

MICROCOMPUTER SWITCH CONTROLLER

Batch-52

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INTRODUCTION ABOUT THIS PROJECT :-

Our program is to control the states of switches it should be able to command any switch to be turned on/off, query the state of any or all switches based on specified conditions like time, previous states. The input comes from data cards with key words TIME, ON, OFF, ?, ALL, AT and stop. Time is simulated through input (4 digits and 24 hour form)

Approach

- As the problem is multi-conditional with multiple test cases, we break the problem into smaller parts and solve them one by one(USING FUNCTIONS)
- We identify the conditions and control flow of the program to better understand the logic and structure
- We test the individual parts and the whole code with boundary inputs to detected the accuracy of code

LEARNINGS :-

- **TEAM WORK**
- **GIT**
- **LaTex**
- **PROBLEM SOLVING SKILLS**

CHALLENGES :-

- Due to multiple conditions we faced difficulty in identifying the control flow.
- We overcame them by breaking the problem into multiple parts and solving them.
- We faced difficulty in finding the right data structure to store the previous scheduling switches.
- By identifying the properties needed for data structure like generating key value pairs.

STATISTICS :-

- Our python code has overall 48 lines.
- The code has 4 user defined functions.
They are:
- `switch_on(index)`
- `switch_off(index)`
- `schedule_switch(index, action, hour)`
- `sense_state(z)`

PROGRAM:

```
1 initial_state = ["OFF"] * 16
2 schedule = {}
3
4 def switch_on(index):
5     initial_state[index] = "ON"
6     print("Switch" ,(index+1), "is turned ON")
7
8 def switch_off(index):
9     initial_state[index] = "OFF"
10    print("Switch" ,(index+1), "is turned OFF")
11
12 def schedule_switch(index, action, hour):
13     schedule[index] = (hour, action)
14
15 def sense_state(z):
16     if z == 'ALL':
17         for i in range(len(initial_state)):
18             print((i+1), "-", (initial_state[i]))
19     else:
20         print(initial_state[int(z)-1])
21
22 while True:
23     cmd = input("Enter command: ").split()
24     if 'ON' in cmd:
25         index = int(cmd[0]) - 1
26         if len(cmd) == 2:
27             switch_on(index)
28         else:
29             hour = cmd[3]
30             schedule_switch(index, 'ON', hour)
```

PROGRAM:

```
32
33 elif 'OFF' in cmd:
34     index = int(cmd[0]) - 1
35     if len(cmd) == 2:
36         switch_off(index)
37     else:
38         hour = cmd[3]
39         schedule_switch(index, 'OFF', hour)
40         print("Switch" ,(index+1), "will be turned OFF at" ,hour)
41
42 elif 'TIME' in cmd:
43     time = cmd[1]
44     print("Time is set to" ,time)
45     for index, (hour, action) in dict(schedule).items():
46         if hour == time:
47             if action == 'ON':
48                 switch_on(index)
49             else:
50                 switch_off(index)
51
52 elif '?' in cmd:
53     sense_state(cmd[1])
54
55 elif cmd[0] == 'STOP':
56     print('Simulation halts')
57     break
58
```


OUTPUT:

```
Enter command: 2 ON
Switch 2 is turned ON
Enter command: 7 OFF
Switch 7 is turned OFF
Enter command: 3 ON AT 0900
Switch 3 will be turned ON at 0900
Enter command: TIME 0900
Time is set to 0900
Switch 3 is turned ON
Enter command: ? 6
OFF
Enter command: ? ALL
1 - OFF
2 - ON
3 - ON
4 - OFF
5 - OFF
6 - OFF
7 - OFF
8 - OFF
9 - OFF
10 - OFF
11 - OFF
12 - OFF
13 - OFF
14 - OFF
15 - OFF
16 - OFF
Enter command: STOP
Simulation halts
```

Thank you!