



FPT UNIVERSITY

Capstone Project Document

FACILITIES MANAGEMENT SYSTEM IN THE BUILDING

| SWP490-G7 | |
|------------------------------|---|
| Group Members | Bùi Như Nhật - HE140280 Đương Đức Thành - HE140025 Nguyễn Thu Hà - HE140104 Nguyễn Công Thành - HE140350 Phạm Tuấn Vương - HE140353 |
| Supervisor | Phạm Đức Thắng |
| Ext Supervisor | |
| Capstone Project code | FMS |

- Hanoi, August 2022 -

Table of Contents

| | |
|--|----|
| Acknowledgement | 10 |
| Definition and Acronyms..... | 11 |
| I. Project Introduction | 12 |
| 1. Overview | 12 |
| 1.1 Project Information..... | 12 |
| 1.2 Project Team | 12 |
| 1.2.1 Supervisor | 12 |
| 1.2.2 Teams members..... | 12 |
| 1.2.3 Stakeholders | 12 |
| 2. Product Background..... | 12 |
| 3. Existing Systems..... | 13 |
| 3.1 FPT Campus Infrastructure Management (cim.fpt) | 13 |
| 3.2 Cảnh quan văn phòng (CQVP)..... | 14 |
| 4. Business Opportunity..... | 14 |
| 5. Software Product Vision | 15 |
| 6. Project Scope & Limitations | 15 |
| 6.1 Major Features..... | 15 |
| 6.2 Limitations & Exclusions | 16 |
| II. Project Management Plan..... | 17 |
| 1. Overview | 17 |
| 1.1 Scope & Estimation | 17 |
| 1.2 Project Objectives | 19 |
| 1.3 Project Risks | 19 |
| 2. Management Approach..... | 20 |
| 2.1 Project Process..... | 20 |
| 2.2 Quality Management | 20 |
| 2.3 Training Plan..... | 20 |
| 3. Project Deliverables | 21 |
| 4. Responsibility Assignments..... | 21 |
| 5. Project Communications | 22 |
| 6. Configuration Management | 22 |
| 6.1 Document Management | 22 |
| 6.2 Source Code Management..... | 22 |
| 6.3 Tools & Infrastructures | 22 |

| | |
|---|----|
| III. Software Requirement Specification | 23 |
| 1. Product Overview | 23 |
| 2. User Requirements..... | 24 |
| 2.1 Use Case Diagram | 24 |
| 2.2 Actor..... | 24 |
| 2.3 Use cases list | 25 |
| 2.4 Use cases detail..... | 27 |
| 2.4.1 Login..... | 27 |
| 2.4.2 Create trouble report..... | 28 |
| 2.4.2.1 Create trouble report (Login) | 28 |
| 2.4.2.2 Create trouble report (Without login) | 29 |
| 2.4.3 View list trouble reports | 30 |
| 2.4.4 View trouble report detail | 31 |
| 2.4.5 Assign technician..... | 32 |
| 2.4.6 Update report | 33 |
| 2.4.7 View history of changes | 34 |
| 2.4.8 Change workflow | 35 |
| 2.4.9 Update troubleshooting..... | 36 |
| 2.4.10 Cancel report..... | 37 |
| 2.4.11 Delete report..... | 38 |
| 2.4.12 Create checklist..... | 39 |
| 2.4.13 View list checklist | 40 |
| 2.4.14 Checklist detail | 41 |
| 2.4.15 Customize checklist..... | 42 |
| 2.4.15.1 Create/ Update/ Delete Checklist templates..... | 42 |
| 2.4.15.2 Create/ Update/ Delete Checklist components..... | 43 |
| 2.4.15.3 Preview | 45 |
| 2.4.16 View Technical report | 46 |
| 2.4.17 Import/ Export warehouse | 47 |
| 2.4.18 Import/ Export warehouse history | 49 |
| 2.4.19 Warehouse remaining list..... | 50 |
| 2.4.20 Customize warehouse standards..... | 51 |
| 2.4.21 View map | 52 |
| 2.4.22 Customize map..... | 53 |
| 2.4.23 Create/ Update Campuses | 54 |
| 2.4.24 Create/ Update Locations | 55 |

| | |
|--|----|
| 2.4.25 Create/ Update Areas/ Rooms..... | 56 |
| 2.4.26 Create/ Update Users | 57 |
| 2.4.27 Create/ Update Categories | 57 |
| 2.4.28 Create/ Update Assets | 59 |
| 3. Functional Requirements | 60 |
| 3.1 System Functional Overview..... | 60 |
| 3.1.1 Screens Flow | 60 |
| 3.1.2 Screen Descriptions..... | 61 |
| 3.1.3 Screen Authorization | 62 |
| 3.1.4 Entity Relationship Diagram..... | 63 |
| 3.2 Login..... | 65 |
| 3.2.1 Login..... | 65 |
| 3.3 Trouble Management | 66 |
| 3.3.1 Create trouble report..... | 66 |
| 3.3.1.1 Create trouble report (Login) | 66 |
| 3.3.1.2 Create trouble report (Without login) | 67 |
| 3.3.2 View list trouble reports | 67 |
| 3.3.3 View trouble report detail | 68 |
| 3.3.4 Assign technician..... | 68 |
| 3.3.5 Update report | 70 |
| 3.3.6 View history of changes | 70 |
| 3.3.7 Change workflow | 70 |
| 3.3.8 Update troubleshooting..... | 71 |
| 3.3.9 Cancel report..... | 71 |
| 3.3.10 Delete report..... | 71 |
| 3.4 Checklist Management | 72 |
| 3.4.1 Create checklist | 72 |
| 3.4.2 View list checklist | 72 |
| 3.4.3 Checklist detail | 72 |
| 3.4.4 Customize checklist..... | 73 |
| 3.4.4.1 Create/ Update/ Delete Checklist templates..... | 73 |
| 3.4.4.2 Create/ Update/ Delete Checklist components..... | 74 |
| 3.4.4.3 Preview | 74 |
| 3.5 Technical Report | 76 |
| 3.5.1 View Technical report | 76 |
| 3.6 Warehouse Management | 79 |

| | |
|--|----|
| 3.6.1 Import/ Export warehouse | 79 |
| 3.6.2 Import/ Export warehouse history | 80 |
| 3.6.3 Warehouse remaining list | 80 |
| 3.6.4 Customize warehouse standards..... | 81 |
| 3.7 Map | 81 |
| 3.7.1 View map | 81 |
| 3.7.2 Customize map..... | 82 |
| 3.8 Configuration Management..... | 82 |
| 3.8.1 Create/ Update Campuses..... | 82 |
| 3.8.2 Create/ Update Locations | 83 |
| 3.8.3 Create/ Update Areas/ Rooms..... | 83 |
| 3.8.4 Create/ Update Users | 84 |
| 3.8.5 Create/ Update Categories | 84 |
| 3.8.6 Create/ Update Assets | 84 |
| 4. Non-Functional Requirements | 85 |
| 4.1 External Interfaces | 85 |
| 4.2 Quality Attributes..... | 85 |
| 5. Requirement Appendix | 85 |
| 5.1 Business Rules | 85 |
| 5.2 Common Requirements | 85 |
| 5.3 Application Messages List | 85 |
| 5.4 Other Requirements | 87 |
| IV. Software Design Description | 87 |
| 1. System Design | 87 |
| 1.1 System Architecture..... | 87 |
| 1.1.1 Overall Architecture | 87 |
| 1.1.2 Development tool | 88 |
| 1.1.2.1 Front-end..... | 88 |
| 1.1.2.2 Back-end | 88 |
| 1.2.1.3 Database..... | 88 |
| 1.1.2.4 Deployment Enviroment | 89 |
| 1.2 Package Diagram..... | 90 |
| 1.2.1 Front-end | 90 |
| 1.2.2 Back-end..... | 92 |
| 2. Database Design..... | 94 |
| 1.1 Table “Configuration.Roles” | 95 |

| | | |
|-------|--|-----|
| 1.2 | Table “Configuration.MeasureUnits” | 95 |
| 1.3 | Table “Configuration.Categories” | 95 |
| 1.4 | Table “Configuration.Assets” | 95 |
| 1.5 | Table “Configuration.Users” | 96 |
| 1.6 | Table “Configuration.Areas” | 96 |
| 1.7 | Table “Configuration.Locations” | 96 |
| 1.8 | Table “Configuration.Campuses” | 97 |
| 1.9 | Table “Configuration.Workflows” | 97 |
| 1.10 | Table “Configuration.AreaTypes” | 97 |
| 1.11 | Table “Configuration.ChecklistTypes” | 98 |
| 1.12 | Table “Warehouse.ImportAssets” | 98 |
| 1.13 | Table “Warehouse.ExportAssets” | 98 |
| 1.14 | Table “Warehouse.RemainingAssets” | 99 |
| 1.15 | Table “Trouble.Troubleshootings” | 99 |
| 1.16 | Table “Trouble.Reports” | 99 |
| 1.17 | Table “Trouble.Images” | 100 |
| 1.18 | Table “Trouble.HistoryChanges” | 100 |
| 1.19 | Table “Checklists.Results” | 100 |
| 1.20 | Table “Checklist.Items” | 100 |
| 1.21 | Table “Checklist.Components” | 101 |
| 1.22 | Table “Checklist.Templates” | 101 |
| 1.23 | Table “Checklist.Checklists” | 101 |
| 1.24 | Table “Map.Floors” | 102 |
| 1.25 | Table “Map.Doors” | 102 |
| 1.26 | Table “Map.Areas” | 102 |
| 1.27 | Table “Configuration.Roles” | 103 |
| 3. | Detailed Design..... | 104 |
| 3.1 | Trouble Management | 104 |
| 3.1.1 | Class Diagram | 104 |
| 3.1.2 | Create trouble report..... | 104 |
| 3.1.3 | My trouble list..... | 104 |
| 3.1.4 | Update Trouble | 105 |
| 3.1.5 | Delete Trouble | 105 |
| 3.1.6 | Trouble Detail..... | 106 |
| 3.2 | Checklist Management | 106 |
| 3.2.1 | Class diagram | 106 |

| | | |
|--------|---------------------------------|-----|
| 3.2.2 | My Checklists | 106 |
| 3.2.3 | My checklists weekly..... | 107 |
| 3.2.4 | Checklist detail | 107 |
| 3.2.5 | Customize checklists | 108 |
| 3.2.6 | Import popup | 108 |
| 3.2.7 | Create Checklist | 109 |
| 3.2.8 | Update Checklist | 109 |
| 3.2.8 | Delete Checklist..... | 110 |
| 3.3 | Technical – report | 110 |
| 3.3.1 | Get List Technical Report | 110 |
| 3.3.2 | Export Technical Report..... | 111 |
| 3.4 | Map | 111 |
| 3.4.1 | Class Diagram..... | 111 |
| 3.4.2 | Map view..... | 111 |
| 3.4.3 | Customize map..... | 112 |
| 3.5 | Warehouse | 112 |
| 3.5.1 | Class Diagram..... | 112 |
| 3.5.2 | Export Asset | 112 |
| 3.5.3 | Import Asset..... | 113 |
| 3.5.4 | Import History | 113 |
| 3.5.5 | Export History | 114 |
| 3.5.6 | Remaining Report | 114 |
| 3.6 | Configuration | 115 |
| 3.6.1 | Class Diagram..... | 115 |
| 3.6.2 | View Campus..... | 115 |
| 3.6.3 | Create Campus | 115 |
| 3.6.4 | Update Campus..... | 116 |
| 3.6.5 | Delete Campus | 116 |
| 3.6.6 | View Location..... | 117 |
| 3.6.7 | Create Location | 117 |
| 3.6.8 | Update Location | 118 |
| 3.6.9 | Delete Location | 118 |
| 3.6.10 | View Area/ Room | 119 |
| 3.6.11 | Create Area/ Room | 119 |
| 3.6.12 | Update Area/ Room | 120 |
| 3.6.13 | Delete Area/ Room | 120 |

| | | |
|--------|------------------------------------|-----|
| 3.6.14 | View Users..... | 121 |
| 3.6.15 | Create Users..... | 121 |
| 3.6.15 | Update Users..... | 122 |
| 3.6.16 | Delete Users..... | 122 |
| 3.6.17 | View Category | 123 |
| 3.6.18 | Create Category | 123 |
| 3.6.19 | Update Category | 124 |
| 3.6.20 | Delete Category | 124 |
| 3.6.21 | View Asset..... | 125 |
| 3.6.22 | Create Asset | 125 |
| 3.6.23 | Update Asset..... | 126 |
| 3.6.24 | Delete Asset | 126 |
| VI. | Release Package & User Guides..... | 127 |
| 1. | Scope of Testing | 127 |
| 1.1 | In Scope | 127 |
| 1.2 | Stages/levels of testing | 127 |
| 2. | Test Strategy | 128 |
| 2.1 | Testing Model | 128 |
| 2.2 | Testing Types..... | 128 |
| 2.2.1 | Component Testing..... | 128 |
| 2.2.2 | Function Testing..... | 129 |
| 2.2.3 | User Interface Testing..... | 130 |
| 2.2.4 | Regression Testing | 130 |
| 2.2.5 | Business Testing | 131 |
| 2.3 | Test Levels..... | 131 |
| 2.4 | Supporting Tools | 131 |
| 3. | Test Plan..... | 132 |
| 3.1 | Human Resources | 132 |
| 3.2 | Test Milestones..... | 133 |
| 4. | Test Cases | 134 |
| 4.1 | Unit test..... | 134 |
| 4.2 | Integration test | 137 |
| 4.3 | System test..... | 138 |
| 4.4 | Defect & bug log | 139 |
| 4.5 | Acceptance Test | 139 |
| 5. | Test Reports | 140 |

| | |
|--|-----|
| 5.1 Unit Test | 140 |
| 5.2 Integration Test..... | 140 |
| 5.3 System Test | 141 |
| VI. Release Package & User Guides..... | 142 |
| 1. Deliverable Package..... | 142 |
| 2. Installation Guides | 142 |
| 2.1 System Requirements | 142 |
| 2.2 Installation Instruction | 142 |
| 2.2.1 Installation FrontEnd..... | 142 |
| 2.2.2 Installation BackEnd..... | 143 |
| 2.2.3 Deployment..... | 145 |
| 3. User Manual..... | 145 |
| 3.1 Login..... | 145 |
| 3.2 Trouble Management | 146 |
| 3.2.1 Create trouble report(Login)..... | 146 |
| 3.2.1.1 Create trouble with Login (Submit) | 146 |
| 3.2.1.2 Create trouble with Login (Save draft) | 146 |
| 3.2.1.3 Create trouble with Login(Submit) using scan QR Code | 146 |
| 3.2.1.4 Create trouble with Login(Submit) using scan QR Code | 147 |
| 3.2.2 Create trouble report (Without login) | 148 |
| 3.2.2.1 Create trouble without Login | 148 |
| 3.2.2.2 Create trouble without Login using scan QR Code | 148 |
| 3.2.3 View list trouble reports | 148 |
| 3.3 Checklist Management | 156 |
| 3.4 Technical Report | 161 |
| 3.5 Warehouse Management | 164 |
| 3.6 Map | 168 |
| 3.7 Configuration Management..... | 170 |

Acknowledgement

So finally, FMS has reached its final stage after 15 working weeks. Looking back on the past time, it has been a journey full of difficulties and challenges but also extremely meaningful experiences with SWP490-G7. To be able to get to this day, the entire team has worked together, tried non-stop, and especially the enthusiastic support from everyone around. Therefore, we would like to send everyone the most sincere thanks, thank you for always being with us during the past time.

First, we express our deep gratitude to our supervisor - Mr. Pham Duc Thang. From the very first days, he has been with us, giving us directions and useful advice to help our team choose the right topic. Thank you very much for the last time, you have always been by our side to support, supervise and give timely advice to our team.

Next, a very important person for the FMS project, Mr. Trinh Van Bon (Department of Infrastructure Engineering - FPT University), we are extremely grateful for your support throughout the past journey. He is both a brother and a great partner. During the past journey, we would like to thank you for any difficulties you have supported and answered.

Last but not least, we would like to thank all the teachers who have accompanied us during our 4 years at FPT University. Without the teachers, we would not be here today, thank you for the valuable lessons, and the practical experiences that the teachers have imparted, and thank you for the orientation that we can have today.

Finally, we would like to thank all of you. Hope everyone stays happy and healthy. Thanks again to all who helped us!

Hanoi, August 19th, 2022

FMS Project, SWP490-G7

Definition and Acronyms

| Acronym | Definition |
|---------|------------------------------------|
| PWM | Psychology website |
| AWS | Amazon Web Services |
| BA | Business Analysis |
| BR | Business Rule |
| ERD | Entity Relationship Diagram |
| GUI | Graphical User Interface |
| PM | Project Manager |
| SDD | Software Design Description |
| SPMP | Software Project Management Plan |
| SRS | Software Requirement Specification |
| UAT | User Acceptance Test |
| UC | Use Case |
| API | Application Program Interface |
| FMS | Facilities Management System |
| UI/UX | User Interface |

I. Project Introduction

1. Overview

1.1 Project Information

- Project name: Facilities Management System in the building
- Project code: FMS
- Group name: SWP490-G7
- Software type: Web-based Application

1.2 Project Team

1.2.1 Supervisor

| Full Name | Role | Email | Mobile |
|----------------|------------|---------------------|--------|
| Pham Duc Thang | Supervisor | thangpd10@fe.edu.vn | |

1.2.2 Teams members

| Full Name | Role | Email | Mobile |
|-------------------|--------|----------------------------|--------------|
| Bui Nhu Nhat | Leader | nhatbnhe140280@fpt.edu.vn | 0973 856 236 |
| Nguyen Thu Ha | Member | hanthe140104@fpt.edu.vn | 0988 606 178 |
| Duong Dac Thanh | Member | thanhddhe140025@fpt.edu.vn | 0388 832 396 |
| Nguyen Cong Thanh | Member | thanhnche140350@fpt.edu.vn | 0961 592 142 |
| Pham Tuan Vuong | Member | vuongpthe140353@fpt.edu.vn | 0886 102 385 |

1.2.3 Stakeholders

| Full Name | Role | Email | Mobile |
|---------------|------------------------|-----------------|--------------|
| Trinh Van Bon | Infrastructure Manager | bontv@fe.edu.vn | 0912 825 444 |

2. Product Background

According to research by **Mr. Trinh Van Bon** - the Infrastructure Manager at FPT University - who has many years of experience in infrastructure management, currently in Vietnam (also including the Asia region), infrastructure management has not been developed, there is no software or solution for comprehensive facilities management. Usually, companies will order goods according to one or several functions in building management into a separate system for that company (some examples like Room management function - room booking system, hotel booking system; Warehouse management function - warehouse management software;...).

Nowadays, **FPT University** has become one of the most qualitative universities in Vietnam. Not only does it have many cutting-edge technologies in teaching, but also includes an enormous amount of wonderful infrastructure like buildings, libraries, canteens, and so on. FPT University has four campuses in Vietnam (including Hanoi, Danang, Hochiminh, Cantho, and more than in the future). In parallel with the expansion, it is necessary to pay more attention to the management work to avoid causing unfortunate incidents when operating the building. It is one of the main reasons make our team make the decision to develop this project.

Currently, on the campus of FPT University, the management of building facilities is still manual, with not too much support from software. When there is a breakdown of the lecture hall or dormitory, the damaged incidents are still recorded on the books and then handed over to the repair party. The repair staff still waiting for the student to sign the certificate is quite time-consuming. Another problem is the daily work inspection and maintenance is currently only recorded on paper, leading to the loss of assessment and forecasting of problems with many difficulties.

Based on **the expectations** of the Infrastructure Manager and the current situation at FPT University, our team make a decision to develop software support infrastructure management. Our capstone project will provide a building facilities management system including the trouble reporting function; checklist function for daily work; based on the checklists, troubleshoot data build Technical Report to review quality and make suggestions to repair or replace for each area, location; warehouse management function; map system building function.

3. Existing Systems

3.1 FPT Campus Infrastructure Management (cim.fpt)

This website (<https://cim.fpt.edu.vn>) was developed by CIM Developers (FPT University). The main function is to serve the reporting and handling of breakdowns in buildings at FPT University. Currently running the following workflow:

1. Scan the QR code in the room
2. This response link to cim and user can report in a form
3. Click submit to the system
4. The manager change issue for a technician
5. The technician will solve this problem and confirm in the system to become done.

Other functions include import list campus, location, area, location from excel; generate and print QR codes, user management and configuration.

Some of the **disadvantages** are:

- The user interface (UI/UX) is not eye-catching, is a little bit monotonous, and needs improvement in the future.
- Many functions on the screen are currently in processing and no data.
- Currently, only one function can be served in building management (large workload).

The screenshot shows a web browser displaying the 'My Report' section of the FPT Campus Infrastructure Management system. The URL in the address bar is 'cim.fpt.edu.vn/MyReport'. The page title is 'FPT Campus Infrastructure Management'. On the right side, there is a user profile with the name 'Hello! nhatbmhe140280!' and a 'Log out' button. Below the title, there is a search bar with a dropdown menu set to 'All...' and a 'Search' button. The main content area is titled 'My Report' and contains a table header with columns: Area Code, Status, Report At, Picture Before, Picture After, Comment, and Feedback. There is no visible data in the table rows.

3.2 Cảnh quan văn phòng (CQVP)

This is a system including a mobile application and website support to config data for the mobile app. This system has developed by FST Team (FPT Software). The main function is service for security guards, cleaners, and the manager. The main feature is checklist function, workflow of this function:

1. Go to the room, on the Bluetooth map the beacon scans the location and shows the list of checklists for this room.
2. Security guard and cleaner do checklist, if have any incidents log a ticket to report to the system.
3. The Manager in the website version filters working-report, and incident reports....

Some of the **disadvantages** are:

- Because this software is made by FPT Software, the access is limited - only for FPT Software employee use.
- Currently, only one function can be served in building management (large workload).



4. Business Opportunity

Today, life is increasingly advanced, developing in the direction of modern integration with support management systems. Increasingly, buildings are built with modern and intelligent facilities, but however, there is no software system to support the management.

In Vietnam, the Building Facilities Management industry is still quite new, there are no supporting software or solutions for this job. The workload for building management includes a lot of complex issues, roughly divided into two basic categories: hard service (including management of electrical systems, furniture, water pumping systems, fire protection systems, elevator system,...) and soft service (including service system, reception, cleaning,

security,...). The amount of daily work is considerable, but it is only stored on paper, making it difficult to manage, review, and suggest maintenance and replacement.

FPT University - the school has the top quality and modern facilities in Vietnam. With the ambition to continue to expand campuses across the country (currently 4 campuses have been built), more necessary attention is paid to the management of facilities. In parallel with the expansion of construction, the management needs to be more concerned to ensure the operation, maintenance, and replacement work is always available. To support this work requires a larger-scale, higher-quality software system that can support more jobs.

Our team has met with some stakeholders to collect the suggestions and expectations of the infrastructure management staff at FPT University. With a role as an infrastructure manager, they want to build a management system that can support their work, both the lecture hall and the school's dormitory on all campuses of FU. The system must include functions of building facilities management (report incidents; store checklists; store maintenance work; and make technical reports), warehouse management, and a 2D map of the building.

A system like this will be convenient for everyone including students, lecturers, and staff, ... can report malfunctions. The technical infrastructure management can easily reckon assets and supplement equipment in the warehouse to facilitate repair and warranty. With the 2D map system, everyone can determine their current location on the map. In the future not only in FPT University, but the system can also be public and deal with some out-source companies like a solution of Facilities Management System.

5. Software Product Vision

The **Facilities Management System (FMS)** is a solution for infrastructure management at FPT University. Our system can access from a website or a mobile website with an Internet connection. With a normal user having permission to access FMS, they can report incidents in a room from mobile or web to the Infrastructure Management department and can view the map of a building to easily find and move. With a user having a role as a technician, they can view a list of incidents - they need to solve, do checklists daily and weekly, commit reports in FMS, and see what equipment have in the warehouse. With a Manager, they can see all reports of each function; config schedules, checklists, the map, and assets of each campus; and technical reports to review and make suggestions to repair or replace. The FMS can change management from paper to software to improve work quality, time-consuming and professional for the future.

6. Project Scope & Limitations

6.1 Major Features

FE-01: Trouble Management - user can create a trouble report; technician troubleshoot, and all user can view a list report about troubles (normal user view their request; technician view all reports troubleshoot by them; manager views all and assign a technician to solve trouble report).

FE-02: Checklist Management - technician daily, weekly checks active of devices and records by a checklist; view report checklist; and manager can customize checklist.

FE-03: Technical Report - based on checklist records, trouble reports, and standards & regulations of each piece of equipment, the system can make a technical report to review quality and suggestions.

FE-04: Warehouse Management - record the import and export history of the warehouse, continuously update the status and the number of supplies in the warehouse, and remind when the supplies are running low and need to be replenished.

FE-05: Map - record each room of each floor of each building in 2D version.

FE-06: Configuration Management - this function is built for the admin system to import campus, location, room, assets in each room; user management and grant permission to access the system.

6.2 Limitations & Exclusions

LI-1: General administration department, may wish to integrate their meeting room booking function into the map system, but now this function run with academic portal not can move at the momment.

LI-2: The checklist function can be extended not only for hard service but also soft service for security guards, janitors and janitors. However, the age of these employees is a bit old and their education level is not high, so it may not be feasible to develop further but in the future it can be.

LI-3: At the moment, only apply development based on the wishes and requirements of the Management Board of Infrastructure Engineering of Hoa Lac campus.

II. Project Management Plan

1. Overview

1.1 Scope & Estimation

| # | WBS Item | Complexity | Est. Effort (man-days) |
|----------|---|------------|------------------------|
| 1 | <i>Iteration 0</i> | | 28 |
| 1.1 | Project Start | Simple | 0 |
| 1.2 | Select Capstone Project Topic | Medium | 3 |
| 1.3 | Meeting stakeholders to collect their requirements | Medium | 4 |
| 1.4 | Design Overview | Simple | 3 |
| 1.5 | Define Use Case diagram | Simple | 2 |
| 1.6 | Technical training | Medium | 4 |
| 1.7 | Design UI/UX | Complex | 10 |
| 1.8 | Confirm, update design UI/UX and get data source | Simple | 1 |
| 1.9 | Plan for Iteration 1 | Simple | 1 |
| 2 | <i>Iteration 1</i> | | 14 |
| 2.1 | Design architecture and code structure | Simple | 1 |
| 2.2 | Design database architecture | Simple | 1 |
| 2.3 | Update documentation (Report 1, 2) | Medium | 3 |
| 2.4 | Create database | Simple | 1 |
| 2.5 | Develop function: Base components, Login Google authentication, Configuration | Complex | 5 |
| 2.6 | Create test plan for Iteration 1 | Simple | 1 |
| 2.7 | Test Iteration 1 | Simple | 1 |
| 2.7 | Plan for Iteration 2 | Simple | 1 |
| 3 | <i>Iteration 2</i> | | 14 |
| 3.1 | Update documentation (Report 3) | Medium | 3 |
| 3.2 | Create test plan for Iteration 2 | Simple | 2 |
| 3.3 | Develop function: Trouble Report Management | Complex | 7 |
| 3.4 | Test Iteration 2 | Simple | 1 |
| 3.5 | Plan for Iteration 3 | Simple | 1 |

| | | | |
|----------|--|---------|-----------|
| 4 | <i>Iteration 3</i> | | 14 |
| 4.1 | Update documentation (Report 4) | Medium | 3 |
| 4.2 | Create test plan for Iteration 3 | Simple | 2 |
| 4.3 | Develop function: Checklist Management | Complex | 7 |
| 4.4 | Test Iteration 3 | Simple | 1 |
| 4.5 | Plan for Iteration 4 | Simple | 1 |
| 5 | <i>Iteration 4</i> | | 14 |
| 5.1 | Update documentation (Report 5, 6) | Medium | 3 |
| 5.2 | Develop function: Technical Report | Complex | 5 |
| 5.3 | Deploy version 1 | Simple | 2 |
| 5.4 | Create test plan for Iteration 4 | Simple | 2 |
| 5.5 | Test Iteration 4 (System test) | Simple | 1 |
| 5.6 | Plan for Iteration 5 | Simple | 1 |
| 6 | <i>Iteration 5</i> | | 14 |
| 6.1 | Update documentation (Report 7) | Medium | 3 |
| 6.2 | Develop function: Warehouse Management, Map | Complex | 7 |
| 6.3 | Deploy version 2 | Simple | 1 |
| 6.4 | Create test plan for Iteration 5 | Simple | 1 |
| 6.5 | Test Iteration 5 (System test) | Simple | 1 |
| 6.6 | Plan for Iteration 6 | Simple | 1 |
| 7 | <i>Iteration 6</i> | | 10 |
| 7.1 | Update documentation (Report 7) | Medium | 3 |
| 7.2 | Deploy lastest version | Simple | 1 |
| 7.3 | System test & fix bug | Simple | 2 |
| 7.4 | Acceptance test with stakeholders | Simple | 1 |
| 7.5 | Finish, review documentation and demo production | Simple | 1 |
| 7.6 | Rehearsal | Simple | 1 |
| 7.7 | Finish capstone project | Simple | 1 |

Total Estimated Effort (man-days) **108**

1.2 Project Objectives

| # | Testing Stage | Test Coverage | No. of Defects | % of Defect | Notes |
|---|------------------|---------------|----------------|-------------|--------------------------|
| 1 | Reviewing | 100 | | | |
| 2 | Unit Test | 80 | | | Coverage 80% source code |
| 3 | Integration Test | 100 | | | Coverage 100% service |
| 4 | System Test | 100 | | | Coverage 100% function |
| 5 | Acceptance Test | 100 | 0 | 0 | Coverage 100% user story |

Milestone Timeliness (%): 100%

Allocated Effort (man-days): 108 man-days

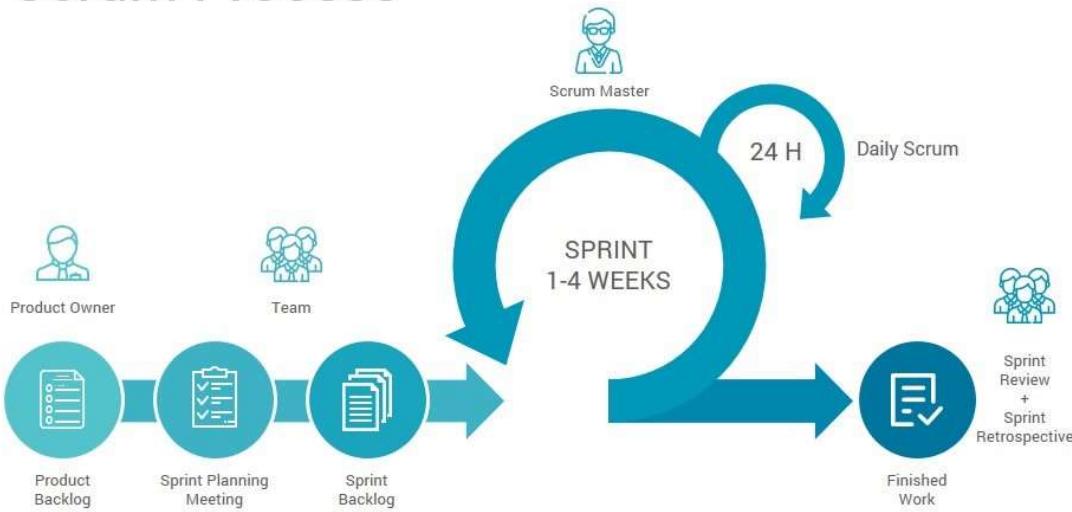
1.3 Project Risks

| # | Risk Description | Impact | Possibility | Response Plans |
|---|--|--------|-------------|--|
| 1 | Conflict between members | Medium | Medium | Hold small meetings immediately, to listen and resolve conflicts. |
| 2 | Lack of skills | High | Medium | Meeting to training skill, share documents, and learn from open resource on the Internet, Youtube and Udemy |
| 3 | Lack of professional knowledge of infrastructure engineering | Medium | Low | Share with stakeholders, listen to their experiences, learn more about their work through meetings. Save the audio file so you can learn more. |

2. Management Approach

2.1 Project Process

Scrum Process



For the FMS project, we decided to use the Scrum process model to implement the work. We will divide the project into small iterations of about 1-2 weeks to develop each function.

For the FMS project, we will split it into 6 iterations (each of them will last about 10-14 days, excluding Iteration 0).

2.2 Quality Management

For back end, our team choose .NET Core 5.0 REST API, .NET Framework 4.7 to develop.

For front end, we use React JS apply by Ant Design library to develop base on React class components.

For UI/ UX Design, we choose Figma to design.

For requirement, we using Excel (summary of meeting with stakeholders); using diagram to show the use case.

2.3 Training Plan

| Training Area | Participants | When, Duration | Waiver Criteria |
|-------------------|--------------|----------------------|-----------------|
| .Net C# Core | All members | Iteration 0, 1 day | Mandatory |
| Git, GitLab, Jira | All members | Iteration 0, 2 hours | Mandatory |
| MSSQL | All members | Iteration 0, 4 hours | Mandatory |
| ReactJS, Antd | All members | Iteration 0, 2 day | Mandatory |
| Figma, Zeplin | All members | Iteration 0, 2 hours | Mandatory |

3. Project Deliverables

| # | Deliverable | Due Date | Notes |
|---|-------------|------------|---|
| 1 | Report 1 | 25/05/2022 | |
| 2 | Report 2 | 19/06/2022 | |
| 3 | Report 3 | 03/07/2022 | |
| 4 | Report 4 | 17/07/2022 | |
| 5 | Report 5 | 31/07/2022 | |
| 6 | Report 6 | 31/07/2022 | |
| 7 | Report 7 | 21/08/2022 | |
| 8 | Deployment | 21/08/2022 | http://demofms.site:3000/login |

4. Responsibility Assignments

D ~ Do; R ~ Review; S ~ Support; I ~ Informed; <blank> - Omitted

| Responsibility | NhatBNHE140280 | ThanhDDHHE140025 | ThanhNCHE140350 | HaNTTHE140104 | VuongPTHE140353 |
|--|----------------|------------------|-----------------|---------------|-----------------|
| Project Planning & Tracking | D,R | I | I | I | I |
| Prepare Project Introduction Document | S,R | D | S | D | I |
| Prepare SRS Document (Overview Part) | R | D | S | S | R |
| Prepare SRS Document (User Requirements) | D | R | S | S | R |
| SRS Document (Report 1) | R | D | I | D | I |
| SRS Document (Report 2) | R | D | I | D | I |
| SRS Document (Report 3) | R | D | I | D | I |
| SRS Document (Report 4) | R | S | I | D | I |
| SRS Document (Report 5) | R | S | I | D | I |
| SRS Document (Report 6) | R | S | I | D | I |
| SRS Document (Report 7) | D,R | S | I | S | I |
| Design UI/UX Document | S,R | D | I | I | I |
| Back End Software Package | D | S | S | I | I |
| Front End Software Package | D | I | I | S | D |
| Database | S | D | I | I | I |

| | | | | | |
|-----------------------------|---|---|---|---|---|
| Component Test | R | I | D | I | I |
| Test Document (Test Plan) | R | S | D | I | S |
| Test Document (Test Report) | R | D | D | I | S |
| Deployment | D | I | I | I | S |
| User Manual | I | D | I | I | I |

5. Project Communications

| Communication Item | Who/ Target | Purpose | When, Frequency | Type, Tool, Method(s) |
|----------------------|----------------------------------|--|-----------------|-----------------------|
| Online daily meeting | All team member | Review work, check schedule | Every day | Google Meet |
| Offline meeting | All team members and supervisors | Review work during a week. Take plan for next week | Every week | Google Meet or DE-320 |
| Question - Answer | All team member | Find solution for issue | Every time | Mesenger, Zalo |

6. Configuration Management

6.1 Document Management

All document will upload in Google Driver, show changes on table of changes.

6.2 Source Code Management

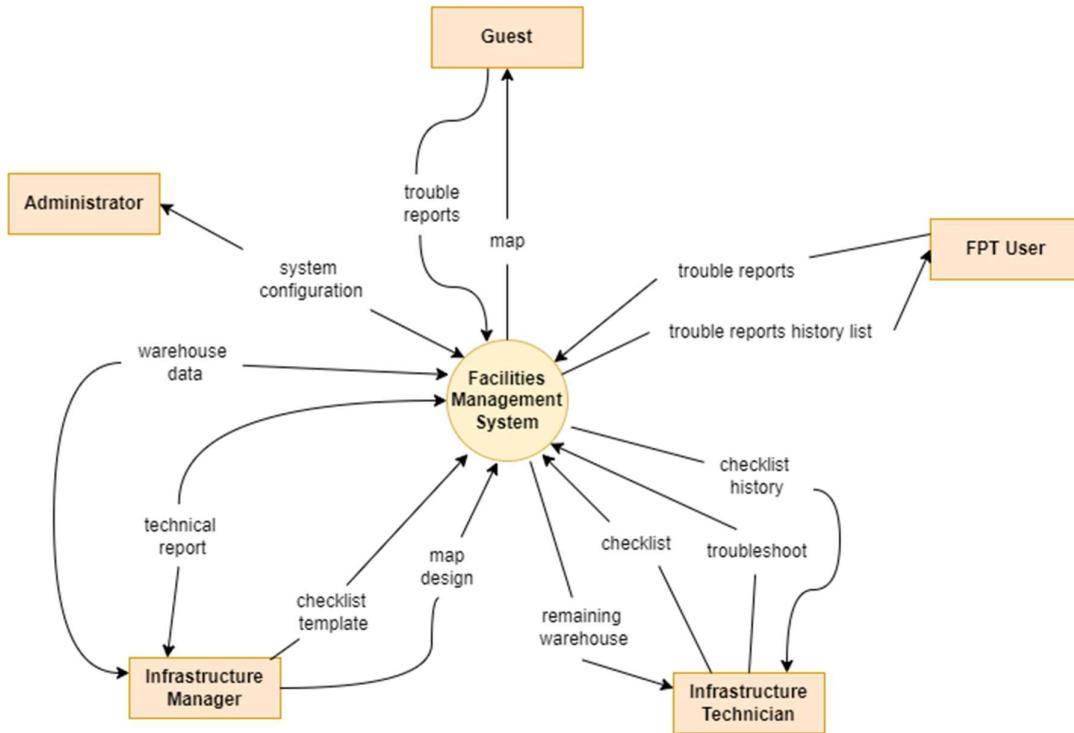
Source code will store in GitLab, each member code in a branch and commit merge to main.

6.3 Tools & Infrastructures

| Category | Tools / Infrastructure |
|--------------------|---|
| Database | MSSQL 2016 |
| IDEs/Editors | Visual Studio Code, Visual Studio Community 2019, SQL Server Management Studio (SSMS) |
| Diagramming | Draw.IO |
| Documentation | MSOffice, Google Docs/Sheets/Slides |
| Version Control | GitLab (Source Codes), Google Drive (Documents) |
| Deployment server | SSD Hosting Window, VPS Cloud |
| Project management | Jira (Tasks, Defects) |

III. Software Requirement Specification

1. Product Overview



The **Facilities Management System (FMS)** is a new software system for infrastructure management to replace manual recording. Through a website, you can manage problems and maintain them more easily. The context diagram below illustrates the external entities and system interfaces for release 1.0. The system is expected to evolve over several releases, and will eventually complete software that can meet all the infrastructure management requirements of the school.

For FPT user, you can access FMS to create trouble report, modify trouble report, view map and manage trouble report history list.

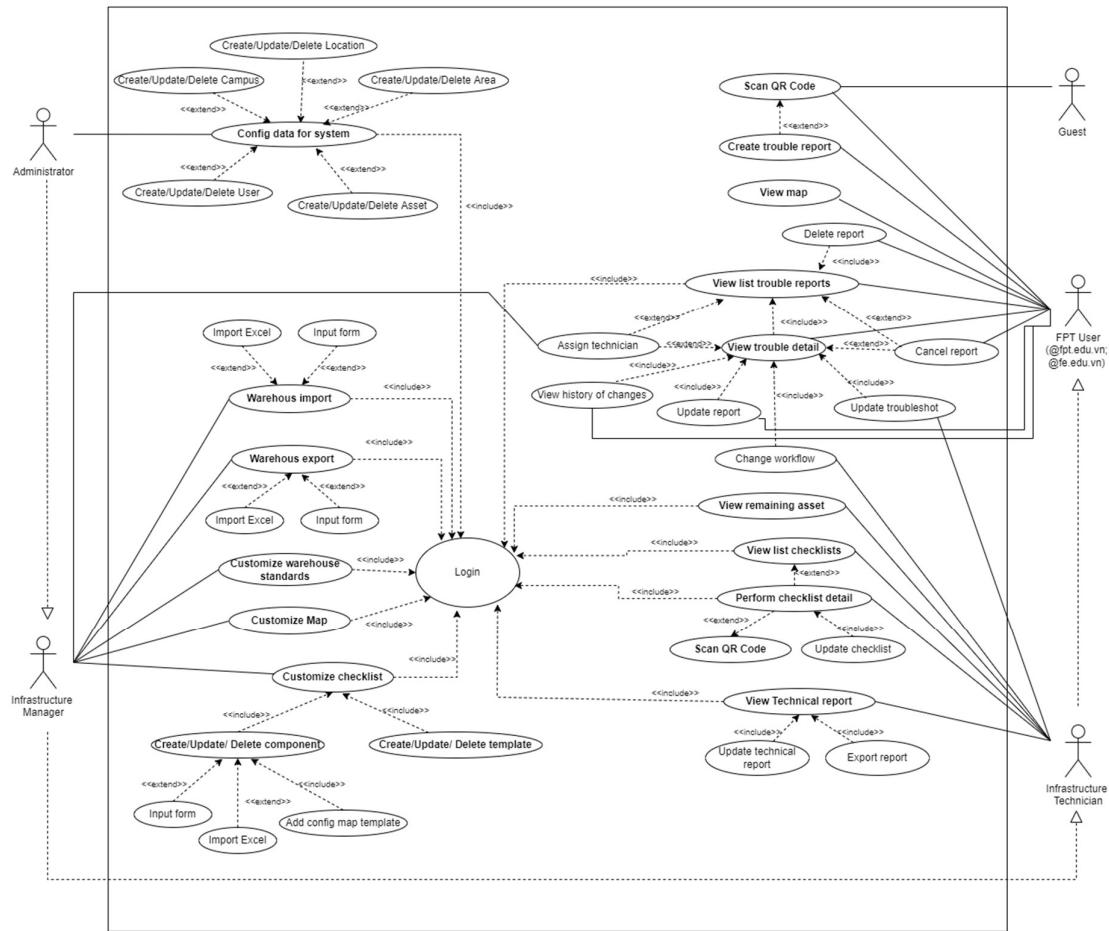
For Infrastructure technician, it is possible to troubleshoot problems encountered in the building, view checklist history, and view warehouse remaining.

For Infrastructure manager, you can import/ export asset for warehouse, export report of changes warehouse, export technical report, customize checklist, customize map.

For Admin, you have full functions and can configuration system data as campuses, locations, areas/ rooms, assets in a room, and user management.

