MIDTERM REVIEW

NEXT MONDAY:
IN-CLASS MIDTERM

CANNOT MAKE IT?

If for some special circumstance, you CANNOT make the in-class midterm, please email me ASAP.

If we don't know about your special circumstance by 11.59pm today (10/09), we won't be able to accommodate you.

FORMAT

3-4 multiple choice

2-3 short coding

THINGS YOU SHOULD KNOW ABOUT THE MIDTERM

Anything from lecture and MPs is fair game

One-sheet of handwritten notes (front and back)

Expect to write code: **Javascript**, HTML, CSS, SASS, React, Mongo Query Language

Will test your ability to apply what you've learned in new situations -- NOT regurgitate memorized facts (i.e., history of HTML)

HOW TO STUDY FOR MIDTERM

Go through all the questions on slides

Go through all code examples on slides/CODE PEN

Review the challenging aspects of the MPs

Be sure to review the following topics...

STRUCTURAL SEMANTIC TAGS

```
<body>
   <header>
      <h1>How to Get a PhD</h1>
      <nav>...</nav>
   </header>
   <article>
      <section>
         <figure><img src="benfranklin.jpg"></figure>
         <h3>Bribing your Committee</h3>
         <p>When blackmail fails...</p>
      </section>
      <aside>
         <h4>Useful Links></h4>
         <a href="www.bevmo.com">Research Supplies</a>
      </aside>
   </article>
</body>
```

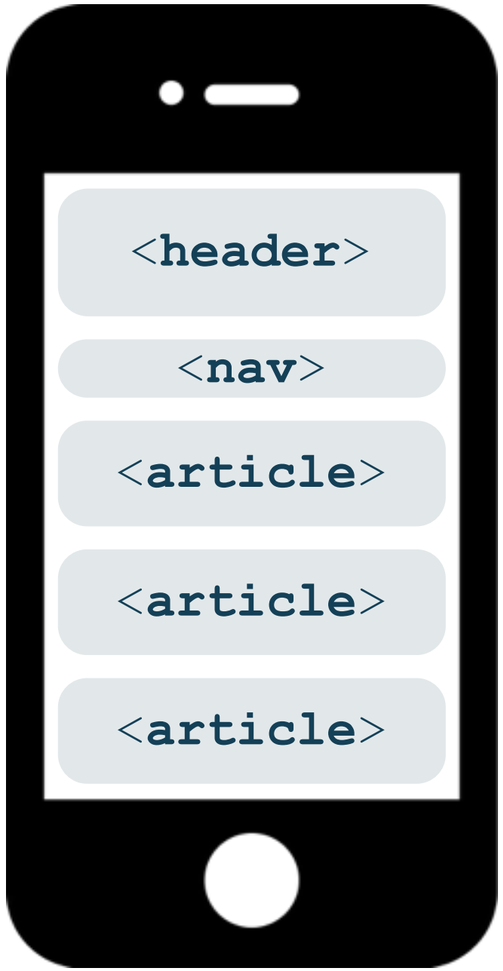
STRUCTURAL SEMANTIC APPLICATIONS?

