



An Undergraduate Internship Report on GAMEPLAN Website

By

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May 10, 2021

Dissertation submitted in partial fulfillment for the degree of Bachelor of
Science in Computer Science

Department of Computer Science & Engineering

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Attestation

I certify that this report is solely my work, based on responsibilities that have been assigned to me during my internship period. In addition to that, I have acknowledged all material and sources used in this report. I also certify that this report has not been submitted previously for any assessment in any other unit and that I have not forged the work of other students or persons. However, following the internationally accepted academic guideline using other's written work is accurately cited if used in any part of this work.

Signature

Date

Zahid Hasan

Name

Acknowledgement

First and foremost, I want to express my sincerest sense of gratitude to Almighty Allah because of His mercy and blessing that I have come so far. It has been a great privilege to work for Debug BD as an intern. I have received so much support and encouragement from the individuals of Debug BD who have years of experience in Software Development. I also would like to thank the members of Debug BD for spending their valuable time and knowledge and was essential for the completion of this report.

I express my gratefulness to my internal supervisor, Sanzar Adnan Alam, Lecturer, Department of Computer Science and Engineering, Independent University, Bangladesh (IUB), for his invaluable instructions, continuous guidance, constructive criticism, support, and motivation during my internship period and preparation of this report.

I besides want to express my deepest gratitude to my external supervisor and my mentor Mohammad Tanzilur Rahman for allowing me to be a part of this organization. His support and leading ability were the driving force of this project.

I am greatly indebted to my honorable teachers of the Department of Computer Science and Engineering at the Independent University, Bangladesh, who taught me during my study. Without any doubt, their teaching and guidance have completely transformed me into the person that I am today.

I am incredibly thankful to my parents for their unconditional love, endless prayers, caring, and immense sacrifices for educating and preparing me for my future. I want to say thanks to my family members and friends for their kind support and care, good wishes, moral support, fruitful advice, inspirations, and encouragement.

Finally, I would like to thank all the people who have supported me in completing the project directly or indirectly.

Zahid Hasan
May, 2021

Letter of Transmittal

May 10, 2021

Sanzar Adnan Alam

Lecturer,

Department of Computer Science and Engineering
Independent University, Bangladesh

Subject: Letter of Transmittal for Internship Report, Spring 2021

Dear Sir,

This is to inform you that I, Zahid Hasan, ID - 1631146 from the internship course of Autumn 2020 Semester, Section 9, would like to submit my Internship report with due honor and respect. This report is based on my internship program and the project I have worked on during this period. I conducted my internship from 1st February to 30th April 2021, and it has been completed at Debug BD Limited.

This report is based on my experience and the work I did at Debug BD Limited during my internship program. The primary goal for my internship report was to gain knowledge from working in the software engineering industry and familiarize myself with all the different technology-related fields of the company, including research and development, documentation, software development, and to get acquainted with software development processes and practices. Throughout my internship at Debug BD Limited, I had to learn and adapt to the evolving technologies being used in different situations and requirements and to be able to apply them in real-life projects.

I shall be highly obliged if you are kind enough to receive this report and provide your valuable judgment. It would be my immense pleasure to find this report useful and informative to have a clear perspective on the issue.

Sincerely,

Zahid Hasan

ID - 1631146

Email: 1631146@iub.edu.bd

Evaluation Committee

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Abstract

In Bangladesh, the internet speed tends to be slow, mostly in rural areas, and websites take more time to load; consumers have the tendency to abandon websites that takes a longer time to load. In the age of smartphones and the internet, people are visiting sites more than ever. Consumers spend more time on the website when it loads faster than when it loads slower. During my internship at Debug BD Ltd., as a web developer intern, my project was to make the "Gameplan" website load quicker, keeping all the necessary dynamic features. A hybrid architecture is used to solve these problems, and the client frontend will fetch dynamic contents during build time when the admin will make any changes in the cms. And all these are accomplished by implementing the latest frontend technologies, i.e., GatsbyJS, ReactJS, GraphQL with proper backend powered by MongoDB, NodeJS, ExpressJS. The result showed significant improvement in website performance tested in the lighthouse in chrome dev tools, which tests web page performance, accessibility, SEO, and more. The results suggest that more people will spend time on the website learning the actual product which the website sells.

Contents

Attestation	i
Acknowledgement	ii
Letter of Transmittal	iii
Evaluation Committee	iv
Abstract	v
1 Introduction	1
1.1 Background of the Work	1
1.2 Objectives	2
1.3 Scopes	2
1.4 Company Overview	3
1.5 Background of the Company	3
1.6 Mission, Vision and Values	3
1.7 Products and Services	4
2 Literature Review	5
2.1 Relationship with Undergraduate Studies	5
2.2 Related works	7
3 Project Management & Financing	8
3.1 Work Breakdown Structure	8
3.2 Process/Activity wise Time Distribution	10
3.3 Gantt Chart	11
3.4 Estimated Costing	12
4 Methodology	13
4.1 Software Development Methodology	13
4.2 Agile Development Methodology	14
4.3 Development Tools Used	16

5 Body of the Project	18
5.1 Work Description	18
5.2 System Analysis	18
5.2.1 Six Element Analysis	19
5.2.2 Feasibility Analysis	20
5.2.3 Problem Solution Analysis	21
5.3 System Design	22
5.3.1 Rich Picture	22
5.3.2 UML Diagrams	23
5.3.3 Requirement Analysis	24
5.3.4 Functional and Non-Functional Requirements	24
5.3.5 Functional and Non-Functional Requirements	26
5.3.6 Architecture	27
6 Results & Analysis	29
7 Project as Engineering Problem Analysis	38
7.1 Sustainability of the Project/Work	38
7.2 Social and Environmental Effects and Analysis	39
7.3 Addressing Ethics and Ethical Issues	40
8 Future Work & Conclusion	41
8.1 Future Works	41
8.2 Conclusion	41
Bibliography	44

List of Figures

1.1	Debug BD Company Logo	3
3.1	Work Breakdown Structure of Gameplan	9
3.2	Time Distribution Pie Chart	10
3.3	Gantt Chart of Gameplan	11
3.4	Estimated Costing Pie Chart	12
4.1	Software Development Life Cycle (SDLC)	14
5.1	Rich Picture of Gameplan	22
5.2	Use Case Diagram of Gameplan	23
5.3	Client Server Architecture	27
6.1	Landing Page of Gameplan Website	29
6.2	Send Link Section	30
6.3	Contact Us Section	30
6.4	Sign In Page for Admins	31
6.5	Update Admin Profile	31
6.6	Admin List Page	32
6.7	New Admin Register Page	32
6.8	Edit Registered Admins Credentials	33
6.9	Review List Page	33
6.10	Edit Review Page	34
6.11	Create New Review Page	34
6.12	FAQ List Page	35
6.13	Edit FAQ Page	35
6.14	Create New Faq Page	36
6.15	Contact Us List Page	36
6.16	Requested Numbers Page	37

List of Tables

5.1	Six Element Analysis of "Gameplan"	19
5.2	Problem Solution and Constraints Analysis Table	21
5.3	Functional Requirement 1 - Compatibility	24
5.4	Functional Requirement 2 - Login	25
5.5	Functional Requirement 3 - Administration Page Activities	25
5.6	Functional Requirement 4 - Requesting for Download Link	25
5.7	Functional Requirement 5 - Contact Us	26

Chapter 1

Introduction

An *internship* is an opportunity that provides students a great chance to relate their theoretical knowledge with the competitive and natural job market environment. It also allows the understanding of a fundamental job framework and acquires knowledge in their particular field of work. After returning from the internship, students get the skills and confidence they have developed during the internship, which help them gain work experience and prepare them for their future careers.

1.1 Background of the Work

The gameplan is a fantasy sports platform in Bangladesh providing a world-class fantasy sports experience to the sports fan of Bangladesh. It is a project that is researched and built-in Debug BD Ltd. People are spending a significant amount of time on their phones more than ever, and there are so many fun and addictive games out there in the market, but there is a lack of fantasy game app that connects to real life. Moreover, with the start of the Coronavirus Pandemic, people are playing games more than ever. Nevertheless, to play a fantasy game like Game Plan, users need to understand the rules perfectly. Also, they might have thousands of questions for which there is a need for a connection medium between the users and the Game Plan. Furthermore, nothing serves better than a website. A website needs to be fast enough to be connected with the users because research showed the users ignore slow websites.

