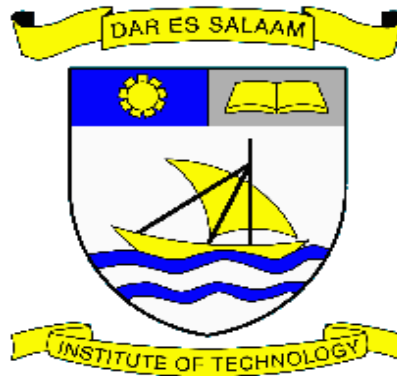# DAR ES SALAAM INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER STUDIES

ORDINARY DIPLOMA IN COMPUTER ENGINEERING

NTA LEVEL 6

PROJECT 1

PROJECT TITLE   **:** DEVELOPING HELP DESK MAINTENANCE SYSTEM

PROJECT TYPE   **:** PROBLEM SOLVING

CASE STUDY   **:** CARLCARE COMPANY Ltd

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ADMISSION NUMBER **:** 150222141287

SUPERVISOR   **:** Mr. RAPHAEL M. JESSE

ACADEMIC YEAR   **:** 2017/2018

JUNE 2018.

DECLARATION

I Ramadhan M. Kivoja declare to the best of my knowledge that the project presented here as a partial fulfillment of Diploma in Computer Engineering, is my own work and has not been copied anywhere or presented elsewhere.

CANDIDATE'S NAME   SIGNATURE   DATE

RAMADHAN M. KIVOJA   _____   _____

SUPERVISOR'S NAME   SIGNATURE   DATE

Mr. RAPHAEL M. JESSE   _____   _____

ABSTRACT

The aim of this project is to create a web-based help-desk maintenance system for Carlcare Company limited. The system will help customers from different places to make an order with the office place so as they can get services offered by the company without being on queue and wasting a lot of time and costs trying to place a right time for him to get the service.

This project resolve data retrieval problems that Carlcare and its customers have being facing for a long time, strengthen the collaboration among the levels of operations from the help desk to the customer, reduce cost spent by customers and prove enough storage space for the company to store various data.

The method used to come to solution is prototype methodology. Where a prototype of the system is made then let the user to interact with the prototype of the system and then collect the feedbacks from the users and modifying the prototype according to the feedbacks.

Data collection was done to obtain functional and non-functional requirement to build the system. Ways observation were the current system was observed how it is operating and observation was used to get information that questionnaire could not get.

From the data collected the functional requirement are to manage employees (delete, add and change their password), view general maintenance report, provide friendly interaction between client and Helpdesk, generate receipt once service is done, send notification to customers, all cashless payment to be made if client is interested. Moreover, non-functional requirement are Data integrity, Performance, Usability and Reliability.

Different data input had been entered as input to test and validate the output, finally the result of testing yield to the best output which shows how the specific objective had met. For the best of my knowledge the scope of my project is covered, but the chance for further development is allowed.

ACKNOWLEDGEMENT

I take this great opportunity to thank my Lord for his protection, health, free air, love, happiness and guidance through tough situations happened in my life and throughout the period towards accomplishing this project.

I express my heartfelt and deep sense of gratitude to the head of department of Computer studies for giving me this precious chance to gain a great knowledge in my studies at this college.

I am kindly expressing my special thanks to my project supervisor Mr. Raphael M. Jesse for his generosity, inspiring advice, tireless assistance, constant technical support and encouragement to ensure that this project is well completed. I also thanks my project coordinator Mr. Justus Selestine for his academic support and all staff members in the Department of computer studies, for their technical contribution and encouragement to make this project possible.

Special thanks to my parents and my entire friends for great support, suggestion, encouragement and contribution towards the work of this project.

Thank you.

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LIST OF SYMBOLS

	Shows objects/Entities/users
	Shows process/interface
	Shows the direction flow of data and connections
	Indicate storage device
	Shows actor of the system
	Indicate an activity
	Shows data store.
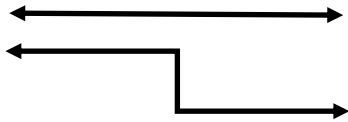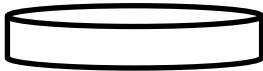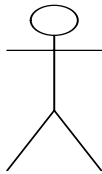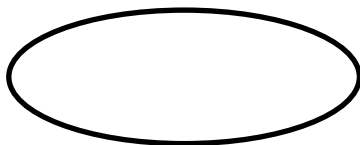
LIST OF ABBREVIATION

NTA   National Technical Award

Ltd   Limited

ID   Identification/Identity Document

NHC   National Housing Corporation

SMS   Short Message Service

PHP   Hypertext Preprocessor

HTML   Hypertext Markup Language

CSS   Cascading Style Sheets

SQL   Structured Query Language

UPS   Uninterruptible Power Supply

LIST OF FIGURES

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CHAPTER ONE

1.0 INTRODUCTION

Paper documentation system is most commonly used system to manage business. Matt Peterson (2007 researcher at Leuven Kulak) said "Almost 80 of the small business start with paper document system", Henry Howard (1990 cited Wilson 1998, p.89) saying, "Lowering paper usage at the office can result in higher efficiency measures and increased productivity levels throughout an organization. Changes in paper consumption can include increasing recycling efforts, printing less or even going paperless with document management software". Paper documentation system are inexpensive compared to some of electronic data storage, data can be accessed without much power, original can be maintained and paper are not easily destroy by crashing them.

Carlcare Company limited as other company uses a paper-based documentation for accessing customer details about their service and submit the documentation to the technician with the device to repair and after that, the customer is required to come back on the day when his device is ready repaired with the replicate of the documentation to verify device ownership. All of this maybe done with the computer-based system where by the customer will fill the documentation/work order form online. Once after the reservation is approved then he will be told when to deliver and take his device from the company after getting the services of the company.

1.1 BACKGROUND INFORMATION

Carlcare established in 2009 is a professional after-sales service brand. It provides remarkable customer services in electronics, home appliances, lighting and is expanding to further categories. Dedicated to providing customized service for a global market, Carlcare has shown exponential growth with more than 1000 service touch points (including the third-party service points) in Africa, Middle East and Southeast Asia. Carlcare is striving to become one of the large solution providers in electronic and home appliance worldwide. In Dar es Salaam, they are located at Jangwani Street, Kariakoo and Samora Street NHC house.

1.2 PROBLEM STATEMENT

With the best services offered by Carlcare Company limited to its customers there are still some difficulties or problems they face when delivering the service. The problems the company and customers both faces are:-

I.   Loss of time and costs of bus fares by customers when make a go and return to the Carlcare trying to fix with the company when his device will get repaired.

