

A MOBILE-BASED BARBING APPOINTMENT MANAGEMENT SYSTEM

BY

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BACHELOR OF SCIENCE (B.Sc.) DEGREE IN COMPUTER SCIENCE

DECEMBER, 2022,

## **DECLARATION**

I hereby declare that this project was written by me and is a correct record of my work done with fully justified research. It has not been presented in any previous application for any degree of this University. All sources and citation of information are acknowledged by means of references.

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ORIGBO JESSE LEONARD

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DATE

## CERTIFICATION

This is to certify that this project was carried out by ORIGBO JESSE LEONARD in fulfillment of the requirements for the award of Bachelor of Science (B.Sc.) Degree in Computer Science, Department of Physical and Computer Sciences, University of Benin, Ugbowo, Benin City

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## DEDICATION

This project is dedicated to the Almighty God for his guidance and protection while studying at The University of Benin. Also, his grace and direction in carrying out this research work dutifully. I also dedicate this project to my parents for their unconditional love and encouragement at all times and without whose financial support and assurances this study would have been impossible.

## **ACKNOWLEDGEMENTS**

I would like to deeply express my sincere gratitude to my supervisor Mr. Idehen for his constructive remarks, correction, motivation, encouragement and useful suggestions which in no small measure contributed to the success of this project. My gratitude also goes to Prof. (Mrs) A.O Egwali, my project coordinator Mr. Desmond Idehen, and all the other lecturers in the Department of Computer Science, University of Benin, for their support and inspiration in one way or the other: Prof. (Mrs.) Akwukwuma, Prof. (Mrs) F.A. Egbokhare, Prof E.A. Onibere, Prof. A.A. Imiavan, Prof. (Mrs) S.C. Chiemekwe, Prof. G.O. Eguobase, Prof F.I. Amadin, Dr. F.O. Chete, Dr. S.S. Daodu, Dr. K.C. Ukaoha, Dr. (Mrs) S. Konyeha, Dr. E.P. Ebietomere, Mr. E.E. Obasohan, Dr. (Mrs) R.O. Osaseri, Mr. P.E.B. Imiefoh, Mr. S.O.P. Oliomogbe, Mr. E. Nwelih, Mrs. R.A. Usiobaifo, Mr. E.C. Igodan, Mr. K.O. Otkiti, Mr. F. Osagie, Miss O.L. Usiosefe, Mr. E. Obayagbona, Mrs. T. Agenmonmen, Mrs. O. Aziken, Mr. Odetayo, for their support in the completion of this work. I am most grateful to my family; my parents, Mr. and Mrs. Origbo, my siblings for their unending love and support. To my friends and colleagues, who contributed in various ways to the successful completion of this work, I say thank you! Lastly, the one who without him all of this would have been impossible, The Lord God Almighty for keeping me steadfast on this journey.

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## **ABSTRACT**

The internet has made the flow of scheduling appointments easy and so much more convenient on so many platforms; either on mobile phones or personal computers (PCs). Nowadays, businesses and service providers make due usage of appointment management systems to render services to customers. In most barbershops, the traditional system of queuing and waiting patiently are implemented; this system has a lot of flaws and is not at its best efficiency as barbers would not be able to satisfy and manage clients accordingly. This project conducts a mobile-based barbing appointment management system which would make provisional services simpler and convenient by stopping problems such as delays in appointments, absent or missed appointments which causes loss to the barber. This project was implemented using some design models such as Use sequence diagram, case diagram, logical model and data flow diagram. Flutter was used in crating the front-end development and PHP and MySQL was used for the back-end. This project aims to solve the issues stated above by providing a solution where people can conveniently reserve or schedule an appointment at any particular time on their mobile devices. The systems thorough evaluation was done to ensure that a user-friendly system is created, performs functions to the reason it was developed and works appropriately as desired. The systems adoption by barbers and customers would be beneficial as time would be efficiently and effectively managed by both barbers and the customer.

## CHAPTER ONE

### INTRODUCTION

A management system is described as a collection of interconnected or interacting elements that work together to set policy and achieve objectives. Management systems are increasingly becoming a requirement for businesses today. The management system is gradually becoming the standard by automating activities that are inconvenient to complete manually. A computerized system is fast, reduces data anomalies, eliminates data duplication, uses less paper and automatically generates information (Annie et al., 2017). The internet and its technologies have a massive impact on businesses. (Forster et al., 2018) It has changed how businesses run. In fact, a host of diverse businesses have been built entirely off the internet platform. For example, Facebook, Twitter, Just-Eat, eBay. The internet has given businesses the opportunity to reach a global audience to offers their services and goods. Through the internet, competition is no longer localized but rather the business can compete on a global platform. But a major asset that the internet provides is advertising. Advertising tools such as websites and search engine optimization SEO, have allowed even the smallest businesses to have an online presence and reach potential consumers. Nowadays, more people are accessing the internet through their mobile devices. (Forster et al., 2018)

Companies and firms are now using the internet to make and expand their business, making their business models more cohesive, effective and also make life easier for customers. For example, Just-eat made ordering food that much easier by their website which is also mobile friendly, and their phone application. This wasn't so in the Barbers industry. Although some have websites, a lot of them are just local, unknown to potential customers. Nowadays, there are so many

applications which are used to schedule appointments for a variety of services to be rendered. Often times, when customers come into a barbershop or a hair salon, the barber that they would want or would like to be attended by wouldn't be around at that moment, this causes them to grow impatient and head out to another barbershop to get their haircut. With the appointment management system in place, customers would be able to reserve a treatment as well as choose the barber they would like.

It's easier and faster to go to a barbershop when a reservation has been made as this saves time for customers that have so much on their schedule and so little free time. This is the exact scenario of barbershops; this also happens in the spa as well as beauty parlors (Abhishek, 2018). For example, there are apps that can be used to schedule appointments for various services online. If a customer requires some type of salon service, the first step in selecting a salon is to determine what services are required. Customers can also encounter difficulties when visiting the nearest salon. Traditional barbing reservations are a way for customers to go to the salon to arrange a treatment and a barber, while a mobile based appointment system for a barbing salon allows customers to book a treatment and choose a barber that they would really like.

This project is a mobile-based application with appointment scheduling functionality. This application can reduce waiting time for each customer and stylist. It will allow the customers to set the desired time and date of appointment with the salon. The salon management system does not require human efforts in maintain customer detail. It eliminates the paper based work use at the salon premise such as usage of diaries to note down appointment. It improve the efficiency and effectiveness of the salon management activities, services and processes like maintaining customers, stylist and appointments

## **Significance of Study**

Being a salon client today can get really inconvenient. You have to remember that you need to make an appointment, then hope you remembered during business hours, and finally scramble to find the phone number and take time out of your busy day to make the call. And never mind finding user reviews of local salons and stylists; tracking those down somewhere on the web is a headache that most don't even attempt. This is the experience of countless salon-goers every day, even as we move well into the twenty first century. There is a strong, well-articulated need for a "one-stop-shop" online platform that connects clients to salons, putting all the information users need in one convenient place, on demand.

Equally surprising, many salons today are still using paper and pencil systems to schedule appointments and manage customers. These systems are grossly inefficient at sharing and syncing information, and are prone to costly human error. This project promises to end the dependence on paper-pencil systems, and put salons in control with an easy to use interface. This project will be more than just an online scheduler; it will be a salon management tool that will allow salons to manage stylists and services, promote sales to customers, and track customer satisfaction. (Joshua, 2017)

## **Problem Statement**

The usual queuing system in barbershops has flaws and is far from being perfect as it leads to problems such as an increase in the waiting time of customers, which in turn leads to frustration for customers as well as a waste of resources.

