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Dijlah University College
Department of Computer Science

Blood Bank Information System

(BBIS)

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A Graduation Project Submitted to the Department of Computer Science / Dijlah University College as a Partial Fulfilment of the Requirement of the BSc. Degree in Computer Science

By

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June, 2021 – Baghdad

بسم الله الرحمن الرحيم

(يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ)

صدق الله العظيم

اهداء...

إلى من أُفضِّلها على نفسي، ولِمَ لا؛ فلقد ضحَّت من أجلي

ولم تدَّخر جُهدًا في سبيل إسعادي على الدَّوام

(أُمِّي الحبيبة).

نسير في دروب الحياة، ويبقى من يُسيطر على أذهاننا في كل مسلك نسلكه

صاحب الوجه الطيب، والأفعال الحسنة.

فلم يبخل عليَّ طيلة حياته

(والدي العزيز).

إلى جميع اساتذة و دكاترة قسمي في جامعة دجلة,

أُقدِّم لكم هذا البحث، وأتمنَّى أن يحوز على رضاكم.

Dedicate

To:

- **the sparkle of hope ....The Advocates of change towards development**

- **Everyone who seeks to spread goodness, love and hope throughout my country**

We dedicate these our humble efforts …

Mustafa Saber Mahdi

Mustafa Sameer Hashim

Muhammed Talal Suhail

Muhammed Nather Ahmed

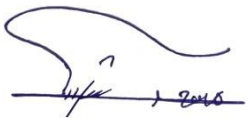
June 2021

Supervisor's Certification

I certify that the preparation of this graduation research project titled "**Blood Bank Information System** / Department of Computer Science / Dijlah University College in partial fulfillment of the requirements for the degree of BSc. In Computer Science.

Supervisor

Signature:



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ABSTRACT

Blood donation is the main source of blood resources in the blood banks which is required in the hospitals for everyday operations and blood compensation for the patients. In special cases, the patients require fresh blood for compensation such as in the case of major operations and similar situations. In this paper, In this project, we have proposed a blood bank information system (BBIS) and a denotation mechanism between the blood donors and patients in the case of fresh blood donation is required.. A web application for managing and monitoring the cases was desinged using Asp.Net with C#.net programming langugae. While a mobile application is developed for creating an easy way for both donors and patients to apply for our system. The mobile application was designed using a cross platform technology, which was Xamarin.Forms with C#.net programming language.. The website contains large database including information about the donors, patient and their blood group, age and other personal information to facilitate the donation process. This system is designed with unlimited abilities to be used by any hospital, blood bank, or individuals to manage the donation process with no constrains.

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List of Abbreviations

Abbreviation	Meaning
ASP	Active Server Page
IT	information technologies
IS	information systems
GPS	global positioning systems
MHS	mobile healthcare systems
TAM	Technology acceptance model
IDT	innovation diffusion theory
SMS	short- message-service
CLR	Common Language Runtime
CLI	Common Language Infrastructure

Chapter One

An Overview

Chapter One

An Overview

1.1 Introduction

Healthcare industry, conventionally, is recognized as having lagged behind other industries in the use and adoption of new information technologies (IT) and information systems (IS). However, this situation is shifting at a fast pace. Modern IT/IS is an essential tool that fosters and promotes progress in health care and drastically reforms current healthcare practices. Mobile IT/IS applications in healthcare can be recognized as both emerging and enabling technologies that have been applied in several countries for emergency care or general health care. For example, a variety of wireless technologies such as mobile computing, wireless networks and global positioning systems (GPS) have been applied to ambulance care in Sweden and emergency trauma care in the Netherlands. Relevant information about the patient. vital information) and the ambulance (exact time and location) can be transmitted to the hospital in real-time. There- fore, the hospital can be well-prepared for ambulance arrival. In Finland, a system with secure mobile healthcare services was tested in 2003 and was available nationwide in 2004. This system includes health consulting, electronic prescription, etc. Authorized individuals can easily access the system via mobile devices such as mobile phones.

Furthermore, health care professionals also need to access and input medical or patient information from anywhere, at any time in their daily ward rounds. Hence, mobile healthcare systems can facilitate efficient and effective patient care information input and access at the point of patient care. The systems can improve patient care and quality of services, decrease clinical errors, integrate resources, and enable ubiquitous real-time access to patient information and up-to-date medical knowledge However, most applications, in fact, have failed or have not been implemented as predicted. Among these, 30% of the failure rate results from non-technical factors. Insufficient user acceptance has long been an obstacle to the successful adoption of IT/IS. Therefore, it is

extremely significant to probe the determinants crucial to advance IT/IS acceptance by healthcare professionals.

With accelerated hospital competition and the popularity of the Internet and mobile devices, there is a need to understand the factors that would entice healthcare professionals to use mobile healthcare systems (MHS). Comprehending the essentials of what determines healthcare professional MHS acceptance can provide great management insight into developing effective strategies that will allow hospitals to create new opportunities and values for its customers, to increase the efficiency and effectiveness of health care personnel, and thereby, remain competitive. Generally, the essential characteristics of users and technologies in professional healthcare differ greatly from the customary commercial context. Thus, any model developed for the general public may not apply to a healthcare environment. MHS acceptance may need to consider MHS-specific factors, such as healthcare professional values and their mobile computing capabilities. Hence, the purpose of this study is to present a conceptual frame- work for assessing the medical professional behavioral intention to adopt MHS. Technology acceptance model (TAM) and the innovation diffusion theory (IDT) serve as the theoretical basis for this study that are integrated with MHS self- efficacy, and technical support and training. We also validate the factors that determine healthcare professional MHS acceptance and examine the relationships among those latent variables. psychological state regarding the individuals' intention to use MHS in their practice. The integrated mobile IT/IS can pro- vide easy access to the networks and resources whether the healthcare professionals or patients are stationary or moving. MHS allows professionals to access real-time patient records and state-of-the-art medical information. The variety of mobile devices includes personal digital assistants (PDAs), laptops, pocket and tablet computers, GPS, smart-phones, etc. While system use is recognized as a good indicator of IT/IS success, user adoption and system acceptance can be predicted adequately from the individual's behavioral intent. A number of empirical studies have proven this point.

1.2 The Aim and Objectives

1.2.1 1.2.1 Aim of the Project

The main aim of our project is to design and develop a mobile application and web application to facilitate communication between blood donors with those in need.

1.2.2 1.2.2 Objectives of the Project

- To design a real time cloud database using a firebase database for storing the important information for both donors and receiver.
- To design a cross platform mobile application for blood Donation system, which is called “Shriyan”.
- To design a web application for blood Donation management system, which is called “Shriyan”.

1.3 Statement of Problem

Despite advances in technology, today’s blood bank systems are running in manual system. As such, there is a prevalent problem in the availability of needed blood types. For instances, when a person needs a certain type of blood and this type is not available in the hospital, family members send messages through social media to those who can donate to them and this process takes longer than the life of the patient to the most dangerous. In addition, it seems that there is lack of proper documentation about blood donors and its medical history. This may lead to blood bag contamination and affect the blood transfusion safety.

1.4 Literatures Review

Blood donation is an important process to maintain the blood storage and prevent it from becoming at low stock. Blood management systems have been widely considered in the literature [1-5], which depends on different technologies and methods. In addition, in some cases, it is essential to provide fresh blood to the patients or to offer an instant blood replacement. In [6], a system is proposed that correlates the previously blood bank systems to a new system that improves the efficiency of the blood bank and upgrades the framework to a portable scheme. In addition, the project has discussed the enhancement in the prospective of the data storing and donated blood groups. Automated blood bank systems have been designed in [7-9] utilizing Raspberry Pi B+ kit to gather blood donors with the blood recipients by means of Mobile application. The proposed systems connect both the donator and the receptor using short- message-service (SMS).

On the other hand, a blood bank system that utilizes the cloud has been considered in [10] in which, the users having access to the information that are related to different blood banks locations, hospitals and donors. As a security check. An Mobile application and web application has been used to fulfill this job, which has the ability to track the different blood bank locations to make the process easier for the users to select the nearest blood bank. In [11], the database of the blood bank has been collected from different sources including blood banks, hospitals and national service scheme (NSS), while the communication between the donors and the receptors has been achieved using Asterisk hardware. The health status of the donors and the distance from the caller has been taken into consideration in an algorithm that is stored in a central server.

In [12], the receptor sends a text message over SMS to a shared blood bank platform with the required blood group, if the requested group was available at a certain blood bank, then the receptor is directed to that bank, otherwise, it sends the contact details of the donors with the required blood group. A computer- based system for blood management have been designed in [13] to manage, monitor and store the blood records, in addition to improving the medical service by providing a secure medical report. The implementation was achieved utilizing Firebase database, bar-code technique and a XamarinC# language, and tested with the national blood transfusion center (NBTC), which helped improving the system manipulation compared to the manual systems. A web-based application has been proposed in [14] that solve the issues of low blood resources resulting from several reasons such as uncontrolled blood managements, shortage of some blood groups and low awareness regarding blood donations. The processes of donating, testing, storing and delivering the blood bags are controlled by the proposed application.

A study on the blood biochemical and biophysical characteristics over a specific time has been carried out in [15] to show the effect of time on the blood characteristics while it is been stored in the blood banks. Several samples for different donors have been tested with HB, K+, P50, 2, 3 DPG, ATP, lactate and pH. The result of this work has suggested that the blood quality is more sensitive to be changed due to filterability than the normal biochemical factors. The problem of storing the blood bags for long time in both rural and urban areas has been considered in [16] by seeking the right donor information using a verbal keyword when a specific blood group is in need.

The contribution of this paper is to build a general virtual blood bank that gathers the users who requires a specific blood group with the users who are able to donate. The

proposed web-based application can be used on a PC browser or on a smart phone app without any constrained, and it contains a database for all the users who are willing to donate.A study on the blood biochemical and biophysical characteristics over a specific time has been carried out in [15] to show the effect of time on the blood characteristics while it is been stored in the blood banks. Several samples for different donors have been tested with HB, K+, P50, 2, 3 DPG, ATP, lactate and pH. The result of this work has suggested that the blood quality is more sensitive to be changed due to filterability than the normal biochemical factors. The problem of storing the blood bags for long time in both rural and urban areas has been considered in [16] by seeking the right donor information using a verbal keyword when a specific blood group is in need.

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1.5 Programming and Implementation Tools

The main techniques used in this project:

1.5.1 Asp.net

ASP.NET is an open-source, server-side web-application framework designed for web development to produce dynamic web pages. It was developed by Microsoft to allow programmers to build dynamic web sites, applications and services.

It was first released in January 2002 with version 1.0 of the .NET Framework and is the successor to Microsoft's Active Server Pages (ASP) technology. ASP.NET is built on the Common Language Runtime (CLR), allowing programmers to write ASP.NET code using any supported .NET language. The ASP.NET SOAP extension framework allows ASP.NET components to process SOAP messages.

ASP.NET's successor is ASP.NET Core. It is a re-implementation of ASP.NET as a modular web framework, together with other frameworks like Entity Framework. The new framework uses the new open-source .NET Compiler Platform (codename "Roslyn") and

is cross platform. ASP.NET MVC, ASP.NET Web API, and ASP.NET Web Pages (a platform using only Razor pages) have merged into a unified MVC 6.

1.5.2 Xamarin

Xamarin is a Microsoft owned software company founded in May 2011 by the engineers that created Mono, Xamarin .Android (formerly Mono for Android) and Xamarin .iOS (formerly Mono Touch), which are cross-platform implementations of the Common Language Infrastructure (CLI) and Common Language Specifications (often called Microsoft .NET).

With a C# shared codebase, developers can use Xamarin tools to write native Android, iOS, and Windows apps with native user interfaces and share code across multiple platforms, including Windows, macOS, and Linux. According to Xamarin,

1.5.3 Firebase

Firebase is a platform developed by Google for creating mobile and web applications. It was originally an independent company In 2014 Google acquired the platform and it is now their flagship offering for app development.

1.6 The Scientific Contribution(s)

The findings of this study will redound to the benefit of managing the information in blood bank and also it will allow the hospital to take decision if they want particular type of blood by publishing advertisement in the home page of the system. Furthermore, managing the blood bags in the blood bank will be much easier because each blood bag has an information about the donor and blood type and the expiration date. Also, doctor can use this system to serve blood bags to their patient. The main advantages of the system are: i) Blood bank staff can find and manage the donor details on the system easily. Ii) The expiration date of blood bags can be viewed in the system and iii) Hospital can be alerted about issued blood bags.

1.7 The GRP Outline

The rest of this graduation research project (GRP) is composed of four main chapters, as follows :

- Chapter 1: Presents an overview on the importance of mobile computing in healthcare fields. Moreover, it presents the statement of the problem, aim of the research, and literature review.
- Chapter 2: In this chapter, the proposed system in terms of conceptual framework, class diagram, activity diagram, and use-case diagram is designed to achieve the main goal of this report.
- Chapter 3: Introduces the implementation of the designed system. Which is given in details in chapter two.
- Chapter 4: Presents conclusions, limitations and recommendations for future works that can improve and augment this graduation research project.

Chapter Two

The System Design

Chapter Two

The System Design

2.1 Introduction

In a system development life cycle (SDLC), the system design step is an important phase when all the diagrams are designed. These diagrams illustrate the main process required for developing the final product/software. In this chapter four main diagrams are designed, which are : Conceptual framework, Class diagram, Activity diagram, and Use-case diagram.

2.2 Conceptual Framework

The proposed blood donation management system contains different types of people, which represent the main components of the system. It consists of: doctors, donors, patients, admins, and hospital employees. The following figure illustrates the conceptual framework of the proposed system.

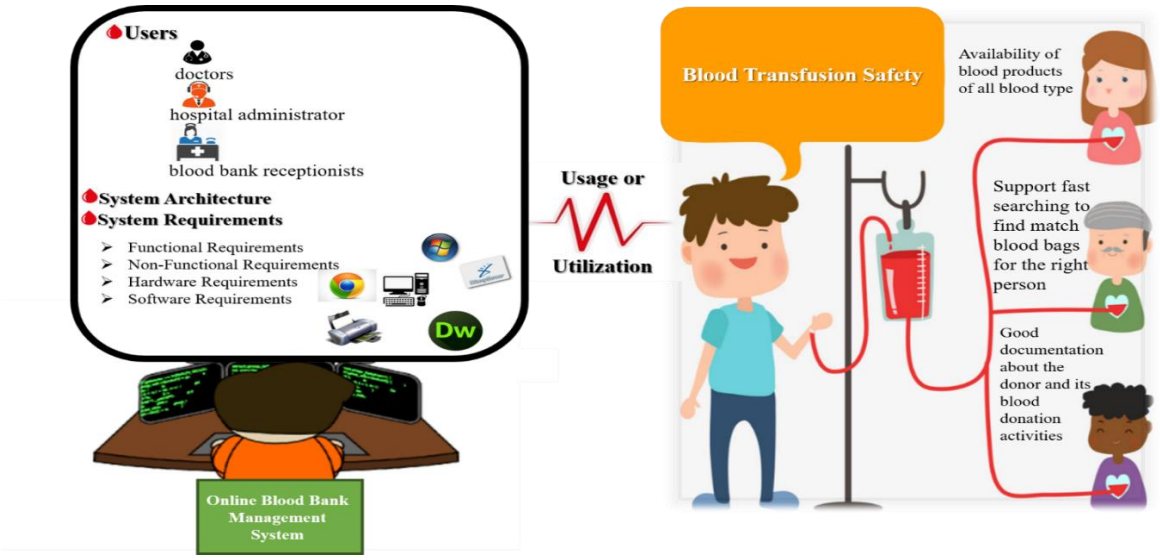


Figure 2-1 Conceptual Framework of BBIS

2.3 Class Diagram

The main classes of our proposed system have been analyzed and converted into a class diagram. Figure 2-2 below shows the relationships between the main classes (Person, Patients/Donors, Admin). The objects required in this study are:

- Person : which represents a main class for any person/customer who use our system.
- Donor/Patient : It is a derived class, which is inherited from the person class. This class represents the main customers of our system.
- Employee/Admin : It is a derived class, which inherited from the person class. This class represents the employee who can monitor the system, and the admins who manage the information stored in the system.
- Blood : It is a class for keeping the main information about the requested blood, such as blood type and the requested amount of blood.
- Address : it is a class which consists of the main information required for keeping the address of all persons used our system. In other word, the address class is associated with the person class, so every derived class contains an address.
- Hospital : It is a class which contains main information about the place where the blood is required, such as a hospital.

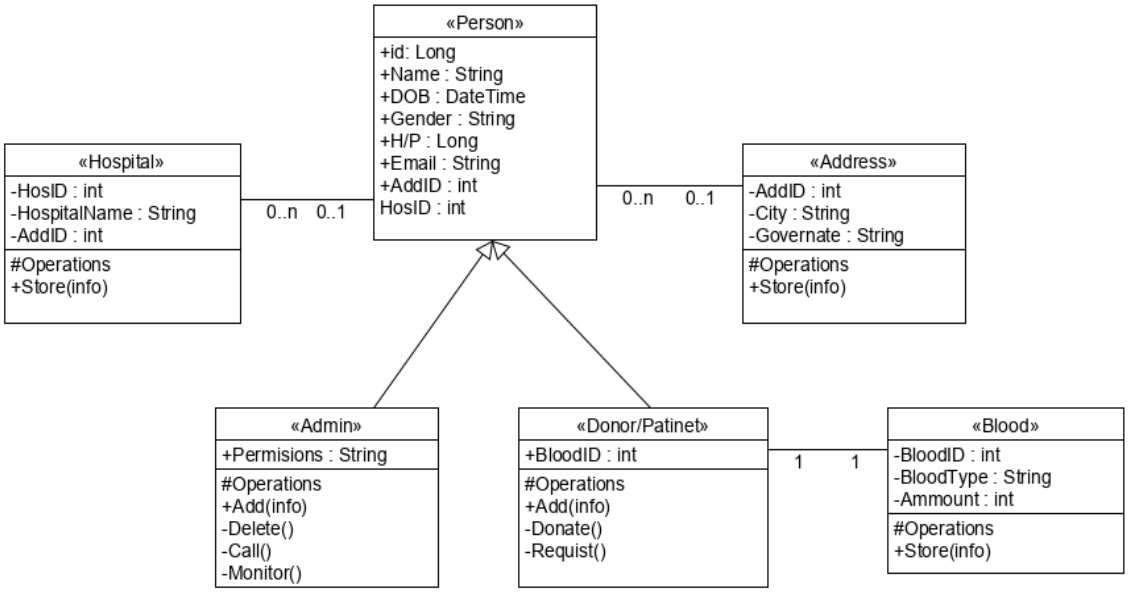


Figure 2-2 Class Diagram for the proposed system

2.4 Activity Diagram

In order to develop a software for our proposed system (i.e., web application and mobile application), an activity diagram should be designed first. Figure 2-3 below illustrates the activity diagram of our proposed software.

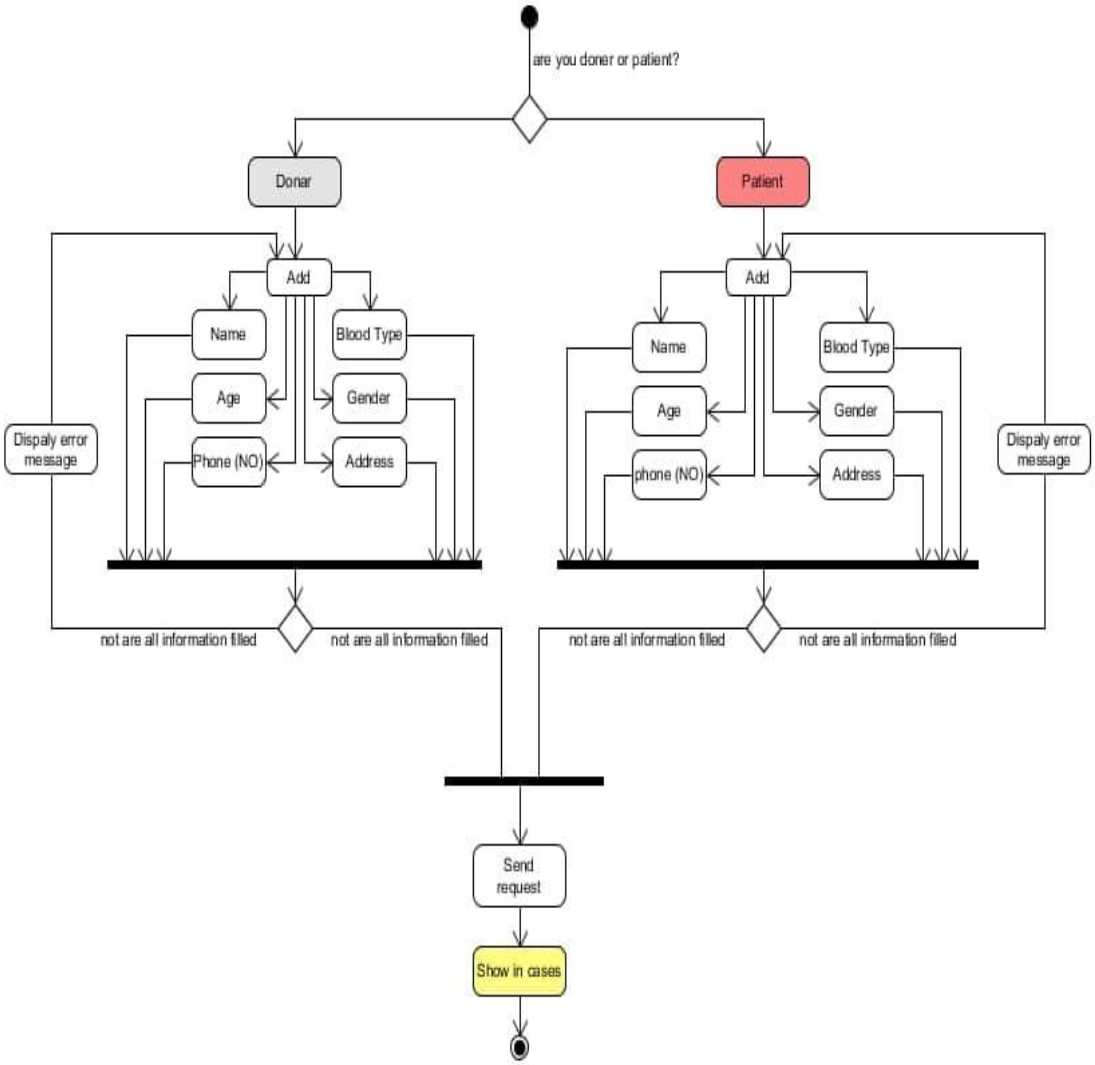


Figure 2-3 Activity Diagram for the proposed system

2.5 Use-Case Diagram

The possibilities of our proposed system are drawn in a use case diagram which is given in the following figure :

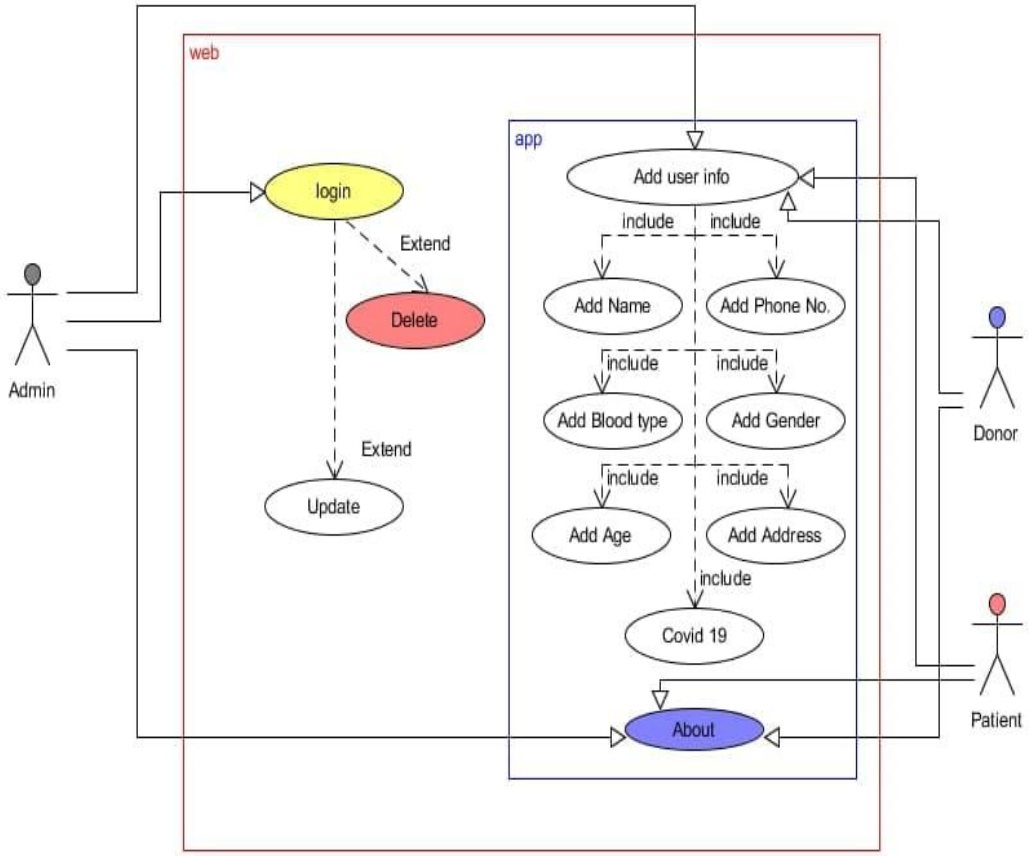


Figure 2-4 Use-Case scenario for the proposed system

2.6 ER-Diagram

The project entirely depends on a real time database, therefore, there is a need to design an entity relationship (ER) diagram .

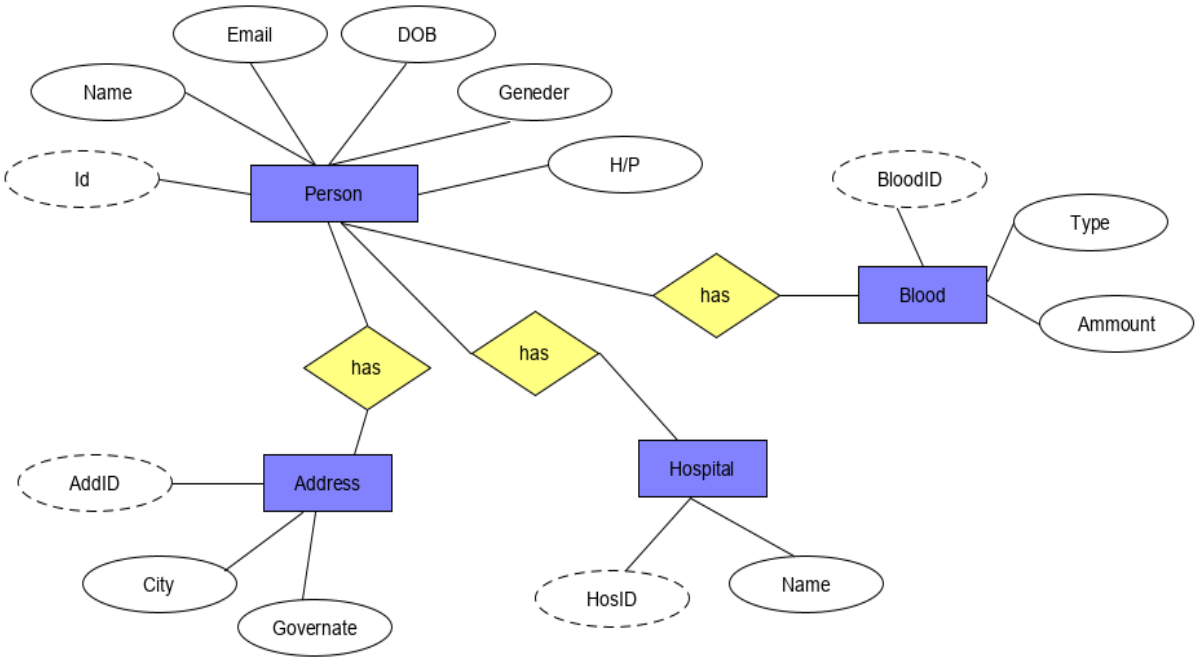


Figure 2-5 ER Diagram

Chapter Three

Development and Implementation

Chapter Three

Development and Implementation

3.1 Introduction

In previous chapter, the theoretical and conceptual design of our system were explained in details. In this chapter, the proposed system (mobile and web applications) will be presented.

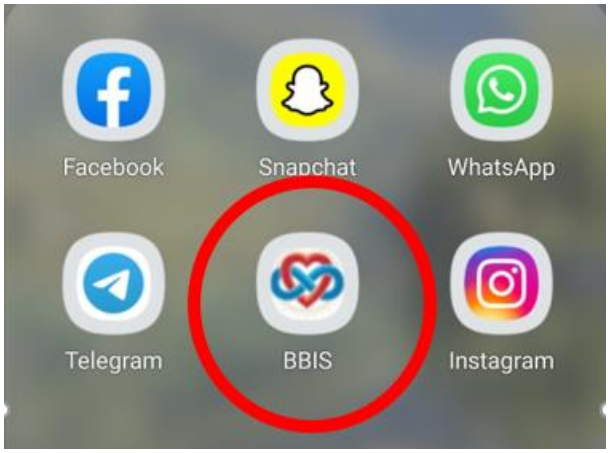
3.2 SHRIYAN Application

The proposed blood donation system in this research is developed under the name “Shriyan”, which is an Arabic word means a blood-vessel. We have designed a specific logo for our project which portrays the main idea behind it. The logo is given in the following figure.

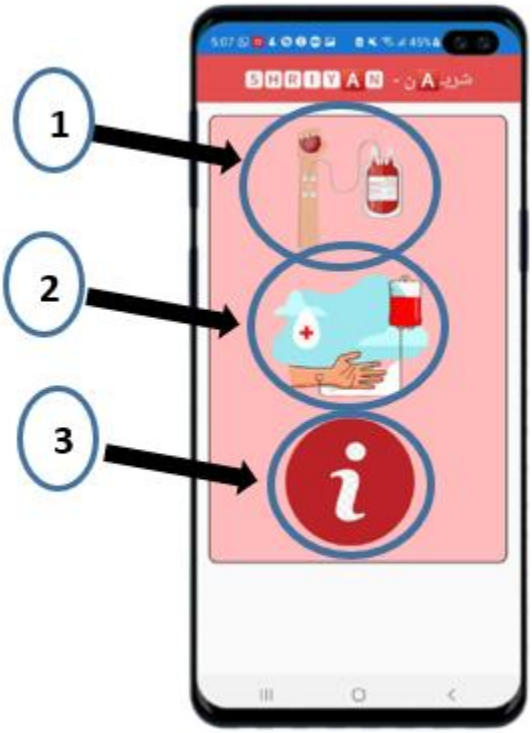
Figure 3-1The main logo of SHRIYAN

Shriyan consists of two different applications, a web and mobile applications. The web-app is useful for the customers who use the web browser on their computers. While the mobile app is useful for the customers who prefer to use their smartphones over the computers, and useful for emergency cases as well.

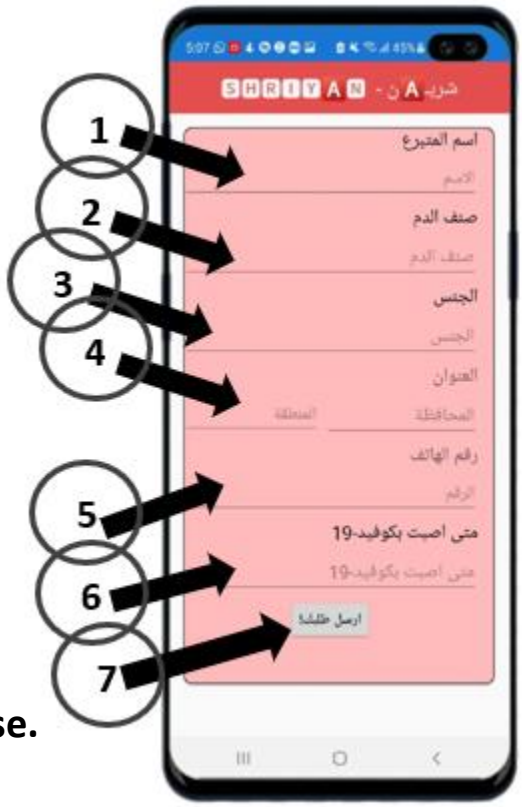
1.Shriyan logo (BBIS)



1. **Move to donor page.**
2. **Move to patient page.**
3. **Move to about page.**

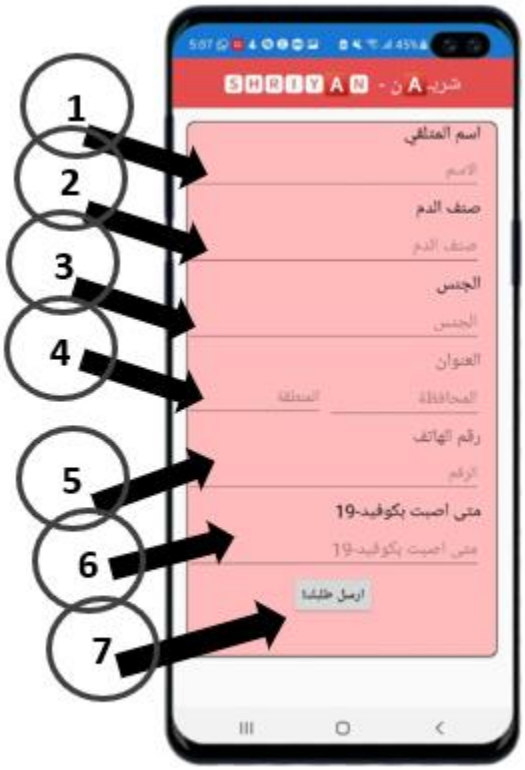


Donor page.



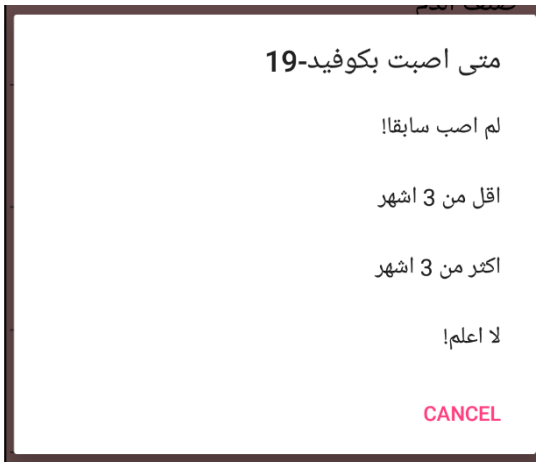
1. **Insert Donor name.**
2. **Insert blood type for donor.**
3. **Insert Donor gender.**
4. **Insert Donor address.**
5. **Insert Donor phone (NO).**
6. **Choosing the time of infection with Covid-19.**
7. **Sending information to the database.**

Patient page.

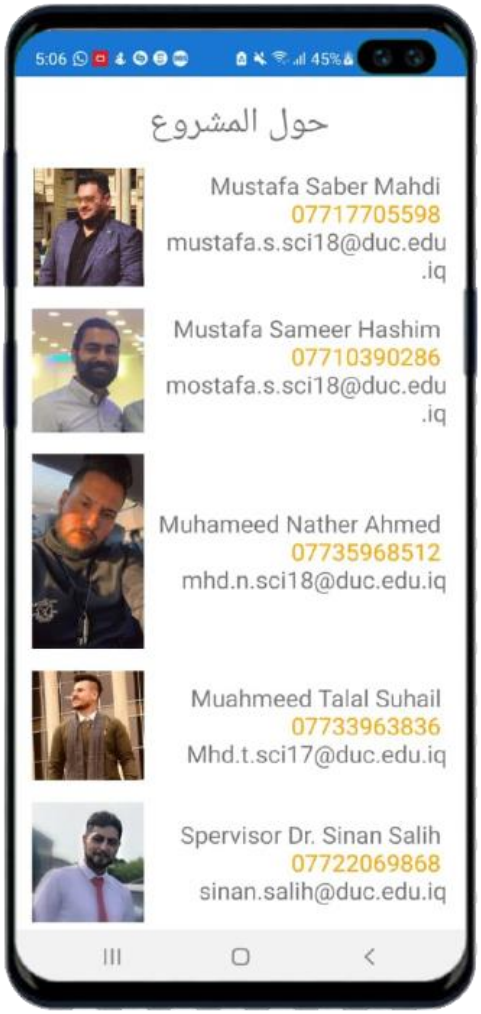


1. **Insert patient name.**
2. **Insert blood type for patient.**
3. **Insert patient gender.**
4. **Insert patient address.**
5. **Insert patient phone (NO).**
6. **Choosing the time of infection with Covid-19.**
7. **Sending information to the database.**

Options for time of infection with Covid-19.



About page.



3.2.1 The importance of a web application:

This website can be used by browsers, whether from a computer or a smartphone browser, for easy access without complexity. It was programmed using asb.net and was linked to using Database using the Firebase and it collects information about donors and patients to communicate with each other after entering the information for each of The donor or the patient and it is saved in the database. This site was designed in a simple and clear way for ease of use and speed. It was designed in Arabic as it targets Iraq in order to take into account people who do not master the English language or others.

A. Homepage :

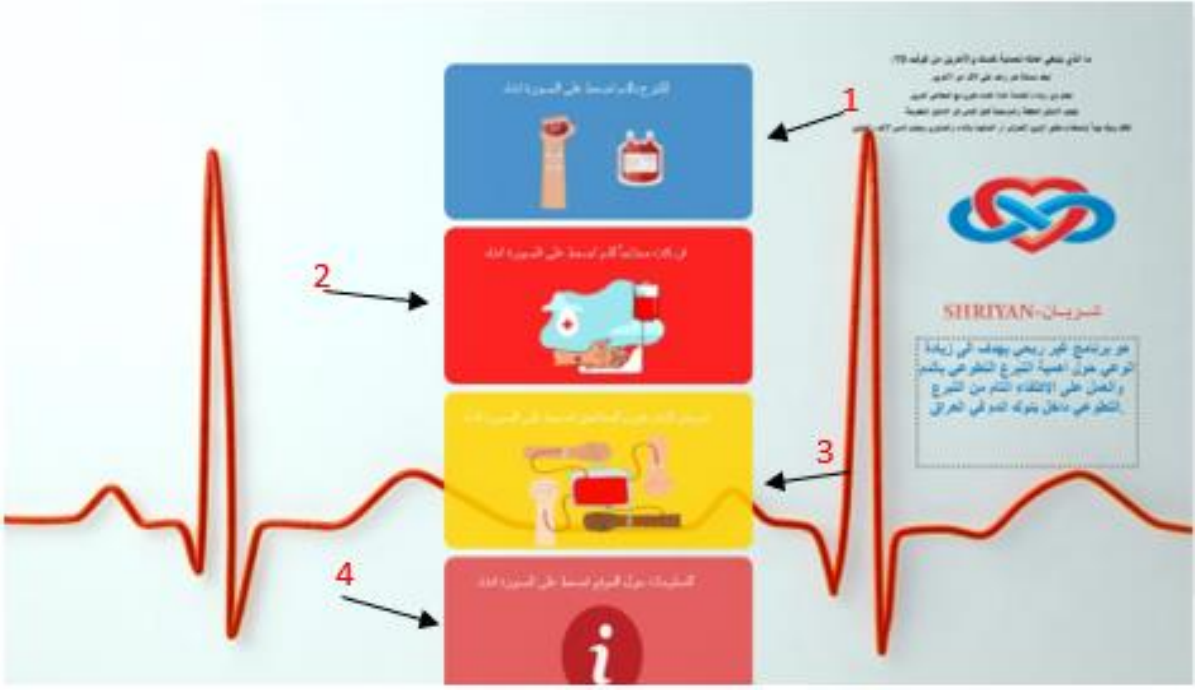


Figure 3-2 The main page

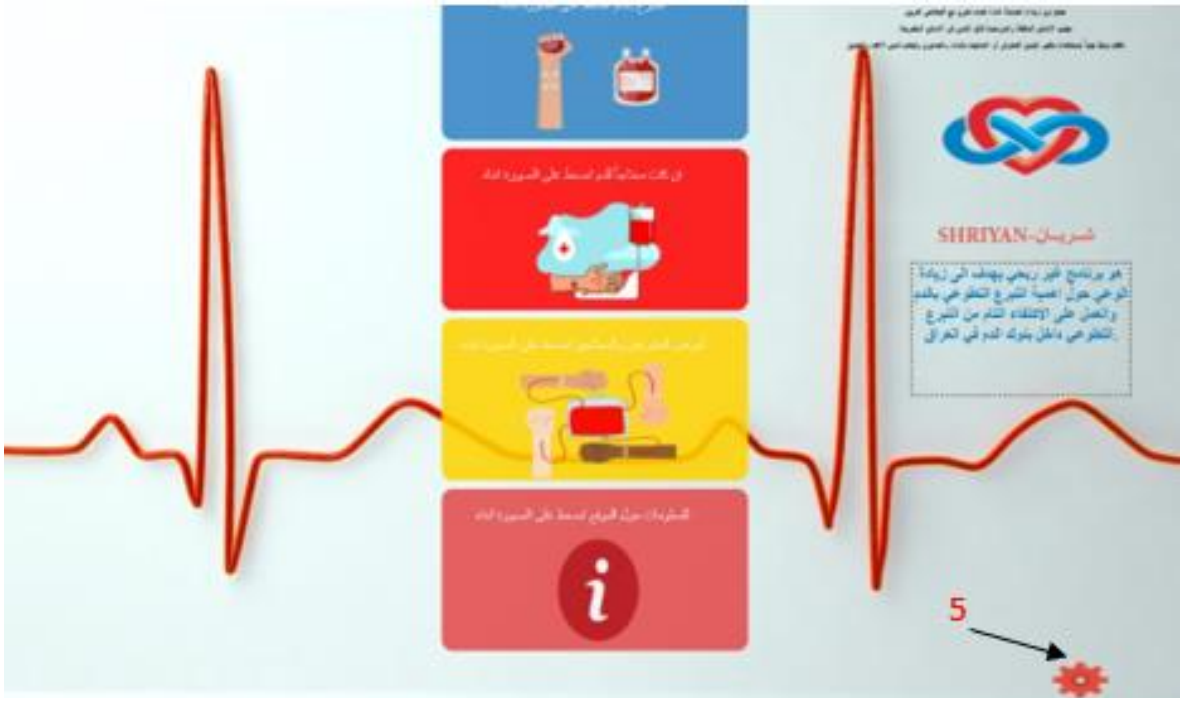


Figure 3-3 The dashboard button

The homepage on web application contains the following :

1. Move to donor page.
2. Move to patient page.
3. Move to page show donor and patient information.
4. Move to about page.
5. Move to Admin login.

B. The donor page:

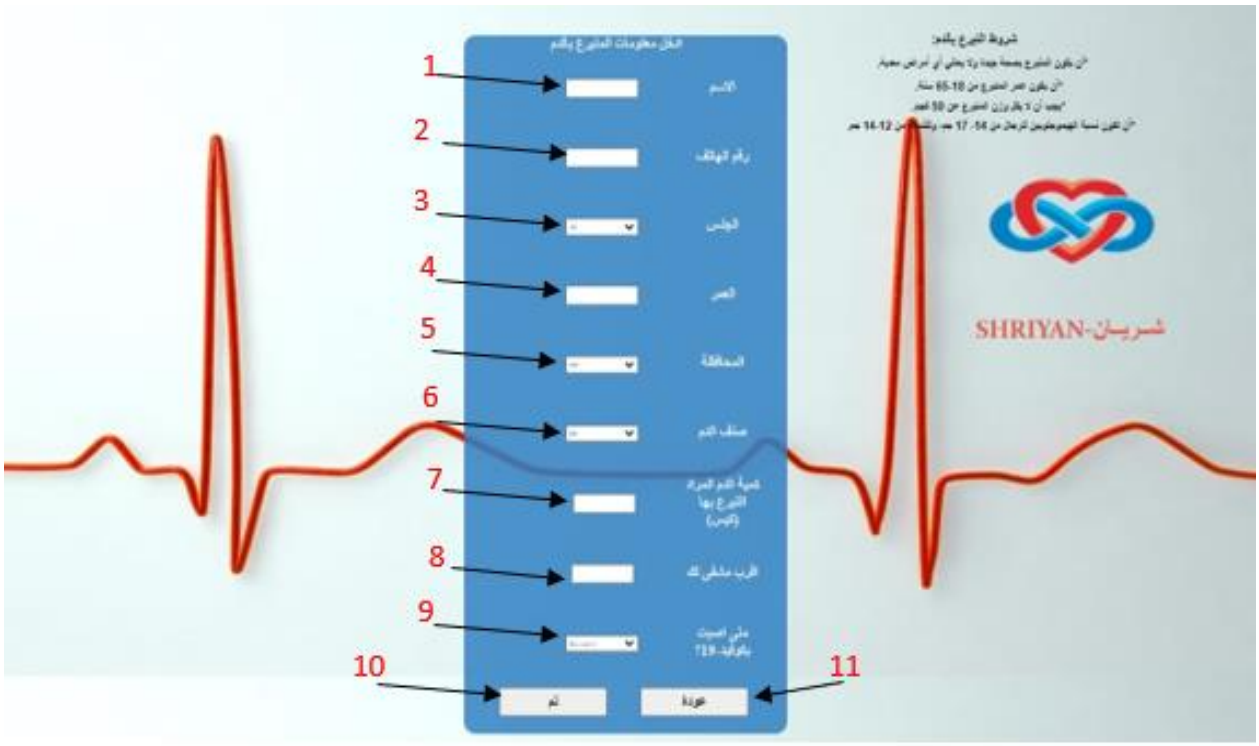


Figure 3-4 The donor page

The donor page consists of the following :

1- Insert Donor name.
2- Insert Donor phone (NO).
3- Insert Donor gender.
4- Insert Donor age.
5- Insert Donor address.
6- Insert blood type for donor.
7- Insert the amount of blood you want to donate.
8- Insert the nearest hospital to you.
9- Choosing the time of infection with Covid-19.
10- Sending information to the database.
11- To return to the first window.

C. The patient page:

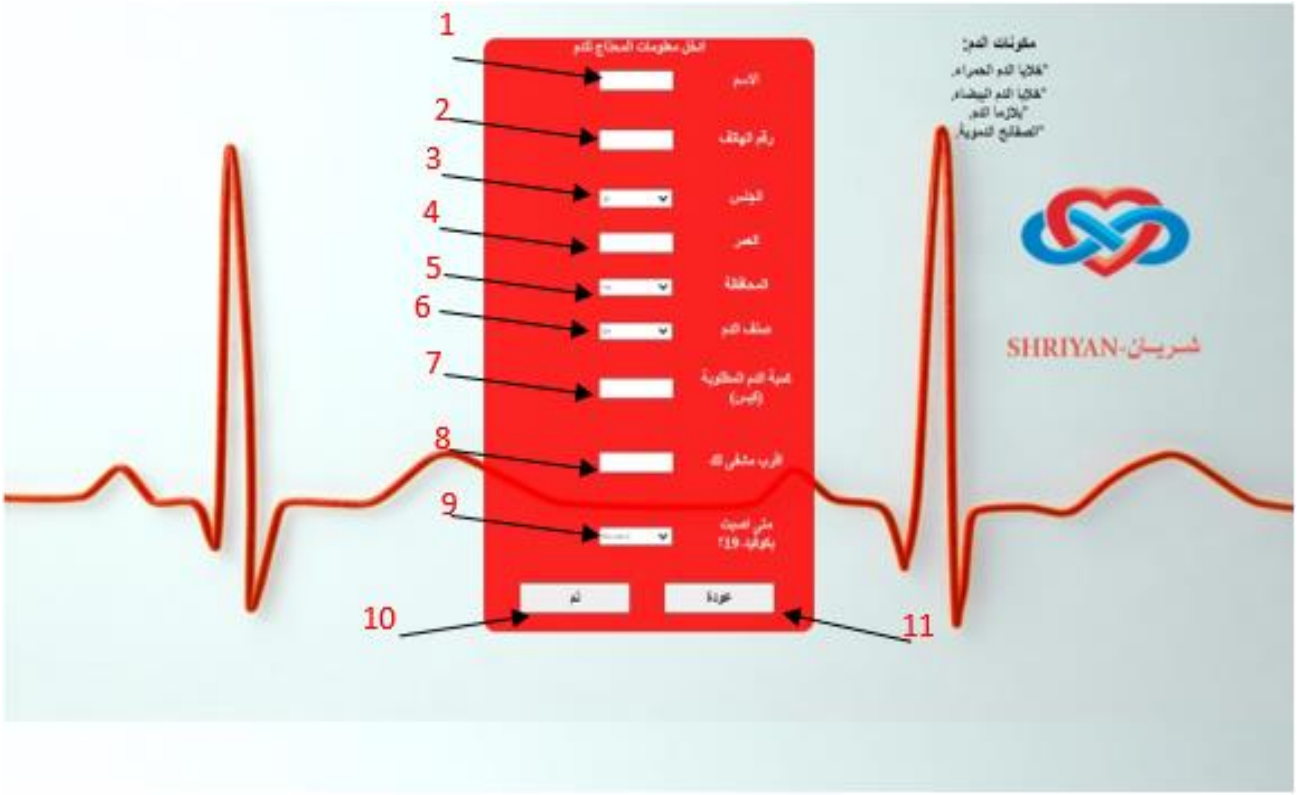
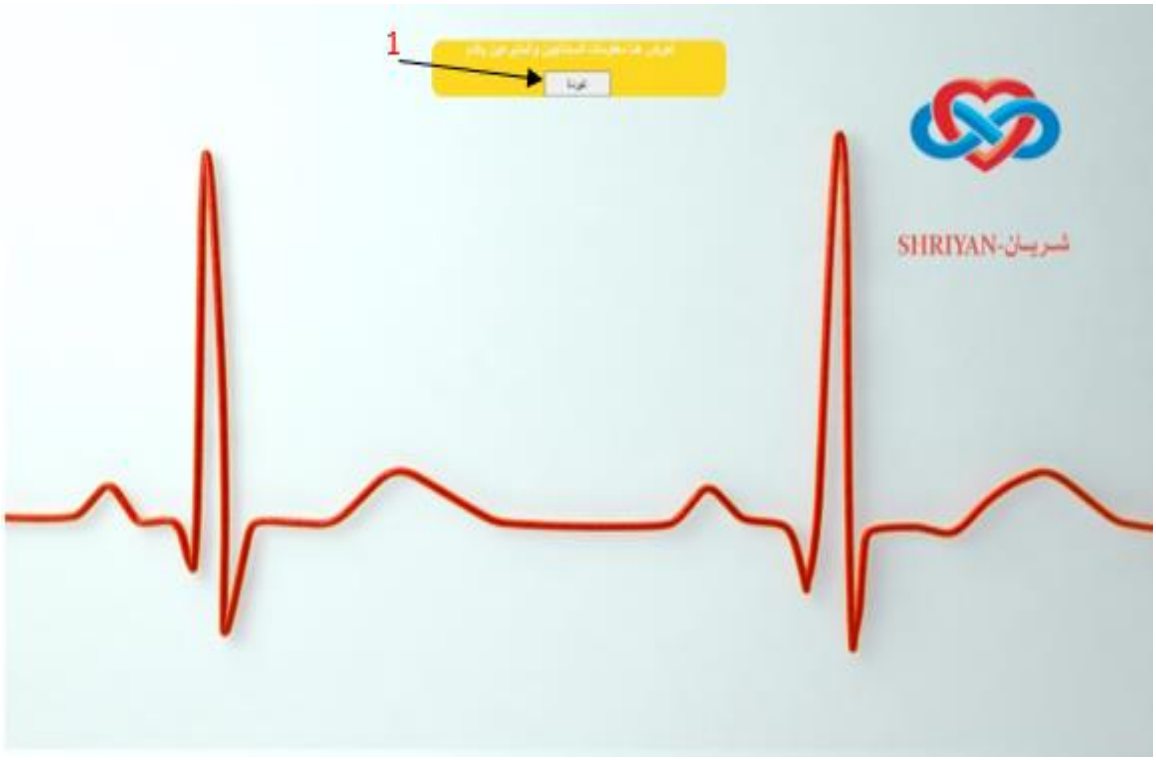


Figure 3-5 The patient page

The patient page contains the following :

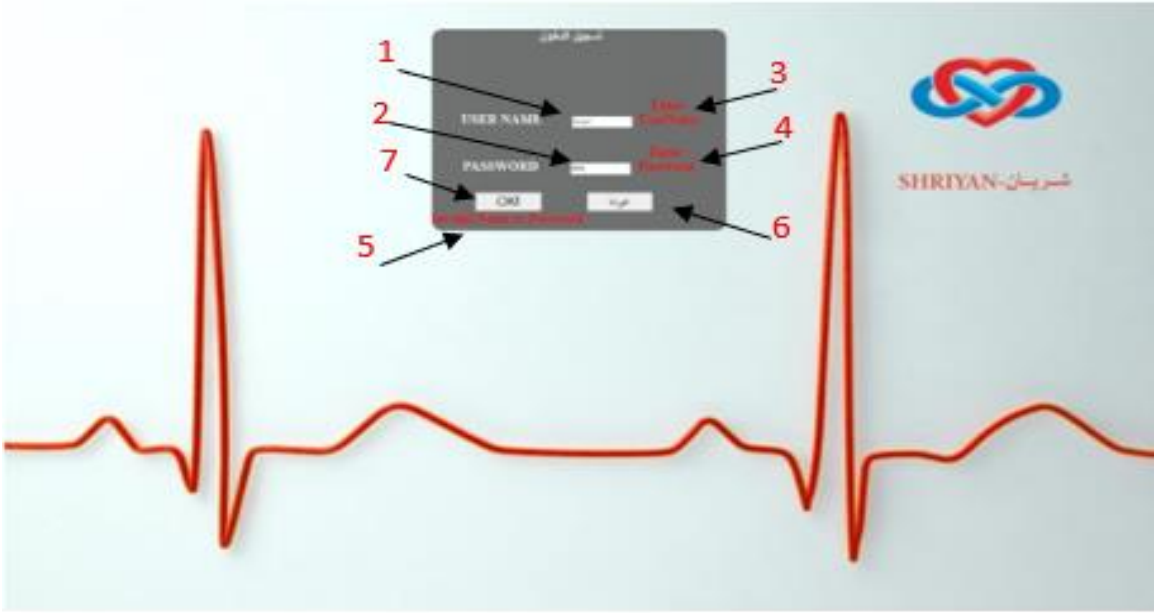
1. Insert Patient name.
2. Insert Patient phone (NO).
3. Insert Patient gender.
4. Insert Patient age.
5. Insert Patient address.
6. Insert blood type for patient.
7. Insert the required amount of blood
8. Insert the nearest hospital to you.
9. Choosing the time of infection with Covid-19.
10. Sending information to the database.
11. To return to the first window.

Page show donor and patient information:



1. **To return to the first window.**
   *** This page cannot be accessed, only admin for privacy.**

The sign in page:



1- Insert admin user name.
2- Insert admin password.
3- If you don't insert user name.
4- If you don't insert password.
5- If your user name or password isn't correct.
6- To return to the first window.
7- Go to dashboard.

The about page:

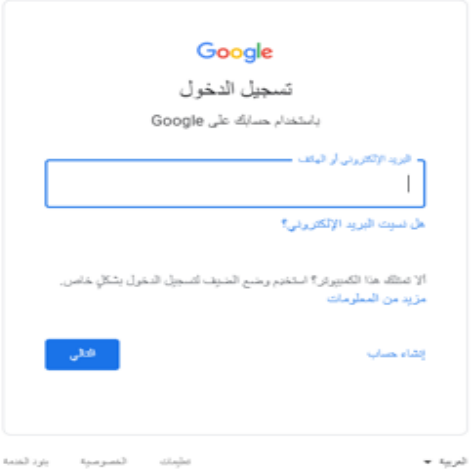
This page consists of the names of the students and the supervisor who developed the web application.

3.3 The Implemented Toolset

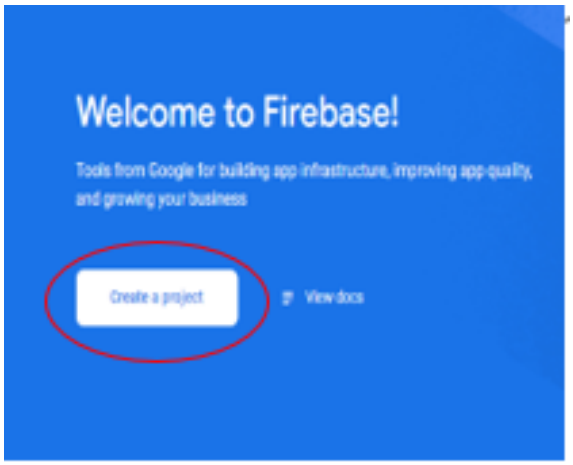
3.3.1 Creating real time database:

In this section, the main database used for keeping the information. In this project, we have used a real time cloud based database, which is firebase database. The reason behind choosing this database is that it is more secure than other databases, can handle the issue of authentication, easy to use, and free for small projects. The following steps show how to create a real time firebase database:

1- At the first step, a new Gmail account should be used for creating a project of firebase database.

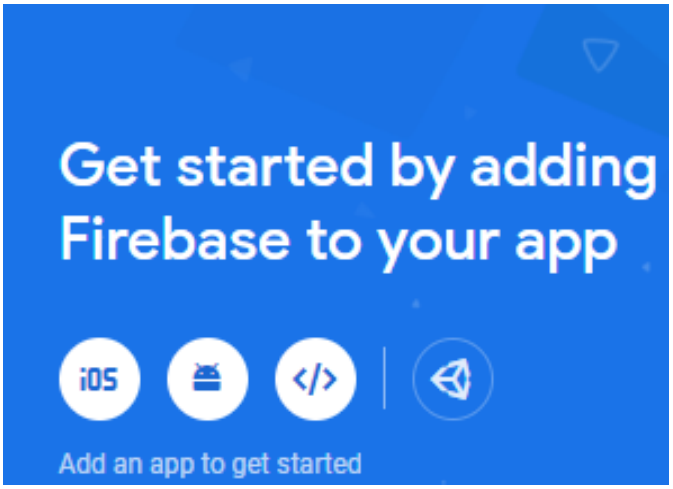


Then choice (Create a project).

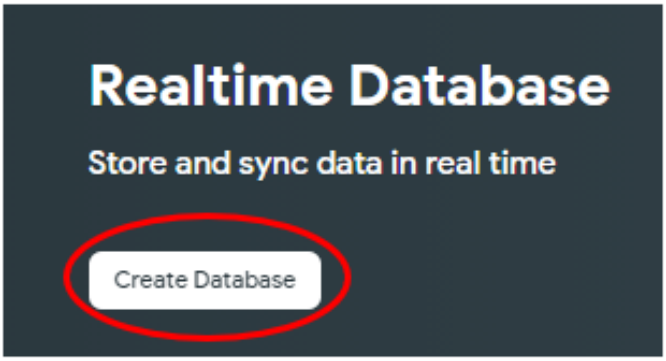


2- Here you will insert project name and your analytics and accept the conditions and choice (Create a project).

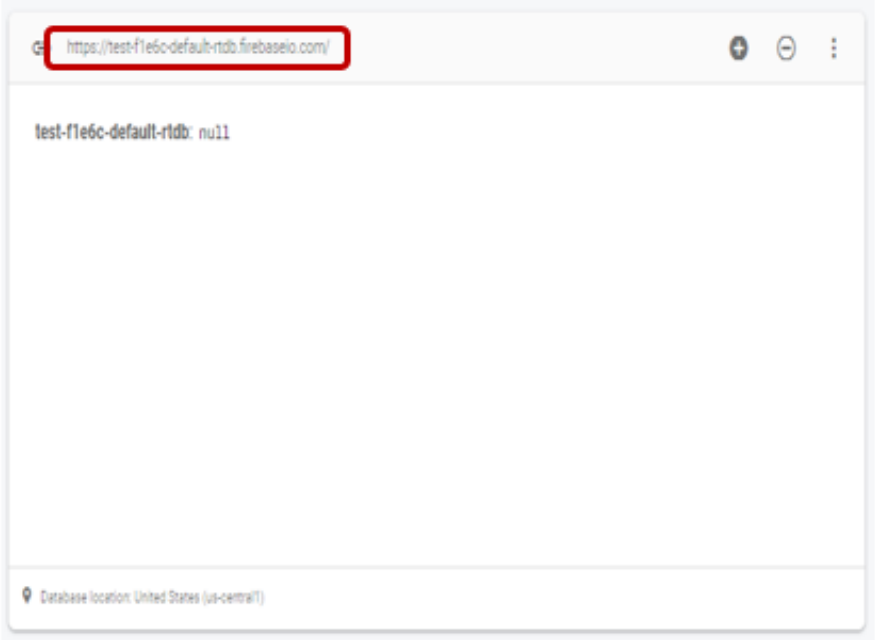
3- Add an app (iOS or android or web).



4- Choice "create database".



5- Copy this link.



7- On the page that you want to transfer the information to Database, choose to modify it with cs and write the code like what is written in the image and paste the link in the specified place inside the rectangle.

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Web;
using System.Web.UI;
using System.Web.UI.WebControls;
using FireSharp.Config;
using FireSharp.Interfaces;
using FireSharp.Response;
using Newtonsoft.Json;

namespace shrijant.views
{
    public partial class patient1 : System.Web.UI.Page
    {
        {
            AuthSecret = "[redacted]",
            BasePath = "[redacted]"
        };
        IFirebaseClient Client;

        protected void Page_Load(object sender, EventArgs e)
        {
            Client = new FireSharp.FirebaseClient(config);
            if (Client != null)
                patient1_type.Text = "connected!";

        }

        protected void Button2_Click(object sender, EventArgs e)
        {
            // Inserting assigned record
            var data = new Data
            {
                name = patient1_name.Text,
                Phone = patient1_phone.Text,
                sex = patient1_sex.Text,
                blood_type = patient1_type.Text,
                age = patient1_age.Text,
                corona = patient1_corona.Text,
                address = patient1_address.Text



            };
            SetResponse response;
            response = Client.Set("patint information/" + data.name, data);
            Data result = response.ResultAs<Data>();