STRUCTURAL SEMANTIC APPLICATIONS

Reuse stylesheets

Remix pages and applications

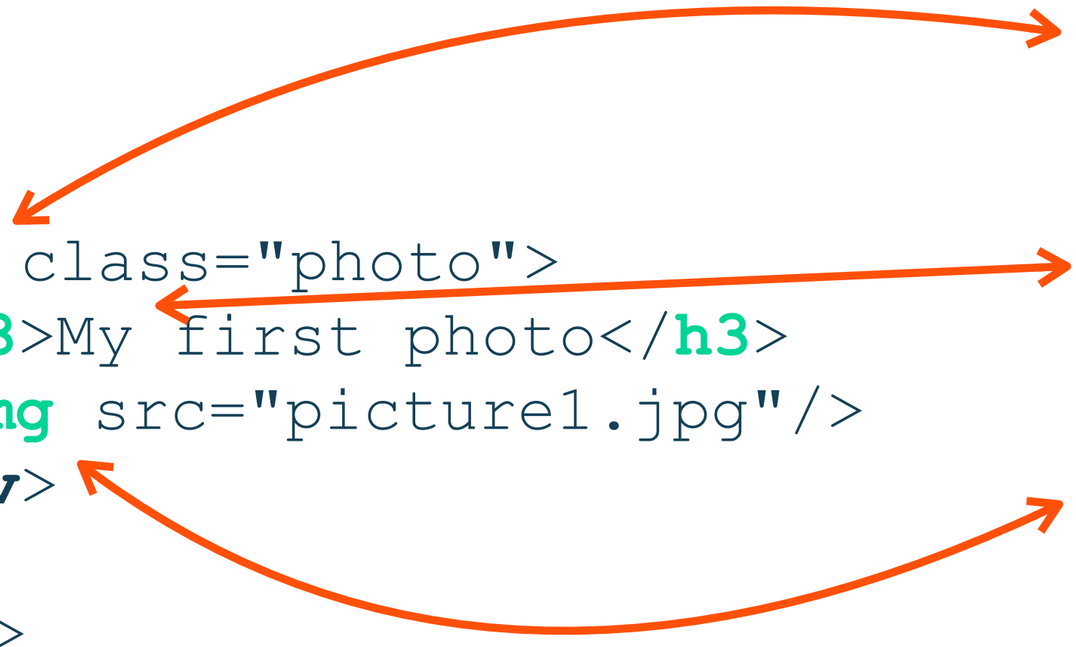
Retarget between form factors



CSS SELECTORS

```
<!DOCTYPE html>
<html>
  ...
  <body>
    <div class="photo">
      <h3>My first photo</h3>
      <img src="picture1.jpg"/>
    </div>
  ...
  </body>
</html>
```

```
.photo {
 width:300px;
}
.photo h3 {
 font-weight:bold;
}
img {
 border:1px solid black;
}
...
```



map HTML elements to CSS rules

Which selectors promote the most *reuse*?

WHY CASCADING?

more than one rule can apply to an HTML element

priority rules for resolving conflicts

more *specific* = higher priority (class trumps element)

some properties (**`font-size`**) are inherited, while others aren't (**`border`**, **`background`**)

LINKING TO HTML

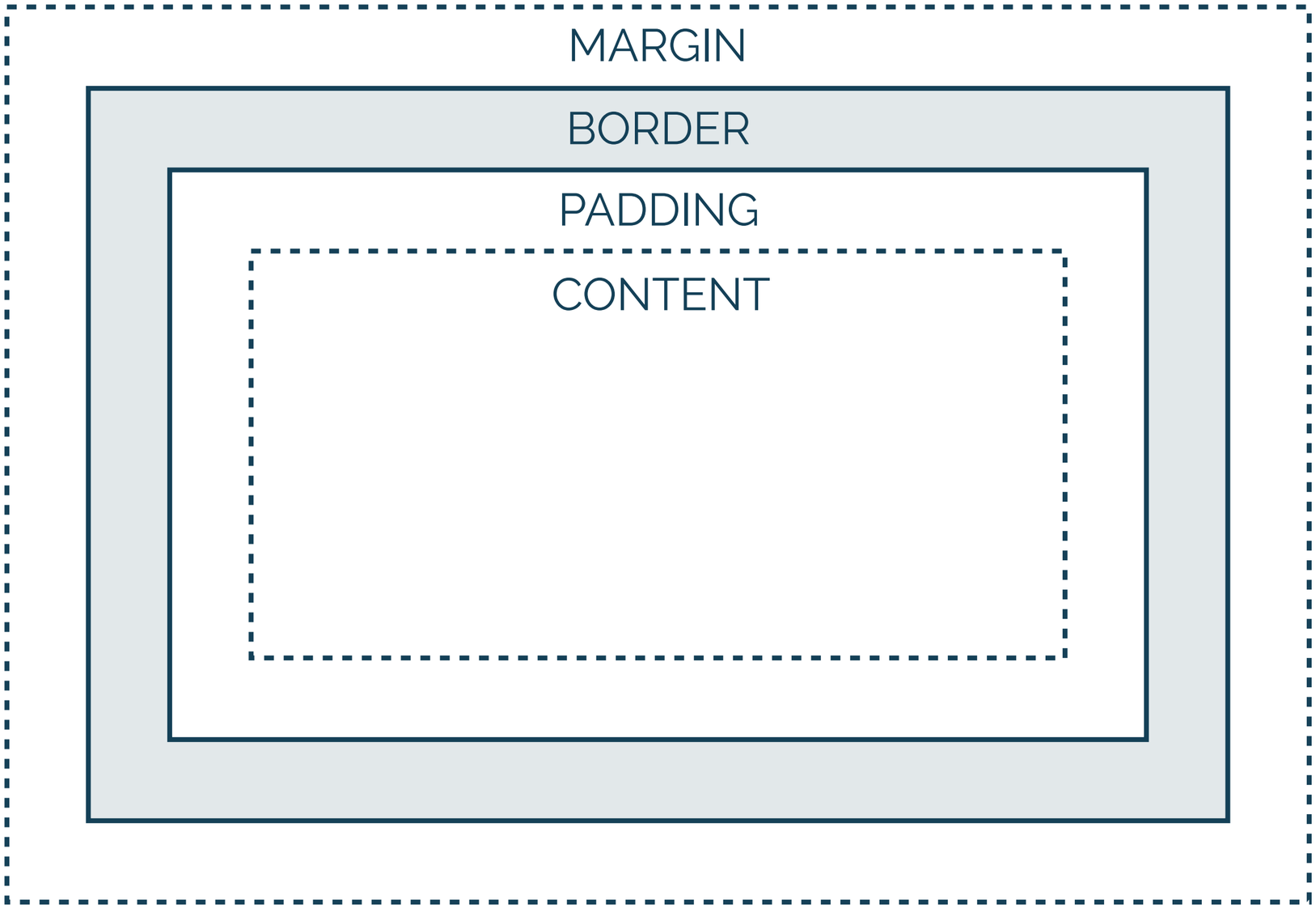
(1)
```
<link rel="stylesheet" href="gallery.css" type="text/css"/>
```

