REPUBLIC OF BENIN

****

MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH

****

PRACTICE MAKES PERFECT (PMP)

PRACTICE MAKES PERFECT
INTERNATIONAL LANGUAGE
INSTITUTE

THEME : OPERATING SYSTEMS (OS)

Made by :

Karen HOUEHA

Under the supervision of :

Coach James & Coach Elisabeth

Academic year : 2023-2024

PLAN 2

Introduction

    I.   Definition of an Operating System (OS)

    II.   History and Evolution

    III.   Types of Operating Systems

    IV.   Current Trends and Future of Operating Systems

Conclusion

Introduction

Operating systems are a fundamental component of modern computing, shaping the way we interact with our technological devices. From the early days of computing, where the first computers used rudimentary interfaces, to the current era of sophisticated graphical interfaces, operating systems have undergone a remarkable transformation.

Over the decades, the evolution of operating systems has not only enabled major technological advancements but also influenced our daily lives, from how we work to how we entertain ourselves. Today, whether managing a complex server, using a personal computer, or interacting with a smartphone, operating systems are ubiquitous and essential.

In this presentation, we will delve into the fascinating history of operating systems, explore the different types that exist, understand their main functions, and discuss current and future trends in this ever-evolving field. This exploration will help us better grasp the crucial importance of operating systems in today's and tomorrow's digital world.

I. Definition of an Operating System (OS)

An operating system (OS) is software that acts as an intermediary between the user and the computer's hardware. It provides a user interface and manages the computer's resources, enabling applications to run efficiently. Essentially, the OS serves as a foundation upon which applications and users interact with the hardware.

To better understand the importance of an operating system, let's examine the main roles it plays in a computing environment.

1. **Resource Management:** The OS manages the computer's resources, such as the CPU, memory, and storage, ensuring that each application gets the necessary resources without conflict.

2. **User Interface:** It provides a user interface, whether it's graphical (GUI) or command-line (CLI), allowing users to interact with the computer easily.

3. **File Management:** The OS organizes files on various storage devices, maintaining file systems and directories for easy access and management.
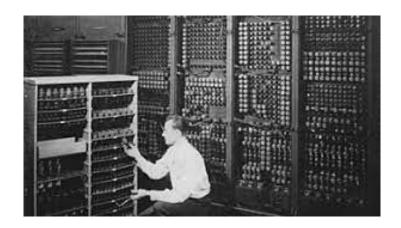
4. **Security and Access Control:** It ensures the security of data by managing user permissions and protecting the system from unauthorized access.

5. **Application Support** : The OS provides a platform for running applications, offering necessary services and APIs for software development and execution.

6. **Device Management:** It controls and coordinates the use of peripheral devices like printers, scanners, and other hardware components.

II.   History and Evolution

The history of operating systems dates back to the early days of computing in the 1950s and 1960s. During this period, computers were massive machines that required a team of operators to manage. The earliest computers operated without an operating system. Programs were fed directly into the machine using punch cards, and the machines executed tasks sequentially, with no multitasking capabilities.

- **The 1960s: Birth of Operating Systems**

The need for more efficient management of computing resources led to the development of the first operating systems. One of the earliest and most influential was the Compatible Time-Sharing System (CTSS) developed at MIT in the early 1960s. CTSS allowed multiple users to share computer resources simultaneously, a significant advancement over the batch processing systems of the time.

- **The 1970s: Unix and the Rise of Portability**

In 1969, Ken Thompson, Dennis Ritchie, and others at AT&T's Bell Labs developed Unix, an operating system that introduced many concepts still used today. Unix was designed to be portable, meaning it could run on different types of hardware with minimal modifications. This portability made Unix popular in academic and research settings, influencing many later operating systems.

- **The 1980s: Personal Computing and Graphical Interfaces**

The 1980s saw the rise of personal computers, bringing operating systems into homes and small businesses. In 1981, IBM introduced the IBM PC, which ran PC DOS, an operating system developed by Microsoft. Around the same time, Apple's Macintosh, introduced in 1984, brought graphical user interfaces (GUIs) to the mainstream, making computers more user-friendly.

