the Master Course

{CODENATION}

Intermediate JavaScript

JavaScript Engines

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Learning Objectives

To discover how a JavaScript engine operates

To be familiar with the JavaScript execution context

To explore JavaScript engine call stack, memory heap, event loop and callback queue

JavaScript Engines

...are typically developed by **web browser** vendors

 **= V8 Engine**

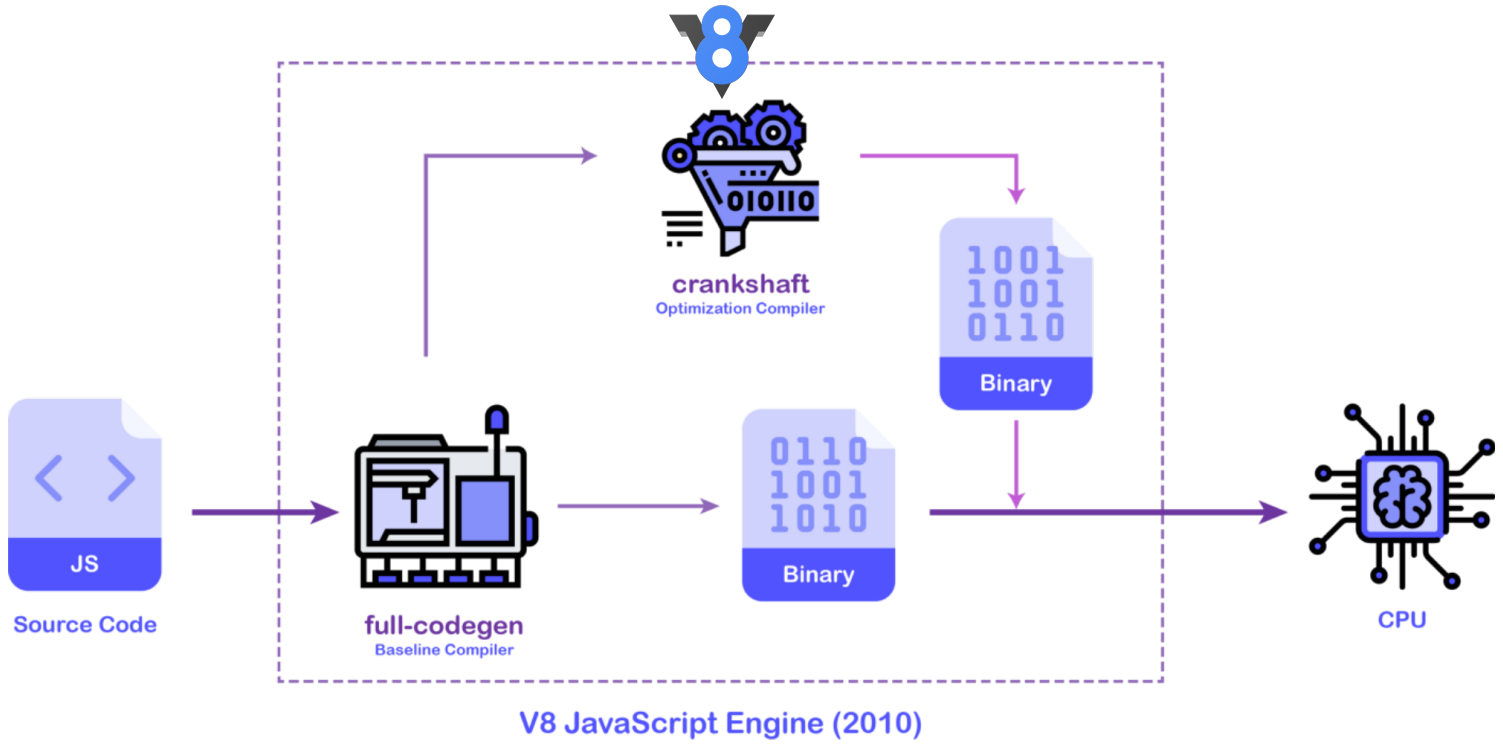
 **= Chakra**

 **= SpiderMonkey**

 **= JavaScriptCore**

Chrome V8

A JavaScript engine **executes** JavaScript code



Let's take a look

at JavaScript **runtime execution**
inside the browser

Execution Context

Everything in JavaScript happens
inside an execution context

Three fundamental parts of the JavaScript engine...

