**Lab 04:** **Draw Activity Diagram (System S1)**

**Lab Learning Outcomes (LLO)**

By completion of the lab the students should be able to

1. Develop activity diagram for the Traffic Violation System to model various scenarios related to the traffic violation, detection and communication system in context with the problem description and its suggested solution in Lab1.

**Tools Required**

For example, [StarUML](https://staruml.io/), [Lucidchart](https://www.lucidchart.com/pages/), [penpot](https://penpot.app/) and [Figma](https://www.figma.com/) etc

**Task to Do**

It is assumed that students know all the rules for drawing activity diagram and will be able to draw activity diagram for the system S1 i.e. **Traffic Violation System (TMS)**. We can further assume that the whole system S1 is composed of multiple units such as Data acquisition Unit, Data Processing Unit and Communication Unit and others (refer to Lab 1). All of these units are collectively represented as ‘Saher’ or ‘TVS’ System. Students are required to draw an activity diagram for the scenarios as given below, considering the swim-lanes and related activities as identified below**.**

**Activity Diagram: Traffic Violation System**

1. **Start in Traffic Violation System Swimlane:**
   * **Activity:** Start
2. **Traffic Police Officer Swimlane:**
   * **Activity:** Access System
   * **Activity:** Review Violation Evidence
   * **Activity:** Confirm Violation
   * **Activity:** Update Violation Status
   * **Activity:** Communicate with Vehicle Owner
3. **System Swimlane:**
   * **Activity:** Capture Traffic Data
   * **Activity:** Analyze Traffic Data
   * **Activity:** Detect Violation
   * **Activity:** Classify Violation
   * **Activity:** Verify Violation
   * **Activity:** Generate Evidence
   * **Activity:** Update Database
4. **Vehicle Owner Swimlane:**
   * **Activity:** Receive Violation Notification
   * **Activity:** View Violation Details
   * **Activity:** Dispute Violation
   * **Activity:** Pay Penalty Online
5. **End in Traffic Violation System Swimlane:**
   * **Activity:** End

**Explanation of Swimlanes and Activities:**

* The **Traffic Violation System Swimlane** represents the entire system's context. It starts with the "Start" activity and ends with the "End" activity.
* The **Traffic Police Officer Swimlane** represents the activities performed by traffic police officers within the system. Activities include accessing the system, reviewing violation evidence, confirming violations, updating violation status, and communicating with vehicle owners.
* The **System Swimlane** represents system-related activities such as capturing traffic data, analyzing data, detecting and classifying violations, verifying violations, generating evidence, and updating the database.
* The **Vehicle Owner Swimlane** represents activities performed by vehicle owners, including receiving violation notifications, viewing violation details, disputing violations, and paying penalties online.

**Start and End:**

* The system starts with the "Start" activity in the Traffic Violation System Swimlane.
* The system ends with the "End" activity in the Traffic Violation System Swimlane.

**Connections:**

* Arrows connect the activities in a sequential order, indicating the flow of actions.
* Decision points can be indicated using diamonds if there are choices or conditions.

**Note:** This is a simplified outline of the activity diagram. Depending on the level of detail you want to include and the specific interactions between activities, you can further expand each activity with more detail. The swimlanes help visualize the roles and responsibilities of different actors within the system.

**SCENARIOS**

Consider the following scenarios. A couple of them may be completed in-class and the remaining may be assigned as homework.

**Scenario 1: Data Acquisition Process:**

* **Description:** Create an activity diagram that illustrates the process of data acquisition through cameras and sensors installed at strategic locations.
* **Steps:**
  1. Begin with the "Start Data Acquisition" initial node.
  2. Initiate data capture using cameras and sensors.
  3. Record vehicle information, including number plates, speed, and direction.
  4. Store captured data in the system's database.
  5. Conclude with the "Data Acquired" final node.

**Scenario 2: Data Processing and Violation Detection:**

* **Description:** Design an activity diagram showing the sequence of steps to process data and detect traffic violations.
* **Steps:**
  1. Start with the "Start Data Processing" initial node.
  2. Retrieve captured data from the database.
  3. Analyze data to detect violations, such as over speeding or red light violations.
  4. Assign severity levels to detected violations.
  5. End the process with the "Violations Detected" final node.

**Scenario 3: Data Verification and Confirmation:**

* **Description:** Develop an activity diagram depicting the verification process by traffic police officers.
* **Steps:**
  1. Begin with the "Start Data Verification" initial node.
  2. Traffic police officers review detected violations.
  3. Confirm violations and assign penalties if required.
  4. Provide feedback and input on the verification process.
  5. Conclude with the "Verification Complete" final node**.**

**Scenario 4: Communication and Penalty Notification:**

* **Description:** Create an activity diagram illustrating the communication process with drivers regarding violations and penalties.
* **Steps:**
  1. Start with the "Start Communication" initial node.
  2. System sends notifications to drivers about detected violations.
  3. Direct drivers to an online platform for penalty payment.
  4. Offer an option to view violation details and submit disputes.
  5. Conclude with the "Communication Completed" final node.

