Smart Home Automation System

OSGi - Framework

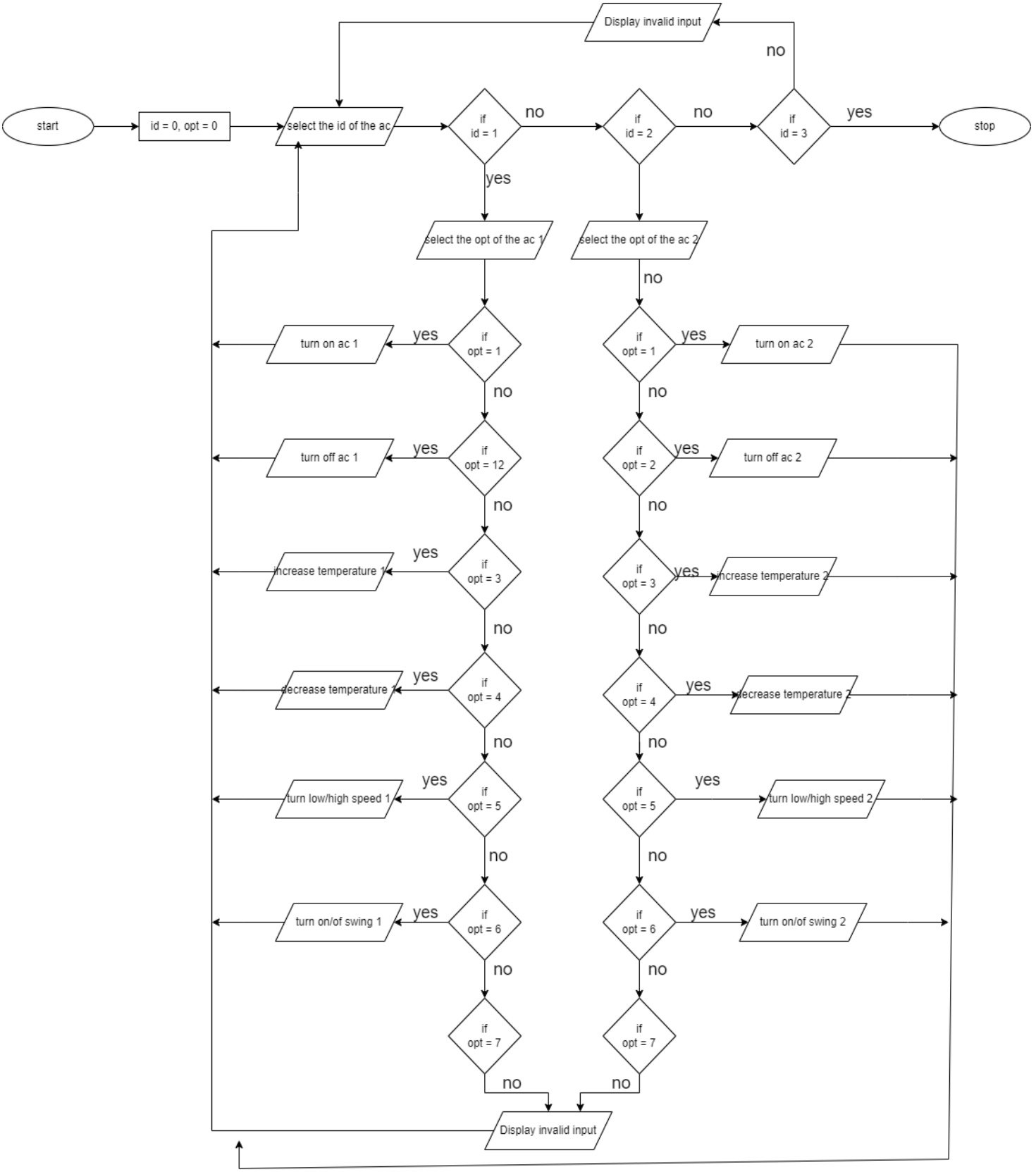
SE3030 – Software Architecture – Assignment 1	
Members	Registration Number
Saraf M.M.M.S	IT21297854
Sudhais F.M	IT21098000
Sajid Ahmed M.J	IT21294570
GitHub Link : https://github.com/it21297854/SmartHomeAutomationSystem	

