DESIGN OF THE LC-3 CONTROL UNIT

**Recap**

* Control unit design:
  - Hardwired control unit vs Microprogrammed control unit

* **Microprogram** executes **microinstructions** that implement the control unit
LC-3 microarchitecture

Each LC-3 state mapped to an address in control store, which contains 39 control signals and 10 bits to determine next-state.
LC-3 microinstructions

Format:

IRD  COND  J  Control signals

| 48 | 47 | 46 | 45 | 44 ... 39 | 38 ... 0 |

Next-state bits

IRD: indicates we are in DECODE state
COND: allows to modify next-state location
J: default next-state location
**LC-3 microsequencer**

Circuit that computes address of next microinstruction

![Diagram of LC-3 microsequencer](image)

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Examples

1) Write the 10 next-state bits for the microinstruction stored in control store address 18.
2) Write the 10 next-state bits for the microinstruction stored in control store address 33.
3) Write the 10 next-state bits for the microinstruction stored in control store address 35.