Stored Program Concept

Parts of a CPU:

- Arithmetic Logic Unit (ALU)
  Circuitry for arithmetic and logic operations.

- Control Unit
  Fetches, interprets, and executes instructions.

- Registers
  Holds data for use by the ALU.

- Buses
  Circuits connecting the CPU, registers, and memory.

- Main Memory
  Internal memory containing instructions and data for use by the CPU. (Storing both instructions and data in memory is known as the stored program concept - introduced by Von Neumann.)

Control Unit Registers:

- Program Counter (PC):
  Contains the main memory address of the next instruction to be fetched.

- Instruction Register (IR):
  Contains the instruction that is currently executing.

Control Unit Instruction Execution - The Machine Cycle:

- **Fetch** the next instruction from the address in main memory contained in the program counter. Place the instruction into the instruction register. Increment the program counter to the next location in memory.

- **Decode (or interpret)** the instruction to understand what operations and resources are required for its execution.

- **Execute** the next instruction by obtaining the resources needed and carrying out the required operations.

Example - Add two numbers stored in memory:

- obtain the first number from memory and store it in a register.
- obtain the second number from memory and store it in a register.
- use the ALU to add the two numbers together and place the sum into another register.
- store the sum into main memory.