JAVASCRIPT

and the Web!

JAVASCRIPT

popular scripting language on the Web, supported by browsers

separate scripting from structure (HTML) and presentation (CSS)

client- and server-side programming

object-oriented, imperative, functional

HOW TO EMBED JS IN HTML

Embed external file

```
<script type=“text/javascript" src=“code.js”></script>
```

Inline in HTML

```
<script type="text/javascript">
  Javascript goes here...
</script>
```

Revisiting the Dom

THE **`document`** OBJECT

root node of HTML document

selector properties/methods:

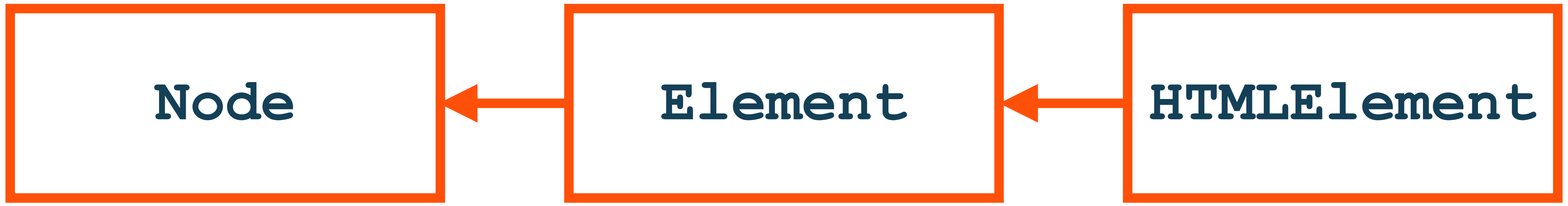
`document.body`

`document.getElementById()`

`document.getElementsByClassName()`

`document.getElementsByTagName()`

THE **HTMLElement** OBJECT



From **Node**

element.**nodeName**

element.**nodeType**

