Recruiting Fundamentals Training

Mobile Development
An Overview

IT 4 Recruiters

Overview

Once seen as a fashionable device, the mobile phone has become one of the fastest growing technologies to date. They have become so engrained into our daily lives that we no longer see mobile phones as a piece of technology, but as a necessity we cannot live without.

In the beginning, the early mobile phones were bulky, heavy, and didn't hold a good charge. These phones were predominately used for making and receiving calls, but through breakthroughs in technology, the current landscape of mobile phones evolved into something more: a smartphone. These new smartphones have more functionality than the traditional mobile ones. The newer smartphone changed from being just a phone into the equivalent of a small, pocket sized, computer. These devices can now host various types of applications that can be used for business and personal tasks. The biggest players in the manufacturing of these new phones are Samsung, Apple, and other dominant players like Microsoft (formerly Nokia), LG, and Lenovo filling out the remainder of the field.

In the current generation of smartphones users can access the Internet, e-mail, instant messages, text messages, web browsing, work on documents (such as Microsoft Office, Adobe Acrobat), and many more. These Smartphones are now supported by thousands of developers across the world to develop various types of applications. Currently there are about 3.97 million apps in various app stores with Google's App Store in the lead with 1.6 million apps followed by Apple's App Store with 1.5 million.

Keywords

Here are some useful definitions to keep in mind while reading this document:

- Software Development Kit (SDK): is typically a set of software development tools that allows the creation of applications for a certain software package, software framework, hardware platform, computer system, video game console, operating system, or similar development platform.

- Integrated Development Environment (IDE): these are software applications created to help assist developers with a nice graphical interface and tools for writing, compiling, debugging, and generating code. Some example IDE's are: Windows Visual Studios, Apple's Xcode, Eclipse, and Oracle's NetBeans.

- Voice Over Internet Protocol (VOIP): an internet protocol that enables users to communicate over networks. In the case of mobile, users can make phone calls using an internet connection over Wi-Fi instead of their phone providers network.

- Personal Digital Assistant (PDA): this is a nifty electronic hand held device that gives the user all the capabilities of a personal assistant. These devices can be used to store personal and business information normally kept on paper. Some example information would be address books, contact information, and calendars.

- Open Source: software that has had its source code included as part of the released product. This code is generally maintained by communities of developers instead of private companies. These types of software are often designed to be free of charge and without the typical restrictive copyrights and licensing involved in traditional commercial software.

Mobile Development Snapshot

Due to the vast industry that is mobile, it is important to stay on top of the increasing demand for more complex mobile devices. Mobile devices used to be more for communicating via voice from one person to another, but since the introduction of text, email, and apps, this technology has gone beyond a simple communication device and is now the equivalent of a personal computer in your pocket. This is not just for individuals. Businesses are using applications such as Skype, GotoMeeting, VOIP, and more to replace traditional phones and computers with mobile devices. Users can have teleconferences from their homes, offices, while traveling, or any other location as long as they have the ability to connect to the Internet.

Thanks to mobile, what was once imagination and science fiction has become a reality. Touch screens, phones, watches, tablets, and more make up the growing list of devices that require experienced Mobile Developers. Due to the continuous growth in this industry, candidates with a few years of experience can be solid developers. In order to assist companies with their mobile development needs, you will need to have a good understanding of what mobile means to the company. This will aide in the developing of applications that will help the company's growth and stability.

History of Mobile Phones

The majority of the earlier mobile phones were considered to be "bricks" and were primarily used as car phones because they were too large to carry in a pocket or purse. The world's first mobile phone call was made on April 3rd, 1973 by Mr. Martin Cooper from a mobile phone that weighed 1.1 Kg. With a prototype of this kind a caller can speak only up to 30 minutes and it took 10 hours to become fully charged.

The world's first commercial mobile phone was developed by Motorola, released into US markets in 1983 and later into other countries. The mobile phone was named Motorola DynaTAC 8000X, this analogue phone offered 30 minutes of talk time, required 6 hours of charging, and sold at a price of $3,995 USD. The cell phone was primarily used by people in business or sales and was not used by the general public for communication purposes.

Businesses are using applications such as Skype, GotoMeeting, VOIP, and more to replace traditional phones and computers with mobile devices

Touch screens, phones, watches, tablets, and more make up the growing list of devices that require experienced Mobile Developers.

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The world's first commercial mobile phone was developed by Motorola and released in 1983

Market Share Oct, 2015
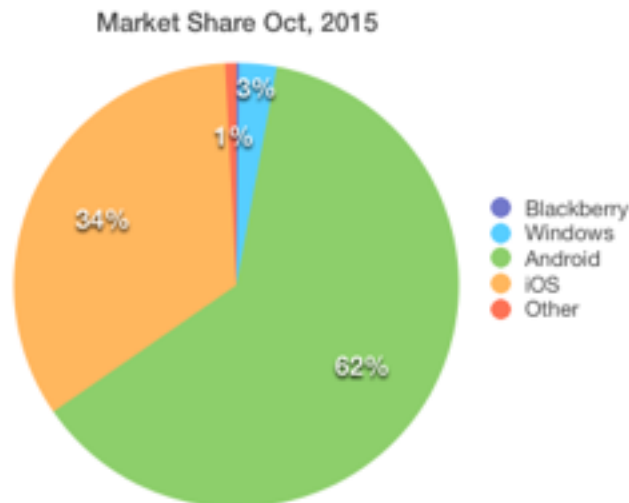
In late 1980's and early 1990's companies such as Nokia and NEC forayed into the manufacturing of cell phones. In 1998, Nokia developed its first hand held mobile phone "Mobira Cityman 900" and later developed "Mobira Cityman 450." These two phones were designed for the Nordic Mobile Telephony system, NMT. The Nokia phones were a major success amongst users as they were lightweight and portable.

