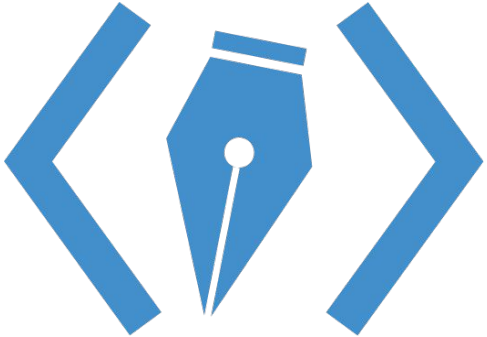
Week 9

How JavaScript Meets HTML/CSS



Announcements

Homework 7 due tomorrow at 7pm!

Homework 8 will be released tonight

Start the Final Project!
Check-in due **November 12th**
Project due **December 1st**
Your project can be featured on our showcase website!

Final Project Submission: wdd.io/go/project-submit

Come to office hours via Piazza or wdd.io/go/OH

Give us anonymous feedback at wdd.io/go/feedback

Review variables & functions

New concept: Objects

JS & HTML meet —> The DOM

Adding/removing CSS Classes with JS

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Review: Variables

Variables are like in math! We use a variable when we want to store the value of something and give it a name.

```
let name = "Ajia";
let age = 21;
```

IMPORTANT: if we're storing text, it must be in **quotes**. This is called a **string.**

"let" means that we're creating a variable

Make names meaningful! Usually a noun.

value to store, in this case, a number.

Review: Variables

If we do something with a variable, we want to store the result so we can use it later!

```
let age = 20 + 5;
age - 2.5;
```

First of all, this is **incorrect**, and the browser would give you an error. Second of all, it does not make sense, because the `age - 2.5` value would be lost forever, since it's not stored anywhere

```
age = age * 2;
```

This is correct! When you modify a variable, remember to *re-assign* it, or put it in a new variable.

Review: Using Functions

defining the function - the code is not run, but is now ready to be used!

```
function showGreeting(name) {
    let greeting = "howdy " + name + "!";
    alert(greeting);
}
```

calling the function - actually runs the code in the function definition

```
showGreeting("Myles");
```

Review: Using Functions

```
function square(x) {
    return x * x;
}
```

"return" means, this is the final output value

```
let y = square(5);
let z = square(y);
```

So now the value of y is 25.

A variable can be the function input! This is the equivalent of square(25).

Review variables & functions

New concept: Objects

JS & HTML meet —> The DOM

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New concept: Objects

- Before we go on - we need to introduce a new concept
- When we write code we're trying to convert the world and how we describe it in English, to a representation that computers can understand
- We've only talked about numbers and strings, but what if we want something more complex?
- **Theme:** complex things are just composed of simple things

New concept: Objects

- Objects are JavaScript's way of representing more complex things.
- Objects are a collection of **methods (functions)** and **properties (variables)**
- **Theme:** think about what you're trying to do in English before converting to code
- **Example:** a car
  - What are **properties** of a car?
    - color, model, current mph
  - What are **functions** a car can do?
    - drive straight, brake, change color

Car object

- **Properties:** color, model, current mph
- **Functions**: drive straight, brake, change color

Getting closer to code..

Properties

- `color`: string
- `model`: string
- `mph`: number

Functions

- `driveStraight()`
- `brake()`
- `changeColor(color)`

Car object: in JavaScript

Properties

- `color`: string
- `model`: string
- `mph`: number

Functions

- `driveStraight()`
- `brake()`
- `changeColor(color)`

```
let car = {
    color: "red",
    model: "Tesla Model S",
    mph: 0,
    driveStraight: function() {
        // ...
    },
    brake: function() {
        // ...
    },
    changeColor: function(newColor) {
        // ...
    },
};
```

Car object: in JavaScript

Properties

- `color`: string
- `model`: string
- `mph`: number

Functions

- `driveStraight()`
- `brake()`
- `changeColor(color)`

```
let car = {
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Car object: in JavaScript

Properties

- `color`: string
- `model`: string
- `mph`: number

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let car = {
    color: "red",
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    driveStraight: function() {
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    },
    brake: function() {
        // ...
    },
    changeColor: function(newColor) {
        // ...
    },
};
```

Car object: in JavaScript

Wow, this is a lot of new syntax! We won't really be writing our own objects, so **don't worry** too much about this.