II.   Loss of data about the customer details in case they came back and complaining about the repaired device not being fixed well.

III.   Record retrieval is not easy, find the specific information from the Carlcare Company record store is a struggle because of the large data it contain.

IV.   Customers have to be in queue when trying to get the services from the company since the number of customers is large than the number of staff that serve them.

V.   Paper document is more cost full, as you have to buy the blank papers every month for varying needs, including photocopying and printing costs.

1.3 OBJECTIVES

Objectives of this project are mainly divided into two parts which are main and specific objective.

1.3.1 MAIN OBJECTIVE

The main objective of this project is to design and implement a web based system that will connect customers of Carlcare Company Ltd to the help desk staff of Carlcare Company Ltd directly through their devices which support internet surfing.

1.3.2 SPECIFIC OBJECTIVES

Specific objectives of this project are as follows:

I.   To develop a user management sub-system for user to log-in, log-out and sign-up to the system

II.   To develop a sub-system for customer to tell/express the problem they face with their device.

III. To develop a sub-system for report generation (all kinds of report. i.e. maintenance report etc.)

IV. To develop a sub-system for payment process through mobile phones.

V. To develop a sub-system for feedback from customers and SMS notification from the company to the customers.

1.4 SIGNIFICANCE OF THE PROJECT

After completion of this project, the system being developed will have several significance to both customers and company as follows:

I. Allow the company to reach a great number of customers interested in internet.

II. Allow company to get the direct feedbacks from their customers.

III. Demand for online service is real.

IV. It saves time and costs to customers.

V. It keeps record of customers easily and it is safe.

1.5 SCOPE AND LIMITATION OF THE PROJECT

The scope of this project is to the design and development of the web-based help desk maintenance system for Carlcare Company. The system will provides user management sub-system to manage the user, Customer sub-system for customers to fill the form describing how their devices met with defects and generate a special ID with which he will use to submit and take his ready repaired device from the Company, generate reports for the manager and sub-system to generate daily maintenance report.

CHAPTER TWO

2.0 LITERATURE REVIEW

This chapter describes about the existing system and how it work with its appropriate block diagram which show how it was operated. Also I will describe about the proposed system and how it will work and its appropriate block diagram. This chapter will also include the disadvantages of the existing system and the advantages of the proposed system and the existing gap between the existing system and the proposed system.

