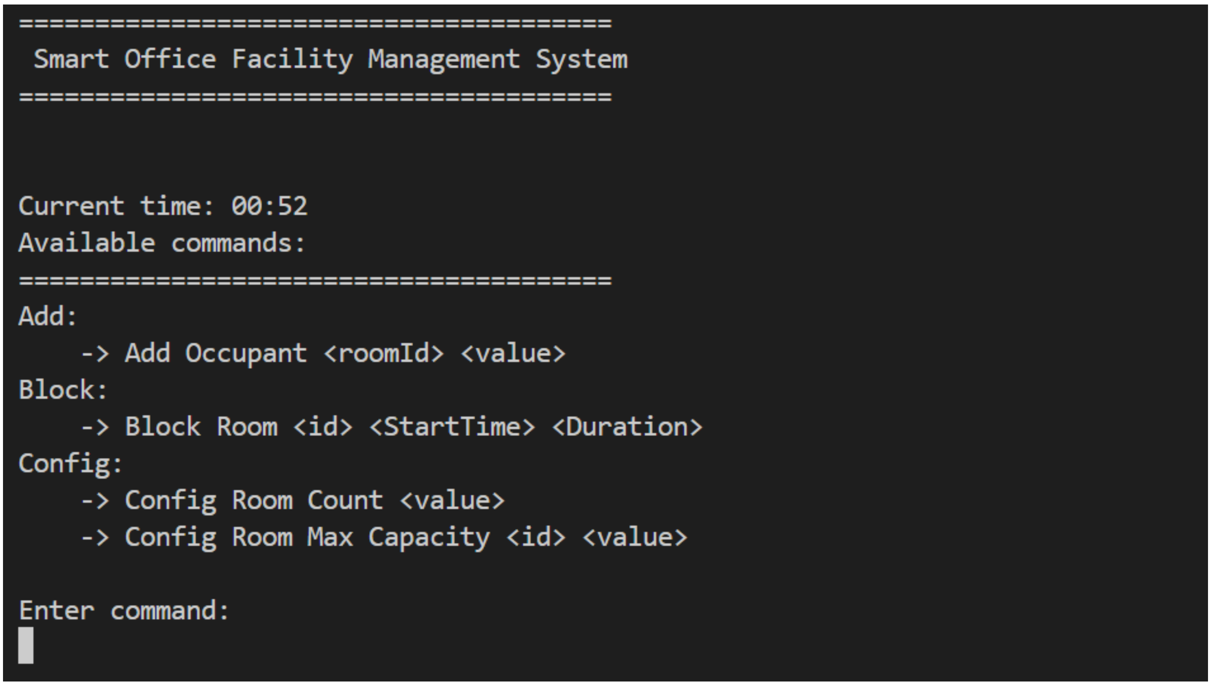
Smart_Office_Facility

A console-based Java application that manages a smart office environment with features such as conference room booking, occupancy detection, and automated control of air conditioning and lighting. The project demonstrates OOP principles, design patterns, and clean coding practices for building scalable, maintainable systems.

WalkThrough:

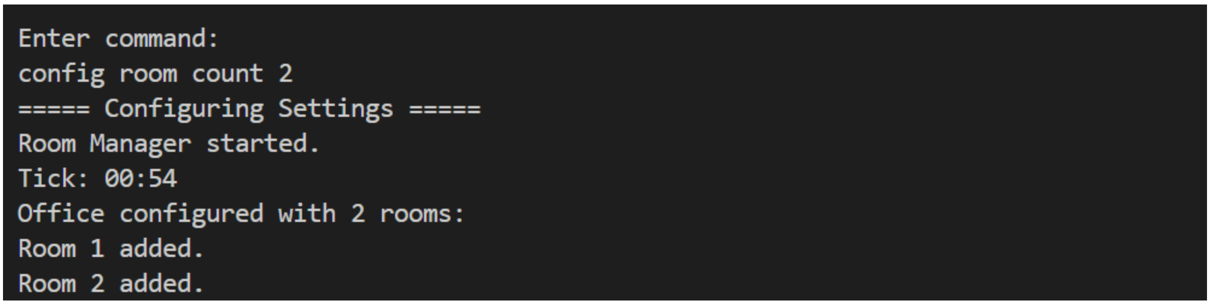
1. Listing all the commands with Syntax and Current System Time:



```
=======================================
 Smart Office Facility Management System
=======================================


Current time: 00:52
Available commands:
=======================================
Add:
    -> Add Occupant <roomId> <value>
Block:
    -> Block Room <id> <StartTime> <Duration>
Config:
    -> Config Room Count <value>
    -> Config Room Max Capacity <id> <value>

Enter command:
```

