COM1025 WEB & DATABASE SYSTEMS

Lecture 2

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CSEE

LAST WEEK

- We considered the foundations of how the internet works
- We created some simple JavaScript programs. We ran these programs in the Node.js environment.
  - However, we did not use any Node.js features. We just used JavaScript features.

THIS WEEK

- This week, we will be learning about Node.js features, and why we need them
- Specifically, we will consider:
  - ✓ How to create simple web applications
  - ✓ Using templating languages
  - ✓ Using a package manager
  - ✓ Using a web framework

BY THE END OF THE WEEK

You’ll be able to complete the following assessment tasks:

- ✓ 8. Application Structure [3 Marks]
- ✓ 10. A Minimum of 4 User-facing Routes Served [4 marks]
- ✓ 11. Construct EJS Views for the 4 Routes [3 marks]

THE ANATOMY OF A NODE PROJECT

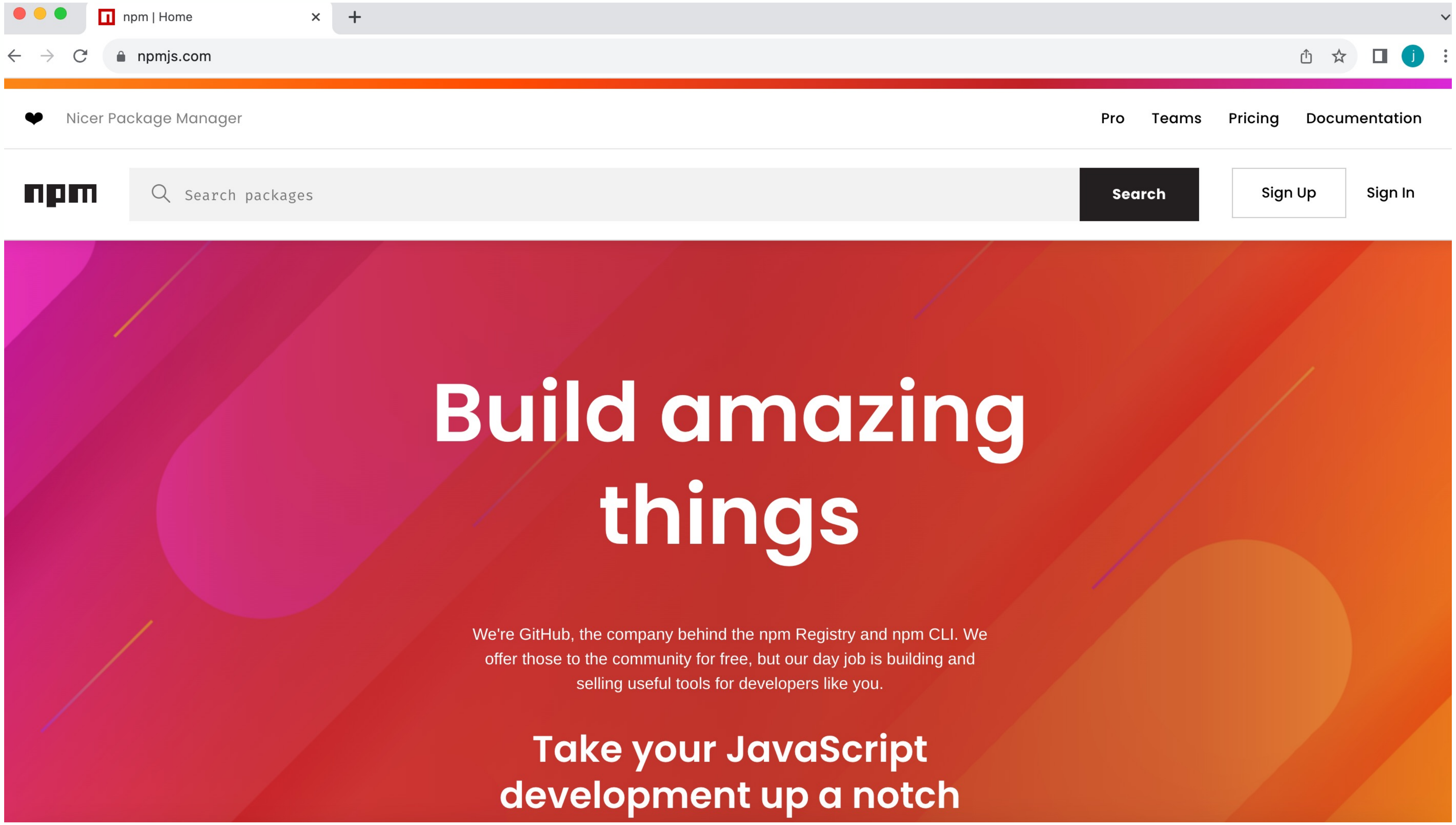
A TYPICAL NODE.JS PROJECT

```
| — my-project
        |— package.json
        |— package-lock.json
        |— node_modules
        |— index.js
```

