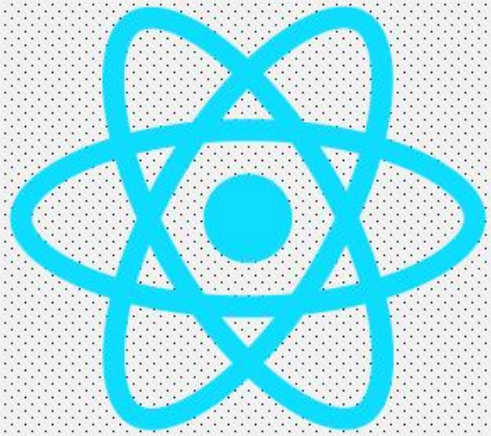

React JS

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Assistant Professor
Dept. of CSE (AI-ML)

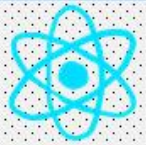
What is React JS?

- React JS is a JS (javascript) **library** created by Facebook in 2013.
- React specializes in helping developers build **User Interfaces (UI)**.
- It abstracts **DOM manipulation** from developers and makes the user interface a function of application state.
- With React developers can create **reusable UI components**. These components can be used any number of times anywhere in the application. This reduces the time for debugging and rewriting.
- Internally React performs smart and clever operations and **manipulates DOM** with a minimum number of operations. Only the **required components are re-rendered** and the rest of the other components remain the same.
- Hence using React can provide a **faster interface and optimized application**.

Single Page Applications (SPA)

- The upgradation of the javascript performance of web browsers gave birth to Single Page Applications (SPAs).
- A single-page application is a web application that works in a browser and does not require a page reload during use.
- It loads all the files on the initial load and then updates its DOM dynamically on user interaction.
- Unlike the multi-page applications, in single-page applications, only the needed assets are rendered, and the page gets updated.
- As all the assets are not required to be fetched again, the bandwidth also becomes low.
- In SPAs, the logic is executed in the browser rather than the server. This makes the app faster.

React JS History



Current version of React.JS is V18.0.0 (April 2022).

Initial Release to the Public (V0.3.0) was in July 2013.

React.JS was first used in 2011 for Facebook's Newsfeed feature.

Facebook Software Engineer, Jordan Walke, created it.

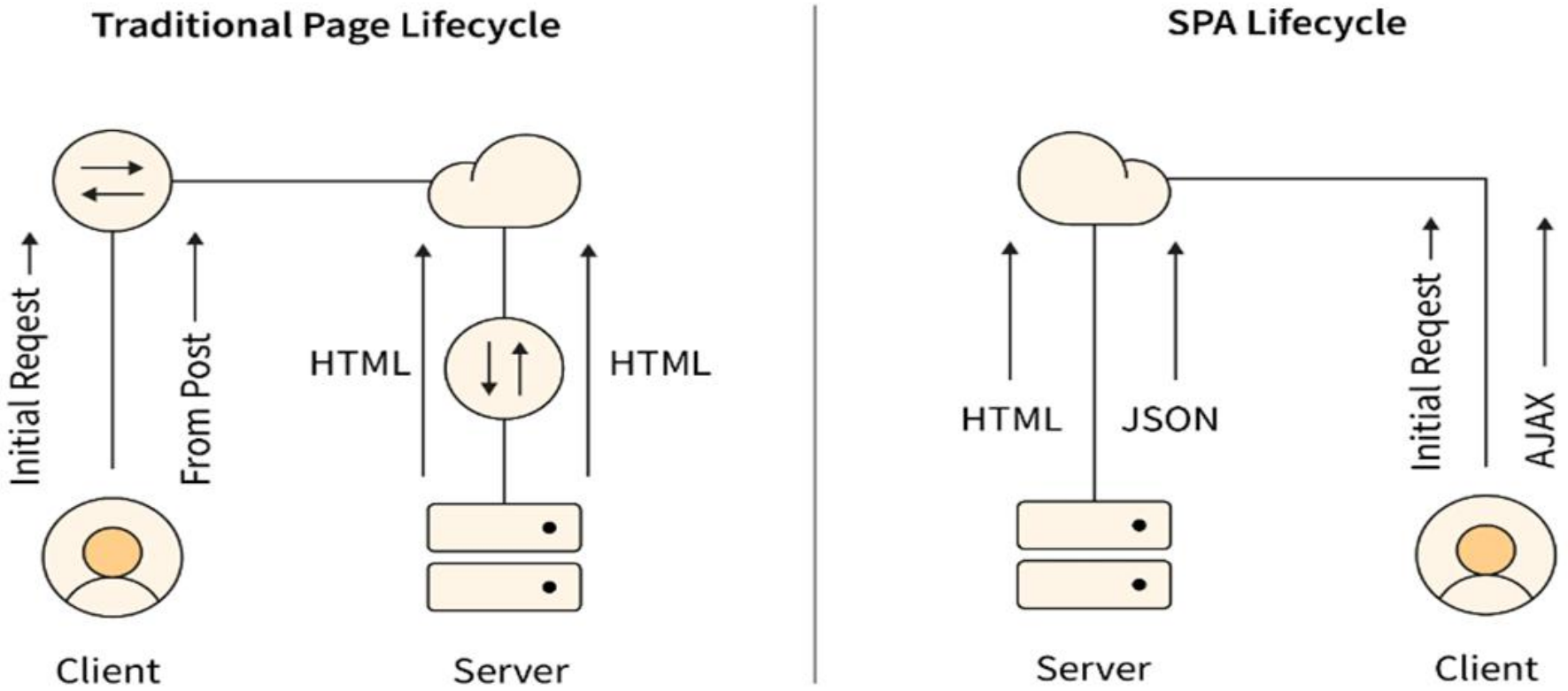
Current version of `create-react-app` is v5.0.1 (April 2022).

