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**CS 10**

**Assignment 2**

1. **What is the Instruction Execution Cycle?**

Instruction execution cycle is the process where the CPU go through predefined sequence of steps to execute a machine instruction. A single machine instruction cannot execute all at once. There are five steps which are fetch, decodes, fetch operands, executes, and stores result. First, the CPU fetch the instruction from instruction queue and increments the instruction pointer. Second, CPU decodes the instruction from the binary bit. It reveals if whether the instruction has input values. Third, CPU fetch operands if involved. It will fetch from registers and memory. Fourth, CPU executes the instruction by using operand values. It also updates status flags. Finally the fifth step, the CPU stores the result of the execution in the fourth step in the operand.

1. **What is the duration of a single clock cycle in a 3 GHz processor?**

We can calculate the duration of clock cycle as the reciprocal of the clock’s speed. It is measured in oscillations per second. 1 GHz means that it oscillates 1 billion times per second. It produces a clock cycle with a duration of one billionth of a second (1 nanosecond). If 3 GHz processor is used then it will be one third of 1 GHz, which is 0.33 nanoseconds or 3.33 x 10-10.

1. **Name all eight 32-bit general-purpose registers.**

EAX, EBX, ECX, EDX, EBP, ESP, ESI, EDI

1. **What special purpose does the ECX register serve?**

The CPU uses ECX as a loop counter automatically.

1. **Which flag is set when an arithmetic or logical operation generates a negative result?**

The sign flag is set when an arithmetic or logical operation generates a negative result.

1. **Which type of RAM is used for CPU cache memory?**

SRAM is used for CPU cache memory because it does not have to be refreshed. Primarily used for expensive, high-speed cache memory.

1. **What is the function of the PCI Express Bus?**

A PCI express bus is a bus that provides connections between devices, memory, and the processor using two way serial connections. It is used to transfer data at high speed. It connects high-speed components. It also carry data in packets, similar to networks, in separate “lanes”.

1. **What are the access levels for input-output operations?**

High-level language functions, operating system and BIOS.

1. **Of the four levels of input/output in a computer system, which is the most portable?**

The application program level.

1. **Is it likely that the BIOS for a computer running MS-Window would be different from that used by a computer running Linux?**

No. We can install Linux in a computer running MS-Window and MS-Window in computer running Linux. It will not affect the BIOS at all. The example would be my computer, I have both OS installed.

1. **Why are the device drivers necessary, given that the BIOS already has code that communicates with the computer's hardware?**

Device drivers are made for operating system to communicate directly with hardware devices and system BIOS. It can be installed in one of two ways. Before and after a device has been attached and identified. Therefore, since new devices are invented time to time, BIOS might not have the capabilities when it was written and that is where the device drivers are necessary because it have the capabilities that the BIOS might not have.

1. **Which level of programming would be used send and receive data from hardware ports?**

Level 0 of programming send and receive data from hardware ports. It also have the absolute control over some devices.