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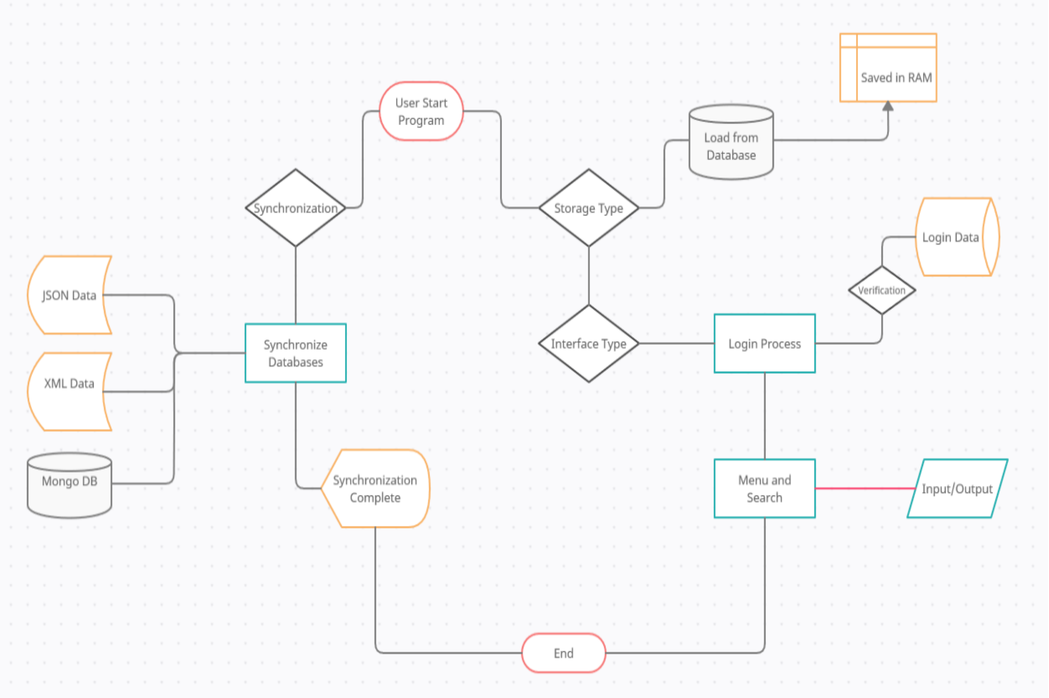
I. Introduction

JARVIS (Just A Rather Very Intelligent System) is a home automation system used to gather and control various appliances in a smart home. It is very extensible as it stores saved data under XML, JSON, and MongoDB formats. It also provides a CLI or a GUI depending on the user's preferences and provides encrypted and secured login for all users connected on all devices throughout the house.

II. Description

A. Model

The following is the model adopted in the project:



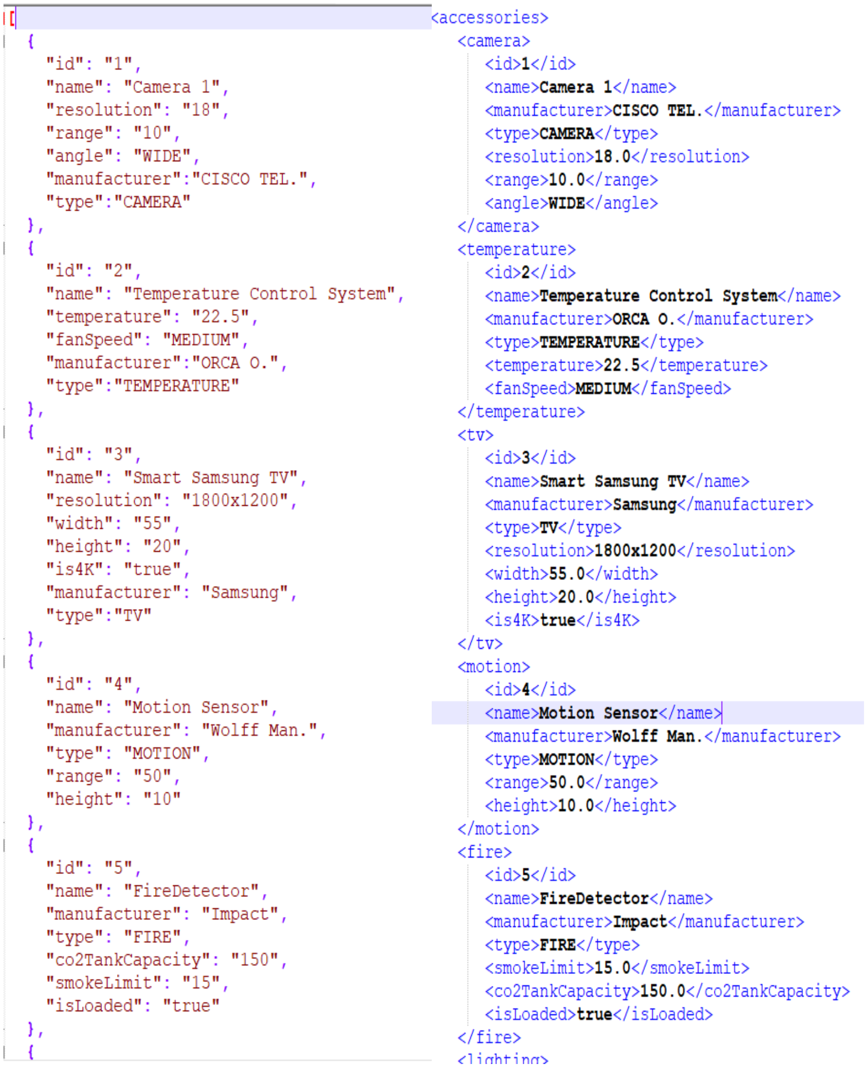
B. Options

For convenience, the application is packaged into a jar, which can be run with various starting options.

```
java –jar JarvisFX-1.0-SNAPSHOT.jar [XML|JSON|MONGODB] [GUI|CLI]
```

