

Frontend development using React JS.

Abstract

Before starting frontend development, we should have a knowledge about the evolution of web. In late 1980's web 1.0 was started where people use to create websites which contains information. The users used to get information via these websites. The websites during web 1.0 were static which means there was only one way communication. The user has no role except reading the content given on the websites. This web 1.0 sustained till 2005, but after that those websites are of no use and the user traffic got reduced. In early 2000 web 2.0 slowly came into picture which was going to be a big revolution in the world of internet. These websites were dynamic in nature. There is a two way communication between the websites and users. The users can participate while using the web app. The user interactivity was increased in web 2.0. In Web 2.0 people can retrieve and contribute to the content present in websites. This web 2.0 gave rise to the creation of social media websites where people consume the content present on the website and also contribute to the website via posting, sharing life stories etc.

Introduction

Frontend development is related to the development of the website using frontend technologies like HTML, CSS and JS. This deals with the looks, design and feel of the websites. Here user's interaction and experience is very important for a website to succeed. It is very important to have a design layout of the website we are going to create.

The three technologies :

- 1) HTML (Hyper Text Markup Language) - is a programming language helps in creating the basic skeleton of the website. We can think of it as chassis of a newly built car, it quite similar to this. It helps in creating the basic structure of the website.
- 2) CSS (Cascading Styles sheet) - is a programming language helps in giving styling to the text, layout of the page. We can correlate this with the color, other design of a car. It basically gives the look and design to the website.
- 3) JS (Javascript) - is a programming language helps in creating interactive websites using both html and css. It deals with the dynamic behaviour of the website (eg - clicking of a button)

With change in time the technologies are also evolving, so there are several javascript frameworks which helps in making our tasks easier for creating websites. Some JS frameworks are React, Angular, Vue etc. For our project we used React to build our frontend of the project.

React is a javascript framework, which was created and maintained by facebook. It is a lightweight javascript framework for creating websites. It helps in creating one page application which gives faster interaction for the users. It reduces the waiting time of users. It has several packages helps which makes easier for building the web application. React gives us the best way of adding dynamic properties to the web app. It does not re-renders the whole page whenever we click something that has dynamic behaviour.

Literature Review

Junda Lou wrote a paper on “Frontend Web Project: A learning resource Platform”. It aimed to provide learning resource searching and overviewing, with a focus on the web Frontend [1]. Here he explained about the evolution of the frontend technologies in recent years. He also described the architecture and how to implement the frontend technologies. He also briefed about the restful api in his paper.

Sanchit Aggarwal wrote a paper on “Modern Web development using React Js”, there he explained about the features of new javascript framework React, what are its advantage over other frameworks [2]. He also mentioned some of the disadvantages of using React like the complexity of app increases with increase in the use of inline templates.

In early 1990's HTML was the only technology used for creating the websites, at those times creators were able to create static websites only, there was no dynamic properties associated with it. Users were only able to read from the website. There is no interaction between the users and the web app. The pages built on simple HTML contained only texts.

To add some styling, some researchers came up with a technology that is css which helped the creator to add various styling which enhanced the look of the websites. In late 1970's css was introduced which was added to html element which improved the design and look of the complete websites.

After some times researchers thought of making the websites more interactive, so to make the website interactive they introduced javascript which supported both html and css. By adding javascript it increased the dynamic behaviour of the web app. The websites became more interactive and users were able to contribute their part, which was biggest revolution in the world of internet.

Features of React Js.

Modularized :

React helps in dividing our web app into small modules known as components. These components help the developer to easily modify the contents and make the work faster. The code complexity gets reduced by dividing the whole code into several components. It helps to understand the codebase easily. Each component is connected with each other. All the similar functionalities are kept under a single component which helps in easier maintenance of the code. The error detection in the code becomes faster for the developer.

Virtual DOM :

We know about the Document Object model created by our browsers whenever we create a web application, but the virtual DOM is an exclusive feature that is available only in React Js. Whenever there is a change made in the codebase, the change is not directly visible on the DOM created by the browser rather than that the changes are updated in Virtual DOM. There is a function which finds the dissimilarity between the DOM (browser) and Virtual DOM, renders only those differences that are not updated in browser DOM. This gives an edge to the webapp built using React Js because it ultimately increases the speed and improves the usability of the product.

JSX:

JSX (Javascript Markup language) is a kind of combination of javascript and markup language. It helps in creating react elements which is the basic building block of a webpage, which is very much similar to that of html elements. Developers use JSX because it makes easier for them to build react elements faster.

Methodology

Here in this section we will be having a walk around of how a web app is created using React Js.

First of all we need to have node.js which will help in running our javascript code.

