ONLINE CAR RENTAL INFORMATION SYSTEM

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ONLINE CAR RENTAL INFORMATION SYSTEM

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STATEMENT

I hereby declare that in this thesis there is no work, either in whole or in part, that has been submitted for an academic degree at any university, and to the best of my knowledge there is also no work or opinion that has been written or published by another person, except which are cited in writing in this manuscript and mentioned in the citation list/bibliography.

Malang, 03 August 2022

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ABSTRACT

Hussen Ali Abdulsamea. "***Online Car rental information system***". **Supervisors: (1) Imam Fahrur Razi S.T.M.T. (2) Pramana Yoga Saputra, S.Kom.,**
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This research aims to develop an online car rental system to help a car rental industry in Libya. The system was conducted at Al asalah car rental in Libya This paper is designed so as to be used by the Car Rental Office specializing in renting cars to customers. It is an online system through which customers can view available cars, register, view profile and book car. Visual Studio Code-igniter was used in a device with 2.5Ghz of processor, 8GB of RAM, and 500GB of Hard drive. The system was developed to be able to solve problem for user to rent a car and also help the owner of the car to advertise and manage his car rental business without wasting time. Moreover, the web-based car rental online information system for Al asalah Rental car in Libya is an online system through which customers can view available cars, register, view profile and book car. It is also the best way to increase the quality of management and can reduce the time constraints. Moreover, the web is user friendly which can be understood easily by the clients, admins or owners of the car rental. The security is highly kept in the system. Besides, the online system also allows time reduction in term of transaction and payment.

Key words: car rental, online system, web-based system.

ABSTRAK

Hussen Ali Abdulsamea. "*Sistem Informasi Rental Mobil* ". Pembimbing: (1) Imam Fahrur Razi S.T.M.T. (2) Pramana Yoga Saputra, S. Kom., MMT.

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Penelitian ini bertujuan untuk mengembangkan sistem rental mobil online untuk membantu industri rental mobil di Libya. Penelitian dilakukan dengan data yang diambil dari rental mobil Al asalah di Libya sistem ini dirancang agar dapat digunakan oleh rental mobil tersebu yang mengkhususkan diri dalam penyewaan mobil kepada pelanggan. Ini adalah sistem online di mana pelanggan dapat melihat mobil yang tersedia, mendaftar, melihat profil dan memesan mobil. Visual Studio Code-igniter digunakan pada perangkat dengan prosesor 2.5Ghz, RAM 8GB, dan Hard drive 500GB. Sistem dikembangkan untuk dapat memecahkan masalah bagi pengguna untuk menyewa mobil dan juga membantu pemilik mobil untuk mengiklankan dan mengelola bisnis sewa mobilnya tanpa membuang waktu. Selain itu, sistem informasi online rental mobil Al asalah Rental mobil di Libya berbasis web adalah sistem online di mana pelanggan dapat melihat mobil yang tersedia, mendaftar, melihat profil dan memesan mobil. Hal ini juga merupakan cara terbaik untuk meningkatkan kualitas manajemen dan dapat mengurangi kendala waktu. Selain itu, web ini user friendly yang dapat dipahami dengan mudah oleh klien, admin atau pemilik rental mobil. Keamanan sangat dijaga dalam sistem ini. Selain itu, sistem online juga memungkinkan pengurangan waktu dalam hal transaksi dan pembayaran.

Kata Kunci: persewaan mobil, sistem online, sistem website.

FOREWORD

Praise and gratitude we pray to the presence of God Almighty for all His grace and guidance, the author was able to complete this thesis with the title "ONLINE CAR RENTAL INFORMATION SYSTEM" MEASUREMENT USING CREDIBILITY SCORING METHOD". This thesis is written as a requirement to complete the Diploma IV study program, Informatics Engineering Study Program, Information Technology Department, State Polytechnic of Malang.

The author realizes that without the support and cooperation of various parties, the activities of this final report will not be able to run well. For that, he would like to express our gratitude to:

1. Mr. Imam Fahrur Rozi, ST., MT., as the First Supervisor
2. MrPramana Yoga Saputra, S.Kom., MMT, as the Second Supervisor
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4. Mr. Imam Fahrur Rozi, ST., MT., as the Head of the Informatics Engineering DIV Study Program
5. And all parties who have helped and supported the writing of the Final Report from beginning to end which we cannot mention one by one.

The author realizes that in the preparation of this final report, there are still many shortcomings and weaknesses that the author has, both in the systematics of writing and the use of language. For this reason, the author expects suggestions and criticisms from various parties that are constructive in order to improve this report. Hopefully this report is useful for readers in general and writers in particular. Finally, the authors say thank you very much.

Malang, 15 August 2022

The author

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CHAPTER I. INTRODUCTION

1.1 BACKGROUND

A car rental or car hire agency is an office that rents automobiles for short period of time for a fee whether in a few hours, days, weeks or months. It is an elaborate form of a rental shop, often organized with numerous local branches (which allow a user to return a vehicle to a different location), and primarily 'located near airports or busy city areas and often complemented by a website allowing online reservations.

Car rental agencies primarily serve people who have a car that is temporarily out of reach or out of service, for example travelers who are out of town or owners of damaged or destroyed vehicles who are awaiting repair or insurance compensation. Because of the variety of sizes of their vehicles, car rental agencies may also serve the self-moving industry needs, by renting vans or trucks, and in certain markets other types of vehicles such as motorcycles or scooters may also be offered.

The manual car rental system provides services only during office hours. Thus, customers have limited time to make any transactions or reservation of the cars. The problem with some of the current system is that some small offices already have a car rental system which is not a web-based application. This is a limitation that gives them capability to store customer's details, but at the same time they cannot make their services more available to the public through the internet, they rather make use of posters to advertise their services to the public. They also make use of phone call reservations which is also limited to few features as compare to a web base system. For example, a customer might make a phone call reservation for a particular car, but when he/she comes to pick the car, he/she might turn not to like the car, this could be because the customer could not see a sample picture of the car, he/she wants to rent. There are some problems occurring in manual car rental offices. First of all, people need to first go to the nearest office to register as a client, but a problem occurs when the customer doesn't have enough time to do that. Moreover, the car rentals are normally

advertised in local or national newspaper which involves a lot of paper work and consumes time. The process of managing customer's data is also slow if the office is using manual system and there might be thousands of clients. Besides, it is very hard to keep record of all rental cars.

In Libya, car rental system is still conducted manually. Many people who need to rent a car should go to the rental office. In Libya there is a car rental office name Al asalah which provides cars for rent to general people. However, as it is located in the city and there is no website to post the information about the availability of the cars and their rental prices, people living outside the city find it hard to get the information. Therefore, there is a need to a system which can accommodate the rental service online.

This paper is designed so as to be used by Car Rental office specializing in renting cars to customers. It is an online system through which customers can view available cars, register, view profile and book car. This system is developed to solve the problems that usually happen when student want to rent a car in Libya, all activities is done manually which is no record have done on computerize or on mobile technology. So, they have many problems using this existing way of process.

A web application is an application that is accessed over a network such as the Internet or an intranet. Therefore, with this new method, the process will be more efficient and the safety of hiring car is secure. It is also the best way to increase the quality of management and can reduce the time constraints.

1.2 RESEARCH PROBLEM

Al asalah rent car is a office that rents out cars of any size to the business community in Libya. It uses a Manual File System to store, manipulate and retrieve customer information. Secondly, if customers wanted to make a booking, it required them to physically come to the rental office and make a booking. The system has led to information redundancy, time wasting, duplication and difficulties in information retrieval. Therefore, there is need to develop an online information system.

1.3 RESEARCH OBJECTIVES

From the above-mentioned problems, the aim is to develop a computer-based information system that will help to address the ongoing issues from the manual information system and help to facilitate some tasks that seems to be difficult for both the car rental office and those who are renting the cars (customers). The main objective is to design and implement a car rental management system for an organization. Specific objectives are:

1. To develop a simple and secure system that protects client information and confidential information of the organization
2. To design a user-friendly web-based system that enables client check for availabilityof vehicle and book or reserve a vehicle online.
3. To design a system that enables clients pay their car rent online

To develop a system that stores bookings and reservations information as well as payment history to help the organization keep track of transactions.

1.4 SIGNIFICANCE OF THE PROJECT

Projects provide a flexible framework for engaging students in exploring curricular topics and developing important skills, such as communication, teamwork, and technology skills. The car rental management system will help to solve numerous problems associated with the manual way of doing things. Errors, waste of precious time and energy will be eliminated with the system. This will in turn enhance productivity and efficiency in an organization. Also, it would help students and researchers that are working actively towards enhancing the car rental management system, this work would serve as a reference to them as they strive to develop the car rental office technologically. Additionally, issues of insecurity, trustfulness could be resolved.

CHAPTER II. LITERATURE REVIEW

2.1 How Car Rental Services Work

A car rental is a vehicle that can be used temporarily for a period of time with a fee. Renting a car assists people to get around even when they do not have access to their own personal vehicle or don't own a vehicle at all. The individual who wants to rent a car must first contact the car rental office for the desire vehicle. This can be done online. At this point, this person has to supply some information such as; dates of rental, and type of car. After these details are worked out, the individual renting the car must present a valid Identification Card.

Most offices throughout the industry make a profit based of the type of cars that are rented. The rental cars are categorized into economy, compact, compact premium, premium and luxury. Meanwhile, customers are free to choose any car of their choice based on their purse and availability of such car at the time of reservation.

2.2 Internet and Website in the Service Industry

There is strong evidence that office's use the Internet and technology significantly to support domestic and international activities. The fact that relatively small offices use the technology indicates a sophisticated level of Internet use.

