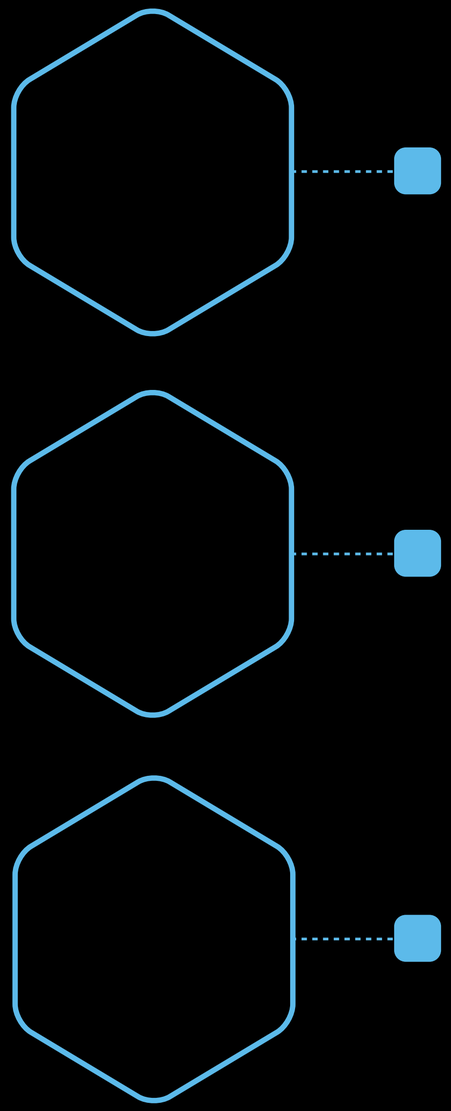
ES6 WORKSHOP

Pratik Patel @prpatel

LABO

- Install Node.js 4.2.2 https://nodejs.org/
- Install workshop from command line:
- git clone https://github.com/prpatel/es6-workshop
- Run workshop:
- cd; es6-workshop
- npm install
- npm test
- npm run test:watch
- Free online env: https://koding.com/R/prpatel

WHY MIGRATE TO ES6 _NOW_?



- FUTURE PROOF
- BETTER, LESS “WTF”S
- MODULES!

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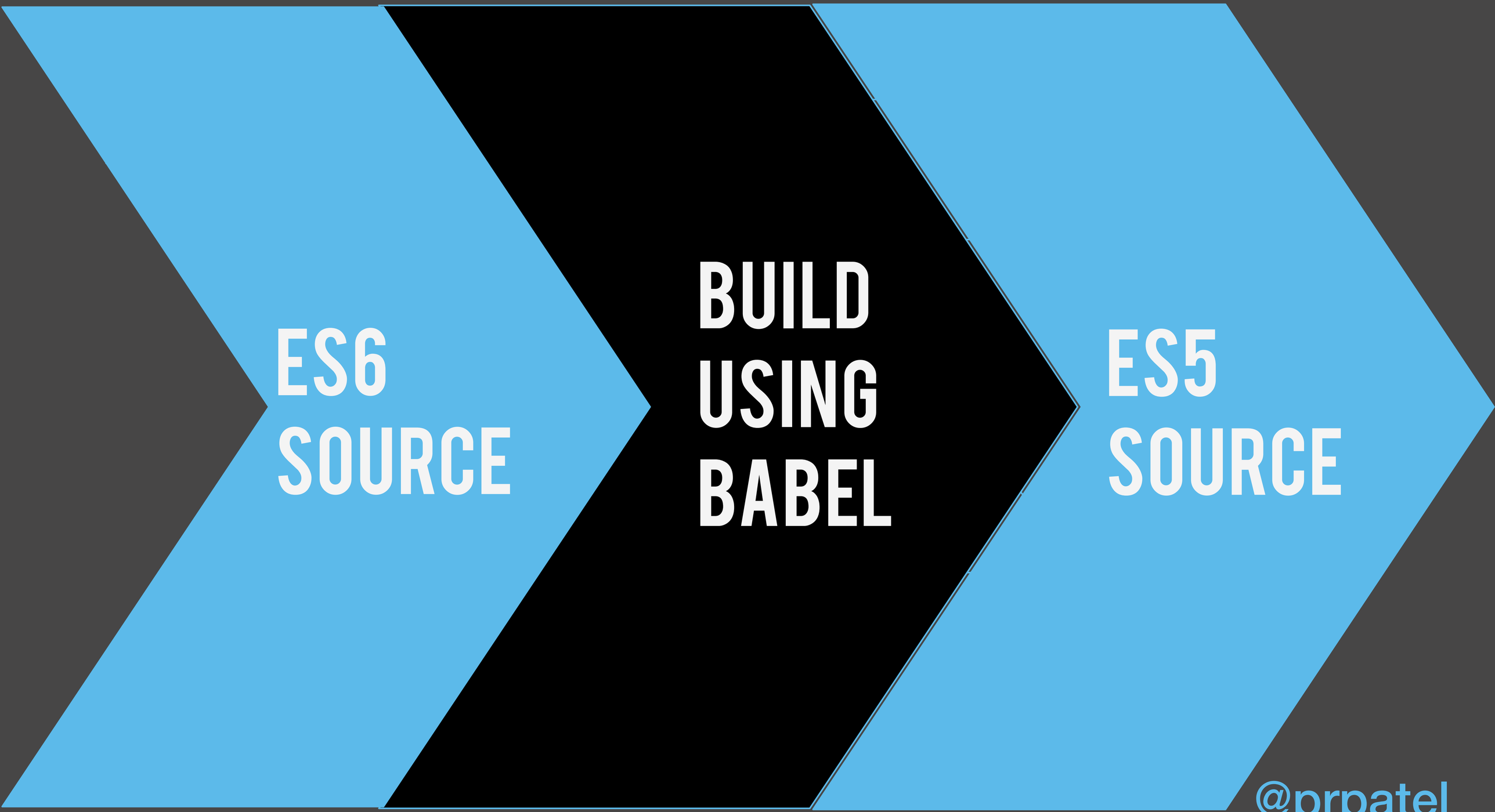
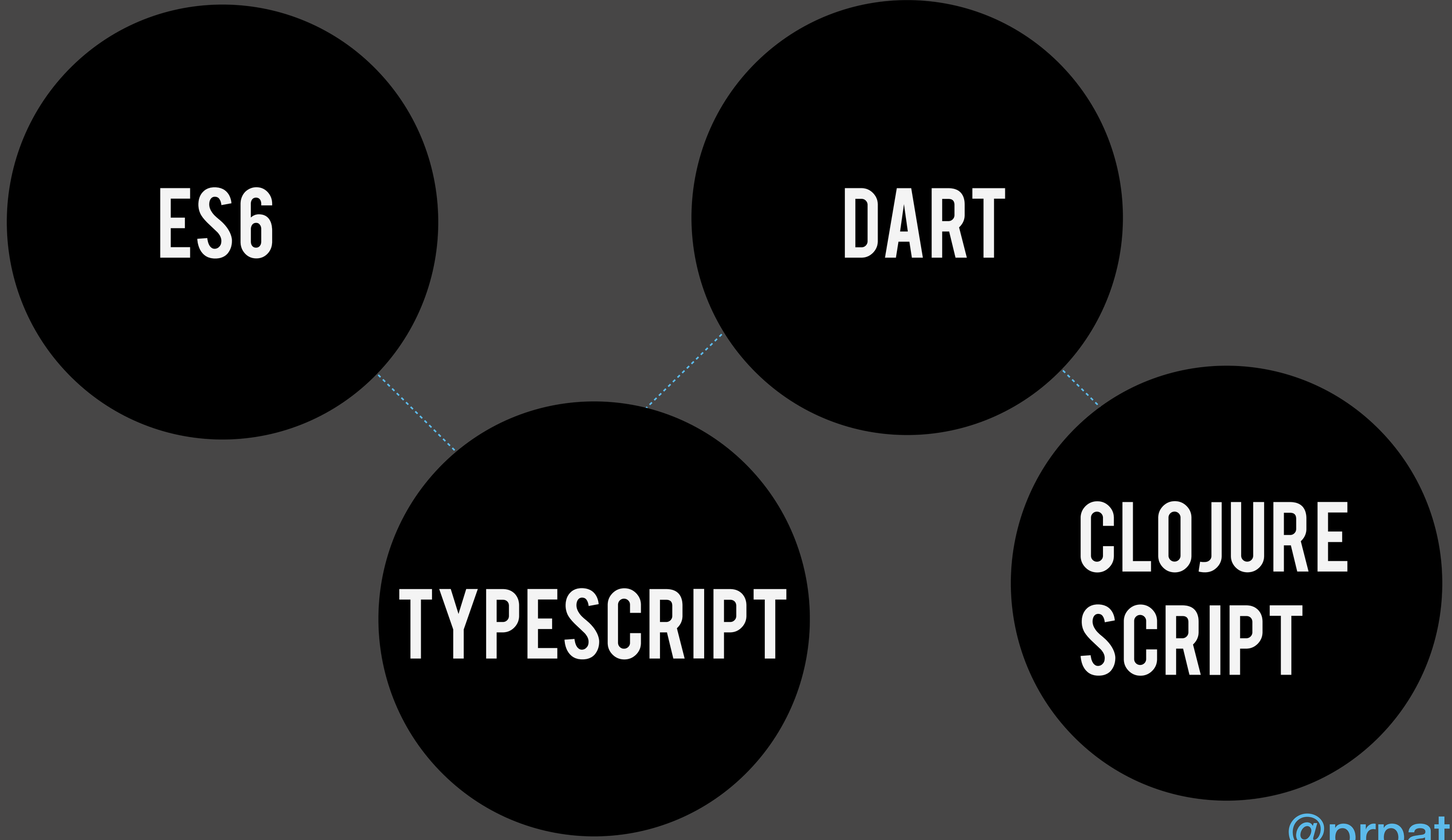
WILL ES6 WORK IN TODAY'S BROWSERS?