        }
    }
}
```

3.3.2 ASP.NET:

ASP.NET is an open-source, server-side web-application framework designed for web development to produce dynamic web pages. It was developed by Microsoft to allow programmers to build dynamic web sites, applications and services.

It was first released in January 2002 with version 1.0 of the .NET Framework and is the successor to Microsoft's Active Server Pages (ASP) technology. ASP.NET is built on the Common Language Runtime (CLR), allowing programmers to write ASP.NET code using any supported .NET language. The ASP.NET SOAP extension framework allows ASP.NET components to process SOAP messages.

ASP.NET's successor is ASP.NET Core. It is a re-implementation of ASP.NET as a modular web framework, together with other frameworks like Entity Framework. The new framework uses the new open-source .NET Compiler Platform (codename "Roslyn") and is cross platform. ASP.NET MVC, ASP.NET Web API, and ASP.NET Web Pages (a platform using only Razor pages) have merged into a unified MVC 6.

3.3.3 Xamarin:

Xamarin is a Microsoft owned software company founded in May 2011 by the engineers that created Mono, Xamarin .Android (formerly Mono for Android) and Xamarin .iOS (formerly Mono Touch), which are cross-platform implementations of the Common Language Infrastructure (CLI) and Common Language Specifications (often called Microsoft .NET).

With a C# shared codebase, developers can use Xamarin tools to write native Android, iOS, and Windows apps with native user interfaces and share code across multiple platforms, including Windows, macOS, and Linux.

3.1. Empirical Outcomes:

- We got a simple and seamless electronic system for donating blood.
- Facilitate the process of donating and obtaining blood easily and communication between donors and patients easily.
- Facilitating the search for a donor with the required blood type
- We have made the system work in the form of a mobile app and a web app, making it easy to access at the desired speed.
- Make the phone app and web app in Arabic for ease of use and consideration for people who don't speak English.
- Donor and patient information is not visible to everyone for privacy.

Chapter Four

Conclusions, Limitations and Future Works

Chapter Four

Conclusions, Limitations and Future Works

4.1 Conclusion

For hospitals, a blood bank known as blood collection center, also is an area in which collected blood bags are stored and preserved for future use in blood transfusion services. Blood transfusion is a medical operation where a patient requires blood or blood products as a life saving measure. In a report by Ministry of Health(MoH) in its website, it mentioned that the total amount of blood donated annually in Muscat is approximately 25,084 units. MoH further reported that its Department of Blood Services is functioning at full capacity to meet the demands in the Sultanate.

Most blood banks are still running manual system in its processes. As such, there is a lack of efficiency because it is still paper-based in collecting information about donors, inventories of blood bags, and blood transfusion services. The lack of proper documentation may endanger patients' health due to the possibility of having contaminate blood bags. Contamination happened when there is an incomplete donors' medical history record and the blood bags' shelf life is not monitored properly. Hence, a web-based blood bank management system might be needed to address these issues and problems encountered to ensure blood transfusion safety.

In this project, a blood donation management system is proposed. Which is an easy way for both blood donors and the others who are in need. The proposed system was developed as a web application and mobile application. The outcomes from our system proofed that the system is easy to use and could help thousands of people by requesting a specific type and amount of blood, especially after the pandemic of COVID-19 where the plasma of blood could enhance the immune system of the infected people to decrease the chances of death.

4.2 Limitations

This research study does not cover the actual blood collection activity, and actual blood transfusion operation. Blood donors and patients or recipients of blood donation are not system users, their registration or information will be encoded by the blood bank receptionists. Also, the study excludes the consideration of system security measures such as password expiration, use of CAPTCHA, idle window timeout, web caching, etc., audit trail, and back-up and recovery.

4.3 Recommendation for Future Works

For future works, there are several suggestions could be implemented:

1- Add chat system, which may help the donors and patients to contact each other directly.
2- The collected dataset from our proposed system could be used for future scientific studies. This dataset would help the researchers with studying the effect of COVID-19 on different types of blood.
3- Adding bounce to the donors in order to encourage more donors to use our proposed system.

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المستخلص

يعتبر التبرع بالدم المصدر الرئيسي لماصدر الدم في بنوك الدم المطلوبة في المستشفيات للعمليات اليومية و تعويض الدم للمرضى, وفي حالات خاصة يحتاج المريض الى دم جديد للتعويض كما في حالة العمليات الكبرى او في حالات الحروب والحلات المماثلة .

في هذا المشروع ، اقترحنا نظام بنك دم الكتروني وآلية دلالة بين المتبرعين بالدم والمرضى المحتاجين اله في حالة التبرع بالدم .

وهذا النظام يحتاج الى تطبيق ويب لأدارة الحالات ومراقبتها مصمم باستخدام

ASP.NET مع لغة برمجية C#.net

بينما يتم تطوير تطبيق الهاتف المحمول لانشاء طريقة سهلة لكل من المتبرعين والمرضى للاستفادة من نظامنا،تم تصميم تطبيق الهاتف باستخدام تقنية عبر الانظمة الأساسة ،وهي

Xamarin.Forms مع لغة برمجة C # .net

يحتوي النظام على قاعدة بيانات كبيرة تتضمن معلومات عن المتبرعين والمرضى مثل الاسم والعمر وصنف الدم ومعلومات شخصية اخرى لتسهيل عملية التبرع

وبعد انتشار فايروس كوفيد-19 تم اضافة خيار تاريخ الاصابة او عدم الاصابة من اجل عدم العدوى بين المتبرع والمريض.

جعلنا هذا النظام يعمل باللغة العربية باعتبارة يستخدم داخل العراق ومع مراعاة الافراد اللذين لا يجيدون اللغة الانجليزية.

تم تصميم هذا النظام بقدرات غير محدودة لأستخدامه من قبل اي مستشفى او بنك دم او افراد لادارة عملية التبرع بدون قيود.

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
كلية دجلة الجامعة
قسم علوم الحاسوب

نظام بنك الدم المعلوماتي

هذا المشروع مقدم الى قسم علوم الحاسوب / كلية دجلة الجامعة كجزء من متطلبات الحصول على درجة البكلوريوس في علوم الحاسوب

معد من قبل

مصطفى صابر مهدي
مصطفى سمير هاشم
محمد نذير احمد
محمد طلال سهيل

بأشراف

د. سنان صالح

حزيران، 2021 – بغداد

Republic of Iraq
Ministry of Higher Education and Scientific Research
Dijlah University College
Department of Computer Science

Design and Implement a Car parking Application

A Graduation Project Submitted to the Department of Computer Science / Dijlah University College as a Partial Fulfilment of the Requirement of the BSc. Degree in Computer Science

By

Sajad Basim Mohammed

Mohammed Abdul-Kadhim Lahmoud

Mohammed Zuhair Dia

Ali Amer Abdul-Majeed

Supervised By
L. Zinah Tareq Nayyef

Baghdad - 2021

Dedicate

To the man of advice and wisdom,

…Dear father

The Torch of Love and Hope …Dear Mother

Brothers and Sisters with My Great Love

To all who gave us advice and assistance to the realization of this Project

Supervisor's Certification

I certify that the preparation of this graduation research project titled "**Design and Implement a Car parking Application"**/ Department of Computer Science / Dijlah University College in partial fulfillment of the requirements for the degree of BSc. In Computer Science.

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Signature:

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Date: / / 2021

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Date: / / 2021

Abstract

To this day people are still using manualparking systems, which consists of many problems for example, looking for free space in a parking lot without any prior knowledgeifthe parking lot is full or not, which leads to wastage of time and fuel. Safety of vehicle is also an addressable issue. Keeping these in mind, we are proposing an automobile parking system application. Through this system, drivers will be able to know if there are vacant parking slots or not.

This application solves the aforementioned problems, by helping the user to locate free parking areas, locate the place of the parked car, and manage the parking fees.

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Chapter One

An Overview

Chapter One

An Overview

1. 1 Introduction

In the past few years, cities in all countries are experiencing a huge growth in the number of cars used for transportation. A general trend toward increased mobility and the concentration of shops and restaurants in malls have created parking problems and traffic jams. Frustration with parking is a major concern for all stakeholders involved. Parking Management Systems developed to help people find parking spots quickly, thus reducing traffic jams and the resulting frustration, and enhancing the visitor's experience [1].

1.1.1. Mobile Application technologies

One of the advantages of using smart applications is that they are usedin thecontext of e-government to submit complaints and retrieve local data, and tofollowthenewsthroughsocialtools.
SuchasTwitter,Facebook,andYouTube.Swiftadvancesinmobilecommunicatio ntechnologyhavespawnedalmostunlimitednewmobileapplications.Mobileapp licationdevelopmentisanextremely well growing industry across the globe that created new opportunitiesof modern businesses and pioneered new technologies in the area [2]. In order to buildhighqualitymobileapplications, it isimperativetounderstandthekeycharacteristics that define mobile applications, which if wisely considered andimplemented, canfacilitatethedeliveryoftrulyexceptional, valuableanduser friendly mobile apps that satisfy users' needs. Only few scientific publications canbefoundwhichspecificallyidentifythekeycharacteristicsandwhatmakesmo

bileapplicationsdifferentfromtraditional software. The key characteristics that differentiate mobile applicationsfromtraditionalonesintothreecategories:Hardware,Software(applicationinteraction,applicationdevelopment,andapplicationsecurity)and Communication [3].

1.2. The Aim

This application provides user an easy way of booking the parking slots through an application. To avoid the problem of traffic conjunction in commercial areas that unnecessarily consumes time, this project provides the easy reservation system for parking. In this application the user can view various parking slots and check for the availability of slots. The users are able to use this application when they enter the mall. They can locate free parking spaces, check the parking fees, locate their cars, and even pay using the mobile application.

1.3. Statement of Problem

Car parking may be considered a problem, especially in the big cities. Unorganized parking systems are time wasting and cause traffic jams. When a customer visits a mall or a center it may take him/her a long time to locate free areas. Later on, after spending a couple of hours in the mall or center, it may be a difficult task to relocate the parked car. Moreover more time is needed to pay for parking fees because of the long waiting queues. Accordingly, there is a need to create and design a parking management system using mobile application.

1.4. Main Concepts and Technologies

A.Mobile Device

A Mobile Device is a little electronic device that possesses almost (if not all), the functionalities of a computer and may be used for many computing activities. Mobile devices often come with a touch screen or tiny keyboard as the input device. Well known 12 manufacturers of these types of devices are: Blackberry, Apple, Sony, Samsung, LG, Motorola, and HTC [4]. One major component of any mobile device is an operating system which interfaces between the hardware and the application software installed on it. Other conventional functionalities include: Bluetooth, Wi-Fi, and GPS that facilitate communication between a local mobile device and the internet or other similar devices. Multimedia functionalities are often embedded in mobile devices such as cameras for image and video recording, and they a real so powered with rechargeable lithium batteries.

B.Mobile Operating Systems

This is an operating system (OS) designed for a portable device such as mobile devices, smartphones, personal device assistants (or PDAs) and tablets. This type of OS often use the full functional design of computer OS with an addition of mobile features such as Bluetooth, touchscreen, Wi-Fi, etc. The two-tier design allows some possible vulnerability which can be exploited for malicious attacks [5].

C. Mobile Application Development

Mobileapplicationdevelopmentisadevelopmentmethodusedtodesignapplicationsforsmall,portableandwirelesscomputingandcommunicationThe reared 3 main type so smart phone applications and theyare as follows [6]:

1-Native

It is the type that writes in the languages stated from the main platforms(Android and iOS), which allows the application to deal

harmoniously with all components of the phone quickly and efficiently and raises applications after programming on Google and Apple stores.

2- Hybrid

It is the type that writes with some libraries and different frameworks that allow taking some features of Native applications as well as some features of webapplications,andraisesapplicationsafterprogrammingonGoogleandApples tores.

3- Web /HTML5

It is the type that is written in the programming languages of web applications, taking into account the appropriate display of applications on smart phones.

D. Mobile Application Platforms

The development of mobile phone applications was a very challenging task about a decade ago. The issues are [7] [8]:

- Urgent market demands with short project timeline.
- Disjoint requirements across different mobile platforms.
- Portability a cross many platforms.
- Diverse standards and network protocols.
- Threat of change and introduction of new devices.

Astimepassed,manyoftheseissueswereovertakenbytechnologicaladvancement s.Mobileapplicationdevelopmentismoreimportanttotheenterprise than ever before. Development organizations are increasingly lookingfor a Mobile Application Development Platform (MADP) that can support theirneedsforbothcurrentand future projects.

Quite a number of development platforms exist for mobile application can beperceived as operating systems forthemobile applications.Essentially, these platforms provide the core mobile software for mobile devices.All other

mobile applications are developed over this underlining core software direly on rules set for development on the platforms. Each platform is unique andexhibits different features, capabilities and behavior based on the specificationsandfunctionalitiesrequiredbythedevelopersoftheplatform.
Therefore,platform for specific mobile application development has to conform to the rules stipulated for its environment. Some common examples of mobileapplicationdevelopmentplatforms are:

1. **AndroidMobileOperatingSystem**

The Android platform is a mobile device platform/operating system based onLinux. It is a free open-source mobile platform which is made available for use onany form of smartphone developed by any manufacturer. Due to its open-
sourceimplementation,Androidframeworkallowshardwaremanufacturerstobu ildcustomizeduserfriendlyinterfacestosuittheirindividualrequirements [9].However, the android platform ensures all applications developedhaveequalaccesstomostof the core applications and hardware functionalities of the device. This allows formaximum exploitation of the Android-handset combination. Android operatingsystemsuiteprovidesmemorymanagement,processmanagement,net workmodel, driver model, security and an abstraction between mobile hardware andthe higher level mobile device applications.

2. Apple iOS mobile operating system

iOS is a proprietary operating system developed solely for Apple mobile devicessuch as the iPhone, iPod touch, and the iPad. The iOS mobile platform comes with13advanced features of Voice over IP, multitasking, threading, folders, a unifiedmailbox and other features. iOS provides a set of well-defined system interfaces for/ developers to write mobile applications t/hat

can be integrated into theApple devices [10]. The iOS uses a layered system architecture with lower and higherlevel layers. The lower layers contain fundamental services and technologies.Higher-level layers build upon the lower layers and provide more sophisticatedservices and technologies with object-oriented abstractions that make it easier towrite application codes for IOS [9].

1.5.Programming and Implementation Tools

Thetoolsusedtodevelopthisprogramareandroidstudiotodatabaseweusedfirebaseviathecloudfirestore.

1.6.The GRP Outline

The rest of this graduation research project (**Design and Implement a Car parking Application**) is composed of three major parts, the importing of necessary theoretical background, the developing of concepts and techniques (where the majority of the work has been done), and at least the conclusions and recommendations for the feature works. The general roadmap for the graduation research project is organized as follows:

- **Chapter 1:** Introduction to the graduation research project (**Design and Implement a Car parking Application**) is highlighted in the beginning of this chapterand it ends with the scientific contribution.
- **Chapter 2:** In this chapter, the proposed system is designed to achieve its goal.
- **Chapter 3:** Introduces the implementation of the designed system, Which is given in details in chapter two.

- **Chapter 4:** Presents some conclusions, some limitations and recommendations for future works that can improve and augment this graduation research project.

Chapter Two

The System Design

Chapter Two

The System Design

2.1. Introduction

The "Parky" application is based on the client-server architecture. The client is provided with an interactive Android based user interface for the process of pre-booking of parking slot and renting his garage as a renter. The server side processing will be enabled using (firebase). The client requests the server for locations where parking is available and the server responds with slots availability.Also,server offers the renter to rent his garage and make a way to earn money.

2.2. The Activity Diagram (AD)

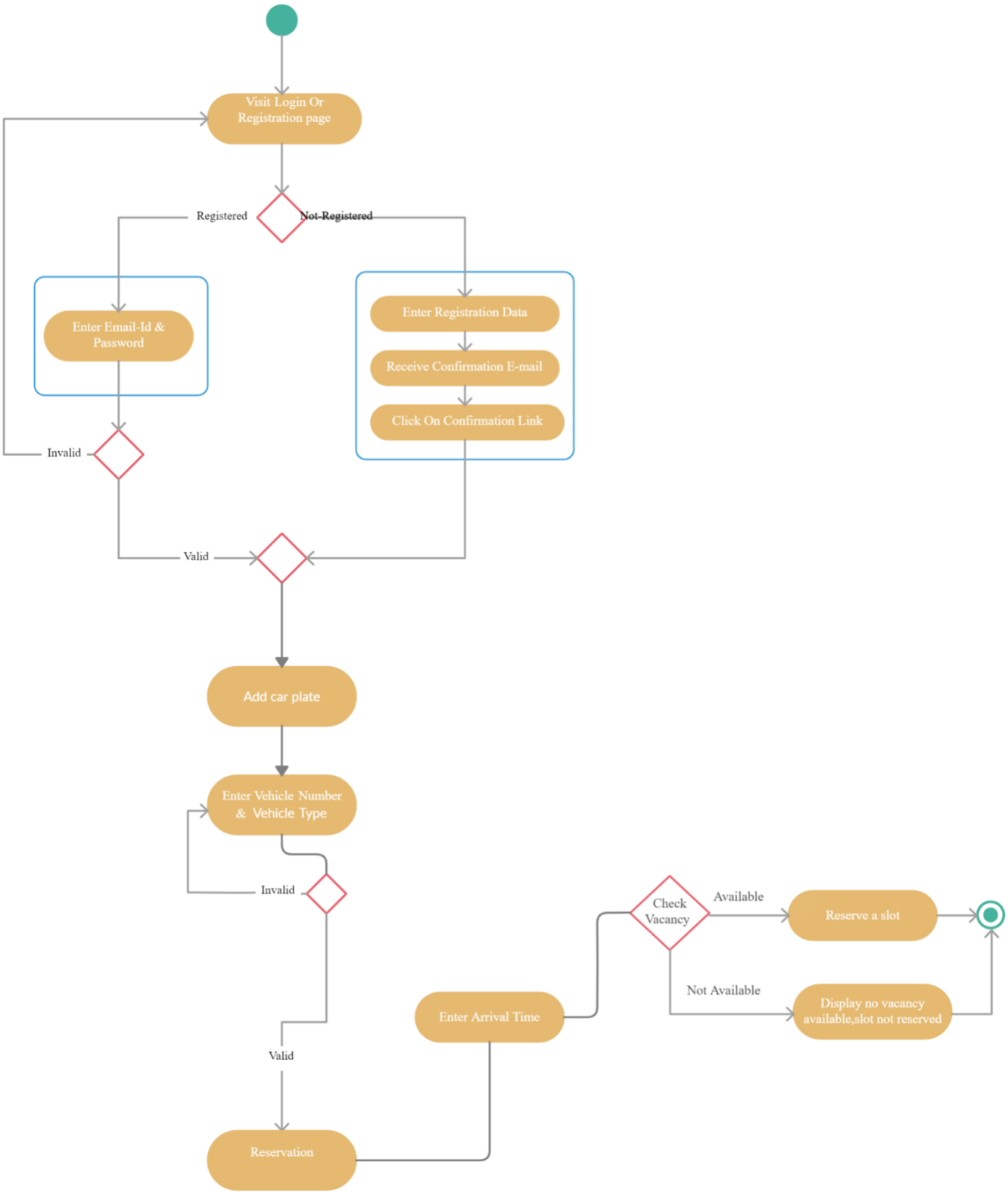

Figure (2-1): Activity Diagram

Chapter Three

The Implemented System and Tests

Chapter Three

The Implemented System and Tests

3.1. Introduction

The aim of this chapter is to describe the implementation of the design system, which was given in details in chapter two. The system requirements and the implementation toolset are discussed also.

3.2. The Implemented Toolset

The tools that used for implementation range from programming languages and data manipulation language to implementation tools, as shown in brief in section (1.6). The following are the programming and implementation tools in details:

1. Android studio.
2. Database we used firebase via the cloud fire store.

3.3. The Implemented System

The Figure below shows how the system work and the stages for customer (owner of car and owner parking place) include:

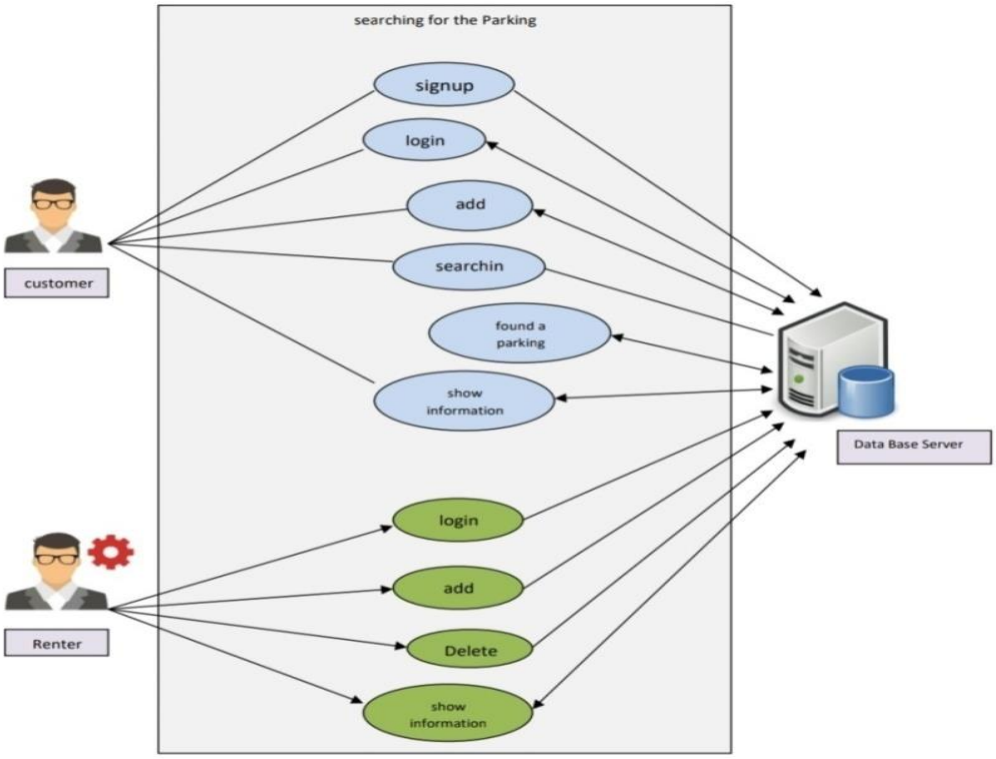

Figure (3-1): Application works.

3.4. The Interaction with The Implemented System

In order to test the implemented system. Figures below depict a typical interaction of user with the implemented application.The user needs to install the “Parky” application on his Android based device. After installation, the icon of the app will feature on the Home Screen of the user’s device. “Parky” Home Screen will be flashed to the user on opening the application.

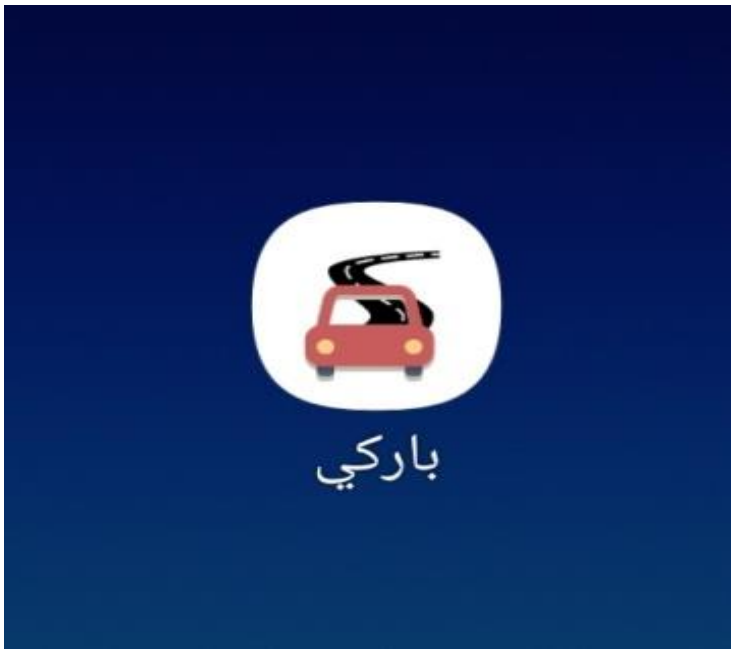

Figure (3-2): Application icon.

Figure (3-3): Application interface.

- **Registration**

Initially, the user has to register his details with the application for the first time. This is a one-time registration. The user has to enter details like mobile no. as username, name, email-id, ate etc.All this data will be stored on server and confidentiality will be ensured. User can then book slot and also rent garage slot using same registered account. We use Google's firebase authentication system to send verification emails and verify.

Figure (3-4): Registration.

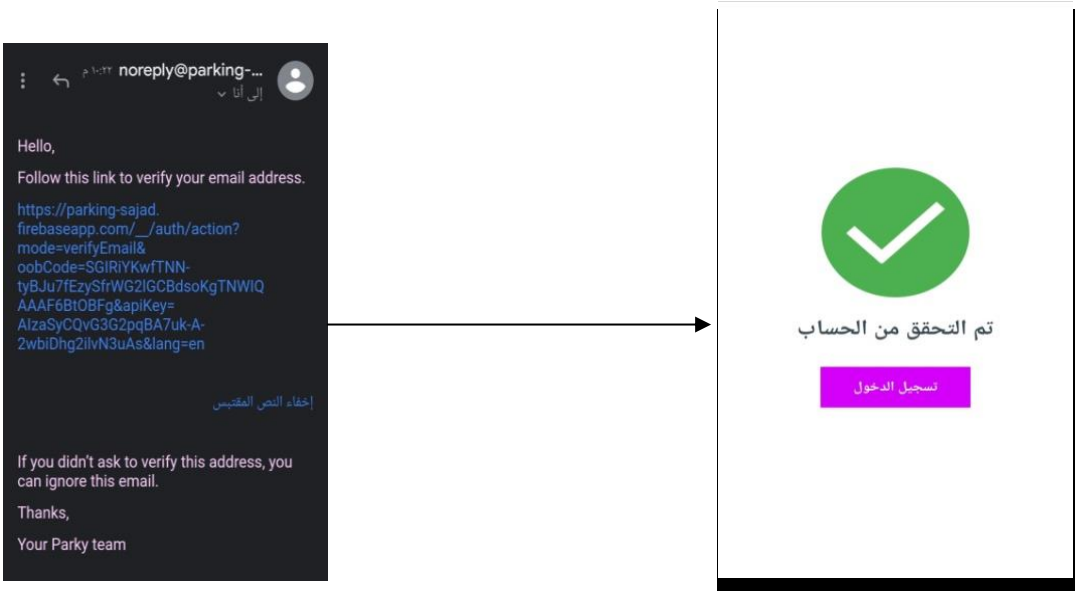

Figure (3-5): a. Verification EmailFigure (3-5): b.Email Verified

- **Login**

Once the user registers, he can use his mobile number to login in future. This authenticates the user. After login he can see his profile, history, available garages, vehicles information etc.

Figure (3-6): login.

- **Home**

From this window user can go to add garage, vehicle or search for parking location, see ongoing status, notifications and logout**.**

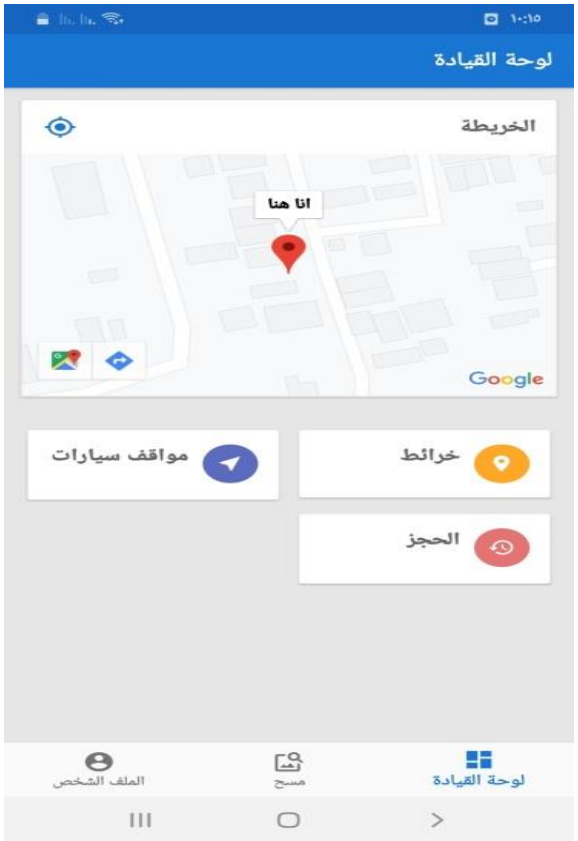

Figure (3-7): Home.

- **Scan**

First, you must add your car plate and the rest of the data by scanning, as shown in the figure below.

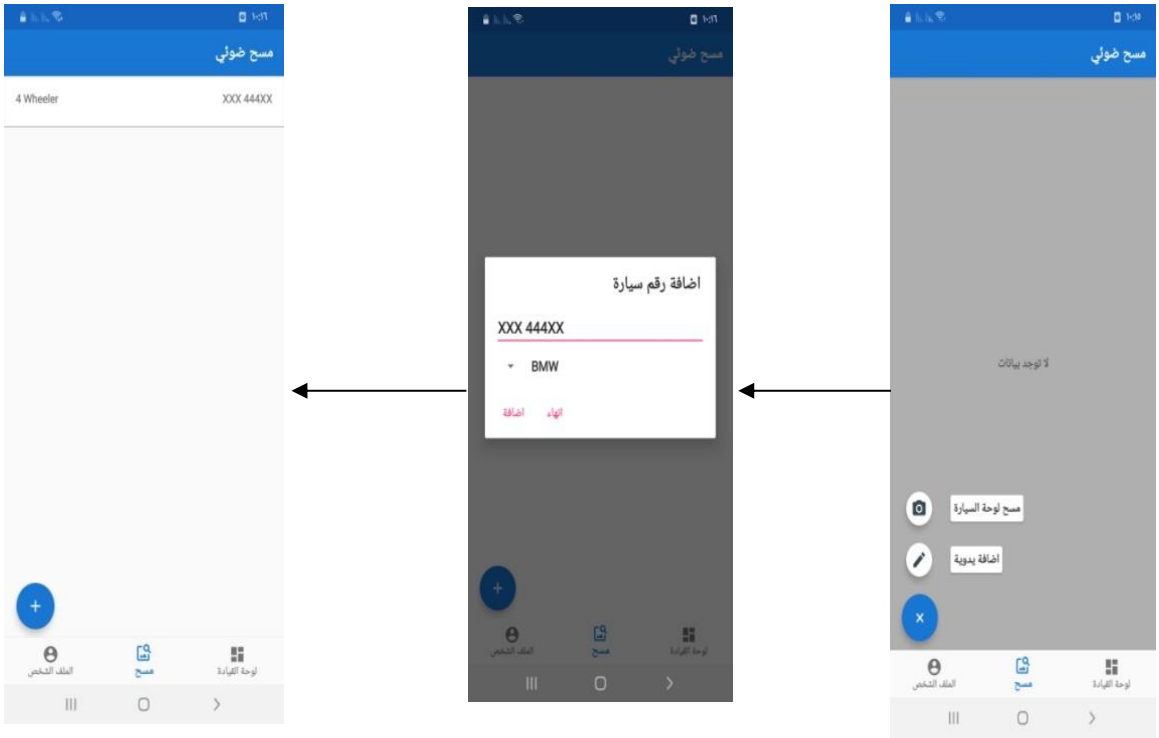

Figure (3-8): Scan.

- **Dashboard**

The dashboard consists of three icons (maps, parking, and reservation). First, through Maps, you can find the nearest car park to you and book. As shown in Figure (3-9).

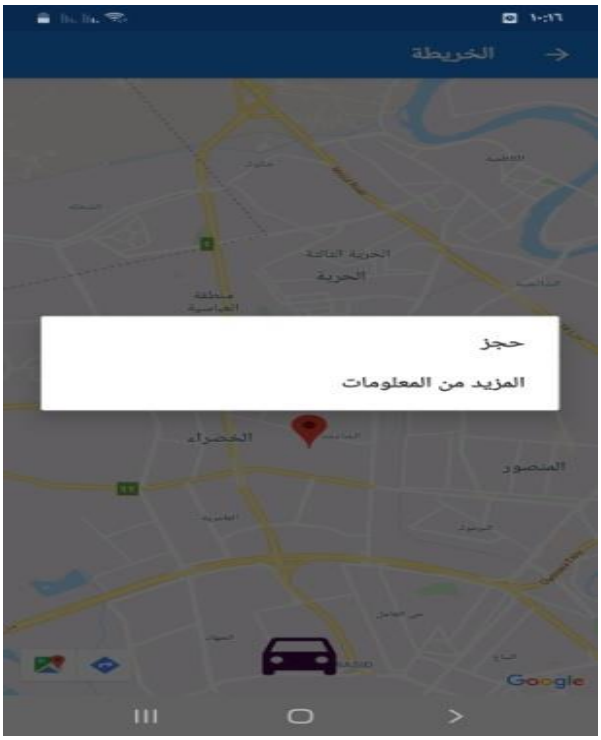

Figure (3-9): Reservation.

When you select the nearest suitable car park for you, click on “Reserve” to be directed to the reservation window as shown in Figure (3-10).

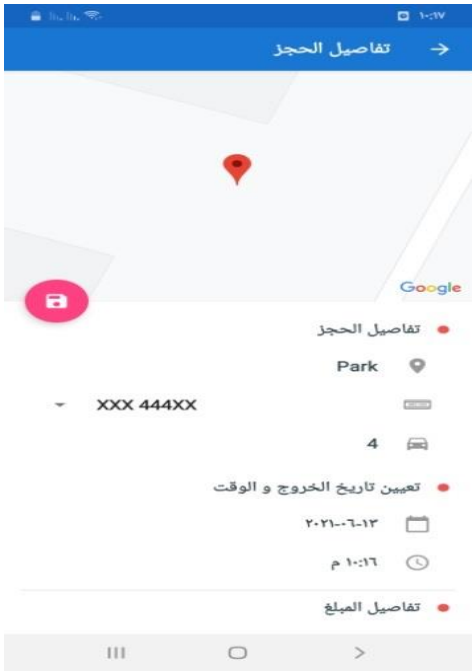

Figure (3-10):Enter reservation information)

Through the window in Figure (3-10), enter your data such as the license plate, the date and time of the reservation, and when you press the save icon, the amount of money will be deducted from your account and the reservation will be completed successfully. When you return to the control panel and go to the reservation button, you will find your reservation as shown in Figure (3-11).You can also find your car park by searching through the car park control panel and searching as shown in Figure (3-12).

Figure (3-11): Date of Reservation.

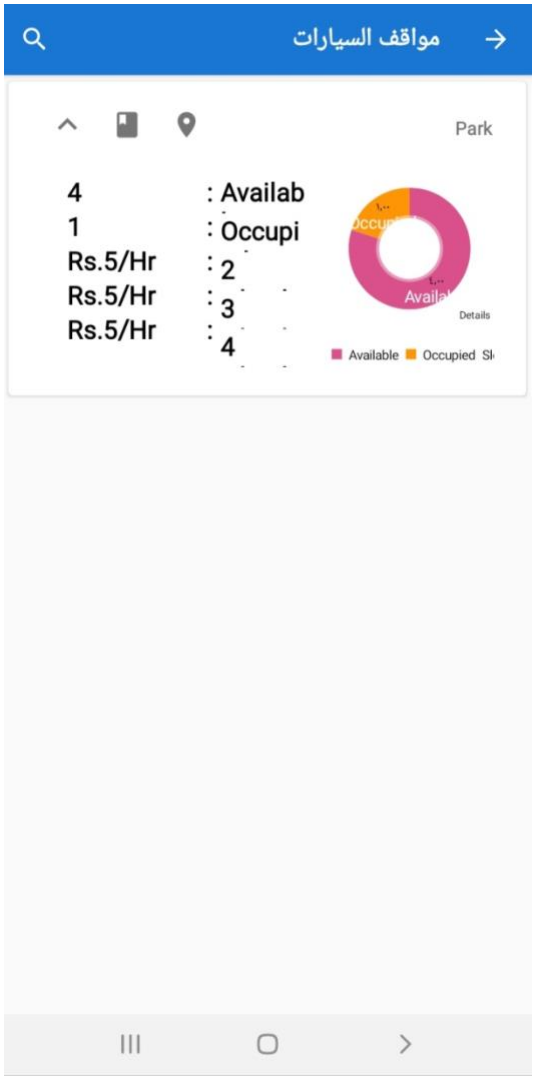

Figure (3-12): car park list.

Chapter Four

Conclusions, Limitations and Future Works

Chapter Four

Conclusions, Limitations and Future Works

4.1. Conclusions

For this graduation research project (GRP), many points which are certain significance are drawn and concluded from this work, themostimportantof them:

Car Parking System using mobile app is a prototype of a parking and event management system. It consists of a mobile web-based application, the server containing all parking-related information, and database. This project facilitates the parking process, reduces traffic and saves time. Moreover, Parking Management System could be modified in such a way that it can be adapted to other places as universities, institutions and other kinds of organizations on different geographic areas with more features to benefit from.

4.2. Limitations

One of the most important reasons for the incomplete project is time and we do not have enough experience in the world of applications because it is the first application that we have developed.

4.3 Suggestions for Future Works

The designed and implemented system presents many fruitful lines of continued graduation research, and opens the door to a range if future work, as listed in the following:

1. Messages: Talk to the owner of car park via the app

2. Website for the application
3. Connect the application with sensors capable of determining the presence/absence of a car. These sensors status is sent to a database using the Arduino Mega 2560 microcontroller and a W5100Arduino Ethernet shield.

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الخلاصة

حتى يومنا هذا ، لا يزال الناس يستخدمون أنظمة وقوف السيارات اليدوية ، والتي تتكون من العديد من المشاكل على سبيل المثال ، البحث عن مساحة خالية في موقف للسيارات دون أي معرفة مسبقة إذا كان الموقف ممتلئًا أم لا ، مما يؤدي إلى إهدار الوقت والوقود. سلامة السيارة هي أيضا قضية يمكن معالجتها. مع وضع هذه الأمور في الاعتبار ، نقترح تطبيق نظام وقوف السيارات. من خلال هذا النظام ، سيتمكن السائقون من معرفة ما إذا كانت هناك مواقف شاغرة أم لا.

هذا التطبيق يحل المشاكل المذكورة أعلاه ، من خلال مساعدة المستخدم على تحديد أماكن وقوف السيارات المجانية ، وتحديد مكان السيارة المتوقفة ، وإدارة رسوم وقوف السيارات.

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
كلية دجلة الجامعة
قسم علوم الحاسوب

تصميم و تنفيذ تطبيق مواقف السيارات

هذا المشروع مقدم الى قسم علوم الحاسوب / كلية دجلة الجامعة
كجزء من متطلبات الحصول على درجة البكلوريوس في علوم الحاسوب

معد من قبل

اسماء الطلاب

سجاد باسم محمد

محمد عبد الكاظم لهمود

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علي عامر عبد المجيد

بأشراف

م. زينه طارق نايف

2021 - بغداد

Republic of Iraq

Ministry of Higher Education and Scientific Research

Dijlah University College

Department of Computer Science

Design and Implement an eLearning Platform

A Graduation Project

Submitted to the Council of the department of Computer Science as a Partial Fulfillment of the Requirements for the Bachelor Degree in Computer Science

By:

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2021 A.D 1442 A.H

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Abstract

MOOC stands for Massive Open Online Course. They are distance-learning courses run online by many universities worldwide. Usually, they are open to anyone who registers. One single course may admit even thousands of students.

It is possible to study almost any subject through this method, and many of famous universities worldwide are now offering MOOCs. They can be treated as a standalone study for individuals interested in a particular subject matter.

MOOC Allow participating instructors to rethink their course. Typically, a teacher who has taught the same course for a few years has his lectures, syllabus, and material more or less set in stone. By joining a MOOC, teachers can look at their course with completely new eyes.

MOOC helps instructors by indirectly giving them teaching tips and ways to structure their course as well as directly providing them with knowledge they may not have known that they can apply to their own lectures.

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List of Figures

Chapter One

An Overview

1.1. Introduction

"Cademe" /**Kædɪ**:**mɪ**/ is an Iraqi Massive Open Online Course (MOOC) provider aimed at professional adults and students. It was founded in September 2020.

With the development of Web internet technology, an increasing number of teaching functions can be implemented via this network platform. Thus, MOOC emerges at the request of higher education development. With the high-speed development of internet information technology, MOOC has developed into a modern online network education platform which integrates multiple functions. MOOC is a shortened form of Massive Open Online Course, where M represents Massive. The word "Massive" means the large number of users who use this online educational platform. Through this platform, anyone can learn relevant knowledge with the corresponding account. The first O represents Open. Open means anyone can participate in the course on the platform. The second O represents online. Online represents the most outstanding feature of MOOC platform – online teaching through the internet, we can learn corresponding knowledge anytime anywhere. And lastly C represents Course.

"Cademe" platform is an important foundation of MOOC teaching. The students only need to register an account and log in the account so as to select and learn corresponding courses. On "Cademe" platform, each course is maintained by the corresponding teacher. Also, teachers can provide such services as teaching and answering questions. Therefore, "Cademe" platform is highly opened with the function of multicourse management. A large number of students can learn online simultaneously.

1.2. The Aim

“Cademe” has come a long way from its beginnings in Zain Iraq Summer Training. When “Cademe” first started out, her passion for education development for Iraqi youth, drove her to develop a platform so that “Cademe” can offer “Best courses from the best teachers”. We now hope to serve students all over Iraq, and are thrilled that we’re able to turn our passion into our own website.

Our goal is to gather a large number of specialized teachers in various fields to provide effective educational content, and to create an integrated environment in which the teacher communicates with his students directly and in real time.

1.3. Background of the Problem

There are many problems that led to the creation of "Cademe" some of which:

- There is no integrated educational platform in Iraq that provides educational courses for all age groups and various specialties, in addition to the absence of a platform that experienced people can provide their experiences to spread knowledge.
- Another problem is most of the courses that are available on some platforms are weak in terms of the quality of video and audio filming and the quality of education.
- Finally there is no communication and follow-up by the teacher to the students, and the teacher cannot test the students in the scientific content.

1.4. Possible Solutions

“Cademe” platform provides the best learning lessons by the best teaching staff with high-quality, well-recorded and fast-accessible videos to facilitate the studying process. Also, “Cademe” platform provides a forum for communication between students and their teacher. The platform provides the possibility of making exams to

test and evaluate students to complete the rest of the course, the student can communicate directly with the instructor to meet his needs with the ability to rate the videos and the course in general.

“Cademe” is also Multi-Vendor which means it provides an opportunity for experienced people to create original content according to their specialization.

1.5. Main Concepts and Technologies

“Cademe” platform includes five main functions: massive online student data management, independent course data management, pressure bearing design of course video, online test score statistics and title setting, and course resource data management. The five functions need to be operated by different roles. The administrator can operate user management and maintain public information of courses. Teachers can operate course video management, course outline management, course resource management and online test management. Students only own such rights as browsing, proposing questions and answering the online test questions. The integrated functions of “Cademe” platform are shown in Figure1. According to the five-dimensional evaluation model and design features of “Cademe”. The platform based on courseware storage system including the following four modules: user management module, course outline module, multimedia resource module, and test management module.

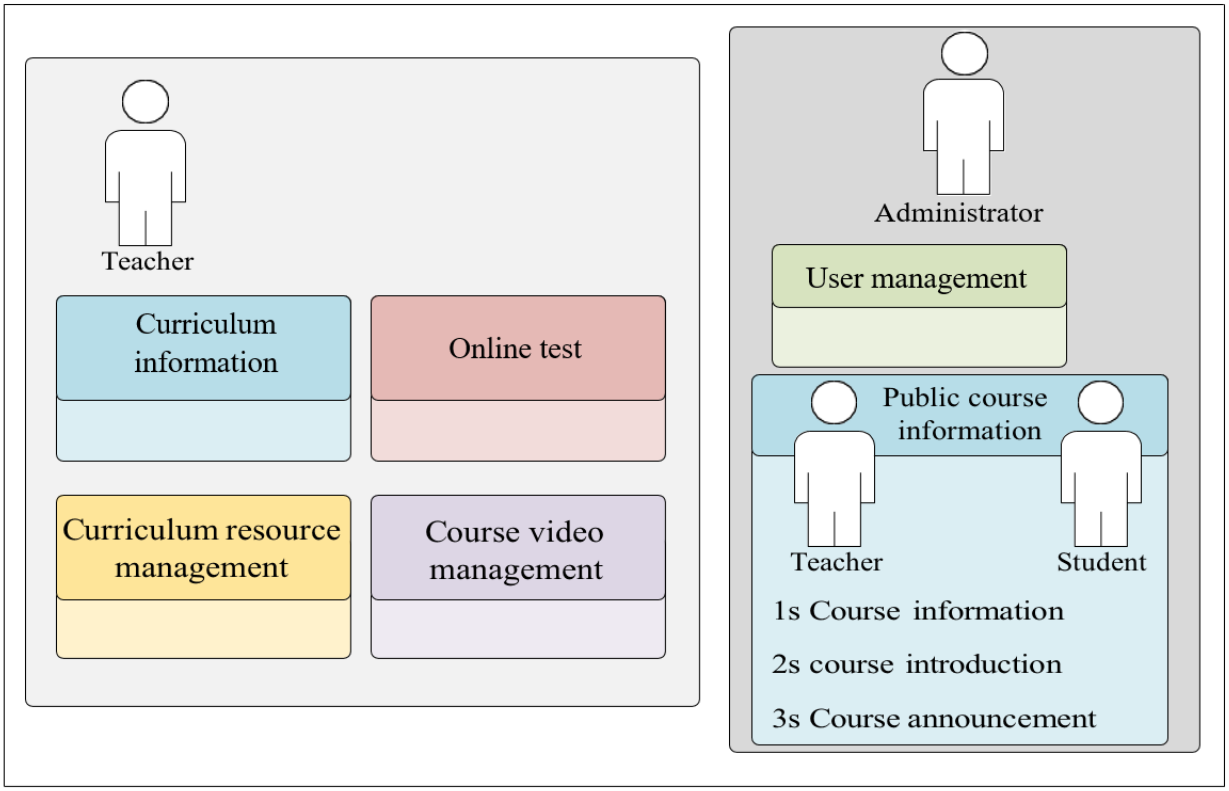

Figure 1. Integrated functional structure of “Cademe” platform.

1.6. Literatures Review

The term MOOC was coined in 2008 by Dave Cormier from the University of Prince Edward Island (Canada) and a senior researcher Bryan Alexander who worked in the Canadian Institute of Humanities Educational Technology Application. MOOC achieved unprecedented development in the United States in 2012[1]. In foreign countries, the design of MOOC courses is mainly divided into two types: First, centered on institutions with higher learning, popular courses in universities are published on the MOOC learning platform. Second, users can independently publish course on the MOOC learning platform to achieve the dissemination of educational resources.

Udacity, Coursera and edx are the major MOOC learning platforms established around universities. The user can publish the representative model of the course such as Udemy and P2PU. Borras-Gene O proposed the concept of gamification and MOOC integration in 2016 and applied it to the curriculum design. The research results showed that the combination of MOOC and gamification can improve the learning interest of course learners [2].

During the ongoing pandemic MOOC has gained so much popularity according to "Class Central". On March 15th, Class Central noticed a big rise in learners visiting their website. Since then, 15 million learners (and maybe even a few celebrities) visited Class Central to look for courses, sending 8.5 million clicks to MOOC providers [3].

1.7. Programming and Implementation Tools

Some of the tools that were used in creating "Cademe" platform are; "WordPress" as a basic element, and a hosting site was used which is "BlueHost" where all the databases were uploaded to it. Among the things that WordPress needs are plugins, as add-ons have been used by "LearnPress", which are considered essential to the educational platforms industry [4].

1.7.1 What is WordPress?

WordPress powers nearly one-third of the world's websites, from small personal blogs to the complex sites of major corporations such as Sony, Time Inc., the New York Post, and NBC. WordPress is only one of the site builders and content management systems that users can download and install for free, but it has unique features that make it the most popular content management system in use today [5].

1.7.2 Why WordPress?

WordPress tops the list of the three most often used site building packages in the world, followed by Joomla and Drupal.

Here's a look at a few key benefits of using WordPress:

1. Flexible and Adaptable for Changing Needs: WordPress sites can contain full-service e-Commerce stores, showcase a portfolio, or host a social network, group, or podcast. Whatever a company's requirements, the core WordPress package plus a variety of basic and premium plugins that are suitable for any site.

2. User-friendly even for Beginners: A WordPress site can be installed and up and running in a matter of minutes, even without any technical expertise.

3. WordPress is free and open source: WordPress can be installed free through WordPress hosting provider or uploaded directly from WordPress.org.

1.7.3 WordPress Implementation in Creating “Cademe”?

WordPress works with three primary languages that were used to create “Cademe” which are; HTML, PHP and CSS.

- HTML (Hyper Text Markup Language) is the fundamental language of the web. It’s a declarative language rather than a programming language, and also the web’s most important markup language.
- PHP (Hypertext Preprocessor) is a programming language that runs on a web server, the machine that hosts a website. PHP can perform all sorts of dynamic operations, and outputs HTML to send to the client’s browser at the end. PHP is the core language of WordPress.
- CSS (Cascading Style Sheets) is another declarative language: it’s a flexible, powerful, repeatable way to style-control the appearance of HTML markup.

Chapter Two

The System Design

2.1. Introduction

At the stage of preliminary preparation of the MOOC it is necessary to:

1. Identify the narrow and desired learning outcomes for students.

2. Provide a strategy for evaluating students and verifying the mastery of knowledge in accordance with specified learning outcomes.

3. Develop a sequence of tasks and actions that will support the student's actions in mastering the learning objectives (knowledge, skills, activity):

• Availability of content that will support active learning; model of activity / skills for students.

• Duration of the course; the course building from basic knowledge to higher order of skills, such as application, integration and analysis.

4. Ensure a balance between the presence of the teacher / instructor, social and expert cooperation, and the presence of cognitive challenges.

2.2. The Activity Diagram

There are two main types of activity diagrams on “Cademe” that can be performed, some of which:

1. Activity Diagram for Students:

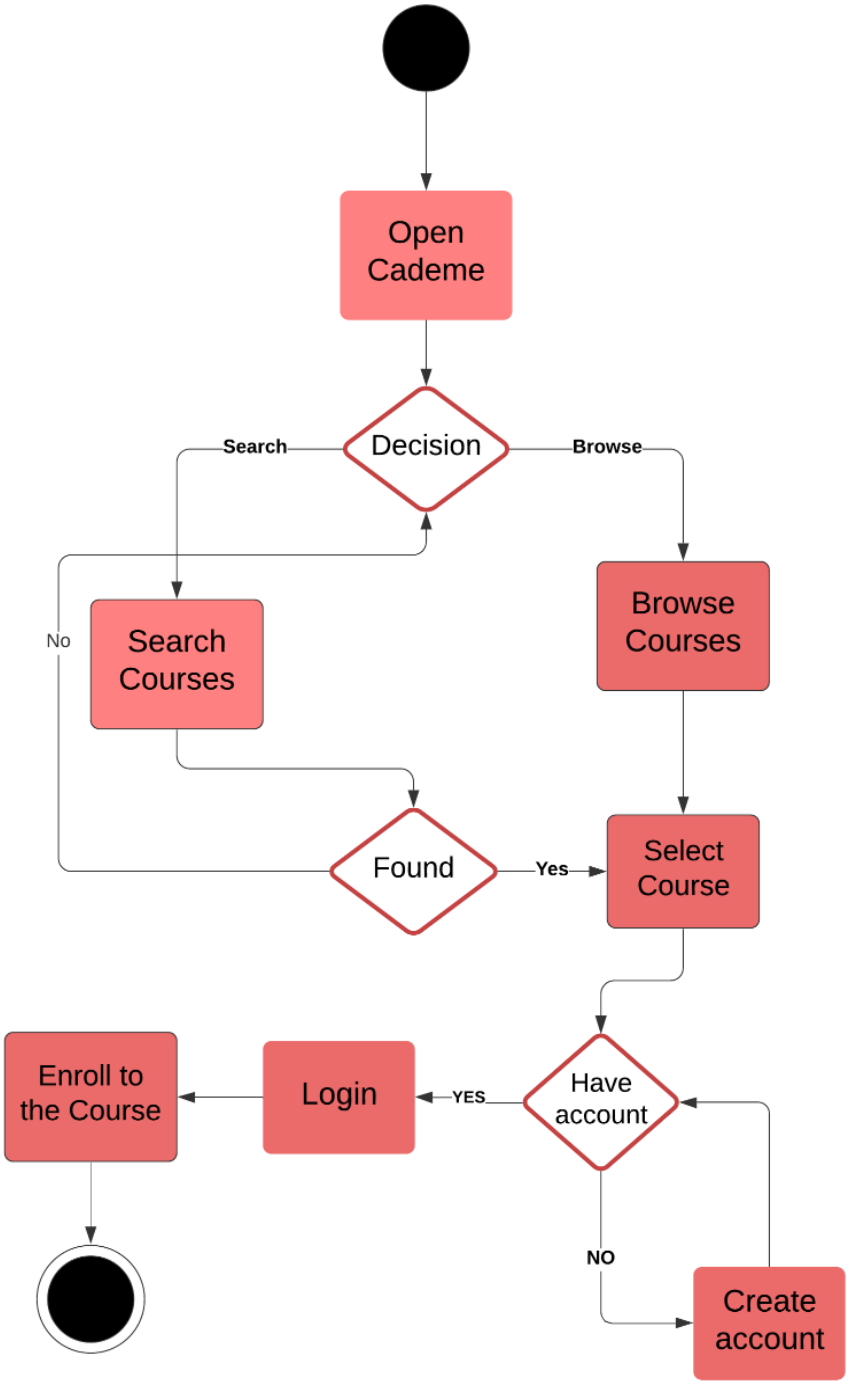

Figure 2. Activity Diagram for Students.

2. Activity Diagram for Teachers:

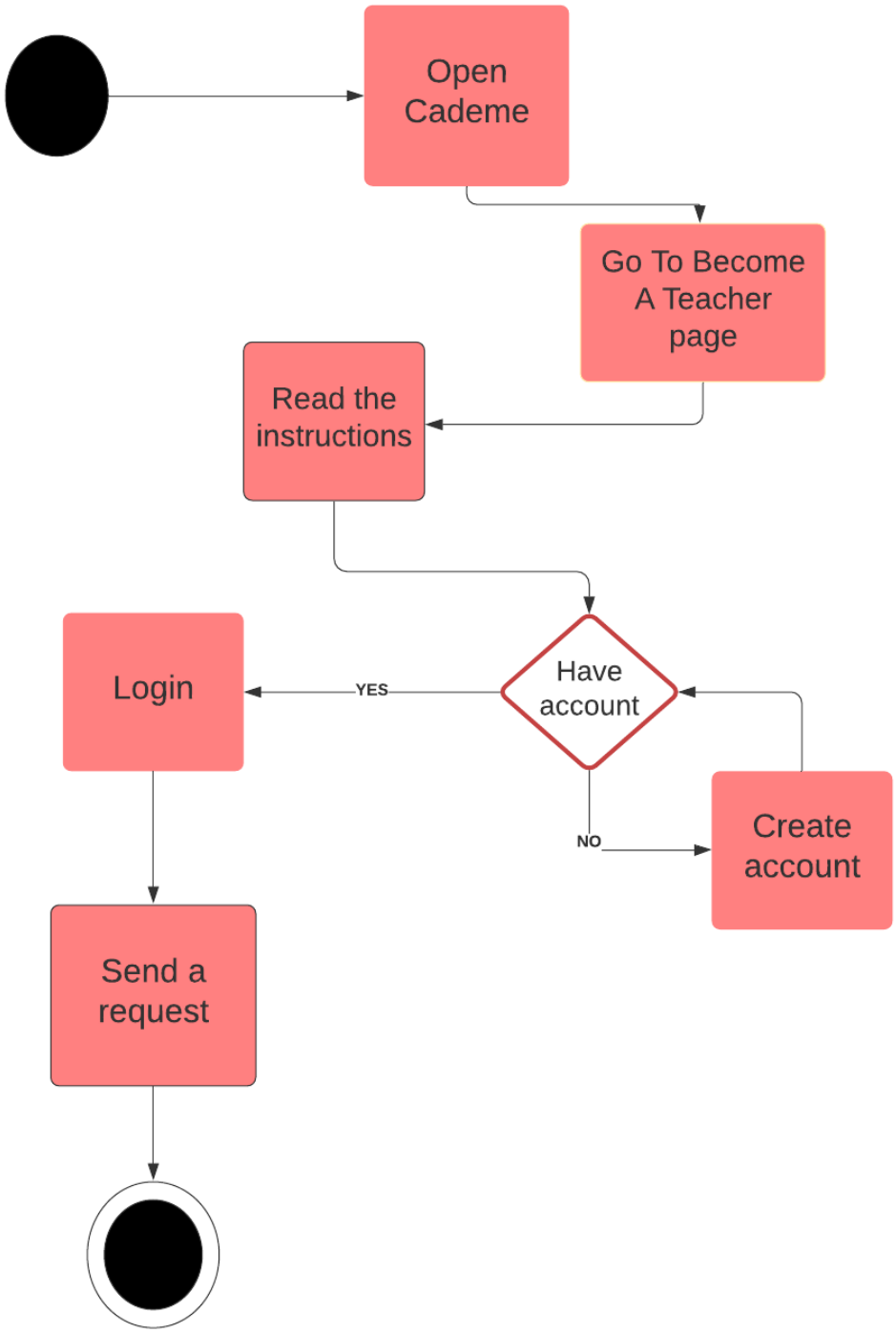

Figure 3. Activity Diagram for Teachers.

2.3. The Data Flow Diagram

"Cademe" system design is a personalized application for students to manage their course materials anywhere and anytime. The system is also user friendly and feature simple and easy navigation for students.

Figure 4 shows the physical structure of "Cademe" platform website while Figure 5 shows the system's data flow diagram. The system is equipped with an authentication process for security purposes. When an authorized user enters the system, the main page will be shown. There are seven navigational tab-bar buttons included such as Courses, Events, About Us, Blog, Contact, Shop, and Become a Teacher. The Courses button is for navigating to courses list page where all courses which have been registered by the user will be displayed in a table. After a user selects a course, Course details page will be shown. All functions to manage documents such as Upload, Edit, Delete, and Search are available within this page. The system has four different editors to upload and edit the respective multimedia documents such as text, image, audio, and video.

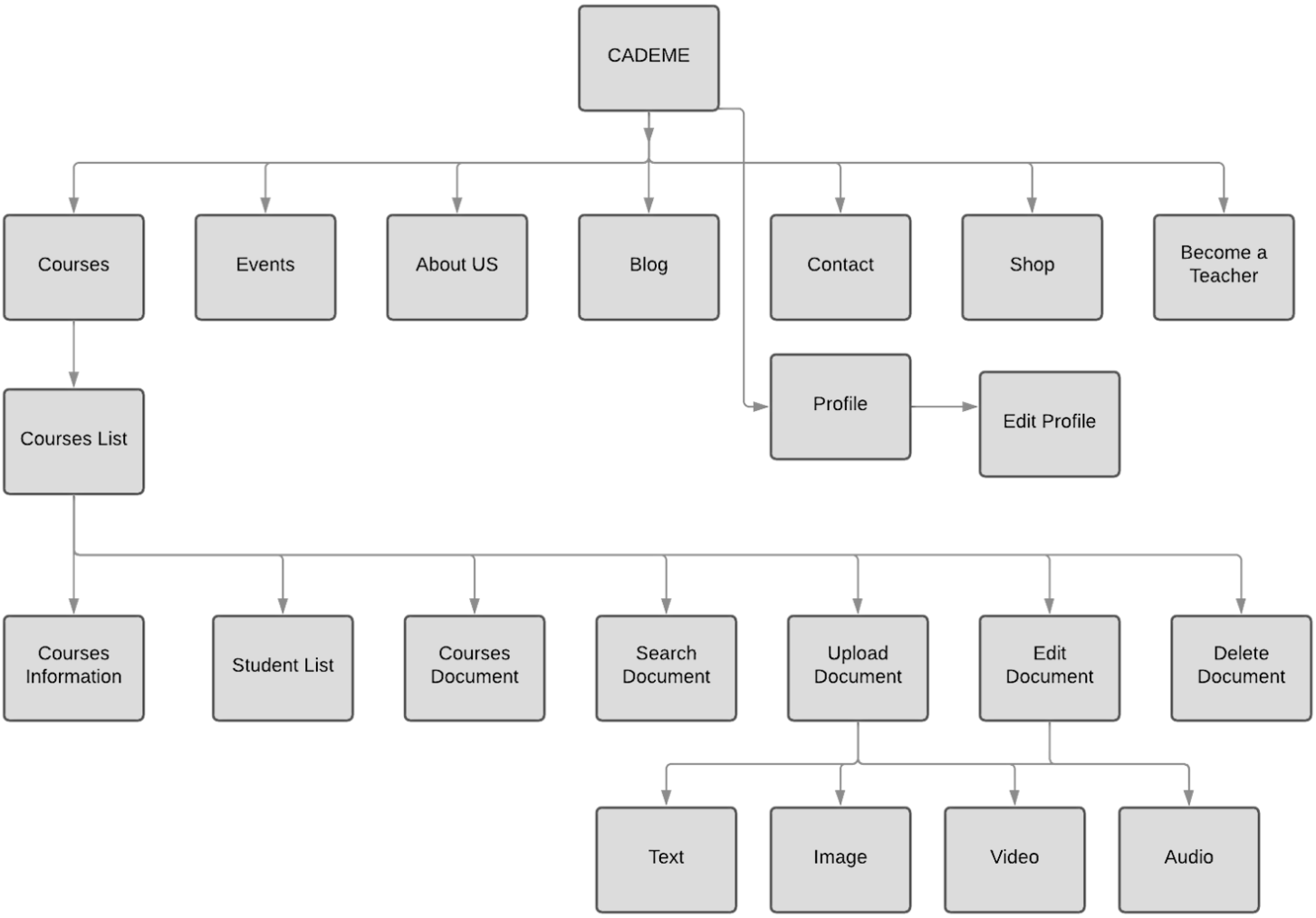

Figure 4. Navigation map of “Cademe”.

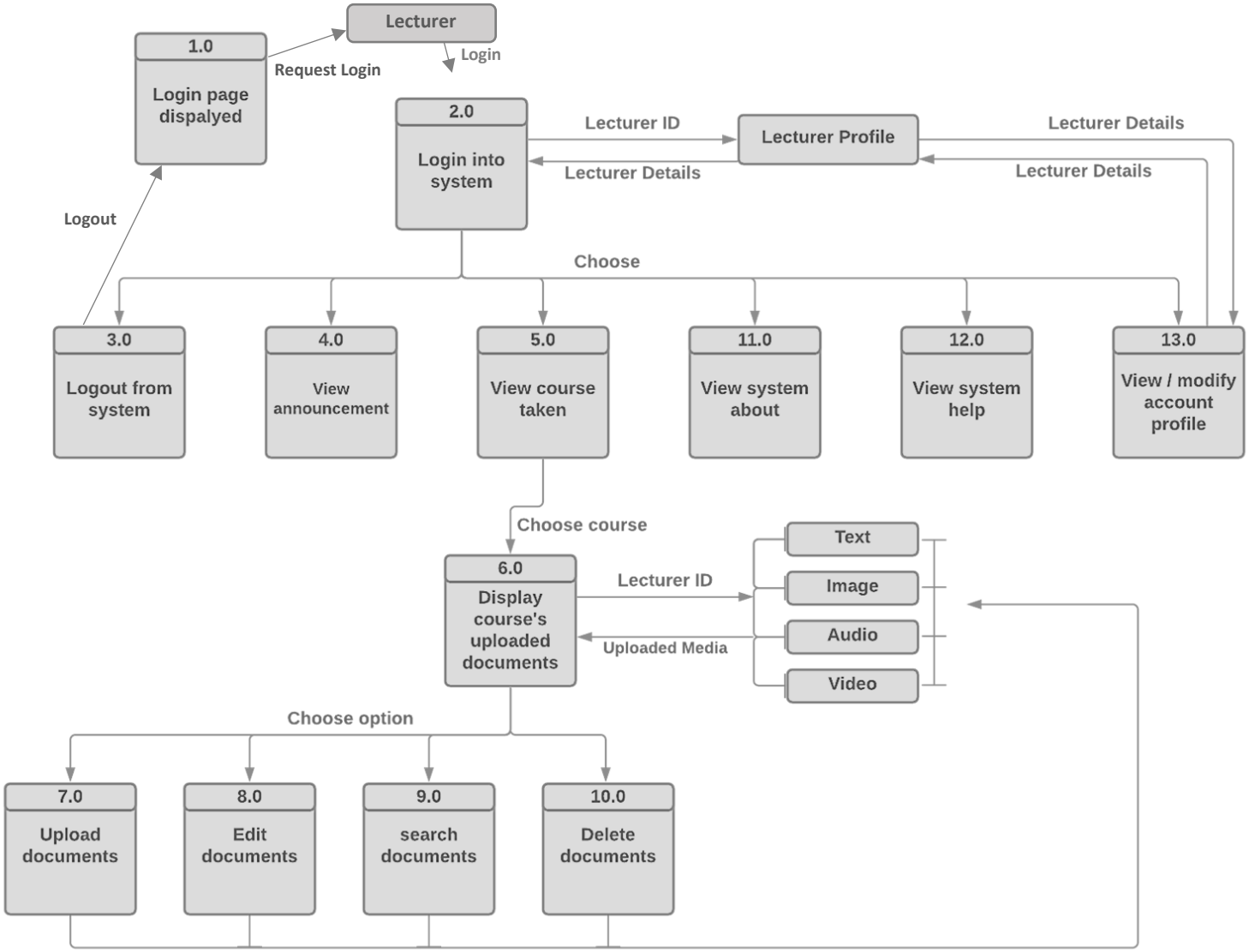

Figure 5. Data flow diagram of “Cademe”.

2.4. The System Architecture

Demand analysis of user management module. The administrator with three roles can manage teachers and students. Teachers can publish and set courses. Students can only browse course content and propose questions online. The three roles can visit the pages within the limit of rights.

Main interface design of the platform. Main interface layout of the platform is composed of navigation frame, top frame and main window frame. The top frame is mainly used to display the login information of users. The navigation frame is at the left side of the page, and it is mainly used to display the list of functions that users can operate. The left main window frame is mainly used to display the corresponding operation interface of each function.

Interface design of user management module. For the whole user management module, corresponding login interface is needed. After login succeeds according to the login type of users, the operation interface corresponding to user role will appear. The teacher is the course manager of "Cademe" platform. The administrator of "Cademe" platform owns the highest priority, and can manage teachers, such as adding, deleting and editing teachers.

Design of course outline module. This module design aims to display course publishing result and the concrete content of each page, including the corresponding results of chapters. Students can effectively confirm their learning contents according to the results. For "Cademe" teachers, course outline module contains such functions as course publishing, course chapter management, and course information editing and course announcement management.

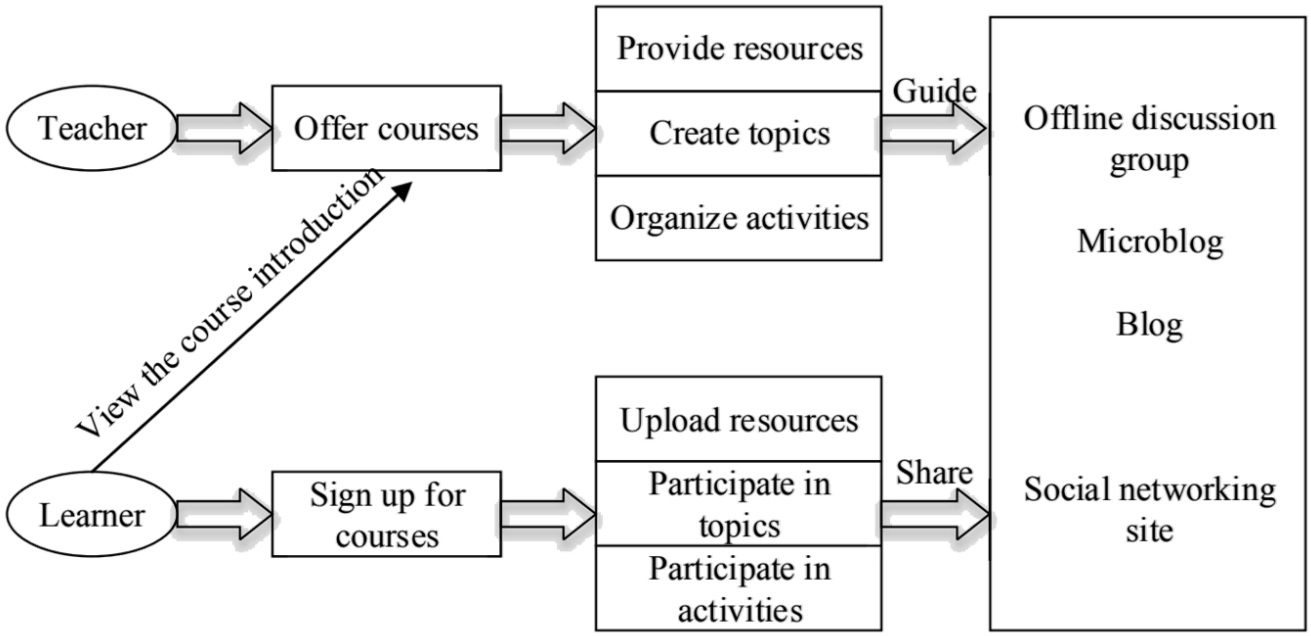

Figure 6. Teaching mode of “Cademe”.

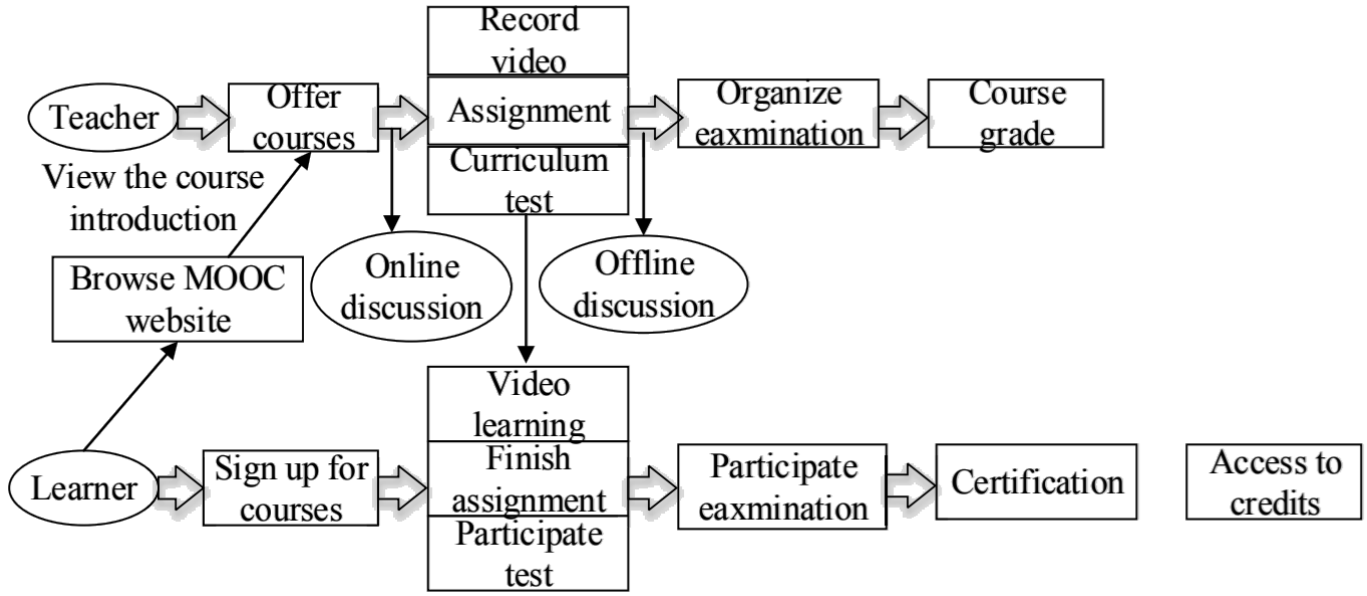

Figure 7. The System Architecture of “Cademe”.

Chapter Three

The Implemented System

3.1. Introduction

The presented study used qualitative descriptive methods to develop a learning model that complies with MOOC rules. The literature review is used to collect data from previous studies related to dimensions of online learning. The concept used in developing a MOOC-compatible learning model defines the relationship between previous studies and current learning development phenomena. This concept consists of 10 interrelated dimensions and it is divided into 3 categories: Learner Oriented, Communication, and Technology. These 10 dimensions are used to compose 49 questions in a questionnaire, which were used to support learning development. Questionnaire and interview were also used to collect data. The questions at this stage were aligned with the dimensions of learning. Convenience sampling was applied in order to select respondents to the questionnaire, which consisted of lecturers and learners with online learning experience. The electronic interview portion of the data collection was conducted to obtain input from learning developers at universities that implemented online learning.

In designing the learning model, the Unified Model Language (UML) was used and the model consists of a use case, activity diagram, class diagram, entity relationship, data flow diagram, and user interface.

3.2. The Implemented System's Requirements

In the figure below, there are 40 entities related to learning materials, learning process, and users. This design discusses the learning process of the duration dimension and its relationship to potential activities that learners can perform during learning, which are presented in Figures 8 and 9.

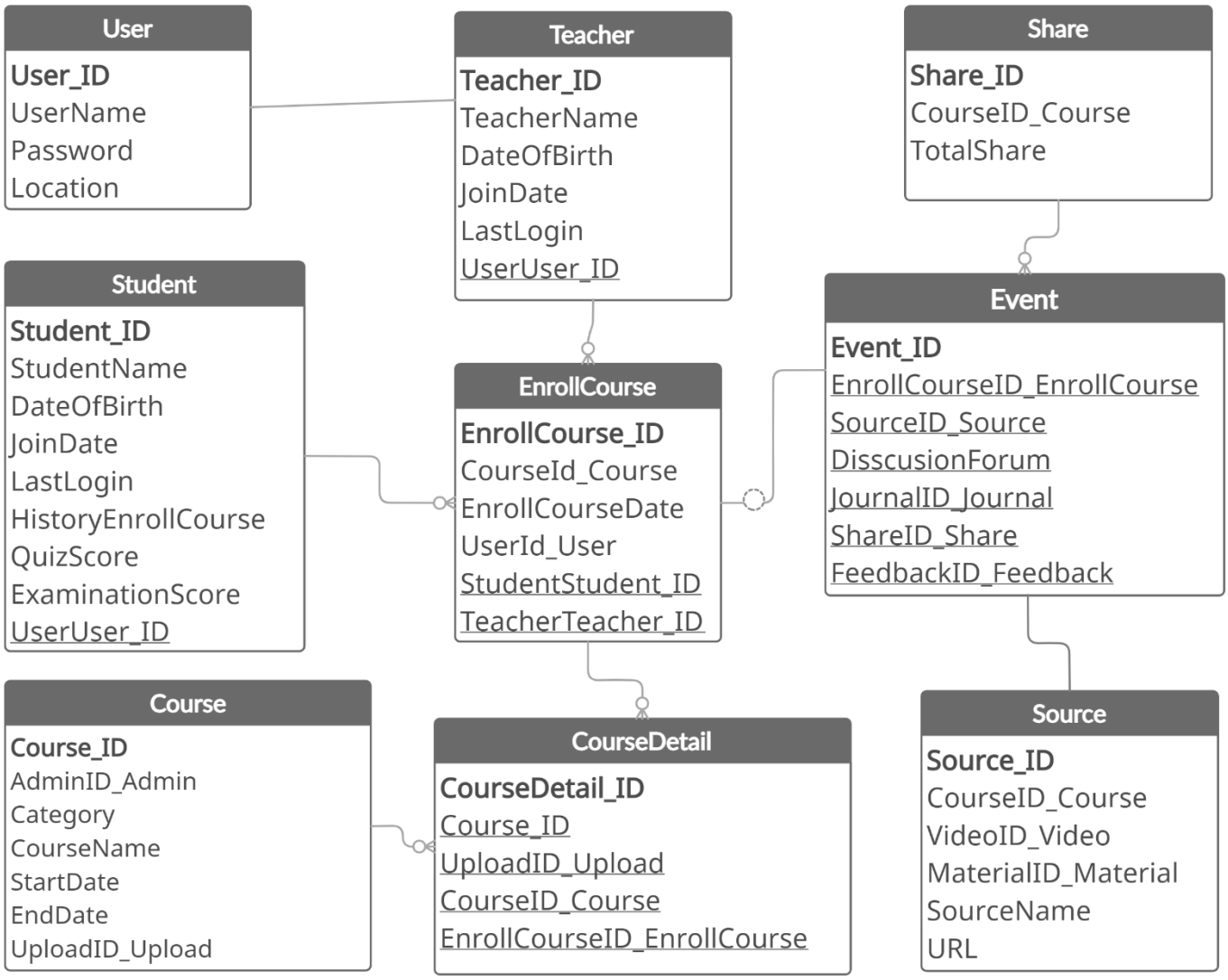

Figure 8. Entity Relationship Diagram (1).

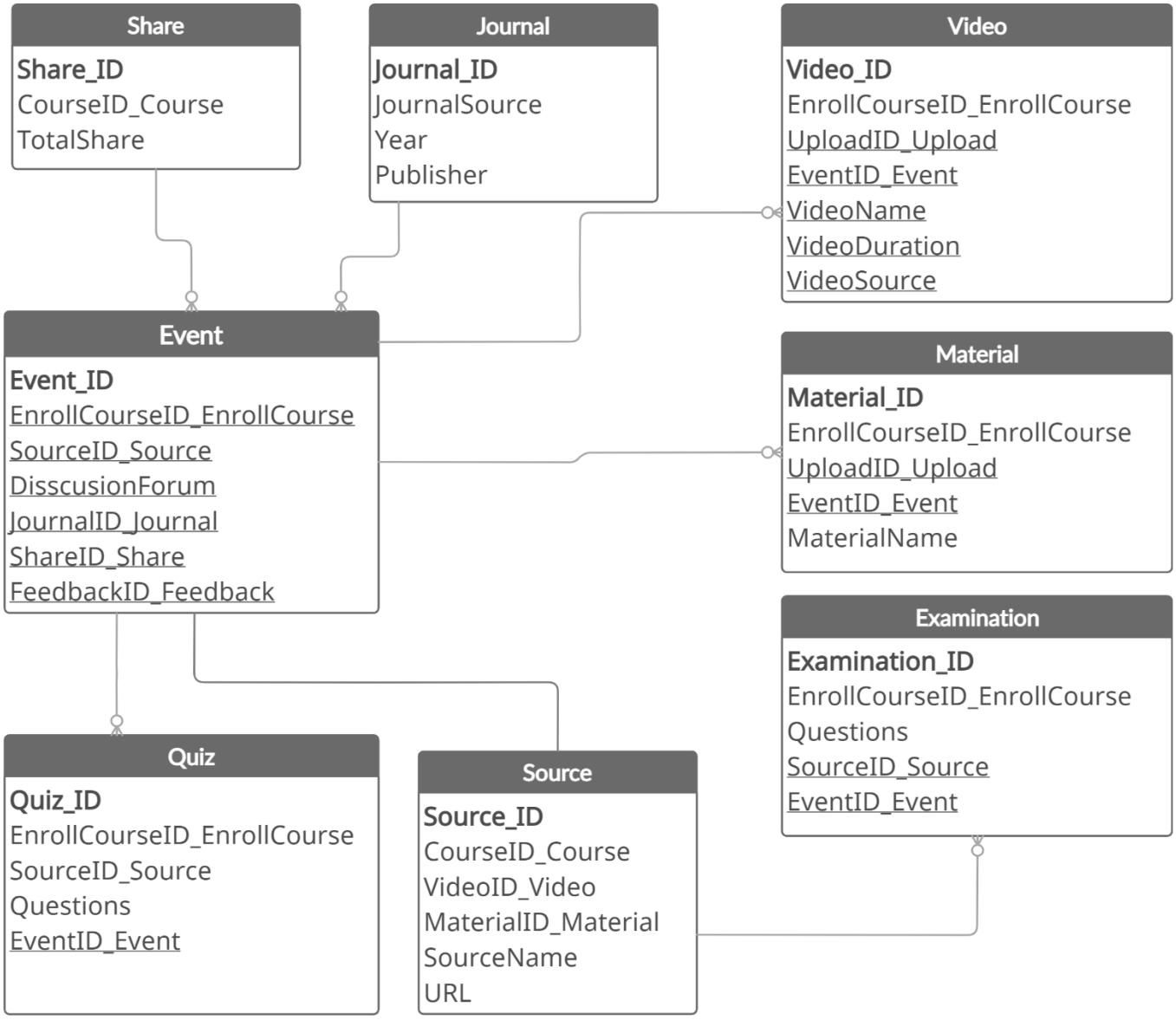

Figure 9. Entity Relationship Diagram (2).

The learning process related to user activities (shown in Figure 8) covered learner, teacher, course, enroll course, course detail, event, source, and share entities. 'User entity' stores data needed to log in to the learning system, while the detail is stored at entities based on their roles. 'Enroll course' and 'course detail' store data concerning learning. 'Share' stores data concerning sharing activities, 'source' stores data concerning source of material, and 'event' stores data concerning

learning activities, material name, duration between starting and accomplishment time (adjusted to the level of difficulty for each material based on 93% of respondents), and information about material log. ‘Source’ stores data concerning material resources that come from many other resources including its material access URL.

Figure 9 shows the relation between event entity and any activities that learners can perform. The Design in Figure 9 consists of journal, video, material, quiz, and examination entities. Those entities are related to event entity that covers all activities, duration, and frequency during the enrollment. Based on 93%, it is designed for users to access quizzes during the enrollment period with options to retake the quiz if results do not meet expectations.

3.3. The Implemented System

The results of this research are the MOOC system website called “Cademe”. Using the waterfall SDLC model, in the analysis phase, for level access control, users are divided into three levels of access, namely Student, Teacher, and Administrator. The three levels of access have different access control to “Cademe” platform as shown below in the use case diagram in Figure 10 and Figure 12.

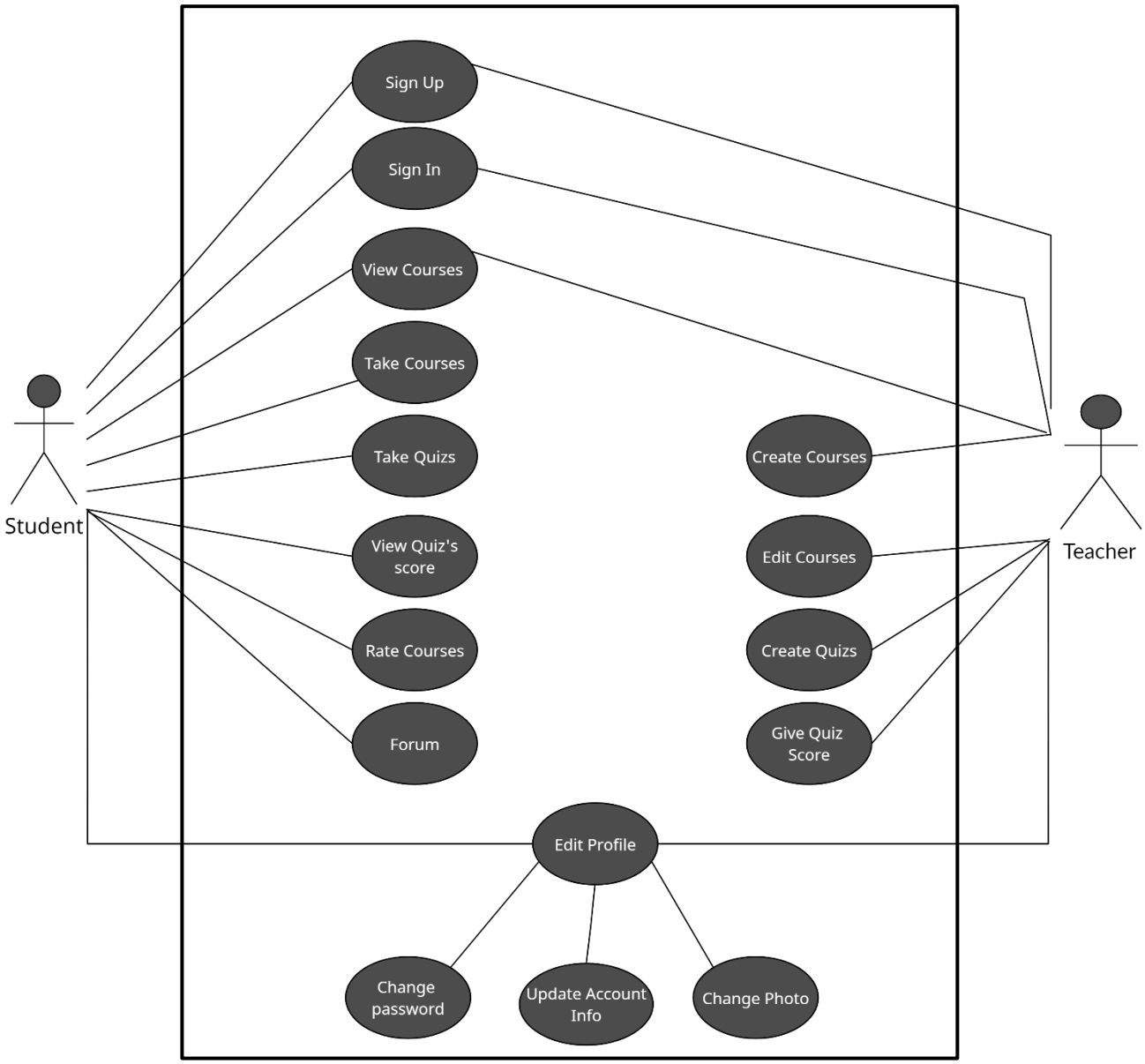

Figure 10. UML Use Case Diagram.

The Class diagram model is responsible for the database logic of the platform. It will encapsulate methods to access data (databases, files, and others) and make a reusable class library available. Usually, the model is built with data abstraction, validation, and authentication. Moreover, the model is made up of classes that define the domain of interest. These objects belong to the domain with encapsulated data stored in databases. It also includes code used to manipulate this data and enforces business rules.

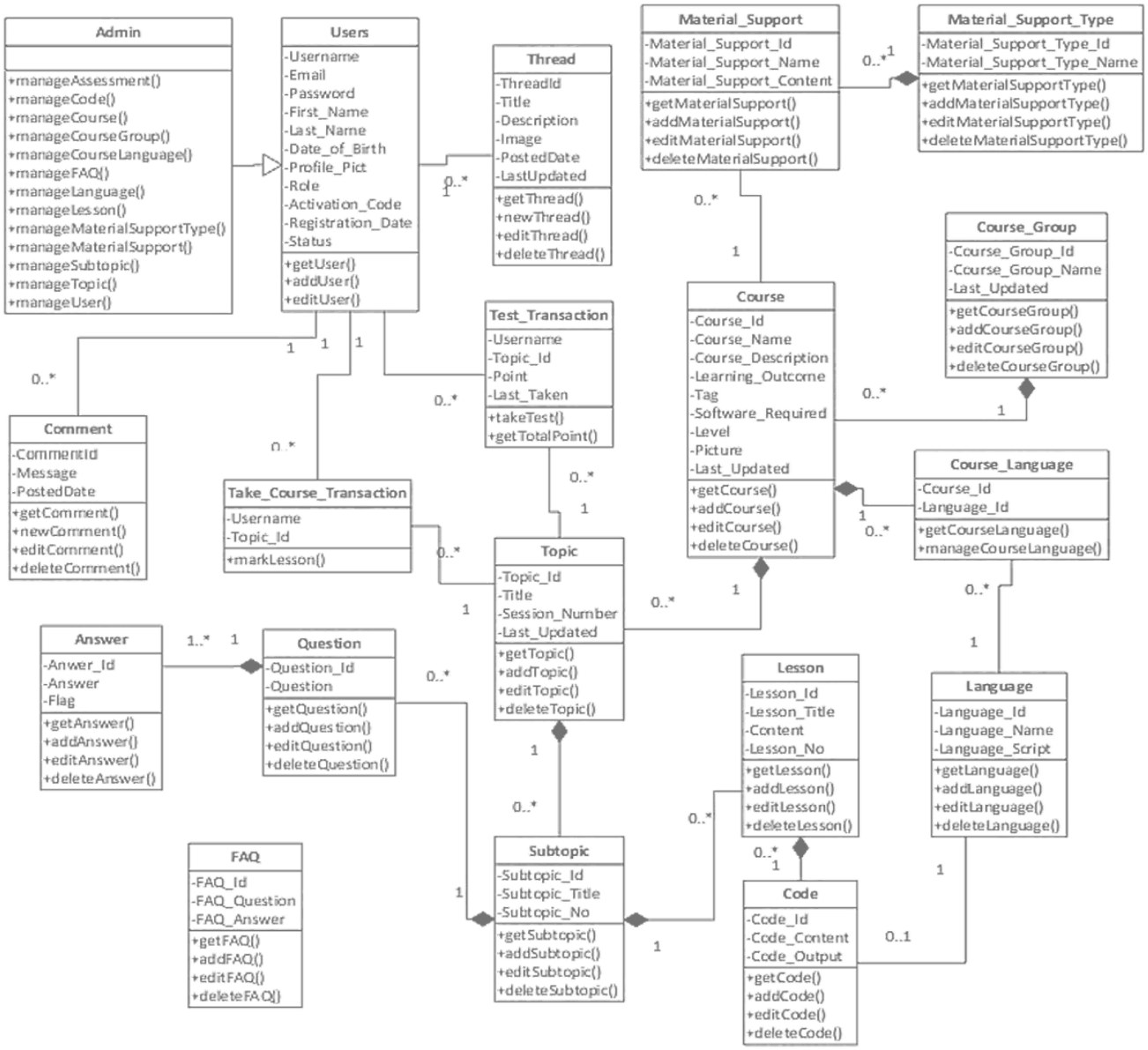

Figure 11. UML Class Diagram.

3.4. The Interaction with the Implemented System Administrator

There are Manage Group (used by administrator to manage course group), Manage Course (used by the admin to manage learning materials that exist in the system). Admin (can add, change and delete existing material), Manage Users (used by administrators to manage user access are registered in the system. Admin (can also delete an existing user), and Manage Quizzes (used by the admin to set up practice questions or quizzes in the system). Before the MOOC System can be used by the user, the admin must add courses to the system. The process begins when admin adds the course group. In add New Group page, admin can create a new group.

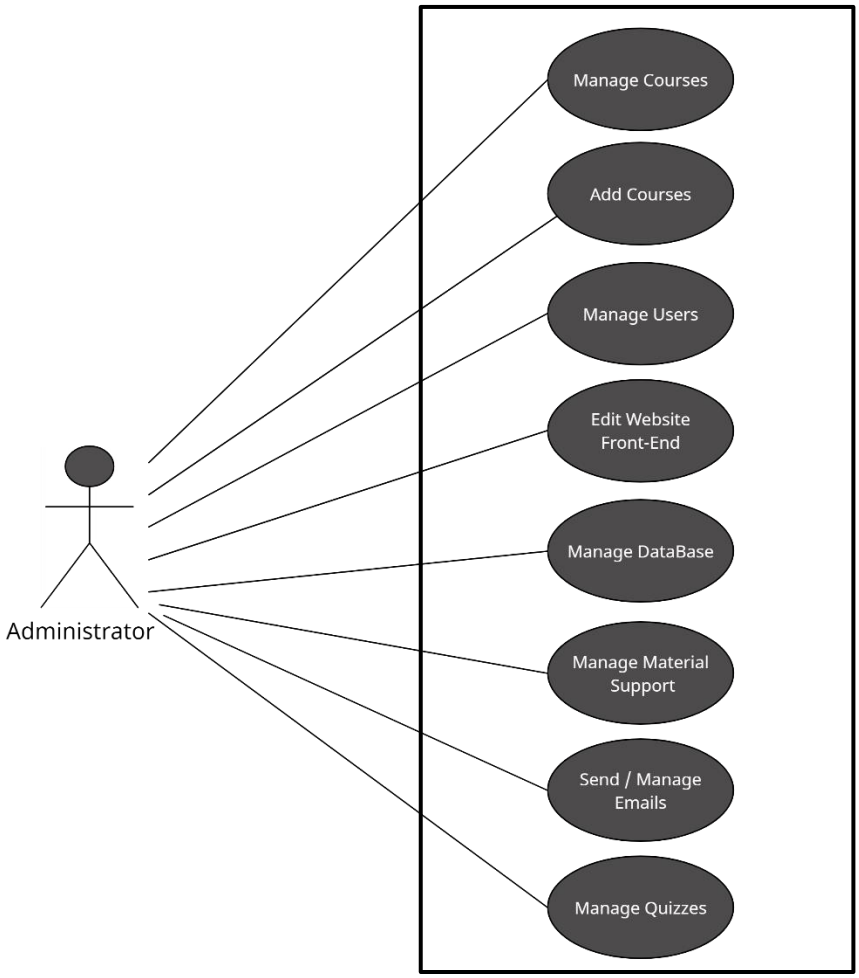

Figure 12. UML Use Case Diagram of Administrator.

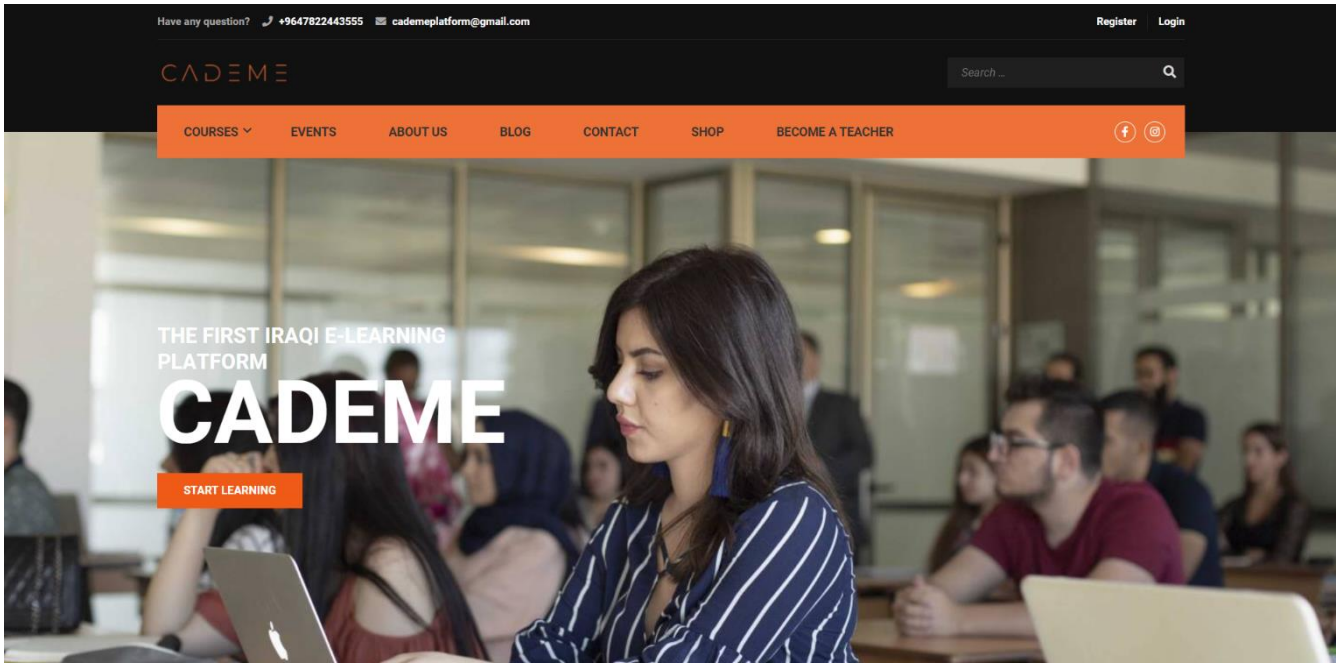

Figure 13. Shows the main page of "Cademe" platform website, the user can search or browse courses and sign up an account to get ready for enrolling to the courses.

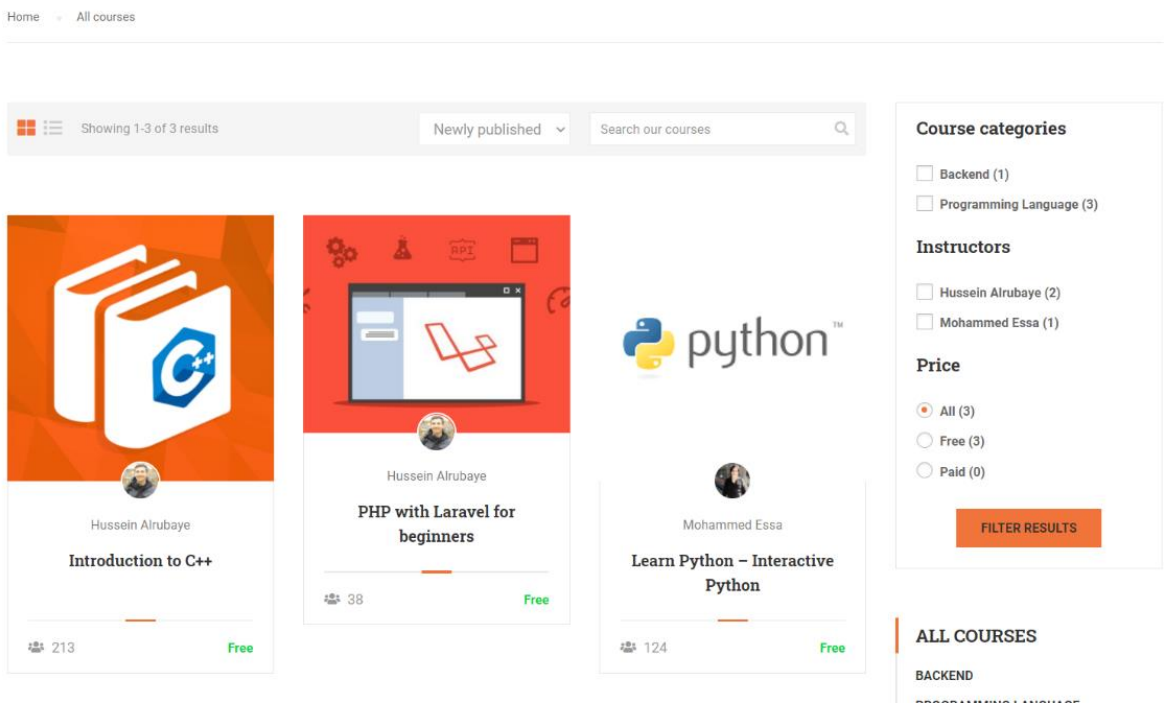

Figure 14. Shows the Courses page, the user can search or browse courses and see the details of each course also the users can filter the categories of courses or choose a specific instructor.

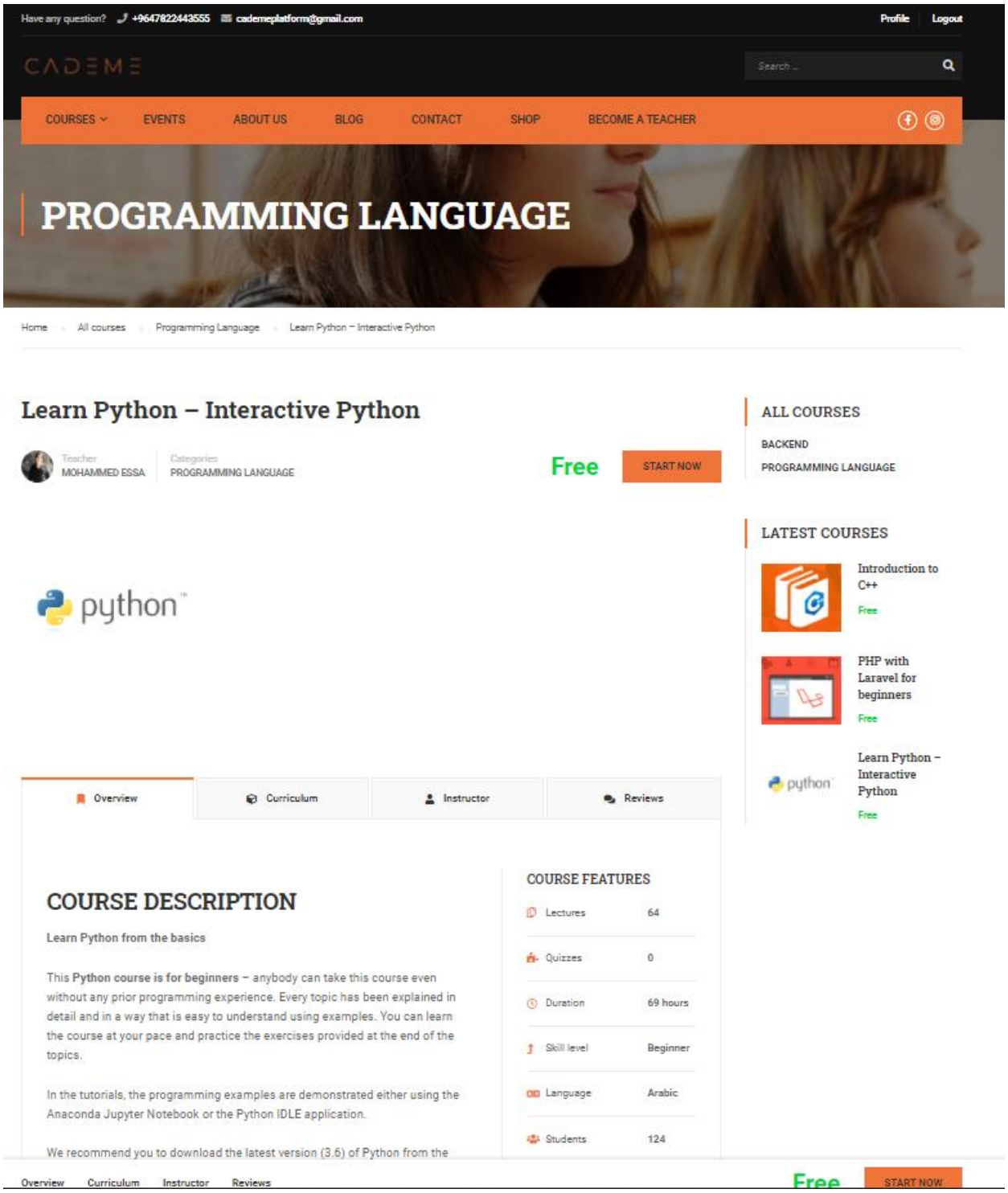

Figure 15. After signing in the user can enroll to any course and can see the details of the course and its curriculum, the user can also see and write reviews for the course.

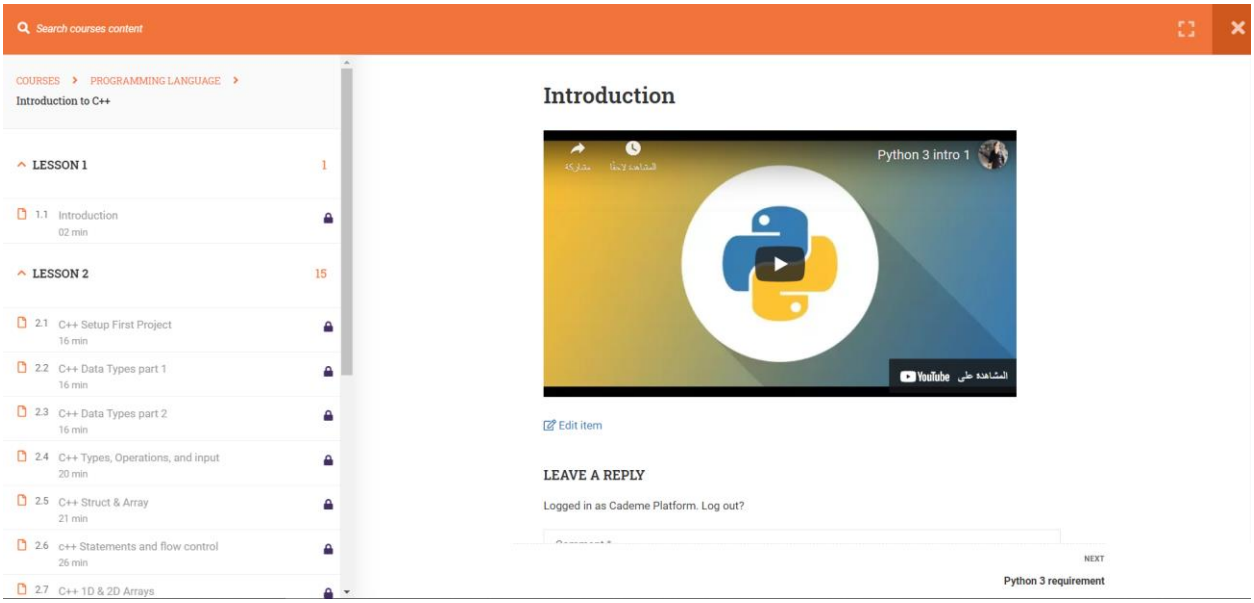

Figure 16. Shows the classroom of the courses

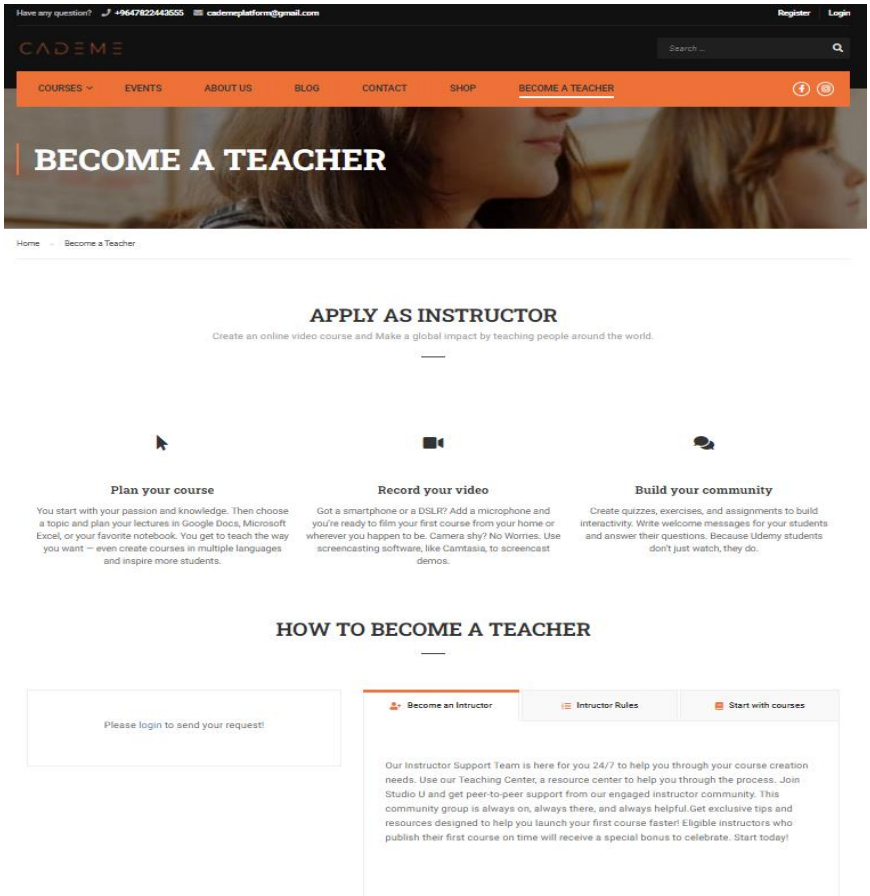

Figure 17. Shows the Become a Teacher page where instructors can apply to platform and start creating courses.

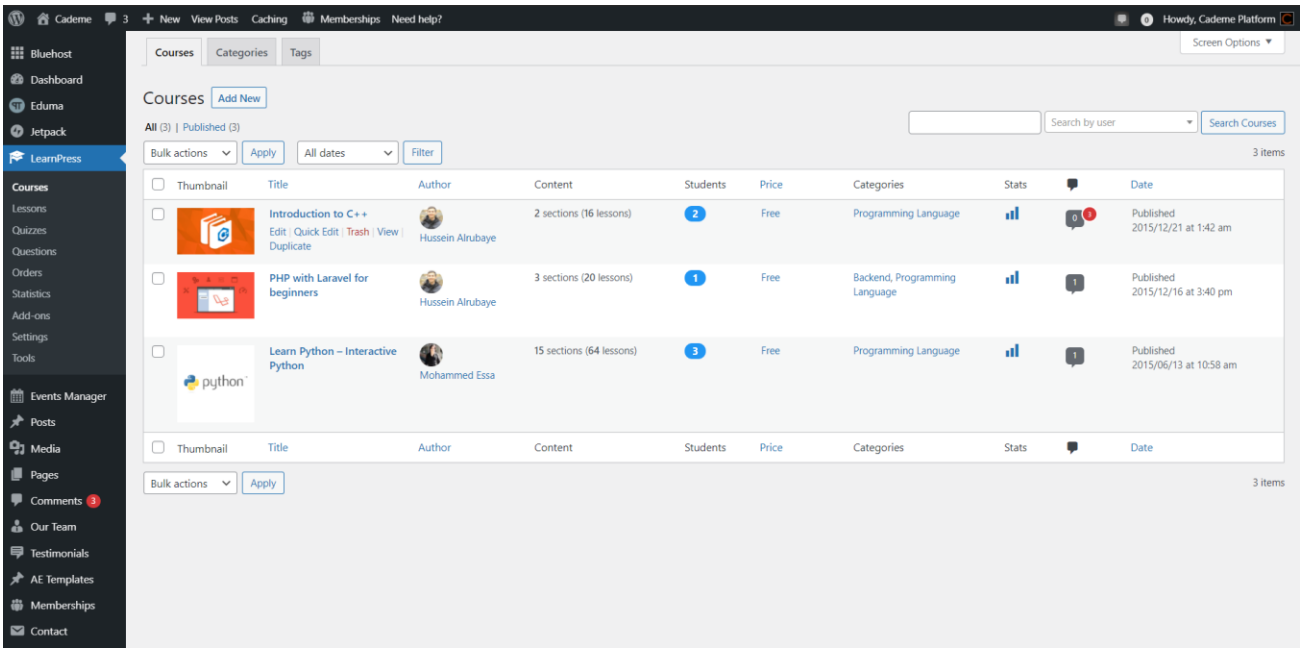

Figure 18. Shows the Courses page from “Cademe” backend on WordPress. When instructors can add or edit the courses.

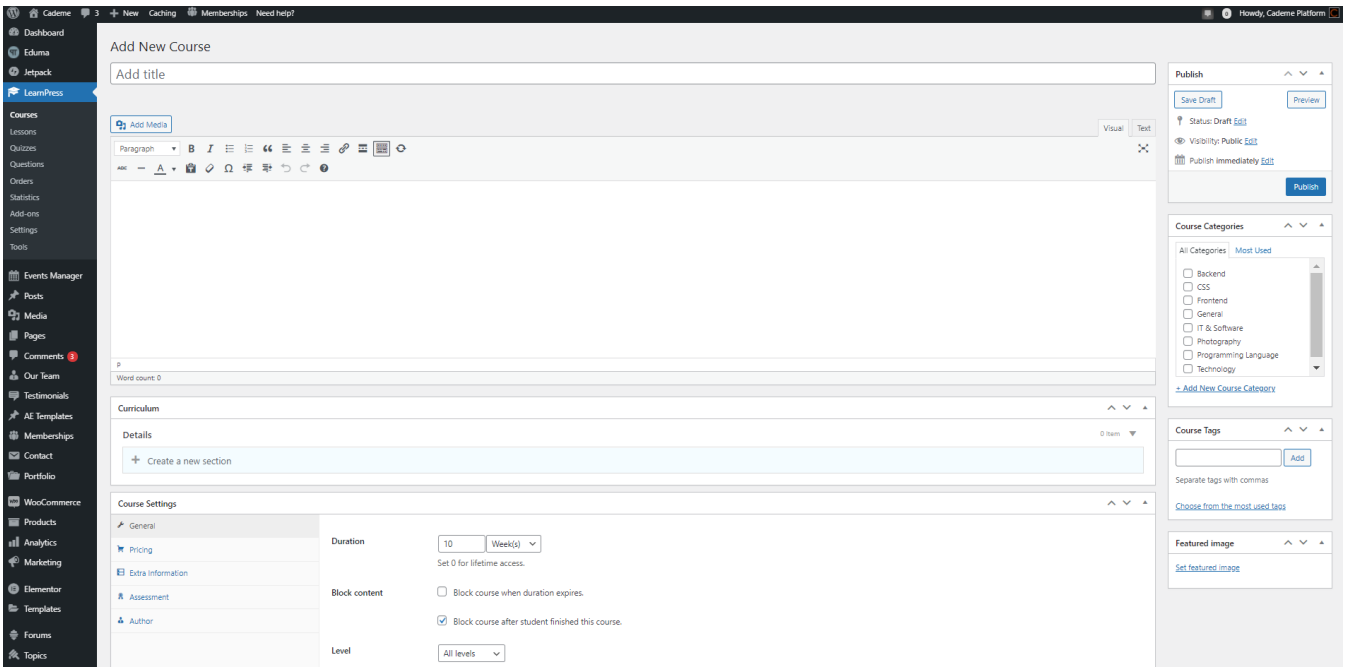

Figure 19. Shows the Add New Course page where the instructor can create and add the details the course.

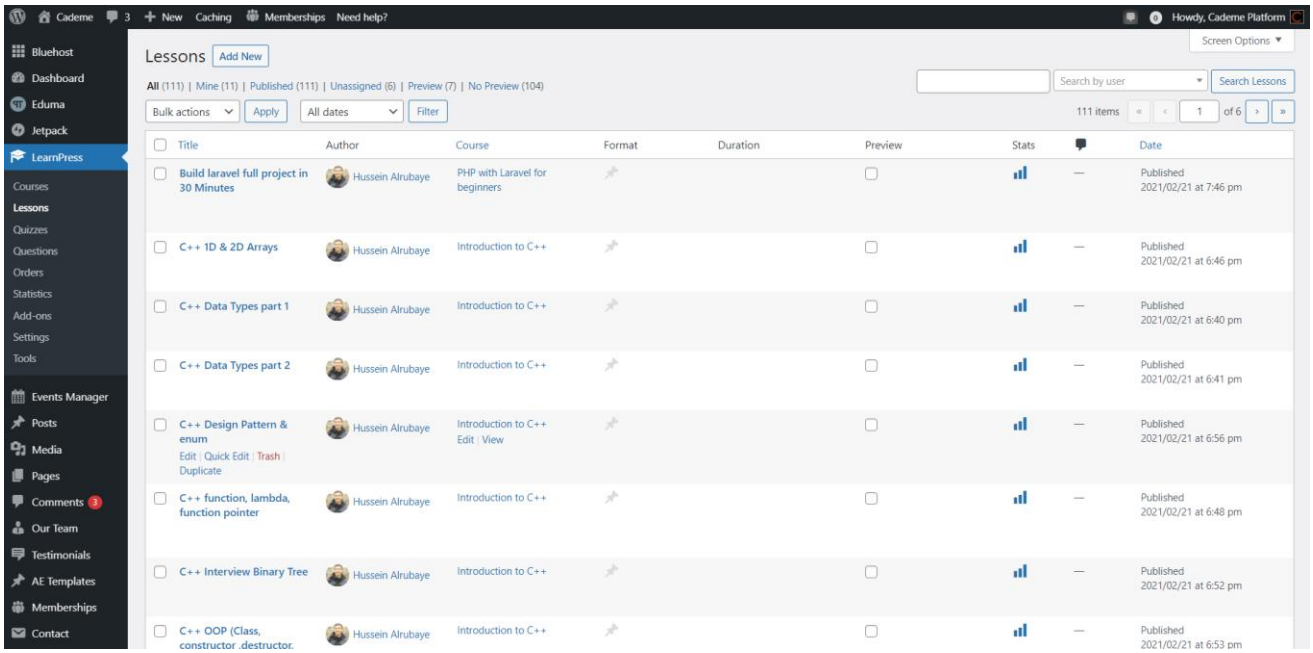

Figure 20. Shows the number of Lessons that instructors made.

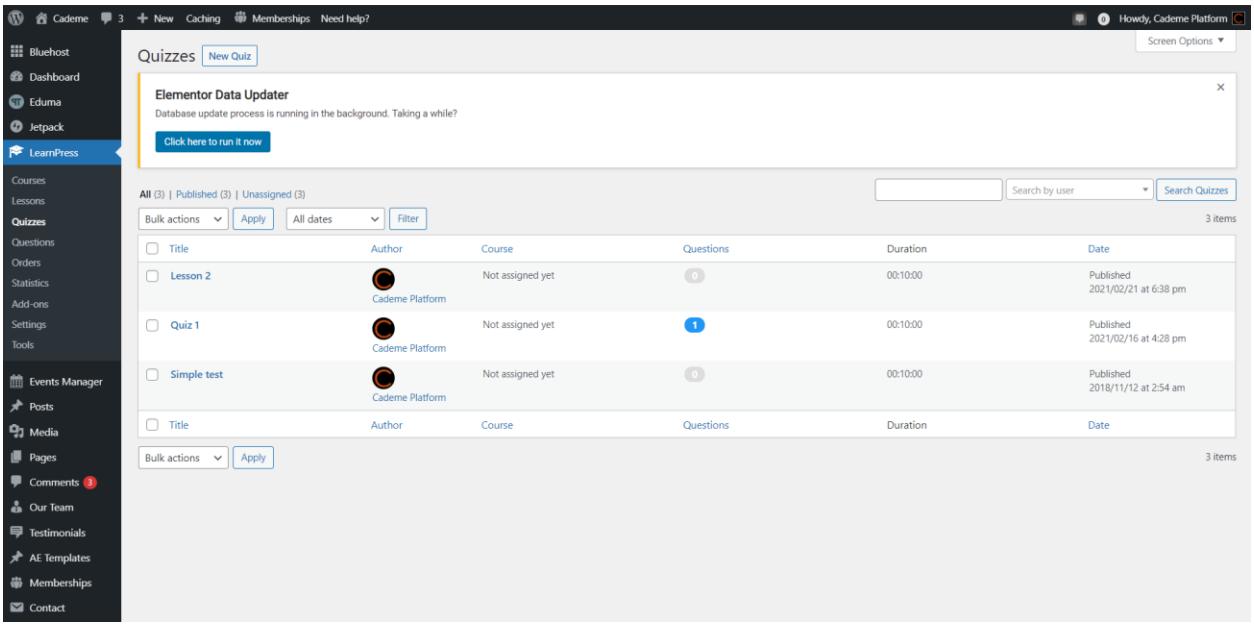

Figure 21. Shows the Quizzes that instructors made and they can add or edit a quiz.

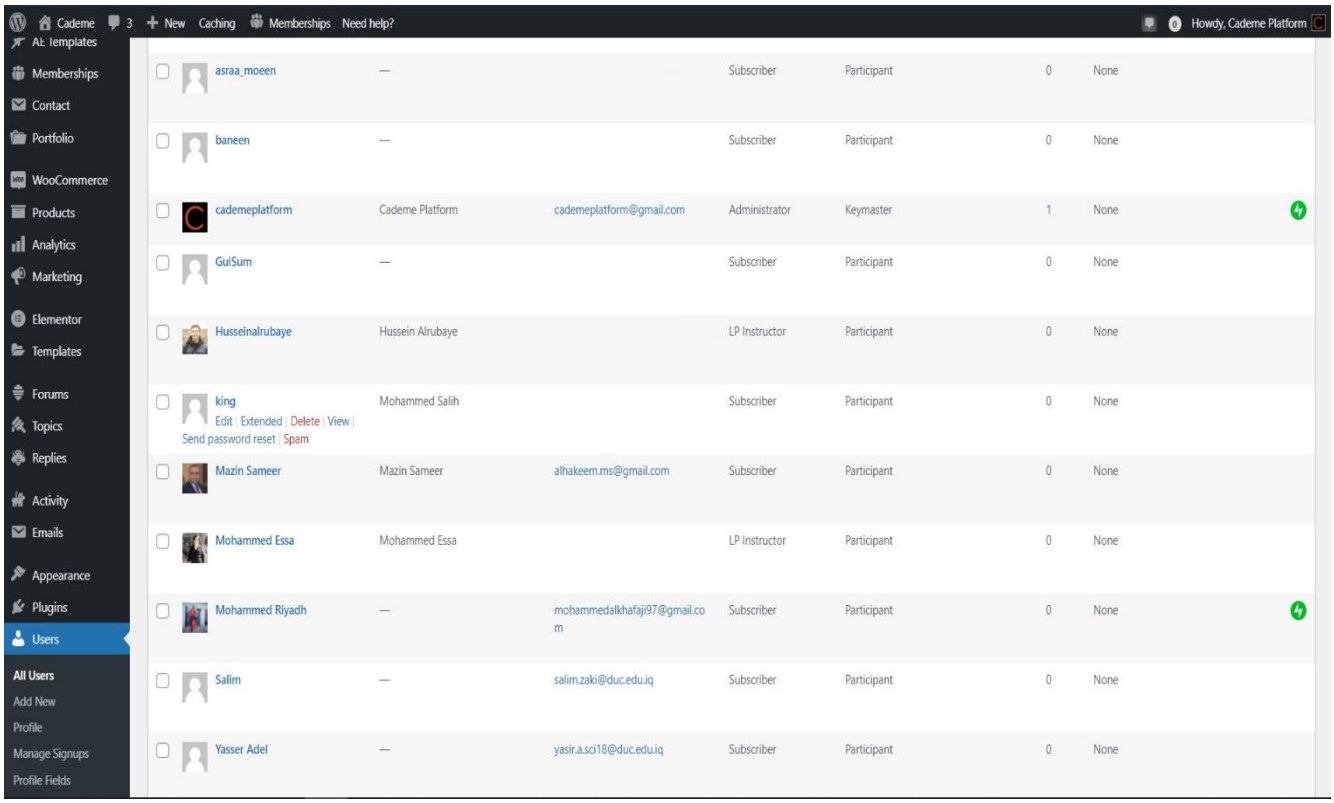

Figure 22. Shows the Users page were admin can manage roles or edit user’s information.

Chapter Four

Conclusion, Limitations and Future Works

4.1. Conclusion

This research focused on developing a MOOC model design with 10 interrelated dimensions that were used to develop “Cademe” platform. Learning model development is described differently, depending on the provider. Incorporating input from users and professionals improves the design of the model. Despite its wide reach, MOOC can be used to target individual users as well. Studying each user is important in order to assemble ways to personalize and thus improve the quality of learning experiences. For example, the 'time' dimension can be taken as an indicator by which providers can modify the duration of material learning and the level of physical difficulty of a course; Users can also choose indirect learning based on their own interests in order to support stimulating and learning activities.

4.2. The Advantages of MOOC:

1. Courses are offered for free.

2. Access to courses offered by teachers at the top schools.

3. Courses are available to a vast and diverse audience across the globe.

4. Learners performance can be monitored easily using the data captured during the start of courses.

5. Both teachers and learners gets world-wide exposure, thus improving educational techniques and knowledge sharing.

6. Can be used as a tool in a blended learning program, where students can access more information than what is provided in the class.

4.2. Limitations of MOOC:

1. Customized curricula and teacher attention cannot be provided.

2. Learners with special needs and poor internet connection cannot use MOOC platform in an appropriate way.

4.3 Suggestions for future work

The presented project, whose model design was discussed in the previous chapters, aims to:

1. Develop and expand the e-learning process by providing educational courses in various fields.

2. It aims to target all categories of students from primary to university and beyond.
3. In addition, this platform will be developed into an application to run on mobile devices.

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المستخلص

(مووك MOOC) هي اختصار لـ Massive Open Online Course. هي منصة دورات للتعلم عن بعد تديرها العديد من الجامعات في جميع أنحاء العالم عبر الإنترنت. عادة ، تكون مفتوحة لأي شخص يقوم بالتسجيل. قد تقبل دورة واحدة حتى آلاف الطلاب.

من الممكن دراسة أي موضوع تقريباً من خلال هذه المنصات، وتقدم العشرات من الجامعات الشهيرة في جميع أنحاء العالم هذه المنصات الآن. يمكن التعامل معها على أنها دراسة قائمة بذاتها للأفراد المهتمين بموضوع معين، أو دراسة توطيدية لدورة تتابعها بالفعل.

