IAS Architecture Explanation

Key Components Explained

- **Input-Output Equipment (I/O):**
  - Brings data and instructions into the computer, or sends results out to the user or devices.
- **Main Memory (M):**
  - Stores instructions and data that the computer uses while it works.
  - Data passes between main memory and other parts of the computer.
- **Arithmetic-Logic Unit (ALU):**
  - Handles all calculations and logic operations.
  - Uses two registers:
    - **Accumulator (AC):** Temporarily holds data (results or operands) for ALU operations.
    - **Multiplier Quotient (MQ):** Helps with multiplication/division, stores parts of larger results.
- **Memory Buffer Register (MBR):**
  - Temporarily holds data that is being moved between main memory and other parts (ALU, I/O, etc.).
  - Acts as a "middleman" during data transfers.
- **Memory Address Register (MAR):**
  - Keeps the address (location) in memory for data that will be read from or written into.
- **Instruction Register (IR):**
  - Holds the operation code (opcode) of the instruction currently being carried out.
- **Instruction Buffer Register (IBR):**
  - Temporarily holds part of an instruction (used when two instructions were stored together).* Stores Right Hand Instruction
- **Program Counter (PC):**
  - Keeps track of the address of the next instruction to be fetched from memory.
- **Control Circuits & Control Signals:**
  - Direct the flow of data and instructions throughout the system by sending control signals to different components.

How It Works Together (Step-by-Step Overview)

1. **Fetch:** The PC tells the memory where to get the next instruction; data moves to the IR and IBR.
2. **Decode:** The IR decodes the instruction, directing what action should be taken.
3. **Execute:** Data is moved between Memory, MBR, MAR, and the ALU as needed to carry out operations.

4. **Store/Output:** Results can be saved in memory or sent out via the I/O equipment.

In summary:

- **ALU** does the math and logic.
- **Main memory** holds all the temporary and active data.
- **Control unit** (PC, IR, IBR, control circuits) manages program flow and coordinates actions.
- **Registers** like MBR and MAR move data and addresses in and out of memory.
- **I/O** lets data go in and out of the computer.

This structure is the foundation of how early stored-program computers, like the IAS, functioned.

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