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Question 1

(a)

The kernal of an Operating system is the essential center of a computer ~~operating~~ OS. It is the core that provides basic services for all other parts of the OS. It is the layer between hardware and OS. Basically it manages operations of memory and CPU time and also file system, device control and networking.

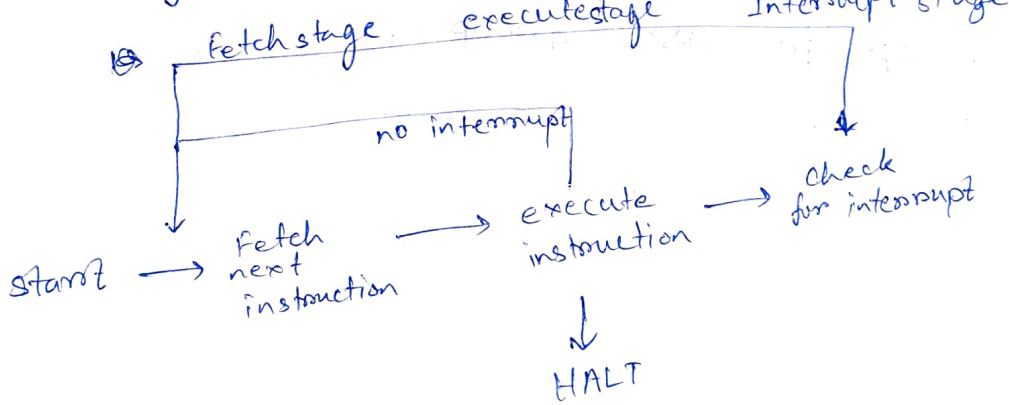
Interrupts are generally signals which are generated by the software or hardware when a particular even or process require immediate attention. So, the signal informe the processon about a high priority process causing a interruption in current workflow.

For every interrupt handling to occur there is an Interrupt service routine (ISR) or Interrupt handler.

~~This mechanism accepts an address a number that selects the~~

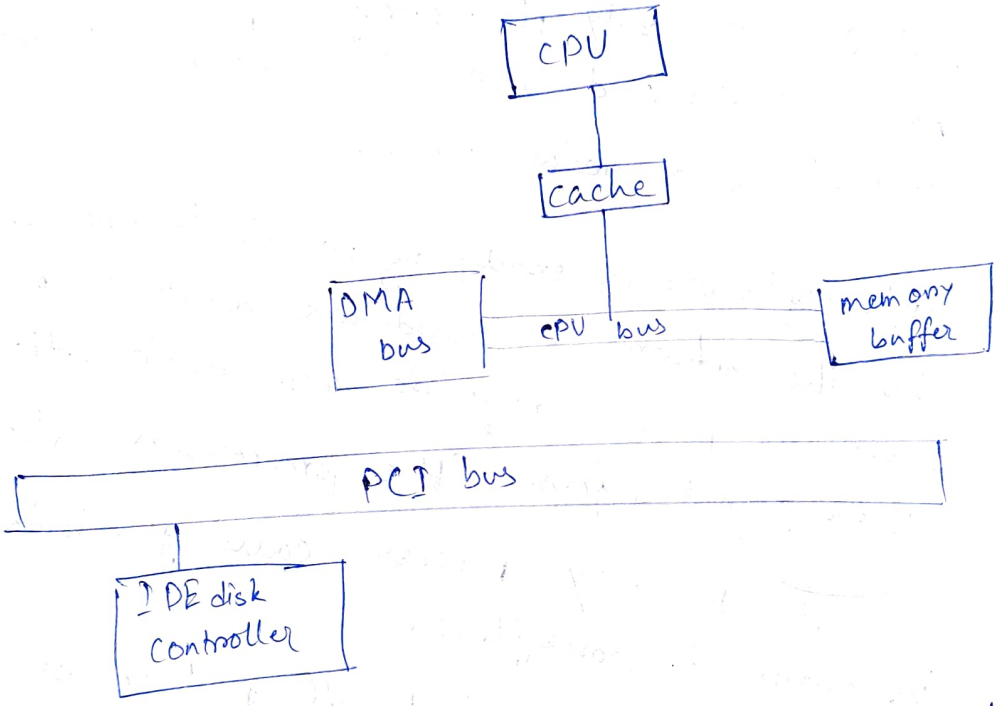
For the user program, an interrupt suspends the normal sequence of execution. When

the interrupt processing is completed, execution resumes. To accomodate interrupts, an interrupt stage is added of the instruction cycle. In the interrupt stage, the processor check if any interrupt have occurred, if yes then the processor suspends execution of the current program and control move to the interrupt signal and start executing that after complete execution CPU control back to priviously executing program and resume that.



(b)

DMA controller is a hardware device that allows I/O devices to directly access memory with less participation of the processor. It needs the same old circuits of an interface to communicate with the CPU and I/O devices.



