

# HW1: Von Neumann architecture, and multilayered computing (CS220-01)

- 1) Prior to the ENIAC, computers used 10 vacuum tubes per digit of number and multistate switches. How did the ENIAC change this?

The ENIAC moved 10 tubes for each number down to one. He did this by switching the number representation from decimal to binary, so now one number can be represented with a 1 or 0, off or on, as possible with the switches.

- 2) Identify the three main components of a CPU. Half credit for only acronyms.

(a) ALU - Arithmetic logic unit

(b) CU - Control unit

(c) Registers

- 3) (a) What is the basic thing distinguishing the "Integrated Circuit", "VLSI" and "Embedded" generations of computing? (b) What does VLSI stand for?

(a) VSLI's have exponentially more transistors in the same space than IC's. They are smaller, faster and cheaper. Embedded generation was distinguished by hardware/software co-design where the hardware devices are so teeny the computer chips

(b) can be embedded into existing devices.

Very Large Scale Integration

- 4) Ada Lovelace envisioned a two layered machine vs the previously imagined single layer machine. Why was the addition of a second layer so profound?... why not just use one layer?

The second layer allowed you to do more with a task than just the single layer. This meant you could take the previous actions dictated by punch cards that were fed into the first layer, and perform more complex tasks like looping (which was technically the first algorithm ever invented).

This created a machine conceptually similar to a computer.

- 5) In layman's terms, what is a bus?

Bunch of wires in parallel allowing data to move in parallel from one point to another

- 6) The EDSAC was the first useful "stored program" computer. Programs had to be stored somewhere before; what was so special about how the EDSAC did it?

Read programs into the same memory in which we store data, and execute them directly from memory instead of reading programs from things like punch cards.

This meant that now code and data were sort of one in the same because both were in memory, so it changed the way programmers looked at the two.

- 7) During which discussed generation did the personal computer appear?

Generation 4 alongside the VSLI

- 8) Which computer in our discussion introduced what we now know as the system "bus"?

The PDP-8 introduced the Omni-bus

- 9) For the basic transistor discussed, what is the purpose of the basis pin?

An electronic way to have an equivalent of a human pushing down the button, so that the signal is carried through the device.