



Welcome to this session: Express.js

The session will start shortly...

Questions? Drop them in the chat.
We'll have dedicated moderators
answering questions.



Safeguarding & Welfare

We are committed to all our students and staff feeling safe and happy; we want to make sure there is always someone you can turn to if you are worried about anything.

If you are feeling upset or unsafe, are worried about a friend, student or family member, or you feel like something isn't right, speak to our safeguarding team:



Ian Wyles
Designated Safeguarding
Lead



Simone Botes



Nurhaan Snyman



Rafiq Manan



Ronald Munodawafa



Tevin Pitts

Scan to report a
safeguarding concern



or email the Designated
Safeguarding Lead:
Ian Wyles

safeguarding@hyperiondev.com

Skills Bootcamp Cloud Web Development

- The use of disrespectful language is prohibited in the questions, this is a supportive, learning environment for all - please engage accordingly. **(Fundamental British Values: Mutual Respect and Tolerance)**
- No question is daft or silly - **ask them!**
- There are **Q&A sessions** midway and at the end of the session, should you wish to ask any follow-up questions. Moderators are going to be answering questions as the session progresses as well.
- If you have any questions outside of this lecture, or that are not answered during this lecture, please do submit these for upcoming Academic Sessions. You can submit these questions here: **Questions**

Skills Bootcamp Cloud Web Development

- For all **non-academic questions**, please submit a query:
www.hyperiondev.com/support
- **Report a safeguarding incident:** **www.hyperiondev.com/safeguardreporting**
- We would love your feedback on lectures: Feedback on Lectures
- If you are hearing impaired, please kindly use your computer's function through Google chrome to enable captions.

Learning Outcomes

- Explain the purpose of Express.js as a Node.js framework
- Create and manage routes in Express.js applications
- Define the concept of middleware
- Designing RESTful APIs and perform CRUD functionalities with Express.js
- Testing RESTful APIs with Postman.



What is Express.js?

- A. A programming language
- B. A database management tool
- C. A front-end development library
- D. A web application framework for Node.js



Which of the following is true about Express.js?

- A. It only works with databases
- B. It is used to build network applications like web servers
- C. It is only compatible with Python applications
- D. It is used for designing graphics

Introduction to Express



Express.js

Definition and Use Cases

- ❖ Express is a minimal and flexible Node.js web application framework that provides a robust set of features for web applications.
- ❖ Express.js' main features include:
 - **Routing:** defines routes for handling different HTTP methods (GET, POST, PUT, DELETE).
 - **Middleware:** functions having access to request and response objects in the application.

Express.js

Definition and Use Cases

- **Static File Serving:** built in middlewares in place for serving static files (HTML, CSS, JS, Images).
- **Creating APIs:** Easy creation of API endpoints for web applications. The endpoints can perform tasks such as interacting with a database e.t.c.
- ❖ Express.js' lightweight and unopinionated nature makes it popular among developers for building scalable web solutions

Prerequisites for Express.js

- ❖ **Node.js:** make sure node.js is installed on your laptop
 - Confirm by running **node -v**
- ❖ **Code Editor:** preferably Visual Studio Code

Configuring Node.js and Installing Express.js



Installation and Configuration

Setting up Express.js

- ❖ Create a folder where your application will live and change directory to it:
 - `mkdir server`
 - `cd server`
- ❖ Initialize your package.json file with the default settings:
 - `npm init -y` (The y is optional if you need to skip prompts)
- ❖ Install express.js:
 - `npm install express`

Installation and Configuration

Setting up Express.js

- ❖ The commands executed should initialize a package.json file with predefined settings.
- ❖ After installing Express.js, the package name should be listed in the dependencies section of the package.json.
- ❖ All packages installed are stored in the node_modules folder.
NOTE: Make sure the node_modules folder is .gitignored to avoid pushing it to github.

