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Abstract

I-Fix is an Android application that helps reduce effort and time in searching for industrial service providers. The idea of this application appeared according to the difficulty of finding highly qualified industrialists in line with the developments of the technological age, so we developed the application to provide the opportunity for individuals to search for industrial service providers. The user enters his personal information such as name, phone number, etc. in addition, then the user will fill in the crash information in the request form, and the application delivers the request to the service provider to whom the request was sent personally and hires it from among other service providers. As for service providers, the application displays all the requests that have reached this provider smoothly that facilitates searching for the user, finding his location and communicating with him. The application provides the greatest assistance to users specifically without the need to go to service providers on the ground, which reduces the time and effort required to conduct the maintenance process in general.

After reviewing the previous work, we added some features and improved some of them to reach an application that differs in its content from other pre-existing applications and competes with it in this field, as our application contributed to creating a channel that connects users with service providers and the advancement of social work and industrial work in Jordan. One of the most important additions to the application is the ability to support the largest possible number of local service providers and facilitate the process of linking them with users. The application will be developed and a version running on the (IOS) system to enable access to the largest segment of users, along with a desktop version, in addition to many important future works.

الملخص

I-Fix هو تطبيق أندرويد يساعد في تقليل الجهد والوقت في البحث عن موفري الخدمات الصناعية. ظهرت فكرة هذا التطبيق في ظل صعوبة العثور على صناعيين مؤهلين تأهيلا عاليا بما يتماشى مع تطورات العصر التكنولوجي ، لذلك قمنا بتطوير التطبيق لإتاحة الفرصة للأفراد للبحث عن مقدمي الخدمات الصناعية. يقوم المستخدم بإدخال معلوماته الشخصية مثل الاسم ورقم الهاتف وما إلى ذلك بالإضافة إلى ذلك ، ثم يقوم المستخدم بملء معلومات العطل في نموذج الطلب ، ويقوم التطبيق بتسليم الطلب إلى مزود الخدمة الذي تم إرسال الطلب إليه شخصيًا و يستأجرها من بين مقدمي الخدمات الآخرين. أما بالنسبة لمقدمي الخدمة ، فيقوم التطبيق بعرض جميع الطلبات التي وصلت لهذا المزود بشكل سلس يسهل البحث عن المستخدم والعثور على موقعه والتواصل معه. يقدم التطبيق أكبر مساعدة للمستخدمين على وجه التحديد دون الحاجة إلى الذهاب إلى مزودي الخدمة على أرض الواقع ، مما يقلل من الوقت والجهد اللازمين لإجراء عملية الصيانة بشكل عام.

بعد مراجعة العمل السابق قمنا بإضافة بعض الميزات وتحسين بعضها للوصول إلى تطبيق يختلف في محتواه عن التطبيقات الأخرى الموجودة مسبقًا ويتنافس معها في هذا المجال ، حيث ساهم تطبيقنا في إنشاء قناة تربط المستخدمين بها مقدمو الخدمات والنهوض بالعمل الاجتماعي والعمل الصناعي في الأردن. من أهم الإضافات للتطبيق هو القدرة على دعم أكبر عدد ممكن من مزودي الخدمة المحليين وتسهيل عملية ربطهم بالمستخدمين. سيتم تطوير التطبيق وإصدار نسخة تعمل على نظام (IOS) لتمكين الوصول إلى أكبر شريحة من المستخدمين ، إلى جانب إصدار سطح المكتب ، بالإضافة إلى العديد من الأعمال المستقبلية المهمة.

Chapter One
Introduction

1.1 Introduction

A career is work that you like doing and that allows you to prepare and set goals for yourself. The willingness to advance in an orderly, progressive way is another characteristic of the practice. As a type of short-term employment, a job may also be defined as the work that a person does daily to obtain a regular income; thus, the distinction between a job title and an occupation exists as the job is a stage for obtaining additional experiences that qualify the individual later to begin the desired professional career. [1]

In general, a profession includes a set of mental knowledge and a set of practices, experiences, and applications that make up the profession, such as providing a certain amount of specialized technical skills and expertise, providing specialized intellectual outputs, and possessing the ethical and behavioral rules that govern and regulate work among the members of the profession; Proactive practices are one of the features that differentiate a profession from other professions. [2]

In the past, professions were a means of earning a livelihood, and they were among the lifelines that a person relied upon in all areas of his life. The arduous occupations such as construction, agriculture, blacksmithing, etc. were known, as well as the luxury professions such as adornment or simple works, which mastered the ancient man in practice. [3]

Occupations and crafts had a very distinct interest in the past, with unprecedented prevalence and great wealth, but the commodity differed as did the initial and luxury crafts. [3]

The focus has changed to simple and appropriate things after the outbreak of the Industrial Revolution, the transformation of the means of production into machines that depend on all types of fuels for their functions, and the cultural invasion that contributed to the spread of cynical thought that permeated the human mind. [3]

1.2 Background

Industrial occupations started as a pastime or an individual activity in all parts of the world, and then developed into a service by which the individual aims to obtain his monthly income; this is because they produce a group of salable goods or services that create some of the owner's material income, as these careers have evolved to become among the most popular and significant in the world.

Industrial jobs play an important part in society's social and economic growth. Since these careers are taught in specialized professional schools, students are trained to achieve the highest degree of competence and expertise possible through academic and analytical preparation as well as practical application.

Both conventional works have been turned into automated work (using robotics and artificial intelligence) as a result of global advances, which has resulted in a decline in employment prospects for people employed in these occupations within communities, affecting families' income in general.

1.3 Problem statement

A. The difficulty of finding and searching for the target people by individuals and owners of institutions and facilities.
B. The difficulty of finding professional industrial professionals to solve problems efficiently.
C. Low likelihood of finding a way to connect industrial professionals with individuals, business owners and establishments.

1.4 Project Objectives

The project objectives can be summarized through the following points:
A. Facilitate the search for craftsmen through maps.
B. Speed in finding the location of users in relation to the two characters through maps.
C. Reaching out to the largest possible segment of users and craftsmen in the Kingdom.
D. Confining all craftsmen within one application to solve all household faults and similar ones in institutions and facilities.

1.5 Motivation

The inspiration for this project came from the difficulties that some individuals and business owners face in following up and fixing existing malfunctions. As a result, we built this project so that users could identify the people they need to address their issues without requiring prior knowledge between them.

1.6 Project Scope

The application has been developed to include the owners of industrial professions on the one hand, individuals, institutions and establishments that may have faults and who need some industrial professionals in order to fix them within a specific geographical location (Jordan).

1.7 Contribution

In this project, we aim to identify individuals, owners of establishments and establishments, and owners of industrial professions approved by the competent authorities and link them appropriately, so that this project will encourage the owners of industrial professions to better master their work in order to reach a better social and practical position.

Chapter Two
BACKGROUND AND RELATED WORKS

2.1 Introduction

In this chapter, a description of the application is presented that is similar to the developed application and compares it in terms of features, advantages and disadvantages and differs from the developed application. For every application developed there are specific goals to be achieved, while goals differ between applications and there are similarities between them. The differences and similarities between the application and the developed application are discussed in detail. In this chapter, we also discussed some of the applications in which services are organized between users and industry professionals.

The services application was created for those wishing to access an industrial profession with flexibility and ease, providing users with a unique experience that differs from previous searches, so that the application is keen to link individuals to a group of industrial professions wishing to receive their calls to inform them of their malfunctions.

This application consists of two interfaces linked together, one of which serves individuals and owners of establishments and establishments specifically and the other the owners of industrial professions themselves.

As the first application dedicated to individuals and owners of establishments and establishments facilitates the search process by specifying the categories of industrial professions (blacksmith, carpenter, plumber, electrician, mechanic, etc.), in addition to an area that allows individuals to access some accurate details about the owners of the professions.

As for the second application, it works differently from the previous one as it displays the requests of individuals for the same profession and not from the owners of other professions on a regular basis and in a simple way that is formed by displaying the name of the individual and what are the faults he has, in addition to the

description that the individual wrote, and he follows it with a set of options Such as displaying the individual's location on maps, in addition to the direct contact feature.

2.2 Theoretical background

We will face several difficulties during executing this project till it's written, but we think that the most difficult thing is to find a craftsman to work with us.

2.3 Related Application

We have reviewed the current apps and studies that are similar to ours and discussed the most important features that each app has and the country in which each app operates. We made a comparison table for all the apps we reviewed and compared them with suggested features and improvements serving the target people by individuals and owners of institutions and facilities.

For example, we tried some applications, and we reviewed their interfaces and how they work, and we monitored the tasks that each application performs, but we encountered some problems in the process of checking the application and the speed of obtaining the request, and that is because some applications work on this idea outside Jordan, and examples of these applications:

2.3.1 Maharah [4]

Maharah is a leading mobile application that help you to book your maintenance services and civil works in less than a minute. Maharah is connecting service seekers with professional service providers (Maher). It is simply a process of 3 steps; Look at Figure (2.3.1):

1. Choose a Service: electricity, plumbing, A/C, etc.
2. Details: determine location, date and time and take a picture or record a video for the requested service.
3. Job Done: Maher will send you a message and you can see his profile before getting the job done.

Maher is ready to serve you
Check his rating on previous jobs
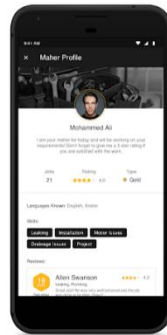
Figure 2.3.1: Maharah Application.

2.3.2 Syaanh.com [5]

From home repairs & cleaning to errands & delivering, Syaanh.com app is a Qatar based home maintenance & repair service provider finds you trusted and skilled service providers to handle your requests-when you want it and at prices offers you can afford with free to choose best offer for you. Figure (2.3.2) shows the Syaanh.com application interface!
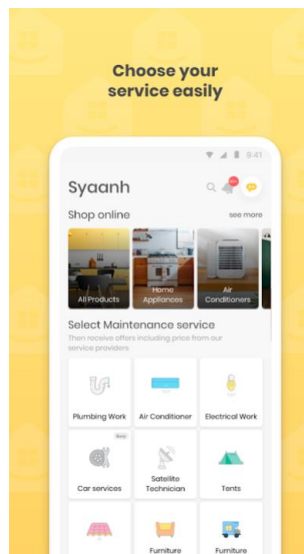
Figure 2.3.2: Syaanh.com Application.

2.3.3 Services [6]

Application of services that carries many of the features and features that are important and useful to the user, such as offering best prices and discounts, fast and direct booking, and selection from hundreds of technicians and service providers; Check out Figure (2.3.3).

1. The possibility of booking and confirmation without a credit card.
2. Service available 24 hours a day, 7 days a week and from anywhere in the world.
3. The application is free, easy and simple to use and available to everyone
4. .The application is designed in Arabic and English as a first stage.
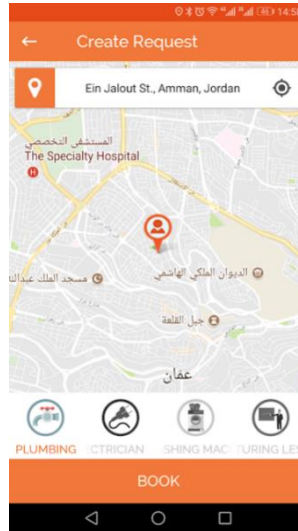
Figure 2.3.3: Services Application.

2.3.4 Sendan [7]

A service that will be able to reach inside the Kingdom, by providing qualified technical cadres in various languages.

The developers of Sendan application seek to develop the concept of home services in the Kingdom, in terms of upgrading the level of quality and reasonable price, in addition to providing a pioneering technology that has been specially designed, by providing a pioneering technology that is

specially designed according to the needs of the Saudi market; As shown in Figure (2.3.4).

Figure 2.3.4: Sendan Application.