`create-react-app` includes built tools such as webpack, Babel, and ESLint.

Working of Single Page Applications

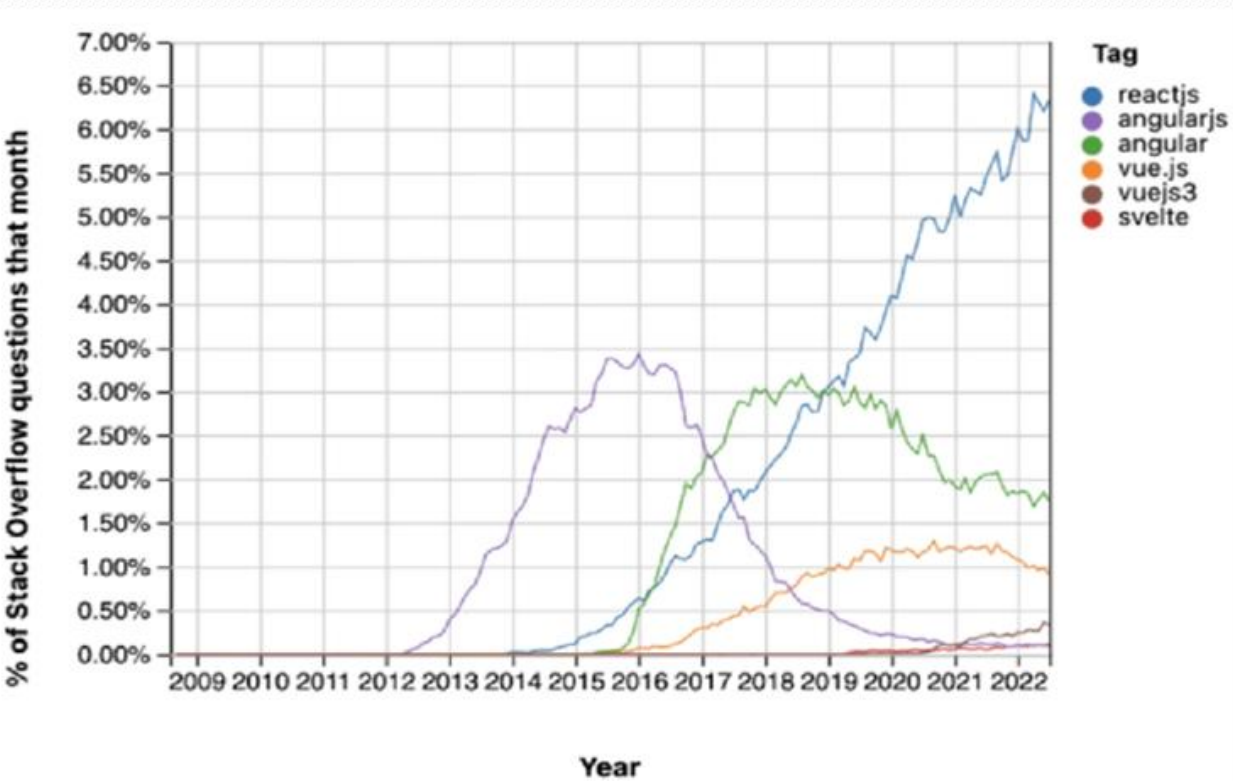
- In Single page applications, the server sends an **HTML file only** on the **first request**. In all the subsequent requests, **only data** is passed to and from the server.
- Javascript is used to define all the logic. Only the **changes are rewritten** on the page, and the complete page is not rerendered. This creates a **seamless user experience**.
- They are **mobile-friendly**. The frameworks that are used to create SPA can also help in the creation of mobile apps by reusing codes.
- Single-page applications are widely used by **Facebook**, **Gmail**, and **Twitter** are some famous examples of SPAs.

