

Cross Platform Application Development

And

Progressive Web Application

Deep understating on the its with components and technologies

LAMBTON COLLEGE

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Differentiate between PWA, Native and Hybrid Apps?

Talking about different types of Applications. All the three kind of Applications has their own advantages. Although they have some disadvantages too.

Progressive Web Application (PWA)

These are also called as Web application that load regular like a web pages or website. These are the cheapest to develop. It is a cross platform web application which means that it can run on both ANDROID and IOS devices. It is built using HTML, CSS and JAVASCRIPT. These applications run inside a browser. This kind of applications are developed like a regular website which is designed to look good inside on a mobile device. The maintenance is very easy as compared with other applications. It can use any kind of technology and the best thing is that only one team is required to develop this application for all platforms. The most important think at we no need to install this application. Its make a short cut in android and IOS devices to use any website with one click on the application.

But, along with many advantages there are some disadvantages too. These applications are not supported directly like a web application. These applications are not available on ANDROID or IOS application stores. These need to be executed through a browser and is not supported by internet explorer however Safari has now enabled PWA application to run on its platform. The website must make its popularity on its own when talking about application like features. These are not as fast compared with native application.

Native Applications

It is a smartphone application developed specifically for mobile operating system. As we know there are particularly two kind of operating systems that have dominated the market. JAVA is used for ANDROID and SWIFT is used for IOS. It is the most-fastest and reliable along with the most responsive Features. It uses the built-in features like GPS, camera and many other built in features. These are built using native programming languages and for specific platform. Like ANDROID uses SDK platform. These applications are interactive and intuitive. The best part of these application is that these can interact with device utilities. It has a push notification feature and a responsive software performance. The quality is assured through ratings in application stores and the developers can update the application on a regular basis.

On the other hand, these applications are built for a single platform. Which means for every platform they must hire a different team of developer which get hire and pay for making native application. The languages for developing applications is very hard as compared with other kind of application. The cost of these applications is at a high stake and is increasing because of larger team and maintenance cost.

PWA Vs Native, Side by Side Feature

Some of the feature are similar but some of feature provide by PWA not give by Native Application let see the side by side comparison. This Comparison given by Ignite online blog article which publish by 07/02/2017, You can see that most of the feature given by PWA where native application not able to give us

that why now a days most of the company provide Progressive web application developer to develop application

FEATURE	PROGRESSIVE WEB APP	NATIVE APP
FUNCTIONS OFFLINE	✓	✓
MOBILE-SPECIFIC NAVIGATION	✓	✓
PUSH NOTIFICATIONS	✓	✓
HOME SCREEN ACCESS	✓	✓
NO DOWNLOAD REQUIRED	✓	✗
BYPASSES THE MARKETPLACE	✓	✗
LINKABLE AND SHAREABLE	✓	✗
INDEXED BY GOOGLE	✓	✗
LOW DATA REQUIREMENTS	✓	✗
REQUIRES NO UPDATES	✓	✗

Hybrid Application

These types of applications are created with the combination of native and mobile application. You install these applications from the operating systems application stores but are a web application on the inside of the device. These kinds of application are build with Java script, HTML and CSS. These applications run in WebView which is a simplified browser in your application. It has one Code Base which can run on both platforms with some modifications. The cost for developers is saved as you only need one team of developer to manage the database. These are easier to scale on other platforms, once it is build for one.

Although, there are some consequences too when developing a hybrid application. The performance is the biggest drawback because it runs in a browser like component named WEBVIEW which is responsible for Java Script code and UI. The cost that is required to build a hybrid application is a kind of same little less as compared with Native application but less than Progressive web application. It is less interactive than Native Applications.

Describe briefly PWA components?

