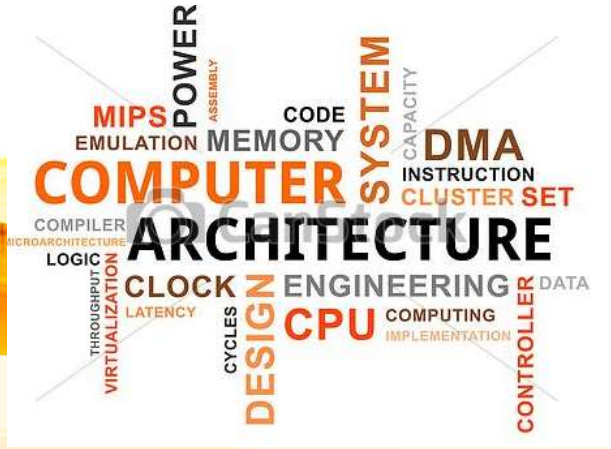
# UNIT III
# PROCESSOR AND PIPELINING

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – **Hardwired control –** Micro programmed control – Pipelining: Basic concepts – Data hazards – Instruction hazards – Influence on Instruction sets – Data path and control consideration.

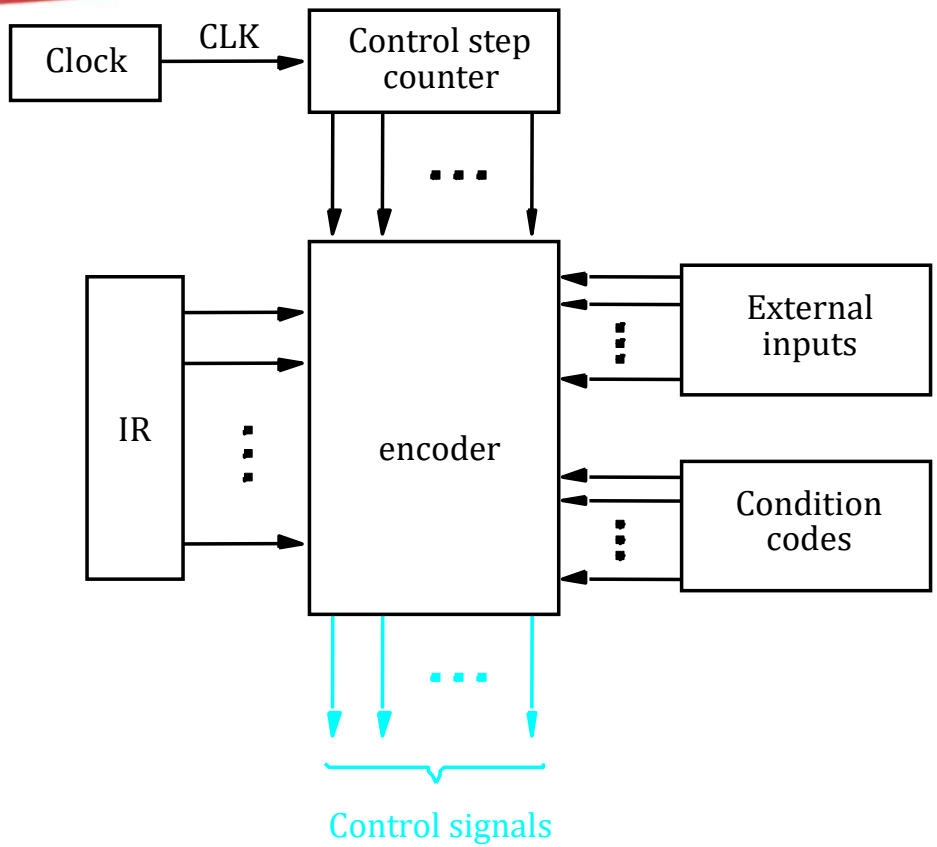