Working of Single Page Applications

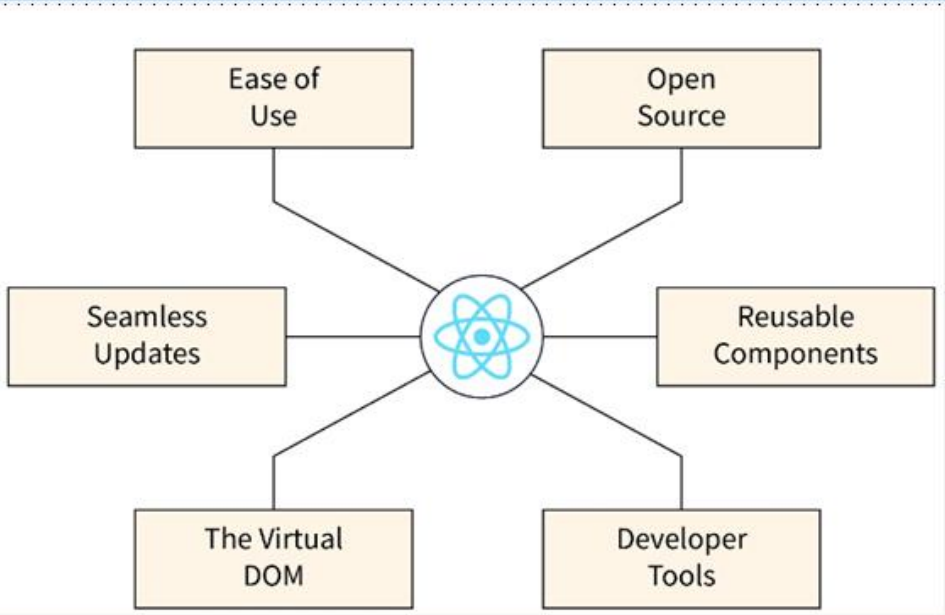


Why someone should learn React

- React JS can be used for building both mobile and web applications.
- Open up a lot of opportunities as most successful companies are using React.
- React is quite **flexible** and **compatible** and can easily integrate advanced technologies like **AR-VR** and **IOT**.



Why to Use React JS for Web Development?



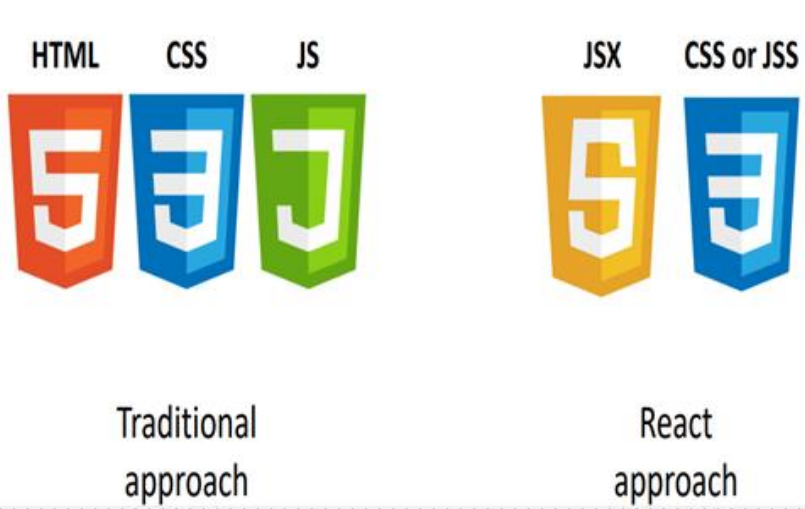
React creates a VIRTUAL DOM in memory.

