Proposal

For

Final Year Project

Bachelor of Science in Information Technology

Druk eBird

Submitted by

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Read carefully before filling the form.

1. Please do not alter the layout of the application form. Information must be filled in the spaces provided, under set format.
2. Guidance notes in various fields should not be deleted.
3. Required information should be duly filled in the specified fields.

Guidelines and Forms

Submission Procedure

Duly filled proposal forms completed in all respects should be submitted in the form of soft copy in the VLE. On receipt of the applications the proposals will be evaluated by the examiner and proposals would then be defended by student groups. The project group may need to revise the proposal in light of the examiner's recommendations.

For further information, please contact:

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Application for the Project

1. Project Identification

1.1 **Reference Number**:

2023_FYP_01(IV_FYP_01)

1.2 Problem statement

Bhutan today boasts of harboring 5,369 plant species and 5,114 species of animals of which about 774 species are birds. Many Birds of Bhutan are rare birds of the world. Owing to Bhutan's strict nature and conservation policies, the bird population in Bhutan is growing. It has become the envy of birders and researchers from across the globe. The protected wildlife parks and sanctuaries and designated biological corridors have also been pivotal in ensuring that the birds are safe and thriving.

Even though the country is rich in bird diversity, there is a need for a proper platform to store and share more accurate and up-to-date information on bird populations and distributions because the birdwatchers currently record their sightings in personal notebooks, making it difficult for researchers to access and analyze this valuable data.

Druk eBird aims to address the lack of comprehensive and up-to-date information on the bird species, abundance and distribution in and around Bhutan. The researchers are finding it difficult to fetch accurate data on populations, abundance, location and distribution of the birds. It will provide a centralized platform on bird sighting and observation for collecting and sharing bird observation data in a standardized format, making it easier to compare and analyze data from different sources.

1.3 **Project Title**: Druk eBird

1.4 **Key Words:**

Birds, Researchers, RSPN (Royal Society For Protection of Nature), Checklist, Birding, Druk eBird…

1.5 **Project Guide:**

Name:	Jigme Wangmo
Designation:	Associate Lecture
Mobile # :	Tel. # :

1.6 **Project Duration:**

Starting Date:	12th March
Completion Date:	19th june_____

2. Aims, Goals, Objectives and scope of the Project

2.1 Aims of the Project:

The main aim of the project is to develop an application to create an organized and centralized platform for gathering and sharing information about bird observations across the country.

2.2 Goals of the Project:

The goals of Druk eBird Project are:

1. To create a centralized platform for the bird observation in and around Bhutan, allowing the birder and researchers to explore patterns in bird distribution and abundance, track the changes in bird populations over the time.
2. To create a database center of bird sightings and observations that can help for scientific research, conservation efforts, and public education.
3. To provide accurate information about the birds and count based on the location.
4. To encourage birdwatchers and nature enthusiasts to contribute in collecting the information on bird observations.
5. To revolutionize the way bird observation data is collected, analyzed and shared.

2.3 Objectives of the Project:

Druk eBird project will focus on the following objectives:

1. Collecting high-quality data on bird species, abundance, and distribution that can be used for research, conservation, and education purposes.
2. Providing a platform for birdwatchers to share their sightings with other birders, and to explore observations from other locations and times of year.
3. Promoting public engagement with birds and nature, and fostering a community of citizen scientists who are passionate about birds and birdwatching.

2.4 Scope of the Project:

The Druk eBird project will be targeted to all the enthusiastic birders and researchers in and around Bhutan.

3. Project features

3.1 Background

The technology aims in imparting a tremendous knowledge oriented technical innovations nowadays. Though the world has changed towards the era of technology and automation, in many bird habitation centers in Bhutan the data that they collect are kept private and it is not centralized and organized. The most essential part in birding is the preservation of the species and tracking the species. Nowadays birding is considered as an important factor for both the researcher as well as the birdwatchers for wildlife conservation. There is a need for more accurate and up-to-date information on bird populations and distributions because the birdwatchers currently record their sightings in personal notebooks, making it difficult for researchers to access and analyze this valuable data.

