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Hashing

Graph

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Python

SQL

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Javascript

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Functions of Operating System

Prerequisite – Introduction of Operating System – Set 1

An **Operating System** acts as a communication bridge (interface) between the user and computer hardware. The purpose of an operating system is to provide a platform on which a user can execute programs in a convenient and efficient manner.

An operating system is a piece of software that manages the allocation of computer hardware. The coordination of the hardware must be appropriate to ensure the correct working of the computer system and to prevent user programs from interfering with the proper working of the system.
Example: Just like a boss gives order to his employee, in the similar way we request or pass our orders to the Operating System. The main goal of the Operating System is to thus make the computer environment more convenient to use and the secondary goal is to use the resources in the most efficient manner.

What is Operating System ?
An operating system is a program on which application programs are executed and acts as an communication bridge (interface) between the user and the computer hardware.

The main task an operating system carries out is the allocation of resources and services, such as allocation of: memory, devices, processors and information. The operating system also includes programs to manage these resources, such as a traffic controller, a scheduler, memory management module, I/O programs, and a file system.

Important functions of an operating System:

1. **Security –**
   The operating system uses password protection to protect user data and similar other techniques. it also prevents unauthorized access to programs and user data.

2. **Control over system performance –**
   Monitors overall system health to help improve performance. records the response time between service requests and system response to have a complete view of the system health. This can help improve performance by providing important information needed to troubleshoot problems.

3. **Job accounting –**
   Operating system Keeps track of time and resources used by various tasks and users, this information can be used to track resource usage for a particular user or group of user.

4. **Error detecting aids –**
   Operating system constantly monitors the system to detect errors and avoid the malfunctioning of computer system.

5. **Coordination between other software and users –**
   Operating systems also coordinate and assign interpreters, compilers, assemblers and other software to the various users of the computer systems.

6. **Memory Management –**
   The operating system manages the Primary Memory or Main Memory. Main memory is made up of a large array of bytes or words where each byte or word is assigned a certain address. Main memory is a fast storage and it can be accessed directly by the CPU. For a program to be executed, it should be first loaded in the main memory. An Operating System performs the following activities for memory management:
   It keeps tracks of primary memory, i.e., which bytes of memory are used by which user program. The memory addresses that have already been allocated and the memory addresses of the memory that has not yet been used. In multi programming, the OS decides the order in which process are granted access to memory, and for how long. It Allocates the memory to a process when the process requests it and deallocates the memory when the process has terminated or is performing an I/O operation.

7. **Processor Management –**
   In a multi programming environment, the OS decides the order in which processes have access to the processor, and how much processing time each process has. This function of OS is called process scheduling. An Operating System performs the following activities for processor management.
   Keeps tracks of the status of processes. The program which perform this task is known as traffic controller. Allocates the CPU that is processor to a process. De-allocates processor when a process is no more required.

8. **Device Management –**
   An OS manages device communication via their respective drivers. It performs the following activities for device management. Keeps tracks of all devices connected to system. designates a program responsible for every device known as the Input/Output controller. Decides which process gets access to a certain device and for how long. Allocates devices in an effective and efficient way. Deallocates devices when they are no longer required.

9. **File Management –**
   A file system is organized into directories for efficient or easy navigation and usage. These directories may contain other directories and other files. An Operating System carries out the following file management activities. It keeps track of where information is stored, user access settings and status of every file and more… These facilities are collectively known as the file system.

Moreover, Operating System also provides certain services to the computer system in one form or the other.
The Operating System provides certain services to the users which can be listed in the following manner:

1. **Program Execution**: The Operating System is responsible for execution of all types of programs whether it be user

programs or system programs. The Operating System utilises various resources available for the efficient running of all types of functionalities.

2. **Handling Input/Output Operations**: The Operating System is responsible for handling all sort of inputs, i.e, from keyboard, mouse, desktop, etc. The Operating System does all interfacing in the most appropriate manner regrading all kind of Inputs and Outputs.
   For example, there is difference in nature of all types of peripheral devices such as mouse or keyboard, then Operating System is responsible for handling data between them.
3. **Manipulation of File System**: The Operating System is responsible for making of decisions regarding the storage of all types of data or files, i.e, floppy disk/hard disk/pen drive, etc. The Operating System decides as how should the data should be manipulated and stored.
4. **Error Detection and Handling**: The Operating System is responsible for detection of any types of error or bugs that can occur while any task. The well secured OS sometimes also acts as countermeasure for preventing any sort of breach to the Computer System from any external source and probably handling them.
5. **Resource Allocation:** The Operating System ensures the proper use of all the resources available by deciding which resource to be used by whom for how much time. All the decisions are taken by the Operating System.
6. **Accounting:** The Operating System tracks an account of all the functionalities taking place in the computer system at a time. All the details such as the types of errors occurred are recorded by the Operating System.
7. **Information and Resource Protection:** The Operating System is responsible for using all the information and resources available on the machine in the most protected way. The Operating System must foil an attempt from any external resource to hamper any sort of data or information.

All these services are ensured by the Operating System for the convenience of the users to make the programming task easier. All different kinds of Operating System more or less provide the same services.

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