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Digitization of the traffic police law

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Dedication

I dedicate this graduation to the one who taught me to give and to the one whose name I proudly bear, and I hope that God will extend your age to see the fruits that have come after a long wait for "dear father".

To my angel in life, to the meaning of love, tenderness, and devotion, to the blessing of life, the mystery of existence, and to whom her prayer was the secret of my success, the most beloved "mom" .

To those in whose presence I gain boundless strength and love and to those with whom I have come to know the meaning of life "my brothers and sisters" .

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To my partner Bentadj Hiba

For her moral support, patience, and understanding throughout this project.

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Dedication

On the occasion of my graduation, I dedicate my graduation to the one who paved the path of Science for me, to the one who lights up my scientific path with an unquenchable light, dear one who walked every path and every way until I got here, to the one I love a laugh to my heart, I dedicate my graduation to my father "BenTadj Attallah" who has always been a support and pride for me, all respect and appreciation for you, you who have struggled for us and you who have struggled to make us happy, endured the hardships of life to serve us, tasted the colors of misery to raise us, as well as the person who raised me in I dedicate to her the word of thanks of my dear mother "BenTadj Mesaouda" and I do not forget my brothers "Anfel", "Roufida" and "Moutaz Billah" who were and still are the cause of my happiness, ask Allah To bring me together with them in the highest paradise.

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Abstract

The term digitization has become used in all developing countries of the world, and with the rapid development of Information Technology, this has led us to the benefits of the police in the application of traffic law and the points licensing system, as well as the state's benefits in reducing traffic accidents. In order to deter drivers who violate the law and hold them responsible for their actions and reduce accidents known as road terrorism, a system called «Digital police» has been established, which is a system based on the digitization of the traffic law, the points license system, as well as police and driver data, so that it facilitates the process of editing and managing offenses and misdemeanors, managing the points license system, and the speed of searching and accessing the central database.

Keywords: Digitization, Traffic Law, Points license System, Offenses, Misdemeanors.

ملخص

مصطلح الرقمنة اصبح مستخدما في جميع دول العالم المتقدمة والنامية ، و مع التطور المتسارع لتكنولوجيا المعلومات ، قادنا هذا لمعاناة الشرطة في تطبيق قانون المرور و نظام الرخصة بالنقاط و كذا معاناة الدولة في الحد من حوادث المرور. ان كثرة حوادث المرور عائد لعدم احترام معظم السائقين لقانون المرور ،و من اجل ردع السائقين مخالفين القانون و تحميلهم مسؤولية افعالهم و التقليل من الحوادث المعرفة باسم ارهاب الطرقات تم انشاء نظام سمي ب »الشرطة الرقمية « و هو نظام مبني على رقمنة قانون المرور و نظام رخصة بالنقاط و كذا بيانات الشرطة و السائقين بحيث يسهل من عملية تحرير و ادارة المخالفات و الجنح و ادارة نظام رخصة بالنقاط و سرعة البحث و الوصول لقاعدة البيانات المركزية .

الكلمات الرئيسية: الرقمنة، قانون المرور ، نظام الرخصة بالنقاط ، المخالفات ، الجنح

Résumé

Le terme numérisation est devenu utilisé dans tous les pays développés et en développement du monde, et avec le développement accéléré des technologies de l'information, cela nous a conduit à la souffrance de la police dans l'application du code de la route et du système de licences à points, ainsi que la souffrance de l'État dans la réduction des accidents de la circulation. Afin de dissuader les conducteurs qui enfreignent la loi et de les tenir responsables de leurs actes et de réduire les accidents connus sous le nom de terrorisme routier, un système appelé "Police numérique" a été mis en place, qui est un système basé sur la numérisation du code de la route et du système de permis à points, ainsi que les données de la police et des conducteurs, afin de faciliter le processus d'édition et de gestion des infractions et délits, la gestion du système de permis à points et la rapidité de recherche et d'accès à la base de données .

Mots clé : Numérisation, Code de la Route, Système de Permis à points, Infractions, Délits.

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GENERAL INTRODUCTION

The number of traffic accidents in Algeria in 2022 amounted to 59,766 accidents, while the number of interventions amounted to 110,242 interventions and 73,715 injured. The number of deaths from traffic accidents, according to the General Directorate of civil protection, was estimated at 1867 dead with an average of 05 deaths per day(5). These terrifying figures burdened the state, due to which most drivers did not respect the traffic law, lack of deterrence, drivers ' lack of awareness of the punishment imposed on them and their evasion of responsibility, as well as falsification of documents and false statements (the driver received more than one copy of the driver's license), bribery, nepotism, the influence of money and power holders, also the traditional methods used by the traffic police to perform their duties have become outdated and ineffective in our time today. These difficulties led to the idea of creating a modern digitization system in Algeria as a solution to this achievement disorder and also enabled us to add many suggestions that will undoubtedly contribute to the construction of a solid digital traffic system.

Our thesis consists of three chapters:

- Chapter 1:«Priminilaries of traffic law in Algeria»

  We have presented the basic concepts and definitions of the most important terms that we will cover during the study of our topic. We also dealt with violations and misdemeanors under the Algerian traffic law.

- Chapter 2:«Presentation of the host organization and Contributions »

  We started with a comprehensive presentation of the host organization to understand the business system and ensure better management, then we covered the reasons that prompted us to start this business, as well as a brief description of our proposed project.

- Chapter 3 :«Analysis and implementation» We have described the step-by-step process of analyzing and designing the system and the environment in which we programmed our system and we will finish with a description of the main interfaces.

Finally, we close this thesis with a general conclusion and some points of view.

Chapter 1

PRIMINILARIES OF TRAFFIC LAW IN ALGERIA

1.1 Introduction

Over the past decade, new technologies have found different ways to unlock new horizons, thanks to technology, slowly implemented processes have become manual and with some failures until recently automatic. The term digitization has become used in all the world's developed and developing countries because developed countries depend on digitization technologies and developing countries want to stay caught up. This brings us to an important point: the suffering of the police in liberalizing traffic offenses. Solving this problem is digitizing traffic law. In this chapter, we will address concepts and terminology related to our project and such offenses and misdemeanors as stipulated in the new traffic law.

1.2 Digitization

Digitization is the process of transforming data into a digital format that computers can read. The end result is the representation of an object, picture, sound, document, or signal that is produced by turning a collection of numbers describing various sets of points or samples into a sequence of numbers (14). The outcome is known as a digital representation, or more precisely, a digital picture, of the object, which is the signal's digital form. However, digitization is the process of "converting analog source material into digital form" Digital data is often stored as binary digits in modern practice to facilitate processing by digital computers and other processes.(15). In another definition, digitization refers to converting continuous analog signals into binary digital signals. The following Figure 1.1 shows more (7):

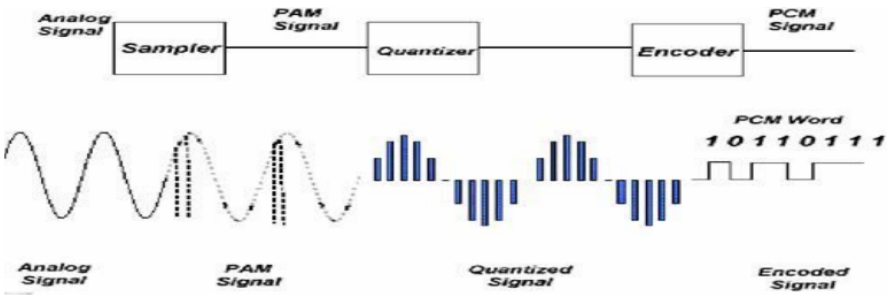

Figure 1.1: Convert analog signals into digital

1.3 Digitization history

Digitization gained popularity in the late 20th century with the advent of personal computers and the Internet. These technologies have made it possible to convert many different forms of information,

such as text, images, audio, and video, into digital form. The digitization process has revolutionized communication and commerce, profoundly influencing almost every aspect of modern life (19).

1.4 Digitization Types

1. Manual Digitization:

Involves manual tracking via digital converter All lines from the printed map, to create an identical digital map on the computer.

2. Heads-Up Digitization:

Similar to the manual digitization method, however, the difference is that it scans the map or image directly, displaying it on the computer screen.

3. Interactive Tracing:

This method is an upgraded version of vertical digitization, where speed and precision increase in tracking one line at a time under the guidance of the operator.

4. Automatic Digitization:

It is the process of converting dot data into an automated vector using pattern recognition and image processing technologies. In this method, the computer tracks all the features on the map; It gives high precision with low time consumption, allows customization, and improved image quality (12).

1.5 How does information become digital

Digitization of information typically consists of one or more of the following processes:

1. To scan:

Use the scanner to capture an image, possibly an image of text, and convert it to an image file, such as a bitmap.

2. Register:

Record audio or video on recording media, such as tape or disc, and convert it using an analog-to-digital converter.

3. Optical:

Character Recognition (OCR). The OCR program analyzes the image of the text for light and dark areas to identify each letter of the alphabet or number and converts each character to an ASCII code.

4. Sampling:

Sampling measures the amplitude or signal strength of an analog waveform at evenly spaced times-tamps and represents the samples as digital values for input as digital data (19).

1.6 The importance of digitization

Digitization contributes to enabling and improving operations within companies, by taking advantage of digital technologies and data. It plays an important role in improving the user experience, for example, Digitization of the food order process reduces the long wait period for it and allows the dissemination of information in various forms after digitization, Such as converting a manuscript into audio or video readings and facilitating access from anywhere(12).

1.7 Digitization Fields of Use

Digitization is used in many areas, including:

1. Publish the information contained in historical or paper documents or maps in several ways and make it available to the global public, without having to visit the actual site, thereby saving time and travel costs
2. The potential to create new sources of income, as many documents contain information that can have commercial value when submitted to the appropriate audience.
3. Increase the efficiency of research as obtaining correct metadata from a digital document makes it easier to find relevant content a lot.
4. Keeping data digitally ensures that information remains recoverable if a disaster in the actual location of documents results in its loss(12).

1.8 Digitization advantages

Digitization offers a range of advantages, the most important of which are:

- Provide storage space.
- Reduce the costs of printing paper, inks, and printers.
- Save time spent printing paper files.
- Facilitate the process of searching and sorting files(12).
- Widespread and in-depth access to information with its assets and branches.
- We collect information from large groups no matter how large.
- Get information in audio, photo, and color too(19).
- Preserve, share, and access the same from any part of the world.

1.9 Examples of digitization

Here are some examples of information that can typically be digitized:

- text, including books, essays, and contracts.
- images, including pictures, works of art, and images used in medicine.
- audio files like music, talks, and interviews, video files like movies, TV shows, and webcam footage; and data files such as numerical sensor data, financial data, and weather data (19).

1.10 Smart card and smart card reader:

A smart card reader is a device that reads information from a smart card. A smart card is a computer chip-mounted plastic card, which can be either a microprocessor or memory chip, in which computer-compatible digital and alphabet information can be saved, based on the data reading inside the chip and converted into readable information based on the nature of the software and the electronic code saved. Smart Card is used in a variety of applications, including (11) :

1. Access control.
2. E-commerce.
3. Banking.
4. Healthcare.

5. Transportation.

Transactions are made via data stored on the chip through the smart card reader connected to the smart card either directly or indirectly through radio frequency connections. The connection between a smart card and reader occurs through simultaneous protocols that involve transferring small-scale data packages called Application Protocol Data Units (APDUs) via a chain link between the two. The reader sends the command APDU to the smart card while the card sends the APDU response to the reader. Figure 1.2 shows the interaction between the components of the smart card system. The host app sends a convenient order to the smart card reader asking for the required information via intermediate software that acts as a connecting link between the two. Reader connected to intermediate programs or host computer through Universal Serial Bus (USB) or RS232. The smart card reader collects information from the card and returns it to the app. Thus, the card reader and smart card work in the main slave way (18).

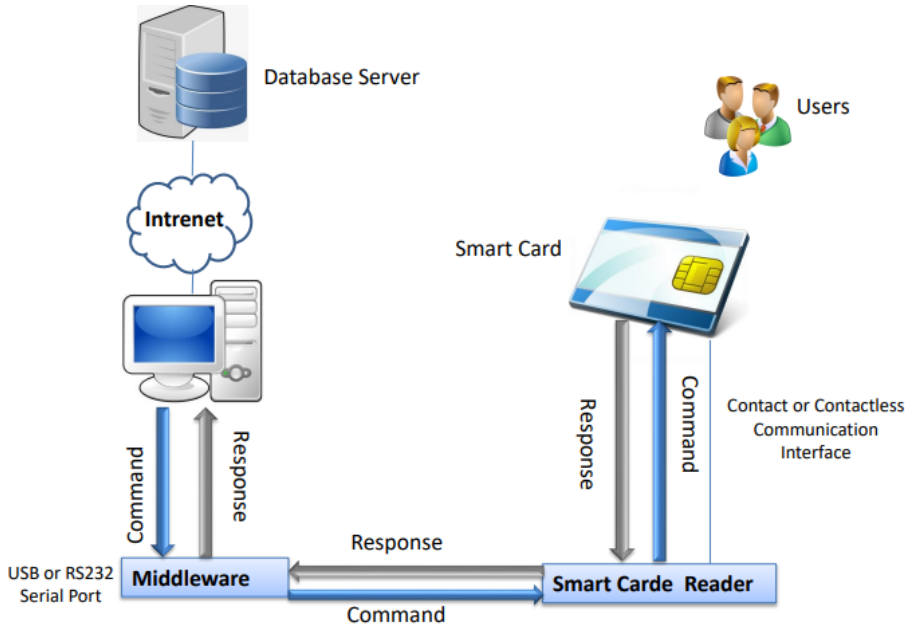

Figure 1.2: Smart card system components and working

1.11 Benefits of using a smart card reader

1. Increased security:

Smart cards are more secure than traditional magnetic stripe cards. The embedded microprocessor makes it difficult to counterfeit or clone smart cards.

2. Convenience:

Smart cards can be used to perform a variety of tasks, such as making payments, accessing buildings, and logging into computers. This can save users time and hassle.

3. Flexibility:

Smart cards can be used in a variety of applications. This makes them a versatile and cost-effective solution for a wide range of businesses and organizations.

1.12 Speed Radar

It is a non-mechanical means of measuring a vehicle's speed, where the speed sensor releases a radar beam in the direction of the Earth and measures the Doppler effect of the bouncing beam. These signals or information are sent to the engine controller and the vehicle speed is calculated (9).

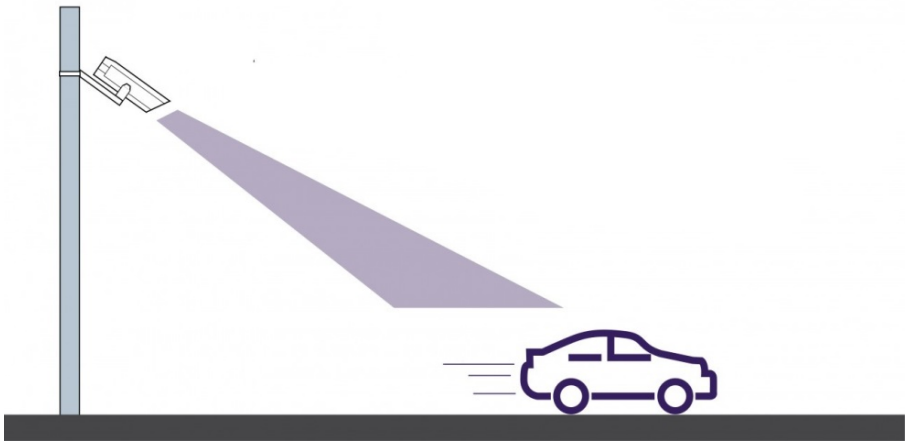

Figure 1.3: Speed radar

1.13 Face recognition camera

A face recognition camera is a type of security camera that can identify people by their faces. Face recognition cameras use computer vision and artificial intelligence to analyze images of faces and compare them to a database of known faces. When a face is matched to a known face in the database, the camera can trigger an alarm or take other actions, such as opening a door or logging a person into a system. Here's an overview of how a face recognition camera generally works:

1. Capture :

   The camera captures a person's face by capturing a video or a series of images in real time. The camera may be integrated into a device (such as a smartphone or surveillance camera) or designed as a standalone unit.

2. Preprocessing:

   The captured images or video frames are preprocessed to enhance the quality and clarity of the facial features. This may involve tasks such as noise reduction, image stabilization, and normalization

3. Face Detection:

   The camera employs face detection algorithms to locate and identify the presence of human faces within the captured images or video frames. These algorithms analyze patterns and features to distinguish faces from other objects.

4. Face Alignment:

   Once the faces are detected, the camera performs face alignment, which involves adjusting the detected faces to a standardized position and orientation. This step helps normalize variations in head pose and scale, ensuring consistent facial feature extraction.

5. Feature Extraction:

   The camera extracts unique facial features from the aligned faces. This process involves analyzing key facial landmarks, such as the position of eyes, nose, mouth, and other distinctive features. These features are then transformed into numerical representations called face templates or embeddings.

6. Face Matching:

   The extracted face templates are compared against a database or a reference set of known faces. This comparison is done using complex algorithms that measure the similarity or dissimilarity between the face templates. The goal is to find the closest match or identify if the face belongs to a known individual.

7. Authentication/Identification:

   Based on the face-matching results, the camera can perform two main functions:

- Authentication

  It verifies if the captured face matches a specific individual's face template, usually for access control purposes, such as unlocking a device or granting entry to a secure area.

- Identification

  It searches the database for a potential match among multiple face templates, aiming to identify an unknown individual by comparing their face against a larger dataset. This is commonly used in surveillance or forensic applications.

8. Decision and Output

   The camera provides the final decision based on the face-matching results. It may display a notification, trigger an action (e.g., unlocking a door), or send the information to a central server for further processing or integration with other systems

The face identification process is shown in Figure 1.4 (23) .

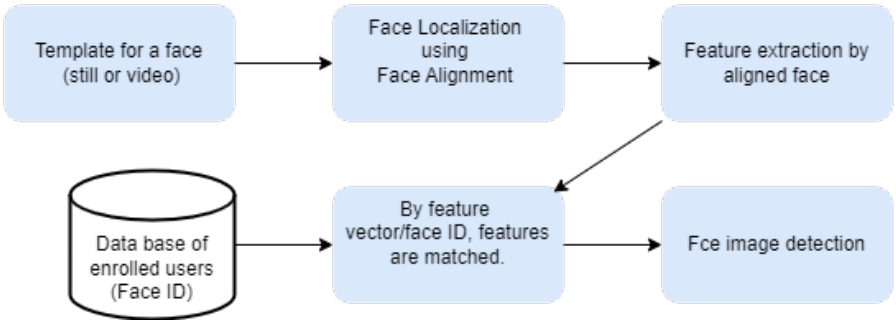

Figure 1.4: Face detection process

1.14 Presentation of UML

UML "Unified Modeling Language" is an object-oriented modeling language developed in response to the call for proposals launched by the Object Management Group (OMG) with the aim of defining a standard notation for modeling applications built with objects and also for software design. Also, UML is a visual language consisting of a set of diagrams, called diagrams, which each give a different vision of the project to be treated. UML, therefore, provides us with diagrams to represent the software to be developed: its operation, its start-up, the actions likely to be performed by the software, etc(21)

1.14.1 UML diagrams

UML offers thirteen types of graphs to represent different modeling perspectives. It is divided into two main groups (22):

- Structure Diagram.
- Behavior Diagram.

In this chapter, we will see one diagram for behavioral diagrams.

Use case diagram

The Use Case Diagram is used for modeling user needs. The use cases describe the behavior of the system studied from the point of view of the user and the possibilities of functional interactions between the system and the actors, they allow to define of the limits and the relations between the system and its environment(21).

1. Role of the Use Case Diagram
    - Provides a view of the system in its external environment.
    - Defines the relationship between the user and the elements the system implements.
2. Components of a Use Case Diagram

    The basic components of the use case diagrams are the actor, the use case, and the association(21).

    - Actor:

      An actor is a user who communicates and interacts with system use cases. It is an entity that behaves like a person or system.
    - Use Case:

      A use case represents a functionality provided by the system, typically described in the form Verb+object (for example to register a car or delete a user). Use cases are represented by an ellipse containing their names.
    - Association:

      Associations are used to link actors with use cases. They indicate that an actor participates in the use case in some form. Associations are represented by a line linking the actor and the use case.

1.15 Traffic law

The Traffic Act regulates road traffic and safety by setting out the conditions for the operation of the various categories of users of the public road (vehicles and pedestrians) to achieve and ensure the safe

and fair movement of citizens. The law is flexible (flexible law), which must be constantly amended to keep pace with developments in various spheres of life(4).

1.16 Traffic accident

When a vehicle collides with another vehicle, a pedestrian, an animal, a roadblock, or any other immovable impediment like a tree or an attaching shaft, the result is a traffic accident, also known as a collision. Traffic crashes can result in injuries, fatalities, vehicle damage, and property damage. Automobile collisions result in death, disfigurement, and a financial burden. Road accidents, in particular, result in numerous fatalities, property damage, and resource losses(20).

1.17 Traffic Accident Statistics

National Security Services recorded the loss of more than 700 people and the injury of 20,575 people in 17,186 traffic accidents in 2022, as confirmed, on Monday, by Inspector General of National Security Services Comptroller General of Police Haj Said Arzki. 709 deaths and 20,575 injuries were recorded in 17,186 traffic accidents during the previous year, stating that compared to 2021, it recorded a rise in road accidents of 0.74% and in the number of deaths of 9.08% and an increase in the number of injured by 1.88Mr. Haj Saeed attributed the high number of accidents to the human component and the general lack of respect for the Traffic Act, recalling the various sensitization and deterrence measures taken to reduce such incidents(5).

