DEV ACADEMY
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# Node.js & JS (variables, functions, objects)

Week 1, Day 1

# Agenda for Today

- Node.js - JavaScript *not* in the browser
- Revision:
  - Variables
  - Functions
- Objects & Arrays - `.` and `[]` notation
- Running `.js` challenges on Bootcamp
  - When to ask for help

# Node.js - JavaScript *not* in the browser

- Node.js is an open-source JavaScript *runtime* environment that allows us to run JavaScript on our own computers (not just in the browser)
- First introduced in 2009 by Ryan Dahl, built on top of Google's V8 JavaScript engine
- You've been using it in Foundations to run tests
  - `npm test` to run tests
  - `npm install` to install packages
- Has many of the same functions/features as browser JavaScript, but...
  - is missing some (the DOM, `window`, `alert`)
  - has some extras (`fs`, `path`, `process`, `import`, `export`)

# Node.js - the REPL

Demo

- REPL stands for Read-Eval-Print-Loop
- Run `node` in your terminal to start the Node.js REPL

```
$ node
Welcome to Node.js v18.17.0.
Type ".help" for more information.
> 1 + 1
2
> console.log('hello world')
hello world
```

**Helpful tip**: you can exit the REPL with `Ctrl` + `D`

# Node.js - running a file

Demo

- You can also run a `.js` file with `node`
- Create a file called `hello.js` with the following contents:

```
console.log('hello Matai! ✳')
```

- Run it with `node hello.js`

```
$ node hello.js
hello Matai! ✳
```

# Variables `Revision`

Two ways to define: `let`, `const`

## `let`

- Values can be *reassigned*

```
let shout = 'HELLO!'

console.log(string) // hello

shout = 'GOODBYE!'
console.log(string) // goodbye
```

## `const`

- Values cannot be *reassigned*

```
const string = 'hello'
console.log(string) // hello

// Uncaught TypeError: Assignment to constant variable.
string = 'goodbye'
```

# Variables

`Revision`

Three ways to define: `var`, `let`, `const`

## `let`

- Values can be *reassigned*

## `const`

- Values cannot be *reassigned*
- Does not prevent *mutation*

```
1  const object = {
2    colour: 'red'
3  }
4  console.log(object) // { colour: 'red' }
5
6  object.colour = 'blue'
7  console.log(object) // { colour: 'blue' }
```

# Objects & Arrays

Revision

Objects and arrays are *mutable* data types - they can be changed after they are created

... even if they are a `const`

```
const teachers = ['Ahmad', 'Daph', 'Hannah']

teachers // ['Ahmad', 'Daph', 'Hannah']

teachers[0] = 'Jared'
teachers // ['Jared', 'Daph', 'Hannah']

teachers.push('Barbora')
teachers // ['Jared', 'Daph', 'Hannah', 'Barbora']
```

# Objects & Arrays

Revision

Objects and arrays are *mutable* data types - they can be changed after they are created

... even if they are a `const`

```
1   const waterBottle = {
2     colour: 'Silver',
3     size: '709mL',
4     contents: 'Water'
5   }
6
7   waterBottle // { colour: 'Silver', size: '709mL', contents: 'Water' }
8
9   waterBottle.contents = 'Coffee'
10
11  waterBottle // { colour: 'Silver', size: '709mL', contents: 'Coffee' }
```

# Functions

Revision

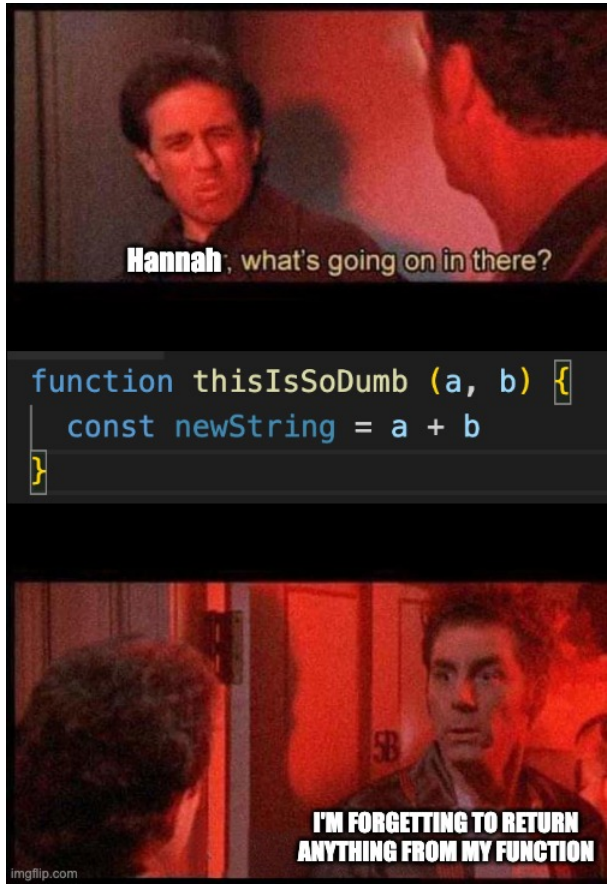
Functions are reusable blocks of code

```
function myFunction(a, b) {
  console.log(a, b)

  // ... do something

  return 'return value'
}

// invoke the function
const result = myFunction('hello', 'world')
```