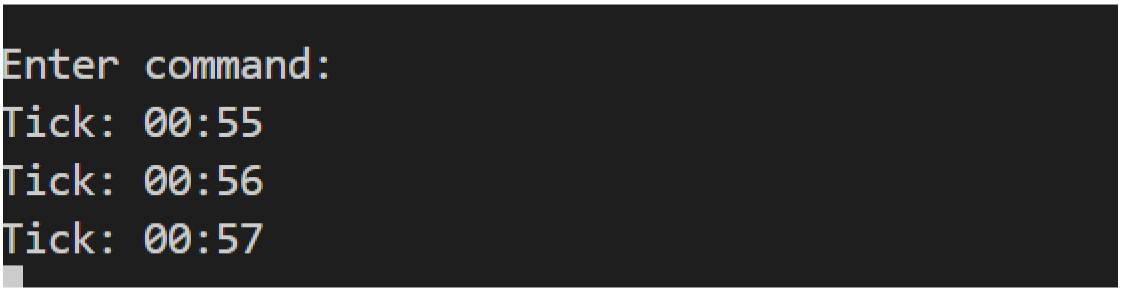
2. Configuring the Office (Use of singleton pattern ensure only one office instance is created)

    a. Creates RoomManager instance that maintains the list of room and handles updating the room status.



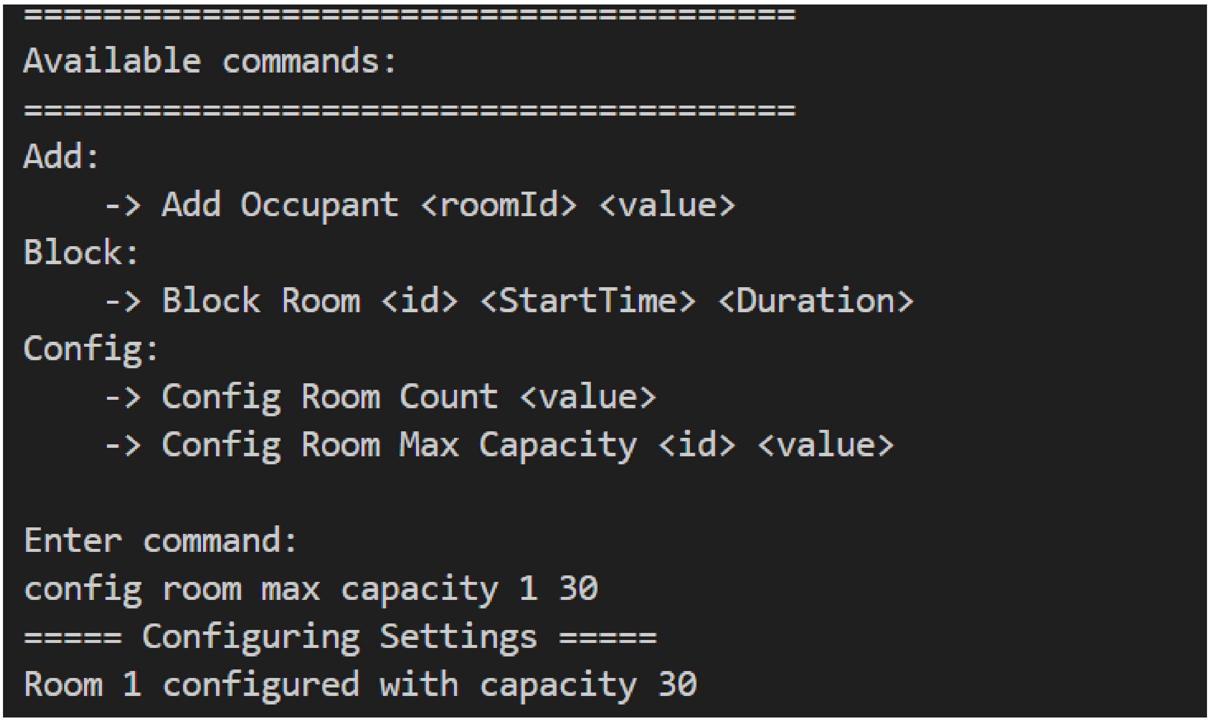
```
Enter command:
config room count 2
===== Configuring Settings =====
Room Manager started.
Tick: 00:54
Office configured with 2 rooms:
Room 1 added.
Room 2 added.
```

