Software Development Course

Unit 1: Front End Web Technologies

Session 10

JavaScript: Introduction to the DOM

Recall.

1. What is the difference between a while loop and a do while loop?
2. Which iterator would you use to run a function on each item in an array?
3. How would you write a basic for loop?
4. What is an infinite loop?
5. How do you avoid an infinite loop?

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TechTalent's safeguarding lead is: **Max Ruddock**

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1. Introduction to the DOM

- Understanding and exploring the DOM Model
- Exploring the parent-child relationship to nodes and objects
- Accessing and updating the DOM

The DOM.
The Document Object Model

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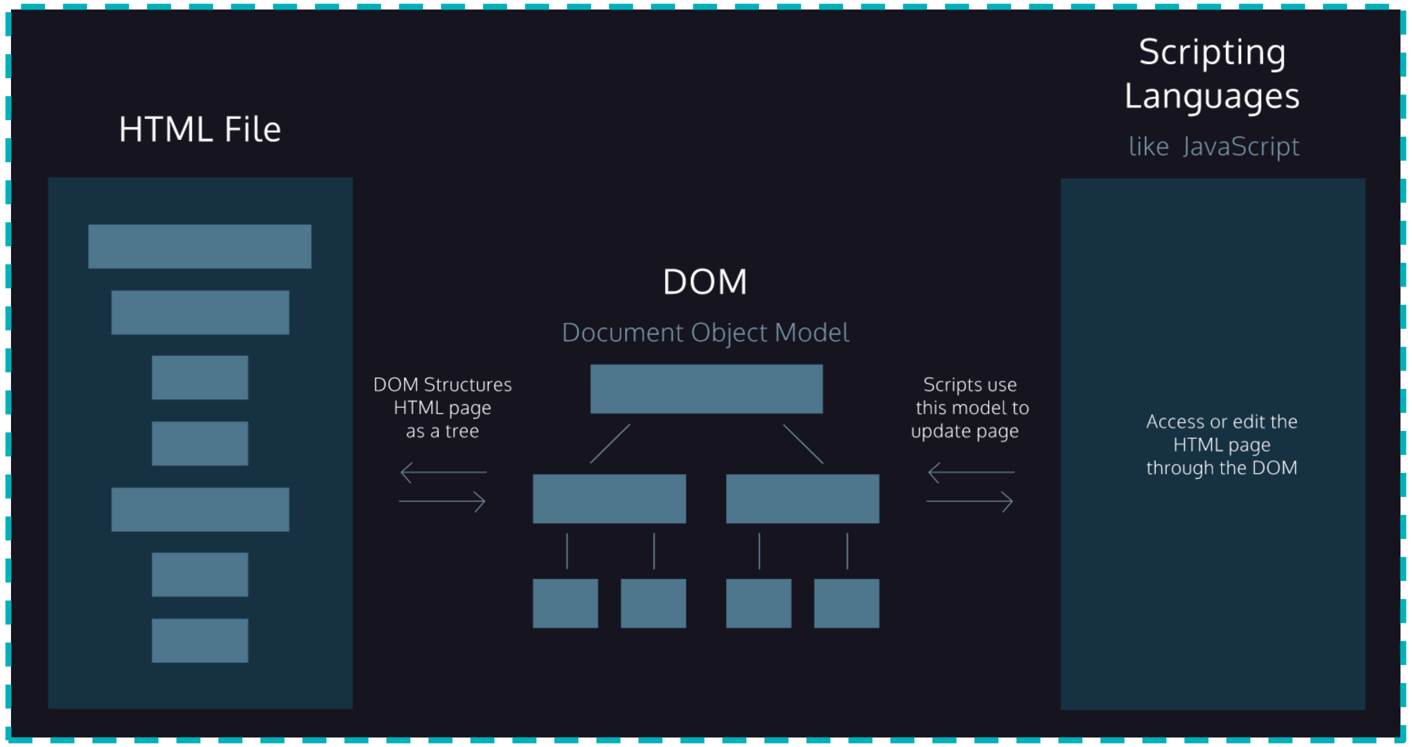
- DOM – Document Object Model
- Allows programmers to conceptualise hierarchy.
- Used to access elements on a web page
- DOM is generated by the browser
- DOM allows JavaScript to access, modify, and update the structure of a HTML web page


HTML File
DOM
Document Object Model
DOM Structures HTML page as a tree
Scripts use this model to update page
Scripting Languages
like JavaScript
Access or edit the HTML page through the DOM

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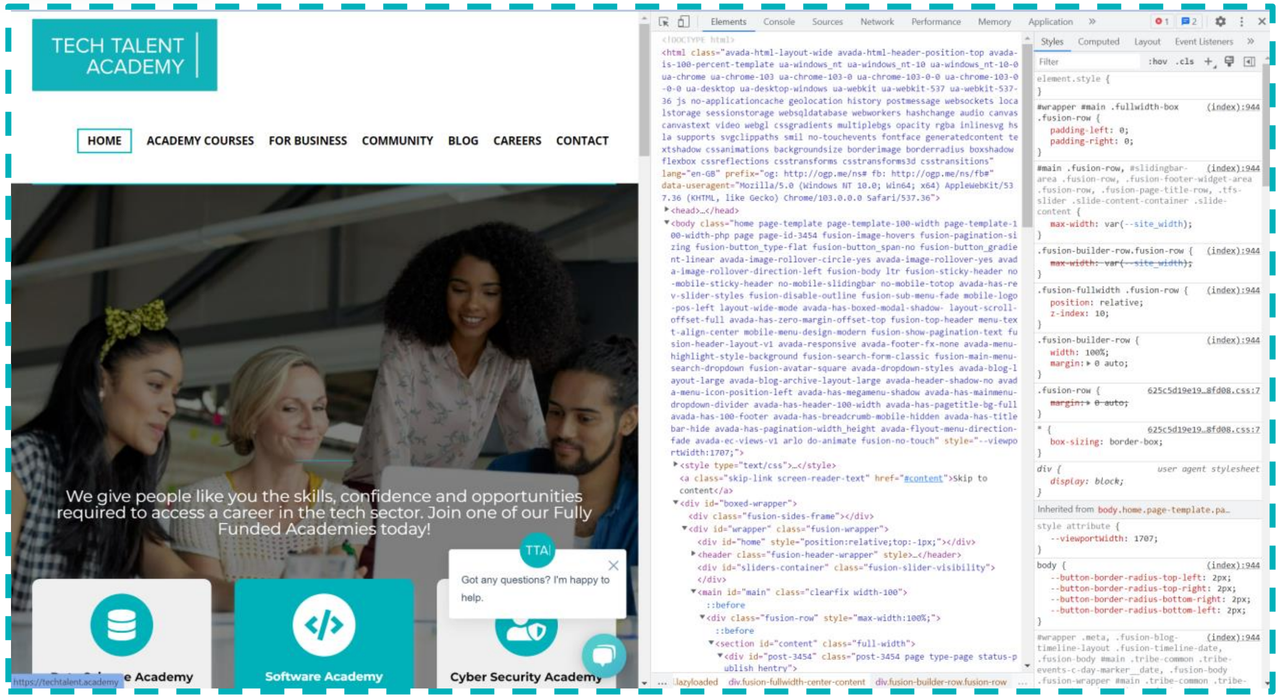
Activity.

