MOBILE APPLICATION DEVELOPMENT

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CSE 598- Distributed Software Development
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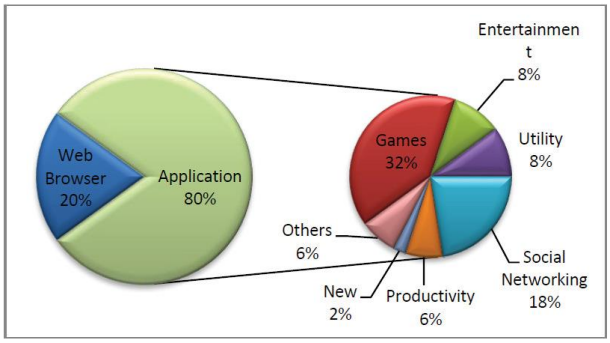
Abstract:

With the increase in number and development of smartphones, mobile application development has become more and more demanding these days. All the versions of different platforms of every phone demands same application with different compatibility. This rising demand need large number of developers to move towards the development of mobile applications. Even universities are trying to promote this concept among the students by providing them knowledge of free and open source tools and languages for mobile application development. The paper will present the basic requirements for the development of mobile applications like portability, dataset interaction, power usage, information availability and property to connect. The paper will give the brief overview of the tools needed for the secure development of mobile applications such as PhoneGap, Sencha Touch, MoSync, Application Craft, Widgetpad and Appcelerator. It will also provide knowledge about challenges that a developer usually face like practicality, performance, security, compatibility and usablity while developing mobile applications and will also include the risk associated with the development of the apps like customer related risks, managerial risks, risks related to finances, risks related to market, etc. and ways to mitigate them. Paper will also talk about the languages (C, C++, HTML, JavaScript, Ruby, Python, CSS) which will be used in the development of mobile application. It will throw light on the security attacks which are possible during the development process. Later in the paper we will discuss in details about the different types of platforms (IPhone, Android, WebOS, Blackberry, WindowsMobile) needed for development of mobile applications.

Keywords: *Mobile application development, Mobile phones, Mobile operating system.*

I. Introduction

Mobile Technology is getting advanced day by day and so are their applications. With the increase in technology of mobile platform and their new applications, people are getting more diverge and involved in it. Not only the normal person, developers of the mobile application are developing new application and new version of older application which are compatible with today's new mobile platforms. In today's era, everyone is carrying a mobile phone as one of the necessary thing. Social networking websites like Facebook and Twitter have fascinated masses to update their day to day activity. Mobile phones are satisfying the need of pocketbook and notecases for people. Media is also playing a great role in promoting and attracting large crowd to use different applications on their mobile phones [2]. Using mobile applications, anyone can see the latest news (regarding global, economical, weather, international, sports) or update of the things going around the world from anywhere. Mobile application can be used in every aspect of life whether it is for voting or for playing games. Now a days, for selection of candidate in an election, voting can be done through in built apps in the mobile phone. This is how, mobile apps have become the crucial part of everyone's life. The current data point of the time spend by the people on mobile phone for various activities is depicted below [1].



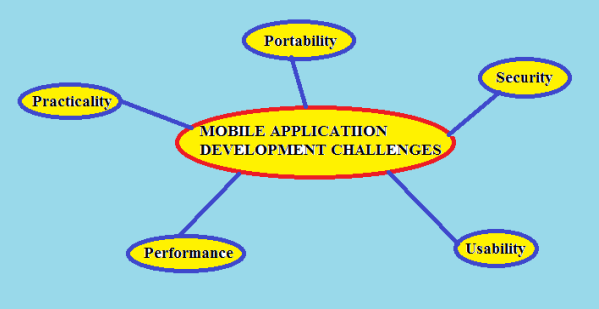
Mobile apps are different from the application which we use on our desktops and laptops. But sometimes they are similar applications on desktops which are compatible to mobiles [5]. Developers these days are

trying to develop applications which are compatible for both, the desktop version as well mobile phones. From student's point of view, it is very important to understand the development of mobile application [4]. These days, universities across the globe have introduced the mobile application development as one the course for the curriculum to increase and distribute the knowledge of mobile application development among the students. Now, it depends on the choice of student to choose his/her platform for mobile application development. The platform can be either for Windows Phone, Android, IOS, AIR or Blackberry [3].

