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| *FLORIDA INTERNATIONAL UNIVERSITY*  School of Computing and Information Sciences  CIS 4911 Senior Capstone Project |
| **Smart Systems for Occupancy and Building Energy Control (SSOBEC)** |
| Requirements Document (RD) |
|  |
|  |
| **Instructor**: Dr. Masoud Sadjadi  **Mentor**: Dr. Leonardo Bobadilla  **Mentor:** Dr. Ali Mostafavi    01/23/2015  *Group Member:*  Maria Eugenia Presa Reyes  Dalaidis Hidalgo Arencibia |

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* Abstract – one or two paragraphs giving a brief overview of the document.

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# Introduction

## Problem Definition.

Below is a list of definitions, acronyms, and abbreviations.

**DEFINITIONS:**

**Facility Manager**: Person that has elevated privileges in the application.

**Room Owner**: Person with limited access, who uses the application to track energy consumption for just his own rooms.

**Android Studio**: Is the official IDE that it is used by Android application development based on IntelliJ IDEA.

**ACRONYMS AND ABBREVIATIONS:**

**SSOBEC**: Is an app which aims to help people learn to reduce the consume of energy.

**EIA:** U.S. Energy Information Administration

**DB**: Database

**FIU**: Florida International University

**SCIS**: School of Computing & Information Sciences

**App**: Application

## 1.2 Scope of system.

1.3 Terminology - Definitions, acronyms, and abbreviations.

* 1. Overview of document – brief explanation of what to expect in chapters 2 through 6.

1. Current System (limitations and problems) – either existing system or manual system that is being automated.

# Project Plan

This chapter present the SSOBEC system a project manager. Initially, the organization of the project and its roles will be listed and described. Next, the milestones with all the task and Deliverables will be planned. To conclude, the estimate cost amount will be offered.

## 3.1 Project organization

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **NAME** | **ROLES** | **TASKS** | **PERIOD REQUIRED** | **KEY PHASES** |
| Maria Presa | * Project manager * Document Editor * Developer * Test Engineer |  |  |  |
| Dalaidis Hidalgo | * Project manager * Document Editor * Developer * Test Engineer |  |  |  |

## 3.2 Work breakdown

|  |  |
| --- | --- |
| **MILESTONE** | **TASK AND DELIVERABLE** |
| Documentation | * Feasibility Study * Project Plan * System Design * Object Design |
| Environment Setup | * Android Studio * JDK 8 * Source Tree * Git * Github * StarUML * Visio 2013 * LAMP * Vertabelo * PHPMyAdmin * SqliteBrowser * Google Drive * Mingle |
| UI Design (Project) | * Login * Logout * Zone Details * Occupancy in different zones * Plug Load * Temperature * Artificial Lighting |

3.3 Cost Estimate

# Proposed System Requirements

Introduce the chapter (one or two paragraphs)

## 4.1 Functional Requirements

Use the following format:

*The system shall …*

For each functional requirement state the associated non-functional requirements, if any, for *Usability, Reliability, Performance,* and *Supportability*.

## 4.2 Analysis of System Requirements

Analysis models – contains the complete functional specification and is mainly for the designers and programmers. This section describes the diagrams in the Appendices B - D and validates the models against the use cases.

