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 2: System modelling

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# 1 Task Assignment

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| Trần Nhân Nghĩa | Draw class diagram and describe it and write report |
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| Nguyễn Trung Kiên | Draw sequence diagram and describe it |
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# 2 Activity diagram
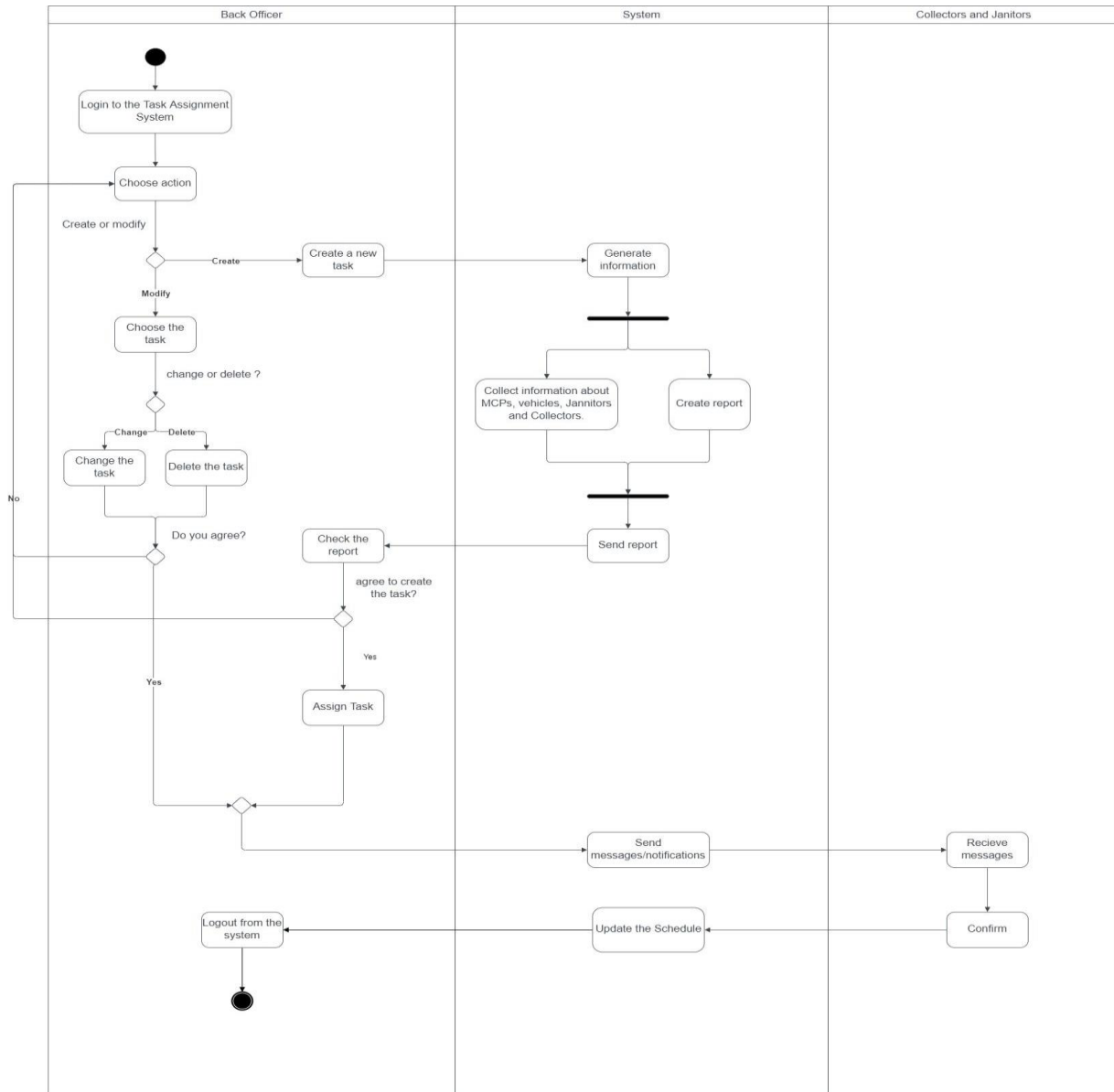


## Link Drive Photo:

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## Description

- Back Officers login to the Task Assignment System

- There will be two options to choose from: create a new task or modify the available tasks.