Bhutan being one of the least developed countries, there is no such platform that provides the researchers an opportunity to get access to accurate information about bird observations. Druk eBird will provide a good platform for birdwatchers to keep track of their bird sightings and share them to the other users. On the other hand, users can also create checklists of the species they found and add details such as Name, Time, Date, location and species. The checklist can be shared with the Druk eBird community and later this would be useful for tracking changes in bird's habitation and population over time.

In addition to providing a space for birdwatchers to share their observations, Druk eBird can be also used by the researcher to study about the bird population, distribution and migration patterns. Overall, it is a powerful application for researchers, birdwatchers, providing a platform for users and contributing to our understanding of birds and their conservation.

3.2 Literature Review:

1. ebird mobile application.

eBird is a global online checklist programme launched in the USA in 2002 by the Cornell Lab of Ornithology and the National Audubon Society, and worldwide in 2012, that gathers information on bird distribution and abundance. The demand for better information on bird populations and distribution has inspired the creation of the eBird project.

The eBird project comprises both web application and mobile application making it easier for the users to use. It contains features such as start checklist, my checklist, search, explore and etc…

Some of the papers that discussed the development of eBird project are:

1. Sullivan et al. (2009) - "The eBird enterprise: An integrated approach to development and application of citizen science."

   This paper describes the development of the eBird project, including the motivations behind the project, the design and implementation of the data collection system, and the ways in which the data is being used for research and conservation. The authors discuss the challenges of building a citizen science platform that can collect and manage large amounts of data from a diverse group of users, and the strategies they have used to address these challenges.

2. Johnston et al. (2019) discussed the use of machine learning algorithms to improve the accuracy of bird species identification from eBird data. They showed that these algorithms could improve the quality of the data collected by eBird, making it more useful for research and conservation efforts.

2. White-bellied heron conservation. Royal Society For Protection of Nature.

The Royal Society of Protection of Nature has been involved in the White-bellied Heron (WBH) and Black-necked Cranes(BNC) conservation project. Over the years much has been understood about their status, potential threats and conservation options in Bhutan.

As a critically endangered species in the world, it is very important to protect it and its natural habitat. Bhutan plays a pioneering role in protecting the critically endangered white-bellied heron. Although RSPN has initiated study on its ecology and breeding behavior, the rapid pace of development activities calls for immediate interventions that could provide quicker options for the survival of the bird ("White-bellied Heron Conservation"). Taking into account this information, we have become aware that the Royal Society for Protection of Nature has launched conservation efforts for endangered species. As such, mobile apps like Ebird Bhutan app would be highly effective in determining the status of these species and implementing appropriate actions.

3. Analytical guidelines to increase the value of community science data: An example using eBird data to estimate species distributions.

Community science or citizen science (CS) data are increasingly making important contributions to applied ecological research and conservation planning. One of the most common forms of CS data is the recording of species observations by members of the public. These observations are being collected for a diverse array of taxa, including butterflies, sharks, bats and birds. The number of these CS projects has been growing exponentially, but they vary widely in complexity, data collection flexibility and participation (Johnston et al., 2021). This document explicitly declares that the popularity of the CS project is rapidly rising due to its practical and effective method of preserving species. It is therefore feasible to create a similar project in our country.

4. A citizen-based bird observation network in the biological sciences.

In 2009, Sullivan said that eBird was built with a simple concept in which whenever the bird watchers raise binoculars, he or she has the opportunity to collect useful data serving both scientific and birding communities by gathering, organizing and disseminating observations of birds. The collected data help to have knowledge on species occurrence, migration timing and relative abundance at a variety of spatial and temporal scales and also through the process of informal science education, eBird users become better scientists by understanding and using standardized data-gathering techniques, exploring bird data through visualization tools, and

interacting with experts. (Sullivan, 2009). Knowing this, we could create a similar platform for our country that would assist birdwatchers and conservationists by establishing a permanent centralized database for their bird observations. This platform could also allow users to keep track of their own bird sightings, the effort they put into birdwatching, and their personal bird lists.