1.2 Objectives

The main objective of the Game Plan website is to make users easily connected with the game, understand the rules of the game perfectly, and get their question answers from the makers of the game. When a website is fast and beautiful, people tend to spend more time on it, which ultimately adds more users, so it is essential to redesign the website to make it fast. The report's object is to know the problem faced in the software industry and these problems are solved. To know coding style, convention of history, go through the development cycle and models, and understand software maintenance.

1.3 Scopes

After the development of the Gameplan web application, the features for user and admin are:

- Home or Main Landing Page
- Users can ask for app link with the text message by putting their number send link field
- Users can easily send their questions, recommendation, or review from the contact us section
- Admin login page
- Admin can manage the content of the page from the dashboard
- Admin can create, edit, delete reviews to show on the main landing page
- Admin can create, edit, delete FAQs to show on the main landing page
- Admin can create, edit, delete admin profiles to show on the main landing page
- Admin can see the recent numbers that requested the app link
- Admin can see the recent questions, recommendation, or review from the user
- A copy of the user's query will directly be sent to the admin email address

1.4 Company Overview



Figure 1.1: Debug BD Company Logo

1.5 Background of the Company

Debug BD is a strictly quality-driven Software Development and Support, System Integration, and related IT Services specialist with a major domain focus on mobile application and game development [1] .

Debug BD was established in August 2014, with a vision to develop various mobile applications and games to take Bangladesh in the global mobile application and game development arena [1].

With a unique combination of visionary leadership, experienced resources, intelligent processes, and compatible infrastructure, Debug BD is committed to identify and recognize the needs of actual users that can be served through mobile applications in the public and private sectors all over Bangladesh [1].

1.6 Mission, Vision and Values

The company was set up to produce high-quality software products by training software engineers who can contribute locally and internationally. To engage local developer communities and encourage a culture of knowledge skill transfer. Contribute to digital Bangladesh and try to fulfill the demand in the IT sector and research new technology. Debug BD Ltd. is aiming at customers to achieve operational efficiency and excellence. Our mission is to deliver optimal solutions with quality and services at reasonable prices. For us, customer satisfaction is given top place. We are very friendly in our dealings with the customers, and it helps us retain existing clients and expand the customer circle. We always try to improve the quality of our products by exploring innovative ideas.

Our vision is to be a leading IT Solution company in the technology sector and progress in our current position in the market. We are committed to adding value to our customer's business. We give the best service to our customers. Whatever the business domain is, we can simplify and streamline business workflows by saving customers time and cost. Figure out the needs of the IT market and research in those and try to provide the best solution to fulfill the needs.

1.7 Products and Services

- **Web Application Development:** Developing Customized Web Applications, Responsive Websites, WordPress Theme Development, Dynamic Websites, E-Commerce solutions, and so on.
- **Mobile Application Development:** Developing mobile application development for IOS and Android by researching and analyzing to meet requirements and expectations
- **Game Development:** Develop 2D/3D games, educational and kids games, real-time and strategic games, puzzle and card games, and so on.
- **Software:** Developing Accounting and inventory software, invoice and billing software, ERP, medical management, POS, HR and Payroll software, Restaurant Management, etc.
- **Other notable services:** UX/UI Design, Online Marketing, Cyber Security.

Chapter 2

Literature Review

A literature review is a comprehensive study and interpretation of literature that addresses a specific topic [2]. It discusses published information in a particular subject area with substantive findings and theoretical and method contributions to a specific topic.

2.1 Relationship with Undergraduate Studies

Knowledge and skills gained from the courses that I have enrolled at IUB over the past few years have played a tremendous role in completing my internship. It would have proven more difficult if these courses were not covered before working on these projects. Some of the courses are:

- **CSE 203 - Data Structure:** This course was about handling and manipulating complex arrays, objects, classes, an array of objects, objects of an array, nested objects, etc. This course created the base to analyze the efficiency of implementation choices and diagnose appropriate approaches or algorithms to solve problems. The frontend and backend framework used to build this complete project involves many complex data structures, the skills gained from this course made handling them much more manageable.
- **CSE 213 - Object-Oriented Programming:** This course introduced the concepts of object-oriented programming with a background in the procedural paradigm. Design principles and patterns of modularity and abstraction in object-oriented programming are taught in this course. The course helped to understand the benefits of object-oriented design and when this object-oriented methodology is appropriate to use. This course is a deep dive into classes and their objects of programming. It also taught how to write modular programs, which made codes less repetitive and more reusable. As the framework works the modular way, it helped to code faster.

Also, as the application grew, this practice helped avoid writing new modules from scratch by using parts of old modules and adding new functions to them.

- **CSE 303 - Database Management:** The course introduced detailed coverage of the development process, database architectural principles, relational algebra, and SQL. The course taught me to design database applications proficiently, starting from conceptual design to implementing database schemas and user interfaces. This was the first course that taught me how to design and plan a project. It covered popular planning and strategy practices such as System Development Life Cycle, Rich Picture, Requirement Analysis, Entity Relationship Diagram, Business Process Model and Notation Diagram, and many more. These techniques helped in the website's development planning and strategy and helped in writing this report.
- **CSE 307 - System Analysis and Design:** This course introduced the tools and techniques for the design and analysis of information systems. Topics covered include Systems and models; Project management; Tools for determining system requirements; data flow diagrams; decision table and decision trees; Systems analysis: systems development life cycle models. Object-oriented analysis: use-case modeling, Unified Modeling Language. Feasibility analysis, Structured analysis; systems prototyping; system design and implementation: application architecture, user interface design. Front-end and backend design; database design; software management and hardware selection. Case studies of Information Systems. All these lessons helped to land the final project and also to complete the report.
- **CSE 309 Web Application and Internet:** This is the course where the development of web applications was taught. It covered essential technologies highly demanding in the industry, such as HTML, CSS, JavaScript, jQuery, View Engines(Handlebars and embedded JavaScript), PHP, Node.js, Express.js, MySQL, API, MongoDB, and deployment with Heroku. The tools and technologies learned from this course immensely contributed to the development of these websites. This course introduced the fundamental web-based client-server architecture concepts which ultimately used in this project.

2.2 Related works

Most of the landing pages use simple HTML, CSS, JavaScript, or JQuery for their development. Most of the time, WordPress is used to remove any level of hard coding or to faster the development. As our goal for this project is to start begging to convert the mobile application to the web, we used more complex development frameworks. It is challenging to find a related website that has used similar web technologies to our project. Some websites in the industry are stated below:

- **Fantasy Premier League:** With over 7 million players, Fantasy Premier League is the biggest Fantasy Football game in the world. The interface is self-explanatory, and users can directly play from their laptop or any best system. It has both web and mobile versions, and in the web version, the website uses react, similar to our base frontend library [3].
- **My 11 Circle:** My 11 Circle is quite similar to our developed project. Though the website does not use any latest JavaScript library or framework for the frontend, the user interface has a similar feeling for the users [4].
- **Dream 11:** Dream 11 is a similar fantasy app platform. Its landing page is also informative as our developed project. The website does not seem to use any latest frontend frameworks [5].