- A node project is a folder that contains a **package.json** file.
- The **package.json** file contains information about the project, including the packages it uses.
- A **package.lock** file contains information about the packages that are installed in the project
- There should be at least one JavaScript that will be the entry point for your application: **e.g., index.js, app.js**

THE NODE PACKAGE MANAGER

The node package manager can be used to manage node projects (https://www.npmjs.com/)



Build amazing things

We're GitHub, the company behind the npm Registry and npm CLI. We offer those to the community for free, but our day job is building and selling useful tools for developers like you.

Take your JavaScript development up a notch

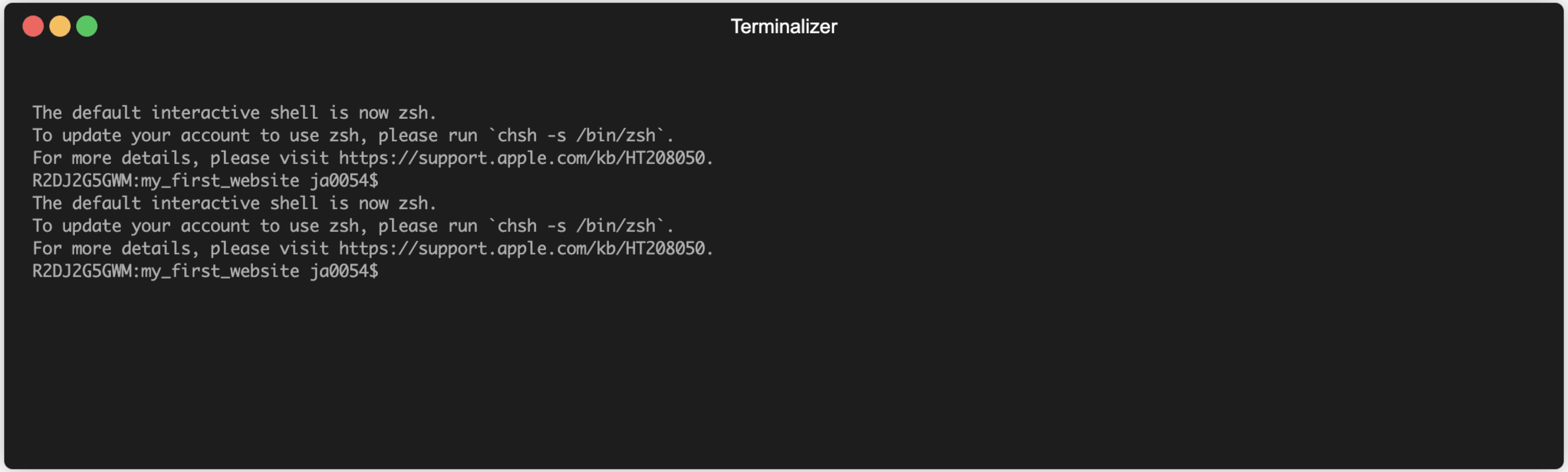
THE NODE PACKAGE MANAGER(NPM)

npm is:

- a package manager for JavaScript
- if you have Node.js installed, you have npm installed!
- the world's largest software registry
- it provides a command-line interface (CLI) for managing packages and other tasks
- it can be used to install, manage, and publish packages, manage dependencies, and run scripts

GETTING STARTED WITH NPM

- Ensure your have NodeJS installed
- In the directory of your project run the terminal command: **npm init**
- **You can keep pressing enter to accept the defaults.**



```
The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
R2DJ2G5GWM:my_first_website ja0054$
The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
R2DJ2G5GWM:my_first_website ja0054$
```

YOU NOW HAVE A PACKAGE.JSON FILE

```
{
  "name": "my_first_website",
  "version": "1.0.0",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "author": "",
  "license": "ISC",
  "dependencies": {
 },
  "devDependencies": {},
  "description": ""
}
```

- The `package.json` file contains information about the project and is split into sections.
- For this module, there are only three sections we care about:
- The `devDependencies` field is a list of packages that the project depends on in development mode.
- The `dependencies` field is a list of packages that the project depends on.