Description

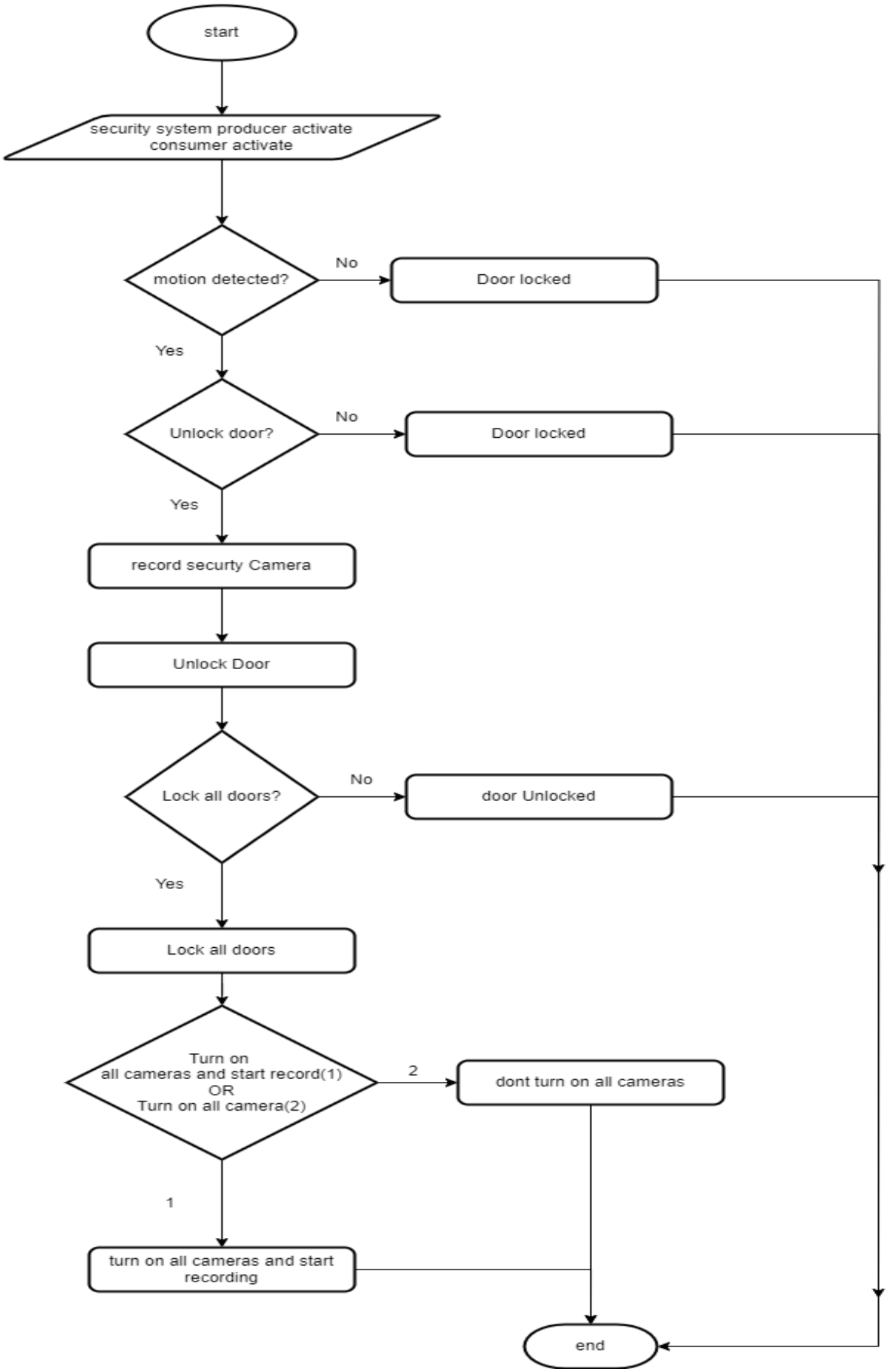
In our Smart Home Automation System, comprising the Security System, AC, and Light Control, we've prioritized seamless integration and user convenience. The Security System, equipped with security cameras, motion sensors, and remote door locks, ensures comprehensive home protection. Users benefit from real-time monitoring, immediate alerts for suspicious activities, and the flexibility to manage security remotely. The AC optimizes home comfort by allowing users to set temperature preferences, on/off, changing the speed and swing/fixed option can perform. Meanwhile, Light Control empowers users to customize lighting to suit their needs, offering features like brightness adjustment and scheduling. Leveraging the OSGi framework, we've modularized each component into separate bundles, enabling easy maintenance and scalability. This approach enhances code management, streamlines development processes, and lays the foundation for future service enhancements. Ultimately, our Smart Home Automation System embodies innovation, security, and comfort, providing residents with a tailored and intuitive living experience.