Chapter 3

Project Management & Financing

3.1 Work Breakdown Structure

The Work Breakdown Structure (WBS) is a visual, hierarchical, and deliverable-oriented method for completing complex, multi-step projects. It applies the divide-and-conquer paradigm to large projects, so tasks are completed faster and more efficiently. It is the hierarchical tree structure-property that outlines a project and breaks it down into more inadequate pieces. The goal of WBS is to make large projects more manageable. By breaking down the complete project into smaller chunks, team members can work on different features, leading to better productivity. We utilize the top-down approach to appear Work Breakdown Structure (WBS) to this extend. Using WBS will be effective for us to protect work quality and easy to synchronize the whole project. Below is the WBS of "Game Plan"

3.1. WORK BREAKDOWN STRUCTURE PROJECT MANAGEMENT & FINANCING

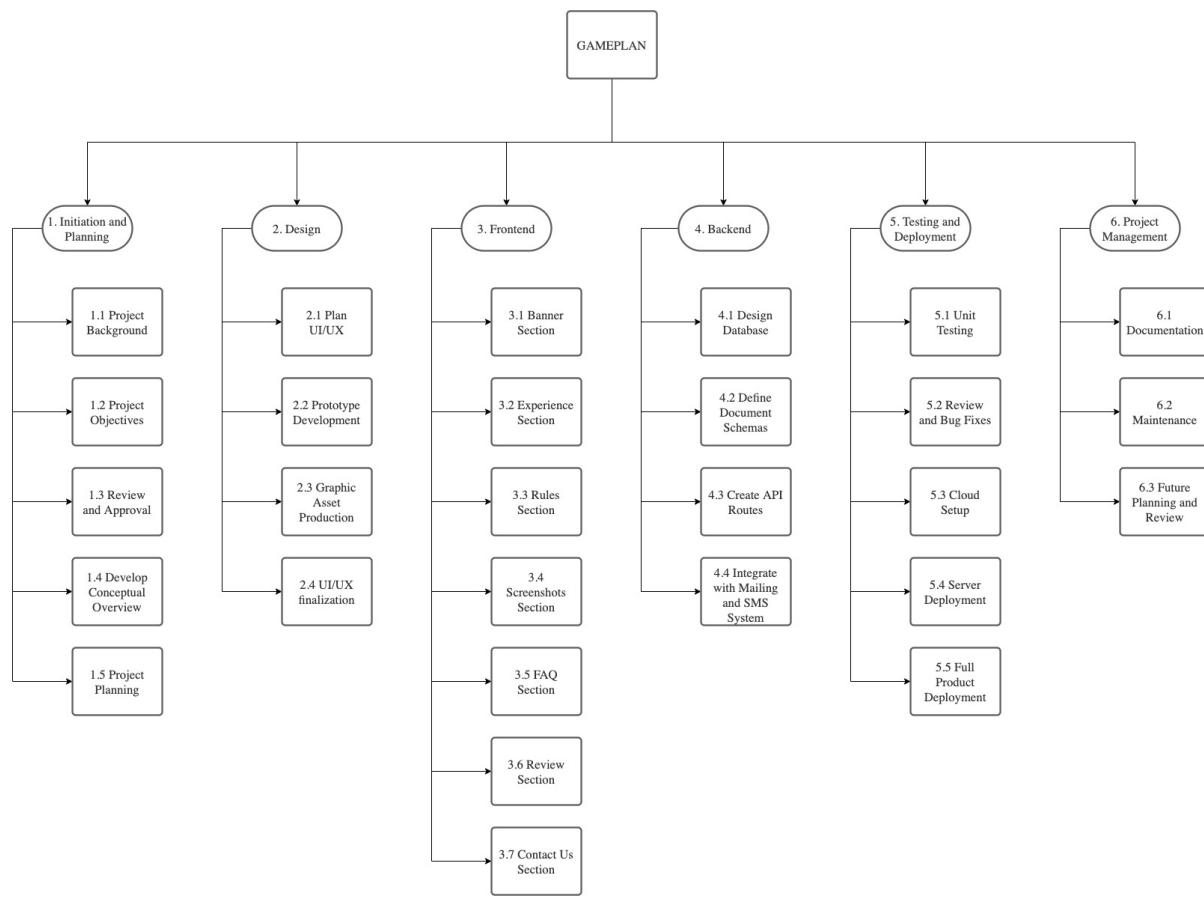


Figure 3.1: Work Breakdown Structure of Gameplan

3.2 Process/Activity wise Time Distribution

All the activities related to this project are listed in the WBS. We, as a team, attempted to complete these tasks in a given time. The time for completing the project is estimated at 90 days.

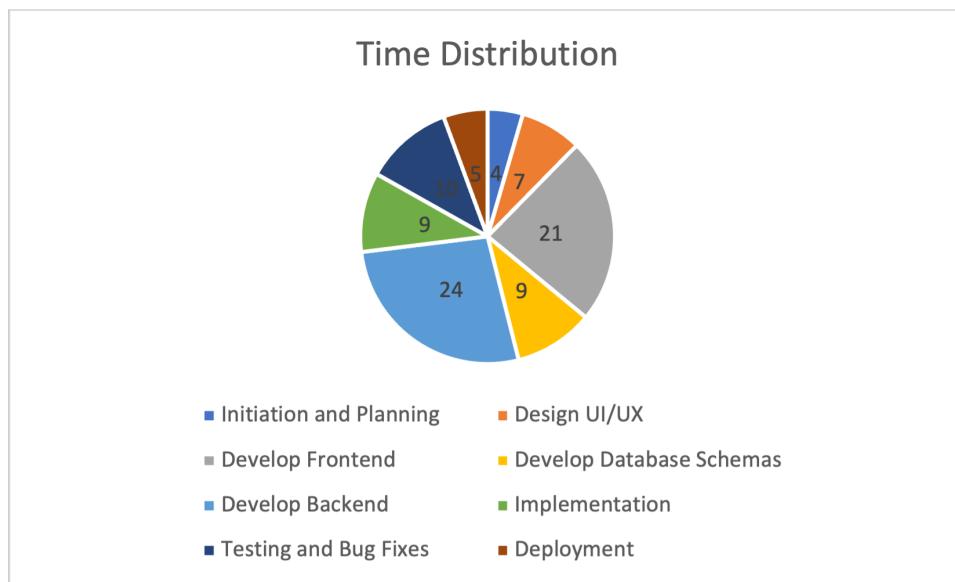


Figure 3.2: Time Distribution Pie Chart

3.3 Gantt Chart

A Gantt Chart is a graphical presentation of a project schedule, commonly used in project management and is one of the most popular and beneficial techniques of showing activities (tasks or events) displayed against time. It helps to estimate how long the project should take, determine the resources needed and plan in the order in which tasks will be completed. Work breakdown structure appears as the sum of activities, and to complete these activities, a particular time is required, which is portrayed within the Gantt Chart. It is also helpful to monitor the project's advancement once it has begun. It helps to have a more precise vision of what should have been delivered by a specific time frame, and when the project falls behind schedule, proper actions are taken to bring it back to track.

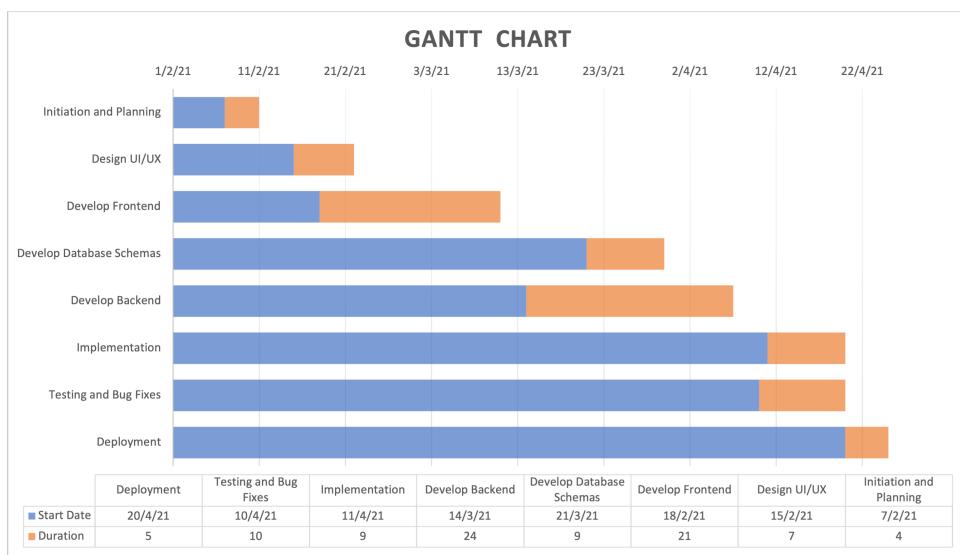


Figure 3.3: Gantt Chart of Gameplan

3.4 Estimated Costing

As an intern, I did not get any allowances for working with Debug BD Ltd. The company shared a little of their actual cost for the development of Gameplan. But the approximate cost was evaluated around nearly 30,000 BDT. It can be expanded on the changes in the project.

