

A black and white photograph of a person's hands holding a spiral-bound notebook. The notebook is open to a calendar page, showing dates from 1 to 31. The person is wearing a textured, knitted sweater. The text "Module 3-9" and "JavaScript Event Handling" is overlaid on the image.

Module 3-9

JavaScript Event Handling

Can you?

- Select DOM objects and attach anonymous functions with `addEventListener()`
- Describe event bubbling and how it works
- Describe default browser behavior and the various events that are triggered ([w3schools HTML Event Reference](#))
- List possible events and the elements that may be associated with those events
- Describe how to add listeners to newly created DOM elements
- Remove an event listener with `removeEventListener()`

Events

- Events are changes that can occur within HTML DOM elements as a result of the browser's page life cycle or user interaction.
- Examples of events:
 - A user hovering over a piece of text with the mouse cursor.
 - A user clicking on a link or button.
 - A HTML page loading for the first time.
 - A user double clicking somewhere on the page.
- JavaScript can be used to define actions that should take place when these events occur.

Common Events

Event	Description
click	user clicks once
mouseover	when the mouse cursor is over an element
dblclick	user clicks twice in rapid succession
change	user changes the value on a form (if it's an input box, user needs to click somewhere else to complete the event)
focus	When an element is the currently active one, think again about a form, the field you are currently on is the one that's focused.
blur	Opposite of focus, element has lost focus, something else is focused.

Adding Events Using JavaScript

Events are added using the `addEventListener` method, it is a method of a DOM element, consider the following example:

HTML

```
<button type="button"
id='superBtn'>You are
awesome.</button>
```

JS

```
let button = document.getElementById('superBtn');
button.addEventListener('click', action);

function action() {
    window.alert('No.... you are awesome!');
}
```

This method is straightforward, the first parameter is the event we are trying to catch. The second parameter is the action it will take, most likely codified in a function.

In-line HTML Event Handlers vs. Event Listeners

`<button onclick="btnClick()">Click Me!</button>`

In-line Events, while convenient, have drawbacks:

1. They add complexity to the HTML document
2. They are attached to a fixed attribute value and can be overwritten
3. They violate the separation of concerns provided by the HTML - CSS - JS development model.

Event Listeners solve these in-line shortcomings and add one critical benefit:

1. MULTIPLE EVENTS LISTENERS CAN BE ADDED TO A SINGLE EVENT!

Once you become familiar with `addEventListener` method, dive deeper here:

<https://developer.mozilla.org/en-US/docs/Web/API/EventTarget/addEventListener>

Let's add some events



The “DOMContentLoaded” Event

DOMContentLoaded is a special event that is particularly helpful as one of the browser’s page lifecycle events that runs every time an HTML document is loaded. Specifically, this event fires once the browser has fully loaded the HTML and the DOM tree is built. *However*, external resources like pictures and stylesheets may not yet be loaded.

We can use this event to write JS code that “preps” page content before a user starts interacting with the page:

- Set the values of some DOM elements (i.e. page titles, lists)
- Add event handlers for elements on the page

DOMContentLoaded Example

Consider the following code:

```
<html><body>
  <div id='content'>
    <input id='theButton' type='button' value='Surprise!'/>
  </div>

  <script src="thisScript.js"></script>
</body></html>
```

HTML

```
document.addEventListener('DOMContentLoaded', doAfterDOMLoads);
```

1

```
function doAfterDOMLoads() {
  let btn = document.getElementById('theButton');
  btn.addEventListener('click', buttonAction);
}
```

2

JS

3

```
function buttonAction() {
  window.alert('surprise!');
}
```

4

1. First thing that happens, an event listener is defined that will be triggered by DOMContentLoaded to run the method **doAfterDOMLoads**.
2. Once the DOMContentLoaded event fires, the method **doAfterDOMLoads** is executed.
3. Note that in turn, this method defines another event handler for the button. If the button is clicked, the method **buttonAction** will execute.
4. If someone clicks the button, this method executes.

DOMContentLoaded Example

Alternatively, the previous block of JS code can be implemented using anonymous functions. Note that these two blocks of code are identical:

```
document.addEventListener('DOMContentLoaded',
doAfterDOMLoads);

function doAfterDOMLoads() {

    let btn =
document.getElementById('theButton');
    btn.addEventListener('click', buttonAction);
}
function buttonAction() {
    window.alert('surprise!');
}
```

JS

```
document.addEventListener('DOMContentLoaded',
() => {
    let btn =
document.getElementById('theButton');
    btn.addEventListener('click',
        () => {
            window.alert('surprise!');
        }
    );
});
```