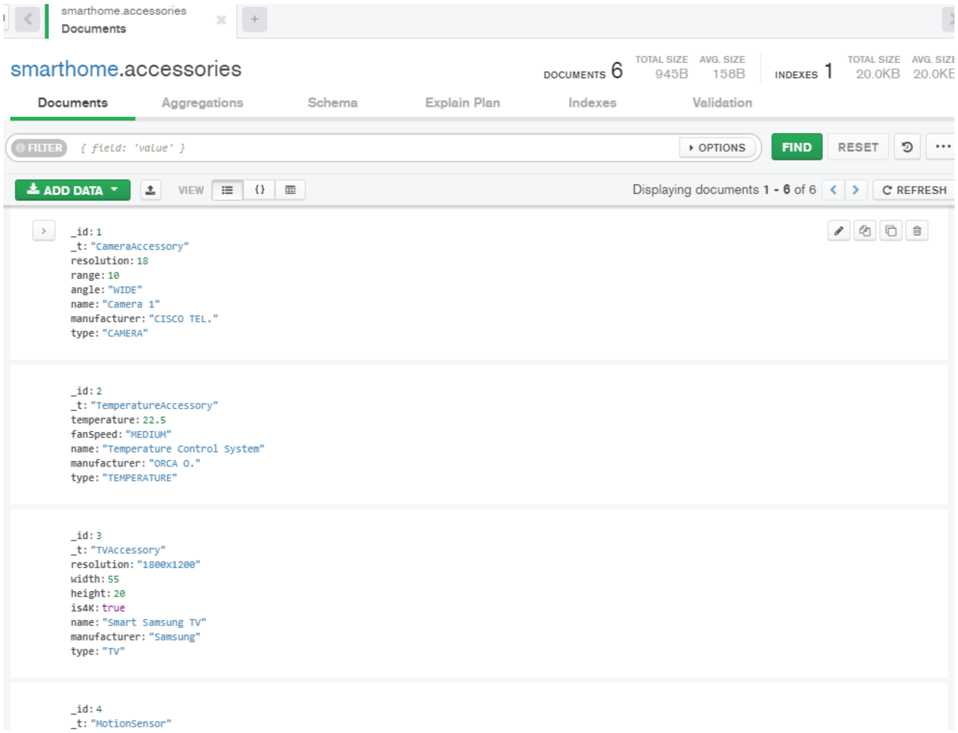
C. Storage Types

There are three types of storage such as JSON, XML and a NoSQL support (MongoDB). They are mapped to objects using serialization/deserialization principles. Here's the layout of the three storage types; based on the respective type of the object.



```
[
  {
    "id": "1",
    "name": "Camera 1",
    "resolution": "18",
    "range": "10",
    "angle": "WIDE",
    "manufacturer":"CISCO TEL.",
    "type":"CAMERA"
  },
  {
    "id": "2",
    "name": "Temperature Control System",
    "temperature": "22.5",
    "fanSpeed": "MEDIUM",
    "manufacturer":"ORCA O.",
    "type":"TEMPERATURE"
  },
  {
    "id": "3",
    "name": "Smart Samsung TV",
    "resolution": "1800x1200",
    "width": "55",
    "height": "20",
    "is4K": "true",
    "manufacturer": "Samsung",
    "type":"TV"
  },
  {
    "id": "4",
    "name": "Motion Sensor",
    "manufacturer": "Wolff Man.",
    "type": "MOTION",
    "range": "50",
    "height": "10"
  },
  {
    "id": "5",
    "name": "FireDetector",
    "manufacturer": "Impact",
    "type": "FIRE",
    "co2TankCapacity": "150",
    "smokeLimit": "15",
    "isLoaded": "true"
  },
  {
```

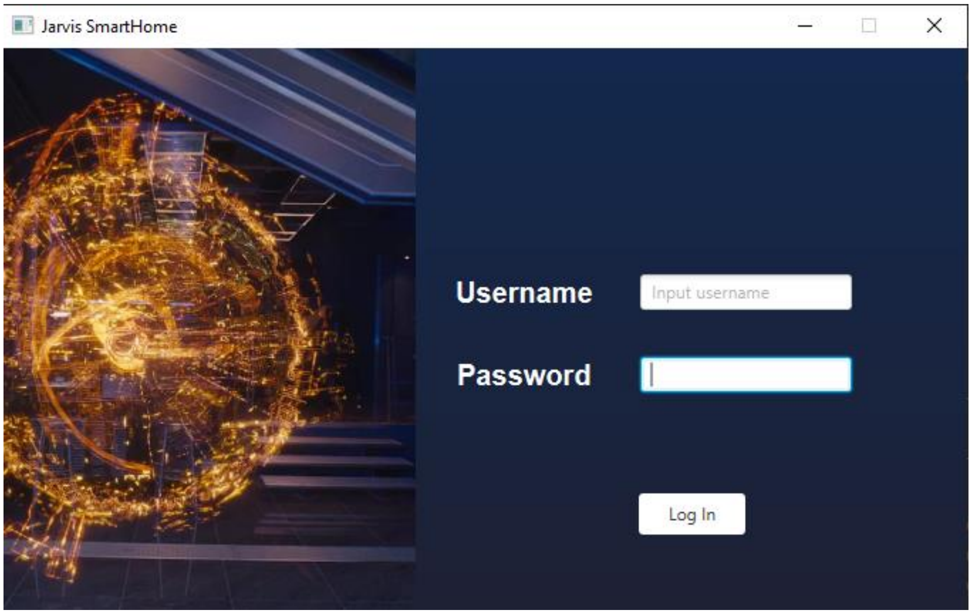
```
<accessories>
   <camera>
      <id>1</id>
      <name>Camera 1</name>
      <manufacturer>CISCO TEL.</manufacturer>
      <type>CAMERA</type>
      <resolution>18.0</resolution>
      <range>10.0</range>
      <angle>WIDE</angle>
   </camera>
   <temperature>
      <id>2</id>
      <name>Temperature Control System</name>
      <manufacturer>ORCA O.</manufacturer>
      <type>TEMPERATURE</type>
      <temperature>22.5</temperature>
      <fanSpeed>MEDIUM</fanSpeed>
   </temperature>
   <tv>
      <id>3</id>
      <name>Smart Samsung TV</name>
      <manufacturer>Samsung</manufacturer>
      <type>TV</type>
      <resolution>1800x1200</resolution>
      <width>55.0</width>
      <height>20.0</height>
      <is4K>true</is4K>
   </tv>
   <motion>
      <id>4</id>
      <name>Motion Sensor</name>
      <manufacturer>Wolff Man.</manufacturer>
      <type>MOTION</type>
      <range>50.0</range>
      <height>10.0</height>
   </motion>
   <fire>
      <id>5</id>
      <name>FireDetector</name>
      <manufacturer>Impact</manufacturer>
      <type>FIRE</type>
      <smokeLimit>15.0</smokeLimit>
      <co2TankCapacity>150.0</co2TankCapacity>
      <isLoaded>true</isLoaded>
   </fire>
   <lighting>
```

