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# FixIt: Mobile Applications for Online Complaints in the Wilaya of Mila

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# ***Dedication***

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# *Abstract*

The use of smart phones has increased especially with the appearance of mobile applications in different domain notably in administration. In this thesis, we are interested in the use of this mobile technologies in Wilaya administrations. We focus our work on the relation between citizen and complaint services in Wilaya. In Wilaya there are two offices to receive the complaints : The call center and the mediation office, but the used methods to receive and save the complaint information in both offices are primitive and backward, despite the potential technological devices owned by the Wilaya, which are not fully used. For this, we propose a solution by developing an android application to provide a permanent connection between the citizen, Wilaya services and executive institutions.

إن استعمال الهواتف الذكية في تزايد مستمر خصوصا بعد ظهور وانتشار تطبيقات الهاتف في مختلف المجالات وبالتحديد في الإدارات.

في هذه الأطروحة نحن مهتمون بتكنولوجيا الهواتف الذكية واستعمالاتها في الإدارات التابعة لولاية ميلة . لقد ركزنا عملنا ومجهودنا على العلاقة بين المواطن وخدمات استقبال الشكاوى المتوفرة في الولاية.

يوجد في الولاية مكتبتين خاصتين باستقبال الشكاوي : مركز الاتصال و الوساطة ، لكن الطرق المستعملة لاستقبال الشكاوي في كلا المكتبتين تعتبر رجعية ومتخلفة بالرغم من توفر الولاية على اجهزة الكترونية و تكنولوجيا.

من أجل هذا نحن نقترح حلا وهو برمجة وتطوير تطبيق اندرويد يسمح بتوفير اتصال دائم بين المواطن ، خدمات استقبال الشكاوي من طرف الولاية و المديريات المعنية بحل هذه الشكاوي.

L'utilisation de téléphones intelligents a surtout augmentée grâce à l'apparence d'applications mobiles dans différents domaines, en particulier dans l'administration.

Dans ce mémoire, nous nous sommes intéressés à l'utilisation de ces technologies mobiles dans les administrations de la Wilaya de Mila. Nous nous sommes focalisés sur la relation entre le citoyen et les services de plaintes à la Wilaya : le centre d'appel et le service de médiation. Cependant les méthodes utilisées pour recevoir et enregistrer les informations sur les plaintes dans les deux services sont primordiales et primitives, malgré les dispositifs technologiques potentiels détenus par la Wilaya, qui ne sont pas pleinement utilisés.

Pour cela, nous proposons une solution en développant une application Android pour assurer un lien permanent entre le citoyen, les services Wilaya et son exécutives.

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# GENERAL INTRODUCTION

The biggest proliferation of Smartphones provides a variety of services for the users to help them solving a lot of problems in their daily lives in simple ways. Every smartphone has its own operating system such as (Apple OS, windows OS, firefox OS , Tizen ... etc ) and the most important one is Android . Besides having the largest installed base worldwide on Smartphones, it's also an open source which makes it the most popular OS in the world.

Nowadays, the importance of Smartphones increases with the use of mobile applications in different domain notably in administration.

In this thesis we are interested to the use of this mobile technologies in Wilaya administration. We focus our work on the relation between citizen and complaint services.

As we know, the citizen in his daily life faces many obstacles and problems that disturbs him. One of these problems is broken public facilities such as roads, sidewalk, street light ...etc. These problems make him resorts to provide many complaints to the wilaya by going directly to them, waiting in a large queues, wasting a lot of time and effort due to unorganized process of receiving complaints.

In wilaya there are two ways to receive a citizen complaints:

The first one is through a phone call to the call center where they use a basic application called VorixAgent . This application has a lot of disadvantages such as : The citizen cannot send the Complaint at anytime in the day , because the application works only if there is an employee there (the application works from 8:00 AM till 5:00 PM , from Saturday to Thursday) .

The second way is by using traditional methods (write the information about the complaint in papers using Microsoft Windows Document). These methods are primitive and backward, despite the potential technological devices owned by wilaya, which are not fully used. For these raisons, we propose a solution by developing an Android application for wilaya services called FixItW and another for the citizen called FixIt .

These two applications provide a permanent connection between the citizen, wilaya services and executive institutions allowing the citizen to send his complaints without going to them (save time and effort, more organization). In the other side, the wilaya will receive complaints and deal with them with a fast and organized way.

Our thesis is organized as follow :

1. In the part one we will present:

- Wilaya of Mila and its departments.
- Mediation Office and Call Center department.
- VorixAgent Application: Classical scenario and disadvantages.
- Proposed mobile applications, 'FixIt' and 'FixItW' description and features as a solution for the problem.

2. In the part two we will present:

- Smartphones and their different operating systems.
- Typical examples about administrative applications.
- A brief overview of the client / server architecture.
- Brief overview of Unified Modeling Language(UML) and the different types of diagrams.

3. In the part three we will present:

- The needs of the application to be realized.
- Define the specifications that contain all the objectives of this project.

- Present the textual description of use case, Sequence, Activity and Class Diagrams

4. In the part four we will present:

- Tools and programming languages used in our applications such as: Android studio, PHPMyadmin , MySql , Java , PHP , XML.
- Some aspects of implementation for FixIt (Citizen) and FixItW (Admin, Was-sit, Wali, Executive institution)

# **Part I**

## **Study Domain and Project Presentation**

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# CHAPTER 1

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## THE WILAYA OF MILA

### 1.1 Introduction

In this chapter we will give a brief overview of the Wilaya of Mila and its departments. Also we will present the organization of each department.

### 1.2 Presentation

The wilaya of Mila is located in the north-east of Algeria, it is created during the last Algerian administrative division in 1984, with the city of MILA as the capital of the wilaya 43.

The headquarters of the Wilaya is located at the new City DNC. It has been rolled by more than six 'Walis' since its creation. It currently consists of thirty two Communes and thirteen Daïras.

### 1.3 Organization

The Wilaya of Mila consists of three Directorates and one Inspection :

- Directorate of Local Administration(Direction de l'Administration Local).
- National Telecommunication Directorate (Direction des Transmissions National).
- Regulation Directorate of Public Affairs (Direction de la réglementation et des affaires générales). See Figure 1.1

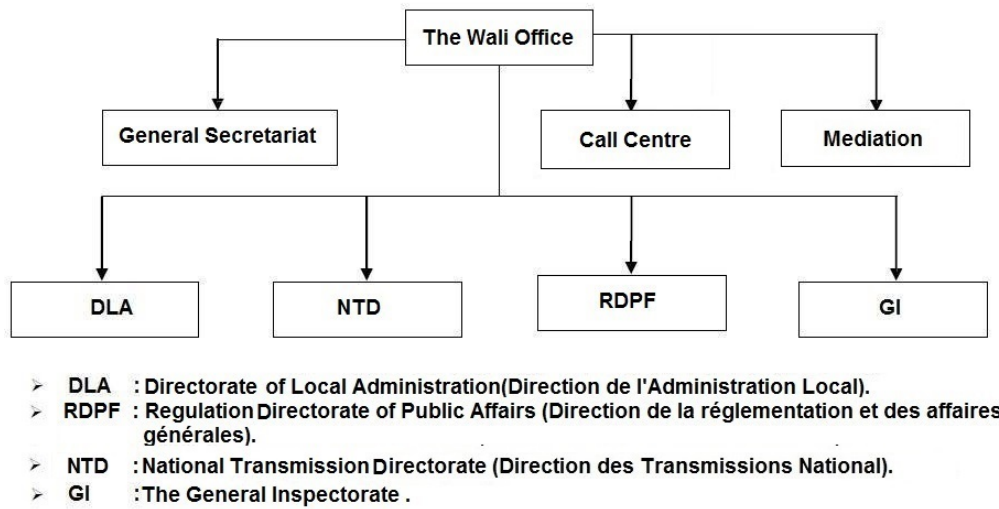


Figure 1.1: Organization of the Wilaya

### 1.3.1 Directorate of Local Administration (DLA)

Directorate of Local Administration (DLA) or DAL (Direction de l'Administration Locale) is composed of three departments (See Figure 1.2 ) :

- Budget and Property Department (Service des budgets et du patrimoine).
- Personnel Department(Service de personnels de la Wilaya).
- Locale Markets Department (Service de l'animation communale des marchés).

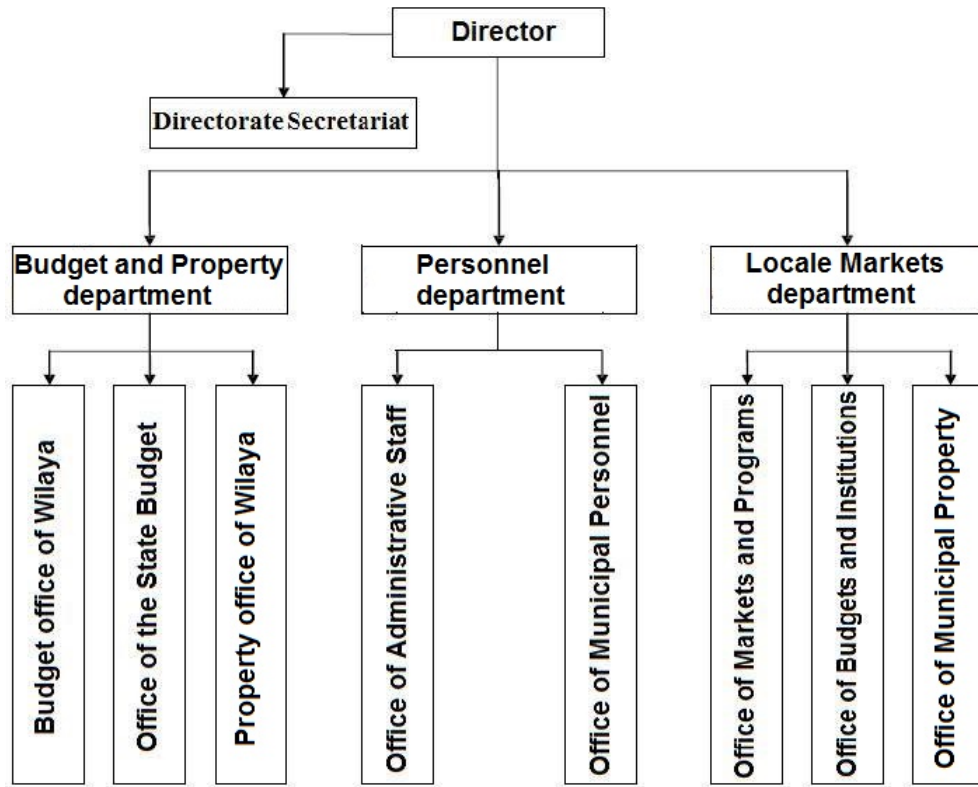


Figure 1.2: Organization of the Directorate of Regulatory Affairs and General Affairs

### 1.3.2 National Transmissions Directorate (NTD)

National Transmissions Directorate or DTN(Direction des Transmissions National) is composed of four departments (See Figure 1.3):

- Informatic Department(Service informatique).
- Maintenance Department(Service technique).
- Exploitation Department(Service exploitation).
- Department of Administration and Logistics(Service de l'administration et de la logistique).

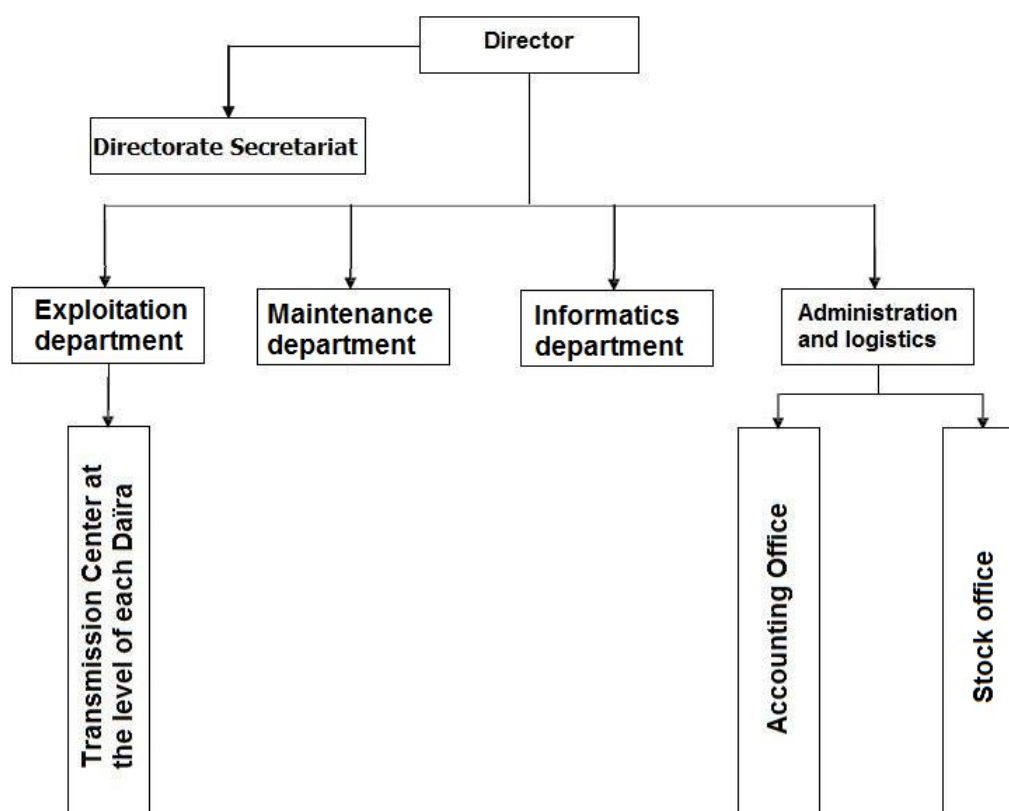


Figure 1.3: Organization of the National Transmissions Department

### Used network

The Wilaya is connected to two networks:

The first is the national network of the MICL (Ministère de l'Interieur et des Collectivités Locales) which gathers all forty eight wilayas of the country in the intranet and ensures their interconnections. The exchange of official documents and mission orders is done via the electronic messaging system IBM Lotus Domino.

The second is the Wilaya network, which groups together the thirteen daïra and the thirty two communes of the wilaya and ensures their interconnections. The exchange of official documents and mission orders is done as the first network, through the electronic messaging system IBM Lotus Domino.

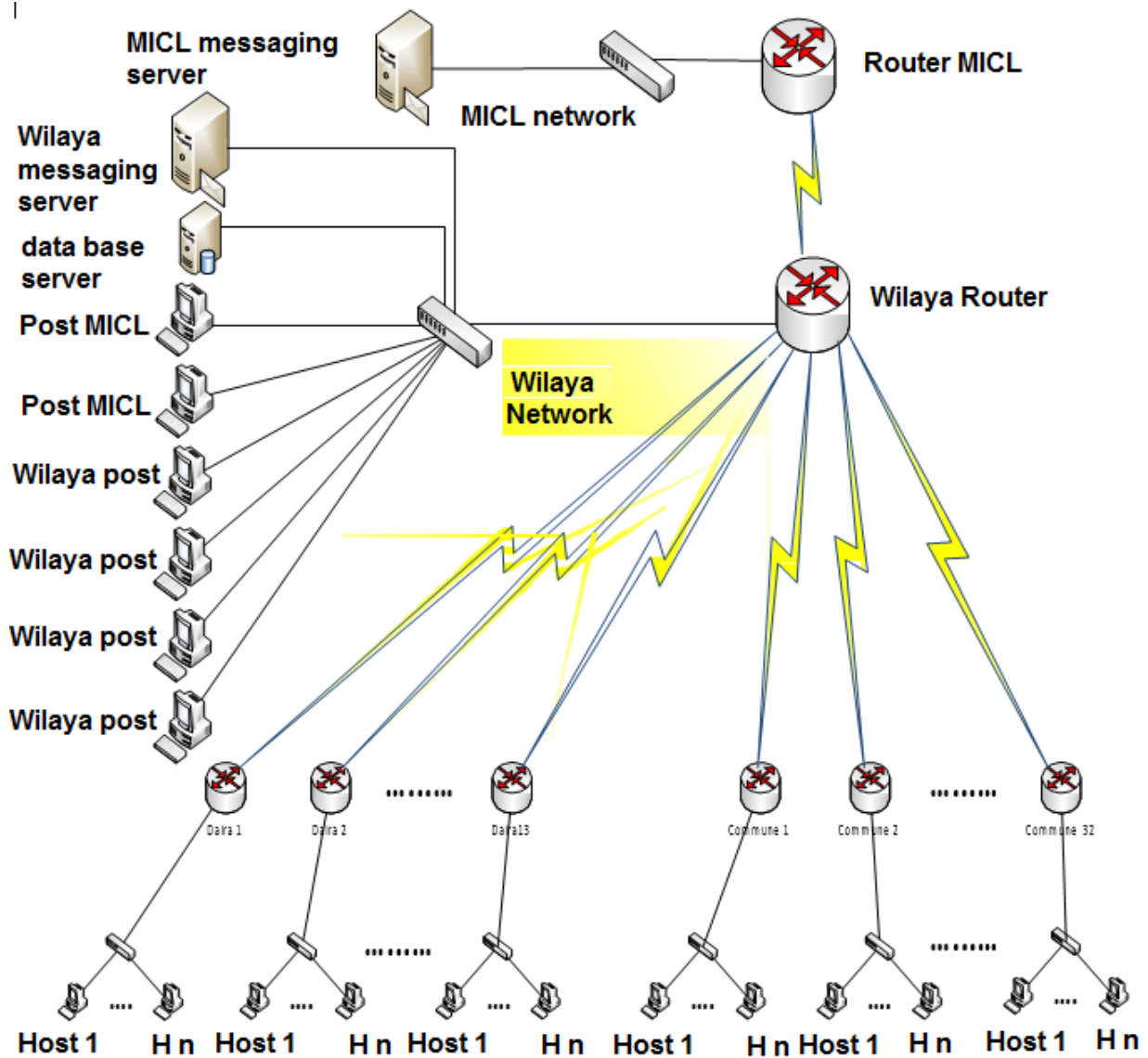


Figure 1.4: Network of MICAL-Wilaya-Dairas-Communes

The wilaya of mila contains a lot of electronic materials (servers, routers, switches, etc.) and these electronic materials can be used for many other functionalities such as : creating different application that can solve a lot of problems and save their own databases on servers. That motivates us to develop our project.

### 1.3.3 Regulation Directorate of Public Affairs(RDPF)

Regulation Directorate of Public Affairs or DRAG(Direction de la réglementation et des affaires générales) is composed of four departments (See Figure 1.5):

- Department of Legal Affairs and Disputes (Service des affaires générales).
- General Regulation Department (Service de la réglementation générale).
- Department of Persons Movement(Service de la circulation des personnes).
- Legal Affairs and Litigation Department(Service des affaires juridique et du contentieux).

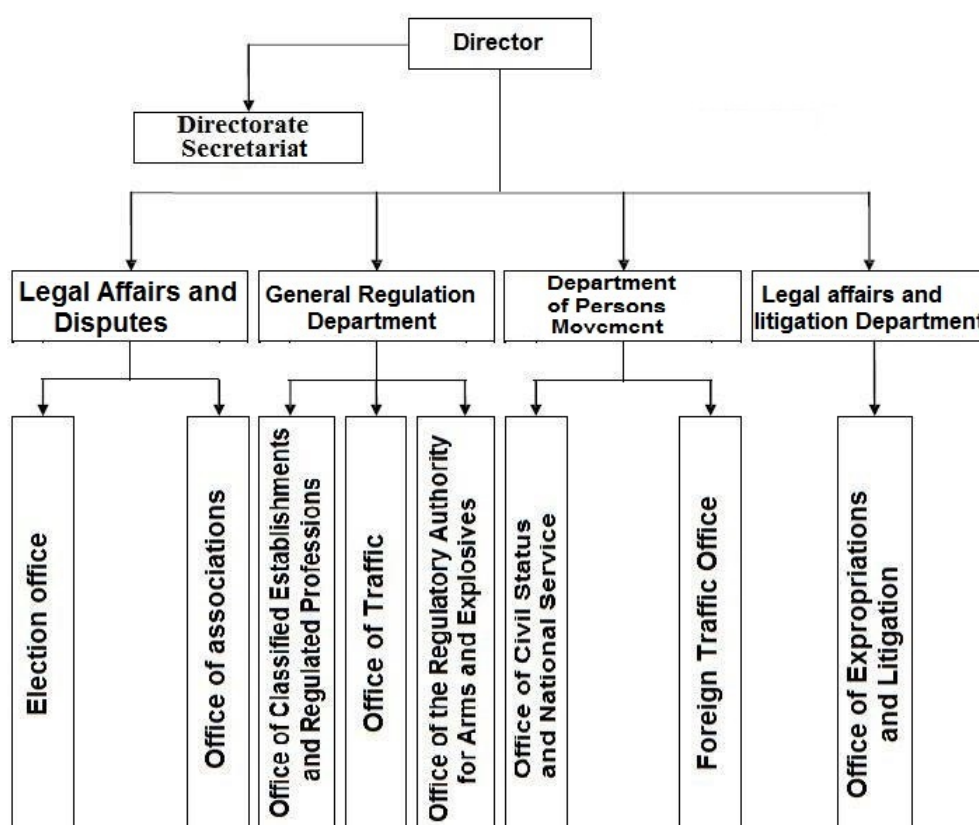


Figure 1.5: Organization of the Regulatory and Business

## 1.4 Conclusion

In this chapter we gave a brief overview of Wilaya of Mila and its departments. Also we present the organization of each department.

In the next chapter we will focus the project domain on : Mediation Office and Call Center Department. We will critic the actual scenario and give an overview of the proposed solution.

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## CHAPTER 2

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# MEDIATION OFFICE AND CALL CENTER DEPARTMENT

### 2.1 Introduction

During our stage, we investigated the Mediation Office and Call center Department. In this chapter, we will give a brief overview of Mediation Office, Call Center Department and VoraxAgent Application, its scenario and disadvantages .

Also we will present our mobile applications,namely FixIt and FixItW, description and features as a proposed solution for the problem .

### 2.2 Presentation

Mediation Office and Call center Department are a subsidiary offices of 'the Wilaya' subordinated by the Wali of Mila. The objectives of these two offices is receiving various complaints from citizens and directing them towards the executive institution (health directorate, Education directorate, etc) to resolve the problem. The organization of these offices are presented in this figure 2.1 :

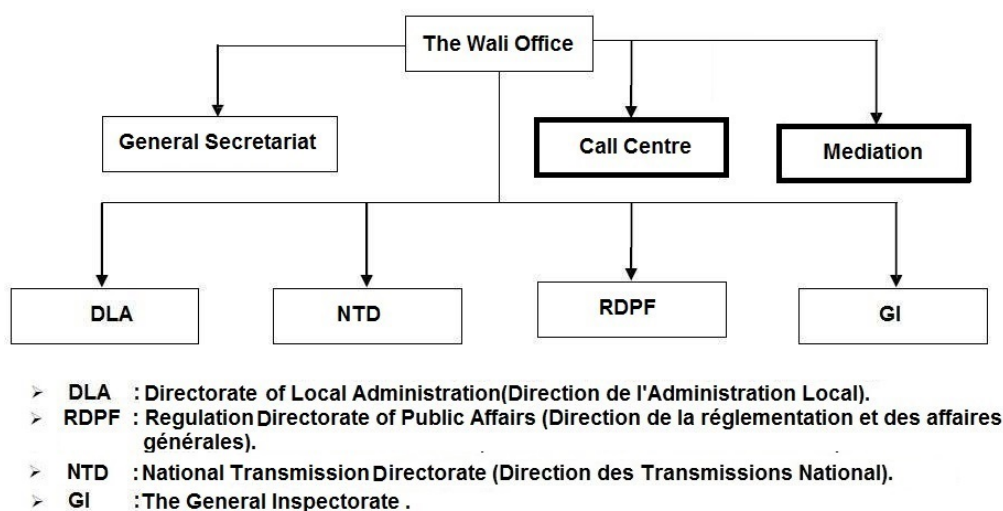


Figure 2.1: Mediation Office and Call Center Department

## 2.3 Tasks

### 2.3.1 Mediation Office

The principal role of the Mediation Office is to receive all complaints of various kinds in a small office. The citizen goes to the office to register the complaint and some required information such as the first name, last name, complaint type , subject etc. The Mediation Office writes the complaint in a word Microsoft word file and sends it directly to the Wali Office . The director of Wali Office reads the complaint , corrects the errors then approves the complaint and sends it back to the Mediation Office . The Mediation Office sends the complaint to the executive institution using the mail .

In The Mediation Office there is no application or a specific program to help employees to deal with the problems , every thing is manual.

### 2.3.2 Call Center Department

The Call Center Department is an office containing computers and communication devices. A special software(an application) is used to store important information about citizens calls, problems, complaints, etc.

The citizen can make a call to the Call Center Department either to lodge a complaint, to request information or to make suggestions.

The software(application) automatically records the phone number of the citizen and other information such as first name, last name, the subject, and the type of complaint, its class and its date of registration. All these informations are manually typed into the program by one of the employees.

After registering the complaint, the employee prints the complaint form and re-fills it using Microsoft Word and sends it to the Wali for approval.

## **2.4 The Complaints**

### **2.4.1 Definition**

The complaint is an expression of discontent, censure, resentment, about something specific . In the Wilaya of Mila , a complaint is a grievance concerning a citizen or a group of citizens.

### **2.4.2 Type of complaints**

#### **Complaints in Mediation Office**

There are many types of complaints that reach to the Mediation Office, complaints of work, broking public facilities, requests for an interview with the Wali and other complaints (complaint about neighbor, officer, etc). There is no specific classification for these complains because every thing is typed manually on a papers or a Microsoft word file .

