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Progressive Web Apps: A lighter alternative

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ABSTRACT-*Mobile applications have changed the information technology market, creating new markets, greater accessibility for any user, new jobs and content always accessible at any time. This accessibility has made users to want all their digital content available on any device with Internet access, be it on your phone, computer, tablet, or television, among others. This fact makes companies obliged to have their own applications available online for any device regardless of your operating system, screen size or any other condition of the device. This results in more expensive native app development. In this paper we explore the concepts of Progressive web apps, advantages and take a deeper look through an example called Smart Choice.*

Keywords: Web Apps, Progressive Web Apps, Android, iOS, Windows, Mobile Native Apps.

1. INTRODUCTION

Progressive web apps are a modern alternative to traditional Native apps. Google launched a new concept called Progressive Web Apps (PWA). This new technology allows an application to be available on any device with access to a Web Browser, without the need to develop the application natively specifically for a particular device or operating system. This application should offer a user experience similar to a native application. The goal is that the average user does not feel the difference between running a native and a web application.

1.1 About Progressive Web Apps

A Progressive Web App (PWA) focuses on progressive and platform independent development that will run the application. This was perhaps the first major step, to standardize application developments so that they are available on any device and platform with a Web Browser. This new concept has given us the possibility of reaching a point where we are able to provide similar functionality and an interface very close to that found on the best native Android or iOS applications. The most important advantage of this approach and also the most apparent, is that programmers don't need to develop several specific applications for different mobile platforms. Even for those who develop only for iOS and Android, this means big savings in time and effort that goes into application development. Also, PWAs offer the ability to develop a single application that works perfectly in all platforms and devices. Unlike a conventional web application, PWAs can be run offline. It is as simple as adding the application to the device's home screen (desktop or smartphone) and also make sure it has an Internet connection in order to install the necessary data locally on the device. Offline mode is useful in the case of games or content that need to be viewed later. When this application is added to the home screen it no longer looks like a website, it starts to feel like a native application.

2. TECHNICAL SPECIFICATION OF PWA

Technically a Progressive Web App does not use specific technology. It is not a new development framework, just as it is not a new programming language. In fact, PWA are a set of strategies, techniques and APIs that provide the user with a user experience very similar to the experience in a native application.

PWA are characterized as:

- Quick, usually rendering content on user's device in just seconds;
- Stable, even on weak quality Internet connections or on weaker devices;
- Engaging when enabling notifications, even on the web
- App, users can receive notifications or be alerted to any pertinent information in the application, even if the browser is not open.

To develop a PWA application, despite all the wide compatibility, we do not need to be developed in several programming languages like Objective-C, Java, C ++, like native applications. For the development of PWA applications, we just learn JavaScript, CSS and HTML. Over time, browsers evolve their features usually called progressive enhancement. This is where the PWA's true potential lies. Users get a better experience of using the

application depending on how updated their browser on which they are running the application.

3. DEVELOPMENT FRAMEWORKS

As mentioned earlier, Progressive Web Apps are not really a new technology or a language of programming, not even a framework. They are actually a concept and certain procedures that must be followed in the development of a Web App, so that it is considered a Progressive Web App. In this section, we briefly describe React, Angular, Vuejs and Ionic, which are considered the main frameworks used by Web developers.

3.1 React (https://reactjs.org/)

Raised and maintained by the Facebook team, this is one of the best-known frameworks for the development of Web Apps. It has had a great growth in the number of programmers choosing this framework in the development of Web Apps. The programming language used is JavaScript. Based on React and taking into account its success, a new version of React is available which offers development of hybrid applications. This version is called React Native, which seeks to get the best of both worlds, to develop once and be able to execute in any device, but also to optimize the usability of the app depending on the device. The big advantage is to be able to decrease the costs of development, but at the same time enhance the application compatibility to maximum on each platform, for example, allow the presentation of Widgets on the Android home screen (which with a Web App does not allow this functionality, as it is specific to the platform itself)..

