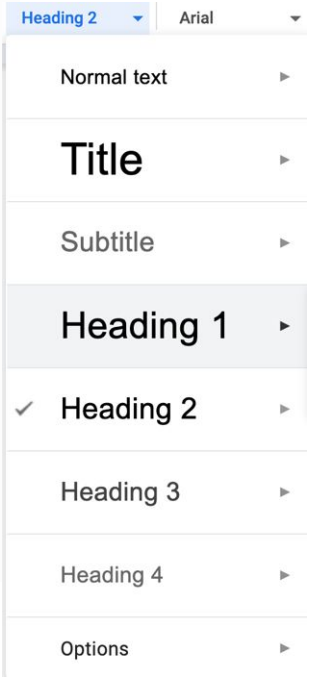
<h1>Most important HEADING</h1>
<h2>Second Most Important Heading</h2>
<h3> Third Most Important Heading</h3>
<h4> Fourth Most Important Heading</h4>
<h5> Fifth Most Important Heading</h5>
<h6>Least Important Heading</h6>

Provides visual context and meaning

*There's no such thing as <h7>...</h7> and beyond...
Maybe you can try :)



Denoting different segments and heading importance



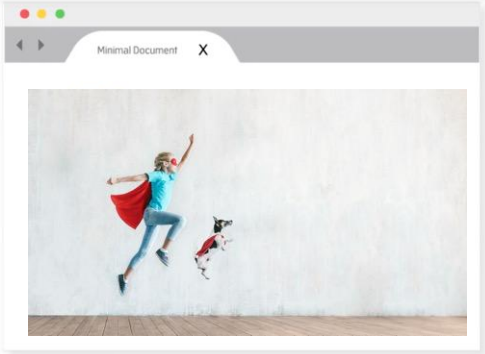
Google Docs

Image Tag
<img>

Used to display an image
Self-closing tag

https://picsum.photos/

```
<img src="interactive-dev.jpg">
```



https://repl.it/@malcolmyam/wk01-image-example

Image Tag
<img>

Absolute URL

https://interactivedev.com/logo.png

Absolute URLs are the type of links you're used to.

They include http:// or https:// and the full domain name before the directory (/assets/logo.png)

Relative URL

/logo.png

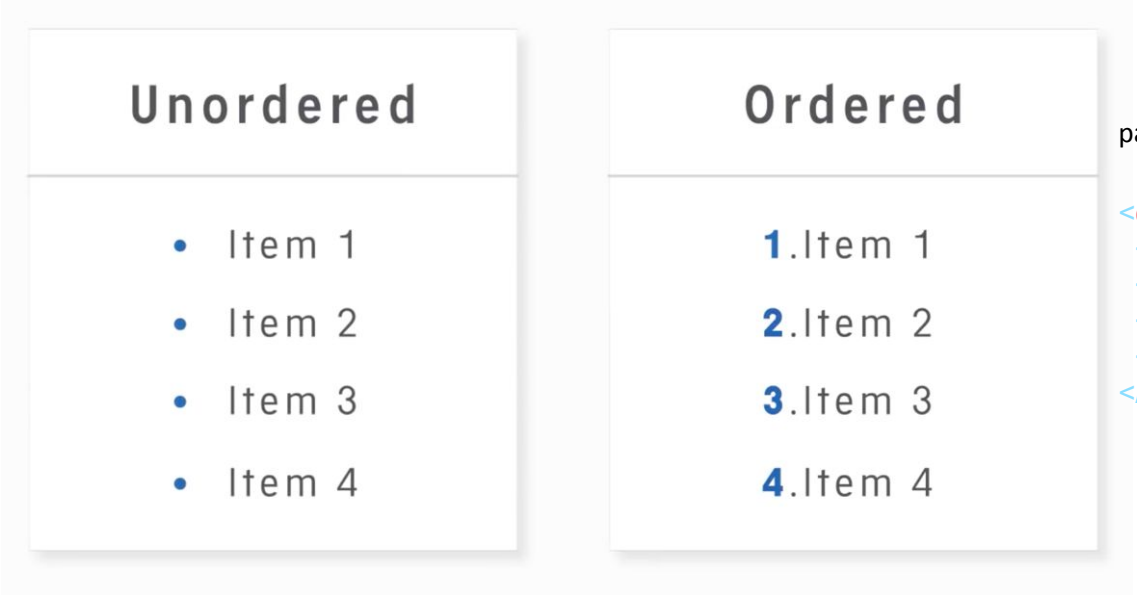
Relative URLs are shortcuts that allow you to skip the domain name.

It only works if you're linking to a file on the same domain on the current page.

https://repl.it/@malcolmyam/wk01-image-example

Lists


```
<ul>
  <li>Item 1</li>
  <li>Item 2</li>
  <li>Item 3</li>
  <li>Item 4</li>
</ul>
```



parent element

```
<ol>
  <li>Item 1</li>
  <li>Item 2</li>
  <li>Item 3</li>
  <li>Item 4</li>
</ol>
```

child elements

Common HTML5 Elements

<p>	<h1><h6>		
Defines a	Title	emphasis/stress	Gives text
paragraph	<h1>	text	importance
Block element	Section	italics	Bold
	block	inline	Section headings
			inline

*Note: Block elements are elements that create a spacing/line break below themselves

Anatomy of a HTML Page

<Tags>

Tags can also have attributes.

- A name optionally followed by a value.
- An attribute is used to:
  - Select between different options of element function
  - Provide extra information about what the element describes

```
<p class="special">
   A special paragraph
</p>
```

Example of a <p> tag with a “class” attribute

Common HTML Elements Link

<a>

- Start tags can also have attributes
- a stands for anchor
- anchor/hyperlink element
- Allows linking to:
  - Internal locations on a document
  - Other documents and resources
  - text in <a> tags displayed in the browser as a link text

```
<a href="https://interactivedev.com" title="JumpStart to Interactive Development">Interactive Development</a>
```

*Note: Every link has a destination
In order to make any link work, you'll need to specify a destination URL in the <a> element by adding the **href** attribute

Interactive Development

JumpStart to Interactive Development

Common HTML Elements

Image

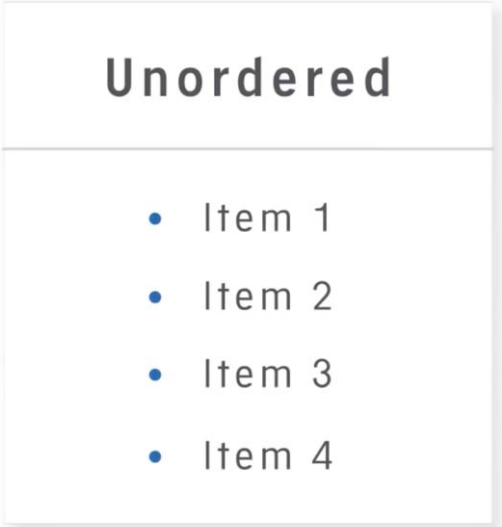
- Display an image
- src attribute
  - Internal locations on a document
  - Other documents and resources
- alt attribute
  - Image description
    - Visually impaired users (accessibility)
    - In case of image not loading

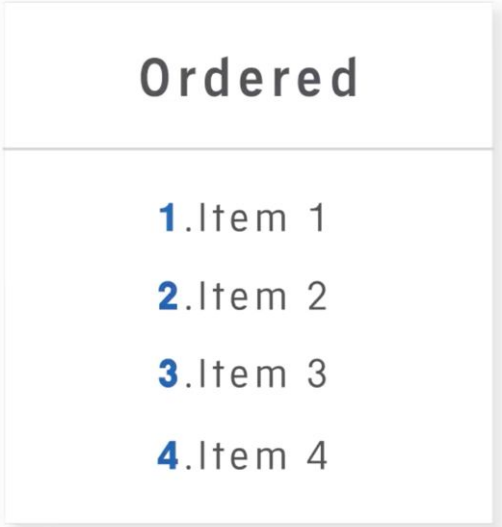
```
<img alt="JumpStart to Interactive Development &amp;
Programming" src="interactive-development.jpg">
```

Common HTML Elements

List

```
<ul>
  <li>Item 1</li>
  <li>Item 2</li>
  <li>Item 3</li>
  <li>Item 4</li>
</ul>
```






```
<ol>
  <li>Item 1</li>
  <li>Item 2</li>
  <li>Item 3</li>
  <li>Item 4</li>
</ol>
```

https://repl.it/@malcolmyam/wk01-unordered-ordered-list-example

ul -Unordered list. For listing things that do not need to be in any specific order. Navigation menus are often created with unordered lists, and are styled with CSS to display horizontally.
ol -Ordered list. A list that is automatically numbered.

