

Progressive Web Apps vs Responsive Web Apps

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Abstract: *In this research paper, we will investigate the browser compatibility of PWA features and compare and analyse the performance and memory consumption of PWA features compared to responsive web apps. In 2015, the term Progressive Web Applications was coined to describe an application that takes advantage of all the features of a progressive app. Some of the key features include offline support, an app-like user interface, and secure connectivity. Since then, case studies of PWA implementations have shown optimistic promises to improve web page performance, time spent on websites, user engagement, and more. The report is to compare PWAs and RWAs and analyse some of the impacts of PWAs. The results show that many of PWA's features are not yet supported by some major browsers. Performance benchmarks have shown that the https connection required for the PWA slows down all PWA performance metrics on the first visit. With repeated access, some PWA features such as speed indexing are better than RWA. PWA storage consumption has more than doubled its RWA size. In conclusion, there may be a workaround even if some features are not directly supported by the browser. If https is not optimized on the web server, the PWA will be slower than a RWA. Different browsers have different storage limits for PWA caches.*

Keywords: Pattern Recognition, Security, Algorithms

I. INTRODUCTION

The world is moving towards smartphone applications and total activity on mobile phone through web browsing or through app is almost close to 67% which the recent survey had identified. Most of the time the user had been spend in browsing the site through the web browser of smartphone. The interface of most of website are not auto responsive in mobile web browser, the user doesn't feel good about the contents while browsing the application. Even though the mobile browser are trying to become full fleshed software platform, Still as of today the mobile web application struggles to provide eye pleasing and satisfactory experience to the user because of lack of strong network connection across the various area.

Therefore, Progressive Web Apps(PWA) is a new technology designed and developed by Google to overcome the limitation of mobile browsing and native applications. PWA can be launched by clicking on an icon on the home screen of the device just like how one goes with native apps [1],[2],[3]. PWA's get instantly loaded on screen regardless what kind of network connectivity is available in area they support the splash screen through push notifications [1],[2],[3].

PWA are an open-source initiative that uses the most up-to-date web capabilities to offer app-like capabilities to users, without them having to download an app. They are more reliable even in the flaky network, have a faster response time to the user's interaction, and are more engaging to users as compared to the responsive websites.

PWA's are dependent, takes up less storage space and updates just like a web page- so that the users can see the update functionality which may include such as Bluetooth, webcam, microphone and other hardware sensors [1],[3].

Responsive Web Apps(RWA) is a name given to the set of techniques applied at the level of the layout, so that it allows a website to adapt itself to any device or width of screen. Another name used to describe this set of techniques is "Adaptive Web Apps". According to Harry Roberts and Paul Gordon, this name would match more since "the website really adapts to the device, rather than responding continuously to changes in its environment" [4]. Users always seeking for better experiences at your site no matter what types of devices they have been used and what type of network they have been but they expect better experiences. You need to be set certain strategy which meets users' expectations, unrealistic they may be. Responsive webs make a strategy which completes the expectations of people while working well on devices but not sufficient enough [4].

Section II written on Literature Survey of PWA and RWA. In Section III, Methodology mentioned comparison of PWA and RWA followed by Section IV. Result and Section V Conclusion.

II. LITRATURE SURVEY

For a few years it looked like the old, dirty mobile Web was going to die. Adaptive and responsive design came to make full websites look good on mobile with rich and immersive experiences. The “mobile” bit was going to be stripped out and all we were left with was the Web, in all its glory, from any device we decide to access it. But it now looks like the mobile Web is making a comeback. Instead of breaking down barriers between the mobile Web and the full Web, a group of technology companies is working to try and make the mobile version of the Web faster. Native Apps on mobiles are fast whereas the mobile websites are comparatively slow.

In 2016, this particular problem of Web and native App was prime conversation during all the discussion and conference. Researcher around the world was planning to launch a new way of programming which will help fill this gap of Web and Native Apps. Putting by a summary, PWA launches as a new tab in browser and progress similar to like “app” where most of the people are used for native app. We can have various pin points so that one can go to home screen or an application from the app drawer by using notifications and also by using offline access. PWA are just like native app in terms of security and full touch responses.

PWA repair this problem with new internet APIs, new design concepts, and new buzzwords. Progressive Web Apps offers the functions we have come to expect native app for cell browser. It makes use of standards-primarily based technologies and runs in a comfortable field accessible to everybody at the web. In spite of the availability of a totally advanced mobile web app, it's nevertheless hard to provide fun and satisfying user experience, especially because of lack of strong network connection in many distinctive regions/fields. Consequently, Google designed and developed PWA as a new technology to triumph over boundaries of cell browsers and native programs.

