





Error and Debugging::




8.1 Types of Errors

1

Syntax Error

2

Logical Error

3

Run-Time Error

1. **Syntax Error:** An error in the code's structure, causing it to not compile or run (e.g., missing semicolon).
2. **Logical Error:** The code runs but produces incorrect results due to faulty logic (e.g., wrong formula).
3. **Runtime Error:** An error that occurs while the program is running, often due to invalid operations




8.2 Syntax Errors

```
// Missing parenthesis in function call
console.log("Hello, world");

// Unclosed string literal
let message = "Welcome to Node.js; ~

// Improper use of reserved keywords
let new = 5;

// Incorrect variable declaration (const needs an initial value)
const myVar;
```



8.3 Runtime Errors

```
Error [ERR_HTTP_HEADERS_SENT]: Cannot set headers after they are sent to the client
    at ServerResponse.setHeader (node:http_outgoing:699:11)
    at IncomingMessage.<anonymous> (/Users/prashantjain/workspace/Test Project/node/app.js:44:11)
    at IncomingMessage.emit (node:events:532:35)
    at endReadableNT (node:internal/streams/readable:1696:12)
    at process.processTicksAndRejections (node:internal/process/task_queues:82:21) {
  code: 'ERR_HTTP_HEADERS_SENT'
}

// Reference Error (x is not defined)
console.log(x);

// Type Error (num is not a function)
let num = 10;
num();

// Invalid JSON parse (SyntaxError)
let jsonString = "{ name: 'John' }"; // Invalid JSON (single quotes)
JSON.parse(jsonString);

// File not found error (fs module)
const fs = require('fs');
fs.readFileSync('nonexistentFile.txt'); // Throws Error: ENOENT (file not found)
```

8.4 Logical Errors

```

let x = 5;
if (x = 10) { // Assignment instead of comparison
  console.log("x is 10"); // Incorrectly prints this
}

let arr = [1, 2, 3, 4, 5];
for (let i = 0; i <= arr.length; i++) {
  console.log(arr[i]); // Prints undefined at the end of the loop
}

let num = "10";
console.log(num + 5); // Expected result: 15, prints 105

```

8.5 Using the Debugger

Step 1

Go Run Terminal Window Help

Start Debugging F5

Run Without Debugging ^F5

Step 2

Select debugger

- Node.js
- VS Code Extension Development
- Web App (Chrome)
- Web App (Edge)
- Install an extension for JavaScript...

Step 3: Put a breakpoint

```

1 let x = 5;
2 if (x = 10) { // Assignment instead of comparison
3   console.log("x is 10"); // Incorrectly prints this
4 }
5

```

8.5 Using the Debugger

Step 4: Use the tools

Step 5: Hover

```

(5) [1, 2, 3, 4, 5]
0 = 1
1 = 2
2 = 3
3 = 4
4 = 5
length = 5
> [[Prototype]] = Array(0)
> [[Prototype]] = Object
Hold Option key to switch to editor language hover
let arr = [1, 2, 3, 4, 5];
for (let i = 0; i <= arr.length; i++) {
  console.log(arr[i]); // Prints undefined
}

```

Step 6: Debug Panel

RUN AND D... No Configur...

VARIABLES

- Block
 - > this = Object
- Local
 - ...dirname = "/Users/prashantjain/..."
 - ...filename = "/Users/prashantjain/..."
 - > arr = (5) [1, 2, 3, 4, 5]
 - > exports = {}
 - > module = Module {id: "...", path: "...", require = f require(path) {
 - > require = f require(path) {
 - x = 10
- Global

CALL STACK

- Launch Program: test2.js... PAUSED
- <anonymous> node/test2.js (7:14)
- Show 8 More: Skipped by skipfiles

LOADED SCRIPTS

- App.jsx react/test2/src
- test2.js node

BREAKPOINTS

- Caught Exceptions
- Uncaught Exceptions



8.5 Using the Debugger

Step 7: Using Debug Console

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

/opt/homebrew/bin/node ./node/test2.js
→ x
  10
→ x++
  10
→ x === 15
  false
>
```



8.6 Debugger with Async Code

```
31 console.log("Here");
32 req.on("end", () => {
33   const parsedBody = Buffer.concat(body).toString();
34   console.log(parsedBody);
35   const params = new URLSearchParams(parsedBody);
36   const jsonObject = {};
37   for (const [key, value] of params.entries()) {
38     jsonObject[key] = value;
39   }
40   const jsonString = JSON.stringify(jsonObject);
41   console.log(jsonString);
42   // Async Operation
43   fs.writeFile("user-details.txt", jsonString, error => {
44     res.setHeader("Location", "/");
45     res.statusCode = 302;
46     return res.end();
47   });
48 });
49 }
```



8.7 Restart Debug with nodemon



Run Terminal Window

Start Debugging
Run Without Debugging
Stop Debugging
Restart Debugging

Open Configurations
Add Configuration...

Step Over
Step Into

```
{
  "version": "0.2.0",
  "configurations": [
    {
      "type": "node",
      "request": "launch",
      "name": "Launch Program",
      "skipFiles": [
        "<node_internals>/**"
      ],
      "program": "${workspaceFolder}/node/*.js",
      "restart": true,
      "runtimeExecutable": "nodemon",
      "console": "integratedTerminal"
    }
  ]
}
```