Assembly – 2.1 prep questions

Read 6th ed §2.1; prep #1, 2, 4, 5, 9, and 11

2.1.5 Section Review

1. The central processor unit (CPU) contains registers and what other basic elements?

Ans: contains a limited number of storage locations named registers, a high-frequency clock, a control unit, and an arithmetic logic unit.

2. The central processor unit is connected to the rest of the computer system using what three buses?

Ans: The CPU is attached to the rest of the computer via pins attached to the CPU socket in the computer’s motherboard. Most pins connect to the data bus, the control bus, and the address bus.

4. What are the three basic steps in the instruction execution cycle?

Ans: Executing a machine instruction requires three basic steps: fetch, decode, and execute.

***Fetch:***

The control unit fetches the next instruction from the instruction queue and increments the instruction pointer (IP). The IP is also known as the *program counter*

***Decode:***

The control unit decodes the instruction’s function to determine what the instruction will do. The instruction’s input operands are passed to the ALU, and signals are sent to the ALU indicating the operation to be performed.

***Additional step here in number 5***

***Execute:***

The ALU executes the instruction using the named registers and internal registers as operands and sends the output to named registers and/or memory. The ALU updates status flags providing information about the processor state.

***Additional step here in number 5***

5. Which two additional steps are required in the instruction execution cycle when a memory operand is used?

Ans:

***Fetch operands:***

If the instruction uses an input operand located in memory, the control unit uses a *read* operation to retrieve the operand and copy it into internal registers. Internal registers are not visible to user programs.

***Store output operand:***

If the output operand is in memory, the control unit uses a write operation to store the data.

9. Define multitasking

Ans: A *multitasking* operating system is able to run multiple tasks at the same time.

11. When the processor switches from one task to another, what values in the first task’s state must be preserved?

Ans: A multitasking OS runs on a processor (such as the x86) that supports task switching. The processor saves the state of each task before switching to a new one. A task’s state consists of the contents of the processor registers, program counter, and status flags, along with references to the task’s memory segments.