COMP4021
Internet Computing

Building a Simple Server

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Node.js and Express

- In this presentation, we will look at using the Express module to build a simple web server
- We assume that you have successfully installed Node.js and the Express module in your system
- We will build:
  - a server that allows access of static files
  - a server that returns JSON responses

Using Express

- To start using Express, you import the module and then create an Express app:

```
const express = require("express");
const app = express();
```

- You do things using this app, for example, start a web server like this:

```
app.listen(8000);
```

Starting a Web Server

- A web server has been started using this code:

$$\texttt{app.listen(}\underbrace{\texttt{8000}}_{\textit{A port number that the web server is listening to}}\texttt{);}$$

  - Remember the typical port number (the ‘door number’) for a web server is port 80
  - But you can use any number that has not been used by the computer such as 8000

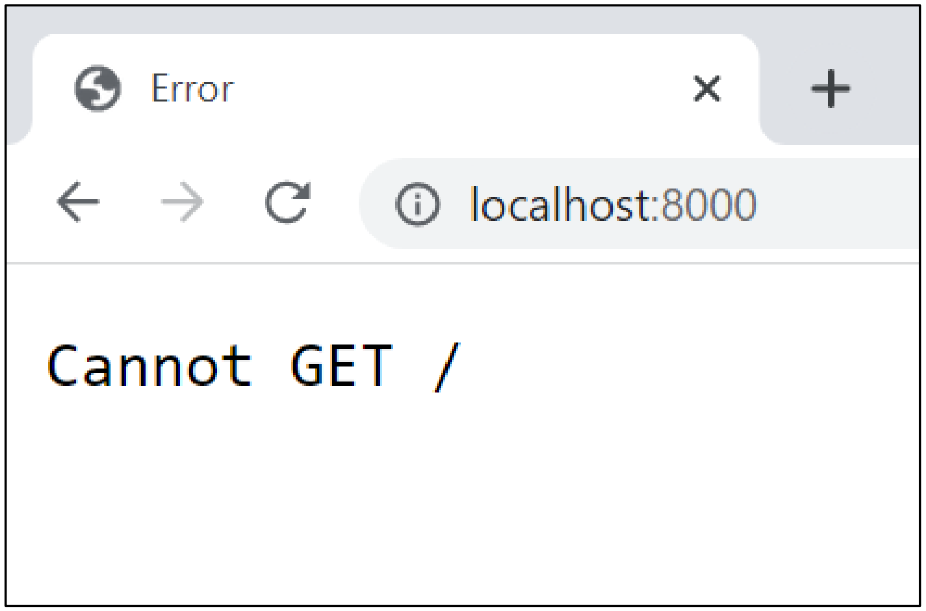
Accessing the Server

- You can use a browser to connect to the server using this URL:

```
http://localhost:8000
```

Going through port 8000 of the local computer

- This is what you get if you do that
- It gives you an error because we have not set it up correctly



```
Cannot GET /
```

Serving Static Files

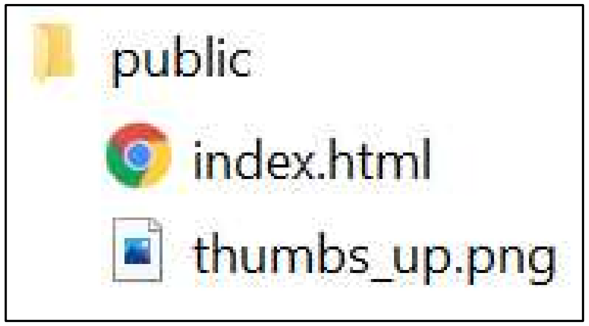
- Let's make a minimal web server
- The server only sends back any requested static files, i.e. files that do not change
- You only need to add one line of code, before running `app.listen()`, i.e.:

```
...
app.use(express.static('public'));
app.listen(8000);
```

- This above code asks Express to serve the files under the folder 'public'