3.3 Requirements

Functional Requirements

1. **Registration:** Registration in the Druk eBird app refers to the process of creating an account with app in order to access its features and functionalities. To register, users are required to provide their name, email address, Date of Birth, Country, profession and a password. Registration helps to authenticate the identity of the user, ensuring that only authorized users can access the features and functionalities of the app. It also helps to ensure the security of user data and protect against unauthorized access or use of the app.
2. **Login:** Once the user is registered, they must log in using email address and password to access the application fully. Login helps to ensure the accuracy, integrity, and privacy of the data being submitted to Druk eBird, while also encouraging collaboration and community among birders and researchers.
3. **Start Birding**: Start Birding feature allows the users to quickly and easily create a checklist of birds that they have observed at a particular location at a particular time.
4. **Stop Birding:** Stop Birding feature allows the users to submit their checklist.
5. **My Checklists:** This feature allows users to keep track of the bird species they have seen, where and when they saw them, and how many of each species they observed.
6. **Search**: The search feature can be a useful tool for birdwatchers to find the information about bird observations nearby.
7. **Dashboard:** Admin can quickly track the bird sightings by providing a summary of the user's recent checklists and the number of observed species. This will also provide an admin with charts and graphs that visualize birding information.

Non-Functional Requirements

Some non-functional requirements of Druk eBird app are as follows:

1. **Performance:** The Druk eBird app should be fast and responsive, even when there are large amounts of data to load or process. This ensures that users can quickly and easily record sightings without experiencing delays or crashes.
2. **Reliability:** The Druk eBird app should be reliable, with minimal downtime or errors. Users rely on the app to store and manage their birding data, so any loss of data or system failures could be detrimental.
3. **Usability:** The Druk eBird app should be user-friendly and easy to navigate. The app should have a clear and intuitive interface that makes it easy for users to record and view their bird sightings.
4. **Security:** The Druk eBird app should be secure, with robust data encryption and protection mechanisms. This ensures that users' birding data is kept safe and private.
5. **Compatibility:** The Druk eBird app should be compatible with a wide range of devices and operating systems. This ensures that users can access the app from their preferred devices and platforms.

3.4 Technology

Front-End Technology

- React Native - React Native is a popular open-source framework for building mobile applications using JavaScript and React. It is a popular choice for building mobile applications due to its cross-platform capabilities, high-performance, and ease of use for developers.

Back-End Technology

- Node js - Node.js is an open-source, cross-platform, server-side JavaScript runtime environment that runs on the JavaScript Engine, and executes JavaScript code outside a web browser.

- My SQL - MySQL is a powerful and widely-used database management system that provides a reliable, scalable, and easy-to-use solution for managing and manipulating data in a variety of applications.

Version Control

- GitLab - GitLab is a comprehensive platform that enables teams to manage their software development process from start to finish, with features like version control, continuous integration and deployment, issue tracking, and more.

Design

- Figma (Prototype) - Figma is a powerful tool that enables designers to collaborate, iterate, and create high-quality designs in a seamless and efficient manner.

Hardware Technology

- Laptop/Desktop (Microsoft Windows 7/8/10 (64 bits)/Linux)
- 4 GB RAM minimum, 16GB RAM
- 1280 * 800 minimum screen resolution
- Processor 2.00GHz * 4

3.5 System Architecture

3.5.1 System Design

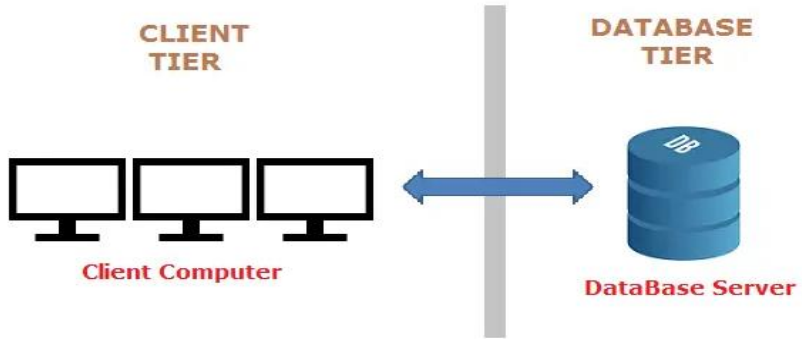

Figure 1: two-tier architecture

This system is a two-tier architecture which consists of client tier and data tier. The client system handles both Presentation and Application layers and the Server system handles the Database layer. It is also known as a client-server application.

- Client Application (Client Tier): is a user interface layer and communication layer of the application. Here the users will be able to start the checklist by logging into the application and submit the checklist. The application will auto generate the time, date and location while submitting the checklist.
- Database (Data Tier): it is also known as database tier which will store the observation information of the birds submitted by the users as well as the details of the users.

