

Comparison of JavaScript Frameworks: React.js and Vue.js

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Abstract:- The rising ubiquity of JavaScript has prompted an assortment of JavaScript framework that expect to assist designers with tending to programming errands. Be that as it may, the quantity of JavaScript framework has risen quickly so it is challenging for the developers to distinguish the framework that best met their requirements. For web programmers, it is essential to pick the proper JavaScript framework that not just serves their ongoing web project needs, yet additionally gives code of high quality and good execution. Moreover, there is a lack of information in regards to what drives developers towards the decision. The extent of this work is to give an exhaustive quality and performance test of the most well-known JavaScript frameworks React.js and Vue.js.

Keywords:- Frameworks, JavaScript, Developers, React, Vue.

I. INTRODUCTION

JavaScript programming language has been in presence for a long time as of now and is one of the most commonly known, if not, the most utilized front-end programming language in web improvement. Nonetheless, JavaScript is as yet developing and with the rise of JavaScript Frameworks (JSF), there has been a significant change in how developers develop software these days. Developers these days frequently utilize multiple frameworks to satisfy their work which has led to the issue for developers with regards to picking the right JavaScript framework to create software which is halfway because of the accessibility of innumerable quantities of JavaScript frameworks and libraries. In addition, the utilization of JavaScript is getting more significant for web advancement and in this way, there has been significant contemplations done about the execution part of the JavaScript programming language.[1] There has been an overwhelming interest as of late for incredibly progressed and dynamic web applications, to supplant the old desktop application in all areas. The advancement of web applications is much of the time in view of the utilization of a specific framework and at times mix of frameworks for better execution. These days, single-page applications have become very common, notwithstanding their huge limit with regards to making web and mobile applications.[17] This project involves the comparison of JavaScript frameworks which increasingly have become a cornerstone of web development. This research evaluates the performance of JavaScript

frameworks in order to further expand knowledge and research towards comparing JavaScript frameworks. In simple terms, a JavaScript framework is a web application framework that is written using the JavaScript language. A JavaScript framework differs to that of a JavaScript library in that, a library comes packaged with predefined functions that are ready to be used by developers straight out of the box. On the other hand, a JavaScript framework describes how an application should be built and allows for code to be reusable and more organized which in turn, reinforces the scalability and flexibility of an application.

II. FRONT-END FRAMEWORKS AND LIBRARIES

A. React Js

React is a JavaScript library used to build stateful and reusable UI parts. openly released by Facebook in 2013, and is ideal for setting up present day single-page utilizations of any size and scope.

Many front-end applications rely on global state management to store information, such as who is logged in and other user settings. The most popular project for JavaScript state management is Redux. Most developers use the official React bindings for Redux, which are maintained by the Redux team. Because of React.js popularity, finding input components and ready-to-use elements is extremely easy. They are all just a Google or GitHub search away. The React ecosystem also includes React Native that allows you to build native iOS and Android applications from a single codebase written in React. So, React can be a great choice for building mobile applications using web technologies, too. React is part of the MERN stack, which contains MongoDB, Express.js, React, and NodeJS. The great thing about this combination is that a single language — JavaScript — powers the whole application.[11]-[13]

B. Vue Js

Vue.js is an orderly framework for the improvement of UIs. Vue was intended to be gradually user adoptable. Because of its usefulness, genuinely straightforward expectation to learn and adapt, what's more, capacity to fabricate strong, fast, and refined single-page applications.[17]-[19]

Despite the fact that Redux can be utilized in Vue, there are no authority ties. Yet, that shouldn't concern you on the grounds that Vuex is the authority state the board library made

explicitly for Vue applications. Beside coordinating very well with Vue, it is not difficult to troubleshoot utilizing Vue's designer devices. In the beginning of Vue, it was more diligently to find ready to-use parts. Since the local area has developed, there is a great many info parts and high-level components that you can use to accelerate your turn of events. For mobile application, there is an exceptional project called Weex. Weex is created and utilized by Alibaba, yet it isn't generally so full grown and strong as React Native. In addition, since the undertaking is created and involved more in China, it is more enthusiastically to track down documentation and answers for issues in English. Vue coordinates well with Laravel, and that is the reason they are frequently utilized together. Laravel offers total JavaScript and CSS framework to empower the utilization of Vue in new undertakings.[11]