2.3.5 MyHome [8]

MyHome is the app for all your needs. Whether you need maintenance work done on your AC unit or groceries delivered to your door, MyHome is your fast and reliable solution. Select what you need, where and when you need it, and we'll connect you with the right service provider, or browse our list of vendors within select services; Look at Figure (2.3.5).
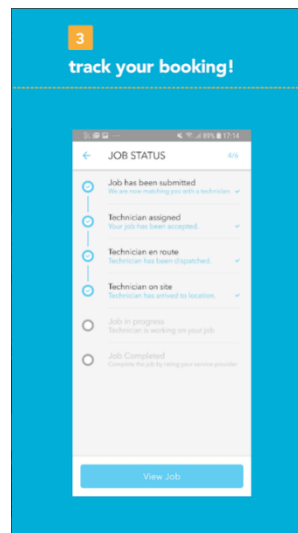
Figure 2.3.5: MyHome Application.

2.3.6 Online Maintenance / صيانة اونلاين [9]

It is a special application of the maintenance of household appliances with delivery to the customer's place of faith in the production center for maintenance under the auspices of Symi Cologne Company of software solutions and technology; and is received based on a broad spectrum of users and service request, household maintenance to receive the delegate to the door of the house; Check out Figure (2.3.6).

Figure 2.3.6: Online Maintenance Application.

2.3.7 Home Maintenance Guide / دليل الصيانة المنزلية [10]

You can through the application of the home maintenance guide-Requesting the service with clarification of the request details with the possibility of raising a picture of the goods and goods, Determine the place of receipt; Look at Figure (2.3.7).

1. Find the nearest available cars on the map.
2. Display information about the driver and the car.
3. Determine the approximate time of the driver's arrival.
4. Track the route of shipments through GPS.

Figure 2.3.7: Home Maintenance Guide Application.

2.3.8 Fanni [11]

Technical application is a special application to provide employment for home maintenance services in various fields and you can request with ease; Look Figure (2.3.8).

Figure 2.3.8: Fanni Application.

2.3.9 Siyanatech [12]

Application maintenance Tech specializes in matters of maintenance for all types of crafts from your place of maintenance for your home; Look at Figure (2.3.9).
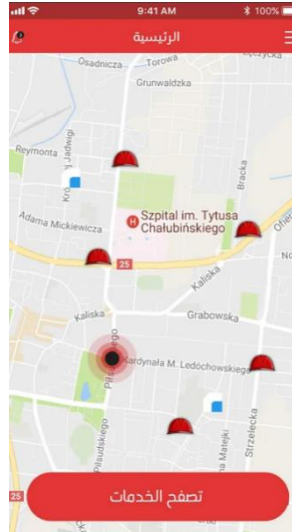
Figure 2.3.9: Siyanatech Application.

2.3.10 Aoun / عون [13]

We at Al-Aoun Services and Maintenance believe that the world is always renewed, and that investment in the service of man and society is an integral part of our values, and that electronic services have become the most reliable, flexible and fastest accomplishment, and therefore we launched a digital platform that is considered the first in its field in our country, and that By launching (Aoun) service to help fix emergency breakdowns for cars, water and electrical household breakdowns; Check Figure (2.3.10).
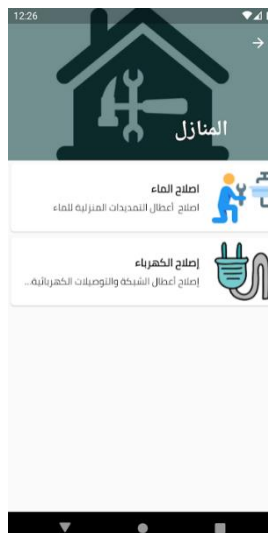
Figure 2.3.10: Aoun Application.

2.3.11 Rightman [14]

Rightman Home is a Home Maintenance Related Services Platform where you can book all type of home services at very low cost without any login. You just have to open app and select your required service and then enter billing details and after successful booking our service man will be at your doorstep. No hidden Charges will be there. So why late book you home service and Get Rid of Home Maintenance we will take care of everything; Check Figure (2.3.11).
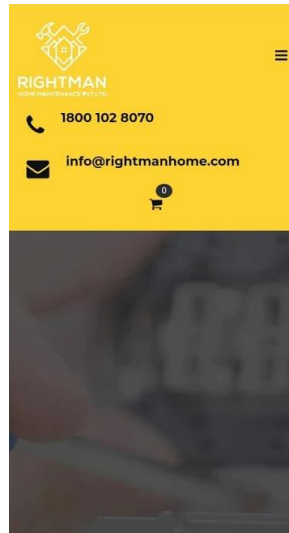
Figure 2.3.11: Rightman Application.

2.3.12 Aryan [15]

Aryan home maintenance company (AHMC) is established 01 Jan 2016 with this aim to make Houses, Offices, required maintenance. Easy and simple. All of our handymen have been trained by Skilled India Education Scheme (Dream of our honorable Prime minister of INDIA Mr. Narendra Damodar Rao Modi) and ITI, Polytechnic and engineering colleges with high quality; Look Figure (2.3.12).

Figure 2.3.12: Aryan Application.

2.3.13 UrbanFix [16]

UrbanFix App helps customers to hire trusted professionals for all their service needs. We connect you with skilled local service providers to tackle essential services and errands, safely and efficiently. Popular tasks include trash valet, no-contact, errands, cleaning, mounting, furniture assembly and moving. Plus, we back all tasks with our Happiness Pledge so you can have peace of mind. Thereby improving the quality of life for our customers. We have also partnered with local service businesses to organize and enhance their services too; Check Figure (2.3.13).

Figure 2.3.13: UrbanFix Application.

2.3.14 AlooHerafi [17]

The application helps artisans to promote their services and products and present them to citizens and institutions; as shown in Figure (2.3.14).
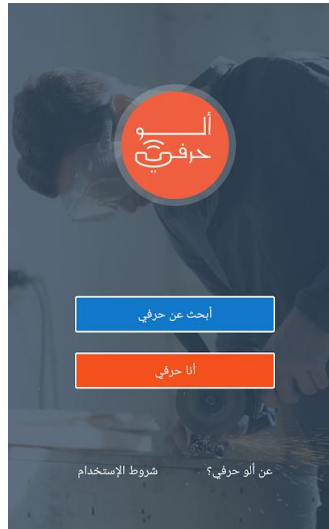
Figure 2.3.14: AlooHerafi Application.

2.3.15 Primo [18]

You can order industrial craftsmen from Primo (engraver - plumber - electrician - ceramics - and others).You will choose the craftsman yourself from a group of industrialists and call and interview them.Every craftsman owns a page that contains his picture, data, and pictures of some of his works, and others evaluate him in terms of (commitment to deadlines - proficiency in the craft - behavior and discipline); Look Figure (2.3.15).

Figure 2.3.15: Primo Application.

2.3.16 OyeBusy [19]

One of the best Home Services and Maintenance platforms to get all your basic needs and local Home Services at your doorstep. OyeBusy is one of the fastest-growing companies that has proved to be the best app in a very short period of time; Check Figure (2.3.16).
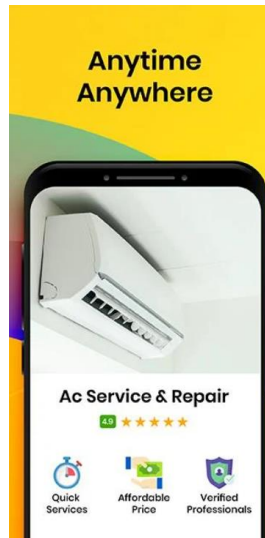
Figure 2.3.16: OyeBusy Application.

2.3.17 Seyanah-UAE [20]

For Our Customers:

1. User has the ability of signing up as Free/Premium user each has a special offer and plan.
2. User can request his own and desired order at any time.

For Freelancers:

He can register with his own profession (Carpenter, Plumber) Thus he will receive all businesses that matches with his registered category; Look at Figure (2.3.17).
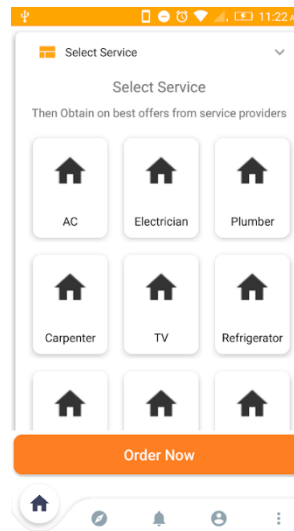
Figure 2.3.17: Seyanah-UAE Application.

2.3.18 Kaodim [21]

On the Kaodim app, users can easily access professional services like home renovation, office cleaning, logistics, air condition services, moving, plumbing, electrical and wiring, event catering, house cleaning, health & fitness, and many more.

To book a service, simply select the service you need, key in the required information, and submit your request. Hiring the right service provider has never been easier; Check Figure (2.3.18).
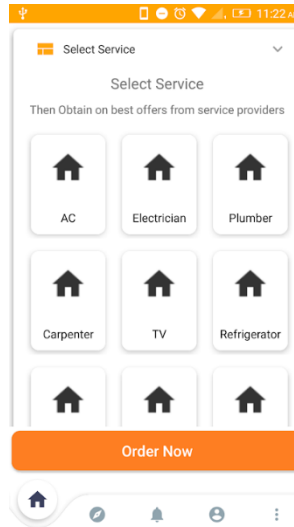
Figure 2.3.18: Kaodim Application.

2.3.19 ServiesHero [22]

Hire the best helpers for your tasks on ServiesHero. We've got Part-time Cleaners, Handyman Services, Air condition technicians, disinfection agents and more. With our fair and transparent pricing, you know you'll always get a good deal. You can book securely and pay via the mobile app; Check out Figure (2.3.19).
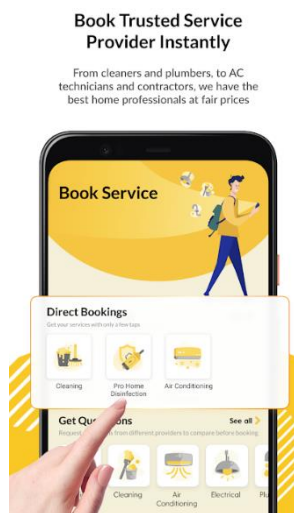
Figure 2.3.19: ServiesHero Application.

2.4 Comprehensives Study

Comprehensive Study combines every question from every reference on your bibliography into one study session. ... The main purpose of Comprehensive Study is to review what you have studied from the references on your bibliography, without having to click on them individually.

Apps	Registration & Sign in (Employee/User)	Easy to use	Diversity of Industrial occupations	conditions of the service	GPS
Maharah	Not Exist / Exist	Easy	Exist	Not Exist	Exist
Syaanh.com	Not Exist / Not Exist	Easy	Exist	Not Exist	Exist
Services	Not Exist / Exist	Normal	Exist	Not Exist	Exist
Sendan	Not Exist / Exist	Normal	Exist	Not Exist	Exist
MyHome	Not Exist / Not Exist	Easy	Exist	Not Exist	Not Exist
Online Maintenance	Not Exist / Exist	Hard	Not Exist	Not Exist	Not Exist
Home Maintenance Guide	Not Exist / Not Exist	Normal	Exist	Not Exist	Exist
Fanni	Not Exist / Exist	Hard	Exist	Not Exist	Not Exist
Siyanatech	Not Exist / Not Exist	Normal	Not Exist	Not Exist	Exist
Aoun	Not Exist / Exist	Normal	Not Exist	Not Exist	Not Exist
Rightman	Not Exist / Exist	Easy	Exist	Not Exist	Exist
Aryan	Not Exist / Exist	Easy	Exist	Not Exist	Exist
UrbanFix	Not Exist / Exist	Easy	Exist	Not Exist	Exist
AlooHerafi	Not Exist / Exist	Easy	Exist	Not Exist	Exist
Primo	Not Exist / Exist	Easy	Exist	Not Exist	Exist

OyeBusy	Not Exist / Exist	Easy	Exist	Not Exist	Exist
Seyanah-UAE	Not Exist / Exist	Easy	Exist	Not Exist	Exist
Kaodim	Not Exist / Exist	Easy	Exist	Not Exist	Exist
ServiesHero	Not Exist / Exist	Easy	Exist	Not Exist	Exist

Table 2.3.1: Comprehensives Study about Related Application.

