4   Task 2.1

> ◐ **Question 4.** Draw activity diagrams to capture the business process between systems and the stakeholders in Task Assignment Module.

<div align="center">✔ Solution</div>

4.1   Theoretical basis: Activity diagram

Activity diagram shows the activities in a process and the flow of control from one activity to another.

- The start of a process is indicated by a filled circle, the end by a filled circle inside another circle.

- Rectangles with round corners represent activities, that is, the specific sub-processes that must be carried out.

- Arrows represent the flow from one activity to another, and a solid bar indicates activity coordination.

- When the flow from more than one activity leads to a solid bar, then all of these activities must be complete before progress is possible.

- When the flow from a solid bar leads to a number of activities, these may be executed in parallel.

- Arrows may be annotated with guards (in square brackets) that specify when that flow is followed.

4.2   Activity diagram for Task Assignment module

For the sake of a clearer description of the Task Assignment module, our group divide the Task Assignment module into 4 smaller parts: Task Assignment, Sending Message, Viewing Task and MCP Notification.

Please follow this link for a more detailed view of these diagrams. (This link contains **4 ACTIVITY DIAGRAMS!**)

4.2.1   Activity diagram for Task Assignment
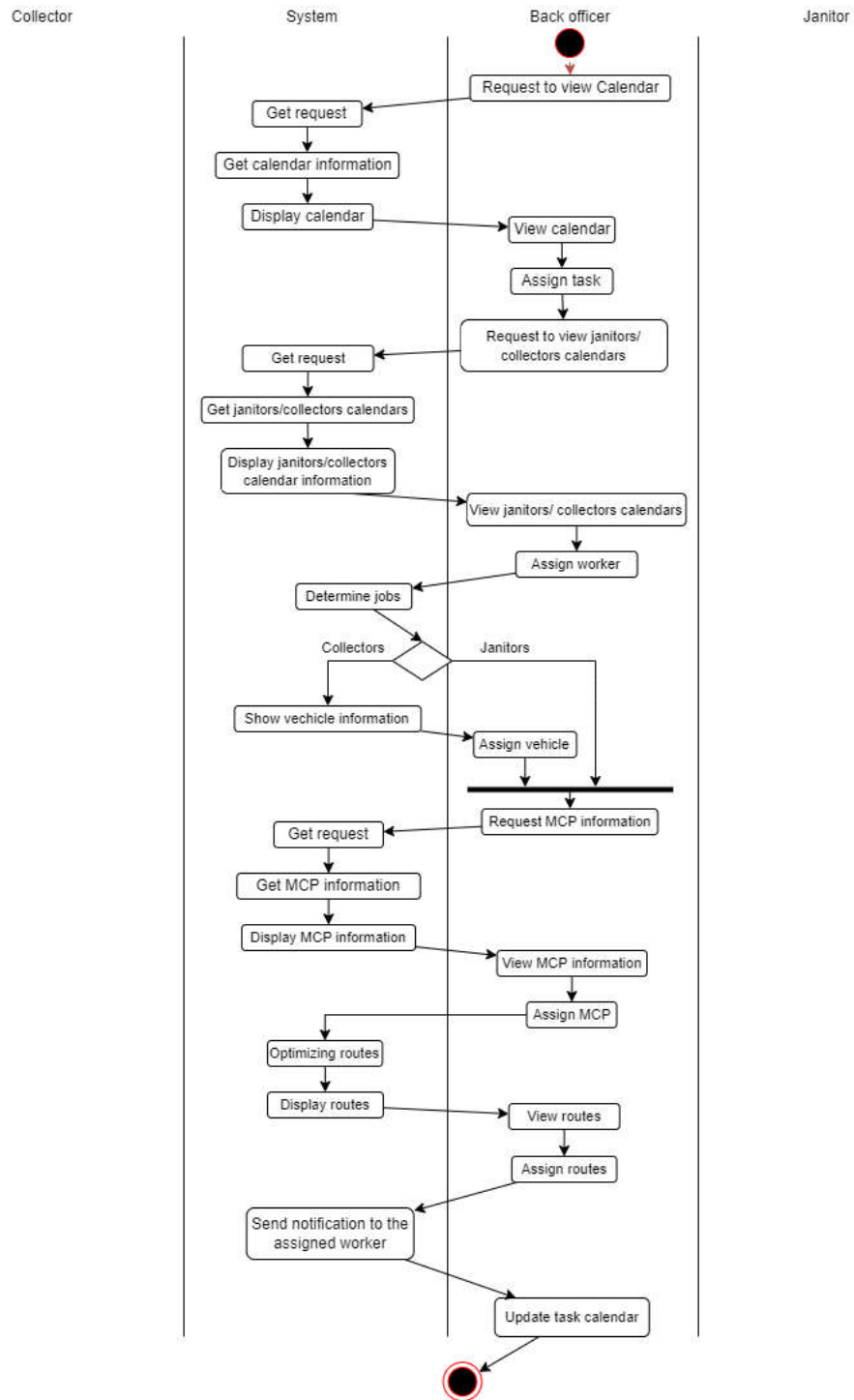
Description:

1. View calendar

   - First, the Back Officer sends a request to view the task calendar (a calendar that is noted with the upcoming tasks).

   - Second, the system receives the request from the Back Officer UI.

   - Third, the system gets the calendar information.

   - Fourth, the system displays the calendar to the Back Officer UI.

   - Fifth, hence, the Back Officer can view the task calendar.

   - Sixth, the Back Officer chooses and assigns a task.

2. View janitors and collectors working shifts

   - Seventh, the Back Officer sends a request to view the janitors and collectors working shifts in that day.