In 1993, Bellsouth and IBM created a mobile phone named Simon, which was regarded as the first original smartphone. Simon had features including: pager, Email, Stylus for writing on the screen, keypad to type number and letters, and a calendar. Only 2,000 Simon phones were manufactured and these were sold for $899 USD. The 1990's was a period of evolution in the mobile phone industry and new types of designs such as flip phones were introduced into the market mainly targeting the elite community.

In the late 1990's PDA phones were introduced into the market which were used as pocket computers and had a touch screen where the users could send and receive email and access the Internet.

In the early 2000's, mobile communication started becoming cheaper and more affordable. This prompted companies such as Nokia and Motorola to start manufacturing mobile phones for the masses. However, Canadian Research in Motion introduced the world's first integrated phone, Blackberry 6210. This phone had various features such as email, text, web browser and its own messaging service, this was an instant hit among the business class.

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In 1993, Bellsouth and IBM created a mobile phone named Simon, which was regarded as the first original smartphone.

In the late 1990's PDA phones were introduced into the market

2003 Blackberry 6210 release. 1st phone offering email, phone, SMS, a web browser, and BlackBerry Messenger.

The real game changer for the mobile phone industry happened in 2007 after the launch of Apple's iPhone by Steve Jobs. The phone combined three products into a single device: a mobile phone, iPod, and a wireless communication device. Other features included: visual voicemail box, touchpad keyboard, a photo library that could be linked to a remote computer, and an almost nine-centimeter display for watching movies and television.

The app-enabled smartphone has taken over the market after the release of Apple's iPhone. Google has introduced its own platform, Android, and their own app store Google Play. Manufacturers such as Samsung, HTC, Motorola, and others, have been very successful manufacturing Smartphones based on the Android platform.
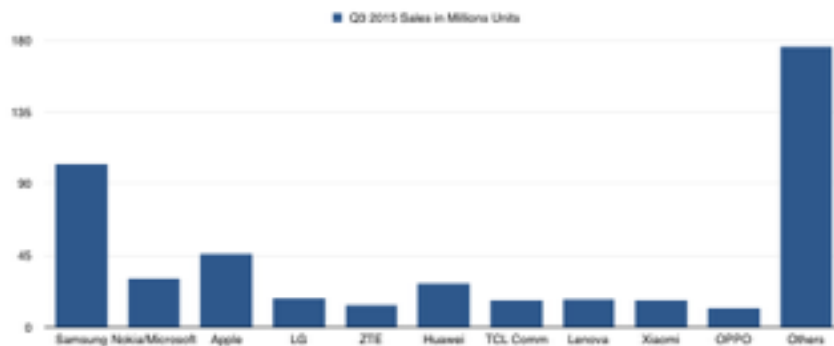
Recent Innovations of Major Players

Motorola

With the rapid changes to the phone industry in 2001, Motorola releases the V60 model their 1st phone with text messaging, voice activation dialing, and internet access. This model was so popular it was quickly adapted to all 3 cellular technologies GSM, TDMA, and CDMA.

Trying to make a more indestructible military grade flip phone they released the Razor V3 in 2004. This new metal-clad, quad-band phone used aircraft-grade aluminum to achieve several design and engineering innovations, including a nickel-plated keypad.

In 2011 Google purchase Motorola Mobility for USD 12.5 billion, thus launching their Nexus brand of phones. Many feel this was Googles' attempt to fend off the barrage of patent infringement lawsuit attacks from other vendors (Apple, Microsoft, and Oracle). With this purchase Google gained access to all of Motorola's Patents which they used to shore up and defend the viability of its Android operating system.

June 29th 2007, Apple releases their 1st iPhone taking the mobile industry by storm.

2001, Motorola releases the V60, 1st phone to be adapted to all 3 wireless technologies at the time (GSM, TDMA, CDMA).

In 2011 Google purchase Motorola Mobility for USD 12.5 billion.

Nokia/Windows

In the mid 2000s, Nokia had released numerous mobile phones into the market; some of their successful phones were the Nokia 6600, Nokia N series phone (such as N-70, N-71, and N-90). During this time the company launched its first ever touch phone Nokia 5800 XPress music phone which introduced Nokia's own Symbian OS.

In the 2010s Nokia joined forces with Microsoft and released the first Windows phones: Lumia 710 and Lumia 800. Nokia and Microsoft set about establishing a strategic partnership to try and curb the growth of the big 2: Apple iOS and Google's Android OS. Shortly after this partnership Nokia released their 8080 pure view. This was to be the last Symbian OS phone by Nokia, because the following year the company was sold to Microsoft. By 2013 the Symbian OS was completely replaced by Microsoft's mobile OS.

Apple iPhone

Steve Jobs, CEO of Apple Company, in 2007 changed the landscape of mobile phones forever. In a keynote speech he introduced the iPhone, a new phone combining all the features of their popular iPod music device line with that of a mobile phone. They didn't stop there; these phones essentially were computers with calling capabilities. Users could connect to the internet using existing cellular technologies and independently through Wi-Fi. The phone was released to the US Markets in June of that year, it was an instant hit with consumers and sold more than 5 million iPhones (1st generation). All-in-all today Apple has released a total of 10 different iPhone models.