Common HTML Elements

div + span

div + span
SEMATIC-NEUTRAL

A container unit

Encapsulates other page elements

Divides the HTML documents into sections

An inline unit

Usually used for small chunks of HTML

Inside a line

e.g inside a paragraph

*Sematic-neutral elements do not provide meaning to the page but provides structure

Common HTML Elements

div +

```
<style>
div{
 border: 1px solid red;
}

span{
 border: 1px solid green;
}
</style>

<div>This is a block level element </div>
<span>This is an inline element </span>

<!-- the H1 is a block element -->
<h1>Welcome to <span>Interactive
Development</span></h1>
```

https://repl.it/@malcolmyam/wk01-divspan-example

Common HTML Elements

comment

In programming, we often use comments to explained our code

Comments are not displayed to the browser

```
<!– this is an example of a comment -->
```

#CODINGTIME #CA #ACTIVITY

ACTIVITY

#CODINGTIME #CA #ACTIVITY

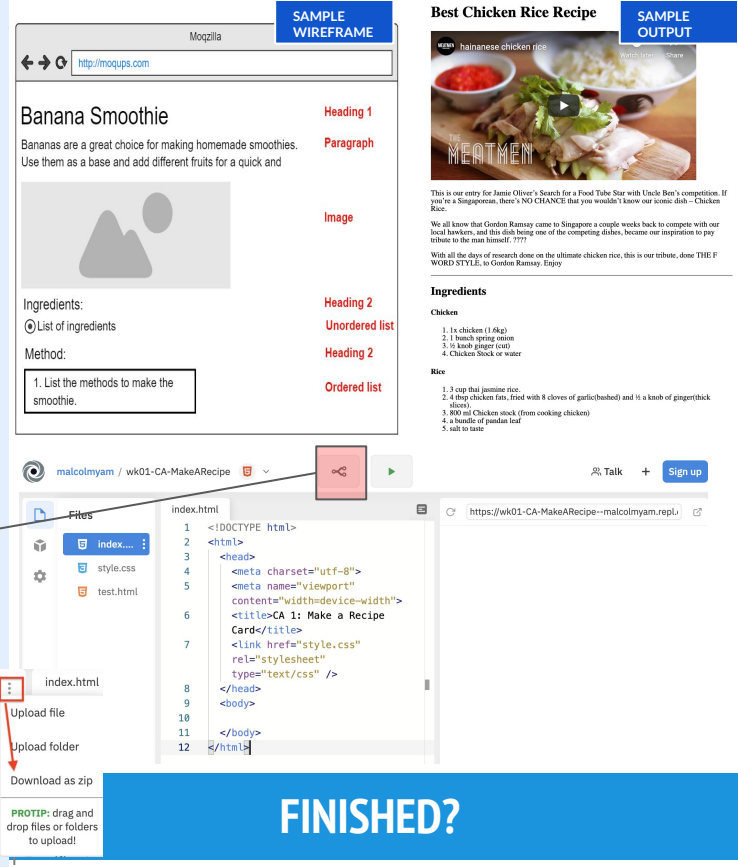
RECIPE/PROFILE CARD

In this activity, you will start to make your own recipe/player profile. You will be introduced to five common HTML tags; headings, paragraphs, image, ordered lists and unordered lists.

1. Based on the wireframe on the right, try to create your own profile card
2. Start by forking the base template http://bit.ly/id-MakeARecipe

Submit a html titled “Wk06-studentid-studentname-make-a-card.html”
E.g DDAWk01-16012010D-UncleRoger-make-a-card.html
*Submit the file in **Google Classroom***
You may download your repl.it file once you are satisfied :)

15 minutes



- Publish your recipe and share it with your teacher/class.
- Help a neighbour!
- Challenge yourself! Research how to add a link to a website or insert a YouTube video.

TABLES

(ノ°□°)ノ ⌒ ┻━┻

Does using a table make it more clear what the content means?

Model	B76	C75	D92	E88
Price	$	$$	$$$	$$$$
Rating	★★☆☆☆	★★★☆☆	★★★★☆	★★★★★
Resolution	4608 x 3072	5472 x 3648	6000 x 4000	6720 x 4480

Standings

#	Team	MP	W	D	L	PD	Pts	Form
1.	Invictus Gaming	16	14	0	2	28:11	14	W W W W L
2.	JD Gaming	16	12	0	4	26:10	12	W W W W W
3.	FunPlus Phoenix	16	12	0	4	27:13	12	L W W W L
4.	Top Esports	16	11	0	5	23:14	11	W W W L L
5.	eStar	16	11	0	5	23:14	11	L W W L L
6.	EDward Gaming	16	9	0	7	23:18	9	L L W L W
7.	Royal Never Give Up	16	8	0	8	20:18	8	L L W L L
8.	Team WE	16	8	0	8	20:21	8	W W L L L
9.	Vici Gaming	16	7	0	9	21:22	7	W L W L L
10.	Bilibili Gaming	16	7	0	9	20:22	7	W W L W W

Common HTML Elements

TABLES

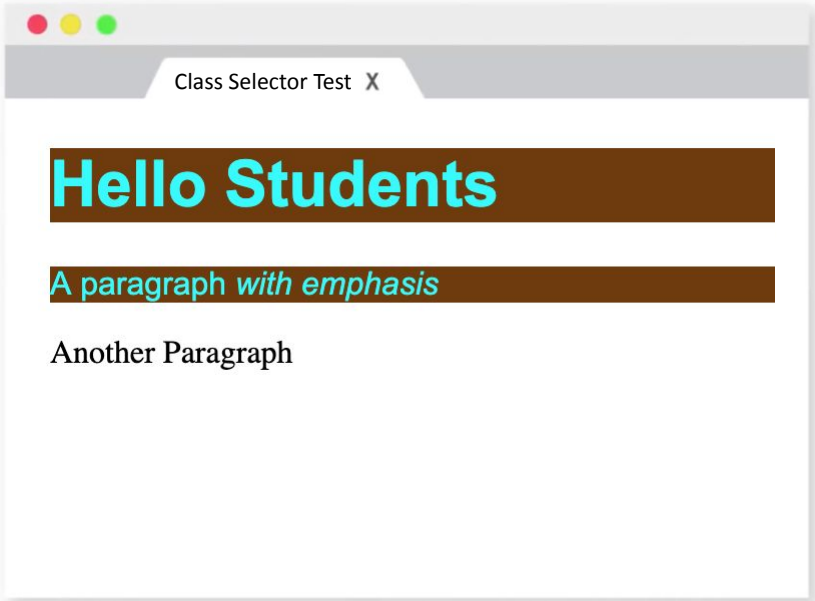
```
<table>
  <tr>
    <th>Name</th>
    <th>Class</th>
  </tr>
  <tr>
    <td>Uncle Roger</td>
    <td>T01</td>
  </tr>
  <tr>
    <td>Naomi Neo</td>
    <td>T02</td>
  </tr>
  <tr>
    <td>Xia Xue</td>
    <td>T03</td>
  </tr>
</table>
```

