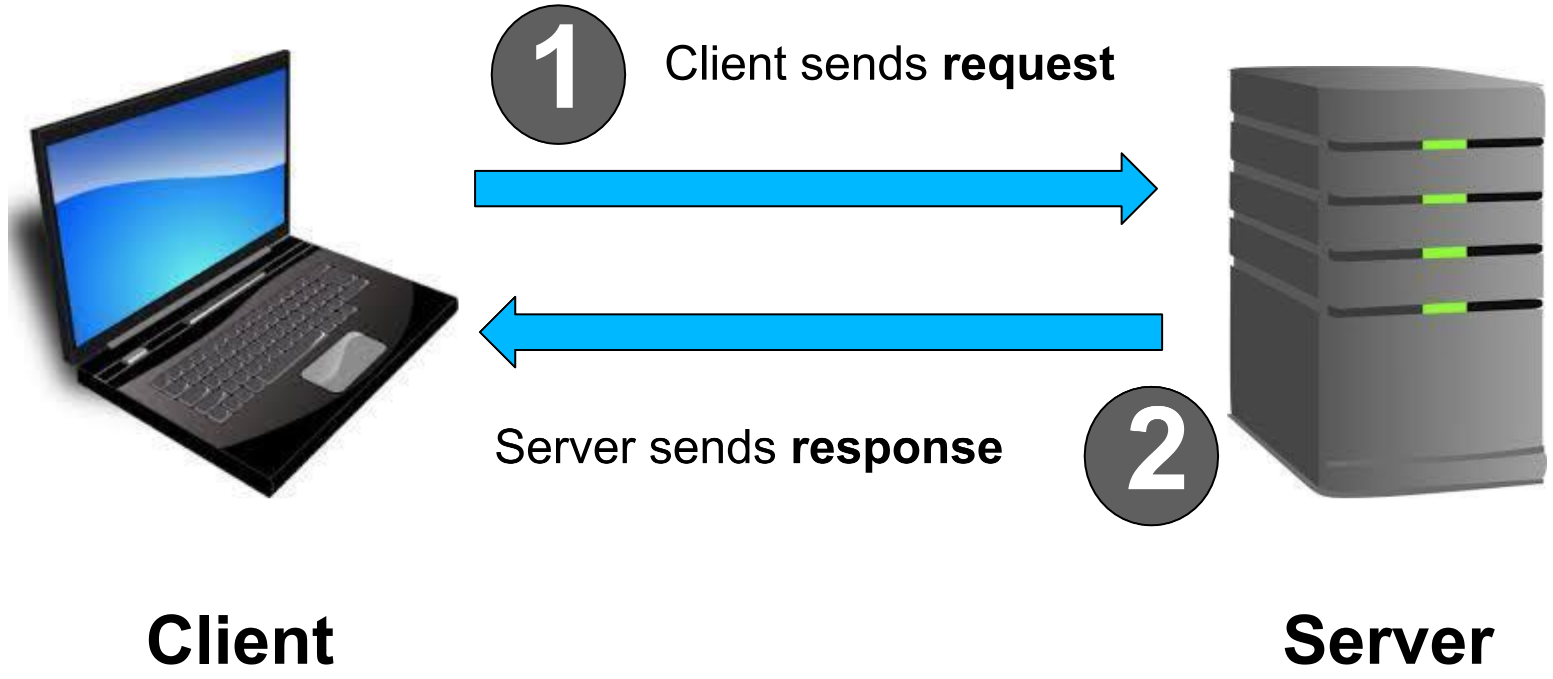
Node.js
Intro to Node.js Environment

SENG 4640
Software Engineering for Web Apps