System Flowcharts

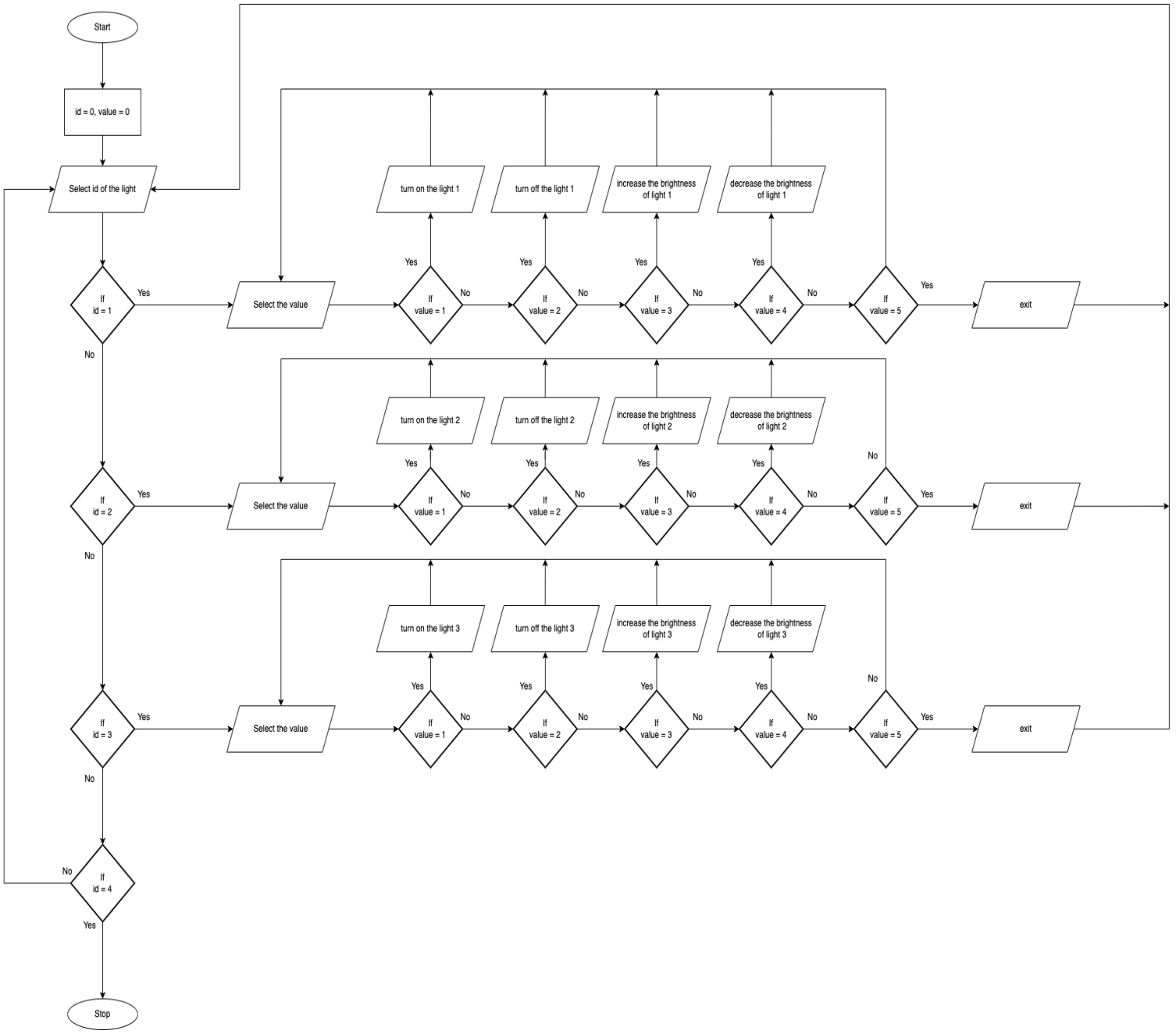
AC System – IT21098000



Security System – IT21297854



Light Automation System – IT21294570



Getting Started - Installation

1. This is a basic producer and consumer application utilising the OSGi Framework.

2. Run all the producer bundles first before the consumer because you need to run these separately.

3. Make sure to create a new OSGi configuration for each producer bundle when running and also select ONLY the producer bundle you want to run.

4. For each producer press “Enter” and type “lb” to list all the bundles in order to check if your producer bundle is “ACTIVE” or not.

5. If you cannot find the bundle then use “Ctrl + f” to search by the bundle name or type “ss” and move to the top of the bundle list IDs, usually your desired bundle would be within the top 10 IDs.

6. Create a new OSGi configuration for the consumer bundle and run the configuration by selecting ALL the producer bundles including the consumer bundle.

7. Repeat steps 4 and 5 and check if all bundles, producers and consumers are “ACTIVE”. (If they are already “ACTIVE” your application will run automatically)

To run AC System

1. Run the “AC_ServicePublisher” bundle producer first.
2. Finally run “AC_ServiceSubscriber” bundle consumer.