Element	Name	Purpose	Attributes
<table></table>	Table	Wraps the whole table	
<tr></tr>	TR – table row	Wraps around a set of elements, defining them as belonging to the same row	colspan, rowspan, headers
<th></th>	TH – table header	Defines a header for a column	colspan, rowspan, scope
<td></td>	TD – table data	Marks the actual bits of data	

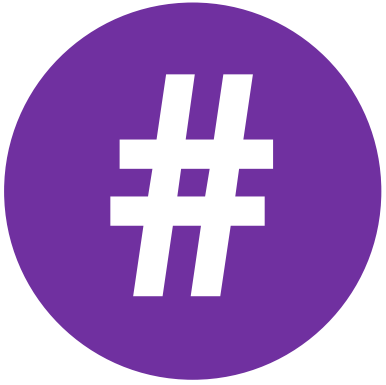
Common Elements

Class Attribute

```
<!DOCTYPE html>
<html>
<head>
  <title>Class Selector Test</title>
  <style>
  .myClass{font-family:Arial, Helvetica, sans-serif;
  color: #23FBFF;background-color: #6E3B04;}
  </style>
</head>
<body>
  <h1 class="myClass">Hello Students</h1>
  <p class="myClass">
  A paragraph <em> with emphasis</em>
  </p>

  <p>Another Paragraph</p>
</body>
</html>
```

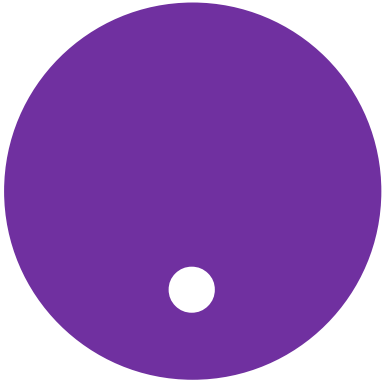


ID Attribute - TARGETING AN INDIVIDUAL



- #header { } Selects any element with the **id** “header", e.g.
- Unique to that element
- Hash symbol
- The "**#**" is how you tell CSS "this is an id.”
  - Selector name matches element ID value, prefixed with # symbol

Class Attribute - TARGETING A GROUP



- .warning { color: red; } Selects any element with the **class name** “warning”, e.g.
- Used to style an element grouping
- Targets one or more element's class attribute
- Elements can be of different type
- The "." is how you tell CSS "this is a class name."
- An element can have only 1 id but multiple classes, so you can take advantage of that for greater flexibility.
  - Eg hi -> hi

  aka class chaining

Pseudo Classes

A set of "pseudo classes" can style anchor elements depending on their state.

```
a:link { /* unvisited link */ color: red; }
a:visited { /* visited link */ color: blue; }
a:hover { /* moused over link */ color: green; }
a:active { /* current link */ color: purple; }
a:focus { /* focused link */ color: purple; }
```

Best Practices

Some rules to follow when making IDs and class names:

- **Describe the content**, not the presentation ("warning", not "redbox").
- Use **all lowercase, and hyphens when needed for readability** ("header-info", not "headerInfo").
- Use hyphens to show that a class or ID is part of something else. (e.g. "footer", "footer-copyright", and "footer-logo").
- Preferably **NO** camel case

5-10 minutes

CHALLENGE: Applying Class & ID

1. Refer to the repl.it file
2. Apply the #heading ID to ***one*** appropriate element to affect the result to look like the one on the right
3. Apply the class styles to the appropriate elements to affect the result

Submit a html titled:
"DDAWk06-studentid-studentname-css-id.html"

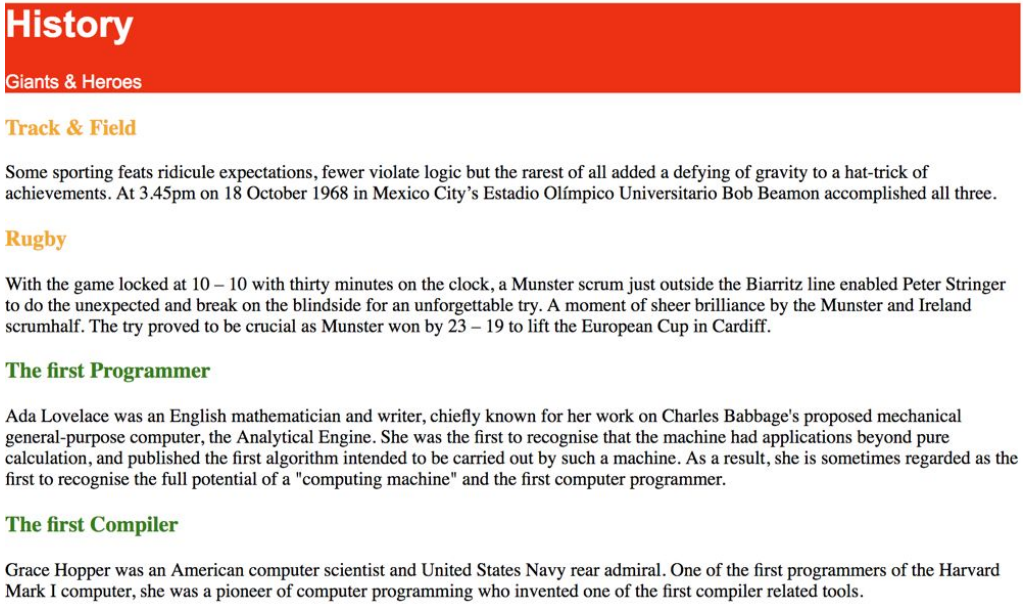
E.g DDAWk02-16012010D-UncleRoger-css-id.html
*Submit the file in **MeL***
You may download your repl.it file once you are satisfied :)

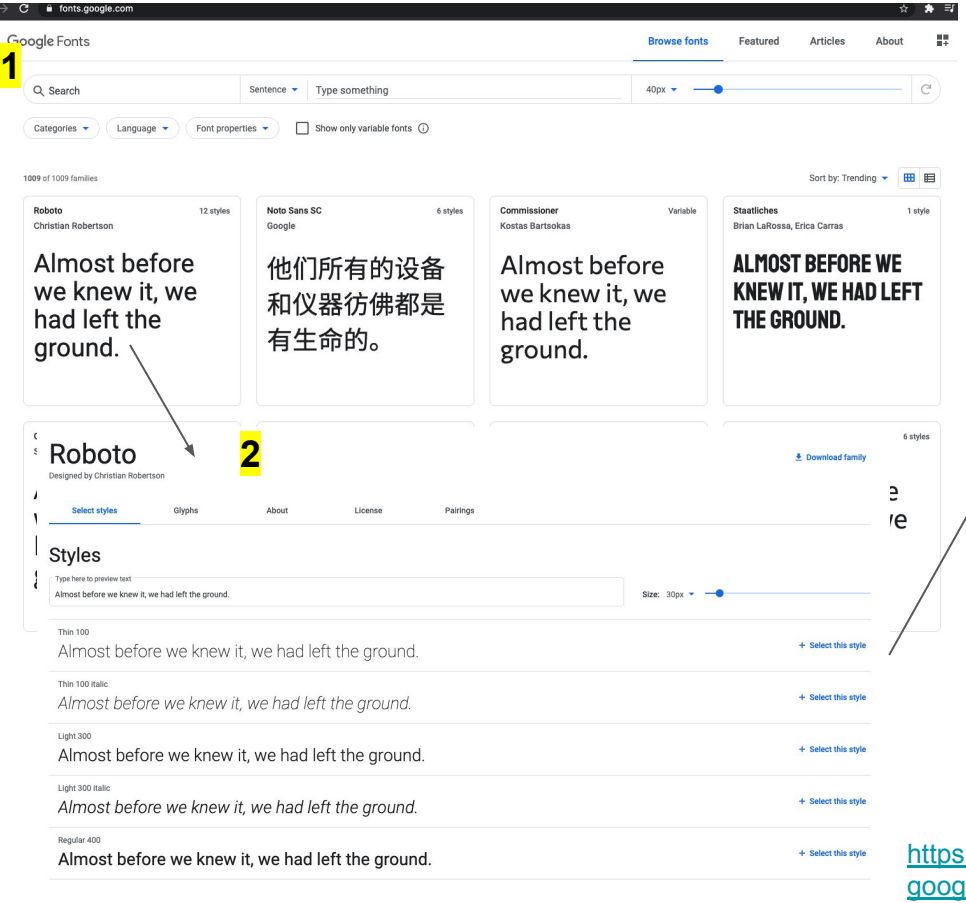
https://code.visualstudio.com/

Some KickAss Visual Studio Code Extensions
Live-Server, Prettier, HTML Boilerplate, HTML Snippets