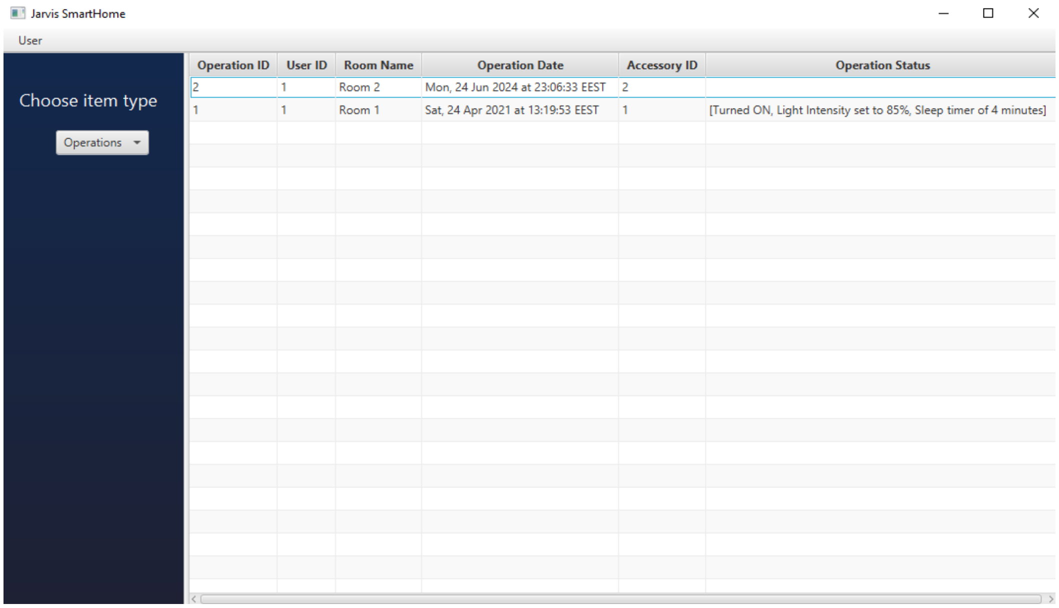


```
_id: 1
_t: "CameraAccessory"
resolution: 18
range: 10
angle: "WIDE"
name: "Camera 1"
manufacturer: "CISCO TEL."
type: "CAMERA"

_id: 2
_t: "TemperatureAccessory"
temperature: 22.5
fanSpeed: "MEDIUM"
name: "Temperature Control System"
manufacturer: "ORCA O."
type: "TEMPERATURE"

_id: 3
_t: "TVAccessory"
resolution: "1800x1200"
width: 55
height: 20
is4K: true
name: "Smart Samsung TV"
manufacturer: "Samsung"
type: "TV"

_id: 4
_t: "MotionSensor"
```

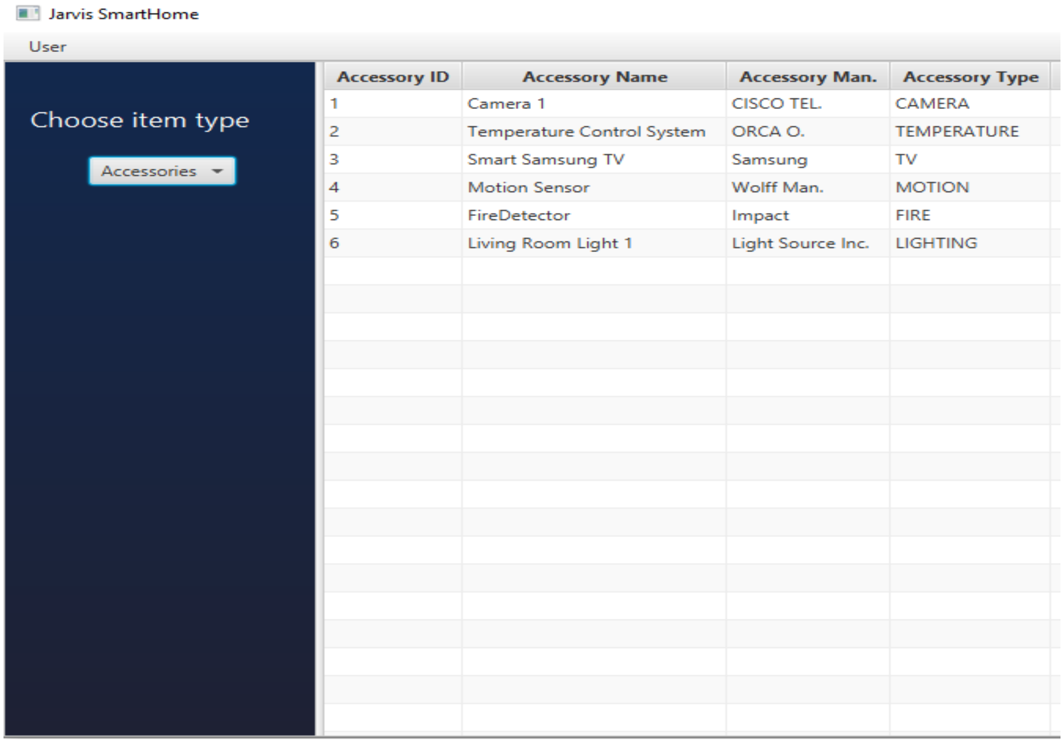
D. GUI Run

Here’s the sample run of the application using the GUI launch option.

