M03 - Document Object Model

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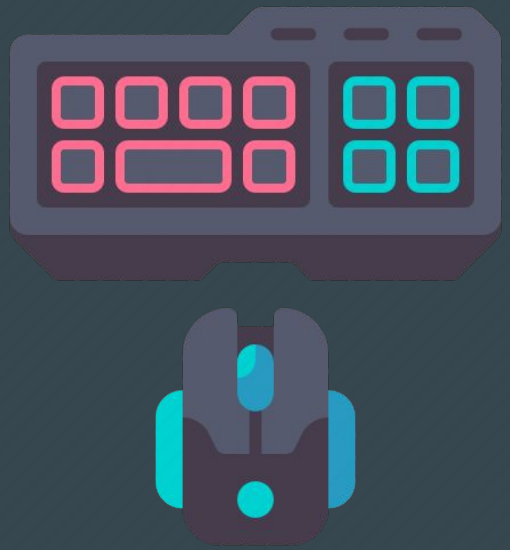
Events

Events

1. Introduction to Events
2. Type of Events
3. Forms



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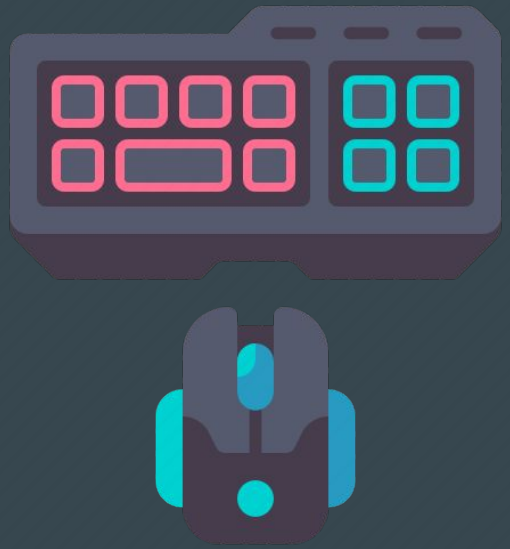


Events

1. Introduction to Events

- We can associate JavaScript code when an event occurs
- Types of events:
  - system (e.g. loading an HTML page)
  - user (e.g. click a button)
- To react to events, a handler is assigned - a function performed when a event occurs
- Ways to associate handlers:
  - HTML attribute
  - DOM property
  - addEventListener method

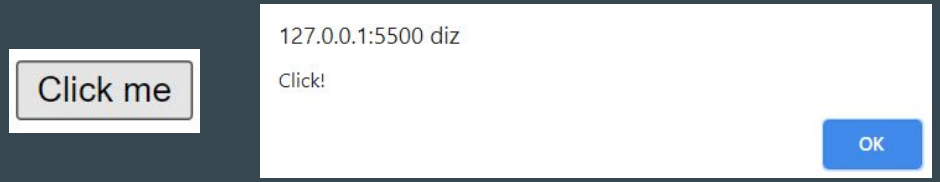
Events

1. Introduction to Events

- Ways to associate handlers:
  - HTML attribute
  - DOM property
  - addEventListener method

- A handler can be defined in HTML with an attribute on<event>
- For example, to assign a click handler to a button, we can use the onclick:

```
<input value='Click me' onclick='alert("Click!")' type='button'></input>
```



Events

1. Introduction to Events

- Ways to associate handlers:
  - HTML attribute
  - DOM property
  - addEventListener method

```
<p onclick='hello(this)'>Hello World!</p>

<script>
    function hello(obj) {
        alert(obj.innerHTML);
    }
</script>
```

- Use of the reserved word this
  - creates a reference to the element itself
  - in the next example, this creates a reference to the element <p>

Events

1. Introduction to Events

- Ways to associate handlers:
  - HTML attribute
  - DOM property
  - addEventListener method

- A handler can be defined as a DOM property called on<event>
- Similar technique to previous, but preferable because it separates HTML from JS

```
<input id='elem' type='button' value='Click me'>
<script>
    elem.onclick = function () {
        alert('Thank you!');
    }
</script>
```

Events

1. Introduction to Events

- Method AddEventListener attaches an event handler to an element without overwriting existing event handlers
- Syntax: element.addEventListener(event, handler[, options])
- You can add event handlers
  - to an element
  - of the same type to an element, that is for instance, two click events
  - to any DOM object, not just HTML elements (e.g. window object)
- JavaScript is separate from HTML markup
  - better readability
  - allows you to add event handlers even if you don't control the HTML