Samsung

Samsung entered into the mobile phone market in 1992. Not until 1999 did they begin developing Smartphones with the ability to connect to the internet. This trend continued thru 2009 when Samsung entered the Android market with its release of the Samsung i7500, also known as the Samsung Galaxy. Their Galaxy line continues today and is one of the leading competitors to Apples' popular iPhone.

In the 2010s Nokia joined forces with Microsoft and released the first Windows phones: Lumia 710 and Lumia 800

2013 ends the Nokia brand altogether being replaced by Microsoft.

1st Generation iPhone sold more than 5 million devices. All-in-all today Apple has released a total of 10 different iPhone models.
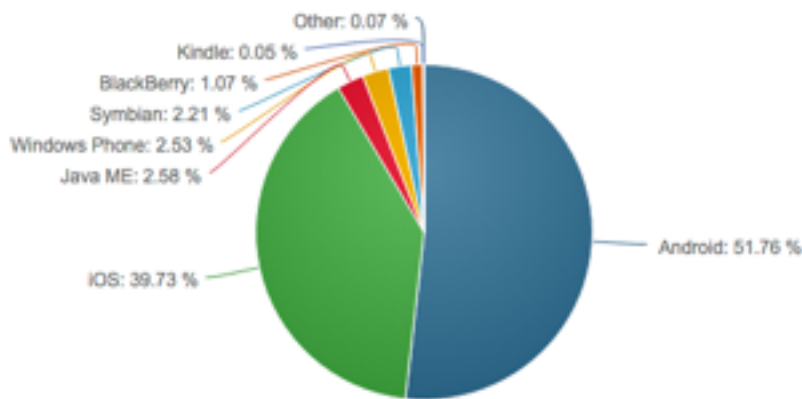
Samsung entered into the mobile phone market in 1992.

Currently the leading manufacturer and seller of mobile devices running Android OS.

Current Mobile OS landscape

We will be taking a look at iOS, Android, and Windows to see how these environments impacted the mobile landscape, which devices the software is run on, and briefly explore what to look for in a developer. We will also briefly look at what other players are out there and what their impact on mobile has been.

Other: 0.07 %
Kindle: 0.05 %
BlackBerry: 1.07 %
Symbian: 2.21 %
Windows Phone: 2.53 %
Java ME: 2.58 %
Android: 51.76 %
iOS: 39.73 %

Android

Android OS is the most widely used OS on smartphone devices across the Globe. Android powered 1.1 billion shipped smartphone units in 2014, up 32% from the 802.2 million units shipping with the Android OS in 2013. According to research firm IDC, Samsung has remained the top original equipment manufacturer (OEM) of Android-powered phones, shipping more units than the next 5 manufacturers combined.

The year 2015 was an Android era, mobile devices have captured the public admiration, becoming part of our daily lives and work routines. The Android OS is dominant in terms of changing of the technology. As we enter 2016 this trend continues, the other operating systems (such as iOS and Windows) are starting to slip and be overtake by Android in terms of apps and devices sold. However, this overall revenue made from app store sales still goes to the Apple Store.

Android is an open source Operating System. This has enticed the majority of mobile manufacturers to show interest in launching mobile devices with the Android OS installed right from the start. Even the newest mobile manufacturers are interested in launching their phones in Android rather than any other OS. This is in part due to the million plus apps in the Google Play store. These companies do not need to spend much effort on the development of the OS and can concentrate more on technological advances.
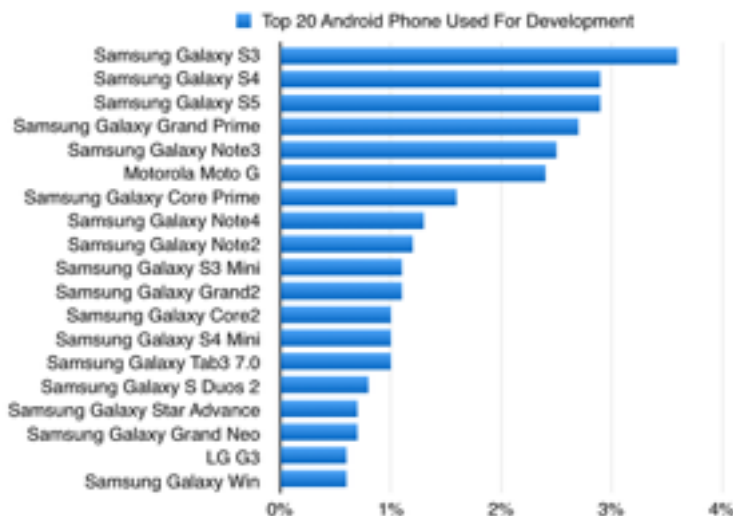
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Android 6.0 "Marshmallow", which was released in October 2015.

The Android Source code is readily available for people to download and change. This allows for more variants of the operating system and a greater adoption rate on different hardware platforms. Moreover, being the first open source mobile OS has helped the Android OS to be adopted faster when compared to its competitors.

Android apps must be developed using the Android Software Development Kit (SDK) and do not require a specific development environment. Android is Java based and works with most Java development tools. Developers can also build an application on any OS (Windows, Mac, Linux). When approaching Android positions (other than knowing Android) the candidate will need to know Java (or C/C++). Make sure the job position lists other required skill related details like tools and environment. Additionally, Android does have support for C/C++ SDK libraries, but Java is the primary development language.

Android apps can be developed on any operating system platform. Unlike Windows and Mac that require developers to build application on devices running their operating system.

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Samsung currently dominates in the number of devices used for Android development.

