09.30.2024 JOURNAL OF

Systematic and Modern Science Research (JSMSR) Vol. 5 No.9

EXPLORING OPERATING SYSTEM DIVERSITY: A COMPARATIVE ANALYSIS OF WINDOWS, MAC OS, ANDROID AND IOS

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ABSTRACT

Different operating systems (OS) with various features and attributes have evolved over the years. Users' knowledge of the capabilities of each operating system influences the OS they decide to install on their PCs. This means that in order to clearly show the differences and similarities among various operating systems are in terms of their strengths and weaknesses, a comparison of them needs to be done. The design, functionality, advantages, and disadvantages of four operating systems—Windows, Mac OS, Android and iOS are compared in this study. Android is the target of a higher percentage of mobile malware than iOS. OS X and Windows are more dependable and safer. Windows and Android are more widely utilized, easier to use, and support a greater number of application programs than Mac OS. Mac OS is very costly, whereas Windows

Introduction

The operating systems used on modern desktop computers, such as Microsoft Windows, Linux, and Mac OS, support additional application software or applications. An operating system (OS) is a piece of software that manages and controls the main hardware, peripheral hardware, and software resources of a computer. It also acts as an intermediary between the user and the hardware of the device by offering application programs a framework and support. (Adekotujo, et al., 2020). Operating systems provide routine services for executing tasks such as deadlock,

E-ISSN 3027-2939 P-ISSN 3026-8397

is reasonably priced. This article presents some tips to assist developers and end users in selecting the best operating systems for their needs.

Keywords: iOS, Android, Mac OS, Windows and Comparative Analysis.

scheduling, and storage, among others. Additionally, it permits a programming environment that greatly simplifies and boosts productivity while developing and carrying out programs by a user. An operating system is a component of every computer system, including mobile phones, tablets, desktops, laptops, supercomputers, and even video game consoles. The ICT world of today has several different operating system versions. Similar to how Windows is owned by Microsoft Inc. Android is owned by Google Inc., the Mac operating system was developed and is owned by Apple Inc. An operating system's five primary functions are process generation, processing state, synchronization, communication, and deadlock prevention (Thangavel, et al., 2019). Applications need an operating system (OS) to function, and the computer itself needs OS to keep the system secure and to build a GUI/CLI base that users can use to access the computer and carry out operations. Many software operations, including the cost of processor time allocation, mass storage, printing, etc., rely on the OS, while hardware functions, including input and output, memory allocation, system calls, etc., also require it. Various operating systems with different features and functionalities have arisen, this makes a comparison of several operating systems inevitable. Among the many different kinds of operating systems, the four main wide operating system types are Real-Time Operating System (RTOS), Single-user single task, Single-user multi-tasking, and Multi-user.

Related Works

The methodology we employed involved leveraging relevant scholarly articles and technical documentation to gather comprehensive information on the design, features, advantages, and disadvantages of each operating system. We followed a systematic approach to identify and extract the most suitable papers for our analysis, which included the following range of steps:

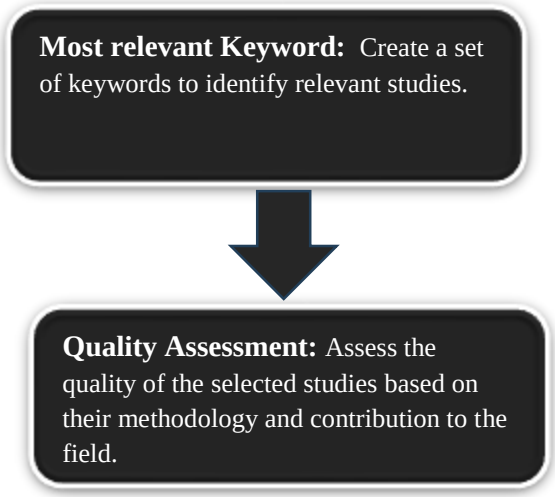

Figure 2: Methodology

Operating systems have been the focus of several research investigations. This section provides an overview of the works that are currently in publication. The operating system is the most important piece of software that operates on a computer. It manages the computer's hardware, software, memory, and processes(Sahu et al., 2021). Using this strategy, you can communicate with the computer even if you cannot understand its language. An operating system is essential to the operation of a computer. Changing to a new operating system may feel unusual at first since each operating system has a different graphical user interface. Nonetheless, modern operating systems share much of the basic ideas because they are designed to be user-friendly (Nita, et al., 2022). Research by (Brown, 2019) assesses the user experience aspects of popular operating systems across different devices. It examines factors like ease of use, intuitiveness, customization options, and overall satisfaction to provide insights into user preferences. (Kim, 2021) focuses on performance metrics such as speed, resource utilization, and responsiveness, this article compares the performance of major operating systems. It includes benchmark tests and analyses to evaluate their efficiency and effectiveness.

A study provides an empirical analysis of how traditional POSIX abstractions are utilized in modern operating systems, specifically focusing on Android, OS X, and Ubuntu. This study helps to understand the current relevance of POSIX in the context of contemporary OS environments (Atlidakis & Andrus, 2016)

(Shukla, et al., 2018) addresses the critical role of RTOSs in managing the complexities of dynamic environments. They provide a thorough analysis of the challenges in designing modern RTOSs, as well as a detailed discussion of the latest systems available. (Thomas, 2017) Provided an insight on accessibility options, their study compares the features available in various operating systems, aiming to improve inclusivity and accessibility for users with disabilities. (Garcia, 2019) addresses privacy concerns, this paper analyzed the privacy policies and data protection mechanisms of different operating systems, contributing to the understanding of user privacy rights and protections.

(Idris, et al., 2022) offer a comprehensive analysis of the challenges faced in designing modern RTOSs, emphasizing the need for efficient task scheduling and resource

management. Additionally, the paper provides a detailed discussion of the latest RTOSs available, exploring how these systems are evolving to meet the demands of contemporary real-time embedded systems (RTES).

Batch systems, time-sharing systems, real-time systems, and distributed systems are the four categories into which general-purpose operating systems can be divided (Kendall, 2020). An early form of operating system known as a batch system executes similar tasks in batches through an operations console after being sorted by an operator. A form of multitasking operating system known as a "time-sharing system" carries out several tasks at once by automatically switching between them at predetermined time windows.

Operating System Functions

Operating systems (OS) perform a wide range of functions that are crucial for the effective operation of a computer. A user can execute applications/programs, source allocation is done in Operating System and allows you to hide details of hardware (Solanki & Paliwal, 2018).

An effective operating system must prevent the incorrect execution of other programs by malicious programs (Silberschatz, et al., 2012). These functions collectively ensure that the operating system effectively manages the hardware and software resources of a computer, providing a stable and efficient environment for the execution of applications and services.

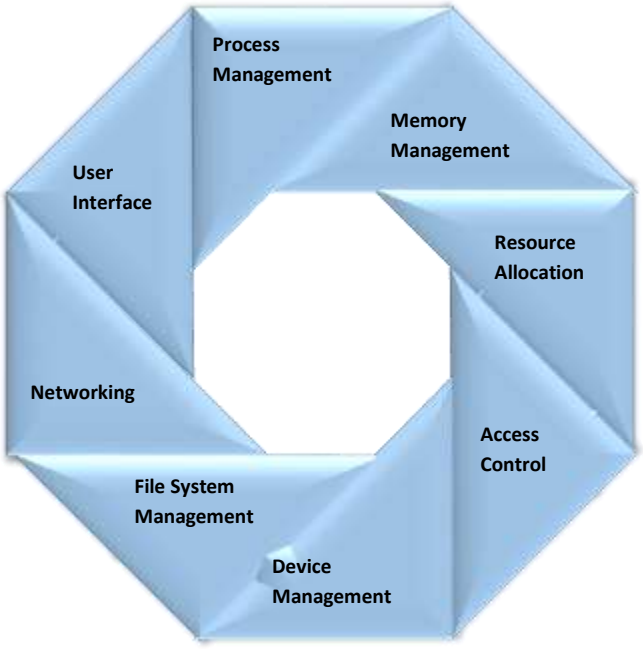

Figure 2: Shows the major functions of operating system (Sahu, et al., 2021).

