

History of Computers

Charles Babbage - invented the Analytical engine which is the design for modern computers.

Ada Lovelace - Although programming was slightly different, she is known to be the first person to program, using the Analytical engine algorithms.

Differences in the generations

1. Vacuum Tube 2. Transistors 3. Integrated Circuit

4. Very Large Scale Integration 5. System on Chip

¹⁹⁴⁵⁻⁵³
1. Vacuum Tube - Massive, Lots of power, heavy, low memory

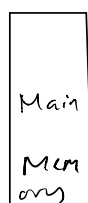
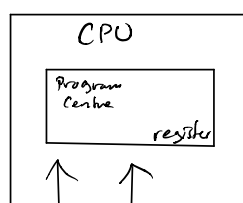
⁵³⁻⁶⁵
2. Transistors - Smaller, less power, lighter eg (T.V's, radios)

⁶⁵⁻⁸⁰
3. IC - Smaller, faster cheaper.
Many transistors integrated on microchips.
- More than one person can use at a time.

^{80-Now}
4. VLSI - Portability

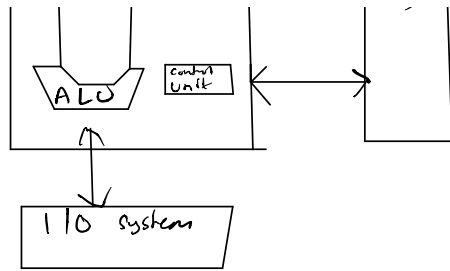
5. SOC - All components of a computer on a single chip eg, modern CPU.

Von Neumann Model



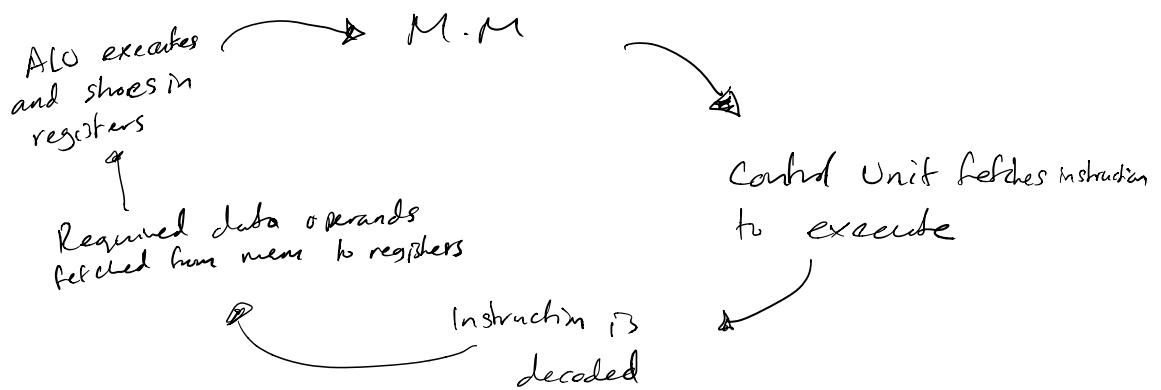
5 main components

1. Control Unit
2. Arithmetic Logic Unit
3. Main Memory (M, m)



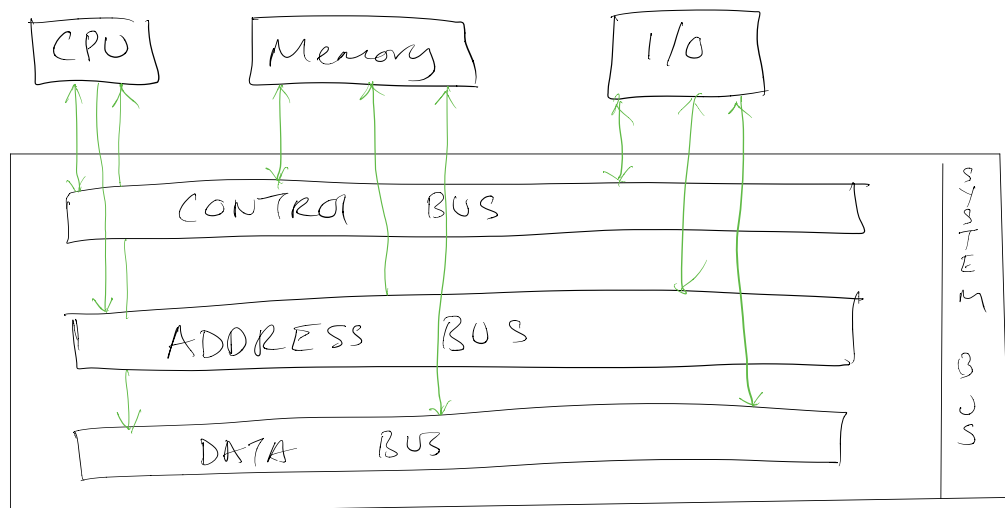
- 4. Registers
- 5. I/O systems

Datapath - von Neumann bottleneck is a single datapath between the CPU and the M.M.



Evolution of the von Neumann model

Bus system - Electrically conducting path along which data is transferred through devices.



- A computer bus consists of parallel conductors which may be wires or printed circuit board.
- Each wire carries 1 bit of data. Depending on how many wires, will define how many bit device.

Data bus - Transfers data to different components of a computer. Depending of how many lines will define the speed.

They are Bi-directional - CPU can read and write to memory using these lines.

Address bus - Address bus is unidirectional. Components are connected through buses.

Each component has a unique ID known as the address. Address bus can be used to communicate with different components

Control bus - Transmits different commands between different components.

eg 1. Type of operations

2. Time for which a device can use data and address bus

Hardware Components

Check presentation

Semiconductors - Silicon, is cheap, can switch between insulator and conductor via external controls.

Abstraction

The representation of essential information by not visualizing background info. eg, programming without knowledge of electricity flow.

Layers of abstraction

Lower level info is hidden from higher level.
Avoids cluttering

Vacuum tubes used to get destroyed, were not as reliable as transistors.

SISD - Simple info on simple data.

Graphics depend on the cost arrays of pixels available.

Prediction units - predict the order of execution.

Quantum computers - Can be no more than one instance at a given time