Here are some statistics about the number of complaints sorted by type that arrives to the Mediation Office in 2016 :

**Statistics of Wali Receptions in 2016**

| Month     | The number of complaints | Citizens who were reception by Wali | Processed re-quests |
|-----------|--------------------------|-------------------------------------|---------------------|
| January   | 62                       | 21                                  | 41                  |
| February  | 116                      | 31                                  | 85                  |
| March     | 53                       | 07                                  | 46                  |
| April     | 77                       | 18                                  | 59                  |
| May       | 79                       | 15                                  | 64                  |
| June      | 83                       | 25                                  | 58                  |
| July      | 70                       | 15                                  | 55                  |
| August    | /                        | /                                   | /                   |
| September | 61                       | 08                                  | 53                  |
| October   | 29                       | /                                   | 29                  |
| November  | 24                       | /                                   | 24                  |
| December  | /                        | /                                   | /                   |
| Sum       | 654                      | 154                                 | 514                 |

Table 2.1: Statistics of Wali Receptions in 2016

**Statistics of Diwan Receptions in 2016**

| month     | Number citizens ceived by Wali | Residence | Job | Others |
|-----------|--------------------------------|-----------|-----|--------|
| January   | 29                             | 09        | 13  | 07     |
| February  | 51                             | 21        | 13  | 17     |
| March     | 30                             | 13        | 07  | 10     |
| April     | 22                             | 06        | 06  | 10     |
| May       | 44                             | 16        | 06  | 22     |
| June      | 33                             | 18        | 10  | 05     |
| July      | 19                             | 08        | 04  | 07     |
| August    | 28                             | 16        | 05  | 07     |
| September | 20                             | 07        | 01  | 12     |
| October   | /                              | /         | /   | /      |
| November  | /                              | /         | /   | /      |
| December  | /                              | /         | /   | /      |
| Sum       | 276                            | 114       | 65  | 97     |

Table 2.2: Statistics of Diwan (wali office) Receptions in 2016

**Complaints statistics in 2016(By Type)**

| month     | The number of complaints | A public housing lease | Rural construction | job | Social order | Financial announcements | Others | Processed requests | Under processing |
|-----------|--------------------------|------------------------|--------------------|-----|--------------|-------------------------|--------|--------------------|------------------|
| January   | 304                      | 74                     | 06                 | 18  | 47           | 08                      | 151    | 304                | 00               |
| February  | 398                      | 105                    | 04                 | 05  | 72           | 11                      | 201    | 398                | 00               |
| March     | 360                      | 65                     | 06                 | 09  | 58           | 02                      | 220    | 360                | 00               |
| April     | 380                      | 84                     | 17                 | 06  | 43           | 02                      | 228    | 380                | 00               |
| May       | 454                      | 127                    | 12                 | 09  | 57           | 09                      | 240    | 454                | 00               |
| June      | 301                      | 50                     | 02                 | 08  | 51           | 09                      | 181    | 301                | 00               |
| July      | 288                      | 51                     | 01                 | 12  | 66           | 08                      | 150    | 52                 | 236              |
| August    | 374                      | 74                     | 02                 | 19  | 44           | 03                      | 232    | 76                 | 298              |
| September | 359                      | 75                     | 07                 | 20  | 63           | 04                      | 190    | 82                 | 277              |
| October   | 351                      | 50                     | 05                 | 18  | 78           | 12                      | 188    | 55                 | 296              |
| November  | 284                      | 63                     | 11                 | 15  | 47           | 07                      | 141    | 284                | 00               |
| December  | 304                      | 69                     | 12                 | 16  | 58           | 02                      | 147    | 184                | 120              |
| Sum       | 4157                     | 887                    | 85                 | 155 | 684          | 77                      | 2269   | 2930               | 1227             |

Table 2.3: Complaints statistics of 2016 (By Type)

**Complaints statistics in 2015 (By Type)**

| month     | The number of complaints | Subject of the complaint |           |     |        |           | processed requests | Under processing |
|-----------|--------------------------|--------------------------|-----------|-----|--------|-----------|--------------------|------------------|
|           |                          | Collective requests      | Residence | job | Others | Subsidies |                    |                  |
| January   | 188                      | 27                       | 36        | 03  | 119    | 03        | 188                | 00               |
| February  | 214                      | 34                       | 62        | 06  | 108    | 04        | 214                | 00               |
| March     | 350                      | 33                       | 96        | 07  | 208    | 06        | 350                | 00               |
| April     | 243                      | 27                       | 47        | 03  | 166    | 00        | 243                | 00               |
| May       | 237                      | 22                       | 57        | 04  | 149    | 05        | 237                | 00               |
| June      | 223                      | 23                       | 42        | 04  | 145    | 09        | 223                | 00               |
| July      | 156                      | 25                       | 35        | 02  | 92     | 02        | 156                | 00               |
| August    | 208                      | 29                       | 44        | 04  | 130    | 01        | 208                | 00               |
| September | 297                      | 32                       | 71        | 08  | 182    | 04        | 297                | 00               |
| October   | 313                      | 40                       | 57        | 11  | 203    | 02        | 313                | 00               |
| November  | 418                      | 65                       | 91        | 04  | 252    | 06        | 418                | 00               |
| December  | 402                      | 50                       | 68        | 02  | 277    | 05        | 102                | 300              |
| Jan 2016  | 321                      | 52                       | 77        | 22  | 161    | 09        | 20                 | 498              |
| Sum       | 3570                     | 459                      | 783       | 80  | 2192   | 56        | 2771               | 799              |

Table 2.4: Complaints statistics of 2015 (By Type)

## **Complaints in Call Center Department**

In the Call Center Department there is a specific classification of complaints using the application 'VoraxAgent' . Here are all the complaints category existing in the application : Mail and communication Investment, culture, Social activity and solidarity, Connection, Environment, health, Tourism , Organized activities, Sports, Schools, Agriculture, Property, Energy, Roads, Housing, Others.

Here we present some examples about the complaints in Call Center Department:

- Mail and communication: complaint about Internet interruptions or network problems , the responsible department about solving this problem is Algeria Telecoms.
- Environment: complaint about trash, garbages ..etc , the responsible department about solving this problem is the Commune 'Baladiya'.
- Housing:complaint about finding a home , the responsible departments about solving this problem are 'Dayra' and 'Commune' .
- Health : Complaint about problems in the health sector , the responsible department about solving this problem is the Directorate of Health .

According to the statistics in the Call Center department , the number of complaints that arrived from 4 January 2015 till 2 January 2017 is 3862 complaints.

## **2.5 VoraxAgent Application and the current scenario**

1. The employees in the Center Call department use an application called 'VoraxAgent' to register the citizen complaint.
2. When the citizen makes a call to the call center the employee starts using the application to register the phone number and all the necessary information about the citizen such as : the first name, the last name, type of person(individual or Corporation), the category of the complaint(complaint about health or transport etc), the priority of the complaint(urgent complaint or not), the date, the name of the Wilaya, the Daira and the Commune, the subject of the complaint.

3. The employee saves these informations and prints it on a paper to send it to the Wali.
4. After the approval of the Wali , the call Center Department employee sends the complaint to the executive institution. If the problem is not solved , the same scenario will proceed again.

## 2.6 Disadvantages and Critics

- The citizen cannot send the Complaint at anytime in the day , because the application works only if there is an employee there (the application works from 8:00 AM till 5:00 PM , from Saturday to Thursday) .
- There is no direct contact between the citizen , call center , the Wali and the executive institution through the application.
- Employee remains fixed in his office all the day , because the application is on a fixed machine (pc) and it cannot run automatically .
- Employee have to insert manually most of citizen information about the complaint.
- All complaints are registered according to a phone number which means that the citizen can use different numbers for the same complaint.
- A large amount of complaint information.
- In the current scenario, citizens have to wait long time to apply their complaints in the appropriate service, because only one reception employee is affected to the mediation office.
- In the call center side, their are at most six operators to receive citizens calls. In case where the number of complainers is more than six, they have to wait.

## 2.7 FixIt and FixItW:our proposed solution

To solve these problems we suggest in our Master thesis two mobile applications (FixIt and FixItW).

FixIt and FixItW are android applications which provide a permanent connection between the citizen and Wilaya. Citizens use FixIt application to send their grievances about different sectors to the Wilaya using pictures and with the ability of localization using GPS coordinate.

The Wali , the Wilaya and the Executive Institution employees use FixItW to receive these complaints and deal with them with a fast and organized way.

### 2.7.1 Features and solved problems

- FixIt and FixItW are android applications which provide a 24/24 hours and 7/7 days permanent connection between the citizen and the Wilaya .
- The citizens can use FixIt application anytime and anywhere.
- With the proposed applications, a large number of complaints can be sent and received in the same time.
- They have the ability to send pictures of the problem and its position using GPS coordinates.
- No need to print any paper or send it manually by mail which take a lot of time and efforts , because with these two applications there is a direct connection between the citizen , the wilaya , the Wali and the executive institution .
- By using FixItW application the employee can deal with a large number of complaints with easiest way (no need to write the citizen problems , he will send all the problem's information to the employee) .
- One of the most important features in FixIt and FixItW is mobility, The employee can move to anywhere and read the problems from anyplace even at home. Also the citizen can send its complaints from anywhere and anytime.

## 2.7.2 FixIt , FixItW Applications and the proposed scenario

### Description

There are two Applications .

- The first one is FixIt application for the citizen :  
The citizen can sign in to the application , add new complains (with pictures and localization using GPS coordinate)and send it to the Wilaya , receive the result of the complains, and evaluates them.
- The second one is FixItW application for the employees of Wilaya 'Wassit'(Mediation Office and Call Center Department) , Wali and Executive Institution employees.
  - The employee of the Wilaya can check the complaints of citizens at anytime and anywhere. This employee is called Wassit
  - The employee reviews , corrects the complaint then sends it to the Wali and the executive institution.
  - The employee can send the result of the complaint to the citizen after resolving the problem .
  - The Wali can consults any complaint and fix a deadline to solve it.

### The scenario

1. The citizen logs in to FixIt application , creates a new complaint with the necessary informations (complaint's description , the pictures , place position , the category of the complain) then send it to the Wilaya.
2. Wassit will check these complaints first using FixItW application (reviewing and correcting the complaints) then send it to the Wali and the executive institution.
3. The Wali will check the complaint and fix a date called management date. This date is a deadline to solve a complaint , allows the Wali to follow up each Executive Institution .

4. The Executive institution will start working on that complaint to solve it.
5. The Wilaya will alert the citizen after solving the complaint.
6. A notification about the solved problem will be sent to the citizen who can rate its resolution (satisfied or not).

Figure 2.2 summarizes on proposal.

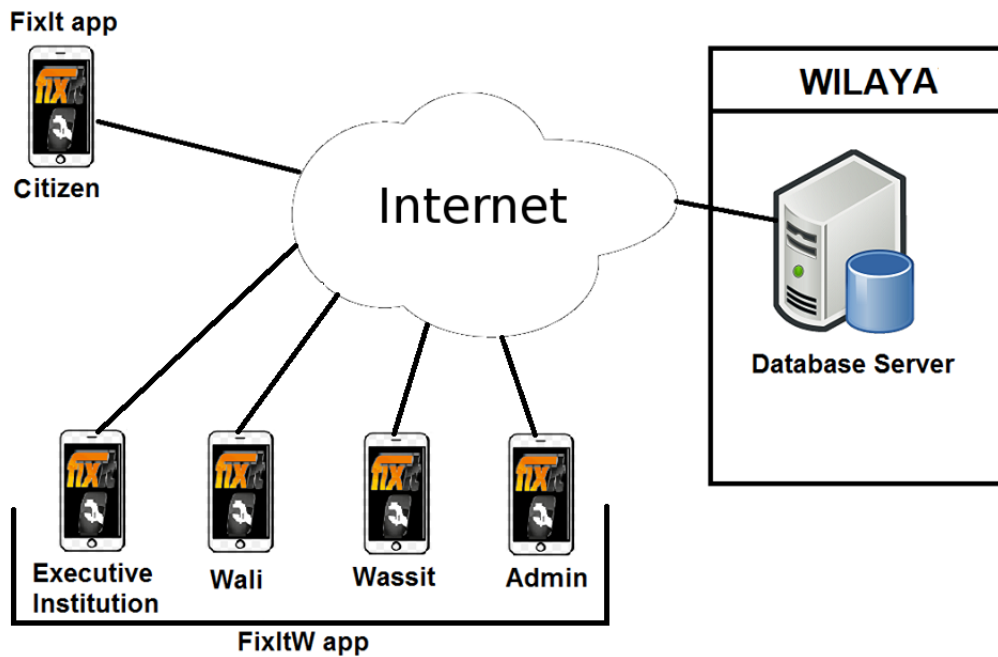


Figure 2.2: FixIt app global architecture

## 2.8 Conclusion

In this chapter we gave a brief overview of Mediation Office , Call Center Department and VoraxAgent Application , its scenario and Disadvantages .

Also we present our two mobile applications FixIt and FixItW description and features as a proposal solution for the problem. In the next part, we will give an overview about some definitions and used concepts.

## **Part II**

### **Definitions and Basic Concepts**

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## CHAPTER 3

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# MOBILE APPLICATIONS IN ADMINISTRATION

### 3.1 Introduction

In this chapter we will give a brief overview of smartphones with their different operating systems and some typical examples about administrative applications.

### 3.2 Smartphone Definition

Like standard mobiles, smartphones let you make calls and send texts.

But they also include screens that can be swiped with your finger, a camera, email and Internet access. Furthermore, they run applications(apps) that make staying in touch with family and friends and getting the most out of your day simple and rewarding . [8] Smartphones have a lot of other useful features such as calendar, media player, video games, GPS navigation, most smartphones can access the Internet and can run a variety of third-party software components("apps").Figure 3.1



Figure 3.1: Examples of smartphones (Samsung, Nokia and Blackberry)

### 3.3 A Brief History of Smartphones

It seems as though just about everyone owns a smartphone. With their advanced computing capabilities and other features, smartphones have quickly gained popularity. Prior to the invention of smartphones, there were several devices that were used including regular mobile phones, and PDA devices. Eventually technologies were combined and the concept of smartphone was born.

First concepts that eventually led to the invention of the smartphone date back to the 1970s, it was not however until 1992 that IBM came up with a prototype mobile phone incorporating PDA features. The device was demonstrated the same year at a computer industry trade show called COMDEX.

In 1994, BellSouth came up with a more refined version of the phone and called it the Simon Personal Communicator. This is the first device that could really be referred to as a smartphone. The Simon Personal Communicator was able to make and receive calls, send faxes, emails and more.

In the later part of the 1990s, many mobile phone users began carrying PDAs (Personal Digital Assistants). Early PDAs ran on various systems such as Blackberry OS, and Palm OS.

Nokia released a phone combined with a PDA in 1996. The device was called the Nokia 9000.

In 1999, a smartphone was released by Qualcomm. The pdQ smartphone, as it was called, featured a Palm PDA with Internet connectivity capabilities.

Smartphone technology continued to advance throughout the early 2000s. These advances in technology brought about the introduction of the iPhone, the Android operating system and more.

2000: the Ericsson R380 was the first device marketed as a 'smartphone'. It was a groundbreaking device since it was as small and light as a normal mobile phone, and was the first device to use the new Symbian OS.

## 3.4 Evolution of Smartphones

- **2002:** The Palm Treo was a line of smartphones originally developed by Handspring, which was bought by Palm. Treos had a number of integrated features such as the ability to check the calendar while talking on the phone, dial directly from a list of contacts, and send emails.
- **2003 :** The Blackberry 'Quark' family of smartphones was the first to offer integrated voice calling. Before this device, owners had to attach a wired headset to make calls. [9]
- **2004 :** One of the slimmest cell phone of the time, created by Motorola.  
The cell phone comes with: dual screen, VGA camera and lots of other exciting features.
- **2005 :** Sony unveiled the world's first Walkman phone.  
The Sony W800i was built for delivering great music and with dedicated buttons for music playback, Memory Stick support, which made it a great gadget for enjoying music anytime.
- **2006 :** Mobile phones were transforming into a stylish gadget, the LG Chocolate, was a great example of how cellphone designer.

- **2007 :**

**January** - Steve Jobs of Apple introduces the iPhone which he refers to as a "revolutionary and magical product." April - Gartner, a technology research company, shares that Microsoft's Windows Mobile, in the first three months of the year, has an eighteen percent share of the smartphone market.

**November** - Google announces that they will offer the Android operating system for free and anyone will be able to use or change it.

- **2008 :**

**October** - Apple announces sales of iPhones for their summer quarter, stating that they have sold 4.7 million devices, giving Apple almost thirteen percent of the smartphone market.

**November** - The G1, the first Android phone is launched. It features a sliding keyboard and limited touchscreen capabilities.

**December** - Microsoft stops Windows Mobile after realizing they cannot compete with the Android and iPhone. They then develop the Windows Phone.

- **2010 :**

**January** - Apple launches their first edition of the iPad which is a ten-inch tablet.

**February** - Android phones begin to appear that feature the same full touchscreen interaction as the iPhone.

**April** - It is announced that Google's Android has gained slightly less than ten percent of the smartphone market in the first three months of the year.

**September** - Another tablet, the Samsung Galaxy is introduced. It is slightly smaller than the iPad, at seven inches.

**October** - Microsoft introduces their first phones running on the Windows Phone operating system. Sales are initially very low.

- **2011**

**January** - It is announced that research has shown that smartphones actually outsold personal computers in the last three months of 2010.

**April** - Apple takes the lead, becoming the largest smartphone vendor, and Android becomes the highest selling smartphone platform.

**June** - Nokia and Apple settle a multiple year dispute by signing a patent licensing agreement, and Microsoft starts demanding payments from Android phone makers, with the claim of patent infringements.

**July** - Android takes over forty-three percent of the smartphone market in the year's second quarter. **October** -According to estimates, Samsung is the largest smartphone vendor at this time.

**November** - Android takes over fifty percent of the smartphone market in the year's third quarter. [9]

- **2013** :Gartner, the market research company that invented the famous “hype-cycle for emerging technologies” included a new emerging phenomenon on their list: “The Internet of Things”.

**October**- IDC published a report stating that the Internet of Things would be a 8.9 trillion market in 2020.

Today billions of devices are connected to the Internet in what we call the "Internet of Things" or "IoT". These devices are already transforming our lives, but as they do, there are also serious challenges that must be addressed to maximize the potential benefits. [10] Nowadays, smartphone technology has become even more advanced and technology continues to improve at a rapid pace. Smartphones have more features than ever before including touchscreen capabilities, GPS, cameras, and much more.

## 3.5 Mobile Operating Systems

Mobile operating system is a software that supports phone in its basic functions from controlling its memory and keyboard to storage and applications. [8]

In the next section, we will present the most popular OS for Smartphones.

### 3.5.1 Android Operating System

Google's Android operating system is the most widely used. It's available on lots of different types of phones from Samsung and HTC to Sony, among others. It comes with many Google features like Gmail, Google web browsing, Google Maps and weather reports, also get access to the Google Play store, which lets you download more apps, music and books to smartphone. Figure 3.2 [8],

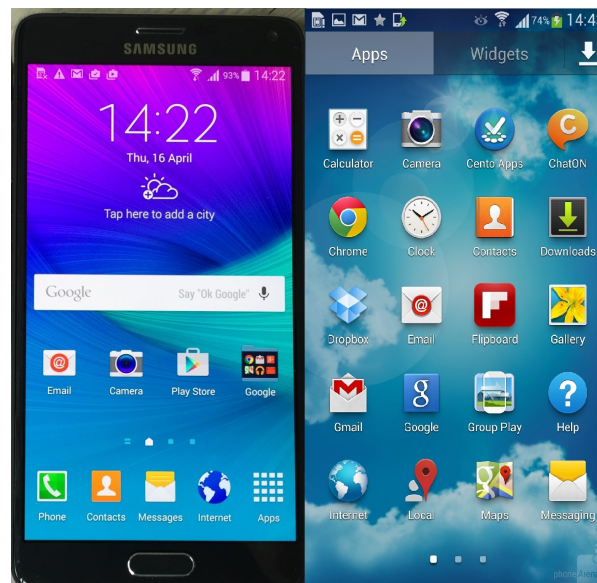


Figure 3.2: Android system

### 3.5.2 BlackBerry's Operating System

BlackBerry's OS is a discontinued proprietary mobile operating system developed by BlackBerry Limited for its BlackBerry line of smartphone handheld devices.

The operating system provides multitasking and supports specialized input devices that have been adopted by BlackBerry for use in its handhelds, particularly the trackwheel, trackball, and most recently, the trackpad and touchscreen. Figure3.3 [8]



Figure 3.3: BlackBerry system

### 3.5.3 Windows Mobile

The operating system of Windows Mobile has been developed by Microsoft to run this OS on variety of mobile phones. Window Mobile OS is based in Win32 API, and designed to offer a similar service like desktop PCs. Figure3.4 [5]



Figure 3.4: Windows Mobile

## 3.6 Mobile Applications

In this section we will talk about Mobile Applications and their importance in the Administration fields.

### 3.6.1 Definition

A mobile application is a software that is contained within a phone for a particular purpose or use. The purpose of mobile applications varies from providing information to actual interaction with the user. Essentially, the main goal for all mobile applications is to provide a service that can be used on cell phones rather than an actual computer. Although mobile applications are complex and serve various purposes, all share the ability of allowing the user to access information through this mobile device or cell phone. [6] There are a lot of mobile apps in the Internet you can find them in 'app store' or in websites, these apps provide a variety of services for the users to help them solving a lot of problems in their daily life's in simple ways.

There are many types of applications such as a sport app, news, entertainment, games, family .... etc.

In our work we are interested to Mobile app in Administration, these administrative apps offer many advantages to help improving the Administrative Services or to provide a communication between the citizen and the Government employees.

### **3.6.2 Mobile Applications in Administration**

#### **Definition of Administration Application**

Administration Applications are softwares that allows system administrators to control the functions or services available to users and groups on a specific system.

This includes controlling the functions available to users that access their system through clients. [11]

In the next section we will present some examples about Mobile Applications in Administration.

#### **MPay(Payment through the Mobile Phone)**

Dubai Smart Government has designed this service with the aim of bringing more ease and convenience to users, particularly in situations where users have to make emergency payment of fines or fees for a continued service or charges to avoid a new fine.

It is available as an iPhone and Android app or can be used through conventional SMS to a phone number to inquire or pay government transaction fees or due charges.

A number of government entities are currently using this service, which covers Salik(the electronic toll road system in Dubai) recharge from RTA(Roads and Transport Authority), payment of traffic fines from Dubai Police, payment of electricity bills from Dubai Electricity and Water Authority, payment of Etisalat bills and donations to Dubai Cares and Al Jalila Foundation(non profit charitable organization for promoting medical education and research in the United Arab Emirates).Figure3.5 [20]

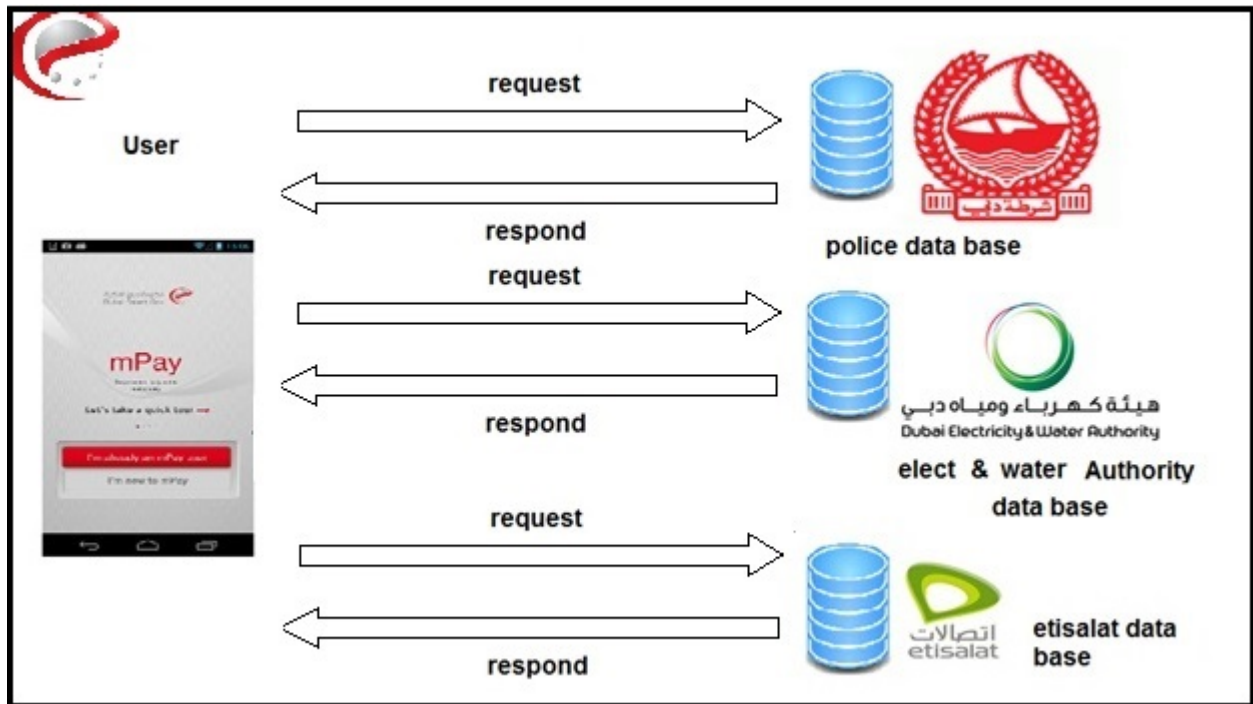


Figure 3.5: Mpay components

### Smart Employee

The Smart Employee app has been specially configured by Dubai Smart Government for Dubai Government employees (Figure3.6). As a Dubai Government employee, uses this smart app to take care of back-office operations (i.e Human Resources, procurement etc). Besides the app has been configured by Dubai Smart Government to create a customized employee self-service menu with services such as [20]:

- Absence and attendance management – apply and return from leave. Also enquire about leave balances, leave requests, attendance records, permission requests etc.
- Get citizen manager to approve/reject citizen leave requests or purchasing requisitions instantly .
- Available in Arabic and English.
- Certificates and letters – apply for official letters and certificates and review previous requests.

- Notifications – get notifications for immediate action.
- Payroll – get information and salary related information including payslips.
- Check the team hierarchy or search for an employee and contact them- Send notes or add tag words to help other employees to search for your record.
- Use on smartphones or tablets.

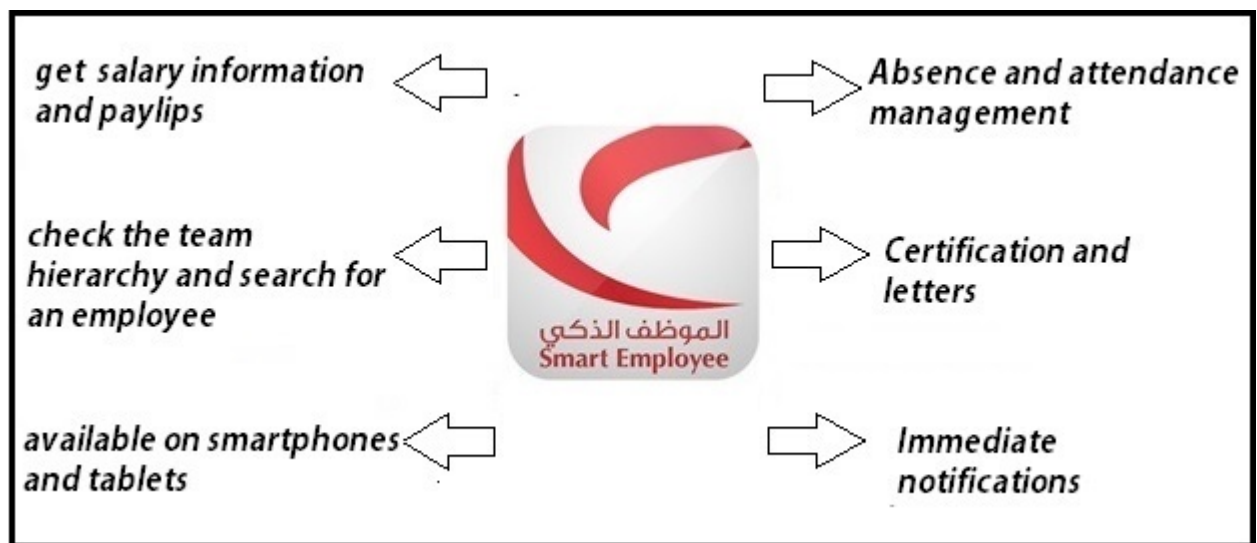


Figure 3.6: Smart Employee components

### DubaiNow

Is the first unified Dubai government services smart app offering over 50 smart services from 22 government entities. [20]

Here are the Dubai Government services included in DubaiNow Figure3.7:

- Utilities and Bills:
  - Pay your DEWA( Electricity and Water Authority), Etisalat, du, Dubai Municipality bills.
  - Pay your Dubai Police traffic fines .

- Top up your Salik(electronic toll road system), NOL(electronic ticketing card), Dubai Customs Accounts.
- Donate to Dubai Cares and Al Jalila Foundation (non profit charitable organization for promoting medical education and research in the United Arab Emirates).
- Driving: Renew vehicle registration ,Top up parking time , Explore street speed limits.  
View road accident notifications to plan travel efficiently.
- Public Transport.
- Islam: View daily prayer timings Find your nearest mosque and select the fastest route.
- Health: Find all doctors, clinics and hospitals registered with Dubai Health Authority (Dubai Health Authority).

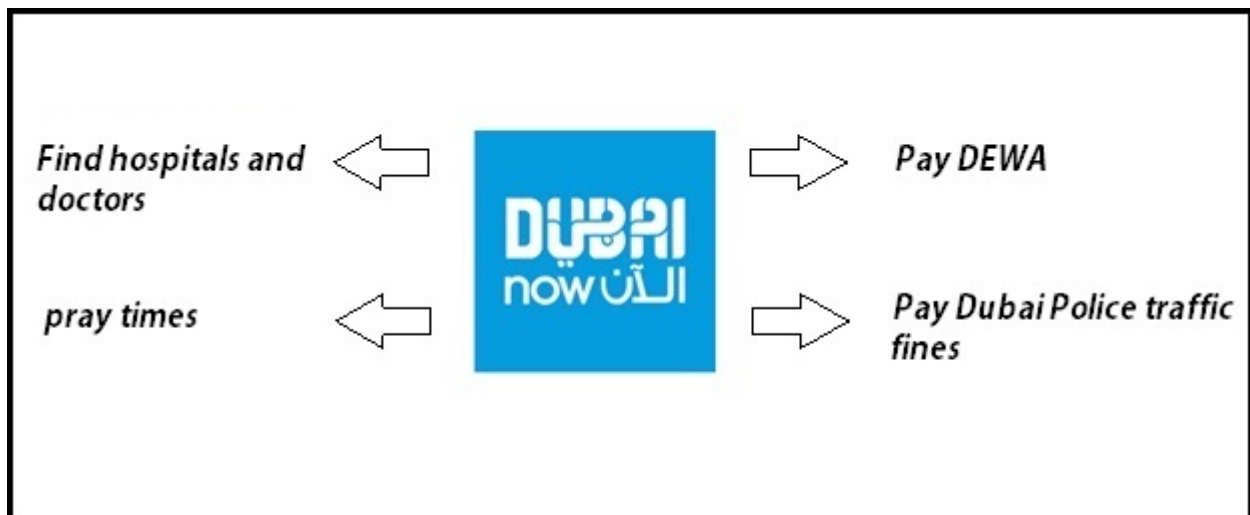


Figure 3.7: DubaiNow components

## JapanGov Official Gateway Application

JapanGov Application, an official app of the Government of Japan, delivers up date information about Japan including photos and videos. Figure3.8 [20]

Exclusive advantages JapanGov App can offer- Both new and trending contents are distributed through the Topics screen.