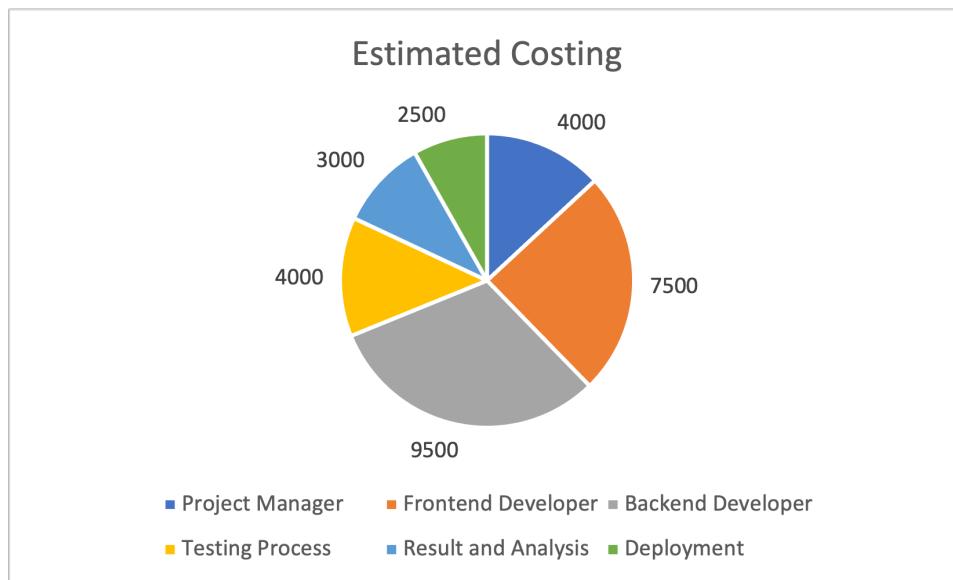


Figure 3.4: Estimated Costing Pie Chart

Chapter 4

Methodology

Methodology refers to the overarching strategy and rationale of our project. It involves studying the methods used in our field and the theories or principles behind the selection process to develop an approach that matches our objectives. The methodology is a system of methods that we use in a specific area of study or activity. The methodology is the detailed procedures used to identify, select, process, and analyze information about a subject. The website I have working on is one of the most complete and fully functional websites, and it is developed using modern web technologies.

4.1 Software Development Methodology

The software development life cycle (SDLC) is a framework for defining tasks performed at each step in the software development process. The life cycle describes a methodology for improving the quality of software and the overall development process. Software Development Life Cycle is the application of standard business practices to building software applications [6]. It has typically divided into six to eight steps: Planning, Requirements, Design, Build, Document, Test, Deploy, Maintain. SDLC is a way to measure and improve the development process. It allows a fine-grain analysis of each step of the process. These practices, in turn, helps companies maximize efficiency at each stage.

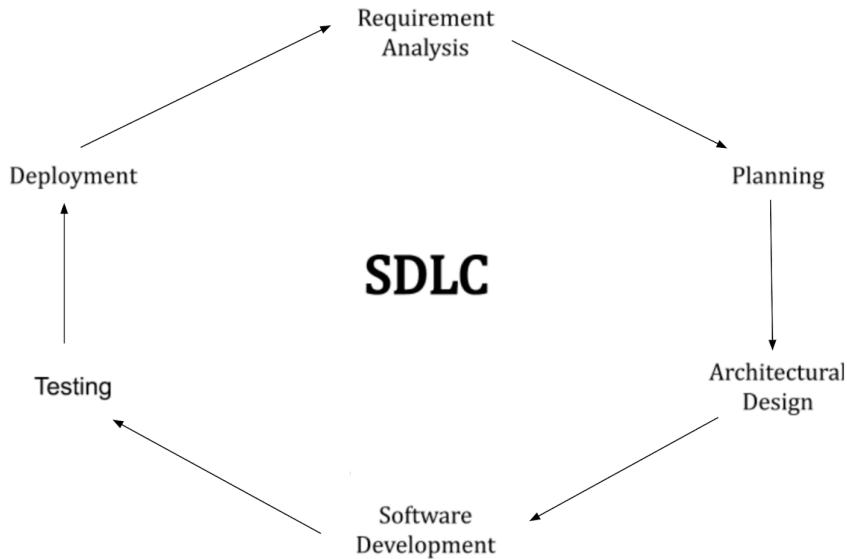


Figure 4.1: Software Development Life Cycle (SDLC)

There are many popular software development methodologies used in development. The most common SDLC examples or SDLC models are listed below:

- Waterfall Model
- Agile Model
- Rapid Application Development
- Iterative Model
- Spiral Model
- V-Model etc

4.2 Agile Development Methodology

Agile methodology is a practice that promotes continue interaction of development and testing during the SDLC process of any project. Agile is the ability to create and respond to change. It is a way of dealing with, and ultimately succeeding in, an uncertain and turbulent environment [7]. Agile is an iterative approach to project management and software development that helps teams deliver value to their customers faster and with fewer headaches. Instead of betting everything on a "big bang" launch, an agile team delivers work in small but consumable increments. Requirements, plans, and results are evaluated continuously, so teams have a natural mechanism for responding to change quickly. All of these builds are provided in iterations, and each iteration lasts

from one to three weeks. The Agile SDLC model separates the product into cycles and delivers a working product very quickly [8]. This methodology produces a succession of releases. Teams use the agile development methodology to minimize risk (such as bugs, cost overruns, and changing requirements) when adding new functionality. In all agile methods, teams develop the software in iterations that contain mini-increments of the new functionality. Agile is an umbrella term for several methods and practices. Some of

the popular methodologies:

- Scrum
- Extreme Programming (XP)
- Adaptive Software Development (ASD)
- Dynamic Software Development Method (DSDM)
- Feature Driven Development (FDD)
- Kanban
- Behavior Driven Development (BDD)

At Debug BD Ltd., we followed the most recent methods of software development methodologies. To develop this project, we followed Agile Methodology, and to be more specific Scrum method.

Scrum is a process framework used to manage product development and other knowledge work. Scrum is empirical in that it provides a means for teams to establish a hypothesis of how they think something works, try it out, reflect on the experience, and make the appropriate adjustments. That is when the framework is used correctly. Scrum is structured in a way that allows teams to incorporate practices from other frameworks where they make sense for the team's context [9].

4.3 Development Tools Used

For the development of the web application, “Gameplan,” various modern application development tools are used.

- **ReactJS:** React is a declarative, efficient, flexible JavaScript library for building user interfaces or UI components. It was created on Facebook and is currently maintained by Facebook and a community of individual developers and organizations. React can be applied as a base in developing single-page applications (SPA) or mobile applications [10].
- **GatsbyJS:** GatsbyJS is a free, open-source, React-based, GraphQL powered static site generator framework designed to build blazing-fast websites and apps [11].
- **NodeJS:** Node.js is a cross-platform, open-source, server-side run time environment built on Chrome’s v8 JavaScript engine and executes JavaScript code outside the web browser. “JavaScript everywhere” paradigm is represented by Node.js. It provides an event-driven, non-blocking (asynchronous) I/O and cross-platform run time environment for building a highly scalable server-side application using JavaScript [12].
- **ExpressJS:** Express is a minimal, lightweight, and flexible Node.js web application framework that helps to organize a web application into an MVC architecture on the server-side, and it also supplies a vigorous set of features for web and mobile applications [13].
- **Git:** *Version control* is a system that stores changes of a file or set of files over time so that specific versions can be recalled later. Git is a free and open-source distributed version control system. Git is designed to handle everything from small to large projects with speed and efficiency. It is used to track changes in source code during software development. Git helps for coordinating work among programmers as well as to track changes in any set of files. Its goals include speed, data integrity, and support for distributed non-linear workflows [14].
- **Github:** GitHub, Inc. is a provider of Internet hosting for software development and version control using Git. It offers the distributed version control and source code management functionality of Git, plus its features [15].
- **MongoDB:** MongoDB is a document-oriented NoSQL database used for high-volume data storage. Instead of using tables and rows as in the traditional relational databases, MongoDB uses collections and documents. Documents consist of key-value pairs, which are the basic unit of data in MongoDB. Collections contain sets

of documents and functions, which is the equivalent of relational database tables [16].

