SNS COLLEGE OF ENGINEERING

Kurumbapalayam (PO), Coimbatore – 641 107
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DEPARTMENT OF INFORMATION TECHNOLOGY

COURSE NAME: 19IT301 COMPUTER ORGANIZATION AND ARCHITECTURE

II YEAR/ III SEM

Unit 3 : Processor and Pipeling

Topic 3.3 - Hardwired control

Overview of Hardwired Control

- To execute instructions, the processor must have some means of generating the control signals needed in the proper sequence.
- Two categories for this purpose:
  1. Hardwired control
  2. Microprogrammed control
- Hardwired control is a method of **control unit design**
- The control-signals are generated by using logic circuits such as gates, flip-flops, decoders etc.

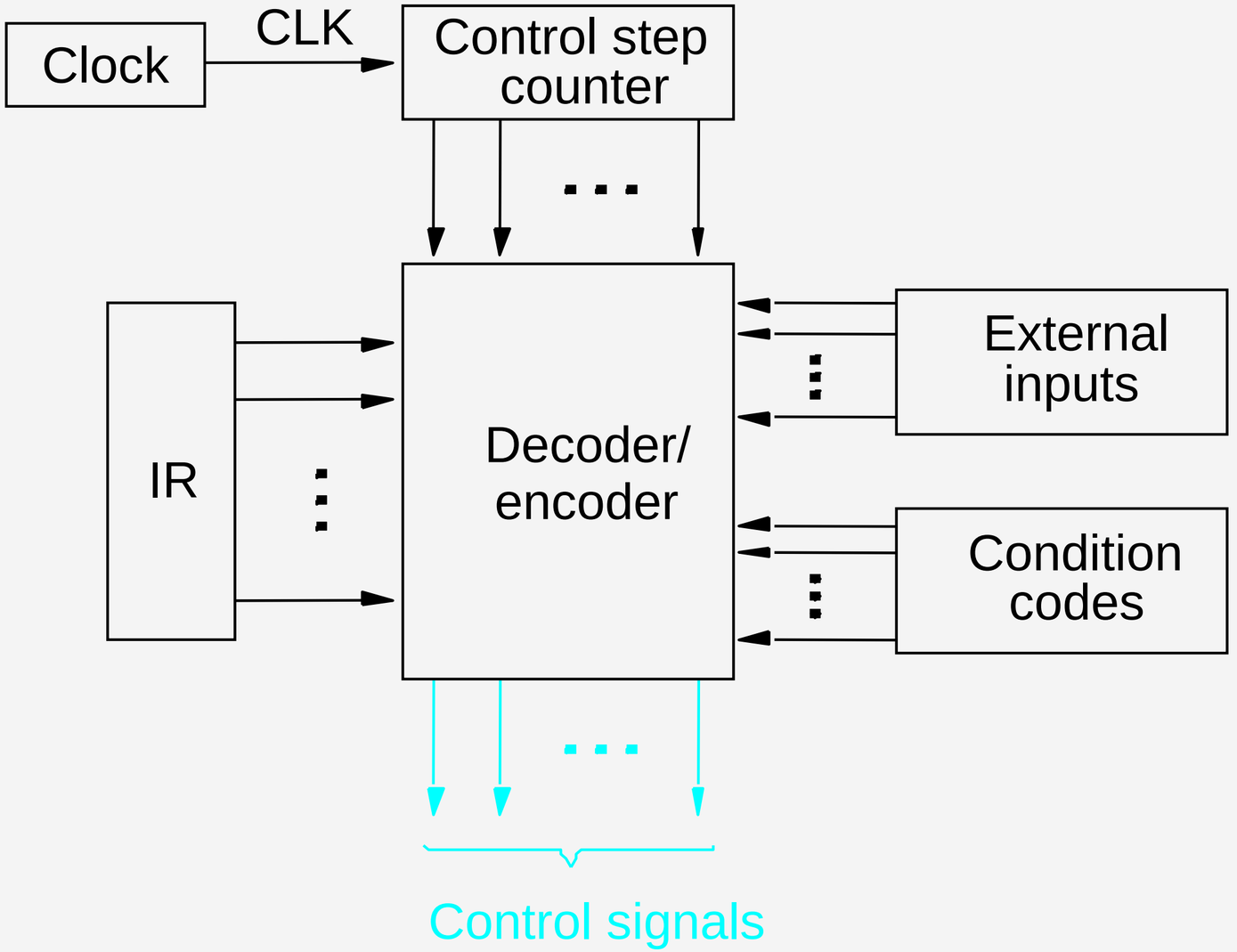
Overview of Hardwired Control

- Each step in the control sequence is completed in one clock period.
- Counter is used to keep track of control steps.
- Control signals are determined by
  - Contents of the control step counter
  - Contents of the IR
  - Contents of the condition code flags
  - External input signals like MFC and interrupt requests

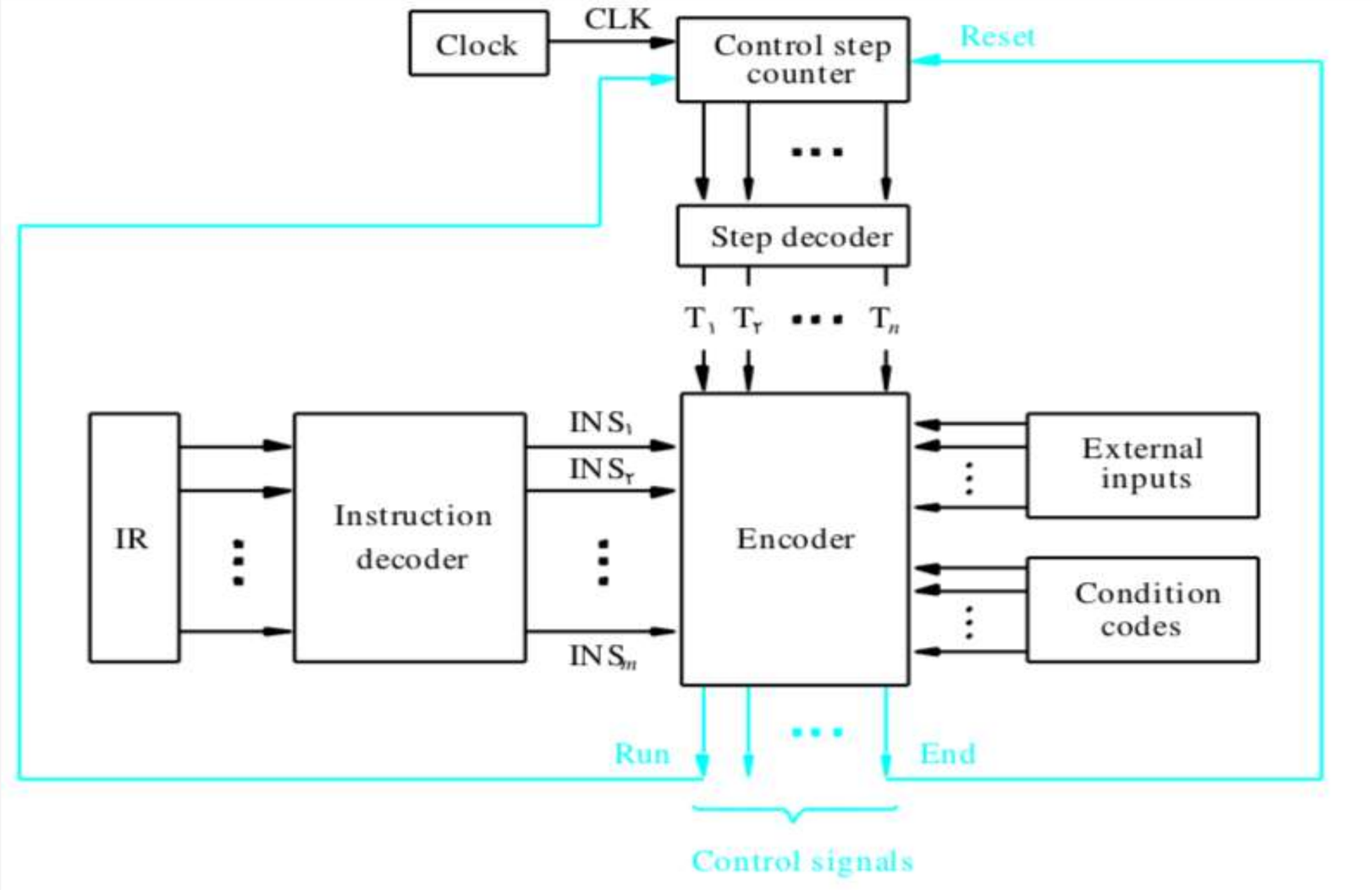
Step	Action
1	PC_{out}, MAR $_{in}$, Read, Select4, Add, Z_{in}
2	Z_{out}, PC $_{in}$, Y_{in} WMF C
3	MDR $_{out}$, IR $_{in}$
4	$R3_{out}$, MAR_{in}, Read
5	$R1_{out}$, Y_{in}, WMFC
6	MDR_{out}, SelectY, Add, Z_{in}
7	Z_{out}, $R1_{in}$, End