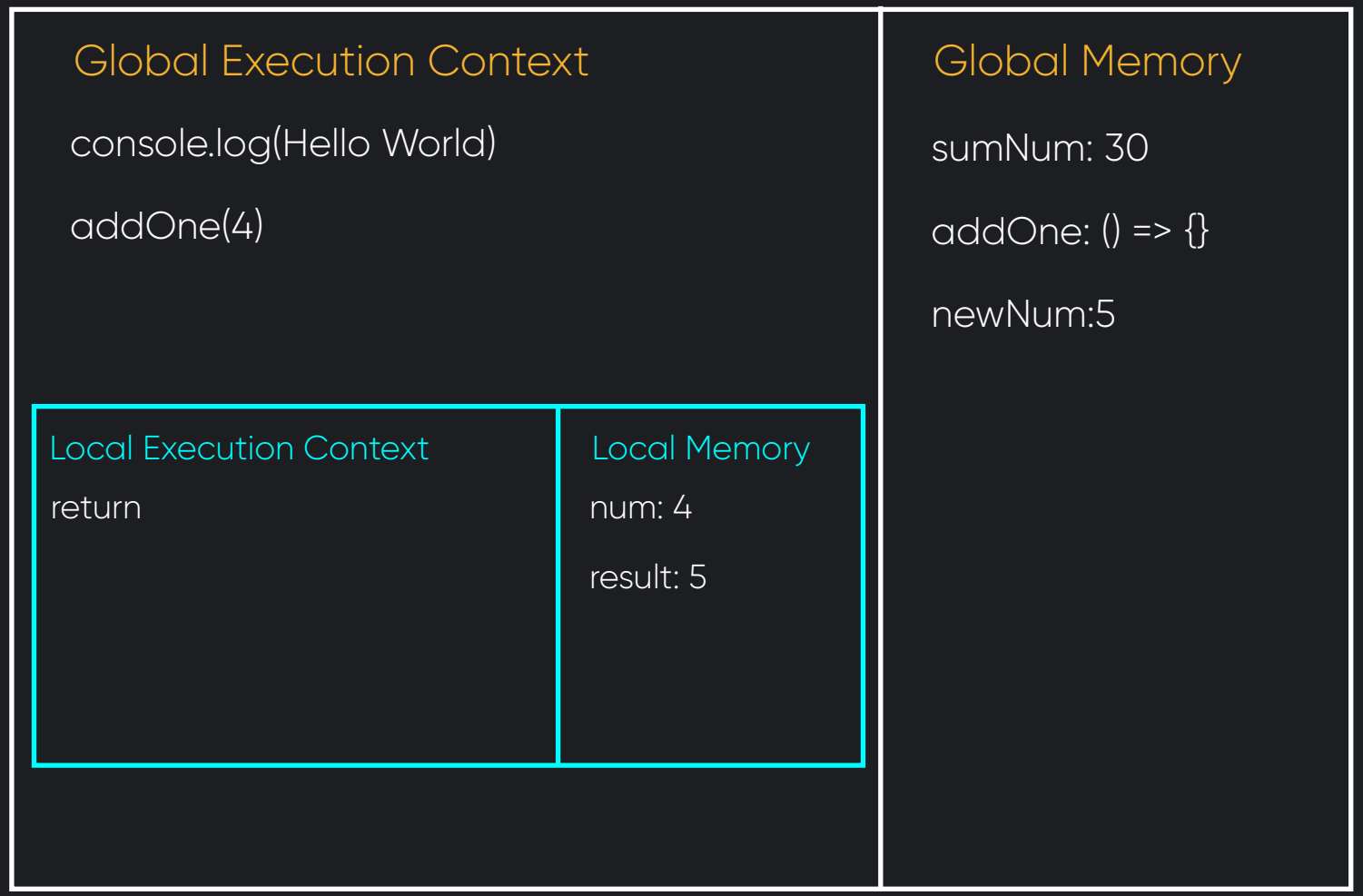
- Execution context
- Memory environment
- Thread of execution

[Javascript execution context video]

What about functions...