FORK

https://repl.it/@malcolmyam/wk02-css-id-class





5

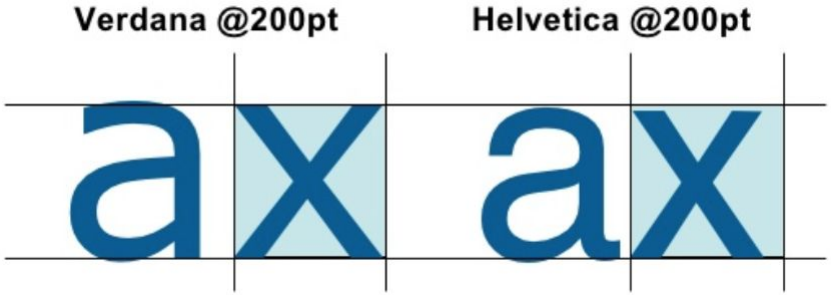
Place link into the <head> element
Add on CSS rule to your CSS styles
Now test it out!

https://repl.it/@malcolmyam/wk02-simple-googlefonts#index.html

FONT STACKING

- Think about fallback fonts
- Platform usage (Windows, Mac, Linux etc)
- Font aspect ratio
    - If you use fonts with different aspect ratios,

  Some people may see your site with smaller fonts



Example of difference in Font aspect ratio

Larger aspect ratio

```
body{
   font-family: Verdana, Arial, sans-serif
}
```

Smaller aspect ratio

The <form> Tag

```
<form action="someurl.php" method="post">
    <!-- All our inputs will go in here -->
</form>
```

action – the URL to send form data to

method – the type of HTTP request

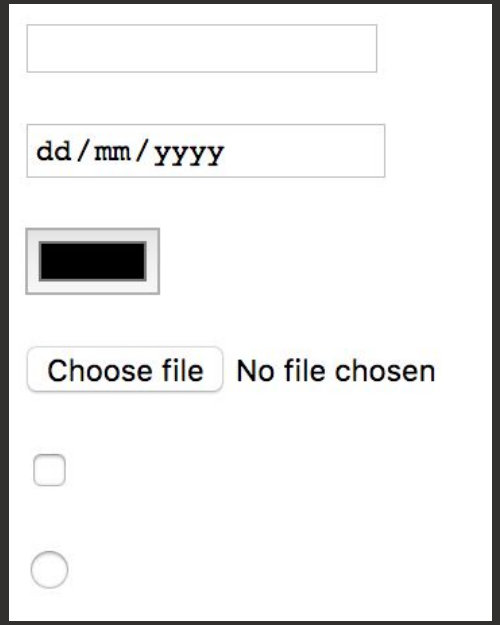
Until we work with a database noSQL/mongoDB/backend languages, our forms are actually quite "sad" :(

https://developer.mozilla.org/en-US/docs/Learn/Forms

The <input> Tag

The input tag creates interactive controls.
The "**type**" attribute determines the type of input

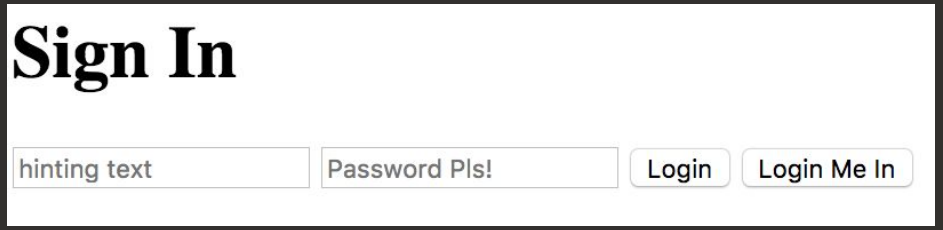
```
<input type="text">

<input type="date">

<input type="color">

<input type="file">

<input type="checkbox">

<input type="radio">
```



Reading Reference: https://developer.mozilla.org/en-US/docs/Web/HTML/Element/input

A Simple Form

```
<form action="/some-url" method="POST">
    <input type="text" placeholder="hinting text">
    <input type="password" placeholder="Password Pls!">
    <button>Login</button>
    <input type="submit" value="Login Me In">
</form>
```



Let's try sending data.

*UX: When designing forms it's a whole process.
Got to think about the platform, device, readability, audience
Also think about are the fields **REALLY NECESSARY?**

Recommending reading:
https://static.lukew.com/webforms_lukew.pdf

Reading Reference: https://developer.mozilla.org/en-US/docs/Web/HTML/Element/input

Labels

Let's us add captions to the form elements

Labels are really important for making site accessible (visual impairment, etc)


```
<form action="/some-url" method="GET">
    <label>Username:
        <input type="text" placeholder="hinting text" name="username">
    </label>
    <label>Password:
        <input type="password" placeholder="Password Pls!" name="password">
    </label>

    <button>Login</button>
    <input type="submit" value="Login Me In">
</form>
```

```
<form action="/some-url" method="GET">
    <label for="username">Username:</label>
    <input type="text" placeholder="hinting text" name="username" id="username">
    <label for="password">Password:</label>
    <input type="password" placeholder="Password Pls!" name="password" id="password">
    <button>Login</button>
    <input type="submit" value="Login Me In">
</form>
```

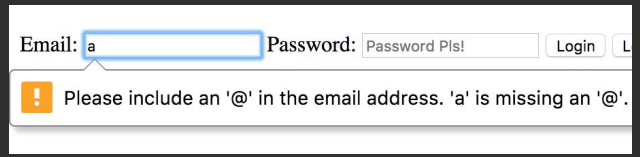
Alternate syntax, using **"for"** and **"id"** attributes

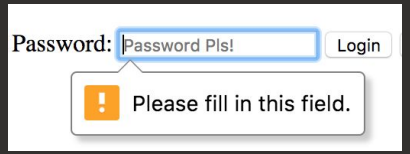
Reading Reference: https://developer.mozilla.org/en-US/docs/Web/HTML/Element/input

Validations

- The 'required' attribute validates that an input is not empty
- There are also type validations. Try changing "type" from "text" to "email"

```
<!-- not every single browser allows form validation -->
<form action="/some-url" method="GET">
    <label for="email">Email:</label>
    <input type="email" placeholder="Email.." name="email" id="email" required>
    <label for="password">Password:</label>
    <input type="password" placeholder="Password Pls!" name="password" id="password" required>
    <button>Login</button>
    <input type="submit" value="Login Me In">
</form>
```

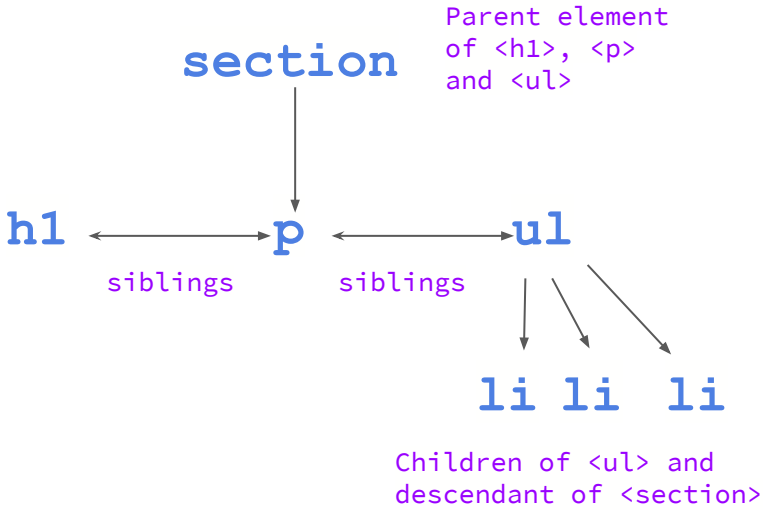




Reading Reference: https://developer.mozilla.org/en-US/docs/Web/HTML/Element/input