Just be able to recognize how variables can now contain not just a number or a string, but also **objects** that have properties and functions.

```
let car = {
    color: "red",
    model: "Tesla Model S",
    mph: 0,
    driveStraight: function() {
        // ...
    },
    brake: function() {
        // ...
    },
    changeColor: function(newColor) {
        // ...
    },
};
```

Using object properties and functions: dot notation

```
let car = {
    color: "red",
    model: "Tesla Model S",
    mph: 0,
    driveStraight: function() {
        // ...
    },
    changeColor: function(newColor) {
        // ...
    },
};
```

```
console.log(car.color);
// result: “red”

car.driveStraight();

car.changeColor(“blue”);
```

IMPORTANT: To call an object’s function, or get the value stored in an object’s property, we use a dot!

Now back to how HTML & JS meet..

Review variables & functions

New concept: Objects

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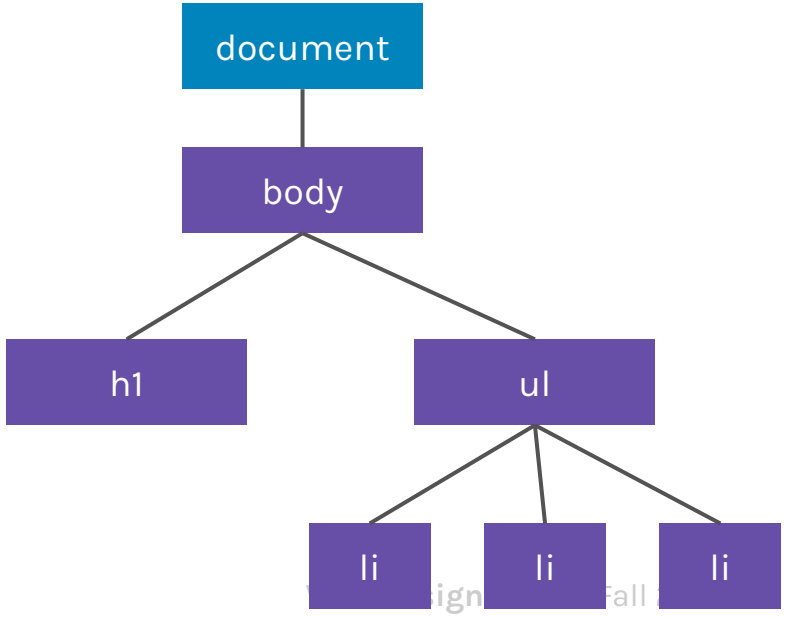
HTML & JS meet!

index.html

```
<html>
<body>
  <h1>Food Places</h1>
  <ul id="food-list" class="blue-box">
    <li>Mezzo</li>
    <li>Pho K&K</li>
    <li class="highlight">Taco Bell</li>
  </ul>
</body>
</html>
```

Diagram of the JavaScript side constructed by the web browser, very simplified



The DOM: Document Object Model

When the HTML page is loaded, JavaScript creates its own representation of the page, which is made up of objects. Each HTML tag is an object.

