JAVASCRIPT

THE SCRIPTING LANGUAGE FOR WEB PROGRAMMING

JAVASCRIPT FUNDAMENTALS

A BRIEF INTRODUCTION TO JAVASCRIPT

WHAT IS JAVASCRIPT?

JAVASCRIPT IS A *HIGH-LEVEL*, *OBJECT-ORIENTED*, *MULTI-PARADIGM* *PROGRAMMING LANGUAGE.*

We don’t have to worry about complex stuff like memory management

We can use different styles of programming

Based on objects, for storing most kinds of data

Instruct computer to do things

JAVASCRIPT FEATURES

HIGH-LEVEL	PROTOTYPE-BASED OBJECT-ORIENTED	MULTI-PARADIGM
INTERPRETED OR JUST-IN-TIME COMPILED	DYNAMIC	SINGLE-THREADED
NON-BLOCKING EVENT LOOP	FIRST-CLASS FUNCTIONS	GARBAGE-COLLECTED

THERE IS NOTHING YOU CAN'T DO WITH JAVASCRIPT

FRONT-END APPS

Dynamic effects and web applications in the browser

JS

100% based on JavaScript. They might go away, but JavaScript won't!

BACK-END APPS

Web applications on web servers

JS

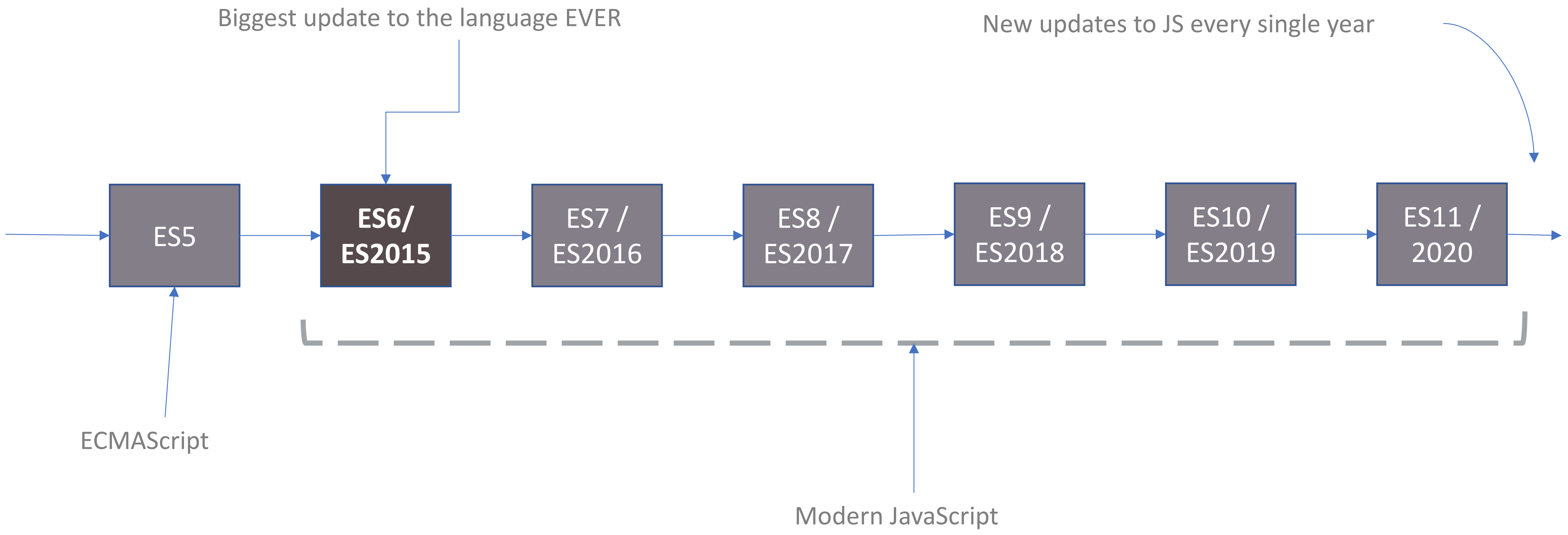
Native mobile applications

JS

Native desktop applications

JS

JAVASCRIPT RELEASES...



