Introduction to React. 35th Day {35%}

React is a JavaScript library used to build the user interface for web applications. React was initially developed and maintained by the folks at Facebook, which was later used in their products (WhatsApp & Instagram). Now it is an open source project with an active developer community.

Popular websites like Netflix, Airbnb, Yahoo!Mail, KhanAcademy, Dropbox and many more use React to build their UI. Modern websites are built using MVC (model view controller) architecture. React is the 'V' in the MVC which stands for view, whereas the architecture is provided by **Redux** or **Flux**. React native is used to develop mobile apps, the Facebook mobile app is built using React native.

Facebook's annual F8 Developer conference 2017, saw two promising announcements: **React Fiber** and **ReactVR**. React Fiber is a complete rewrite of the previous release focusing on incremental rendering and quick responsiveness, React Fiber is backward compatible with all previous versions.

ReactVR is built on top of React Native frameworks, it enables developing UI with the addition of 3D models to replicate 360–degree environment resulting in fully immersive VR content.

Why Learn React.

React is among the easiest JS libraries you can start with. Conventional Vanilla JavaScript is more time–consuming, why waste time writing lengthy code when u can get things done smoothly with React. React has over 71,200 stars on GitHub, making it the 4th most starred project of all time(Dated 1st May 2020).

ReactJS Key Terminology.

JSX (JavaScript Extension)

JSX Allows us to include 'HTML' in the same file along with 'JavaScript' (HTML+JS=JSX). Each component in React generates some HTML which is rendered by the DOM.

ES6 (ES2015)

The sixth version of JavaScript is standardized by ECMA International in 2015. Hence the language is referred to as ECMAScript. ES6 is not completely supported by all modern browsers.

ES5(ES2009)

This is the fifth JavaScript version and is widely accepted by all modern browsers, it is based on the 2009 ECMA specification standard. Tools are used to convert ES6 to ES5 during runtime.

Webpack

A module bundler which generates a build file joining all the dependencies.

Babel

This is the tool used to convert ES6 to ES5. This is done because not all web browsers can render React (ES6+JSX) directly.

Major React Features.

Learning Curve

React has a shallow learning curve and it is suitable for beginners. ES6 syntax is easier to manage especially for smaller to–do apps. In React, you code in the 'JavaScript' way, giving you the freedom to choose your tool depending upon your need. Angular expects you to learn one additional tool 'typescript' which can be viewed as the 'Angular' way of doing things. In 'Angular' you need to learn the entire framework even if you're just building a simple UI application.

The Simplicity Of Virtual DOM

In contrary to the actual DOM, react makes use of the Virtual DOM. Virtual DOM utilizes a differential algorithm for making calculations. This relieves the real DOM which can then process other tasks. Let me illustrate this with an example.

Now consider there are 10,000 nodes out of which we only need to work on 2 nodes. Now most of the processing is wasted in traversing those 10,000 nodes while we only operate on 2 nodes. The calculations are done by the Virtual DOM to find those 2 nodes and the real DOM quickly retrieves them.

Performance

When it comes to performance, React sits right at the top. React is known for its superior rendering speed. Thus the name “React”, an instant reaction to change with minimum delay. DOM manipulation is the heart of a responsive website, unfortunately it is slow in most JavaScript frameworks. However, Virtual DOM is implemented in React, hence it is the underlying principle behind React’s superior performance.

Size

As we already said, React is not a framework, thus features may be added according to the user’s needs. This is the principle behind the light–weight applications built on React – pick only what is needed. Webpack offers several plugins which further minimize (minify) the size during production, The React + Redux bundle minified constitutes around 200 kb whereas its rival Angular is almost four times bigger (Angular + RxJS bundle).

Debugging

There will be a point when a developer goes through a roadblock. It could be as simple as a ‘missing bracket’ or as tricky as a ‘segmentation fault’. In any case, the earlier the exception is caught the lesser is the cost overhead. React uses compile time debugging and detects errors at an early stage. This ensures that errors don’t silently turn up at run–time.

Facebook's unidirectional data flow allows clean and smooth debugging, fewer stack traces, lesser clutter and an organized Flux architecture for bigger applications.

ReactJS Installation.

Step 1: Install NodeJS and NPM:

Go to https://nodejs.org/en/ and download the latest version of NodeJS LTS with Administrator privileges.