3. Display of time on each Minute



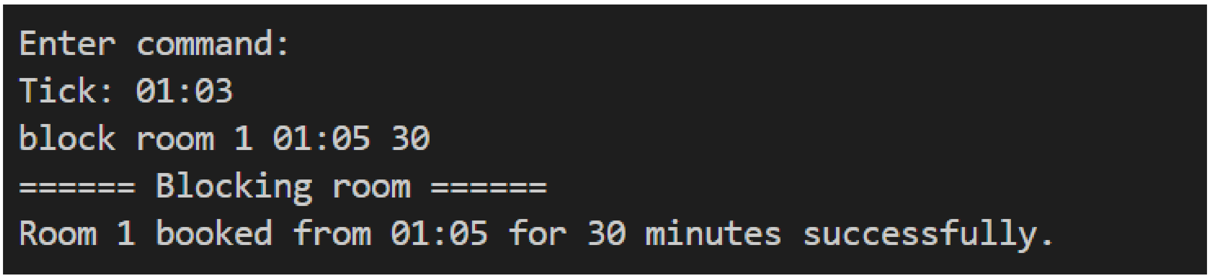
```
Enter command:
Tick: 00:55
Tick: 00:56
Tick: 00:57
```

4. Configure room (setting max capacity to rooms)



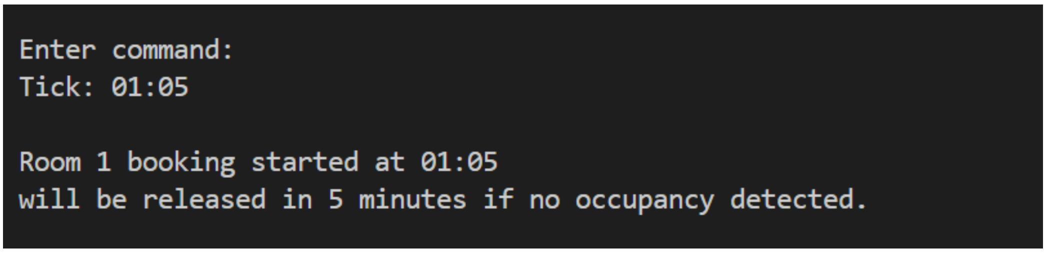
```
=======================================
Available commands:
=======================================
Add:
    -> Add Occupant <roomId> <value>
Block:
    -> Block Room <id> <StartTime> <Duration>
Config:
    -> Config Room Count <value>
    -> Config Room Max Capacity <id> <value>

Enter command:
config room max capacity 1 30
===== Configuring Settings =====
Room 1 configured with capacity 30
```

5. Booking room (booking room 1 for 30 mins)



```
Enter command:
Tick: 01:03
block room 1 01:05 30
====== Blocking room ======
Room 1 booked from 01:05 for 30 minutes successfully.
```

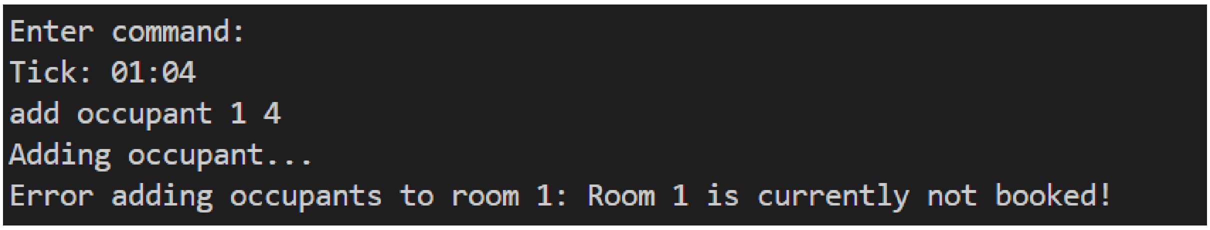
6. Status updates of the room.
   The room is switched to BOOKED state only after the booking StartTime .



```
Enter command:
Tick: 01:05

Room 1 booking started at 01:05
will be released in 5 minutes if no occupancy detected.
```

7. Adding Occupant is restricted if the room is not booked at current time.

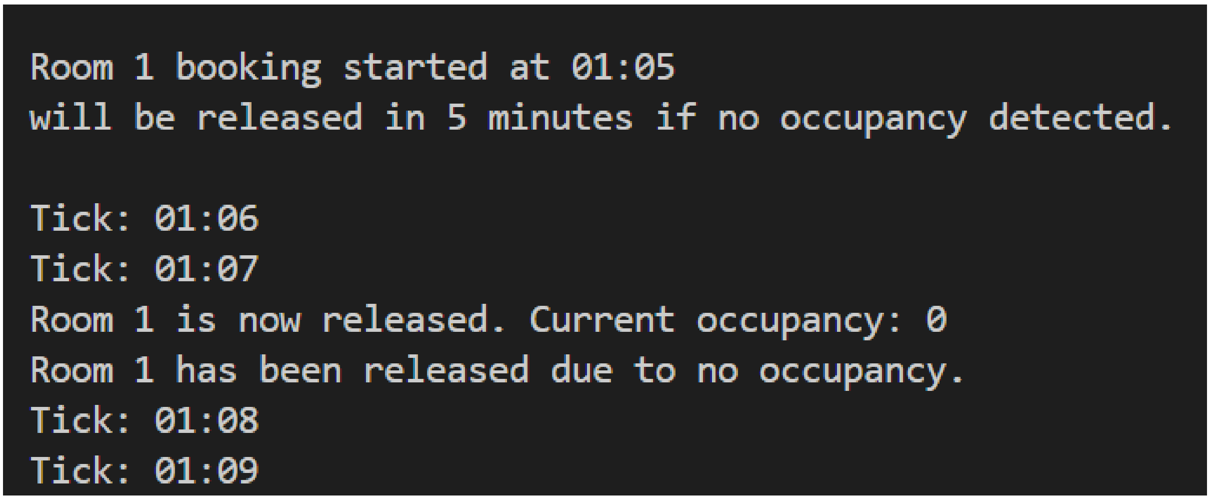
   Trying to add occupant at 1.04 (before start time 1.05).



```
Enter command:
Tick: 01:04
add occupant 1 4
Adding occupant...
Error adding occupants to room 1: Room 1 is currently not booked!
```

