



DOM

(Document Object Model)

.NET

The **Document Object Model (DOM)** is the data representation of the objects that comprise the structure and content of a document on the web. The DOM represents an HTML or XML document in memory.

DOM (Document Object Model)

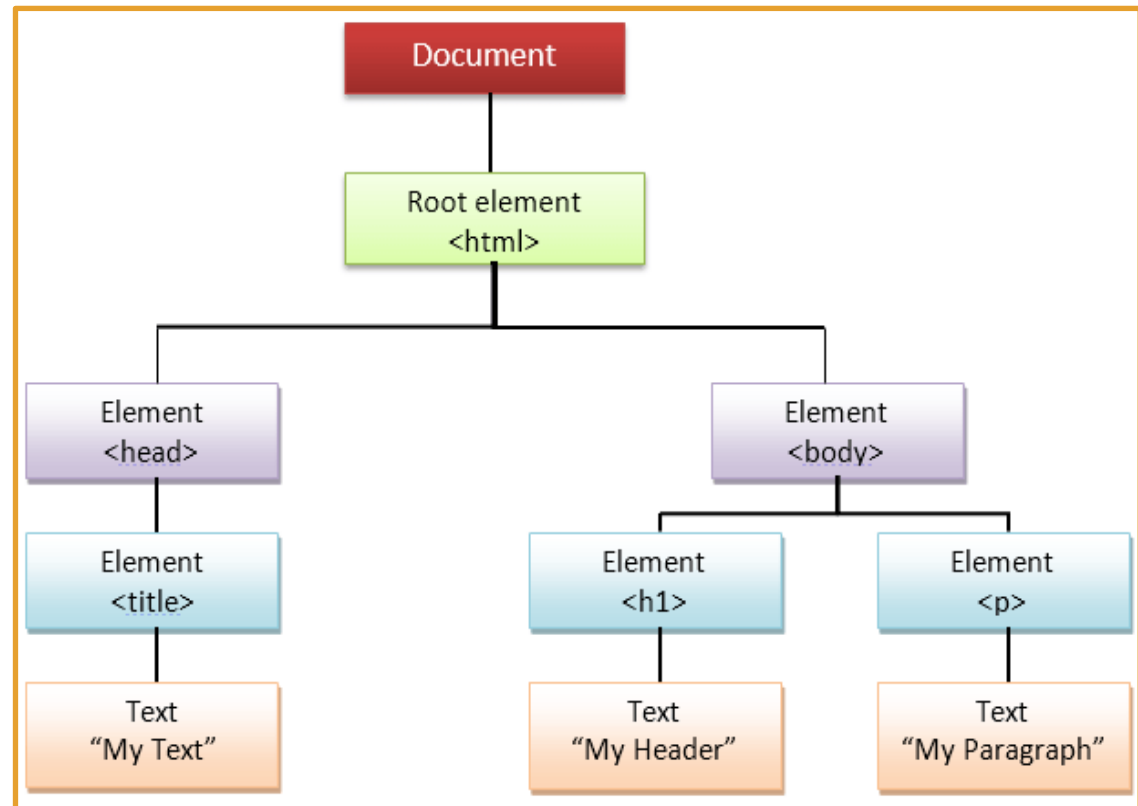
https://developer.mozilla.org/en-US/docs/Web/API/Document_Object_Model/Introduction

The *Document Object Model (DOM)* is a programming interface for HTML and XML documents. It represents the page as nodes and objects. The DOM allows programs to change the documents' structure, style, and content.

A Web page is one document that can be

- displayed in the browser window,
- viewed as HTML, and
- represented by the DOM.

The DOM can be manipulated by scripting languages like JavaScript.



DOM in action

<https://javascript.info/>

All the properties, methods, and events available for manipulating and creating web pages are organized into objects.