Events

1. Introduction to Events

- Syntax: element.addEventListener(event, handler[, options])
  - event
    - Name of the event, e.g. click
  - handler
    - The handler function
  - options
    - An additional optional object with the following properties:
      - once: if true, the listener is automatically removed after being triggered
      - capture: allows you to control the propagation of events (bubbling - false, capturing - true)
      - passive: if true, the handler will not do preventDefault(), we will address this later

Events

1. Introduction to Events

- Syntax: element.addEventListener(event, handler[, options])

```
<p id='p1'>Hello World!</p>
<script>
    document.getElementById('p1').addEventListener('click', myFunction);

    function myFunction() {
        alert('Hello World!');
    }
</script>
```

With named function

With anonymous function

```
<p id='p1'>Hello World!</p>
<script>
    document.getElementById('p1').addEventListener('click', function () {
        alert('Hello World!');
    });
</script>
```

Events

1. Introduction to Events
- Handler removal
  - Syntax: element.removeEventListener(event, handler)
  - Example:

```
<p id='p1'>Hello World!</p>

<script>
    function handler() {
        alert('Thank you!');
    }

    const myP = document.getElementById('p1');
    myP.addEventListener('click', handler);
    myP.removeEventListener('click', handler);
</script>
```

Events

1. Introduction to Events

- Never reference DOM elements before they are in the DOM tree!
- This example:

```
<script>
    alert(document.getElementById('p1').innerHTML);
</script>
<p id='p1'>Hello World!</p>
```

- Will throw this error in the console, since the script is loaded before the paragraph is in the DOM tree:

```
Uncaught TypeError: Cannot read property 'innerHTML' of null
    at index.html:14
```

Events

1. Introduction to Events

- Two alternatives:
  - Put all the script in the end of the tag <body>
  - Assign a handler to the load event which execution will occur after the creation of the DOM tree in memory

```
<script>
    window.addEventListener('load', function () {
        alert(document.getElementById('p1').innerHTML);
    });
</script>
<p id='p1'>Hello World!</p>
```

Events

1. Introduction to Events
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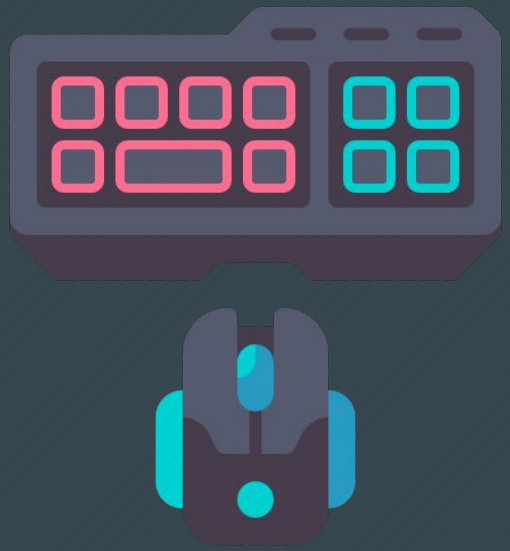
3. Forms



Events

2. Type of Events

- Window
- Mouse
- Keyboard
- Widgets

Events

2. Type of Events

- Window
  - load - fully available window
  - unload - end of window availability
  - resize - changing dimensions
  - scroll - window scroll navigation

```
window.addEventListener('load', function () {
    console.log('The DOM tree is fully loaded!');
});
```

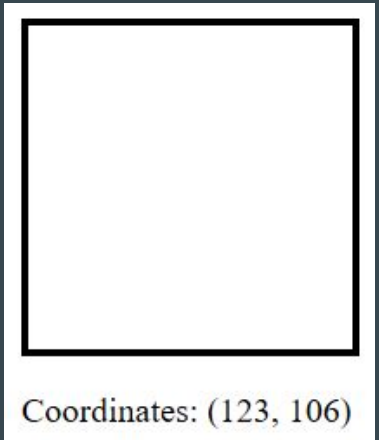
Events

2. Type of Events

- Mouse
  - click - start and end of pressure on a button
  - doubleclick - two clicks in quick succession
  - mousedown - start of pressing on a button
  - mouseup - end of pressing on a button
  - mousemove - mouse movement

```
<div id="div" style="width: 150px; height: 150px; border: solid;"></div>
<p id="result"></p>
<script>
    const myDiv = document.getElementById('div');
    myDiv.addEventListener('mousemove', function (event) {
        const coor = `Coordinates: (${event.clientX}, ${event.clientY})`;
        document.getElementById('result').innerHTML = coor;
    });
</script>
```