...in the execution context?

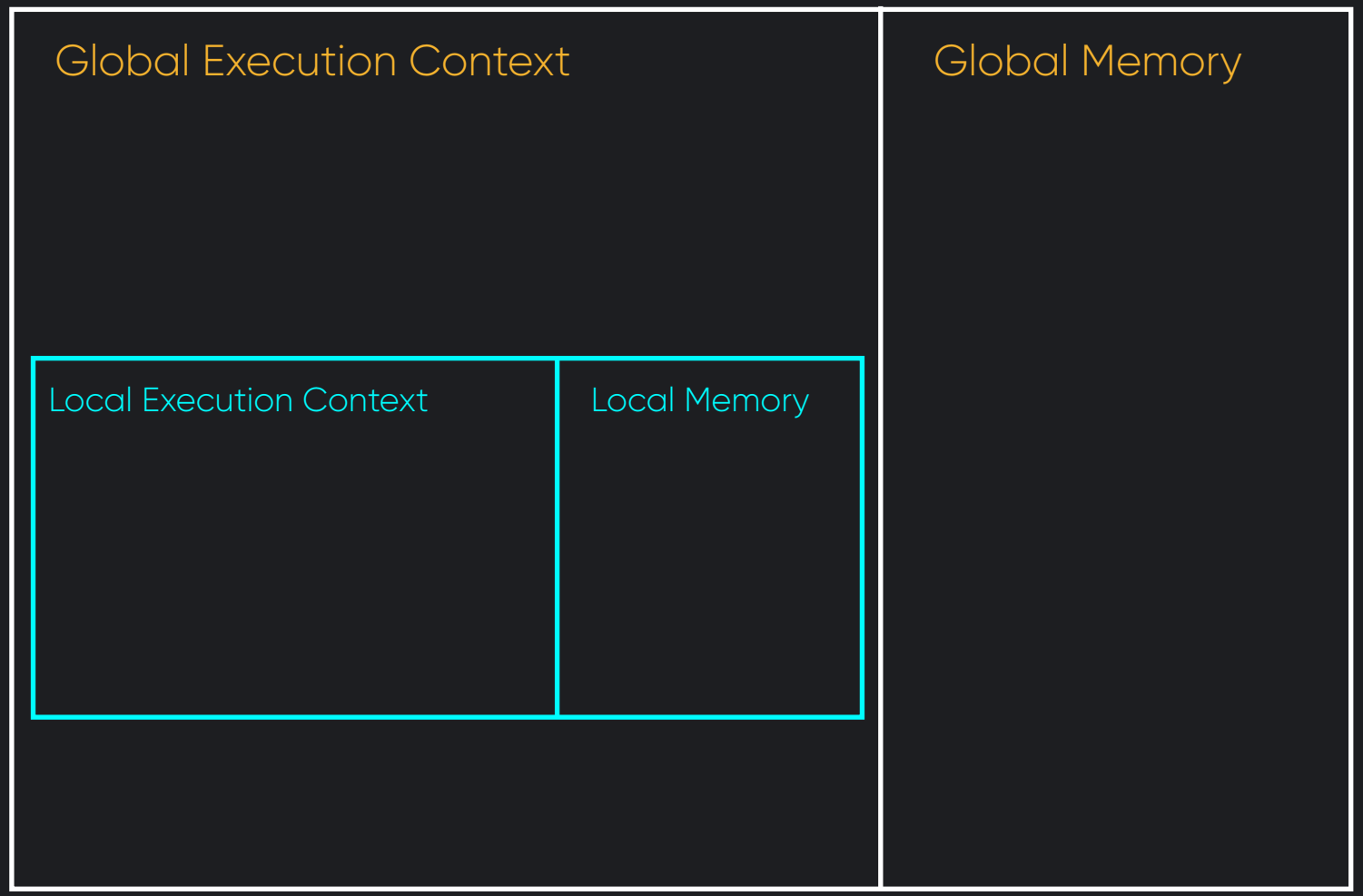
```
const sumNum = 30;

const addOne = (num) => {
    const result = num + 1;
    return result;
};

console.log('Hello World');
const newNum = addOne(4);
```