Installation and Configuration

Note the express inside the dependencies.

```
WalobwaD@users-MacBook-Pro Hyperion % mkdir server
WalobwaD@users-MacBook-Pro Hyperion % cd server
WalobwaD@users-MacBook-Pro server % npm init -y
Wrote to /Users/WalobwaD/coding/Hyperion/server/package.json:
```

```
{
  "name": "server",
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "keywords": [],
  "author": "",
  "license": "ISC"
}
```

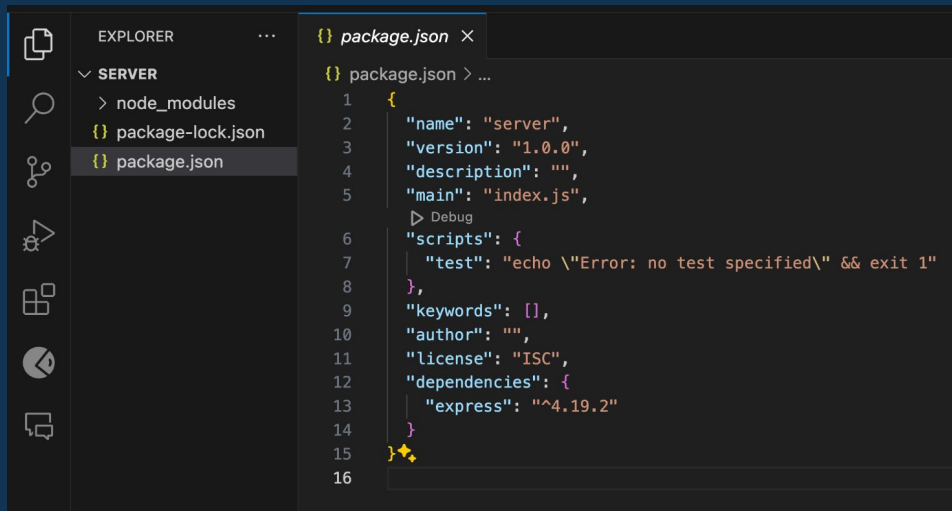
```
WalobwaD@users-MacBook-Pro server % npm install express
```

```
added 64 packages, and audited 65 packages in 11s
```

```
12 packages are looking for funding
  run `npm fund` for details
```

```
found 0 vulnerabilities
```

```
WalobwaD@users-MacBook-Pro server %
```



The screenshot shows the VS Code interface. The Explorer sidebar on the left shows the project structure with a folder named 'SERVER' containing 'node_modules', 'package-lock.json', and 'package.json'. The Editor pane on the right displays the content of 'package.json' with line numbers 1 through 16. The JSON content is as follows:

```
1 {
2   "name": "server",
3   "version": "1.0.0",
4   "description": "",
5   "main": "index.js",
6   "scripts": {
7     "test": "echo \"Error: no test specified\" && exit 1"
8   },
9   "keywords": [],
10  "author": "",
11  "license": "ISC",
12  "dependencies": {
13    "express": "^4.19.2"
14  }
15 }
16
```