GETTING STARTED WITH NPM

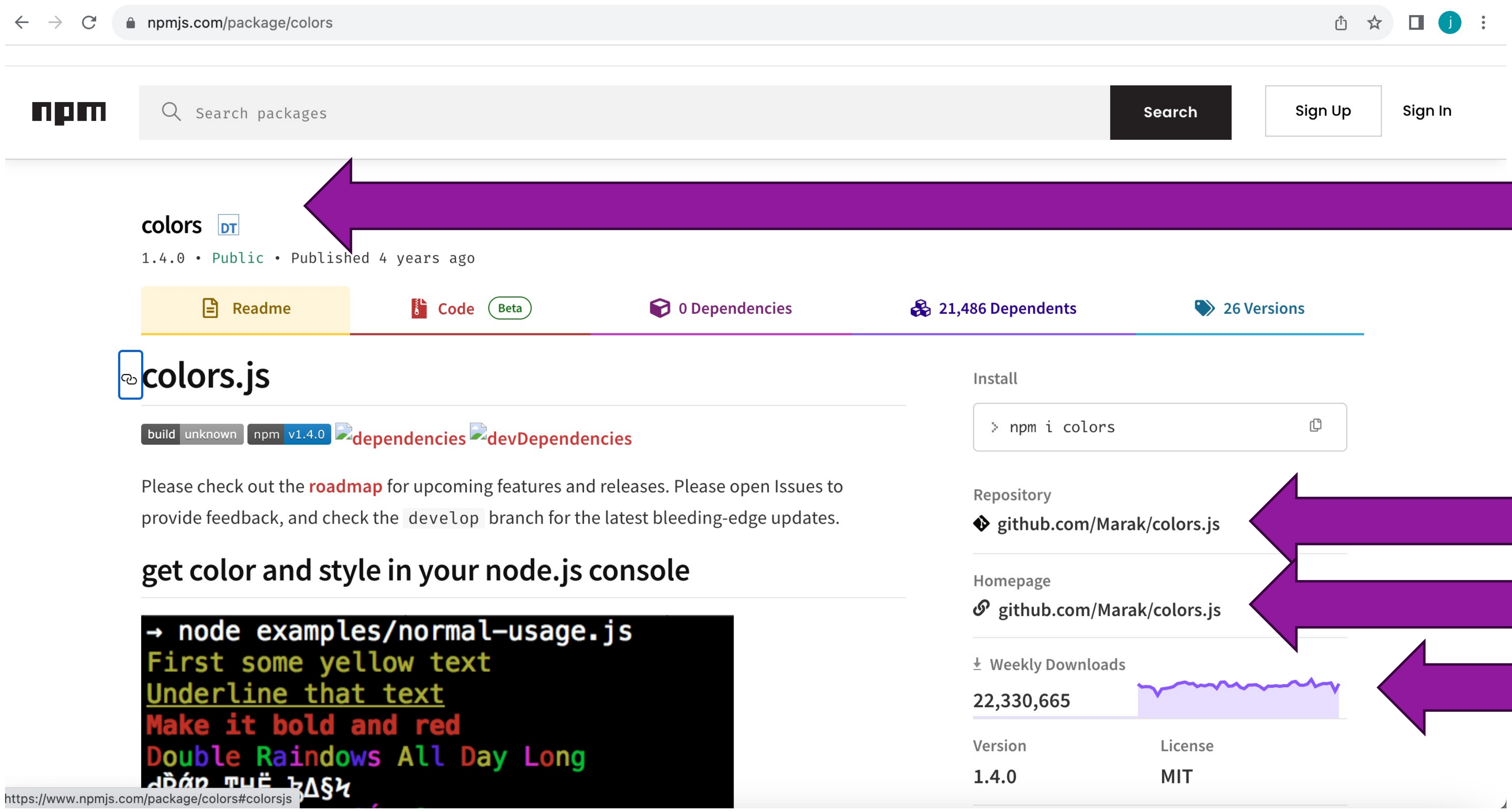
- After running “npm init”; we can now install some packages
- You can find packages by searching the https://www.npmjs.com/

Repository

- Packages are open source and free
- There are over 1.2million packages
- Many are downloaded millions of times a week

LET'S INSTALL COLORS (I)

This package lets us print different colors to the console



npmjs.com/package/colors

Search packages | Search | Sign Up | Sign In

colors DT

1.4.0 • Public • Published 4 years ago

Readme | Code Beta | 0 Dependencies | 21,486 Dependents | 26 Versions

colors.js

build unknown | npm v1.4.0 | dependencies | devDependencies

Please check out the roadmap for upcoming features and releases. Please open Issues to provide feedback, and check the `develop` branch for the latest bleeding-edge updates.

get color and style in your node.js console

```
→ node examples/normal-usage.js
First some yellow text
Underline that text
Make it bold and red
Double Raindows All Day Long
```

