



**Tribhuvan University**  
**Faculty of Humanities & Social Science**  
**Nepathya College**

## **Supervisor's Recommendation**

I hereby recommend that this project report under my supervision by **Aashish Panthee** entitled “**Bike Rental System**” in partial fulfillment of the requirement for Bachelor's Degree in Computer Application of Tribhuvan University be processed for the evaluation.

.....  
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**Faculty of Humanities and Social Science**  
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## **LETTER OF APPROVAL**

This is to certify that this project prepared by **Aashish Panthee** entitled “**Bike Rental System**” in partial fulfillment of the requirements for the degree of Bachelor in Computer Application has been evaluated. In our opinion it is satisfactory in the scope and quality as a project for the required degree.

<p>.....</p> <p>Shiva Bhattarai Supervisor Nepathya College</p>	<p>.....</p> <p>Ananta Pandey HOD/Coordinator Nepathya College</p>
<p>.....</p> <p>Internal Examiner Nepathya College</p>	<p>.....</p> <p>External Examiner Tribhuvan University</p>

## **ABSTRACT**

In Nepal, two wheelers increasingly become the preferred option for most people, especially among students in campuses and universities. Besides, the raising taxi fares and inconsistent bus arrivals in Nepal continues to discourage people from taking up the public transport. So, bike rental service continues to grow in Nepal. Hence it required an improvement and good monitoring system. The purposed bike rental system aims to revolutionize the bike rental process by introducing an efficient online platform that allows users to reserve and manage motorbike rentals effortlessly. The purposed system is completely integrated online system. It automates manual procedure in an effective and efficient way. This automated system facilitates customer and provides to fill up the details according to their requirements. The purposed of this system is to develop a website for the people who can book their bike and will provide the bike rental company with a centralized management system for inventory, reservations, and customer data. The digital platform ensures a seamless rental process catering to diverse user needs.

***Keywords: fares, monitoring, revolutionize, catering, centralized***

## **Acknowledgement**

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## **LIST OF ABBREVIATIONS**

BRS	Bike Rental System
CASE	Computer-aided software engineering
DFD	Data Flow Diagram
ERD	Entity Relationship Diagram
ROI	Return on investment
UI	User Interface

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# **Chapter 1**

## **INTRODUCTION**

### **1.1. INTRODUCTION**

Bike rental service is a type of business that allows customers to rent motorcycles for a specific period of time. In Nepal, bike rental service increasingly becomes the preferred option for most people, especially among students in campuses and universities. This occurs because not all students can afford having their own vehicle and perhaps the university bus service doesn't always help. Besides, the raising taxi fares and inconsistent bus arrivals in Nepal continue to discourage people from taking up the public transport. Bike rental service continues to grow in Nepal. Hence it required an improvement and good monitoring system.

The proposed bike rental system aims to make the rental process even more convenient and accessible by offering an online platform for reserving bikes and managing the rental process. With the integration of advanced web technologies, the system will enable customers to easily book their rentals online. Additionally, the system will provide the bike rental company with a centralized management system for inventory, reservations, and customer data.

The integration of advanced web technologies into the bike rental system will bring numerous benefits to both the customers and the company. Firstly, the online platform will allow customers to browse through the available motorcycles, view their specifications, and check for their availability. This feature will save time and effort for customers who would otherwise need to physically visit the rental shop to inquire about the bikes.

For the bike rental company, the centralized management system will prove to be a game-changer. Having all the inventory, reservations, and customer data stored in one place will make it easier for the staff to handle operations efficiently. They can quickly check the availability of bikes, manage bookings, and keep track of rental durations, simplifying the overall workflow. This data-driven approach will enable the company to make informed decisions, optimize their offerings, and enhance customer satisfaction.

## **1.2. PROBLEM STATEMENT**

The bike rental system faces several challenges that hinder its efficiency and customer satisfaction. The current rental process involves extensive paperwork and manual processing, resulting in time-consuming and error-prone procedures. Customers are inconvenienced by the need to physically visit the rental centre for paperwork and identification, which may discourage potential users from availing the service. Moreover, the lack of a centralized system for inventory management and customer data handling leads to inefficient operations and outdated processes. These issues contribute to limited customer satisfaction and may result in a potential loss of business for the bike rental company. To overcome these obstacles, the proposed bike rental system aims to introduce an online platform for reserving bikes and managing the rental process, integrating advanced web technologies to enhance convenience and accessibility for users. The system will provide a user-friendly interface for easy online bookings, streamlined inventory management, and efficient data handling, ultimately improving customer satisfaction and optimizing the overall rental process.

## **1.3 Objectives**

The proposed BRS aims to provide a comprehensive and accessible solution for individuals who do not have access to their own bikes. Below are some objectives of this project.

- To provide users with a convenient and flexible mode of transportation for short-term needs, such as business trips, weekend getaways, or recreational activities.
- To offer a user-friendly and intuitive platform for renting motorbikes, making it easy for users to find and reserve motorbikes online.
- To implement a transparent pricing structure, clearly displaying rental fees, additional charges, and any applicable discounts, ensuring customers know the exact costs upfront.
- Store and manage customer information securely, including personal details, contact information, and rental history, for personalized services and communication.

## **1.4 Scope and Limitations**

### **1.4.1 Scope**

- The bike rental system offers a user-friendly online platform for convenient bike browsing and reservations on web browsers.
- Users can choose from various rental durations, such as daily, or weekly, to accommodate short-term and long-term rental needs.
- The system will employ a centralized management approach to handle inventory, reservations, customer data, and other operational aspects efficiently.

### **1.4.2 Limitations**

- The system's availability may be limited to specific cities or regions, potentially restricting access for users in remote areas.
- Certain legal requirements, such as minimum age and valid driving license, may limit the eligibility of potential customers.
- Bike availability might be affected by maintenance schedules, and certain models may be temporarily unavailable due to repairs or servicing.
- Rental availability and pricing might fluctuate during peak seasons or special events, potentially affecting user experience and costs.

## **1.5 Report Organization**

This report document contains five chapters including this chapter. Chapter two defines and describes Background Study and Overview of related existing systems and their pros and cons. Chapter three presents the System Analysis and Design including Requirement Analysis and Feasibility Analysis. Chapter four presents the Implementation, Testing and debugging are explained. In chapter five, Conclusion, Limitations and Future Enhancement are briefly explained.

## **Chapter 2**

### **BACKGROUND STUDY AND LITERATURE REVIEW**

#### **2.1 Background Study**

The motorbike rental system is an emerging business model that addresses the transportation needs of individuals who require short-term access to motorcycles. This system has gained popularity in various regions due to factors such as urbanization, traffic congestion, environmental concerns, and shifting consumer preferences. This system has gained popularity in various regions due to factors such as urbanization, traffic congestion, environmental concerns, and shifting consumer preferences. The increasing demand for flexible and convenient transportation options has opened up new opportunities for motorbike rental services.

It is estimated that the market for rented bikes will significantly increase by 2021. According to a report of the Global Motorcycle rental market, the industry is expected to grow at a CAGR of 7.74 percent from 2017-2021 [1]. In urban areas, traffic congestion and limited parking spaces have become major challenges, leading people to seek alternative modes of transportation. Motorbike rentals offer a practical solution for short-distance travel, allowing users to navigate through congested city streets and reach their destinations more quickly.

The advent of digital platforms and the proliferation of smartphones have transformed the landscape of motorbike rentals. Online rental platforms and mobile apps have streamlined the booking process, making it more convenient for customers to browse available motorcycles, check specifications, and reserve bikes in real-time. This technological integration has expanded the reach of motorbike rental services, attracted a broader customer base and increased accessibility.

In conclusion, the motorbike rental system offers a promising solution to the evolving transportation needs of individuals and tourists in urban areas and beyond. This project report aims to delve into the design and implementation of an efficient and user-friendly motorbike rental platform. By leveraging advanced technologies and adopting customer-centric strategies, the project endeavours to provide a seamless and enjoyable experience for users seeking short-term motorbike rentals.