2.5 Summary

It became clear from the previous table that most of the applications specialized in providing this type of services were limited to some services and features, in contrast to what our application will provide, which will provide various forms of services, in addition to many advantages (such as GPS) that will facilitate access to individuals and owners of institutions and facilities.

Chapter Three
PROJECT METHODOLOGY

3.1 Introduction

The purpose of this study is to plan and test the implementation of I-Fix. To accomplish the previously stated aims, this chapter sets up a research approach. Besides, as described in Chapter One, checking and validating the proposed strategy as well as evaluating the efficiency of the I-Fix application are essential tasks to be accomplished. It takes a clear approach to attain these aims, and this is the focal point of this chapter. This thesis uses the Architecture Analysis Approach (DRM) for this reason and implements its key phases according to the phenomenon of this research. To present the intent of the chapter.

Reforms are one of the most burdensome matters on individuals, hence the need to provide individuals with an application that helps them facilitate access to industry professionals to smoothly complete the maintenance process that saves them time and effort, in terms of the time required to search for competent industrial professionals for existing maintenance work. Without falling into the usual mistakes that many individuals face, represented in fraud, perhaps, and reducing the efficiency and quality of maintenance, in addition to reducing the effort exerted in transferring these faults to the owners of industrial professions who are more deserving of efficiency to perform this task.

Through our application, we will meet their needs when searching for an application that provides them with many features, which reduces the burden on them, such as a list showing them the many types of industrial occupations that they can access, in addition to a list containing all the professionals who work in this field (employees) and include All the experiences of these employees through an explanatory description of what they can do, so that it is easy for individuals to choose the most appropriate employee to do the maintenance of the existing Issues, and on the same

town. Or the employees, this map will determine the location of the individuals to facilitate the process of accessing it.

3.2 Gantt Chart

Gantt chart, which is commonly used in project management, is a type of bar chart that shows the project schedule; Gantt charts show start and end dates for goals and summarize project components; To the left of the diagram there is a list of activities and along the top, there is a table corresponding to the list of activities; Each activity is represented by a bar so that the position and length of the bar reflect the beginning, duration, and end of the activity; As shown in Figure (3.2).

This graph helps us remember the following:

- Start and end times for each stage.
- What are the different activities that we want?
- Expected time to complete a specific task; where activities or tasks are mixed with similar tasks.
- Time from start to finish.

Figure 3.2: Gantt Chart of the System.

3.2.1 Research Approach

The key goal of this research is to establish an I-Fix content positioning and eviction policy to optimize the overall caching efficiency in terms of bandwidth and memory use. While this is a daunting challenge to map the current caching schemes to the new one leading to an effective and optimal solution, these criteria, however, are consistent with the concept of design research as suggested by Blessing [23], where' design research incorporates the production of understanding and protocol.' These features complement each other to deliver an effective and productive.

According to Blessing [23], to achieve satisfactory findings in both theoretical and functional terms, architecture analysis must be scientific, so it requires a special approach with its unique characteristics. He suggested a strategy called Concept Analysis Methodology for this purpose (Design Research Methodology). DRM aims to make design analysis more accurate and economical, so it has been embraced for this thesis to be carried out. In the following four steps, DRM can be classified:

- Research Clarification (RC).
- Descriptive Study-I (DS-I).
- Prescriptive Study (PS).
- Descriptive Study-II (DS-II).

In the following pages, a short overview of DRM phases from the viewpoint of this research field is provided. Figure 3.2.1 displays the DRM system where the connections between the phases of DRM, the methods used at each stage, and the key deliverables are shown [24]. Light arrows between the phases represent the main flow of the operation, while the bold arrows to/from each step show methods used and deliverables of that individual phase; Check out Figure (3.2.1).
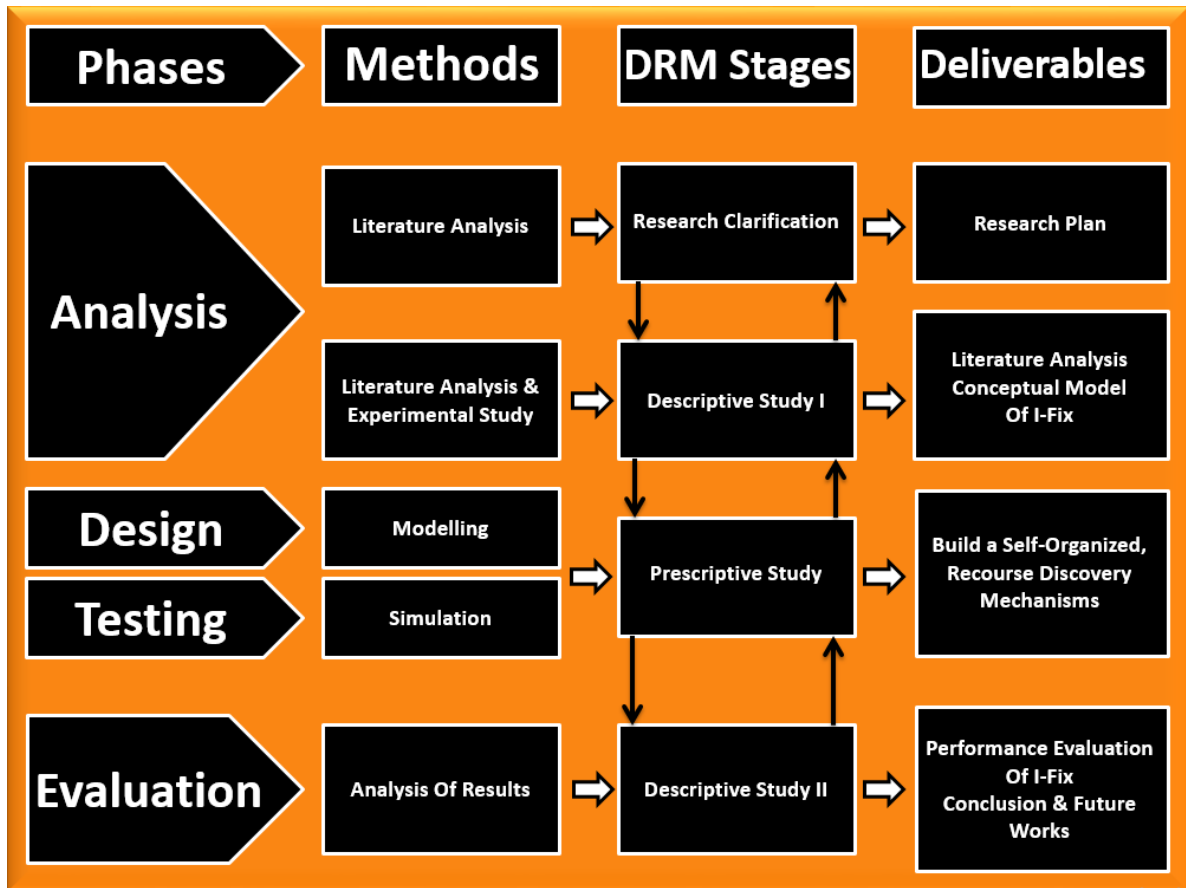
Figure 3.2.1: DRM Framework.

3.2.2 Research Clarification (RC)

The first stage of DRM is Research Confirmation (RC), which is used to gain basic information about the overall research program. As seen in Figure (3.2.2), RC requires six iterative steps.

In general, the RC stage deliverables are the overall study strategy consisting of the following points:

- The basis of research and its motivation.
- Research questions and research problems.
- Important areas to be addressed.
- Research approach.
- Area of contribution and deliverables.
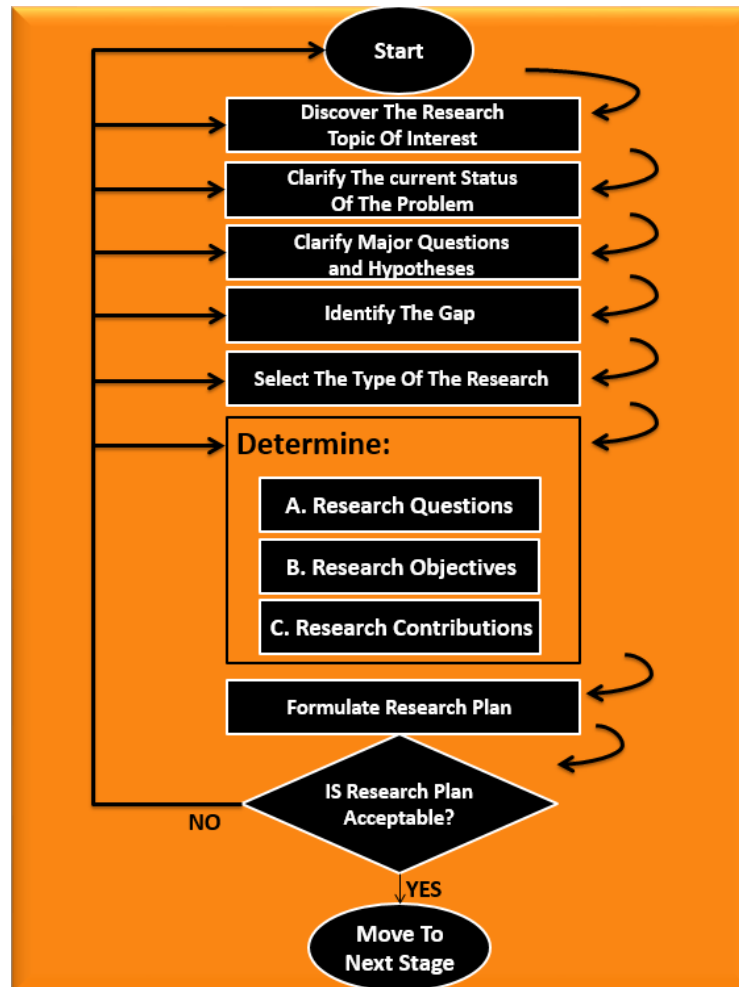
Figure 3.2.2: Research Clarification (RC).

3.2.3 Descriptive Study-I (DS-I)

DS-I is the second level of DRM, which is used to gain a deep understanding of the present situation. This stage entails a critical analysis of the research field's current work as well as observational studies. A thorough analysis of the latest ideas was addressed during the course of this study. To gain a deep understanding of the current systems, several observational experiments were also objectively examined. As shown in Figure 3.3.3, the DS-I involves five steps with several iterations, where each step aims to improve comprehension and can lead to more scientific experiments or

literature reviews that lead to the refinement and upgrading of performance and conceptual models; Look at (3.2.3).

The deliverables of DS-I stage are:

- Conducting a systematic review in Ehsan on cache control approaches.
- In order to understand the power and shortcomings of the algorithms, conduct an inclusive analysis on the algorithms in I-Fix and perform an experimental calculation. Also, to describe the study problems that should be taken into account during the review of I-Fix in I-Fix.

Figure 3.2.3: Descriptive Study-I (DS-I).