3.5.2 Workflow

The following diagrams shows the workflow of Druk eBird:

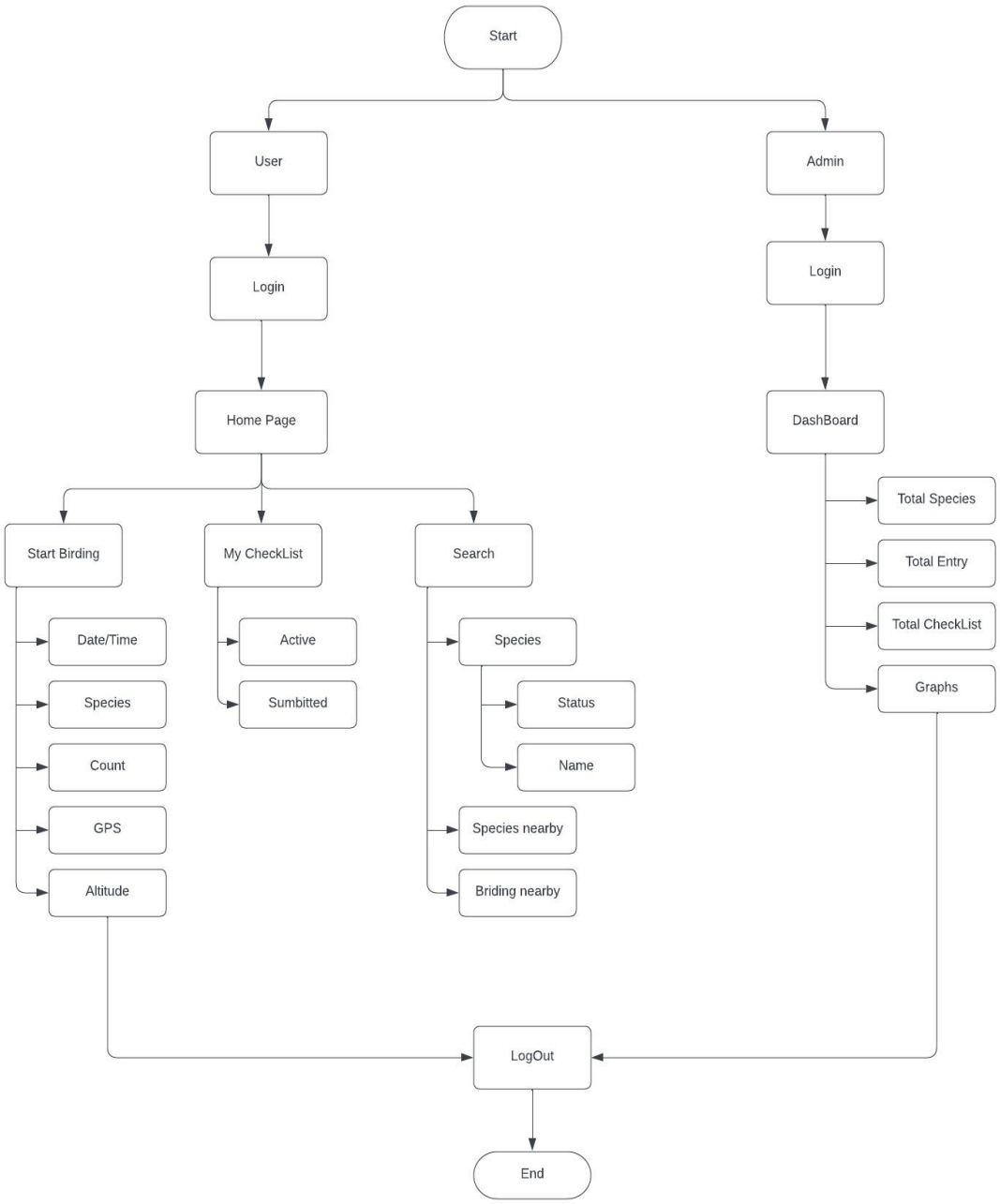

Figure 2: Workflow

Followings are the two types of users for Druk eBird:

1) **Birders/Researchers(Users):** Users can login to the system using their registered credentials. The users can perform the following activities:
    A. Start Birding
    B. My Checklist
    C. Search
    D. Logout

2) **Admin:** Admin can login to the admin dashboard. The information of the birds will be accessible to the admin. A graphical analysis of the information gathered will be also displayed in the admin dashboard.