Install

```
> npm i colors
```

Repository
github.com/Marak/colors.js

Homepage
github.com/Marak/colors.js

Weekly Downloads
22,330,665

Version	License
1.4.0	MIT

https://www.npmjs.com/package/colors#colorsjs

Name of the package

The source code

Documentation

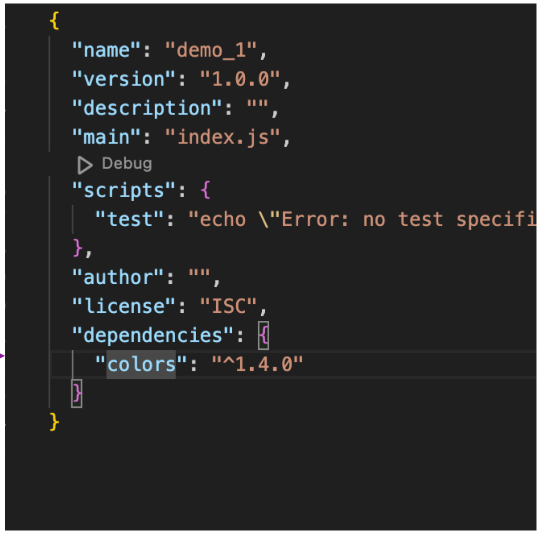
Downloads

LET'S INSTALL COLORS.JS (II)

- Dependencies are installed from command line.
    - Ensure your terminal window is pointed to the root of your project.

```
> npm install colors
```

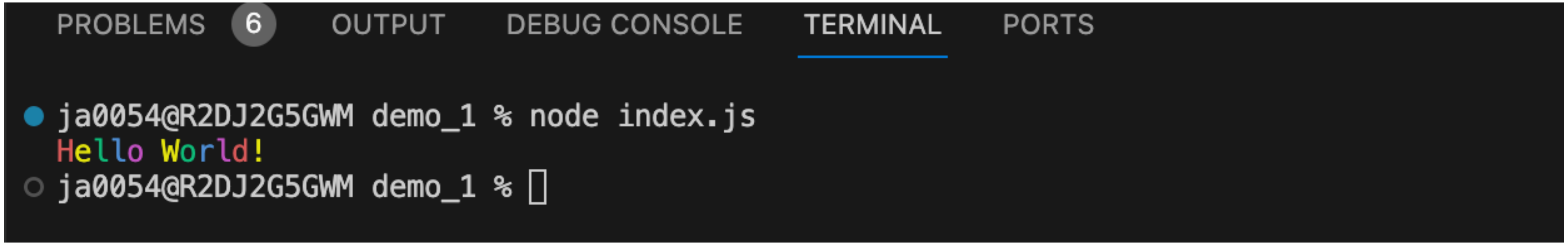
- Packages are stored in the "node_modules" folder
- Dependencies listed in the ”package.json” file
- Packages are stored in the "node_modules" folder



```
{
  "name": "demo_1",
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  ▷ Debug
  "scripts": {
    "test": "echo \"Error: no test specifi
  },
  "author": "",
  "license": "ISC",
  "dependencies": {
    "colors": "^1.4.0"
  }
}
```

USING PACKAGES

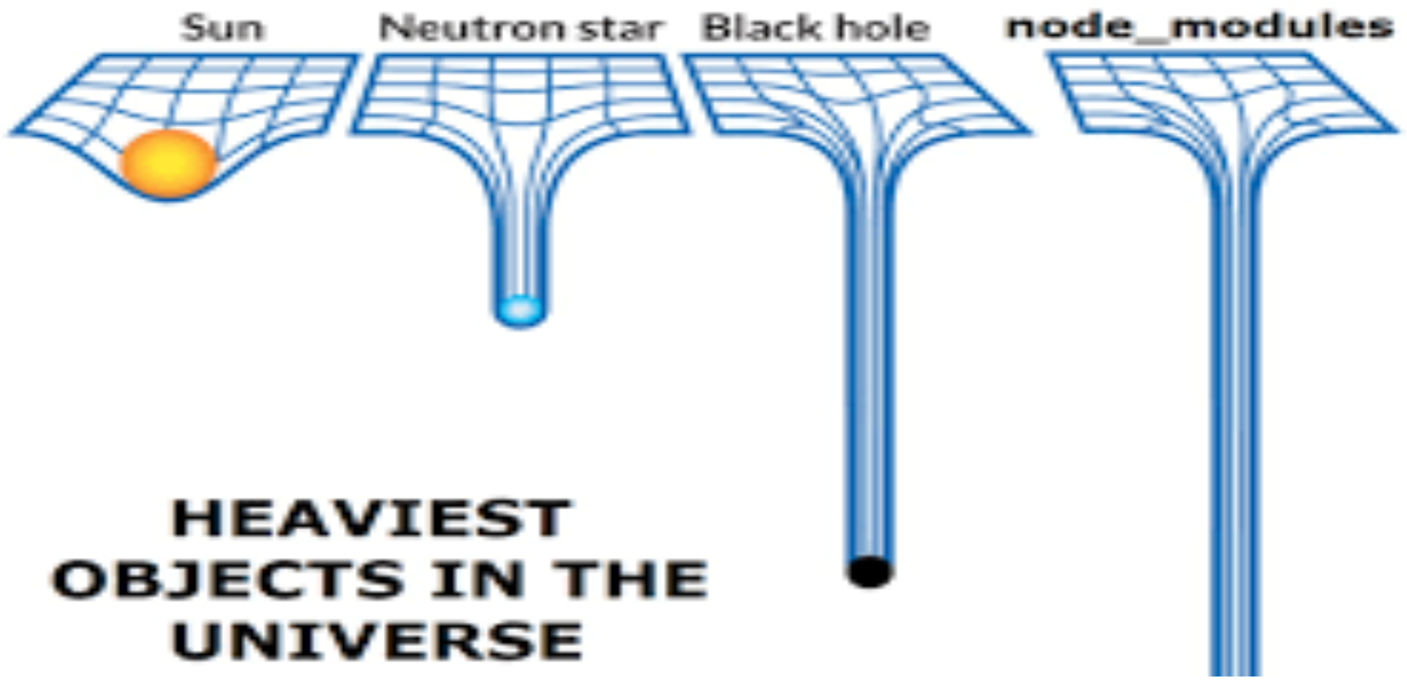
```
const colors = require('colors’);  // save the package to a const
console.log('Hello World!'.rainbow);
```



```
● ja0054@R2DJ2G5GWM demo_1 % node index.js
  Hello World!
○ ja0054@R2DJ2G5GWM demo_1 % 
```