Accessing and Updating the DOM

- We can use the console to update the DOM of a page in real time
- The DOM is a virtual representation of the code fed into the web browser – it is NOT the original file



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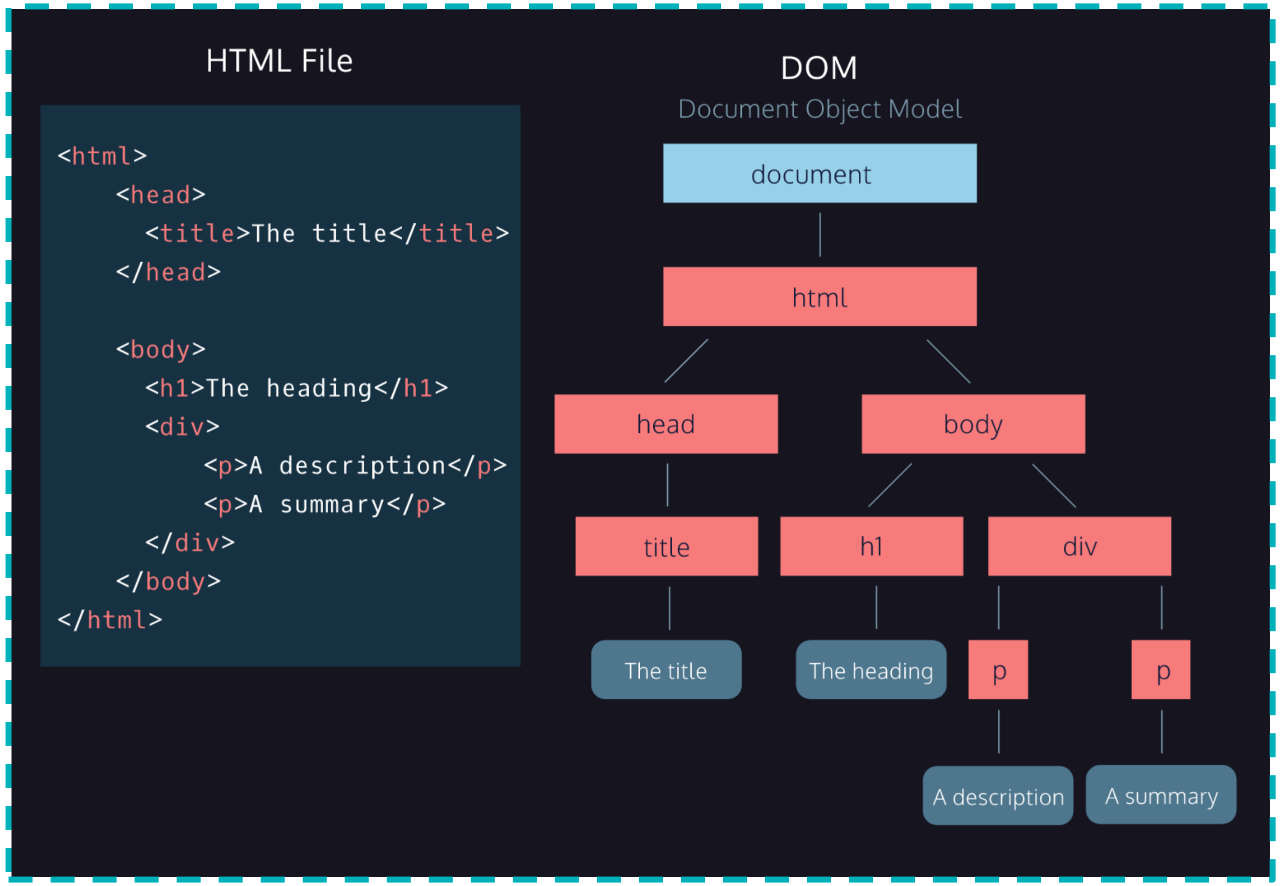
```
<!DOCTYPE html>
<html class="avada-html-layout-wide avada-html-header-position-top avada-is-100-percent-template ua-windows_nt ua-windows_nt-10 ua-windows_nt-10-0 ua-chrome ua-chrome-103 ua-chrome-103-0 ua-chrome-103-0-0 ua-chrome-103-0-0-0 ua-desktop ua-desktop-windows ua-webkit ua-webkit-537 ua-webkit-537-36 js no-applicationcache geolocation history postmessage websockets localstorage sessionstorage websqldatabase webworkers hashchange audio canvas canvastext video webgl cssgradients multiplebgs opacity rgba inlinesvg hsla supports svgclippaths smil no-touchevents fontface generatedcontent textshadow cssanimations backgroundsize borderimage borderradius boxshadow flexbox cssreflections csstransforms csstransforms3d csstransitions" lang="en-GB" prefix="og: http://ogp.me/ns# fb: http://ogp.me/ns/fb#" data-useragent="Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/103.0.0.0 Safari/537.36">
 ▶<head>…</head>
 ▼<body class="home page-template page-template-100-width page-template-100-width-php page page-id-3454 fusion-image-hovers fusion-pagination-sizing fusion-button_type-flat fusion-button_span-no fusion-button_gradient-linear avada-image-rollover-circle-yes avada-image-rollover-yes avada-image-rollover-direction-left fusion-body ltr fusion-sticky-header no-mobile-sticky-header no-mobile-slidingbar no-mobile-totop avada-has-rev-slider-styles fusion-disable-outline fusion-sub-menu-fade mobile-logo-pos-left layout-wide-mode avada-has-boxed-modal-shadow- layout-scroll-offset-full avada-has-zero-margin-offset-top fusion-top-header menu-text-align-center mobile-menu-design-modern fusion-show-pagination-text fusion-header-layout-v1 avada-responsive avada-footer-fx-none avada-menu-highlight-style-background fusion-search-form-classic fusion-main-menu-search-dropdown fusion-avatar-square avada-dropdown-styles avada-blog-layout-large avada-blog-archive-layout-large avada-header-shadow-no avada-menu-icon-position-left avada-has-megamenu-shadow avada-has-mainmenu-dropdown-divider avada-has-header-100-width avada-has-pagetitle-bg-full avada-has-100-footer avada-has-breadcrumb-mobile-hidden avada-has-titlebar-hide avada-has-pagination-width_height avada-flyout-menu-direction-fade avada-ec-views-v1 arlo do-animate fusion-no-touch" style="--viewportWidth:1707;">
   ▶<style type="text/css">…</style>
    <a class="skip-link screen-reader-text" href="#content">Skip to content</a>
   ▼<div id="boxed-wrapper">
      <div class="fusion-sides-frame"></div>
     ▼<div id="wrapper" class="fusion-wrapper">
        <div id="home" style="position:relative;top:-1px;"></div>
       ▶<header class="fusion-header-wrapper" style>…</header>
        <div id="sliders-container" class="fusion-slider-visibility">
        </div>
       ▼<main id="main" class="clearfix width-100">
          ::before
         ▼<div class="fusion-row" style="max-width:100%;">
            ::before
           ▼<section id="content" class="full-width">
             ▼<div id="post-3454" class="post-3454 page type-page status-publish hentry">
… lazyloaded   div.fusion-fullwidth-center-content   div.fusion-builder-row.fusion-row   …
```

```
element.style {
}
#wrapper #main .fullwidth-box                 (index):944
.fusion-row {
    padding-left: 0;
    padding-right: 0;
}
#main .fusion-row, #slidingbar-               (index):944
area .fusion-row, .fusion-footer-widget-area
.fusion-row, .fusion-page-title-row, .tfs-
slider .slide-content-container .slide-
content {
    max-width: var(--site_width);
}
.fusion-builder-row.fusion-row {              (index):944
    ~~max-width: var(--site_width);~~
}
.fusion-fullwidth .fusion-row {               (index):944
    position: relative;
    z-index: 10;
}
.fusion-builder-row {                         (index):944
    width: 100%;
    margin: ▶ 0 auto;
}
.fusion-row {                   625c5d19e19…8fd08.css:7
    ~~margin: ▶ 0 auto;~~
}
* {                             625c5d19e19…8fd08.css:7
    box-sizing: border-box;
}
div {                            user agent stylesheet
    display: block;
}
Inherited from body.home.page-template.pa…
style attribute {
    --viewportWidth: 1707;
}
body {                                        (index):944
    --button-border-radius-top-left: 2px;
    --button-border-radius-top-right: 2px;
    --button-border-radius-bottom-right: 2px;
    --button-border-radius-bottom-left: 2px;
}
#wrapper .meta, .fusion-blog-                 (index):944
timeline-layout .fusion-timeline-date,
.fusion-body #main .tribe-common .tribe-
events-c-day-marker__date, .fusion-body
.fusion-wrapper #main .tribe-common .tribe-
```