Instead of manipulating the browser's DOM directly, React creates a virtual DOM in memory, where it does all the necessary manipulating, before making the changes in the browser DOM.

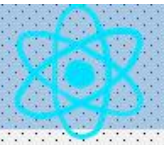
React only changes what needs to be changed!

JSX

- JSX stands for Javascript XML. It's syntactic enhancement for JavaScript that is based on ES6.
- It makes it easier to write and add HTML in React. It allows us to use an HTML-like syntax to describe React's object tree.
- The use of JSX is not mandatory, but it is recommended as it makes code readable and efficient.
- It enables developer to create virtual DOM using XML syntax. It compiles down to pure JavaScript (React.createElement function calls).

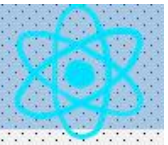


Virtual DOM



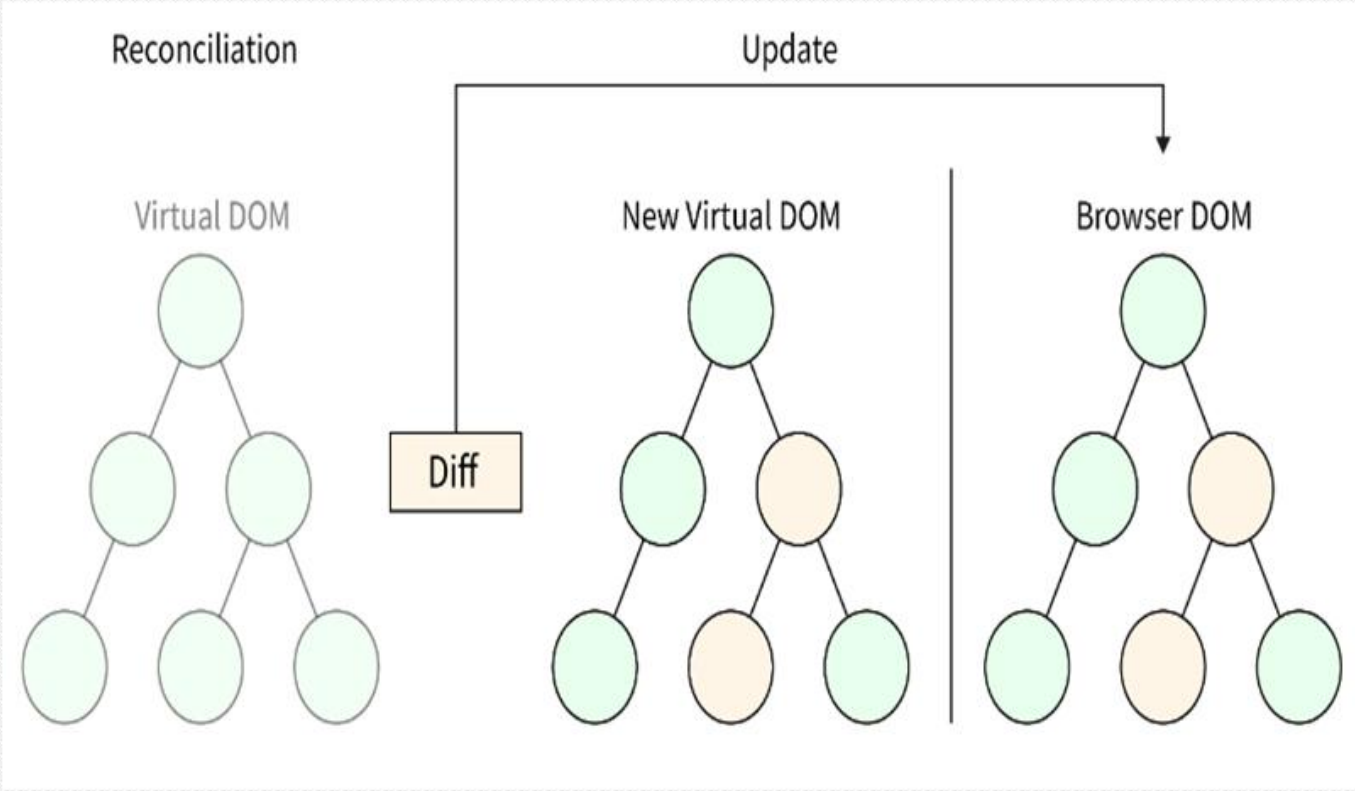
- A **DOM** or Document Object Model is the **structured form of HTML** elements present on a webpage. Javascript is used to manipulate DOM to show modified or dynamic content on the web page.
- Virtual DOM is a **lightweight copy** of the Real DOM stored in the memory.
- React uses the **virtual DOM** represented as a **tree**. Each element acts as a **node** of this tree.
- The manipulation of real DOM is **slow**. So whenever changes are made to the webpage content, the changes are **first made in the virtual DOM**. This also answers the question of why to use React js.
- After making all the changes in the virtual DOM, it is compared with the real DOM. This gives the necessary changes that are needed to be made.