For example, the document object represents the document itself and the **<table>** object implements the *HTMLTableElement* DOM interface for accessing HTML tables.

getElementsByName("p") returns a list of all the **<p>** elements in the document.

```
1 | const paragraphs = document.getElementsByTagName("p");  
2 | // paragraphs[0] is the first <p> element  
3 | // paragraphs[1] is the second <p> element, etc.  
4 | alert(paragraphs[0].nodeName);
```

DOM – How to Access the DOM

Within the `<head>` of your `.html` file or at the bottom of the `<body>`, include a `<script>` tag which contains the `.js` file you want to use for the `.html` page. You can then access the *document* in the `.js` file with `document.getElementById("#IdName")`.

```
<head>
    // other tags, etc....
</head>
<body>
    //...
    <script type="text/javascript" src="jsfile.js"></script>
</body>
```

DOM – Selectors

<https://blog.bitsrc.io/dom-selectors-explained-70260049aaf0>

JS DOM **Selectors** are used to select HTML **elements** within a **document**. There are 5 **selectors**.

Selector Name	Purpose
<code>document.getElementsByTagName("myTag")</code>	Returns a collection (array) of Items matching the tag name.
<code>document.getElementsByClassName("myClass")</code>	Returns a collection (array) of Items matching the class name. The '.' is only needed for <code>.querySelector(className)</code>
<code>document.getElementById("myId")</code>	Returns the <u>first</u> matched id name. Id's are supposed to be unique in the .HTML file.
<code>document.querySelector("li")</code>	Returns the <u>first</u> element that matches the specified CSS selector.
<code>document.querySelectorAll("ol")</code>	Returns <u>all</u> the elements that match the specified CSS selector

Walking the DOM - Basics

<https://javascript.info/dom-navigation>

We can perform many actions with *elements* and their contents after accessing the correct DOM element.

The topmost tree nodes are available directly as document properties:

To get the `<html>` element, use:

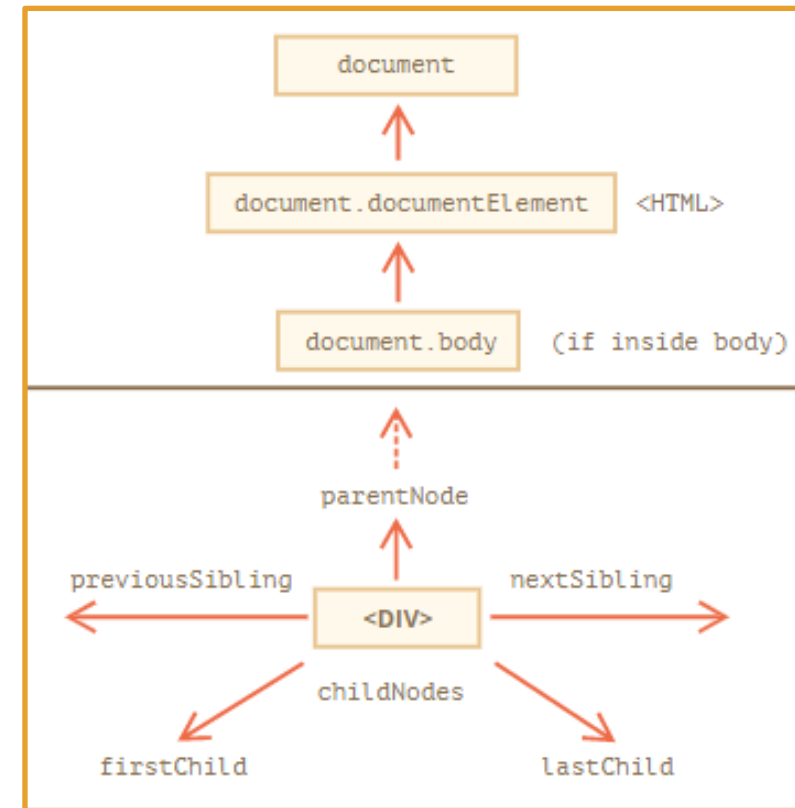
- `var html = document.documentElement;`

To get the `<body>` element, use:

- `var body = document.body;`

To get the `<head>` element, use

- `var head = document.head;`



Walking the DOM - Basics

<https://javascript.info/dom-navigation>

- Child nodes – Elements that are nested in the given element. `<head>` and `<body>` are both children of `<html>`.
- Siblings – nodes that are children of the same parent.
- Descendants – all elements nested in the given element. This includes children, their children, etc.