Top 20 Android Phone Used For Development

Device	
Samsung Galaxy S3	
Samsung Galaxy S4	
Samsung Galaxy S5	
Samsung Galaxy Grand Prime	
Samsung Galaxy Note3	
Motorola Moto G	
Samsung Galaxy Core Prime	
Samsung Galaxy Note4	
Samsung Galaxy Note2	
Samsung Galaxy S3 Mini	
Samsung Galaxy Grand2	
Samsung Galaxy Core2	
Samsung Galaxy S4 Mini	
Samsung Galaxy Tab3 7.0	
Samsung Galaxy S Duos 2	
Samsung Galaxy Star Advance	
Samsung Galaxy Grand Neo	
LG G3	
Samsung Galaxy Win	

Windows

Microsoft has spent millions of dollars for development and advertising on the Windows Phone, but they have had very little impact in the mobile phone industry. With Apple & Android OS taking up the largest market share, Windows OS has little impact on the industry and it is expected to stay in the third position for number of devices sold for a particular OS. The biggest problem with Windows OS has been a lack of mobile apps in comparison to Android and Apple.

With the latest release of Windows 10, Microsoft is trying again to re-establish their presence in the mobile market. Their new OS brings all their mobile technologies onto the same platform.

Windows 10 released on July 29, 2015.

The biggest problem with Windows OS has been a lack of mobile apps in comparison to Android and Apple.

Microsoft is trying to mimic its success with their "Xbox One" game console which mixes the experiences of PC, TV, and video games to a single platform. They are hoping Windows 10 will do the same for business and mobile alike, by allowing developers an easier way of developing apps on one platform that will be compatible with Windows Phone, Tablets, PC, Laptops, and Game Consoles.

Windows, like Apple, restricts the development of their applications to be done using a Windows OS. Developers will need to use Microsoft's Visual Studios IDE which contains all the SDKs, emulators, and libraries for all Microsoft development. These developers will need to be skilled in one of the .NET languages depending on the type of mobile application they are developing. Primarily C# and Visual Basic will be the primary building blocks most developers will use, but they are not limited to these.

<div align="center">IOS</div>

Apple iPhone has changed the way the mobile industry operates. Starting from the first phone released back in 2007 to iPhone 6 and 6+ in 2015, it has created a wave that was unmatched by any of the mobile manufacturers around the world. Each new model of the iPhone has sold as many units as all previous versions combined.

The introduction of iOS has created a technology battle to see who will gain the lion's share of the mobile technology market, Apple or Google. To date, Apple has started to lag allowing Google to gain ground going into 2016. This could be in part due to some software problems with their latest OS release iOS 9, an increase in competition, and more competition oversees in China and india.

Due to the proprietary nature of Apple, all iOS applications must be developed on an Apple machine running OS X. This is so Apple can control the access to their mobile device simulators and enforce their strict coding standards. This made it costly for companies already doing development on other operating systems (Windows PC or Linux OS) to build Apple iOS apps.

In general, the only way companies could develop applications for Apple devices was to hire developers experienced with Apple's Xcode, iOS SDK, and Objective-C. Apple's development language "Objective-C" is "C" based and led companies to look for developers with C and/or C++ knowledge due to the limited

Windows, like Apple, restricts the development of their applications to be done using a Windows OS.

Financial numbers in Q4 2015 shows sales of devices running Windows OS declining.

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Apple's development language "Objective-C" is "C" based.

number of developers that were highly skilled in the Objective-C language. We will discuss alternatives at the end of the "Current Mobile OS landscape" section.

Blackberry

In the early days, Blackberry was the industry leader for mobile business needs. Their services provided all the laptop and desktop services for mobile. The ability for businesses to have a secure device for conducting daily business needs went unrivaled for years. However, due to a combination of constant network outages and the explosive growth of newer, faster, more robust, and cheaper devices caused their market share to decline. As iOS and Android became the dominant players in the market, Blackberry fell behind. Blackberry now struggles to hold onto a meager market share of 0.40% as it strives to rebrand and turn the product around. In a sudden turnaround late in 2015, Blackberry released a new series of blackberry phones that are built with Blackberry technology, but running Android. This has excited some industry experts and may be an opportunity for Blackberry to cut into Microsoft declining market share.

Sailfish OS

Going in a different direction we have a company Jolla, based in Finland, has produced a Linux based mobile operating system called Sailfish OS. This project is built on the core of the Mer Project. Their core principles include an independent platform, shorter iteration cycles, smaller teams, and continuous integration. Sailfish OS was designed to be capable of running Android applications. Thanks to the use of Qt5 and Wayland technologies this OS can be adapted to run on most hardware that was designed for Android. This will give them a huge boost to build a device suite capable of running their OS.

Firefox OS

From the developers of Firefox, Mozilla has come up with a new community-based development operating system for mobile called Firefox OS. With a Linux based framework, developers can use this new free and open sourced software platform to build mobile apps with HTML5 and Javascript. With Firefox OS, Mozilla is building a user web identity which will replace the traditional phone/tablet experience giving users the ability to have the same experience from any of their Firefox OS devices.

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In a sudden turnaround Blackberry has just released a new series of blackberry phones that are built with Blackberry technology, but running Android.

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This OS was engineered to be able to run Android applications.

Firefox OS is another exciting new Linux based framework, allowing developers to build applications with HTML and JavaScript.