TRANSPILES ES6 TO ES5 (WHAT TODAY'S BROWSERS SUPPORT)

BABEL


ES6
SOURCE
BUILD
USING
BABEL
ES5
SOURCE

What about the other transpile to JS langs?



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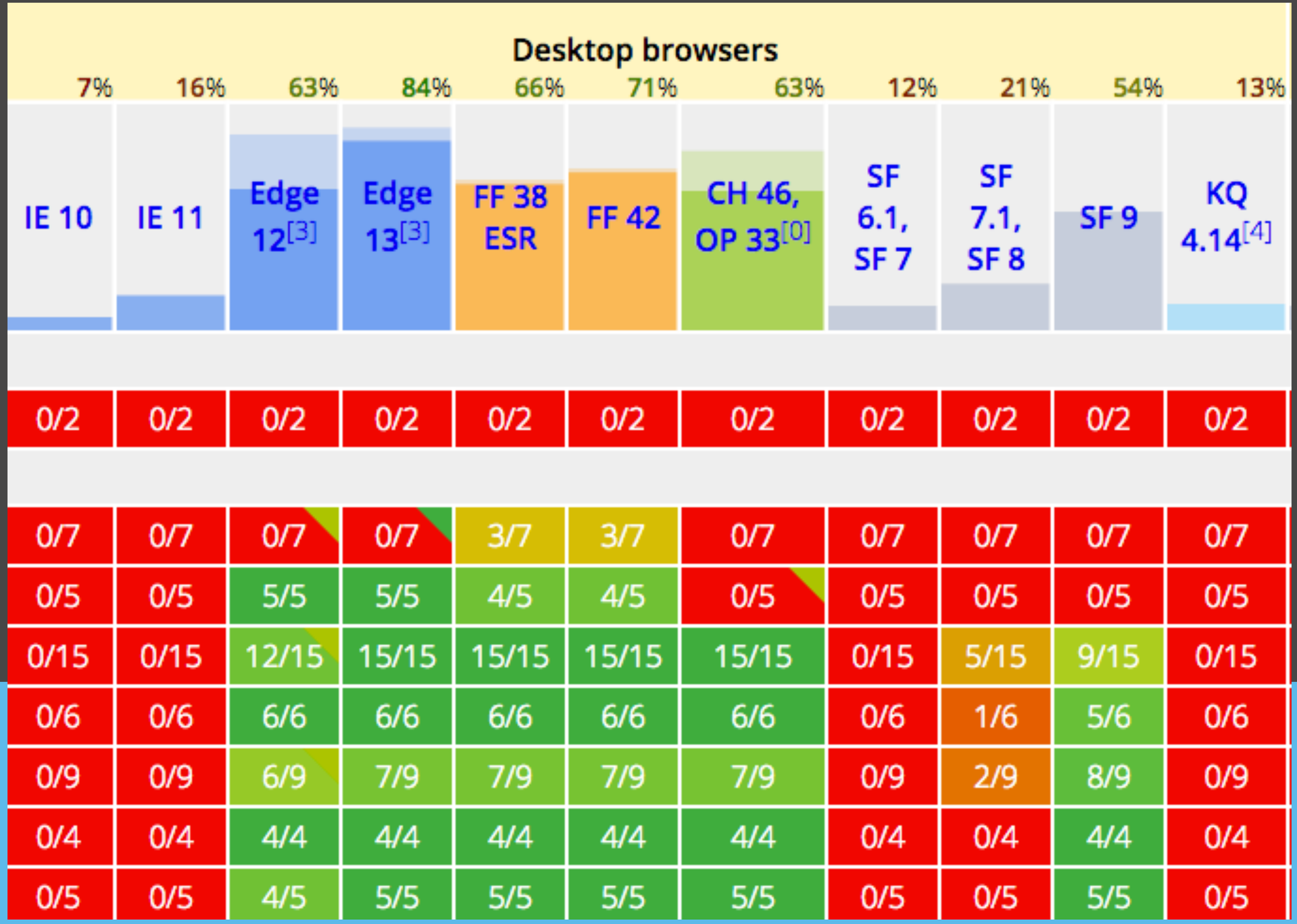
WILL BE _NATIVELY_
SUPPORTED IN BROWSERS

ES6 IS A STANDARD



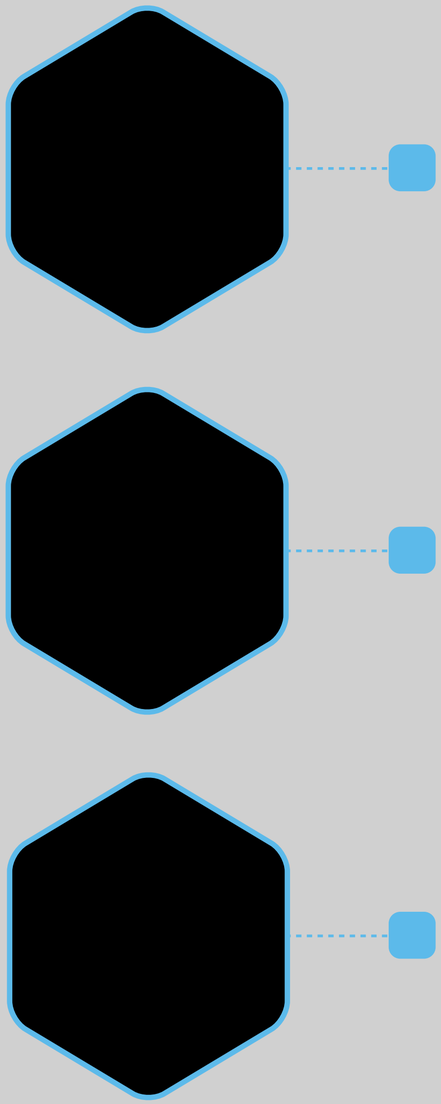
HTTPS://KANGAX.GITHUB.IO/COMPAT-TABLE/ES6/

RUN TEST

CODE

REPEAT

TIME TO GET BUSY



- "NPM RUN TEST:WATCH" FROM COMMAND LINE
- EDIT TEST/01_....JS
- WATCH CLI TO SEE RESULTS

INSTRUCTIONS

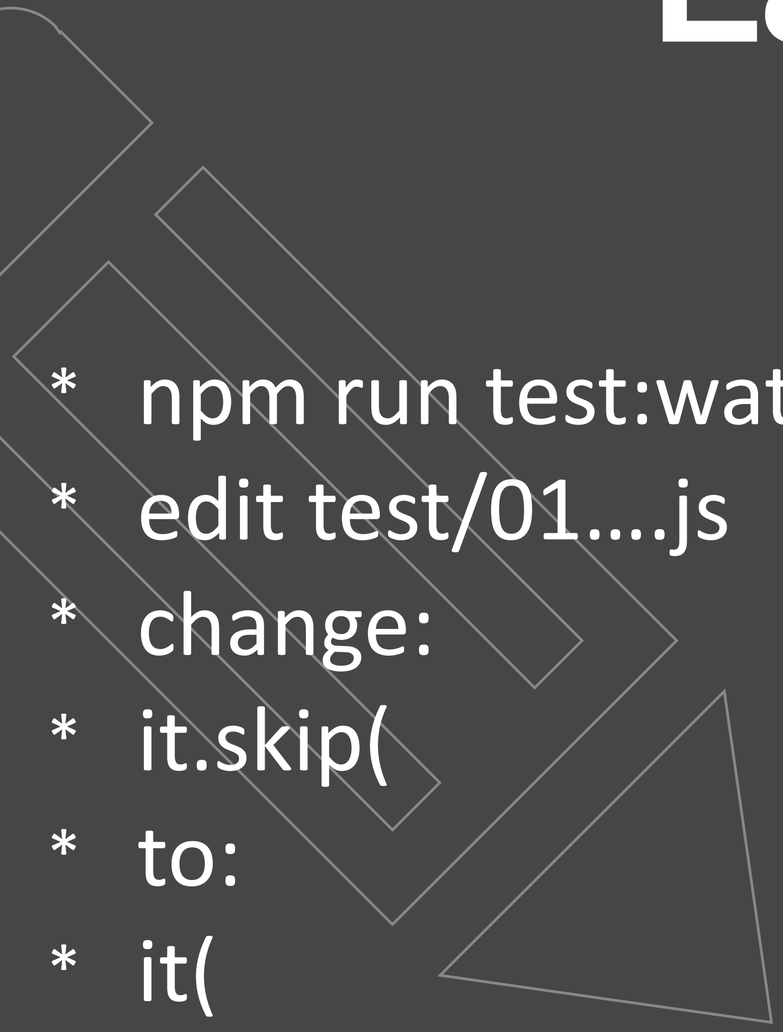
LAB 1: REAL SCOPES!

SCOPES HAVE ALWAYS BEEN AN ISSUE IN JS

let and const and var

```
{
    var a = 10;
    let b = 20;
    const tmp = a;
    a = b;
    b = tmp;
    // tmp = 30; Can't do that, will result in a SyntaxError
}
```

Lab 1: SCOPE



* npm run test:watch
* edit test/01….js
* change:
* it.skip(
* to:
* it(
* to enable the test!