1.18 Traffic Law No. 17-05 of 16 February 2017

Algeria's legislation promulgated a new law, No. 17-05 of 22 February 2017, on the regulation, safety, and security of traffic, amending and supplementing Act No. 01-14 on the immediate withdrawal of a driver's license in the event of an offense. Through this law, the legislator seeks to form drivers on the one hand, and on the other hand to deter violators in the event of a violation of the law and to reduce traffic accidents

1.19 Traffic police

The Traffic Police or Traffic Police is a sector in most countries that follows the Police or Internal Security Service's responsibility to enforce traffic rules and achieve traffic liquidity, especially in the

event of congestion accumulations or a traffic accident(6).

1.20 Driving License

It is a valid document for the class of vehicle considered to be obtained by the driver and to make him drive his vehicle legally.

1.21 Test Driver's License

It is the designation adopted by the new legislation instead of the provisional driving certificate valid for two years from the date of success in applied examinations, The recipient of the test driver's license shall be liable for the cancellation of the license in case of any misdemeanor in section II of this order by the competent court without prejudice to penal penalties. And the offender can only run for a driver's license again after six. (06) months from the date of the cancellation decision as per (art. 99). used by many countries to regulate and enforce safe driving practices (13).

1.22 Points License System

A standard and pedagogical tool that aims to make drivers take responsibility for their violation of traffic rules through the points management system allocated to each driver's license holder and supports the fight against road insecurity. A drip driver's license serves as a measure of social compensation through equal taxation (13).

1.23 Importance of the points license system

The importance of the points licensing system lies in its ability to deter dangerous driving behavior, as well as to identify and punish repeat offenders. By allocating points for traffic offenses, drivers are incentivized to follow traffic and driving rules safely, as the accumulation of points can lead to penalties such as fines, suspension or cancellation of licenses, and increased insurance premiums. In addition, the points system allows authorities to identify and take action against the usual perpetrators who pose a significant risk to other road users. Furthermore, the points system helps to create a level playing field for all drivers, regardless of their age, gender, or social status. It promotes equity and accountability, where all drivers are subject to the same standards and face the same consequences for breaching traffic laws.

1.24 Traffic offenses

Traffic offenses are the conduct of violating the provisions of the Traffic Code, which exposes the offender to punishment, and is punishable by imprisonment, fine, or both, whether intentionally or unintentionally (1). If the wounds constitute a general inability to work for less than three months, the accident is considered an offense.

1.24.1 Types of traffic offenses

Traffic offenses are divided into 4 classes:

First-class :

1. Offense the provisions relating to lighting and braking bicycles.
2. Offense of the provisions relating to lighting, signaling, and braking of moving bicycles and motorcycles.
3. Offense of the provisions related to the submission of vehicle documents and, when necessary, a certificate of professional competence.
4. Offense of the provisions related to the use of a non-conforming machine or vehicle device.
5. Offense by pedestrians of the rules that regulate their movement, especially the rules related to the use of protected passages.
6. Offense of the provisions related to malfunctions in the excitation and signaling devices of cars.
7. Offense of the provisions related to wearing seat belts by motor vehicle occupants.

Second class :

1. Offense of the provisions relating to the use of audible alarm devices.
2. Offense the provisions related to traffic in the middle of roads, paths, paths, road strips, side-walks, or road edges designated for the passage of public transport vehicles and other vehicles specially authorized for that, and for the passage of pedestrians.
3. Offense the provisions related to an abnormal reduction in speed without inevitable reasons that will reduce traffic flow.

4. Offense the provisions related to registration plates, equipment, exceptional transport signals, as well as speed indicators.
5. Offense the provisions related to setting the appropriate sign by every driver with a driving license during the probationary period.
6. Offense the provisions related to walking on a continuous line.
7. Offense of provisions relating to arbitrary stopping or standing that obstructs traffic.
8. Offense of the provisions related to the passage of a motor vehicle or a trailer in lanes open to traffic without this vehicle having two registration plates.
9. Offense of the provisions related to not authorizing the transfer of vehicle ownership or not authorizing a change of residence of the vehicle's owner.
10. Offense of the provisions related to exceeding the authorized legal speed limit by a percentage not exceeding 10%, which the approved equipment inspected for motor vehicles with or without a trailer, or semi-trailers in some road sections, and for each type of vehicle.

Third class :

1. Offense of the provisions related to exceeding the legal authorized speed limit by / more than 10% and less than 20%, which the approved equipment inspected for motor vehicles with a trailer, without a trailer, or semi-trailers in some road sections, and for each type of vehicle.
2. Offense the provisions related to prohibiting or restricting traffic in some traffic lanes for some types of vehicles or for vehicles that perform some types of transportation.
3. Offense of the provisions relating to wearing seat belts by the driver of a motor vehicle.
4. Offense of the provisions relating to the compulsory wearing of a helmet for motorcyclists in front wheelchairs, motorcycles, and their riders.
5. Offense the provisions related to passing, stopping, or stopping without an imperative on the emergency stop lane of the motorway or highway.
6. Offense the provisions related to dangerous stopping or standing.
7. Offense of the provisions relating to the prohibition of transporting children under the age of ten.

8. Offense the provisions relating to vehicles that are not equipped with equipment that allows the driver to have a sufficient field of vision.
9. Offense the provisions related to placing plastic tape or any other opaque material on the vehicle's windows.
10. Offense the provisions related to not declaring the changes made to the vehicle.
11. Offense of the provisions related to obligating holders of driving licenses during the probationary period of training and at their expense.
12. Offense of the provisions relating to the nature, shape, and condition of the rubber tires of motor vehicles that do not conform to accepted standards.
13. Offense the provisions related to the mandatory periodic technical monitoring of vehicles

Fourth class :

1. Offense the provisions relating to the imposed direction of traffic.
2. Offense of the provisions related to road intersections and the priority of traffic.
3. Offense of provisions relating to the intersection and overtaking
4. Offense the provisions relating to stop command signals
5. Offense of provisions related to prohibited maneuvers on motorways and highways
6. Offense of the provisions related to speeding by the driver of the vehicle while attempting to overtake him by another driver;
7. Offense of the provisions related to the movement of a vehicle without lighting or a signal, or its parking in the middle of the road at night or during the spread of fog in a place devoid of public lighting
8. Offense of the provisions related to the prohibition of passing on a lane located directly to the left of a road that includes three lanes or more with one direction of traffic for vehicles transporting people that include more than nine (9) seats, or for vehicles transporting goods whose length exceeds seven (7) meters. , or of an authorized gross weight with a payload over 3.5 tons;
9. Offense of the provisions related to the prohibition of parking or stopping on parts of the road that cross the surface of a railway or the movement of unauthorized vehicles on the railways

10. Offense the provisions related to crossing some sections of roads that are prohibited for traffic or some bridges with a limited load.
11. Offense of provisions relating to the weight of motor vehicles that do not conform to accepted standards.
12. Offense of the provisions relating to the brakes of motor vehicles and the coupling of trailers and semi-trailers.
13. offense the provisions related to the maximum load for each axle.
14. Offense of the provisions relating to the installation of a timer speed recorder, its features, operation, proper use, and maintenance.
15. Offense the provisions related to a significant change of direction without the driver making sure that the maneuver does not pose a danger to other users and without alerting them of his desire to change direction.
16. Offense the provisions related to crossing a continuous line.
17. Offense of the provisions relating to the operation of audio-visual devices at the front of the vehicle while driving.
18. Offense of the provisions related to the stop on the median lane that separates the medians of the highway and the highway.
19. Offense of the provisions related to the size of vehicles and the installation of vehicle lighting and signaling devices.
20. Offense of the provisions related to continuing to drive a vehicle without undergoing a periodic medical examination.
21. offense of the provisions related to teaching driving motor vehicles with or without a charge.
22. Offense of the provisions relating to non-compliance with the driving period and the rest period by the drivers of goods transport vehicles whose total authorized weight with the load or its official total traveling weight exceeds 3,500 kg and people transport vehicles that contain more than nine (9) seats, including driver's seat.
23. Offense of provisions related to cases of obligation or prohibition of crossing railways located on the road.

24. Offense of the provisions related to the manual use of a mobile phone, or eavesdropping with both ears by wearing a radio and audio eavesdropping helmet while driving.

25. Offense of the provisions related to exceeding the speed limits stipulated for the category of drivers holding a driver's license during the optional period.

26. Offense of the provisions related to the priority of pedestrians passing at the level of protected passages.

27. Offense of the provisions related to the priority of pedestrians passing at the level of protected passages

28. Offense of provisions related to damage or danger to others, or to public conduct and its equipment or accessories

29. offense of the provisions related to the emission of smoke and toxic gases and the production of noise when the specified levels are exceeded.

30. Offense of the provisions related to exceeding the authorized legal speed limit by more than 20% and less than 30%, which the approved equipment inspected for motor vehicles with a trailer, or without a trailer or semi-trailer, in some road sections, and for each type of vehicle(13).

1.25 Misdemeanor

A misdemeanor in many common legal systems is defined as a "smaller" criminal act. Offenses are usually punishable by lighter penalties than felonies and more severe penalties for administrative offenses. Offenses are often punishable by financial fines. Misdemeanors may include offenses such as minor theft, minor assault, disorderly conduct (such as inconvenience or altercation), minor vandalism of another's property, and reckless driving (10). If the wounds constitute a general inability to work for more than three months, the accident is considered a misdemeanor.

1.25.1 Types of traffic misdemeanor

1. Manslaughter:

   (a) In case of intoxication or affected by substances or herbs listed in drug varieties.

   (b) In the same conditions by the vehicle of heavy weight items, mass transport or transport of dangerous materials.

(c) In case of committing one of the following offenses:

- Over-speed.
- Dangerous overreach.
- Failure to respect a legal priority.
- Failure to comply with the signs of a complete cessation order.
- Dangerous maneuvers.
- Go in the forbidden direction.
- Drive a vehicle without a light, or signal, or parking in the middle of the road at night or during the spread of fog in a place free from public lighting.
- Manual use of a mobile phone or eavesdropping on both ears by placing a radio and audio eavesdrop helmet during the race.
- Operation of audiovisual devices during driving.
- Walk with overload.

In the same conditions by the vehicle of heavy weight items, mass transport or transport of dangerous materials

(d) Each driver of a cargo transport vehicle exceeding the authorized gross weight with the payload or the authorized GPW of 3500 kg, or a personal transport vehicle with more than nine seats including the driver's seat, after failure to respect legal measures about the duration of the life.

(e) Committing or causing an accident while attempting to escape criminal or civil liability

2. Wrong wound

(a) In case of intoxication or affected by substances or herbs listed in drug varieties.

- In the same conditions by a vehicle of heavy weight items, mass transport or transport of dangerous materials.

(b) In case of committing one of the following offenses:

- Over-speed.
- Dangerous overreach.
- Failure to respect a legal priority.
- Failure to comply with the signs of a complete cessation order.
- Dangerous maneuvers.

- Go in the forbidden direction.
- Drive a vehicle without a light, or signal, or parking in the middle of the road at night or during the spread of fog in a place free from public lighting.
- Manual use of a mobile phone or eavesdropping on both ears by placing a radio and audio eavesdrop helmet during the race.
- Operation of audiovisual devices during driving.
- Walk with overload.

  In the same conditions by the vehicle of heavy weight items, mass transport or transport of dangerous materials

(c) Each driver of a cargo transport vehicle exceeding the authorized gross weight with the payload or the authorized GPW of 3500 kg, or a personal transport vehicle with more than nine seats including the driver's seat, after failure to respect legal measures about the duration of the life.

(d) Committing or causing an accident while attempting to escape criminal or civil liability.

3. Committing or causing an accident while attempting to escape criminal or civil liability.
4. Driving a vehicle or accompanying an apprentice driver in exchange or free of charge while drunk or under the influence of narcotic substances.
5. Driving a vehicle under the influence of substances or herbs that are included in drug varieties.
6. Every driver or facility of a trainee driver refuses to undergo medical, hospital, and biological examinations.
7. Refuse to comply with the stop alert issued by the agents and undergo investigations.
8. Placement of motor vehicle or trailer with a registration plate that does not match the vehicle or user.
9. Obtaining a driver's license or attempting to do so with a false permit or a second copy. item Driving a vehicle without a valid license for vehicle class.
10. Use a device or machine to detect or obstruct the operation of violation inspection tools.
11. Violation of the provisions governing the licensed transport, without prejudice to the immediate suspension of the vehicle.
12. Organizing races on public tracks without a license.

13. Exceed the authorized legal speed limit by 30% and above.
14. Driving without a license.
15. Receipt of a notification of a decision, including suspension or revocation of the driver's license and refusal to return the suspended or canceled license to the aid of the authority responsible for executing this decision.
16. To continue driving despite the legal notification of the suspension, cancellation, or prohibition of its issuance, and to anyone who refuses to respond to the aid.
17. Delayed placement on open course without a license.
18. Failure to comply with the rules governing the organization of races on the course public.
19. No delivery of grey card when final withdrawal from the car.
20. Failure to comply with the rules governing the organization of races on the course public.
21. Doing work on the road without licensing.
22. Failure to comply with the provisions of the license despite obtaining it(13).

1.26 Conclusion

In this chapter, we saw that digitization began mainly with the advent of computers in the last century. Since then, the nonstop digitization march has transformed almost everything into computer-compatible values for 1 and 0 and changed the way we work, Communicate, shop, bank, and even how relax and enjoy ourselves, its purpose is to enable automation, Improve the quality of data, collect all that data and structure so that we can apply advanced technology, We also addressed the basic concepts and definitions of the most important terms that we will address during our study of our subject. We have also dealt with offenses and misdemeanors under Algeria's traffic law.

Chapter 2

PRESENTATION OF THE HOST ORGANIZATION AND CONTRIBUTIONS

2.1 Introduction

The introduction of the host organization is an essential step in the analysis, where it allows to identify the area in which the organization wishes to improve its performance. This chapter aims to present the context and objectives of our contributions. First, a comprehensive presentation of the host organization will be presented to a better understanding of the business system and to ensure better management. Then, we will address the reasons behind this work, as well as a brief description of our proposed project.

2.2 Host organization's submission

The Algerian Traffic Police is responsible for implementing Algeria's traffic laws and regulations. They are also responsible for investigating road accidents and arresting offenders. The Algerian Traffic Police is part of the Algerian National Police, a branch of the Algerian Ministry of the Interior. The Algerian Traffic Police has several different responsibilities, including:

- Enforcement of traffic laws and regulations.
- Investigation of traffic accidents.
- Seizure of violators.
- Traffic Safety Education.
- Help motorists in need.
- Keeping traffic flow.

Here we will see the current traffic police work, the points license system that was decided in the law but not applied.

2.3 What does traffic law say?

2.3.1 Criminal penalty

Due to the dangers of traffic violations, rules governing road traffic have been established, and it has been decided Appropriate sanctions to be applied to perpetrators to preserve security and public safety and to urge road users to comply with them. We shall see the sanctions established for offenses and the sanctions established for misdemeanors.

1. Penalties for offenses:

    - First-degree offenses: punishable by a fine of 2,000 DZ.
    - Second-degree offenses: punishable by a fine of 2,500 DZ.
    - Third-degree offenses: punishable by a fine of 3,000 DZ.
    - Violations of the fourth degree are punishable by a fine of 5,000 DZ(13).

2. Penalties for misdemeanors: For misdemeanors, every misdemeanor and punishment (13) .

2.3.2 The process of editing the offense

The policeman who authorized the offense shall retain the driver's license in exchange for the delivery of a document attesting to this retention enabling its owner to drive for 10 days from the date of the liberation of the offense. At that time, the driver of the offense may pay the minimum penalty in accordance with the amount specified in this Act, which is referred to in the record of the offense. This fine must be paid within 45 days. If the fine is paid within 45 days, the retention procedure shall be lifted and the driver's license shall be returned to the owner. In the event that the fine is not paid within this period, the interest that has observed the offense shall edit the record of the non-payment of the fine and send it to the competent court with the driver's license(3).

2.3.3 The process of editing the misdemeanor

The police officer who frees the offense withdraws the driver's license and sends it to the department, and then the department's role comes where it sends everything related to the offense to the competent authorities (the court) to complete the proceedings(3).

2.3.4 Operation of the license system in points

Allocate to the driver's license a final balance of points set at twenty-four (24) points. What answers is that there is a two-year trial period (2) Each new driver's license holder shall be subject to a provisional driving certificate during this period, and this period shall have an initial balance of twelve points. (12). If some points are lost by the driver at the end of the test period, only the remaining points of the final balance shall be awarded to him. If the points are effective at this stage, the license holder is required to pursue a formation at his own expense, and this is to recover the lost points. If the driver maintains the full points at this stage, the final balance is awarded to him or her, i.e. 24 points. This system

basically depends on the composition of drivers, where the competent authority receives the driver's license for each person who has successfully conducted theoretical and applied tests to obtain it.

Penalties for driver's license

When the driver commits a traffic or misdemeanor offense, the points are withdrawn as follows:

1. Offenses and Misdemeanors:

    - For infractions of the first degree: one point, except for infractions mentioned in the first chapter (1, 5, and 7).
    - For second-degree offenses: two points (2).
    - For third-tier offenses: four points (4).
    - For fourth-tier offenses: six points (6).
    - For misdemeanors 10 points, except the offenses mentioned in articles 78, 80, 81, 82, (87 first paragraph), 88, and 90.

    With the expiration of 45 days and in case of non-payment of the penalty, the record of non-payment shall be sent to the public entity. In this case, the maximum amount of the fine shall be raised as follows:

    - 3000 DZ for first-degree offenses.
    - 4000 DZ for second-degree offenses.
    - 6000 DZ for third-degree offenses.
    - 7000 DZ for fourth-degree 4 offenses.

    The information shall be sent to the department charged with the operation of the license system in points for the additional withdrawal of two points (2). In case of several irregularities simultaneously resulting in the withdrawal of points, the withdrawal of points shall be grouped within half the number of final observation points (24-12 = 12)(13).

2. Penalties relating to the driver's license in points

    After all the points have entered into force, the driver's license becomes automatically invalid, and the person concerned must return his license to the competing interests of the Ministry Internal. Six (6) months later, starting from the date of return of his license to eligible interests, the applicant can obtain a new driver's license subject to the test period. This period is increased

to one year if the license is void twice within five (5) years. In all the above cases, a new driver's license cannot be requested if it is blocked. Persons A new license may only be applied after payment of fines for irregularities Road traffic rules. If the driver's license is suspended or revoked by a court ruling, the person concerned person must return his license to the competing interests of the Ministry of the Interior. If the licensee commits a misdemeanor that is legally examined during the probation period, The competent court shall issue a decision revoking the license in addition to Algeria's penalties. In this case, the latter cannot apply for a new license within eighteen (18) months of the date of cancellation decision (13).

3. Points Withdrawal Process:

   The points are withdrawn when the aid who saw the violation sends the information about the offense that results in the withdrawal of the points, to the department charged with conducting the license system in points not exceeding eight (8) days, starting from the date of viewing the offense.

4. Return points:

   Points are recovered by the license holder, after payment of fines related to violations of traffic rules, as follows:

   - If the person concerned has not committed any other offense within a specified period.
   - After following the composition at his expense.

5. Licensed to view the points balance:

   Licenses for persons and authorities are listed below:

   - Driver's license holder.
   - Security interests: Leadership of the National Gendarmerie and the General Administration of National Security.
   - The judicial authorities.
   - The department is charged with collecting fines(13).

6. The objective of the points license system:

   The points license system is a system used in some countries to motivate drivers to abide by the traffic rules and apply them well. Points are allocated to each driver and these points are deducted when the driver breaches the traffic rules. When all driver's points are exhausted,

the driver's license is withdrawn for a certain period, and he must wait to recover his points to recover his license. The main objective of this system is to motivate drivers to abide by and apply traffic rules well by:

- Raising drivers' awareness of the importance of adhering to and applying traffic rules properly and safely.
- Reducing the rate of traffic accidents and injuries resulting therefrom.
- Enhancing traffic safety and improving public security on roads.
- Improving the quality of life and the environment by reducing emissions from traffic accidents.
- Motivate drivers to learn and continuously improve driving skills and comply with traffic rules.

It can be said that the points license system is an effective system that improves traffic safety and motivates drivers to abide by traffic rules, thereby contributing to reducing the rate of traffic accidents and improving the quality of life on the roads.

2.3.5 The obstacles they faced to reflect the license system in points:

The points license system is a system based on the automatic withdrawal of points due to an offense If they rely on the immediate withdrawal of the driver's license following an offense with the payment of the penalty, However, it has not been implemented in Algeria despite the issuance of legal texts regulating it. One of the most important obstacles to its reflection is the inability to establish a sophisticated information system that allows for monitoring traffic violations and knowing the quality, location, and time of errors. This means that qualified agents are not subject to an automated system and information when checking the violation is to be placed on the database immediately upon the violation. The inability to circulate the bio-metric license system renders the points license system useless, so careful thought must be given to mechanisms and ways to replace it with paper, but the situation will remain the same. In addition, the nature of the society to which this system will be applied(2).

2.4 Presentation of the essence of the project

This project "digital police" is related to the digitization of the traffic law, when the driver commits any violation provided for by law, he is subject to punishment according to the new traffic law. When

the traffic policeman stops the driver, he first checks his information by reading the biometric driver's license card through a smart card reader. this technology allows him to see all the driver's and car's information without the need to return any papers, and then edit the offense committed by the driver.in case the driver does not have a driver's license, it is enough to enter the driver's name and surname to extract the necessary information to complete the procedures. then the driver must pay the fine via the internet or courier centers, after receiving a text message about the offense he committed. There is no requirement for the presence of a policeman so that tickets can be released through surveillance cameras after recording the offense as a speeding offense. One of the advantages of the "digital police" is that it allows us to apply the law of the points license system on the ground with zero probability of error and facilitates the process of withdrawing and retrieving points, as well as knowing the total points for each driver easily and accurately. So that the drivers ' information becomes stored in the central database, as well as the points and offenses committed, which facilitates and speeds up the search process. As for the offenses and misdemeanors that have been released, they are processed in the department by the administrator, who has the ability to view this information and retrieve points when the fine is paid by the driver under the law (17-05) dated February 16, 2017, and then saved in the archive, the information and data are stored in an organized way that allows them to be viewed again easily and quickly after the transactions were made with papers. For the parties (Boss, administrative, policeman, driver) registered in the system, each party has its own identification number that allows it to enter its own space according to its rank, one of the additions provided by the "digital police" is that each policeman has his own page with his own information and the offenses and misdemeanors that he edited.