منصات التعليم الالكتروني تسمح للمُدرسين المشاركين بإعادة التفكير في مسارهم. عادةً ما يكون المُعلم الذي قام بتدريس نفس الدورة التدريبية لبضع سنوات قد وضع محاضراته ومقرراته ومواده بشكل أو بآخر. من خلال الانضمام إلى هذه المنصات ، يمكن للمدرسين النظر إلى الدورة التدريبية بعيون جديدة تماماً.

تساعد هذه المنصات المدربين من خلال إعطائهم نصائح وطرق تعليمية بشكل غير مباشر لهيكلة الدورة التدريبية الخاصة بهم بالإضافة إلى تزويدهم بشكل مباشر بالمعرفة التي ربما لم يعرفوا أنه يمكنهم التقدم إلى محاضراتهم.

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة دجلة
قسم علوم الحاسوب

تصميم وتنفيذ منصة تعليم الكترونية

مشروع تخرج

مُقدم إلى مجلس قسم علوم الحاسوب كاستيفاء جزئي لمتطلبات الحصول على درجة البكلوريوس في علوم الحاسوب

من:

محمد رياض درهم

ياسر عادل حسين

عبدالله احمد مهدي

احمد عدي حميد

بأشراف:

د. سالم محمد زكي

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Republic of Iraq
Ministry of Higher Education and Scientific Research
Dijlah University College
Department of Computer Science

Design and Implementation distance learning program (e-Academic note)

DUC-CS:2021.07

A Graduation Project Submitted to the Department of Computer Science/ Dijlah University Collegeas a Partial Fulfillment of the Requirement of the BSc. Degree in ComputerScience

By

Mohammed Majid Mohammed
Abdul Hamid Faisal
Hassan abd alkarim
Hassan Kadhem

Supervised By
Dr.Saif Hussein

2021

Republic of Iraq
Ministry of Higher Education and Scientific Research
Dijlah University College
Department of Computer Science

July, 2021 – Baghdad

بسم الله الرحمن الرحيم

وقل ربي زدني علما

صدق الله العظيم

أهداء

اهدي هذا الجهد المتواضع الى اغلى ما عندي

امي وابي

واخواني واخواتي

والى كل من احبني بصدق

واهدي هذا العمل الى الذي وجهني واشرف علي مشرفي

د. سيف رؤف

Supervisor's Certification

Supervisor

Signature:

I certify that the preparation of this graduation research project titled "Design and Implementation distance learning program (e-Academic note)" / Department of Computer Science / Dijlah University College in partial fulfillment of the requirements for the degree of BSc. In Computer Science.

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Date: / 07 / 2021

Abstract

Mobile application of education is one of the modern means of education, and it contributes to stimulating and strengthening the educational process, and it also protects the student from exposure to education in a method of direct indoctrination that causes the killing of his creative skills. Modern methods, such as storage, and Internet sites containing various information-learning has helped to strengthen the educational process and find a new method for providing information, which has contributed to the concentration of information in the students' brains. E-learning is also characterized by freedom; It gives the student the possibility of receiving information remotely, so the student does not need to go to the field of education, and wait for the teacher to give him the information, but rather searches for the information he wants at any time and place he wants, without committing to a specific time and time, through the use of websites and CDs. At the this time, the world is resorting to remote study due to the Covid-19 pandemic, due to the seriousness and lethality of this disease. Our project has appeared, which will help students complete their studies and advance their academic careers. The aim of the project is to solve the communication problem (notification) between the lecturer and the student by using novel mobile application, we call it *e-Academic Note*. The application is also can do communicate between lecturer with the department or the student and department. We used 10 mobiles to evaluate our application, our App was working perfectly in 9 mobiles and not working in one mobile

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An Overview

Chapter One

An Overview

1-1. Introduction

A Covid-19 was a pandemic in the whole world that led to the closure of everything, mosques, universities, markets and this problem reached Iraq in 2020. Many problems arose, as following: Will education continue or stop? But a good measure has been taken which is continuing education, but electronically and here, many more problems arose including what platforms will universities take to continue education? What are the methods? Also, the most important problem is the method of communication between the subject professor and the student, and between the subject professor and the department, and between the department and the student In the beginning, social media was taken as educational means of communication, and this is a mistake because it is not based on education, but on the basis of communication between people. And here the big mistakes started, such as using Telegram / WhatsApp / Email / as a means of communication Telegram / WhatsApp . It is a social media that is not intended at all for distance education or the idea of education in the first place. Furthermore the e-mail address is used to commuincate in the education. Educational platforms became more accurate such as classroom / zoom. These applications, despite their quality, are need to develope in some cases such as show notification when students put a comment on the post lecture. While the classroom application notify by using email address.

1-2. The Aim

The aim of the project is to solve the communication problem (notification) between the lecturer and the student by using novel mobile application, we call it *e-Academic Note*. The application is also can do communicate between lecturer with the department or the student and department.

1-3. Obstacles to E-learning

Websites are at risk of being hacked at any time; This makes the educational process completely unsafe, and completely distrusting what websites offer. The need to spend effort and time in training teachers and leaders of educational fields on how to deal with modern e-learning methods. Many teachers and leaders in educational fields refused to introduce electronic teaching aids into their fields. Lack of complete awareness by the community about the principles of eLearning. The inability to fully cover the financial cost to start using e-learning.

The difficulty of abolishing traditional education completely, and directly replacing it with e-learning. The lack of maintenance centers used to solve technical problems, especially in remote areas. The lack of people with experience and competence in the field of e-learning management. The lack of infrastructure that serves communications.

1.4. E-Learning Obstacles Solutions

1. Spreading the culture of e-learning among the people more, by holding awareness seminars, and publishing publications containing the benefits of e-learning.
2. Holding e-learning courses and free lectures that explain its importance.
3. Benefit from external expertise, especially the experiences of developed countries in the field of e-learning, and take a lesson.
4. Improving the infrastructure that serves communications.
5. The characteristics of e-learning provides the appropriate time and place to start the educational process.
6. The learner is stimulated to exert effort and search for knowledge on his own without taking information from anyone in the manner of memorization.
7. Reduces the financial cost paid. It offers many services that support education.
8. It uses modern means that attract the user, such as modern computers, and various Internet sites.

1.5. Current platform issues

Educational platforms help train hundreds of thousands of students of different ages and nationalities, as they provide smart models in terms of dealing with various educational curricula, but they face many obstacles that stand in their way and limit their success, and the most important of these obstacles is the absence of real support from official institutions The lack of competencies interested in developing self-education, and the absence of a culture of volunteerism and initiative in order to produce free educational materials. The negatives side can be clarified as follows: Loss of the social aspect of learning.
Weak direct interaction with the teacher and the absence of his real role. And unavailability or uncover the Internet in some areas and some social classes.

1.6. Advantages of E-learning

1- Saves time and money**:** One of the most obvious advantages of e-learning is that you can save time and money. You can manage your schedule and take online courses at your most convenient time, whether early in the morning, late afternoon, or evening. You save money, too, because you don't have to pay for transportation or worry about eating on the go.

2- Better retention: E-learning makes use of different platforms like Pedagogue, which provides interactive content. Also, you can share your thoughts and opinions with others. The more engaging the lessons, the more students can remember the information.

3- Personalized learning: You can choose your learning path and study at your own pace. You become more motivated and invested in the course.

4- Cost-effective: Students aren't the only ones that can save money in e-learning. Many educational institutions save money through this set-up because there's no need to use a physical classroom, which translates to reduced monetary spending.

Chapter Two
The System Design

2.1. Introduction

The conceptual design of the proposed system was carried out using the activity diagram and data flow diagram as shown in the following parts.

2.2. The Activity Diagram

Java (programming language)

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 also among the most favored for the development of edge devices and the internet of things.

Java was designed to have the look and feel of the C++ programming language, but is simpler to use and enforces an object-oriented programming model. Java can be used to create complete applications that may run on a single computer or be distributed among servers and clients in a network. It can also be used to build a small application module or applet for use as part of a webpage.

It is difficult to provide a single reason as to why the Java programming language has become so ubiquitous. However, the language's major characteristics have all played a part in its success, including the following components

- Programs created in Java offer portability in a network. Source code is compiled into what Java calls bytecode, which can run anywhere in a network, on a server or on a client that has a Java virtual machine (JVM). The JVM interprets the bytecode into code that will run on computer hardware. In contrast, most programming languages, such as COBOL or C++, will compile code into a binary file. Binary files are platform-specific, so a program written for an Intel-based Windows machine cannot on run a Mac, a Linux-based device or an IBM mainframe. As an alternative to interpreting one bytecode instruction at a time, the JVM includes an optional just-in-time (JIT) compiler which dynamically compiles bytecode into executable code. In many cases, the dynamic JIT compilation is faster than the virtual machine interpretation.

- Java is object-oriented. An object is made up of data as fields or attributes and code as procedures or methods. An object can be a part of a class of objects to inherit code common to the class. Objects can be thought of as "nouns" that a user can relate to "verbs." A method is the object's capabilities or behaviors. Because Java's design was influenced by C++, Java was mainly built as an object-orientated language. Java also uses an automatic garbage collector to manage object lifecycles. A programmer will create objects, but the automatic garbage collector will recover memory once the object is no longer in use. However, memory leaks may occur when an object which is no longer being used is stored in a container.
- Cause the program and perhaps the operating system to terminate or crash. The JVM makes a number of checks on each object to ensure integrity.
- Data is secure. Unlike C++, Java does not use pointers, which can be unsecured. Data converted to bytecode by Java is also not readable to humans. Additionally, Java will run programs inside a sandbox to prevent changes from unknown sources.
- Applets offer flexibility. In addition to being executed on the client rather than the server, a Java applet has other characteristics designed to make it run fast.
- Developers can learn Java quickly. With syntax similar to C++, Java is relatively easy to learn. Especially for those with a background in C.

Android Studio

is the official[7] integrated development environment (IDE) for Google's Android operating system, built on JetBrains' IntelliJ IDEA software and designed specifically for Android development.[8] It is available for download on Windows, macOS and Linux based operating systems or as a subscription-based service in 2020.[9][10] It is a replacement for the Eclipse Android Development Tools (E-ADT) as the primary IDE for native Android application development.

Android Studio was announced on May 16, 2013 at the Google I/O conference. It was in early access preview stage starting from version 0.1 in May 2013, then entered beta stage starting from version 0.8 which was released in June 2014.[11] The first stable build was released in December 2014, starting from version 1.0.[12]

On May 7, 2019, Kotlin replaced Java as Google's preferred language for Android app development.[13] Java is still supported, as is C++.[14]

Android Studio 4.1 running on Linux	
Developer(s)	Google, JetBrains
Stable release	4.2.1[1] / 13 May 2021; 25 days ago
Preview release	Arctic Fox (2020.3.1) Beta 1 (May 18, 2021; 20 days ago[2]) [±]
Repository	2- android.googlesource.com/platform/tools/adt/idea
Written in	Java, Kotlin and C++
Operating system	Windows, macOS, Linux, Chrome OS[3]
Size	727 to 877 MB[3]
Type	Integrated development environment (IDE)
License	Binaries: Freeware,[4] Source code:[5][6] Apache License
Website	developer.android.com/studio/index.html

Features of Android Studio 4

A specific feature of the Android Studio is an absence of the possibility to switch auto save feature off
The following features are provided in the current stable version:

- Gradle-based build support.
- Android-specific refactoring and quick fixes.
- Lint tools to catch performance, usability, version compatibility and other problems.
- ProGuard integration and app-signing capabilities.

- Template-based wizards to create common Android designs and components.
- A rich layout editor that allows users to drag-and-drop UI components, option to preview layouts on multiple screen configurations.
- Support for building Android Wear apps.
- Built-in support for Google Cloud Platform, enabling integration with Firebase Cloud Messaging (Earlier 'Google Cloud Messaging') and Google App Engine.
- Android Virtual Device (Emulator) to run and debug apps in the Android studio.

Android Studio supports all the same programming languages of IntelliJ (and CLion) e.g. Java, C++, and more with extensions, such as Go and Android Studio 3.0 or later supports Kotlin and "all Java 7 language features and a subset of Java 8 language features that vary by platform version External projects backport some Java 9 features While IntelliJ states that Android Studio supports all released Java versions, and Java 12, it's not clear to what level Android Studio supports Java versions up to Java 12 (the documentation mentions partial Java 8 support). At least some new language features up to Java 12 are usable in Android.

Once an app has been compiled with Android Studio, it can be published on the Google Play Store. The application has to be in line with the Google Play Store developer.

2.1. The Data Flow Diagram

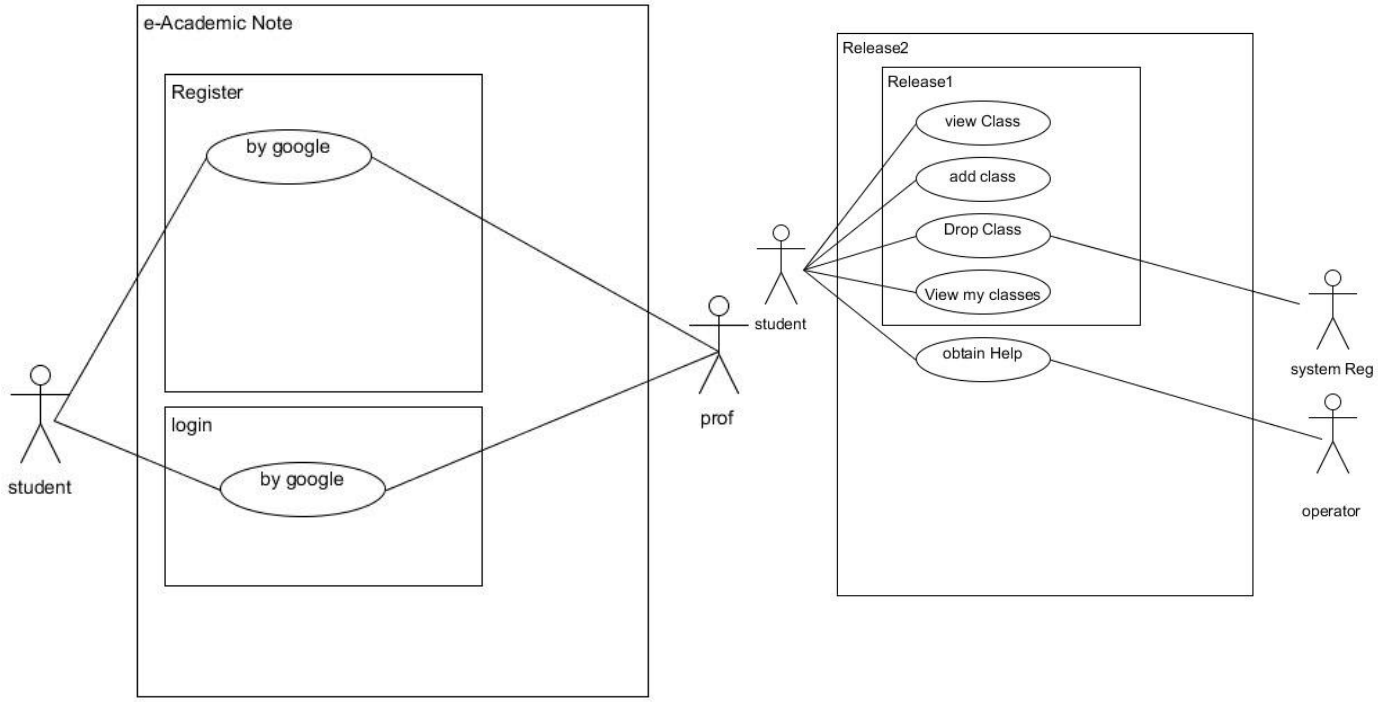

Figure 2.1 Diagram showing how the application works**.**

In Figure 1 we explain our application steps, which start with Here, between the basic components and the actual working method of a program for both the teacher and the student, we show what are the characteristics of the professor and the student and the characteristics of each of them, as well as the tasks of the student and the professor

2.3. The System Architecture

The system architecture is the foundation of the solution and should be presented first. The core components will be indicated, piecing it all together in the overall architecture, with some thoughts about communications, showing the technical integration of the components and added features. Figure (2) shows the proposed system architecture.

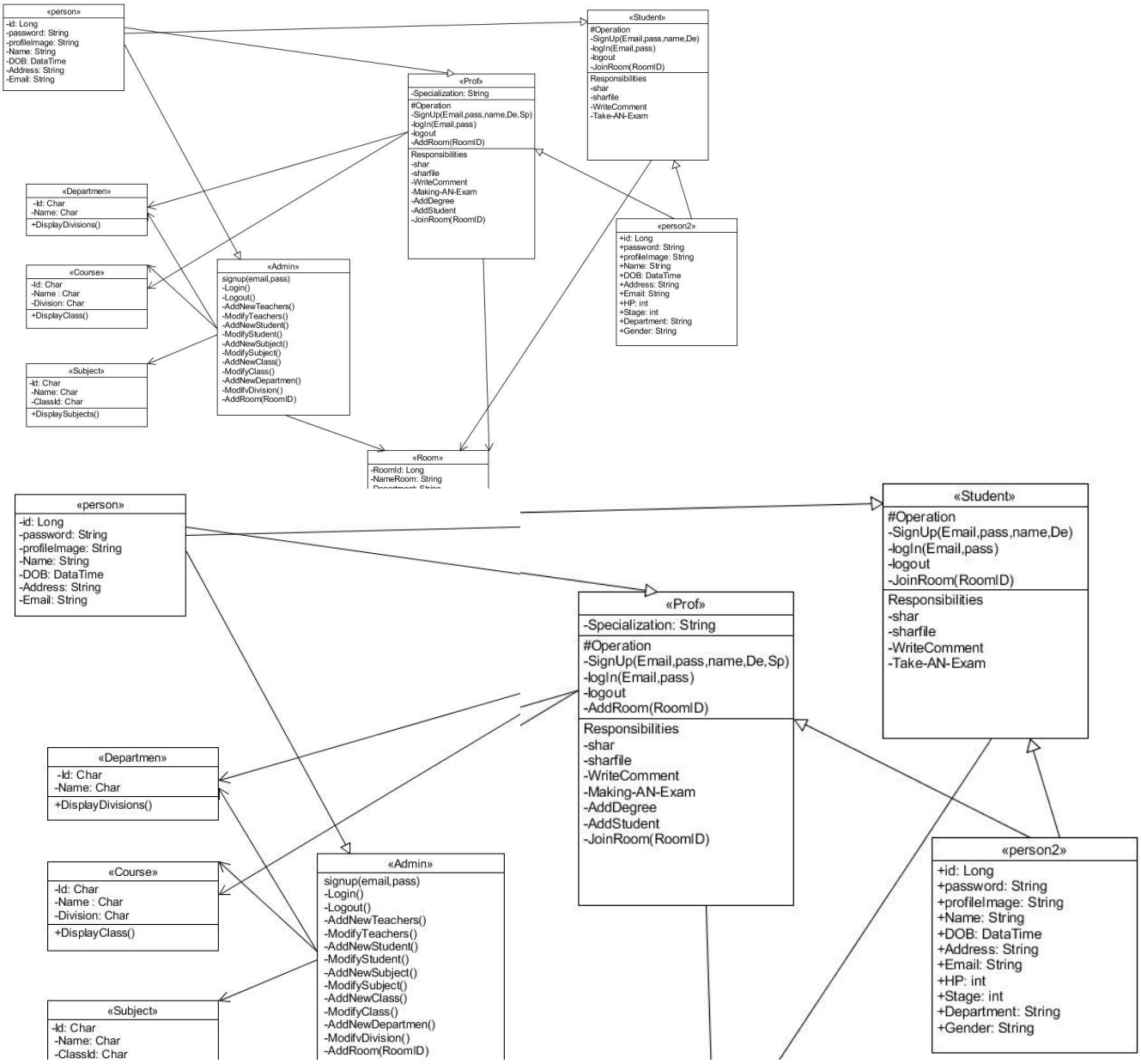

Figure 2.2 Diagram showing the main components of the application

Chapter Three
The Implemented System, Tests and Empirical Outcomes

3.1 Introduction

The aim of this chapter is to describe the implementation of the design system, which was given in details in chapter three. The system requirements and the implementation toolset are discussed also. The **e-Academic** note system is presented and the interaction of user with the implemented system through the demonstration as test are discussed as shown in next Figures (3.1 - 3.13), we explain details of each Figure.

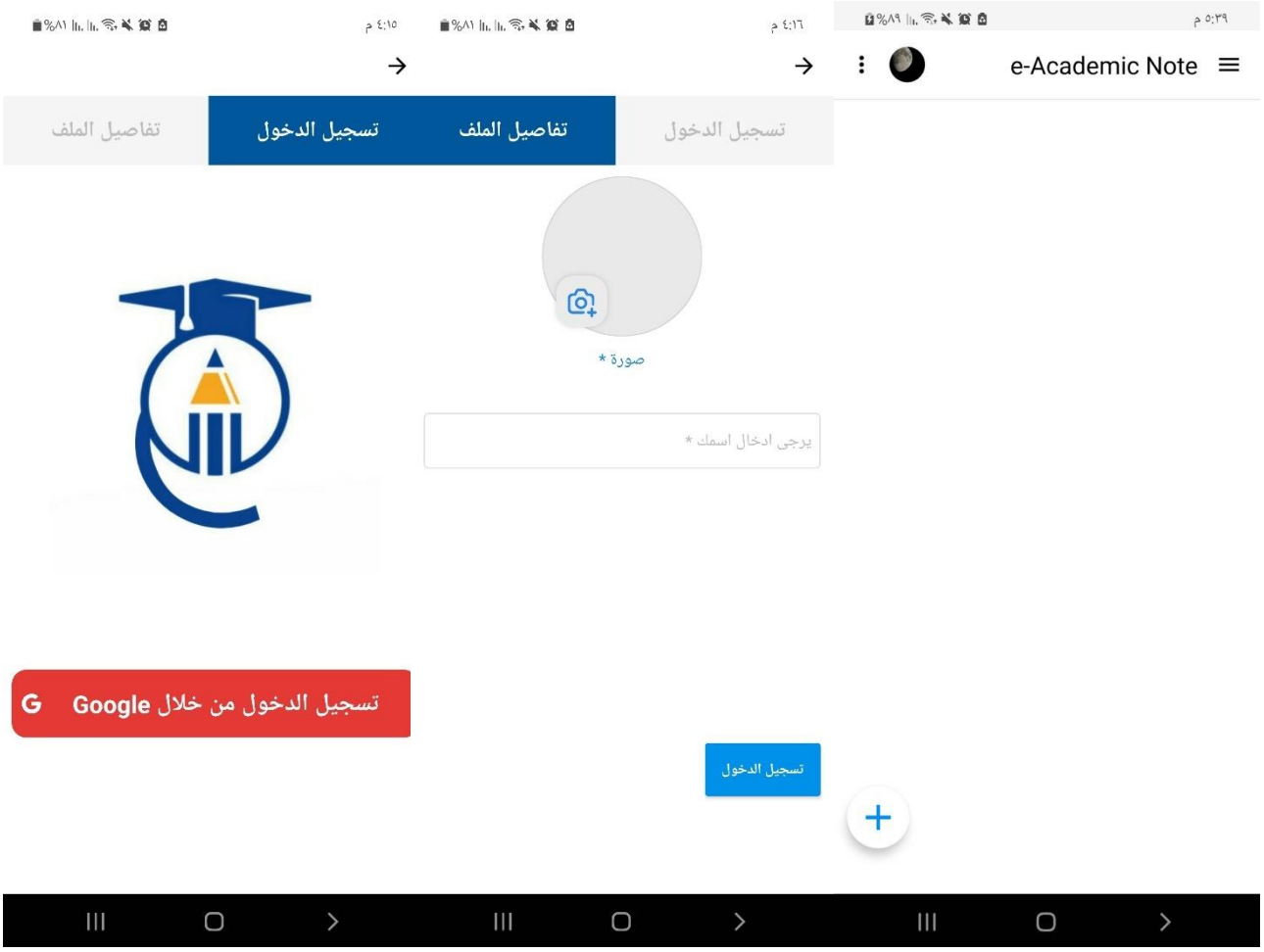

Figure (3.3)App main interface shapeWhen you open the program, we log in with the Gmail account, then we put the name of the student and the student's photo, and then click on Login

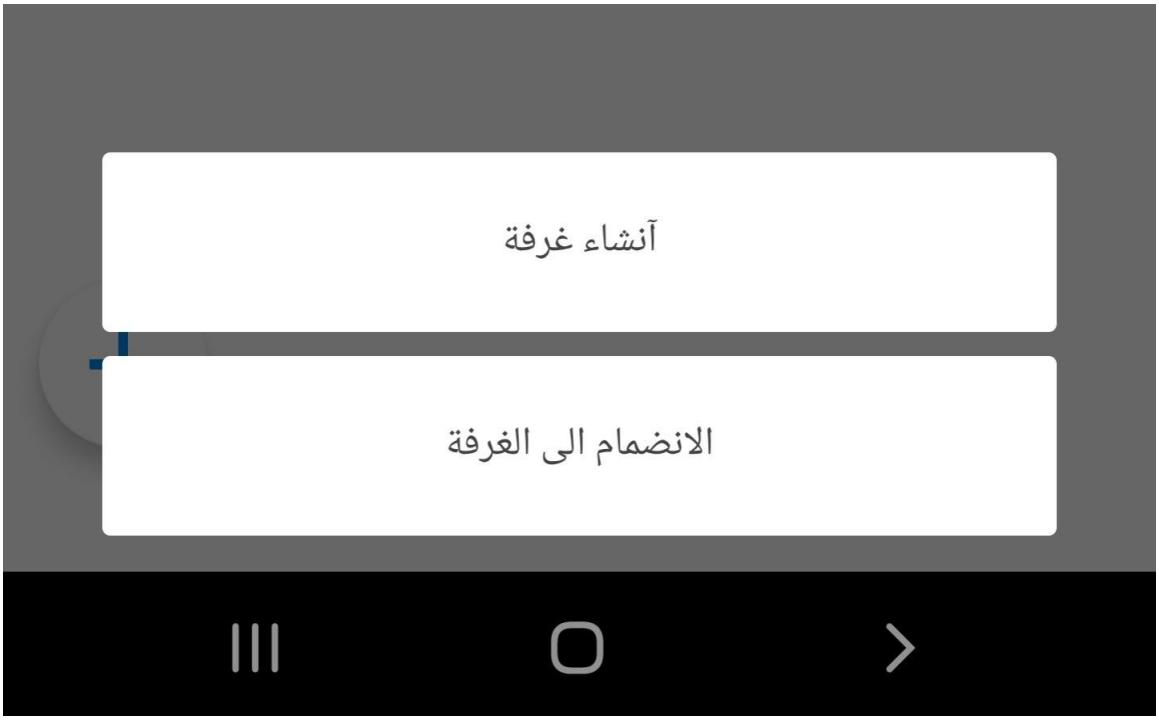

Figure (3.4) The form of the program first opened After pressing the + sign, two windows will appear

Figure (3.5)we display how to create account in our App, it need to fill up information of client such as Department, room name which show the title of room such as lecture 1

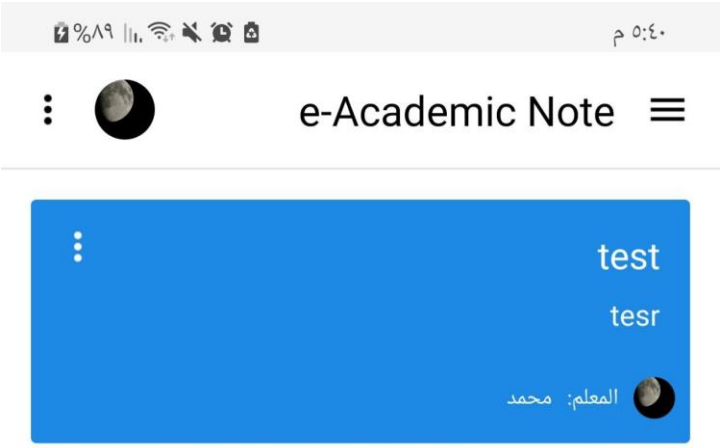

Figure (3.6)After creating the room, the following figure appears, which is the shape of the room after completing the data entry

Figure (3.7)Create a new post inside the room. The professor can upload any type of documents, photos and videos

Figure (3.9)Here a comment box appears the student can be inquire

Figure (3.8)The form of the post After it is published inside the room, any student can currently view the post and what it contains

Figure (3.10)Here the professor can upload a study assignment or a test, and he can specify the time and grade with uploading any question format, possible fictitious writing or document file

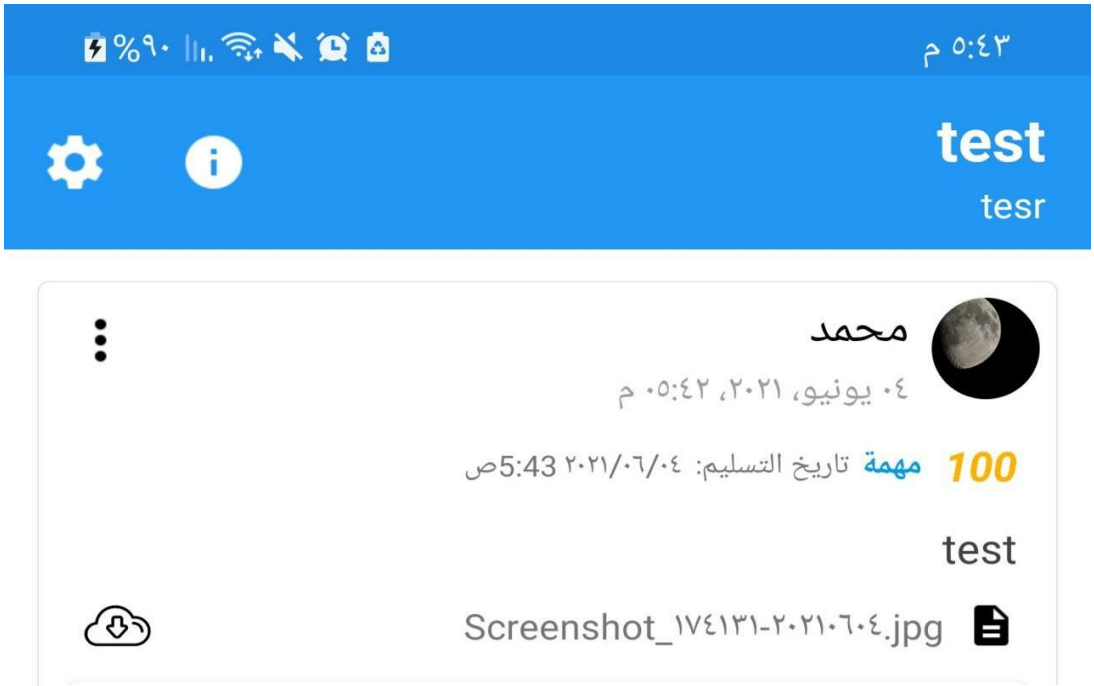

Figure (3.11)The form of the study assignment after participation

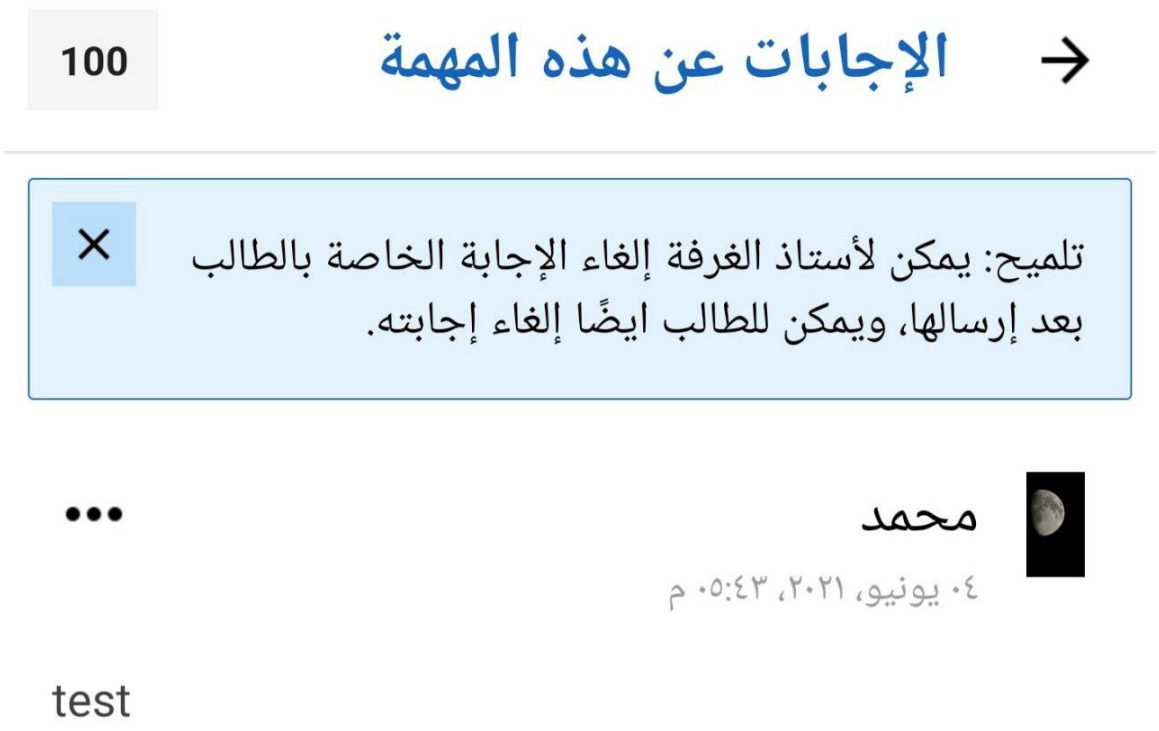

Figure (3.12)After the student answers the study task, the teacher can give a grade and see the answers

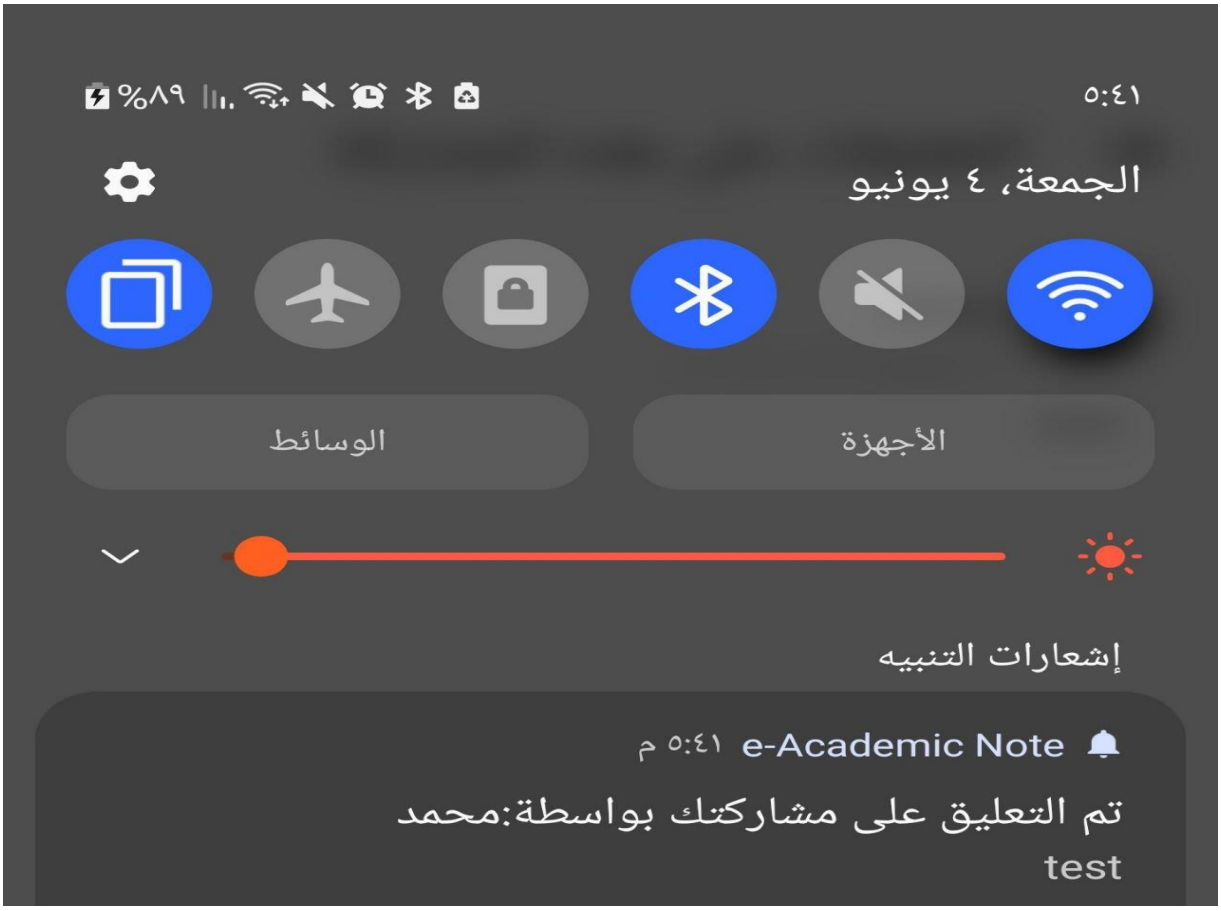

Figure (3.13)The form of notifications reaching a student or professor

Chapter Four
Conclusions, Limitations and Future Works

4.1. Conclusions

For this graduation research project (GRP), many points which are certain significance are drawn and concluded from this work, they are:

1. The program facilitates the process of communication between students and the department, between students and the professor, and between the department and the professor.
2. The program can be accessed from any computer or from any mobile device regardless of the platform, and all files uploaded by teachers and students are stored in the folder on the device.
3. Teacher can easily distinguish learners' instructions. Customizing lessons for the whole class, individual students or groups of students takes just a few simple steps when creating an assignment.
4. It provides students with access to an online learning system, and many college and university programs now require students to register for at least one. semester online. Recognizing students may help them transition to other learning management systems used in higher education.
5. Data from assessments can easily be exported to spreadsheets for sorting and analysis.

4.2. Limitations

The researchers suffers from many limitations during the design and implement system, as listed in the following:

1- The limitations of the study are those characteristics of design or methodology that impacted or influenced the interpretation of the findings from your research. They are the constraints on generalizability, applications to practice, and/or utility of findings that are the result of the ways in which you initially chose to design the study or the method used to establish internal and external validity or the result of unanticipated challenges that emerged during the study.

2- if your study depends on having access to people, organizations, data, or documents and, for whatever reason, access is denied or limited in some way, the reasons for this needs to be described. Also, include an explanation why being denied or limited access did not prevent you from following through on your study.

3- Sample sizes are typically smaller in qualitative research because, as the study goes on, acquiring more data does not necessarily lead to more information. This is because one occurrence of a piece of data, or a code, is all that is necessary to ensure that it becomes part of the analysis framework. However, it remains true that sample sizes that are too small cannot adequately support claims of having achieved valid conclusions and sample sizes that are too large do not permit the deep, naturalistic, and inductive analysis that defines qualitative inquiry. Determining adequate sample size in qualitative research is ultimately a matter of judgment and experience in evaluating the quality of the information collected against the uses to which it will be applied and the particular research method and purposeful sampling strategy employed. If the sample size is found to be a limitation, it may reflect your judgment about the methodological technique.

4.3. Suggestions for Future Work

The designed and implemented system presents many fruitful lines of continued graduation research, and opens the door to a range if future work, as listed in the following: We are trying hard to ignore the educational application No. 1 in Iraq. We are trying to include all levels of study, not only universities, but students of primary studies from the preparatory and middle stages. We are thinking of putting a special place to upload educational videos for sixth preparatory students

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الملخص

يعد تطبيق التعليم عبر الهاتف المتحرك من وسائل التعليم الحديثة ، ويساهم في تحفيز العملية التعليمية وتقويتها ، كما أنه يحمي الطالب من التعرض للتعليم بأسلوب التلقين المباشر الذي يتسبب في قتل مهاراته الإبداعية. الأساليب الحديثة كالتخزين ، ومواقع الإنترنت التي تحتوي على معلومات متنوعة ، وقد ساعد التعلم الإلكتروني في تقوية العملية التعليمية وإيجاد طريقة جديدة لتوفير المعلومات ، مما ساهم في تركيز المعلومات في أدمغة الطلاب. يتميز التعلم الإلكتروني أيضًا بالحرية ؛ يمنح الطالب إمكانية تلقي المعلومات عن بعد ، فلا يحتاج الطالب إلى الذهاب إلى مجال التعليم ، وينتظر المعلم لإعطائه المعلومات ، بل يبحث عن المعلومات التي يريدها في أي وقت ومكان. يريد ، دون الالتزام بوقت ووقت محددين ، من خلال استخدام المواقع الإلكترونية والأقراص المدمجة ، وفي هذا الوقت يلجأ العالم إلى الدراسة عن بعد بسبب جائحة كوفيد 19 ، لخطورة هذا المرض وفتكه. ظهر مشروعنا الذي سيساعد الطلاب على إكمال دراساتهم والتقدم في حياتهم الأكاديمية ، والهدف من المشروع هو حل مشكلة الاتصال (الإخطار) بين المحاضر والطالب باستخدام تطبيق جديد للهاتف المحمول ، نسميه e-Academicملحوظة. كما يمكن للتطبيق التواصل بين المحاضر بالقسم أو الطالب والقسم. استخدمنا 10 هواتف محمولة لتقييم تطبيقنا ، وكان تطبيقنا يعمل بشكل مثالي في 9 هواتف محمولة ولا يعمل في هاتف محمول واحد

جمهورية العراق

وزارة التعليم العالي والبحث العلمي

كلية دجلة الجامعية

قسم علوم الحاسوب

تصميم وتنفيذ برنامج التعلم عن بعد

(ملاحظة أكاديمية إلكترونية)

DUC-CS: 2021.07.001

مشروع تخرج مقدم إلى

قسم علوم الحاسبات / كليات جامعة دجلة ليقوم باستيفاء جزئي لمتطلبات البكالوريوس. شهادة في علوم الكمبيوتر

بواسطة

محمد ماجد محمد

عبد الحميد فيصل

حسن عبد الكريم

حسن كاظم

يشرف عليها

الدكتور سيف رؤف حسين

2021

Republic of Iraq
Ministry of Higher Education and Scientific Research
Dijlah University College
Department of Computer Science

DHCP Network Implementation using Network Simulator

DUC-CS:2021.06.19

A Graduation Project Submitted to the Department of Computer Science / Dijlah University College as a Partial Fulfilment of the Requirement of the BSc. Degree in Computer Science

By

Anas jafar salman

Ruaa abd alrasul

Zahraa salah thajil

Zahraa aoda abd

Supervised By

Sarah yahya ali

June, 2021 – Baghdad

Supervisor's Certification

I certify that the preparation of this graduation research project titled "**DHCP Network Implementation using Network Simulator**" Department of Computer Science / Dijlah University College in partial fulfillment of the requirements for the degree of BSc. In Computer Science.

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Date: *19 / 06 / 2020*

Abstract

The Dynamic Host Configuration Protocol (DHCP) is based on the Bootstrap Protocol (BOOTP), which provides the framework for passing configuration information to hosts on a TCP/IP network. DHCP adds the capability to automatically allocate reusable network addresses and configuration options to Internet hosts. DHCP consists of two components: a protocol for delivering host-specific configuration parameters from a DHCP server to a host and a mechanism for allocating network addresses to hosts. DHCP is built on a client/server model, where designated DHCP server hosts allocate network addresses and deliver configuration parameters to dynamically configured hosts. Where one of the dynamic routing protocols was implemented on the designed network in the cisco packet tracer, which is OSPF to calculate the shortest path between the source and the destination

Table of Contents

Chapter One

Introduction

1.1 Introduction:

The Dynamic Host Configuration Protocol (DHCP) is a network protocol that is used to configure network devices so that they can communicate on an IP network. A DHCP client uses the DHCP protocol to acquire configuration information, such as an IP address, a default route and one or more DNS server addresses from a DHCP server. The DHCP client then uses this information to configure its host. Once the configuration process is complete, the host is able to communicate on that internet. The DHCP server maintains a database of available IP addresses and configuration information. When it receives a request from a client, the DHCP server determines the network to which the DHCP client is connected, and then allocates an IP address or prefix that is appropriate for the client, and sends configuration information appropriate for that client. Because the DHCP protocol must work correctly even before DHCP clients have been configured, the DHCP server and DHCP client must be connected to the same network link. In larger networks, this is not practical. On such networks, each network link contains one or more DHCP relay agents. These DHCP relay agents receive messages from DHCP clients and forward them to DHCP servers. DHCP servers send responses back to the relay agent, and the relay agent then sends these responses to the DHCP client on the local network link. DHCP servers typically grant IP addresses to clients only for a limited interval.

DHCP clients are responsible for renewing their IP address before that interval has expired, and must stop using the address once the interval has expired, if they have not been able to renew it. DHCP is used for IPv4 and IPv6. While both versions serve much the same purpose, the details of the protocol for IPv4 and IPv6 are sufficiently different that they may be considered separate protocols. Hosts that do not use DHCP for address configuration may still use it to obtain another configuration information. Alternatively, IPv6 hosts may use stateless address auto configuration. IPv4 hosts may use link-local addressing to achieve limited local connectivity [5].

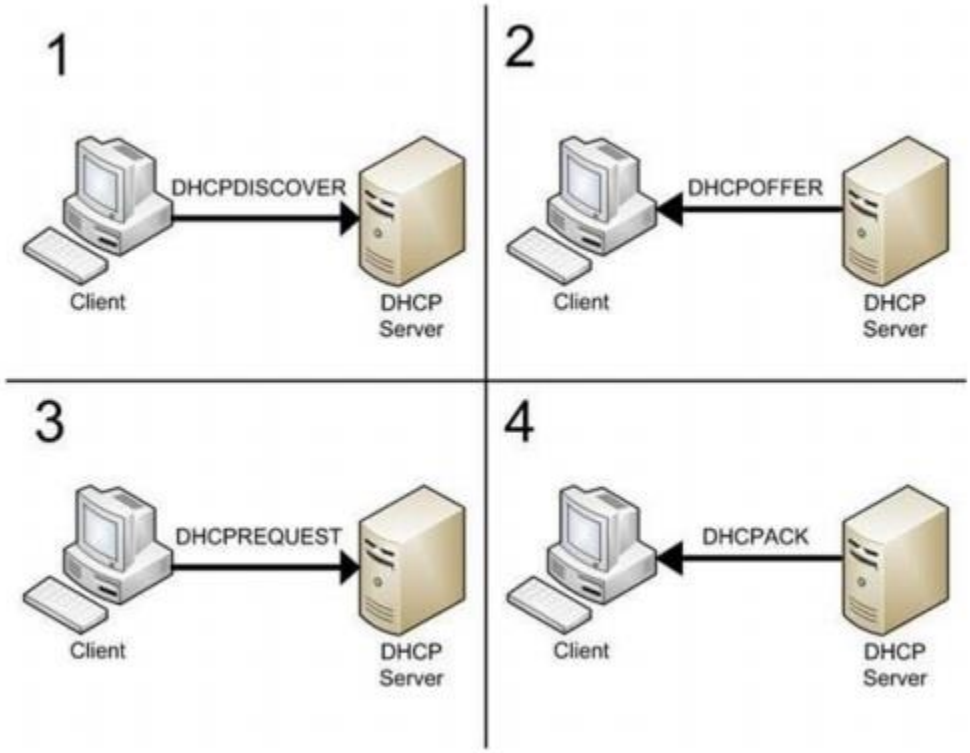

Figure (1.1) DHCP Operation

Dynamic Host Configuration Protocol (DHCP) is a standardized client/server network protocol that dynamically assigns IP addresses and other related configuration information to network devices.

Every device on a TCP/IP-based network must have a unique unicast IP address to access the network and its resources. Without DHCP, IP addresses for new computers or computers that are moved from one subnet to another must be configured manually. DHCP is widely used in everyday life, for example when you: ν turn on your cell phone and connect to the Internet ν use a hotspot or wifi in a cafe ν connect to your home or office network. The key thing to understand about DHCP is that it dynamically assigns IP addresses. This is in contrast with its alternative, static addressing. With static addressing, IP addresses are assigned manually to specific devices, and do not change over time as the device is used. Static addressing is typically used where the source address of the device must not change, for example, to access a service such as a printer server. With this in mind, DHCP allows reservations - these are static IP addresses within the DHCP scope that can be assigned to specific servers or devices and never given out to other devices. DHCP provides an automated way to distribute and update IP addresses and other configuration information on a network. A DHCP server provides this information to a DHCP client through the exchange of a series of messages, known as the DHCP conversation or the DHCP transaction. If the DHCP server and DHCP clients are located on different subnets, a DHCP relay agent is used to facilitate the conversation. DHCP is based on BOOTP, and is defined in RFC 2131[5].

1.2 Dynamic Routing Protocols:

Routing links together small networks to form huge internetworks that span vast regions. This cumbersome task makes the network layer the most complex in the OSI reference model. The network layer provides the transfer of packets across the network. Routing protocols define the path of each packet from source to destination. To complete this task, routers use routing tables, which contain information about possible destinations in the network and the metrics (distance, cost, bandwidth, etc.) to these destinations. Routers have information regarding the neighbor routers around them. The degree of a router's network knowledge and awareness depends on the routing protocol it uses. At every change in the network, including link failure and link recovery, routing tables must be updated. The efficiency of these updates determines the efficiency of the routing protocols. There are two main types of routing protocols: static routing and dynamic routing. Static routing assumes that the network is fixed, meaning no nodes are added or removed and routing tables are therefore only manually updated. Dynamic or adaptive routing, more commonly used for internetworking, allows changes in the network topology by using routing tables that update with each network change. In this report we will only consider dynamic routing protocols. Within the class of dynamic protocols, we can have Interior or Exterior Gateway Protocols. EGP's deals with routing information between different autonomous. An example of an EGP is Border Gateway Protocol (BGP). The three routing protocols we chose to compare are IGP's, protocols that exchange routing information within an AS. These protocols can either use distance vector (such as RIP and EIGRP) or link-state algorithms (such as OSPF) to optimize convergence times. In this project we will compare the three dynamic routing protocols shown on the right of the hierarchy chart below: RIP, OSPF and EIGRP [5].

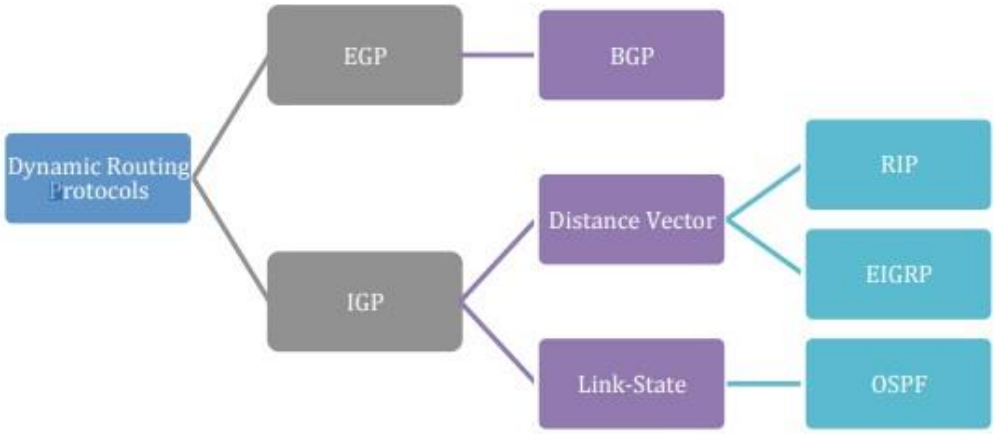

Figure (1.2) Hierarchy Chart of Routing Protocols

1.2.1 Open Shortest Path First (OSPF):

Open Shortest Path First (OSPF) is a very widely used link-state interior gateway protocols (IGP). This protocol routes Internet Protocol (IP) packets by gathering link-state information from neighboring routers and constructing a map of the network. OSPF routers send many message types including hello messages, link state requests and updates and database descriptions. Djisktra's algorithm is then used to find the shortest path to the destination. Shortest Path First (SPF) calculations are computed either periodically or upon a received Link State Advertisement (LSA), depending on the protocol implementation. Topology changes are Dynamic Routing Protocols EGP BGP IGP Distance Vector RIP EIGRP Link-State OSPF - detected very quickly using this protocol. Another advantage of OSPF is that its many configurable parameters make it a very flexible and robust protocol. Contrary to RIP, however, OSPF has the disadvantage of being too complicated [6].

1.2.2 OSPF Fundamentals

OSPF sends to neighboring routers link-state advertisements (LSAs) that contain the link state and link metric. The received LSAs are stored in a local database called the link-state database (LSDB), and they are flooded throughout the OSPF routing domain, just as the advertising router advertised them. All OSPF routers maintain a synchronized identical copy of the LSDB for the same area. The LSDB provides the topology of the network, in essence providing for the router a complete map of the network. All OSPF routers run the Dijkstra shortest path first (SPF) algorithm to construct a loop-free topology of shortest paths. OSPF dynamically detects topology changes within the network and calculates loop-free paths in a short amount of time with minimal routing protocol traffic.

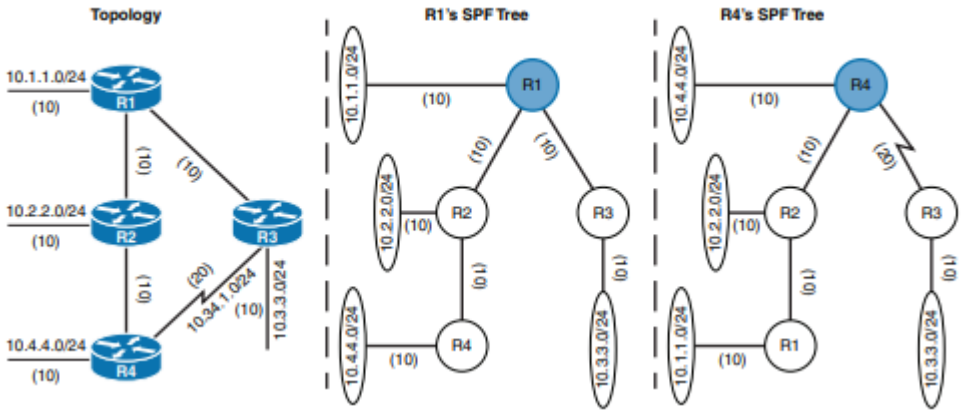

Figure (1.3) OSPF Shortest Path First (SPF) Tree

Figure (1.3) shows a simple OSPF topology and the SPT from R1's and R4's perspective. Notice that the local router's perspective will always be the root (top of the tree). There is a difference in connectivity to the 10.3.3.0/24 network from R1's SPT and R4's SPT. From R1's. perspective, the serial link between R3 and R4 is missing; from R4's perspective, the Ethernet link between R1 and R3 is missing [1].

1.2.3 Understanding OSPF Areas

OSPF offers a very distinguishable feature named: Routing Areas. It means dividing routers inside a single autonomous system running OSPF, into areas where each area consists of a group of connected routers.

The idea of dividing the OSPF network into areas is to simplify administration and optimize available resources. Resource optimization is especially important for large enterprise networks with a plethora of network and links. Having many routers exchange the link state database could flood the network and reduce its efficiency – this was the need that led to the creation of concept Areas.

Areas are a logical collection of routers that carry the same Area ID or number inside of an OSPF network, the OSPF network itself can contain multiple areas, the first and main Area is called the backbone area "Area 0", all other areas must connect to Area 0 as shown in the diagram below figure (1.4):

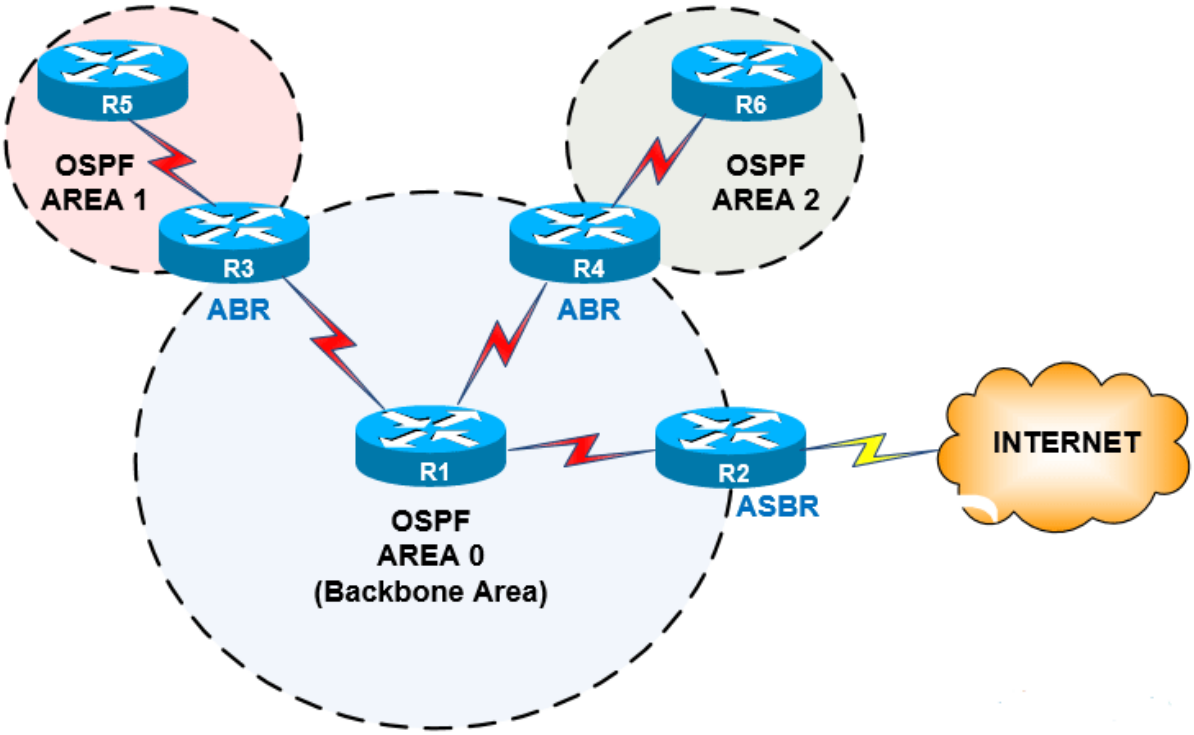

Figure (1.4) OSPF Areas, Area 0 (Backbone Area), ABR and ASBR OSPF routers

The goal of having an Area is to localize the network as follow:

- The Area boundaries will give the opportunity of using summarization, as it's not possible to summarize network prefixes in normal link state protocols because routers are supposed to have the same map topology of the entire network coincide in all neighbors.
- Area boundaries will also help preventing fault containment by suppressing updates that take place when a change occurs in the network causing a flood of updates between routers. This also happens to be a weakness of link state protocols: When connecting large sized networks, it is very difficult to avoid link state database floods [2].

1.2.4 OSPF Link State Packet Types

OSPF routers generate packets of information that are exchanged with neighboring routers. These packets are designed for several purposes such as forming neighbor relations between routers, calculating cost and best path for a specific route and more. The following is a list of the most frequently used OSPF packets:

- Link State Advertisement (LSA): The primary mean of communication between OSPF routers, it's the packet that carries all fundamental information about the topology and is flooded between areas to perform different functions, there are 11 types of LSA packets that will be covered in great depth in future OSPF articles here on Firewall.cx
- Link State Database (LSDB): LSDB packet contains all updated link-state information exchanged among the network, and all routers within the same area have identical LSDB, and when two routers form new neighbor adjacency, they sync their LSDB to be fully adjacent.
- Link State Request (LSR): Once neighbor adjacency is formed and LSDB is exchanged, neighbor routers may locate a missing LSDB information, they then send a request packet to claim the missing piece, neighbors receive this packet and respond with LSU.
- Link State Update (LSU): A response packet sends a specific piece of LSDB information requested by an OSPF neighbor via LSR packet.

- Link State Acknowledgment (LSAcK): The router that sends the LSR packet confirms receiving the LSU from neighbor by sending a confirmation packet acknowledging receiving the requested LSUs [2].

1.3 DHCP work

When you access the Internet, your computer automatically requests an IP address from the network's DHCP server. The DHCP server contains a range (or scope) of IP addresses that it is allowed to give out. If there is an address available, the DHCP server will send your computer a response containing an IP address, the default gateway address, subnet mask, and the lease time that your computer can use the address for. You might ask, "why is the IP address leased?" This is so that the range of IP addresses can be recycled and not used up, or left as 'used' by a device that has been disconnected. Leases times are configured to suit various requirements. For example, a cafe with free wifi may have leases that last/expire in 1 day, but in an Enterprise environment such as a call center with 1000 computers using the same IP addresses from a DHCP server 'permanently', they may use a lease of 100 days. This would make sure no undue network traffic was going on simply for renewing an IP address for hosts plugged in all the time. Clients renew their leases (generally at 50% of the lease time), and when the lease is renewed it will usually be the same IP address. Of course, not every device on the network needs to have a dynamic IP address. Using DHCP, you can reserve addresses for devices such as printers. As each network device has a MAC address, you can assign a static IP at the server to a specific MAC address. This allows devices such as the network printer to always get the same IP address even after it reboots and without assigning the IP address at the printer [3].

1.4 DHCP Architecture

The DHCP architecture is made up of DHCP clients, DHCP servers, and DHCP relay agents. The client interacts with servers using DHCP messages in a DHCP conversation to obtain and renew IP address leases. Here is a brief description of the DHCP components:

1.4.1 DHCP client

A DHCP client is any IP device connected on the network that has been configured to act as a host requesting configuration parameters such as an IP address from a DHCP server. Configuration parameters and other control information are carried in tagged data items that are stored in the Options field of the DHCP message. DHCP uses the Options to pass additional IP settings to DHCP clients such as the default gateway IP address, DNS server address, and the DNS domain name.

1.4.2 DHCP server

The DHCP server is a device on the network with a pool of IP addresses at its disposal to automatically assign to devices as they join the network.

The DHCP server assigns the network device its:

- IP address - dynamically configured
- subnet mask - statically configured
- default gateway for the network - statically configured
- Primary DNS server - to match a device NAME to an IP address
- Secondary DNS server - statically configured for redundancy and load balancing.

1.5 DHCP relay agent

DHCP relay agents pass DHCP messages between servers and clients where the DHCP server does not reside on the same IP subnet as its clients. For example, on large networks consisting of multiple subnets, a single DHCP server may service the entire network when aided by DHCP relay agents located on the interconnecting routers. You can configure a maximum number of 400 DHCP relay agents (one per interface) Plus devices. You can use DHCP relay agent information, Option 82, to protect your switch from spoofing attacks, where untrusted hosts send requests for IP addresses to access the network.

The following diagram shows the changing port numbers and the source and destination addresses used during the DHCP transaction. UDP port 68 is reserved for DHCP clients, and UDP port 67 is reserved for DHCP servers.

- Step 1 DHCP Discover

  Sent by the client looking for the IP address. The source IP is 0.0.0.0 because the client doesn't have an IP address. The destination is 255.255.255.255, which is the broadcast address, as the client doesn't know where the DHCP server is located, so it broadcasts to all devices on the network.

- Step 2 DHCP Offer

  Sent by the DHCP server offering an IP address to the client. The source address is the DHCP server address. The DHCP server doesn't know the client address yet, so it broadcasts the offer to all devices on the network.

- Step 3 DHCP Request

  Sent by the client to the DHCP server to say "I will take that IP address, thanks." The client IP address is still 0.0.0.0 and it is again broadcast to all so that any other servers on the network that may have offered an IP address will know to stop communicating with the client for now.

- Step 4 DHCP Acknowledgment

  Sent by the DHCP server to the client. It confirms the IP address and other details such as subnet mask, default gateway, and lease time with the client. The source address is the DHCP server and the destination is still the broadcast address [1].

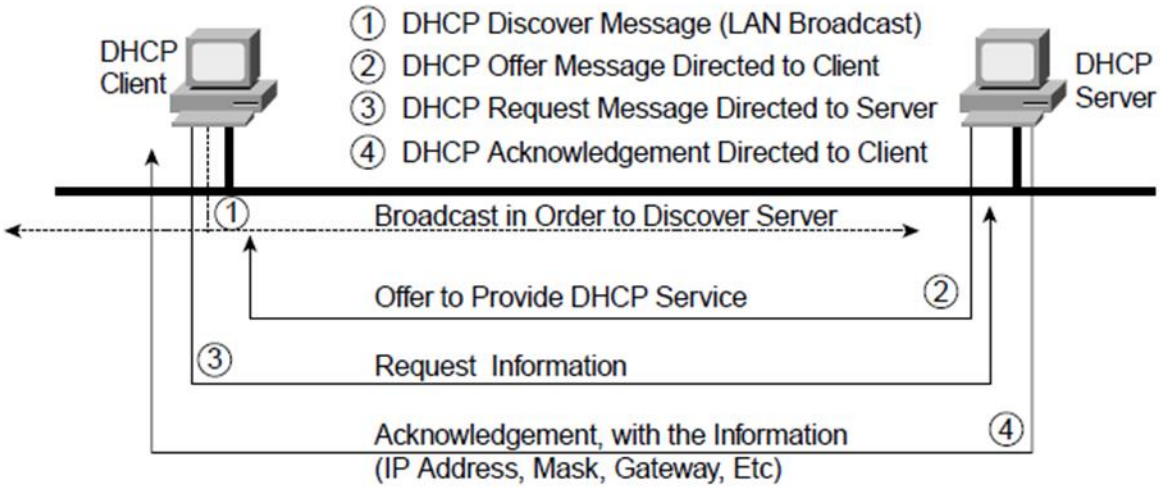

Figure (1.5) DHCP Operation.

1.6 The DHCP process

There are four basic steps the DHCP process follows when a client connects to the network:

1. The client broadcasts a DHCP Discover message to say "I need an IP address, are there any DHCP servers out there?"

2. Multiple DHCP servers may respond (via broadcast) with an OFFER for a leased IP address back to the client.

3. The client will choose a DHCP server offer and then broadcast a DHCP REQUEST back to the DHCP server(s) to say "Thanks, I have selected an offer from this DHCP server." All servers will see which offer the client selected.

4. Finally, the selected DHCP server will send (broadcast) an ACKNOWLEDGEMENT back to the client to confirm the IP address, lease time, and other details [3].

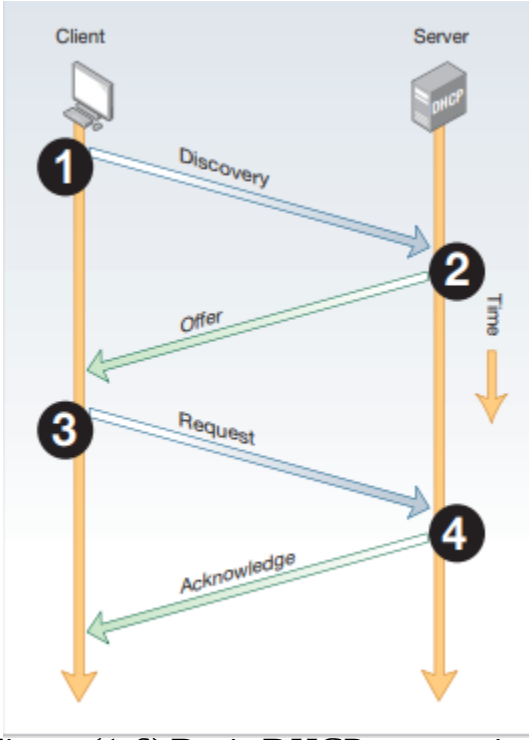

Figure (1.6) Basic DHCP transaction.

1.6.1 Leases

One of the most significant benefits of DHCP is that it can dynamically configure devices with IP addresses and associate leases with the assigned addresses. DHCP uses a lease mechanism that offers an automated, reliable, and safe method for distributing and reusing addresses in networks, with little need for administrative intervention. As system administrator, you can tailor the lease policy to meet the specific needs of your network. Leases are grouped together in an address pool, called a scope, which defines the set of IP addresses available for requesting hosts. A lease can be reserved (the host always receives the same IP address) or dynamic (the host receives the next available, unassigned lease in the scope).

Figure (1.7) shown the DHCP server of the site is configured to lease addresses 192.168.1.100 through 192.168.1.199. If you plan not to have more network devices than configured addresses for the scope, you can define long lease times, such as one to two weeks, to reduce network traffic and DHCP server load [4].

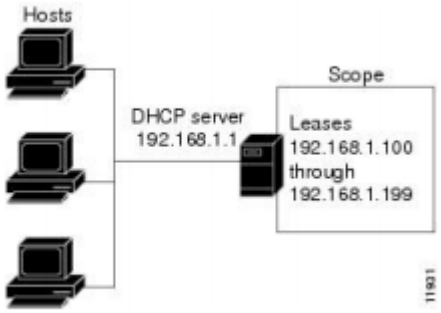

Figure (1.7) DHCP Hosts Requesting Leases from a DHCP Serve.

1.7 Aim of the Project:

- Configure a router for DHCP using Cisco packet tracer.
- Configure a router for DHCP using the Cisco IOS CLI.
- Configure a DHCP client.
- Verify DHCP functionality.

Chapter Two

The System Design

2.1 Introduction

The project works to implement Network for a company based on DHCP by means of a main router called MAIN_ROUTER, and the main router is a server that is distributed to the rest of the sections and contains DHCP and OSPF dynamic protocols and this main router contains several sections.

i. **MARKETING ROUTER**
ii. **ACCOUNT ROUTER**
iii. **TECHINCAL ROUTER**

And each division of the company contains a specific router that is based on the main router MAIN_ROUTER in terms of the DHCP protocol and also on these sections the work of the DHCP relay and the work of (ROUTING) between devices by the protocol of (OSPF) Dynamic for each section. In order for it to be a communication process between the associated devices and it is within the LSA family These three sections are also connected with switches for each section These switches are connected to multiple node and end devices.

2.2 Network Topology

The following figure represents a simple design to understand the function of the DHCP that is used to configure network devices. DHCP allows a computer to join an IP-based network without having a pre-configured IP address. DHCP is a protocol that assigns unique IP addresses to devices, then releases and renews these addresses as devices leave and re-join the network.

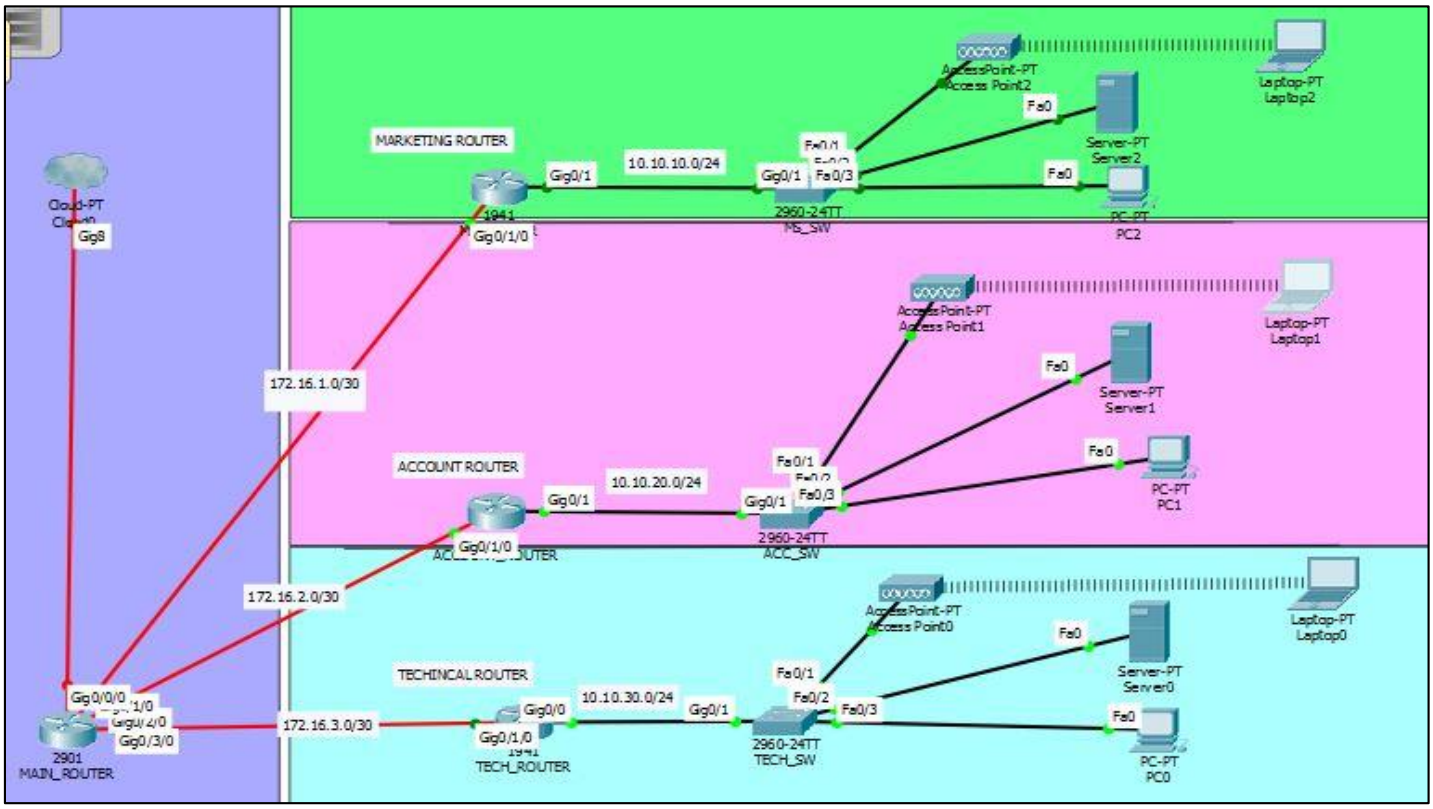

Figure (2.1) Network Design

2.3 The System Architecture

Here, we explain how the devices obtain an IP DHCP through the main router through the getaway path passing through a secondary router via a DHCP relay, and we also explain the process of sending and delivery by doing a Ping or Trace-Root to clarify the communication process between two devices.

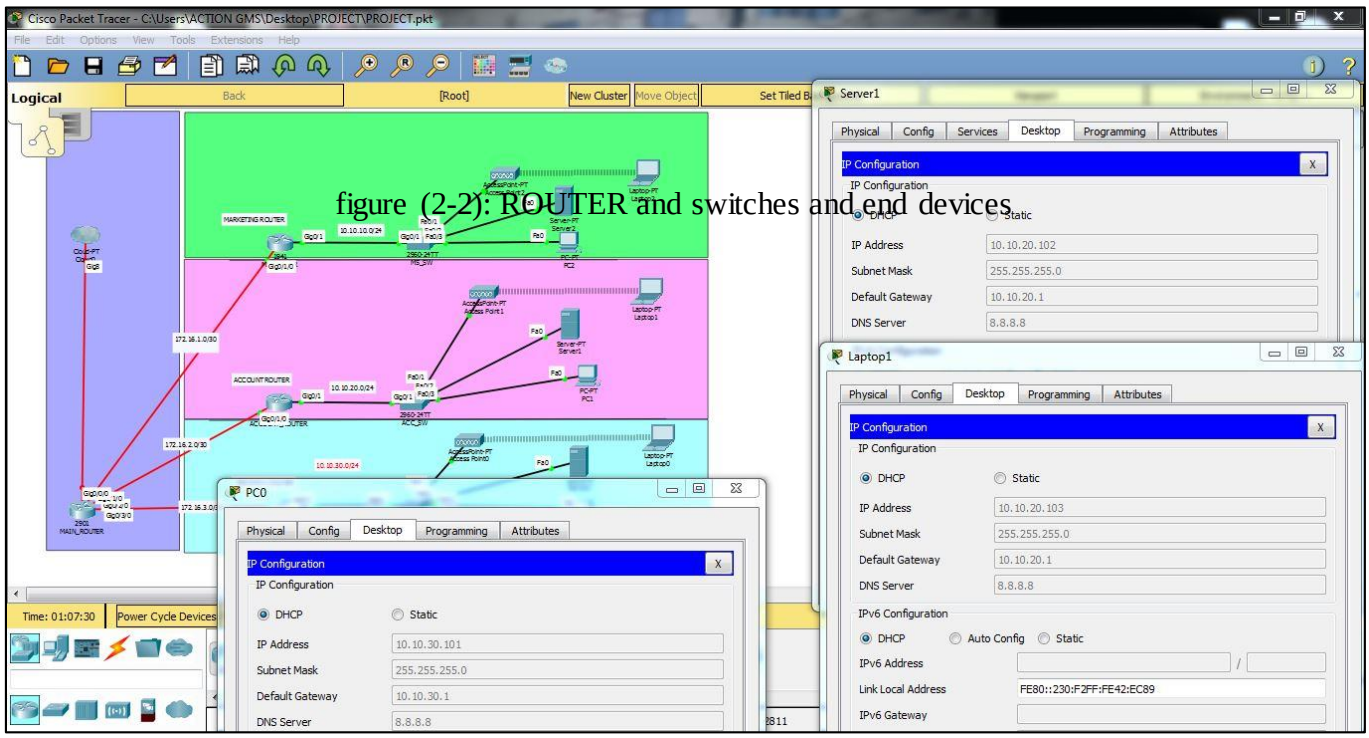

figure (2-2): ROUTER and switches and end devices

Figure (2.2) Mechanism of obtaining DHCP for the device

To check the communication between the nodes on different networks, sending and delivery between two hosts. This is done by sending a message between two devices on different networks.

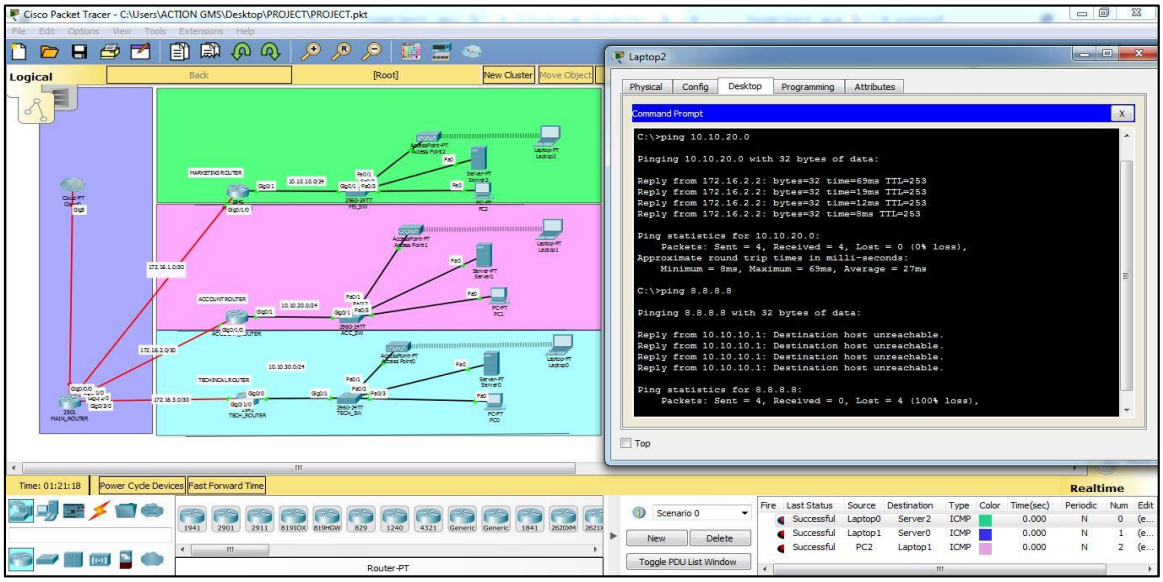

Figure (2.3) The process of communication

Chapter Three

The Implemented System

3.1 Introduction

Packet Tracer is a cross-platform visual simulation tool designed by Cisco Systems that allows users to create network topologies and imitate modern computer networks. The software allows users to simulate the configuration of Cisco routers and switches using a simulated command line interface. Packet Tracer makes use of a drag and drop user interface, allowing users to add and remove simulated network devices as they see fit. The software is mainly focused towards Certified Cisco Network Associate Academy students as an educational tool for helping them learn fundamental CCNA concepts. Previously students enrolled in a CCNA Academy program could freely download and use the tool free of charge for educational use.

3.2 The Implemented System's Requirements

Several devices were used in the project, including the main router 2901, and three connected routers were also used in the main type 1941 and three type 2960 switches and it contains 24 ports and each switch connected to a specific router and a group of end devices such as a laptop, an access point, or a pc server to be connected with switches

i. Routers

ii. Switch

iii. end devices

3.3 The Implemented System

A set of branches of the router and the switches to make the communication process between the servers and clients

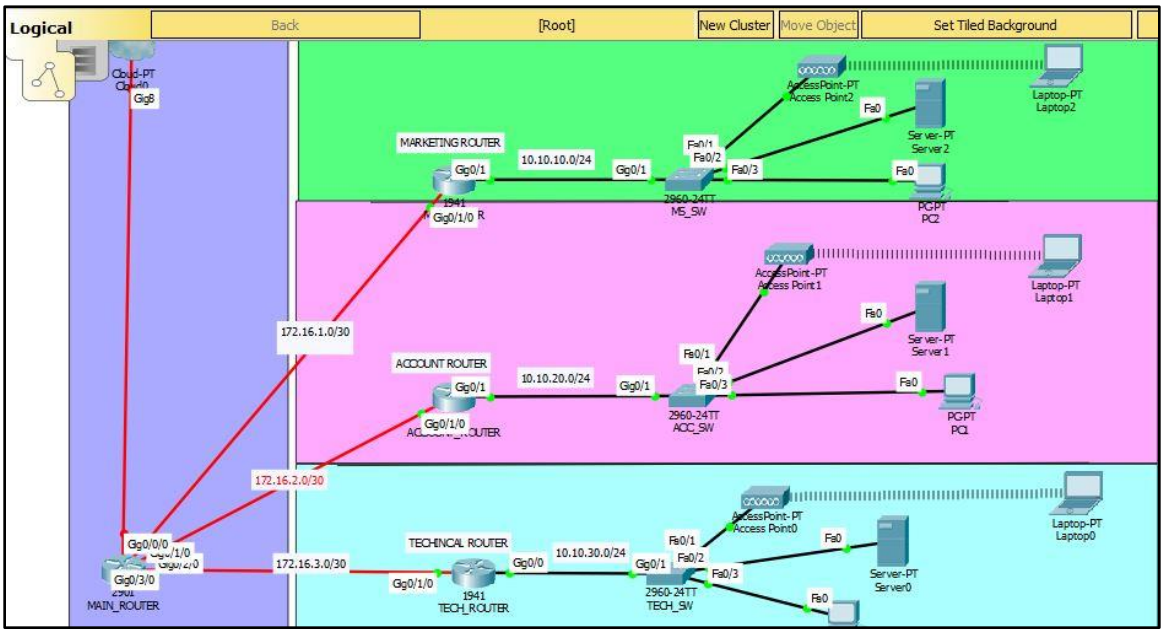

Figure (3.1) Implemented Design

3.4 Configuring the Ports

After connecting the devices and configuring the network design, all the interfaces must be turned on and distribute IP address to each of them depending on the network that is a part of it as shown below:

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# hostname MAIN_ROUTER
MAIN ROUTER (config)# enable pass
MAIN ROUTER (config)# enable password anas
MAIN ROUTER (config)# int gig0/1/0
MAIN_ROUTER (config-if)# ip add 172.16.1.1 255.255.255.252
MAIN ROUTER (config-if)# no sh
MAIN_ROUTER (config-if)# int gig0/2/0
MAIN_ROUTER (config-if)# ip add 172.16.2.1 255.255.255.252
MAIN ROUTER (config-if)# no sh
MAIN ROUTER (config-if)#exit
```