To run Security System

1. Run the “SecuritySystemProducer” bundle producer first.
2. Finally run “SecuritySystemConsumer” bundle consumer.

To run Light Automation System

1. Run the “light_service_publisher” bundle first.
2. Then run the “light_ServiceSubscriber” bundle

Console Screenshots

AC System – IT21098000

1.Select AC and turn on/off

```
AC publisher start
Start AC service subcriber
Select the AC
1. AC 1
2. AC 2
3. Exit
1
==========AC 1 ===========
Select the AC option
1. Turn On
2. Turn Off
3. Increase the temperature
4. Decrease the temperature
5. speed
6. swing
7. Exit
1
Turning on AC 1

Select the AC option
1. Turn On
2. Turn Off
3. Increase the temperature
4. Decrease the temperature
5. speed
6. swing
7. Exit
2
Turning off AC 1
```

2.Increase the temperature

```
Select the AC option
1. Turn On
2. Turn Off
3. Increase the temperature
4. Decrease the temperature
5. speed
6. swing
7. Exit
3
AC Temperature is 21

Select the AC option
1. Turn On
2. Turn Off
3. Increase the temperature
4. Decrease the temperature
5. speed
6. swing
7. Exit
3
AC Temperature is 22

Select the AC option
1. Turn On
2. Turn Off
3. Increase the temperature
4. Decrease the temperature
5. speed
6. swing
7. Exit
3
AC Temperature is 23
```

