### **More JavaScript Concepts**

#### **Objective:**

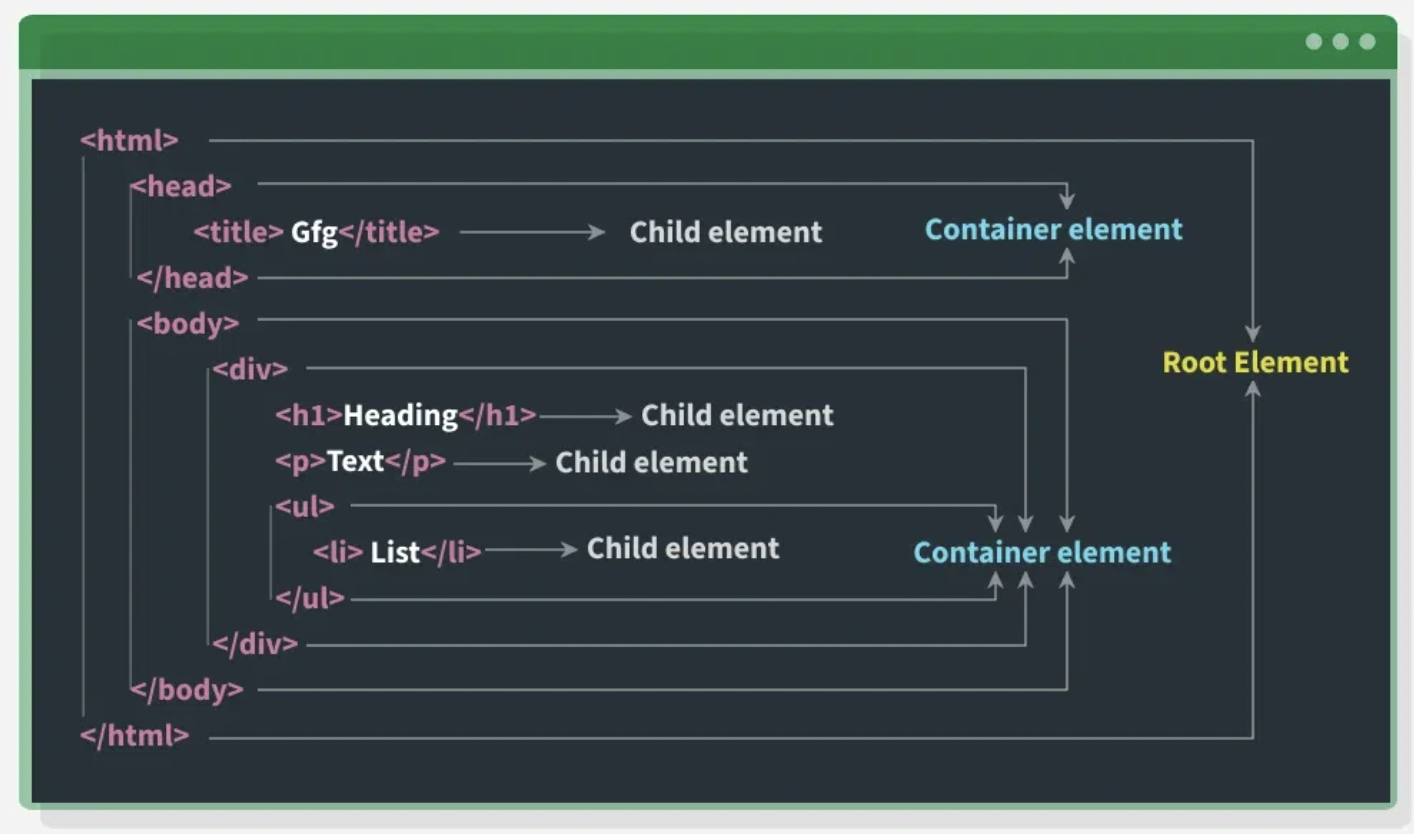