3.2.4 Prescriptive Study (PS)

The key stage in DRM is the Prescriptive Analysis (PS), as it involves the nature of the mechanisms proposed. Network modeling and simulation methods suggested by Guizani et al [25] have been pursued for the purposes of this study; Check out Figure (3.2.4).
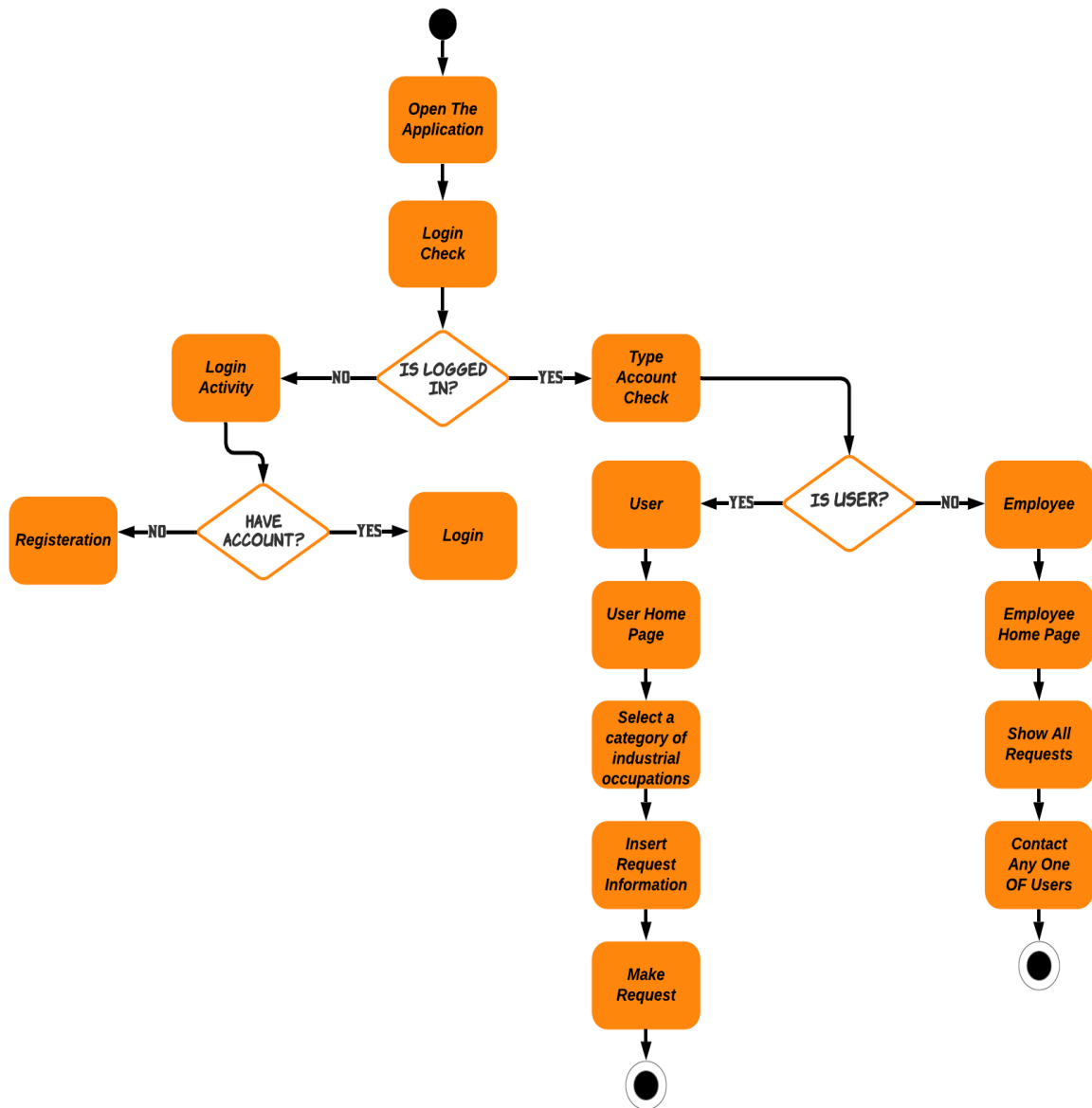
Figure 3.2.4: System Flow Chart.

3.2.5 Descriptive Study-II (DS-II)

This stage focuses on the assessment of the procedures and procedure designed. In assessing any analysis, performance assessment is the imperative step.

3.2.6 Verification and Validation

Validation and verification are characterized as a method to validate the data's authenticity and internal integrity and to verify that it embodies real-world entities that are relevant to its intended purpose or number of objectives. Validation is the process, according to the modeling and simulation community, to assess the extent to which a concept, simulation, or mixture of prototype and simulation and its related data correctly reflects the real world from the point of view of its intended application.

While verification is the process of figuring out that a prototype, simulation, or mixture of prototype and simulation and its relevant data correctly represents the conceptual model and its explanation of the creator. Therefore, it is a step to ensure that the model implementations have correct assumptions. To ensure that the computational model is an accurate representation of the operating model, this means testing the simulation software.

3.3 Analysis of the new system

It is a study to determine the goals and actions effectively. It is also a problem-solving technology that divides the system into parts to examine the success of these parts and interact to achieve the desired goal. System analysis relates to requirements analysis, Figure (3.3).
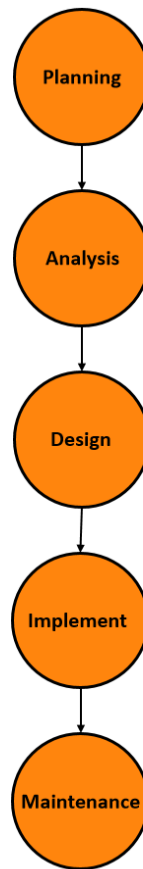
Figure 3.3: System Development Life Cycle (SDLC).

3.3.1 User requirements

3.3.1.1 Functional requirements

Actors in the application of I-Fix:

- **Employee:**
    1. The Employee shall be able to create an account with his personal information.
    2. The Employee shall be able to login into the application by Email, password.
    3. The Employee can set a profile picture.

4. The Employee shall be able to display requests & the users who made them.

5. The Employee shall be able to the possibility of direct contact with the user, in addition to showing his location on the map.

- **User:**
    1. The User shall be able to create an account with his personal information.
    2. The User shall be able to login into the application by Email, password.
    3. The User can set a profile picture.
    4. The User shall be able to select the category of Industrial occupations he wants.
    5. The User shall be able to write a description about the request.
    6. The User shall be able to put his location on the map.
    7. The User shall be able to select the Employee.

3.3.1.2 Non-functional requirements

- **Availability:** The application's availability success rate shall be 100%.
  The application shall be available 24h/7d.
- **Performance:** The application shall take an advantage of concurrency which makes the application run faster.
- **Security:** The application shall be password protected.
  The cloud shall be able to authenticate the clients by using the authentication server.

- **Modifiability:** The application's components shall be able to be changed without breaking the whole application.
- **Usability:** The application's user-interface shall be intuitive.
  The application's user-interface shall use easy to read fonts.
- **Scalability:** The application shall be able to enlarge in features and handles increasing amount of workload.
  The application shall be able to enlarge in features in the upcoming future.

3.3.2 System Requirements

System requirements are the configuration that a system must-have for a hardware or software application to run smoothly and efficiently. Failure to meet these requirements can result in installation problems or performance problems. The former may prevent a device or application from getting installed, whereas the latter may cause a product to malfunction or perform below expectation or even to hang or crash.

- **Hardware Requirements**

  The most common set of requirements defined by any operating system or software application is the physical computer resources, also known as hardware, it's shown in Table (3.3.2.1).

Specification	Recommended Requirements
Computer Type	Dell
Computer CPU	Intel Pentium, 3^{Rd} generation
Computer RAM	2GB, External 4GB
Computer Storage	Internal 480GB
User Device	Android OS, Version 5.0 or up

Table 3.3.2.1: Hardware Requirements.

- **Software Requirements**

    The software requirements are a description of the features and functionalities of the target system. Requirements convey the expectations of users from the software product. The requirements can be obvious or hidden, known or unknown, expected or unexpected from a client's point of view. Software requirements are defined as follows: The conditions or capabilities the user needs to solve a problem or achieve a specific goal.

    Conditions or capabilities of the software to make it compatible with the capabilities of the system to verify the contract and the characteristics agreed upon between the developer and the user, and it's shown in Table (3.3.2.2).

Specification	Recommended Requirements
Operating System	Windows 10
Target Program	Android Studio
Program Language	Java

Table 3.3.2.2: Software Requirements.

3.3.3 Domain Requirements

It is important because we really need a system to help people search for Industrial professionals, to reduce the effort and time they spend searching, and this system provides users with an integrated environment that includes all Industrial professionals to reach an easy and flexible Fixing process that differs from its predecessors.

By:

1. Choosing the categories of Industrial occupations.
2. Determine the location of the employees and the current location of the users using maps.

As the application will achieve more accurate and efficient services if the user can handle the system efficiently.

3.4 Summary

The approach to ensuring the achievement of research goals has been comprehensively clarified in this chapter. Designing I-Fix is the subject of the study. Here, four key research practices were illustrated, in line with DRM. The first activity is the Study Clarification (RC) stage, which provides techniques to support the preliminary stage of this research. The purpose of RC is to categorize and solve a research issue, research questions, and priorities of both academic and realistic interest.

The second phase is the Informative Study-I (DS-I), which addresses measures to gain sufficient awareness of the current condition. This stage entails both developing a reference model and proposing a hypothetical model. The Prescriptive Analysis (PS) is the third stage that focuses on strategies introduced in the design of the cache management strategy proposed. The last stage that addresses the assessment of the planned Ehsan is DS-II.

Chapter Four
Software Design and Implementation

4.1 Introduction:

This chapter will discuss in detail the design and implementation phases of the proposed project, including Android activities, interactions between activities, and database design, in addition to explaining the application life cycle, activity flow, system actors, and their responsibilities.

4.2 Overall System:

System components fall into two categories: hardware components and software components; Check out Figure (4.2).

The hardware component includes:

- **Backend servers:** They are used to store the databases that will be shared between users, authenticate users, and connect users, and the administration system is built on these servers.

- **Mobile devices:** Users and Employees can access the backend of the system through an API and take advantage of its features from their mobile devices, and the mobile device must run on Android OS 5.0 or later.

The program components includes:

- **Database:** The system works on a Firebase database where the entities are not directly related to each other, but rather the structure depends on documents, as the entities can be merged and have different structures without dismantling the system. This can boost system performance because the database requires one query most of the time without joining the tables.

- **Web server:** The system runs on the infrastructure of the google cloud platform (GCP) in short, this is critical and fits well with the needs of the system due to automatic scalability, as GCP automatically creates a new server in case the system increases users and balances the traffic between the server instances.

- **Android OS:** Android is the leading operating system in the market due to its popularity, ease of use, and the number of devices running on its basis, which gave the operating system the advantage of targeting the system instead of other operating systems, in addition to that it has a relatively easier learning curve.

The system consists of two possible user types. User types share many functions of the system, but each user type has its permissions and functions in particular.

These types of users are:

- **Users:** They can define the category and type of the industrial profession, put a detailed explanation of the request, as well as locate them and specify the worker they want.

- **Employees:** They can receive requests from users, communicate with them directly, and reach them through the site previously specified by users.

The figure below shows the activities for each user type, the abstract flow of the system, and how the components interact with each other.
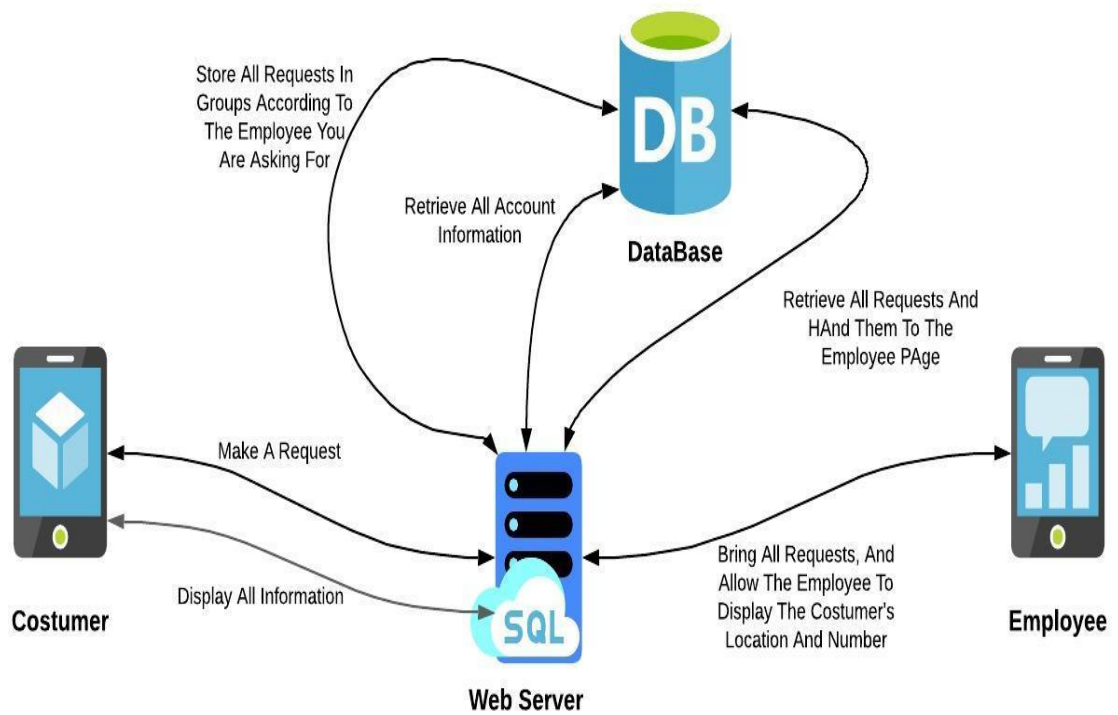
Figure 4.2: Overall System.