Ubuntu Touch

From the developers that brought us the versatile and user friendly Linux platform, Ubuntu, comes their new mobile version Ubuntu Touch. Developed by Canonical Ltd. and with the help from the Ubuntu Community they are developing an OS which will work in all of the existing platforms. Thanks to their contracts with T-Mobile, Vodafone, Deutsche Telekom, and the ever-growing Ubuntu Community, this has the potential to gain market share and popularity in the future. To help bolster their hold in the market Ubuntu OS is now being released on a new series of phone dedicated to their OS.   These phones are BQ Aquaris E5 HD, BQ Aquaris E4.5, and the Meizu MX4 Ubuntu Edition. The new phones are built and priced to be very competitive with their Android counter parts such as the Samson's Galaxy series.

Tizen

Tizen is an open source, Linux based OS. This OS has been adopted by Samsung with the recent release of the Samsung Z1, officially bringing Tizen to the mobile phone industry. With the ongoing legalities between Samsung and Apple, Samsung has started to reduce its dependencies on Android in hopes of becoming a larger player in the mobile OS market. To do this, Samsung has embraced the lightweight Tizen platform.
This will allow their phones to deliver an upgraded web performance, improved power savings, reduced load times, and faster access to apps. Thanks to the attention and recognition brought by Samsung, Tizen is hoping to use this recognition to become a larger player in the mobile OS arena by attracting more Independent Software Vendors and mobile phone users. Tizen has the second-largest market share in the budget segment of smartphones in India as of Q4 2015. This has pushed Tizen into the fourth largest Mobile OS slot in term of market share.

Alternative Mobile Development Environments

Over the past few years there has been a growing business need for development tools/suites to address the growing problem of having to build apps for multiple devices. Now companies have the option to use their existing developers and their skills to develop multi-device/multi-OS applications. These new tools/suites allow developers to build mobile applications using an array of skills including: HTML, CSS, JavaScript, C#, Java, and PHP to build their mobile application in one development environment. These tools also give the user the ability to compile, build, and deploy onto any device (Windows, Android, Web Browser, or Apple).

Developed by Canonical Ltd. and with the help from the Ubuntu Community they are developing an OS which will work in all of the existing platforms.

Late 2015 Ubuntu released 3 new phones running their OS:
- BQ Aquaris E5 HD
- BQ Aquaris E4.5
- Meizu MX4 Ubuntu Edition.

Tizen is an open source, Linux based OS.

With the recent legalities between Samsung and Apple, Samsung has started to reduce its dependencies on Android and hopes Tizen will help them become a larger player in the mobile OS market.

Over the past few years there has been a growing business need for development tools/suites to address the growing problem of having to build apps for multiple devices.

The only limitation these tools have is with iOS. These applications still need to be built on an Apple machine running OS X for the compilers to have access to the required SDK libraries and simulators.

Here is a list of alternatives to .NET, Android, and Objective-C:

Tool	Languages	Link
Phone gap	HTML, CSS, and JavaScript	http://phonegap.com/
Appcelerator	HTML, CSS, and JavaScript	http://www.appcelerator.com/
Xamarin	C#	http://developer.xamarin.com/
Oracle Mobile Application Framework	Java	http://www.oracle.com/technetwork/ developer-tools/maf/overview/index.html
Zend	PHP	http://www.zend.com/en/resources/zend-studio

Adoption

In today's landscape the 3 biggest players are Android (Android M, Lollipop, KitKat, Jelly Bean, Ice Cream Sandwich, Honeycomb, Gingerbread, etc.), iOS (versions 6, 7, 8, 9), and Microsoft Windows (Microsoft Mobile, Surface, Windows 10, Windows CE).
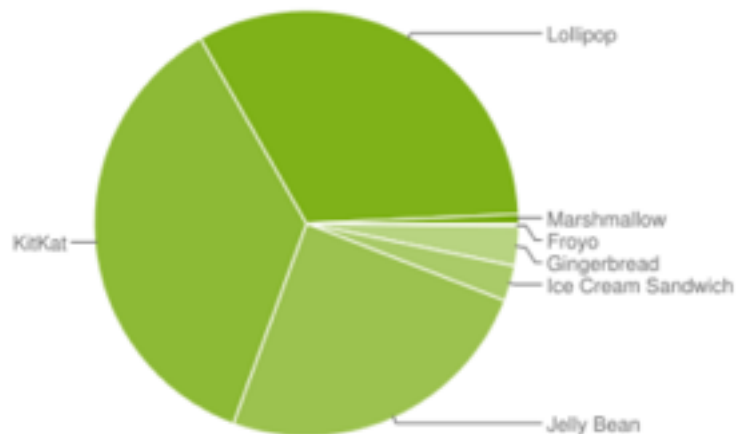
% of devices running a given version of the Android platform

Why build devices on only one platform, when you now have options to develop in your favorite language and deploy to all major OS's.

3 biggest players are:
1. Android
   - Android M,
   - Lollipop,
   - KitKat,
   - Jelly Bean,
   - Ice Cream Sandwich,
   - Honeycomb,
   - Gingerbread,
   - Marshmellow.
2. iOS 6, 7, 8, 9
3. Microsoft Windows
   - Microsoft Mobile
   - Surface
   - Windows 10
   - Windows CE

Market Skill Set

Typically mobile developers can fall into a couple of different job categories which can include skills in cross platform development, UX/UI design, front end development, and back end development.

Android and Windows Developers having an understanding of a variety of programming languages (such as PHP, Java, C#, .NET, HTML, and others) will help candidates stand out from developers who specialize in only one language. The only exception to this would be an Apple Developer. Apple's native iOS application requires developers to be extremely skilled in only Objective-C.