Winter 2023

Sina Keshvadi
Thompson Rivers University

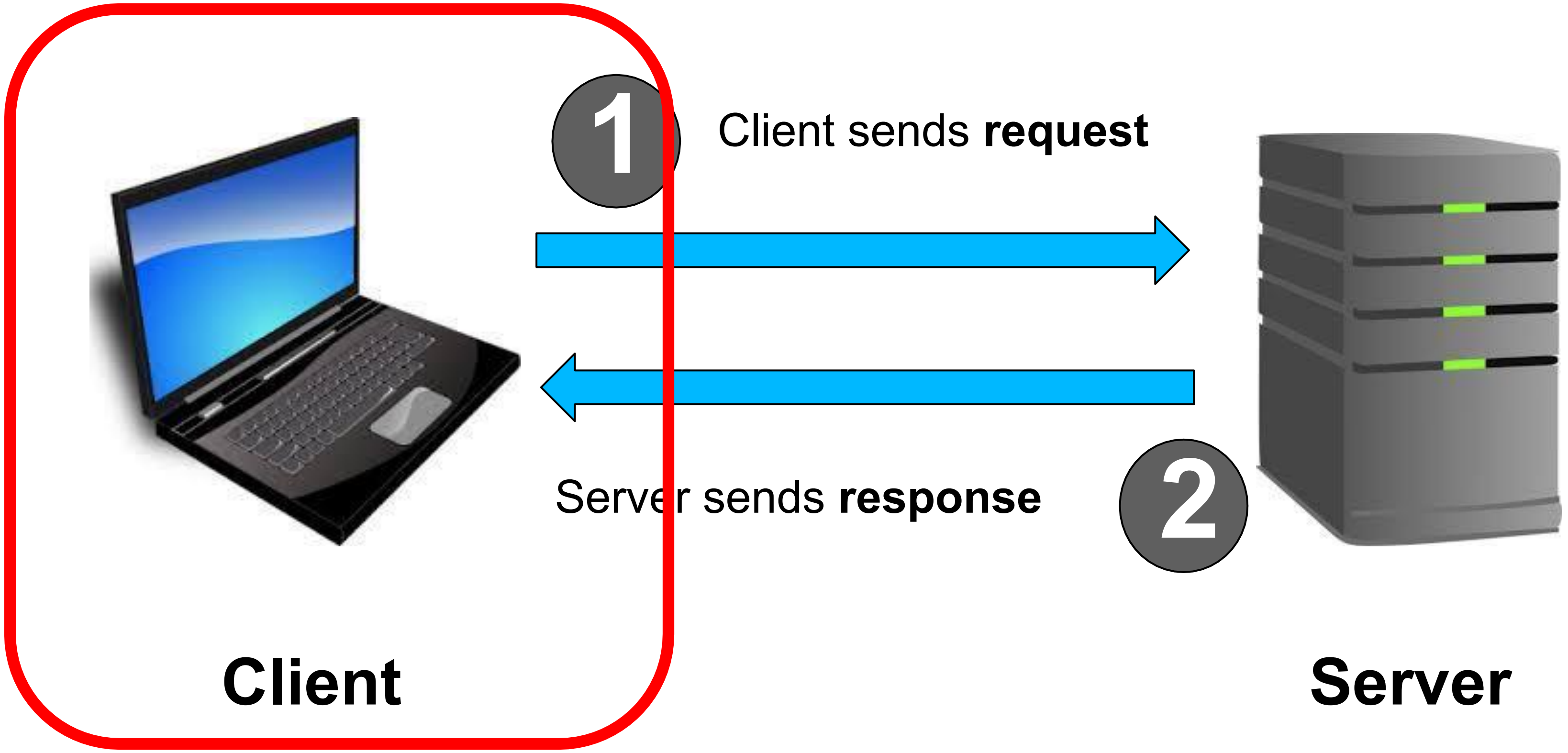
Review: How does a Web Browser Work?