The Static Files

- Let's say you have the following files under the 'public' folder:



```
public
    index.html
    thumbs_up.png
```

```
<!DOCTYPE html>
<html>
<head>
    <title>Node.js Server</title>
</head>
<body>
  <h1>Congratulations!
      You have set up the server!</h1>
  <img src="thumbs_up.png"
       alt="Good job!">
</body>
</html>
```

index.html

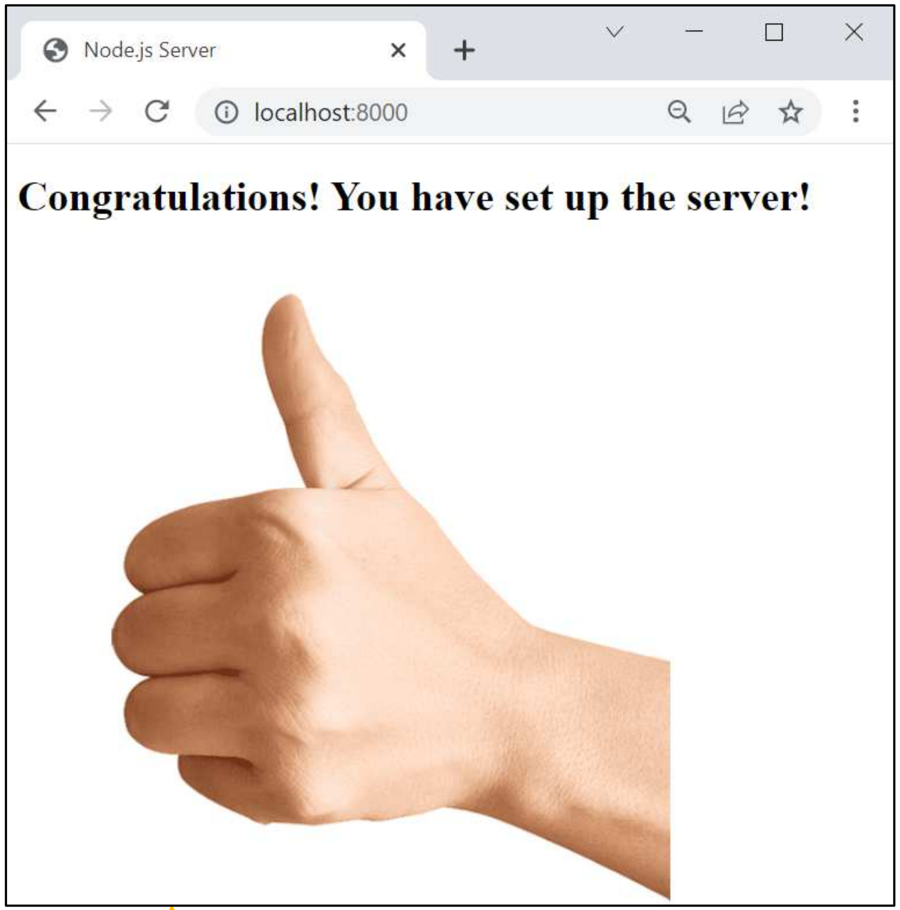
thumbs_up.png

Using the Server

- If you use the URL

`http://localhost:8000`

  in your browser, you will get the page on the right:
- So a few lines of code give you a completely working web server!



Congratulations! You have set up the server!

index.html is the root file of the Express server

Returning JSON Content

- It is very common that a web server sends ‘pure’ data to the client, such as JSON data
- Let’s extend our minimal web server so that it can return JSON content
- To do that, you need to:
  - Configure the server to handle GET requests under a specific request path
  - Use the HTTP response to send JSON data back to the client

Handling GET Requests

- You can set up the server to handle the HTTP GET requests, like this:

The path that matches the URLs that you want to handle

```
app.get( ...Path... , (req, res) => {
    ...Handle the request here...
});
```