document

FUNCTIONS
- `getElementById`
- `getElementsByClassName`

PROPERTIES
- `title`

body

PROPERTIES
- `classList`
- `innerHTML`
- `style`
- `children`

h1

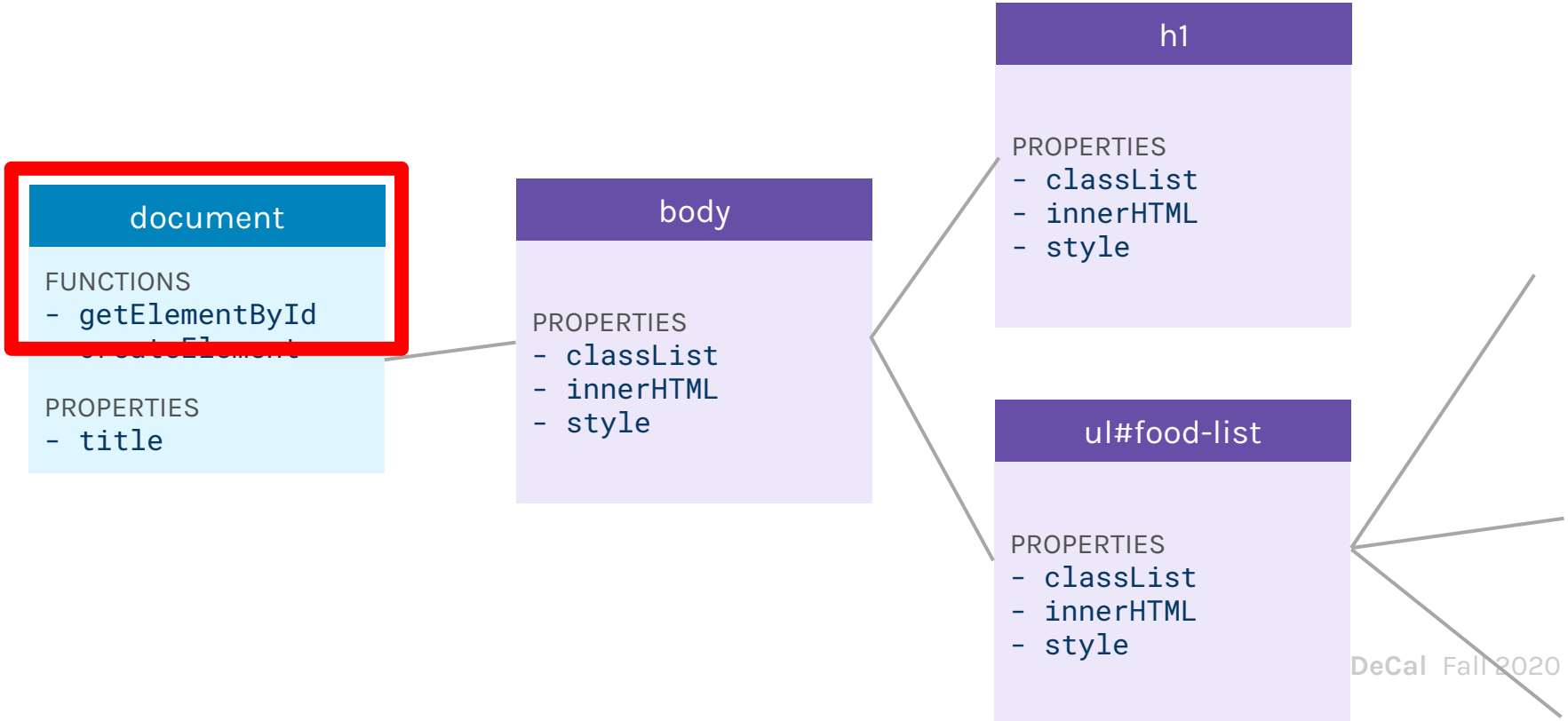
PROPERTIES
- `classList`
- `innerHTML`
- `style`

ul#food-list

PROPERTIES
- `classList`
- `innerHTML`
- `style`
- `children`

Only a few (out of like a hundred..) functions and properties are listed here, and all HTML elements on the page have the same set. We won't go over all of these in class, but this diagram is a sampler.

Our first focus: `document.getElementById`



What is this function, `document.getElementById()`?

- Takes one argument, a string, which is the id of the HTML element we want
- Returns the element object

What is this function?

```
let listElement = document.getElementById("food-list");
```

ul#food-list

PROPERTIES
- classList
- innerHTML
- style
- children

```
<ul id="food-list" class="blue-box">
  <li>Mezzo</li>
  <li>Pho K&K</li>
  <li class="highlight">Taco Bell</li>
</ul>
```

Examples: properties of element objects

```
let foodList = document.getElementById("food-list");

console.log(foodList.classList);

-> result: ["blue-box"]

console.log(foodList.innerHTML);

-> result: "<li>Mezzo</li><li>Pho K&K</li>
            <li class="highlight">Taco Bell</li>"

console.log(foodList.children);

-> result: [li, li, li]
```

Remember, this is what is available to us:

ul#food-list

PROPERTIES
- classList
- innerHTML
- style
- children

Why are we doing this again?

