JavaScript Engine

A JavaScript engine is a computer program that executes JavaScript code. It's responsible for translating human-readable JavaScript code into machine-readable instructions that the computer's hardware can execute.

Interpreter vs Compiler

Both compilers and interpreters are used to convert a program written in a high-level language into machine code understood by computers. But, there are differences between how an interpreter and a compiler works

-Interpreter

- Translates program one statement at a time.
- Interpreters usually take less amount of time to analyze the source code. However, the overall execution time is comparatively slower than compilers.

-Compiler

- Scans the entire program and translates it as a whole into machine code.
- Compilers usually take a large amount of time to analyze the source code. However, the overall execution time is comparatively faster than interpreters.

The modern JS engine now use a mix of interpreter and compiler which is known as JIT (just in time compiler)

In JIT compilation, the entire code is converted into machine code at once and then executed immediately.

JIT compiler process

1- parse the code

During this parsing process, the code is parsed into a data structure called the AST (Abstract Syntax Tree). This works by first splitting up each line of code into pieces that are meaningful to the language , and then saving all these pieces into the tree in a structured way.

This step also checks if there are any syntax errors. The resulting tree will later be used to generate the machine code.

2- compilation

The engine takes the AST and compiles it to machine code, then, this machine code gets executed immediately because its using JIT.

-Any JS engine always contains a call stack and a heap.

The call stack is where our code gets executed with the help of the execution context. And the heap is an unstructured memory pool that stores all the objects in the memory that every application needs.

Dom Tree

The Document Object Model (DOM) is a JS method that represents the page we see in the web browser and provides us with an API to interact with it.

Web Browser constructs the Dom when it loads an HTML document , and structures all the elements in a tree-like representation , JS can access the DOM to dynamically change the content , structure , and style of a web page.

Prompt vs Alert vs Confirm (JS Popup boxes)

Prompt Box

A prompt box is often used if you want the user to input a value before entering a page. When a prompt box pops up, the user will have to click either "OK" or "Cancel" to proceed after entering an input value. If the user clicks "OK" the box returns the input value. If the user clicks "Cancel" the box returns null

Alert Box

An alert box is often used if you want to make sure information comes through to the user. When an alert box pops up, the user will have to click "OK" to proceed.

Confirm Box

A confirm box is often used if you want the user to verify or accept something. When a confirm box pops up, the user will have to click either "OK" or "Cancel" to proceed. If the user clicks "OK", the box returns true. If the user clicks "Cancel", the box returns false.