React JS – UI for Modern Web Development

USHA B S

Student, Master of Computer Applications, Bapuji Institute of Engineering and Technology, Davangere, Karnataka, India

Abstract- *ReactJS is a component based library which is deployed for the development of interactive and reusable user interfaces. Currently it is the most popular front-end JS library. React basically enables development of large and complex web based applications which can change its data without subsequent page refreshes. This paper talks about how react.js is helping in the building those application and what advantages it is having in building the front end. With more than 1,400 developers and over 92,000 sites making use of React.js to build their websites it wouldn't be an overstatement to call React the future of front-end development.*

INTRODUCTION

React JS is an open-source JavaScript library built to develop UI's for web applications. It is designed at Facebook by Jordan Walke, a Software Engineer in 2011 but released to the public in the month of May 2013. According to React official documentation, following is the definition: **React is a library for building modular user interfaces**. Using reusable components helps developers to design rich UI's. React JS incorporates with View part from M-V-C (Model-View-Controller) model. React JS implements One-Way data flow so that it gets easier than traditional data binding.

React basically enables development of large and complex web based applications which can change its data without subsequent page refreshes. React uses virtual DOM, thus offering a simple, performing and robust application development experience. React renders on server side using NodeJS.

FEATURES

- *Short and Easy Learning Curve*

The straightforward and non-complex nature of ReactJS empowers one to rapidly get settled with the framework. The developer can learn the code with no difficulties. The easy and non-complex nature of ReactJS enables one to quickly get comfortable with the framework. The learning curve is extremely easy and gets one along without any complications. The idea of using JSX feels to be an entirely natural and pleasing phenomenon that a developer gets along with the framework very easily. Initial levels of expertise in the framework can easily be achieved without any complications.

- *One-way Data Flow*

ReactJS is featured with one-way or unidirectional data flow between the states and layers in an application. This means data can flow in a single direction between the application states and layers. This was done as the components need to be immutable and data within them must not change under any circumstances. The advantage is to give you better control through the application. It is on the grounds that components should be unchanging and the information inside them can't be changed.

- *JSX*

JSX is language that is basically similar to a blend of JavaScript and XML. It is not compulsory to use JSX while building up a react based application however it is exceptionally famous between the developers as it is a short hand that makes improvement simple, at whatever point they are composing mark-ups for parts and the relating restricting occasions. JSX lets you determine the DOM components before the components directly

within JavaScript records. This is such a good thought when different structures are assuming lines to position them.

- *Virtual DOM*

Another key element of ReactJS is the virtual DOM (Virtual document object model). It is like the document object model created by the browser but with a difference that it is stored it memory. Prior to the appearance of Virtual DOM in JavaScript structures, it was wasteful to perform DOM activities, for the presentation as well as for the designers. The working of virtual DOM is very basic. Whenever a request for changing the page content is made, the changes are reflected to the memory residing virtual DOM first. After that an algorithm compares the two i.e. the virtual DOM and the browser DOM and then the required changes only are reflected to the browser DOM, instead of re-rendering the entire DOM. This gives an enormous lift to the exhibition of utilization, basically when a huge number of information changes are to be made.

- *Performance*

ReactJS is known to be a proficient performer. React gives a much effective and light weight document object model. The purpose of this is that it deals with a virtual DOM. When a huge lump of information is to be adjusted, the presentation gets seriously influenced. The DOM is a cross-stage and programming API that manages HTML, XML, or XHTML. The DOM exists all together in memory. Because of this, when we make a component, we didn't compose it straightforwardly to the DOM. All things being equal, we are composing virtual parts that will transform into the DOM prompting smoother and quicker execution.

NPM PACKAGES FOR REACT

NPM (Node Package Manager) is a package manager for node. It assists with introducing different packages and settling their different conditions. Utilizing npm packages in your venture can diminish the measure of time expected to accomplish the errand. The absolute most broadly utilized npm packages are given here –

- ***React Router:***

It is a tool that permits you to deal with routes in a web application, utilizing dynamic directing. Dynamic routing happens as the application is rendering on your machine, dissimilar to the old directing design where the directing is taken care of in an arrangement outside of a running application. It gives diverse steering components as indicated by the requirements of the application and stage.

Installation – **npm install –save react-router-dom**

- ***Create React App:***

It is a CLI (Command Line Interface) tool that doesn't require any building configuration. So it gives ReactJS engineers an extraordinary head start when dealing with React ventures as it empowers the designers to produce their own standards. The instrument collects the parts and records expected to construct, test, and dispatch an application. Thusly, it radically lessens the time and exertion put resources into the advancement cycle. One can start the application building measure by essentially running a solitary order and no more complexities are involved.