Process Management: The OS is responsible for managing the execution of multiple processes by scheduling tasks in a way that optimizes CPU usage. It allows multiple processes to run concurrently by allocating CPU time to each process (multitasking).

Memory Management: The OS allocates memory to processes as needed and deallocates it when the processes

are finished. Virtual Memory uses techniques like paging and segmentation to extend the physical memory of a system by using disk space as additional memory

Resource Allocation: The OS manages the CPU's time, ensuring that all running processes get the necessary CPU time for execution

Access Control: The OS authenticates users by managing login credentials and passwords to prevent unauthorized access. It controls user access to files, directories, and system resources based on permissions and roles.

Device Management: The OS uses device drivers to manage communication between the system and peripheral devices like printers, scanners, and storage devices

System Management: The OS provides the mechanisms to create, delete, read, and write files.

Network Management: The OS manages network connections, enabling data exchange between different devices over a network.

User Interface: The OS provides a text-based interface where users can type commands to interact with the system. Most modern OS provide a GUI, allowing users to interact with the system through graphical elements like windows, icons, and menus.

Windows, Mac, Android and Ios Comparative Analysis

The focus of this part is conducting a comparison between Windows, Mac, Android, and iOS operating systems. The following is a quick explanation of each of the four operating systems before moving directly into the comparative study.

Microsoft Windows

At the moment, Windows is the operating system that is most often used worldwide. Thanks to Microsoft's later versions of Windows 1.0, Windows 95, Windows 2000, Windows XP, Windows Vista, Windows 7, and finally Windows 11, there have been significant developments since then. It was said back in the beginning of the year that modern Windows has evolved into a very user-friendly platform that is compatible with most devices and software (Bhatt, 2022).

Hackers frequently target Windows, so it's critical to use antivirus software to protect your computer. Clearly, Windows is a very commonly installed system platform. Microsoft offers both a client version and a server version (Windows

Server 2019). (Windows 10). This distinction is crucial. Microsoft deliberately aims its marketing at two distinct and distinct market segments. While the client OS is built to consume services, the server OS is optimized to deliver them. Printing, website hosting, hosting collaboration suites, directory services, name resolution, and many other things are among these services (Garn, 2021).

Mac Os

Apple Inc. developed the Mac operating system in 1984 (Idris, et al., 2022). Macintosh computers used the Motorola PowerPC Chip, which has a state-of-the-art architecture and has been improved for multimedia, graphics, and usability. Macintosh OSs only had GUI environments and no command-line option. Although Intel has been the basis of the Apple Mac series of computers since 2005, the first multitasking operating system, Mac OS, is limited to use with Apple Mac machines. Mac OS X offers us the option of a character-based user interface because of its UNIX roots. Apple Computers is the sole manufacturer of Macintosh computers. Apple's marketing of the Macintosh placed a lot of emphasis on how simple and intuitive the operating system was to operate. Unlike almost all other current PCs, the Mac OS, formerly known as just System Software and with a version number appended, was graphically based. Eventually, the majority of computer operating systems embraced the GUI model

Android

Android is an operating system designed for touch-screen mobile devices, such as smartphones and tablet PCs, and is based on the Linux foundation. The operating system has evolved significantly over the past 15 years, starting with the advent of black-and-white phones and continuing through smartphones and minicomputers today. Right now, one of the most widely used mobile operating systems is Android. The Palo Alto, California-based company Android Software was founded in 2003.

On various mobile devices, the Android operating system is the most commonly used globally. By the end of 2020, it will own about 75% of the market's shares globally. An organization named Open Handset Alliance developed the original Android, which was built on a modified Linux kernel and additional open-source software. In 2005, Google funded the initiative in its infancy and bought the entire firm. When the first Android smartphone hit the market in September 2008, it

quickly became the standard for the mobile industry because of features like customizable devices, extensive community support, ease of use, and large-scale manufacturing of Android devices by major corporations.

iOS

All Apple mobile devices run Apple iOS, an operating system based on the Mac OS. Since its initial release in 2007, this proprietary operating system has been the platform for using Apple devices, such as iPads and iPhones.