- If the BO chooses to create a new task:
    o The system will collect information about MCPs, vehicles, Janitors, and Collectors, and then make a report.
    o The system will send the report back to the BO.
    o The BO will check the report.
    o If the BO agrees to assign the task:
        ▪ The system will send messages to the Collectors and Janitors.
        ▪ The Collectors and Janitors will have an overview of the task and then confirm.
    o If the BO disagrees to assign the task, the BO will be sent back to the Choose Action step.

- If the BO chooses to modify an available task.
    o The system will ask the BO to choose the task that needs to be modified.
    o After choosing the task, the system will ask the BO to choose between deleting and changing the task.
    o After that, the system will ask if the BO agrees to delete/change the task.
    o If the BO agrees:
        ▪ The system will send messages to the Collectors and Janitors.
        ▪ The Collectors and Janitors will be notified about the deleted/changed task.
    o If the BO disagrees, the BO will be sent back to the Choose Action step.

- The system will update the schedule.

- The BO can logout.

# 3    Sequence Diagram

## 3.1 Solution for the route planning task

Assume that there is a group of collectors and the MCPs are numbered in sequence.

*Step 1:* Consider groups of MCPs with close observation positions.

*Step 2:* Merge that MCP group into 1 group.

*Step 3:* Perform optimal route segmentation through the sorting algorithm as described below:

|        | MCP1 | MCP2 | MCP3 |
|--------|------|------|------|
| MCP1   | 0    | 1    | 2    |
| MCP2   | 1    | 0    | 3    |
| MCP3   | 2    | 3    | 0    |

Create a distance matrix with MCP1, MCP2, MCP3… as MCP points, and cells in the table are the distance values.

The values "0" are the points that overlap.

- Find all possible routes through preselected points by permutation.

For example, you need to go through 3 points MCP1, MCP2, MCP3

There are 3! = 6 cases to go through the 3 points above:

a) MCP1, MCP2, MCP3
b) MCP1, MCP3, MCP2
c) MCP2, MCP1, MCP3
d) MCP2, MCP3, MCP1
e) MCP3, MCP1, MCP2
f) MCP3, MCP2, MCP1.

- Calculate the distances of all found routes.

Calculating the total of cases

a) 1+3 =4

b) 2+3=5

c) 1+2=3

d) 3+2=5

e) 2+1=3

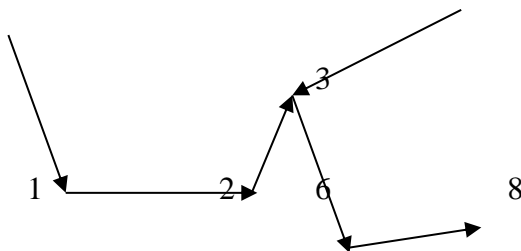f) 3+1=4

- Find the smallest distance.

Choose the case with the smallest distance: c = e = 3.

*Step 4:* If there are MCP locations located close to each other and coincide in the arranged route, priority select the route that saves transportation time and vehicle fuel.

For example, Route 1 passes through MCP1, MCP2, MCP3, and Route 2 passes through MCP6, MCP3, and MCP8.

ROUTE 1                              ROUTE 2



If the total distance calculated in Step 3 for Route 2 is greater than the total distance for Route 1, MCP3 will be assigned to Route 1.

Firstly, helping optimize fuel for vehicles when running Route 1,

Secondly, help to shorten the road that needs to be moved for Route 2.

*Step 5:* In case, there are 2 equally short routes, it will depend on the location of the end point relative to the meeting point.

For example, the end of Route 1 is farther from the meeting point than the Route 2, even if the distance is equally short, the second route will be preferred.

If it is fit for both sides, you can choose 1 or 2.