Creating an Express.js Server





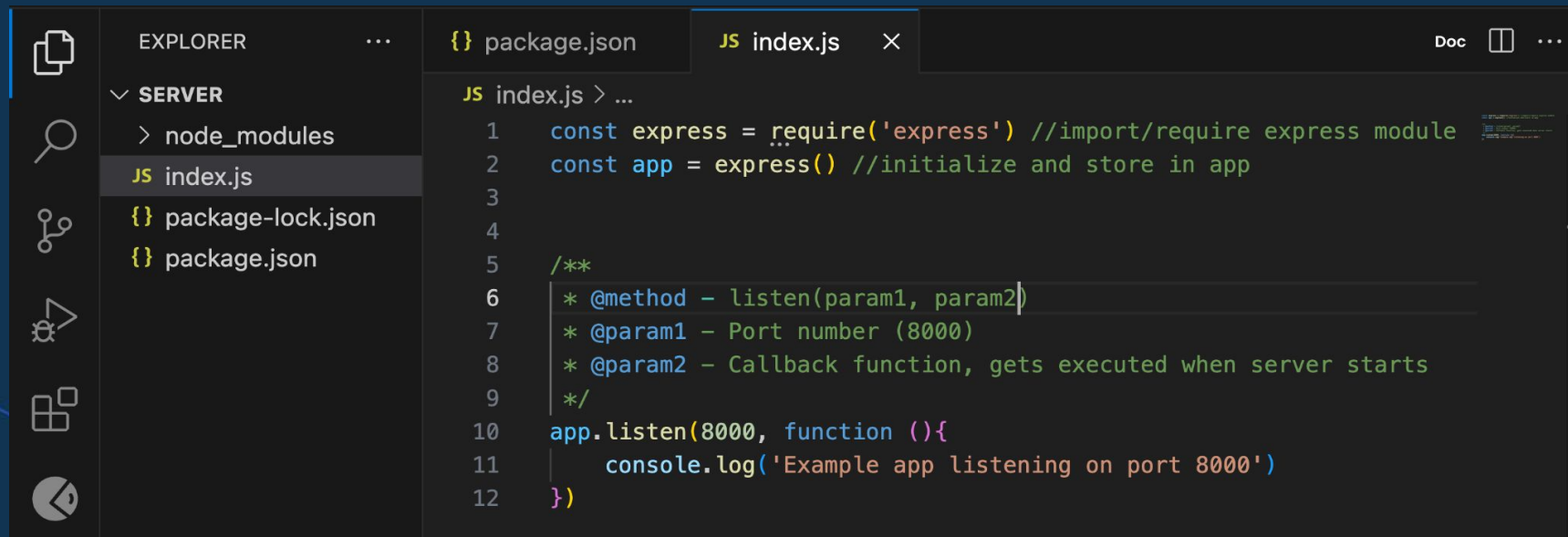
Creating a server

Running a port on your local machine

- ❖ From the configuration we just built, we can create an **index.js** file to act as your root file.
 - ❖ We'll go ahead and import the `express.js` we just installed using common js syntax and reference it to a variable called `app` so whenever we need an express property, we'll use the `app` variable.
 - ❖ The `express` module contains a **listen method** which takes in two arguments (**the port number** and **a callback function**). This will be the method to create the needed server for our app to run.
- 

Creating a server

Running a port on your local machine



The screenshot shows the Visual Studio Code interface. On the left, the Explorer sidebar displays a project structure with a folder named 'SERVER'. Inside 'SERVER', there are files 'node_modules', 'index.js' (selected), 'package-lock.json', and 'package.json'. The main editor area shows the 'index.js' file with the following code:

```
JS index.js > ...
1  const express = require('express') //import/require express module
2  const app = express() //initialize and store in app
3
4
5  /**
6   * @method - listen(param1, param2)
7   * @param1 - Port number (8000)
8   * @param2 - Callback function, gets executed when server starts
9   */
10 app.listen(8000, function () {
11     console.log('Example app listening on port 8000')
12 })
```

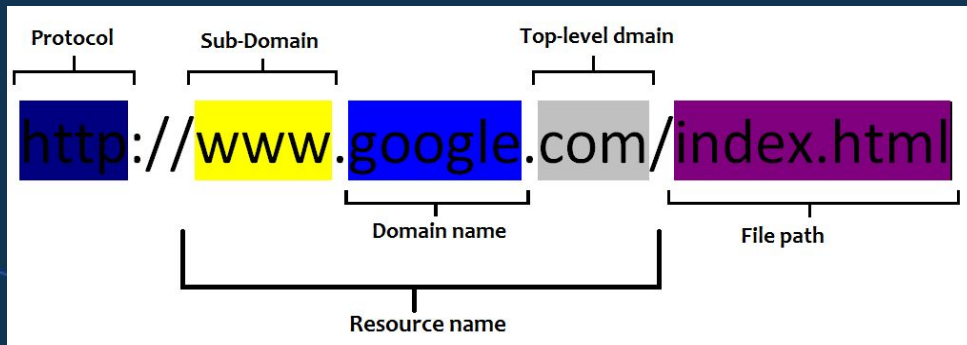
Routes in Express.js



Routes

Determining how an application responds to a client's request to a particular endpoint.

- ❖ Since we have the server configured, we need a routing mechanism to react to users' requests.
- ❖ Having a brief of routes and URLs will assist. Below is an example of a full URL.



Routes

URL Parts

- ❖ **Protocol (Scheme):** Specifies the protocol or method used to access the resources such as **HTTP, HTTPS, FTP** e.t.c
- ❖ **Subdomain:** A prefix to the main domain name indication a specific department within the domain. **www**
- ❖ **Domain:** The main part of the URL that identifies the website or web service.
- ❖ **Top Level Domain:** Used to categorize the internet domain space into different groups based on their purpose of location.