The DOM. Nodes

- Top most node is referred to as the 'root node'
- Sharp-edged rectangles are element nodes
- Rounded edge rectangles are text nodes
- When modifying a web page, the script will mostly interact with the DOM elements (occasionally text nodes)

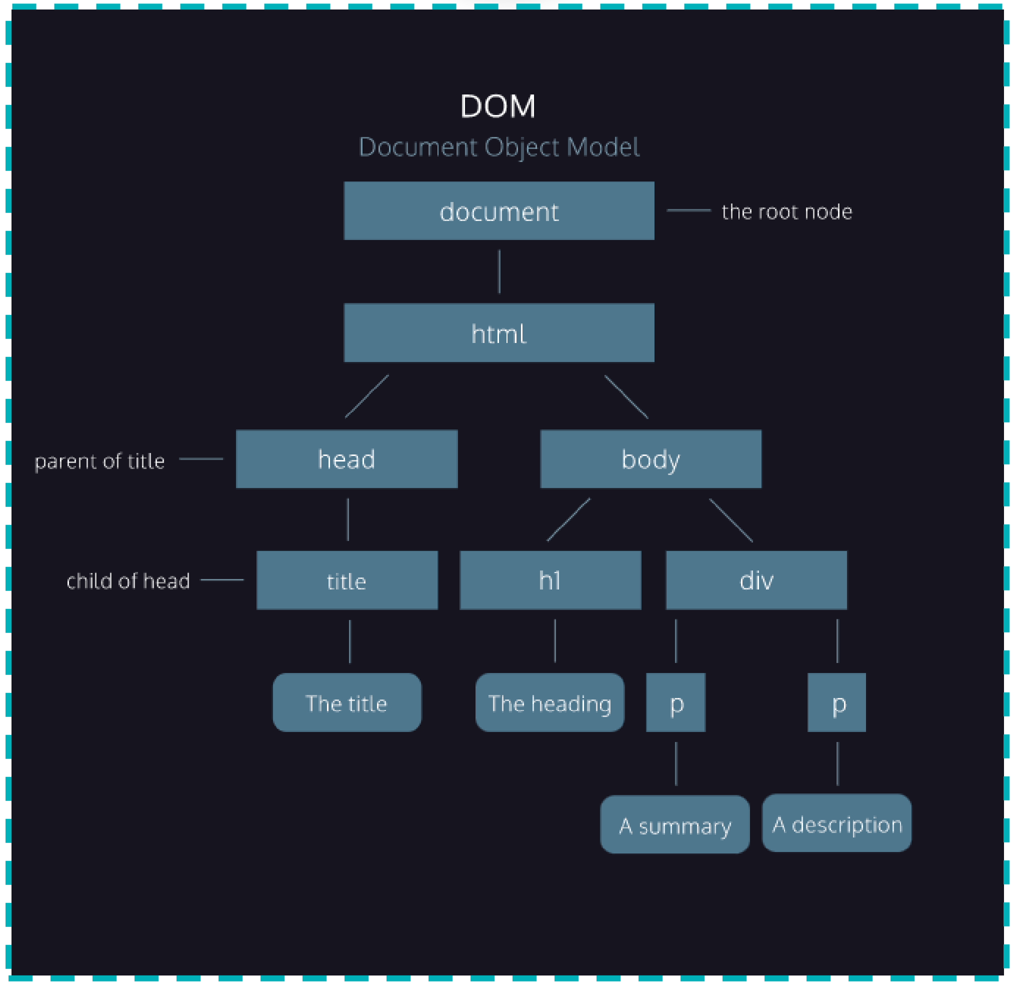

HTML File

```
<html>
    <head>
      <title>The title</title>
    </head>

    <body>
      <h1>The heading</h1>
      <div>
          <p>A description</p>
          <p>A summary</p>
      </div>
    </body>
</html>
```

The DOM.
Parent-Child Relationship

- A parent node is any node that is a direct ancestor of another node
- A child node is a direct descendant of another node, called the parent node



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2. The Script Tag

- Exploring the different methods to include JavaScript into a HTML webpage
- Using HTML buttons to add JavaScript functionality to a webpage

Scripts.

Inline and Internal JavaScript

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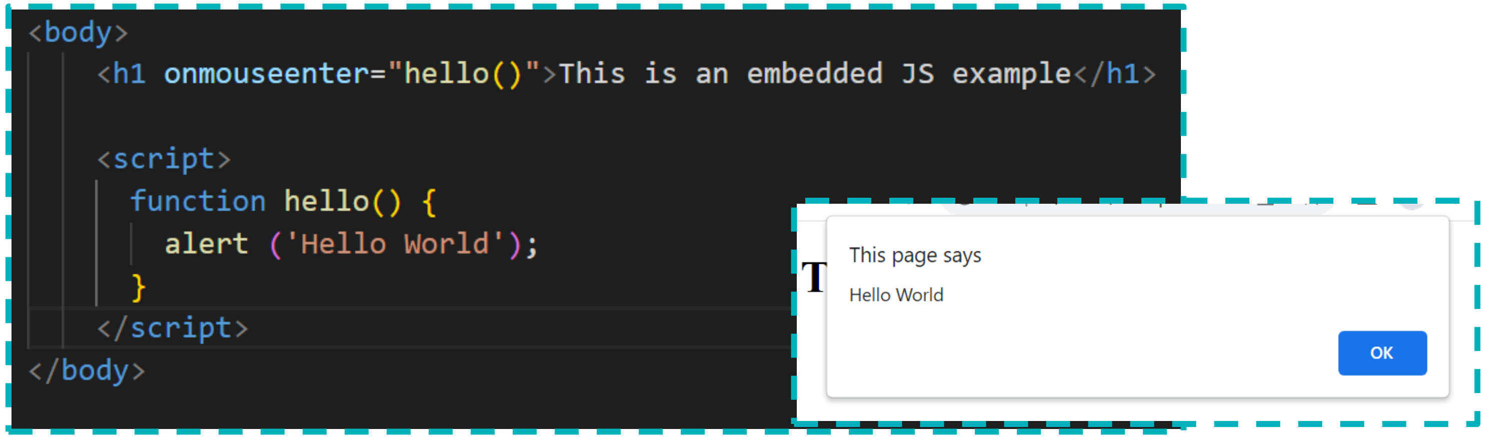
- Like CSS, you can have internal, external and inline JavaScript
- The <script></script> tag allows JavaScript code to be added to a HTML file
- Works like most tag within HTML
- Can be placed anywhere within a HTML file
- By default the web browser will load the script when loading the HTML file (top to bottom)



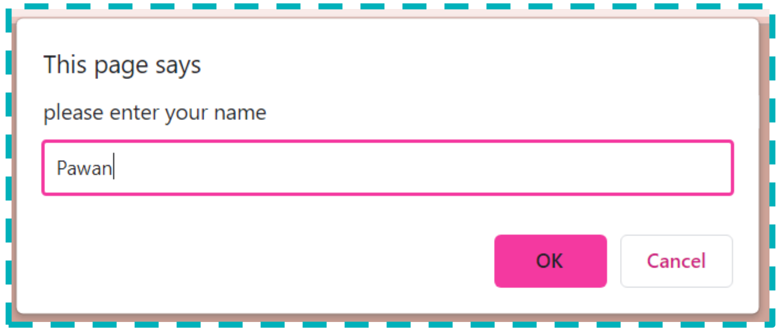
```
<body>
    <h1 onmouseenter="hello()">This is an embedded JS example</h1>

    <script>
      function hello() {
        alert ('Hello World');
      }
    </script>
</body>
```

```
This page says
Hello World
```

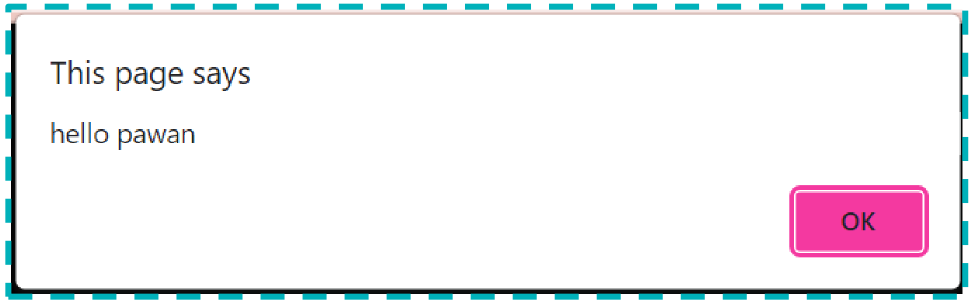
Scripts.
prompt() and alert()