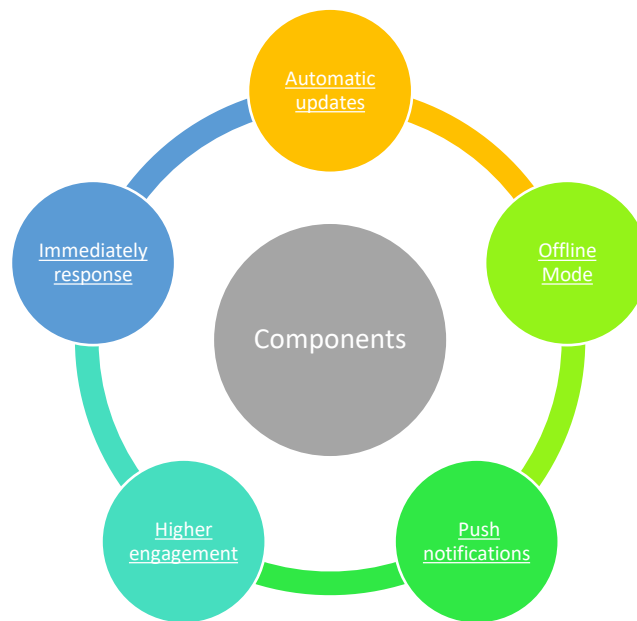
Progressive web application dedicates that it is the cheapest hardware, the user can easily access the data from the internet and in this web app there is no need to install any applications. Some users they can't afford money for the cost to install the different app because some apps are very expensive, so this is key for the programmers because they can't take the information from the internet when they want in the application it will display like we are using a application not a browser but actually we use a browser as form of native application. Let see PWA components in deep.

Components of the Progressive Web applications:

Offline Mode:

When the app is offline or there is no internet connection still this app refreshes the tab and gives the information when the connection is back. Due to the background run when the application connected with internet it will be able to get information from the application.

Mostly this app is used in the grocery stores and for shopping carts. Also, we use Instagram application its also based on the PWA now they make application with adding some of the features which are able to perform by the native application.



Push notifications:

Users mostly like those apps which send the notifications on the app. PWA send the notification when there is any update on the activities of the app. If the tab is closed or it is not in the active mode it still pushes the notifications, so it is beneficial for the users, so they can see the changes in the application when they are free.

For example. When we may travel some area the map or some restaurant app send some notification regarding that you are near by this some store or gas station are far away by some distance.



Higher engagement:

PWA gives the different outlook like push notifications, works on the offline mode so it gives the higher engagement of the users. Besides this the user can easily access the data from the internet and they do not need to pay the payments for installation, so this is also the big reason why users prefer to use this app. There is a fact that most of the user prefer those PWA to get some important information through the notification like some news and Facebook information.

Immediately response:

The Users can use this app on the mobile phones, tablets, I pad, desktop. It can be work on the different size of the screen. It does not matter where you are working. It takes the information or checks weather it is correct or not and send back to the users. Like if your mobile support any browser that mean you can able to get experience of PWA.

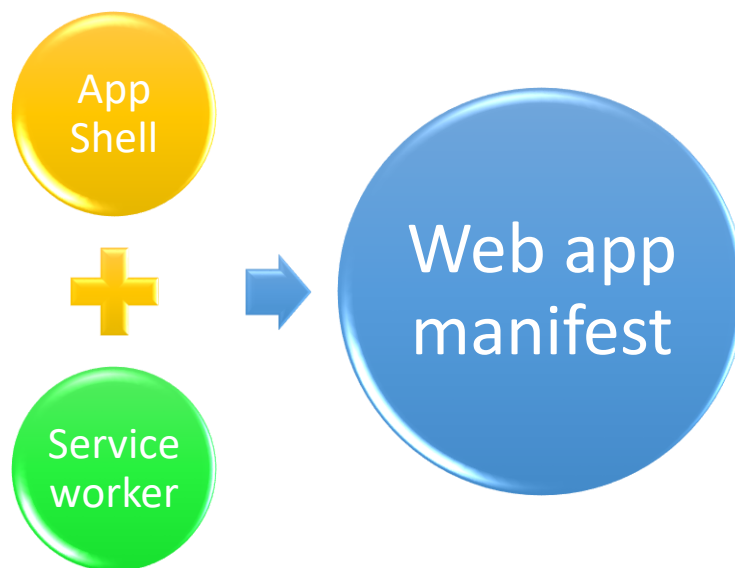
Automatic updates:

When this app needs the latest versions then the app will automatic start updating the users do not needs to put their applications for updating. Simply if website change automatically PWA application will automatically change.

