VIET NAM NATIONAL UNIVERSITY - HO CHI MINH CITY
UNIVERSITY OF TECHNOLOGY
FACULTY OF COMPUTER SCIENCE AND ENGINEERING

Software Engineering (CO3001)

URBAN WASTE COLLECTION AID - UWC 2.0

Task 1: Requirement elicitation

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Ho Chi Minh City, September - 2022

Contents

1 Introduction To Project

Urban waste management is one of several significant problems faced by many countries in the world and thus considered one of the important points to be improved in Sustainable Development Goal (SDG) 11: sustainable cities and communities and SDG 6: clean water and sanitation. Particular attention is given to developing countries that continue to prioritize development and economic growth. In urban context, solid waste management is costly and ineffective. Improvement of waste collection and management is emphasized by governments and organizations for positive impacts on cities, societies and environments.

Waste collection is often designated to an organization that provides professional waste management services. Organization X is contracted to develop an information management system called UWC 2.0 in order to improve efficiency of garbage collection of Service provider Y.

In this report, we just represent task 1 of the assignment, including 3 inner tasks:

- Task 1.1: Identify the context of this project. Who are relevant stakeholders? What are their current needs? What could be their current problem? In your opinion, what benefits UWC 2.0 will be for each stakeholder?
- Task 1.2: Describe all functional and non-functional requirements that can be inferred from the project description. Draw a use-case diagram for the whole system.
- Task 1.3: For the Task assignment module, draw its use-case diagram and describe the use-case using a table format.

2 Task Assignment

Nguyễn Minh Khỏe	Define Context, stakeholders and scope of this project.
Nguyễn Tấn Thanh	Define Functional, non-functional requirement.
Lê Bảo Quốc	Draw "Login" use-case diagram and describe the use-case using a table format
Lê Ngọc Hòa	Draw "Dashboard" use-case diagram and describe "Dashboard" use-case using a table format
Lữ Hoàng Anh	Draw "Coordinate" use-case diagram and describe the use-case using a table format
Cù Thanh Bằng	Draw "Communication" use-case diagram and describe the use-case using a table format
Nguyễn Thanh Sang	Draw "Whole System" use-case diagram and write report

3 Context, stakeholders and scope of this project.

Task 1.1: Identify the context of this project. Who are relevant stakeholders? What are their current needs? What could be their current problem? In your opinion, what benefits UWC 2.0 will be for each stakeholder?

- Context of this project:
  Urban waste management is one of several significant problems faced by many countries in the world and thus considered one of the important points to be improved in Sustainable Development Goal. In urban context, solid waste management is costly and ineffective. Improvement of waste collection and management is emphasized by governments and organizations for positive impacts on cities, societies and environments. Waste collection is often designated to an organization that provides professional waste management services.

  Organization X is contracted to develop an information management system called UWC 2.0 in order to improve efficiency of garbage collection of Service provider Y. The solution will include a Task Management module to sastify the needs of relevant stakeholders and developments from the current system UWC 1.0 with a database.

- Relevant stakeholders of this project are:
  - Service provider Y:
    + Back officers : create calendar, coordinate front janitors and collectors; coordinate calendar (time) and tasks that assigned among janitors; plan which vehicles to use and their routes (monthly).
    + Collectors: drive vehicles and pick up garbage at a MCP. One collector drives one vehicle during his working shift.
    + Janitors : manually collect garbage from MCPs; use trollers to collect garbage in their assigned area and deliver to the MCPs.
  - Organization X : responsible for building and providing the software

- Relevant stakeholders's current needs, problems and benefits:
  - Back officers:
    + Be able to get information of janitors and collectors and their calendar ⇒ more convenient to coordinate their tasks.
    + Be able to get information of vehicles and their technical details ⇒ easily keep track of vehicles' status (weight, capacity, fuel,...) and assign them to janitors and collectors.
    + Get information of the MCPs updated frequently ⇒ easy to keep track of MCPs' capacity → help for coordinating and creating route.