### 4.1.1 Scenarios

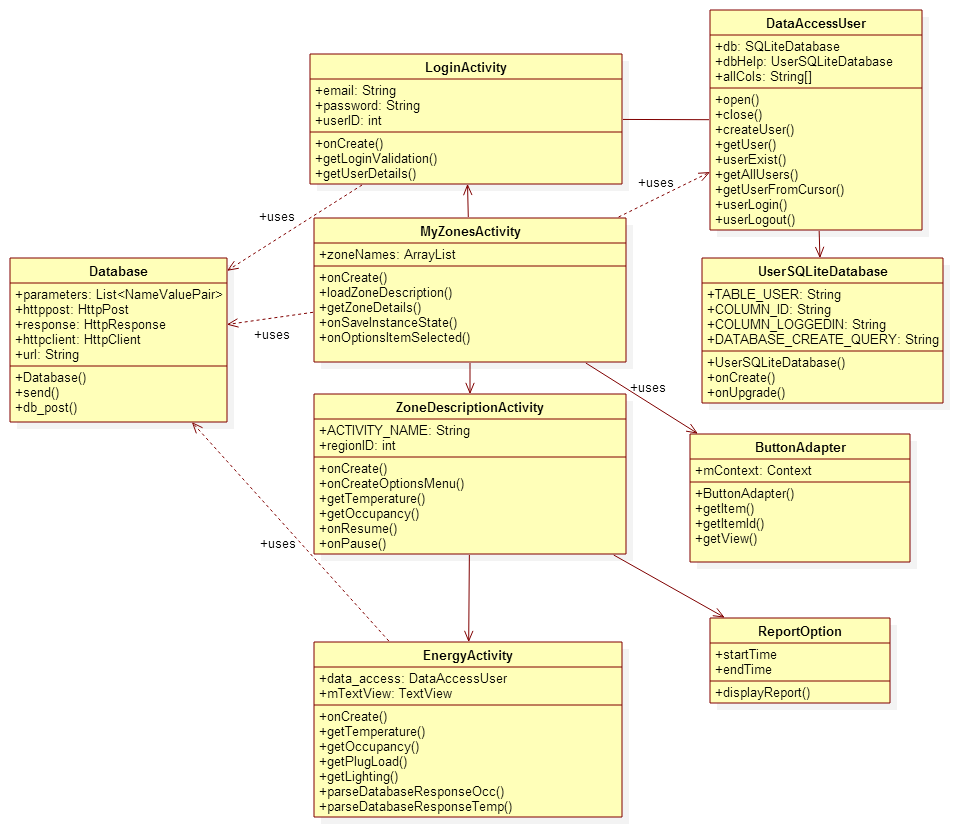
### 4.1.2 Use case model

The use case diagram provide the list of steps that defines the interaction between the two types of users displayed in the diagram: facility manager and occupant. They all have the intention to accomplish the goal of this proposed system.



