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# Maximizing the efficiency of web projects: An analysis of the influence of frameworks on performance

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**ABSTRACT**
With the exponential increase in the use of digital content and services, companies in the sector are increasingly focused on providing a high-quality experience for their customers. Hartson and Pyla (2012) point out that user experience is made up of five essential qualities: usefulness, functionality, usability, persuasiveness and graphic design.

**Keywords:** Web page, Framework, Efficiency.

## INTRODUCTION

With the exponential increase in the use of digital content and services, companies in the sector are increasingly focused on providing a high-quality experience to their customers. Hartson and Pyla (2012) highlight that user experience is composed of five essential qualities: utility, functionality, usability, persuasiveness, and graphic design.

Performance optimization in the *front-end* It emerges as a crucial issue that directly influences the functionality of websites, affecting users' ability to enjoy a satisfying and responsive experience. Considering that the interface represents the user's first point of contact with the content, it is imperative that companies prioritize the optimization of interfaces to offer an efficient and pleasant experience (NAPOMUCENO; NAPOMUK; SADOK, 2020).

A study conducted by the *Pinterest* revealed that a 40% reduction in load time resulted in a 15% increase in traffic (PAVIC; CHRIS; ANSTEY, 2023). In the midst of this competitive landscape, it becomes crucial for companies to implement optimization techniques in the *front-end*, aiming to ensure a fast, efficient, and satisfactory user experience.

As the development of graphical user interfaces seeks to capture the user's attention, this often leads to the incorporation of multiple components, potentially increasing load times. In this context, this

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study aims to explore some of the main optimization techniques in *front-end*how *lazy loading*, *caching* and data compression, with the aim of reducing load times and comparing them to determine the most effective in optimizing performance in web applications.

A study conducted by the *BBC* demonstrated that a 10% loss of users occurred for each additional second of site load time (PAVIC; CHRIS; ANSTEY, 2023), highlighting the importance of addressing load time in web application interfaces. The analysis and research of these techniques can contribute significantly to the development of more efficient and enjoyable web interfaces, resulting in reduced page load times and improved overall application performance.

The aim of this study is to explore the loading time of graphical interfaces in environments *web* and as the main *frameworks web* help in their performance. The analysis focuses on *frameworks* Popular As *React* and *Vue.js* and in relation to the development of *frameworks*. Although the main focus is on The advantage of using *frameworks* when it comes to overall performance, this research also addresses questions of Pages Operation *web*, aiming to offer *insights* valuable for developers and businesses looking to optimize their applications *web*.

## MATERIALS AND METHODS

The page *web* It is a document accessible through the internet that can contain different types of content, such as text, images, videos, and interactive elements. In the context of this study, the *web* is developed using *TypeScript* for client-side programming logic. *TypeScript* it's an extension of language *JavaScript* which adds static typing capabilities, allowing developers to write more secure and scalable code. In addition, libraries are used *React* and *Vue.js*, being popular user interface frameworks for creating reusable components and building dynamic and responsive user interfaces.

*Microsoft Edge* is a *web* browser developed by *Microsoft*. It is built on top of *Chromium*, the same rendering engine used by the *Google Chrome* browser, supporting modern *web* technologies and open standards. *Microsoft Edge* is known for its speed, security, and integration with *Microsoft* services. In this study, *Microsoft Edge* is used as the default browser to evaluate the constancy and performance of developed *web* pages.

*Google Lighthouse* is an open-source tool developed by *Google* for evaluating the quality and performance of *web* pages. It analyzes various aspects of the pages, including performance, accessibility, good development practices, and *SEO* (*Search Engine Optimization*). *Google Lighthouse* provides detailed reports and suggestions for improvements, allowing developers to optimize their pages to deliver a superior user experience and improve their search engine rankings. In this study, *Google Lighthouse* is used to perform objective evaluations of the quality and performance of web pages developed with *React* and *Vue.js*, using the *Typescript programming language*.

For the tests, three web pages were developed, in a simple format, using *TypeScript* and *HTML*, the second using *TypeScript* and *React* and the third using *TypeScript* and *Vue.js*. The development was done using the same standards for all three pages, containing a high-resolution image, simple API calls, and importing font files.

The tests were carried out in three stages, looking for the minimum, median and maximum score found by *Google Lighthouse*, so a more consistent format of results was found, placing the average of the three test batteries as a result.

**FINDINGS**

The results of the analysis using *Google Lighthouse* offer a detailed view of the advantages that frameworks can provide in terms of performance for *web projects*. When comparing with development without the use of *frameworks*, where only *HTML* and *TypeScript* were employed, with projects that incorporated frameworks such as *React* and *Vue.js*, the differences are remarkable.

For development without *frameworks*, the scores obtained in the three test batteries were relatively stable, but still lower compared to projects using *frameworks*. This suggests that while it is possible to develop functional *web* pages without *frameworks*, the absence of these additional frameworks may result in limited performance.

On the other hand, projects developed with *frameworks* have shown a considerable improvement in performance. The higher scores obtained in these configurations indicate better code optimization, more efficient resource management, and a faster and smoother user experience. Using *TypeScript* in conjunction with *frameworks* such as *React* and *Vue.js* allowed them to consistently achieve higher scores, demonstrating the ability of these tools to boost the performance of *web pages*.

In addition, when looking at the median of the scores, it is evident that developing with *frameworks* offers a significant advantage in terms of performance. With a 17-point difference in the median score between projects developed with and without *frameworks*, it's clear that incorporating these frameworks can result in a substantially better user experience.

In summary, the results highlight the importance of *frameworks* in the development of *web* projects and how their use can contribute significantly to the improvement of performance, ensuring that *web* pages are faster, more efficient and more responsive for users.

## FINAL CONSIDERATIONS

This study highlights the importance of *frameworks* in the performance of *web projects*, demonstrating that the use of *frameworks* such as *React* and *Vue.js* consistently resulted in significant improvements compared to projects developed without *frameworks*. The substantial difference in scores, especially in the median, underscores the positive impact of frameworks on quality and user experience. By opting for *frameworks*, developers can ensure superior performance and a more satisfying user experience in their *web applications*.

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