III. COMPARING REACT JS AND VUE JS

This section focuses on the comparison of the java script frameworks React Js and Vue Js on the basis of different parameters to make a clear view on the both the frameworks.

A. Performance and speed test using a web app

A Todo web app is developed in both the frameworks to test the performance and speed of the same webpage in both the frameworks i.e., React Js and Vue Js.

➤ Performance Test

Webpage.org site is used to test the performance of both the webpages through a waterfall view.

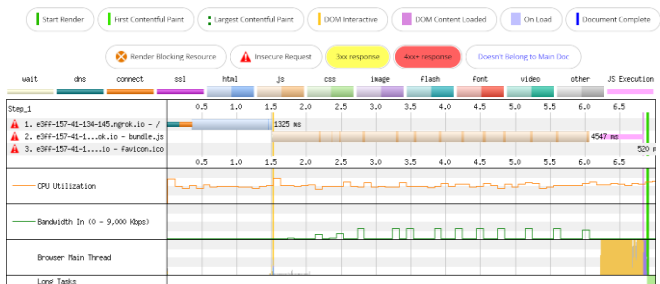


Fig 1:- The waterfall view of React Js app. [20]

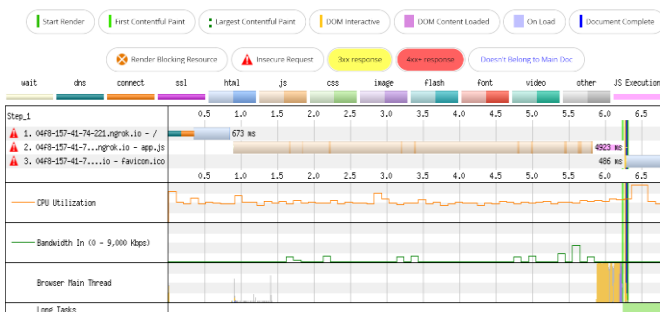


Fig 2:- The waterfall view of Vue Js app. [20]

From the figures 1 & 2, It is observed that both the web apps are very close in case of the time taken to load but in performance, Vue is preferable as the webpage is lighter in size.

➤ Speed test

Pingdom and giftofspeed websites are used to test the speeds of both the webpage.

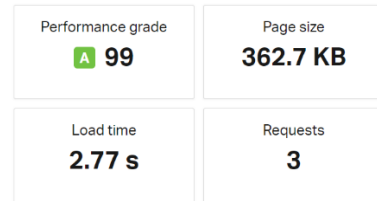


Fig 3:- React Js app speed test in Pingdom. [10]



Fig 4:- Vue Js app speed test in Pingdom. [10]

From the figures 3 & 4, It is evident that Vue Js app is slightly faster as compared to React Js app Due to half the size of React Js app.

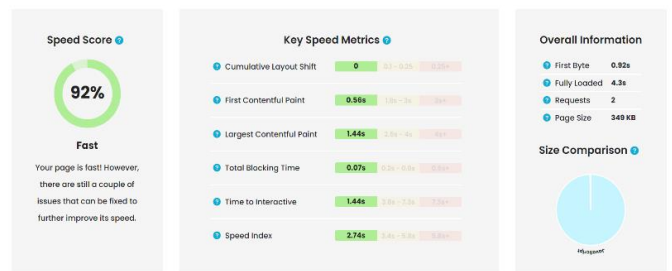


Fig 5:- Speed test of React Js app using giftofspeed.[2]

