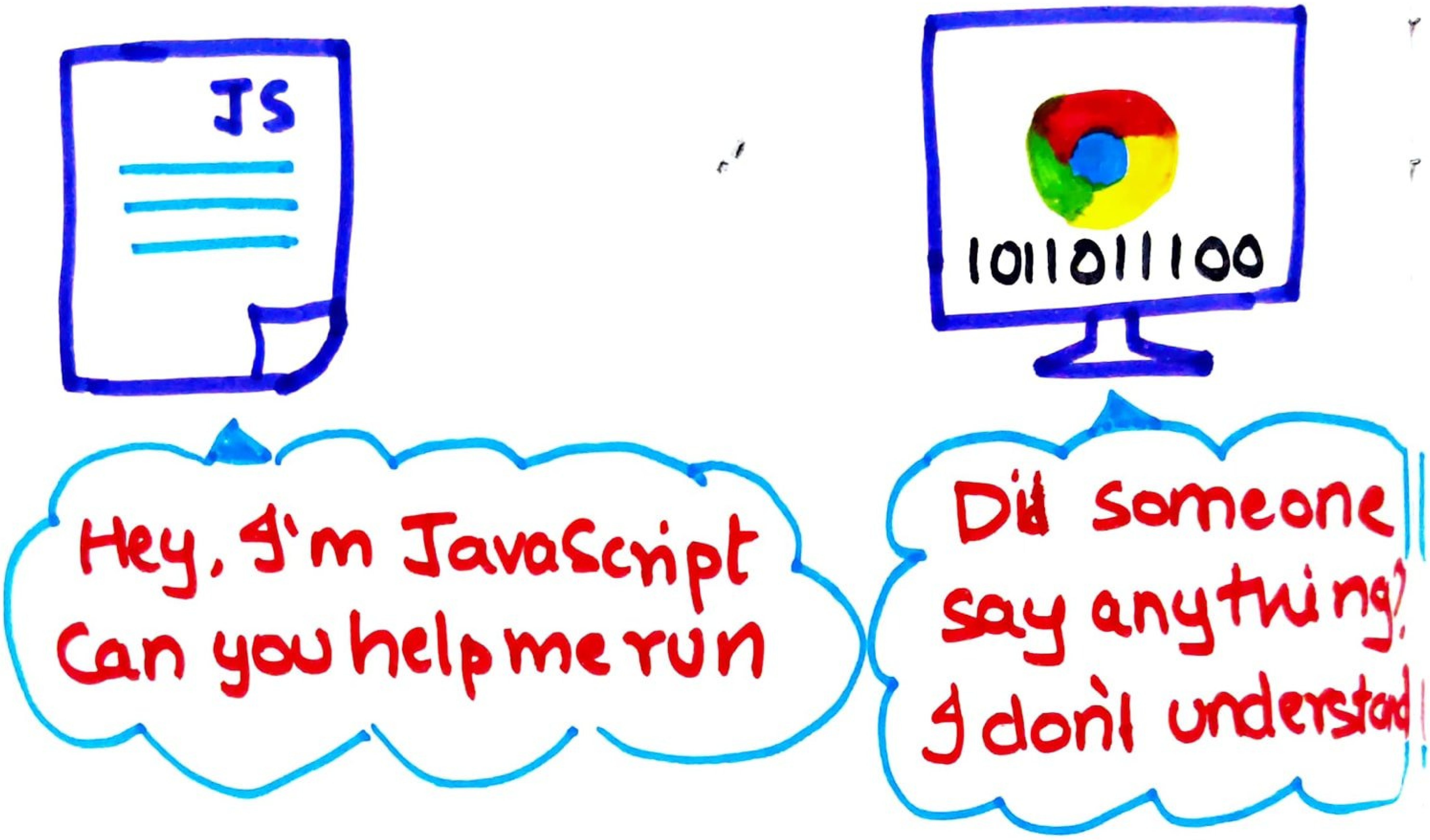
JavaScript Engine


JS
1011011100
Hey, I'm JavaScript Can you help me run
Did someone say anything? I don't understand!

Okay... So the browser dosen't understand JavaScript.