Figure (3.2) Configure interfaces in MAIN_ROUTER

```
Router>en
Router#conf t
Enter configuration commands, one per line. Ind with CNTL/z
Router (config)#hostname
MS -ROUTER MS _ROUTER (config)#enable pass ruaa
MS _ROUTER (config)# int gig0/1/0
MS_ROUTER (config-if)#ip add 172.16.1.2 255.255.255.252
MS ROUTER (config-if) no sh
MS_ROUTER (config-if)int gig0/1
MS_ROUTER (config-if)# ip add 10.10.10.1 255.255.255.0
MS_ROUTER (config-if)#no sh
```

Figure (3.3) Configure interface in MS_ROUTER

```
Router>en
Router# conf t Enter configuration commands, one per line. End wish CNTL/Z
Router(config)#hostneme Account_ROUTER
ACCOUNT ROUTER( config )#enable pass aoda
ACCOUNT_ROUTER (config) #int gigi0/1/0
ACCOUNT ROUTER (config-if) #ip add 172.16.2.2 255.255.255.252
ACCOUNT_ROUTER (config-if) # no sh
ACCOUNT_ROUTERI (config-if) #int gig0/1
ACCOUNT_ROUTER( contag-if) ip add 10.10.20.1 255.255.255.0
ACCOUNT_ROUTER(config-if)no sh
```

Figure (3.4) Configure interface in ACCOUNT_ROUTER

```
Router>en
Router# conf t Enter configuration commands, one per line. End wish CNTL/Z
Router(config)#hostneme TECH ROUTER
TECH ROUTER( config)#enable pass zahraa
TECH _ROUTER(config)# int gig0/1/0
TECH _ROUTER(config-if)# ip add 172.16.3.2 255.255.255.252
TECH _ROUTER(config-if)# no sh
TECH _ROUTER(config-if)# int gig0/0
TECH _ROUTER(config-if)# ip add 10.10.30.1 255.255.255.0
TECH _ROUTER(config-if)# no sh
```

Figure (3.5) Configure interface in TECH_ROUTER

3.5 Implement DHCP Protocol

Cisco routers can also be configured as a DHCP server that is shown below:

```
MAIN ROUTE (config)# ip dhcp excluded-address 10.10.10.1 10.10.10.100
MAIN ROUTER (config)# ip dhcp pool MS MAIN ROUTER
MAIN ROUTER (dhcp-config)# network 10.10.10.0 255.255.255.0
MAIN ROUTER (dhcp-config)# dns 8.8.8.8
MAIN_ROUTER (dhcp-config) # default-router 10.10.10.1
MAIN_ROUTER (dhcp-config) # exit
MAIN ROUTER(config)# ip dhcp excluded-address 10.10.20.1 10.10.20.100
MAIN _ROUTER (config)# ip dhcp pool ACCOUNT
MAIN_ROUTER (dhcp-config)# net 10.10.20.0 255.255.255.0
MAIN ROUTER (dhcp-config)# def 10.10.20.1
MAIN_ROUTER (dhcp-config)# dns 8.8.8.8
MAIN _ROUTE (dhcp-config) # exit
MAIN_ROUTER (config)# ip dhcp excluded-address 10.10.30.1 10.10.30.10
MAIN_ROUTER (config) #ip dhcp pool TECH
MAIN_ROUTER (dhcp-config)# net 10.10.30.0 255.255.255.0
MAIN ROUTER (dhcp-config)# def 10.10.30.1
MAIN ROUTER (dhcp-config)# dns 8.8.8.8
MAIN _ROUTE(dhcp-config)# exit
```

Figure (3.6) Configure DHCP in MAIN_ROUTER.

As it is known to us that the router turns off what is known as the Broadcast, but we may need to publish in some cases. What we will do is activate the ip helper to allow the broadcast of the DHCP server that is shown in the following figures

```
MS _ROUTER (config) #int gig0/1
MS _ROUTER (config-if) #ip helper
MS _ROUTER (config-if)#ip helper-address 172.16.1.1
```

Figure (3.7) DHCP relay in MS_ROUTER

```
ACCOUNT _ROUTER (config) #int gig0/1
ACCOUNT _ROUTER (config-if) #ip helper
ACCOUNT _ROUTER (config-if)#ip helper-address 172.16.2.1
```

Figure (3.8) DHCP relay in ACCOUNT_ROUTER

```
TECH _ROUTER (config) #int gig0/1
TECH _ROUTER (config-if) #ip helper
TECH _ROUTER (config-if)#ip helper-address 172.16.2.1
```

Figure (3.9) DHCP relay in TECH_ROUTER

3.6 Implement of Open Shortest Path First (OSPF) Protocol

Open Shortest Path First is an open standard routing protocol that's been implemented by a wide variety of network vendors, including Cisco. And it's that open standard characteristic that's the key to OSPF's flexibility and popularity. Most people opt for OSPF, which works by using the Dijkstra algorithm to initially construct a shortest path tree and follows that by populating the routing table with the resulting best paths [15].

Here's a list that summarizes some of OSPF's best features:

- Allows for the creation of areas and autonomous systems
- Minimizes routing update traffic
- Is highly flexible, versatile, and scalable
- Supports VLSM/CIDR
- Offers an unlimited hop count

• Is open standard and supports multi-vendor deployment

Then the following figures shown the configuration of OSPF protocol in the routers

```
MAIN_ ROUTER (config)#router ospf 1
MAIN_ROUTER (config-router)# network 172. 16 1 .0 0.0.0.3 ares 0
MAIN _ROUTER (config-router)# network 172.16.2 .0 0.0.0.3 area 0
MAIN _ROUTER (config-router)#network 172.16.3.0 0.0.0.3 area0
```

Figure (3.10) OSPF in MAIN _ROUTER

```
ACCOUNT_ ROUTER (config) #router ospf 1
ACCOUNT_ ROUTER (config-router)#network 172.16.2.0 0.0.0.3 area 0
ACCOUNT _ROUTER(config-router) #net 10.10.20.0 0.0.0.255 area 0
```

Figure (3.11) OSPF in ACCOUNT _ROUTER

```
MS _ ROUTER (config) #router ospf 1
MS _ ROUTER (config-router)#network 172.16.1.0 0.0.0.3 area 0
MS _ROUTER(config-router) #net 10.10.10.0 0.0.0.255 area 0
```

Figure (3.12) OSPF in MS _ROUTER

```
TECH_ROUTER (config)# router ospf 1
TECH_ROUTER (config-router) #network 10.10.30.0 0.0.0.255 area 0
TECH_ROUTER (config-router) #network 172.16.3.0 0.0.0.3 area 0
```

Figure (3.13) OSPF in TECH _ROUTER

3.7 The Interaction with The Implemented System

explain the process of customer interaction with the server to obtain a set of commands such as IP address and a communication process between clients and servers such as data transfer and pinging or trace routines.

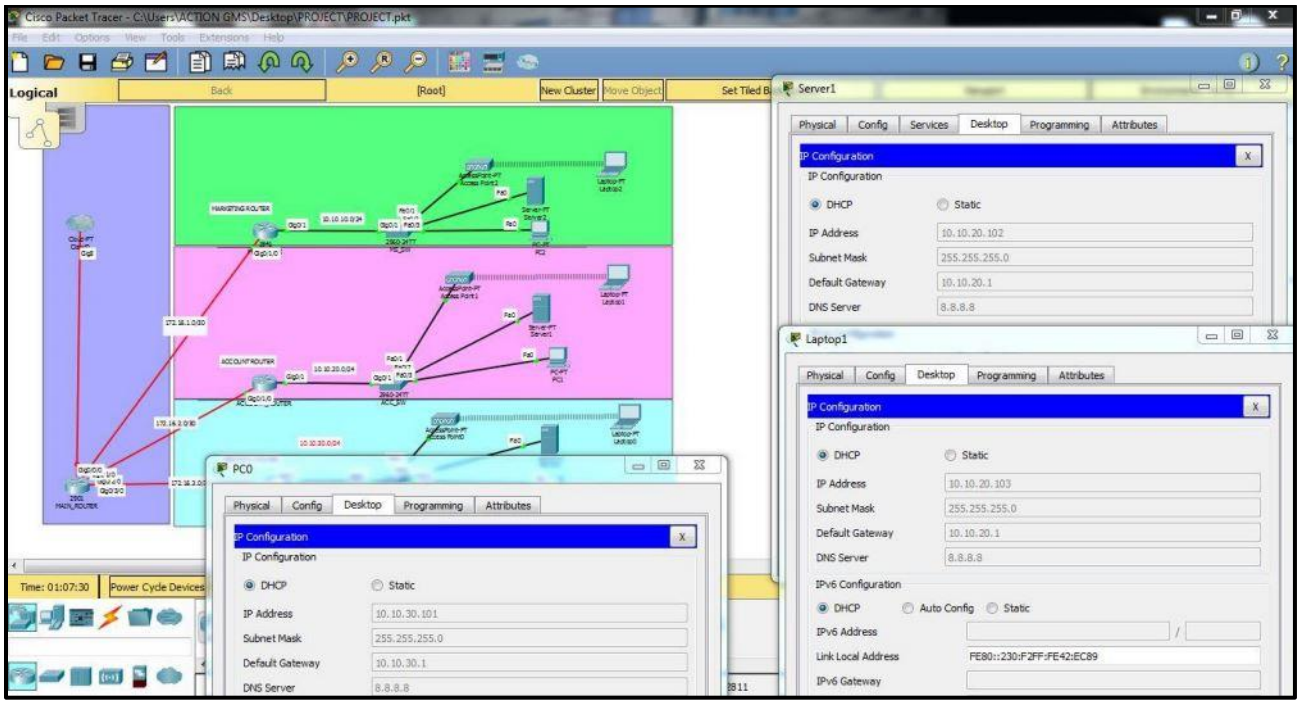

Figure (3.14) Mechanism of obtaining DHCP for the device

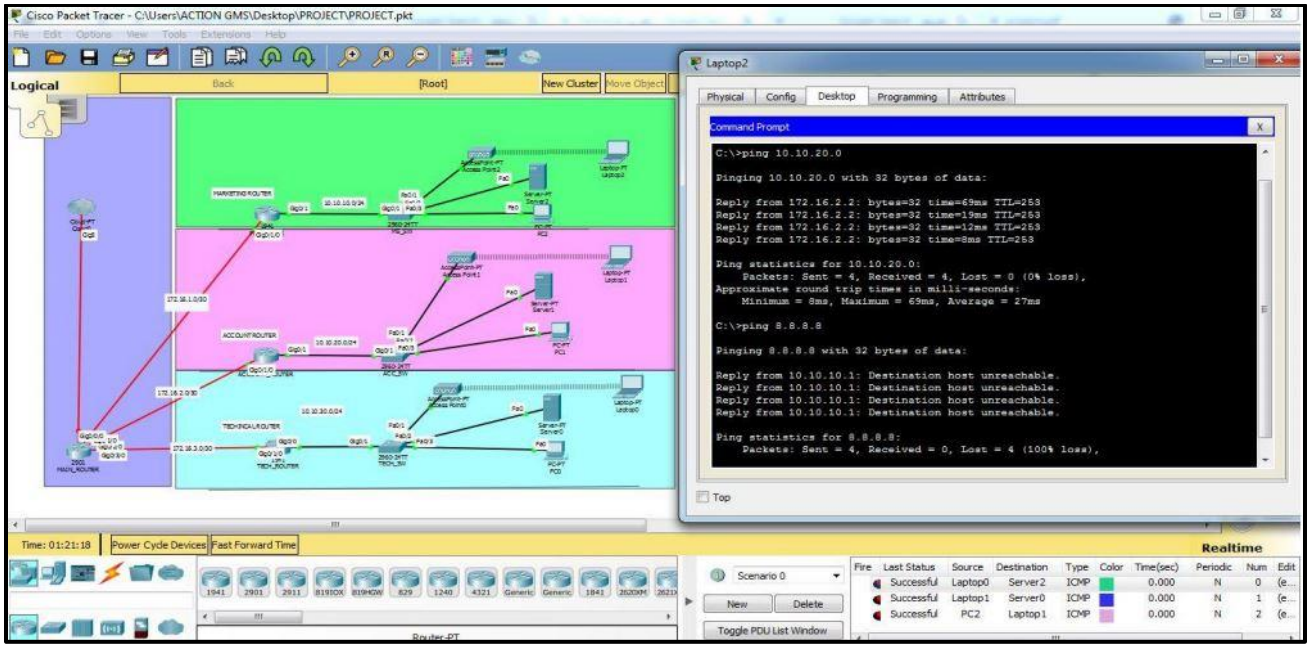

Figure (3.15) The process of communication, sending and delivery between devices

Chapter Four

Conclusions, Limitations and Future Works

4.1. Conclusions

many points which are certain significance are drawn and concluded from this work, they are:

i. Clients obtain a dynamic IP address from a DHCP server without any interference regardless of the number
ii. A communication process between clients
iii. Sending and delivering data between them using the OSPF protocol

4.2. Limitations

i. When we create a DHCP server in the main router, the control router and this router is connected to several routers, we will face a problem when the user requests an IP Idris because it is not directly connected to the main router, so here we must put (DHCP RELAY) in the sub router in order to be a vision between the client and the server
   And that by making the routing also between the devices in order for the process to take place
ii. There are several Advantages and Drawbacks in the routing protocol process

- **The advantages of OSPF:**
  - **a.** OSPF is not a proprietary protocol.
  - **b.** Fast and loop less convergence
  - **c.** Low bandwidth utilization
  - **d.** Precise metrics are supported and if needed multiple metrics can be used.
  - **e.** Multiple paths are supported.
  - **f.** External routes are represented separately.
  - **g.** No hop count limit.
  - **h.** Supports VLSM.
  - **i.** Supports larger networks.
- **Drawbacks of OSPF are**
  - **a.** Complex to configure
  - **b.** Memory overhead. To keep track of all Areas and networks connected within an Area OSPF utilizes link-state databases. These LSDB may become large if the topology is complex which may result in the reduction of the maximum size of an Area.
  - **c.** Processing overhead is high when topology changes occur. This is due to the fact that all routing information needs to be flooded. Furthermore, recalculation of the routes needs also to be performed.

4.3. Suggestions for Future Works

In the future we can make and add more suggestions to our own design as external communication with several company via VPN or by cable We can also work on dividing the company's divisions into several internal branches through the work of VLAN switch

Also, we can increase the area of the area by using the ospf directive protocol by using an area, as listed in the following:

i. External communication with several company through (VPN).

ii. Add a VLAN group to expand the network and add new partitions by (VLN) switch.

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الخلاصـــــــــة

يعتمد بروتوكول التكوين الديناميكي للمضيف (DHCP) على بروتوكول Bootstrap (BOOTP)، والذي يوفر إطارًا لتمرير معلومات التكوين إلى المضيفين على شبكة TCP / IP. يضيف DHCP القدرة على التخصيص التلقائي لعناوين الشبكة القابلة لإعادة الاستخدام وخيارات التكوين لمضيفي الإنترنت. يتكون DHCP من مكونين: بروتوكول لتسليم معلمات التكوين الخاصة بالمضيف من خادم DHCP إلى مضيف وآلية لتخصيص عناوين الشبكة للمضيفين. تم بناء DHCP على نموذج العميل / الخادم ، حيث يقوم مضيفو خادم DHCP المعينون بتخصيص عناوين الشبكة وتقديم معلمات التكوين للمضيفين الذين تم تكوينهم ديناميكيًا. حيث تم تنفيذ أحد بروتوكولات التوجيه الديناميكي على الشبكة المصممة في متتبع حزم سيسكو ، وهو OSPF لحساب أقصر مسار بين المصدر والمستلـــــــم .

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
كلية دجلة الجامعة
قسم علوم الحاسوب

المشروع يهدف الى تنفيذ شبكه اكسترانت لشركه بالاستناد الى بروتكول DHCP

هذا المشروع مقدم الى قسم علوم الحاسوب / كلية دجلة الجامعة
كجزء من متطلبات الحصول على درجة البكلوريوس في علوم الحاسوب

معد من قبل

أنس جعفر سلمان

رؤى عبدالرسول كاظم

زهراء صلاح ثجيل

زهراء عوده عبد

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MINISTERY OF HIGHER EDUCATION AND SCIENTFIC RESEARCH

DIJLAH COLLEGE

DEPARTMENT OF COMPUTER SCIENCE

E - Doctor

A Graduation Project Submitted to the Department of Computer Science / Dijlah University College as a Partial Fulfilment of the Requirement of the BSc. Degree in Computer Science

Maryam Ahmed Mahdi

Saleh Ammar

Yusra Ali

Noor ElDeen Fouad

Supervisor By:

MSC Ali Taha

June 2021

Supervisor's Certification

I certify that the preparation of this graduation research project titled "**E-Doctor**/ Department of Computer Science / Dijlah University College in partial fulfillment of the requirements for the degree of BSc. In Computer Science.

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Date: 19 / 06 / 2021

بسم الله الرحمن الرحيم

﴿ وَفَوْقَ كُلِّ ذِي عِلْمٍ عَلِيمٌ ﴾

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Dedication

This study is wholeheartedly dedicated to our beloved parents, who have been our source of inspiration and gave us strength when we thought of giving up, who continually provide their moral, spiritual, emotional, and financial support. To our brothers, sisters, relatives, mentor, friends, and classmates who shared their words of advice and encouragement to finish this study. And lastly, we dedicated this book to the Almighty God, thank you for the guidance, strength, power of mind, protection and skills and for giving us a healthy life. All of these, we offer to you.

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First and foremost, praises and thanks to the God, the Almighty, for His showers of blessings throughout my research work to complete the research successfully.

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I am extremely grateful to my parents for their love,

prayers, caring and sacrifices for educating and preparing me for my future. I am very much thankful to my wife and my daughters for their love, understanding, prayers and continuing support to complete this research work. Also, I express my thanks to my sisters, brother.

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Finally, my thanks go to all the people who have supported me to complete the research work directly or indirectly.

Abstract

The purpose of this program "E – Doctor" is to establish an internet website to help the doctor and the pharmacist in their work as well as to keep record of their patients that attend the clinic. The doctor can choose from many diseases to help diagnose the patient and send the prescription to the pharmacist where it can be handed to the patient by using the website, the whole website helps in establishing a good communication between doctor, pharmacist and the patient

Chapter One

1.1 Introduction

Human health is the most important aspect that humans as individuals, institutes or even as governments focus on. Diagnosing patients to accurately identify the diseases is the core step for curing the disease and prescribing the correct medicines. Incorrect diagnosing can worsen the patient condition. Incorrect diagnosing can be the result of doctor unintentionally identifying the wrong disease for the patient condition, or unintentionally prescribing the wrong medicine. Even when doctors are correct, pharmacists can mistakenly give the medicines prescribed by the doctors to the wrong patient.

To help eliminate or at least minimize such mistakes, we provide the E–Doctor system. The system accurately associates the diseases with their symptoms and with the correct medicines. Later on, doctors using the system can easily input the symptoms identified by their patients and automatically display to the doctors the diseases associated with the identified diseases. After the doctors select the diseases, the system will automatically display the corresponding medicines to be selected by the doctors. Doctors can easily input patient information (for new patients) or select from known patients to issue the medicines prescription which will automatically be sent to the pharmacist. The pharmacist can view the received prescriptions and verify the patient information before processing the prescriptions.

The E–Doctor system allow doctors and pharmacists to register in the system. Administrators, using the system, are responsible for verifying the accounts information and activating them. Administrators, using the system, can also create, edit and delete accounts. In addition, Administrators, using the system, are responsible for initially inputting the diseases data, symptoms data and medicines data and build the associations between these data. Clinic Management System (e-Doctor) is an online system (Web-Based System) that can be easily accessed by any web browser.[1]

1.2 The Aim

The (E-Doctor) system is used:

- To help the doctors to correctly diagnose patients' diseases and prescribe appropriate medicine.
- To automate the process of issuing medical prescription and sending them to the pharmacist.
- Simplifying the pharmacist job to view and keep track of medical prescriptions and associate these medical prescriptions with the corresponding patients to help verifying the patient information before handing the patient the prescribed medicines.

1.3 Problem background

The absence of a well-established information system to serve patient and staff has led to inconveniences. This has tantamount to the loss of patient and staff records.

This is basically because of the weakness of the existing system which includes over reliance on paper-based work. Paper files consume a lot of the office space, slow recording, processing and retrieval of patient details. Accessing and sharing of information by different departments is difficult due to poor information management. [2]

1.4 Possible Solutions

- For collecting, the association data between symptoms, diseases and medicines data, we can possibly depend on doctors to input such information during the diagnosing process. However, doctors are under huge pressure and stress physically and emotionally due to the long hours of work and the dealing with many patients from different gender, age, ethnicity and sometimes language. This stress increases the chances of making mistakes when inputting the association data. Therefore, the solution we choose is to move the burden to the administrators to collect such information.

- For issuing the medical prescriptions, possible solutions include generating a printable prescription document and hand it to the patient to take it to the pharmacy. However, printed documents can be lost or altered. Thus, the solution we choose is generating an electronic medical prescription that can be automatically and instantly sent to the pharmacists registered in the system.
- Since the system is accessed by doctors, pharmacists and administrators, one of the possible solutions is to make a different application for each user and different platform. However, the solution we choose is to make a unified access point that can be used by all users from any device with any platform and hence a web-based system.[3]

1.5 Main concepts and technologies

Heartbeat Time Series Classification with Support Vector Machines In this study, heartbeat time series are classified using support vector machines (SVMs). Statistical methods and signal analysis techniques are used to extract features from the signals. Several techniques have been proposed for the investigation of HRV time series. Among them, spectral methods based on fast Fourier transform (FFT) or standard autoregressive modeling, nonlinear approaches, including Markov modeling, entropy-based metrics, the mutual information measure, and probabilistic modeling are widely used. The application of the Karhunen–Loeve transformation and modulation ¨ analysis have also been considered. [4]

e-Doctor: A Web Based Support Vector Machine for Automatic Medical Diagnosis in industries across the world, automated diagnostics becomes more and more prevalent, leveraging continually advancing algorithms that become increasingly intelligent in identifying solutions to known problems. Yet, in the health care industry, doctors have outdated and limited access to potential solutions and details from a patient’s case are seldom fully available to be investigated holistically. We used SVM which was implanted in MATLAB an

adapter was developed, which is the interconnecting interface between our Java-based application and the MATLAB-based SVM engine [5]

1.6 Literature Review

The E-Doctor enables the doctor and the pharmacist to have a quick communication by means of using an internet website that can help both doctors to diagnose the patient more accurately and the pharmacist to know the specific prescribed medicine without any difficulties, it also helps the patient by keeping his history in the patient record.[6]

E – Doctor is like another technologic investment that merge between daily medicine and the internet technology, where it eases the job even more and being more accurate than doing it by hand to minimize many mistakes possible.[7]

In recent years, people have interests in their health; development of medical domain application has been one of the most active research areas. The main purpose of these applications is to improve the efficiency so that more patients could receive treatment more quickly without reducing the quality of care.[8]

e-doctor; a web-based application that makes automatic diagnoses about health problems. The whole procedure is based on Support Vector Machines (SVMs), which are supervised learning models that analyze data and proceed to decisions, based on their knowledge. System administrators define specific characteristics for each health problem that can be diagnosed and educate the SVM by entering sample files of statistical data. After that, medical staff can enter exam information about patients, and e-doctor makes an automatic diagnosis / prediction by means of answering if the patient has (or may have in the future) a specific health problem.[9]

1.7 Programming and implantation tools

The project is built using the following elements,We used NetBeans to design the frontpage of the website, We used HTML, CSS for front end and Java Script for the backend, where HTML is specialized in designing the websites, And CSS work in stimulation with HTML in order to form the frontpage of the website, And we used also Java script where it give dynamic motion to the website, We used Java Persistence to ease the frontpage building, We also used tomcat server that support Java in the websites environment, We also used MySQL for database, It is used to store the database for users, diseases, symptoms and medicines, this whole website was programmed Java language and we used library called prime faces.[10]

1.8. The GRP Outline

1- Chapter One includes: - introduction, project aim, problem background, problem solution, Main concepts and technologies, Literature Review and Programming and implantation tools.

2- Chapter Two includes: - Use Case Diagrams (Doctor Perspective, Pharmacy perspective and Admin perspective), Class Diagrams, Activity Diagram, Entity Diagram and The System Architecture.

3- Chapter Three includes: - introduction, The Implemented System's Requirements, The Implemented Toolset, The Interaction with The Implemented System and Empirical Outcomes.

4- Chapter Four includes: - conclusion and Future works.

Chapter Two

2.1 Introduction

The system consists of three types of users. They are pharmacist, doctor and admin. There is also an Artificial intelligence system which will try to identify problem of patient and find out which types of diseases that patient has.[11]

1. Admin Perspective: Admin will monitor the system and has full access to the database. Admin can also ban user if someone violate the rule.

2. Doctor Perspective: Doctors have to login first to get access of his her/her profile. Doctor can send prescription through email. Doctor will have contact list of patients.

3. Pharmacist Perceptive: Pharmacist have to log in to get access of his/her profile. Pharmacist will receive a prescription prescribing the medicine should be given out to the patient, where he can assure that patient had taken his medicine that will notify the doctor of that.

2.2 Use case diagram (UML) Doctor

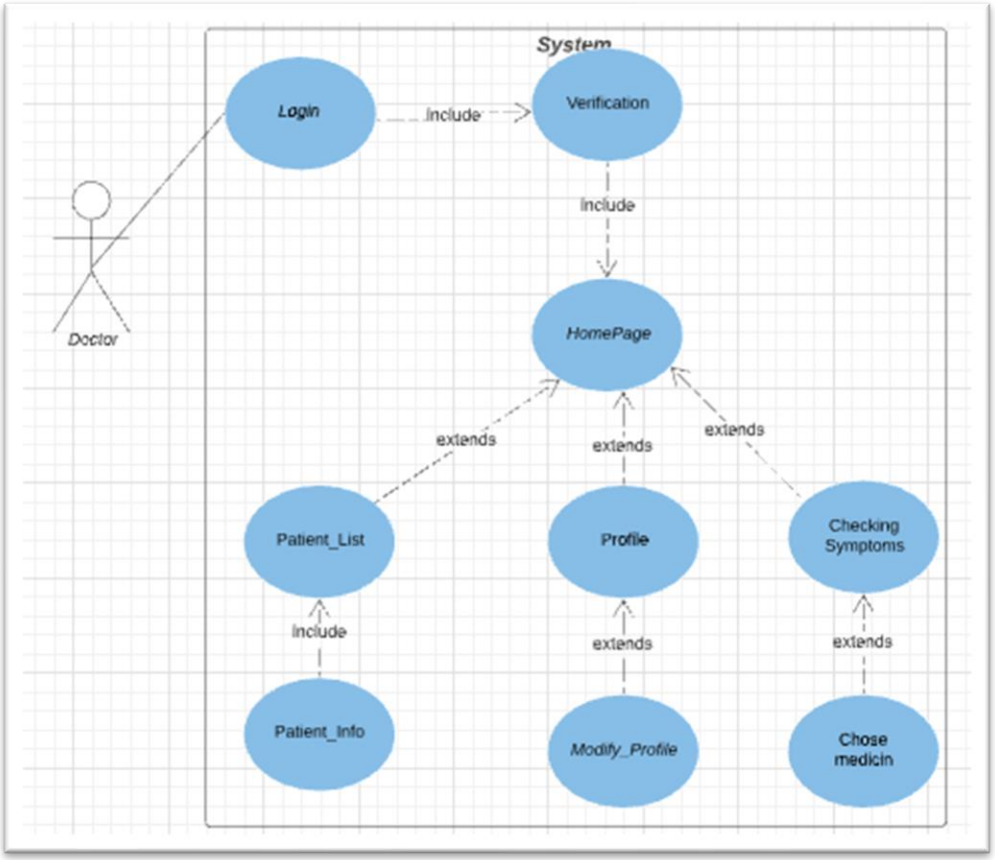


Figure [2.1]: Doctor Perspective

Scenario:

- Doctor can log in to the system and it will be verified.
- can choose symptoms, disease and then medicine via a box.
- Can send the prescription to the pharmacist.

2.3 Use case diagram (UML) Pharamcist

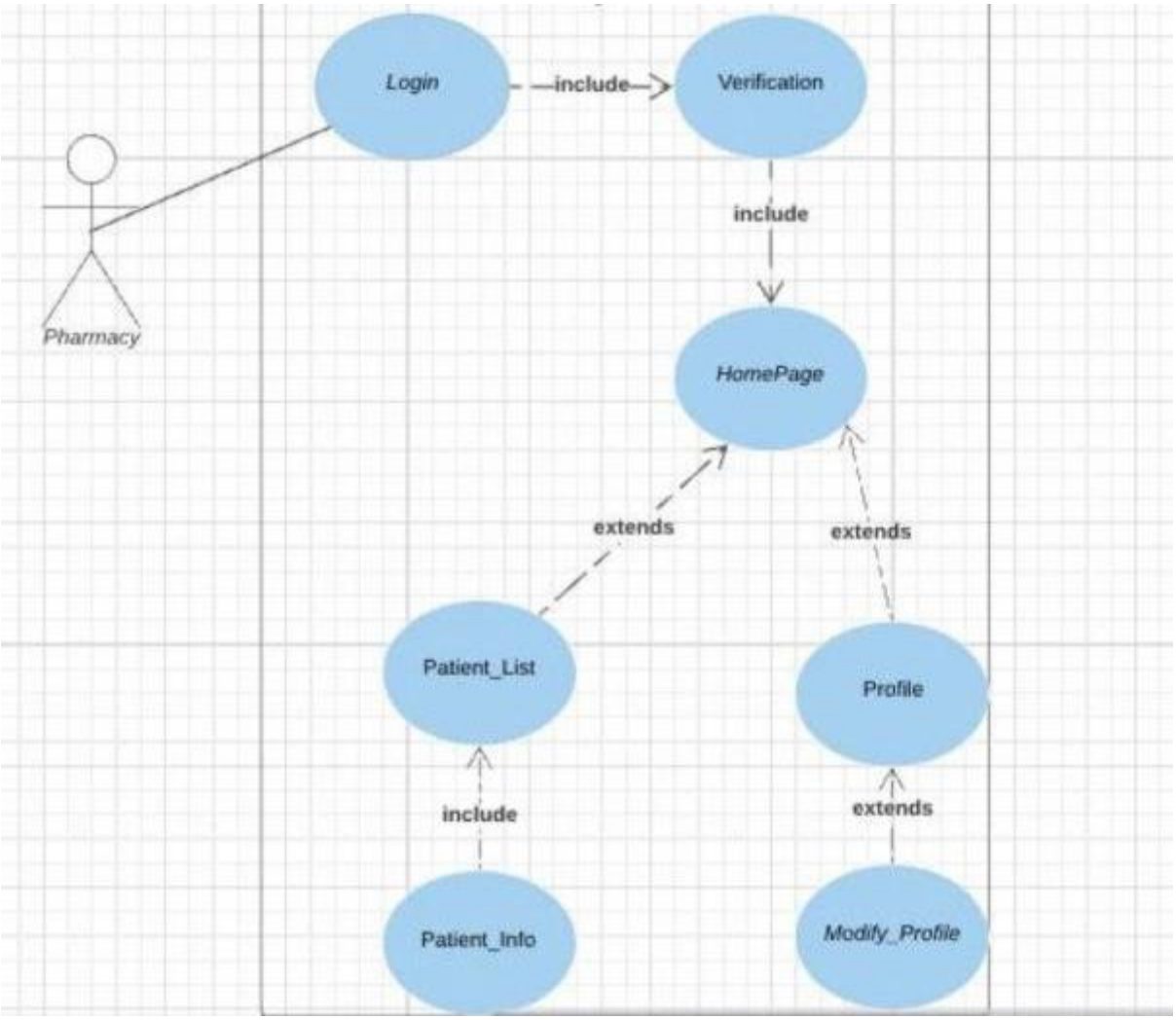


Figure [2.2]: Pharmacy perspective

Scenario:

- Pharmacist receive the prescription from the doctor.

2.4 Use case diagram (UML) Admin

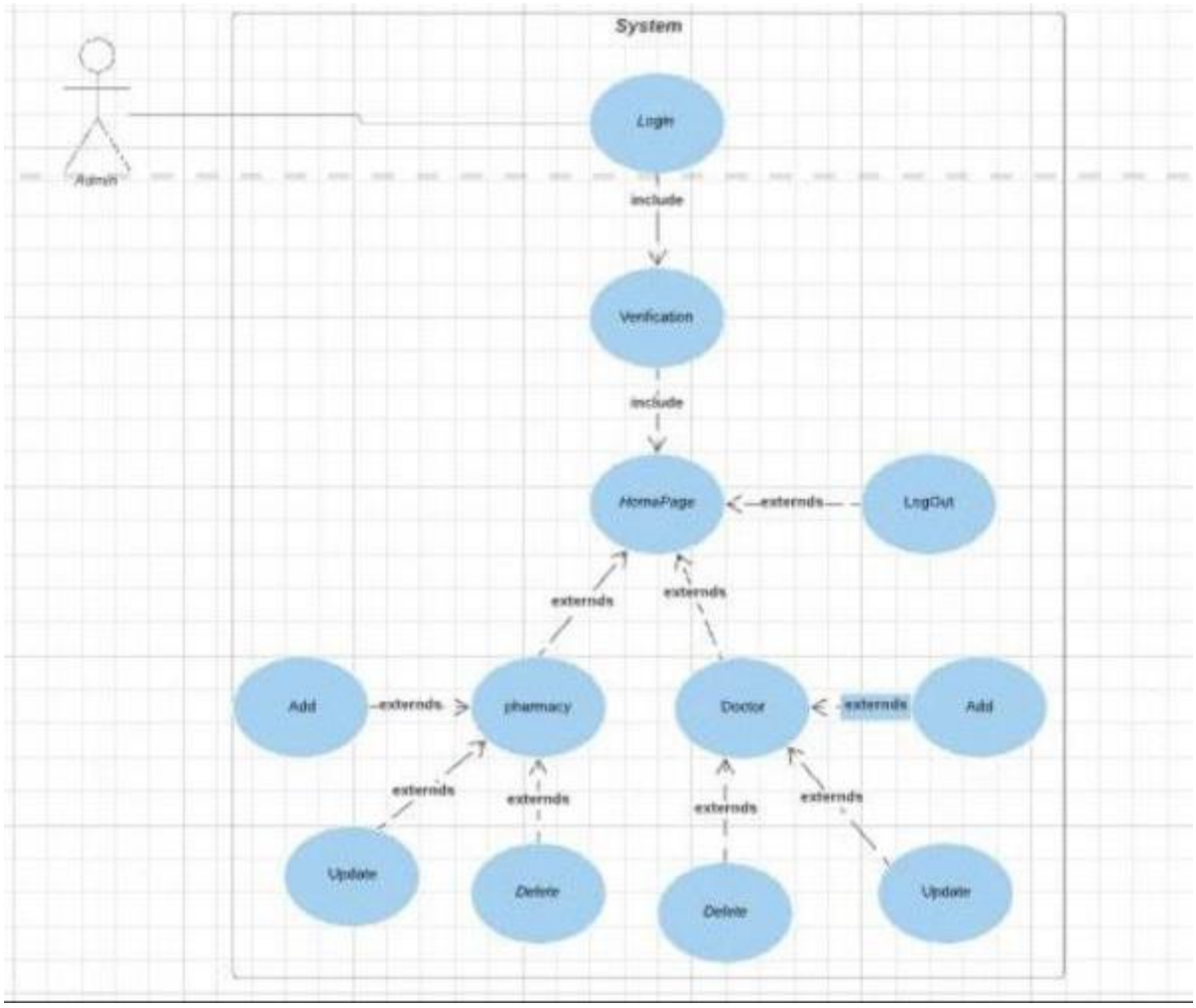


Figure [2.3]: Admin perspective

Scenario:

- Admin can log in to the system and it will be verified by the system.
- In Homepage, admin can, can see the info of patients and doctors. Admin can also add or delete the info of doctors. And Pharmacy

2.5 Class Diagram

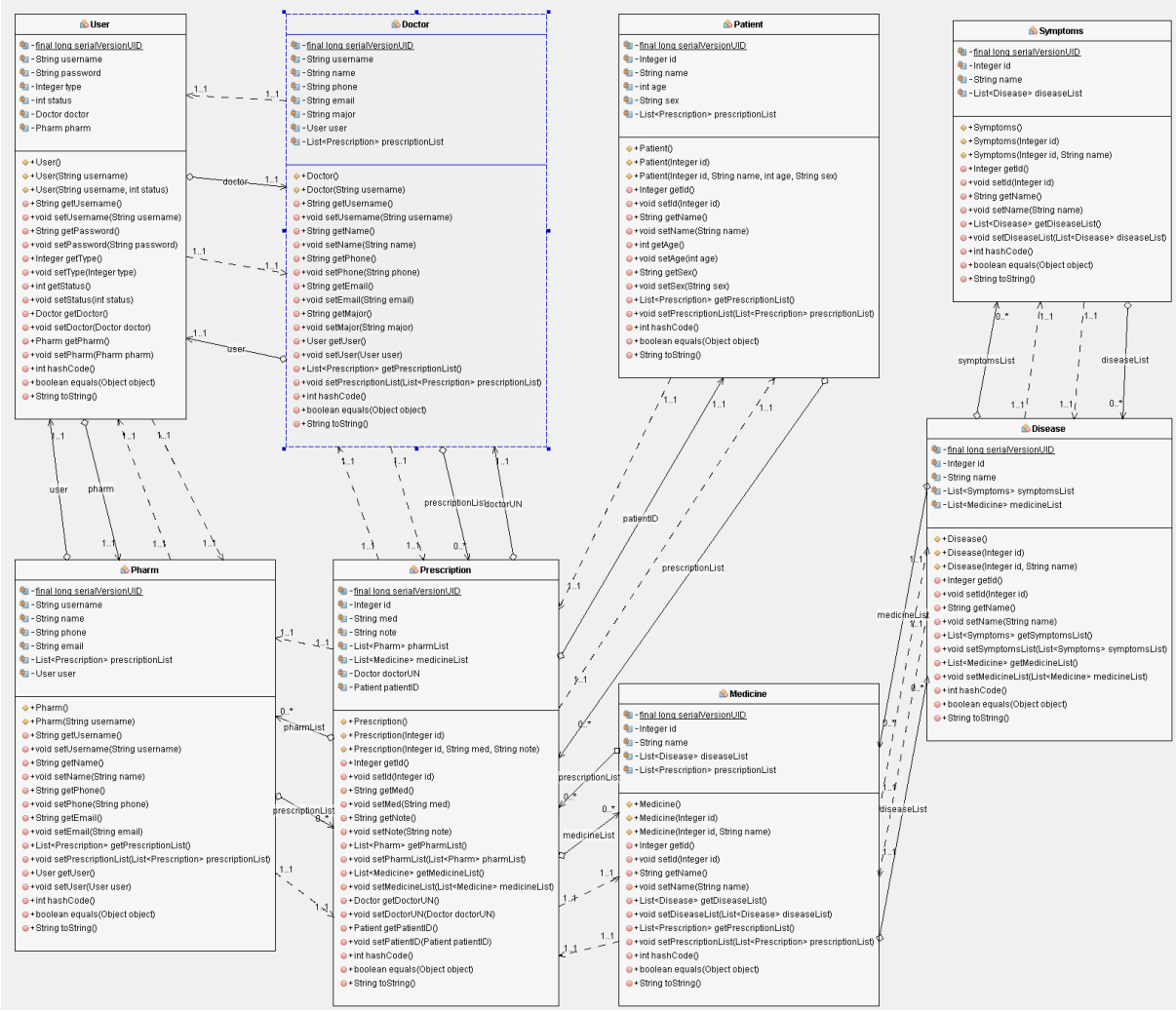


Figure [2.4]: Class Diagram

2.6 Activity Diagram:

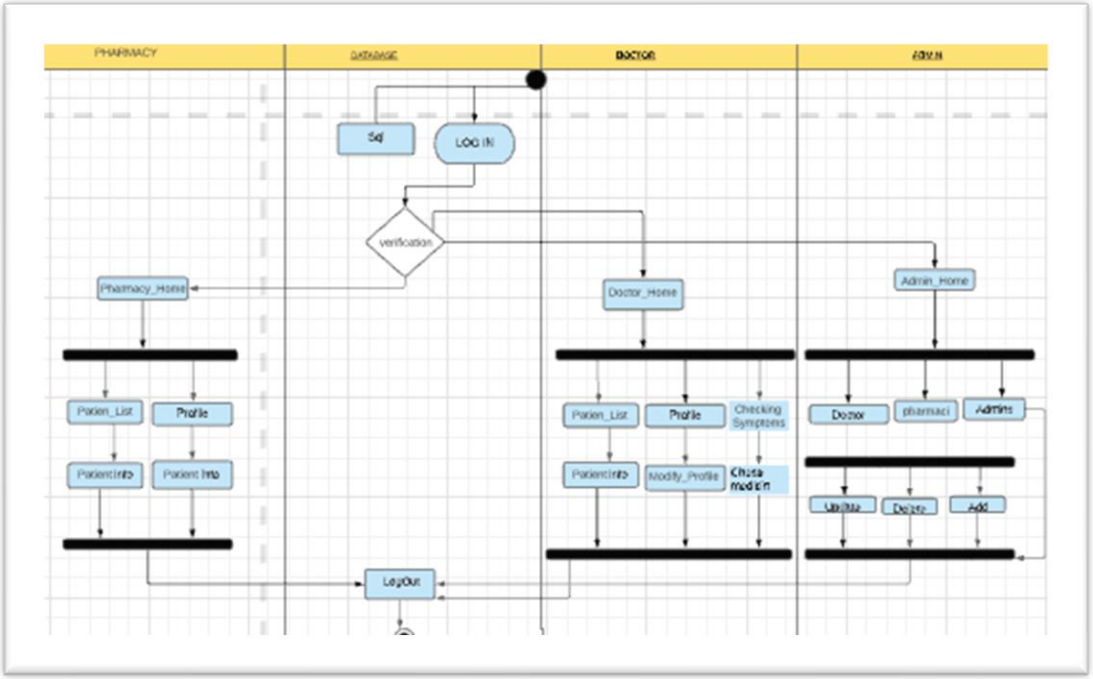


Figure [2.5]: Activity Diagram

2.7 Entity Diagram:

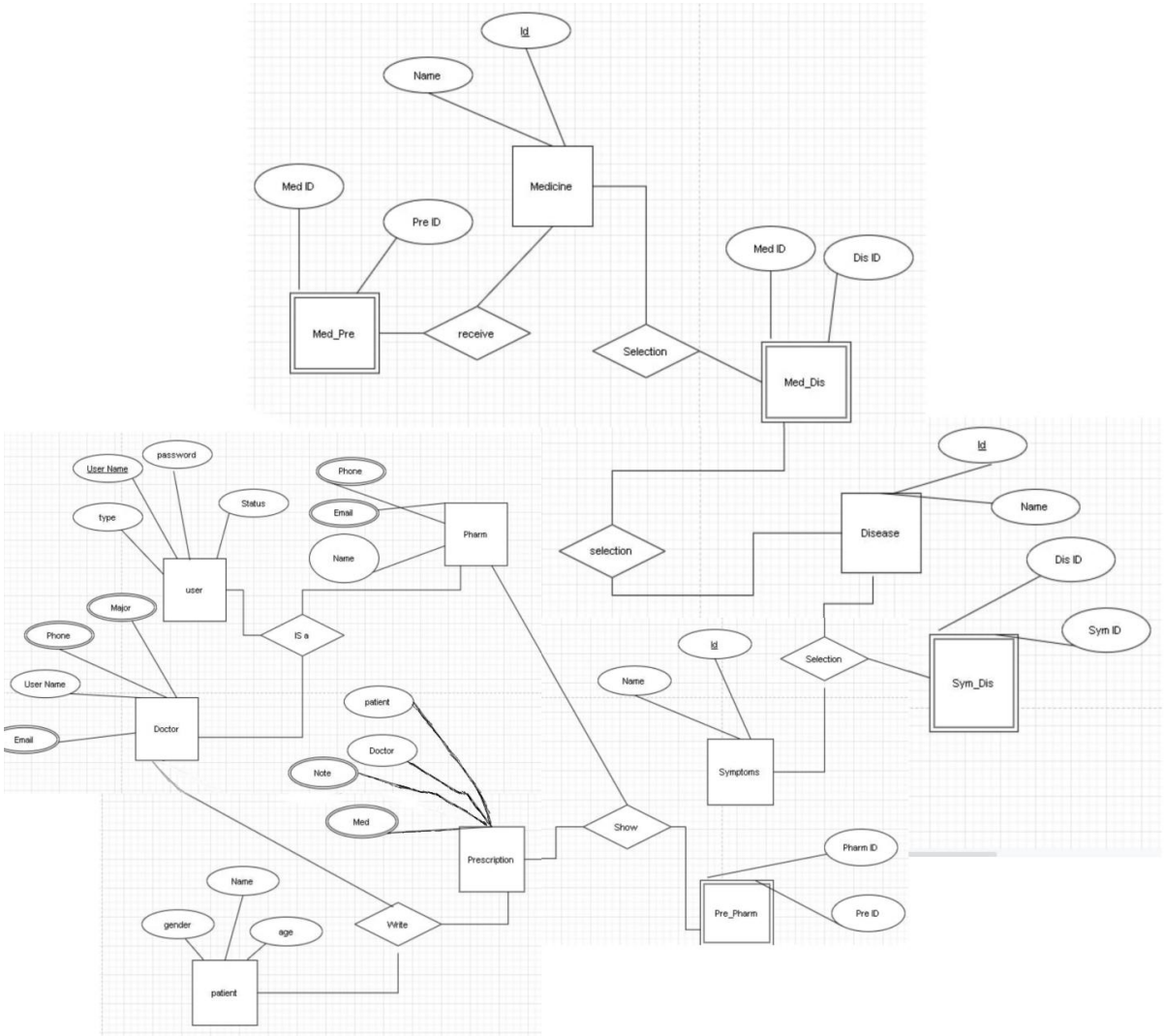


Figure [2.6]: Entity Diagram

2.8 The System Architecture

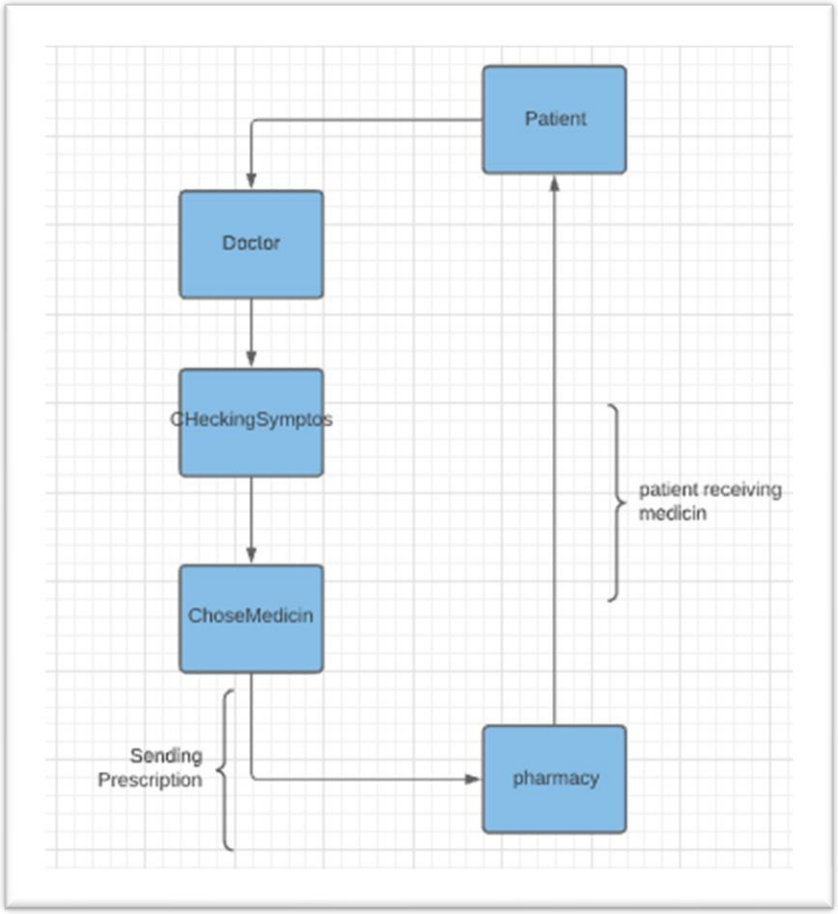


Figure [2.7]: The System Architecture

Chapter Three

3.1 Introduction

The list of requirements that is developed in the definition phase can be used to make design choices. In the design phase, one or more designs are developed, with which the project result can apparently be achieved. Depending on the subject of the project, the products of the design phase can include dioramas, sketches, flow charts, site trees, HTML screen designs, prototypes, and photo impressions. The project supervisors use these designs to choose the definitive design that will be produced in the project. This is followed by the development phase. As in the definition phase, once the design has been chosen, it cannot be changed in the other stage of the project.[12]

3.2 The Implemented System's Requirements

Software

Windows: windows 10

Hardware

Laptop screen 12 inches, 1366x768 resolution

Processor: intel core i5 – 8th gen 1.60Hz

Ram: 8.00 GB

System type: 64Bit

Mouse Red dragon, wired, 5v – 150mA, 14400 DPI.

3.3 The Implemented Toolset

Xampp 3.4.2

XAMPP's designers intended it for use only as a development tool, to allow website designers and programmers to test their work on their own computers without any access to the Internet. XAMPP also provides support for creating and manipulating databases in MySQL and SQLite among others. Once XAMPP is

installed, it is possible to treat a localhost like a remote host by connecting using an FTP client. Using a program like FileZilla has many advantages when installing a content management system (CMS) like Joomla. It is also possible to connect to local host via FTP with a HTML editor. The default FTP user is "new user", the default FTP password is "wampp". The default MySQL user is "root" while there is no default MySQL password.

We use a database of xampp in our system (E - Doctor system) to create a database, tables insert and deleting data. Here, the Admin will handle the entire table of the data.[13]

3.4 The Interaction with The Implemented System

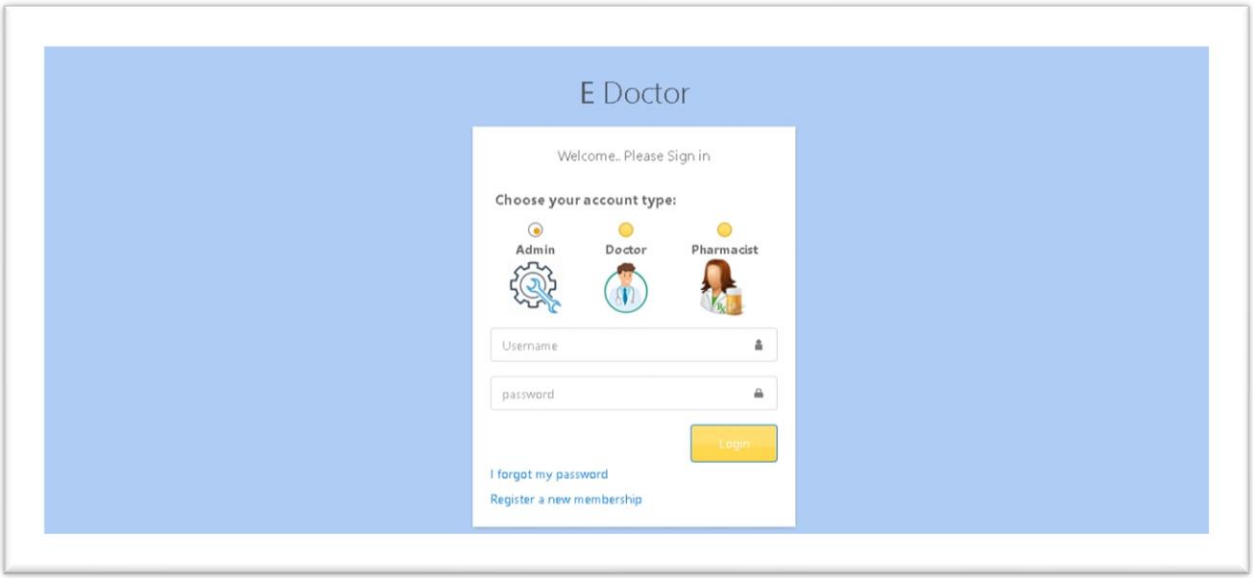


Figure [3.1]: Home Page

This interface shows the page for all user to log in with their username and password. The username and password have been registered earlier when they want to use this system for the first time. User needs to enter the correct username and password to access to their own page or their access will be denied.

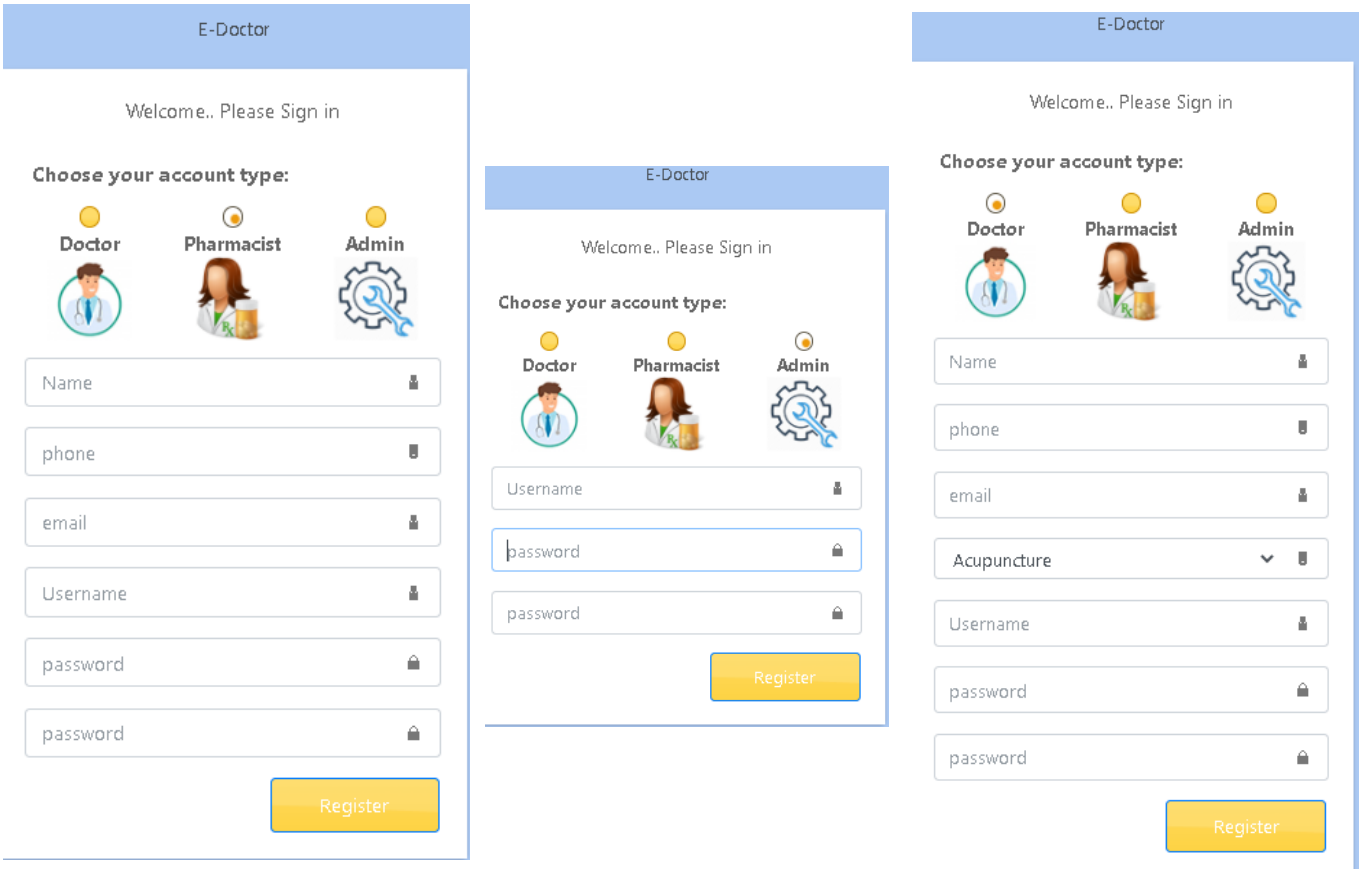


Figure [3.2]: Interface login

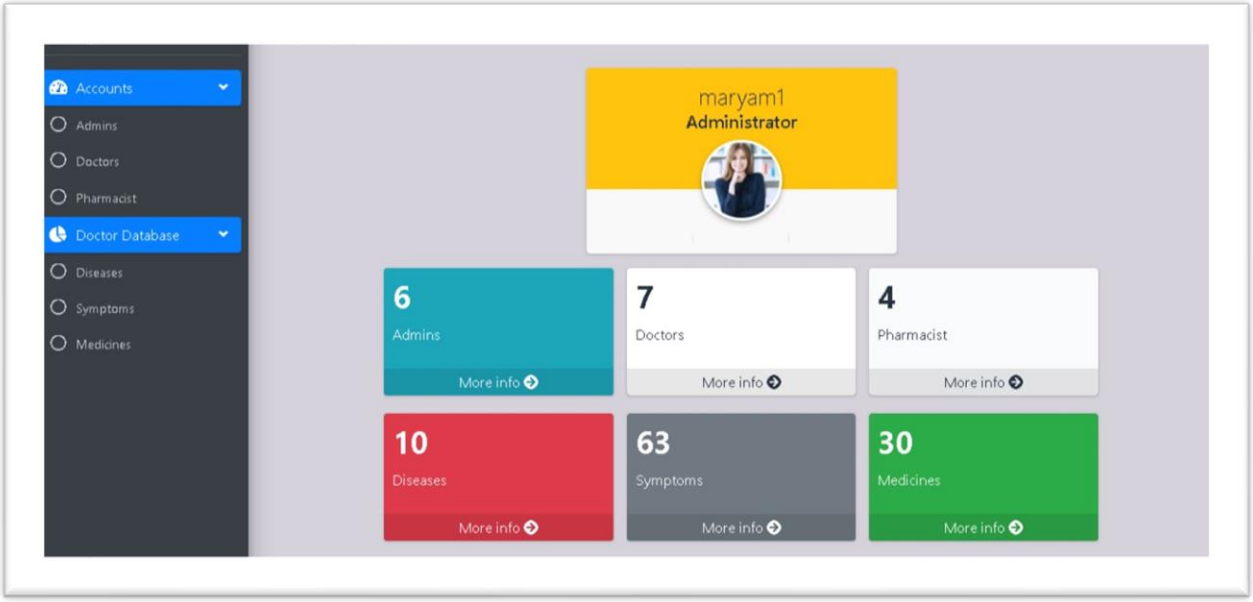
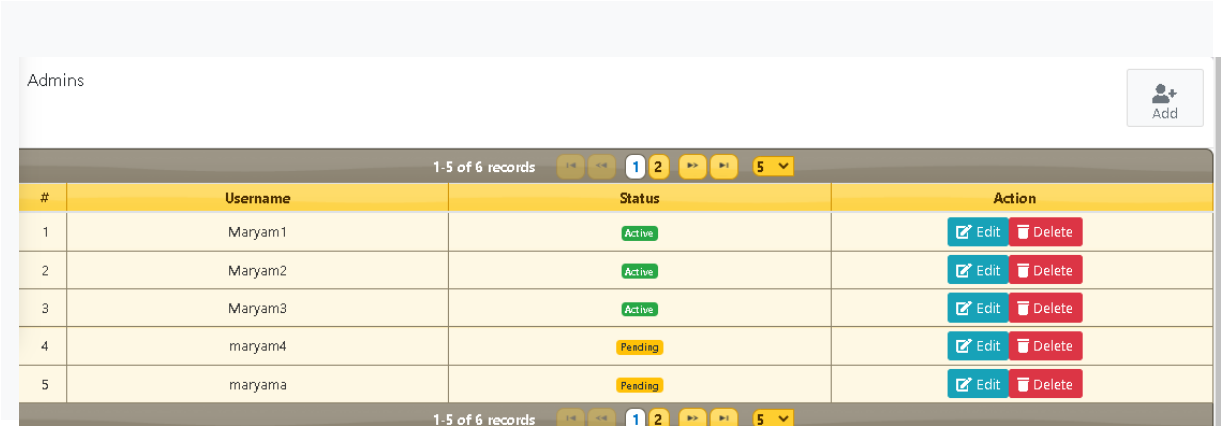


Figure [3.3]: Admin Profile

This interface can show the admin other admins, doctors and pharmacist, and he can view diseases, symptoms and medicines, also he can add, remove or update the existing data.