From The use of cutting-edge and innovative IT, such as the integration of ICTinto business processes, complete digital information and communication systems and in larger enterprises ICT as a formal responsibility with dedicated managers. Therefore, thereis little or no evidence to support the adoption or ladder model, where offices develop

additional e- commerce models, eventually reaching a position where they transact online sales. Strict evidence emerges from research that Internet adoption is not a gradual process. On the other hand, most office's adopt ICT technology to suit their business model, and only change their ICT provision when new technologies that are useful to them become available

In the system development life cycle, a system model can be developed using Data Flow Diagrams (DFD). said that DFD is a graphic diagram for determining, building and visualizing a system model. DFD is used in defining requirements in a graphical display. Argued, Structured Query Language (SQL) is the main language responsible for data management and data structures in a relational database management system. SQL is a practical science that must be learned in order to have a solid foundation in writing complete programs with database applications. Basic SQL Operation is an important topic, which is considered as a core element in Database Management. Implementing basic SQL operations in developing a comprehensive IT program is both a project and an important role.

2.3 Benefits of Online Car Rental Services

A lot of benefits are obtained from online services, including car rental online system. Online car rental solution is fully functional and flexible. It is very easy to use. This online car rental system helps in back-office administration by streamlining and standardizing the procedures. It saves a lot of time, money and labor. It is eco-friendly: The monitoring of the vehicle activity and the overall business becomes easy and includes the least of paper work. The software acts as an office that is open 24/7. It increases the efficiency of the management at offering quality services to the customers. It provides custom features development and support with the software.

2.4 Car Rental System

The project is designed to help people utilize transport effectively. In recent times cars have become most convenient modes of transportation. Sheth, Yasutake and Sute (2016) said “our car rental system helps in making this an easier, hassle-free and enjoyable experience to acquire and use a car as per ones needs”. A person can book a car specifically for his travel time, co-travelers and the nature of travel. The rental system traverses from designing a database to understanding business concept and above all tomake this easy to adapt system for various travelling needs (Sheth, Yasutake& Sute, 2016). Sheth, Yasutake and Sute (2016) used the following entities which madeup the car rental system database: People, Customers,Agents, Employees, Car_details, Car_bookings, Extra_driver, Location, Insurance, Bill_generate, and Payment.

Sheth, Yasutake and Sute (2016) described the following database entities as:

1. The **people** table stores information about all people associated with the travels system which includes employees, agents and customers. In this entity people id is the primary key. The other attributes are first name, last name, street address, state, zip code, home, cell and email.

2. The **customers** table consists of all the information of travelers using Rental service. The customer id (CID) is a primary key. People ID is reference key here which references to people table. The other attributes of this entity are identification type and itinerary id which is the foreign key references to Itineraries table.

3. The **Agents** table stores all the data about the agents who setup cars for the renters and their commission percentage. Also notes the location where they work as a foreign key.

4. In the **Employees** table, we have all of the employees working in the office, not including on field agents, and car mechanics.

5. The **Car_details** entity keeps the records for all of the available cars. It has car id as primary key. This entity also includes car name, seating capacity of car, production year. It also stores the price to rent the car.

6. The **Car_bookings** table keeps the records of the cars booked by the travelers at the specific locations. The booked car is added to this table with its car id and itinerary id of the person who booked the car.

7. **Extra_driver**; This is a weak entity derived from the customers table which has customer id as a foreign key which references to the customers' table. This entity keeps the record of the person who might drive the rented car with the customer. Driving license number will also store of that person.

8. **Locations** are either a car rental distribution center which holds rental cars waiting to be rented, or an office where agents work. This is distinguished by attribute Type.

9. **Insurance** table has Insurance Type as primary key which keeps record of insurance type. This table has other entities like collision coverage which stores amount of Collison, Body coverage will cover amount of body damage of car and medical coverage will cover medical issue with customer in accidents.

10. **Bill** table holds the bill for the customers. This table has bill number as primary key. Rent per day and rented days are attributes for counting bill amount which shows amount customer needs to pay.

11. **Payment** entity has payment id as primary key and bill number is foreign key to get bill details from bill generate. And some other attributes like card number, expiry date, cvv are for the customer who wants to pay by credit card.

2.5 Previous Studies

Studies about development rental car information system have been conducted previously by several researchers. Eddy & Alex (2013) studied online rental car management system with a case study of Africa one travels. The focus was to develop and implement an Online Car Rental Information Management and Centralized Database System that helps in capturing the information from Customers and their Booking transactions. This was developed to reduce the effect of Manual System o f Registering customers while booking. The result shows that technological progress makes it possible for Online Car Rental Management System of Africa One Travels to provide total cost-effective access to more complete, accurate Booking Data from Clients and to offer improved performance and enhancement functionalities that are used to meet the past and future information management challenges. In addition, Shet, Yasutake & Sute (2016) also developed a car rental system. The aims of the study was to design a car rental system to help people utilize transport effectively, to ease car renting for the masses and to create a web-based system to book, rent car fora person, family or an entire organization. They created a database that a market can use for Car Rental System, including Customer, Agents and Employees. Customer can add extra driver who will drive car with him/her. It helps keep record for that extra driver and agent location. They implemented relational system & languages. It was found out that how reliable this system is for database because it provides centralized database structure which make database system efficient.

CHAPTER III. METHODOLOGY

This chapter describes the steps and the research method that will be used during this research. The following are steps that the author followed while carrying out this research.

2.1 Literature Study

References from books and journals are collected at this stage that help to obtain information about development of information system. The theory or information is then used by the author to develop a car rental information system. From the references, there are theories about information system, system development life cycle (SDLC) using water fall method. Implementation of the system designed is done using PHP programming language using the CodeIgniter framework. Software testing is carried out using Blackbox testing and usability testing.

2.2 Needs Analysis

At this stage, the information needed to build the system is collected. The collection starts by analyzing the condition of renting car through interview and observation. After that, a need analysis is carried out to identify functional and non- functional requirements as well as use case scenarios.

2.3 System

At this stage, a system is designed based on the needs analysis by designing activity diagram and sequential diagram that produce class diagram and system interface design.

2.4 System Implementation

At this stage of system implementation, the author uses CodeIgniter framework in system development. System implementation will undergo three stages. The first stage is the implementation environment specification process where the facilities used in implementing the system as hardware, software and operating system are described. The second stage is the implementation of the system carried out with a program code that has been compiled using PHP programming language using CodeIgniter framework which produces system output. The third stage is the interface implementation carried out based on the interface design carried out.

2.5 System Testing

At this stage, system testing is carried out to ensure that the system that has been built is running well. In addition, the test session can help to find bugs or errors in the system so that debugging or system repair can be made. System testing session will produce output in the form of test evidences, where the evidence will portray whether implementation of the application goes well and in accordance with the needs that has been designed in the system design. The testing was carried out with two testing methods, the first is validation testing using the Blackbox method to access whether or not the function is running on the system built. The other method is usage test method that uses the system usability scale (SUS) method. SUS carried out using 10 questions sample addressed to 5 respondents. The test result would be the benchmark in accessing the success of the system being built.

2.6 Conclusion and Suggestion

This stage is carried out after the completion of analysis stage, design, implementation and testing. Conclusions are drawn based on the results of the system testing carried out with two test methods, Black box test and usability test. From the test, the conclusion of the assessment for the system that is built based on whether it is valid or not is obtained from the test result. Suggestions are improvements given by the author for possible system development on further research.

CHAPTER IV. ANALYSIS AND SYSTEM DESIGN

4.1 Analysis of Current System

Evaluation in the current procedure is an overview of the problem based on the stages ofthe activity. Explanation of evaluation procedures that run can be seen in table 4.1.

Problem	Solution
Customer: Looking for car rental manually by asking friends and visiting rental place in person to book a car	Online car rental: Costumers search on search engine and social media online.
Rental Owner: Advertising car rental via brochures, billboards, and yellow pages which accommodate people locally	Car rental owner posts advertisement on the web, manages booking and payment online.

Table 4. 1 Evaluation of Current System

4.2 Requirement Analysis

Requirement analysis is needed to describes the behaviors and features of the system. It contains the list of requirements of the system and the diagrams. Requirements list are the list of functions that a system must possess. These include functional and non-functional. Functional requirements are the requirement that the stakeholders need from the system, how is the system going to be operated and what the system should have. Non-functional requirements are the requirements that specifies the criteria that can be used to judge how the system operates

4.2.1 Functional Requirements

The database application was analyzed in order to make sure that it performs the following functions; Support capturing of data from the customer booking form to the system, production of reports, storing of data, Validating and updating of data can be seen in table 4.2.

Requirement	Description	Type
R-1	A customer is able to register with name, address, ID number, and phone number	Functional
R-2	A customer can view the details of a particular car	Functional
R-3	The system allows users to search a specific car	Functional
R-4	The system shows available cars to the customer during reservation	Functional
R-5	The system displays the summary of successful Reservations.	Functional
R-6	The system allows the customer to print the invoice and upload the payment proof.	Functional
R-7	Admin can login to the system using his/her username and password.	Functional
R-8	The system allows admin to modify or update any car information when it is needed and to save all changes made by admin	Functional
R-9	The system allows users to logout	Functional

Table 4. 2 Functional Requirement

4.2.2 Non-Functional Requirements

The following were the non-functional requirements. Only the authorized users access the administration database system. Users were trained to acquire skills to operate the system. The system allows centralized processing of information. The system is User friendly. Secure system (password) only allows the system administrator and Authentication of user. It can be seen in table 4.3.

Requirement	Description	Type
R-1	Transactions are securely made and users data are protected from attacks	Security
R-2	The system is user-friendly	Usability
R-3	The system runs on any hardware with any kind of browser.	Compatibility
R-4	System is able to keep running when it's launched unless there is an intentional shutdown of the system	Performance

Table 4. 3 Non-Functional Requirement

4.3 System Design

System Design refers to the art of defining the architecture, components, modules, interfaces and data for the System to fulfill the project main objective. The main goal of the design phase is to find the best design, within the limitations from the requirements and the physical and social environment where the system operates.

4.3.2 System Design Architecture

The analysis of the system architecture is a process to describe the physical system to be built and also its supporting components. The overview of the built system architecture is presented below.

