Node.js Documentation

Module 2: Node.js Platform Setup

- **Node REPL**

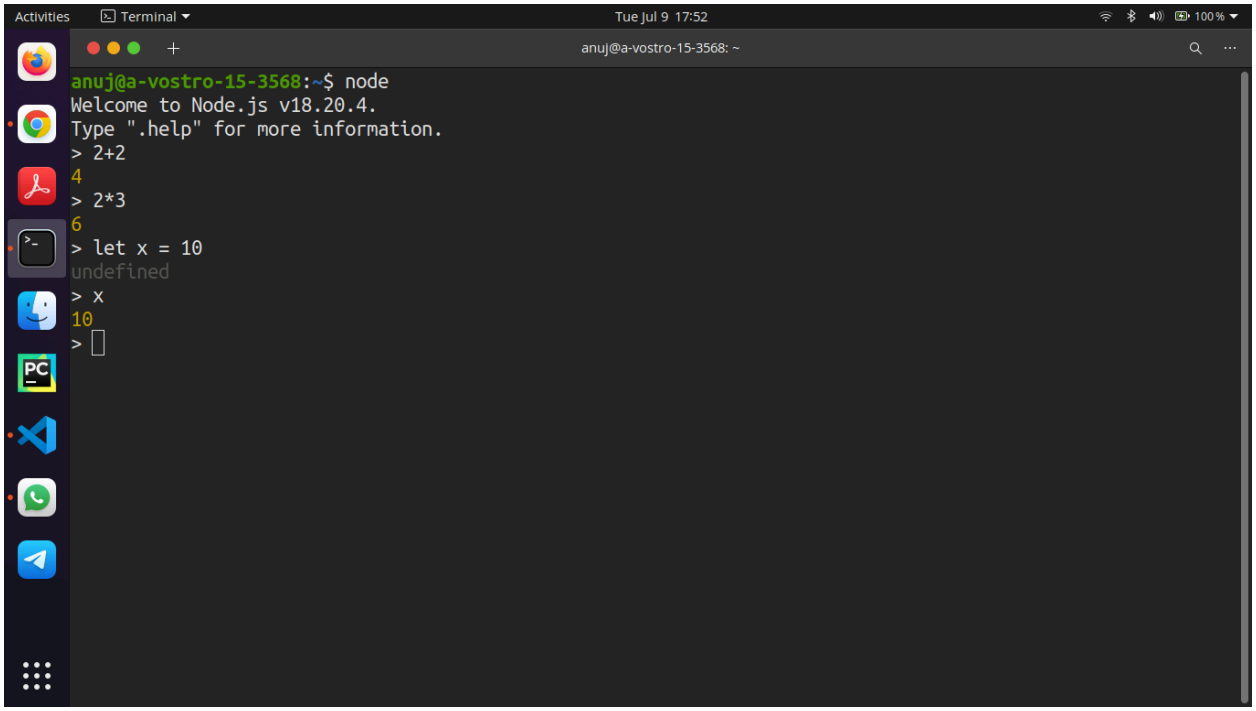
  The Node.js REPL (Read-Eval-Print Loop) is an interactive shell that allows you to enter JavaScript code and immediately see the results. It's a useful tool for testing and experimenting with Node.js code snippets in real-time.

  Starting the Node.js REPL

  To start the Node.js REPL, simply open your terminal or command prompt and type: node

  This will start the REPL, and you'll see a prompt (>) where you can start typing JavaScript code.

  Basic Operations in the REPL



- **Download and Install Node.js**

To download and install Node.js, follow these steps based on your operating system:

For Windows

1. **Download Node.js Installer:**
   - Go to the Node.js download page.
   - Click the Windows Installer button to download the `.msi` file.

2. **Run the Installer:**
   - Locate the downloaded `.msi` file and double-click to run it.
   - Follow the prompts in the Node.js Setup Wizard. Accept the license agreement and choose the installation options.
   - Make sure to check the box that says "Automatically install the necessary tools" (if available).
3. **Verify Installation:**

- Open Command Prompt (`cmd`) or PowerShell.
- Type the following commands to verify the installation: node -v
- npm -v

For macOS

1. **Download Node.js Installer:**
   - Go to the Node.js download page.
   - Click the macOS Installer button to download the `.pkg` file.

2. **Run the Installer:**
   - Locate the downloaded `.pkg` file and double-click to run it.
   - Follow the prompts in the Node.js Installer. Accept the license agreement and proceed with the installation.