Recall some of our examples of interactive features from last lecture:

- When the user clicks on this image, then increase its size.
  - "increase its size" → *change its CSS* `width`
- When the user clicks on this button, then change colors to dark mode.
  - "change colors to dark mode" → *change CSS* `color` *and* `background-color`

We want to convert these to code:

"this button" —> `document.getElementById("dark-mode-button")`

"change CSS" —> see next slides! we're almost there!!

Another method: document.querySelector()

- Takes one argument, a string, which is a **CSS selector** of the HTML element we want
- Returns the **first** element object that matches the selector name
- Can be the same as **document.getElementById()**

What is this function?

```
let listElement = document.querySelector("#food-list");
```

ul#food-list

PROPERTIES
- classList
- innerHTML
- style
- children

```
<ul id="food-list" class="blue-box">
  <li>Mezzo</li>
  <li>Pho K&K</li>
  <li class="highlight">Taco Bell</li>
</ul>
```

Another way??

```
let listElement = document.querySelector("ul");
```

ul#food-list

PROPERTIES
- classList
- innerHTML
- style
- children

```
<ul id="food-list" class="blue-box">
  <li>Mezzo</li>
  <li>Pho K&K</li>
  <li class="highlight">Taco Bell</li>
</ul>
```

Multiple repeated names?

```html
<div class="child">
    Child 1
</div>
<div class="child">
    Child 2
</div>
```

```javascript
let element = document.querySelector(".child");

/* element is now the first child div. any changes to
"element" will only change the first div! */
```

Demo

Review variables & functions

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Adding/removing CSS Classes with JS

Properties of properties

Turns out that the result of `foodList.classList` is not just a list, but another object! So now our code goes like:

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`document`

document

FUNCTIONS
- `getElementById`
- `createElement`

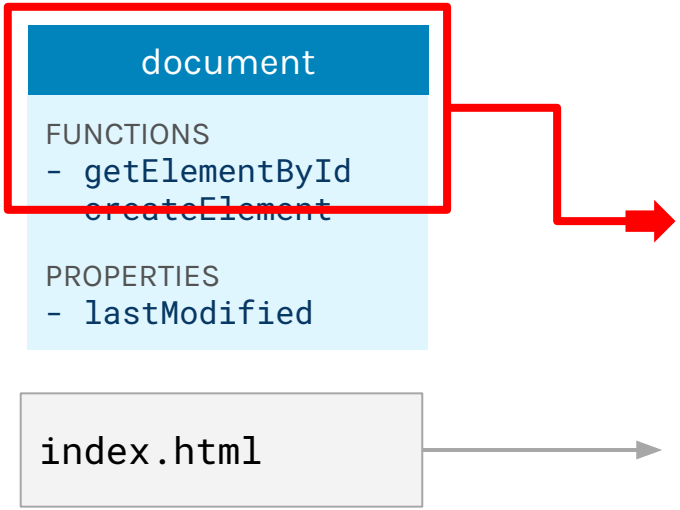
PROPERTIES
- `lastModified`

`index.html`

Properties of properties

Turns out that the result of `foodList.classList` is not just a list, but another object! So now our code goes like:

```
document.getElementById("food-list")
```



