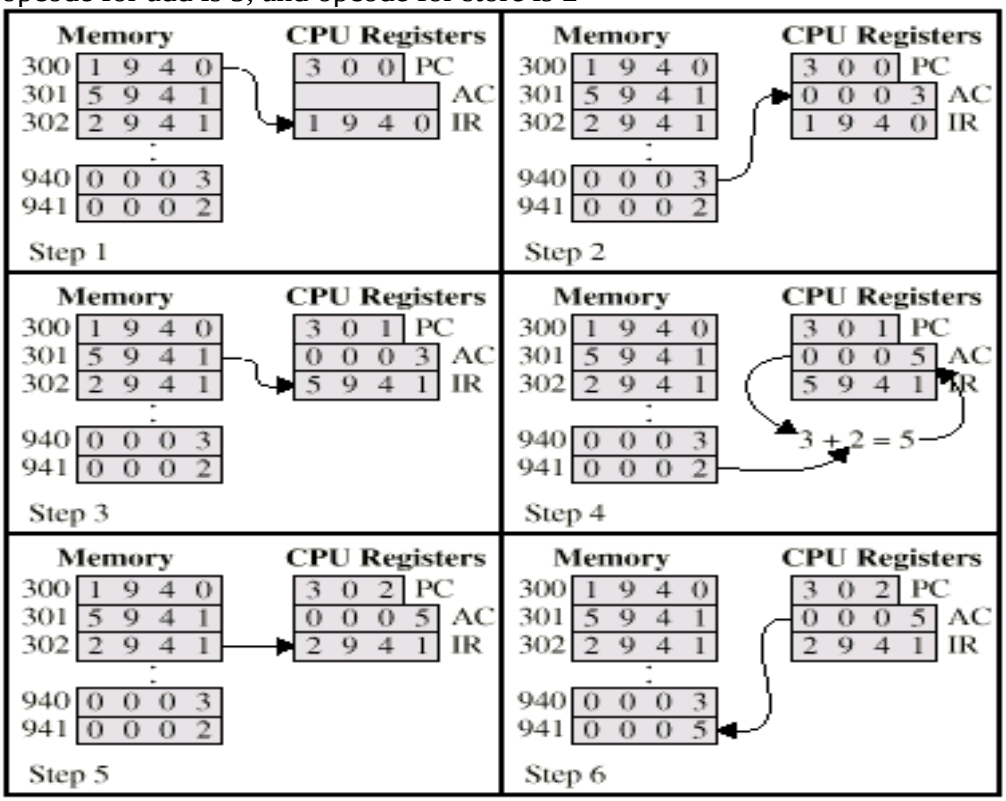
Assignment 2 sol

Question 1

For the following computer architecture fetch-execute cycles, assume opcode for Load is 1, opcode for add is 5, and opcode for store is 2



If the 3rd line in the program with content "2941" in all steps is changed to "5941"
Explain how this would change register values in step 5 and step 6

In 3rd line the meaning of the command will be add number 2 in location 941 to accumulator, in step 5 it will be the same because it is fetch, in step 6, AC will contain 5+2=7

Question 2

Write down the micro steps for the following instructions

Load A

- » Move A into MAR
- » Send read signal to Memory
- » Move data from MDR to one of the micro processor registers

Add B,A

- » Move B to MAR
- » Send a read signal
- » Move B to the ALU input, send add bits to the ALU
- » Move output through accumulator to one of CPU registers

» Move A to MAR
» Send a read signal
» Move A to the ALU input, send add bits to the ALU
» Move output through accumulator to one of CPU registers

Write C

» Move C into MAR
» Send Write signal to Memory
» Move data from MDR to the memory location C

Question 3

Define what is meant by a fetch cycle, and an Execute cycle, list specific operations that happened in it each and what type of data/instructions that happened in side it.

- Fetch means bringing the opcode from memory and decoding it into machine code through the IR
- Execute means executing the previous opcode upon the operand
- Fetch deals with opcode only, while Execute deals with operands
- In a fetch cycle, Program Counter (PC) holds address of next instruction to fetch, then Processor fetches instruction from memory location pointed to by PC, then Increment PC, then Instruction loaded into Instruction Register (IR), Processor interprets instruction and performs required actions
- In an execute cycle, data is transferred between CPU and main memory, or between CPU and I/O units, some arithmetic or logical operation on data could happen
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Question 4

Define what is meant by the following

1. Hard wired Computer Board
   Computer programmed (or design with a Finite State Machine) circuits that are wired with all signals, main draw back they are inflexible if we want to redesign. Advantages are easy to track and simpler to understand

2. Micro coded Computer Board

Computer programmed (or design with a Finite State Machine) circuits that are programmed through a pseudo code and any programming language and embedded in digital devices. Advantages easy to reprogram, but harder to track errors