3. **Verify Installation:**
   - Open Terminal.
   - Type the following commands to verify the installation: node -v
   - npm -v

- ## Import Required Modules

In Node.js, you can import required modules using the `require` function for CommonJS modules, which is the module system used by Node.js by default. Here's how you can import some commonly used modules:

Core Modules

```
const fs = require('fs'); // File system module
const http = require('http'); // HTTP module for creating web servers
const path = require('path'); // Path module for working with file and directory paths
```

const os = require('os'); // OS module for getting operating system-related utility methods and properties
const util = require('util'); // Utilities module

External Modules

External modules are installed via npm (Node Package Manager). For example, to use the `express` module, you first need to install it using npm:

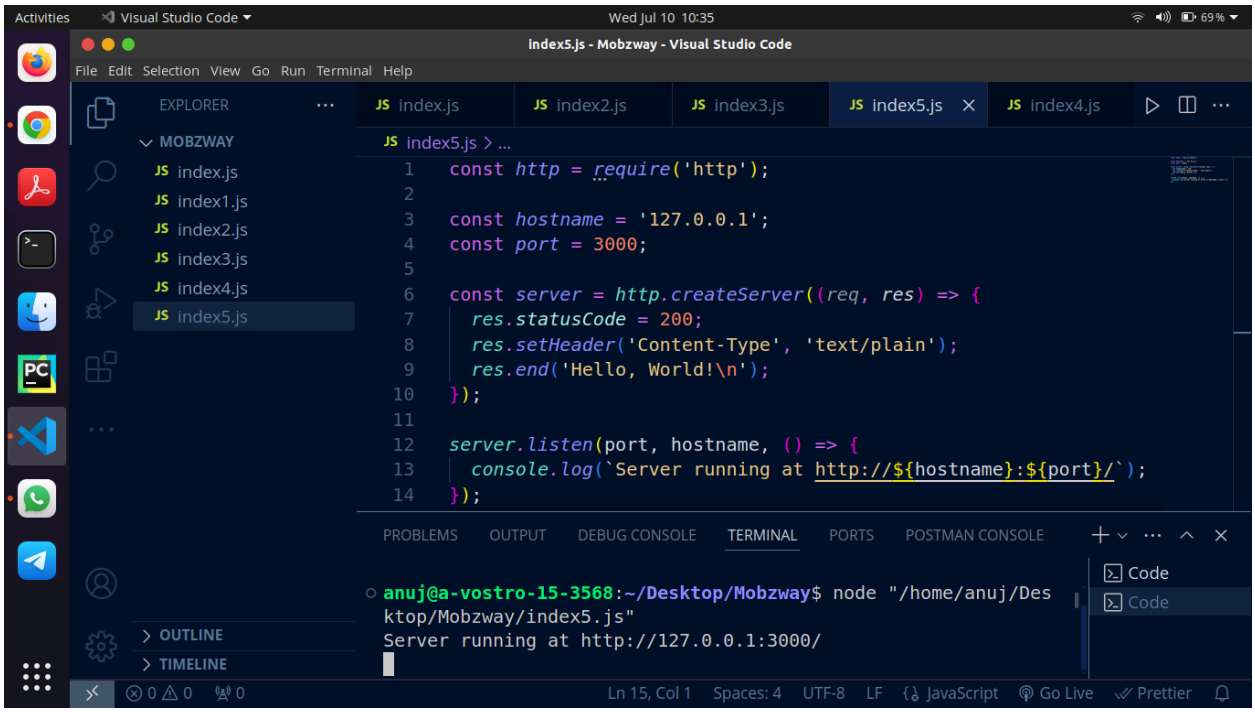
```
npm install express
```

Then, you can import it in your Node.js application.

- ## Creating Web Server

Creating a web server in Node.js is straightforward, I'll show you how to create a web server: using the built-in `http` module.

Using the `http` Module



let's break down this code step by step:

Importing the `http` Module

This will import the built-in `http` module, which provides the functionality to create an HTTP server.

Setting the Hostname and Port

Here, `hostname` is set to `'127.0.0.1'`, which is the loopback IP address (localhost). The `port` is set to `3000`. These are the address and port number where the server will listen for incoming requests.

Creating the Server

1. http.createServer((req, res) => { ... }): This function creates an HTTP server. It takes a callback function as an argument. This callback function is called every time a request is received by the server.

2. (req, res): The callback function takes two arguments:
   - `req`: An object representing the incoming request.
   - `res`: An object representing the response that will be sent to the client.

3. res.statusCode = 200;: This line sets the status code of the response to `200`, which means "OK".

4. res.setHeader('Content-Type', 'text/plain');: This line sets the `Content-Type` header of the response to `text/plain`. This tells the client that the response body is plain text.