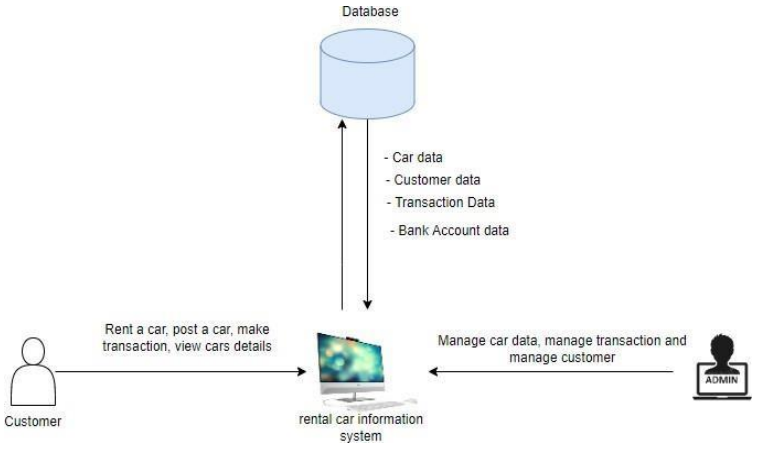


Figure 4. 1 System Design Architecture

4.4 Use Case Diagram

Use case diagrams show the interaction between the external entities and the system. Use case description shows the detail description of interaction between the actors and their use cases. The description enables to have a proper understanding of how actor interacts with the system through their use cases.

4.4.1 Admin and Customer Use Case Diagram

describes the interaction between the admin and the system. In the diagram, an admin actor is on the left. The descriptions in the box show the system of use cases. The use cases are activities that an actor can perform in the system. The top left within the system is login use case, before login in to the system, the details for logging need to be valid, which is represented by the valid use case at the top-left corner. Admin can also view report and cancel order. He/She is also able to input register user which must be valid,delete user and check the payment.

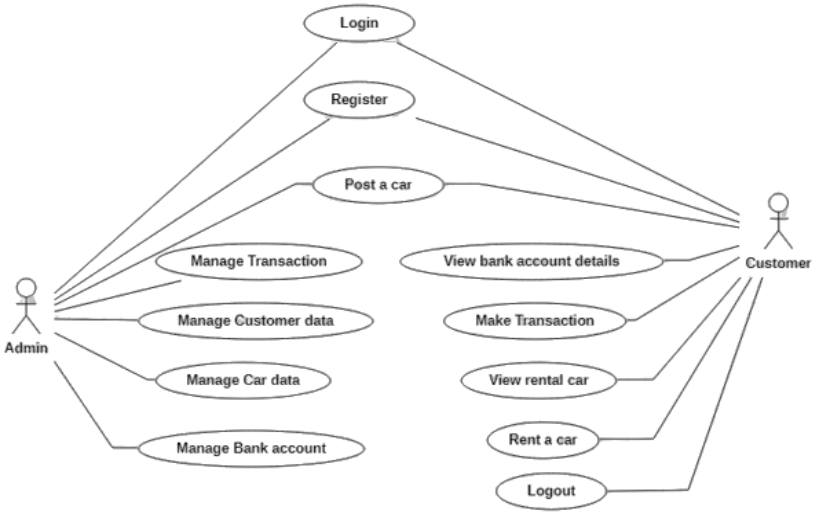


Figure 4. 2 Activity Diagram

4.6 Data Flow

The Data Flow Diagram shows the overall view of the data that goes in, and how it flows to other entities. From the left, the square symbol represents a customer entity which can help make reservation from the system. The arrow that is labeled Car Detail is the processed data that comes out of the system depending on the logic executed. The square with rounded corners at the center of the diagram represents the system. The data of payment deposit can be accessed by the partner bank. Admin represented on the bottom can create users, cancel the reservation and view report. Admin staff can check car availability, add or update the rented cars, and view report.

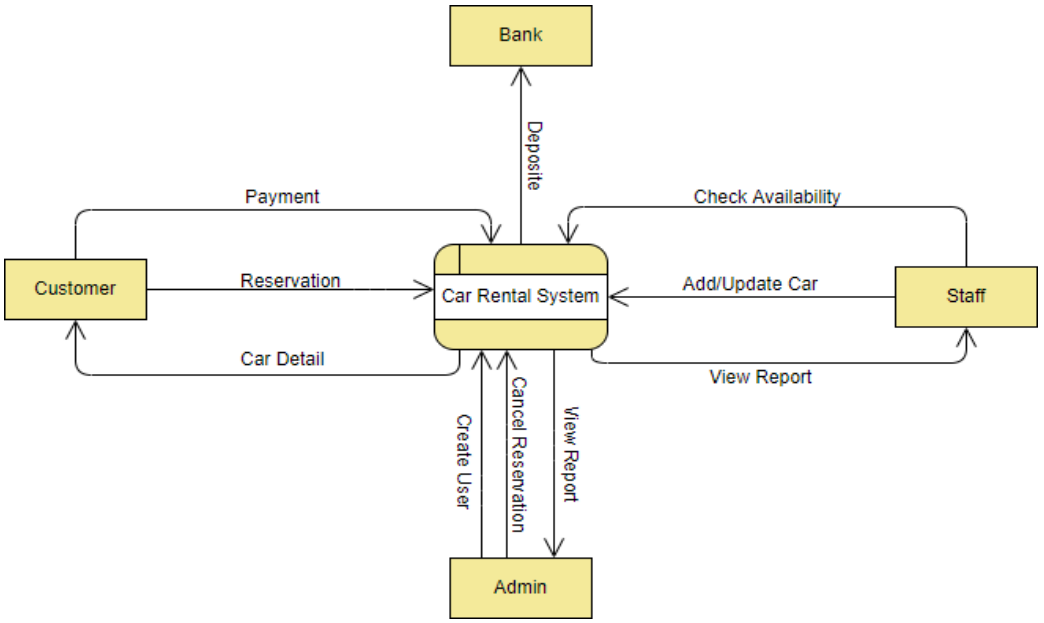


Figure 4. 3 Data Flow

4.6 Activity Diagram

Activity diagrams graphically represent the sequential business and operational workflows of a system. It is a dynamic diagram that shows the activity and the event that causes the object to be in the particular state. The workflows from activity diagram will serve as guide for system navigation in the final design phase of the system.

4.6.1 Member Registration

This activity below explains about member registration. It's member to display member registration. Which it can be seen in figure 4.4.

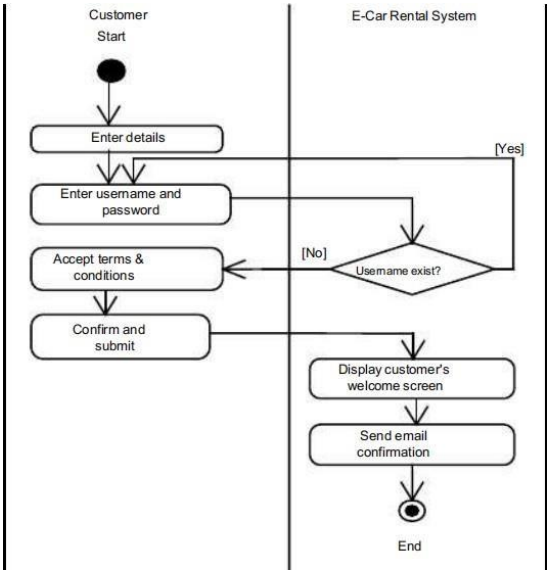


Figure 4. 4 Register as a Member

4.6.2 Reservation of a Car

This activity below explains about Reservation. It's reservation to display reservation of car rent. Which it can be seen in figure 4.5.

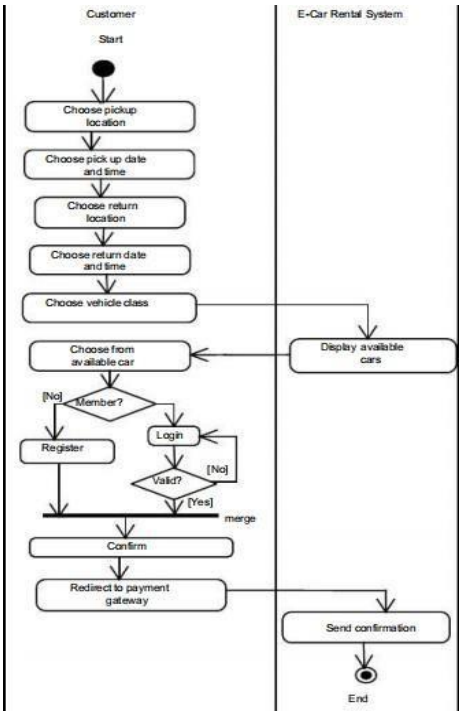


Figure 4. 5 Reservation of a Car

4.6.3 Payment of Rent Car

This activity below explains about payment of rent car. It's payment to display payment of car rental. Which it can be seen in figure 4.6.

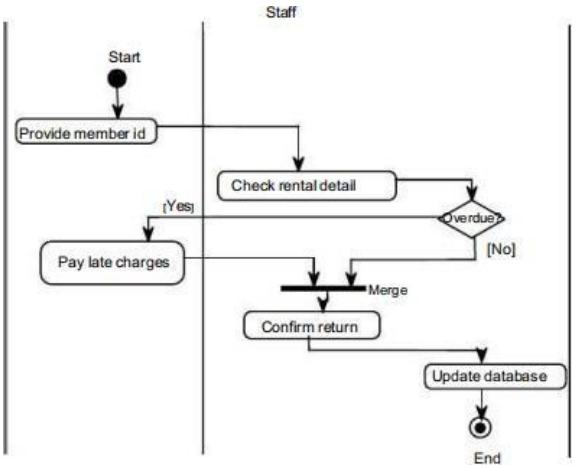


Figure 4. 6 Payment Process

4.6.1 Adding a New Car

This activity below explains about adding a new car. It's adding a new car todisplay adding a new car. Which it can be seen in figure. 4.7.

