CoGrammar

Welcome to this session:
DOM Manipulation and Event Handling

The session will start shortly...

Questions? Drop them in the chat.
We'll have dedicated moderators answering questions.

Safeguarding & Welfare

We are committed to all our students and staff feeling safe and happy; we want to make sure there is always someone you can turn to if you are worried about anything.

If you are feeling upset or unsafe, are worried about a friend, student or family member, or you feel like something isn't right, speak to our safeguarding team:

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- The use of disrespectful language is prohibited in the questions, this is a supportive, learning environment for all - please engage accordingly. **(Fundamental British Values: Mutual Respect and Tolerance)**
- No question is daft or silly - **ask them!**
- There are **Q&A sessions** midway and at the end of the session, should you wish to ask any follow-up questions. Moderators are going to be answering questions as the session progresses as well.
- If you have any questions outside of this lecture, or that are not answered during this lecture, please do submit these for upcoming Academic Sessions. You can submit these questions here: **Questions**

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- For all **non-academic questions**, please submit a query: ***www.hyperiondev.com/support***
- **Report a safeguarding incident: *www.hyperiondev.com/safeguardreporting***
- We would love your feedback on lectures: ***Feedback on Lectures.***
- Find all the lecture **content** in your **Lecture Backpack** on GitHub.
- If you are hearing impaired, kindly use your computer's function through Google chrome to enable captions.

Learning Outcomes

- Explain the Document Object Model (DOM) and its role in web interactions.
- Use query selectors to manipulate HTML elements through JavaScript.
- Implement event listeners to handle user interactions like clicks, mouse movements, and keyboard events

Lecture Overview

- Integrating HTML with JavaScript
- The Document Object Model (DOM)
- Query Selectors
- DOM manipulation
- JavaScript events and event handlers.

The Document Object Model (DOM)

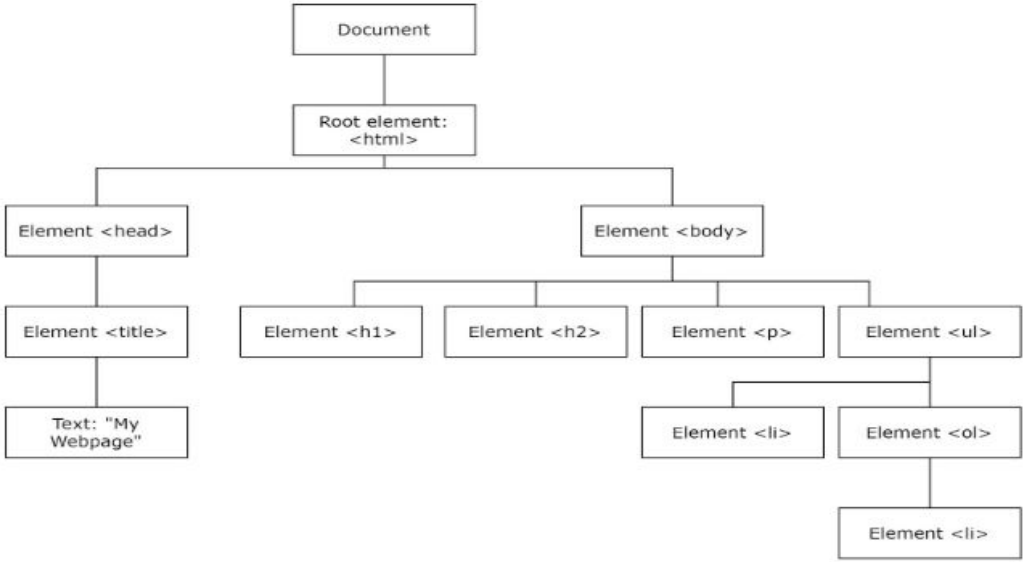
- What is the Document Object Model (DOM)?
  - **The Document Object Model (DOM)** is a programming interface for web documents.
  - It represents the **structure** of HTML documents as a hierarchical **tree** of **objects**.
  - Each **node** in the tree corresponds to a **part** of the document, such as elements, attributes, or text content.
  - The DOM **provides** a structured representation of the document, allowing **scripts** to **dynamically** access, modify, and manipulate its content and structure.