Admins

Add

1-5 of 6 records 1 2 5

#	Username	Status	Action
1	Maryam1	Active	Edit Delete
2	Maryam2	Active	Edit Delete
3	Maryam3	Active	Edit Delete
4	maryam4	Pending	Edit Delete
5	maryama	Pending	Edit Delete

1-5 of 6 records 1 2 5

Figure [3.4]: Admin information

1-5 of 10 records 1 2 5

#	Disease Name	Symptoms	Medicines	Action
1	pneumonia	cough fever shortness of breath rapid sharp loss of appetite	cefaclor diprophylline lefamulin	Edit] Delete
2	diabetes	urinate thirsty lose weight have blurry vision have numb feel very tired have very dry skin very hungry	insulin aspart insulin detemir insulin glulisine	Edit] Delete

Figure [3.5]: Disease information

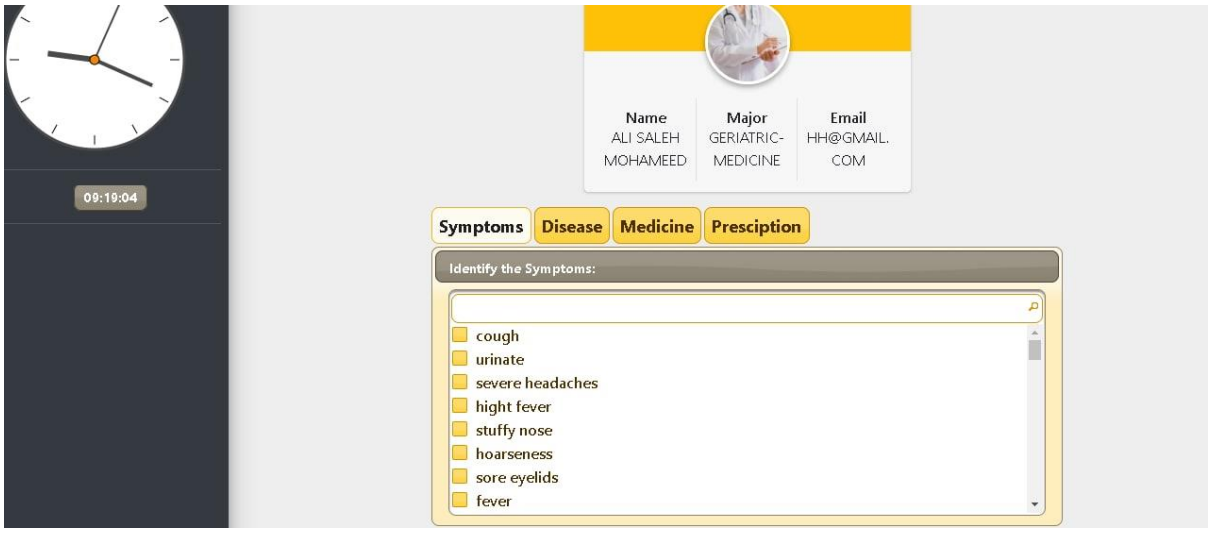


Figure [3.6]: Doctors Profile

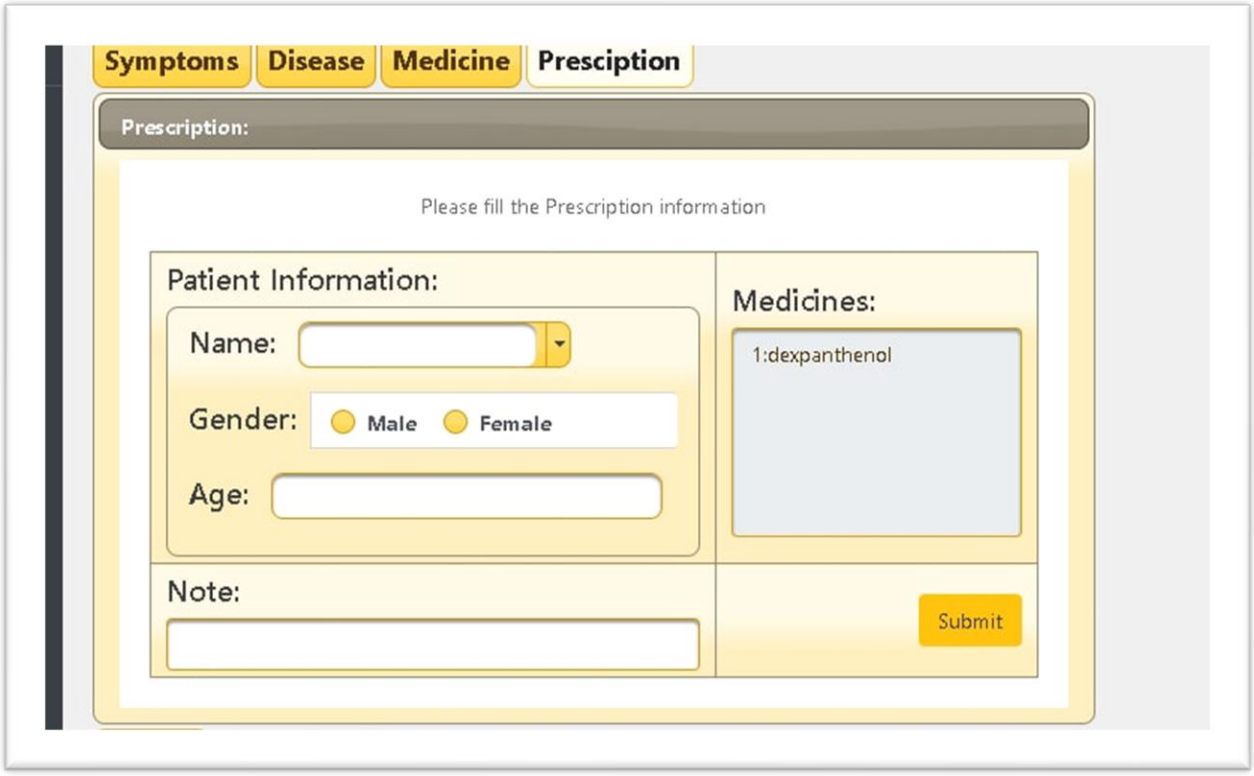


Figure [3.7]: Patient information

1-5 of 7 records 1 2 5

#	Patient	Medicines	Note	Status	Action
1	hamza	1:Nyqule	tttt	Processed	Delete
2	Hamza1111	1:Tylnole	123	Processed	Delete
3	maryam	1:Nyqule		Processed	Delete
4	maryam	1:insulin aspart		Processed	Delete
5	meme	1:beclomethasone 2:indapmide		Pending	Delete

1-5 of 7 records 1 2 5

Figure [3.8]: Output of patient information

This is the interface if the clerk or user wants to key in the patient's information. Users need to fill all the information at the space given and the data will automatically save in the system. Then, users need to click „Next" button to go to another page.

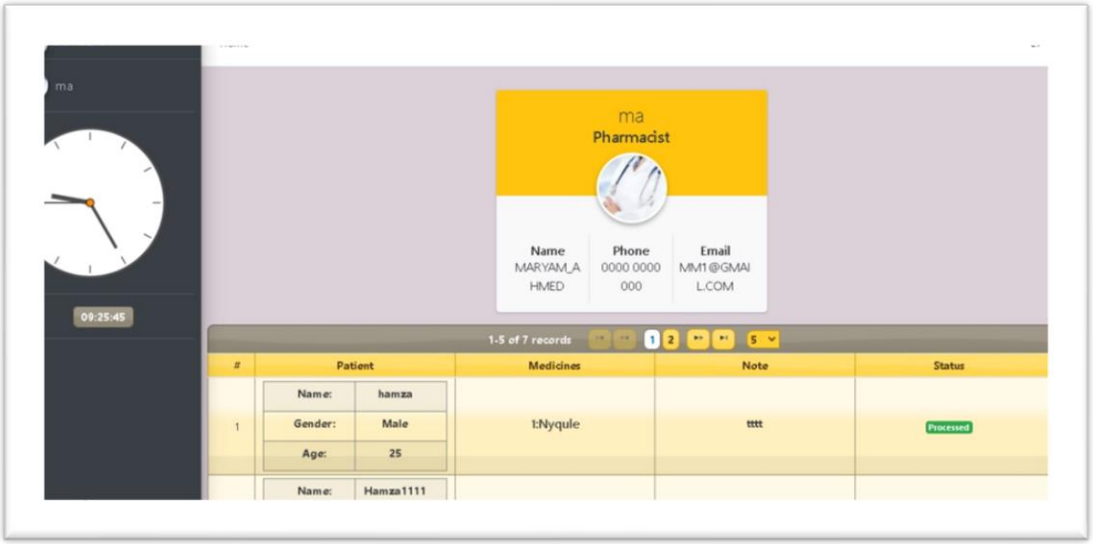


Figure [3.9]: Pharmacist Profile

Where he can view the patient's information and the prescribed medicine, where he/she can confirm that the patient took his medicine by tapping on the green button, if not the button will turn red alarming the doctor that patient did not receive his medicine.

3.5 Empirical Outcomes

Some elements of prime faces did not work smoothly, and after a deep investigation, it appears there weren't a congruity in between prime face and java that was used to resolve this problem prime face library was used with oldest version (The seventh) instead of the eight version.

Chapter Four

4.1 Conclusion

As was previously stated, the problems of the current system, manually system, are weak data organization which causes data loss, high consumption of office space and difficulty in accessing patient data. As compared with the manually system, E-Doctor system, which is planned to solve these problems, it gives an organized data storage, reduces space usage and enables the accessing of patient data with a clear-cut interface.

E-Doctor was developed to help. The system is further providing facilities to doctor and pharmacist to get all information about their patient. All information includes detail about patient and their health record.

The use of identification codes and password used in this system as well as providing control on access and safety data exist in this system. Password used can be changed from time to time whether by doctor or pharmacies in person or by the system administrator.

Besides, the system enables update on demands which is not present in the system that mostly used by the clinics. This function makes the management easier when the clinic has more than one branch. The interconnection between the module of the system including ICM patient, ICM pharmacy and clinical data management increases security of the data and enables the daily report generating.

MySQL database development and Server-side scripting which was done in java embedded in HTML with documentation enables the engineers to do future update of the system. It is clear that the best and compatible system to manage the daily activities of the clinic is the e-doctor system.

4.2 Future Works

In the future we will allow every account to choose his profile picture, and allowing the auto update for all new updates without needing to re-log to see the updates, Also sending an SMS to confirm the registered accounts, We also planning to make the website go online where the patient can go online and choose the doctor he wants to contact, Also the doctor can schedule his appointments in the website where every patient has his own profile and can access to see all the detail and his/her appointment time and else details.

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Department of Computer Science

Design and Implement an ERP System

DUC-CS:2021.04

A Graduation Project Submitted to the Department of Computer Science / Dijlah University College as a Partial Fulfillment of the Requirement of the BSc. Degree in Computer Science

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July, 2021 – Baghdad

Republic of Iraq
Ministry of Higher Education and Scientific Research
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بِسۡمِ ٱللَّهِ ٱلرَّحۡمَٰنِ ٱلرَّحِيمِ

يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنكُمْ
وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ

صدق الله العظيم

الاهداء

في مثل هذه اللحظات يتوقف اليراع ليفكر قبل أن يخط الحروف ليجمعها في كلمات وتتبعثر الأحرف وعبثا أن يحاول تجميعها في سطور سطورا كثيرة تمر في الخيال ولا يبقى لنا في نهاية المطاف الا قليلا من الذكريات وصور تجمعنا برفاق كانوا الى جانبنا....

فان تباشير هذه الكلمات لمن اهديها .. ؟

واولى الكلمات لمن اعطيها ... إلى الرسول الهادي مُحَمَّد عليه افضل الصلاة والسلام

والى ابي ...الرجل الذي يسكن قلبي وتحمل الشقاء لنسعد

والى الحنان والعاطفة ونبعهما ... الى والدتي الحنون

والى اخوتي ... انهار المحبة ربيع الحياة , واريجها الدائم .

وإلى اساتذتي ... القناديل التي تبدد الظلمة وتنير دروب عملنا

Supervisor's Certification

I certify that the preparation of this graduation research project titled *"Design and Implement an ERP System"* / Department of Computer Science / Dijlah University College in partial fulfillment of the requirements for the degree of BSc. In Computer Science.

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Date: / 07 / 2020

Abstract

Software manufacturing or production is not easy at the whole time because the requirement engineering methodology is combining and developing continuously so that the ERP (Enterprise Resources Plan) systems are handled a lot of cases which are related to database or information collecting. The researchers proposed a platform for payroll management system at a certain bank and they met almost all the requirement as allowance and dedications to employees. The powerful of system works as a web application and implements many Application Programming Interfaces (API) that are covering services of the system. The APIs are created and implemented by HTML and Java script as frontend and the backend is designed and implemented by MySQL database.

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Chapter One

An Overview

Chapter One

An Overview

1-1. Introduction

Enterprise Resource Planning (ERP) systems have been designed to integrate data and optimize its distribution between functions and services in order to improve operational performance [1]. The study would argue that ERPs are important resources for creating the ability to control commercial activities, creating a competitive advantage for the company in combination with the company's existing competitive edges [2]. Integration is carried out by sharing a common database of all data processing functions and applications with the company [3]. The primary reason why businesses adopt ERP is a way of streamlining business operations, enhancing job performance, and generating value by improving the integration of best practice job processes, management functions, real-time reporting, and knowledge analysis capabilities. Most businesses probably face business problems because they invest a significant amount of money in ERP applications, but they do not reap any benefits at the end of the day and are left with a huge ERP investment that they did not get anything out [4]. An ERP system helps a company to handle its operations holistically in order to stay competitive in today's business climate [5]. Therefore, operational efficiency should be a key outcome when a business chooses to adopt a technical program at its place of operation. Research on operational efficiency effects shows that, in most situations, enduser performance declines rapidly after the technology is implemented. With technology's ever-increasing development and its integration into the lives of both private and professional individuals, a question remains open about its acceptance or rejection [6]. In the past, millions of dollars have been invested in information technology (IT), such as ERP systems, to attempt to boost the performance or quality of workers, workplace productivity [5], or to achieve competitive advantage [7]. However, until individual employees within these organizations use IT properly and effectively to execute their organizational activities,

these advantages will not be realized [8]. For all Small Medium Enterprises (SMEs), ERP systems are important because they allow them to conduct data transactions along the value chain and help to simplify information between finance, inventory, planning, development, human resources, marketing, engineering, distribution, materials and sales and all other units within the organization and among other organizations [9,10].

1-2. The Aim

The main objective of this project is to present a how stakeholder will deal with employees' data in a simple way for meeting the requirements of any enterprise. These requirements are reaching the important region. The research objectives can be presented as follows:

1. Analyzing customer's requirement.
2. Design a suitable system for meeting the requirement.
3. Solve some of challenges that are faced via working time.
4. Implementing the design due to finalized the approval processes in order to draw a work plan for achieving it.

1-3. Statement of Problem

The problem is defined to find a methodology to deal with one of designing and implementation problems So that the researches choice a spiral methodology to find its results.

The project has three problems should be solve by its methodology. The first problem is implementing ERP system and its features; the second problem is using the ASP and HTML platform to covert the project methodology; the third problem is the results of project which will be acceptable or not.

1-4. Possible Solutions

The architecture discovered potential qualification and gaps within the entire value chain that were preventing ERP system capabilities desired. The researchers focused on identifying qualification in the architecture, and any gaps associated with the tools

currently being used for model development and deployment. A technical tool evaluation was depending on their current and future presented results along with several near-term future actionable paths forward in the form of an executive readout presentation. They also identified critical capabilities that already existed within the organization that should continue to be supported and elevated to a central role in the enterprise as foundational components such as their custom methods for deploying models into operational decisions within a single product.

1-5. Main Concepts and Technologies

The project is dealing with many concepts which are new in our computer science world so that the researchers go to find what is the ERP system? What are its features, tools and technologies?

The project concept presents a simple way to meet the requirements from available ERP system in the internet and process it and finds a way to make a reasonable decision by simple tools and technologies.

1-6. Programming and Implementation Tools

According to the articles surveying, the researchers found a simple and appropriate technology and tool which are solving the project problems as the table (1-1) that describes tools and techniques briefly:

Table (1-1) Programming and Implementation Tools

Seq.	Tools	Description
1.	HTML	Hypertext markup language is used to create a web pages. Markup language works with text and provides a format for text files. [11]
2.	CSS	Cascading Style Sheets is a language intended to simplify website design and development. It handles the look and feel of web page. With CSS can control the color, text, style of fonts and all editing operations.[12]
3.	JavaScript	JavaScript is a language, working in tandem with related to browser feature, is a web-enhancing technology [13]

Table (1-1) Programming and Implementation Tools (Continued)

Seq.	Tools	Description
4.	ASP.Net	ASP.net is a web framework that is built on top of Microsoft .NET 4.0 and above, implements the HTTP specification, and can be used to build or consume HTTP services. [15]
5.	MySQL	MySQL or database stored program is a computer program (series of instructions associated with name) that is stored with and executes with, the database server. The source code any compiled the stored program are almost always held with the database server's system tables as well. [16]

1-7. The Scientific Contribution(s)

The main idea is designing a Web application and its challenges and finding a technology to break these challenges and improving the Governorate methodology and opinions for software production. The researchers are used simple and available tools and new technologies for reaching to a best solutions.

1-8. Projects overview

This section is presenting the parts of project as the following chapters:

Chapter 1: is described the general introduction of projects and its aspects which should be describe them to understand them.

Chapter 2: is described how and why they choice the design and the methodology to implement it clearly.

Chapter 3: is explained the practical part of the project and what the suitable platform to execute all methodology in the right way

Chapter 4: is presented the conclusion of project and its future works

Chapter Two

The System Design

Chapter Two

The System Design

2-1. Introduction

ERP systems are designed to improve productivity by increasing an organization's ability by collecting accurate and timely information within the enterprise and the supply chain. The successful implementation of ERP systems would lead to lower efforts, reduce product growth time, improve customer service, increase production (productivity), increase profitability and improve efficiency through better customer services [17]. To increase productivity, business enterprises invest in information systems, bearing in mind the benefits and functionality of these systems [18] and converting to ERP systems and turning to ERP systems to deal with changing environment and overcome limitations of legacy systems [19]. Implementation of the ERP system has led to better outcomes [20]. These systems have provided organizations with huge benefits, such as increased productivity, enhanced access to accurate and timely information, improved workflow, decreased paper dependence, shared knowledge, tight control [21], and automated business processes by organizing and integrating departmental information [22]. And these benefits are direct evidence; that is why these systems attract larger organizations with massive data volumes [23].

2-2. The Activity Diagram (AD)

The activity diagram is taking about the project methodology which explains the main Three parts. Figure (2.1) is shown these parts and will describe in detail to understand the stages of the project which are following as:

1. Data preparations: The project is prepared its data by two ways either manually (operator can enter data as adding new employee) or automatically (operator can import the existing data by using Excel file which is prepared for this purpose. Of course after cleansing them to be suitable to deliver to customer).

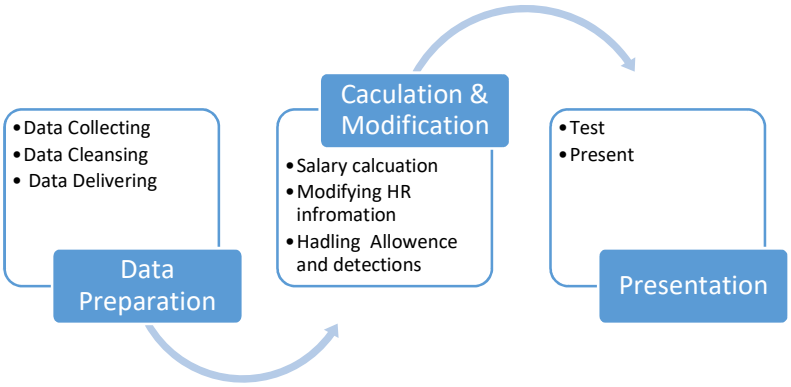


Figure (2.1): The Proposed Activity Diagram.

2. Calculation & Modification: this part is calculated the details of employee's salary according to the rules and regulations of Iraqi Government (salary grades and steps). The modification has been happened when any employee may have an increments or allowances and detections.
3. Presentation: The project has the abilities to present its results by using Microsoft Excel sheets or APIs for using its data usefully. The results designed to be accepted to other offices or banks

2-3. The Data Flow Diagram (DFD)

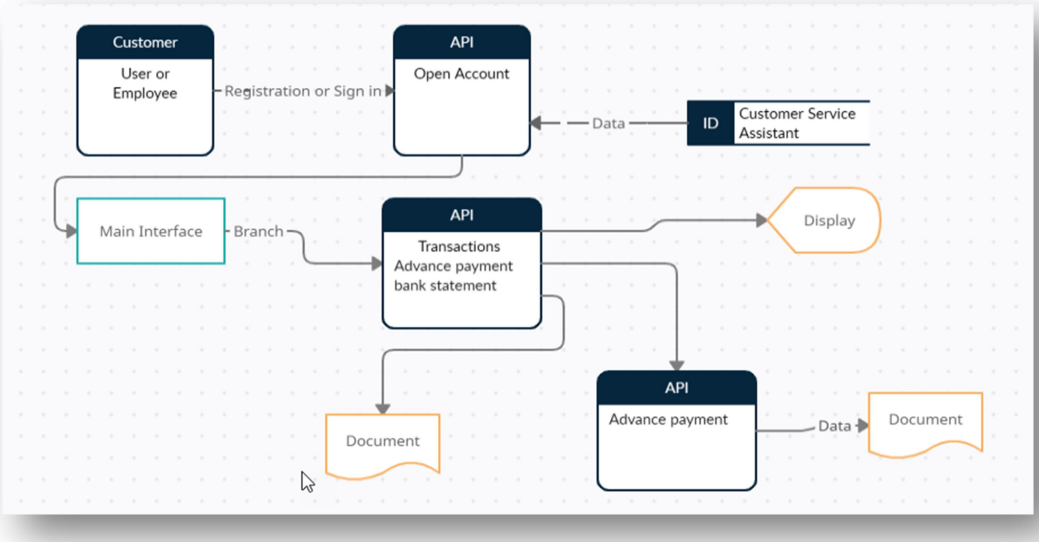


Figure (2.2): The ERP system

The figure 2.2 describes the main parts of project that are mentioned in following steps:-

- **Enrollment system**
- **Advance Payments system**
- **Transaction system**

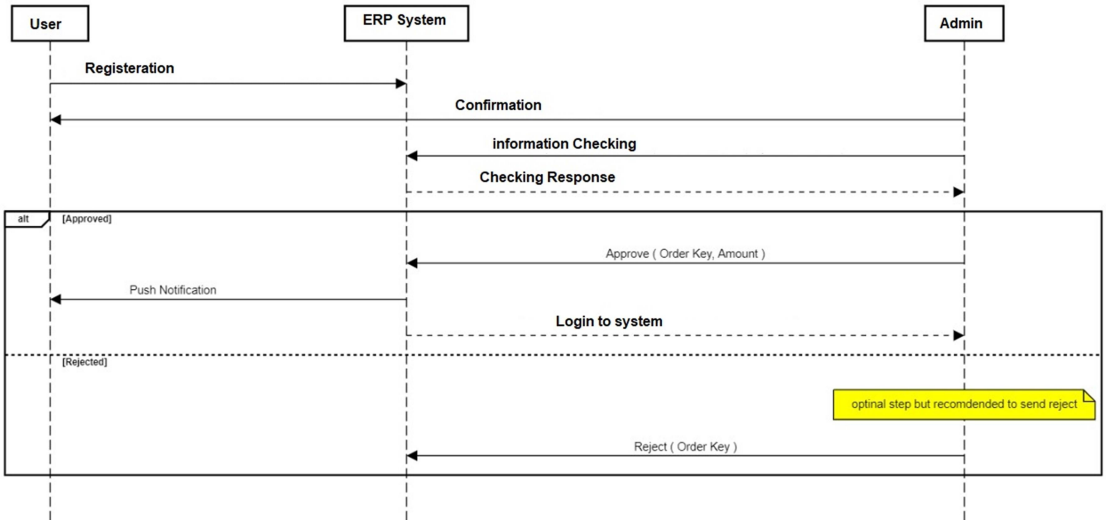
- **Reporting system**

Enrollment System

The project designers are prepared an API which can register any information of stakeholders but they want to save the time, they prepared a template in excel sheet for this purpose and then can upload easily to the project. The project categorized the stakeholders into the following as:

1. Admin: has full control to manage the project
2. Operator: has a partial control to manage the project (add and delete a certain part of the system)
3. User or Customer: the system has viewed and shown some of information related to him or her.

The Figure (2-3) illustrates a sequence diagram of enrollment stages which present the enrollment steps in details.



The Figure (2-3) Sequence Diagram of Enrollment stages

Advance Payments system

The figure (2-4) illustrates the advance payment process in a simple methodology due to designer of project proposed it

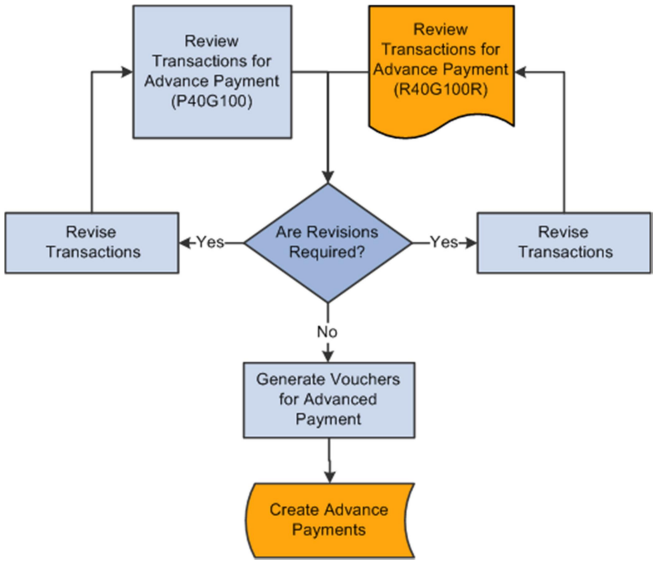


Figure (2-4) The advance payment process

The agreement with any Enterprise should be issued an advance payment before temporal and final payments and issued a specific monetary amount to Enterprise on a certain date. The amount for an advance payment is based on:

- The due date rule that is assigned to the installment payment term that is associated with the payment schedule record.
- The distribution percent on the payment schedule record.
- The current estimate amount on the harvest record.

Transaction system

Figure (2-5) illustrates the Money Transforming System which is the essential goal for business and hence it is important to provide a strong money transaction to everyone who relate to business and for everyone who earning money. Money transforming is basic job for to transfer money from different range of countries, areas and zones. The people now a day it's common to transfer money to his friends, family members and for business purposes. The people use different methods for money transforming. For example, through bank, easy paisa and by private money transaction system. Transforming money

not having rang but it transfers globally. Advance technologies are used to transfer the money and promote the transaction system throughout the world to bring transforming fast and secure.

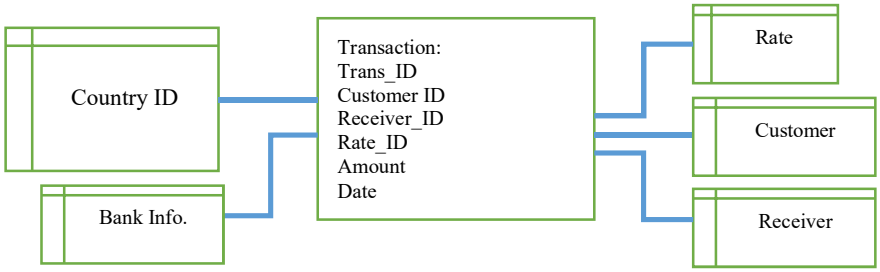


Figure (2-5) Money Transforming Data flow Diagram

Reporting system

The reporting system of project is divided to five types in current time. These type are following as:-

1. Bank statement report
2. Transaction report
3. Advance payment report
4. Customers report
5. On demand report
6.

2-4. The Scheme Architecture

Figure (2-6) shows the proposed system architecture which is divided into five subsystems, each of them is designed to be series of source codes. The subsystems fetch the data from first stage to turn in the next stage. Each stage converts its process by HTML and ASP.net platform supporting.

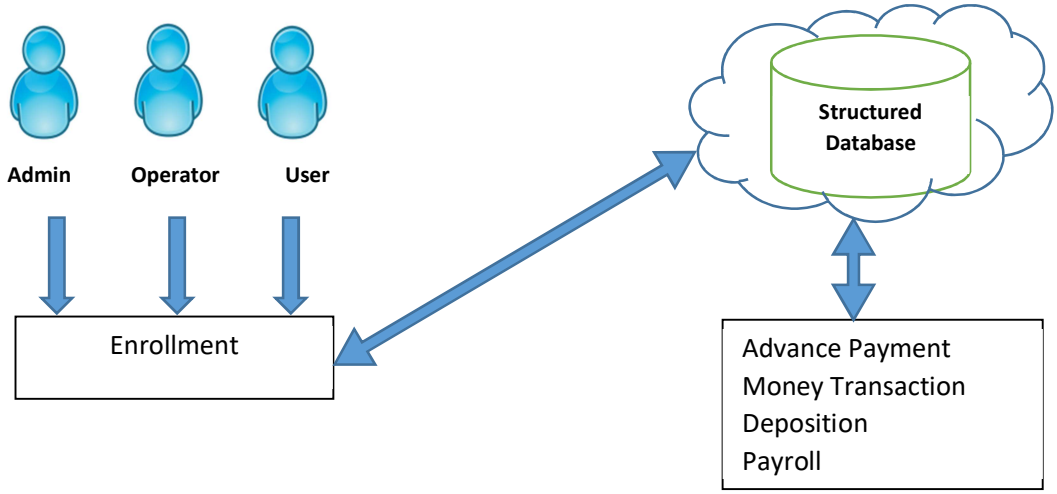


Figure (2.6): The Proposed System Architecture.

The scheme built to serve customers electronically by many APIs which will save the time, effect and money. The APIs are working in order to execute four main banking functions. These functions are banking functions that are mentioned previously. Figure(2-6) describes the proposed scheme which is started as the following as:

1. The registration (Enrollment) is classified into administrator, operator or superuser, and user (Customer). The three types of users are adding manually but in the first time and by excel sheets to avoid the addition of a bank's employees.
2. The system may be cloud based or on promise so that the frontend and backend will be saved inside a host server and should be worked 24/7.
3. Initially, the banking system is working to cover four main functions which are following as:
   - Transaction process
   - Advance payment process
   - Deposition process
   - Reporting

As the mentioning before, the project needs a hug effort to achieve its features properly but according the time and abilities. The plan is started as the following as:-

1. Building a database which contains many tables and queries in order to cover all parts of scheme like tables for users information, transactions, countries, ..etc. all of these will implement by MySQL.

2. Frontend is designed to make the project useful, and the stakeholders use the intelligence features to negative the project easily.
3. The web pages are designed to fast enough for more than 1K users and understandable to secure almost all of user levels.
4. The project should be scalable and flexible to modify and enhance its source code without limitations.

Chapter Three

The Implemented System

Chapter Three

The Implemented System

3-1. Introduction

The chapter is converting all the stages that are described at previous chapter. The chapter will explain in details the all parts of design system, and the challenges of its execution parts while running the project by ASP.net and MySQL platforms. Frankly, the system requirements are met from some of previous requirements which are available in some of scientific websites and researchers' advices. The computer specifications are Pentium Core i5 and works under windows 10 system. Some of results are verified a high quality of design for the frontend and backend. Many parts of project are supported with WordPress tools and modules that are finalized this work successfully.

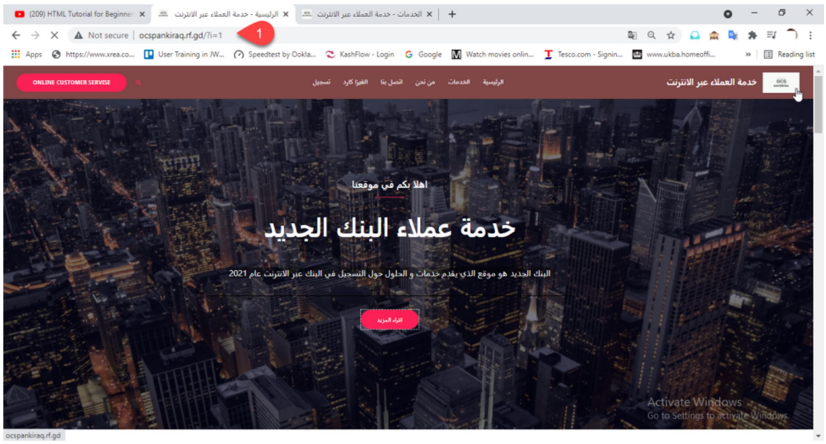
3-2. The Implemented System's Requirements

According to previous chapter, the implementation of system would be run at the following tools and platform:

1. Visual Studio – HTML (Frontend Design)
2. CSS (interactive of Frontend)
3. JavaScript (the functionality of Frontend)
4. MySQL (Project Database (backend))
5. Microsoft ASP.net (source code (Backend))

The requirements of project are implemented by the above tools and all use Google chrome to use its URL address. The developer of project use non secured server:

http://ocspankiraq.rf.gd



3-3. The Implemented Tool set

The tools that used for implementation range from programming languages and data manipulation language to implementation tools, as shown in brief in section (1.6). The following are the programming and implementation tools in details:

3-3-1. HTML Language

The reason for choosing HTML language because it has been used widely for its libraries and resource therefore it is very useful for the projects implementation. The HTML language is free to work in it by Google chrome website. The researchers started with a compatible with windows 10 – 64 bit. As the researchers mentioned before, that HTML is an web page design and transferred from one source code to another easily. The HTML is run as shown in figure (3-1).

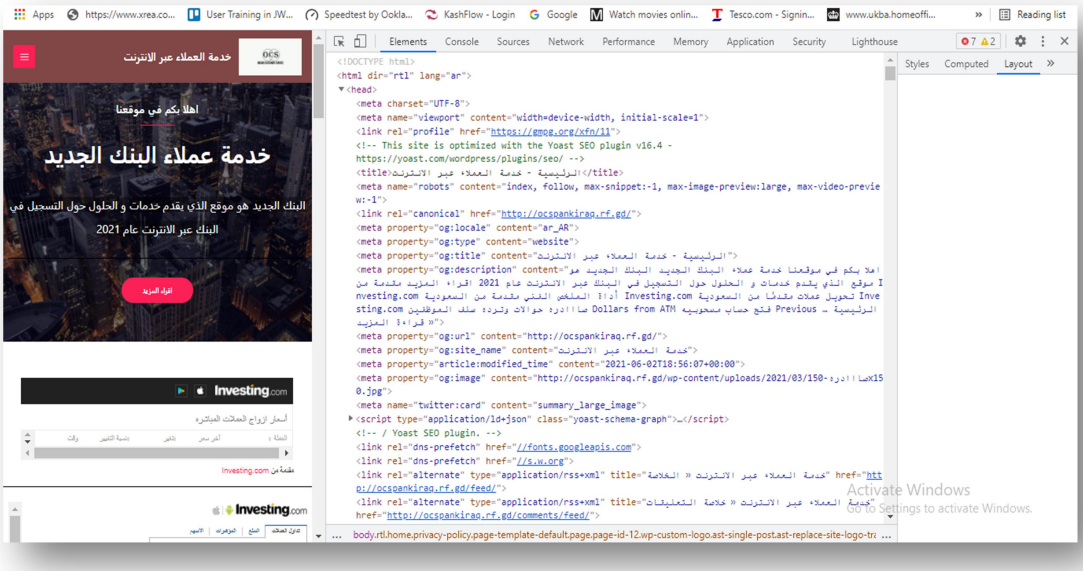


Figure (3-1) HTML interface

3-3-2. CSS language

As the researchers mentioned in chapter 2, they worked on CSS language to make the web page an interactive web page. The researchers also worked under CSS code with HTML to prepare a web page more acceptable (configurations and properties) like it is shown in source code in figure (3-2).

The researchers dealt with CSS language and tested many source codes and implemented the project accordingly. The CSS and HTML are worked together to post the design of frontend page.

```
img.wp-smiley,
img.emoji {
display: inline !important;
border: none !important;
box-shadow: none !important;
height: 1em !important;
width: 1em !important;
margin: 0 .07em !important;
vertical-align: -0.1em !important;
background: none !important;
padding: 0 !important;
}
```

Figure (3-2). The sample of CSS language

3-3-3. JavaScript Language

The developer used JavaScript engine language to implement and run performance-critical portions of web page scripts close to native speed. The developer needs to make animations for some parts of web pages for increasing the interaction in the project.

3-3-4. MySQL Database

The developer used MySQL database in order to deal with a hug information of customers. The developer creates tables and queries to meet the requirements of project but the design of database is prepare to collect data inside a cloud server and it can be saved inside on promise server.

3-3-5. Microsoft ASP.Net

The developer installed and used Visual Studio 2019 in order to render the HTML source codes for controlling, and test them easily. ASP.Net contains more libraries and modules more than the other versions so that the developer selected it.

3-4. The Implemented System

The implemented system includes five main subsystems that are integrated and worked together to present the project outcomes. These subsystems are:

3-4-1. Enrollment System

It is first part of the project that registers the information of users or customers inside the project by using five APIs which are mentioned as following as:

1. Login API
2. Accepted API
3. Logout API
4. Confirm API

3-4-2. Advance Payment process:

The developer designed and implemented this part to meet the project's requirements. The developer created a three APIs and designed to be interactive web page because these pages contain many functions to calculate the agreement payments which should paid to a certain customer. The API are as following as:

1. Create advance payment
2. Approve order
3. Reject order

3-4-3. Transaction Process

In this part, the developer converted the design of transaction process in chapter two to a source code which is written by ASP.net. The Transaction process is not easy process because it contains many stages that are explained as following as:

1. Source country
2. Sender information
3. Transaction amount (the amount is very high or not)
4. Receiver information
5. The transaction schedule

3-4-4. Deposition Process

Transactions on deposit accounts are recorded in a bank's books, and the resulting balance is recorded as a state of being responsible for processing of the bank and represents an amount owed by the bank to the customer. Some banks charge fees for transactions on a customer's account. Additionally, some banks pay customers interest on their account balances. The developer mentioned this state for handling as a simple example of transactions that is happened inside the bank. The process also contains to the following three APIs:-

1. Creating process.
2. Approve the order
3. Reject the order

3-4-5. Reporting Process

The developer and designer worked hard to present on demand reports for recording almost all bank's operations which are mentioned previously. The reporting process contains two types of presentation either by Microsoft Excel sheet (template file) or papers for two size (A4, A3). The developer implemented an one API to execute the reporting process. The report part contains the following as:-

1. Bank statements
2. Deposit sheet
3. Money Transaction sheet
4. Payroll report
5. Bank reports for auditing

3-5. The Interaction with the Implemented System

The type of project is APIs and web pages interaction system because it deals with a huge of stakeholders who are using the system from any place electronically. The system depend on internet services so that it may not working properly while the quality of internet is not well. The designer and developer tried to describe all the parts of system in the previous sections.

The Web applications will develop in future to be more flexible and scalable. It implemented by many modules which achieved the design of project. These modules are mentioned in previous paragraph of this chapter. The modules are created by ASP.net as a backend and the frontend modules were implemented the interfaces of project.

According the system interaction is very high because it is dealt with many types of stakeholders (operator, administrator, users, developer, customer). The properties of project's interface should be as following as:

1. Easy to navigate (web page size)
2. Very clear language (each page is understandable and is told the user what to do)
3. Page design is interactive to work on it
4. The process of each page works fast to execute its task.

Chapter Four

Conclusions, Limitations and Future Works

Chapter Four

Conclusions, Limitations and Future Works

4-1. Conclusions

The graduation research project (GRP), focused to manipulate a modern project in Web Application which is diagnosing the situations of certain groups. Performance measures must be developed and standardized to give organizations a clearer picture of the benefits derived from Enterprise Resource Planning implementation. Much has been written about and learned from some well-publicized successes and failures in ERP implementations. Some of it has even been directly contradictory. However, most agree on some basic rules:

- Establish the business processes prior to selecting the software.
- Staff the project team with members of the user community in addition to IT staff.
- Develop an implementation plan and stick to it.

4-2. Limitations

The researchers suffer from many limitations during the design and implement system, as listed in the following:

1. System Analysis was not easy to implement whole parts accurately.
2. Other APIs did not complete because the researcher have no time to complete it.

4-3. Suggestions for Future Works

The designed and implemented system presents many productive lines of continued graduation research, and opens the door to a range of future works, as listed in the following:

1. The project can implement other algorithm to enhance the analysis speed.
2. The project can be mobile application
3. The project will be used in many parts of social life to explore a certain people in the world whether it is marketing well.
4. The project can enhance to cover other issue which needs to be online.

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المستخلص

لا يعد تصنيع أو إنتاج البرامج أمرًا سهلاً طوال الوقت لأن منهجية هندسة المتطلبات تجمع وتتطور باستمرار بحيث يتم التعامل مع أنظمة تخطيط موارد المؤسسات (ERP) خطة موارد المؤسسة في كثير من الحالات التي تتعلق بقاعدة البيانات أو جمع المعلومات. اقترح الباحثون نظامًا أساسيًا لنظام إدارة كشوف المرتبات في بنك معين وقد استوفوا جميع المتطلبات تقريبًا كعلاوات واستحقاقات للموظفين. تعمل قوة النظام كتطبيق ويب وتنفذ العديد من واجهات برمجة التطبيقات (API) التي تغطي خدمات النظام. يتم إنشاء واجهات برمجة التطبيقات وتنفيذها بواسطة نصوص HTML وجافا كواجهة أمامية ويتم تصميم الواجهة الخلفية وتنفيذها بواسطة قاعدة بيانات.MySQL

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
كلية دجلة الجامعة
قسم علوم الحاسوب

هذا المشروع مقدم الى قسم علوم الحاسوب / كلية دجلة الجامعة
كجزء من متطلبات الحصول على درجة البكلوريوس في علوم الحاسوب

معد من قبل

ازهر احمد بدر

سجى نمير كامل

هبة محمد عبدالامير

فاطمة سعدي محمد جواد

بأشراف

م.د. عمر صبرالدين عزيز

تموز، 2020 - بغداد

Republic of Iraq
Ministry of Higher Education and Scientific Research
Dijlah University College
Department of Computer Science

Design and Implement a Multi-Vendor Marketplace

DUC-CS:2021.06

A Graduation Project Submitted to the Department of Computer Science / Dijlah University College as a Partial Fulfilment of the Requirement of the BSc. Degree in Computer Science

By

Baybak Adeeb Mohhamed

Ahmed Mohammed

Mustafa Alwan Hussein

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Dr. Salim M Zaki

June, 2021 – Baghdad

Supervisor's Certification

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Affiliation: ***Dijlah University College / Department of Computer Science***
Date: 29/ 06 / 2021

Abstract

e-Commerce is the process of doing business through computer networks. A person sitting on his chair in front of a computer can access all the facilities of the Internet to buy or sell the products.

The main advantage of e-commerce over traditional commerce is the user can browse online shops, compare prices, and order merchandise sitting at home on their PC.

we are in jumla break working on the first B2B (business-to-business a type of electronic commerce (e-commerce), is the exchange of products, services or information between businesses) marketplace that connects small businesses with wholesalers and brands in one place to procure supply efficiently

Jumla Break attends to target local areas first then expands to all Iraq areas.

Table of Contents

List of Figures

Chapter One

An Overview

1.1. Introduction

Jumla Break is an electronic platform that links wholesalers with market owners or shops and provides many tools and solutions for them from providing a whole system for managing purchases & delivering management tools & original things that reduce for the wholesalers & the solo market or solo person's time & money.

Jumla Break attends to target local areas first then expands to all Iraq areas.

1.2. The Aim

Jumla Break aims to provide a secure platform that help market owners to buy wholesale products easily and quickly

by our system, market owners will be able to easily follow their orders, profits and monthly expenses through the application or the website

1.3. Statement of Problem

Problems are divided into several sections, including:

The problems that market owners face

- Many market owners suffer from financial errors while managing assets and assets in their store, which causes a loss of money, sometimes reaching thousands of dollars.
- Market owners suffer from the experience in managing materials and products causing a loss of time & money .
- Some of the imported materials obtained by market owners are of poor quality or are out of date, causing loss of money .
- The owner of a retail market is forced to buy the product from the same wholesale market because of his prior knowledge without comparison with other vendors to separate them in the market.
- Lots of market / store owners struggle with the problems of managing their purchases and money management.

- Payment of purchase bills can vary:
  A- Paying in cash .
  B- Paying to a sales man .

  These cause problems in tracking the buying and selling lists, and tracking purchases and debts.

- Owners of retail markets are forced to shop from wholesale markets in various ways, for example:

  A- Shopping by visiting the wholesale market (requires time and transportation).

  B- Calling the phone and selecting the product (without product inspection + phone call charges).
  C- They are visited by a representative and present the product (requires a car to transport products + time for roaming) .

Problems that dealers face

- Merchants suffer from the lack of a clear database of the owners of markets or stores inside Iraq.
- Difficulty marketing products to market owners in Iraq.
- The lack of clear tools or systems to manage their sales.
- Problems getting payments from market owners.
- Problems delivering products to market owners.

1.4. Possible Solutions

- Provide multiple options for retail market owners to purchase products.
- Providing an electronic system to manage monthly or daily purchases for market owners and wholesalers.
- Provide an immediate account statement for purchases made through the Jumla Break platform.
- The possibility of paying bills electronically through Zain Cash or Master Key Card.
- Marketing products to market owners for free.
- An integrated shipping system inside the platform that provides instant notifications about the shipping process for products.
- An electronic application to preview all available products and order them electronically.
- Merchant ratings system on the website and app.
- Continuous support for traders and market owners.

- Providing better prices for market owners.

1.5. Targeted category

1.6. Profit mechanism

A commission is deducted for every sale made through the platform, and this commission is borne by the merchant, and it will be as follows:

- **A 4% commission is deducted from each purchase if the payment is after receipt, and the merchant is billed monthly.**
- **A 5% commission is deducted from each purchase if the payment is via Zain Cash, and the merchant is billed on a weekly basis.**
- **A 7% commission is deducted from each purchase if the payment is via Master Key Card, and the merchant is billed on a weekly basis.**

1.7. Market size

In the first stage, the Baghdad area will be targeted only, and according to the statistics that we have made, the Baghdad area contains about 17,000 markets and small shops.

1.8. Programming and Implementation Tools

Technologies used in the web page

The website will be developed on the **WordPress** platform, as it is considered one of the largest Content management platforms in the world, making it easier for us to accomplish the Development and design easily and quickly, and the **PHP** language will be used in the Development of the site in general with the use of the **JS** language in developing some tools and **MYSQL** will be used in the rules Data and also the electronic application will be provided with an **API.**

Technologies used in the application

The website will be developed for the online application through the "**Flutter**" library of Google and it is considered one of the most famous and best technologies currently used to develop applications that operate on more than one platform and contribute to reducing development time and project completion with high quality and speed.

1.9. Competitors in the market

- **Miswag** Company is an Iraqi company officially registered in Iraq, and all transactions and tasks between the company, merchants and customers are official and take place within the Iraqi commercial legal framework.
- **Shopini** is a site specialized in the field of shopping in logic, but that is not all. They offer a wide range of diverse products while providing smooth purchasing and delivery methods for customers.
- **Tamata** is a new service in Iraq tailored for the Iraqi market and consumers that care about selling and delivering lots of different products for customers all around Iraq.

All of those have websites had apps that represent them.

Chapter Two

The System Design

Introduction

This chapter contains site design diagrams. The system was designed using Class Diagram, Active Diagram and use case.

Class Diagram

As shown in the **Figure2.1** this diagram describes the types of objects in the system and various kinds of static relationships which exist between them.

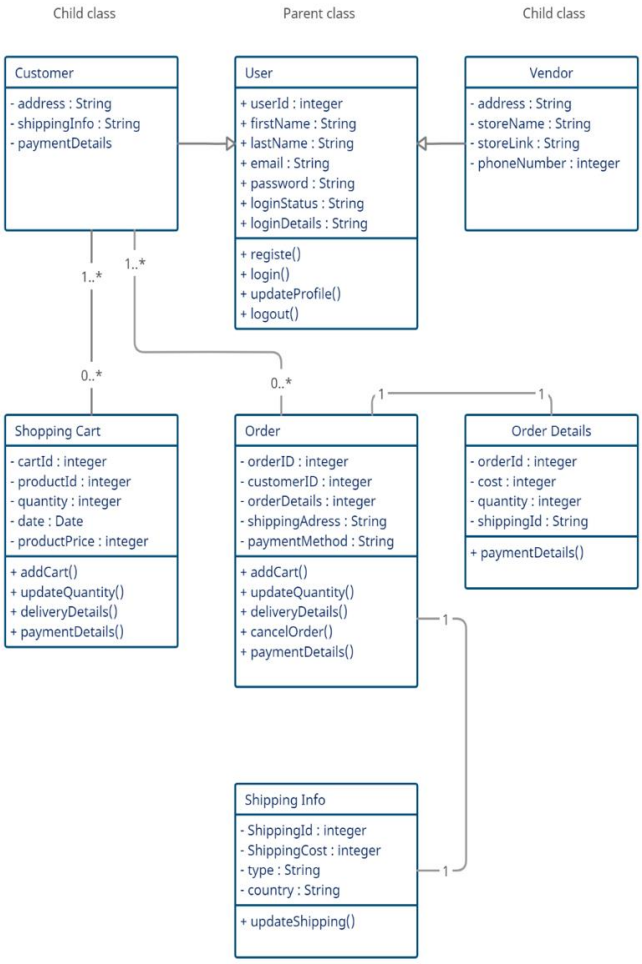

Figure 2.1: Class Diagram

Activity Diagram

The activity diagram focuses on the state of flow and sequence that occurs in the system.This scheme was designed into two parts, one part for the client and the other part for the seller.

At the beginning of **Figure 2.2**, the user can login, then check the system if the user is registered or not, if the user is present, can access the application and use all the features of the application. If it is not registered, it returns to the same page as the login.

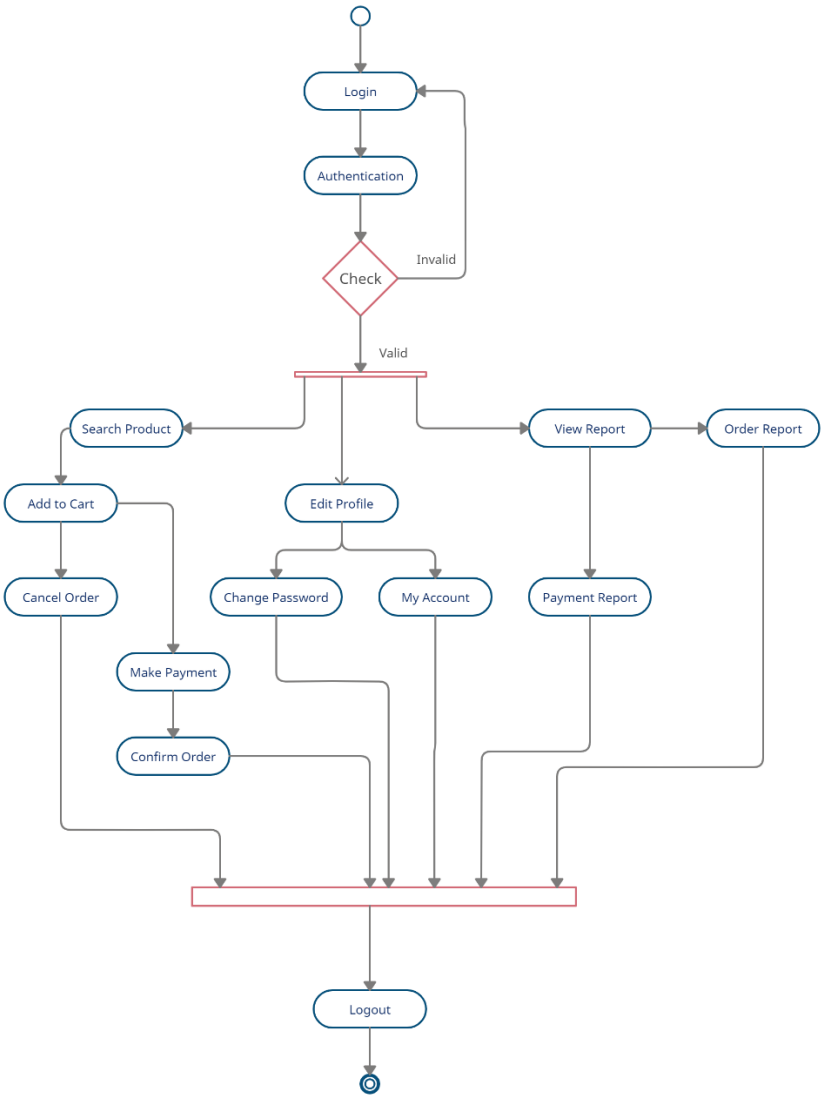

Figure 2.2: Activity Diagram for customer

As shown in **Figure 2.3**, Admin can add products, add orders and modify product information such as price, name, etc.

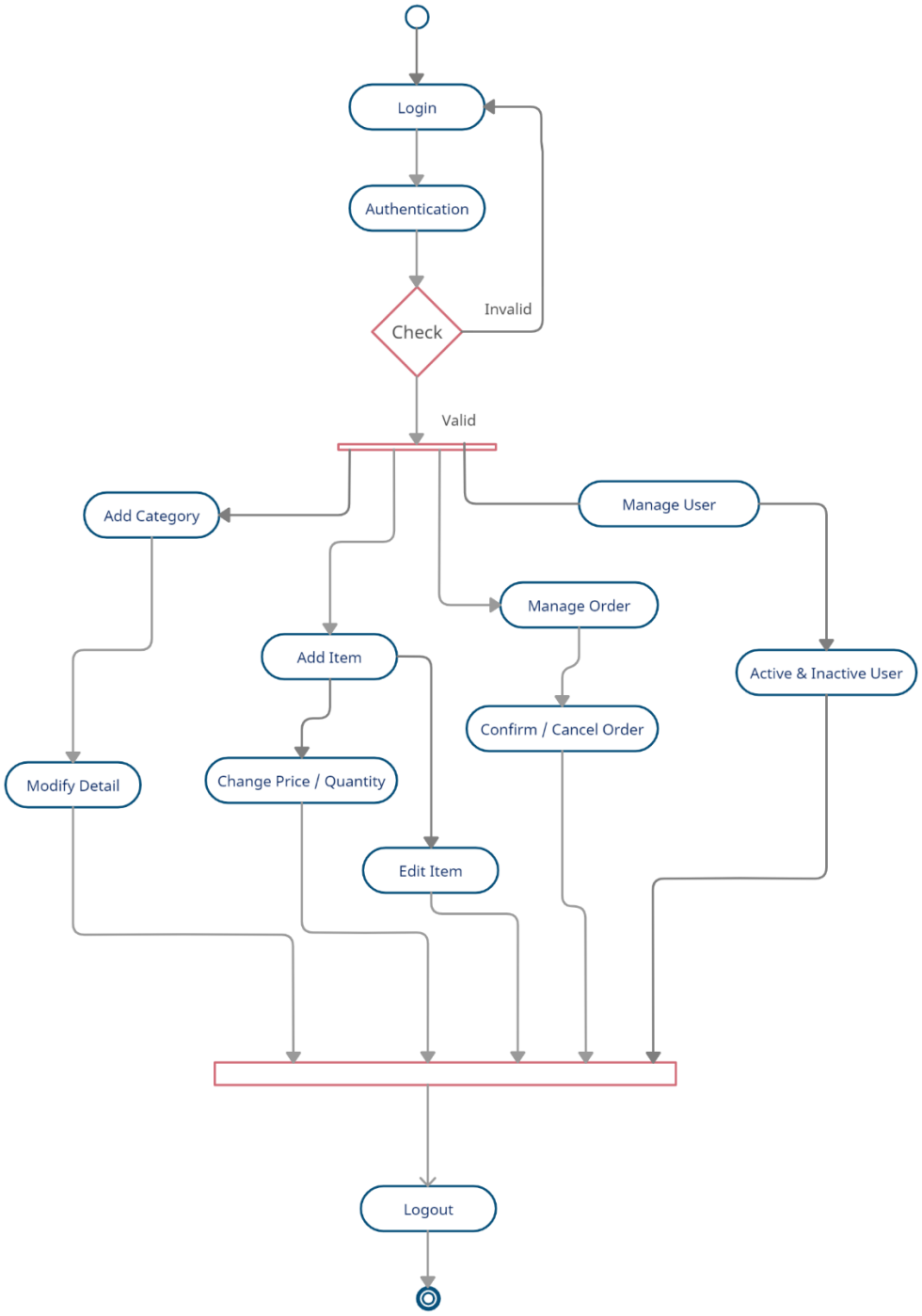

Figure 2.3: Activity Diagram for admin

As shown in **Figure 2.4**, the seller can also open an account in the app and add, manage and modify its own products. Most of the features available to the admin can also be used by the seller.

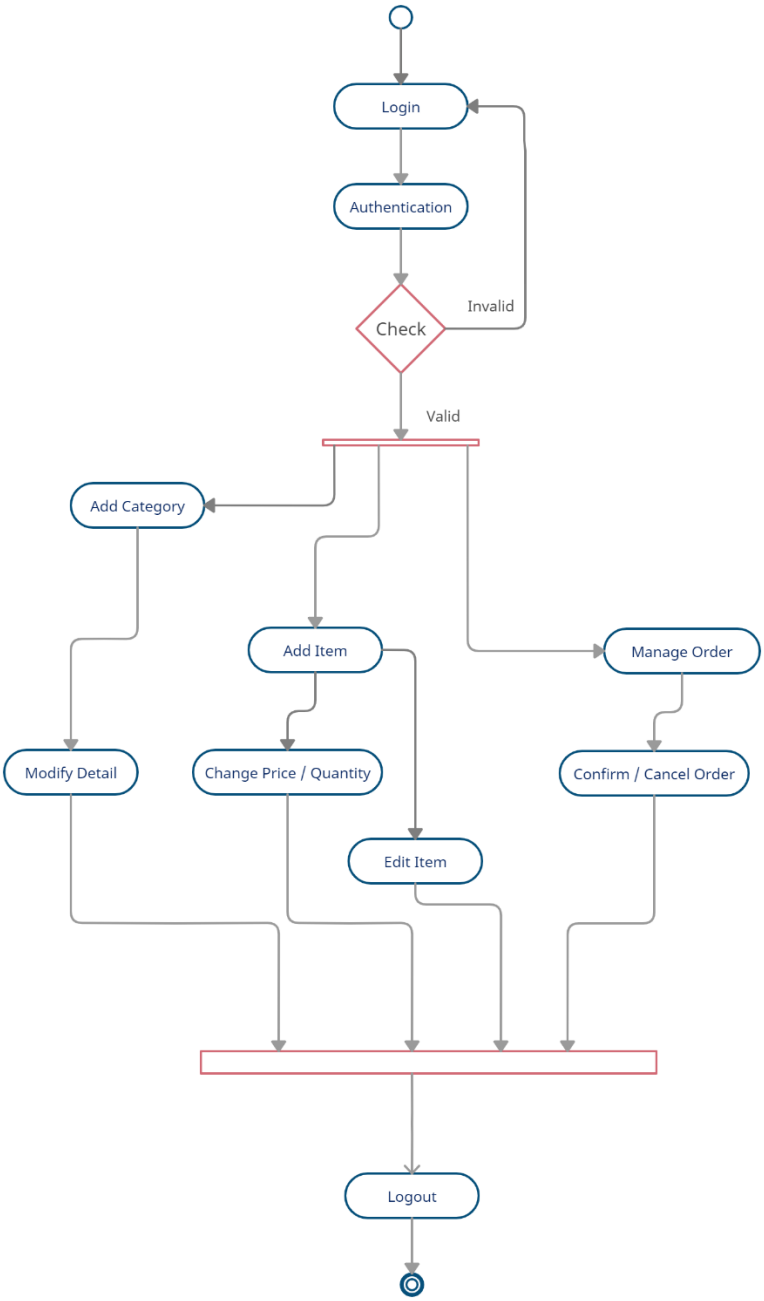

Figure 2.4: Activity Diagram for vendor

Use Case Diagram

A use-case model describes a system's functional requirements in terms of use cases. It is a model of the system's intended functionality (use cases) and its environment (actors).

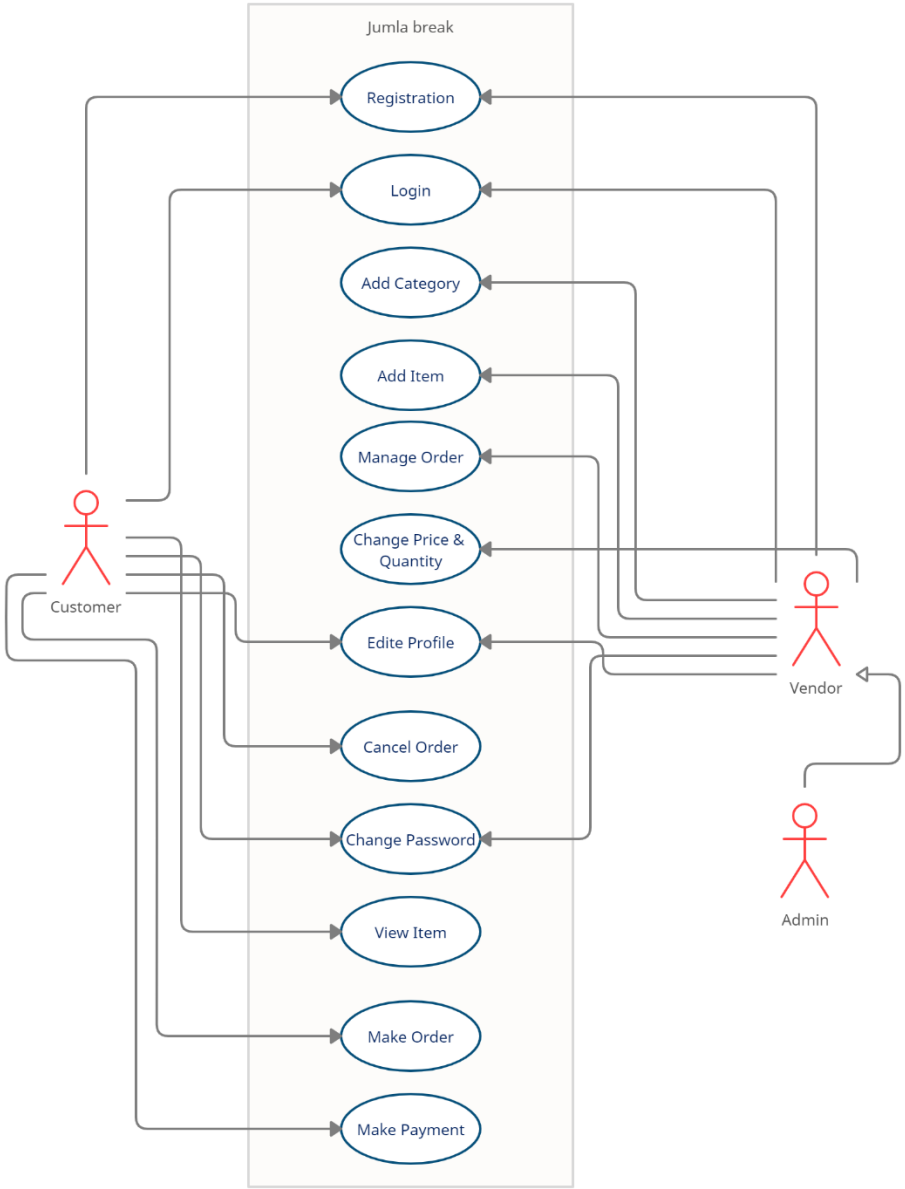

Figure 2.5: Use Case Diagram

Chapter Three

The Implemented System, Tests and Empirical Outcomes

3.1. Introduction

This chapter discusses the results of developing and using Jumla Break. The results presented in format of a user visiting the website and content is explained supported by image. The results discussion shows that objectives set in Chapter One of this report are achieved.

3.2. Jumla Break App

The jumla break application consists of four main pages:

Home page

Categories

My Account

Shopping cart

3.2.1. Home page

After login, the main page will appear as the first page in the application at the top. There is a search box where the user can search for whatever product they need. Then the categories in the application are to move between the categories that can be pulled to the right and left.

Then comes the vendor section. You can browse all the vendors by pressing the word **more** found in the left of the screen. The last thing on the page. The best-selling products are also available. The user can press **more** to view all the products and choose the most suitable for them. As shown in the **Figure 3.1**

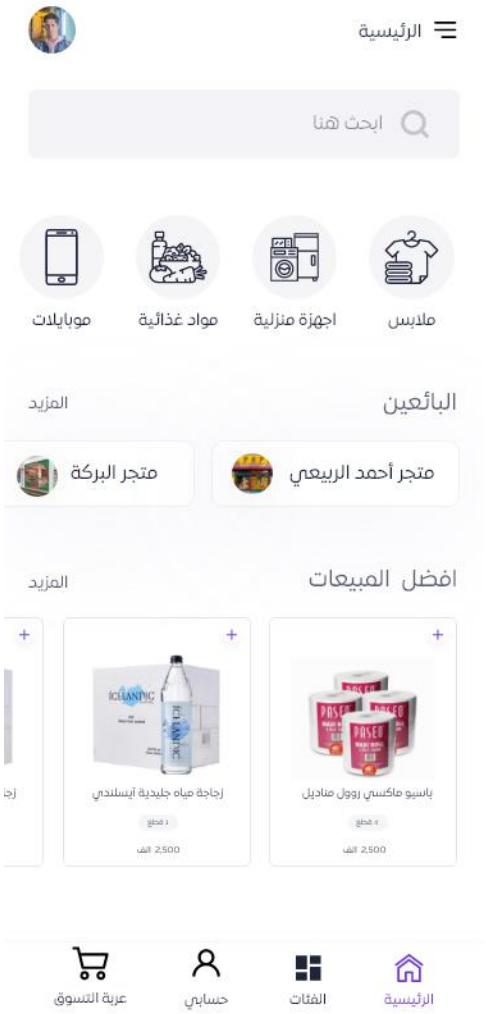

Figure 3.1: Home Page

3.2.2. Categories

This page has all the product categories currently available in the application, for example, when selecting the clothing category, all clothing products will appear. As shown in the **Figure 3.2**

Figure 3.2 : Categories

3.2.3. My Account

This page at the top contains a picture and the name of the account holder below it. The profile information is the shipping address, payment information and date of orders. This data can be changed at any time on this page. As shown in the **Figure 3.3**

Figure 3.3 : My Account

3.2.4. Shopping cart

This page has all the products selected during the shopping process, as shown in the image below. There's the product image, the name and the price of the product. We can also pull from left to right to delete the product. Below there's a card with a total product price and a purchase button in green. As shown in the **Figure 3.4**

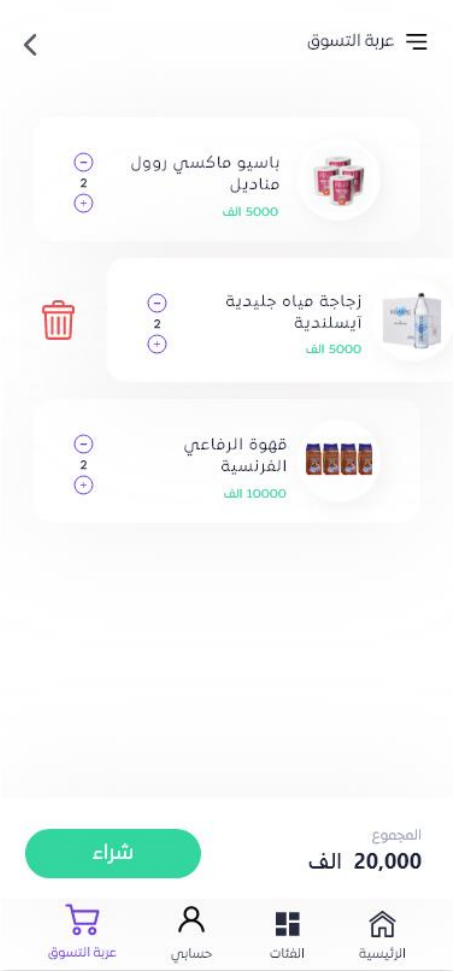

Figure 3.4 : Shopping cart

3.3. Jumla Break Website

we designed and programmed Jumla Break platform using multiple tools and programming languages. find below in **Figure 3.5** the tools that were used in programming our platform

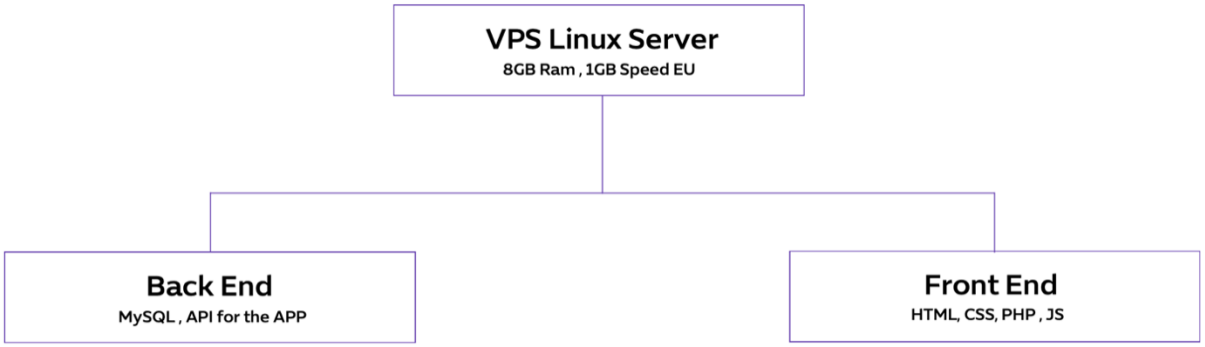

Figure 3.5 : Website Chart

3.3.1. Sections of the Jumla Break Website

1- Merchant: contains a complete control panel to manage his own store

2- clients: It contains a complete control panel to manage purchases

3- Site Administration: It contains a control panel to manage the entire platform

4- Application Administration: A mini control panel to manage our app

5- technical Support system: It contains a ticket system between site management, market owners, and merchants

3.3.2. The Merchant

Through our platform, the merchant or wholesaler will be able to open a free account in less than 3 minutes and start selling their products as we provide them with an easy and simple control panel .. **Figure 3.6**

They have the ability to:

1- Add new products

2- Follow-up sales (such as total sales, sales by one product, sales by a specific period and sales by a specific user)

3- Follow up on total profits after deducting platform commission

4- Monitor the total number of visitors to each product

5- Withdraw money at any time via Zain Cash or bank transfer

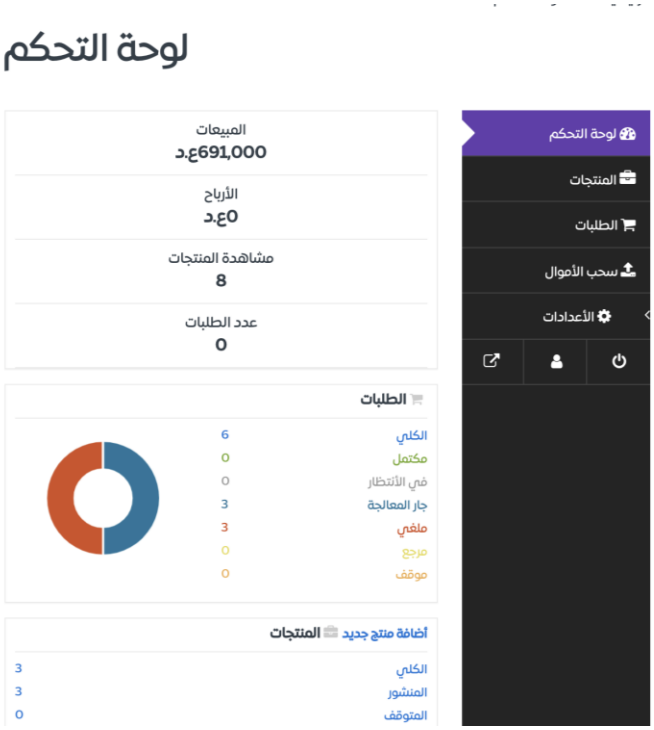

Figure 3.6: The Merchant

3.3.3. The Clients

Through our platform, the customer or the owner of the grocer will be able to create his account within a few seconds and with the ability to purchase directly and pay using e-payment methods(Zaincash) or cash.. **Figure 3.7**

They have the ability to:

1 — Purchasing products online

2 — Follow up on the status of orders through the control panel

3 — contact the merchant using the control panel

4 — Knowing the prices of products directly and without contact with the merchant

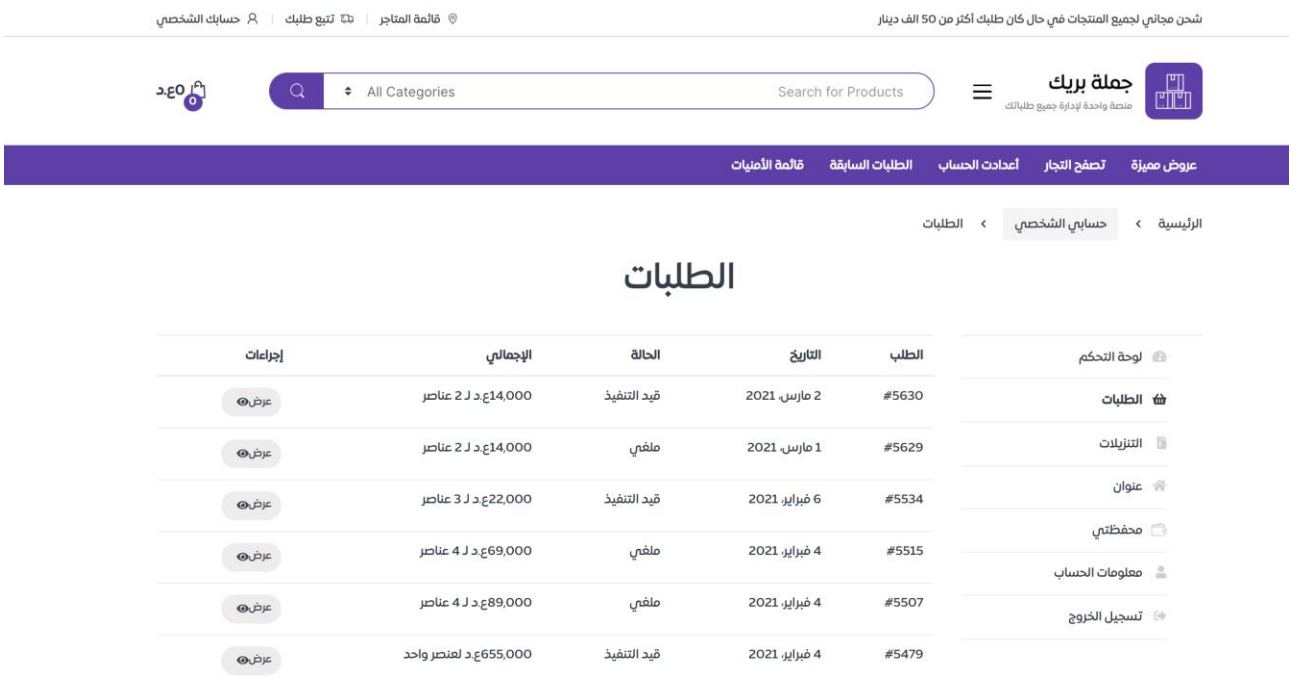

Figure 3.7: The Clients

3.3.4. Site Administration

Through our control panel, we will be able as a team to modify all the content on the website for example.. **Figure 3.8**

They have the ability to:

1- Create new pages or modify existing pages

2- Add users and control their access

3- Know all the profits of merchants and their products

4- The ability to control all products on the site

5- The ability to control the orders that reach to the merchants

6- The ability to control and modify the merchant control panel

7- The ability to communicate with merchants and users

8- The ability to know detailed statistics about visitors and the total number of users during a certain period

9- The possibility of knowing the total profits from the commissions imposed on traders

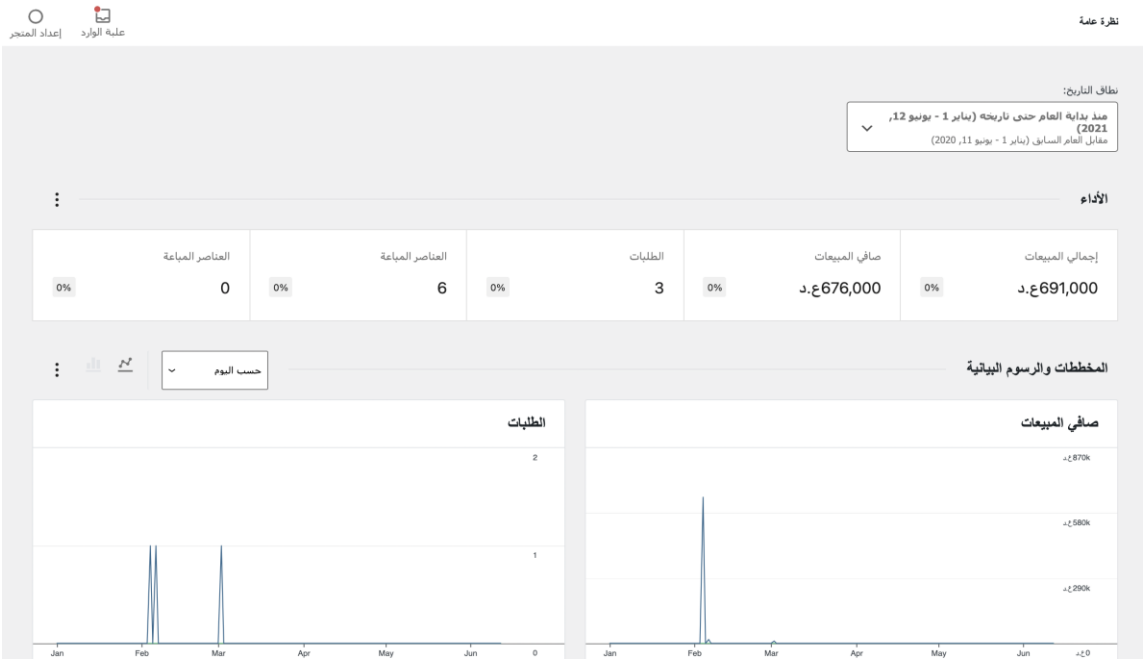

Figure 3.8: Site Administration

Chapter Four

Conclusions and Future Work

4.1. Conclusions

Jumla Break is a B2B (business-to-business a type of electronic commerce (e-commerce), is the exchange of products, services or information between businesses) marketplace that connects small businesses with wholesalers and brands in one place to procure supply efficiently in Jumla Break we reinventing wholesale! and we provide to the supermarket owner

One Stop Shop

Access to the top brands & wholesalers with best prices and real-time promotions via your mobile

Get the supply you need on-demand

Replenish your stock in less than 24hrs. It's time to repurpose the storage for a retailing space and get more sales per sqm

Pay for the supply in flexible methods

We offer cash-on-delivery, online payment by ZainCash

4.2. Limitations

Like any startup or company that operate in Iraq, there are many challenges and limitations that we will face in the future:

- Shipping in Iraq, one of the biggest obstacles, regions and cities in Iraq is not organized and it makes the shipping process is complex and difficult

- Less than 15% of Iraqis have a bank account and the majority of Iraqis don't use e-payment methods which will make it difficult for us to transfers money between merchants and users

- The internet in Iraq is generally too slow! so this was one of the challenges that made us work on programming a platform that works even on slow internet.

4.3. Future Work

The next step of enhancing and adding new features to jumla break platform and we will make the platform more reliable and serve more merchants and users and the proposed future features are:

- Develop an integrated support system that works using artificial intelligence to answer user inquiries
- Adding other e-payment methods such as Qi-Card, which has about 10 million users currently
- Adding more features to the shipping system like tracking map
- Adding the ability to create a new account on the platform by Facebook and Google
- Building new partnerships with suppliers in order to supply new products to the Iraqi market

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Republic of Iraq
Ministry of Higher Education and Scientific Research
Dijlah University College
Department of Computer Science

Design and implementation of a delivery company website

A Graduation Project Submitted to the Department of Computer Science / Dijlah University College as a Partial Fulfilment of the Requirement of the BSc. Degree in Computer Science

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Supervised By:
Ansam Ahmed Alwan

June, 2021 – Baghdad

Republic of Iraq
Ministry of Higher Education and Scientific Research
Dijlah University College
Department of Computer Science

تصميم وتنفيذ موقع شركة التوصيل

هذا المشروع مقدم الى قسم علوم الحاسوب / كلية دجلة الجامعة كجزء من متطلبات الحصول على شهادة البكالوريوس في علوم الحاسوب

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حمزه ضياء مبدر

رانيه عامر علي

بأشراف

م.م أنسام احمد علوان

حزيران ، 2021 – بغداد

Dedicate

To:

- **the sparkle of hope ....The Advocates of change towards development**
- **Everyone who seeks to spread goodness, love and hope throughout my country**

We dedicate these our humble efforts …

Sadeer salih

Muhanned Ayad

Hamza Dhiaa Mubder

Rania Amiar Ali

.June 2021

Supervisor's Certification

I certify that the preparation of this graduation research project titled "**Design and implementation of a delivery company website**/ Department of Computer Science / Dijlah University College in partial fulfillment of the requirements for the degree of BSc. In Computer Science.

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Affiliation: ***Dijlah University College / Department of Computer Science***
Date: / 06 / 2021

Head of Department
Signature:

Name: **Dr. Salim M. Zaki**
e-Mail: **salim.zaki@duc.edu.iq**
Affiliation: ***Dijlah University College / Department of Computer Science***
Date: / 06 / 2021

Examining Committee Report

We certify that we have read this graduation research project titled "Design implementation of a delivery company website "and as an examining committee, examined the students:

Sadeer Salih **Muhanned Ayad**

Hamza Dhiaa **Rania Amiar**

In it's content and in what is related to it, and that in our opinion it meets the standard of a graduation research project for the degree of BSc in Computer Science.