Push notifications enable to easily find update information.

Bookmark the favorite contents.

Online magazines issued by the Government of Japan are also available.

Topics gives recommendations and updates out of all the contents on JapanGov App.

This app offers two essential services:

Key Initiatives: it introduces documents and links about Japanese Government's latest initiative.

JapanGov Web: shows the top page of the JapanGov website. The site contains abundant information from the Government of Japan including useful related links.

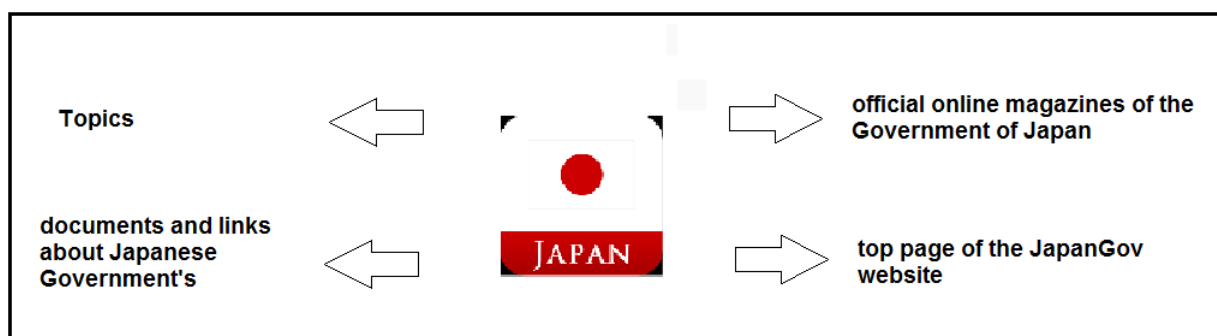


Figure 3.8: JapanGov components

## Service Public Application Moroccan

Service Public Application is a bilingual application (Arabic / French), allowing the public release of information on administrative procedures, coordinates public services and the opinions of recruitment competitions for state services, local authorities and institutions and enterprises.

The editorial content are from the Ministry of Public Service and the modernization of

the administration in partnership with various government departments.

The application "ServicePublic" is a portal service "Service-Public.ma" first Moroccan government portal, specializing in the dissemination of information on procedures and paperwork. Figure 3.9 [20]

It offers access to:

- The administrative procedures to guide the user to find all the practical information's relating to administrative procedures.
- A section Ask questions service that allows the user to view the database (ask questions by phone , email and get answers) .
- In view of the competitive examinations for state services, local authorities and public establishments and enterprises.
- A directory of government, informing on the physical space and e-mails of some state services and public institutions.



Figure 3.9: Service Public App Moroccan components

## **3.7 Conclusion**

In this chapter we gave a brief overview of smartphones with their different operating systems and some typical examples about administrative applications. In the next chapter, we will give an over view about client / Service architecture.

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# CHAPTER 4

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## CLIENT/SERVER ARCHITECTURE

### 4.1 Introduction

In this chapter we will give a brief overview of the client / server architecture with its concepts and its operations.

### 4.2 Definition

Client/server is a network architecture that divides functions into client and server subsystems, with standard communication methods to facilitate the sharing of information between them.

A client is defined as a requester of services and a server is defined as the provider of services.

Client/server computing is a very efficient and safe means of sharing database information in a multi-user environment.

The client program usually accepts user requests and provides screen displays. Server programs generally reside on more powerful machines and are used to process information.

A single machine can be both a client and a server depending on the software configuration.

When client-server programs are on different machines, the client and the server machines are linked together through a network.

## **4.3 Client/Server Components**

### **4.3.1 Client**

The client is any computer process that requests services from the server. The client is also known as the front-end- application, reflecting the fact that the end user usually interacts with the client process. [4]

### **4.3.2 Server**

The server is any computer process providing services to the clients. The server is also known as the back-end application, reflecting the fact that the server process provides the background services for the client process. [4]

### **4.3.3 Middleware**

Communication middleware: is any computer process(es) through which clients and servers communicate. The communication middleware, also known as middleware or the communications layers, is made up of several layers of software that aid the transmission of data and control information between clients and servers. [4]

### **4.3.4 Relational Database**

Relational Database : A database in which information access is limited to the selection of rows that satisfy all search criteria. [1]

### 4.3.5 Structured Query Language

Structured Query Language (SQL): A language developed by IBM and standardized by ANSI for addressing, creating, updating, or querying relational databases . [1]

Here we present the Client/Server components and the interactions between them.(Figure 4.1)

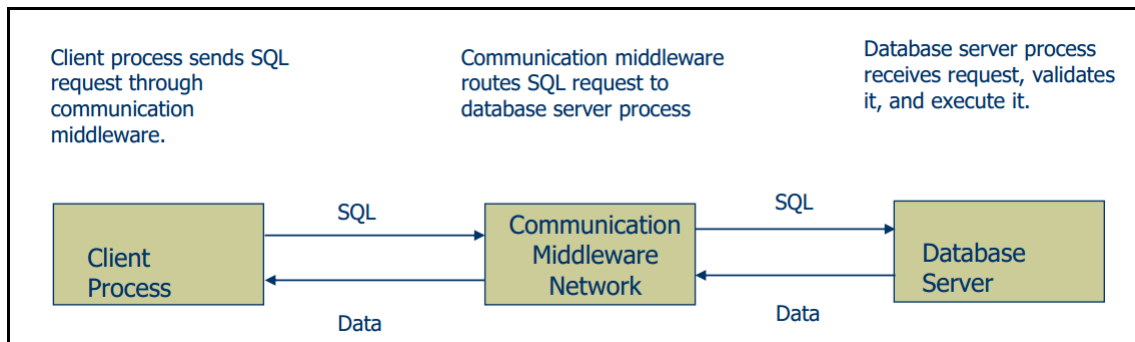


Figure 4.1: How Components Interact

## 4.4 Types of Servers

### 4.4.1 File Server

- File Servers are useful for sharing information across the network
- The client passes a request for file records over a network to the file server.
- This is the most primitive type of data service used for exchanging messages over the network to find the requested data.
- The file servers provide access to the remote server processors. In the typical implementation the software, shared data, databases and backups are stored on disk, tape and optical storage devices that are managed by the file server.(Figure 4.2) [2]

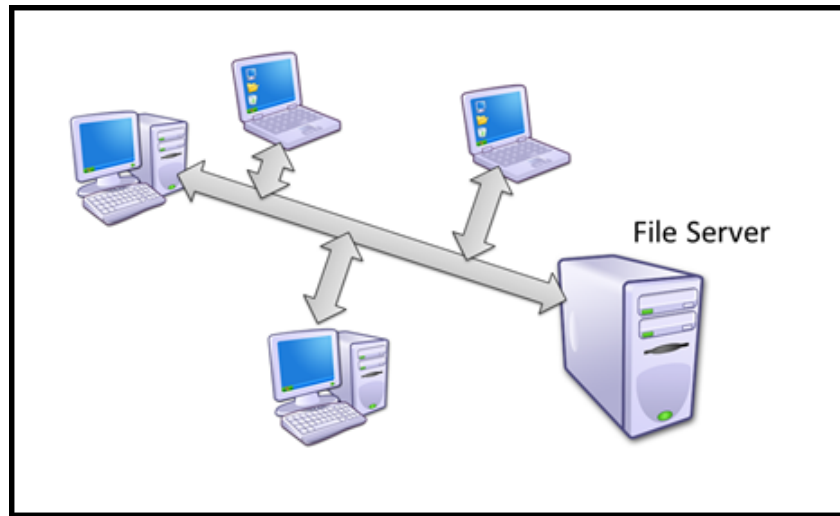


Figure 4.2: Client/Server with a File Server

#### 4.4.2 Transaction Server

The client can invoke remote procedure or services that reside on the server with an SQL database engine using the transaction server.

- The network exchange consists of a single request/ reply, The SQL statements either all succeeded or fail as a unit.
- These grouped SQL statements are called transactions.
- With a transaction server you create the client/server application by writing the code for both the client and the server components.
- The client component usually includes a Graphical User Interface(GUI). The server component consists of SQL transaction against a database. These applications are called Online Transaction Processing or OLTP(Online transaction processing).
- The OLTP are mission-critical applications that require a very less response time (1-3 sec).
- The OLTP applications also require tight controls over the security and integrity of the database.

- It has two forms
  - TP-Lite: based on the stored procedures provided by database vendors.
  - TP-Heavy: bases on the TP Monitors which is provided by OLTP vendors.(Figure 4.3) [2]

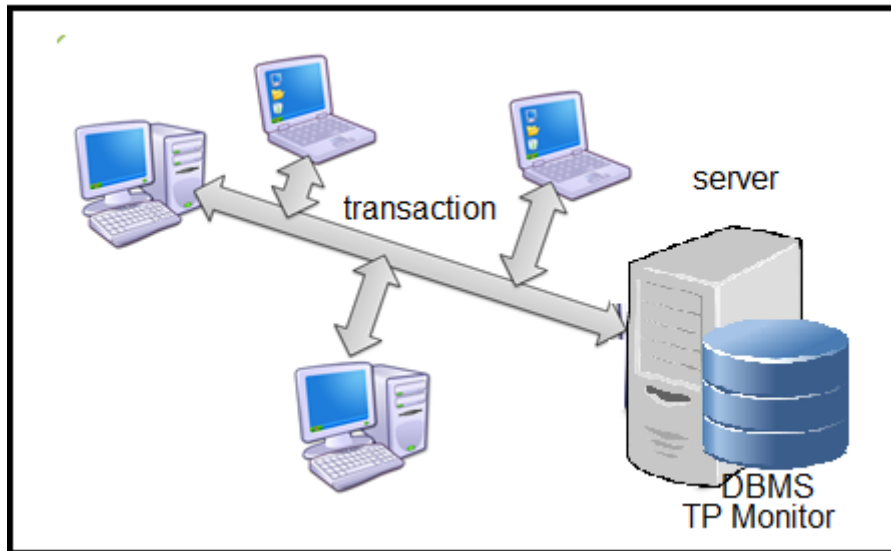


Figure 4.3: Client/Server with the Transaction Servers

### 4.4.3 Database Server

- The client passes the SQL requests as messages to the database server, the result of each SQL command is returned over the network.
- The code, which processes the SQL request and the data, reside in the same machine, the server uses its own processing power to find the requested data back to the client, instead of passing all the records back to the client. This results in a much more efficient use of the distributed processing power.
- The database servers provide the foundation for decision-support systems and also provide key role in data warehousing.(Figure 4.4) [2]

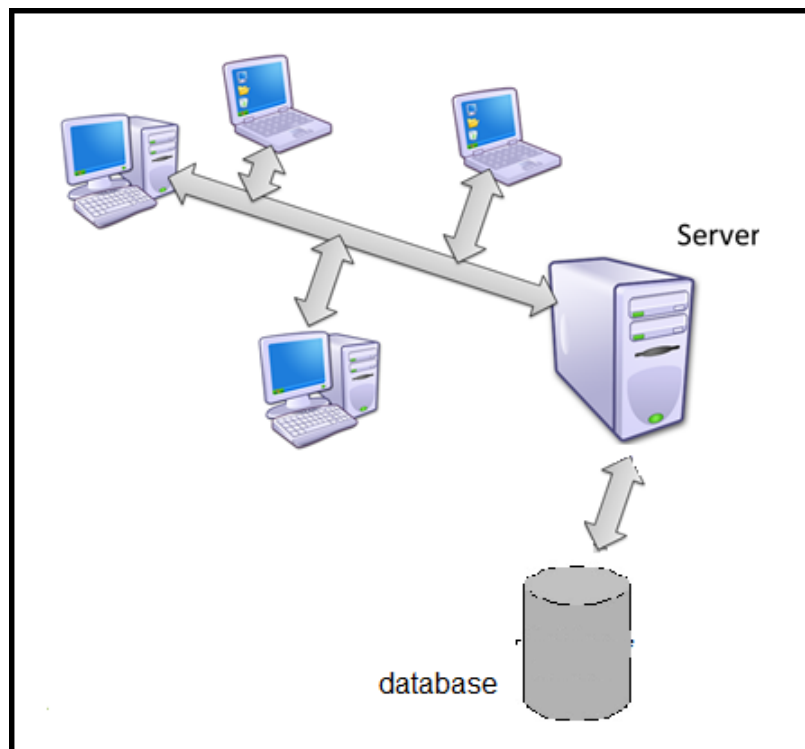


Figure 4.4: Client server with database server

#### 4.4.4 Web Server (Internet Server)

All of the machines on the Internet are either servers or clients. The machines that provide services to other machines are servers. And the machines that are used to connect to those services are clients. There are Web servers, e-mail servers, FTP servers and so on serving the needs of Internet users all over the world.

When the user connect to a website to read a page, he is sitting at a client's machine.

The server machine finds the requested page and sends it to the user.

A server has a static IP address that does not change very often.

A home machine that is dialing up through a modem, on the other hand, typically has an IP address assigned by the ISP every time you dial in. That IP address is unique for the session 'it may be different the next time you dial in'.(Figure 4.5) [12]

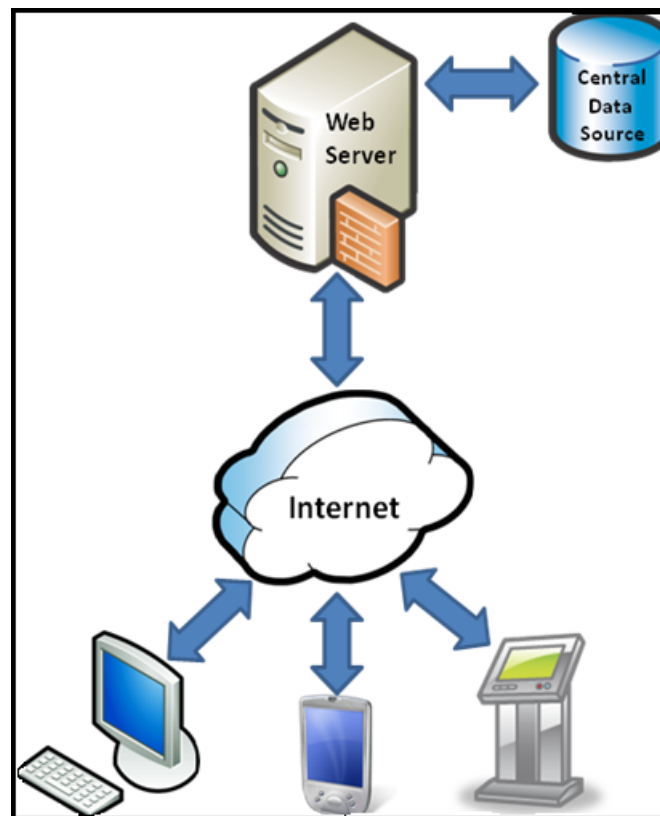


Figure 4.5: Client server with Web Server (Internet Server)

In our work (Graduation Application Project) we will use the Web Server Architecture

## 4.5 Client/Server Architecture

- A network architecture in which each computer or process on the network is either a client or a server. Servers are powerful computers or processes dedicated to managing disk drives (file servers), printers (print servers), or network traffic (network servers).
- Clients are PCs or workstations on which users run applications.
- Clients rely on servers for resources, such as files, devices, and even processing power.
- Another type of network architecture is known as a peer-to-peer architecture because each node has equivalent responsibilities. Both client/server and peer-to-peer

architectures are widely used, and each has unique advantages and disadvantages.

- Client-server architectures are sometimes called two-tier architectures. [2]

### 4.5.1 2-tier Client/Server Architecture

2-tier architecture is used to describe client/server systems where the client requests resources and the server responds directly to the request, using its own resources. This means that the server does not call on another application in order to provide part of the service.(Figure 4.6) [13]

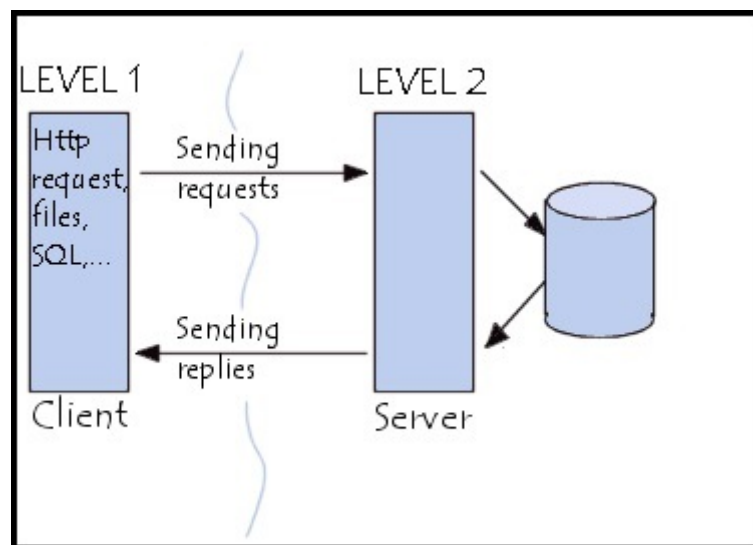


Figure 4.6: 2-tier Client/Server Architecture

### 4.5.2 3-tier Client/Server Architecture

In 3-tier architecture, there is an intermediary level, meaning the architecture is generally split up between:

- A client, i.e. the computer, which requests the resources, equipped with a user interface (usually a web browser) for presentation purposes.
- The application server (also called middleware), whose task it is to provide the requested resources, but by calling on another server

- The data server, which provides the application server with the data it requires.(Figure 4.7) [13]

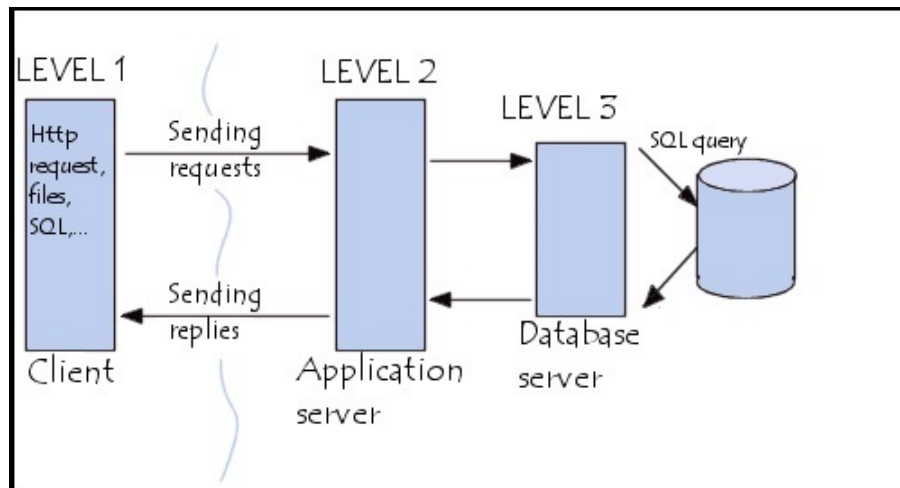


Figure 4.7: 3-tier Client/Server Architecture

### 4.5.3 Multi-Tiered Architecture

In 3-tier architecture, each server (tier 2 and 3) performs a specialized task (a service). A server can therefore use services from other servers in order to provide its own service. As a result, 3-tier architecture is potentially an n-tiered architecture.(Figure 4.8) [13]

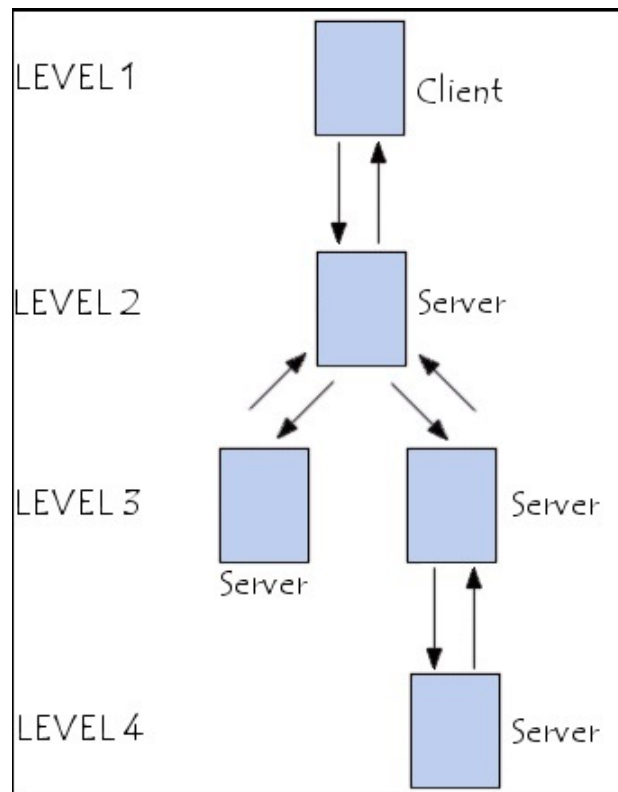


Figure 4.8: Multi-Tiered Architecture

## 4.6 Conclusion

In this chapter we gave a brief overview of the client / server architecture with its concepts and its operations.

At the end of this chapter we wish to note that the architecture adopted in this project is the Client/Server architecture. In the next chapter, we will give an over view about Unified Modeling Language.

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# CHAPTER 5

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## UML:UNIFIED MODELING LANGUAGE

### 5.1 Introduction

In this chapter we will give a brief overview of Unified Modeling Language(UML) and the different types of diagrams , also we will give a simple overview of 2TUP process .

### 5.2 Definition

Unified Modeling Language (UML) is a standard visual modeling language intended to be used for:

- modeling business and similar processes,
- analysis, design, and implementation of software-based systems

UML is a common language for business analysts, software architects and developers used to describe, specify, design, and document existing or new business processes, structure and behavior of artifacts of software systems. UML can be applied to diverse application domains (e.g., banking, finance, Internet, aerospace, healthcare, etc.) It can be used

with all major object and component software development methods and for various implementation platforms (e.g., J2EE, .NET). [21]

## 5.3 The History and Origins of UML

- Where and how did UML begin? Identifiable object-oriented modeling languages began to appear between mid-1970 and the late 1980s as various methodologists experimented with different approaches to object-oriented analysis and design. The number of identified modeling languages increased from less than 10 to more than 50 during the period between 1989-1994. Many users of OO methods had trouble finding complete satisfaction in any one modeling language, fueling the "method wars."
- By the mid-1990s, new iterations of these methods began to appear and to incorporate each other's techniques. This resulted in the emergence of a few clearly prominent methods.
- Software engineers and other experts needed a simplified and consistent way to model systems, but new languages were cropping up at a rapid pace. UML itself was developed in late 1994, when the two creators of popular methodologies teamed up. Grady Booch and Jim Rumbaugh of Rational Software Corporation worked to unify the Booch and OMT (Object Modeling Technique) methods, and in 1995, Ivar Jacobson joined their endeavor. Their combined method was known as OOSE Method 1—Object-Oriented Software Engineering.
- The Three Amigos of software engineering as they were known, had evolved other methodologies. They teamed up to provide clarity for programmers by creating new standards. The collaboration between Grady, Booch, and Rumbaugh made all three methods stronger and improved the final product. [14]

## 5.4 Different types of UML diagrams

UML uses elements and associates them in different ways to form diagrams that represent static, or structural aspects of a system, and behavioral diagrams, which capture the dynamic aspects of a systems.

There are 13 Diagrams in UML: Class Diagram, Component Diagram, Composite Structure Diagram , Object Diagram , Package Diagram , Activity Diagrams, Communication Diagram, Interaction Overview Diagram, Sequence Diagram, State Machine Diagram , Timing Diagram, Use Case Diagram

In this section we will explain some UML diagrams :

### 5.4.1 Class Diagram

**Class Diagram** The most commonly used UML diagram, and the principal foundation of any object-oriented solution. Classes within a system, attributes and operations and the relationship between each class. Classes are grouped together to create class diagrams when diagramming large systems. [14]

### 5.4.2 Object Diagram

**Object Diagram** Shows the relationship between objects using real world examples and illustrate how a system will look at any given time. Because data is available within objects, they can be used to clarify relationships between objects. [14]

### 5.4.3 Activity Diagrams

**Activity Diagrams** Graphically represented business or operational workflows to show the activity of any part or component in the system. Activity diagrams are used as an alternative to State Machine diagrams. [14]

### 5.4.4 Sequence Diagram

Sequence Diagram Shows how objects interact with each other and the order of occurrence. They represent interactions for a particular scenario. [14]

### 5.4.5 Use Case Diagram

Represents a particular functionality of a system, created to illustrate how functionalities relate and their internal/external controllers (actors). [14]

## 5.5 2TUP

### 5.5.1 Definition

2TUP is a unified process (i.e. a software development process) built on the UML modeling language . Every process answers the following main characteristics:

- It is an incremental process, allowing a better technical and functional risk management and thus constituting the deadlines and the costs control.
- It is an iterative process. The degrees of abstraction are increasingly precise at each iteration.
- It is component oriented, offering flexibility to the model and supporting the re-use.
- It is user oriented because built from their expectations. [7]

The 2TUP process answers to the constraints of change of the information systems subjected themselves to two types of constraints: functional constraints and technical constraints as shows it the following diagram:

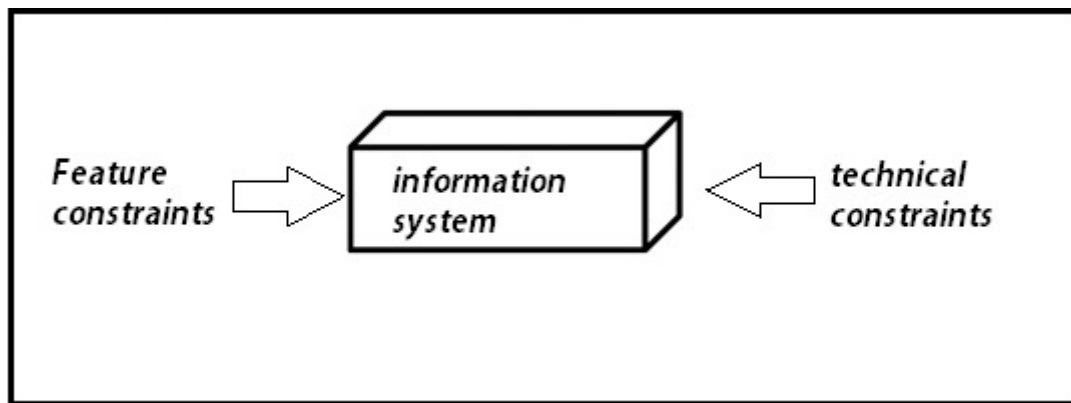


Figure 5.1: The different constraints of 2TUP

### 5.5.2 2TUP process

The process of 2TUP is modeled by two branches (tracks):

#### **Functional track (capitalization of knowledge trade)**

This branch capture functional requirements, which produced a model focused on the business end users.

#### **Technical track (re-use of a technical know-how)**

Techniques developed for the system are independent of functions to be performed. these two tracks amalgamate for the realization of the system. This is why this process is still called Y-shaped process.

With this development process, a model is essential in order to anticipate the results.

A model can be used with each step of the development with an increasing detailed manner. The industrial standard of object modeling, UML, was selected as the development tools. It appeared very difficult to consider the 2TUP process without using UML and, more particularly UML 2.0 which support the oriented design component. [7]

## 5.6 Conclusion

In this chapter we gave a brief overview of Unified Modeling Language(UML) and the different types of diagrams , also we gave a simple overview of 2TUP process. In the next part, we will give an over view about Case study.