Nested Elements & the DOM

```
<section>
 <h1>Heading</h1>
 <p>Paragraph</p>
 <ul>
   <li>List item</li>
   <li>List item</li>
   <li>List item</li>
 </ul>
</section>
```



Descendant Selector

```
/* Selects only links, inside of a paragraph, inside of section */
   section p a {...}
```

Descendant element

```
 <section>
    <p>There's a <a href="#">link</a> inside this paragraph.</p>
    <p>Paragraph</p>
    <a href="#">Link</a>
  </section>
  <a href="#">Link</a>
```

→ Not affected

https://repl.it/@malcolmyam/simple-selectors#index.html

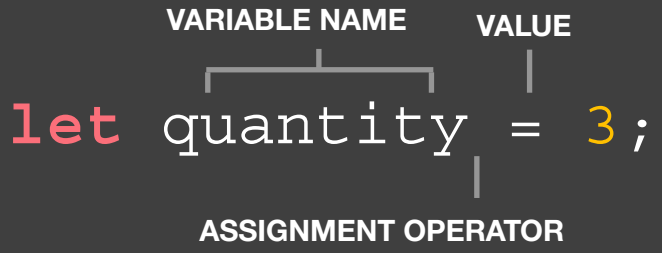
JavaScript
#RECAP

Python

```
quantity = 3
```

C#

```
type variableName = value;
int quantity = 3;
```




```
console.log(quantity);
```

*Instead of var, we are using let (ES6)

Reading Materials:

https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Statements/let

https://hackernoon.com/why-you-shouldnt-use-var-anymore-f109a58b9b70

https://wesbos.com/is-var-dead/

3 PRIMITIVE DATA TYPES

Numbers: Floating point numbers, decimals & Integers

Strings: Sequence of characters, text

Booleans: Logical Data (True or False)

2 OTHER PRIMITIVE DATA TYPES

Undefined: Data type of a variable that does not have a value yet

Null: Also means non-existent

DATA TYPES

Numbers

```
let x = 1;
```

Strings

```
let myName = "Bob";
```

Boolean

```
let myName = true;
```

Array

```
let myName = [1, 2, 3, "hi"];
```

Syntax

```
let name = <value>;
```

Using Quotes for Strings

Note that for **String** variable, the value must be enclosed using either the double quotes or the single quotes. (It's more common to use the double quotes).

Example:

```
let item = "durian cake";
let fruit = 'durian';
```

** Notice how the string is placed inside quote marks

*if start with double quotes, end with double quotes
If start with single quotes, end with single quotes

✓ "hello"
✓ 'hello'

X "hello'
X 'hello"

✓ " "
✓ ' '

X “ ”
X ‘ ’

String Processing

Concatenation

```
string1 + string2
```

```
"some" + "text"; // returns "sometext"
let first = "my";
let second = "string";
let union = first + second; // union variable has the string "mystring"
```

Length of a String

```
string.length
```

```
"My name".length // 7 , white space is also counted
"".length // 0
```

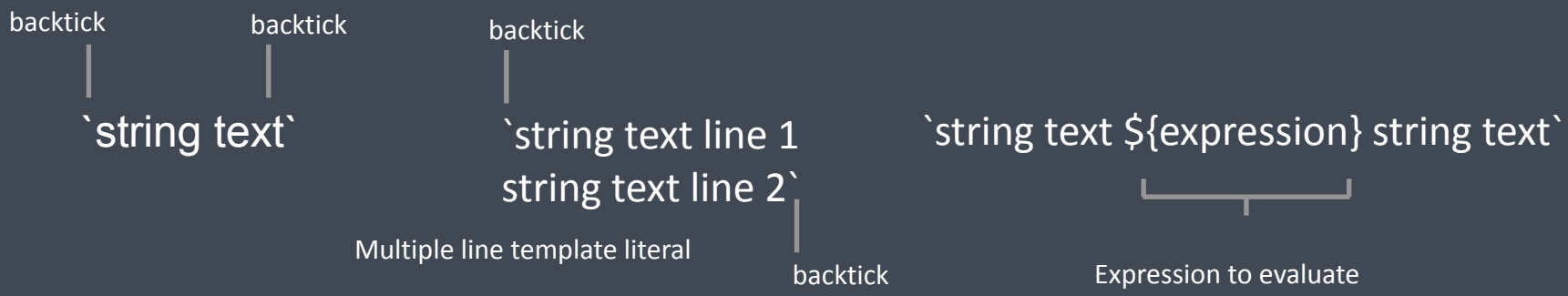
Case Manipulation

```
"my name".toUpperCase(); // Returns "MY NAME"
"MY NAME".toLowerCase(); // Returns "my name"
```

trim() // replace() // charAt() // substring() // indexOf()

For more: http://www.w3schools.com/jsref/jsref_obj_string.asp

Template literals are enclosed by the back-tick (` `)



*Reference Article
https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Template_literals

Usual method of writing strings

```
var age = 21;
console.log('My age is ' + age);
```

Substitution using Template String

```
var age = 21;
console.log(`My age is ${age}`);
```

Template String

- ✓ String Substitution
- ✓ Cleaner
- ✓ More Readable

&&

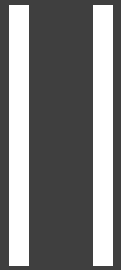
LOGICAL AND

This operator test **more than one** condition.

((2 < 5) && (3 >= 2))
returns **true**

If both expressions evaluate to true then the expression returns true. If just one of these returns false, then the expression returns false.

true && true returns **true**
true && false returns **false**
false && true returns **false**
false && false returns **false**



LOGICAL OR

This operator test **at least one** condition.

((2 < 5) || (3 >= 2))
returns **true**

If both expressions evaluate to true then the expression returns true. If just one of these returns false, then the expression returns false.

true && true returns **true**
true && false returns **false**
false && true returns **false**
false && false returns **false**