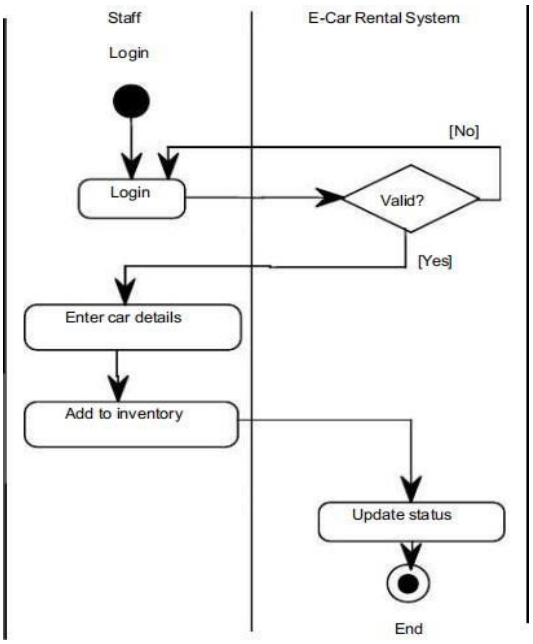


Figure 4. 7 Adding a New Car

5.1 Implementation.

Implementation is the stage that is carried out after conducting the analysis requirements and system design. In this subchapter, the researcher explains the development environment used in conducting research in the form of system specification implementation and interface implementation and program code.

5.1.1 Implementation of program codes

5.2.1.1 Implementation of customer data controller (Admin)

This source code below explains about customer data. It's codes to display customer data and add customer data into a database.

```php
<?php
class customer_data extends CI_Controller{

    public function index(){
        $data['customer']=$this->rental_model->get_data('customer')->result();
        $this->load->view('admin_template/header');
        $this->load->view('admin_template/sidebar');
        $this->load->view('admin/customer_data',$data);
        $this->load->view('admin_template/footer');
    }

    public function add_customer(){
        $data['customer']=$this->rental_model->get_data('customer')->result();
        $this->load->view('admin_template/header');
        $this->load->view('admin_template/sidebar');
        $this->load->view('admin/form_addcustomer');
        $this->load->view('admin_template/footer');


    }
    public function add_custAction(){
        $this->rules();
        if($this->form_validation->run()==FALSE){
            $this->add_customer();
```

```
        $data= array(
            'cust_name' =>$cust_name,
            'username'  =>$username,
            'address'   =>$address,
            'gender'    =>$gender,
            'phone_no' =>$phone_no,
            'id_no'     =>$id_no,
            'password' =>$password
        );
        $this->rental_model->insert_data($data,'customer');
        $this->session->set_flashdata('message', 'Customer Data sucessfully added!');
        $this->session->set_flashdata('message','<div class="alert
        alert-success alert-dismissible fade show" role="alert">
       Customer data successfully added!.
       <button type="button" class="close" data-dismiss="alert"
           aria-label-"Close">
        <span aria-hidden="true">&times;</span>
       </button>
     </div>');

        redirect('admin/customer_data');
    }
```

```
    }



    public function delete_customer ($id){
        $where = array('cust_id'=>$id);
        $this->rental_model->delete_data($where,'customer');
        $this->session->set_flashdata('message', 'Customer Data sucessfully deleted!');

        redirect('admin/customer_data');

    }
    public function search(){
        $keyword = $this->input->post('keyword');
        $data['customer']=$this->rental_model->get_keyword($keyword);
        $this->load->view('admin_template/header');
        $this->load->view('admin_template/sidebar');
        $this->load->view('admin/customer_data',$data);
        $this->load->view('admin_template/footer');

    }
}
```

```
    $data =array(
        'cust_name' =>$cust_name,
        'username' =>$username,

        'address' =>$address,
        'gender' =>$gender,
        'phone_no'=>$phone_no,
        'id_no' =>$id_no,
        'password' =>$password

    );
    $where = array(
       'cust_id' =>$id);


    $this->rental_model->update_data('customer',$data,$where);
    $this->session->set_flashdata('message', 'sucessfully updated!');

    redirect('admin/car_data');

}
```

Figure 5. 1 Implementation of customer data controller (Admin)

This source code below explains about car data. It's codes to display car data and add car data into a database.

Implementation of car data controller (Admin)

```
<?php
class car_data extends CI_Controller{
    public function index()
    {
        $data['car']=$this->rental_model->get_data('car')->result();
        $this->load->view('admin_template/header');
        $this->load->view('admin_template/sidebar');
        $this->load->view('admin/car_data',$data);
        $this->load->view('admin_template/footer');

    }
    public function add_car(){

        $data['car']=$this->rental_model->get_data('car')->result();
        $this->load->view('admin_template/header');
        $this->load->view('admin_template/sidebar');
        $this->load->view('admin/form_addcar',$data);
        $this->load->view('admin_template/footer');
}
public function add_carAction()
{
    $this->_rules();
    if($this->form_validation->run() ==  FALSE){
        $this->add_car();
    }else{
```

Figure 5. 2 Implementation of car data controller (Admin)

This source code below explains about transaction data. It's codes to display transactions data and upload payment receipt into a database

```php
<?php
class transaction extends CI_controller{
    public function index()

{
    $customer =$this->session->userdata('cust_id');

$data['transaction'] =$this->db->query("SELECT *FROM transaction tr,
        car cr, customer ct WHERE tr.id_car=cr.id_car And
        tr.cust_id=ct.cust_id AND ct.cust_id='$customer' ORDER BY id_rental DESC ")->result();
          $this->load->view('customer_templates/header');
          $this->load->view('customer/transaction', $data);
          $this->load->view('customer_templates/footer');
        }

        public function payment($id){
            $data['transaction'] =$this->db->query("SELECT *FROM transaction tr,
        car cr, customer ct WHERE tr.id_car=cr.id_car And
        tr.cust_id=ct.cust_id AND tr.id_rental='$id' ORDER BY id_rental DESC ")->result();
        $data['bank_account']=$this->db->query("SELECT *FROM bank_account")->result();
         $this->load->view('customer_templates/header');
         $this->load->view('customer/payment', $data);
         $this->load->view('customer_templates/footer');

        }
```

```php
<div class="main-content">
        <section class="section">
          <div class="section-header">
            <h1>Customer's Data</h1>

          </div>


         <div>
          <a href="<?php echo base_url('admin/customer_data/add_customer') ?>" class="btn btn-primary text-right" >Add Cus
          </div>




          <?php echo $this->session->flashdata('message')?>

          <div class="navbar-form navbar-right">

          </div>
          <br>
```

```
<table class="table-responsive table table-bordered table-striped">



    <tr>
        <th>No</th>
        <th>Name</th>
        <th>Username</th>
        <th>Address</th>
        <th>Gender</th>
        <th>Phone NO</th>
        <th>ID No</th>
        <th>password</th>
        <th width="200px">Action</th>
    </tr>

    <?php
    $no=1;
    foreach($customer as $cs) :?>
     <tr>
```

```
}

public function payment_action(){
    $id =$this->input->post('id_rental');
    $payment_proof                  =$_FILES['payment_proof']['name'];
if ($payment_proof){
    $config ['upload_path']='./assets/upload';
    $config ['allowed_types']= 'pdf|jpg|jpeg|png|tiff';
    $this->load->library('upload', $config);
    if($this->upload->do_upload('payment_proof')){
        $payment_proof=$this->upload->data('file_name');
        $this->db->set('payment_proof', $payment_proof);
    }else{
        echo $this->upload->display_errors();
    }
}
$data = array(
    'payment_proof' => $payment_proof,
```

```
}
public function cancel_transaction($id){
    $where  = array('id_rental' => $id);
    $data   = $this ->rental_model->get_where($where, 'transaction')->row();

    $where2 = array('id_car' => $data->id_car);
    $data2  = array('status' => '1');


    $this-> rental_model->update_data('car', $data2,$where2);
    $this->rental_model->delete_data($where, 'transaction');
    $this->session->set_flashdata('message','<div class="alert
    alert-success alert-dismissible fade show" role="alert">
    Transaction successfully deleted!
   <button type="button" class="close" data-dismiss="alert"
       aria-label-"Close">
     <span aria-hidden="true">&times;</span>
   </button>
 </div>');
 redirect('customer/transaction');



}
public function bank_details($id){
```

```
        }
        public function bank_details($id){

            $data['details']=$this->rental_model->get_BankID($id);
                    $this->load->view('customer_templates/header');
                    $this->load->view('customer/transaction', $data);
                    $this->load->view('customer_templates/footer');
            }
    }

?>
```

Figure 5. 3 Implementation of Transaction controller (Customer)

5.1.2 Implementation of system interface

5.2.2.1 Main Website Homepage Interface (Customer)

The main website Homepage (index page) acts as a navigation point of all pages of the system. Through the main web-page, users can access any part of the system depending on the level of authentication. Customers can access only five Web-Pages that are in their areas of concern including Home, About, Register, and Login. Only the administrators will be allowed to access the entire System.

On this webpage, the customers can access and get information about the car rental, register as a new member or login as an existing member to rent a car in Al asalah rent car.