3.5.3 Use Case

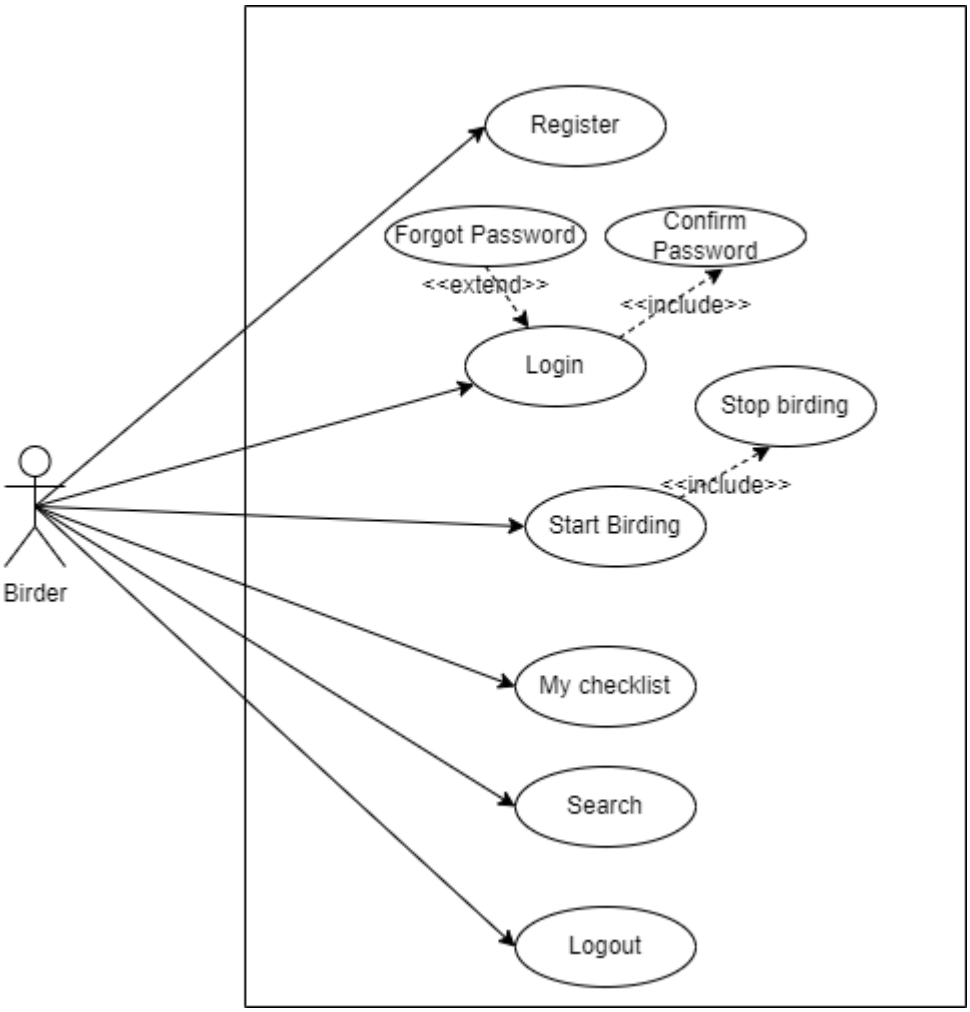

Figure 3: Birder Usecase Diagram

The enthusiast birth watchers and other researchers can login to the mobile app once they are done with the registration. They can record and share their sightings by clicking on the “Start Birding” button, which can then be used by researchers to better understand the existence, distribution and trends of the bird population across the country. Once the user starts creating a checklist by clicking on the “Start Birding” button, they can submit the checklist which will then be verified by the admin. The users can also find the existence of nearby birds using the search section. The users can logout of the app once they are done.