After Android, iOS is the second most popular mobile operating system (OS). It has several benefits, including user-friendly interfaces, a large app store, efficient battery life, and more. But iOS has drawn criticism for offering less options for customization, apps, widgets, and file transfers than Android OS. Version 15 of this operating system is now in use, and the release of iOS 16 is planned for autumn of 2022. An estimated 2.2 billion iPhones have been sold since 2007.

Table 1: The comparison of the operating systems based on features and functionalities is presented below (Adekotujo, et al., 2020).

FEATURES	WINDOWS	MAC OS	ANDROID	iOS
Manufacturer	Microsoft Inc.	Apple Inc. for their Macintosh line of computer systems	Open-source OS designed &developed by Android Inc. Google is now the current owner	Apple Inc. closed, with components that are source openly
Architecture	x86, x86-64	68k, PowerPC	Android-x86 powered by AMD and Intelx86 processors	ARM
Development & Distribution	Developed and distributed by Microsoft.	Mac OS was designed only to be deployed by Apple Computers	OHA (*Open Handset Alliance)*	Apple Inc. developed and distributed iOS
File System Supported	NTFS, FAT & exFAT with ISO 9660; UDF, 3rd Party driver that supports file system ext2, and ext3, ReiserFS, and HFS (Adekotujo, et al., 2020).	HFS+, HFS, MFS (Mac OS 8.0 and before) AFP, with ISO 9660, FAT, UDF	Ext4	HFS+, FTP

Target System Type	Workstation, Personal Computer, Media Centre, Tablet PC, Embedded	Workstation, Personal Computer, embedded	Ext4	HFS+, FTP
User Friendly	Incredibly User Friendly	Incredibly User Friendly	Incredibly User Friendly	Incredibly User Friendly
Threat Vulnerability	Huge	Negligible	Negligible	Negligible
Firewalls	Windows Firewall	Application Firewall	iptables	Firewall-IP for iOS
Kernel Type	Hybrid	Monolithic with modules	Linux kernel	XNU kernel of Darwin
Shell Terminal	CMD	BASH	Mosh	Blink Shell
Reliability	Greatly reliable	Greatest of all	Could be unstable	Better than android

Advantages and Disadvantages of The Operating Systems: Windows, Mac Os, Android and Ios

Windows

With a nearly 90% market share since its launch in 1985, the Windows operating system has dominated the software market. This kind of software is comprehensive and strong. Due to its substantial and prevailing presence in commercial structures, industrial facilities, and personal PCs. It's thought that this statement won't hold true again, even though public interest in open-source operating systems is currently extremely high. Windows is an operating system for home and business workstations that was produced by Microsoft. Being the original Graphical User Interface (GUI), it quickly began to rule the PC industry (Roomi, 2019). It comes pre-installed on a lot of workstations. Today, it is very challenging to find a computer without the Windows operating system. Most individuals do not think of switching to other operating systems because of its popularity and benefits.

Therefore, you must first be aware of the advantages provided by the Windows operating system as well as any potential disadvantages. This may help you decide whether this operating system is best for you.

Advantages Of Windows Operating System

User Friendly

When compared to other operating systems, the Windows OS's Graphical User Interface (GUI) makes its functions significantly simpler. You don't need to be an expert in computers to use this operating system. This can be used by even those who have only rudimentary computer skills.

When it comes to functional differences, most Windows versions are rather similar. Nearly all of the functionality are the same, with a few aesthetic differences. Therefore, a Windows user does not see much of an impact while switching from one OS to another. Because of this, Windows users do not think about switching to another operating system.

Hardware Compatibility

Whenever a new piece of hardware is launched, the most of hardware manufacturers add Windows support. The enormous popularity of the Windows operating system makes it impossible for hardware manufacturers to ignore it. Any item you buy from a computer vendor is almost certainly compatible with the Windows operating system. Furthermore, once connected in, these devices are ready for usage. So long as the necessary drivers are installed, Windows automatically recognizes hardware components.