Popular Mobile Position Types	
Cross platform development	Employers are always looking for candidates who can develop apps for different mobile OS such as iOS, Android, Windows and Blackberry.
UX/UI Design	Responsible for building good application design and slick user interfaces making applications really stand out amongst all other competition in apps related software category.
Architect	Developing IT architecture plans and software development methodologies. Includes skills in mobile infrastructure, device management, data, security, and analytics to name a few.
DBA	All the typical DBA responsibilities plus requires the additional task of understanding, building, security, restrictions, and maintaining mobile app databases on the mobile devices.

Certifications

Most of the programming languages used for mobile development have some sort of certification. With the addition of programming certification there are also additional certifications for other roles such as Security, DBA, Architects, and UX/UI designers. In the table below we list some major vendor certifications available. Keep in mind though that most early adopters of mobile were coding long before most of these certifications were available. The older, more seasoned, developers probably do not have certifications, since they have more hands on development experience building mobile apps than junior developers who are just entering the market with certifications.

Suggested Mobile Developer Certification Sites	
Android	http://www.androidatc.com/pages-4/Android-Certifications-and-Exams
iOS	There is no official certification. There are, though, non-Apple-official courses which are highly reputed, such as Big Nerd Ranch's (https://www.bignerdranch.com/we-teach/) , for instance.
Microsoft	https://www.microsoft.com/learning/en-us/exam-list.aspx
Blackberry	http://us.blackberry.com/support/programs/certification.html
Java	https://education.oracle.com/pls/web_prod-plq-dad/db_pages.getpage?page_id=652&get_params=p_exam_id:1Z0-869
Mobile Networking	http://certification.comptia.org/

http://www.transcender.com - This is site offers a large variety of third party certifications and training.

Clarifying Questions

There are many areas of mobile, so there is a need to ensure you have the right information to identify the correct job requirements from the employer for their particular mobile project. Here are some questions to help clarify what type of mobile project you're dealing with so you can find the ideal resources that will guarantee you a good candidate to fill a position:

• What is the device you are developing for?
  - iPhone, iWatch, iPad, Galaxy Tab, Galaxy Note, Windows Surface, Blackberry, etc...

• Which operating system do you need developers for?
  - iOS, Android, Windows, Linux.

• What development tools do you use?
  - Xcode, Visual Studios, Eclipse, etc...

• What development languages are required?
  - Java, .Net, JavaScript, HTML, CSS, etc...

• Is this a new mobile application or an existing application?
  - This will help determine if this position will require someone with knowledge of building systems from scratch.

www.transcender.com Offers a large variety of third party certifications and training.

Questions to help identify what Architect position the company needs:

• What is the device you are developing for?

• Which operating system do you need developers for?

• What development tools do you use?

• What development languages are required?

• Is this a new mobile application or an existing application?

- Does this application live in the Cloud? Does the candidate need existing cloud experience?
  - If the position requires a senior cloud expert, look for someone with at least 2-3 yrs of experience with Cloud and mobile.

- Do they need someone who understands the existing architecture to maintain it and continue to grow it?
  - Some companies will rely heavily on frameworks to build their mobile applications. These companies will be hesitant to change or breakaway from what they started with. This may make it tricky to find the right candidate for the position and may require looking for someone with either cutting edge or legacy framework skills to meet the demands of the position. In either case the client may have to pay more for the skill set they are looking for.

- Does the candidate need to have previous experience developing mobile applications? If so can they provide examples?
  - Providing examples of mobile applications as a reference for existing or new product will give recruiters and candidates a reference point to determine what the company is trying to build without giving away company secrets.

- Does the position require the candidate to be responsible for all areas of SDLC in mobile? Do they need to be able to architect/ design, develop/code, test/debug, and build/deploy?
  - Knowing the responsibilities the candidate will be required to perform, along with their development skills will be key to finding the right fit for the position. As discussed in the SDLC course, companies tend to mix and match areas of the SDLC process and a candidate could be required to do more than just develop code.

- Is this more of a customer service role requiring enough technical knowledge of mobile to walk customers through use of the application?
  - Some companies may only be looking to fill a technical role for support or training. These positions can usually be filled by junior candidates with little actual development knowledge. Talk to the companies and see if they are more interested in potential candidates who are just out of college or only have a working knowledge in the technology. Sometimes companies will ask for this type of candidate, but are looking for someone with more drive than a typical

Additional questions to help identify what Architect position the company needs:

- Does this application live in the Cloud? Does the candidate need existing cloud experience?

- Do they need someone who understands the existing architecture to maintain it and continue to grow it?

- Does the candidate need to have previous experience developing mobile applications? If so can they provide examples?

- Does the position require the candidate to be responsible for all areas of SDLC in mobile? Do they need to be able to architect/design, develop/code, test/ debug, and build/ deploy?

- Is this more of a customer service role requiring enough technical knowledge of mobile to walk customers through use of the application?

support position and would like to grow these candidates into a development role later. This again will change the type of candidate you will be required to find, so make sure to get complete answers to these questions.

Crossover/Complimentary Skills

When talking to the employees or a manager, make sure to ask for additional responsibilities the position may require. Traditional mobile development projects do not generally involve just coding or understanding a particular mobile environment. There are many skill areas that can be shared, providing an interesting mix of crossover skills. Mobile development, like web application development, has a tendency to require developers to work on other areas of the project. These areas could include working with managers to design and build the UI/UX from the business requirements. In other environments the developer may also be responsible for determining if they need to build an embedded database for data storage, push the data into a Cloud, or use a database. Some environments may require additional knowledge of web services so their mobile app can interface with third party systems like stock markets, weather services, or statistical information from another vendor.