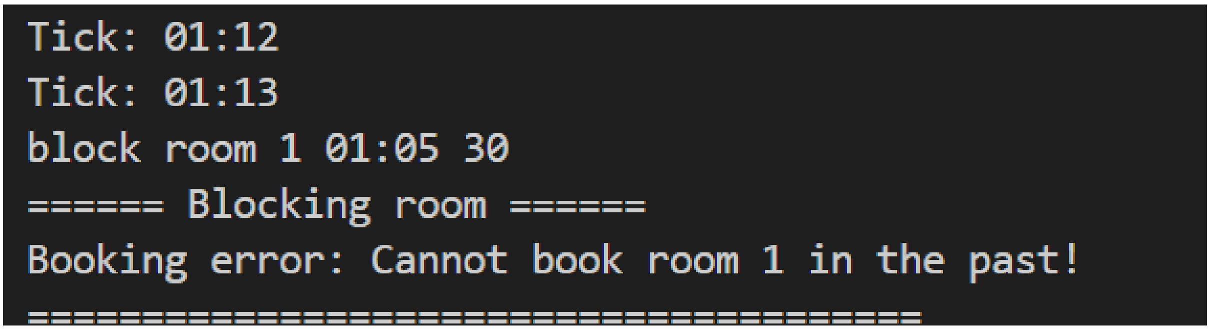
8. Release of Room if it is not occupied during a booking for 5mins the booking is released.

   (for ease of testing kept the release time to be 2mins)



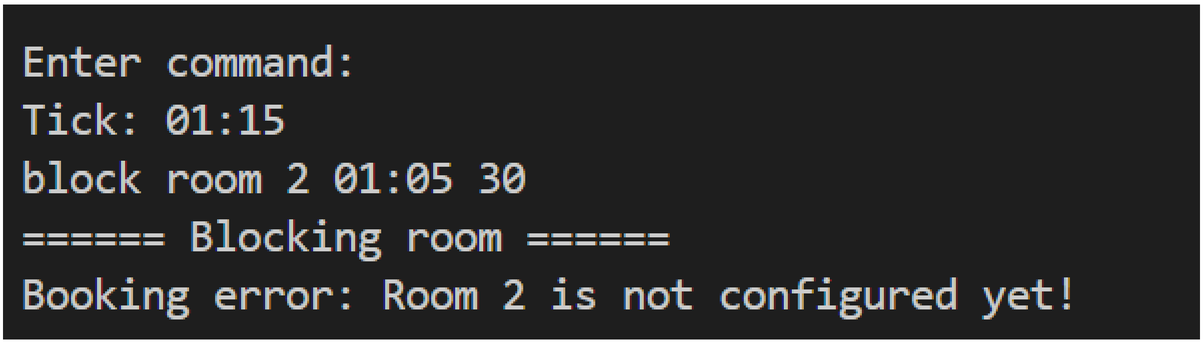
```
Room 1 booking started at 01:05
will be released in 5 minutes if no occupancy detected.

Tick: 01:06
Tick: 01:07
Room 1 is now released. Current occupancy: 0
Room 1 has been released due to no occupancy.
Tick: 01:08
Tick: 01:09
```