Minimum conditions to qualify as PWA

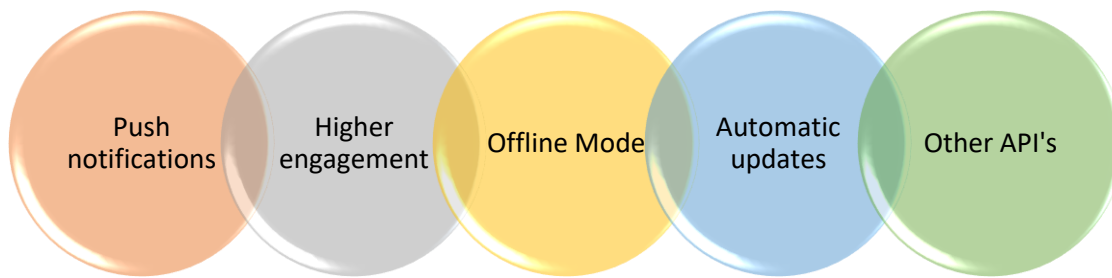
Progressive web apps are those that combines all the features that may be from a web app or from a native app and shows them combinedly on a single platform. Progressive web applications are fast, reliable. But to qualify as a progressive web application there are certain conditions that the app must qualify. Those conditions may include security issues, app or site should be mobile friendly etc.

Core requirements:



PWA work properly only under the combination of these three core requirements that are App Shell, Service Worker and Manifest. The major work is done by these. Here is an explanation that these works together.

Optional Extra features:

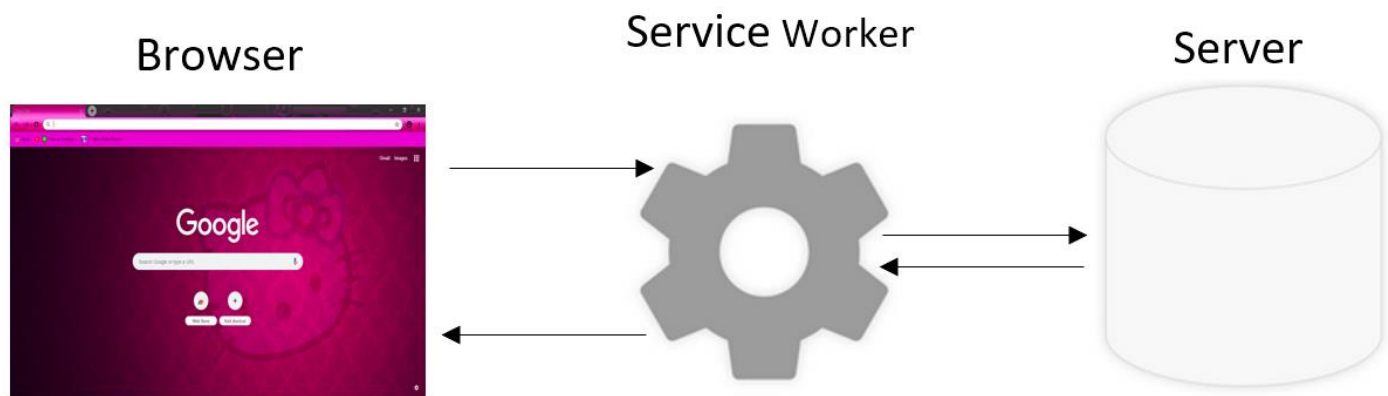


App Shell

This is basically known as the Skelton of the app. This is just the basic for the HTML, CSS and java script. This is the requirement that makes sure that app all files and data has been uploaded over the web and has also retrieved from there and has been saved in the local device. Whenever we load app these files open up from the local storage of the device that makes our Progressive web app work faster and makes it look more reliable.

Service Worker

Service workers are considered as the Min element for PWA. This means script that may be HTML, CSS, or JavaScript etc. These codes run the webpage. This helps in making webpages more advanced full of new features. It acts as an intermediate between the browser and the server. Whatever we browse on our web browser it requests to the service worker that passes on the signal to the Server and gets the response back from there and response to the user via web browser.