SOME TIPS

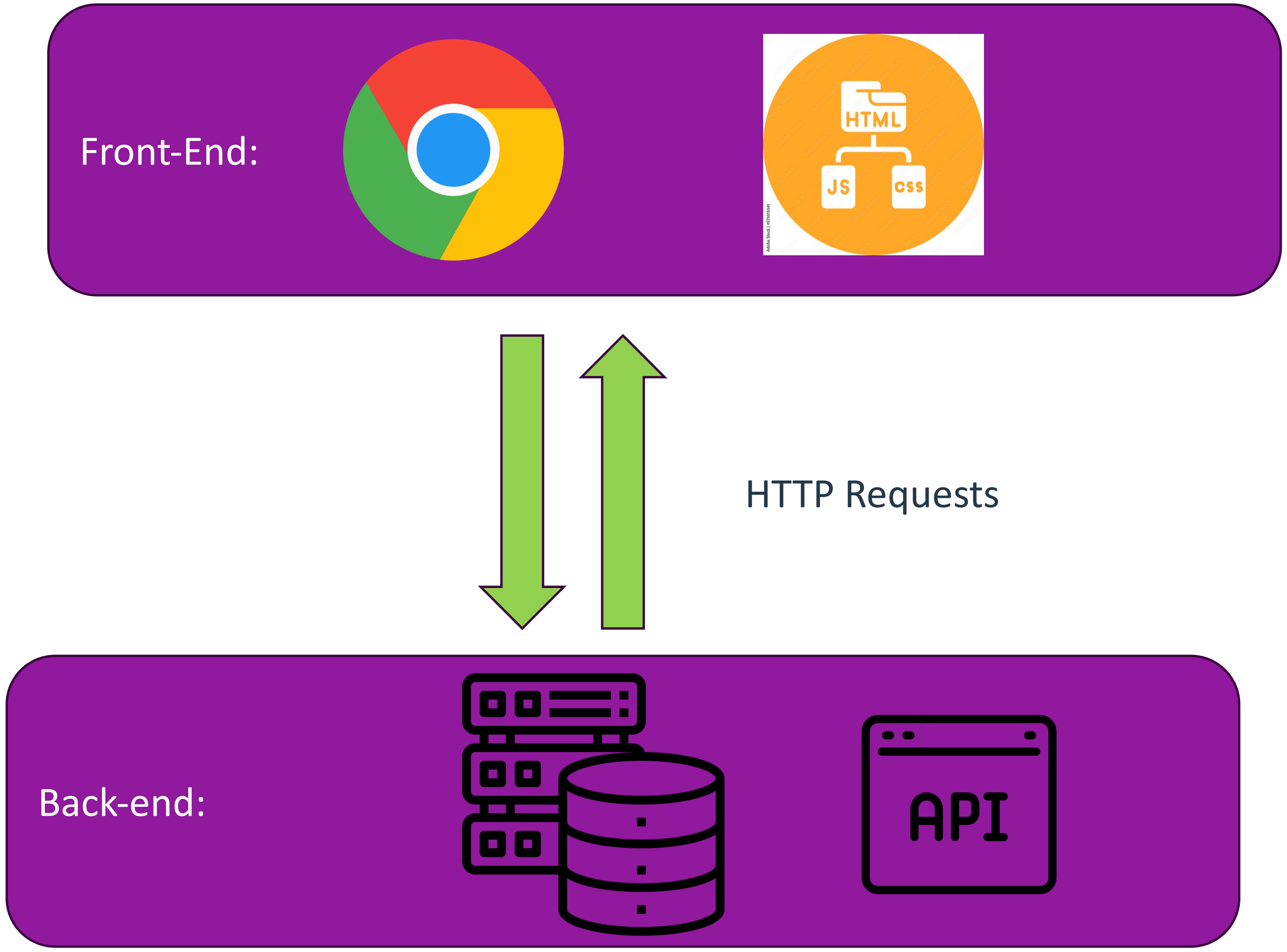
- Since packages have dependencies the ”**node_modules**” folder gets very heavy
- Use .gitignore to exclude "**node_modules**" from version control
- Delete the ”**node_modules**” folder before submitting your assessment
- We can install the dependancies by running “**npm install**”