## **Aim of Study**

The aim of this project is to create a mobile-based application that allows users to book barbershop appointments in their area. By providing barbershops with an online forum to attract potential clients, this application aims to enhance their business processes. This project will bridge the gap between barbershops and the online world as according to my findings, a significant number of barbershops have no online presence and rely solely on word of mouth and local residents.

## **Objectives of the Study**

The objective of this is;

- i. Review of existing literature on appointment systems
- ii. Design a mobile based system for barbing appointment
- iii. Implement and evaluate a system that is user friendly to consumers.



## CHAPTER TWO

### LITERATURE REVIEW

Sinhas and Wagh (2010) studied the growth and performance of the cellular communication sector since September 2008. The survey examines consumers' preferences and choices when it comes to mobile services as well as mobile usage. The research was based on original data gathered from businesspeople, employees, students, farmers, and other sources. The study region is Janupur in the Eastern Uttar Pradesh district, with a sample size of 100 respondents and a questionnaire-based survey. According to the findings, the bulk of consumers are prepaid customers who favor lower tariffs over better service. According to the findings, the majority of customers are satisfied with the service given by mobile service providers. There is a lack of coordination between service providers, device manufacturers, and customers, according to further investigation (Gareth et al., 2015). Finally, collaboration between service providers and mobile phone manufacturers is critical to meeting the demands of mobile phone customers. (Sinhas et al., 2010)

(Ding, 2008) worked on an article to investigate the current mobile marketing and advertising market, examine current mobile marketing applications, and analyze three selected Best practices as well as the future development of mobile marketing. The research is divided into five components. The component of the problem statement that explains the motivating factors for conducting this research is called the problem statement. Background Information highlights the structural framework and distinguishing elements of mobile marketing, as well as factors impacting consumer attitudes toward mobile marketing and measurement foundations for mobile marketing campaigns. The next section includes an analysis of current mobile marketing applications, as well as three best practices. Following that, the section on Future Development

of Mobile Marketing delves into the predictions for how Mobile Marketing will develop and how mobile technologies will influence it. This part also looks into the Key Success Factors of Mobile Marketing. (Abraham, 2007)

Numerous attempts have been made for a long time to build and improve effective barber appointment management systems that would make it easier for customers to schedule a haircut appointment without difficulty. Many constraints have been addressed by the various systems that have been developed, such as delayed appointments and waiting times, among others.

Rosadi and Andriawan conducted research that resulted in the creation of an Android-based system that can help people find boarding houses in specific areas. The descriptive analysis and growth, data collection methods, and object-oriented system development methods were used in this study. The results of this study show that a boarding house application will assist users in obtaining details, allowing them to locate boarding houses quickly and according to their preferences. (Rosadi et al., 2016).

Neny Rosmawarni created a framework that makes application development recommendations. This research employs a collective filtering approach, in which data is gathered based on user input such as reviews and ratings. This Android-based framework was tested in the area of beauty, such as a beauty salon. Users should consider a salon that suits their requirements, budget, and the suitability of the type of treatment given based on the user's needs based on some suggestions from this application. (Kadek, et al., 2020)

There have been a slew of similar applications that have been developed. There is an online appointment application for our subject that displays the current status, time, and location of the shops. Another similar app was discovered for this, called the App Service Center Appointment

Scheduler System, in which Royal Enfield claims to have online bike services. The Royal Enfield App is a one-stop shop for everything customers need to know about Royal Enfield motorcycles. Another app is for shops that have proper booking shops. There are several bugs in this app, including the inability to provide online booking, services station by phone, and the lack of an Android program. They only offer online reservations through their websites. There is an application that allows the doctor to handle his or her appointments from anywhere, and patients who are unable to visit the clinic can schedule an appointment via this application, saving both the doctor's and the patient's time. (Neny et al., 2018)

Devi and Rinabi (2016) developed an information system for a medium scale beauty salon by using Visual Basic 2010 programming with SDLC waterfall. The study was conducted by interviews to obtain and conduct data analysis. The implementation resulted in a program that could solve the problems found in medium-scale salons (Devi et al., 2016). After conducting multiple researches using different articles, I came across some core issues such as

### **Traditional System**

In the traditional system the customer goes to the salon and takes the service of salon. This does not require any online system. In this, the customer himself has to go to salon and book the seat. People need barber's service for looking good and clean. A person would like to get his turn for the haircut as soon as he reaches the barber but unfortunately that rarely happen. People don't get their turn for haircut as they reach the salon because some numbers of people are already waiting there at the salon for their turn.

### **Disadvantages**

- i. Customer's time is wasted.

- ii. Profit does not increase.
- iii. Daily Booking cannot store.
- iv. Barber cannot advertise his salon.

### **Calling System**

In the calling system the customer books the barber shop using the phone call. Customer makes a call to the barber shop and asks for a time slot and the salon provides the time slot to that customer. The customer needs the phone number of barber shops.

### **Disadvantages**

- i. Taking calls is inefficient.
- ii. Many appointments are missed.
- iii. Extra employees are needed to manage the phone calls.

Finally, we get idea, we can make a mobile application that will help customers who want to go barber shop, here any customer can easily register in this app and can book services as they want in require time slot, with the help of this any customer can save their time easily. Here barber can earn even more.

### **Waiting Time**

Waiting time simply means a period of time which one must wait in order for a specific action to occur, after that action is requested (Fernandes et al., 1994). Customers' waiting time is defined as " the length of time from when the customer enters the salon to the time the customer gets his or her haircut". (Jamaiah, 2003). It is defined as the total time from registration until consultation with a barber.

Customers become unhappy the longer they wait because waiting can be frustrating, annoying and can cause vast ambiguity. Sometimes customers are faced with the problem of arriving early to get a haircut only to hear that the barber would be late for a while or would not be available for the day. The factors leading to long waiting times include: high customer load and poor communication. (Oso, 2020)

### **Appointment Delay**

Past research shows that the longer the appointment delay which is defined as the time between the day a customer requests an appointment and his or her actual appointment date, the higher the chances that he or she will cancel or not show up (Gallucci et al., 2005). This suggests an obvious way of minimizing no shows and cancellations, this is done by asking the customers to come right away or make appointment requests on the day they want to be seen (Murray, 2000). This is called an open access (OA) or advanced access policy (Tantau, 2000), and of late it has become a popular paradigm in practice and the subject of active research. Several authors report on their experiences in implementing OA, both positive and negative (Dixon et al., 2006).

### **Kinds of Appointment Systems**

#### **Paper-based Appointment Systems**

Scheduling appointments by pen and paper limits the available window that people can make appointments which leads to the loss of potential customers. Another problem is that conflicts may arise as patients feel dissatisfied with the long waiting time. Paper based appointments do not give room for reminders or recurring appointments. (Oso, 2020)

## **Mobile Booking System**

A system is a set of independent components working together to achieve a common objective or purpose. Therefore, a mobile based system is one that is accessible by a user in order to achieve a particular task for a given objective. The alarming number of missed appointments has forced the barbing sector to recognize how they deliver services. With the advancement of IT technology today, appointment booking system lies at the intersection of delivering efficient, dependable and timely access to barbing services. Mobile application could be pre-installed on phones during manufacturing or delivered as web-application

## **Flutter**

Flutter is an open-source user interface software development kit developed by Google. It is a mobile application SDK (Software Development Kit), complete with framework, widgets and tools that offer developers with a means to build and deploy mobile applications written in Dart. It allows a native mobile application to be created with only one codebase, meaning that one programming language and one codebase can be used to create two different applications (for Android and iOS). Flutter is used to develop applications for Android, iOS, Google Fuchsia, Windows, Linux, Mac and the web from a single codebase. Flutter is written in C, C++, Dart.