Routes

URL Parts

- ❖ **Port:** Identifies a specific endpoint within a server separated from the domain by a colon. example.com:**8080**
- ❖ **Path:** specifies the location of a specific resource or file within the domain directory structure. E.g example.com/**path/file**
- ❖ We'll be more interested in the path section of the URL by identifying the path that was requested and providing a response based on that path.

Creating a route for your application

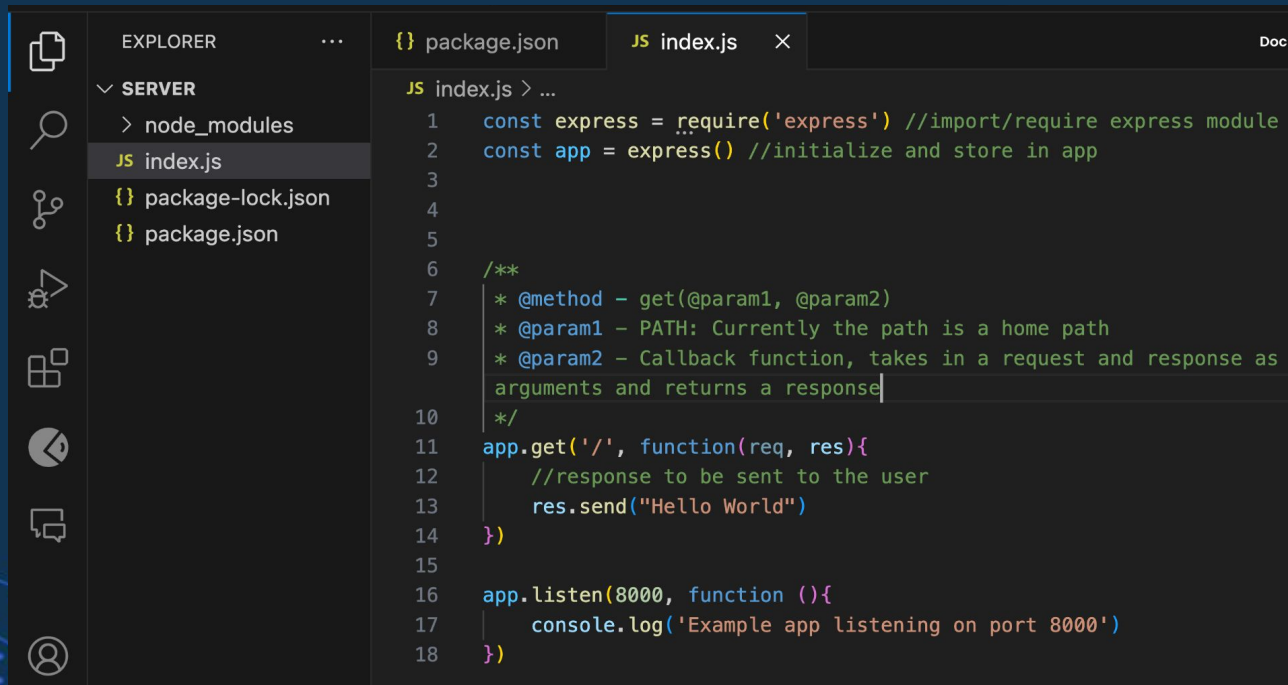
- ❖ In Express.js (or any backend frameworks) there are routing methods that specify the type of requests.
- ❖ Common routing methods we'll use in express.js:
 - **GET:** Retrieves data from server
 - **POST:** Submit data to be processed in the server
 - **PUT:** Updates or replaces data existing in the server with submitted data.
 - **DELETE:** Delete a specified resource from the server.

Creating a route for your application

- ❖ We'll create our first path with the GET method.
- ❖ From the app variable, we can call the `app.get()` which takes in two main arguments. (**The path** and **a callback function**).
- ❖ The callback function in this case becomes the route handler, it determined the kind of response the user will get after making a request to a specific path on the server.