DEMO

WEB DEVELOPMENT FRAMEWORKS

FRONT END VS BACK-END DEVELOPMENT



WEB FRAMEWORKS

- Web Frameworks Simplify the process of web development
- They abstract low-level details
- Common web frameworks include:
  - Express.js (Node.js)
  - Django (Python)
  - Ruby on Rails (Ruby)
  - Flask (Python)
  - Laravel (PHP)
  - Spring Boot (Java)

This is what we will use

Express 4.18.1

Fast, unopinionated, minimalist web framework for Node.js

- ✓ A minimal and flexible Node.js web application framework
- ✓ Express includes a routing system that enables developers to define routes for different HTTP methods and URLs.
- ✓ Makes it easy to create a structured and organized API or web application with specific endpoints.
- ✓ Express can be integrated with various template engines, such as **EJS** or Pug.

CREATING AND EXPRESS APPLICATION

```
> npm install express
```

```
const express = require("express");
const app = express();
const port = 3000;

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

app.listen(port, () => {
  console.log(`Example app listening at http://localhost:${port}`);
});
```

- The above example uses the express package to create a new web-server that listens on port 3000. We can then set up listeners to respond to any given HTTP request.

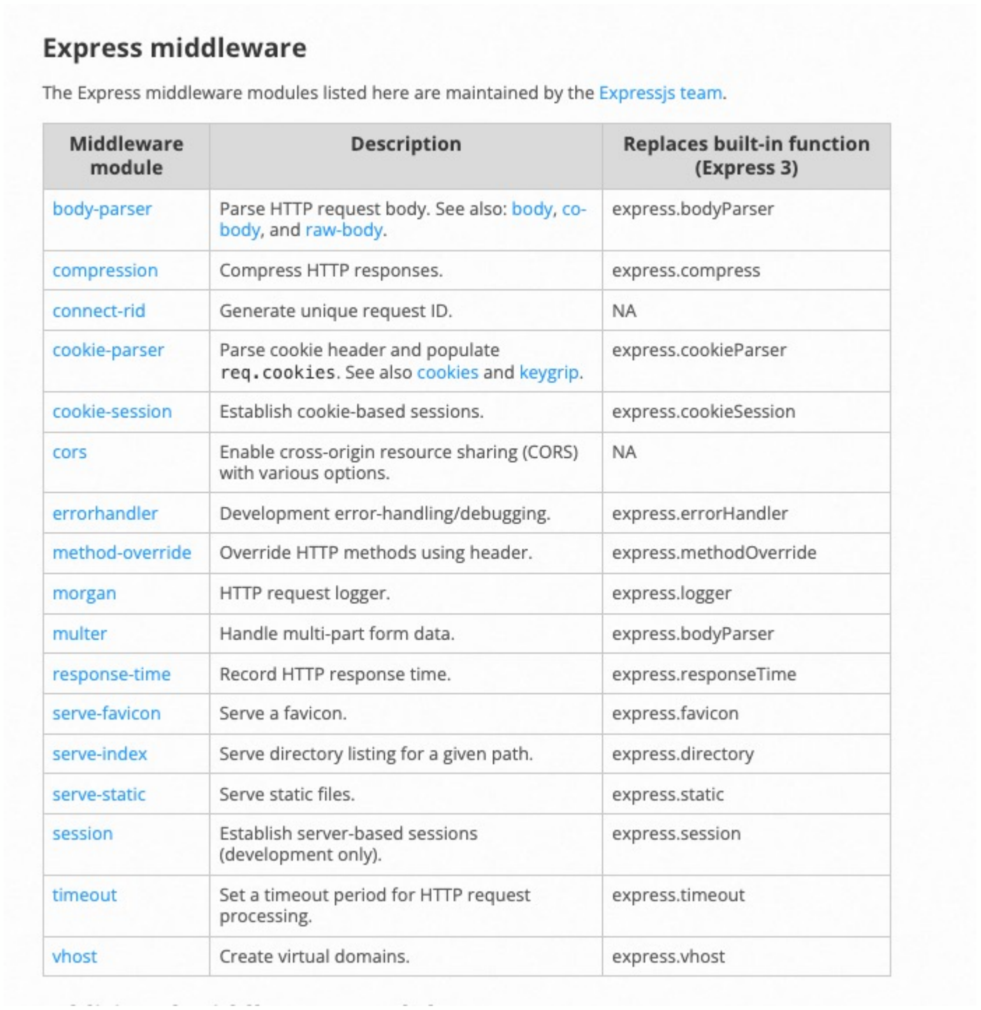
SERVING HTML FILES

```
const express = require("express");
const path = require("path"); // this is a built in node package

const app = express();
const port = 3000;

app.get("/", (req, res) => {
  res.sendFile(path.resolve(__dirname, "index.html"));
});

app.listen(port, () => {
  console.log(`Example app listening at http://localhost:${port}`);
});
```

