# 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">
<![CDATA[
  Javascript goes here...
]]>
</script>
```

*everything inside ignored by parser*

## Revisiting the Dom

## DOM DOCUMENT OBJECT

root node of HTML document

selector properties/methods:

```
document.body
document.getElementById()
document.getElementsByClassName()
document.getElementsByTagName()
```

# DOM ELEMENT OBJECT

Element metadata:

```
element.tagName
element.className
element.id
element.attributes
element.innerHTML
```

Node metadata:

```
element.nodeName
element.nodeType
element.nodeValue
```

www.w3schools.com/jsref/dom_obj_all.asp

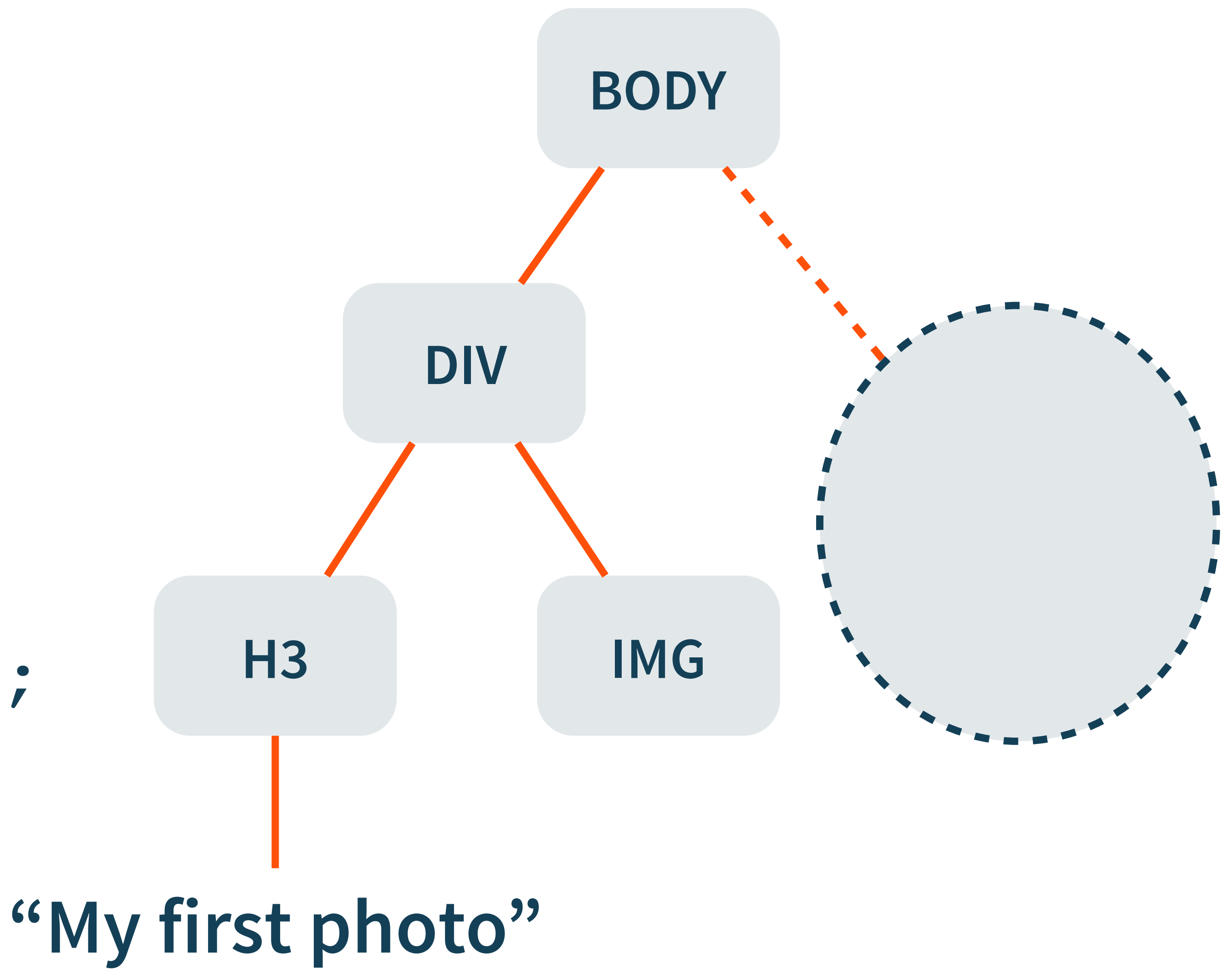
# DOM ELEMENT OBJECT

properties for traversing the DOM tree:

```
element.childNodes/element.children
element.parentNode/element.parentElement
element.previousSibling/element.previousElementSibling
element.nextSibling/element.nextElementSibling
```

# 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;
```



www.w3schools.com/jsref/dom_obj_all.asp

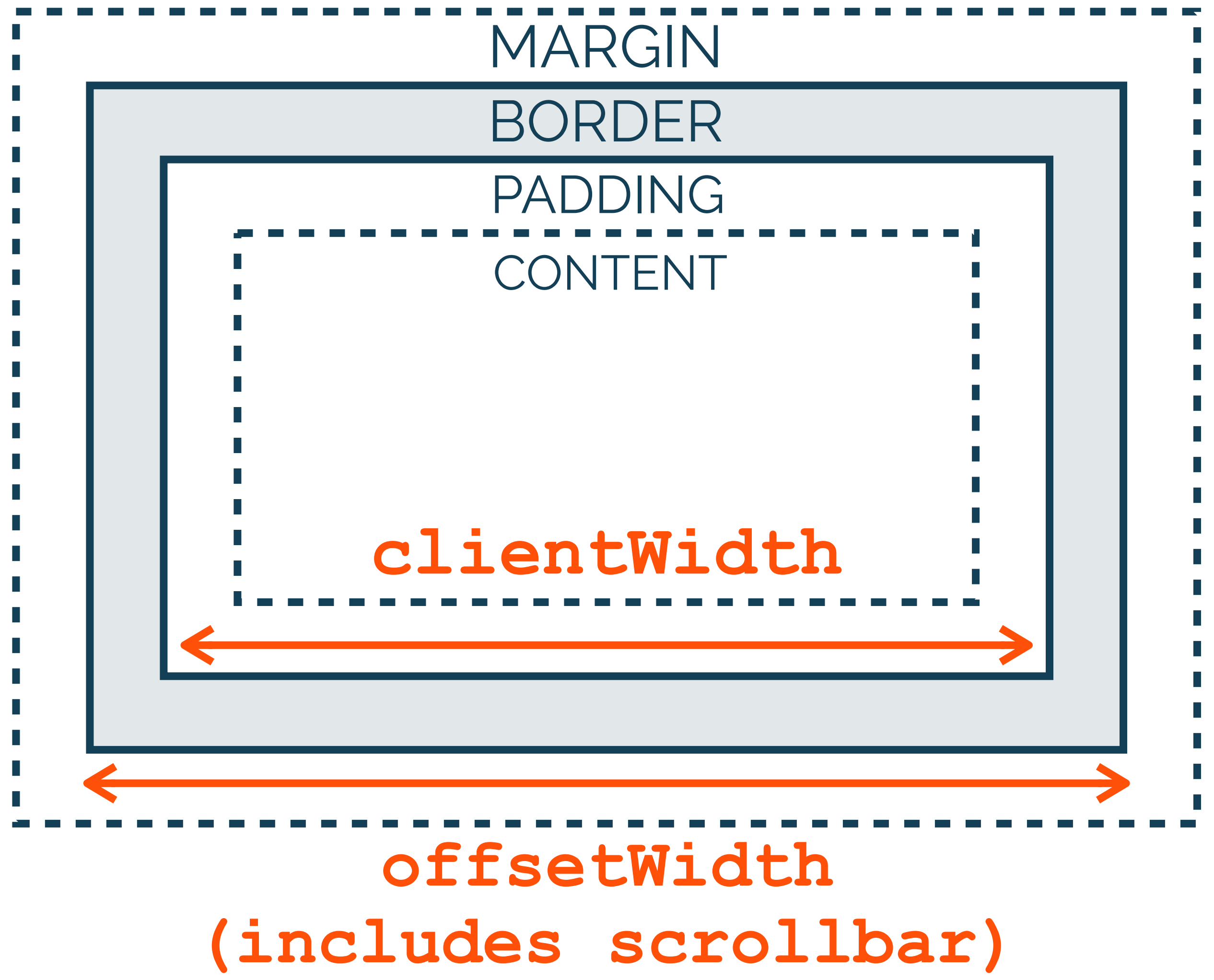
# DOM ELEMENT OBJECT

**relative to offsetParent**

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

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

style: **`element.style`**



www.w3schools.com/jsref/dom_obj_all.asp