A BRIEF HISTORY OF JAVASCRIPT

1995	Brendan Eich creates the very first version of JavaScript in just 10 days. It was called Mocha.
1996	Mocha changes to LiveScript and then to JavaScript, in order to attract Java developers.
	Microsoft launches IE, copying JavaScript from Netscape and calling it JScript;
1997	With a need to standardize the language, ECMA releases ECMAScript 1 (ES1), the first official standard for JavaScript (ECMAScript is the standard, JavaScript the language in practice)
2009	ES5 (ECMAScript 5) is released with lots of great new features
2015	ES6/ES2015 (ECMAScript 2015) was released: the biggest update to the language ever!
	ECMAScript changes to an annual release cycle in order to ship less features per update
2016 onwards	Release of ES2016 / ES2017 / ES2018 / ES2019 / ES2020 / ES2021 / … / ES2089

JAVASCRIPT NEW FEATURES

ES6 AND MORE

ES6 & MORE – NEW FEATURES

- ARROW FUNCTION
- DESTRUCTURING
- REST / SPREAD
- TEMPLATE LITERALS
- BLOCK SCOPING
- MAP/SET
- CLASSES
- DEFAULT PARAMETERS

ARROW FUNCTION =>

Arrow functions are handy for one-liner functions

Arrow Function Flavors

Without Curly braces
(…args) => expression

With curly braces
(…args) => { body }

Limitations

Don’t have this keyword

Don’t have arguments keyword

Cant call with new operator

BLOCK SCOPING

Restricts the scope of variables to the nearest curly braces { }

Variables Types

const: converts the variable to a constant

let: for all type of variables

const !== immutable

REST / SPREAD OPERATOR

REST	A function can be called with any number of arguments, no matter how it is defined.
	The rest parameters must be at the end.
	Usage: create functions that accept any number of arguments
SPREAD	Spread operator looks similar to rest parameters, also using (...), but does quite the opposite.
	It is used in the function call, it “expands” an iterable object into the list of arguments.
	Usage: pass an array to functions that normally require a list of many

DESTRUCTURING

Destructuring assignment is a special syntax that allows us to “unpack” arrays or objects into a bunch of variables.

OBJECT DESTRUCTURING

- We have an existing object at the right side, that we want to split into variables.

ARRAY DESTRUCTURING

- The array is destructured into variables, but the array itself is not modified.

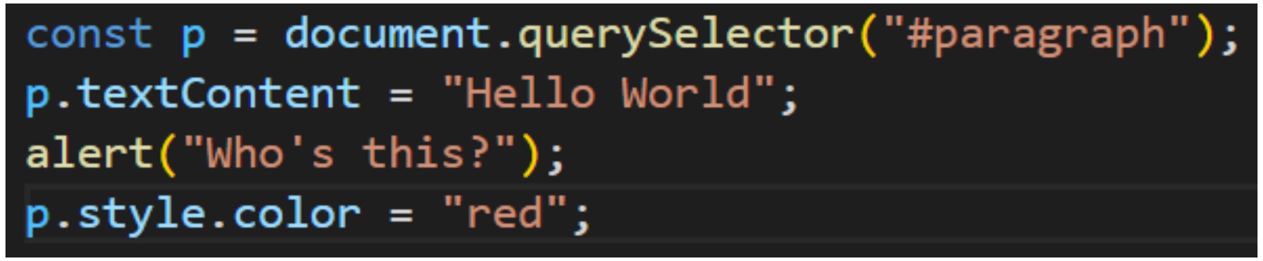
NESTED DESTRUCTURING

- If an object or an array contain other objects and arrays, we can use more complex left side patterns to extract deeper portions.