## **Existing Appointment Management Systems**

Several appointment management systems have been developed and used in different fields. For example, Appointment management systems are used in healthcare to manage patients' appointment scheduling. An application to manage patients appointment booking has made use of exponential enter arrival times. This particular model used assumes that the exponential enter

arrival times could not be properly validated by date and is limited as a result of the nature of the appointment scheduling (Rohleder, 2004).

Klassen (2004) developed another method for managing patients' appointment using multiple schedule appointment in multiple period environments. Patients can call for any appointment time but if the period time is totally full, they should replace the appointment to another time. Moreover, various combinations for multi appointment and double booking are measured and recommended for various operational use depending on the health care environment as the varying appointment request has little effect on appointment system performance, especially maintaining acceptable performance, except when the system has the overloaded option (Rohleder, 2004).

Another system developed by Patrick (2006) allows a registered patient, having user name and password, to access and explore the list of physicians alphabetically and select a physician whose email contact and profile are also provided. A patient can also view the physician working calendar to find out his/her working and non-working day to make an appointment. When the patient selects, view calendar the patient can choose any particular day in a month to book an appointment (Patrick, 2006). After that, the patient will receive an electronic mail from the system to validate or confirm the appointment time or to inform that patient that the time which has been selected has already been taken by another patient or blocked by the physician. In general, the patient appointment management system provides all of the choices to the patients, such as selecting the time of appointment, selecting the physician to be consulted by and even allows the patients to access the health care system without spending time waiting for a nurse or having lengthy phone calls.

Wijewickrama and Takakuwa (2005) opine that the health care operating time (due time) is from about 8:30am to 5:30pm during the week days. Throughout this period, four types of patients arrive to have a consultation appointment in the health care center-appointed patients, same day appointment patients (walk-ins), patients who come for a medical test and new patients (Wijewickrama and Takakuwa, 2005). Patients who have appointments are given priority over those who walk in for consultation. Consequently, these latter patients have to wait a long time in the waiting room to meet a doctor even if the consultation time only lasts few minutes (Wijewickrama and Takakuwa, 2005).

### **Related Works**

Jirabhron et al. (2016) proposed an automated patient appointment reminder for cross-platform mobile application. This research work solved patient appointment management problems as patients can conveniently book and observe their appointments via a mobile application on their mobile device. The limitation of this project was that the application developed was only made for Android devices.

Choudhari et al. (2014) proposed a mobile application for booking appointments using Android. This research work brought about an easier way of booking appointments with the doctor, the patient will book the appointment through his/her mobile phone. At the other end, the doctor can determine the number of patients he attended to throughout the day, this research work can easily be adopted by hospitals to provide better medical care and service. The limitation of this application was that there was a limit to the total number of appointments to be booked.

Wenjun et al. (2011) presented a web-based appointment system to investigate the efficacy of web based appointment system in the registration service for outpatients. The proposed method

provides an increase in the satisfaction of patients with registration. The limitation with the project was that the UI was not very user friendly.

Gowthem and Kaliyamurthie (2015) proposed a smart appointment reservation system. The proposed system assists in managing appointments and it offers a platform for patients to cancel or reschedule appointments by incorporating clinical systems into a set of reliable and suitable services available in a web browser. PHP and MySQL were used in the development of this project.

Chutisant and Nwe (2012) proposed a dentist online reservation system. The objective of the proposed system is to save the time and effort of the users in safe and suitable methods. It allows patients to book and check their appointment schedule and administrator to maintain the database online without difficulty. It permits the administrator to check the patient's requests, manage the appointment schedule, and manage the patient's information. The development of this system involved the use of HTML, CSS, for the front end as well as PHP and MySQL for the back end. The only flaw with the system developed was that reservation of appointments took more time than necessary.

Wang and Gupta (2011) proposed a framework for appointment systems with patient references. They developed a framework for the appointment systems that automatically update patient's preferences to enhance booking decisions.

Mohd et al. (2009) developed a web-based appointment system by incorporating with intelligent system techniques. The system was designed to handle appointments and time set aside between students and lecturer for any academic-associated activity such as weekly meeting and discussion with lecturers. The major emphasis of the prototype is to manage appointment and calendar

updating. This system can easily be adopted by academic institutions to easily schedule and manage appointments with lecturers. HTML, CSS, JavaScript were used in the front end development of this system. PHP and MySQL were used in the back end development.

Gopal and Moinul (2017) proposed an approach based on artificial intelligence which offers fuzzy logic-based patients queue management. The model the system made used of was based on real-time referring of patients to different doctors including prescription management; this project made queuing management much easier and efficient.

## **CHAPTER THREE**

### **DESIGN METHODOLOGY**

This project will enable users book an appointment online. The main reason behind this project is to eliminate the paper-based work use at the salon premise. This project would improve the efficiency and effectiveness of salon management activities, services. The project is based on iterative waterfall model also known as software life cycle. Iterative waterfall methodology was selected for this project. Iterative waterfall methodology was use for this project because while using this model constructive changes in future. During this process he risk and iterations are implemented (Pathak et al., 2020)

#### **Development Phases**

There are four phases involved in the development of this system, the first is the requirements and analysis phase, this phase involves gathering information from client and checking by an analyst whether requirements will fulfill or not. In this system we are able to record customer information, and appointment information. The next phase is the design phase; this phase involves designing the overall system architecture like Data flow diagram, activity diagram, and use case diagram. After this phase is the implementation phase which involves putting the requirements into coding language, the front end and back end systems are developed which includes all design modules and the design database based on requirements. The last phase is the

testing phase. This phase involves linking the interfaces together to ensure the navigation and flow is smooth. All functions are integrated into the system along with the database. Testing is conducted to ensure that the modules are functional and to check for errors

## **Requirements Specifications**

This involves formulating a number of requirements: namely user requirements, system hardware requirements software attribute. They were grouped into user, functional, non-functional and system requirements. Functional Requirements covers and describes the functional requirements of the application, it also outlines what the application is going to do such as:

- Login: The system must allow the user to login. Using a form page, the user inputs his username and password which is validated and authenticated on the server side.
- Registration: The system will allow user to register/create an account. Also using a form page, the user inputs will be his/her username, email and created password.
- Find barber shops via location: The system will find the nearest barbershop via the user's location.
- Find barber shops via city: The system will find the nearest barbershop via the user's location or city provided.
- List of Service and price: The system must provide user with the services the barbershop provides and its corresponding price.
- Appointment booking: The system will allow user to book appointments.

- Google maps Direction: The system will display an on-screen map and direction list to the appointed barbershop.

