

EFFECTIVE SERVICES IN OPERATING SYSTEM

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Abstract— An operating system is a collection of software which manages computer hardware resources and provides common services for computer programs. The operating system is a vital component of the system software in a computer system, which is an intermediary between user and computer hardware and controls the execution of all kinds of programs. It provides user an environment in which programs get executed conveniently and efficiently. It manages the hardware and software resources of the computer system. The resources include the processor, memory, I/O device, storage, files, printers, disk space. The operating system is responsible for security, ensuring that unauthorised user do not access the system. This paper discuss about some of the operating system services, goals and functions. The operating system services include program execution, I/O operation, resource allocation, file system manipulation, protection, error detection, communication, accounting and security.

Keywords— I/O Operations, Operating system, Program, Protection , Security.

1. INTRODUCTION

Operating system is a software program that facilitates access between physical devices and application programs, which provides an interface between applications and hardware. The operating system is a vital component of the system software in a computer system. It performs functions such as, controlling and allocating memory, prioritizing system requests, controlling input and output devices, facilitating networking and managing file system. It is low-level software which enables a user and higher-level application software to interact with a computer's hardware and the data and other programs stored on the computer. It performs tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as printers. It is initially loaded into the computer by a boot program to support the activities of a computer installation and manages the various resources and overall operations of a computer system. The

application programs make use of the operating system by making requests for services through a defined application program interface (API).The user can interact directly with the operating system through a user interface such as a command language or a graphical user interface (GUI). The goal of operating system is convenience for the user, efficient operation of the computer system and ability to evolve.

II. OPERATING SYSTEM SERVICES

An operating system is a program that manages the computer hardware and acts as an intermediary between a user of a computer and the computer hardware.

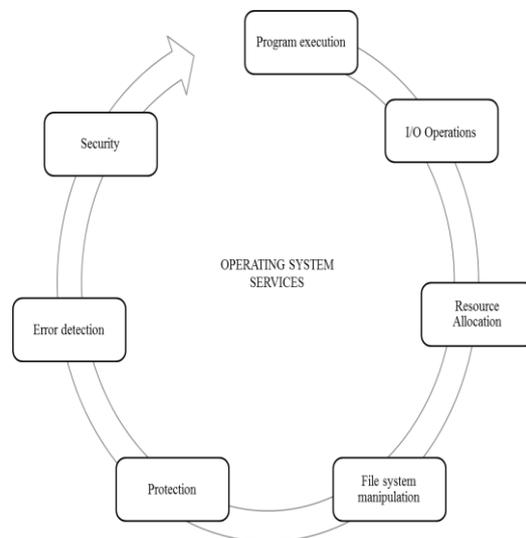


Fig.1. Operating system services.

The user communicates with the operating system, supplies application programs and input data, and receives output. An Operating System provides services to both the user and to the programs. It provides programs, an environment to execute and services to execute the programs in a convenient manner. The Fig.1 shows common operating system services, which are program execution, I/O

operations, resource allocation, filesystem manipulation, protection, error detection, security. Other service includes communication and accounting. Operating system allows one process to communicate with another process, which can be running on the same computer or on different computers connected through a network. Accounting is the process of keeping track of a user activity while accessing operating system resources, such as CPU, I/O device, files, memory etc.

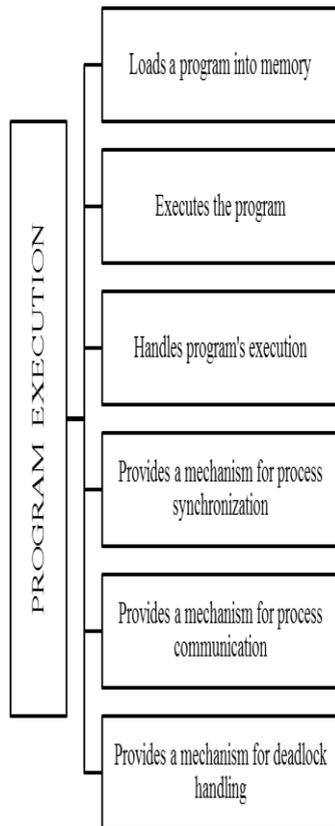


Fig.2. Program execution.