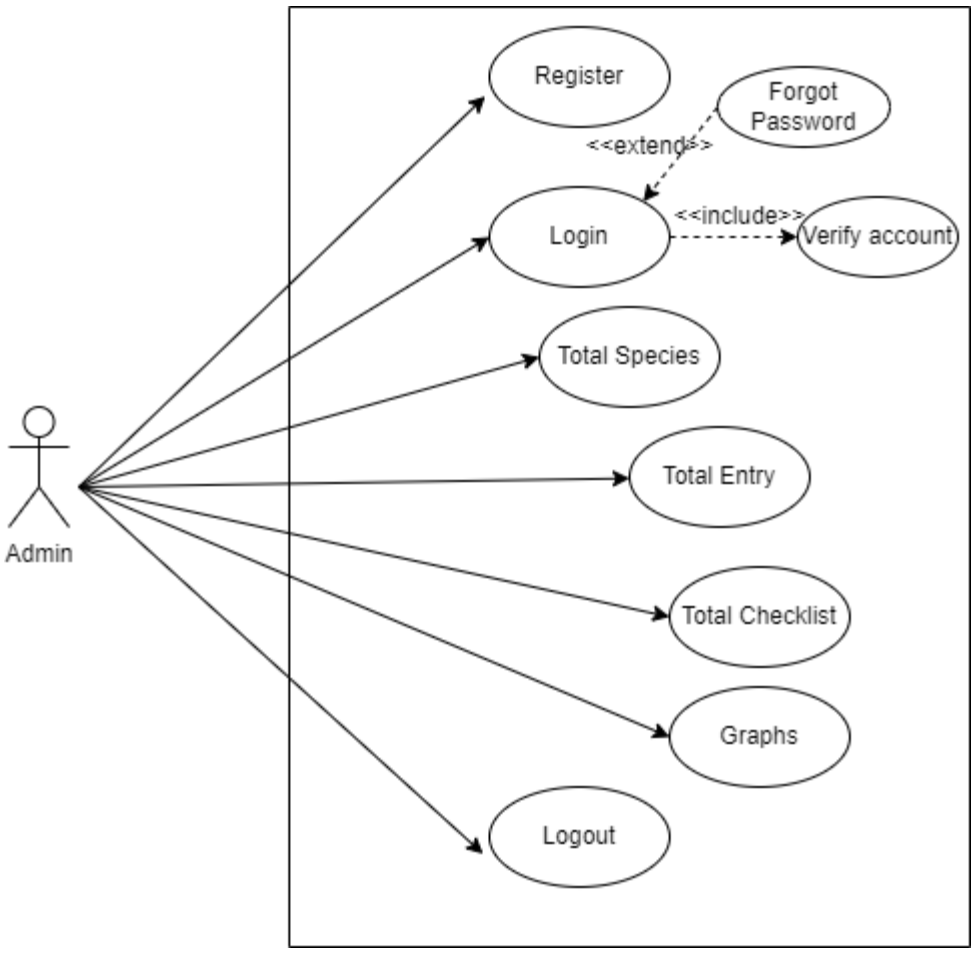

Figure 4: Admin Usecase Diagram

The admin also has to register and login to the website so that they can view the details of the total species of birds, total entries, the total checklist submitted by different birders and they can also see the analysis of bird information in the form of graphs and other visual representations.

3.6 Deployment

4 Team Members Role

4.1 Member 1 Name and Role

Cheki Lhamo (Team Leader)

4.2 Member 2 Name and Role

Tshering Wangchuk(Developer)

4.3 Member 3 Name and Role

Dema Lhamo(Scrum master)

4.4 Member 4 Name and Role

Karma Choda(Developer)

4.5 Member 4 Name and Role

Nar Bdr Kharka(Developer)

5. Examiner Comments

Project Schedule / Milestone Chart /Work plan

Task	Start Date	End Date	Duration
Scrum Team Formation & Requirement Analysis	06-Mar	10-Mar	4
Project Problem Statement & Title	11-Mar	13-Mar	2
Architecture, Tech Stack and Project Timeline	12-Mar	18-Mar	6
Project Proposal and Presentation	11-Mar	19-Mar	8
Database design	17-Mar	18-Mar	1
Wireframe design	18-Mar	20-Mar	2
Prototype design	20-Mar	26-Mar	6
Sprint Planning Meeting	27-Mar	28-Mar	1
Development Environment Setup	28-Mar	31-Mar	3
Sprint I	01-Apr	11-Apr	10
Sprint I Testing	12-Apr	17-Apr	5
Sprint II	18-Apr	28-Apr	10
Sprint II Testing	29-Apr	04-May	5
Sprint III	04-May	14-May	10
Sprint III Testing	15-May	20-May	5
Project Documentation	21-May	26-May	5
Promotional Materials	27-May	31-May	4
Presentation Preparation	01-Jun	07-Jun	6
Project Showcase	08-Jun	09-Jun	1

