John Spicer
CS385
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Second Theoretical Assignment
I pledge my honor that I have abided by the Stevens Honor System.

1. Memory addresses from a CPU instruction is copied to the MAR, which finds the memory location and the CPU checks whether it is a store or a retrieval. Then it transfers the information between the memory and the MDR.

2. Parallel and serial buses are physical connection that allow the transfer of data between locations in a computer system. Parallel buses are more expensive than serial buses, but they have a high throughput. They are prone to radio electrical interferences and are therefore only used over very short areas.

3. The key instructions are call and return. Call lets the program jump into a subroutine, while return reloads the program counter with whatever value it was initially given. This makes the program return to the instruction after a call.

4. Pipelining is the use of an assembly line technique to overlap fetch-execute cycles of instructions and sequences. The idea of pipelining is to better vole branching and stalling problems.

5. Cache memory is faster and smaller than main memory. It executes commands much faster and has hit ratios generally above 90%. Locality of reference is the idea that because the majority of memory references are located in a small area of memory at a given time, cache memory can access the data very quickly.

6. A CPU clock cycle is the time between two pulses of an oscillator. The importance is due to the fact that the higher the number of pulses, the faster the CPU can process information. A CPU at 4.77MHz

performs 4,770,000 clock cycles per second.

7. A thread is a segment of a program that is independent and can be executed concurrently. There are two ways of configuring a multiprocessor system. The master-slave technique has a master CPU that manages the entire system and assigns tasks to a slave CPU. Symmetrical multiprocessing allows both CPU's to have access to equal resources.

8. DMA stands for Direct Memory Access. DMA gives the capability of direct transfer to and from memory, without using the CPU. A certain pre-allocated portion of memory is used for DMA channels. The program requests I/O services from the OS, and the DMA is initiated with a location of the data on the I/O device, the start location, the size, and read/write. After the DMA finishes the CPU receives an interrupt signal.

9. An interrupt is a signal that alters the normal flow of execution of instructions by a CPU. The interrupt frees the CPU from waiting for other events. The set of saved registers of the program before the interrupt handler gets control is the context. When an interrupt is serviced, higher priority interrupts are executed first, the program currently in progress is suspended, and the context gets saved in the process control block as the handler is interrupted with a branch.

10. The different between polling and vectored interrupt processing it that vectored processing includes the address of the interrupting device in the interrupt itself, while polling processing identifies the interrupting device by polling each device.

11. Block-oriented devices transfer data in blocks and require a buffer mechanism. Character-oriented devices transfer data in stream and do not require a buffer. A hard drive is a block-oriented device, and

a character-oriented device would be a printer.

12. Flash memory is faster than hard disk storage, smaller, immune to physical shock, and generates little to not heat or noise. Hard disk advantages include the space and cost. The advantages of hard disk and flash memory storage over RAM are that they are secondary storage devices, meaning that RAM can only store data temporarily while hard drives and flash memory can store it permanently. RAM's advantage over other types of memory is the speed is much faster.

13. A disk array is a the grouping of more than one disk. This allows data to be accessed much faster than with a single disk.

14.

a. Capacity of a track is 30.72 KB. The capacity of each surface is 122.88 MB. The capacity of the disk is 1.2288 GB.

b. The disk has 4,000 cylinders.

c. The maximum rotational delay is .0083 seconds.

d. The transfer rate is 3.701204 MB/s.