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MOBILE PLATFORMS AND APPLICATIONS

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UNIT-V

Mobile OS

A mobile operating system (or mobile OS) is an operating system for smartphones, tablets, PDAs, or other mobile devices. While computers such as the typical laptop are mobile, the operating systems usually used on them are not considered mobile ones as they were originally designed for bigger stationary desktop computers that historically did not have or need specific "mobile" features. This distinction is getting blurred in some newer operating systems that are hybrids made for both uses.

Mobile operating systems combine features of a personal computer operating system with other features useful for mobile or handheld use; usually including, and most of the following considered essential in modern mobile systems; a touchscreen, cellular, Bluetooth, Wi-Fi, GPS mobile navigation, camera, video camera, speech recognition, voice recorder, music player, near field communication and infrared blaster.

Mobile devices with mobile communications capabilities (e.g. smartphones) contain two mobile operating systems – the main user-facing software platform is supplemented by a second low-level proprietary real-time operating system which operates the radio and other hardware. Research has shown that these low-level systems may contain a range of security vulnerabilities permitting malicious base stations to gain high levels of control over the mobile device.

A mobile OS is a software platform on top of which other programs called application programs, can run on mobile devices such as PDA, cellular phones, smartphone and etc. A Mobile operating system is a System Software that is specifically designed to run on handheld devices such as Mobile Phones, PDA's. It is a Platform on top of which the application programs run on mobile devices. Each Operating System follows its own Architecture. Mobile devices evolved the way users across the globe leverage services on the go from voice calls to smart devices which enables users to access value added services anytime and anywhere. At present, the mobile devices are able to provide various services to users but still suffers from issues include Performance, security and Privacy, Reliability and Band width costs.. In this paper, we pointed out the issues, challenges, Advantages and Disadvantages of various Mobile Operating systems in terms of their Architectures

Applications

The diagram shows four basic apps (App 1, App 2, App 3 and App 4), just to give the idea that there can be multiple apps sitting on top of Android. These apps are like any user interface you use on Android; for example, when you use a music player, the GUI on which there are buttons to play, pause, seek, etc is an application. Similarly, is an app for making calls, a camera app, and so on. All these apps are not necessarily from Google. Anyone can develop an app and make it available to everyone through Google Play Store. These apps are developed in Java, and are installed directly, without the need to integrate with Android OS.

Application Framework

Scratching further below the applications, we reach the application framework, which application developers can leverage in developing Android applications. The framework offers a huge set of APIs used by developers for various standard purposes, so that they don't have to code every basic task.The framework consists of certain entities; major ones are:

Activity Manager

This manages the activities that govern the application life cycle and has several states. An application may have multiple activities, which have their own life cycles. However, there is one main activity that starts when the application is launched. Generally, each activity in an application is given a window that has its own layout and user interface. An activity is stopped when another starts, and gets back to the window that initiated it through an activity callback.

□ Notification Manager

This manager enables the applications to create customized alerts

□ Views

Views are used to create layouts, including components such as grids, lists, buttons, etc.

□ Resource Managers

Applications do require external resources, such as graphics, external strings, etc. All these resources are managed by the resource manager, which makes them available in a standardized way.

□ Content Provider

Applications also share data. From time to time, one application may need some data from another application. For example, an international calling application will need to access the user's address book. This access to another application's data is enabled by the content providers.

Libraries

This layer holds the Android native libraries. These libraries are written in C/C++ and offer capabilities similar to the above layer, while sitting on top of the kernel. A few of the major native libraries include

□ Surface Manager: Manages the display and compositing window-ing manager. - Media framework: Supports various audio and video formats and codecs including their playback and recording.

□ System C Libraries: Standard C library like libc targeted for ARM or embedded devices.

□ OpenGL ES Libraries : These are the graphics libraries for rendering 2D and 3D graphics.

□ SQLite : A database engine for Android.

Kernel

The Android OS is derived from Linux Kernel 2.6 and is actually created from Linux source, compiled for mobile devices. The memory management, process management etc. are mostly similar. The kernel acts as a Hardware Abstraction Layer between hardware and the Android software stack.