2.1 EXISTING SYSTEM

In the existing system customers are required to go directly to the office places to submit their affected devices to the technicians but they are required to express their defects to the help desk so as they can identify what's actually wrong and predict the actual amount to be paid. The help desk sometimes may update the customers about the availability of accessories based on their devices defects hence make some kind of disturbance to them since they are required to come and check if the required resource is available or not. Also they use a paper based system to keep the record of several report like maintenance report.
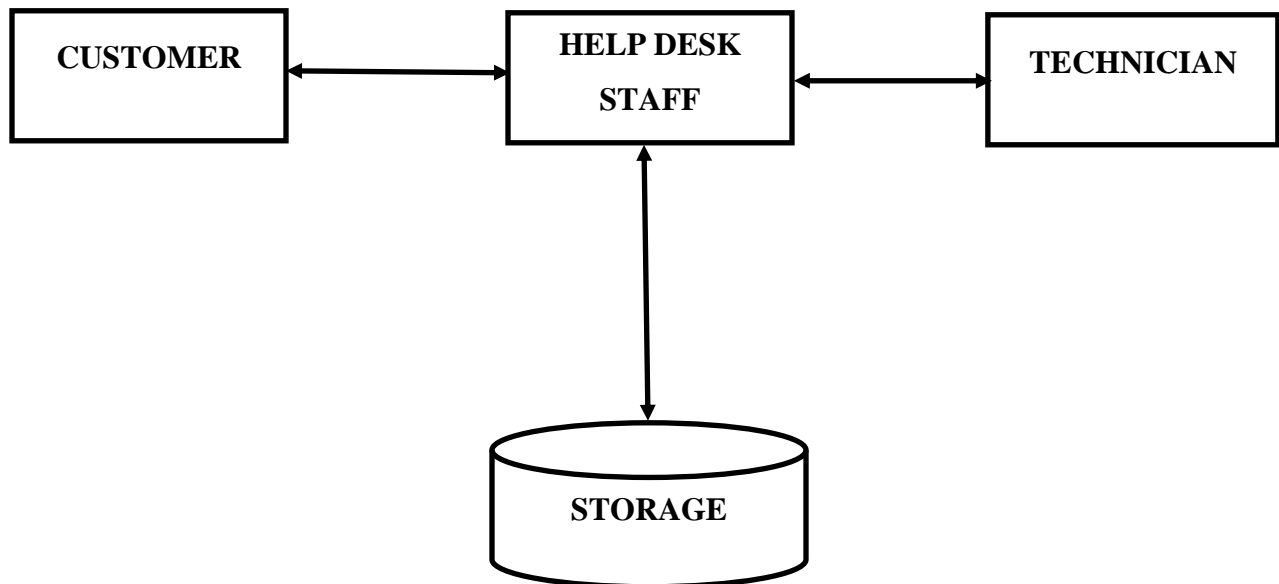
```
┌──────────────┐        ┌──────────────┐        ┌──────────────┐
│   CUSTOMER   │◄──────►│  HELP DESK   │◄──────►│  TECHNICIAN  │
│              │        │    STAFF     │        │              │
└──────────────┘        └──────┬───────┘        └──────────────┘
                               │
                               ▼
                          ╭─────────╮
                          │ STORAGE │
                          ╰─────────╯
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Figure 2.1: Block Diagram of the Existing System

2.1.1 COMPONENTS OF THE EXISTING SYSTEM

The existing system that is used by Carlcare Company Ltd comprises of various components as shown on the Figure 2-1 above which are described below as follows:

1. CUSTOMER

In the existing system customers are required to go direct to the help desk so as they can explain what is it with their devices so as they can identify what is to be repaired and how much it will cost. Sometimes it may happen that the component for repairing the mobile phone is not available thus the customer has to be notified when it should probably be available so as he can deliver his devices to be repaired. They suffer much in queue waiting for the services as they waste their time as well as other costs of go and return to the office place.

2. HELP DESK STAFF

They are the staff members who involve direct with serving the customers by listening up what I sit up to their devices and how they can solve the problems they face. They sometimes face the challenges of misunderstanding with the customers since customers differs in their mood, and sometimes it is difficult to handle them all.

3. TECHNICIAN

They are the member of a staff whose work is to repair the devices of the customers once he detects what is wrong with them. Once repaired the device he has to deliver it back to the help desk so as the help desk can return the device to the respective customers without mixing different devices to unauthorized owner.

2.1.2 WEAKNESS OF THE EXISTING SYSTEM.

The following are the disadvantages of the existing system

   I.   Queue for customers when awaiting for the service.
  II.   Disturbances to customers due to unavailability of resources for repair.
 III.   Poor storage of information.
  IV.   Time consuming on providing services to customers on the queue.
   V.   It takes a long time to retrieve customers' data from the files.
  VI.   Difficult to collect customer feedbacks about the service.

2.2 PROPOSED SYSTEM

A proposed system will consist of a web-based platform where by the customers will be required to fill their information about their devices defect and then receive a note of when to deliver their devices to the work places for the technician to further examine them. But customers will be required to present a special ID given from the online system they use to book for the technician to repair their device to reception so as to verify the customer and his or her device and the appropriate payments. After completion of repair of the device the reception will notify the customer to come back and take their repaired devices together with the payment receipt if they made an online payment or manual payments.
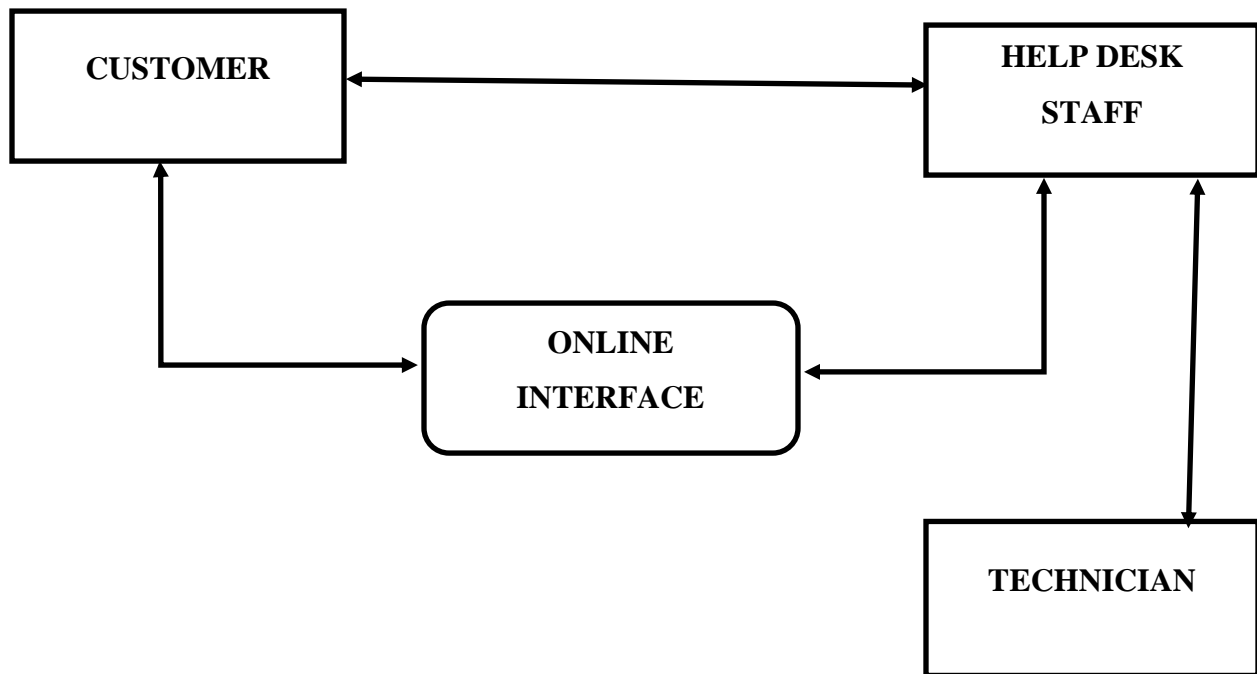

Figure 2.2: Block Diagram of the Proposed System

2.2.1 COMPONENTS OF A PROPOSED SYSTEM.

A proposed system comprises of various components as shown in Figure 2.2 above that are Customers, Help-desk, Technician and Admin:

1. CUSTOMER

As on the existing system, here in the proposed system the customer is required to interact with the online interfaces whereby he will explain what he faces with his devices so as the reception or help desk can tell him what is to be repaired and how much it will cost him. He will also be given a special ID for the help desk to easily identify them when delivering their devices. They sometimes maybe notified about the progress of their devices if they are ready repaired or if the component to be used to repair their devices is unavailable for the day until further day's maybe, he will also be notified for that if it may happen.

2. HELP DESK STAFF

Also known as help desk from the existing system. This member of staff should have to verify the order or reservation of the customer by checking the availability of resources to repair the customer devices. He would also validate or notify the customer whether to come to the office place to submit their device to office place or tell them when to submit their devices once the resources for repair are not available. They are responsible for storing data on the company.