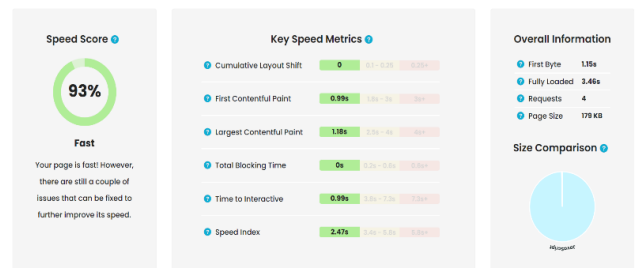


Fig 6:- Speed test of Vue Js app using giftofspeed. [2]

From Figures 5 & 6, It is evident that Vue Takes less time React but its solely due to lesser in size.

B. Secondary Statistics

➤ Github Statistics

GitHub is a development stage that was established in 2008 by Chris Wanstrath, PJ Hyett, Tom Preston-Werner, and Scott Chacon. For every repository seeing the aggregate sum is conceivable of watches, stars and forks, in table 1 underneath information from every framework's repository were accumulated. [3] [4]

	Watch	Stars	Forks
React	6.6k	191k	39.4k
Vue	6.1k	198k	32.4k

Table 1:- Github Statistics. [5] [6]

➤ *Npm Statistics*

Npm, Node package manager, is the biggest programming vault instrument for JavaScript creating, which empowers designers from everywhere the world to use, to acquire or share open source packages for building applications. Npm is based upon three parts, the site, the CLI and the registry. Below is the table 2 which shows the dependents, weekly downloads, unpacked size and total files. [7]

Frame works	Dependents	Weekly downloads	Unpacked size	Total files
React	89,139	14,580,495	316 KB	20
Vue	56,818	3,301,092	2.55MB	33

Table 2:- Npm Statistics. [8] [9]

From table 2, Its clear that more number of people use React Js that Vue Js and React also slightly upper hand due to its much lesser unpacked size and total files as compared to Vue.

➤ *State of java script surveys*

State of JS is a site made by Raphaël Benitte, Sacha Greif and Michael Rambeau. They direct yearly reviews about the state of JavaScript, and that implies inquiring developers about points from frontend frameworks to backend frameworks. Below is the Figure 1 implies the ranking of front-end frameworks including React Js and Vue Js. [14]

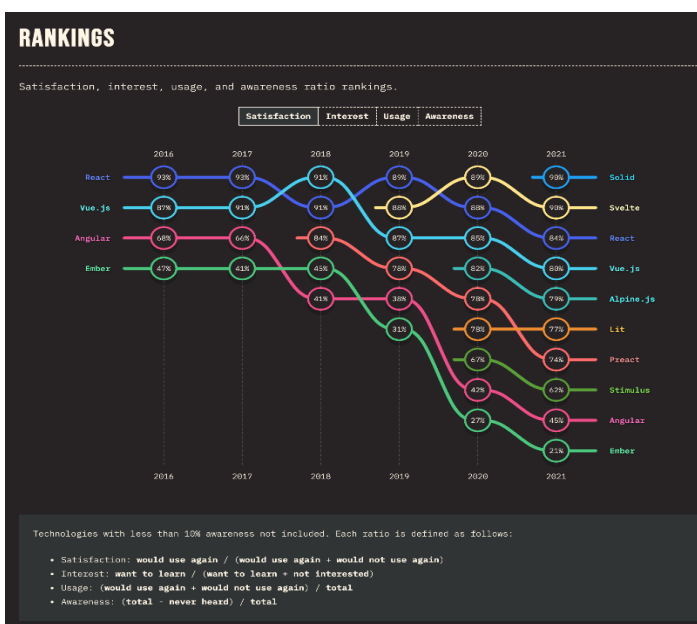


Fig 7:- Rankings of front- end frameworks. [15]

From Figure 7, In case of Likability and usability, Vue is just next to React by the web developers community over the years.