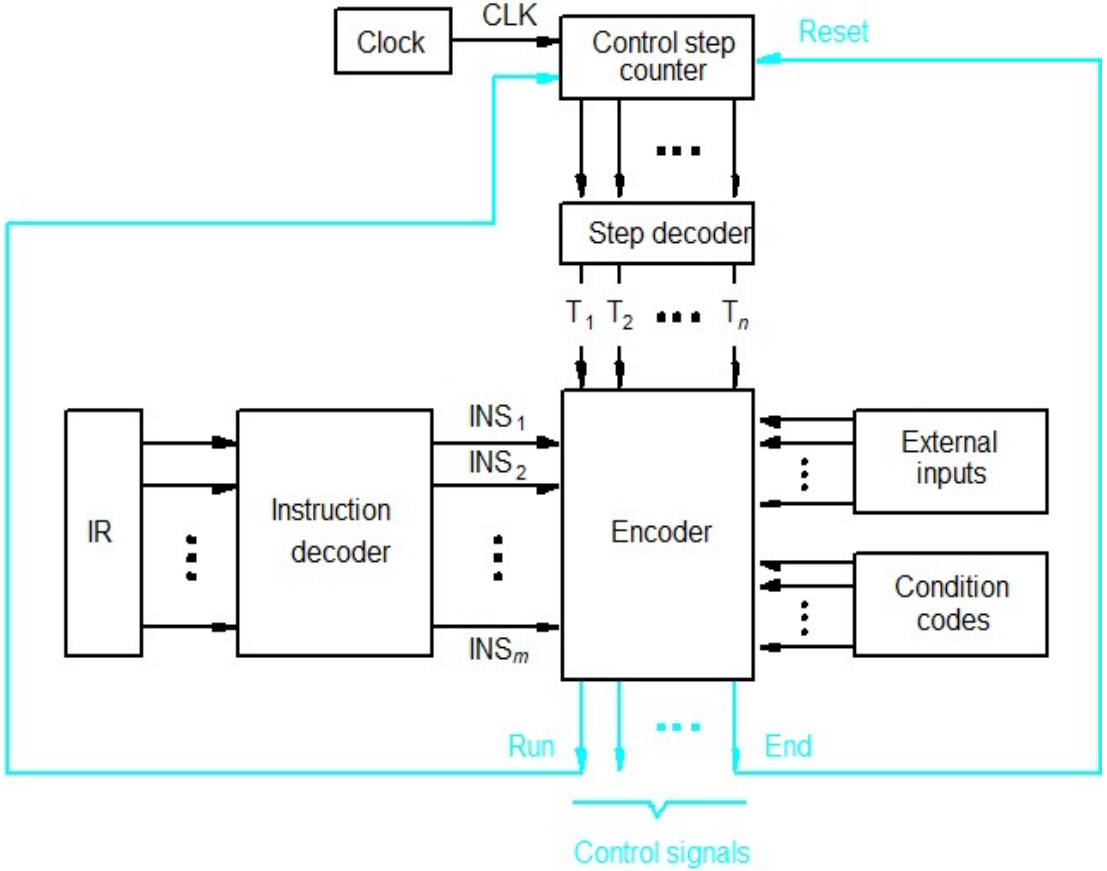
# Recap the previous Class

# Overview

- To execute instructions, the processor must have some means of generating the control signals needed in the proper sequence.
- Two categories: **hardwired control and microprogrammed control**
- Hardwired system can operate at high speed; but with little flexibility.

