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SOFTWARE ENGINEERING

GROUP NAME: Do something bro

URBAN WASTE COLLECTION AID - UWC 2.0

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Ho Chi Minh, 2/2023

1. Introduction

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

2. Requirement elicitation

2.1. Task 1.1

Context:

With the strong increase in population and the rapid development of various production industries in recent times, on the one hand, it has driven the economic and social development of the country, while on the other hand it has increased the demand for consumer goods, raw materials, energy, and also rapidly increased the amount of solid waste generated. Solid waste has been increasing rapidly in quantity, and with increasingly complex components, it has posed difficulties for management and disposal. In addition, solid waste management in our country has not been applied using comprehensive management methods, and has not given priority to reducing, reusing, recycling and recovering energy from waste, resulting in high amounts of buried solid waste, non-saving land, and in many areas, solid waste buried in temporary landfills, open spaces, is already and still a source of environmental pollution.

Stakeholders:

Back officers

Collectors

Janitors

Current needs:

- Back officers:

  Check and change details about workers tasks, route.

  Create a plan, route for workers, assign the tasks.

  Edit route, change plan if necessary.

  Get data about their resources and equipment.

  Manage vehicles and technical details (weight, capacity, fuel consumptions, etc).

  Updating every 15 minutes about the status of MCPs.

  able to send message to collectors and janitors.

- Collectors and Janitors:

Have an overview of their work calendar.

Have a detail view of their task on a daily and weekly basic.

All important information should be displayed in one view (without scrolling down).

Be able to communicate with collectors, other janitors and back officers.

The messages should be communicated in a real-time manner with delay less than 1 second.

Check in / check out task every day 5. Be notified about the MCPs if they are fully loaded.

Current problems:

Having a high number of employees poses a challenge for back-office staff to effectively manage and distribute the human resource. Furthermore, inadequate management practices result in a significant loss of both labor and equipment.

The inefficient route taken by the driver leads to a waste of time and fuel and negatively impacts the work's advancement.

The insufficient communication among staff members and the delayed updates of MCPs hinder the efficient execution of work processes.

Benefits of UWC 2.0:

Easy to manage workers and their resources.

Intuitive statistics, easy to view and categorize about work performance.

All in one app provides them to connect to the others faster with lower latency by various methods (call via app, via phone numbers, messages).

Including Google Maps and a new engine to find out the best way for their route to reduce both time and fuel.

Integrating a calculating engine and tracking system to predict the remaining time that collectors arrive.

Notification classification makes it easy for users to reach.

2.2. Task 1.2

1. Functional Requirements:

Back officer:

- Get a general understanding of the work schedules of janitors and collectors.
- Acquire information about the vehicles, including weight, capacity, fuel consumption, etc.

- Have a complete understanding of all MCPs, including capacity, which should be updated every 15 minutes with a minimum of 95% operational availability.
- Allocate vehicles to janitors and collectors.
- Assign tasks to janitors and collectors at MCPs.
- Plan the most efficient route for each collector, taking into consideration fuel consumption and travel distance.
- Ability to communicate with collectors and janitors through messages.

Collector and janitor:

- Get a comprehensive understanding of the work schedule.
- Have a comprehensive view of daily and weekly tasks, with all important information displayed in one view without the need to scroll.
- Ability to communicate in real-time with collectors, other janitors, and back-end officers, with a delay of less than 1 second.
- Perform daily check-in/check-out procedures.
- Receive notifications when MCPs are fully loaded.

2. Non-functional Requirements:

- UWC 2.0 should incorporate the database from the original version.
- The Task Management should be inter-operable with the UWC 1.0 as much as possible.
- UWC 2.0 should be a highly efficient application that can run on a variety of mobile devices, tablets, and computers, and operate smoothly across multiple platforms.
- Janitors and Collectors should have access to all crucial information displayed on a single page for ease of use.
- The response time for messages sent through UWC 2.0 should be less than 1 second.
- The system must be equipped to process real-time data from a minimum of 1000 MCPs at once, with the ability to handle 10,000 MCPs within 5 years.
- The UWC 2.0 interface should be in Vietnamese.

