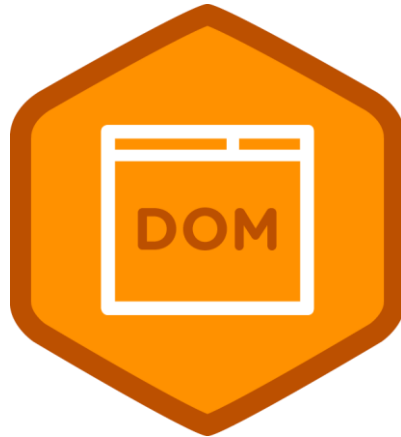


JavaScript on the Client Side

Outline

1. DOM Manipulation using JavaScript
2. Consume Web API using Fetch

DOM Manipulation using JavaScript



What Can JavaScript Do?

- **Server Side Web applications**
 - Write server-side application logic and Web API (using Node.js)
- **Client Side Dynamic Behavior**
 - **React to user input** i.e., handle client side events such as button clicked event. e.g., Changing an image on moving mouse over it
 - **Updating the page**
 - Add/update page content: **Manipulate the Document Object Model (DOM)** of the page: read, modify, add, delete HTML elements
 - Change how things look: CSS updates
 - **Validate form input** values before being submitted to the server
 - **Perform computations**, sorting and animation
 - **Perform asynchronous Web API calls** (AJAX) to get or submit JSON data to the server without reloading the page

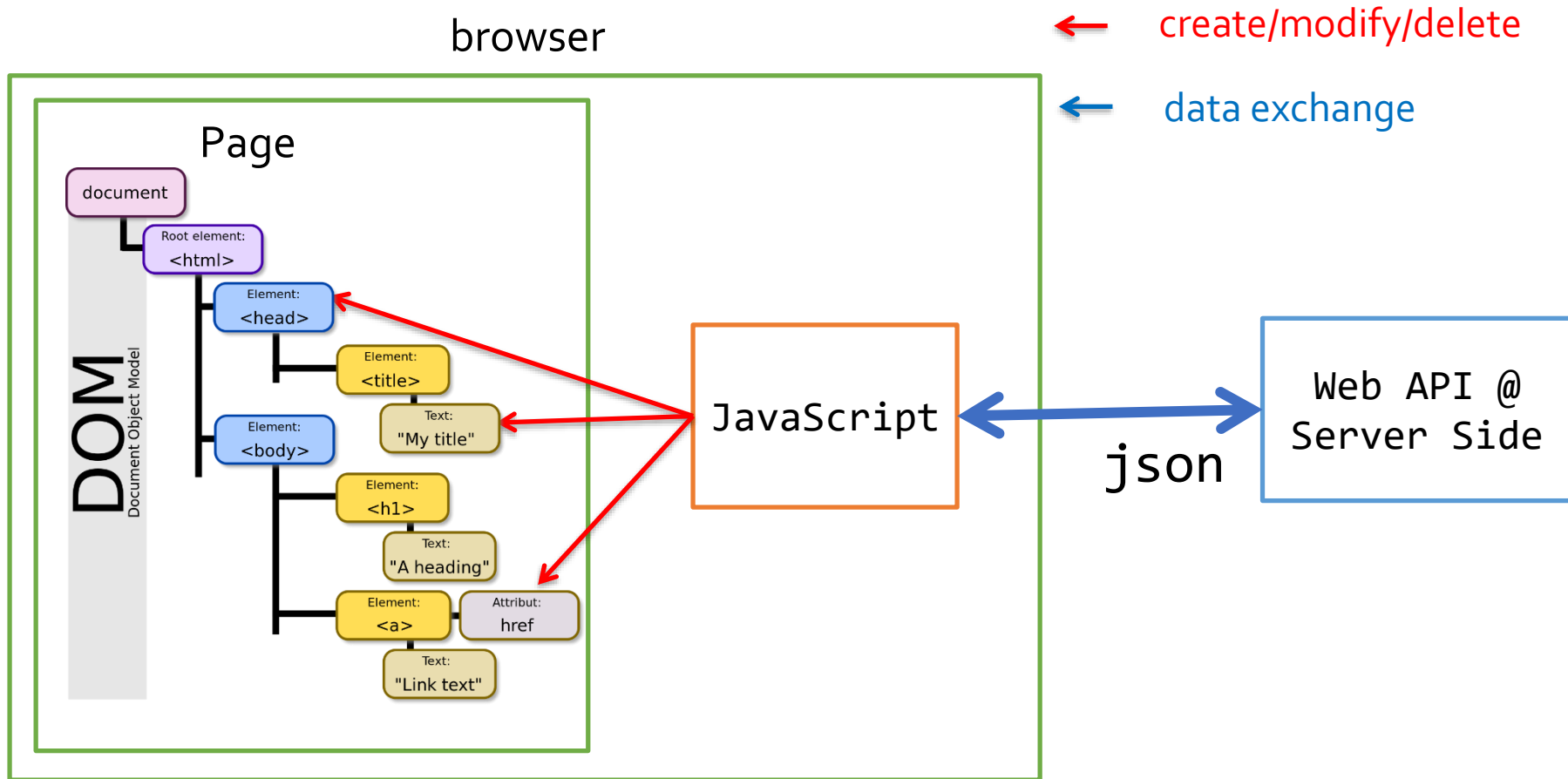
Where to place JavaScript Code?