## 2.2 Literature Review

The poll on this system includes data from a range of sources. These sources include some websites, IEEE publications, some relevant research papers, and even some project reports. Our research benefited greatly from the modules, diagrams, literature, etc. The numerous websites were searched using keywords like “bike rental system”, “car rental system”, etc. They were very helpful. An internet site called “Self Drive Nepal” was being examined. Nowadays, the shared bike, represent an alternative solution to motorized solution [2]. The motorbike rental system has attracted significant attention from researchers and practitioners as a promising solution to urban transportation challenges. Numerous studies have examined various aspects of motorbike rental services, shedding light on its benefits, challenges, and implications for sustainable mobility. There are a total of 17 Two Wheeler Rental Agencies in Nepal as of July 19, 2023 [3].

Tourist destinations have also become a focal point of interest in studying motorbike rental systems. Tourists often seek adventure and independence in exploring new places, and motorbike rentals offer them the freedom to discover scenic routes and off-the-beaten-path locations. This growing demand for motorbike rentals contributes to the local economy by creating business opportunities for entrepreneurs and generating income for rental companies. As a result, motorbike rental services play a significant role in promoting tourism and supporting local economies in popular travel destinations.

With the advent of digital technologies, researchers have investigated how motorbike rental systems integrate with online platforms and mobile applications to enhance user experience. The availability of mobile apps and user-friendly websites has streamlined the rental process, offering real-time information on bike availability, secure payment options, and easy reservation systems. These digital advancements have contributed to the wider adoption of motorbike rental services among tech-savvy users, simplifying the rental experience and attracting a broader customer base. This project utilizes a manual system for booking, renting, registering, and keeping track of all rental activities and client data [4].

## **Chapter 3**

### **System Analysis and Design**

#### **3.1 System Analysis**

Considering the fact that this project involves design and implementation of a software system regardless that is web-based, it will be important to mention and consider some models used in software development and deployment, some general models of software development are namely:

- The Waterfall approach: It represents activities in requirements, specifications, design, implementation and testing, all these as separate process.
- Incremental / Evolutionary development: It involves a rapid development of the specifications and then refined later for the customer.

System assembly from reusable components: This approach assumes that part of the system already exists. This model is focused on integration.

After reading all these models, the waterfall model fits the development of this website.

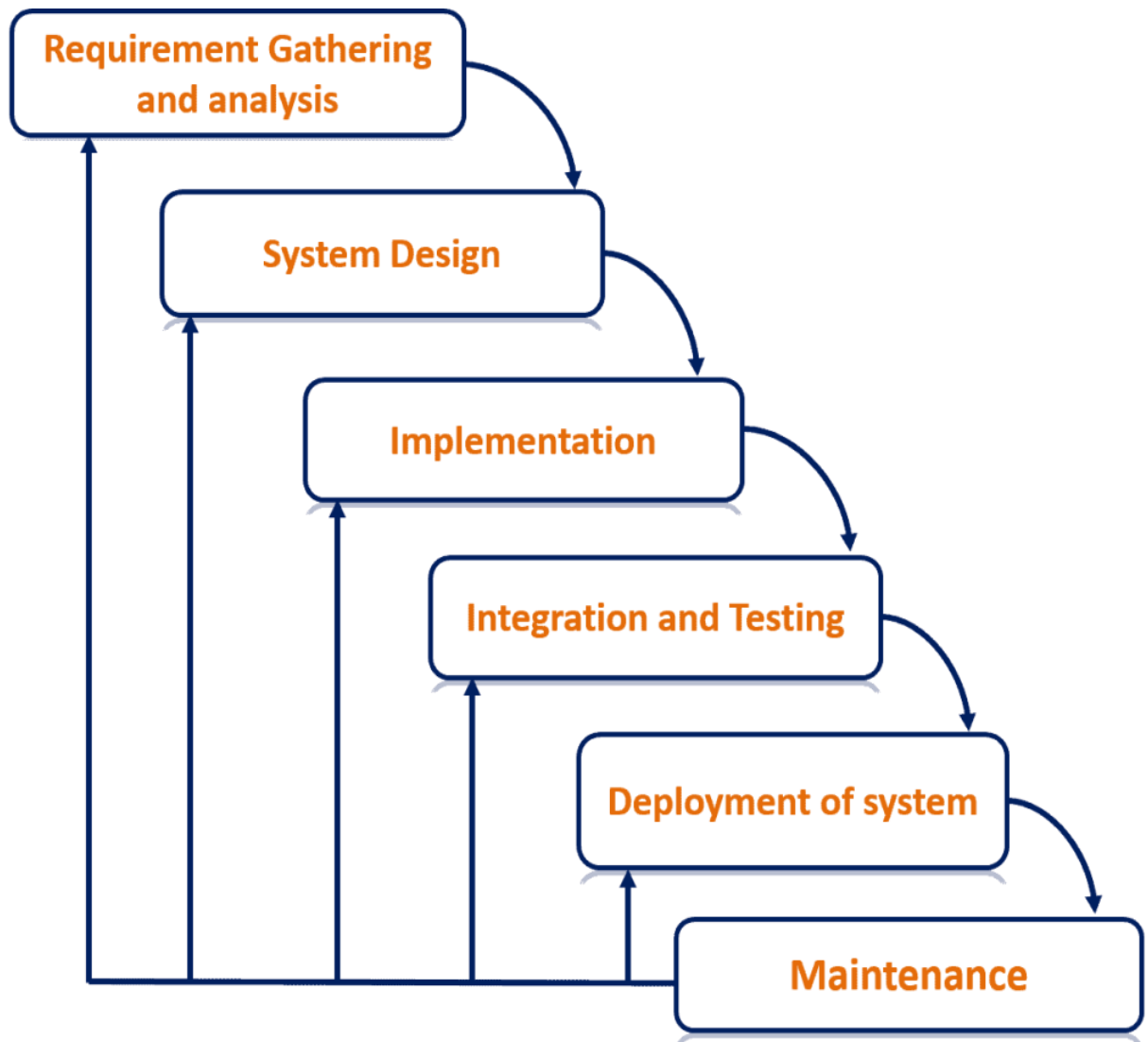
The main aim of using this approach is we can focus on each part of the model during development and come back to it if need be. The project can easily be broken down into different parts based on this model.

This is the model that will be used to develop the Bike Rental System. However, feedback loops will be allowed during the whole software development process. We find this model suitable for us to follow:

It requires that software development follows the following stages:

- Requirements are to be proposed.
- System design should be made according to the requirements.
- Implementation of the features according to the design.
- Integration and testing of the system.
- Deployment of the system.
- Maintenance of the system.

This process has been illustrated below on Figure showing top-down development.



**Figure 3. 1:Development Methodology**

### **3.1.1 Requirement Analysis**

Requirement analysis is done while developing a system and before implementing it, it is necessary to analyse the whole system requirement. It is categorized into two mainly parts:

- i. Functional requirements
- ii. Non-functional requirements

For any system, there are functional and non-functional requirements to be considered while determining the requirements of the system. The functional requirements are user “visible” features that are typically initiated by stakeholders of the system, such as generate report, login, and signup. On the other hand, non-functional requirements are requirements



that describe how the system will do what it is supposed to do. For example, Usability, Reliability and Availability, Performance, Security and maintainability.

- i. Functional requirements: The requirement that has been used in the project as the functional requirements generally includes the function such as inputs, the processing and the final output. The functional requirements in the project are mentioned below.