2.5 The goal of creating "digital police" (The purpose of our study)

Application of the license system in points with the possibility of zero error

The application of the licensing system in points with the possibility of zero error so that the introduction of the points system while avoiding any errors necessarily speedy trading of the use of the biometric license to replace the paper driving license, so that there is a benefit of the points licensing system and if only a matter of time. In addition to continuing awareness-raising for vehicle drivers, especially those who know how to draw points and on what basis, It should be informed that each offense is met by specific points, especially first and second-degree offenses, which we find to be the normal and common behavior of individuals, This makes them threatened every time to withdraw their points and result in losing their license. By cancellation, suspension, or withdrawal, not to men-

tion penalty, Hence the loss of the right to move by driving the vehicle So when applying this system, individuals will strive to respect the traffic law in all its rules and details, Therefore, individuals must be very careful in driving the vehicle not only to preserve lives and property but also to ensure that his license is not compromised. the drip driver's license includes the educational aspect of the driver as withdrawing them means withdrawing points to the end of the last point, That is, a driver who draws four or five points and does not then make any legal infractions retrieves his points. After two to six months, drivers are accustomed. Hence, it is a deterrent. This is how qualified agents are subjected to continuous formation, especially when resorting to an electronic digital system to ensure that the use of power is not arbitrary or ignorant(2).

Do not book a driver's license

To lessen the issue of losing a driver's license, experts and professionals thought that canceling the withdrawal of driver's licenses was the best course of action. the withdrawal of the driver's license under the previous system has detrimental repercussions on many levels and elevations after a detailed analysis by the gendarme leadership, during which the latter was lost. As they interfere with citizens' interests and stop drivers from working, especially commercial drivers who rely on their vehicles for a living, like bus drivers and cargo carriers, the economy suffers, and on a social level, many drivers are expelled or have their licenses revoked. In the private sector," stating that many families have been impacted by these ramifications. According to the speaker, the resolution will end the issue of missing driver's license files, particularly in the states, as well as the issue of movement and distances traveled by citizens to pass through the withdrawal committee of the driver's license, without mentioning the burdens and bureaucratic challenges that they will encounter while traveling (8). We use Europeans as an illustration. When infractions occur, they deal with drip. For instance, Tatie disregards the undeniable proof that the infraction was committed in the house to pay the fee even though the Englishmen avoid speaking to the offender. Unfortunately, unlike our country, their law does not automatically revoke the license for a minor infraction (8).

Disposal of paper transactions

Many benefits can be obtained when you get rid of Traffic Police paper transactions and move to work digitally. These benefits include:

- Increased efficiency and speed:

  Traffic police can improve efficiency and speed in performing administrative tasks and verify data and information when using digital work rather than paper transactions. Working paper

transactions between a policeman and a driver requires considerable time and effort to pack and sign forms and forms, while things can be done quickly and easily through digital work.

- Improved reliability:

  Digital traffic police work allows easy and fast access to records and data. It helps reduce the chances of human errors that can occur when working with paper transactions, thus increasing the reliability of information and improving the quality of service provided.

- Cost savings:

  The traffic police can reduce costs related to the purchase of paper, ink, printers, and paper storage, which can provide digital work with financial resources and help improve operational efficiency. Maintaining records:

- Digital work helps maintain accurate and reliable records of transactions between the policeman and the driver, allowing easy and quick access to this information when needed.

In general, getting rid of traffic police paper transactions, especially between cop and driver, and transitioning to digital work can bring many benefits, including improved efficiency, speed, accuracy, cost, and time savings.

Easy and fast search for driver and car information

Working digitally makes searching for driver and car information easy and quick can help improve traffic safety and facilitate traffic police work in their tasks. In the normal case, the policeman stays for minutes and checks between the papers only to see the information. Among the advantages that can be provided through the «digital police» are: The digital traffic police system allows faster and more efficient access to driver and car information such as registration information and driver information, helping to improve the quality of services provided by traffic police. This means that traffic police will be able to free up more offenses and monitor roads more efficiently than they can provide better service to the community and protect citizens. The digital system helps to reduce road crime by identifying and constantly monitoring the driver and the vehicle's information. It saves time and effort in gathering information and handling irregularities, and information can be obtained quickly and accurately.

Reducing traffic accidents

Reducing traffic accidents is a major target of any traffic system, as traffic accidents are one of the biggest problems facing communities around the world. The digital traffic police system can help

achieve this goal by refining reckless drivers and ”speed enthusiasts”, making them more compliant and law-abiding.

Facilitating the liberalization of infractions and misdemeanors on the policeman and driver

The digital system allows for improving the efficiency of the process of editing offenses and misdemeanors and reduces the time and effort required by traditional paperwork, enabling the policeman to edit them faster and easier, thanks to the use of digital input and automated processing techniques. Providing support and assistance to the traffic police in managing offenses and providing useful reports and statistics to improve the quality of service provided to citizens.

Avoid forgery and false statements

Through the application of «digital police», accurate verification of vehicle and driver information and details is possible. This prevents the possibility of falsification of documents or data, thereby ensuring the reliability and full validity of the data used in the editing of irregularities, allowing the cop to avoid false declarations and provide false information and has a significant role to play in reducing corruption, bribery, and illegal practices, Information and data are thoroughly verified without manipulation.

2.6 Conclusion

This chapter used the framework for our project. We addressed the host organization. We saw the strict penalties applicable to drivers of vehicles who did not respect the law as a result of an offense or misdemeanor. In addition to how the license system operates with the relevant points and penalties Each offense or misdemeanor has a custom withdrawal of points and how to recover these points, We also saw the aim of its application which is to motivate drivers to abide by the traffic rules and apply them well and the obstacles that caused the State not to start it, to apply it correctly by establishing a digital system that automatically controls points according to the type of offense or misdemeanor committed The reason why we created this digital system is to eliminate the problem of booking a driver’s license and getting rid of the paperwork suffered by the cop and the driver. In addition to making the search for license and car information easy and fast as well as avoiding forgery and false declarations, the most important reason is to reduce the traffic accidents suffered by the State: hundreds and thousands of deaths each year.

Chapter 3

ANALYSIS AND IMPLEMENTATION

3.1 Introduction

To achieve better organization and good control of our work, thereby developing better applications, a systematic approach is necessary. Therefore, choosing the design method is of the utmost importance to accurately describe the application to be implemented so we chose modeling that shows different actors as well as the roles they can play, Then we will address the implementation part that describes the environment of the hardware and software that allowed us to implement our project as well as explain the way the application works by offering its various interactions between the user and the system.

3.2 Project incarnation

3.2.1 Scenarios 1

Digital police are based on reading data stored in the bio-metric driver's license chip by a smart card reader who can access the data stored in any smart chip card. This technology allows the police to read the digital card, verify information, edit the offense without the need for paper transactions, and upload the data to the system's central database, Figure 3.1 expresses this at the following stages:

1. Insert the bio-metric driver's license into the smart card reader.
2. Authentication by reading the card concerning personal data stored in the central database and displaying the information stored in the card by automatically detecting any discrepancy between the information stored in the microchip of the card and those in the database.
3. After ascertaining the driver's and car's information, the cop edits the (x) offense or (y) misdemeanor.
4. Send data to the server.

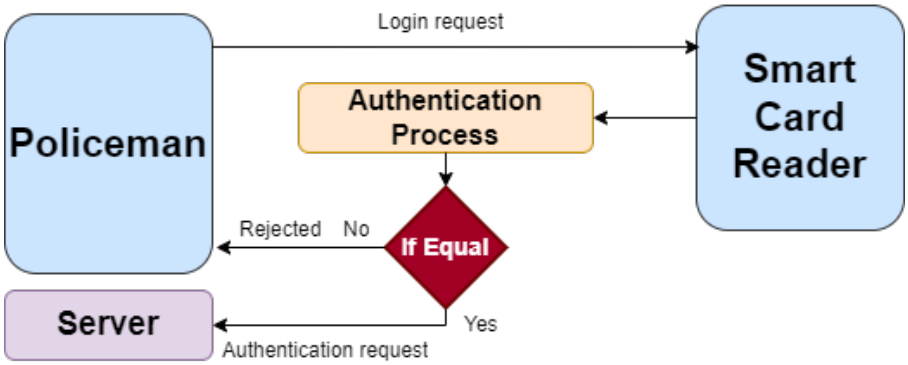

Figure 3.1: Authentication process

3.2.2 Scenarios 2

In this scenario the traffic law is applied in the presence of the policeman according to the following stages:

1. There's a traffic cop.
2. Driver's offense (x) or misdemeanor (y).
3. Police arrested the driver.
4. Use a smart card reader to read the driver's license for information.
5. Check and verify the driver's information.
    - If the driver's license is false or unregistered, this will be disclosed.
    - If the driver does not have a driver's license, entering the name and surname is sufficient.
6. Edit offense x or misdemeanor y depending on the following stages:
    (a) In the case of a normal driver's license (24 points): If it is an offense, the points shall be automatically withdrawn and the penalty shall be imposed according to its grade:
        - First-degree offenses: withdrawal of point (1) and imposition of a penalty fine of 2,000 DZ.
        - second-degree offenses: withdrawal of point (2) and imposition of a penalty fine of 2,500 DZ.
        - third-degree offenses: withdrawal of four points (4) and imposition of a penalty fine of 3,000 DZ.
        - fourth-degree offenses: withdrawal of six points (6) and imposition of a penalty fine of 5000 DZ.

        If a misdemeanor 10 points are automatically withdrawn.

    (b) In the case of a test driver's license (12 points):
        - If it is an offense, the points shall be automatically withdrawn and the penalty shall be imposed according to their grade.
        - If a misdemeanor cancels the driver's license by the police department after receiving an order for revocation by the judiciary.

7. After the police have done the editing procedures, the offense (x) or misdemeanor (y) in the database and the driver's page for later access (date, time, cause, location, amount, validity of the license in points, total number of points).

8. After informing the driver about the details of the offense (x) or misdemeanor (y):

    - Either pay the fine for the offense (x) within 45 days to return the discounted points, or automatically withdraw two points and raise the fine to the maximum, in case the penalty is not paid after the expiry of this term from the date of inspection of the violation.
    - In the case of a misdemeanor (y), the police department shall send it to the court, which shall decide whether or not to acquit the driver. In the case of acquittal, the points that have been withdrawn shall be retrieved. In the case of non-acquittal, it shall be up to the competent authority to make legal decisions and points shall not be recovered.
    - In the end, all offenses, misdemeanors, and their consequences are kept in the archives for easy reference.

9. In the case of a driver's license (0 points):

    - After all points are exhausted, the driver's license automatically becomes invalid.

Figure 3.2: The application of Scenario 2

3.2.3 Scenario 3

In this scenario we will apply the digital policeman application. In the absence of traffic police, the application ensures speed control for drivers. We also enable anyone who commits a speeding offense to be punished without a traffic policeman. This is done by the following stages:

1. No Traffic Cop.
2. Registration of RADAR for offense of permitted speed juxtaposition.
3. Record the speed of the car.
4. Capture vehicle number with vehicle identification camera (Vehicle identifier detection camera)
5. Extract vehicle information from Management and Application Center.
6. Take driver photos and identify them through the database.
7. Send a message to the driver's phone by notifying him of the offense (X) or misdemeanor (y).
8. If the driver is not identified, the digital administrative status is canceled and the following procedures apply:
    - Send a message to the owner's phone to inform him of the offense (X) or misdemeanor (y).
    - Obligation to pass immediately to the nearest police station to record driver's information.

In the event of the driver's absence or omission, the actions will be taken against the owner of the vehicle; or other penalties, it is up to the competent authority to make legal decisions. In the case of a policeman, the operation is done according to scenario 2.

3.2.4 Scenario 4

This scenario applies in the absence of a traffic policeman, we can control the speed and commitment of drivers to respect the permitted speed, by placing a vehicle identification camera. In addition, he sent a text message to the owner's phone informing him that the traffic offense (X) or misdemeanor (y) had been committed, and to avoid his refusal and obligation to join the nearest police station. In this case, if the facial recognition camera is available, allowing the driver's facial images to be captured and recognized from the database. This is done by the following stages:

- No Traffic Cop.
- Registration of RADAR for violation of permitted speed juxtaposition.
- Speed recording of the car.
- Pick up the vehicle number with the vehicle identification camera.

- Extract the vehicle information from the management and application center.
- Take driver photos and identify them through the database.
- Send a message to the driver's phone by notifying him of the offense (X) or misdemeanor (y).
- If the driver is not identified, the following procedures apply:
  - Send a message to the owner's phone to inform him of the traffic offense (X) or misdemeanor (y).
  - Obligation to pass immediately to the nearest police station to record driver's information.
- In the event of the driver's absence or omission, the actions will be taken against the owner of the vehicle; or other penalties, it is up to the competent authority to make legal decisions.

In the case of a policeman is present, the operation is done according to scenario 2.

Figure 3.3: The application of Scenario 3 and 4

3.3 Flowchart of scenarios

3.3.1 Flowchart of scenarios 2

- the case of a normal driver's license (24 points):

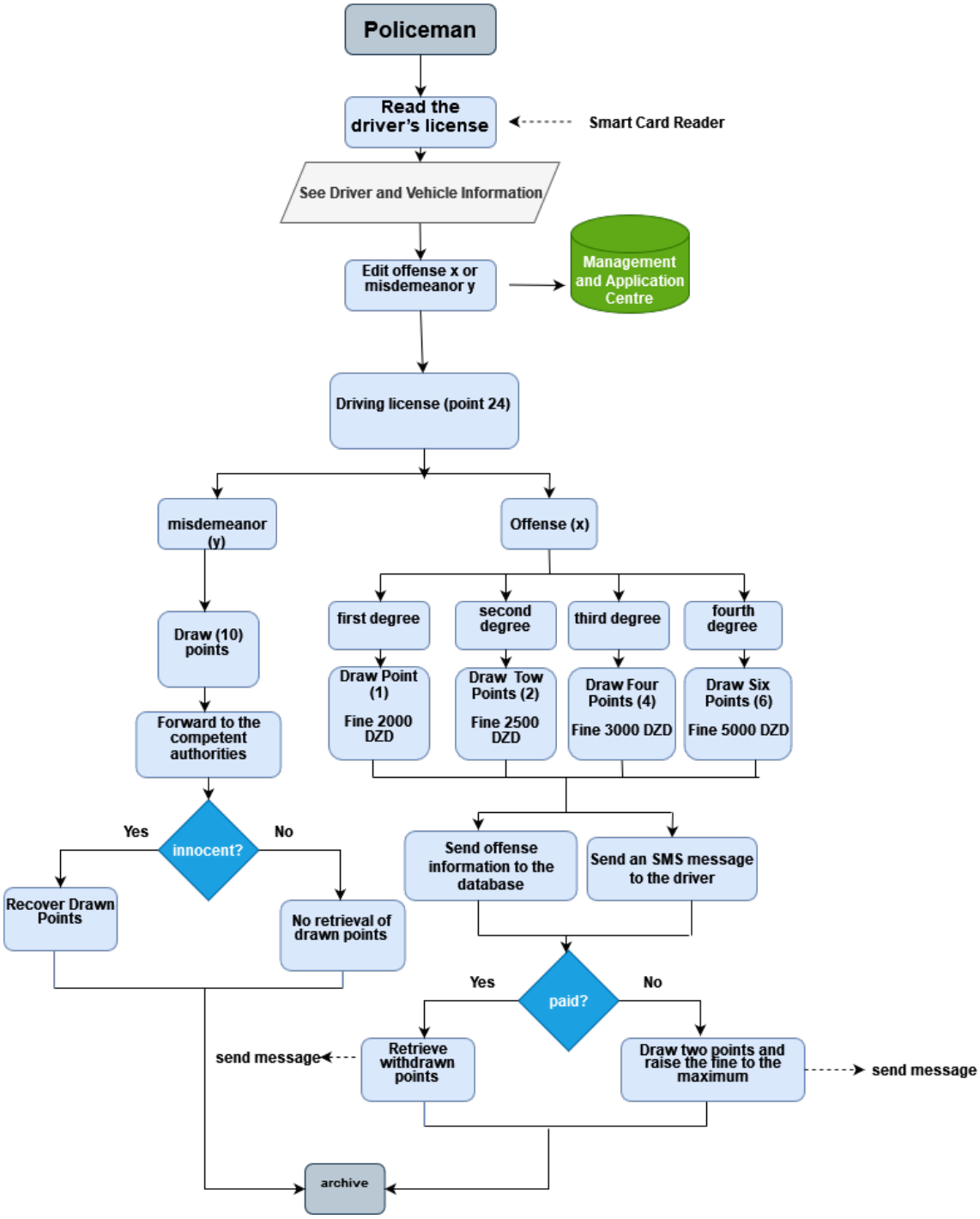

Figure 3.4: Flowchart of driver's license (24 points)

- the case of a test driver's license (12 points):

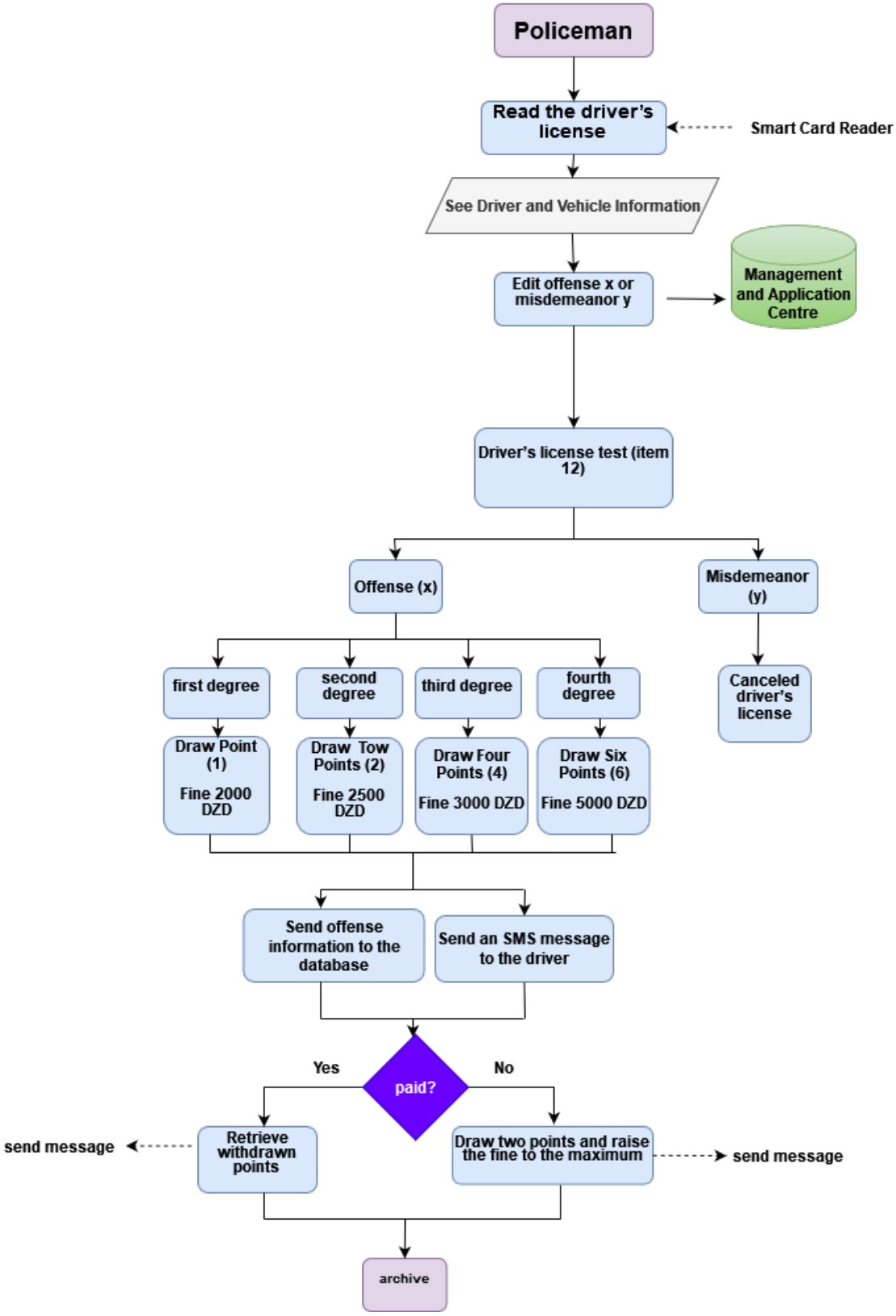

Figure 3.5: Flowchart of a test driver's license (12 points)

- In the case of a driver's license (0 points):