- The JavaScript code can be placed in:
 - `<script>` tag in the head
 - In an external file and add a reference to it in the HTML file. This is the recommended way
 - Reference via `<script>` tag in the **head** or at the end of the **body**

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

- JavaScript files usually have **.js** extension
- The **.js** files get cached by the browser

Role of JavaScript on the Client Side

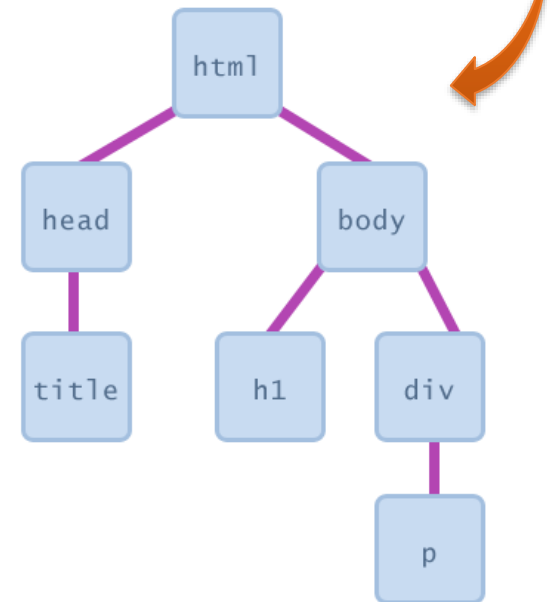


- DOM = A tree structure built out of the page HTML elements
- Use JavaScript to manipulate the DOM by changing the properties of DOM elements

Document Object Model (DOM)

- DOM API consist of objects and methods to interact with the HTML page
 - **Select** page elements
 - **Add, update** or **remove** page elements
 - **Apply styles** dynamically
 - **Listen** to and **handle** events

```
<html>
<head>
  <title> ... </title>
</head>
<body>
  <h1> ... </h1>
  <div>
    <p> ... </p>
  </div>
</body>
</html>
```



Example DOM Element

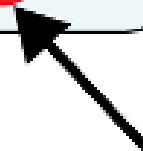
HTML

```
<p>  
  Look at this octopus:  
    
  Cute, huh?  
</p>
```



DOM Element Object

| Property | Value |
|------------|---------------|
| tagName | "IMG" |
| <u>src</u> | "octopus.jpg" |
| alt | "an octopus" |
| id | "icon01" |



JavaScript

```
var icon = document.getElementById("icon01");  
icon.src = "kitty.gif";
```


Selecting HTML Elements

- Elements must be **selected first** before changing them or listening to their events
 - **querySelector()** returns the first element that matches a specified *CSS selector* in the document
 - **querySelectorAll()** returns all elements in the document that matches a specified CSS selector

Example CSS selectors:

1. By tag name: `document.querySelector("p")`
 2. By id : `document.querySelector("#id")`
 3. By class: `document.querySelector(".classname")`
 4. By attribute: `document.querySelector("img[src='cat.png']")`
 - Return the first image whose src attribute is set to `cat.png`
- Examples
 - https://www.w3schools.com/jsref/met_document_queryselector.asp
 - https://www.w3schools.com/jsref/met_document_queryselectorall.asp

Selecting Elements – old way!