+ Assign vehicles and tasks through the system, create and assign the optimized route for each collector ⇒ more convenient and effective.
+ Be able to send message to collectors and janitors ⇒ quickly notify them important information and/or assign tasks and vehicles to them.

- Collectors and janitors:

+ Have an overview of their work calendar ⇒ easily check the date and time they are required to work and also the task on that date and time.
+ Have a detail view of their task on a daily and weekly basic. Important information displayed in one view ⇒ understand what they have to do and get some crucial note about their task easily + work calendar → they can prepare for their work.
+ communicate with each other and with back officer through real-time message system ⇒ they can discuss about their upcoming work, ask back officer for a rearrangement,...
+ Check in / check out task every day.
+ Get notification when the MCPs are fully loaded ⇒ help for their tasks, get the right time to collect garbage from MCPs.

4 Functional, non-functional requirements and use-case diagram for the whole system.

Task 1.2: Describe all functional and non-functional requirements that can be inferred from the project description. Draw a use-case diagram for the whole system.

4.1 Functional requirements

1. Back officers:
    - Monitor employees (information and work schedule)
    - Monitor vehicles and their technical details (weight, capacity, fuel consumptions, etc)
    - Monitor all MCPs and information about their capacity
    - Assign vehicles to janitors and collectors
    - Assign janitors and collectors to MCPs (task)
    - Create a route for each collector. Assigned route is optimized in term of fuel consumption and travel distance
    - Send message to collectors and janitors
2. Collectors and Janitors:
    - Follow their work calendar and their task on a daily and weekly basic
    - Communicate with other collectors, other janitors and back officers.
    - Check in / check out task every day
    - Get notification about the MCPs if they are fully loaded
    - Export a report about the results of the tasks for the BO monthly.

4.2 Non-functional requirements

1. Security:
    - System information can only be viewed by those authorized to access it.
    - The schedule can be only changed by back officers.
    - Login password is not displayed in all cases (login, register, change password,...)
2. Usability:
    - The system has to be easy to use, simple interface, users can use without instructions. 95% of users can use proficiently on the first trial, its support native language-Vietnamese and can change to English.