Driver Update

The software component known as a device driver allows communication between hardware components and the operating system. The hardware component won't function properly without the drivers. If you use Windows OS, updating the drivers is now simple and easy. When a new driver is released, the Windows operating system updates the drivers automatically.

Drawbacks Of Windows Operating System

Security

The Windows OS is vulnerable to security risks. One such instance is a hacker attack. Due to its widespread use, Windows OS is a common target for cybercriminals. This is one of the factors contributing to Windows' lackluster security. Additionally, a huge number of viruses are created specifically for this

OS. You therefore need good antivirus protection in the interim, which is obviously not free.

Cost

Windows operating system is not free, in opposed to Linux OS. For users to use Windows OS legally, they must purchase a license. A license is now a pricey investment. The pricing typically varies depending on the Windows version (Latest versions costs more). Microsoft also continuously raising the cost of licenses over time. Every two to three years, according to Microsoft, Windows should be upgraded.

Software Fee

Shortly following OS installation, you might require application software. For instance, using an antivirus program is essential to keeping your computer safe from malware threats.

Since the majority of applications are paid for, you must also budget for the software fee in addition to the license fee. The vast majority of these applications are paid for (Either onetime payment or subscription on a regular basis). You'll eventually find yourself paying for each and every piece of software.

Macintosh Operating System (Mac Os)

Compared to Mac OS, Windows OS is marginally more recent. It distinguished itself as the first commercially successful graphical operating system when it was released, a year ahead of its Microsoft equivalent. One of the main features of Mac OS and a powerful unifying idea that distinguishes it from UNIX systems are the Mac Interface Guidelines. They go into great detail explaining how an app's graphical user interface is supposed to work.

Advantages Of Mac Os Operating System

Reduced malware assaults and security problems

With only 10% of the desktop operating system market, Mac OS, the second most popular operating system, has fewer active users and, consequently, fewer virus infestations. Therefore, there's no need to install any form of antivirus software.

Excellent client service

When it comes to other operating systems, the Mac support staff is not as responsive. Apple has a team of skilled experts who help users fix issues with both its hardware and software.

Similar GUI for all the products

All Apple products have a graphical user interface (GUI) that is similar to that of mac OS, including iPads and the iPhone. If users switch from previous Apple products, they feel comfortable using mac OS.

Disadvantages Of Mac Os Operating System

Expensive

A Mac PC typically costs more than $1000. At $1,000, you can purchase a good Windows computer with more hardware specifications.

No Hardware Customization

You are unable to change the hardware on a Mac computer once you buy it, including the processor and graphics card. Some Mac laptops allow you to change the hardware and RAM, but not all of them. The only way to replace other hardware attachments, including internal computer components, is to buy a new Mac computer. Fifty percent of your computer's features won't work unless you upgrade it for every major operating system version.

Fewer Games and Software

Most game developers prefer to create games for Windows OS because of its bigger user percentage. Mac users can access a smaller selection of games. Mac computers have poor graphics capability, although they can run high-graphics games. Adobe Premiere Pro is one piece of software that is available for Windows users alone and not for Mac users.

Android

The most widely used mobile operating system worldwide is Android. Since its debut in 2008, it has undergone a radical transformation and is now found in some of the best mobile devices ever created.

Android Inc. was the platform's initial developer; Google later acquired it and published the operating system as the AOSP (Android Open-Source Project) in 2007. The establishment of the OHA (Open Handset Alliance), a group tasked with creating and disseminating Android, added to this recent development. The program is referred to as free open source and is currently distributed under the Apache license. As a result of the large developer communities that continually update and produce applications utilizing specifically designed versions of Java, Android releases new versions every few months. Love both iOS and Android equally.

Advantages Of Android Operating System

It Is Possible to Sideload Apps from Outside the Play Store

With a few taps on your phone's settings, you can, depending on your device, avoid the Google Play Store if you can't locate the app, you're looking for there. If you have an Android smartphone, you can install apps from places other than the Google Play Store. You can get apps from other sources in addition to the best Android apps available on the Play Store.