- Console is for developers
- We use prompt() and alert() to get and present information to users
- (not best practice but good to know)
- Information gathered from prompt() can be stored as a variable

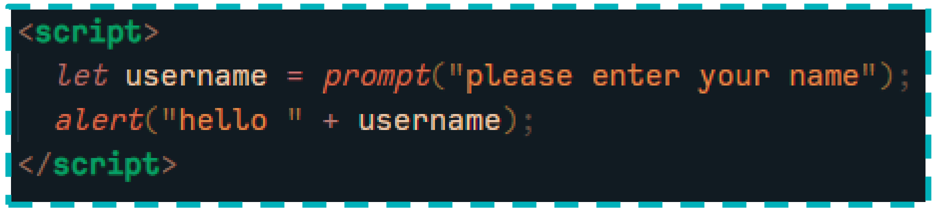

This page says

please enter your name

Pawan


This page says

hello pawan

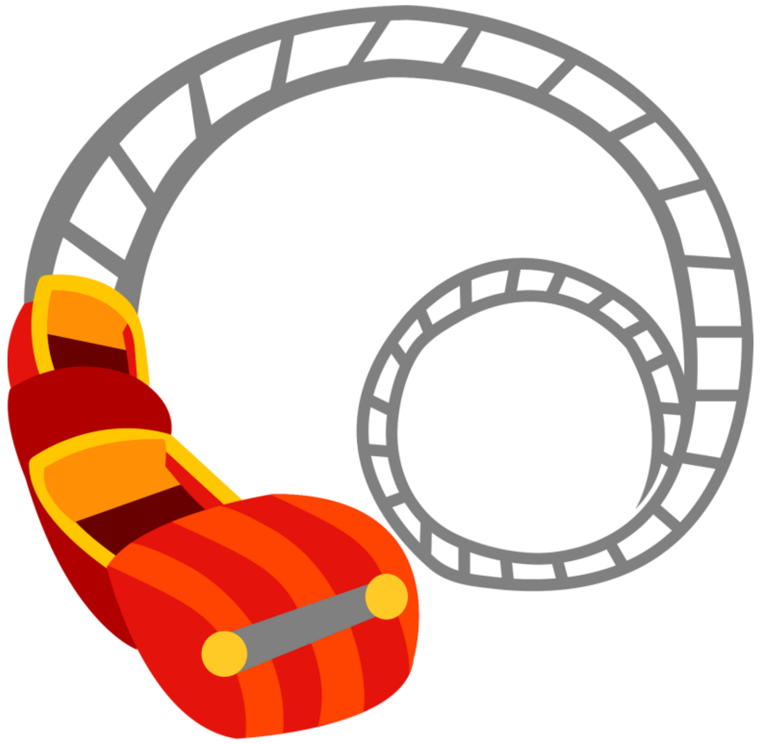


```
<script>
  let username = prompt("please enter your name");
  alert("hello " + username);
</script>
```

Activity.
User Loops

- Create a loop that will ask the user for number and then print out the following sentence that number of times:
  - “The value of i is: i” where the second i is replaced with the value e.g. ‘The value of i is: 1” etc

Challenge: Create a loop that will print the number of times the loop has been executed, and only exit when the user inputs the word “stop”.



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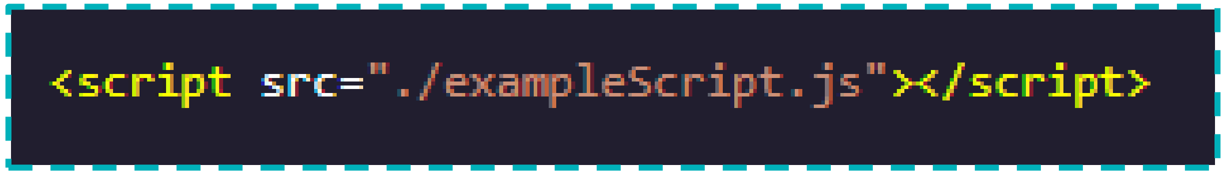
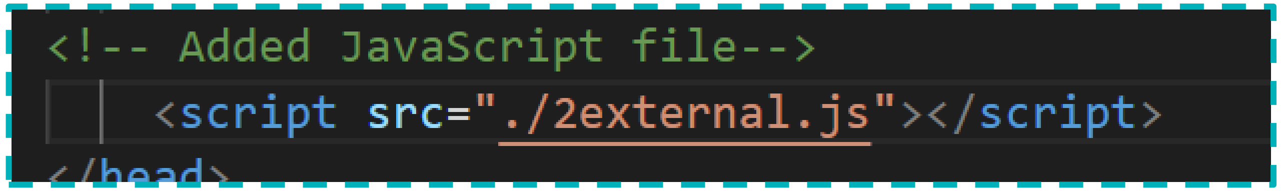
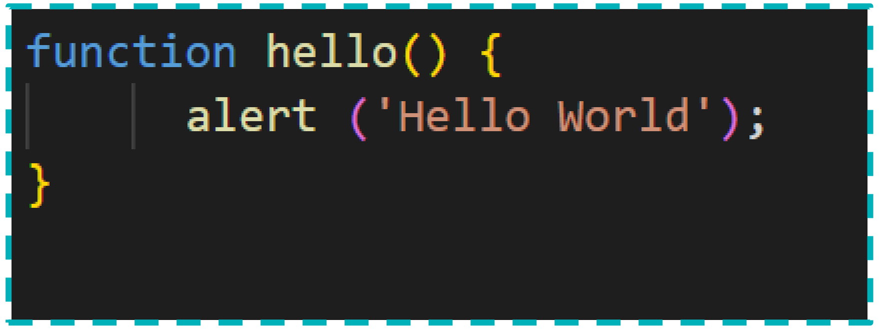
Scripts.
External scripts

- SoC (Separation of Concerns)
  - Having JavaScript written in-line with HTML can be messy and can cause concerns when the code does not run as intended.

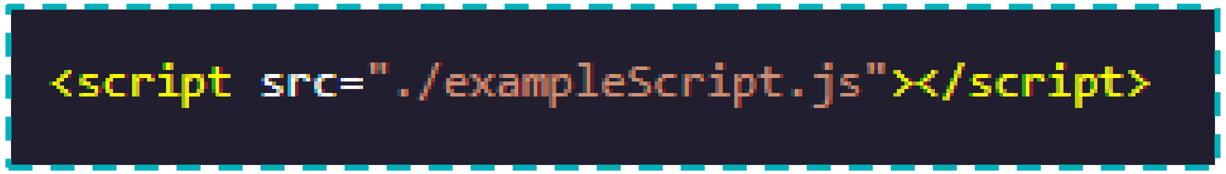

```
<script src="./exampleScript.js"></script>
```


```
<!-- Added JavaScript file-->
    <script src="./2external.js"></script>
</head>
```

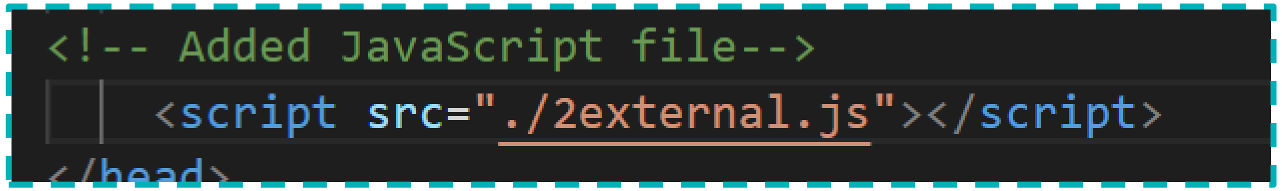

```
function hello() {
    alert ('Hello World');
}
```