## 3.2 Draw a sequence diagram
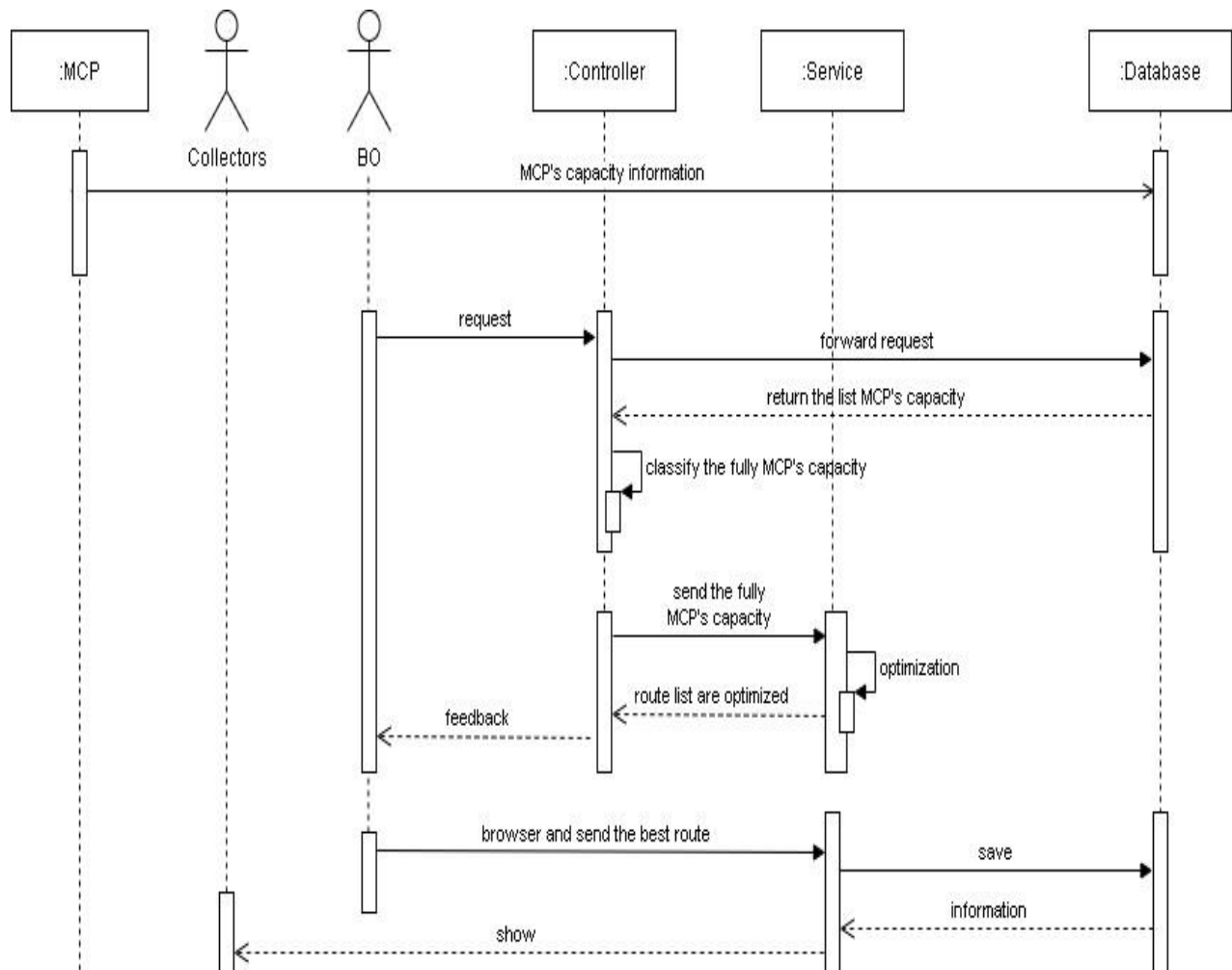
## Description

In this function, Back Officers will through the Controller interface request to receive a list of the MCP's capacity including the MCPs full of garbage and the MCPs that are not full of garbage from the Database. Database will send detailed information back to the MCP to the Controller.

Here, the system will help analyze the types of MCPs full of garbage and continue to make a list of MCPs full of garbage, sending that list to the Service.

At Service, the MCP list will be selected to sort and optimize the routes. Then, the system will send the optimized routes back to the display interface for Back Officers.

Finally, Back Officers through the sent list to save information on the Database and send the notification distribution to the Collectors.