The Document Object Model Example

```
<!DOCTYPE html>
<html>
  <head>
    <title>My Webpage</title>
  </head>
  <body>
    <h1></h1>
    <h2></h2>
    <p></p>
    <ul>
      <li></li>
      <ol>
        <li></li>
      </ol>
    </ul>
  </body>
</html>
```

The Document Object Model Example

- This would be graphically represented as a tree like this:



DOM Manipulation

- What is **DOM** Manipulation?
  - DOM manipulation refers to the process of **dynamically** altering the structure, content, or style of web documents using **scripting languages** like JavaScript.
  - It allows developers to create **interactive** and **dynamic** web pages by **accessing** and **modifying** elements in the Document Object Model (DOM).

DOM Manipulation

- Why is **DOM** Manipulation significant?
  - It enables developers to respond to user actions, update content dynamically, and create engaging user experiences without page reloads.
  - It forms the foundation for modern web applications, facilitating tasks such as form validation, content updates, and animation effects.
  - It empowers developers to create responsive and interactive interfaces, enhancing usability and user engagement.

Document Object

- What is the **document** object?
  - The **document** object represents the entire HTML document as a tree structure.
  - It serves as the entry point to the web page's content, allowing **manipulation** and **interaction** with its elements.
  - The **document** object serves as the root node of the Document Object Model (DOM) tree.
  - It offers various **properties** and **methods** for interacting with the document's structure and content.
  - It serves as a fundamental component for **dynamic** web development, enabling developers to create **responsive** and **interactive** user interfaces.

DOM Traversal

- DOM **traversal** involves navigating through the DOM tree to access or manipulate elements.

```
// Retrieve the element with the ID "myDiv"
let element = document.getElementById("myDiv");

// Retrieve all elements with the CSS class "container"
let containers = document.getElementsByClassName("containers");

// Retrieve all list (li) item elements
let listItems = document.getElementsByTagName("li");

// Retrieve the first list element where the parent is an ordered list
let listOrderedParent = document.querySelector("ol > li");

// Retrieve a specific list element where the parent is an ordered list
let thirdItem = document.querySelector("ol > li:nth-child(3)");

// Retrieve the first paragraph element within a container
let paragraph = document.querySelector(".container p");

// Retrieve all paragraph elements within a container
let paragraphs = document.querySelectorAll(".container p");
```

DOM Manipulation

- Creating new elements:
  - It is possible to create entirely new elements using the createElement method in JavaScript
  - *document.createElement("p");*
- Appending to elements:
  - We can add both text and new elements to existing elements in our HTML file.
  - *document.body.appendChild(myItem);*

It’s Morphin’ Time

- Adding elements:

```
// Create a new paragraph element
let paragraph = document.createElement("p");
let heading = document.createElement("h1");

// Add text content to the paragraph
paragraph.textContent = "This is a new paragraph.";
heading.textContent = "I love pie";

// Append the paragraph to the body element
document.body.appendChild(paragraph);
document.body.insertBefore(heading, paragraph);
```

Let's take a break

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DOM Manipulation

- Modifying elements:

```
// Change inner HTML content of an element
document.getElementById("myElement").innerHTML = "<strong>New content</st

// Set text content of an element
document.getElementById("myElement").textContent = "Updated text content"

// Set attribute value of an element
document.getElementById("myElement").setAttribute("class", "new-class");
```

DOM Manipulation

- Removing elements:

```
// Get the element to remove
let elementToRemove = document.getElementById("toRemove");

// Remove the element from the DOM
elementToRemove.remove();
```

Events

- JavaScript is often used to handle events that occur on a website.
- An **event** is an **action** that occurs that your program responds to.
- DOM **events** are either things that a user does, such as clicking a button or entering text into a text box, or actions caused by the browser, such as when a web page has been completely loaded.
- **Event handling** is the process of **capturing**, **processing**, and **responding** to events.