event object



Events

2. Type of Events

- Keyboard
  - keypress - key pressed
  - keydown - start of key press
  - keyup - end of key press

```
<input type='text' id='demo'></input>
<script>
    const myInput = document.getElementById('demo');
    myInput.addEventListener('keypress', function (event) {
        console.log(`You pressed the key ${event.key}`);
    });
</script>
```

event object

key pressed

Events

2. Type of Events

- Widgets
  - change - changing values (input, select and textarea)
  - focus - receive focus (input and textarea)
  - select - text selection (input and textarea)
  - submit - form submission (form)

```
<input type='text' id='demo'></input>
<script>
    const myInput = document.getElementById('demo');
    myInput.addEventListener('change', function () {
        console.log(`You changed the text to: ${myInput.value}`);
    });
</script>
```

new input value

Events

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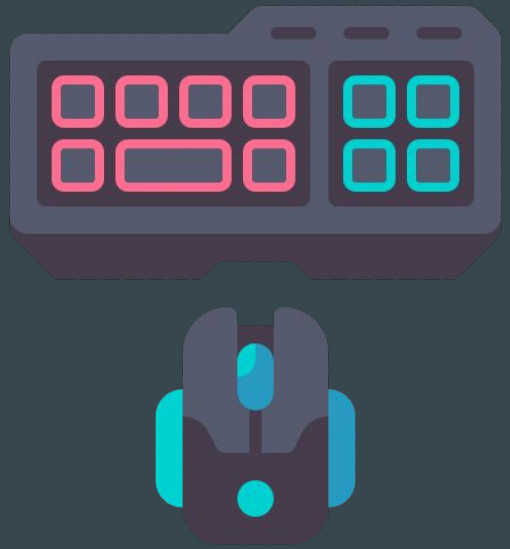
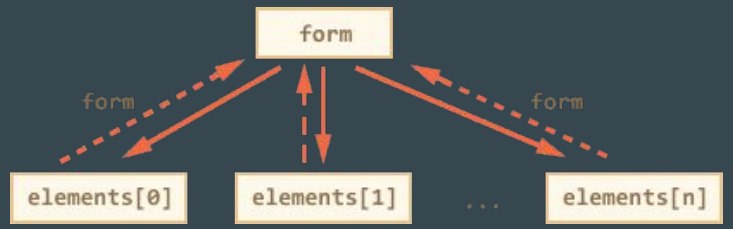


Events

3. Forms

- Forms and their elements have many special properties and events
- Forms in an HTML document are members of a collection document.forms
- To access the elements we can use the collection elements
- Access can be done by name or index

```
<form>
    <input name='one' value='1'>
    <input name='two' value='2'>
</form>
<script>
    // get the form
    const form = document.forms.my; // element <form name="my">
    // get the input with name "one"
    const elem = form.elements.one; // element <input name="one">
    alert(elem.value); // 1
</script>
```

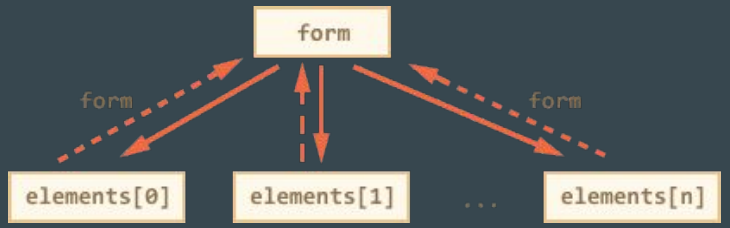


Events

3. Forms

- Note that there may be several elements with the same name (e.g. radio buttons)
- In this case, form.elements[name] is a collection, for example:

```
<form name='my'>
    <input type='radio' name='age' value='10'>
    <input type='radio' name='age' value='20'>
</form>
<script>
    const form = document.forms[0];
    const ageElems = form.elements.age;
    alert(ageElems[0].value); // 10, the first input value
</script>
```