2. User Requirements

2.1 Use Case Diagram



[View Use case in Draw.IO](#)

2.2 Actor

| No | Actor | Description |
|----|------------------------|--|
| 1 | Administrator | <p>Login</p> <p>Configuration campuses, locations, areas, assets in room, users</p> |
| 2 | Infrastructure Manager | <p>Login</p> <p>Warehouse management include import, export, view warning, customize standard</p> <p>Technical report to customize standards, view export technical reports.</p> <p>Map management include create, modify, delete map and login.</p> <p>Troubles management for Manager include assign technician.</p> |

| | | |
|---|---------------------------|--|
| | | Checklist management for Manager include customize checklist, create checklist, modify, delete checklist. |
| 3 | Guest | Create trouble request |
| 4 | Normal User | Login Trouble management for user include modify, cancel request, view history requests View map |
| 5 | Infrastructure Technician | Login Trouble management for Technician include change workflow, modify incident resolve. Warehouse management for user include view remaining equipments Checklist management include view checklist report, perform checklist consist of complete checklist, view checklist detail Technical report to customize standards, view export technical reports. |

2.3 Use cases list

| ID | Use Case | Primary Actors | Secondary Actors |
|----|--|---|------------------------|
| 1 | <u>Login</u> | Administrator, User, Technician, Manager | |
| 2 | <u>Create trouble report</u> | Anyone | Technician, Manager |
| 3 | View list trouble reports | User, Technician, Manager, Admin | |
| 4 | View trouble report detail | User, Technician, Manager, Admin | |
| 5 | Assign technician | Manager | Technician |
| 6 | Update report | User (Reporter) | |

| | | | |
|----|-------------------------|---|--|
| 7 | View history of changes | User, Technician, Manager, Admin | |
| 8 | Change workflow | Technician | |
| 9 | Update troubleshooting | Technician | |
| 10 | Cancel report | User, Technician, Manager, Admin | |
| 11 | Delete report | User, Technician, Manager, Admin | |
| 12 | Create checklist | Manager | |

2.4 Use cases detail

2.4.1 Login

| | | | |
|--------------------|--|-------------------|------------|
| UC ID and Name: | UC-01 Login | | |
| Created By: | NhatBN | Date Created: | 21/06/2022 |
| Primary Actor: | User, Technician, Manager, Admin | Secondary Actors: | |
| Trigger: | A user want to using FMS | | |
| Description: | This screen is first step to a user authen access before using FMS | | |
| Preconditions: | None | | |
| Post-conditions: | None | | |
| Normal Flow: | <p>1.0 Login</p> <ol style="list-style-type: none"> 1. User access to http://demofms.site:3000/login 2. Select Campus 3. Click “Sign in with Google” 4. Choose one of email list show in Google authenticator popup. 5. Redirect to Home (dashboard) base on role | | |
| Alternative Flows: | None | | |
| Exceptions: | <p>1.0.E1. If user don't select campus before click sign in, show MSG01</p> <p>1.0.E2. If user choose an email not have extension @fpt.edu.vn, show MSG02</p> | | |
| Priority: | High | | |
| Business Rules: | BR-02 | | |
| Assumptions: | None | | |

2.4.2 Create trouble report

2.4.2.1 Create trouble report (Login)

| | | | |
|--------------------|---|-------------------|------------|
| UC ID and Name: | UC-02.1 Create trouble report with Login | | |
| Created By: | NhatBN | Date Created: | 22/06/2022 |
| Primary Actor: | User, Technician, Manager, Admin | Secondary Actors: | |
| Trigger: | A user want to create a trouble report | | |
| Description: | When user encounter any problem in any area/room (for example: broken fan, burned out light bulb, etc.) that requires the support and repair of the technical department, please create a trouble report on the FMS system (with login). With login, user can easily follow the troubleshooting. | | |
| Preconditions: | Login to FMS | | |
| Post-conditions: | None | | |
| Normal Flow: | <p>2.0.1 Create trouble with Login (Submit)</p> <ol style="list-style-type: none"> In navigation menu, hover on “Trouble”, choose “Create Trouble” Fill all required field (Location, Area, Summary, Images), and fill more detail field Click “Submit” FMS validate data. If data is valid, store data to database, create trouble in status “Opening” and show MSG04 and MSG05. Else see 2.0.1.E1 <p>2.0.2 Create trouble with Login (Save draft)</p> <ol style="list-style-type: none"> In navigation menu, hover on “Trouble”, choose “Create Trouble” Fill all required field (Location, Area), and fill more detail field Click “Save draft” FMS validate required data. If data is valid, store data to database, create trouble in status “Draft” and show MSG04 and MSG05, else see 2.0.1.E2 | | |
| Alternative Flows: | <p>2.0.3 Create trouble with Login (Submit) using scan QR Code</p> <ol style="list-style-type: none"> Scan QR Code in area/ room Click “Login” Login successfully, click “Create Trouble” Auto fill Location, Area information. Return step 2.0.1.3 or 2.0.2.3 of Normal Flow | | |
| Exceptions: | <p>2.0.1.E1 If user don't input information in required field, show MSG03.</p> <p>2.0.2.E2 If user don't input information in required field, show MSG03.</p> | | |
| Priority: | High | | |
| Business Rules: | BR-01, BR-03, BR-04 | | |

| | |
|--------------|------|
| Assumptions: | None |
|--------------|------|

2.4.2.2 Create trouble report (Without login)

| | | | |
|--------------------|---|-------------------|------------|
| UC ID and Name: | UC-02.2 Create trouble report without Login | | |
| Created By: | NhatBN | Date Created: | 22/06/2022 |
| Primary Actor: | Anyone | Secondary Actors: | |
| Trigger: | A user want to create a trouble report | | |
| Description: | When user encounter any problem in any area/room (for example: broken fan, burned out light bulb, etc.) that requires the support and repair of the technical department, please create a trouble report on the FMS system. | | |
| Preconditions: | None | | |
| Post-conditions: | None | | |
| Normal Flow: | <p>2.1.1 Create trouble without Login</p> <ol style="list-style-type: none"> 1. On Login screen, click “Create Trouble Report” 2. Fill all required field (Location, Area, Summary, Images), and fill more detail field 3. Click “Submit” 4. FMS validate data. If data is valid, store data to database, create trouble in status “Opening” create by Anonymous and show MSG04 and MSG05, else see 2.2.1.E1 | | |
| Alternative Flows: | <p>2.1.2 Create trouble without Login using scan QR Code</p> <ol style="list-style-type: none"> 1. Scan QR Code in area/ room 2. Click “Create Trouble Report” 3. Auto fill Location, Area information. 4. Return step 2.1.1.3 of Normal Flow | | |
| Exceptions: | 2.2.1.E1 If user don't input information in required field, show MSG03. | | |
| Priority: | High | | |
| Business Rules: | BR-05 | | |
| Assumptions: | None | | |

2.4.3 View list trouble reports

| | | | |
|--------------------|---|-------------------|------------|
| UC ID and Name: | UC-03 View list trouble report | | |
| Created By: | NhatBN | Date Created: | 23/06/2022 |
| Primary Actor: | Admin, Manager, User, Technician | Secondary Actors: | |
| Trigger: | A user want to view a list of trouble reports related to them | | |
| Description: | This function can help user easily to manager trouble reports related to them, and can follow what reports will solve. | | |
| Preconditions: | Login to FMS | | |
| Post-conditions: | None | | |
| Normal Flow: | <p>3.0.1 View list trouble report</p> <ol style="list-style-type: none"> 1. In navigation menu, hover on “Trouble”, choose “My Troubles” 2. Table showing all troubles base on the role of the user: Normal user (show troubles reported by user), Technician (show troubles reported by the user and handled by them), and Admin and Manager (show all trouble reports from Opening status). <p>3.0.2 View list trouble report (Search)</p> <ol style="list-style-type: none"> 1. In navigation menu, hover on “Trouble”, choose “My Troubles” 2. Input search data in Search tab 3. Click “Search” 4. Table showing all troubles map search data base on the role of the user: Normal user (show troubles reported by user), Technician (show troubles reported by the user and handled by them), and Admin and Manager (show all trouble reports from Opening status). <p>3.0.3 View list trouble report (Export)</p> <ol style="list-style-type: none"> 1. In navigation menu, hover on “Trouble”, choose “My Troubles” 2. Click “Export” 3. Export to Excel data in table. | | |
| Alternative Flows: | None | | |
| Exceptions: | None | | |
| Priority: | High | | |
| Business Rules: | BR-01 | | |
| Assumptions: | None | | |

2.4.4 View trouble report detail

| | | | |
|--------------------|---|-------------------|------------|
| UC ID and Name: | UC-04 View trouble detail | | |
| Created By: | NhatBN | Date Created: | 23/06/2022 |
| Primary Actor: | Admin, Manager, User, Technician | Secondary Actors: | |
| Trigger: | A user want to view a trouble report again | | |
| Description: | The function allows users to review the trouble report and follow the processing of the trouble report. | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. A trouble report has been generated. | | |
| Post-conditions: | None | | |
| Normal Flow: | 4.0 View trouble detail <ol style="list-style-type: none"> 1. In navigation menu, hover on “Trouble”, choose “My Troubles” 2. Click button View  or Edit  in record of table 3. FMS select trouble by ID and redirect to View Detail screen | | |
| Alternative Flows: | None | | |
| Exceptions: | None | | |
| Priority: | High | | |
| Business Rules: | BR-01 | | |
| Assumptions: | None | | |

2.4.5 Assign technician

| | | | |
|--------------------|--|-------------------|------------|
| UC ID and Name: | UC-05 Assign technician | | |
| Created By: | ThanhDD | Date Created: | 20/06/2022 |
| Primary Actor: | Manager | Secondary Actors: | Technician |
| Trigger: | A manager view reports and assign to technician to do | | |
| Description: | The function helps the manager easily assign a technician to solve trouble reports. | | |
| Preconditions: | PRE-01. Log Into FMS PRE-02. A trouble report has been generated. PRE-03. Logged user has the “Manager” role | | |
| Post-conditions: | None | | |
| Normal Flow: | <p>5.0 Assign Technician</p> <ol style="list-style-type: none"> 1. In navigation menu, hover on “Trouble”, choose “My Troubles” 2. With a reports in status “Opening”, select a technician in record 3. Click button “Assign technician”  in record. 4. Show confirm popup MSG06. (See 5.0.E1) 5. If user click “Confirm”, FMS change status of report to “Processing” and close the popup, show message MSG08 | | |
| Alternative Flows: | <p>5.1 Assign Technician from Trouble Detail</p> <ol style="list-style-type: none"> 1. In navigation menu, hover on “Trouble”, choose “My Troubles” 2. Click “Edit” in record has status in “Opening” 3. Select technician in Technician Select box 4. Click “Update” 5. FMS change status of report to “Processing” and close the popup, show message MSG08 | | |
| Exceptions: | 5.0.E1 If user don't choose a technician before show error message MSG07 | | |
| Priority: | High | | |
| Business Rules: | BR-01, BR-06 | | |
| Assumptions: | None | | |

2.4.6 Update report

| | | | |
|--------------------|--|-------------------|------------|
| UC ID and Name: | UC-06 Update report | | |
| Created By: | ThanhDD | Date Created: | 21/06/2022 |
| Primary Actor: | User (Reporter) | Secondary Actors: | |
| Trigger: | A user want to update information of report before Manager view and assign technician. | | |
| Description: | The function allows users to update trouble report | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. A trouble report has been generated and status of this report is “Draft” or “Opening” PRE-03. Logged user is owner (reporter) of this trouble report | | |
| Post-conditions: | None | | |
| Normal Flow: | 6.0 Update report <ol style="list-style-type: none"> 1. In navigation menu, hover on “Trouble”, choose “My Troubles” 2. Click button View  or Edit  in record of table 3. FMS select trouble by ID and redirect to View Detail screen 4. Update information in tab Trouble Report 5. Click “Update” 6. FMS validate information, if it valid, sync data to database, update history of changes and show message MSG05. Else see 6.0.E1 | | |
| Alternative Flows: | None | | |
| Exceptions: | 6.0.E1 User don't input in required field show message MSG03 | | |
| Priority: | High | | |
| Business Rules: | BR-04 | | |
| Assumptions: | None | | |

2.4.7 View history of changes

| | | | |
|---------------------|---|-------------------|------------|
| UC ID and Name: | UC-07 View history of changes | | |
| Created By: | ThanhDD | Date Created: | 20/06/2022 |
| Primary Actor: | Admin, Manager, User, Technician | Secondary Actors: | |
| Trigger: | A user want to view what changes in a trouble report | | |
| Description: | The function can help user manager a trouble reports, view how this solve, what changes in timeline and who change. | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. A trouble report has been generated. | | |
| Post-conditions: | None | | |
| Normal Flow: | 7.0 View trouble detail <ol style="list-style-type: none"> 1. In navigation menu, hover on “Trouble”, choose “My Troubles” 2. Click button View  or Edit  in record of table 3. FMS select trouble by ID and redirect to View Detail screen, scroll move to last to see History tab | | |
| Alternative Flows: | None | | |
| Exceptions: | None | | |
| Priority: | High | | |
| Business Rules: | BR-01, BR-07 | | |
| Assumptions: | None | | |
| Activity Diagram: | | | |
| Screen Discription: | | | |

2.4.8 Change workflow

| | | | |
|--------------------|--|-------------------|------------|
| UC ID and Name: | UC-08 Change workflow | | |
| Created By: | ThanhDD | Date Created: | 21/06/2022 |
| Primary Actor: | Technician | Secondary Actors: | |
| Trigger: | A technician want to resolve trouble report | | |
| Description: | The function allows technician to sync data when technician solve trouble report | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. A trouble report has been generated, in the status “Processing” and the Manager assigned a technician to handle it. PRE-03. Logged user has a “Technician” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | 8.0 Change workflow <ol style="list-style-type: none"> In navigation menu, hover on “Trouble”, choose “My Troubles” Click button View  or Edit  in record of table FMS select trouble by ID and redirect to View Detail screen Select new status in Status Select Click “Update” Update data base on rule: <ol style="list-style-type: none"> If user change status to “Done”, validate all required fields. If valid data, store to data base, show message MSG05. Else see 8.0.E1. If status not in “Done”, sync data to database and show message MSG05. | | |
| Alternative Flows: | 8.0.E1 User don't input required field, show error message MSG03. | | |
| Exceptions: | None | | |
| Priority: | High | | |
| Business Rules: | BR-01, BR-08 | | |
| Assumptions: | None | | |

2.4.9 Update troubleshooting

| | | | |
|--------------------|---|-------------------|------------|
| UC ID and Name: | UC-09 Update troubleshooting | | |
| Created By: | ThanhDD | Date Created: | 23/06/2022 |
| Primary Actor: | Technician | Secondary Actors: | |
| Trigger: | A technician want to resolve trouble report | | |
| Description: | The function allows technician to sync data when technician solve trouble report. | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. A trouble report has been generated, in the status “Processing” and the Manager assigned a technician to handle it. PRE-03. Logged user has a “Technician” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | 9.0 Update troubleshooting <ol style="list-style-type: none"> 1. In navigation menu, hover on “Trouble”, choose “My Troubles” 2. Click button View  or Edit  in record of table 3. FMS select trouble by ID and redirect to View Detail screen 4. Fill data to tab “Trouble shooting” 5. Update data base on rule: <ol style="list-style-type: none"> (1) If user change status to “Done”, validate all required fields. If valid data, store to data base, show message MSG05. Else see 9.0.E1. (2) If status not in “Done”, sync data to database and show message MSG05. | | |
| Alternative Flows: | 9.0.E1 User don't input required field, show error message MSG03. | | |
| Exceptions: | None | | |
| Priority: | High | | |
| Business Rules: | BR-01 | | |
| Assumptions: | None | | |

2.4.10 Cancel report

| | | | |
|--------------------|--|-------------------|------------|
| UC ID and Name: | UC-10 Cancel report | | |
| Created By: | ThanhDD | Date Created: | 25/06/2022 |
| Primary Actor: | Admin, Manager, User, Technician | Secondary Actors: | |
| Trigger: | A user want to cancel a error report | | |
| Description: | The function allows users cancel report if this report has error at information. | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. A trouble report has been generated. | | |
| Post-conditions: | None | | |
| Normal Flow: | 10.0 Cancel trouble report <ol style="list-style-type: none"> 1. In navigation menu, hover on “Trouble”, choose “My Troubles” 2. Click button Cancel  in record of table 3. Show confirm popup 4. If user click “Confirm”, sync data change status to Cancel, close popup and show message MSG09. Else close popup. | | |
| Alternative Flows: | 10.1 Cancel trouble report (Change workflow in Troule detail) <ol style="list-style-type: none"> 1. In navigation menu, hover on “Trouble”, choose “My Troubles” 2. Click button View  or Edit  in record of table 3. FMS select trouble by ID and redirect to View Detail screen 4. In Status Select, choose Cancel 5. Click “Update” 6. FMS sync data change status to Cancel, close popup and show message MSG09. 7. Redirect to My Troubles. | | |
| Exceptions: | None | | |
| Priority: | High | | |
| Business Rules: | BR-01 | | |
| Assumptions: | None | | |

2.4.11 Delete report

| | | | |
|--------------------|--|-------------------|------------|
| UC ID and Name: | UC-11 Delete trouble report | | |
| Created By: | ThanhNC | Date Created: | 20/06/2022 |
| Primary Actor: | Admin, Manager, User, Technician | Secondary Actors: | |
| Trigger: | A user want to delete a trouble report | | |
| Description: | The function allows users delete trouble in status “Cancel”. | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. A trouble report in status Cancel. | | |
| Post-conditions: | None | | |
| Normal Flow: | 11.0 Delete trouble report <ol style="list-style-type: none"> 1. In navigation menu, hover on “Trouble”, choose “My Troubles” 2. Click button Delete  in record of table 3. Show confirm popup 4. If user click “Confirm”, delete this report, close popup and show message MSG10. | | |
| Alternative Flows: | None | | |
| Exceptions: | None | | |
| Priority: | High | | |
| Business Rules: | BR-01 | | |
| Assumptions: | None | | |

2.4.12 Create checklist

| | | | |
|--------------------|--|-------------------|------------|
| UC ID and Name: | UC-12 Create checklist | | |
| Created By: | ThanhNC | Date Created: | 20/06/2022 |
| Primary Actor: | Manager | Secondary Actors: | |
| Trigger: | A manager create checklist for technician do | | |
| Description: | The function allows manager create checklist using template for day or week working, | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | <p>12.0 Create checklist</p> <ol style="list-style-type: none"> 1. In navigation menu, hover on “Checklist”, choose “My Checklists” 2. Click button “Create” 3. Show create popup 4. User fill data in create form 5. Click “Submit” 6. FMS validate input data, if data is valid, close popup and sync data create checklist. Else see 12.0.E1 | | |
| Alternative Flows: | None | | |
| Exceptions: | 12.0.E1 Any required fields is empty, show error message MSG03. | | |
| Priority: | High | | |
| Business Rules: | BR-01, BR-10 | | |
| Assumptions: | None | | |

2.4.13 View list checklist

| | | | |
|--------------------|--|-------------------|------------|
| UC ID and Name: | UC-13 View list checklist | | |
| Created By: | ThanhNC | Date Created: | 22/06/2022 |
| Primary Actor: | Manager, Technician | Secondary Actors: | |
| Trigger: | A manager or technician view available checklist list | | |
| Description: | The function show now how many checklist is checked/ uncheck/ check failed. | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” or “Technician” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | 13.0 View list checklist <ol style="list-style-type: none"> 1. In navigation menu, hover on “Checklist”, choose “My Checklists” 2. FMS select data from data base and show data in table. | | |
| Alternative Flows: | None | | |
| Exceptions: | None | | |
| Priority: | High | | |
| Business Rules: | BR-01 | | |
| Assumptions: | None | | |

2.4.14 Checklist detail

| | | | |
|--------------------|---|-------------------|------------|
| UC ID and Name: | UC-14 View/ Update checklist detail | | |
| Created By: | ThanhNC | Date Created: | 22/06/2022 |
| Primary Actor: | Manager, Technician | Secondary Actors: | |
| Trigger: | A manager or technician view available checklist list | | |
| Description: | The function show detail checklist need to do. | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” or “Technician” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | 14.0 View/ Update checklist detail <ol style="list-style-type: none"> 1. In navigation menu, hover on “Checklist”, choose “My Checklists” 2. On table, in Action column, click “Edit” button  3. Base on type of check list, FMS redirect: <ol style="list-style-type: none"> (1) Type of check list is “Weekly”, redirect to map view all areas/ room checklist base on choose data. User click in a area/ room to redirect checklist detail of this. (2) Type of checklist is “Daily”, redirect to checklist detail of this. 4. Perform checklist by fill data in checklist content and total summary. 5. Click “Update” 6. FMS sync data and show message MSG05 | | |
| Alternative Flows: | None | | |
| Exceptions: | None | | |
| Priority: | High | | |
| Business Rules: | BR-01, BR-11 | | |
| Assumptions: | None | | |

2.4.15 Customize checklist

2.4.15.1 Create/ Update/ Delete Checklist templates

| | | | |
|--------------------|--|-------------------|------------|
| UC ID and Name: | UC-15 Customize checklist template (Create/ Delete/ Update) | | |
| Created By: | ThanhNC | Date Created: | 23/06/2022 |
| Primary Actor: | Manager, Admin | Secondary Actors: | |
| Trigger: | A manager or administrator want to customize a checklist template | | |
| Description: | The function can help manager/ admin easily custom checklist template by using input form. | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” or “Admin” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | 15.0 Customize checklist template (Create/ Delete/ Update) <ol style="list-style-type: none"> 1. In navigation menu, hover on “Checklist”, choose “Customize checklist” 2. Select a checklist component (don’t map template before) or input new components 3. FMS show configuration tab 4. Choose function you want: <ol style="list-style-type: none"> (1) Click “Create” button : Open Create popup, manager/ admin fill data → Click “Submit” → FMS validate required field, if it valid close popup and show message MSG05, else see 15.0.E1 (2) Click “Edit” button : Open Update popup auto fill data from database to form, manager/ admin update data → Click “Submit” → FMS validate required field, if it valid close popup and show message MSG05, else see 15.0.E1 (3) Click “Delete” button : Open Delete confirm pop → Click “Confirm” → FMS delete data in database, close popup, and show message MSG10. | | |
| Alternative Flows: | None | | |
| Exceptions: | 15.0.E1 Any required fields is empty, show error message MSG03. | | |
| Priority: | Low | | |
| Business Rules: | BR-01, BR-12 | | |
| Assumptions: | None | | |

2.4.15.2 Create/ Update/ Delete Checklist components

| | | | | |
|------------------|---|-------------------|------------|--|
| UC ID and Name: | UC-16 Customize checklist components | | | |
| Created By: | HaNT | Date Created: | 20/06/2022 | |
| Primary Actor: | Manager, Admin | Secondary Actors: | | |
| Trigger: | A manager or administrator want to customize a component in a checklist template | | | |
| Description: | The function can help manager/ admin easily custom checklist component and items belong to this. | | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” or “Admin” role. | | | |
| Post-conditions: | None | | | |
| Normal Flow: | <p>16.0.1 Customize checklist components (Using form)</p> <ol style="list-style-type: none"> In navigation menu, hover on “Checklist”, choose “Customize checklist” Select a checklist component or input new components name Fill data to “Create New Item” tab Click “Submit” button If data is valid, FMS sync data store item to this component, else see 16.0.1.E1 & 16.0.1.E2 <p>16.0.2 Customize checklist components (Using import Excel)</p> <ol style="list-style-type: none"> In navigation menu, hover on “Checklist”, choose “Customize checklist” Select a checklist component or input new components name Click button “Import” (see 16.0.1.E1) Open Import Checklist popup Click on dragger “Import from Excel”. Choose a valid Excel file. (see 16.0.2.E1) FMS read file and generate data to preview part, user can check data again, modify if have error, remove items by click on User choose option save Overwrite (delete all existed items and write again) or Continue write (continue to lastest item) Click “Submit”, FMS save data in database and show message MSG05, close popup. <p>16.0.3 Customize checklist component configuration</p> <ol style="list-style-type: none"> In navigation menu, hover on “Checklist”, choose “Customize checklist” Select a checklist component or input new components name FMS show configuration tab Fill data in configuration tab Click “Save” FMS save config to database, show message MSG12 and reload page <p>16.0.4 Customize checklist components (Delete)</p> | | | |

| | |
|--------------------|--|
| | <ol style="list-style-type: none"> 1. In navigation menu, hover on “Checklist”, choose “Customize checklist” 2. Select a checklist component 3. Click button “Delete”. (see 16.0.1.E1) 4. Open Delete confirm popup 5. Click “Confirm” 6. FMS delete component, show message MSG10, close popup and reload page |
| Alternative Flows: | None |
| Exceptions: | <p>16.0.1.E1 If user don't choose any component, show error message MSG11.</p> <p>16.0.1.E2 Any required fields is empty, show error message MSG03.</p> <p>16.0.2.E1 If user upload invalid template, show error message MSG16.</p> |
| Priority: | Medium |
| Business Rules: | BR-01, BR-12 |
| Assumptions: | None |

2.4.15.3 Preview

| | | | |
|--------------------|--|-------------------|------------|
| UC ID and Name: | UC-17 Preview checklist components | | |
| Created By: | HaNT | Date Created: | 22/06/2022 |
| Primary Actor: | Manager, Admin | Secondary Actors: | |
| Trigger: | A manager or administrator want to preview a component in a checklist template | | |
| Description: | The function can help manager/ admin view checklist component and items belong to this look like. | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” or “Admin” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | 17.0 Preview checklist <ol style="list-style-type: none"> 1. In navigation menu, hover on “Checklist”, choose “Customize checklist” 2. Select a checklist component 3. Click button “Preview”. (see 17.0.E1) 4. FMS select data and show preview popup | | |
| Alternative Flows: | None | | |
| Exceptions: | 17.0.E1 If user don't choose any component, show error message MSG14 | | |
| Priority: | Medium | | |
| Business Rules: | BR-01, BR-12 | | |
| Assumptions: | None | | |

2.4.16 View Technical report

| | | | |
|--------------------|---|-------------------|------------|
| UC ID and Name: | UC-18 Technical Report | | |
| Created By: | HaNT | Date Created: | 20/06/2022 |
| Primary Actor: | Manager, Admin | Secondary Actors: | |
| Trigger: | A manager or technician want to create report in a room/ area | | |
| Description: | The function can help manager/ technician easily create a report using template. | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” or “Technician” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | 18.0 Technical Report <ol style="list-style-type: none"> 1. In navigation menu, click “Technical Report” 2. Fill data in search tab 3. Click “Search” 4. FMS base on filter data, generate view of report 5. User can fill more detail data: cause analysis, solution, repairment/ replacement plan, review,etc. 6. Click “Export” 7. FMS generate report using data and template and return Excel file | | |
| Alternative Flows: | None | | |
| Exceptions: | None | | |
| Priority: | Medium | | |
| Business Rules: | BR-01, BR-12 | | |
| Assumptions: | None | | |

2.4.17 Import/ Export warehouse

| | | | |
|------------------|---|-------------------|------------|
| UC ID and Name: | UC-19 Import/ Export Warehouse | | |
| Created By: | HaNT | Date Created: | 24/06/2022 |
| Primary Actor: | Manager | Secondary Actors: | |
| Trigger: | A manager want to import or export asset into warehouse | | |
| Description: | The function can help manager easily to manage import/ export assets | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | <p>19.0.1 Import asset (Using form)</p> <ol style="list-style-type: none"> 1. In navigation menu, hover on “Warehouses”, click Import/ Export Asset 2. Choose tab “Import” 3. Choose tab “Using form” 4. Fill data in form 5. Click “Add” 6. Validate data: check required all field, if it is invalid, see 19.0.1.E2. Else, check assert existed or not, see 19.0.1.E1 7. If it is valid data, add to table preview. 8. Click “Submit”, FMS sync data to database. <p>19.0.2 Import asset (Using import Excel)</p> <ol style="list-style-type: none"> 1. In navigation menu, hover on “Warehouses”, click Import/ Export Asset 2. Choose tab “Import” 3. Choose tab “Using form” 4. Click “Import from excel” 5. Display data to Preview table. (see 19.0.2.E1) 6. Click “Submit”. FMS validate data, show MSG05. (see 19.0.2.E1) <p>19.0.3 Export asset (Using form)</p> <ol style="list-style-type: none"> 1. In navigation menu, hover on “Warehouses”, click Import/ Export Asset 2. Choose tab “Export” 3. Choose tab “Using form” 4. Fill data in form, if user input references link, click “Check link”. 5. Click “Add” 6. Validate data: If valid URL, show message MSG19; else (see 19.0.1.E2, 19.0.3.E1, 19.0.3.E2). 7. If it is valid data, add item to preview table. 8. Click “Submit”, FMS sync data to database. <p>19.0.4 Import asset (Using import Excel)</p> | | |

| | |
|--------------------|---|
| | <ol style="list-style-type: none"> 1. In navigation menu, hover on “Warehouses”, click Import/Export Asset 2. Choose tab “Import” 3. Choose tab “Using import Excel” 4. Click “Import from excel” 5. Display data to Preview table. (see 19.0.2.E1) 6. Click “Submit”. FMS validate data, if it is invalid see 19.0.2.E1; else show MSG05. |
| Alternative Flows: | None |
| Exceptions: | 19.0.1.E1 If it existed, check input data, if it have data not map show message MSG15. 19.0.1.E2 If it is invalid, show error message MSG03 19.0.2.E1 Can not read file show error message MSG16 19.0.3.E1 If user input references link but not check is valid or not, require click “Check link” and show message MSG17. 19.0.3.E2 If check invalid URL, show message MSG18. |
| Priority: | Medium |
| Business Rules: | BR-01 |
| Assumptions: | None |

2.4.18 Import/ Export warehouse history

| | | | |
|--------------------|---|-------------------|------------|
| UC ID and Name: | UC-20 Import/ Export History | | |
| Created By: | VuongPT | Date Created: | 20/06/2022 |
| Primary Actor: | Manager | Secondary Actors: | |
| Trigger: | A manager want to view import or export history | | |
| Description: | The function can help manager easily to view history of changes in warehouse. | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | 20.0 View history <ol style="list-style-type: none"> 1. In navigation menu, hover on “Warehouses”, click Import/ Export History 2. FMS select data from database and show this to table 3. If user input data to search tab and click “Search”, FMS select data by filter and reload table view 4. If user click “Export”, FMS return report in Excel template format. | | |
| Alternative Flows: | None | | |
| Exceptions: | None | | |
| Priority: | Low | | |
| Business Rules: | BR-01 | | |
| Assumptions: | None | | |

2.4.19 Warehouse remaining list

| | | | |
|--------------------|---|-------------------|------------|
| UC ID and Name: | UC-21 View Remaining list | | |
| Created By: | VuongPT | Date Created: | 21/06/2022 |
| Primary Actor: | Manager, Technician | Secondary Actors: | |
| Trigger: | A technician/ manager view list remaining assets in warehouse | | |
| Description: | The function can help manager easily to view remaining asset in warehouse. | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” or “Technician” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | 21.0 View remaining list <ol style="list-style-type: none"> 1. In navigation menu, hover on “Warehouses”, click “Remaining Asset” 2. FMS select data from database and show this to table 3. If user input data to search tab and click “Search”, FMS select data by filter and reload table view | | |
| Alternative Flows: | None | | |
| Exceptions: | None | | |
| Priority: | High | | |
| Business Rules: | BR-01 | | |
| Assumptions: | None | | |

2.4.20 Customize warehouse standards

| | | | |
|--------------------|--|-------------------|------------|
| UC ID and Name: | UC-22 Customize warehouse standards | | |
| Created By: | VuongPT | Date Created: | 25/06/2022 |
| Primary Actor: | Manager | Secondary Actors: | |
| Trigger: | A manager want to set min value of each asset in warehouse | | |
| Description: | The function can help manager easily set min value to asset in warehouse | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | 22.0 Customize warehouse standards <ol style="list-style-type: none"> 1. In navigation menu, hover on “Warehouses”, click “Customize warehouse standards” 2. FMS select data from database and show this to table 3. Input min value in table 4. Click “Save”. If is valid number, FMS sync data. (see 22.0.E1, 22.0.E1) | | |
| Alternative Flows: | None | | |
| Exceptions: | 22.0.E1 If input text, show error message MSG20 22.0.E2 If input negative number, show error message MSG21 | | |
| Priority: | High | | |
| Business Rules: | BR-01 | | |
| Assumptions: | None | | |

2.4.21 View map

| | | | |
|--------------------|---|-------------------|------------|
| UC ID and Name: | UC-23 View map | | |
| Created By: | VuongPT | Date Created: | 25/06/2022 |
| Primary Actor: | Manager, User, Technician, Admin | Secondary Actors: | |
| Trigger: | A user want to view location in a map 2D | | |
| Description: | The function can show a location in a map 2D | | |
| Preconditions: | PRE-01. Login to FMS | | |
| Post-conditions: | None | | |
| Normal Flow: | 23.0 View map <ol style="list-style-type: none"> 1. In navigation menu, hover on “Map”, click “View map” 2. Fill search data 3. Click “Search” 4. FMS select data and show in map. | | |
| Alternative Flows: | None | | |
| Exceptions: | None | | |
| Priority: | Low | | |
| Business Rules: | BR-01 | | |
| Assumptions: | None | | |

2.4.22 Customize map

| | | | |
|--------------------|---|-------------------|------------|
| UC ID and Name: | UC-24 Customize map | | |
| Created By: | VuongPT | Date Created: | 25/06/2022 |
| Primary Actor: | Manager, Admin | Secondary Actors: | |
| Trigger: | A manager/ admin change config off map | | |
| Description: | The function change config of map. | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” or “Admin” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | 24.0 Customize map <ol style="list-style-type: none"> 1. In navigation menu, hover on “Map”, click “View map” 2. Fill search data 3. Click “Search” 4. FMS select data and show in map. 5. Config map using right menu 6. Click “Save all” 7. FMS sync data to database | | |
| Alternative Flows: | None | | |
| Exceptions: | None | | |
| Priority: | Low | | |
| Business Rules: | BR-01, BR-13 | | |
| Assumptions: | None | | |

2.4.23 Create/ Update Campuses

| | | | |
|--------------------|---|-------------------|------------|
| UC ID and Name: | UC-25 Create/ Update campuses | | |
| Created By: | VuongPT | Date Created: | 25/06/2022 |
| Primary Actor: | Manager, Admin | Secondary Actors: | |
| Trigger: | A manager/ admin config data of campuses | | |
| Description: | Sync config data of campuses to system | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” or “Admin” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | 25.0 Create/ Update Campus <ol style="list-style-type: none"> 1. In navigation menu, hover on “Configurartion”, click “Campuses” 2. FMS select data and fill to table 3. Click “Create”/ “Edit” button 4. Show Create/ Update popup 5. User fill data in form 6. Click “Submit” 7. Validate data (see 25.0.E1) 8. FMS sync data to save on database, close popup and show message MSG05. 9. FMS sync data reload table | | |
| Alternative Flows: | None | | |
| Exceptions: | 25.0.E1 If user don't input in required fields, show error message MSG03 | | |
| Priority: | Low | | |
| Business Rules: | BR-01, BR-13 | | |
| Assumptions: | None | | |

2.4.24 Create/ Update Locations

| | | | |
|--------------------|--|-------------------|------------|
| UC ID and Name: | UC-26 Create/ Update locations | | |
| Created By: | ThanhDD | Date Created: | 26/06/2022 |
| Primary Actor: | Manager, Admin | Secondary Actors: | |
| Trigger: | A manager/ admin config data of locations | | |
| Description: | Sync config data of locations to system | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” or “Admin” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | <p>26.0 Create/ Update Locations</p> <ol style="list-style-type: none"> 1. In navigation menu, hover on “Configurartion”, click “Locations” 2. FMS select data and fill to table 3. Click “Create”/ “Edit” button 4. Show Create/ Update popup 5. User fill data in form 6. Click “Submit” 7. Validate data (see 26.0.E1) 8. FMS sync data to save on database, close popup and show message MSG05. 9. FMS sync data reload table | | |
| Alternative Flows: | None | | |
| Exceptions: | 26.0.E1 If user don't input in required fields, show error message MSG03 | | |
| Priority: | Low | | |
| Business Rules: | BR-01, BR-13 | | |
| Assumptions: | None | | |

2.4.25 Create/ Update Areas/ Rooms

| | | | |
|--------------------|---|-------------------|------------|
| UC ID and Name: | UC-27 Create/ Update Areas or Rooms | | |
| Created By: | ThanhDD | Date Created: | 26/06/2022 |
| Primary Actor: | Manager, Admin | Secondary Actors: | |
| Trigger: | A manager/ admin config data of areas or rooms | | |
| Description: | Sync config data of areas or rooms to system | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” or “Admin” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | <p>27.0 Create/ Update Locations</p> <ol style="list-style-type: none"> 1. In navigation menu, hover on “Configurartion”, click “Areas/ Rooms” 2. FMS select data and fill to table 3. Click “Create”/ “Edit” button 4. Show Create/ Update popup 5. User fill data in form 6. Click “Submit” 7. Validate data (see 27.0.E1) 8. FMS sync data to save on database, close popup and show message MSG05. 9. FMS sync data reload table | | |
| Alternative Flows: | None | | |
| Exceptions: | 27.0.E1 If user don't input in required fields, show error message MSG03 | | |
| Priority: | Medium | | |
| Business Rules: | BR-01, BR-13 | | |
| Assumptions: | None | | |

2.4.26 Create/ Update Users

| | | | |
|--------------------|---|-------------------|------------|
| UC ID and Name: | UC-28 Create/ Update users | | |
| Created By: | ThanhDD | Date Created: | 27/06/2022 |
| Primary Actor: | Manager, Admin | Secondary Actors: | |
| Trigger: | A manager/ admin config data of users | | |
| Description: | Sync config data of users to system | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” or “Admin” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | 28.0 Create/ Update Users <ol style="list-style-type: none"> 1. In navigation menu, hover on “Configurartion”, click “Users” 2. FMS select data and fill to table 3. Click “Create”/ “Edit” button 4. Show Create/ Update popup 5. User fill data in form 6. Click “Submit” 7. Validate data (see 28.0.E1) 8. FMS sync data to save on database, close popup and show message MSG05. 9. FMS sync data reload table | | |
| Alternative Flows: | None | | |
| Exceptions: | 28.0.E1 If user don't input in required fields, show error message MSG03 | | |
| Priority: | Low | | |
| Business Rules: | BR-01, BR-13 | | |
| Assumptions: | None | | |

2.4.27 Create/ Update Categories

| | | | |
|-----------------|--|-------------------|------------|
| UC ID and Name: | UC-29 Create/ Update categories | | |
| Created By: | ThanhNC | Date Created: | 28/06/2022 |
| Primary Actor: | Manager, Admin | Secondary Actors: | |
| Trigger: | A manager/ admin config data of categories | | |

| | |
|--------------------|--|
| Description: | Sync config data of categories to system |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” or “Admin” role. |
| Post-conditions: | None |
| Normal Flow: | <p>29.0 Create/ Update Categories</p> <ol style="list-style-type: none"> 1. In navigation menu, hover on “Configurartion”, click “Categories” 2. FMS select data and fill to table 3. Click “Create”/ “Edit” button 4. Show Create/ Update popup 5. User fill data in form 6. Click “Submit” 7. Validate data (see 29.0.E1) 8. FMS sync data to save on database, close popup and show message MSG05. 9. FMS sync data reload table |
| Alternative Flows: | None |
| Exceptions: | 29.0.E1 If user don't input in required fields, show error message MSG03 |
| Priority: | Low |
| Business Rules: | BR-01, BR-13 |
| Assumptions: | None |

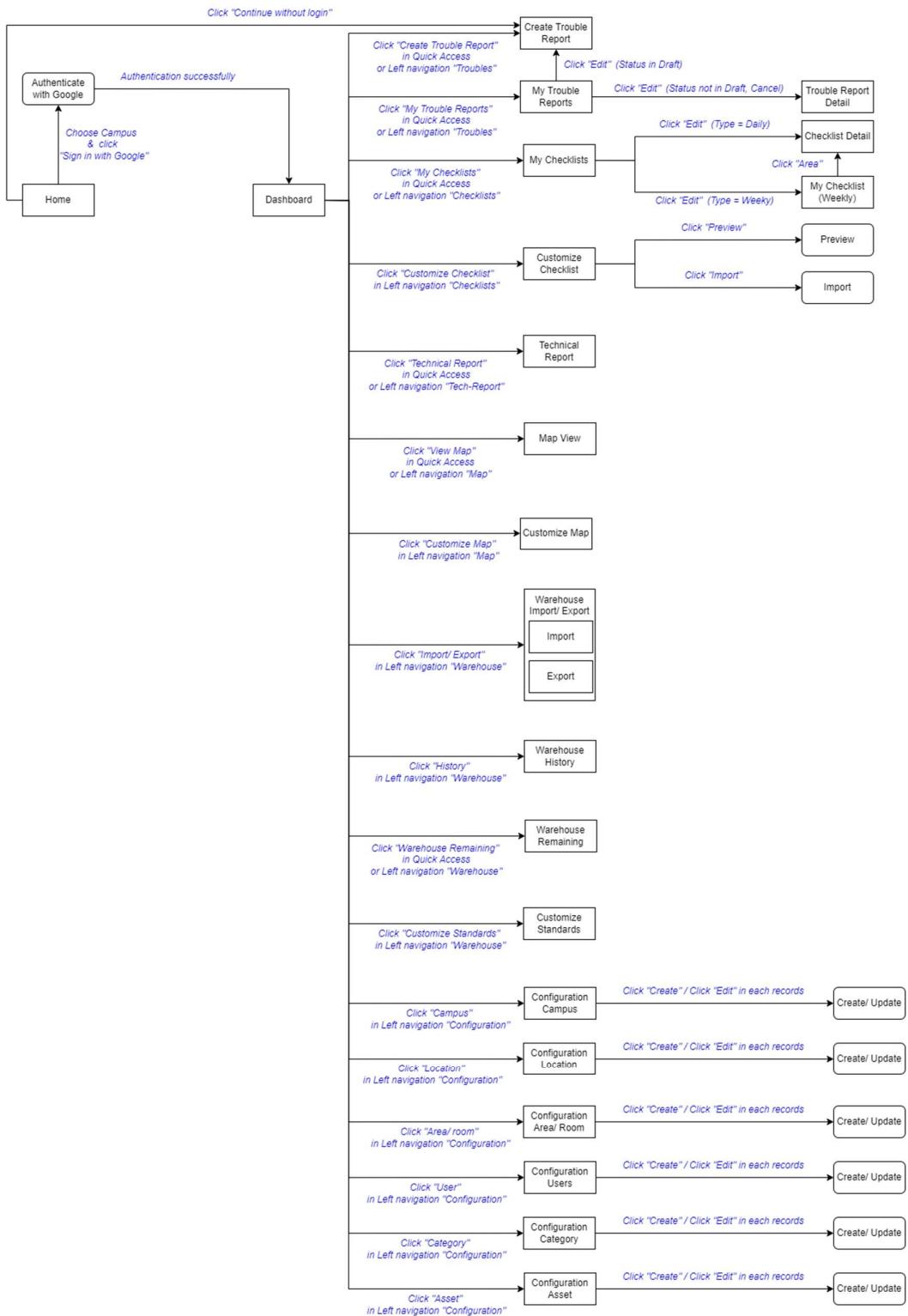
2.4.28 Create/ Update Assets

| | | | |
|--------------------|---|-------------------|------------|
| UC ID and Name: | UC-30 Create/ Update Assets in room | | |
| Created By: | NhatBN | Date Created: | 26/06/2022 |
| Primary Actor: | Manager, Admin | Secondary Actors: | |
| Trigger: | A manager/ admin config data of assets in room | | |
| Description: | Sync config data of assets in room to system | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” or “Admin” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | 30.0 Create/ Update Assets in room <ol style="list-style-type: none"> 1. In navigation menu, hover on “Configurartion”, click “Assets” 2. FMS select data and fill to table 3. Click “Create”/ “Edit” button 4. Show Create/ Update popup 5. User fill data in form 6. Click “Submit” 7. Validate data (see 30.0.E1) 8. FMS sync data to save on database, close popup and show message MSG05. 9. FMS sync data reload table | | |
| Alternative Flows: | None | | |
| Exceptions: | 30.0.E1 If user don't input in required fields, show error message MSG03 | | |
| Priority: | Low | | |
| Business Rules: | BR-01, BR-13 | | |
| Assumptions: | None | | |

3. Functional Requirements

3.1 System Functional Overview

3.1.1 Screens Flow



3.1.2 Screen Descriptions

| # | Feature | Screen | Description |
|----|-----------------------------|--------------------------------------|---|
| 1 | Login | Home | Access to FMS |
| 2 | Login | Authenticate with Google | Login with authenticator google |
| 3 | Dashboard | View Dashboard | Show the main items of the system |
| 4 | Trouble Management | Create Trouble Report | Add a new trouble report by form |
| 5 | Trouble Management | My Trouble Report | Show all trouble reports created by user |
| 6 | Trouble Management | Trouble Report Detail | Details of a trouble report by ID |
| 7 | Checklist Management | My Checklists | Show all available checklists. |
| 8 | Checklist Management | Checklist Detail | Details of each checklist by ID. |
| 9 | Checklist Management | My Checklist (Weekly) | The user's checklist will display the status of the rooms and areas inside the building |
| 10 | Checklist Management | Customize Checklist | Customize and configure the items and contents of the checklist |
| 11 | Checklist Management | Preview Customize Checklist | A preview of the custom checklist just changed |
| 12 | Checklist Management | Import Customize Checklist | Import with an excel file according to the available file format |
| 13 | Technical Report Management | Tech-Report View | Fill in the form to report to the technician |
| 14 | Map Management | Map View | The map shows the floor plan of the building |
| 15 | Map Management | Customize Map | Plot the location of the room in coordinates |
| 16 | Warehouse Management | Warehouse Import/Export Assets | Import, export assets to warehouse |
| 17 | Warehouse Management | Warehouse Import/Export History | The import/export history of a warehouse asset |
| 18 | Warehouse Management | Warehouse Remaining Report | Inventory of remaining devices in the warehouse |
| 19 | Warehouse Management | Warehouse Customize Standards | A list of the minimum quantities of each device |
| 20 | Configuration Management | Configuration Campus | Configure each campus(name, address, phone_ |
| 21 | Configuration Management | Configuration Campus Create/Update | Add a new campus by form |
| 22 | Configuration Management | Configuration Location | Configure each location(campus, code, name,...) |
| 23 | Configuration Management | Configuration Location Create/Update | Add a new location by form |

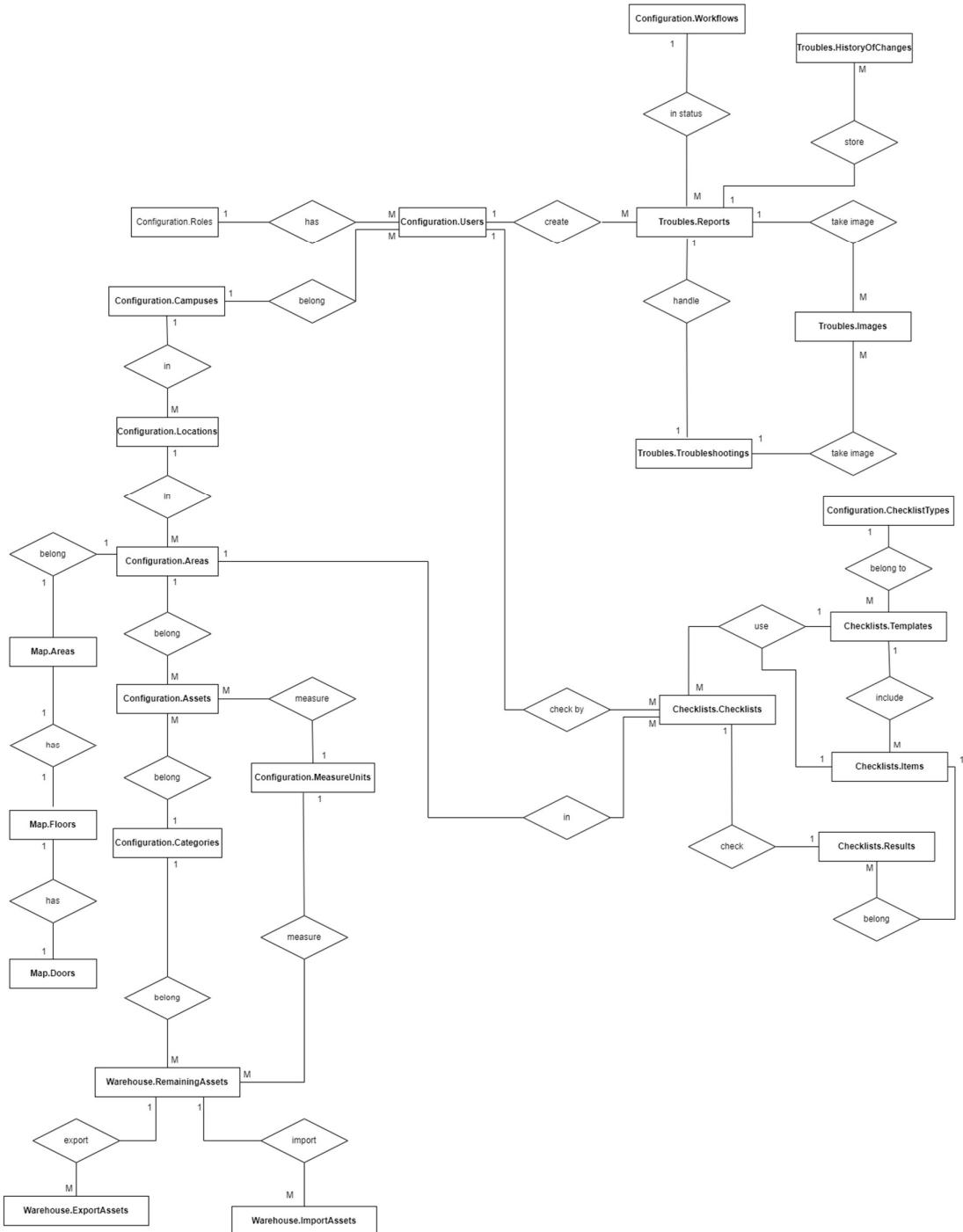
| | | | |
|----|--------------------------|---------------------------------------|--|
| 24 | Configuration Management | Configuration Area/Room | Configure each area/room(campus, code, name,...) |
| 25 | Configuration Management | Configuration Area/Room Create/Update | Add a new area/location by form |
| 26 | Configuration Management | Configuration Users | Configure each user(campus, username, email, fullname) |
| 27 | Configuration Management | Configuration Users Create/Update | Add a new user by form |
| 28 | Configuration Management | Configuration Category | Configure each category |
| 29 | Configuration Management | Configuration Category Create/Update | Add a new category by form |
| 30 | Configuration Management | Configuration Asset | Configure each asset (campus, location, area,...) |
| 31 | Configuration Management | Configuration Asset Create/Update | Add a new asset by form |

3.1.3 Screen Authorization

| Screen | Admin | Manager | Technician | User | Guest |
|---------------------------------|-------|---------|------------|------|-------|
| Login | X | X | X | X | |
| Dashboard | X | X | X | X | |
| Quick Access | X | X | X | | |
| Trouble Report Notice | X | X | X | X | |
| Checklist Notice | X | X | X | | |
| Warehouse Remaining Notice | | X | X | | |
| | X | | | | |
| Create Trouble Report | X | X | X | X | X |
| My Trouble Report | X | X | X | X | |
| Trouble Report Detail | X | X | X | X | |
| Trouble Report | X | X | X | X | |
| Troubleshooting | | X | X | | |
| My Checklists | X | X | X | | |
| My Weekly Checklists | X | X | X | | |
| Checklist Detail | X | X | X | | |
| Customize Checklist | X | X | X | | |
| Import Popup | X | X | | | |
| Preview Popup | X | X | | | |
| Technical Report | X | X | | | |
| Map View | X | X | X | X | |
| Customize Map | X | X | | | |
| Warehouse Import/Export assets. | | X | | | |
| Warehouse Import/Export history | | X | | | |
| Warehouse Remaining Report | X | X | | | |

| | | | | | |
|-----------------------------------|---|--|--|--|--|
| Warehouse Standards Configuration | X | | | | |
| Configuration Campus | X | | | | |
| Configuration Location | X | | | | |
| Configuration Area/Room | X | | | | |
| Configuration Asset | X | | | | |
| Configuration User | X | | | | |

3.1.4 Entity Relationship Diagram

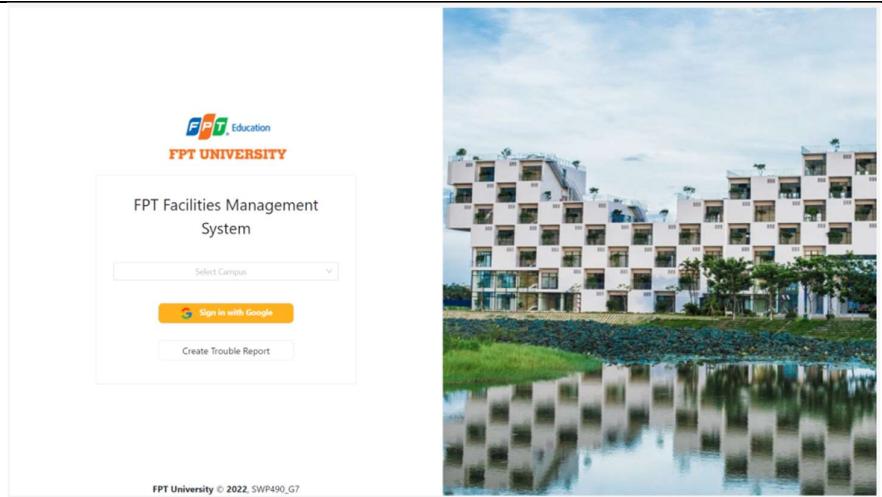
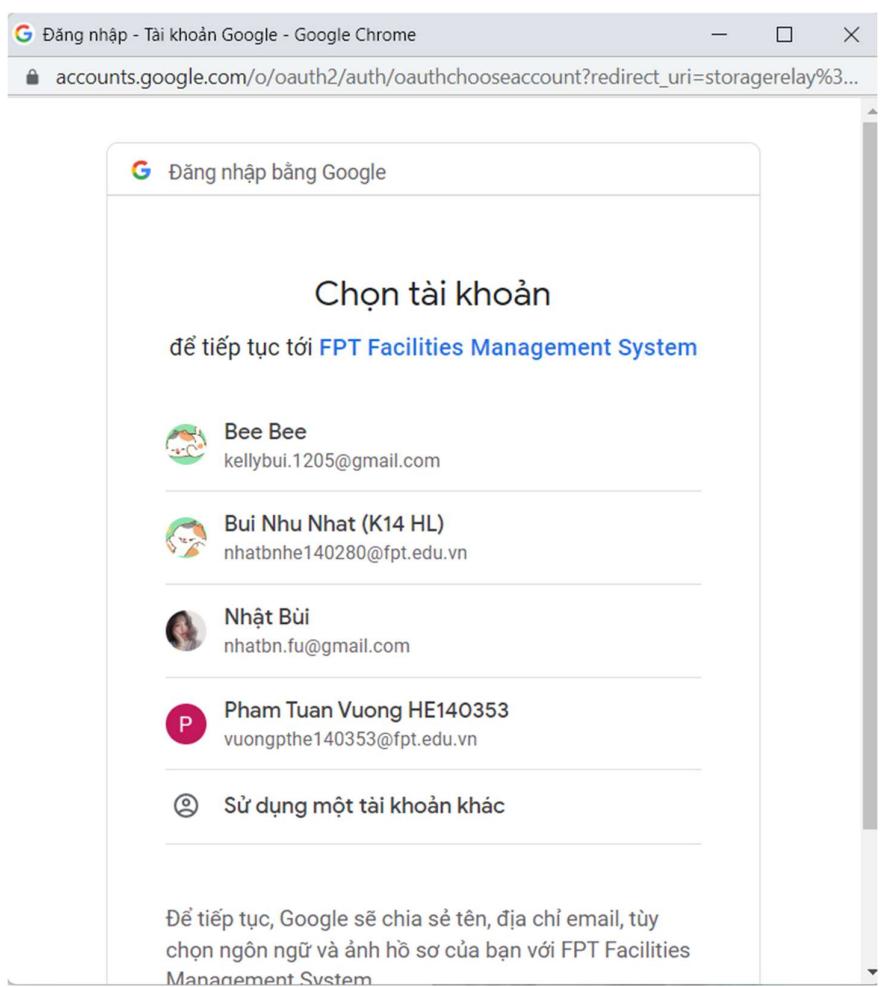