9. Booking of room for a past time is restricted



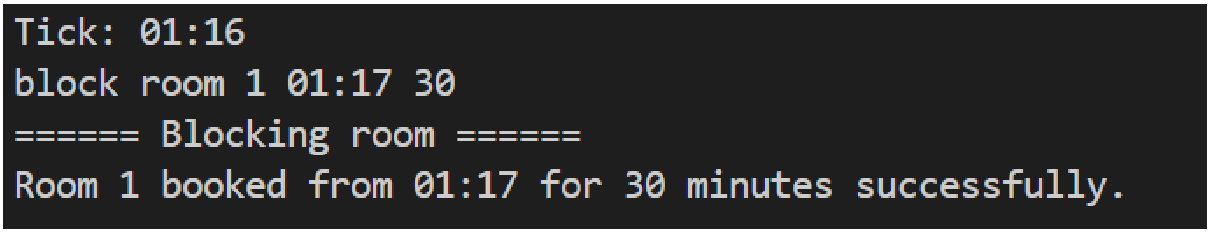
```
Tick: 01:12
Tick: 01:13
block room 1 01:05 30
====== Blocking room ======
Booking error: Cannot book room 1 in the past!
========================================
```

10. Booking of Rooms that are not Configured

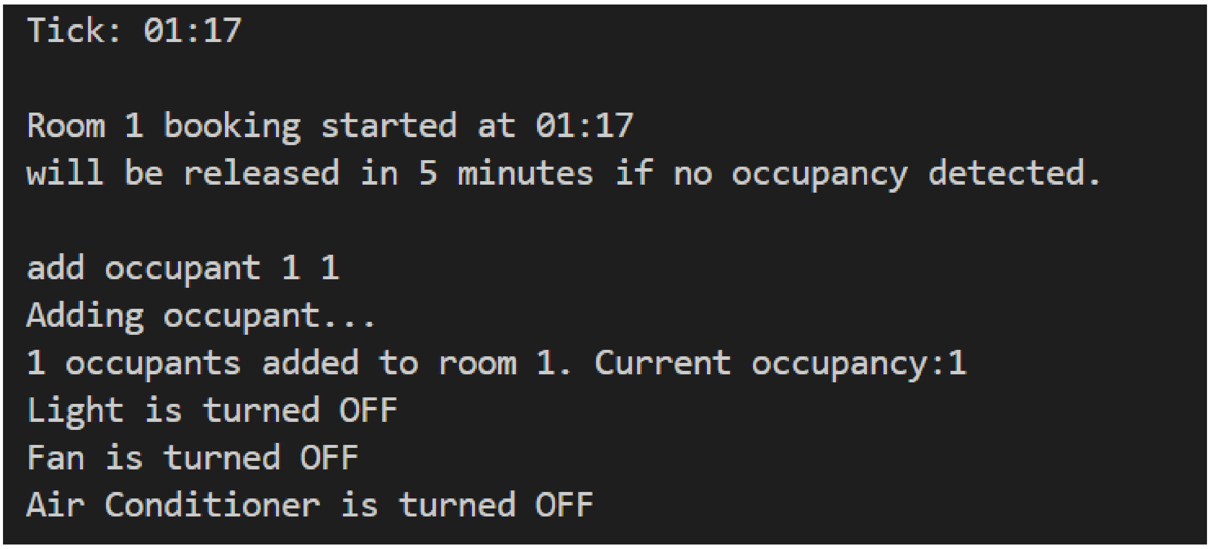


```
Enter command:
Tick: 01:15
block room 2 01:05 30
====== Blocking room ======
Booking error: Room 2 is not configured yet!
```

11. Adding occupant to room that is In BOOKED state

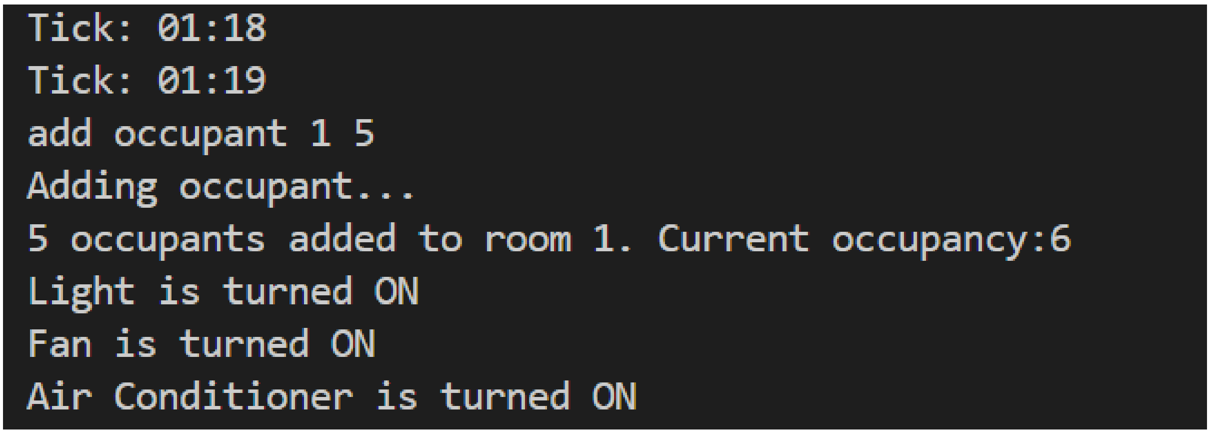


```
Tick: 01:16
block room 1 01:17 30
====== Blocking room ======
Room 1 booked from 01:17 for 30 minutes successfully.
```



```
Tick: 01:17

Room 1 booking started at 01:17
will be released in 5 minutes if no occupancy detected.

add occupant 1 1
Adding occupant...
1 occupants added to room 1. Current occupancy:1
Light is turned OFF
Fan is turned OFF
Air Conditioner is turned OFF
```