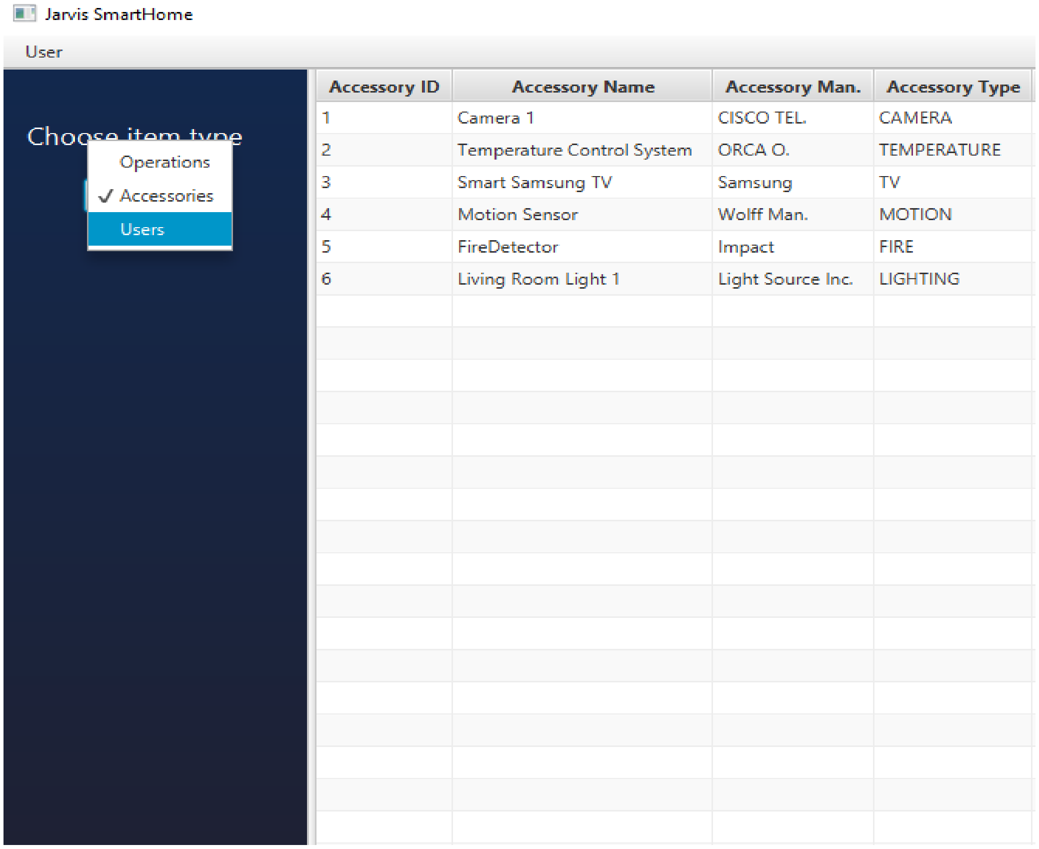




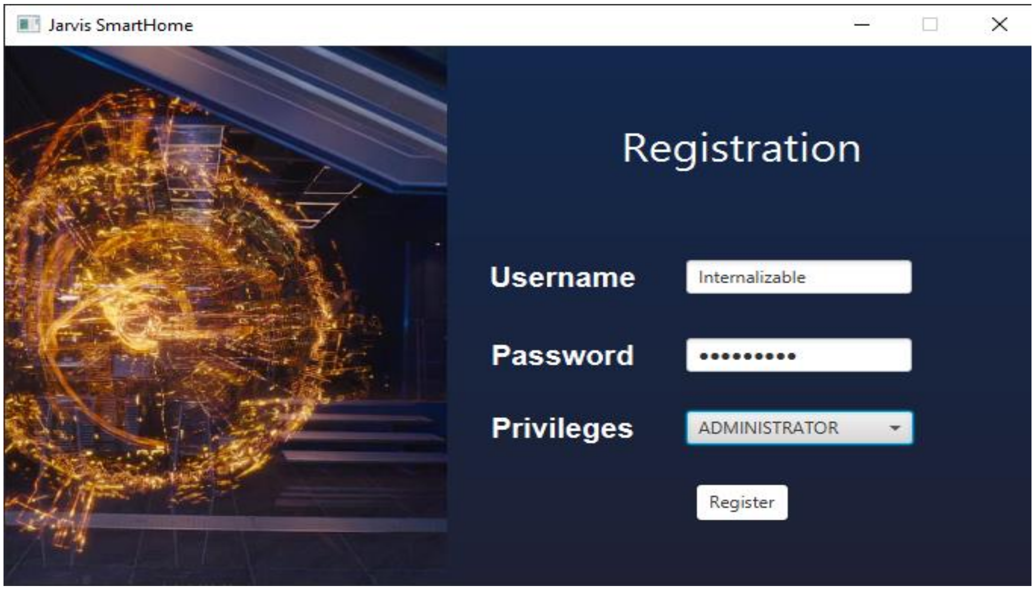
Operation ID	User ID	Room Name	Operation Date	Accessory ID	Operation Status
2	1	Room 2	Mon, 24 Jun 2024 at 23:06:33 EEST	2	
1	1	Room 1	Sat, 24 Apr 2021 at 13:19:53 EEST	1	[Turned ON, Light Intensity set to 85%, Sleep timer of 4 minutes]