What it understands is bits (1's and 0's)

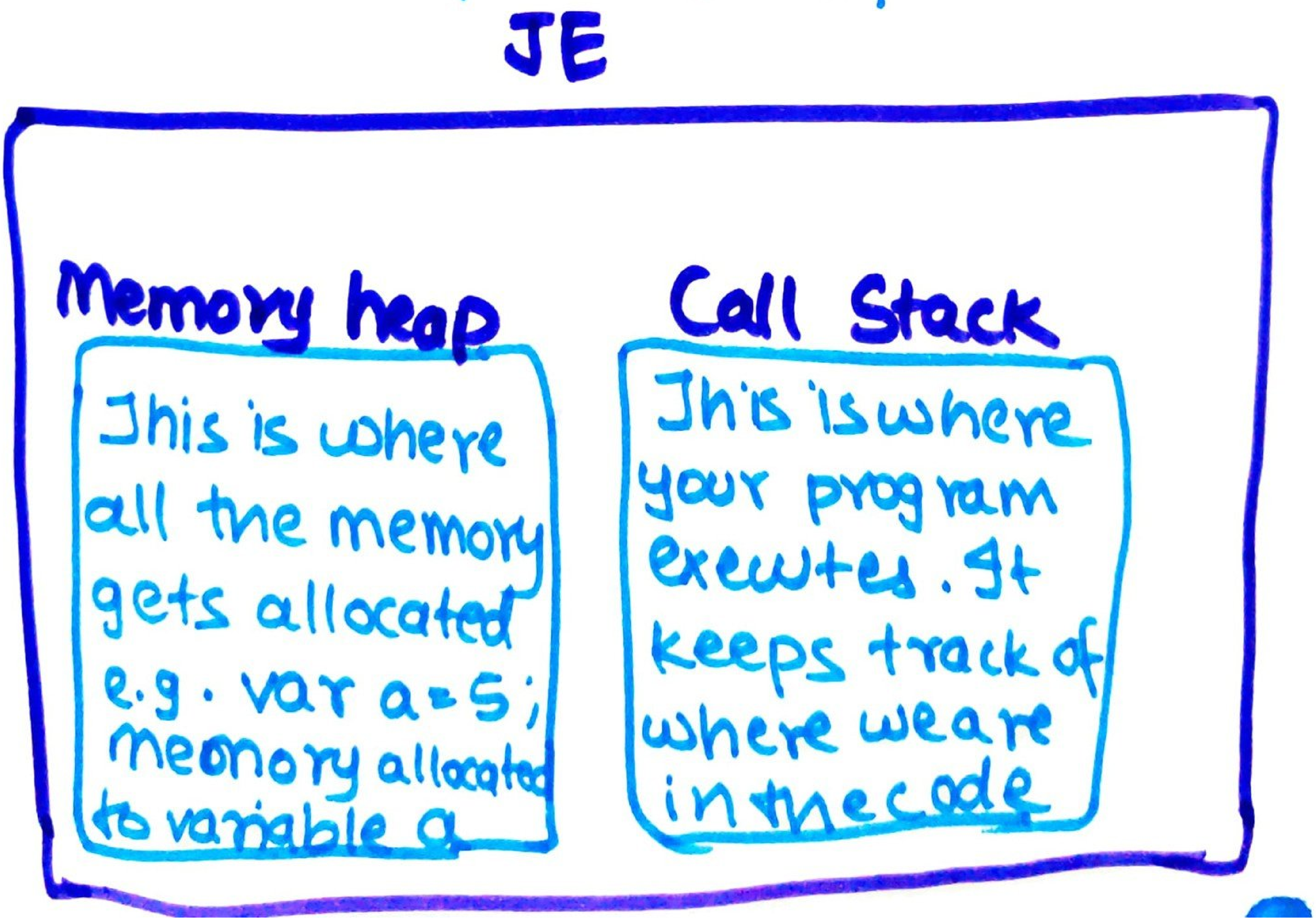
Who can help us here?

Yes!! The JavaScript Engine

There are a lot of JavaScript Engines out there written by really smart people!

For example :- V8 engine is written in C++ (Yes they're programmed too and can be in a different language)

Okay, so what's inside this JavaScript Engine?



This is where all the memory gets allocated e.g. var a=5; memory allocated to variable a

This is where your program executes. It keeps track of where we are in the code

So ever heard of a memory leak?