## Part III

# Analyse and Design

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## CHAPTER 6

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# ANALYSE AND IDENTIFICATION OF NEEDS

### 6.1 Introduction

In this chapter we will identify the needs of the applications to be realized. In the beginning, we will define the specifications that contain all the objectives of this project. Then, we will present the textual description of use case, Activity and Sequence Diagrams .

### 6.2 Drafting of specifications

#### 6.2.1 Project display

The goal of this Master thesis project (FixIt and FixItW applications) is to make applications that provide a permanent connection between the citizen and Wilaya . Allowing the citizen to send his grievances about different sectors to the Wilaya.

### **6.2.2 Actors and functional requirements**

Application's users are : Citizen, Administration, Executive institution, Wassit and Wali.

- Citizen (any person over the age of 15 years), can :
  - Sign in to the FixIt application .
  - Edit his information.
  - Add new complaint.
  - Edit his complaints if is not checked by Wassit.
  - Delete his complaints if the complaint is not checked by Wassit.
  - Search and View complaints .
  - Rate the solution of his complaints .
- Admin (a computer engineer) can :
  - Edit the information of users (Citizen, Wilaya employees ) .
  - Validate the information of user.
  - Delete the user.
  - Search for user.
  - View the information of user .
- Wassit(employee of Mediation Office) can :
  - Edit the information of the complaint.
  - Delete the complaint.
  - Search and view complaint .
  - Check the complaint .
  - Do statistic (Represent the number of the complaints based on the selected criteria) .
- Executive institution employee( directorate responsible for solving problems), can:

- View and Search for complaints.
- Do statistic by Criteria.
- Resolve the complaint.
- Wali of Mila can:
  - View and Search for complaints.
  - Do statistic by Criteria.
  - Fixation Management Date.
  - View Black list (List of not solved complaints after the deadline).

## 6.3 Use Case Diagram

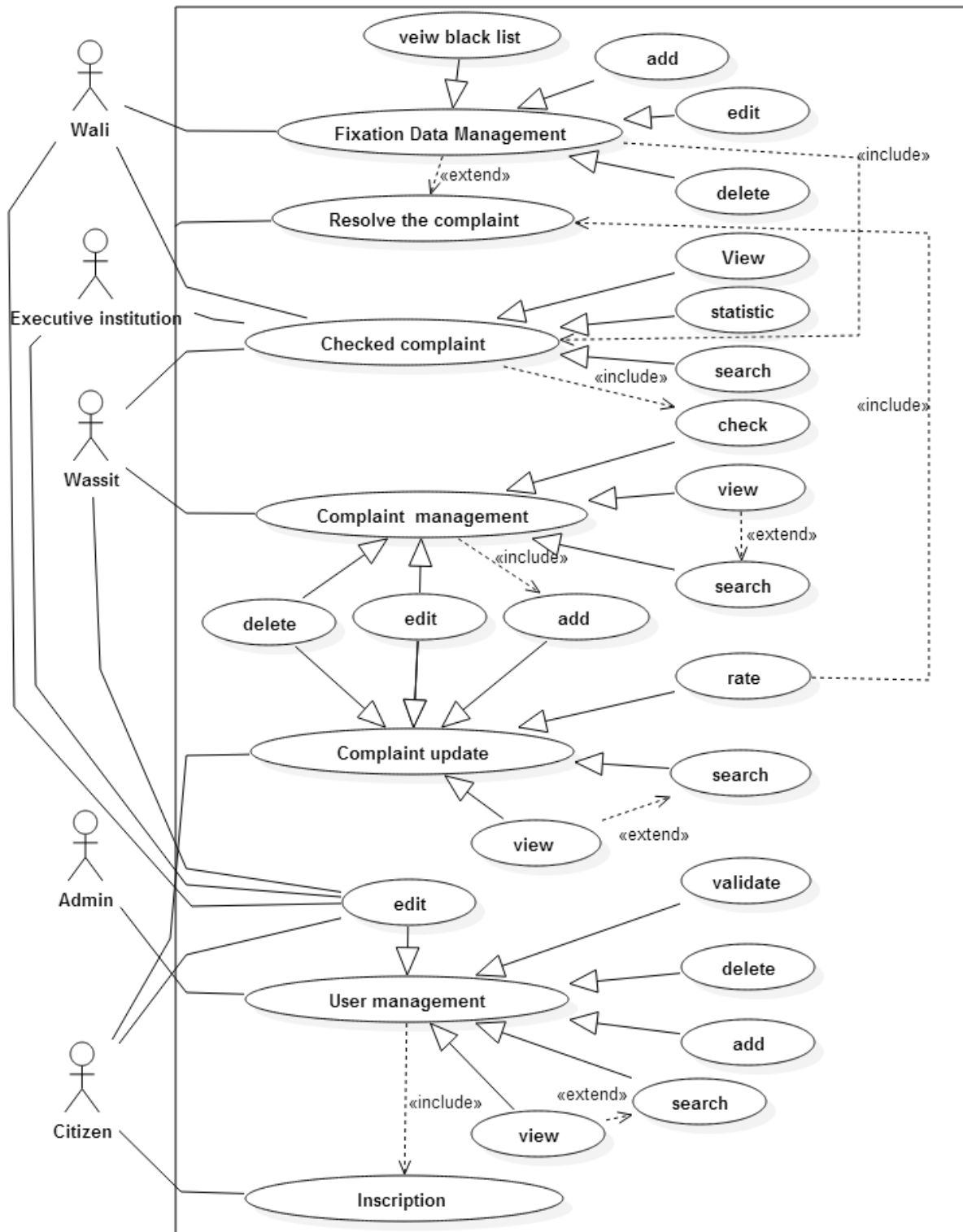


Figure 6.1: Use case diagram

## 6.4 Complaint Update

### 6.4.1 Textual description of Complaint Update (Citizen)

| Actor            | Citizen                     |                                                                                                                                                                                   |
|------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pre Conditions   | Citizen(user) is identified |                                                                                                                                                                                   |
| Post Conditions  | Complaint Update            |                                                                                                                                                                                   |
| Nominal Scenario | 1                           | Citizen asks the system to show up the menu of Complaint Update                                                                                                                   |
|                  | 2                           | The system displays the menu of Complaint Update                                                                                                                                  |
|                  | 3                           | The Citizen chooses one of these actions :<br>- Add Complaint<br>- View Complaint information<br>- Search Complaint<br>- Edit Complaint<br>- Delete Complaint<br>- Rate Complaint |
| Error Scenario   | 1                           | The system informs the Citizen that no data base Connection                                                                                                                       |
|                  | 2                           | The system informs the Citizen that no Internet Connection                                                                                                                        |

Table 6.1: Complaint Update Scenario

### Add Complaint(Citizen)

| Actor                | Citizen               |                                                                         |
|----------------------|-----------------------|-------------------------------------------------------------------------|
| Pre Conditions       | Citizen is identified |                                                                         |
| Post Conditions      | Add new complaint     |                                                                         |
| Nominal Scenario     | 1                     | The system asks the Citizen to input the complaint information          |
|                      | 2                     | The Citizen inputs the information                                      |
|                      | 3                     | The system checks all the information                                   |
|                      | 4                     | The system add the complaint                                            |
|                      | 5                     | The system informs the citizen that the complaint is added successfully |
| Alternative Scenario | A                     | 4 The system informs the citizen that the information are incorrect     |
|                      |                       | 5 The system asks the citizen to correct the information                |
|                      |                       | 6 Continue from step 2                                                  |

Table 6.2: Add Complaint Scenario

**Search Complaint (Citizen)**

| Actor                | Citizen                                   |                                                            |
|----------------------|-------------------------------------------|------------------------------------------------------------|
| Pre Conditions       | Citizen is identified                     |                                                            |
| Post Conditions      | The system displays complaint information |                                                            |
| Nominal Scenario     | 1                                         | The system asks to choose complaint criteria               |
|                      | 2                                         | The Citizen chooses complaint criteria one or more         |
|                      | 3                                         | The system displays the results                            |
| Alternative Scenario | A                                         | 4 The system informs the Citizen that there are no results |
|                      |                                           | 5 Continue from step 2                                     |

Table 6.3: Search Complaint Scenario

**Edit Complaint(Citizen or Wassit)**

| Actor                | Citizen or Wassit                                                       |                                                                               |
|----------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Pre Conditions       | Citizen or Wassit are identified and complaint is not checked by Wassit |                                                                               |
| Post Conditions      | The system edits the complaints information                             |                                                                               |
| Nominal Scenario     | 1                                                                       | The system displays the list of complaints                                    |
|                      | 2                                                                       | Citizen or Wassit Select one complaint                                        |
|                      | 3                                                                       | The system displays the complaint information                                 |
|                      | 4                                                                       | Citizen or Wassit edit the current information                                |
|                      | 5                                                                       | The system checks the new information                                         |
|                      | 6                                                                       | The system displays a confirmation message.                                   |
|                      | 7                                                                       | The Citizen or Wassit confirm the edition.                                    |
|                      | 8                                                                       | System save complaint information                                             |
|                      | 9                                                                       | The system informs the Citizen or Wassit that the complaint is edited         |
| Alternative Scenario | A                                                                       | 6 The system informs the Citizen or Wassit that the information are incorrect |
|                      |                                                                         | 7 The system asks the Citizen or Wassit to correct the information            |
|                      |                                                                         | 8 Continue from step 3                                                        |
|                      | B                                                                       | 7 The user cancels the edition                                                |
|                      |                                                                         | 8 The system ignores the edition.                                             |
|                      |                                                                         | 9 Continue from step 3                                                        |

Table 6.4: Edit Complaint Scenario

**Delete Complaint (Citizen or Wassit)**

| Actor                | Citizen or Wassit                                                      |                                                                         |
|----------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Pre Conditions       | Citizen or Wassit is identified and complaint is not checked by Wassit |                                                                         |
| Post Conditions      | System removes the complaint                                           |                                                                         |
| Nominal Scenario     | 1                                                                      | The system displays the list of complaints                              |
|                      | 2                                                                      | Citizen or Wassit select one complaint                                  |
|                      | 3                                                                      | The system displays a confirmation message.                             |
|                      | 4                                                                      | The Citizen or Wassit confirm the deletion.                             |
|                      | 5                                                                      | The system deletes the selected complaint                               |
|                      | 6                                                                      | The system notifies the Citizen or Wassit that the complaint is removed |
| Alternative Scenario | A                                                                      | 5 The Citizen or Wassit cancel the deletion                             |
|                      |                                                                        | 6 The system ignores the deletion.                                      |
|                      |                                                                        | 7 Continue from step 1                                                  |

Table 6.5: Delete Complaint Scenario

**Rate Complaint(Citizen)**

| Actor            | Citizen                                                                                |                                                                   |
|------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| Pre Conditions   | Citizen is identified and the complaint has been Resolved by the concerned directorate |                                                                   |
| Post Conditions  | add rate                                                                               |                                                                   |
| Nominal Scenario | 1                                                                                      | Citizen asks for the list of complaints                           |
|                  | 2                                                                                      | The system displays the list of resolved complaints               |
|                  | 3                                                                                      | The Citizen selects one complaint                                 |
|                  | 4                                                                                      | The system Shows the information of complaint                     |
|                  | 5                                                                                      | The Citizen adds rate (Good/Bad)                                  |
|                  | 6                                                                                      | The system notifies the Citizen that the complaint has been rated |