Entities Description

| # | Entity | Description |
|----|------------------------------|--|
| 1 | Configuration.Users | Manage permission of account map role |
| 2 | Configuration.Roles | Define roles in system |
| 3 | Configuration.Campuses | Define campuses belong to system |
| 4 | Configuration.Locations | Define locations in each campuses |
| 5 | Configuration.Areas | Define areas in locations/ campuses |
| 6 | Configuration.Assets | Define assets belong to area |
| 7 | Configuration.Categories | Define category of each asset |
| 8 | Configuration.MeasureUnits | Define measure unit of asset |
| 9 | Configuration.Workflows | Define each step of trouble report |
| 10 | Configuration.ChecklistTypes | Define type of checklists |
| 11 | Troubles.Reports | Store data of trouble reports |
| 12 | Troubles.Images | Store data of troubles/ troubleshoot image |
| 13 | Troubles.Troubleshootings | Store information of handle trouble reports |
| 14 | Troubles.HistoryOfChanges | Store each changes when handle a trouble reports |
| 15 | Checklists.Components | Define a component in checklist |
| 16 | Checklists.Items | Define each items in a checklist |
| 17 | Checklists.Templates | Define template of checklist |
| 18 | Checklists.Results | Record result of each items |
| 19 | Warehouse.RemainingAssets | Record available assets in warehouse |
| 20 | Warehouse.ExportAssets | Record import assets history in warehouse |
| 21 | Warehouse.ImportAssets | Record export assets history in warehouse |
| 22 | Map.Areas | Store config of area in map |
| 23 | Map.Floors | Store config of floor in map |
| 24 | Map.Doors | Store config of door in map |

3.2 Login

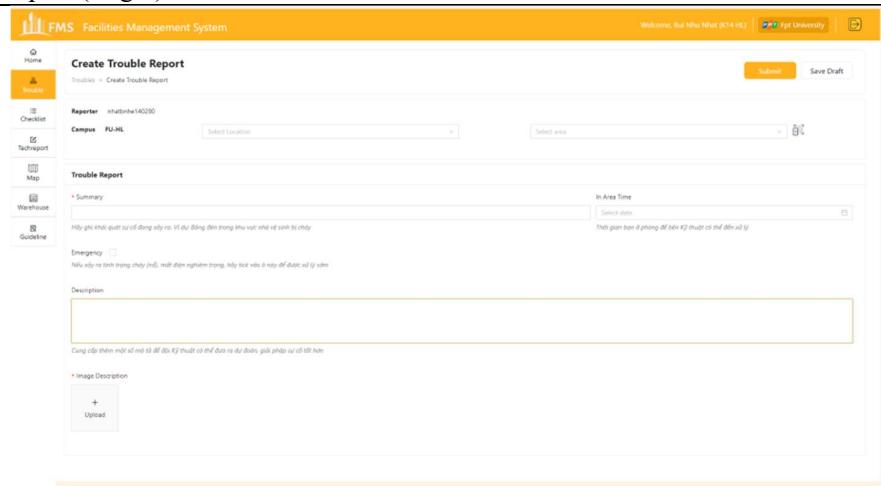
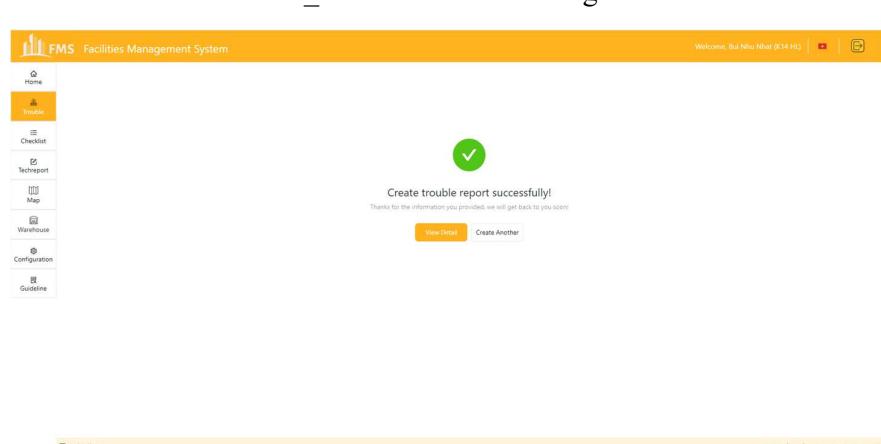
3.2.1 Login

| | |
|---------------------|--|
| Screen Description: |  <p>The image shows the FPT University Facilities Management System login page. At the top is the FPT Education logo and the text "FPT UNIVERSITY". Below it is the system name "FPT Facilities Management System". There is a dropdown menu labeled "Select Campus" and a yellow "Sign in with Google" button. At the bottom left is the copyright notice "FPT University © 2022, SWP490_G7". To the right of the login form is a photograph of a modern, multi-story building with many windows, situated by a body of water with lily pads.</p> <p>UI_Login screen</p>  <p>The image shows a Google authentication popup window titled "Đăng nhập bằng Google". It displays the message "Chọn tài khoản để tiếp tục tới FPT Facilities Management System". Below this, there is a list of accounts:</p> <ul style="list-style-type: none">Bee Bee (kellybui.1205@gmail.com)Bui Nhu Nhat (K14 HL) (nhatbnhe140280@fpt.edu.vn)Nhật Bùi (nhatbn.fu@gmail.com)Pham Tuan Vuong HE140353 (vuongpthe140353@fpt.edu.vn)Sử dụng một tài khoản khác <p>At the bottom, there is a note: "Để tiếp tục, Google sẽ chia sẻ tên, địa chỉ email, tùy chọn ngôn ngữ và ảnh hồ sơ của bạn với FPT Facilities Management System".</p> <p>Google authenticator popup</p> |
|---------------------|--|

3.3 Trouble Management

3.3.1 Create trouble report

3.3.1.1 Create trouble report (Login)

| | |
|---------------------|--|
| Screen Description: |  <p>UI_Create trouble with login</p>  <p>UI_Create successfully</p> |
|---------------------|--|

3.3.1.2 Create trouble report (Without login)

| | |
|----------------------------|---|
| Screen Description: | <p>UI_Create trouble without login</p> |
|----------------------------|---|

3.3.2 View list trouble reports

| | |
|----------------------------|--|
| Screen Description: | <p>UI_My Troubles</p> <p>Export Excel Template</p> |
|----------------------------|--|

3.3.3 View trouble report detail

| | |
|----------------------------|--------------------------|
| <p>Screen Discription:</p> | <p>UI_Trouble Detail</p> |
|----------------------------|--------------------------|

3.3.4 Assign technician

| <p>Screen Discription:</p> | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #f2a1c1;"> <th style="text-align: center; padding: 5px;">Technician</th> <th style="text-align: center; padding: 5px;">Issue Review</th> <th style="text-align: center; padding: 5px;">Solution</th> <th style="text-align: center; padding: 5px;">⚙️</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">Select Technici... ▾</td> <td style="text-align: center; padding: 5px;"></td> <td style="text-align: center; padding: 5px;"></td> <td style="text-align: center; padding: 5px;"> 📝 📨 ✖️ </td> </tr> </tbody> </table> <p>UI_Assign technician (My troubles)</p> | Technician | Issue Review | Solution | ⚙️ | Select Technici... ▾ | | | 📝 📨 ✖️ |
|----------------------------|---|------------|---|----------|----|----------------------|--|--|---|
| Technician | Issue Review | Solution | ⚙️ | | | | | | |
| Select Technici... ▾ | | | 📝 📨 ✖️ | | | | | | |

Update

Over 24 hours

1 Opening thanhddhe140025 > 2 Processing > 3 Up Work > 4 Done

Trouble Shooting

* Change Status * Assign Technician

Opening Select Technician

* Category * Priority

Select Category High

Resolved None

UI_Assign technician (Trouble detail)

Notification X

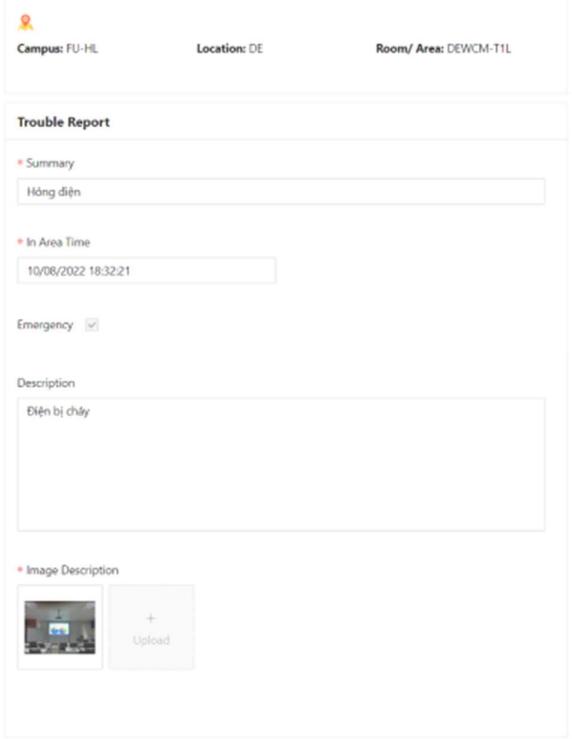
This report will be changed to Processing. Are you sure assign technician for this report?

Confirm **Cancel**

UI_Confirm popup

The screenshot shows a software application window. At the top right is an orange 'Update' button. Below it is a status bar with four circular icons labeled 1 Opening, 2 Processing, 3 Up Work, and 4 Done, with 'Opening' being blue and underlined. The main area has a title 'Over 24 hours'. Below this is a horizontal flow diagram with arrows between the four stages. Underneath is a section titled 'Trouble Shooting' with two rows of dropdown menus. The first row has 'Change Status' set to 'Opening' and 'Assign Technician' as a dropdown menu. The second row has 'Category' set to 'Select Category' and 'Priority' set to 'High'. At the bottom left is a radio button group for 'Resolved' and 'None', with 'None' selected. Below this is a heading 'UI_Assign technician (Trouble detail)' followed by a yellow 'Notification' bar with an 'X' icon. A message in the bar reads: 'This report will be changed to Processing. Are you sure assign technician for this report?'. At the bottom are 'Confirm' and 'Cancel' buttons.

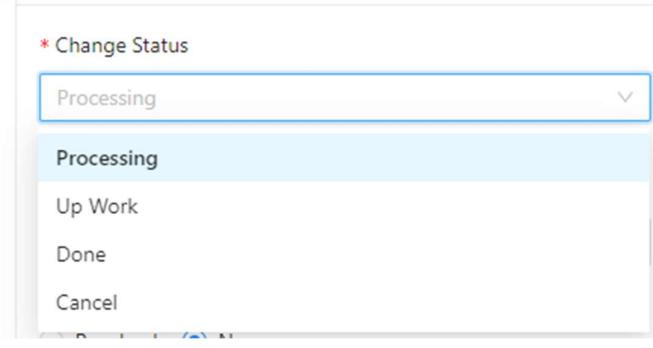
3.3.5 Update report

| | |
|---------------------|--|
| Screen Description: |  |
|---------------------|--|

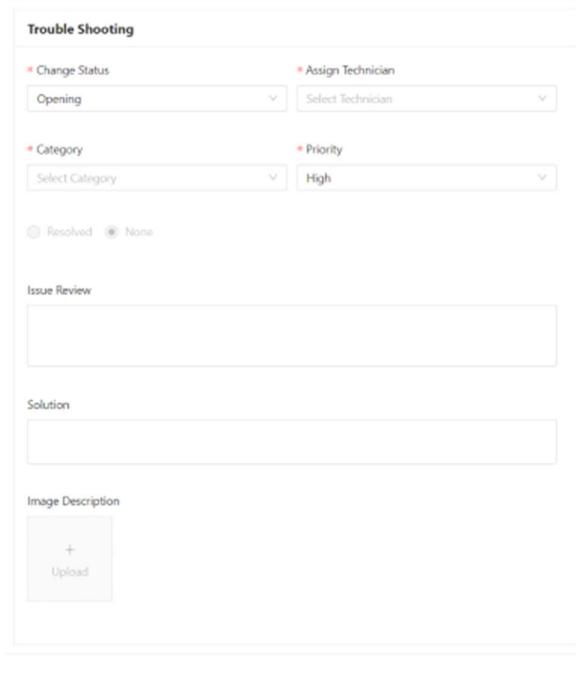
3.3.6 View history of changes

| | |
|---------------------|---|
| Screen Description: |  <p>UI_History Of Changes</p> |
|---------------------|---|

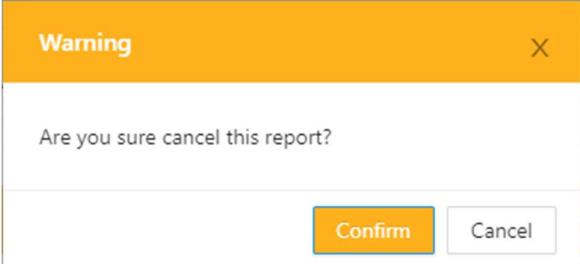
3.3.7 Change workflow

| | |
|---------------------|--|
| Screen Description: |  |
|---------------------|--|

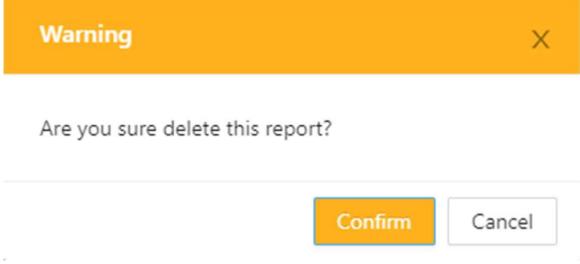
3.3.8 Update troubleshooting

| | |
|------------------------|--|
| Screen Discription: |  <p>The UI_Troubleshooting Tab interface includes the following fields:<ul style="list-style-type: none">Change Status: OpeningAssign Technician: Select TechnicianCategory: Select CategoryPriority: HighIssue Review: Text areaSolution: Text areaImage Description: Upload button (+)</p> |
| UI_Troubleshooting Tab | |

3.3.9 Cancel report

| | |
|---------------------|--|
| Screen Discription: |  <p>The UI_Confirm popup for canceling a report has the following structure:<ul style="list-style-type: none">Title: WarningMessage: Are you sure cancel this report?Buttons: Confirm (orange), Cancel</p> |
| UI_Confirm popup | |

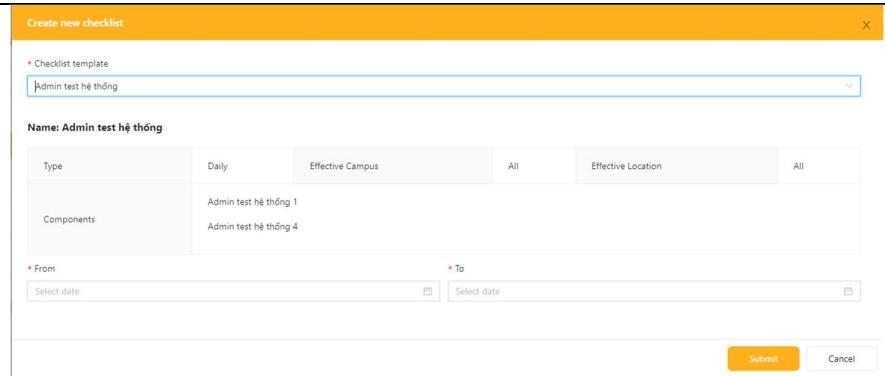
3.3.10 Delete report

| | |
|-------------------------|--|
| Screen Discription: |  <p>The UI_Confirm delete popup for deleting a report has the following structure:<ul style="list-style-type: none">Title: WarningMessage: Are you sure delete this report?Buttons: Confirm (orange), Cancel</p> |
| UI_Confirm delete popup | |

3.4 Checklist Management

3.4.1 Create checklist

Screen Description:

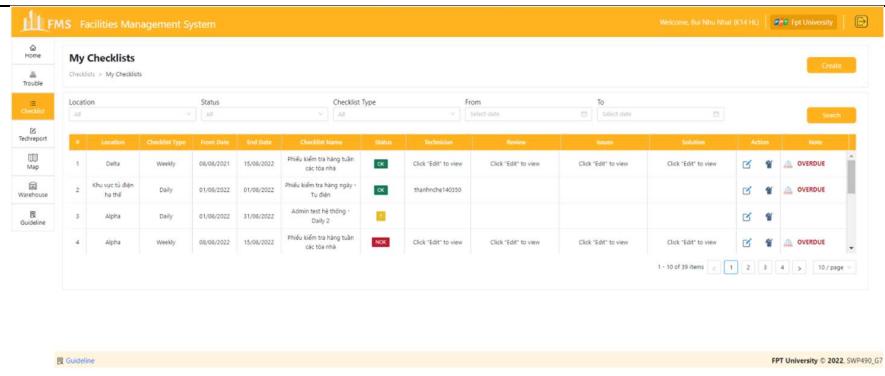


The screenshot shows a modal window titled "Create new checklist". It has a "Checklist template" dropdown set to "Admin test hệ thống". The "Name" field contains "Admin test hệ thống". Under "Components", there are two entries: "Admin test hệ thống 1" and "Admin test hệ thống 4". The "From" and "To" fields are empty. At the bottom right are "Submit" and "Cancel" buttons.

UI_Create checklist popup

3.4.2 View list checklist

Screen Description:

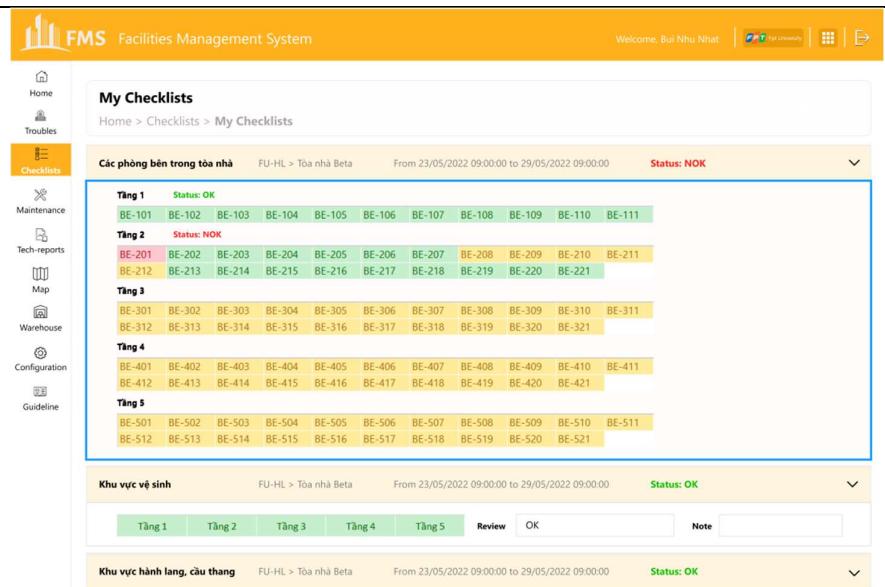


The screenshot shows a list of checklists in the "My Checklists" section. The table includes columns for Location, Checklist Type, From date, End date, Checklist Name, Status, Technician, Reviewer, Owner, Solution, Actions, and Name. The data shows four entries, each with a status of "OVERDUE".

UI_My checklists

3.4.3 Checklist detail

Screen Description:



The screenshot shows a detailed view of a checklist for "Các phòng bên trong tòa nhà" (Rooms inside the building) from May 23, 2022, to May 29, 2022. The status is "NOK". The interface shows five floors (Tầng 1 to Tầng 5) with various room numbers highlighted in green or red. Below this, sections for "Khu vực vệ sinh" (Sanitation area) and "Khu vực hành lang, cầu thang" (Hallway, staircase area) are shown, both with "Status: OK". At the bottom is a "Guideline" section.

FPT University © 2022, SWP490_G7

UI_My checklists (Weekly view)

Checklist Detail

Checklist: Weekly - Các phòng trong tòa nhà FU-HL > Tòa nhà Beta > Tầng 2 > BE-201 29/05/2022 09:00:00

Summary : Weekly - Các phòng trong tòa nhà FU-HL > Tòa nhà Beta > Tầng 2 > BE-201 29/05/2022 09:00:00

Status: NOK Technician: bonthu, Trịnh Văn Bốn
Review:

Issues
01. Trí - Sạch sẽ - Màn hình có vết bẩn

Solution

FPT University © 2022 SWP490_G7

UI_Checklist detail

3.4.4 Customize checklist

3.4.4.1 Create/ Update/ Delete Checklist templates

Screen Description:

Create New Template

* Template Name: Input template name

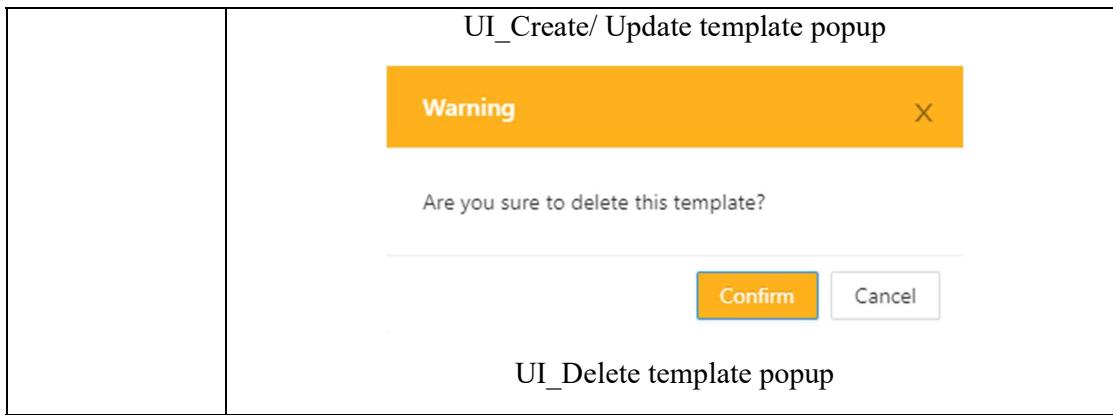
* Checklist Type: Select checklist type

* Effective Campus: All campuses (selected), Only effect at campus

* Effective Location: All locations (selected), Only effect at location

Select Campus: Select Location

Submit Cancel



3.4.4.2 Create/ Update/ Delete Checklist components

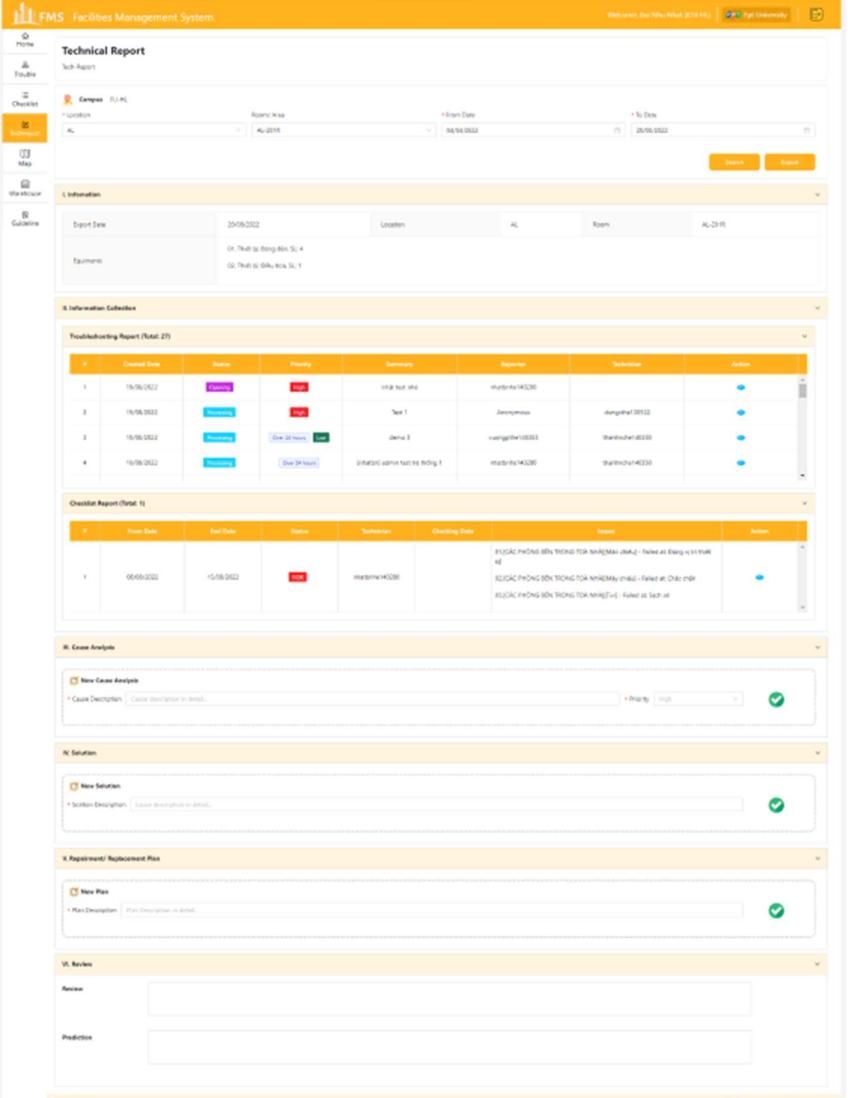
3.4.4.3 Preview

| | | | |
|--------------------|--|-------------------|--|
| UC ID and Name: | UC-17 Preview checklist components | | |
| Created By: | | Date Created: | |
| Primary Actor: | Manager, Admin | Secondary Actors: | |
| Trigger: | A manager or administrator want to preview a component in a checklist template | | |
| Description: | The function can help manager/ admin view checklist component and items belong to this look like. | | |
| Preconditions: | PRE-01. Login to FMS PRE-02. Logged user has the “Manager” or “Admin” role. | | |
| Post-conditions: | None | | |
| Normal Flow: | 31.0 Preview checklist <ol style="list-style-type: none"> 5. In navigation menu, hover on “Checklist”, choose “Customize checklist” 6. Select a checklist component 7. Click button “Preview”. If user don’t choose any component, show error message MSG14 8. FMS select data and show preview popup | | |
| Alternative Flows: | None | | |
| Exceptions: | None | | |
| Priority: | Medium | | |
| Business Rules: | BR-01, BR-12 | | |
| Assumptions: | None | | |

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|---|------------|----------------------------|---|---|---|---|--|--|----------------------------------|------------|----------------------------|---|---|--|------------------------------------|------------|----------------------------|---|---|--|--|------------|----------------------------|---|---|--|
| Activity Diagram: | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Screen Discription: | <p>Preview Bình Ác quy</p> <p>X</p> <table border="0"> <tr> <td>01. Kiểm tra đầu nối cáp điện cọc bình ác quy, bộ khởi động</td> <td>Status: OK</td> <td>Note: <input type="text"/></td> </tr> <tr> <td><input checked="" type="checkbox"/> Bình thường</td> <td><input checked="" type="checkbox"/> Chắc chắn</td> <td><input checked="" type="checkbox"/> Không bị rỉ sét (rỉ muối)</td> </tr> <tr> <td><input checked="" type="checkbox"/> Không bị hỏng hóc</td> <td></td> <td></td> </tr> <tr> <td>02. Nhiệt độ thân vỏ bình ác quy</td> <td>Status: OK</td> <td>Note: <input type="text"/></td> </tr> <tr> <td><input checked="" type="checkbox"/> Bình thường</td> <td><input checked="" type="checkbox"/> Không có hiện tượng nóng bất thường</td> <td></td> </tr> <tr> <td>03. Tình trạng thân vỏ bình ác quy</td> <td>Status: OK</td> <td>Note: <input type="text"/></td> </tr> <tr> <td><input checked="" type="checkbox"/> Sạch sẽ</td> <td><input checked="" type="checkbox"/> Chắc chắn</td> <td><input checked="" type="checkbox"/> Không hỏng hóc</td> </tr> <tr> <td>04. Kiểm tra giá treo, cáp đỡ ống khói ngoài nhà</td> <td>Status: OK</td> <td>Note: <input type="text"/></td> </tr> <tr> <td><input checked="" type="checkbox"/> Sạch sẽ</td> <td><input checked="" type="checkbox"/> Chắc chắn</td> <td><input checked="" type="checkbox"/> Không bị rò rỉ</td> </tr> </table> <p style="text-align: right;"><input type="button" value="Cancel"/></p> <p style="text-align: center;">UI_Preview popup</p> | 01. Kiểm tra đầu nối cáp điện cọc bình ác quy, bộ khởi động | Status: OK | Note: <input type="text"/> | <input checked="" type="checkbox"/> Bình thường | <input checked="" type="checkbox"/> Chắc chắn | <input checked="" type="checkbox"/> Không bị rỉ sét (rỉ muối) | <input checked="" type="checkbox"/> Không bị hỏng hóc | | | 02. Nhiệt độ thân vỏ bình ác quy | Status: OK | Note: <input type="text"/> | <input checked="" type="checkbox"/> Bình thường | <input checked="" type="checkbox"/> Không có hiện tượng nóng bất thường | | 03. Tình trạng thân vỏ bình ác quy | Status: OK | Note: <input type="text"/> | <input checked="" type="checkbox"/> Sạch sẽ | <input checked="" type="checkbox"/> Chắc chắn | <input checked="" type="checkbox"/> Không hỏng hóc | 04. Kiểm tra giá treo, cáp đỡ ống khói ngoài nhà | Status: OK | Note: <input type="text"/> | <input checked="" type="checkbox"/> Sạch sẽ | <input checked="" type="checkbox"/> Chắc chắn | <input checked="" type="checkbox"/> Không bị rò rỉ |
| 01. Kiểm tra đầu nối cáp điện cọc bình ác quy, bộ khởi động | Status: OK | Note: <input type="text"/> | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Bình thường | <input checked="" type="checkbox"/> Chắc chắn | <input checked="" type="checkbox"/> Không bị rỉ sét (rỉ muối) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Không bị hỏng hóc | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 02. Nhiệt độ thân vỏ bình ác quy | Status: OK | Note: <input type="text"/> | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Bình thường | <input checked="" type="checkbox"/> Không có hiện tượng nóng bất thường | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 03. Tình trạng thân vỏ bình ác quy | Status: OK | Note: <input type="text"/> | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Sạch sẽ | <input checked="" type="checkbox"/> Chắc chắn | <input checked="" type="checkbox"/> Không hỏng hóc | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 04. Kiểm tra giá treo, cáp đỡ ống khói ngoài nhà | Status: OK | Note: <input type="text"/> | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Sạch sẽ | <input checked="" type="checkbox"/> Chắc chắn | <input checked="" type="checkbox"/> Không bị rò rỉ | | | | | | | | | | | | | | | | | | | | | | | | | | |

3.5 Technical Report

3.5.1 View Technical report

| Screen Description: |  <p>The screenshot displays the 'Technical Report' module of the FMS system. The main header includes the system name and navigation links for Home, Folder, Checklist, Catalogue, Map, Warehouse, and Guideline. The 'Technical Report' tab is active.</p> <p>I. Information: Displays Export Date (20/09/2022), Location (AL), Room (AL-23 (B)), and Equipment (O1: Thanh to bring dinh SL:4, O2: Thanh to Dak, Ma SL:1).</p> <p>II. Troubleshooting Report (Total: 2): A table showing four troubleshooting cases with columns: ID, Created Date, Status, Priority, Summary, Reporter, and Remarks.</p> <table border="1"><thead><tr><th>ID</th><th>Created Date</th><th>Status</th><th>Priority</th><th>Summary</th><th>Reporter</th><th>Remarks</th></tr></thead><tbody><tr><td>1</td><td>18/09/2022</td><td>Active</td><td>High</td><td>nhà tắm nhà</td><td>minhduc140300</td><td></td></tr><tr><td>2</td><td>18/09/2022</td><td>Active</td><td>High</td><td>Tiles 1</td><td>minhduc140300</td><td>dangthai140300</td></tr><tr><td>3</td><td>18/09/2022</td><td>Pending</td><td>Low (2 hours)</td><td>Item 2</td><td>vietnguyet140300</td><td>thanhchau140300</td></tr><tr><td>4</td><td>18/09/2022</td><td>Pending</td><td>Low (24 hours)</td><td>nhatho140300 đang bị hỏng 1</td><td>minhduc140300</td><td>thanhchau140300</td></tr></tbody></table> <p>III. Checklist Report (Total: 1): A table showing one checklist entry with columns: ID, From Date, End Date, Status, Summary, and Remarks.</p> <table border="1"><thead><tr><th>ID</th><th>From Date</th><th>End Date</th><th>Status</th><th>Summary</th><th>Remarks</th></tr></thead><tbody><tr><td>1</td><td>06/09/2022</td><td>15/09/2022</td><td>Open</td><td>nhatho140300</td><td>PHIẾU KIỂM ĐỊNH BỊ HỎNG TỐI ĐA NGÀY 06/09/2022 - Fehler am Eingang zu toilette K2 KHÔNG PHÒNG ĐỘN TRONG TỐI ĐA NGÀY 06/09/2022 - Fehler am Dusch zelle KHÔNG PHÒNG ĐỘN TRONG TỐI ĐA NGÀY 06/09/2022 - Fehler am Saun</td></tr></tbody></table> <p>IV. Cause Analysis: A form for creating a new cause analysis entry with Cause Description and Priority (High) selected.</p> <p>V. Solution: A form for creating a new solution entry with Solution Description and Priority (High) selected.</p> <p>VI. Requirements/ Replacement Plan: A form for creating a new plan entry with Plan Description and Priority (High) selected.</p> <p>VII. Review: Fields for Review and Predictive analysis.</p> <p>Bottom Navigation: Guideline, Home, Logout, Helpdesk, and Search.</p> | ID | Created Date | Status | Priority | Summary | Reporter | Remarks | 1 | 18/09/2022 | Active | High | nhà tắm nhà | minhduc140300 | | 2 | 18/09/2022 | Active | High | Tiles 1 | minhduc140300 | dangthai140300 | 3 | 18/09/2022 | Pending | Low (2 hours) | Item 2 | vietnguyet140300 | thanhchau140300 | 4 | 18/09/2022 | Pending | Low (24 hours) | nhatho140300 đang bị hỏng 1 | minhduc140300 | thanhchau140300 | ID | From Date | End Date | Status | Summary | Remarks | 1 | 06/09/2022 | 15/09/2022 | Open | nhatho140300 | PHIẾU KIỂM ĐỊNH BỊ HỎNG TỐI ĐA NGÀY 06/09/2022 - Fehler am Eingang zu toilette K2 KHÔNG PHÒNG ĐỘN TRONG TỐI ĐA NGÀY 06/09/2022 - Fehler am Dusch zelle KHÔNG PHÒNG ĐỘN TRONG TỐI ĐA NGÀY 06/09/2022 - Fehler am Saun |
|---------------------|--|------------|----------------|-----------------------------|--|-----------------|----------|---------|---|------------|--------|------|-------------|---------------|--|---|------------|--------|------|---------|---------------|----------------|---|------------|---------|---------------|--------|------------------|-----------------|---|------------|---------|----------------|-----------------------------|---------------|-----------------|----|-----------|----------|--------|---------|---------|---|------------|------------|------|--------------|--|
| ID | Created Date | Status | Priority | Summary | Reporter | Remarks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 18/09/2022 | Active | High | nhà tắm nhà | minhduc140300 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 18/09/2022 | Active | High | Tiles 1 | minhduc140300 | dangthai140300 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 18/09/2022 | Pending | Low (2 hours) | Item 2 | vietnguyet140300 | thanhchau140300 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 18/09/2022 | Pending | Low (24 hours) | nhatho140300 đang bị hỏng 1 | minhduc140300 | thanhchau140300 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ID | From Date | End Date | Status | Summary | Remarks | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 06/09/2022 | 15/09/2022 | Open | nhatho140300 | PHIẾU KIỂM ĐỊNH BỊ HỎNG TỐI ĐA NGÀY 06/09/2022 - Fehler am Eingang zu toilette K2 KHÔNG PHÒNG ĐỘN TRONG TỐI ĐA NGÀY 06/09/2022 - Fehler am Dusch zelle KHÔNG PHÒNG ĐỘN TRONG TỐI ĐA NGÀY 06/09/2022 - Fehler am Saun | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

UI_Technical report

BÁO CÁO KỸ THUẬT

I. THÔNG TIN CƠ BẢN/ BASIC INFORMATION

| | | |
|--------------------------|-------------------|--------------|
| Ngày/ Date: | Vi tri/ Location: | Phòng/ Room: |
| Thiết bị/ Equipments: | | |

II. THU THẬP THÔNG TIN/ DATA COLLECTION

1. Báo cáo sự cố/ Trouble reports

| STT No | Ngày tạo Create date | Tổng kết Summary | Trạng thái Status | Ưu tiên Priority | Người xử lý Technician |
|-----------|-------------------------|---------------------|----------------------|---------------------|---------------------------|
| | | | | | |

2. Đánh giá sử dụng checklist/ Checklist reports

| STT No | Ngày kiểm tra Checking date | Trạng thái Status | Các vấn đề Issue list | Giải pháp Solution | Người đánh giá Technician |
|-----------|--------------------------------|----------------------|--------------------------|-----------------------|------------------------------|
| | | | | | |

III. PHÂN TÍCH NGUYÊN NHÂN / CAUSE ANALYSIS

IV. GIẢI PHÁP/ SOLUTION

V. KẾ HOẠCH SỬA CHỮA (THAY THẾ) / REPAIRMENT (REPLACEMENT) PLAN

VI. ĐÁNH GIÁ/ REVIEW

1. Review/ Đánh giá

UI_Template Technical Report (P.1)

2. Dự đoán/ Prediction

| | |
|------------------------------|------|
| Người lập báo cáo/ Reporter: | |
| Phòng ban/ Department: | KTHT |

UI_Template Technical Report (P.2)

3.6 Warehouse Management

3.6.1 Import/ Export warehouse

Screen Description:

| # | Import Date | Reason | Category | Asset Code | Asset Name | Measure Unit | Quantity | Ready for use | Action |
|---|-------------|---------------|---------------------|------------|--------------|--------------|----------|-------------------------------------|-----------------------------------|
| 1 | 01/08/2022 | Bổ sung mới | Hệ thống chiếu sáng | HTCS.001 | Bóng đèn 30W | Cái | 2 | <input checked="" type="checkbox"/> | X |
| 2 | 03/08/2022 | Bổ sung lần 2 | Hệ thống quạt | HTQ.003 | Quạt điện cơ | Bộ | 4 | <input checked="" type="checkbox"/> | X |

UI_Import Asset/ Using form

| # | Import Date | Reason | Category | Asset Code | Asset Name | Measure Unit | Quantity | Ready for use | Action |
|---|-------------|-------------|---------------------|------------|--------------|--------------|----------|-------------------------------------|-----------------------------------|
| 1 | 17/08/2022 | Mua bổ sung | Hệ thống chiếu sáng | 8001 | Bóng đèn dài | Cái | -18 | <input checked="" type="checkbox"/> | X |

UI_Import Asset/ Using import Excel

| # | Export Date | Receiver | Asset Code | Quantity | Reason | Reference | Action |
|---|-------------|----------------|--------------|-------------------------------------|---------------|--|-----------------------------------|
| 1 | 22/08/2022 | Input receiver | Select Asset | <input checked="" type="checkbox"/> | Select Reason | http://demofms.site:3000/detailTrouble/714 | X |

UI_Export Asset/ Using form

| | |
|-----------------------------------|---|
| <p>Screen Description:</p> | <p>UI_Export Asset/ Using import Excel</p> |
|-----------------------------------|---|

3.6.2 Import/ Export warehouse history

| | |
|-----------------------------------|------------------------------------|
| <p>Screen Description:</p> | <p>UI_Warehouse History</p> |
|-----------------------------------|------------------------------------|

3.6.3 Warehouse remaining list

| | |
|-----------------------------------|---|
| <p>Screen Description:</p> | <p>UI_Warehouse Remaining List</p> |
|-----------------------------------|---|

| | |
|--|-------------------------------|
| | UI_Warehouse Remaining |
|--|-------------------------------|

3.6.4 Customize warehouse standards

| | |
|---------------------|--|
| Screen Description: | |
|---------------------|--|

3.7 Map

3.7.1 View map

| | |
|---------------------|--|
| Screen Description: | |
|---------------------|--|

UI_Map View

3.7.2 Customize map

Screen Description:

The screenshot shows the 'Customize Map' section of the FMS system. On the left is a vertical sidebar with icons for Home, Trouble, Checklist, Techreport, Map (highlighted in orange), Warehouse, and Guideline. The main area has a yellow header bar with the FMS logo, 'Facilities Management System', and user information. Below the header is a search bar with fields for Campus (FU-HL), Location (Beta), and Floor (2). A large grid represents a floor plan with rooms labeled BE-201 through BE-209. A specific area is outlined in orange. To the right is a panel titled 'Area Configuration' with fields for Name (Choose room), Size (2x2 square), Position (X: 1, Y: 1), Area Type (Select type), and Clone this area (checkbox). Buttons for 'Save & Exit' and 'Save & Add' are at the bottom.

UI_Map Customize

3.8 Configuration Management

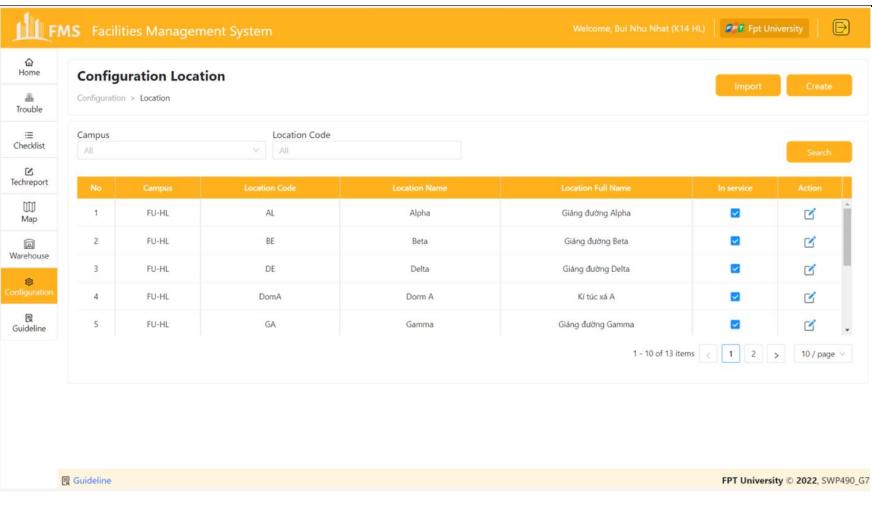
3.8.1 Create/ Update Campuses

Screen Description:

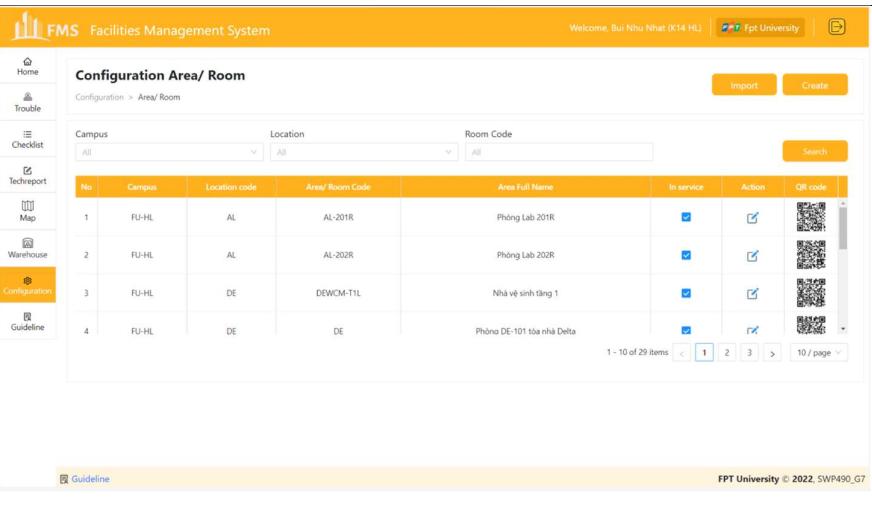
The screenshot shows the 'Configuration Campus' section of the FMS system. The sidebar includes icons for Home, Trouble, Checklist, Techreport, Map, Warehouse, Configuration (highlighted in orange), and Guideline. The main area has a yellow header bar with the FMS logo, 'Facilities Management System', and user information. Below the header is a search bar with a 'Campus Name' dropdown set to 'All'. A table lists four campuses: FU-HL, FU-HCM, FU-CT, and FU-DN, each with its address, telephone number, and 'In service' status. At the bottom are pagination controls (1 - 4 of 4 items, page 1) and a '10 / page' dropdown. A 'Guideline' link is at the bottom left, and 'FPT University © 2022, SWP490_G7' is at the bottom right.