Mobile OS Special Constraints:

Smaller screen size

Stay focused on the user's immediate task. Display only the information that users need at any given moment. For example, a customer relationship management system can provide a massive amount of information, but users only require a small amount of that information at one time. Design the UI so that users can perform tasks easily and access information quickly.

One screen appears at a time

Use a single screen if possible. If your application requires multiple screens to be open at the same time, use a split screen or rethink the flow of your application.

Shorter battery life

Try to handle data transmission efficiently. The less often the device needs to transmit data, the longer the battery lasts.

Wireless network connections

Try to simplify how your application creates network connections. Compared with standard LANs, longer latency periods that are inherent in some wireless network connections can influence how quickly users receive information that is sent over the network.

Slower processor speeds

Avoid processor-intensive tasks where possible. Slower processor speeds can affect how users perceive the responsiveness of an application.

Less available memory

Free up as much memory as possible. For example, while an application is not being used, try to keep it from using memory.

Special Service Requirements

Support for specific communication protocol

Support for a variety of input mechanisms

Compliance with open standards

Extensive library support

Support for Integrated Development Environment

Commercial Mobile

Smartphones are now participating nearly in each and every sphere of life like business, educati workplace and healthcare. The Worldwide Mobile Communications Device Open Operating Syst Sales (WMCDOOS) provides total market of 104,898 to End Users by OS. There are over million active applications in Google Play App Store. Android is the first open source, Linux-bas and modern mobile handset platform. Google developed it for handset manufacturers like T-Mobil Sprint Nextel, Google, Intel, Samsung, etc.. It offers to consumers a richer, less expensive, bette mobile experience and various features like 3D, SQLite, Connectivity, WebKit, Dalvik and FreeType etc. Since android provides open source operating system; users by Microsoft for smartphones and Pocket PCs.

Its origins dated back to Windows CE in 1996, though Windows Mobile itself first appeared in 2000 as *PocketPC 2000*. It was renamed "Windows Mobile" in 2003, at which point it came in severa versions (similar to the desktop versions of Windows) and was aimed at business and enterprise consumers. By 2007, it was the most popular smartphone software in the U.S., but this popularit faded in the following years. In February 2010, facing competition from rival OSs including iOSan Android, Microsoft announced Windows Phone to supersede Windows Mobile. As a resul Windows Mobile has been deprecated. Windows Phone is incompatible with Windows Mobil devices and software. The last version of Windows Mobile, released after the announcement c Windows Phone, was 6.5.5. After this, Microsoft ceased development on Windows Mobile, in ord to concentrate on Windows Phone.

Most versions of Windows Mobile have a standard set of features, such as multitasking and t ability to navigate a file system similar to that of Windows 9x andWindows NT, including supp for many of the same file types. Similarly to its desktop counterpart, it comes bundled with a set applications that perform basic tasks. Internet Explorer Mobile is the default web browser, a Windows Media Player is the default media player used for playing digital media. The mob version of Microsoft Office, is the default office suite.

Internet Connection Sharing, supported on compatible devices, allows the phone to share its Inter connection with computers via USB and Bluetooth. Windows Mobile supports virtual pri networking over PPTP protocol. Most devices with mobile connectivity also have a Radio Interf Layer. The Radio Interface Layer provides the system interface between the Cell Core layer wi the Windows Mobile OS and the radio protocol stack used by the wireless modem hardware. allows OEMs to integrate a variety of modems into their equipment.

The user interface changed dramatically between versions, only retaining similar functionality. *Today Screen*, later called the *Home Screen*, shows the current date, owner information, upcor appointments, e-mails, and tasks. The taskbar display the current time as well as the volume l Devices with a cellular radio also show the signal strength on said tas

alm OS (also known as **Garnet OS**) is a mobile operating system initially developed by Palm, Inc., for personal digital assistants (PDAs) in 1996. Palm OS was designed for ease of use with a touchscreen-based graphical user interface. It is provided with a suite of basic applications for personal information management. Later versions of the OS have been extended to support smartphones. Several other licensees have manufactured devices powered by Palm OS.

