CIS 350 – INFRASTRUCTURE TECHNOLOGIES
SMALL GROUP ACTIVITY #4

Names of group members: Anthony Basil, Addie Cengic, Jacob Forcht, Walker Nicolson

Topic: The operation of the CPU and memory, Machine cycle, Instructions

Logistics

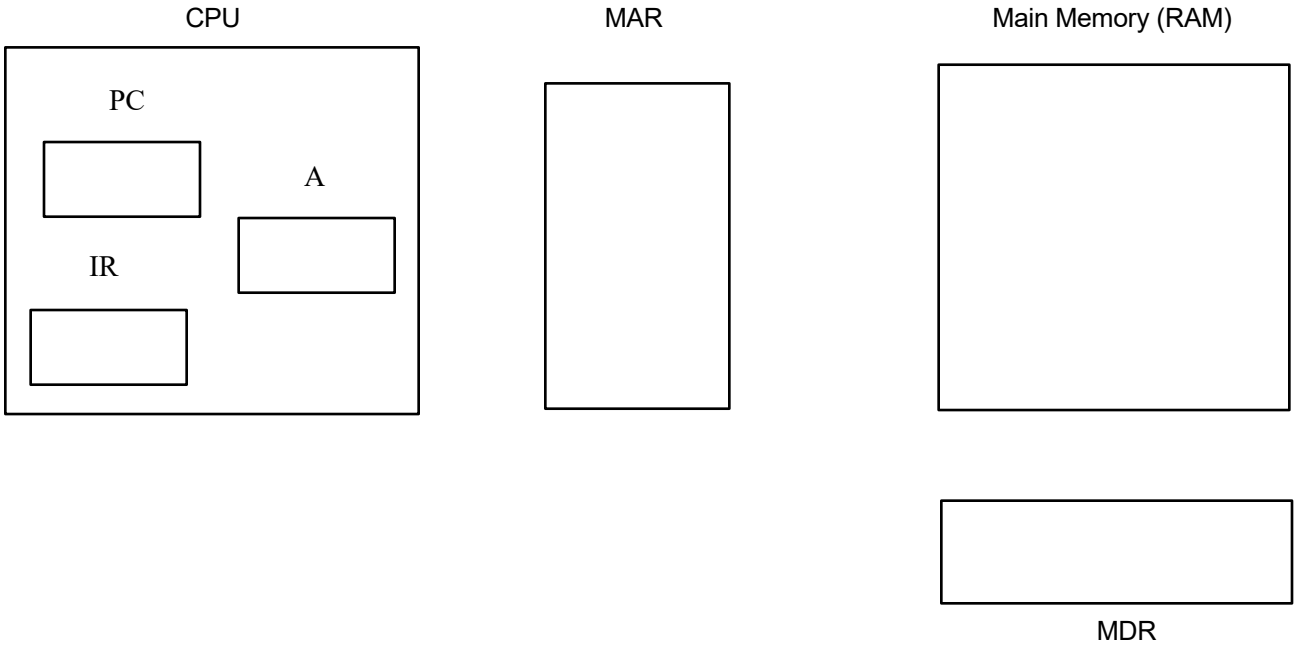
1. Get in touch with your group of 4 or 5 students. (See Groups folder on Blackboard.)
2. Discuss and complete the assignment together via E-mail, Discussion Forum, Blackboard Collaborate Ultra, and/or MS Teams.
3. Choose a recorder to prepare the final copy (<u>one</u> per group) and submit it via the Blackboard Assignments/Small Group Activities folder to the instructor.
4. Be sure all group members' names are on final copy. Do <u>not</u> add names of your group classmates who did not participate in the assignment.

<u>Assignment One</u>

Suppose that the following instruction is found at the given address/location in memory:

Address	Instruction
05	LDA 20
06	….
….	Data
20	15

The instruction LDA 20 residing at address 05 loads the contents of memory location 20, which is 15, into the Accumulator (A). Draw the diagram showing the contents of the CPU (PC, IR, A), MAR, Memory, and MDR, after each of the 5 steps of the fetch-execute cycle is executed. Fill in the table below with the contents of the PC, MAR, MDR, IR, and A as each of the 5 steps of the fetch-execute cycle is performed for that instruction. If the content of the register is unknown, write a question mark "?".



	PC	MAR	MDR	IR	A
(1) PC → MAR	5	5	LDA 20	?	?
(2) MDR → IR	5	5	LDA 20	LDA 20	?
(3) IR [address] → MAR	5	20	15	LDA 20	?
(4) MDR → A	5	20	15	LDA 20	20
(5) PC+1 → PC	6	20	15	LDA 20	20

Assignment Two

___1. The following sequence of steps in the instruction cycle
PC → MAR
MDR → IR
If A=0 Then IR [address] → PC Else PC+1 → PC What instruction does it represent? BRZ
The possibilities are: LDA, STO, SUB, ADD, IN, OUT, HLT, BR, BRP, and BRZ.

____2. The following sequence of steps in the instruction cycle
PC → MAR
MDR → IR
If A≥0 Then IR [address] → PC Else PC+1 → PC What instruction does it represent? BRP

____ 3. The following sequence of steps in the instruction cycle
PC → MAR
MDR → IR
In-basket → A
PC + 1 → PC What instruction does it represent? IN

____4. The following sequence of steps in the instruction cycle
PC → MAR
MDR → IR
IR [address] → MAR
A + MDR → A
PC+1 → PC What instruction does it represent? ADD

___ 5. The following sequence of steps in the instruction cycle
PC → MAR
MDR → IR
IR [address] → PC What instruction does it represent? BR

___ 6. The following sequence of steps in the instruction cycle
PC → MAR
MDR → IR
IR [address] → MAR
A - MDR → A
PC+1 → PC What instruction does it represent? SUB

___ 7. The following sequence of steps in the instruction cycle:
PC → MAR
MDR → IR
IR [address] → MAR
MDR → A
PC+1 → PC What instruction does it represent? LDA

____ 8. The following sequence of steps in the instruction cycle
PC → MAR
MDR → IR
PC → 0 or PC → PC (remains the same) What instruction does it represent? HLT

____ 9. The following sequence of steps in the instruction cycle
PC → MAR
MDR → IR
A → Out-basket
PC + 1 → PC What instruction does it represent? OUT

____ 10. The following sequence of steps in the instruction cycle:
PC → MAR
MDR → IR
IR [address] → MAR
A → MDR
PC+1 → PC What instruction does it represent? STO