3. The use case diagram for the system

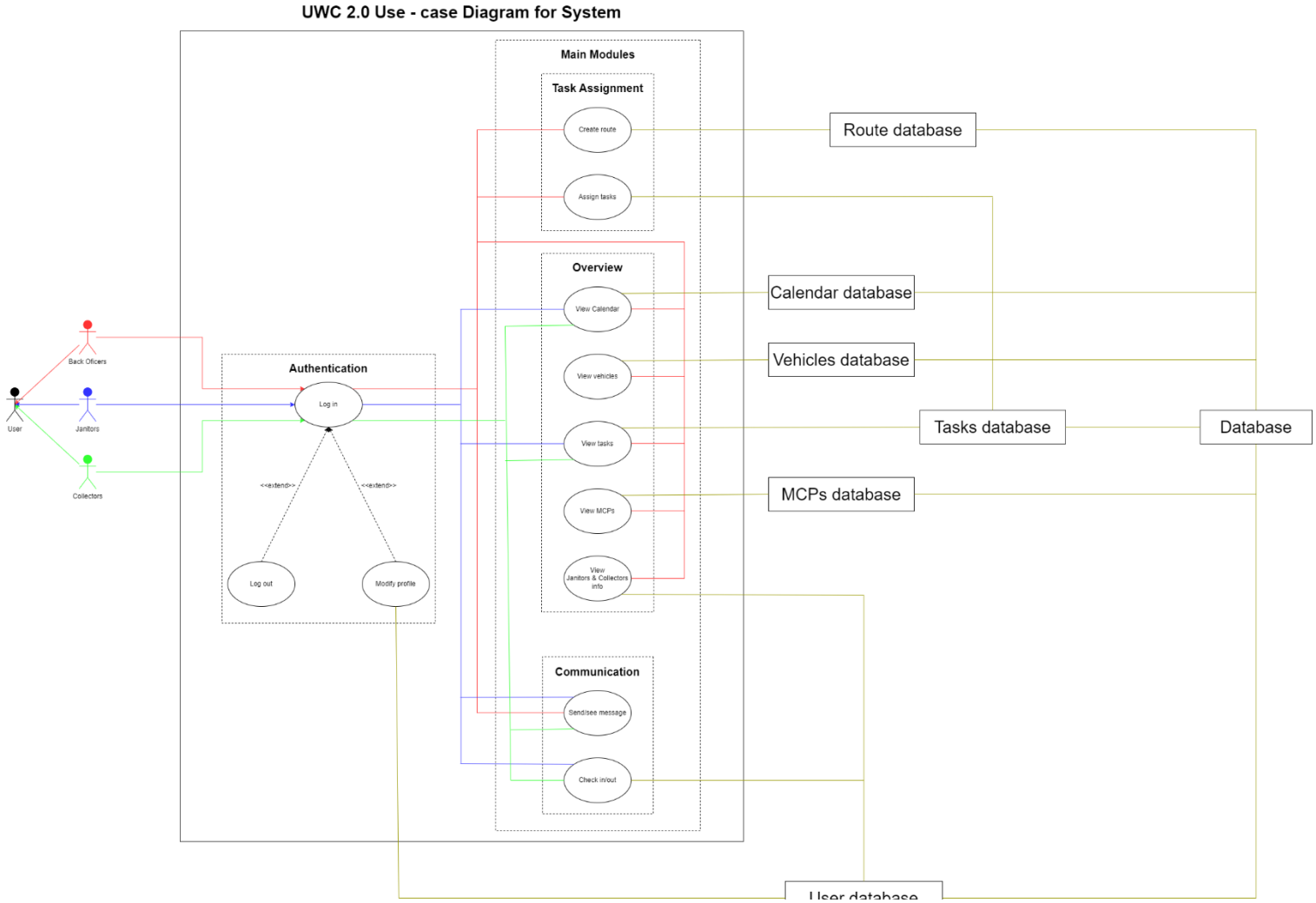

Figure 1: Use case diagram for the whole system

Task 1.3

The use case diagram for the Task Assignment Module:

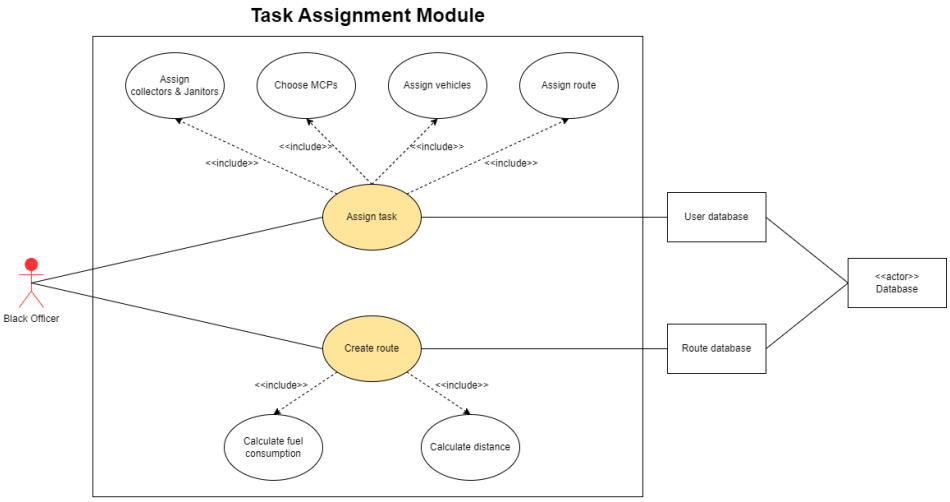

Figure 2: Use case diagram for Task Assignment Module

Back officers assign task:

Use Case ID Use Case Name	1 Assign task
Use Case Overview	Back officers assign tasks for collectors and janitors
Actors	Back officers
Pre-conditions	Back officers have to be logged in to the system.
Post-conditions	Back officers are responsible for making decisions and selecting from the available collectors, janitors, MCPs, vehicles and routes.
Normal flow	0. Use case begins when back officers click on “Assign task”. 1. The system will ask the user to fill in the necessary information: • Collectors, Janitors • MCPs • Vehicles • Route 2. Users click on the “create” button.
Exception flow	None

SBack officers create route:

Use Case ID Use Case Name	2 Create route
Use Case Overview	Back officers create route for janitors and collectors
Actors	Back officers
Pre-conditions	Back officers have previously calculated fuel consumption and distances.
Post-conditions	A route will be successfully established.
Normal flow	0. Use case begins when back officers click on “Create route”. 1. The system displays a form for the user to input new route information • Distance • Fuel consumption 2. Users click on the “create” button.
Exception flow	None