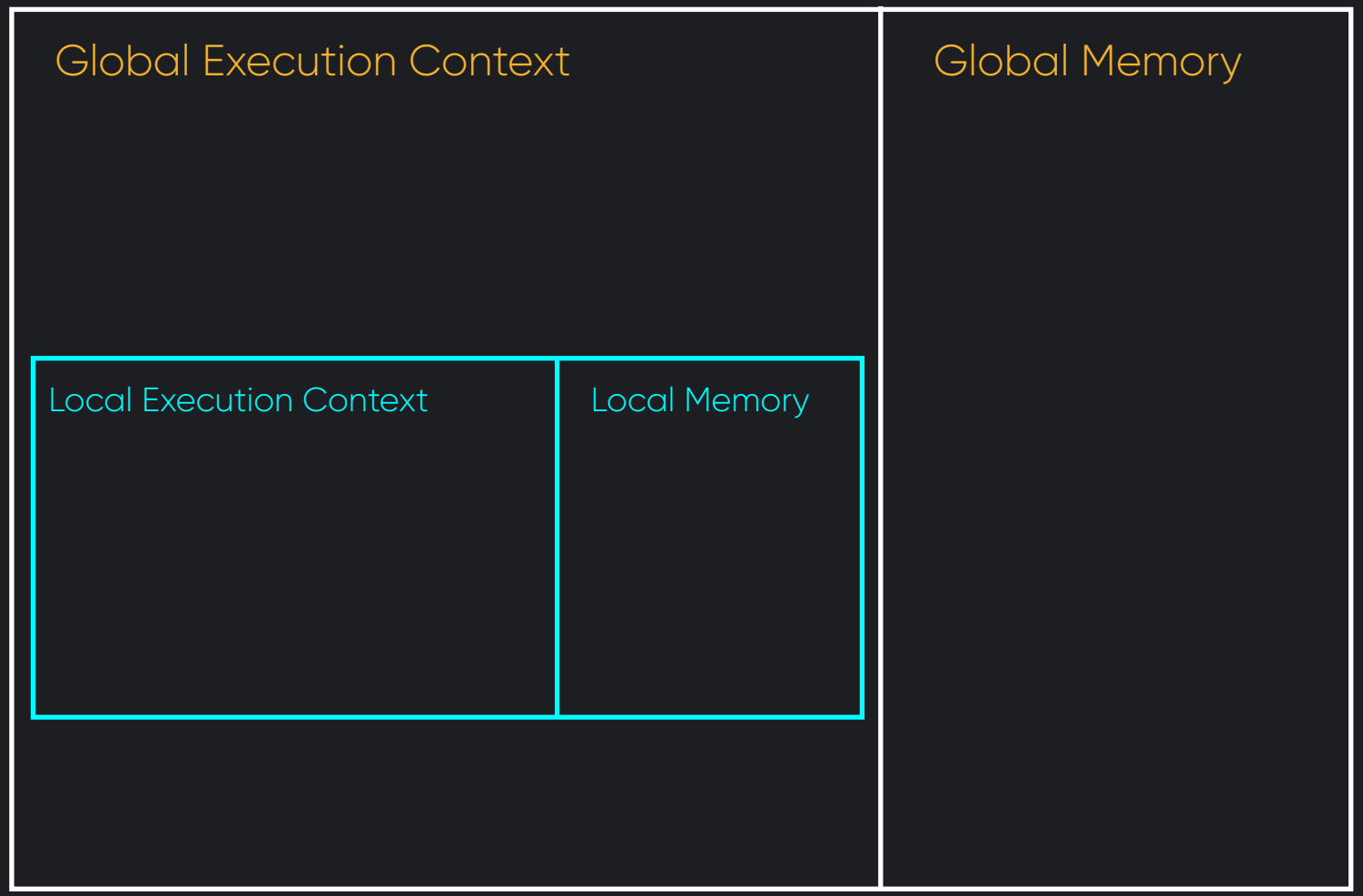
```
const first = 'Hello';
const second = 'Dave';
const allTogether = `${first} ${second}`;


console.log(allTogether);
```

```
const words = ['hello', 'world'];

const second = words[1];

let name = 'Dave';
name = 'Bob';

const greet = () => {
    return 'Hello';
};
```