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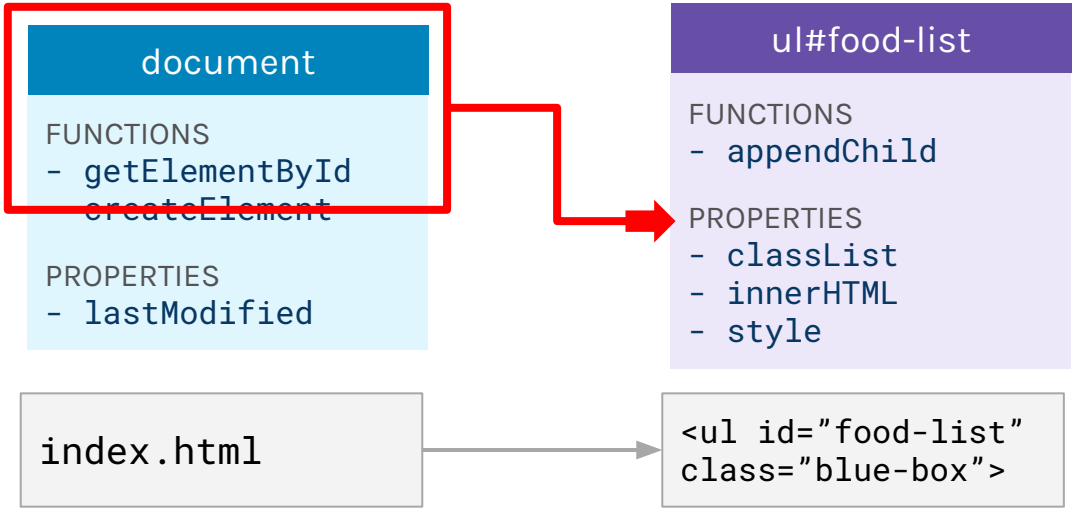

Properties of properties

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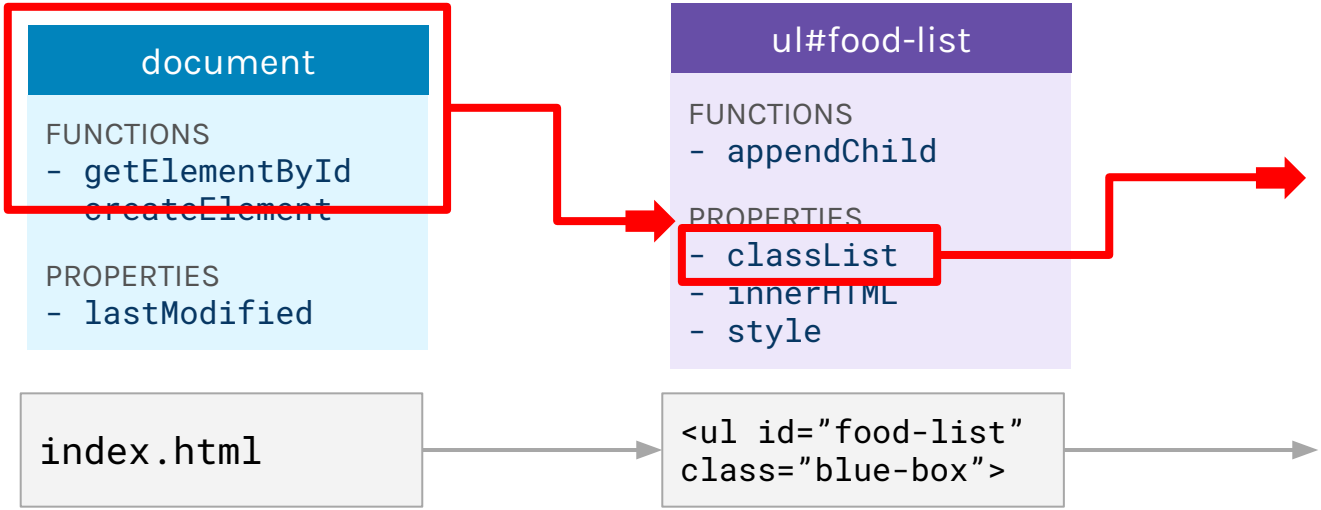
```
document.getElementById("food-list").classList
```