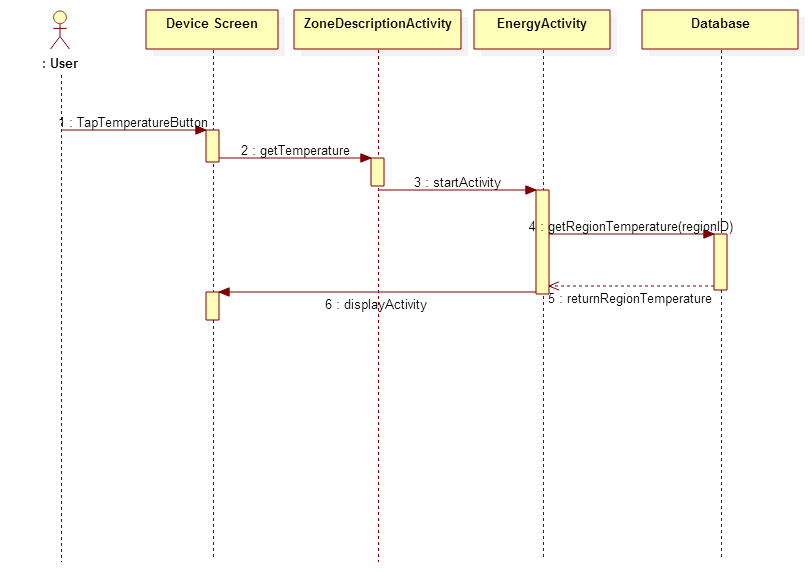
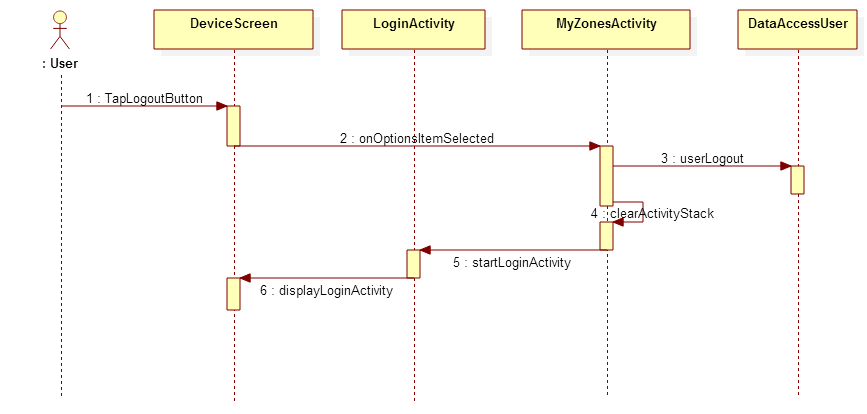
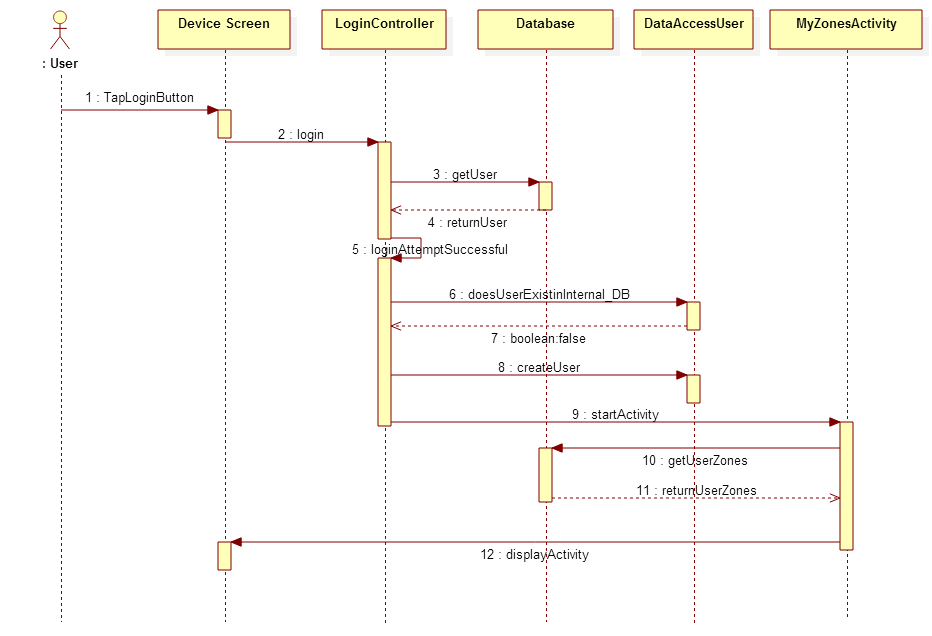
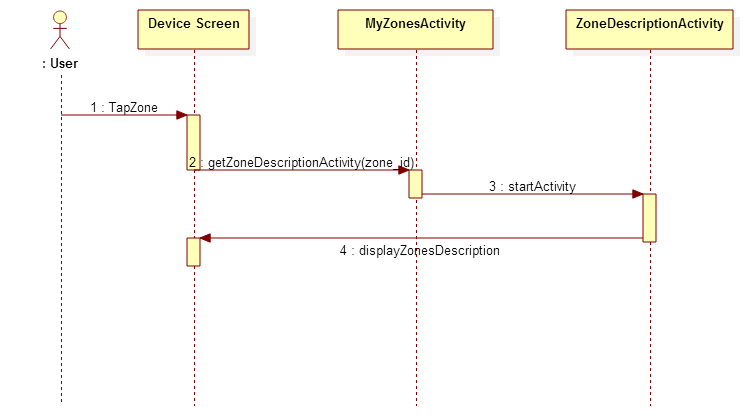
### 4.1.3 Static model

A static model states the system. The diagram will display the structure of the system by showing the classes, attributes, methods, and also the relationship that can be between these classes.



### 4.1.4 Dynamic model

The dynamic model does account for time. For the Smart Systems for Occupancy and Building Energy Control, sequence diagram will be included. These has objective to show the interaction between object and class in a sequence of event arranged in a time line. In addition, it displays functionality in order to allow the developers and programmers to view how the users should made transition based on these actions.