Weasels

There is a lot of confusion about what mobile development is and how it is used. This has opened the door for candidates to weasel their way into positions they are not qualified for. Due to the popularity of mobile, many developers want to work in a mobile environment at least once in their career, so they can say they are a Mobile Developer. With the increasing demand for more web application and Mobile Developers this will continue to become a problem for companies to weed out the real mobile experts, from those who are book smart or have the development knowledge with no real mobile development skills or expertise.

The "book weasel" is a person who has no real development skills in the particular framework and is likely to have read some material from the developers' website, online tutorials, or some other reference site with detailed information and examples on how a mobile application should be developed. When interviewing these candidates their limited knowledge should become apparent pretty quickly if you ask detailed questions about how to deploy an application or what development environment they use for the application. For example, if you ask a candidate which environment they developed iOS applications on and their

Traditional mobile development projects do not generally involve just coding or understanding a particular mobile environment.

Some projects may require developers to work with:
- UI/UX
- Databases
- Web Services
- Cloud Storage

Watch out for the "book weasel". This is a person who has no real development skills in the particular framework and is likely to have read some material from the developers' website, online tutorials, or some other reference site with detailed information and examples on how a mobile application should be developed.

response was Windows OS they are full of it. iOS applications can only be done on a Macintosh. Other questions may be more tailored to the specific language, for example how would you sort a list of values? Unless they have really studied, this question will stump them or they will give an answer that has no relevance to the question.

The "developer weasel", these are real developers (Jr, Mid, Sr) who have experience programming applications, but have no experience whatsoever when it comes to building a mobile application. Android positions may get plagued with Java Developers who know the in and outs of the Java language and will be able to answer most of the Android questions with ease, since the core is built on Java. However, they will not be able to explain how to build an android app, configure, or deploy the app to the store. Windows Mobile will be plagued by similar problems from .Net Developers but to less of a degree. Microsoft intentionally tries to make their environments similar between standalone, web, and mobile. Apple iOS uses Objective-C, thus Java, C, C++, and C# like language runs the gambit for the most abuse. These individuals use their skills in the related languages to fool hiring managers into believing they know how to code an iOS application. iOS is one of the toughest curves as far as environments go. If the developer has been a Senior .Net Developer for most of their career, it's a stretch to consider them an iOS Senior Developer if they have only been doing iOS development for 6 months. Similarly for a Java or C++ Developer who has worked on a Mac for years, may not have worked with Xcode and therefore will have little knowledge of how an iOS application is built.

Luckily weeding these weasels out is very similar to how you weed out a development language weasel. Make sure to ask the candidates to provide examples of recent works, especially links to the app stores where their work has been published. This may not always be possible if applications are built for internal company use, but they should be able to provide very detailed descriptions of the project. Ask them specific questions about the development framework. Xcode, Visual Studios, Eclipse, just to name a few, are very different in how they handle the development, configuration, build, and deploy of an application. If they say they know iOS then they should be able to explain in detail how to build an iOS application. Likewise with Windows and Visual Studios and Eclipse with Android.

Another weasel to avoid is the "developer weasel". These are real developers (Jr, Mid, Sr) who have experience programming applications, but have no experience whatsoever when it comes to building a mobile application.

Make sure to ask the candidates to provide examples of recent works, especially links to the app stores where their work has been published.

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Screening Questions

Here are some questions that you, the recruiter, can ask to help clarify if the candidates meet the requirements for these positions. Incidentally, you can also see if candidates have other areas of expertise overlooked or not on their resume. If these can help the candidate apply for the position, then they should be included on the resume. This will help the candidate show their skills and qualities for the particular position.

Native	- Quick way for users new to mobile development that have no previous development experience. - Build performance-critical mobile apps to take advantage of hardware. - Take advantage of native APIs - Requires using native SDK and development language
Mobile Web	- The application development is faster, simpler, more rapid and the application is easier to maintain. - These web applications (or web pages) run in the native browser, or wrapped in a native application
Hybrids	- Device language neural, all you need is an understanding of HTML, CSS, and JavaScript - Requires third party tools like Appcelerator or phone gap to build.

- What are different types of mobile apps? Use the table above to test their knowledge of the differences between native, mobile web, and hybrids.

- What platforms have you worked with? Understanding what platforms (iOS, Android, Windows, etc.) will help you determine which platform experiences the candidate has. This question helps you with followup questions based on the individual platform. Don't waste your time asking an Android Developer how to build iOS (or Windows) application, or vise versa.

- When do you develop for native apps and when do you target mobile web? See table.

- Mobile Website vs. Mobile App (Application): Which is best for your organization? This will require a candidate to have an understanding of how past projects were structured and what development strategies were used at those companies. Mid to Senior level candidates should be able to explain the differences between the two and the pros and cons of each. Inexperienced or Jr. developers may understand the differences, but will not be able to get into the technical details of the why. Use the above table to help you differentiate the two.

Types of mobile apps:

1. Native:
- Quick way for users new to mobile development that have no previous development experience.
- Build performance-critical mobile apps to take advantage of hardware.
- Take advantage of native APIs
- Requires using native SDK and development language

2. Mobile Web:
- The application development is faster, simpler, more rapid and the application is easier to maintain.
- These web applications (or web pages) run in the native browser, or wrapped in a native application

1. Hybrids:
- Device language neural, all you need is an understanding of HTML, CSS, and JavaScript
- Requires third party tools like Appcelerator or phone gap to build.

