Lecture 1

Introduction to Mobile Technology

1. What does make mobile Technology very important?

Mobile technology is receiving significant attention in the business and IT worlds. The technology represents a dramatic change in technological capacity that has enabled potential economic advantage for those able to take advantage of it. Mobile technology is the basis of innovations in reaching customers, and in redesigning business processes and software products that lead to the creation of many small businesses.

1.1. The widespread of the use of Mobile Devices

1) Mobile devices add a host of new possibilities for business and personal software because they are truly the first mobile computing platforms. Although laptops and netbooks are moveable, their size significantly impacts how easily they are transported. Very few people carry a laptop during their every waking hour to every location they visit.

2) The capability to be made aware of its current environment through built-in sensors. Mobile devices have sensors designed to capture where they are, where they're going, and the environment around them. Sensors can identify their present location to within a few meters and capture their current heading, orientation, and acceleration. Additionally, they can recognize how close they are to another object through a proximity sensor. These devices also have the capability to capture information about the ambient environment, including light levels, temperature, pressure, and magnetic field.

3) The capability to communicate with other computing devices through a variety of mechanisms. A laptop can communicate using Wi-Fi and Bluetooth. However, mobile devices also have these communication capabilities; they can communicate via cellular signals and using Near Field Communication (NFC). Wi-Fi is not available in all situations, and its range is

measured in yards, whereas cellular's range is measured in miles. Bluetooth may be too short range to be useful in many situations, but too long in other situations. The range of communication using Bluetooth is measured in feet, whereas the range of NFC is measured in inches. If a device wants to communicate with another device based on its proximity, broadcasting in inches may be preferable to broadcasting and listening in feet.

4) Mobile devices have most of the same features, such as being able to display and manipulate data. Some of these features have enhanced usability because they are on a device that is easily moved. One example of this is the camera. Although many laptops and desktops have cameras built in, their usefulness is limited because they cannot easily be moved. Data input is also similar because a user can use either a keyboard or speech to enter data or instruct the device to perform some operation. Again, these features may be more useful because data can be entered at its source, when it is produced, rather than after the fact when human memory errors can impact the integrity of the data. Another similarity is that mobile devices also have the capability to store data in a number of formats, including in relational databases.

5) Mobile devices are also computers. Taken together, the added capabilities of mobile devices compared to traditional computing platforms means that the smartphone and tablet are the most dramatic change in technological capability since the introduction of the PC.

1.2. Advantages of Mobile Applications for Organizations to Reach Customers

1) Smartphone users almost always have their device within reach. Organizations want to be ready when a potential customer is interested in a product or service. Having the app always available on the device may lead to your organization being one of the first choices when the consumer is in the buying mood. Additionally, the app's consistent interface may help the individual learn it so that working with your organization becomes quicker and easier than working with others.

2) Having a mobile app can also support brand loyalty and awareness. Some organizations have developed apps that allow customers to interact with

their brands in positive ways. Although these apps could also be available on a traditional computing platform, having them on a mobile app allows the customer to access them quickly when they happen to think of it, even if they are standing in line or sitting on a bus. This allows the company to have a positive interaction with a customer in more situations than only when the customer is sitting at a computer.

3) One area where mobile devices enable a strong potential for disruption of the assumptions made about a business process is the payment industry, where a lot of companies are innovating to provide consumers and businesses the capability to make and receive payments.

4) The final, and potentially most important, advantage of an app is that it can take full advantage of the device's hardware and software capabilities to provide the customer with capabilities that make your products an easy option for them. The device's location could be used to guide potential customers to a nearby store or even find a product within a store.

1.3. Changing Business Process

One of the most exciting possibilities associated with mobile technology is the potential it has to impact business processes. Processes are designed within the parameters of the available technology. When technology drastically changes, new forms are enabled. Businesses are paying significant attention to mobile because these qualities suggest that the technology may have implications for strategic and tactical advantage, or, as demonstrated with the banking app, become competitive necessities. Information technology was applied to portions of the existing process to make it faster or increase accuracy. As businesses became more adept with the technology and the technology became more capable, it was recognized that the full potential of the technology was not being realized, and companies began rethinking entire processes to take advantage of the technology. Mobile technology is likely to follow a similar path in application to business processes.