Virtual DOM



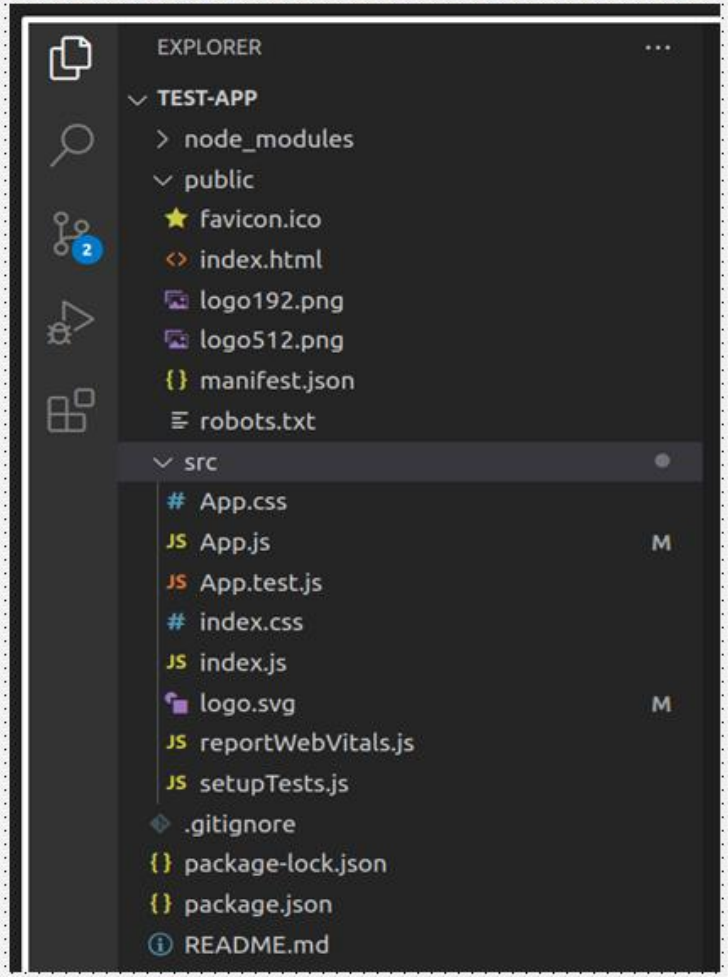
- React tries to use the best way to manipulate the DOM so that minimum elements are changed, and minimum operations are needed.
- Each component may contain a **state**, and whenever the state changes, React updates the **virtual DOM**.
- React maintains **two** virtual DOMs at a time. One is updated, and one is the previous DOM.
- **Diffing** is the process in which React **compares** the two versions and **updates** the necessary elements.
- React updates the browser's **real DOM** efficiently. This is known as **Reconciliation**.

Virtual DOM


Reconciliation
Update
Virtual DOM
Diff
New Virtual DOM
Browser DOM

Folder and file structure

- **create-react-app** gives us everything we need to develop a React application. Its initial file structure looks like this:



- **node_modules**

  This folder contains the files of packages that are required to run the app (dependencies). This folder is managed by npm.

- **public**

  This is the entry folder of the project. All assets that can be directly accessed via urls are placed in this folder.

Folder and file structure

- **favicon.ico**

This image is shown on the left of the next to the page's title on the tab, when the website is loaded.