Lab 1: Discussion

LAB 2: TEMPLATE STRINGS

Also known as Template Literals

Template Literals

```
Basic string:
‘Hello World’
```

```
Multiline:
` line 1
line 2`
```

```
String interpolations:
var a = “World”;
`Hello ${a}`
```

```
Can also use a function inside ${}!
```

```
Can also tag:
const result = tagIt`Hello ${noun}!`;
```

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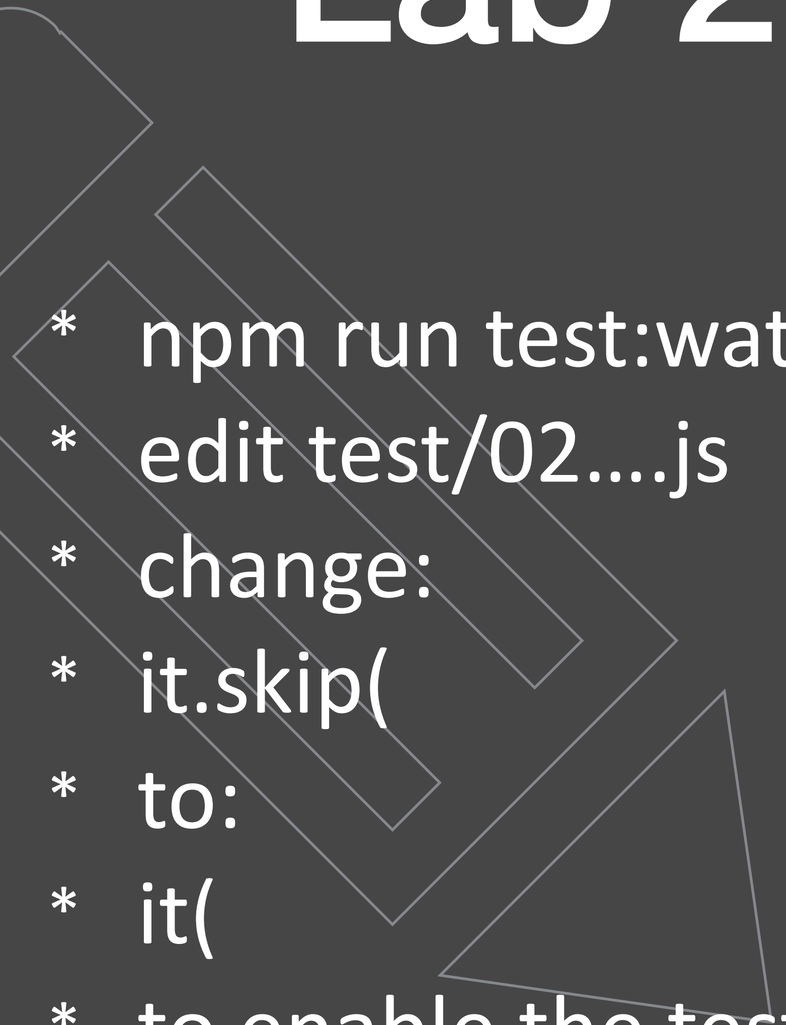
Lab 2: Template String



* npm run test:watch
* edit test/02….js
* change:
* it.skip(
* to:
* it(
* to enable the test!
* Do the extra credit if you’re ahead, or skip it

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Lab 2: Discussion

LAB 3: NEW CORE OBJECT FUNCTIONS

USEFUL STUFF ADDED TO Strings, Objects, Arrays

New APIs

```
Number.isInteger(Infinity) // false
Number.isNaN("NaN") // false

"abcde".includes("cd") // true
"abc".repeat(3) // "abcabcabc"

Array.from(document.querySelectorAll('*')) // Returns a real Array
Array.of(1, 2, 3) // Similar to new Array(...), but without special one-arg behavior
[0, 0, 0].fill(7, 1) // [0,7,7]
[1, 2, 3].find(x => x == 3) // 3
[1, 2, 3].findIndex(x => x == 2) // 1
[1, 2, 3, 4, 5].copyWithin(3, 0) // [1, 2, 3, 1, 2]
["a", "b", "c"].entries() // iterator [0, "a"], [1,"b"], [2,"c"]
["a", "b", "c"].keys() // iterator 0, 1, 2
["a", "b", "c"].values() // iterator "a", "b", "c"

// NOTE: NOT DEEP COPY/MERGE!
Object.assign({a:1}, {b:2}, {c:3}) => { a: 1, b: 2, c: 3 }
```

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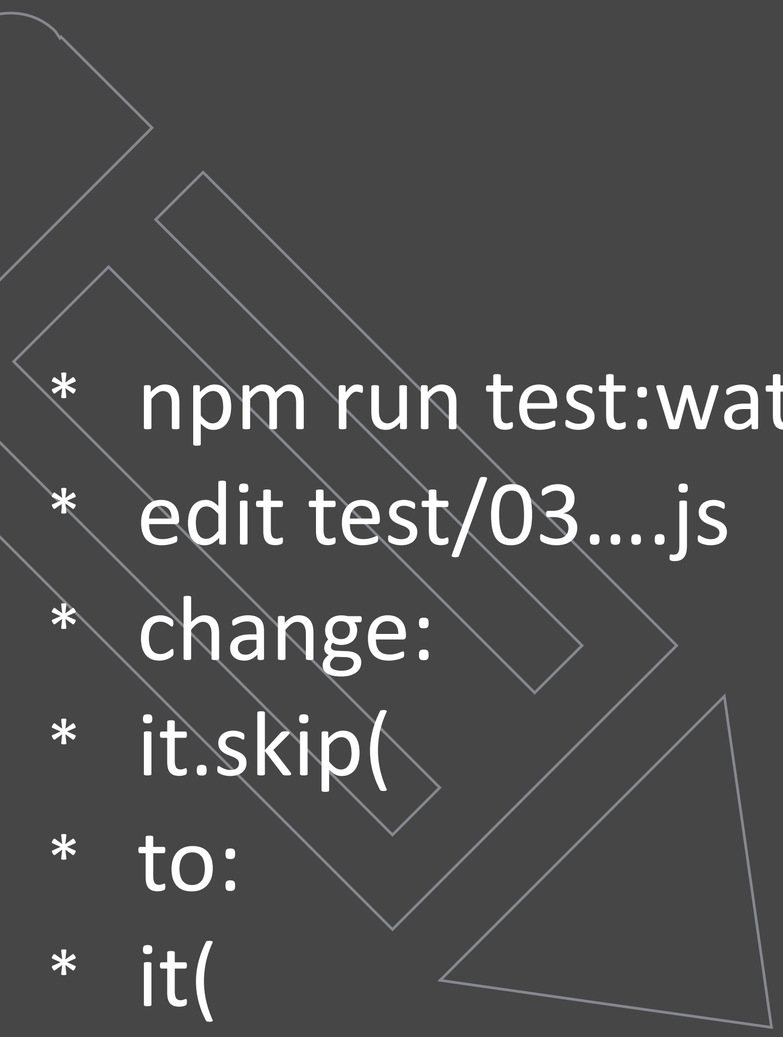
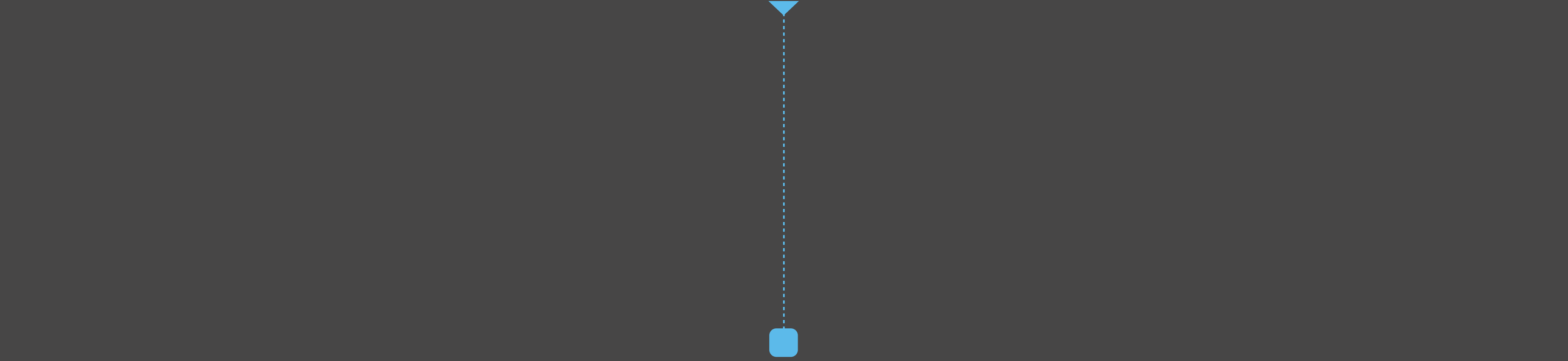
Lab 3: APIs



* npm run test:watch
* edit test/03….js
* change:
* it.skip(
* to:
* it(
* to enable the test!

Lab 3: Discussion

LAB 4:DESTRUCTURING



Easier to access properties of arrays and objects - similar to Clojure!