3. TECHNICIAN

This member of staff is responsible for repairing the devices of the customers when he or she submit it to the company. Once he finishes the work he submit it to the help desk or reception with the report so as the reception can return the device to the required customer and store the maintenance report on the storage space or database.

4. ONLINE INTERFACES

It is the interfaces where by the customer has to use to interact with the help desk from anywhere with only the internet connection and device like laptop, mobile phone or anything that is capable to do so. This interface will help to reduce the queue on the working place and it will save time and costs of the customers.

2.2.2 SIGNIFICANCE OF A PROPOSED SYSTEM.

I. Save time and cost.

II. Safe and more storage capacity.

III. Fast access to database.

IV. Update customers about their devices progress and availability of possible resources to repair their defected devices.

V. Easy to get customers feedback.

VI. Easy to maintain customer information.

2.3 STRENGTH OF PROPOSED SYSTEM TO EXISTING SYSTEM.

I. It is easy to collect customers' information from the database since they are well stored.

II. There is no more queue to the reception in proposed system since many processes are made through the online system.

III. Better storage capacity of data on the proposed system.

IV. There is no more disturbances/arguments between customers and help desk.

V. Payments maybe made online thus avoiding the disturbances of finding agency to withdraw payment money to the company.

VI. It is easy to get the customers feedback in the proposed system than in the existing system. This will help evaluating the performance of the company.

CHAPTER THREE

3.0 METHODOLOGY

This chapter describes about the methodology used by the project and why choosing that methodology. The chapter will also describe the methods used in data collection and data analysis and the method used for system testing.

3.1 PROJECT METHODOLOGY

The methodology used in the project is prototype-based methodology.

A prototype is an initial version of a software system that is used to demonstrate concepts, try out design options and, generally, to find out more about the problem and its possible solutions. (Sommerville, 2006)

Prototype model is based on the four phase.

1. Planning

2. Data collection

3. Analysis

4. Design

5. Implementation

PLANNING

The plan here is to develop a web-based system for helping customer to interact with the help desk of the company so as he can get the service he wants from the company. The help desk will then be required to respond to the customers carefully and provide services and store customer information to the database.

DATA COLLECTION

Data are collected from the field to obtain the type of input data required on the system and what will be the output data to be produced by the system. In addition, the collected data will be able to define the functional and non-functional requirements that are required to the

system. This kind of data help to determine what functionality is to be included into the system and what functionality to exclude in the system.

ANALYSIS

At this phase, the collected data are to be analyzed and evaluated so as they to give the actual look of the system. Here data are analyzed by using Data flow diagram (DFD) because it help to show all the important processes to be included into the system, external entity or real users of the system and what kind of data to be stored and what will be the output data from the system.

DESIGNING

This is the stage whereby the initial designing are happening. All sorts of designing like database design and user interface design are generated based on the analyzed data collected from customers.

IMPLEMENTATION

The system is developed using different programming languages such as PHP to make the system dynamic, HTML for creating the framework of the system interface, CSS for making the system interfaces look better and easy to interact with, SQL for querying data for the database.
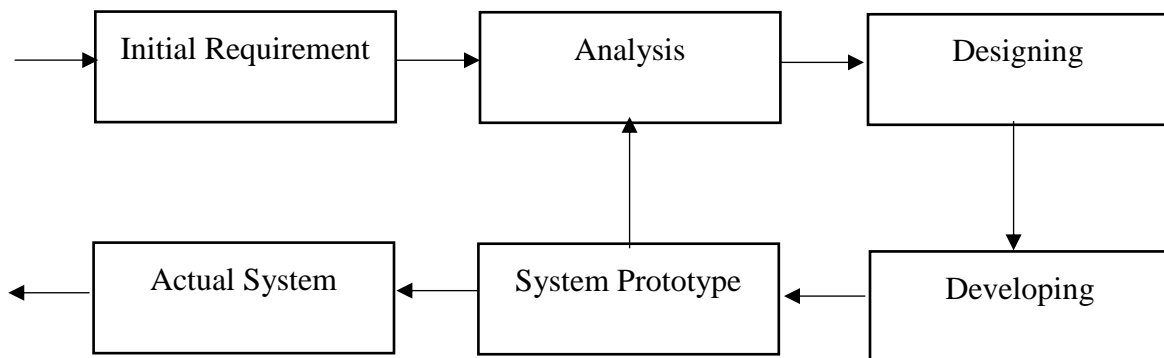
Figure 3.1: Block Diagram of Prototype Methodology

In a study of 39 prototyping projects, Gordon and Bieman (Gordon and Bieman, 1995) found that the benefits of using prototyping were:

I.   Improved system usability

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II.   A closer match of the system to users' needs

III.   Improved design quality

IV.   Improved maintainability

V.   Reduced development effort

Their study suggests that the improvements in usability and better user requirements that system from using a prototype do not necessarily mean an overall increase in system development costs. Prototyping usually increases costs in the early stages of the software process but reduces costs later in the development process. The main reason for this is that rework during development is avoided because customers request fewer system changes. However, Gordon and Bieman found that overall system performance may sometimes be degraded if inefficient prototype code is reused.

Reason for using prototype methodology are as follows:-