1. Install Node.js

Node.js is a runtime environment which helps in running javascript code outside the browser [3].

```
nikhil@nikhil-Lenovo:~$ sudo apt update
[sudo] password for nikhil:
Hit:1 http://packages.microsoft.com/repos/code stable InRelease
Hit:2 http://repository.spotify.com stable InRelease
Hit:3 https://packages.microsoft.com/repos/ms-teams stable InRelease
Hit:4 http://ppa.launchpad.net/wireshark-dev/stable/ubuntu focal InRelease
Ign:5 http://packages.linuxmint.com uma InRelease
Hit:7 http://packages.linuxmint.com uma Release
Hit:8 http://dl.google.com/linux/chrome/deb stable InRelease
```

```
nikhil@nikhil-Lenovo:~$ sudo apt install nodejs
Reading package lists... Done
Building dependency tree
Reading state information... Done
nodejs is already the newest version (10.19.0~dfsg-3ubuntu1).
The following packages were automatically installed and are no longer required:
  linux-headers-5.4.0-120 linux-headers-5.4.0-120-generic
  linux-headers-5.4.0-91 linux-headers-5.4.0-91-generic
  linux-image-5.4.0-120-generic linux-image-5.4.0-91-generic
```

```
nikhil@nikhil-Lenovo:~$ node -v
v14.17.6
```

2. Install node package manager:

After installing node.js we have to install the node package manager which helps in installing several packages which is required while developing a website.

```
nikhil@nikhil-Lenovo:~$ sudo apt install npm
Reading package lists... Done
Building dependency tree
Reading state information... Done
npm is already the newest version (6.14.4+ds-1ubuntu2).
The following packages were automatically installed and are no longer required:
  linux-headers-5.4.0-120 linux-headers-5.4.0-120-generic linux-headers-5.4.0-91 linux-headers-5.4.0-91-generic linux-image-5.4.0-120-generic
  linux-image-5.4.0-91-generic linux-modules-5.4.0-120-generic linux-modules-5.4.0-91-generic linux-modules-extra-5.4.0-120-generic
  linux-modules-extra-5.4.0-91-generic
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
```

```
nikhil@nikhil-Lenovo:~$ npm -v
6.14.15
```

3. Create a react app

After installing the node.js and node package manager which are the prerequisite for creating a react app, we are ready to create a react app by running the following command in the terminal. While creating a new react app we have to give the name for the app which we are creating. The name cannot have any capital letters.

```
nikhil@nikhil-Lenovo:~/Documents$ npx create-react-app digitalit-page
npx: installed 67 in 4.441s
```

Output:

```
Success! Created digitalit-page at /home/nikhil/Documents/digitalit-page
Inside that directory, you can run several commands:

  npm start
    Starts the development server.

  npm run build
    Bundles the app into static files for production.

  npm test
    Starts the test runner.

  npm run eject
    Removes this tool and copies build dependencies, configuration files
    and scripts into the app directory. If you do this, you can't go back
```

4. To start the server

For starting our app in local host we need to write the following command on the terminal having path of the current react-app.

```
nikhil@nikhil-Lenovo:~/Documents/digitalit-page$ npm start  
  
> digitalit-page@0.1.0 start /home/nikhil/Documents/digitalit-page  
> react-scripts start
```

5. Look of initial react web application

After following all these initial steps this the starting point of the react app, from here onwards we can add different styling, layout and properties to our app.



Edit src/App.js and save to reload.

[Learn React](#)

Conclusion

Web Development is related to development of web application which can be deployed over the web servers and users over the internet can consume the content provided by the application. Web Development is basically divided into 2 parts frontend development and backend development. Frontend development deals with development of that part of application which will be directly visible to the users. How an application will be visible to the user is the frontend of the application. Backend development basically deals with the management of database and functionality of application. It is responsible for how the application will change after some instructions is given to the application.

From this report we get to know why React is a better javascript framework for developing web app. The exclusive features that it has (modularization, JSX, virtual DOM) makes it a one step ahead of other frameworks that are currently available. React js is a lightweight framework than angular js. The modularization feature that it has which helps the developer to divide the whole code into several modules. Modularization ultimately helps in easier debugging of errors from the code. The code cleanliness and readability increases.

React helps in adding dynamic properties to the components without re-rendering the whole page. It only re-renders the particular component so the whole page does not get re-renders. This feature ultimately improves complexity of application and makes the application faster. React is also easier for any beginner to use and build there webapps, since React is completely based on JavaScript so we do not require any other scripting language to use react. But contrary to that Angular requires both the knowledge of Javascript and Typescript which makes it makes it difficult to use for a complete beginner.

We also got to know why web 2.0 is great revolution to the whole internet world. It gave the power to the users to consume and also contribute back to the web application. It created a kind of two way communication between the users and the webapp. The late 90's static websites are completely overtaken by the dynamic websites of current generation. Web 2.0 gave rise a number of social media web applications some of them are whatsapp, instagram etc. These applications were great creation by web developers in the web 2.0 era.

This paper also describes the steps to create your first web application using reactjs.

References

[1] Lou, Junda. "FRONTEND WEB PROJECT: A LEARNING RESOURCE PLATFORM." (2021).

[2] Aggarwal, Sanchit. "Modern web-development using reactjs." *International Journal of Recent Research Aspects* 5.1 (2018): 133-137.

[3] Wikipedia contributors. "Node.js." *Wikipedia, The Free Encyclopedia*. Wikipedia, The Free Encyclopedia, 6 Jul. 2022. Web. 17 Jul. 2022.