ASSIGNMENT 3 – RLMCA 381

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1. Discuss the major operating systems used in smart phones and explain their key features.

A mobile operating system is an operating system that helps to run other application software on mobile devices. It is the same kind of software as the famous computer operating systems like Linux and Windows, but now they are light and simple to some extent.

The operating systems found on smartphones include Symbian OS, iPhone OS, RIM's BlackBerry, Windows Mobile, Palm WebOS, Android, and Maemo. Android, WebOS, and Maemo are all derived from Linux. The iPhone OS originated from BSD and NeXTSTEP, which are related to Unix.A mobile operating system allows the user to run other different application software on the mobile, tablets, etc. Moreover, we can say that it is a type of operating system which is specially designed for mobiles, tablets, smartwatches, etc. Furthermore, they are a mixture of computer OS with some additional features for mobiles. Also, they are comparatively light and simple.An operating system (OS) is a program that acts as an interface between the system hardware and the user. Moreover, it handles all the interactions between the software and the hardware. Before knowing different mobile OS, let us study some functions of an operating system.

Functions of OS

1. Memory Management

It is the management of the main or primary memory. Furthermore, whatever program is executed, it has to be present in the main memory. Therefore, there can be more than one program present at a time. Hence, it is required to manage the memory.The operating system:

- Allocates and deallocates the memory.
- Keeps a record of which part of primary memory is used by whom and how much.
- Distributes the memory while multiprocessing.

2. Processor Management/Scheduling

When more than one process runs on the system the OS decides how and when a process will use the CPU. Hence, the name is also CPU Scheduling. The OS:

- Allocates and deallocates processor to the processes.
- Keeps record of CPU status.

3. Device Management

The processes may require devices for their use. This management is done by the OS. The OS:

- Allocates and deallocates devices to different processes.
- keep records of the devices.

- Decides which process can use which device for how much time.

4. File Management

The files on a system are stored in different directories. The OS:

- keeps records of the status and locations of files.
- Allocates and deallocates resources.

5. Security

The OS keeps the system and programs safe and secure through authentication. A user id and password decide the authenticity of the user.

6. Other Functions

Some other functions of the OS can be:

- Error detection.
- keeping a record of system performance.
- Communication between different software etc.

1. Android

It is a mobile operating system based on a modified version of the Linux kernel and other open-source software, designed primarily for touchscreen mobile devices such as smartphones and tablets. Android is developed by a partnership of developers known as the Open Handset Alliance and commercially sponsored by Google. It was disclosed in November 2007, with the first commercial Android device, the HTC Dream, launched in September 2008.

It is free and open-source software. Its source code is Android Open Source Project (AOSP), primarily licensed under the Apache License. However, most Android devices dispatch with additional proprietary software pre-installed, mainly Google Mobile Services (GMS), including core apps such as Google Chrome, the digital distribution platform Google Play and the associated Google Play Services development platform.

Features of Android Operating System

1. Near Field Communication (NFC)

Most Android devices support NFC, which allows electronic devices to interact across short distances easily. The main goal here is to create a payment option that is simpler than carrying cash or credit cards, and while the market hasn't exploded as many experts had predicted, there may be an alternative in the works, in the form of Bluetooth Low Energy (BLE).

2. Infrared Transmission: The Android operating system supports a built-in infrared transmitter that allows you to use your phone or tablet as a remote control.

3. Automation: The *Tasker* app allows control of app permissions and also automates them.

4. Wireless App Downloads: You can download apps on your PC by using the Android Market or third-party options like *AppBrain*. Then it automatically syncs them to your Droid, and no plugging is required.

5. Storage and Battery Swap: Android phones also have unique hardware capabilities. Google's OS makes it possible to upgrade, replace, and remove your battery that no longer holds a charge. In addition, Android phones come with SD card slots for expandable storage.

6. Custom Home Screens: While it's possible to hack certain phones to customize the home screen, Android comes with this capability from the get-go. Download a third-party launcher like *Apex, Nova*, and you can add gestures, new shortcuts, or even performance enhancements for older-model devices.