Accessory ID	Accessory Name	Accessory Man.	Accessory Type
1	Camera 1	CISCO TEL.	CAMERA
2	Temperature Control System	ORCA O.	TEMPERATURE
3	Smart Samsung TV	Samsung	TV
4	Motion Sensor	Wolff Man.	MOTION
5	FireDetector	Impact	FIRE
6	Living Room Light 1	Light Source Inc.	LIGHTING



Accessory ID	Accessory Name	Accessory Man.	Accessory Type
1	Camera 1	CISCO TEL.	CAMERA
2	Temperature Control System	ORCA O.	TEMPERATURE
3	Smart Samsung TV	Samsung	TV
4	Motion Sensor	Wolff Man.	MOTION
5	FireDetector	Impact	FIRE
6	Living Room Light 1	Light Source Inc.	LIGHTING



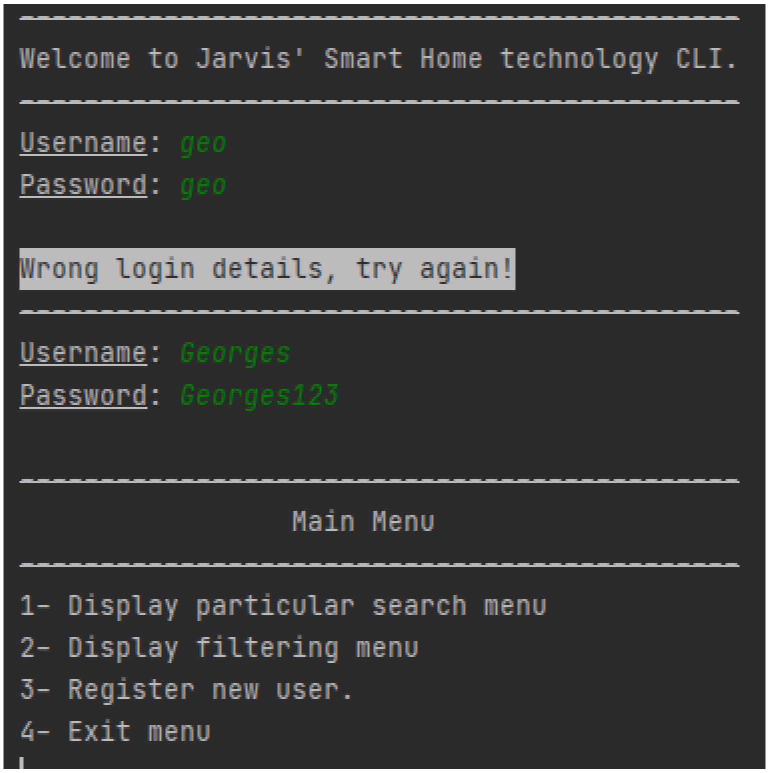
Username: Internalizable

Password: ••••••••••

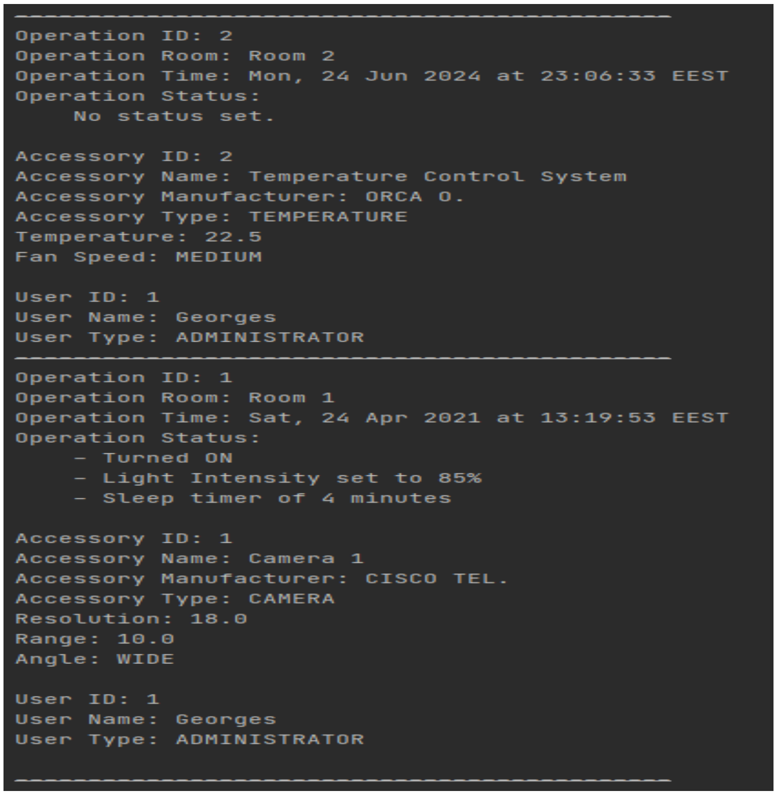
Privileges: ADMINISTRATOR

E. CLI Run

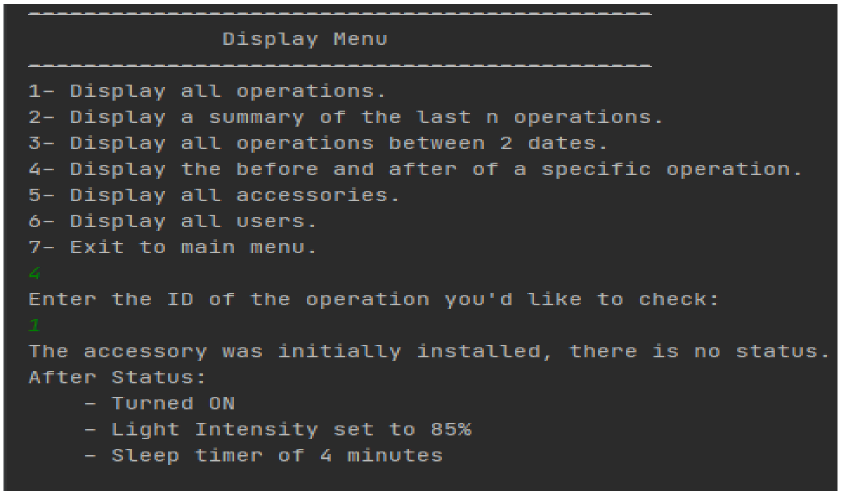
The CLI has been formatted using ANSI codes to give the user a slick and unique experience whilst handling the CLI. A test run with the images is shown below:



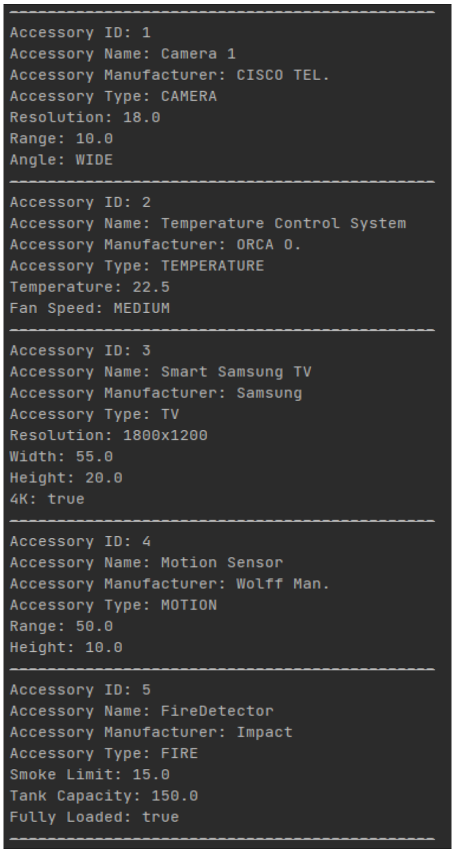
```
--------------------------------------------------
Welcome to Jarvis' Smart Home technology CLI.
--------------------------------------------------
Username: geo
Password: geo

Wrong login details, try again!
--------------------------------------------------
Username: Georges
Password: Georges123


--------------------------------------------------
                   Main Menu
--------------------------------------------------
1- Display particular search menu
2- Display filtering menu
3- Register new user.
4- Exit menu
```



```
---------------------------------------------
Operation ID: 2
Operation Room: Room 2
Operation Time: Mon, 24 Jun 2024 at 23:06:33 EEST
Operation Status:
    No status set.

Accessory ID: 2
Accessory Name: Temperature Control System
Accessory Manufacturer: ORCA O.
Accessory Type: TEMPERATURE
Temperature: 22.5
Fan Speed: MEDIUM

User ID: 1
User Name: Georges
User Type: ADMINISTRATOR
---------------------------------------------
Operation ID: 1
Operation Room: Room 1
Operation Time: Sat, 24 Apr 2021 at 13:19:53 EEST
Operation Status:
    - Turned ON
    - Light Intensity set to 85%
    - Sleep timer of 4 minutes

Accessory ID: 1
Accessory Name: Camera 1
Accessory Manufacturer: CISCO TEL.
Accessory Type: CAMERA
Resolution: 18.0
Range: 10.0
Angle: WIDE

User ID: 1
User Name: Georges
User Type: ADMINISTRATOR

---------------------------------------------
```



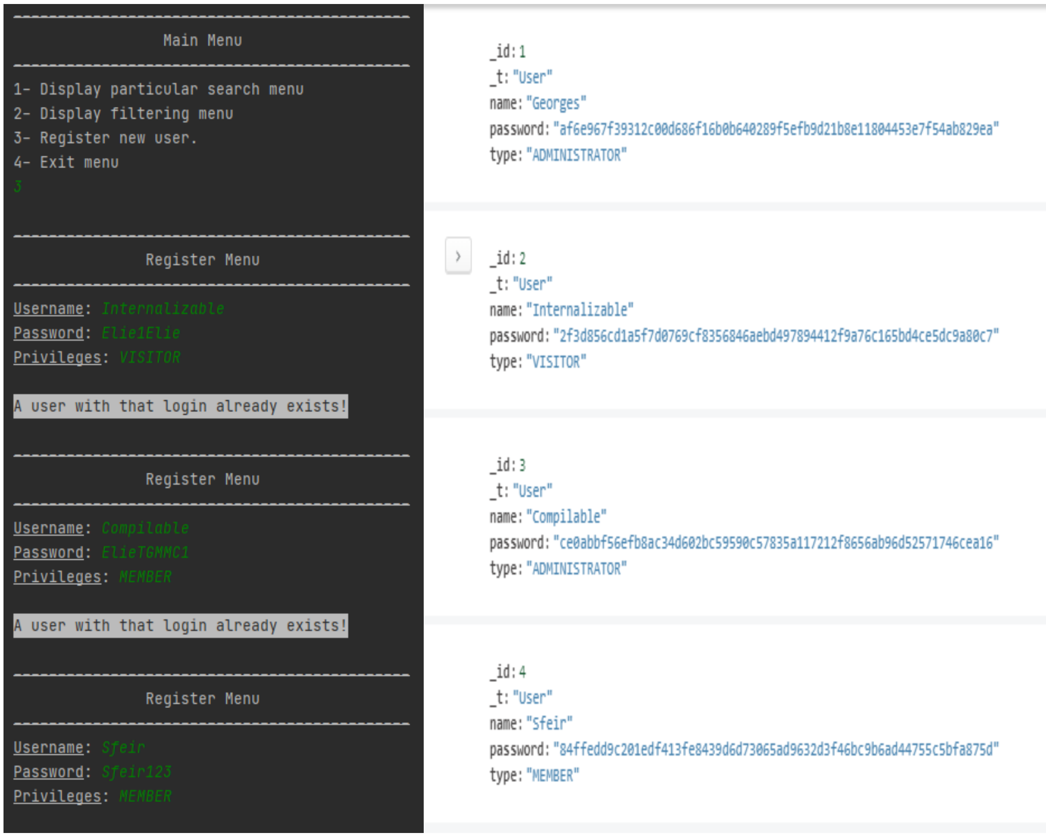
```
---------------------------------------------
              Display Menu
---------------------------------------------
1- Display all operations.
2- Display a summary of the last n operations.
3- Display all operations between 2 dates.
4- Display the before and after of a specific operation.
5- Display all accessories.
6- Display all users.
7- Exit to main menu.
4
Enter the ID of the operation you'd like to check:
1
The accessory was initially installed, there is no status.
After Status:
    - Turned ON
    - Light Intensity set to 85%
    - Sleep timer of 4 minutes
```



```
---------------------------------------------
Accessory ID: 1
Accessory Name: Camera 1
Accessory Manufacturer: CISCO TEL.
Accessory Type: CAMERA
Resolution: 18.0
Range: 10.0
Angle: WIDE
---------------------------------------------
Accessory ID: 2
Accessory Name: Temperature Control System
Accessory Manufacturer: ORCA O.
Accessory Type: TEMPERATURE
Temperature: 22.5
Fan Speed: MEDIUM
---------------------------------------------
Accessory ID: 3
Accessory Name: Smart Samsung TV
Accessory Manufacturer: Samsung
Accessory Type: TV
Resolution: 1800x1200
Width: 55.0
Height: 20.0
4K: true
---------------------------------------------
Accessory ID: 4
Accessory Name: Motion Sensor
Accessory Manufacturer: Wolff Man.
Accessory Type: MOTION
Range: 50.0
Height: 10.0
---------------------------------------------
Accessory ID: 5
Accessory Name: FireDetector
Accessory Manufacturer: Impact
Accessory Type: FIRE
Smoke Limit: 15.0
Tank Capacity: 150.0
Fully Loaded: true
---------------------------------------------
```

