CSCI-UA-4-005

Intro to Web Design + Computer Principles

Javascript: Day 2

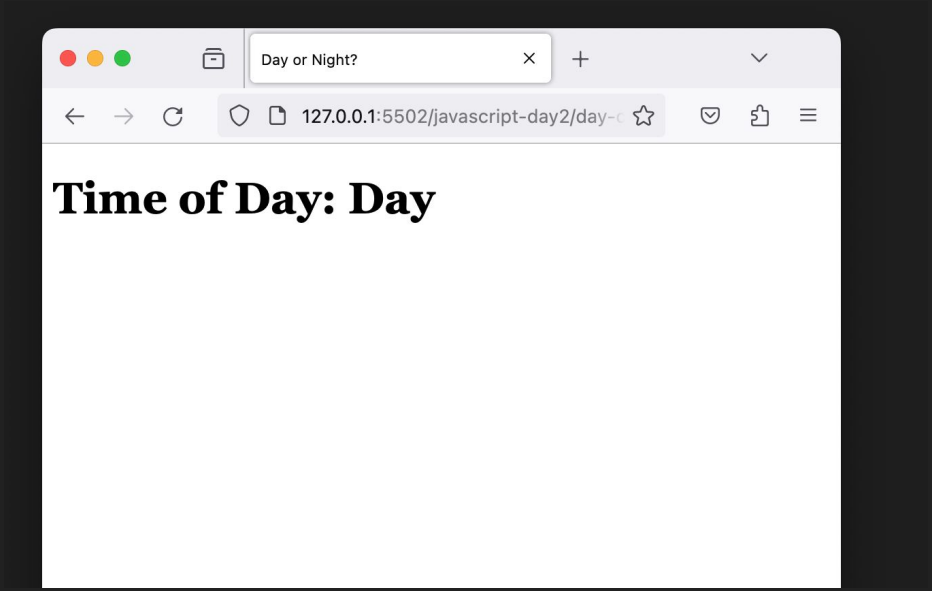
Professor Emily Zhao
M/W 12:30PM – 1:45PM

Agenda

- Lecture: The DOM
- [Demo] Changing CSS + Changing HTML Content
- Generating Random Numbers
- [Demo] Coin Flip
- Functions
- DOM Events

Warmup: Day/Night Website

Make a page that displays whether it is daytime or nighttime.



Document Object Model (DOM)

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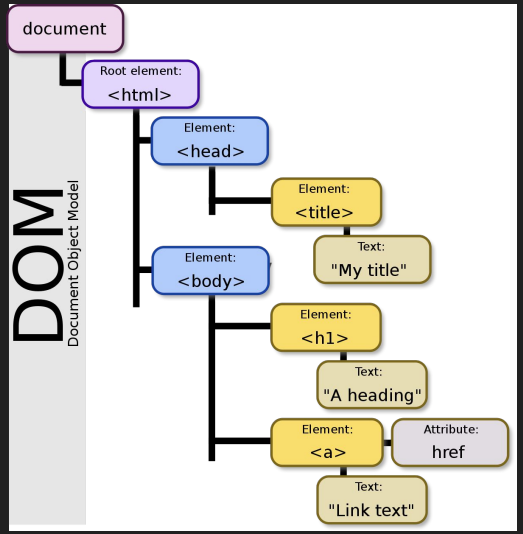


When a browser loads a web page, it creates a model of that page.

This is called a “DOM tree” and it is stored in the browser’s memory.

Every element, attribute, and piece of text in the HTML is represented by its own “DOM node.”