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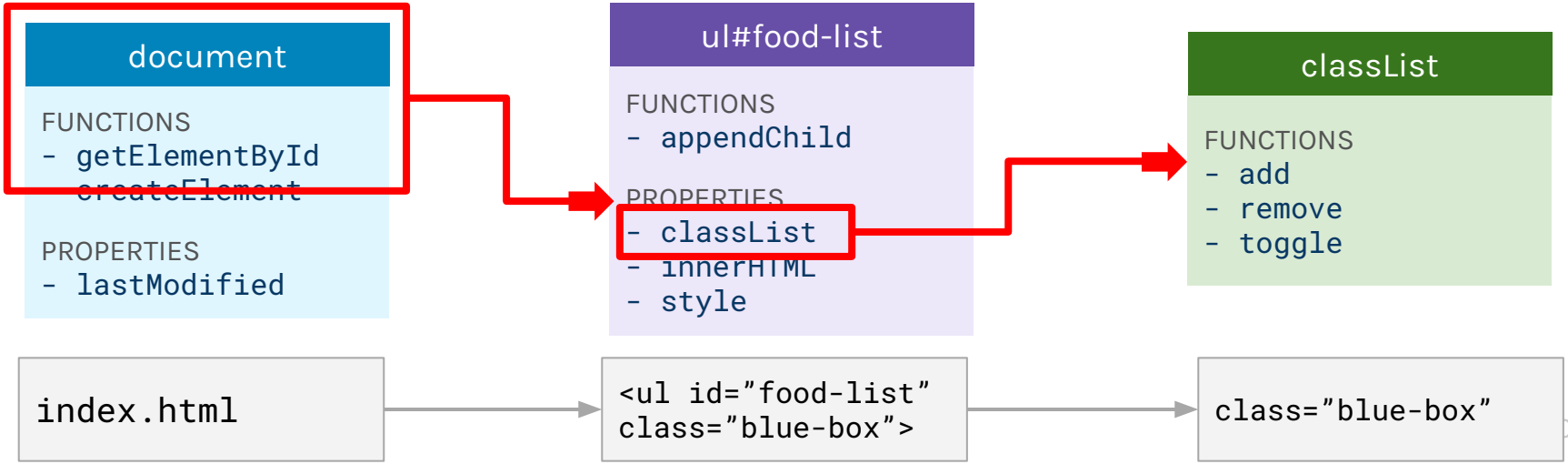


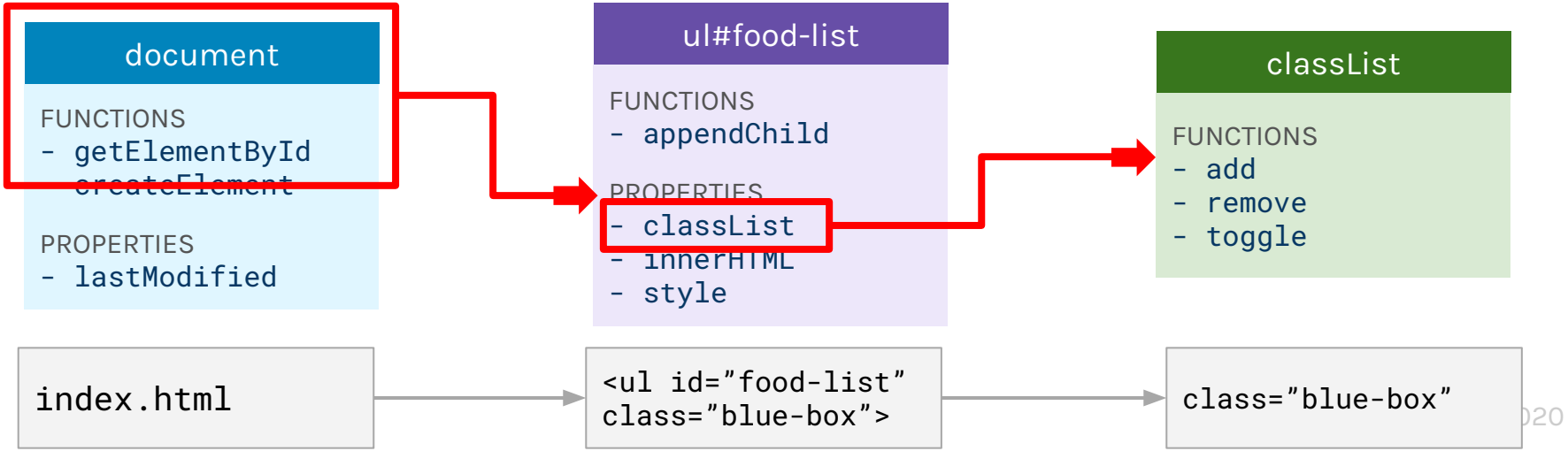
Ok here we are! Changing CSS with JS!

```
let foodList = document.getElementById("food-list");

console.log(foodList.classList);

-> result: ["blue-box"]

foodList.classList.add("dark-mode");
console.log(foodList.classList);

-> result: ["blue-box", "dark-mode"]
```