3.Decrease the temperature

```
Select the AC option
1. Turn On
2. Turn Off
3. Increase the temperature
4. Decrease the temperature
5. speed
6. swing
7. Exit
4
AC Temperature is 22

Select the AC option
1. Turn On
2. Turn Off
3. Increase the temperature
4. Decrease the temperature
5. speed
6. swing
7. Exit
4
AC Temperature is 21

Select the AC option
1. Turn On
2. Turn Off
3. Increase the temperature
4. Decrease the temperature
5. speed
6. swing
7. Exit
4
AC Temperature is 20
```

4.Changing speed

```
Select the AC option
1. Turn On
2. Turn Off
3. Increase the temperature
4. Decrease the temperature
5. speed
6. swing
7. Exit
5
Low Speed

Select the AC option
1. Turn On
2. Turn Off
3. Increase the temperature
4. Decrease the temperature
5. speed
6. swing
7. Exit
5
High Speed
```

5.Changing swing / fixed

```
==========AC 1 ============
Select the AC option
1. Turn On
2. Turn Off
3. Increase the temperature
4. Decrease the temperature
5. speed
6. swing
7. Exit
6
fixed

Select the AC option
1. Turn On
2. Turn Off
3. Increase the temperature
4. Decrease the temperature
5. speed
6. swing
7. Exit
6
Swinging
```

Security System – IT21297854

```
g! start 3
Security System Producer Activator: Start
g! start 2
Consumer Activator: Start
Recording footage from security cameras...
Checking for motion...
Motion detected! Do you want to unlock the door? (yes/no)
no
Door remains locked.
Receiving security status...
Security status: Door locked: true, Motion detected: true, Security camera recording: true
```

Figure 1: Door remains locked when entering No

```
g! start 3
Security System Producer Activator: Start
g! start 2
Consumer Activator: Start
Recording footage from security cameras...
Checking for motion...
Motion detected! Do you want to unlock the door? (yes/no)
yes
Unlocking the door...
Receiving security status...
Security status: Door locked: false, Motion detected: true, Security camera recording: true
Locking the door...
Do you want to Lock all the doors? (yes/no)
yes
Closing all the doors...
Do you want to turn on() all the cameras or Turn on and record(2)? (1/2)
2
Turning on all the cameras and start recording...
```

Figure 2: Unlocking the door when entering yes and also lock all the doors , on all cameras and started recording

```
g! start 3
Security System Producer Activator: Start
g! start 2
Consumer Activator: Start
Recording footage from security cameras...
Checking for motion...
Motion detected! Do you want to unlock the door? (yes/no)
yes
Receiving security status...
Security status: Door locked: false, Motion detected: true, Security camera recording: true
Locking the door...
Do you want to Lock all the doors? (yes/no)
no
Same as it is
```