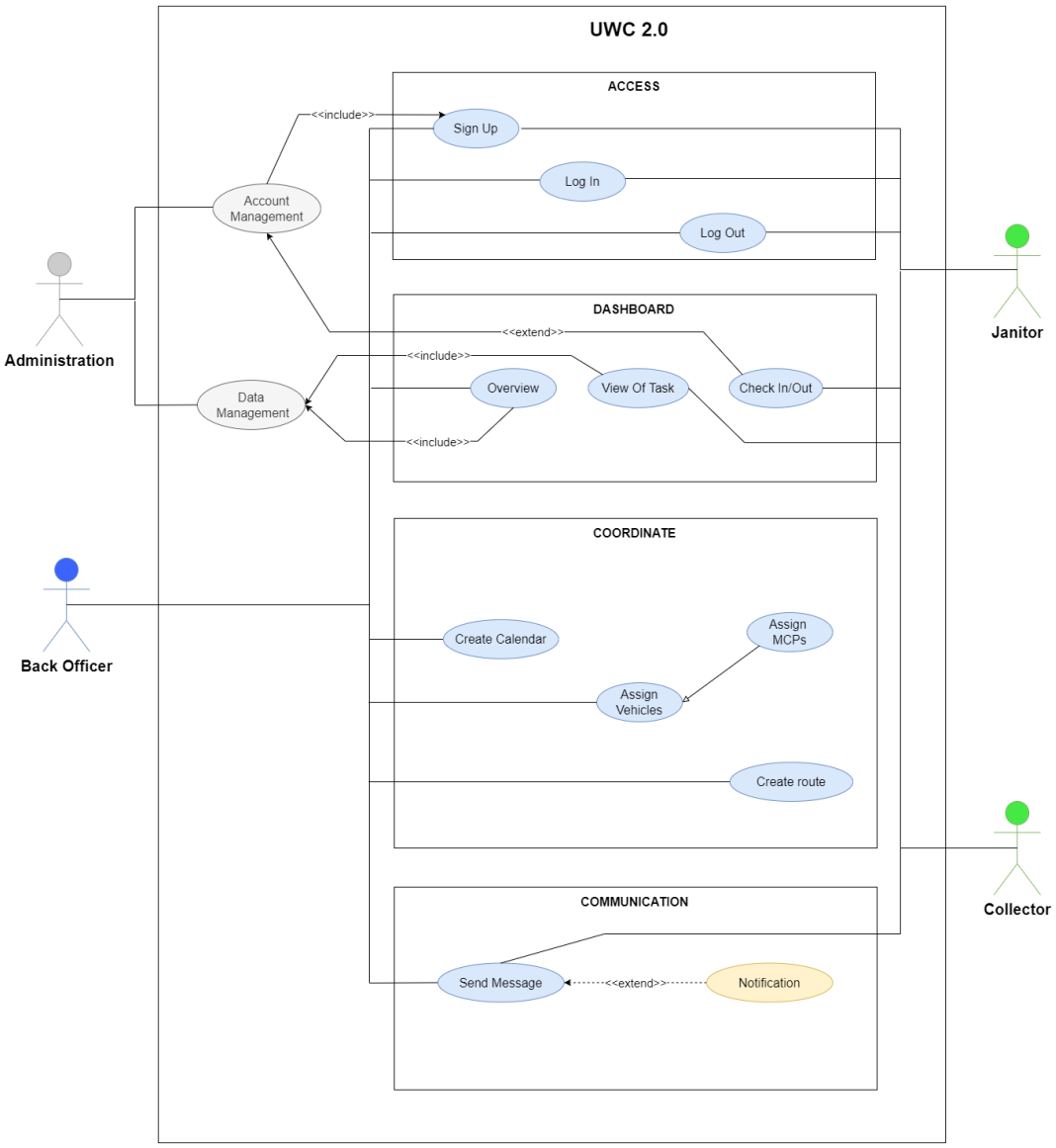
- All important information about janitors and collectors' tasks should be displayed in one view (without scrolling down)
- Information should be updated from MCPs every 15 minutes with the availability of at least 95% of their operating time.
- System interface must be friendly, clear within 1-meter visibility.
- People with vision problems such as color blindness can also view information. (Depend on choosing theme color).
- Can schedule just one time and know what to do next through daytime automatically.

3. Availability:
   - During working hours.
   - In maintaining time, only system managers can access.
4. Efficiency/Performance:
   - The system can support all relenvant stakeholders access and using at the such time. (at least 100).
   - Saving cost but efficiency.
   - System starting takes less than 20 seconds.
   - The maximum response time is 2 seconds. (Actions for searching, adding, deleting)
   - Time to update the schedule is no more than 1 minute (When the back officers edit the schedule).
   - The messages in message system should be communicated in a real-time manner with delay less than 1 second.
   - System can handle real-time data from at least 1000 MCPs at the moment and 10.000 MCPs in five years.
5. Flexibility:
   - Application of the system can be used on many different types of devices like smartphones, tablets and computers just by connecting to the ỉnternet.
   - Update and develop from an extisting system UWC 1.0.
   - Support to get feedback from users to improve this system.
6. Maintainability:
   - The system can be operated stably continuously for 24 hours without maintenance.
   - The system has to be easy to maintain and update.

7. Scalability:

   - Support more languages (English,...)
   - Increasing number of users, MCPs and operation at the same time.
   - Wide working area

4.3 Whole System's Use-case Diagram



5 Detailed use-case diagram and use-case with table format.

Task 1.3: Choose one specific feature, i.e. access system, dashboard, coordinate, communicate. Draw its use-case diagram and describe the use-case using a table format.