element.**textContent**

From **Element**

element.**attributes**

element.**className**

element.**id**

element.**innerHTML**

element.**tagName**

THE **`HTMLElement`** OBJECT

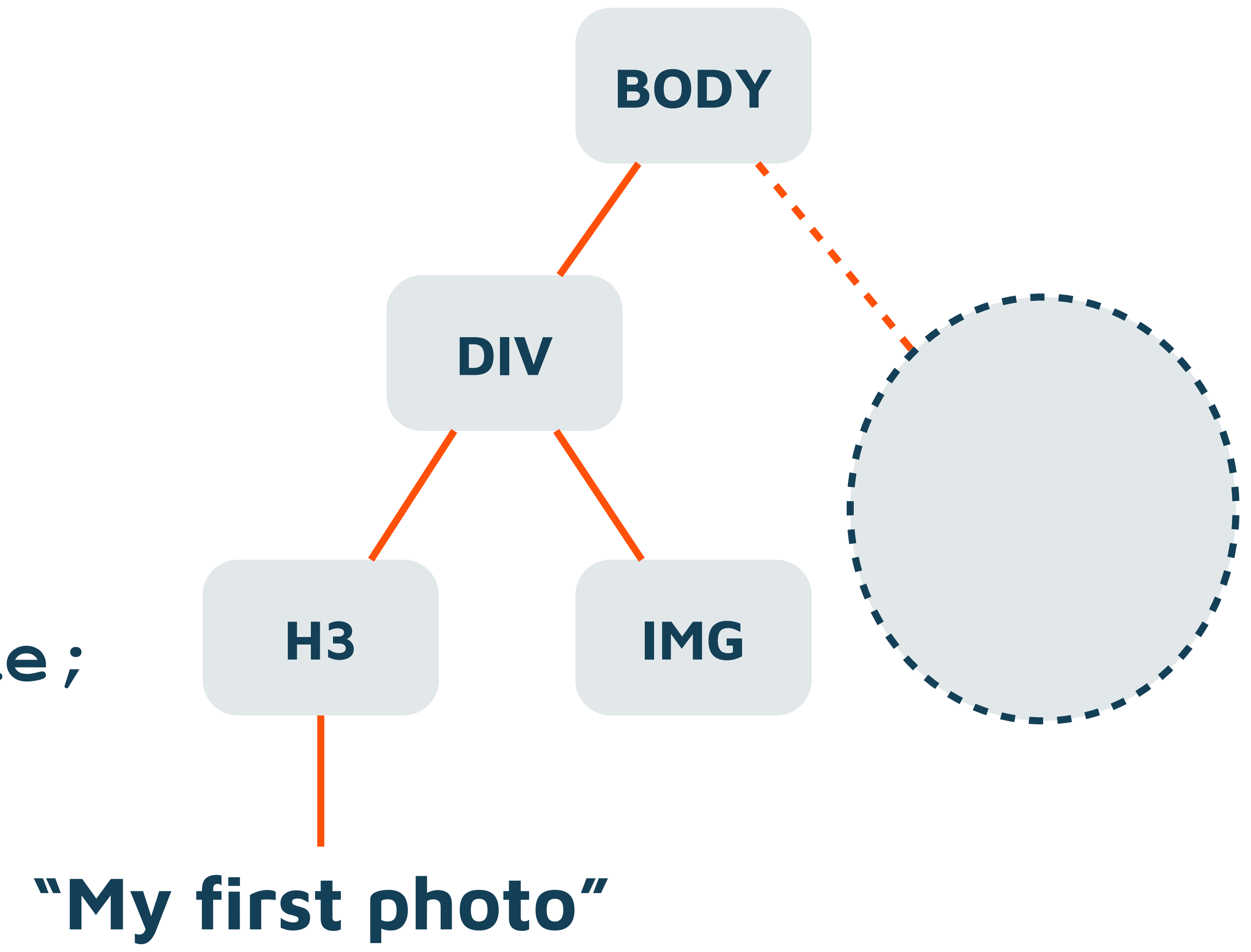
properties for traversing the DOM tree

`element.childNodes`		**`element.children`**
`element.parentNode`	**VS.**	**`element.parentElement`**
`element.previousSibling`		**`element.previousElementSibling`**
`element.nextSibling`		**`element.nextElementSibling`**

A **`Node`** can be anything in the DOM (Text, Comments, etc.), while **`Elements`** are the nodes that represent HTML elements

TRAVERSING THE DOM

```
var body = document.body;
var div = body.children[0];
var h3 = div.children[0];
var textNode = h3.childNodes[0];
var textString = textNode.nodeValue;
```