- Above, we return an index.html file when a request is received to the root of our website.
- path.resolve is a Node.js method that resolves a sequence of path segments into an absolute path
  - e.g., if your current directory is “/user/example” the output would be “/user/example/index.html”

USING THE STATIC MIDDLEWARE

- Currently we cannot serve static assets such as CSS and images in our HTML pages.
  - We are only sending a single HTML file, not linked assets (e.g., images, css, and JavaScript)
- To configure this functionality, we need to use some middleware.
- Middleware can is bult into express, and there is also third-party modules you can use
- We can use middleware to handle concerns such as



Express middleware

The Express middleware modules listed here are maintained by the Expressjs team.

Middleware module	Description	Replaces built-in function (Express 3)
body-parser	Parse HTTP request body. See also: body, co-body, and raw-body.	express.bodyParser
compression	Compress HTTP responses.	express.compress
connect-rid	Generate unique request ID.	NA
cookie-parser	Parse cookie header and populate `req.cookies`. See also cookies and keygrip.	express.cookieParser
cookie-session	Establish cookie-based sessions.	express.cookieSession
cors	Enable cross-origin resource sharing (CORS) with various options.	NA
errorhandler	Development error-handling/debugging.	express.errorHandler
method-override	Override HTTP methods using header.	express.methodOverride
morgan	HTTP request logger.	express.logger
multer	Handle multi-part form data.	express.bodyParser
response-time	Record HTTP response time.	express.responseTime
serve-favicon	Serve a favicon.	express.favicon
serve-index	Serve directory listing for a given path.	express.directory
serve-static	Serve static files.	express.static
session	Establish server-based sessions (development only).	express.session
timeout	Set a timeout period for HTTP request processing.	express.timeout
vhost	Create virtual domains.	express.vhost

SERVING STATIC ASSETS

- Below, we instruct express to serve assets from a folder in our root directory called **public**
- **Note,** use “express.use” to set up middleware

```
const express = require("express");
const path = require("path");
const app = express();
app.use(express.static(path.join(__dirname, "public")));
```

- Above, express looks up the files relative to the static directory public:
  - the name of the static directory is not
  - if we place the image foo.jpeg in the public folder we would reference it in index.html like this, <img src="foo.jpeg" />.

DEMO

WHAT'S WRONG WITH JUST HTML

- Serving plain HTML files provides us with a means to present a website
- How do we inject data into our html pages?
- Shared components or layouts must be replicated across different HTML files
- As web applications grow in complexity, maintaining a large codebase written in pure HTML becomes increasingly challenging.
- The lack of a clear separation of concerns makes it difficult to manage the presentation layer independently from the application logic

TEMPLATING TO THE RESCUE

- Templating allows for the dynamic generation of content in web applications
- Templating promotes code reusability by separating the HTML structure from the data
- Shared components
- Templating ensures consistent layouts across different pages of a website.
- Some popular templating languages include: EJS, Handlebars, Mustache , and Pug

EXPRESS SUPPORTS TEMPLATING

- We’ll use EJS
- EJS is simple to use. First, we need to install it:

```
> npm install ejs
```

- We can now tell express to render our html pages using ejs. Below is a full example.

USING EJS (I)

```
const express = require("express");
const path = require("path");
const app = express();
const port = 20000;
app.set("view engine", "ejs");
app.use(express.static(path.join(__dirname, "public")));

app.get("/", (req, res) => {
  res.render("index");
});

app.listen(port, () => {
  console.log(`Example app listening at http://localhost:${port}`);
});
```

USING EJS (II)

- Express will assume that we have an index.ejs file in a views folder which lives in the root directory of your project.