Control Sequence

Control Unit Organization

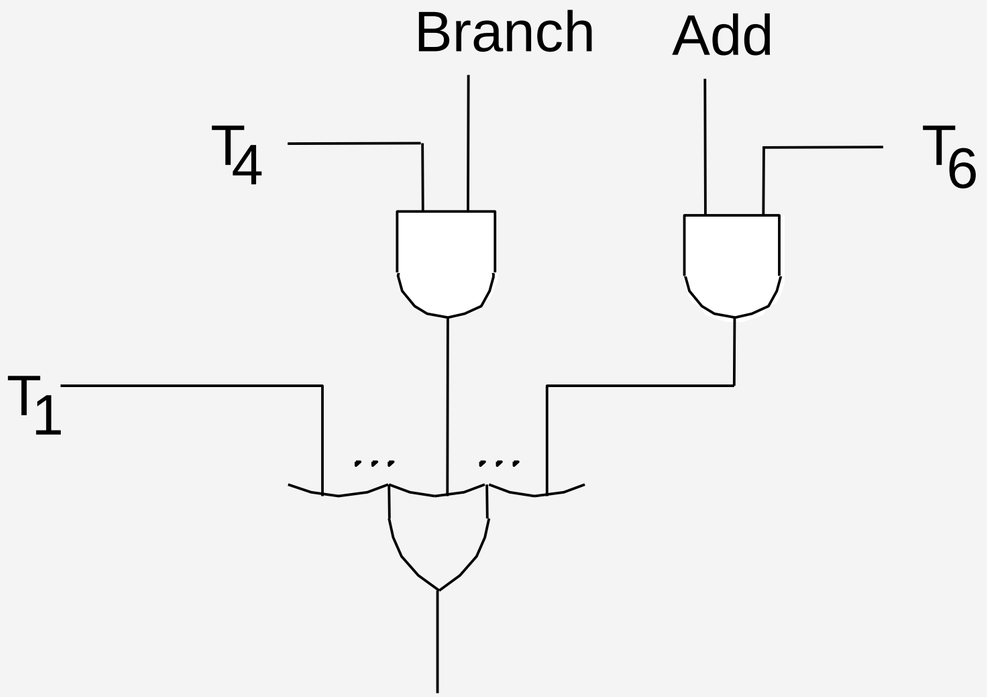


Detailed Block Description



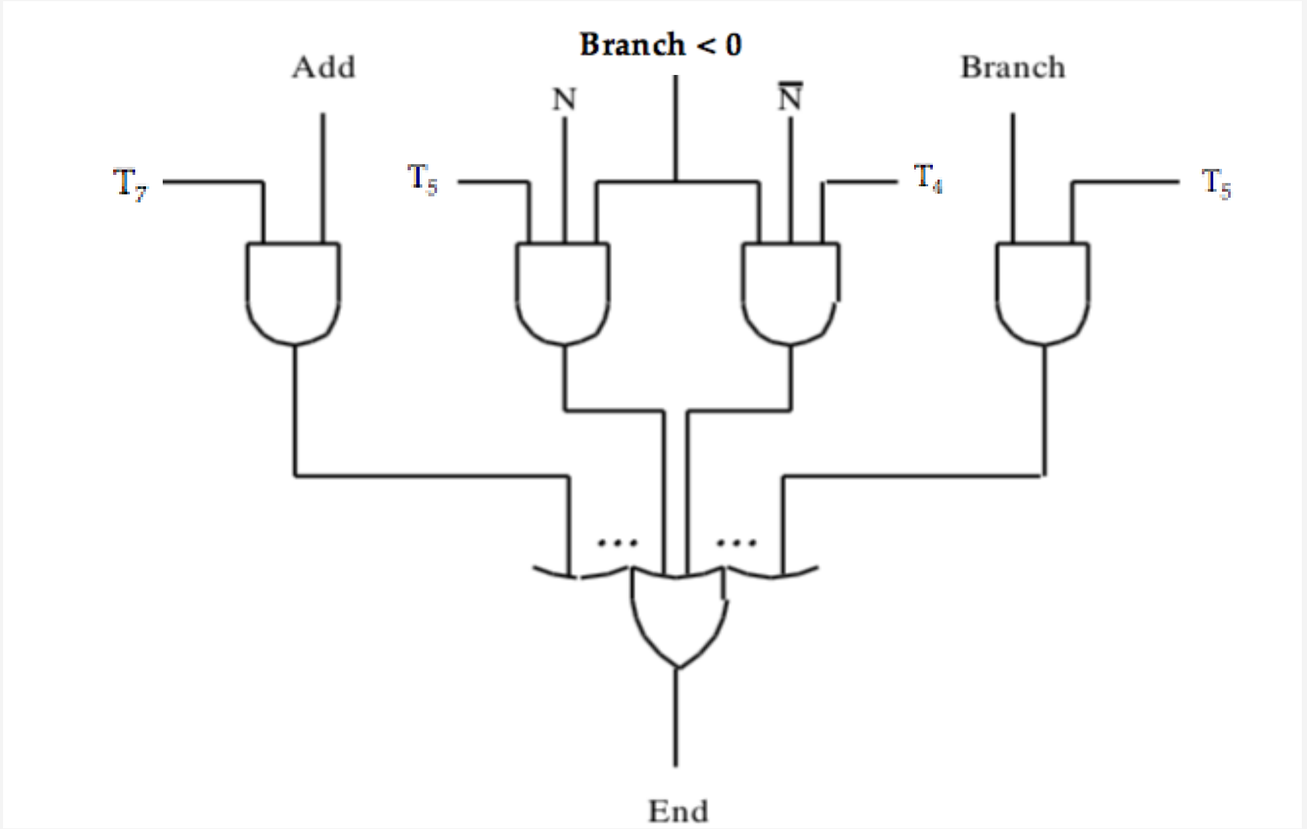
Generating Z_{in}