Expandable Memory

Since many Android phones allow expandable memory, many of them have no trouble reaching their full capacity. With detachable storage like memory cards, Android users can easily add more memory to meet their needs. A memory card may hold more than just your favorite apps, it can also hold pictures and videos.

Widgets

Widgets are used for apps or information that you need right away, such as a calendar with reminders, weather predictions, pertinent news headlines, and many other things. Others offer simple controls, like those for your media apps, while some are for swiftly obtaining information.
Android smartphones are much more advanced and competent even though iOS smartphones have widgets. The least amount of scrolling and tapping is required to get crucial information thanks to them.

Lots of Hardware Innovations

Customers can choose from a wide range of hardware combinations for devices running Android platforms. You can select the CPUs, battery types, RAM and

storage capacities, and whether or not portable storage devices like memory cards are supported.

Options are available in a variety of sizes, shapes, and feature sets. Android is also responsible for the majority of hardware advances, such as bendable phones, in-screen fingerprint readers, and pop-up selfie cameras.

Divers Phone Options

As you are aware, a wide variety of smartphone brands from around the world can use the Android operating system. This indicates that there are numerous gadgets from which to choose. In order to reflect its brand and target customers, each brand offers unique hardware and features. Android phones range in size, storage capacity, camera resolution, battery life, style, and other factors. You may choose an Android device that fits your needs, regardless of your budget or the size of the screen you require.

Disadvantages of Android Operating System

Hardware Quality is mixed

When it comes to options, you might assume "the more the merrier," but it could end up costing you a lot of money to locate a small, reliable Android smartphone with all the hardware you need.

It's challenging to maintain quality control because of Android's extensive collaborations with various smartphone manufacturers. There are many brands that you have never heard of, frequently for good cause.

In order to reflect its brand and target customers, each brand offers unique hardware and features. Android phones range in size, storage capacity, camera resolution, battery life, style, and other factors. You may choose an Android device that fits your needs, regardless of your budget or the size of the screen you require.

Need for Google Account

Why use an Android phone without a Google account? Without a Google account, you can't utilize your phone to its full potential. It needs to be backed up by your Google account, particularly when installing applications, downloading content, or engaging in other activities.

Apple ID is used by the iOS mobile operating system to verify user activity on smartphones. Given that Google created the Android operating system, its services are very closely integrated with it. True, the majority of people are okay with this. Some individuals, though, might choose to use a phone without Google.

Too much Ads in Apps

Users also find Android's pop-up adverts annoying, particularly the inexpensive ones. There are advertisements all throughout the Play Store whenever you open it. Some less expensive phones may even include advertisements in the notifications.

It's a compromise. iOS apps frequently feature less advertisements, but there is also a greater acceptance of paying for apps in the society. The trend towards free apps is significantly more prevalent on Android.

iPhone Operating System (iOS)

The Apple firm created the mobile operating system known as iOS. The abbreviation for the iPhone operating system is iOS. The initial release of iOS occurred in 2007. iOS 13 is the most recent stable version, and iOS 14 beta is now available. The stable release of iOS 14 is almost here. The operating system used by iPhone devices is called iOS, while the ones used by the iWatch and iPad are called watchOS and iPad OS, respectively. If you like android, you might be interested in the ongoing controversy surrounding IOS software.

After Android, iOS is the second most popular mobile operating system. While the Android app market produced $39 billion in revenue in 2019, iOS generated $54 billion. The majority of Apple Company's users are from industrialized nations. There are about 2 million apps in the Apple app store. Apple iOS had a 26.3 percent market share of smartphones as of June 2021, coming in second only to Android, which had a 73.3 percent market share. IOS gadgets feel incredibly user-friendly and compatible. The iPhone guarantees that all features and applications function exactly as Apple intended, making for a highly simple user experience. This is regarded by users as one of the best aspects of the iPhone. iOS devices are dependable, unlike Android devices. Since it is made by the same manufacturer, neither its interface nor its design have undergone significant changes (Tiwari, 2021).