(2)
```
<html>
   <head>
      <style>
       h1 {color:red;}
       p {color:blue;}
      </style>
```

(3)
```
<div style="color:blue;text-align:center">
```

higher priority

Box Model



control over white space

position

VALUE	DESCRIPTION
`static`	default. positioned by the flow model; unaffected by top, bottom, left, right
`fixed`	positioned relative to browser window; will not move when window is scrolled
`relative`	positioned relative to its normal position
`absolute`	positioned relative to the first ancestor where `position!=static`

use with

`top`
`bottom`
`left`
`right`

Design Challenge:

vertically center a `<div>`
of unknown height

CODEPEN

SOLUTION

```
<div class="table-outer">
  <div class="outer">
    <div class="inner">
    </div>
  </div>
</div>
```

```
.table-outer {
  width: 100%;
  display: table;
}

.outer {
  height: 200px;
  background-color: #144057;

  display: table-cell;
  vertical-align: middle;
}

.inner {
  width: 100px;
  height: 50%;
  background-color: #B6C4C9;
}
```

Separation of CONTENT from PRESENTATION?


```
<div class="table-outer">
  <div class="outer">
    <div class="inner"></div>
  </div>
</div>
```

a lot of HTML suffers from presentational `div` bloat

CSS PREPROCESSORS

languages that extend CSS in meaningful ways

features: variables, nesting, mixins, inheritance

shrinks developer's codebase and compiles into CSS

popular CSS preprocessors: LESS and SASS

JAVA : JAVASCRIPT ::

:

Functions are first-class objects

FUNCTIONS ARE OBJECTS

that are callable!

reference by variables, properties of objects

pass as arguments to functions

return as values from functions

can have properties and other functions

ANONYMOUS FUNCTIONS

create a function for later use

store it in a variable or method of an object

use it as a callback

see more examples next class

`this`

the other implicit parameter

a.k.a. function context

object that is implicitly associated with a function's invocation

defined by how the function is invoked (not like Java)

`apply()` *and* `call()`

two methods that exist for every function

explicitly define function context

```
apply(functionContext,arrayOfArgs)
```

```
call(functionContext,arg1,arg2,...)
```

```
function forEach(list, callback){
  for (var n = 0; n < list.length; n++){
    callback.call(list[n],n);
  }
}

var numbers = [5,3,2,6];
forEach(numbers, function(index){
      numbers[index]= this*2;});
console.log(numbers);
```