Scripts.
External scripts

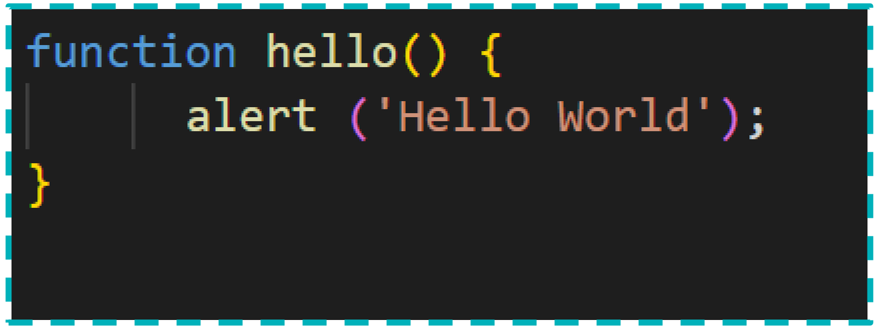
- SoC (Separation of Concerns)
  - Having JavaScript written in-line with HTML can be messy and can cause concerns when the code does not run as intended.



```
<script src="./exampleScript.js"></script>
```



```
<!-- Added JavaScript file-->
    <script src="./2external.js"></script>
</head>
```



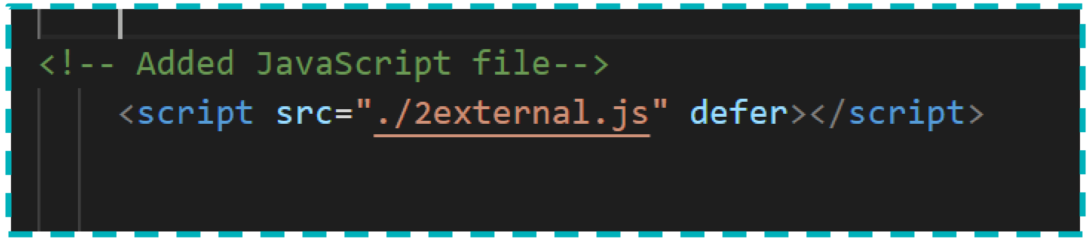
```
function hello() {
    alert ('Hello World');
}
```

Scripts.
Parsing

- All browsers come equipped with HTML parsers that help render the elements accordingly
- Elements, including the <script> element, are by default parsed in the order they appear in the HTML file
- When the HTML parser encounters a <script> element, it loads the script then executes its contents before parsing the rest of the HTML
- Important points:
  - The HTML parser does NOT process the next element in the HTML file until it loads and executes the <script> element, thus leading to a delay in load time and often resulting in poor user experience
  - Scripts are loaded sequentially, so if one script is dependent on another script, they should be placed in that very order inside the HTML

Scripts.
Defer Attribute

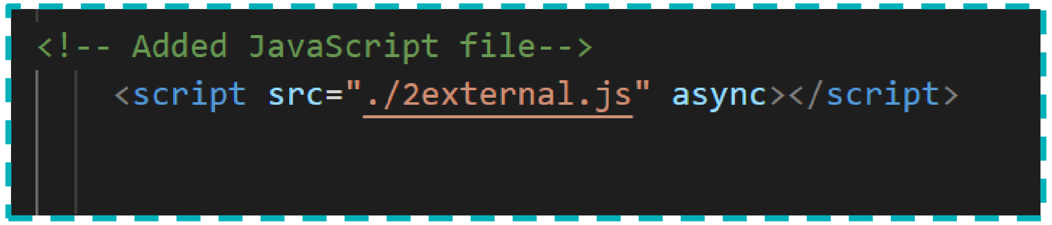
- Adding the defer attribute specifies scripts should be executed after the HTML file is completely parsed
- Added inside the open <script> tag
- HTML parser loads the script but defers the actual execution until all HTML elements have been parsed.
- Used when script requires interaction with the DOM
- Defer attribute is only for external scripts



```
<!-- Added JavaScript file-->
    <script src="./2external.js" defer></script>
```

Scripts.
Async Attribute

- Adding the async attribute specifies scripts should be downloaded and parsed in parallel along with the HTML file
- The script will execute as soon as it is available.
- Added inside the open <script> tag
- Defer attribute is only for external scripts



```
<!-- Added JavaScript file-->
    <script src="./2external.js" async></script>
```

Scripts.
Best Practice

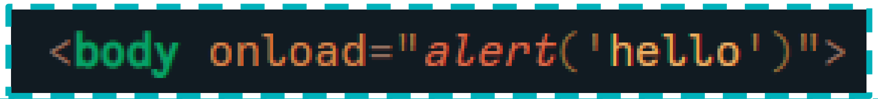
- Although we can use the <script> tag for simple code, best practice is that we store our scripts externally.
- To do this, create a .js file locally (usually script.js) and include it within the <head> of our document:

```
<script src="script.js"></script>
```

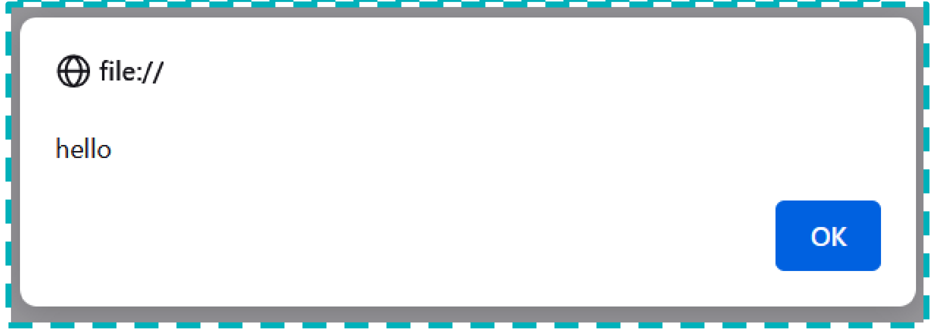
- Multiple script files should be included in its own folder e.g. 'Javascript', which would change the 'src' path too: Javascript/script.js

Scripts.
Events

- An event is something that happens to an element
- JavaScript 'listens' out for these events and then 'reacts' to them
- For example <body onload="alert('hello!')"> will execute a pop-up when the onload event occurs (not recommended however!)
- Some of the most common events are: onmouseover, onmouseout, onclick, onchange etc, but there are lots more: https://www.w3schools.com/jsref/dom_obj_event.asp



```
<body onload="alert('hello')">
```

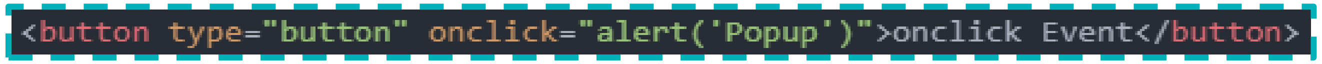


file://

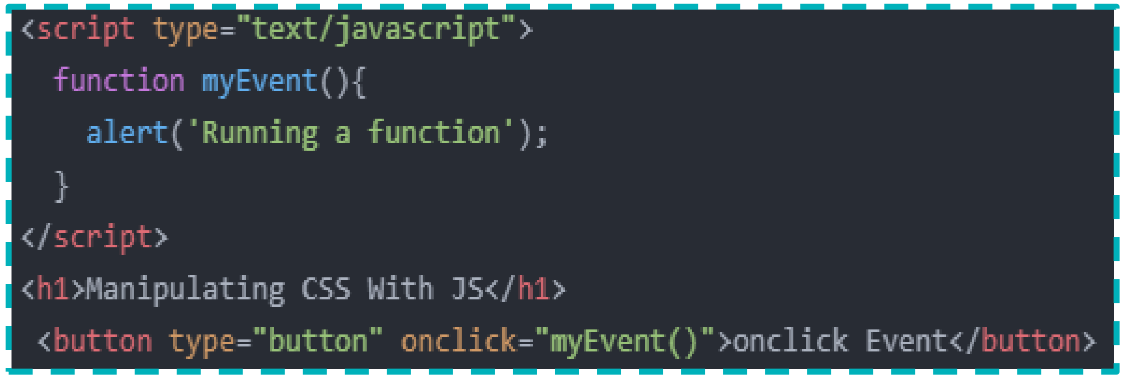
hello

Scripts.
onclick events

- Let's start by looking at adding in some buttons to a webpage and associating some functionality to that button with JavaScript.
- The code on the right has two properties associated with it: it's type and an onclick event. We have set the event to create an alert dialogue box that says the word "popup" when the button is pressed.
- *Mini-task: create a button that pops up an alert box*



```html
<button type="button" onclick="alert('Popup')">onclick Event</button>
```