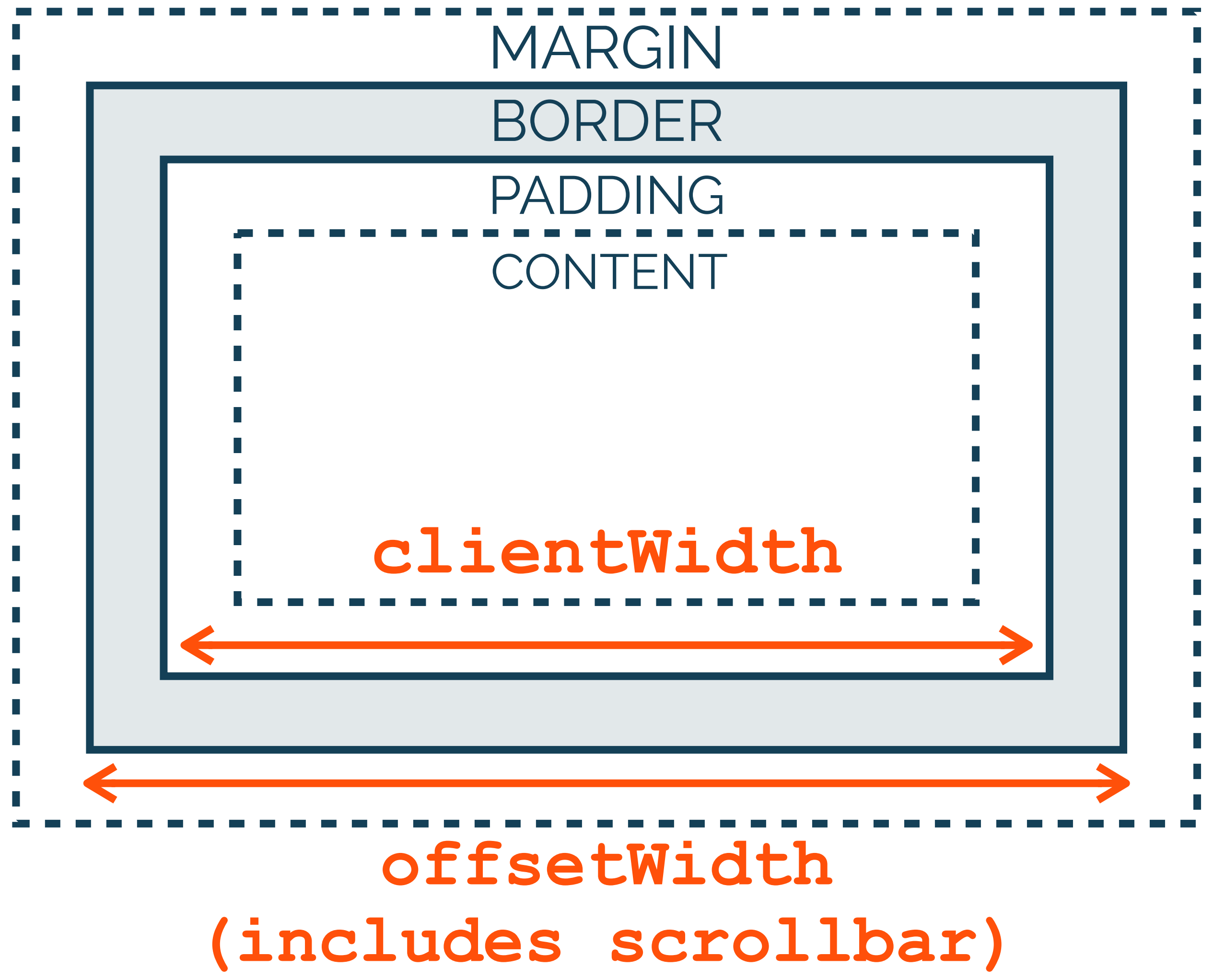
THE **`HTMLElement`** OBJECT

relative to offsetParent

position: **`element.offsetTop`**, **`element.scrollTop`**, ...

dimensions: **`element.clientWidth`**, **`element.offsetWidth`**, ...

style: **`element.style`**



DOM MANIPULATION

programmatically change the structure and modify element properties

```
element.style.backgroundColor = "red";
element.innerHTML = "<div><h3>Llama!</h3>…</div>"
```

augment DOM structure:

```
element.appendChild(),element.removeChild(),...
```

Events

TYPES OF EVENTS

User mouse clicks/moves, key presses

Browser page load/unload

Network responses to AJAX request

Timer

TIMER EVENTS

`setTimeout(``fn, ms`**`);`**

calls function after specified amount of time (ms)

`setInterval(``fn, ms`**`);`**

calls function at specified intervals (ms) until `clearInterval()` or window is closed

EVENT HANDLERS

also known as listeners

make use of callback functions

specify what happened, where it happened, and how to handle it

EVENT HANDLERS

In HTML DOM LEVEL 0

```
<div onclick="alert('Llama!');">…</div>
```

In Javascript using the DOM DOM LEVEL 1

```
element.onclick = function(){alert('Llama!');}
```