# Control Unit Organization

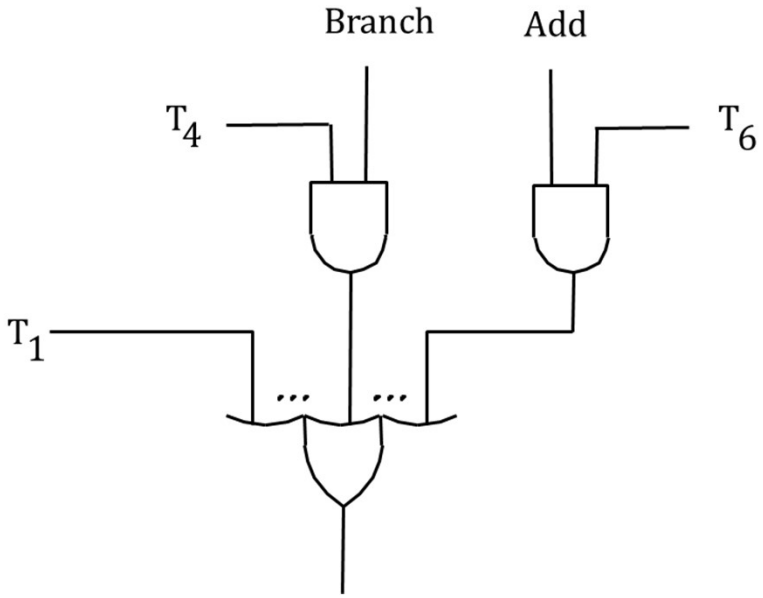


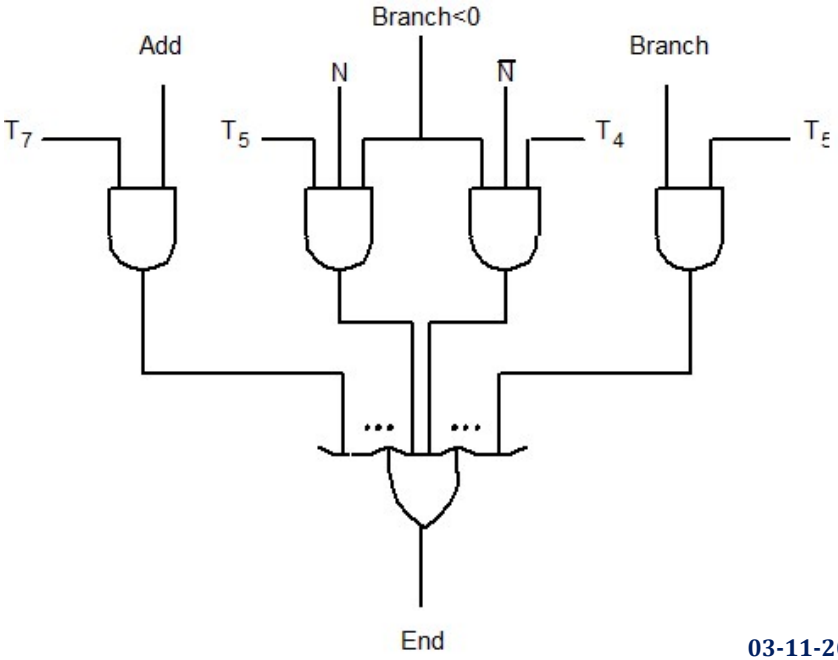



# Generation of the $Z_{in}$ and End control signal for the processor

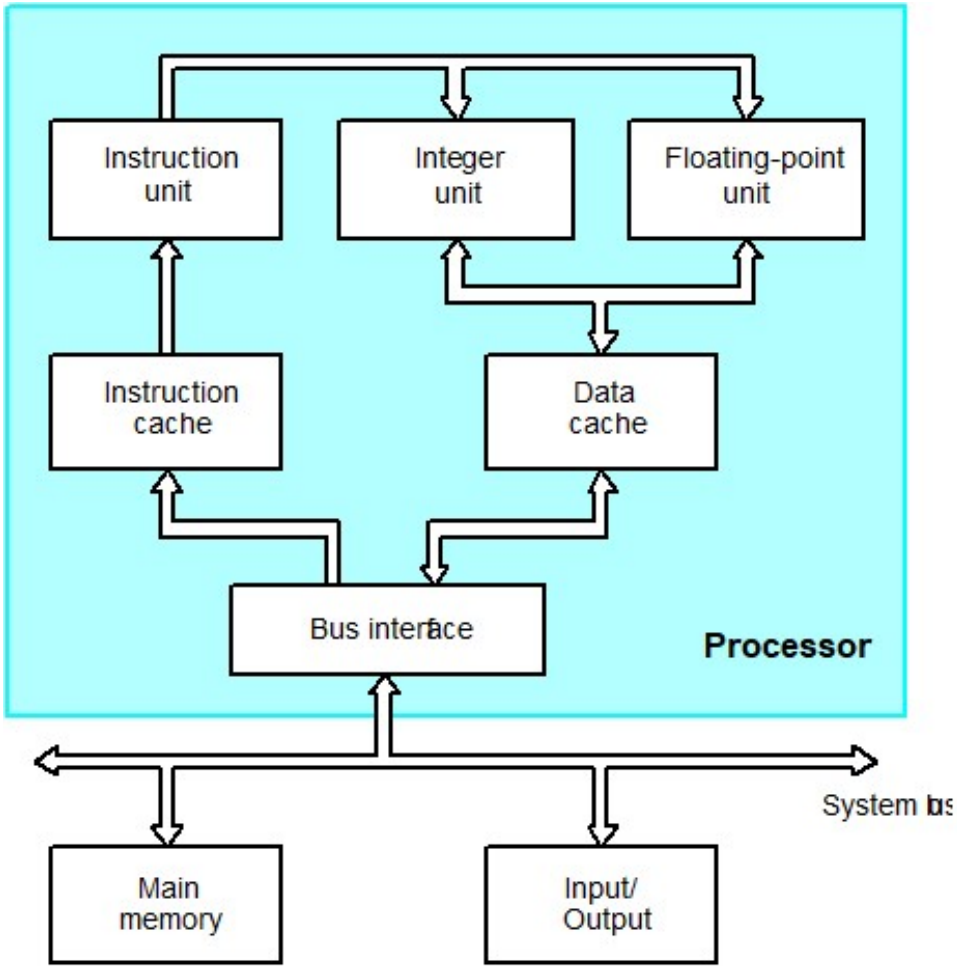
$Z_{in} = T_1 + T_6 \bullet ADD + T_4 \bullet BR + \ldots$

End = T7 • ADD + T5 • BR + (T5 • N + T4 • N) • BRN +…



# A Complete Processor




Thank You