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3rd year IS license

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Supervised Work 4: Interaction diagrams (Sequence Diagram and Communication Diagram)

Exercise 1: We are interested in the **dynamic modeling of library management**. To borrow a book, we have the following **scenario**:

1) The member goes to the counter and the **librarian** uses the functionality to borrow a **book** from **the application** .
2) First, it is necessary to check whether the member has the right to borrow books (valid card, number of books already borrowed does not exceed a fixed threshold, etc.).
3) Next, we need to check if the book is available.
4) If all goes well, we create a new **loan** with the loan date and the return date, associated with the member and the book chosen.
5) We make the book unavailable.
6) We increment the number of books borrowed by the member.

Question: Establish the sequence diagram of the scenario described above considering only the nominal case (we do not deal with error cases, such as: invalid card, number of books borrowed exceeds a fixed threshold, etc.)

Exercise 2:

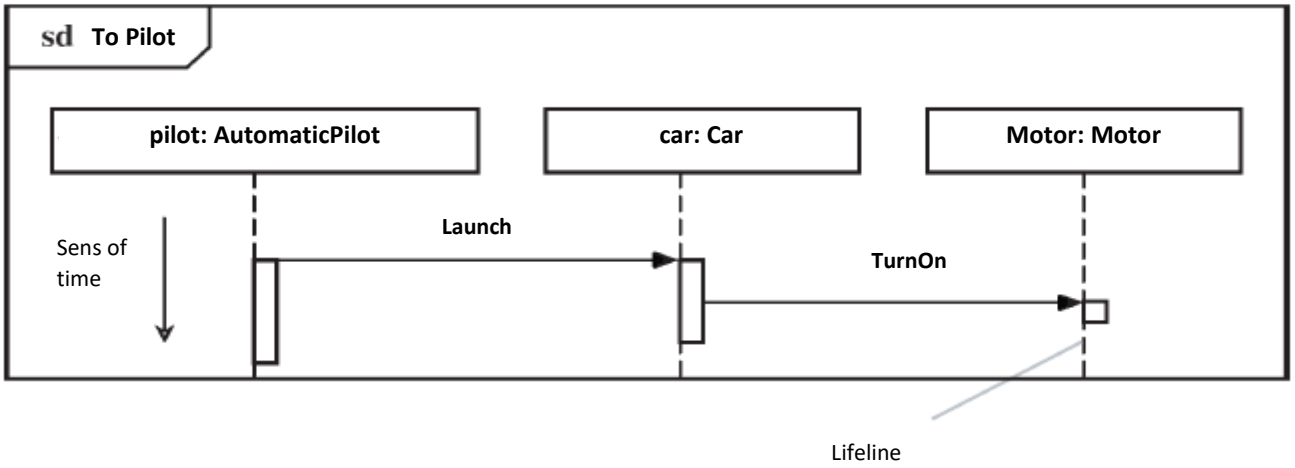
Consider the Minesweeper game:

Question: Develop the **sequence diagram** when a player **reveals a square:**
- If the **square is mined**, the **game is lost.**
- If the **box is numbered**, we must **test if the game is won.**
- If the **box is empty**, we **discover all the neighboring boxes**.

Note: Use fragments where possible.

Exercise 3 (Optional): Modeling Robot behavior
We want to model the behavior of a mobile **robot** , equipped with a **camera** and a **shock detector** . During its normal operation, the robot must analyze the image coming from the camera, and the shock detector must allow it to avoid obstacles. In the **emergency event**, at any time a human **pilot** can stop the robot, which leads to the immediate shutdown of its **motor:** this operation must be accomplished **atomically.**
Question: Develop the corresponding sequence diagram.

Exercise 4: Consider the following sequence diagram:



Question: Transform this sequence diagram into a communication diagram.

Exercise 5:

Explain the syntax of the following messages taken from a communication diagram.

a) **2: displays (x,y) .**
b) **1.3.1: find("Hadock") .**
c) **4 [x < 0]: inverse (x,color) .**
d) **3.1 *[i:= 1..10]: start again() .**

Solution :

a) **2: displays (x,y)** : simple message , invocation of a method .
b) **1.3.1: finds("Hadock")** : nested call.
c) **4 [x < 0]: inverse (x,color)** : conditional , If the condition [x<4] is verified then the sending will take place. .
d) **3.1 *[i:= 1..10]: start again()** : iteration , the star designates the iteration and the guard (the condition) [i := 1..10] designates the number of iterations.