Step 2: Install any Text editor of your choice, we will use Visual Studio Code:

Go to https://code.visualstudio.com/ and download the latest version or VS Code. run VS Code and it should recommend to install Git. Follow instructions to install Git for your operating system.
After installation, should be able to get version of git.

Check git version:

```
git --version
```

Check nodejs version:

```
node --version
```

Check node package manager(NPM) version:

```
npm --version
```

Each should give versions you installed.

Install React from terminal.

Use can open cmd or PowerShell if you are on Windows 10, and run it as administrator to grant admin privileges and run following command to install CRA (CREATE-REACT-APP).

```
npm install -g create-react-app
```

If successful, you should be able to get version using the following command:

```
create-react-app --version
```

Follow the following steps to create and run a Demo app:

1). Use CRA CLI to create you app starting point.

```
    create-react-app  projectname
```

2). Navigate to your project folder.

```
    cd projectname
```

3). Use nope package manager to run your app.

```
npm start
```

Expected output in terminal also note that it should auto open browser to port 3000:

Compiled successfully!

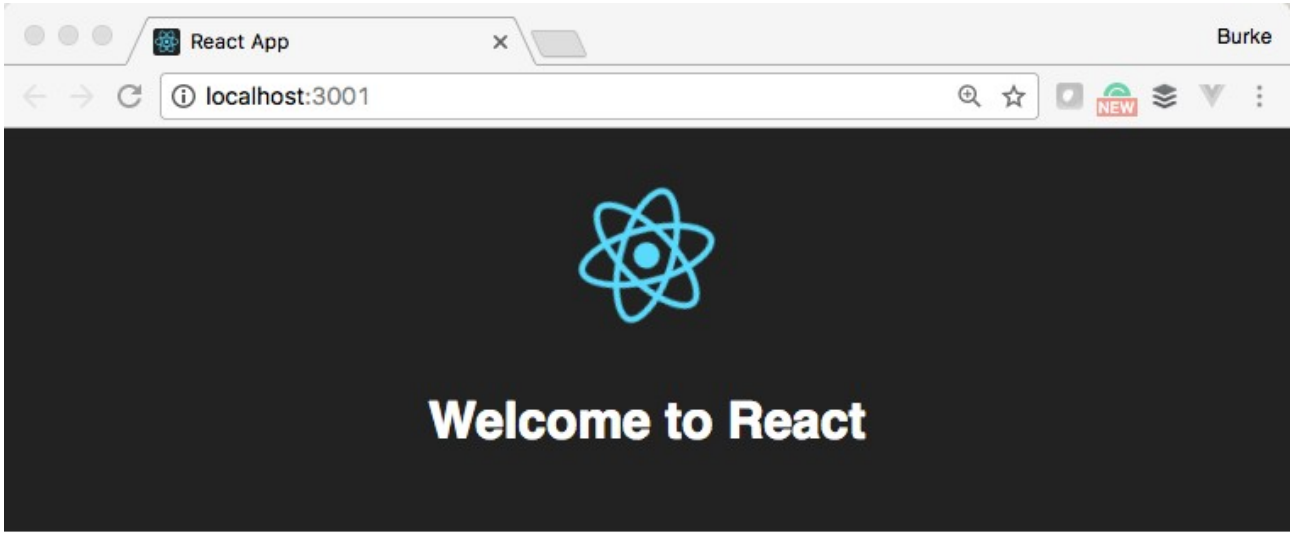
You can now view project_name in the browser.

Local: http://localhost:3000/

On Your Network: http://<your_ip_address>:3000/

Note that the development build is not optimized, to create a production build, **use yarn build**.

Expected output on the browser:



To get started, edit `src/App.js` and save to reload.

The following figure shows how the file structure should look once you have successfully installed React,created an app and opened in your favorite text editor:

projectname

```
├── README.md
├── node_modules
├── package.json
├── .gitignore
├── public
|    └── favicon.ico
|    └── index.html
|    └── manifest.json
└── src
     └── App.css
     └── App.js
     └── App.test.js
     └── index.css
     └── index.js
     └── logo.svg
     └── registerServiceWorker.js
```

You can use Facebook official react docs:

https://reactjs.org/docs/getting-started.html#learn-react

Best Wishes Lux Tech Academy (LTA)