I.   It requires high level of user interactions who needs to go through several screens on the system.

II.   Missing functionality can be identified easily.

III.   Reduces time and cost as the defects can be detected much earlier.

IV.   Quicker user feedback is available leading to better solutions.

V.   Since a working model of the system is displayed, the users get a better understanding of the system being developed.

3.1.1 STRENGTH OF PROTOTYPE MODEL

The following are the advantages of using prototype methodology;

I.   In prototype methodology errors can be detected early.

II.   Prototype method is adaptive.

III.   In prototype method, user can provide feedback about the system while it is developed.

IV.   In prototype method, some missing functionality may be identified throughout the phase.

3.1.2 DISADVANTAGES OF PROTOTYPE MODEL

I. In prototype method, users and analysts may adopt a prototype as a completed system.

II. In prototype method, the design is likely to be of less quality.

III. In prototype method, the system is somehow harder to maintain.

IV. The prototyping approach requires more experienced team members.

V. In prototype method, the developed system is likely to have more features.

VI. In prototype method, the performance of the developed system is likely to be worse.

3.2 TOOLS USED

The following are the tools which were used to develop the system.

1. Wamp Server 64

2. SQL (Structured Query Language)

3. Sublime text

4. Microsoft windows

5. PHP (Hypertext Preprocessor)

6. HTML (Hyper Text Markup Language)

7. CSS (Cascading Style Sheet)

8. Bootstrap

9. Microsoft Visio

TOOLS USED	DESCRIPTION
WAMPSERVER 64	This is a lightweight cross-platform that makes it extremely easy for developers to create a local web server for testing and development purposes.
SUBLIME TEXT	This is a software used to write and edit text just like notepad.
MICROSOFT WINDOWS	This is the kind of operating system that will be operating on a computer while developing the system.
PHP (PHP HYPERTEXT PREPROCESSOR)	This is a language used to create dynamic web pages, web content management system. It perform different execution on request.
HTML (HYPER TEXT MARKUP LANGUAGE)	Enables to markup text so that it can function as hypertext on the web. It is used to create web pages.
CSS (CASCADING STYLE SHEET)	Used to specify presentation information without violating the structure versus presentation description.
SQL (STRUCTURED QUERY LANGUAGE)	This is the language used to access and manipulate database.
BOOTSTRAP	Used to develop a responsive web site. It is the most popular HTML, CSS and JavaScript framework.
Microsoft Visio	This software were used to design data flow diagram.

Table 3.1: Tools Used.

CHAPTER FOUR

4.0 DATA COLLECTION

Data collection is the method of gathering information towards approach of the project conducted. The method may be conducted by using interview, questionnaire, and observation. The following are the methods that I am going to use during data collection.

I. Interview.
II. Observation.

4.1 INTERVIEW

This is the data collection method that was employed within my project to collect relevant data that will help in the development of the product that will solve the problem persist. The interview will be conducted to customers and help desk (customer care) employee's so as to know what they actually do on the existing system and the problem they face on the system so as it can be improved. Although sometime, the method can be time consuming, expensive and deliver biased responses but it got many advantages on my project. Answers to interview questions are attached into appendix A.1.

4.1.1 REASON FOR USING INTERVIEW METHOD

I. Allow for more in-depth data collection and comprehensive understanding.
II. Body language and facial expressions are clearly identified and understood.
III. Can probe for explanations of responses.
IV. Stimulus material and visual aids can be used to support the interview.
V. Interview length can be considerably longer since the participant has a greater commitment to participate.

4.2 OBSERVATION

This is the most common method used for getting information about various things around us, it is to observe those things and also the various processes related to those things. Hence, it can be said that observation acts as a fundamental and the basic method of getting information about anything. But it must be kept in mind that observation is not just seeing things but it is carefully watching the things and trying to understand them in depth, in order to get some information about them. Data collected by this method are attached into appendix A.2.

4.2.1 REASON FOR USING OBSERVATION METHOD

I. Easy access to situations and people where questionnaires and interviews are impossible or are inappropriate to use.

II. Easy access to people in real life.

III. It is good for explaining meaning and context.

IV. It is strong on validity and in-depth understanding.

4.3 SOFTWARE REQUIREMENT SPECIFICATIONS

The following are the minimum requirement specifications needed for the software to run effectively

I. Microsoft window 7 operating system or above.

II. 2GB physical memory (RAM) or above.