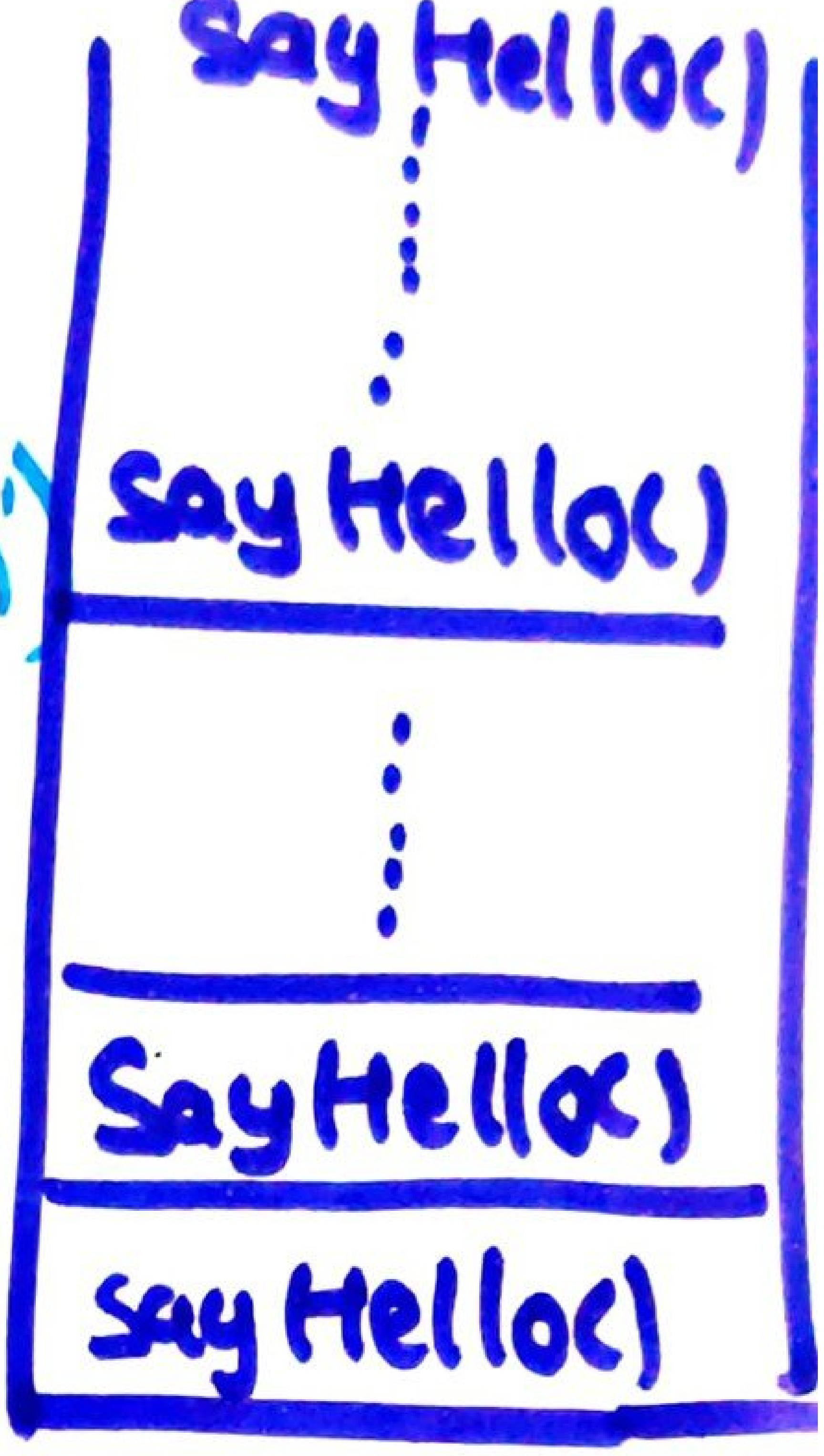
A memory heap has limited space. When you have too much of unused memory that you dont free up the space gets filled.

No wonder, global variables are bad (They remain throughout the execution of the code)

You must've heard of stack overflow!!

Well that's when your call Stack overflows as it also has limited space.

```
function SayHello()
{
    console.log('Simran')
     SayHello();
}
```



Well that went into an infinite recursion and we have stack overflow

JavaScript is a single threaded language?

Well that means it has only ONE CALL STACK and therefore it can only execute one task at a time

Okay But why single threaded?