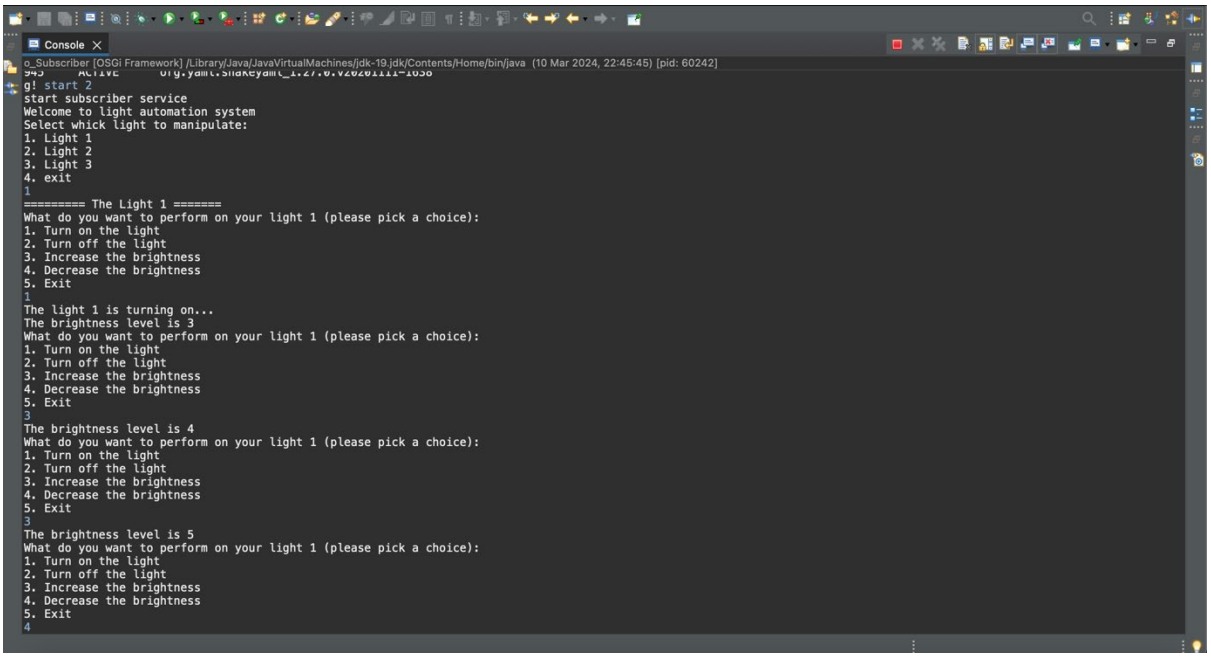
Figure 3: Unlocking the door when entering yes and not closing all doors

```
g! start 3
Security System Producer Activator: Start
g! 23:46:10.132 [qtp257364021-66] DEBUG org.eclipse.jetty.util.thread.QueuedThreadPool -- Evic
start 2
Consumer Activator: Start
Recording footage from security cameras...
Checking for motion...
Motion detected! Do you want to unlock the door? (yes/no)
yes
Receiving security status...
Security status: Door locked: false, Motion detected: true, Security camera recording: true
Locking the door...
Do you want to Lock all the doors? (yes/no)
yes
Closing all the doors...
Do you want to turn on() all the cameras or Turn on and record(2)? (1/2)
1
Turning on all the cameras...
g!
```

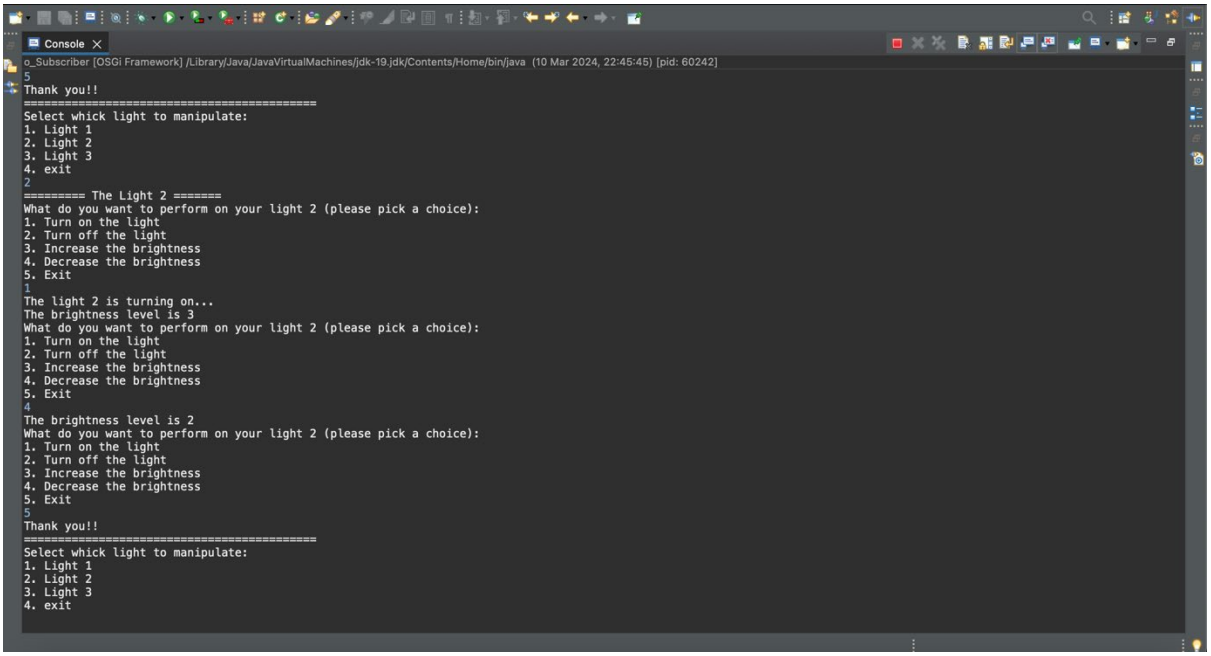
Figure 4: Unlocking the door when entering yes and also lock all the doors and turn on all the cameras