Table 6.6: Rate Complaint Scenario

## 6.4.2 Activity Diagram of Complaint Update (Citizen)

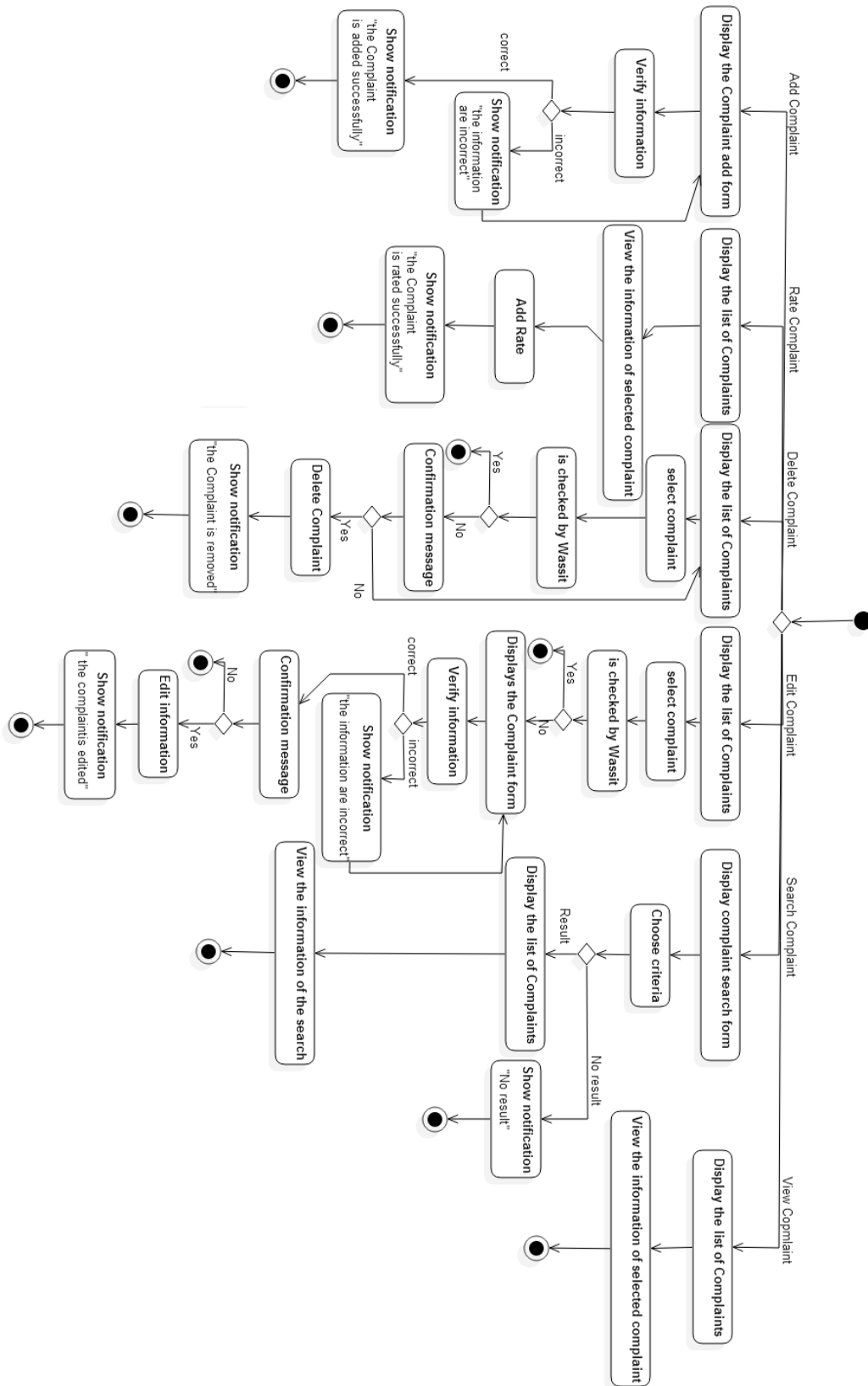


Figure 6.2: Complaint Update Activity Diagram

### 6.4.3 Sequence Diagram Complaint Update (Citizen)

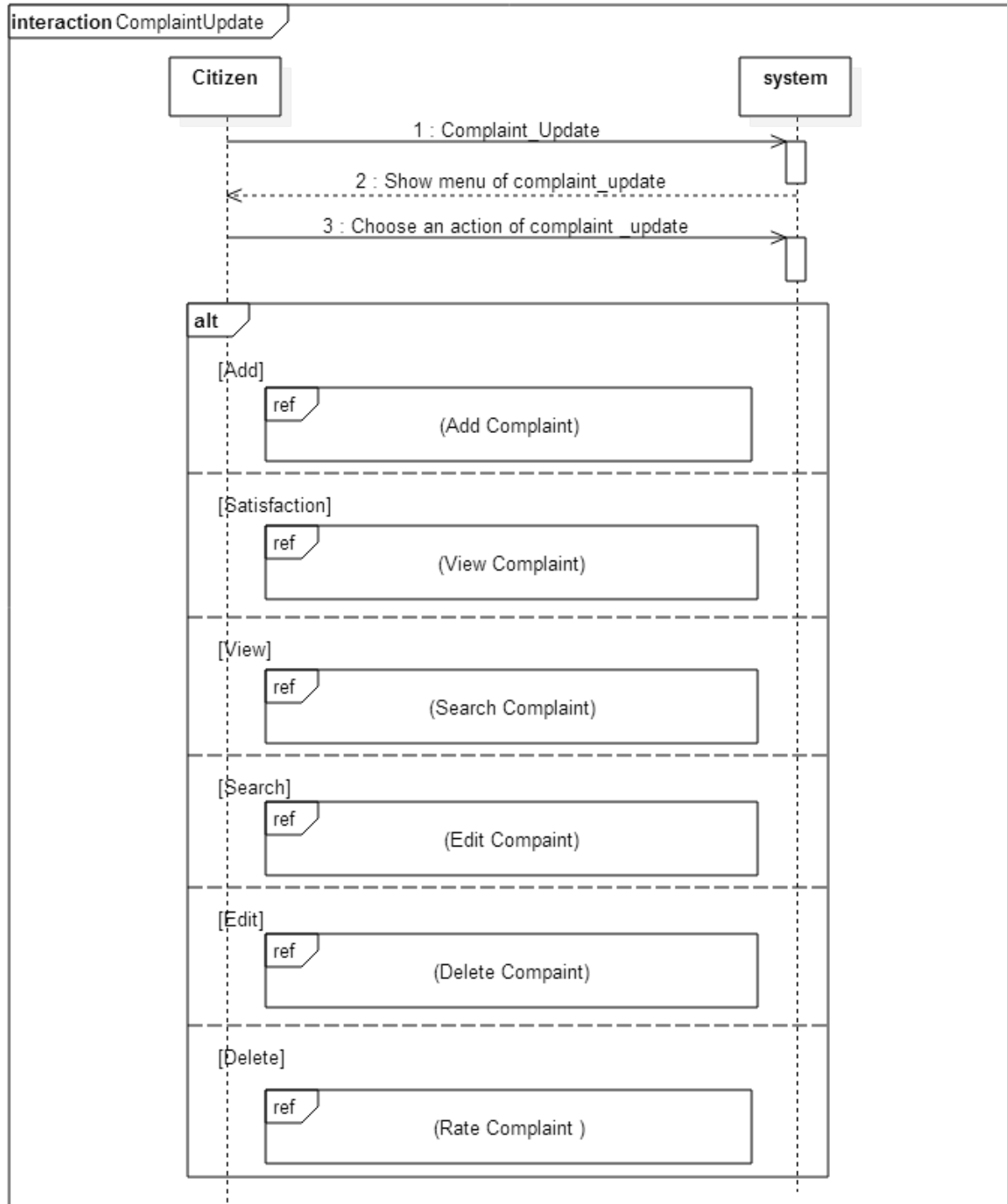


Figure 6.3: Complaint Update

### Add Complaint (Citizen)

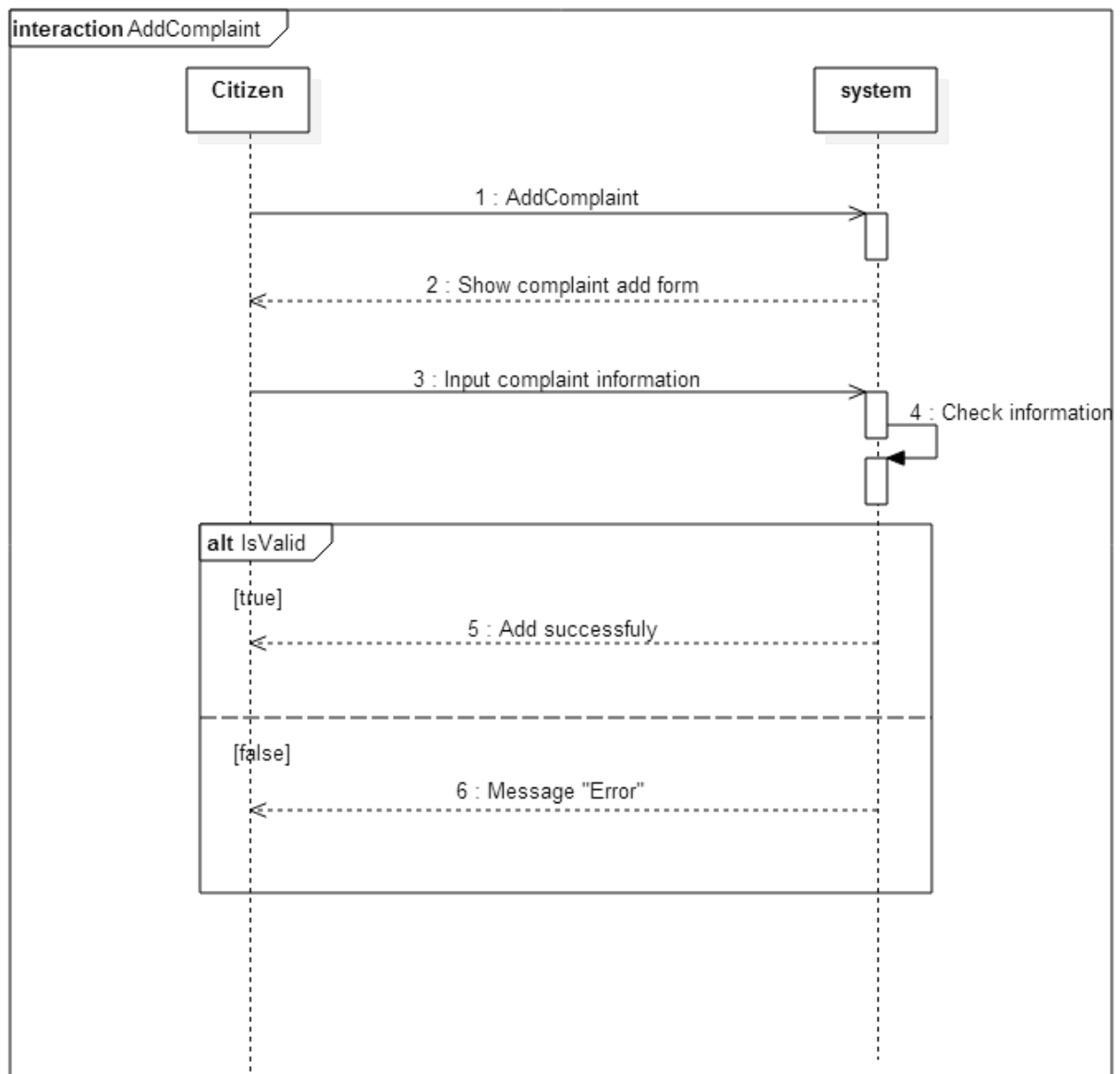


Figure 6.4: Add Complaint Sequence Diagram

## Search Complaint (Citizen)

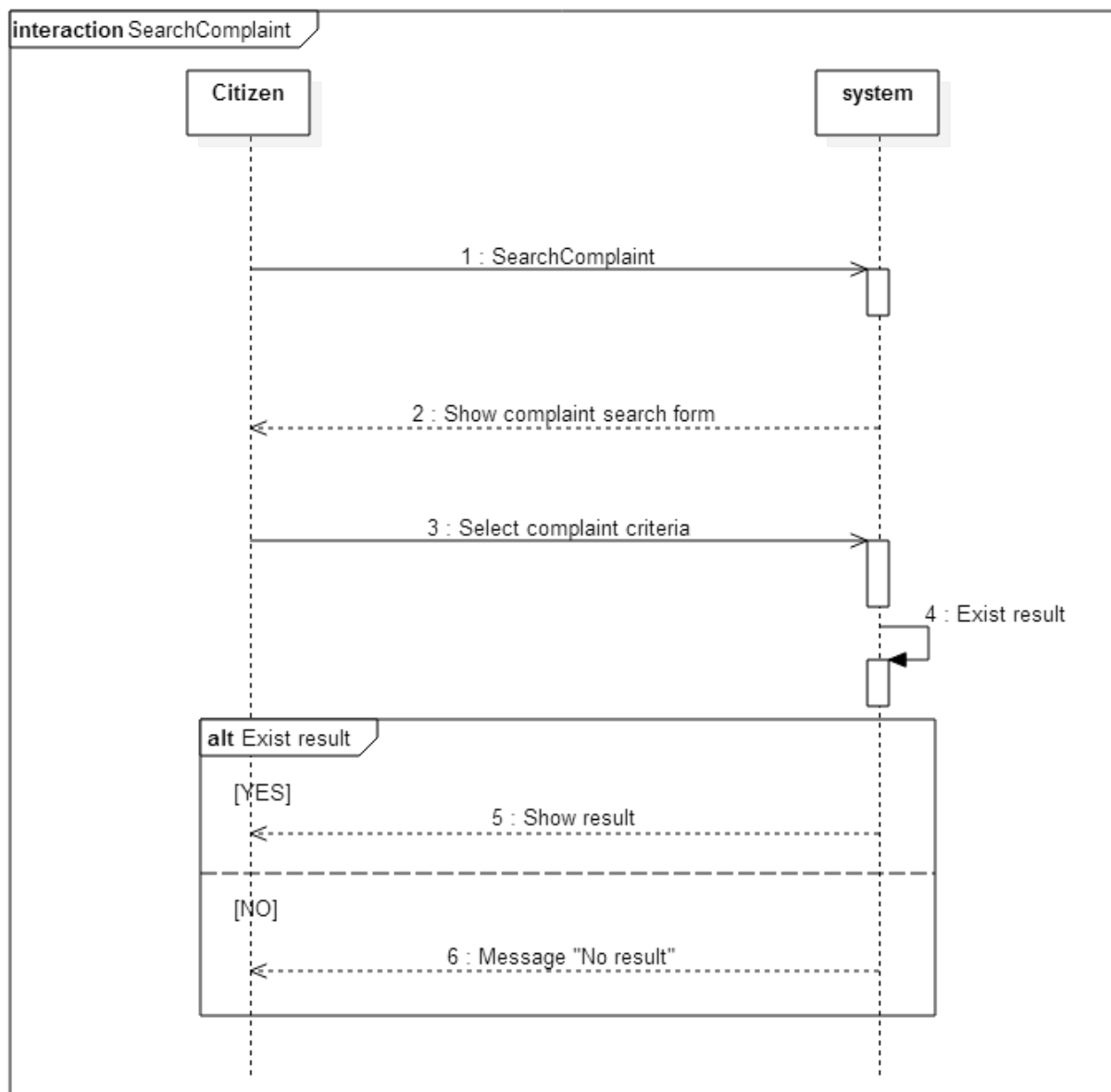


Figure 6.5: Search Complaint Sequence Diagram



## Delete Complaint (Citizen or Wassit)

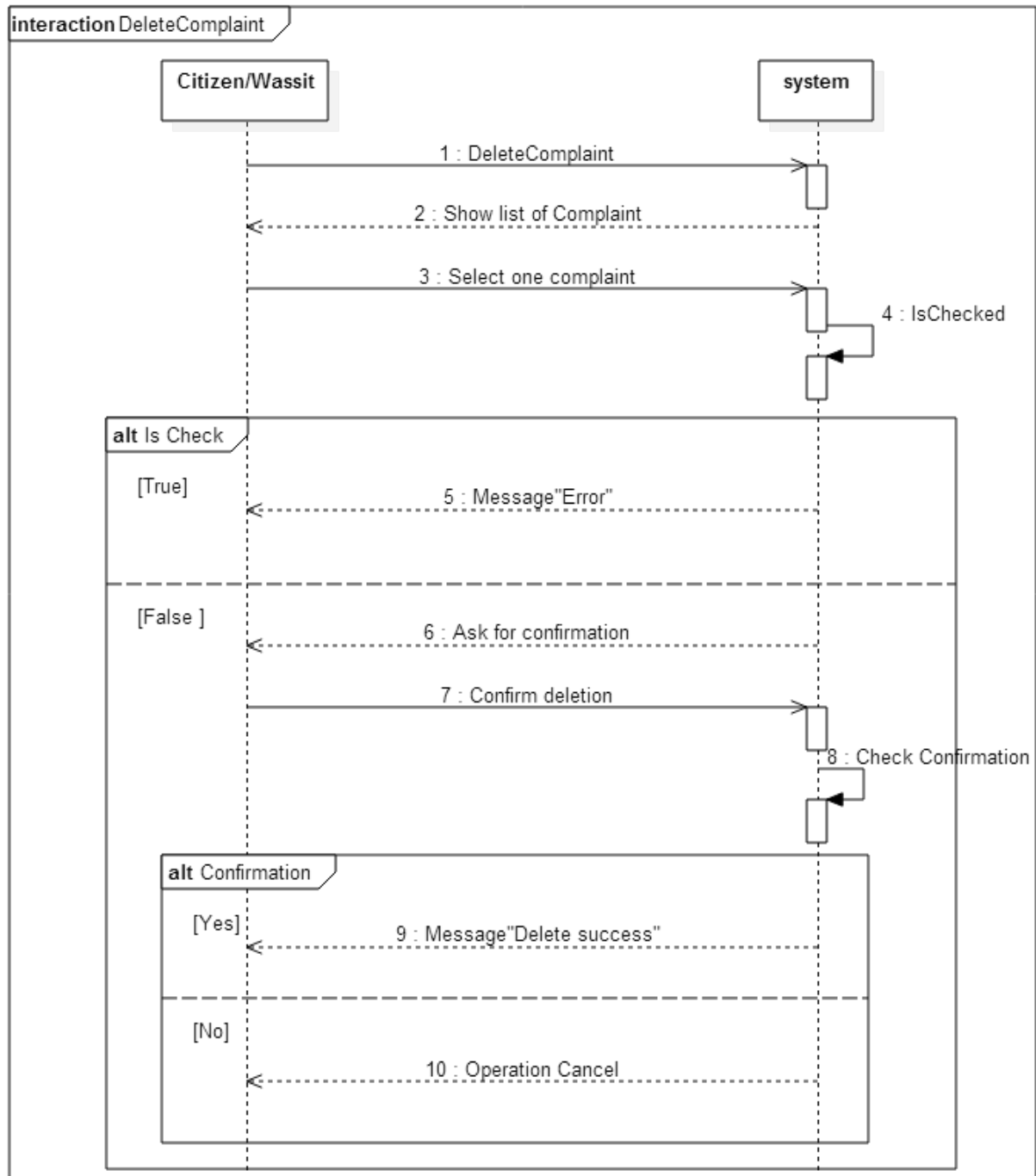


Figure 6.7: Delete Complaint Sequence Diagram

### Rate Complaint (Citizen)

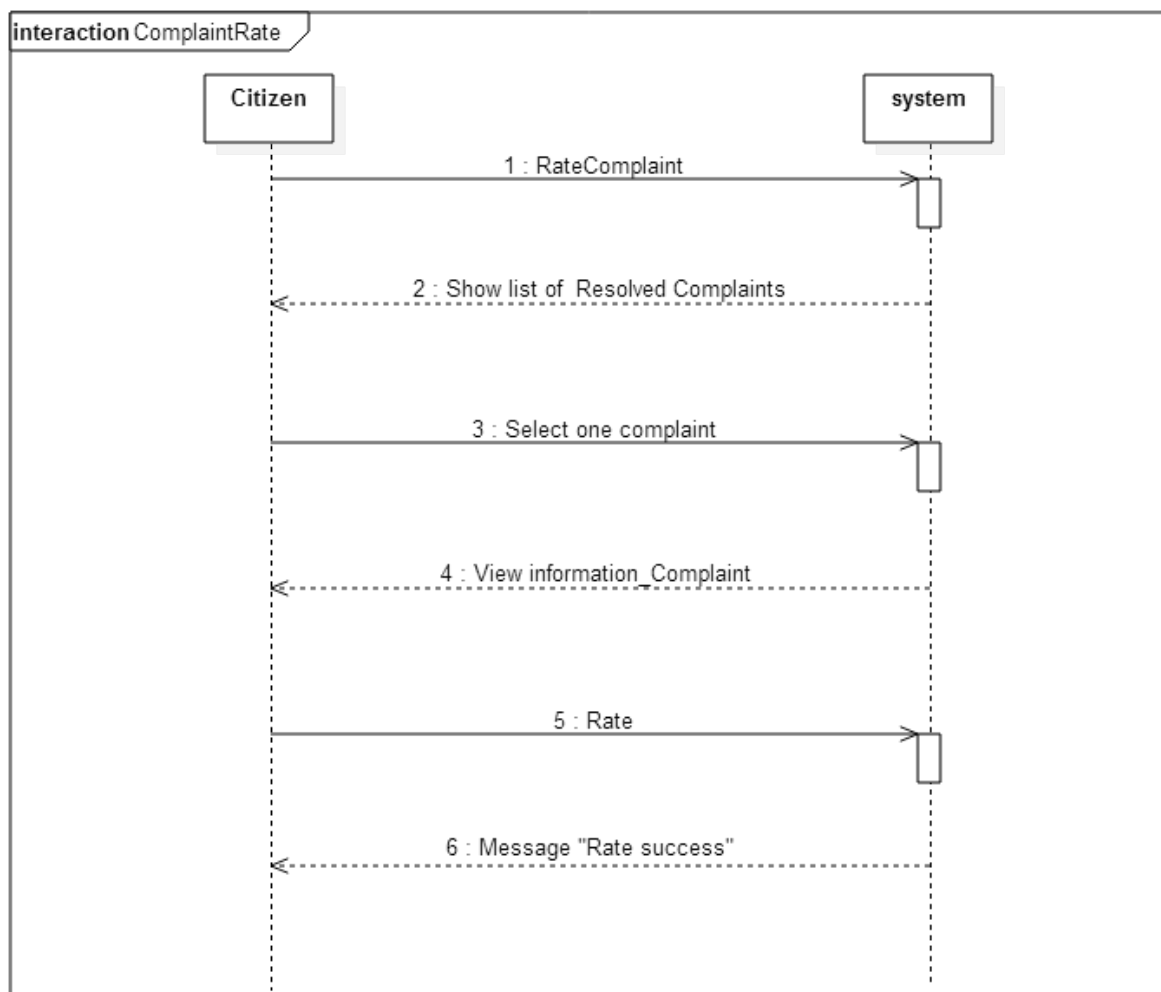


Figure 6.8: Rate Complaint Sequence Diagram

## 6.5 Complaint Management

### 6.5.1 Textual description of Complaint Management (Wassit)

| Actor            | Wassit               |                                                                                                                                                                                                                 |
|------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pre Conditions   | Wassit is identified |                                                                                                                                                                                                                 |
| Post Conditions  | Complaint Management |                                                                                                                                                                                                                 |
| Nominal Scenario | 1                    | Wassit asks the system to show up the menu of Complaint Management                                                                                                                                              |
|                  | 2                    | The system displays the menu of Complaint Management                                                                                                                                                            |
|                  | 3                    | Wassit chooses one of these actions : <ul style="list-style-type: none"><li>- Check Complaint</li><li>- View Complaint</li><li>- Search Complaint</li><li>- Edit Complaint</li><li>- Delete Complaint</li></ul> |
| Error Scenario   | 1                    | The system informs the Wassit that no data base Connection                                                                                                                                                      |
|                  | 2                    | The system informs the Wassit that no Internet Connection                                                                                                                                                       |

Table 6.7: Complaint Management Scenario

### Check Complaint (Wassit)

| Actor                | Wassit                                            |                                                             |
|----------------------|---------------------------------------------------|-------------------------------------------------------------|
| Pre Conditions       | Wassit is identified and complaint is not checked |                                                             |
| Post Conditions      | Complaint is Checked                              |                                                             |
| Nominal Scenario     | 1                                                 | Wassit asks for the list of complaints                      |
|                      | 2                                                 | The system displays the list of complaints                  |
|                      | 3                                                 | Wassit select one complaint                                 |
|                      | 4                                                 | The system displays a confirmation message                  |
|                      | 5                                                 | Wassit sets the complaint as a checked complaint            |
|                      | 6                                                 | The system notifies Wassit that the complaint is checked    |
| Alternative Scenario | A                                                 | 5 Wassit sets the complaint as a rejected complaint         |
|                      |                                                   | 6 The system notifies Wassit that the complaint is rejected |

Table 6.8: Check Complaint Scenario

**Search Complaint (Wassit,Executive institution or Wali)**

|                      |                                                                             |                                                                                              |
|----------------------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| Actor                | Wassit,Executive institution or Wali                                        |                                                                                              |
| Pre Conditions       | Wassit,Executive institution or Wali is identified and complaint is checked |                                                                                              |
| Post Conditions      | The system displays checked complaints                                      |                                                                                              |
| Nominal Scenario     | 1                                                                           | The system asks for complaint criteria                                                       |
|                      | 2                                                                           | Wassit,Executive institution or Wali chooses/ inputs the complaint criteria                  |
|                      | 3                                                                           | The system verifies complaint criteria                                                       |
|                      | 4                                                                           | The system displays the results                                                              |
| Alternative Scenario | A                                                                           | 4 The system informs the Wassit,Executive institution or Wali that the criteria is incorrect |
|                      |                                                                             | 5 The system asks the Wassit,Executive institution or Wali to correct the criteria           |
|                      |                                                                             | 6 Continue from step 2                                                                       |
|                      | B                                                                           | 5 The system informs the Wassit,Executive institution or Wali that there is no results       |
|                      |                                                                             | 6 Continue from step 2                                                                       |

Table 6.9: Search Complaint Scenario

### 6.5.2 Activity Diagram of Complaint Management (Wassit)

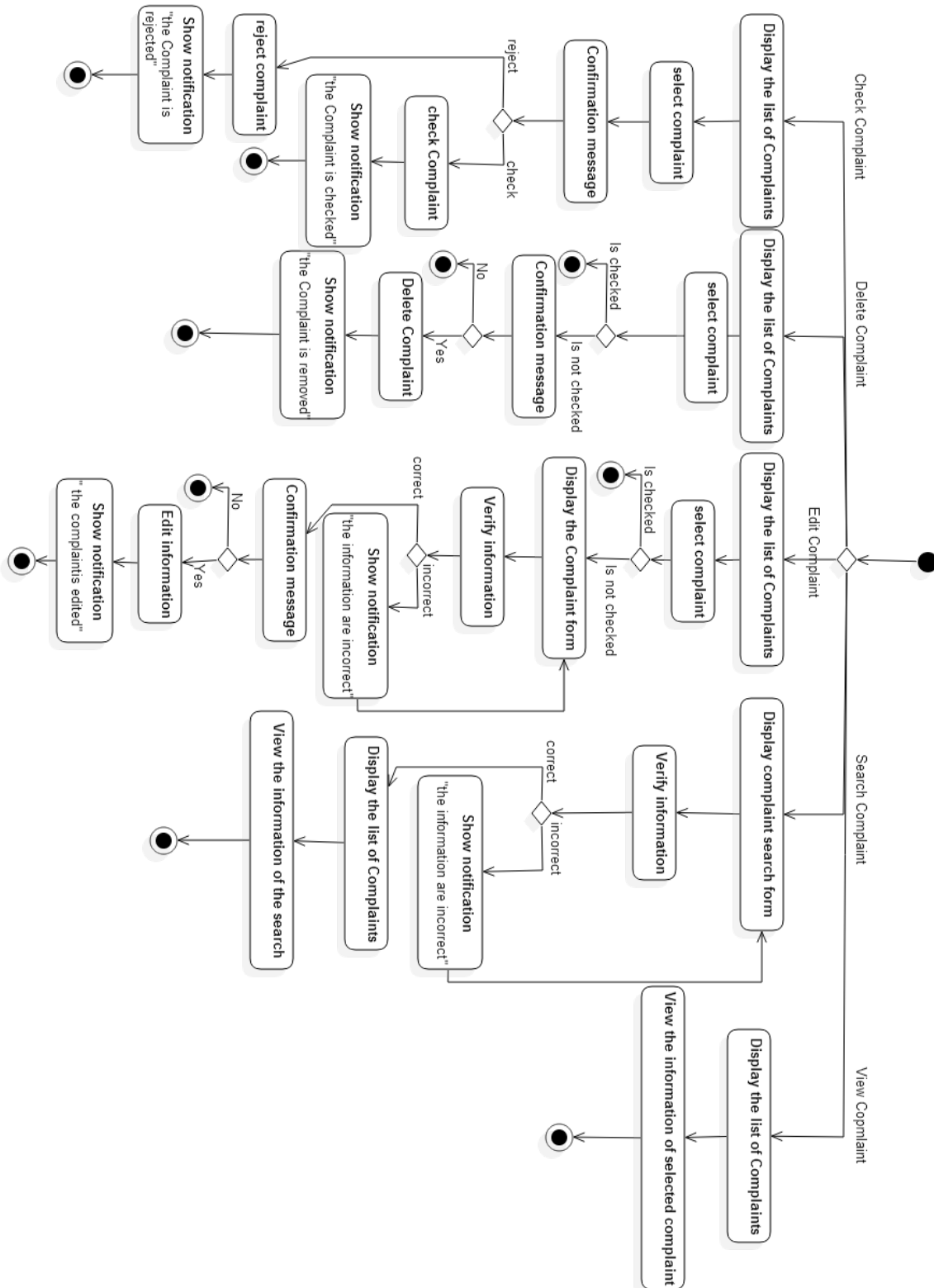


Figure 6.9: Complaint Management Activity Diagram

### 6.5.3 Sequence Diagram Complaint Management (Wassit)

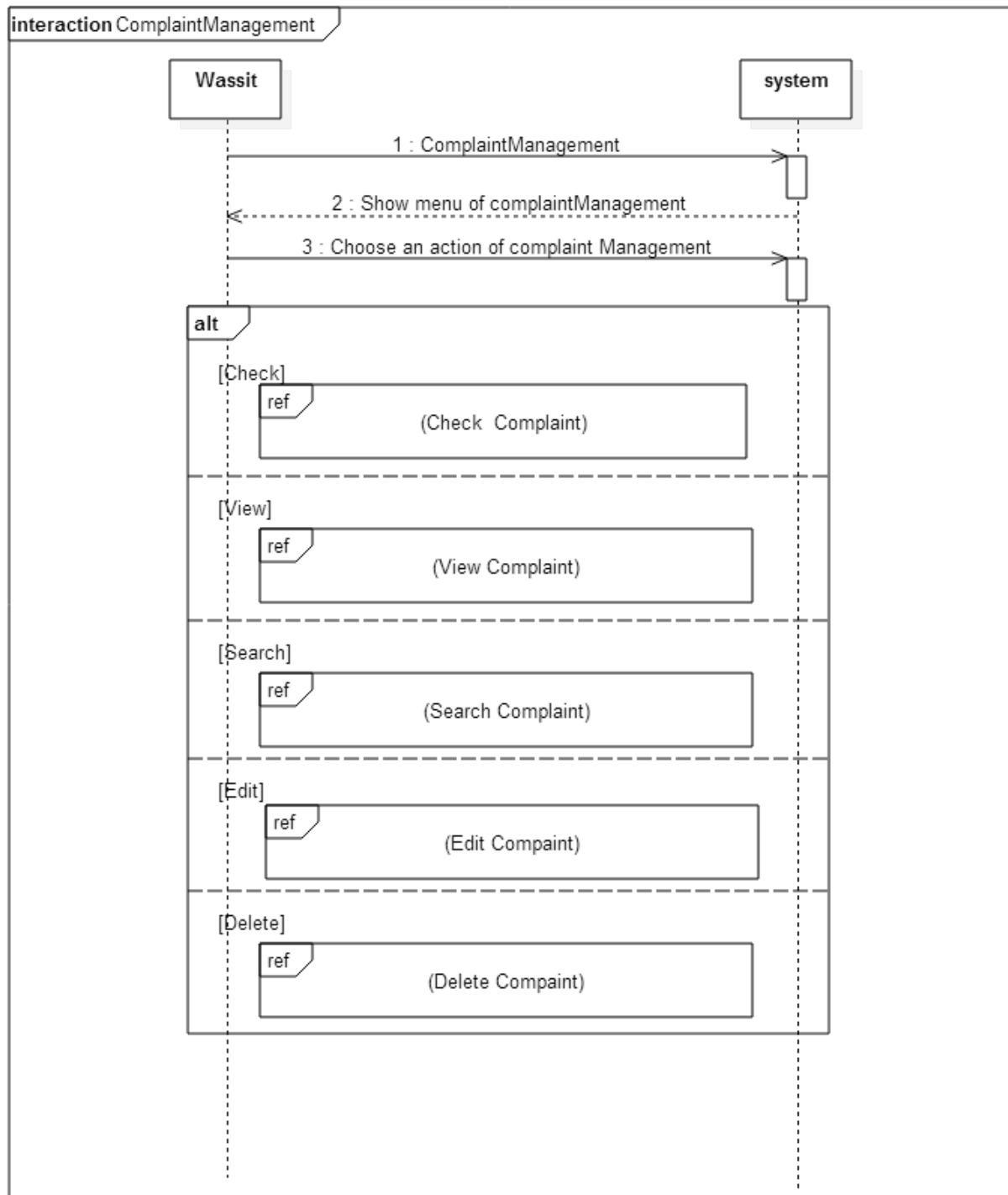


Figure 6.10: Complaint Management Sequence Diagram

## Check Complaint (Wassit)

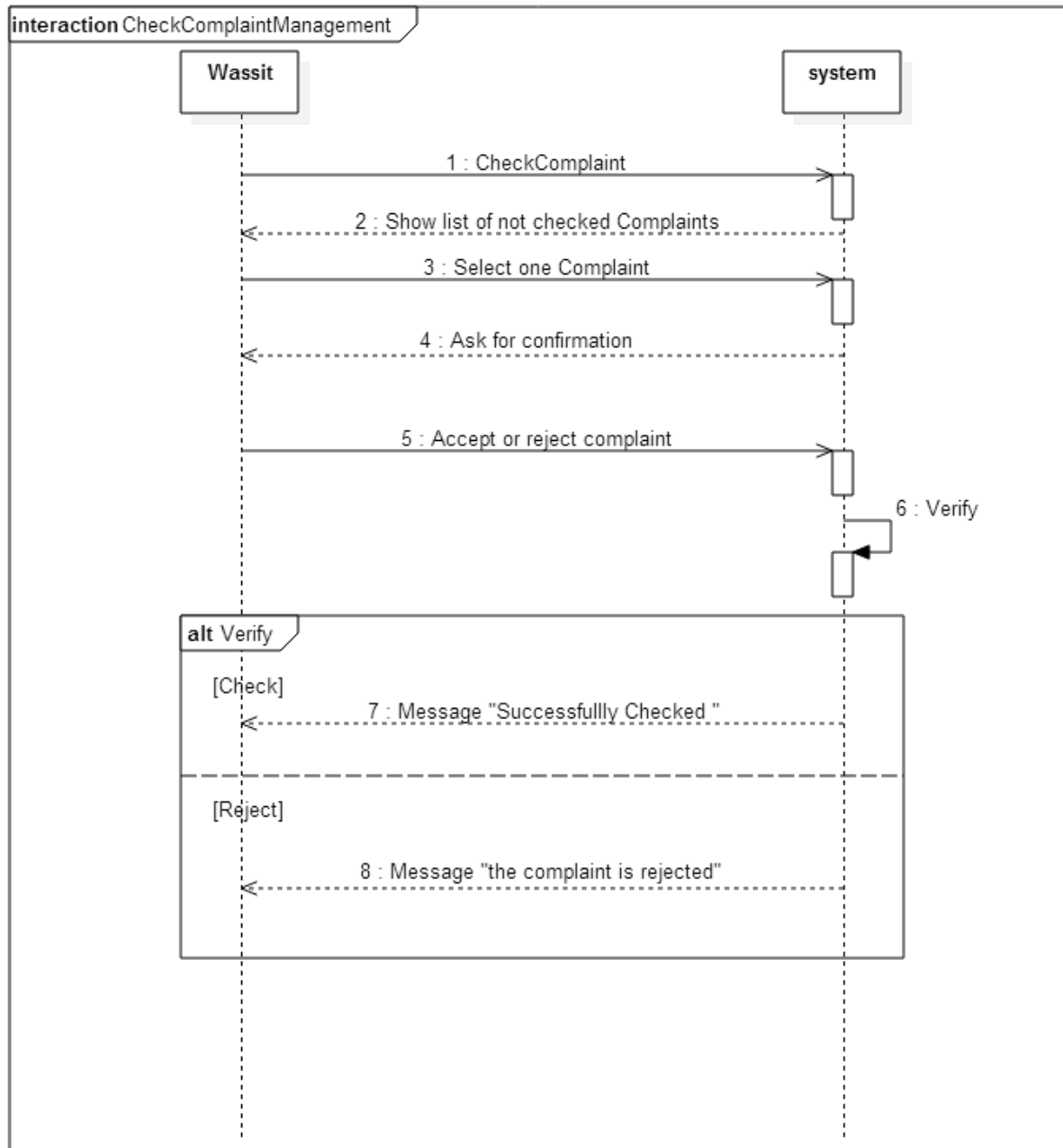


Figure 6.11: Check Complaint Sequence Diagram

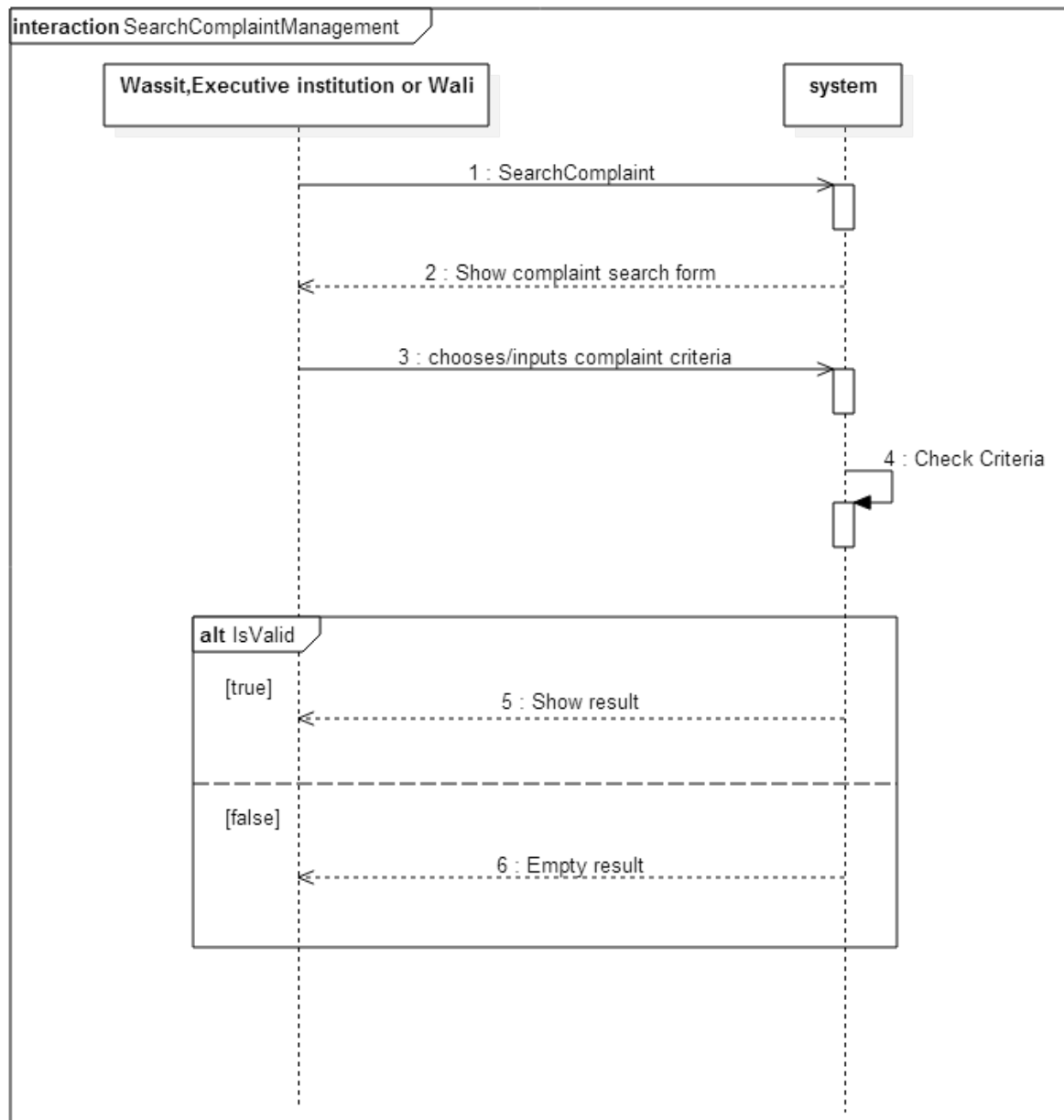
**Search Complaint (Wassit,Executive institution or Wali)**

Figure 6.12: Search Complaint Sequence Diagram

## 6.6 Checked Complaint

### 6.6.1 Textual description of Checked Complaint (Wassit, Executive institution or Wali)

|                  |                                                     |                                                                                                                                                                      |
|------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Actor            | Wassit, Executive institution or Wali               |                                                                                                                                                                      |
| Pre Conditions   | Wassit, Executive institution or Wali is identified |                                                                                                                                                                      |
| Post Conditions  | Show checked complaint                              |                                                                                                                                                                      |
| Nominal Scenario | 1                                                   | Wassit, Executive institution or Wali asks the system to show up the menu of Checked Complaints                                                                      |
|                  | 2                                                   | The system displays the menu of Checked Complaints                                                                                                                   |
|                  | 3                                                   | Wassit, Executive institution or Wali choose one of these actions:<br>- Statistics of Checked complaints<br>- Search Checked Complaints<br>- View Checked Complaints |
| Error Scenario   | 1                                                   | The system informs the Wassit, Executive institution or Wali that no data base Connection                                                                            |
|                  | 2                                                   | The system informs the Wassit, Executive institution or Wali that no Internet Connection                                                                             |

Table 6.10: Checked Complaint Scenario

### Statistics (Wassit,Executive institution or Wali)

|                  |                                                     |                                                                               |
|------------------|-----------------------------------------------------|-------------------------------------------------------------------------------|
| Actor            | Wassit,Executive institution or Wali                |                                                                               |
| Pre Conditions   | Wassit, Executive institution or Wali is identified |                                                                               |
| Post Conditions  | show Statistics of Checked complaint                |                                                                               |
| Nominal Scenario | 1                                                   | Wassit,Executive institution or Wali asks for Statistics of Checked complaint |
|                  | 2                                                   | The system displays the complaint criteria                                    |
|                  | 3                                                   | The Wassit,Executive institution or Wali choose complaint criteria            |
|                  | 4                                                   | The system displays the results                                               |