This was a summary of the system components, in the following sections, you can find a detailed description of each component and its functions, as well as a diagram that shows the life cycle of the system and the system flow in each step, including use case diagrams, sequence diagrams, class diagrams, database design, flow diagram and more.

4.3 Design Of Database

One of our goals was to build a robust and extensible database design to achieve our goal of building a resilient and maintainable project, thus, the database design follows a structure in which the data is normalized to achieve minimal redundancy. Figure (4.3) shows the ERD database:
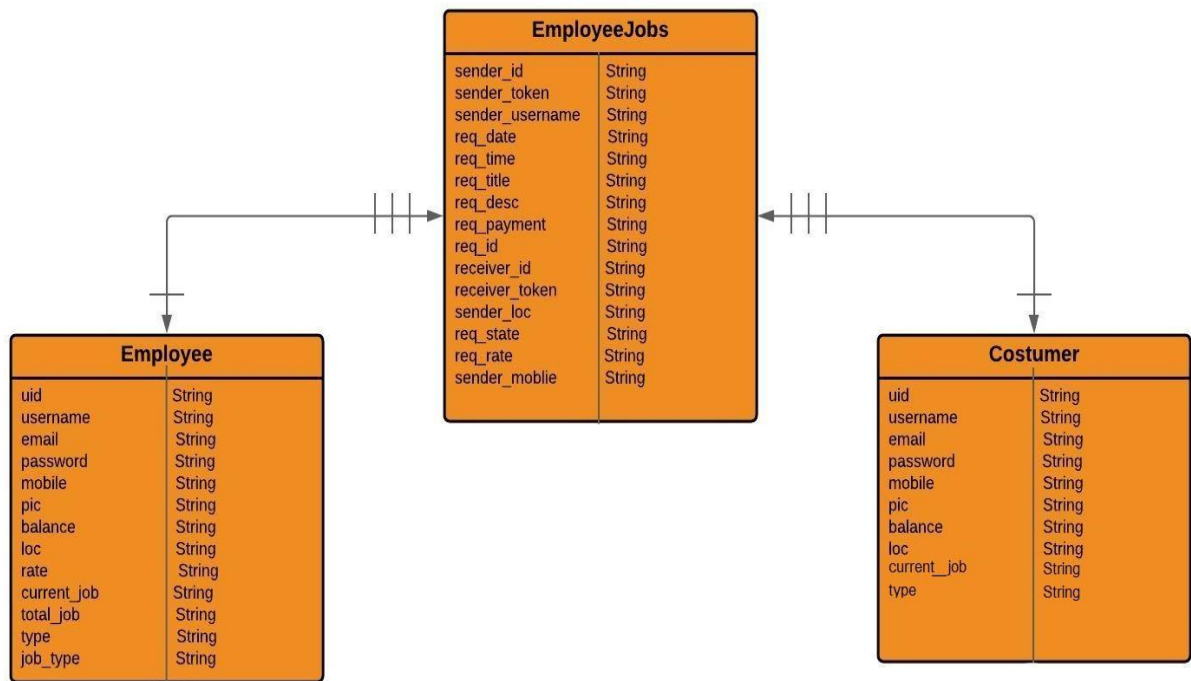
Figure 4.3: ERD database.

4.4 Use Case Diagrams

Use cases are a simple and effective way to express the functional requirements of a system. It describes how actors can use the system and what the system can do for them. The system has two types for end-users: Employees (Industrial professionals) and users (Individuals and owners of establishments and establishments); Relationships between end-users as well as use cases are illustrated in the figures below:

Figure 4.4.1: Costumer Use Case Diagram.

Figure 4.4.2: Employee Use Case Diagram.

- Use Case Specification :

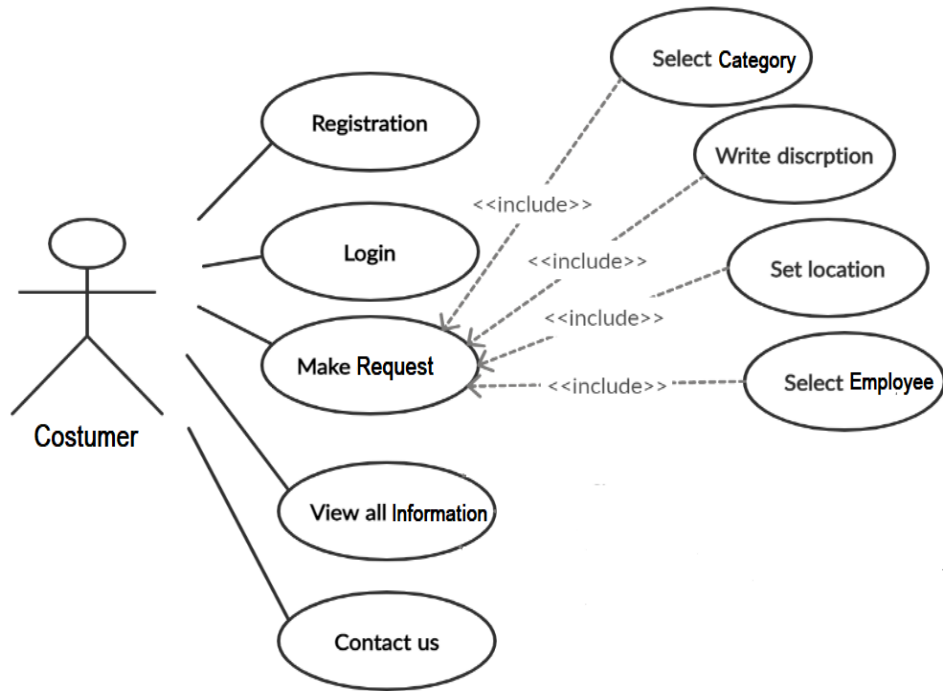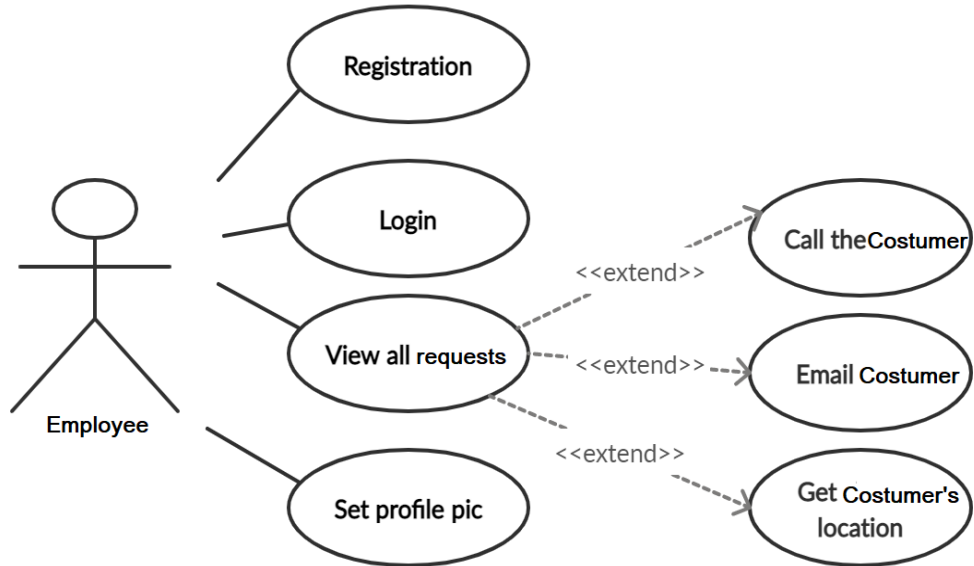| Use Case:	Create Account.
Actor(s):	Users.
Summary Description:	Allows users to create account on the system.
Pre-condition:	1-The user must have valid and effective mobile phone number. 2- The user must have good internet connection.
Post-Conditions:	1-The user already has a registered account. 2-User's data saved in the database.
Alternative Paths:	1-The user leaves at least one field empty. 2-The user typing a non-valid character in one or more fields. 3- The user chooses a password that is less than 6 characters.
Basis Path:	1-The user must enter his personal information. 2-The user should choose a memorable password.

Table 4.4.1: Use Case For Create Account.

Use Case:	Login.
Actor(s):	User.
Summary Description:	Allows users to login the system.
Pre-condition:	1. The user has a registered account. 2. The user must have good internet connection.
Post-Conditions:	The client application will be authorized to send and receive back-end calls.
Alternative Paths:	1. The user leaves at least one field empty. 2. The user enters an incorrect password. 3. The user enters an incorrect username. 4. The user did not submit his inputs by clicking the login button. 5. The application can't communicate with the back-end. 6. The application connection gets interrupted while processing the login request.
Basis Path:	1. The user enters his login credentials. 2. The user submits and attempts to log on by clicking the login button.

Table 4.4.2: Use Case For Login.

Use Case:	Make Request.
Actor(s):	User (Costumer).
Summary Description:	Costumers are allowed to choose the request category by pressing on it from the list.
Pre-condition:	1. The user must be logged into the application.
	2. The user must have good internet connection.
Post-Conditions:	A new screen will appear to enter all request information.
Alternative Paths:	1. The user didn't select the items from the selected category.
	2. The user didn't fill in the description.
	3. The user didn't put his location or he couldn't locate it accurately.
	4. The user didn't choose one of the employees.
	5. The user didn't click on the button (Make Request).
Basis Path:	The user must select the category.

Table 4.4.3: Use Case For Make Request (Costumer).

Use Case:	Show All Requests.
Actor(s):	User (Employee).
Summary Description:	Employees Are allowed to show all requests.
Pre-condition:	1. The Employee must be logged into the application.
	2. The user must have good internet connection.
Post-Conditions:	A list of all requests made to this employee will appear.
Alternative Paths:	None.
Basis Path:	The Employee must have at least one request process or more.

Table 4.4.4: Use Case For Show All Requests (Employee).

4.5 Class Diagram

A class diagram is a type of static topology diagram that explains the structure of a system by showing the classes of a system, their properties, their processes, and the relationships between objects. The figure below represents the relationship between the classes and gives an overview of how they work together; As shown in Figure (4.5):

Employee Jobs

+sender_id (String)
+sender_token (String)
+sender_username (String)
+req_date (String)
+req_time (String)
+req_title (String)
+req_desc (String)
+req_payment (String)
+req_id (String)
+receiver_id (String)
+receiver_token (String)
+sender_loc (String)
+req_state (String)
+req_rate (String)
+sende_mobile (String)

Employee

+uid (String)
+username (String)
+email (String)
+password (String)
+mobile (String)
+pic (String)
+balance (String)
+loc (String)
+rate (String)
+current_job (String)
+total_job (String)
+type (String)
+job_type (String)

Costumer

+uid (String)
+username (String)
+email (String)
+password (String)
+mobile (String)
+pic (String)
+balance (String)
+loc (String)
+current_job (String)
+type (String)

1...*   *...1

1...*   *...1

Figure 4.5: Class Diagram.