Following Palm's purchase of the Palm trademark, the currently licensed version from ACCESS was renamed *Garnet OS*. In 2007, ACCESS introduced the successor to Garnet OS, called Access Linux Platform and in 2009, the main licensee of Palm OS, Palm, Inc., switched from Palm OS to webOS for their forthcoming devices.

Palm OS was originally developed under the direction of Jeff Hawkins at Palm Computing, Inc. Palm was later acquired by U.S. Robotics Corp., which in turn was later bought by 3Com, which made the Palm subsidiary an independent publicly traded company on March 2, 2000.

In January 2002, Palm set up a wholly owned subsidiary to develop and license Palm OS, which was named PalmSource. PalmSource was then spun off from Palm as an independent company on October 28, 2003. Palm (then called palmOne) became a regular licensee of Palm OS, no longer in control of the operating system.

In September 2005, PalmSource announced that it was being acquired by ACCESS.

In December 2006, Palm gained perpetual rights to the Palm OS source code from ACCESS.[9] With this Palm can modify the licensed operating system as needed without paying further royalties to ACCESS. Together with the May 2005 acquisition of full rights to the *Palm* brand name, only Palm can publish releases of the operating system under the name 'Palm OS'.

As a consequence, on January 25, 2007, ACCESS announced a name change to their current Palm OS operating system, now titled *Garnet OS*.

Palm OS is a proprietary mobile operating system. Designed in 1996 for Palm Computing, Inc.'s new Pilot PDA, it has been implemented on a wide array of mobile devices, including smartphones, wrist watches,handheld gaming consoles, barcode readers and GPS devices.

Palm OS versions earlier than 5.0 run on Motorola/Freescale DragonBall processors. From version 5.0 onwards, Palm OS runs on ARM architecture-based processors.

The key features of the current Palm OS Garnet are:

Simple, single-tasking environment to allow launching of full screen applications with a basic, common GUI set

Monochrome or color screens with resolutions up to 480x320 pixel

Handwriting recognition input system called Graffiti 2

HotSync technology for data synchronization with desktop computers

Sound playback and record capabilities

Simple security model: Device can be locked by password, arbitrary application records ca be made private

TCP/IP network access

Serial port/USB, infrared, Bluetooth and Wi-Fi connections

Expansion memory card support

Defined standard data format for personal information management applications to store calendar, address, task and note entries, accessible by third-party applications.

Included with the OS is also a set of standard applications, with the most relevant ones for the fou mentioned PIM operations.

Symbian was a closed-source mobile operating system (OS) and computing platform designed fo smartphones.[6] Symbian was originally developed by Symbian Ltd., as a descendant of Psion's EPOC and runs exclusively on ARM processors, although an unreleased x86 port existed.

Symbian was previously an open-source platform developed by the now defunct Symbian Foundation in 2009, as the successor of the original **Symbian OS** before being transitioned to a non-open license in 2011. Symbian was used by many major mobile phone brands, like Samsung, Motorola, Sony Ericsson, and above all by Nokia. It was briefly the most popular smartphone OS on a worldwide average until the end of 2010 – at a time when smartphones were in limited use, when it was overtaken byAndroid, as Google and its partners achieved wide adoption.

Symbian rose to fame from its use with the S60 platform built by Nokia, first released in 2002 and powering most Nokia smartphones. UIQ, another Symbian platform, ran in parallel, but these two platforms were not compatible with each other. Symbian^3 was officially released in Q4 2010 as the successor of S60 and UIQ, first used in theNokia N8, to use a single platform for the OS. In May 2011 an update, Symbian Anna, was officially announced, followed by Nokia Belle (previously Symbian Belle) in August 2011.