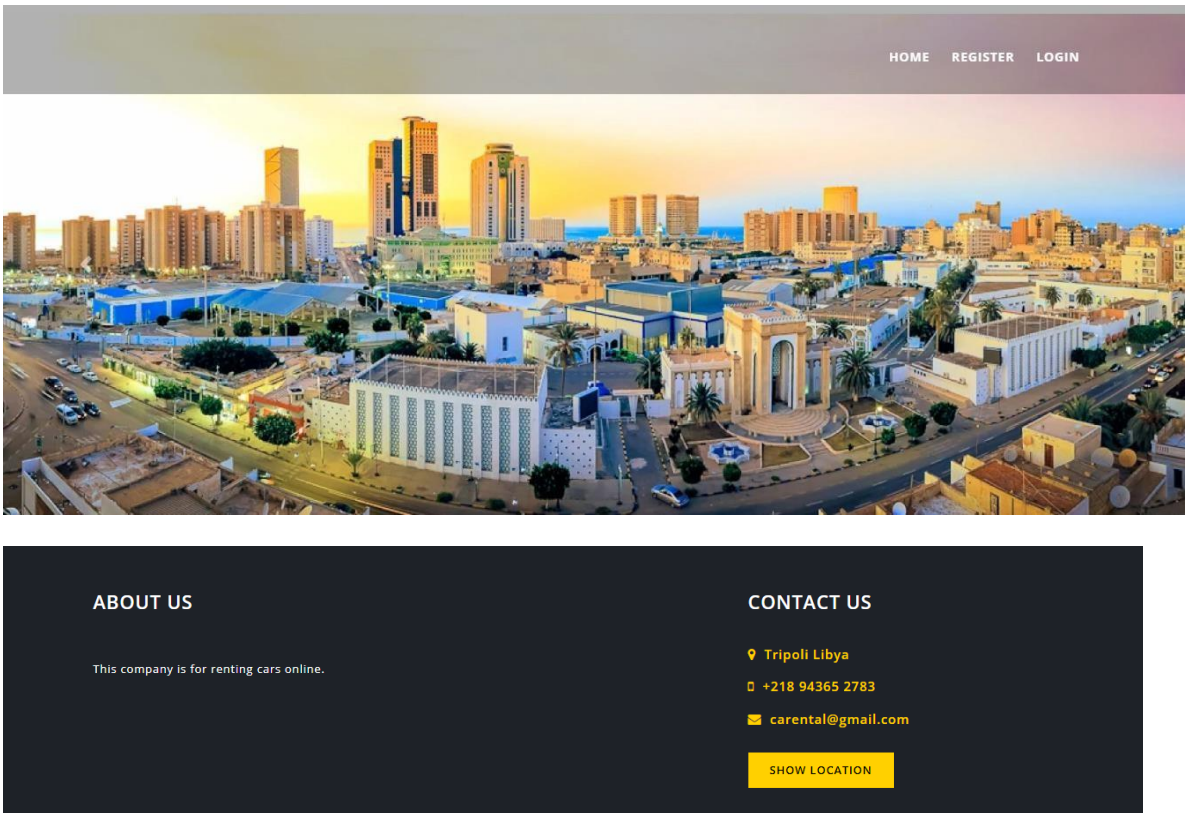


Figure 5. 3 Main Homepage

5.2.2.1 Registration Interface

In the registration page, customers are required to fill in the valid information with name, address, gender, ID number and phone number. Following that, they are required to fill in username and password to start registration.

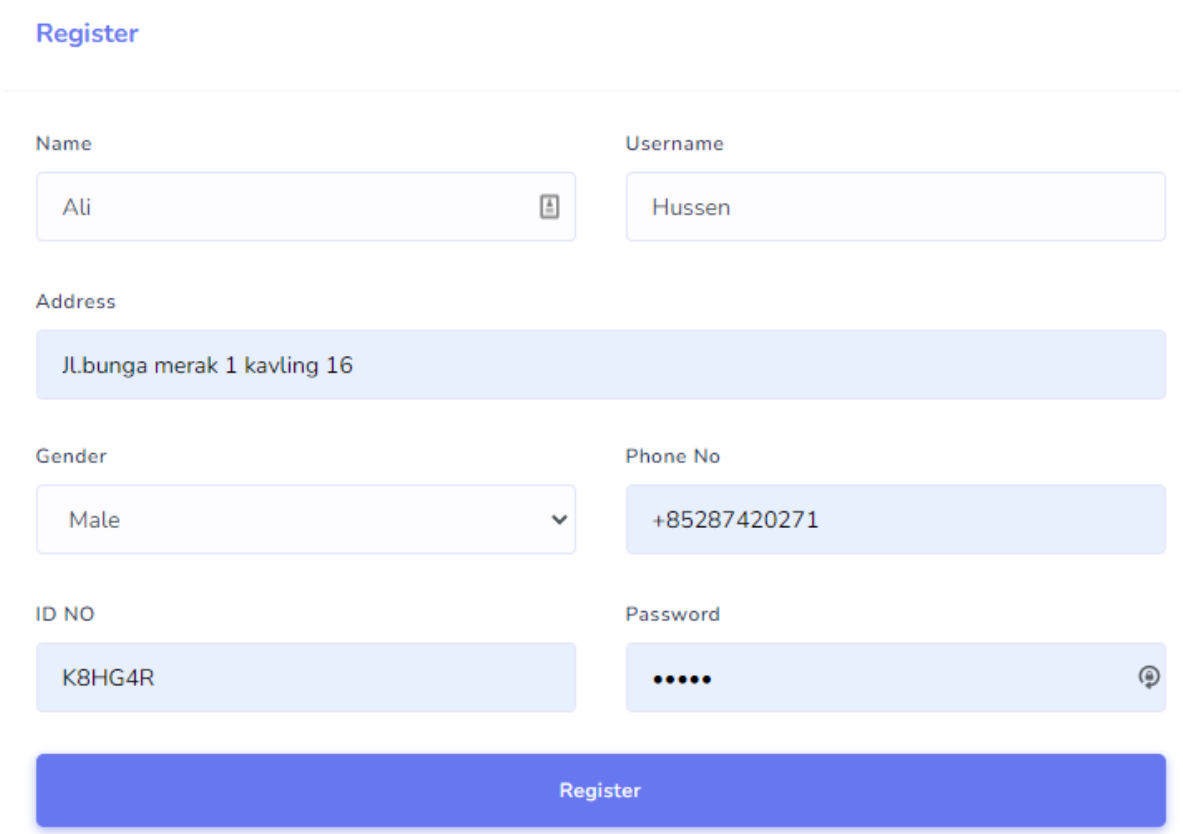


Figure 5.4 Customer Registration

5.2.2.2 Login Interface

To login into their account, the customers need to enter username and password they register. Menu Forgot Password? is also added to give alternative of login in the case when the customers forget their password.

This login below explains about how to login.

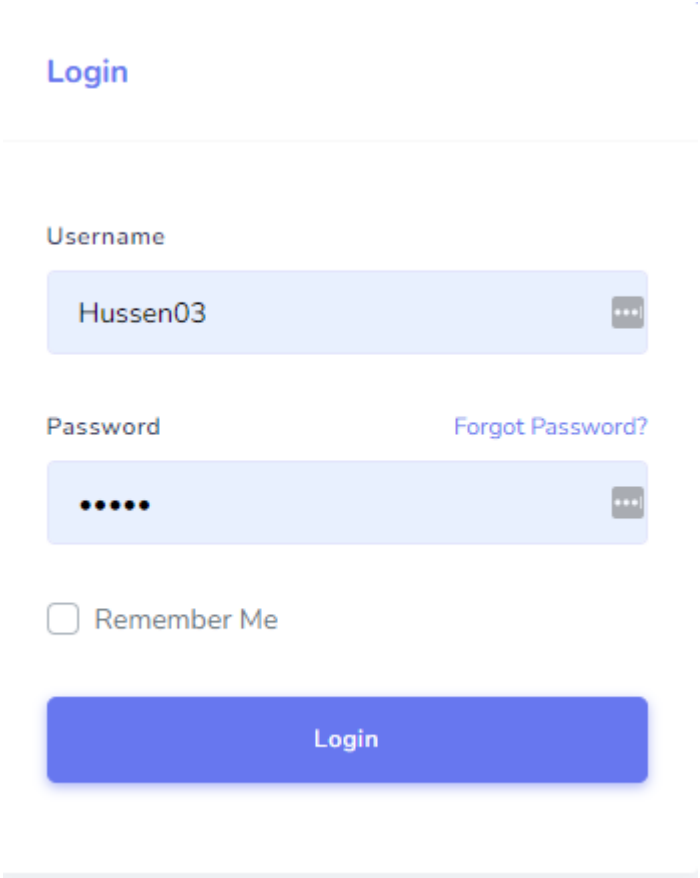
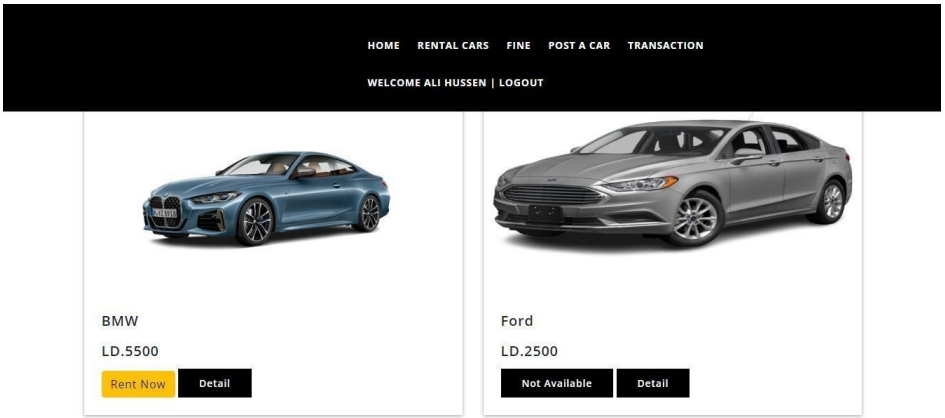


Figure 5. 4Customer Login

5.2.2.1 Car data Interface

The homepage of registered customers include home, rental cars, fine, post a car, transaction, logout menu and search bar to ease them in looking a particular car to rent. Itdirectly shows the option cars with the detail brand and price.