Operating system performs various kinds of activities from user programs, application programs such as word processors, database programs, web browsers, development tools, to system programs such as compiler. Each of these activities is encapsulated as a process. A process is a program in execution, which represents the basic unit of work to be implemented in the system. It includes the complete execution context code to execute, data to manipulate, registers, resources in use and it places programs into memory and prepares them for execution. The Fig.2 shows the major activities of an operating system with respect to program management. Loading a program involves reading the contents of the executable file containing the

program instructions into memory, and then carrying out other required preparatory tasks to prepare the executable for running. The operating system executes a program that is stored as a sequence of machine language instructions in main memory. Program execution is done by repeatedly reading, or fetching, an instruction from memory and then executing the instruction.

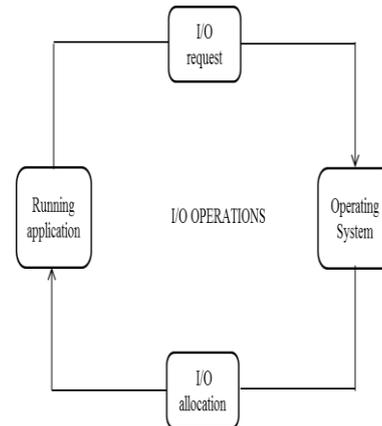


Fig.3. I/O Operations.

Management of I/O devices is a very important part of the operating system. I/O device is hardware used by a user or other system to communicate with a computer, which is capable of sending data to a computer and receiving data from a computer. It is used to enter information and instructions into a computer for storage or processing and to deliver the processed data to a user or computer. I/O subsystem comprised of I/O devices and their corresponding driver software. Operating System manages the communication between user and device drivers. I/O operation includes read or write operation with any file or any specific I/O device. Program may require any I/O device while running. Operating system provides the access to the required I/O device when required by application as shown in Fig.3. Whenever a running application requires an I/O it sends I/O request to operating system, then the operating system provides I/O access to the application.

Resource management is a primary operating system responsibility and it allows competing applications to share a system resources. Fig.4 shows resources managed by operating system. The resource management function of an operating system allocates computer resources such as CPU

time, main memory, secondary storage, and I/O devices for use. It manages all kind of resources using schedulers. CPU scheduling algorithms are used for better utilization of CPU.

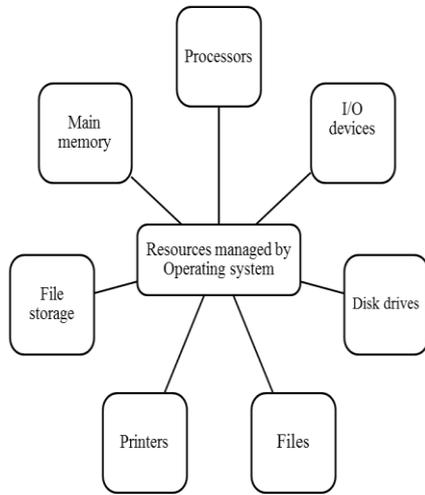


Fig.4. Resources managed by Operating system.

Resource management is the dynamic allocation and de-allocation by an operating system of processor cores, memory pages, and various types of bandwidth to computations that compete for those resources. The objective of operating system is to provide for an orderly and controlled allocation of the processors, memory, and I/O devices among the various programs competing for them, so as to optimize responsiveness subject to the finite resources available.