- Access elements via their ID attribute

```
let element = document.getElementById("some-id")
```

- Via the **name** attribute

```
let elArray = document.getElementsByName("some-name")
```

- Via tag name

```
let imgTags = document.getElementsByTagName("img")
```

- Returns array of `` elements

DOM Manipulation

- Once we **select** an element, we can read / change its attributes

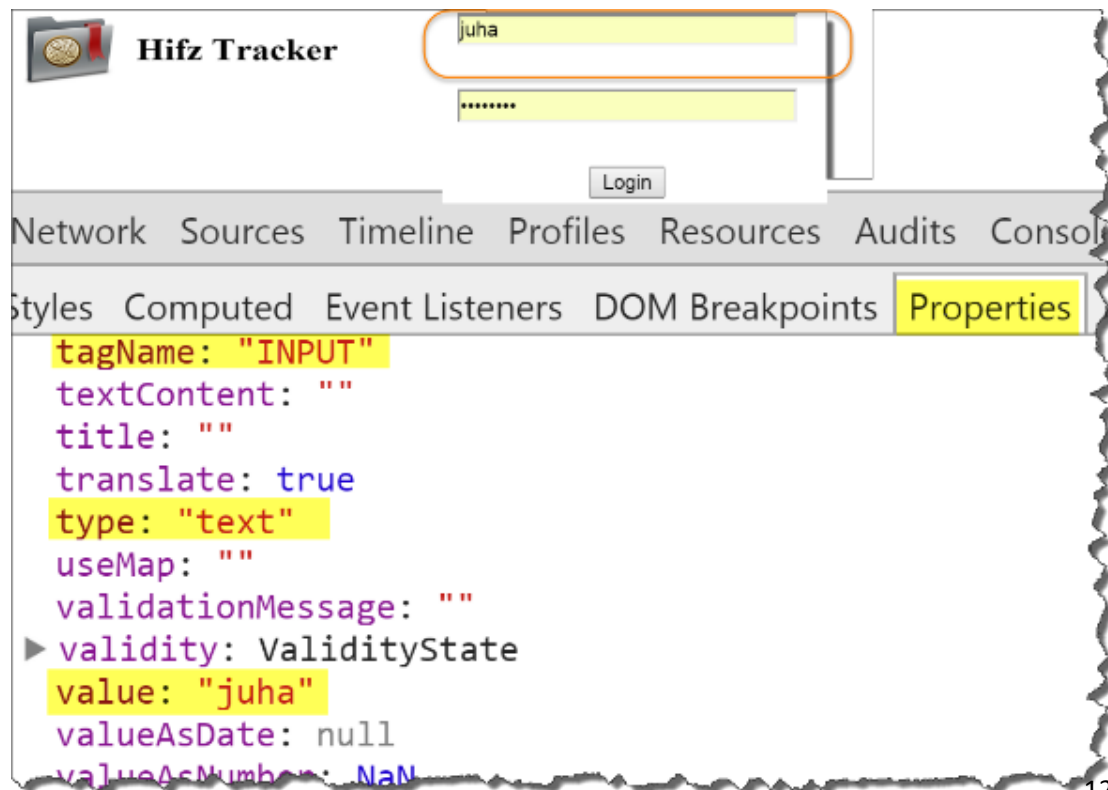
```
function change(state) {  
  let lampImg = document.querySelector("#lamp")  
  lampImg.src = `lamp_${state}.png`  
  let statusDiv =  
    document.querySelector("#statusDiv")  
  statusDiv.innerHTML = `The lamp is ${state}`  
}  
...  

```

Common Element Properties

- `value` - get/set value of input elements
- `innerHTML` - get/set the HTML content of an element
- `className` - the `class` attribute of an element

User Chrome
Dev Tool to see
the Properties of
Page element



Events Handling

- JavaScript can register event handlers
 - Events are fired by the Browser and are sent to the specified JavaScript **event handler** function
 - Can be set with HTML attributes:

```

```

- Can be set through the DOM:

```
const img = document.querySelector("#myImage")  
img.addEventListener('click', imageClicked)
```

Ask to be notified of clicks on element **#myImage**

Event Handler Example

```
<script>  
document.querySelector("#btnDate").  
    addEventListener("click", displayDate)  
  
function displayDate() {  
    document.querySelector("#date").innerHTML = Date()  
}  
</script>
```

Try it @

http://www.w3schools.com/js/tryit.asp?filename=tryjs_addeventlistener_displaydate

Common DOM Events

- Mouse events:
 - `onclick`, `onmousedown`, `onmouseup`
 - `onmouseover`, `onmouseout`, `onmousemove`
- Key events:
 - `onkeypress`, `onkeydown`, `onkeyup`
 - Only for input fields
- Interface events:
 - `onblur`, `onfocus`, `onscroll`
- Form events
 - `onsubmit`: allows you to cancel a form submission if some input fields are invalid

DOMContentLoaded

- DOMContentLoaded is fired when the DOM tree is built, but external resources like images and stylesheets may be not yet loaded
 - Best event for adding event listeners to page elements

```
//When the document is loaded in the browser then listen to studentsDD on change event  
document.addEventListener("DOMContentLoaded", () => {  
    console.log("js-DOM fully loaded and parsed");  
    document.querySelector('#studentsDD').addEventListener("change", onStudentChange)  
})
```