›s (originally **iPhone OS**) is a mobile operating system created and developed by Apple Inc. and distributed exclusively for Apple hardware. It is the operating system that presently powers many of the company's mobile devices, including the iPhone, iPad, and iPod touch. It is the second most popular mobile operating system in the world by sales, after Android. iPad tablets are also the second most popular, by sales, against Android since 2013, when Android tablet sales increased by 127%.[7]

Originally unveiled in 2007, for the iPhone, it has been extended to support other Apple devices such as the iPod Touch (September 2007), iPad (January 2010), iPad Mini (November 2012) and second-generation Apple TV onward (September 2010). As of January 2015, Apple's App Store contained more than 1.4 million iOS applications, 725,000 of which are native for iPads.[8] These mobile apps have collectively been downloaded more than 100 billion times.[9]

The iOS user interface is based on the concept of direct manipulation, using multi-touch gestures. Interface control elements consist of sliders, switches, and buttons. Interaction with the OS includes gestures such as *swipe*, *tap*, *pinch*, and *reverse pinch*, all of which have specific definitions within the context of the iOS operating system and its multi-touch interface. Internal accelerometers are used by some applications to respond to shaking the device (one common result is the undo command) or rotating it in three dimensions (one common result is switching from portrait to landscape mode).

iOS shares with OS X some frameworks such as Core Foundation and Foundation Kit; however, its UI toolkit is Cocoa Touch rather than OS X's Cocoa, so that it provides the UIKit framework rather than the AppKit framework. It is therefore not compatible with OS X for applications. Also while iOS also shares the Darwinfoundation with OS X, Unix-like shell access is not available for users and restricted for apps, making iOS not fully Unix-compatible either.

Major versions of iOS are released annually. The current release, iOS 9.3, was released on March 21, 2016. In iOS, there are four abstraction layers: the Core OS layer, the Core Services layer, the Media layer, and the Cocoa Touch layer. The current version of the operating system (iOS 9), dedicates around 1.3 GB of the device's flash memory for iOS itself.[10] It runs on the iPhone 4S and later, iPad 2 and later, iPad Pro, all models of the iPad Mini, and the 5th-generation iPod Touch and later.

Android is a mobile operating system (OS) currently developed by Google, based on the Linux kernel and designed primarily for touchscreen mobile devices such as smartphones and tablets. Android's user interface is mainly based on direct manipulation, using touch gestures that loosely correspond to real-world actions, such as swiping, tapping and pinching, to manipulate on-screen objects, along with a virtual keyboard for text input. In addition to touchscreen devices, Google has further developed Android TV for televisions, Android Auto for cars, and Android Wear for wris watches, each with a specialized user interface. Variants of Android are also used on notebooks game consoles, digital cameras, and other electronics.

Android has the largest installed base of all operating systems of any kind. Android has been the be selling OS on tablets since 2013, and on smartphones it is dominant by any metri

Initially developed by Android, Inc., which Google bought in 2005, Android was unveiled in 20 along with the founding of the Open Handset Alliance – a consortium of hardware, software, and telecommunication companies devoted to advancing open standards for mobile devices. As of July 2013, the Google Play store has had over one million Android applications ("apps") published, and over 50 billion applications downloaded.[18] An April–May 2013 survey of mobile application developers found that 71% of developers create applications for Android,[19] and a 2015 survey found that 40% of full-time professional developers see Android as their priority target platform, which is comparable to Apple's iOS on 37% with both platforms far above others.[20] At Google I/O 2014, the company revealed that there were over one billion active monthly Android users, up from 538 million in June 2013.

Android's source code is released by Google under open source licenses, although most Android devices ultimately ship with a combination of open source and proprietary software, including proprietary software required for accessing Google services. Android is popular with technology companies that require a ready-made, low-cost and customizable operating system for high-tech devices. Its open nature has encouraged a large community of developers and enthusiasts to use the open-source code as a foundation for community-driven projects, which add new features for advanced users[23] or bring Android to devices originally shipped with other operating systems. At the same time, as Android has no centralised update system most Android devices fail to receive security updates: research in 2015 concluded that almost 90% of Android phones in use had known but unpatched security vulnerabilities due to lack of updates and support. The success of Android has made it a target for patent litigation as part of the so-called "smartphone wars" between technology companies

Software Development Kit

The iOS SDK (Software Development Kit) (formerly iPhone SDK) is a software development kit developed by Apple Inc. and released in February 2008 to developnative applications for iOS.