7. Widgets: Apps are versatile, but sometimes you want information at a glance instead of having to open an app and wait for it to load. Android widgets let you display just about any feature you choose on the home screen, including weather apps, music widgets, or productivity tools that helpfully remind you of upcoming meetings or approaching deadlines.

8. Custom ROMs: Because the Android operating system is open-source, developers can twist the current OS and build their versions, which users can download and install in place of the stock OS. Some are filled with features, while others change the look and feel of a device. Chances are, if there's a feature you want, someone has already built a custom ROM for it.

2.Apple OS

MacOS is the computer operating system (OS) for Apple desktops and laptops. It is a proprietary graphical OS that powers every Mac.

- Media features. Users can watch, listen and read content using applications like Music, TV, Podcasts, Books and Photos.
- Creativity-based features. Applications such as Photos, GarageBand and iMovie enable users to view, edit and create media.
- Productivity features. Individuals can use applications such as Pages, Numbers and Keynote to work with graphics tools.
- Communications features. Users can communicate with one another using text, visual and audio applications such as Mail, Messages and FaceTime.
- Organization features. These help users find notes and other content using applications like Notes, Reminders, Calendar, Voice Memos and Contacts.

- iCloud. Users can access and share their content with different devices.
- Accessibility features. Several assistive tools can help users with disabilities such as VoiceOver, Accessibility Keyboard and Text to Speech.
- Compatibility features. Users can transfer Windows-based files and other data from a Windows PC to a Mac. They can also run Microsoft Office or even Windows on a Mac.

3.RIM Blackberry

BlackBerry 10 OS is a mobile operating system. It was designed to compete with other modern mobile operating systems such as Android, iOS, and Windows Phone. BlackBerry 10 OS offers a range of features for business users, including support for BlackBerry Balance, which allows users to separate and secure their work and personal data on the same device. It also includes a virtual keyboard that adapts to the user's typing style, a predictive text engine, and a voice control system. BlackBerry 10 OS features a variety of multimedia and productivity apps, such as BlackBerry World, BlackBerry Remember, and BlackBerry Protect, among others.

- Active Frames − Active Frames is a feature that allows users to see live tiles of recently used apps on the home screen. This feature also allows users to quickly switch between running apps.
- BlackBerry Hub − BlackBerry Hub is a centralized messaging system that allows users to access all of their messages, including email, text messages, and social media notifications in one place. Users can access BlackBerry Hub from any app by swiping up from the bottom of the screen.
- Peek and Flow − Peek and Flow is a gesture-based system that allows users to view information without leaving the app they are using. Users can peek at incoming messages, notifications, or events by swiping up and to the right, and then flow back to the app they were using.
- Virtual Keyboard − The virtual keyboard on BlackBerry 10 OS adapts to the user's typing style and includes a predictive text engine that suggests words as the user types. The keyboard also supports gestures, such as swiping to the left to delete a word, and swiping down to access numbers and symbols.
- BlackBerry Remember − BlackBerry Remember is a productivity app that allows users to create and manage tasks, memos, and notes. The app integrates with Evernote and Microsoft Outlook.

4. Symbian OS

- Real-time: It has a real-time, multithreaded kernel.
- Multimedia support: It supports audio, video recording, playback and streaming, and image conversion.

- Platform Security: Symbian provides a security mechanism against malware. It allows sensitive operations and can be accessed by applications which have been certified by a signing authority. In addition, it supports full encryption and certificate management.
- Internationalization support: It supports Unicode standard.
- Client-server architecture: It provides simple and high-efficient inter-process communication. This feature also eases porting of code written for other platforms to Symbian OS.
- Fully object-oriented and component-based.
- Optimized memory management.
- Flexible user interface design.
- Multi-tasking.
- A Hardware Abstraction Layer (HAL): This layer provides a consistent interface to hardware and supports device in dependency.

5. Windows

1. Control Panel
A Control panel is a feature of the Windows operating system that contains many tools that help in configuring and managing the computer's resources. For e.g., the control panel provides the settings for audio, video, mouse, keyboard, network connections, date and time, installed applications, etc. which the user can change as per his/her need.