- **Mongoose:** Mongoose is an Object Data Modeling (ODM) library for MongoDB and Node.js. It manages relationships between data, provides schema validation, and is used to translate between objects in code and represent those objects in MongoDB [17].
- **Redux:** Redux is a predictable state container designed to help write JavaScript apps that behave consistently across client, server, and native environments and are easy to test [18].
- **Postman:** Postman is a collaboration platform for API development. Postman's features simplify each step of building an API and streamline collaboration to create better APIs—faster [18].
- **Styled Components :** Styled Components are one of the new ways to use CSS in modern JavaScript. It is meant to be a successor of CSS Modules, a way to write CSS that's scoped to a single component and not leak to any other element on the page [19].

Chapter 5

Body of the Project

5.1 Work Description

During my internship, I worked on a project called "Gameplan." "Gameplan" is a fantasy app that currently only has a mobile version, but the company has a plan to have a web version shortly. The current website has limited interactions with the users. Currently, users only can request the download link for the mobile app, and also they can send a query through the contact form. On the Admin side, there is also a limited number of features. For example, they can change the page's content, see the requested numbers for the app download link, see the latest queries from the users, and admins login functionality. REST APIs are used for the dynamic feature of the website. The website also teaches users how to play the game, recent reviews by app users, and much more.

5.2 System Analysis

Systems development is a systematic process that includes phases such as planning, analysis, design, deployment, and maintenance. System analysis is a process of collecting and interpreting facts, identifying the problems, and decomposition of a system into its components. System analysis is conducted to study a system or its parts to identify its objectives [20]. It is a problem-solving technique that improves the system and ensures that all the system components work efficiently to accomplish their purpose. Analysis specifies what the system should do. This chapter contains parts of System Analysis that will help understand the project better. System analysis is essential because it provides an avenue for solutions in the system through various tasks involved in doing the analysis.

5.2.1 Six Element Analysis

Process	Human	Non Computing Hard-ware	Computing Hard-ware	Software	Database	Network
Login	Admin	N/A	PC, Laptop, Mobile	Any Browser	MongoDB	Internet
View Recent Request for Link	Admin	N/A	PC, Laptop, Mobile	Any Browser	MongoDB	Internet
View Recent Queries from Users	Admin	N/A	PC, Laptop, Mobile	Any Browser	MongoDB	Internet
View Home Screen	User	N/A	PC, Laptop, Mobile	Any Browser	MongoDB	Internet
Request for Link	User	N/A	PC, Laptop, Mobile	Any Browser	MongoDB	Internet
Send Messages	User	N/A	PC, Laptop, Mobile	Any Browser	MongoDB	Internet

Table 5.1: Six Element Analysis of "Gameplan"

5.2.2 Feasibility Analysis

Feasibility analysis is a study to assess the feasibility of a proposed project or system. It is an introductory survey for the system's examination. It intends to provide information to help a later in-depth inquiry. It is a measurement process of the software product in terms of how useful the developed product will be for the business from a functional point of view. A feasibility study is conducted out based on many purposes to examine whether software features will be right in terms of development, implantation, the contribution of the project to the organization, etc. The report produced at the end of the feasibility analysis includes suggestions and reasonable arguments. The report will be helpful for the management to decide whether they should commit further resources to the proposed project.

There are various measures of feasibility that helps to decide whether a particular project is feasible or not. Main parts of feasibility study:

- **Technical Feasibility:** In technical feasibility, present resources, hardware, and software, along with required technology, are analyzed to develop the project. The technical feasibility analysis reports on whether there are correct required resources and technologies used for the project development. It also evaluates the technical skills and capabilities of the technical team, and it also analyzes whether current technology can be used or not. "Gameplan" website is built using React.js, Gatsby.js, Node.js, Express.js, MongoDB, and GraphQL. These technologies are trendy in the modern software industry, and everyone involved in the making of this project had the skills to work with these technologies mentioned above. Debug BD Ltd. has skilled technical experts to complete and maintain this project. Debug BD Ltd. also trained and guided me to complete this project with accuracy. Hence, it can be concluded that the project is technically feasible.
- **Operational Feasibility:** In operational feasibility degree of providing service to requirements is analyzed along with how easy the product will be to operate and maintain after development. An application must be user-friendly as well as it must work with no difficulties. Along with these, other operational scopes are determining the usability of the product and determining whether a suggested solution by the software development team is acceptable or not. "Gameplan" is a simple website built with complex technology. Users can easily navigate through the whole website as it is self-explanatory. Our project is developed from scratch using modern web development technologies and frameworks, and it will allow us to customize our project to our perception. As a result, the project can be called operationally feasible.

- Economic Feasibility:** In economic feasibility analysis, the cost and benefit of the project are analyzed. It is a detailed study where the project's cost from all of the different spaces is combined. For example, the cost for required hardware and software resources, UI/UX design and development cost, operational cost, etc. And then, it is calculated whether the project will be financially beneficial for the company or not. The only service needed for the development of "Gameplan" is just a cloud server, which is relatively cheap and easily covered from the revenue collected from the app that the project sells. So the proposed system is justifiable in terms of cost and benefit, and it ensures that the investment in this system provides a reasonable return. In conclusion, the project can be called economically feasible.

5.2.3 Problem Solution Analysis

Problem	Analysis	Solution	Constraints
Data Loss	Any time data can be lost for various reasons (Virus attack, attack by hackers, unfortunate system crash)	Database system is more secure and deleted, lost data easily can be restored	Internet Connectivity
Time Complexity	accessing a specific information requires a lot of time to find and compute	Database system is easily accessible and need less time	Internet Connectivity
Human Error	Invalid user inputs	Form validation from both client side and server side	N/A
Analysis the data	Some problem occurs due to fetching manually different information	Database system can collect all the data and it is very easy to analyses the data	Internet Connectivity
Steal Data	Data can be stolen	authentication	Internet Connectivity

Table 5.2: Problem Solution and Constraints Analysis Table

5.3 System Design

System design is the process of designing the elements of a system, such as the architecture, modules, and components, the different interfaces of those components, and the data that goes through that system. System design is deriving a solution which satisfies software or system's requirement. We can define software design as translating requirements into software components and interactions among them. Any design may be modeled as a directed graph made up of entities with attributes that participate in relationships. A design represents the system, how it will work, and how it can be assessed for quality. Design is the way to translate a client's requirements into a system or software product accurately. Software architecture provides an abstract representation of the overall structure of software. This chapter contains numerous design-level diagrams to have a clearer understanding of the system and flow of data.

5.3.1 Rich Picture

A rich picture is a way to explore, acknowledge and define a situation and express it through diagrams to create a preliminary mental model. A rich picture helps to open discussion and come to a broad, shared understanding of a situation. It comprises pictures, content, images, and symbols, which are all utilized to demonstrate the graphically the circumstance. A rich picture illustrates how the application works. The process begins with the user turning on the application on their device using a browser while being connected to the internet. Then they can roam around the website to get their necessary information. They can choose to request the game link by giving their phone number input to the send link form. They can also choose the send queries to the admin.

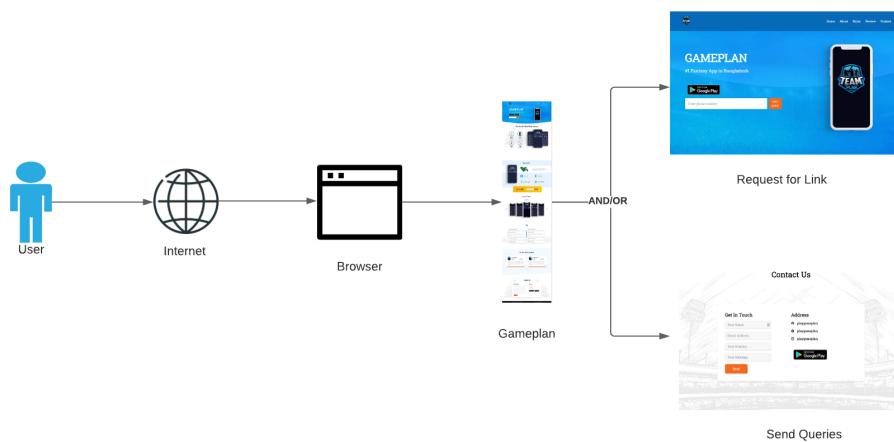


Figure 5.1: Rich Picture of Gameplan

5.3.2 UML Diagrams

UML, which stands for Unified Modeling Language, is a way to visually represent the architecture, design, and implementation of complex software systems. When we are writing code, there are thousands of lines in an application, and it is not easy to keep track of the relationships and hierarchies within a software system. UML diagrams divide that software system into components and sub-components. Use case diagram model shows how users, displayed as stick figures called “actors,” interact with the system.