Examining Committee

Signature:

Name:

- Chairman -

Date: / 06 / 2021

Signature:

Name:

- Member -

Date: / 06 / 2021

Signature:

Name:

- Supervisor -

Date: / 06 / 2021

Head of Department

Signature:

Name: Date: / 06 / 2021

(بِسْمِ اللَّـهِ الرَّحْمَـٰنِ الرَّحِيمِ)

(هُوَ الَّذِي أَنزَلَ عَلَيْكَ الْكِتَابَ مِنْهُ آيَاتٌ مُّحْكَمَاتٌ هُنَّ أُمُّ الْكِتَابِ وَأُخَرُ مُتَشَابِهَاتٌ ۖ فَأَمَّا الَّذِينَ فِي قُلُوبِهِمْ زَيْغٌ فَيَتَّبِعُونَ مَا تَشَابَهَ مِنْهُ ابْتِغَاءَ الْفِتْنَةِ وَابْتِغَاءَ تَأْوِيلِهِ ۗ وَمَا يَعْلَمُ تَأْوِيلَهُ إِلَّا اللَّهُ ۗ وَالرَّاسِخُونَ فِي الْعِلْمِ يَقُولُونَ آمَنَّا بِهِ كُلٌّ مِّنْ عِندِ رَبِّنَا ۗ وَمَا يَذَّكَّرُ إِلَّا أُولُو الْأَلْبَابِ)

صدق الله العظيم

Dedication

This graduation research project is dedicated to:

A message saying that it was written in order to honor or express affection for someone. (Font type: Lucida Calligraphy)

Sadeer Salih

Muhanned Ayad

Hamza Dhiaa

Rania Amiar

Abstract

the delivery system is a fully customized end-to-end Field management solution to manage business resources. Enterprises can Improve their Delivery Service With Optimized Routes & Real-Time Tracking. It not only streamlines all your business operations also save time & cost with its intelligent dispatching system. it provides an agent app and manager dashboard with features like notification & alerts, Barcode scanning, Geo-analytics powered Reports, etc.

Running a successful service company should be synonymous with delivering excelling service. If not, then why consider running a service business at all? Yet, if all companies which perform services effectively compete on providing the service, then the key differentiator lies in the service management model and the ability to execute it. Designing the service delivery system should focus on what creates value to the core organizations and how to engage frontline employees to deliver the ultimate customer experience.

Tired of spending hours trying to map messy delivery routes yourself? Our software can help you manage your delivery operations whether you're transporting parcels, fresh produce, or furniture. Routific helps you deliver faster and on schedule, track your drivers, and lower your cost-per-delivery. Whether your delivery fleet has 1 vehicle or 25, Routific lets you plan, dispatch, and track optimized routes in minutes.

new products are really not the first place to start with the delivery systems. starting with keeping the established brands healthy and growing . . . because that’s really the key to overall profitability. . . . Totally new brands have the lowest odds of success and are the least frequent means of innovation for delivery systems. Whether these systems deliver flavor, color, nutraceutical benefits, texture properties, convenience, or some other function or health attribute, the key is that they add value the kind of value that can enhance existing products and the kind of value that referring to in the remarks. these kinds of ingredients help deliver the right message.

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Chapter One

An Overview

1.1. Introduction

Over the last decade, especially in light of the financial crisis we have just been through, we have forgotten some of the most important lessons from the "Golden days of Service Management" (in the early 80s, from pioneers such as Richard Norman, Christian Grönroos as well as James Heskett, Earl Sasser and more). No matter how technical we have made the FM profession, it is still predominantly a people business – carried out by people for people occupying/working in the facilities we so diligently maintain and serve.

Delivering excellent service is just as important today as it was in the 80s, but many companies still struggle to deliver even a basic service at a decent quality. The successful Facility Manager of the future is one who is able to design a service delivery system focused on what is creating value for the core organization and how to engage frontline employees in the delivery process.[1]

Some of these delivery systems are new concepts, trying to move "outside the box," if you will. Some of them are established systems that have been modified to meet a specific need or solve a particular problem. Some of them have been combined with other less traditional ingredients. Some of them have had application in the pharmaceutical industry, but increasingly, with the emphasis on nutraceuticals, may have relevance in the manufacture of health-promoting foods. [2]

Of course, when we think about delivery systems, most likely "encapsulation" or "microencapsulation" immediately comes to mind. According to a leading supplier of encapsulated ingredients, Balchem Encapsulates, microencapsulation can be defined as a process where a core

ingredient is coated or shelled within a second material for controlled release and protection of the active ingredient against the surrounding environment. Coating types include a variety of polymers, carbohydrates, fats, or waxes. A coating material is designed to stabilize the core material and protect it from release until appropriate conditions are present to trigger release. The material should also allow release under the specific conditions needed, based on the product application. In addition to microencapsulation, other delivery systems might include coatings; premixes; novel packaging concepts ranging from films to systems that release an ingredient directly into the finished product; injection technologies; particulates of various sizes and shapes; and ingredients available in a variety of forms, including powders, liquids, crystals, compressed tablets, nuggets, and so on. [2]

Finally, delivery systems can help revitalize familiar products to consequently can help established brands to flourish. Or delivery systems can help create new products, taking advantage, especially around holidays or even in response to troubled times caused by political problems and unrest.[2]

In the future, we may also be seeing more innovative packaging developments which can act as delivery systems. Someday, the individual may even be able to control or adjust the amount of the ingredient to be delivered in the application. Again, some people argue that the finished product can be viewed as a delivery system itself. Innovative packaging ideas only make this approach a further reality.[2]

a guide for all start-up companies that wish to use e-commerce with a focus on e-retail. In addition, the case company will receive valuable, objective ideas on how they could improve their order-to-delivery process. All of the ideas discussed in the thesis can be applied to any company, but the focus is to create a functioning order-to-delivery process for the case company. For these reasons all ideas will be explored to a reasonable extent after which the prevailing one will be selected for the case in question. It is important to keep in mind that there are no absolute truths. Every company is an individual and should be treated as such when designing the order-to-delivery process.[3]

1.2. The Aim

When you're running an e-commerce business, one thing you absolutely need to get right is delivery. Customer's needs have changed dramatically, with most now expecting a fast, reliable delivery service.

If you're looking to improve your customer service and boost your business, paying attention to your delivery process is key. Here, you'll discover why delivery service is so important in e-commerce and how to ensure it's the best that it can be.

The purpose of this paper is to provide researchers with an overview of the service quality and delivery domain, focusing on the inclusion of customer co-production and customer integration. Specifically, this paper concentrates on service quality (including quality measurement), the service environment, controls, and their consequences.

1.3. Statement of Problem

Delivery of goods used to take 7-10 working days, with very few options available to customers. However, as technology has evolved, so too have the number of delivery methods and options.

Customers today have a lot of choice when it comes to receiving the goods they buy online. This has led to a total change in attitude towards how delivery should work. Next day deliveries aren't just a perk anymore, they're actually expected. So, if your business isn't providing a variety of delivery options, it could be missing out on a lot of potential customers.

Delivery is also the last impression a customer has of your business. So, if they experience a problem, it's going to leave them with a negative view of your brand, and they'll be unlikely to buy from you again.

There is even businesses offering same-day delivery in specific geographic locations. This delivery expansion is occurring in both the US and the UK with increased focus from the online grocery market.

1.4. Possible Solutions

There are a lot of ways to improve your delivery service as an e-commerce company, the five key improvements are stated below:

Variety of delivery options: If you don't already, make sure you add a number of delivery options for your customers to choose from. As mentioned earlier, next-day delivery has become the norm and any business not offering this will feel the repercussions in sales. The more options you provide, the happier your customers will be.

Choose the right logistics company: There's one costly mistake you can make with your delivery service and that's choosing the wrong courier. Don't simply look at the cost when choosing the right courier for your company. You need to ensure you're using an affordable yet reliable courier service in order to keep your customers happy. Some small businesses may run their delivery service alone but once orders increase a courier is vital in order to take this stress away and allows you to concentrate on other parts of the business.

Tracking parcels: A large amount of orders can cause confusion which is why it is recommended that parcels are tracked. This allows the business to monitor every parcel that is sent out and if a problem occurs this can be rectified quickly, as the last whereabouts of the parcel is known.

Delivery price: Customers particularly appreciate free or discounted delivery options. Many companies offer free delivery if a customer spends a set amount. Special delivery offers can encourage additional spending and draw in more customers to your business. It could be the difference between a customer going elsewhere to purchase the same product. Although it may seem like you are losing out on money, reduced delivery prices could increase sales.

Customer Satisfaction: Customers are the most important factor in e-commerce businesses and therefore customer satisfaction must be the main priority in everything you do. This is no different when providing a delivery

service. Customers want communication from the beginning of their experience. This includes offering clear delivery service options on the

website and acknowledgement of the order after purchase on screen and via email. Customers rely on updates and this highlights to them that a company cares about them receiving their delivery. Deliveries can lead to a customer planning their day around it, so providing a time slot for delivery can ensure customers are satisfied with their experience and will shop with you again.

In e-commerce, your reputation is everything. When you provide a poor-quality delivery service, it's going to have a significantly negative impact on your reputation. Social media allows consumers to vent their anger, so ensuring you don't offer a poor delivery service is as an important as ever. Even if just one customer writes a negative review about your delivery service, it's going to put off other people from buying from you. So, if you're looking to become successful, it's crucial you follow the tips above and work on improving your delivery service as much as you can.

1.5. Main Concepts and Technologies

How Technology is Changing the Delivery Industry? Over the past decade, the world of logistics has changed almost beyond recognition. And this change has been driven, almost entirely, by the advancement of networking technology. We're now able to connect to the internet from just about anywhere in the world and order just about any item imaginable – from boots to drones.

Such convenience has led to higher expectations on the delivery side of things. We now expect to receive items within days of ordering them. And, when we're willing to pay a little extra, the timescale can shrink to hours. As more and more of us switch to shopping online and outfit our homes with smart-assistants like Amazon's Echo, the demand on the industry is likely only to escalate. Fortunately, a whole host of technologies are being brought to bear on the problem.

Route Planning: Often, the best way to improve the time a journey takes is to reduce the distance travelled. And that means effective route-planning. Fortunately, this is an area where sophisticated satellite navigation systems, of the sort most of us are carrying around in our pockets, can help out.

Anticipating road works and congestion in real-time helps a driver to avoid delays, and makes the system more consistent and reliable. This in turn allows online retailers to promise more when it comes to delivery time.

Tracking Improvements: For years, hauliers have provided their customers with updates on where their package is. Until recently, this has consisted of a time estimate, which refreshes only occasionally, and rarely reflects reality.

Now that tracking devices are more accurate, customers can be told precisely where their package is. This information can also be used by hauliers to assess the performance of drivers, and diagnose niggling problems with efficiency.

Delivery Flexibility: In some cases, a customer might not be home to receive a delivery. The most frustrating outcome in this circumstance is the traditional one: an apologetic note. Modern customers have commitments out of the house, and they increasingly expect to be able to arrange for a delivery to go to an alternate address, like a workplace, or to have the package brought to a public storage facility. In urban settings, with lots of lockers packed into a small area, this is especially advantageous.

Similarly, technology allows customers to specify the exact weight and dimensions of the parcel being shipped, and thereby attain an accurate quote. Major names like TNT offer a special large parcel delivery service.

1.6. Literatures Review

According to Paul Shang, the e-retail industry has faced three major changes in the past fifteen years. First, all the different retail channels were separate. This single-channel approach considered the web as just another way to gain sales. The systems were not integrated and required a significant amount of manual labor. Then it was realized that sales could be increased

by integrating all the sales channels in a way that it would not matter which channel the customer was using, the view of the product would always be the same. This also meant the systems would be integrated and an order

placed in one system would automatically appear in the other via a central database.[3]

According to Thomas Davenport, The Service Design and Delivery Guide provides assistance to those facing the challenge of electronically enabling public services. The assistance is made up of principles, guidance, tools and checklists that can help them succeed. The main messages for building effective service delivery are listed below.[4]

According to Zahava, To be successful in today's on-demand market, a business must provide exceptional, fully branded deliveries while improving efficiencies across the organization, choosing a comprehensive on-demand delivery management platform is critical to reaching both of these goals. Success will depend on leveraging your existing infrastructure and layering on innovative delivery management software.[5]

According to Tony D'Angelo, Delivery Management is a much broader scale of project management. It is the organization, administration, and supervision of the people, processes, and technologies, which when combined into a comprehensive plan, provides the business and technical functions needed to successfully achieve what a client expects to receive.[6]

According to VALENTIN BEUCHILLOT, Delays, functionality, and ergonomics problems, poor choice of technologies, security flaws... When it comes to IT projects, the list of potential problems can be long, very long.

According to Valentin Beuchillot, At Discngine we develop software and bespoke solutions for scientific data management, visual analytics, and decision-making processes destined to R&D divisions in the Life Science industry.We have a track record of successful project completions, and we think our approach to delivery management makes a difference. [7]

According to Shane Hastie, Existing and new Delivery Managers using any approach will gain the most from the first knowledge-based certification on this track. The more advanced content targets those managing agile delivery at scale across programs and portfolios. Delivery Managers who wish to build deep competence and differentiate themselves from their peers should pursue the competency-based expert certification.[8]

1.7. Programming and Implementation Tools

This Information section provides information on Using project implementation tools.

The following information sheets are part of this series:

Introduction to the module

Topic 1: Defining adaptation objectives and activities

Topic 2: Developing and allocating costs

Topic 3: Defining benefits and effectiveness

Topic 4: Calculating and comparing costs and benefits

Topic 5: Using project implementation tools

Topic 6: Using project closure tools

By the end of this topic you will understand the following:

How to use project implementation tools?

Project implementation is the third phase of the project cycle. It commences once the preparation and planning phase is complete. Although all phases of the project are important, it is during the execution/implementation phase that very careful control must be kept of activities and progress. The

following aspects of project execution have been selected for brief discussion:

People management (team management and communication)

Standards and security (including quality and risk)

Managing and mitigation (cost, time, risk and people)

Record keeping (change requests, minutes and reports)

1.8. The Scientific Contribution(s)

Service experiences are the outcomes of interactions between organizations, related systems/processes, service employees and customers. Considerable research in marketing and management has examined customer satisfaction with service experiences (e.g. Arnold and Price, 1993; Bitner, Booms and Mohr, 1994; Bitner, Booms and Tetreault, 1990; Keaveney, 1995; Ostrom and Iacobucci, 1995; Surprenant and Solomon, 1987; Zeithaml, Parasuraman and Berry, 1990).

Predominantly, the research has focused on the roles of service processes, employees and tangibles in creating quality service experiences for customers. However, in many services customers themselves have vital roles to play in creating service outcomes and ultimately enhancing or detracting from their own satisfaction and the value received. This is true whether the customer is an end consumer (for example, consumers of health care, education, personal care, or legal services) or a business (for example, organizations purchasing maintenance, insurance, computer consulting or training services). In all of these examples, customers themselves participate at some level in creating the service and ensuring their own satisfaction.

This manuscript focuses specifically on the roles of customers in creating quality and productivity in service experiences. Drawing on previous (primarily conceptual) research, two frameworks are first presented to aid managerial decision making and guide potential research related to customer participation in service. The first framework examines different levels of participation required of customers across a variety of service

contexts while the second framework presents three major roles played by customers in service delivery.

1.9. The GRP Outline

The rest of this graduation research project (Design and implementation of a delivery company website) is composed of three major parts, the importing of necessary theoretical background, the developing of concepts and techniques (where the majority of the work has been done),

and at least the conclusions and recommendations for the feature works. The general roadmap for the graduation research project is organized as follows:

Chapter 1: Introduction to the graduation research project (GRP) is highlighted in the beginning of this chapter, in the literature review of chapter 1, and it ends with the scientific contribution.

Chapter 2: In this chapter, the proposed system is designed to achieve its goal.

Chapter 3: Introduces the implementation of the designed system. Which is given in details in chapter two.

Chapter 4: Presents some conclusions, some limitations and recommendations for future works that can improve and augment this graduation research project.

Chapter Two

The System Design

2.1. Introduction

The conceptual design of the proposed system was carried out using the activity diagram and data flow diagram as shown in the following parts.

2.2. The Activity Diagram

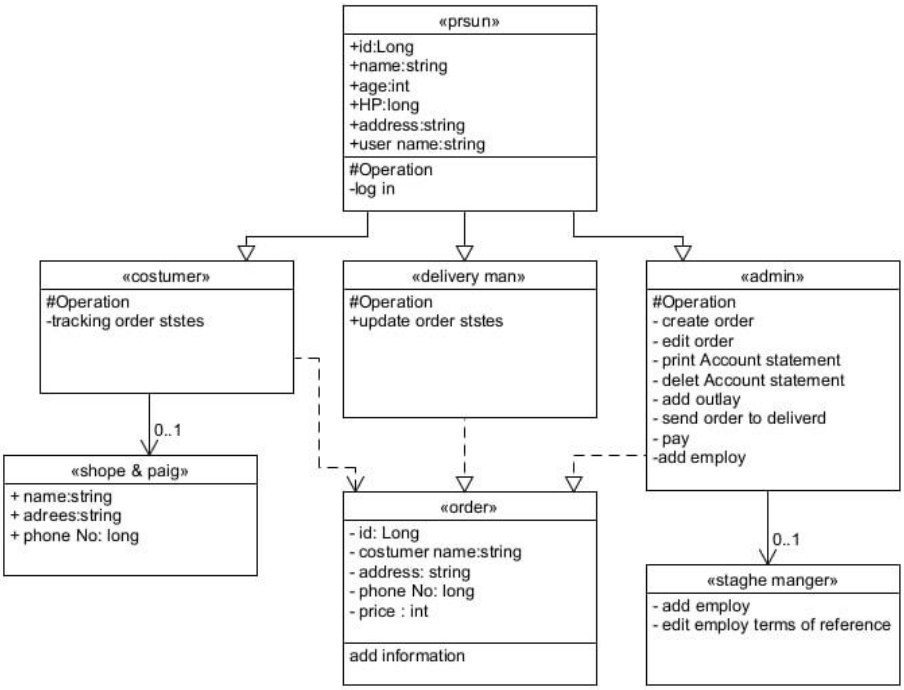
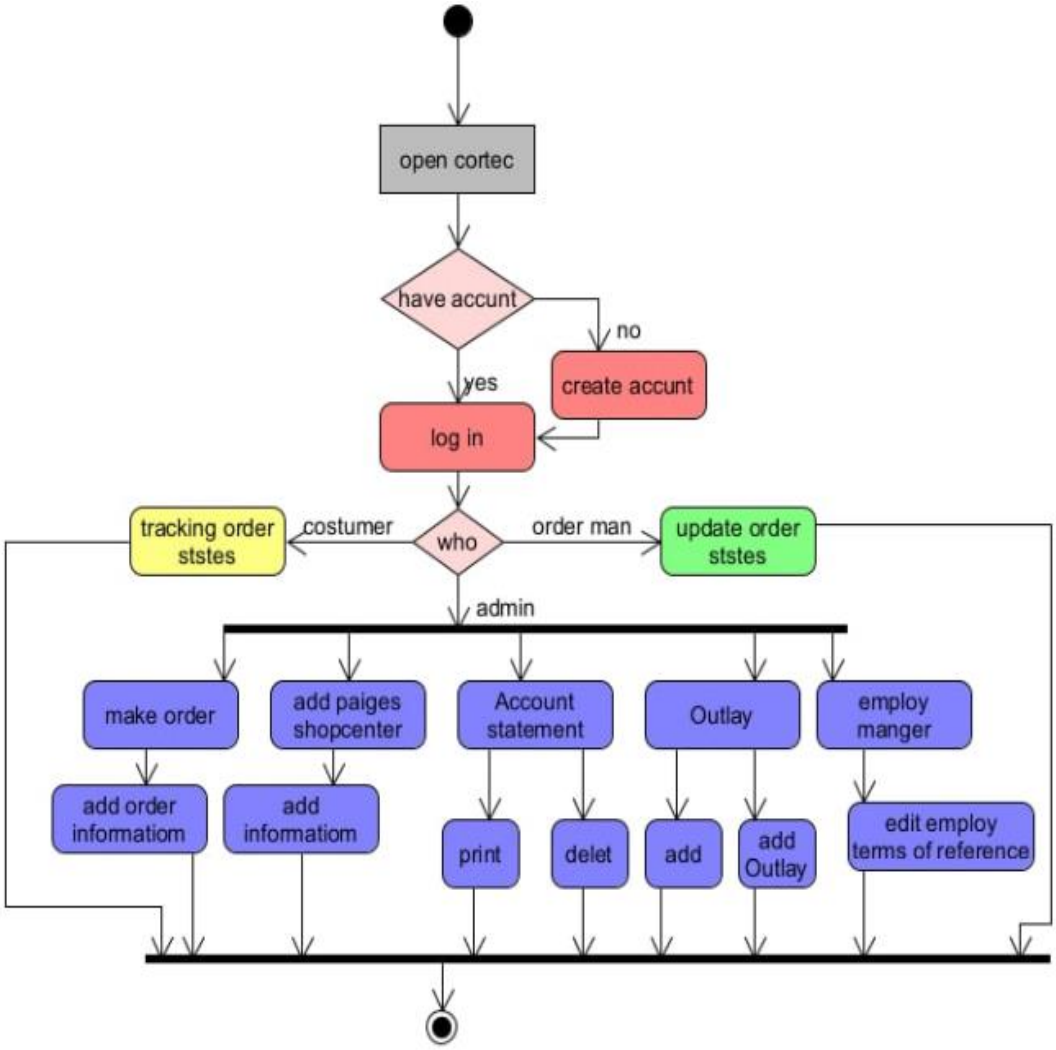
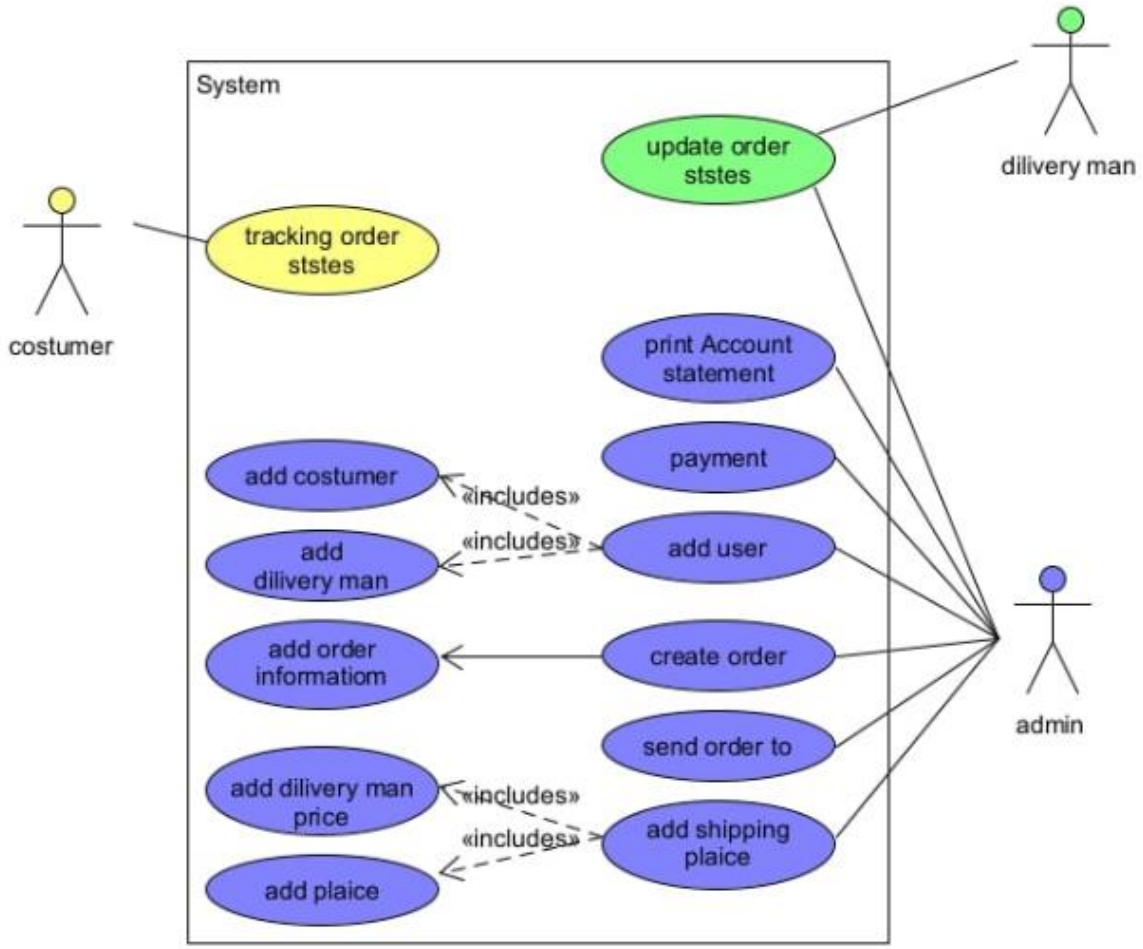


Figure (2.1) activity diagram

2.3. The Data Flow Diagram





Figure(2.2) The Data Flow Diagram

2.4. Delivering service excellence through purpose-led leadership

There are four key elements in Delivering service system:

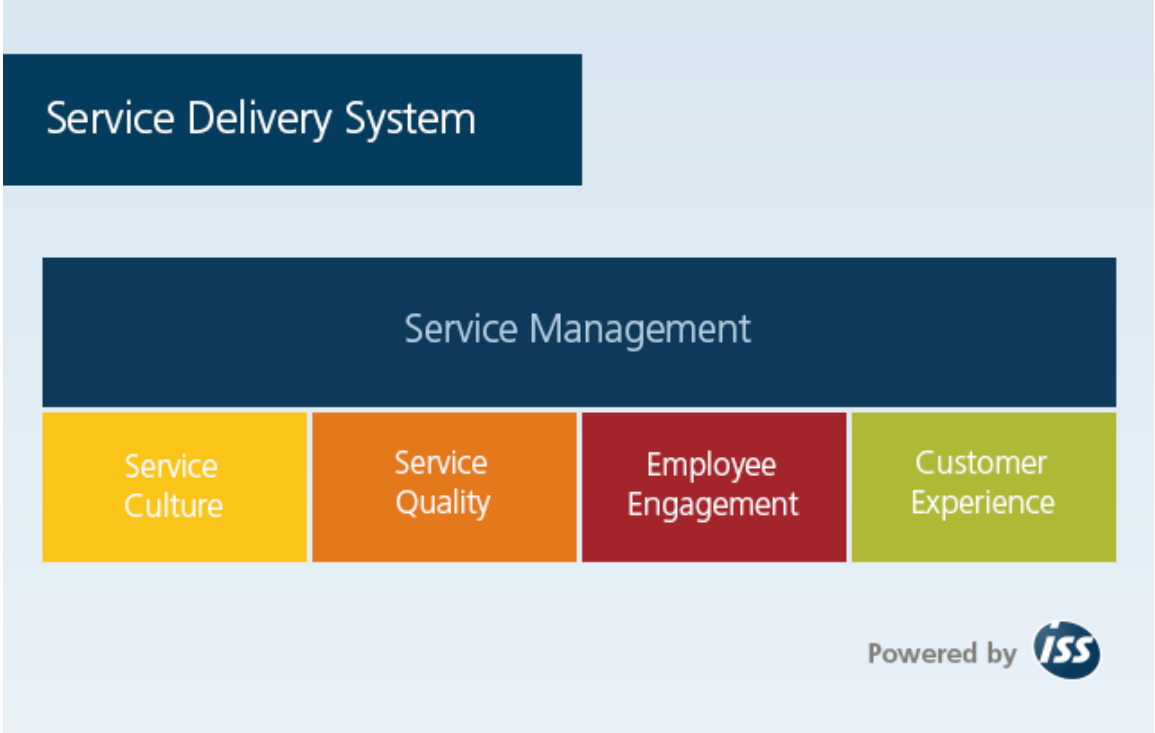
1. Service Culture: is built on elements of leadership principles, norms, work habits and vision, mission and values. Culture is the set of overriding principles according to which management controls, maintains and develops the social process that manifests itself as delivery of service and gives value to customers.

2. Employee Engagement: includes employee attitude activities, purpose driven leadership and HR processes. Even the best designed processes and systems will only be effective if carried out by people with higher

engagement.

3.Service Quality: includes strategies, processes and performance management systems. The strategy and process design is fundamental to the design of the overall services management model.

4.Customer Experience: includes elements of customer intelligence, account management and continuous improvements. Perception is king and constantly evaluating how both customer and end-user perceive service delivery is important for continuous collaboration.



Figure(2.3) service delivery elements.

2.5. The System Architecture

The system architecture is the foundation of the solution and should be presented first. The core components will be indicated, piecing it all together in the overall architecture, with some thoughts about communications, showing the technical integration of the components and added features. Figure (3.3) shows the proposed system architecture.

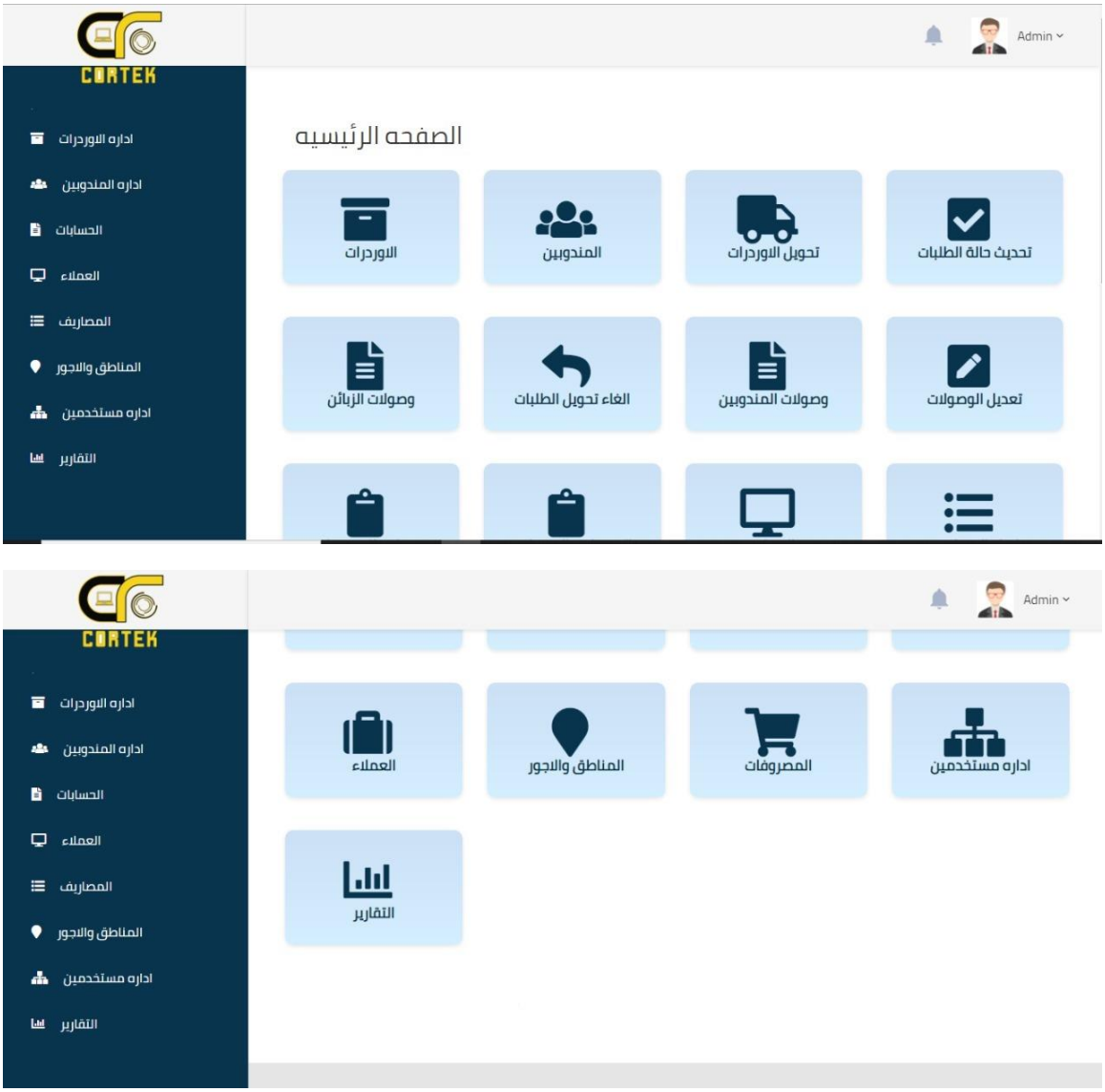


Figure (2.4): The Proposed System Architecture.

Chapter Three

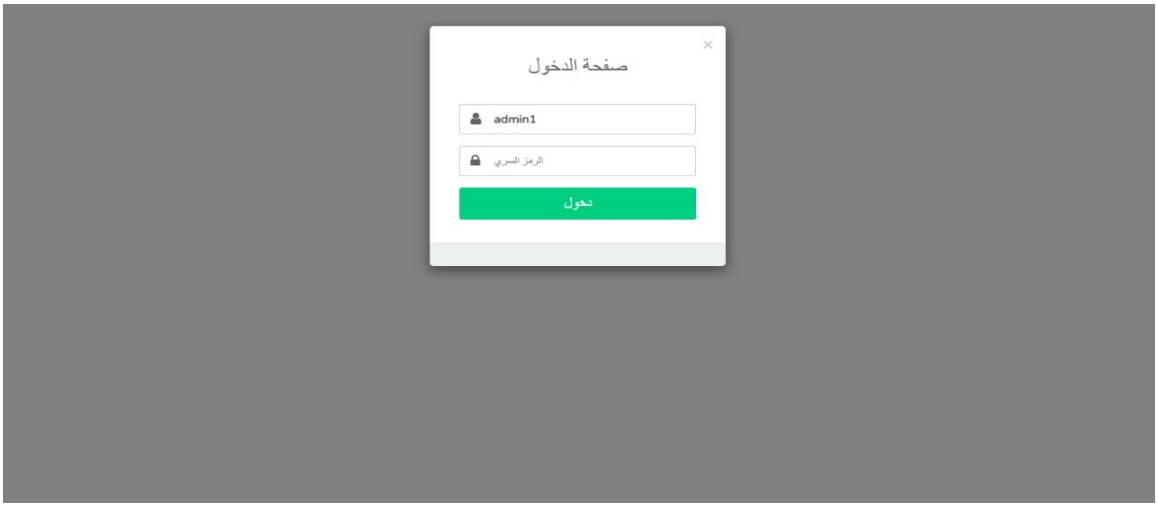
The Implemented System, Tests and results

3.1. Introduction

The aim of this chapter is to describe the implementation of the design system, which was given in details in chapter three. The system requirements and the implementation toolset are discussed also. The **delivery** system is presented and the interaction of user with the implemented system through the demonstration as test are discussed. As section below we discuss the flows of running system.

3.2. The Implemented System

As first, when we open the delivery website, we must enter the user name and password in order for make our system as safety as possible, as shown in figure (3.1).



Figure(3.1) log in website

After we entered to the website the main website will shows that contain all the operations and application of the website, which are: Manage orders, Managing delegates, Accounts, customers, Expenses, areas and fees, User management and Reports. As shown in figure (2.4).

When we pressed on Manage orders and oredrs , several sections will appear, which are: orders, converting orders, Order status update, Cancel transfer orders and Edit Receipts. As shown in figure (3.2)

Figure (3.2) orders management sections

When we pressed on Accounts, aslo several sections will appears, which are: Customer Receipts, Delegates' receipts, Return receipts and Orders and Receipts. As shown in figure (3.3). aslow on customers filed, two sectins are appear which are: customers and pages, as shown in figure (3.3).

Figure (3.3) account sections

When we press Expenses field two sectiona are showes, which are: types of expenses and expenses, as shown in figure (3.4)

Figure (3.4) expenses sections

We can make a lot of operations and prosessing on this website like add new order, as shows in figure (3.5), where we enter several information like prodect name, user name ,user address ,etc. Also we can Sending the orders to the delegate and dividing the orders by regions depending on the delegate, as shown in figure (3.6). also we want to Withdrawing the order from a specific representative, as shown in figure (3.7). we can updete th orders information statuses, as shown in figure (3.8). if any wrong happend of entering order information or any changing happend, we can update and change the order, as shown in figure (3.9-a and b). We can Add a list of delegates, as shown in figure (3.10), we can add new customers, as shown in figure (3.11). if there is new store of the customer is opened, we must add it into our website , so Add stores and beiges belonging to customers webpage will appear, as shown in figure (3.12). we can determine the type of payments and adds new payments, as shown in figure (3.13). the determined the area of order and the fees that should pay with the account of dedicator also can be found in website, as shown in figure (3.14). when we change the stuff of company or add new employees, we must give them the access of the system depending on their jobs, and give them the authorization to enter the system, therefore we must add them with their information the website, as shown in figure (3.15). finally the manager can give the authorization to the website and employees by changing the authentication of the website as shown in figure (3.16).

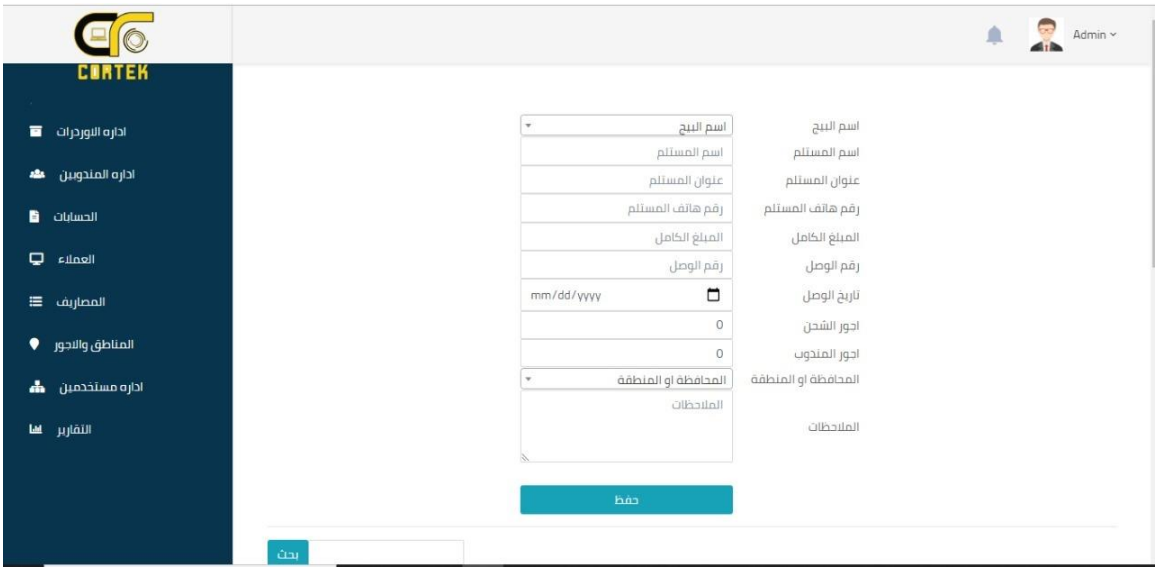


Figure (3.5) add new order

Figure (3.6) Sending the orders to the delegate

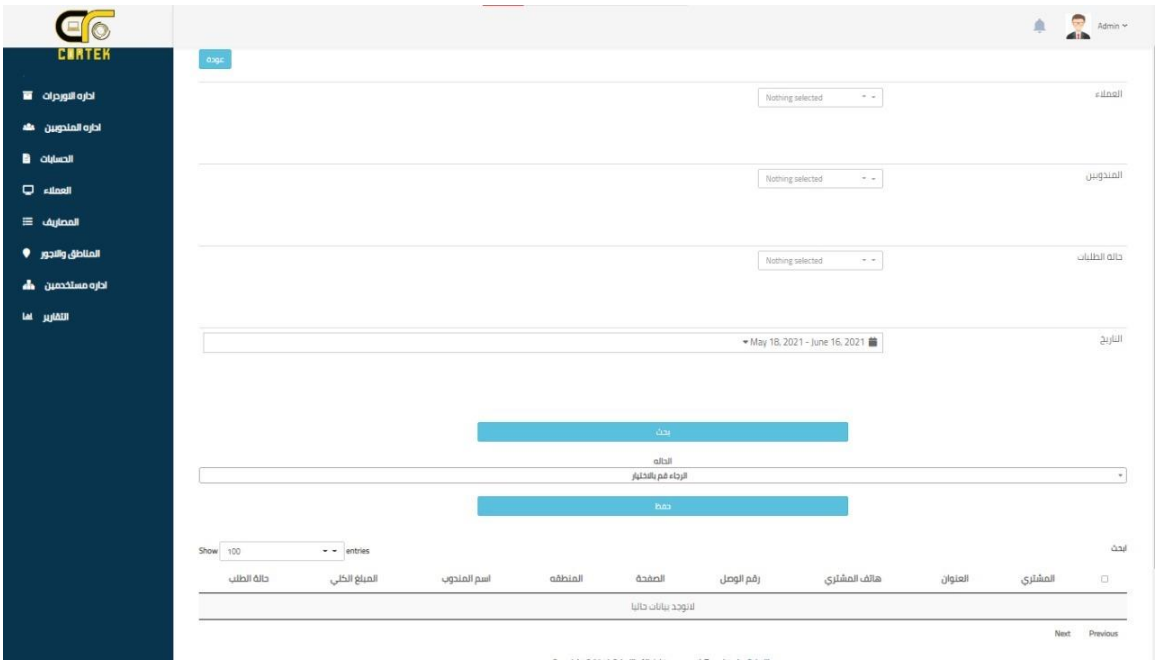


Figure (3.7) Withdrawing the order

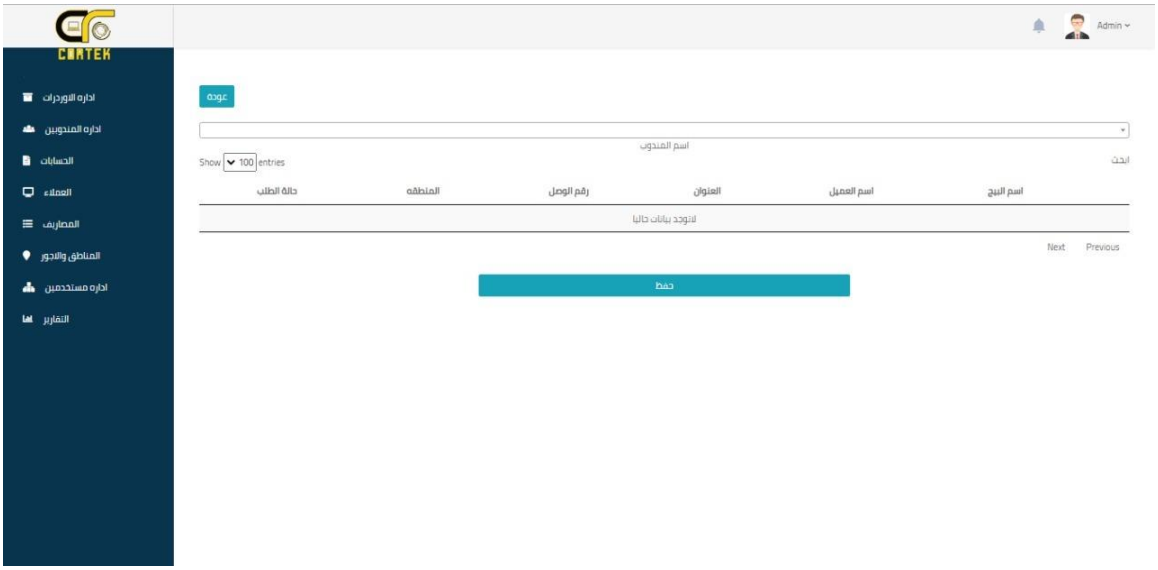


Figure (3.8) orders status updating

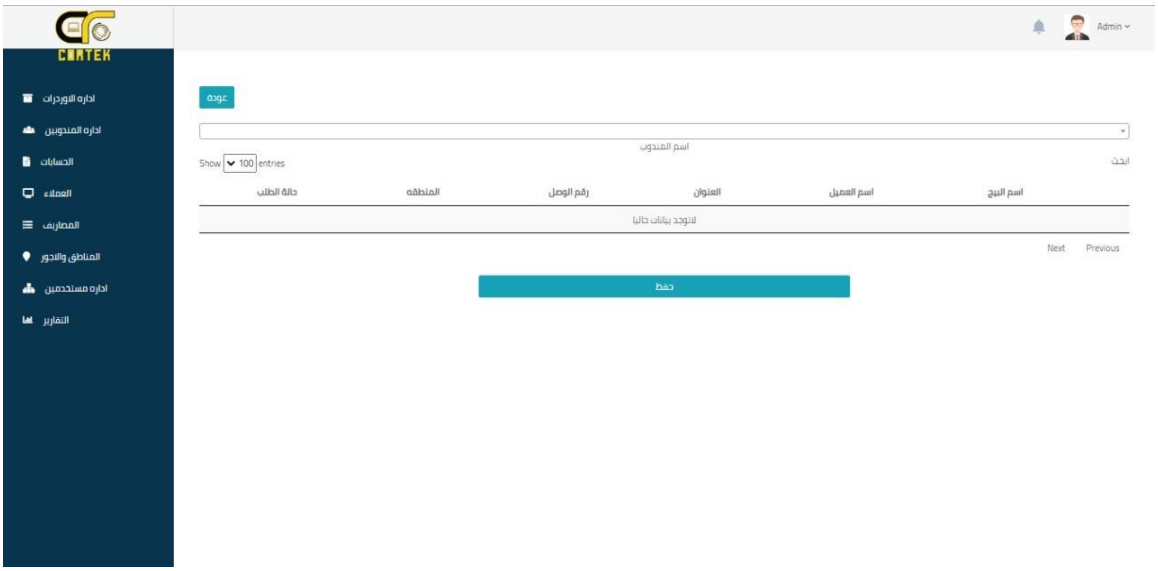


Figure (3.9-a) order information updating

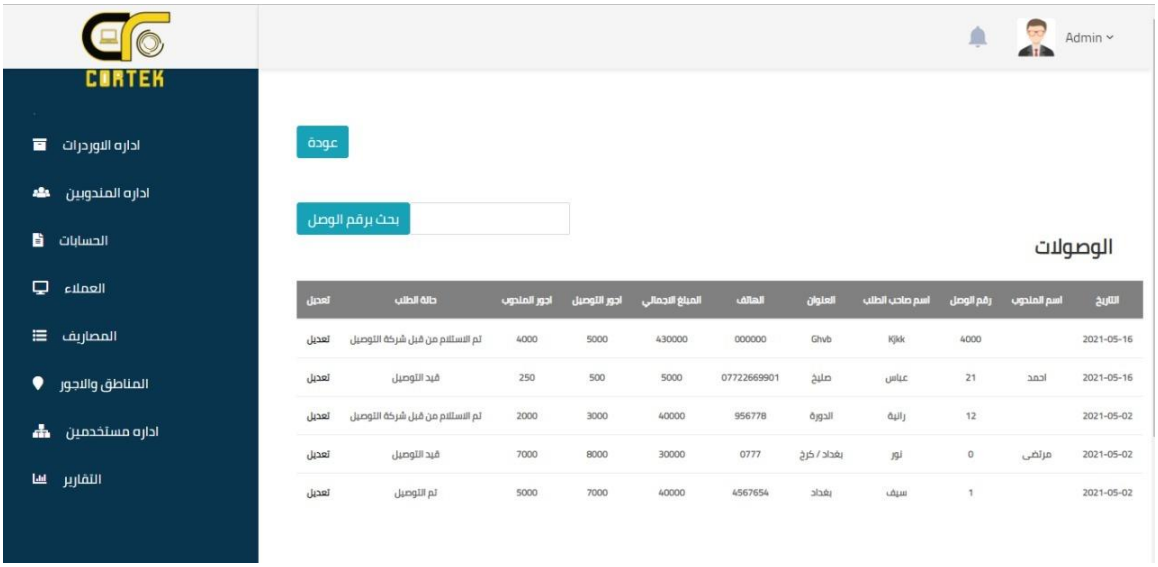


Figure (3.9-b) order information updating complete

Figure (3.10) Add a list of delegates

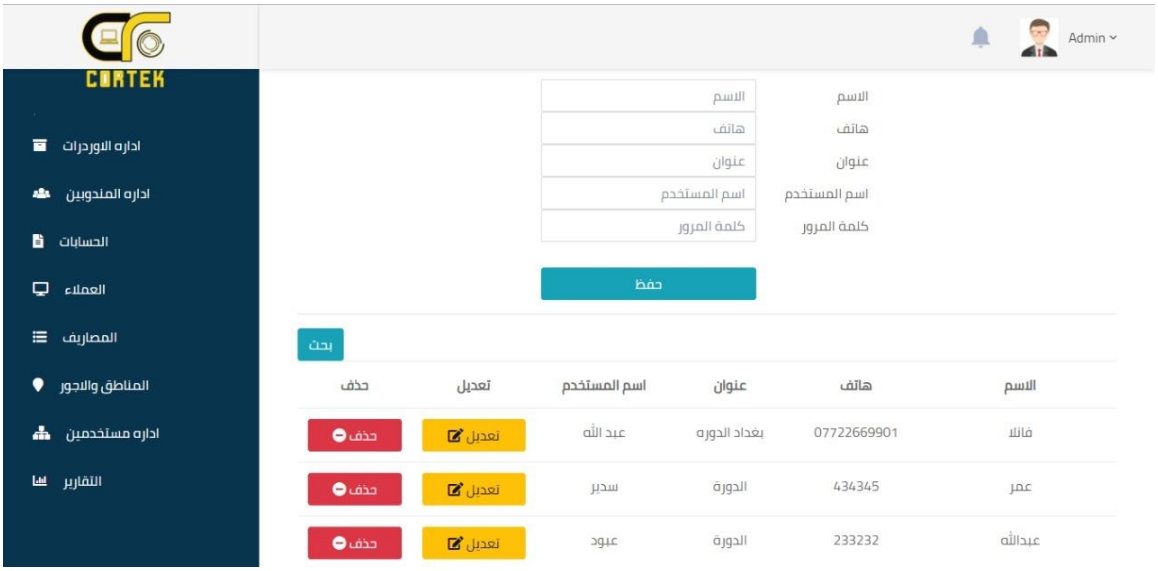


Figure (3.11) add new customer

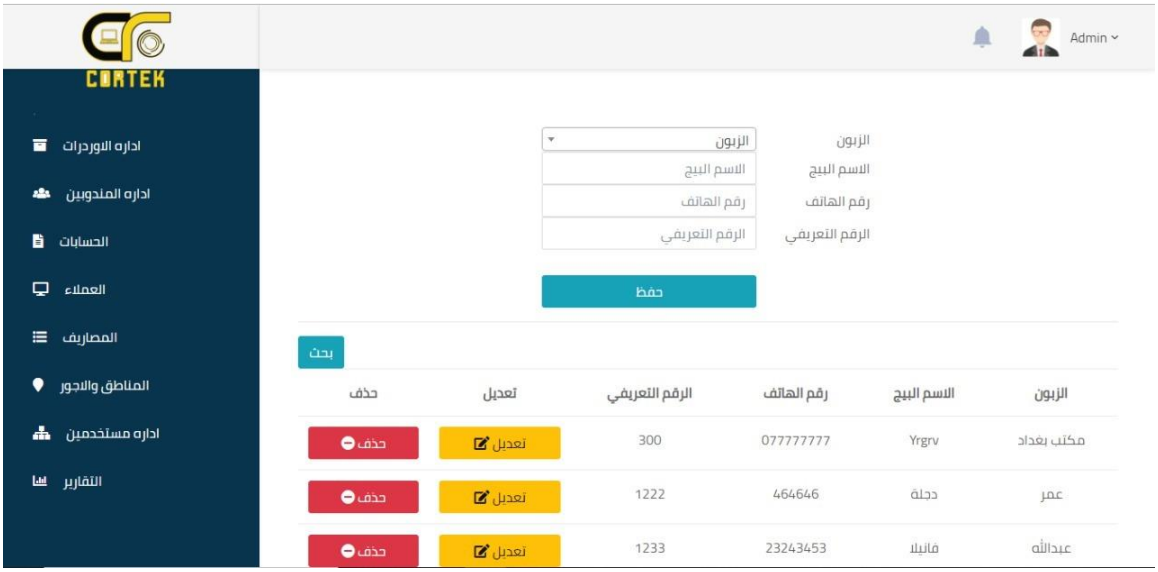


Figure (3.12) Add stores and beiges belonging to customers

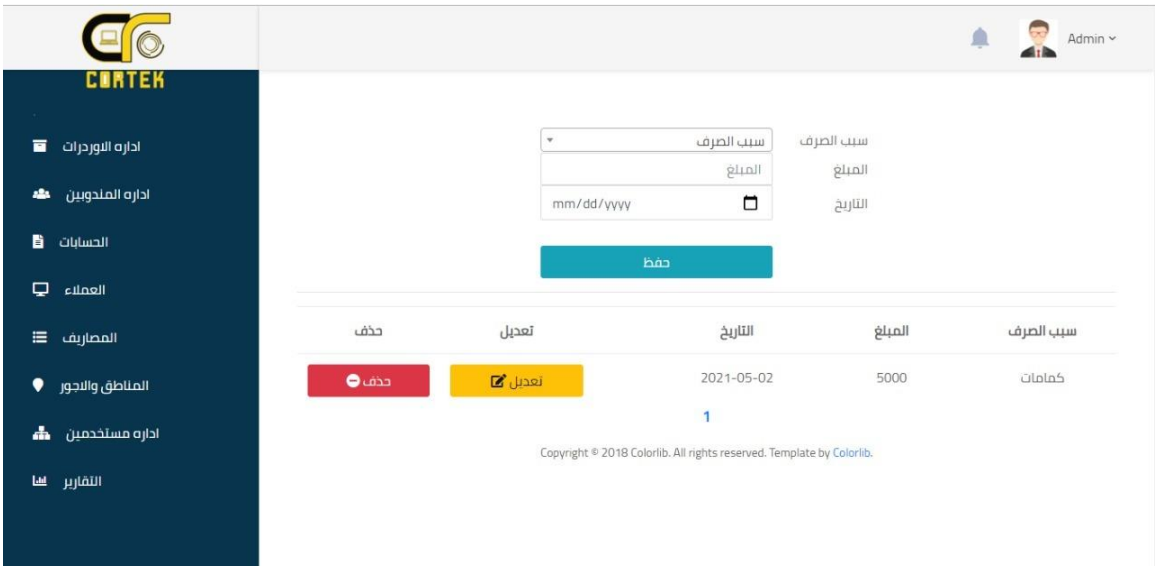


Figure (3.13) type of payments

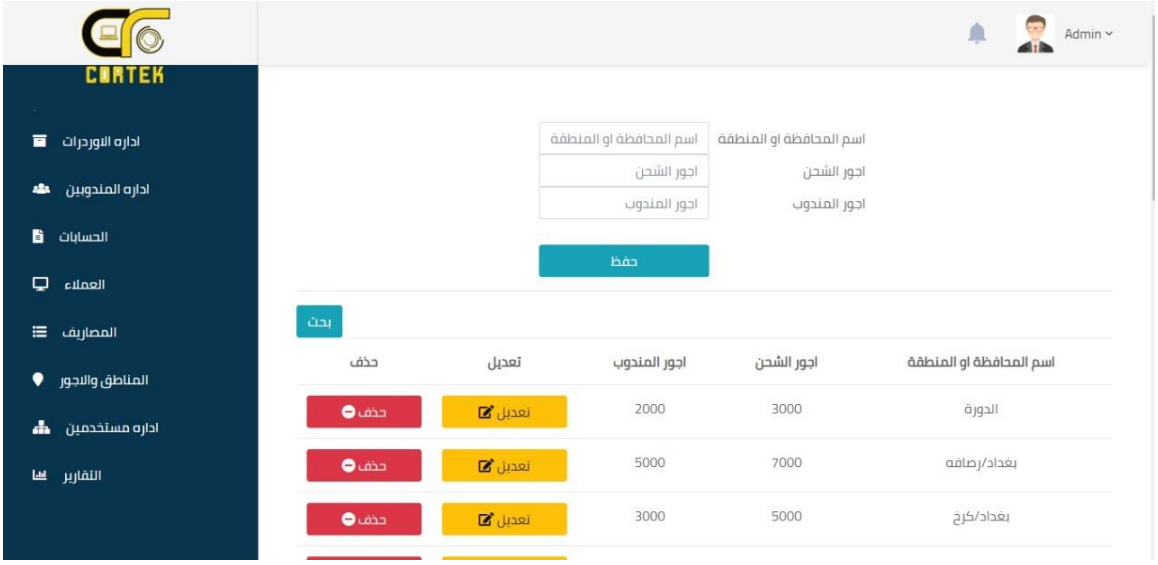


figure (3.14) area and fees webpage

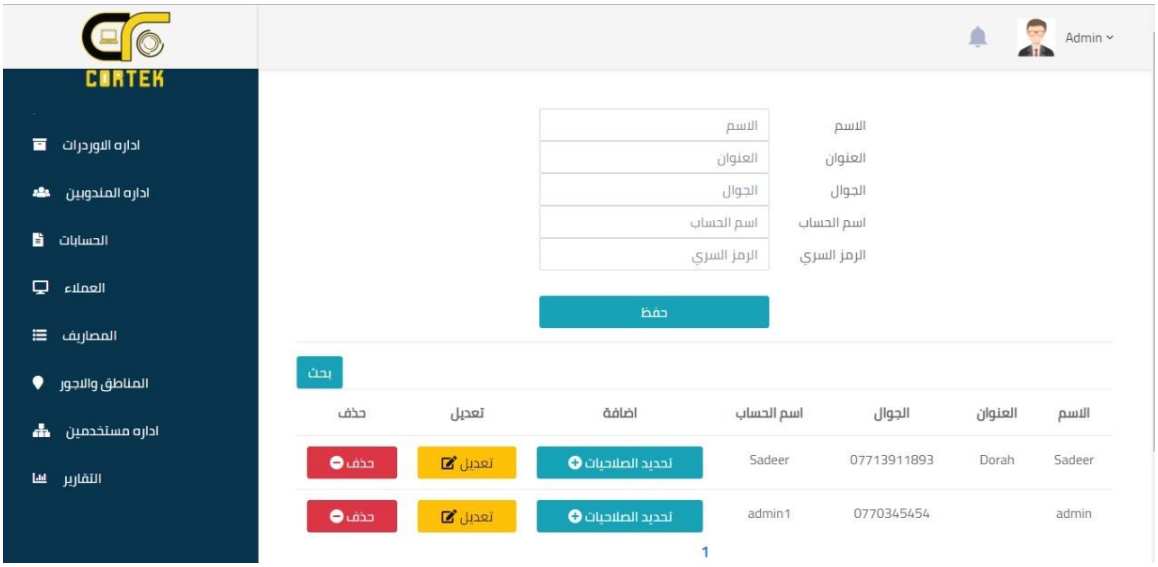


Figure (3.15) employees addition

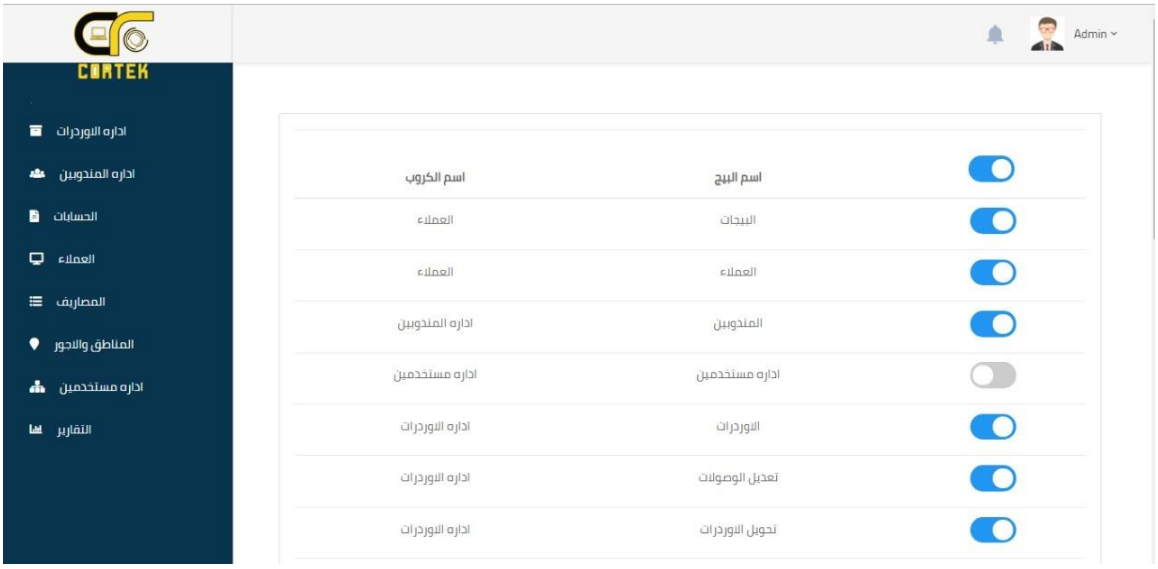


Figure (3.16) authentication of operations

Chapter Four

Conclusions and Future Works

4.1. Conclusions

For this graduation research project (Design and implementation of a delivery company website), many points which are certain significance are drawn and concluded from this work, they are:

The price of the Products, as well as any other sum due to the Company for any reason, is expressed and shall be understood to be net of value added taxes, any additional charges provided for by law, import taxes and charges and any certification. Unless otherwise agreed, payment must be made in advance, by bank transfer, to the current account indicated on the invoice issued by the Company, or in any other manner agreed upon. After the due date has elapsed, interest will be charged at the statutory rate in force, with no need for the debtor to be in default. In the event that the Customer fails to pay in accordance with the Contract in addition to the other remedies, the Company may require payment in advance for all future orders and shipments, with the right to suspend the supply of the Products.

For the 2 (two) years following the date of delivery ("Warranty Period") the Company warrants that the Products: a. shall be free from defects in design and manufacture such as to render them unfit for their intended purpose; b. meet the standards of the place of manufacture of the Products and the requirements of the certifications that from time to time accompany the Products.

The issuance of the order implies the acceptance of these General Conditions by the Customer, which the latter declares to know and accept in every part. The Company will send the Customer an order confirmation, in the absence of which the Contract shall not be deemed to have been concluded. The Contract shall be governed exclusively on the basis of the

content of these General Conditions and the order confirmation. The Contract prevails over any other provision coming unilaterally from the Customer, over any general conditions of the same, and replaces any previous provision, agreement or commitment, formulated both in written and oral form, relating to the supply of the Products.

During the Warranty Period the Customer shall, under penalty of forfeiture, within eight (8) days after discovery of the defect, notify the Company in writing of the existence of defective 2 Products (hereinafter "Non-Conforming Products") and provide a written description of the reasons or cause of non-conformity of the Products. During the Warranty Period, in the event of non-conformity of the Products confirmed by the Company. The Client shall not be entitled to claim any compensation or other remedies from the Company other than those listed above, nor shall the Client be entitled to any remedy after the end of the Warranty Period.

4.2. Suggestions for Future Works

Although at 83%, overall satisfaction with online shopping is high, satisfaction levels drop to less than 50% when customers are faced with today's delivery options. Whether it's delivery date flexibility, the freedom to choose a specified time, the option to reroute packages, or whether there's a green shipping option or not, they're all getting in the way of a seamless digital shopping experience.

Knowing it's an open battlefield ready for the taking, large corporations have taken steps to make their mark and small yet very exciting companies are taking matters into their own hands. We run through the innovations you should know about when it comes to understanding the future of delivery.

The designed and implemented system presents many fruitful lines of continued graduation research, and opens the door to a range if future work, as listed in the following:

The fastest delivery time stands at just a few minutes. With a business model that revolves around giving the customer complete control over every aspect of their delivery, also we suggest offers the opportunity to send and receive packages locally within 90 minutes or to choose a convenient 1hour time slot. Having recently conducted a survey that said 91% of people valued delivery options that provide a timeslot so that they don't have to wait all day.

We suggest offering people the choice to receive their deliveries at a time that's convenient for them, they have physical stores in locations near railway stations and workplaces. Integrating push notifications when your parcel has arrived, as well as in store barcode scanning for speedy service.

We suggest of adding an algorithm for finding the shortest path to the dedicator in order to deliver the order as fast as possible also we suggest of sending email to the customer that shows the path of the dedicator

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المستخلص

نظام التسليم هو حل إدارة ميداني شامل ومخصص بالكامل لإدارة موارد الأعمال. يمكن للشركات تحسين خدمة التوصيل من خلال المسارات المُحسَّنة والتتبع في الوقت الفعلي. لا يقتصر الأمر على تبسيط جميع عمليات عملك فحسب ، بل إنه يوفر الوقت والتكلفة من خلال نظام الإرسال الذكي الخاص به. إنه يوفر تطبيق وكيل ولوحة تحكم للمدير مع ميزات مثل الإشعارات والتنبيهات ومسح الباركود والتقارير المدعومة من Geo-analytics ، إلخ.

يجب أن تكون إدارة شركة خدمات ناجحة مرادفًا لتقديم خدمة متميزة. إذا لم يكن الأمر كذلك ، فلماذا تفكر في إدارة أعمال الخدمات على الإطلاق؟ ومع ذلك ، إذا كانت جميع الشركات التي تقدم الخدمات تتنافس بشكل فعال على تقديم الخدمة ، فإن الفارق الرئيسي يكمن في نموذج إدارة الخدمة والقدرة على تنفيذه. يجب أن يركز تصميم نظام تقديم الخدمة على ما يخلق قيمة للمنظمات الأساسية وكيفية إشراك موظفي الخطوط الأمامية لتقديم تجربة العملاء النهائية.

هل سئمت من قضاء ساعات في محاولة تحديد طرق التوصيل الفوضوية بنفسك؟ يمكن أن يساعدك برنامجنا في إدارة عمليات التسليم الخاصة بك سواء كنت تقوم بنقل الطرود أو المنتجات الطازجة أو الأثاث. يساعدك برنامج روتيفيك على التسليم بشكل أسرع وفي الموعد المحدد ، وتتبع برامج التشغيل ، وخفض التكلفة لكل توصيل. سواء كان أسطول التسليم الخاص بك يحتوي على مركبة واحدة أو 25 مركبة ، فإن روتيفيك يتيح لك تخطيط الطرق المحسنة وإرسالها وتتبعها في دقائق.

المنتجات الجديدة ليست في الحقيقة المكان الأول للبدء بأنظمة التسليم. بدءا بالحفاظ على العلامات التجارية الراسخة صحية ومتنامية. . . لأن هذا هو حقًا مفتاح الربحية الإجمالية. . . . تتمتع العلامات التجارية الجديدة تمامًا بأقل احتمالات النجاح وهي أقل وسائل الابتكار شيوعًا لأنظمة التوصيل. سواء كانت هذه الأنظمة تقدم النكهة أو اللون أو الفوائد الغذائية أو خصائص الملمس أو الراحة أو وظيفة أخرى أو سمة صحية ، فإن المفتاح هو أنها تضيف قيمة لنوع القيمة التي يمكن أن تعزز المنتجات الحالية ونوع القيمة التي تشير في الملاحظات. تساعد هذه الأنواع من المكونات في توصيل الرسالة الصحيحة.

Chapter One

An Overview

Chapter Two

The System Design

Chapter Three

The Implemented System, Tests and Results

Chapter Four

Conclusions and Future Works

Republic of Iraq
Ministry of Higher Education and Scientific Research
Dijlah University College
Department of Computer Science

DESIGN AND ANALYSIS OF JOB PORTAL

DUC-CS:2021.01

A Graduation Project Submitted to the Department of Computer Science / Dijlah University College as a Partial Fulfilment of the Requirement of the BSc. Degree in Computer Science

By

Abdul Qadir W. Hussein

Abdul-Muhamin A. Rashid

Abdul Aziz H. Saloum

Zainab H. Mahmoud

Supervised By Wissam R. Ahmed

June, 2021 – Baghdad

Dedicate

We dedicate this work to my supervisor and All my teachers in Dijla university first and then to my family, friends for their continuous encouragement and motivation to perform all necessary endeavors for the achievement of my goals. This would not have been possible without their unconditional love and support.

Supervisor's Certification

I certify that the preparation of this graduation research project titled "DESIGN AND ANALYSIS JOB PORTAL / Department of Computer Science / Dijlah University College in partial fulfillment of the requirements for the degree of BSc. In Computer Science.

Signature:

Name: e-Mail:

Affiliation: *Dijlah University College / Department of Computer Science*
Date: / / 2021

Abstract

The purpose of this project is to design a Web Site that helps c, companies s, employers, and staff to interact seamlessly in a single place. All these entities are dependent on each other so that they can grow individually or collectively. Companies need staff so that they have people to employed; similarly, companies need talent so that they can produce and upgrade products, and at the same time staff needs this company to gather knowledge and increasing Of experience and then showcase their talent through they hired.

Today the world connects with using the Internet, which has changed the way we communicate and is a technology, which is evolving day by day. Today the Iraq States has thousands of companies in which there are hundreds of thousands of employees enrolled and there are very few means of communication through which these organizations can interact with each other and exchange useful knowledge. So, this Web Site provides organizations with various useful communication tools which can successfully remove barricades to going to different places for information and provide a single stop solution for many needs regarding future events, employment opportunities and much more. So, this project is going to serve the needs of all governorates of Iraq with all the tools it provides to bring them to the same Web Site.

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An Overview

Chapter One An Overview

1.1. Introduction

Technology is constantly changing, Society, as we know, depends on this fact. That which we take for granted today would have been the stuff of science fiction as little as fifty years ago. In the early years of the twentyfirst century, it is computers and the Internet that have captured the public imagination and found their way into not just the working environments but increasingly into the domestic spaces. In this modern society, if we are not capable to cope up with these changes than we are not going to stand or survive anywhere in this technical world. Today there is no place for errors, to make a system more effective and efficient we need such technology where error-prone chances must be least. In the scenario of this project, we are required to develop a web-based application on the Job Portal Management System. In this time of recession where everyone, is either experienced or fresher, is in search of a job. This job portal can prove to be very helpful since it allows users of different profile to upload their CVs, search job based on their qualification. Every user can access user-id and apply for multiple jobs at a time. Viewing available jobs or applying for the job at the company can be done for which job seekers have to go to the company and check the available jobs at the company. Job seekers check the list of jobs available and apply for the job. Then the company will show available jobs for the job seeker for his qualifications and then updates the jobs database. The developed Job Portal management system is web-based which Requires Employee Registration & Profiles, Job Search, Employer Registration and amp; Profiles, and Subscription Option for both Employee and Employer etc. An employer can add Own Profile and post jobs and Job Seeker can Search Jobs based on Geographical Area (Country, and City), Qualification, and Company wise or based on Experience and Expertise wise. Today's world is a global village, with more people to people interaction, on the scale never seen before, and the main factor, which contributes to this is the World Wide Web or Internet. Through it, we can easily communicate with people, wherever they might like. Chat, email, websites, video conferencing are some of the gifts which the Internet provides to this world.

The main objective of the project is to come up with an application, which can empower companies, employers, and users to interact smoothly with each other through various tools, which this application provides. These tools will be frequently useful to most families. There are many websites, which shares information about companies and employers individually,

but they do not bring these institutions together. A user must go to different websites to get different knowledge in respect to these institutions and that too without any useful tools in those websites. So, keeping in mind that this project contributed towards developing a web-based dynamic application, which can provide information about the subject matter in an efficient way and at the same time bring these institutions together at a common platform. There are various levels through which students move in their career. At the very beginning of a career, they must attend schools or universities to gain the necessary knowledge to be successful in a field. Once he/ she has that knowledge which is gained over years of studies and is finally ready to be employed, then he/she interacts with different companies, in order to secure work in the corporate world. This application helps students in that it provides them with the option to interact with career opportunities at the same place and with tools, which can make him successful in his life.

1.2. The Aim

The objective of the application is to design a Web Site which job applicants' and recruiters can communicate with each other. An Online Job Portal is an application where the job seekers can register themselves at the website and search for jobs that are suitable for them whereas the employers register with the website and put up jobs that are vacant at their company. The Online Job Portal System is a package to be used by agencies to improve the efficiency of a business. The Web Site provides jobs catalogue and information to members and helps them decide on the jobs to apply for. The Admin and employers can keep the jobs catalogue updated all the time so that the Job seekers get updated information all the time.

1.3. Statement of Problem

Applicants were required to search through print and visual media for opportunities, most times these jobs were limited to the applicant's location, Application was submitted using the conventional methods which weren't effective and efficient based on loss of document during transits and many more. The old system approach was tedious and requires much effort and resources, most times Employers need to advertise the vacancies and sort all applicants' details, conduct selections procedures based on qualifications.

1.4. Possible Solutions

The purpose of the study is to solve and develop an online Job Portal where applicants easily find jobs and employer can find suitable candidates for the jobs.

1.5. Scope of the Study

The researcher is concerned with an Online Job Portal, Scopes for the system are as follows:

1- Maintain Job Seeker and Employer records.

2- Maintain uploaded Resumes.

3- Provide Customized Job Postings.

4- Maintain Job Posting details and generate various reports.

1.6. The Scientific Contribution

The project focus is on the design and implementation of Web Site include service both users and companies using a web-based application with the ASP.Net, SQL database and visual basic as the language for programming. One of the important advantages of webbased applications is the programmer does not have to think about building a client for these applications since these applications run on web browsers and are not dependent on the native computer configuration. The application is such that it's very easy to navigate and the user does must think much how to use it. Also, it's a fee less application where you don't have to pay for taking benefit of this application. At the same time tools as a job, event, and news can help prospective employers and employees, companies and users become closer. Job portal is a tool through which students can create their profiles, search, and apply for jobs at the same platform, whereas employers can create their profiles and job. At the same time, an event tool can help companies and Employers to create a different kind of events and invite people to these events, which can create awareness among the masses about any topic. So, this website along with its powerful tools can be accessed anywhere on the web using any client or device.

1.7. The Job Portal Outline

The rest of this graduation research project (job portal) is composed of three major parts, the importing of necessary theoretical background, the developing of concepts and

techniques (where the majority of the work has been done), and at least the conclusions and recommendations for the feature works. The general roadmap for the graduation research project is organized as follows:

- **Chapter 1:** Introduction to the graduation research project (job portal) is highlighted in the beginning of this chapter and it ends with the scientific contribution.
- **Chapter 2:** This chapter tells about the technologies used to develop the software and briefly discusses were the supporting software, tools and integrated development environments (IDE).
- **Chapter 3:** In this chapter, the proposed system is designed to achieve its goal.
- **Chapter 4:** Introduces the implementation of the designed system. Which is given in details in chapter three.
- **Chapter 5:** Presents some conclusions, some limitations and recommendations for future works that can improve and augment this graduation research project.

Chapter Two

Technologies

2.1. Introduction

T discusses were the supporting software, tools and integrated development his chapter tells about the technologies used to develop the software and briefly environments (IDE), which is used to accomplish the thesis. Technologies play an important role in developing any application so one should be careful in choosing the best technology available which can meet the requirements of the application. Following are the technologies used in the thesis:

2.2. .NET FRAMEWORK

The .NET Framework is a software framework that runs primarily on Microsoft Windows. It includes a large library and supports several programming languages, which allow language interoperability (each language can use code written in other languages). The .NET library is available to all the programming languages that .NET supports [2]. The .NET Framework is designed to fulfill the following objectives:

- To provide a consistent object-oriented programming environment whether object code is stored and executed locally, executed locally but Internet-distributed, or executed remotely [3].
- To provide a code-execution environment that minimizes software deployment and versioning conflicts [3].
- To provide a code-execution environment that promotes safe execution of code, including code created by an unknown or semi-trusted third party [3].
- To provide a code-execution environment that eliminates the performance problems of scripted or interpreted environments [3].

The .NET Framework has two main components:

1- CLR: The Common Language Runtime is the foundation of the .NET Framework. It is the execution engine of the framework. It provides core services such as memory management, thread management, and remoting, while also enforcing

strict type safety and other forms of code accuracy that promote security and robustness. In fact, the concept of code management is a fundamental principle of the runtime. Code that targets the runtime is known as managed code, while code that does not target the runtime is known as unmanaged code (See Figure 2.1 [4]).

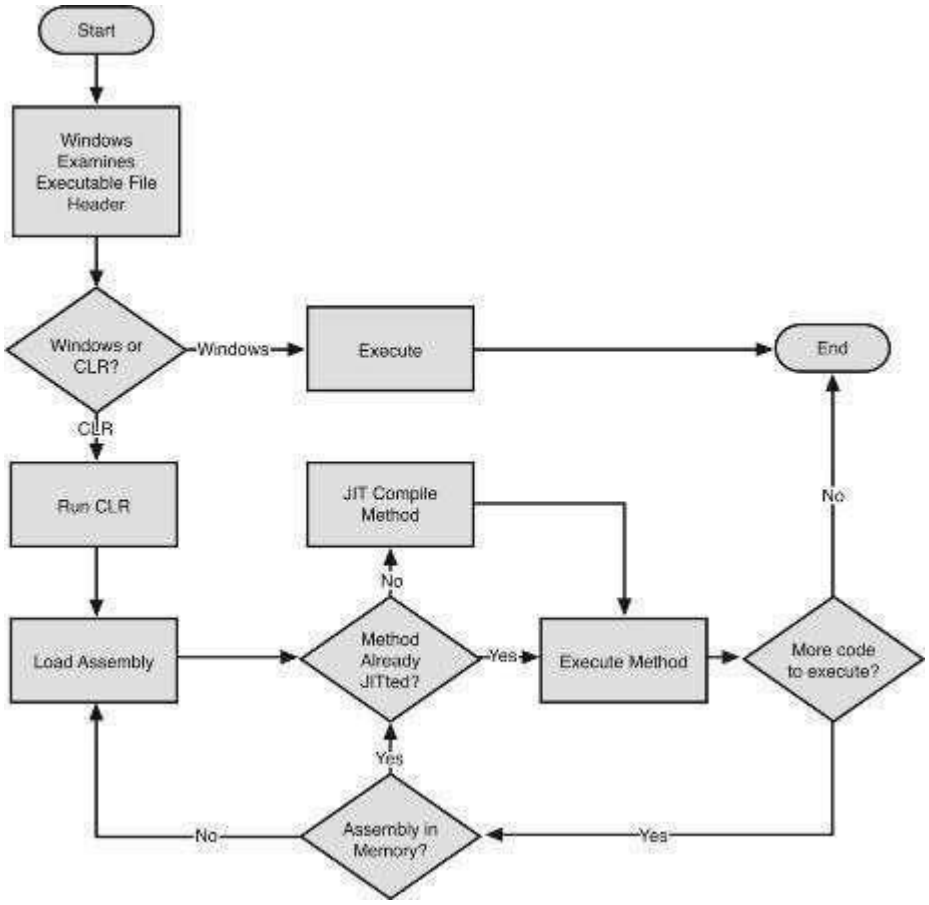


Figure 2.1. CLR Execution process. Source: Wiki Answers. What are the advantages and disadvantages of aspnet? n.d. http://wiki.answers.com/Q/What_are_the_advantages_and_disadvantages_of_ asp net.

2- .Net Framework Class Library: It is a comprehensive, object-oriented collection of reusable types that you can use to develop applications ranging from traditional command-line or graphical user interface (GUI) applications to applications based on the latest innovations provided by ASP.NET, such as Web Forms and XML Web services [3].

The following Figure 2.2 [3], and Figure 2.3 [5] shows the relationship between CLR and the Base Class Library and to the overall system.

2.3. VISUAL STUDIO 2010

Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It can be used to develop console and graphical user interface applications along with windows form applications, web sites, web applications and web services [6].

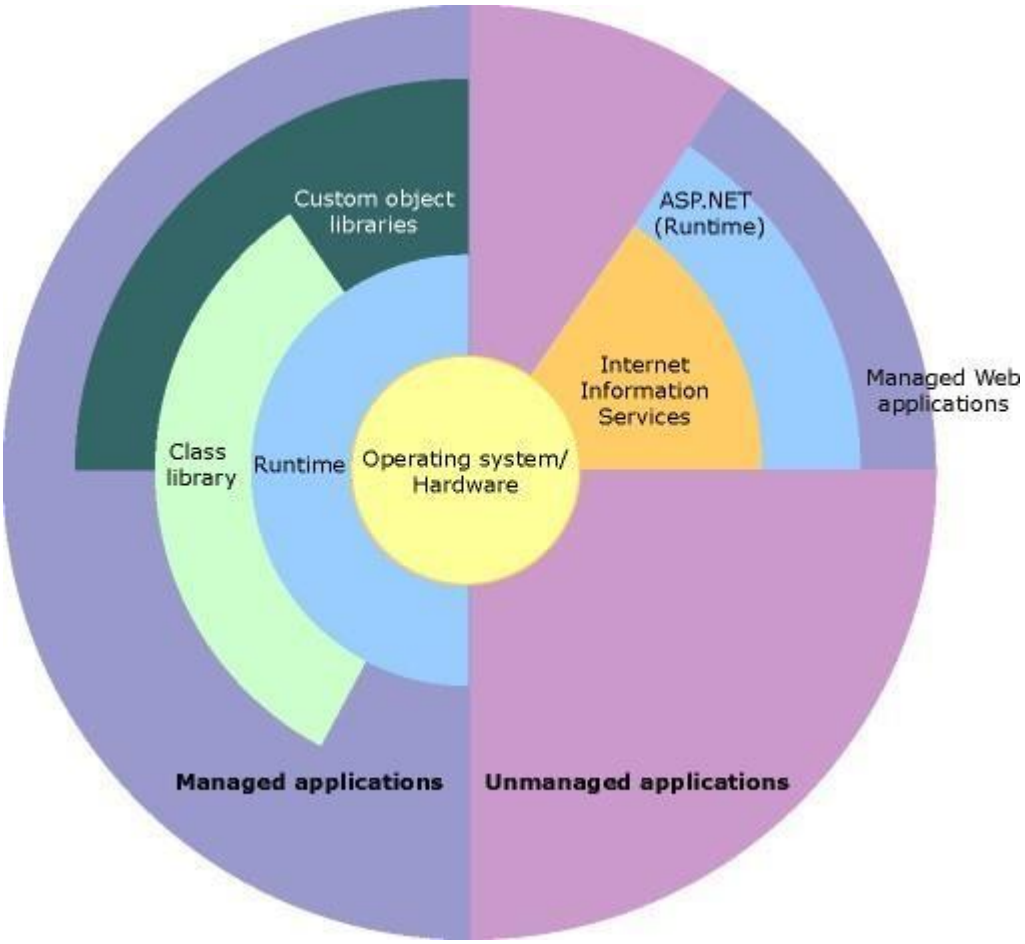


Figure 2.2. .NET Framework in context. Source: Microsoft. Overview of the .NET Framework, n.d. http://msdn.microsoft.com/en-us/library/ zw4w595w.aspx.

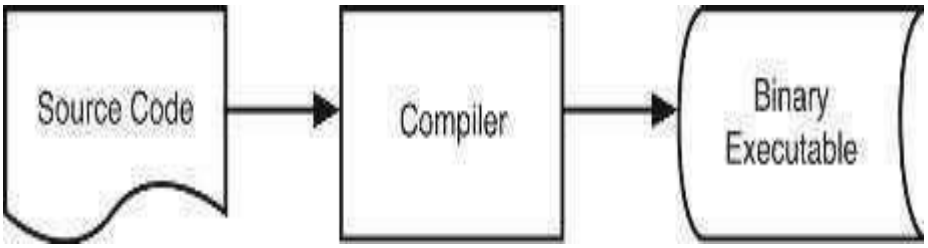


Figure 2.3. Traditional Compilation in .Net. Source: Code Magazine. Introducing the .NET Platform, n.d. http://www.codemagazine.com/Article.aspx?quickid=080093.