   - Eighth, the system receives the request.

   - Ninth, the system gets the needed information from the database.

   - Tenth, the system displays the information of the janitors and collectors to the Back Officer UI.

   - Eleventh, the Back Officer can view those information.

   - Twelfth, the Back Officer assigns the worker.

3. Assign tasks and vehicles

   - Thirteenth, the system determines whether the worker assigned by the Back Officer is a janitor or a collector.

   - Fourteenth, if he is a collector, then the system will show the available vehicles for the Back Officer to choose.

   - Fifteenth, the Back Officer will assign a vehicle.

4. Assign Major Collecting Points

   - Sixteenth, the Back Officer will send a request to the system to view the available MCP.

   - Seventeenth, the system receives the request.

   - Eighteenth, the system gets the MCP information from the UWC 1.0 Database.

   - Nineteenth, the system displays the available MCP to the Back Officer UI.

   - Twentieth, the Back Officer can view the MCP information.

   - Twenty-first, the Back Officer choose one MCP and assign it to the worker.

5. Assign routes

- Twenty-second, the system will use the shortest path algorithm such as Dijkstra to determine the most optional route.

- Twenty-third, the system will display the route onto the Back Officer UI.

- Twenty-fourth, the Back Officer can see the routes (can be more than one).

- Twenty-fifth, the Back Officer will choose one of the most optimal routes to assign to the janitors and collectors.

- Twenty-sixth, the system will display the assigned task to the assigned worker with corresponding information: vehicle, MCP, route.

- Twenty-seventh, the Back Officer may update the task calendar (cross out the latest assign task).

- Twenty-eighth, the activity diagram reaches the end symbol.

4.2.2 Activity diagram for sending message
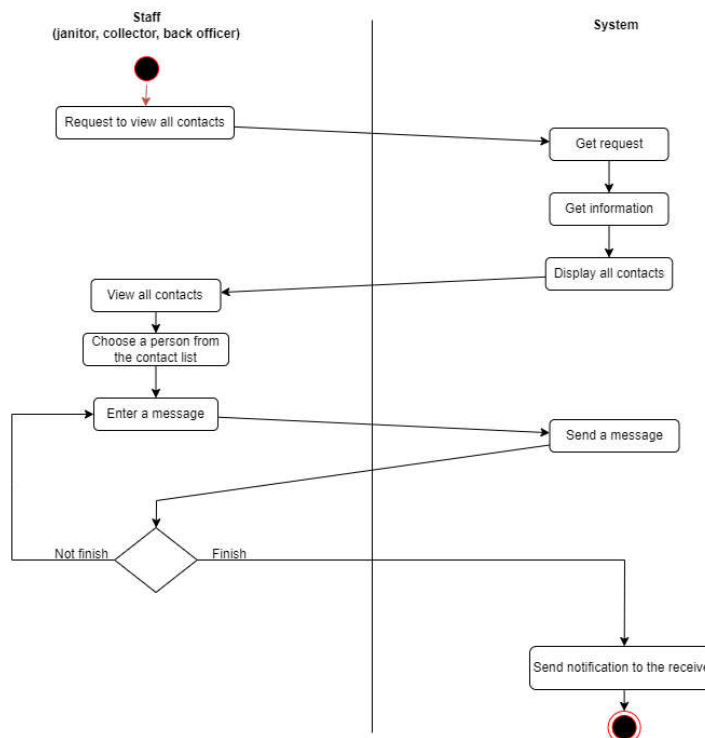
Description:

- First, the staff (either the collector, the janitor or the back officer) request to view all his available contacts.