5.1 Access

5.1.1 Use-case diagram

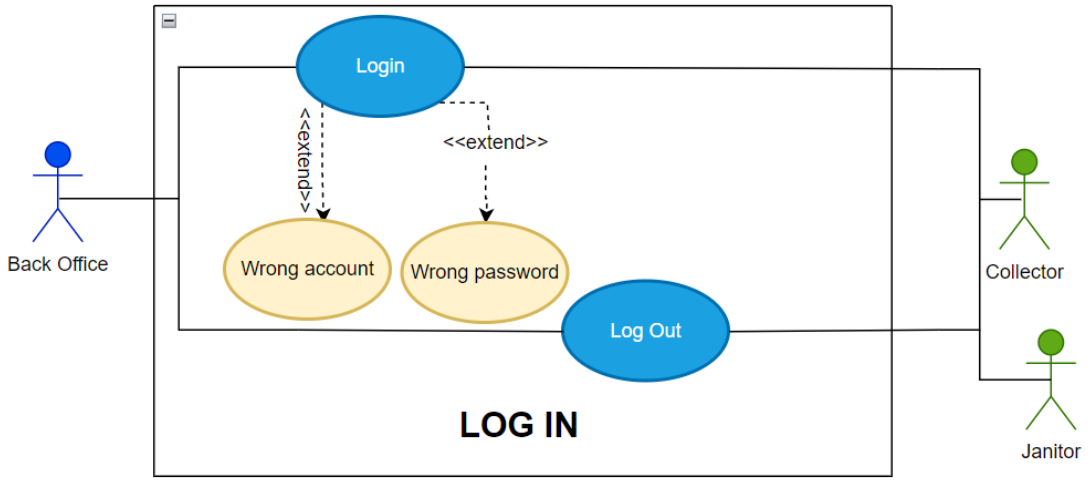


Figure 1: The use-case of access system

5.1.2 Format Table

Use-case name	Acess
Actor	Managers and staffs
Description	Log in account in the system and for use service
Precondition	Clerk has logged into the system Must have an account created by the manager and they have internet connection
Postcondition	Can interact with all of their granted function when logged in

Normal flow	**A. Access to system** 1. Access the website for employees 2. The web page displays the menu 3. Can interact with these function 4. The system will read the database take the information of the employee out 5. The website shows the items ordered and the total amount 6. These information will be shown under a table format. 7. The system confirm that customer has paid succesfully and show the order number 8. System call login success
Alternative flow	**Wrong log in information** **Case 1:** Wrong account, a pop-up will show up and notify that they have typed in wrong account **Case 2:** Wrong password, a pop-up will show up and notify that they have typed in wrong password
Exception flow	**None**