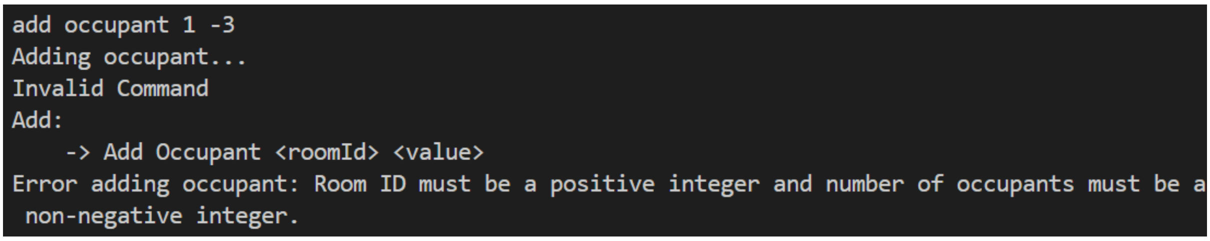
Note: Devices are set OFF since the current occupancy is < 2.



```
Tick: 01:18
Tick: 01:19
add occupant 1 5
Adding occupant...
5 occupants added to room 1. Current occupancy:6
Light is turned ON
Fan is turned ON
Air Conditioner is turned ON
```

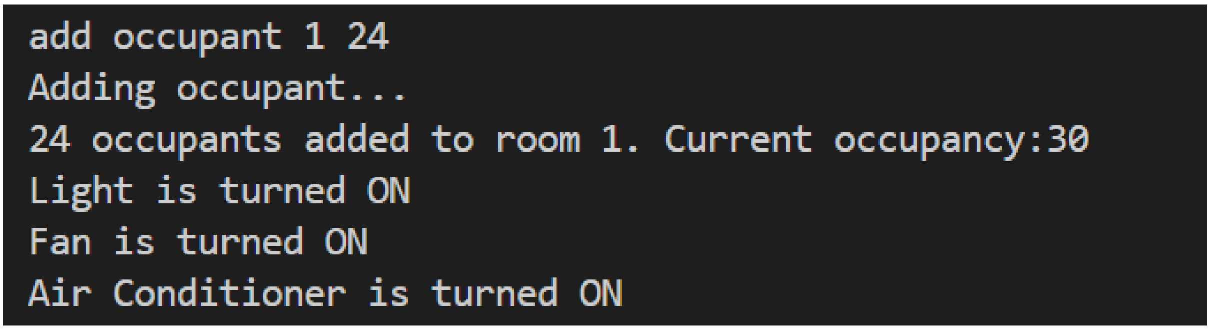
Note: Devices are notified to set state to ON (Observer Pattern – DeviceManager)

12. Adding occupant with negative number.



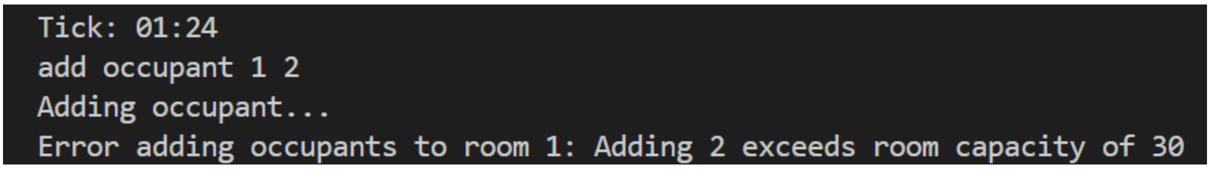
```
add occupant 1 -3
Adding occupant...
Invalid Command
Add:
    -> Add Occupant <roomId> <value>
Error adding occupant: Room ID must be a positive integer and number of occupants must be a
 non-negative integer.
```

13. Adding occupant > the max capacity of room



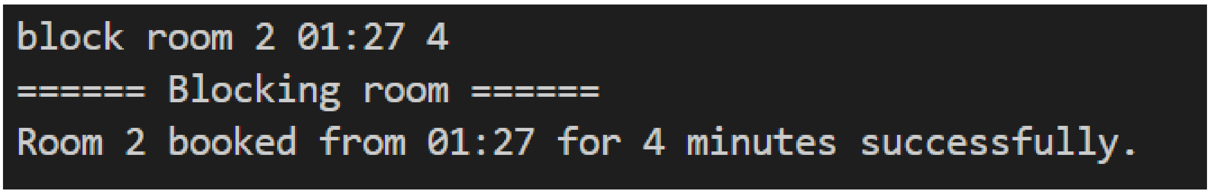
```
add occupant 1 24
Adding occupant...
24 occupants added to room 1. Current occupancy:30
Light is turned ON
Fan is turned ON
Air Conditioner is turned ON
```

Occupant is allowed to be added till the count reaches to max.

