5 Task 2.2

> ◉ **Question 5.** Propose a conceptual solution for the route planning task and draw a sequence diagram to illustrate it.

<div align="center">

✅ Solution

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5.1 Theoretical basis

5.1.1 Conceptual design

Conceptual design is an initial/starting phase in the process of planning, during which the broad outlines of function and sort of something are coupled. It tells the customers that what the system actually will do and shows the conceptual model of the system, in other words, what the system should look like.

5.1.2 Sequence diagram

UML Sequence Diagrams are interaction diagrams that detail how operations are carried out. They capture the interaction between objects in the context of a collaboration. Sequence Diagrams are time focus and they show the order of the interaction visually by using the vertical axis of the diagram to represent time what messages are sent and when. Sequence Diagrams captures:

- the interaction that takes place in a collaboration that either realizes a use case or an operation (instance diagrams or generic diagrams)

- high-level interactions between user of the system and the system, between the system and other systems, or between subsystems (sometimes known as system sequence diagrams)

A sequence diagram contains the following components:

- **Actor:** a type of role played by an entity that interacts with the subject, external to the subject, representing roles played by human users, external hardware, or other subjects.

- **Lifeline:** represents an individual participant in the Interaction.

- **Activation:** a thin rectangle on a lifeline, which represents the period during which an element is performing an operation.

- **Message:** defines a particular communication between Lifelines of an Interaction

  - **Call message:** represents an invocation of operation of target lifeline.

  - **Return message:** represents the pass of information back to the caller of a corresponded former message.

  - **Self message:** represents the invocation of message of the same lifeline.

- **Recursive message:** represents the invocation of message of the same lifeline. It's target points to an activation on top of the activation where the message was invoked from.

- **Create message:** represents the instantiation of (target) lifeline.

- **Destroy message:** represents the request of destroying the lifecycle of target lifeline.

- **Duration message:** shows the distance between two time instants for a message invocation.

- **Sequence fragments:** represented as a box, called a combined fragment, which encloses a portion of the interactions within a sequence diagram. Seven types: ref, assert, loop, break, alt, opt, neg.

5.2 Our solution for the question

5.2.1 Conceptual solution for the route planning task

Our proposed conceptual solution for the route planning task of UWC 2.0 system can be described as follow:

1. The back officer initiates the route assignment module.

2. The route assignment module calls the database to get the list of available collectors. The list of collectors is returned and displayed to the back officer's UI. If there are no collectors available, the UI will display the message "No collectors available".

3. If there are available collectors, the back officer chooses a collector to assign MCPs and create route. The module calls the database to get the list of available MCPs. The list of available MCPs is returned and displayed to the back officer's UI.

4. The back officer selects MCPs to assign to the chosen collector.

5. The system creates the most optimal route from the list of designated MCPs from the previous step.

6. The system asks for confirmation from the back officer. After receiving the confirmation from the back officer, the system will update assigned MCPs and route of the chosen collector in the database.

5.2.2 Sequence diagram of route planning task

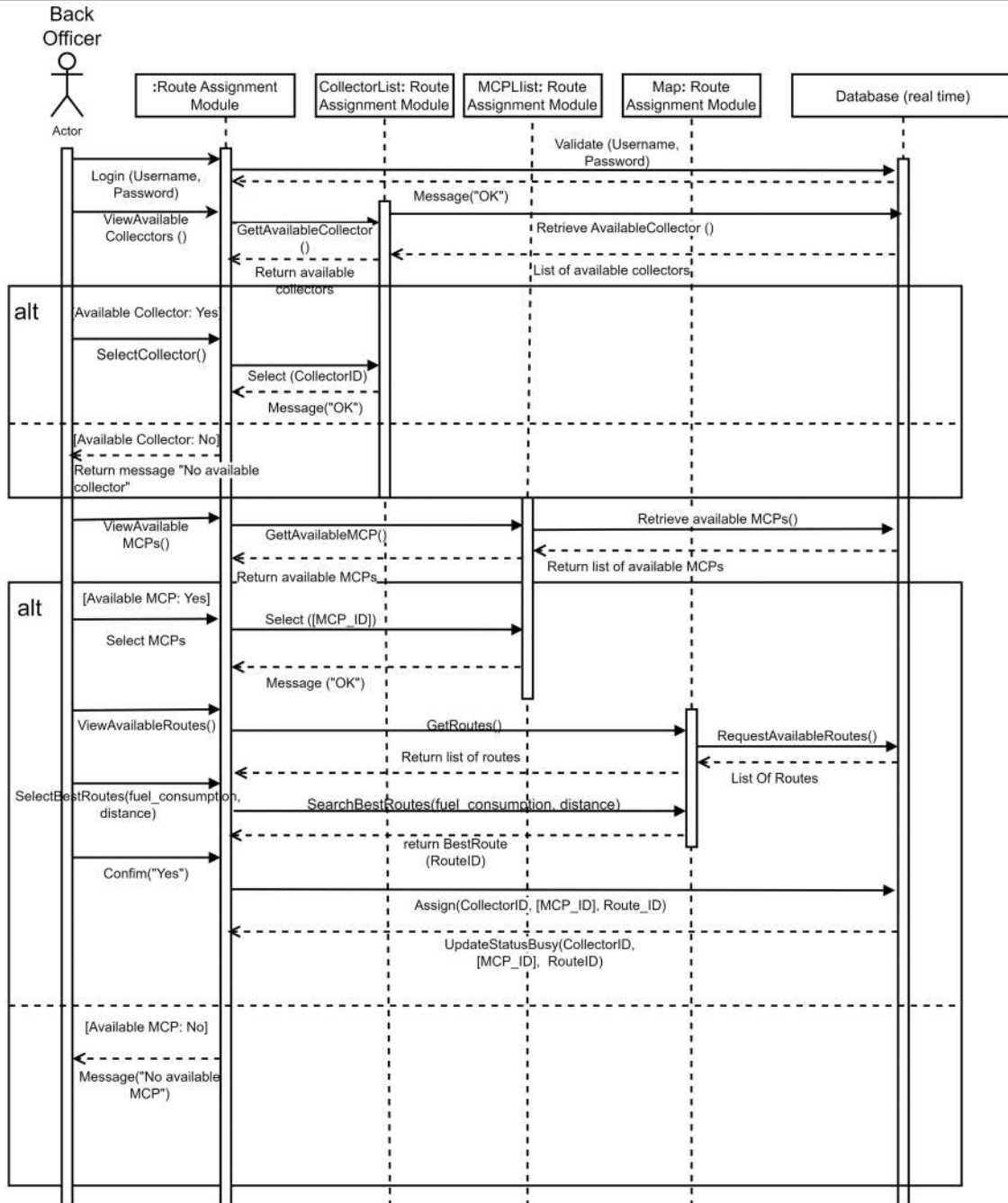Note: [MCP_ID] refers to an array of IDs of MCPs. It means that the back officer has chosen multiple MCPs.

Figure 2: Sequence Diagram for the route planning process

The figure can be digitally accessed using this link