- 1) User Module

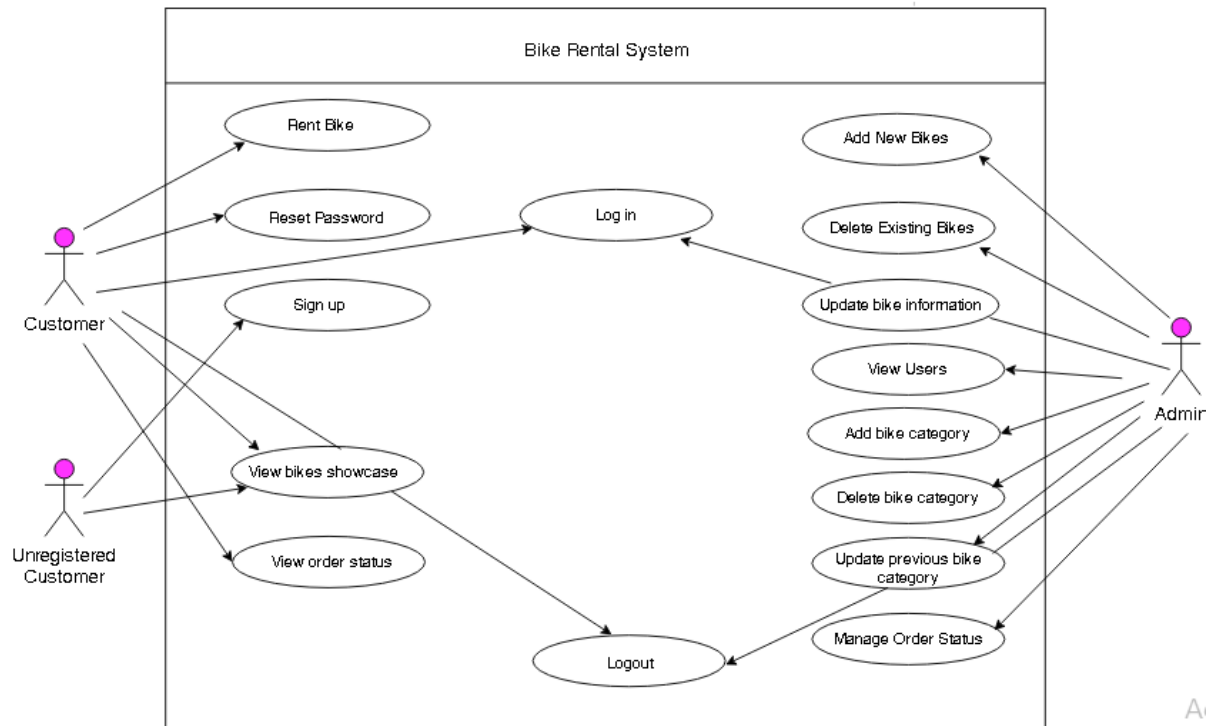
- User can register and login the system.
- User can look at their bike rental history.
- User can logout from the system after completing the rental process.

- 2) Admin Module

- Admin can login the system.
- Admin can add, update and delete bikes.
- Admin can see the registered users.
- Admin can logout from the system.

## Use Case Diagram

In bike rental system, there are three actors, actors such as admin, registered user and unregistered user where admin can login, manage categories, manage bikes, see customer details, order details and status and logout from the admin panel and. likewise, customers can register, login, make requests for bike rental, and logout from the system.



**Figure 3. 2 Use Case Diagram for bike rental system**

- ii. Non- Functional requirements: The non-functional requirements specifies how the system works. The non-functional requirements included in the project are:
1. User authentication and authorization protocols should be in place to ensure only authorized users can access the system.
  2. Personal information and rental histories should be stored securely and accessible only to authorized personnel.
  3. Modular design and separation of concerns should be employed to enable future enhancements and modifications.
  4. The system should have low response times to provide a seamless user experience during bike browsing, reservations, and payments.
  5. It should be able to handle a large number of concurrent users without significant performance degradation.

### **3.1.2 Feasibility Analysis**

#### **i. Technical Feasibility**

- The UI of this project is very simple.
- User will require internet browser and internet to use it.
- It will run on many existing web browsers with the latest versions and even in the smart phones.

Recommended Software are:

The following software are used for the development of the system:

- VS Code
- MongoDB

#### **ii. Operational Feasibility**

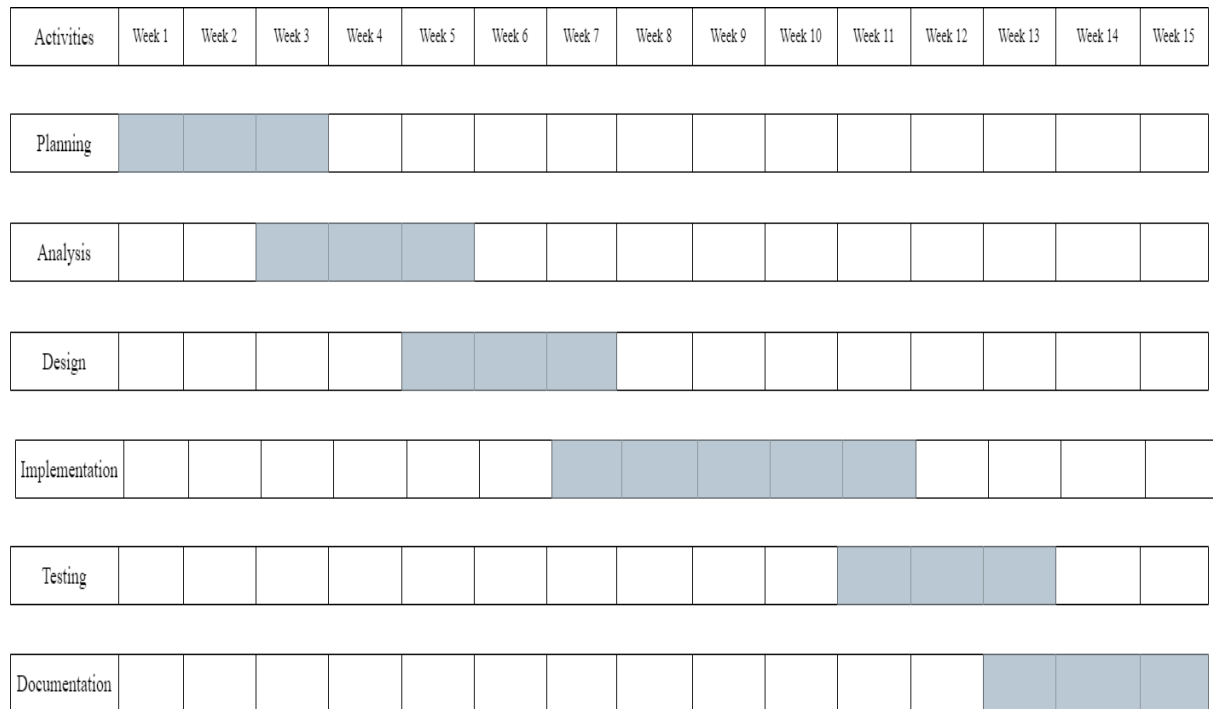
- Determine whether the proposed system can be integrated into the existing business processes.
- Identify the potential impact of the system on the organization's operations.
- Assess the readiness of the organization to adopt the proposed system.

#### **iii. Economic Feasibility**

- Determine the cost of implementing the proposed system.
- Assess the potential return on investment (ROI).
- Conduct a cost-benefit analysis.