ASYNCHRONOUS JAVASCRIPT

PROMISES, ASYNC/ AWAIT AND MORE

SYNCHRONOUS CODE



```
const p = document.querySelector("#paragraph");
p.textContent = "Hello World";
alert("Who's this?");
p.style.color = "red";
```

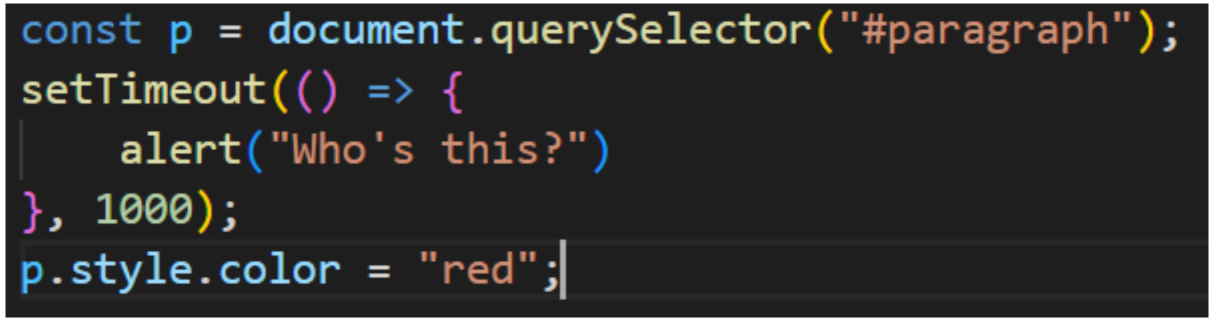
Most code is synchronous

Synchronous code is executed line by line

Each line of code waits for previous line to finish

Long-running operations block code execution

ASYNCHRONOUS CODE



```
const p = document.querySelector("#paragraph");
setTimeout(() => {
    alert("Who's this?")
}, 1000);
p.style.color = "red";
```

Asynchronous code is executed after a task that runs in the “background” finishes

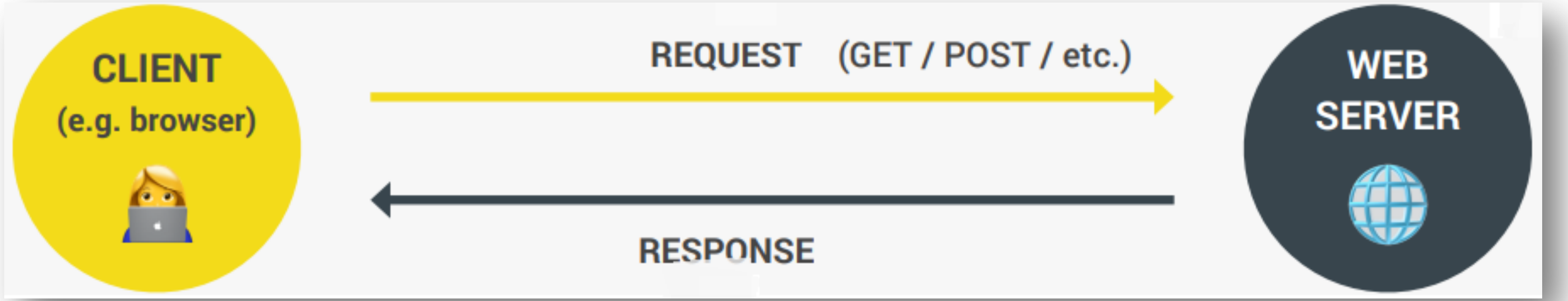
Asynchronous code is non-blocking

Execution doesn’t wait for an asynchronous task to finish its work

Callback functions alone do NOT make code asynchronous

WHAT ARE AJAX CALLS?