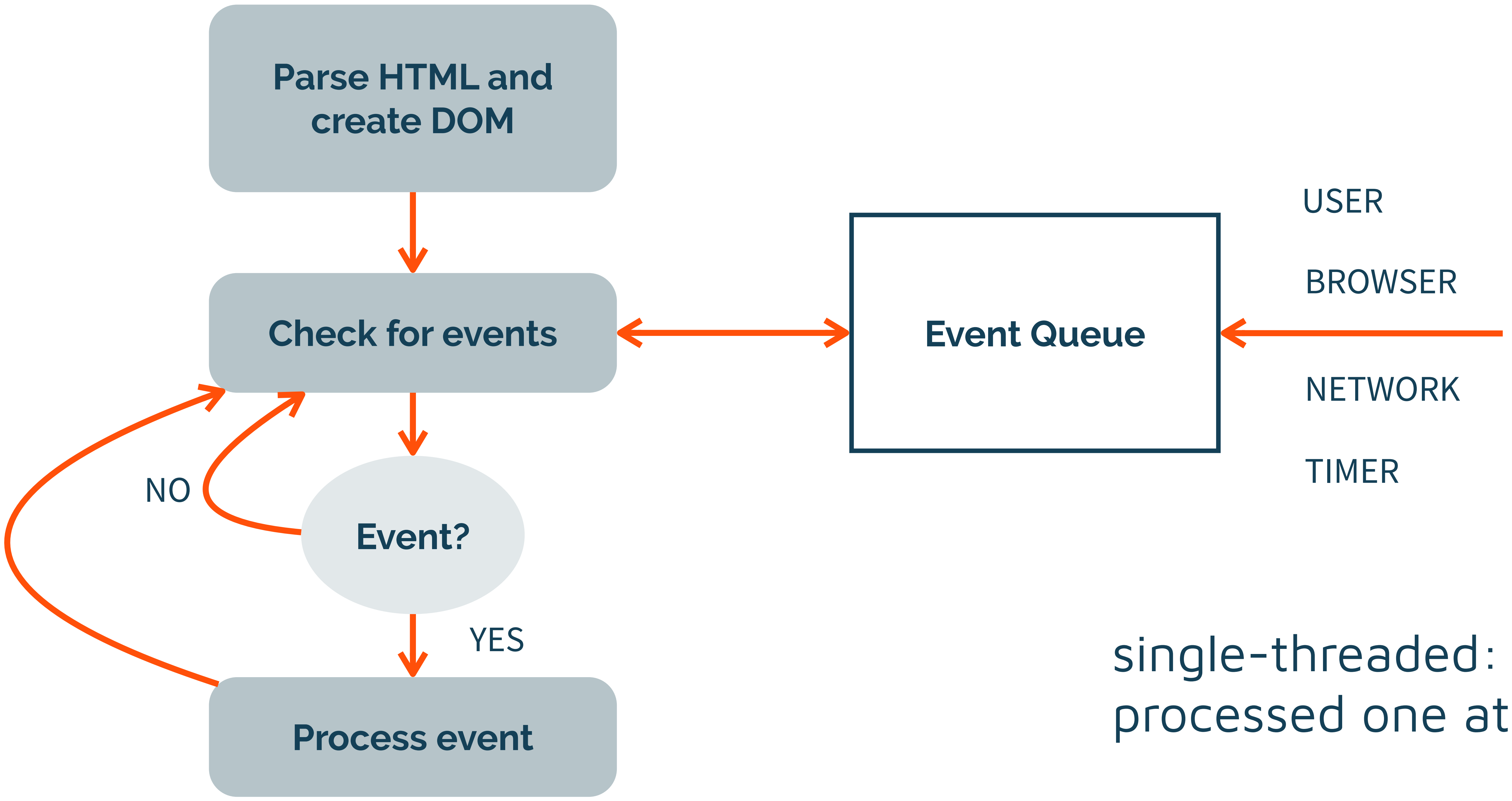
EVENT HANDLERS

DOM LEVEL 2

```
var el = document.getElementById(‘myButton');
el.addEventListener('click', function(){
     alert('Llama!');
});
```

supports multiple handlers per event!