In this example, `<body>` has two children, `<div>` and ``. `<div>` and `` are siblings

Among the descendants of `<body>` are the direct children `<div>` and `` and more deeply nested elements, like `` (child of ``) and `` (child of ``).

```
1  <html>
2  <body>
3      <div>Begin</div>
4
5      <ul>
6          <li>
7              <b>Information</b>
8          </li>
9      </ul>
10 </body>
11 </html>
```


Walking the nodes of the DOM

<https://javascript.info/dom-navigation>

Method	Explanation/Example
<code>document.body.childNodes[n]</code>	<code>.childNodes</code> lists all child nodes in a (read-only) <u>collection</u> , including text nodes.
<code>.firstChild</code>	Gives access to the first child. <code>elem.firstChild</code>
<code>.lastChild</code>	Gives access to the last child. <code>elem.lastChild</code>
<code>.nextSibling</code>	Access the following or “right” sibling going down the page.
<code>.previousSibling</code>	Access the prior or “left” sibling going up the page.
<code>.parentNode</code>	Access the parent of the current node.

Walking the elements of the DOM

<https://javascript.info/dom-navigation#children-childnodes-firstchild-lastchild>

Method	Explanation/Example
.firstElementChild	Gives access to the first child.
.lastElementChild	Gives access to the last child.
.nextElementSibling	Access the next (“right”) sibling element going down the page.
.previousElementSibling	Access the prior (“left”) sibling element going up the page.
.parentElement	Access the parent of the current node if it’s an element. Returns <i>null</i> if not an element
.children	Returns an array of all children elements.

DOM – Events Overview

<https://developer.mozilla.org/en-US/docs/Web/Events>

<https://developer.mozilla.org/en-US/docs/Web/API/GlobalEventHandlers/onclick>

DOM **Events** are sent when things happen on the HTML page, such as when a **button** is clicked, or an object is ‘moused’ over.

Each **event** is represented by an **object** which is based on the **Event** interface that can have fields and/or functions used to get additional information about what happened.

The two most common **events** are ‘**clicks**’ and form submissions.



Event Listeners and Event Handlers

https://developer.mozilla.org/en-US/docs/Learn/JavaScript/First_steps/A_first_splash

The “construct” that listens for an event to happen is called an *event listener*. The block of code that runs when the event fires is called an *event handler*.

The below code creates an object that represents an HTML element with `id='button'`.

```
var button = document.getElementById("button");
```

guessSubmit holds all the data from an element.

It uses a built-in JS helper function called `addEventListener()` which takes two arguments.

1. The type of event we are listening for (*click*), and
2. A *callback* to the code we want to run when the event occurs. Because `checkSubmission()` is a callback, you don't need to use the `()`.

```
button.addEventListener('click', callbackFunction);
```

Bubbling and Capture

[https://developer.mozilla.org/en-US/docs/Web/API/Document_Object_Model/Examples#Example 5: Event Propagation](https://developer.mozilla.org/en-US/docs/Web/API/Document_Object_Model/Examples#Example_5:_Event_Propagation)
https://developer.mozilla.org/en-US/docs/Learn/JavaScript/Building_blocks/Events

Event ***bubbling*** and event ***capture*** are two mechanisms that describe what happens when two ***handlers*** of the same ***event type*** are activated on one ***element***.

When an event is fired (a '***click***') on an element that has parent elements, modern browsers run two different phases — the ***capturing*** phase and the ***bubbling*** phase.