4.6 Sequence Diagram

The sequence diagram will help us explain what happens under the hood after the user interacts with the app at each point.

4.6.1 Registration Sequence Diagram:

In the registration process, the user provides his personal information which includes the full name, password, mobile phone number and location, and this information will be sent to the back end and used to create the new account that will be linked to this after we store this data and create the account, we will notify the user whether The account has been created successfully, or something went wrong during the registration process such as an incorrect entry; Look Figure (4.6.1).
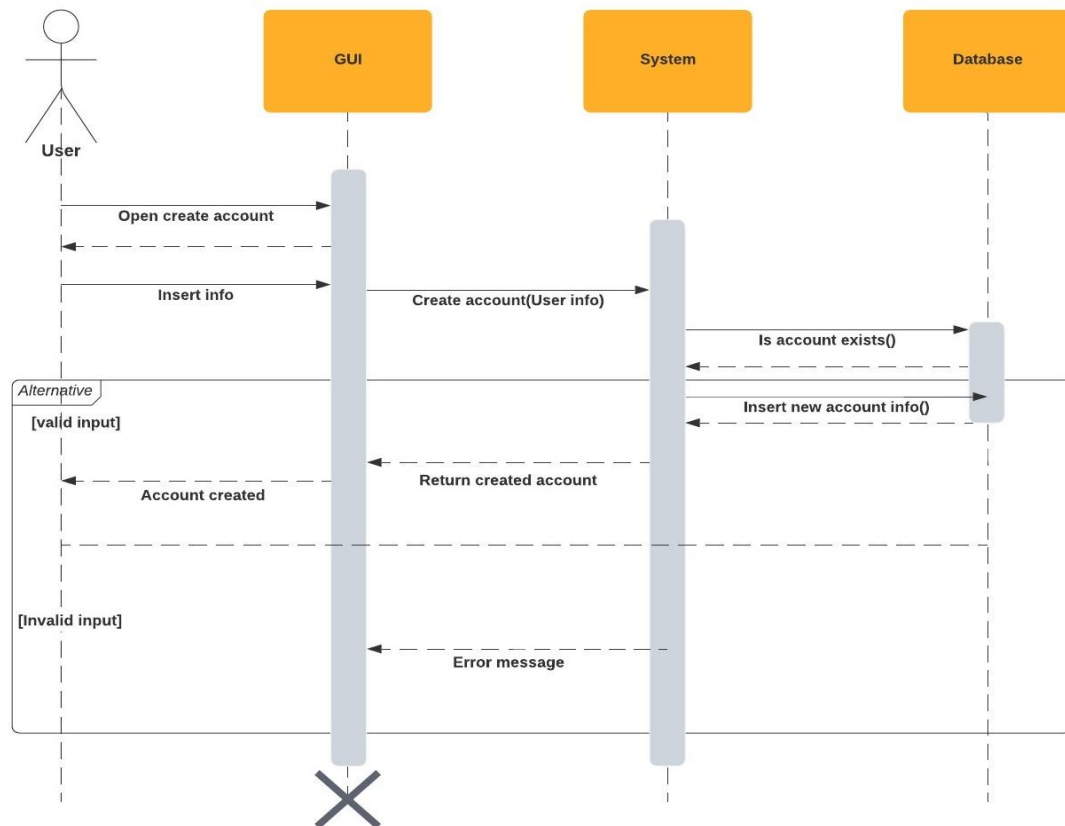
Figure 4.6.1: Create Account Sequence Diagram.

4.6.2 Login Sequence Diagram:

The login process is fairly simple, the user enters his credentials, and the system will check whether the entered credentials are in the database, otherwise, it will inform the user if the entered credentials are wrong; Look Figure (4.6.2).
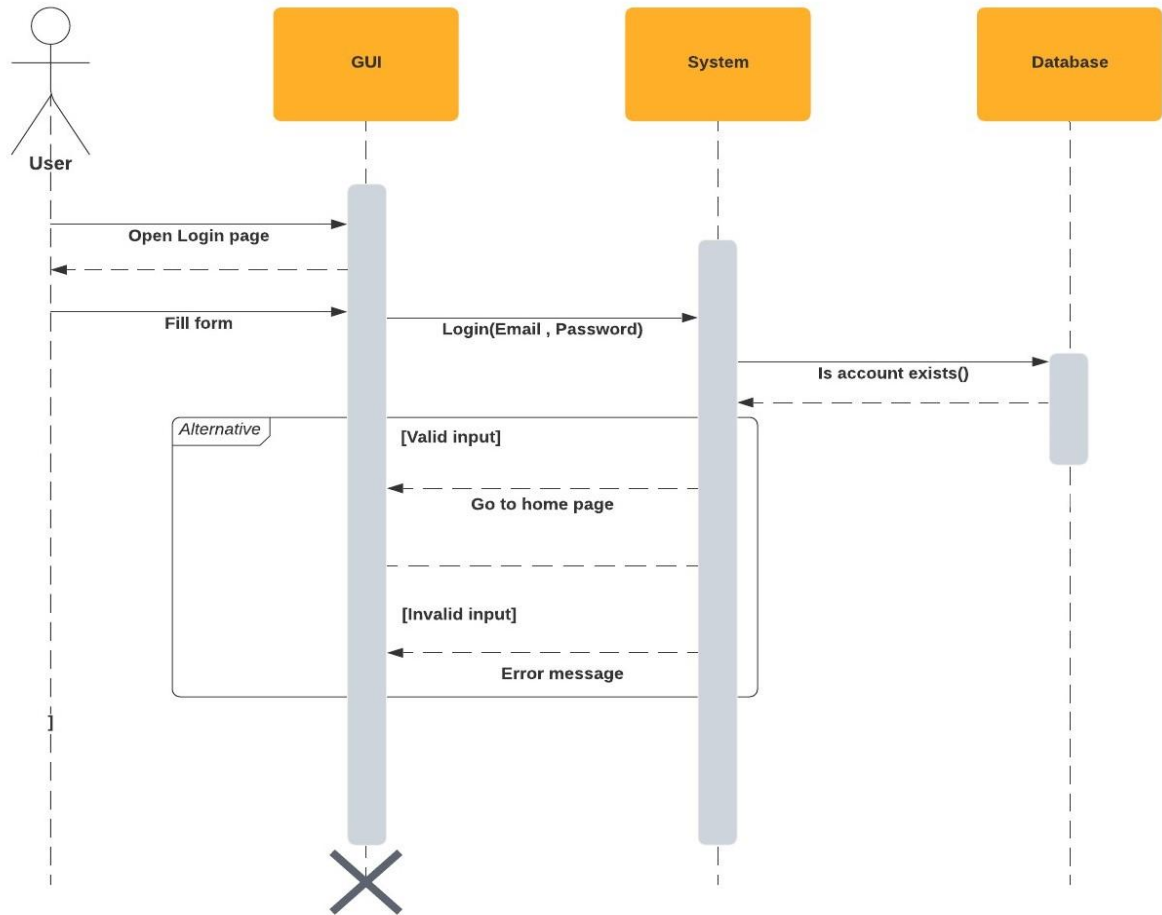
Figure 4.6.2: Login Sequence Diagram.

4.6.3 Home Page Costumer Sequence Diagram:

The costumer determines the required category, then writes an explanation of the request, then determines his current location on the map, and finally chooses the employee he wants; Look Figure (4.6.3).
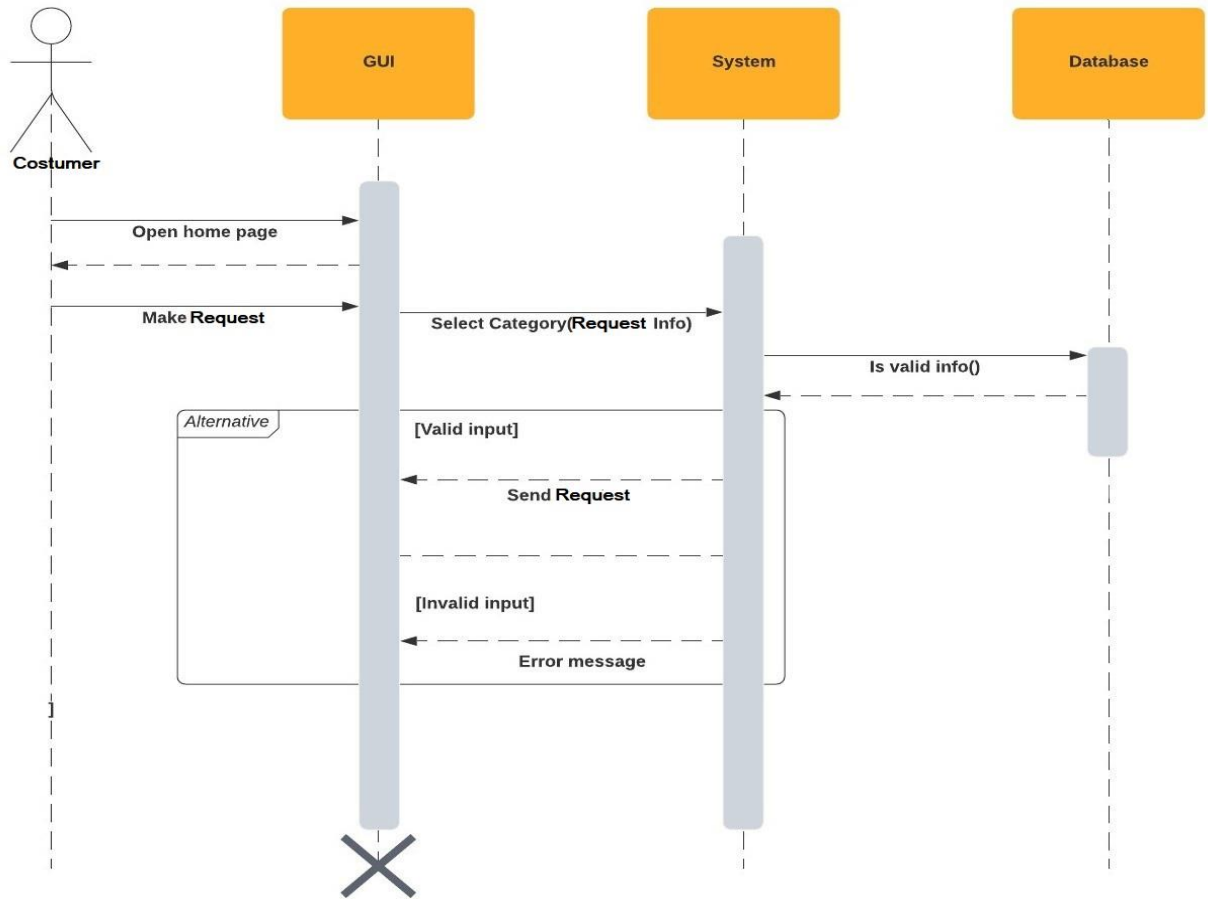
Figure 4.6.3: Home page Costumer Sequence Diagram.