- Second, the system gets the request.

- Third, the system gets the information from the Database provided.

- Fourth, the system displays all his available contacts onto the user UI.

- Fifth, the staff can now view all his contacts.

- Sixth, the staff then chooses another staff that he wants to communicate.

- Seventh, the staff continuously enters messages until he finishes doing so. The system sends all messages written to the receiver.

- Eighth, the system will also notice the receiver that he has coming messages from another person.

### 4.2.3 Activity diagram for MCP management
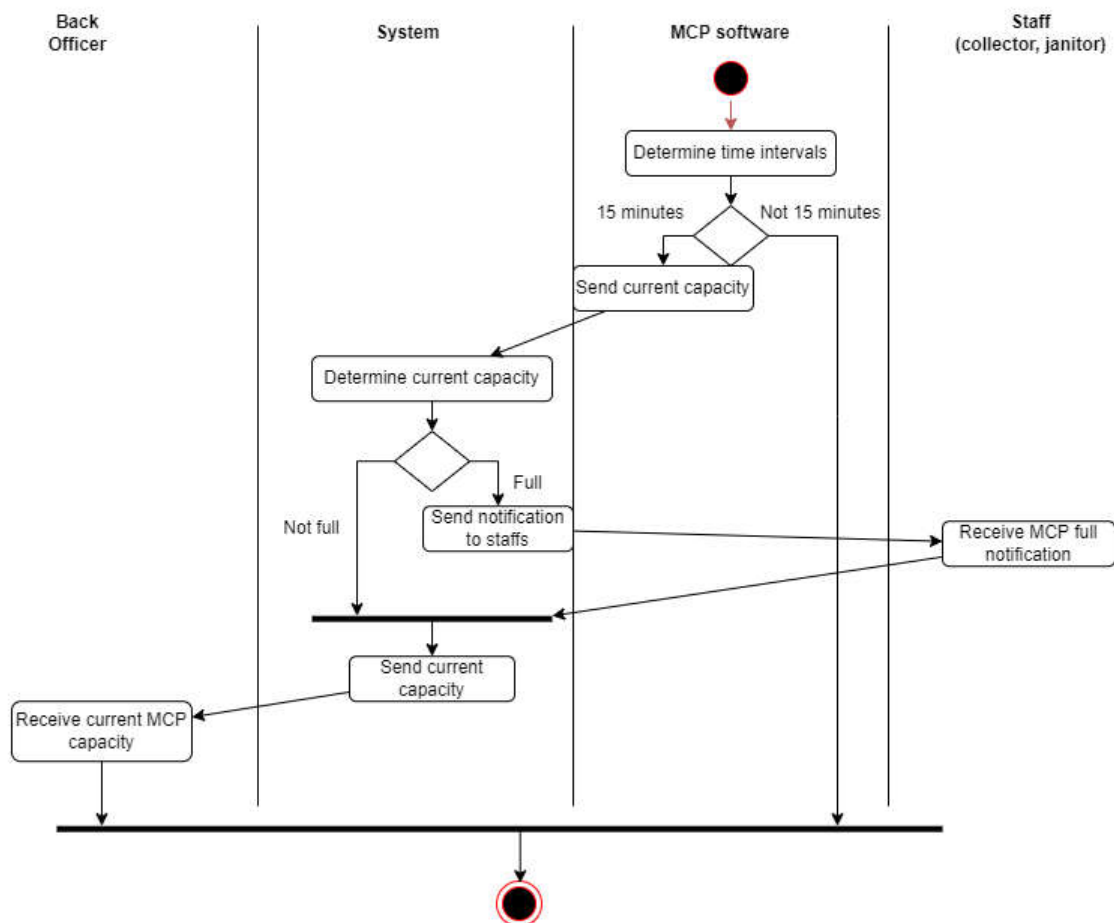
Description:

- First, the embedded software in each MCP will determine the time intervals whether it has been 15 minutes since the last update or not.

- Second, if it is, then the MCP software will send the current capacity to our system. If it is not 15 minutes, stops.

- Third, when our system receive the current capacity, it will determine whether the current capacity is full or not.

- Fourth, if it is not, then skip this step. Otherwise, send the notification to the staff about with the information that the MCP is full.

- Fifth, our system is also responsible for sending the current capacity (whether full or not) to the back officer.

