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**CMIS 310**

**HOMEWORK #6 – Week #6**

This homework is worth 10% of your course grade.

**Read each problem carefully. Failure to follow the instructions for a problem will result in a zero score for that problem.**

Submit the completed Homework via Assignment in LEO.

1. A 32-bit computer has two selector channels and one multiplexor channel. Each selector channel supports two magnetic disk and two magnetic tape units. The multiplexor channel has two line printers, two card readers, and five VDT terminals connected to it. Assume the following transfer rates.

Disk drive 700 Kbytes/s

Magnetic tape drive 200 Kbytes

Line printer 6.6 Kbytes/s

Card Reader 1.2 Kbytes/s

VDT 1 Kbytes/s

Estimate the maximum aggregate I/O transfer rate in this system.

**Selector Channel 1 = 2 x 700 + 2 \* 200 = 1400 + 400 = 1800 Kbytes/s**

**Selector Channel 2 = 2 x 700 + 2 \* 200 = 1400 + 400 = 1800 Kbytes/s**

**Mux Channel 1 = 2 \* 6.6 + 2 \* 1.2 + 5 \* 1 = 13.2 + 2.4 + 5 = 20.6 Kbytes/s**

**SC1 + SC2 + MC1 = 1800 + 1800 + 20.6 = 3620.6 Kbytes** max transfer rate

2. Given the following set of events, show which routines the CPU is executing for times 0 to 100 ns. Each handler routine (with its interrupt request) takes 20 ns to complete. The priority of the interrupts ranges from IRQ6 as the **highest priority** interrupt to IRQ0 as **the lowest priority** interrupt.

|  |  |
| --- | --- |
| Time | Action |
| 0 ns | Start of main program |
| 10 ns | IRQ1 |
| 25 ns | IRQ4 |
| 40 ns | IRQ6 |
| 50 ns | IRQ3 |

Time Action

0-10 ns: IRQ1

10-30ns: IRQ4

30-70ns: IRQ6

50-100ns: IRQ3

1. Do Exercise 22 in Chapter 7 (Input/Output and Storage Systems) of Null and Lobur

Exercise 22: Why do you think the term *random access device* is something of a misnomer for disk drives?

**Random Access Device implies that the device writing data does so in a random sequence, however, it’s not possible to write data in a truly random sequence.**

1. Do Exercise 33 in Chapter 7 (Input/Output and Storage Systems) of Null and Lobur

Exercise 33: What are the advantages and disadvantages of having a small number of sectors per disk cluster? (Hint: You may want to think about retrieval time and the required lifetime of the archives).

**A couple major advantages that I see of having a small number of sectors per disk cluster is the likelihood of fragmentation of data by the system is less likely. This in-turn provides for better performance and data retrieval as the system doesn’t have to repair the data before representation and provides for better archiving within memory.**

**Disadvantages include the length of time the system requires to retrieve large files (since it isn’t fragmented). It also requires more read and write operations, which will cause component failure at higher rates over time.**