It's quite easy and no complications

Okay... Wait! I've heard of asynchronous programming. If JavaScript can do that, how is it single threaded?

Let's take an example!

```
setTimeout(()=>{
      console.log("setTimeout is asyn
  },2000) → wait for 2 second
```

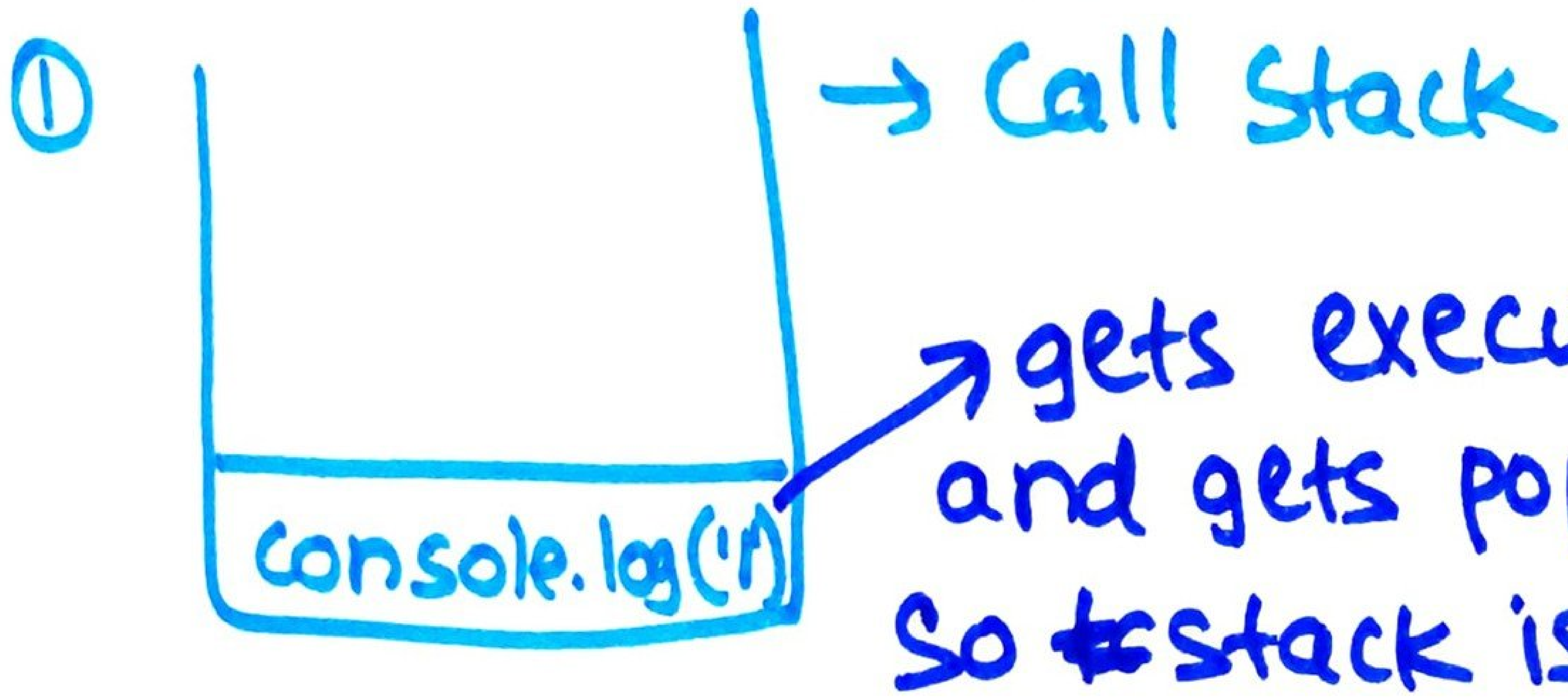
setTimeOut is given to us by Web APIs (It gives us various APIs) It's technically not a part of JavaScript.

```
console.log('1')
setTimeout(() => {
    console.log('2');
}
console.log('3');
```