Rest of the paper will describe the challenges and disputes for the development of mobile application, requirements for mobile application development, tools needed for mobile application development, different types of mobile application platforms, risks involved in the development of mobile application and security attacks in mobile application development.

II. Mobile Application Development Challenges

Today in market, there are numerous companies for providing mobile phones. Among them, the top companies are Nokia for providing Symbian OS, Research in motion for blackberry OS, Google for providing Android OS, Microsoft providing Windows OS and Apple for providing IPhone operating system [3]. All these companies have different cross platform for developing their respective OS. All of them provide different development tool, different working libraries, different imitator and different development environment for their application development. A few of them provide open source software for the development of applications. Different tools such as Eclipse IDE and Microsoft visual studio provide an environment for the development of mobile application which provides the same feel of working on a mobile phone [3]. These tools create an emulator which provides user-friendly environment for the development of application. Still the application developed on the desktop computers are widely popular and used than mobile application because of their portability and ease of information transfer from one system to another. Below are few points discussed which are the major challenges and disputes in the development of mobile applications.



Challenges of Mobile Application Development

Practicality: Developed software must be accessible when needed and should also perform the required functions and the specific task for which it was developed. Application should not cease the flow of the process in between and should maintain continuity.

Performance: Developed application must performance well throughout its lifetime. Its performance should not change with the issues like memory overflow, system load issues, information transfer between the devices and data synchronization.

Security: Developed mobile application should be secure. There should be no loss or leakage of any data packet or sensitive information from the system. Hackers should not be able to hack any device via any wireless connection such as Wifi or Bluetooth. In case of information loss, proper measures should be taken in form of recovery of lost data from the backup.

Compatibility: Developed application should be compatible for all the higher version of platform. For e.g. application developed on Android 2.2 must run on all the versions of android greater than 2.2. Also, the developed application must inherit and should be with application developed on smaller version of the platform. Application should not be dependent on the size of the mobile screen and resolution, neither on its network configuration.

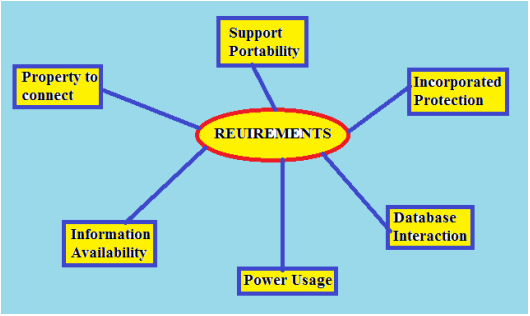
Usability: Developed application should run spontaneously and consistently throughout its use. Application should not break its implementation consistency with the interface and should be user friendly.

III. Requirements of Mobile Application Development Challenges

Following are the requirements of a mobile application development:

Support Portability: Application developed for one device must support other operating systems and platforms too [6]. For example, if an application is developed for android or Blackberry, it must also support IOS and other OS.

Incorporated Protection [6]: The application which is about to be develop must be secure in all ways. The sensitive data transferred from one device to another must be protected from the attacker. Application should be secure from all kind of viruses.



Requirements of Mobile Application Development

Database Interaction: The application must provide a good back-end connection to the users so that they can manipulate and retrieve the information anytime and anywhere [6]. Also, there should be proper connection between the front end and the back end so that user can remain connected to the other online features.

Power usage [6]: The application which is about to develop must use less power. It means that, developed app should not consume the power in large quantity. Application must have high efficiency in terms of power usage.

Information availability [7]: Information must be made available on the demand of user every time. Whenever the user wants to use the app for transfer of his/her sensitive information through the application, it should always remain online and must be connected with the communicating device. There should be no loss of information from the device.

Property to connect [7]: Application to be develop must have a property to connect to a device or a network at a very fast pace. In the enterprise world, high connectivity is everything. Even for every small business transaction, the speed show be high.

IV. Mobile Application Development Tools

There are numerous tools for development of mobile applications. A few of them are discussed below.