Table 1: Project Schedule

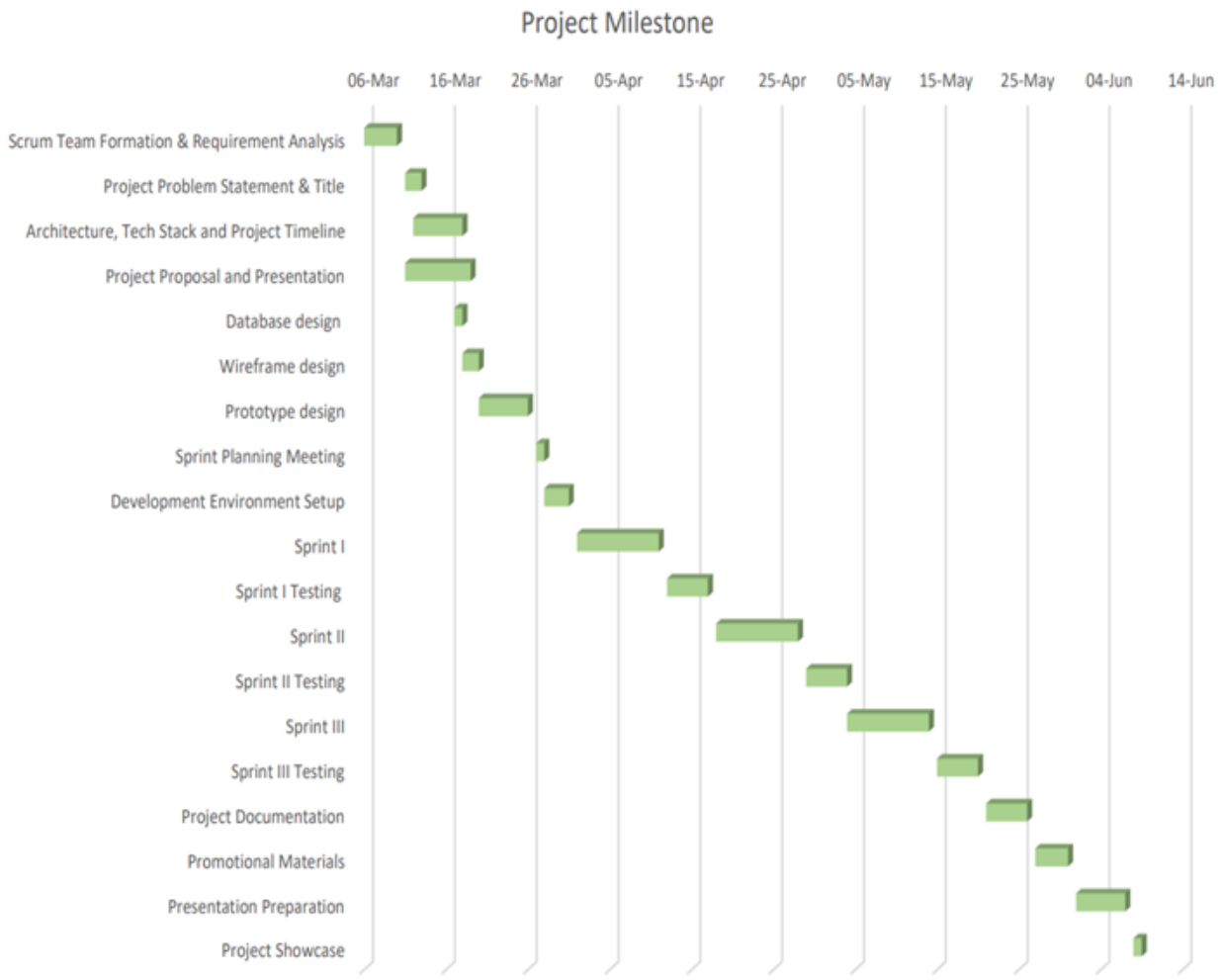

Figure 5: Project Milestone

7. Bibliography

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