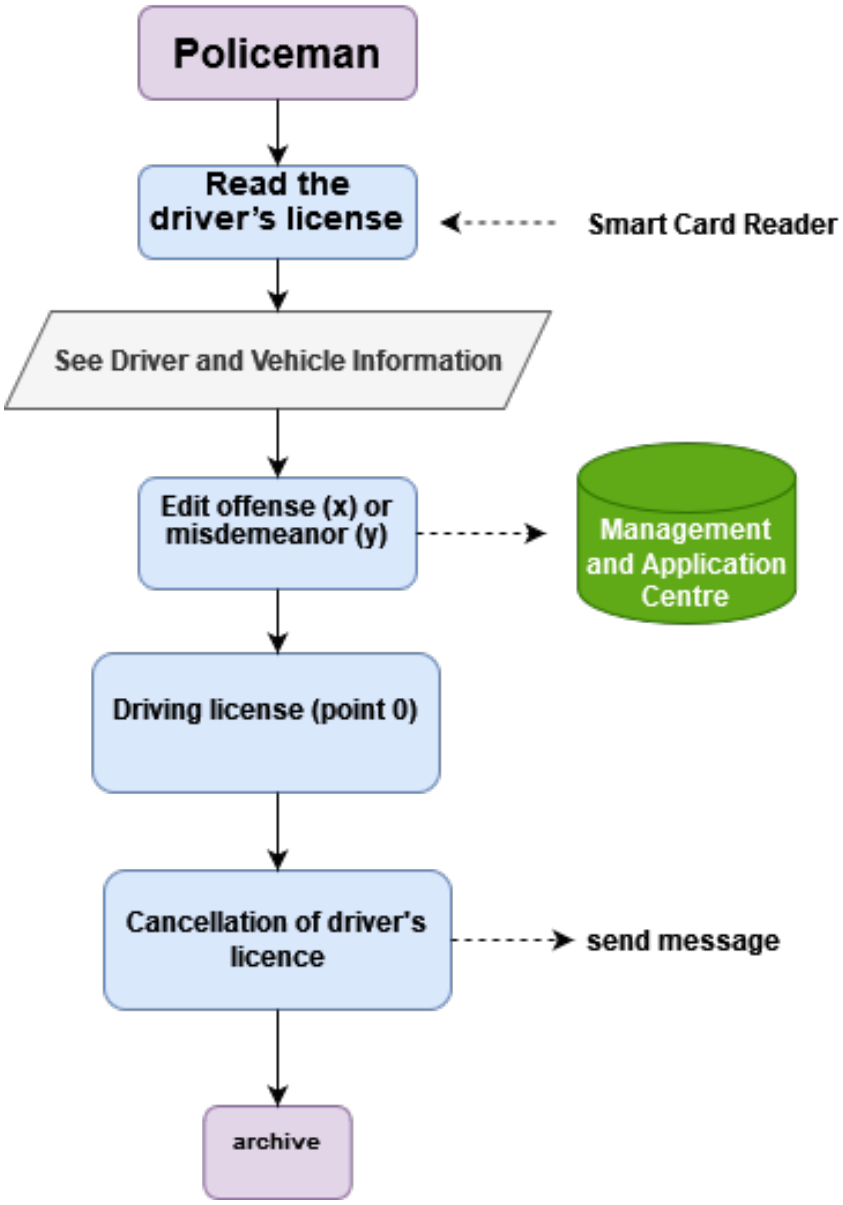

Figure 3.6: Flowchart of driver's license (0 points):

3.3.2 Flowchart of scenarios 3

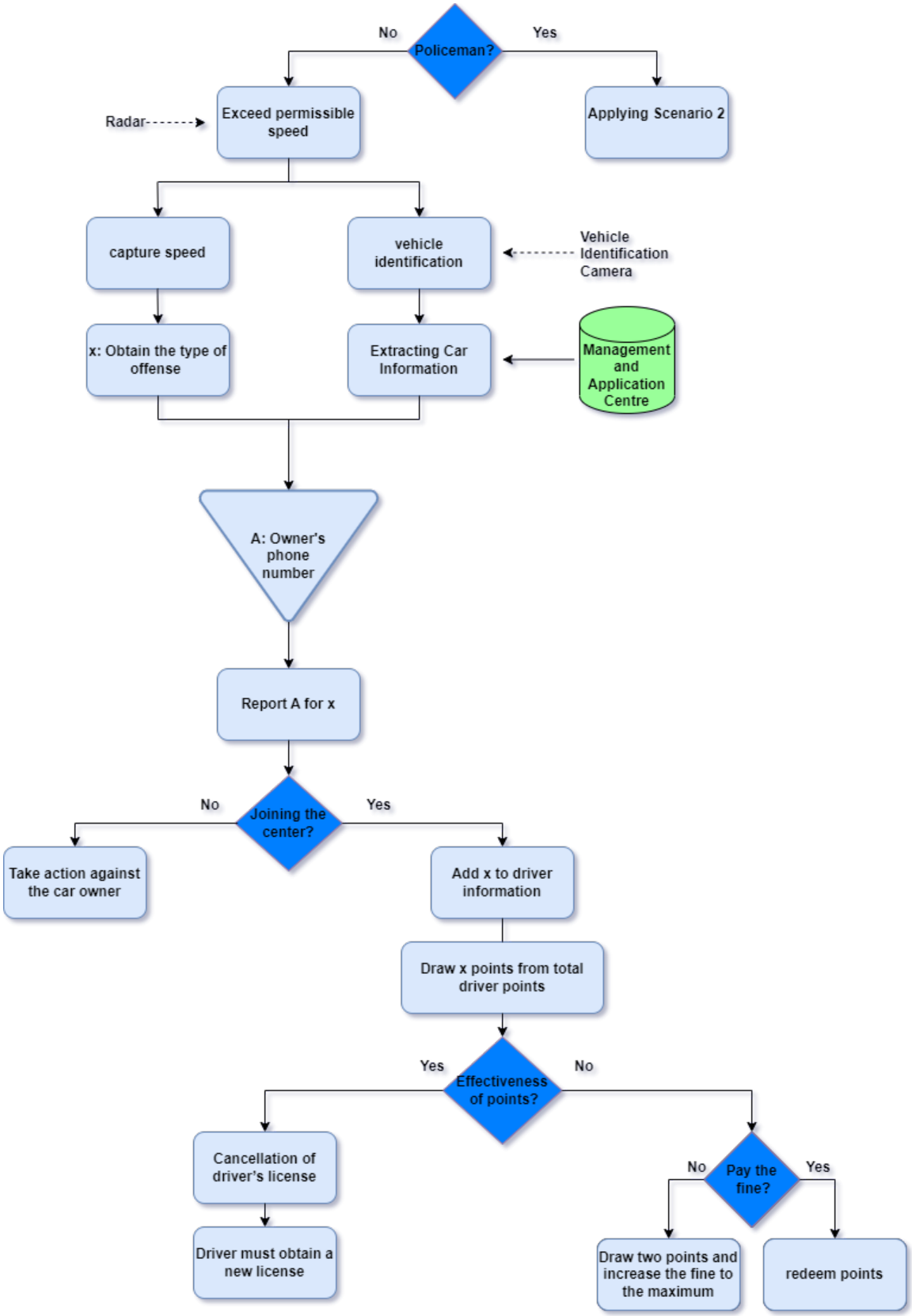

Figure 3.7: Flowchart of scenarios 3

3.3.3 Flowchart of scenarios 4

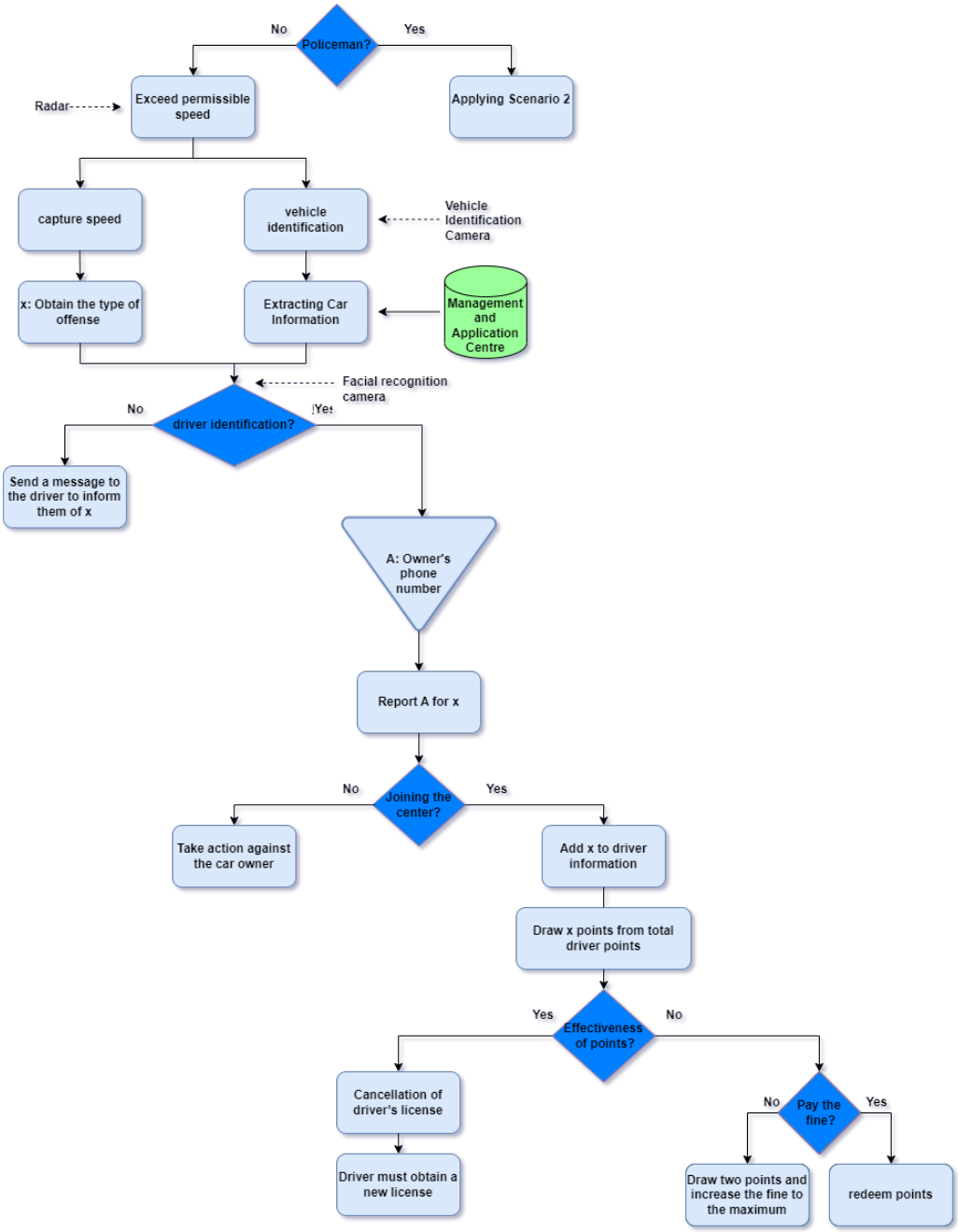

Figure 3.8: Flowchart of scenarios 4

3.4 Analysis

Before looking at the conceptual study, we will first study the context of a system that is, as a reminder, ”digitization of traffic law. We will identify use cases to create each actor’s usage status chart.

3.4.1 Context diagram

To address the first point, we will use a context diagram to model the system globally speaking.

The context diagram allows you to:

- Highlight key players.
- Define the interactions between the modeled system and the different actors.

Identification of actors

The actor is an External entity that can interact with the system (user, another system). The term actor means not only human users but also other systems (hardware and software) external to the application. An actor may have the following behaviors:

- Give information to the system.
- Receive information from the system.
- Provide and receive information from the system.

In response to the action of an actor, the system provides a service that corresponds to his need.

To identify the actors, we must focus on the role of the different entities. For our system, we have four actors:

1. Policeman:

   the person responsible for the liberation of offenses and misdemeanors.

2. Administrative:

   Person responsible for the administration of offenses and misdemeanors.

3. President:

   The person responsible for the management of the system (data management).

4. Driver:

   Person to receive information from the system (access to offenses and misdemeanors)

For a global view of the interactions between these actors and the system, we use the context chart, a conceptual flow model, which is represented in the following format:

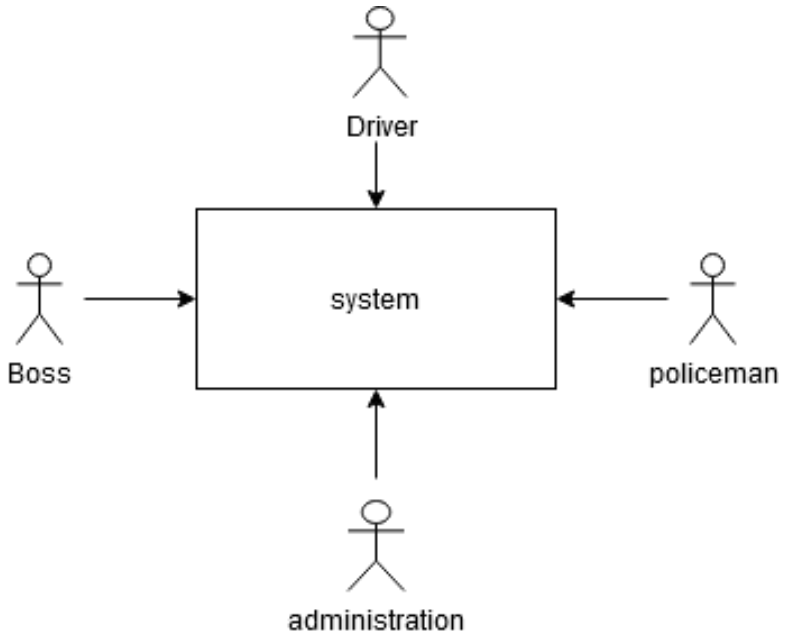

Figure 3.9: Contextual outline

3.4.2 Identification of use cases

The use status represents a set of sequences implemented by the system in response to an actor by an actor that produces an observable result. Use cases describe what the system should do without specifying how to do it.

1. Administration's use case

- Authentication.
- Show an offense(enter the offense code , paid).
- Show the misdemeanor (enter the misdemeanor code, paid).

2. policeman's use case

- Authentication.
- Add an offense (enter license number, enter the vehicle registration number. enter the offense number, Send, Close).
- Add a misdemeanor (enter license number, Enter the vehicle registration number, enter the misdemeanor number, Send, Close).
- Show information (offenses and misdemeanors edited by the policeman).

3. Boss's use case

- Authentication.
- Show vehicle database.
- Show driver database.
- Show policeman database.
- Show administration database.
- Show offenses database.
- Show Misdemeanors database.

4. Driver's use case

- Authentication.
- Show the driver's information.
- Show car information.
- Show the offense committed.
- Showing misdemeanors committed.

3.4.3 Use case diagram

A system can be described by several usage cases describing a range of sequences of actions expressed by a group of users. The range of use cases is represented in the form of a diagram below, we present the use of status charts associated with each actor identified above:

1. Administrative use case diagram

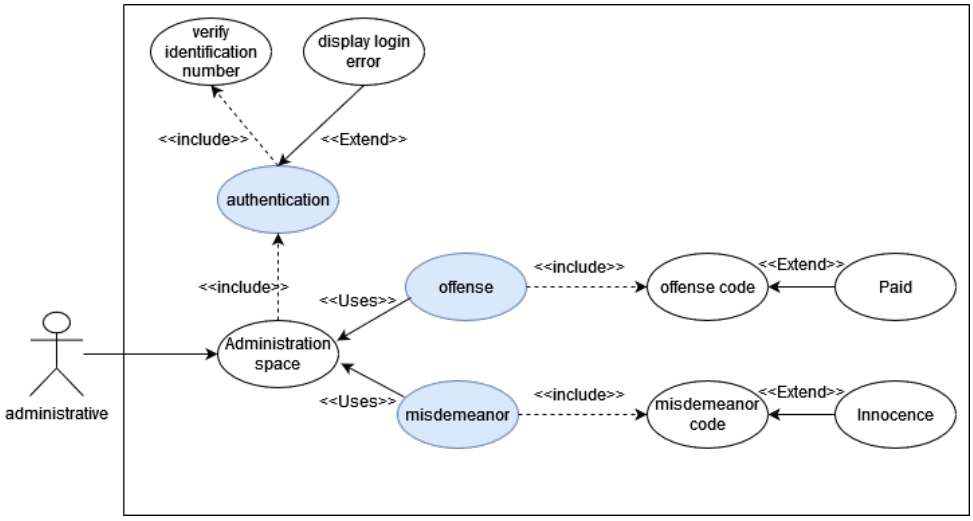

Figure 3.10: Administrative use case diagram

Scenarios by administrative function

Task	Scenario
Authentication	• the administrator goes to the home page, he certifies himself by inserting his ID number, and then clicks ”Enter.” • The system verifies the authenticity of the information received and displays the interface of the administrative area, otherwise, it returns the file of a message in writing.
Offenses Management	• To search for an offense, the administrator selects ”offense ”, showing the interface of the offense. • The administrator inserts the offense code and shows the relevant information.

Offenses Management	• The administrator chooses ”Paid” and the system automatically returns points that have been withdrawn from the balance of the driver’s license points, which is after the driver has paid the fine related to the offense. • Offenses processed are automatically saved in the database.
Misdemeanor management	• To search for a Misdemeanor, the administrator selects ”Misdemeanor ”, showing its interface. • The administrator inserts the misdemeanor code and the relevant information is displayed. • The administrator selects ”Innocence”. The system automatically returns points drawn from the driver’s license points balance. after the driver’s acquittal by the competent authorities. • Misdemeanors processed are automatically saved in the database.

Table 3.1: Scenarios by administrative function

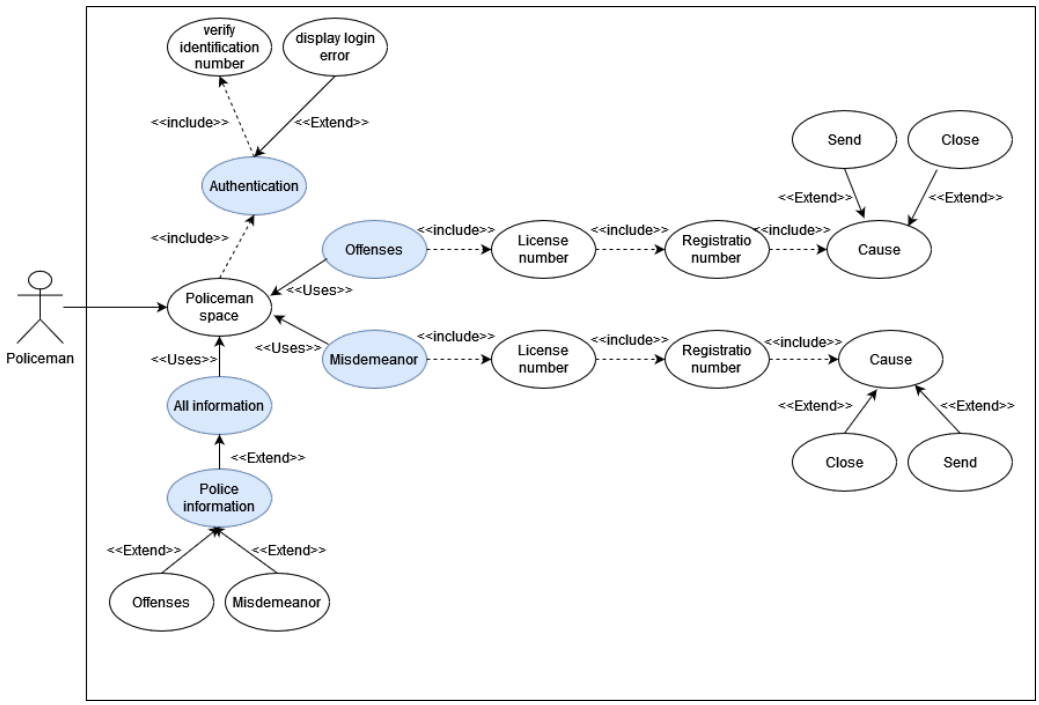

Figure 3.11: Policeman use case diagram

2. Policeman use case diagram

Scenarios by policeman function

Task	Scenario
Authentication	• the policeman goes to the home page, certifies himself by inserting his ID number, and then clicks ”Enter.” • The system verifies the authenticity of the information received and displays the interface of the administrative area, otherwise, it returns the file of a message in writing.
Add an offense	• The policeman clicks on ”add an offense”, showing him the infringement information interface. • The policeman Selects the location of adding the offense.

Add an offense	• Enter the driver's license number (manually or using the smart card reader) and show the driver's information in addition to the total license points and is valid or not. • Enter the vehicle registration number (manually or using the smart card reader) and show the vehicle information • Choosing the number of the offense that is confused by the driver and showing the amount of the penalty automatically. • When verifying the authenticity of the added information, select "Send" and register the offense in the database. • Click "Close" if the policeman just wants to see the driver's information.
Add a misdemeanor	• The policeman clicks on "Add a misdemeanor", showing him an information interface. • The policeman Selects the location of adding the misdemeanor. • Enter the driver's license number (manually or using the smart card reader) and show the driver's information in addition to the total license points and is valid or not. and the vehicle owner's information. • Enter the vehicle registration number (manually or using the smart card reader) and show the vehicle information and the vehicle owner's information. • Choosing the number of the misdemeanor that is confused by the driver.