Types of DOM Nodes

There are four main types of nodes:

- The Document node, which represents the entire page
- Element nodes, which represent individual HTML tags
- Attribute nodes, which represent attributes of HTML tags, such as a class
- Text nodes, which represents the text within an element, such as the content of a <p> tag

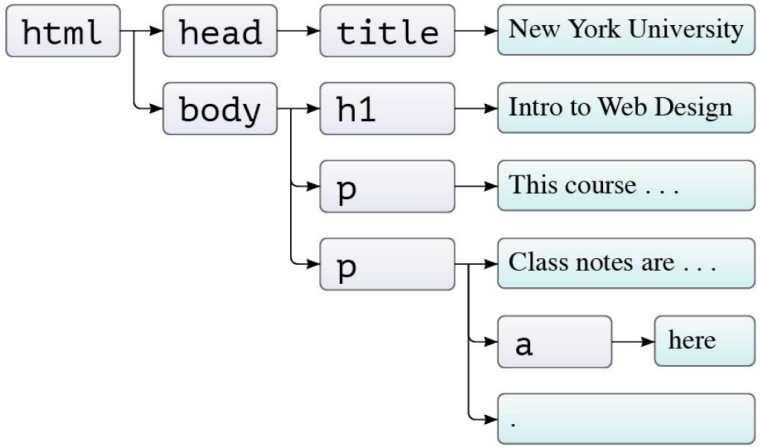
We talk about the relationship between element nodes as “parents,” “children,” and “siblings.”

```
<html>
  <head>
    <title>New York University</title>
  </head>

  <body>
    <h1>Intro to Web Design</h1>

    <p>In this course you will learn how to build websites.</p>

    <p>Class notes are available
    <a href="notes.html">here</a>.<p>
  </body>
</html>
```



DOM Queries

- JavaScript methods that find elements in the DOM tree are called “DOM queries.”
- DOM queries may return one element, or they may return a “node list.”
- Which DOM query you use depends on what you want to do and the scope of browser support required.

DOM Queries

Methods that return a single element node:

`.getElementById()`

`.querySelector()`

Methods that return one more more elements as a node list

`.getElementsByClassName()`

`.getElementsByTagName()`

`.querySelectorAll()`

What can we change?

`.textContent`

sets or returns the text content of the specified node

```
let element = document.getElementById("changeMe");
element.textContent = "I have changed!";
```

`.innerHTML`

sets or returns the HTML content (inner HTML) of an element

```
let element = document.getElementById("changeMe");
element.innerHTML = "<a href='#'>I have changed!</a>";
```

`.style.CSSPropertyName`

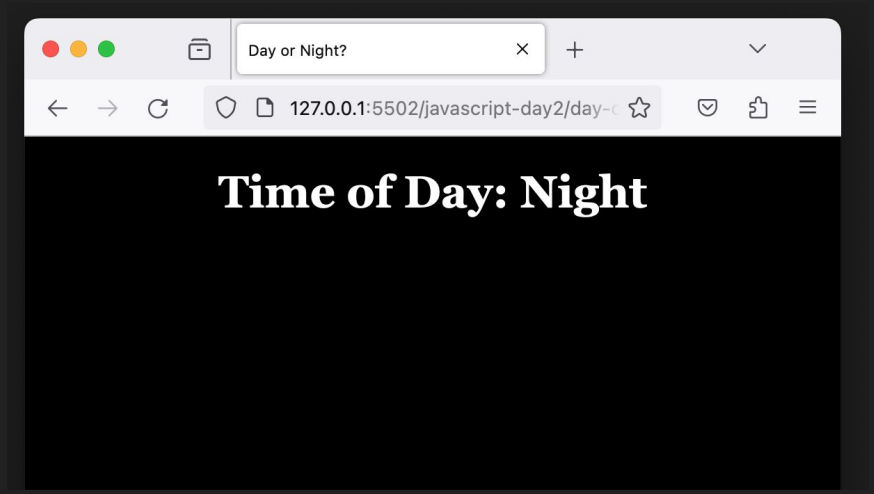
sets or returns the value of a given CSS property

```
let element = document.getElementById("changeMe");
element.style.color = "red";
```

[Demo] Changing Text + Inner HTML Content

Day/Night Website (cont'd)

Now, we're going to change some of the styles of our page using DOM Queries:



- Center the heading
- Change the background color of body
- Change the color of the text

[Demo] Random Numbers

`Math.random()`

`Math.random()`

returns a random decimal number between 0 (inclusive), and 1 (exclusive):

```
num = Math.random()
console.log(num) // 0.5566941489945507
```

`Math.floor()`

Used to round down to the nearest integer

```
num = Math.floor(5.95)
console.log(num) // 5
```

Combined, **`Math.floor()`** and **`Math.random()`** can return random integers

```
num = Math.floor(Math.random() * 10);
console.log(num) // Returns a random integer from 0 to 9:
```

Functions

Functions

Functions are blocks of reusable code that can be defined and invoked (called) to perform a specific task.

Functions play a crucial role in:

- Organizing and structuring code
- Promoting code reuse
- Enabling modular and maintainable programs

```
// Defining a function without parameters
function greet() {
  console.log('Hello, world!');
}

// Calling the greet function
greet();
```

```
// Defining a function with parameters
function addNumbers(a, b) {
  return a + b;
}

// Calling the addNumbers function with arguments 3 and 5
const result = addNumbers(3, 5);
console.log(result); // Output: 8
```

→ Let’s make `coinFlip()` and `randomBgColor()` functions

DOM Events

DOM Events

As you navigate the web, your browser registers different types of events.

Common events include:

- Clicking or tapping on a link
- Hovering or swiping over an element
- Resizing the browser window
- A web page loading

JavaScript can be used to respond to the multitude of events that occur within the DOM.

Keyboard Events

- keydown
- keyup
- keypress

Mouse Events

- click
- dblclick
- mousedown
- mouseup
- mouseover
- mouseout

Focus Events

- focus
- blur

Touch Events

- touchstart
- touchmove
- touchend
- touchcancel

Pointer Events

- pointerover
- pointerenter
- pointerdown
- pointermove
- pointerup
- pointercancel
- pointerout
- pointerleave
- gotpointercapture
- lostpointercapture

User Interface (UI) Events

- load
- unload
- error
- resize
- scroll

Mutation Events

- DOMSubtreeModified
- DOMNodeInserted
- DOMNodeRemoved
- DOMNodeInsertedIntoDocument
- DOMNodeRemovedFromDocument

Form Events

- input
- change
- submit
- reset
- cut
- copy
- paste
- select

Binding

Specifying which event will trigger the response is also known as “binding”.

There are three different ways to bind an event to an element:

— HTML event handler
— DOM event handler
— DOM Event listener *

* *preferred method*

HTML Event Handler

```
<button onclick="myFunction()">Click me</button>
```

***Downsides**: Mixing HTML markup with JavaScript can make the code less maintainable and harder to debug. It's generally considered a best practice to separate HTML and JavaScript code.*

DOM Event Handler

```
let btn = document.querySelector("button");
btn.onclick = myFunctionName;
```

***Downsides:** Assigning multiple event handlers to the same event on the same element will overwrite the previous assignment.*

DOM Event Listener

```
let btn = document.querySelector('button');
btn.addEventListener('click', myFunctionName);
```

***Most recommended!** They're most flexible and powerful. They allow you to attach multiple event handlers to a single event on a DOM element without overwriting existing ones.*

Event Handling

1. Select an element for the script to respond to
2. Specify which event will trigger the response
3. Run code specific to that event

```
// Step 1: Select an element for the script to respond to
const button = document.getElementById('myButton');

// Step 2: Specify which event will trigger the response
button.addEventListener('click', myFunction);

// Step 3: Run code specific to that event
function myFunction() {
  alert('Button clicked! This is the response to the click event.');
})
```

Flip a Coin (cont'd)

Now, we're going to add a button to our HTML.

Instead of flipping the coin and generating a random background color on reload, we are now going to bind those responses to a button click.

I'll show you all three ways to do it:

1. HTML event handler
2. DOM event handler
3. DOM event listener