On October 17, 2007, in an open letter posted to Apple's "Hot News" weblog, Steve Jobs announced that a software development kit (SDK) would be made available to third-party developers in February 2008.[1] The SDK was released on March 6, 2008, and allows developers to make applications for the iPhone and iPod Touch, as well as test them in an "iPhone simulator". However, loading an application onto the devices is only possible after paying an iOS Developer Program fee, which is $99.00 USD per year.[2] Since the release of Xcode 3.1, Xcode is the development environment for the iOS SDK. iPhone applications, like OS Xapplications, are written in Swift and Objective-C,[3] with some elements of an application able to be written in C or C++.

Developers are able to set any price above a set minimum for their applications to be distributed through the App Store, of which they will receive a 70% share. Alternately, they may opt to release e application for free and need not pay any costs to release or distribute the application except for the membership fee.[25]

Since its release, there has been some controversy regarding the refund policy in the fine print of the Developer Agreement with Apple. According to the agreement that developers must agree to, if someone purchases an app from the app store, 30% of the price goes to Apple, and 70% to the developer. If a refund is granted to the customer (at Apple's discretion), the 30% is returned to the customer from Apple, and 70% from the developer; however, Apple can then take another 30% of the cost from the developer to make up for Apple's loss

Android software development is the process by which new applications are created for the Android operating system. Applications are usually developed in Javaprogramming language using the Android software development kit (SDK), but other development environments are also available.

The Android software development kit (SDK) includes a comprehensive set of development tools. These include a debugger, libraries, a handset emulator based onQEMU, documentation, sample code, and tutorials. Currently supported development platforms include computers running Linux (any modern desktop Linux distribution),Mac OS X 10.5.8 or later, and Windows XP or later. As of March 2015, the SDK is not available on Android itself, but the software development is possible by using specialized Android applications.

Until around the end of 2014, the officially supported integrated development environment (IDE) was Eclipse using the Android Development Tools (ADT) Plugin, thoughIntelliJ IDEA IDE (all editions) fully supports Android development out of the box,[7] and NetBeans IDE also supports Android development via a plugin. As of 2015,Android Studio, made by Google and powered by IntelliJ, is the official IDE; however, developers are free to use others. Additionally, developers may use any text editor to edit Java and XML files, then use command line tools (Java Development Kit and Apache Ant are required) to create, build and debug Android applications as well as control attached Android devices (e.g., triggering a reboot, installing software package(s) remotely).

Enhancements to Android's SDK go hand in hand with the overall Android platform development. The SDK also supports older versions of the Android platform in case developers wish to target their applications at older devices. Development tools are downloadable components, so after one has downloaded the latest version and platform, older platforms and tools can also be downloaded for compatibility testing.

Android applications are packaged in .apk format and stored under /data/app folder on the Android OS (the folder is accessible only to the root user for security reasons). APK package contains .dex files (compiled byte code files called Dalvik executables), resource files, etc.

BlackBerry OS

BlackBerry OS is a proprietary mobile operating system developed by BlackBerry Ltd for its BlackBerry line of smartphone handheld devices. The operating system provides multitasking and supports specialized input devices that have been adopted by BlackBerry Ltd. for use in its handhelds, particularly the trackwheel, trackball, and most recently, the trackpad and touchscreen.

The BlackBerry platform is perhaps best known for its native support for corporate email, throug MIDP 1.0 and, more recently, a subset of MIDP 2.0, which allows complete wireless activation an synchronization with Microsoft Exchange, Lotus Domino, or Novell GroupWise email, calenda tasks, notes, and contacts, when used with BlackBerry Enterprise Server. The operating system als supports WAP 1.2.Updates to the operating system may be automatically available from wireles carriers that support the BlackBerry over the air software loading (OTASL) service.

Third-party developers can write software using the available BlackBerry API classes, although applications that make use of certain functionality must be digitally signed.Research from June 2011 indicated that approximately 45% of mobile developers were using the platform at the time of publication. BlackBerry OS was discontinued after the release of BlackBerry 10 but BlackBerry will continue support for the BlackBerry OS.