Table 6.11: Statistics of Checked complaint Scenario

### 6.6.2 Activity Diagram of Checked Complaint (Wassit, Executive institution or Wali)

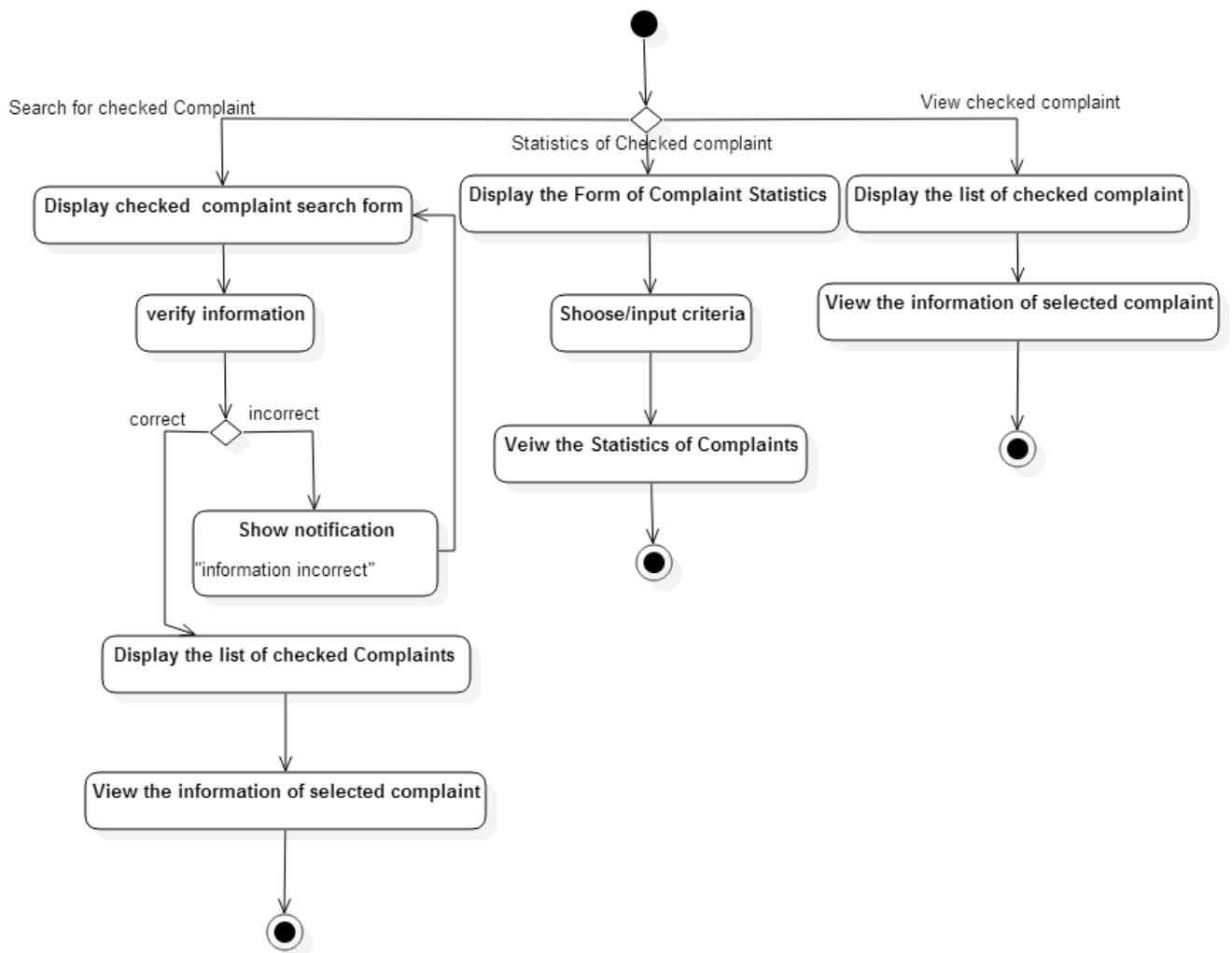


Figure 6.13: View Checked Complaint Activity Diagram

### 6.6.3 Sequence Diagram of Checked Complaint (Wassit, Executive institution or Wali)

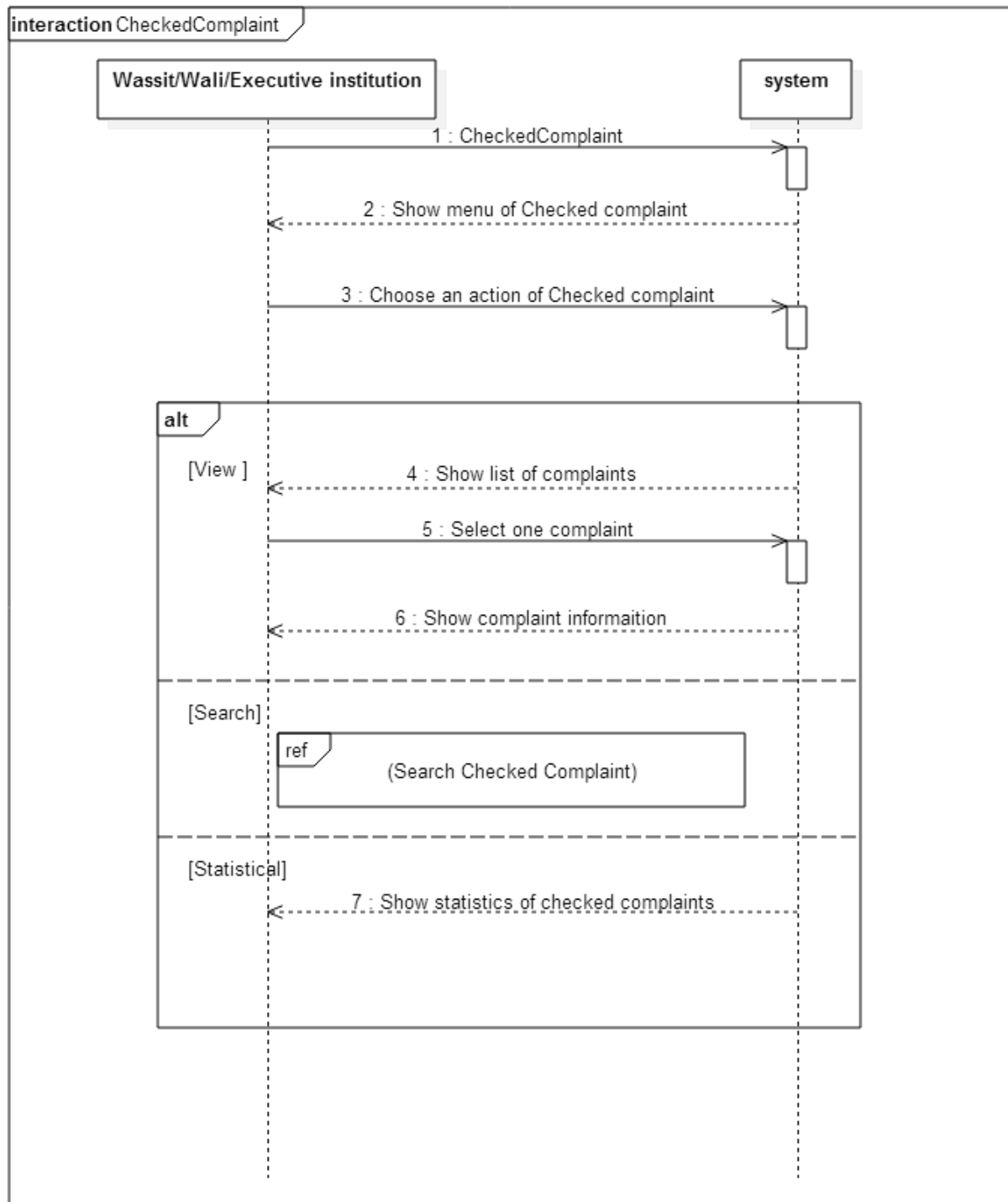


Figure 6.14: View Checked Complaint Sequence Diagram

## 6.7 Fixation Date Management

### 6.7.1 Textual description of Fixation Date Management (Wali)

| Actor            | Wali                                        |                                                                                                                                  |
|------------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Pre Conditions   | Wali is identified and complaint is checked |                                                                                                                                  |
| Post Conditions  | Fixation date                               |                                                                                                                                  |
| Nominal Scenario | 1                                           | Te Wali asks the system to show up the menu of Fixation Date                                                                     |
|                  | 2                                           | The system displays the menu of Fixation Date                                                                                    |
|                  | 3                                           | Wali chooses one of these actions:<br>- Add Fixation Date<br>- Edit Fixation Date<br>- Delete Fixation Date<br>- View Black List |
| Error Scenario   | 1                                           | The system informs the Wali that no data base Connection                                                                         |
|                  | 2                                           | The system informs the Wali that no Internet Connection                                                                          |

Table 6.12: Fixation date management Scenario

### Add Fixation Date (Wali)

| Actor                | Wali                                        |                                                             |
|----------------------|---------------------------------------------|-------------------------------------------------------------|
| Pre Conditions       | Wali is identified and complaint is checked |                                                             |
| Post Conditions      | Fixation date is added                      |                                                             |
| Nominal Scenario     | 1                                           | The system displays the list of the checked complaints      |
|                      | 2                                           | wali selects one complaint                                  |
|                      | 3                                           | The System Shows the complaint information                  |
|                      | 4                                           | The wali chooses/fixation Date                              |
|                      | 5                                           | The system checks the new information                       |
|                      | 6                                           | The system informs the wali that the Fixation Date is added |
| Alternative Scenario | A                                           | 6 The system informs the wali that the date is incorrect    |
|                      |                                             | 7 The system asks the wali to correct the date              |
|                      |                                             | 8 Continue from step 4                                      |

Table 6.13: Add Fixation Date Scenario

**Edit Fixation Date (Wali)**

| Actor                | Wali                                      |                                                              |
|----------------------|-------------------------------------------|--------------------------------------------------------------|
| Pre Conditions       | Wali is identified and complaint is added |                                                              |
| Post Conditions      | Edit Fixation Date                        |                                                              |
| Nominal Scenario     | 1                                         | The system displays the list of the checked complaints       |
|                      | 2                                         | wali selects one complaint                                   |
|                      | 3                                         | The System Shows the complaint information                   |
|                      | 4                                         | The wali edits Date                                          |
|                      | 5                                         | The system checks the new information                        |
|                      | 6                                         | The system informs the wali that the Fixation Date is edited |
| Alternative Scenario | A                                         | 6 The system informs the wali that the date is incorrect     |
|                      |                                           | 7 The system asks the wali to correct the date               |
|                      |                                           | 8 Continue from step 4                                       |

Table 6.14: Edit Fixation date Scenario

**Delete Fixation Date (Wali)**

| Actor                | Wali                                          |                                                                |
|----------------------|-----------------------------------------------|----------------------------------------------------------------|
| Pre Conditions       | Wali is identified and Fixation Date is added |                                                                |
| Post Conditions      | Delete Fixation Date                          |                                                                |
| Nominal Scenario     | 1                                             | The system displays the list of the checked complaints         |
|                      | 2                                             | wali selects one complaint                                     |
|                      | 3                                             | The system displays a confirmation message.                    |
|                      | 4                                             | The Wali confirms the deletion.                                |
|                      | 5                                             | The system deletes the Fixation Date of selected complaint     |
|                      | 6                                             | The system notifies the Wali that the Fixation Date is removed |
| Alternative Scenario | A                                             | 5 The Wali cancels the deletion                                |
|                      |                                               | 6 The system ignores the deletion.                             |
|                      |                                               | 7 Continue from step 1                                         |

Table 6.15: Delete Fixation date Scenario

**View Black List (Wali)**

|                  |                                              |                                                                     |
|------------------|----------------------------------------------|---------------------------------------------------------------------|
| Actor            | Wali                                         |                                                                     |
| Pre Conditions   | Wali is identified and Fixation Date Expired |                                                                     |
| Post Conditions  | Wali views the black list of complaints      |                                                                     |
| Nominal Scenario | 1                                            | Wali asks for the black list of complaints (Fixation Date Expired ) |
|                  | 2                                            | The system displays the list of complaints                          |

