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Comparative Analysis of Webkit and Non-Webkit Based Browsers and their Future

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ABSTRACT

Web browsers have become an integral part of our daily lives, facilitating access to the vast world of information on the internet. While several web browsers are available, they can be broadly categorized into two groups: WebKit-based and non-WebKit-based browsers. This article provides a comprehensive comparative analysis of these two browser categories, discussing their origins, development, key features, and market share, as well as what the future looks like for both of these categories.

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Introduction

Since its inception in 1983, the internet has experienced significant evolution. The development of this technology has directly influenced the way that the internal is accessed, and how content is interacted with. Over the years, web browsers have undergone continuous development and innovation, resulting in a diverse ecosystem of browsers available to users. One prominent categorization of web browsers is based on their rendering engine, which divides them into two major categories: WebKit-based and non-WebKit-based browsers.

WebKit is an open-source web rendering engine primarily developed by Apple. It powers several well-known browsers, including Safari, Google Chrome (until 2022), and various mobile browsers on iOS. On the other hand, non-WebKit-based browsers use alternative rendering engines, such as Gecko (used in Mozilla Firefox), Blink (used in the post-2022 Google Chrome), and others. This article aims to provide a comparative analysis of WebKit-based and non-WebKit-based browsers, examining their historical development, key features, and market share. It also aims to explore the future potential for both types of browser within the context of the continually developing internet and user expectations.

Historical Development
WebKit-Based Browsers

WebKit was originally created for use on the Konqueror browser's KHTML engine, an open-source project [1]. In 2003, this was adopted and developed for use on Safari, Apple's own web browser [2]. This change helped to enhance the browser and its open-sourcing. This particular shift was pivotal for WebKit-based browsers, and created a solid foundation for future web-rendering technology. The versatility of WebKit enabled it to be adopted by multiple browsers, not just the one it was developed for (Safari). In fact, Google Chrome used WebKit as its rendering engine until 2022 when it transitioned to Blink, a fork of WebKit [3]. WebKit has also been used to power mobile browsers, thanks to its integration into iOS [4].

Non-WebKit-Based Browsers

Mozilla Firefox and Gecko are two examples of non-WebKit-based browsers that have also risen to prominence. Mozilla Firefox was developed by the Mozilla Foundation, and was first released in 2004 [5]. Notably, this browser was seen as an early competitor for the Internet Explorer, which was the main web browser at the time [6]. Firefox utilizes the Gecko rendering engine, known for its robust support of web standards and extensibility [7].

Google Chrome is another non-WebKit-based browser that was initially released in 2008, and has maintained relative popularity [8]. At its inception, Google Chrome did actually employ WebKit, however in 2022 Google forked and introduced Blink as an alternative to provide more control over development [3]. Chromium, an open-source project, serves as the foundation for Google Chrome and several other browsers, including Microsoft Edge [9].

Key Features

WebKit-based browsers are well-known for their optimized performance, particularly on Apple devices. Apple's tight integration of hardware and software allows for seamless rendering and energy-efficient browsing experiences. This has been a key selling point for Safari and other WebKit-based browsers. They also offer a high degree of integration within the Apple ecosystem. This can be attributed to features like Handoff, which allows users to switch between Apple devices seamlessly, and Safari's Reading List, which synchronizes content across devices [10].

A key feature of WebKit has always been its position as a frontrunner in web standards compliance. It has always supported modern web technologies and ensured that web pages are displayed correctly [4].

Conversely, non-WebKit-based browsers have their own key features that make them enticing and useful for developers and also just the general public. Certain non-WebKit-based browsers such as Firefox have gained popularity for their extensive customizability. Users can personalize their browsing experience by installing add-ons and extensions, making Firefox a favorite among users who are aware of its potential [11].

Mozilla Firefox prioritizes user privacy and security by offering robust features. Tools such as Enhanced Tracking Protection and the Facebook Container extension empower users to protect their online privacy effectively [12]. Although safety is a key priority for all types of browsers, Firefox has consistently employed the latest technologies and developments to keep users and their data safe.

Although many developers favor WebKit-based, there are certainly still many that use non-WebKit-based alternatives. Firefox and Chromium-based browsers offer robust developer tools. These tools include comprehensive debugging and inspection capabilities, which aid in web development and testing [13]. These capabilities make them preferred choices for web developers and designers.