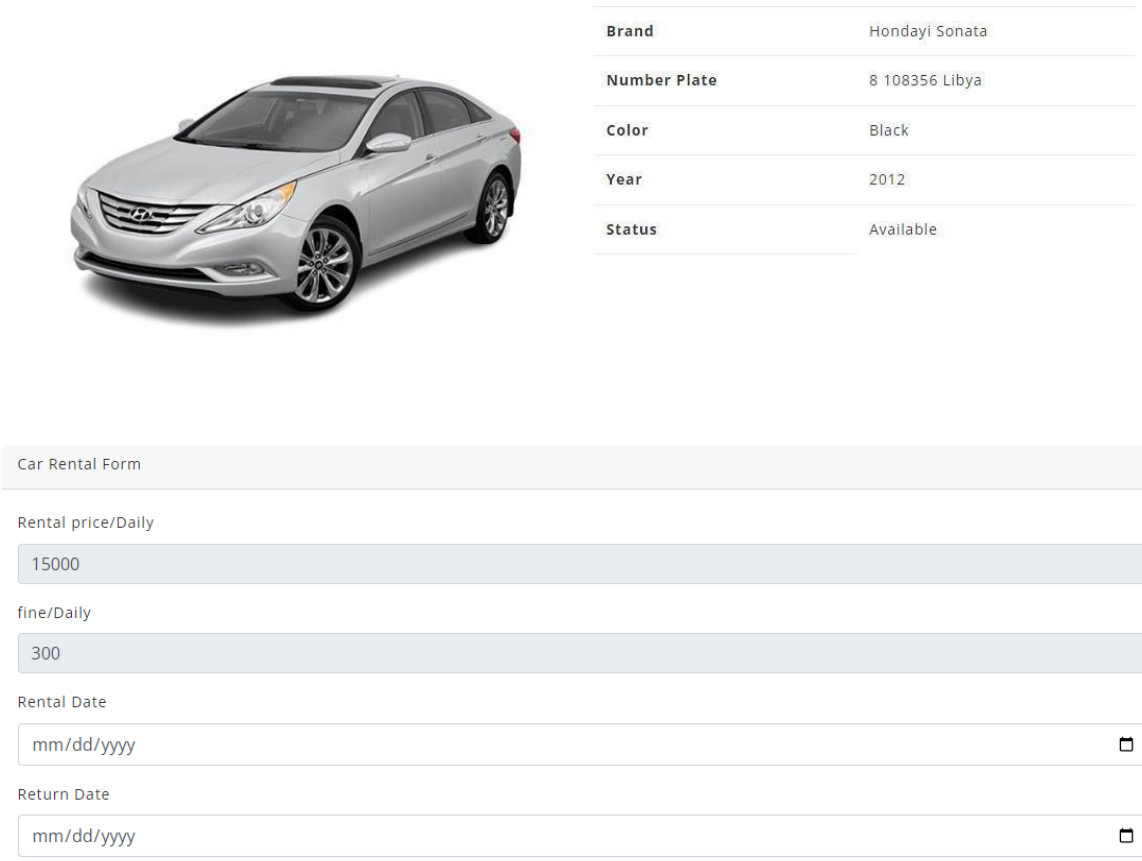


Figure 5. 5Homepage: Registered Customer's View

5.2.2.1 Rental Interface and Car details

This car search below explains about filling customer data for renting car.

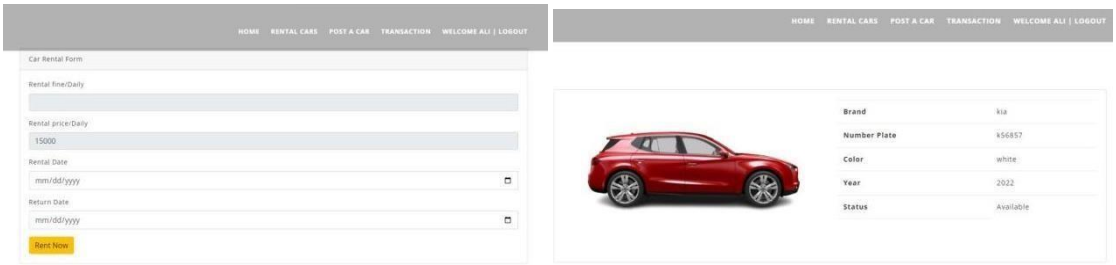


Figure 5. 6 Car Search and Car Detail Pages

Reservation process also conducted online. The website has included the payment transaction which allows the customers to print the invoice and upload their payment proof.

5.2.2.2 Upload Payment proof and Print invoices Interface

This uploading payment below explains about how customer can make payment for renting a car.

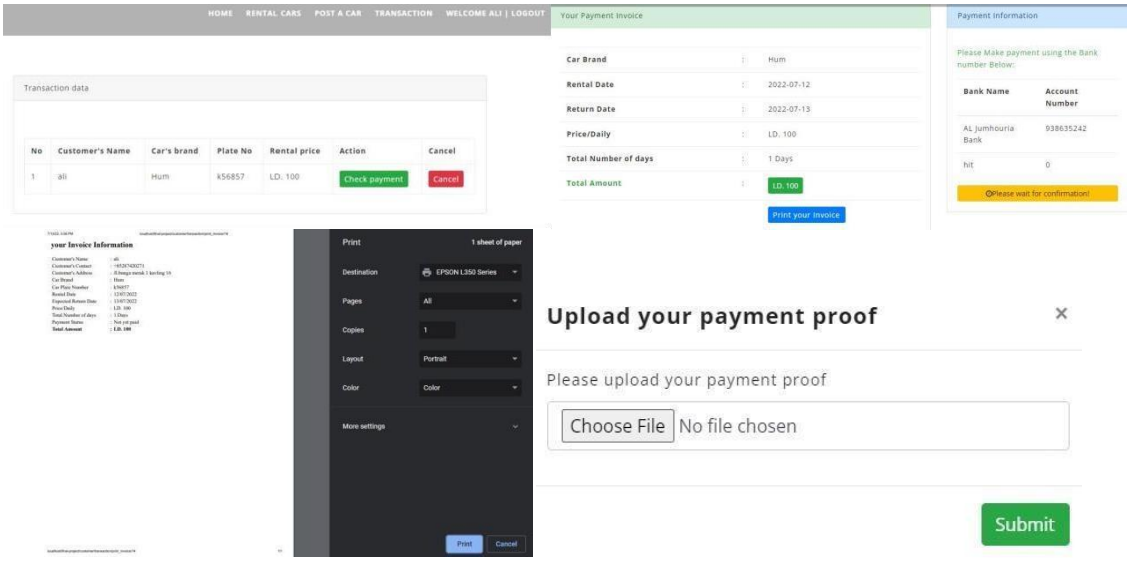


Figure 5. 7 Payment Process

5.2.2.3 Admin Interface

This admin interface below explains about where the admin can manage car rental website and the customer data.

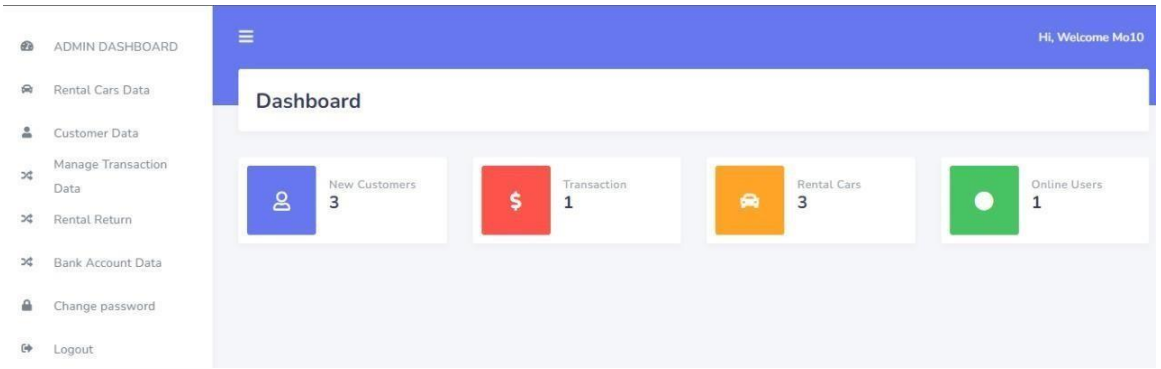
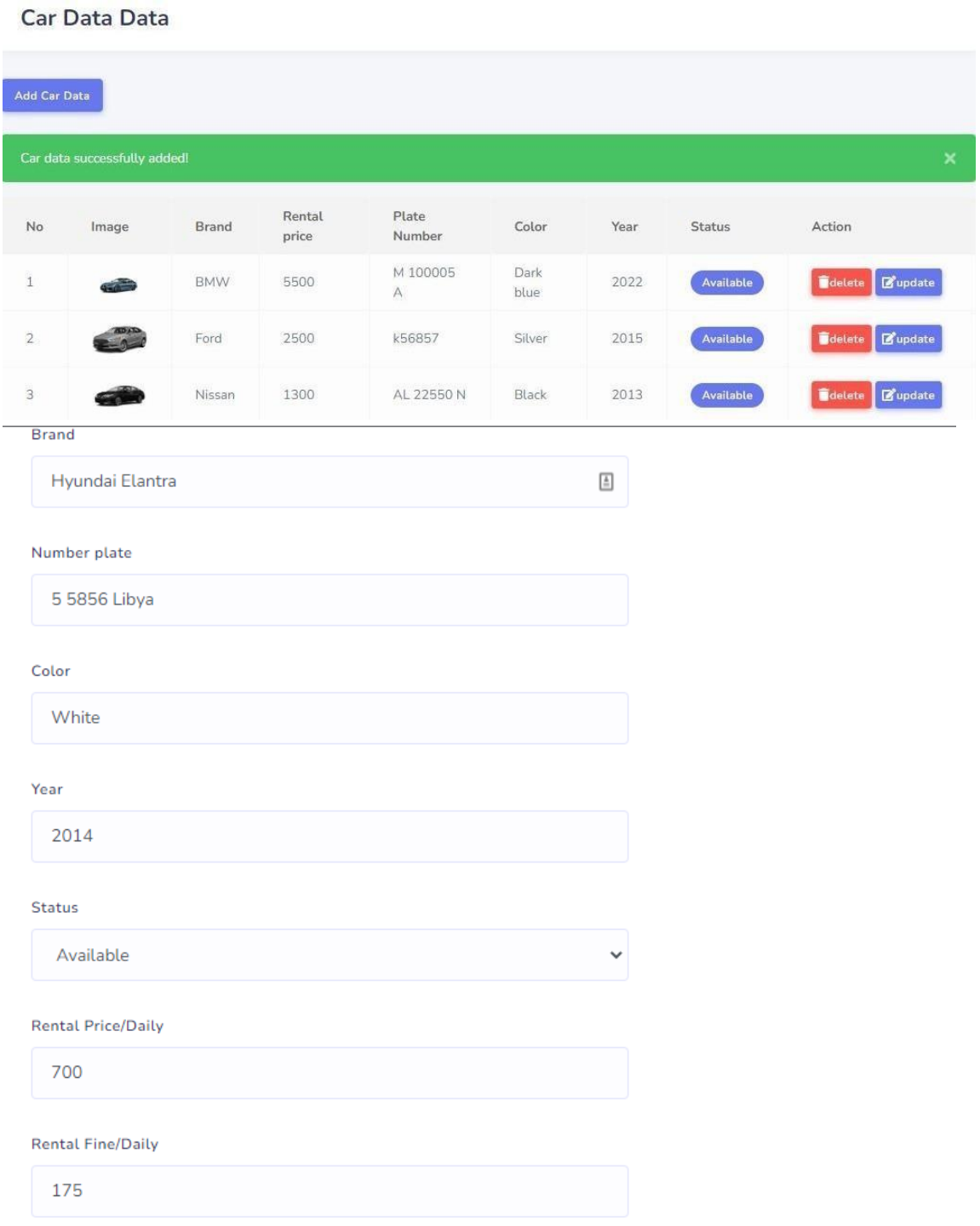