RWA are a holistic approach to improving user experience across devices. Since the release of the iPhone in 2007, there has been an explosion of devices capable of displaying web pages. The mobile app technology has a come long way from running only on specific devices to those that are compatible with all platforms. The case with progressive and responsive app is no different that are now being widely used apps by businesses. Both progressive and responsive web apps have their own merits and demerits so choosing one or the other might be challenging for your business requirements [6].

III. METHODOLOGY

Comparison of PWA and RWA is represented in Table 1, the fields of comparison are as follow :-

1. Push Notification - Push notifications are small, pop-up messages sent to a user’s device by a mobile app that appear even when the app isn’t open. These notifications are designed to grab attention and can convey reminders, updates, promotions, and more
2. Adaptive - Adaptive web design (AWD) promotes the creation of multiple versions of a web page to better fit the user's device, as opposed to a single static page which loads (and looks) the same on all devices or a single page which reorders and resize content responsively based on the device/screen size/browser of the user.
3. Add To Home Screen - Add to Home screen (or A2HS for short) is a feature available in modern browsers that allows a user to "install" a web app, ie. add a shortcut to their Home screen representing their favourite web app (or site) so they can subsequently access it with a single tap.
4. High Loading Speed - Page speed is a measurement of how fast the content on your page loads. Page speed is often confused with "site speed," which is actually the page speed for a sample of page views on a site. Page speed can be described in either "page load time" (the time it takes to fully display the content on a specific page) or "time to first byte" (how long it takes for your browser to receive the first byte of information from the web server).

Table 1 is comparison between PWA and RWA.

TABLE I

Field	PWA	RWA
Push Notifications	Just like in an application, every push notification is specific to the users.	On the contrary, RWA does now no longer offer the consumer with the ease to subscribe and get notifications.
Adaptive	The responsive design of PWA is efficient and capable to run on any device.	In the case of RWA, you want to increase separate code for diverse gadgets and systems making it highly-priced and tricky.

Add To Home Screen	With simply the house display icon, PWAs will stay immediately at the smartphone display.	The comfort of including the app to the house display screen is absent in RWAs.
Convenience	In continuation to the above point, PWAs are more convenient than RWAs	RWAs lack the features and connectivity criteria, compromising the user experience.
High Loading Speed	PWAs provided over RWAs is their amazing speed. The mechanism and the usage of 'App Shell' makes the process faster.	RWAs do not use 'App Shell' which makes the loading and running of data on mobile phones a longer and tiring process.
Advantages	1.Budget-Friendly 2.Easy to Maintain 3.Smaller and Lighter 3.Offline Support	1.Development at lower costs 2.Lower maintenance needs 3.Higher conversion rates 4.Improved search engine optimization as quality content

IV. RESULT

Responsive web apps are a comprehensive approach to deliver a better customer experience on various devices. When mobile devices became popular, responsive web design was the first logical move to make websites more useful for mobile users. It has also rapidly become a fundamental necessity for new websites, and almost most of the web designers have adopted it to provide a seamless digital experience to the end-users.

Responsive web apps could not deliver additional features like offline service, push notifications, or other native app-like functionality that users anticipate from their smartphones. These features are necessary from the marketing perspective to bring user engagement and conversions. This, in turn, enforced businesses to move towards progressive web applications to transform RWA to PWA.

The web page is just the beginning of PWAs, and where it's separated from responsive web apps is in its functionality. The more user involves in the functionality layer of progressive web apps the more it feels like native apps and easily differentiate responsive web.

PWAs are dynamic and can be personalized according to user's needs like push notification, option to enable locations, camera access and even the ability to add the mobile experience to the home screen. User don't have to download PWAs, with Google's full support of PWAs, they're accessible through the google or add home screen icon directly through Android.

V. CONCLUSION

We have compared progressive web apps, responsive web apps they have their own advantages and disadvantages. However, determining which application suits the requirements is important. If a consistent mobile experience is required, then progressive web apps are the ideal choice, and trying to improve site speed and accessibility for most users, responsive web apps may be a better option.

The performance uplift achieved with service workers as mentioned in section 2, combined with additional app-like features such as push notifications, add to home screen, all prove to make PWA the suitable candidate for being the next evolution of the Web. As of now, the PWA movement is already widely encouraged by almost all of the big companies, including Microsoft with their push of PWA adoptions in Windows 10/11. It won't be long now before we see a future full of Progressive Web App

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