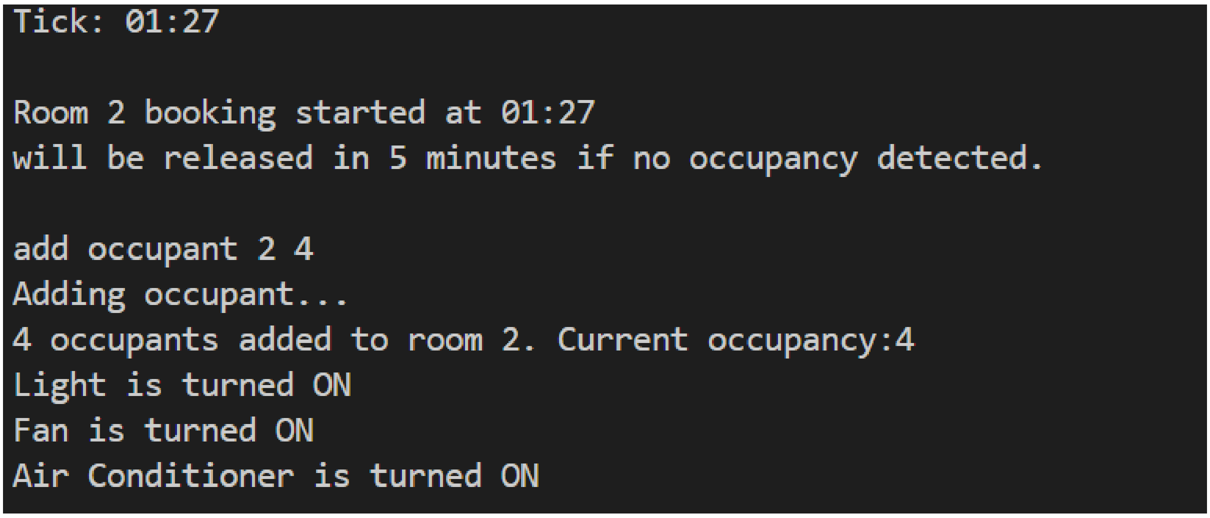


```
Tick: 01:24
add occupant 1 2
Adding occupant...
Error adding occupants to room 1: Adding 2 exceeds room capacity of 30
```

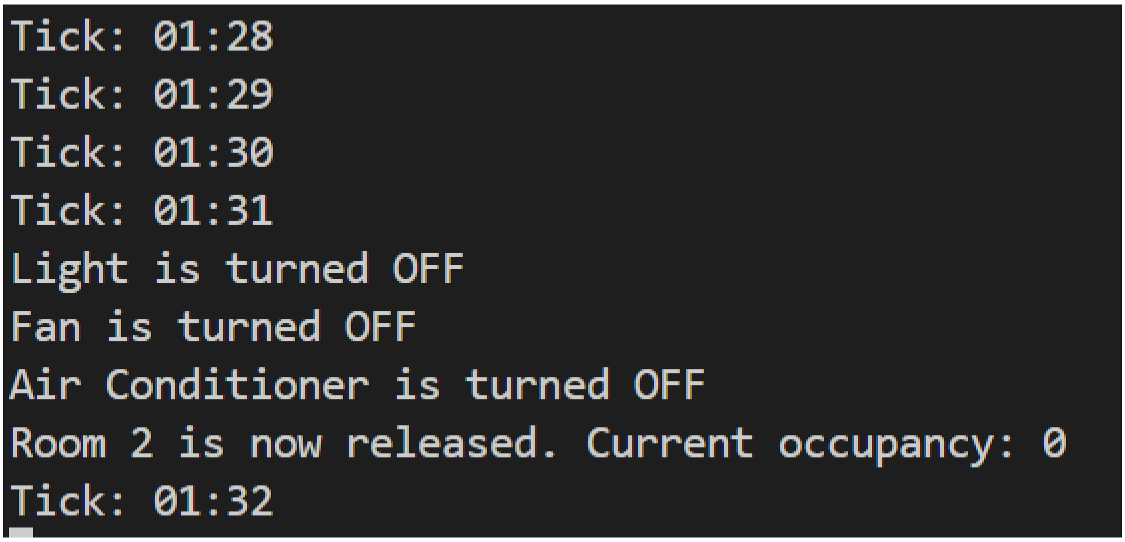
14. Updating the room status after the ENDTIME and notifying the devices to Turn OFF.



```
block room 2 01:27 4
====== Blocking room ======
Room 2 booked from 01:27 for 4 minutes successfully.
```