Output : 1
3
2

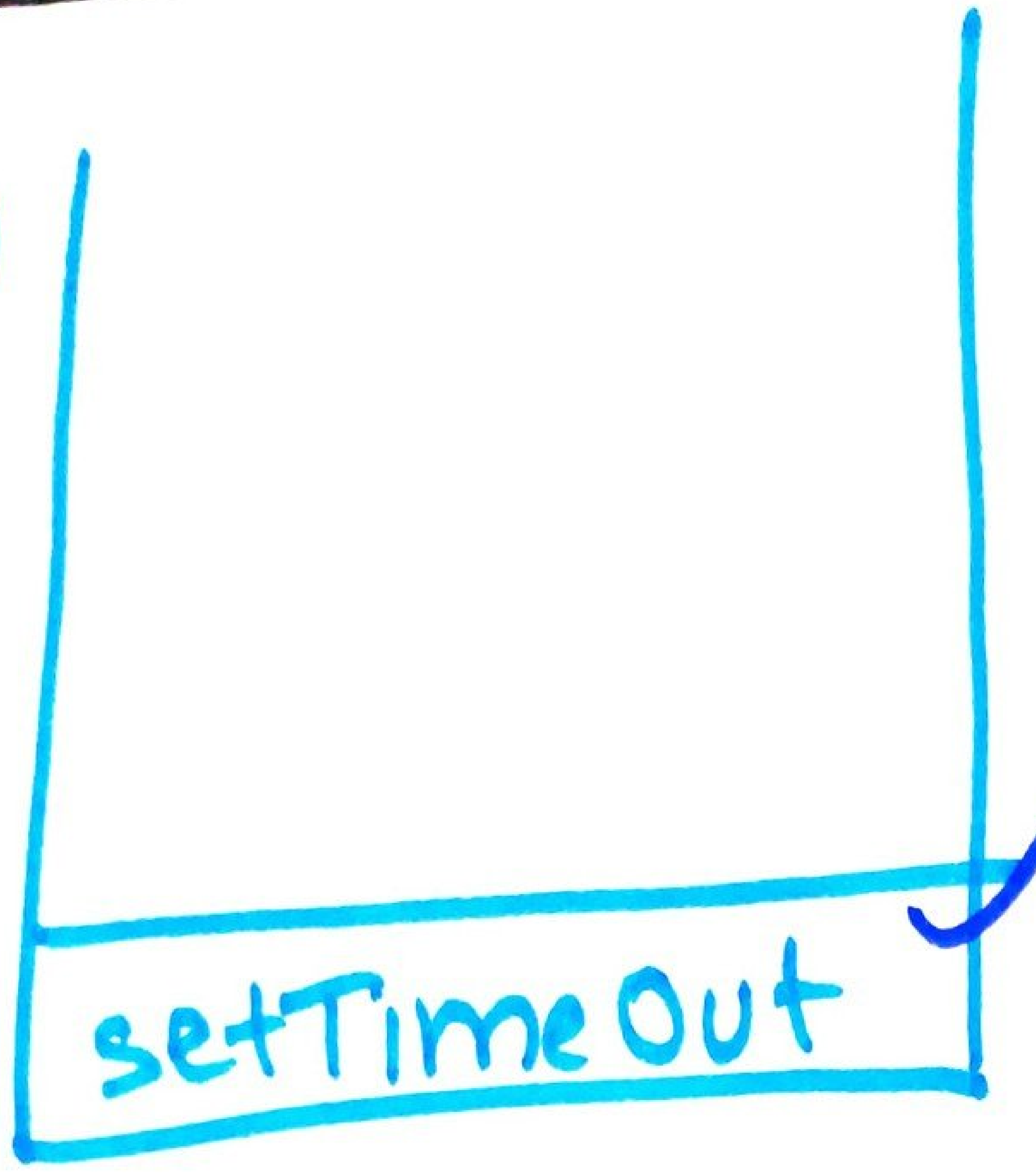
[since setTimeout waits for 2 secs it's printed in the end]