Capture Phase	Bubble Phase
<p>The browser checks to see if the element's <u>outer-most</u> ancestor (<i><html></i>) has an 'onclick' event handler registered on it and, if so, runs it.</p> <p>Then it moves on to the next element inside <i><html></i> and does the same thing, until it reaches the element that was actually clicked.</p>	<p>The browser checks to see if the element that was actually clicked on has an 'onclick' event handler registered on it for the bubbling phase and runs it if so.</p> <p>Then it moves on to the next immediate ancestor element and does the same thing until it reaches the <i><html></i> element.</p>

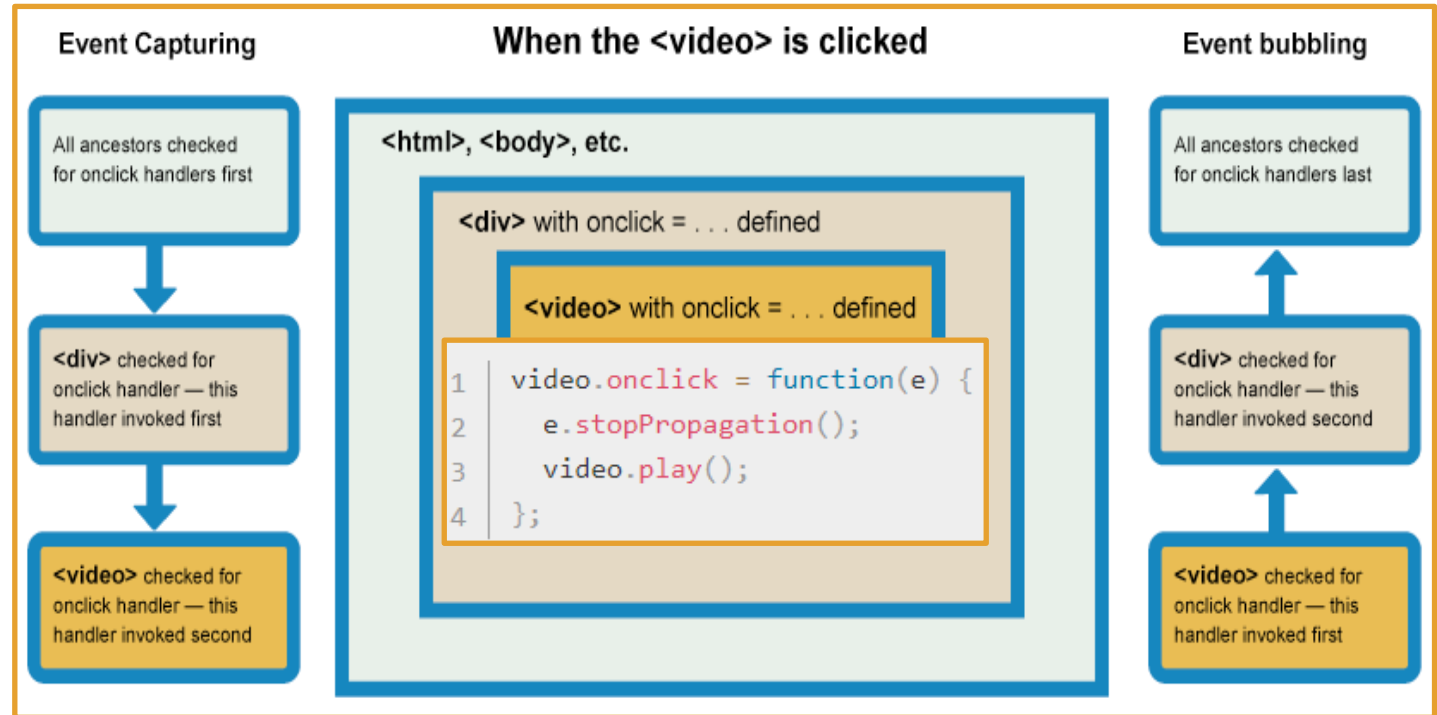
Bubbling and Capture

[https://developer.mozilla.org/en-US/docs/Web/API/Document_Object_Model/Examples#Example 5: Event Propagation](https://developer.mozilla.org/en-US/docs/Web/API/Document_Object_Model/Examples#Example_5:_Event_Propagation)
https://developer.mozilla.org/en-US/docs/Learn/JavaScript/Building_blocks/Events

Browsers automatically register event handlers for the *bubbling* phase.