Classes are defined through functions

OBJECT-ORIENTED PROGRAMMING

`new` operator applied to a constructor function creates a new object

no traditional class definition

newly created object is passed to the constructor as this parameter, becoming the constructor's function context

constructor returns the new object

CONSTRUCTOR INVOCATION

constructors are given the class name

```
function Llama() {
  this.spitted = false;
  this.spit = function() { this.spitted = true; }
}

var llama1 = new Llama();
llama1.spit();
console.log(llama1.spitted); true

var llama2 = new Llama();
console.log(llama2.spitted); false
```

prototype

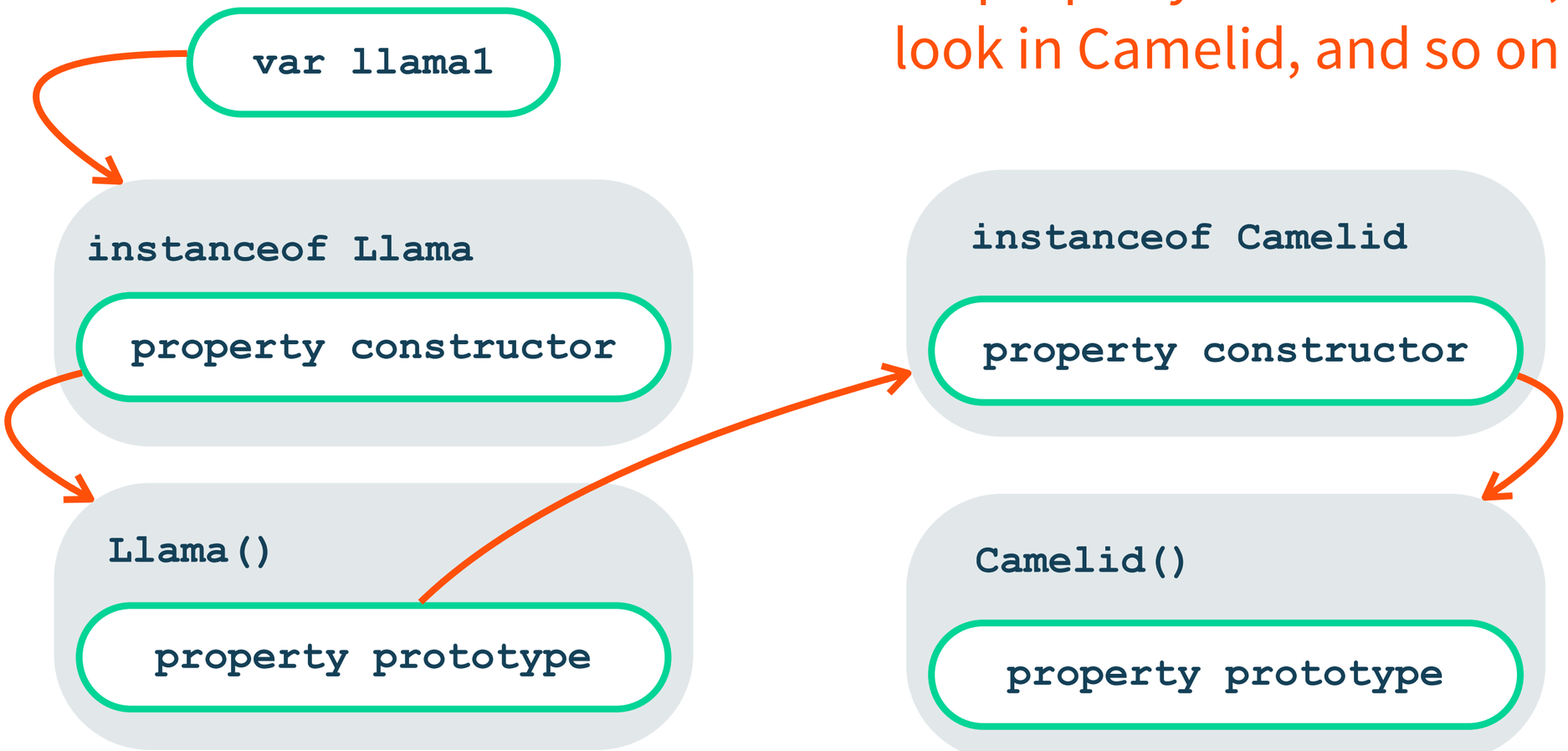
prototype is a property of the constructor

another way to add methods to objects

```
function Llama() {
  this.spitted = false;
}
Llama.prototype.spit = function() {
   this.spitted = true;
};
```