Behind the scenes



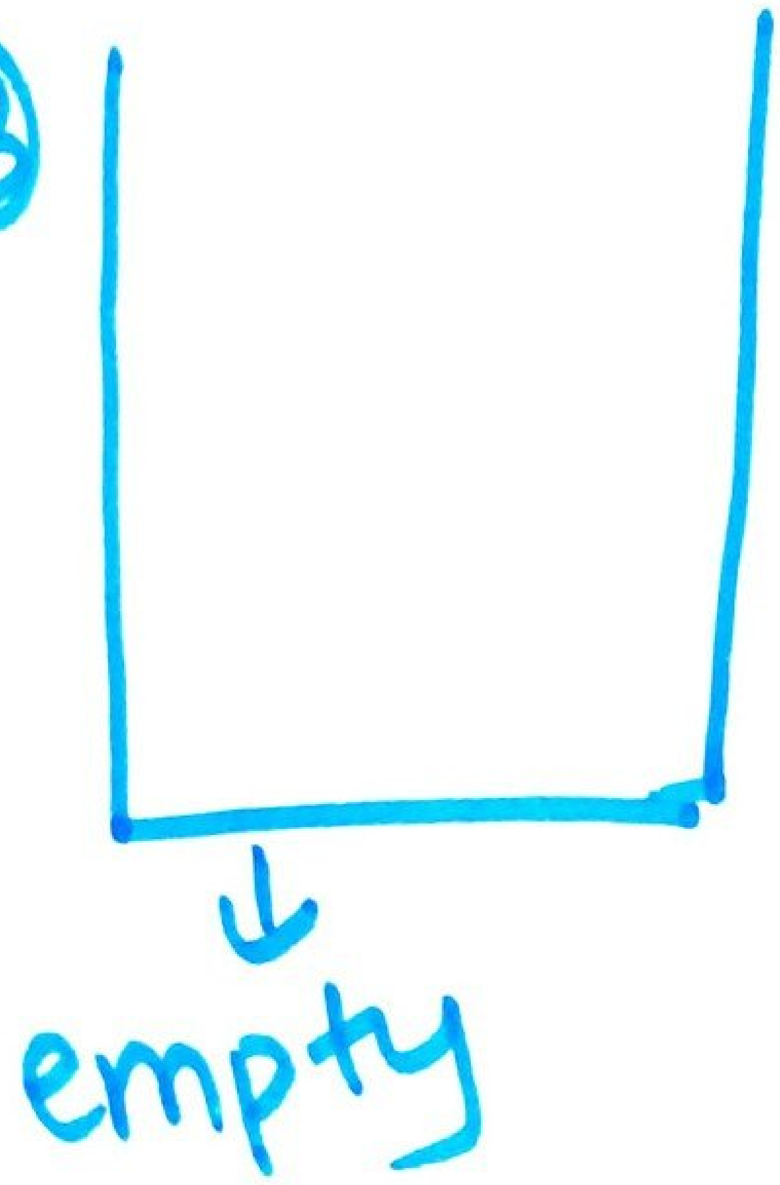
gets executed and gets popped So ~~t~~ stack is now empty and output is 1

