IAPP301 Assignment 2: Python and IoT

Assignment Specifications

- This assignment must be done in a group of two or three students.
- Your submission must consist of a single Python (.py) and Packet Tracer (.pkt) file. The two files need to be submitted as a single .zip file.
- Ensure that your names and student numbers appear as a comment at the top of your Python file and as a label in your Packet Tracer file. If a group member's details are not included in the Python file and Packet Tracer file, they may not be added after submission. It is all group members' responsibility to ensure that their details appear in the files prior to submission.
- Only one member must submit the assignment.
- Submit your zip file on the provided link before the indicated due date.
- Copied assignments will be reported to the HoD of the Software Engineering department

Specifications:

A local business has contacted you to build an IoT prototype for them. The scenario they've requested consists of 4 aspects:

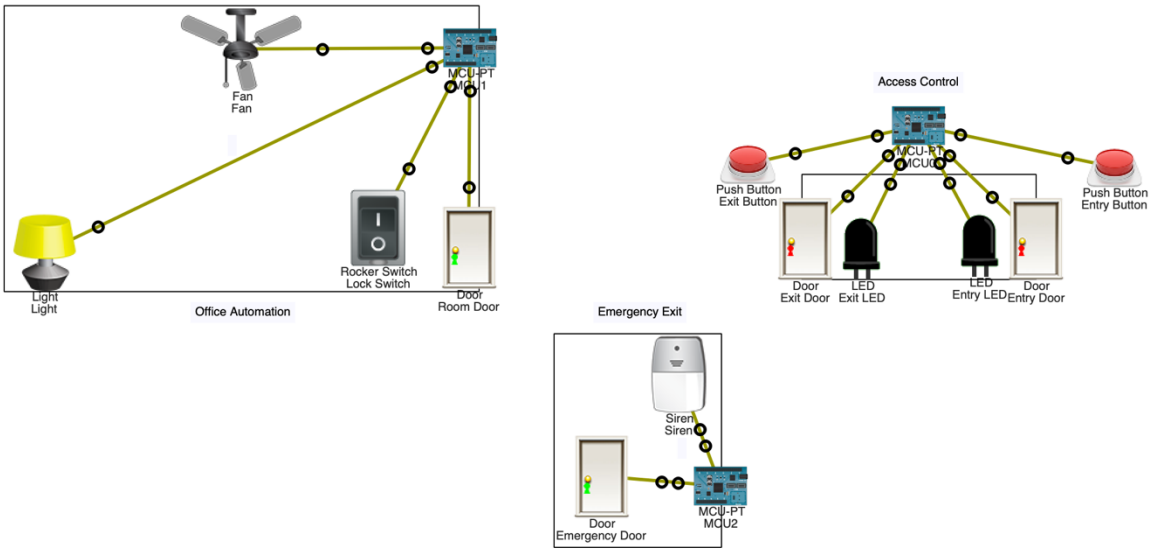
- A TCP Server
- A double-door access control solution
- An office automation solution
- An emergency exit solution

You are required to model this scenario using a Python script and a Packet Tracer simulation.

The TCP Server should do the following:

1. It needs to display messages to the terminal/CLI whenever either the access control or emergency exit solution connects to the server. There is no need for the office automation solution to connect to the server.
2. It should keep track of how many staff members are currently on the premises. When a staff member enters, via the access control solution, the number of staff members should be incremented and whenever a staff member leaves, via the access control solution, the number of staff members should be decremented.
3. Whenever the emergency exit solution's door is opened, the TCP Server should set the number of staff members back to zero, as company policy dictates that all staff members should leave via the emergency exit when anything is wrong.
4. The TCP server should also keep a running text log of all staff entry, exit and emergency events. Each log entry should consist of the following data:
   <date and time>, <event description>, <number of staff members on the premises>

The Packet Tracer simulation should look similar to the following image:



The Access Control Simulation should function as follows:

1. Whenever someone presses the Entry Button, the Entry Door should open and the Entry LED should light up. The door should remain open for +/- 5 seconds (to give someone the chance to enter) and the LED should remain lit for +/- 5 seconds.
2. When the Entry door closes, the Exit Door should open for +/- 5 seconds and the Exit LED should light up for around 5 seconds.
3. When a person wants to exit, the same process happens in reverse.
4. Once the Entry or Exit process has started, it shouldn't make a difference if anyone presses the Entry or Exit button again, i.e., someone shouldn't be able to Exit if someone else is busy with an Entry.
5. The Access Control Simulation should be able to connect to the TCP Server and report on staff members entering or exiting.

The Emergency Exit Simulation should function as follows:

1. If someone opens the Emergency Door, the Siren should be activated.
2. If someone closes the Emergency Door, the Siren should be deactivated.
3. The Emergency Exit Simulation should be able to connect to the TCP Server and report on the emergency event.

The Office Automation Simulation should function as follows:

1. Initially the light and fan in the room should be off.

2. When someone enters the room by opening and closing the door, the light and fan should activate as soon as the door closes.
3. The person should then have the option of locking the door behind them by using the toggle switch and later using that same switch to unlock the door.
4. If the person then leaves the room via the door again, then as soon as the door closes behind them the light and the fan should switch off.