Visual Studio includes a code editor supporting IntelliSense as well as code refactoring. The integrated debugger works both as a source-level debugger and a machine-level debugger. Other built in tools include a forms designer for building GUI applications, web designer, class designer, and database schema designer. Also, visual studio supports different languages like C, C++, C#, VB.NET, Python, Ruby, XML/XSLT, HTML/XHTML, JavaScript, and CSS. Some of the features of the Visual Studio are [6]:

- Code Editor: Visual Studio includes a code editor, which supports highlighting of syntax and code completion using IntelliSense for variables, functions, methods, loops, and queries. It also supports setting bookmarks in code for quick navigation [6].
- Debugger: It allows setting up the breakpoints, which allow execution of program to be stopped temporarily at a certain position and monitor the values of variables as the execution progresses. It works both as a source level debugger and a machine level debugger [6].
- Designer: Some of the designer tools that are included in visual studio are WPF Designer, Windows Form Designer, Web Designer, Class Designer, Data designer, Mapping Designer [6].
- Extensibility: It also allows add extensions to itself to extend its functionality and capability. The extensions can be in the form of macros, add-ins and packages [6].

2.4. ASP.NET

It's a web application framework for building, deploying and running, dynamic and interactive web sites, web applications, and web services. It is a new technology built for sever side scripting. It is built on CLR allowing programmers to write ASP.NET code using any .NET supported language. The latest version of ASP.NET framework also supports processing of SOAP messages.

Some of the advantages of ASP.NET are:

- ASP.NET drastically reduces the amount of code required to build large applications [7].
- ASP.NET makes development simpler and easier to maintain with an event- driven, server-side programming model [7].
- ASP.NET pages are easy to write and maintain because the source code and HTML are together [7].
- The source code is executed on the server. The pages have lots of power and flexibility by this approach [7].
- The source code is compiled the first time the page is requested. Execution is fast as the Web Server compiles the page the first time it is requested. The server saves the compiled version of the page for use next time the page is requested [7].
- The HTML produced by the ASP.NET page is sent back to the browser. The application source code you write is not sent and is not easily stolen [7].
- ASP.NET makes for easy deployment. There is no need to register components because the configuration information is built-in [7].
- The Web server continuously monitors the pages, components and applications running on it. If it notices memory leaks, infinite loops, other illegal software or activities, it seamlessly kills those activities and restarts itself [7].
- ASP.NET validates information (validation controls) entered by the user without writing a single line of code [7].

- ASP.NET easily works with ADO .NET using data binding and page formatting features [7].
- ASP.NET applications run faster and counter large volumes of users without performance problems [7].

Some of its disadvantages are:

- Does not allow for easy unit tests – the framework tends not to support automatic unit testing with tools like NUnit very well, which makes test-driven development difficult [8].
- View state – often times view state can get really large or have negative effects on performance. This is especially true for some of the more complex server controls [8].
- Abstracts the webiness away from web programming [8].

2.5. Microsoft Visual Basic

Microsoft Visual Basic 2010 is an important upgrade and enhancement of the popular Visual Basic programming language and compiler, a technology that enjoys an installed base of millions of programmers worldwide. Visual Basic 2010 is not a stand-alone product but a key component of Microsoft Visual Studio 2010—a comprehensive development system that allows you to create powerful applications for Windows, the Web, handheld devices, and a host of other environments [9].

The latest features of Visual Basic will increase your productivity and programming prowess, especially if you enjoy using and integrating information from databases, entertainment media, Web pages, and Web sites. In addition, an important benefit of learning Visual Basic and the Visual Studio Integrated Development Environment (IDE) is that you can use many of the same tools to write programs for Microsoft Visual C++ 2010, Microsoft Visual C# 2010, Microsoft Visual Web Developer 2010, and other popular products[10].

2.6. SQL SERVER

Microsoft SQL Server is a RDBMS, which is designed to run on platforms ranging from laptops to large multiprocessor servers. SQL Server is commonly used as the backend system for websites and corporate CRMs and can support thousands of concurrent users.

SQL Server comes with a few tools to help you with your database administration and programming tasks [11]. SQL Server is much more robust and scalable than a desktop database management system such as Microsoft Access. Anyone who has ever tried using Access as a backend to a website will probably be familiar with the errors that were generated when too many users tried to access the database. Although SQL Server can also be run as a desktop database system, it is most used as a server database system. Figure 2.4 [12] and Figure 2.5 shows SQL Server management studio and components of SQL Server.

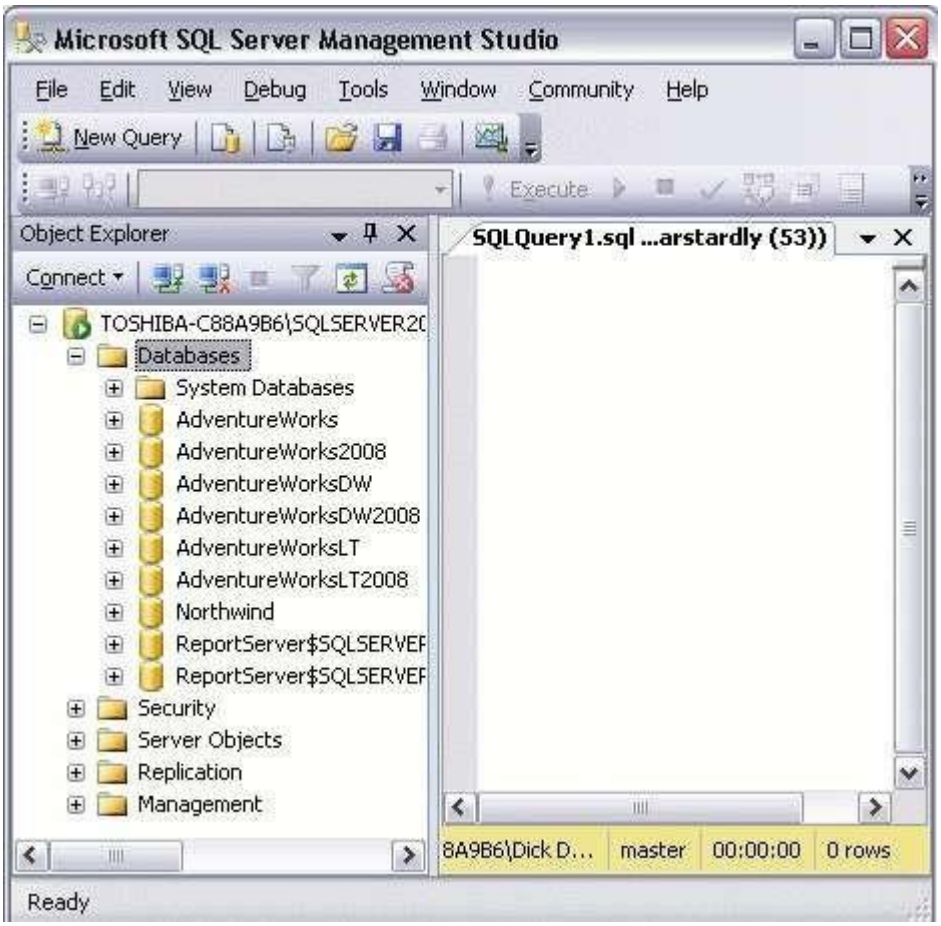


Figure 2.4. SQL Server Management Studio. Source: Quackit. SQL Server Management Studio (SMS).http://www.quackit.com/sql_erver/sql_server_2008/tutorial/sql_server_managemen t_studio.cfm.

Some of the features of SQL Server 2008 are: Scalability and Performance

- Security and Data Auditing [11]
  - Transparent Data Encryption - This is encrypting the data while it is on disk and remains transparent to applications
  - External Key Management - This new functionality relates to consolidation of key management and integration with external products

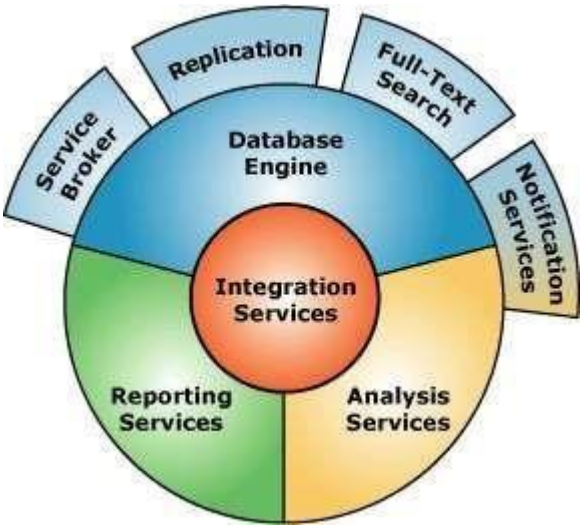


Figure 2.5. Components of SQL Server. Source: Microsoft. SQL Server Overview,n.d. http://msdn.microsoft.com/enUS/ library/ms166352(v=SQL.90).aspx.

- Availability and Reliability [12]
  - CPUs - Support for pluggable CPUs which means that a CPU can be added on the fly and recognized by SQL Server 2008 just like memory in SQL Server 2005

- Database Mirroring - Enhanced Database Mirroring to include compression of mirror streams, enhanced performance and automatic page-level repair for the principal and mirror

✞ Performance [10]

- Data Compression - This new feature provides the ability to easily enable or disable data compression as an online command as well as offer more efficient data storage above and beyond traditional data compression
- Performance Data Collection - When you are experiencing a performance issue the biggest problem is pinpointing the problem, so with SQL Server 2008 Microsoft is introducing a single common framework for performance related data collection, reporting, and warehousing
- Improved Plan Guide Support - With SQL Server 2008 plans can be frozen for permanent query usage as well as pull plans directly from plan cache with SQL Server Management Studio integration
- Resource Governor - If you have had the need to segment your SQL Server resource utilization then you should be looking forward to SQL Server 2008 because you will have the opportunity to create pools and groups to segment the resources and govern them independently

✞ Management [12]

- Policy-Based Management Framework - The ability to manage objects via policies as opposed to traditional scripts with inherent monitoring and enforcement
- Microsoft System Center - Integration with Microsoft System Center which a product from Microsoft to improve operational costs
- Extended Events - Another new feature is Extended Events which is a high performance yet light weight tracing infrastructure with insight into the core engine independent of SQL Trace

✞ New Data Types [12]

- Date Time Data Type - The datetime data type will now be able to support the precision to the 100th nanosecond which is 7 digits past second. Also, rather than having to parse the datetime for just the date or just the time, now SQL Server 2008 will have date only support as well as time only support • D - With the introduction of the ID data type this data type will be hierarchical-aware and will be accompanied by built-in functions, methods, etc. to support complex hierarchies in your data with .NET

✞ Development Enhancements [11]

- Entity Data Model - With SQL Server 2008 will come the concept of a 'business entities' vs. tables, this will enable the ability to model more complex relationships as well as be able to retrieve entities as opposed to a result set of rows and columns
- LINQ- LINQ is a new .NET Framework that encompass language-integrated query, set, and transform operations
- XML enhancements (support for lax validation, office 12 support, xs: dateTime support, lists/union types, LET FLOWR support, etc.)

✞ Service Broker [10]

- Interface - A new user interface and tools will be released for working with Service Broker in order to add, drop or edit Service Broker objects directly in SQL Server Management Studio
- Conversation Priority - The ability to set message ordering with a send and receive impact with levels one to ten

✞ Data Warehousing/ETL [12]

- Persistent Lookups in SSIS - There is no longer a need for re-querying for lookup operators and cache lookups in multiple ways with the ability to persist lookups to disk
- Improved thread scheduling in SSIS - This is accomplished by a shared thread pool and pipeline parallelism

- MERGE statement - The MERGE statement will add a great deal of value with slowly changing dimensions

✞ Reporting [12]

- Reporting Services Deployment - IIS is no longer required to run Reporting Services
- Rich-text support and enhanced visualization graphing

Chapter Three

THE WEB SITE DESIGN

Chapter Three The Web Site Design

3.1 . Introduction T activity diagram and data flow diagram as shown

in the following parts.

he conceptual design of the proposed system was carried out using the

3.2 . The Activity Diagram (AD)

The activity diagram used to describe the flow of activity through a series of actions. An activity diagram is an important diagram to describe the system. Figure 3.1 shows the activity described as an action or operation of the system.

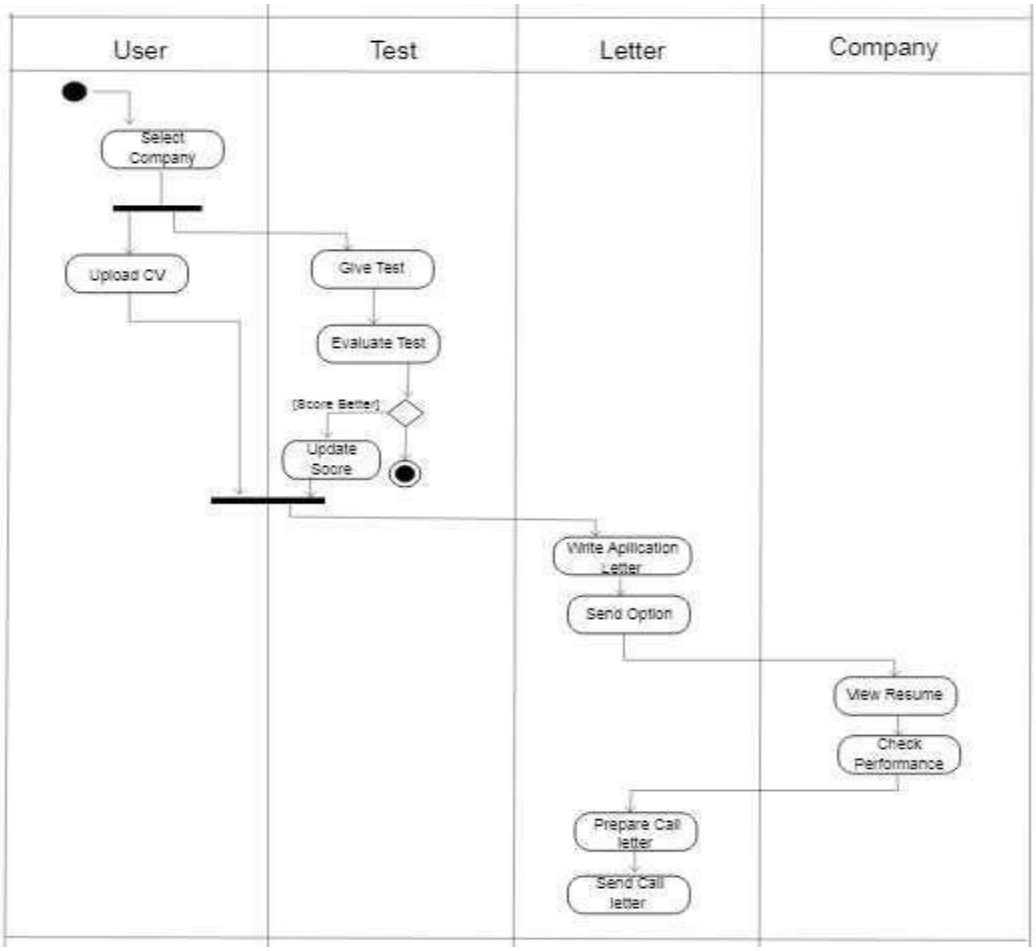
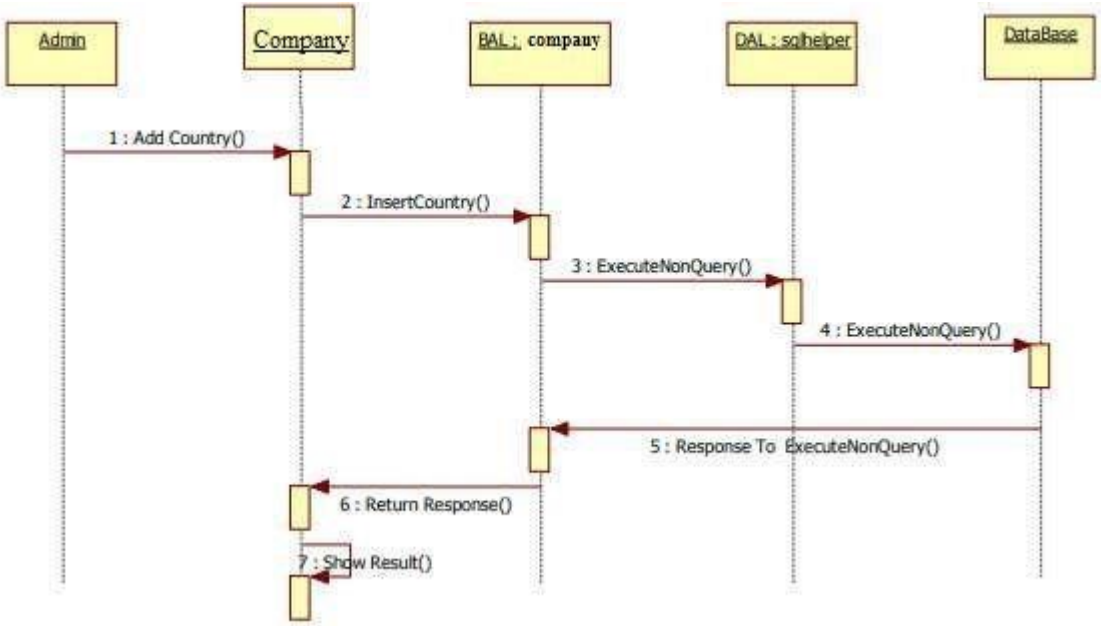


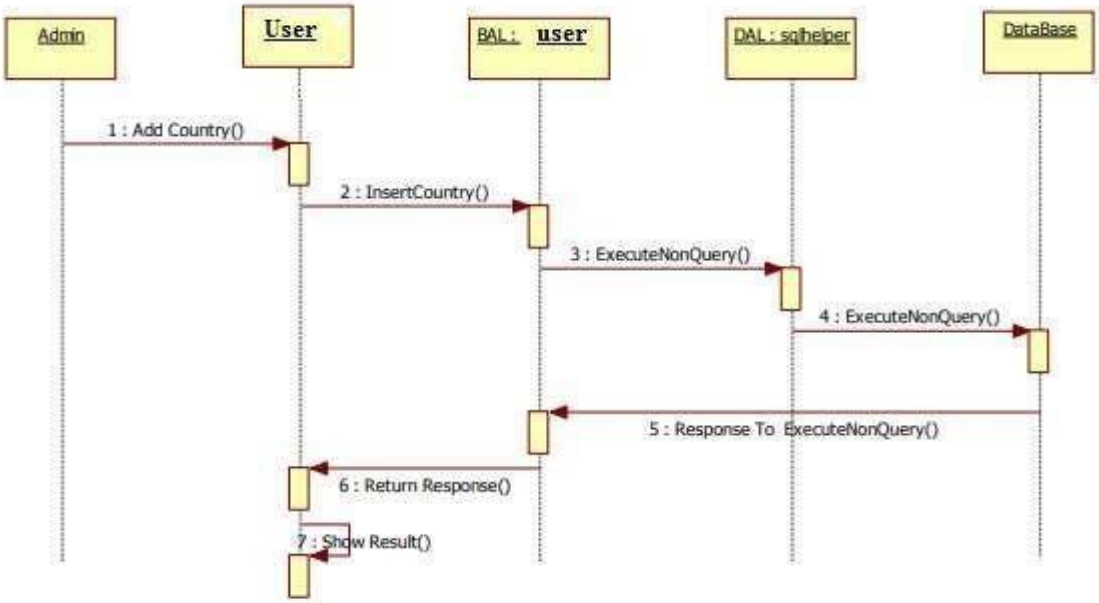
Figure (3.1): The Proposed Activity Diagram.

3.3 Sequence Diagrams

Sequence Diagrams Represent the objects participating the interaction horizontally and time vertically. Figure 3.2-a shows Admin Add company Sequence Diagram and figure 3.2-b shows Admin Add User Sequence Diagram



(a)



(b)

Figure 3.2: (a) Admin Add Company Sequence Diagram (b) Admin Add user Sequence Diagram

3.4 . The Data Flow Diagram (DFD)

Program structure defines control hierarchy without regard to the sequence of processing and decisions. Software procedure focuses on the processing details of each module individually. Procedure must provide a precise specification of

processing, including sequence of events, exact, decision points, repetitive operations and even data organization / structure. Information hiding suggests that modules be "characterized by design decisions that hide from all others." In other words, modules should be specified and designed so that information contained within module is inaccessible to other module.

Design is defining a model of the new system and continues by converting this model to a new system. The method is used to convert the model of the proposed system into computer specification. Data models are converted to a database and processes and flows to user procedures and computer programs. Design proposes the new system that meets these requirements. This new system may be built by a fresh or by changing the existing system. The detailed design starts with three activities, database design, user design and program design. Database design uses conceptual data model to produce a database design. User procedure design uses those parts of the DFD outside the automation boundary to design user procedures.

Our system design includes mainly the design of the UML diagrams and constructing the code. The code construction and its description are also given as separate topic. System design may also include the data flow diagrams (DFD) which models a system by using external entities from which data flows to a process, which transforms the data and creates output data flows which go to other processes or external entities or data stores. Stored data may also flow to processes as inputs. The main merit of DFD is that it can provide an overview of what data a system would process, what transformation of data are done, what data are stored and which stored data are used, and where the results flow. The graphical representation of the system makes it a good communication tool between user and an analyst on the one hand and the analyst and the system designer on the other hand.

DFD is mainly used for the representation of the dataflow in the system, which uses database for the storing and retrieving the data. But as our system doesn't use any database, we haven't provided any data flow diagram here.

Component Diagram

The component diagram contains components and dependencies. Components represent the physical packaging of a module of code. The dependencies between the components show how changes made to one component may affect the other components in the system.

Dependencies in a component diagram are represented by a dashed line between two or more components. Component diagrams can also show the interfaces used by the components to communicate to each other.

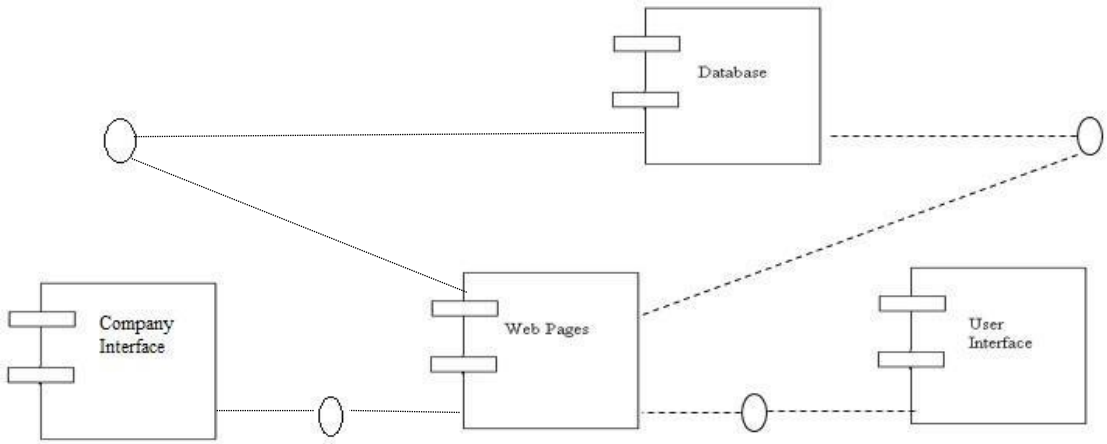


Figure (3.3): The Proposed Data Flow Diagram.

3.5 . The System Architecture

Project Files Created with Web Forms

In Figure 3.4 when create a Web project, Visual Studio constructs a Web application directory structure on the target Web server, and a project structure on your local computer. The following table describes the files that relate to your Web Forms pages. The server on which you create your Web Forms pages is typically not the server on which you will deploy the pages and their associated files for production. To deploy a Web project containing Web Forms pages, you may follow one of two approaches:

- Copy your project to the Web server.
- Create a deployment project.

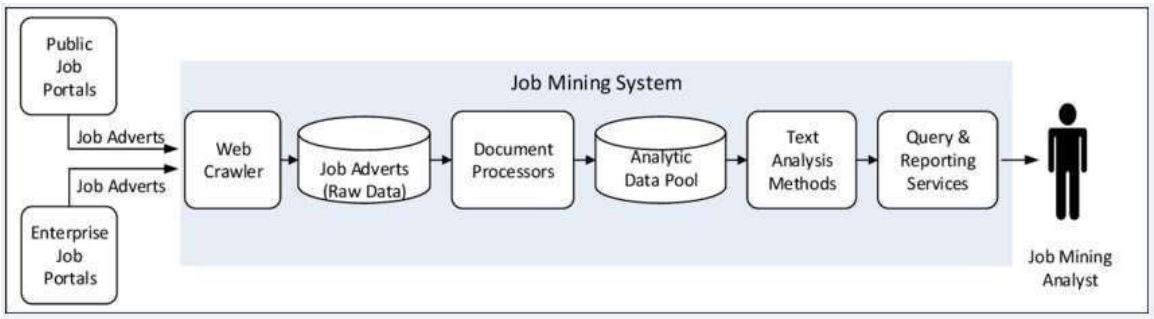


Figure (3.4): The Proposed System Architecture.

Microsoft SQL Server 2010

Microsoft® SQL Server™ 2005is a set of components that work together to meet the data storage and analysis needs of the largest Web sites and enterprise data processing systems. The topics in SQL Server Architecture describe how the various components work together to manage data effectively as shows in Figure 3.5. Microsoft® SQL Server™ 2005data is stored in databases. The data in a database is organized into the logical components visible to users. A database is also physically implemented as two or more files on disk.

Each instance of SQL Server has four system databases (master, model, and MS SQL) and one or more user databases (Information, salary, employees). Some organizations have only one user database, containing all the data for their organization. Some organizations have different databases for each group in their organization, and sometimes a database used by a single application. For example, an organization could have one database for sales, one for payroll, one for a document management application, and so on. Sometimes an application uses only one database; other applications may access several databases.

It is not necessary to run multiple copies of the SQL Server database engine to allow multiple users to access the databases on a server. An instance of the SQL Server Standard or Enterprise Edition is capable of handling thousands of users working in multiple databases at the same time. Each instance of SQL Server makes all databases in the instance available to all users that connect to the instance, subject to the defined security permissions.

When connecting to an instance of SQL Server, your connection is associated with a particular database on the server. This database is called the current database

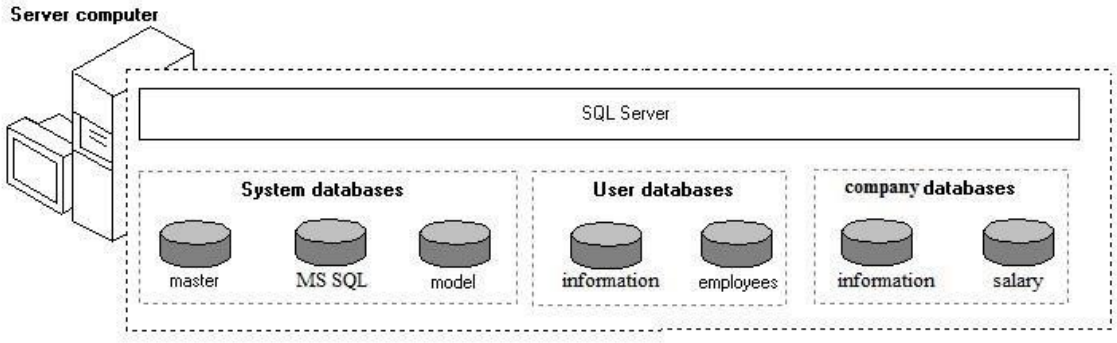


Figure (3.5): SQL Server

Database Architecture

Microsoft® SQL Server™ 2010data is stored in databases. The data in a database is organized into the logical components visible to users. A database is also physically implemented as two or more files on disk as shown in Figure 3.7.

When using a database, you work primarily with the logical components such as tables, views, procedures, and users. The physical implementation of files is largely transparent. Typically, only the database administrator needs to work with the physical implementations

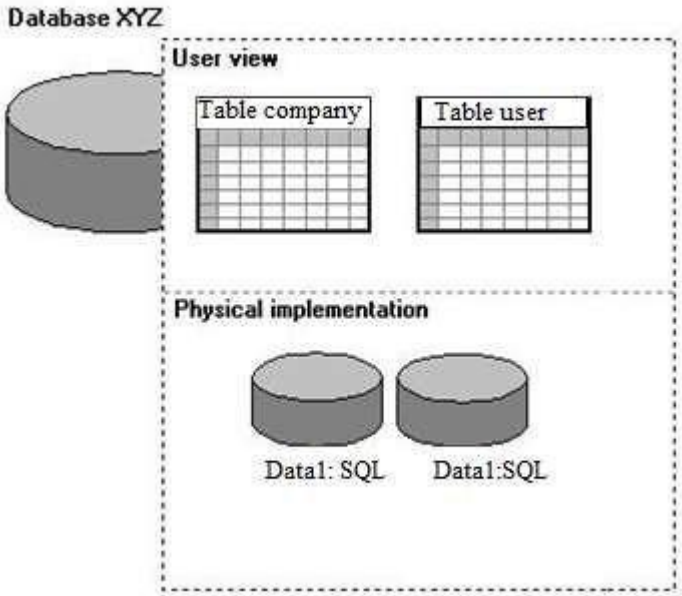


Figure (3.6): Database Architecture

Chapter Four

The Implemented System and Tests

Chapter Three The Implemented System and Tests

4.1 Introduction

T system, which was given in details in chapter three. The system he aims of

this chapter are to describe the implementation of the design
requirements and the implementation toolset are discussed also. The Job Portal Web Site is presented and the interaction of the user with the implemented system through the demonstration as the test are discussed. Finally, the empirical outcomes are discussed.

4.2 The Implemented System's Requirements

We have developed the job-portal. This portal can handle data of users (Several Companies) who are looking for suitable candidates for their vacancies. This portal will be most useful for Consultants for searching of matching job with job seekers etc. The classic Functionality of this Application focuses on data storage. However, the means to retrieve and analyze data, to extract, transform and load data, and to manage the data dictionary. An administrator is provided through which can enter the User's record /type of jobs/jobseeker's description. A registration form is provided through which user can enter details of company like location of company/type of job/status of job/Qualification of jobseekers. This data once entered can be edited/deleted as required when there will be vast entries of data user can scroll the data.

The implemented system would be run at the following requirements:

Software Requirements: Microsoft Visual Studio 2010, SQL Server.NET Framework 3.5

Development Platform: Microsoft Visual Studio 2008

Front-end-tool : ASP.NET

Back-end-tool : SQL Server

Office Automation Tools: Ms-word

Project Guide : My Supervisor ASS. Wisam R. Ahmed

4.3 The Implemented Toolset

ASP.NET includes features to make Web site management easier for both Web site developers and for administrators. Configuration files include a richer set of elements that give site developers control over new features and finer control over existing ones. A new configuration API makes it possible to control configuration programmatically. New tools provide a GUI interface for configuring applications — the new Web Site Administration Tool makes it easy for Web site developers to manage their own sites using a Web-based interface (both locally and remotely), and an ASP.NET-specific MMC snap-in allows site administrators to manage complex configuration scenarios using a standard Windows server-based tool.

Controls

ASP.NET features many improvements to Web server controls, including both enhancements to existing controls and a selection of new controls.

General Control Improvements

A major area of enhancement in ASP.NET 3.5 is in the controls you use to create ASP.NET Web pages. General improvements to controls include:

- By default, controls now generate markup that is compatible with the XHMTL 1.1. standard.
- All controls support adaptive rendering and can emit markup that is appropriate for the requesting browser.
- All data controls can use either the new data-binding model with data source controls or can continue to use the model used in earlier versions of ASP.NET.
- All controls support themes and skins so that you can customize their appearance using an ASP.NET theme.

- You can use device filtering with many control properties, specifying different property values for different devices. When the control is rendered, the appropriate property value is set based on the requesting browser.

- Validation controls can now be grouped, which allows you to selectively enable validation for some controls.

- Improvements to individual controls such as the Label control, List Box control, and others to add functionality often requested by developers.

New Controls

ASP.NET offers a greater selection of controls to help you create fully featured Web pages much more quickly. You can now take advantage of the following controls:

- **Navigation.** You can add navigation paths (also known as breadcrumbs) to pages with the **SiteMapPath** control and display a site map using the TreeView control.

- **Security.** You can authenticate users with a suite of login controls that allow you to get and validate user credentials, display custom output for logged-in users, and more.

- **Web Parts.** A new set of Web Part controls allow you to create portal pages that users can personalize at run time. For example, you can create a Web Part that allows a user to enter a custom value such as a postal code and get localized weather reports.

- **Client behavior.** New controls provide ASP.NET server control functionality for tasks that previously were handled only by HTML elements. These include the FileUpload control, ImageMap control, and the HiddenField control.

- The new Wizard control allow you to create a page with multiple panels that step the user through multi-part forms.

In addition, existing ASP.NET controls have been enhanced with new features. All controls now support the new data-binding model, themes, and personalization.

You can also use all controls to create pages for devices; controls now automatically support adaptive rendering and device filtering.

Data

ASP.NET includes substantially improved support for working with data in your Web applications.

Data Source Controls

For binding data to controls on Web pages, you can now use data source controls, which encapsulate connections, query commands, and parameters into a single control. ASP.NET includes data source controls that work with a variety of back-end data sources, including Microsoft SQL Server, Microsoft Access, XML files, Web services, FrontPage site maps, and business objects that return data sets. All data source controls support the same basic object model, giving you a consistent way to work with data regardless of its source.

Data source controls can automatically fetch data and manage it when the page runs. You no longer need to write code to execute commands and manage datasets for common data scenarios. However, if your application requires it, you still have access to the lowerlevel data functions exposed by ADO.NET.

To pass parameters to data source controls, you can configure the controls to draw parameters values from other controls, Session state, query strings, or cookies; in addition, you can set parameter values programmatically.

Middle-Tier Data Access

By using the new ObjectDataSource control, you can easily add data access to a page that is based on a middle-tier business object. The **ObjectDataSource** exposes the same binding interface to controls on the page, but instead of performing direct database access, it invokes methods on a component that you specify.

Data Display Controls

ASP.NET also includes enhanced support for displaying and updating data with controls on Web pages. All controls can now use data source controls as data source instead of working directly against a dataset or other store. You can also take advantage of the following new controls that are specifically built to make data access easier:

- The **GridView , DetailsView , FormView** controls to display and edit data. (The **GridView** control supersedes the DataGrid control from previous versions of ASP.NET.)

- The **TreeView** control to display hierarchical information from XML files, sitemap files, and relational data sources.

- The **SiteMapPath** and Menu controls to provide data-bound support for navigation.

4.4 The Implemented System

The implemented Web Site includes Six pages main that are integrated and worked together in the SQL database. These pages are:

4.1.1 Main page:

The main page is a form page to enter the Web Site for this project. It is containing links to all pages, can move to any pages via these links, as shown in Figure 4.1.

Figure (4.1): Main Page

4.1.2 Users Page:

In User sections, user can enter the details of companies through the help of portal. The portal has a form that's will ask details like company id / name / location / address / city / contact person/contact number/email. Once entering the details, the data will be saved by clicking save button and the details will be stored in the Recruiter database, as shown in Figure 4.2

.

Figure (4.2): Users Page

Companies Page:

In Companies sections, various vacancies of various companies are stored. All the details like job id, job title, job location, functional skills, technical skills, company id, company name, contact person, contact number, email are stored in a database, as shown in Figure 4.3.

Figure (4.3): Companies Page **About Web site:**

This page to provide the information about for Web Site**,** as shown in Figure 4.4.

Figure (4.4): About Web Site Page

Conditions of participation page:

This page contains all conditions of participation of web Site, as shown in Figure 4.5.

Figure (4.5): Conditions of Participation Page **Contact us:**

This page contains information to connect with admin of web Site, as shown in Figure 4.6.

Figure (4.6): Contact us Page

4.5 The Interaction with The Implemented System

Generally, it has been specified thought for testing that: Testing is the critical element of any software quality assurance and represents the ultimate review of specification, design and code generation.

Software testing has a dual function; it is used to establish the presence of defects in a program and it is used to help judge whether the program is usable in practice. Thus, software testing is used for validation and verification, which ensure that software conforms to its specification and meets the need of the software customer.

The test results of the project were good through of characteristics of software of the following:

1- Operability
2- Observables
3- Controllability
4- Decomposability
5- Simplicity
6- Stability
7- Understandability

Chapter Five

Conclusions, Limitations and Future Works

Chapter Four Conclusions, Limitations and Future Works

4.1. Conclusions

F certain significance are drawn and concluded from

this work, they are:

or this graduation research project (Portal Job), many points which are

1. In making this application, we have learnt that handling files and maps are becoming easy.
2. Using this application, a user gets different Jobs and companies get a lot of selections of employees.

4.2. Limitations

The researchers suffer from many limitations during the design and implement system, as listed in the following:

1- It can run only on Windows servers. It is not compatible with LINUX servers.

2- It is not safe from professional hackers.

3- Only registered users and companies can benefit from using this website.

4.3. Suggestions for Future Works

The designed and implemented system presents many fruitful lines of continued graduation research, and opens the door to a range if future work, as listed in the

1- In future if we get a chance to work on the same project then we like to implement Improvement for advertisement.

2- We also like to make our site more secure.

3- we can add search properties

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المستخلص

الغرض من هذ ا المشروع هو تصميم منصة تساعد الشركات وأصحاب العمل والموظفين على التفاعل بسلاسة في مكان واحد. كل هذه الكيانات تعتمد على بعضها البعض حتى يتمكنوا من النمو بشكل فردي أو جماعي .
تحتاج الشركات إلى موظفين بحيث يكون لديها أشخاص لتوظيفهم ؛ وبالمثل ، تحتاج الشركات إلى المواهب حتى تتمكن من إنتاج المنتجات وترقيتها ، وفي الوقت نفسه يحتاج الموظفون إلى هذه الشركة لجمع المعرفة وزيادة الخبرة ومن ثمعرض مواهبهم من خلال تعيينهم. اليوم يتصل العالم باستخدام الإنترنت ، الأمر الذي غّيّر الطريقة التي نتواصل به ا ، وهو بحد ذاته تقنية تتطور يومًا بعد يوم. يوجد في العراق اليوم آلاف الشركات التي يوجد بها مئات الآلاف من الموظفين المسجلين وهناك عدد قليل جدًا من وسائل الاتصا ل الت ي يمكن لهذه المنظمات من خلالها التفاعل مع بعضها البعض وتبادل المعرفة المفيدة. لذلك ، توفر هذه المنصة للمؤسسات العديد من أدوات الاتصا ل المفيدة التي يمكنها إزالة الحواج ز بنجاح للوصو ل إلى أماكن مختلف ة للحصول عل ى المعلومات وتوفير حل واح د للعديد من الاحتياجات المتعلقة بالأحداث المستقبلية وفرص العمل وغير ذلك الكثير. لذلك ، سوف يخدم هذا المشروع احتياجات جميع محافظات العراق بجميع الأدوات التي يوفرها لتقديمها في نفس المنصة.

جمهورية العرا ق
وزارة التعليم العالي والبحث العلم
ي كلية دجلة الجامعة قسم علوم
الحاسو ب

تصميم وتحليل بوابة العمل

هذا المشروع مقدم الى قسم علوم الحاسوب / كلية دجلة الجامعةكجزء من متطلبات الحصول على درجة البكلوريوس في علومالحاسوب

معد من قبل

عبدالقادر وليد حسين

عبدالمهيمن عباس رشيد

عبدالعزيز حمادي سلوم

زينب حسن محمود

بأشراف وسام رعد احمد

حزيران، 2020 - بغدا د

Republic of Iraq
Ministry of Higher Education
and Scientific Research
Dijlah University College
Department of Computer Science

Design and Implement a Hotel Reservation System

A Graduation Project Submitted to the Department of Computer Science / Dijlah University College as a Partial Fulfilment of the Requirement of the BSc. Degree in Computer Science

احمد علاء محمد سعيد

سالي امين داود

هاشم حسن عبدالرزاق

مصطفى ماجد صبيح

إشراف

م. زينة حسين

٢٠٢٠-٢٠٢١

الآية القرآنية

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ وَاللَّهُ بِمَا

تَعْمَلُونَ خَبِيرٌ

صدق اللَّهُ العظيم

سورة يوسف الآية ٧٦

abstract

Technology is one of the best developments at this time due to the frequent use of the Internet. We worked on creating an application that helps users to access and learn more about available hotel services more easily, because of non-local services and highlight them a lot, and make them more available than other services, knowing that there are Global services similar in quality and price, and we decided, in turn, to shed light on the local hotel services to contribute to raising the Iraqi economy, where through marketing it is possible to reveal patterns of customer behavior, as purchase rates increase, after providing the appropriate services to the right customer.

Table of Contents

CHAPTER ONE

OVERVIEW

١.١ Introduction

The level of adoption of information technology applications in the business world - in general - is affected by the extent to which current and potential customers accept those applications. The more customers accept modern applications related to the world of information technology, this leads to an increase in their desire to change their traditional practices, and thus the opportunities for service providers increase. To introduce new updates to the methods of serving these customers, which provides explanations for how the rapid spread of applications of modern technology in various fields of business in the contemporary world. With the amazing development in the field of smartphone technology and its applications, tourism companies and hotel establishments have begun to rely on these applications to provide and market their services, and tourists have increasingly relied on these applications to obtain various tourist and hotel services provided, as well as to complete all tourist and hotel reservation procedures. . The literature has identified a number of characteristics that have an impact on the spread of information technology applications in the business world, and it is a group of characteristics that are directly related to customers and not to service providers, and it has been possible to limit these characteristics to the following: comparative advantage, compatibility, simplicity/complexity, susceptibility to experimentation, . The ability to notice the change

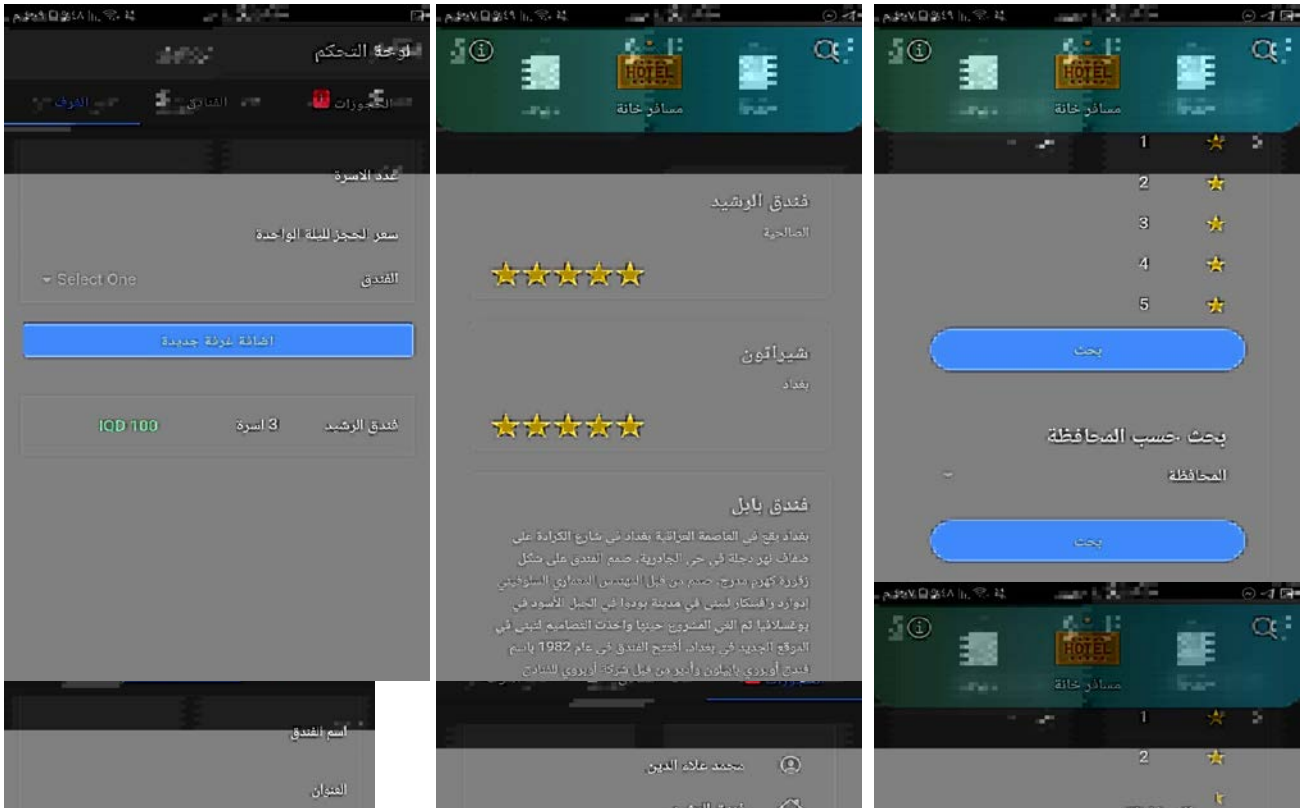
١.٢. The Aim

Recognizing the role played by the various characteristics of smart phone technology applications in customers' adoption of these applications as a hotel reservation tool, from the point of view of users who have tried one of these applications in hotel reservations, at least once. By striving towards providing the

application with ease of access to reservation services and ease of use, because the interface is for a user, because the user interface is designed in a simple and smooth way, and the method of displaying services was directed directly to the customer, as well as speed in performance and use, in addition to real-time communication with the hotel as the reservation process is done Directly and without delay, as well as reducing costs for users through the discounts that the user obtains through .offers by hotels

١.٣ project idea

The idea came through studying the market and identifying the tourism sector in Iraq and the possibility of developing it and the need for an application that provides hotel reservations for local hotels.



١.٤. Problems and solutions

One of the most important problems that we encountered in general is the poor use of the Internet in general in Iraq, which directly leads to problems in developing the application, and the failure to add payments using Visa Card or PayPal, for this application supports

Payment upon arrival at the hotel, ease of displaying advertising services, instead of advertising on expensive platforms or advertisements in the streets or the channel, and this makes it easier for the customer to cost advertising.

١.٥. Main Concepts and Technologies

The tools that used for implementation range from programming languages and data manipulation language to implementation tools:

The application interfaces are designed in html and interfaces are stayle by css, operations, and control in JavaScript and ionic, and write it on Server

LINUX CENTOS ٧, Database MYSQL ٨.

١.٦. Programming and Implementation Tools

Visual studio code

Node.js

Chapter Two

The System Design

٢.١. Introduction

conceptual design of the proposed system was carried out using the activity diagram and data flow diagram as shown in the following parts.

٢.٢. The Activity Diagram (AD)

Initially entering the application and searching for an item if it does not exist will return to the search list and if the request is found the item list will appear and add it to the shopping cart and if the addition process did not complete successfully he will return to choosing the item and then add the card and then the reservation

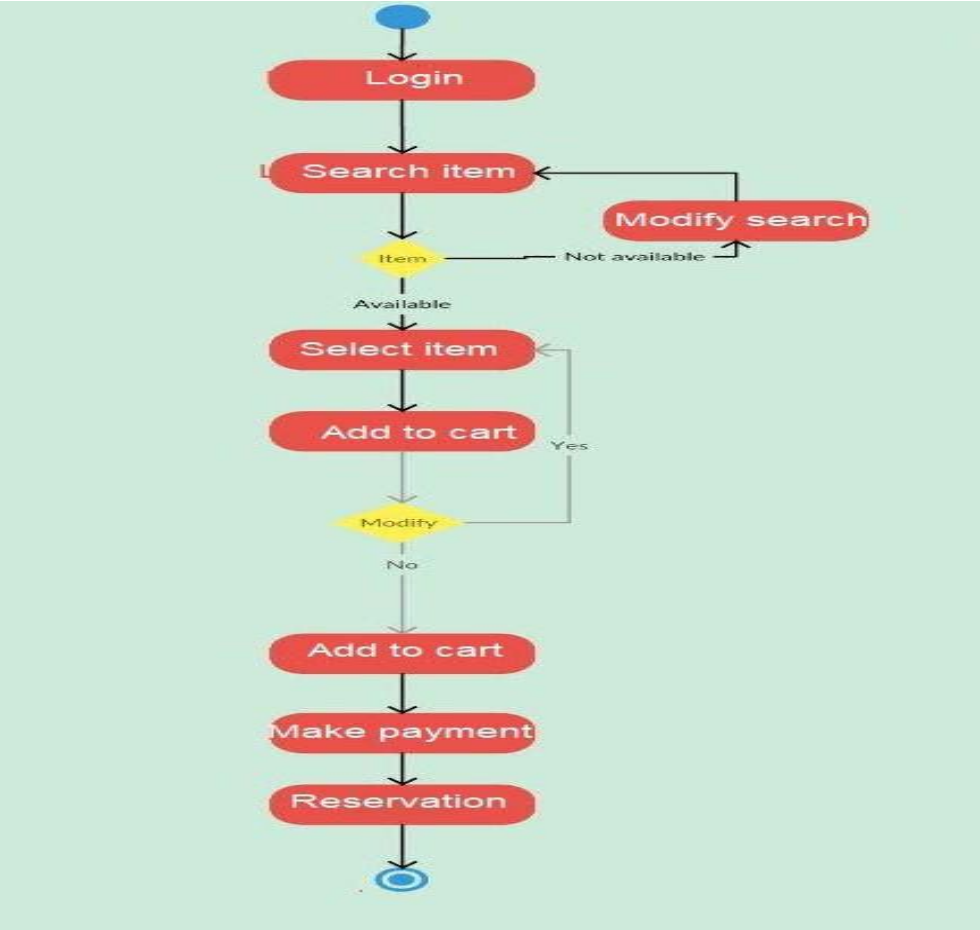


Figure (٢.١): Planned the Activity Diagram (AD)

٢.٣. The Data Flow Diagram (DFD)

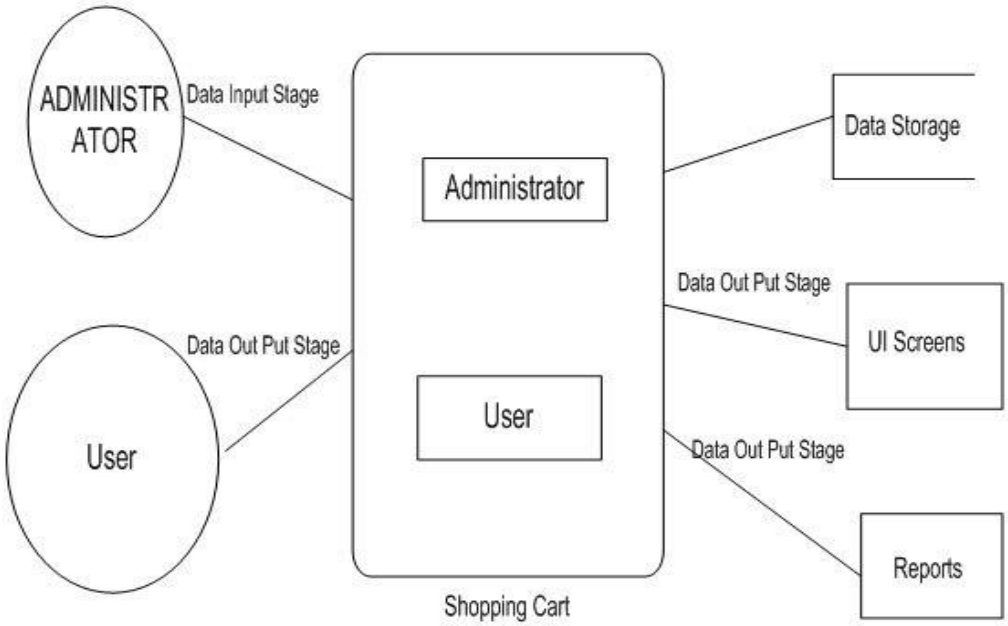


Figure (٢.٢): The Proposed Data Flow Diagram.

٢.٤. The System Architecture

The system architecture is the foundation of the solution and should be presented first. The core components will be indicated, piecing it all together in the overall architecture, with some thoughts about communications, showing the technical integration of the components and added features.

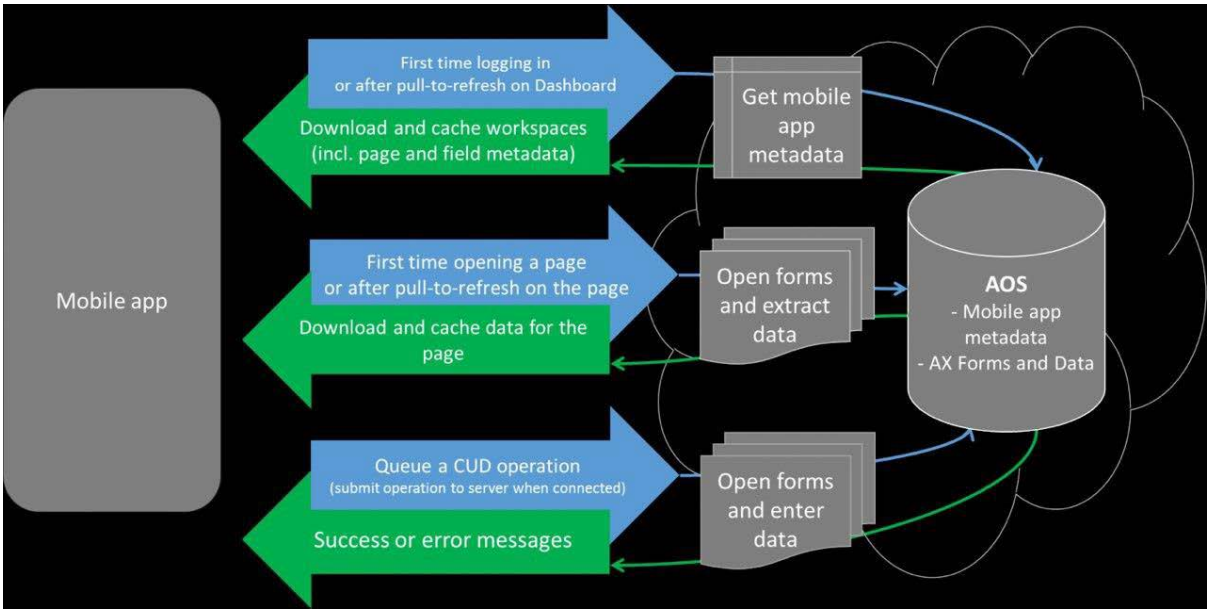


Figure (٢.٣): The Proposed System Architecture.

Chapter Three

The Implemented System, Tests and Empirical Outcomes

Introduction

he aim of this chapter is to describe the implementation of the design system, which was given in details in chapter three. The system requirements and the implementation toolset are discussed also. The made in Iraq system is presented and the interaction of user with the implemented system through the demonstration as test are discussed. Finally the empirical outcomes are discussed.

٣.٢. The Implemented System’s Requirements

The implemented system would be run at the following requirements:

This application supports the Android system (Android ٥ to the latest version) It can support iOS after adding it to the system.

٣.٥. The Implemented Toolset

The tools that used for implementation range from programming languages and data manipulation language to implementation tools:

The application interfaces are designed in html and interfaces are stayle by css, operations, and control in JavaScript and ionic , and write it on Server

LINUX CENTOS ٧, Database MYSQL ٨.

٣.٦. The Interaction with The Implemented System

In order to test the implemented system. Figures below depict a typical interaction of user with the implemented system through waving the demonstration version.

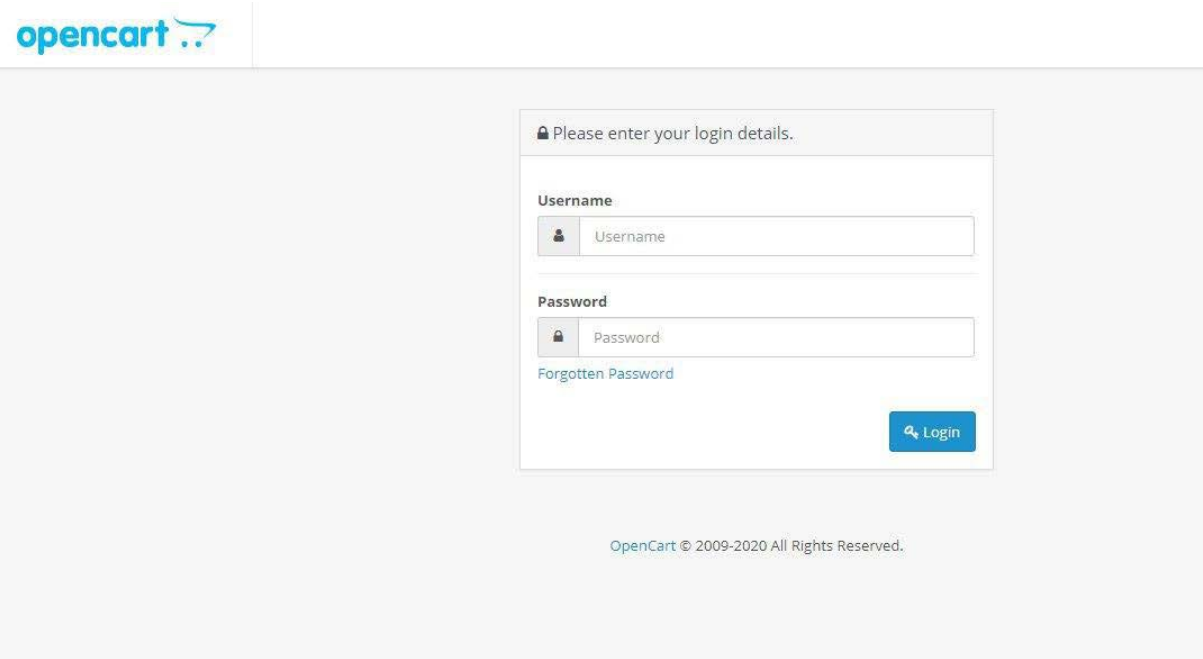


Figure (٣.١) Addictive login interface

Logging in is done by entering the user name and passcode through the owner as in Figure (٣.١) but if there is an error in the user name or passcode it appears to us as in Figure (٣.٢)

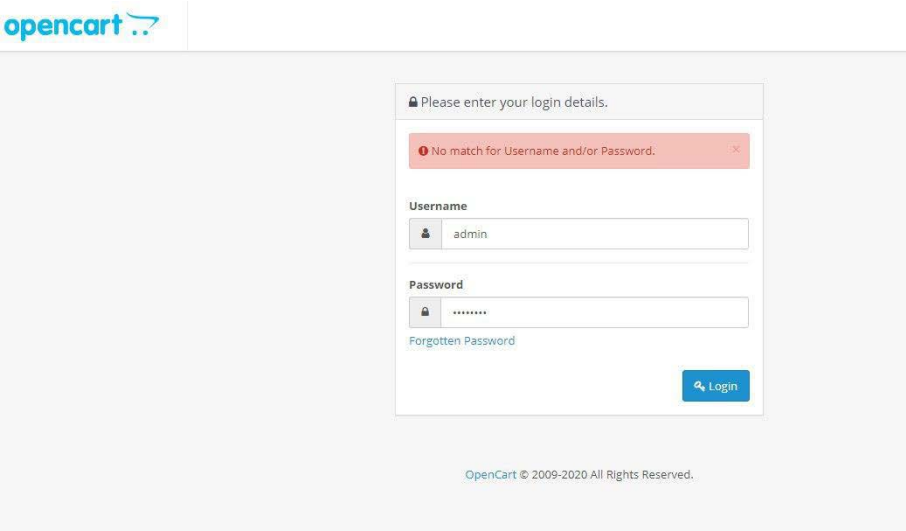


Figure (٣.٢) Addictive login interface error

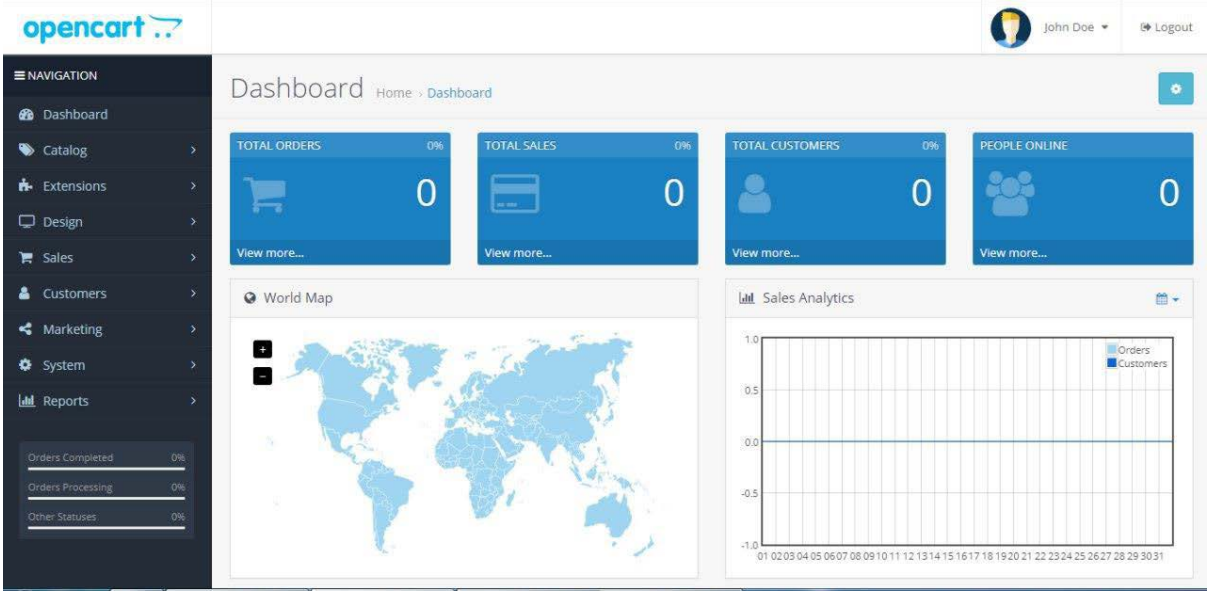


Figure (٣.٣) Initial settings interface.

When you click on the catalog, several options are displayed, which go to the other settings, as shown in Figure (٣.٤)

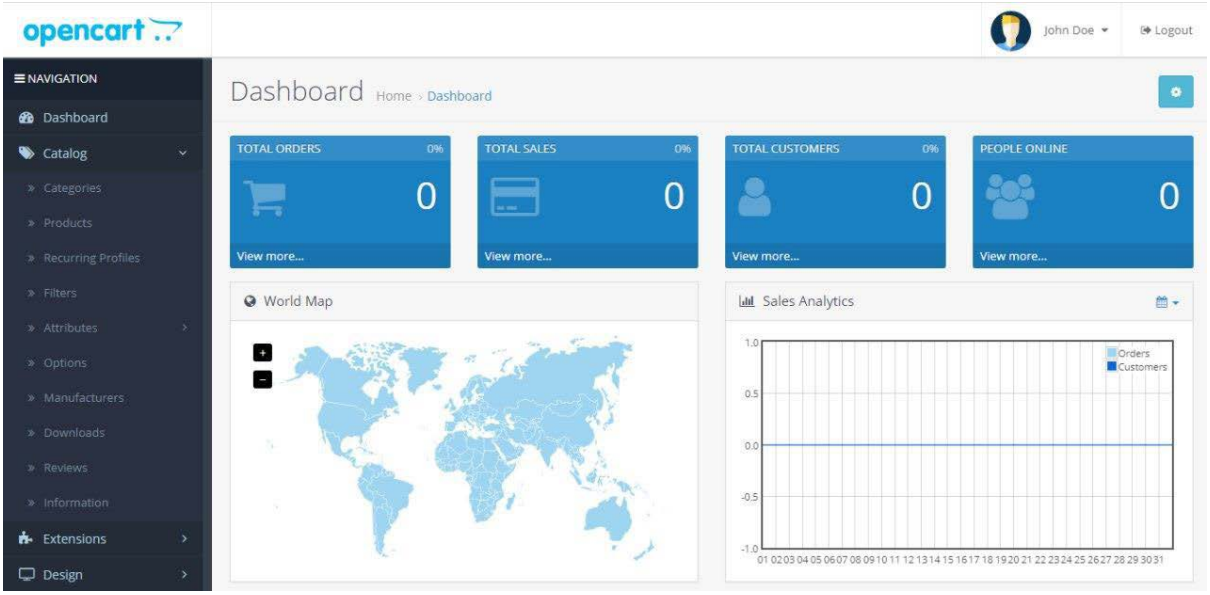


Figure (٣.٤) Initial settings interface (catalog).

Through this interface, you can go to other interfaces, such as adding, deleting, and modifying categories, as shown in Figure (٣.٥) .

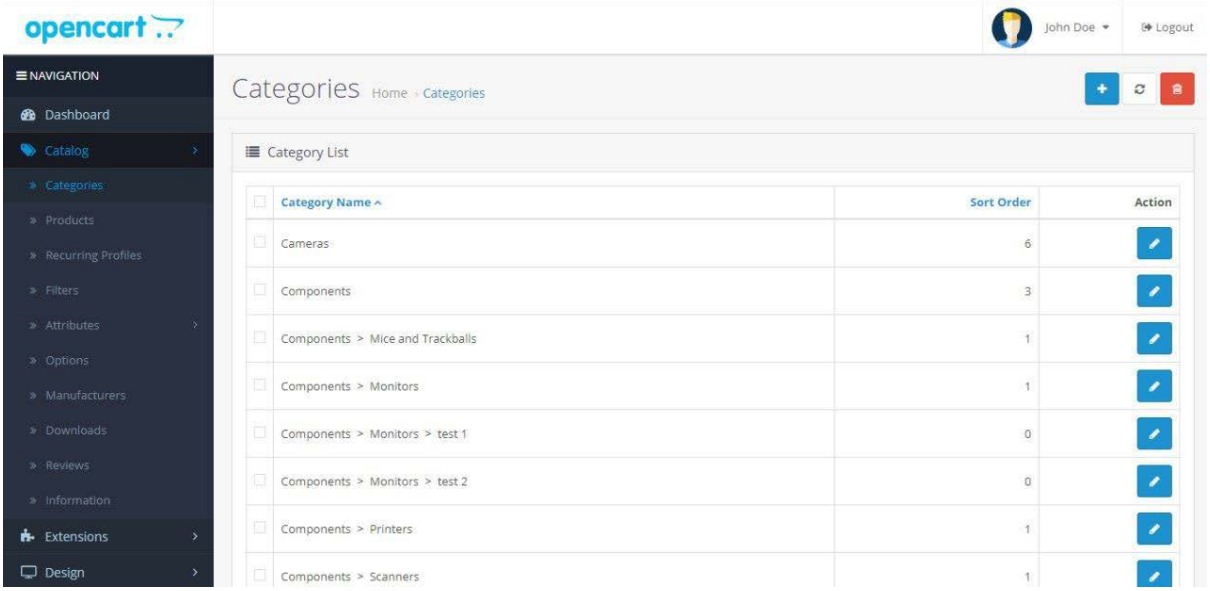


Figure (٣.٥) category list.

Through this interface the category name and description are added to the category as shown in the Figure (٣.٦) .

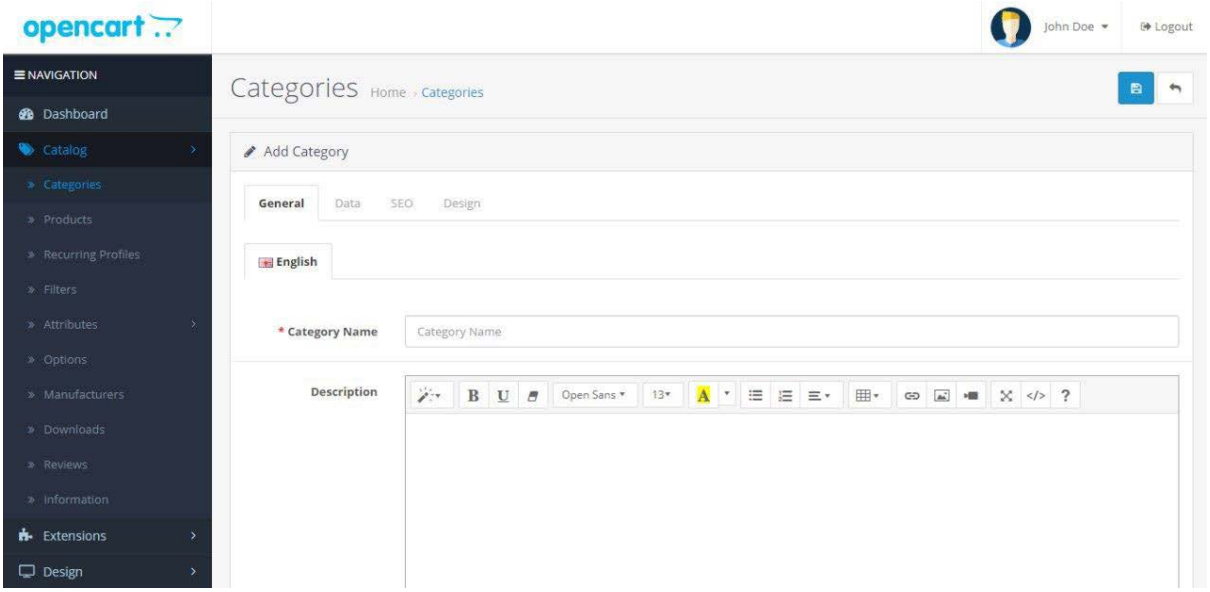


Figure (٣.٦) categories name and description

In this interface, the products that are displayed in the application are displayed and the product data. From here, you can go to the interfaces of adding, deleting and modifying as shown in the Figure (٣.٦).

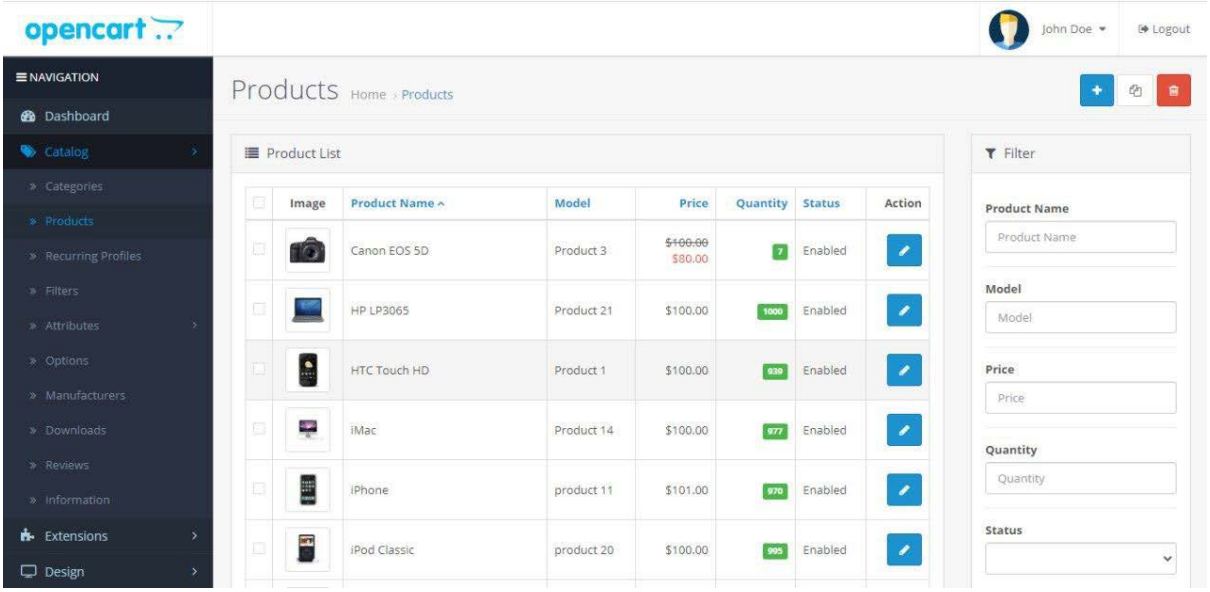


Figure (٣.٧) product list.

In this interface, the product name and product description are added as shown in the Figure (٣.٧) .

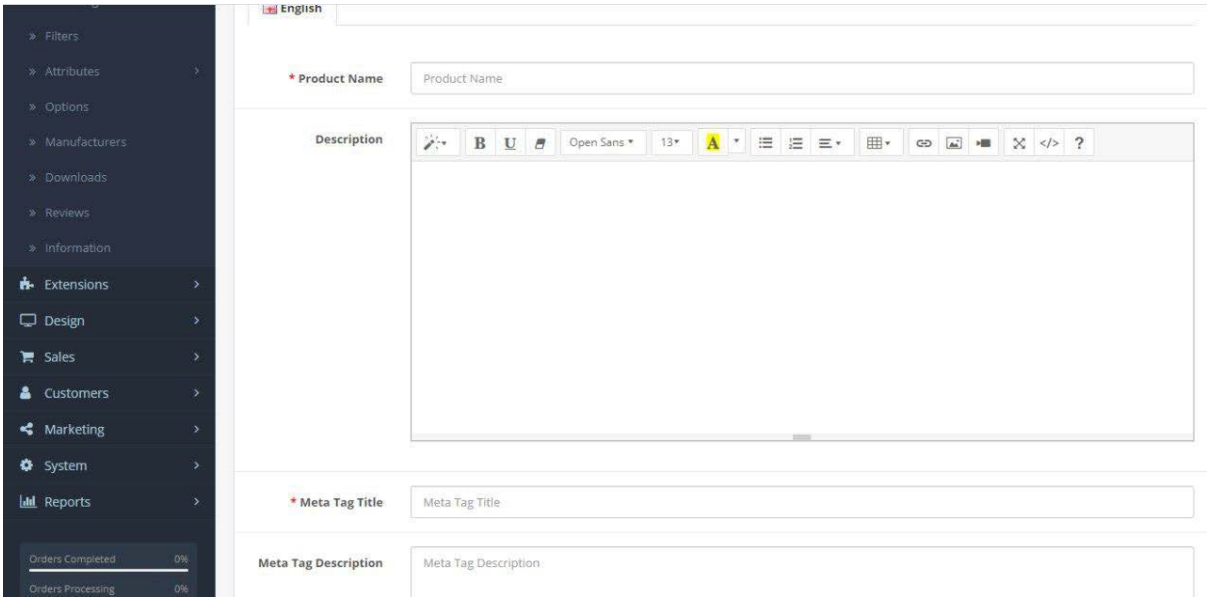


Figure (٣.٨) production name and description

In this interface, a special product code is entered for admin, adding price, location, and other product information as shown in the Figure (٣.٨) .

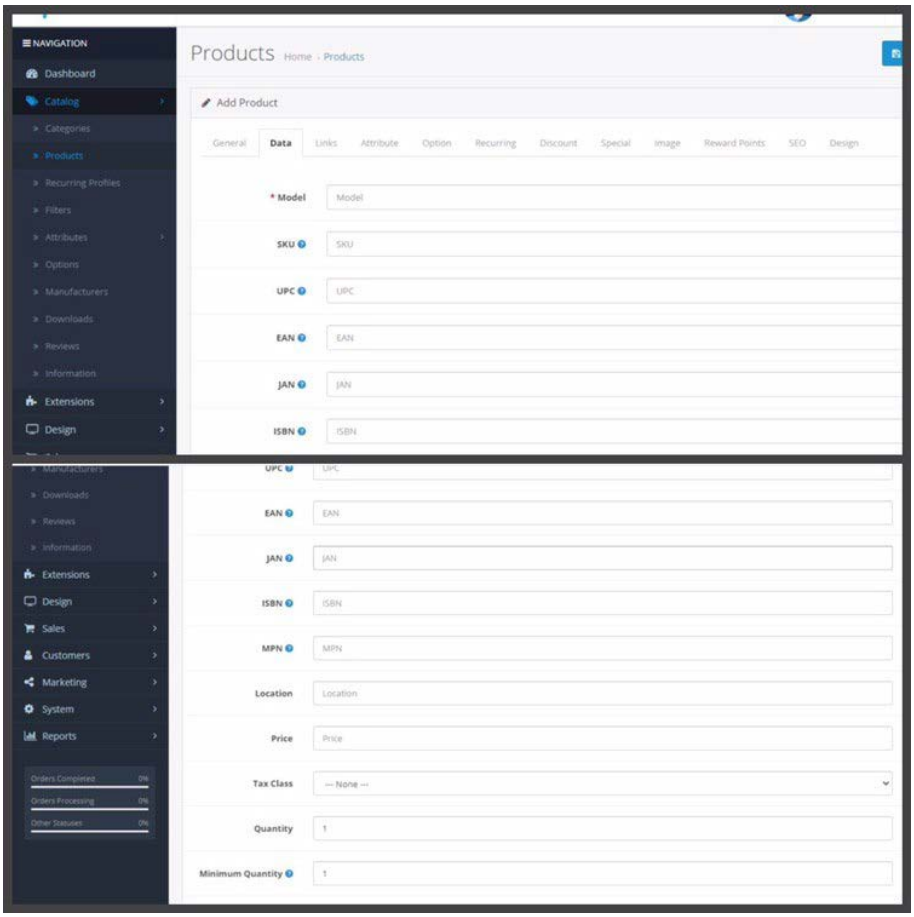


Figure (٣.٩) Product information entry interface

The product is placed in the category by typing the category name in the categories field and selecting the appropriate category for the product as shown in the figure.

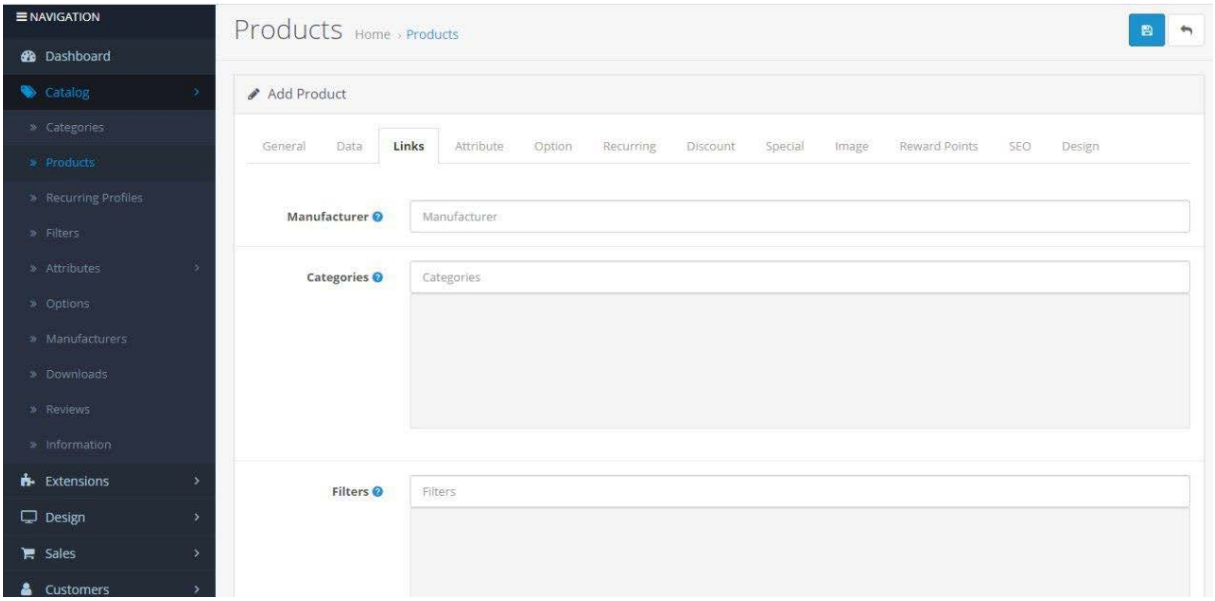


Figure (٣.١٠) connect the product to the category

In the last step, after selecting the appropriate image for the product to be displayed on the application, we click on Save to complete the process of downloading the product to the application interface as shown in the figure

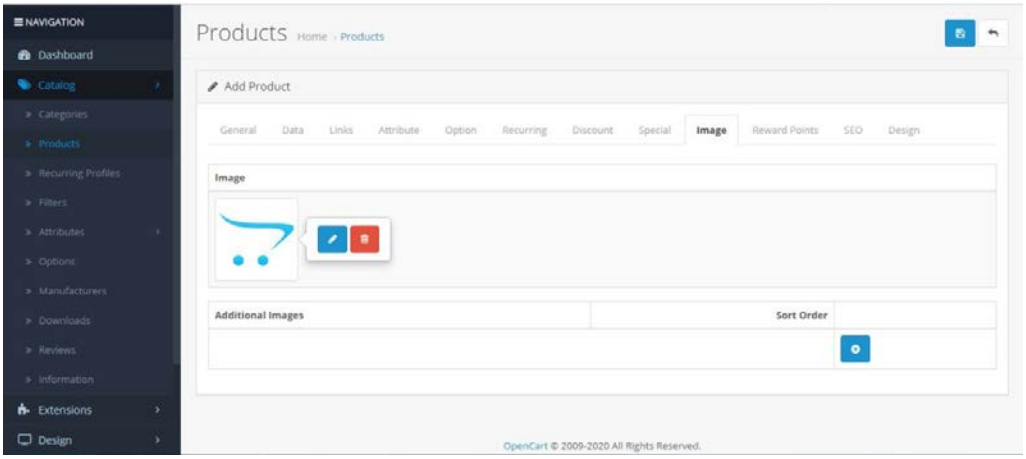


Figure (٣.١١) add an image to the product

٣.٥. Empirical Outcomes

١- ١st Empirical Outcome.