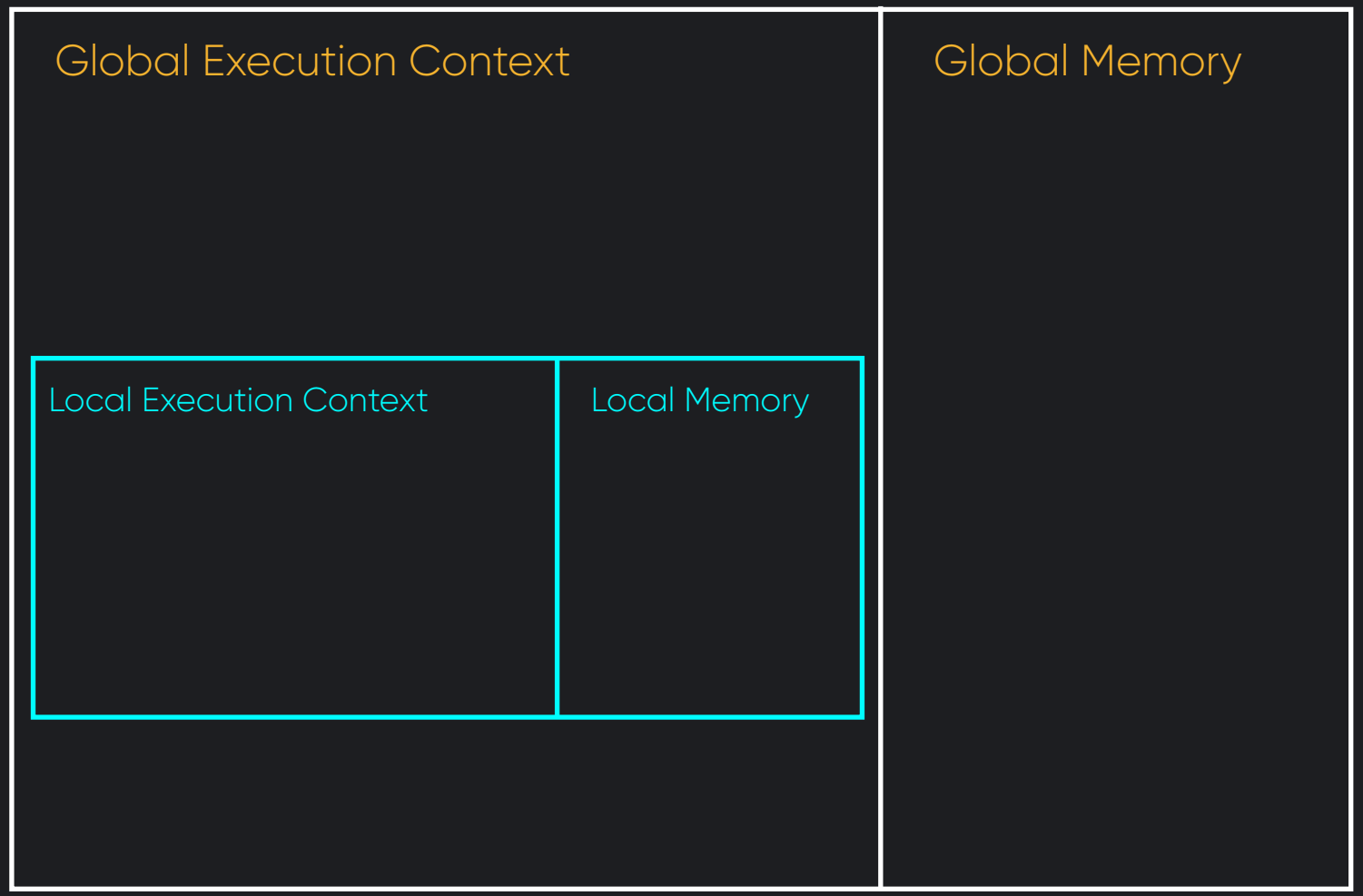
```
let name = 'Dave';

const greet = (person) => {
    return `Hello ${person}`;
};

console.log('I like pizza');
const result = greet(name);

console.log(result);
```