UI_Configuration Campus

3.8.2 Create/ Update Locations

| | |
|----------------------------|--|
| Screen Description: |  <p>UI_Configuration Location</p> |
|----------------------------|--|

3.8.3 Create/ Update Areas/ Rooms

| | |
|----------------------------|---|
| Screen Description: |  <p>UI_Configuration areas or rooms</p> |
|----------------------------|---|

3.8.4 Create/ Update Users

Screen Description:

The screenshot shows the 'Configuration User' page in the FMS Facilities Management System. The left sidebar includes links for Home, Trouble, Checklist, Techreport, Map, Warehouse, Configuration (which is highlighted in orange), and Guideline. The main area has tabs for 'User' and 'Role'. A search bar at the top right allows filtering by User Name, Campus, and Role. Below is a table listing 9 items, each with a 'Create' button in the 'Action' column.

| No | Campus | Username | Email | Full Name | Role | Active | Action |
|----|--------|----------------|---------------------------|-----------------|------------|-------------------------------------|--------|
| 1 | FU-HL | bontv | bontv@fpt.edu.vn | | Admin | <input checked="" type="checkbox"/> | |
| 2 | FU-HL | dungthe130522 | dungthe130522@fpt.edu.vn | Chu Tiến Dũng | Technician | <input checked="" type="checkbox"/> | |
| 3 | FU-HL | hanhthe140104 | hanhthe140104@fpt.edu.vn | | Admin | <input checked="" type="checkbox"/> | |
| 4 | FU-HL | hungvthe130277 | hungvthe130277@fpt.edu.vn | Võ Thành Hung | Technician | <input checked="" type="checkbox"/> | |
| 5 | FU-HL | minhhnh141666 | minhhnh141666@fpt.edu.vn | | Manager | <input checked="" type="checkbox"/> | |
| 6 | FU-HL | rhatbrhe140280 | rhatbrhe140280@fpt.edu.vn | Hoàng Ngọc Minh | Admin | <input checked="" type="checkbox"/> | |

1 - 9 of 9 items < 1 > 10 / page

Guideline FPT University © 2022, SWP490_G7

UI_Configuration User

3.8.5 Create/ Update Categories

Screen Description:

The screenshot shows the 'Configuration Asset Category' page in the FMS Facilities Management System. The left sidebar includes links for Home, Trouble, Checklist, Techreport, Map, Warehouse, Configuration (highlighted in orange), and Guideline. The main area has tabs for 'Asset Category'. A search bar at the top right allows filtering by Asset Name and Parent Category. Below is a table listing 5 items, each with a 'Create' button in the 'Action' column.

| No | Asset Category Name | Parent Category | Action | Note |
|----|---------------------|-----------------|-------------------------------------|------|
| 1 | Hệ thống điện | None | <input checked="" type="checkbox"/> | |
| 2 | Hệ thống chiếu sáng | Hệ thống điện | <input checked="" type="checkbox"/> | |
| 3 | Hệ thống quạt | Hệ thống điện | <input checked="" type="checkbox"/> | |
| 4 | Hệ thống điều hòa | Hệ thống điện | <input checked="" type="checkbox"/> | |

1 - 5 of 5 items < 1 > 10 / page

Guideline FPT University © 2022, SWP490_G7

UI_Configuration Categories

3.8.6 Create/ Update Assets

Screen Description:

The screenshot shows the 'Configuration Asset' page in the FMS Facilities Management System. The left sidebar includes links for Home, Trouble, Checklist, Techreport, Map, Warehouse, Configuration (highlighted in orange), and Guideline. The main area has tabs for 'Asset'. A search bar at the top right allows filtering by Campus, Location, Room/Area, and Asset Name. Below is a table listing 3 items, each with a 'Create' button in the 'Action' column.

| No | Campus | Location | Room/ Area | Asset Name | Asset Code | Unit | Quantity | Created By | Start Date | End Date | In service | Action |
|----|--------|----------|------------|---------------------|----------------|------|----------|----------------|------------|----------|-------------------------------------|--------|
| 1 | FU-HL | AL | AL-201R | Hệ thống chiếu sáng | TBD-HTCS.BD.01 | Cái | 4 | rhatbrhe140280 | 09/08/2022 | | <input checked="" type="checkbox"/> | |
| 2 | FU-HL | AL | AL-201R | Hệ thống điện | TBD-HTC.DH.01 | Cái | 1 | rhatbrhe140280 | 09/08/2022 | | <input checked="" type="checkbox"/> | |
| 3 | FU-HL | DE | DE | Hệ thống quạt | Q701 | Cái | 2 | rhatbrhe140280 | 09/08/2022 | | <input checked="" type="checkbox"/> | |

1 - 3 of 3 items < 1 > 10 / page

Guideline FPT University © 2022, SWP490_G7

UI_Configuration Assets

4. Non-Functional Requirements

4.1 External Interfaces

4.2 Quality Attributes

5. Requirement Appendix

5.1 Business Rules

| ID | Rule Definition |
|-------|---|
| BR-01 | All activities belong to manager need login first. |
| BR-02 | System only accept for FPT email (has extension @fpt.edu.vn) login to. |
| BR-03 | With login, user can create trouble in status Draft. |
| BR-04 | With login, the user can view trouble report detail and update information before the Manager assigns this report to a technician. |
| BR-05 | Only with a mobile device, anyone can create a trouble report. |
| BR-06 | With the report in status “Opening”, the manager can choose a technician to do this and the status of this report change to “Processing”. |
| BR-07 | All changes in trouble report will store in database |
| BR-08 | Only technician can change workflow after Processing. |
| BR-09 | Only technician can update data in tab “Troubleshooting”. |
| BR-10 | Only Manager can create new checklist. |
| BR-11 | Only Manager and Technician can view and update data of a checklist |
| BR-12 | Only Manager can view and customize checklist template |
| BR-13 | Only Manager and Administrator can config system |

5.2 Common Requirements

5.3 Application Messages List

| # | Message code | Message Type | Context | Content |
|---|--------------|----------------------------|-------------------------------------|--|
| 1 | MSG01 | Toast message | Not choose a campus before login | <i>Please, choose a campus.</i> <i>Hãy chọn campus mà bạn đang học/ làm việc.</i> |
| 2 | MSG02 | Toast message | Don't have permission to access FMS | <i>Don't have permission to access FMS</i> <i>Tài khoản của bạn không được phép đăng nhập vào hệ thống.</i> |
| 3 | MSG03 | In red, under the text box | Required field | <i>This field cannot be empty!</i> |
| 4 | MSG04 | Result screen | Create trouble successfully | |

| | | | | |
|----|-------|---------------|---|---|
| 5 | MSG05 | Toast message | Save data successfully | <i>Successfully Save successfully.</i> |
| 6 | MSG06 | Confirm popup | Confirm assign technician | <i>This report will be changed to Processing. Are you sure assign technician for this report?</i> |
| 7 | MSG07 | Toast message | Don't choose technician | <i>Error Please choose a technician!</i> |
| 8 | MSG08 | Toast message | Assign technician successfully | <i>Successfully Change technician successfully.</i> |
| 9 | MSG09 | Toast message | Cancel report successfully | |
| 10 | MSG10 | Toast message | Delete report successfully | <i>Successfully Delete successfully.</i> |
| 11 | MSG11 | Toast message | Don't choose a component before click "Import" | <i>Error create new item Choose a component or input component name (if you want to create a new template).</i> |
| 12 | MSG12 | Toast message | Save checklist configuration successfully | <i>Successfully Update configuration successfully.</i> |
| 13 | MSG13 | Toast message | Don't choose a component before click "Delete" | <i>Error Please choose a template to delete.</i> |
| 14 | MSG14 | Toast message | Don't choose a component before click "Preview" | <i>Error Please choose a component or input checklist content to view preview.</i> |
| 15 | MSG15 | Toast message | Conflict existed data | <i>Conflict data This asset is existed, and has changed value. Please check again!</i> |
| 16 | MSG16 | Toast message | Invalid import file | <i>Error at import file Please check import file again! / Hãy check lại file import!</i> |

| | | | | |
|----|-------|----------------------------|-----------------------------------|--|
| 17 | MSG17 | Toast message | Require check link | Error <i>Please, click to validate URL first.</i> |
| 18 | MSG18 | In red, under the text box | Invalid URL | <i>Invalid URL. Please input again!</i> |
| 19 | MSG19 | Under the text box | Valid URL | <i>Valid URL.</i> |
| 20 | MSG20 | Toast message | Input invalid quantity | Error <i>Quantity is number./ số lượng cần nhập là số</i> |
| 21 | MSG21 | Toast message | Input negative number in quantity | Error <i>Quantity is positive number./ vui lòng nhập số dương</i> |

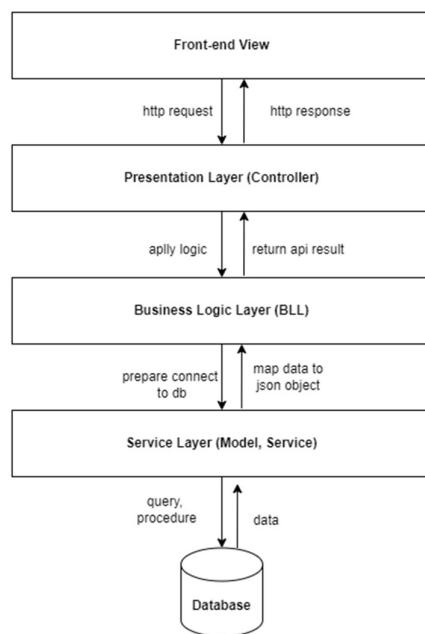
5.4 Other Requirements

IV. Software Design Description

1. System Design

1.1 System Architecture

1.1.1 Overall Architecture



FMS builds on 3-layers model:

Views: contains front-end processing code.

Presentation Layer: contains Controllers that receive/return HTTP request/response to the front-end.

Business Logic Layer: Receives information from the controller that deploys the logic to the Service layer and aggregates the results after processing.

Data Access Layer: Handles the code to connect to the database, map data to object model, and return data in the JSON object.

Database: Store data of the entire system in the form of tables and relationships (FK).

1.1.2 Development tool

1.1.2.1 Front-end



FMS uses React JS combined with the support from the Ant Design library system to build the front-end. We use the IDE which is Visual Studio Code to code.

1.1.2.2 Back-end



On the architecture side for the Back end, FMS chooses the .NET Core 5 REST API platform, .NET Framework 4.7 to build the Back end. Code on IDE Visual Studio Communication 2019, build API using IIS Express. Using Postman for test API Result.

1.2.1.3 Database

In this project, we choose a database using SQL Server 2016 on the SSMS IDE to store data.



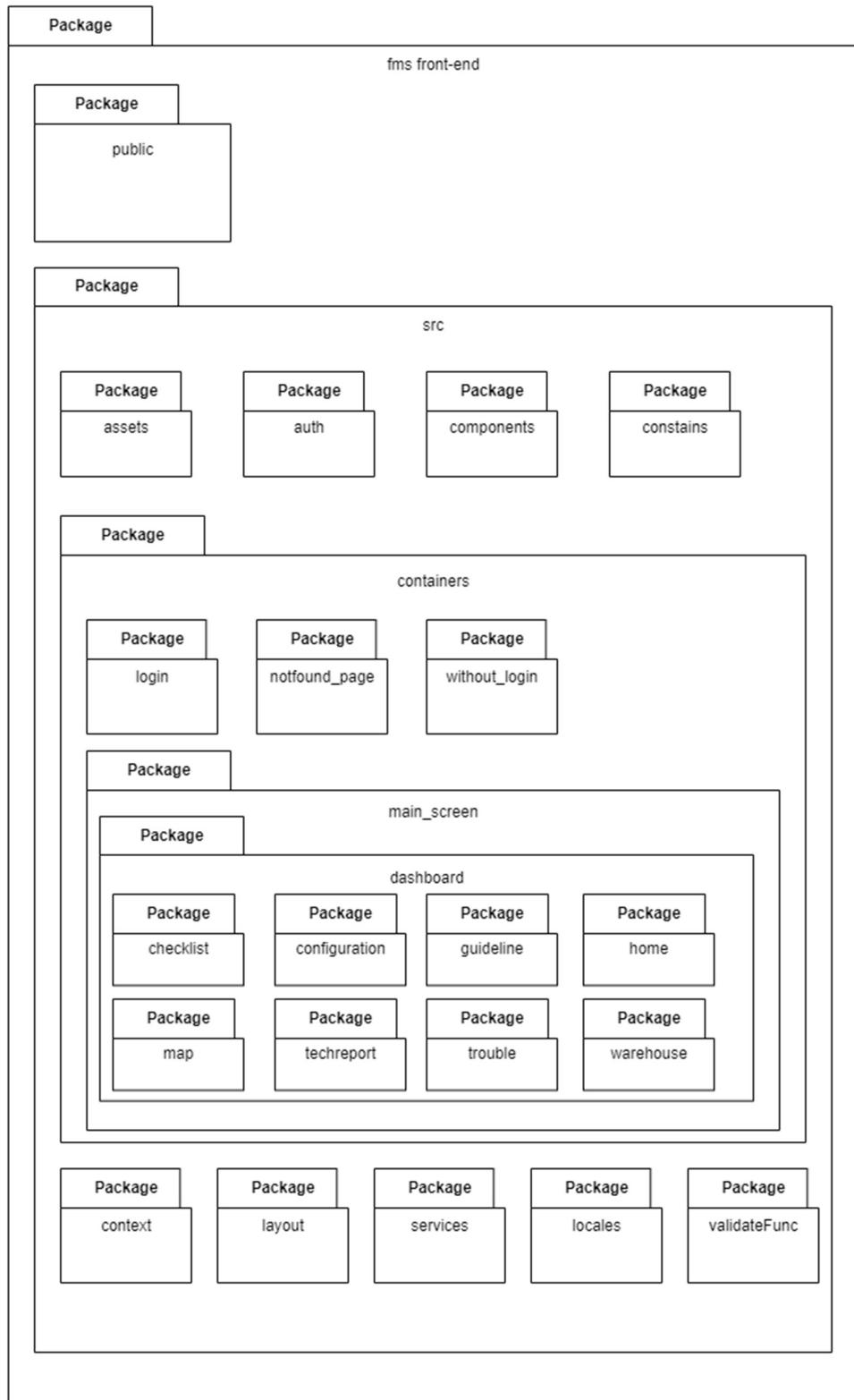
1.1.2.4 Deployment Enviroment

We use VPS Cloud to build Front-end and use SSD Hosting Window (all service belong to Inet) for build Back-end and Database.



1.2 Package Diagram

1.2.1 Front-end

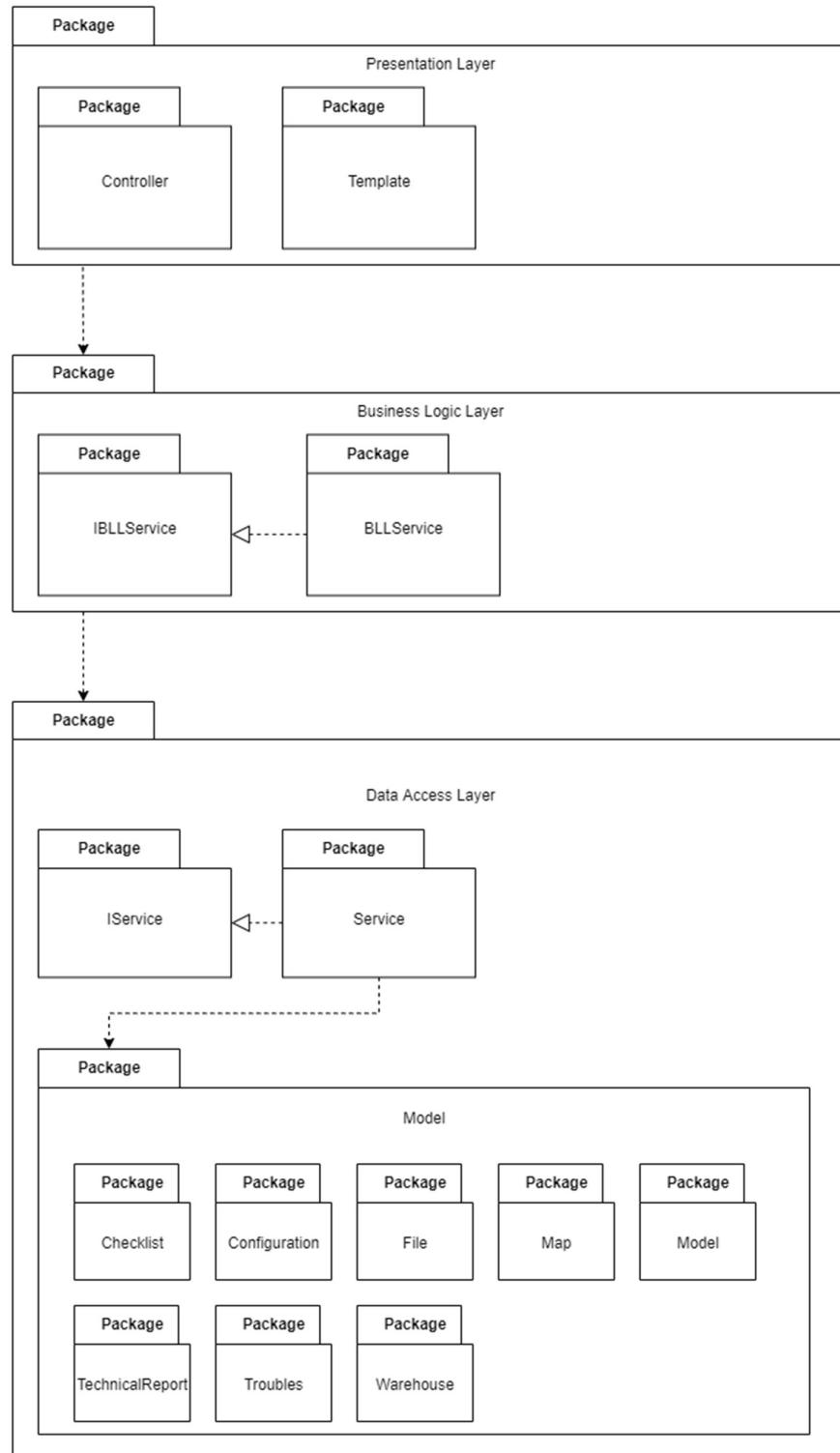


Package Descriptions

| No | Package | Description |
|----|---------------|--|
| 01 | fms front-end | Contains all source code FE |
| 02 | public | This package config to title page |
| 03 | src | Contains main logic code |
| 04 | assets | Store all images, icon in here |
| 05 | auth | Store authentication information |
| 06 | components | Base components can use in many different classes |
| 07 | constains | Store contains data like api path, env config, etc |
| 08 | containers | Contains code of all screens |
| 09 | login | Contains code of Login screen |
| 10 | notfound_page | Contains code of Not Found screen |
| 11 | without_login | Contains code of Without Login screen |
| 12 | main_screen | Contains all code FE after login |
| 13 | dashboard | Contains code of Dashboard screen |
| 14 | checklist | Contains code of Checklist screen |
| 15 | configuration | Contains code of Configuration screen |
| 16 | guideline | Contains code of Guideline screen |
| 17 | home | Contains code of Home screen |
| 18 | map | Contains code of Map screen |
| 19 | techreport | Contains code of Technical report screen |
| 20 | trouble | Contains code of Trouble screen |
| 21 | warehouse | Contains code of Warehouse screen |
| 22 | context | Contains code store to context |
| 23 | layout | Contains .css code of all screen |
| 24 | services | Contains code call api to BE |

| | | |
|----|--------------|--|
| 25 | locales | Contains code english/ vietnamese language |
| 26 | validateFunc | Contains code of validate functions |

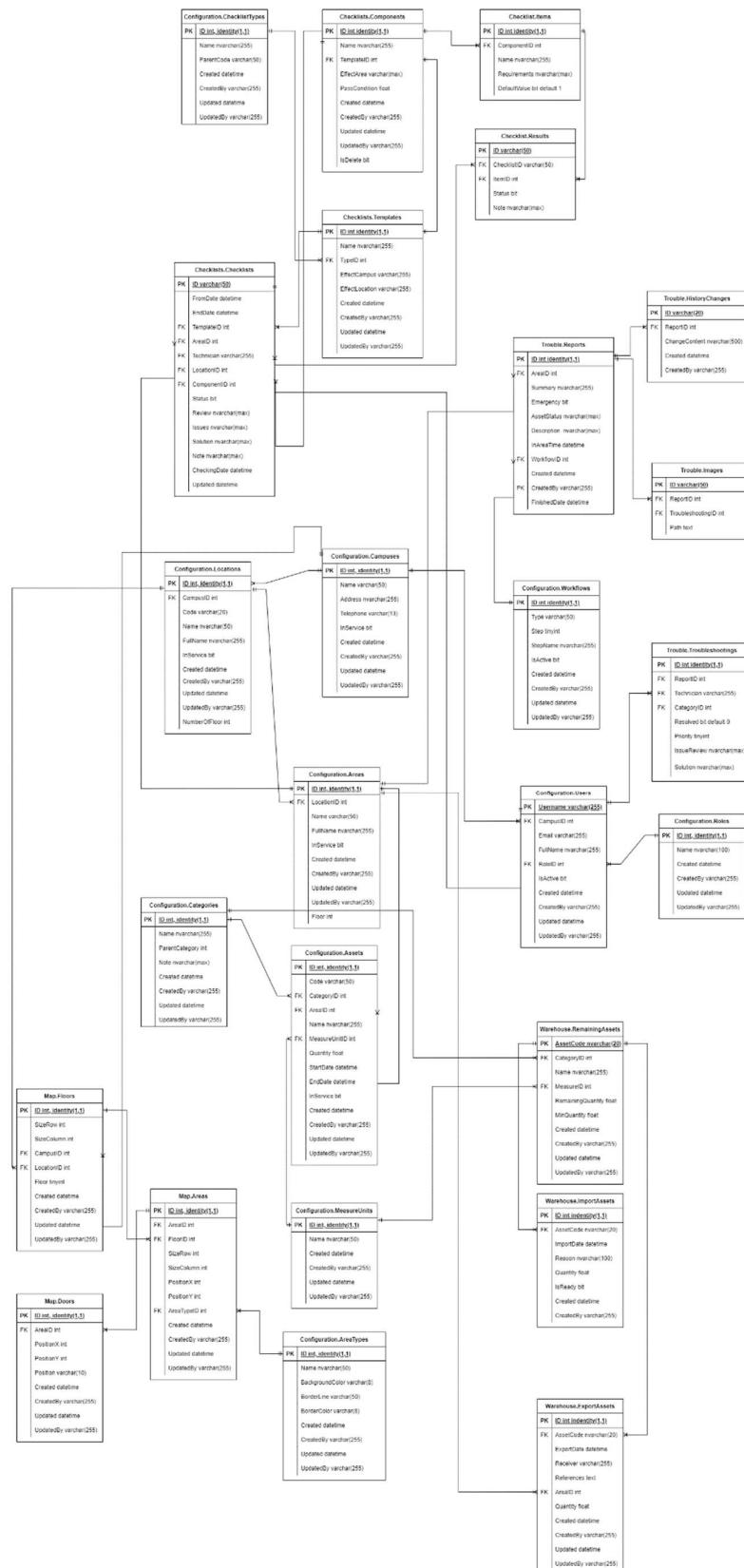
1.2.2 Back-end



Package Descriptions

| No | Package | Description |
|----|--------------------|--|
| 01 | Presentation Layer | First layer communication with FE |
| 02 | Controller | Map API by HTTP method |
| 03 | Template | Contains template to import, export data |
| 04 | IBLLService | Base interface of bussiness logic layer |
| 05 | BLLService | Code apply interface IBLLService |
| 06 | IService | Base interface of data access layer |
| 07 | Service | Code apply interface IService |
| 08 | Model | Contains code of class define |
| 09 | Checklist | Contains code of all class solve Checklist function |
| 10 | Warehouse | Contains code of all class solve Warehouse function |
| 11 | Configuration | Contains code of all class solve Configuration function |
| 12 | File | Contains code of File classes |
| 13 | Map | Contains code of all class solve Map function |
| 14 | Troubles | Contains code of all class solve Troubles function |
| 15 | TechnicalReport | Contains code of all class solve Technical Report function |
| 16 | Model | Contains code of SearchModel, BaseApiModel,etc |

2. Database Design



1.1 Table “Configuration.Roles”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|----------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |
| 2 | Name | nvarchar | 100 | | | | |
| 3 | Created | datetime | | | | | |
| 4 | CreatedBy | varchar | 255 | | | | |
| 5 | Updated | datetime | | | | | |
| 6 | UpdatedBy | varchar | 255 | | | | |

1.2 Table “Configuration.MeasureUnits”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|----------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |
| 2 | Name | nvarchar | 255 | | | | |
| 3 | Created | datetime | | | | | |
| 4 | CreatedBy | varchar | 255 | | | | |
| 5 | Updated | datetime | | | | | |
| 6 | UpdatedBy | varchar | 255 | | | | |

1.3 Table “Configuration.Categories”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|----------------|----------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |
| 2 | Name | nvarchar | 255 | | | | |
| 3 | ParentCategory | int | | | | | |
| 4 | Note | nvarchar | max | | | | |
| 5 | Created | datetime | | | | | |
| 6 | CreatedBy | varchar | 255 | | | | |
| 7 | Updated | datetime | | | | | |
| 8 | UpdatedBy | varchar | 255 | | | | |

1.4 Table “Configuration.Assets”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|----------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |
| 2 | Code | varchar | 50 | | | | |
| 3 | Created | datetime | | | | | |
| 4 | CreatedBy | varchar | 255 | | | | |
| 5 | Updated | datetime | | | | | |
| 6 | UpdateBy | varchar | 255 | | | | |
| 7 | CategoryID | int | | | | FK | |

| | | | | | | | |
|----|---------------|----------|-----|--|--|----|--|
| 8 | AreaID | int | | | | FK | |
| 9 | Name | nvarchar | 255 | | | | |
| 10 | MeasureUnitID | int | | | | FK | |
| 11 | Quantity | float | | | | | |
| 12 | StartDate | datetime | | | | | |
| 13 | EndDate | datetime | | | | | |
| 14 | InService | bit | | | | | |

1.5 Table “Configuration.Users”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|----------|------|--------|----------|-------|-------|
| 1 | UserName | varchar | 255 | | | PK | |
| 2 | Email | nvarchar | 255 | | | | |
| 3 | Created | datetime | | | | | |
| 4 | CreatedBy | varchar | 255 | | | | |
| 5 | Updated | datetime | | | | | |
| 6 | UpdatedBy | varchar | 255 | | | | |
| 7 | CampusID | int | | | | FK | |
| 8 | FullName | nvarchar | 255 | | | | |
| 9 | RoleID | int | | | | FK | |
| 10 | IsActive | bit | | | | | |

1.6 Table “Configuration.Areas”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|----------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |
| 2 | Name | varchar | 50 | | | | |
| 3 | Created | datetime | | | | | |
| 4 | CreatedBy | varchar | 255 | | | | |
| 5 | Updated | datetime | | | | | |
| 6 | UpdatedBy | varchar | 255 | | | | |
| 7 | LocationID | int | | | | FK | |
| 8 | FullName | nvarchar | 255 | | | | |
| 9 | InService | bit | | | | | |
| 10 | Floor | int | | | | | |

1.7 Table “Configuration.Locations”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |

| | | | | | | | |
|----|-------------|----------|-----|--|--|----|--|
| 2 | Name | nvarchar | 50 | | | | |
| 3 | Created | datetime | | | | | |
| 4 | CreatedBy | varchar | 255 | | | | |
| 5 | Updated | datetime | | | | | |
| 6 | UpdatedBy | varchar | 255 | | | | |
| 7 | CampusID | int | | | | FK | |
| 8 | Code | varchar | 20 | | | | |
| 9 | FullName | nvarchar | 255 | | | | |
| 10 | InService | bit | | | | | |
| 11 | NumOffFloor | int | | | | | |

1.8 Table “Configuration.Campuses”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|----------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |
| 2 | Name | nvarchar | 50 | | | | |
| 3 | Created | datetime | | | | | |
| 4 | CreatedBy | varchar | 255 | | | | |
| 5 | Updated | datetime | | | | | |
| 6 | UpdatedBy | varchar | 255 | | | | |
| 7 | Address | nvarchar | 255 | | | | |
| 8 | Telephone | varchar | 13 | | | | |
| 9 | InService | bit | | | | | |

1.9 Table “Configuration.Workflows”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|----------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |
| 2 | Type | nvarchar | 50 | | | | |
| 3 | Created | datetime | | | | | |
| 4 | CreatedBy | varchar | 255 | | | | |
| 5 | Updated | datetime | | | | | |
| 6 | UpdatedBy | varchar | 255 | | | | |
| 7 | Step | tinyint | | | | | |
| 8 | StepName | nvarchar | 255 | | | | |
| 9 | IsActive | bit | | | | | |

1.10 Table “Configuration.AreaTypes”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|------|------|--------|----------|-------|-------|
| | | | | | | | |

| | | | | | | | |
|---|-----------------|----------|-----|--|--|----|--|
| 1 | ID | int | | | | PK | |
| 2 | Name | nvarchar | 50 | | | | |
| 3 | Created | datetime | | | | | |
| 4 | CreatedBy | varchar | 255 | | | | |
| 5 | Updated | datetime | | | | | |
| 6 | UpdatedBy | varchar | 255 | | | | |
| 7 | BackgroundColor | varchar | 8 | | | | |
| 8 | BorderLine | varchar | 50 | | | | |
| 9 | BorderColor | varchar | 8 | | | | |

1.11 Table “Configuration.ChecklistTypes”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|----------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |
| 2 | Name | nvarchar | 255 | | | | |
| 3 | Created | datetime | | | | | |
| 4 | CreatedBy | varchar | 255 | | | | |
| 5 | Updated | datetime | | | | | |
| 6 | UpdatedBy | varchar | 255 | | | | |
| 7 | ParentCode | int | | | | | |

1.12 Table “Warehouse.ImportAssets”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|----------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |
| 2 | AssetCode | nvarchar | 20 | | | FK | |
| 3 | Created | datetime | | | | | |
| 4 | CreatedBy | varchar | 255 | | | | |
| 5 | Quantity | float | | | | | |
| 6 | IsReady | bit | 255 | | | | |
| 7 | ImportDate | datetime | | | | | |
| 8 | Reason | nvarchar | 100 | | | | |
| 9 | Updated | datetime | | | | | |
| 10 | UpdatedBy | varchar | 255 | | | | |

1.13 Table “Warehouse.ExportAssets”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|----------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |
| 2 | AssetCode | nvarchar | 20 | | | FK | |

| | | | | | | | |
|----|------------|----------|-----|--|--|--|--|
| 3 | ExportDate | datetime | | | | | |
| 4 | Receiver | varchar | 255 | | | | |
| 5 | References | text | | | | | |
| 6 | Reason | nvarchar | 100 | | | | |
| 7 | Quantity | float | | | | | |
| 8 | Created | datetime | | | | | |
| 9 | CreatedBy | varchar | 255 | | | | |
| 10 | Updated | datetime | | | | | |
| 11 | UpdatedBy | varchar | 255 | | | | |

1.14 Table “Warehouse.RemainingAssets”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|-------------------|----------|------|--------|----------|-------|-------|
| 1 | AssetCode | nvarchar | 20 | | | PK | |
| 2 | Name | nvarchar | 255 | | | | |
| 3 | Created | datetime | | | | | |
| 4 | CreatedBy | varchar | 255 | | | | |
| 5 | Updated | datetime | | | | | |
| 6 | UpdatedBy | varchar | 255 | | | | |
| 7 | MinQuantity | float | | | | | |
| 8 | RemainingQuantity | float | | | | | |
| 9 | MeasureID | int | | | | FK | |
| 10 | CategoryID | int | | | | FK | |

1.15 Table “Trouble.Troubleshootings”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|-------------|----------|-----------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |
| 2 | ReportID | int | | | | FK | |
| 3 | Technician | varchar | 255 | | | FK | |
| 4 | CategoryID | int | | | | FK | |
| 5 | Resolved | bit | default 0 | | | | |
| 6 | Priority | tinyint | | | | | |
| 7 | IssueReview | nvarchar | max | | | | |
| 8 | Solution | nvarchar | max | | | | |

1.16 Table “Trouble.Reports”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |

| | | | | | | | |
|----|--------------|----------|-----|--|--|----|--|
| 2 | AreaID | int | | | | FK | |
| 3 | Summary | nvarchar | 255 | | | | |
| 4 | Emergency | bit | | | | | |
| 5 | AssetStatus | nvarchar | max | | | | |
| 6 | Description | nvarchar | max | | | | |
| 7 | InAreaTime | datetime | | | | | |
| 8 | WorkflowID | int | | | | FK | |
| 9 | Created | datetime | | | | | |
| 10 | CreatedBy | varchar | 255 | | | FK | |
| 11 | FinishedDate | datetime | | | | | |

1.17 Table “Trouble.Images”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|--------------------|---------|------|--------|----------|-------|-------|
| 1 | ID | varchar | 50 | | | PK | |
| 2 | ReportID | int | | | | FK | |
| 3 | Troubleshootin gID | int | | | | | |
| 4 | Path | text | | | | | |

1.18 Table “Trouble.HistoryChanges”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|---------------|----------|------|--------|----------|-------|-------|
| 1 | ID | varchar | 50 | | | PK | |
| 2 | ReportID | int | | | | FK | |
| 3 | ChangeContent | nvarchar | 500 | | | | |
| 4 | Created | datetime | | | | | |
| 5 | CreatedBy | varchar | 255 | | | | |

1.19 Table “Checklists.Results”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|-------------|----------|------|--------|----------|-------|-------|
| 1 | ID | varchar | 50 | | | PK | |
| 2 | ChecklistID | varchar | 50 | | | FK | |
| 3 | ItemID | int | | | | FK | |
| 4 | Status | bit | | | | | |
| 5 | Note | nvarchar | max | | | | |

1.20 Table “Checklist.Items”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |
| 2 | TemplateID | int | | | | FK | |

| | | | | | | | |
|---|--------------|----------|-----|--|--|--|--|
| 3 | Name | nvarchar | 255 | | | | |
| 4 | Requirements | nvarchar | max | | | | |
| 5 | DefaultValue | bit | | | | | |

1.21 Table “Checklist.Components”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|----------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |
| 2 | TemplateID | int | | | | FK | |
| 3 | Name | nvarchar | 255 | | | | |
| 4 | EffectArea | varchar | 10 | | | | |
| 5 | Created | datetime | | | | | |
| 6 | CreatedBy | varchar | 255 | | | | |
| 7 | Updated | datetime | | | | | |
| 8 | UpdatedBy | varchar | 255 | | | | |
| 9 | IsDelete | bit | | | | | |

1.22 Table “Checklist.Templates”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|----------------|----------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |
| 2 | TypeID | int | | | | FK | |
| 3 | Name | nvarchar | 255 | | | | |
| 4 | EffectCamus | varchar | 255 | | | | |
| 5 | Created | datetime | | | | | |
| 6 | CreatedBy | varchar | 255 | | | | |
| 7 | Updated | datetime | | | | | |
| 8 | UpdatedBy | varchar | 255 | | | | |
| 9 | IsDelete | bit | | | | | |
| 10 | EffectLocation | varchar | 255 | | | | |

1.23 Table “Checklist.Checklists”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|----------|------|--------|----------|-------|-------|
| 1 | ID | varchar | 50 | | | PK | |
| 2 | FromDate | datetime | | | | | |
| 3 | EndDate | datetime | | | | | |
| 4 | TemplateID | int | | | | FK | |
| 5 | AreaID | int | | | | FK | |
| 6 | Technician | varchar | 255 | | | FK | |

| | | | | | | | |
|----|--------------|----------|-----|--|--|----|--|
| 7 | Status | bit | | | | | |
| 8 | Review | nvarchar | max | | | | |
| 9 | Issues | nvarchar | max | | | | |
| 10 | Solution | nvarchar | max | | | | |
| 11 | Note | nvarchar | max | | | | |
| 12 | CheckingDate | datetime | | | | | |
| 13 | LocationID | int | | | | FK | |
| 14 | ComponentID | int | | | | FK | |
| 15 | Updated | datetime | | | | | |

1.24 Table “Map.Floors”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|----------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |
| 2 | Floor | tinyint | | | | | |
| 3 | Created | datetime | | | | | |
| 4 | CreatedBy | varchar | 255 | | | | |
| 5 | Updated | datetime | | | | | |
| 6 | UpdatedBy | varchar | 255 | | | | |
| 7 | SizeRow | int | | | | | |
| 8 | SizeColumn | int | | | | | |
| 9 | CampusID | int | | | | FK | |
| 10 | LocationID | int | | | | FK | |

1.25 Table “Map.Doors”

| No | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|----|------------|----------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |
| 2 | Position | varchar | 10 | | | | |
| 3 | Created | datetime | | | | | |
| 4 | CreatedBy | varchar | 255 | | | | |
| 5 | Updated | datetime | | | | | |
| 6 | UpdateBy | varchar | 255 | | | | |
| 7 | AreaID | int | | | | FK | |
| 8 | PositionX | int | | | | | |
| 9 | PositionY | int | | | | | |

1.26 Table “Map.Areas”

| STT | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|-----|------------|------|------|--------|----------|-------|-------|
| | | | | | | | |

| | | | | | | | |
|----|------------|----------|-----|--|--|----|--|
| 1 | ID | int | | | | PK | |
| 2 | Created | datetime | | | | | |
| 3 | CreatedBy | varchar | 255 | | | | |
| 4 | Updated | datetime | | | | | |
| 5 | UpdateBy | varchar | 255 | | | | |
| 6 | AreaID | int | | | | FK | |
| 7 | FloorID | int | | | | FK | |
| 8 | AreaTypeID | int | | | | FK | |
| 9 | SizeRow | int | | | | | |
| 10 | SizeColumn | int | | | | | |
| 11 | PositionX | int | | | | | |
| 12 | PositionY | int | | | | | |

1.27 Table “Configuration.Roles”

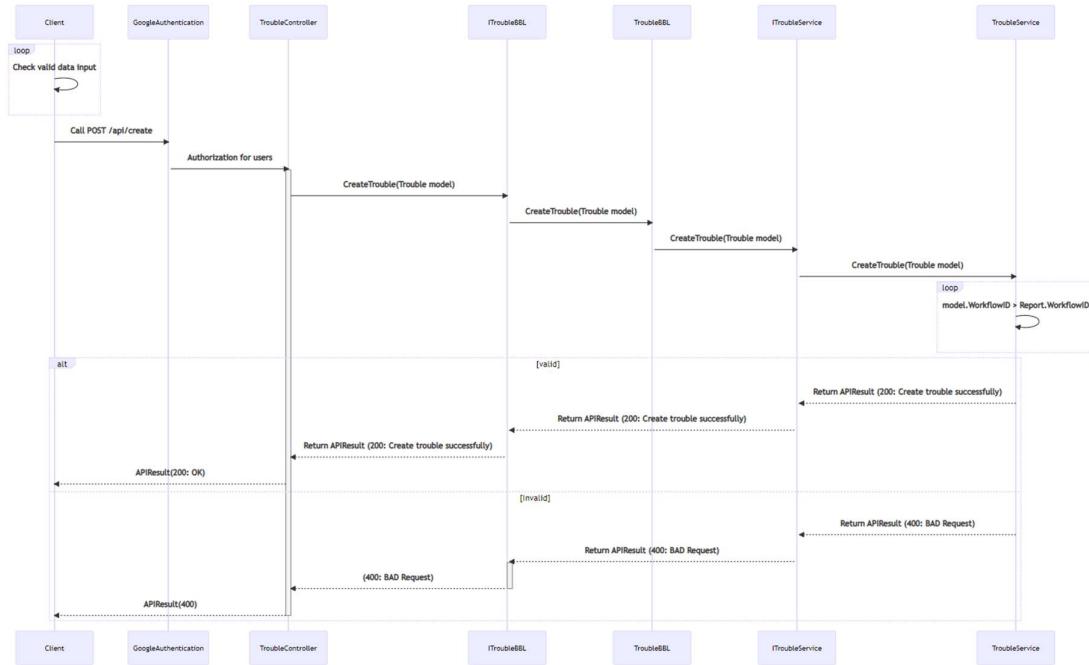
| STT | Field name | Type | Size | Unique | Not Null | PK/FK | Notes |
|-----|------------|----------|------|--------|----------|-------|-------|
| 1 | ID | int | | | | PK | |
| 2 | Name | nvarchar | 100 | | | | |
| 3 | Created | datetime | | | | | |
| 4 | CreatedBy | varchar | 255 | | | | |
| 5 | Updated | datetime | | | | | |
| 6 | UpdatedBy | varchar | 255 | | | | |

