JavaScript Complete Guide - Section 01: Introduction

What is JavaScript?

JavaScript (JS) is a high-level, interpreted programming language

that is one of the core technologies of the World Wide Web, alongside HTML and CSS.

- Created by Brendan Eich in 1995 at Netscape.

- Standardized under ECMAScript (ES).

Key Features:

- Interpreted & Just-in-Time Compiled

- Dynamic Typing & Weak Typing

- Prototype-Based OOP

- First-Class Functions

- Asynchronous by Nature

Example:

```
console.log("Hello, JavaScript!");
```

How JavaScript is Executed?

JavaScript is executed in JavaScript Engines embedded inside browsers (V8, SpiderMonkey).

Steps of Execution:

1. Parsing -> AST

2. Compilation -> Bytecode / Optimized Code

3. Execution -> Machine Code

4. Garbage Collection

Example:

```
function greet(name) {
  return `Hello, ${name}`;
}
```

```
console.log(greet("Deepraj"));
```

Dynamic vs Weakly Typed

JavaScript is dynamically typed, meaning variable types are decided at runtime.

Example:
```
let x = 42;
x = "Hello JS"; // Allowed
```

JavaScript is weakly typed, meaning coercion happens automatically.

```
console.log(5 + "5");  // "55"
console.log("5" * 2);  // 10
```

JavaScript Host Environment

JavaScript does not run alone - it requires a host environment like a browser or Node.js.

Browser Environment:
- Provides APIs: document, window, fetch

Node.js Environment:
- Provides APIs: fs, http, os, process

Example (Browser):
```
document.getElementById("demo").innerText = "Hello, Browser!";
```

Example (Node.js):
```
const fs = require("fs");
fs.writeFileSync("hello.txt", "Hello Node.js");
```