F. CLI Registration

The CLI includes a registration submenu that allows the administrator to register more users. After registering the user, the program automatically updates the references in the database.



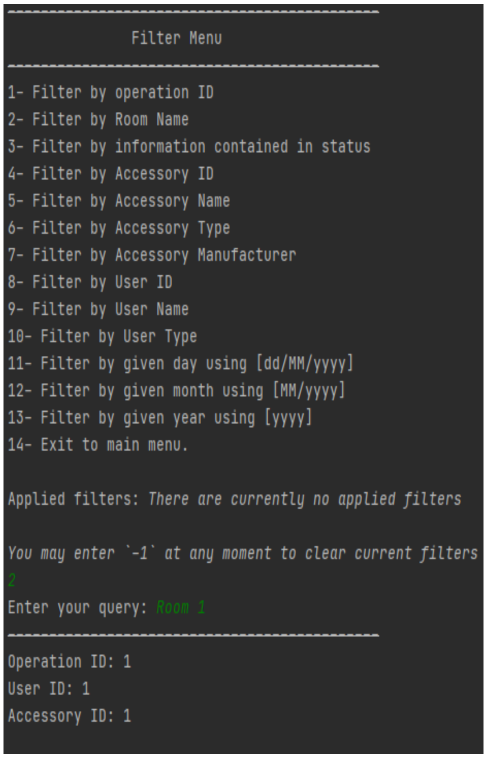
```
---------------------------------------------
                  Main Menu
---------------------------------------------
1- Display particular search menu
2- Display filtering menu
3- Register new user.
4- Exit menu
3

---------------------------------------------
                Register Menu
---------------------------------------------
Username: Internalizable
Password: Elie1Elie
Privileges: VISITOR

A user with that login already exists!

---------------------------------------------
                Register Menu
---------------------------------------------
Username: Compilable
Password: ElieTGMMC1
Privileges: MEMBER

A user with that login already exists!

---------------------------------------------
                Register Menu
---------------------------------------------
Username: Sfeir
Password: Sfeir123
Privileges: MEMBER
```

```
_id:1
_t:"User"
name:"Georges"
password:"af6e967f39312c00d686f16b0b640289f5efb9d21b8e11804453e7f54ab829ea"
type:"ADMINISTRATOR"

_id:2
_t:"User"
name:"Internalizable"
password:"2f3d856cd1a5f7d0769cf8356846aebd497894412f9a76c165bd4ce5dc9a80c7"
type:"VISITOR"

_id:3
_t:"User"
name:"Compilable"
password:"ce0abbf56efb8ac34d602bc59590c57835a117212f8656ab96d52571746cea16"
type:"ADMINISTRATOR"

_id:4
_t:"User"
name:"Sfeir"
password:"84ffedd9c201edf413fe8439d6d73065ad9632d3f46bc9b6ad44755c5bfa875d"
type:"MEMBER"
```

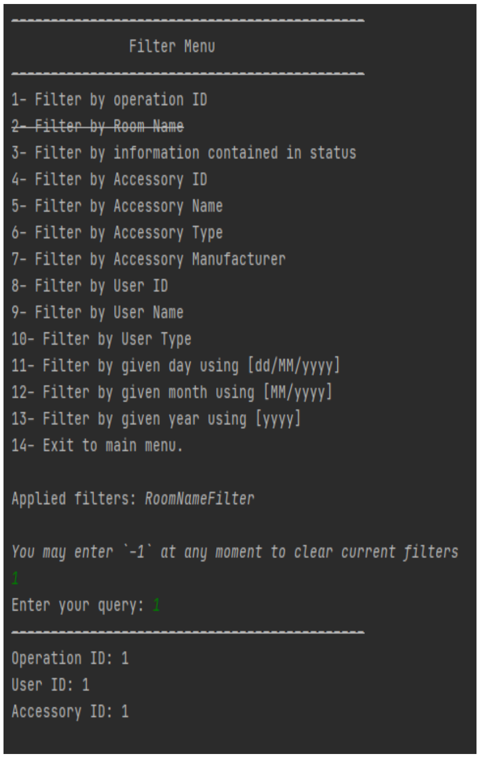
G. CLI Filter Submenu

The CLI provides a filter submenu used in aggregation mode. That means you can query any operation given any parameter, and you can apply more filters to the initial search. They all implement a common IFilter interface, making adding filters seamless.