# 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(),...
```

www.w3schools.com/jsref/dom_obj_all.asp

## Events

# TYPES OF EVENTS

User: *mouse clicks, mouse 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*

callback functions

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

# EVENT HANDLERS

DOM LEVEL 0

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

**In HTML**

DOM LEVEL 1

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

**In Javascript using the DOM**

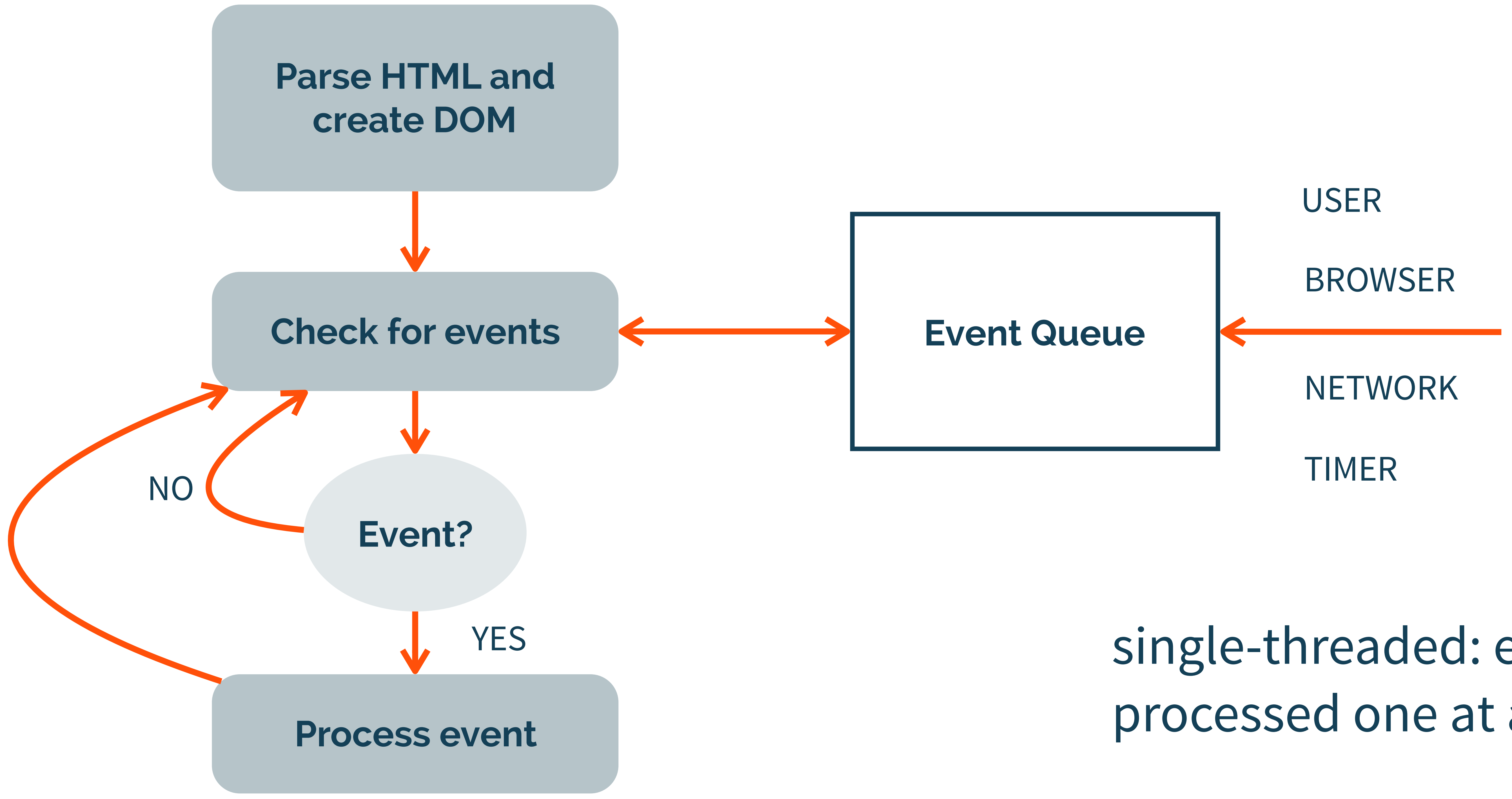
# EVENT HANDLERS

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){…};
```