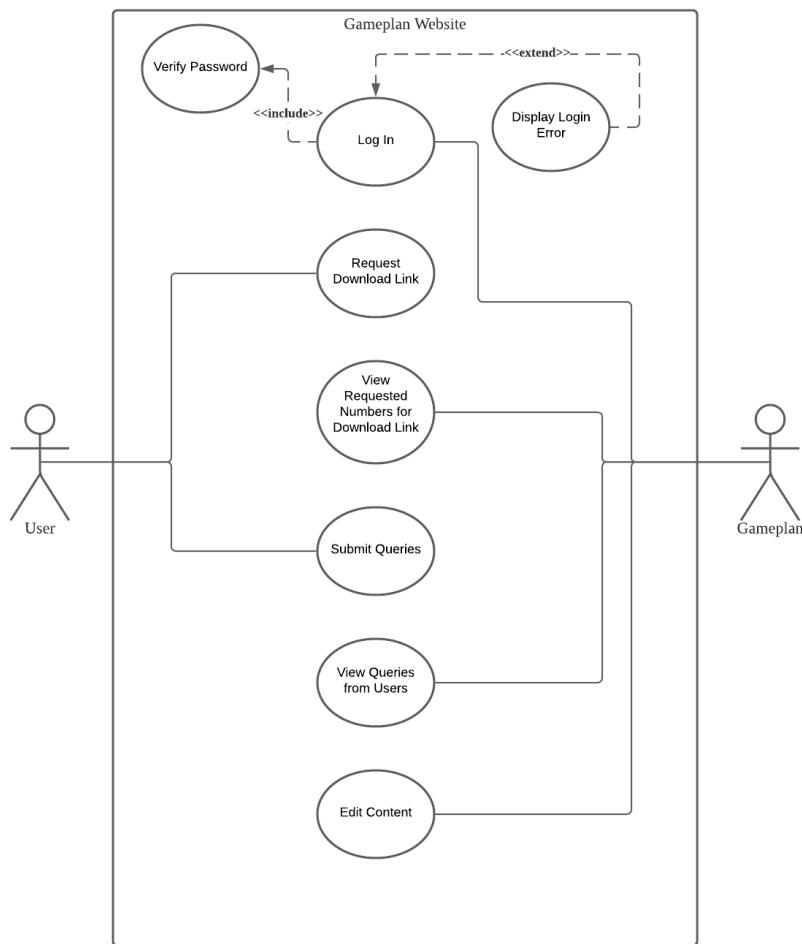


Figure 5.2: Use Case Diagram of Gameplan

5.3.3 Requirement Analysis

Requirement analysis involves all the tasks that are conducted to identify the needs of different stakeholders. Therefore, requirement analysis means analyzing, document, validate and manage software or system requirements. Outstanding quality requirements are documented, actionable, measurable, testable, traceable, helps identify business opportunities, and are defined to facilitate system design.

The software requirements are descriptions of features and functionalities of the target system. Requirements convey the expectations of users from the software product. The requirements can be obvious or hidden, known or unknown, expected or unexpected from the client's perspective. Requirements can be divided into two types; functional and non-functional requirements.

5.3.4 Functional and Non-Functional Requirements

The functional requirement typically specifies something a system should do. Functional requirements are features that must be included in an information system. Functional requirements help to satisfy the business requirement, and it needs to be acceptable to the users. Functional requirements are the operations and activities that a system must be able to perform. Functional requirement defines applications nature and components as well as what these components are supposed to accomplish. The following functional requirements are assembled using requirements gathering methods. The inputs, process, output a precondition and post-condition are discussed below:

Function: Must be compatible with all types of devices		
Input: N/A	Process: Software must be developed in a common development environment	Output: Application will be accessible from all sorts of devices
Precondition: User must have a computer or smart device connected with internet		
Post-condition: Everyone can use the website		
Alternative Option: N/A		

Table 5.3: Functional Requirement 1 - Compatibility

Function: Login		
Input: Email and Password	Process: Login Admin Interface	Output: Administration interface in the website
Precondition: Must have a computer or smart device connected with internet		
Post-condition: Admin can login and observe activities		
Alternative Option: If email or password are not valid then showing alert		

Table 5.4: Functional Requirement 2 - Login

Function: Administration Page Activities		
Input: N/A	Process: Admin can add, edit and delete data	Output: Administration interface in the website
Precondition: Must have a computer or smart device connected with internet		
Post-condition: Admin can maintain and observe activities		
Alternative Option: N/A		

Table 5.5: Functional Requirement 3 - Administration Page Activities

Function: Send Download Link		
Input: Phone Number	Process: API for send link to phone number will be triggered	Output: The download link will be sent to the users phone
Precondition: input should be valid a phone number		
Post-condition: To access the link user need internet connection		
Alternative Option: N/A		

Table 5.6: Functional Requirement 4 - Requesting for Download Link

Function: Queries		
Input: Name, email, phone number, message	Process: API for contact us page will triggered	Output: A copy of the query will be sent to email and another copy will be saved to database
Precondition: All the input field details should be valid		
Post-condition: User must wait a certain amount of time to get a reply		
Alternative Option: N/A		

Table 5.7: Functional Requirement 5 - Contact Us

5.3.5 Functional and Non-Functional Requirements

Another kind of requirement is no-functional requirements. A non-functional requirement is a qualitative requirement for a project. It judges the software system based on responsiveness, usability, security, portability, etc. Non-functional requirements are described below:

- **Reliability:** The system is well trusted. Admin and user can use this software very easily. The software is made so simple that users can understand the interface and procedure very clearly. The system is built with the latest web technologies and well maintained, so the application is reliable.
- **Performance:** The primary purpose of building this simple website with complex frameworks is to gain extra performance. It is required to exhibit and to meet the user's need. It describes the acceptable throughput rate and a sufficient response time. Users tend to spend more time on the website when it loads faster, and this website should provide a smooth experience to all kinds of users.
- **Security:** Security requirements are another leading type of non-functional requirement. All the information from the client-side to the server-side is secured. The website deals with a limited number of data, but the architecture follows all the latest security measurements. Only admins can perform administrative tasks, and appointed developers have access to the core code. The backend of this application is built with Node.js, Express.js, and MongoDB, which have several levels of security. So the system is well secured.

5.3.6 Architecture

The architecture of a system describes its major components, their relationships (structures), and how they interact. Software architecture is what defines and structures a solution that meets technical and operational specifications. It serves as a blueprint for a system. It provides an abstraction to manage the system complexity and establish a communication and coordination mechanism among components. Software architecture optimizes attributes involving a series of decisions, such as security, performance, manageability. Many types of architecture are used in the software industry. We are using client-server-architecture for our system.

Client-Server-Architecture

The client-server architecture is a distributed system structure that partitions task or workload between a resource or service provider, called a server, and service requests called clients. Distributed systems are where the system or software runs on a loosely integrated group of cooperating processors linked by a network. It means a set of separate devices that are capable of an autonomous operation linked by a network. In client-server architecture server hosts, manages, and delivers most of the resources, and most of the services are consumed by the client. It is a type of architecture where clients are connected to a central server over the internet connection. Clients do not share any of their resources. When the client device sends a request for data to the server, the server accepts the requested process and delivers the data packets requested back to the client.