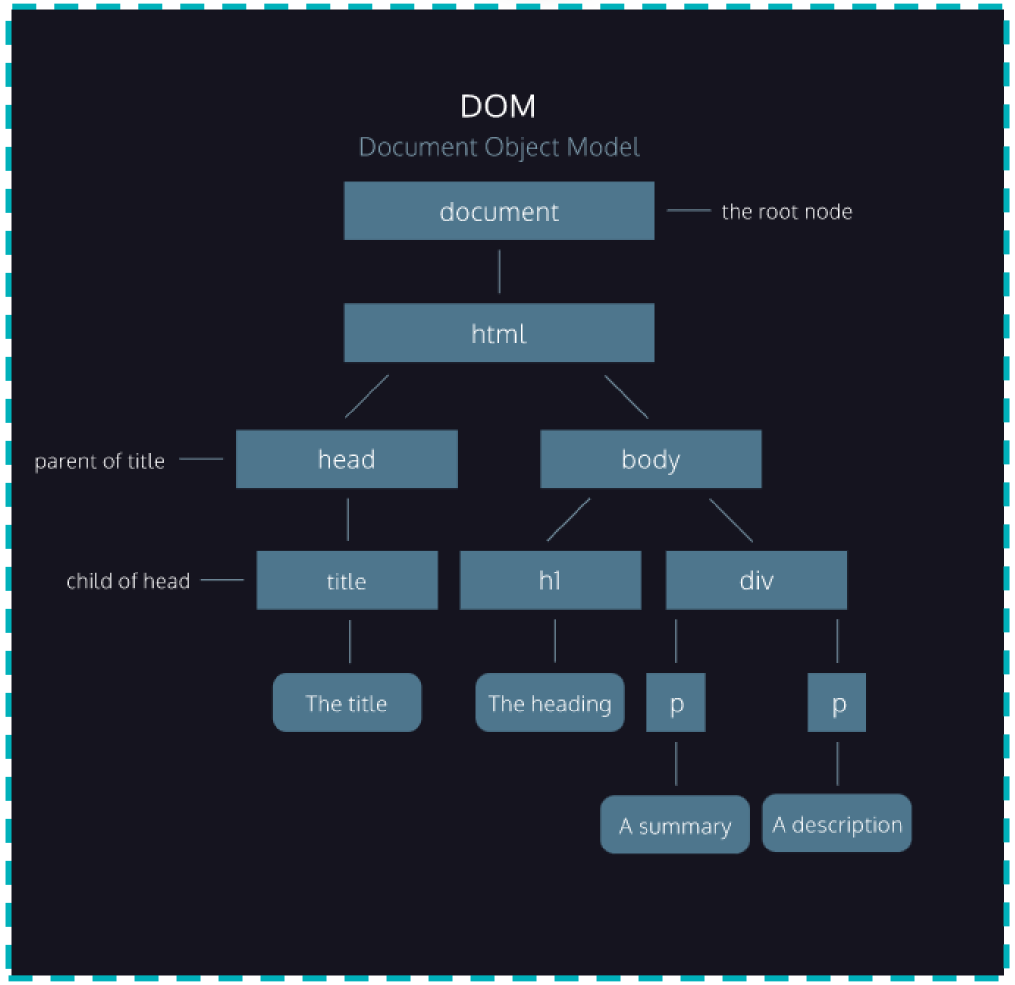
```html
<script type="text/javascript">
  function myEvent(){
    alert('Running a function');
  }
</script>
<h1>Manipulating CSS With JS</h1>
 <button type="button" onclick="myEvent()">onclick Event</button>
```

3. Grabbing Elements

- Exploring the different methods to grab elements from the DOM

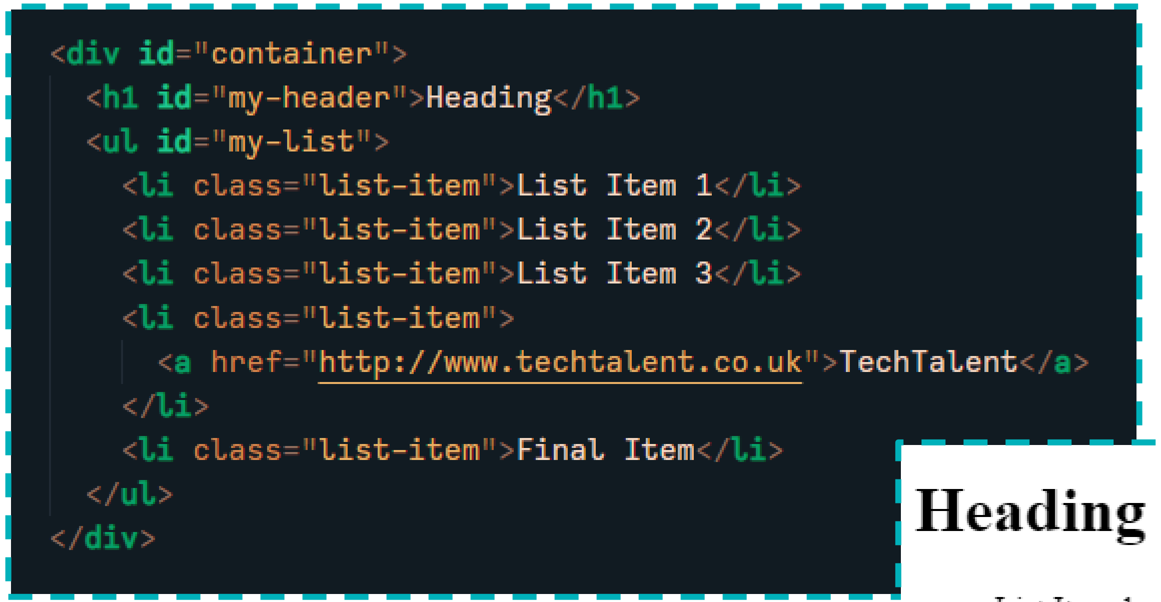
Grabbing Elements.
DOM Tree

- A reminder that elements are arranged in a tree structure, with each element being a **node**
- There are different ways of ‘grabbing’ these different items

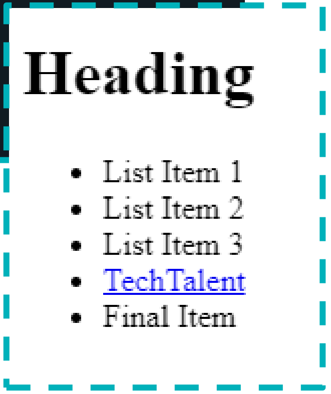


Grabbing Elements.
Code Along

- A reminder that elements are arranged in a tree structure, with each element being a **node**
- There are different ways of 'grabbing' these different items
- Open the '3.1 Grabbing Elements Task' HTML file in a browser and open up the **console**.



```html
<div id="container">
  <h1 id="my-header">Heading</h1>
  <ul id="my-list">
    <li class="list-item">List Item 1</li>
    <li class="list-item">List Item 2</li>
    <li class="list-item">List Item 3</li>
    <li class="list-item">
      <a href="http://www.techtalent.co.uk">TechTalent</a>
    </li>
    <li class="list-item">Final Item</li>
  </ul>
</div>
```



Heading

- List Item 1
- List Item 2
- List Item 3
- TechTalent
- Final Item

Grabbing Elements.
Selecting HTML Activity

- **Select the following items:**
- The heading
- The anchor tag
- The last item on the list
- The array of the list items