DESTRUCTURING

```
var foo = 123;
    var bar = 456;

    // swapping of the value
    [bar, foo] = [foo, bar];

var pt = {x: 123, y: 444};
    var {x, y} = pt;
    console.log(x, y); // 123 444

//nested too!

var pt =  { data:
      {x: 123, y: 444}
    };
let {data: {x, y}} = pt;
// x and y are 123, 444
```

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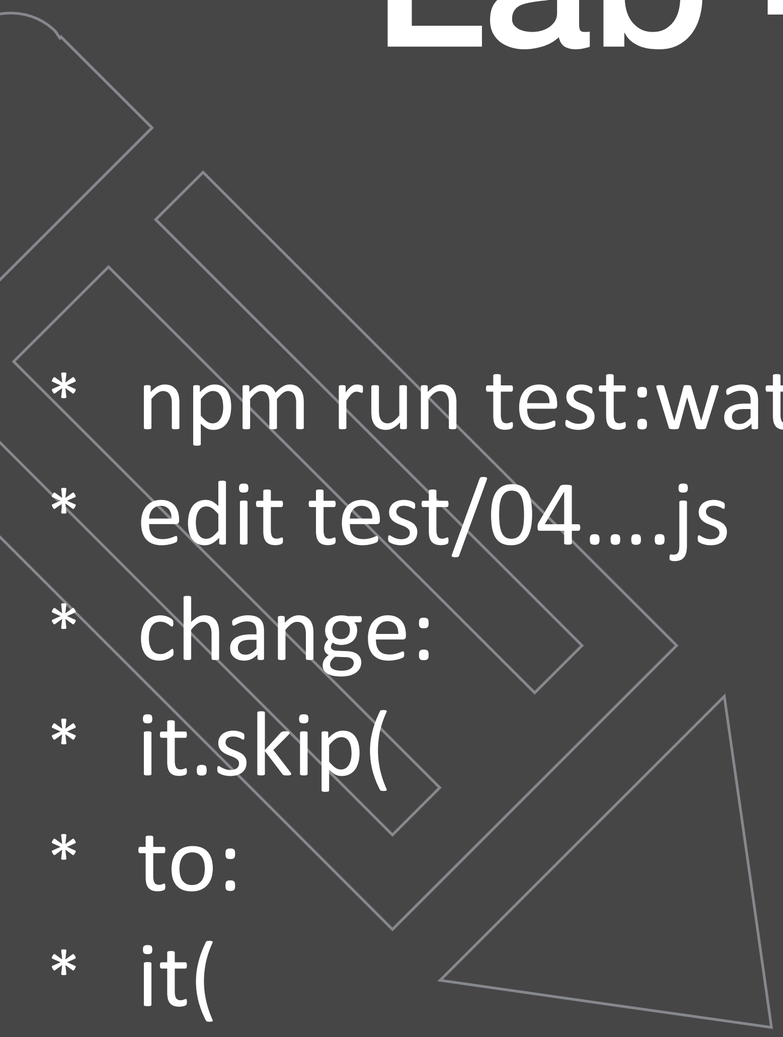
Lab 4: Destructuring



* npm run test:watch
* edit test/04….js
* change:
* it.skip(
* to:
* it(
* to enable the test!

Lab 4: Discussion

LAB 5: MODULES

Modular JavaScript has been around with tools

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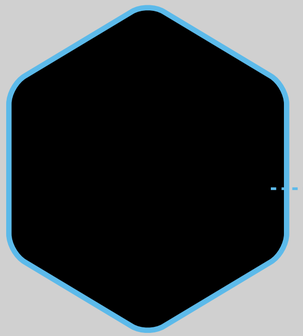
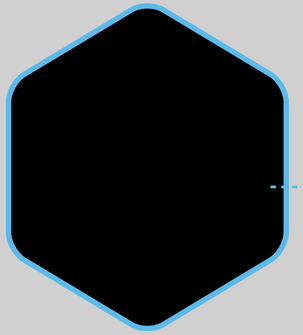
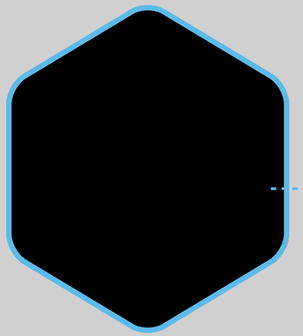


BROWSERIFY, AMD, COMMONJS

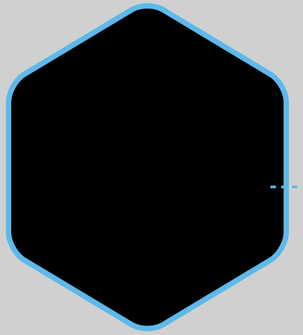


USED TO USE IIFE TO DO THE SAME THING IN PAST

MODULAR JS



NODE HAS SUPPORTED MODULES FOR A WHILE



NPM PACKAGING ALSO FOR THE BROWSER

MODULAR JS

Modules - the past

```
(function () {
    var $ = this.jQuery;

    this.myExample = function () {};
}());
--
common.js:
    exports.message = 'Hello Babel';
    var message = require('./Message').message;
    console.log(message); // Hello Babel
```

Modules - the future

```
export const message = 'Hello Babel’;
_
import {message} from ‘./Message';
___________
export function sum(x, y) {
  return x + y;
}
export var pi = 3.141593;
_________
import * as math from "lib/math";
alert("2π = " + math.sum(math.pi, math.pi));

import {sum, pi} from "lib/math";
alert("2π = " + sum(pi, pi));

import {sum as Summer} from "lib/math";
```

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Modules - the future

```
const greeting = 'Hello';
    const name = 'Babel';
    const version = 'v5.0';
    export default {
      greeting: greeting,
      name: name,
      version: version
    };

--

import Message from './Message';
```

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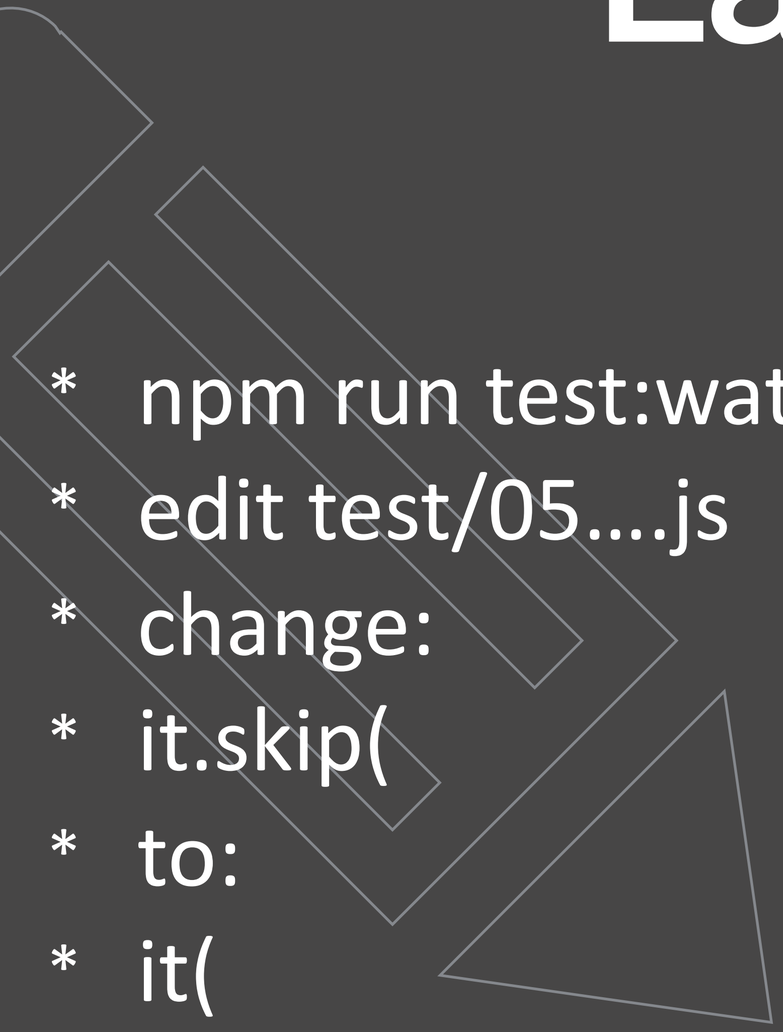
Lab 5: Modules



* npm run test:watch
* edit test/05….js
* change:
* it.skip(
* to:
* it(
* to enable the test!

Lab 5: Discussion

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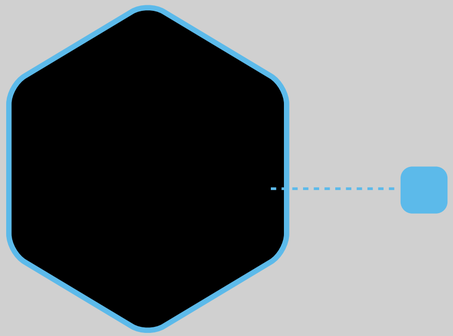
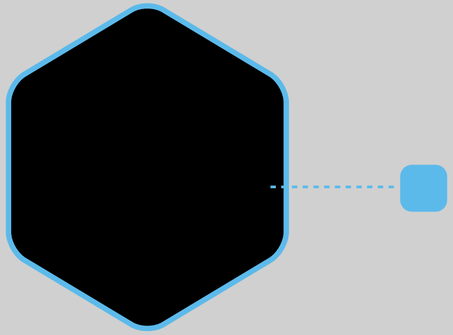
LAB 6: OBJECT LITERALS



SET PROTOTYPE AT CONSTRUCTION



SHORTHAND FOR ASSIGNMENTS

OBJECT LITERALS

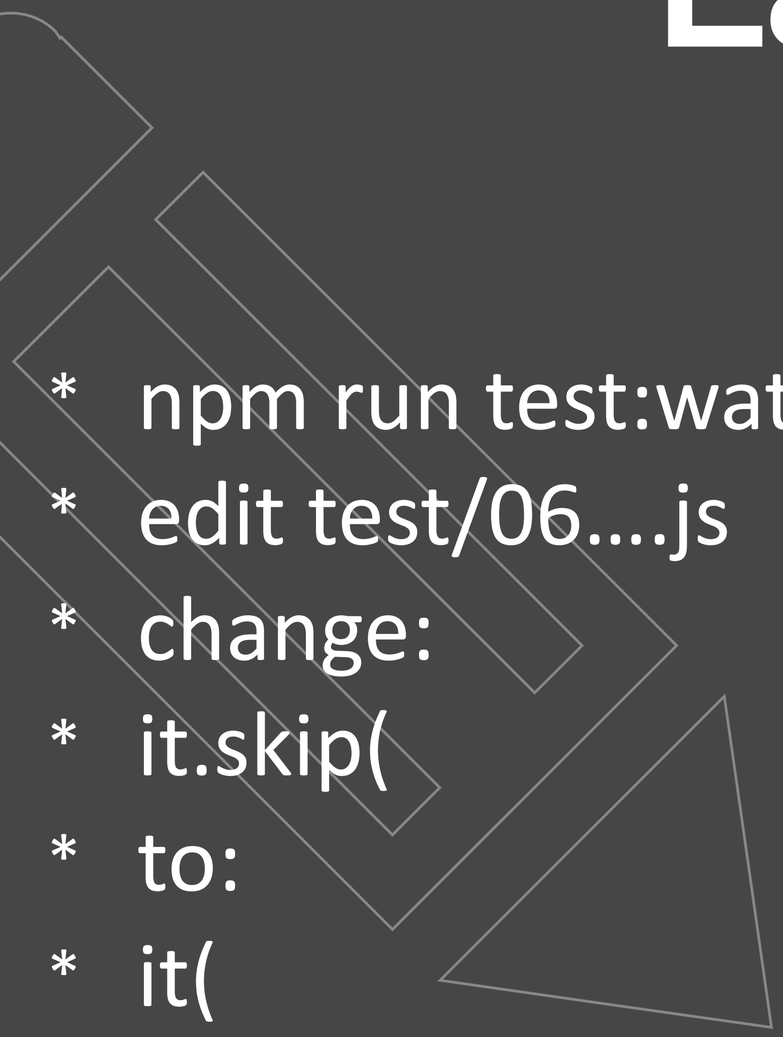
- DEFINED METHODS
- SUPER CALLS
- COMPUTED PROP NAMES

OBJECT LITERALS

Obj Literals

```
var obj = {
    // __proto__
    __proto__: theProtoObj,
    // Shorthand for ‘handler: handler’
    handler,
    // Methods
    toString() {
     // Super calls
     return "d " + super.toString();
    },
    // Computed (dynamic) property names
    [ 'prop_' + (() => 42)() ]: 42
};:
```