III. Processor 1.5 GHz clock speed duo core or above.

IV. Storage of 30GB or above.

4.3.1 FUNCTIONAL REQUIREMENTS

I. The system will have to allow each user of the system to log in and log out to allow only authorized users to interact with the system.

II. The system should enable customers to make new reservation for their device to be repaired so as they can be able to escape unnecessary queue when seeking for service from the company.

III. A system must be able to send SMS notification to the customers when their device is ready repaired.
When their device is already repaired by technician then the help desk will have to notify customers by sending an SMS or Email notification or both to the customers so as they can pick up their devices.

IV. A system must allow technician to prepare maintenance report. When the customer devices are ready repaired, technician have to prepare a maintenance report about each repaired device.

V. A system may support cashless payment. Just like others betting system which allow users to make their payments online. The system should allow customers to make such payments when interested.

4.3.2 NON-FUNCTIONAL REQUIREMENTS

   i.   System shall be available during work hours though customers may use it 24/7.

  ii.   System must be easily usable by customers and users.

 iii.   System should be secure to handle sensitive information.

 iv.   System should operate 24/7.

  v.   System should have a good performance.

4.4 DATA ANALYSIS

Data collected on field of study were analyzed using two techniques that are use case diagram that show the interaction between users and the system. The other technique used to analyze the data collected is data flow diagram (DFD) which is used to show how data will flow through a sequence of processing steps.

4.4.1 USE CASE DIAGRAM

Use case is a very powerful UML tool. It is simply a description of a set of interactions between a user and the system. The collection of use case describe the entire system that has planned to be developed in a clear and concise manner. Figure 4.1 shows the use case used in the Help desk maintenance system.

On the figure below, we may see that there are four users of the proposed system each with his or her respective roles on the system. From the diagram the four actors (users) of the system with their roles are

CUSTOMER

This is the user of the system, which plays several roles on the system. Customer on the system may log in, may make a new reservation to the company for the device to be repaired by the technician, the customer may also provide a feedback based on the service given by the company.

HELP DESK

This is the employee of the company, he also got some roles on the system. The help desk will have to confirm the reservations made by customers by checking if the resources to repair their device is available by the time. They can also view customer feedbacks and maintenance report of customer's device.

TECHNICIAN

Technician may prepare a maintenance report of the repaired device once done. They may also use the system to check the correct credentials given by customers about their device defects.

ADMINISTRATOR

Administrator within the system may add new employees to the system and classify if he is technician or help desk, he may also view customer feedbacks to the system and maintenance reports made by technician once finishing repairing the customers' device.
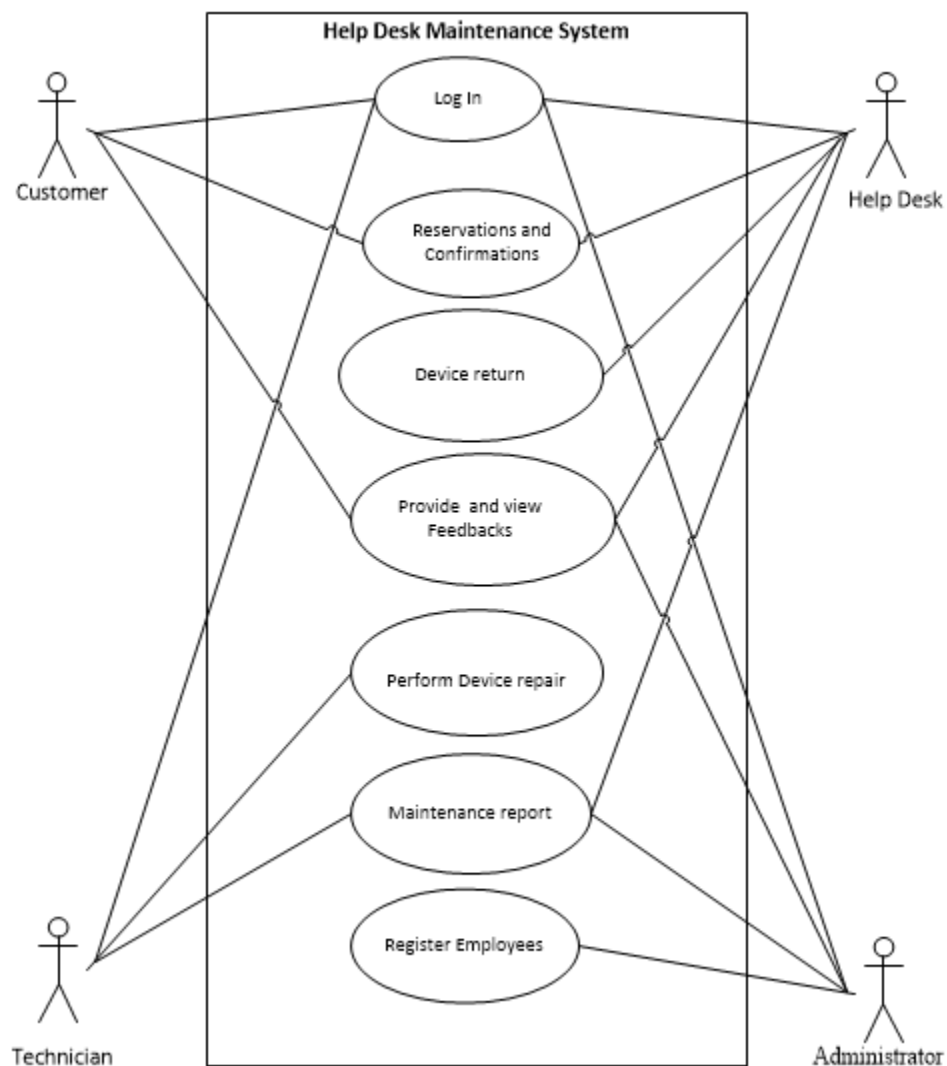
Figure 4.1: Use case diagram

4.4.2 DATA FLOW DIAGRAMS

Data flow diagram used to show how data flows through a sequence of processing steps. For example, a processing step could be to filter duplicate records in a customer database. The data is to be transformed at each step before moving on to the next stage. These processing steps or transformations represent software processes or functions when data flow diagrams used to document a software design. However, in an analysis model, people or computers may carry out the processing. (Sommerville, 2006, p. 174)

On this method I have employed both level 0 (context diagram) to understand the entire system and overview of the system with little details and major processes. Also level 1 which will be used to show how the system is divided into sub-systems (processes), each of which deals with one or more of the data flows to or from an external agent, and which together provide all of the functionality of the system as a whole.

4.4.2.1 DATA FLOW DIAGRAM LEVEL 0 (CONTEXT DIAGRAM)
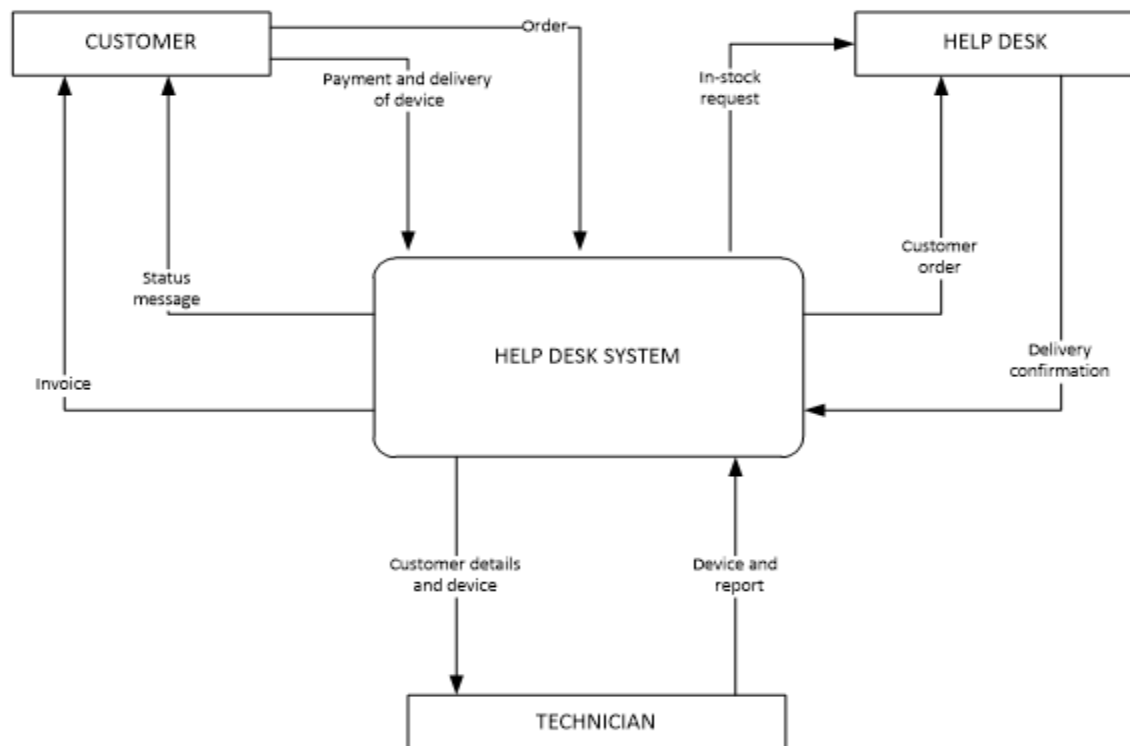
Figure 4.2: Level 0 DFD

4.4.2.2 DATA FLOW DIAGRAM LEVEL 1
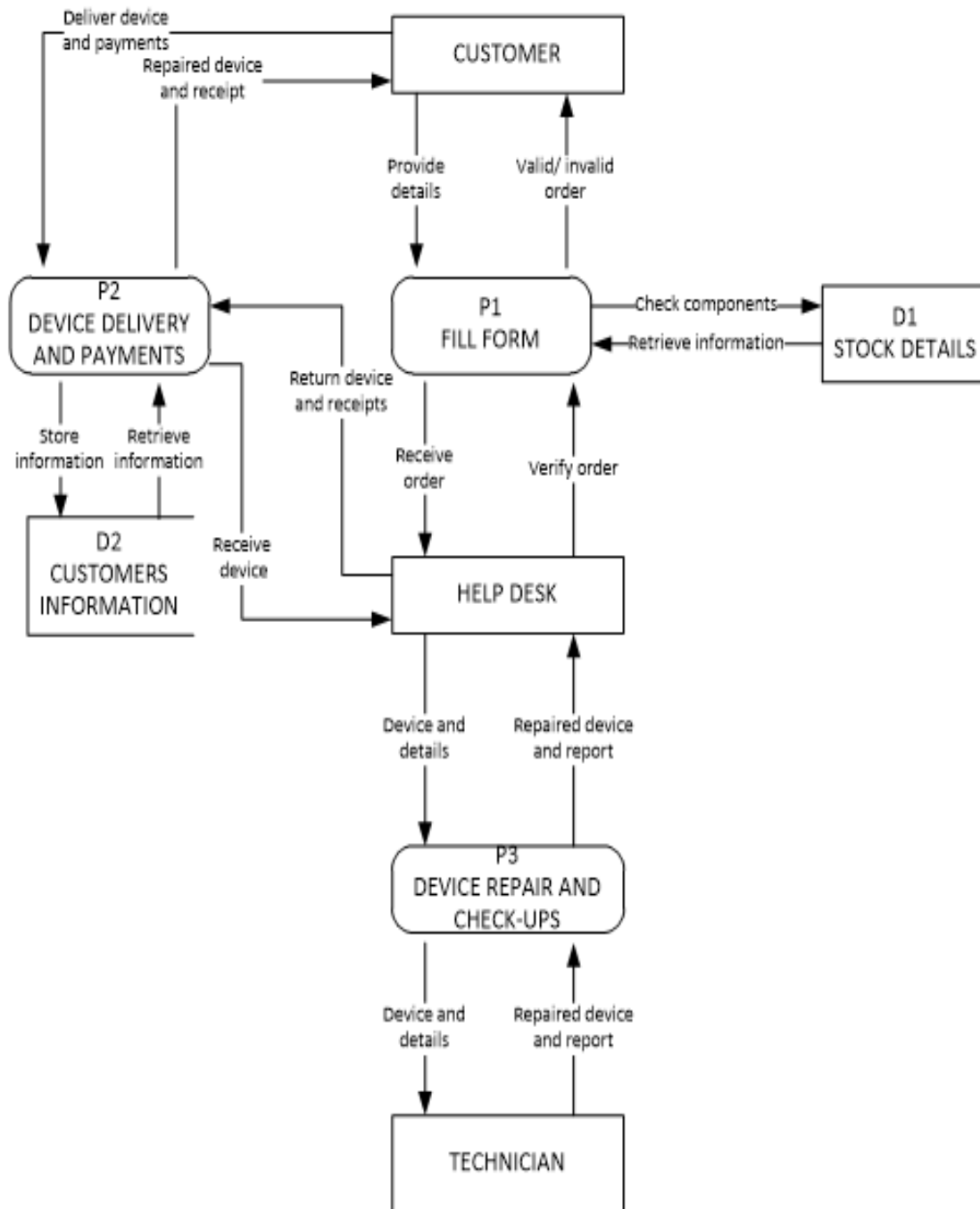
Figure 4.3: Level 1 DFD

4.5 SYSTEM IMPLEMENTATION

The system consists of the following interfaces;

Login interface/Home page

This is the first interface of the system that works for authentication purpose. It request user to log in (Help Desk, Technician and Admin) while it will not allow customers to log in unless he or she register first by clicking the sign up button at the top.

Figure 4.4: Homepage interface.
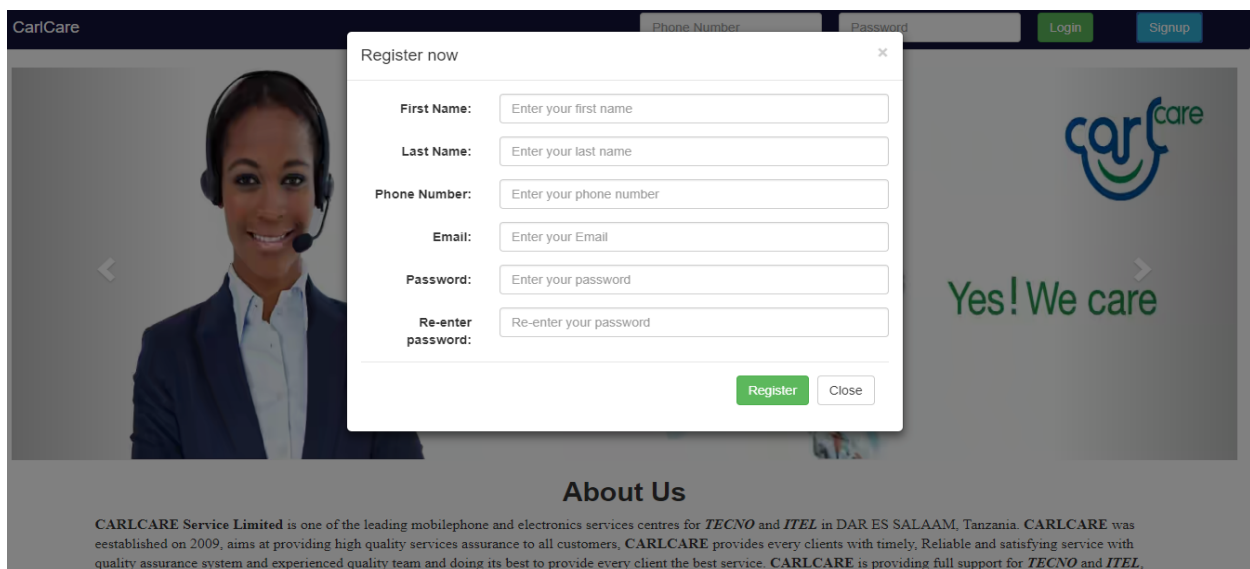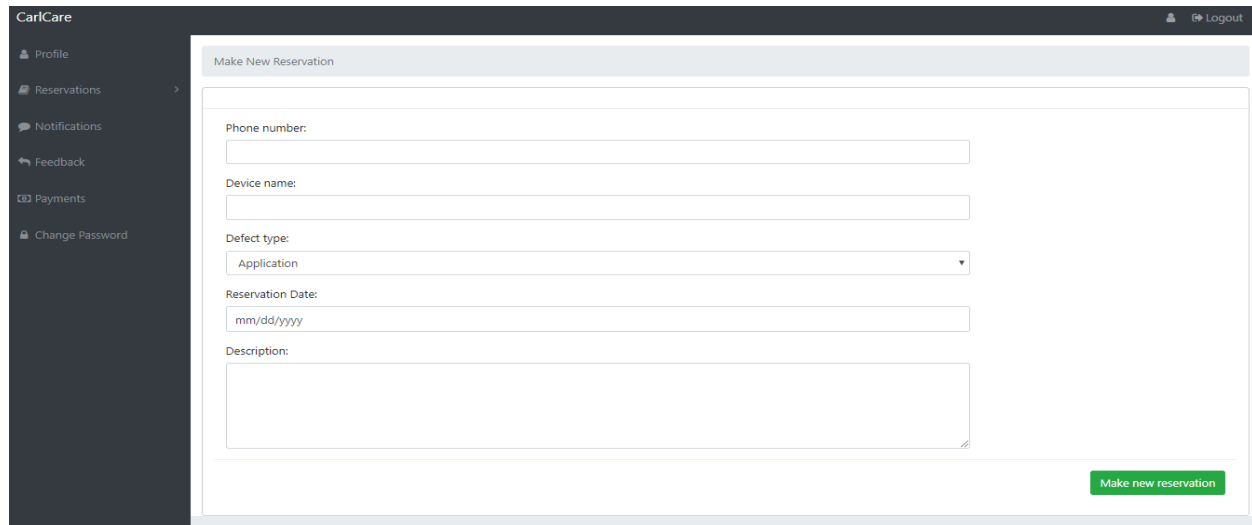
Figure 4.5: Customer Registration interface

