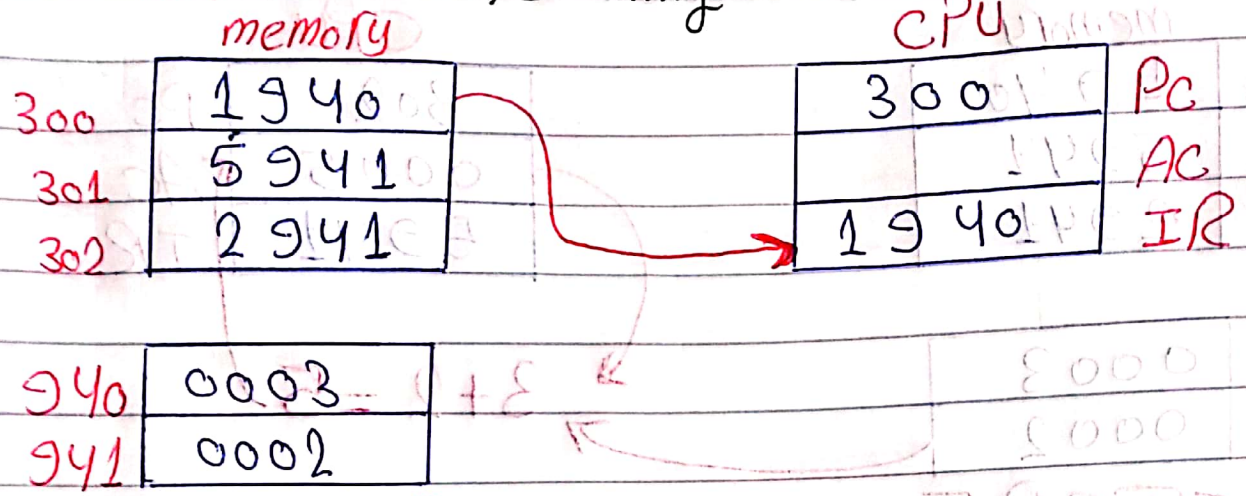
20/2/2020

In the Hypothetical Machine the contents of memory was as shown. And PC contents is 300. Show the contents of memory and PC , AC , IR after execute three instructions (three fetch cycle and there execute cycle)

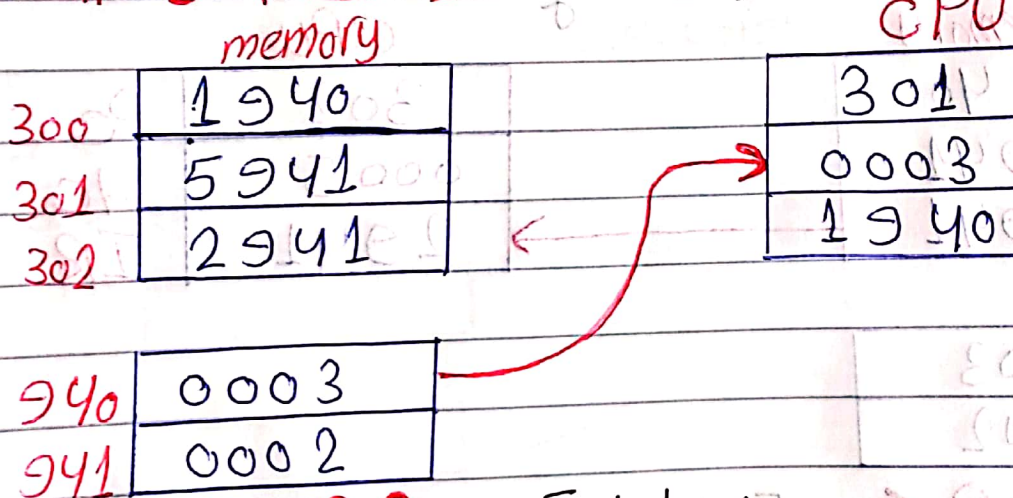
Memory

Q1:

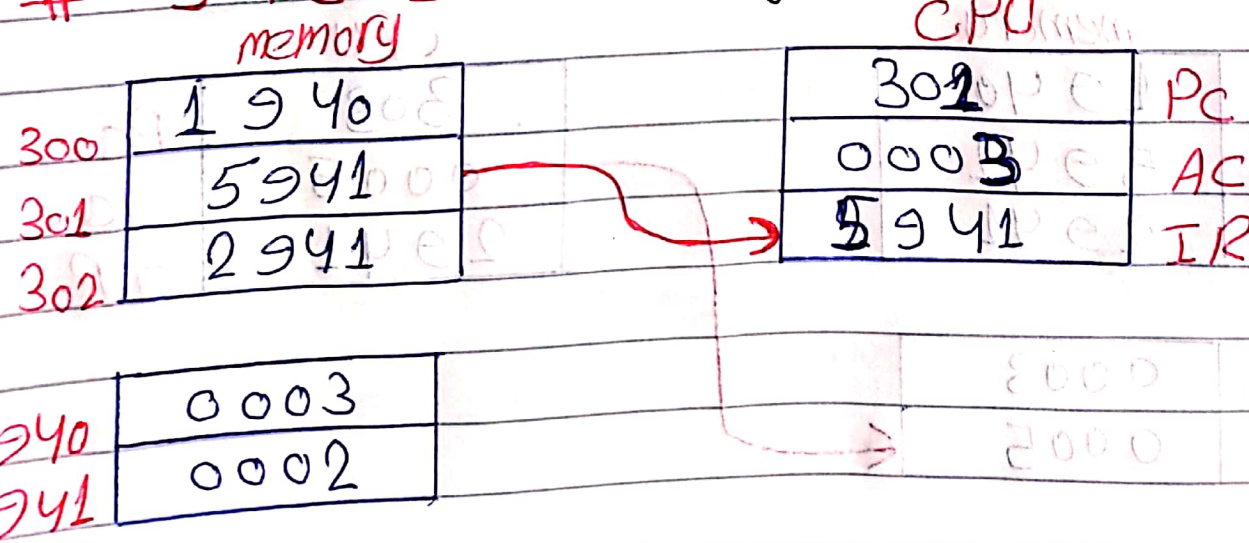
#STEP 1 Fetching



#STEP 2 Execution



#STEP 3 Fetching



STEP 4 Execution

memory

300	1940
301	5941
302	2941

CPU

302	PC
0005	AC
5941	IR

940	0003
941	0002

3+2 = 5

STEP 5 Fetching

memory

300	1940
301	5941
302	2941

CPU

302	PC
0005	AC
2941	IR

940	0003
941	0002

STEP 6 Execution

memory

300	1940
301	5941
302	2941

CPU

303	PC
0005	AC
2941	IR

940	0003
941	0005

Show the contents of PC , AC and IR and memory after the execution of each instruction of the following program on the Hypothetical Machine:

300 LOAD 550
301 ADD 551
302 STORE 600

Where the contents of memory at .550 is 3 and at 551 is 4

The following figure provide the main characteristics of Hypothetical .Machine

Q2:

step 1 Fetching

memory

300	1550
301	5551
302	2600

CPU

300	PC
	AC
1550	IR

550	0003
551	0004
600	

step 2 Execution

memory

300	1550
301	5551
302	2600

CPU

301	PC
0003	AC
1550	IR

550	0003
551	0004
600	

step 3 fetching

memory

300	1550
301	5551
302	2600

CPU

301	PC
0003	AC
5551	IR

550	0003
551	0004
600	

STEP 4 Execution

memory

300	1550
301	5551
302	2600

CPU

302	PC
0007	AC
5551	IR

550	0003
551	0004
600	

3+4=7

STEP 5 Fetching

memory

300	1550
301	5551
302	2600

CPU

302	PC
0007	AC
2600	IR

550	0003
551	0004
600	

STEP 6 Execution

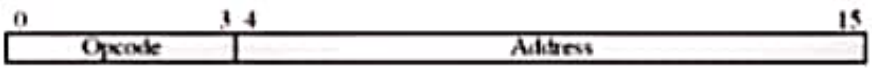
memory

300	1550
301	5551
302	2600

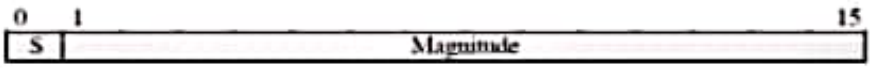
CPU

303	PC
0007	AC
2600	IR

550	0003
551	0004
600	0007



(a) Instruction format



(b) Integer format

Program Counter (PC) = Address of instruction
Instruction Register (IR) = Instruction being executed
Accumulator (AC) = Temporary storage

(c) Internal CPU registers

0001 = Load AC from Memory
0010 = Store AC to Memory
0101 = Add to AC from Memory

(d) Partial list of opcodes

The hypothetical machine also has two I/O instructions:

0011 = load *AC* from I/O

0111 =store *AC* to I/O

In these case, the 12-bi address identifies a particular I/O device. Show the program execution for the following program:

1. Load *AC* from device 5.
2. Add contents of memory location 940.
3. Store *AC* to device 6.

Assume that the next value retrieved from device 5 is 3 and that location 940 contains a value of 2

Q3:

memory

300	3005
301	5940
302	7006

After executing three instructions

Device5: 0003
940 : 2
Device6: 0005