Non-Functional Requirements in contrast to Functional Requirements which deal with “what the system should and must do”, Non-functional requirements focuses on “how the system operates”

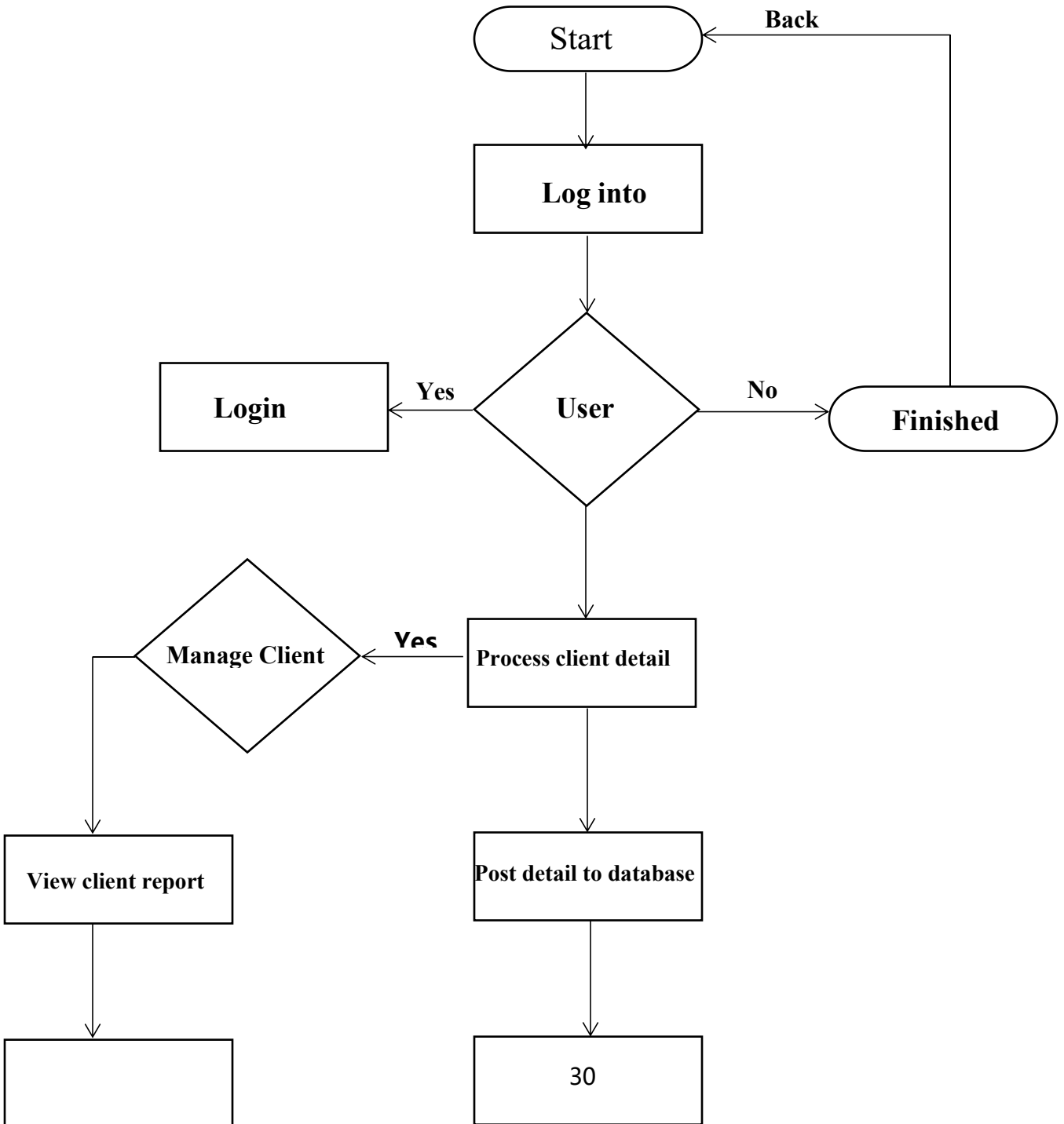
## **System Design**

The tools, which were employed during the methodology stage where Data Flow Diagrams, sequence diagram, logical model and use case diagram. The design ensures that only allows authorized users to access the systems information.

## **Logical Model**

A logical data model is a data model of a particular/specific problem domain expressed independently of a particular database management product or storage technology but in terms of data structures such as relational tables and columns, object-oriented classes. This is as opposed to a conceptual data model, which describes the semantics of an organization without reference to technology.

Logical data models represent the abstract structure of a domain of information. They are often diagrammatic in nature and are most typically used in business processes that seek to capture things of importance to an organization and how they relate to one another. Once validated and approved, the logical data model can become the basis of a physical data model and form the design of a database. Figure 1 shows the logical model.





**Figure 1.** Logical Model of the system

### **System Framework**

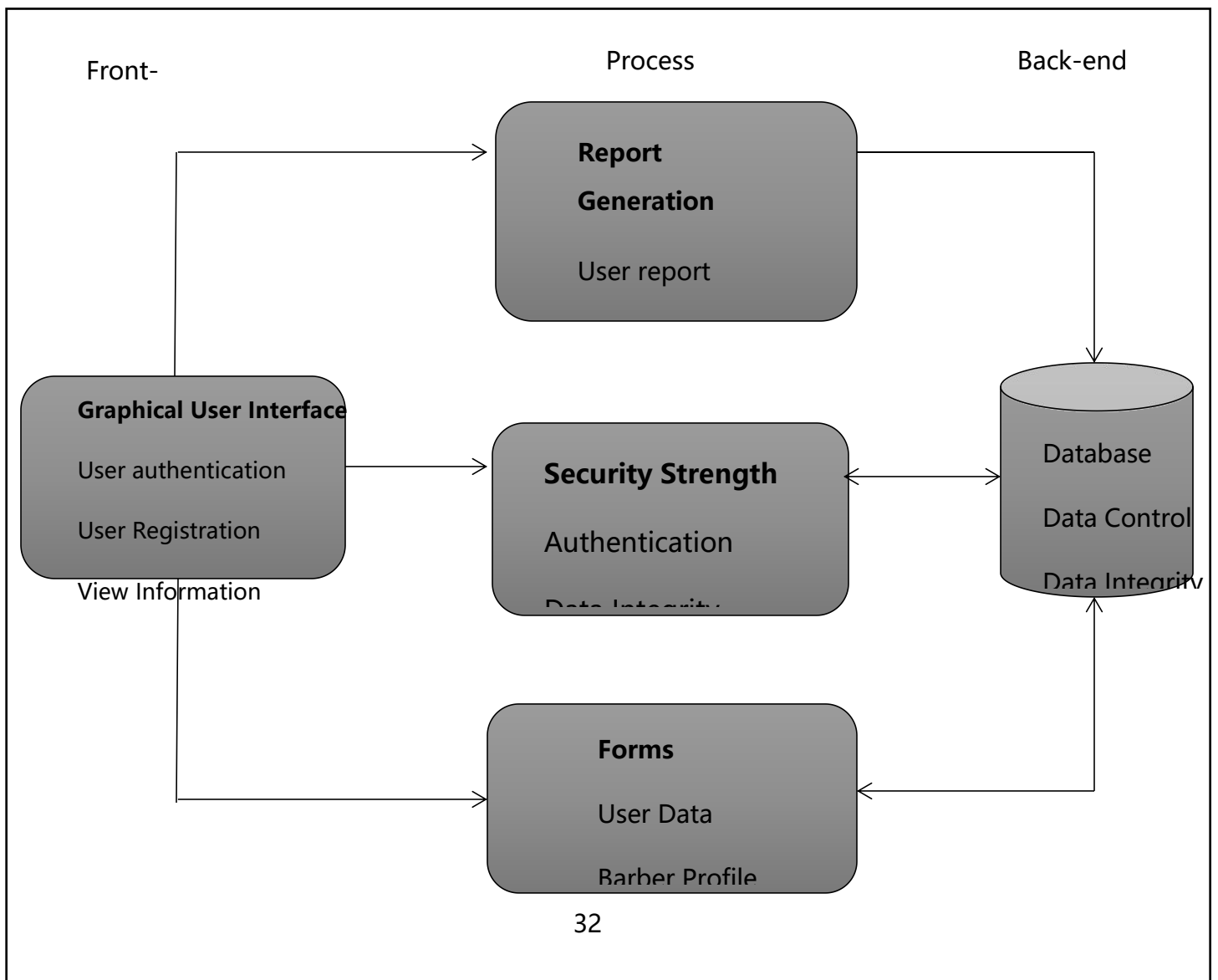
The framework is structured to enable users make use of their mobile phones, portable computer system, desktop computer system to access the booking system. The barbing appointment booking system has two components namely: the admin side and the user side. This architecture was used because with it users will not have to install any other software on their mobile devices Figure 2 shows the system framework.

