FIT2101

SOFTWARE ENGINEERING PROCESS AND MANAGEMENT

ANALYSIS OF ALTERNATIVES

PLATFORM

GROUP 2

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1.0 Summary

The Analysis of Alternatives (AoA) is an analytical comparison of the operational effectiveness, cost, and risks of proposed material solutions to gaps and shortfalls in operational capability. Whenever an important architectural decision is to be made within the team, such a document is written to list down the possible options, criteria to consider and recommendation for the decision. The options of the application platform are identified and the criteria which will be considered are also further elaborated. Each option, which is the possible choice of the application platform, is then compared and evaluated based on the criteria discussed. The last but the least, recommendations will justify and make the most appropriate decision for the application platform based on the evaluation of each option.

2.0 Terms of Reference

There are a total of three application platforms taken into consideration, namely web application, native mobile application and hybrid application. In order to justify the architectural decisions on the application platform to be deployed in this project, a fair number of criteria are considered to base the recommendation of the choices as explained below.

2.1 Performance

Application performance indicates how the app is functioning and how responsive the app is to the end-user. While an application's functionality is very important, users have equally started to look up non-functional areas such as performance. It is important to note that performance comes to even a more important play when the application size starts to scale up. For instance, for a well-performed application, it must have efficient garbage collection to ensure that the application is not taking up too much of the resources besides having an acceptable response time, providing a smoother and better user experience. Considering that all three applications utilize different development tools and platforms, performance differences must be taken into account for choosing the most suitable application type for the project, ensuring scalability of the app in the future for further expansion.

2.2 Cost

The goal of any software project is always aiming to deliver the product with quality, on budget and on time. Therefore, development cost is definitely one of the imperative factors for choosing the right application platform. The main development cost includes app functionality and purpose, integration points with third party libraries or API and maintenance plan, just to name a few. Not to mention that a software development project may carry a hefty cost when the team is not careful enough with the selection of the right application

platform to satisfy the needs of the client. In short, delivering the final product with sufficient quality and within the client's budget by choosing the appropriate application platform is always the top priority.

2.3 Platform Affinity

With the advent of advanced technology, smart hardware devices come in all shapes, sizes, colors and most importantly functionalities. There must be a limit in accessibility of each and every device when using different application platforms. A software product is ever-evolving, therefore maximizing the amount of users for experiencing the software product developed can always aid to further improve the product besides making profit with the vast amount of users. Due to the differences in the nature of development tools for each application platform, some applications need to be built in different languages and target different frameworks on each platform while some will just work on different platforms or operating systems with minimal changes.

2.4 Distribution

App distribution is the process of releasing an app to a broad set of users in order to promote app engagement and usage. It is a well-known fact that such distribution is preferred to be fast and efficient so that the users can experience the latest release sets of features and functionalities without any unnecessary delay. Note that there are multiple channels out there for publishing the application such as a marketplace for each platform or on the web without any restriction. However, each type of application platform comes with its own publishing platform and the main goal is to always distribute the apps to a large global audience and allow easy access or installation of the application by the users.

2.5 Security

Application security is the process of developing, adding, and testing security features within applications to prevent security vulnerabilities against threats such as unauthorized access and modification. It is said that application security is a significant criteria for choosing the right platform. This is because the applications nowadays are often available over various networks and connected to the cloud, increasing vulnerabilities to security threats and breaches. Note that the possible leakage or exposure of important application data, user information as well as the application code itself is highly related to the choice of the application platform. If security vulnerabilities in the application tend to be only discovered after the applications go to production, it may cripple the trust of users and clients in the reliability of the application as well as competence of the developer team

3.0 Body

After identifying the possible criteria, each choice of application platform is then compared against each other in terms of the given criteria.

3.1 Alternative 1: Web Application

3.1.1 Performance

A web is directly accessible using a web browser due to which app size tends to get increased and this impacts the performance of web applications. Usually, due to this large web apps perform considerably slower than native apps considering that a web application heavily depends on the code efficiency and browser performance in interpreting the code.

3.1.2 Cost

Web applications are cheaper to build if compared to other types of apps. Web applications do not require much time for development as compared to mobile apps. A single version of a web app is able to support multiple operating systems due to which the cost of testing the web app in each and every operating system is quite low. Therefore, only a single web developer team is needed to develop the web application that can work on multiple platforms, reducing the overall development cost.

3.1.3 Platform Affinity

Unlike traditional applications, web applications can be accessed at any time using a gadget which supports a web browser and is connected to the internet. Most web applications will just work fine on different platforms and operating systems such as IOS and Android with minimal changes since the web applications are interpreted by the browser.

3.1.4 Distribution

Unlike other types of apps, a web app does not need to be updated manually as long as the server contains the code. A web application which is linked to a website directly gets updated to the most recent version. This is because developers make sure that what is happening in the code is common to all. So everyone who accesses the web app receives the same version and gets updated automatically. Web applications are also easy to maintain because they have a common codebase regardless of mobile platform.

