Level 1: History of Computers

1. Research the history of “Mainframe Computers”. Make notes on the following:

a. The first computers (e,g, UNIVAC) and how they were made.

The UNIVAC I was the world's first commercially available computer. It was built using 5,600 tubes, 18,000 crystal diodes, and 300 relays. It utilized serial circuitry, 2.25 MHz bit rate, and had an internal storage capacity 1,000 words or 12,000 characters. The machine was 25 feet by 50 feet in length.

UNIVAC, www.thocp.net/hardware/univac.htm.

b. Computers in the 1960s and 1970s (e.g. IBM)

1960- IBM introduces the stretch computer

1961- IBM makes the Selectric typewriter and it is popular in offices because the amount of font and because it has many colours available

1964- IBM introduces the System/360

1966- IBM researcher Robert H. Dennard invents Dynamic Random Access Memory (DRAM) cells

1969- IBM gross income grows to $7.19 billion and net earnings increase to $934 million

1970- The IBM System/370 is introduced and has “virtual memory” technology

1972- IBM announces the System /370 Models 125, 158 and 168; the Mag Card "Executive" Typewriter; the IBM Copier II; and the 2991 Blood Cell Processor.

1975- IBM 5100 Portable Computer

1976- The IBM 3800 printer is installed, the first printer to combine laser technology and electrophotography.

“Chronological History of IBM.” IBM - Archives - History of IBM - United States, www-03.ibm.com/ibm/history/history/history\_intro.html.

c. Modern mainframe computers used by banks, government, and other large companies

2. Research the history of “Super Computers”. Make notes on the following:

a. The first super computers (e,g, CRAY) and how they were made.

The first major success in designing a supercumputer was the CRAY-1 which was anounced in 1976. One of the reasons why the CRAY-1 was such a successtory was that it could preform over a hundred million arithmetic operations per second. It was designed by Seymour R. Cray formally of Control Data Corporation but left in 1970 to start his own company Cray Reasearch INC, which was founded in 1972. The CRAY 1 had a top speed of 133 megaflops. The first system was installed at Los Alamos National Laboratory. If you went the conventional route and try to build one yourself using PC's it would take 200.00 of them all cross connected, or you could just purchuse 33.33 Sun4s. CRAY Reasearch INC made at least 16 of their fabulous CRAY 1's A tipical CRAY 1 cost in 1976 about 700,000 dollors. The nice thing about it is you could order the machine in any color you wished and it still holds true today.

The first Cray-1® system was installed at Los Alamos National Laboratory in 1976 for $8.8 million. It boasted a world-record speed of 133 million floating-point operations per second (133 megaflops) and an 8 megabyte (1 million word) main memory. The Cray-1's architecture reflected its designer's penchant for bridging technical hurdles with revolutionary ideas. In order to increase the speed of this system, the Cray-1 had a unique "C" shape which enabled integrated circuits to be closer together. No wire in the system was more than four feet long. To handle the intense heat generated by the computer, Cray developed an innovative refrigeration system using Freon.

Cray 1, www.thocp.net/hardware/cray\_1.htm.

b. Massively Parallel and Network Computers (e.g. Big Blue)

MPP (massively parallel processing) is the coordinated processing of a program by multiple processor s that work on different parts of the program, with each processor using its own operating system and memory . Typically, MPP processors communicate using some messaging interface. In some implementations, up to 200 or more processors can work on the same application. An "interconnect" arrangement of data paths allows messages to be sent between processors. Typically, the setup for MPP is more complicated, requiring thought about how to partition a common database among processors and how to assign work among the processors. An MPP system is also known as a "loosely coupled" or "shared nothing" system.

“What is MPP (Massively parallel processing)? - Definition from WhatIs.Com.” WhatIs.com, whatis.techtarget.com/definition/MPP-massively-parallel-processing.

A computer with minimal memory, disk storage and processor power designed to connect to a network, especially the Internet. The idea behind network computers is that many users who are connected to a network don't need all the computer power they get from a typical personal computer. Instead, they can rely on the power of the network servers.

Beal, Vangie. “Network computer.” What is Network Computer? Webopedia Definition, www.webopedia.com/TERM/N/network\_computer.html.

c. Modern quantum computers and how they work

The Turing machine, developed by Alan Turing in the 1930s, is a theoretical device that consists of tape of unlimited length that is divided into little squares. Each square can either hold a symbol (1 or 0) or be left blank. A read-write device reads these symbols and blanks, which gives the machine its instructions to perform a certain program. Does this sound familiar? Well, in a quantum Turing machine, the difference is that the tape exists in a quantum state, as does the read-write head. This means that the symbols on the tape can be either 0 or 1 or a superposition of 0 and 1; in other words the symbols are both 0 and 1 (and all points in between) at the same time. While a normal Turing machine can only perform one calculation at a time, a quantum Turing machine can perform many calculations at once.

Today's computers, like a Turing machine, work by manipulating bits that exist in one of two states: a 0 or a 1. Quantum computers aren't limited to two states; they encode information as quantum bits, or qubits, which can exist in superposition. Qubits represent atoms, ions, photons or electrons and their respective control devices that are working together to act as computer memory and a processor. Because a quantum computer can contain these multiple states simultaneously, it has the potential to be millions of times more powerful than today's most powerful supercomputers.

This superposition of qubits is what gives quantum computers their inherent parallelism. According to physicist David Deutsch, this parallelism allows a quantum computer to work on a million computations at once, while your desktop PC works on one. A 30-qubit quantum computer would equal the processing power of a conventional computer that could run at 10 teraflops (trillions of floating-point operations per second). Today's typical desktop computers run at speeds measured in gigaflops (billions of floating-point operations per second).

“How Quantum Computers Work.” HowStuffWorks, 8 Dec. 2000, computer.howstuffworks.com/quantum-computer1.htm.

3. Research the history of “Personal Computers”. Make notes on the following:

a. When was the first IBM PC introduced and what features did it have?

IBM 5100 Portable Computer

Model: 5100

Introduced: September, 1975

Price: US $19,975 w/ 64K RAM

Weight: 55 pounds

CPU: IBM proprietary, 1.9MHz

RAM: 16K, 64K max

Display: 5" monochrome monitor

64 X 16 text

Storage: Internal 200K tape (DC300)

Ports: tape / printer I/O port

OS: APL and/or BASIC

Serial #:

BASIC: 10-11503

APL: 10-13616

IBM 5100 computer, oldcomputers.net/ibm5100.html.

b. What were some PCs before the IBM PC?

MITS Altair 8800, IMSAI 8080, and Apple I in 1976.

“Personal Computer History: 1975-1984.” Low End Mac, 5 Mar. 2018, lowendmac.com/2014/personal-computer-history-the-first-25-years/.

c. When was the first Apple introduced and how was it different from the PC?

The apple 1 in 1976 and it was different because it was Apple’s only “kit” computer (you had to add a keyboard, power supply, and enclosure to the assembled motherboard)

“Personal Computer History: 1975-1984.” Low End Mac, 5 Mar. 2018, lowendmac.com/2014/personal-computer-history-the-first-25-years/.

d. How have modern PCs change since the earliest PCs?

Modern PCs are a lot faster, coat a lot less and are more productive.