



College of
Computer Studies

COURSE NOTES

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OPESYS:

Operating Systems

Course Description:

OPESYS deals with the key concepts and the general principles of the study of operating systems. This course focuses on the implementation of various operating systems from their structures, modules, components, and development. Students will learn to manipulate the special features of an operating system, configure the OS settings, create batch files and apply maintenance techniques in an operating system. The course consists of lectures and learning activities. Upon completion of this course, the students are expected to create their own batch files, manipulate and maintain an operating system.

Learning Outcomes:

- Compare and contrast the characteristics and features of various operating systems suited to solve complex problems through evaluation various case studies;
- Implement and simulate basic modules or components of an operating system;
- Participate in developing real-world systems that will suit the needs of the organization.

Tools or Application to Use:

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| <ul style="list-style-type: none">• Student Achievement Monitoring System (SAMS)• Schoology (web application) | <ul style="list-style-type: none">• Messenger• Other Applications |
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Mode of Assessment:

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| <ul style="list-style-type: none">• Online Quiz• Activities | <ul style="list-style-type: none">• Recitation during synchronous class• Presentation |
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References:

- Operating System Concepts, Silberschatz 10th Edition

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WHAT OPERATING SYSTEMS DO

An **operating system** is a program that manages a computer's hardware. It also provides a basis for application programs and acts as an intermediary between the computer user and the computer hardware.

An amazing aspect of operating systems is how they vary in accomplishing these tasks.

- Mainframe operating systems are designed primarily to optimize the utilization of hardware.
- Personal computer (PC) operating systems support complex games, business applications, and everything in between.
- Operating systems for mobile computers provide an environment in which a user can easily interface with the computer to execute programs.

WHAT OPERATING SYSTEMS DO

A computer system can be divided roughly into four components: the **hardware**, the **operating system**, the **application programs**, and the **users**.

The **hardware**—the **central processing unit (CPU)**, the **memory**, and the **input/output (I/O) devices**—provides the basic computing resources for the system. The **application programs**—such as word processors, spreadsheets, compilers, and Web browsers—define the ways in which these resources are used to solve users' computing problems. The operating system controls the hardware and coordinates its use among the various application programs for the various users.

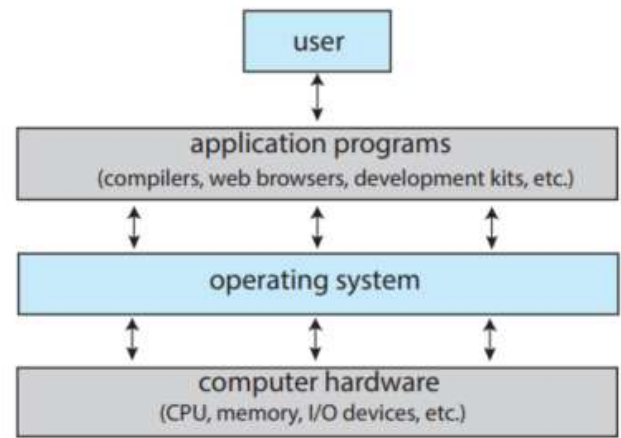
We can also view a computer system as consisting of hardware, software, and data. The operating system provides the means for proper use of these resources in the operation of the computer system. An operating system is similar to a government. Like a government, it performs no useful function by itself. It simply provides an **environment** within which other programs can do useful work.

User View

The user's view of the computer varies according to the interface being used. Many computer users sit with a laptop or in front of a PC consisting of a monitor, keyboard, and mouse. Such a system is designed for one user to monopolize its resources. The goal is to maximize the work (or play) that the user is performing. In this case, the operating system is designed mostly for **ease of use**, with some attention paid to performance and security and none paid to **resource utilization**— how various hardware and software resources are shared.

Increasingly, many users interact with mobile devices such as smartphones and tablets — devices that are replacing desktop and laptop computer systems for some users. These devices are typically connected to networks through cellular or other wireless technologies. The user interface for mobile computers generally features a **touch screen**, where the user interacts with the system by pressing and swiping fingers across the screen rather than using a physical keyboard and mouse.

Many mobile devices also allow users to interact through a **voice recognition** interface, such as Apple's **Siri**.



Some computers have little or no user view. For example, **embedded computers** in-home devices and automobiles may have numeric keypads and may turn indicator lights on or off to show status, but they and their operating systems and applications are designed primarily to run without user intervention.

System View

From the computer's point of view, the operating system is the program most intimately involved with the hardware. In this context, we can view an operating system as a **resource allocator**. A computer system has many resources that may be required to solve a problem: CPU time, memory space, storage space, I/O devices, and so on. The operating system acts as the manager of these resources. Facing numerous and possibly conflicting requests for resources, the operating system must decide how to allocate them to specific programs and users so that it can operate the computer system efficiently and fairly.

A slightly different view of an operating system emphasizes the need to control the various I/O devices and user programs. An operating system is a control program. A **control program** manages the execution of user programs to prevent errors and improper use of the computer. It is especially concerned with the operation and control of I/O devices.

Defining Operating Systems

How, then, can we define what an operating system is? In general, we have no completely adequate definition of an operating system. Operating systems exist because they offer a reasonable way to solve the problem of creating a usable computing system. The fundamental goal of computer systems is to execute programs and to make solving user problems easier. Computer hardware is constructed toward this goal. Since bare hardware alone is not particularly easy to use, application programs are developed. These programs

require certain common operations, such as those controlling the I/O devices. The common functions of controlling and allocating resources are then brought together into one piece of software: the operating system.

In addition, we have no universally accepted definition of what is part of the operating system. A simple viewpoint is that it includes everything a vendor ships when you order “the operating system.” The features included, however, vary greatly across systems. Some systems take up less than a megabyte of space and lack even a full-screen editor, whereas others require gigabytes of space and are based entirely on graphical windowing systems. A more common definition, and the one that we usually follow, is that the operating system is the one program running at all times on the computer — usually called the **kernel**. Along with the kernel, there are two other types of programs: **system programs**, which are associated with the operating system but are not necessarily part of the kernel, and application programs, which include all programs not associated with the operation of the system.

The matter of what constitutes an operating system became increasingly important as personal computers became more widespread and operating systems grew increasingly sophisticated. Today, however, if we look at operating systems for mobile devices, we see that once again the number of features constituting the operating system is increasing. Mobile operating systems often include not only a core kernel but also **middleware**— a set of software frameworks that provide additional services to application developers. For example, each of the two most prominent mobile operating systems — Apple’s iOS and Google’s Android — features a core kernel along with middleware that supports databases, multimedia, and graphics (to name only a few).

In summary, for our purposes, the operating system includes the always running kernel, middleware frameworks that ease application development and provide features, and system programs that aid in managing the system while it is running. Most of this text is concerned with the kernel of general-purpose operating systems, but other components are discussed as needed to fully explain operating system design and operation.



Hi I’m Flashee!

You have reached the end of the lesson. Be sure to answer the corresponding **activity of this lesson** on the activities folder of our class materials in the file server.