3.1.5 Security

Web application lacks the feature of quality control system due to which both the safety and security is reduced to a higher level. Although by using methods such as SSL enforcement, users can prevent data breach to some extent. Note that some browser code

can be inspected easily so the code is considered more publicly exposed compared to the other two choices.

3.2 Alternative 2: Native Mobile Application

3.2.1 Performance

Native Mobile applications are faster than web based applications as they are not interpreted by web browsers. Native mobile applications are created and optimized for a specific platform so the native mobile application has greater access to native device features or sensors and capabilities, contributing to faster performance. Along with that, Native applications are also built for the specific platform and are compiled using the platform's core programming language and APIS which makes it very responsive and fast.

3.2.2 Cost

Native Mobile application is a more expensive option compared to web application because the app needs to be programmed separately for each respective platform (iOS and Android) instead of using the same codebase for two platforms. For example, for native mobile applications that need to target a large crowd of users, there will be two separate teams of IOS and Android developers that need to be hired, incurring higher development costs. Not only that, mobile native applications tend to be more expensive to maintain and update compared to web applications.

3.2.3 Platform Affinity

Mobile apps developed for a specific platform cannot be used on different platforms as compared to web applications. This is because native apps need to be built in different languages and target different frameworks on each platform. For example, a native app compiled for IOS cannot run on Android.

3.2.4 Distribution

Mobile native applications are local, meaning that the app is native to the platform. Therefore, it mostly does not require an internet connection to work unless the users need to access live data from the online server. Users are also required to download the mobile native application from the specific marketplace and need to update the applications manually with each release of a new version of the application.

3.2.5 Security

Native apps are usually more safe and secure because they must be approved by the app store and app stores usually have their security protocols which need to be met before the application can be published on the app store. Not only that, the code is not as

public as browser code as the published native applications were converted into binary code that are not easily decompiled to get back the original code.

3.3 Alternative 3: Hybrid Application

3.3.1 Performance

Compared to the performance with the other two options, the performance of the native app will be slightly faster than hybrid application but hybrid application is still faster than web applications. This is because a hybrid application in general still depends on the quality, completeness and cross browser consistency of the native API bridges.

3.3.2 Cost

Compared to the native app development approach, hybrid app development is proven to be 30% cheaper as only a single developer team, that is familiar with the cross-platform development tools, is required. Not only that, hybrid applications run without much maintenance and are cheaper to maintain than Native Mobile Applications. With the hybrid approach, the developers need to create only one project for both Android and iOS. However, hybrid applications are more expensive than web applications.

3.3.3 Platform Affinity

Hybrid apps have greater platform affinity compared to Native Mobile apps as a single app can work for multiple operating systems. However, hybrid apps still have lower platform affinity compared to web apps that just need to be interpreted by a web browser on any mobile device.

3.3.4 Distribution

Hybrid apps have similar distribution to the native mobile application for installation and update by the users to their devices. However, for the distribution and update of the hybrid apps, the hybrid app developers are given an offer to update their app frequently and it is not necessary to resubmit the new version if the modifications haven't touched native code. Therefore, the time required for the validation for the application to be published or updated on the app store is much shorter compared to native mobile apps.

3.3.5 Security

The security risk is higher for hybrid apps. Not only do they have security vulnerabilities unique to whatever programming language was used, they are also susceptible to vulnerabilities that affect web browsers and those that affect native apps, since hybrid apps are always built with some native code.

4.0 Recommendations

The team's final decision for the application platform is to develop a web application and there are a few justifications on the decision. In terms of the cost and time, web application is the cheapest to build among the 3 platforms suggested as it does not require much time to build compared to native and hybrid apps. A single web application can support multiple operating systems so that it just needs to be written once but can run on various platforms. It is important to note that there is a time constraint in which the project does not have a lot of time to be developed so the cost of time is a very important factor to consider in this case.

Besides, web applications also have the highest platform affinity as it can be accessed and used by any gadget with a web browser connected to the internet. Unlike native and hybrid, they will only be accessible and used on certain platforms which is not a good choice because there is no specific platform mentioned by the client. Moreover, the team agreed that the app should have high distribution and security. From the research, the team found out that web applications are easier to distribute to the users by allowing instantaneous updates of the code on the server, then all the users will be updated automatically when visiting the same website.

Although it is said that web applications do not have the greatest performance and highest security level, the performance and security level of web applications still can be improved by using various web performance optimization tools. The performance of a web application will show a more noticeable deterioration when the web application tends to grow too big. Not only that, the team justified that the overall app structure of this project is satisfiable for the client needs and the security of the web application can be improved by using SSL enforcement which can prevent data breach. On top of that, most of the project team members have experience in web development skills, therefore taking up the skills and applying in this project can increase the chances of delivering a successful project within the given time constraints.