- Sixth, the back officer will receive the current MCP capacity.

4.2.4 Activity diagram for viewing task
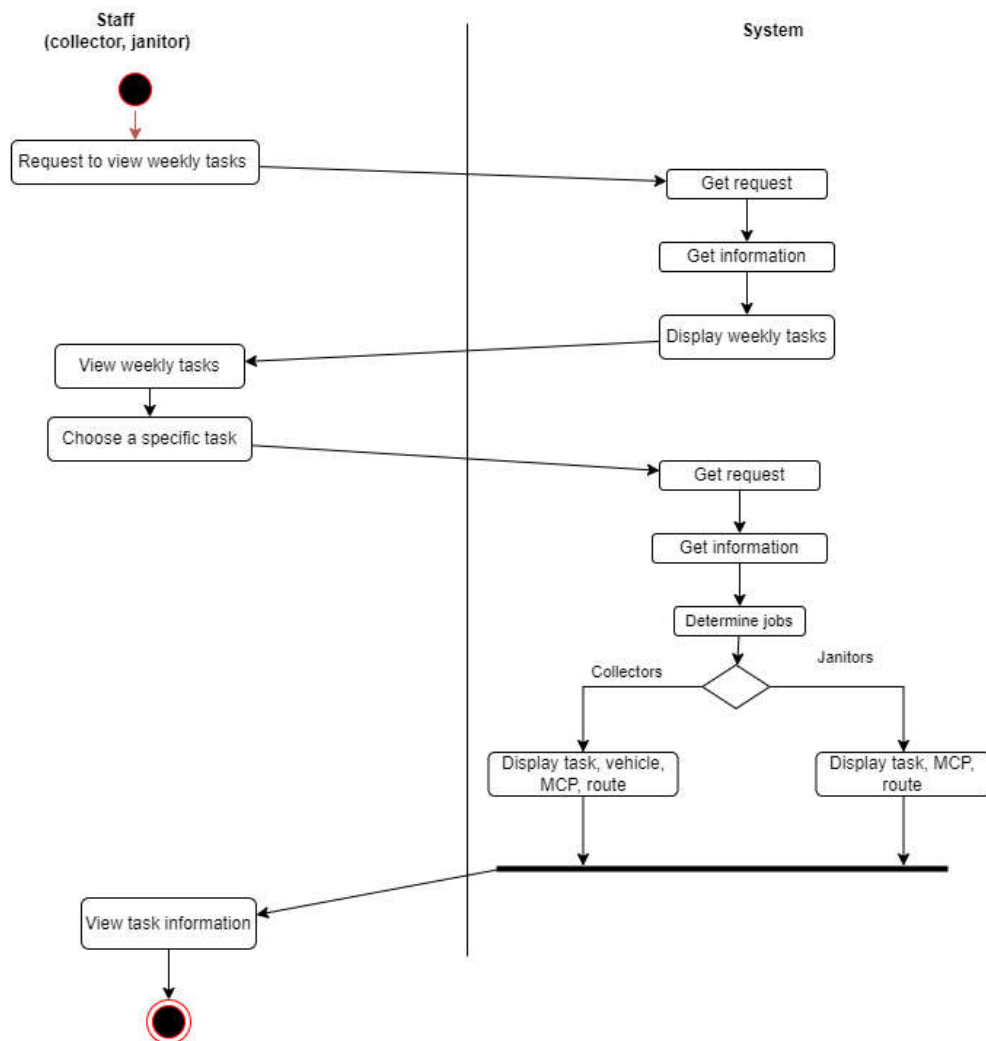
Description:

- First, the staff (either the collector or the janitor) will request to view the weekly tasks.

- Second, the system gets the request.

- Third, the system gets the information from the Database.

- Fourth, the system displays the weekly tasks to the user.

- Fifth, the user can view his weekly tasks.

- Sixth, the user may choose one particular task to see detailed information.

- Seventh, the system gets the request.

- Eighth, the system gets the information from the Database.

- Ninth, the system then determines whether the person who sends the request is a collector or a janitor.

- Tenth, if he is a collector, let him view the task with detailed information of vehicle, MCP and route. Otherwise if he is a janitor, let him view the task, MCP and route.

Note: Each MCP has an embedded system to determine the current capacity of the MCP. And we will let this software handles the jobs of delivering the current capacity back to our main system too. Otherwise, letting the Back Officer to manually walk to the MCP and determine the capacity of each MCP is totally impractical: the time he travels between MCP can be more than 15 minutes and he have to work non-stop, cannot even have lunch!