Creating a server

Adding a start script to the server



The screenshot shows the Visual Studio Code interface. On the left, the Explorer sidebar is open, showing a project structure with a 'SERVER' folder containing 'index.js', 'package-lock.json', and 'package.json'. The 'index.js' file is selected. The main editor area displays the code for 'index.js'. The code imports the 'express' module, initializes an app, and sets up a GET route for the root path that responds with 'Hello World'. The server is configured to listen on port 8000.

```
JS index.js > ...
1  const express = require('express') //import/require express module
2  const app = express() //initialize and store in app
3
4
5
6  /**
7   * @method - get(@param1, @param2)
8   * @param1 - PATH: Currently the path is a home path
9   * @param2 - Callback function, takes in a request and response as
10               arguments and returns a response
11   */
12  app.get('/', function(req, res){
13      //response to be sent to the user
14      res.send("Hello World")
15  })
16
17  app.listen(8000, function (){
18      console.log('Example app listening on port 8000')
19  })
```

Creating a server

Adding a start script to the server

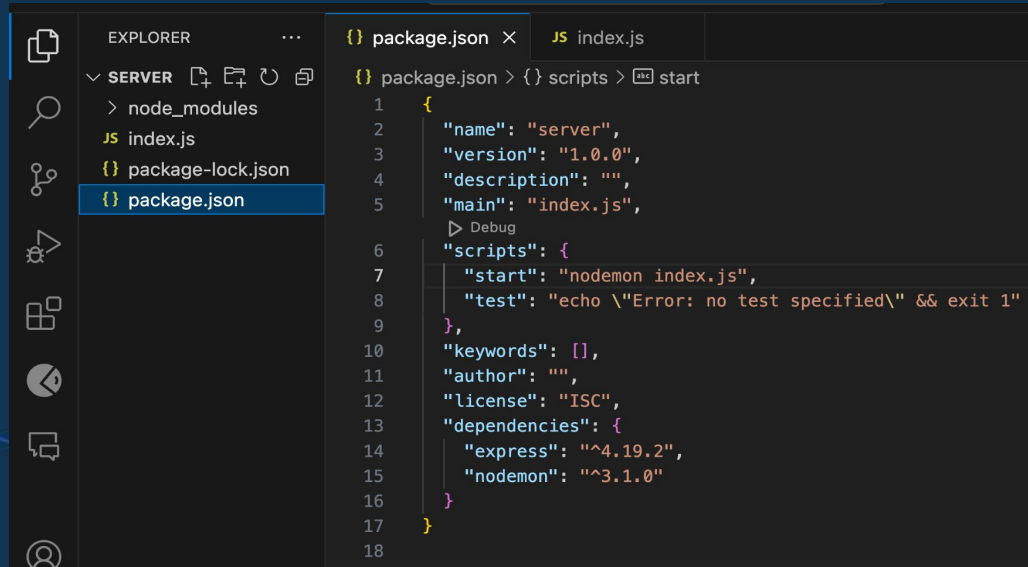
- ❖ We now need to start our server, you can run it directly using Node.js by executing: **node index.js** on the terminal.
- ❖ Instead we're going to use a library called nodemon to assist.
 - Nodemon is a tool that helps develop Node.js based applications by automatically restarting the node application when file changes in the directory are detected.
- ❖ We need to install it in order to use it using the command:

```
npm install nodemon
```


Creating a server

Adding a start script to the server

- ❖ After installing nodemon, in your package.json file, you can insert a “start” property inside your scripts object and include the text:
nodemon {nameOfFile}



The screenshot shows the Visual Studio Code interface. The Explorer sidebar on the left shows a project named 'SERVER' with files 'index.js', 'package-lock.json', and 'package.json'. The 'package.json' file is selected and open in the editor. The editor shows the following JSON content:

```
1  {
2    "name": "server",
3    "version": "1.0.0",
4    "description": "",
5    "main": "index.js",
6    "scripts": {
7      "start": "nodemon index.js",
8      "test": "echo \"Error: no test specified\" && exit 1"
9    },
10   "keywords": [],
11   "author": "",
12   "license": "ISC",
13   "dependencies": {
14     "express": "^4.19.2",
15     "nodemon": "^3.1.0"
16   }
17 }
```

Creating a server

Adding a start script to the server

- ❖ You can now run the project using
npm start
- ❖ At the moment from the configuration done so far, you'll be able to see a **"Hello World"** text being displayed on the UI.
- ❖ This means the server is rendering a response saying Hello World when the user requests for the home path of the website.