# Glossary

|  |  |
| --- | --- |
| **TERM** | **MEANING** |
| Class Diagram | An illustration of all the classes in the system. |
| Sequence Diagram | An illustration on how processes operate with one another and the user during the execution of one specific functionality. |
| Use Case | List of steps describing the interaction between a user and a system to achieve one goal. |
| Task | A piece of job that require to be done within a certain time. |
| Functional Requirement | Statements of services the system should provide, how the system should react to particular inputs and how the system should behave in particular situations. |
| Non- Functional Requirement | Constraints on the system e.g., max. response time, min. throughput, reliability, OS platform etc.. |

# Appendix

## 6.1 Appendix A - Complete use cases

The following use cases that we are implementing:

UseCase ID: **SSOBEC01-Login**

ACTORS:

Facility Manager

Occupant

PRE-CONDITIONS:

1. Download the application.
2. Install the application.
3. Application activated.
4. Created account.
5. Users must have a username and password created.

DESCRIPTION:

1. Use case begins when the Facility Manager/Occupant access the login option.
2. Use case ends when the user will be prompted with a data entry template for username and password.

RELEVANT REQUIREMENTS:

A user will only be admitted into the system if he/she has a valid username and password.

POST-CONDITIONS:

1. Login Successful to the system.

ALTERNATIVE COURSES OF ACTION FOR VENUE REGISTERED VISITOR:

1. In step 2 the user have the option to reset the password if he/she want.

EXCEPTIONS:

1. The login option on the application is not active.
2. The cancel option in the application is not active.
3. The option to reset password is not active.
4. The database is inactive.

RELATED USE CASES:

SPECIAL REQUIREMENTS:

* Usability: No previous training time because is simple and easy following the instruction.
* Reliability: The application should perform correctly 99% of the time.
* Performance: The application should be sent and save within 5 seconds.
* Supportability: The application should be easy to maintain and make appropriate changes and be correctly handled by Android.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

UseCase ID: **SSOBEC02-Logout**

ACTORS:

Facility Manager

Occupant

PRE-CONDITIONS:

1. Users must have previously logged in.

DESCRIPTION:

1. Use case begins when the Facility Manager/ Occupant accesses the logout option.
2. Use case ends when the user is log out of the system and display the login screen.

RELEVANT REQUIREMENTS:

1. A user will only have access to logout if he/she has been previously signed into the system.

POST-CONDITIONS:

1. User gets successfully logged out of the system.

ALTERNATIVE COURSES OF ACTION FOR VENUE REGISTERED VISITOR:

1. N/A.

EXCEPTIONS:

1. The logout option on the application is not active.

RELATED USE CASES:

* Login

SPECIAL REQUIREMENTS:

* Usability: No previous training time because is simple and easy following the instruction.
* Reliability: The application should perform correctly 99% of the time.
* Performance: The application should be sent and save within 5 seconds.
* Supportability: The application should be easy to maintain and make appropriate changes and be correctly handled by Android.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

UseCase ID: **SSOBEC03-Zones**

ACTORS:

Facility Manager

Occupant

PRE-CONDITIONS:

1. The user has registered the zone he/she which to observe
2. The user has access to the zone

DESCRIPTION:

1. Use case begins when the user taps on the zone that appears in the screen
2. The application will then fetch all the data for that particular zone
3. Use case ends when the system displays on the phone screen all the information for the zone chosen by the user

RELEVANT REQUIREMENTS:

1. An occupant will only be able to add a room if he/she is authorized by the facility manager

POST-CONDITIONS:

1. The user will have a list of drop down menus named: “Occupancy”, “Temperature” and “Plug Load” each with further examples of the description of the room.

EXCEPTIONS:

1. The database is not active

RELATED USE CASES:

* Temperature
* Occupancy
* Plug Load
* Artificial Lighting

SPECIAL REQUIREMENTS:

* Usability: No previous training time.
* Reliability: The system should work 99% of the time.
* Performance: The application should be sent and save within 5 seconds
* Supportability: The application should be easy to maintain and make appropriate changes and be correctly handled by Android.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

UseCase ID: **SSOBEC04- Notification**

ACTORS:

Facility Manager

Occupant

PRE-CONDITIONS:

1. Occupant is logged in.
2. Occupant is located in one zone.

DESCRIPTION:

1. Use case begins when the system recognize that in one zone of the occupant is not saving energy. (e.g. the lights were left on while room is empty).
2. Use case ends when the system automatically sends a notification message to an Occupant using a text message to his/her phone.