- The World Wide Web utilizes **Hypertext Transfer Protocol (HTTP)** to transfer documents



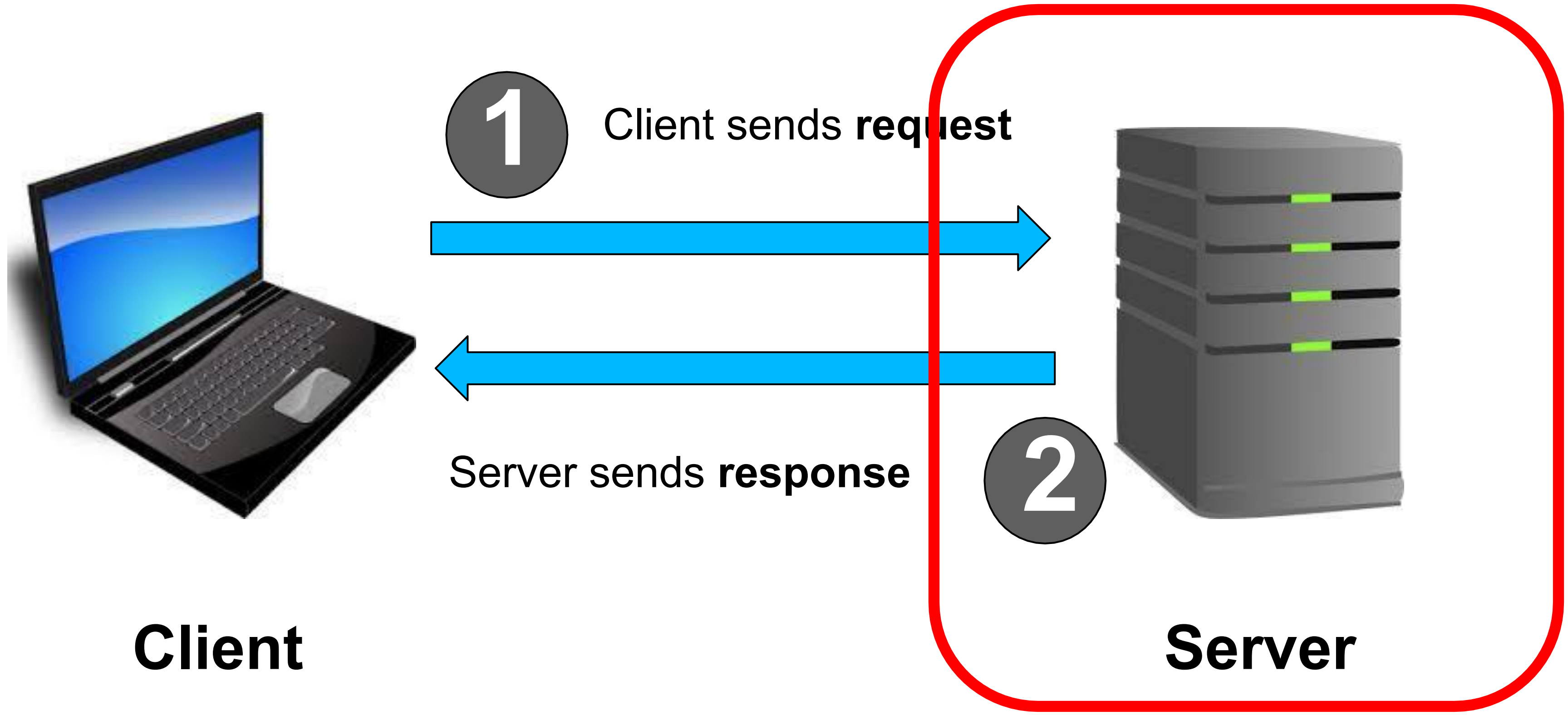
Review: How does a Web Browser Work?

- The World Wide Web utilizes **Hypertext Transfer Protocol (HTTP)** to transfer documents



Review: How does a Web Browser Work?

- The World Wide Web utilizes **Hypertext Transfer Protocol (HTTP)** to transfer documents



What does the Web Server do?