5. res.end('Hello, World!\n');: This line ends the response and sends the string `'Hello, World!\n'` to the client.

Starting the Server

1. **server.listen(port, hostname, () => { ... })**: This method starts the server and makes it listen on the specified `port` and `hostname`.

2. **() => { ... }**: This is a callback function that is executed once the server starts successfully.

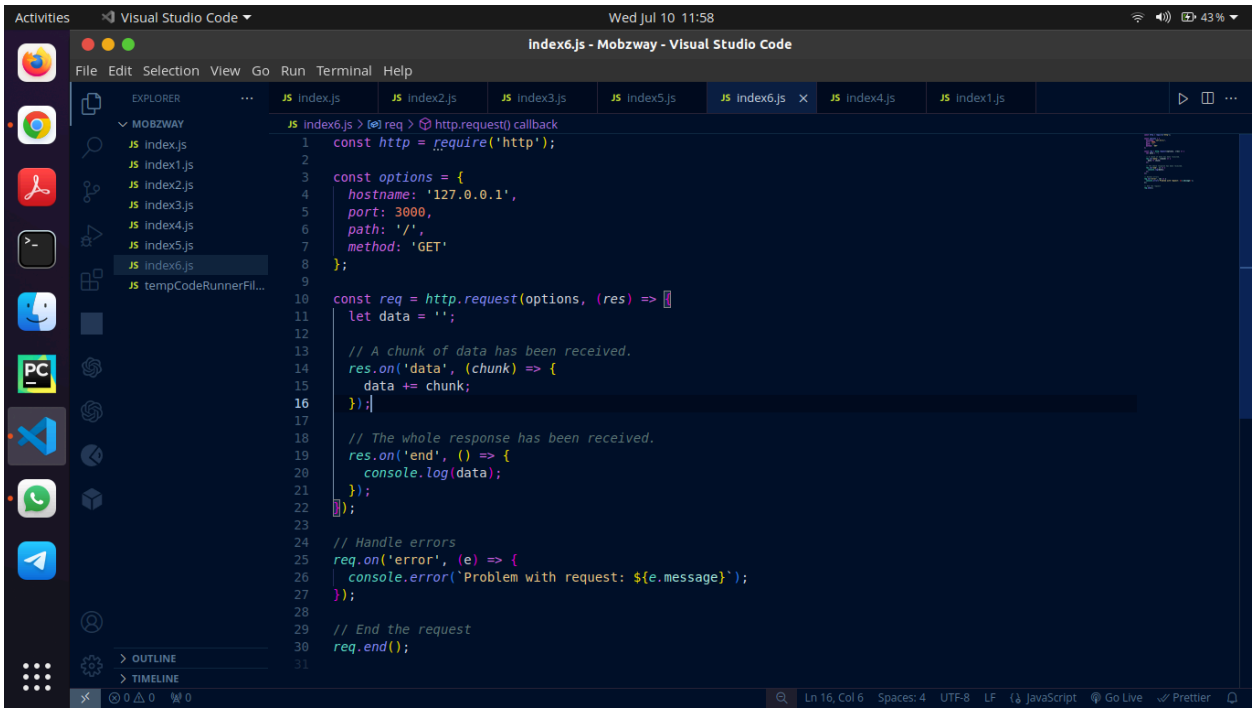
3. **console.log(`Server running at http://${hostname}:${port}/`);**: This line logs a message to the console, indicating that the server is running and providing the URL where it can be accessed.

- ## Sending Request

Here is the example of sending HTTP requests using http module in Node.js:

Using the Built-in `http` Module

Here's an example of how to send a GET request using the `http` module:



Setting Up Request Options

Here, an `options` object is created to specify the details of the HTTP request:

- `hostname`: The server address. In this case, it's the loopback IP address (localhost).
- `port`: The port number to connect to on the server.
- `path`: The URL path to request from the server.
- `method`: The HTTP method to use for the request (GET, in this case).

Making the Request

`http.request(options, callback)`: This function creates a new HTTP request using the provided `options` and a callback function that handles the response.

1. **Callback function `(res) => { ... }`**: This function is called when the server responds. It receives a `res` (response) object.
2. **`res.on('data', (chunk) => { ... })`**: This event listener handles the incoming data chunks. The data received is appended to the `data` variable.
3. **`res.on('end', () => { ... })`**: This event listener is called when the entire response has been received. It logs the complete response data to the console.

Handling Errors

`req.on('error', (callback))`: This event listener is called if there is an error with the request. It logs the error message to the console.