- **The 1990s: Windows Dominance and Open-Source Movement**

Microsoft Windows, first introduced in 1985 as a graphical extension for MS-DOS, evolved significantly during the 1990s. Windows 95, released in 1995, marked a major shift with its fully integrated GUI and improved user experience, solidifying Microsoft's dominance in the personal computer market.

The 1990s also saw the rise of the open-source movement, with Linux, a Unix-like operating system created by Linus Torvalds, gaining popularity. Linux's open-source nature allowed anyone to modify and distribute the software, fostering a collaborative development community.

- **The 2000s : Mobile and Cloud Computing**

The early 2000s brought significant changes with the advent of mobile computing. Apple's iOS, introduced with the first iPhone in 2007, and Google's Android, launched in 2008, revolutionized the mobile phone industry by bringing powerful, user-friendly operating systems to smartphones and tablets.

At the same time, cloud computing began to emerge, with operating systems like Google's Chrome OS and various cloud-based services shifting data storage and

processing from local devices to remote servers. This shift allowed for more efficient resource management and access to data from anywhere.

III.   Types of Operating System

Operating systems can be classified into several categories based on their usage and the devices they manage. Here is an overview of the main types of operating systems:

♦ **Operating Systems for Personal Computers**

These operating systems are designed for personal computers, including desktops and laptops.

- ✘ ***Windows***: Developed by Microsoft, Windows is one of the most popular operating systems for personal computers. It offers a user-friendly graphical user interface (GUI) and is compatible with a wide range of software and hardware. Recent versions include Windows 10 and Windows 11.

- ✘ ***macOS***: Developed by Apple, macOS is the operating system used on Mac computers. Known for its sleek and intuitive interface, macOS is also renowned for its robustness and security. Recent versions include macOS Catalina, Big Sur, and Monterey.

- ✗ *Linux*: Linux is an open-source operating system based on Unix. It is known for its flexibility, security, and performance. There are numerous Linux distributions, such as Ubuntu, Fedora, and Debian, catering to various user needs.

♦ **Operating Systems for Mobile Devices**

These operating systems are specifically designed for smartphones, tablets, and other mobile devices.

- ✗ *Android*: Developed by Google, Android is the most widely used mobile operating system in the world. It is based on the Linux kernel and is open source, allowing for extensive customization by device manufacturers. Android is known for its flexibility and vast ecosystem of applications.

- ✖ **_iOS_**: Developed by Apple, iOS is the operating system for Apple's mobile devices, such as the iPhone and iPad. It is known for its security, stability, and seamless integration with the Apple ecosystem. iOS offers a smooth user interface and a rich app store.

♦ **Server Operating Systems**

Server operating systems are optimized to manage networks, databases, and enterprise applications.

- ✖ **_Windows Server:_** A version of Windows specifically designed for server environments. It includes features such as user management, virtualization, and file and print services.

× *Linux*: Linux distributions are also popular for servers due to their stability, security, and performance. Distributions like CentOS, Ubuntu Server, and Red Hat Enterprise Linux are commonly used in server environments.

× *Unix*: Unix and its variants, such as AIX (IBM) and Solaris (Oracle), are often used in server environments due to their robustness and ability to handle large workloads.

♦ **Real-Time Operating Systems (RTOS)**

RTOS are used in applications that require quick and predictable task processing, such as embedded systems, medical devices, and industrial equipment.

× *VxWorks*: A commercial RTOS developed by Wind River Systems, widely used in embedded systems.

✖ *FreeRTOS*: An open-source RTOS popular for small embedded devices due to its simplicity and efficiency.

♦ **Cloud Operating Systems**

Cloud operating systems are designed to operate in cloud computing environments, where resources are distributed across multiple servers.

✖ *Google Chrome OS*: A cloud-based operating system developed by Google, primarily used in Chromebooks. Chrome OS is centered around the Chrome browser and web applications.

- ✗ *CoreOS*: Designed for deployment in cloud computing environments, CoreOS focuses on containerization and cluster management.

♦ **Operating Systems for IoT (Internet of Things)**

These operating systems are designed to manage IoT devices, which often have limited resources.

- ✗ *RIOT OS*: An open-source operating system specifically designed for IoT devices, offering low power consumption and efficient communication;

× ***Zephyr***: Another open-source operating system for IoT devices, supported by the Linux Foundation, emphasizing security and modularity.

