

CS 271 Computer Architecture and Assembly Language

Self-Check for Lecture#2

Solutions are posted

1. Terms / Definitions

- a. "caching" is _____.
- b. A "bus" is _____.
- c. "vonNeumann architecture" refers to computer architectures that _____.

2. Inside the computer, machine instructions, memory addresses, numbers, characters, etc., are all represented as _____.

3. In the simple CISC architecture discussed in Lecture, which register holds

- a. the current machine instruction? _____.
- b. the current micro-instruction? _____.

4. Number the order of steps in the instruction execution cycle.

_____ Decode the instruction in the Instruction Register.

_____ If the instruction requires memory access, determine the memory address, and fetch the operand from memory into a CPU register, or send the operand from a CPU register to memory.

_____ Increment the Instruction Pointer to point to next instruction.

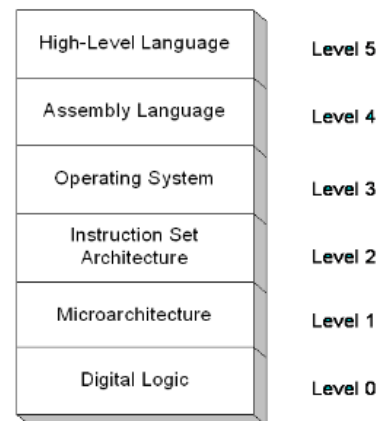
_____ Execute the instruction.

_____ Fetch the instruction at the address in the Instruction Pointer into the Instruction Register.

_____ Repeat from step 1.

5. Consider the virtual machine levels in the diagram at the right. At each level (except 0 and 5), an interpreter accepts an instruction from the level above, converts the instruction to its own language, and passes the resulting instructions to the level below. Note that Level-0 has no interpreter; the instructions from the Micro-architecture level are sent directly to the hardware.

Suppose that the interpreters at each level (levels 1 - 4) generate n instructions in order to represent one instruction from the level above. Suppose also that each Level-0 instruction executes in c nanoseconds.



- a. How long does it take to execute a Level-3 instruction? _____ ns.
- b. How long does it take to execute a Level-5 instruction? _____ ns.

6. How many bits in 35 MiB? _____ bits

Questions 7-10 refer to the IA-32 architecture discussed in Lecture.

7. What is the width of the internal bus? _____

8. What is the size of the general-purpose registers? _____

9. Which of the following are valid 8-bit register references?

_____ AL

_____ DH

_____ SH

_____ EL

10. Why does protected mode prevent programs from changing the EIP register directly?

11. True / False:

a. _____ A MASM program must have a procedure named "main".

b. _____ **END main** is a directive that tells the operating system where to begin execution of the program.