Figure 5. 8 Dashboard View of Admin page

5.2.2.1 Car data Interface (Admin)

This car data interface below explains about where admin can delete or update car information.



This form add car below explains about where admin can add a new car for rent.

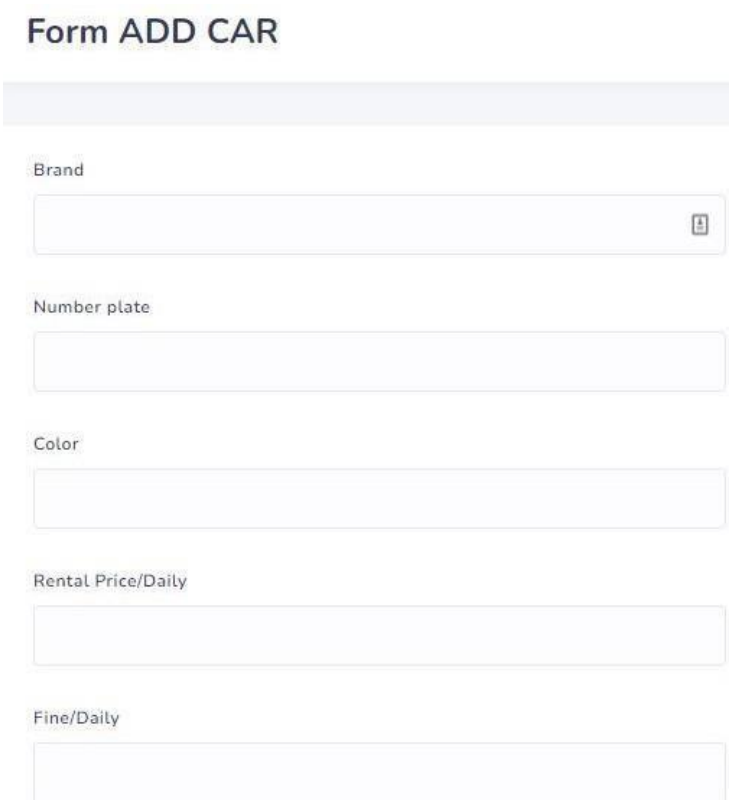


Figure 5. 9 Adding Car Data

5.2.2.1 Customer data Interface (Admin)

This customer data interface below explains about where the admin can see the customer data and customer information.

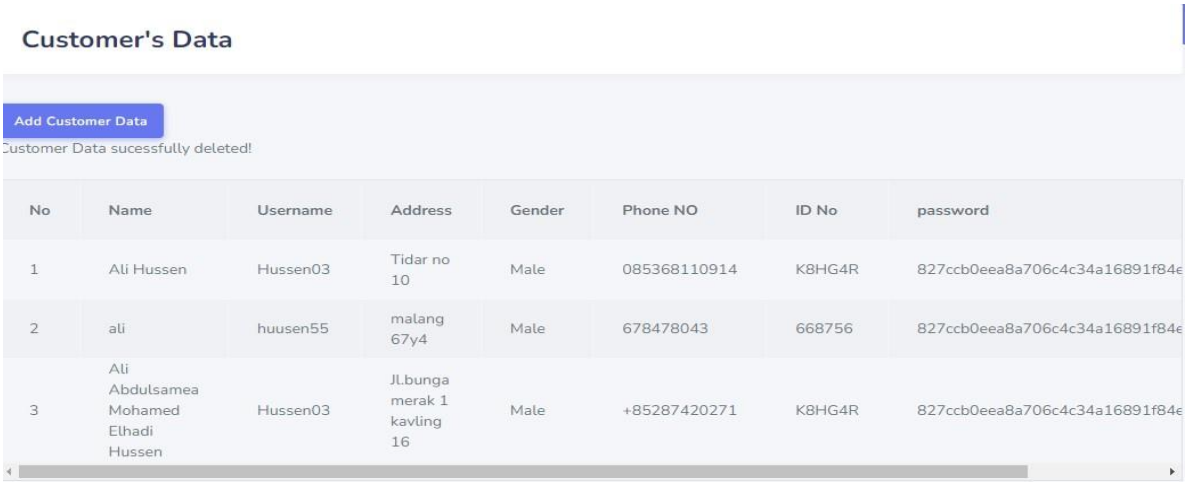
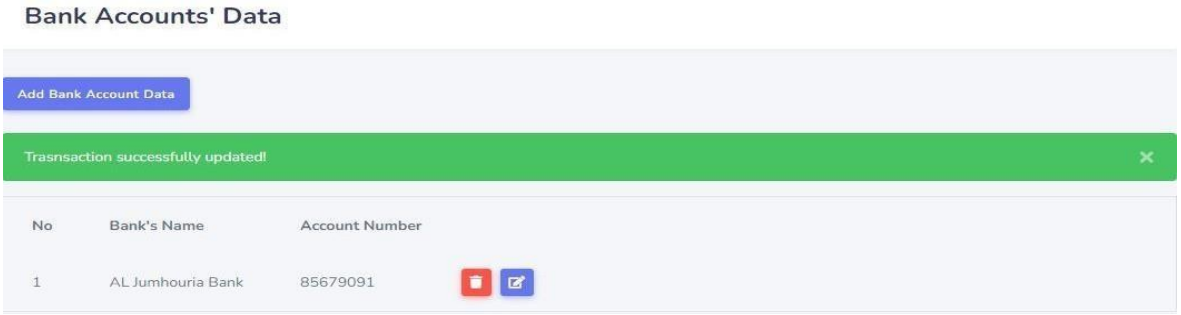
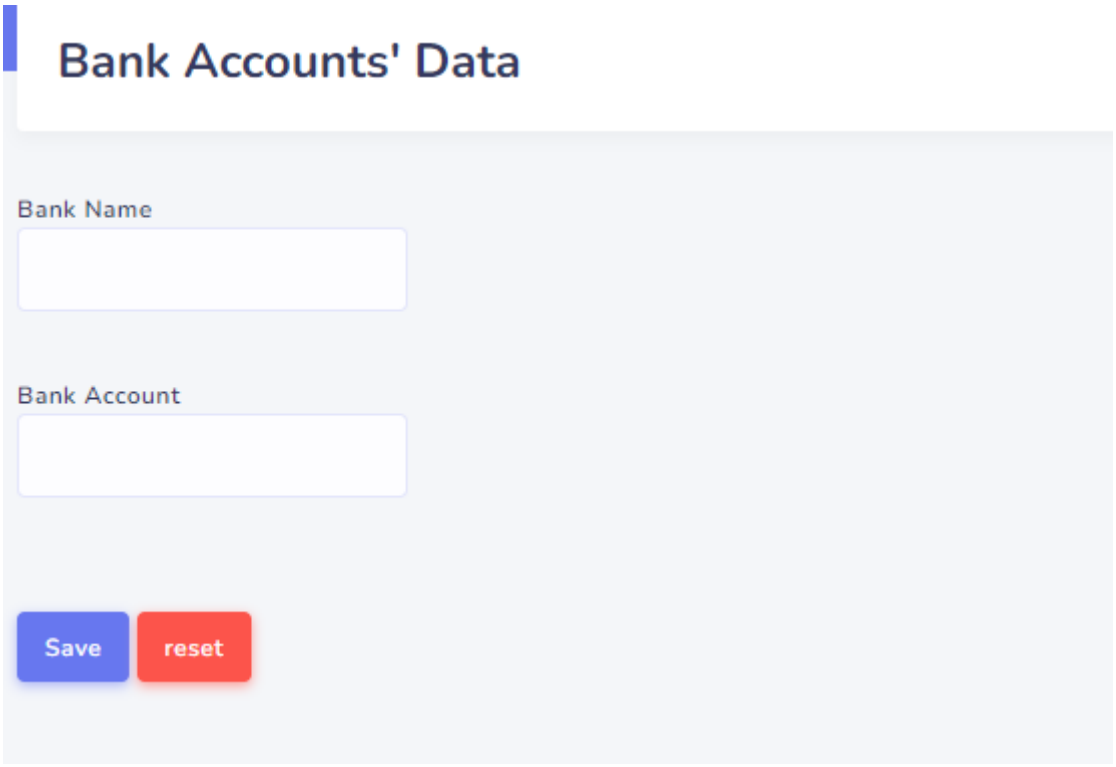


Figure 5. 10 Figure 6.9 Manage Customer Data

5.2.2.2 Bank account data Interface (Admin)

This bank account below explains about where admin can add a new bank account or update a bank account or delete bank account.