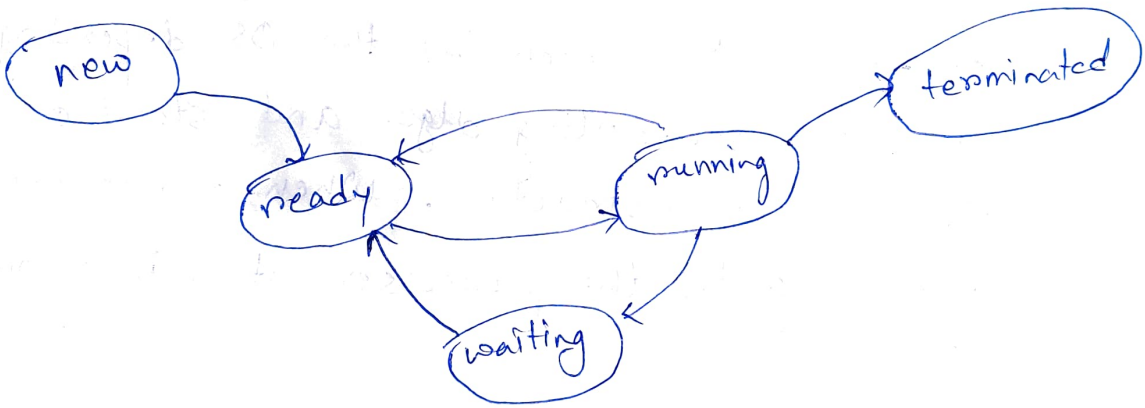
When DMA controller seizes the memory bus, the CPU is momentarily prevented from accessing main memory, although it can still access data items in its primary and secondary caches.

The data transfer work to a DMA controller generally improves the total system performance. Some architecture use physical memory address for DMA, but others perform direct virtual memory access, using virtual addressing.

Question 2:

(a)

A process is basically a program in execution. we can say a process is the instance of a computer program that is being executed by one or many threads. It contains the program code and its activity.



The process from its creation to complition, passes through various states. There are major five states.

1. New — A program which is going to alocated main memory by the OS is called a New process. The process is being created.

2. Ready — Whenever a process is created and allocate memory, it directly enters in the ready state, in which, it waits for the CPU to be assigned. Simply the processes which are ready for the execution and resides in main memory are called ready state process

3. Running — One of the process of the ready state will be chosen by the OS depending upon the scheduling algo. and start execute that process instruction. When a process is executing by the processer it is in running state.

~~4. Block~~

4. Waiting — From the running stat, a process can make transition to the block or wait state depending upon the scheduling algo. or the behavior of the process. When the process is waiting for some event to occur, then the OS move this process to block or waiting state.

5- Terminated —

When a process finishes its execution, it comes in the termination state. All the context of the process will be also deleted.

(b)

A process is an active program. It is more ~~that~~ than the program code as it includes the program counter, process stack, registers etc.

A thread is a lightweight process that can be managed independently by a scheduler. It improves the application perrformance using parallism.

Multiple thread of the same program ~~is~~ share with each other the code, data, and other resources including open files, signals etc.

Though thread is like a process, is also a unit of program execution, there are certain difference between them —

- A thread is a subset of a process. that is a thread is dependent on the process, whereas the processes may be independent.

- Each child process has a separate address space from that of its parent while the threadd belonging to the same process share the address space of the process.

- switching among threads is considerably faster than the process switching and incurs less overhead. This is because the resource state is to be switched only when switching to a thread belonging to a different process.

- Threread require significatly less time for creation, conter switching and termination.

P-thread or POSIX thread, is an execution model that exists independently from a language, as well as a parallel execution model. It allows a program to control multiple diffrent flows of work that overlap in time. Each flow is a thread.

Question 3

(a) Long term schedular regulates the programs which are selected to system for processing. In this the programs are setup in the queue and as per requirement the best one job is selected and it takes processes from job pool.

Short term schedular ensure which program is suitable or important for processing.

Long term Schedular	Short term Schedular
1. Long term schedular takes the process from job pool	1. Short term schedular take process from redy queue.
2. Here, the programs are setup in the queue and per the requirement the best job is selected	2. No such queue is existed.
3. It regulates the more DOM (Degree of Multiprogramming)	3. It regulates the less DOM.
4. Change the process states from New to Ready	4. changes the process states from Ready to Running.

(a) Dispatch latency is the time taken by the dispatcher in context switching of a process from run state and putting another process in the run state. Dispatch latency is an overhead, and the system does no useful work while context switching.

(b) For comparing many CPU scheduling algorithm many criteria have been suggested.

1. CPU utilisation — The main objective of any CPU scheduling algorithm is to keep the CPU as busy as possible. In real time system the CPU utilisation can range from 40 to 90% depending on the load.

2. Throughput — A measured of the work done by CPU is the number of process being executed and completed per unit time. This is called throughput. It may vary depending upon the length or duration of processes.

3. Turnaround time — For a particular process, an important criteria is how long it takes to execute that process. The time elapsed from the time of submission of a process to the time of completion is known as turnaround time.

4. Waiting time — A scheduling algo doesn't affect the time required to complete the process onse it start executing. It only affects the waiting time of that. The time spend by the process in the ready queue is waiting time.

5. Response time — In a interactive system, turn around time is not the best criteria. A process may produce some output fairly early and continue computing new results while previous results are being output to the user. The time taken from submission of request until the first response is produced ~~e Ttr~~ is called response time another criteria of CPU scheduling.

Priority scheduling — Priority scheduling algorithm executes the processes depending upon their priority. Each process is allocated a priority and the process with higher priority executes first.

Round-Robin — Round Robin scheduling algorithm is particularly designed for time sharing systems. The processes are put into the ready queue which is a circular queue in this case. A small unit of time (time quantam) is defined. It select the first process from the queue and executes it for the time defined by the quantam.

Priority Scheduling	Round Robin
① It executes the process according to their priority. Higher priority process executes first.	① Round Robin executes process based upon time quantam. each process executed for fixed amount of time.

(ii) It is both preemptive and non preemptive

(ii) Round-Robin is preemptive in nature.

(iii) ~~Avag~~ Avarage waiting and response time is unknown beforhand.

(iii) The avarage waiting time is quite small and depends on time quantum.

(iv) It is easy to implement and best suited for real time operating system.

(iv) It is easy to implement in any system.