1.4. Making Money

A final reason that mobile is important is that many people see the potential to start businesses and make money. The Google Play Store and the Apple App Store provide the app developer access to the market of app purchasers. The developer does not have to worry about product distribution, returns, or payment collection. The store does all this and conveniently deposits the proceeds into the developer's bank account. Additionally, smartphone users automatically go to these stores to get new apps or browse for apps that might interest them. One final and very big reason for the strong focus on app development is that Google and Apple either support or provide the development environments needed to create apps for their stores. Taken together, this creates significant potential for individuals or small businesses to make money in the app market. Apps make money for their producer through several approaches. Apps can be sold for a onetime fee, like other products. Consumers buy the app through the appropriate store and it is theirs for use whenever they like. The more apps the developers sell, the more money they make. Ad supported apps make money by including an advertisement on a small portion of the screen. Anytime a user clicks an ad, the developer makes money. Both Google and Apple provide developers access to the code to display ads and a service to provide the ads and track the clicks. In contrast to a paid app, the only time the developer gets paid is if an ad is clicked (Apple's ad service also pays per view of the ad, but the amount is significantly less than a click). The amount of money generated by a single click is very small, so to make much money it is important to get a lot of users of the app. A third approach to making money is to provide for in-app purchases. With this model, the user gets the app for free but needs to make a purchase to get additional features. For example, a developer might provide a game for free but require a purchase for more advanced levels of the game. Another approach is subscription based. The app provides functionality that requires access to the developer's data or other services. To use the service, users buy a monthly or annual subscription.

Chapter 3

Monetizing Apps

The market for apps is big and getting bigger. Vision Mobile has estimated the mobile app economy to be growing up to $6.1 trillion in 2021. When you create and test an app, you need your efforts to pay off. What is the best way to do this? What options do you have to make money from apps? What do you have to do to start? In this chapter, you explore the various avenues for monetizing apps.

App Monetization Strategies

Making money from apps is possible but difficult. There are hundreds of thousands of apps available. The revenue generated from an individual app is typically very small, and the app stores take a 30% cut of all the revenue that your app generates. How do you get people to pay you to use yours?
What are the different ways you can collect money for the use of your apps?
How can you get a lot of people to pay you to use the app so that the revenue generated is enough to fund further development or expansion?
These are some of the questions that many developers are asking.

Paid Apps
The simplest approach to monetizing an app is to charge for the download. The price is advertised in the app store and the user decides, based on your description of the app, whether to buy it. If the user buys the app, you get the money. No need to worry about getting clicks or designing features to be purchased. The problem is getting enough customers to generate significant income. One approach to solving this problem is to raise the price of the app. However, as the price of the app goes up, the number of downloads goes down. As mentioned before, the market is very price sensitive. You will need a very enticing description of your app to get downloads. Additionally, after users have purchased the app, future updates are free. You would need to add a new app to charge again.
A significant problem for all strategies, which is exacerbated with paid apps, is getting the potential customer to find your app among the thousands of apps in the app stores. If the user searches the app store using keywords, and your app is displayed along with a number of free apps, the user will often not even read your app's description, focusing only on the free ones.
To attempt to remedy this, you need to advertise. Advertising is a double-edged sword. It costs money! Even a limited Google ad campaign where you pay Google

to display an ad whenever someone searches on a set of keywords costs hundreds of dollars. It takes a lot of $.99 app sales to cover this cost.

An up-and-coming approach to the paid app approach is to build apps for business use. If your app solves a business problem, a business will be happy to pay the cost. This approach does require marketing. It is unlikely that businesses will search the Play Store for a solution to their business problems. This approach requires a much larger commitment than is typical for many app developers. It requires a business plan, establishing a target market, and directly contacting the market with information about your product. It also requires a potentially significant monetary investment.

Ad Supported Apps

The app market is very price sensitive. Free apps get downloaded at a much greater rate than any paid app. However, a totally free app is hard to make money with. That is why although many apps appear to be free, they often have a way to make money built within the app. The most common approach to making money from a free app is to embed ads within the app screens. Ads take up screen real-estate, so you will have to plan and code the user interface with this in mind.