5.2.2.3 Transaction Interface (Admin)

This transaction below explains about where the admin can accept any customer transaction or delete.

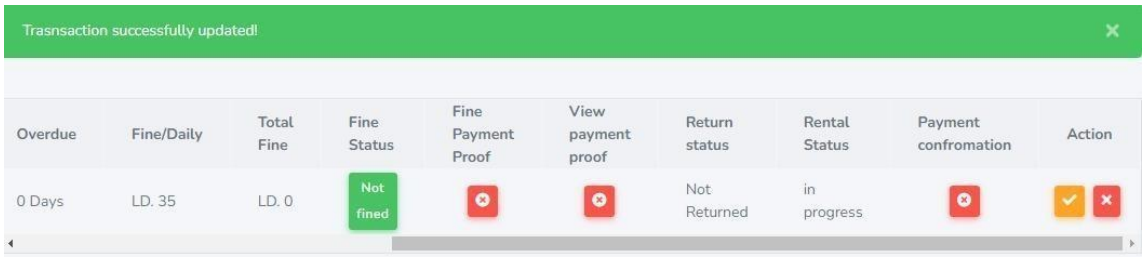


Figure 5. 11 Transaction Management

5.2.2.4 Rental fine transaction data Interface (admin)

This rental fine transaction below explains about where the customer should pay the fine if they did not return the car on same date.

Figure 5. 12 Fine

5.2 Testing

This section shows the test carried out in order to check whether the application is error free or not. Test plan was developed and used which contains all the system functionalities that are going to be tested in case of any error. System testing also helps to check whether the system meets its requirements or not. The system is tested using black box testing. Black box testing focuses on the possibility of the software to meet the needs mentioned in the specifications. Testing was performed by running or executing unit, and then observed whether the result of the unit being tested is whether in line with expectations. The researcher uses two testing methods, Blackbox testing and usability testing.

5.2.1 Blackbox Testing

At this testing stage, the researcher carried out Blackbox testing with the aim of determining the suitability of the system requirements that have been designed with the output of the application system. Black box testing can be sent in the table below.

Test Object	Register
Testing purpose	User should be able to register and create and account in the system
Testing procedure	1. Accessing the application system 2. Click “register” button on the menu bar at the top 3. Fill in the name, address, gender, ID number, phone number, username and password 4. Click Register
Result obtained	Users successfully create an account to register into the system
Test result	Passed

Table 5. 1 Registration Test

Test Object	Login
Testing purpose	User should
Testing procedure	1. Open the website and login 2. Search car name or year OR click rental car to choose the car 3. Select the car option 4. Process the payment and upload payment proof
Result obtained	Users successfully view car details
Test result	Passed

Table 5. 2 Login Test

Test Object	View car details
Testing purpose	User should be able to view the car display and see the car details including: the car image, brand, plate number, year, color, status, and rental cost
Testing procedure	1. Open the website 2. Login 3. Search car name or year OR click rental car to view the options
Result obtained	Users successfully view car details
Test result	Passed

Table 5. 3View car details Test

Test Object	Rent a car
Testing purpose	User should be able to rent a car through the system.
Testing procedure	1. Open the website and login 2. Search car name or year OR click rental car to choose the car 3. Select the car option 4. Process the payment and upload payment proof
Result obtained	Users successfully view car details
Test result	Passed

Table 5. 4 Car Information Display Test

Test Object	Make transaction
Testing purpose	User should be able to rent a car through the system.
Testing procedure	1. Open the website and login 2. Click transactions and then upload transaction receipt 3. Wait for confirmation admin
Result obtained	The customer successfully makes transactions
Test result	Passed

Table 5. 5 Make transaction Test

Test Object	Mange car data
Testing purpose	Admin should be able to delete, update and edit car information
Testing procedure	1. Open the website and login as admin 2. click car data 3. Edit, upload, delete car information
Result obtained	Admin is able to manage car data
Test result	Passed

Table 5. 6Mange car data Test

Test Object	Mange customer data
Testing purpose	Admin should be able to manage customer
Testing procedure	1. Open the website and login as admin 2. Click customer data 3. Delete, add, or edit customer data
Result obtained	Admin successfully manage customer data
Test result	Passed

Table 5. 7 Mange customer data Test

Test Object	Mange bank account
Testing purpose	Admin can mange bank account
Testing procedure	1. Open the website and login as admin 2. Click bank account 3. Edit bank account, delete bank account
Result obtained	Admin successfully manage bank account
Test result	Passed

Table 5. 8 Mange bank account Test

5.2.2 Usability Test

The aims of this test is to check whether there are errors in the developed features using the System Usability ScaIe (SUS) method carried out by actors. This test was carried out by 5 respondents where one correspondent acted as admin while seven (4) correspondents where customers who rented cars.

The list of the respondents and their roles is shown in the table below

Name Respondents	**Role**
Safo	Admin
Mohamed	Customer
Al amin	Customer
Abdulati	Customer
Abraham	Admin
Saker	Customer
Emo	Admin

Table 5.9 Respondents

This test is carried out to determine the level of system capability “Al asalah” rental information when used. On the result table list in the test, there are columns Q1-Q10 which indicate the column value of the answer results of 10 questions provided to examiners. Then there is the column position explains the role of the respondents to the office. After doing the test, the scores from the next assessment are recapitulated and combined into a table that can be seen in the table below

Respondent	Role	Original score									
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
1	Admin	5	4	4	5	5	5	5	4	4	2
2	Customer	5	4	3	5	5	5	5	3	3	2
3	Customer	5	3	4	5	5	5	5	4	4	2
4	Customer	5	3	4	5	5	5	5	4	3	2
5	Customer	5	4	3	5	5	5	5	3	4	2
6	Admin	5	3	4	5	5	5	5	4	3	2

Table 5. 10 System Usability ScaIe (SUS) Test Results

After the test results from each actor, the researcher calculated the score using the SUS method from the original score that had been obtained. In performing calculations on the values obtained in the table above, there are some rules to follow, such as:

1. If the question has an odd number, the original score will be reduced by 1
2. If the question has an even number, then final score will be the result of 5 minus the original number.
3. The final SUS score is calculated using the sum of the scores for each question and then multiply it by 2.5

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Sum	score (Sum * 2.5)
4	1	1	1	4	4	4	1	1	3	24	60
4	1	2	4	4	4	4	2	2	3	30	75
4	2	1	4	4	4	4	1	1	3	28	70
4	2	1	4	4	4	4	1	2	3	29	72.5
4	2	1	4	4	4	4	1	2	3	29	72.5
4	2	1	4	4	4	4	1	2	3	29	72.5
Total											422.5
Final Result											70.4

Table 5. 11 System Usability ScaIe (SUS) Calculation Results

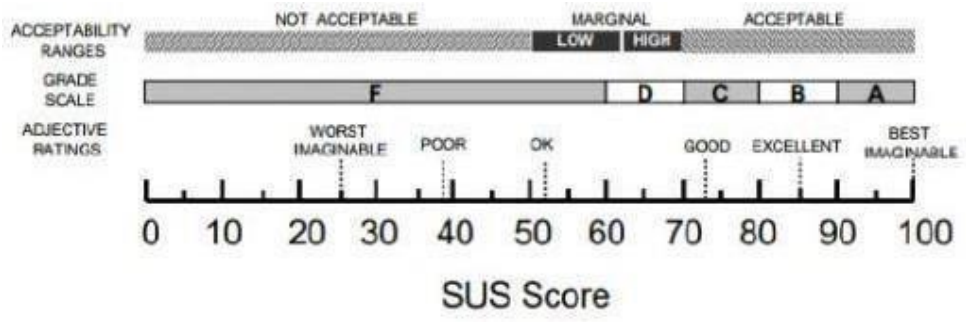


Table 5. 12 SUS Score

Based on SUS score rating the final result of the calculation of 70.4 The result shows that this system gets a good category (Good) and it's acceptable

CHAPTER VI. CONCLUSION SUGGESTION

6.1 Conclusion

Based on the results of the development of a car rental information conclusion can be drawn on the system developed. The process of making a web-based car rental information system on is made through several stages, such as needs analysis, system planning, implementation and system testing. The development of car rental system is made based on needs that have been analyzed in the form of needs functional and non-functional requirements. In the analysis process, 9 functional requirements.

1. The implementation of car rental information system is made based on the results of the system design that has been made. The results of the system design are implemented in the form of a website using the CodeIgniter framework.
2. The system testing process is carried out in 2 stages, namely Blackbox testing and usability testing methods.
3. Based on SUS score rating the final result of the calculation of 70.4 The result shows that this system gets a good category (Good) and it's acceptable

6.2 Suggestion

The system is still prototype which needs much elaboration to improve the quality and work of all entity. Regular maintenance and monitoring are needed and perfection should be done before launching the program for online car rental of Al Asalah. Besides, the system should have a cloud storage for backing up user's data because the cloud storage can save costs, protects user's data from ransomware or malware, regulatory compliance, and data tiering for cost savings. Also, the web-based car rental system shouldalso be developed in form of mobile application, to help improve usability for mobile phone users.

REFERENCES

Eddy, S & Alex, S. 2013. Online Car Rental Management System: A Case Study Africa One Travels. https://ir.kiu.ac.ug/bitstream/20.500.12306/11617/1/Sekamanje%20Eddy%20and%20Sebuufu%20Alex.pdf

Shet.Y.S. Different Forms of Software Testing Techniques (2016),Car rental System. https://www.researchgate.net/publication/310021158_Car_Rental_System

Waspodo, et al., 2011. Development A Car Rental Management System: Case Study: Avis Indonesia. https://www.researchgate.net/publication/292608842_Development_of_Car_Rental_Management_Information_Systems_Case_Study_Avis_Indonesia