$$Z_{in} = T_1 + T_6 \bullet ADD + T_4 \bullet BR + \ldots$$



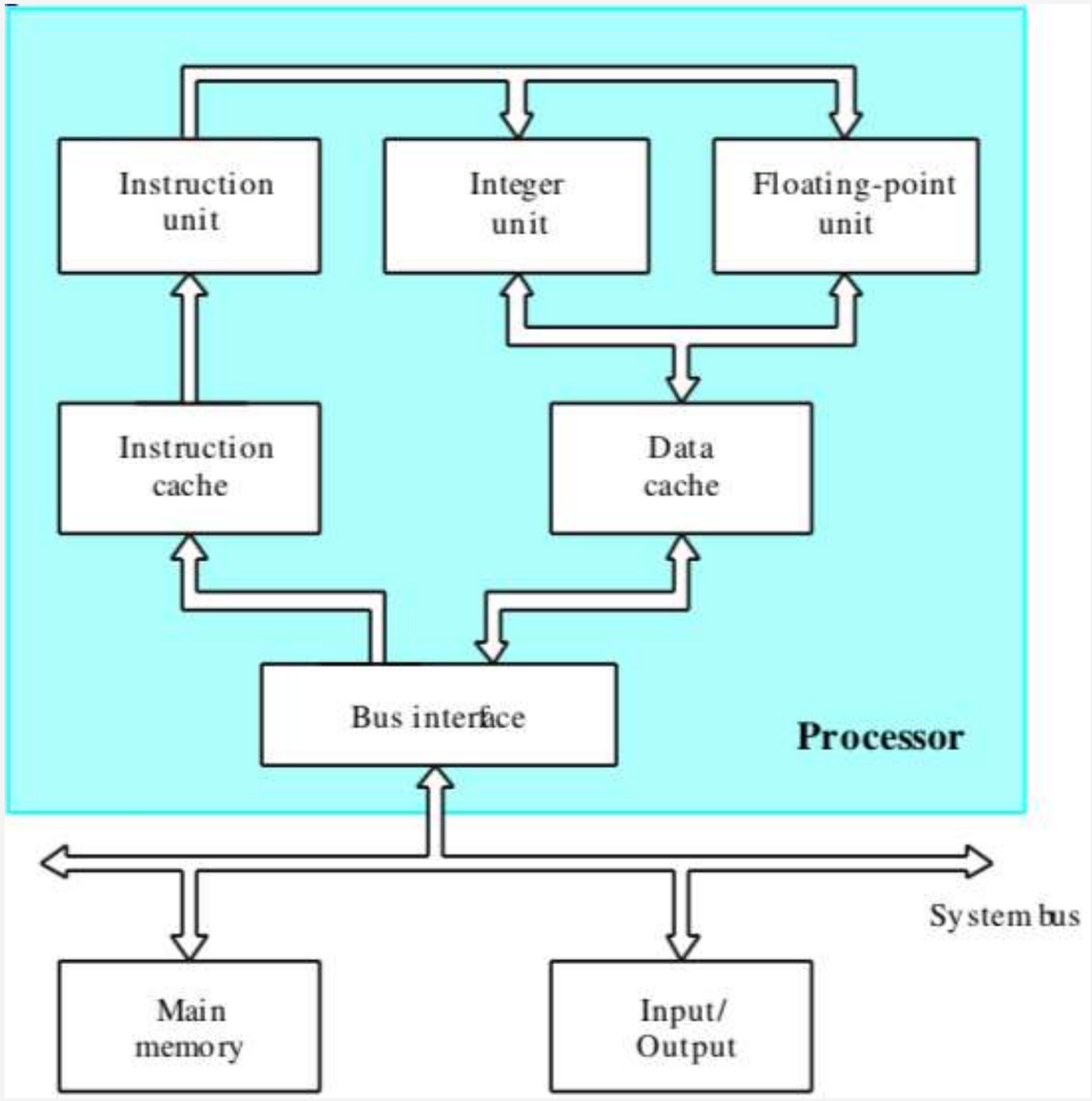
Generating End

$$End = T_7 \cdot ADD + T_5 \cdot BR + (T_5 \cdot N + T_4 \cdot N) \cdot BRN + \ldots$$



- Sequence of operation is determined by wiring of the logic elements hence the name ‘hardwired’
- Hardwired system can operate at high speed; but with little flexibility.

Complete Processor



Thank You