02321 Hardware/Software Programmering (E10)

Home assignment 6

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Problem 9.2

(a) How many trap service routines can be implemented on the LC-3?

$2^8 = 256$, Addresses from $x0000$ to $x00FF$.

(b) Why must the RET instruction be used to return from a TRAP routine?

The RET instruction loads the contents of R7 back to IR, providing a way back to the calling procedure. BR does not.

(c) How many access to memory are made during the processing of TRAP instruction

Assuming that the TRAP is already in the IR, Two access are done; one for loading the word from the address in the TRAP instruction, and one for loading the contents of the address stored in the TRAP vector.

Problem 10.8

(a) Stack contents

The stack contains A and F (see Table 1).

(b) Most elements

The stack contains most elements (in first run) after PUSH D or PUSH E.

Operation	Stack after	Operation	Stack after
PUSH A	A	PUSH G	AFG
PUSH B	AB	PUSH H	AFGH
POP	A	PUSH I	AFGHI
PUSH C	AC	PUSH J	AFGHIJ
PUSH D	ACD	POP	AFGHI
POP	AC	PUSH K	AFGHIK
PUSH E	ACE	POP	AFGHI
POP	AC	POP	AFGH
POP	A	POP	AFG
PUSH F	AF	PUSH L	AFGL
		POP	AFG
		POP	AF
		PUSH M	AFM

Table 1: Stack operations

(c) Additional operations

After the remaining operations, the stack contains AFM (Table 1).

Problem 10.12

PSR for device C	
x6311	
PSR for device B	PSR for device B
x6203	x6203
PSR of program A	PSR of program A
x3007	x3007
PC: x6400	PC: x6311