## Anatomy:

- **Name**: `myFunction`
- **Parameters**: `a`, `b`
- **Return value**: `'return value'`
- **Side effects**: `console.log(a, b)`
- **Invocation**: `myFunction('hello', 'world')`
- **Arguments**: `'hello'`, `'world'`

# Don’t forget to return data from a function!



# Object notation

There are two ways of indexing/accessing properties on an object:

- `.` notation
- `[]` notation

```
1   const object = {
2     trait: 'lazy',
3     colour: 'orange',
4     'favourite food': 'lasagne'
5   }
6
7   console.log(object.trait) // lazy
8   console.log(object['colour']) // orange
9   const key = 'favourite food'
10  console.log(object[key]) // lasagne
```

# . notation

```
1  const object = {
2    trait: 'lazy',
3    colour: 'orange',
4    'favourite food': 'lasagne'
5  }
6
7  object.style // lazy
8  object.colour // orange
9  object.favourite food // Uncaught SyntaxError
```

- Most common way of accessing properties on an object
- Cannot be used if the property name contains spaces or special characters
- Cannot be used to access properties dynamically (*what you see is what you get*)

# `[]` notation

```
1   const object = {
2     trait: 'lazy',
3     colour: 'orange',
4     'favourite food': 'lasagne'
5   }
6
7   object['trait'] // lazy
8   object['favourite food'] // lasagne
9   let key = 'colour'
10  object[key] // orange
11  key = 'trait'
12  object[key] // lazy
```

- Can be used to access properties with spaces or special characters
- Can be used to access properties dynamically (based on a variable)

# Mutability

Primer

We will cover more about mutability in the another lesson, but for now:

- Objects and arrays are *mutable* data types

Example: water bottle

```
const waterBottle = {
  colour: 'Silver',
  size: '709mL',
  contents: 'Water'
}

function fillBottleWithCoffee(bottle) {
  bottle.contents = 'Coffee'
}

waterBottle // { colour: 'Silver', size: '709mL', contents: 'Water' }

fillBottleWithCoffee(waterBottle)

waterBottle // { colour: 'Silver', size: '709mL', contents: 'Coffee' }
```

# Spread operator

Demo

The spread operator (`[...value]`, `{ ...value }`) can be used to *shallow copy* the contents of one array or object into a new array or object

```
const numbers = [1, 2, 3]

const copyOfNumbers = [...numbers]

copyOfNumbers // [1, 2, 3]

numbers.push(4)

numbers // [1, 2, 3, 4]
copyOfNumbers // [1, 2, 3]
```

```
const originalBottle = {
  colour: 'Silver',
  size: '709mL',
  contents: 'Water'
}

function fillANewBottleWithCoffee(bottle) {
  const newBottle = {
    ...bottle,
    contents: 'Coffee'
  }
  return newBottle
}

const newBottle = fillANewBottleWithCoffee(originalBottle)

originalBottle // { colour: 'Silver', size: '709mL', contents: 'Water' }
newBottle // { colour: 'Silver', size: '709mL', contents: 'Coffee' }
```

# Review Questions

1. What is the difference between `let` and `const`?
2. What is the difference between `.` and `[]` notation?
3. What is the difference between a function's *parameters* and *arguments*?
4. What is the difference between a function's *return value* and *side effects*?
5. Given the following function, what is its return value?

```
function logGreeting(greeting) {
  console.log(greeting)
}
```

6. How do you access the `favourite snack` property on the following object?

```
const person = {
  name: 'Rebecca',
  'favourite snack': 'nectarines'
}
```

# Running `.js` challenges on Bootcamp

- Follow instructions step by step
- Often a message at the bottom describes what being done looks like
- It’s okay to run out of time! You can always revisit it later
- Stretch section for extra practice e.g. testing

## When to ask for help?

- If you’re stuck on something for more than 15 minutes
- Constructive problem solving is good within reason
- Asking questions unlocks your true learning potential
- Don’t be shy! We’re here to get you unstuck