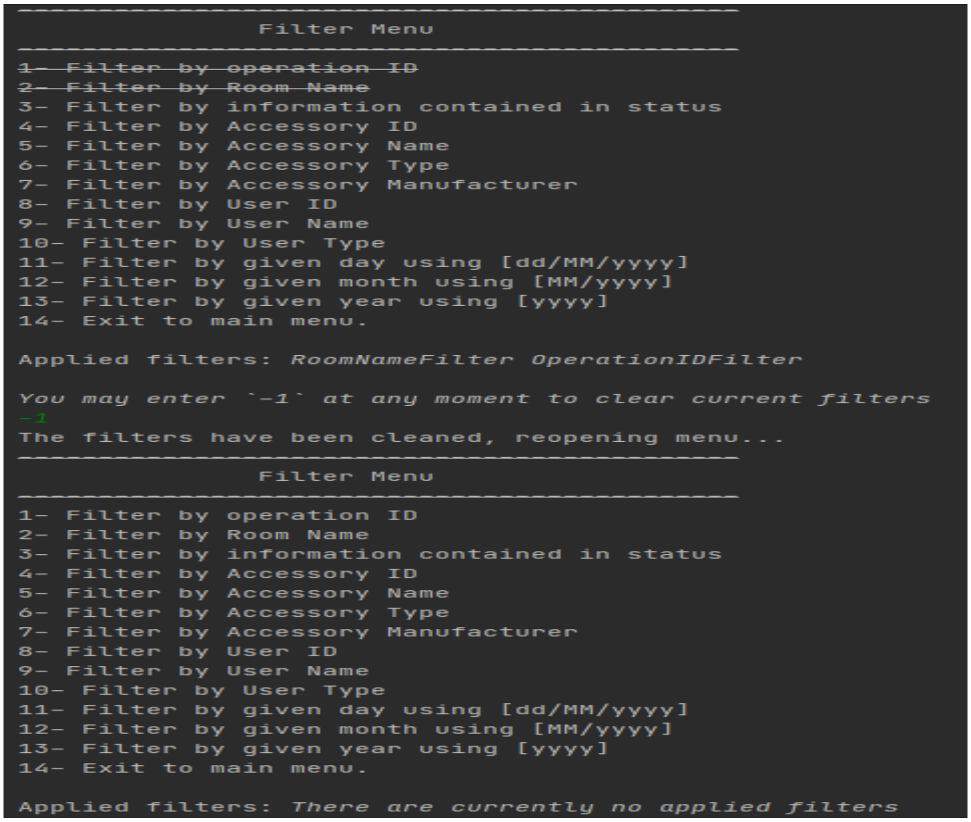
```java
public interface IFilter {

    default String getFilterName() {
        return getClass().getName();
    }

    int getFilterID();
    Predicate<Operation> getPredicate(Object filterValue);

}
```



```
----------------------------------------------
               Filter Menu
----------------------------------------------
1- Filter by operation ID
2- Filter by Room Name
3- Filter by information contained in status
4- Filter by Accessory ID
5- Filter by Accessory Name
6- Filter by Accessory Type
7- Filter by Accessory Manufacturer
8- Filter by User ID
9- Filter by User Name
10- Filter by User Type
11- Filter by given day using [dd/MM/yyyy]
12- Filter by given month using [MM/yyyy]
13- Filter by given year using [yyyy]
14- Exit to main menu.

Applied filters: There are currently no applied filters

You may enter `-1` at any moment to clear current filters
2
Enter your query: Room 1
----------------------------------------------
Operation ID: 1
User ID: 1
Accessory ID: 1
```



```
----------------------------------------------
               Filter Menu
----------------------------------------------
1- Filter by operation ID
~~2- Filter by Room Name~~
3- Filter by information contained in status
4- Filter by Accessory ID
5- Filter by Accessory Name
6- Filter by Accessory Type
7- Filter by Accessory Manufacturer
8- Filter by User ID
9- Filter by User Name
10- Filter by User Type
11- Filter by given day using [dd/MM/yyyy]
12- Filter by given month using [MM/yyyy]
13- Filter by given year using [yyyy]
14- Exit to main menu.

Applied filters: RoomNameFilter

You may enter `-1` at any moment to clear current filters
1
Enter your query: 1
----------------------------------------------
Operation ID: 1
User ID: 1
Accessory ID: 1
```



```
----------------------------------------------
               Filter Menu
----------------------------------------------
~~1- Filter by operation ID~~
~~2- Filter by Room Name~~
3- Filter by information contained in status
4- Filter by Accessory ID
5- Filter by Accessory Name
6- Filter by Accessory Type
7- Filter by Accessory Manufacturer
8- Filter by User ID
9- Filter by User Name
10- Filter by User Type
11- Filter by given day using [dd/MM/yyyy]
12- Filter by given month using [MM/yyyy]
13- Filter by given year using [yyyy]
14- Exit to main menu.

Applied filters: RoomNameFilter OperationIDFilter

You may enter `-1` at any moment to clear current filters
-1
The filters have been cleaned, reopening menu...
----------------------------------------------
               Filter Menu
----------------------------------------------
1- Filter by operation ID
2- Filter by Room Name
3- Filter by information contained in status
4- Filter by Accessory ID
5- Filter by Accessory Name
6- Filter by Accessory Type
7- Filter by Accessory Manufacturer
8- Filter by User ID
9- Filter by User Name
10- Filter by User Type
11- Filter by given day using [dd/MM/yyyy]
12- Filter by given month using [MM/yyyy]
13- Filter by given year using [yyyy]
14- Exit to main menu.

Applied filters: There are currently no applied filters
```

III. Conclusion, repository and javadocs

The repository of this project is publicly available on Github with it's respective Javadoc repository under this link.