3.2 Angular (https://angular.io/)

Once again, Google sought to be involved in the development of Web Apps, and for that they joined the Angular project. This project, initially known as Angularjs, was created to facilitate the development of Web Apps and ensure that they are responsive at any size of the device. Initially the programming language of this framework was JavaScript, but since the Angular 2 version, the programming language has been changed to TypeScript. This is a scripting language created and developed by Microsoft. The syntax is a superset of JavaScript. This new language maintains current JavaScript programmers and attracts programmers with more experience of languages with typing as in the case of Java or Objective-C

3.3 Vuejs (https://vuejs.org/)

Vue.js is an application development framework using JavaScript as front-end. It was created to organize and simplify web development. The framework focuses on declarative rendering and composition of the visual components, and can be incorporated on existing pages. The advanced features needed for complex applications such as localization, development states and tools are offered through libraries officially maintained by the Vuejs team. This is very similar to React and Angular, but as more recent, it was created based on the virtues of both frameworks and minimizing the problems already identified.

3.4 Ionic (https://ionicframework.com/)

The Ionic framework, resembles React Native, that is, it is a hybrid application development framework. Its objective is to centralize the developments of an application, be able to run on any platform and also add specific components and features to each platform that is running the application. The biggest difference is that the development of applications in Ionic, unlike all other frameworks, it is not free, needing a monthly payment in order to develop an application using this technology. This framework is developed in Angular, which allows an Angular programmer to easily start developing Ionic applications.

4. PWAs v/s NATIVE APPS

Based on this analysis we can conclude that the main advantages in the development of a PWA in relation to the Native applications are as follows:

- Cheaper and faster development;
- Easier development team management;
- Centralized implementation always updated;
- Technology with great evolution and easier debugging;
- Can be run on any device;

For native development we can state the following advantages:

- Superior performance is achieved;
- You can use all available features;
- More stable and safer technology;
- Possibility of lower level development;
- Focused developments for the platform specific;
- Installable from the app store.

5. EXAMPLE – SMART CHOICE PWA

5.1 Product Description:

smartChoice is a progressive web app that helps the user obtain the best deal available on a product. smartChoice is a platform that allows the user to search for a product of his/her choice and the PWA finds out which is the best deal that is available for the product across the vast range of

e-commerce websites, primarily Amazon and Flipkart. The PWA obtains the details of the availability and the prices of the product across the various sites and helps the user in choosing the right deal.

The main requirement of such a product arises from the fact that there is a wide array of e-commerce websites that might sell a particular product. In order to obtain the best deal, the user needs to manually check in each and every website. This is a time-consuming process and the possibility of the user missing out on a few good deals by not visiting a particular website is very feasible. This is where smartChoice plays the role of a savior. smartChoice eliminates the possibility of this particular human error and also helps the user to save time. Since smartChoice is a PWA, it can be used across all platforms (various operating systems) that have HTTP capabilities, or in other words, that have a browser.

5.2 Working of the product:

The product is built using framework 7 that provides the PWA characteristics. Framework-7 is a free and open source HTML framework that allows users to build a web application that provides the same look and feel as that of a native application, whether it's an android or ios native application. This enables the web application seem almost like a native application and hence provides a great user experience. A user usually gets accustomed to a few functionalities that are common across all native applications and sort of become a reflex. One of such functionalities would be pulling the screen down to refresh. All such functionalities are present in the PWA summing up to a great user experience.

The product uses a python flask server to process the HTTP requests. Flask is a web framework that is written in python. Flask is a micro framework. A micro framework is a framework that has no dependencies, this results in the application being light and easily updatable. Security bugs once looked after don't impose a problem again. This framework allows a user to build a light-weight web application that can range from a few web pages to even a commercial website. Combining the functionalities of flask and framework-7, it is feasible to build a light weight, easily maintainable PWA which is precisely what smartChoice is.