In-App Purchases

Making enough money from ad-supported apps to support a business is difficult. You need a very popular app to generate a significant amount of money. Another approach for monetization is to release a free app that is supported by in-app purchases. The basic theory for an in-app purchase monetization strategy is that you generate downloads with the free app, get the users hooked, and then allow them to add features by advertising the feature in the app.

The sale is made during use of the app. This is a very popular approach among app developers.

Another advantage over the basic paid app is that in-app purchasing opens up the possibility of a regular revenue stream from the same user, instead of relying on a single purchase up front.

In-app purchasing is one way to establish a freemium business model, where most of your users use the free version, but a small percentage becomes heavily invested in your app and service and convert to paying for the service, thus underwriting the free experience for everyone else.

You can use several approaches to create products for in-app purchase. Most are dependent on the type of app and its designed use. Game apps often limit the user to only a few game levels and then provide an in-app purchase option for moving

to the next level. Other games have consumables that can be purchased during game use. For example, a number of lives are purchased and used up. If users want to continue playing, they have to buy more. Other apps include features that can be unlocked with an in-app purchase. Another approach is to limit the amount of data that can be saved or the number of times the app can be used before the user needs to pay for it. Finally, if your app includes access to content, that content could be purchased on a subscription basis. For example, services that provide weather information cost the developer money, depending on the number of times the weather service is accessed. If the user wants that information in the app, the developer could charge a subscription fee to cover the cost and generate revenue for themselves. Often an in-app purchase strategy is combined with an ad-supported strategy. The free version includes ads that are eliminated as a bonus for an in-app purchase.

Owning Your Own Business

If you are going to sell apps, you should have a business. This is not an absolute requirement. The Play and App Stores will let you sell apps as an individual. However, it is good practice because you can cleanly separate your individual life, income, and assets from your business income and assets. This is important for both tax and liability purposes. The vehicle for setting up your own business is in most cases a Limited Liability Corporation, or LLC.

Other Income Possibilities

Making money from selling apps or advertising in apps is possible. However, your income is very dependent on how successful your app is in terms of number of downloads. You should create, publish, and attempt to monetize an app in at least one of the markets. This will give the knowledge to make money in other ways from app development. Although the authors of this book have several apps available in both markets, we make far more money doing training and consulting than we do from the monetization of our apps.

One of the surest ways to make money from app development is to get paid to do it for someone else. This way, you get paid whether the app sells or not. App developers are a very hot commodity in the business world. The average salary for an app developer employed by an organization is around $100K/year. You have to sell a lot of $.99 apps each year to make this kind of money. If you establish your

ability by publishing apps for both iOS and Android, you can greatly increase your marketability. This is true if you are willing to work for a corporation or if you want to work for yourself as an independent developer.

You can approach independent development as a consultant or a contract developer.

Choosing a Platform

Should you develop for Android or iOS? Both? There are advantages and disadvantages to all three options. You will have to consider your app audience, market size, how committed you are to making a successful app, and what your goals are in publishing an app. Each of the three options will be considered in this section.

Android has the biggest market share in terms of devices sold. Therefore, it also has the biggest potential for app sales. However, much of the market growth is outside the United States. Your app would have to have universal appeal to take advantage of the growth. A second problem with the Android smartphone market is that although the market is big, many of the owners of these phones primarily use them as dumb phones. They are not a likely market for your app.

Finally, Android app users are much less willing to pay for an app than their iPhone compatriots are. Studies have shown that each iOS user spends about three times as much on apps as an Android user. On the other hand, some industry segments you might target may have a tendency to use Android devices at a much greater rate than iOS devices.

Android has an advantage in that the barrier to entry is lower for the casual developer than it is for iOS. The fee to be a developer is a one-time fee, and all the tools are free. You can develop

Android apps on either Windows or Mac computers. Finally, publishing an app is relatively easy. If you want to publish apps for fun, bragging rights, or to demonstrate your credentials as a developer, Android is a good choice.