A filesystem is the method and data structures that an operating system uses to keep track of files on a disk, the way the files are organized on the disk. It is the way in which files are named and where they are placed logically for storage and retrieval. Fig.5 shows activities of file system. The file system provides the mechanism for storage and access to file contents, including data and programs. A file is a named collection of related information that is recorded on secondary storage such as magnetic disks, magnetic tapes and optical disks, for long term storage purpose. Such as magnetic tape, magnetic disk and optical disk drives like CD, DVD. Each of these media has its own properties like speed, capacity, data transfer rate and data access methods.

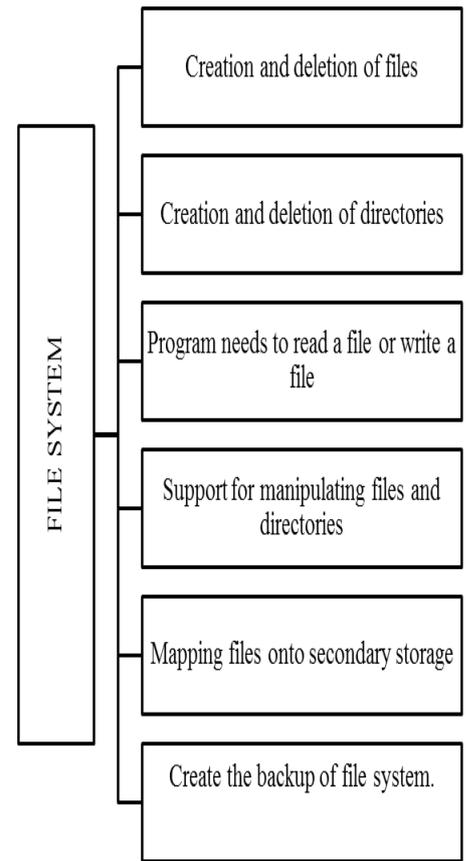


Fig.5. File system.

File system resides on secondary storage, provides user interface to storage, and provides efficient and convenient access to disk by allowing data to be stored, located retrieved easily. Operating system has three main ways to allocate disk space to files, such as contiguous allocation, linked allocation and indexed allocation. The operating system organizes and keep track of files, which provides an interface to create the backup of file system. It allows program to read a file or write a file and gives the permission to the program for operation on file, such as create, delete, open, close, read, write operations. It provides an interface to the user to create or delete files and directories.

Protection refers to mechanism to control the access of programs, processes, or user to the resources defined by a computer system. It ensures that each program component in a system uses resources that have gained proper authorization from the operating system. A computer system having multiple users, the concurrent execution of multiple processes, then the various processes must be protected from each another's activities.

The operating system detects hardware and software oriented errors within the computer system and takes proper actions to resolve them. Errors may occur in the CPU, memory hardware, programs, or in I/O device. Errors can be compile-time errors, logical errors, or run-time errors. A run-time error takes place during the execution of a program, usually happens because of adverse system parameters or invalid input data or the lack of sufficient memory to run an application or a memory conflict with another program. The operating system is responsible for detecting, constantly remains aware of possible errors, and it takes the appropriate action to ensure correct and consistent computing. It can recover from disk read, device unavailable, transient write failures.

Security refers to specified steps or measures used to protect the operating system from threats, viruses, worms, malware or remote hacker intrusions. It ensures operating system integrity, confidentiality and availability. There are numerous security threats to the system, in particular various types of malware, which is short for malicious software. This includes computer viruses which result in loss of data or system crashes, unauthorized reading of data, unauthorized modification of data, unauthorized destruction of data, preventing legitimate use of the system. The operating system has a number of built-in tools to protect against security threats, including the use of virus scanning utilities and setting up a firewall to block suspicious network activity.

CONCLUSION

An operating system makes the computer user friendly, which makes it easier for user to interface with and make use operating system services. An operating system provides an environment for the execution of programs. It provides services such as, program execution, I/O operations, resource allocation, file system manipulation, protection, error detection, security, communication and accounting. Operating system services will continue to evolve, which results in overall performance of the operating system.

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