Add a misdemeanor	• When verifying the authenticity of the added information, select ”Send” and register the offense in the database. • Click ”Close” if the policeman just wants to see the driver’s information.
´All information	• The policeman clicks on ”all information” if he wants to see the offenses and misdemeanors he has edited

Table 3.2: Scenarios by policeman function

3. Boss use case diagram

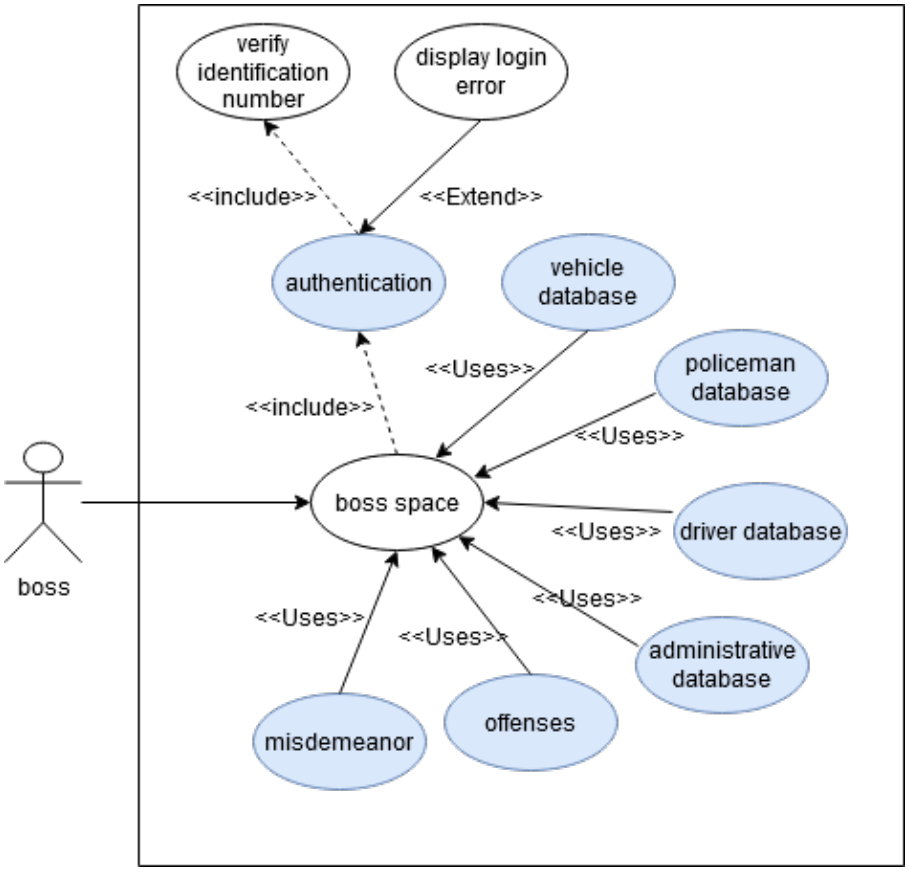

Figure 3.12: Boss use case diagram

Scenarios by boss function

Task	Scenario
Authentication	• the boss goes to the home page, he certifies himself by inserting his ID number, and then clicks ”Enter.” • The system verifies the authenticity of the information received and displays the interface of the administrative area, otherwise, it returns the file of a message in writing.
Vehicle database	• Select ”Vehicle database” to search for car information. • Enters the vehicle registration number in the ”Search” list, showing information about the vehicle and the vehicle owner
Driver database	• Select ”Driver Data”. • inserts the Driver ID number to be searched in the ”Search” list and shows all the information about it
Administrative database	• Select ”Administrative Data”. • inserts the Administrative ID number to be searched in the ”Search” list and shows all the information about it.
Policeman database	• Select ”Policeman Data”. • inserts the Policeman ID number to be searched in the ”Search” list and shows all the information about it.

Table 3.3: Scenarios by boss function

4. Driver use case diagram

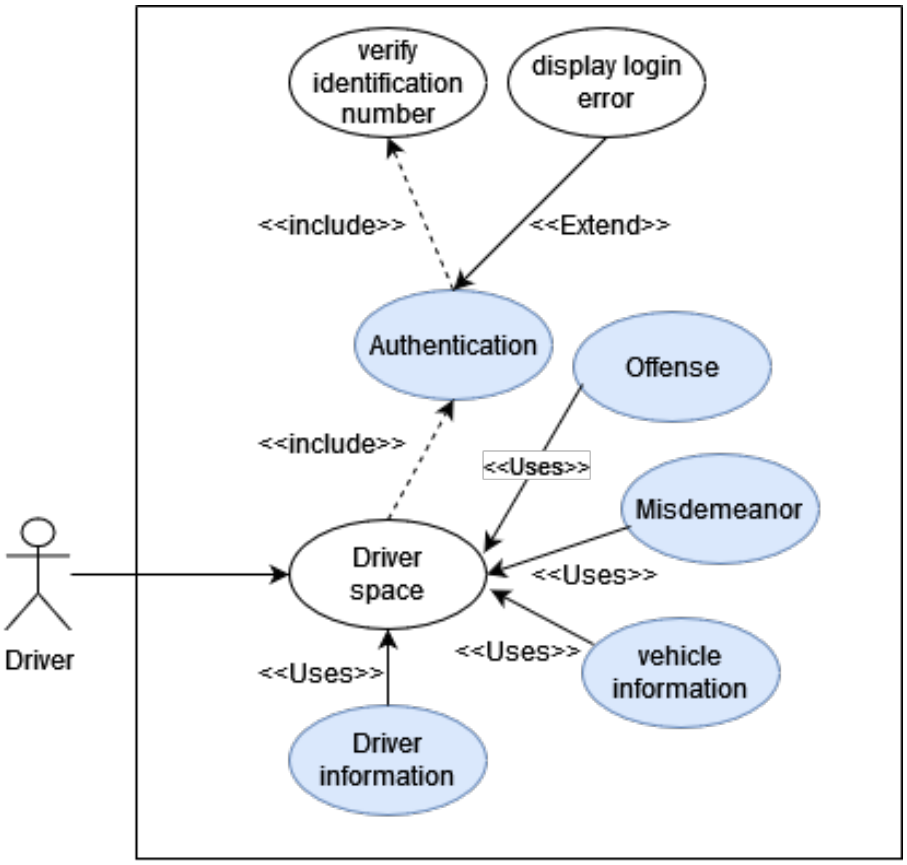

Figure 3.13: Driver use case diagram

Scenarios by driver function

Task	Scenario
Authentication	• the driver goes to the home page, he certifies himself by inserting his ID number, and then clicks ”Enter.” • The system verifies the authenticity of the information received and displays the interface of the administrative area, otherwise, it returns the file of a message in writing.
Driver page	After authentication the driver shows an interface with a list: • Click ”Driver Information” if he wants to see his information.

Driver page	• Click ”Car Information” if he wants to see his car information. • Click ”offense” if he wants to see his offenses • Click ”Misdemeanor” if he wants to see his Misdemeanor

Table 3.4: Scenarios by driver function

3.5 Working environment

3.5.1 Hardware environment

To realize our project and to reflect the different testing, installation, and deployment stages of the application, we used an HP Laptop 15-dw3xxx computer characterized by:

- Operating system: Windows 11 Famille Unilingue.
- Processor: 11th Gen Intel(R) Core(TM) i5-1135G7 @ 2.40GHz 2.42 GHz.
- RAM: 8 GB.
- Hard Disk: 256 GB.

3.5.2 Software environment

Each information technology project requires the use of robust technologies to ensure that the needs identified at previous stages are well implemented. To develop this application, we used the following development environments:

Borland c++ Builder development environment

C++ Builder 6 is an Integrated Development Environment (IDE) for developing Windows applications using the C++ programming language. It was developed by Borland and released in 2002 as part of Borland’s suite of software development tools. C++ Builder 6 combines a user-friendly development environment with a powerful set of tools and features that make it easier to build robust and efficient Windows applications. It includes a range of features such as a code editor, a debugger, a visual

component library (VCL) for creating graphical user interfaces, support for the Standard Template Library (STL), database connectivity tools, and deployment tools. C++ Builder 6 is widely used by developers who want to create Windows applications using the C++ programming language.

Figure 3.14: Borland c++ Builder 6

1. The C++ Builder interface

Figure 3.15 is a typical example of the C++ Builder interface during a work session.

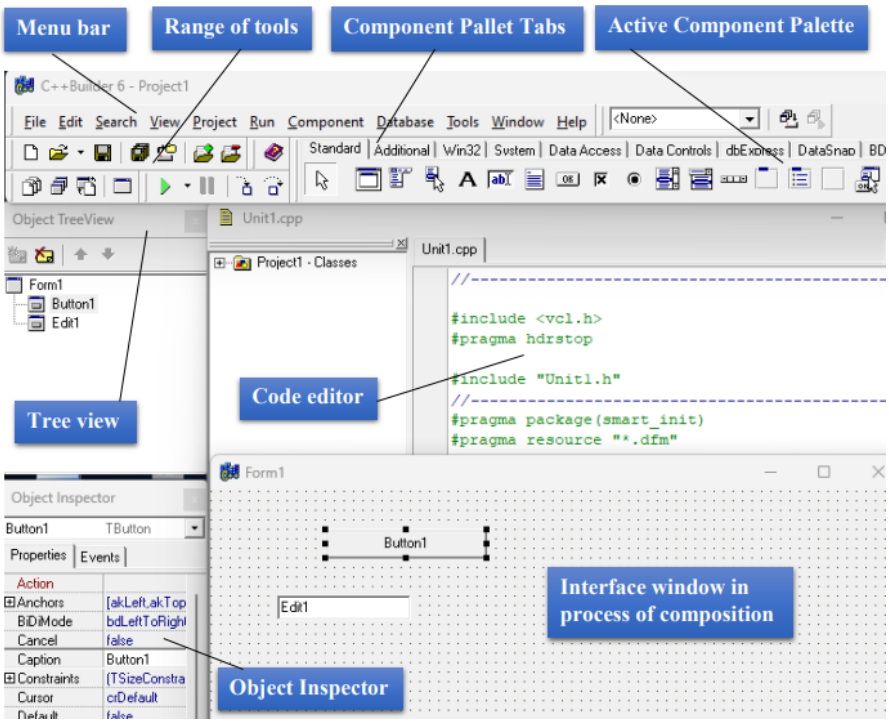

Figure 3.15: The C++ Builder interface

This interface is quite confusing at first because it does not occupy the entire screen. There are several distinct areas:

- The classic menu bar.
- The toolbar is divided into 2 main parts:
    1. The tool palette to perform the most common operations (backup, opening windows, etc.).
    2. Pallets of components arranged and accessible by tabs.
- Object inspector that allows you to manipulate the properties of components and associate code with their events.
- User-created interface windows. These are the windows of the application being created, they bear the name form. Some can be hidden, others present on the screen. It will be seen that in most cases their position (as well as their other geometric characteristics) at the execution are the exact reflection of what it was at the time of design.
- The code editor with automatic display of the code linked to the selected object in the form. Each record corresponds to two files: a header file (.h) and an editable code file (.cpp) (17).

2. C++ Builder components

C++ Builder allows the creation of different types of modules very simply in guided by experts. However, it is possible to request to create a simple application by activating the New Application option from the File menu.

The automatically created elements are a file named Form1 and the associated files Unit1.cpp and Unit1.h.

- Form1: the main program
- Unit1.cpp: the source code file for the main form that is named unit file.
- Unit1.h: the header file for the main forme that is named unit header file .

We recommend always saving the project immediately after its creation: we avoid creating compilation files in the default directories. This operation is performed with the command Save the project under… of the File menu. The project itself (.bpr file) is saved after the various. cpp and .h. Once this operation has been completed, it remains to perform the application by creating the interface objects and associating them with event handlers(17).

Microsoft Access

Microsoft Access is a database management system (DBMS) that combines a graphical user interface, software development tools, and the relational Microsoft Jet Database Engine. It is a component of the Microsoft Office application suite in the professional and above editions. It enables you to link relevant information quickly, such as customer and order data that you enter, as other relational databases do. Access, however, significantly enhances other database systems since it includes a number of strong connecting capabilities. Access, as the name suggests, may interact directly with data from a variety of different sources, including several well-known PC database tools, numerous SQL databases on desktops, servers, minicomputers, and mainframes, as well as data saved on Internet or intranet web servers. For the Windows operating system, Access offers a fairly powerful application development system. This enables rapid application development regardless of the data source(16).

Figure 3.16: Microsoft Access logo

3.6 Application Navigation Diagram

The navigation diagram of an application represents its different pages of it, organized logically and hierarchically in the form of a tree. The first page must be the home page (the root), and the other pages appear in a logical order. The tree structure allows users to better understand and situate themselves in the form, which allows ease and efficiency of use. After analyzing user needs, we structured our platform and were able to distinguish its different sections and pages as illustrated in Figure 3.17.

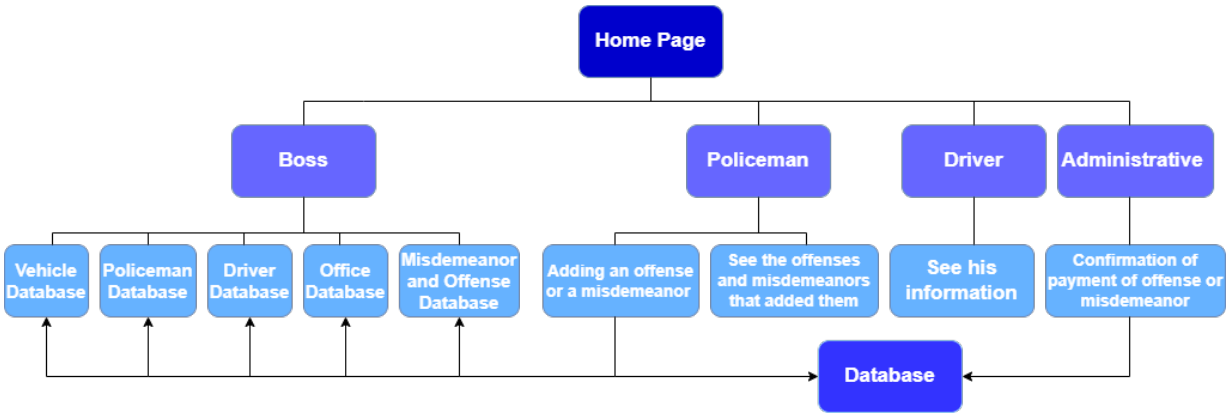

Figure 3.17: Application Navigation Diagram

3.7 Presentation of the interfaces of our application

The application's graphical interfaces are very important because they make it possible to facilitate the dialogue between man and machine and to improve the performance of the application. In this part, we present the main features of our application through the description of some interfaces.

3.7.1 Application logo « digital police»

Figure 3.18: Application logo « digital police»

3.7.2 The main interface "home page"

This page is an essential element of the application, it represents the identification phase to access its functionalities. Once logged in, the authentication page is displayed, and it is composed of the «Enter» zone and the «Identify» zone, the user accesses the page dedicated to him according to his role:

- Boss
- Administration
- Policeman
- Driver

Figure 3.19 below represents the platform home interface where the user authenticates to access the application. The user enters their login data and clicks "Enter". If the information entered is correct, it will be authenticated, otherwise, an error message will be displayed:

- Identify number is incorrect.

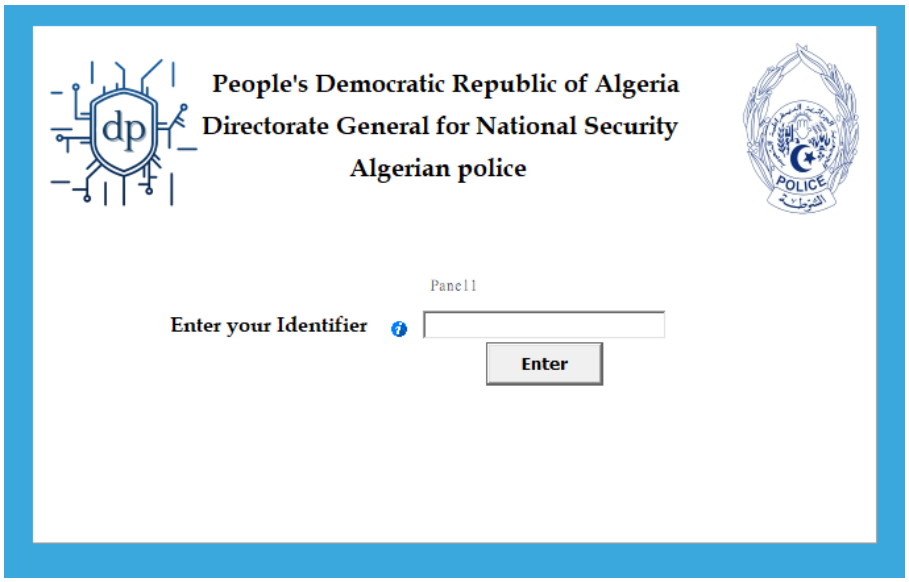

Figure 3.19: Home Page interface

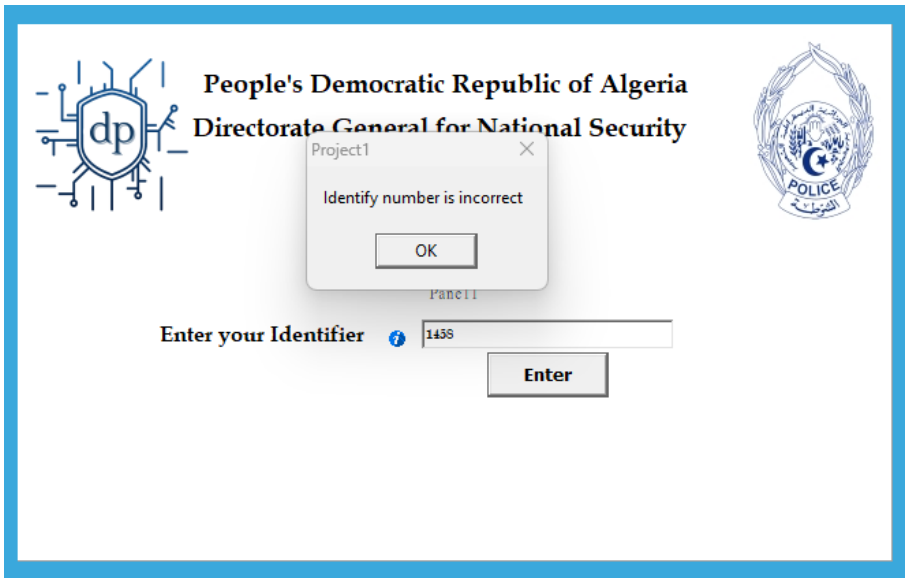

Figure 3.20: Message «Identify number is incorrect»

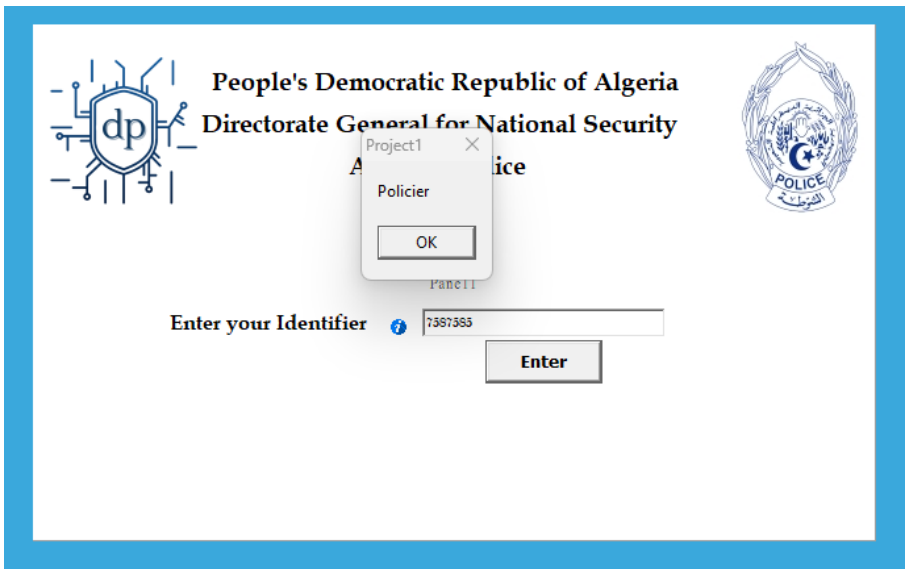

Figure 3.21: Policeman authentication

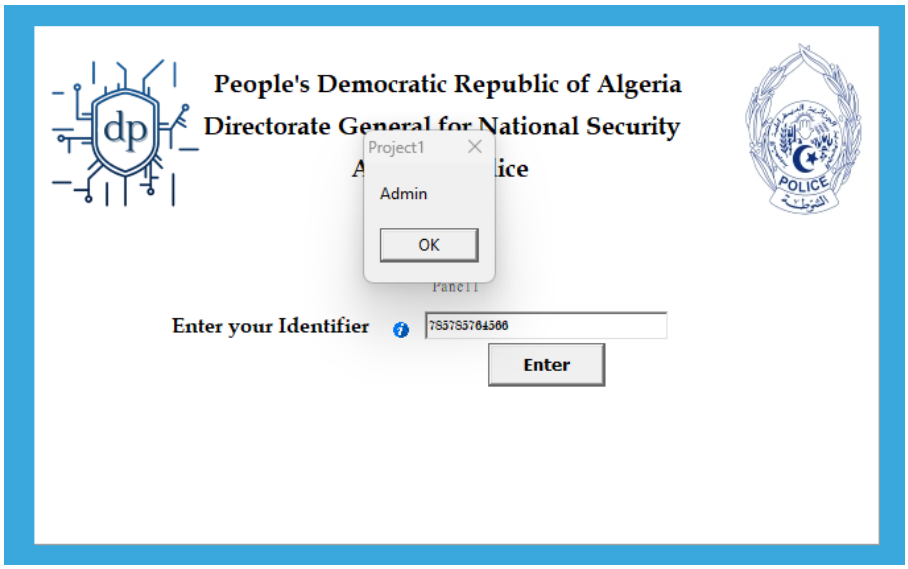

Figure 3.22: Administrative authentication

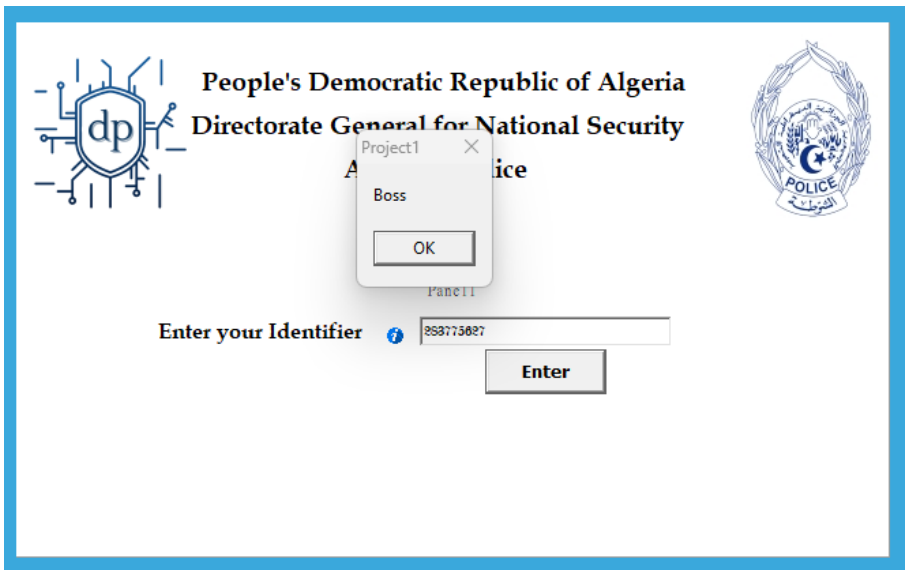

Figure 3.23: Boss authentication

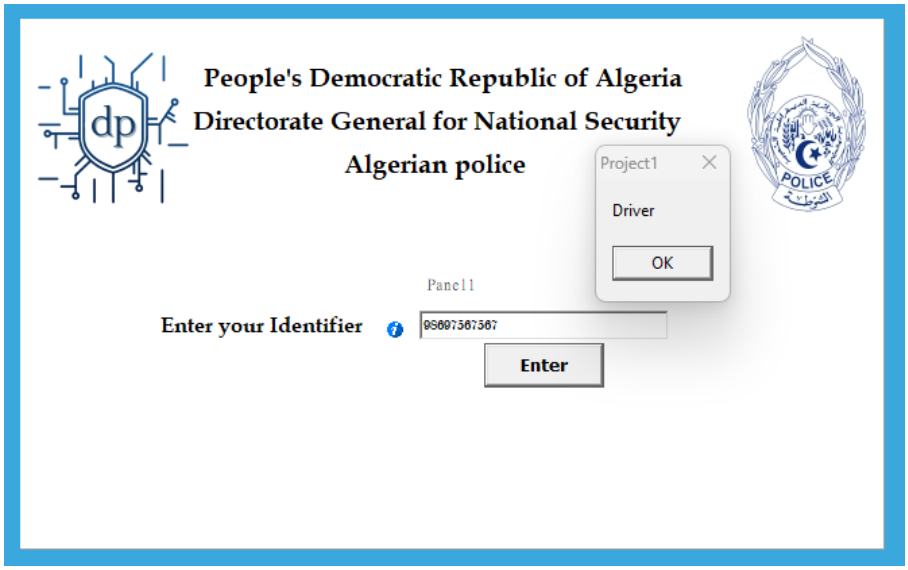

Figure 3.24: Driver authentication

3.7.3 Policeman Interface

Figure 3.25 shows the interface displayed to the policeman, which contains his private information after authentication, the policeman has a role in adding a misdemeanor or an offense. This interface provides the policeman with three links, add an offense, add a misdemeanor, and finally show all information, depending on his choice the policeman will be directed to one of the following interfaces:

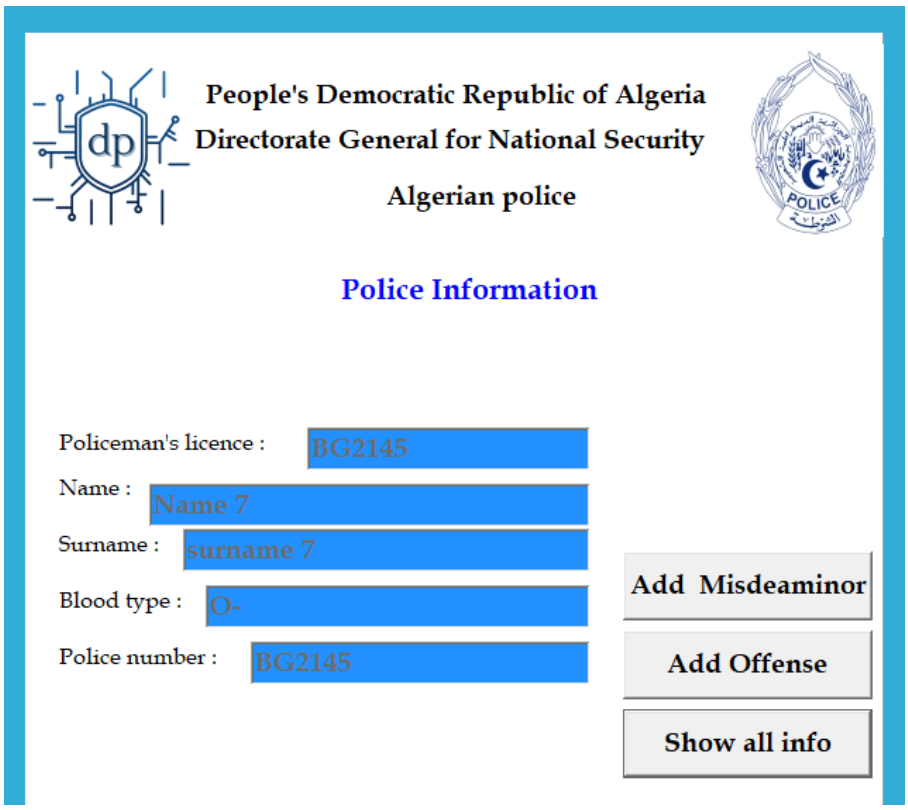

Figure 3.25: Policeman interfece

1. Add an offense

To go to this interface represented in Figure 3.26, the policeman performs the following stages:

- Clicking on the addition of an offense in his own space.
- The appearance of the offense interface.
- The number of the policeman who added This offense is automatically inserted.
- Selects the place of adding the offense.

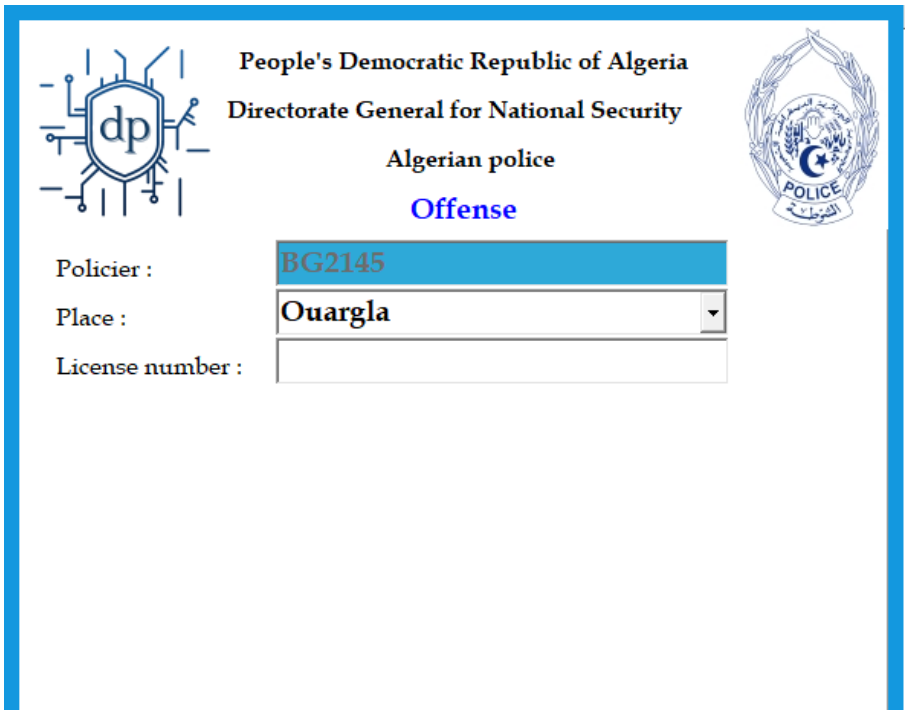

Figure 3.26: Add Offense interface

item step of entering the driver's license number:

- Enter the license number, in this case, if a biometric card reader is available, use this device.

Once the license is entered, the following information automatically appears:

- Name and surname of the driver.
- The date of issuance and expiration of the driver's license.
- The validity of the driver's license in points, so that if the points are not equal to zero, they show True, otherwise they show False, in addition to the balance of the driver's License Points.
- The icon for entering the car registration number.

This step is represented in Fig 3.27.

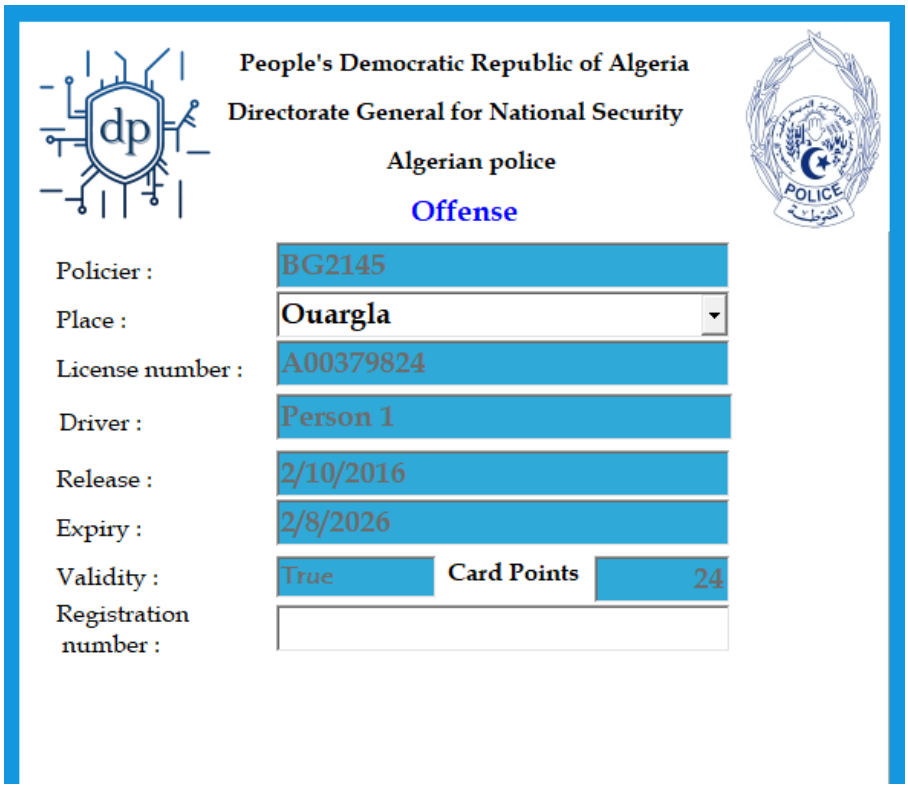

Figure 3.27: Step of entering the driver's license number

step of entering the vehicle registration number:

- Enter the vehicle registration number.

Once the registration number is entered, the following information automatically appears:

- Name and surname of the car owner
- Validity of the car owner's driver's license in points.
- The icon for selecting the committed offense.

This stage is represented in Figure 3.28

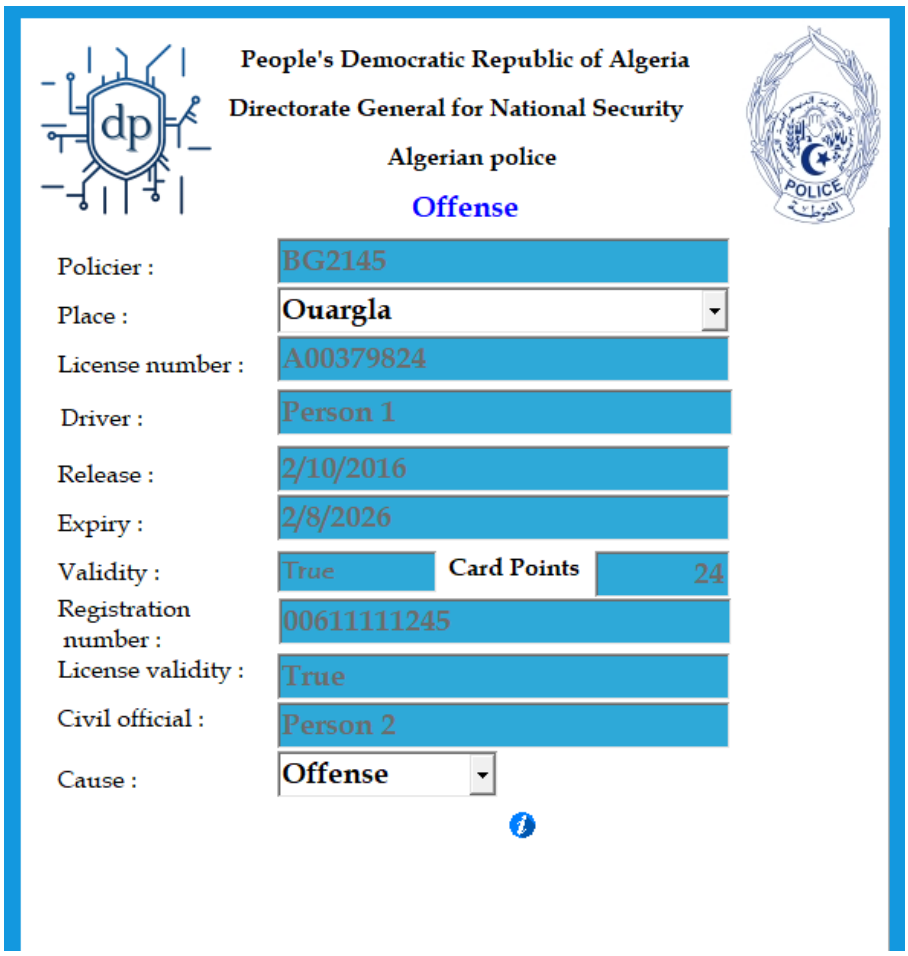

Figure 3.28: step of entering the vehicle registration number

step of choosing the committed offense:

- Select the number of the committed offense, in case the policeman does not know the number of the offense, click on the blue button and all offenses appear with their numbers.
- Once the offense number is selected, the price related to this ticket is automatically displayed, as well as the «Send» button.
- After pressing the «Send» button, the offense information is sent to the database.
- If the policeman wants to check the driver's information and the validity of the license, he presses the «Close» button.

This stage is represented in Figure 3.29

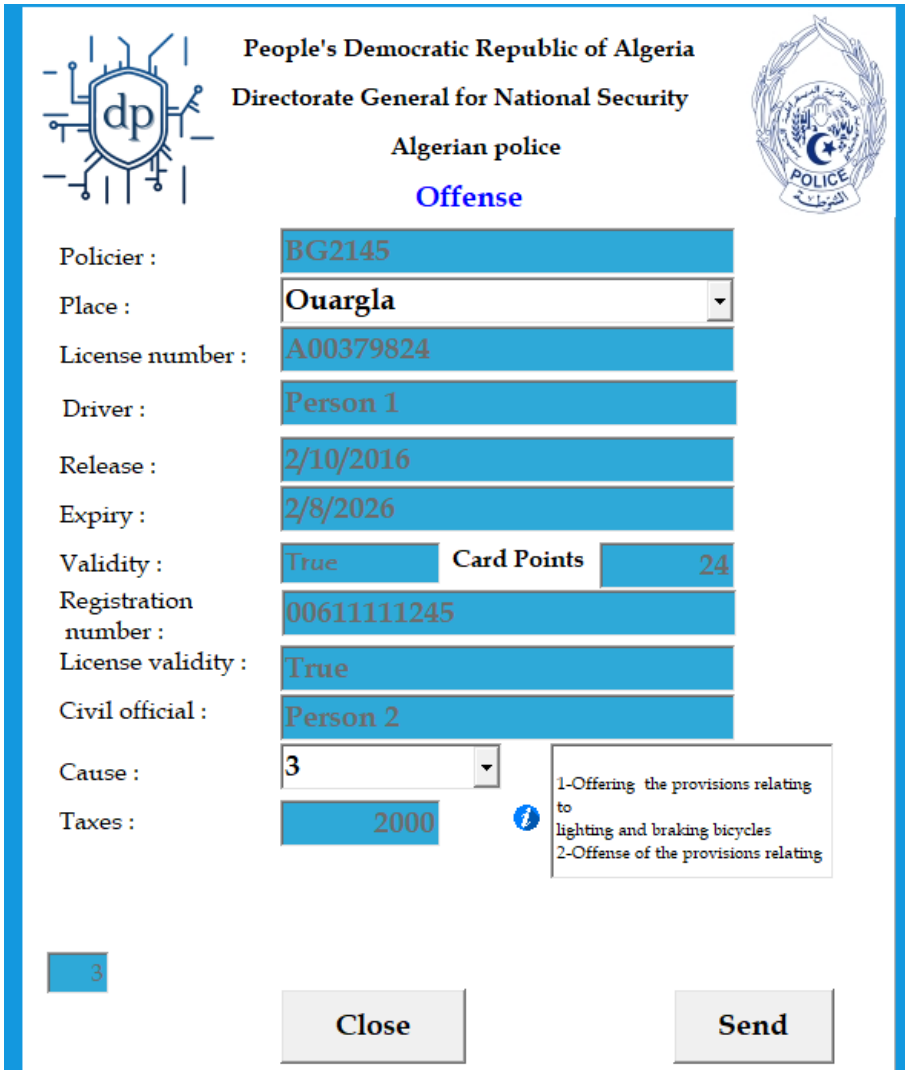

Figure 3.29: Step of choosing the committed offense

2. Add a misdemeanor

To go to this interface represented in the Figure below, the policeman performs the following stages:

- Clicking on the addition of a misdemeanor in his own space.
- The appearance of the misdemeanor interface.
- The number of the policeman who added This misdemeanor is automatically inserted.
- Selects the location of adding the misdemeanor.

This stage is divided into three steps. The first step and the second step are similar to the offense.

The third step is the step of choosing the committed misdemeanor:

- Select the number of the committed misdemeanor, in case the policeman does not know the number of the misdemeanor, click on the blue button and all misdemeanors appear with their numbers.

- Once the misdemeanor number is selected, the price related to this ticket is automatically displayed, as well as the« Send» button.
- After pressing the «Send» button, the misdemeanor information is sent to the database.
- If the policeman wants to check the driver's information and the validity of the license, he presses the «Close» button.

This stage is represented in Figure 3.30.

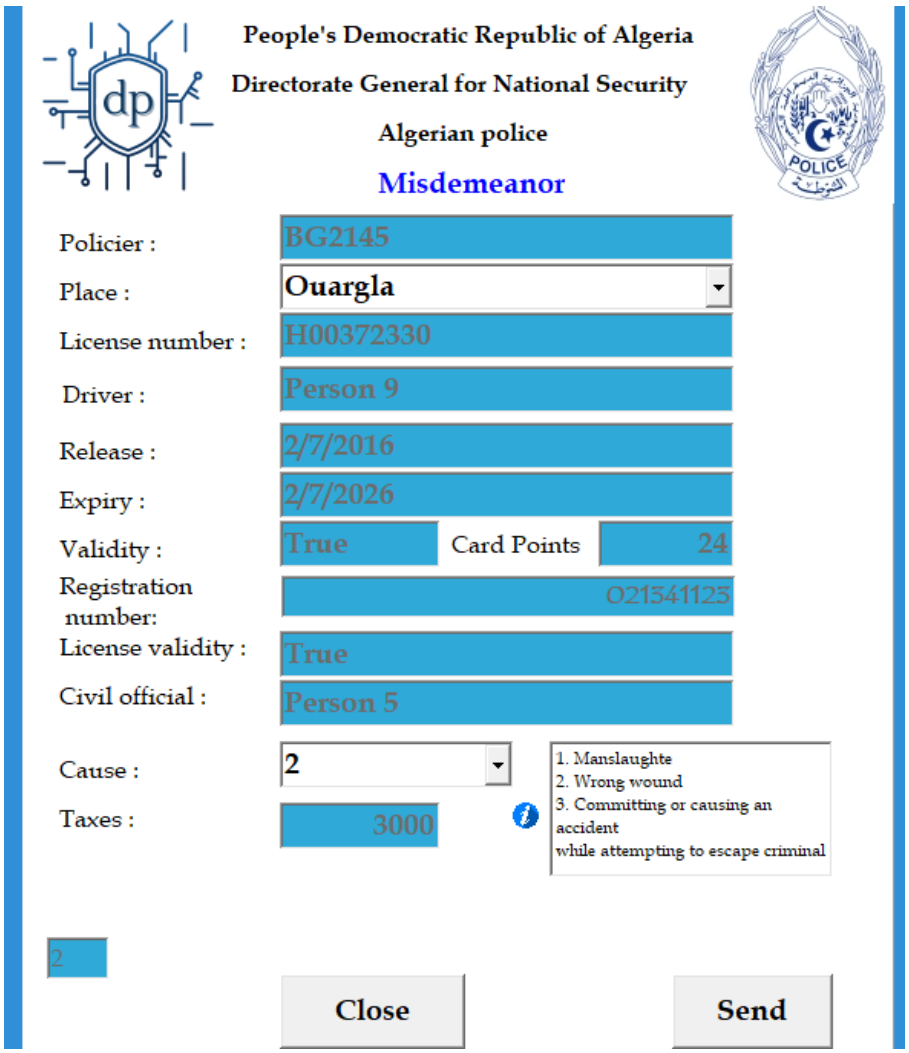

Figure 3.30: Add a misdemeanor

3. Show All information

To move to this interface represented in Figure 3.31, the conditional performs the following stages:

- Clicking on «Show All Information» in his own space.
- The appearance of the interface.

- The policeman chooses «Offense»or «Misdemeanor» .
- He sees all the offenses and misdemeanors that he added.