- Listen for and accept incoming HTTP requests
- Parse the HTTP request to determine what is being requested
- Locate (and/or create) the resource being requested
- Construct and send back the HTTP response

Node.js

- Asynchronous, event-driven JavaScript runtime environment for building web applications
- Treats HTTP requests as **events** that invoke callback functions/handlers that construct the HTTP response
- Also includes a package manager to simplify the deployment of JavaScript apps

Installing Node.js

- You can install Node.js by downloading, running, and finishing the package installer available here:
  - **https://nodejs.org/en/download/**
- Check that installation is correct using: `node –v`
- Update modules using: `npm install npm –g`

Setting up a new project

We want to create a server-side Web application

- Create a new folder for your project
- Use Terminal, Command Prompt, etc. to navigate to that folder
- Set up a new project by running: `npm init`
  - You will be prompted to enter some information about your project (select defaults)
  - Specify "index.js" as your entry point (is the default)

Setting up a new project

- Your project folder should now have a **`package.json`** configuration file

```
{
   "name": "helloworld",
   "version": "1.0.0",
   "description": "A basic hello world app",
   "main": "index.js",
   "scripts": {
     "test": "echo \"Error: no test specified\" && exit 1"
   },
   "author": "TRU Learner",
   "license": "ISC"
}
```

Node is just a framework
We are going to build on top of that using Express

Express

- Express is a web application framework that sits on top of a Node.js server
- Express helps you modularize and streamline your web application
- Within Express, you can organize your app in many ways:
  - Define separate modules that have different responsibilities
  - Handle requests via different *routes* and *routers*
  - Split each step in the processing of a request into *Middlewares*

Adding Express

- To use Express, run the following from the folder where you created your Node.js app:

```
npm install express --save
```

- The Express **package** will be downloaded to the project and added to your package.json file as a **dependency**
  - **Package**: a package is a module of JavaScript code, usually with a specific purpose, that can be re-used and assembled with other modules
  - **Dependency**: A dependency is a piece of code that your program relies on to work correctly

Express Configuration

- Your package.json file will now have a new section called dependencies
- npm can refer to this in the future and re-download or update your packages as needed

```
{
  "name": "helloworld",
  "version": "1.0.0",
  "description": "A basic hello world app",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "author": "TRU Learner",
  "license": "ISC",
  "dependencies": {
     "express": "^4.18.2"
  }
}
```

Hello World

- Create an file named **index.js** in your Node.js project root directory with the following contents:

```
var express = require('express');
var app = express();

app.use('/', (req, res) => {
  res.send('Hello World!');
});

app.listen(3000, () => {
console.log('Listening on port 3000');
});
```

Hello World

- Create an file named **index.js** in your Node.js project root directory with the following contents:

```
var express = require('express');
var app = express();

app.use('/', (req, res) => {
  res.send('Hello World!');
});

app.listen(3000, () => {
console.log('Listening on port 3000');
});
```

Hello World

- Create an file named **index.js** in your Node.js project root directory with the following contents:

```
var express = require('express');
var app = express();

app.use('/', (req, res) => {
  res.send('Hello World!');
});

app.listen(3000, () => {
console.log('Listening on port 3000');
});
```

Hello World

- Create an file named **index.js** in your Node.js project root directory with the following contents:

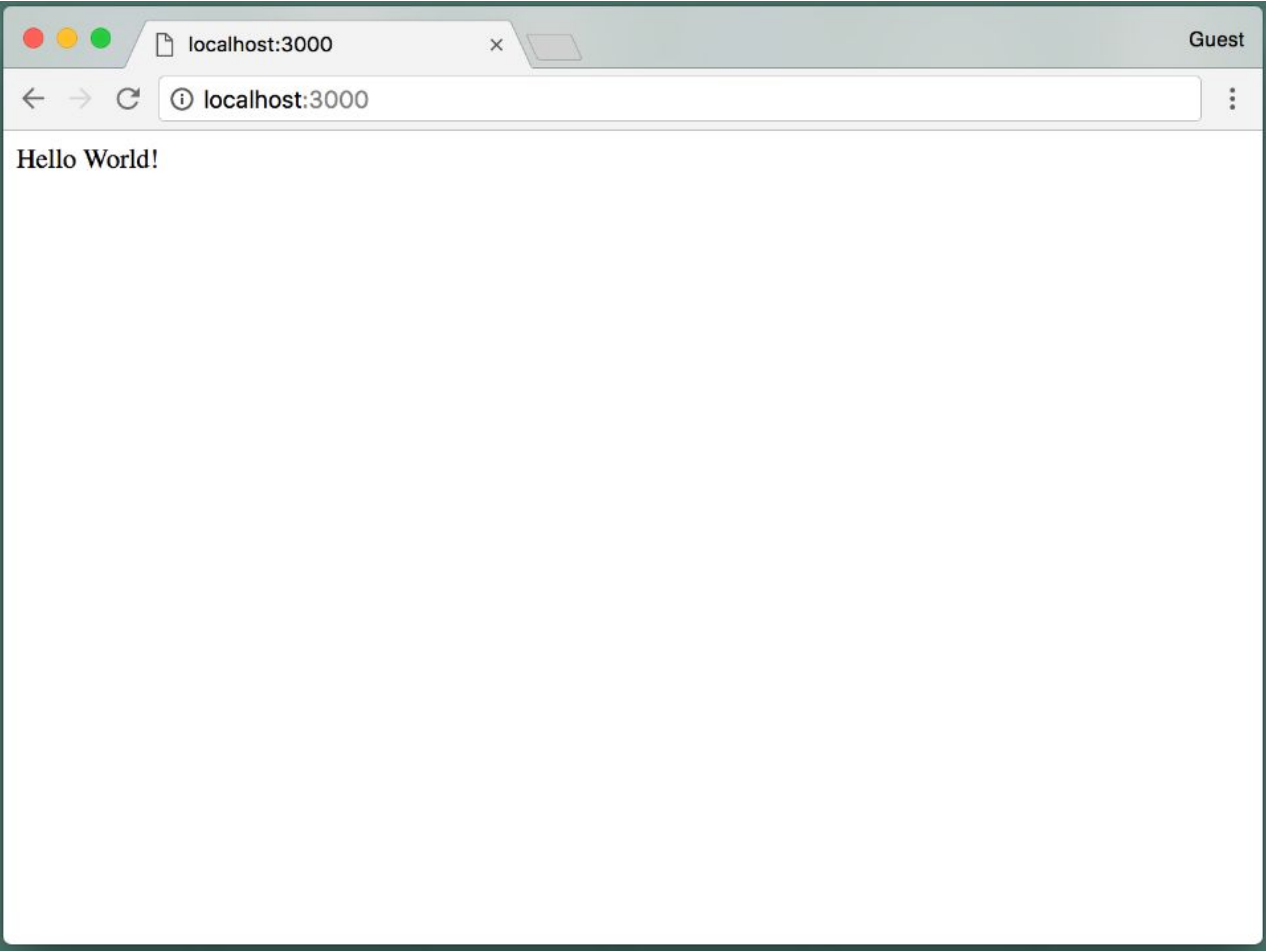
```
var express = require('express');
var app = express();

app.use('/', (req, res) => {
  res.send('Hello World!');
});

app.listen(3000, () => {
console.log('Listening on port 3000');
});
```

Running Express

- In the project folder, run: `node index.js`
- When the server starts, you should see “Listening on port 3000” written to the console/screen
- Open a browser on the same computer and go to **http://localhost:3000/**



```
Hello World!
```

Commands

```
> mkdir app_one

> cd app_one

> npm init

> npm install express --save

> touch index.js
make a file - index.js
write the backend content
> node index.js

open http://localhost:3000/
```

Looking Ahead

- How can the server send different responses for different requests?
- How can the server dynamically generate responses?
- How does the server interact with external data sources?