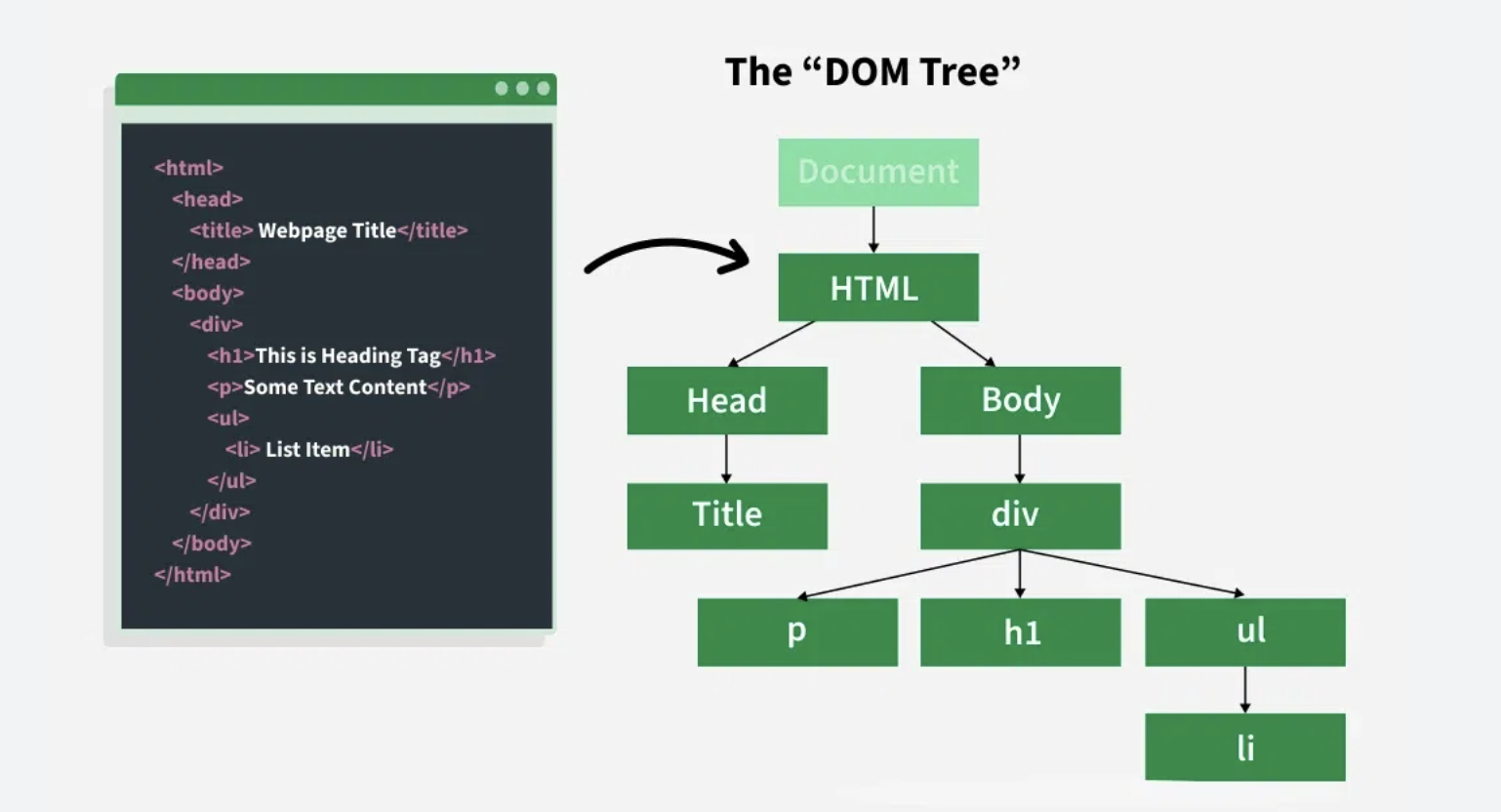
By the end of this lesson, students will:

1. Understand the basics of the **DOM (Document Object Model)** and how to manipulate it using JavaScript.
2. Learn what **JSON** is and how it is used to structure data.
3. Be able to use the **Fetch API** to make **GET requests** to external APIs.
4. Gain practical experience by building a simple web application that fetches data from an API and displays it on a webpage.

### **1. Introduction to the DOM (Document Object Model)**

#### **What is the DOM?**

* The **DOM** is a programming interface for web documents. It represents the structure of an HTML or XML document as a tree of objects, where each object corresponds to a part of the document (like elements, attributes, and text).
* JavaScript can be used to manipulate the DOM, allowing you to dynamically change the content, structure, and style of a webpage.



*Image from geeksforgeeks*

#### **Key Concepts:**

* **Selecting Elements**: You can select elements using methods like document.getElementById(), document.querySelector(), etc.
* **Manipulating Elements**: Once selected, you can change the content (innerHTML), attributes (setAttribute()), or styles (style.property) of elements.
* **Event Handling**: You can add event listeners to elements to respond to user actions like clicks, mouse movements, etc.

#### **Example: Changing Text Content**

<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<title>DOM Example</title>

</head>

<body>

<h1 id="header">Hello, World!</h1>

<button id="changeTextBtn">Change Text</button>

<script>

// Select the button and header elements

const button = document.getElementById('changeTextBtn');

const header = document.getElementById('header');

// Add an event listener to the button

button.addEventListener('click', function() {

header.textContent = 'Text Changed!';

});

</script>

</body>

</html>

#### 

| **Exercise 1** |
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* Create a webpage with a button and a paragraph. When the button is clicked, change the text of the paragraph to “You clicked the button!”

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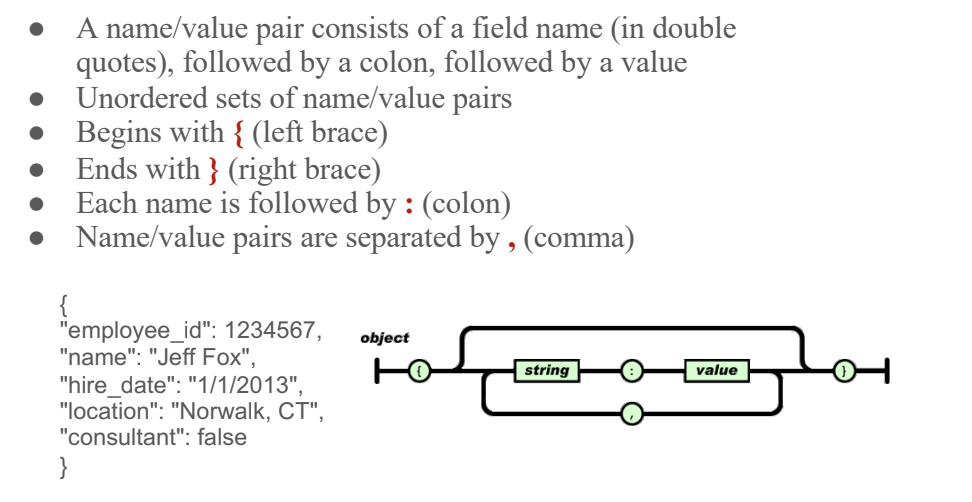
### **2. Understanding JSON (JavaScript Object Notation)**

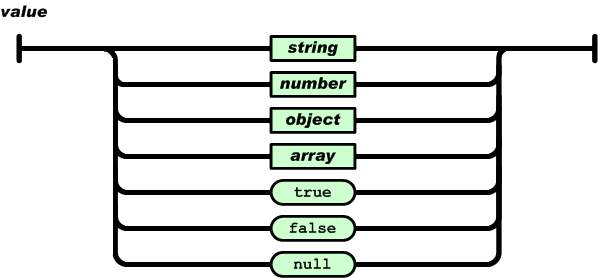
#### **What is JSON?**

* **JSON** is a lightweight data-interchange format that is easy for humans to read and write and easy for machines to parse and generate.
* It is commonly used to send data between a server and a client (e.g., in API responses).

#### **Key Concepts:**

* **Structure**: JSON data is represented as key-value pairs, similar to JavaScript objects.
* **Parsing JSON**: You can convert JSON strings into JavaScript objects using JSON.parse().
* **Stringifying Objects**: You can convert JavaScript objects into JSON strings using JSON.stringify().





#### **Example: Working with JSON**

// JSON string

const jsonString = '{"name": "John", "age": 30, "city": "New York"}';

// Parse JSON string into a JavaScript object

const jsonObject = JSON.parse(jsonString);

console.log(jsonObject.name); // Output: John

console.log(jsonObject.age); // Output: 30

// Convert JavaScript object back to JSON string

const newJsonString = JSON.stringify(jsonObject);

console.log(newJsonString); // Output: {"name":"John","age":30,"city":"New York"}

#### 

| **Exercise 2** |
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* Create a JSON object representing a person with properties like name, age, and hobbies. Use JSON.stringify() to convert it to a JSON string and log it to the console.

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### **3. Using the Fetch API to Make GET Requests**

#### **What is Fetch?**

* The **Fetch API** provides a modern way to make HTTP requests in JavaScript. It is used to retrieve data from a server or send data to a server.
* The most common type of request is a **GET request**, which retrieves data from a server.

#### **Key Concepts:**

* **Promise-based**: Fetch returns a promise, which resolves to the response of the request.
* **Response Handling**: You can use .json() to parse the response as JSON.