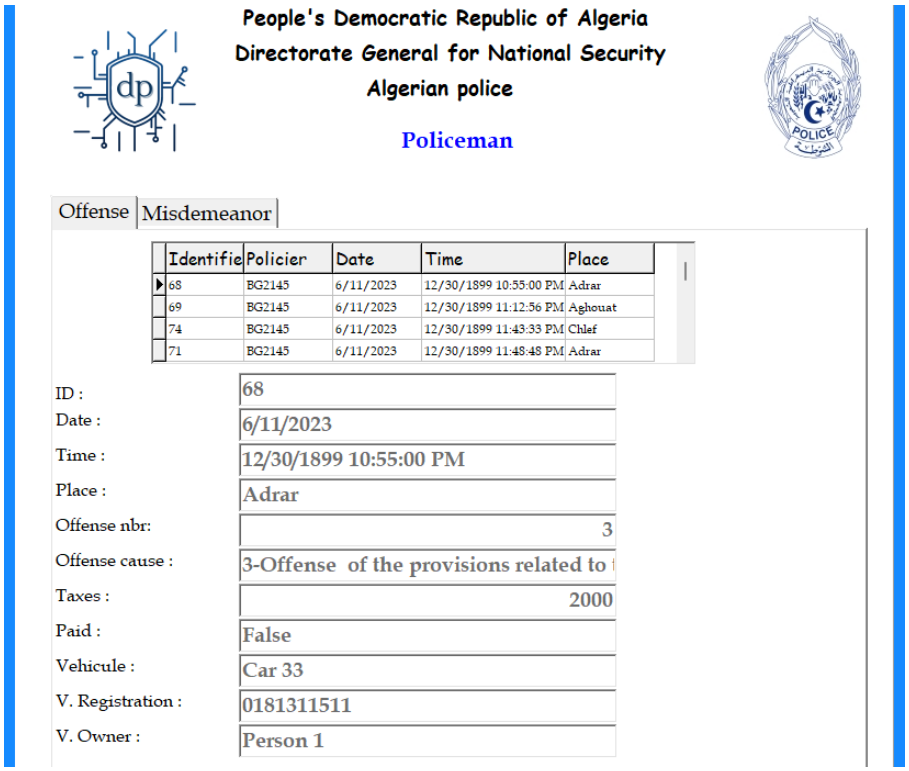

Figure 3.31: Show all information interface

3.7.4 Driver Interface

Figure 3.32 shows the interface displayed to the driver after authentication, this interface provides the driver with four streamlined options, driver information, vehicles, misdemeanors, and offenses, depending on his choice he will be directed to one of the following options:

1. Driver information option

This option, represented in Figure 3.32, displays all the information contained in the bio-metric driver's license, namely:

- Name and surname, license number, issuing authority.
- Date of issue and expiration, day and place of birth, item, National Identification Number, Gender.
- Add to this information the balance of the driver's license points and show whether the license is valid or not.

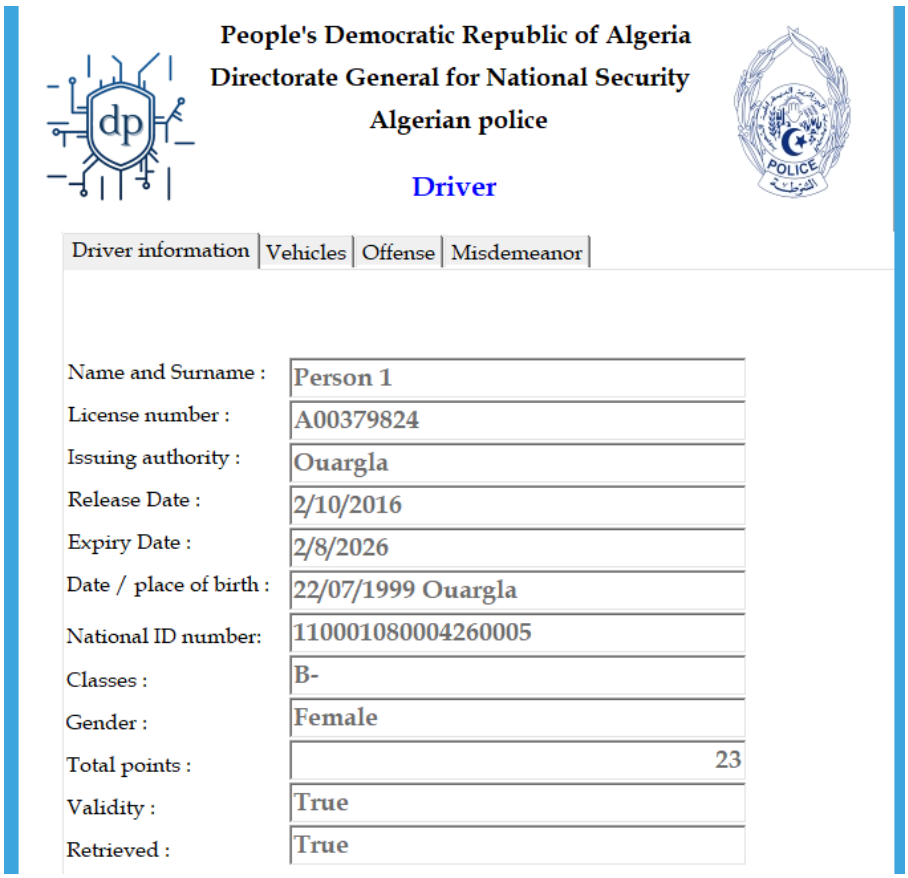

Figure 3.32: Driver interface

2. Vehicles option:

This option of Figure 3.33 displays all the cars owned by the driver with information about them, namely:

- Vehicle registration number, civil administrator, license number.
- Model, item and type of car, state, municipality, and address of the driver.
- Validity of the driver's license.

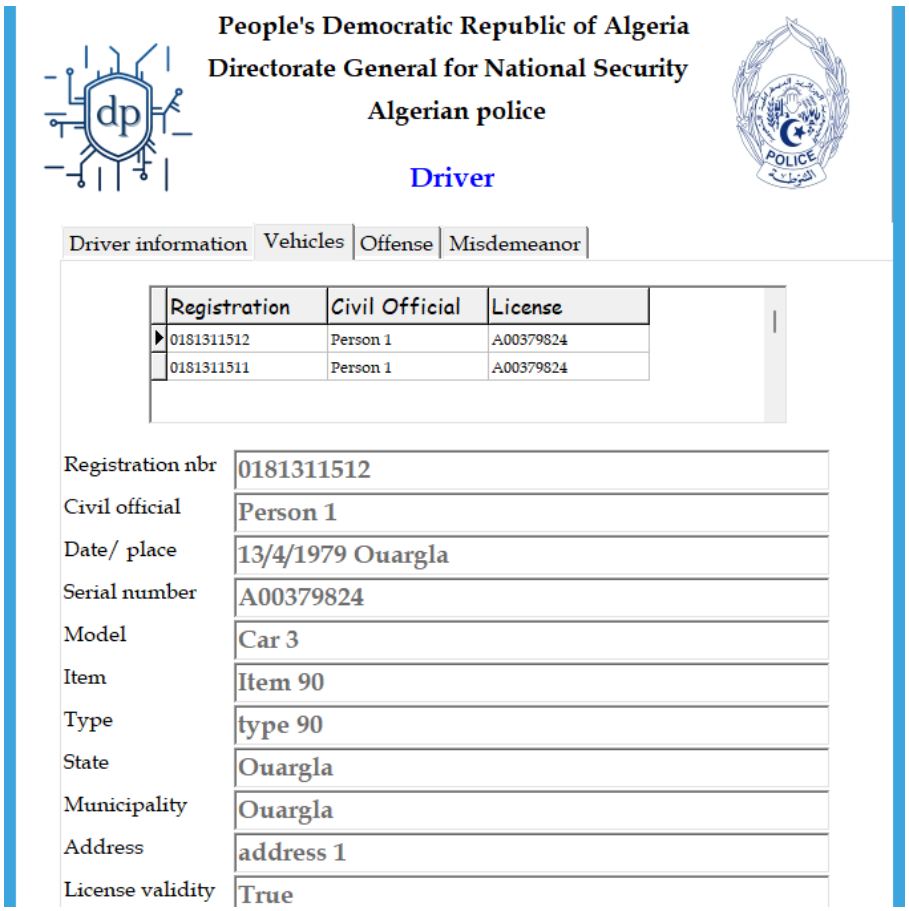

Figure 3.33: Vehicles option

3. Offenses option:

This option of Figure 3.34 displays all the offenses committed by the driver with the information related to them, namely:

- The date, time, and place of the offense committed by him.
- The number of offenses he needs to be able to pay the offense later at the administration.
- The reason for the offense, as well as the fine related to it and whether it was paid (true)or not (false).
- The car in which the offense was committed, its registration number, and the owner of this car.

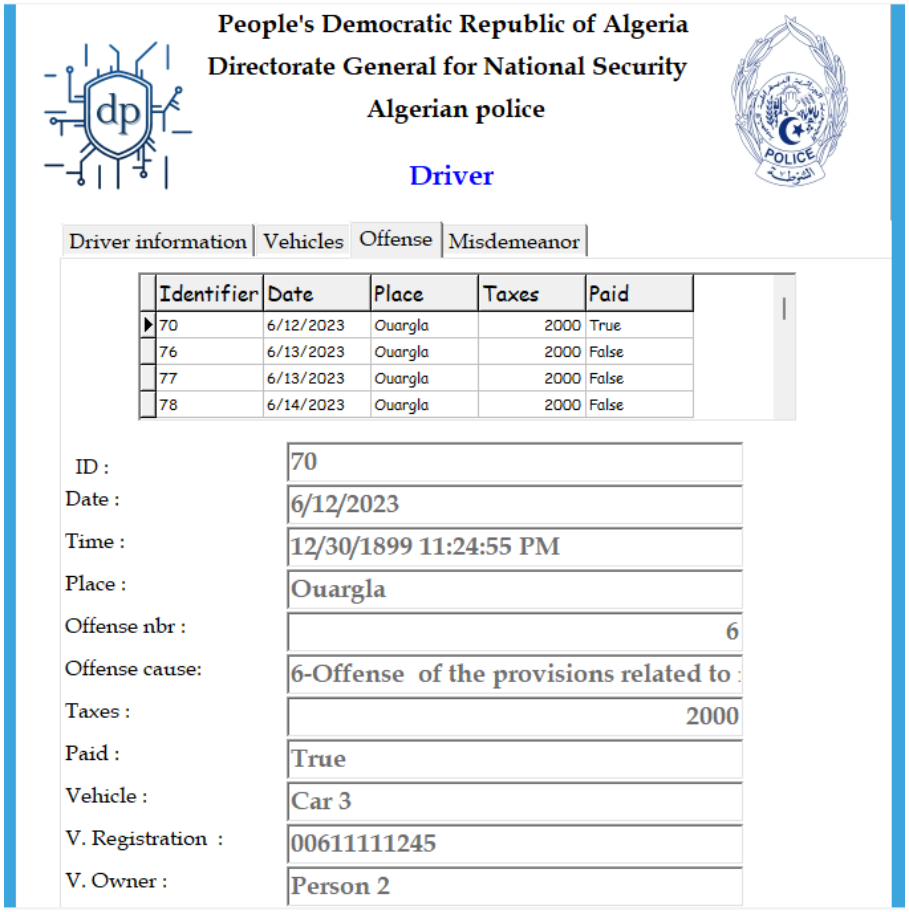

Figure 3.34: Offense option

4. Misdemeanor option :

This option of Figure 3.35 displays all the misdemeanors committed by the driver with information about them, namely:

- The date, time, and place of the misdemeanor committed by him.
- The misdemeanor number that he needs to be able to recover the points withdrawn in the department after he was acquitted.
- The reason for the misdemeanor, as well as the fine related to it and whether it was Innocence (true)or not (false).
- The vehicle in which the misdemeanor was committed, its registration number, and the owner of this vehicle.

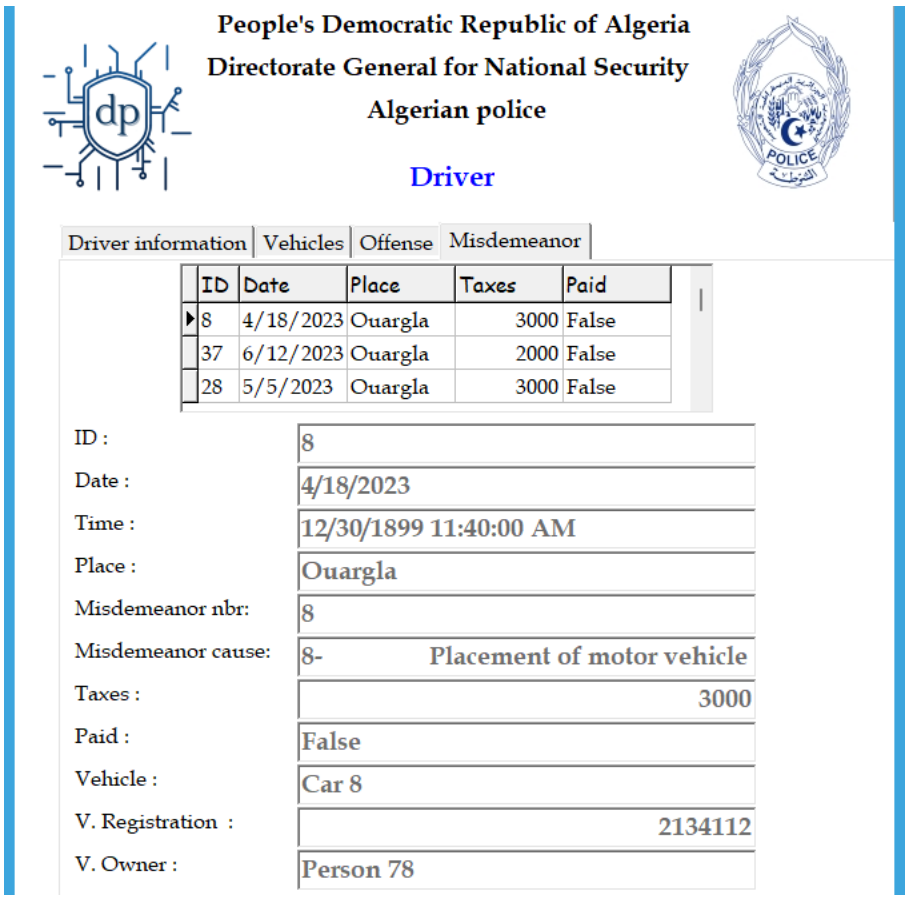

Figure 3.35: Misdemeanor option

3.7.5 Administrative Interface

Figure 3.36 shows the interface displayed to the administrator after authentication, this interface provides the administrator with two links offense and misdemeanor, depending on his choice, he presses the «OK» button to be directed to one of the following interfaces:

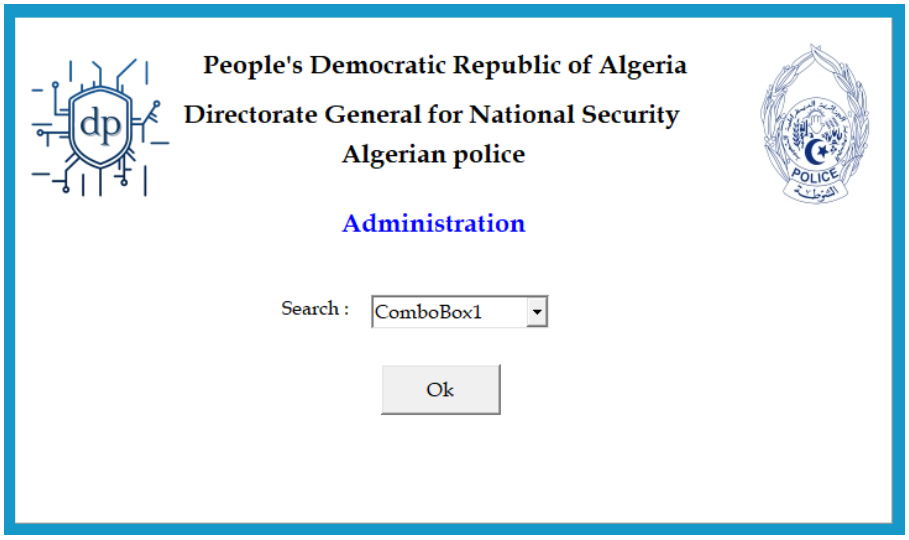

Figure 3.36: Administrative Interface

1. The interface of the offense:

- When the driver comes to the administrator, he gives him the offense number, and the administrator, in turn, enters it, and the information represented in Figure 3.38 is automatically displayed.
- After entering the ticket number, the driver pays the amount requested from him to the administrator.
- After entering the ticket number, the driver pays the amount requested from him to the administrator.
- The administrator presses the «Paid» button.
- Points withdrawn according to the type of offense will be automatically refunded from the license balance.
- Offense information is stored in the system database.

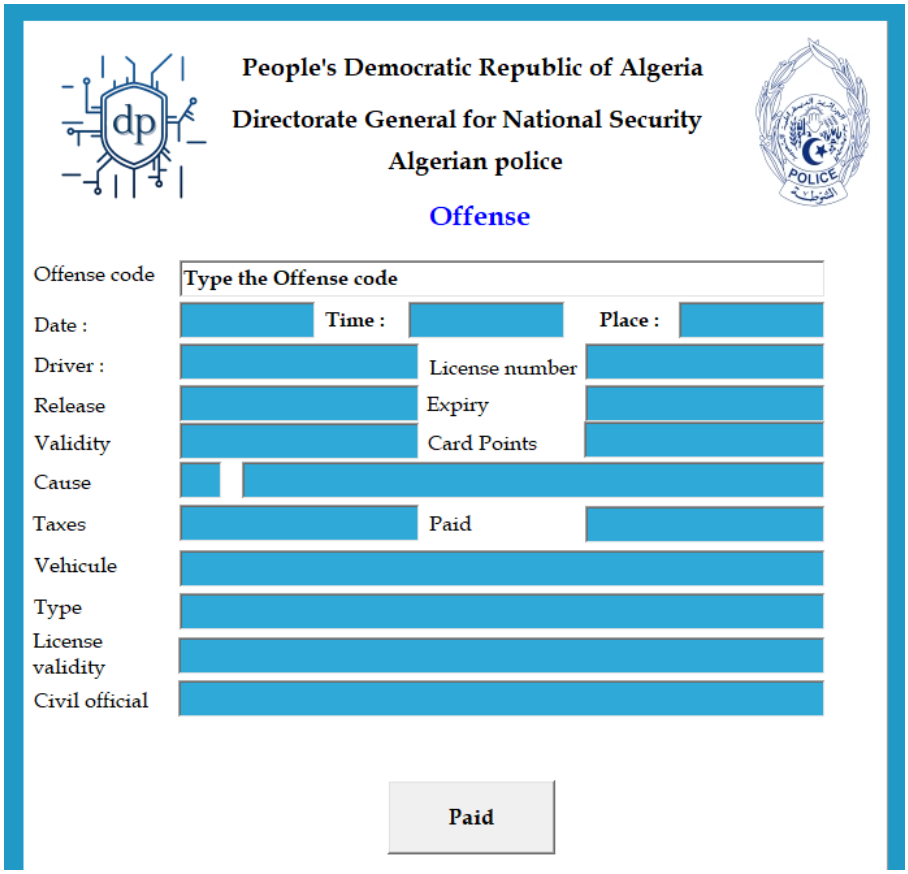

Figure 3.37: The administration interface before entering the offense number

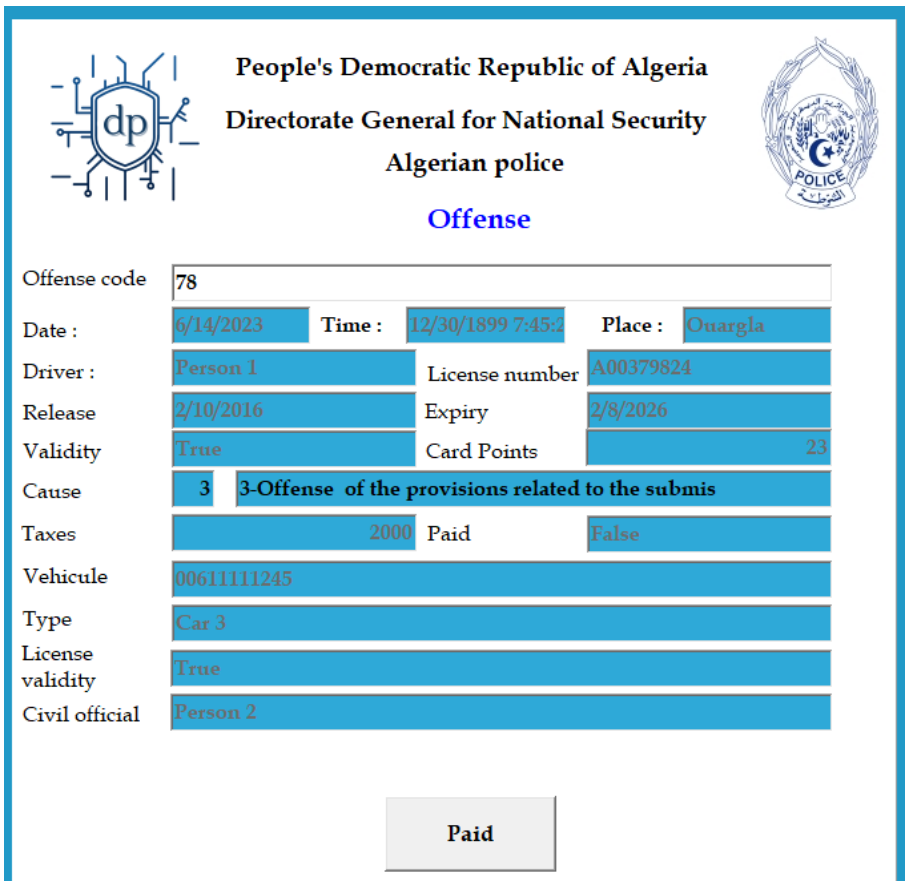

Figure 3.38: The administration interface after entering the offense number

2. The interface of the misdemeanor :

- The police department sends the misdemeanor information to the competent authorities who decide whether to acquit the driver or not, in case of acquittal, enter the misdemeanor number.
- He clicks on the« innocence» button .
- The ten points that have been withdrawn are retrieved.
- In case of non-acquittal, it is up to these authorities to make legal decisions and the points will not be refunded, until the acquittal.
- Misdemeanor information is stored in the system database. This interface is represented in Figure 3.39 .