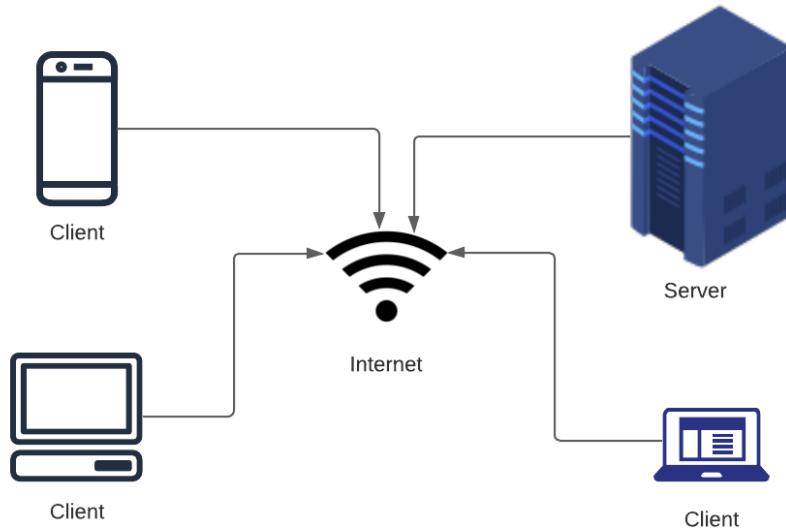


Figure 5.3: Client Server Architecture

In our application, we used the most popular industry-standard client-server architecture. It simply deals with APIs. When a user requests an app download link, it sends a request to the server and updates it. And then, the server handles the sending link functionality to the given number. Also, when the user sends queries, it sends a request to the server, the server gets updated with the latest information, and delivers a copy to the admin mail address. For controlling the admin panel, all the components are API-based, which are the heart of client-server architecture. This architecture requires less maintenance and easily scalable.

Chapter 6

Results & Analysis

This chapter contains screenshots of the web application for both the client and admin side frontend to demonstrate the actual application.

- **Home Page:** The screenshot shown below is the landing page of this project. On the home page, users will find all the necessary information about the game.

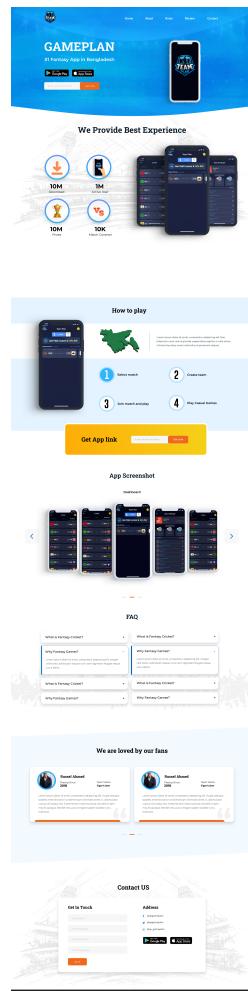


Figure 6.1: Landing Page of Gameplan Website

- **Send Link Section:** In this section, users will put their phone numbers to get the download link for the game.

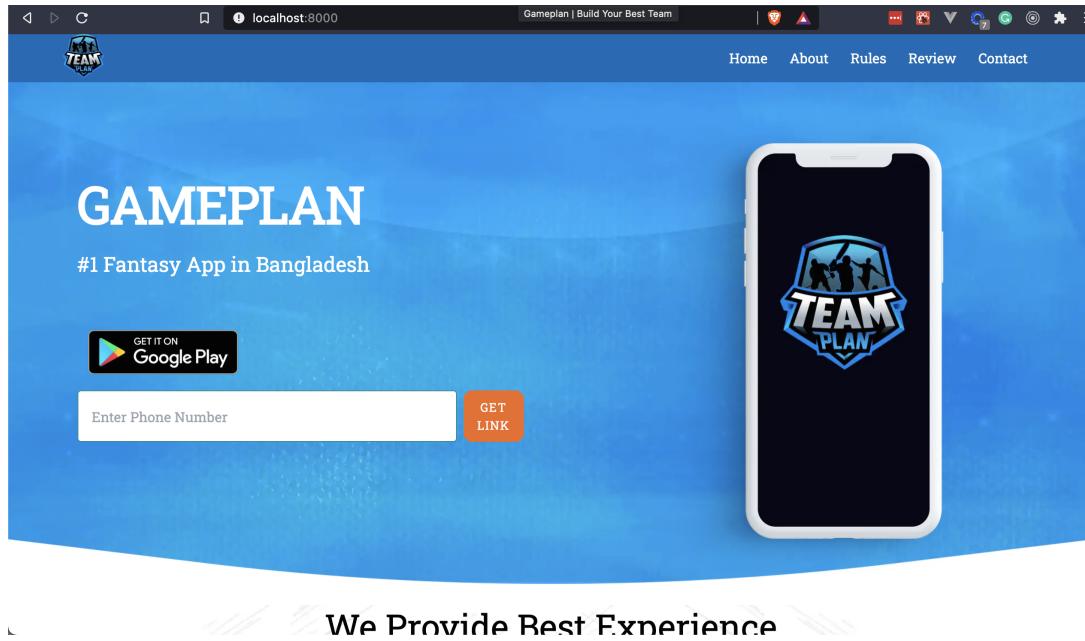


Figure 6.2: Send Link Section

- **Contact Us Section:** In this section, users will fill their required information and message for query/recommendation/review.

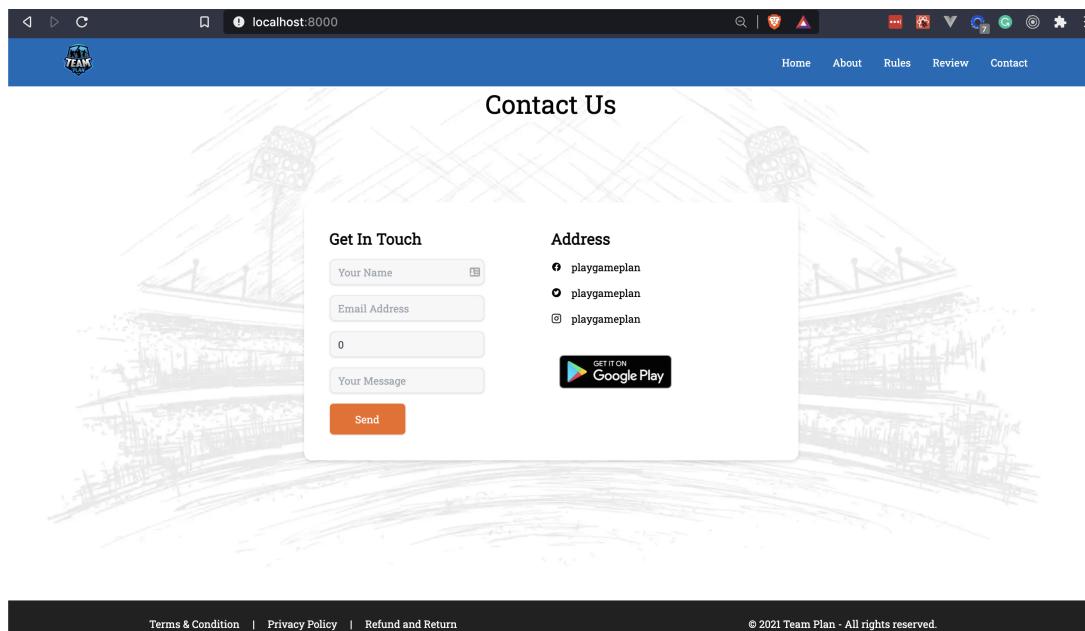


Figure 6.3: Contact Us Section

- **Sign In Page:** On this page, an admin can log in to the system with their email address and password.

The screenshot shows a web browser window with the URL `localhost:3000/login`. The title bar says "GAMEPAL ADMIN". The main content area has a "SIGN IN" heading. It contains two input fields: "Email Address" with placeholder "Enter Email" and "Password" with placeholder "Enter Password". Below the fields is a "SIGN IN" button. At the bottom right, it says "Copyright © Gameplan".

