SCHOOL OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

G51CSA Homework/Tutorial Problems – #VII

1. A disk has as specification as: 512 byte/sector, 96 sector/track, 110 track/surface, 8 usable surfaces, and rotation speed 360 rpm. A processor reads one sector from the disk use interrupt driven I/O, with one interrupt per byte. If it take 2.5 μs to process each interrupt, what percentage of time will the processor handling I/O (disregard seek time and latency time).

2. Repeat question using DMA, assume that one interrupt per sector.

3. A DMA module is transferring characters to memory using cycle stealing, from a device transmitting a 9600 bps (bits per second). The processor is fetching instructions at the rate of 1 million instruction per second (MIPS). By how much will the processor be slowed down due to the DMA activity

4. Assume that the text to be output to the printer is sitting at a particular block of consecutive locations in memory. Also assume that the printer sends an interrupt that results in a jump to some memory location, say 06, each time it has completed printing the previous character. When not sending a character to the printer, the CPU simply waits. Describe the operation of the printer driver program in as much detail as you can.

5. Suppose you wish to send a block of data to a tape drive for storage using DMA. What information must be sent to the tape controller before the DMA transfer can take place?

6. In virtually all systems that include DMA modules, DMA access to main memory is given higher priority than CPU access to main memory. Why?

7. Why would DMA be useless if the computer did not have interrupt capability?

8. What is the advantage of using a disk controller to control the hard disk? How else could you do the job that the disk controller does?

9. A simple character printer could use programmed I/O reasonably well, since the printer speed is slow compared to CPU. Yet most modern printers use DMA. Why?