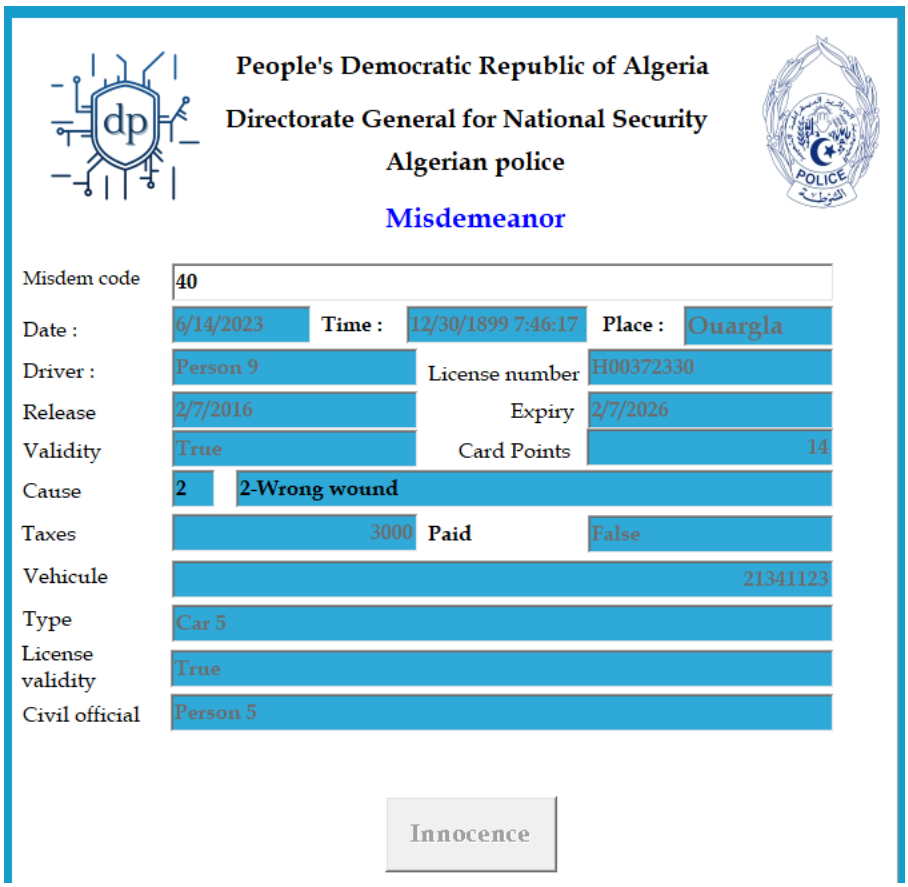

Figure 3.39: The administration interface after entering the misdemeanor number

3.7.6 Boss Interface

Figure 3.40 shows the interface displayed to the boss after authentication, this interface provides the boss with six simplified options, Vehicle database, policeman database, driver database, administration database, misdemeanor database, and offense database, depending on his choice he will be directed to one of the following options:

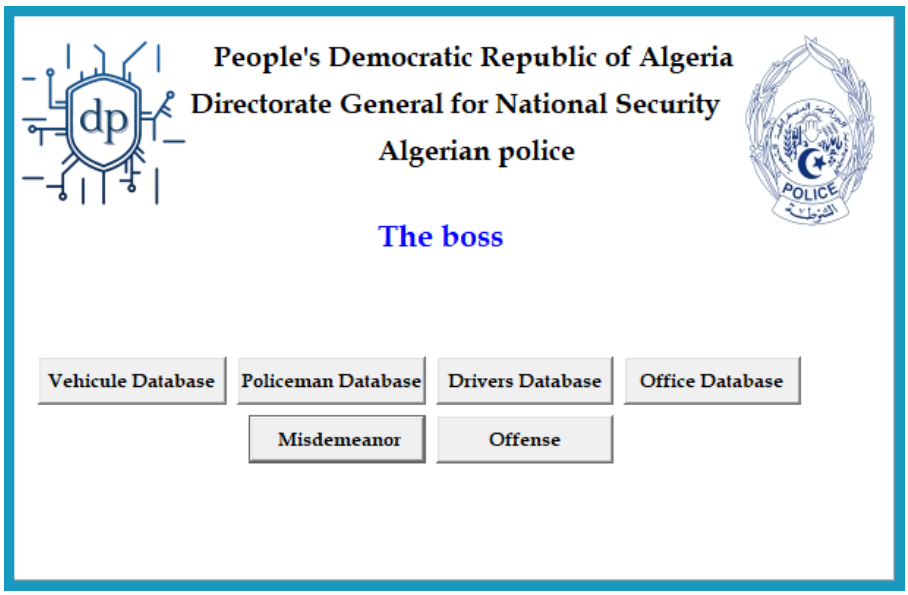

Figure 3.40: Boss interface

1. Vehicle database option:

When the boss wants to search for car information:

- Write in the search box the registration number of the vehicle.
- All information about this vehicle is shown in Figure 3.41.

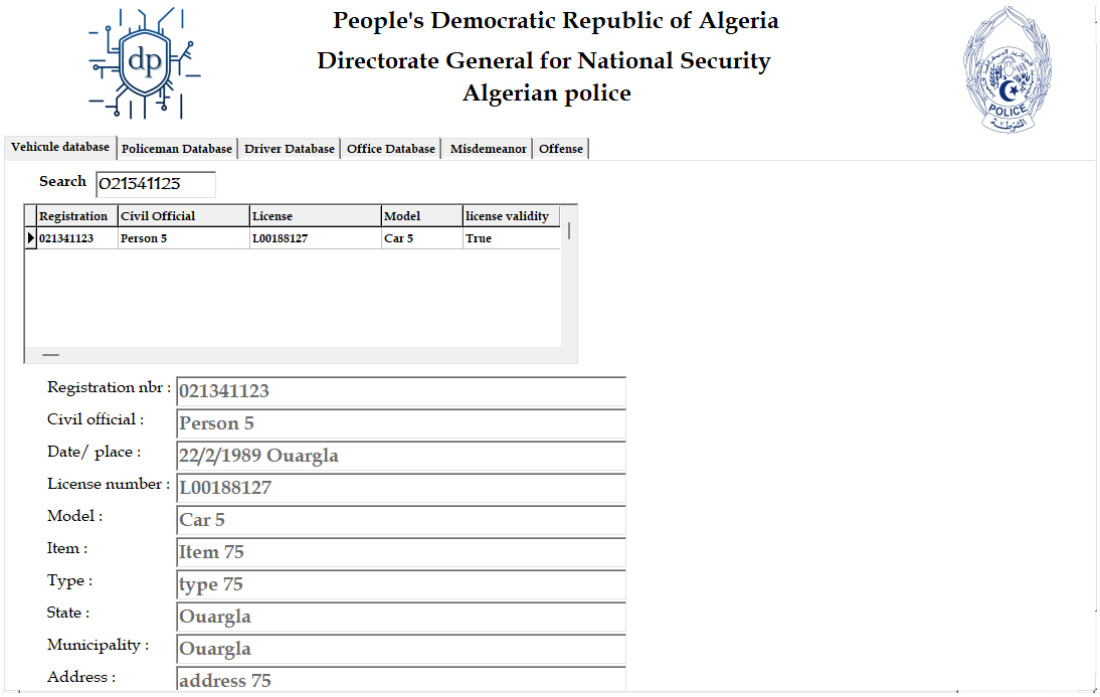

Figure 3.41: Vehicle database option

2. Driver Database option:

When the boss wants to search for the driver's information:

- Write in the search box the driver's license number.
- All information about this driver is shown in Figure 3.42.

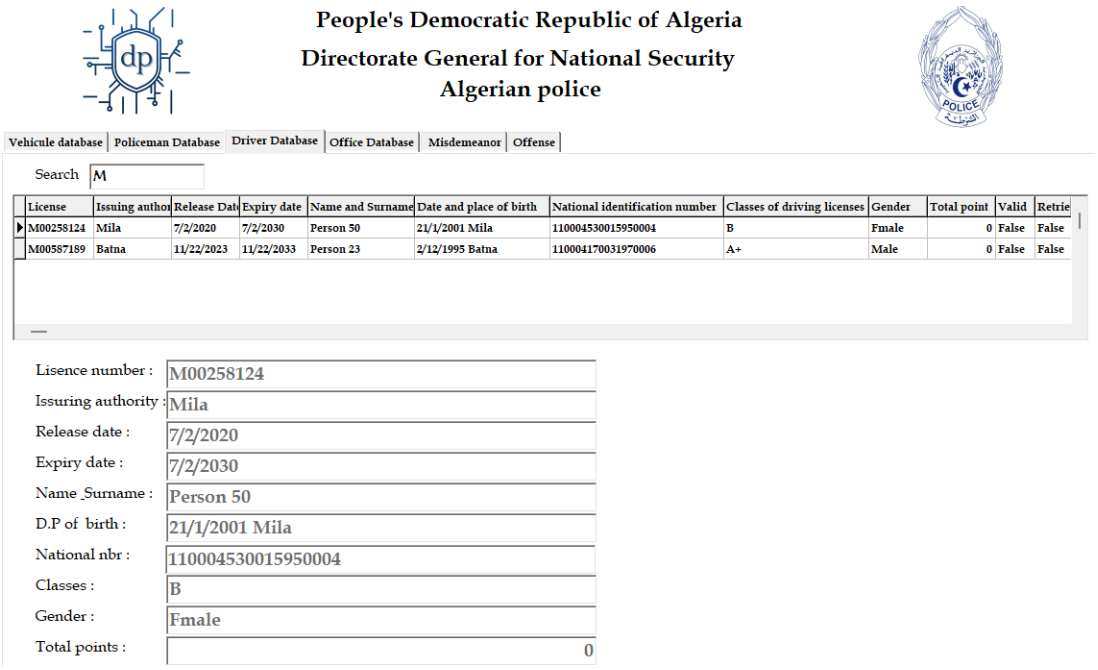

Figure 3.42: Driver Database option

3. Administrative database option :

When the boss wants to look for administrative information:

- Write in the search box the administrative number.
- All information about this administration is shown in Figure 3.43.

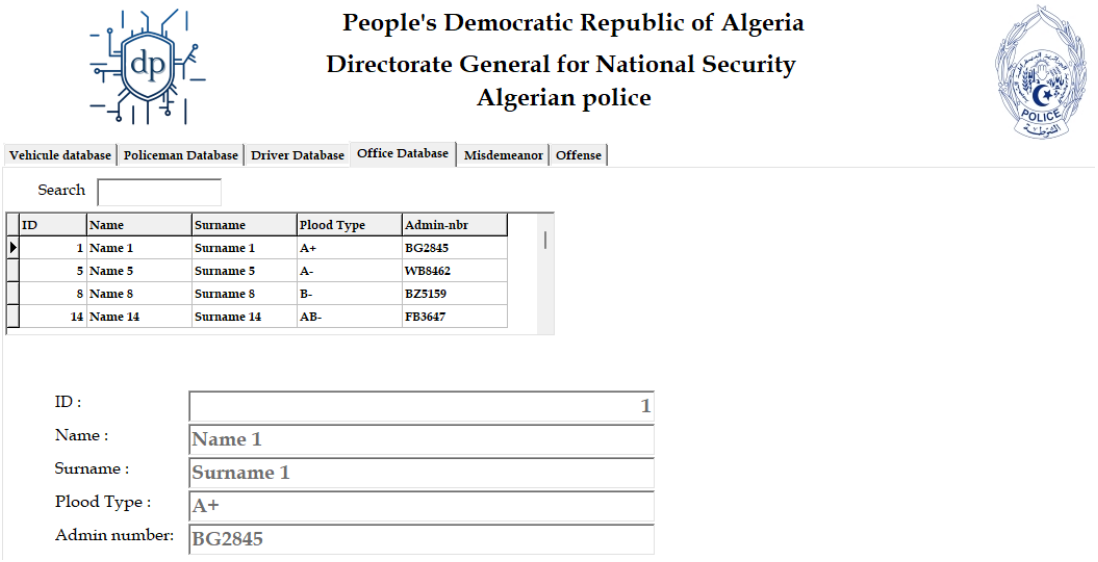

Figure 3.43: Administrative database option

4. Policeman database option :

When the boss wants to search for the policeman's information

- Write in the search box the policeman's number.
- All information about this conditional is shown in Figure 3.44.

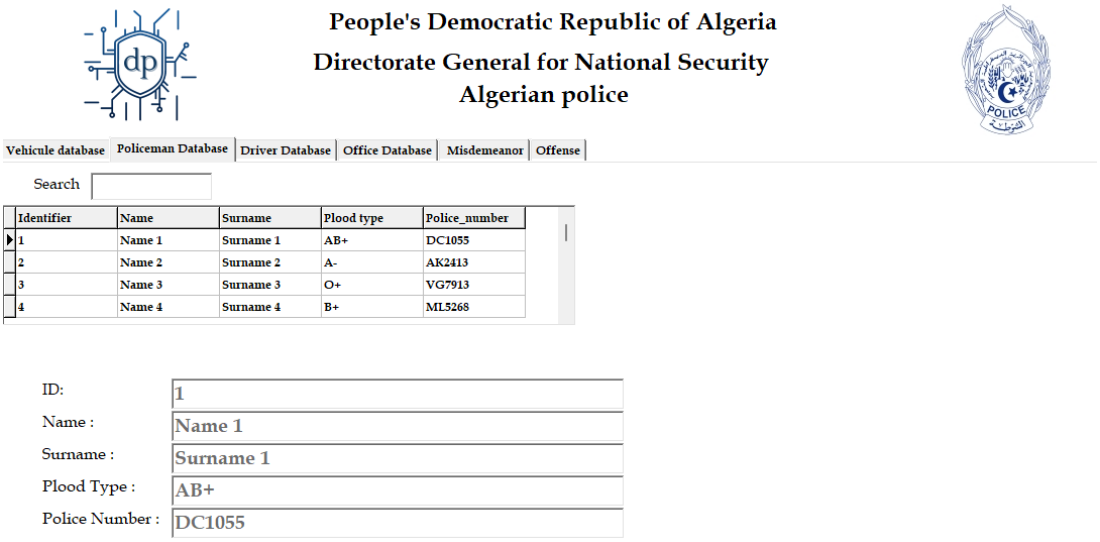

Figure 3.44: Policeman database option

5. Misdemeanor database option:

When the boss wants to look for Misdemeanor information:

- Write in the search box the misdemeanor number.
- All information on this misdemeanor is shown in Figure 3.45.

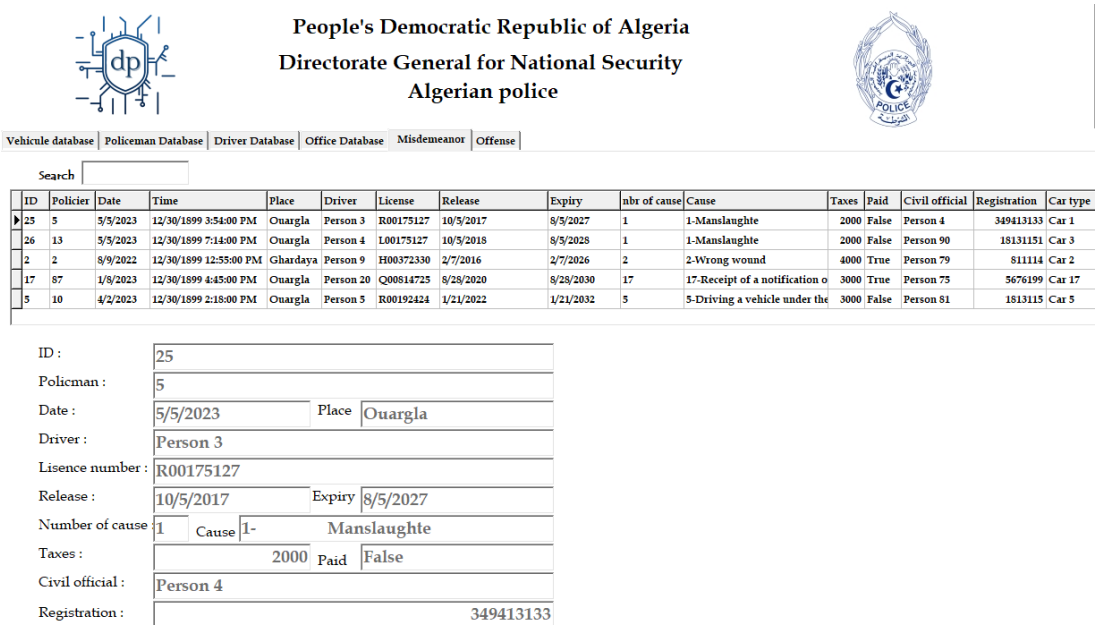

Figure 3.45: Misdemeanor database option

6. Offense database option:

When the boss wants to look for offense information:

- Write in the search box the offense number.
- All information on this offense is shown in Figure 3.46.

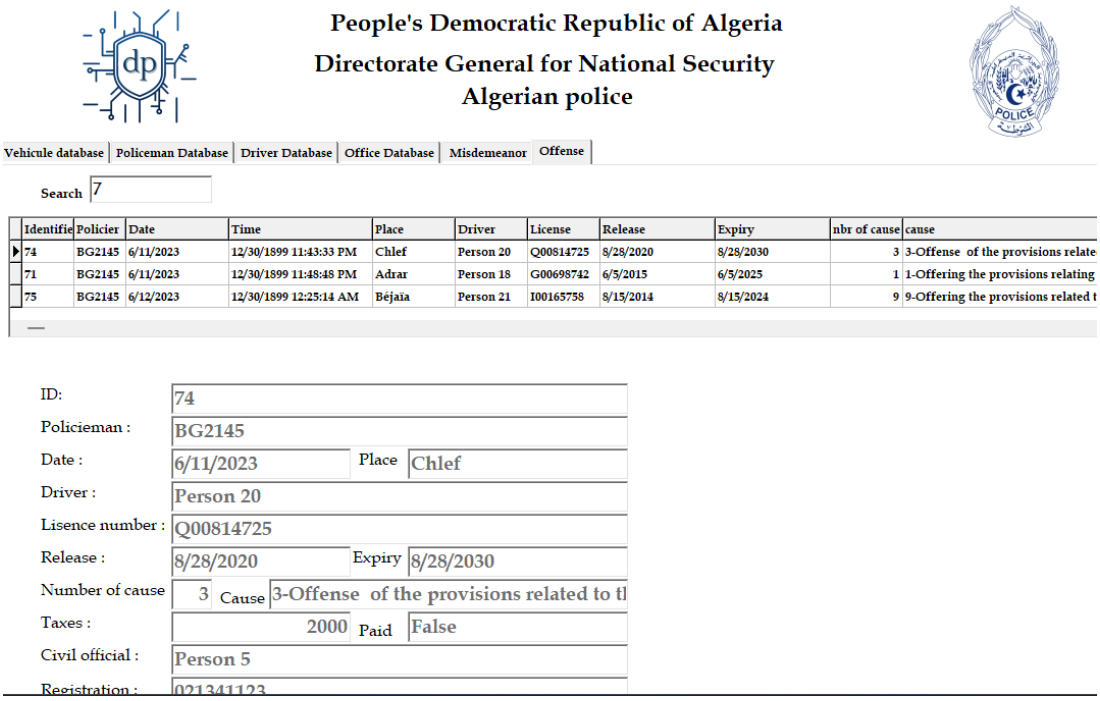

Figure 3.46: Offense database option

3.8 Conclusion

In this chapter, We have described the step-by-step process of analyzing and designing the system and the environment in which we programmed our system and we have finished with a description of the main interfaces.

GENERAL CONCLUSION

The goal of this graduation project is to create a digital system, which is called «digital police», which is an easy-to-use information system based on the digitization of the traffic law and the points license system, as well as the data of drivers and police members, where it is stored in a digital database. This system allows us to edit and manage offenses and misdemeanors digitally, the system provides each policeman with a special page with all his information, allowing him to add an offense or a misdemeanor and see all the offenses and misdemeanors he added, and the driver has a page with all his information (personal information, information of cars he owns, offenses and misdemeanors he committed). As for the administrator, who is responsible for managing offenses and misdemeanors, he has an interface to confirm the payment of the offenses or misdemeanors, and finally, the boss has an interface to access the central database (driver, car, administration, policeman, offenses and misdemeanors), depending on his choice, he will be directed to these data.

One of the most important solutions offered by the system is that there is no requirement for a policeman in the area to apply the traffic law, and this will contribute significantly to reducing traffic accidents caused by speeding or several other offenses by disciplining reckless drivers and speed lovers and making them bear responsibility for offering the traffic law and preventing them from legal evasion. This project has been very useful to us because we enriched our knowledge about two levels: theoretical and practical. It also allowed us to discover and gain new knowledge in this area.

Finally, we can imagine many possibilities to improve this system, for example:

- Expanding the system to include all police stations on the national territory.
- Entering the largest number of drivers and police data into the central database.
- Improvement and development of the system.
- Applying the traffic law to pedestrians who violate the rules that regulate their traffic even without the presence of a policeman.
- Added the electronic payment feature regarding the payment of fines.

- Automatically issue a ticket when a driver violates a traffic light.
- Linking a system with the digitization system of the judiciary with regard to the treatment of misdemeanors.
- The ability to follow the drivers during the probationary period.
- Tracking of stolen cars and cars under surveillance.

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