IV. Advantages and disadvantages of Operating System

Advantages

+ Efficient resource management
+ Multitasking capability
+ User-friendly interface
+ Customization options
+ Enhanced security
+ Data protection
+ Wide application support
+ Network connectivity and security features

Disadvantages

+ Complexity
+ Licensing fees
+ Hardware requirements
+ Vulnerability to malware and cyber-attacks
+ Exploits and bugs
+ Performance overhead

+ Background process resource consumption

+ Software compatibility issues

+ Driver availability limitations

+ Regular maintenance and updates

+ Potential system crashes

V. Current Trends and Future of Operating System

Current Trends

- *Increased Security Measures*
  - ❖ **Enhanced Security Features**: Operating systems are incorporating advanced security features such as kernel-level protection, better encryption, and integrated security protocols to protect against sophisticated cyber threats.
  - ❖ **Zero Trust Architecture**: Many modern operating systems are adopting Zero Trust security models, which require strict verification for every user and device trying to access network resources.

- *Artificial Intelligence and Machine Learning Integration*
  - ❖ **AI-Driven Management**: Operating systems are beginning to integrate AI and machine learning to optimize resource allocation, predict maintenance needs, and enhance overall system performance.
  - ❖ **Smart Assistants:** Integration of AI-based assistants (like Cortana in Windows or Siri in macOS) within operating systems to provide a more intuitive and interactive user experience.

- *Edge Computing*

- ❖ **Edge-Optimized OS**: As edge computing grows, operating systems are being developed to handle processing at the edge of networks, reducing latency and improving performance for IoT devices and other applications.
- ❖ **IoT Integration:** Operating systems are increasingly being tailored for the Internet of Things (IoT), focusing on low power consumption, real-time processing, and secure connectivity.

- *Open Source Adoption*
  - ❖ **Increased Use of Open-Source OS**: There is a growing trend toward adopting open-source operating systems like Linux in both enterprise and consumer spaces due to their flexibility, security, and cost-effectiveness.
  - ❖ **Community-Driven Development**: The open-source community continues to drive innovation in operating systems, with frequent updates and improvements contributed by developers worldwide.

Future of Operating Systems

- *Autonomous Systems*
  - ❖ **Autonomous OS:** With the rise of autonomous vehicles, drones, and robots, there will be a need for operating systems that can handle real-time decision-making, complex sensor integration, and high reliability.

  - ❖ **Real-Time Processing:** Enhancements in real-time processing capabilities will be critical for the development of systems that require immediate responses and high levels of automation.

- *Enhanced Human-Computer Interaction*

- ❖ **Natural User Interfaces (NUI):** Future operating systems might incorporate more natural user interfaces, such as voice commands, gesture recognition, and brain-computer interfaces, making interaction with devices more intuitive.
- ❖ **Augmented Reality (AR) and Virtual Reality (VR):** Operating systems will increasingly support AR and VR environments, providing immersive experiences and new ways of interacting with digital content.

- *Energy Efficiency*
  - ❖ **Green Computing:** Future operating systems will focus on energy efficiency, optimizing software and hardware interactions to reduce power consumption and support sustainable computing practices.
  - ❖ **Battery Life Optimization:** For mobile devices and IoT, operating systems will continue to improve battery management techniques, extending device uptime and enhancing user experience.

These trends and future directions highlight the ongoing evolution of operating systems, driven by technological advancements and changing user needs. As we move forward, operating systems will continue to adapt, becoming more integrated, secure, and intelligent.

Conclusion

In conclusion, operating systems are essential for the functioning of modern computing devices, managing hardware resources, providing user interfaces, and ensuring security. They have evolved from simple batch processing systems to complex, multi-functional platforms that support a wide range of devices, from personal computers to mobile phones and IoT devices.

Current trends such as AI integration, and enhanced security measures are shaping the future of operating systems. Looking ahead, we can expect further innovations in areas like autonomous systems, and energy efficiency. Operating systems will continue to adapt to new technological advancements, remaining a critical component in the digital world. Their ongoing evolution highlights their importance and the role they play in enabling efficient and secure digital interactions.