Lab 6: Literals



* npm run test:watch
* edit test/06….js
* change:
* it.skip(
* to:
* it(
* to enable the test!

Lab 6: Discussion

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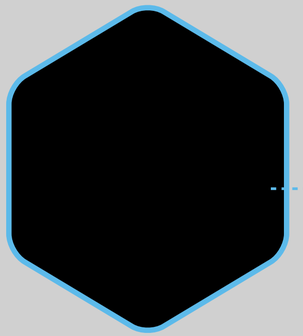
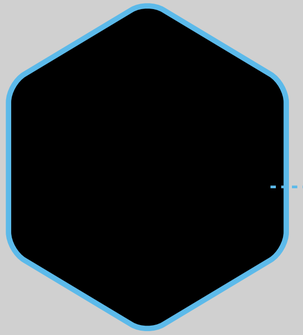
LAB 7: PARAMETERS



- DEFAULT VALUES!



- BETTER VARARGS!

PARAMETERS

Params

```
function f(x, y=12) {
  // y is 12 if not passed (or passed as undefined)
  return x + y;
}
f(3) == 15
```

“arguments” keyword replaced with “args”

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... rest

```
var sum = function(...args){
      return args.reduce( (sum, n) => sum + n );
    };
```

Lab 7: Parameters

* npm run test:watch
* edit test/07….js
* change:
* it.skip(
* to:
* it(
* to enable the test!

Lab 7: Discussion

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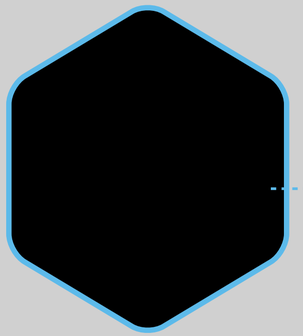
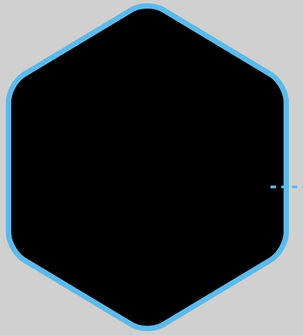
LAB 8: SPREAD



TURN AN ARRAY INTO CONSECUTIVE ARGUMENTS



BETTER VARARGS!

SPREAD

spread operator: pass array to a function and unwrap it

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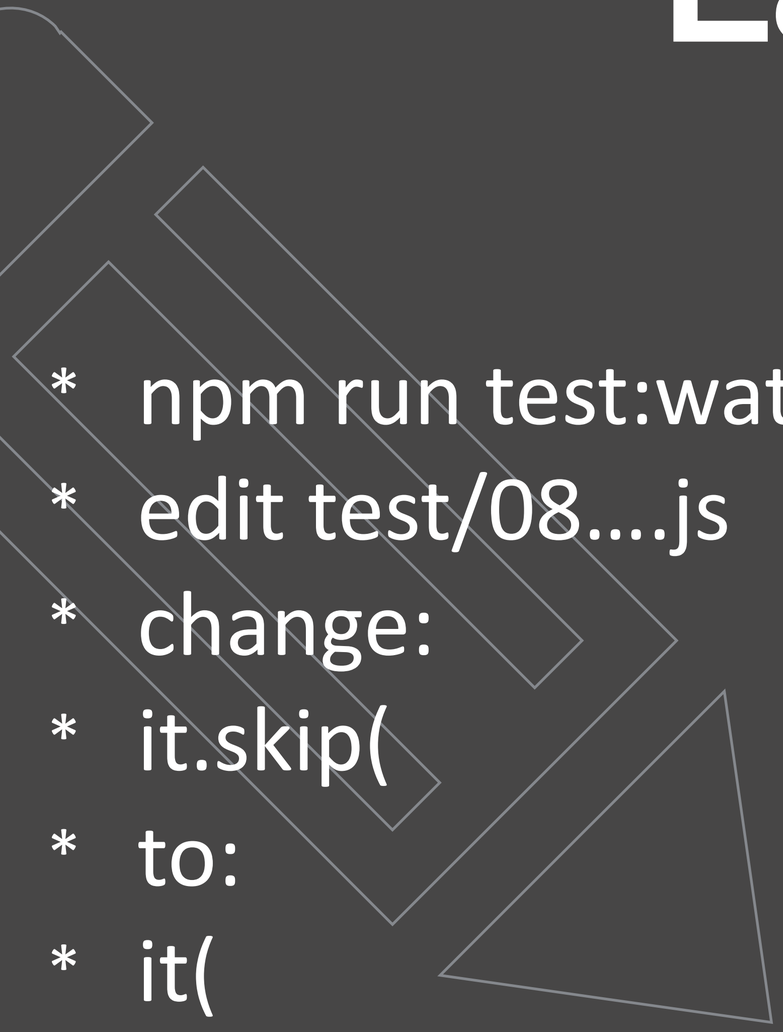
... spread

```
var sum = function(...args){
  return args.reduce( (sum, n) => sum + n );
};

var array = [1, 2, 3, 4];
// This is like calling `sum(1, 2, 3, 4)`
console.log(sum(...array)); // 10
```

Lab 8: Spread



* npm run test:watch
* edit test/08….js
* change:
* it.skip(
* to:
* it(
* to enable the test!

Lab 8: Discussion

LAB 9: ARROW FUNCTIONS

Function declaration - syntax sugar!

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SWEET

```
setTimeout(function(){
  console.log('Test');
}, 100);
```

```
setTimeout(()=>{console.log('Test');}, 100);
```

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

```
var square = (x) => {
  return x * x;
};

var square2 = x => x * x;
```

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- BINDS `THIS` TO THE EVAL SCOPE, NOT THE RUNTIME SCOPE
- SHORTER!

ARROW FUNCTIONS

ARROW Functions

```
var sum = function(...args){
  return args.reduce( (sum, n) => sum + n );
};

var array = [1, 2, 3, 4];
// This is like calling `sum(1, 2, 3, 4)`
console.log(sum(...array)); // 10
```

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Lab 9: ARROW Functions

* npm run test:watch
* edit test/09….js
* change:
* it.skip(
* to:
* it(
* to enable the test!

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Lab 9: Discussion

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LAB 10: CLASSES & OOP

Yes, real classes are coming to JavaScipt!

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OOP IN JS?

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ES5 Classes

```
var Person = function(name) {
    this.name = name;
};

Person.prototype.getName = function() {
    return this.name;
};

Person.prototype.setName = function(name) {
    this.name = name;
};

var alice = new Person("alice");
alice.getName(); // alice
```

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ES6 Classes

```
class Person {
  constructor(name) {
    this.name = name;
  }
  getName() {
    return this.name;
  }
  setName(name) {
    this.name = name;
  }
}

var alice = new Person("alice");
alice.getName(); // alice
```

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ES6 Extends

```
class Monster extends Character {
      constructor(x, y, name) {
        super(x, y);
        this.name = name;
      }
    }
```

Lab 10: CLASSES & OOP

* npm run test:watch
* edit test/10….js
* change:
* it.skip(
* to:
* it(
* to enable the test!

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Lab 10: Discussion

LAB 11: SET

Wow! A new data structure in JavaScript: SET

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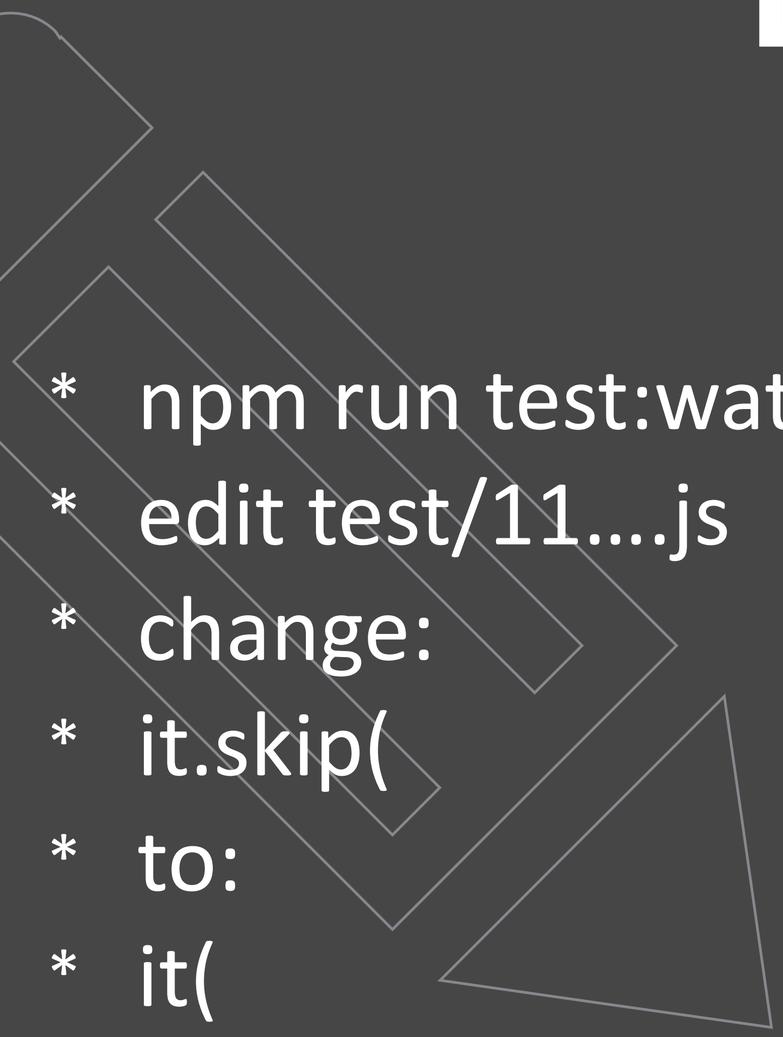
Set

```
var s = new Set();
s.add("hello").add("goodbye").add("hello");
s.size === 2;
s.has("hello") === true;
```