**DOM (IE)**

```
function mouseClick(){…
 x = window.event.clientX;
…};
```

## 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);
  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);
  tick = 0;
  var timer = setInterval(function() {
    if (tick <100) {
      elem.style.left = tick*speed + "px";
      tick++;
    }
    else {clearInterval(timer);}
    }, 30);
}
```

## Event Example 2

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## 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

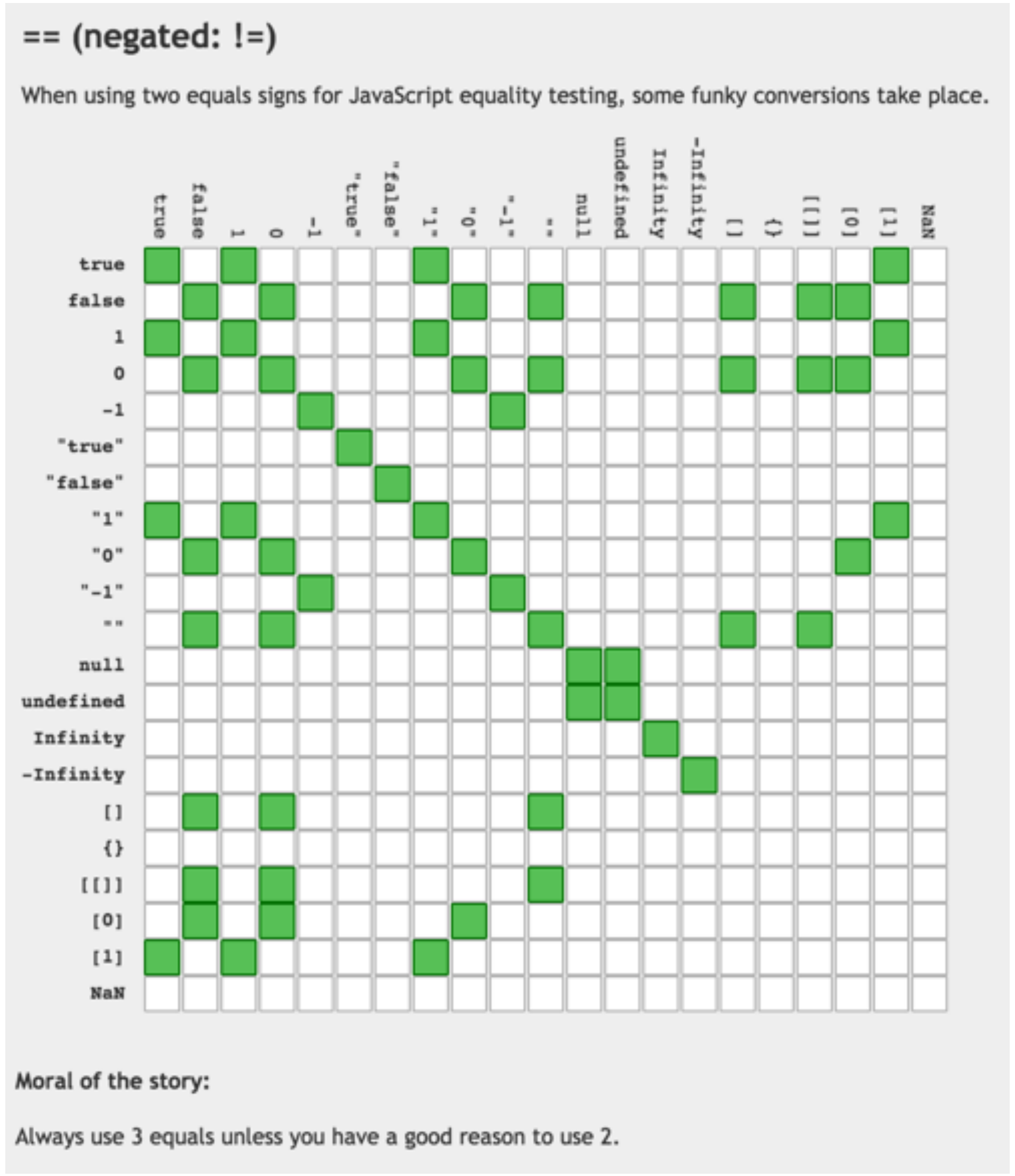
stable APIs, but different implementations

JavaScript libraries duplicate existing event handling and DOM APIs

## JQUERY

cross-browser

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/

## TIPS & TRICKS

developers.google.com/speed/articles/optimizing-javascript

jonraasch.com/blog/10-javascript-performance-boosting-tips-from-nicholas-zakas

## NEXT CLASS: UI DESIGN

courses.engr.illinois.edu/cs498rk1/