THE BROWSER EVENT LOOP



single-threaded: events processed one at a time

EVENT OBJECT

contains the information about the event

HTML

```
<div onclick="mouseClick(event);">
```

DOM

```
element.onclick = mouseClick;

function mouseClick(event){…};
```

EVENT PROCESSING

events propagate in two phases

capture phase: root to innermost element

bubble phase: innermost element to root

DOM standard: capture then bubble

EVENT PROCESSING

```
element.addEventListener(event,
function, useCapture)
```

set capture or bubble phase

```
event.stopPropogation()
```

CodePen

Event Example 1

CodePen

Anonymous Functions

```
function animateIt(elementId, speed) {
  var elem = document.getElementById(elementId);
  var tick = 0;

  var timer = setInterval(function() {
    if (tick < 100) {
      elem.style.left = tick * speed + "px";
      tick++;
    }
    else {
      clearInterval(timer);
    }
  }, 30);
}
```

Closures

```
function animateIt(elementId, speed) {
  var elem = document.getElementById(elementId);
  var tick = 0;

  var timer = setInterval(function() {
    if (tick < 100) {
      elem.style.left = tick * speed + "px";
      tick++;
    }
    else {
      clearInterval(timer);
    }
  }, 30);
}
```

Event Example 2

CodePen

Classes and Mouse Events

```
function Dragger(id) {
  this.isMouseDown = false;
  this.element = document.getElementById(id);
  var obj = this;
  this.element.onmousedown = function(event) {
    obj.mouseDown(event);
  }
}
```

why obj instead of this?

Classes and Mouse Events

```
Dragger.prototype.mouseDown = function(event) {
    var obj = this;
    this.oldMoveHandler = document.body.onmousemove;
    document.body.onmousemove = function(event) {
        obj.mouseMove(event);}
    this.oldUpHandler = document.body.onmouseup;
    document.body.onmouseup = function(event) {
        obj.mouseUp(event);}
    this.oldX = event.clientX;
    this.oldY = event.clientY;
    this.isMouseDown = true;
}
```

why body?