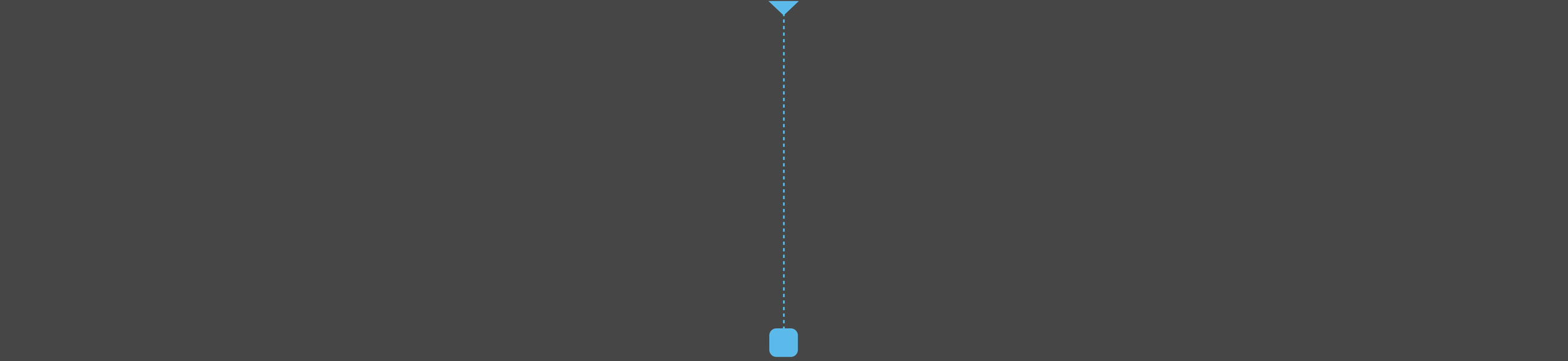
Lab 11: SET



* npm run test:watch
* edit test/11….js
* change:
* it.skip(
* to:
* it(
* to enable the test!

Lab 11: Discussion

LAB 12: MAP



HOLY S**T! Another new data structure in JavaScript: map

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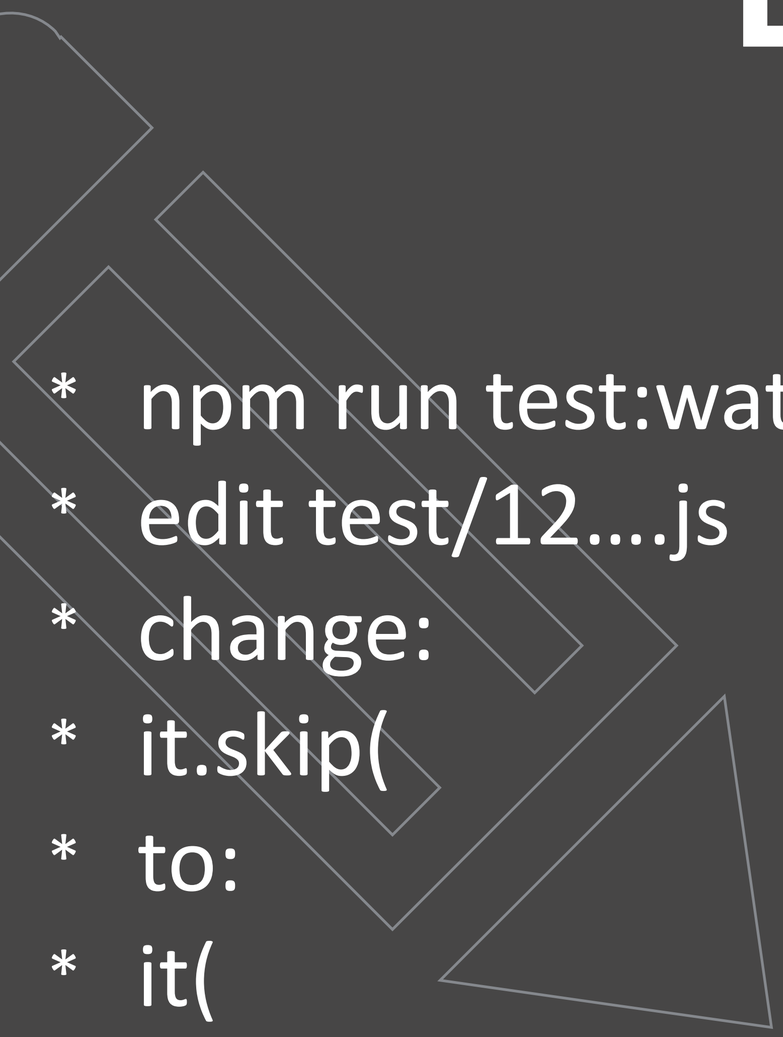
map

```
var m = new Map();
m.set("hello", 42);
m.set(s, 34);
m.get(s) == 34;
```

Lab 12: map



* npm run test:watch
* edit test/12….js
* change:
* it.skip(
* to:
* it(
* to enable the test!

Lab 12: Discussion

LAB 13: WEAKMAP & WEAKSET

HOLY S**T! Moe new data structures in JavaScript!

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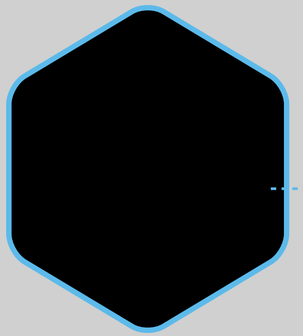
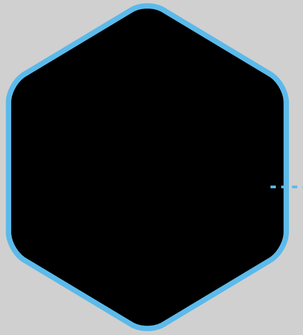


EXTEND OBJC FROM THE OUTSIDE WITHOUT INTERFERING WITH GC



EXTEND A SEALED OBJ, OR EXTERNAL OBJ

WEAK MAP & SET

EXTRA CREDIT

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WEAK

```
// Weak Maps
var wm = new WeakMap();
wm.set(s, { extra: 42 });
wm.size === undefined

// Weak Sets
var ws = new WeakSet();
ws.add({ data: 42 });
// Because the added object has no other references, it will not be held
in the set
```

Lab 13: WEAK

* npm run test:watch
* edit test/13….js
* change:
* it.skip(
* to:
* it(
* to enable the test!

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Lab 13: Discussion

LAB 14: PROMISES

Promises, now included in the language!

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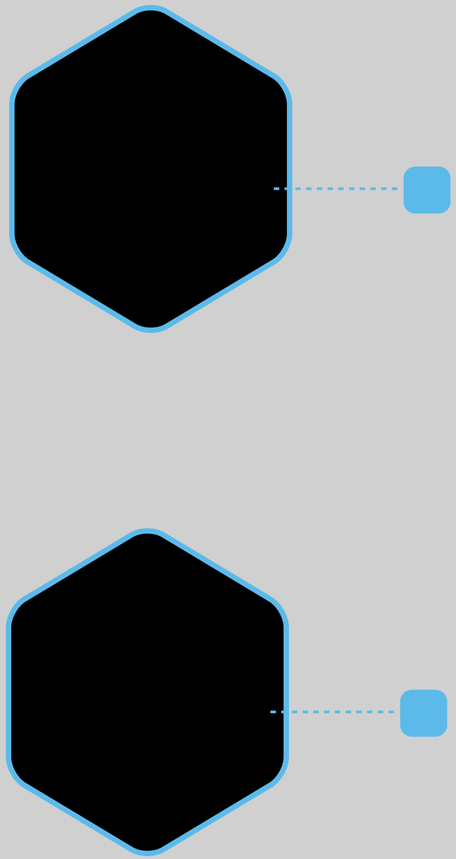

ASYNCHRONOUS PROGRAMMING

VALUE THAT MAY BE MADE AVAILABLE IN THE FUTURE

PROMISES

PROMISES

```
function timeout(duration = 0) {
    return new Promise((resolve, reject) => {
        setTimeout(resolve, duration);
    })
}

var p = timeout(1000).then(() => {
    return timeout(2000);
}).then(() => {
    throw new Error("hmm");
}).catch(err => {
    return Promise.all([timeout(100), timeout(200)]);
})
```