PROTOTYPE CHAINING

if a property isn't in Llama, look in Camelid, and so on



scopes are declared through functions and not blocks { }

HOISTING

Variables and functions are in scope within the entire function they are declared in

`closure` *scope created when a function is declared that allows the function to access and manipulate variables that are external to that function*

PRIVATE VARIABLES

```
var add = (function () {

  var counter = 0;

  return function () {return
  counter += 1;}

})();

add();
```

self-invoking

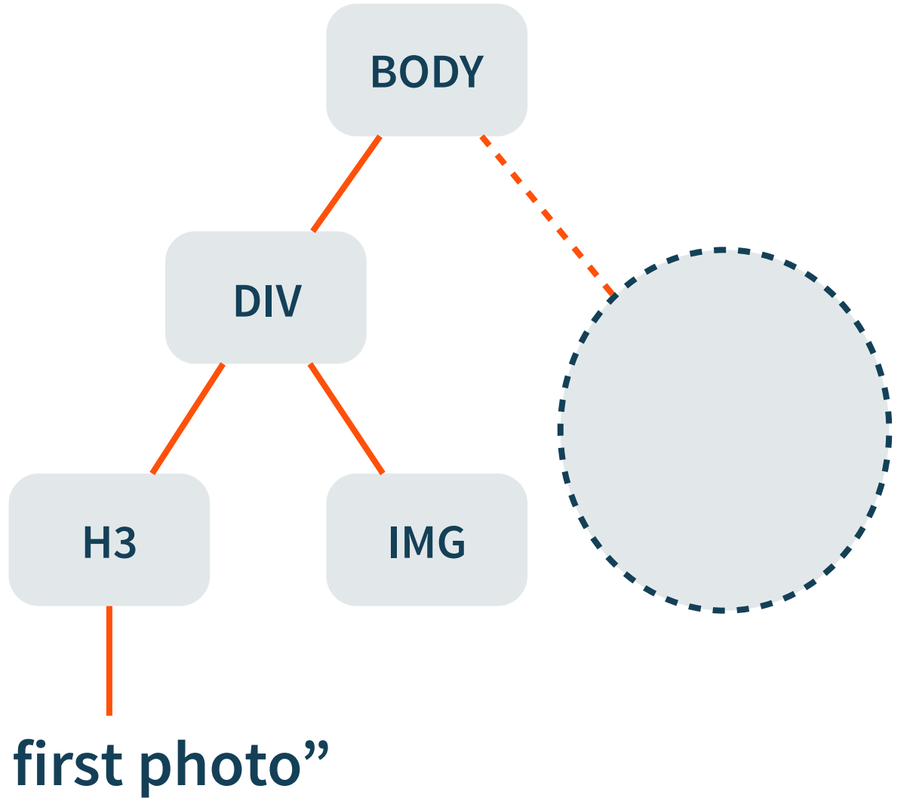
PRIVATE VARIABLES

```
function Llama() {
  var spitted = false;
  this.spit = function() { spitted =
  true; }
  this.hasSpitted = function() { return
  spitted; }
}
```