②



OH! this is given by the web API Let me send it to web API

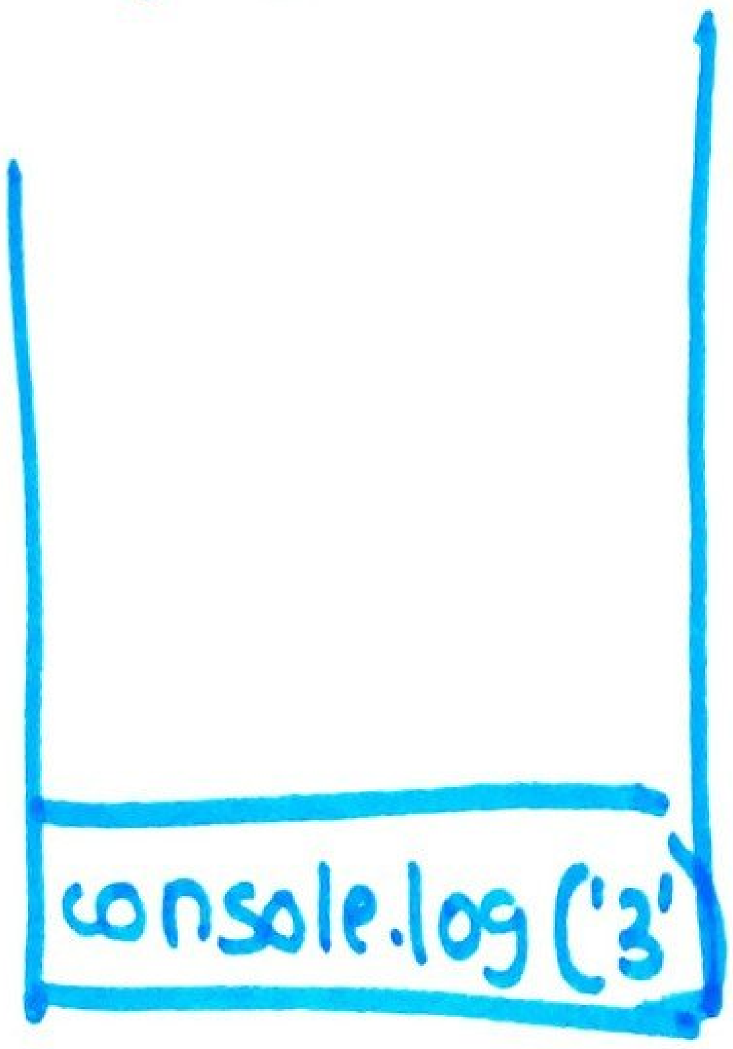
③



Web API

I've setTimeout with me and I should execute it after 2 seconds

④



> Output will print 3

So far
1
3

Web API is still waiting

⑤ After 2 seconds are over

WEB API ← On its console.log()

that should be executed.

This is basically a callback that is executed after 2 secs.

WEB API will send this to callback Queue saying there's a callback please proceed.

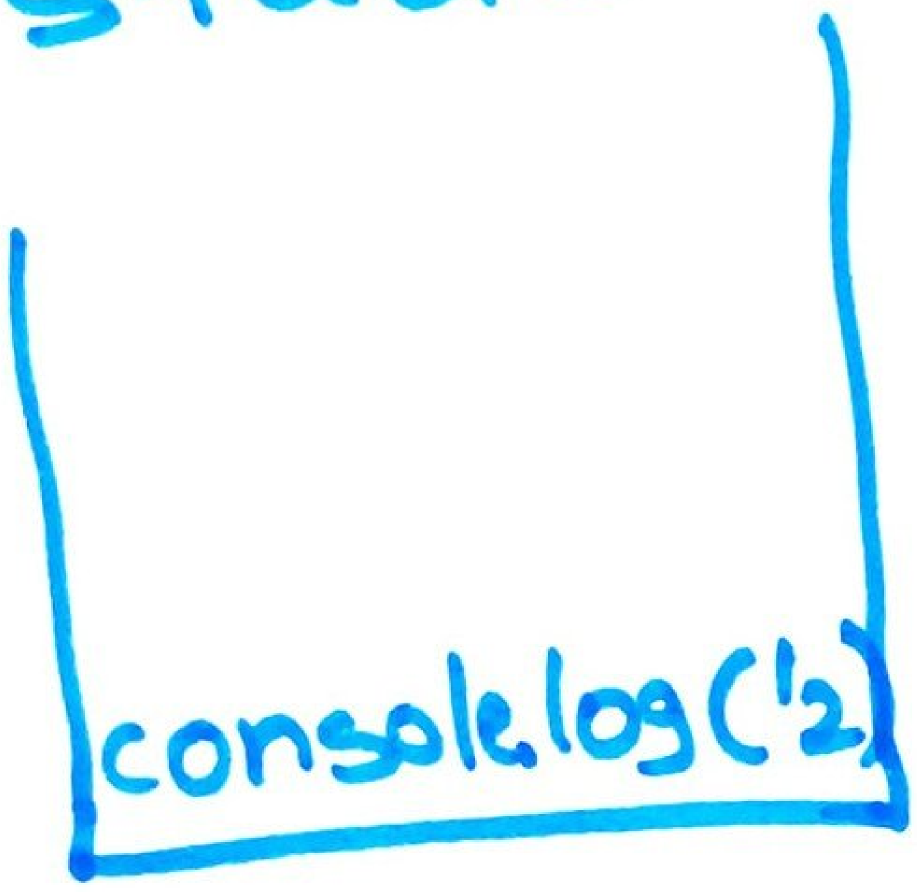
callback1	callback2	....

callback queue

This queue basically keeps track of all callbacks that need to be executed.

Now, there's something called as <u>event loops</u> which <u>keeps checking if stack is empty</u>

Well now it's empty so the event loop will take a callback from callback quewe and put it in the stack


console.log('2)

> prints 2

So finally we have

1

3

2

Recap of setTimeOut

① Pushed to stack → ② Passed to WEP API

④ Pushes callback ← ③ waits for 2 seconds

to callback queue → ⑤ Event Loop ckeck if stack empty and pushes to stack