Activity and Sequence Diagrams

Exercise 1: Chocolate Mousse
Scenario
Below is the recipe for preparing a delicious chocolate mousse:

1. Break the chocolate into small pieces and melt it.
2. While the chocolate is melting, separate the egg whites from the yolks.
3. Once the chocolate is fully melted, add the egg yolks to it.
4. Beat the egg whites until stiff peaks form.
5. Gently fold the beaten egg whites into the chocolate mixture without breaking them.
6. Pour the mixture into individual ramekins.
7. Refrigerate for at least **three hours** before serving.

Tasks
1.1. Create an **activity diagram** that models this recipe.
1.2. In the previous activity diagram, the **ingredients** being manipulated are not yet shown.Add **object flows** (objects and their states) to complete the diagram. The preparation is shared between the **chef** and the **assistant**. Create another partition representing the entities responsible for each action.

Exercise 2: Vehicle Repair Process
Scenario
The **repair management system** is primarily designed for the **workshop manager**.
It enables the manager to enter repair orders and record the work completed by various workshop employees.
During the repair process:

- **Mechanics** and other technicians collect spare parts from the **parts department**.
- Once the new system is installed, **parts department staff** will only issue parts for vehicles that have an **open repair order**.
- They will record the parts supplied directly using a terminal located in the parts department.
- When a repair is completed, the **workshop manager** performs a **test drive**.
- If the vehicle passes the test, it is placed in the **customer lot**, and the repair order is **closed** in the system.
- Finally, **completed repair orders** must be **importable by the accountant** into the accounting software.

Create an **activity diagram** that represents the **entire repair process**, including the interactions among:

- Workshop Manager
- Mechanics / Technicians
- Parts Department
- Accountant

Exercise 3: Mobile Robot
Scenario
We want to model the behavior of a **mobile robot** equipped with:

- A **camera**, and
- A **shock detector**.

During normal operation:

- The robot continuously analyzes images from its camera.
- The shock detector helps it avoid obstacles automatically.

In case of emergency:

- A **human operator** can **stop the robot** at any time.
- This causes the **motor to shut down immediately**.
- The stop operation must be performed **atomically** (i.e., without interruption).

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Draw the **sequence diagram** representing the behavior of the robot, including:

- Normal operation (image analysis and obstacle avoidance)
- Emergency stop sequence triggered by the human operator

Exercise 4: Minesweeper Game

Scenario

We want to model the sequence of interactions that occur when a **player reveals a square** in a Minesweeper game.

The behavior depends on the state of the revealed square:

- **If the square contains a mine:** The game is **lost**.
- **If the square contains a number:** The system checks whether the **win condition** is satisfied.
- **If the square is empty:** All **adjacent squares** are automatically revealed.

Task

Create a **sequence diagram** showing the interactions between the **player**, the **game engine**, and the **board** during this process.