Chapter 7

Input /output and storage systems

Q1.State Amdahl's Law.

Amdahl's Law is quantified by:

$$S=\frac{1}{(1-f)+f/k}$$

where S is the overall speedup; f is the fraction of work performed by a faster component; and k is the speedup of the faster component.The overall performance of a system is a result of the interaction of all of its components. • System performance is most effectively improved when the performance of the most heavily used components is improved.

Q2.Name three types of durable storage.

Disk ,tape,optical memories.

Q3.Explain how programmed I/O is differend from interrupt driven I/O.

--Programmed I/O reserves a register for each I/O device. Each register is continually polled to detect data arrival.

– Interrupt-Driven I/O allows the CPU to do other things until I/O is requested.

– Memory-Mapped I/O shares memory address space between I/O devices and program memory.

– Direct Memory Access (DMA) offloads I/O processing to a special-purpose chip that takes care of the details.

– Channel I/O uses dedicated I/O processors.

Q4.What does it mean when someone refers to I/O As bursty?

-Data is sent in blocks or in form of clusters.The CPU is granted acess to the bus between bursts

Q5.Why does DMA require cycle stealing?

- The DMA Controller and the CPU Share the bus.Generally ,I/O takes priority over CPU memeory fetches bcoz of its tight timing parameters.If they detect no activitywithin specifiedperios, they timout and abort the process.To avoid device timout ,the DMA uses memory cycles that would otherwise be used by the CPU.This is called Cycle Stealing.

Q6.How is Chanel I/O similar to DMA and different from Interrupt Driven I/O?– Direct Memory Access (DMA) offloads I/O processing to a special-purpose chip that takes care of the details.

– Channel I/O uses dedicated I/O processors. Channel I/O consists of one or more I/O processors (IOPs) that control various channel paths.Channel I/O is distinguished from DMA by the intelligence of the IOPs. The IOP negotiates protocols, issues device commands, translates storage coding to memory coding, and can transfer entire files or groups of files independent of the host CPU. • The host has only to create the program instructions for the I/O operation and tell the IOP where to find them.

Q7.What Distinguishes an Asynchronous bus from a Synchronous bus?

I/O buses are Asynchronous and memory Buses are Synchronous.

Synchronous transfers requires both sender and receiver to share a common clock for timing.

Asynchronous bus protocols also require a clock for bit timing and to delineate signal transitions.

Q8 Which device are called direct access devices and why?

Magnetic Disks,bcoz each unit of storage ,the Sector has a unique address that can be accessed independently of the sectors around it.

Q9.by how much is anSSD faster than a magnetic Disk?

100 times.

Q10. How do DVDs store so much of data than a regular CDs?

DVD Uses 650 nmlaser while cds employ 780nm laser.

This means feature size can be much smaller on DVD,so the linear space occupied by a single bit is shorter.

b.)DVD track can be placed much closer.bcoz the shortest pit length on DVD is 0.4 micron.

And spiral track is no longer o N DVDS

Q11. Which RAID levels offer the best performance.

Raid 6 .