2. Cortana
It is used to display the files and folders which are on the computer. It is also known as Windows Explorer. It gives the user the ability to browse data on the hard drive, SSD, and other inserted removable disks. It allows the user to manage the content according to their preference, such as a user can delete or rename a file and search and transfer data.

3. File Explorer
It is used to display the files and folders which are on the computer. It is also known as Windows Explorer. It gives users the ability to browse data on the hard drive, SSD, and other inserted removable disks. It allows the user to manage the content according to their preference such as a user can delete or rename a file, and search and transfer data.

4. Internet Browser
One of the major use of computers is to access the web/internet. Therefore, an internet browser is very necessary to search for anything, view pages, do online shopping, play games, etc. There is a pre-installed internet browser available in the Windows operating system. From Windows 10 onwards, the Edge internet browser is the default browser, while earlier internet explorer used to be the default browser.

5. Disk Cleanup
One of the major tasks of an operating system is to perform cleanup operations. Disk Cleanup is a feature of the Windows operating system that is used to free up disk space by deleting unnecessary files or temporary files no longer required. It helps increase the system's performance and boosts storage space to download programs and documents. We can open disk cleanup by using the following steps:

- Open the file explorer using Window + E
- Right-click on any of the disk drives and click on the properties option from the drop-down menu.
- Click on the Disk Cleanup option.

6. Speed
Aside from the incompatibilities and other concerns that many users had with Vista, one of the most obvious was performance — it simply felt too slow in comparison to XP, even on high-end hardware. Windows 7 feels more quick and sprightly, and Microsoft spent a lot of time and effort perfecting the Start Menu reaction. Microsoft has also identified the need for enhanced desktop responsiveness, which creates the appearance that the machine is responding to the user and that the user is in charge – something that Vista frequently lacked.

7. Hardware Requirements
Vista has a reputation for making even the most powerful hardware appear mundane. Windows 7, on the other hand, will function smoothly on older systems, making the switch from Windows XP easier. Microsoft is promoting Windows 7 for netbooks as well. This could be a modern alternative for Windows XP, which has resurfaced as the preferred operating system for netbooks, displacing Linux. The disadvantage is that Windows 7 Starter Edition, as it will be known, will only allow three applications to run at once.

8. Search and Organization
One of the nicest features of Windows 7 is the upgraded search function, which now competes with Mac OS X's Spotlight in terms of speed and ease of use. Typing 'mouse', for example, will bring up the mouse option in the control panel, while typing a word will display it and divide it into files, directories, and apps nicely. The concept of Libraries is also introduced, which expands on the 'My Documents' concept. The various Libraries, such as Documents and Pictures, will monitor multiple locations that you can add yourself, allowing you to maintain everything in one location.

9. Compatibility
Simply put, compatibility with Windows 7 will be significantly superior to that of Vista. Many programs used by people and businesses on Windows XP did not work right away and required upgrades, but with Windows 7, practically all Vista-compatible applications should still work.

10. Taskbar
At first sight, the taskbar appears to have remained largely unchanged since Vista. That is not the case, and it is far more potent. Microsoft is now putting its aero technology to its full potential. Taskbar icons are now larger by default, and objects are grouped together rather than labeled with clunky text. A stack will appear on the taskbar if you have many Word documents or Windows Explorer windows open. When you move your cursor over the program, each Window will appear as a thumbnail. When you hover your mouse over each thumbnail, it will become visible, while all other open windows will vanish save for their outlines. Each document or window can be closed immediately from the thumbnail, or it can be brought to the front by clicking on it. A small arrow to the right of programs like Word in the Start menu now extends to show a list of recent documents, which may be pinned to keep one on the list permanently. The above points make the taskbar a significant feature of the windows operating system
11. Safety
12. Interface
The user interface of Windows has undergone substantial improvements, many of which are focused on improving the experience on tablet PCs and other touchscreen devices. The new user interface is based on Microsoft's Metro design language, and it features a Start screen similar to that of Windows Phone for opening apps. The Start screen shows a customizable grid of tiles that link to a variety of apps and desktop programs, some of which can display continually updated information and content via "live tiles." Apps can be snapped to the side of a screen as a type of multitasking. A new simplified and touch-optimized settings program called "PC Preferences" is utilized alongside the classic Control Panel for basic configuration and user settings.

