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COMP 262

2/3/17

Lab 1

Calculating the minimum data transfer rate:

* 1920\*1080\*30\*2 = **124416000 bytes/second**
* Since we assume each frame pixel is 1 byte, we multiply the resolution to get the total number of pixels on screen: 1920\*1080 = 2073600 pixels (bytes). We then multiply by the refresh rate, which is given as 30 frames/second: 2073600\*30 = 62208000. Then we multiply it by 2 since the data passes over the bus twice: 62208000\*2 = 124416000 bytes/second.

Calculating the ACTUAL refresh rate:

* Assume memory is going faster than the CPU.
* (10000000/2)/2073600 = **2.413 frames/second**
* 10MHz\*1000000 = 10000000 Hz. Again, since the number of clock cycles is 2, we have: 10000000/2 = 5000000 bytes/s. To get the final refresh rate, we divide it by the data per frame: 5000000/2073600 = 2.413 frames/s. This is obviously lower than the minimum required justifying the video issues meaning there is at least

Finding the mismatched components:

* Taking into consideration both the width and timing compatibility, there are at least 2 mismatches. Looking at the memory, we see that it can process up to 32 bits, or 4 bytes, however, since the data lines width is only 1 byte, the process is slowed down. This means that the minimum requirement for the bus width should be **4 bytes**.
* The second mismatch comes from the transfer rate. Looking at the previous step where we calculated the actual refresh rate, we saw that the actual refresh rate is much slower than what is required. If we look at the transfer rate of the bus, we see that it transfers 1 byte per cycle. Because the refresh rate of the bus is 10 MHz and the refresh rate of the is 30 frames/s: 30/10 = **3 bytes/cycle**, which is what the transfer rate should be instead of 1.