CS 250 Fall 2017 Homework 11

Due 11:58pm Thursday, Nov. 30, 2017

Submit your typewritten file in PDF format to Blackboard

1. A serial interface operates at a throughput of 10 million bits per second and requires 50 microseconds to configure (prepare) a packet of bits to be transmitted regardless of the size of the packet.
   1. What is the effective throughput, expressed first in packets/second and then in bits/second, for this interface for an infinite series of identically-sized packets for sizes 1 bit, 100 bits, 104 bits, and 106 bits? Express your answers rounded to 6 significant digits.

|  |  |  |  |
| --- | --- | --- | --- |
| Bits/packet | Time (sec/packet) | Throughput (packets/sec) | Throughput (bits/sec) |
| 1 | 5.01\*10^-5 | 19960.1 | 19960.1 |
| 100 | 6\*10^-5 | 16666.7 | 1666670 |
| 10000 | 1.05\*10^-3 | 952.381 | 9523810 |
| 1000000 | 0.10005 | 999500 | 9995000 |

* 1. What is being amortized?

Bits/sec

1. How many simultaneous transfers can occur on a crossbar switching fabric of N inputs and M outputs?

N\*M because there are that number of intersections and so that many switches

1. Assume that a RISC processor takes two microseconds to execute each instruction and an I/O device can wait at most 1 millisecond before its interrupt is serviced. What is the maximum number of instructions that can be executed with interrupts disabled?

500micro. Serviced every 2 micro seconds

1. Suppose a user installs ten devices that all perform DMA into a single computer and then attempts to operate the ten devices simultaneously. What components of the computer might become a bottleneck?  
   The memory access for other process might want to write to the memory also. So since the ten devices will have to access the memory at once so same bus device is becomes bottleneck.
2. A user invokes an app that writes a file. The app displays a progress bar that shows how much of the file has been written. Just as the progress bar reaches 50%, the power fails and the computer stops. When power is restored and the computer rebooted, the user discovers that less than 20% of the file was actually written. What might explain why the app report 50% when, clearly, only 20% of the file had actually been written?

50% was written to the buffer and not to the file system.

1. A user invokes an app that writes a file. The app displays a progress bar that shows how much of the file has been written. The progress bar has been advancing quickly, but just as the progress bar reaches 99%, the progress bar seems to freeze, then after a delay the bar show 100%, then disappears, and the app GUI moves on to another phase of activity. What might explain why the progress bar seemed to freeze for a time at 99% complete before reporting 100% complete and moving on?

Buffer was full so had to be flushed before getting more data.

1. Discuss the advantages of multiplexing with respect to buses. What are the two major disadvantages?

Advantages are that it allows an architect to design bus that has fewer lines and it gives higher performance. Disadvantages are that multiplexing takes more time and requires more sophisticated protocol.

1. What are the two types of bus error?

Address conflict and unassigned address

1. Run a system info command on your computer, and use its output to find at least three different buses that your computer contains. For each bus, (1) describe in specific detail the physical hardware from which it would be constructed, (2) name the units within your computer that are connected to the bus (if any) and the external units (if any) typically connected to the bus, (3) classify the bus as serial or parallel, (4) state if the bus is proprietary or if is it standard and when was its standard specification released and what entity released the spec, and (5) state how the bus addresses are configured (manually per I/O device, by hardwiring on the bus, or automatically), and (6) state for automatically configured buses, state whether the bus is hot-pluggable or not. The web, especially Wikipedia, can be a helpful resource.