When the video is clicked, the 'click' event bubbles outward from the **<video>** element outwards to its parent **<div>**, to the **<html>**. If any of these elements has an '*on-click*' event handler, they will fire.

.stopPropagation() is provided to stop further propagation.



Bubbling and Capture

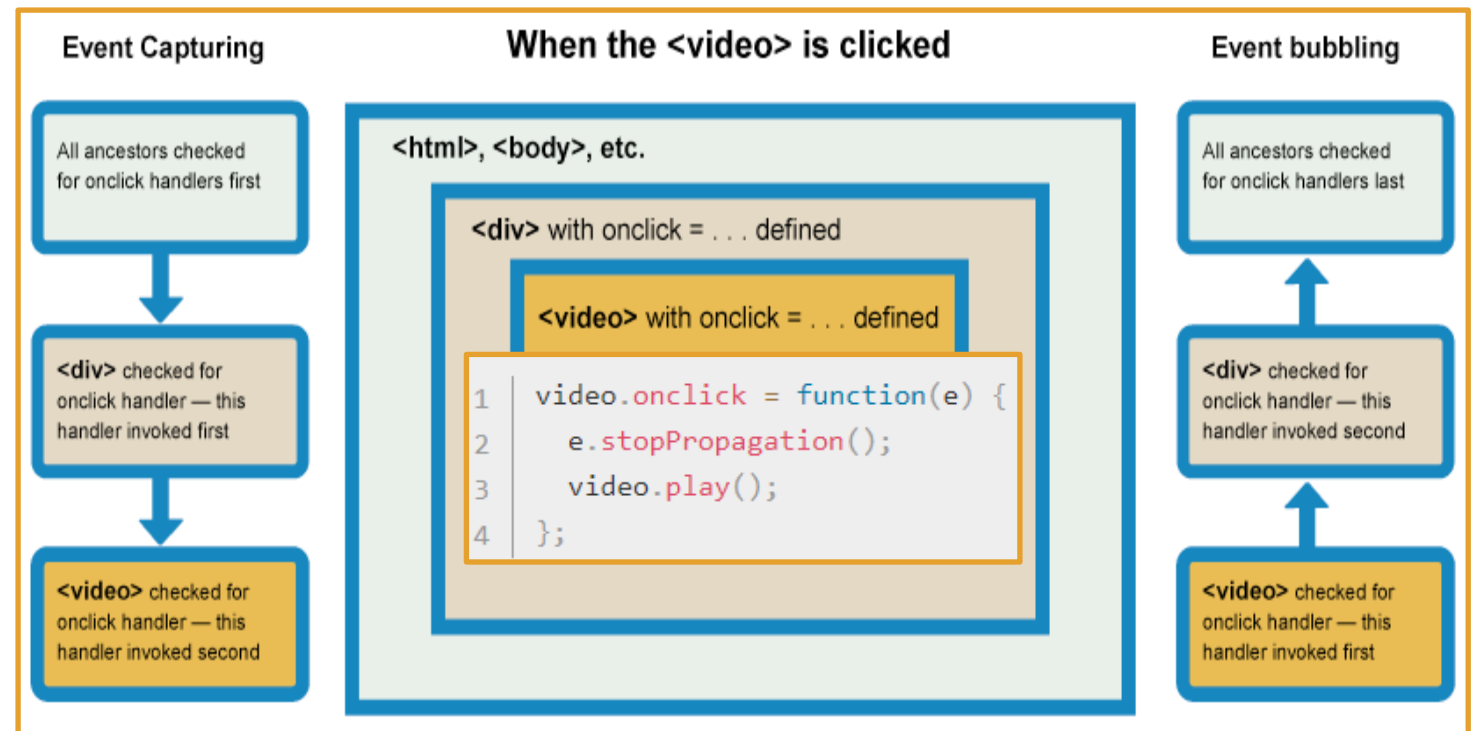
[https://developer.mozilla.org/en-US/docs/Web/API/Document_Object_Model/Examples#Example 5: Event Propagation](https://developer.mozilla.org/en-US/docs/Web/API/Document_Object_Model/Examples#Example_5:_Event_Propagation)
https://developer.mozilla.org/en-US/docs/Learn/JavaScript/Building_blocks/Events