Serving static files with Express.js



Serving static files

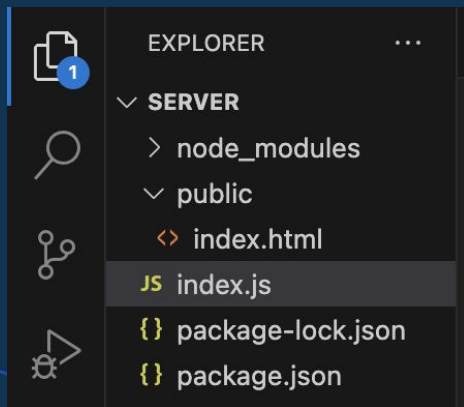
Rendering HTML, CSS or JS using `express.js`

- ❖ Static files like HTML, CSS, JavaScript, images, and other files that don't change dynamically, can be served by Express using a built in **middleware** (**`express.static`**).
- ❖ A common convention for creating the static files is having them in a directory called **public** (You can name it to any word).
- ❖ After creating the folder you simply call the static middleware with the name of the folder (in string format) as an argument.

Serving static files

Rendering HTML, CSS or JS using `express.js`

- ❖ From the code snippet, if you head over to **`http://localhost:800/index.html`**, you'll be able to access the HTML static file.



```
index.js

1  const express = require('express');
2  const app = express();
3
4  //Middleware to allow access to static files
5  app.use(express.static('public'))
```


**SKILLS
FOR LIFE**

SKILLS BOOTCAMPS



Department
for Education

CoGrammar

Break Time


Post any question in the question section

CRUD Operations with Express.js



CRUD Operations

- ❖ CRUD operations are fundamental tasks when working with databases or managing resources.
- ❖ Here's an overview of how CRUD operations are implemented in Express.js and the respective description.

| HTTP verb | CRUD operation | Express method | Description |
|-----------|--|---------------------------|---|
| Post | Create | <code>app.post()</code> | Used to submit some data about a specific entity to the server. |
| Get | Read | <code>app.get()</code> | Used to get a specific resource from the server. |
| Put | Update  | <code>app.put()</code> | Used to update a piece of data about a specific object on the server. |
| Delete | Delete | <code>app.delete()</code> | Used to delete a specific object. |

CRUD OPERATIONS

- ❖ For a start, we'll work with an in-memory array to act as our storage for a complete todo application having the CRUD functionalities.
- ❖ The code snippets on the next slides will show how you can perform the CRUD on the created array.

```
index.js  
  
7 // Mock data (in-memory array)  
8 let todos = [];
```

CRUD Operations

❖ **C** - Create functionality, create a new todo item.

index.js

```
10 // Create (POST) a new todo
11 app.post('/todos', (req, res) => {
12   const { title, description } = req.body;
13   const todo = { id: todos.length + 1, title, description, completed: false };
14   todos.push(todo);
15   res.status(201).send(todo);
16 });
```

❖ **R** - Read functionality, returns all todo items

index.js

```
18 // Read (GET) all todos
19 app.get('/todos', (req, res) => {
20   res.send(todos);
21 });
```

CRUD Operations

❖ **U** - Update functionality, updates an existing todo item

❖ **D** - deletes an existing todo item

index.js

```
34 // Update (PUT) a todo by ID
35 app.put('/todos/:id', (req, res) => {
36   const id = parseInt(req.params.id);
37   const todoIndex = todos.findIndex(todo => todo.id === id);
38   if (todoIndex === -1) {
39     res.status(404).send('Todo not found');
40   } else {
41     todos[todoIndex] = { ...todos[todoIndex], ...req.body };
42     res.send(todos[todoIndex]);
43   }
44 });
```

index.js

```
46 // Delete (DELETE) a todo by ID
47 app.delete('/todos/:id', (req, res) => {
48   const id = parseInt(req.params.id);
49   const todoIndex = todos.findIndex(todo => todo.id === id);
50   if (todoIndex === -1) {
51     res.status(404).send('Todo not found');
52   } else {
53     const deletedTodo = todos.splice(todoIndex, 1);
54     res.send(deletedTodo[0]);
55   }
56 });
```


CRUD OPERATIONS

Passing data to the server using the request object.

