Bangladesh Open University

Diploma in Computer Science and Application Program (DCSA)

**Operating Systems**

TMA - 1

History of operating systems (OS)

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The history of operating systems (OS) is a fascinating journey that spans several decades and encompasses significant technological advancements. Let's delve into the details of this evolutionary process.

**The Earliest Operating Systems:**

In the 1940s and 1950s, computers were large and expensive machines operated by a team of experts. They lacked operating systems as we know them today. Programs were manually entered using punch cards, and the computer would execute them one at a time. Examples of early computers include the Electronic Numerical Integrator and Computer (ENIAC) and the Manchester Mark 1.

**Batch Processing Systems:**

In the late 1950s and early 1960s, the concept of batch processing emerged. Batch processing allowed a series of jobs to be grouped together and executed without manual intervention. The operating systems designed for this purpose managed the execution of jobs from punched cards or magnetic tapes. Examples of batch processing systems include the IBM OS/360 and the Burroughs MCP.

**Time-Sharing Systems:**

Time-sharing systems, developed in the 1960s, allowed multiple users to simultaneously access a computer system. These systems provided each user with a small portion of the computer's time, giving the illusion of real-time interaction. The operating systems used for time-sharing managed resources such as CPU time and memory, and implemented mechanisms to ensure fairness among users. One of the most notable time-sharing systems was the Compatible Time-Sharing System (CTSS) developed at MIT.

**The Rise of Personal Computers:**

The 1970s witnessed the advent of personal computers (PCs). Operating systems were developed to cater to the needs of individual users. One of the most influential operating systems during this period was the UNIX operating system, developed by Bell Labs. UNIX introduced the concept of a hierarchical file system and provided a rich set of utilities and tools for developers. It laid the foundation for many modern operating systems.

**Graphical User Interfaces:**

In the 1980s, the introduction of graphical user interfaces (GUIs) revolutionized the way users interacted with computers. Operating systems like Apple's Macintosh System Software and Microsoft's Windows emerged, offering intuitive interfaces with graphical elements such as windows, icons, and menus. GUI-based operating systems made computing more accessible to non-technical users and set the stage for further advancements.

**Networked and Distributed Systems:**

As computer networks proliferated in the 1980s and 1990s, operating systems evolved to support networked and distributed environments. Novell's NetWare, Microsoft's Windows NT, and Unix variants like Linux and FreeBSD gained prominence. These operating systems incorporated features such as network file sharing, remote login capabilities, and distributed processing, enabling collaboration and resource sharing across multiple machines.

**Mobile and Embedded Systems:**

The 2000s marked the rise of mobile and embedded systems. Operating systems designed for these devices prioritized power efficiency, responsiveness, and support for limited resources. Examples include Symbian OS, Palm OS, Windows CE, and eventually, iOS and Android, which became dominant in the smartphone market. These operating systems introduced touch-based interfaces and ushered in the era of mobile computing.

**Modern Operating Systems:**

Today, modern operating systems continue to evolve, supporting a wide range of devices and technologies. Windows, macOS, and Linux are prevalent on desktop and laptop computers, while iOS and Android dominate the mobile landscape. Cloud-based operating systems, like Chrome OS, have emerged, leveraging web-based applications and storage. Virtualization and containerization technologies have also become integral, enabling efficient resource utilization and application deployment.

It's worth noting that this overview only scratches the surface of the rich and complex history of operating systems. Countless individuals and organizations have contributed to the development and evolution of operating systems over several decades. The field of operating systems has seen significant advancements, innovations, and milestones. Here, we will explore the history of operating systems in more detail, highlighting some key developments:

**1940s-1950s:**

Early Computers: The first electronic digital computers, such as ENIAC and UNIVAC, were developed during this period. They used machine language and had no operating systems.

Batch Processing: The concept of batch processing emerged, where a series of jobs were submitted and processed in sequence without user interaction.

**1950s-1960s:**

Serial Processing Systems: Operating systems started to appear to manage the execution of multiple jobs. Examples include GM-NAA I/O, IBSYS, and SOS.

Time-Sharing Systems: Developers began exploring the idea of interactive computing, allowing multiple users to access a computer simultaneously. The Compatible Time-Sharing System (CTSS) and Multics were notable developments in this era.

**1960s-1970s:**

IBM OS/360: IBM introduced the OS/360 operating system, which was designed to run on their System/360 mainframe computers. It provided a common architecture for different models and introduced virtual memory support.

Unix: Developed at Bell Labs, Unix became one of the most influential operating systems. It introduced concepts such as hierarchical file systems, shell scripting, and multi-user capabilities. Variants of Unix, such as BSD and System V, emerged later.

**1970s-1980s:**

Personal Computers: The introduction of personal computers, like the Altair 8800 and IBM PC, led to the development of operating systems for individual users. Microsoft's MS-DOS and Apple's Macintosh System Software (later macOS) were prominent examples.

GUI-Based Operating Systems: Xerox PARC's Alto introduced the concept of graphical user interfaces (GUIs). This inspired the development of operating systems with GUIs, including Apple's Macintosh and Microsoft's Windows.

**1990s:**

Windows and Linux: Microsoft released Windows 3.0, which popularized GUIs on PCs. Subsequent versions, such as Windows 95, 98, and NT, enhanced functionality and usability. Linux, an open-source Unix-like operating system, gained popularity and continues to be widely used today.

Real-Time Operating Systems (RTOS): RTOS, designed for systems requiring precise timing and responsiveness, found applications in industries like aerospace, automotive, and telecommunications.

**2000s:**

Mobile Operating Systems: With the rise of smartphones, mobile operating systems gained prominence. Apple's iOS and Google's Android emerged as major platforms, revolutionizing mobile computing and app ecosystems.

Virtualization: Virtualization technologies, such as VMware and Xen, allowed multiple operating systems to run concurrently on a single machine, enabling efficient server consolidation and management.

**2010s:**

Cloud Computing: The advent of cloud computing brought about changes in operating systems. Infrastructure as a Service (IaaS) providers, such as Amazon Web Services (AWS) and Microsoft Azure, offered virtualized environments and managed services.

Containerization: Technologies like Docker and Kubernetes popularized containerization, providing lightweight and portable environments for deploying and scaling applications.

Recent Developments:

Edge Computing: As the Internet of Things (IoT) grows, operating systems optimized for edge devices have emerged. Examples include Google's Android Things and Microsoft's Azure Sphere.

Artificial Intelligence (AI): AI is being integrated into operating systems, enabling features like voice assistants and smart recommendations.

This overview only scratches the surface of the rich and complex history of operating systems. Countless individuals and organizations have contributed to the development and evolution of operating systems, pushing the boundaries of computing capabilities and driving technological progress.