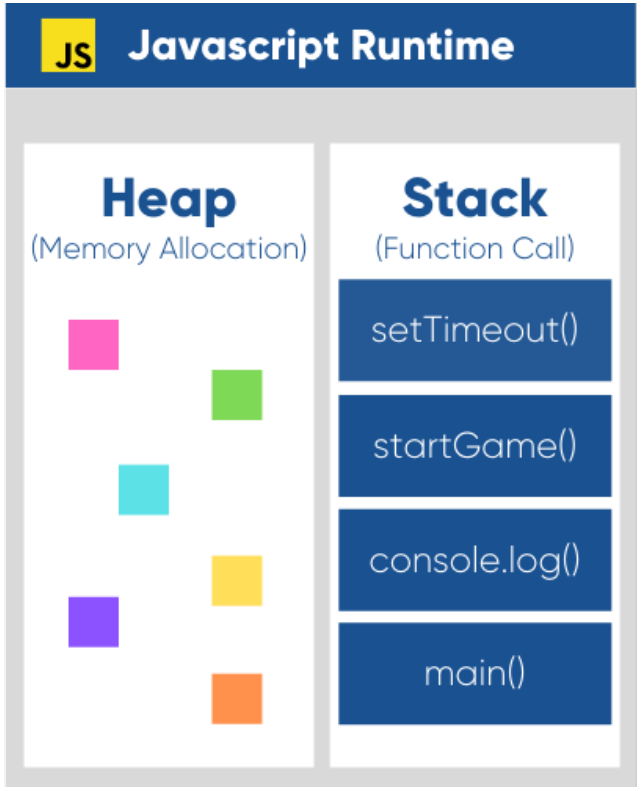
```
const multiply = (num1, num2) => {
    const result = num1 * num2;
};

const newNum = multiply(2, 3);

console.log(newNum);
```



```
let name = 'John';

function subtract(num1) {
    return num1 - 4;
}

console.log(name);
const result = subtract(4);

console.log(result);
```