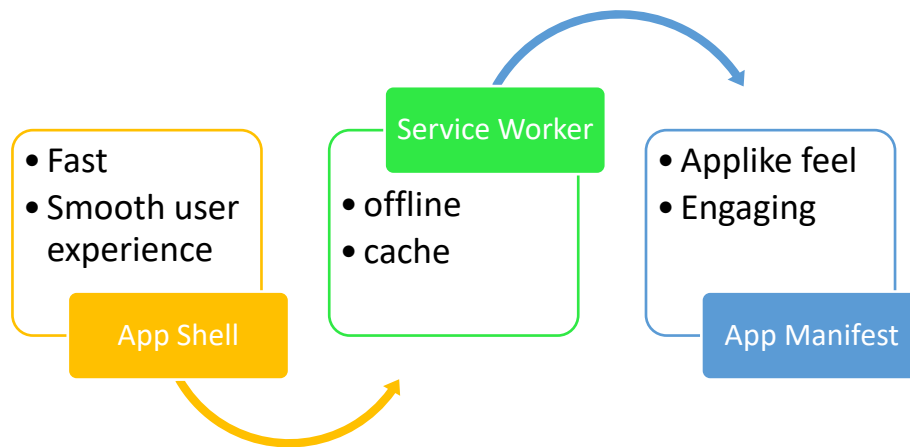
App Manifest

Web app manifest is a JSON file which helps in managing the webpage like how the app will in front of the used and makes it look more presentable. These manifests are deployed in the HTML by using the <link> tag that we add in the head of the documents and then we work on our manifest file where we add different elements that makes the web app more interesting. We can add different things in it like splash screens. The web app Manifest can help in:

- Controlling the orientation of the screen.
- Giving quicker access and a good experience to the user.
- Working offline
- Receiving push notifications.

However, all web browsers do not support the manifest file like Firefox, Internet Explorer etc. But it only works in Chrome in case of desktop. But in case of Mobile Most of the features are available in Chrome for android.

Main Difference between the working of these conditions are:



Technologies available today to implement PWA and clearly state your choices

Many of the browser engine support for PWA (Progressive Web Apps) the most of the significant technology's infrastructure is base on internet where fetch API terms are important to perform or implement PWA. There are plenty of the Technologies work together to perform and implement PWA.

Let see the technology in the following list.

- Web Application Manifest
- Fetch API
- Service Worker API
- Cache API
- Push API
- Notification API
- Background Sync API



Let see the purpose these technology

- Web Application Manifest - The host OS for enabling installation and app store promotion.
- Fetch API – Provides request and response for page resources.
- Service Worker API - Provides an offline-capable web app model
- Cache API – It will store some data which is use mostly.
- Push API - Enables a service worker to subscribe to push notifications.
- Notification API – It will send system notification through the push message.
- Background Sync API- It will run background do some of the event which assign by the Application.

According to our team Push API is useful technology nowadays

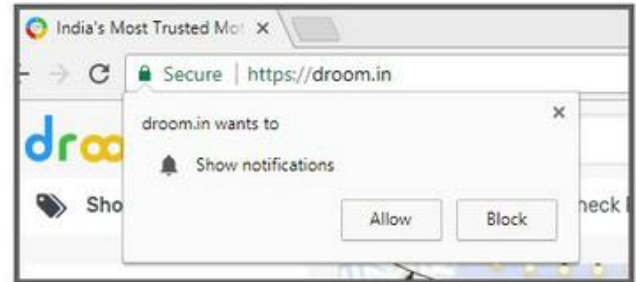
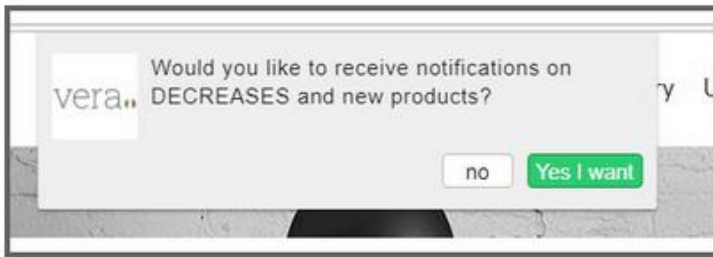
Push notification are using to get some of the idea base on what user want to get notification it will help to make some idea. for example, User how use the new native application to check the news. It become slow the phone due to running background so PWA implement in the Push API in the browser when ever the news updates the bowers send the notification the at the news are this, however, some think use most of the broker use to UpToDate the stock in the market they use enable the push notification extension. Like for example you can see the picture which shown below regarding shopping website notification through the browser



In the PC or MAC there are some configure dialog box to enable the notification and how its look like.