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Customer interface

This interface will allow customers to make new reservations and receiving notification through it they can also receive them through their Email or local SMS. Customers can also provide their feedback to the service offered by the company through the system.

Figure 4.6: Customer homepage interface

Admin interface

This is the interface of an admin, which will allow him to view customer feedbacks, maintenance reports. Nevertheless, mostly they can add new employees to the system.

Figure 4.7: Admin homepage interface

Help desk interface

This interface will allow help desk to interact with system once after logging in into it.

Figure 4.8: Helpdesk homepage interface

Technician interface

This interface will allow technician to interact with system once after logging in into it.

Figure 4.9: Technician homepage interface

CHAPTER FIVE

5.0 CONCLUSION

The aim of this project is to help customers and employees (Help Desk) to interact with each other without seeing each other. Customers have to log in into the system and make a reservation to the company whereby the help desk will have to approve the reservation so as customers can deliver his or her device to the company for repair, then after technician finishing repairing the device will be required to prepare a maintenance report for the device repaired. Once the process is finished then Help desk will have to notify the customers by sending them an SMS notification or Email notification requesting them to come and take their device and make all necessary costs.

Therefore I have great hope that implementation of this project will give appropriate solution to the problems occurred at Carlcare.

5.1 RECOMMENDATION

The system developed may allow any of the company want to deal with online services to its customers to use it and meet their company demand but with only little modification, that suits their business.

In addition, I recommend that the government should try to make use of students' projects and make a little investment in the project ideas brought up by many students since they can help a great deal towards the growth of science and technology in our country and in the field of science and engineering as a whole.

For anyone who will be interested in making improvements and further development of this project he/she is welcome to do so since the field of engineering is all about effective and efficient problem solving which can help most of us develop our ideas and help hundreds of thousands of Tanzanians using science and technology.

Due to my strong personal opinion, I wish to stress that whoever want to perfect this project let it not be a copy paste work but instead let new ideas flow into the system for more improvements to the system.

PROJECT COST ESTIMATION

ITEM	DESCRIPTION	COST
STATIONERY	➢ Printing (100 pages) ➢ Photocopy (50 pages) ➢ Binding and lamination (4 books)	10,000/= (Tshs 100 per page) 2,500/= (Tshs 50 per page) 20,000/= (Tshs 5000 per book)
COMMUNICATION	Internet and airtime	20,000/=
TRANSPORT	Transport fee	15,000/=
CONTINGENCE	Emergency fund	20,000/=
TOTAL COST		87,500/=

Table 2: Project cost estimation

REFERENCE

1. Gordon, V. S., & Bieman, J. M. (1995). Rapid prototyping: lessons learned. IEEE Software, 12(1), 85-95.

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3. Matt, Peterson (2007 researcher at Leuven Kulak). Accessed January 20, 2018, at 00:44am. https://www.corpmagazine.com/.

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5. http://www.mbaofficial.com/mba-courses/research-methodology/features-advantages-and-disadvantages-of-observation/ Retrieved on 23rd may 2018.

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APPENDICES

APPENDIX A.1

The following are the interview questions that were used to collect valuable data at CarlCare Company Ltd are as follows:

Question asked	Answer received
Real users of the existing system?	Help desk, technician and customers.
Method of receiving feedback from customers?	Through mailbox located within the office place.
Method of payment currently used?	Cash payment method is used.
Method of notifying the customer about their device?	They are notified when delivering or come to check their device at the office place.
Method of report generation?	They are collected manually by collecting maintenance report of each device from the technician and work order form from the customers.
Method of returning the device back to customer?	Customer have to show the copy of work order form given to verify the ownership of the appropriate device.

Table 3: Interview questions and answers

APPENDIX A.2

From observation, the following picture of the work order form is successfully captured which show what details does the customers give to make a work order to CarlCare Company Ltd.

APPENDIX B.1

The following are samples of codes used to make the development of the system successfully.

Tabs: all_reservations.php | index.php — final | new_reservation.php | nav.php — Technician | nav.php — Admin | nav.php — Helpdesk | ...ery.php

Folder tree:
- final
  - Admin
  - assets
  - customers
  - db
  - Helpdesk
  - Technician
  - index.php
  - signup.php