PhoneGap [6, 8]: PhoneGap is a free and open source software that can be used to develop mobile application. The tool can be deployed in any IDE as a plugin and later use for development. IDE can be either Eclipse, NetBeans or any IDE. Basic web languages are used here for the development purpose such as HTML, Ajax, Jquery, CSS3, etc [14]. This tool can be used for development of any application for every platform. Platform can be Windows OS for Symbian for Nokia, Android for google products, IOS for Apple products and Windows OS for Microsoft products.

Appcelerator [6, 8]: This is also an open source tool based on titanium development. The programming languages used in this for development purpose are HTML and JavaScript which are the most basic web programming language. This tool can only be deployed in the Eclipse IDE. This tool can be used for development of any application for every platform. Platform can be Windows OS for Symbian for Nokia, Android for google products, IOS for Apple products and Windows OS for Microsoft products. "Other scripting languages like PHP, Python and Ruby" [8] are also used in this tool for mobile application development. Generated file with this tool are easily executable on smart phones.

MoSync [6]: MoSync is a mobile development SDK used for development of mobile application using programming languages such as Python, HTML and javaScript. It is compatible with different types of operating systems like Android, Linux and Symbian This tool has in-built libraries and compilers for development of mobile applications [8].

Application Craft [6]: This tool is based on the facts of cloud computing used for the development of desktop and mobile applications. Code and data

generated during the development process is stacked in the cloud server.

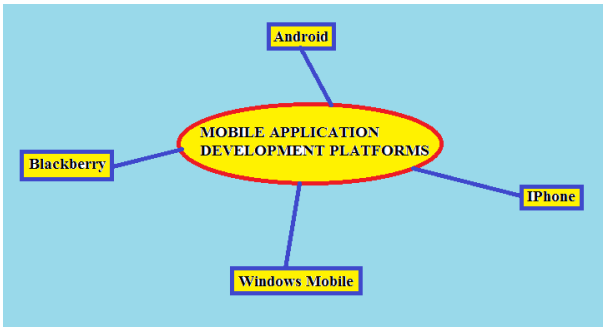
Sencha Touch [6]: This tool is used for the development of application in which code is developed with the help of HTML and JavaScript. The applications developed with this tool can be used to deploy on the Google and Apple products [6].

WidgetPad [8]: This is an open source tool for development of mobile applications, basically smartphone applications. The languages used in this tool for development purpose are HTML and JavaScript [8]. This tool can be used for development of any application for every platform. Platform can be Windows OS for Symbian for Nokia, Android for google products, IOS for Apple products and Windows OS for Microsoft products [8].

V. Mobile Application Development Platforms

iPhone [9]: iPhone operating system is an Apple product with large number of versions. They not only support the applications of Apple but also the applications generated by the other developers. The application programming in iPhone is mainly done in C and C++ languages. "IPhone also supports the Web RunTime services developed in HTML, CSS and JavaScript with the help of WebKit which is web engine used in Safari and Google's chrome web browser" [9]. The company keeps an eye and checks all procedures carried for the development of iPhone operating system. Apple products are very expensive even though they are highly popular among the masses.

Android [9]: Android is an open source platform and a google product used for developing mobile applications for the smart phones based on google. The language used for the development of application is Java. Java uses a dalvik virtual machine (DVM) for running this application. The android is installed in Eclipse IDE as a plugin and emulator (imitator of android smart phones) is used for testing the developed application before deploying it on the actual smart phones. Android supports the concept of multi-tasking [9]. On android devices, multiple tasks such as installation, games and internet surfing can be done simultaneously. The latest available version of android is Lollipop (5.0). Applications installed in android and also the version of android can be updated through google Play Store.



Mobile Application Development Platforms

Symbian [9]: Symbian operating system is used in the mobile operating system projected for the smartphones. Today, Nokia phones are using Symbian as the operating system. The language in which Symbian operating system is written is C++. This operating system also uses the concept of cloud computing which is not possible in case of android operating system.

Windows Mobile [9]: Windows mobile operating system is a closed source operating system used in windows phone. This operating system needs very small amount of memory space for running. Applications installed in windows mobile operating system and also the version of OS can be updated through Windows Marketplace. Number of applications present in the windows market place are fixed and simple unlike android and iPhone operating system. "Programming languages that are used in the Windows mobile operating system includes Java 2 Mobile Edition, Visual C++, Visual Basic, .NET" [9]. These are essentially the product of Microsoft and are useful and found in all the desktop applications.