Installation – **npm install create-react-app –g**

- ***Material UI:***

Material Design is a language of plan that was presented by Google in 2014 for making complex, responsive, and portable applications. To invoke material design in a React web-application, we have to install the Material UI library in the application. This will provide us with a bunch of parts that we can use in building our application. We can likewise customize the subject and components of the Material UI library. The elements of Material UI are autonomous in nature and solely implement the design they have to display. This leads to performance enhancements in the applications. In addition to that, it has very strong community support.

Installation – **npm install –save @material-ui/core**

- ***React Bootstrap:***

React Bootstrap is a Bootstrap library-based UI toolbox. It gives React Developers more power over reusing and coordinating UI segments. The library is natural to utilize in light of the Bootstrap topics and template. Subsequently, designers can code rapidly and all the more profitably with the assistance of reusable coding strategies. With the assistance of the Bootstrap template, react-bootstrap works consummately with the entirety of the bootstrap subjects which we like to utilize. The plan and the capacity of each component are constrained by the React part. Remembering accommodations, every component is executed.

Installation – **npm install –save react-bootstrap bootstrap**

MATERIAL UI

Material UI is the most powerful and efficient tool to build an Application by adding Designs and Animations and using it with technical and scientific innovation. It is basically a design library that was developed by Google in 2014. This saves a significant amount of time since the developers do not need to write everything from scratch. It uses more Design and Animations, grid-system and provides shadows and lightning effects.It can be used with all the JavaScript frameworks like AngularJS, VueJS, and libraries like ReactJS, to make the Application more amazing and responsive.

Features of Material UI: Material UI provides low-level utility functions called **"style functions"** for building powerful design systems.

- Access the theme values directly
- Provides consistent UI
- Use responsive styles
- Works with any theme object.
- Executed very quickly

Material-UI widgets are heavily inspired by Google's principles on building user interfaces. It is, therefore, easy for developers to build visually-appealing applications.

App Bars: They provide context and are usually always visible as the user navigates around the application. Top AppBar displays the information and actions related to the current screen. By using fixed positioning, AppBar components remain visible even as the user scrolls down the page.

Avatar: React avatar component can be used to display circular user profile pictures. Avatar can be used to portray people or objects. It supports images, icons, or letters. You can use the avatars in different sizes and colours. You can also use CSS borders with root avatar element. The AvatarGroup component can be used to wrap multiple Avatars and provide a condensed view of a max number of Avatars. You can also wrap an avatar component with IconButton to get Button functionality.

Button: Buttons allow users to take actions, and make choices, with a single tap. Buttons communicate actions that users can take. They are typically placed throughout the UI. You can have a button with filled background and with borders. Images and icons can also be used as the buttons.

Cards: Cards contain content and actions about a single subject. Cards are surfaces that display content and actions on a single topic. They must be relevant and actionable information. Elements, like text and images, can be placed on them in a hierarchical manner. You can have outlined cards, media cards. Some cards may have complex interactions also.

Checkbox: It allows the user to select one or more items from a set. Checkboxes can be used to turn an option on or off. If you have multiple options appearing in a list, you can preserve space by using checkboxes. If you have a single option, avoid using a checkbox. You can change the colour of the checkboxes. Based on some conditions, you can disable the checkbox. You can use checkboxes in various sizes also.

Chip: Chips are the element that represents an input, attribute, or action. it allows users to enter information, make selections, filter content, or trigger actions .The most common use will be in some form of input.

Grid: Material UI's Grid layout system is mostly a wrapper around the "CSS Flexible Box module", also known as Flexbox. It adapts to screen size and orientation, ensuring consistency across layouts. It also creates visual consistency between the layouts. MUI's standard UI is based on 12-column grid layout.

Icons: MUI provides three ways of icons support, standardized Material Icons, SvgIcon and custom font Icons. The primary purpose of SVG icons is to define vector-based graphics in XML format. SVG icons are slowly earning the stature of a new standard for web fonts and images. You can have both images and fonts as SvgIcons. Paper component is used to create a flat and opaque layout. It is similar to the Card component, i.e. we can use it as a background for other components.

Typography: Typography is used to present the design and content as clearly and efficiently as possible. It provides a helpful variety of styled text components. The actual React/HTML component to be used is determined by the variant prop. So a variant of h1 renders a <h1>, and so on for h2, h3, h4, h5 and h6. Then, you have subtitle1 and subtitle2 which are variations of h6, and body1 and body2 which are variations of <p> paragraph with font. There is also overline and caption variants which are both smaller font sized components.