### **Data Flow Diagram**

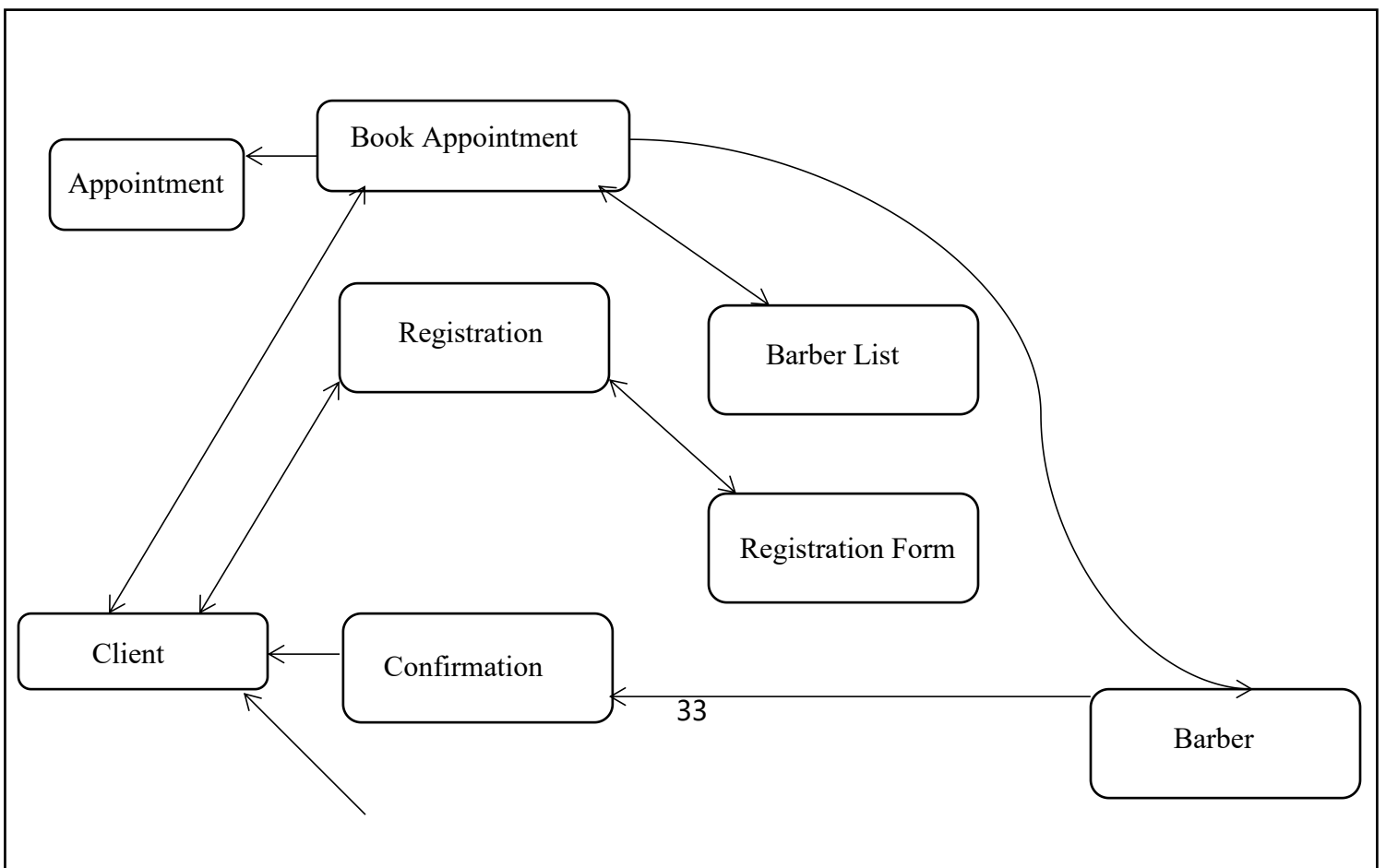
A Data Flow Diagram (DFD) is a way of representing a flow of data of a process or a system. It also provides information about the outputs and inputs of each entity and the process itself. A data flow diagram has no control flow, no decision rules and no loops. Each specific operation based on the data can be represented by a flowchart.

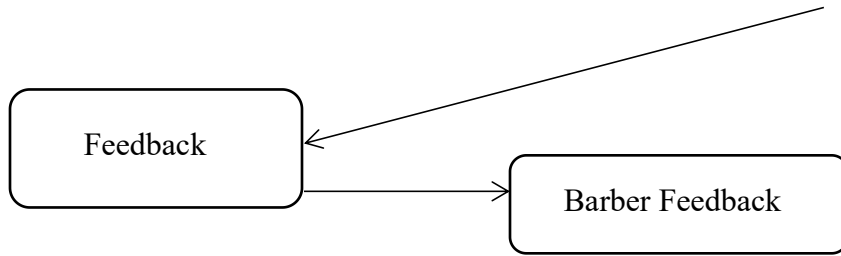
The data flow diagram is part of the structured analysis modeling tools. When using UML, the activity diagram typically takes over the role of the data flow diagram. A special form of data flow plan is a site-oriented data flow plan.

DFDs can also be regarded as inverted Petri nets, because places in such networks correspond to the semantics of data memories. Figure 3 shows the Data Flow Diagram.