The Windows Software Development Kit (SDK) for Windows 8 contains headers, libraries, and a selection of tools that you can use when you create apps that run on Windows operating systems. You can use the Windows SDK, along with your chosen development environment, to write Windows Store apps (only on Windows 8) using web technologies (such as HTML5, CSS3, and JavaScript), native (C++), and managed (C#, Visual Basic) code; desktop applications that use the native (Win32/COM) programming model; or desktop applications that use the managed (.NET Framework) programming model.

The Windows SDK also includes the Windows App Certification Kit (ACK) 2.2 to test your app for the Windows 8 Certification Program and the Windows 7 Logo Program. If you also want to test your app on Windows RT, use the Windows App Certification Kit for Windows RT .

The Windows SDK no longer ships with a complete command-line build environment. You must install a compiler and build environment separately. If you require a complete development environment that includes compilers and a build environment, you can download Visual Studio Express , which includes the appropriate components of the Windows SDK. To download the SDK and install it on another computer, click the download link and run the setup. Then in the Specify Location dialog box, click

Mobile commerce

The phrase mobile commerce was originally coined in 1997 by Kevin Duffey at the launch of the Global Mobile Commerce Forum, to mean "the delivery of electronic commerce capabilities directly into the consumer's hand, anywhere, via wireless technology."[1] Many choose to think of Mobile Commerce as meaning "a retail outlet in your customer's pocket

The Global Mobile Commerce Forum, which came to include over 100 organisations, had its fully minuted launch in London on 10 November 1997. Kevin Duffey was elected as the Executive Chairman at the first meeting in November 1997. The meeting was opened by Dr Mike Short, former chairman of the GSM Association, with the very first forecasts for mobile commerce from Kevin Duffey (Group Telecoms Director ofLogica) and Tom Alexander (later CEO of Virgin Mobile and then of Orange). Over 100 companies joined the Forum within a year, many forming mobile commerce teams of their own, e.g. MasterCard and Motorola. Of these one hundred companies, the first two were Logica and Cellnet (which later became O2). Member organisations such as Nokia, Apple, Alcatel, and Vodafone began a series of trials and collaborations.

Mobile commerce services were first delivered in 1997, when the first two mobile-phone enabled Coca Cola vending machines were installed in the Helsinki area in Finland. The machines accepted payment via SMStext messages. This work evolved to several new mobile applications such as the first mobile phone-based banking service was launched in 1997 by Merita Bank of Finland, also using SMS. Finnair mobile check-in was also a major milestone, first introduced in 2001

M-COMMERCE APPLICATIONS The general m-commerce applications are:

1. Mobile ticketing

Tickets can be sent to mobile phones using a variety of technologies. Users are then able to use their tickets immediately by presenting their phones at the venue.Tickets can be booked and cancelled on the mobile with the help of simple applicationdownloads or by accessing WAP portals of various Travel agents or direct service providers. Mobile ticketing for airports,

ballparks, and train stations, for example, will not only streamline unexpected metropolitan traffic surges, but also help users remotely secure parking spots (even while in their vehicles) and greatly facilitate mass surveillance at transport hubs.

2. Mobile vouchers, coupons and loyalty cards

Mobile ticketing technology can also be used for the distribution of vouchers, coupons and loyalty cards. The voucher, coupon, or loyalty card is represented by a virtual token that is sent to the mobile phone. Presenting a mobile phone with one of these tokens at the point of sale allows the customer to receive the same benefits as another customer who has a loyalty card or other paper coupon/voucher. Mobile delivery enables:

economy of scale
quicker and easier delivery
effective target marketing
privacy-friendly data mining on consumer behaviour
environment-friendly and resources-saving efficacy

Content purchase and delivery

Currently, mobile content purchase and delivery mainly consists of the sale of ring-tones, wallpapers, and games for mobile phones. The convergence of mobile phones, mp3 players and video players into a single device will result in an increase in the purchase and delivery of full-length music tracks and video. Download speeds, if increased to 4G levels, will make it possible to buy a movie on a mobile device in a couple of seconds, while on the go.

4. Location-based services

Unlike a home PC, the location of the mobile phone user is an important piece of information used during mobile commerce transactions. Knowing the location of the user allows for location base services such as:

- □ local maps
- □ local offers
- □ local weather

people tracking and monitoring