Troubles with Browsers and Other Quirks

BROWSERS

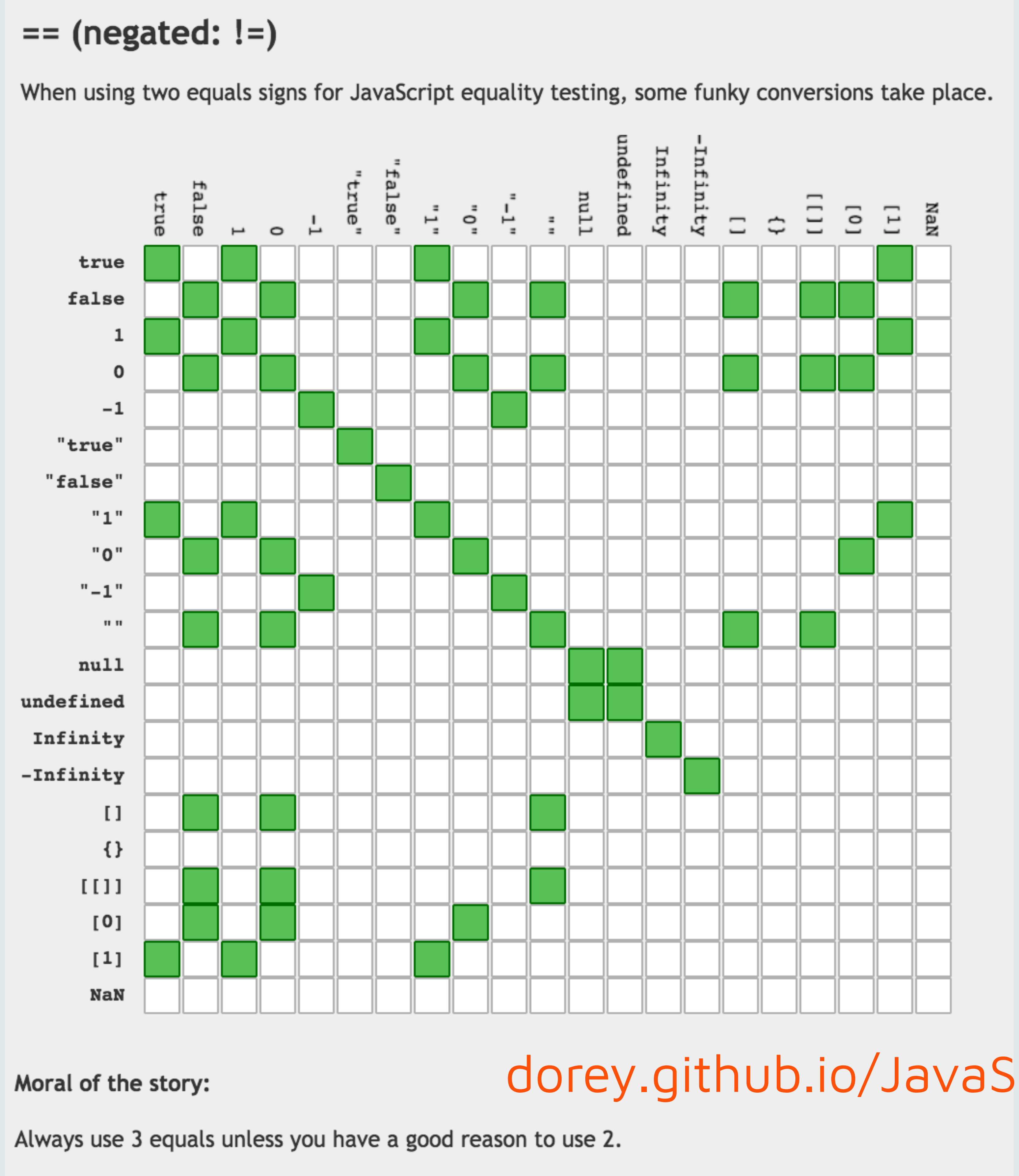
stable APIs, but different implementations

JavaScript libraries duplicate existing event handling and DOM APIs

JQUERY

cross-browser compatibility

use for all DOM manipulation: (e.g., positioning relative to document and not offsetParent)



== (negated: !=)

When using two equals signs for JavaScript equality testing, some funky conversions take place.

	true	false	1	0	-1	"true"	"false"	"1"	"0"	"-1"	""	null	undefined	Infinity	-Infinity	[]	{}	[[]]	[0]	[1]	NaN
true	🟩		🟩					🟩												🟩	
false		🟩		🟩					🟩		🟩					🟩		🟩	🟩		
1	🟩		🟩					🟩												🟩	
0		🟩		🟩					🟩		🟩					🟩		🟩	🟩		
-1					🟩					🟩											
"true"						🟩															
"false"							🟩														
"1"	🟩		🟩					🟩												🟩	
"0"		🟩		🟩					🟩										🟩		
"-1"					🟩					🟩											
""		🟩		🟩							🟩					🟩		🟩			
null												🟩	🟩								
undefined												🟩	🟩								
Infinity														🟩							
-Infinity															🟩						
[]		🟩		🟩							🟩										
{}																					
[[]]		🟩		🟩							🟩										
[0]		🟩		🟩					🟩												
[1]	🟩		🟩					🟩													
NaN																					

Moral of the story:

Always use 3 equals unless you have a good reason to use 2.

dorey.github.io/JavaScript-Equality-Table/

NEXT CLASS: ADVANCED JS + DEVLAB: MP 1

https://uiuc-web-programming.gitlab.io/fa21/