```php
<?php
session_start();
$db = mysqli_connect('localhost', 'root', '1234', 'carlcare');

if (isset($_POST['submit'])) {

    $phonenumber = $_POST['phonenumber'];
    $password = $_POST['password'];

    $sql = "SELECT * FROM admin WHERE administrator='$phonenumber' AND password='$password'";
    $sqlquery = mysqli_query($db, $sql) or die(mysqli_error($db));
    $count = mysqli_num_rows($sqlquery);

    if ($count == 1) {
        header('location: Admin/maintenance_report.php');
    }else{
        $sql = "SELECT * FROM customers WHERE phonenumber='$phonenumber' AND password='$password'";
        $sqlquery = mysqli_query($db, $sql) or die(mysqli_error($db));
        $count = mysqli_num_rows($sqlquery);

        if ($count == 1) {
        header('location: customers/index.php');
        }else{

        $sql = "SELECT * FROM employees WHERE employeeID='$phonenumber' AND password='$password' AND employeerole = 'Helpdesk'";
        $sqlquery = mysqli_query($db, $sql) or die(mysqli_error($db));
        $count = mysqli_num_rows($sqlquery);

        if ($count == 1) {
        header('location: Helpdesk/new_reservations.php');
        }else{

        $sql = "SELECT * FROM employees WHERE employeeID='$phonenumber' AND password='$password' AND employeerole = 'Technician'";
        $sqlquery = mysqli_query($db, $sql) or die(mysqli_error($db));
        $count = mysqli_num_rows($sqlquery);

        if ($count == 1) {
        header('location: Technician/collected_phones.php');
        }else{
        echo "Error";
        }
        }
        }
    }
}
?>
```

Tabs: feedback.php — cust | employee.php | customer_feedback.php | feedback.php — Admin | view_employees.php | reply_feedback.php | 'elpdesk

```php
<?php

$db = mysqli_connect('localhost', 'root', '1234', 'carlcare');

if(isset($_POST['submit'])) {

    $employeeID = $_POST['employeeID'];
    $password = $_POST['password'];
    $password1 = $_POST['password1'];
    $password2 = $_POST['password2'];

    if($password1 == $password2) {

        $sql = "UPDATE employees SET password = '$password1' WHERE employeeID = '$employeeID' AND password = '$password'";

        $result = mysqli_query($db, $sql);

        header('Location: change_password.php');
    }

    else {
        echo "Passwords dont match";
    }

}

?>
```