DOCUMENT OBJECT MODEL

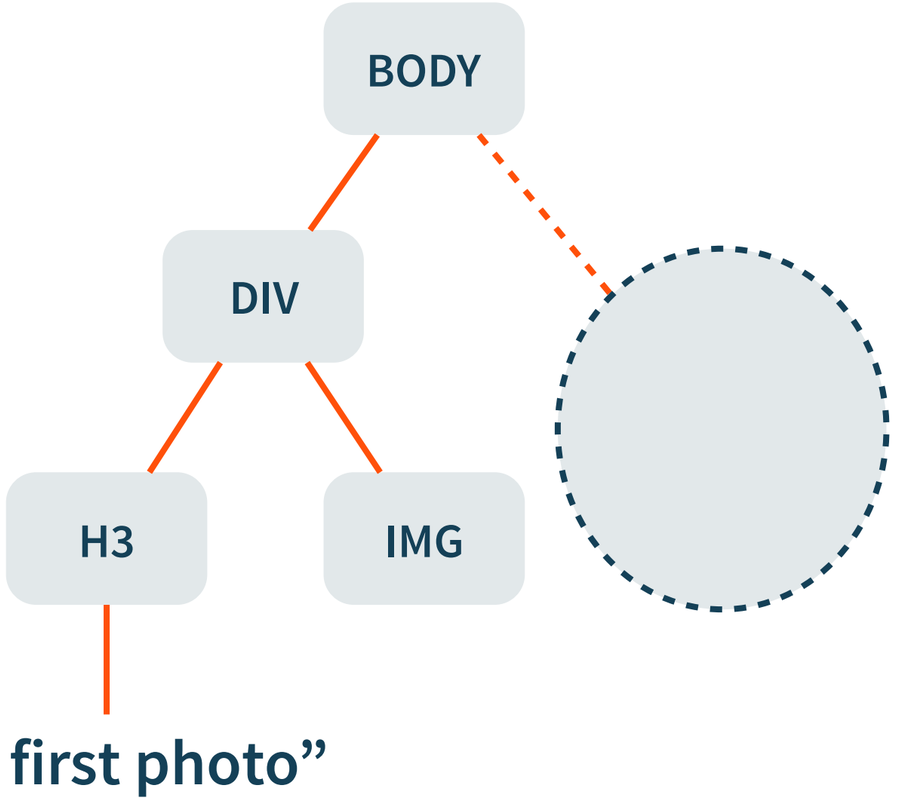
one-to-one correspondence between HTML elements and DOM nodes

```
<body>
  <div class="photo">
    <h3>My first photo</h3>
    <img src="picture1.jpg"/>
  </div>
...
</body>
```