#### **Example: Fetching Data from an API**

<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<title>Fetch API Example</title>

</head>

<body>

<h1>Random User Data</h1>

<div id="userData"></div>

<script>

// Fetch data from a public API

fetch('https://randomuser.me/api/')

.then(response => response.json()) // Parse the response as JSON

.then(data => {

// Extract user data from the response

const user = data.results[0];

const userDataDiv = document.getElementById('userData');

// Display user data on the page

userDataDiv.innerHTML = `

<p>Name: ${user.name.first} ${user.name.last}</p>

<p>Email: ${user.email}</p>

<img src="${user.picture.medium}" alt="User Image">

`;

})

.catch(error => console.error('Error fetching data:', error));

</script>

</body>

</html>

| **Exercise 3** |
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* Modify the above example to display additional information about the user, such as their location (city and country) and phone number.

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### **4. Making an API GET Request**

#### **What is an API?**

* An **API (Application Programming Interface)** is a set of rules and protocols that allows one software application to interact with another.
* APIs often return data in **JSON** format, which can be easily consumed by JavaScript.

#### **Steps to Make a GET Request:**

1. Use the fetch() function to send a GET request to the API endpoint.
2. Handle the response using .then() or async/await.
3. Parse the response as JSON using .json().

#### **Example: Fetching Data from a Weather API**

<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<title>WeatherAPI Example</title>

</head>

<body>

<h1>WeatherAPI Example</h1>

<button onclick="callAPI()">Fetch Weather Data</button>

<div>

<h2>Weather Details</h2>

<p><strong>City:</strong> <span id="weather\_city">--</span></p>

<p><strong>Temperature:</strong> <span id="weather\_temperature">--</span></p>

<p><strong>Condition:</strong> <span id="weather\_condition">--</span></p>

</div>

<script>

// Replace with your WeatherAPI key

const apiKey = 'cbb0b276f1724b6fb1420151241811';

// Change this to the city you want to search

const city = 'Davao';

function callAPI() {

const url = `https://api.weatherapi.com/v1/current.json?key=${apiKey}&q=${city}&aqi=no`;

fetch(url)

.then(response => response.json())

.then(data => {

console.log(data);

document.querySelector("#weather\_city").textContent = data.location.name || 'N/A';

document.querySelector("#weather\_temperature").textContent = `${data.current.temp\_c}°C` || 'N/A';

document.querySelector("#weather\_condition").textContent = data.current.condition.text || 'N/A';

});

}

</script>

</body>

</html>

| **Exercise 4** |
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* Sign up for a free API key from [OpenWeatherMap](https://openweathermap.org/) and replace 'YOUR\_API\_KEY' in the code above with your actual API key. Run the code and see the weather data for London displayed on the page.

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### **5. Putting It All Together: Build a Simple Web App**

#### **Project: Random Quote Generator**

* **Objective**: Build a simple web app that fetches random quotes from an API and displays them on the page.
* **Steps**:
  1. Use the Fetch API to make a GET request to a quote API (e.g., [Quotable API](https://github.com/lukePeavey/quotable)).
  2. Parse the JSON response and display the quote and author on the page.
  3. Add a button that allows users to fetch a new quote when clicked.

#### **Code Example:**

<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1.0">

<title>Random Quote Generator</title>

<style>

body {

font-family: Arial, sans-serif;

text-align: center;

margin-top: 50px;

background-color: #f4f4f9;

}

#quoteDisplay {

margin: 20px 0;

font-size: 1.5em;

color: #333;

}

#author {

font-style: italic;

color: #555;

}

button {

padding: 10px 20px;

font-size: 1em;

background-color: #007bff;

color: white;

border: none;

border-radius: 5px;

cursor: pointer;

}

button:hover {

background-color: #0056b3;

}

</style>

</head>

<body>

<h1>Random Quote Generator</h1>

<div id="quoteDisplay">

<p id="quote">Click the button to get a random quote!</p>

<p id="author"></p>

</div>

<button id="newQuoteBtn">Get New Quote</button>

<script>

const quoteElement = document.getElementById('quote');

const authorElement = document.getElementById('author');

const button = document.getElementById('newQuoteBtn');

// Function to fetch a random quote

function fetchQuote() {

// Show loading message while fetching

quoteElement.textContent = 'Loading quote...';

authorElement.textContent = '';

// Fetch all quotes from the DummyJSON API

fetch('https://dummyjson.com/quotes')

.then(response => {

if (!response.ok) {

throw new Error(`HTTP error! status: ${response.status}`);

}

return response.json();

})

.then(data => {

// Get a random quote from the list of quotes

const randomIndex = Math.floor(Math.random() \* data.quotes.length);

const randomQuote = data.quotes[randomIndex];