**Figure 2.** System Framework





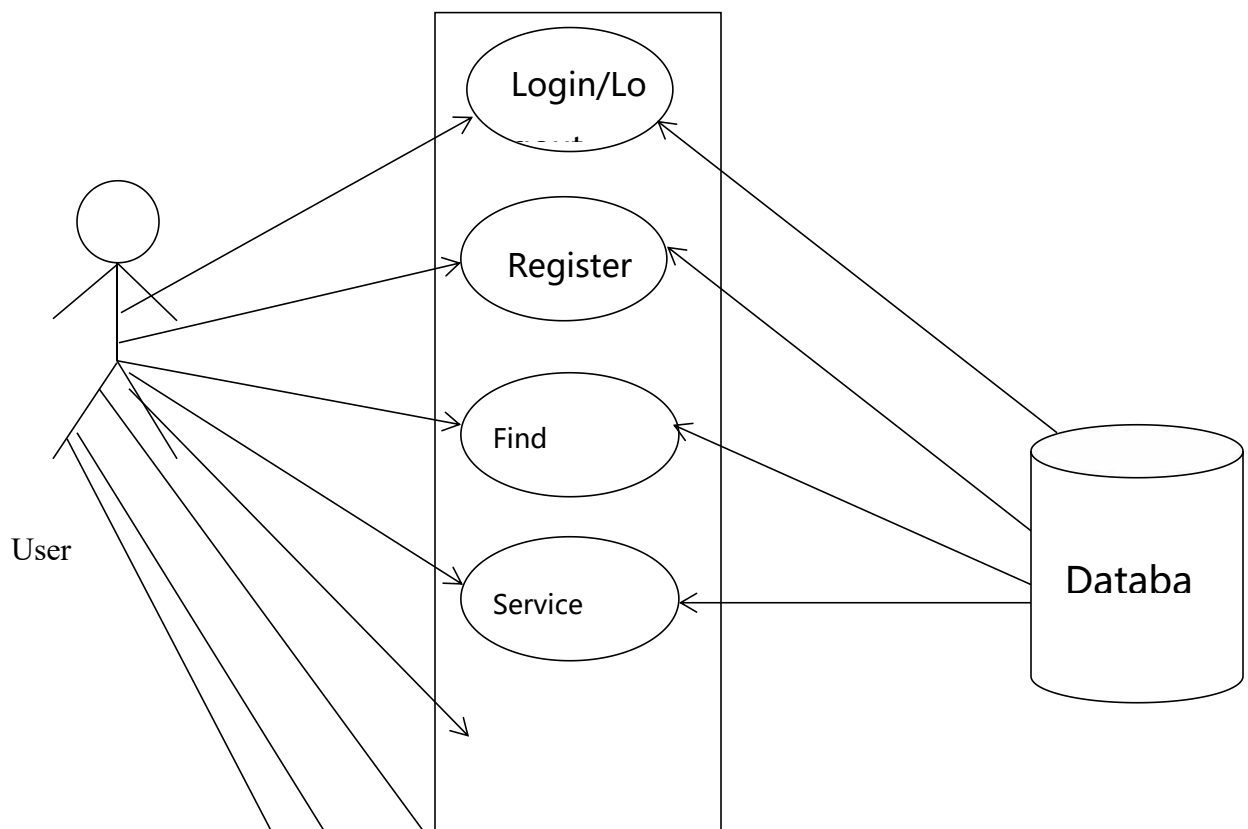
**Figure 3.** Data Flow Diagram of the appointment system

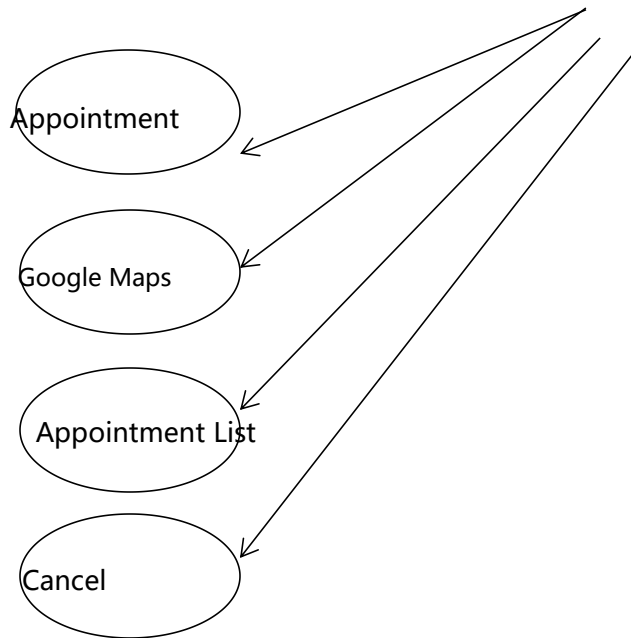
### **Use Case Diagram**

{ } shows the use case diagram of the system

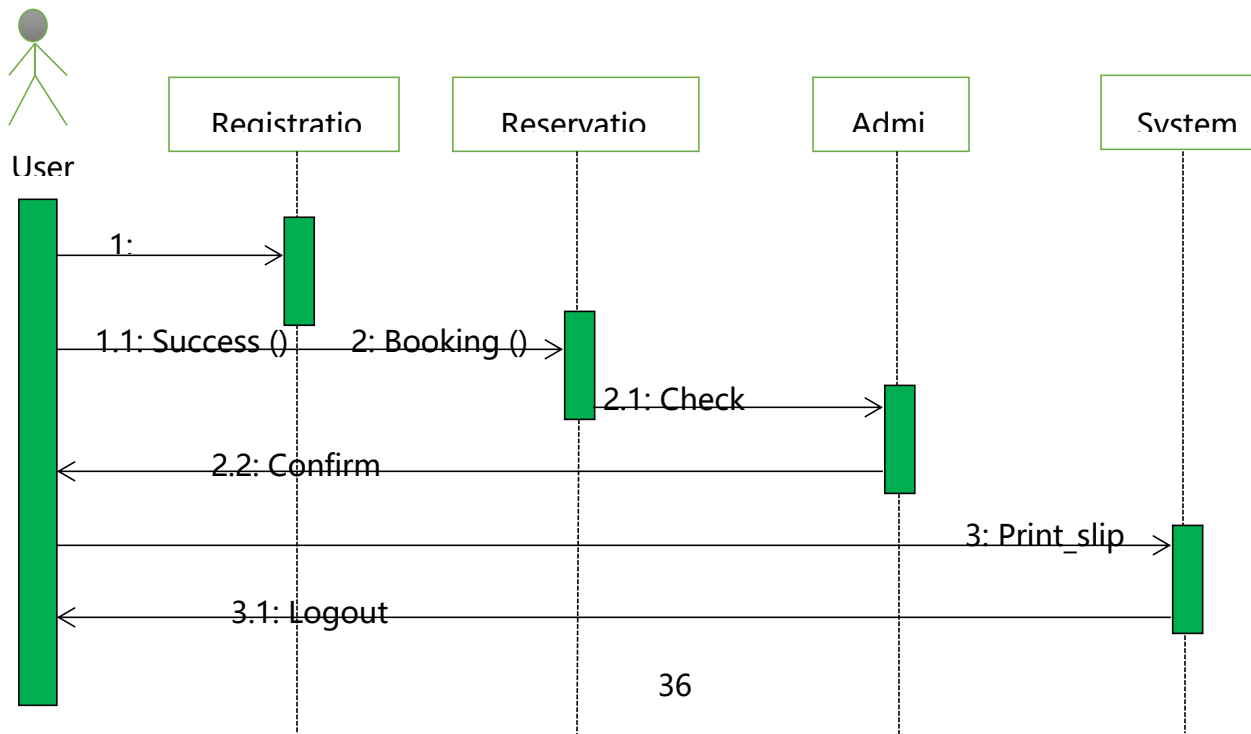
### **Sequence Diagram**

{ } shows the sequence diagram of the appointment flow.





**Figure 4.** Use Case Diagram



**Figure 5.** Sequence Diagram of the appointment flow.

## **CHAPTER FOUR**

### **IMPLEMENTATION, EVALUATION AND RESULTS**

#### **Introduction**

For this project work, Flutter SDK was used to develop the front-end and MySQL database to implement the back-end portion of the work. The implemented appointment system is to assist clients to time when taking appointments.

#### **System Specification**

System specification describes the hardware requirements as well as the software requirements. System specifications have to be studied appropriately to ensure the system would be productive. In order to plan a strong groundwork for the implantation of the project, the hardware and software requirements are shown below.