In this experiment we did a questionnaire on google form and we sent it to some groups of people on social media to know people's opinion and their impression of the application

The result was as follows:

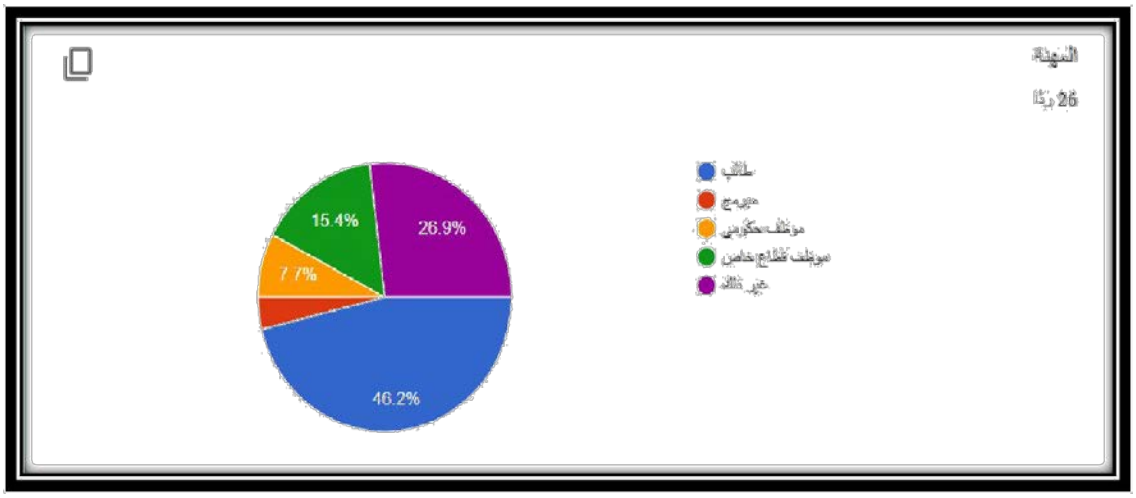


Figure (٣.١٢) questionnaire

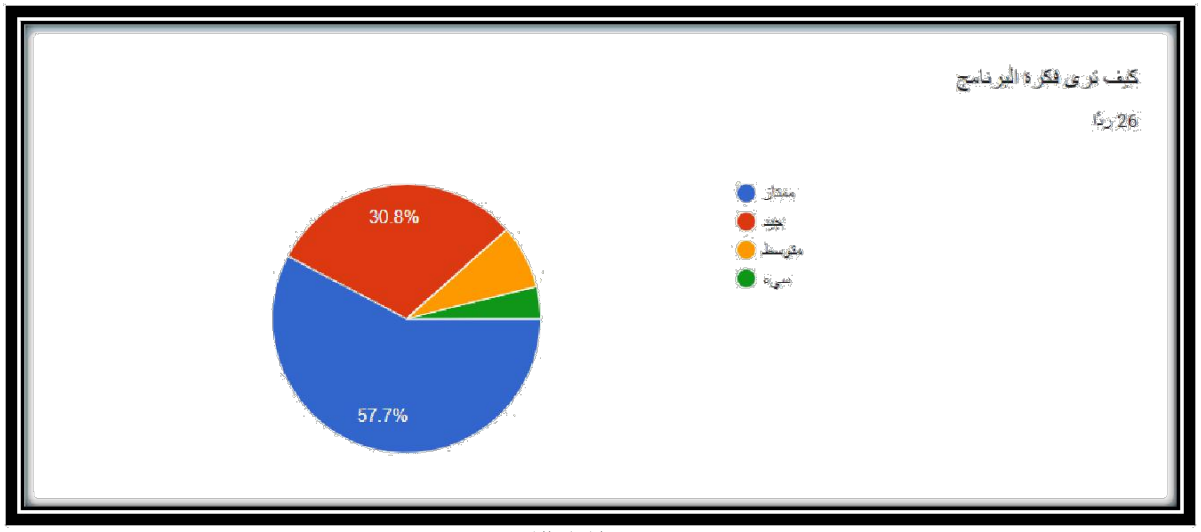


Figure (٣.١٢) questionnaire

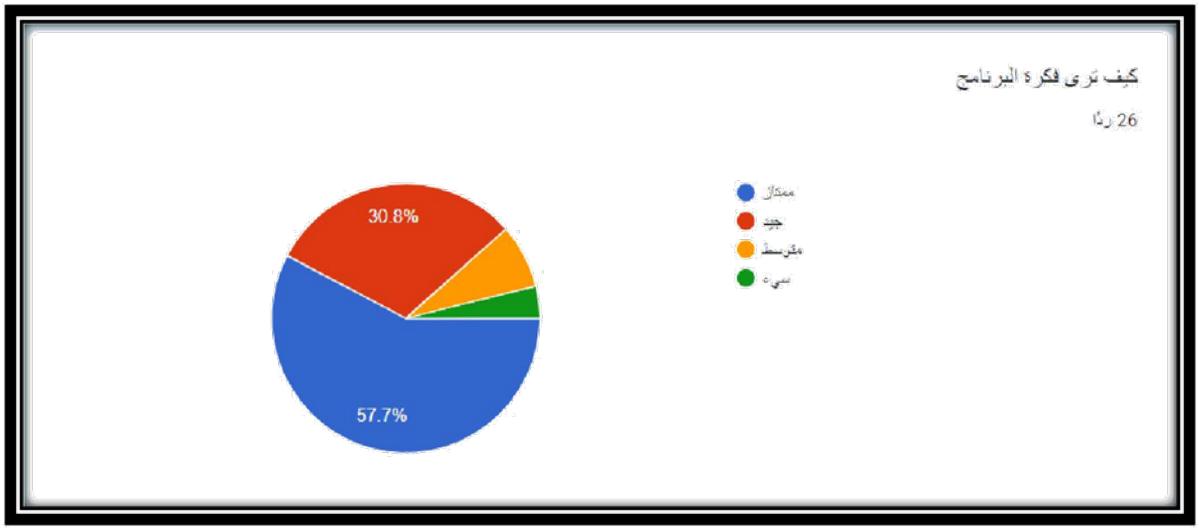


Figure (٣.١٣) questionnaire

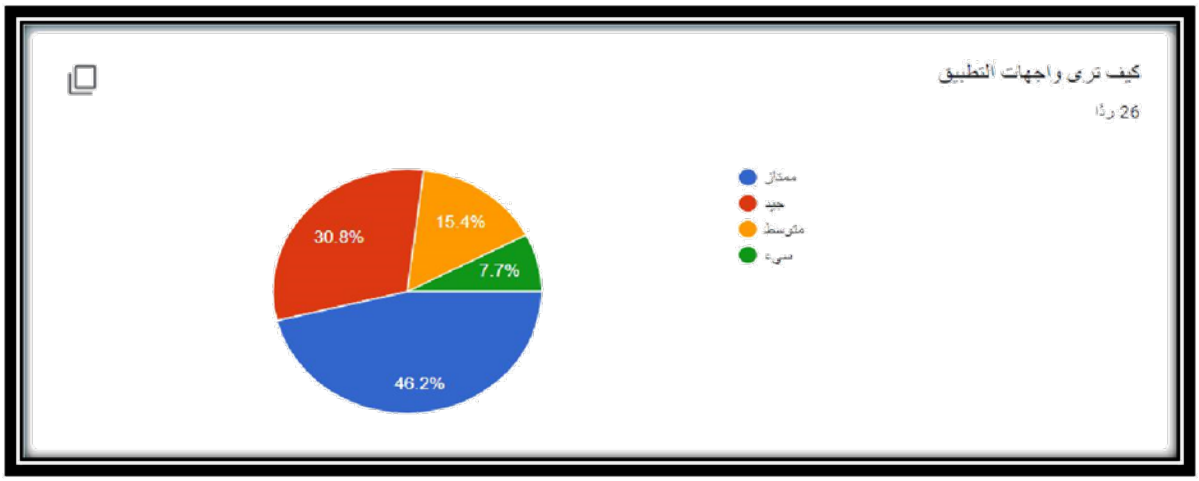


Figure (3.14) questionnaire

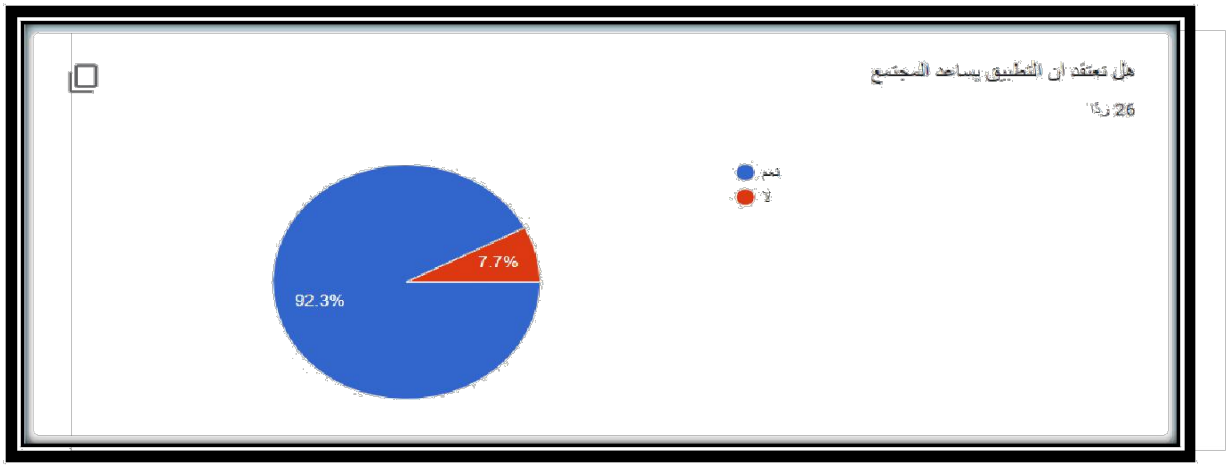


Figure (3.15) questionnaire

Figure (3.16) questionnaire

CHAPTER FOUR

Conclusions &Suggestions for Future Works

٤.١. Conclusions

١- The application provides easy access to reservation services

٢- The application provides ease of use due to the fact that it is a user interface and that the user interface is designed in a simple and smooth way and that the way of displaying the services was directed directly to the customer

٣- The application provides speed in performance and use

٤- Real-time communication with the hotel, as the reservation process is carried out directly and without delay

٥- The application provides cost reduction for users through the discounts that the user obtains through offers by hotels

٦- The operational cost of the application is simple and requires only promotion

٤.٢. Suggestions for Future Works

The new applications are characterized by their multiple functions, as they are directly linked to hotel reservation systems, provide guests with access to city tour guides, as well as easily link them to social media, and provide a range of information of interest to guests, such as an invitation to join the "U By Emaar" loyalty program , special offers and events.

The content of the applications may include a "city guide" that has been carefully prepared to provide a comprehensive picture of everything that is happening in the city, on a daily basis.

In addition to the ability to update applications periodically, ٣٠٪ of the total content of each application.

The “Address Hotels + Resorts”, “Vida Hotels and Resorts”, “Palace Downtown” and “Downtown House” applications are available for “iOS” and “Android” devices through the “Apple” stores and “Google Play”, provided that Application available for download soon.

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Detecting Abnormal Motion by Using Smart Security Camera

A Graduation Project Submitted to the Department of Computer Science / Dijlah University College as a Partial Fulfilment of the Requirement of the BSc. Degree in Computer Science

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Dedicate

Supervisor's Certification

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Abstract

This project discusses a method for abnormal motion detection and its real-time implementation on a smart camera. Abnormal motion detection is a surveillance technique that only allows unfamiliar motion patterns to result in alarms. Existing object detection algorithms suffer from their inability to detect the components constituting a particular object that may result in classifying such components as standalone objects. A human can easily and immediately locates object in a video, but the process is more complex for a machine.

The proposed systems consist of many levels, the first level is normal motion is detected and the motion paths are trained, building up a model of normal behavior , then second level is abnormal motion is detected by comparing the current observed motion to the stored model.

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An Overview

Chapter One

An Overview

1.1. Introduction

Abnormal motion detection is the key to effective and economical video surveillance. The detection of an abnormal motion can trigger video transmission and recording, and can be used to attract the attention of a human observer to a particular video channel. The problem is characterized by three related challenges (Baranwal, Khan, & De Silva, 2011).

One is the reliability requirement, meaning that irregular events should be consistently detected, while the false-alarm rate should be sufficiently low. The second is effective characterization of normal motion, allowing discrimination between normal and abnormal activity. Third, abnormal motion detection should be accomplished using the limited computational power available at or near the camera (Ahmed, Sharif, Ihaddadene, & Djeraba, 2008).

This project presents a novel real-time abnormal motion detection scheme. Motion features are derived from the motion vectors. Normal activity is characterized by the joint statistical distribution of the motion features, estimated during a training phase at the inspected site. During online operation, improbable-motion feature values indicate abnormal motion. Relying on motion vectors rather than on pixel data reduces the input data rate by about two orders of magnitude, and allows real-time operation on limited computational platforms (Al-Nawashi, Al-Hazaimeh, & Saraee, 2017).

Network video cameras permit pervasive, wide-area visual surveillance. However, due to the vast amounts of visual data they produce, human-operator monitoring is not possible and automatic algorithms are needed. A task that recently gained prominence in surveillance and homeland security applications is anomalous behavior detection, i.e., identification of objects whose behavior differs from behavior typically observed. Many surveillance methods are based on a general pipeline-based framework; moving objects are first detected, then they are classified and tracked over a certain number of frames, and, finally, the resulting paths are used to distinguish ”normal” objects from ”abnormal” ones. In general, these methods contain a training phase during which a probabilistic model is built using paths followed by ”normal” objects.

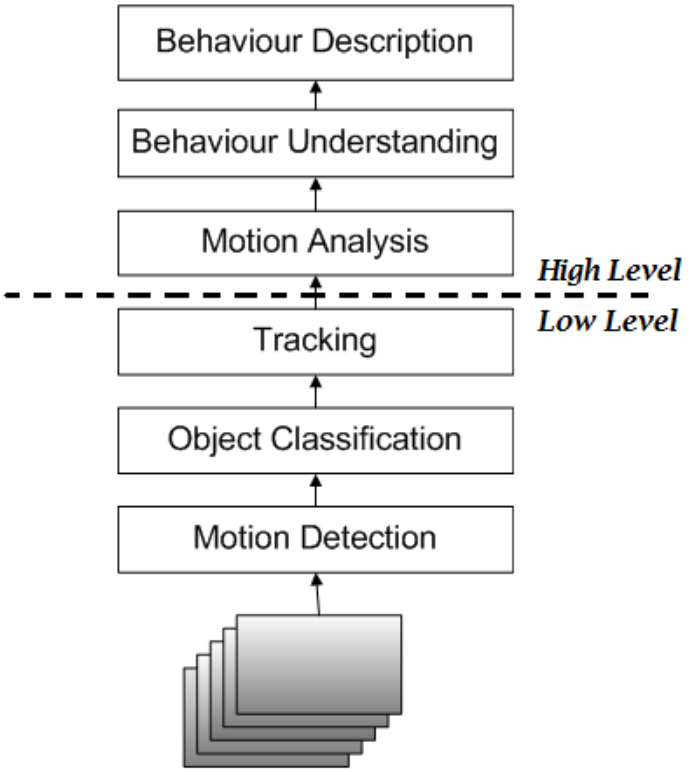


Fig (1. 1)

The main frame-work for video surveillance systems Video surveillance systems produces huge amounts of data for storage and display. Long-term human monitoring of the acquired video is impractical and ineffective.

Automatic abnormal motion detection system which can effectively attract operator attention and trigger recording is therefore the key to successful video surveillance in dynamic scenes, such as airport terminals.

This project presents a novel solution for real-time abnormal motion detection. The proposed method is well-suited for modern video-surveillance architectures, where limited computing power is available near the camera for compression and communication(Baranwal et al., 2011).

1.2. The Aim of project

The aim of this project is to implement a system capable of detecting abnormal motion by using smart security camera, by normal motion is detected and the motion paths are trained, building up a model of normal behavior and then abnormal motion is detected by comparing the current observed motion to the stored model.

1.3. Statement of Problem

Recently, through advances in image processing technology as well as through better availability and affordability of cameras, it has become possible to use automated visual systems for many different applications. Among those, visual monitoring and surveillance attract much attention due to increasing concerns about security threats in sensitive areas and inadequacies in crime prevention(Zhang & Liu, 2008).

In a typical surveillance application, the number of cameras and the amount of captured video can be so large that a human operator cannot handle all the

information from multiple input channels. Moreover, it is difficult for humans to watch video streams for a long time and remain able to analyze the data, detect all suspicious events and respond to them in a timely fashion without missing anything.

A common requirement in all automatic surveillance systems is to detect suspicious and abnormal behavior. The challenge in this area is to extract relevant information from the scene, identify probably suspicious behavior and direct the attention of security personnel to the situation for further investigation.

Unfortunately it can be hard to automatically distinguish between what is a normal and what is an abnormal or suspicious event. In our work abnormal events are defined as events which are not predictable due to the time, condition and location of their occurrence. The key issue in automatic abnormal event detection is learning. The cost of manual selection of algorithms and tweaking of algorithm parameters for each specific environment quickly becomes prohibitive for ubiquitous deployment of camera systems. The surveillance system has to be generic and learn in a predefined manner any normal patterns of behavior for different types of objects detected in the scene and build a model of normal behavior for the area under investigation. Abnormal events will then be detected when an observed event does not match the constructed model of normal behavior. Previous work in the area of event detection varies widely due to different methods employed for learning, feature vector selection and abstraction level of abnormality detection(Ahmed et al., 2008).

Motion is a core feature for abnormality detection, but motion alone may not be enough and other features may need to be used in combination with motion to achieve robust functionality. However, as part of our research challenge is

aimed at embedded systems and because of memory limitations within our current smart camera hardware, we discuss in this project only abnormality detection experiments based on motion patterns.

1.4. VIDEO SURVEILLANCE

There have been a number of surveys about object detection, classification, tracking and activity analysis in the literature. The survey we present here covers only that work that is in the context as our study. Though, for the comprehensive completeness, we too give brief information on some techniques in which are used for similar tasks that are not covered in our project.

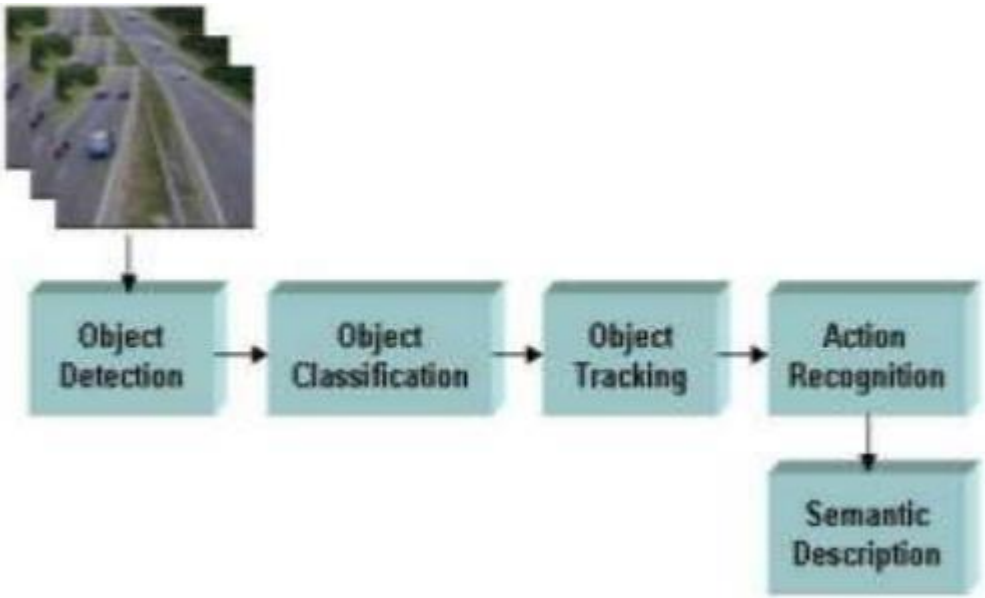


Fig: (1.2) A generic framework for smart video processing system

A generic video processing framework for smart algorithms is shown in fig. 1. Although, the some steps need interchange of information with other level, this structure provides a good structure for the discussion throughout this brief survey(Saruwatari, Sakaue, & Sato, 2012).

1.5. The Project Outline

The contents of individual chapters in the remainder part of this project are briefly reviewed:

- **Chapter 1:** Reviews the concept of the Abnormal motion detection, aim of project and the statement of problem.
- **Chapter 2:** Reviews the concept of the image processing and motion detection algorithm.
- **Chapter 3:** Introduces the implementation of the designed system. Which is given in details in chapter two.
- **Chapter 4:** Presents some conclusions and recommendations for future works that can improve and augment this graduation research project.

Chapter Two

Fundamentals of Image Processing and Camera

Chapter Two

Fundamentals of Image Processing and Camera

2.1. Image processing

An image may be defined as a two-dimensional function, f(x, y), where x and y are *spatial* (plane) coordinates, and the amplitude of f at any pair of coordinates (x, y) is called the *intensity* or *gray level* of the image at that point. When x, y, and the amplitude values of f are all finite, discrete quantities, we call the image a *digital image*. The field of *digital image processing* refers to processing digital images by means of a digital computer. Note that a digital image is composed of a finite number of elements, each of which has a particular location and value. These elements are referred to as *picture elements*, *image elements*, *pels*, and *pixels*. *Pixel* is the term most widely used to denote the elements of a digital image(Al-Nawashi et al., 2017).

The digital image I(r, c) is represented as two dimensional arrays of data where each pixel value corresponds to the brightness of the image at point (r, c), in the linear algebra terms, a two–dimensional array is referred to as a matrix, and one row (or column) is called a vector. This is image model for monochrome (one–color), this is what we normally refer to as black and white image data, we have other types of image data that require extensions to this model typically, these are multiband image and these can be modeled by different I(r, c) function corresponding to each separate band of brightness information.

Color image can be modeled as three-band monochrome image data, where each band of data corresponds to a different color. The actual information stored in the digital image is the brightness information in each spectral band.

When the image is displayed, the corresponding brightness information on the screen pictures element that emits light energy corresponding that particular color. Typical color images are represented as red, green, blue, or RGB images. Using the 8-bit monochrome standard as model, the corresponding color image would have 24–bits/pixel, 8 bits for each of the color bands (red-green, blue) (Nallaivarothayan, Fookes, Denman, & Sridharan, 2014).

2.2 Application of image processing

There are a large number of applications of image processing in diverse spectrum of human activities-from remotely sensed scene interpretation to biomedical image interpretation. In this section we provide only a cursory glance in some of these applications.

1. **Automatic Visual Inspection System**

   Automated visual inspection systems are essential to improve the productivity and the quality of the product in manufacturing and allied industries.

2. **Remotely Sensed Scene Interpretation**:

   Information regarding the natural resources, such as agricultural, hydrological, mineral, forest, geological resources, etc., can be extracted based on remotely sensed image analysis. For remotely sensed scene analysis, images of the earth's surface are captured by sensors in remote sensing satellites or by a multi-spectral scanner housed in an aircraft and then transmitted to the Earth Station for further processing.

3. **Biomedical Imaging Techniques:**

   Various types of imaging devices like X-ray, computer aided tomographic (CT) images, ultrasound, etc., are used extensively for the purpose of medical diagnosis(Petrou & Petrou, 2010).

4. **Defense surveillance**:

   Application of image processing techniques in defense surveillance is an important area of study. There is a continuous need for monitoring the land and oceans using aerial surveillance techniques.

   Suppose we are interested in locating the types and formation of Naval vessels in an aerial image of ocean surface. The primary task here is to segment different objects in the water body part of the image. After extracting the segments, the parameters like area, location, perimeter, compactness, shape, length, breadth, and aspect ratio are found, to classify each of the segmented objects. These objects may range from small boats to massive naval ships.

   Using the above features it is possible to recognize and localize these objects (Petrou & Petrou, 2010).

5. **Content-Based Image Retrieval:**

   Retrieval of a query image from a large image archive is an important application in image processing. The advent of large multimedia collection and digital libraries has led to an important requirement for development of search tools for indexing and retrieving information from them. A number of good search engines are available today for retrieving the text in machine readable form, but there are not many fast tools to retrieve intensity and color images [3].

6. **Image and Video Compression**:

   Image and video compression is an active application area in image processing. Development of compression technologies for image and video continues to play an important role for success of multimedia communication and applications. Although the cost of storage has decreased significantly over the last two decades, the requirement of image and video data storage is also growing exponentially (Van der Walt et al., 2014).

2.3 Human visual perception

Electromagnetic radiation in the optical band generated from our visual environment enters the visual system through eyes and are incident upon the sensitive cells of the retina. The activities start in the retina, where the signals from neighboring receivers are compared and a coded message dispatched on the optic nerves to the cortex, behind our ears. An excellent account of human visual perception may be found in. The spatial characteristics of our visual system have been proposed **as** a nonlinear model. Although the eyes can detect tranquility and static images, they are essentially motion detectors. The eyes are capable of identification of static objects and can establish spatial relationships among the various objects and regions in a static scene. Their basic functioning depends on comparison of stimuli from neighboring cells, which results in interpretation of motion. When observing a static scene, the eyes perform small repetitive motions called *saccades* that move edges past receptors. The perceptual recognition and interpretation aspects of our vision, however, take place in our brain. The objects and different regions in a scene are recognized in our brain from the edges or boundaries that encapsulate the objects or the regions inside the scene(Van der Walt et al., 2014).

The maximum information about the object is embedded along these edges or boundaries. The process of recognition is a result of learning that takes place

in our neural organization. The orientation of lines and the directions of movements are also used in the process of object recognition.

2.4 Human eyes

The structure of an eye the transportation of the visual signal from the retina of the eye to the brain takes place through approximately one and a half million neurons via optic nerves. The retina contains a large number of photo-receptors, compactly located in a more or less regular, hexagonal array. The retinal array contains three types of color sensors, known as *cones* in the central part of the retina named as fovea centrals. The cones are distributed in such a way that they are densely populated near the central part of the retina and the density reduces near the peripheral part of the fovea. There are three different types of cones, namely red, green and blue cones which are responsible for color vision. The three distinct classes of cones contain different photosensitive pigments. The three pigments have maximum absorptions at about 430 *nm* (violet), 530 *nm* (blue-green) and 560 *nm* (yellow-green).

Another type of small receptors fill in the space between the cones. These receptors are called *rods* which are responsible for gray vision. These receptors are more in number than the cones. Figure (2.1) shows the human eyes.

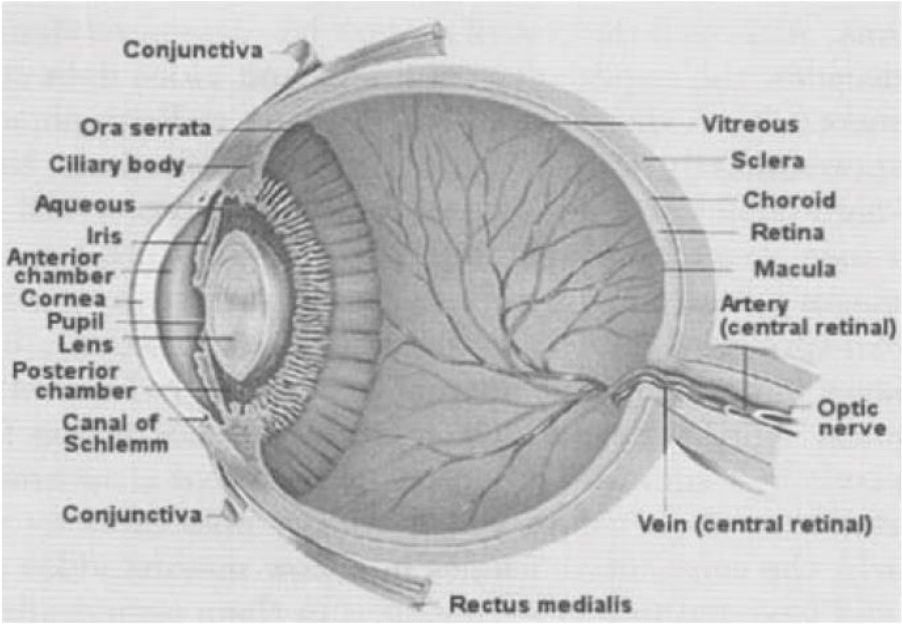


Fig (2.1): human eyes

Rods are sensitive to very low-levels of illumination and are responsible for our ability to see in dim light (scotopic vision). The cone or photopic system, on the other hand, operates at high illumination levels when lots of photons are available, and maximizes resolution at the cost of reduced sensitivity(Petrou & Petrou, 2010).

2.5 RGB Color Model:

The RGB color model has three basic primary colors: Red, Green, and Blue. All other colors are obtained by combining them. This model can be thought as a cube, where 3 non-adjacent and perpendicular corners are R, G and B, like in the figure (2.2)

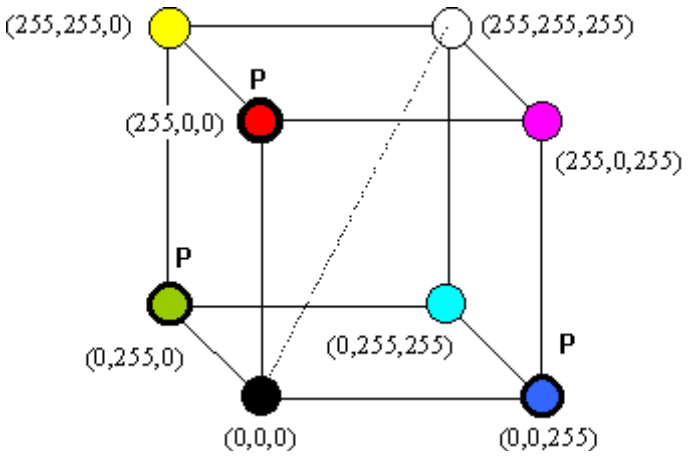


Fig (2.2): RGB color mode

The colors with a P are the primary colors. The dashed line indicates, where to find the grays, going from (0, 0, 0) to (255,255,255).

As can be seen, RGB is an additive color model, since the combination of red, green and blue gives white. This is the color model that is most commonly used in computer graphics, since it matches the way the color is stored in the video memory [5].

Compute the R, G, and B values

R= pixel mod 256 ……..(2.1)

G=(pixel and &HFF00FF00)/256& ……(2.2)

B=pixel and &HFF0000)/65536 ……(2.3)

2.5 Gray model:

The gray model is the result from converted the RGB color space to gray level color space (Petrou & Petrou, 2010).

Figure (2.3) shows the Converting model.

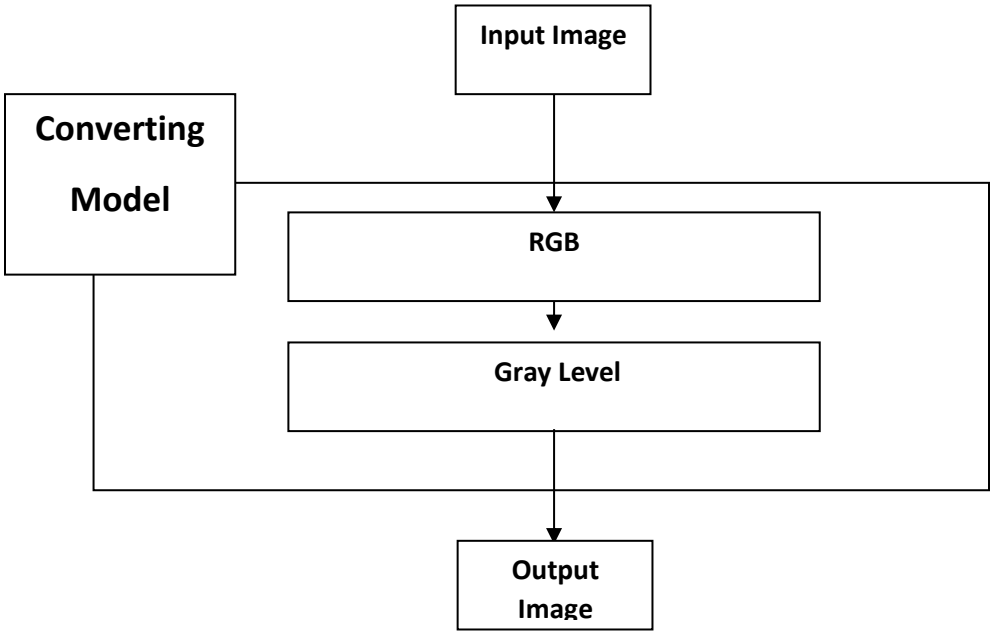


Fig (2.3): converting Model

The equation to find the gray value

Gray=(R*0.2999)+(G*0.587)+(B*0.114) …….(2.4)

2.6. Motion Detection Algorithm

As a first step in prepare the background to be the first frame we received, as that we now have no motion at all, we further schemes the background by applying a Grayscale filter and a Pixel late Filter. The pixilated filter here used to reduce the pixels calculates and emphasize the overall color distribution of the image; then we extract the image dimensions to use in further processing.

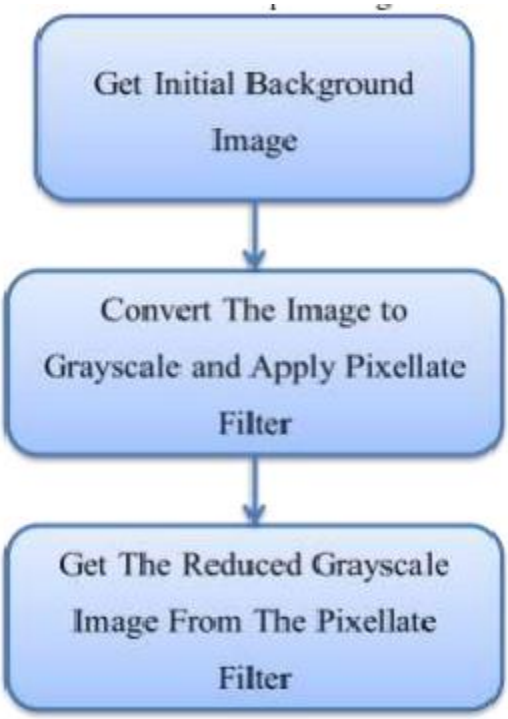


Fig:(2.4) setting the initial background image.

Updating the background image from the steps in first we get a frame and called it the current frame, we first apply the same filters as we did with the background image process. That means we make the current frame as the same as the background image in structure and format process. For update the background image by moving the pixels intensity towards the pixels intensity of the current frame by one level, during the direction of reduces diffirence with overlay image source image is moved towards overlay image. The update equation is defined in the next way(Van der Walt et al., 2014):

The bigger is step size value the more resulting image will look like overlay image. For example, the case if step size is equal to 255, the resulting image will be equal to overlay image regardless of source image pixel values. The second case if step size is set to 1, the resulting image will very little differ from the source image. However, in the case if the filter is applied repeatedly to the resulting image again and again, it will become equal to overlay image

in maximum 255 iterations. In our case we repeatedly apply the filter to the updated background overlayed on the current frame, which in result will be counted as applying the filter for the first time. The value of step per pixel, we take is 1, since if we increase the moving steps, we make the background image more similar to the current frame, among this small amount of movement we prevent the background image from become less sensitive to the changes of the upcoming frames, and also reduce the number of iterations that will be made on the background and the current frame, which yields more speed in processing the frames which is a crucial criteria in real-time processing.

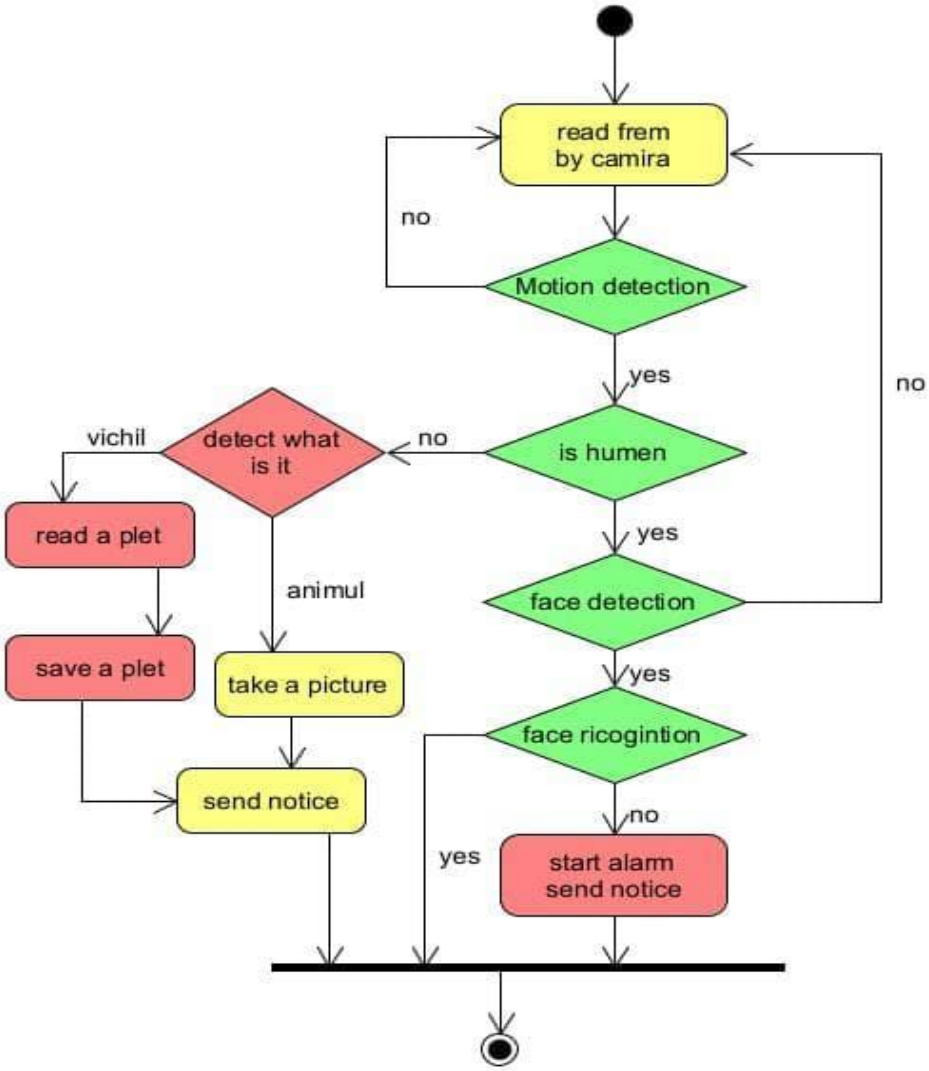
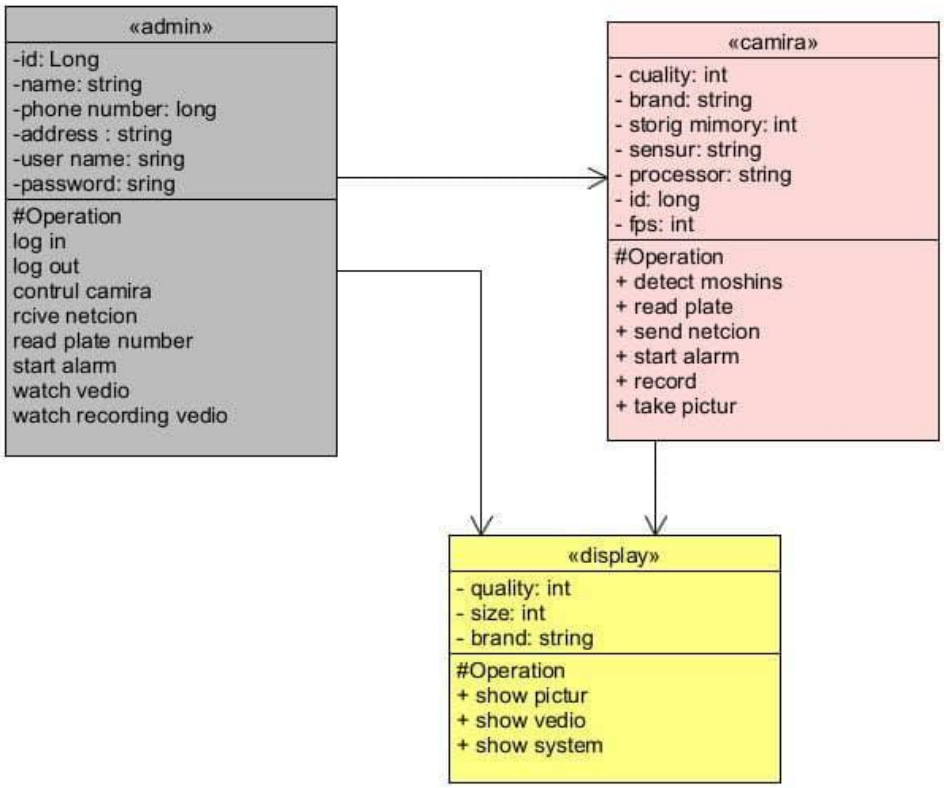


Fig (2.5) ACTIVITY DIAGRAM



Fig(2.6) CLASS DIAGRAM

Chapter Three

Design of the Proposed System

Chapter Three

Design of the Proposed System

3.1. Overview

What is an abnormality?

For people, abnormal events or occurrences are something that we are learned to identify based on experiences and our ability to understand the context in which things occur. E.g. there is nothing abnormal about a car driving on a road, but a car driving on a playground is highly abnormal. As well as there is nothing abnormal about a child playing on a playground, but it certainly would be if the child was on a road. If we see something we will consider the surroundings, use other senses and several other factors which will help us decide if we should be concerned or not(Ahmed et al., 2008).

An algorithm can be taught what is normal and abnormal to a certain extent, but not to the same extend as humans with years of experiences and a complex brain with many senses - at least not yet. The more complex the input is, the more difficult it becomes to develop very good algorithms for understanding abnormalities.

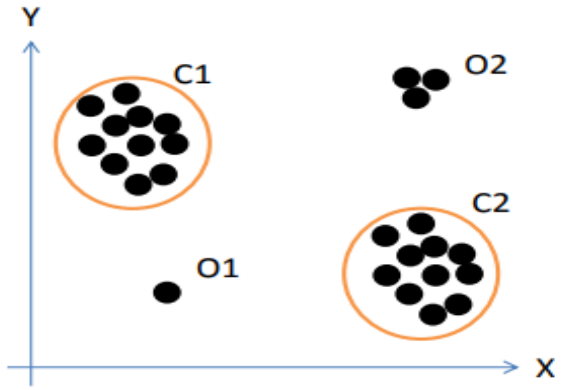


Figure 3.1: Simple example of abnormalities.

For simple input, as visualized in figure 3.1 there are fairly simply solutions to detect abnormalities as O2 and O1. Often identifying outliers is more complex than this and require more sophisticated solutions.

3.2. Definition of abnormal

In this project abnormal events will be defined as something that statistically occurs very rarely. The term “rarely” is obviously not very well defined and a value for this will have to be determined, either on-line while the program is running or by setting a fixed threshold or probability(Baranwal et al., 2011).

To detect something that statistically occurs very rarely it is necessary to extract information from the scene and create a model. This model will then be a generalized or average of the normality in the scene. By using statistical tools or probability theory it is then possible to measure how closely related occurrences in the scene are to the normality. This is known as the classification process which will determine if an occurrence is within the definition of abnormal or not (normal).

- **Feature extraction:**

Extraction of information from a scene is a technique known as feature extraction. A feature, in computer vision, is a mapping of an image or image patch from raw image data to an often smaller representation. A good feature should be transforming the raw image data to a much smaller representation. This should be done by extracting only the key information of the raw data and leaving out the redundant and non-describing data. Note that describing data is very different for different feature extraction methods.

- **Supervised learning:**

For generating a model there are primarily two methods; supervised and unsupervised learning. Supervised learning is a learning algorithm where the user will tell the system which class is being introduced into the classifier. It is also possible to assign weights to represent a cost of classifying an item and set a priori probabilities for these inputs. This method is most applicable to specific situations where the input data is known such as for separating known objects. The major drawback of this method is that it requires a person to manually train the classifier which can be a long and costly process, but for many classification problems this is still very feasible and the achieved results can be very good, especially if the difference between the classes is big(Al-Nawashi et al., 2017).

- **Unsupervised learning:**

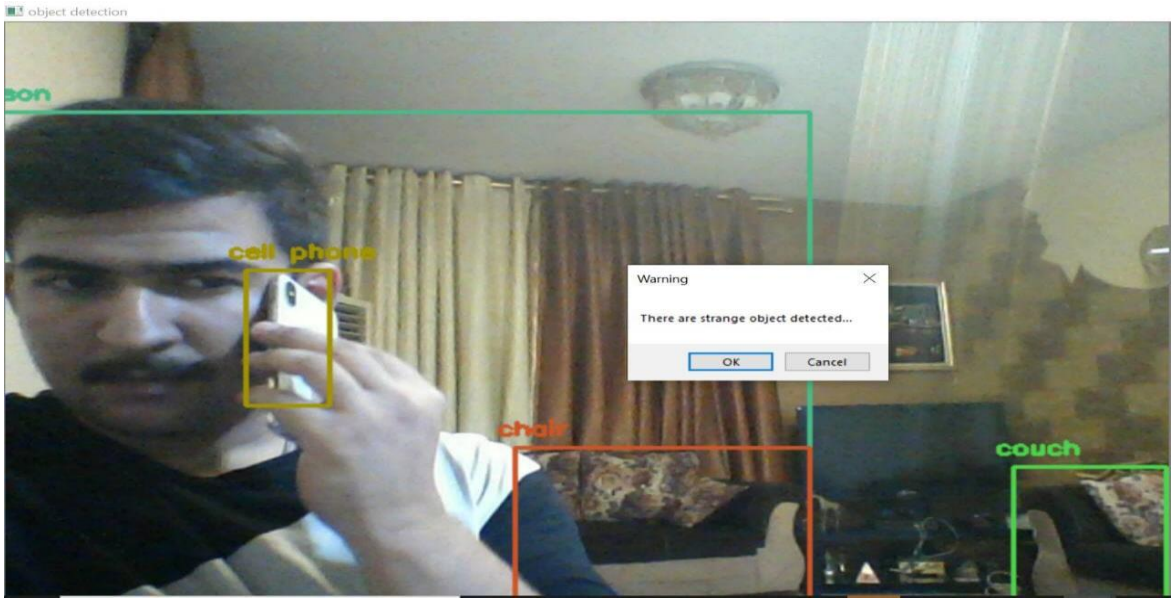
Unsupervised learning is the without pre classified data. There is no manual input of what is right and what is wrong. The system must on its own learn from the input and build a classifier that separates one or more classes from each other. The only thing the user has to do is to select the features that should be used for representing the scene and the classifier - the rest should be learned by the program. This could be combined with a method for updating the different parameters and features while the program is running. The major advantage is that the system does not require any manual input. This significantly reduces setup time of the system and the overall cost of installing it.

3.3. Proposed System

This project presents a method for detecting abnormal motion in real time using a computer vision system. The method is based on the modeling of human body image, which takes into account both orientation and velocity of prominent body parts. The present approach of abnormal motion detection using a vision system consists of the following three steps:

A. Identification of a human in the image
B. Extraction of motion parameters by using human body image modeling
C. Severity value calculation and decision making

In an indoor environment, the task is limited to identifying all the moving objects and finding the largest moving object in the image. The foreground information in the image is extracted by subtracting the background from it. This approach has a major disadvantage. If an object be changes its position in the successive images, it will always treated as moving. Hence, the background model is adaptive in nature, as the current frame is actually the current frame along with some part of the previous



3.4. Figure The Result

To overcome the problem in tracking deformable objects such as humans, the present project proposes a method modeling a human body image. This method also proves to be efficient in handling complexity and hence can be easily employed in real time procedures. A simple model for human body image is thought of as an ellipse. The advantages are as follows:

A. It is the simplest geometric shape that can represent the human body. Being a simple shape, the extraction of information from it is relatively less complex and time-consuming.
B. The rate of change of orientation of an ellipse is an indicator of severity of abnormal motion. A large rate of change of the ellipse orientation may indicate an event such as a fall or collision.
C. The rate of change of dimensions of an ellipse is also an indicator of the severity of abnormal motion.

Chapter Four

Conclusions and Future Work

Chapter Four
Conclusions and Future Works

4.1. Conclusions

This project presented a method for detecting abnormal motion in real time using a computer vision system. The method was based on the modeling of human body image, which took into account both orientation and velocity of prominent body parts. From the real time experiments conducted in the present work, the method was found to be efficient in characterizing human motion and classifying it into basic types such as falling, sitting, and walking. A shortcoming of the method was in the foreground extraction, which was essentially devised for indoor detection, as it was based on the assumption that the largest moving object in the environmeant was a human. For implementation in other (outdoor) environments, the scheme needs to be appropriately modified. For example, the use of skin color information along with the foreground identification and extraction may be appropriate. Finding moving objects (or bounding boxes) that contain human skin color or human infrared data will resolve the problem. Though the method can detect basic human motions, there are some serious abnormal motions such as, the motion of the hand in a heart attack — that cannot be tracked, as it requires motion information on various body parts obtained separately and then analyzed as a whole. The method

must be modified for precise detection of individual body parts when these are visible within the camera frames.

4.2. Future Work

Further work has to be done on the texture feature to find a descriptor that better differentiates between objects. Tests with descriptors could be tried as well as doing more test with different classifiers. A working texture classifier could be the extra that completes the project.

Improvement of the detection rate might be found by using different region sizes in these scenarios. The region size could be based on the size of the objects in the different regions. For the system to be able to adapt to changes in the scene the classifiers should be constructed such that there is the possibility of updating them in an on-line fashion. This could be done by saving the extracted features in a buffer and after every fixed interval updating the model. To test this, a dataset with adaptive motion would have to be created, since no such exists. Tests were done on the equal error rate, since this provided a method for comparing the methods. In a real-world scenario where there would probably be better to skew the error rates to get more false negative and less false positives. Tests could be done to see how many of the actual abnormalities the system picks up where one frame per abnormality would be enough. This should minimize the false positives and still output at least one frame of the abnormality.

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المستخلص

يناقش هذا المشروع طريقة لاكتشاف الحركة غير الطبيعية وتنفيذها في الوقت الفعلي على كاميرا ذكية. الكشف عن الحركة غير الطبيعية هو أسلوب للمراقبة يسمح فقط لأنماط الحركة غير المألوفة أن تؤدي إلى الإنذارات. تعاني خوارزميات اكتشاف الكائن الحالية من عدم قدرتها على اكتشاف المكونات التي تشكل كائنًا معينًا والتي قد تؤدي إلى تصنيف هذه المكونات على أنها كائنات قائمة بذاتها. يمكن للإنسان تحديد موقع الكائن في مقطع فيديو بسهولة وعلى الفور ، لكن العملية أكثر تعقيدًا بالنسبة للجهاز.

تتكون الأنظمة المقترحة من عدة مستويات ، المستوى الأول يتم الكشف عن الحركة العادية ويتم تدريب مسارات الحركة ، وبناء نموذج للسلوك الطبيعي ، ثم يتم الكشف عن المستوى الثاني هو الحركة غير الطبيعية عن طريق مقارنة الحركة المرصودة الحالية بالنموذج المخزن.

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
كلية دجلة الجامعة
قسم علوم الحاسوب

كشف الحركة غير الطبيعية باستخدام كاميرا المراقبة الذكية

هذا المشروع مقدم الى قسم علوم الحاسوب / كلية دجلة الجامعة
كجزء من متطلبات الحصول على درجة البكلوريوس في علوم الحاسوب

معد من قبل

بأشراف
د. سيف محمد علي

حزيران، 2021 - بغداد

Republic of Iraq
Ministry of Higher Education and Scientific Research
Dijlah University College
Department of Computer Science

E-data set

DUC-CS:2021.01

A Graduation Project Submitted to the
Department of Computer Science / Dijlah University College as a Partial Fulfilment of the Requirement of the BSc. Degree in Computer Science

By

Abdullah Ali
Ali Mohammed Ali
Abdullah Alaa
Mohammed Saad Sultan

Supervised By
Abdel Moneim Abdel Wahed Khudair

June, 2021 – Baghdad

Dedicate

To:

- ·the sparkle of hope ....The Advocates of change towards development
- ·Everyone who seeks to spread goodness, love and hope throughout my country

We dedicate these our humble efforts ...

Abdullah Ali
Ali Mohammed Ali
Abdullah Alaa
Mohammed Saad Sultan

June 2021

Supervisor's Certification

I certify that the preparation of this graduation research project titled "GRP Title Line 1/ Department of Computer Science / DijlahUniversity College in partial fulfillment of the requirements for the degree of BSc. In Computer Science.

Supervisor
Signature:

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Affiliation: *Dijlah University College / Department of Computer Science*
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Date: 17/ 06 / 2021

CONTENTS OF TABLE

LIST OF ABBREVATION

Abbreviation	Meaning
HDMS	Hospital Database Management System
OOP	object oriented programming
MRI	Clinical Magnetic Resonance Imaging
ECG	Electrocardiogram

1. ABSTRACT

Every hospital big or small keeps the records of its patients including the registration details of the patient and the fee payments. The entry of patients is determined whether s/he has arrived in emergency, OPD or for a routine check-up. The patient who gets admitted is provided with a room according to his/her choice. The patient is allotted a doctor according to his illness. The doctor may refer the patient to another doctor with expertise of the illness. On discharge, the patient is required to settle the bills sent by the accounts department of the hospital. The hospital also keeps the record of the doctors visiting the hospital, plus the permanent employees of the hospital. Each doctor has a few days associated with his/her visit to the hospital and also the timings when s/he is available in the hospital. The employees draw their salary from the accounts department. The hospital maintains the record of the inventory of the hospital including the equipment and the medicines, blood bank, etc. A limit for inventory is maintained for every item. When the limit is reached, an order for the purchase of the concerned item is placed. The database is updated after the supplier supplies the product.

CHAPTER ONE

Introduction

1.1 overview

Hospitals are key institutions and there is need for efficient service delivery in the hospital as good health is paramount to a happy society. As a result of this there is need for a system that will enable hospital management in making effective and efficient decision . Recently, efforts are continuously being made in designing and constructing a user friendly and reliable database system to satisfy hospital or medical management system On the other hand, many hospitals and medical centres are still adopting the manual system of hospital management. These methods of medical management system have continued to pose a lot of setbacks and problems to medical practitioners, nurses, patients and other staff in both government and private hospitals.[1][2][3]

1.2 Overall Description

A Hospital is a place where Patients come up for general diseases. Hospitals Recording information about the Patients that come.

- Generating bills.
- Recording information related to diagnosis given to Patients.
- Keeping record of the Immunization provided to children/patients.
- Keeping information about various diseases and medicines available to cure them.

These are the various jobs that need to be done in a Hospital by the operational staff and Doctors. All these works are done on papers. The work is done as follows:-

- Information about Patients is done by just writing the Patients name, age and gender. Whenever the Patient comes up his information is stored freshly.

- Bills are generated by recording price for each facility provided to Patient on a separate sheet and at last they all are summed up.

- Diagnosis information to patients is generally recorded on the document, which contains Patient information. It is destroyed after some time period to decrease the paper load in the office.

- Immunization records of children are maintained in pre-formatted sheets, which are kept in a file.

- Information about various diseases is not kept as any document. Doctors themselves do this job by remembering various medicines.

All this work is done manually by the receptionist and other operational staff and lot of papers are needed to be handled and taken care of. Doctors have to remember various medicines available for diagnosis and sometimes miss better alternatives as they can’t remember them at that time.[2]

1.3 Definitions of problems

1.3.1. Lack of immediate retrievals: The information is very difficult to retrieve and to find particular information like- E.g. - To find out about the patient's history, the user has to go through various registers. This results in inconvenience and wastage of time.

1.3.2. Lack of immediate information storage: The information generated by various transactions takes time and efforts to be stored at right place.

1.3.3. Lack of prompt updating: Various changes to information like patient details or immunization details of child are difficult to make as paper work is involved.

1.4 Advantages of Hospital Management System

1.4.1. Streamlined Operations:

- Minimized documentation and no duplication of records.
- Reduced paper work.

1.4.2. Improved Patient Care:

- Procedures for timely and effective patient care
- Faster information flow between various departments
- Easy access to reference records.

1.4.3 Better Administration Control:

- Availability of timely and accurate information
- Access to updated management information.

1.4.4 Smart Revenue Management:

- Optimized bed occupancy checks
- Effective billing of various services
- Exact stock information.

1.5 Goals of proposed system

1.5.1 .Planned approach towards work in: The working in the organization will be well planned and organized. The data will be stored properly in data stores, which will help in retrieval of information as well as its storage.

1.5.2 Accuracy: The level of accuracy in the proposed system will be higher. All operation would be done correctly and it ensures that whatever information is coming from the centre is accurate.

1.5.3 Reliability: The reliability of the proposed system will be high due to the above stated reasons. The reason for the increased reliability of the system is that now there would be proper storage of information.

1.5.4 No Redundancy: In the proposed system utmost care would be that no information is repeated anywhere, in storage or otherwise. This would assure economic use of storage space and consistency in the data stored.

1.5.5 Immediate retrieval of information: The main objective of proposed system is to provide for a quick and efficient retrieval of information. Any type of information would be available whenever the user requires.

1.5.6 Immediate storage of information: In manual system there are many problems to store the largest amount of information.

1.5.7 Easy to Operate: The system should be easy to operate and should be such that it can be developed within a short period of time and fit in the limited budget of the user

Chapter Two

2.1 THE OLD SYSTEM

The procedure involved in the current system is that, when a patient visit the hospital for medication, the patient will first of all buy the identification card which contains name, and other relevant information needed, and card identification number. The patient will then waits for the card to be processed together with a file jacket that holds the card that has column for diagnosis made by physician, drugs prescribed, and date at the waiting room for the arrival of the card. When the file arrived, the patient joints the queue to see a doctor. In this current system, file cabinets are used for keeping individual patient card enclosed in a file. This system is so tedious in tracing a record files slow in processing of records, space occupied by the file time waiting while waiting for the patient file to be retrieve by the receptionist

2.2 SOURCES OF DATA

2.2.1 Interview

The doctors and some of the personnel were interviewed in order to acquire some facts that will help in building the new system.

2.2.2 Information from Published Sources

Pieces of information were gathered from many existing publication on this subject. Several books and journals on hospital database management were consulted to get information that would be necessary for the designs of the new system

2.2.3 Documentation and Events in the Hospitals

Many hospitals are still adopting the manual system of Design and Implementation of a Hospital Database Management System (HDMS) for Medical Doctors hospital management. This method of hospital management have continued to pose a lot of setbacks, and problems to medical practitioners, nurses, patients and other staffs both private and government hospitals. Thus, a good example of these hospitals that are yet to adopt the automated system of hospital management in Baghdad. A case day shows hospitals have over two thousand patient in a week most of whom are out patient and they treat between 30 – 50 patients per day.

2.3 THE NEW SYSTEM

This new system is design for medical practitioner/physician to keep track of all patient's medical record/information such as diagnosis, drug prescribed, admission and discharged, etc. the new system will take care of the long processes and tedium work involved in tracing and retrieving a patient's record in the old system in a nut shell this will improve the efficiency of the management in a daily work as it can provide required records on time.

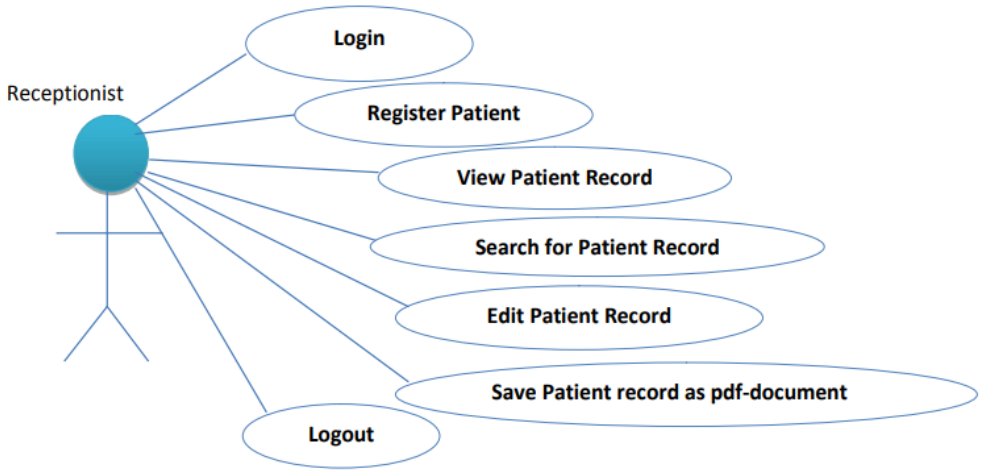


Figure 1: Receptionist Data model [4]

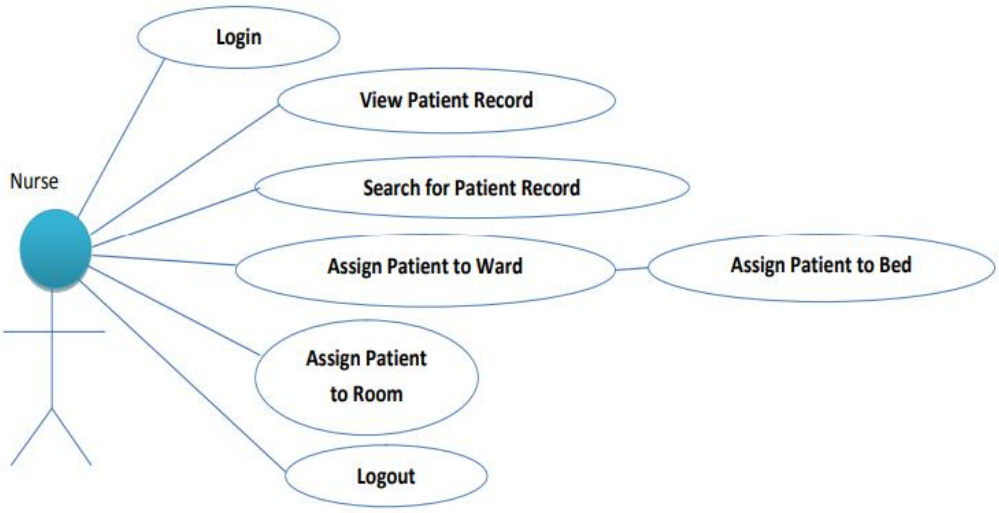


Figure 2: Nurse Data model[4]

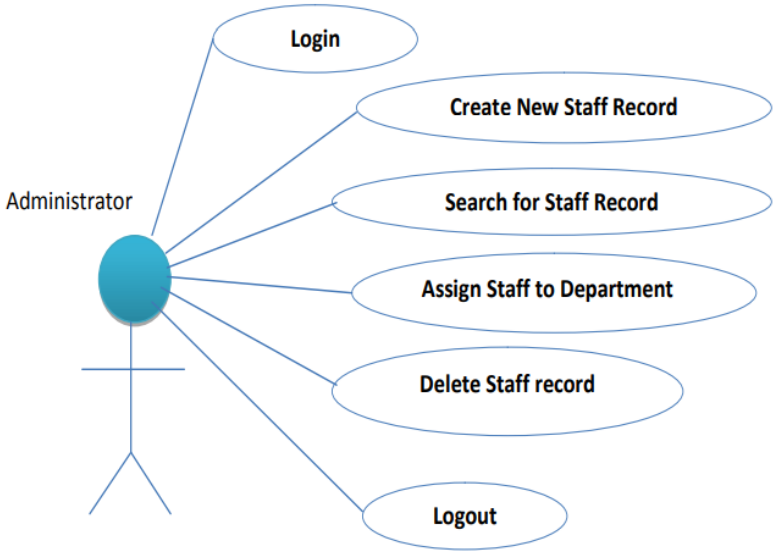


Figure 3: Administrator Data model[4]

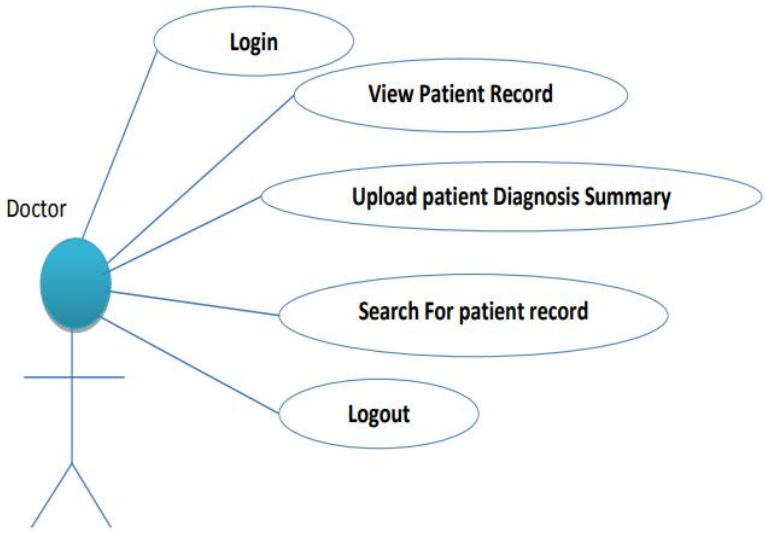


Figure 4: Doctor Data model[4]

2.4 Programming Language

The programming language to be use in designing the program is Microsoft visual basic MS, access 6.0Visual basic programming: is a programming language environment that are specially designed for creation of other programs, which is an object oriented programming (OOP) and event driven,(user don't control and determine the sequence of execution, but user will just press keys and click on various button and boxes in the window). In visual basic, we work with object (things), properties (which tell something about the object), and method (action associated with object). Therefore a visual basic program is made up of many subprograms, each has own program codes, and can be executed independently and at the same time each can linked together in one way or the other. The programming language are window basic program contain tools to make programming for windows easy, code is compiled, therefore the compiled code runs quick, keeping simple organized and protected, arranging component or control on a form using drag and drop techniques. Visual basic is user friendly

2.5 SYSTEM DESIGN

System design is the process of art of defining the architecture, component, modules, interface, and for system to satisfy specified requirement .Architecture desire creates a blue-print for the design with necessary specification for the hardware, software; people and data resources. In many cases multiple architectures are evaluated before one selected. The research question such as what is currently being done, how is it being done? How well is the task being perform. The analysts gather details about the business (medical record) process and try to improve on them. In order to enter information into an electronic medical record, special software is required. In designing the program with Microsoft visual basic the design will include the following[4]

- Use case diagram
- Database design
- Normalization

2.5.1 Database Design

Database: is a collection of structure and related record (information) stored somewhere or some location for easy retrieval and exploration. Database is designed in order to assist in eliminating unnecessary data and to minimize duplication of data.

2.5.2 Database Normalization

Normalization is the organization of data to conform to a standard called Normal form and for efficient manipulation, storage and update of data.

2.5.3 Database Implementation

The database of this application was implemented inMicrosoftoffice Access. MS-Access is database application with which one can create database files using the relational model. With this model you can create tables, store and manipulate data within the tables as required. Relationship can also be established to create communication among them

2.6 Pharmacy Management

In the hospital management system, it is necessary to monitor drug expiration dates in the stock. Also, the control module is needed, which helps to plan the delivery of medicines and products.

2.6.1 Pharmacist module

- Maintain medicine
- Keep records of hospitals stock medicines and status
- Manage medicine categories
- Watch prescription of patient
- Provide medication to prescriptions

2.7 Laboratory and tests management

The system should be able to keep its own records as well as to form plans according to the international standards. The hospital management system should store the results of all laboratory research in electronic form.

2.7.1 Clinical Magnetic Resonance Imaging (MRI) is a specialized diagnostic imaging tool capable of anatomic imaging, tissue chemical analysis as well as functional imaging of certain metabolic processes through using strong magnetic fields in order to induce and detect resonance at the nuclear (atomic) level. The results can be stored in a database and fetched again via the doctor for more security and no paper loss

2.7.2 Electrocardiogram (ECG)

Continuous measurement of patient parameters such as heart rate and rhythm, respiratory rate, blood pressure, blood-oxygen saturation, and many other parameters have become a common feature of the care of critically ill patients. When accurate and immediate decision-making is crucial for effective patient care, electronic monitors frequently are used to collect and display physiological data. Increasingly, such data are collected using non-invasive

sensors from less seriously ill patients in a hospital's medical-surgical units, labor and delivery suites, nursing homes, or patients' own homes to detect unexpected life-threatening conditions or to record routine but required data efficiently.

2.8 Data Tables

2.8.1 Users Table:-

Field Name	Data Type	Description
ID	NUMBER	
Name	Text	
Username	Text	
Password	Text	
Age	Number	
Specialization	Text	
University	Text	
Phone	Text	
User Type	Text	

2.8.2 Patient Detail Table:-

Field Name	Data Type	Description
ID	NUMBER	
Name	Text	
Phone	Number	
Treatment	Text	
Age	Number	
Details	Text	
Next date	Date	

2.8.3 Drugs Table:-

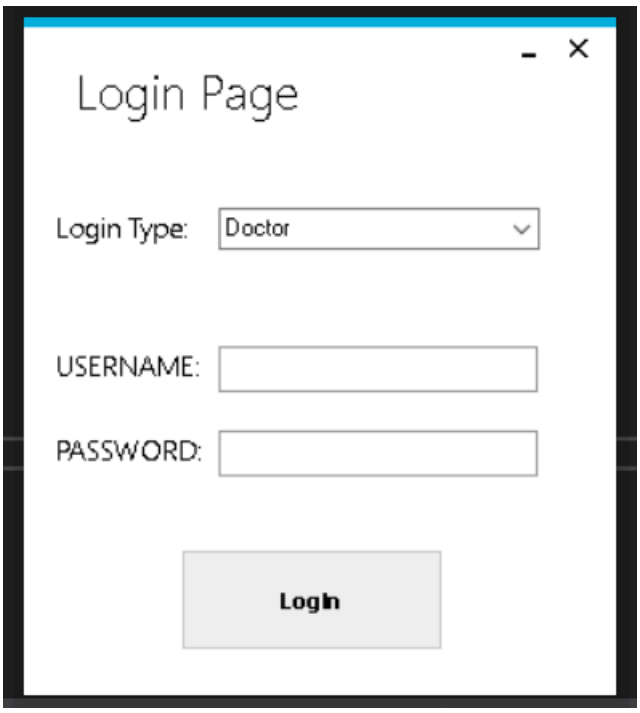
Field Name	Data Type	Description
ID	**Number**	
Name	**Text**	

Chapter Three

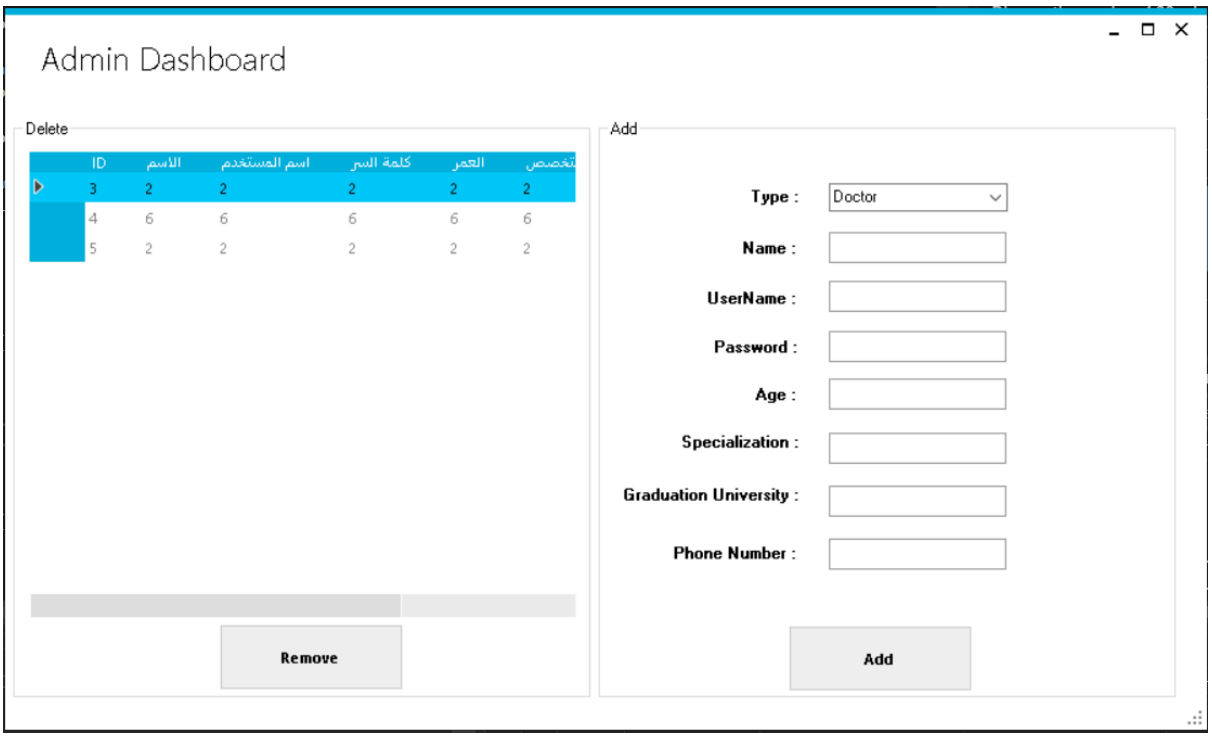
3.1 Introduction

As we explained earlier, this system was programmed using C Sharp language and Visual Studio 2019 environment, and using an Access database, the program currently works on Windows only

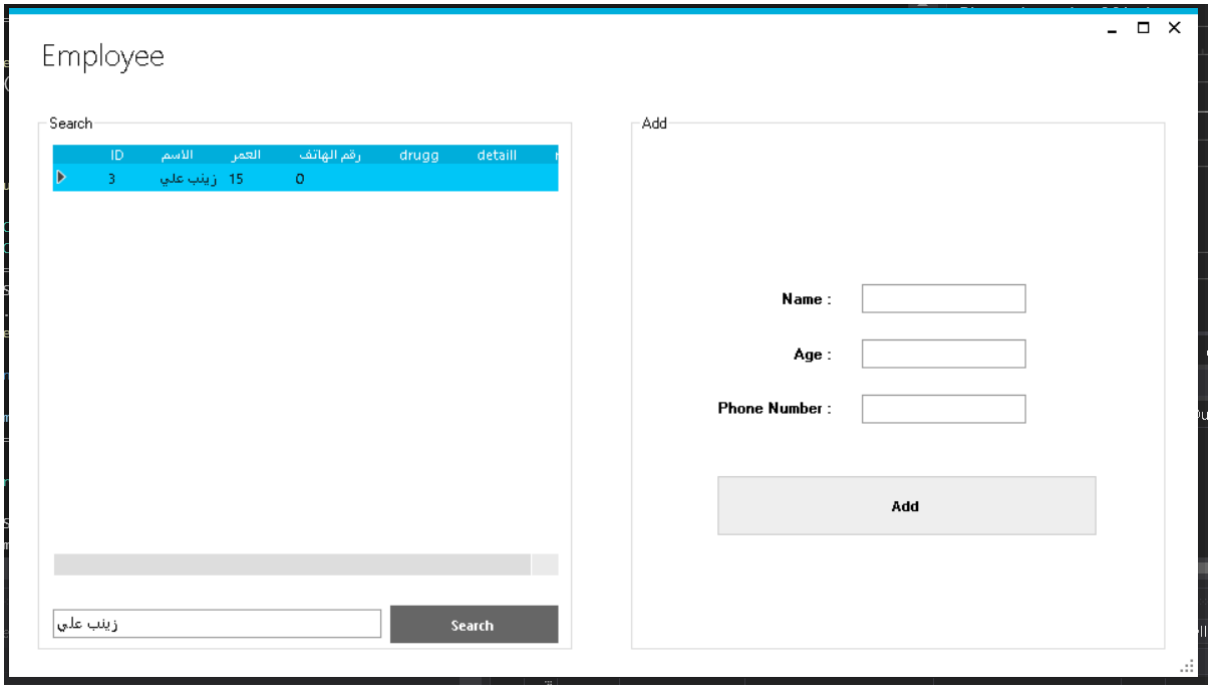
3.2 The Project Windows



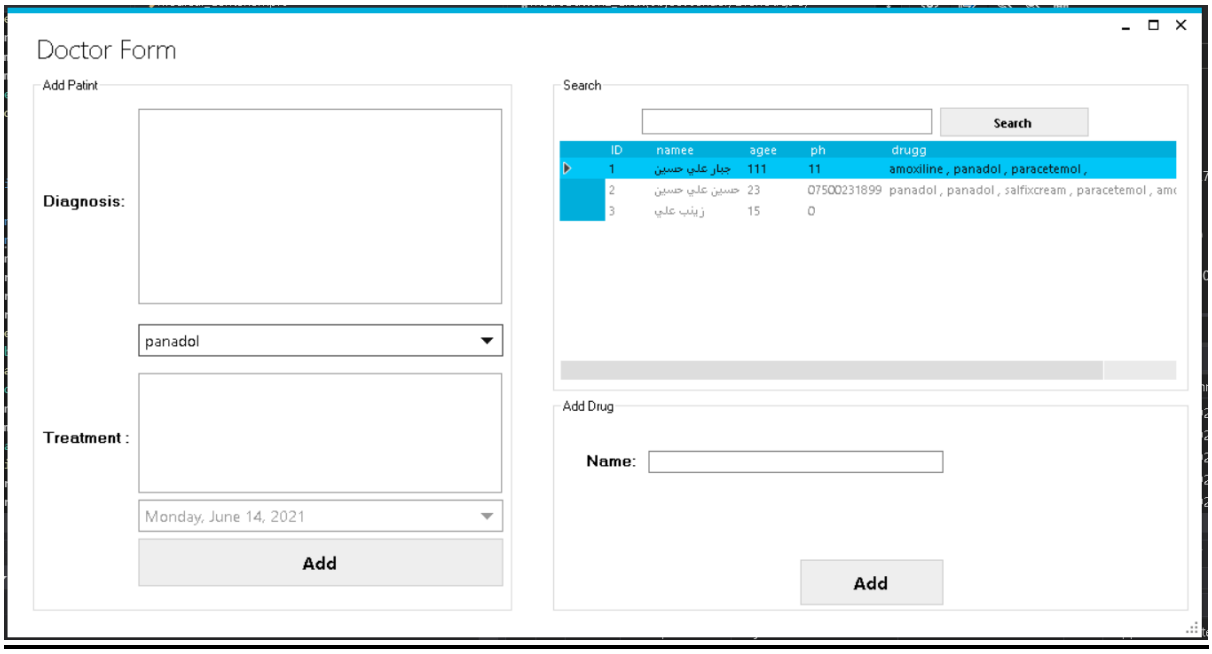
Login interface: It is the first interface when running the program, in which the type of user is entered if it is (manager, employee or doctor), and then enters the operations interface if the information is correct and if it is wrong, a warning message appears



Administrator or admin interface: Through this interface, the admin can display all employees and doctors in the database, and also can add or delete doctors, employees or admins



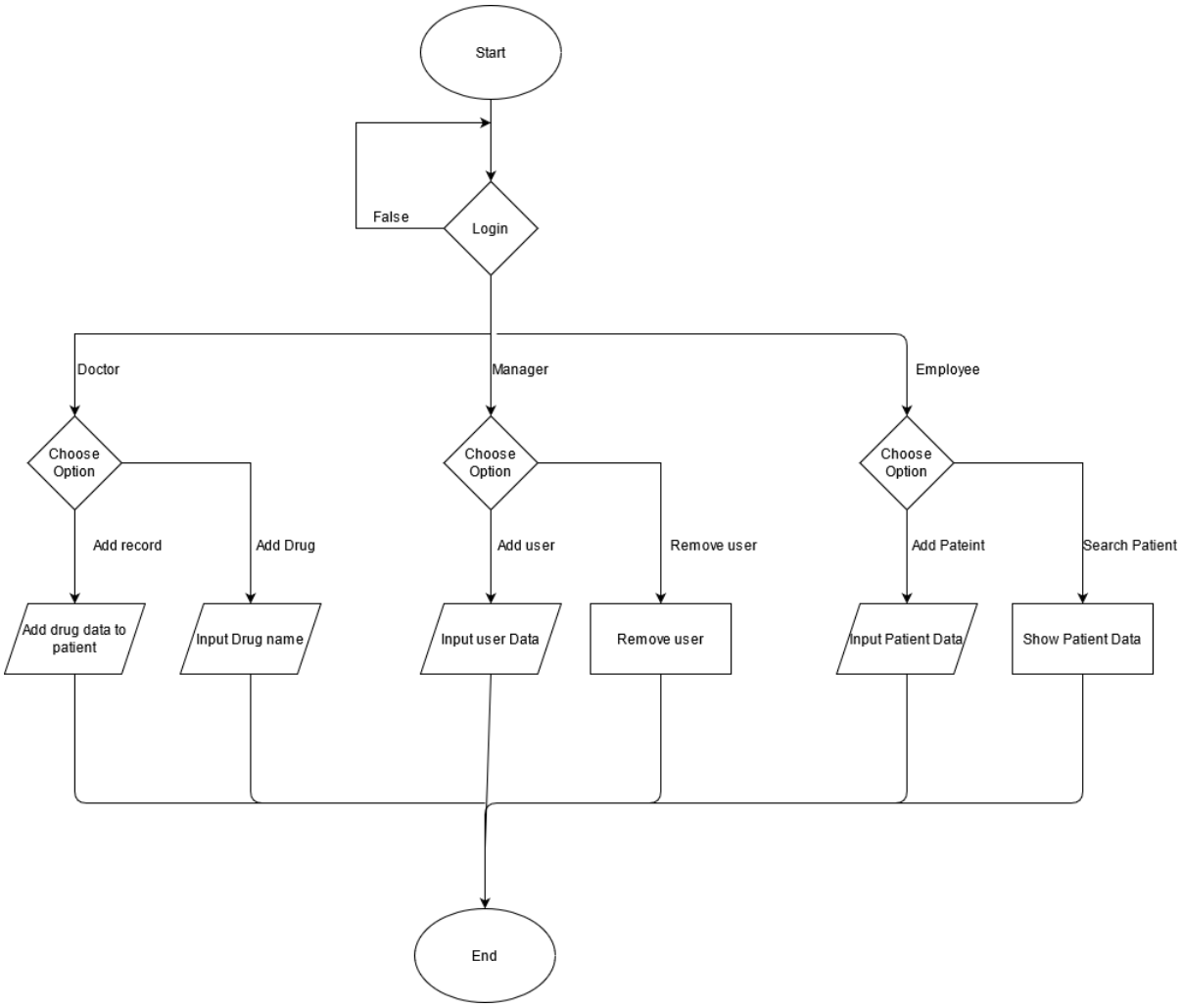
Employee interface: Through this interface, an employee can view all patients in the database, and also can add or search for patients



Doctor interface: Through this interface, the doctor can search for all patients in the database, and also can add a diagnosis to the patient or add a drug to the database

Chapter Four

4.1 Flowchart



4.2 CONCLUSION

The project Hospital Management System (HMS) is for computerizing the working in a hospital. It is a great improvement over the manual system. The computerization of the system has speed up the process. In the current system, the front office managing is very slow. The hospital managing system was thoroughly checked and tested with dummy data and thus is found to be very reliable. The software takes care of all the requirements of an average hospital and is capable to provide easy and effective storage of information related to patients that come up to the hospital. It generates test reports and also provides the facility for searching the details of the patient. It also provides billing facility on the basis of patient's status whether it is an indoor or outdoor patient. The system also provides the facility of backup as per the requirement.

4.3 Future Work

The proposed system is Hospital Management System. We can enhance this system by including more facilities like pharmacy system for the stock details of medicines in the pharmacy. Providing such features enable the users to include more comments into the system. And build an mobile app for android and IOS devices.

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