OPERATING SYSTEMS

Tutorial 1

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(1)An address generated by the CPU is also referred to as a physical address. True or False?

False, An address generated by the CPU is referred to as a Logical Address and it is a virtual address.

(2)What is the hardware device that maps virtual to physical addresses?

The run time mapping between virtual and physical address is done by a hardware device known as MMU i.e memory management unit.

(3)Name two differences between logical and physical addresses.

The two differences are:-
1.Logical address is the virtual address generated by cpu while the physical address is an actual location in the main memory.
2. A logical address is an address at which an item such as memory cell, storage element appears to reside from the perspective of an executing program. A physical address is a memory address that allows accessing a particular storage cell in the main memory.

3. Logical address helps to obtain the physical address. Physical address helps to identify a location in the main memory.

(4)Why are page sizes always powers of 2?

We know, Paging is implemented by breaking up an address into a page and offset number. It is most efficient to break the address into x page and Y offset, rather than perform arithmetic on the address to calculate the page number and offset. Because each bits position represents a power of 2, splotting an address between

bits result in a page size is a power of 2.

(5) An application program is being designed and developed for a microprocessor based controller for an automobile. The application is required to perform the following functions:
i- monitor and display the speed of the automobile
ii- monitor the fuel level and raise an alarm if necessary
iii- display the fuel efficiency
iv- monitor the engine condition and raise an alarm if unusual condition is detected
v- periodically record some auxiliary information like speed, fuel level etc.
(a) Is this a real time application. Justify your answer
(b) It is proposed to create multiple processes to reduce the response time of the application. Enlist the prcesses that should be in it. Specify their priorities.

a. Yes it is a real time application because in the above mentioned application its give response with a time interval i.e 0 time interval and the connection is always open.
   • The alarm raising functions, functions 'ii' and 'iv' are real time functions.
   • At the same time, function 'v' can be considered as a soft real time function.

b. The given application has very light I/O and CPU requirement so, there is no need to create multiple processes.

(6) Explain the difference between the single user single tasking, multitasking and multiprogramming operating systems.

An OS that allows to perform only one task at a time is called single user single tasking OS.
Function like printing document

Example MS-DOS, Plam OS etc

Multiprogramming	**multitasking**
It increases CPU utilization by organizing jobs so that the CPU always has one to execute.its idea is to keep multiple jobs in main memory.	It is a logical execution of multiprogramming. In this, CPU execute multiple jobs by switching among them typically using a small time.
It is Non pre-emptive.	It is pre-emptive
Concept of context switching is used.	Concept of context switching and time sharing is used.

(7) What do you mean by kernel and MicroKernel?

Kernel is the core part of an Operating system which manage the system resources. Kernel is like a bridge between application and hardware .
It is classified into two categories:-

1. **Micro kernel:-**
   Microkernel is one in which user services and kernel services are kept in separate address space.
   It is smaller in size and slow execution.
2. **Monolithic Kernel :-**
   Monolithic Kernel is one in which user services and kernel services both are kept in same address space.
   It is larger than microkernel and fast execution.