VI. Risk Analysis in Mobile Application Development

There are numerous risks involved with development of mobile application. Below are the classification of the risks involved in development process of the mobile application:

Customer Related Risks [2]: Requirement stage is the first and most important stage of any development process whether it is a software development or mobile

application development. Customer's requirements must be clearly understood by the developer team so that they can fulfill the needs of customer even if he is not technically sound.

Communication Related Risks [2]: There should be proper communication between the end customer and the developer of the application to reduce the risk of getting wrong end product as a result of miscommunication. Developer must listen to all the requirements of the customer very clearly.

Market Risks [2]: It is always better to see the current trend going in the market as well as the requirements of the user before developing an application.

Resource Risks [2]: Application to be build is dependent on the large number of factor. Say for e.g. sometimes applications are dependent on the external resources such as memory space present in the system or provided by the system for execution of application. Other dependency can include the dependency of platform because few application built on one platform does not work on the other. The last dependency is the investment from the stakeholder. It plays a very important role in the development of the application by providing financial strength to the product for its promotion. Stakeholders are only responsible for financing the product from beginning to end.

Financial Risk [2]: Finances is a crucial thing that needs to be discussed with the customer before developing the mobile application. All the expenses must be discussed beforehand because sometimes cost may go up or down as the application approaches the last stage of development.

Technical Risks [2]: The design of the application to be build must be technically sound. From technicality, it means that design should have a proper algorithm which leads to the expected end product as the final result. The design must have workable platform for execution of applications. Also the application developed on one platform must be compatible for the apps developed on other platforms.

Managerial Risks [2]: "In order to fascinate masses towards the application, developers release their application to get benefit from the initial developed product to which they further update to improve the efficiency of the application" [2].

Performance Risks [2]: One risk to which any software or application are vulnerable are the performance risks because of security issues. There must be proper security checks in order to reduce the risk of attackers attacking the application to steal the sensitive information. Personal information of the customer must be kept confidential with high security means.

Maintenance Risks [2]: Developer must do the regular maintenance of the developed application in order to reduce the bugs found during its execution or to provide regular update on the application.

External Risks [2]: External risks involve the use of external resources for proper execution of the applications. For few applications, a good internet connection is required [2] for their proper execution. So, the connection must be checked periodically in order to ensure that application is running without any divergence.

VII. Security attacks in Mobile Application Development

Several security attacks are possible during the development of mobile applications. A few of them are listed below.

Malicious User [12]: A malicious user can misuse the private data of the user if he found any sensitive information in it. The information can be misused against the user. This type of attack usually happen when the user of mobile phone leave any crucial application unclosed on the phone or his phone is stolen. The attacker can brute force the common security credential easily to get access to the phone.

Malicious 3rd party apps [12]: This type of attack is possible when user gives access permission to an external application to run and download vicious application from the internet. These applications can have virus and worms that might inject in the original application and destroy it.

Malicious access to database system [12]: A malicious attacker always try to attack at the back-end of the application from where he can easily access the content of the application and can perform

manipulations on it. The developer of the application must use the proper security features so that no attacker can see the back-end portion of the application.

Trusting untrusted apps [12]: Sometimes, user trust untrustworthy application and give them the access to original application. But trust cannot be shown to every application. Some can be trustworthy but not all. Untrustworthy can misuse our original application.

Accessing sensitive data [12]: A malicious user can manipulate the sensitive data and misuse the information for their personal gain if provided with access permission of using back-end of the application. Several crucial information can be leaked with this including the important credentials of the user.

VIII. Conclusion

Through this paper, we can conclude that, smartphones are getting advance day by day with the advancement in the mobile application. Also, the paper resolves risks involved in the development of the mobile applications and the security concerns which need to be kept in mind while developing the application. The paper also talks about the challenges that one faces while developing the secure mobile application. Also, we learnt about the different types of smart phones in the market and the tools we need to create the applications compatible with those devices and the languages used for their development.

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