RELEVANT REQUIREMENTS:

1. An occupant will only be notify if he/she is the responsible on save energy specifically on his/her zone.

POST-CONDITIONS:

1. The occupant has a notification on his/her phone.

ALTERNATIVE COURSES OF ACTION FOR VENUE REGISTERED VISITOR:

1. N/A

EXCEPTIONS:

1. The notification is not received but it is sent.
2. The notification is not sent.

RELATED USE CASES:

* Temperature
* Occupancy
* Plug Load
* Artificial Lighting

SPECIAL REQUIREMENTS:

* Usability: N/A
* Reliability: The use should perform correctly 99% of time.
* Performance: The notification should be sent immediately when the times comes.
* Supportability: Notification should be correctly handle by Android.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

UseCase ID: **SSOBEC05- Report**

ACTORS:

Facility Manager

Occupant

PRE-CONDITIONS:

1. Facility Manager/Occupant is logged in.
2. The database is up to date in the system and in real time.

DESCRIPTION:

1. Use case begins when the user wants to make a request of some information for a specific period of time.
2. Use case ends when the access to create a report is granted with full access to the Facility Manager and a Limited access for the Occupant.

RELEVANT REQUIREMENTS:

1. A Facility Manager can has full access to create a report while the Occupant has only access to one limit zone in with he/she is the responsible to save energy.

POST-CONDITIONS:

1. Access to make a report is granted.

ALTERNATIVE COURSES OF ACTION:

1. N/A

EXCEPTIONS:

1. The report in the Android application is not active.

RELATED USE CASES:

* Login
* Logout
* Temperature
* Occupancy
* Plug Load
* Artificial Lighting

SPECIAL REQUIREMENTS:

* Usability: No previous time because is simple and easy to follow the steps.
* Reliability: The system should perform correctly 99 % of the time.
* Performance: The application should be sent and save within 5 seconds.
* Supportability: Report should be correctly handle by Android.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

UseCase ID: **SSOBEC07- Temperature**

ACTORS:

Facility Manager

Occupant

PRE-CONDITIONS:

1. Facility Manager/Occupant is logged in.
2. The Facility Manager/Occupant have been selected a zone that was previous register for them.

DESCRIPTION:

1. Use case begins when the user select temperature
2. Use case ends when the user can have access to all the information regarding temperature for the real time.

RELEVANT REQUIREMENTS:

1. A Facility Manager can has full access to see the temperature in all zones while the Occupant has only access to one limit zone to see the temperature in with he/she is the responsible to save energy.

POST-CONDITIONS:

1. Access to see the temperature is granted.

ALTERNATIVE COURSES OF ACTION:

1. N/A

EXCEPTIONS:

1. The temperature in the Android application is not active.

RELATED USE CASES:

* Login
* Zones

SPECIAL REQUIREMENTS:

* Usability: No previous time because is simple and easy to follow the steps.
* Reliability: The system should perform correctly 99 % of the time.
* Performance: The application should be sent and save within 5 seconds.
* Supportability: Report should be correctly handle by Android.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

UseCase ID: **SSOBEC08- Plug Load**

ACTORS:

Facility Manager

Occupant

PRE-CONDITIONS:

1. Facility Manager/Occupant is logged in.
2. The Facility Manager/Occupant have been selected a zone that was previous register for them.

DESCRIPTION:

1. Use case begins when the user select Plug Load
2. Use case ends when the user can have access to all the information regarding plug load for the real time.

RELEVANT REQUIREMENTS:

1. A Facility Manager can has full access to see the information of plug load in all zones while the Occupant has only access to one limit zone to see the information about plug load in with he/she is the responsible to save energy.

POST-CONDITIONS:

1. Access to see the plug load is granted.

ALTERNATIVE COURSES OF ACTION:

1. N/A

EXCEPTIONS:

1. The plug load in the Android application is not active.

RELATED USE CASES:

* Login
* Zones

SPECIAL REQUIREMENTS:

* Usability: No previous time because is simple and easy to follow the steps.
* Reliability: The system should perform correctly 99 % of the time.
* Performance: The application should be sent and save within 5 seconds.
* Supportability: Report should be correctly handle by Android.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

UseCase ID: **SSOBEC09- Occupancy**

ACTORS:

Facility Manager

Occupant

PRE-CONDITIONS:

1. Facility Manager/Occupant is logged in.
2. The Facility Manager/Occupant have been selected a zone that was previous register for them.