- ❖ There are several ways of accepting data to the server from the user. This is made possible by utilizing the request (**req**) object.
- ❖ The **req** object is a mandatory parameter in the callback function of your request method. It has several properties like **body** and **params**.
- ❖ We access data passed to the body of the request using **req.body** (As observed from the POST/create method).
- ❖ We access data passed to the URL parameter of the request using **req.params** (As observed from the PUT/update method).

Testing the API Endpoints Created



API testing

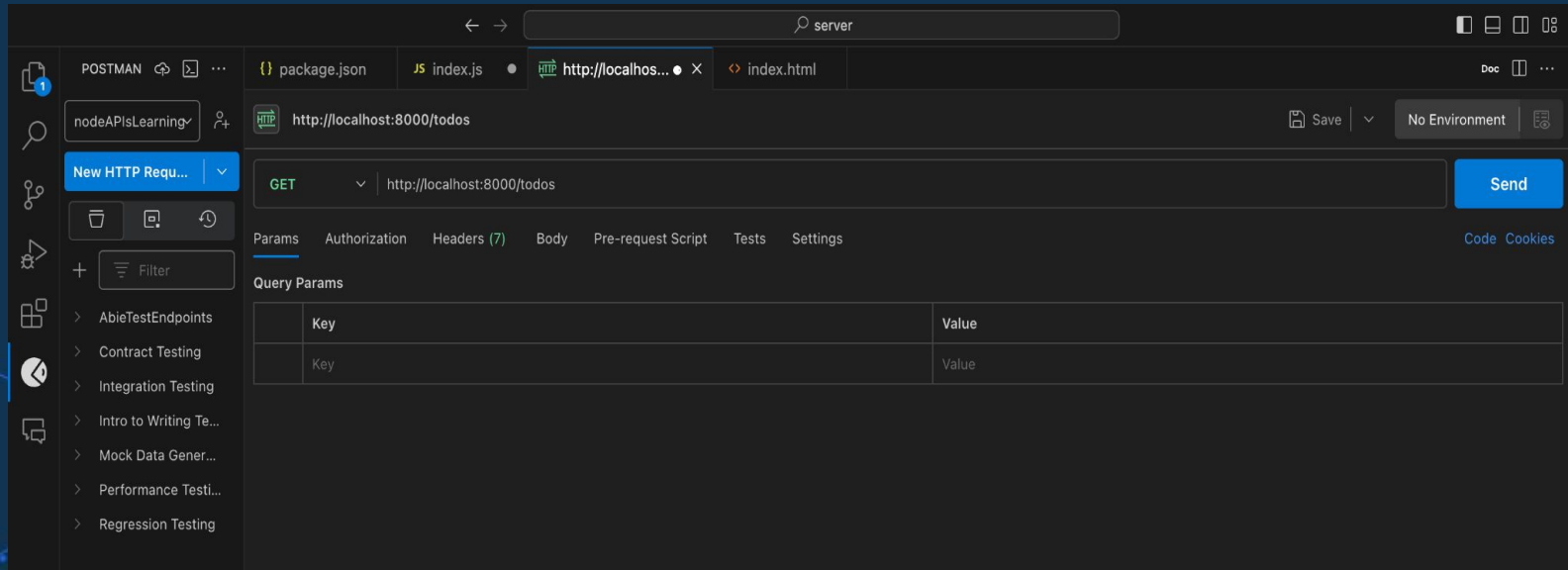
Using postman to access and send requests to the APIs created.

- ❖ After building your express endpoints, it is a best practice to test the APIs first before consuming them on the Frontend.
- ❖ We do this by use of tools like POSTMAN. Postman is an API platform for building and using APIs.
- ❖ After creating a postman account, you can install the application, use it on the browser or download it as a VS Code extension.
- ❖ The easiest way to get started with postman is by using the VSCode extension. You can get it by searching for postman in the extension marketplace.

API testing

Using postman to access and send requests to the APIs created.

- ❖ Testing the **/todos** endpoint as an example. Returns an empty list. You can make a POST request to the /todos and create a todo item.





In an Express.js application, which method is used to handle HTTP GET requests?

- A. `app.get()`
- B. `app.send()`
- C. `app.post()`
- D. `app.fetch()`



Which of the following commands is used to install Express.js?

- A. `npm uninstall express`
- B. `npm create express`
- C. `npm install express`
- D. `node install express`

Questions and Answers



Thank you for attending



CoGrammar



Department
for Education