## Link Drive Photo:

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# 4    Class diagram
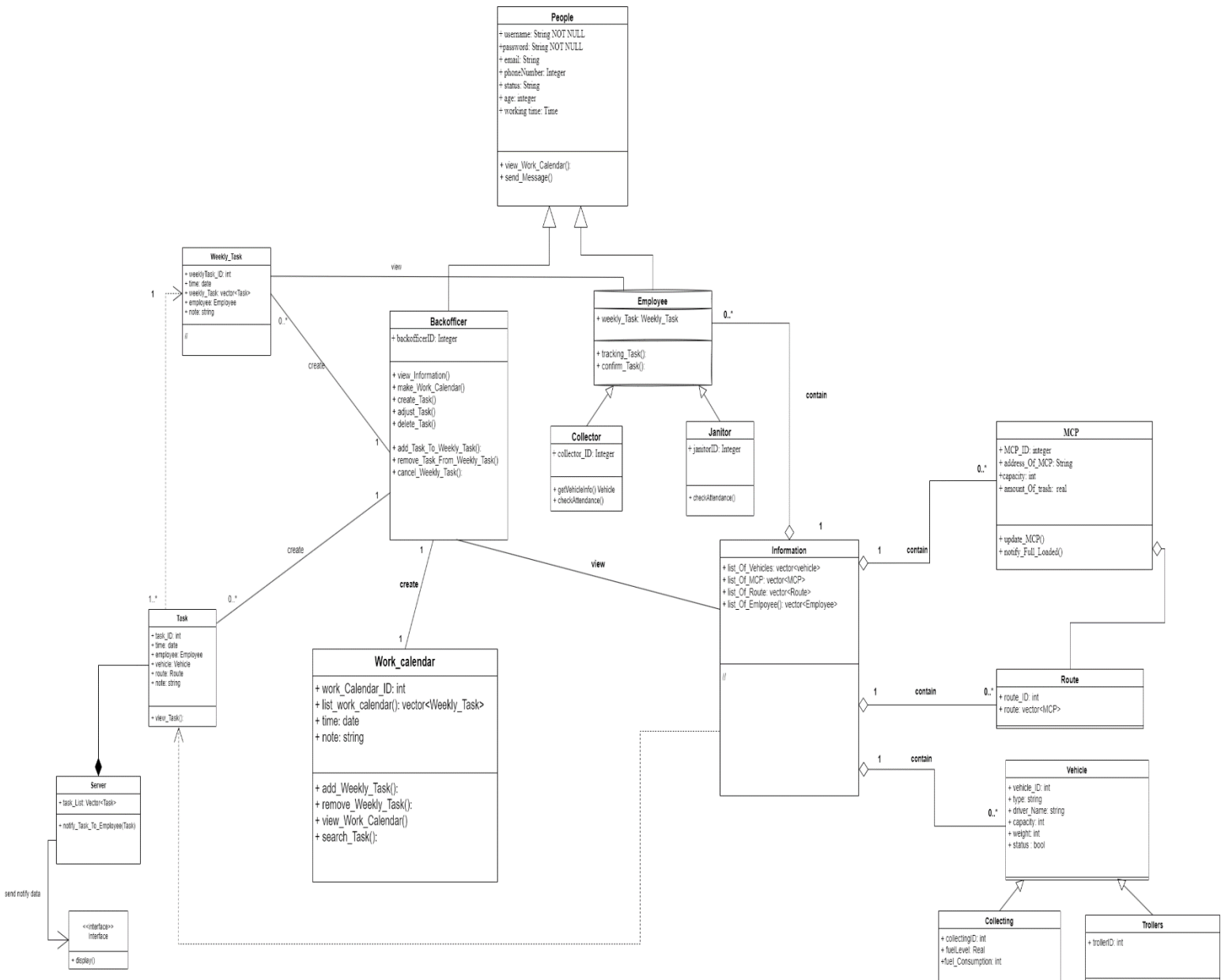
## Description

- Back Officer can create Task for Employee (Collector and Janitor). Back Officers will assign employee, route, vehicle and some note to each task.
- During the task creation process, Back Officer can view detail information of: Employee, Vehicles, Routes, MCP through the information channel to have the most appropriate assignment.
- Employee will confirm the task. If the employee does not confirm,the task will be changed accordingly or deleted.The confirmed tasks of an employee will be added to the list of weekly_Task so that the employee can easy to keep track their work
- Each employee's weekly tasks will be added to Work_Calendar by the Back Officier to get an overview of each employee's work schedule.

## Link Drive Photo:

https://drive.google.com/file/d/1mtLgP12wcVktR3DSKD_BZx9VjeIbwEc6/view?usp=sharing