Table 6.16: Black List Scenario

### 6.7.2 Activity Diagram of Fixation Management Date (Wali)

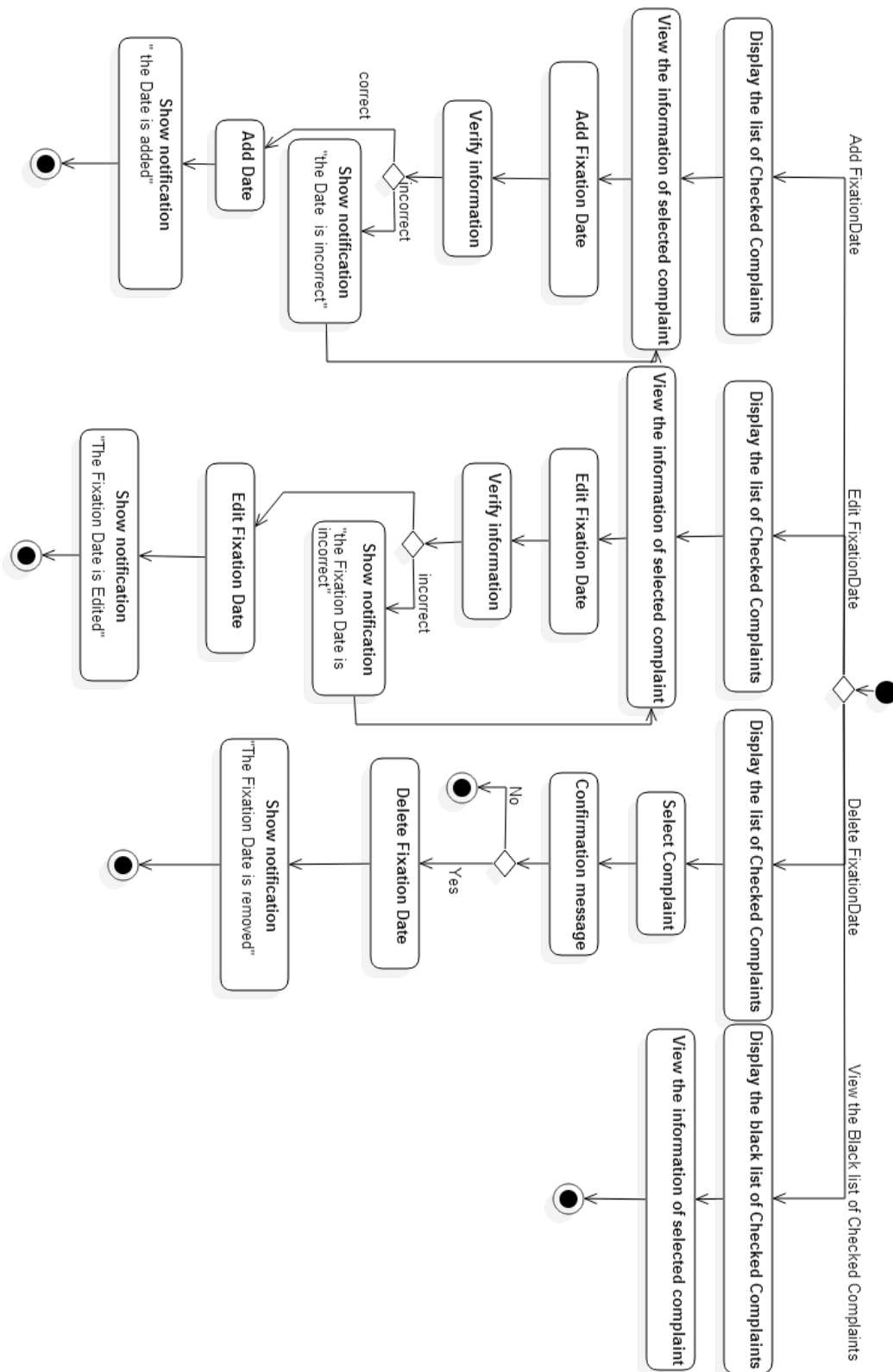


Figure 6.15: Fixation Management Date Activity Diagram

### 6.7.3 Sequence Diagram of Fixation Management Date (Wali)

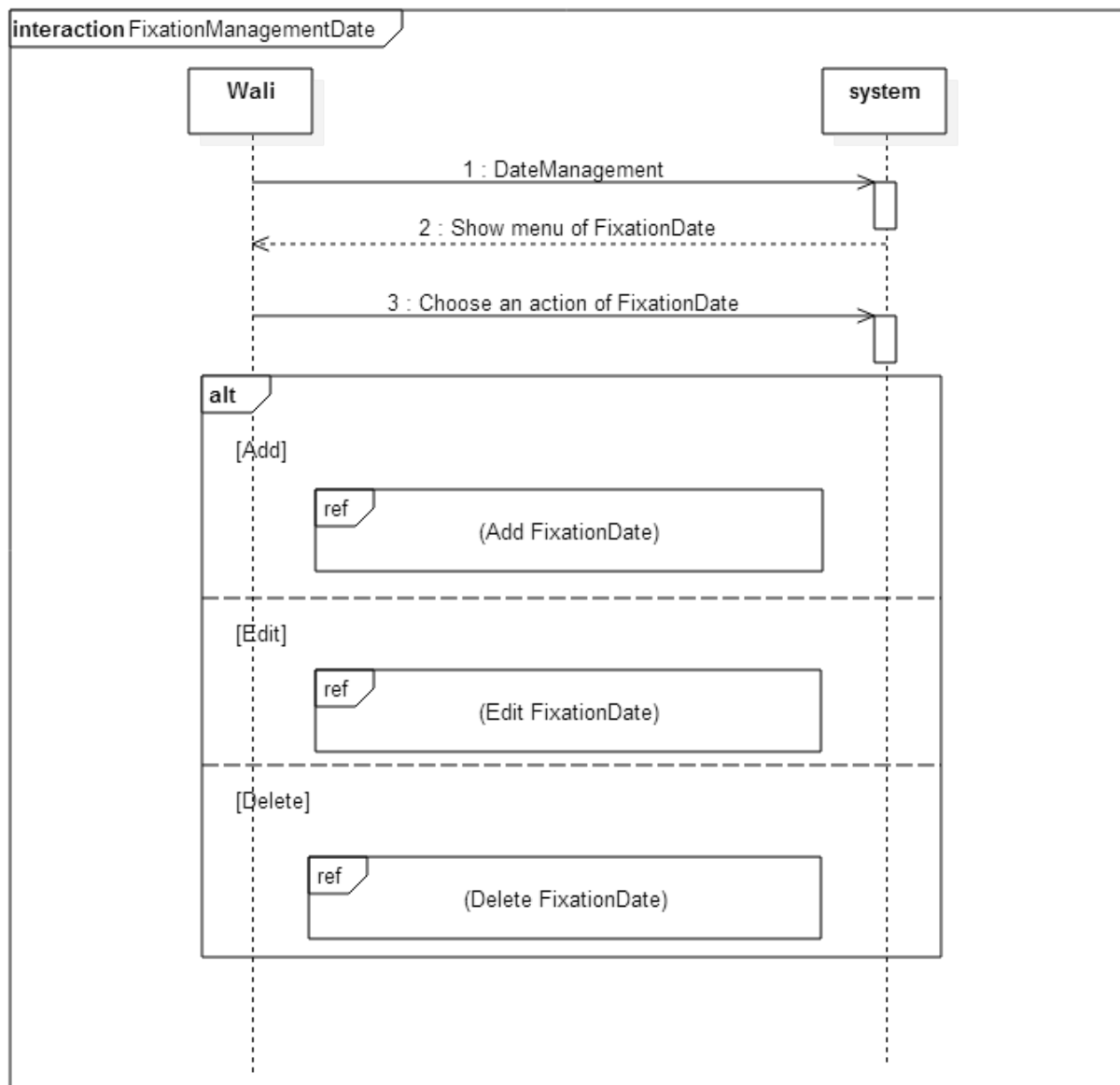


Figure 6.16: Fixation Management Date Sequence Diagram

## Add Fixation Date (Wali)

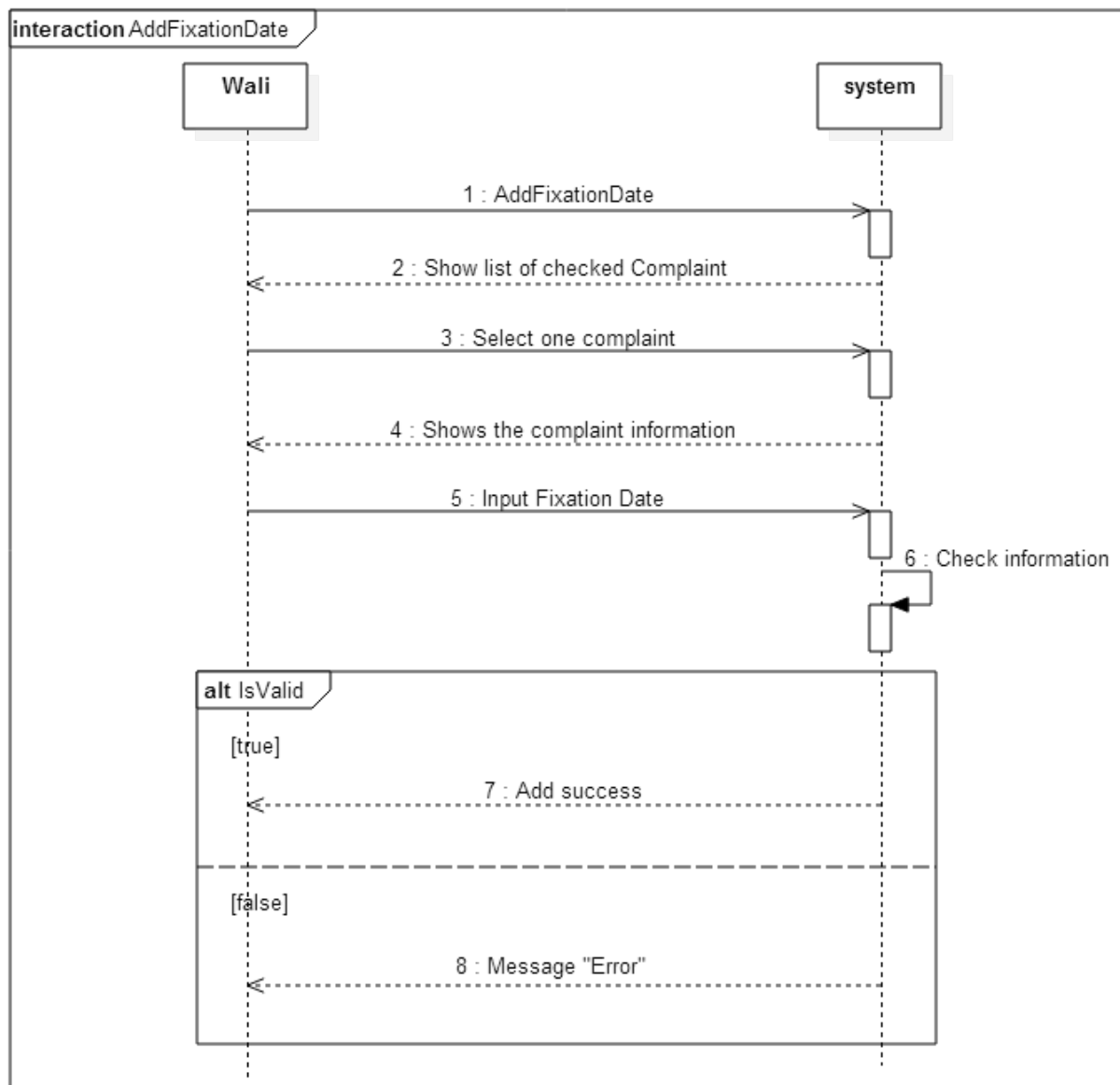


Figure 6.17: Add Fixation Date Sequence Diagram

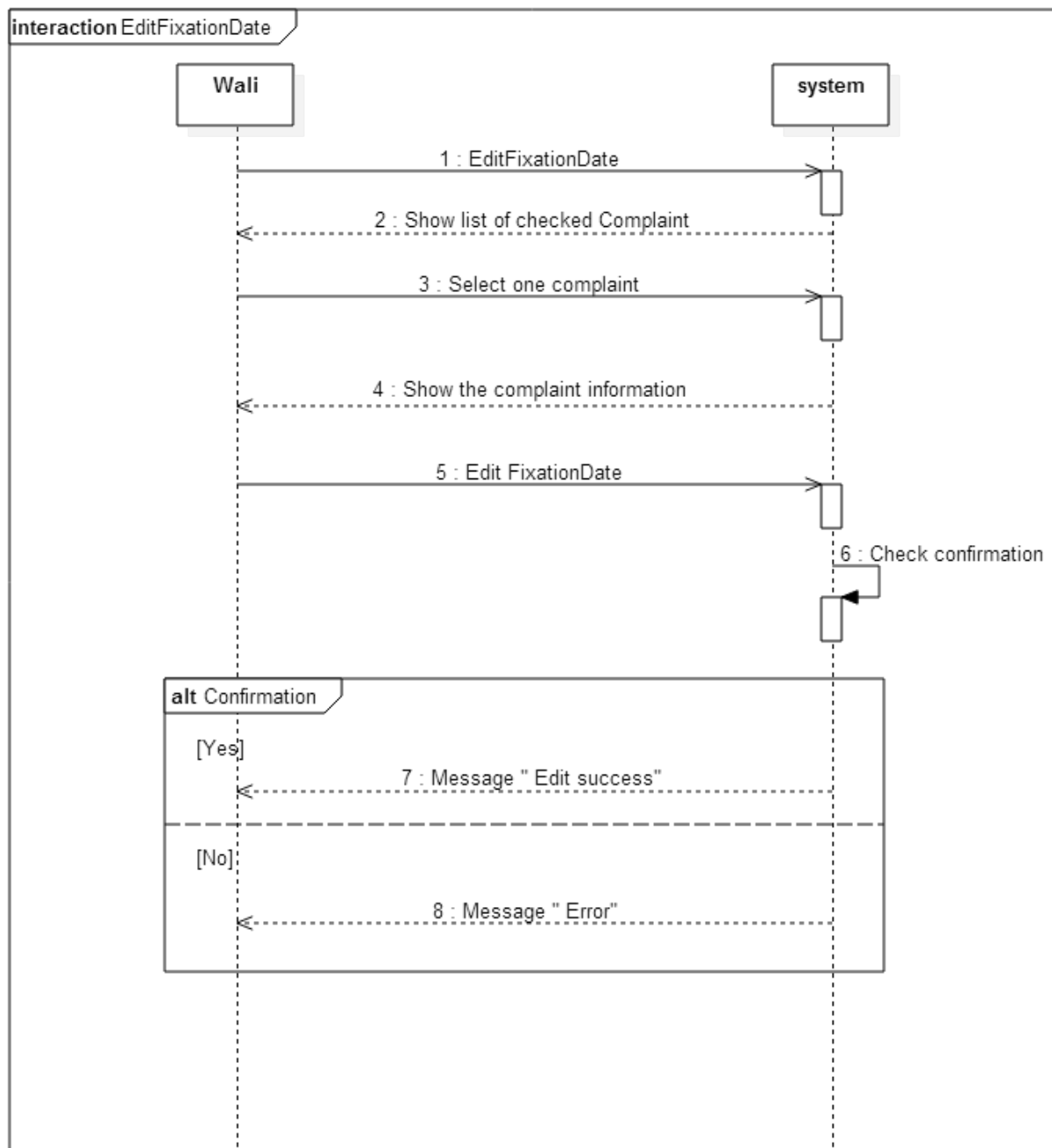
**Edit Fixation Date (Wali)**

Figure 6.18: Edit Fixation Date Sequence Diagram

## Delete Fixation Date (Wali)

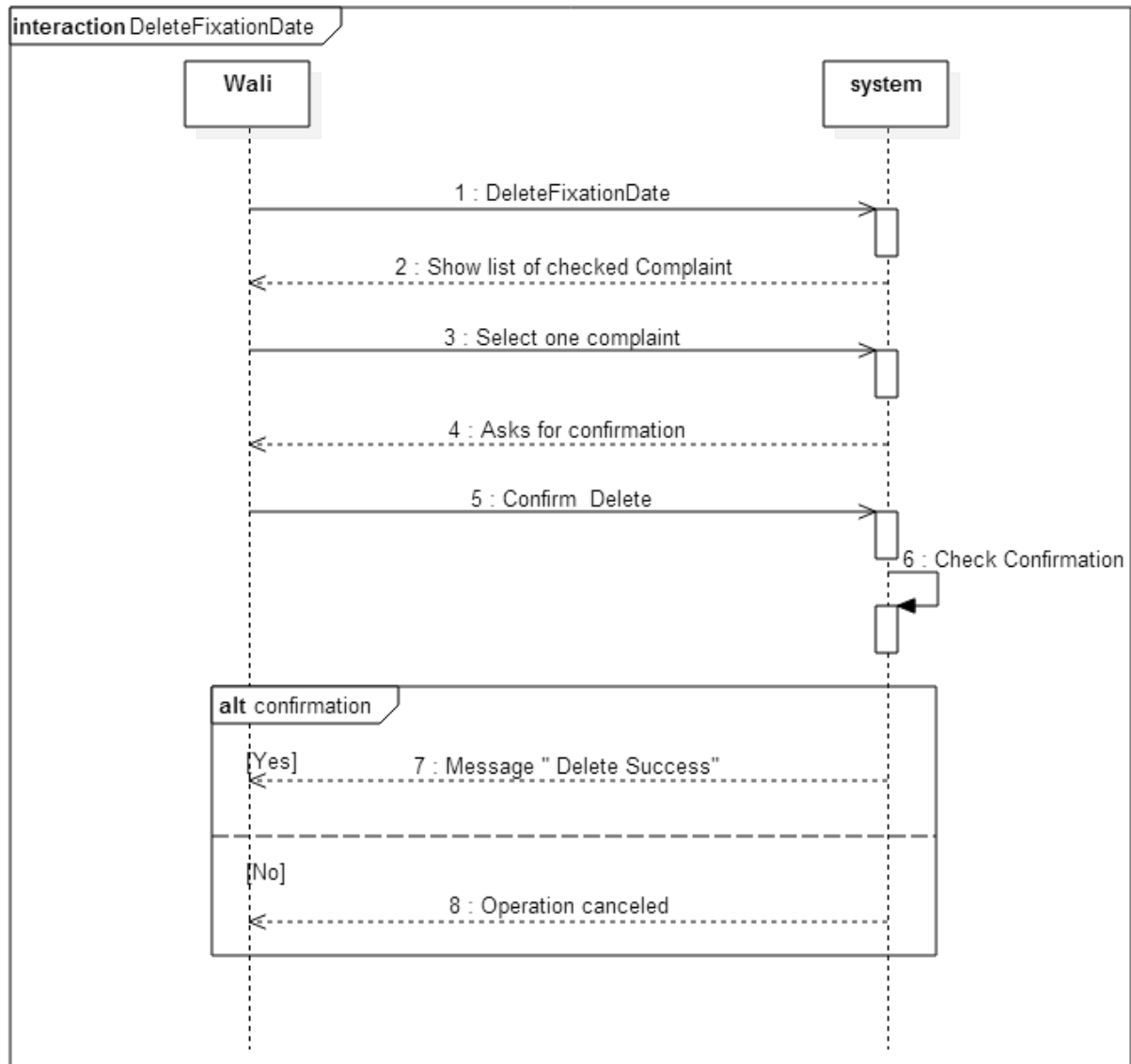


Figure 6.19: Delete Fixation Date Sequence Diagram

### View Black List (Wali)

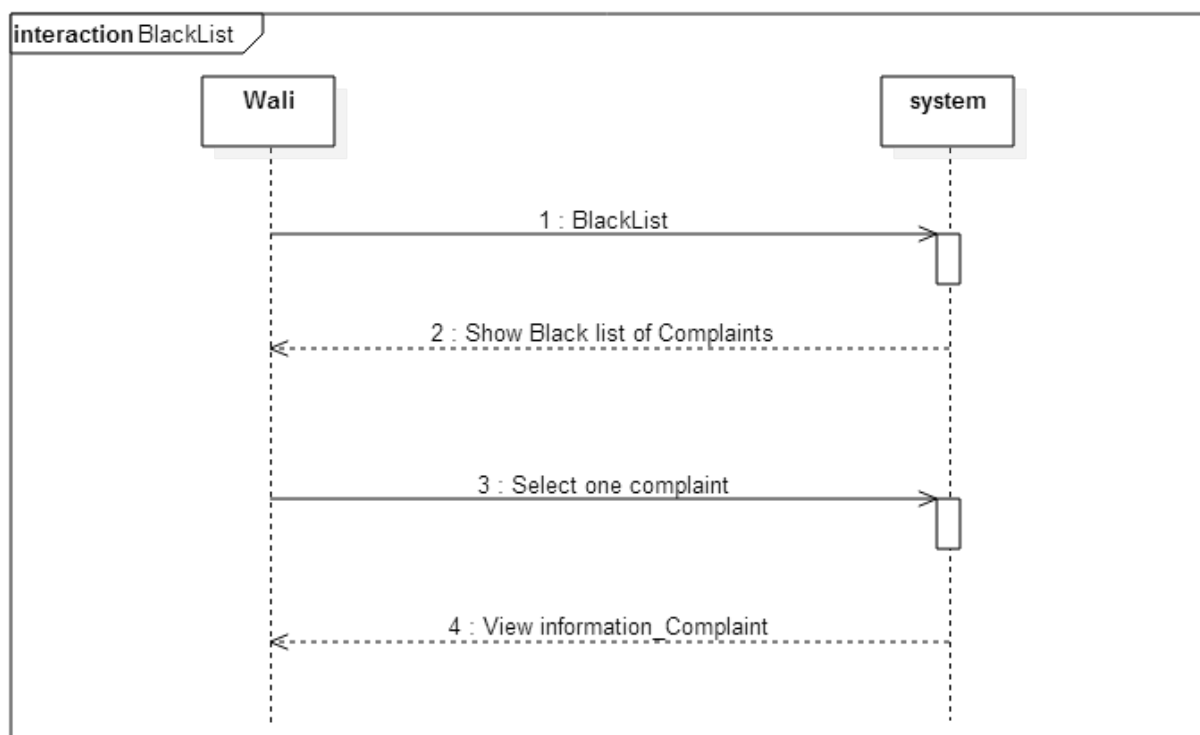


Figure 6.20: View Black List Sequence Diagram

## 6.8 Resolve the complaint

### 6.8.1 Textual description of Resolve the complaint (Executive institution)

|                  |                                     |                                                                                                      |
|------------------|-------------------------------------|------------------------------------------------------------------------------------------------------|
| Actor            | Executive institution               |                                                                                                      |
| Pre Conditions   | Executive institution is identified |                                                                                                      |
| Post Conditions  | Resolve the Complaint               |                                                                                                      |
| Nominal Scenario | 1                                   | Executive institution asks for the list of complaints                                                |
|                  | 2                                   | The system displays the list of complaints                                                           |
|                  | 3                                   | Executive institution chooses one complaint                                                          |
|                  | 4                                   | The system sets complaint as resolved                                                                |
|                  | 5                                   | The system notifies the Executive institution, Wali and citizen that The complaint has been resolved |
| Error Scenario   | 1                                   | The system informs the Executive institution that no data base Connection                            |
|                  | 2                                   | The system informs the Executive institution that no Internet Connection                             |

Table 6.17: Resolve the Complaint Scenario

### 6.8.2 Activity Diagram of Resolve the complaint (Executive institution)

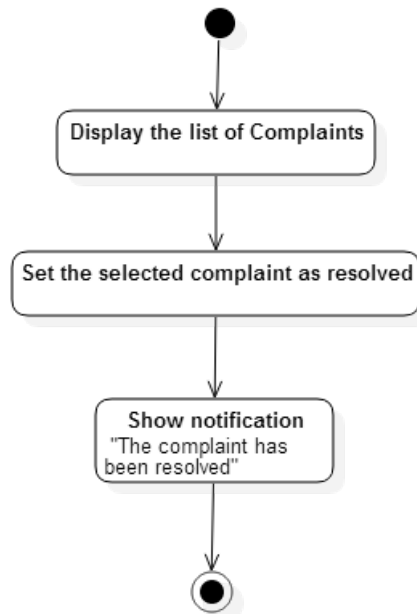


Figure 6.21: Resolve the Complaint Activity Diagram

### 6.8.3 Sequence Diagram of Resolve the complaint (Executive institution)

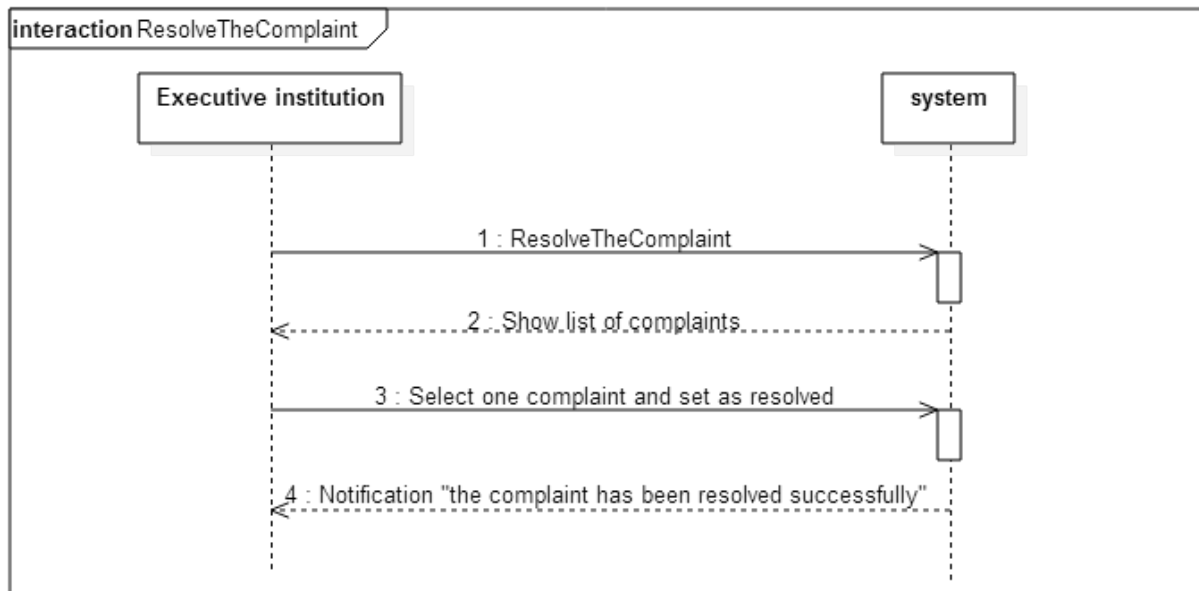


Figure 6.22: Resolve the Complaint Sequence Diagram

## 6.9 Conclusion

In this chapter we present the textual description of use case, Sequence and Activity Diagrams of our application. In the next part, we will give an over view about Detailed conception.

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# CHAPTER 7

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## DETAILED CONCEPTION

### 7.1 Introduction

The class diagram is considered as the most important part of object-oriented modeling.

Indeed, conception precisely construct and document classes of the system.

In this chapter we will present Class Diagram Conception and Class Diagrams.

## 7.2 Class Diagram Conception

| Class                                         | Codification   | Description                                                                                           | Type                              |
|-----------------------------------------------|----------------|-------------------------------------------------------------------------------------------------------|-----------------------------------|
| Person                                        | FirstName      | First Name                                                                                            | String                            |
|                                               | LastName       | Last Name                                                                                             | String                            |
|                                               | Email          | Email                                                                                                 | String                            |
|                                               | PhoneNumber    | Phone Number                                                                                          | Int                               |
|                                               | IdUser         | Identification card for citizen/ code number for(admin, wassit, wali, Executive institution employee) | Int                               |
|                                               | Address        | Address                                                                                               | String                            |
|                                               | Password       | Password                                                                                              | String                            |
|                                               | City           | City                                                                                                  | String                            |
|                                               | BirthDate      | Birth Date                                                                                            | Date                              |
|                                               | Gender         | Gender(Female,Male)                                                                                   | Int(0=Female,1=Male)              |
| Complaint                                     | IdUser         | Identification card for citizen/ code number for: admin, wassit, wali, Executive institution employee | Int                               |
|                                               | IdComplaint    | complaint Identification                                                                              | Int                               |
|                                               | ComplaintTitle | Title of the complaint                                                                                | String                            |
|                                               | ComplaintType  | Complaint Type                                                                                        | String                            |
|                                               | Longitude      | Longitude                                                                                             | Int                               |
|                                               | Latitude       | Latitude                                                                                              | Int                               |
|                                               | Commune        | Commune                                                                                               | Int                               |
|                                               | ConcDept       | Executive institution                                                                                 | Int                               |
|                                               | StartDate      | Start Date                                                                                            | Date                              |
|                                               | FixDate        | Fix Date                                                                                              | Date                              |
|                                               | Satisfaction   | rate the complaint (Bad/Good)                                                                         | Int(0=Bad, 1=Good)                |
|                                               | Notification   | Notification                                                                                          | String                            |
|                                               | ResovlOrNot    | Complaint has been Resolved Or Not                                                                    | Int(0=Resolved ,1=Not Resolved)   |
|                                               | Description    | Description                                                                                           | String                            |
|                                               | CheckedOrNot   | Complaint has been Checked Or Not                                                                     | Int (0=Checked , 1= not Checked ) |
| DirectEmp<br>(Executive institution employee) | IdconcDept     | Executive institution Identification                                                                  | Int                               |
| Direct<br>(Executive Institution)             | IdconcDept     | Executive institution Identification                                                                  | Int                               |
|                                               | Deptname       | Executive institution name                                                                            | String                            |
| ConcDept                                      | IdComplaint    | Complaint Identification                                                                              | Int                               |
|                                               | IdconcDept     | Executive institution Identification                                                                  | Int                               |

Table 7.1: Class diagram conception

## 7.3 Class Diagram

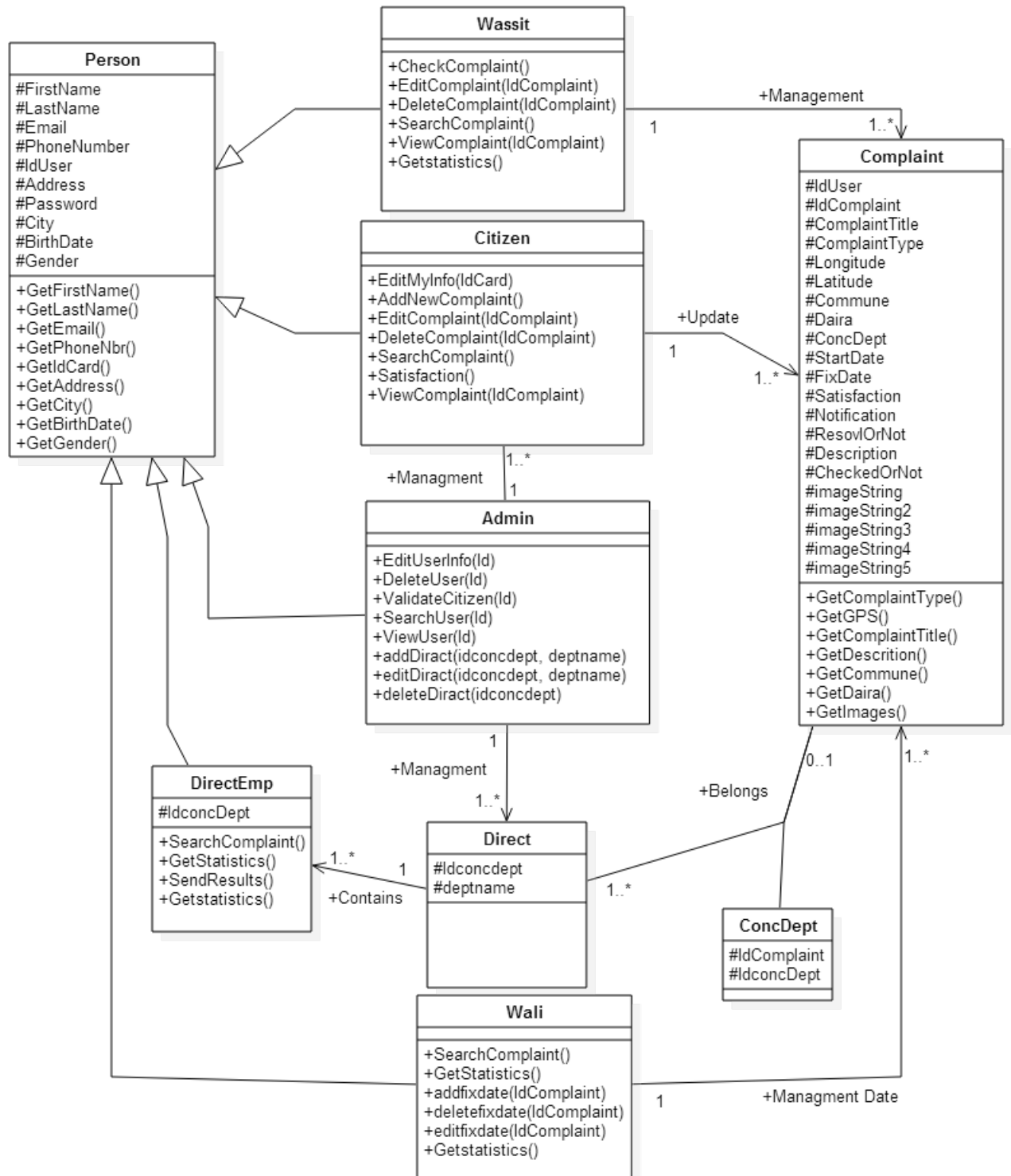


Figure 7.1: Class Diagram

## 7.4 Conclusion

In this chapter we present Class Diagrams Conception and Class Diagrams of our application. In the next part, we will give an over view about Technical Files.

# Part IV

## Technical Files

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# CHAPTER 8

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## TECHNICAL NEEDS

### 8.1 Introduction

In this chapter we will give a brief description about Material Configuration , Software configuration and three layer Architecture of FixIt and FixItW Applications.

### 8.2 Material configuration

In this part we will present the technological devices of wilaya such as : database server, smartphones and Network equipment.

### 8.2.1 Technical file of database server

| HP Proliant DL380G        |                                                                                             |
|---------------------------|---------------------------------------------------------------------------------------------|
| Chipset Type              | Intel 5000P                                                                                 |
| Processor                 | Intel dual-core Xeon 5160 / 3 GHz                                                           |
| Cache Memory              | Installed Size: L2 cache - 24 MB , Cache Per Processor: 12 MB ( 2 x 6MB(6MB per core pair)) |
| Ram                       | Technology: DDR II size: 3.25 GO                                                            |
| Hard Drive                | 3 X HDD 146 GO (SCSI).                                                                      |
| Storage Controller        | 1 X RAID ( Server RAID-8K)                                                                  |
| Second Storage Controller | 1 X Serial ATA                                                                              |
| Optical Storage           | Combination CD-RW/DVD-RW                                                                    |
| Ethernet controler        | Ethernet, Fast Ethernet, 2x Gigabit Ethernet avec Wake on LAN                               |
| Feed                      | Type: Redundant-hot-plug Action plan: 1 + 1<br>Power Provided: 835 Watt                     |
| Keyboard                  | bilingual                                                                                   |
| Mouse                     | Optical                                                                                     |
| Screen                    | Plat type TFT 19"                                                                           |
| Server Inverters          | MGE Evolution S 3000                                                                        |

Table 8.1: Technical file "database server"

### 8.2.2 Technical file of smartphone

In this phase we used the HTC one m8 smartphone to test our application.

| HTC one m8            |                                                           |
|-----------------------|-----------------------------------------------------------|
| Operating system (OS) | 5.0 Lollipop                                              |
| Processor             | Qualcomm MSM8974AB Snapdragon 801 - 2.3 GHz               |
| Display Resolution    | 1920 x 1080 px                                            |
| Internal memory       | 16/32 Go, 2 Go RAM                                        |
| GPS                   | yes (A-GPS)                                               |
| Network               | GSM / HSPA / LTE                                          |
| 4G                    | 150 Mbps (Cat.4)                                          |
| Camera                | 4 Megapixel (UltraPixel) with Dual LED Flash + Auto Focus |

Table 8.2: Technical file "smartphone"

### 8.2.3 Network equipment

|                 | Description                                         | Quantity |
|-----------------|-----------------------------------------------------|----------|
| <b>Switch</b>   | ProCurve networking                                 | 02       |
|                 | IST 24 ports 10/100 BTX                             | 01       |
| <b>Firewall</b> | Cisco PIX 515 ports 10/100 BTX                      | 02       |
| <b>Routers</b>  | Cisco 2620 ports Wan, 02MBPS, 08 Asynchronous lines | 02       |
|                 | Cisco 3845 04 Cartes Hwic                           | 01       |
| <b>Network</b>  | Fiber Optic (TCP / IP Protocol)                     |          |

Table 8.3: Network equipment list

## 8.3 Software configuration

In our application, we used Android Lollipop 5.0 , Android 6.0 Marshmallow as operating system, and we used MySQL to create and manage the data base tables.

## 8.4 Three levels Architecture

In figure 8.1 we present the three levels architecture of our application. FixIt.apk is: the source file of the citizen, FixItw.apk is: the source file of admin, Wassit, Executive institution or Wali.

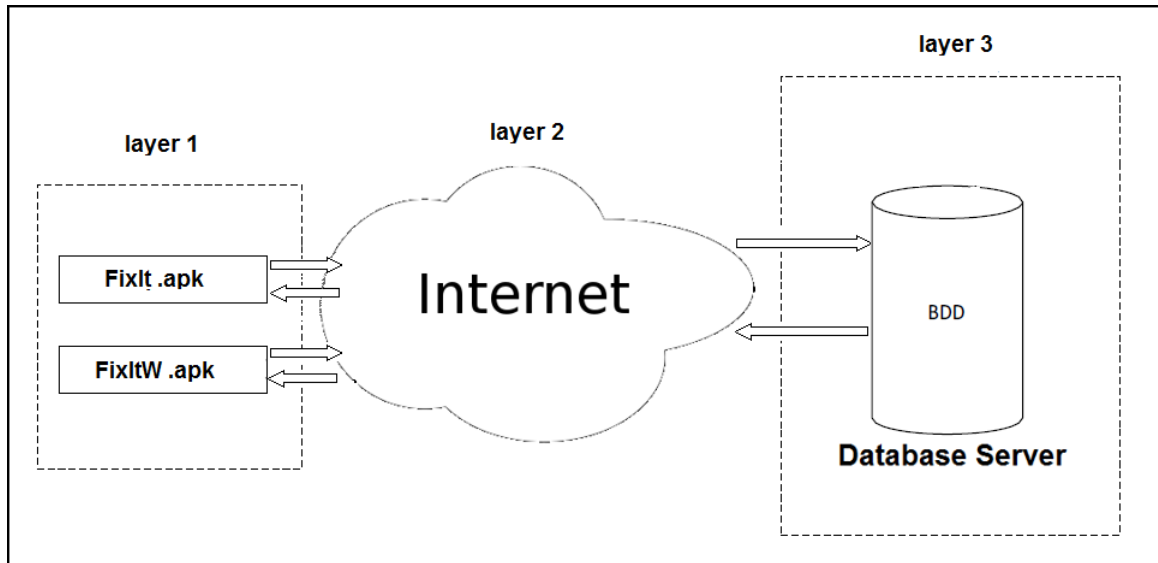


Figure 8.1: Architecture three levels of our system

## 8.5 Conclusion

In this chapter we gave a brief description about Material Configuration , Software Configuration and three layer Architecture of FixIt and FixItW applications. In the next chapter, we will give an overview about Tools and Programming languages.

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# CHAPTER 9

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## TOOLS AND PROGRAMMING LANGUAGES

### 9.1 Introduction

In this chapter we will give a brief definition about tools and programming languages used in our application such as Android Studio, PhpMyAdmin, Java, XML, PHP and MySQL.

### 9.2 Tools

#### 9.2.1 Android Studio

Android Studio is the official Integrated Development Environment (IDE) for Android app development, based on IntelliJ IDEA, Figure 9.1 [15]. On top of IntelliJ's powerful code editor and developer tools, Android Studio offers even more features that enhance your productivity when building Android apps, such as:

- A fast and feature-rich emulator.
- Extensive testing tools and frameworks.

- C++ and NDK support
- Extensive testing tools and frameworks.



Figure 9.1: Android Studio Logo

### 9.2.2 PhpMyAdmin

phpMyAdmin is a free software tool written in PHP, intended to handle the administration of MySQL over the Web. phpMyAdmin supports a wide range of operations on MySQL and MariaDB. Frequently used operations (managing databases, tables, columns, relations, indexes, users, permissions, etc) can be performed via the user interface, while you still have the ability to directly execute any SQL statement, Figure 9.2 [16]. We used PhpMyAdmin to manage the data base .



Figure 9.2: PhpMyAdmin

## **9.3 Programming languages**

### **9.3.1 Java**

Java is a general purpose, high-level programming language developed by Sun Microsystems. A small team of engineers, known as the Green Team.

Java is a widely used programming language expressly designed for use in the distributed environment of the internet. It is the most popular programming language for Android smartphone applications and is among the most favored for edge device and internet of things development [3]. We used Java to programme most of FixIT App code.

### **9.3.2 XML**

Extensible Markup Language (XML) is used to describe data. The XML standard is a flexible way to create information formats and electronically share structured data via the public Internet, as well as via corporate networks [17]. We used XML in design.

### **9.3.3 PHP**

PHP (recursive acronym for PHP: Hypertext Preprocessor) is a widely-used open source general-purpose scripting language that is especially suited for web development and can be embedded into HTML [18]. We used PHP to link Android Apps to the Data Base.

### **9.3.4 MySQL**

MySQL is an open source relational database management system. Information in a MySQL database is stored in the form of related tables. MySQL databases are typically used for web application development (often accessed using PHP).

A MySQL database can be accessed (queried) directly using; C, C++, Eiffel, Java, Perl, PHP and Python computer languages. There is also third party support for connection in a Windows environment [19]. We used MySQL to create Data Base .

## 9.4 Conclusion

In this chapter we gave a brief definition about the tool and programming languages used in our application. In the next chapter, we will give an overview about FixIt and FixItW Implementation.

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# CHAPTER 10

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## FIXIT IMPLEMENTATION

### 10.1 Introduction

In this chapter we will present some aspects of implementation for FixIt (Citizen) and FixItW (Admin, Wassit, Wali, Executive institution) applications.

### 10.2 Citizen FixIt application description

In this section, we will describe some screen shoot of the application: Authentication , Main Window, List of complaints, View complaint, View the coordinates on map, Complaint Management.

## 10.2.1 Authentication

### Login activity

This activity(Figure 10.1 ) asks the user(citizen) for his id card and password to give him the permission to access to the application .



Figure 10.1: Login activity

### Signin activity

In this activity(Figure 10.2 ) the citizen can sign up in our application using his information such as : the id card, first name, last name, phone number, email, address, city, birthday and gender .

The figure displays two screenshots of the 'FixIt' application's Signin activity. The left screenshot shows the registration form with the following fields: 'رقم بطاقة التعريف الوطنية او رخصة السياقة' (National ID or Driving License Number), 'اللقب' (Last Name), 'الاسم' (First Name), 'example@example.com' (Email), 'الرقم السري' (Password), 'تأكيد الرقم السري' (Confirm Password), and 'رقم الهاتف' (Phone Number). The right screenshot shows the date of birth selection screen with a calendar grid and gender selection options. The calendar grid shows dates 16, 17, and 18 for the months of mars, avr., and mai for the years 2016, 2017, and 2018. The gender selection options are 'ذكر' (Male) and 'انثى' (Female). A 'سجل' (Sign Up) button is visible at the bottom of the right screenshot.

Figure 10.2: Signin activity

### 10.2.2 Main Window (Menu)

Main Window activity(Figure 10.3 ) shows up the most important functions that the user(citizen) can do using our app such as : search and view the list of all his complaints , view his informations , add new complaint , view the list of deleted complaint .



Figure 10.3: Main Window activity

### 10.2.3 List of complaints

This activity(Figure 10.4 ) shows up a list Containing all the complaints added by the user(citizen). The user can choose actions to do on each complaint such as : delete , edit or rate the complaint. The user also can click on any complaint to show up or view all the information of that complaint.

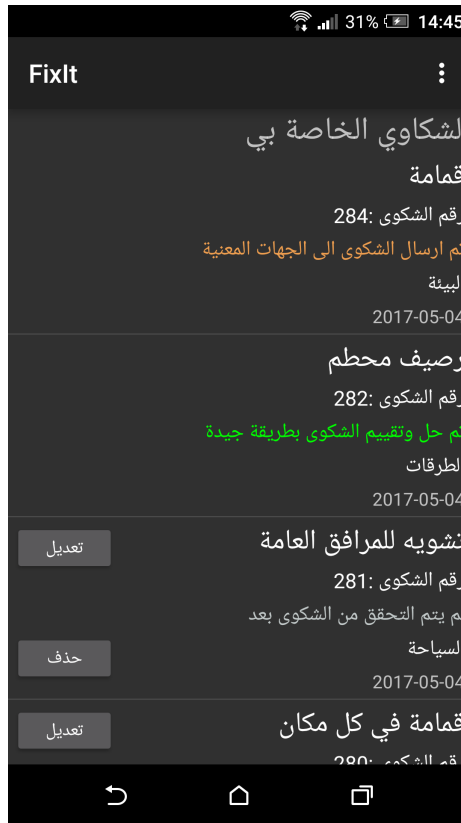


Figure 10.4: List of complaints activity

### 10.2.4 View complaint

View complaint activity(Figure 10.5 ) shows up all the information about the complaint such as : the title , the type , commune , dairai , executive institution , registration date , fixation date by Wali , rate ... etc . Also the user can browse the coordinates of the location on the map , delete , edit or rate the complaint .



Figure 10.5: View complaint activity

### 10.2.5 View the coordinates on map

In this activity(Figure 10.6 ) the user can brows the location coordinate using google map.