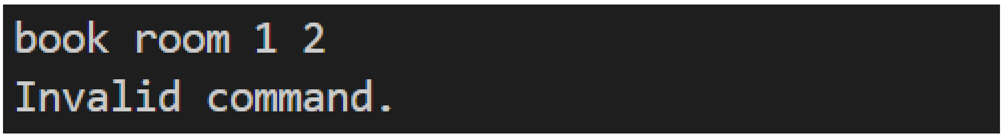


```
Tick: 01:27

Room 2 booking started at 01:27
will be released in 5 minutes if no occupancy detected.

add occupant 2 4
Adding occupant...
4 occupants added to room 2. Current occupancy:4
Light is turned ON
Fan is turned ON
Air Conditioner is turned ON
```



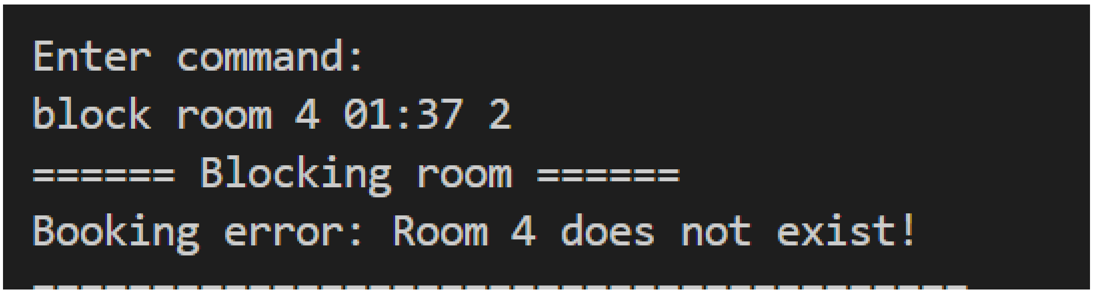
```
Tick: 01:28
Tick: 01:29
Tick: 01:30
Tick: 01:31
Light is turned OFF
Fan is turned OFF
Air Conditioner is turned OFF
Room 2 is now released. Current occupancy: 0
Tick: 01:32
```

15. Entering invalid command



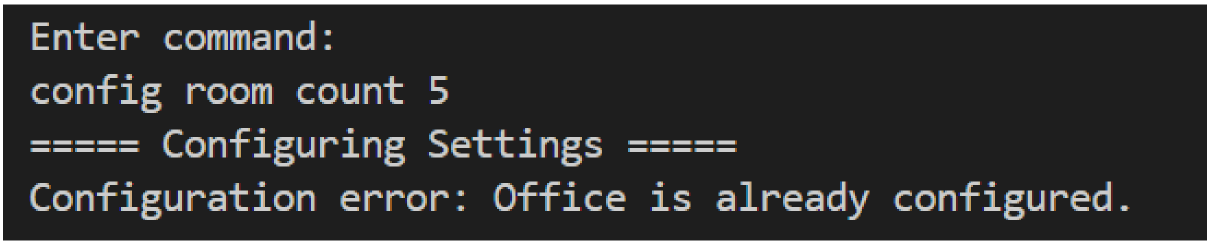
```
book room 1 2
Invalid command.
```

16. Trying to book room that does not exist

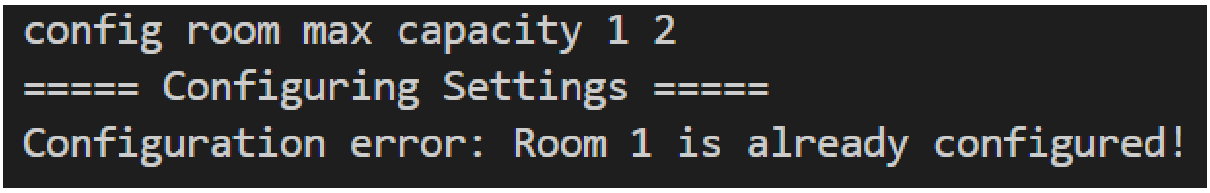


```
Enter command:
block room 4 01:37 2
====== Blocking room ======
Booking error: Room 4 does not exist!
```

17. Trying to config the Office or Room again.



```
Enter command:
config room count 5
===== Configuring Settings =====
Configuration error: Office is already configured.
```



```
config room max capacity 1 2
===== Configuring Settings =====
Configuration error: Room 1 is already configured!
```