Asynchronous JavaScript And XML: Allows us to communicate with remote web servers in an asynchronous way. With AJAX calls, we can request data from web servers dynamically



WHAT ARE PROMISES?

Promise: An object that is used as a placeholder for the future result of an asynchronous operation.

Less Formal

Promise: A container for an asynchronously delivered value.

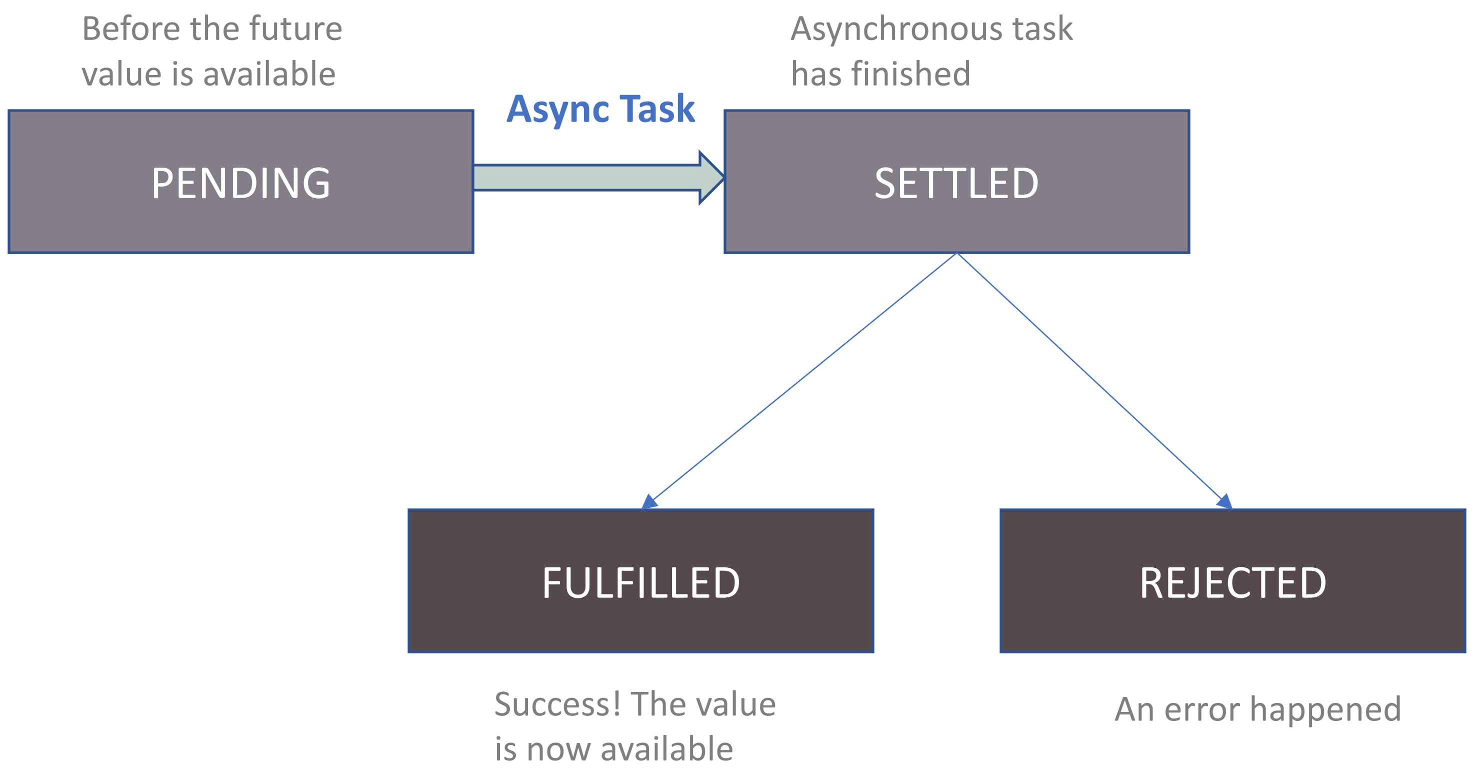
Less Formal

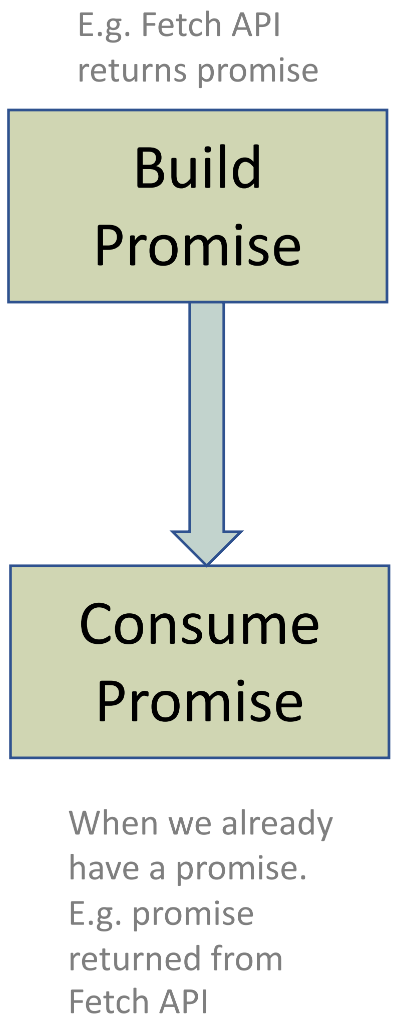
Promise: A container for a future value.

We no longer need to rely on events and callbacks passed into asynchronous functions to handle asynchronous results;

Instead of nesting callbacks, we can chain promises for a sequence of asynchronous operations: escaping callback hell

THE PROMISE LIFECYCLE


Before the future value is available
PENDING
Async Task
Asynchronous task has finished
SETTLED
FULFILLED
REJECTED
Success! The value is now available
An error happened


E.g. Fetch API returns promise
Build Promise
Consume Promise
When we already have a promise. E.g. promise returned from Fetch API

MODERN JAVASCRIPT DEVELOPMENT

WRITING CLEAN AND MODERN JAVASCRIPT

REVIEW: MODERN AND CLEAN CODE

READABLE CODE

- Write code so that others can understand it
- Write code so that you can understand it in 1 year
- Avoid too “clever” and overcomplicated solutions
- Use descriptive variable names: what they contain