Light Automation System – IT21294570

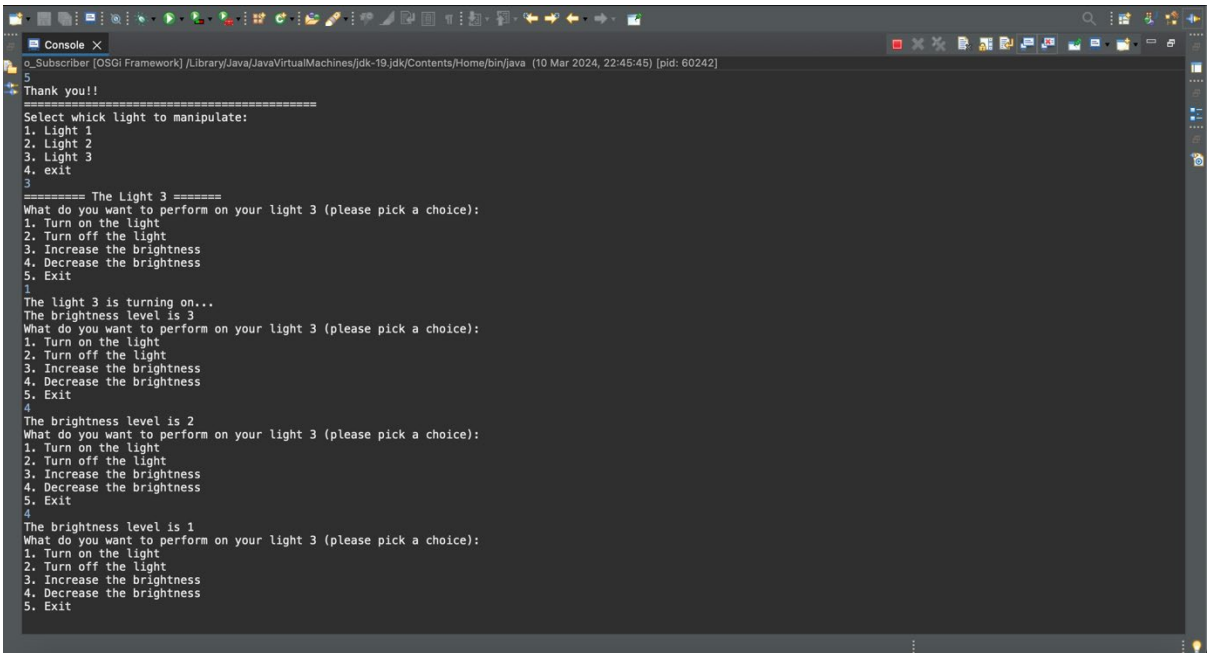
Manipulating light 1



Manipulating light 2



Manipulating light 3



Manifest Screenshots

AC System – IT21098000

AC Service Publisher Manifest.mf

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: AC_ServicePublisher
Bundle-SymbolicName: AC_ServicePublisher
Bundle-Version: 1.0.0.qualifier
Bundle-Activator: com.ac.service.ServiceActivator
Export-Package: com.ac.service
Import-Package: org.osgi.framework;version="1.3.0"
Bundle-RequiredExecutionEnvironment: JavaSE-17
```

AC Service Subscriber Manifest.mf

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: AC_ServiceSubscriber
Bundle-SymbolicName: AC_ServiceSubscriber
Bundle-Activator: com.ac.subscriber.service.ServiceActivator
Bundle-Version: 1.0.0.qualifier
Bundle-RequiredExecutionEnvironment: JavaSE-17
Import-Package: com.ac.service,
 org.osgi.framework;version="1.3.0"
```

Security System – IT21297854

SecuritySystemConsumer × SecuritySystemProducer

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: SecuritySystemConsumer