- Describe the mobile apps development lifecycle? The mobile development lifecycle is made up of many parts. However, the main areas of focus a candidate should be required to know are: Planning, Design Development, Testing/QA, and Release/ Deploy. A more detailed explanation of the development lifecycle can be found in the SDLC course.

- What are key considerations/guidelines when creating requirements for features/functionality for mobile apps? This is a great question to ask candidates who say they have experience designing and building mobile apps. When asking this question you will want to look for responses that refer to the SDLC of building mobile applications. They should also be able to walk you through the requirements gathering.

- How would you go about getting requirements for an application that calls for the user to enter data? They should begin explaining where they need to start to get the requirements. This begins by talking with different areas of the business and customers to determine what information needs to be collected. If the candidate has experience in this area they will probably mention things like backend storage, data storage on the device, data transfer, or some other area related to storing the data entered by the user.

- What are key guidelines for laying out data architecture for mobile apps? When building mobile applications how the application handles data transfers and storage is crucial for the success of an application. Candidates should be able to list at least two of the guidelines listed in Table 1. Applicants should be able to give reasons and explanations for the guideline they choose. These should not be short one word answers either. Their understanding of this question will help you distinguish if they are just a coder or if they truly understand the process of mobile data architectures. If they can not answer right away, then prompt them with additional questions about their current company's development structure. Maybe this particular candidate is more front end or design heavy in the work that they do.

- While performing end to end mobile testing what are the major criteria you have to take into consideration? This question is intended to gauge the candidate's knowledge of areas related to testing a mobile application. Most Mobile Developers should be able to walk thru how to install, uninstall, and use system emulators to run their apps for testing and debugging.

Great Interview Questions:

1. What are different types of mobile apps?

2. What platforms have you worked with?

3. When do you develop for native apps and when do you target mobile web?

4. Mobile Website vs. Mobile App (Application): Which is best for your organization?

5. Describe the mobile apps development lifecycle?

6. What are key considerations/ guidelines when creating requirements for features/ functionality for mobile apps?

7. Explain how to get requirements for an application that calls for the user to enter data?

8. What are key guidelines for laying out data architecture for mobile apps?

- What are some common network issues and how do you avoid them? If you have ever tried to use the Facebook app without a network connection you may have noticed the performance of the app was either poor or non functional. These are the type of problems this question is referring to. Candidates should be familiar with ways of handling application launching without having a network connection, how to test the application performance on different kinds of devices and network scenarios, and how to test application response times and functionality.

- What is the difference between Windows Phone apps and Windows Store apps? Windows Store Application is not same as Windows Phone 8 Application; they are totally different (in terms of UI and other backend api's). Windows Store Applications run on Windows RT and Windows 8, while Windows Phone 8 (10) applications only run on Windows Phone 8 (10) phones.

- List some advantages of why it is important to define software architecture for mobile application? Some of the major points are performance, connectivity, usability, and security. Here is a brief explanation of each so you will be able to identify if the candidate is giving you the correct answer without naming the points directly. See table 2.

More Interview Questions:

9. While performing end to end mobile testing what are the major criteria you have to take into consideration?

10. What are some common network issues and how do you avoid them?

11. What is the difference between Windows Phone apps and Windows Store apps?

12. List some advantages of why it is important to define software architecture for mobile application?

5 guidelines for laying out data architecture for mobile apps:

1. API Layer
2. Backend Server
3. Data Model
4. Storage
5. Data Transfers

API Layer	Using native Api's can improve a native apps performance where hybrids and mobile do not and may incur a performance hit.
Backend Servers	These are server needed by applications that are not standalone and require some form of communication thru a networked system for the application to work.
Data Model	This layer holds all the business logic pertaining to how data elements relate to one another.
Storage	This includes things like encrypting data, authentication, disposal, backup, and physical security
Data Transfers	It is important that applications are compressing data packets correctly to reduce the amount of data the application uses when not on a Wi-Fi connect.

Table 1

Performance	Application that take too long to load, retrieve data, or process data are deadly to mobile apps. Users expect applications to respond quickly to commands, load and process data quickly.
Connectivity	Refers to an application which users rely on communication with a server for the application to work. Poor connectivity or lack of an offline mode may cause the application to work improperly or not at all causing users to abandon the application.
Usability	Ensure that the mobile applications navigation and components are easily accessible and not overly complex.
Security	Not all apps require security, but those that do will require an extra layer of encryption and access restriction.

Table 2

Some advantages to define software architecture:
1. Performance
2. Connectivity
3. Usability
4. Security

Mobile Development Resources

Resources for more information

Here are some additional resources to familiarize yourself with the individual development tools/frameworks available.

Companies Referenced	Website
Microsoft	https://msdn.microsoft.com/en-us/default.aspx
Java	https://www.oracle.com/java/index.html
Android	https://www.android.com/
Samsung	http://developer.samsung.com/home.do
Blackberry	http://developer.blackberry.com/
Sailfish OS	https://sailfishos.org/
Firefox OS	https://developer.mozilla.org/en-US/Apps/Reference
Ubuntu Touch	https://developer.ubuntu.com/en/
Tizen	https://developer.tizen.org/
Apple	https://developer.apple.com/
Motorola	http://www.motorola.com/us/Motorola-Developers/motorola-developers.html
IBM	http://www.ibm.com/developerworks/Mobile/
HTC	https://www.htcdev.com/

Quick Reference Sheet Links

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Source Materials

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