Assuming we created a CSS class called `.dark-mode` in `style.css` and our CSS file is properly linked, then our HTML element now has the styles applied to it!!

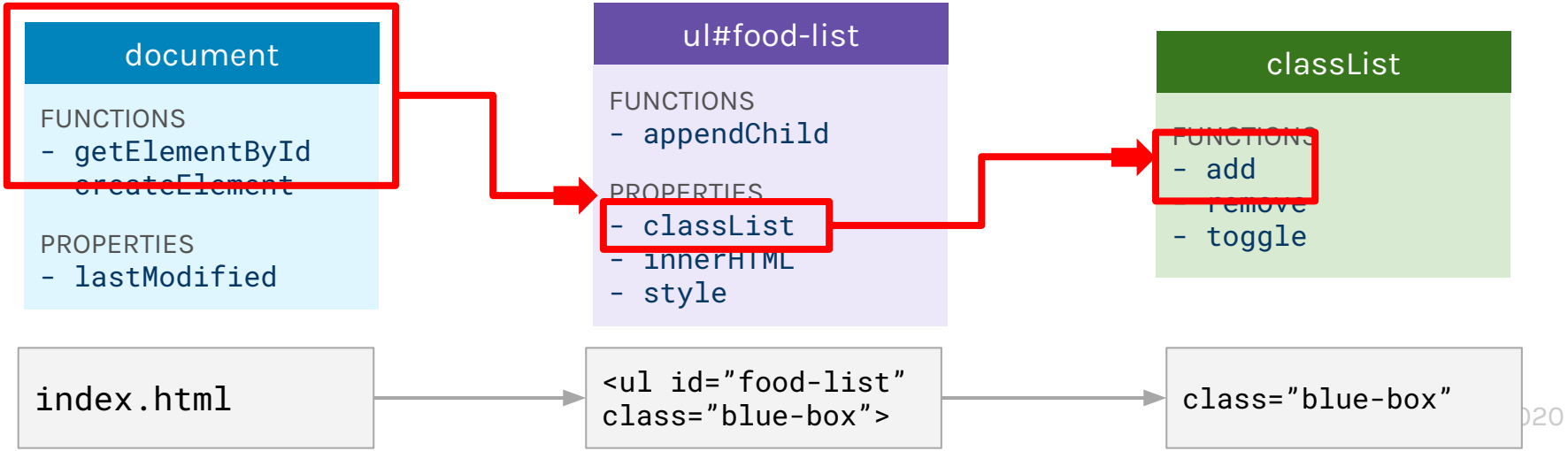
Properties of properties

```
document.getElementById("food-list").classList.add("dark-mode")
```



Properties of properties

```
document.getElementById("food-list").classList.add("dark-mode");
```



Removing a class

```
foodList.classList.add("dark-mode");
console.log(foodList.classList);
```

```
-> result: ["blue-box", "dark-mode"]
```

```
foodList.classList.remove("dark-mode");
console.log(foodList.classList);
```

```
-> result: ["blue-box"]
```

Demo

Thinking about this interactive functionality..

We'll think of a feature to add to our webpage like:

When the user clicks on [this button/link/image],

then [add/change/remove] [this HTML/CSS].

Thinking about this interactive functionality

Next lecture we'll put this all together!

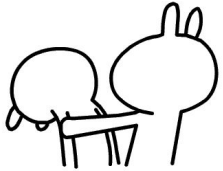
We can now specify the element if it has an id!

think of a feature to add to our [illegible] age like:

***When the user clicks on** [this button/link/image],*

then [add/change/remove] [this HTML/CSS].

We can now add/change/remove CSS!



Questions?