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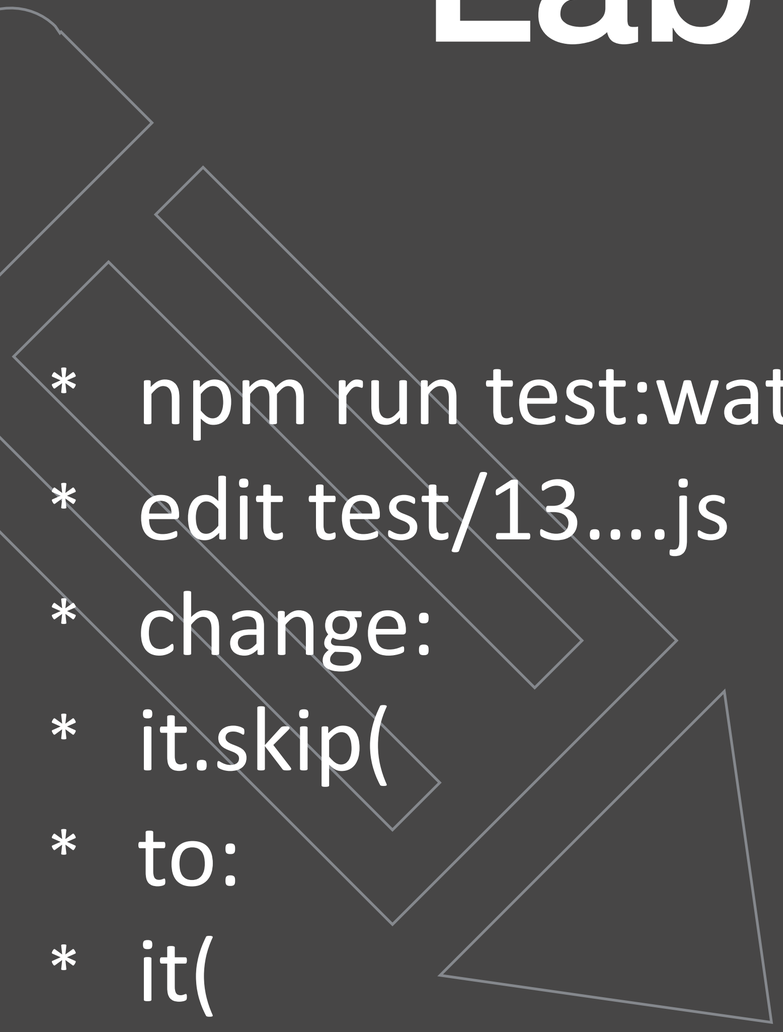
Lab 14: PROMISES



* npm run test:watch
* edit test/13….js
* change:
* it.skip(
* to:
* it(
* to enable the test!

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Lab 14: Discussion

LAB 15: GENERATORS

Generators simplify iterator-authoring using function* and yield

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EXTRA CREDIT

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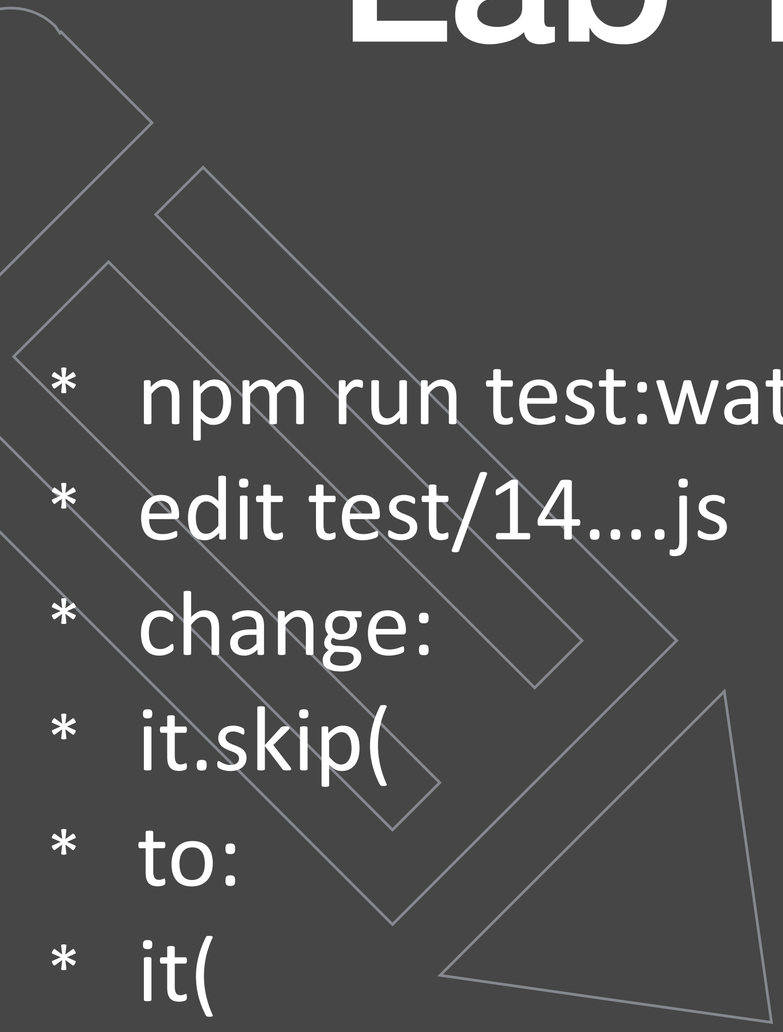
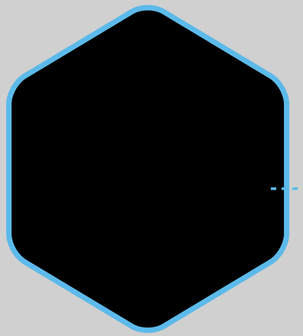
Lab 14: GENERATOR



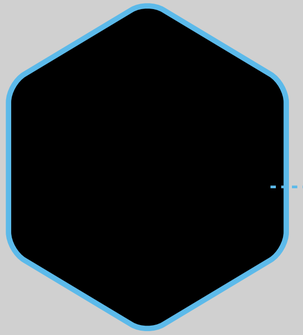
* npm run test:watch
* edit test/14….js
* change:
* it.skip(
* to:
* it(
* to enable the test!

LAB 16: SYMBOLS

Symbols are a new primitive type



SYMBOLS ENABLE ACCESS CONTROL FOR OBJECT STATE



SYMBOLS ARE UNIQUE

SYMBOLS

SYMBOLS

```
var MyClass = (function() {
  // module scoped symbol
  var key = Symbol("key");
  function MyClass(privateData) {
    this[key] = privateData;
  }
  MyClass.prototype = {
    doStuff: function() {
      ... this[key] ...
    }
  };
  return MyClass;
})();
var c = new MyClass("hello")
c["key"] === undefined
```

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EXTRA CREDIT

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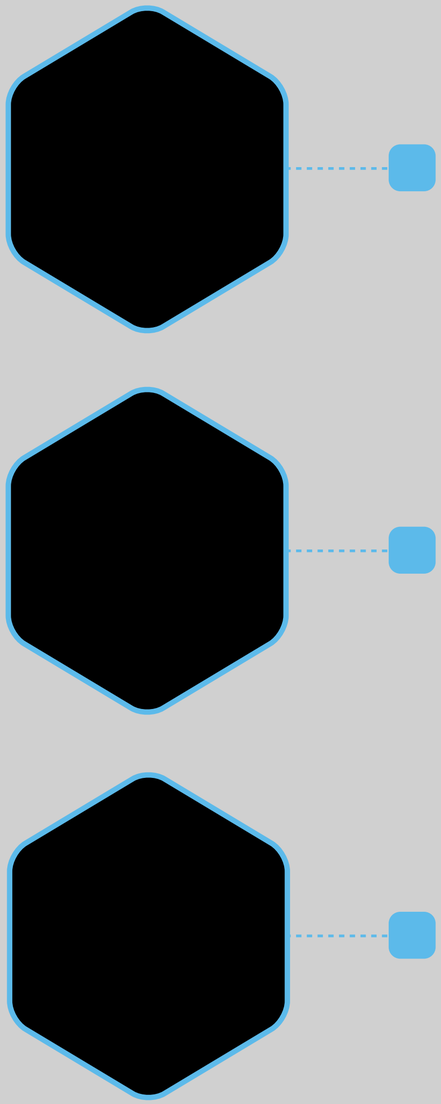
Lab 16: SYMBOLS

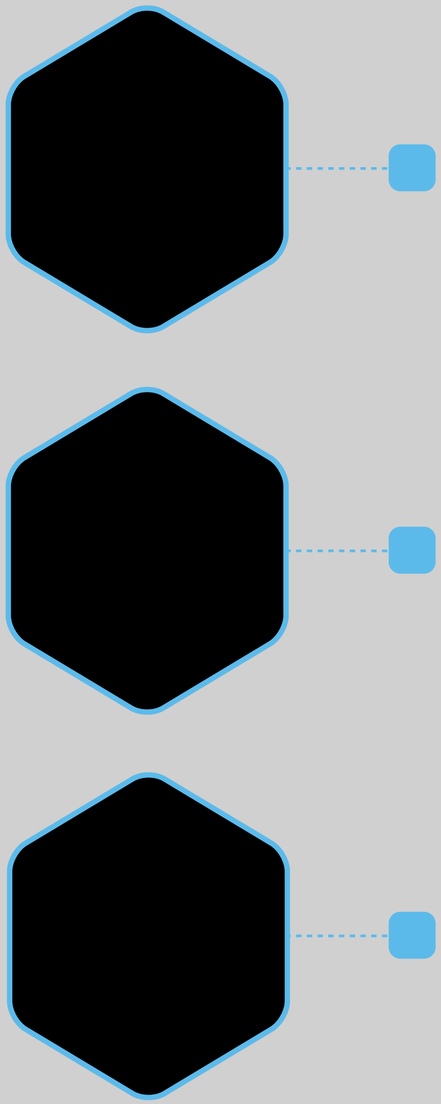
* npm run test:watch
* edit test/13….js
* change:
* it.skip(
* to:
* it(
* to enable the test!