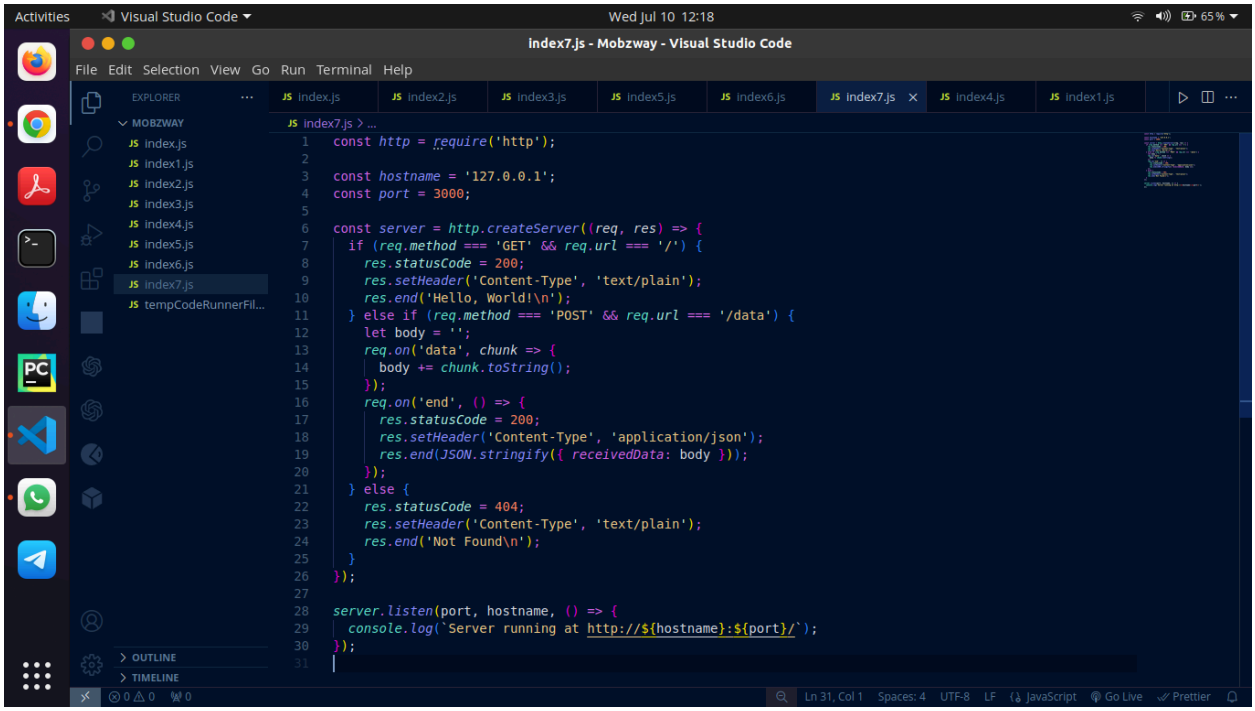
Ending the Request

`req.end()`: This function signals that the request has been completed and no more data will be sent. It is necessary to call `req.end()` to actually send the request.

- ## Handling HTTP requests

  Handling HTTP requests in Node.js typically involves creating a server that listens for incoming requests and responds appropriately. This can be done using the built-in `http` module.

  ### Using the Built-in `http` Module



  ### Handling GET Requests

  1. **Checking the Request Method and URL**: This `if` statement checks if the request method is `GET` and the request URL is `/`.
  2. **Setting the Status Code**: `res.statusCode = 200;` sets the HTTP status code of the response to `200`, which means "OK".
  3. **Setting the Header**: `res.setHeader('Content-Type', 'text/plain');` sets the `Content-Type` header of the response to `text/plain`, indicating that the response body is plain text.
  4. **Ending the Response**: `res.end('Hello, World!\n');` ends the response and sends the string `'Hello, World!\n'` to the client.

Handling POST Requests

Checking the Request Method and URL: This `else if` statement checks if the request method is `POST` and the request URL is `/data`.