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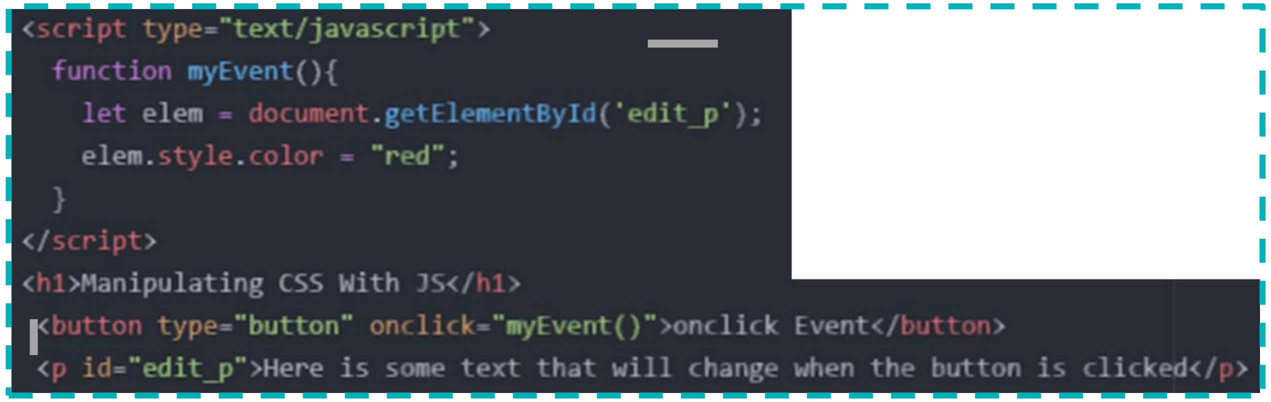
Grabbing Elements.
Changing content

- Step 1: grabbing an element. You need to store it as a variable in order to do things with it
- Step 2: calling a method on it to change it
- To be able to access elements of our webpage, we need to have **identifiers** on those elements.

```
const myBody = document.getElementByTagName('body');
const myTitle = document.getElementById('title');
```

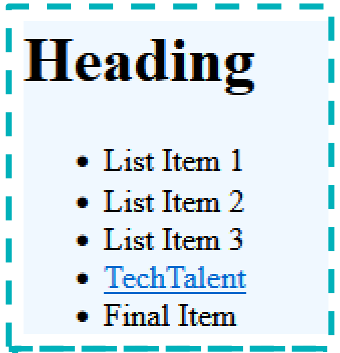
```
myBody[0].innerHTML = "<p>new HTML to replace old HTML</p>";

myTitle.textContent = "new Title";
```



```
<script type="text/javascript">
  function myEvent(){
    let elem = document.getElementById('edit_p');
    elem.style.color = "red";
  }
</script>
<h1>Manipulating CSS With JS</h1>
<button type="button" onclick="myEvent()">onclick Event</button>
<p id="edit_p">Here is some text that will change when the button is clicked</p>
```

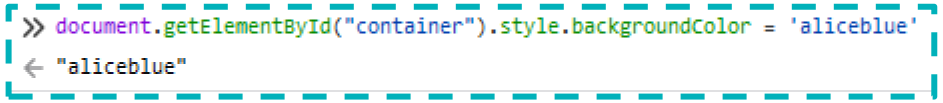
Grabbing Elements.
Changing content

- .textContent – accepts a string; changes the text
- .innerHTML – accepts a string; changes the HTML
- .style – any CSS property can be changed using dot notation and camelCase

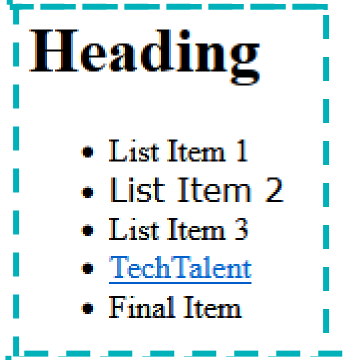


Heading

- List Item 1
- List Item 2
- List Item 3
- TechTalent
- Final Item

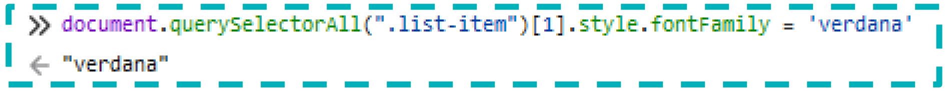


```
>> document.getElementById("container").style.backgroundColor = 'aliceblue'
← "aliceblue"
```

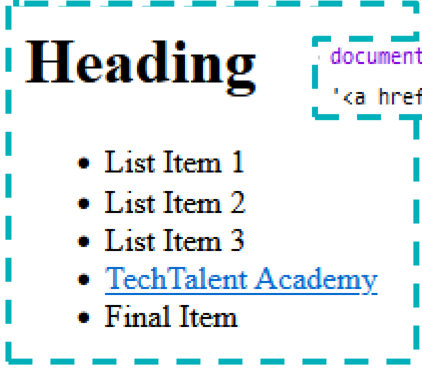


Heading

- List Item 1
- List Item 2
- List Item 3
- TechTalent
- Final Item

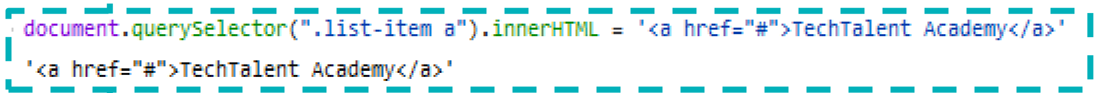


```
>> document.querySelectorAll(".list-item")[1].style.fontFamily = 'verdana'
← "verdana"
```



Heading

- List Item 1
- List Item 2
- List Item 3
- TechTalent Academy
- Final Item



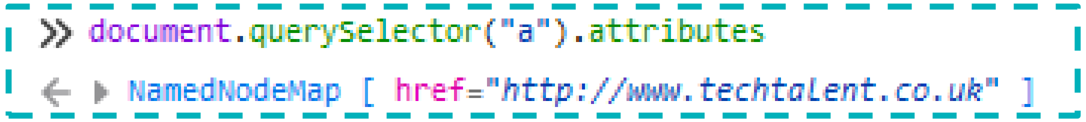
```
document.querySelector(".list-item a").innerHTML = '<a href="#">TechTalent Academy</a>'
'<a href="#">TechTalent Academy</a>'
```

Grabbing Elements.
Changing CSS

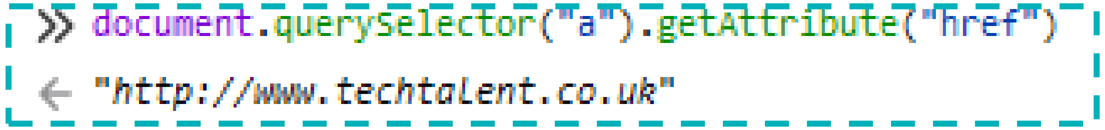
- On this webpage, create 3 buttons that will activate different methods to change the style of your webpage.
- This page holds a complete list of accessible styles. What else can you change? https://www.w3schools.com/jsref/dom_obj_style.asp
- **Challenge**: You can also create new elements. Research and add another element to the list

Grabbing Elements.
Changing attributes

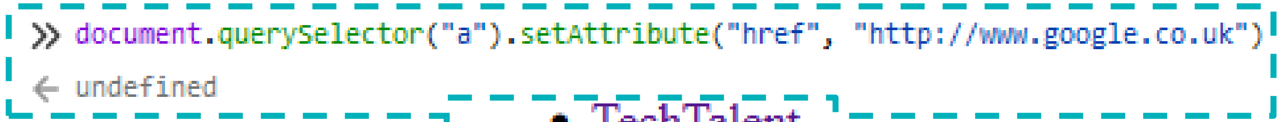
- .attributes – gives a list of elements attached to an element
- .getAttribute(“”) – gets back values
- .setAttribute(“”, “”) – takes two parameters: what attribute you want to access, and what you want to set it to