Advantages of iPhone Operating System (Ios)

High Security

For years, the iOS operating system has been acclaimed for its ability to fend off foreign cyber-attacks. Additionally, the new edition has increased the security code from the standard 4-digit system to 6-digits. Only apps with higher levels of security are approved since all apps in the Appstore must pass a strict vetting process.

You cannot foresee your phone being compromised, and there are very slim chances that you will put harmful software

Real-Time Translation on Siri

The virtual assistant app for the iOS operating system, Siri, has seen tremendous improvement. During a chat, Apple's voice recognition software can swiftly translate between several languages.

There are currently multiple languages accessible for this service. Chinese, French, German, Italian, and Spanish are all conversational languages for Siri.

Minimal Heat Generation

iPhone users can verify that these devices generate less heat even when used for extended periods of time. This is because it has been demonstrated that iPhone batteries produce significantly less heat than those utilized by other operating systems.

The operating system and its unique devices are popular among users since they allow for prolonged gaming without having to worry about overheating.

Picture Quality

There is no denying that iPhone is the best camera on the market. The iPhone undoubtedly outperforms your expectations for the advertised megapixels, therefore the megapixels on its camera are merely numbers. Other phones typically saturate the colors for improvement; however the iPhone displays your image as accurately as possible.

Disadvantages Of iPhone Operating System (iOS)

Expensive

Undoubtedly, one of the main weaknesses of iOS that prevents it from surpassing the android operating system is its high price. IOS devices can burn a significant

hole in your cash due to their high price. Because of this, it is less prevalent in the economically underprivileged section of society.

Storage Concerns

The memory of iOS devices cannot be increased. When purchasing a cell phone, you must consider your memory. The only option accessible if you wish to increase the storage capacity of your iPhone is to change the device. The price of higher-capacity iPhones is high, and there is no way to increase your iPhone's memory.

No Customization

IOS does not allow for customization. You can only alter your backdrop to make something more personalized.

I'll say it again: You can change anything on Android. If you use it, you get a file system; the app's icon; its name; and the folder icon. You could even flash custom ROMs if you're interested in that.

File Sharing and Download Problem

Downloading anything to the iPhone from the internet is quite difficult. The issue of file sharing is also quite important.

Android is widely used by people in developing countries. As a result, iPhone users find it challenging to share files with others.

Progress in the Modern Operating Systems Design

Virtual Memory Management

Virtual memory is a general-purpose technique offered by modern operating systems for processing data that is greater than the main memory that is accessible. Swapping transports pieces of the data back and forth from the disk as needed and is transparent to the software. Pages are the standard name for the units that make up the virtual address space. Page frames are the name for the equivalent units in physical memory. The virtual addresses on the page frames are mapped by a page table, which also tracks whether they are loaded or not. The operating system selects a rarely chosen page frame and writes its contents back to the disk when a page fault takes place (i.e., a program attempts to utilize an unmapped page). The relevant page is then fetched into the newly

freed page frame, the map is modified, and the stuck instruction is restarted. Memory management is implemented on hardware with a page size that is typically fixed at 4,096 bytes in current systems.

Dynamic Loading New Libraries

Dynamic shared libraries are supported by the majority of modern operating systems. They use this to reduce memory utilization and maximize code reuse. You can leverage whatever is loaded to your advantage, as I mentioned in the last section, but occasionally you might require something that isn't already loaded. A payload can decide whether to load a dynamic library on demand and use the functions in it, just like code in a program. We looked at an illustration of this in the straightforward Windows NT exploit example. LoadLibrary() and GetProcAddress are two procedures that will always be loaded in a process space under Windows NT (). These functions simply let us load any DLL and search for a specific function by name. It is a combination of dlopen() and dlsym on UNIX (). Both of these operations can be divided into two categories: loaders and symbol lookups.

Conclusion

Windows and Android are usually the most commonly utilized operating systems, especially the most recent versions. It's because they are compatible, safe, dependable, and fairly priced. It is possible to conclude that any operating system designed with a particular purpose considered the preferences of the people who would use it. All operating systems, especially those for mobile devices, provide users with distinctive and competitive features and services. All open-source operating systems, however, gain from the daily updates and addition of fresh concepts, apps, and developers from the community.

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