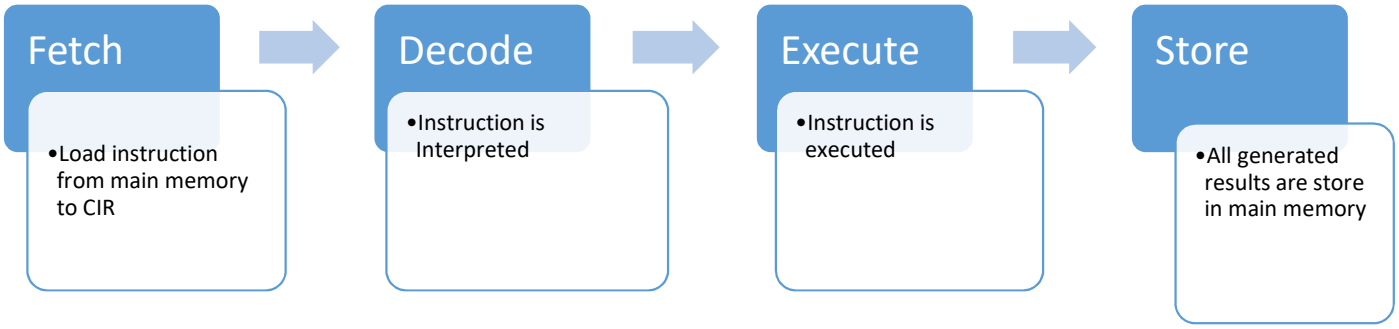
Phases of machine cycle / Computer Instruction Cycle

- Each time the CPU executes an instruction, it takes a series of steps. The complete series of steps is called a machine cycle.
- An **instruction cycle** (sometimes called **fetch-and-execute cycle**, **fetch-decode-execute cycle**, or **FDX**) is the basic operation cycle of a computer.



A machine cycle can be divided into two main cycles.

- ✓ Instruction cycle
- ✓ Execution cycle

Four steps of Machine cycle

1. **Fetch - Retrieve an instruction from the memory.**
2. **Decode - Translate the retrieved instruction into a series of computer commands.**
3. **Execute - Execute the computer commands.**
4. **Store - Send and write the results back in memory.**

❖ **Instruction cycle:**In instruction cycle CPU takes two steps

1. **Fetching:** Before the CPU can execute an instruction, the control unit must retrieve or fetch a command or data from the computer's memory.

Fetch the instruction

- The program counter stored address is the address which contains next instruction that is to be executed.
- Via data bus the content of address contained in the program counter is fetched from the main memory & stored in the CIR (Current Instruction Register)
- Program counter = incremented by 1

2. Decoding: Before a command can be executed, the control unit must decode the command into instruction set.

- The instruction decoder interprets the instruction
- All required data = fetched from main memory & put in data registers

❖ **Execution cycle:** In execution cycle CPU also takes two steps--1.

1. Executing: When the command is executed, the CPU carried out the instructions in order by converting them into macrocode.

- CU passes decoded instruction to different parts of CPU to perform the actions that are required.

2. Storing: The CPU may be required to store the result of an instruction in memory.

- Results of calculations in CPU = stored in main memory or sent to output device
- Program Counter could be updated to a new address