#### **iv. Schedule Feasibility**

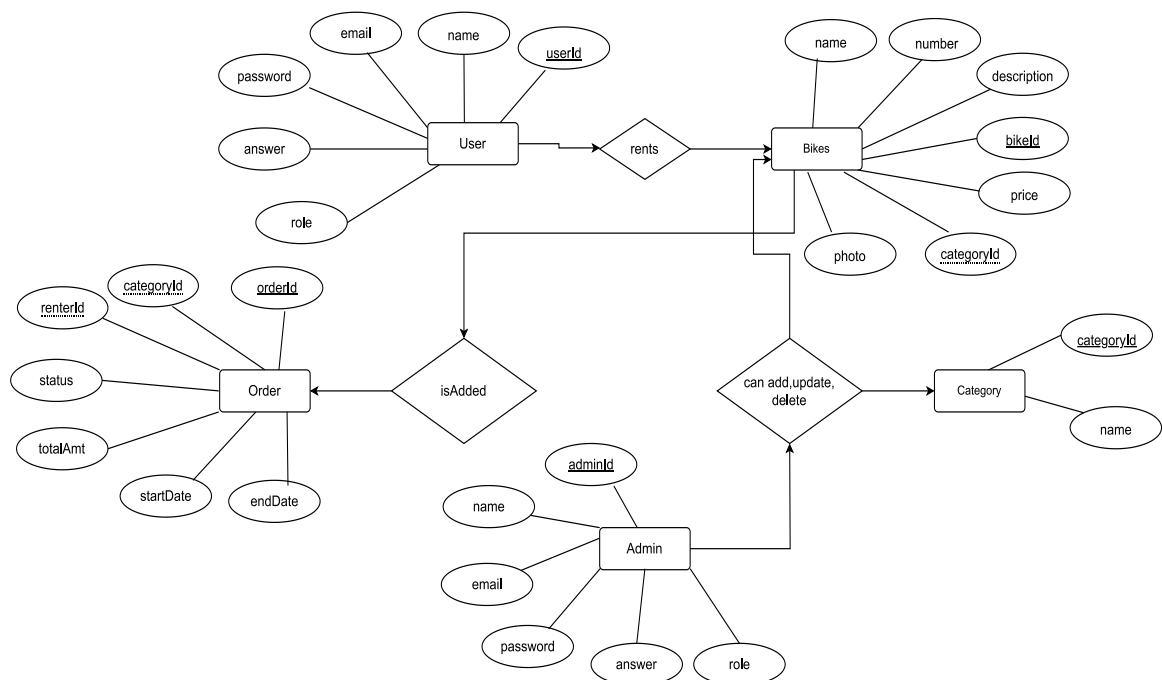
The system that we developed is scheduling feasible as it does not require more time for the development phase. The data collection takes more time to collect the data about various products and their quality. After data is collected, the other development phase can be within a month. Gantt Chart: Gantt chart is a bar chart that provides a visual view of tasks scheduled over time. A Gantt chart is used for planning projects of all sizes, and it is a useful way of showing what work is scheduled to be done on a specific day. It can also help you view the start and end dates of a project in one simple chart.



**Figure 3. 3 Gantt Chart**

### 3.1.3 Data Modelling (ER-Diagram)

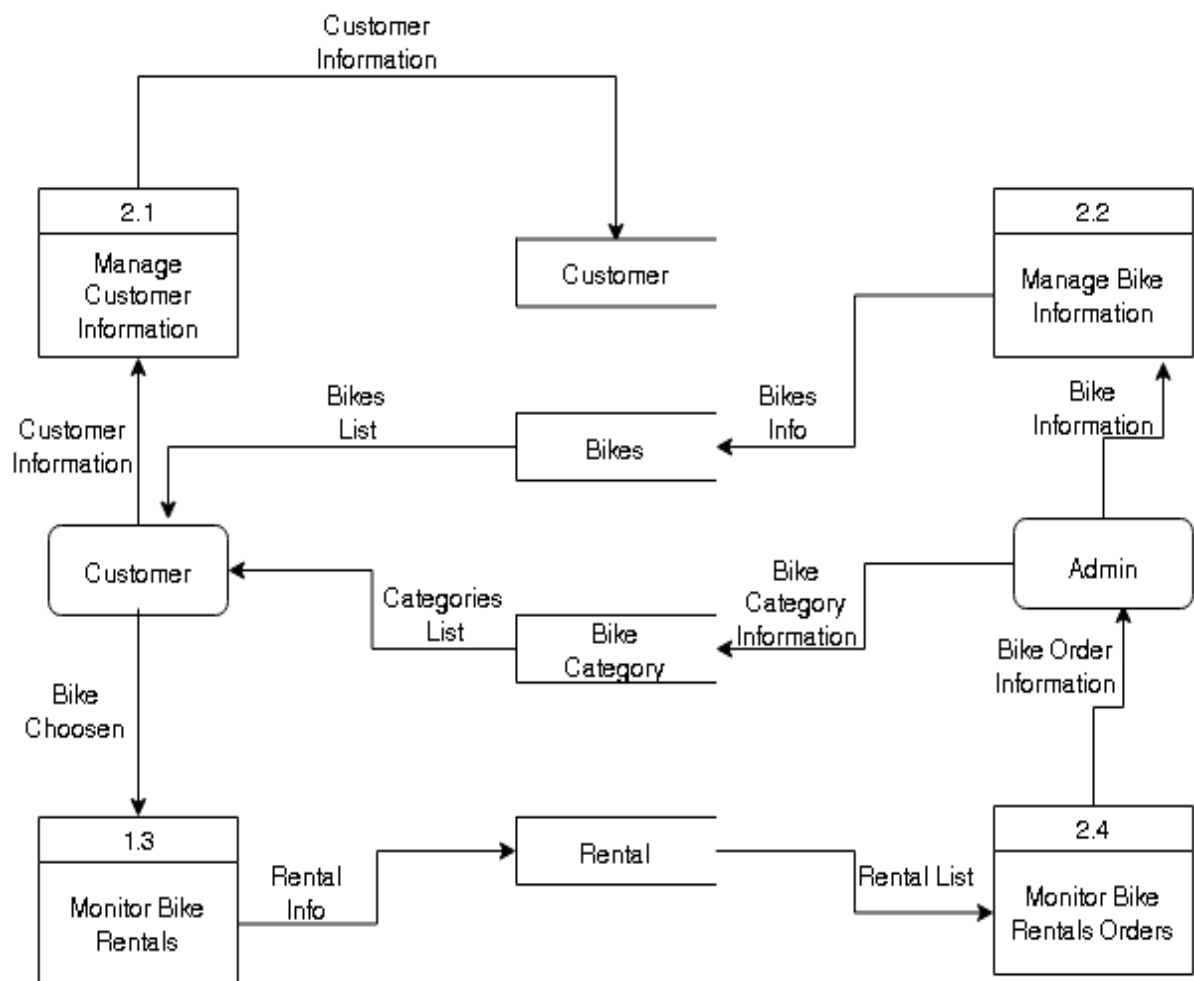
Data model is a detailed model that captures the overall structure of data in an organization. Entity-Relationship (E-R) diagrams are commonly used in data modelling. The overall relationship between the entities is shown in the ER diagram below:



**Figure 3. 4 ER-Diagram of the Bike Rental System**

### 3.1.4 Process Modelling (DFD)

Data Flow Diagrams show the flow of data from external entities into the system, and from one process within the system to another within the system. Following are the Data Flow Diagrams for the current system. Each process within the system is first shown as a Context Level DFD and later as a Detailed DFD. The Context Level DFD provides a conceptual view of the process and it's surrounding input, output and data stores. The Detailed DFD provides a more detailed and below comprehensive view of the interaction view of the interaction among the sub processes within the system which is explained below in figure.