NOT

This operator inverts true or false values

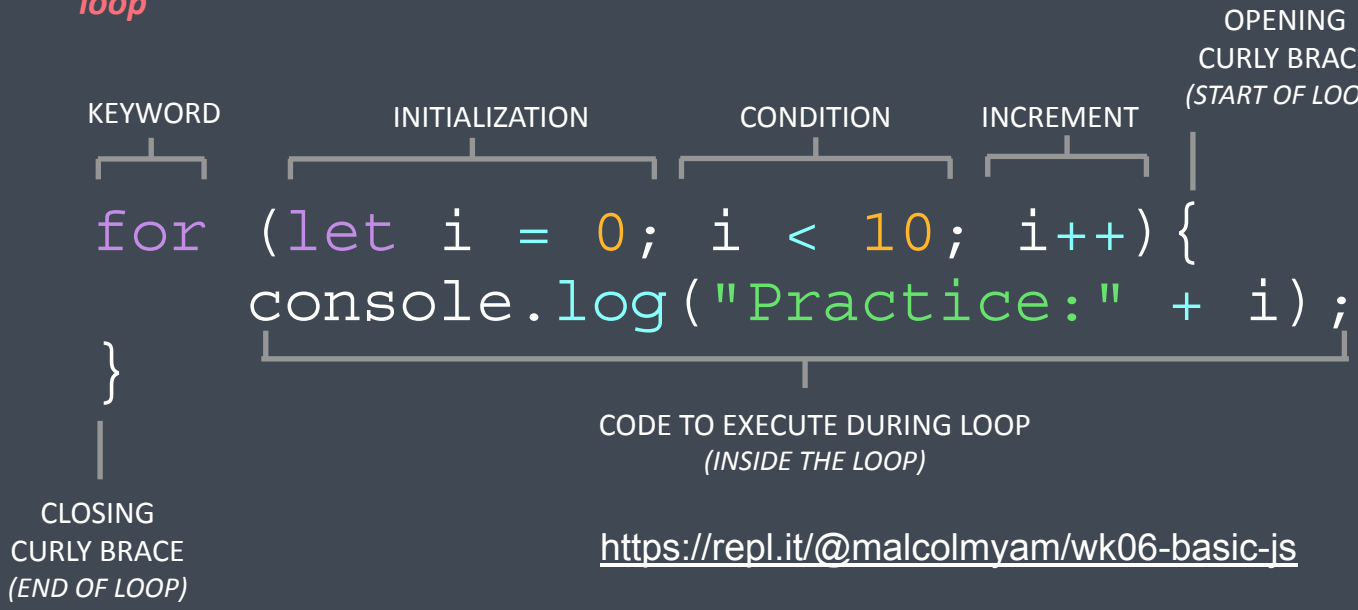
(!true)
returns **false**

Operator simply inverts the value contained within

FOR LOOPs

for(var i = 0; i < 10; i++){ ….}

*Example: Display the word "Practice: x" using **for loop***



https://repl.it/@malcolmyam/wk06-basic-js

Output
Practice: 0
Practice: 1
Practice: 2
Practice: 3
Practice: 4
Practice: 5
Practice: 6
Practice: 7
Practice: 8
Practice: 9
Loop stops because i < 10
Q. How do we loop 10 times and get number 10?

INITIALISATION

Create a variable and set it to 0
Acts as a counter

```
let i = 0;
```

Variable is only created the **first time** the loop is run.

CONDITION

Loop continues to run until the counter reaches a specific number

```
i < 10;
```

The value of i was initially set to 0, so in this case the loop will run 10 times before stopping.

INCREMENT / UPDATE

Every time the loop has run the statements in the curly braces, it adds **one to the counter**

```
i++
```

One is added to the counter using the increment (++) operator.

It is also possible for loops to count downwards using the decrement operator (--)

CODE SAMPLE

```
for (let i = 0; i < 10; i++){
    console.log("Practice:" + i);
}
```

FOR LOOP

```
for (let i = 0; i < 10; i++){
    console.log("Practice:" + i);
}
```

V S

WHILE LOOP

```
let i = 0;
while (i < 10){
    console.log("Practice:" + i);
    i++;
}
```

Both are equivalent and produce the same results

ACTIVITY

"Loops Recap" (10min)

Q3 -. EVEN LOOP
Use a for loop to print out the following set of numbers that counts down from the number 10. For each even number, print out "(even)" beside it.
Desired Output

```
10 (even)
...
6 (even)
..
2 (even)
0
```

End of output

Q4 -. SIMPLE ARRAY
Use a for loop to print out an array. Fill in the blanks in the code below:

```
let a = [1001, 1002, 1003, 1004, 1005];
for (let i = 0; i < ????; ++i)
{
        console.log ( a [ ??? ] );
}
```

INSTRUCTIONS
Create a document
Wk06-JS-studentid-studentname.docx

Label each question in the docx and insert your answers inside
E.g
Q1. <answer>

Complete all 5 exercises and Submit your .docx file

LITERAL OBJECTS

- OBJECT
- KEY / NAME
- VALUE

```
let hotel  = {

  name: 'Raffles Hotel',
  rooms:  100,
  booked: 24,
  gym: true,
  roomTypes:
['twin','suite','delux'],

  checkAvailability: function() {
    return this.rooms - this.booked;
  }
};
```

PROPERTIES
These are variables

METHOD
This is a function

Object is the curly braces {… } and its contents
Object stored in a variable **hotel**

Separate each key from its value using a colon
Separate each property and method with a comma

The this keyword in checkAvailability() method,
References the rooms and **booked** projects of the
Object (hotel)

https://repl.it/@malcolmyam/wk06-objects#script.js

ACCESSING AN OBJECT


```
let hotelName = hotel['name'];
let roomsFree = hotel['checkAvailability']();
```

https://repl.it/@malcolmyam/wk06-objects#script.js

UPDATING AN OBJECT

*** Note:** If the object does not have the property you are trying to update, it will be added to the object

```
hotel['name'] = 'Favcho Royale Hotel';
```

```
delete hotel.name; // Delete a property using the delete keyword
hotel.name = '';   // Clear the value of a property by assigning a blank string
```

FUNCTION BASED OBJECTS

OBJECT
KEY / NAME
VALUE

PARAMETERS

```
function Hotel(name, rooms, booked){

  this.name = name;
  this.rooms = rooms;
  this.booked = 24;

  this.checkAvailability = function()
{
    return this.rooms - this.booked;
  };
}
```

PROPERTIES

METHOD

Creating a function Hotel allows it to be used as a template for creating multiple objects

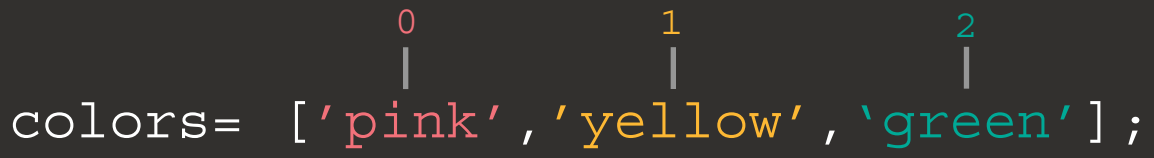
This is called a function based object.

The **this** keyword is used instead of the object name to indicate the property/method belongs to the object that **this** function creates.

Each statement creates a new property or method. Uses **semi-colon** instead of comma (literal object syntax)

https://repl.it/@malcolmyam/wk06-objects#script.js

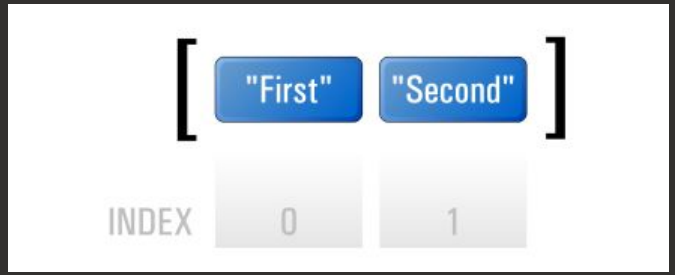
ARRAY INDEXING



Defining Arrays

Declare an array called list

```
let list=[];
list[0] = "First";
list[1] = "Second";
```



We can insert a **variable** into an array by *specifying which **index** it goes into*

DECLARING A FUNCTION

Python

```python
def my function():
  print("Hello from a function")

my_function()
```

KEYWORD

FUNCTION NAME

```
function sayHello() {
  document.write('Hello');
}
```

CODE BLOCK (IN CURLY BRACES)

```
sayHello();
```

FUNCTION NAME

https://repl.it/@malcolmyam/wk06-basic-js

PARAMETER PARAMETER

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

THE PARAMETERS ARE USED LIKE VARIABLES WITHIN THE FUNCTION

CALLING A FUNCTION THAT NEEDS INFORMATION

```
getArea(3, 5);
```

ARGUMENTS

https://repl.it/@malcolmyam/wk06-basic-js

OOP

Object Oriented
Programming

LITERAL OBJECTS

- OBJECT
- KEY / NAME
- VALUE

```
let hotel  = {

  name: 'Raffles Hotel',
  rooms:  100,
  booked: 24,
  gym: true,
  roomTypes:
['twin','suite','delux'],

  checkAvailability: function() {
    return this.rooms - this.booked;
  }
};
```