// Display the quote and author

quoteElement.textContent = `"${randomQuote.quote}"`;

authorElement.textContent = `- ${randomQuote.author}`;

})

.catch(error => {

// Handle any errors that occur during the fetch

console.error('Error fetching quote:', error);

quoteElement.textContent = 'Failed to load quote. Please try again.';

authorElement.textContent = '';

});

}

// Fetch a quote when the button is clicked

button.addEventListener('click', fetchQuote);

// Fetch a quote when the page loads

fetchQuote();

</script>

</body>

</html>

| **Exercise 5:** |
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* Customize the app by adding styles (CSS) to make it look more appealing. You can also add functionality to share the quote on social media or copy it to the clipboard.

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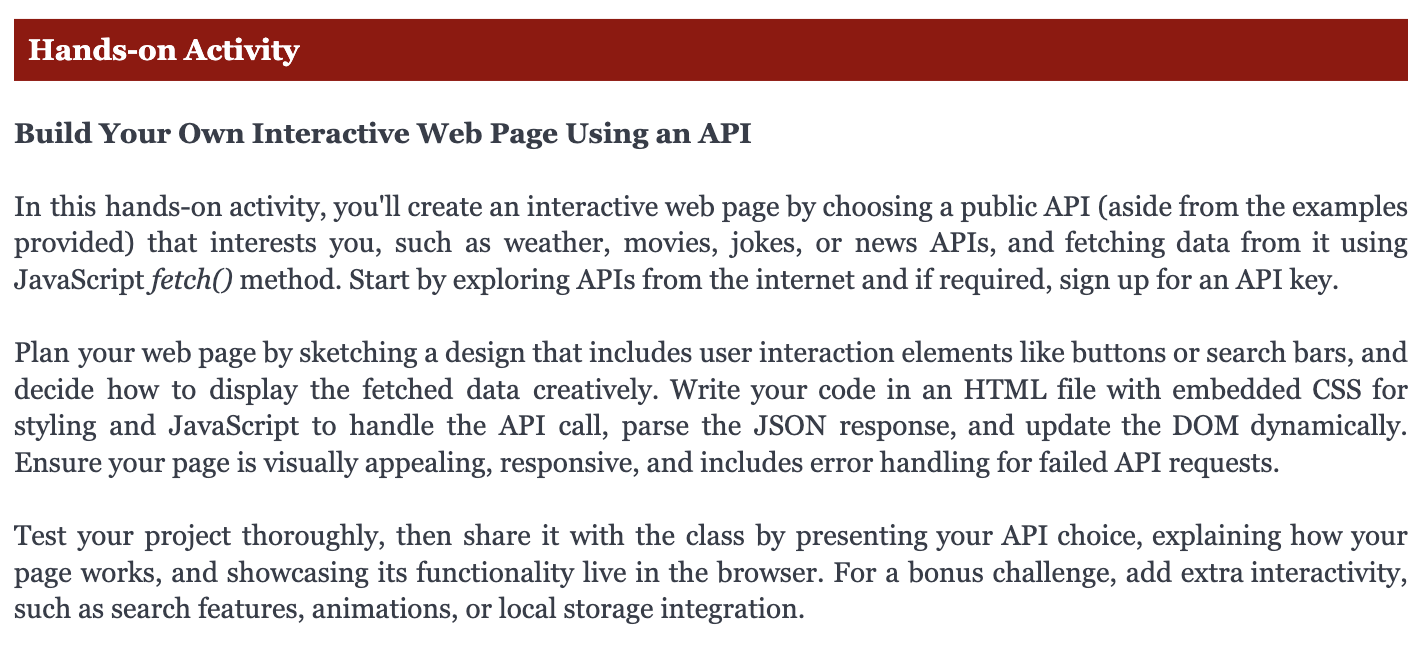
### **Conclusion:**

In this lesson, we covered:

1. **DOM Manipulation**: How to select and modify elements on a webpage.
2. **JSON**: How to work with JSON data in JavaScript.
3. **Fetch API**: How to make GET requests to APIs and handle responses.
4. **Building a Simple Web App**: A practical project that combines all the concepts learned.

### **Additional Resources:**

* [MDN Web Docs - DOM](https://developer.mozilla.org/en-US/docs/Web/API/Document_Object_Model)
* [MDN Web Docs - Fetch API](https://developer.mozilla.org/en-US/docs/Web/API/Fetch_API)
* [JSON.org](https://www.json.org/json-en.html)
* [Free Public APIs](https://github.com/public-apis/public-apis)



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