Activity 2 : Operating Systems

Operating System (OS) is a fundamental component of computer systems, serving as the intermediary between the user and the hardware. It is a specialized type of system software that provides the environment in which application programs can run and ensures that all the resources of a computer are used efficiently and fairly. The primary purpose of an OS is to simplify the use of a computer system. It abstracts the complexities of hardware management and provides users and applications with an accessible, organized interface.

To encourage self-pace learning in this topic, the student should answer and comply the following:

1. Explore the features and history of **Windows, Linux, macOS, and Mobile OS (e.g., Android, iOS)**. You can also watch introductory videos explaining how operating systems work and their importance in everyday computing.

Windows

Microsoft developed Windows, which is perhaps the most well-known operating system for personal computers. It was first introduced in 1985 as a simple graphical interface for MS-DOS and has since evolved into a full-fledged operating system with versions including Windows XP, 7, 10, and the most recent, Windows 11. Windows, known for its user-friendly design and compatibility with a wide range of hardware and software, has emerged as the preferred choice for home, school, and commercial use. Its features include multitasking, file management, built-in security via Windows Defender, and cloud integration with services such as OneDrive.

Linux

In contrast, Linux is a notable example of an open-source operating system. Since its creation by Linus Torvalds in 1991, Linux has evolved into a wide variety of distributions, including Fedora, Ubuntu, and Debian. It is favored by servers, developers, and even supercomputers due to its adaptability, stability, and robust security. Linux is free and community-driven, so anybody can alter or distribute it, unlike Windows and macOS. Linux silently powers a large portion of the internet and numerous embedded systems that people use on a daily basis without recognizing it because of its dependability and efficiency.

macOS

Another well-known operating system with a UNIX core is macOS, which was created by Apple and initially released as Mac OS X in 2001. Now known as macOS, it is made specifically for Apple products, guaranteeing seamless integration and performance. Creative professionals in industries like design, music, and video production are particularly drawn to macOS because of its slick interface and robust features like Finder, Spotlight search, and iCloud compatibility. Users who appreciate both design and reliability trust macOS because of Apple's significant emphasis on privacy and security.

Android and IOS

Lastly, the way people use technology has been completely transformed by mobile operating systems like iOS and Android. Due to its open-source nature and compatibility with other brands, including Samsung and Xiaomi, Android—which was developed in 2003 and purchased by Google in 2005—became the most popular mobile operating system. In the meantime, Apple's iOS, which debuted with the original iPhone in 2007, offers a safe, seamless, and extremely integrated experience across all Apple devices. When combined, these mobile platforms have made cellphones indispensable daily tools for work, education, entertainment, and communication.

2. Answer the following in 4-5 sentences.

   a. What is the primary role of an operating system?
   An operating system's main function is to act as a conduit between the user and the computer's hardware. The CPU, memory, storage, and input/output devices are among the resources it controls. In addition, the OS guarantees that apps can function properly and provide a user interface. Users wouldn't be able to communicate with computers efficiently without it.

   b. How does an OS manage memory?
   By giving programs and processes space when they require it, an operating system controls memory. It records the portions of memory that are free and those that are being used. Additionally, the OS makes sure that processes don't impede one another's memory usage. Errors are avoided, and the system becomes more effective.

   c. Give one advantage of Linux over Windows.
   The fact that Linux is open-source and free to use is one of its main advantages over Windows. Linux is available for free

download, modification, and distribution by users. Because of this, it is affordable for corporations, schools, and individuals. Additionally, it allows more experienced users to alter the system to suit their requirements.

d. Why is process management important?
Because it guarantees that several applications can operate concurrently without encountering conflicts, process management is crucial. The operating system assigns resources, plans processes, and keeps track of how they're being carried out. This guarantees equitable usage of CPU and memory and avoids crashes. The system would become sluggish and unstable in the absence of process management.

e. What are the differences between a desktop OS and a mobile OS?
Desktop operating systems, like Windows or macOS, are made for desktop computers with powerful hardware, larger screens, and keyboards. Mobile operating systems, such as iOS and Android, are designed with touchscreens, mobility, and energy efficiency in mind. Wireless connectivity and app-based user interfaces are also key components of mobile systems. Desktop systems, on the other hand, are designed for productivity, multitasking, and interoperability with more sophisticated software.

3. Identify types and give examples of Operating Systems according to their purpose.

Operating System for Batch

carries out tasks in groups without requiring user input.

Early IBM Mainframe OS is one example.

Multitasking/Time-Sharing Operating System

permits the simultaneous sharing of system resources by numerous users or programs.

For instance, Windows 10 and UNIX.

Operating System Distribution

enables several computers to function as a single system by connecting them.

Google's Android and Amoeba are two examples (in distributed computing environments).

Operating System for Embedded Systems

designed for low-resource, tiny devices.

Examples include VxWorks, Windows IoT, and embedded Linux.

Operating System in Real Time (RTOS)

Instantaneous data processing is utilized in systems that need to react quickly.

For instance, RTLinux and QNX.

Operating System for Mobile Devices

designed with touch and mobility in mind for smartphones and tablets.

For instance, iOS and Android.

4. Create a comparison chart of at least three operating systems (Windows, Linux, macOS).

• Developer/Company

• User Interface (GUI/CLI)

• Security and Stability

• Application Support

• Hardware Requirements

• Target Users

CHART

Category	Windows	Linux	macOS
Developer / Company	Microsoft	Open-source community (e.g., Linux Foundation Canonical for Ubuntu, Red Hat, etc.)	Apple Inc.
User Interface (GUI / CLI)	GUI-focused (Windows Desktop, Start Menu, Taskbar) with optional Command Prompt/PowerShell	Offers both GUI (varies by distro: GNOME, KDE, etc.) and powerful CLI (Terminal, Bash)	GUI-focused (Aqua interface, Dock, Finder) with Termin (Unix-based CLI)
Security and Stability	Good, but frequent target of malware due to popularity ; requires updates and antivirus	Highly secure and stable; less prone to malware; strong permission and process isolation	Very secure and stable; Unix-based with strong built-in protections
Application Support	Extensive support for commercial software, games, bus apps, and hardware drivers	Wide range of open-source applications; limited support for some commercial apps (workarounds like Wine/VMs)	Strong support for creative, productivity, and Apple-exclusive apps; limited game and enterprise support
Hardware Requirements	Runs on a wide range of hardware, but performance dep version (Windows 10/11 need higher specs)	Can run on low-end to high-end hardware; lightweight distros available for old machines	Runs only on Apple hardware; requires modern Mac devices
Target Users	General consumers, businesses, gamers, enterprises	Developers, IT professionals, servers, cybersecurity experts, hobbyists	Creative professionals, Apple ecosystem users, premium consumers

Case Study 1 Operating System Security (submit as a separate file)

Research at least 5 real-world OS vulnerability and answer the requirement below (e.g., Windows WannaCry ransomware, Linux Dirty COW, macOS Gatekeeper bypass).

Present the ff:

• The nature of the vulnerability.

• How it was exploited.

• Patches/solutions provided.

• Lessons learned for system administrators and users.

Case Study 2 Future of Operating Systems (submit as another separate file)

• Investigate emerging OS technologies (e.g., Google Fuchsia, Huawei HarmonyOS, Cloud-based OS). •

Write a short paper (2-3 page) discussing:

o How these differ from traditional OS.

o Their potential impact on computing.

I used AI to give me some bases and guide to answer the questions.