**ASSIGNMENT # 1**

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**Course: Operating System**

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**Question 1: a)**

First explain different definitions of the Operating system. Keep them in mind, and explain why none of them can define Operating System as a whole. Try to give a comprehensive definition of Operating system, also explain which Application/ program should be part of operating system, what should not and why?

**ANS:**

**OPERATING SYSTEM:**

1. Operating system is a program that acts as an intermediary between the computer user and the computer hardware. It is a software that manages computer resources. It execute user programs and make solving user problems easier. OS make the system convenient to use.
2. It is a software that is designed to communicate with the hardware of the system and enables the other programs to run. It manages computer’s memory and all the processes.

**EXPLANATION:**

None of the definition cannot define the Operating system as it has many roles and functions in our daily life. It is used everywhere, in toasters, ships, space crafts, home appliances, mobile phones, TV, automobiles, industrial control systems etc. All these devices have many roles that cannot be generalized.

**COMPREHENSIVE DEFINATION:**

An operating system is loaded by the boot program. Once it is loaded it initializes all the system and manages all the application programs of the system. The application program request the operating system for the services through API (Application Program Interface). Users can interact with the operating system directly through user interface, for e.g. Command Line Interface (CLI) and Graphical User Interface (GUI).

**APPLICATIONS PART OF OPERATING SYSTEM AND WHAT SHOULD NOT BE:**

All the applications without which operating system cannot function efficiently must be made part of it. Applications that allow the user to maintain the system must be included as well, as basic utilities.

All the applications cannot be made part of the operating system due to limited resources, such as RAM, storage, processing abilities. A specific task is not defined when a computer is bought with OS. The Device maybe a phone, embedded system, car, PC etc.

**Question 1: b)**

Explain purpose of Cache memory. “If we increase size of cache memory. We will not need virtual memory. Speed of computation will also increase”. Do you agree with this if Yes / No. Provide valid reasons to sport you answer?

**ANS:**

**CACHE MEMORY:**

Cache memory is a small size volatile memory that enables the user to access data at high speed for processing and stores the data, application and program that is frequently in use. It is the fastest and most efficient memory of the computer that is integrated on the motherboard.

**PURPOSE OF CACHE MEMORY:**

Cache act as a buffer between very high speed, limited registers and main memory which is relatively slower. Its operating speed is somewhat similar to CPU, the CPU does not has to wait for the data when it is accessing data from the cache. Whenever the user needs the data, the CPU checks the cache for faster data access because RAM is slower and far from the CPU. If the desired data is found in the cache, this is known as cache hit. It enables the processor to access the data form the cache itself saving the time and making the system more efficient. The size of cache is much smaller than the RAM that is why it stores the data temporarily and does not hold the information that is required for the processor. Similarly, when the desired data is not found in the CPU it is known as cache miss, now the CPU has to search for that data on the hard drives and RAM.

The operating system moves the data that is not immediately required by the CPU out of the RAM and store it in virtual memory. When this data is required by the CPU it is copied back to RAM. We cannot use the virtual memory as it slow down the system because it takes much more time in copying the data on the hard disk than reading and writing on the cache.

**IF WE INCREASE THE SIZE OF THE CACHE, THE COMPUTATION SPEED INCREASE:**

Yes, if we increase the size of the cache we will not need the virtual memory and the speed of the computation will also increase. There will be more space for the codes of line that is currently executing. The CPU does not have to fetch the instructions from the main memory. This saves the processing power and time.

Mostly the programs that are opened and operated at some time needs very less resources, this is because they are frequently used instructions are already cached. That is why the systems that have slower processors with larger cache are way faster than the systems that have faster processor but smaller cache.

However, increasing cache can increase the overall cost of the CPU and lead to architectural programs. So the manufactures figure out the mid-way between these two conditions.

**Question 2:**

Some programs make heavy use of operating system by utilization of large number of system calls, but system hide all details from programmer. How developer deign a program without such details. Explain with example of different operating environments.

**ANS:**

Some programs make heavy use of operating system by utilization of large number of system calls with the help of Application Programming Interface (API). It acts as an interface between the operating system and systems calls, provides an abstract layer. API hides all the details from the programmer i.e. complexity, organize code, make components reusable and extends systems to partners.

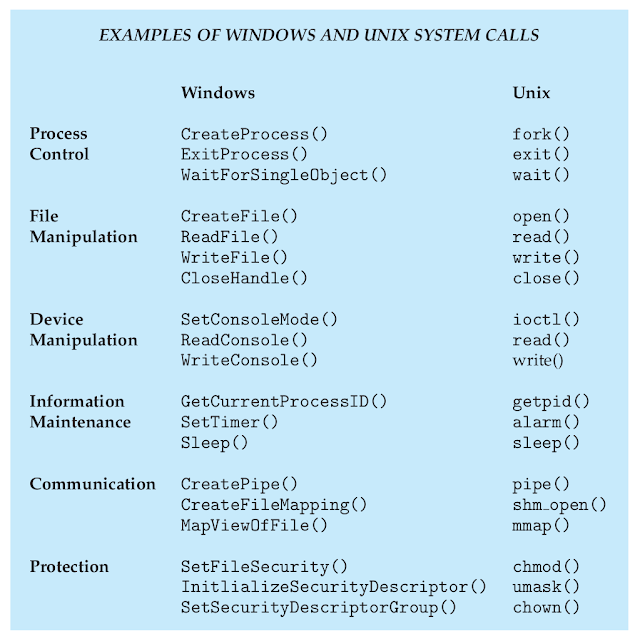
The system calls that are made and implemented not only depends on the system architecture but also depends on the Operating system in which it is being used.

**WINDOWS:**

The system call is converted internally. It is used for process control, main memory management, file system control, security, inter-process communication, I/O device handling etc. It is the only way to access the kernel. All the other programs in the system that need resources must use system calls. From the library function of WinAPI, a system call is made with a unique number that is read by the operating system needed to refer to the desired function in the kernel mode.

**LINUX:**

System calls in Linux are stored on its core directly in the system call table. Every entry of the table is assigned a unique number and specific functions are used in order to run the system in the kernel mode. Unique number is loaded in the CPU memory to execute any desired Linux system call. And then it is loaded with software interrupt. System call is similar to function call except that it removes the control from the user process.

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