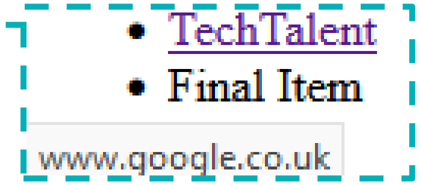
```
>> document.querySelector("a").attributes
<- ▶ NamedNodeMap [ href="http://www.techtalent.co.uk" ]
```



```
>> document.querySelector("a").getAttribute("href")
<- "http://www.techtalent.co.uk"
```



```
>> document.querySelector("a").setAttribute("href", "http://www.google.co.uk")
<- undefined
```

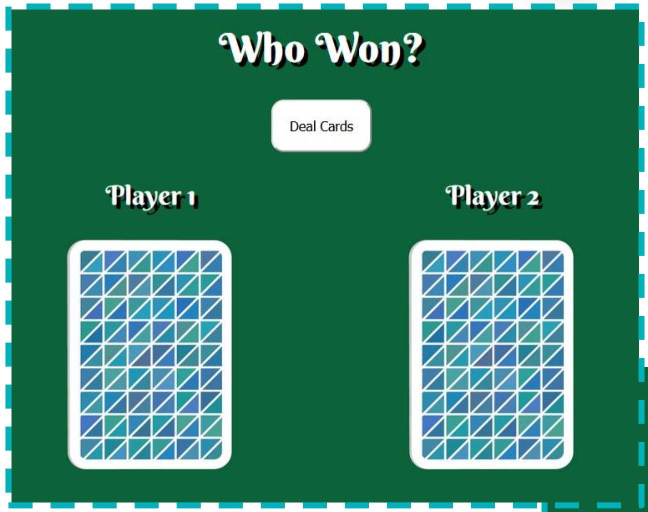


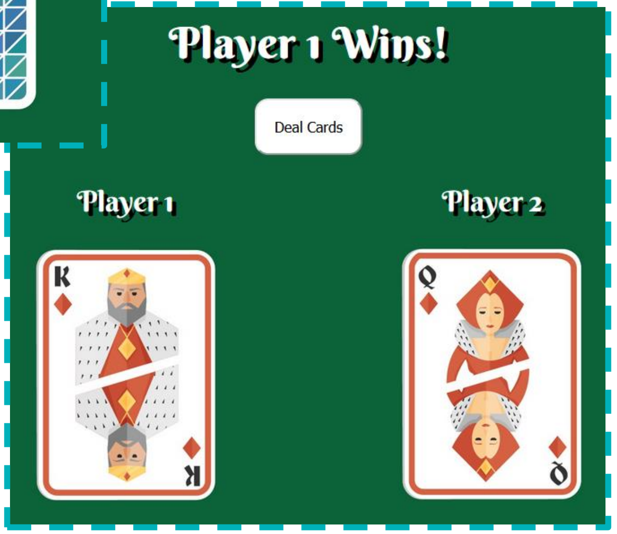
- TechTalent
- Final Item

www.google.co.uk

Activity.
Playing Cards

- You have been given some starter code to create a playing card game.
- Every time you refresh the screen, a new card – either a Jack, Queen, King, Ace or Joker – is chosen.
- Whoever draws the highest card, wins.
- There is a README file in the starter code with further instructions, and the completed code, too.





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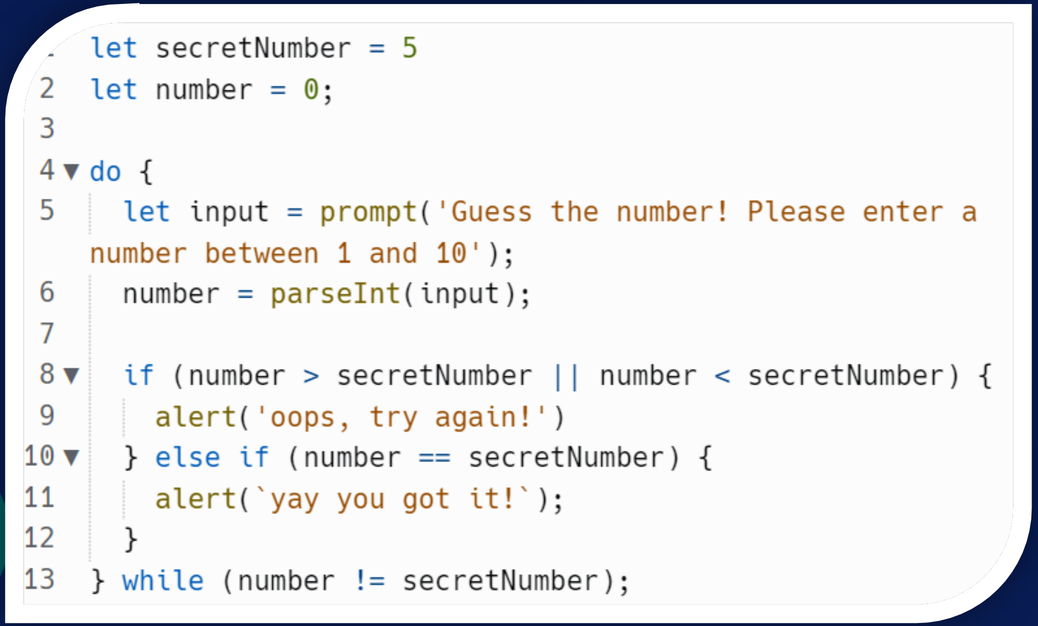
Review.

Which of the following pieces of code will run correctly?

a)

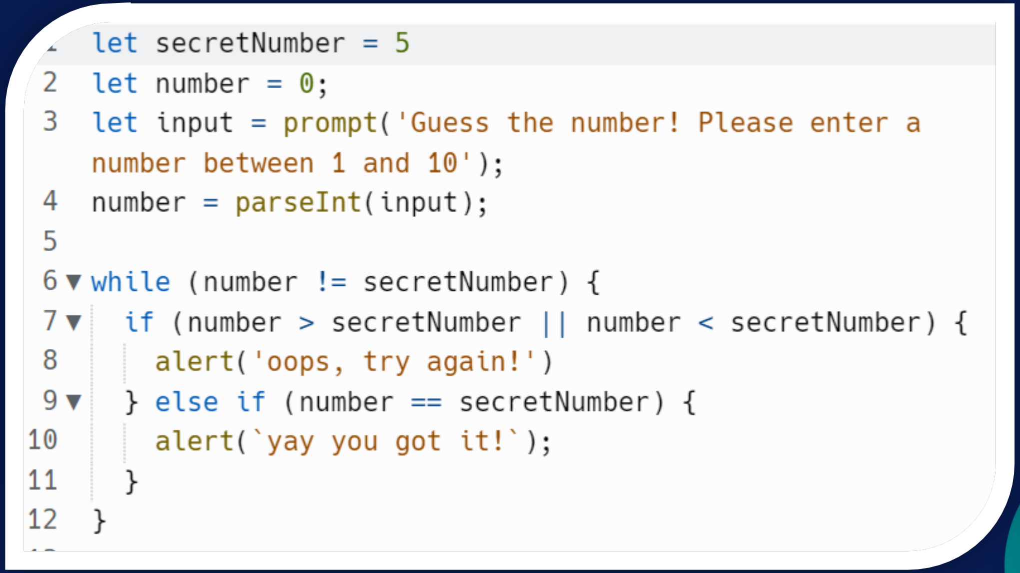


```
let secretNumber = 5
let number = 0;

do {
  let input = prompt('Guess the number! Please enter a number between 1 and 10');
  number = parseInt(input);

  if (number > secretNumber || number < secretNumber) {
    alert('oops, try again!')
  } else if (number == secretNumber) {
    alert(`yay you got it!`);
  }
} while (number != secretNumber);
```

b)



```
let secretNumber = 5
let number = 0;
let input = prompt('Guess the number! Please enter a number between 1 and 10');
number = parseInt(input);

while (number != secretNumber) {
  if (number > secretNumber || number < secretNumber) {
    alert('oops, try again!')
  } else if (number == secretNumber) {
    alert(`yay you got it!`);
  }
}
```

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