

Notes: TRAP; The LC-3 Simulator

A. Why?

TRAP instructions provide a way to access operating-system-level routines (like I/O). The LC-3 simulator lets us run LC-3 programs.

B. Outcomes

By the end of the class you should

- Know how the LC-3 TRAP instruction is used to read or write a character or halt the program.
- Recognize the major parts of the LC-3 simulator and how to create and run programs.

C. TRAP Instruction

- Calls a service routine, identified by 8-bit “trap vector.”
- When routine is done, PC is set to the instruction following TRAP.
 - (We’ll talk about how this works later.)
- Call operating system routine, basically.
- Some Trap vectors
 - x21: Output character in rightmost byte of R0 to the monitor.
 - x23: Input a character from keyboard into **rightmost byte of R0**.
 - x25: Halt the program.

D. Sample Program

- Print string pointed to by R2
 - String: Sequence of words with ASCII char in right byte (left byte x00).
 - Terminated by null character x00
- Specification
 - Given: R2 points to first word of string.
 - At end: R2 points to word with null char; string pointed to by original R2 printed.
- Uses R0

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TOP  LDR  R0, R2      ; R0 = M[R2], the current character
      BRZ  DONE      ; (next+3) Done if we find null char
      TRAP x21       ; print char in R0
      ADD  R2, R2+1  ; Pt R2 -> next char
      BR   TOP       ; (next-5) continue loop
DONE ...

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E. LC-3 Simulator

- See Guide to Using the Windows Version of the LC-3 Simulator and LC3Edit