Although the iOS market is smaller than the Android market, people get iPhones because they want to use the apps. They are much more likely to look for apps to use, and iPhone users are also much more willing to pay for an app. This makes selling an app using the simple paid approach as well as in-app purchase discussed earlier much more feasible. On the other hand, Apple charges a higher annual fee to be a developer, the publishing process is more complicated, and is in no way guaranteed. Finally, you must have a Mac to use Xcode to create your app. You cannot create an iOS app on a Windows machine.

Why not publish on both? If you are trying to make money from apps, this is probably the way to go. You get access to a larger market and thus more potential revenue generation.

Additionally, after you've gone through the effort of designing a user experience, user interface, and logic to create an app for one market, you can leverage that effort by creating an app for the other environment. You will have to completely recode the app, but coding is much easier if you already know what you want the app to do. Additionally, many of the control structures are almost identical on the two platforms (for example, a for loop) so much of the code structure can be copied directly between the code files. You will have to learn both development environments in-depth, but you've got a good start from what you have learned by completing this module. The primary problem with targeting both markets is that you will have to keep your app current on both platforms. This means more work just to keep the lights on.

Summary

You can make money from mobile apps in several ways. Revenue can be generated through monetization of the app itself using ads, in-app purchase, or charging for the download. If you choose to generate revenue from your apps, you should create a Limited Liability Corporation for both tax and liability purposes. You can also make money by coding apps for other people or organizations as a consultant or freelancer. Finally, money can be made by getting hired as an app developer in a larger company. This is a much more reliable source of income than any of the other approaches.

What kind of app do you want to make? Who is the target audience? How will you monetize it? Why would somebody want your app? How difficult would it be to make?

Chapter Four

Publishing Apps

Introduction

Creating an app can be challenging exercise, but for most developers this is not enough. The finished app has to be available for someone to use to complete the process. Apps are made available to their audience by publishing them. The manner of publication is dependent on the target audience and the platform. The two primary audiences are typically the employees of an organization for which the app was developed or the public. Many aspects of publishing are the same for both audiences. However, some important differences exist that the developer needs to be aware of. Likewise, publishing Android and iOS apps have many similarities and some significant differences. In this lecture you learn the basics of publishing apps for both consumer and enterprise audiences and both platforms.

App Distribution through the App/Play Stores

Both Apple and Google provide a marketplace where developers can sell their apps. To publish an app in either of these stores, a developer must configure the app and conform to the requirements established by their sponsors. A significant amount of the work required to publish the app should be done during development. Both Google and Apple have requirements and guidelines for apps that should be incorporated during development. You should read these guidelines prior to development so that you are not doing a lot of rework just to get the app published. Apple is especially meticulous about these rules. Every app is reviewed before it is published, and if your app does not conform, it will be rejected. Google will publish an application that does not meet its store requirements, but will remove the app from the store later if it finds that the app violates its rules.

When you are confident your app meets publication requirements of the market you are targeting, the process of publishing requires several steps in either market and is greatly facilitated by preparing prior to beginning the process. The preparation is similar for both stores. You will need to prepare an icon for your app. Android requires an app icon sized to 512 x 512, whereas iOS requires the icon to be 1024 x 1024 pixels. Both platforms require at least one screenshot of your app for each targeted screen size. You can provide up to eight screenshots for each targeted Android device and up to four screenshots for each targeted iOS device. For iOS apps, you also have to supply a launch image that matches the resolution for the devices that the app will run on. The launch image is displayed while the app is loading and is typically a blank image of what the first screen looks like or a splash screen.

In addition to preparing screenshots, you should also prepare a description of your app. This narrative is presented to potential customers, so you should be as clear as possible in describing exactly what the app is designed to do and why it is advantageous for the customer to buy the app. For iOS apps, you will also have to provide a description of any specific conditions or requirements that the tester will need to know to adequately review your app.

Other considerations prior to beginning the publication process include determining what price you want to charge for the app. In Android, you enter this price. In iOS you will be prompted to select from a set of pricing tiers. You should also determine what general category best describes the app (for example, game, sports, tool, and so on) because you will have to indicate this during the publishing process. Finally, you will need to determine in which countries your app should be made available.