Events

3. Forms

- Main form elements:
  - Input
  - Textarea
  - Select and option

Events

3. Forms

- Input:
  - Using the value property to set/get the text box value

```
<form>
    <input id='input1' value='12'>
</form>

<script>
    const myInput = document.getElementById('input1');
    console.log(myInput.value); // get the current value (12)
    myInput.value = 15; // define a new value to the text input
    console.log(myInput.value); // get the current value (15)
</script>
```

propriedade value

```
<form>
    <input id='input1' type='checkbox'>
</form>

<script>
    const myCheckbox = document.getElementById('input1');
    console.log(myCheckbox.checked); // get the current value (false)
    myCheckbox.checked = true; // activate the checkbox
    console.log(myCheckbox.checked); // get the current value (true)
</script>
```

propriedade checked

  - Use of the checked property to enable/disable the checkbox

Events

3. Forms

- Input
  - Main events:
    - change - triggered after loss of focus of the text box
    - input - triggered at every data input

```
<input type='text' id='input1'>
oninput: <span id='result'></span>
<script>
    const myInput = document.getElementById('input1');
    const myResult = document.getElementById('result');
    myInput.addEventListener('input', function () {
        myResult.innerHTML = myInput.value
    });
</script>
```

esmad × oninput: esmad

Events

3. Forms

- Select and option
  - An <select> element has 3 important properties:
    - select.options - the <option> element collection
    - select.value - the value of the chosen option
    - select.selectedIndex - the number (index) of the selected option

Events

3. Forms

- Select and option
  - Example of setting a value for an option of element <select>

- Three ways to set the value of a <select>:
  - Find the <option> and set option.selected to true
  - Set select.value for the value
  - Set select.selectedIndex to the option number

```
<select id='select'>
    <option value='apple'>Apple</option>
    <option value='peer'>Pear</option>
    <option value='banana'>Banana</option>
</select>

<script>
    const mySelect = document.getElementById('select');

    // the next 3 lines do the exactly same thing
    mySelect.options[2].selected = true;
    mySelect.selectedIndex = 2;
    mySelect.value = 'banana';
</script>
```

Events

3. Forms

- Select and option
  - Creating a new option
  - Syntax: option = new Option(text, value, defaultSelected, selected)
  - Parameters:
    - text - the text inside the option
    - value - the option value
    - defaultSelected - if true, then the selected attribute is created
    - selected - if true, the option is selected

```
<script>
    const option = new Option('Text', 'value');
    // creates <option value="value">Text</option>
</script>
```

Events

3. Forms

- Select and option
  - Example: fill an <select> element with data from an array

```
<select id='select'></select>

<script>
    const names = ['Mary', 'Peter', 'John'];

    const mySelect = document.getElementById('select');
    let result = '';
    for (const name of names) {
        result += `<option value='${name}'>${name}</option>`;
    }
    mySelect.innerHTML = result;
</script>
```

for...of loop
to iterate over array of strings

Use of template strings for composing <option> elements

Property innerHTML

Events

3. Forms

- Submission
  - The submit event is triggered when the form is submitted
  - Used to validate the form before sending it to the server or to abort the submission and process it in JavaScript

```
<form id='form1'>
    Name: <input type='text' required><br>
    Age: <input type='number' min='0' max='120' required><br>
    Driving License: <input type='checkbox'><br>
    <input type='submit' value='Register'>
</form>

<script>
    const myForm = document.getElementById('form1');
    myForm.addEventListener('submit', function () {
        // validation code
    });
</script>
```

HTML5 validations

JS validations

submit event

Events

3. Forms

- Submission
  - Use of event.preventDefault() to prevent the predefined action of the event
  - In this case your call prevents the form from being submitted to the server
  - Passing the event object handler as a parameter

```html
<form id='form1'>
    Name: <input type='text' required><br>
    Age: <input type='number' min='0' max='120' required><br>
    Driving License: <input type='checkbox'><br>
    <input type='submit' value='Register'>
</form>
```

Name:
Age:
Driving License:
Register

```javascript
const myForm = document.getElementById('form1');
myForm.addEventListener('submit', function (event) {
    // validate
    if (myForm.age.value < 18 && myForm.drivingLicense.checked === true) {
        alert('You cannot have a driving license with that age!');
        event.preventDefault();
    } else {
        alert('All Ok, the form will be submitted to the server!');
    }
});
```

event object

preventDefault() method