3. Detailed Design

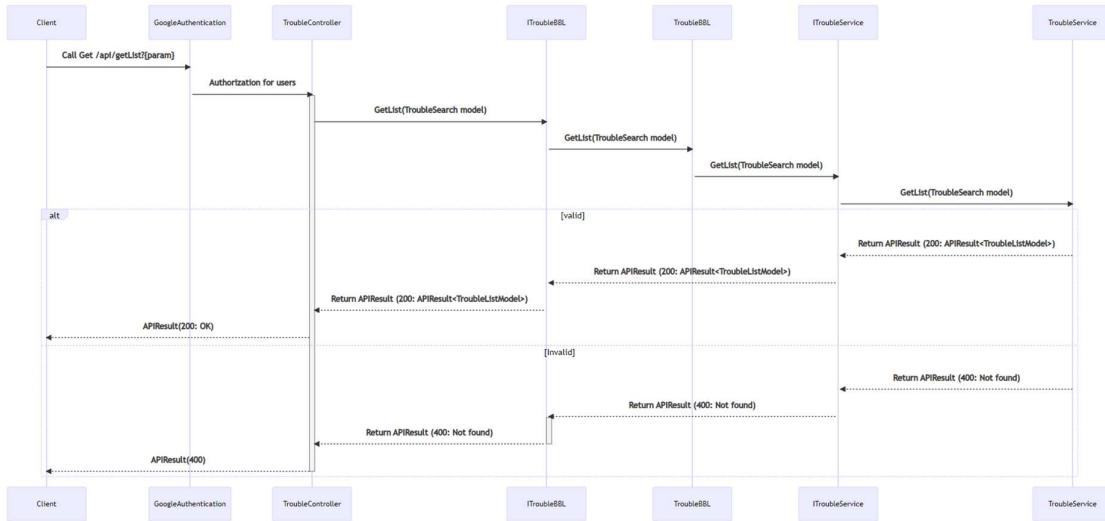
3.1 Trouble Management

3.1.1 Class Diagram

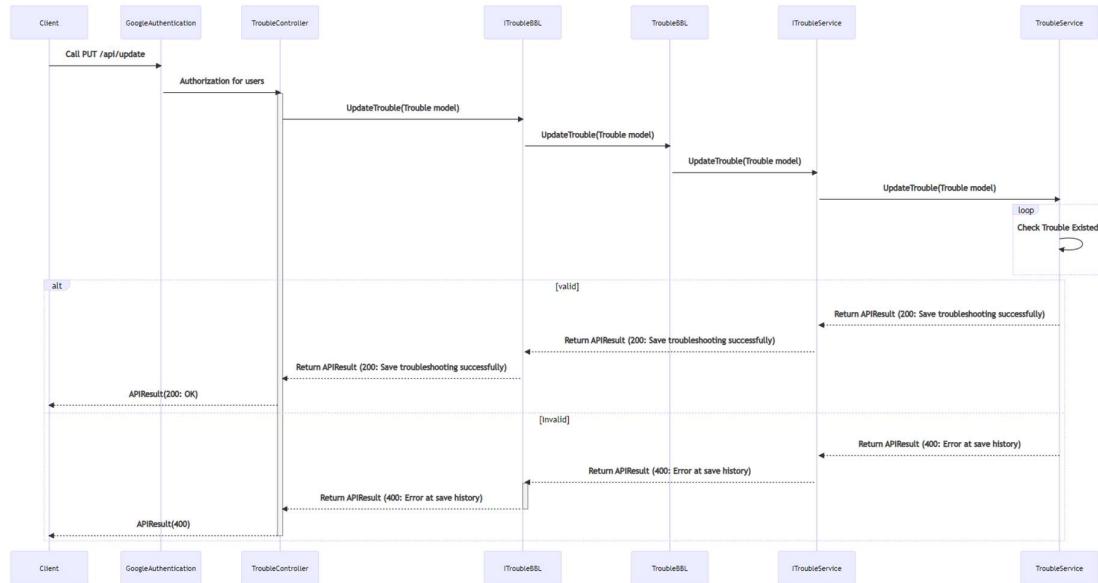
3.1.2 Create trouble report



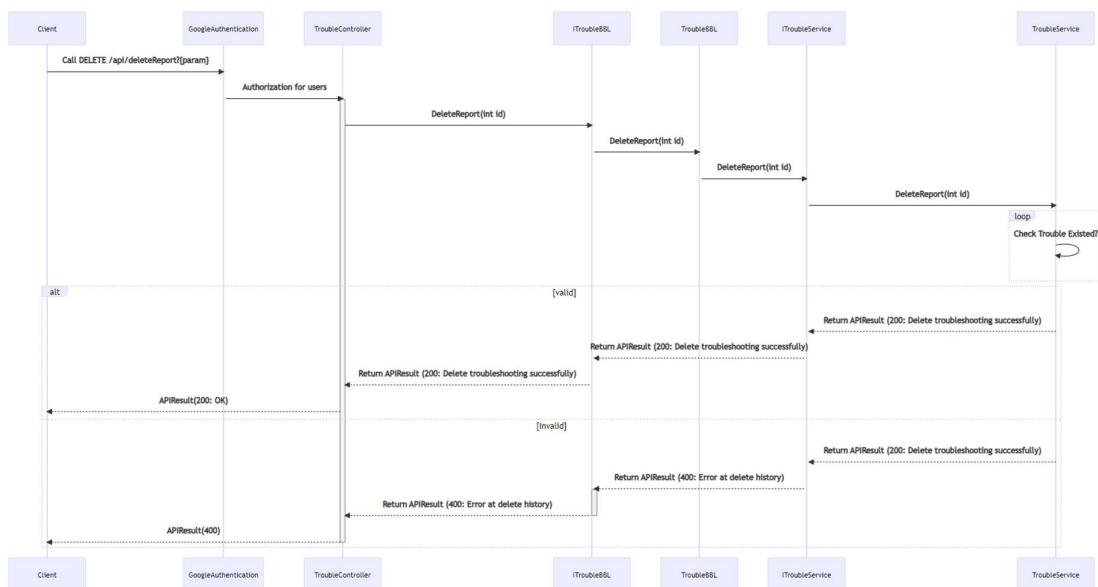
3.1.3 My trouble list



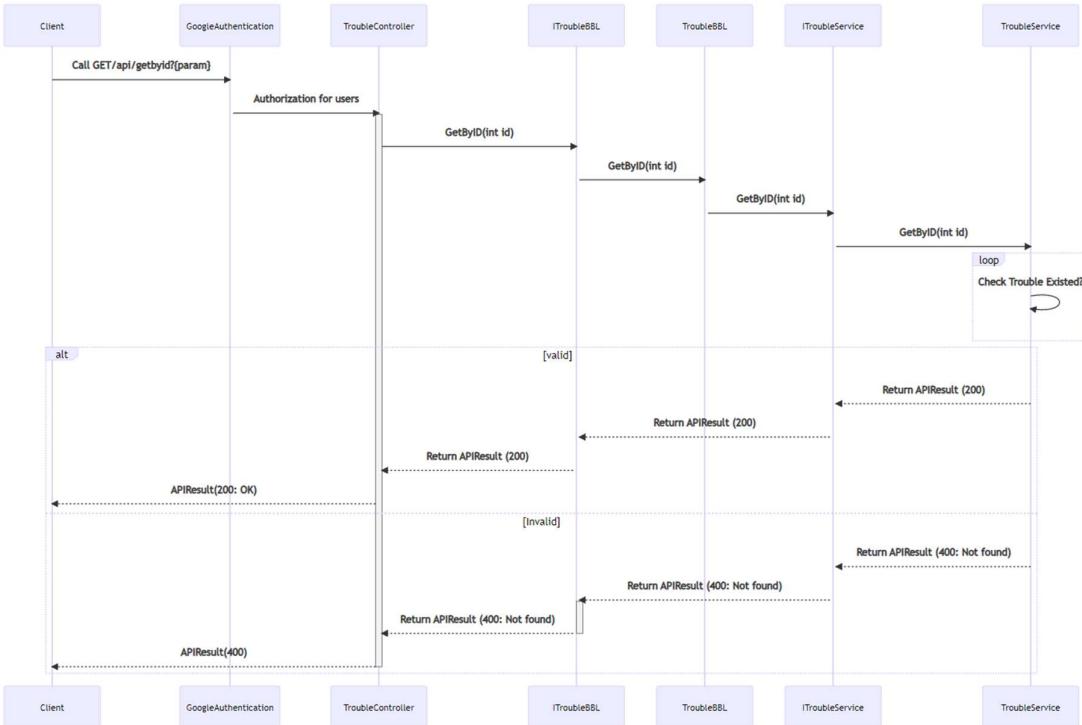
3.1.4 Update Trouble



3.1.5 Delete Trouble



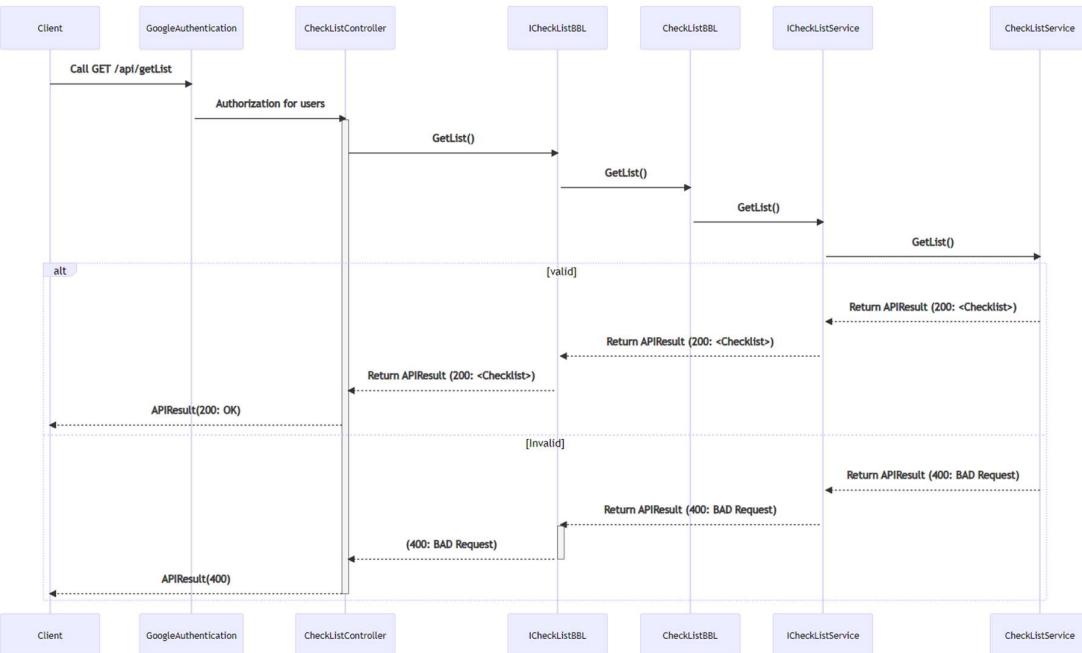
3.1.6 Trouble Detail



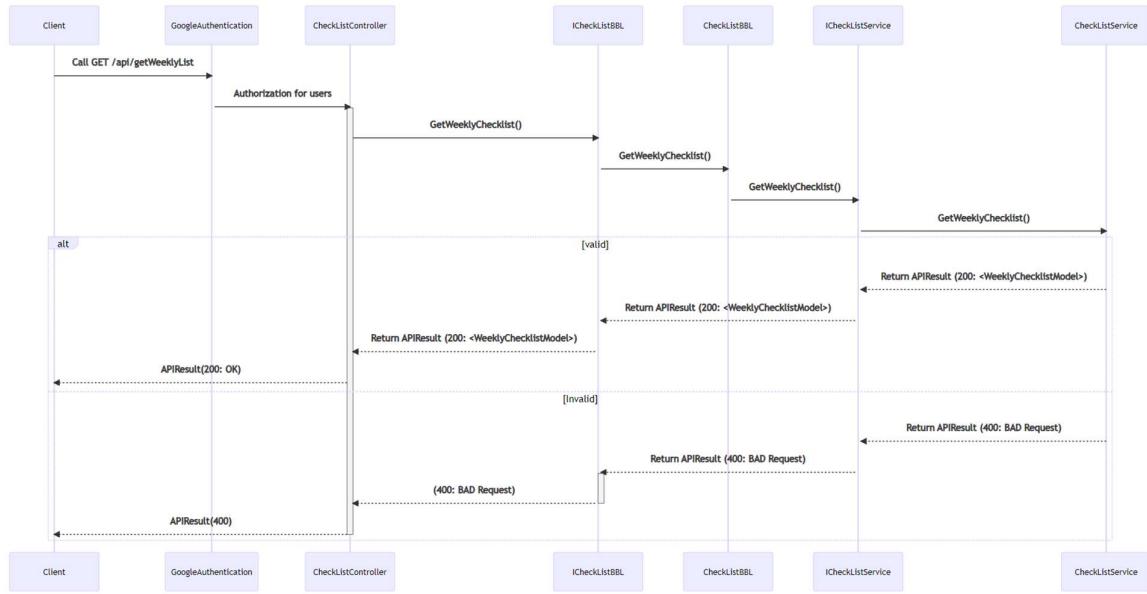
3.2 Checklist Management

3.2.1 Class diagram

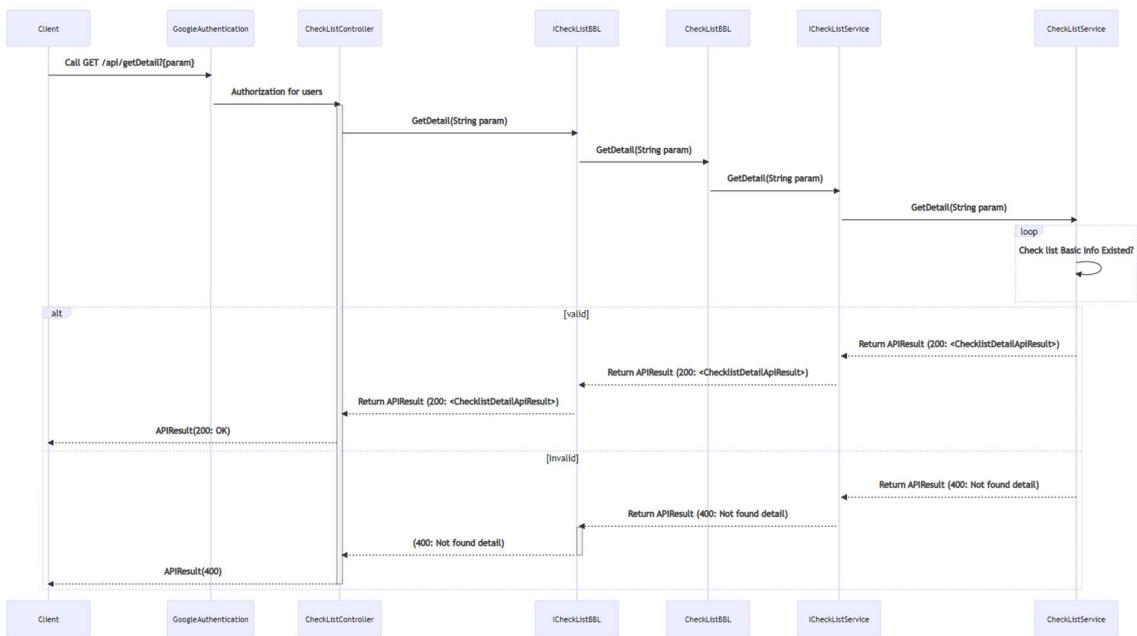
3.2.2 My Checklists



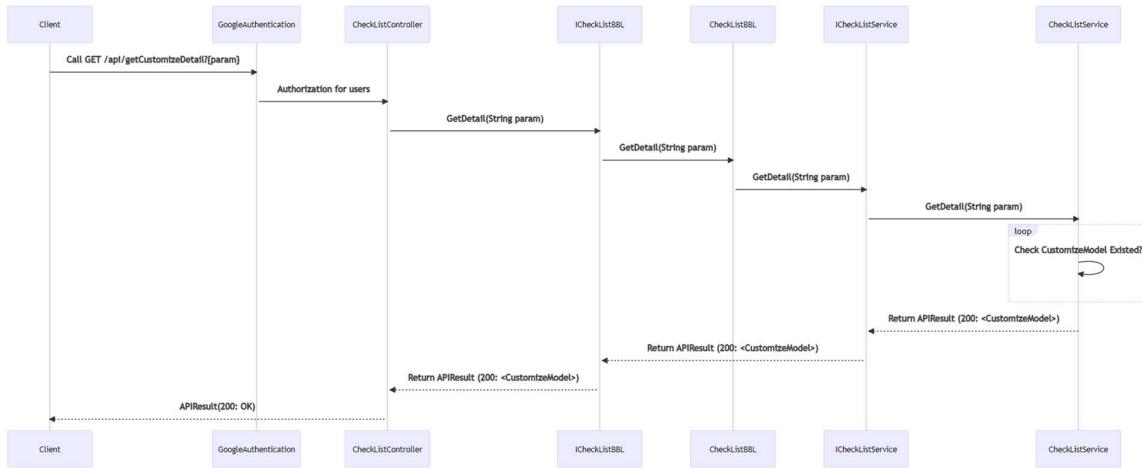
3.2.3 My checklists weekly



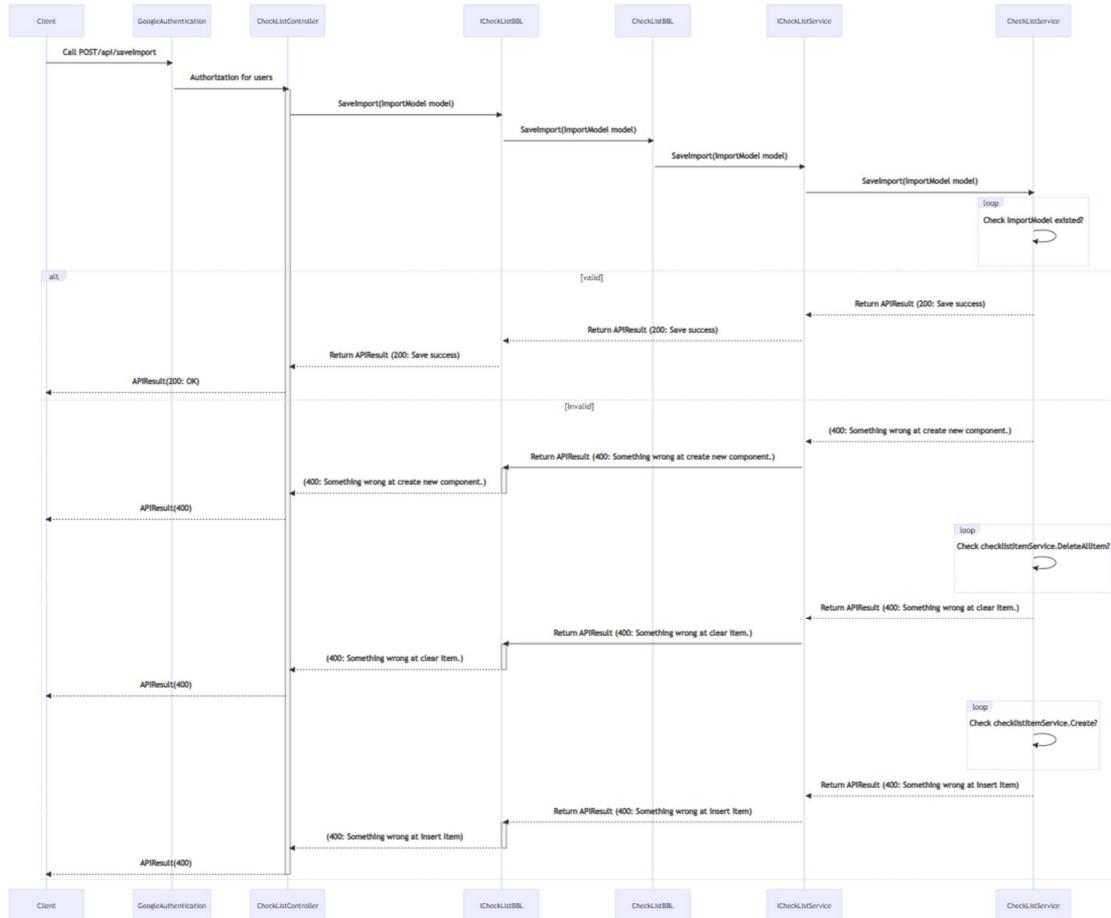
3.2.4 Checklist detail



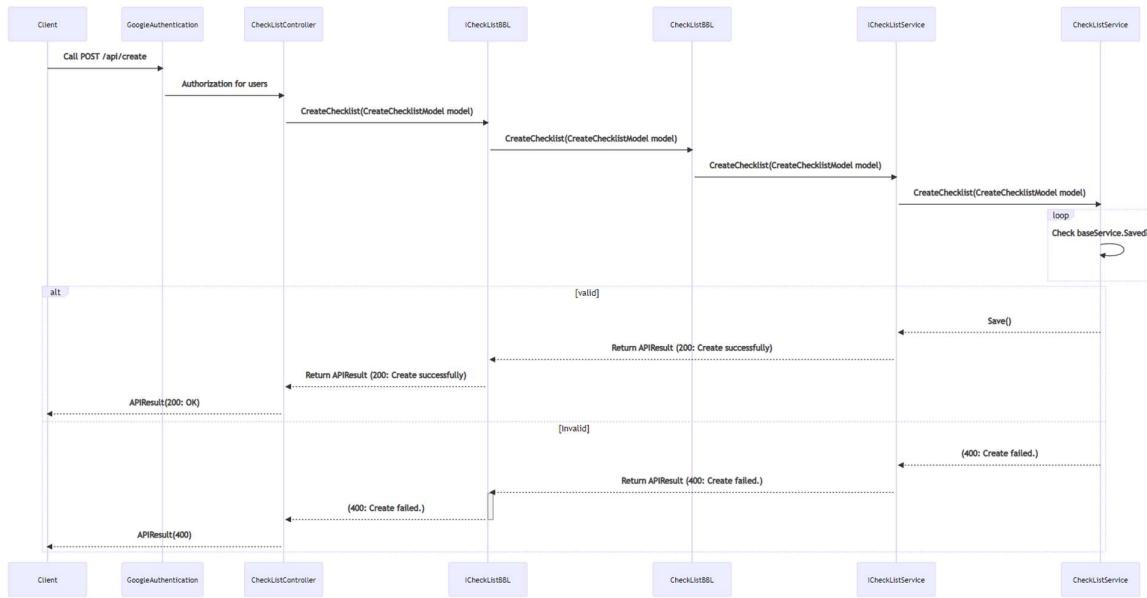
3.2.5 Customize checklists



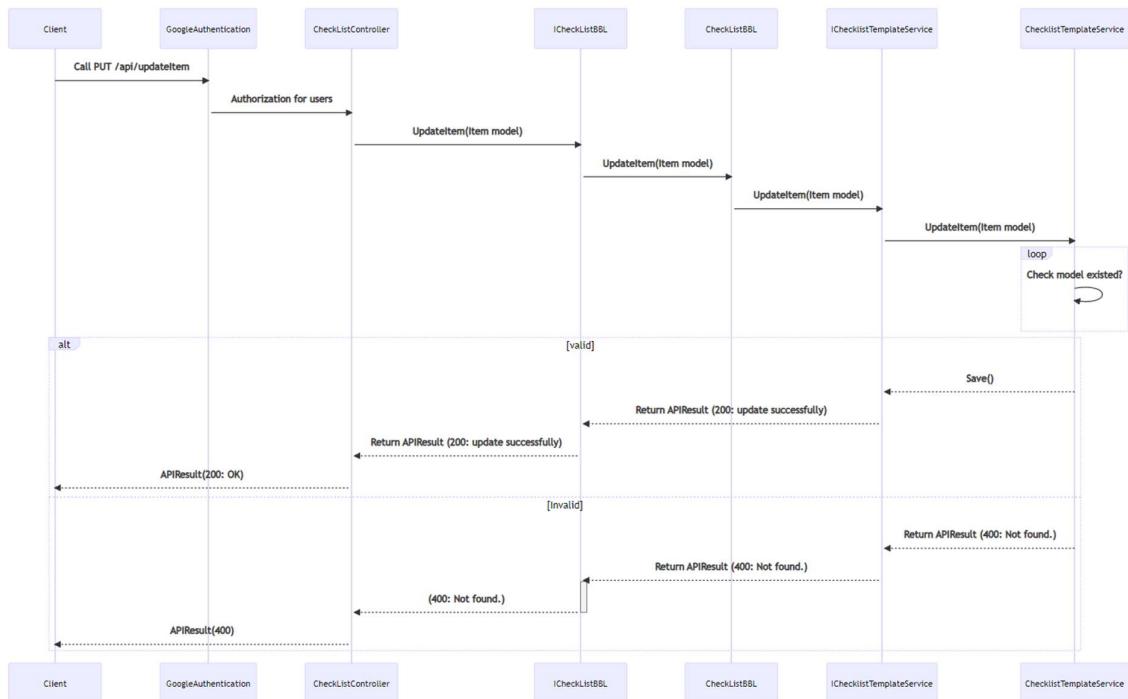
3.2.6 Import popup



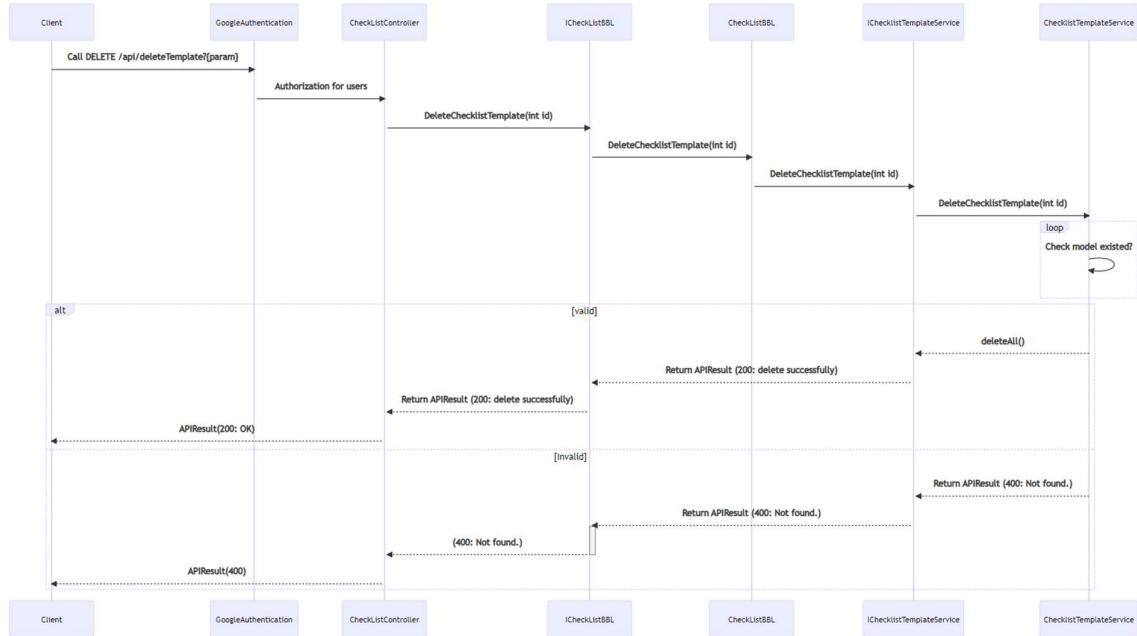
3.2.7 Create Checklist



3.2.8 Update Checklist

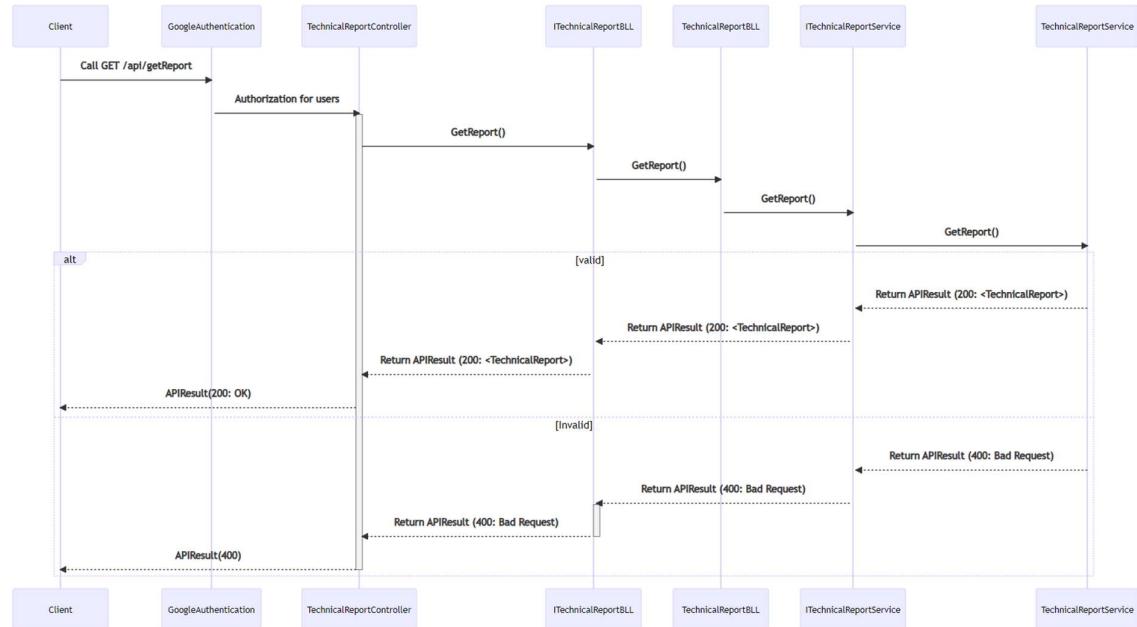


3.2.8 Delete Checklist

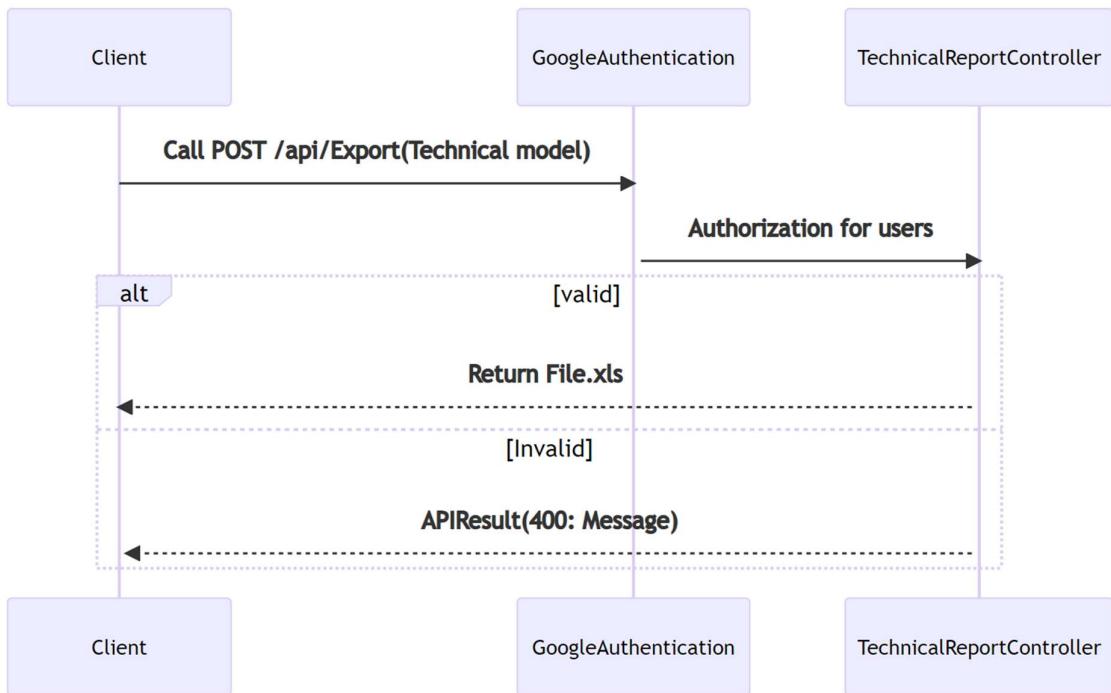


3.3 Technical – report

3.3.1 Get List Technical Report



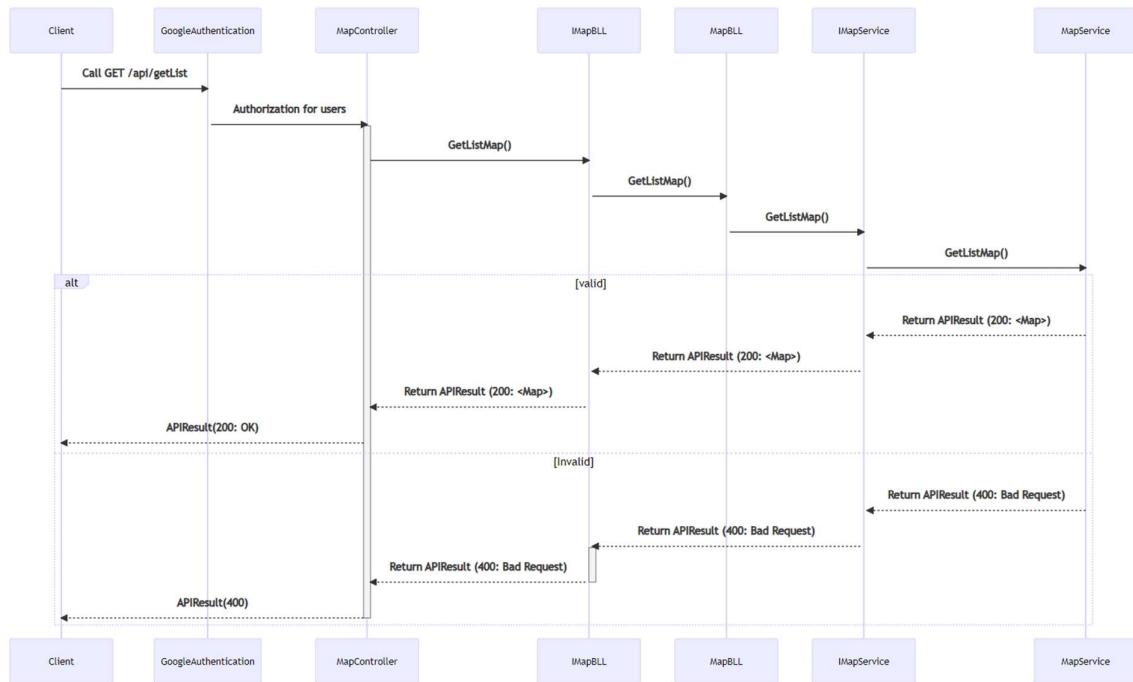
3.3.2 Export Technical Report



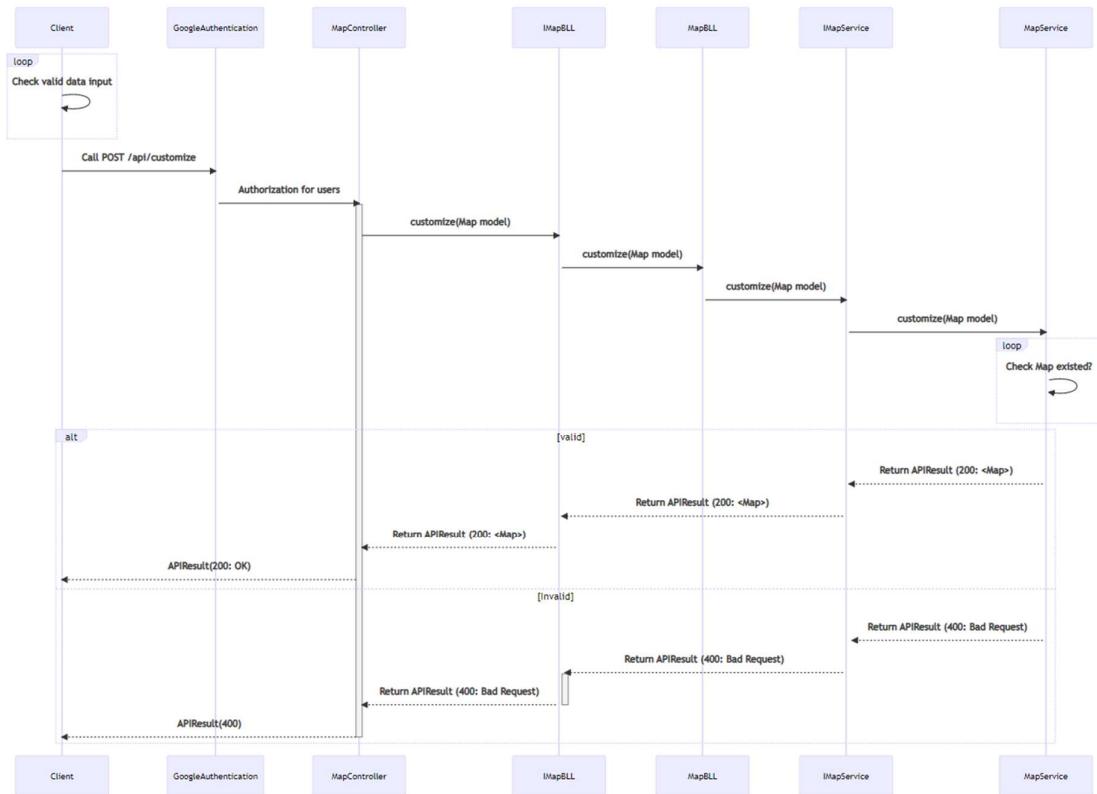
3.4 Map

3.4.1 Class Diagram

3.4.2 Map view



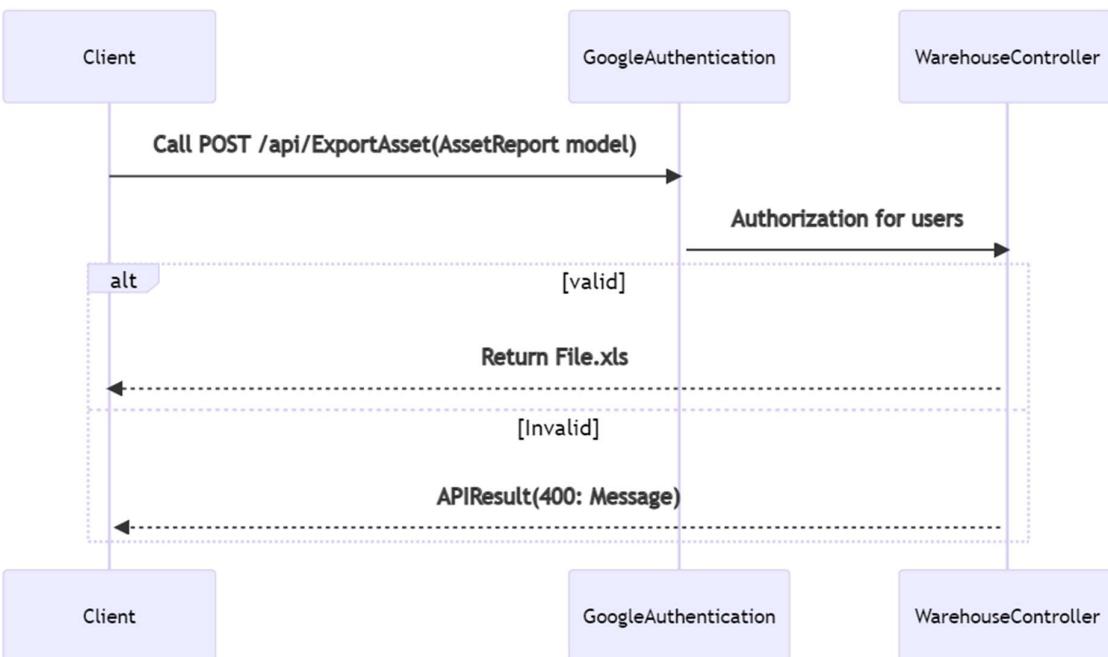
3.4.3 Customize map



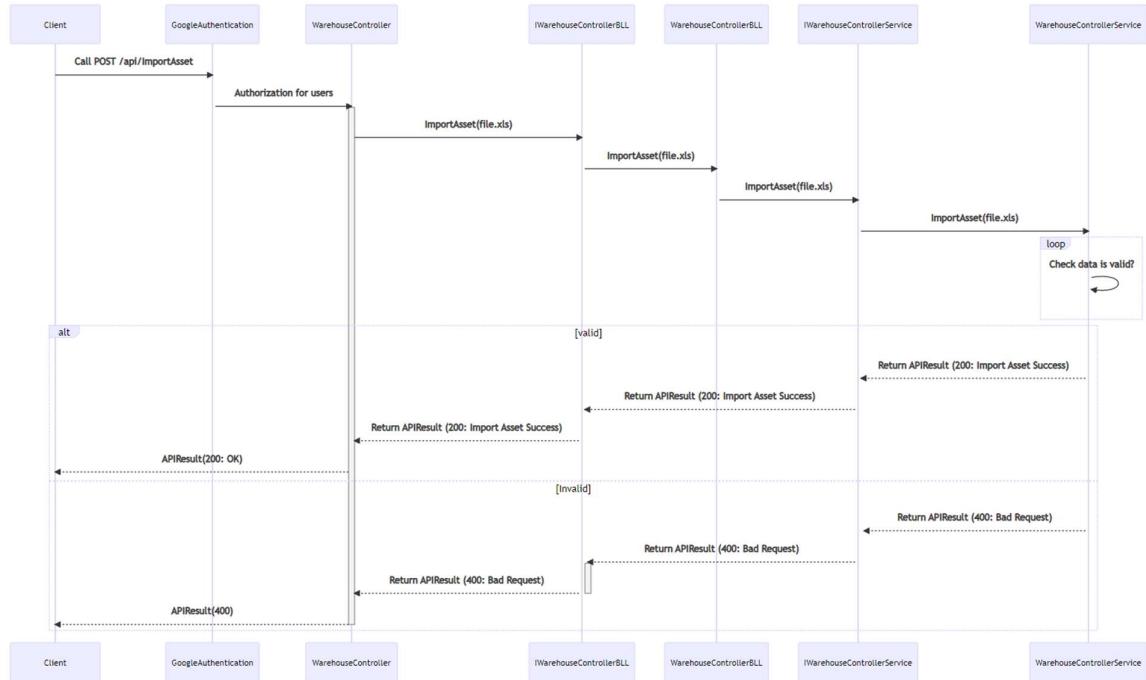
3.5 Warehouse

3.5.1 Class Diagram

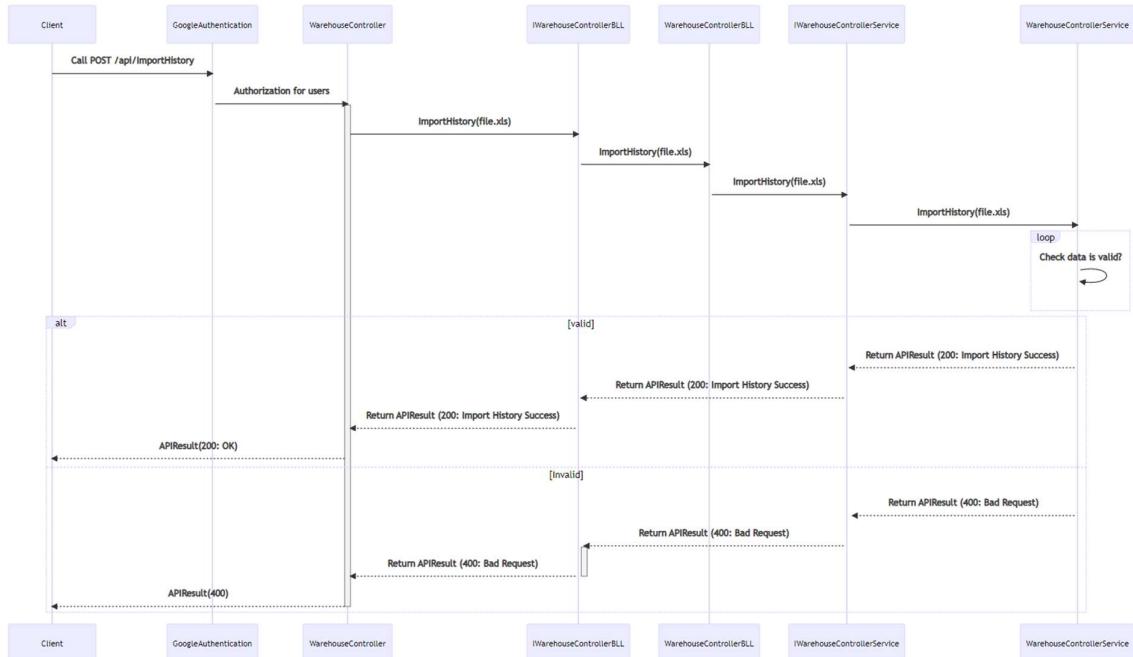
3.5.2 Export Asset



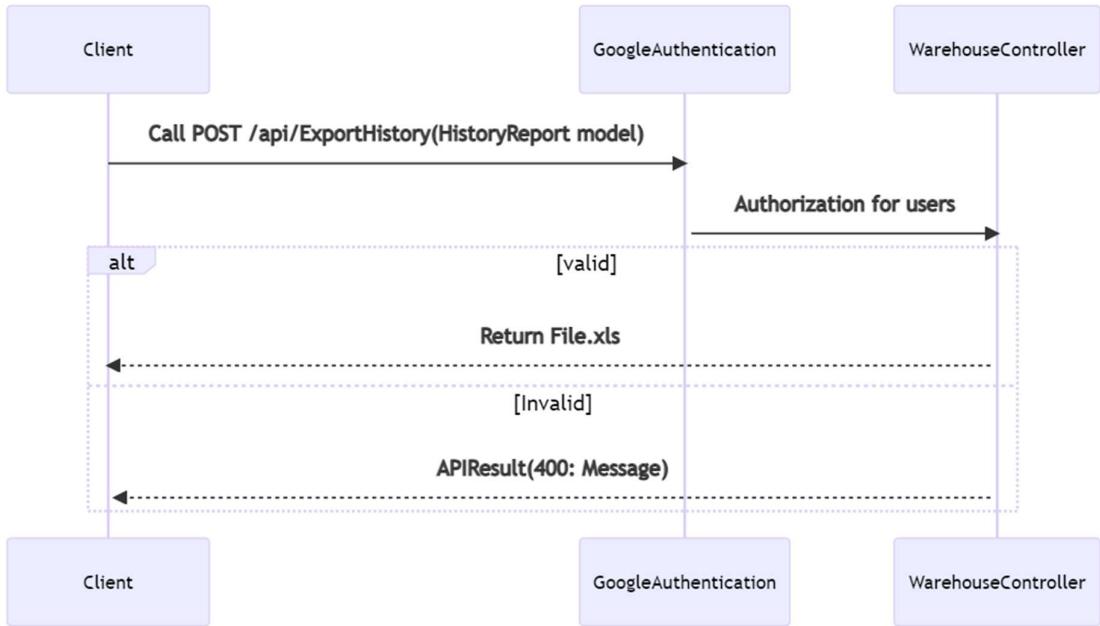
3.5.3 Import Asset



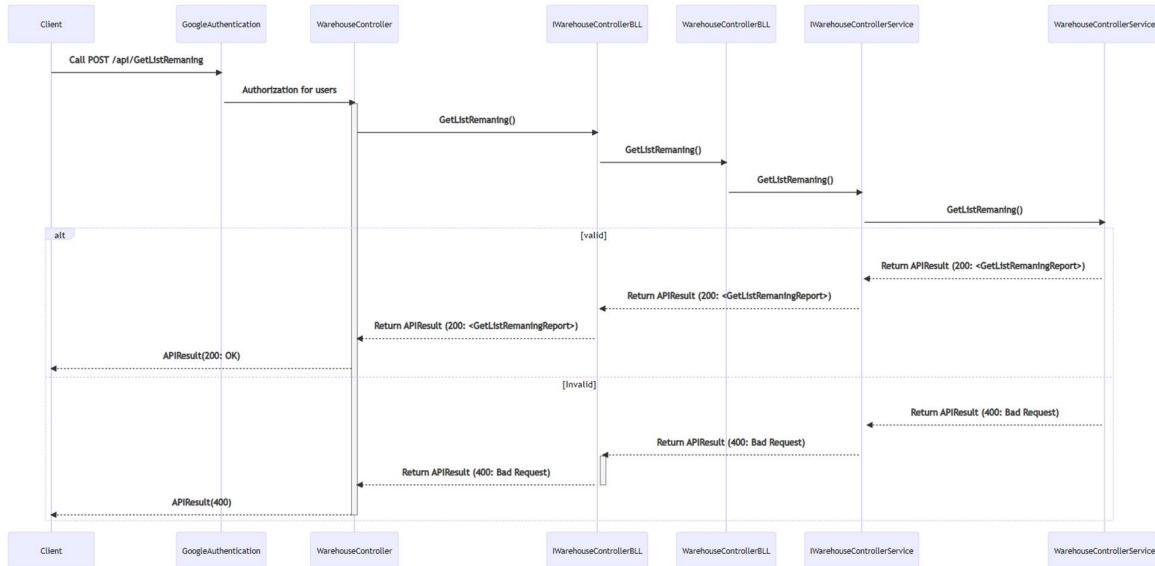
3.5.4 Import History



3.5.5 Export History



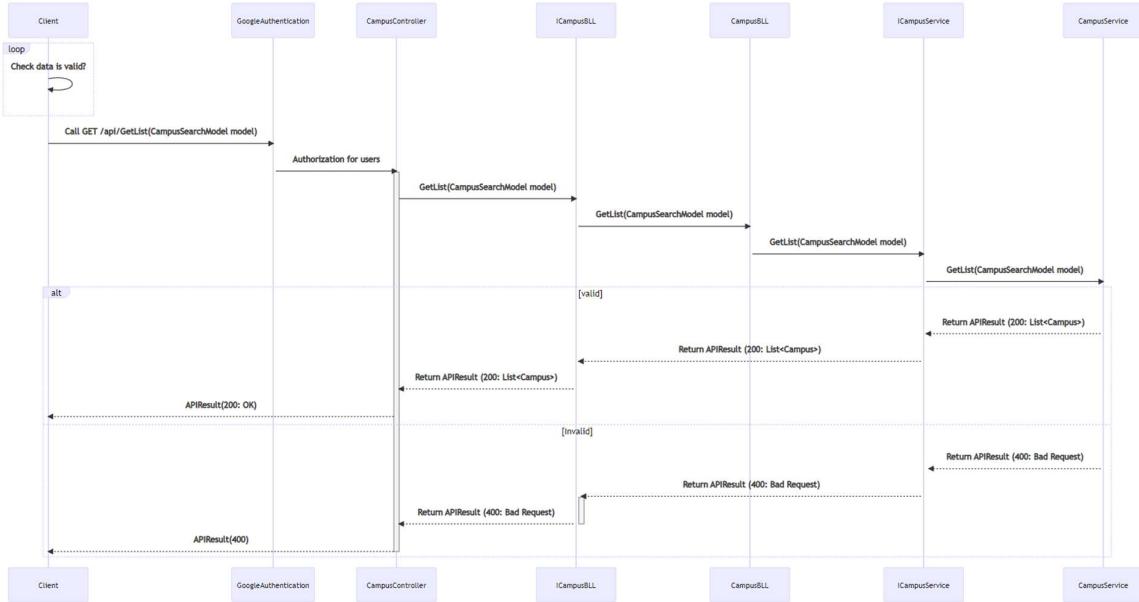
3.5.6 Remaining Report



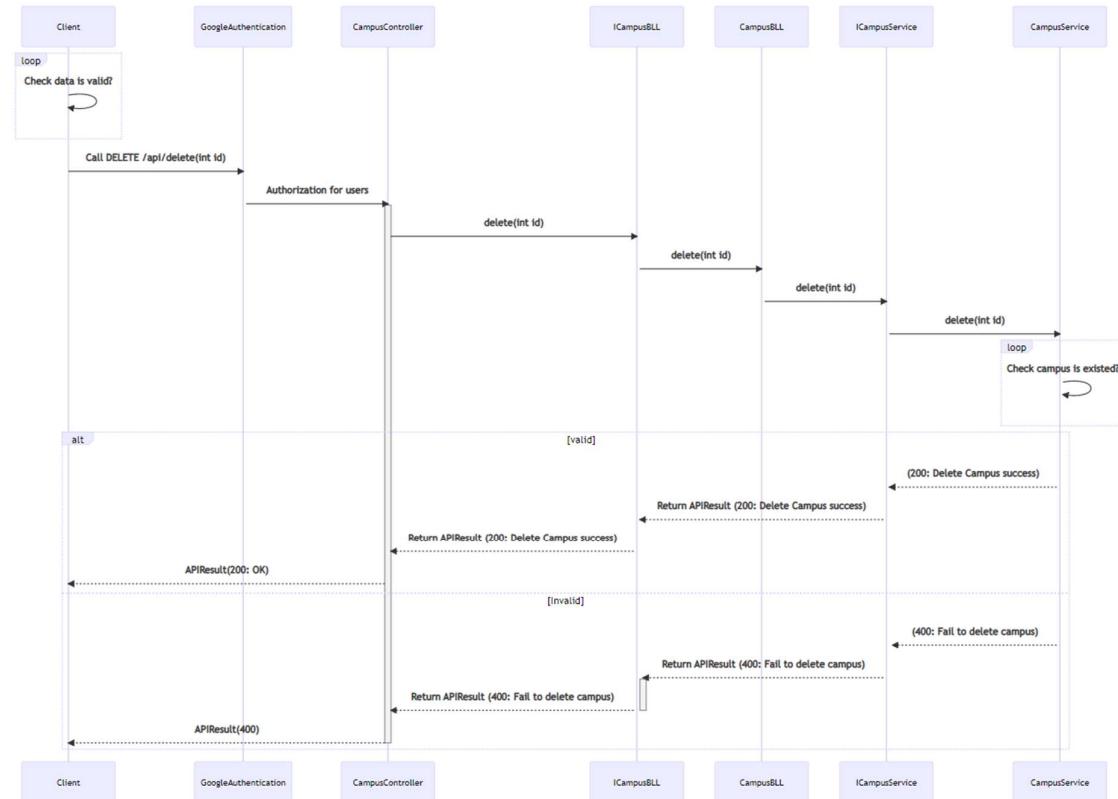
3.6 Configuration

3.6.1 Class Diagram

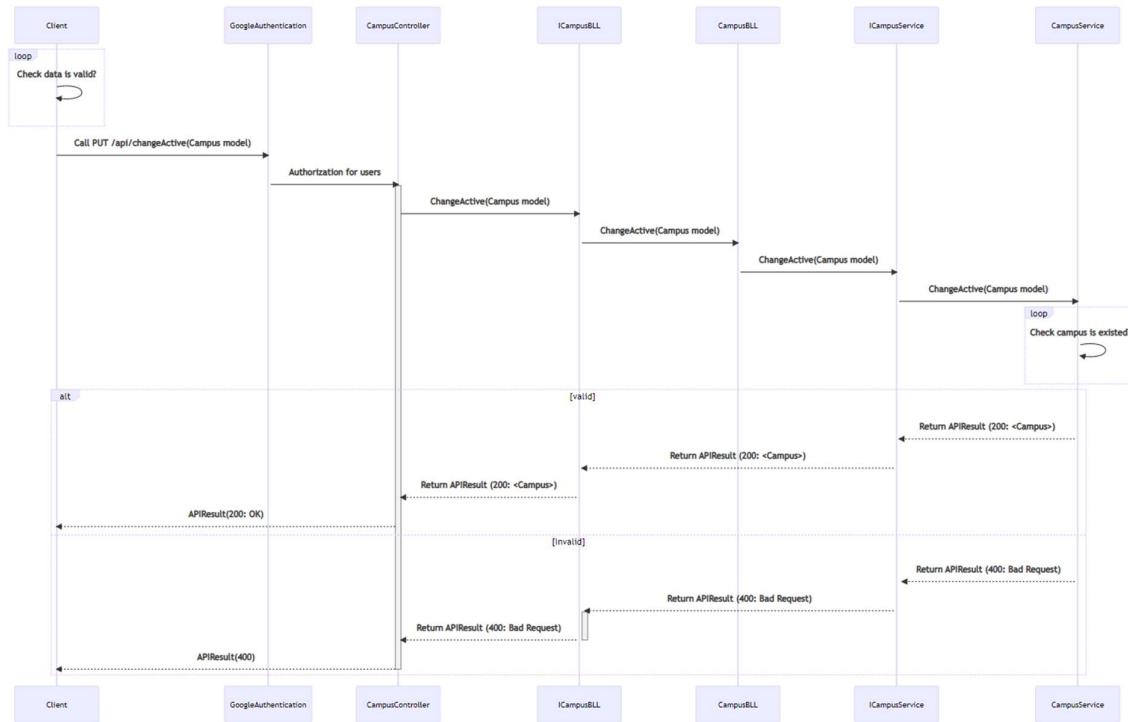
3.6.2 View Campus



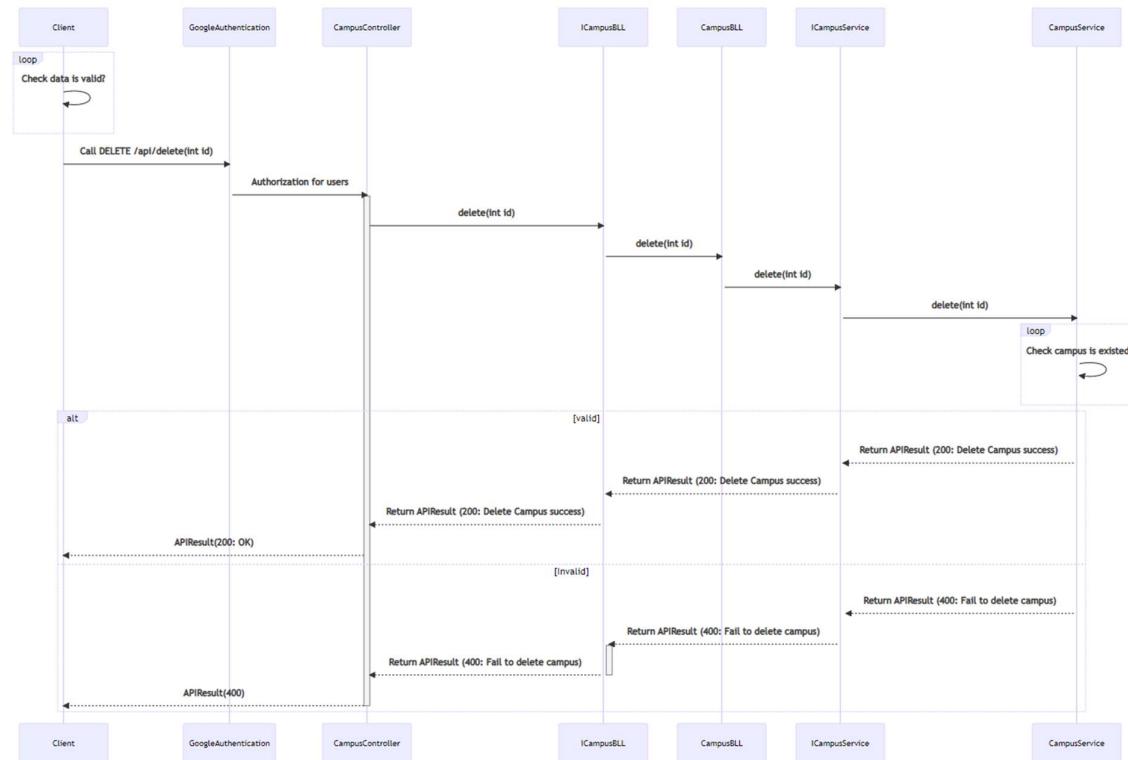
3.6.3 Create Campus