4.6.4 Home Page Employee Sequence Diagram:

The Employees page displays all the requests made to this Employee exclusively from other Employees, so that the Employee is allowed to communicate directly with any of the costumers, either by phone or e-mail, with the ability to see the current location of the costumer on the map. It is worth noting that the Employee can reject any request by removing it from the list of requests; Look Figure (4.6.4).
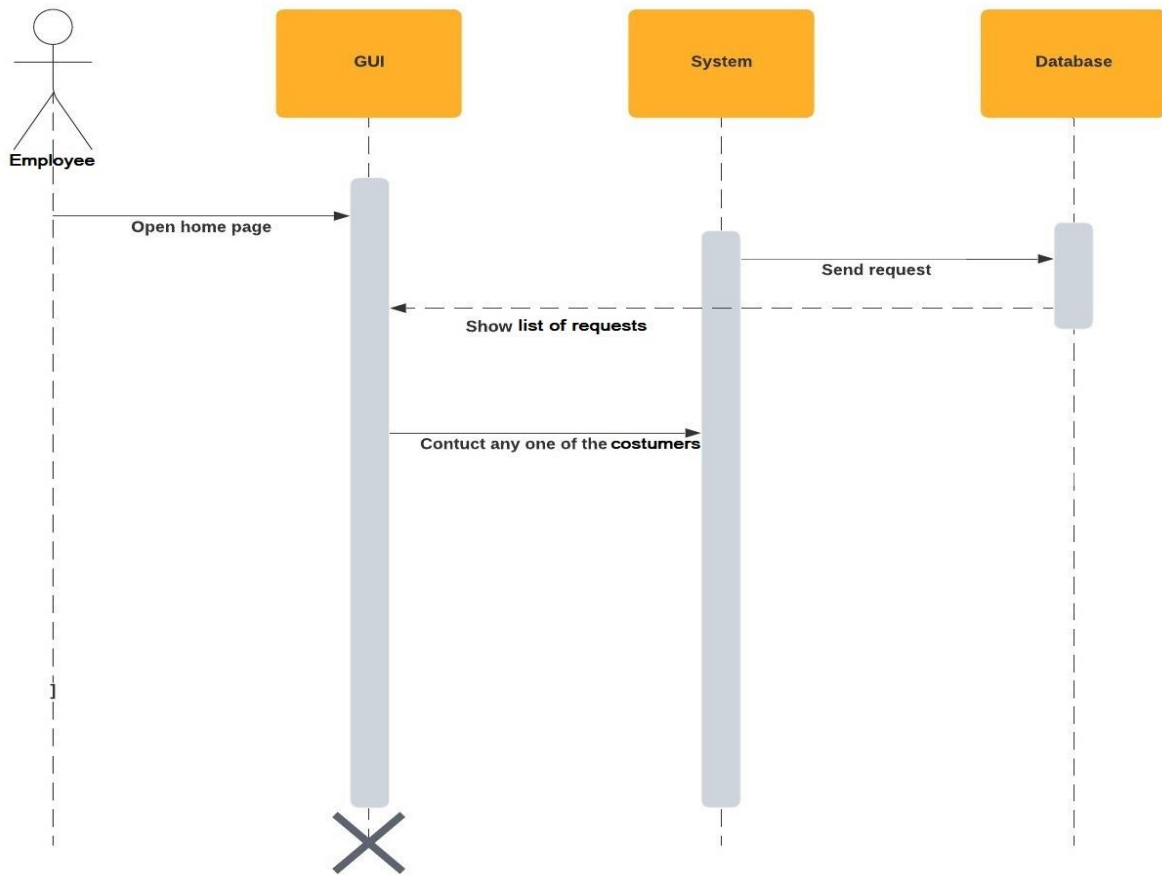
Figure 4.6.4: Home page Employee Sequence Diagram.

4.7 Flow Chart Diagram

Activity diagram is used to show overall system behavior, and to describe the flow from one activity to another. This section will discuss in detail how activities interact with each other during the application life cycle.

4.7.1 Splash Screen Flow Chart Diagram

This is the login screen for the application, this screen is non-interactive and does not provide any data for the user, we use it to retrieve the necessary data in advance and download the user's status from the database to check whether he has logged in or not. When everything has loaded, the app automatically moves to the next screen; As shown in Figure (4.7.1):
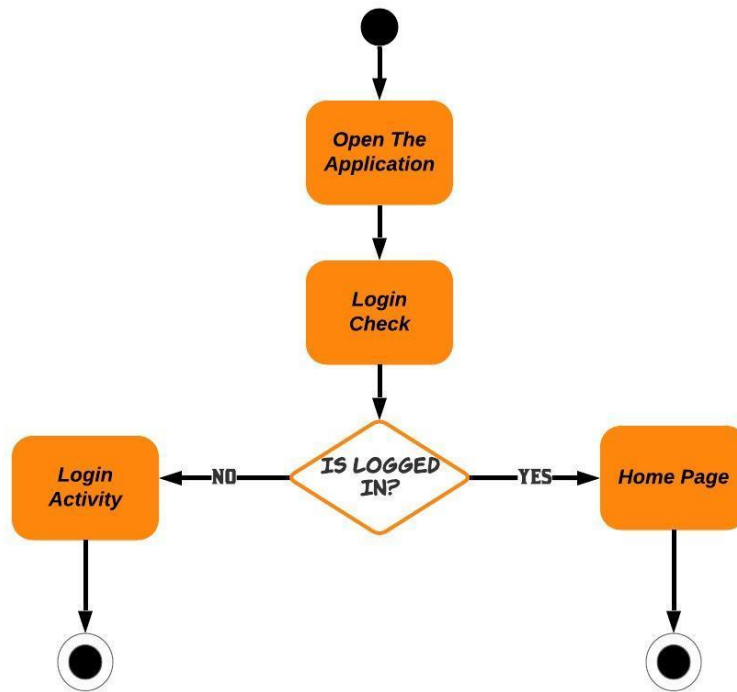
Figure 4.7.1: Splash Screen Flow Chart Diagram.

4.7.2 Create Account Flow Chart Diagram

When the user launches the application for the first time, he must create an account and provide his personal information which includes the full name, password, mobile phone number, and location. If this data is acceptable and not identical to an account that was previously created, the account will be successfully created and its data saved in the database, but if there is an error, the user will be returned to the account creation page after showing an error message when entering the data; As shown in Figure (4.7.2):
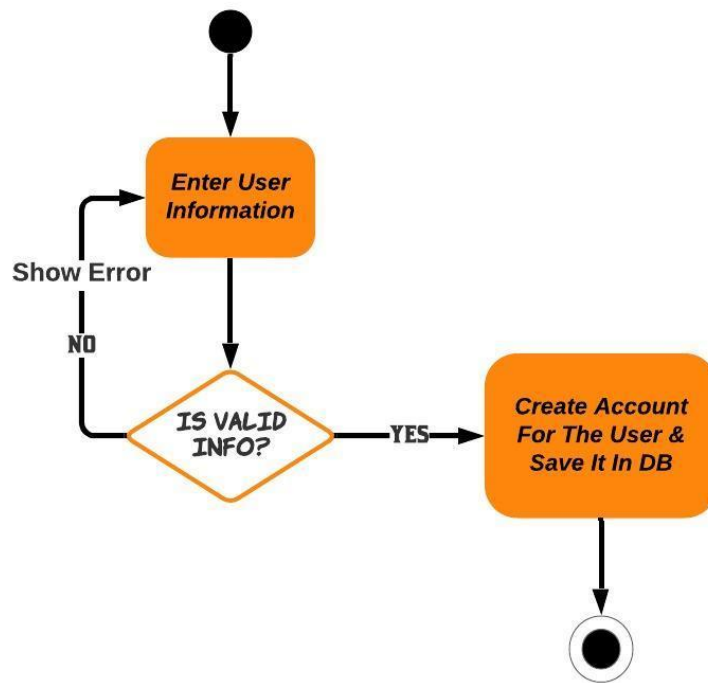
Figure 4.7.2: Create Account Flow Chart Diagram.

4.7.3 Login Flow Chart Diagram

This activity is responsible for authorizing application users by entering their credentials and sending them securely to our backend to match it against the saved credentials, if the user does not already have an account, they can create a new one; As shown in Figure (4.7.3):

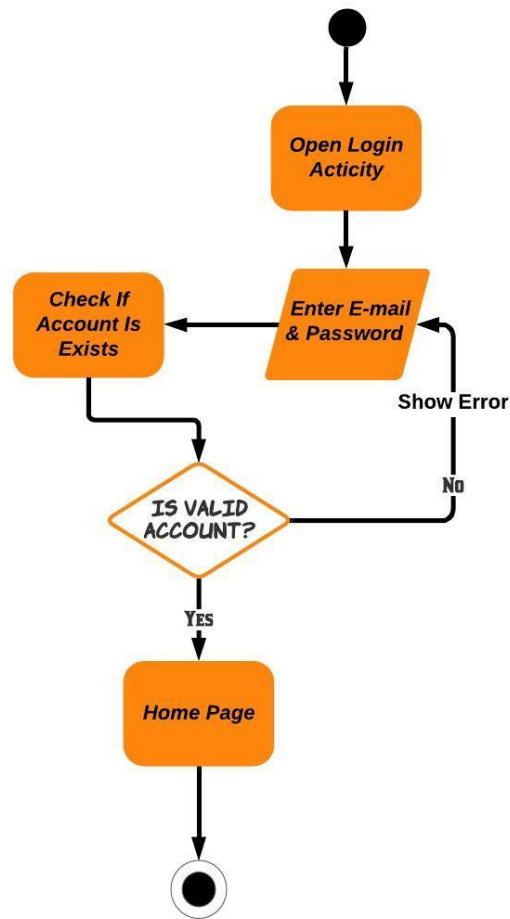Figure 4.7.3: Login Flow Chart Diagram.

4.7.4 Home Page Costumer Flow Chart Diagram

This activity is responsible for allowing application users to submit requests by specifying the category of the Industrial occupations to be taken to the next page to fill in the Request information, And save the data in the database, otherwise, the application will show the error to the user; As shown in Figure (4.7.4):
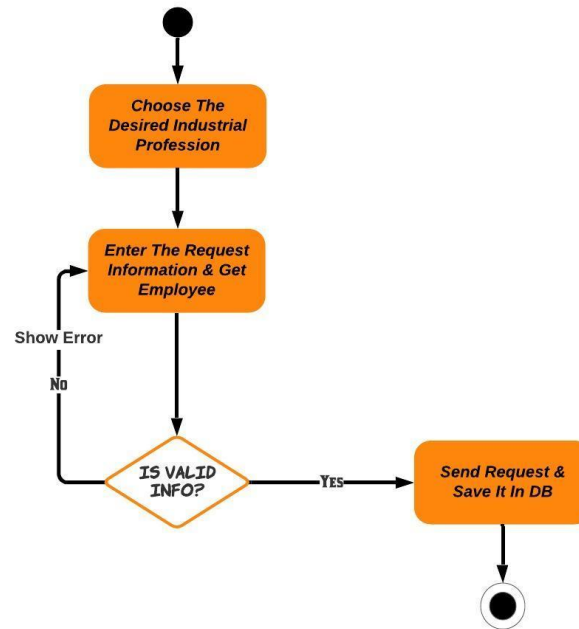
Figure 4.7.4: Home Page Costumer Flow Chart Diagram.

4.7.5 Home Page Employee Flow Chart Diagram

This activity is responsible for allowing application users (Employees) to view all requests made to them only; then the employee can directly contact the user by phone number and show his current location; As shown in Figure (4.7.5):

Figure 4.7.5: Home Page Employee Flow Chart Diagram.

4.8 Implementation

In this phase, we'll explain how the project will take shape, including building the actual project outcome, and how we participate programmatically in coding, and in developing graphic materials visually.

At the end of the implementation stage, the result is evaluated according to the list of requirements created in the definition stage.

The components used to implement the application:

The prototype of the tool is an Android app implemented with programmatic commands using Android Studio, which is Google's official integrated development environment (IDE) for Android.

This program is designed to develop android applications using the used Java programming language. Implementation includes the use of our code and interfaces.

When a new user enters the application, the user becomes inside the application and is authorized to use it. The portable user interface (MUI) is the graphic screen and is usually touch-sensitive on a mobile device, such as a smartphone or tablet, which allows the user to interact with the device's applications, features, contents, and functions.

The application is installed on the phone from the Google store for both (Users and Employees) and each of them has its user interface as that saves time and effort for each user of the application.

Chapter Five
Results and Discussion

5.1 Introduction

This chapter illustrates the results of the system developed and proposed by pictures from the actual application, Along with a comparison with the related applications.