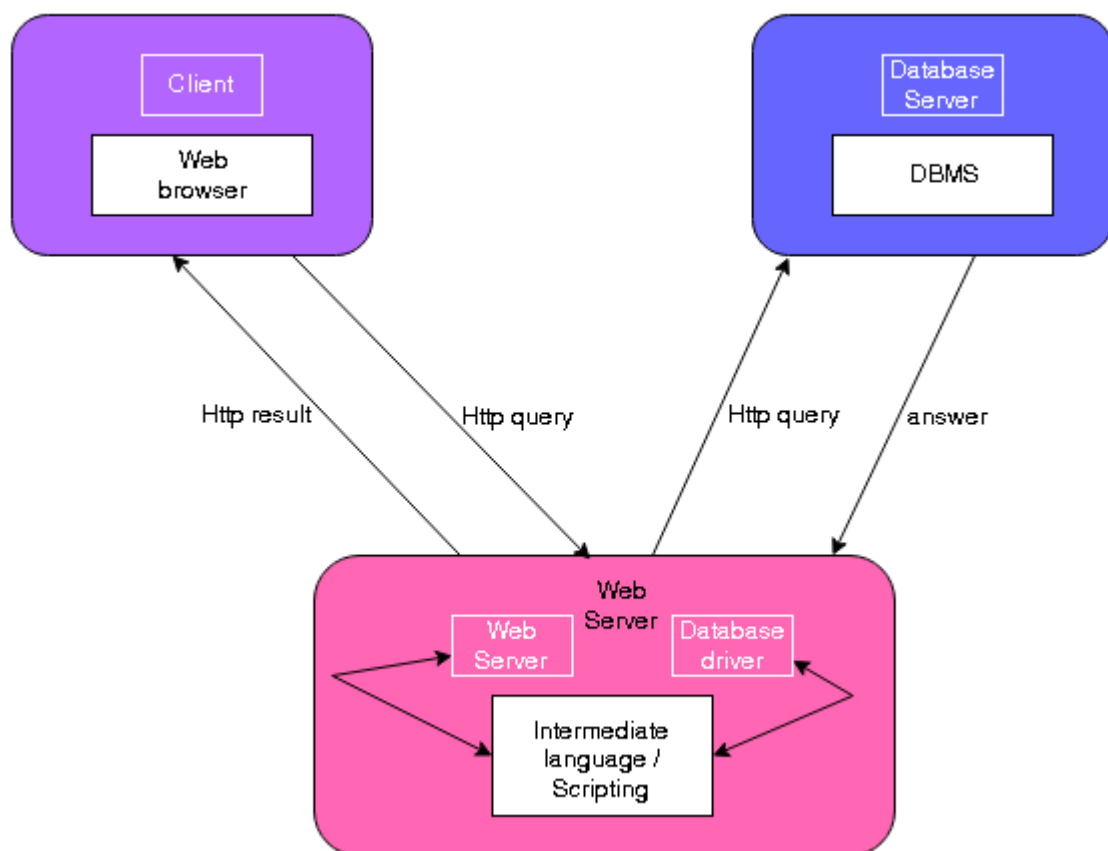


**Figure 3. 5 DFD Level 2 Diagram of Bike Rental System**

## 3.2 System Design

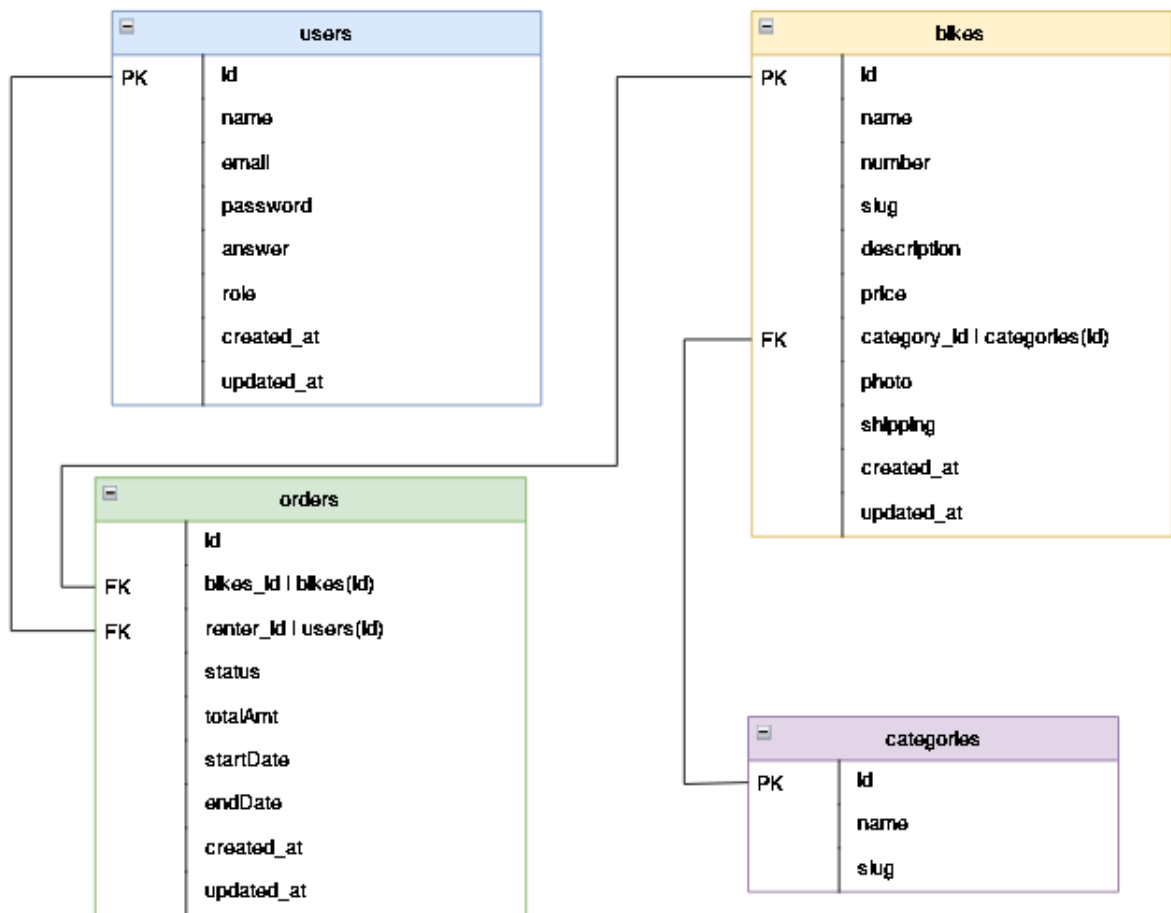
### 3.2.1 Architectural Design

In the bike rental website, users interact with the system through a simple user interface. The bike rental website uses three tier architectures. The data is collected from the users and stored in the database through which the server provides order details to the user. In order to perform order transaction/status to the user, the system uses different database tables including different attribute for each entity. User has a unique user id which makes them different from other users. In this way, system architecture is designed which is an abstract view of the system.



**Figure 3. 6 Architectural Design**

### 3.2.2 Database Schema Design



**Figure 3. 7 Database Schema Design of the bike rental system**

### 3.2.3 Interface Design (UI Interface / Interface Structure Diagrams)

Before implementing the actual design of the project, a few user interface designs are constructed to visualize the user interaction with the system as they browse registration, login and perform rental orders. The UI design of homepage, signup page, login page and dashboard page of bike rental system are shown below:

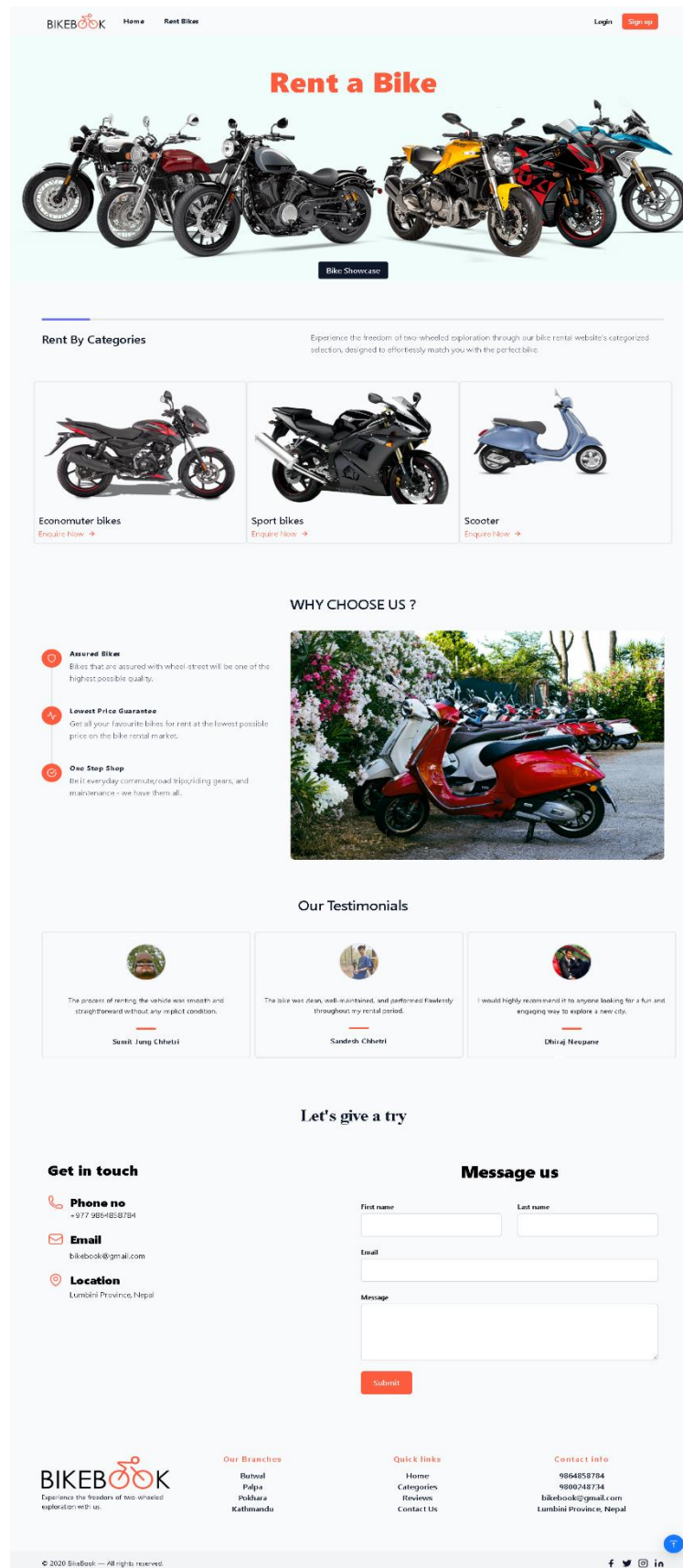


Figure 3. 8 Homepage prototype



BIKEBOOK

Home

Rent Bikes

Login

Sign up

BIKEBOOK

Sign in to your account

Email address

Password

Forgot password?

Login

Don't have an account ? Sign up

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Figure 3. 9 Login prototype

BIKEBOOK

Home

Rent Bikes

Aashish

Filter by Category

☐ Economuter Bike

☐ Sports Bike

☐ Scooter

☐ Cruiser

Filter by Price

☐ NPR 0 to NPR 1500

☐ NPR 1600 to NPR 3000

☐ NPR 3100 to NPR 5000

☐ NPR 5100 or more

Clear Filter

FZ V3

Price per day: 4000

Add to cart

Enquire Now

Crossfire

Price per day: 5000

Add to cart

Enquire Now

Dominar

Price per day: 2000

Add to cart

Enquire Now

FZ

Price per day: 2500

Add to cart

Enquire Now

NS 200

Price per day: 3000

Add to cart

Enquire Now

BMW

Price per day: 4000

Add to cart

Enquire Now

Duke 200

Price per day: 1500

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Royal Enfield

Price per day: 3500

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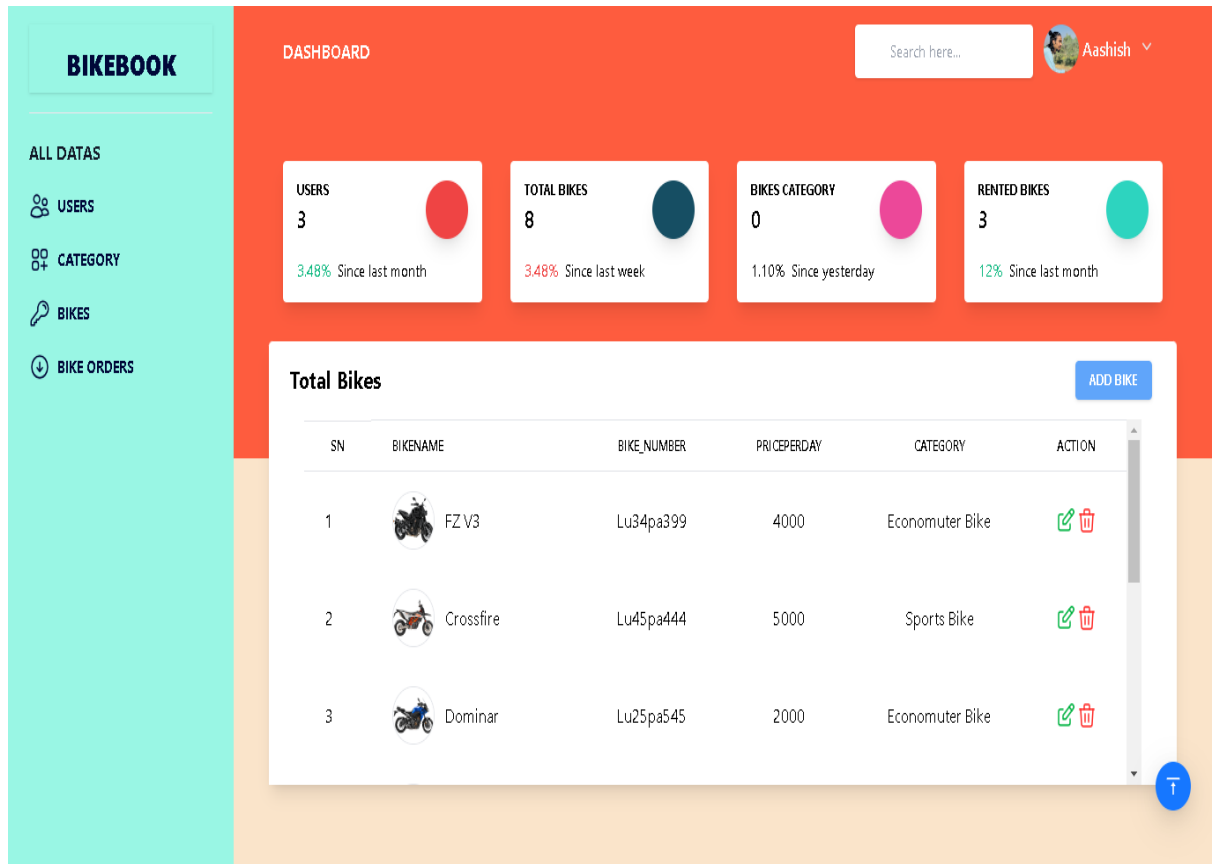
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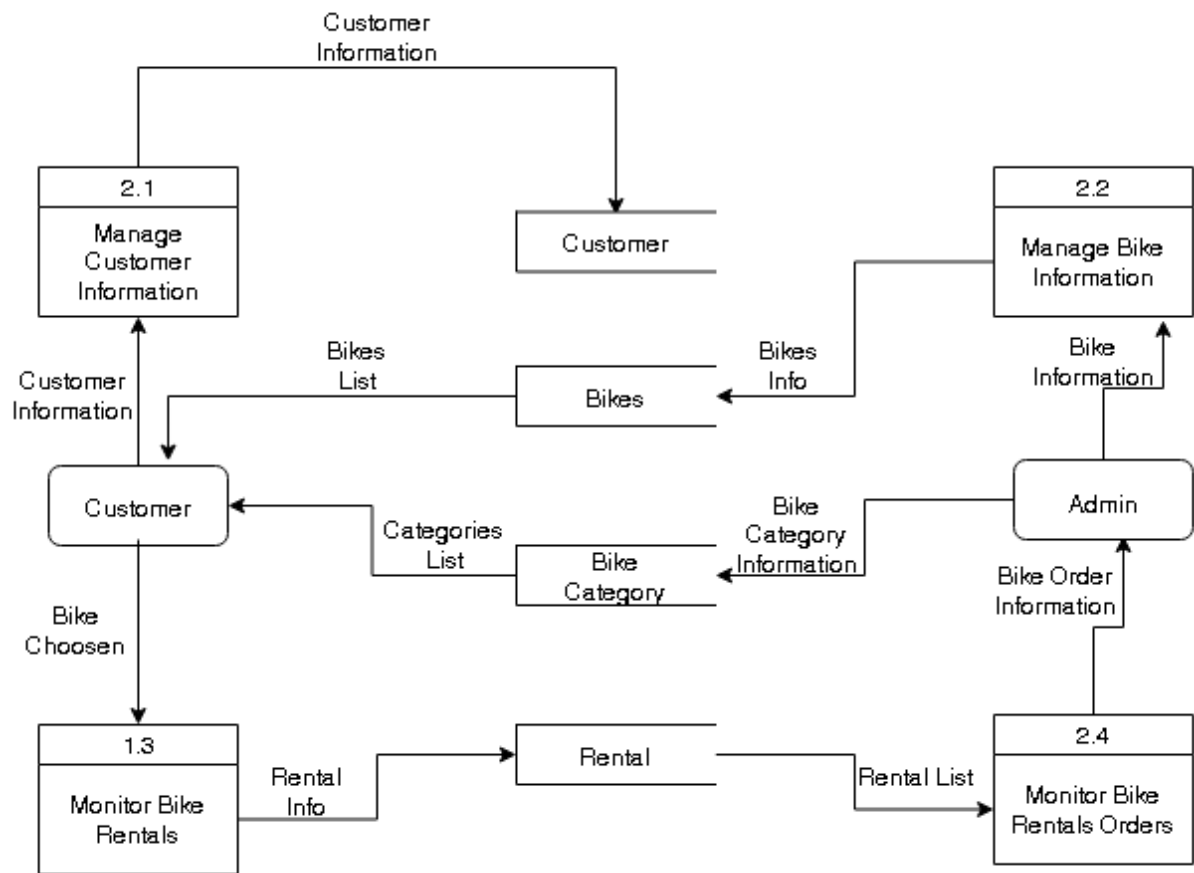
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Figure 3. 10 Bike showcase page prototype