5.2 Dashboard

5.2.1 Use-case diagram

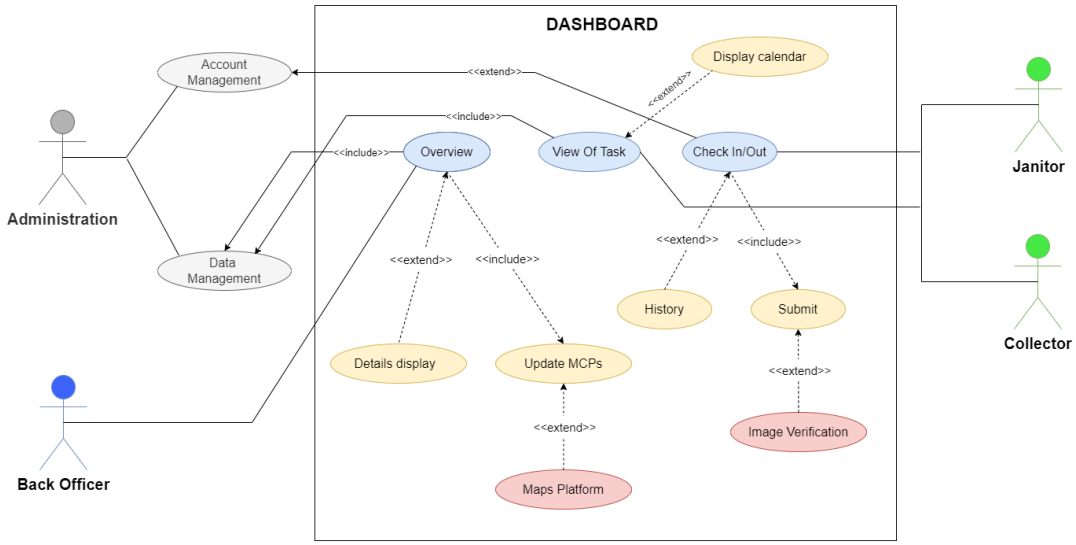


Figure 2: The use-case of dashboard

5.2.2 Format Table

Use-case name	Dashboard
Actor	Back officers, collectors and janitors
Description	1. Provide necessary information for Back officers to assign tasks and Collectors and janitors to understand their work. 2. Overview (Back officers) 3. View of tasks (Collectors, janitors) 4. Check-in/out (Collectors, janitors)
Precondition	They have to log into the system successful
Postcondition	None
Normal flow	**A. Overview (Back officers)** 1. Display overview of people, vehicles and MCPs on screen. 2. They can click the button to see the detailed information.

	B. View of tasks (Collectors, janitors) 1. Display their task on a daily and weekly on screen. 2. They can click the button to see their work calendar. **C. Check-in/out (Collectors, janitors)** 1. Open the "Attendance" Tab. 2. Click the "Submit" button to confirm attendance. 3. Add the image to complete their job. 4. Update their work day
Alternative flow	A,B none C. Send the message to back officers to confirm attendance.
Exception flow	None