The PWA is deployed on the Heroku cloud. Heroku is a platform as a service type of cloud, that allows users to deploy modern applications such as a PWA. The cloud service is integrated for deploying with a wide variety of developer tools that are new and gaining wide audience.

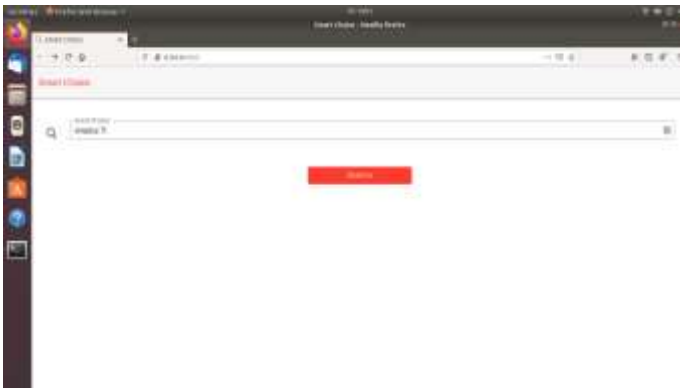

Fig-1: Product search page

The user has to open the application and enter the product to be searched for in the search bar. The product checks the availability across the e-commerce websites and displays the sites at which it is available and indicates which is the best deal among the same.

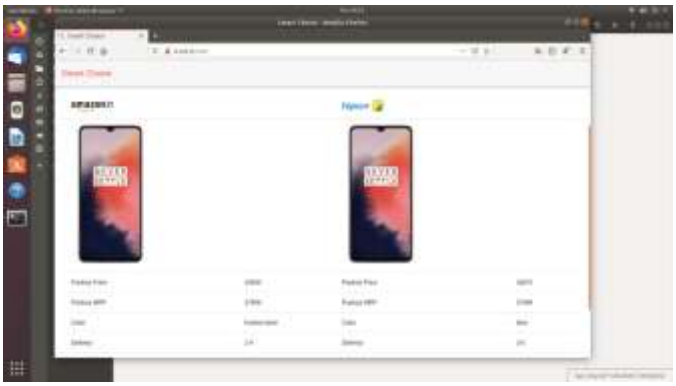

Fig-2: Product Comparison

The user also has an email notification option to which he/she can subscribe to. If the user is interested in a certain product that falls outside their budget, the user can subscribe to notifications about that product via e-mail. Whenever there is a price drop on any of the websites, the user will be sent a notification about the same. Hence, smartChoice proves to be a user-friendly and light-weight PWA.

5.3 Why PWA instead of Native application?

smartChoice is an application that needs to make use of the information present in other websites. Due to which, updates might need to be made to the application often if/when any of the e-commerce websites makes a change. If the application were a native one, updates need to be made differently as the platforms of the native application might wary. In other words, leveraging the fact the a PWA is platform independent proves to be useful.

Another major factor is there is no need to create a website separately for the same, a PWA is essentially a website or web application. Hence it serves two purposes at the same time. The user can access it using a system via a web browser or use it as an application that has the look and feel of a native application, on the mobile phone

5.4 Advantages of smartChoice:

- Allows the user to search for the best deal in a time efficient manner.
- Removes the human error possibility that might occur in manual comparison.
- Works on both ios and android like a native application, and as a website.
- Provides the user with the best deal possible.

6. IMPROVEMENTS

The application can be improved functionality wise. It can be made to include more features that might prove to be useful to the user such as directing the user to the particular website, recommendations of similar products, statistics of which deal was chosen by a majority of the users for that particular product and so on and so forth.

7. CONCLUSION

smartChoice is a PWA that assists the user in getting the best deal online for a specific product. It is built using framework7 and python flask web framework that provides the PWA with a native application look and feel. The application is hosted on Heroku that is a platform as a service cloud. SmartChoice saves the users time and removes possibility of human error that might occur in manual checking. The email subscription feature is unique and useful. On the whole, smartChoice is a user-friendly PWA that more than serves the purpose of the user.

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