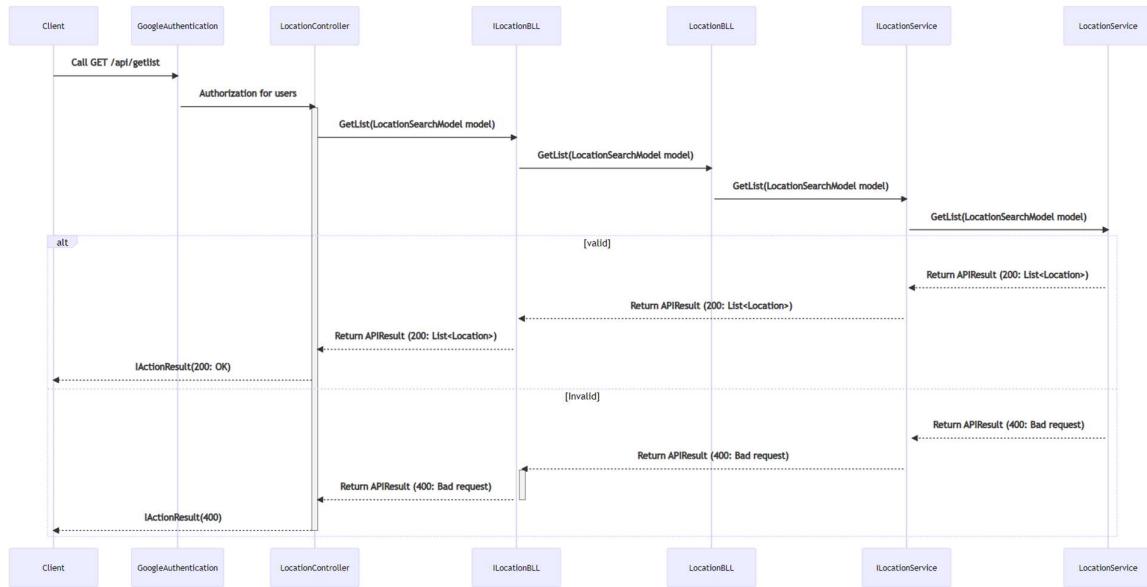
3.6.4 Update Campus



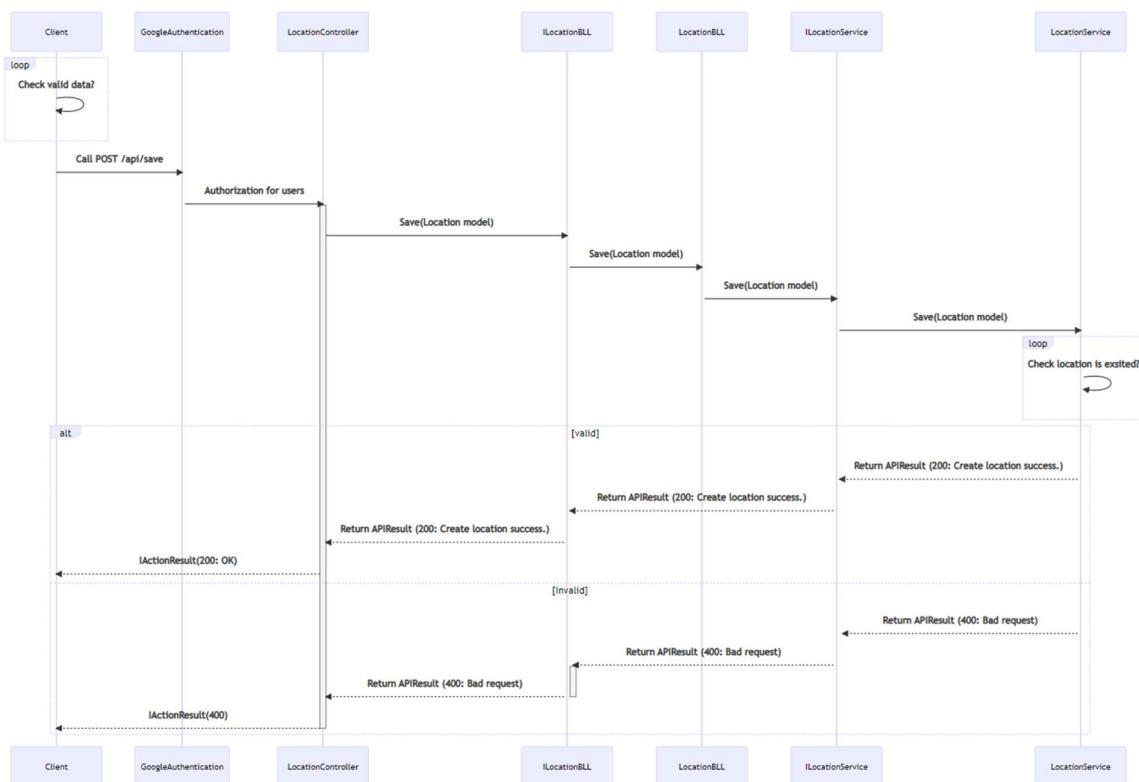
3.6.5 Delete Campus



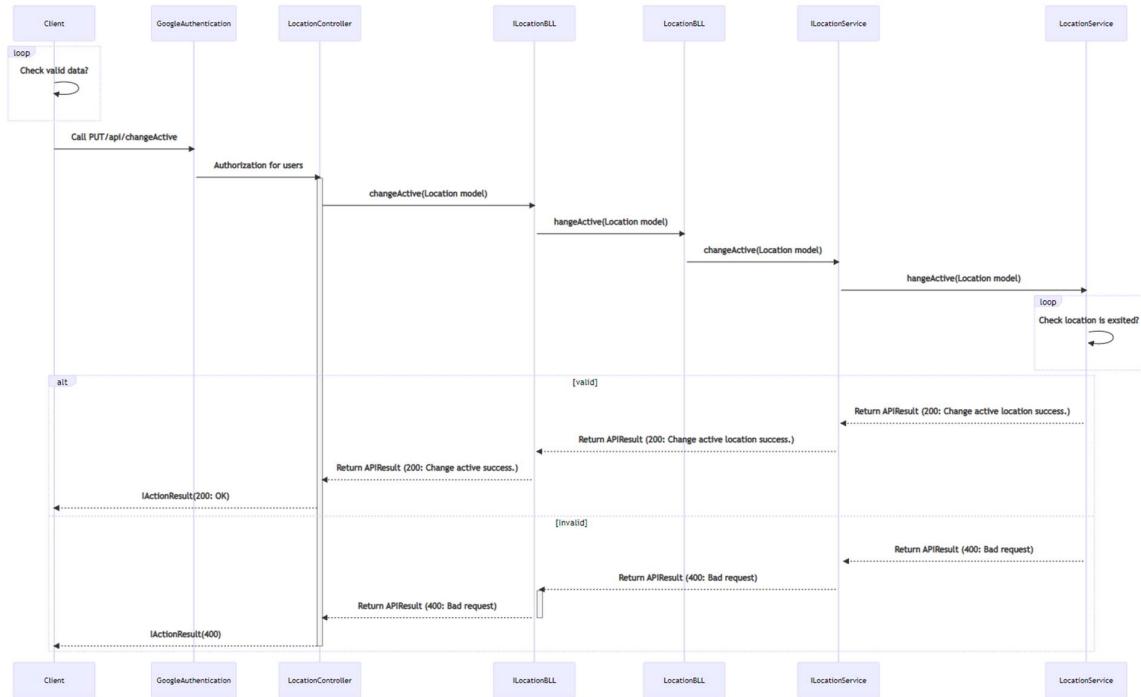
3.6.6 View Location



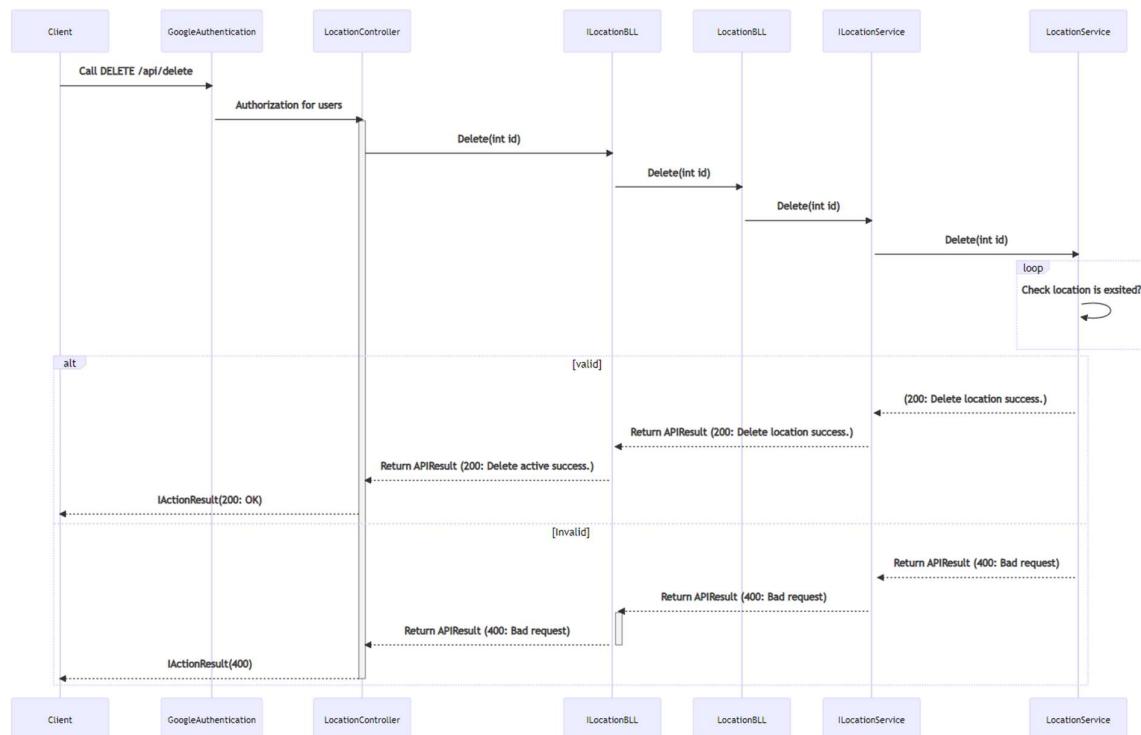
3.6.7 Create Location



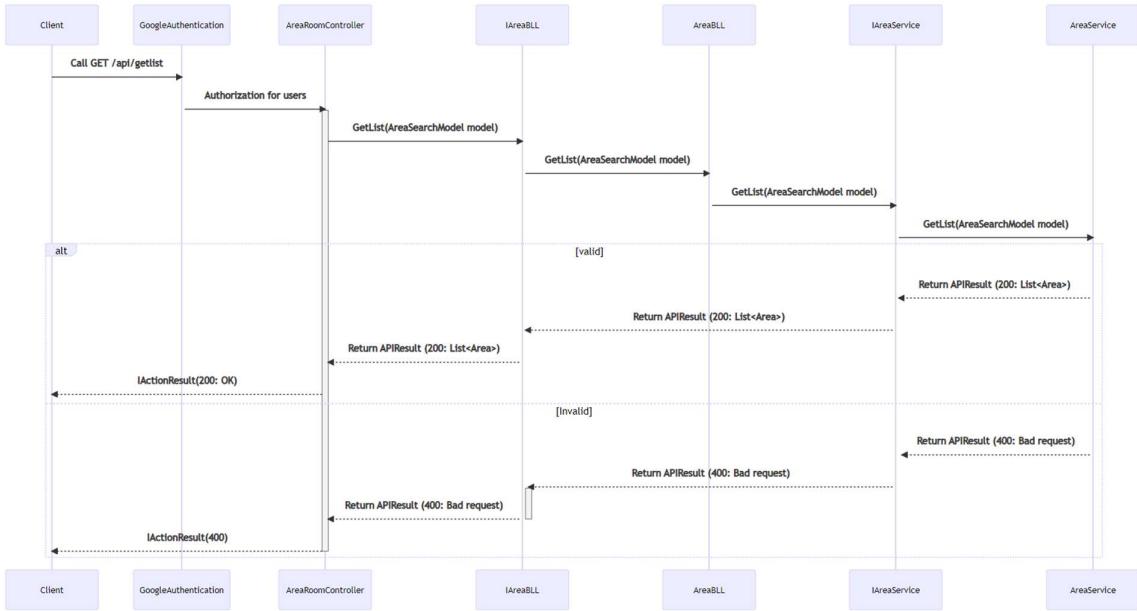
3.6.8 Update Location



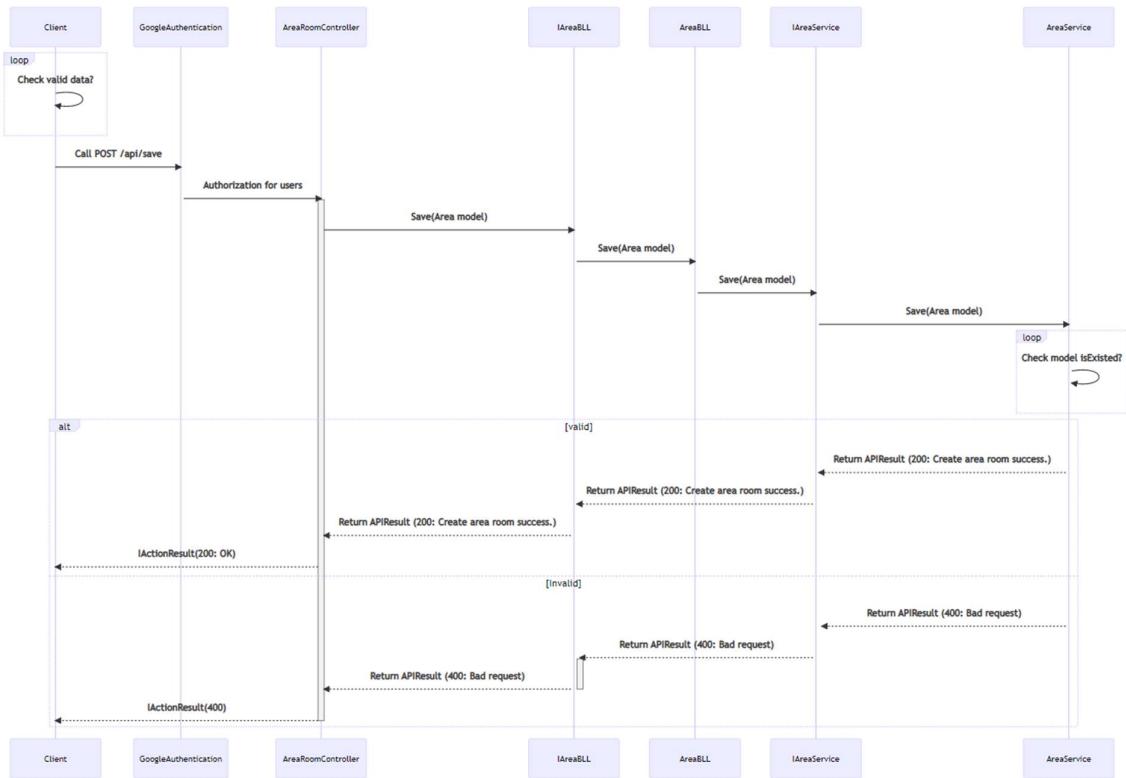
3.6.9 Delete Location



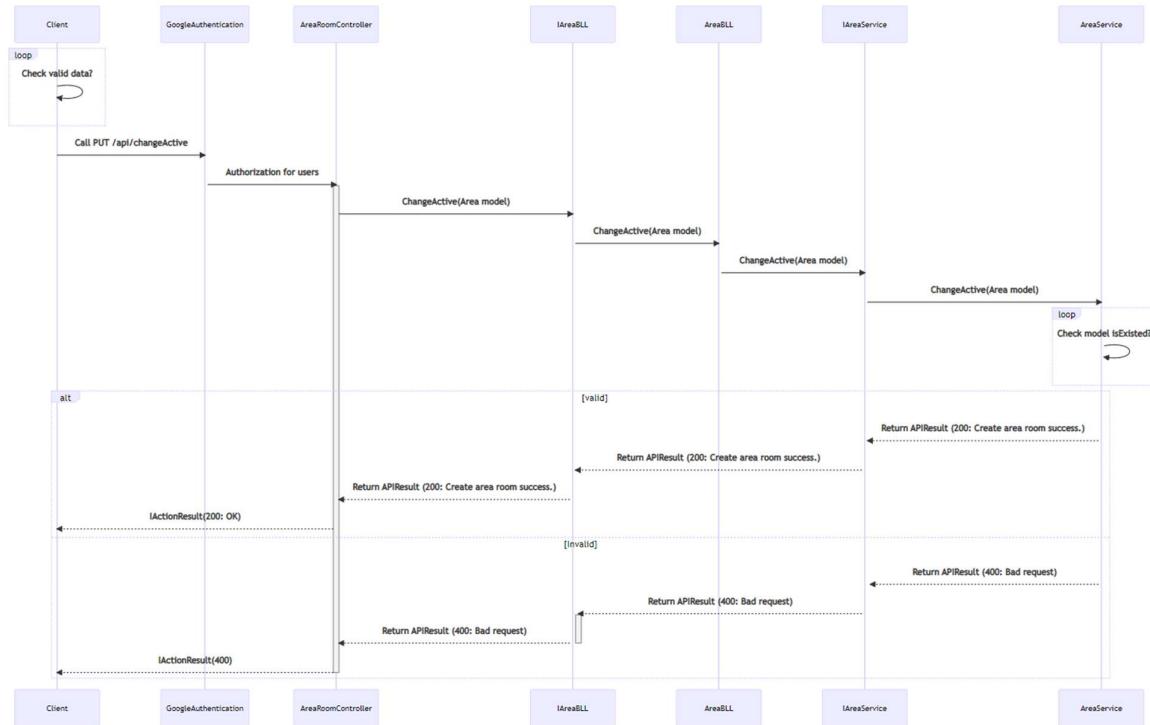
3.6.10 View Area/ Room



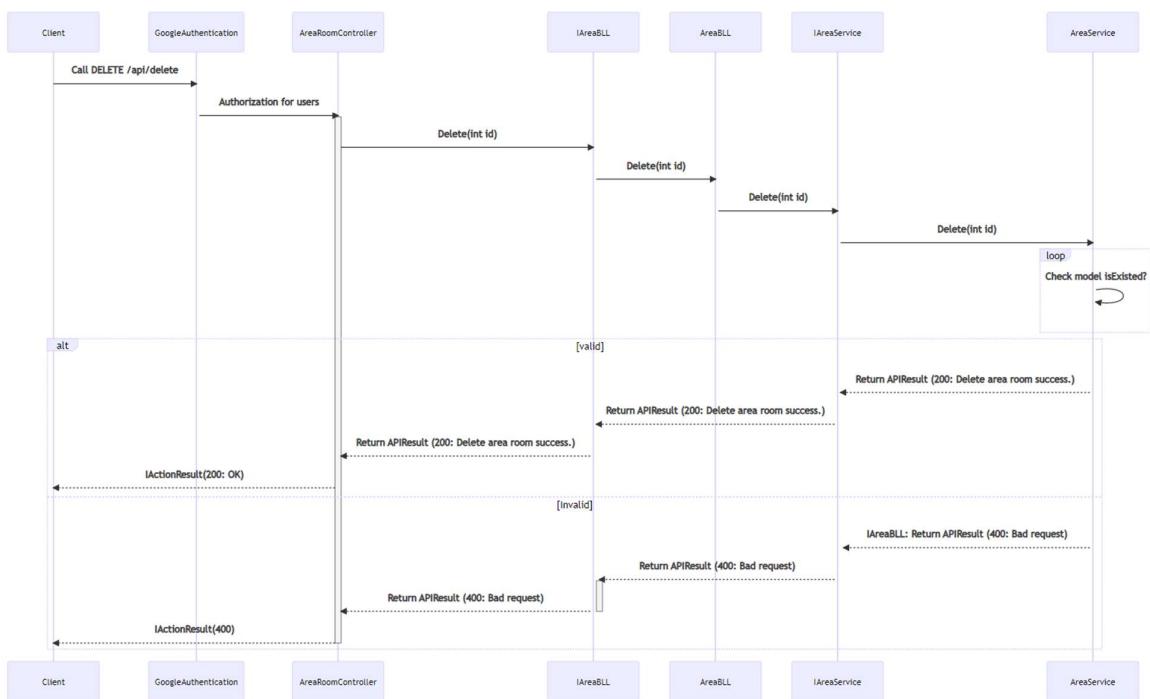
3.6.11 Create Area/ Room



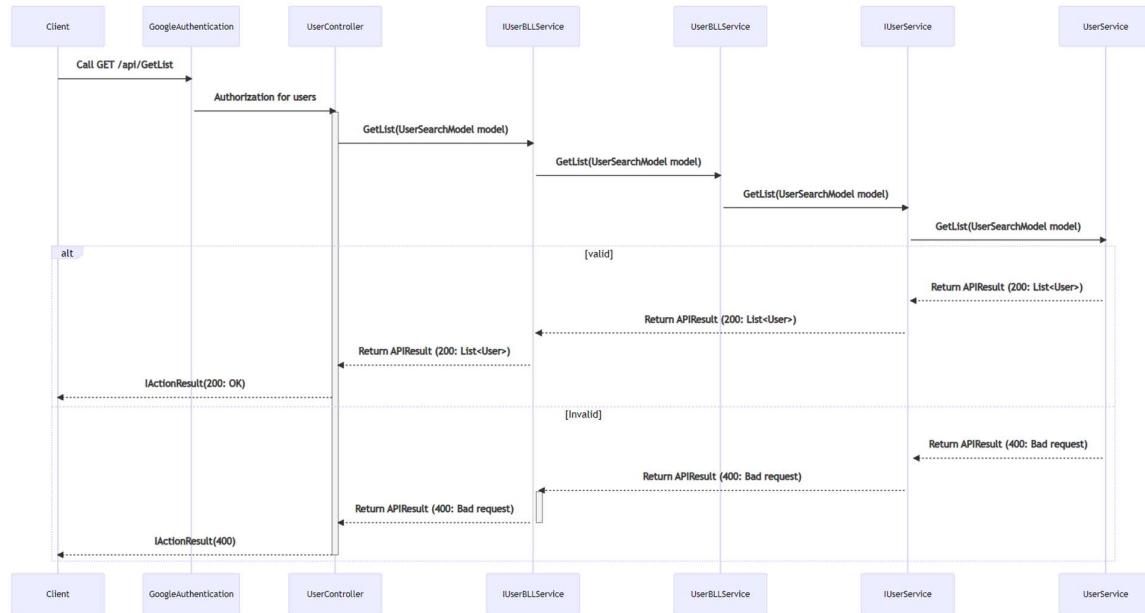
3.6.12 Update Area/ Room



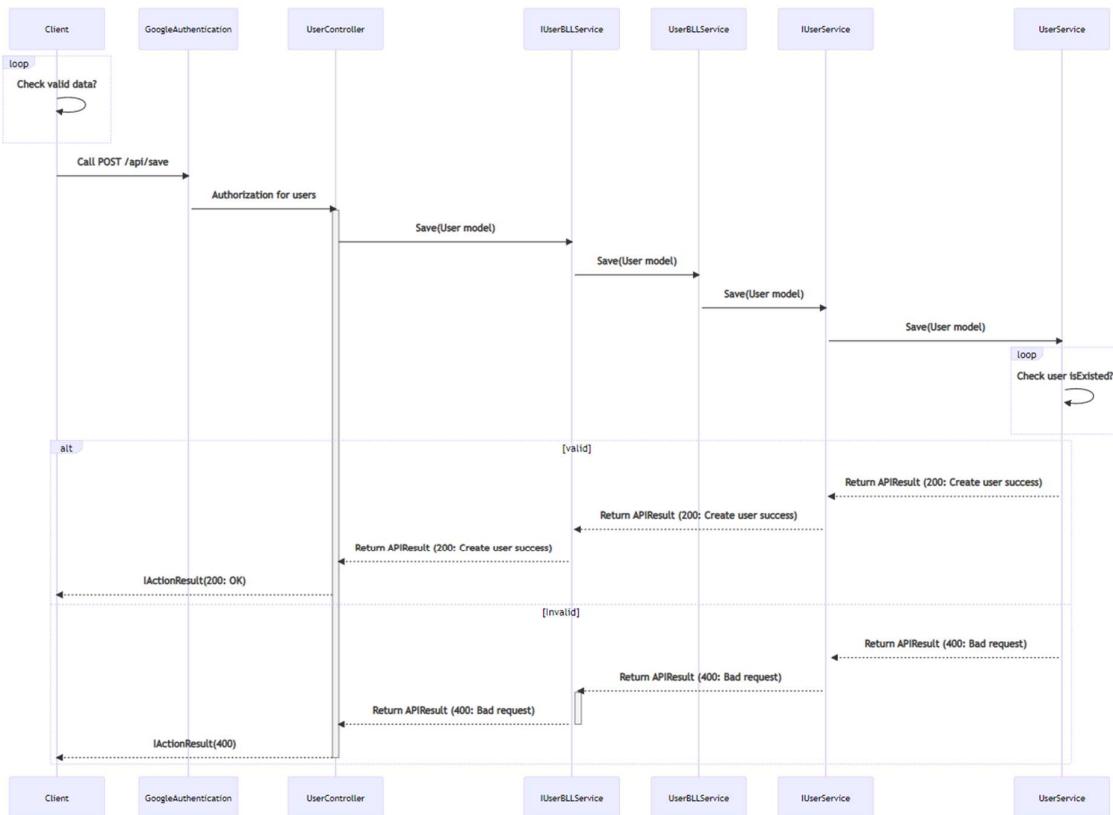
3.6.13 Delete Area/ Room



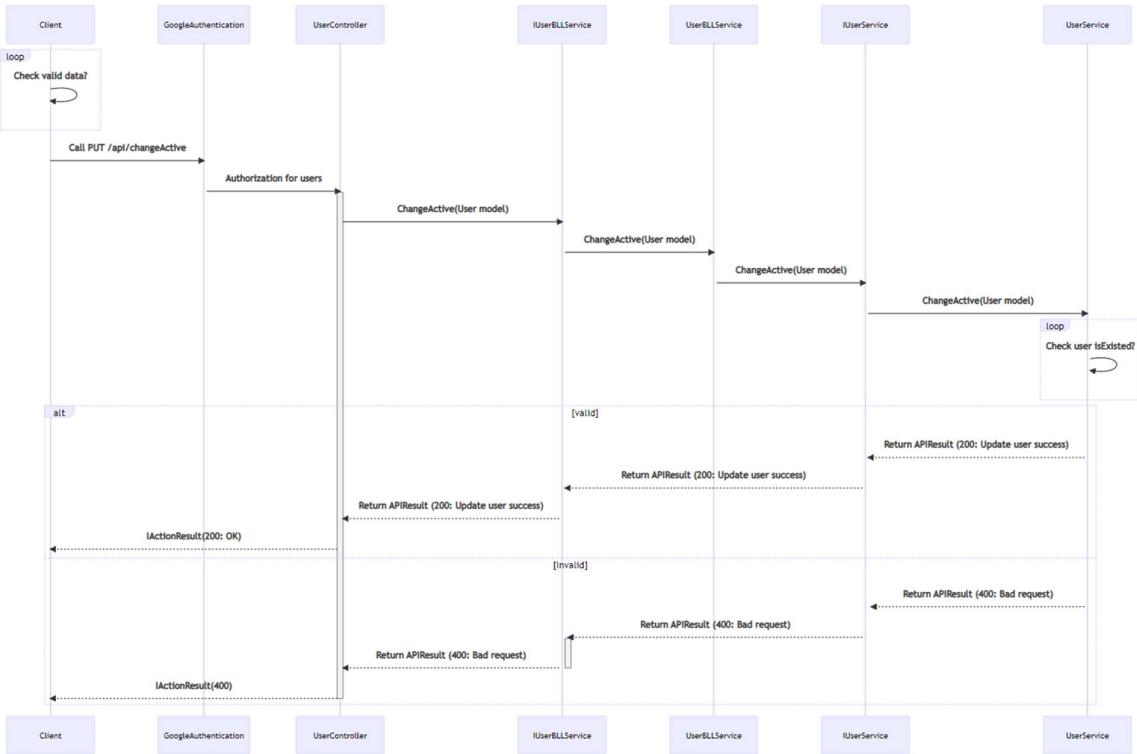
3.6.14 View Users



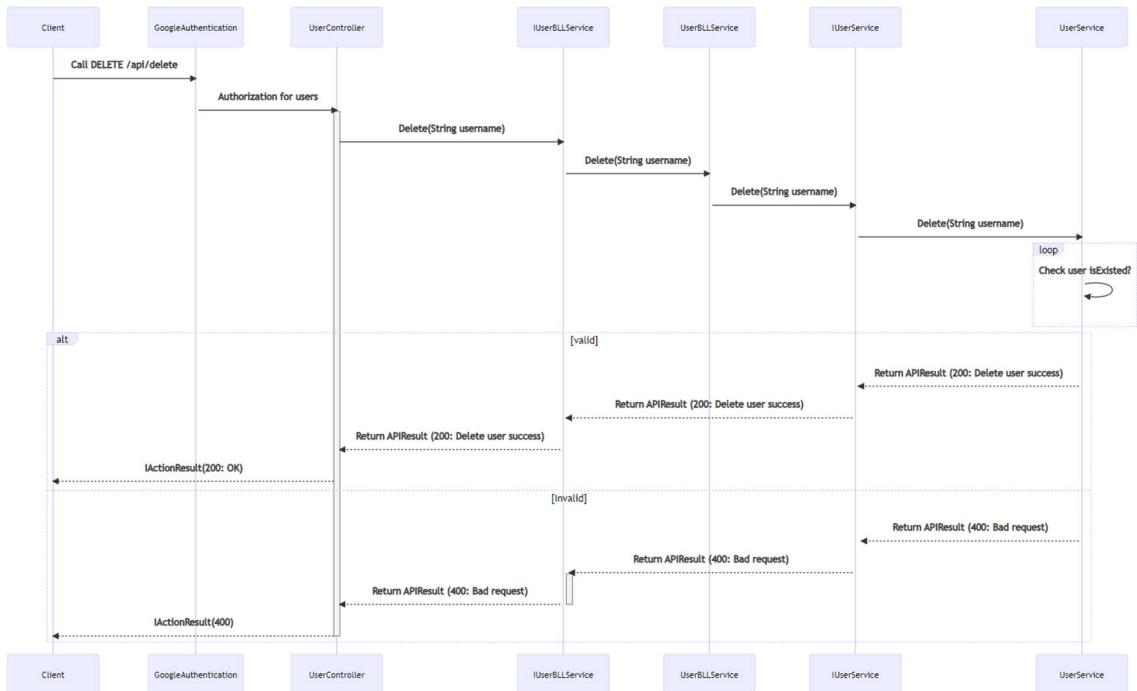
3.6.15 Create Users



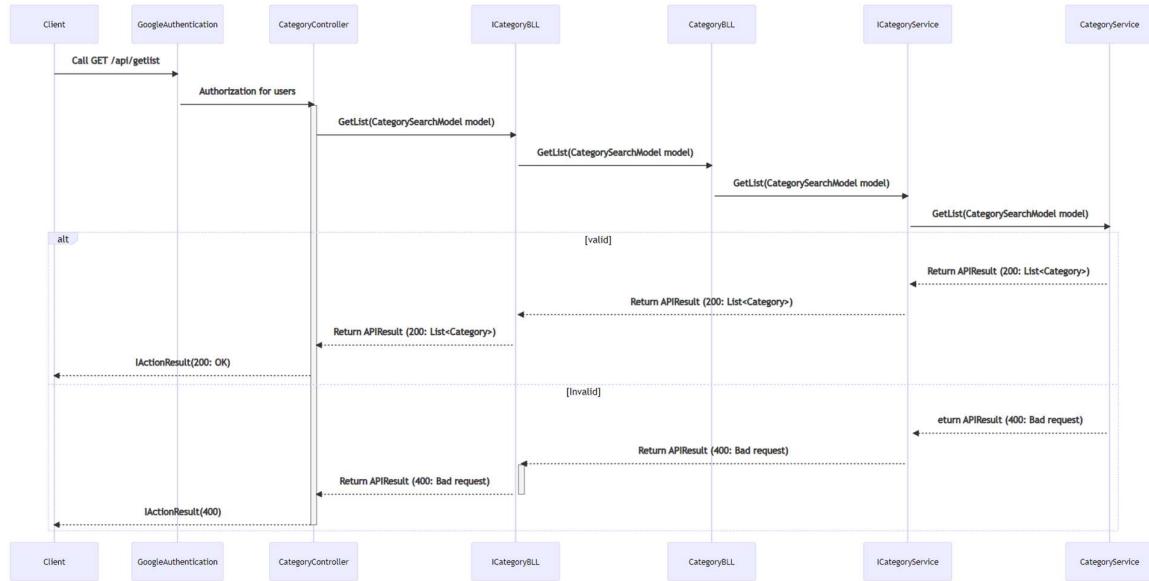
3.6.15 Update Users



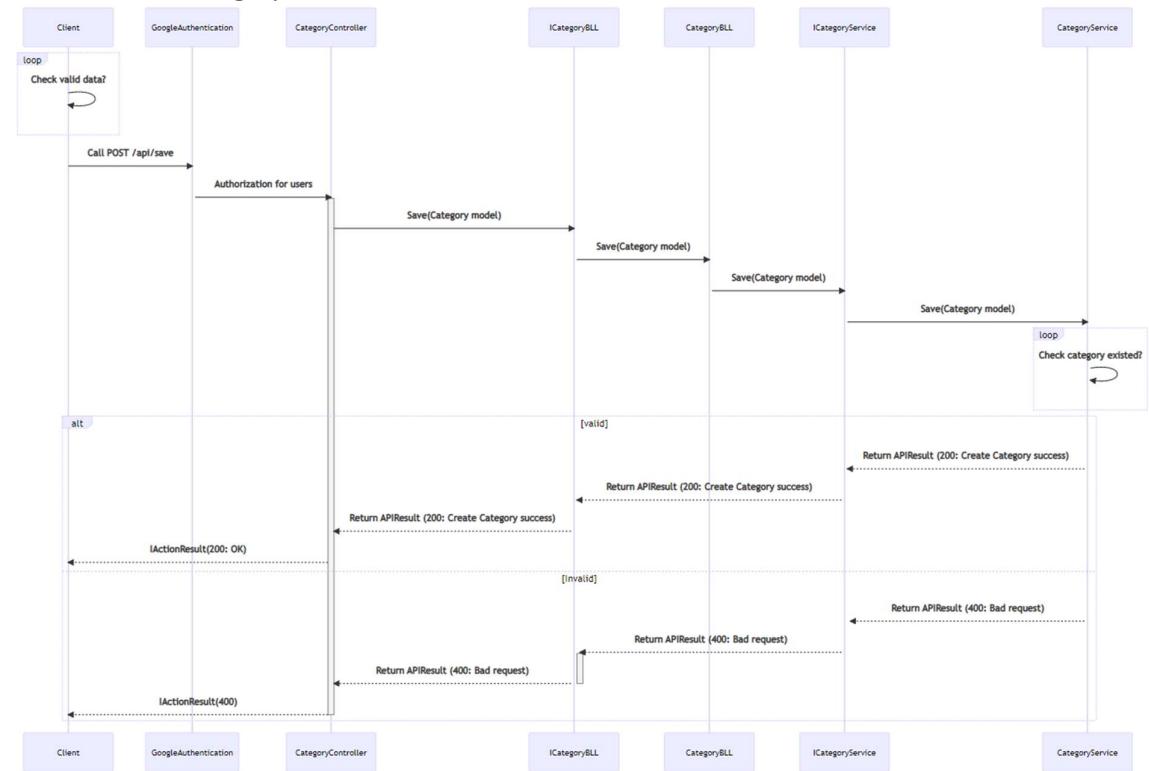
3.6.16 Delete Users



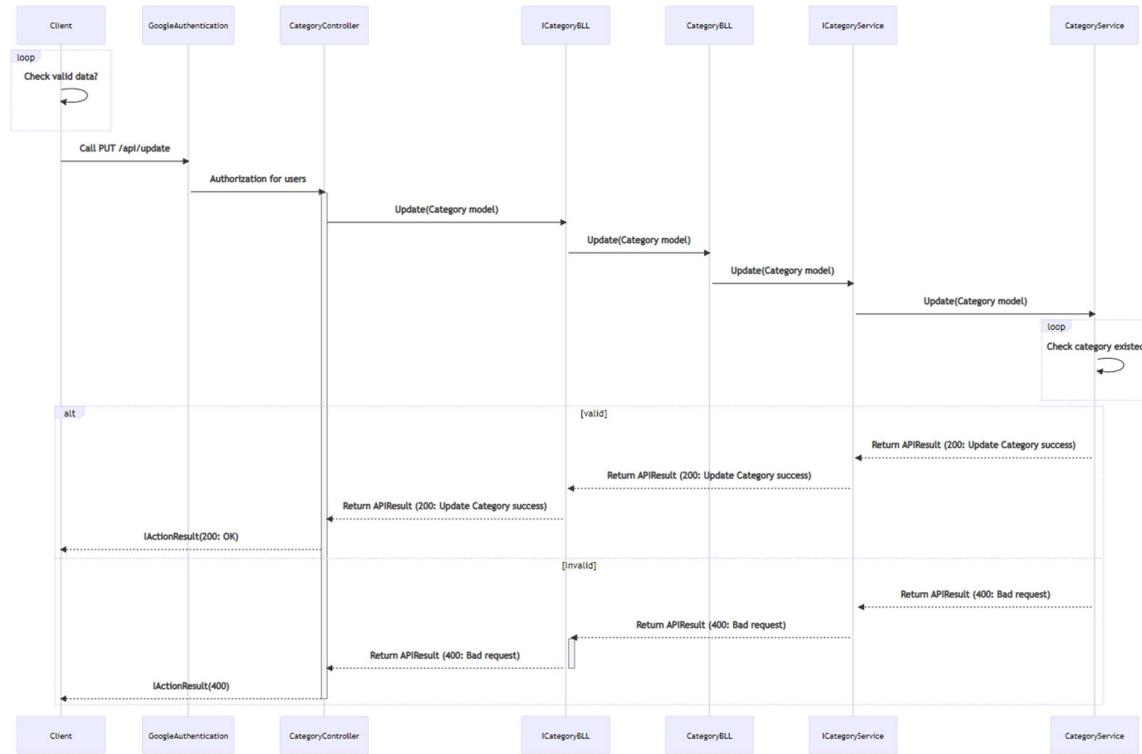
3.6.17 View Category



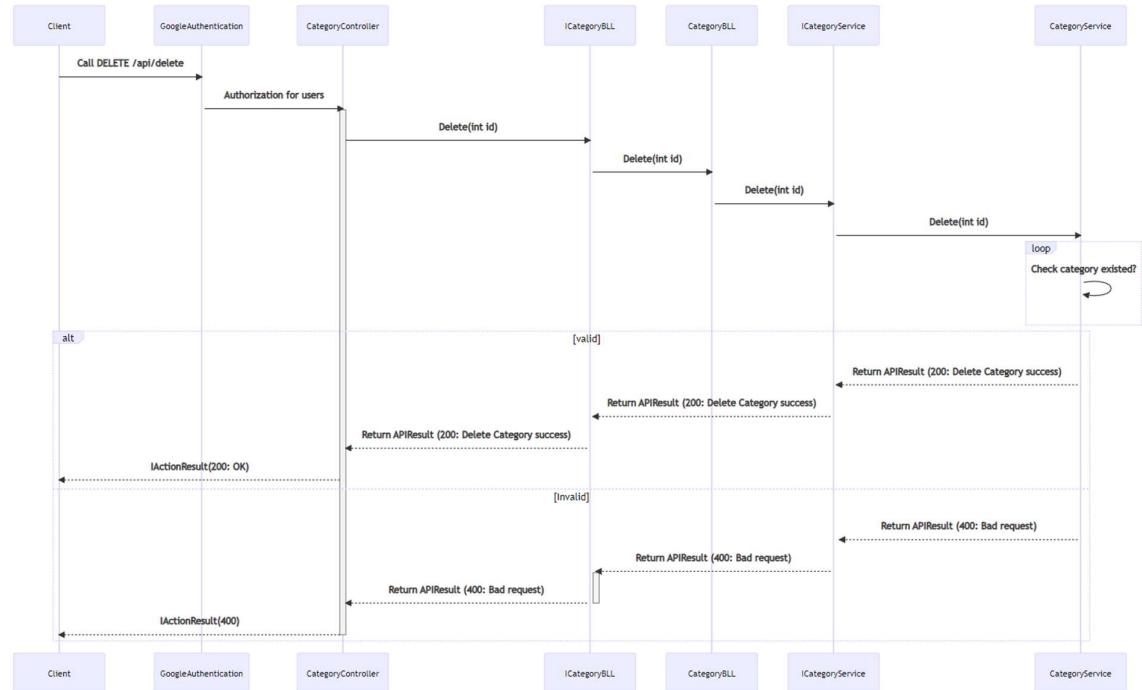
3.6.18 Create Category



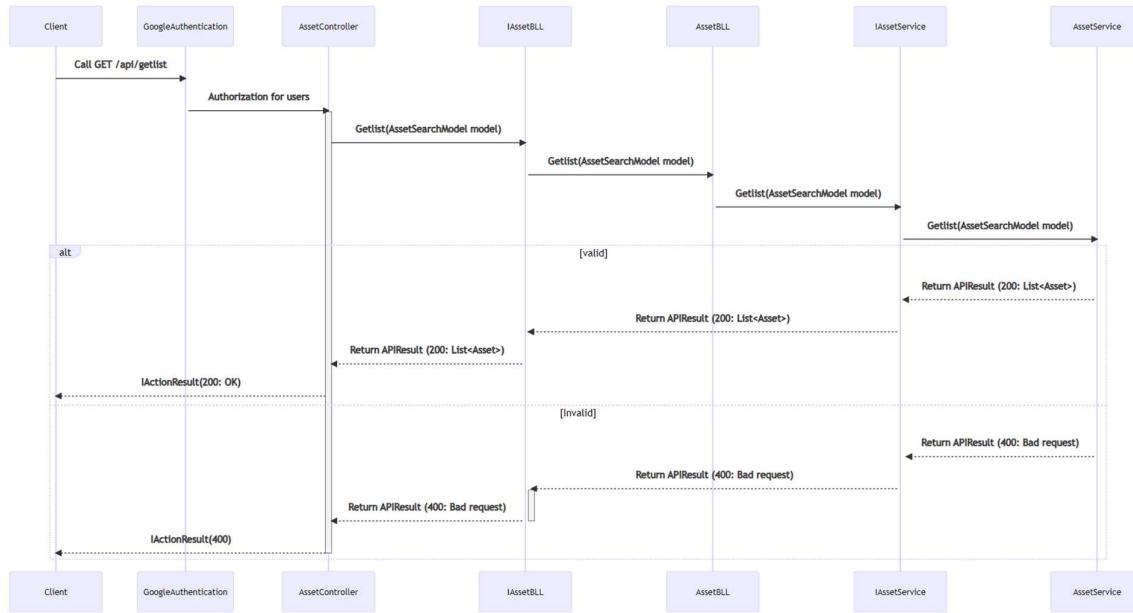
3.6.19 Update Category



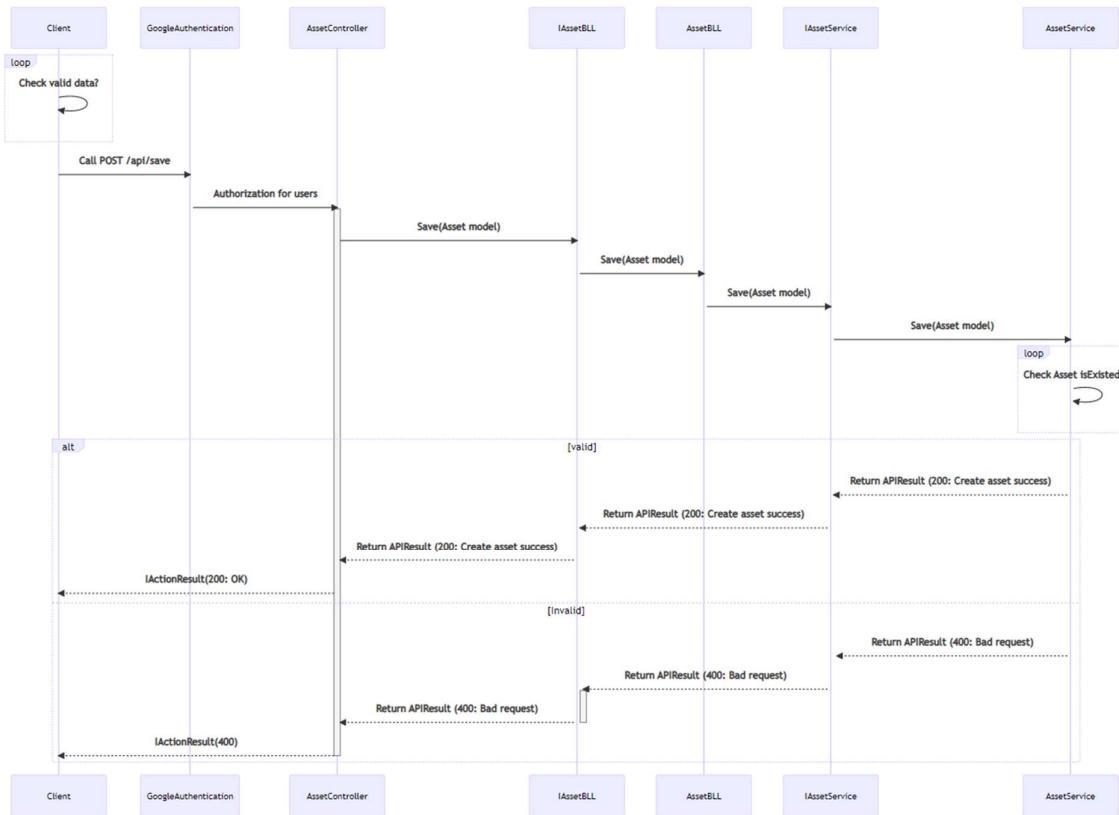
3.6.20 Delete Category



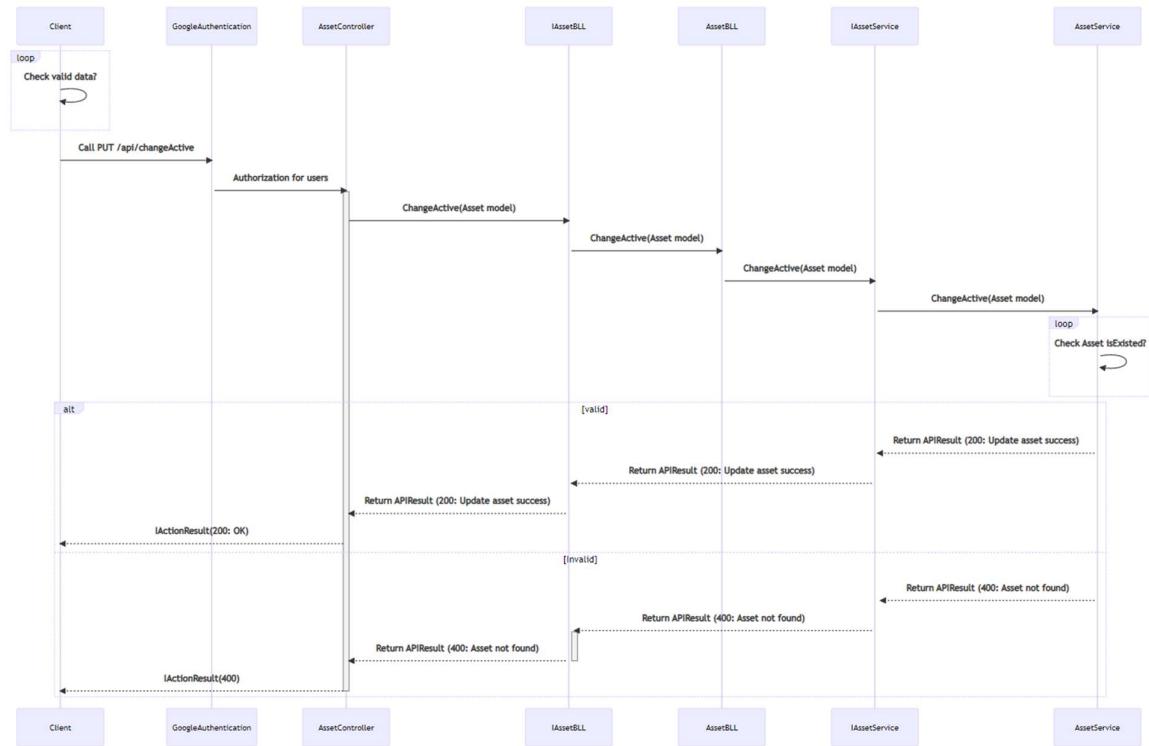
3.6.21 View Asset



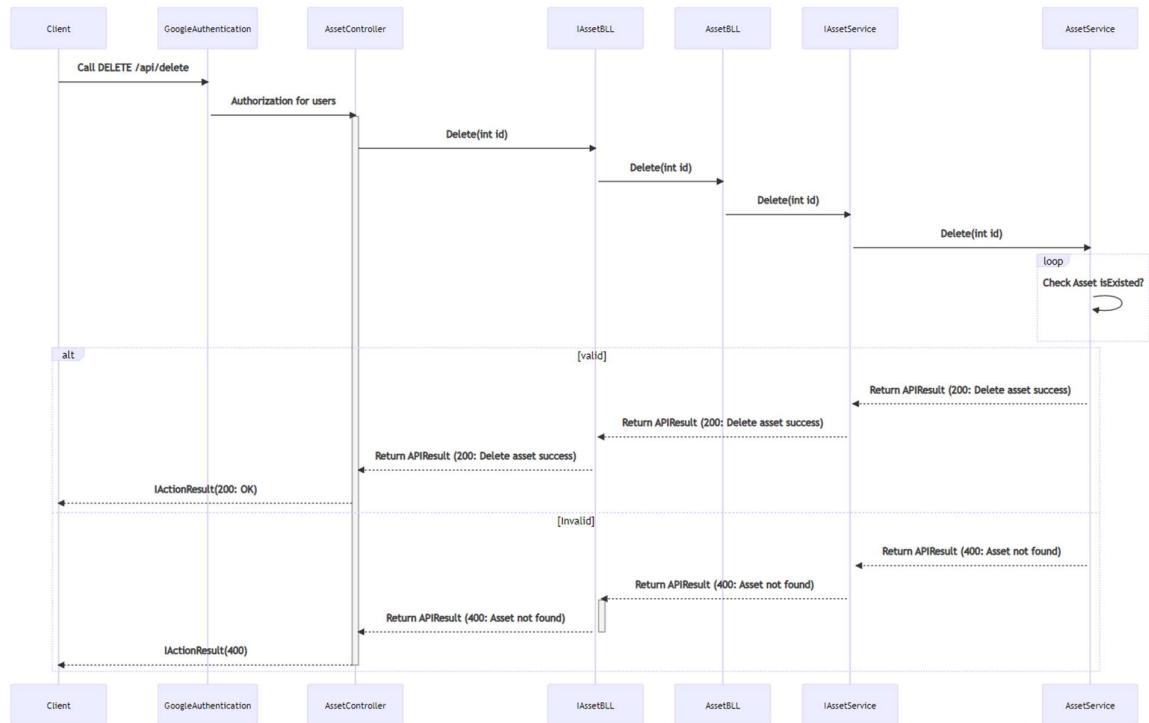
3.6.22 Create Asset



3.6.23 Update Asset



3.6.24 Delete Asset



VI. Release Package & User Guides

1. Scope of Testing

1.1 In Scope

We will perform functional testing to focus on all the actors to see their interaction through FMS. We will focus on testing all the functions and external interface of the website. System test will be performed manually by test team members. Unit test and Integration test will be test by NUnit on Visual Studio. Acceptance test will be test by Mr. Trinh Van Bon - the Infrastructure Manager at FPT University with support from our team.