Op-In Message

Op-In Logo



Which Browsers Supports Web Push Notifications?

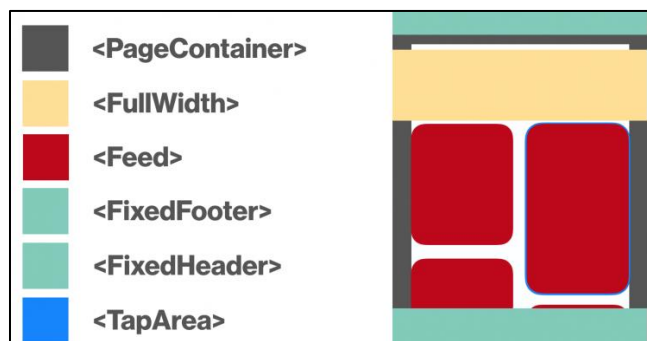
DEVEICE	OPERATING SYSTEM	BROWSER
Desktop	Windows MAC (OS) Ubuntu	Chrome, Firefox, Safari, Opera
Mobile	Android iOS	Chrome, Firefox
Table	Android Window OS	Chrome, Firefox

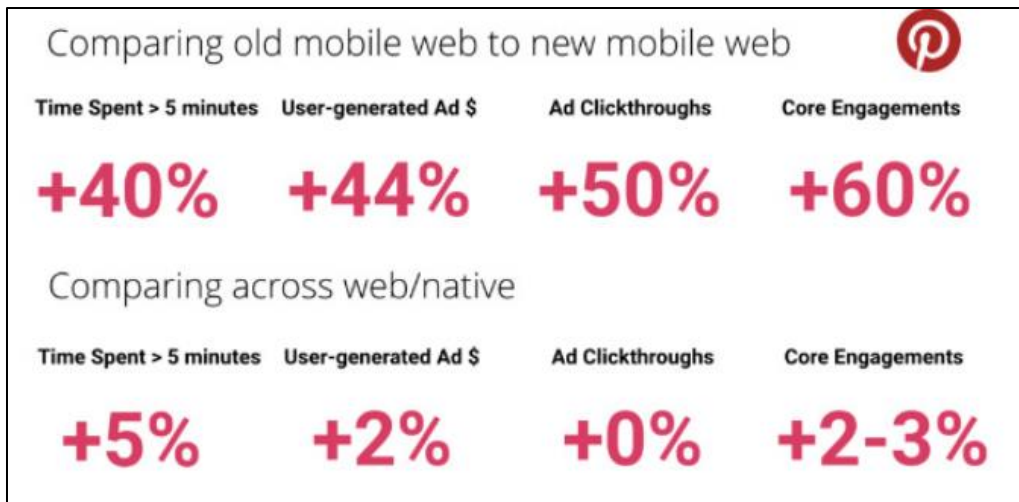
Provide one example of applications that would best fit PWA requirements and why?

There are tons of the example of applications where developer make its clear PWA and full fill the requirement and make the under the component