C. *Analysis of the front-end solutions*

There is no question that React and Vue are well known frontend improvement arrangements in present day web development. Notwithstanding, they have various attributes and driven idea. It implies that different business measures need to choose a reasonable framework or library to greatest their application utilization and effectiveness.

➤ *Data Processing*

Data Processing is the fundamental part in front-end improvement since the information handling proficiency and quality choose the client experience in visiting the application.

	React	Vue
Data Binding	One way	One way /Two ways

Table 3 - Data binding in React Js and Vue Js. [21]

Table 3 shows the data binding way in every framework and library. Vue can utilize DOM audience members to accomplish two-way restricting or utilize one-way restricting without DOM audience members. React requirements to process more confounded data stream because of actually take a look at the distinction between virtual DOM and displayed DOM. [21]

➤ *Volume and performance*

Bigger volume implies the framework or library contains more highlights and works, however it will invest more energy on stacking the framework or library.

Activity	React	Vue
Read memory	4.5±0.1 (1.3)	3.8±0.0 (1.1)
Run memory	9.7±0.1 (2.6)	7.5±0.1 (1.9)

Table 4:- Front-end framework and library memory allocation performance. [16]

From Table 4, It is observed that Vue takes less time because of its adaptable and proficient benefits.

➤ *Technical Support*

Technical Support is likewise essential since better help can develop a superior relationship with developer networks which is a fundamental part to extend the framework's standing. React offers solid specialized help and its API is entirely steady. Update and migration are exceptionally straightforward because of the authority scripts to help developers to conclude the connected update. So, React offers relentless specialized types of assistance. In spite of the fact that Vue has straightforward migration and update between various adaptations, there is no normal update plan from the authority group due to the monetary constraint. [21]

➤ *Merits and Demerits*a. *React Js*

Merit –

- React utilizes a virtual DOM that accomplishes ideal productivity by re-rendering nodes as wanted.
- Server side rendering is one more significant benefit of this structure for some sort of executions like substance centered applications.
- Limits client's asset load by offering support for packaging and tree shaking.
- Utilitarian programming of react helps in making reusable code.
- Generally better SEO in examination with vue.js.

Demerits –

- Need to import libraries for state and model as React doesn't carry out MVC.
- React creates some distance from class-based modules and can be a hindrance for Object Oriented Programming (OOP) for developers to feel more loose.

b. *Vue Js*

Merits-

- Vue is quick and very light. It offers benefits that incorporate more noteworthy proficiency for restricted asset PCs, expanded convenience for clients with poor network and a superior by and large client experience.
- Its reactivity is one of the most grounded elements of Vue.js. Connecting information among HTML and JS code has never been simpler.
- Vue is treating two-way powerful information restricting like nothing else. At the point when the information is refreshed, the DOM ought to continuously be adjusted as needs be which is ideally suited for SPA. [17]

Demerits-

- Contrasted with React, Vue.js just has a moderately low piece of the pie, and that intends that data trade in this system is just in the beginning phases.
- Hazard of being over adaptable while coordinating with enormous tasks because of absence of resources.

D. *Discussion*

The analysis shows that the various frameworks capability all around founded on the below application criteria:

Vue.js is more reasonable for applications:

- Light weight applications.
- At the point when there is prerequisite to incorporate into existing applications.
- Where speed is basic boundary.

React is practical framework for applications:

- That require fast action with better performance.
- Applications that require adaptability.
- Best SEO.

IV. CONCLUSION

This Research work aimed to choose a framework by comparing the JavaScript Frameworks and libraries on the basis of different criteria like the performance and speed test of the same web app in both the JavaScript Frameworks, to observe the popularity and the usability of users around the world through secondary statistics and by analyzing the solution of Frameworks through data binding, volume and performance and technical support.