PROPERTIES
These are variables

METHOD
This is a function

Object is the curly braces {… } and its contents
Object stored in a variable **hotel**

Separate each key from its value using a colon
Separate each property and method with a comma

The this keyword in checkAvailability() method,
References the rooms and **booked** projects of the
Object (hotel)

https://repl.it/@malcolmyam/wk06-objects#script.js

ACCESSING AN OBJECT


```
let hotelName = hotel['name'];
let roomsFree = hotel['checkAvailability']();
```

https://repl.it/@malcolmyam/wk06-objects#script.js

UPDATING AN OBJECT

*** Note:** If the object does not have the property you are trying to update, it will be added to the object

```
hotel['name'] = 'Favcho Royale Hotel';
```

```
delete hotel.name; // Delete a property using the delete keyword
hotel.name = '';   // Clear the value of a property by assigning a blank string
```

CONSTRUCTOR NOTATION

OBJECT
KEY / NAME
VALUE

```
let hotel = new Object();

hotel.name = 'Raffles Hotel';
hotel.rooms = 100;
hotel.booked = 24;
hotel.gym = true;
hotel.roomTypes =
['twin','suite','delux'];

hotel.checkAvailability: function() {
  return this.rooms - this.booked;
}
```

PROPERTIES

METHOD

Create an object using the "new" keyword and the **Object()** constructor (Blank object)

Add properties, methods to the newly created blank object

FUNCTION BASED OBJECTS

OBJECT
KEY / NAME
VALUE

PARAMETERS

```
function Hotel(name, rooms, booked){

  this.name = name;
  this.rooms = rooms;
  this.booked = 24;

  this.checkAvailability = function()
{
    return this.rooms - this.booked;
  };
}
```

PROPERTIES

METHOD

Creating a function Hotel allows it to be used as a template for creating multiple objects

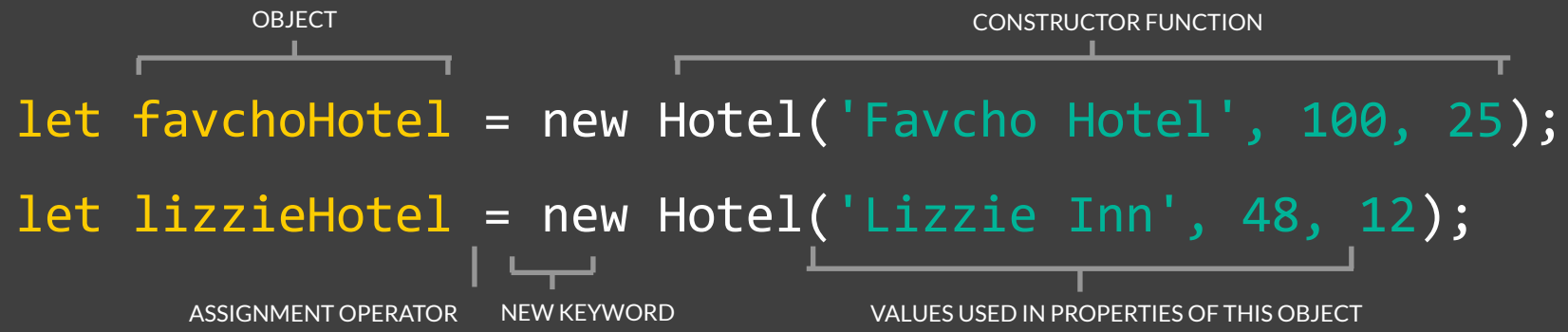
This is called a function based object.

The **this** keyword is used instead of the object name to indicate the property/method belongs to the object that **this** function creates.

Each statement creates a new property or method. Uses **semi-colon** instead of comma (literal object syntax)

https://repl.it/@malcolmyam/wk06-objects#script.js

MULTIPLE OBJECT INSTANCES



The first object **favchoHotel**. Name is "Favcho Hotel".
100 rooms, 25 booked

The second object **lizzieHotel**. Name is "Lizzie Inn".
48 rooms, 12 booked

***Note:** Even when multiple objects are created using the same constructor function, the methods stay the same.

https://repl.it/@malcolmyam/wk06-objects#script.js

ACTIVITY

"Objects" (30min) - GROUP Work

Q1. Working with Literal Objects
Based on your assignment 1, create literal objects of your class models.

Create appropriate literal objects and for each property, indicate the appropriate data types to use.

Q2. Working with Function Based Objects
Based on your assignment 1, create function based objects of your class models, **indicate the appropriate data types to use.**

Create sample object variables based on your models
You may assume your own property values.

Eg. converting SimpleLeaderBoard

```
public class SimpleLeaderBoard {

    public string userName;
    public int highScore;
    public long updatedOn;

    //simple constructor
    public SimpleLeaderBoard() { }

    //constructor with parameters
    public SimpleLeaderBoard(string userName, int highScore)
    {
        this.userName = userName;
        this.highScore = highScore;
        this.updatedOn = GetTimeUnix();
    }
```

```
let simpleLeaderBoard =
{
    "userName": "Royden", //string/
    "highScore": 392, //int
    "updatedOn": 1637707595 //int
}
```

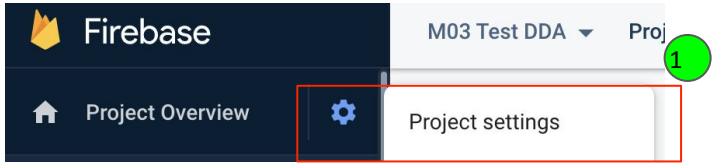
Select the best structured data in your team
Submit your JavaScript files and your C# class models
//save as DDAWk06-studentid-studentname-objects.zip
Upload to Google Classroom

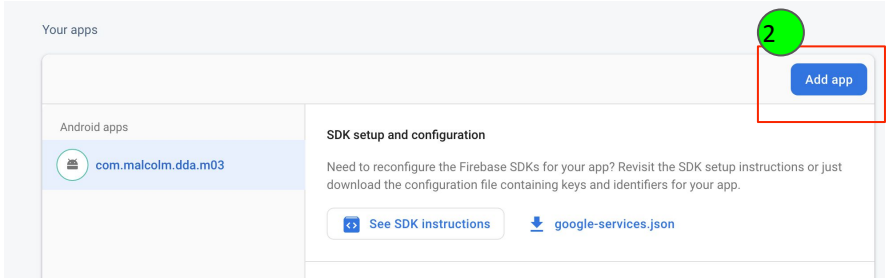
Firebase & Web

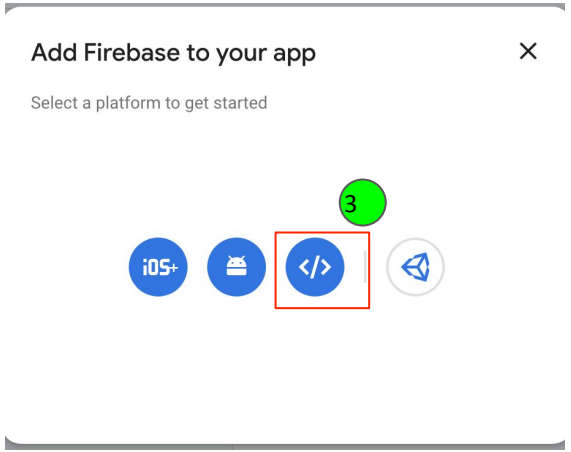
#FirebaseWeb

Setting up Firebase for Web

1. Go to your Firebase Console
2. Select your project
3. Click on Project Overview -> Project Settings
4. Select Add App
5. A popup will appear -> Choose web

