The Control Unit

Control unit’s job:
- Supply all the control signals to the datapath
- Respond appropriately to its status signals:
  - \( Z, N, C, V \)
Von Neumann Architecture

Input to the control unit:

- A stream of instructions coming from memory $M$
- This stream must be converted to a sequence of micro-operations for the datapath

Control Unit uses:

- Program counter $PC$ to index in $M$ the next executable instruction
Algorithmic State Machine

- Data processing may be achieved through:
  - Sequencing Register transfer operations
  - May be specified as hardware algorithm
  - Consists of a finite number of procedural steps

- ASM are used:
  - Control Unit
  - Datapath
Algorithmic State Machine (ASM) Chart
- Defines the hardware algorithm
- Defines relationship to time
  - Clock
- Three basic elements:
  - State Box
  - Decision Box
  - Conditional Output Box
State Box contains:

- Register transfer operation or output signals that are activated while the control unit is in this state.
- RUN is 1 for any box it appears and 0 for any box it does not appear.
Exit path is taken if input condition is:

- True (1)
- False (0)
Conditional Output Box entry path must pass through one or more decision boxes.
ASM Box Example