Market Share
Market share provides valuable insights into the popularity of web browsers and the preferences of internet users. Currently, the market is dominated by non-WebKit based browsers, as Chrome holds 63.56% of the market share [14]. As seen in Figure 1, Safari holds 20% of the market share, and is the largest WebKit-based browser. The remainder of the market share consists of non-WebKit-based browsers.
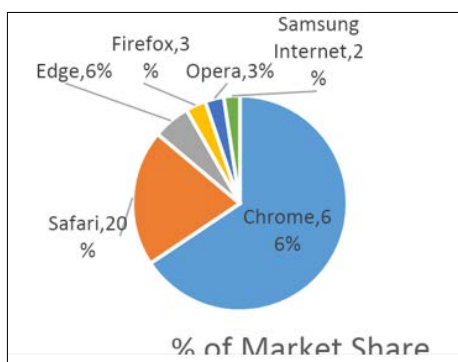

Figure 1: Percentage of the market attributed to each browser [14].

According to StatCounter data from August 2013 to August 2023, WebKit-based browsers collectively held a significant global market share, and this trend has been steadily increasing over the last decade [14]. Non-WebKit-based browsers also held substantial shares, with Chrome leading the way. Here is a breakdown of the market share of these categories, as seen in Figure 2. It is important to note that the fork that shifted Google Chrome from WebKit-based to non-WebKit-based in 2022 has not significantly impacted its market share.
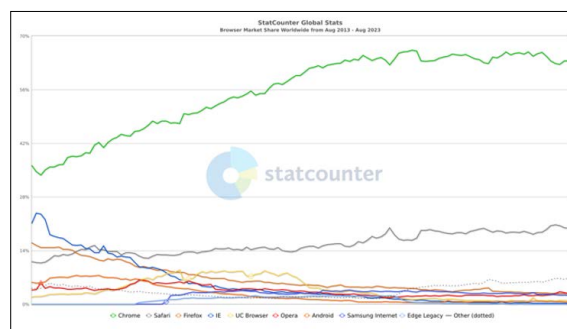

Figure 2: Trends in market shares from August 2013 - August 2023 [14].

Future Predictions
The future of web browsers will be shaped by emerging technologies and evolving user demands. Both WebKit-based and non-WebKit-based browsers have unique strengths that can help them adapt to these changes.

WebKit-Based Browsers
To encourage future growth, WebKit-based browsers can expand their presence on non-Apple platforms. While Safari has made limited appearances on Windows in the past, a more concerted effort in this direction could tap into a broader user base. WebKit-based browsers should continue to develop on their strengths such as standards compliance, to continue to emphasize compatibility with emerging web technologies and standards. This ensures that users have a smooth experience as the web evolves. Equally, they can build their capacities in areas that were historically seen as weaknesses in comparison to non-WebKit-based browsers. For example, Apple has taken notable steps towards enhancing user privacy with features like Intelligent Tracking Prevention [15]. WebKit-based browsers can build upon this foundation by providing users with even more control over their online privacy, attracting users who prioritize this aspect.

Non-WebKit-Based Browsers
Firefox and Chromium-based browsers can further improve their extensions ecosystems by refining the WebExtensions API. Simplifying the development process for extensions will ideally attract more developers, leading to a wider variety of add-ons. At the same time, standardizing web technologies across different browsers can reduce compatibility issues. Efforts like the CSS Grid Layout and Web Components can lead to smoother user experiences and fewer cross-browser inconsistencies [16]. It would also be a good idea to cater to the needs of users, and to predict how these may change or remain the same in the future. It is likely that security will remain a top priority for users, and browsers like Firefox can continue to innovate in this area. Leveraging advanced security features and collaboration with security communities can help ensure safer browsing.

Conclusion
Web browsers are essential tools in today's digital age, enabling users to access and interact with online content. The comparison between WebKit-based and non-WebKit-based browsers has shed light on their historical development, key features, and market share. Both categories have their strengths and have contributed to the diversity of the browser landscape.

The future of these browsers depends on their ability to adapt to evolving technologies and user expectations. WebKit-based browsers can leverage their performance, ecosystem integration, and web standards compliance to stay competitive. Non-WebKit-based browsers can focus on customizability, privacy, and security to retain and expand their user base. In this ever-evolving digital landscape, web browsers must continue to innovate and evolve to meet the changing needs of users, ensuring a seamless and secure browsing experience for all.

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