Browsers automatically register event handlers for the *bubbling* phase.

stopImmediatePropagation()
prevents other listeners from
being triggered.

If several listeners are on the
same element for the same
event type, they are called in
sequential order.

stopImmediatePropagation(), if
invoked, prevents remaining
listeners from being called.



DOM Events Order

https://developer.mozilla.org/en-US/docs/Web/API/Document/DOMContentLoaded_event

The ***DOMContentLoaded*** event fires when the initial HTML document has been completely loaded and parsed, without waiting for stylesheets, images, and subframes to finish loading.

A different event, ***load***, should be used only to detect a fully-loaded page. It is a common mistake to use ***load*** where ***DOMContentLoaded*** would be more appropriate.

Synchronous JavaScript pauses when parsing the DOM. To parse the DOM as fast as possible after the user has requested the page, make your JavaScript asynchronous to optimize the loading of stylesheets.

If loaded as usual, stylesheets slow down ***DOM*** parsing as they're loaded in parallel. This "steals" traffic from the main HTML document.

```
1 <script>
2   document.addEventListener('DOMContentLoaded', (event) => {
3     console.log('DOM fully loaded and parsed');
4   });
5
6   for( let i = 0; i < 1000000000; i++)
7   {} // This synchronous script is going to delay parsing of the DOM,
8     // so the DOMContentLoaded event is going to launch later.
9 </script>
```


DOM Events Order

https://developer.mozilla.org/en-US/docs/Web/API/Document/DOMContentLoaded_event

DOMContentLoaded may fire before your script has a chance to run, so it is wise to check before adding a listener.

HTML

```
1 <div class="controls">
2   <button id="reload" type="button">Reload</button>
3 </div>
4
5 <div class="event-log">
6   <label>Event log:</label>
7   <textarea readonly class="event-log-contents" rows="8" cols="30"></textarea>
8 </div>
```

JS

```
1 const log = document.querySelector('.event-log-contents');
2 const reload = document.querySelector('#reload');
3
4 reload.addEventListener('click', () => {
5   log.textContent = '';
6   window.setTimeout(() => {
7     window.location.reload(true);
8   }, 200);
9 });
10
11 window.addEventListener('load', (event) => {
12   log.textContent = log.textContent + 'load\n';
13 });
14
15 document.addEventListener('readystatechange', (event) => {
16   log.textContent = log.textContent + `readystate: ${document.readyState}\n`;
17 });
18
19 document.addEventListener('DOMContentLoaded', (event) => {
20   log.textContent = log.textContent + `DOMContentLoaded\n`;
21 });
```

Result of the above

Event log:

```
readystate: interactive
DOMContentLoaded
readystate: complete
load
```

Reload

GuessingGame Tutorial

https://developer.mozilla.org/en-US/docs/Learn/JavaScript/First_steps/A_first_splash

1. Complete the guessingGame Tutorial.
2. Change guessingGame from using **events** to using a **form** to get the number.
3. Use <https://javascript.info/ui> for independent study.