React is sufficiently old to be experienced and has an immense number of commitments from the community. It has acquired inescapable acknowledgment. The work market for React is great, and the future for this framework looks splendid. React looks like a decent decision for somebody getting everything rolling with front-end JavaScript systems, new companies and developers who like some adaptability. The capacity to coordinate with different frameworks flawlessly gives it an extraordinary benefit for the people who would like some adaptability in their code.

Vue is most current to the field, without the support of a significant organization. Nonetheless, it has done well over the most recent couple of years to emerge as competitor for React, and particularly so with the arrival of Vue 3.0. This is maybe assuming a part with a great deal of Chinese giants like Alibaba and Baidu picking Vue as their essential front-end JF. Vue ought to be your decision on the off chance that you favor user-friendliness, yet in addition like adaptability.

To finish up the decision of framework relies upon who is utilizing it, what sort of prerequisites an undertaking has, the assets of an organization, and the areas requests. Thusly, various frameworks will be reasonable for various circumstances.

REFERENCES

- [1]. A Andreas B. Gizas, Sotiris P. Christodoulou and Theodore S. Papatheodorou, "Comparative Evaluation of JavaScript Frameworks ", Proceedings of the 21st international conference on world wide web, april 2012, pages-513-514
- [2]. Giftofspeed, [online] Available at : <https://www.giftofspeed.com/> [Accessed on May,2022]
- [3]. Github, [online] Available at: <https://github.com/> [Accessed on May,2022]
- [4]. Github features, [online] Available at: <https://github.com/features/> [Accessed on May,2022]
- [5]. Github react statistics, [online] Available at: <https://github.com/facebook/react/releases/tag/v0.3.0> [Accessed on May,2022]
- [6]. Github vue statistics, [online] Available at: <https://github.com/vuejs/vue/releases/tag/0.6.0> [Accessed on May, 2022]
- [7]. npm, [online] Available at: <https://docs.npmjs.com/about-npm/> [Accessed on May, 2022]

- [8]. npm react statistics, [online] Available at: <https://www.npmjs.com/package/react> [Accessed on May,2022]
- [9]. npm vue statistics, [online] Available at: <https://www.npmjs.com/package/vue> [Accessed on May,2022]
- [10]. Pingdom website speed test, [online] Available at : <https://tools.pingdom.com/> [Accessed on May,2022]
- [11]. Rajeev Kumar Sinha, "International Journal of All Research Education and Scientific Methods (IJARESM)", Volume 9, Issue 5, May -2021
- [12]. React, [online] Available at : <https://reactjs.org/> [Accessed on May,2022]
- [13]. React docs, [online] Available at :<https://reactjs.org/docs/getting-started.html> [Accessed on May,2022]
- [14]. State of JavaScript Survey, [online] Available at: <https://stateofjs.com/en-us/> [Accessed on May 2022]
- [15]. State of JavaScript Survey Front-end frameworks and libraries, [online] Available at: <https://2021.stateofjs.com/en-us/libraries/front-end-frameworks/> [Accessed on May,2022]
- [16]. Stefankrause Developer Team., 2018, December. Results for js web frameworks benchmark, [online] Available at: <https://www.stefankrause.net/js-frameworks-benchmark6/webdriver-ts-results/table.html> [Accessed on May,2022]
- [17]. Vinuta Hutagikar and Vinay Hegde, "Analysis of Front-end Frameworks for Web Applications", International research journal of Engineering and Technology (IRJET), volume: 07, issue: 04, april 2020
- [18]. Vue, [online] Available at: <https://vuejs.org/> [Accessed on May,2022]
- [19]. Vue docs, [online] Available at: <https://vuejs.org/guide/introduction.html> [Accessed on May,2022]
- [20]. webpage test, [online] Available at : <https://www.webpagetest.org/> [Accessed on May,2022]
- [21]. Yongkang Xing, "Research and analysis of the front-end frameworks and libraries in E-business development", the 2019 11th international conference ,feb 2019