The Event Object

```
function name (event) {  
    // an event handler function...  
}
```

- Event handlers can accept an optional parameter to represent the event that is occurring
- Event objects have the following properties/methods:

| Property | Description |
|-----------|--|
| type | what kind of event, such as "click" or "mousedown" |
| target | the element on which the event occurred |
| timestamp | when the event occurred |

Stopping an Event

- [preventDefault\(\)](#) stops the browser from doing its default action on an event.
 - for example, stops the browser from following a link when `<a>` tag is clicked
 - Or return false in an event handler to stop an event

```
<a href="#" onclick="onAddHero(event)">Add Hero</a>
```

```
async function onAddHero(event) {  
  event.preventDefault();  
  
  const heroesDiv = document.querySelector("#heroes");  
  const heroEditor = await getHeroEditor();  
  heroesDiv.innerHTML = heroEditor;  
}
```

Commonly used methods

- Add Element

e.g., add div element and assign it *alert-success* css class

```
let newDiv = document.createElement('div')
newDiv.innerText = 'Div added by script'
newDiv.classList.add('alert-success')
document.body.appendChild(newDiv)
```

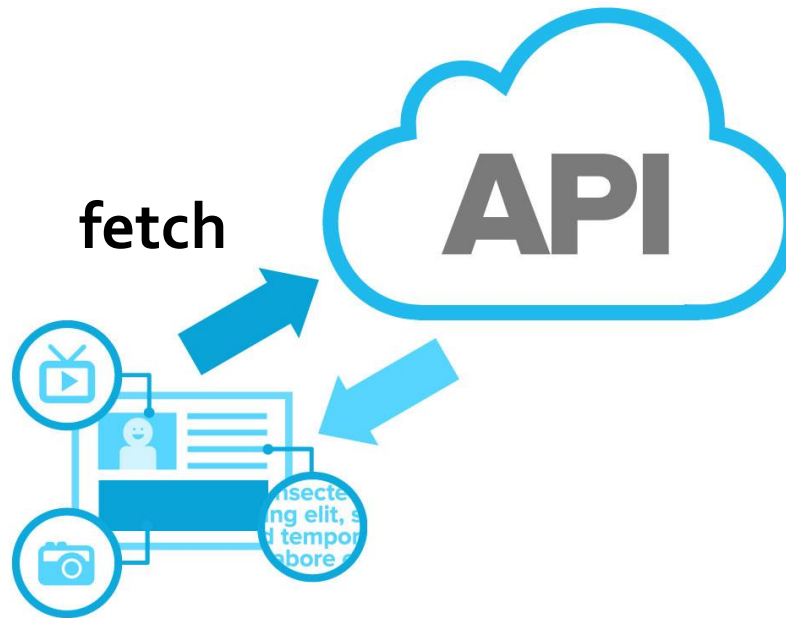
- DOM Traversal

```
let parent = document.querySelector('#about').parentNode
let children = document.querySelector('#about').children
```

- Hide & Show

```
document.querySelector('#myDiv').style.display = 'none';
document.querySelector('#myDiv').style.display = '';
```

Consume Web API using Fetch





- AJAX is acronym of Asynchronous JavaScript and ~~XML~~ JSON
 - AJAX is used for **asynchronously** fetching (in the background) of dynamic Web content and data from Web API
 - Allows dynamically adding elements into the DOM
- Two styles of using AJAX for **partial page update**
 - Load an HTML fragment and inject it in the page
 - Call Web API then use the received JSON object to update the page at the client-side using JavaScript

Web API Get Request using Fetch

- Fetch content from the server

```
async function getStudent(studentId) {  
    let url = `/api/students/${studentId}`  
    let response = await fetch(url)  
    return await response.json()  
}
```

- **.json()** method is used to get the response body as a JSON object

Web API Post Request using Fetch

- Fetch could be used to post a request to the server

```
let email = document.querySelector( "#email" ).value,  
    password = document.querySelector("#password").value
```

```
fetch( "/login", {  
    method: "post",  
    headers: { "Accept": "application/json",  
               "Content-Type": "application/json" },  
    body: JSON.stringify({  
        email,  
        password  
    })  
})
```

//headers parameter is optional

Resources

- DOM

[https://developer.mozilla.org/en-US/docs/Web/API/Document Object Model/Introduction](https://developer.mozilla.org/en-US/docs/Web/API/Document_Object_Model/Introduction)

- Fetch API

[https://developer.mozilla.org/en-US/docs/Web/API/Fetch API](https://developer.mozilla.org/en-US/docs/Web/API/Fetch_API)