FACULTY OF COMPUTERS AND ARTIFICIAL INTELLIGENCE, CAIRO UNIVERSITY

CS213: Programming II

Year 2022-2023

First Semester

Assignment 2 – Part 2

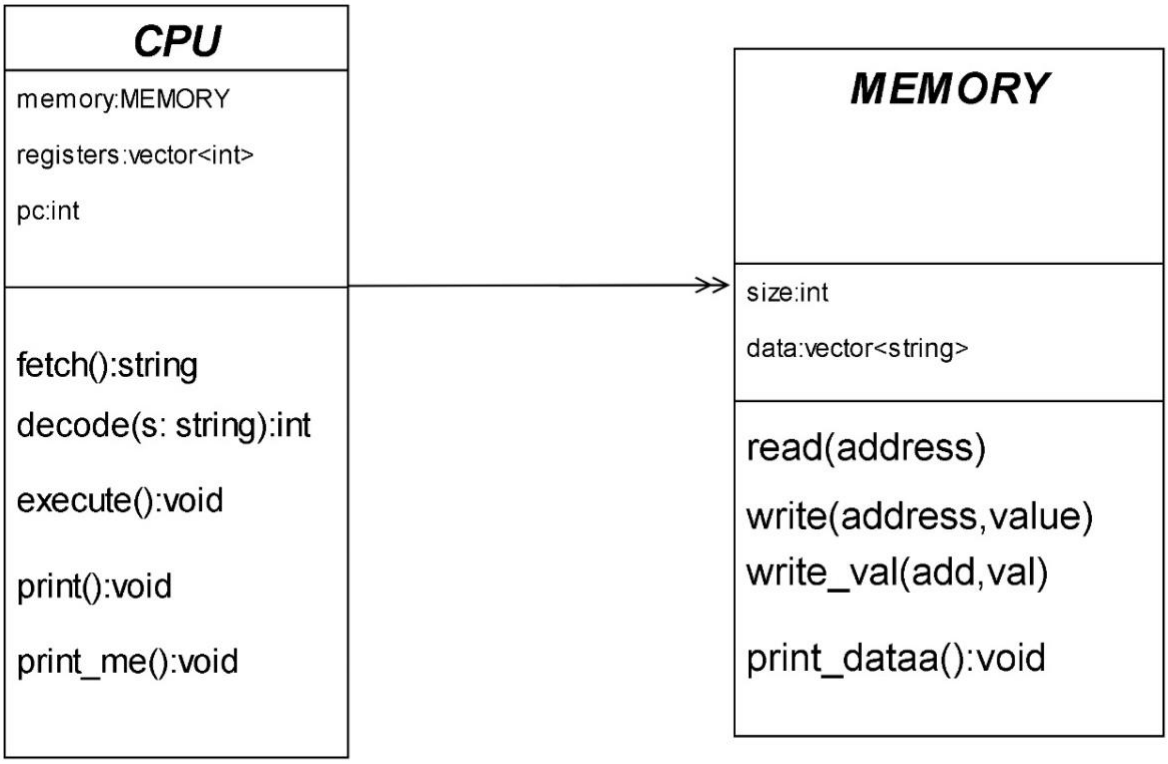
Course Instructors:

Dr. Mohammad El-Ramly.

***Work break-down table*:**

Salma Gamal Kamel.	2022 1073	-Function decode -Some of instructions In CPU class.
Malak Ahmed El Tabah.	2022 1157	Class Memory & Main function
Nadra Mahmoud Saad.	2022 0355	-Function fetch -Some of instructions. In CPU class. -print function.

1-Code Diagram:



2-Code Description:

This C++ code implements a simple virtual CPU (Central Processing Unit) and memory system.

1-Memory Class (MEMORY):

This class represents a basic memory unit with a size of 256 cells, each storing two characters.

It provides methods to read, write, and print data. The read method retrieves a two-character string from a specified memory address, and the write method stores a two-character string at a given address.Additionally, there's a method write_val to write a single character to a memory cell, and print_data displays the content of the entire memory.

2-CPU Class (CPU):

The CPU class interacts with an instance of the MEMORY class and includes a set of registers (16 in this case) and a program counter (pc).

The fetch method retrieves the next instruction from memory based on the program counter.

The decode method converts a two-character string into an integer value, considering hexadecimal representation.

The execute method processes various instructions based on opcode and operands, performing operations such as loading from memory, immediate loading, storing in memory, copying, arithmetic addition, and conditional jumping.

The run method repeatedly fetches, decodes, and executes instructions until a halt instruction or an unsupported opcode is encountered.

The print and print_me methods display the content of registers and memory, respectively.

Main Function:

In the main function, an instance of the MEMORY class and the CPU class is created.

The program attempts to open a file (“in.txt”) using ifstream to load instructions into memory. If the file doesn’t exist, it outputs an error message.

The user is prompted to choose between executing a file or ending the program. If the user chooses to execute a file, the program reads instructions from the file and writes them into memory.

After setting up the memory, the CPU’s run method is called, initiating the execution of instructions.

Finally, the program prints the state of registers and memory after execution