

Challenges in Transition from Web to App

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Abstract

Ease of availability and handy nature of mobile devices have made accessing services through mobile apps more popular than that of web applications. The inclination of service providers also is towards using mobile apps instead of traditional web applications. This transition may not be smooth though and may face challenges. This paper lists the key differences between web & mobile apps and challenges in the transition from the web to mobile apps. We discuss/elaborate solutions to these challenges using app indexing, faster incremental downloading strategies and improved updating approaches.

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1. Introduction

The growth of Internet promoted browser-based applications over standalone desktop applications. Web browser-based applications effectively used client/server architecture with thin client application and thick server. Now with the advent of smartphones, mobile apps are gaining more and more popularity, and will very soon leave behind the web applications and also web surfing [4]. As per Flurry [3], a company in mobile analytics, reports people spend 86% of the time on apps, and only 14% time is spent on the Web

In the next section web and mobile apps are compared. Driving forces behind mobile apps are presented in Section 3 whereas restricting ones in Section 4 followed by concluding remarks.

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2. Web Applications and Mobile Apps

In this paper browser-based applications are referred as web applications. Some of the important comparative features of web versus mobile apps are:

- Browser-based application development is quite matured area with various standards such as HTML5 are available to support the development whereas mobile app development is evolving and yet to standardize.
- Web applications have an URL as a unique identity across web ecosystem governed by an independent body. Mobile Apps however have no unique identifier across app stores though it has a unique identity within any single app store.
- *Platform Dependency* - Client portion of the web applications are completely platform independent. The browsers render this and provide support for various technologies. However, in the case of mobile apps the application needs to be developed for different development platforms or developed once in framework such as Phonegap [5] and compiled for different platforms such as iOS, Android, Windows separately.
- In the case of mobile apps, the client portion resides in a device, whereas in the case of web apps, client-side code resides at the server end and is downloaded by browsers as per user request. Hence, the performance of mobile apps varies with the mobile device specifications limiting the number of apps that can be installed on the device.

3. Driving Forces for Migration to Apps

The driving forces for migration from traditional web application to mobile apps are:

- **Personalized User Experience:** User experience can be based on *environment* and *usage pattern*. Mobile devices with a variety of sensors like GPS, accelerometer, NFC provide continuous data about user environment. This data can be easily accessed by apps to provide services which are circumferential.

As the users are always logged into their app-store provider account e.g. Android, iPhone, user's behavior can more accurately be tracked.

- **Ease of Authentication:** Communication using mobile devices can be made more secure using seamless user authentication and/or mobile based biometric scanners.
- **Ease of use:** A single touch on an app icon takes the user to his/her personalized screen with smartphone as oppose to typing the URL and then log-in to the user account in web apps. various resources of Smartphones such as camera or NFC, enable the smooth connection between the physical and digital worlds.

4. Challenges in Migration to Apps

Though multiple features are driving web applications to Mobile apps, the migration is not easy. The road has challenges.

4.1 App Indexing

Major hurdle in apps taking over web is unavailability of content based *App Indexing*. It has been observed that, out of the millions of apps available on Apple, Google and Microsoft app stores, the majority of time spent on smartphones is spread out between only a handful of apps[2]. People are not able to locate other apps, because search engines can not really get and rank app contents.

Current method of crawling web pages for indexing is based on hyperlinks. But, apps don't use hyperlinks to connect contents as web pages do. Recently, search engine providers have began to index app contents so that it shows up in search results.

Mobile Deeplinking is an effort in the direction of app linking. Mobile Deeplinking is a methodology for launching a native mobile app via a link. It connects a unique URL to a defined action in a mobile app seamlessly linking users to relevant contents such as homepage, product pages or shopping cart.

4.2 App Installation Limitation

Apps often require a minute or two or even more time to download and install before it can be used. It also takes significant space in memory. The above issue can be tackle by developing app cache system in the following ways:

- *App Caching* - A *lite* version of an app can quickly be downloaded on the temporary area of phone storage so that the user can start using the app. Meanwhile the full version might be downloaded in the background and gets installed.
- *App Migration* - Mobile devices have limited storage capabilities, which restricts number of applications which can be installed on a device. Mobile Cloud Computing features can be leveraged to extend device storage capabilities. One of the possibilities is to migrate least frequently used/ dormant applications to the cloud and only a small link to the app is kept on the device. Such mi-

grated applications can be brought back when user clicks on the app link [1].

- *App Streaming* - Instead of downloading and installing the app, it can be streamed from the app store. When the user stops using the app, the streamed data may be discarded and the app state if any, may be cached locally on the phone for the further usage. As the apps are not downloaded and installed this will remove the requirement of updating the apps so frequently. The concept will also help the users to get the preview of an app before purchasing or installing it.

4.3 Auto Update

When apps are updated, the complete app is downloaded from the app store. Downloading only the delta element of the application that is modified will help save the bandwidth. This may bring more modular design in mobile apps.

App streaming explained earlier can also be an alternate solution to overcome auto update issue of mobile apps.

4.4 User Privacy

Irrespective of functional requirements apps capture prior permissions to access most of the user data making user vulnerable to privacy theft. Alongwith this data variety of sensors like GPS, accelerometer, NFC provide continuous data about user environment to these apps.

There is no such privacy encroachment is done by web. Web takes permission to access sensor data as and when it requires. Flexible selection of data and sensor data access should be adopted by mobile apps to make them more user trustworthy.

5. Conclusion and Future Work

This paper compared mobile apps and web. Unlike web, apps do not have have unique identifier across entire ecosystem; and deeplinking within app is yet to have a uniform structure. Future work is required for the standardization of app identification, app indexing, streaming based applications, delta change updates of mobile apps, extending mobile storage using cloud and user trustworthiness.

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