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

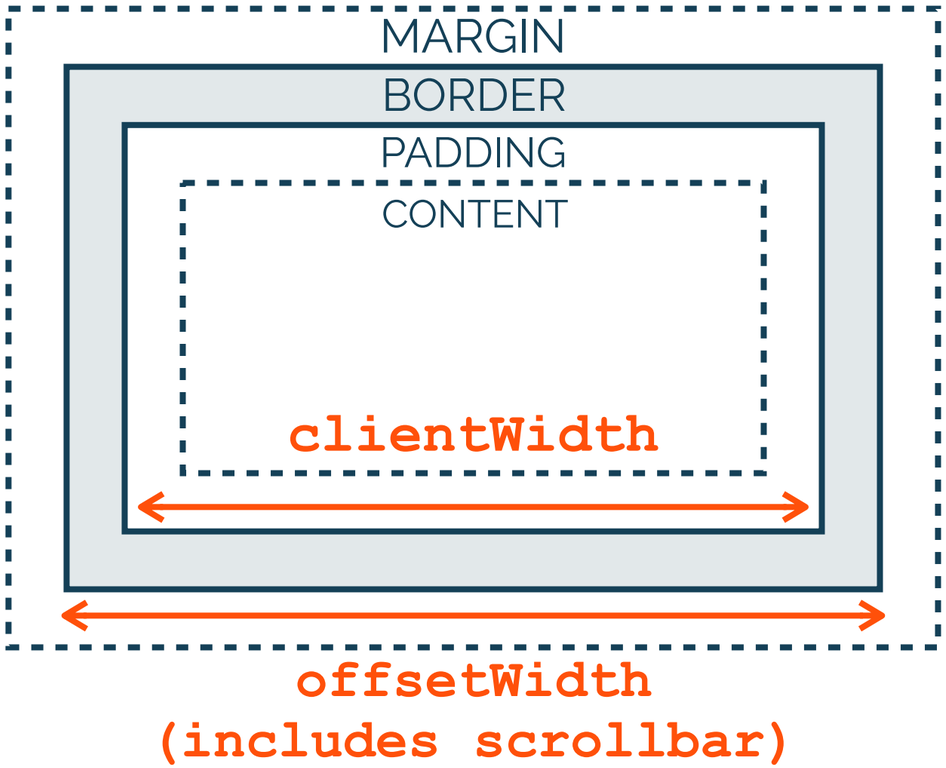
DOM ELEMENT OBJECT

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

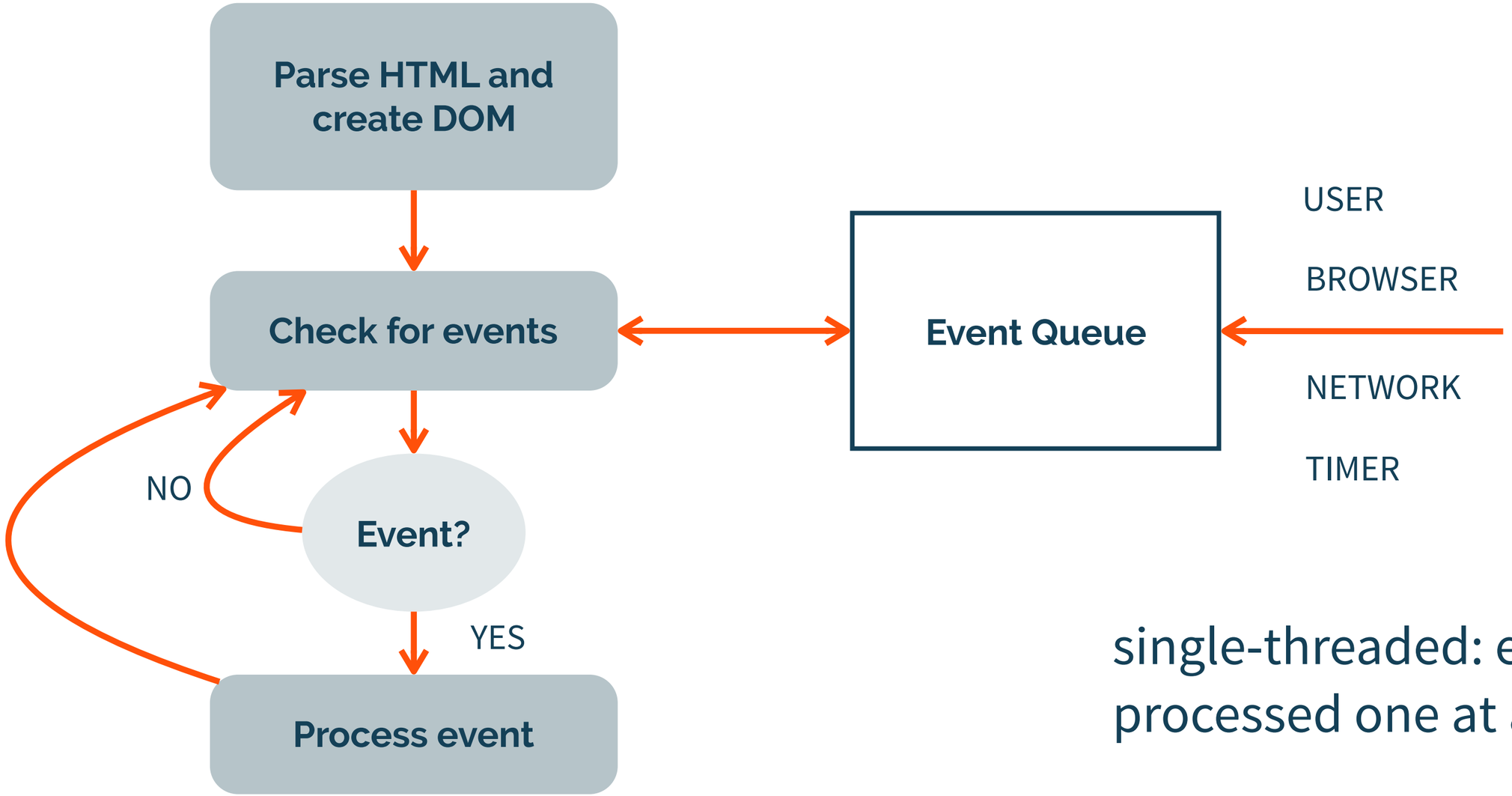
```
element.style.backgroundColor = “red”;
element.innerHTML = “<div><h3>Llama!</h3>…</div>”
```

augment DOM structure:

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

www.w3schools.com/jsref/dom_obj_all.asp

THE BROWSER EVENT LOOP



single-threaded: events processed one at a time

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)
```


```
event.stopPropogation()
```

CODEPEN

REACT COMPONENTS

each module manages its own data and views

how to write components and compose them

REACT CONCEPTS

Unidirectional data flow

DOM Painting

Virtual DOM

How JSX works

REACT CONCEPTS

Props

State

Lifecycle Methods

render & setState

React Router

ES6

Fat arrow functions

let

const

CONTINUATION PASSING STYLE (CPS)

```
function getY(continueWith) {
  $http.get("/gety", function(jsonData) {
    continueWith(jsonData.y);
  });
}

var x = 5;

getY(function(y) {
  console.log(x + y);
});
```

CALLBACK STYLE PROGRAMMING

```
fs.readdir(source, function(err, files) {
  if (err) {
    console.log('Error finding files: ' + err)
  } else {
    files.forEach(function(filename, fileIndex) {
      console.log(filename)
      gm(source + filename).size(function(err, values) {
        if (err) {
          console.log('Error identifying file size: ' + err)
        } else {
          console.log(filename + ' : ' + values)
          aspect = (values.width / values.height)
          widths.forEach(function(width, widthIndex) {
            height = Math.round(width / aspect)
            console.log('resizing ' + filename + 'to ' + height + 'x' + height)
            this.resize(width, height).write(destination + 'w' + width + '_' + filename, function(err)
              if (err) console.log('Error writing file: ' + err)
            })
          }.bind(this))
        }
      })
    })
  }
})
```

callbackhell.com

PROMISES

software abstraction for dealing with “callback hell”

move from CPS style

```
getTweetsFor("domenic", function (err, results) {
    // the rest of your code goes here.
});
```

to one where functions return a value, called a promise

```
var promiseForTweets = getTweetsFor("domenic");
```

https://gist.github.com/domenic/3889970

1. [10 pts] **Asyncing Feeling**

Assume all HTTP requests are valid and `$http` behaves like Angular's `$http` object. Which of the following is a possible output of this code?

```
function baz() {
  console.log("baz");
}

var gotUsers = false;
$http.get("/api/users").then(function foo() {
  console.log("foo");
  gotUsers = true;
});

$http.get("/api/tasks").then(function bar() {
  console.log("bar");
  while (!gotUsers) {
    // loop
  }
});

baz();
```

A.
```
baz
bar
```

B.
```
foo
bar
baz
```

C.
```
baz
bar
foo
```

D. Both A and B

E. Both B and C

MONGO SCHEMA DESIGN

For “one-to-few”, you can use an array of embedded documents

For “one-to-many”, or on occasions when the “N” side must stand alone, you should use an array of references. You can also use a “parent-reference” on the “N” side if it optimizes your data access pattern

For “one-to-squillions”, you should use a “parent-reference” in the document storing the “N” side

blog.mongodb.org/post/88473035333/6-rules-of-thumb-for-mongodb-schema-design-part-3

RESTful API DESIGN

if a relation is usually requested alongside the resource, **embed the relation's representation** within the output representation of the resource

if a relation can exist independently, **include an identifier** for it within the output representation of the resource

Verbs

GET Get a representation of resource

DELETE Destroy resource

POST Create a new resource based on the given representation

PUT Replace resource state with the one described in the given representation

HEAD Get the headers that would be sent with a representation, but not the representation itself

OPTIONS Discover which HTTP methods this resource responds to

PATCH Modify part of the state of this resource based on the given representation

COLLECTIONS

<VERB> http://example.com/users

GET Return all the objects in the collection

POST Create a new entry in the collection; automatically assign new URI and return it

PUT and **DELETE** **not generally used**

ELEMENTS

<VERB> http://example.com/users/12345

GET Return the specific object in collection

PUT Replace object with another one

DELETE Delete element

POST not generally used

NEXT CLASS:
NODE & EXPRESS

courses.engr.illinois.edu/cs498rk1/