- Use descriptive function names: what they do

FUNCTIONS

- Generally, functions should do only one thing
- Don’t use more than 3 function parameters
- Use default parameters whenever possible
- Generally, return same data type as received
- Use arrow functions when they make code more readable

REVIEW: MODERN AND CLEAN CODE

GENERAL

- Use DRY principle (refactor your code)
- Don’t pollute global namespace, encapsulate instead
- Don’t use var
- Use strong type checks (=== and !==)

OOP

- Use ES6 classes
- Encapsulate data and don’t mutate it from outside the class
- Implement method chaining
- Do not use arrow functions as methods (in regular objects)

REVIEW: MODERN AND CLEAN CODE

AVOID NESTED CODE

- Use early return (guard clauses)
- Use ternary (conditional) or logical operators instead of if
- Use multiple if instead of if/else-if
- Avoid for loops, use array methods instead
- Avoid callback-based asynchronous APIs

ASYNCHRONOUS CODE

- Consume promises with async/await for best readability
- Whenever possible, run promises in parallel (Promise.all)
- Handle errors and promise rejections

REFERENCES

READING MATERIAL

- https://javascript.info/
- https://developer.mozilla.org/en-US/docs/Web/JavaScript

VIDEO LINKS

- https://www.youtube.com/watch?v=NCwa_xi0Uuc
- https://www.youtube.com/watch?v=nZ1DMMsyVyI