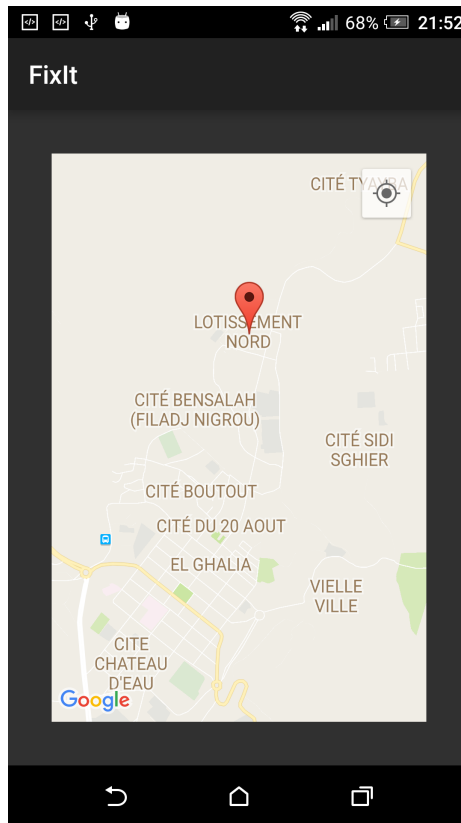
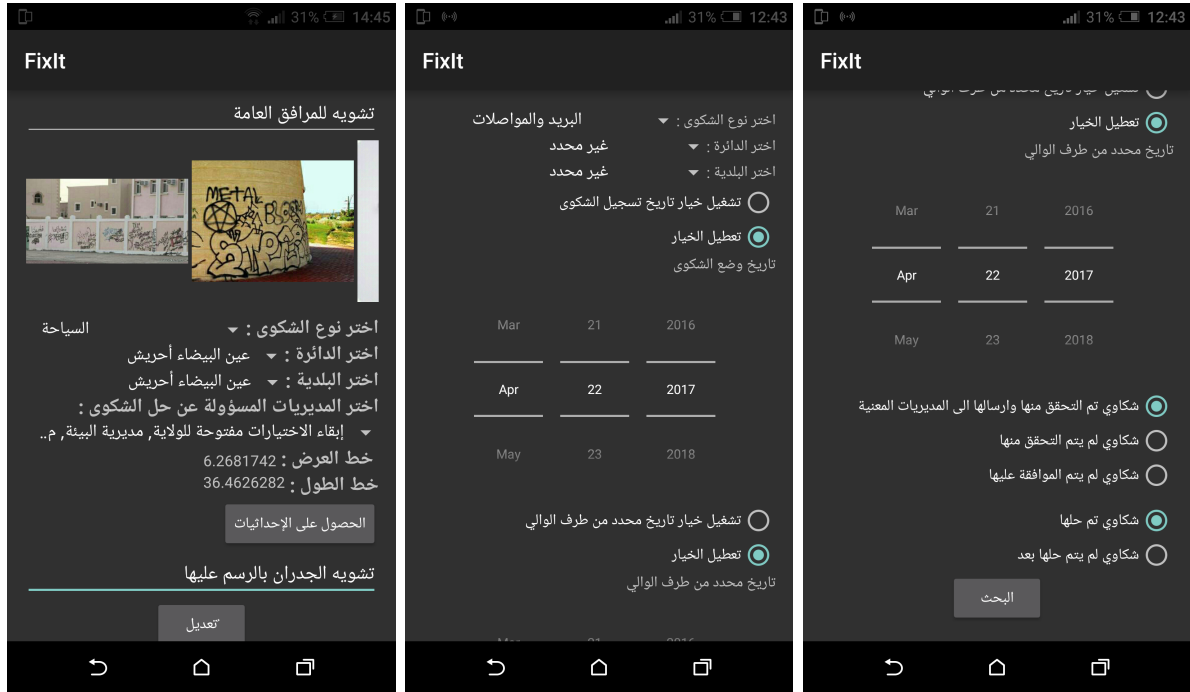


Figure 10.6: View the coordinates on map activity

## 10.2.6 Complaint Management

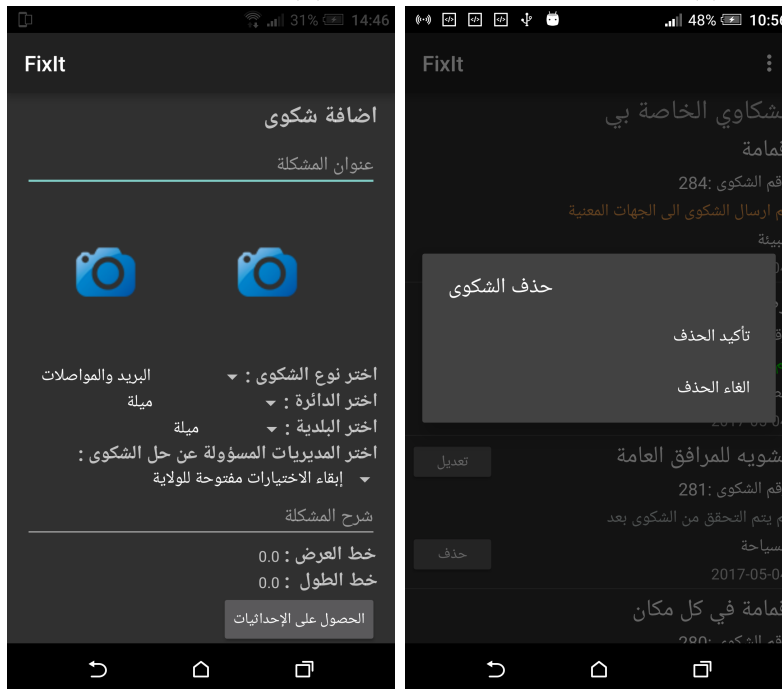
This activity (Figure 10.7 ) shows four activities: Edit , Search , Add and Deleted



(a) Edit

(b) Step 1 Search

(c) Step 2 Search



(d) Add

(e) Deleted

Figure 10.7: Complaint Management activities

## 10.3 Wilaya FixItW application description

### 10.3.1 Authentication

This activity (Figure 10.8 ) asks the user (Wali,Wassit,Admin or Executive institution employees) to fill up his information (identification and password) to login and use the application .



Figure 10.8: Authentication activity (FixItW)

### 10.3.2 Admin part

#### Main Window for Admin

Main Window activity (Figure 10.9 ) of admin shows up all the necessary actions that the admin can do using the app such as : view the list of all users(admins , citizens , wali , wassit ,executive institution employee) , view his information , search for users,add new user and show up the list of all executive institution .



Figure 10.9: Main Window for Admin activity

## View list of users

This activity (Figure 10.10 ) shows up a list of all users. Admin can choose an action to do on each user such as : delete , edit or set the user account as checked .

Admin also can click on any user to show up or view all the information about him.

Also the admin can view the list of not checked users.

Admin can view all the information about the user such as : the id card , first name ,last name , birthday , phone number ... etc.

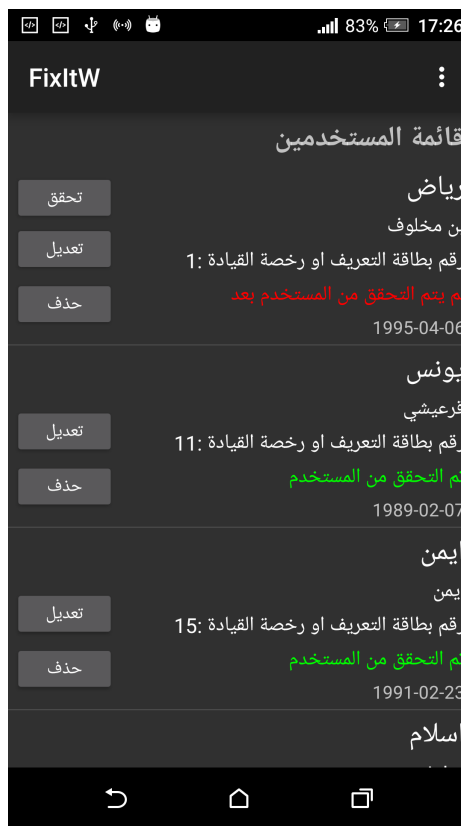


Figure 10.10: View list of users activity

## Users management

This activity (Figure 10.11 ) shows tow activities: Add User and Search User.

The figure consists of three screenshots of the FixItW mobile application interface, all in Arabic. Each screenshot shows a dark-themed screen with white text and input fields.

- (a) Step 1 Add User:** The screen is titled "اضافة عضو جديد" (Add New Member). It features a camera icon for profile picture upload. Below it are input fields for "الرقم الخاص بالمستخدم" (User's unique number), "اللقب" (Surname), "الاسم" (Name), "الرقم السري" (Password), "تأكيد الرقم السري" (Confirm password), and "رقم الهاتف" (Phone number). A blue camera icon is positioned above the "الاسم" field.
- (b) Step 2 Add User:** The screen is titled "FixItW". It shows a date picker for "تاريخ الاقامة" (Residence date) with a dropdown for "اختر البلدية" (Select Municipality). The date is set to "Mar 21 2017". Below the date picker is a "والى" (Gender) section with radio buttons for "ذكر" (Male) and "انثى" (Female). At the bottom is an "اضافة" (Add) button.
- (c) Search User:** The screen is titled "البحث عن مستخدم" (Search for user). It has a search bar with the placeholder "رقم بطاقة التعريف الوطنية او رخصة القيادة" (National ID card number or driving license). Below the search bar are input fields for "لقب المستخدم" (User's surname), "اسم المستخدم" (User's name), and "الايميل" (Email). There is also a "رقم الهاتف" (Phone number) field. At the bottom is a "البحث" (Search) button.

(a) Step 1 Add User

(b) Step 2 Add User

(c) Search User

Figure 10.11: Users management activities

### 10.3.3 Wassit part

#### Main Window for wassit

Main Window activity(Figure 10.12 ) of wassit shows up all the necessary actions that the wassit can do using the app such as : view the list of all complaints, view his information, check complaint, search for complaints and show up the statistics .



Figure 10.12: Main Window for wassit activity

### List of all complaints

This activity(Figure 10.13 ) shows up a list containing all the complaints added by all citizens.

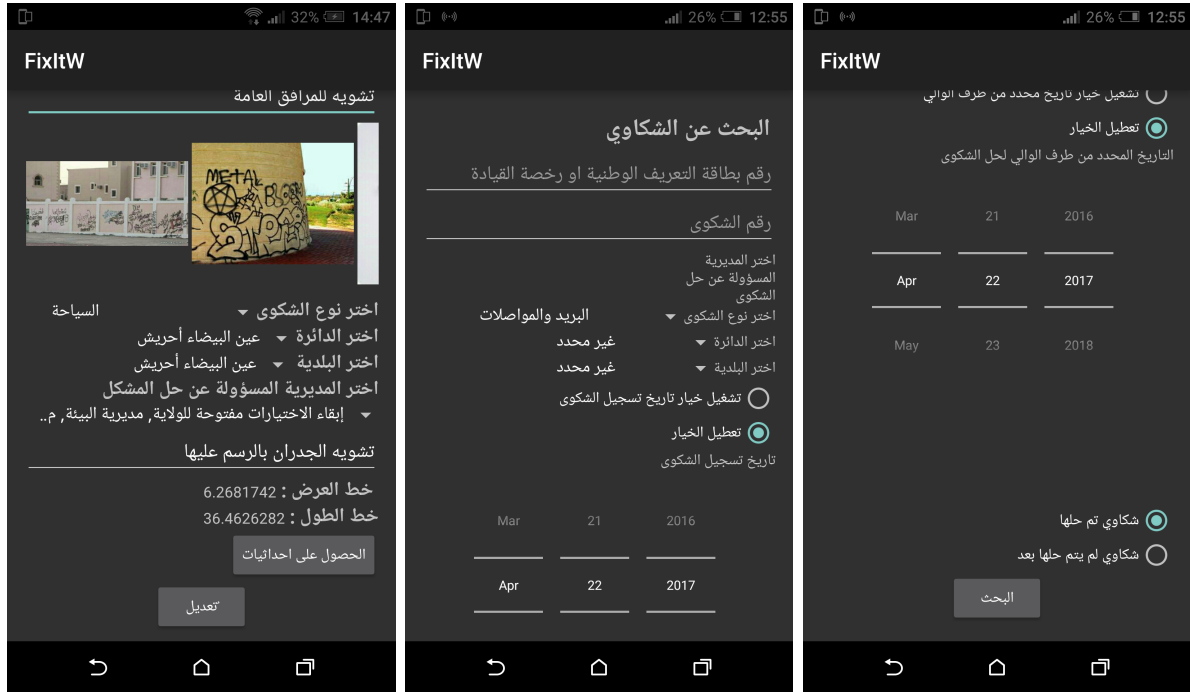
Wassit can choose an action to do on each complaint such as : delete , edit , set as checked or reject the complaint. Wassit also can click on any complaint to show up or view all the information of that complaint.



Figure 10.13: List of all complaints activity

## Complaint management

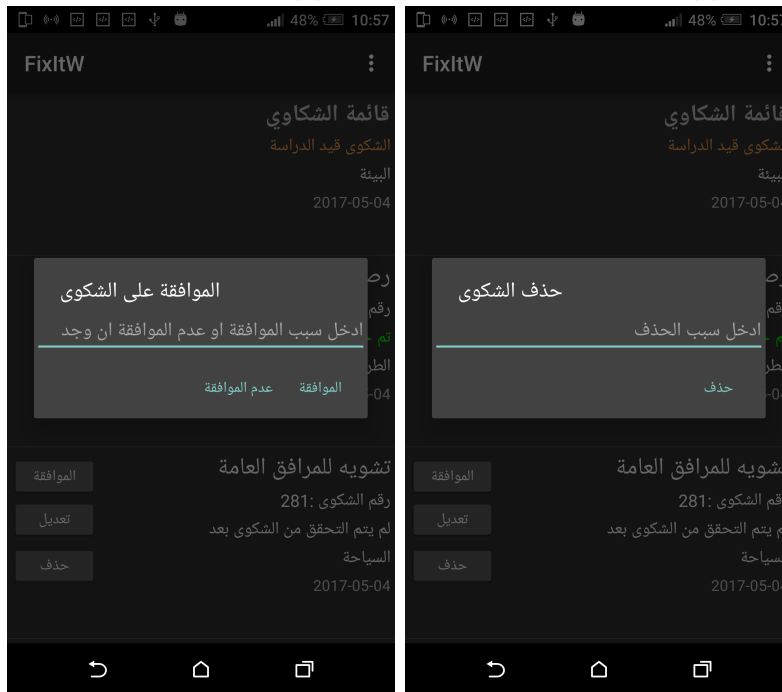
This activity (Figure 10.14) shows three activities: Edit , Search and Check.



(a) Edit

(b) Step 1 Search

(c) Step 2 Search



(d) Check

(e) Delete

Figure 10.14: Management complaint activities

### 10.3.4 Wali part

#### Main Window for wali

Main Window activity (Figure 10.15 ) of wali shows up all the necessary actions that the wali can do using the app such as : view the list of all checked complaints , view his information , search for complaints,view the black list of complaints, show up the statistics and add, edit and delete Fixation Date.



Figure 10.15: Main Window for wali activity

### List of all complaints

This activity (Figure 10.16 ) shows up a list contains all the complaints checked by wassit. wali can choose an actions to do on each complaint such as : add fixation date to resolve the problem , edit or delete the fixation date.

Also the wali can freeze the complaint if the executive institution didn't resolve the problem before the fixation date.

Wali also can view all the information of each checked complaint by pressing on any complaint.



Figure 10.16: List of all complaints activity

## Fixation Date Management

This activity (Figure 10.17 ) shows activities: list of all unfixed complaints , list of complaints without fixation date and Black list. wali can choose an action to do on each complaint such as : Add , edit and delete fixation date.

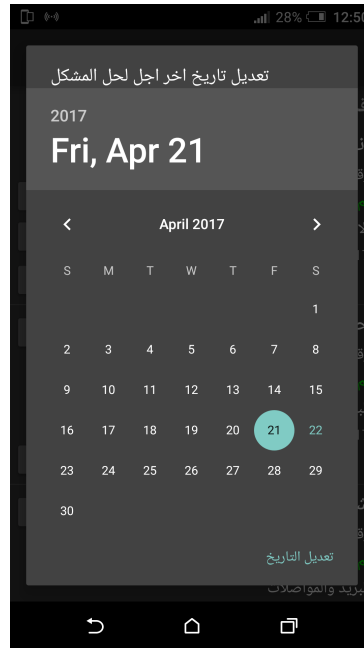
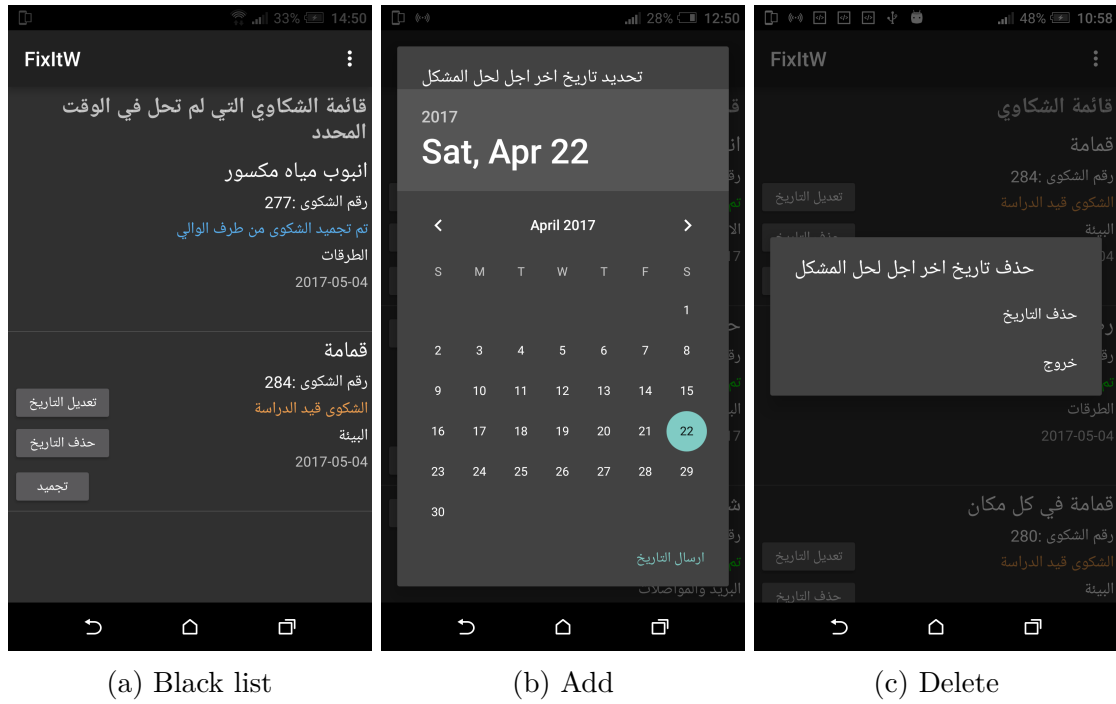


Figure 10.17: Fixation Date Management activities

### 10.3.5 Executive institution part

#### Main Window for Executive institution employees

Main Window activity (Figure 10.18 ) shows up all the necessary actions that the executive institution employees can do using the app such as : view the list of all checked complaints related to the executive institution , each employee can view his information , search for complaints and shows up the statistics .



Figure 10.18: Main Window for Executive institution employees activity

### List of not resolved complaints

This activity (Figure 10.19 ) shows up a list of all not resolved complaints related to the executive institution and checked by wasisit .

The user(Executive institution employee) has only one action to do on each complaint : mark the complaint as repaired(resolved).

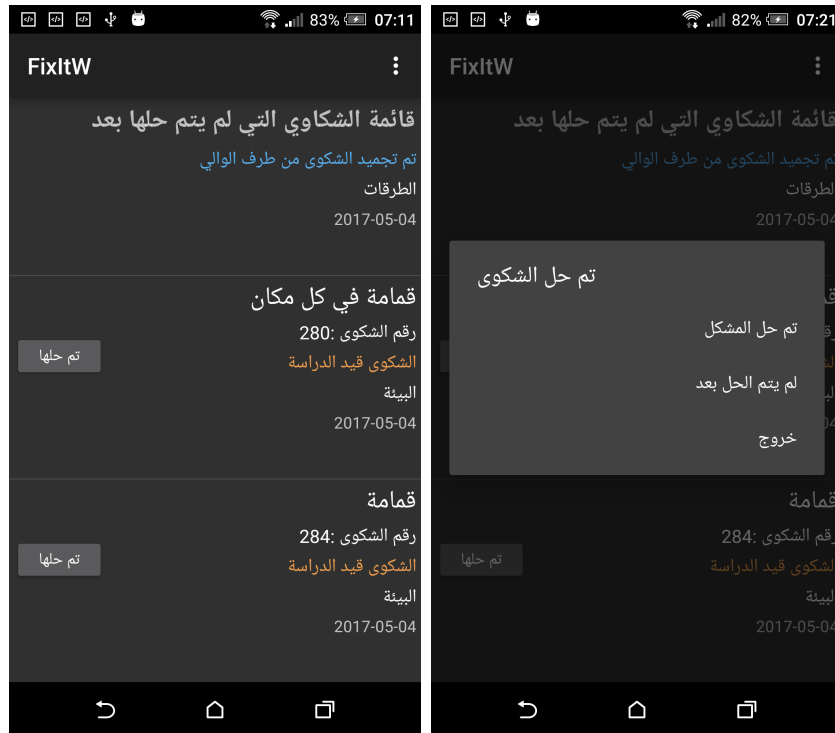


Figure 10.19: List of not resolved complaints activity

### 10.3.6 Common parts

#### Statistics

In this activity (Figure 10.20 ) the user(Wali, Wassit, Admin or Executive institution employees) chooses all the necessary information to show up the result of statistics .

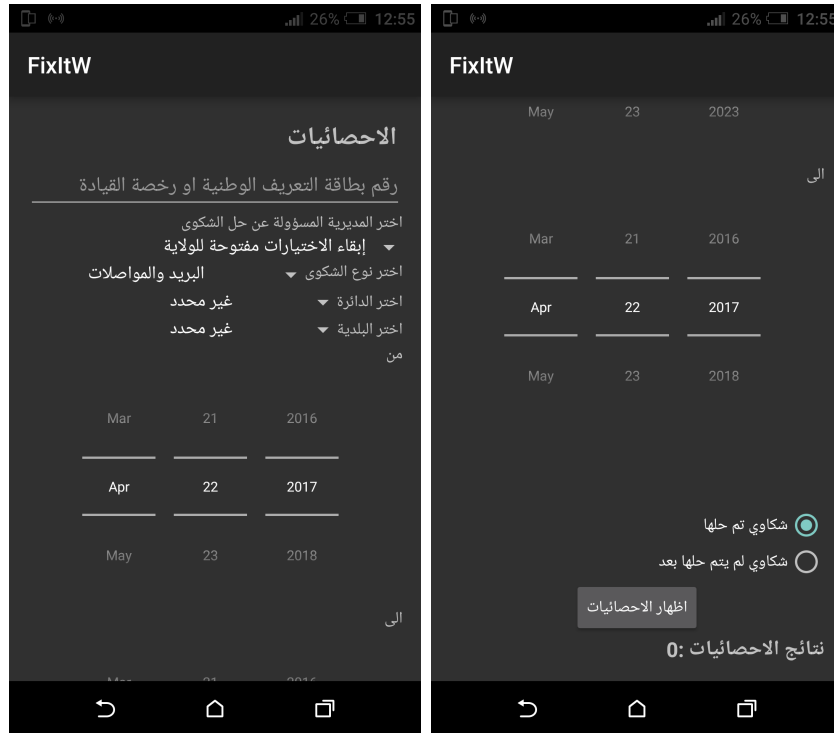


Figure 10.20: Statistics activity

### View the coordinates on map

In this activity (Figure 10.21 ) the user(Wali, Wassit or Executive institution employees) can browse the location coordinate of the complaint using Google map.

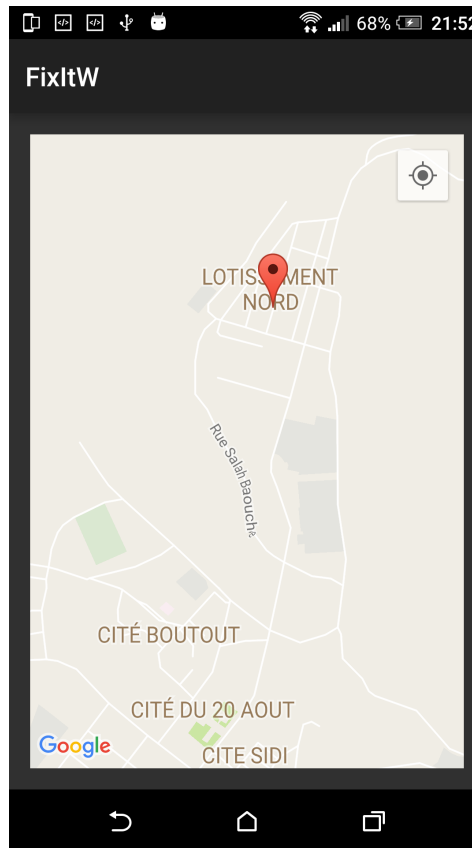


Figure 10.21: View the coordinates activity

## Search complaints

Search complaints activity (Figure 10.22 ) the user fills all the necessary information to search for complaints .

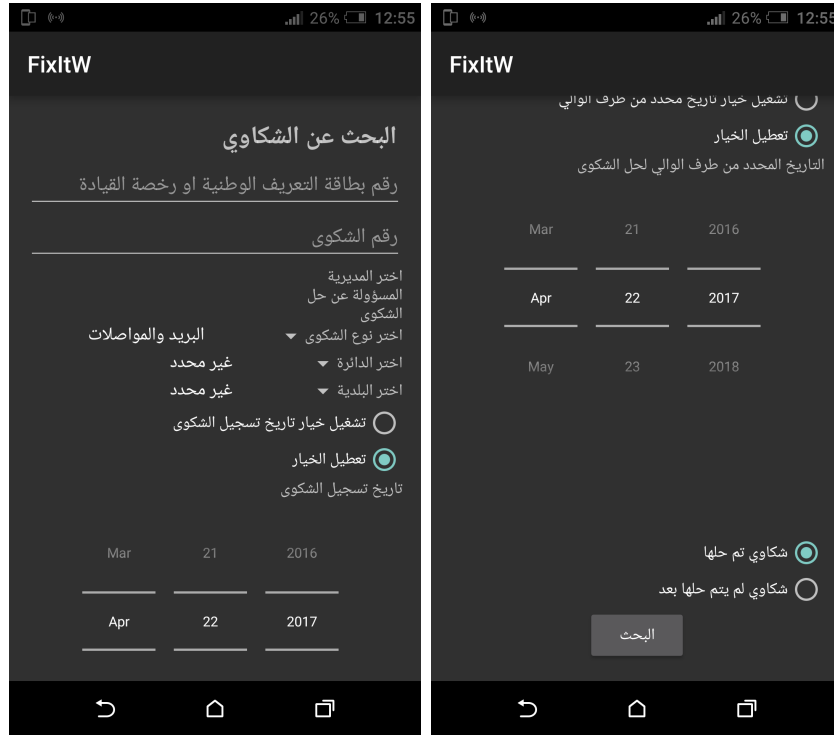


Figure 10.22: Search complaints Activity

## 10.4 Conclusion

In this chapter we present some aspects of implementation for FixIt and FixItW apps. We enriched it with some screen-shots of our applications.

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## GENERAL CONCLUSION

The objective of this thesis is to develop android applications to provide a permanent connection between the citizen and wilaya services.

To realize this project, we participate in an internship in the wilaya of Mila, in call center department and mediation office. We noticed that even they use a desktop application called VorixAgent to register phone calls and complaint information, there are many weaknesses in the complaint process.

To resolve these deficiencies, we proposed in this thesis two mobile applications: the first one is for wilaya services and executive institutions called FixItW. The second one is for the citizen and called FixIt.

These two applications allowing the citizen to send his complaints without going to them. In the other side, the wilaya will receive complaints and deal with them with a fast and organized way.

Finally, we like to mention that there are a lot of ideas and functionalities we want to add in future works. For example not just developing an android application or to make our project working only on smartphones, but also on laptops (personal computers). Therefore, our plan is to develop a desktop application for personal computers.

Furthermore, we want to add some functionalities to mobile applications like:

- Sending videos about the problem (complaint).
- The ability of making calls or even video calls (live video chat) between citizen and wilaya employees.

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