**Figure 3. 11 Dashboard page prototype**

### 3.2.4 Physical DFD



**Fig 3.2.4 Physical DFD of Bike Rental System**

## CHAPTER 4

### IMPLEMENTATION AND TESTING

#### 4.1 Implementation

Implementation basically means the phase where the system is actually being built. Firstly, all the information that we gathered is studied, analysed and implemented a system in operation for users. It is one of the most important phases of any project. Implementation usually consists of coding, testing, installation, documentation, training and support. Different tools and technologies that have been used to develop the system which are already discussed in the previous chapter. It is basically converting system design specification into working software.

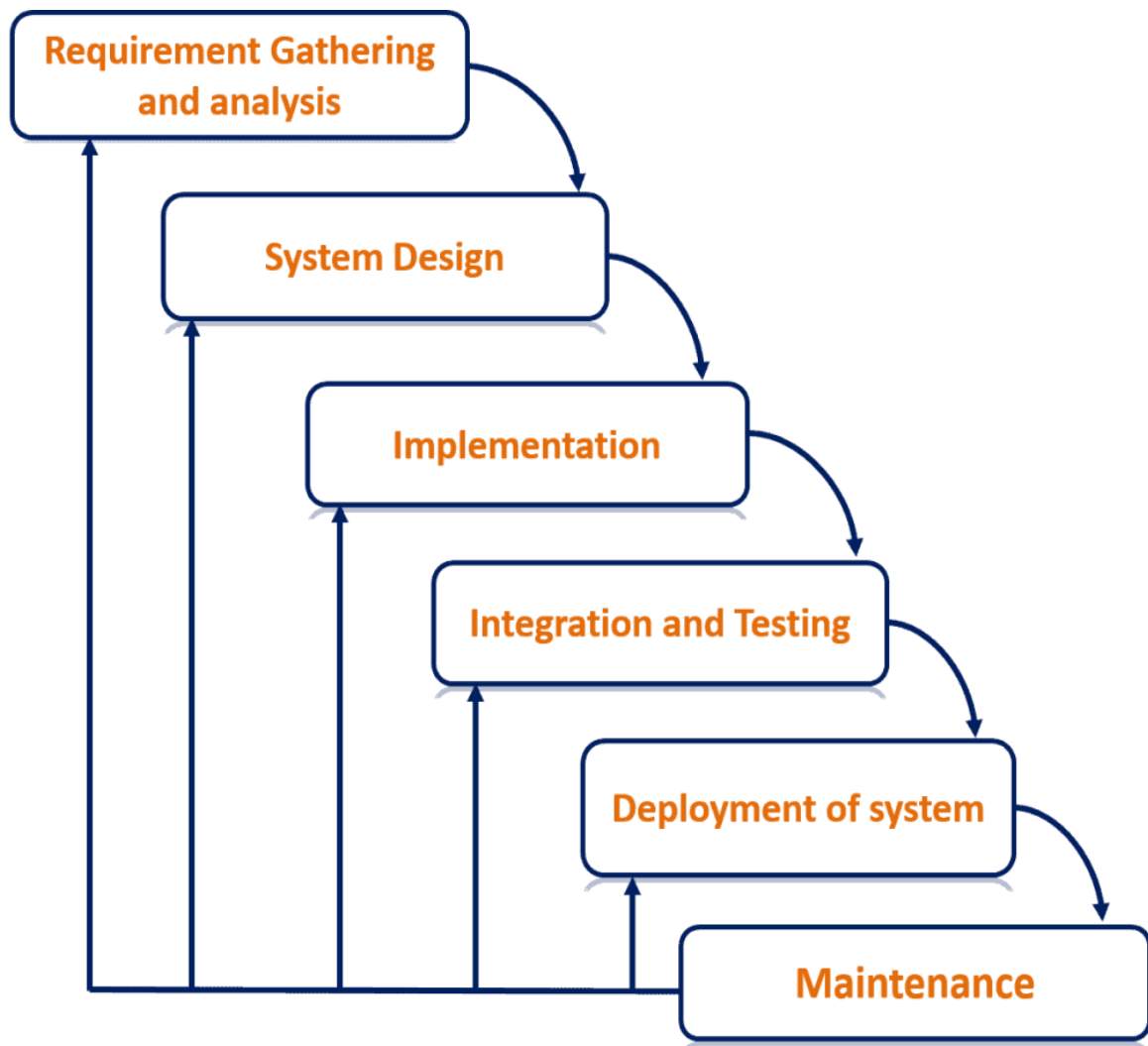


Figure 4. 1 Waterfall Methodology

#### **4.1.1. Tools Used**

The various system tools that have been used in developing both the front-end and back-end of the project are being discussed in this chapter.

##### **CASE Tools used:**

Draw.io

Draw.io is a web-based diagramming tool that allows users to create wide range of diagrams, including flowcharts, use case diagrams, and system architecture diagrams. In the case of bike rental system, we used draw.io to create a process modelling, architectural design, flow chart showing the different stages of the bike rental process.

##### **Backend programming used:**

NodeJs (ExpressJS)

Node.js is a popular runtime environment that allows developers to run JavaScript code on the server-side, enabling the creation of highly scalable and efficient web applications. Express.js, a web framework for Node.js, simplifies the process of building robust and feature-rich web servers. In this bike rental system, Node.js (with Express.js) is used for server-side development and handling HTTP requests from clients and also utilized to manage the following tasks like routing, middleware, API Endpoints, etc.

##### **Database used:**

MongoDB

MongoDB itself is not a backend programming tool, it is an essential component of the backend stack, as it allows developers to store, retrieve, and manage data efficiently in a NoSQL document-oriented database. MongoDB's flexibility and scalability make it a popular choice for web applications, especially in scenarios where the data structure might evolve over time or when handling large volumes of unstructured or semi-structured data. MongoDB can be integrated with backend programming languages and frameworks like Node.js (with Express.js), Python (with Django or Flask), Ruby (with Ruby on Rails), and others.

##### **Frontend used:**

ReactJS

React.js is a popular JavaScript library for building user interfaces (UIs) and front-end web applications. It is widely used for creating interactive and responsive web interfaces. In the

bike rental system, React.js is used for developing the user interface, handling user interactions, and rendering dynamic content.

#### **4.1.2 Implementation Details of Modules**

After the design was made and the problems arising from the design process were clarified and dealt with it, it was time to start implementing the application. Implementing application of this scale requires lots of resources and explaining the whole implementation process will not be clarified in this paper. However major important aspects in the implementation will be described. Some modules of the rental website are listed below:

- **Header:** It displays the header with the logo of the rental website, social media or the login / signup form. It is used in the navbar of the homepage. It is used in order to provide links to different pages of the website.
- **Register Form:** It is used in order to register the new users to the website. It contains the text field like email, username and password. The information entered is further stored to be used in the login page.
- **Login Form:** It is used in order to provide the user the gateway to the website. It used the data like username and password from register form to authenticate the user and give further access.
- **Bike Modules:** Since the rental website offers many bike renting categories. Bike modules divides different bikes according to their categories i.e. Economuter, Sports. Users can select the bikes according to their choices.
- **User Module:** It provides information related to the user. It provides information like ordered detail, bike detail, login, register and logout.
- **Admin Module:** It provides information to the admin. It provides information like user details, Admin can add or remove bikes, etc.