Event Handling

- Events are actions or occurrences that happen in the system you are programming.
- Event handling is the process of capturing, processing, and responding to events.
- Without event handling, applications would not be able to respond to user input or system events promptly.

Inline Event Handlers

- The most common events you'll deal with when getting started are:

Event	Description
`onchange`	Triggered when the value of an HTML element (like an input box or dropdown menu) changes.
`onclick`	Happens when you click on an HTML element, such as a button or link.
`onmouseover`	Occurs when you move the mouse pointer over an HTML element.
`onmouseout`	Happens when you move the mouse pointer away from an HTML element.
`onkeydown`	Triggered when you press a key on the keyboard.
`onload`	Occurs when the entire HTML page and all its resources (like images) have finished loading.

Inline Event Handlers

- HTML attribute equivalents for event handlers exist, but using them is discouraged due to bad practice.
- Inline event handler attributes may seem convenient for quick tasks but lead to inefficiency and manageability issues.
- Mixing HTML and JavaScript makes code harder to read; separating them promotes better organization and reuse across multiple documents.
  - In files with multiple elements (e.g., 100 buttons), using inline handlers results in excessive attributes, complicating maintenance.
- Many server configurations restrict inline JavaScript for security reasons.
- Overall, HTML event handler attributes are outdated and should be avoided.

Handling UI Events

- One common approach to handle UI events is by using the **addEventListener()** method. This method allows developers to attach event listeners to DOM elements and specify callback functions to be executed when the events occur.
- The method has the following syntax:
  - *element.**addEventListener**(**event**, **handler**, **options**);*
  - **event**: A string representing the type of event to listen for (e.g., "click", "keydown").
  - **handler**: A function that is called when the event occurs.
  - **options** (optional): An object that can specify properties like *capture*, *once*, and *passive*.

Event Handling in Action

- Event handling in JavaScript involves capturing and responding to various events that occur within a web page or application.

```
let button = document.getElementById("myButton");
button.addEventListener("click", function () {
  alert("Button clicked!");
});
```

The event object

- In JavaScript, when an event occurs, an **event** object is automatically created by the browser.
- The event object contains information about the event that occurred, such as its type, target element, and additional event-specific data.
- In codebases, you may see the event object argument named as one of the following:
  - event
  - evt
  - e (most commonly found)

```
document.addEventListener("click", function (event) {
  console.log("Event Type:", event.type);
  console.log("Target Element:", event.target);
  console.log("Mouse Coordinates:", event.clientX, event.clientY);
});
```

Handling UI Events

- One common approach to handle UI events is by using the **addEventListener** method. This method allows developers to attach event listeners to DOM elements and specify callback functions to be executed when the events occur.

```
document.getElementById("myButton").addEventListener("click", function ()
  alert("Button clicked!");
});
```

Handling UI Events

- Click Event: Initiates an action when a user clicks on a button, link, or any interactive element.

```
document.getElementById("myButton").addEventListener("click", function ()
  alert("Button clicked!");
});
```

Handling UI Events

- Keydown Event: Captures keystrokes, allowing for keyboard-driven interactions within the application.

```
document.addEventListener("keydown", function (event) {
  console.log("Key pressed:", event.key);
});
```

Handling UI Events

- Mouseover Event: Provides feedback when the mouse cursor enters a specific area or element.

```
let element = document.getElementById("myElement");

element.addEventListener("mouseover", function () {
  console.log("Mouse over element!");
});
```

Handling UI Events

- Mouseout Event: Triggers actions when the mouse cursor leaves a designated area or element.

```
let fetchedElement = document.getElementById("myElement");
fetchedElement.addEventListener("mouseout", function () {
  console.log("Mouse out of element!");
});
```

Questions and Answers

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Thank you for attending

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