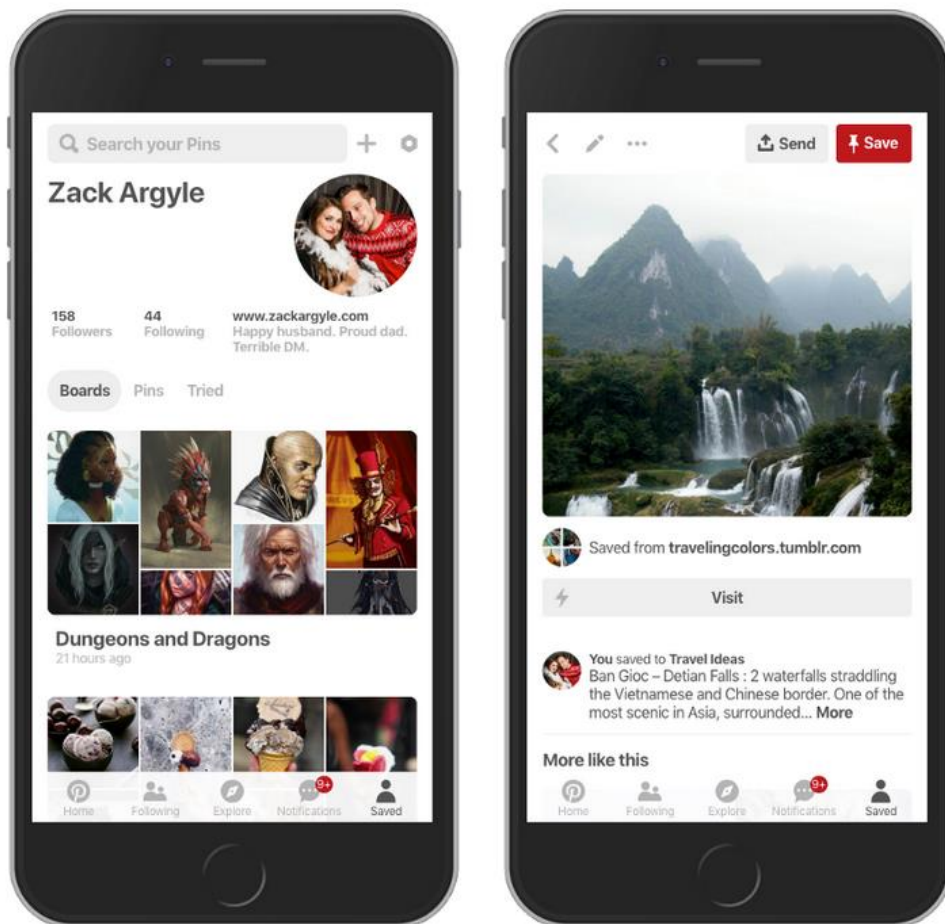
Pinterest (PWA) one of the applications where we do case study

Three years ago, all the company make the application to engage user to user but now Native application not much used or Now all the company make PWA application base like Facebook and Twitter make application base on PWA where Pinterest website make their application base on PWA most of the user give feed back that your Pinterest application is more easy and fast running app. Let see the different of native application and PWA application.





You can see that 5x more user engage over the three year where the most important thing that user time to interactive reduced from 23s to 5.6s, The Progressive Web Application Development has transformed the Pinterest online experience they provide to users making a huge breakthrough in the way the digital world works nowadays.



You can see the different how PWA application look like in the iPhone which cool design with more feature.

Why they do it?

There are two main reason why they make a PWA first one is Our mobile web experience for people in low-bandwidth environments and limited data plans was not good. With more than half of all Pinners based outside the U.S., building a first-class mobile website was an opportunity to make Pinterest more accessible globally, and ultimately improve the experience for everyone.



The second reason base on native app users more heavily for higher engagement than mobile web users, it's not the type of conversion rate anyone strives for. We thought we could do better.

Reference

1. Ignite Online - 07 February 2017 PWA comparison native application
<https://igniteonline.com.au/blog/why-progressive-web-apps-beat-native-apps-hands-down/>
2. Sai Sarkar, 1 year ago Basic, featured what is web push notification and How It Works? <https://blog.pushengage.com/what-is-web-push-notifications/>
3. A one year PWA retrospective Pinterest Engineering Jul 20, 2018
https://medium.com/@Pinterest_Engineering/a-one-year-pwa-retrospective-f4a2f4129e05
4. By google base on <https://developers.google.com/web/ilt/pwa/introduction-to-progressive-web-app-architectures>
5. Lighthouse PWA Analysis Tool Code lab: Auditing with Lighthouse
<https://developers.google.com/web/ilt/pwa/lighthouse-pwa-analysis-tool>
6. 11 Examples of Progressive Web Apps The Manifest Apr 10, 2018 https://medium.com/@the_manifest/11-examples-of-progressive-web-apps-944f6db25a5a
7. Your First Progressive Web App **By** Pete LePage Pete is a Developer Advocate
<https://developers.google.com/web/fundamentals/codelabs/your-first-pwapp/>
8. PWAs: Building Compelling Apps With the Latest Mobile Web Technology by Gil Tayar Jul. 23, 18
<https://dzone.com/articles/progressive-web-apps-building-compelling-apps-with?fromrel=true>
9. CSS Optimization Tools for Boosting PWA Performance August 23, 2018,By [Ahmed Bouchebra](https://www.sitepoint.com/css-optimization-boosting-pwa-performance/)
<https://www.sitepoint.com/css-optimization-boosting-pwa-performance/>