**Scenario 5: Data Management and Rewards:**

* **Description:** Design an activity diagram depicting the data management process and the rewarding system for safe driving behavior.
* **Steps:**
  1. Begin with the "Start Data Management" initial node.
  2. Store violation data securely in the database.
  3. Manage drivers' profiles and driving history.
  4. Implement reward system for drivers exhibiting safe behavior.
  5. End the process with the "Data Management Completed" final node.

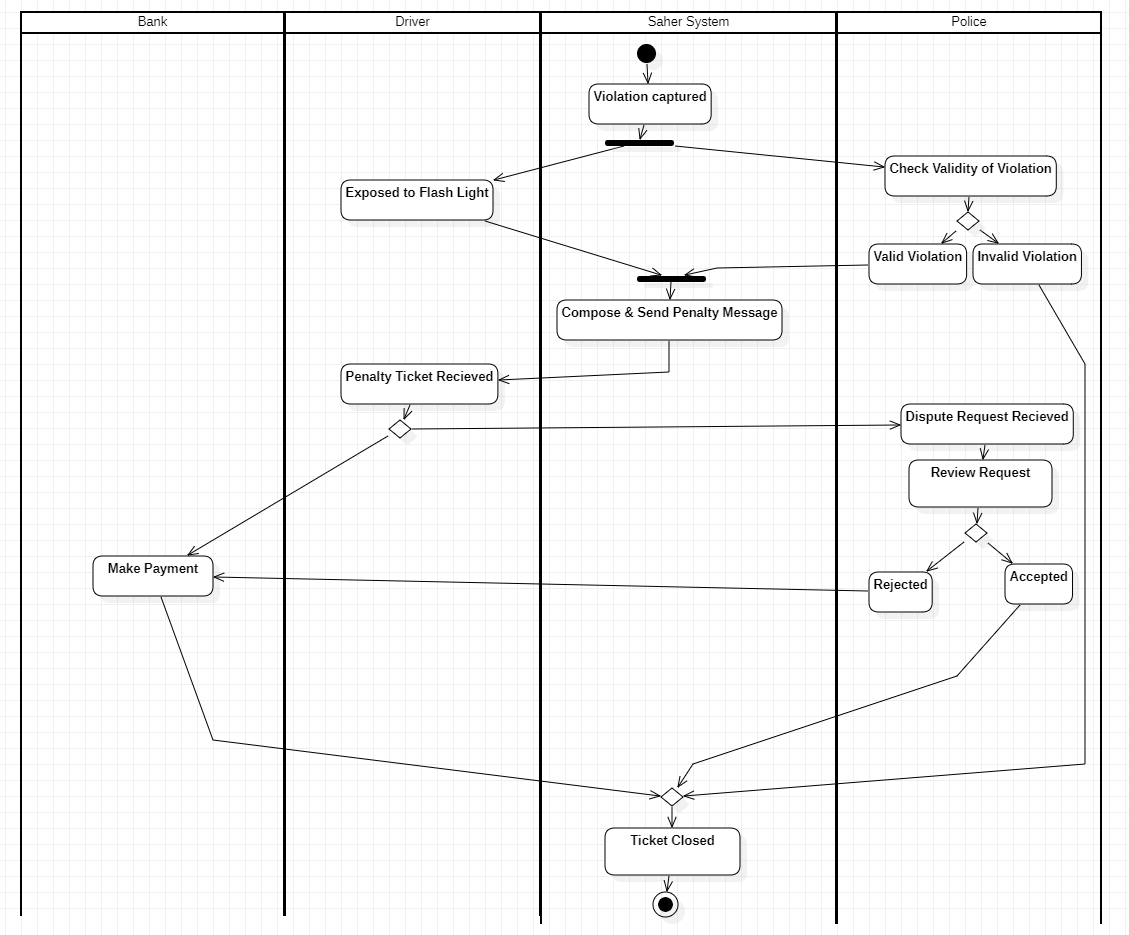
**NOTE:**

You may also get help from the following samples produced by the students. These samples may not be complete and accurate, so you are required to complete them and identify any mistakes/errors or space for improvements or changes required.

**Example:**

The following are samples shown below drawn by the students.

**Sample 1 (TMS-S1)**

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**Sample 2 (TMS-S1)**

**Diagram, schematic

Description automatically generated**