2. Explain various components used by Mobile Web Services for Service Discovery.

1.Context Awareness

- Each mobile device contains information concerning the condition or state of the device and the user who carries the device.
- When parsed properly, this information can provide user's identification and the context of that user.
- Location is the prime example of context. When we search for something near us, the search engine returns results that are location-based and thus have context.
- When a phone transmits its GPS coordinates to a service, that service may be able to send information appropriate to each environment back to the user.
- When GPS coordinates are provided to a service, that service may respond with information appropriate to each environment.
- Such tailored and specific information could be incredibly valuable and useful.
- When a mobile user is connected to mobile service two different sets of information is exchanged:Physical context

- Information derived from measurements made from the mobile device or its sensors.
- It provides location, device conditions, device states, and more.

Logical context

- Information derived from the user or from the manner in which the user has interacted with services over time.
- It contains information about the purpose a location serves, a digital identity and its associated attributes, relationships, interests, past searches, Web sites visited, privileges, and preferences.
- In a Web service, the mobile client plays the role of a service consumer and the Web service is the service provider.
- Based on a user's current context, the system allows both service and content providers to tailor information for a specific user.
- The Context Parser takes all the input data and applies a logical schema to data/information.
- The Context Logic Processor plays the role of the orchestrator providing programmed logic to data.
- This infrastructure can be placed in the cloud.

2.MEMS

- MEMS stands for *Micro Electro-Mechanical Systems* and is a class of very small sensor or actuator devices where small mechanical systems are driven by electricity to indicate a position.
- MEMS size can be between 1 and 1000 micrometers, and they are packaged into components that often include a microprocessor, memory, and others.
- Several MEMS are packaged in smartphones, and their numbers and complexity are growing over time.

3.Location awareness

- Location awareness helps in delivering services based on the location of user.
- Location-aware services are usually based on GPS data, with location accuracy of a few feet through the triangulation of three or more overhead satellite distances and positions.
    - Eg: Skyhook: Its services are based on a Wi-Fi Positioning System (WPS).
    - Skyhook has a hybrid positioning system called XPS, which uses several location technologies in like WPS, GPS, and cellular tower triangulation to obtain accurate user location.
    - Skyhook uses a large reference database of Wi-Fi access points and cell tower IDs, raw position data from each location source (a signal), and an algorithm to locate the device.
    - The XPS system is constantly polling locations to update them and recalibrating data points to improve accuracy over time.
    - If it fails, the system performs a location analysis based on your IP address and your known service provider.

4.Push Services

- Push services are a technology where the transaction is initiated on a server and sent automatically to the client.
- The opposite of a push is a pull technology, in which the client polls for and requests a transaction.

The following services are examples of push technologies

- *Automated software updates*
- *Instant Messaging*
- *e-mail*
- *HTTP streaming*
- *Java pushlet*
- *RSS services*
- *Software installations*
- *Teleconferencing*
- *Comet; an Ajax application data transfer*

5.Blackberry Push Services

- Developers use the BlackBerry Push Service to push application updates, images, text, audio, and other content to BlackBerry users.
- The Push Service transfers up to 8KB messages directly; Otherwise, the notification will be send as a push service and the device downloads the data from the content provider.

6. The Lemonade Profile

- This is an alternative mechanism to a Push-IMAP specification.
- The Lemonade Profile uses a set of e-mail extensions to provide access to mobile devices.
- It builds on the IMAP (Internet Message Access Protocol) for delivery and on the Message Submission SMTP (Simple Mail Transfer Protocol) profile.
- A timely notification is provided when a message is available, and the Mail Submission Agent (MSA) retrieve the e-mail from an IMAP data store.

- The advantage of the Lemonade Profile is that it uses both IMAP and SMTP and can be used by any IMAP client.