- **index.html**

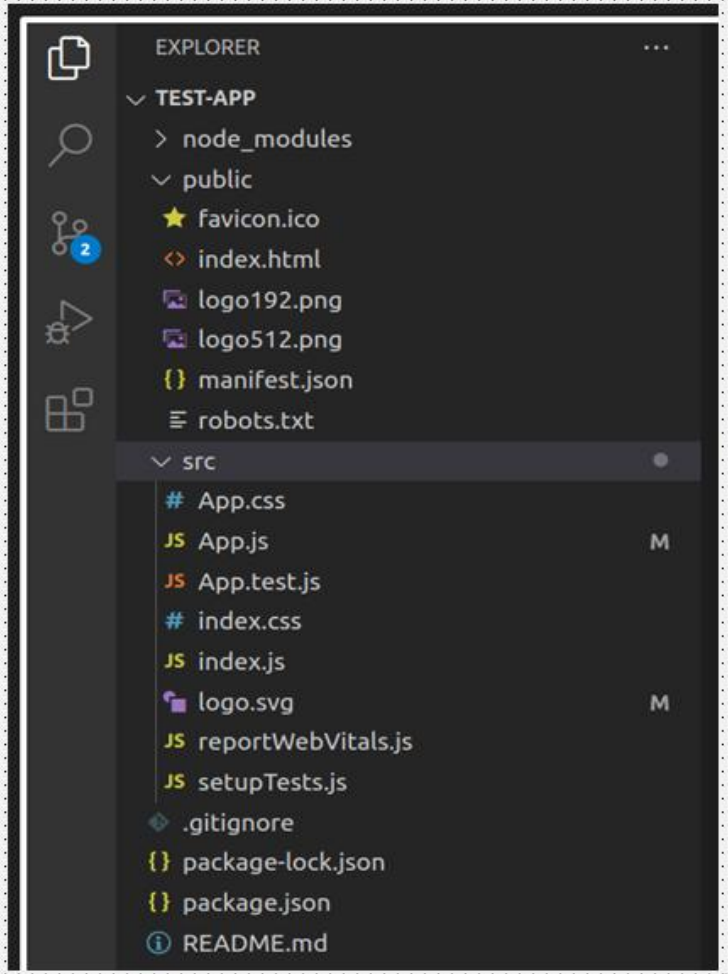
This is the html wrapper for our components.

- **manifest.json**

This file describes your application when it is used as a web app in mobile phones.

- **robots.txt**

This file is used to manage the crawler behaviour.



Folder and file structure

- **src**

  The src directory is where we'll spend most of our time, as it is where the source code for our application lives.

  - **App.css**

    This file contains the styles specific for the app component.

  - **App.js**

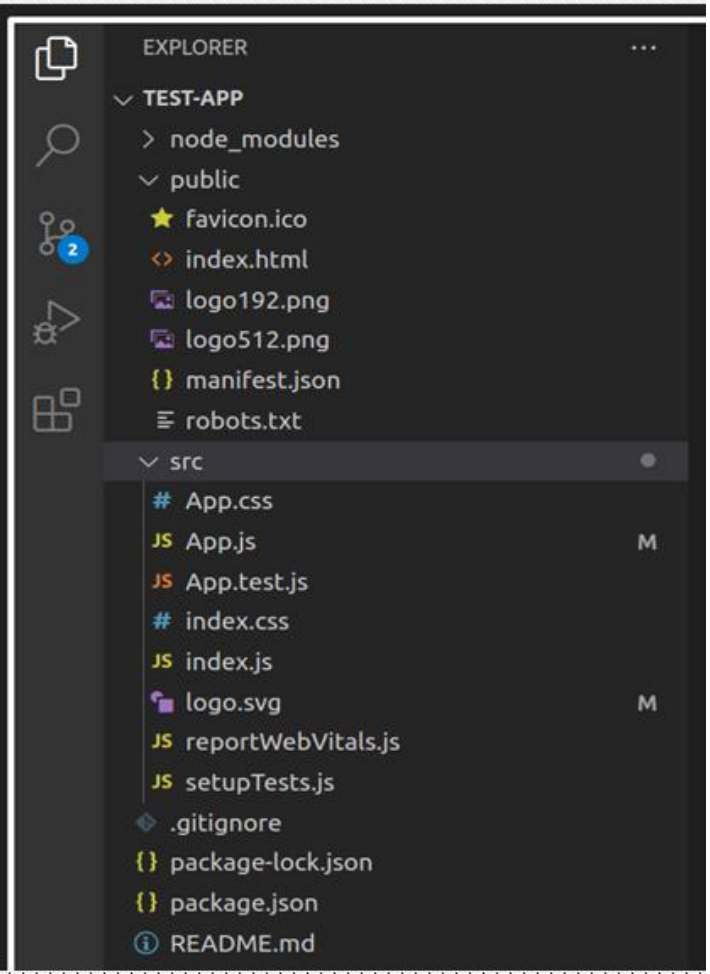
    This file contains the code of the app component. This component is the root component of the app. That is the entire application is contained within this component.