5.3 Coordinate

5.3.1 Use-case diagram

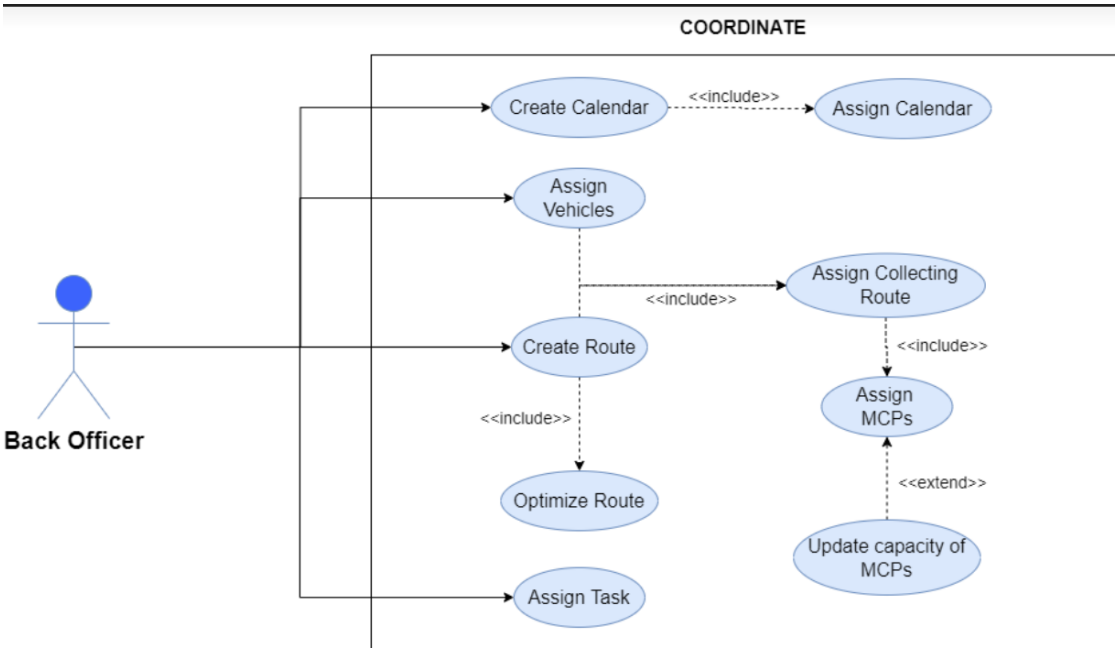


Figure 3: The use-case of coordinate

5.3.2 Format Table

Use-case name	Coordinate
Actor	Back officers
Description	Back officers coordinate Janitors and Collectors through the system.
Precondition	Back officers have special accounts for managing work.
Postcondition	Back officers successfully assign calendar, work and route to Collectors and Janitors
Normal flow	**Back officers manage the work** 1. Create a calendar and task. 2. Create and optimize the collecting route. 3. Assign calendar and task to Janitors and Collectors. 4. Assign optimized routes, MCPs and vehicles to Collectors.
Alternative flow	None.

Exception flow	Back officers notify Janitors and Collectors if MCPs are fully loaded.

5.4 Communication

5.4.1 Use-case diagram

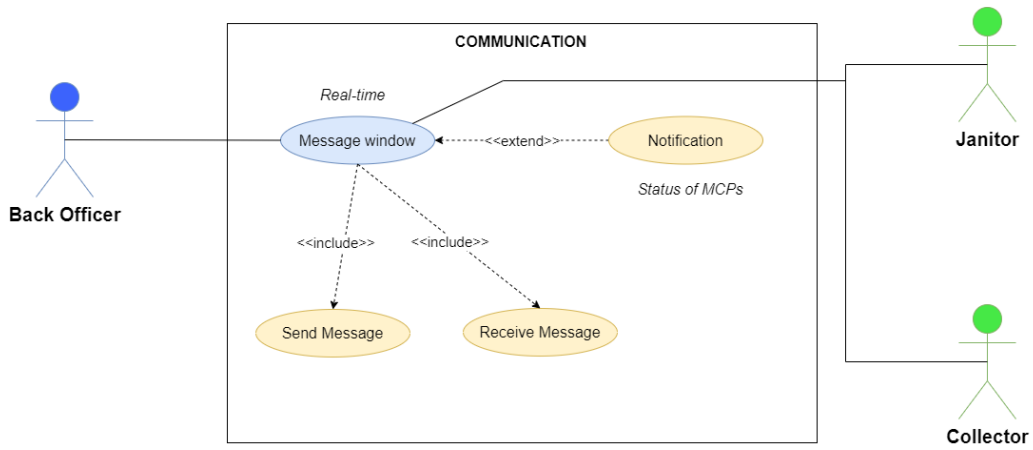


Figure 4: The use-case of communication

5.4.2 Format Table

Use-case name	Communication
Actor	Back officers, Collectors and janitors
Description	Communicate between collectors, janitors and back officers. 1. Send messages 2. Notify about the MCPs
Precondition	1. A none 2. Allow access permission on their phone
Postcondition	None
Normal flow	**A. Send messages** 1. Open the “Messages” Tab 2. Enter text and click the arrow symbol to start the conversation. 3. The other will be notified when receiving the message. **B. Notify about the MCPs** 1. Update the status of MCPs.

	2. If they are fully loaded, connected the collectors and janitors immediately. 3. Push notification or play sound
Alternative flow	None.
Exception flow	1. The messages are delayed. 2. MCPs don't update status exactly 3. Can't access notification permission

6 Summary

Throughout this project module, my group have finally completed almost stages in initial foundation of UWC 2.0 such as defined requirement like functional and non-functional, draw use-case diagram to describe normal flow and basic constraints, exception.... Then we go on modeling system and designing architecture

In detail, team have drawn some diagram to clearly describe transactions on running and visualize the structure of system. This is the most precondition to implementation stage.

In this process, our members almost doing well their job from preparing themselves to coordinating together. Each mission is clear and flexible, ensuring all members can understand this project module well also bring together a good result.

After this project module, we learn a lots about how to use diagram to draw use case, how to describe a table format, improve our collecting data skill also teamwork skill. Thanks to this project we can approach the reality needs in environment problem.

Finally, we seriously thank you about your support, answering our question and your orientation for team to do well this project module.