- EJS, is a superset of HTML. This means, to get the above example to work, we can simply rename our any html file to index.ejs and move it to a views folder.

- Using EJS, we now have some dynamic capabilities within our HTML views.

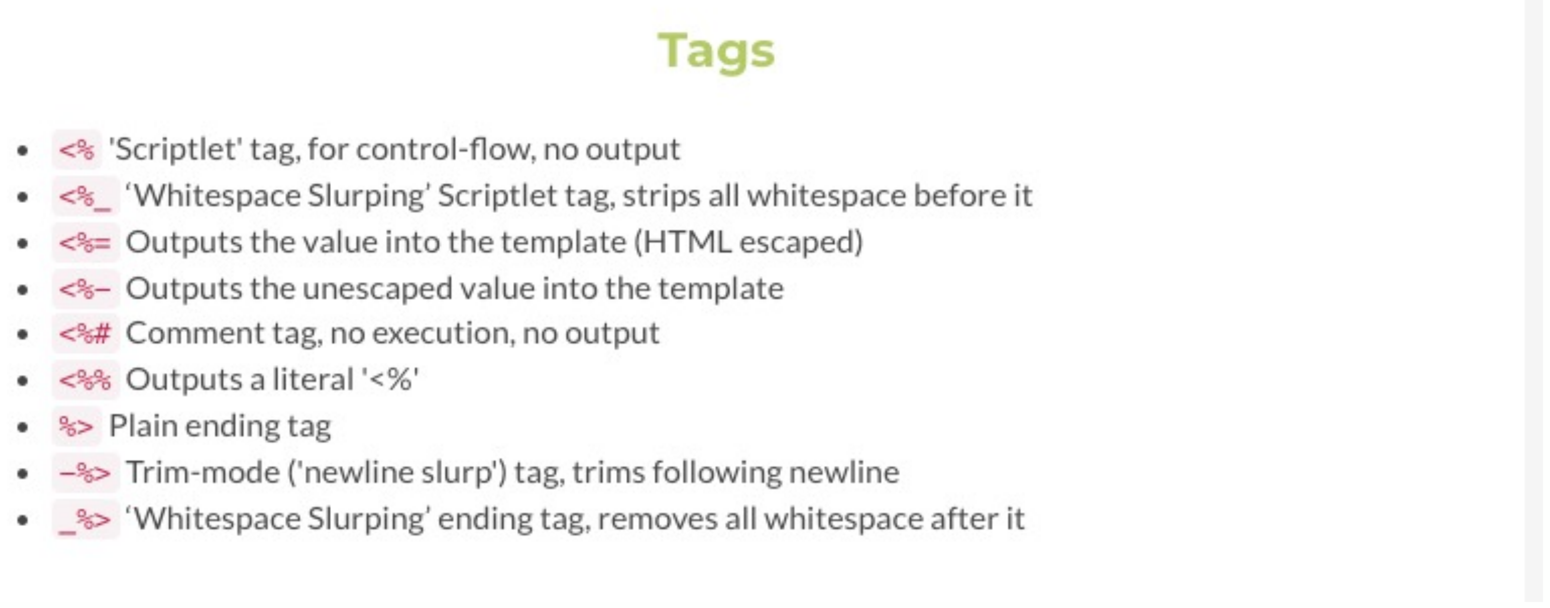
EJS ALLOWS HTML TO BE CHUNKED

```
<!-- views/common/header.ejs -->
<ul>
  <li><a href="home">Home</a></li>
  <li><a href="about"></a>About</li>
  <li><a href="contact">Contact</a></li>
</ul>
```

```
<!-- views/index.ejs -->
...
<body>
  <%- include('common/header'); %>
  <h1>Home Page</h1>
  <img src="test.jpeg" alt="wtf" />
</body>
...
```

DIFFERENT TYPES OF TAGS

- We will investigate more dynamic EJS tags next week
- You can get a full list of tags from the EJS docs:



Tags

- `<%` 'Scriptlet' tag, for control-flow, no output
- `<%_` 'Whitespace Slurping' Scriptlet tag, strips all whitespace before it
- `<%=` Outputs the value into the template (HTML escaped)
- `<%-` Outputs the unescaped value into the template
- `<%#` Comment tag, no execution, no output
- `<%%` Outputs a literal '<%'
- `%>` Plain ending tag
- `-%>` Trim-mode ('newline slurp') tag, trims following newline
- `_%>` 'Whitespace Slurping' ending tag, removes all whitespace after it

DEMO

END OF LECTURE