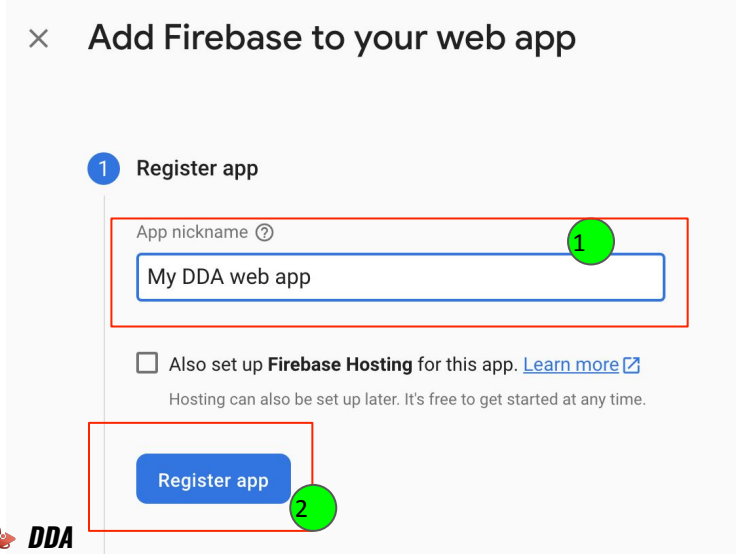


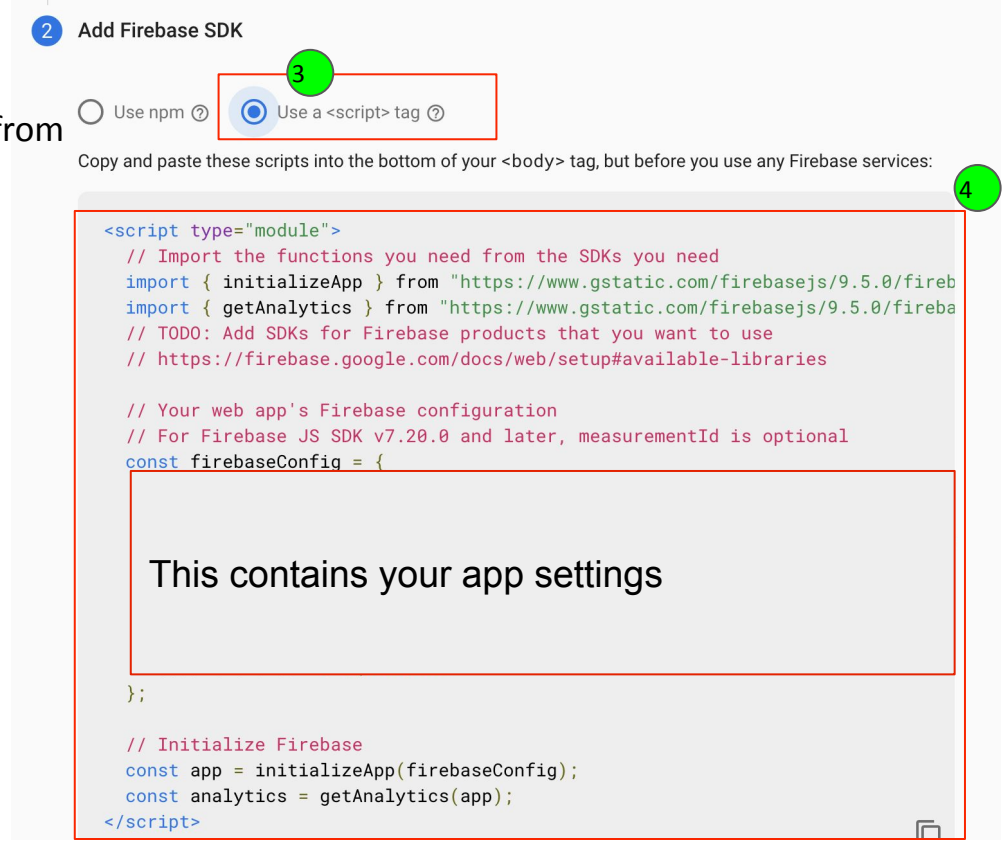




Setting up Firebase for Web

1. Key in an nickname
2. Click on Register app
3. Select “Use a <script> tag”
4. Create a js file, copy and paste the script from Firebase





Connect with Firebase via JS (Read Data)

1. Create a .html file
2. Create a JS file and link it up
3. Start with the skeleton JS script that Firebase provides
4. Let's retrieve data using **get** and **ref**

Note: How we reference nodes/data depends on how you structure your data inside Firebase Database

```
const db = getDatabase();
const playerRef = ref(db, "players");

getPlayerData();
function getPlayerData(){
   //const playerRef = ref(db, "players");
   //PlayerRef is declared at the top using a constant
   //get(child(db,`players/`))
   get(playerRef)
   .then((snapshot) => {//retrieve a snapshot of the data using a callback
   if (snapshot.exists()) {//if the data exist
       try {
           //let's do something about it
           var content = "";
           snapshot.forEach((childSnapshot) => {//looping through each snapshot

//https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/Array/forEach
               console.log("GetPlayerData: childkey " + childSnapshot.key);
           });
       }catch(error){
           console.log("Error getPlayerData" + error);
       }
   }
   });
}//end getPlayerData
```

Connect with Firebase via JS (Create User)

1. Start with the skeleton JS script that Firebase provides
2. Create a form using inputs and a button
3. Create your button listener
4. Test retrieve your form values
5. Let's create auth data using **createUserWithEmailAndPassword** and **userCredential**

Note: How we reference nodes/data depends on how you structure your data inside Firebase Database

```
//Working with Auth
const auth = getAuth();
//retrieve element from form
var frmCreateUser = document.getElementById("frmCreateUser");
//we create a button listener to listen when someone clicks
frmCreateUser.addEventListener("submit", function(e){
 e.preventDefault();
  var email = document.getElementById("email").value;
 var password = document.getElementById("password").value;
 createUser(email, password);
 console.log("email" + email + "password" + password);
});

//create a new user based on email n password into Auth service
//user will get signed in
//userCredential is an object that gets
function createUser(email, password){
 console.log("creating the user");
 createUserWithEmailAndPassword(auth, email, password)
 .then((userCredential)=>{
   //signedin
   const user = userCredential.user;
   console.log("created user ... " + userCredential.toJson());
   console.log("User is now signed in ");
 }).catch((error)=>{
   const errorCode = error.code;
   const errorMessage = error.message;
   console.log(`ErrorCode: ${errorCode} -> Message: ${errorMessage}`);
 });
}
```

Additional Reading

Additional Reference CRUD with Firebase RealTimeDB & Web
https://www.youtube.com/watch?v=oxqVnWPg0So
Simple Firebase DB Setup with Web
https://www.youtube.com/watch?v=S8D9Cxb2lLA

Working with #Auth.CurrentUser

Auth.CurrentUser

The Authentication in Firebase is very powerful and packed with features.

Once we are logged in, we can use our authentication reference to retrieve the current user session and get user's details (userId, DisplayName, ProfilePic, etc)

Additional Reading
https://firebase.google.com/docs/database/security/indexing-data

Working with #Indexes

What is an Index (Optimisation)

An index is a powerful tool. Say for example, our NRICs are unique and we know that it is unique. So it is treated like a key in our database. So once we know exactly the key we can retrieve the data

In databases, an index works by “compiling” that data nicely. So that we can sort our data efficiently. In Firebase terms we use .OrderByChild(“somechildproperty”) or .OrderByKey(“somekey”)

When we index, the database will query and find the data much more efficiently. However, having said so, firebase is pretty efficient. So it depends on how much data you have, and how you want to manipulate the data.

```
{
  "rules": {
    ".read": true,  // 2021-11-11
    ".write": true,//"now < 1636560000000",  // 2021-11-11
     "playerStats": {
      ".indexOn": ["highScore"]
    },
    "leaderboards": {
      ".indexOn": ["highScore"]
    }
  }
}
```

Using OrderByChild hence we index the child properties

Additional Reading

https://firebase.google.com/docs/database/security/indexing-data