  - **App.test.js**

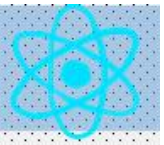
    This file contains the test scripts of the app component.

  - **index.css**

    This file contains the global styles. The styles written here will be applied to all the components in the app.



Folder and file structure



- **index.js**

  This file contains the global styles. The styles written here will be applied to all the components in the app.

- **reportWebVitals.js**

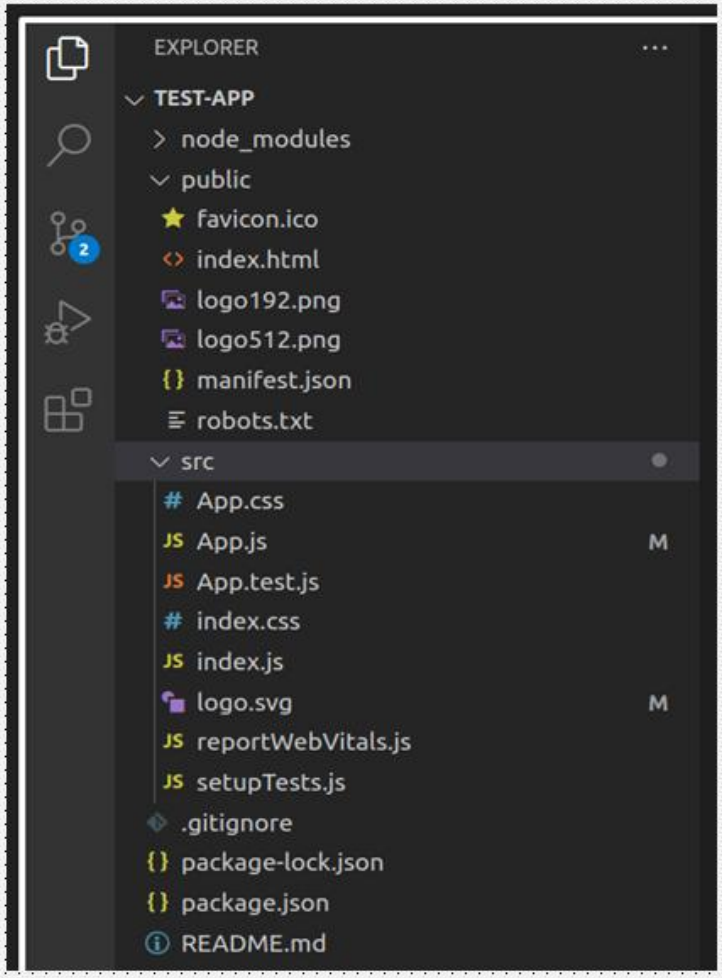
  This file contains the global styles. The styles written here will be applied to all the components in the app.

- **reportWebVitals.js**

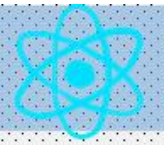
  This file contains the performance monitoring scripts.

- **setupTests.js**

  This file is used to setup test of the entire application.



Folder and file structure



- **.gitignore**

  This file contains the file paths that should not be included in the git repository.

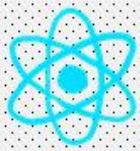
- **package.json**

  This file contains information about our project that Node.js/npm uses to keep it organized. This file is not unique to React applications; create-react-app merely populates it. When we want to share this application with anyone we dont usually share the node modules folder. Because we always can make the node modules folder with the package.json file using the commange `npm install`

- **package-lock.json**

  This file contains the dependencies of the react appThat are already installed

The public directory contains files that will be read by your browser while you are developing the app; the most important of these is index.html. React injects your code into this file so that your browser can run it. There is some other markup that helps create-react-app function, so take care not to edit it unless you know what you're doing. You very much should change the text inside the



Thank You!