You use these parameters to read the HTTP request and set up the HTTP response

Using the Path

- The `path` parameter in `app.get()` tells Express the URLs you want to work with
- It tries to match the path of the URL, i.e.:

$$\texttt{http://me.com}\underbrace{\texttt{/files/images/}}_{\textit{This is the path of the URL}}\texttt{face.png}$$

- Some examples are shown in the next slide

Working Path Examples

- Let's say the `path` parameter is '`/admin`'
- Any URLs that have their path starting with '`/admin`' are handled by `app.get()`, i.e.:

  http://localhost:8000**/admin**

  http://localhost:8000**/admin**?user=root

- But these URLs do not match:

  http://localhost:8000/adminpage

  http://localhost:8000/admin.html

  http://localhost:8000/pages/admin

Making a JSON Response

- You can make your server to send out JSON response easily
- Here is an example:

Note the path used here

```
app.get("/serverinfo", (req, res) => {
    res.json({
        name: "First Node.js Server"
    });
});
```

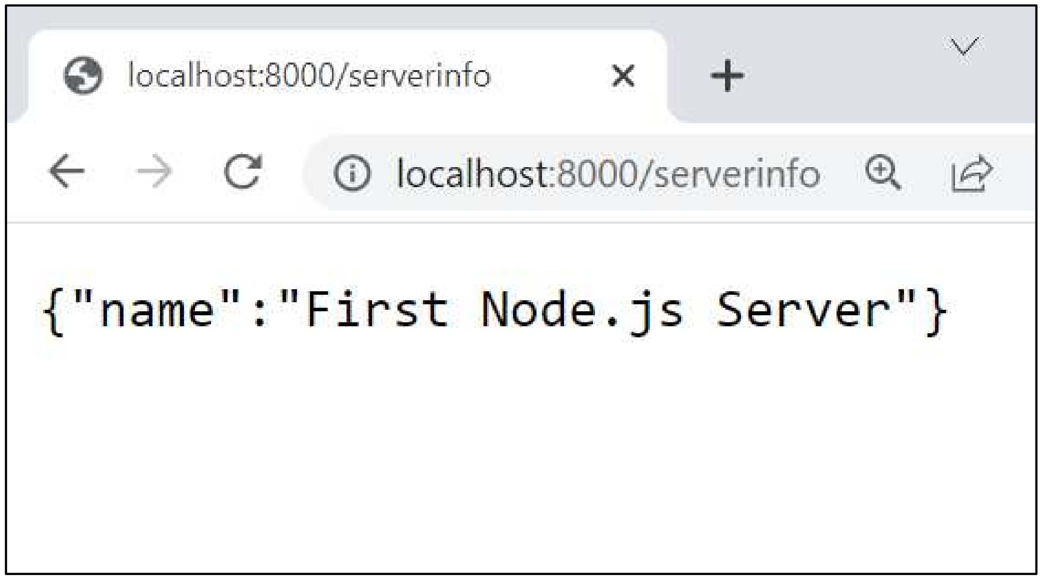
Use the HTTP response to send some JSON data (the input is a JS object)

Accessing the Data

- To get to the example JSON, you can enter this URL in the browser:

```
http://localhost:8000/serverinfo
```

- You will then get the JSON data back in the browser, like this:



```
{"name":"First Node.js Server"}
```

Examining the HTTP Response

- If you view the HTTP response headers from the browser, you can see the content type has been correctly returned to you:

```
HTTP/1.1 200 OK
X-Powered-By: Express
Content-Type: application/json; charset=utf-8
Content-Length: 31
ETag: W/"1f-TZE5rDAhbtf43KyOyzeWpovZgDc"
Date: Tue, 15 Mar 2022 17:38:25 GMT
Connection: keep-alive
Keep-Alive: timeout=5
```

Extending the Server

- We have built a simple web server that can serve static content and JSON data
- Later in the course, we will extend the web server to include more features, such as:
  - Reading JSON data from files
  - Using the query parameters
  - Updating JSON data
  - Handle POST requests