5.2 Results

5.2.1 Expected Results

In this app, I was interested in developing an Android app that makes searching for Industrial professionals easier and faster. The main idea was to develop an app that is easy to use, efficient, and can be used at any time and without restrictions.

5.2.2 Actual Results

We created a database and tested the app to show actual results with users. We found that through the application, the user can find Industrial professionals in the application and communicate with them, in addition to that Industrial professionals will be able to view all user's requests and communicate with them.

5.2.2.1 Splash Screen

The splash screen appears when starting the application;
Check Figure (5.2.2.1).

Figure 5.2.2.1: Splash Screen.

5.2.2.2 Login Screen

An existing user can log in to their account by entering their e-mail address and their password; Check Figure (5.2.2.2).
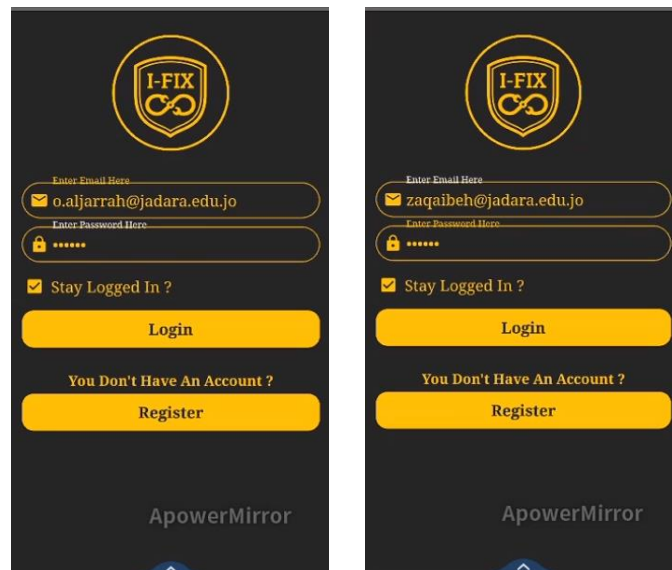

Figure 5.2.2.2: Login Screen.

5.2.2.3 Create Account Screen (Costumer)

        The account creation process depends on entering the full name, email, password, specifying the address, and phone number. After automatic verification of the entered information, the registration button is pressed to complete the process; Check Figure (5.2.2.3).

Figure 5.2.2.3: Create Account Screen (Costumer).

5.2.2.4 Create Account Screen (Employee)

        The account creation process depends on entering the employee's name, email, password, specifying the address, location on the map, and phone number. After automatic verification of the entered information, the registration button is pressed to complete the process; Check Figure (5.2.2.4).

Figure 5.2.2.4: Create Account Screen (Employee).

5.2.2.5 Home Page Screen (Costumer)

The user can choose one of the Industrial professionals in which he needs and then fill in the description, also, the Industrial professionals to which he will choose. After automatic verification of the entered information, press the "Accept" button to complete the process; Check Figure (5.2.2.5).
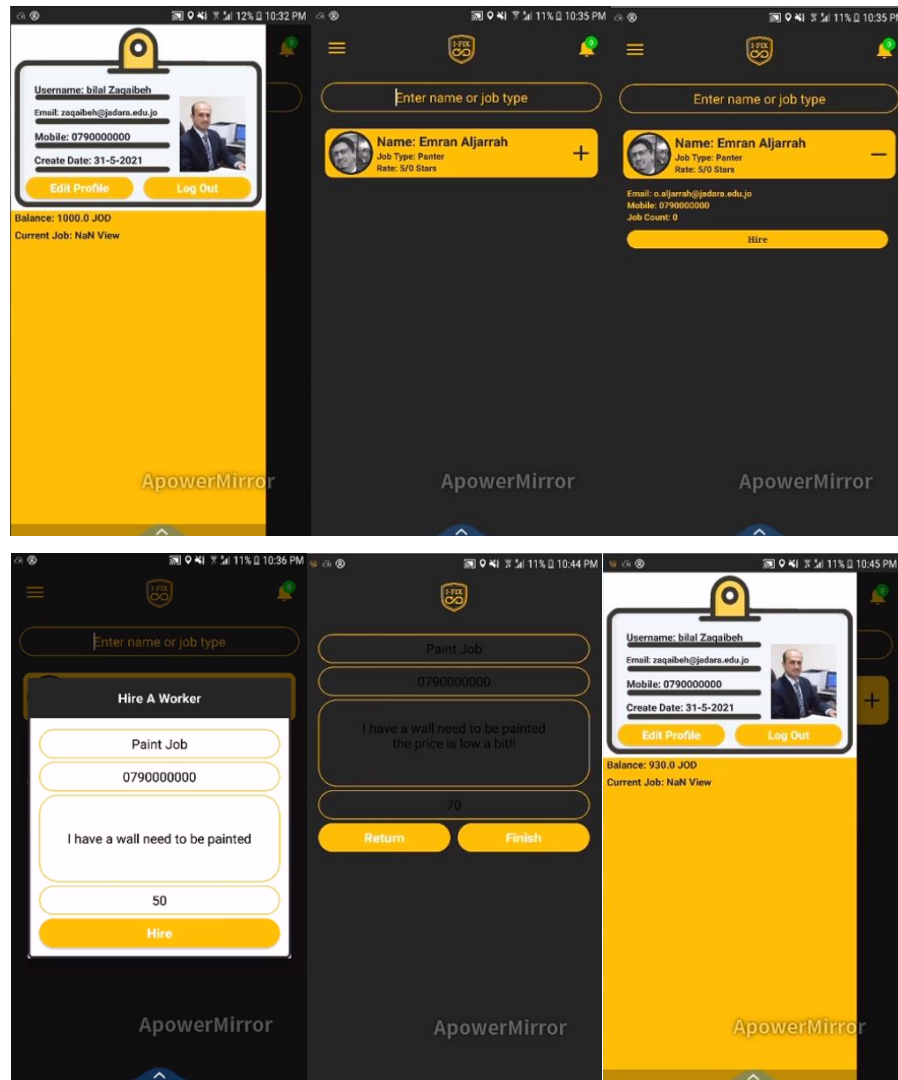
Figure 5.2.2.5: Home Page Screen (Costumer).

5.2.2.6 Home Page Screen (Employee)

This screen displays all user's requests and the user information, and the Industrial professionals can communicate with the users using the phone and display the users' location on the map; Check Figure (5.2.2.6).
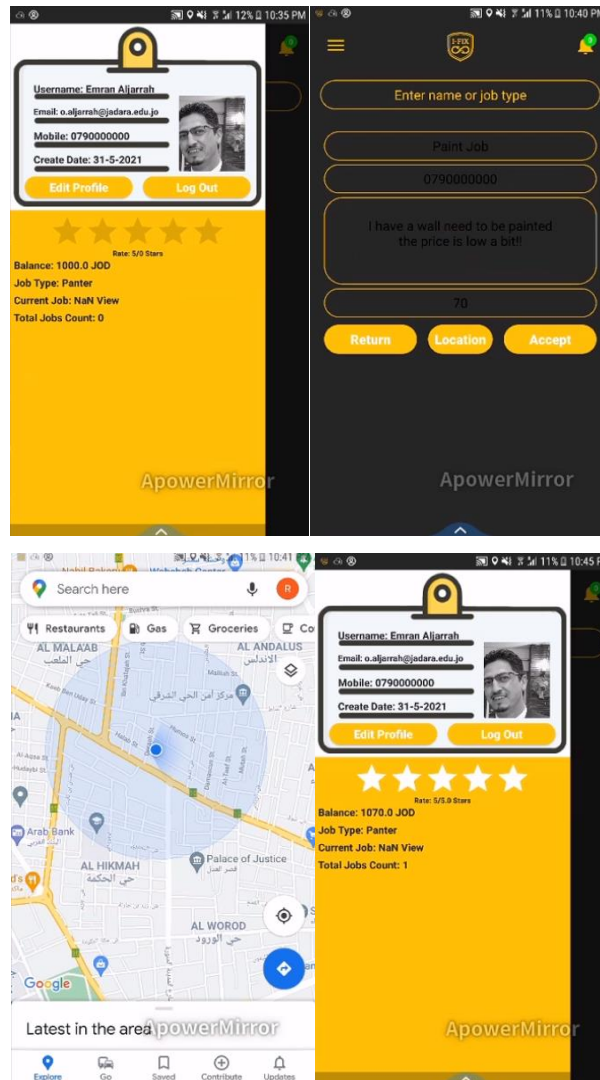
Figure 5.2.2.6: Home Page Screen (Employee).

5.2.2.7 Rate screen

After the user completes the process, this screen appears for evaluation purposes; Check Figure (5.2.2.7).
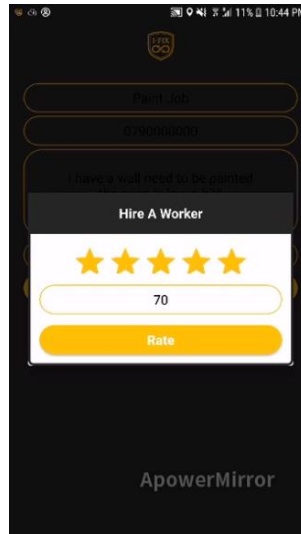
Figure 5.2.2.7: Rate Screen.

5.3 Discussion

Apps	Registration & Sign in (Employee/User)	Easy to use	Diversity of Industrial occupations	conditions of the service	GPS
Maharah	Not Exist / Exist	Easy	Exist	Not Exist	Exist
Syaanh.com	Not Exist / Not Exist	Easy	Exist	Not Exist	Exist
Services	Not Exist / Exist	Normal	Exist	Not Exist	Exist
Sendan	Not Exist / Exist	Normal	Exist	Not Exist	Exist
MyHome	Not Exist / Not Exist	Easy	Exist	Not Exist	Not Exist
Online Maintenance	Not Exist / Exist	Hard	Not Exist	Not Exist	Not Exist
Home Maintenance Guide	Not Exist / Not Exist	Normal	Exist	Not Exist	Exist
Fanni	Not Exist / Exist	Hard	Exist	Not Exist	Not Exist
Siyanatech	Not Exist / Not Exist	Normal	Not Exist	Not Exist	Exist
Aoun	Not Exist / Exist	Normal	Not Exist	Not Exist	Not Exist

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Rightman	Not Exist / Exist	Easy	Exist	Not Exist	Exist
Aryan	Not Exist / Exist	Easy	Exist	Not Exist	Exist
UrbanFix	Not Exist / Exist	Easy	Exist	Not Exist	Exist
AlooHerafi	Not Exist / Exist	Easy	Exist	Not Exist	Exist
Primo	Not Exist / Exist	Easy	Exist	Not Exist	Exist
OyeBusy	Not Exist / Exist	Easy	Exist	Not Exist	Exist
Seyanah-UAE	Not Exist / Exist	Easy	Exist	Not Exist	Exist
Kaodim	Not Exist / Exist	Easy	Exist	Not Exist	Exist
ServiesHero	Not Exist / Exist	Easy	Exist	Not Exist	Exist
I-Fix	Exist / Exist	Easy	Exist	Exist	Exist

Table 5.3: Discussion.

Chapter Six
Conclusion & Future Works

6.1 Conclusion

Based on what was discussed in the first chapter of incentives that contributed to supporting the idea of the project, an application was created and developed that works on:

1. Contribute to providing a gateway to reach the target audience (users / employees) by reducing time and effort.
2. Provide the opportunity for users to access required maintenance operations in a manner that differs from previous traditional maintenance operations.
3. Limiting all industrial professionals to one application.
4. Establishing a channel that links users with industrial professionals.
5. Promoting social work and enhancing the role that industrial occupations of all kinds play in Jordan.

6.2 Future Works

Based on the above, the researchers recommend the following:

1. Development of another version of the application to serve other operating systems such as (IOS).
2. Developing a website version to allow the largest number of users to benefit from the application's services.
3. Developing a special software version of the application for desktop computers.

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[6] Services (Application), access date: 27/5/2020.

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