After you have completed the previous steps, you are ready to publish. Although there are many similarities, each store has its own process and requirements. You may want to look at the specific description of the procedure online. To get access to these resources for iOS, go to http://developer.apple.com . You will need to have a developer ID to access these resources. To access Android resources go to http://developer.android.com/distribute/index.html. You do not have to sign in to access this information.

Android Play Store Distribution

The Google Play Store does not provide any copy protection for your app. Instead, Google provides a Licensing Library, which allows developers to add copy protection to their apps. The Licensing Library needs to be added to the workspace just like the Google Play Services library was. After the library is added, search the developer site for detailed instructions for adding licensing to your app. When you add licensing to an app, each time the user opens the app, the Play Store is queried to determine whether the user bought the app. If the user did not buy the app, the developer can have the app close or take whatever action is deemed appropriate. If you do not use licensing, your app can be copied to other devices quite easily.

After you have added licensing (if you want to), the app needs to be compiled into a signed Android application package (APK) file. Prior to compiling the app, you need to go through the code and remove any logging operations, all debug breakpoints, and address as many of the warnings identified by Eclipse as you think necessary. To create a signed APK (which is required by the Play Store) you need to set a private key. Fortunately, you can do this using the Export Wizard at the same time you are creating the APK.

To publish apps, you need to sign up as a Google developer. The cost is a one-time fee of $25, which must be paid from a Google Wallet account. If you are going to sell your apps, you will need this account for payments. After you have set up all your accounts, you are ready to publish!

iOS App Store Distribution

As a developer, unlike in Android, you don't have to worry about setting up any licensing. However, the builtin copy protection requires other additional work to get your app published. The first step is to set up your Distribution Certificate and Distribution Provisioning Profile. The next step is to set up an entry for your app in iTunes Connect. You will have to use your developer ID to sign in. iTunes Connect is the website that is

used to manage many aspects of your app, including seeing reports on how the app is performing.

In iTunes Connect you provide information about the app, pricing, and screenshots prior to being able to upload the app.

You need to uploaded your App . When it is complete, you will get a success message. Your app is now waiting to be reviewed by Apple.

The app review process is very thorough and may take several weeks to complete. After the app is accepted, it will be available for purchase. If it is rejected, Apple will inform you of the reason and give you a chance to correct the problems. Generally, your first app takes the longest to get reviewed. Future apps typically get a less-thorough review because you have demonstrated that you can conform to the App Store requirements.

App Distribution for the Enterprise

App distribution within an organization differs between iOS and Android. Generally, distribution is easier because you are not required to conform to the specifications of the Play or App stores.

Android Enterprise Distribution

Distributing Android apps within an organization is very easy. You prepare an APK just like you did for the Play Store, and then you give it to your users. The easiest way to do this is by sending users an email with the APK attached. If users open the email on an Android device, the device automatically asks if they want to install it. However, for this to occur, users must have set their device to accept apps from unknown sources. To do this, go to the Settings app on the Android device and check the box next to Unknown Sources. Unfortunately, this item is not located in exactly the same spot in Settings on every Android device. Some common locations are under Applications or Security.

Another approach would be to set up an internal website to distribute the app. Again, accepting apps from unknown sources must be checked. Although these are the two most common approaches, because Android is open, you can choose whatever method works for your organization.

Many organizations also implement Mobile Device Management (MDM) solutions to manage their mobile devices and app distribution. These systems can help organizations implement security controls on both devices owned by employees as well as devices owned by the enterprise.

iOS Enterprise Distribution

Distribution of iOS apps within the organization is a bit more complicated in iOS than it is in Android. The first step is to get an iOS Enterprise Developer license. The cost of the license is $299 per year but allows unlimited distribution of apps within the organization. You cannot sell apps in the App Store with this license. Organizations that want to do both internal and public development need both an Enterprise Developer license and an iOS Developer license.

Distributing within the organization requires setting up both an enterprise distribution certificate and an enterprise distribution provisioning profile. These are then packaged with the app. There is no need to use iTunes Connect with in-house apps. However, the provisioning profile expires after a year. Prior to that time, a new profile must be created, packaged with the app, and redistributed, or the app will stop working. After an app is compiled with the appropriate certificate and profile, it can be distributed through iTunes, or wirelessly from a secure server.