Bundle-SymbolicName: SecuritySystemConsumer
Bundle-Version: 1.0.0.qualifier
Bundle-Activator: com.ssp.service.consumer.Activator
Bundle-RequiredExecutionEnvironment: JavaSE-18
Automatic-Module-Name: SecuritySystemConsumer
Import-Package: com.ssp.service,
 org.osgi.framework;version="1.3.0"
Bundle-ActivationPolicy: lazy
```

Figure 1: SecuritySystemConsumer Manifest.MF

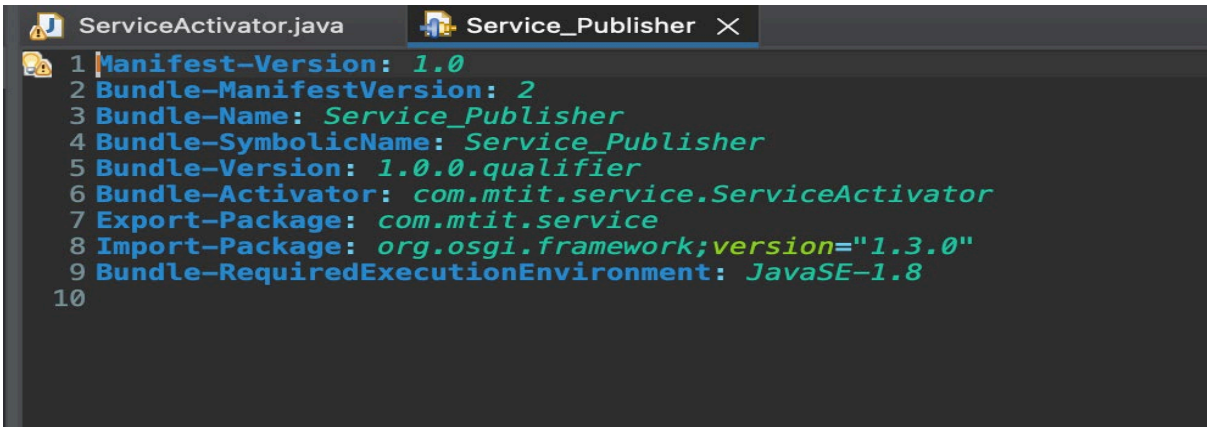
SecuritySystemConsumer SecuritySystemProducer ×

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: SecuritySystemProducer
Bundle-SymbolicName: SecuritySystemProducer
Bundle-Version: 1.0.0.qualifier
Bundle-Activator: com.ssp.service.Activator
Bundle-RequiredExecutionEnvironment: JavaSE-18
Automatic-Module-Name: SecuritySystemProducer
Import-Package: org.osgi.framework;version="1.3.0"
Bundle-ActivationPolicy: lazy
Export-Package: com.ssp.service
```

Figure 2: SecuritySystemProducer Manifest.MF

Light Automation System – IT21294570

Light service publisher manifest.mf



Light service subscriber manifest.mf