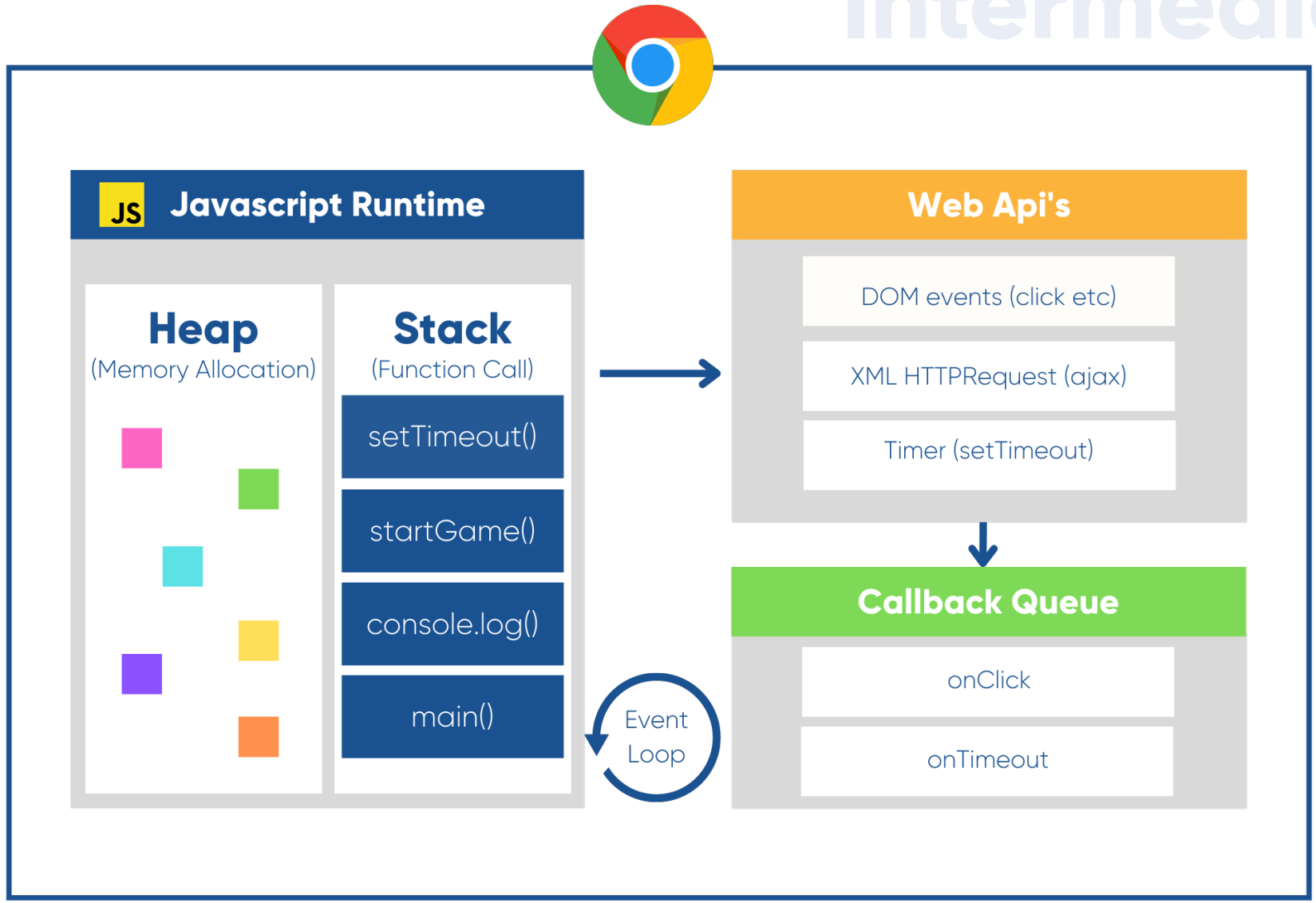
The Memory Heap and Call Stack



The call **stack** is **responsible for keeping the flow of execution** for our application. Without it, JavaScript wouldn't know what to call or when.

The **heap** is responsible for storing our data. This is where the **memory allocation** happens.

...Let's take a closer look at what happens in the browser


Javascript Runtime
Heap
(Memory Allocation)
Stack
(Function Call)
setTimeout()
startGame()
console.log()
main()
Event Loop
Web Api's
DOM events (click etc)
XML HTTPRequest (ajax)
Timer (setTimeout)
Callback Queue
onClick
onTimeout

JavaScript...

...is always synchronous and
single-threaded

...but what about pieces of code that take time to execute?

Asynchronous functions

... such as setTimeout() are provided by browser webAPI's

... we'll look at asynchronous functions in more detail later

[Javascript engine operation video]

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