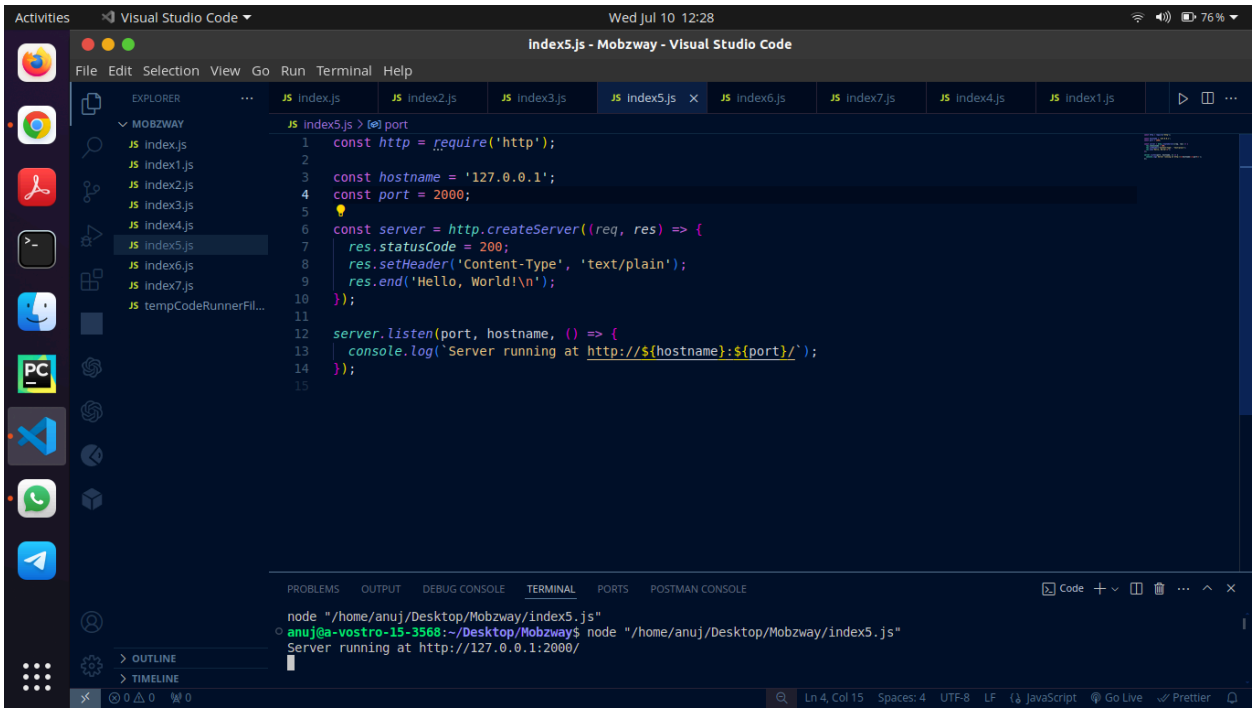
1. **Handling Incoming Data**:
    - `let body = '';` initializes an empty string to accumulate the incoming data chunks.

    - `req.on('data', chunk => { body += chunk.toString(); });` sets up an event listener for the `data` event, which is emitted when a chunk of data is received. The received chunk is converted to a string and appended to the `body` variable.
2. **Handling End of Data**:
    - `req.on('end', () => { ... });` sets up an event listener for the `end` event, which is emitted when all data has been received.
    - Inside the `end` event listener:
        - `res.statusCode = 200;` sets the HTTP status code of the response to `200`, indicating success.

        - `res.setHeader('Content-Type', 'application/json');` sets the `Content-Type` header to `application/json`, indicating that the response body is JSON.

        - `res.end(JSON.stringify({ receivedData: body }));` ends the response and sends a JSON string containing the received data back to the client.

- **Write your First Hello-World Program**



Explanation

1. **Import the `http` Module**: The first line imports the built-in `http` module, which is required to create an HTTP server.
2. **Define the Hostname and Port**: The `hostname` is set to `'127.0.0.1'` (localhost), and the `port` is set to `3000`.
3. **Create the HTTP Server**: The `http.createServer` function creates a new HTTP server. The server takes a callback function that is executed each time a request is received.
4. **Start the Server**: The `server.listen` function starts the server and makes it listen on the specified port and hostname. When the server starts, a message is logged to the console.

- **Deploy your node app on any platform like Heroku, Render and firebase**

Deploying on Heroku

1. **Install Heroku CLI:** If you haven't already, download and install the Heroku CLI.

2. **Login to Heroku:** Open your terminal and run: heroku login

3. **Prepare Your Application**: Ensure your `helloWorld.js` and `package.json` are in the same directory. Your `package.json` should look something like this:

   ```
   {
     "name": "hello-world",
     "version": "1.0.0",
     "main": "helloWorld.js",
     "scripts": {
       "start": "node helloWorld.js"
     }
   }
   ```

4. **Initialize a Git Repository**:

   ```
   git init
   git add .
   git commit -m "Initial commit"
   ```

5. **Create a Heroku App**:

   ```
   heroku create
   ```

6. **Deploy Your Code**:

   git push heroku master

7. **Open Your App**:

   heroku open