DESCRIPTION:

1. Use case begins when the user select occupancy
2. Use case ends when the user can have access to all the information regarding occupancy for the real time.

RELEVANT REQUIREMENTS:

1. A Facility Manager can has full access to see the information of occupancy in all zones while the Occupant has only access to one limit zone to see the information of occupancy in with he/she is the responsible to save energy.

POST-CONDITIONS:

1. Access to see the occupancy is granted.

ALTERNATIVE COURSES OF ACTION:

1. N/A

EXCEPTIONS:

1. The occupancy in the Android application is not active.

RELATED USE CASES:

* Login
* Zones

SPECIAL REQUIREMENTS:

* Usability: No previous time because is simple and easy to follow the steps.
* Reliability: The system should perform correctly 99 % of the time.
* Performance: The application should be sent and save within 5 seconds.
* Supportability: Report should be correctly handle by Android.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

UseCase ID: **SSOBEC10- Artificial Lighting**

ACTORS:

Facility Manager

Occupant

PRE-CONDITIONS:

1. Facility Manager/Occupant is logged in.
2. The Facility Manager/Occupant have been selected a zone that was previous register for them.

DESCRIPTION:

1. Use case begins when the user select Artificial Lighting
2. Use case ends when the user can have access to all the information regarding artificial lighting for the real time.

RELEVANT REQUIREMENTS:

1. A Facility Manager can has full access to see the information regarding Artificial Lighting in all zones while the Occupant has only access to one limit zone to see the the information regarding Artificial Lighting in with he/she is the responsible to save energy.

POST-CONDITIONS:

1. Access to see the information regarding Artificial Lighting is granted.

ALTERNATIVE COURSES OF ACTION:

1. N/A

EXCEPTIONS:

1. The Artificial Lighting in the Android application is not active.

RELATED USE CASES:

* Login
* Zones

SPECIAL REQUIREMENTS:

* Usability: No previous time because is simple and easy to follow the steps.
* Reliability: The system should perform correctly 99 % of the time.
* Performance: The application should be sent and save within 5 seconds.
* Supportability: Report should be correctly handle by Android.

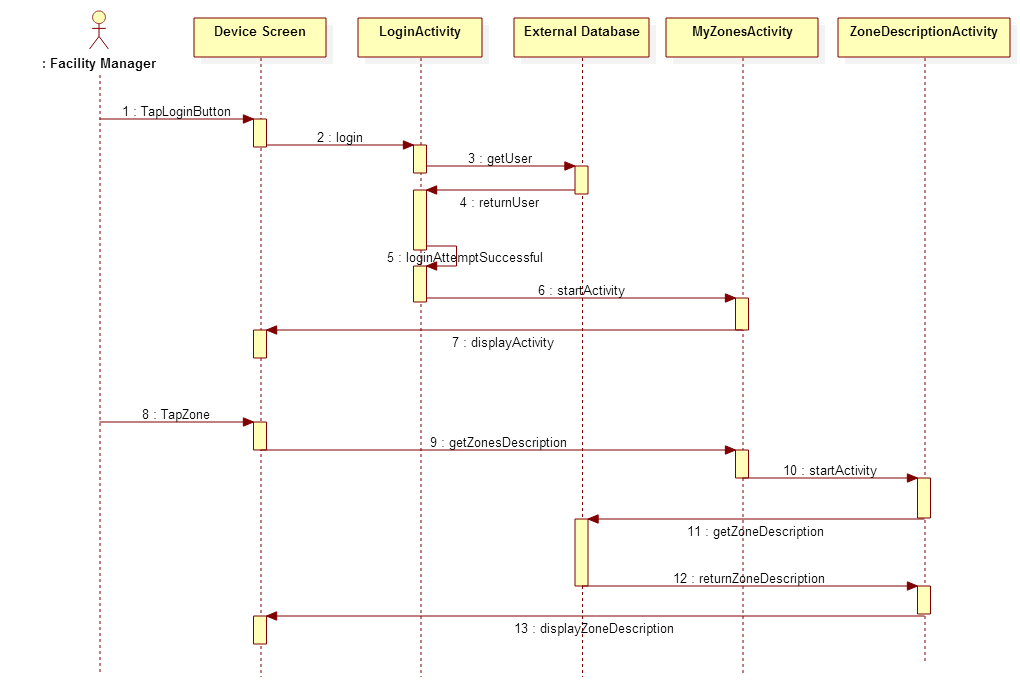
## 6.2 Appendix B - Use case diagram using UML



