Name: **Id#**

COE 301/ICS 233, Term 171

Computer Architecture & Assembly Language

Quiz# 1 Solution

Date: Thursday, Oct. 5, 2017

Q1. Fill the blanks in the following questions:

(1) Assuming 8-bit unsigned representation, the hexadecimal number 3A is equal to the decimal number 58.

(2) Assuming 16-bit signed 2`s complement representation, the hexadecimal number FE00 is equal to the decimal number -512.

(3) The instruction pointer is a register that holds the address of the next instruction to be fetched from memory.

(4) Program portability is an advantage of programming in high-level language.

(5) Having faster executing programs is an advantage of programming in assembly language.

(6) With a 24-bit address bus and 128-bit data bus, the maximum memory size (assuming byte addressable memory) that can be accessed by a processor is 2^{24}=16 MByte and the maximum number of bytes that can be read or written in a single cycle is 16.

(7) A typical memory hierarchy is composed of registers, cache memory (could be several levels), main memory, hard disk, tape.

(8) Dynamic RAM is slower than static RAM because it requires refreshing.

(9) Assuming that the CPU has just read a 32-bit MIPS instruction from the address 0x004001FC, then, the address of the next instruction that this CPU is going to read is 0x004001FC+4=0x00400200.

(10) Given a magnetic disk with the following properties:

- Rotation speed is 7200 RPM (rotations per minute)
- Average seek = 8 ms, Sector = 512 bytes, Track = 200 sectors

The average time to access a block of 100 consecutive sectors is 16.33 ms.

Average access time = Seek Time + Rotation Latency + Transfer Time
Rotations per second = 7200/60 =120 RPS
Rotation time in milliseconds = 1000/120 = 8.33 ms
Rotation Latency = 8.33/2 = 4.17 ms
Time to transfer 200 sectors = (100/200)* 8.33 = 4.17 ms
Average access time = 8 + 4.17 + 4.17 = 16.33 ms.

(11) The binary number 1110 0111 represents character 'g' and uses an even parity bit. Note that the ASCII code of character **A** is 41H and that of character **a** is 61H.