JS

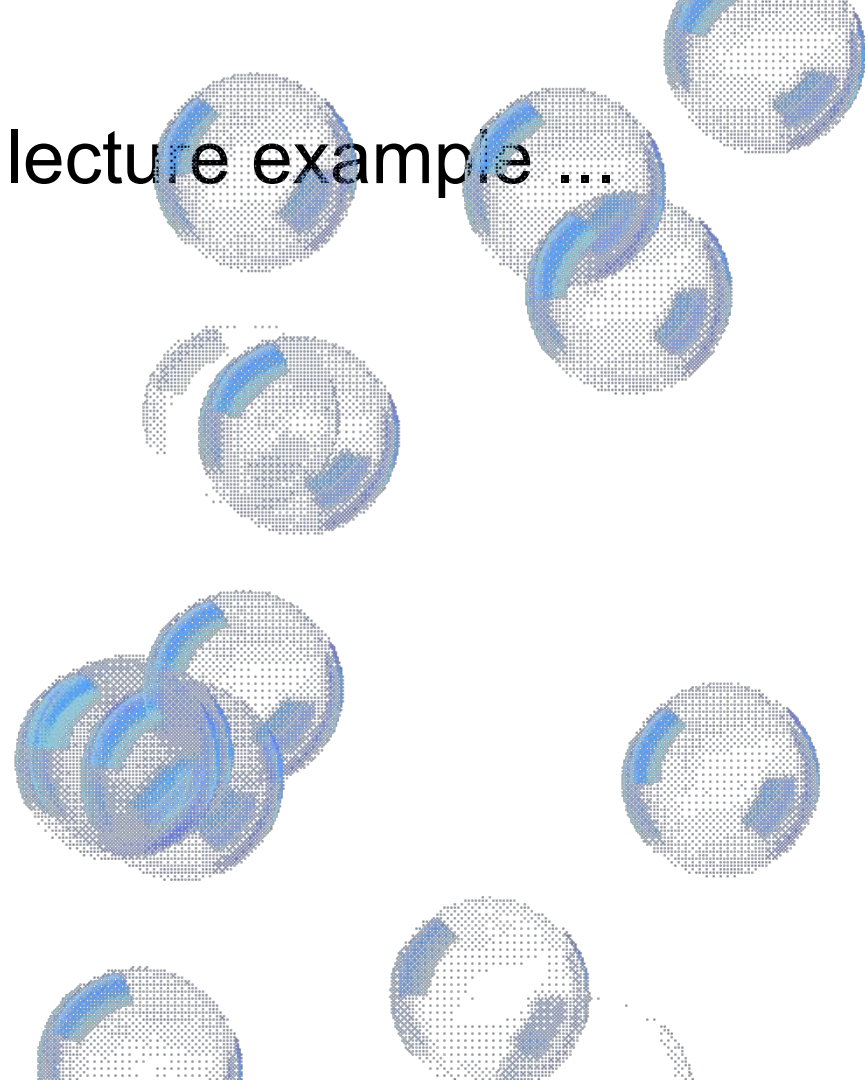
The DOMContentLoaded Pattern

Having an event handler for DOMContentLoaded attach the content's listeners is a standard way to create event handlers:

1. Add an event listener that responds to the DOMContentLoaded event.
2. The DOMContentLoaded event then adds all other event listeners for the page elements (i.e. buttons, form elements, etc.)

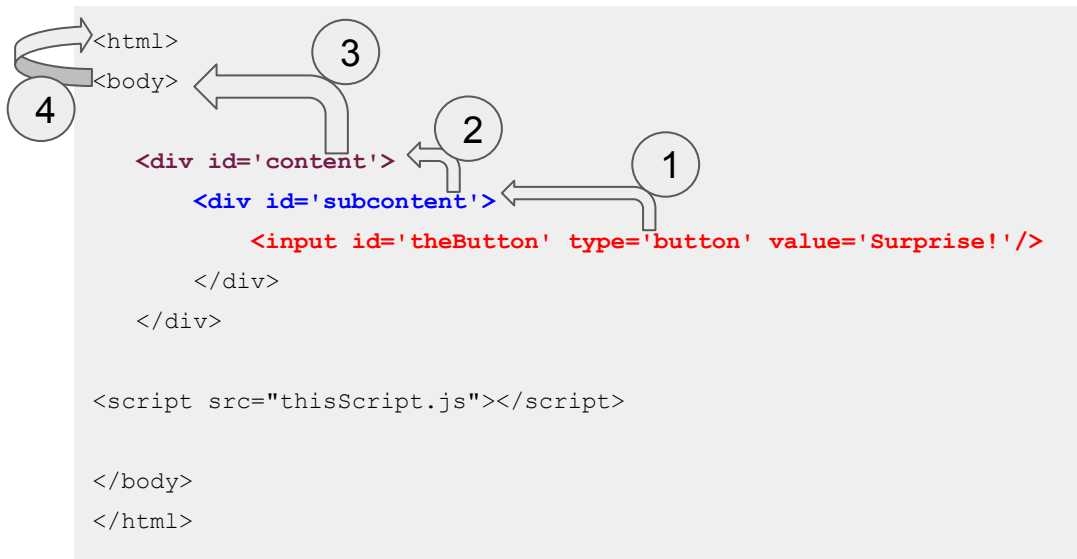
Before we work on the lecture example ...

... Let's talk about bubbling



Event Bubbling

If your HTML elements have a hierarchy of parent child relationships, an event tied to a child element will propagate up (bubble), possibly activating any events tied to the parent. Consider the following:



Under the hood, an event attached to the button travels upward in the following direction:

1. From the button to its immediate parent (#subcontent)
2. From #subcontent to #content
3. From #content to body
4. From body to html

Event Bubbling

If the following JS code were in place, we'd see the popup appear three times:

```
document.addEventListener('DOMContentLoaded', doAfterDOMLoads);

function doAfterDOMLoads() {

    let btn = document.getElementById('theButton');
    let sub = document.getElementById('subcontent');
    let main = document.getElementById('content');

    btn.addEventListener('click', buttonAction);
    sub.addEventListener('click', buttonAction);
    main.addEventListener('click', buttonAction);
}

function buttonAction() {
    window.alert('surprise!');
}
```

Event Bubbling - Prevention: useCapture Parameter

If the following JS code were in place, we'd see the popup appear three times:

```
document.addEventListener('DOMContentLoaded', doAfterDOMLoads);

function doAfterDOMLoads() {

    let btn = document.getElementById('theButton');
    let sub = document.getElementById('subcontent');
    let main = document.getElementById('content');

    btn.addEventListener('click', buttonAction, true);
    sub.addEventListener('click', buttonAction, true);
    main.addEventListener('click', buttonAction, true);
}

function buttonAction() {
    window.alert('surprise!');
}
```