## 6.3 Appendix C - Static UML diagram



## 6.4 Appendix D - Dynamic UML diagrams





## 6.5 Appendix E - User Interface designs.

6.6 Appendix F - Diary of meeting and tasks.

Following are the diary entries for all of our meetings throughout the semester.

|  |  |
| --- | --- |
| **DATE** | January 21, 2015 |
| **Location** | FIU Modesto A. Maidique Campus ECS 212B |
| **Start** | 5:00 pm |
| **End** | 6:30 pm |
| **In Attendance** | Leonardo Bobadilla  Ali Mostafavi  Maria Presa Reyes  Dalaidis Hidalgo Arencibia |
| **Late** | N/A |
| **Agenda** | - General Background of the project  - Collect User Stories  - Begin to work with Feasibility Study |
| **Summary of Discussion** | -Meeting Time (All  weeks) |
| **Assigned Tasks** | -Create Google Drive to share our document between us.  - Continue working with user stories to improve our work. |

|  |  |
| --- | --- |
| **DATE** | January 26, 2015 |
| **Location** | FIU Modesto A. Maidique Campus ECS 212B |
| **Start** | 4:00 pm |
| **End** | 5:10 pm |
| **In Attendance** | Leonardo Bobadilla  Ali Mostafavi  Maria Presa Reyes  Dalaidis Hidalgo Arencibia |
| **Late** | N/A |
| **Agenda** | - Product Backlog  - Feasibility Study  -Project Plan  -System Design  -Object Design  -Name Android Application |
| **Summary of Discussion** | -Programs and tool to use in our application. |
| **Assigned Tasks** | -Dr. Leonardo Bobadilla and Dr. Ali Mostafavi make the selection of the Name of the Android Application.  -Continue working with the documentation in order to try to do the most that we can.  -Make a selection of the Linux machine for the Database. |

|  |  |
| --- | --- |
| **DATE** | January 30, 2015 |
| **Location** | FIU Modesto A. Maidique Campus ECS 212B |
| **Start** | 4:00 pm |
| **End** | 5:00 pm |
| **In Attendance** | Leonardo Bobadilla  Ali Mostafavi  Maria Presa Reyes  Dalaidis Hidalgo Arencibia |
| **Late** | N/A |
| **Agenda** | - Check the Name of the Android Application  - Check our ideas of the Product Backlog with our mentors  - Check Feasibility Study  - Check Project Plan  - Check System Design  - Check Object Design  - Continue working of the documentation  -Continue thinking on the design of different diagrams  -Prepare the PorwerPoint for the presentation |
| **Summary of Discussion** |  |
| **Assigned Tasks** |  |

|  |  |
| --- | --- |
| **DATE** |  |
| **Location** | FIU Modesto A. Maidique Campus ECS 212B |
| **Start** | 4:00 pm |
| **End** | 5:00 pm |
| **In Attendance** | Leonardo Bobadilla  Ali Mostafavi  Maria Presa Reyes  Dalaidis Hidalgo Arencibia |
| **Late** | N/A |
| **Agenda** |  |
| **Summary of Discussion** |  |
| **Assigned Tasks** |  |

|  |  |
| --- | --- |
| **DATE** |  |
| **Location** | FIU Modesto A. Maidique Campus ECS 212B |
| **Start** | 4:00 pm |
| **End** | 5:00 pm |
| **In Attendance** | Leonardo Bobadilla  Ali Mostafavi  Maria Presa Reyes  Dalaidis Hidalgo Arencibia |
| **Late** | N/A |
| **Agenda** |  |
| **Summary of Discussion** |  |
| **Assigned Tasks** |  |

7. References

***Please email me the UML diagram in one file before the presentation.***