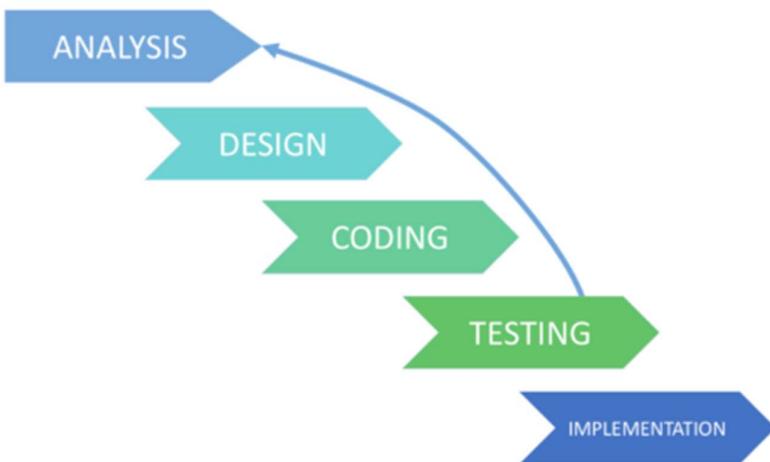
1.2 Stages/levels of testing

| Test stages | In-charge | Purpose | Acceptance criteria |
|---------------------|--|--|--|
| Unit testing | FMS Test Team | Check all functions and backend source code of backend developers to find any bugs after implementing. | The source code as well as the functionality written by the developers must meet the requirements in the SRS and must pass unit tests with 80% coverage in common. |
| Integration testing | FMS Test Team | Ensure that modules when coded separately but when integrated will work as a group together smoothly. | Modules have no problem when interacting with each other according to criteria in SRS. |
| System testing | FMS Test Team | Performed after unit testing and integration testing have been completed to evaluate the complete system after it has been fully integrated against previously defined requirements. | Ensure smooth operation of the system and meet logical, functional and technical standards. |
| Acceptance testing | Test by Mr. Trinh Van Bon - the Infrastructure Manager at FPT University with support from FMS Test Team | This is an end-user testing step performed by Mr.Bon who will directly use and manage the application after the system is put into operation. | The system operates smoothly as described in the SRS document, the business requirements are met. Acceptance by Mr.Bon. |

2. Test Strategy

2.1 Testing Model

Following the Iterative development model, we will use the Iterative Testing Model in each iteration of project. Because the Iterative testing model does not need a full list of requirements before beginning the project. The development process starts with the requirements of the functional part, which can be expanded later. The process is repetitive and allows new versions of the product for every cycle. Every iteration includes the development of a separate component of the system which is added to the functional developed earlier.



2.2 Testing Types

2.2.1 Component Testing

| | |
|-----------------------------|---|
| Test Objective: | Verify that individual functions within the application provide the outputs or results as same as expect |
| Technique: | <ul style="list-style-type: none">- Testers will perform test data creation in the database.- Testers will create test cases including input, desired output based on black box testing technique.- Testers execute tests based on test scenarios and generate reports.- Execute each case, using valid and invalid data, to verify the following: Get the expected results when valid and invalid data is used Valid input data is updated correctly into database The appropriate errors or warning messages when invalid data is used |
| Completion Criteria: | All test cases have been executed to verify proper data acceptance, processing, and retrieval, and passed The appropriate activities will be performed when valid data is used The corresponding error/warning message mechanism is applied for each specific case |

| | |
|--------------------------------|------------------------------|
| | All bugs found must be fixed |
| Special Considerations: | N/A |

2.2.2 Function Testing

| | |
|--------------------------------|---|
| Test Objective: | Verify the application and its internal processes by interacting with the application via the GUI and analyzing the outputs or results |
| Technique: | <ul style="list-style-type: none"> - Testers will create test scenarios against the requirements provided by customer. Test scenarios will be created based on black box test technique. - Testers execute test based on test scenarios and create report. Common defects will be collected for improved checklist. - Execute each case, using valid and invalid data, to verify the following: <ul style="list-style-type: none"> Get the expected results when valid and invalid data is used Valid input data is updated correctly into database The appropriate errors or warning messages are displayed when invalid data is used - Execute each case, using boundary data, to verify the following: <ul style="list-style-type: none"> Get the expected results when boundary data is used Data is updated correctly to database The appropriate errors or warning messages are displayed when invalid data is used - Each valid data input is updated correctly into database. - Each business rule is properly applied. |
| Completion Criteria: | <p>All functional test cases have been executed to verify proper data acceptance, processing, and retrieval, and the appropriate implementation of the business rules, and passed</p> <p>The appropriate activities will be performed when valid data is used</p> <p>The corresponding error/warning message mechanism is applied for each specific case</p> <p>All bugs found must be fixed</p> |
| Special Considerations: | Functional testing will NOT be started in case of developers have not executed unit test before passing application to testers |

2.2.3 User Interface Testing

| | |
|--------------------------------|--|
| Test Objective: | Navigation through the target-of-test properly reflects business functions and requirements, including screen to screen, field-to-field, and use of access methods. Objects and characteristics, such as menus, size, position, state, and focus conform to standards. |
| Technique: | <ul style="list-style-type: none"> - Testers will create specific test scenarios against UI prototypes approved by customer. - Testers execute test based on test scenarios and create report. Common defects will be collected for improved checklists. - Execute each case, using valid, invalid and boundary data, to verify the expected results display when valid, invalid and boundary data is used. |
| Completion Criteria: | <ul style="list-style-type: none"> - All GUI test cases have been executed and passed - Any defects related to GUI are fixed, except those accepted by customer - All defects found by tester are addressed |
| Special Considerations: | N/A |

2.2.4 Regression Testing

| | |
|------------------------|---|
| Test Objective: | Verify the application on new build/ after bug fixing, and be sure that other functions is not affected by fixed parts each iterations |
| Technique: | <ul style="list-style-type: none"> - Testers will select some test scenarios against functional test - Testers execute test based on test scenarios and create report. Common defects will be collected for improved checklists. - Execute each case, using valid and invalid data, to verify the following: Get the expected results when valid and invalid data is used Valid input data is updated correctly into database The appropriate errors or warning messages are displayed when invalid data is used - Execute each case, using boundary data, to verify the following: Get the expected results when boundary data is used Data is updated correctly into database The appropriate errors or warning messages are displayed when invalid data is used - Each valid data input is updated correctly into database. |

| | |
|--------------------------------|---|
| | <ul style="list-style-type: none"> - Each business rule is properly applied |
| Completion Criteria: | <p>Specified function test cases have been executed to verify proper data acceptance, processing, and retrieval, and the appropriate implementation of the business rules, and passed</p> <p>All bugs found must be fixed.</p> <p>Check list and Trouble manager functions is not affected by fixed parts each iterations</p> |
| Special Considerations: | N/A |

2.2.5 Business Testing

| | |
|--------------------------------|---|
| Test Objective: | Customers confirm the functions work well, can be put into use |
| Technique: | <ul style="list-style-type: none"> - The test team will prepare some test scenarios/use the software - Users will perform test operations as in the scenario or as required the business described in the SRS to complete the business. - Valid user input data will be saved to the system - Wrong operations will be reported so that users can recognize |
| Completion Criteria: | <p>Stakeholders can perform operations according to the steps guided by the testing team</p> <p>Stakeholders confirm that the application can meet the business requirements</p> |
| Special Considerations: | N/A |

2.3 Test Levels

| Type of Tests | Test level | | | |
|----------------------|-------------------|-------------------------|--------------------|------------------------|
| | Unit test | Integration Test | System Test | Acceptance Test |
| Component Testing | x | x | | |
| Functional Testing | | | x | x |
| GUI Testing | | | x | x |
| Regression Testing | | | x | |
| Business Testing | | | x | x |

2.4 Supporting Tools

| Purpose | Tool | Version |
|-------------------|-----------------|----------------|
| Manage test cases | Microsoft Excel | excel 2016 |

| | | |
|-----------------|----------------|-----------------------|
| Test APIs | Google Chrome | Version 104.0.5112.81 |
| Test Component | Visual studio | Visual studio 2019 |
| Bugs management | Jira Software | 9.1.0 |
| Test report | Microsoft Word | word 2016 |

3. Test Plan

3.1 Human Resources

| Worker/Doer | Role | Specific Responsibilities/Comments |
|-------------------|---|--|
| Bui Nhu Nhat | Project Manager, Project Technical Leader | Review Test Data Review Test Cases (UT, IT, ST) Approve Test Plan, Test Results, Test Reports |
| Duong Dac Thanh | Tester | Create Test Cases (IT, ST) Create Test Data and Execute Test (IT, ST) Report Test Results |
| Nguyen Thu Ha | Quality Assurance | Create Test Cases (IT, ST) Create Test Data and Execute Test (IT, ST) Report Test Results Test Reports |
| Nguyen Cong Thanh | Test Leader | Manage test resources and assign test tasks Create Test Plan Create Test Cases (UT, ST) Review Test Cases (UT, ST) Create Test Data and Execute Test (UT, ST) Report Test Results |

3.2 Test Milestones

| Milestone Task | Effort | Start Date | End Date |
|---|--------|------------|-----------|
| Create test plan for Iteration 1 | 0.5 | 5/27/2022 | 5/30/2022 |
| Review & update test plan for Iteration 1 | 0.25 | 5/30/2022 | 6/1/2022 |
| Create test cases for Iteration 1 | 0.5 | 6/1/2022 | 6/4/2022 |
| Execute test and create test report for Iteration 1 | 0.75 | 6/4/2022 | 6/10/2022 |
| Create test plan for Iteration 2 | 0.25 | 6/11/2022 | 6/14/2022 |
| Review & update test plan for Iteration 2 | 0.5 | 6/14/2022 | 6/18/2022 |
| Create test cases for Iteration 2 | 0.75 | 6/18/2022 | 6/23/2022 |
| Execute test and create test report for Iteration 2 | 0.25 | 6/23/2022 | 6/25/2022 |
| Create test plan for Iteration 3 | 0.5 | 6/26/2022 | 6/29/2022 |
| Review & update test plan for Iteration 3 | 0.75 | 6/29/2022 | 7/4/2022 |
| Create test cases for Iteration 3 | 0.25 | 7/4/2022 | 7/6/2022 |
| Execute test and create test report for Iteration 3 | 0.5 | 7/6/2022 | 7/10/2022 |
| Create test plan for Iteration 4 | 0.75 | 7/11/2022 | 7/14/2022 |
| Review & update test plan for Iteration 4 | 0.25 | 7/14/2022 | 7/16/2022 |
| Create test cases for Iteration 4 | 0.5 | 7/16/2022 | 7/19/2022 |
| Execute test and create test report for Iteration 4 | 0.75 | 7/19/2022 | 7/25/2022 |
| Create test plan for Iteration 5 | 0.5 | 7/26/2022 | 7/29/2022 |
| Review & update test plan for Iteration 5 | 0.25 | 7/30/2022 | 8/1/2022 |
| Create test cases for Iteration 5 | 0.5 | 8/2/2022 | 8/5/2022 |
| Execute test and create test report for Iteration 5 | 0.75 | 8/6/2022 | 8/9/2022 |
| Create test cases for System testing | 0.75 | 8/10/2022 | 8/15/2022 |
| Review test cases for System testing | 0.25 | 8/15/2022 | 8/16/2022 |

| | | | |
|--|-----|-----------|-----------|
| Execute test and create test report for System testing | 1 | 8/16/2022 | 8/18/2022 |
| Execute Acceptance testing | 1 | 8/19/2022 | 8/19/2022 |
| Finish Test report | 0.5 | 8/19/2022 | 8/21/2022 |

4. Test Cases

4.1 Unit test

Testers will perform functional testing on the server development side, and we will use NUnit(an open-source unit testing framework for the .NET framework). These aid in the reduction of test environment installation and the creation of function tests in the most efficient manner. Each test case will explicitly document the actions required to complete the test case, allowing faults or defects to be identified. Bug will log on jira software of Facilities Management System project

```
[Test]
public void testChangeInService()
{
    //create data
    Area model = AreaData.model1;
    _data.CreateItem(model);
    model.InService = false;

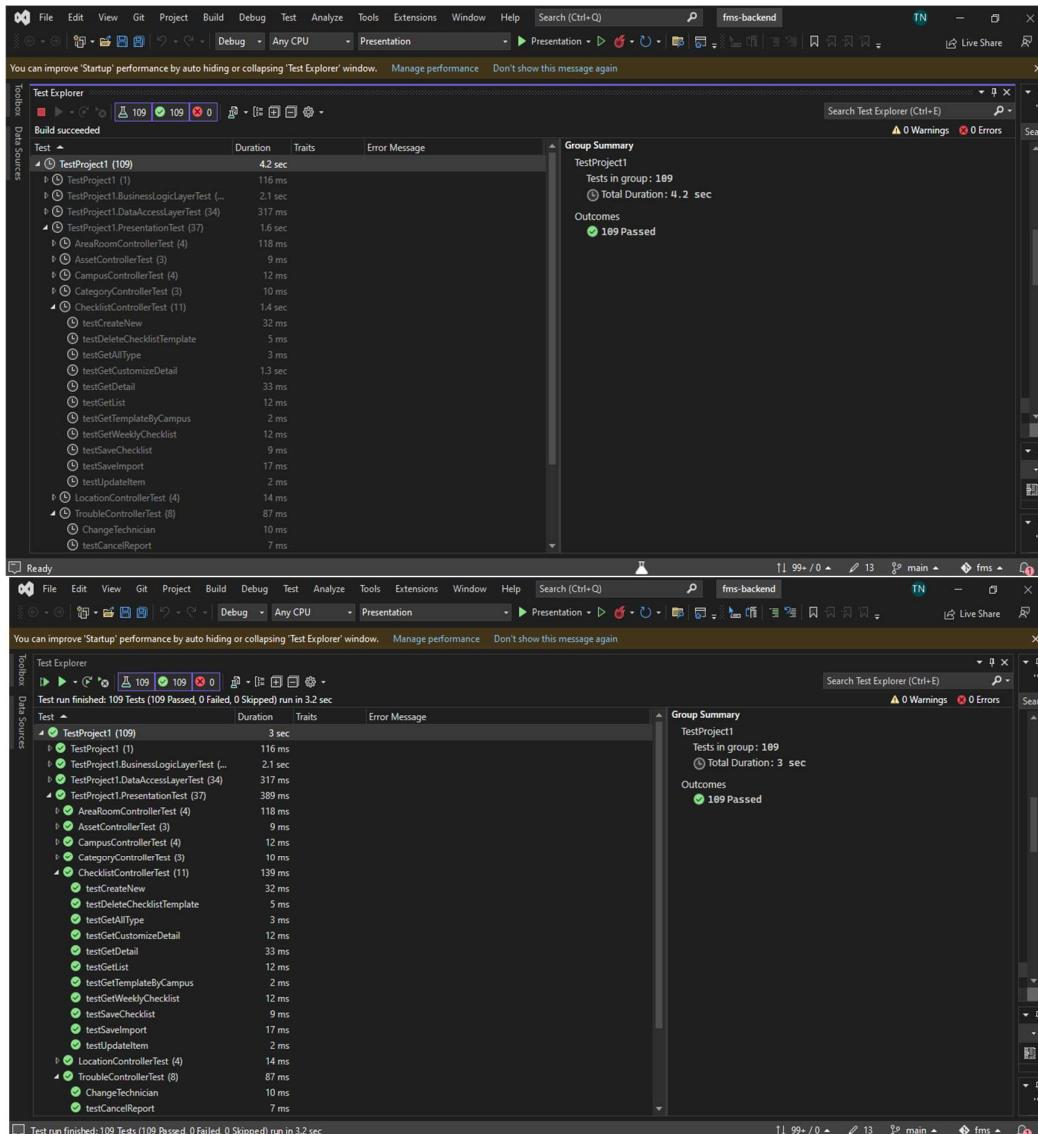
    //test
    try
    {
        var actual = _service.ChangeInService(model);
        ApiResult<Area> expected = new ApiResult<Area>
        {
            Status = 200,
            Message = "Save successfully.",
        };
        Assert.That(actual.Status, Is.EqualTo(expected.Status));
        Assert.That(actual.Message, Is.EqualTo(expected.Message));
    }
    finally
    {
        //clear data
        _data.ClearTestData();
    }
}
```

```

[Test]
public void testGetList()
{
    //create data
    _data.CreateTestData();
    //test
    try
    {
        {
            Paging paging = CommonData.paging1;
            AreasearchModel model = new AreasearchModel
            {
                Campus = null,
                LocationCode = null,
                RoomCode = "ThanhNC-Test",
                paging = paging
            };
            var actual = _service.GetList(model);
            ApiResult<Area> expected = new ApiResult<Area>
            {
                Status = 200,
                ListData = AreaData.Lists,
                Paging = paging,
            };
            Assert.That(actual.Status, Is.EqualTo(expected.Status));
            Assert.That(actual.ListData.Count, Is.EqualTo(expected.ListData.Count));
        }
        {
            Paging paging = CommonData.paging2;
            AreasearchModel model = new AreasearchModel
            {
                Campus = null,
                LocationCode = "BE",
                RoomCode = "ThanhNC-Test",
                paging = paging
            };
            var actual = _service.GetList(model);
            ApiResult<Area> expected = new ApiResult<Area>
            {
                Status = 200,
                ListData = AreaData.Lists.Skip(4).Take(1).ToList(),
                Paging = paging,
            };
            Assert.That(actual.Status, Is.EqualTo(expected.Status));
            Assert.That(actual.ListData.Count, Is.EqualTo(expected.ListData.Count));
        }
        {
            Paging paging = CommonData.paging3;
            AreasearchModel model = new AreasearchModel
            {
                Campus = "FU-HL",
                LocationCode = null,
                RoomCode = "ThanhNC-Test",
                paging = paging
            };
            var actual = _service.GetList(model);
            ApiResult<Area> expected = new ApiResult<Area>
            {
                Status = 200,
                ListData = AreaData.Lists.Skip(2).Take(2).ToList(),
                Paging = paging,
            };
            Assert.That(actual.Status, Is.EqualTo(expected.Status));
            Assert.That(actual.ListData.Count, Is.EqualTo(expected.ListData.Count));
        }
    }
    finally
    {
        //clear data
        _data.ClearTestData();
    }
}

```

Samples of unit test function



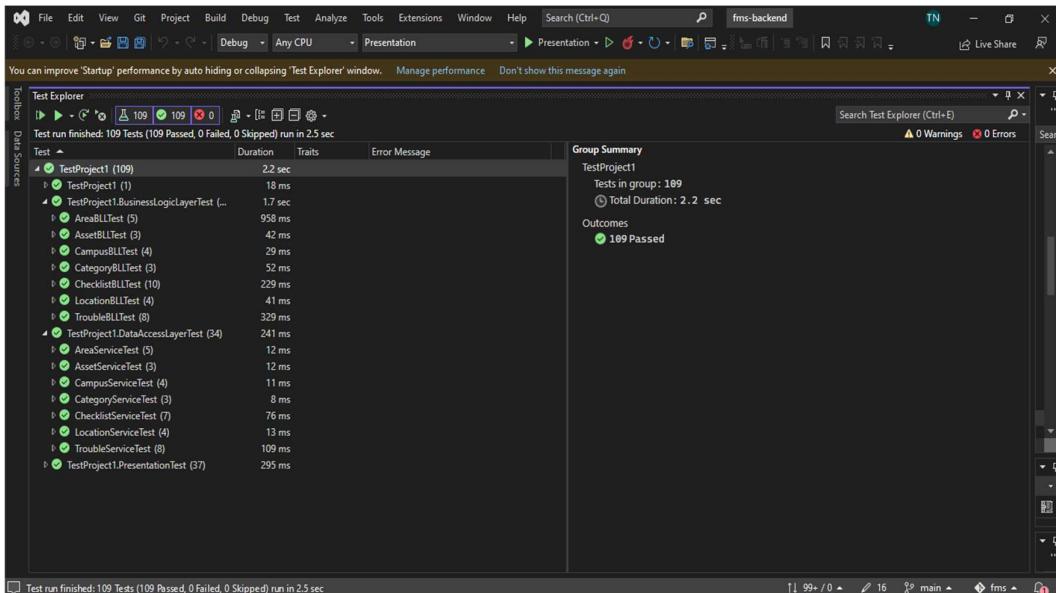
Running unit test function

| FMS_Unit Test Campus.xlsx - Excel | | | | | | | | | | |
|-----------------------------------|---|--|-----------------------|-----------------------|---|--|--|--------|--------|--------|
| Condition | Precondition | | | | | | | | | |
| 9 | Campus | | | | | | | URC001 | URC002 | URC003 |
| 10 | { Name = "ThanhNC-Test-FU-HL", FullName = "ThanhNC-Test-FU-Hồ La", Address = "ThanhNC-Test-khu cn", Telephone = "0961592144", CreatedBy = "thanhnche140350", } | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | |
| 11 | { Name = "ThanhNC-Test", FullName = "ThanhNC-Test-FU-Hồ chí minh", Address = "ThanhNC-Test-q9", Telephone = "0961592144", CreatedBy = "thanhnche140350", } | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | |
| 12 | { Name = "ThanhNC-Test-khu dn", FullName = "ThanhNC-Test-FU-Hồ chí minh", Address = "ThanhNC-Test-q9", Telephone = "0961592144", CreatedBy = "thanhnche140350", } | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | |
| 13 | { Name = "ThanhNC-Test-khu dn", FullName = "ThanhNC-Test-FU-Hồ chí minh", Address = "ThanhNC-Test-q9", Telephone = "0961592144", CreatedBy = "thanhnche140350", } | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | |
| 14 | { Name = "ThanhNC-Test-khu ct", FullName = "ThanhNC-Test-FU-Hồ chí minh", Address = "ThanhNC-Test-khu ct", Telephone = "0961592144", CreatedBy = "thanhnche140350", } | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | |
| 15 | { Name = "ThanhNC-Test-khu qn", FullName = "ThanhNC-Test-FU-Hồ chí minh", Address = "ThanhNC-Test-khu qn", Telephone = "0961592144", CreatedBy = "thanhnche140350", } | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | |
| 16 | Input | | | | | | | | | |
| 17 | CampussearchModel | | | | | | | | | |
| 18 | { CampusName = "ThanhNC-Test", paging = { CurrentPage = 1, PageSize = 5, } } | <input type="radio"/> | | | | | | | | |
| 19 | { CampusName = "ThanhNC-Test", paging = { CurrentPage = 1, PageSize = 4, } } | <input type="radio"/> | | | | | | | | |
| 20 | { CampusName = "ThanhNC-Test", paging = { CurrentPage = 2, PageSize = 2, } } | <input type="radio"/> | | | | | | | | |
| 21 | Return | | | | | | | | | |
| 22 | Status | | | | | | | | | |
| 23 | 200 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | | | | | | |
| 24 | List<Campus> | | | | | | | | | |
| 25 | cnc", Telephone = "0961592144", CreatedBy = "thanhnche140350", }, | <input type="radio"/> | | | | | | | | |
| 26 | cnc", Telephone = "0961592144", CreatedBy = "thanhnche140350", }, | <input type="radio"/> | | | | | | | | |
| 27 | { Name = "ThanhNC-Test", FullName = "ThanhNC-Test-FU-Dà Nẵng", Address = "ThanhNC-Test-khu dn", Telephone = "0961592144", CreatedBy = "thanhnche140350", }, | <input type="radio"/> | | | | | | | | |
| 28 | { Name = "ThanhNC-Test", FullName = "ThanhNC-Test-FU-Cần Thơ", Address = "ThanhNC-Test-khu ct", Telephone = "0961592144", CreatedBy = "thanhnche140350", }, | <input type="radio"/> | | | | | | | | |
| 29 | Exception | | | | | | | | | |
| 30 | System.Data.SqlClient.SqlException | | | | | | | | | |
| 31 | | | | | | | | | | |
| 32 | Result | Type(N : Normal, A : Abnormal, B : Boundary) | N | N | N | | | | | |
| 33 | Passed/Failed | | P | P | P | | | | | |
| 34 | | | 8 | 8 | 8 | | | | | |
| 35 | Executed Date | | / | / | / | | | | | |
| 36 | Defect ID | | 2 | 2 | 2 | | | | | |
| 37 | | | / | / | / | | | | | |
| | | | 2 | 2 | 2 | | | | | |
| | | | / | / | / | | | | | |
| | | | 2 | 2 | 2 | | | | | |
| | | | / | / | / | | | | | |
| | | | 0 | 0 | 0 | | | | | |
| | | | 2 | 2 | 2 | | | | | |
| | | | 2 | 2 | 2 | | | | | |

Unit test tracking

4.2 Integration test

This round of testing will include testing the interactions between functions to come up with a complete API that can be used by frontend developers. Functions should work together smoothly and output the expect result. Each test case will explicitly document the actions required to complete the test case, allowing faults or defects to be identified. Bug will log on jira software of Facilities Management System project



Running integration test function

4.3 System test

Test the application as a whole, the tester will perform test design generation according to the business flows described in the SRS. The application must work smoothly, the interface is the same as in the design at SWP490_G7_FMS_Web. There must be a clear message when performing a successful or failed business task. Each test case will explicitly document the actions required to complete the test case, allowing faults or defects to be identified. Bug will log on jira software of Facilities Management System project

| Report5_Test Report v7.xlsx - Excel | | | | | | | | | | |
|-------------------------------------|--|--|--|---|-------------|------------|-----------------|----------------------------|-----|------|
| Test Case ID | Test Case Description | Test Case Procedure | Expected Results | Pre-conditions | Test Status | Test date | Tester | Test design | Tag | Note |
| [TC_TroubleReportDetail_1] | Test Trouble Report Detail(Click Update) | 1. Enter summary "Hóng quát trán" 2. Enter in area time "10/07/2022" 3. Click checkbox emergency 4. Enter description "Hóng quát trán đã máy hôm nay" 5. Upload image description 6. Change status "Up Work" 7. Select technician "thanhndhe140350" 8. Select category "Hệ thống quát" 9. Select priority "Medium" 10. Click Update button | 1. Show popup "Save successfully." 2. History of changes add items "[09/08/2022 11:53:31] Change technician from none to technician "thanhndhe140350 by "thanhndhe140025". | - Access http://demofms-aeo-200/fms/login successfully from Facilities Management System (user role must be "Admin or Manager") | Passed | 15/08/2022 | Thanhddhe140025 | Trouble Report Test Design | A1 | |
| [TC_TroubleReportDetail_2] | Test Trouble Report Detail(Click Update) | 1. Preview image description | 1. Show image after click preview image | - Access | Passed | 15/08/2022 | Thanhddhe140025 | Trouble | A2 | |
| [TC_TroubleReportDetail_3] | Test Trouble Report Detail(Click Update) | 1. Preview image description | 1. Show image after click preview image | - Access | Passed | 15/08/2022 | Thanhddhe140025 | Trouble | A3 | |
| [TC_TroubleReportDetail_4] | Test Trouble Report Detail(Click Update) | 1. Change status "Done" | 1. Update button not showing | - Access | Passed | 15/08/2022 | Thanhddhe140025 | Trouble | A4 | |
| [TC_TroubleReportDetail_5] | Test Trouble Report Detail(Click Update) | 1. Leave summary empty | 1. Show error message "This field cannot be empty." | - Access | Passed | 15/08/2022 | Thanhddhe140025 | Trouble | A5 | |
| [TC_TroubleReportDetail_6] | Test Trouble Report Detail(Click Update) | 1. Enter summary | 1. Show error message "This field cannot be empty." | - Access | Passed | 15/08/2022 | Thanhddhe140025 | Trouble | A6 | |

System test tracking

4.4 Defect & bug log

If a flaw or fault is detected during any of the above three stages of testing, testers and developers must document it so that it can be addressed in the future. We use Jira Software because it allows us to generate issues, assign developers, and categories issues to reflect how essential they are to the team. All issues must be detailed in detail, with photographs attached, so that the member who is responsible for correcting the error may see it clearly and unambiguously.

The image displays two side-by-side screenshots of the Jira Software interface, illustrating the creation and management of defects (issues) for the FMS system.

Screenshot 1: [Checklist Customize] Xử lý FE cho màn hình (FMS-13)

This screenshot shows a Jira issue page for defect FMS-13. The issue title is "[Checklist Customize] Xử lý FE cho màn hình". The description includes:

- Xử lý Validate phần Effect Area theo rule: Nếu template được chọnTypeID = 1 thì required (for ngược lại với list thôi)
- Màn hình chỉ cho Manager + Tech vào: Tạo màn hình thông báo No permission dạng như Not Found (bất case truy cập bằng link nhưng ko có quyền vào)
- Check lại phần popup Import: Chưa xử lý xóa data sau khi import xong → close → bấm Import (vẫn hiện file cũ)

The right panel shows the issue details:

- Assignee: Phạm tuấn Vương (PV)
- Labels: None
- Reporter: Bui Nhu Nhat (K14 HL)

Activity timeline:

- Created last week
- Updated 2 days ago
- Resolved 2 days ago

Screenshot 2: [Checklist Customize] Xử lý FE cho màn hình (FMS-17)

This screenshot shows a Jira issue page for defect FMS-17. The issue title is "[Checklist Customize] Xử lý FE cho màn hình". The description includes:

Quantity số âm
Mong muốn: báo lỗi Quantity
Thực tế: không thông báo, vẫn load data lên, Import successfully!

Import Date vượt quá hiện tại(cái này bị cá bên import form)
Mong muốn: báo lỗi Import Date
Thực tế: không thông báo, vẫn load data lên, Import successfully!

The right panel shows the issue details:

- Assignee: Bui Nhu Nhat (K14 HL)
- Labels: None
- Reporter: Nguyen Cong Thanh (K14_HL)

Activity timeline:

- Created yesterday
- Updated 20 hours ago
- Resolved 20 hours ago

Defect & Bug Log

4.5 Acceptance Test

The test will be conducted by Mr. Trinh Van Bon - Head of Infrastructure Department, Mr. Do Quoc Dung Technical Officer of Infrastructure Engineering Department and related parties with support from the FMS team. The goal of this test is to determine whether the system meets the business requirements and whether it is suitable for delivery.

| ID | Checklists | Yes | No |
|----|------------|-----|----|
|----|------------|-----|----|

| General | | | |
|--------------------------|--|---|--|
| AT-01 | Text on all screens are grammatically correct | x | |
| AT-02 | All mandatory fields are validated | x | |
| AT-03 | All messages are clearly displayed | x | |
| GUI and Usability | | | |
| AT-04 | Correctly display the selected language (default is Vietnamese) | x | |
| AT-05 | Links, buttons, and checkboxes are easily clickable | x | |
| AT-06 | Business flow work as expected in SRS | | |
| AT-07 | User interface should be clear and easy to use | x | |
| AT-08 | The system must be designed so that users can easily familiarize themselves with and use competently functions in a short time | x | |
| AT-09 | Main functions are organized into navigator for easier access | x | |
| Security | | | |
| AT-10 | It is only possible to log in with an authorized account in the system | x | |

5. Test Reports

5.1 Unit Test

| Module code | Passed | Failed | Pending | N/A | Number of test cases |
|-------------------------|------------|----------|----------|----------|----------------------|
| My Trouble Report | 32 | 0 | 0 | 0 | 32 |
| Configuration Campus | 13 | 0 | 0 | 0 | 13 |
| Configuration Location | 12 | 0 | 0 | 0 | 12 |
| Configuration RoomArea | 12 | 0 | 0 | 0 | 12 |
| Configuration AssetType | 10 | 0 | 0 | 0 | 10 |
| Configuration Asset | 10 | 0 | 0 | 0 | 10 |
| MyChecklist | 47 | 0 | 0 | 0 | 47 |
| Sub total | 136 | 0 | 0 | 0 | 136 |

Normal case: 136

Abnormal case: 0

Boundary case: 0

5.2 Integration Test

| Module code | Passed | Failed | Pending | N/A | Number of test cases |
|-------------------------|-----------|----------|----------|----------|----------------------|
| My Trouble Report | 16 | 0 | 0 | 0 | 16 |
| Configuration Campus | 6 | 0 | 0 | 0 | 6 |
| Configuration Location | 6 | 0 | 0 | 0 | 6 |
| Configuration RoomArea | 6 | 0 | 0 | 0 | 6 |
| Configuration AssetType | 5 | 0 | 0 | 0 | 5 |
| Configuration Asset | 5 | 0 | 0 | 0 | 5 |
| MyChecklist | 20 | 0 | 0 | 0 | 20 |
| Sub total | 64 | 0 | 0 | 0 | 64 |

Test coverage: 100%

Test successful coverage: 100%

5.3 System Test

| Module code | Passed | Failed | Pending | N/A | Number of test cases |
|------------------------------|---------------|---------------|----------------|------------|-----------------------------|
| Create Trouble Report | 16 | 0 | 0 | 0 | 16 |
| Create Trouble for guest | 11 | 0 | 0 | 0 | 11 |
| My Trouble Report | 41 | 0 | 0 | 0 | 41 |
| Trouble Report Detail | 20 | 0 | 0 | 0 | 20 |
| Configuration Campus | 16 | 0 | 0 | 0 | 16 |
| Configuration Location | 17 | 0 | 0 | 0 | 17 |
| Configuration Area | 18 | 0 | 0 | 0 | 18 |
| Configuration User | 18 | 0 | 0 | 0 | 18 |
| Configuration Asset Category | 10 | 0 | 0 | 0 | 10 |
| Configuration Asset | 18 | 0 | 0 | 0 | 18 |
| Checklist | 57 | 0 | 0 | 0 | 57 |
| Warehouse | 57 | 0 | 0 | 0 | 57 |
| Sub total | 372 | 0 | 0 | 0 | 372 |

Test coverage: 100%

Test successful coverage: 100%

VI. Release Package & User Guides

1. Deliverable Package

| No. | Deliverable Item | Description |
|-----|---------------------------|-----------------------------------|
| 1 | Project Schedule/Tracking | SWP490_G7_SRS for Web.xlsx |
| 2 | Source Codes | FMS_SRC.zip |
| 3 | Database Script(s) | FMS_DB.zip |
| 4 | Final Report Document | Report7_Final Project Report.docx |
| 5 | Test Cases Document | Report5_Test Documentation.docx |

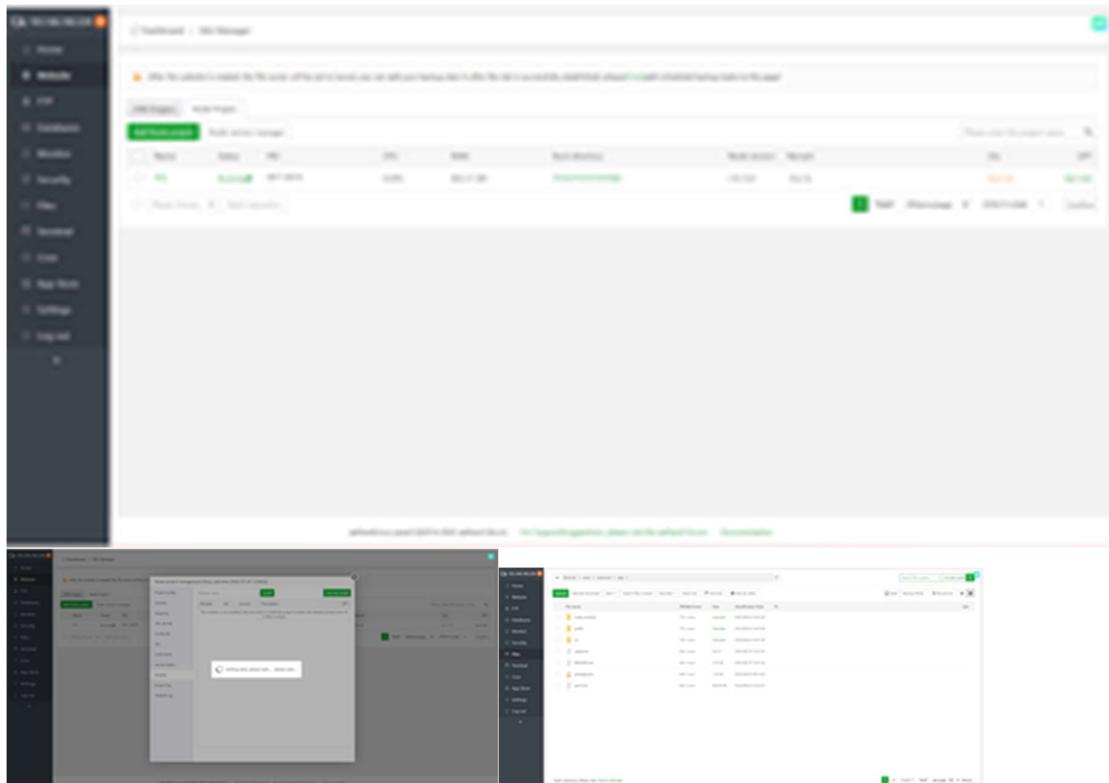
2. Installation Guides

2.1 System Requirements

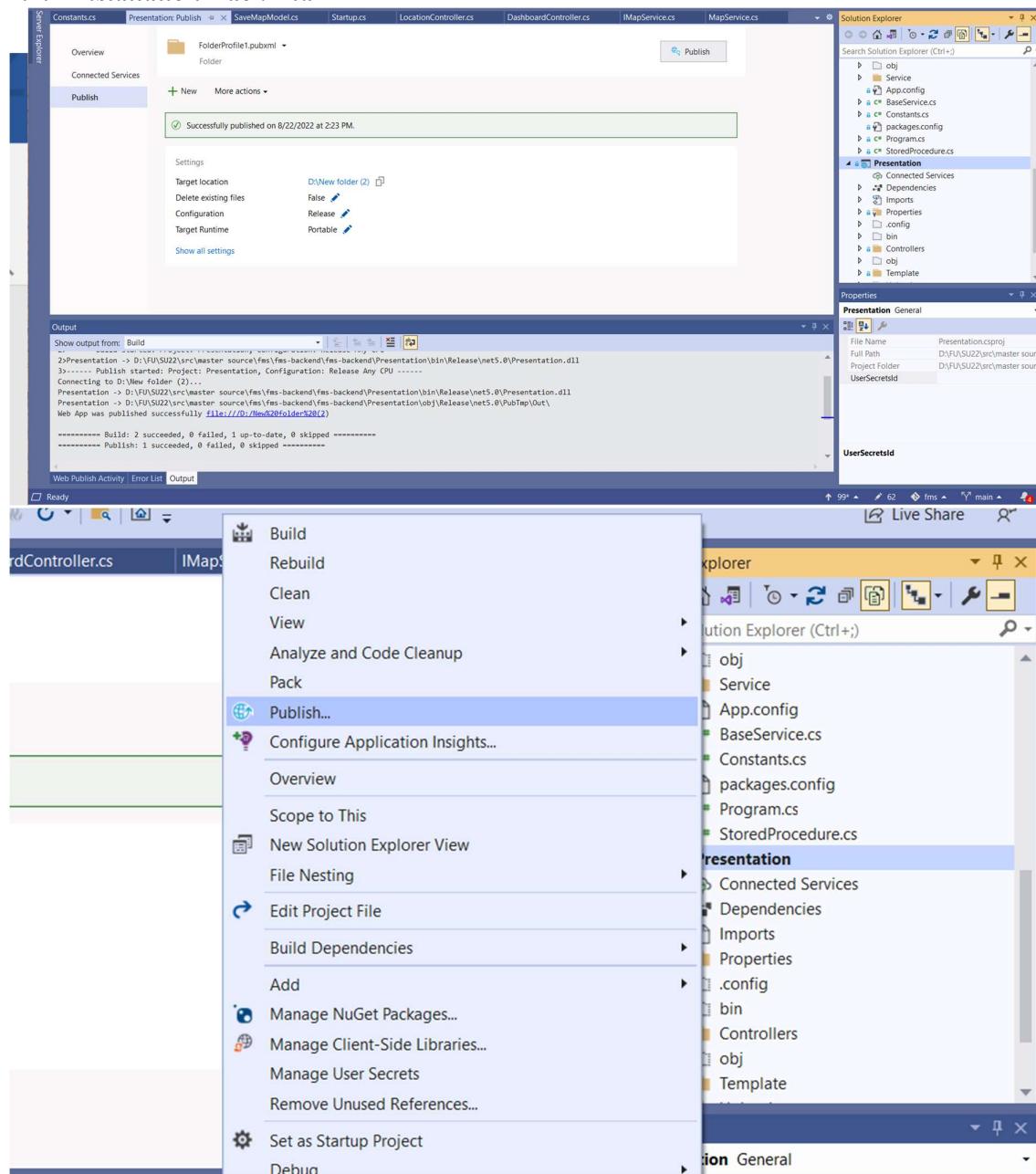
| No. | Requirements Item | Description |
|-----|-------------------|---------------------|
| 1 | Server CPU | Min 2.0GHz (2 core) |
| 2 | Server RAM | Min 2Gb |
| 3 | Server ROM | Min 10Gb |

2.2 Installation Instruction

2.2.1 Installation FrontEnd



2.2.2 Installation BackEnd



This PC > New Volume (D) > New folder (2)

| Name | Date modified | Type | Size |
|---------------------------------------|--------------------|-----------------------|----------|
| runtimes | 8/19/2022 1:55 AM | File folder | |
| Template | 8/19/2022 1:55 AM | File folder | |
| appsettings.Development.json | 6/17/2022 4:10 PM | Text file | |
| appsettings.json | 7/14/2022 12:11 PM | Text file | |
| BusinessLogicLayer.deps.json | 8/22/2022 2:23 PM | Text file | |
| BusinessLogicLayer.dll | 8/22/2022 2:23 PM | Application extens... | 4,062 KB |
| BusinessLogicLayer.exe | 8/22/2022 2:23 PM | Application extens... | 578 KB |
| BusinessLogicLayer.pdb | 8/22/2022 2:23 PM | Application extens... | 3,081 KB |
| BusinessLogicLayer.runtimeconfig.json | 8/22/2022 2:23 PM | Text file | 7 KB |
| Dapper.dll | 8/7/2022 9:58 AM | Application extens... | 7 KB |
| Dapper.xml | 8/7/2022 9:58 AM | Text file | 32 KB |
| DataAccessLayer.exe | 8/22/2022 3:45 AM | Application extens... | 7 KB |
| DataAccessLayer.exe.config | 8/7/2022 9:58 AM | Text file | |
| DataAccessLayer.pdb | 8/22/2022 3:45 AM | Application extens... | |
| EntityFramework.dll | 4/16/2020 8:38 PM | Application extens... | 4,062 KB |
| EntityFramework.SqlServer.dll | 4/16/2020 8:39 PM | Application extens... | 578 KB |
| EPPPlus.dll | 6/10/2022 7:52 PM | Application extens... | 3,081 KB |
| EPPPlus.Interfaces.dll | 3/7/2022 9:49 PM | Application extens... | 7 KB |
| EPPPlus.System.Drawing.dll | 3/7/2022 9:49 PM | Application extens... | 7 KB |

Archive name and parameters

New folder (2).zip

General Advanced Options Files Backup Time Comment

Default Profile Profiles... Update mode Add and replace files

Archive format RAR RAR4 ZIP

Compression method Normal

Dictionary size 32 KB

Split to volumes, size MB Set password...

OK Cancel Help

Bùi Như Nhật - All subscriptions

File Manager for demofmsapi.site

Upload File Upload files to the current directory.

Import file via URL

Create File

Create Directory

Search in filename

Modified Size

appsettings.Development.json Aug 19, 2022 03:11 AM 168 B

appsettings.json Aug 19, 2022 03:10 AM 452 B

BusinessLogicLayer.deps.json Aug 19, 2022 03:10 AM 1.8 KB

BusinessLogicLayer.dll Aug 19, 2022 01:55 AM 14.5 KB

BusinessLogicLayer.exe Aug 19, 2022 01:55 AM 123.0 KB

BusinessLogicLayer.pdb Aug 19, 2022 01:55 AM 15.3 KB

BusinessLogicLayer.runtimeconfig.json Aug 5, 2022 09:24 AM 147 B

plesk.com Suggest an idea Cookies

Website & Domains

Hello! Welcome to your website overview. Take the tour to see how you can manage your sites.

1 items total

Add Subdomain Add Domain Alias

Domain name Status Type

demofmsapi.site Active Website

Open in web Preview

Disk Usage 80.1 MB

Dashboard Hosting & DNS Mail

Files & Databases

- Connection Info for FTP, Database
- File Manager
- ODBC Data Sources
- FTP Access
- Backup & Restore

Dev Tools

- PHP Settings
- ASP.NET Settings
- Logs
- Scheduled Tasks
- PHP Composer
- Git
- Failed Request Tracing

Bùi Như Nhật - All subscriptions

https://winhost-0111.000nethost.com:8443/smb/email-address 80 MB/month

2.2.3 Deployment

3. User Manual

3.1 Login

1. User access to <http://demofms.site:3000/login>
2. Select Campus
3. Click “Sign in with Google”
4. Choose one of email list show in Google authenticator popup.
5. If email is valid, redirect to Home (dashboard) base on role of user, else system show error message:
 1. If user don't select campus before click sign in, show MSG01
 2. If user choose an email not have extension @fpt.edu.vn, show MSG02

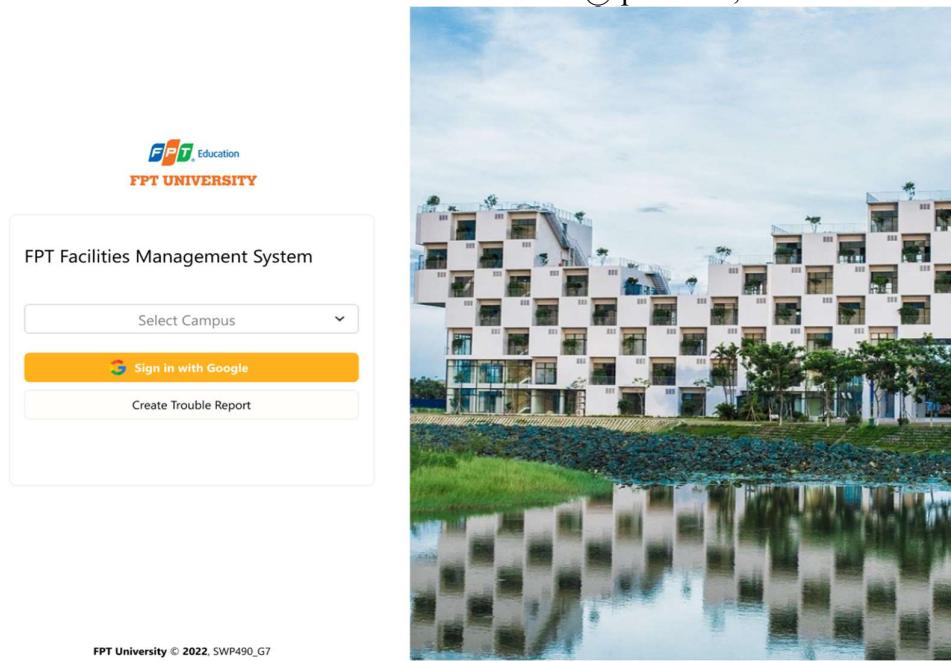


Figure 3.1.1 Login

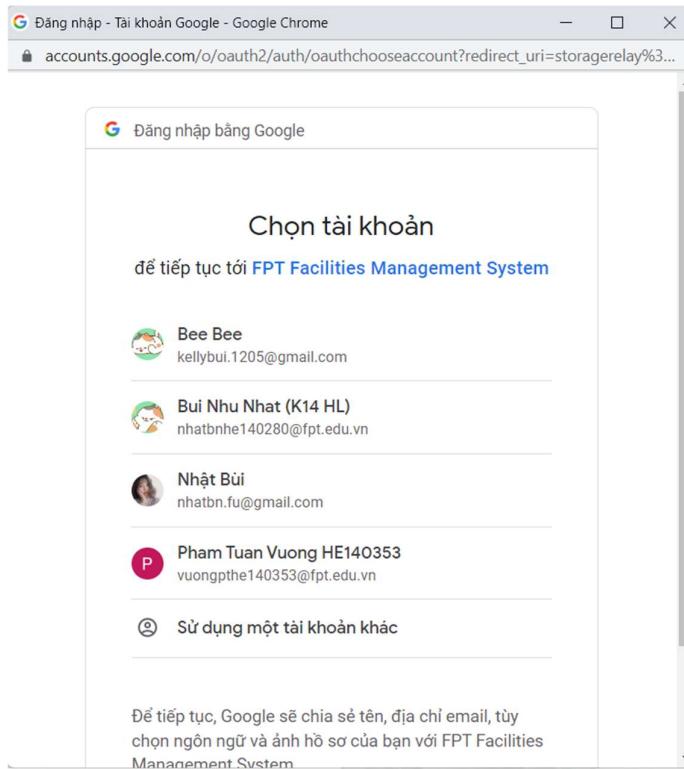


Figure 3.1.2 Google authenticator popup

3.2 Trouble Management

3.2.1 *Create trouble report(Login)*

3.2.1.1 Create trouble with Login (Submit)

- In navigation menu, hover on “Trouble”, choose “Create Trouble”
- Fill all required field (Location, Area, Summary, Images), and fill more detail field
- Click “Submit”
- FMS validate data. If data is valid, store data to database, create trouble in status “Opening” and show MSG04 and MSG05, else system show error message in each field:
 - If user don’t input information in required field, show MSG03.