#### **Hardware Requirement**

The minimum hardware requirements are as follows:

- i. 3.0 GHz Processor speed

- ii. 500 GB Hard disk/ SSD
- iii. 8GB RAM
- iv. Keyboard

### **Mobile devices Requirement**

The mobile device requirements are as follows:

- i. A modern mobile operating system (iOS, Android)
- ii. A mobile device with at least 1GB of RAM
- iii. A reliable 3G connection

### **Software Requirement**

The software requirements are as follows:

- i. Windows 7, Windows 8, Windows 10 operating systems
- ii. XAMPP and MySQL
- iii. Code editor (Visual Studio Code)
- iv. Android Studio

### **Implementation**

Flutter, PHP and MySQL were used to implement the entire system. Flutter was used for the front-end of the system which is the mobile application. PHP was also used for the front-end of the system while MySQL was used for the back-end consisting of the login and user details. The overall source code for the developed system is shown in Appendix 1.

### **Implementation Screenshots**

A screenshot is an image which is taken to show the interface that is being displayed on the screen. It is a digital image that shows or displays the output of an implementation created by the operating system or device; in this case it is an android device.

### **Login Page**

This is the page through which the user can log into his account. I *don't think* shows the screenshot of the login page of the system

### **Scheduling Menu**

This page displays the calendar where the user can schedule barbing appointment on any day

This shows the screenshot of the scheduling menu of the system.

### **Service Menu**

This is where a new service to be provided, it shows the description of the service. This shows the screenshot of the service menu of the system.

### **Appointment Menu**

This is the menu in which an appointment can be booked. It shows the client, the particular time and the service to be provided to the particular client. shows the screenshot of the appointment menu of the system. This shows the output of a booked appointment.

### **Evaluation and Results**

The validation model used for the evaluation of this project involved conducting an evaluation based on the usability of the application by testers to detect the level of satisfaction with the application (Illustrated in the table below). A small survey was conducted in the validation of the application. Questionnaires were made provided for them as well as the installed version of the application on their mobile phones. The testers were asked to test the application and answer the questionnaire in order to properly identify the degree or level of their satisfaction. The evaluator books an appointment with a date and a session which gives the exact time for the appointments, the questions in the questionnaire are answered by the evaluator and answers are provided to each of the questions on a scale of 0 to 5.

Table 1 shows the evaluators survey and results. The keywords in the table are as defined below:

- T - Total Response
- A - Agree
- D - Disagree
- SA - Strongly Agree
- SD - Strongly Disagree
- N - Neutral

**Table 1:** Evaluation Results

	Question	T	SD	D	N	A	SA
--	----------	---	----	---	---	---	----

Perceived ease of use responses	Background knowledge of computing devices is essential to effectively use this application	20	1	1	2	7	9
	Users will understand this application with little effort	20	1	3	0	9	7
	I can easily master the use of the mobile application	20	0	1	2	10	7
	I find it easy to use the application to schedule barbing appointments	20	0	4	0	8	8
	I find the mobile application flexible to use	20	1	5	1	13	0
	Learning to use the mobile application is easy for me	20	3	1	3	10	3
	The mobile application is presented in a way that allows me to easily book barbing appointments  The mobile application is unnecessarily	20	1	2	4	4	9
Perceived usefulness	I find this mobile application useful in helping individuals/physicians to schedule barbing appointments	20	2	1	0	6	11

responses	I need to ask less questions before I could start using this application	20	3	2	3	7	5
	I have the knowledge necessary to use the application	20	0	1	2	3	14
Perception of external control responses	I have the resources necessary to use the application	20	2	2	5	7	4
Job relevance responses	The arrangement of the operation of the application is helpful	20	0	3	2	5	10
	The application is able to address the problem	20	0	0	5	6	9

## **CHAPTER FIVE**

### **DISCUSSION, CONCLUSION AND RECOMMENDATIONS**

#### **Discussion**

In this work, an appointment management system was developed for scheduling barbing appointments. The normal existing method can be very dissatisfying, inefficient, and brings about high waiting time, thereby bringing about a reduction in the quality of barbing service as customers become unhappy. This scheduling system would increase the quality of services provided by barbers, increase efficiency of barbers and reduce waiting time that customers spend in the salon before being attended to.

Testers were given a copy of the mobile application to evaluate the system for appointment scheduling. What happens is that the evaluator books an appointment with a date and session which then gives the exact time for the appointment; the evaluator then answers the questions in the questionnaire and gives answers to each one on a scale of 0 to 5.

The above table shows the evaluation of the testers that took part in answering the provided questions in the questionnaire. The system takes into cognizance the date and session of booking an appointment and it reduces the amount of time spent on services to be delivered

## **Conclusion**

This system allows users to record different type of information such as record of appointments, record of services, and display appointment to customer. This system is successfully developed with the intent to eliminate the typical traditional waiting system. This project would definitely satisfy all the requirements of the users due to the ease of use and the convenience of scheduling appointments on their mobile phones.

## **Recommendations**

The recommendations are as follows:

- i. This project work is recommended for barbers to reduce customer waiting time and efficiently plan their time.
- ii. Adoption of this designed system in salons will allow barbers to provide effective service provision.

## REFERENCES

- Abhishek, S. T. (2018). Development of context-aware mobile services: An approach to simplification. *International Journal of Mobile Communications*, 7(2), 133–153.
- Abraham, R. (2007). Mobile Phones and Economic Development: Evidence from the Fishing Industry in India. *International Journal of Advanced Trends in Computer Science and Engineering*, 23(2), 19-25
- Annie, C., Chuah, C. W. (2017). SHEARS Inc. Salon Management System. *International Journal on Informatics Visualization*. 2(1), 2-4
- Choudharil, S. B., Chaitanya, K., Rucha, S., Parag, M., Joanna, V. (2014). Android application for Doctor's Appointment. *International Journal of Innovative Research in Computer and Communication Engineering*. 3: 45-46
- Chutisant, K., New, N. W. (2012). The Dentist Online Reservation System Design and Implementation Web Based Application and Database Management System. *International Conference on Education Technology and Computer*. 43.
- Devi, M., Rinabi, T. (2016). Rancang bangun sistem informasipada salon skala menengah. *Informatika dan SistemInformasi*, 2(1), 74–81.
- Ding, J. (2008). MSc Project in A web 2.0 approach to a fashionista website. *International Journal of Innovative Research in Science, Engineering and Technology*, 4(4), 10-11
- Dixon, T., Francis, J. M., Thompson, L. (2006). Software Test Process, Testing Types and Techniques. *International Journal of Computer Applications*