Lab 16: Discussion



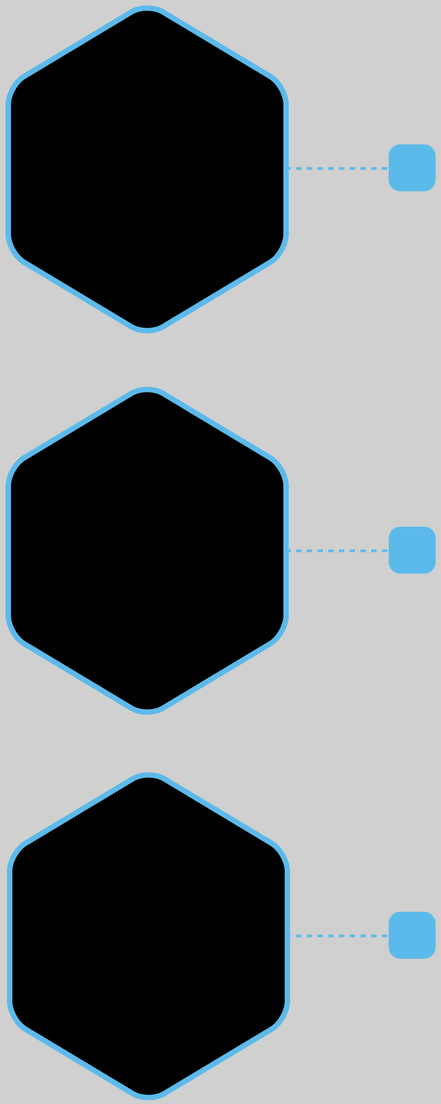
- COMPUTED PROPERTY KEYS
- UNICODE
- PROXIES

STUFF WE DIDN'T COVER



- BINARY AND OCTAL LITERALS
- REFLECT API
- TAIL CALLS

STUFF WE DIDN'T COVER

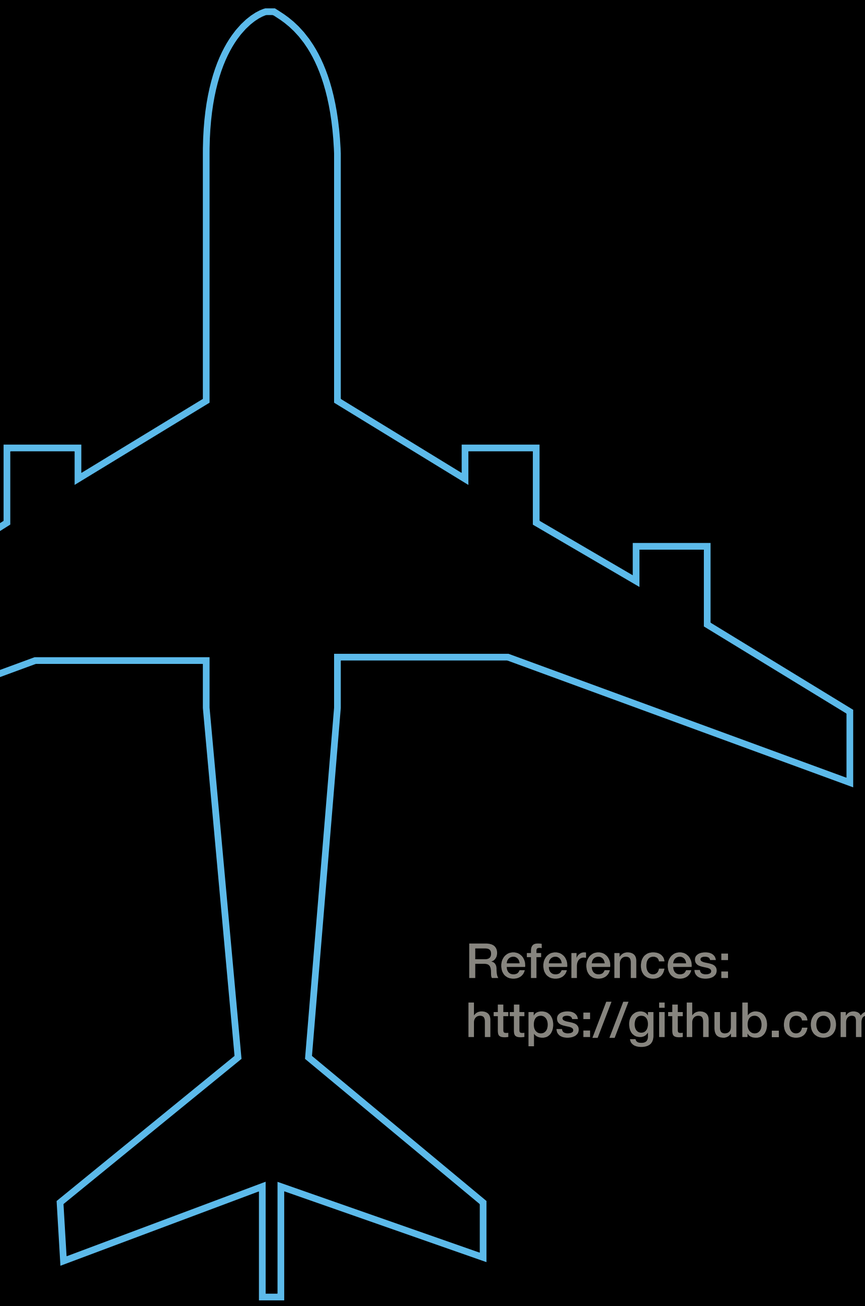


- ITERATORS + FOR..OF
- SUBCLASSABLE BUILT-INS
- ALL THE STUFF IN ES2016!

STUFF WE DIDN'T COVER

References

https://github.com/lukehoban/es6features
https://github.com/kentcdodds/es6-workshop



THANK YOU

References:
https://github.com/davezuko/react-redux-starter-kit

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LAB 7: COMPUTED ROPERTIES

Use expressions as property names for defining/ accesing literals

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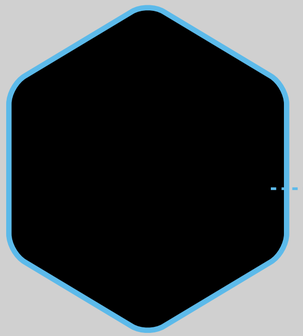
Props

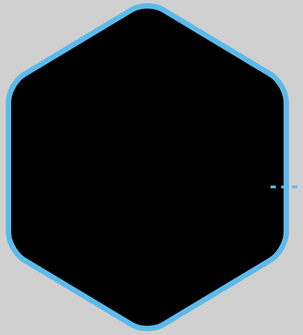
```
// ES5
var prop = "foo";
    var obj = {};
    obj[prop] = "bar";

// ES6

    var prop = "foo";
    var obj = {
      [prop]: "bar"
    };
```



EXPRESS DYNAMIC PROPERTIES WITHOUT USING TEMPORARY VARIABLES



EVEN FUNCTION CALLS!

PROPS

Lab 7: COMPUTED PROPS

* create lab7.js
* tower-of-babel, exercise 7
* Develop: babel-node lab7.js
* Run: tower-of-babel verify lab7.js
* HINT:
  Try to solve without any temporary variables (inline everything)

Lab 7: Discussion

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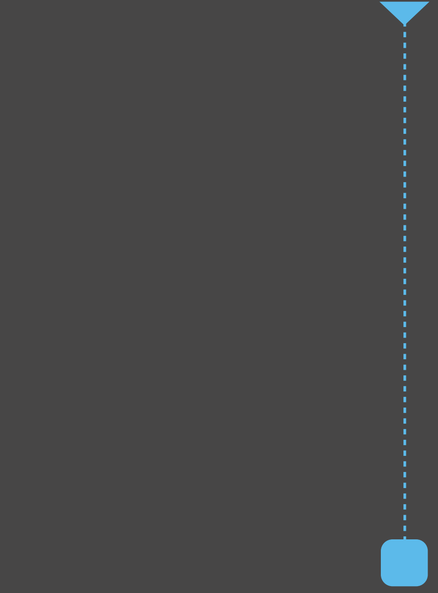
LAB 8: ITERABLE – FOR OF



New Iterable type, can use “for of” with this new type

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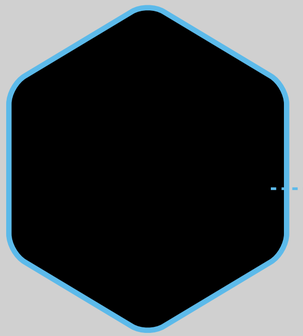
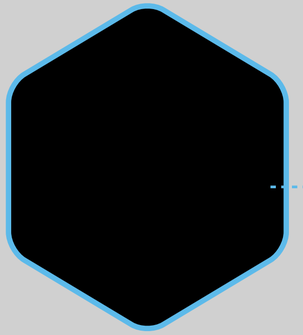
for of

```
var res = [];
    // The next line contains the for-of syntax.
    for (let element of [1, 2, 3]) {
      res.push(element * element);
    }
    console.log(res); // [1, 4, 9]
```



“FOR OF” CAN BE USED WITH ANY UTTERABLE



ITERABLE IS: SYMBOL.ITERATOR

ITERABLE

```
// calculating the fibonacci sequence to the 1000st number
var fibonacci = {
  // Make a method that has the Symbol.iterator function.
  [Symbol.iterator]() {
    let pre = 0, cur = 1;
    // The resulting iterator object has to have a next method:
    return {
      next() {
        // The result of next has to be an object with the property
`done` that states whether or not the iterator is done.
        [pre, cur] = [cur, pre + cur];
        if (pre < 1000)  return { done: false, value: pre };
        return { done: true };
      }
    }
  }
}
for (var n of fibonacci) {
  console.log(n);
```

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Lab 8: ITERABLE

* create lab8.js
* tower-of-babel, exercise 8
* Develop: babel-node lab8.js
* Run: tower-of-babel verify lab8.js

Lab 8: Discussion