3.2.1.2 Create trouble with Login (Save draft)

- In navigation menu, hover on “Trouble”, choose “Create Trouble”
- Fill all required field (Location, Area), and fill more detail field
- Click “Save draft”
- FMS validate required data. If data is valid, store data to database, create trouble in status “Draft” and show MSG04 and MSG05, else system show error message in each field:
- If user don’t input information in required field, show MSG03.

3.2.1.3 Create trouble with Login(Submit) using scan QR Code

- Scan QR Code in area/ room
- Click “Login”

- Login successfully, click “Create Trouble”
- Auto fill Location, Area information.
- Click “Submit”
- FMS validate data. If data is valid, store data to database, create trouble in status “Opening” and show MSG04 and MSG05, else system show error message in each field:
- If user don’t input information in required field, show MSG03.

3.2.1.4 Create trouble with Login(Submit) using scan QR Code

- Scan QR Code in area/ room
- Click “Login”
- Login successfully, click “Create Trouble”
- Auto fill Location, Area information.
- Click “Save draft”
- FMS validate required data. If data is valid, store data to database, create trouble in status “Draft” and show MSG04 and MSG05, else system show error message in each field:
- If user don’t input information in required field, show MSG03.

The screenshot shows the 'Create Trouble Report' interface. On the left is a vertical sidebar with icons for Home, Checklist, Techreport, Map, Warehouse, and Guideline. The main area has a header 'Create Trouble Report' and a sub-header 'Reporters > Create Trouble Report'. It includes fields for 'Reporter' (nhavanh14020), 'Campus' (FPT-HC), 'Select Location', 'Select area', and 'In Area Time'. There's a large 'Description' text area with placeholder text about reporting damage. Below it is an 'Image Description' section with an 'Upload' button. Top right buttons include 'Submit' and 'Save Draft'.

Figure 3.2.1.1 UI_Create trouble with login

The screenshot shows a success message: 'Create trouble report successfully!' followed by 'Thanks for the information you provided, we will get back to you soon!'. At the bottom are 'View Detail' and 'Create Another' buttons. The sidebar and header are identical to the previous screenshot.

Figure 3.2.1.2 UI_Create successfully

3.2.2 Create trouble report (Without login)

3.2.2.1 Create trouble without Login

- On Login screen, click “Create Trouble Report”
- Fill all required field (Location, Area, Summary, Images), and fill more detail field
- Click “Submit”
- FMS validate data. If data is valid, store data to database, create trouble in status “Opening” create by **Anonymous** and show MSG04 and MSG05, else system show error message in each field:
- If user don’t input information in required field, show MSG03.

3.2.2.2 Create trouble without Login using scan QR Code

- Scan QR Code in area/ room
- Click “Create Trouble Report”
- Auto fill Location, Area information.
- Click “Submit”
- FMS validate data. If data is valid, store data to database, create trouble in status “Opening” create by **Anonymous** and show MSG04 and MSG05, else system show error message in each field:
- If user don’t input information in required field, show MSG03.

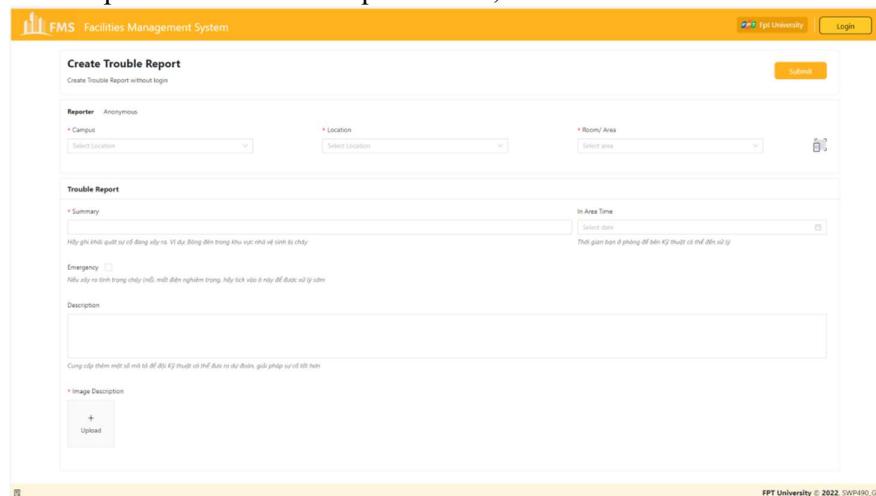


Figure 3.2.2 UI_Create trouble without login

3.2.3 View list trouble reports

1.1.1.1 View list trouble report (Search)

- In navigation menu, hover on “Trouble”, choose “My Troubles”
- Input search data in Search tab
- Click “Search”
- Table showing all troubles map search data base on the role of the user: Normal user (show troubles reported by user), Technician (show troubles reported by the user and handled by them), and Admin and Manager (show all trouble reports from Opening status).

1.1.1.2. View list trouble report (Export)

- In navigation menu, hover on “Trouble”, choose “My Troubles”
- Click “Export”
- Export to Excel data in table.

Figure 3.2.3.1 UI_My Troubles

| No | Room/ Area | Created Date | Priority | Category | Summary | Description | Reporter | Status | Technician | Issue Review | Solution |
|----|------------|--------------|----------|----------|---------|-------------|----------|--------|------------|--------------|----------|
| 1 | | | | | | | | | | | |
| 2 | | | | | | | | | | | |
| 3 | | | | | | | | | | | |
| 4 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
| 6 | | | | | | | | | | | |
| 7 | | | | | | | | | | | |
| 8 | | | | | | | | | | | |
| 9 | | | | | | | | | | | |
| 10 | | | | | | | | | | | |
| 11 | | | | | | | | | | | |
| 12 | | | | | | | | | | | |
| 13 | | | | | | | | | | | |
| 14 | | | | | | | | | | | |
| 15 | | | | | | | | | | | |
| 16 | | | | | | | | | | | |
| 17 | | | | | | | | | | | |
| 18 | | | | | | | | | | | |
| 19 | | | | | | | | | | | |
| 20 | | | | | | | | | | | |
| 21 | | | | | | | | | | | |
| 22 | | | | | | | | | | | |
| 23 | | | | | | | | | | | |
| 24 | | | | | | | | | | | |
| 25 | | | | | | | | | | | |
| 26 | | | | | | | | | | | |
| 27 | | | | | | | | | | | |
| 28 | | | | | | | | | | | |

Figure 3.2.3.2 Export Excel Template

1.1.2. View trouble report detail

- In navigation menu, hover on “Trouble”, choose “My Troubles”
- Click button View or Edit in record of table
- FMS select trouble by ID and redirect to View Detail screen

Figure 3.2.4.1 UI_Trouble Detail

1.1.3. Assign technician

1.1.3.1. Assign Technician from My Trouble

- In navigation menu, hover on “Trouble”, choose “My Troubles”
- With a reports in status “Opening”, select a technician in record
- Click button “Assign technician”  in record.
- If user don't choose a technician before show error message MSG07. Else show confirm popup MSG06.
- If user click “Confirm”, validate technician data. If technician is valid, update to database, change status of report to “Processing” and close the popup, show message MSG08

1.1.3.2. Assign Technician from Trouble Detail

- In navigation menu, hover on “Trouble”, choose “My Troubles”
- Click “Edit” in record has status in “Opening”
- Select technician in Technician Select box
- Click “Update”
- If technician is valid, update to database, change status of report to “Processing” and close the popup, show message MSG08.



Figure 3.2.5.1 UI_Assign technician (My troubles)

Figure 3.2.5.1 UI_Assign technician (Trouble detail)



Figure 3.2.5.1 UI_Confirm popup

1.1.4. Update report

- In navigation menu, hover on “Trouble”, choose “My Troubles”
- Click button View or Edit in record of table
- FMS select trouble by ID and redirect to View Detail screen
- Update information in tab Trouble Report
- Click “Update”

- FMS validate information, if it valid, sync data to database, update history of changes and show message MSG05. Else if user don't input in required field show message MSG03

Figure 3.2.6.1 UI_Update report

1.1.5. View history of changes

- In navigation menu, hover on “Trouble”, choose “My Troubles”
- Click button View or Edit in record of table
- FMS select trouble by ID and redirect to View Detail screen, scroll move to last to see History tab

| History Of Changes | |
|--|--------------------------------|
| ○ [09/08/2022 18:32:38] | thanhddhe140025 create trouble |
| ○ [18/08/2022 23:32:31] | thanhddhe140025 made changes |
| Change [Summary]: Hỏng hết cá rô i > Hỏng điện | |

Figure 3.2.7.1 UI_history of changes

1.1.6. Change workflow

- In navigation menu, hover on “Trouble”, choose “My Troubles”
- Click button View or Edit in record of table
- FMS select trouble by ID and redirect to View Detail screen

- Select new status in Status Select
- Click “Update”
- Update data base on rule:
 - If user change status to “Done”, validate all required fields. If valid data, store to data base, show message MSG05. Else show error message MSG03.
 - If status not in “Done”, sync data to database and show message MSG05.

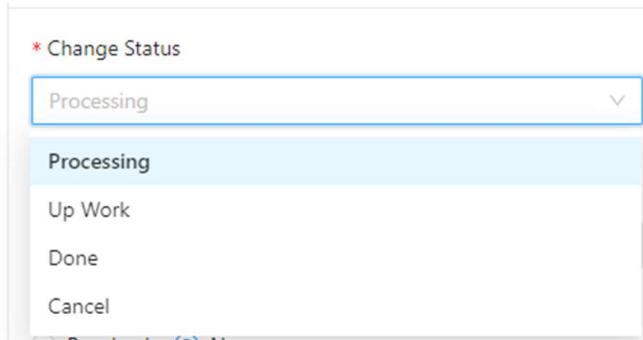


Figure 3.2.8.1 UI_Change workflow

1.1.7. Update troubleshooting

- In navigation menu, hover on “Trouble”, choose “My Troubles”
- Click button View or Edit in record of table
- FMS select trouble by ID and redirect to View Detail screen
- Fill data to tab “Trouble shooting”
- Update data base on rule:
 - If user change status to “Done”, validate all required fields. If valid data, store to data base, show message MSG05. Else show error message MSG03.
 - If status not in “Done”, sync data to database and show message MSG05.

The screenshot displays the 'Trouble Shooting' tab of a software application. At the top, there are four input fields: 'Change Status' (set to 'Opening'), 'Assign Technician' (a dropdown menu), 'Category' (a dropdown menu), and 'Priority' (set to 'High'). Below these are two radio buttons for 'Resolved' or 'None'. Underneath, there are two large text input areas labeled 'Issue Review' and 'Solution', both currently empty. At the bottom left, there is a placeholder box for an image with a '+' icon and the word 'Upload'.

Figure 3.2.9.1 UI_Troubleshooting Tab

1.1.8. Cancel report

1.1.8.1.Cancel trouble report from My Troubles

- In navigation menu, hover on “Trouble”, choose “My Troubles”
- Click button Cancel in record of table
- Show confirm popup
- If user click “Confirm”, sync data change status to Cancel, close popup and show message MSG09. Else close popup.

1.1.8.2.Cancel trouble report (Change workflow in Trouble detail)

- In navigation menu, hover on “Trouble”, choose “My Troubles”
- Click button View or Edit in record of table
- FMS select trouble by ID and redirect to View Detail screen
- In Status Select, choose Cancel
- Click “Update”
- FMS sync data change status to Cancel, close popup and show message MSG09.
- Redirect to My Troubles.

| My Troubles | | | | | | | | | | | |
|-------------|------------|--------------|---------------|------------|--------------|------------------|-----------|------------|-------------------|-----------------|----------|
| Status | | Location | | Room/ Area | | From | | To | | Search / Export | |
| # | Room/ Area | Created Date | Priority | Category | Summary | Description | Reporter | Status | Technician | Issue Review | Solution |
| 1 | AL-202R | 19/08/2022 | Over 24 hours | Giói h | | | Anonymous | Opening | Select Technician | | |
| 2 | DEWCM-T1L | 09/08/2022 | Over 24 hours | Hồng điện | Điện bị cháy | thanhddhe140025 | | Processing | minhhnrhe141686 | | |
| 3 | AL-201R | 19/08/2022 | Over 24 hours | Test 1 | Test | Anonymous | | Processing | dungcthe130522 | | |
| A | AL-201R | 19/08/2022 | Over 24 hours | Alarm 1 | | thanhnnche140350 | | Completed | thanhnncche140350 | | |

Figure 3.2.10.1 UI_Cancel trouble report

Update

Over 24 hours

1 Opening Anonymous > 2 Processing > 3 Up Work > 4 Done

Trouble Shooting

* Change Status

Opening

Opening

Cancel

Select Category

* Assign Technician

Select Technician

* Priority

Select Priority

Resolved None

Issue Review

Solution

Image description

+
Upload

Figure 3.2.10.2 UI_Change workflow in Trouble detail

1.1.9. Delete report

- In navigation menu, hover on “Trouble”, choose “My Troubles”
 - Click button Delete  in record of table
 - Show confirm popup
 - If user click “Confirm”, delete this report, close popup and show message MSG10. Else close popup.

3.3 Checklist Management

1.1.10. Create checklist

- In navigation menu, hover on “Checklist”, choose “My Checklists”
 - Click button “Create”
 - Show create popup
 - User fill data in create form
 - Click “Submit”
 - FMS validate input data, if data is valid, close popup and sync data create checklist.
Else if any required fields are empty, show error message MSG03.

Create new checklist

- Checklist template

Name: Admin test hệ thống

| Type | Daily | Effective Campus | All | Effective Location | All |
|------------|--|------------------|-----|--------------------|-----|
| Components | Admin test hệ thống 1 Admin test hệ thống 4 | | | | |

* From * To

Figure 3.3.1.1 UI Create checklist

1.1.11. View list checklist

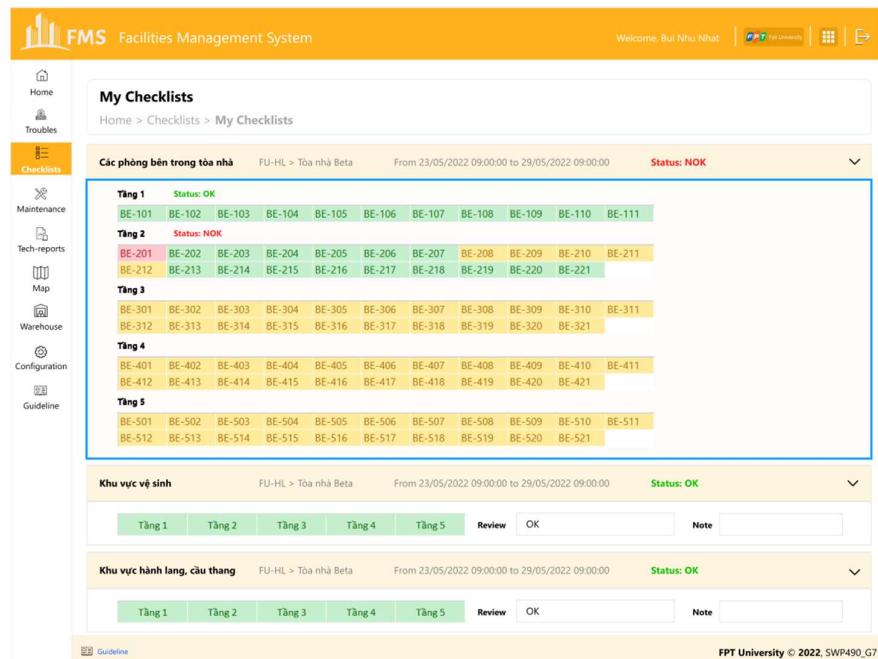
- In navigation menu, hover on “Checklist”, choose “My Checklists”
 - FMS select data from data base and show data in table.

| My Checklists | | | | | | | | | | |
|-----------------------------|-----------------------|--------|------------|----------------|---------------------------------------|------------|----------------------|----------------------|----------------------|---|
| Checklists -> My Checklists | | | | | | | | | | |
| Location | | Status | | Checklist Type | | From | | To | | |
| Office | Office | Open | Open | One-time | One-time | 2023-08-01 | 2023-08-01 | 2023-08-01 | 2023-08-01 | |
| 1 | Delta | Weekly | 08/08/2023 | 15/08/2023 | Phù hiệu tra hàng tuần các tòa nhà | OK | Click "Edit" to view | Click "Edit" to view | Click "Edit" to view | <input checked="" type="checkbox"/>    OVERDUE |
| 2 | Khu vực số 1 huyện | Daily | 01/08/2023 | 01/08/2023 | Phù hiệu tra hàng ngày các tòa nhà | OK | thanhnhanh140230 | | | <input checked="" type="checkbox"/>    OVERDUE |
| 3 | Alpha | Daily | 01/08/2023 | 31/08/2023 | Admin test hệ thống - Đaily 2 | Yellow | | | | <input checked="" type="checkbox"/>    |
| 4 | Alpha | Weekly | 08/08/2023 | 15/08/2023 | Phù hiệu tra hàng tuần các tòa nhà | Not OK | Click "Edit" to view | Click "Edit" to view | Click "Edit" to view | <input checked="" type="checkbox"/>    OVERDUE |

Figure 3.3.2.1 UI My checklists

1.1.12. Checklist detail

- In navigation menu, hover on “Checklist”, choose “My Checklists”
- On table, in Action column, click “Edit” button 
- Base on type of check list, FMS redirect:
 - Type of check list is “Weekly”, redirect to map view all areas/ room checklist base on choose data. User click in a area/ room to redirect checklist detail of this.
 - Type of checklist is “Daily”, redirect to checklist detail of this.
- Perform checklist by fill data in checklist content and total summary.
- Click “Update”
- FMS sync data and show message MSG05



The screenshot shows the FMS Facilities Management System interface. The main title is "My Checklists". Below it, there's a section titled "Các phòng bên trong tòa nhà" with a date range from "From 23/05/2022 09:00:00 to 29/05/2022 09:00:00" and a "Status: NOK" indicator. The interface is divided into several sections:

- Tầng 1 Status: OK**: Contains room numbers BE-101 through BE-111.
- Tầng 2 Status: NOK**: Contains room numbers BE-201 through BE-221.
- Tầng 3**: Contains room numbers BE-301 through BE-321.
- Tầng 4**: Contains room numbers BE-401 through BE-421.
- Tầng 5**: Contains room numbers BE-501 through BE-521.
- Khu vực vệ sinh**: Shows a status of "OK".
- Khu vực hành lang, cầu thang**: Shows a status of "OK".

The sidebar on the left includes links for Home, Troubles, Checklists (selected), Maintenance, Tech-reports, Map, Warehouse, Configuration, and Guideline. The footer at the bottom right says "FPT University © 2022, SWP490_G".

Figure 3.3.3.1 UI_My checklists (Weekly view)

Figure 3.3.3.1 UI_Checklist detail

1.1.13. Customize checklist

1.1.13.1. Create/ Update/ Delete Checklist templates

- In navigation menu, hover on “Checklist”, choose “Customize checklist”
- Select a checklist component (don’t map template before) or input new components
- FMS show configuration tab
- Choose function you want:
 - Click “Create” button : Open Create popup, manager/ admin fill data Click “Submit” FMS validate required field, if it valid close popup and show message MSG05, else show error message MSG03.
 - Click “Edit” button : Open Update popup auto fill data from database to form, manager/ admin update data Click “Submit” FMS validate required

- field, if it valid close popup and show message MSG05, else show error message MSG03.
- Click “Delete” button  : Open Delete confirm pop □ Click “Confirm” □ FMS delete data in database, close popup, and show message MSG10.

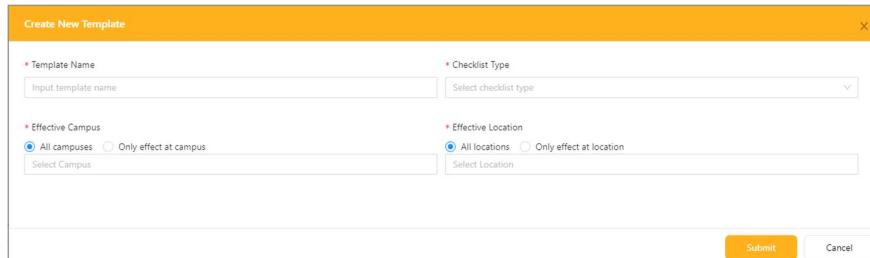


Figure 3.3.3.1 UI_Create/ Update template popup

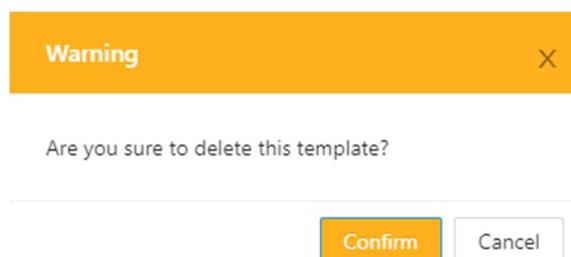


Figure 3.3.3.1 UI_Delete template popup

1.1.13.2. Customize checklist components (Using form)

- In navigation menu, hover on “Checklist”, choose “Customize checklist”
- Select a checklist component or input new components name
- Fill data to “**Create New Item**” tab
- Click “Submit” button :
 - If you don’t choose any component, show error message MSG11
 - Validate required field, if it is invalid show error message MSG03
 - If data is valid, FMS sync data store item to this component

1.1.13.3. Customize checklist components (Using import Excel)

- In navigation menu, hover on “Checklist”, choose “Customize checklist”
- Select a checklist component or input new components name
- Click button “Import”. If user don’t choose any component, show error message MSG11
- Open Import Checklist popup
- Click on dragger “Import from Excel”. If user don’t know template file, they can click on “tại đây” to download template.
- Choose a valid Excel file
- FMS read file and generate data to preview part, user can check data again, modify if have error, remove items by click on 

- User choose option save Overwrite (delete all existed items and write again) or Continue write (continue to latest item)
- Click “Submit”, FMS save data in database and show message MSG05, close popup.

1.1.13.4. Customize checklist component configuration

- In navigation menu, hover on “Checklist”, choose “Customize checklist”
- Select a checklist component or input new components name
- FMS show configuration tab
- Fill data in configuration tab
- Click “Save”
- FMS save configuration to database, show message MSG12 and reload page

1.1.13.5. Customize checklist components (Delete)

- In navigation menu, hover on “Checklist”, choose “Customize checklist”
- Select a checklist component
- Click button “Delete”. If user don’t choose any component, show error message MSG13
- Open Delete confirm popup
- Click “Confirm”
- FMS delete component, show message MSG10, close popup and reload page

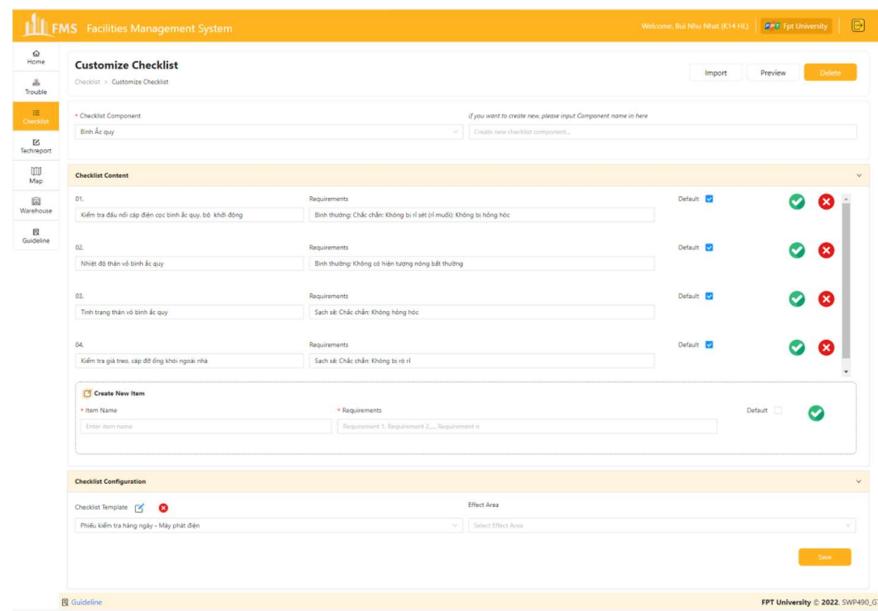


Figure 3.3.4.1 UI_Create/ Update component

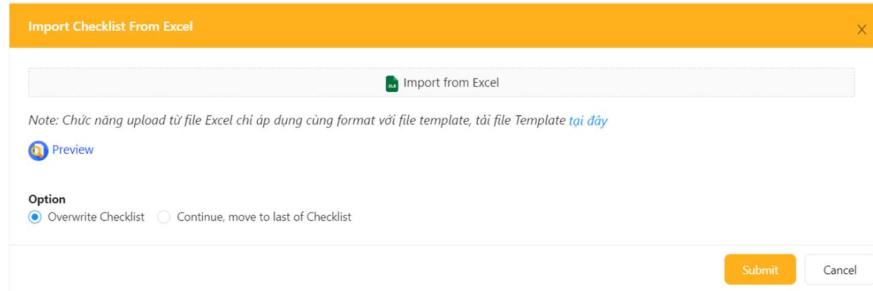


Figure 3.3.4.2 UI_Import Excel popup

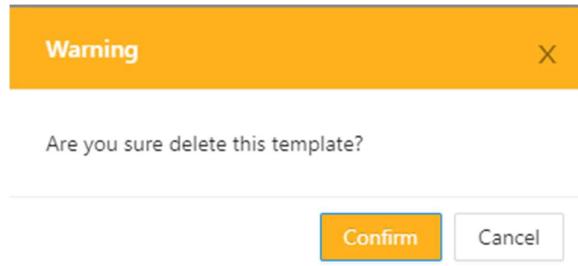


Figure 3.3.4.3 UI_Import Excel popup

1.1.14. Preview

- In navigation menu, hover on “Checklist”, choose “Customize checklist”
- Select a checklist component
- Click button “Preview”. If user don’t choose any component, show error message MSG14
- FMS select data and show preview popup

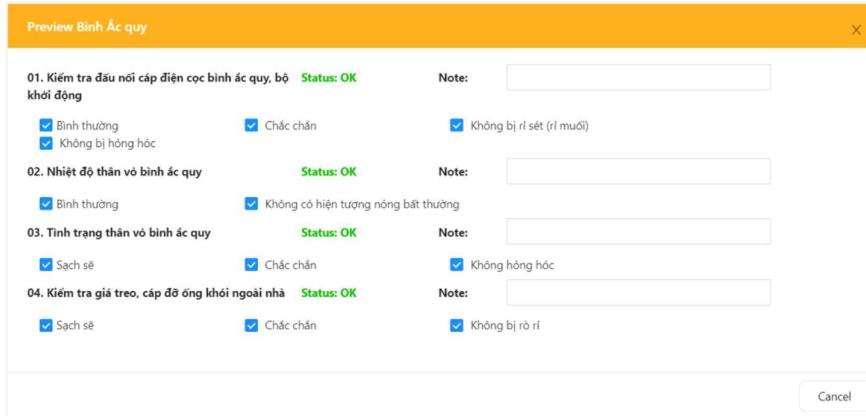


Figure 3.3.5.1 UI_Preview popup

3.4 Technical Report

1.1.15. View Technical report

- In navigation menu, click “Technical Report”
- Fill data in search tab
- Click “Search”

- FMS base on filter data, generate view of report
- User can fill more detail data: cause analysis, solution, repairmen/ replacement plan, review, etc.
- Click “Export”
- FMS generate report using data and template and return Excel file

The screenshot displays the FMS (Facilities Management System) Technical Report interface. The left sidebar includes links for Home, Facility, Checklist, Guidance, Map, Workforce, and Guidelines. The main content area is titled "Technical Report" and "Tech Report". It features several sections:

- I. Information:** Displays Export Date (20/08/2022), Location (A1), Room (A1-23 R), and Equipment (C1: Thiết bị Công binh SL: 4, C2: Thiết bị QĐKQSL SL: 1).
- II. Information Collection:**
 - Troubleshooting Report (Total: 21):** A table with columns: #, Created Date, Status, Priority, Summary, Reporter, Technician, and Action. It lists four entries with details like "Còn hoạt động", "Trung bình", "Cao", "Nhóm 1", "Nhóm 1", "Nhóm 1", and "Hỗ trợ".
 - Checklist Report (Total: 1):** A table with columns: #, Issue Date, End Date, Status, Technician, Checking Date, Issues, and Action. It lists one entry with details like "06/08/2022", "15/08/2022", "Trung bình", "Nhóm 1", "Nhóm 1", and a note about "BỊ LẠC PHÒNG BẢN TRỌNG TỐA NHÀ MÁY (M4) - Hỗ trợ tại Phòng 4".
- III. Cause Analysis:** A section for creating a new cause analysis with fields for Cause Description, Priority, and a checkmark button.
- IV. Solution:** A section for creating a new solution with fields for Solution Description and a checkmark button.
- V. Requirement/ Replacement Plan:** A section for creating a new plan with fields for Plan Description and a checkmark button.
- VI. Review:** Sections for Review and Prediction, each containing a text input field.

Figure 3.4.1.1 UI_Technical report

BÁO CÁO KỸ THUẬT

I. THÔNG TIN CƠ BẢN/ BASIC INFORMATION

| | | |
|--------------------------|-------------------|--------------|
| Ngày/ Date: | Vị trí/ Location: | Phòng/ Room: |
| Thiết bị/ Equipments: | | |

II. THU THẬP THÔNG TIN / DATA COLLECTION

1. Báo cáo sự cố/ Trouble reports

| STT No | Ngày tạo Create date | Tổng kết Summary | Trạng thái Status | Ưu tiên Priority | Người xử lý Technician |
|--|-------------------------|---------------------|----------------------|---------------------|---------------------------|
| 2. Đánh giá sử dụng checklist/ Checklist reports | | | | | |

III. PHÂN TÍCH NGUYÊN NHÂN / CAUSE ANALYSIS

IV. GIẢI PHÁP/SOLUTION

V. KẾ HOẠCH SỬA CHỮA (THAY THẾ) / REPAIRMENT (REPLACEMENT) PLAN

VI. ĐÁNH GIÁ/ REVIEW

1. Review/ Đánh giá

Figure 3.4.1.2 UI_Template Technical Report (P.1)

2. Dự đoán/ Prediction

| | |
|------------------------------|------|
| Người lập báo cáo/ Reporter: | |
| Phòng ban/ Department: | KTHT |

Figure 3.4.1.3 UI_Template Technical Report (P.2)

3.5 Warehouse Management

1.1.16. Import asset (Using form)

- In navigation menu, hover on “Warehouses”, click Import/ Export Asset
- Choose tab “Import”
- Choose tab “Using form”
- Fill data in form
- Click “Add”
- Validate data: check required all field, if it is invalid, show error message MSG03. Else, check assert existed or not, if it existed, check input data, if it has data not map show message MSG15.
- If it is valid data, add to table preview.
- Click “Submit”, FMS sync data to database.

The screenshot shows the FMS Facilities Management System interface. The left sidebar has icons for Home, Trouble, Checklist, Techreport, Map, Warehouse (which is highlighted in orange), and Guideline. The main header says "Warehouse Import/ Export" and "Warehouse > Import/ Export Asset". The top right shows "Welcome, Bui Nhu Nhut (K14 HL)" and "FPT University". The main content area has tabs for "Import" and "Export", with "Import" selected. Below is a section titled "Using form" with a sub-section "Using import Excel". A table titled "Import Assets To Warehouse" lists two items:

| # | Import Date | Reason | Category | Asset Code | Asset Name | Measure Unit | Quantity | Ready For Use | Action |
|---|-------------|---------------|---------------------|------------|---------------|--------------|----------|-------------------------------------|--------------------------|
| 1 | 01/08/2022 | Bđ sung mồi | Hệ thống chiếu sáng | HTCS.001 | Bóng đèn 30W | Cái | 2 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2 | 03/08/2022 | Bđ sung Bìn 2 | Hệ thống quạt | HTQ.003 | Quạt điện cát | Bộ | 4 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

At the bottom, there's a "Preview" note and a "Submit" button.

Figure 3.5.1.1 UI_ Import Asset/ Using form

1.1.17. Import asset (Using import Excel)

- In navigation menu, hover on “Warehouses”, click Import/ Export Asset
- Choose tab “Import”
- Choose tab “Using form”
- Click “Import from excel”. If user don’t know template click “tại đây” to download.
- If FMS cannot read file show error message MSG16. Else, display data to Preview table.
- Click “Submit”. FMS validate data, if it is invalid show error message MSG16; else show MSG05.

The screenshot shows the FMS Facilities Management System interface. The left sidebar has icons for Home, Trouble, Checklist, Techreport, Map, Warehouse (highlighted in orange), and Guideline. The main header says "Warehouse Import/ Export" and "Warehouse > Import/ Export Asset". The top right shows "Welcome, Bui Nhu Nhut (K14 HL)" and "FPT University". The main content area has tabs for "Import" and "Export", with "Import" selected. Below is a section titled "Using form" with a sub-section "Using Import Excel". A table titled "Import Assets To Warehouse By Excel" lists one item:

| # | Import Date | Reason | Category | Asset Code | Asset Name | Measure Unit | Quantity | Ready For Use | Action |
|---|-------------|-------------|---------------------|------------|--------------|--------------|----------|-------------------------------------|--------------------------|
| 1 | 17/08/2022 | Mua bđ sung | Hệ thống chiếu sáng | ED01 | Bóng đèn dài | Cái | -18 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

At the bottom, there's a "Preview" note and a "Submit" button.

Figure 3.5.2.1 UI_ Import Asset/ Using import Excel

1.1.18. Export asset (Using form)

- In navigation menu, hover on “Warehouses”, click Import/ Export Asset

- Choose tab “Export”
- Choose tab “Using form”
- Fill data in form, if user input references link, click “Check link”.
- Click “Add”
- Validate data: check required all field, if it is invalid, show error message MSG03. Else, if user input references link but not check is valid or not, require click “Check link” and show message MSG17. If “Check link” return true, show message MSG19; else show error message MSG18.
- If it is valid data, add item to preview table.
- Click “Submit”, FMS sync data to database.

| # | Export Date | Asset Code | Quantity | Reason | References | Action |
|---|-------------|-----------------|----------|----------|---|--------|
| 1 | 22/08/2022 | ADMIN.TEST.0002 | 2 | Thay thế | http://demofmssite3000/detail/trouble/714 | |

Figure 3.5.3.1 UI_Export Asset/ Using form

1.1.19. Export asset (Using import Excel)

- In navigation menu, hover on “Warehouses”, click Import/ Export Asset
- Choose tab “Import”
- Choose tab “Using import Excel”
- Click “Import from excel”. If user don’t know template click “tại đây” to download.
- If FMS cannot read file show error message MSG16. Else, display data to Preview table.
- Click “Submit”. FMS validate data, if it is invalid show error message MSG16; else show MSG05.

| # | Import Date | Asset Code | Quantity | Reason | References | Action |
|---|-------------|---------------------------|----------|----------|---|--------|
| 1 | 16/08/2022 | Bóng đèn LED-HTC5.8D00001 | 1 | Thay thế | http://demofmssite3000/detail/trouble/8_20220812_20220812_A6 | |
| 2 | 16/08/2022 | Invalid Asset | 1 | Thay thế | http://demofmssite3000/detail/trouble/714 | |
| 3 | 16/08/2022 | Bóng đèn LED-HTC5.8D00001 | 0 | Thay thế | Invalid URL | |

Figure 3.5.4.1 UI_Export Asset/ Using import Excel

1.1.20. Import/ Export warehouse history

- In navigation menu, hover on “Warehouses”, click Import/ Export History
- FMS select data from database and show this to table
- If user input data to search tab and click “Search”, FMS select data by filter and reload table view
- If user click “Export”, FMS return report in Excel template format

Figure 3.5.5.1 UI_Warehouse History

1.1.21. Warehouse remaining

- In navigation menu, hover on “Warehouses”, click “Remaining Asset”
- FMS select data from database and show this to table
- If user input data to search tab and click “Search”, FMS select data by filter and reload table view

Figure 3.5.6.1 UI_Warehouse Remaining

1.1.22. Customize warehouse

- In navigation menu, hover on “Warehouses”, click “Customize warehouse standards”
- FMS select data from database and show this to table
- Input min value in table
- Click “Save”. If is valid number, FMS sync data. Else show error message.

| # | Asset Category | Asset Code | Asset Name | Min quantity | Action | Note |
|---|----------------|-----------------|--------------|--------------|--------|---------------------------------|
| 1 | Hệ thống điện | TBD.HTCS.TB0008 | Thiết bị 8 | 1 | ✓ | Last update by thanhnhanh140350 |
| 2 | Hệ thống điện | TBD.HTCS.TB0009 | Thiết bị 9 | 5 | ✓ | Last update by nhattinhe140280 |
| 3 | Hệ thống điện | TBD.HTCS.BD0001 | Bóng đèn 25W | 0 | ✓ | |
| 4 | Hệ thống điện | TBD.HTCS.TB0007 | Thiết bị 7 | 0 | ✓ | |

Figure 3.5.7.1 UI_Warehouse Customize Standards

3.6 Map

1.1.23. View map

- In navigation menu, hover on “Map”, click “View map”
- Fill search data
- Click “Search”
- FMS select data and show in map.

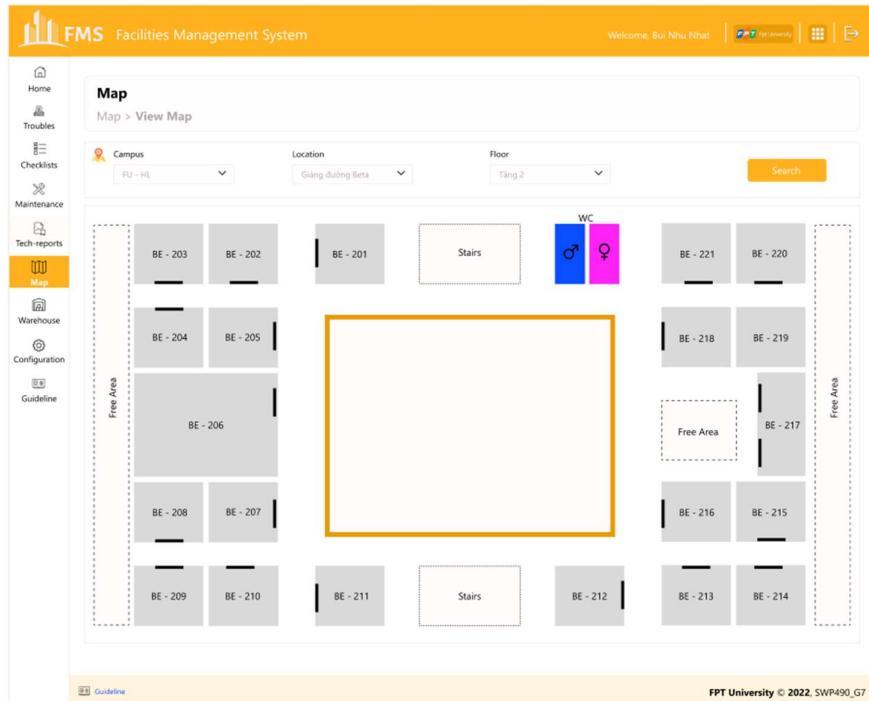


Figure 3.6.1.1 UI_Map View

1.1.24. Customize map

- In navigation menu, hover on “Map”, click “View map”
- Fill search data
- Click “Search”
- FMS select data and show in map.
- Configuration map using right menu
- Click “Save all”
- FMS sync data to database

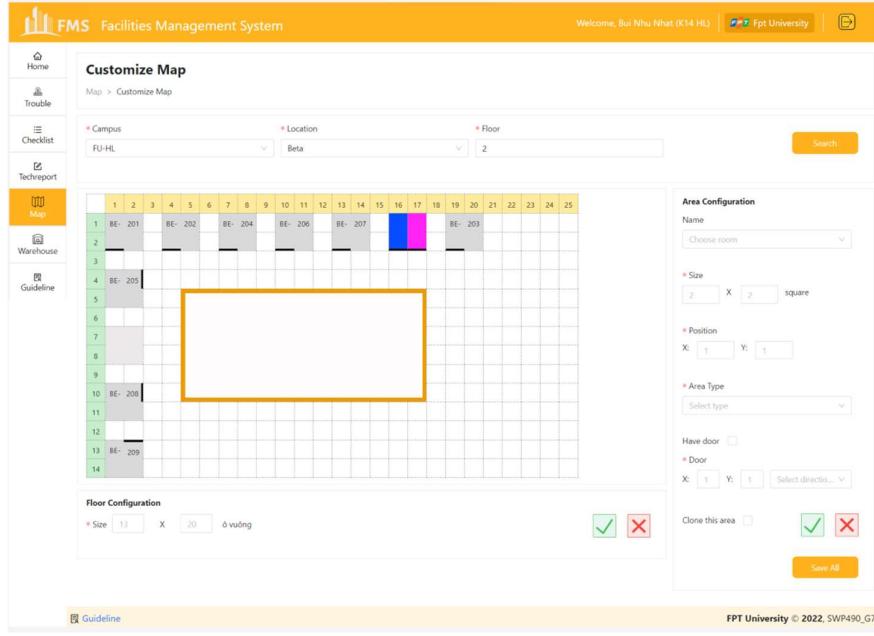


Figure 3.6.2.1 UI_Map Customize

3.7 Configuration Management

1.1.25. Configuration Campuses

- In navigation menu, hover on “Configuration”, click “Campuses”
- FMS select data and fill to table
- Click “Create”/ “Edit” button
- Show Create/ Update popup
- User fill data in form
- Click “Submit”
- Validate data, if data is invalid, show error message MSG03. Else FMS sync data to save on database, close popup and show message MSG05.
- FMS sync data reload table

| Configuration Campus | | | | | |
|----------------------|-------------|--|-------------|-------------------------------------|-------------------------------------|
| Campus Name | | | | | |
| No | Campus Name | Address | Telephone | In service | Action |
| 1 | FU-HL | Km29, Thạch Hòa, Thạch Thất, Hà Nội | 02473005588 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2 | FU-HCM | Lô E2a-7, Đường D1, D. D1, Long Thành Mỹ, Thành Phố Thủ Đức, Thành phố Hồ Chí Minh | 02873005588 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3 | FU-CT | 600, đường Nguyễn Văn Cừ (nối dài), phường An Bình, quận Ninh Kiều, TP. Cần Thơ | 02923601996 | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4 | FU-DN | Khu đô thị FPT City, Ngũ Hành Sơn, Đà Nẵng | 02455566632 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |

Figure 3.7.1.1 UI_Configuration Campus

1.1.26. Configuration Locations

- In navigation menu, hover on “Configuration”, click “Locations”
- FMS select data and fill to table
- Click “Create”/ “Edit” button
- Show Create/ Update popup
- User fill data in form
- Click “Submit”
- Validate data, if data is invalid, show error message MSG03. Else FMS sync data to save on database, close popup and show message MSG05.
- FMS sync data reload table

| No. | Campus | Location Code | Location Name | Location Full Name | In service | Action |
|-----|--------|---------------|---------------|--------------------|-------------------------------------|--------------------------|
| 1 | FU-HL | AL | Alpha | Giảng đường Alpha | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 2 | FU-HL | BE | Beta | Giảng đường Beta | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3 | FU-HL | DE | Delta | Giảng đường Delta | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 4 | FU-HL | DormA | Dorm A | Kr.túc xã A | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 5 | FU-HL | GA | Gamma | Giảng đường Gamma | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Figure 3.7.2.1 UI_Configuration Locations

1.1.27. Configuration Areas/ Rooms

- In navigation menu, hover on “Configuration”, click “Areas/ Rooms”
- FMS select data and fill to table
- Click “Create”/ “Edit” button
- Show Create/ Update popup
- User fill data in form
- Click “Submit”
- Validate data, if data is invalid, show error message MSG03. Else FMS sync data to save on database, close popup and show message MSG05.
- FMS sync data reload table

| No | Campus | Location code | Area/ Room Code | Area Full Name | In service | Action | QR code |
|----|--------|---------------|-----------------|----------------------------|-------------------------------------|-------------------------------------|---------|
| 1 | FU-HL | AL | AI-201R | Phòng Lab 201R | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 2 | FU-HL | AL | AI-202R | Phòng Lab 202R | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 3 | FU-HL | DE | DEWCM-T1L | Nhà vệ sinh tầng 1 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 4 | FU-HL | DE | DE | Phòng DE-101 tòa nhà Delta | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |

Figure 3.7.3.1 UI_Configuration Locations

1.1.28. Configuration Users

- In navigation menu, hover on “Configuration”, click “Users”
- FMS select data and fill to table
- Click “Create”/ “Edit” button
- Show Create/ Update popup
- User fill data in form
- Click “Submit”
- Validate data, if data is invalid, show error message MSG03. Else FMS sync data to save on database, close popup and show message MSG05.
- FMS sync data reload table

| No | Campus | User Name | Email | Full Name | Role | Active | Action |
|----|--------|----------------|---------------------------|-----------------|------------|-------------------------------------|--------|
| 1 | FU-HL | bontv | bontv@fpt.edu.vn | | Admin | <input checked="" type="checkbox"/> | |
| 2 | FU-HL | dungcthe130522 | dungcthe130522@fpt.edu.vn | Chu Tiến Dũng | Technician | <input checked="" type="checkbox"/> | |
| 3 | FU-HL | hanthe140104 | hanthe140104@fpt.edu.vn | | Admin | <input checked="" type="checkbox"/> | |
| 4 | FU-HL | hungthe130277 | hungthe130277@fpt.edu.vn | Vũ Thành Hưng | Technician | <input checked="" type="checkbox"/> | |
| 5 | FU-HL | minhhnhe141686 | minhhnhe141686@fpt.edu.vn | Hoàng Ngọc Minh | Manager | <input checked="" type="checkbox"/> | |
| 6 | FU-HL | nhatbnhe140280 | nhatbnhe140280@fpt.edu.vn | | Admin | <input checked="" type="checkbox"/> | |

Figure 3.7.4.1 UI_Configuration User

1.1.29. Configuration Categories

- In navigation menu, hover on “Configuration”, click “Categories”
- FMS select data and fill to table

- Click “Create”/ “Edit” button
- Show Create/ Update popup
- User fill data in form
- Click “Submit”
- Validate data, if data is invalid, show error message MSG03. Else FMS sync data to save on database, close popup and show message MSG05.
- FMS sync data reload table

Figure 3.7.5.1 UI_ Configuration Categories

1.1.30. Configuration Assets

- In navigation menu, hover on “Configuration”, click “Assets”
- FMS select data and fill to table
- Click “Create”/ “Edit” button
- Show Create/ Update popup
- User fill data in form
- Click “Submit”
- Validate data, if data is invalid, show error message MSG03. Else FMS sync data to save on database, close popup and show message MSG05.
- FMS sync data reload table

Figure 3.7.6.1 UI_ Configuration Assets