- Fernandes, C., Daya, M., Barry, S., Palmer, N. (1994). Emergency department Patients who leave without seeing a Physician: The Toronto Hospital experience. *Ann. Emer. Med*, 24: 1092-1096.
- Forster, T., Trang, D. T. (2018). Successful factors of implementation electronic customer relationship management (e-CRM) on e-commerce company. *American Journal of Software Engineering and Applications*, 6(5), 121-127.
- Gallucci, H., Suresh, S., Priya, A. (2005). Consumer Attitudes toward Mobile Advertising: An Empirical Study. *International Journal of Electronic Commerce*, 8(3), 3-4
- Gareth, N., Sheraz, M. (2015). Software engineering: challenges and their solution in mobile app development. *International Journal of Advanced Computer Science and Applications*, 9(1), 200–203.
- Gopal, C. B., Moinul, I. (2017). Patients Management System Using Fuzzy Logic: An easier and dynamic appointment system. *International Research Journal of Modernization in Engineering Technology and Science* 17: 12-14
- Gowthem, S., Kaliyamurthie, K. P. (2015). Smart Appointment Reservation System. *International Journal of Innovative Research in Science, Engineering and Technology*. 11:23
- Jamaiah, A. (2003). Application of Intelligent Agents in Hospital Appointment Scheduling System. *International Journal of Computer Theory and Engineering*, 4(4). 257-258
- Jirabhron, C., Phonthep, P., Siwapan, I. (2016). Automated Patient Appointment Reminder for Cross-Platform Mobile Application. *International System on Intelligent Signal Processing and Communications System*, 3(1), 32-33
- Joshua, W. (2017). Application of Smart Technologies for Mobile Patient Appointment System. *International Journal of Advanced Trends in Computer Science and Engineering*, 6: 17-19
- Kadek, I., Jin, W., Richard, Y.K. (2020). Adaptive dynamic programming algorithms for sequential appointment scheduling with patient preferences. *IJCSMC*, 8(5), 208 – 218
- Klassen, K. J., T. R. Ramos, S. (2004). Outpatient appointment scheduling with urgent clients in a dynamic, multi-period environment. *Internat. J. Service Indust. Management*, 15(1), 167-186.
- Mohd, H., Abd, W., Norlida, H., Wali, M., Hafizul, F. (2009). Web Based Intelligent Appointment System. *Diverse Journal of Computer and Information Sciences (DJCIS)*, 2(2), 1-3

- Murray, K. (2000). Web-based Data Management System. *International Journal of Computer Applications*, 1(2), 7-8
- Neny, R., Illhoi, Y., Jaie, L., Beau, J. L., and Eduardo, S. (2018). Web-based Medical Appointment Systems: A Systematic Review. *Journal of Medical Internet Research*. 19(4)
- Oso, D. D. (2020). A fuzzy-based patient appointment and scheduling system. *International Journal of Advanced Trends in Computer Science and Engineering*, 2(4), 31-32
- Pathak, D. (2020). Salon Management System. Department of Information Technology, A.I.T.R
- Patrick, J. (2006). Hospital Registration Waiting Time Reduction through Process Redesign. *International Journal of Six Sigma and Competitive Advantage*. 4:240-253.
- Rohleder, L. (2004). Conceptual Design of Web-Based Appointment Management System using Object WebML, 3-4
- Rosadi, D., Andriawan, F. O. (2016). Aplikasi sistem informasipencarian tempat kos di kota bandung berbasis android. *Jurnal Computech & Bisnis*, 10(1), 50-58.
- Sinhas, S., Wagh, A., (2010). Analyzing Growth of Cellular Telecom Sector and Understanding Consumer's preferences and choices on the use of cell phone. *International Journal of Mass Communication* 4(2), 46–51.
- Tantau, A. (2000). *Data Mining Concepts, Model, Methods and Algorithms*. John Wiley & Sons Inc. Publication. 345-355
- Wang, W., Gupta, D. (2011). Adaptive Appointment Systems with Patient Preferences *Manufacturing & Service Operations Management*, 13(3), 373-389.
- Wenjun, C., Yi, W., Haibo, T., Fujun, S., Danhong, L., Zhijun, T., Caihong, S., Qing, Y. and Yongyong, X. (2011). A web-based appointment system to reduce waiting for outpatients: A retrospective study. *BMC Health Services Research*,
- Wijewickrama, V., Takakuwa, R. (2005). Mobile applications; architecture, design, and development [Book Review]. *IEEE Network*, 19(2), 3–4

## APPENDIX I

```
import 'dart:async';

import 'package:basp/Provider/map_data_provider.dart';

import 'package:basp/screens/AppointmentScreen.dart';

import 'package:basp/screens/bookingScreen.dart';

import 'package:basp/screens/mapsScreen.dart';

import 'package:flutter/material.dart';

import 'package:provider/provider.dart';

import 'package:shared_preferences/shared_preferences.dart';

void main() {

  WidgetsFlutterBinding.ensureInitialized();

  runApp(MyApp());

}

class MyApp extends StatelessWidget {

  const MyApp({Key key}) : super(key: key);

  @override

  Widget build(BuildContext context) {
```

```

return MultiProvider(
  providers: [
    ChangeNotifierProvider<MapDataProvider>(
      create: (_) => MapDataProvider(),
    ],
  child: MaterialApp(
    title: "Barber App",

    // ----- Add Theme Data ----- //
    // Add theme data here
    theme: ThemeData(
      // Define the default brightness and colors.
      brightness: Brightness.dark,
      primaryColor: Colors.blueGrey[900],
      accentColor: Colors.cyan[600],

      // Define the default font family.

      // Define the default TextTheme. Use this to specify the default
      // text styling for headlines, titles, bodies of text, and more.
      textTheme: TextTheme(
        headline1: TextStyle(
          fontSize: 25.0,
          fontWeight: FontWeight.bold,
          color: Colors.white),

```

```

        headline2: TextStyle(fontSize: 20.0, fontWeight: FontWeight.normal),
        headline6: TextStyle(fontSize: 20.0, fontStyle: FontStyle.normal),
        bodyText2: TextStyle(
            fontSize: 14.0,
        ),
    ),
),
),

// ----- Manage Routes ----- //
//Add new routes here
routes: {
    '/bookingScreen': (context) => BookingScreen(),
    '/mappage': (context) => Mappage(),
    '/appointmentScreen': (context) => AppointmentScreen(),
},

    home: SplashScreen(),
    debugShowCheckedModeBanner: false,
),
);
}
}

class SplashScreen extends StatefulWidget {
    @override

```

```

    _SplashScreen createState() => _SplashScreen();
}

class _SplashScreen extends State<SplashScreen> {
    // ----- for start page
    Widget defaultPage = Container();

    //----- check if the user is using app for first time or not
    void checkSharedPrefs() async {
        var sharedPrefs = await SharedPreferences.getInstance();
        if (sharedPrefs.containsKey("firstTime")) {
            defaultPage = Container();
        }
    }

    //----- initialize with a Timer that will push to new screen after few seconds
    @override
    void initState() {
        super.initState();
        checkSharedPrefs();
        Timer(Duration(seconds: 4), () {
            Navigator.of(context).pushReplacement(
                MaterialPageRoute(
                    builder: (BuildContext context) => BookingScreen(),
                ),
            ),
        },
    }
}

```

```
);  
});  
}
```

```
// ----- Splash Screen Widget
```

```
@override
```

```
Widget build(BuildContext context) {
```

```
  return Scaffold(  
    // ----- temp background color can be changed.... in THEME DATA
```

```
    backgroundColor: Colors.blueGrey[900],
```

```
    body: Column(  
      mainAxisAlignment: MainAxisAlignment.spaceEvenly,
```

```
      crossAxisAlignment: CrossAxisAlignment.center,
```

```
      children: <Widget>[
```

```
        Image.asset(  
          "assets/splash_screen.gif",
```

```
          height: (60 / 100) * MediaQuery.of(context).size.height,
```

```
          width: MediaQuery.of(context).size.width,
```

```
        ),
```

```
        CircularProgressIndicator(  
          strokeWidth: 4,
```

```
          backgroundColor: Colors.amberAccent[400],
```

```
        )
```

```
      ],
```

```
    ),
```

```
);  
}  
}
```