#### **4.2 Testing**

Testing is done to check the behaviour of a complete and fully integrated software product based on the software requirement specification document. For the application or website to be deployed it has to be tested. Hence test cases will be written to test this application. There are many types of test to be carried out on a web application from performance, functionality, database loading time, response time, server time handling, user's actions

and many others. We il not carry out all types of test for the application considering the time scale to present this project.

#### 4.2.1 Test Cases for Unit Testing

**Table 4. 1 Test Case for Admin Login**

Test Case ID	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
A_LOG_1	Admin enters a wrong email	email:admins@gmail.com password:admin123	Display message **Email do not exist**	As expected	Pass
A_LOG_2	Admin enters a wrong password	email:admin@gtmail.com password:asdf@1234	Display message **Invalid credentials**	As expected	Pass
A_LOG_3	Admin enters correct email.and password	email:admin@gmail.com password:passw0rd!	Logged into homepage with dashboard access	As expected	Pass

**Table 4. 2 Test Case for User Login**

Test Case ID	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
U_LOG_1	User enters a wrong email	email:sanhay@asdf.com password:admin123	Display message **Invalid Credentials**	As expected	Pass
U_LOG_2	User enters a wrong password	email:admin@gtmail.com password:12345	Display message **Invalid credentials**	As expected	Pass
U_LOG_3	User enters correct email.and password	email:sanjay@gmail.com password:passw0rd!	Logged into homepage without dashboard access	As expected	Pass



#### 4.2.2 Test Cases for System Testing

**Table 4. 3 Test Case for System Testing**

Test Case ID	Test Case Description	Expected Results	Actual Results	Pass/Fail
1.	Admin Login	Admin logged in successfully	Admin successfully logged into homepage with dashboard access	Pass
2.	User Login	User logged in successfully	User successfully logged into homepage without dashboard access	Pass
3.	Bike Renting	Bike rented successfully	Bike is rented successfully	Pass

## **CHAPTER 5**

### **CONCLUSTION AND FUTURE RECOMMENDATIONS**

#### **5.1 Lesson Learnt / Outcome**

With the completion of the project, it was possible to achieve the project's goal. The outcome is a fully functional bike rental system. This system makes it easier for both admin and customers/users for renting bikes and maintaining and storing customer information securely. After logging in, user can view and perform rental transaction online through web browser. In this way user can save time and perform rental transaction from this website.

#### **5.2 Conclusion**

Bike rental business has emerged with a new idea compared to the past experience where every activity concerning bike rental business is limited to a physical location only. Even though the physical location has not been totally eradicated; the nature of functions and how these functions are achieved has been reshaped by the power of internet. Nowadays, customers can book bike online, rent bike online, and have the bike brought to their door step once the customer is a registered member or go to the office to pick the bike. The web based bike rental system has offered an advantage to both customers as well as Bike Rental Company to efficiently and effectively manage the business and satisfies customers' need at the click of a button.

#### **5.3 Future Recommendations**

There are many things that can be added in future to improve this website such as user experience and portability. There is more to be done, thus this application can be seen of as a launching pad for something bigger to come. All of them will need more time and resources to complete, but they are still highly realistic and achievable. In near future, we are planning to hire bikes. So that clients can give their bikes to the customer on daily bases. We are planning to add new feature i.e. pay after the trip. We are working to increase automation in the system to increase user experience great.

## Appendices (Screen Shots)

User Model:



```
import mongoose from "mongoose";

const userSchema = new mongoose.Schema(
  {
    name: {
      type: String,
      required: true,
    },
    email: {
      type: String,
      required: true,
      unique: true,
    },
    password: {
      type: String,
      required: true,
    },
    answer: {
      type: String,
      required: true,
    },
    role: {
      type: Number,
      default: 0,
    },
  },
  { timestamps: true }
);

export default mongoose.model("Users", userSchema);
```

Create Category Controller:

```
import slugify from "slugify";
import categoryModel from "../models/categoryModel.js";

export const createCategoryController = async (req, res) => {
  try {
    const { name } = req.body;
    if (!name) {
      return res.status(400).send({
        message: "Name is required",
      });
    }
    const existingCategory = await categoryModel.findOne({ name });
    if (existingCategory) {
      return res.status(409).json({
        success: false,
        message: "Category already exists",
      });
    }
    const category = await new categoryModel({
      name,
      slug: slugify(name),
    }).save();
    res.status(201).send({
      success: true,
      message: "Category created",
      category,
    });
  } catch (error) {
    res.status(500).send({
      success: false,
      error,
      message: "Error in creating category",
    });
  }
};
```

Homepage:

```
import React, { useEffect } from "react";
import WhyUs from "./WhyUs";
import Categories from "./Categories";
import Testimonial from "./Testimonial";
import Main from "./Main";
import Contact from "./Contact";
import Layout from "./Layout";

const Home = () => {
  useEffect(() => {
    window.scrollTo({
      top: 0,
      behavior: "smooth",
    });
  }, []);
  return (
    <Layout className='bg-slate-50'>
      <Main />
      <Categories />
      <WhyUs />
      <Testimonial />
      <Contact />
    </Layout>
  );
};
export default Home;
```

Dashboard:

```
import React from "react";
import { Route, Routes } from "react-router-dom";
import { useDispatch } from "react-redux";
import Sidebar from "../sidebar/Sidebar";
import Dashboardnavbar from "../navbar/Dashboardnavbar";
import Headerstats from "../components/Headerstats";
import User from "../sidebar/User/User";
import Bike from "../sidebar/Bikes/Bike";
import AddBike from "../sidebar/Bikes/AddBike";
import DashboardHome from "../DashboardHome";
import EditBike from "../sidebar/Bikes/EditBike";
import Order from "../sidebar/Order/Order";
import Category from "../sidebar/Category/Category";
import AddCategory from "../sidebar/Category/AddCategory";
import EditCategory from "../sidebar/Category/EditCategory";
const Dashboard = () => {
  const dispatch = useDispatch();
  return (
    <div className='bg-[#fae4ca] h-screen'>
      <div className=''>
        <Sidebar />
        <div className='relative md:ml-64 '>
          <Dashboardnavbar />
          { /* Header */ }
          <Headerstats />
          <div className='w-full px-4 mx-auto -m-24 md:px-10 bg-[#fae4ca]''>
            <Routes>
              <Route path='/' element={ <DashboardHome /> } />
              <Route path='/users' element={ <User /> } />
              <Route path='/category' element={ <Category /> } />
              <Route path='/category/add' element={ <AddCategory /> } />
              <Route path='/category/edit/:id' element={ <EditCategory /> } />
              <Route path='/bikes' element={ <Bike /> } />
              <Route path='/bikes/add' element={ <AddBike /> } />
              <Route path='/bikes/edit/:id' element={ <EditBike /> } />
              <Route path='/userorders' element={ <Order /> } />
            </Routes>
          </div>
        </div>
      </div>
    </div>
  );
};
export default Dashboard;
```

## REFERENCE

- [1] “emizentech,” 10 May 2023. [Online]. Available: <https://www.emizentech.com/blog/bike-rental-mobile-app-development.html>. [Accessed 31 July 2023].
- [2] H. Ayadi, A. Zouari and N. Hamani, “An exploratory study of the bike rental system,” in *7th IEEE International Conference on Advanced Logistics & Transport*, Marrakech, Morocco, 2019.
- [3] “Smartscrapers,” 19 July 2023. [Online]. Available: <https://rentechdigital.com/smartscraper>. [Accessed 31 July 2023].
- [4] N. VK, P. YV and K. K. MN, *Bike Booking and Rental System*, vol. 2, no. 1, p. 331, 2022.