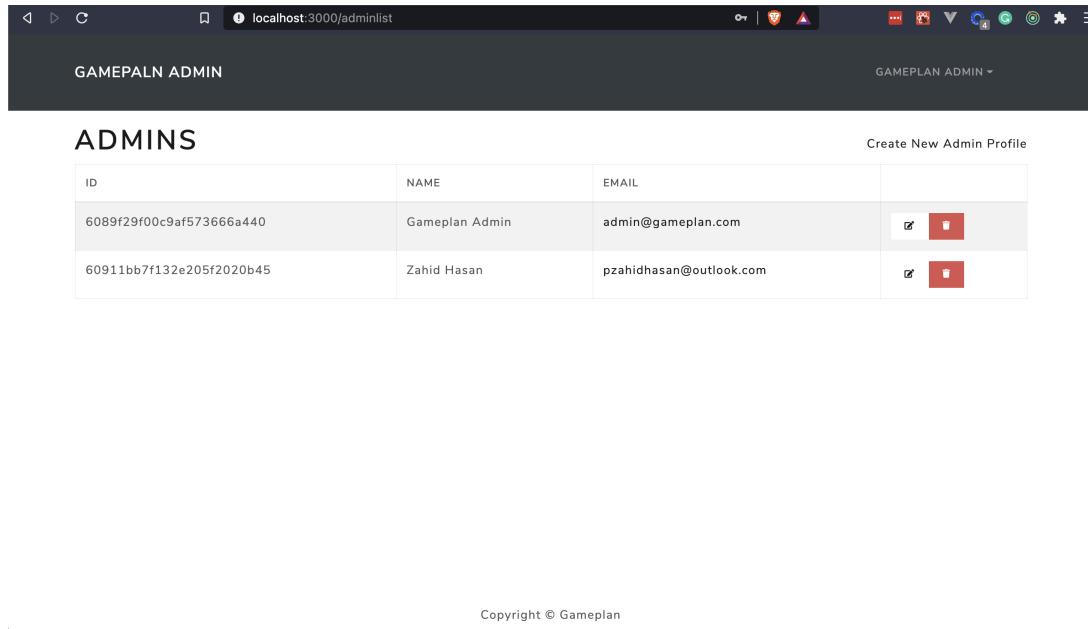
Figure 6.4: Sign In Page for Admins

- **Update Admin Profile:** On this page, an admin can update his/her profile information, i.e., Name, Email Address, Password.

The screenshot shows a web browser window with the URL `localhost:3000/profile`. The title bar says "GAMEPAL ADMIN". On the right, there's a dropdown menu showing "GAMEPLAN ADMIN". The main content area has a "UPDATE ADMIN PROFILE" heading. It contains four input fields: "Name" with value "Gameplan Admin", "Email Address" with value "admin@gameplan.com", "Password" with placeholder "Enter Password", and "Confirm Password" with placeholder "Enter Password". Below the fields is an "UPDATE" button. At the bottom right, it says "Copyright © Gameplan".

Figure 6.5: Update Admin Profile

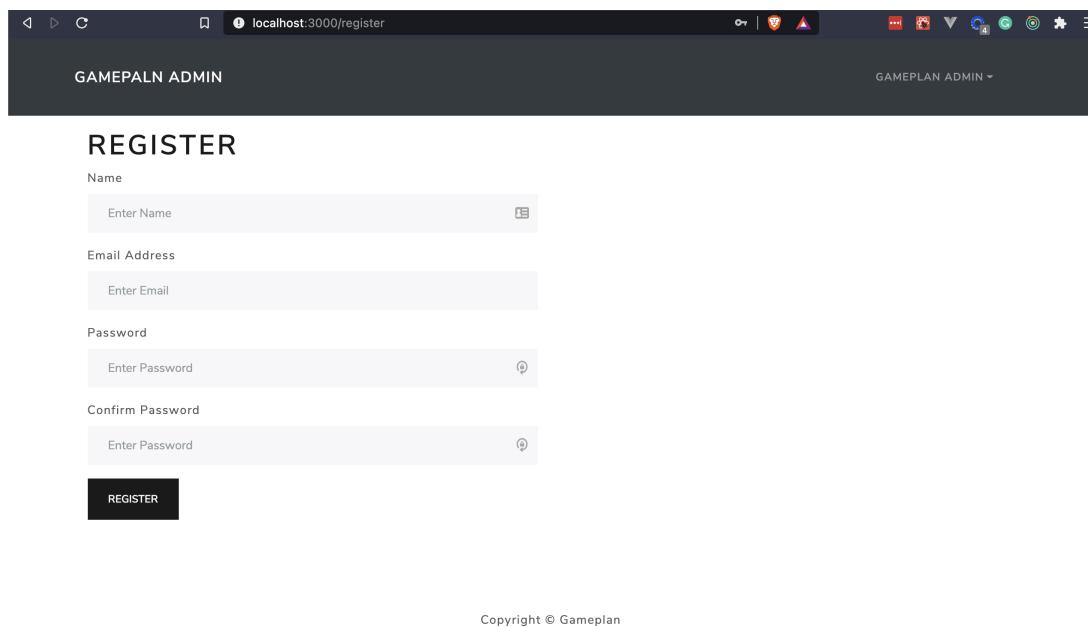
- **Admin List:** On this page, the admin can see the list of admins who have access to the backend. The page also contains a link to the edit admin page details and a button to delete the admin.



The screenshot shows a web browser window with the URL `localhost:3000/adminlist`. The title bar says "GAMEPALN ADMIN". The main content area is titled "ADMINS" and displays a table with two rows of data. The columns are labeled "ID", "NAME", "EMAIL", and two small red square icons with white symbols. The first row has an ID of "6089f29f00c9af573666a440", a name of "Gameplan Admin", and an email of "admin@gameplan.com". The second row has an ID of "60911bb7f132e205f2020b45", a name of "Zahid Hasan", and an email of "pzahidhasan@outlook.com". A link "Create New Admin Profile" is visible at the top right of the table area. At the bottom of the page, there is a copyright notice "Copyright © Gameplan".

Figure 6.6: Admin List Page

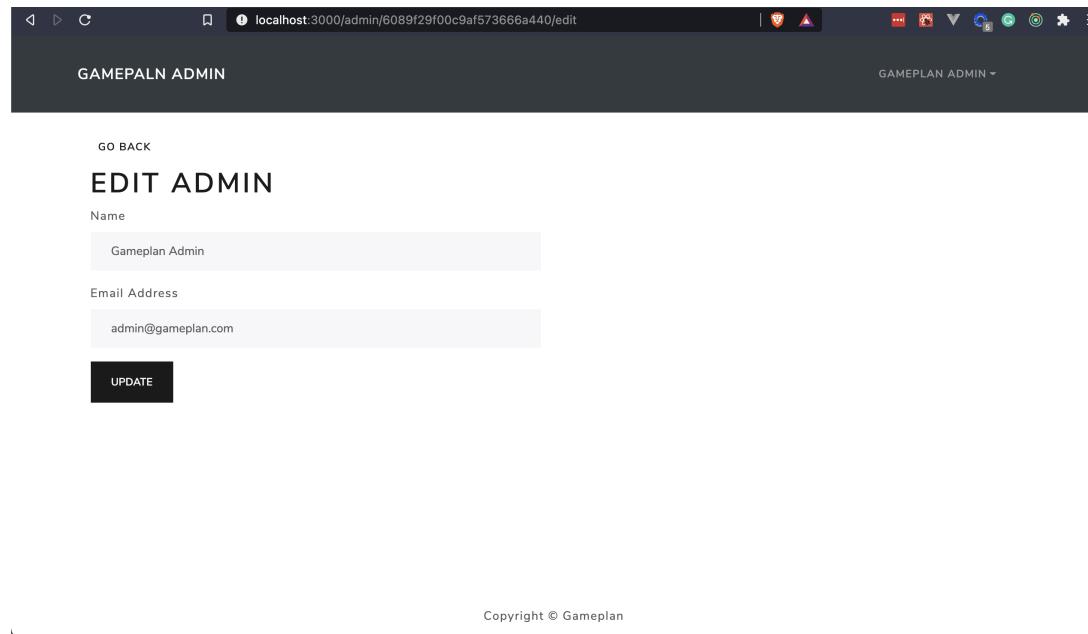
- **Register New Admin:** On this page, Logged in, the admin can add a new admin with the required information, i.e., Name, Email, and Password.



The screenshot shows a web browser window with the URL `localhost:3000/register`. The title bar says "GAMEPALN ADMIN". The main content area is titled "REGISTER". It contains four input fields: "Name" (placeholder "Enter Name"), "Email Address" (placeholder "Enter Email"), "Password" (placeholder "Enter Password"), and "Confirm Password" (placeholder "Enter Password"). Below the input fields is a "REGISTER" button. At the bottom of the page, there is a copyright notice "Copyright © Gameplan".

Figure 6.7: New Admin Register Page

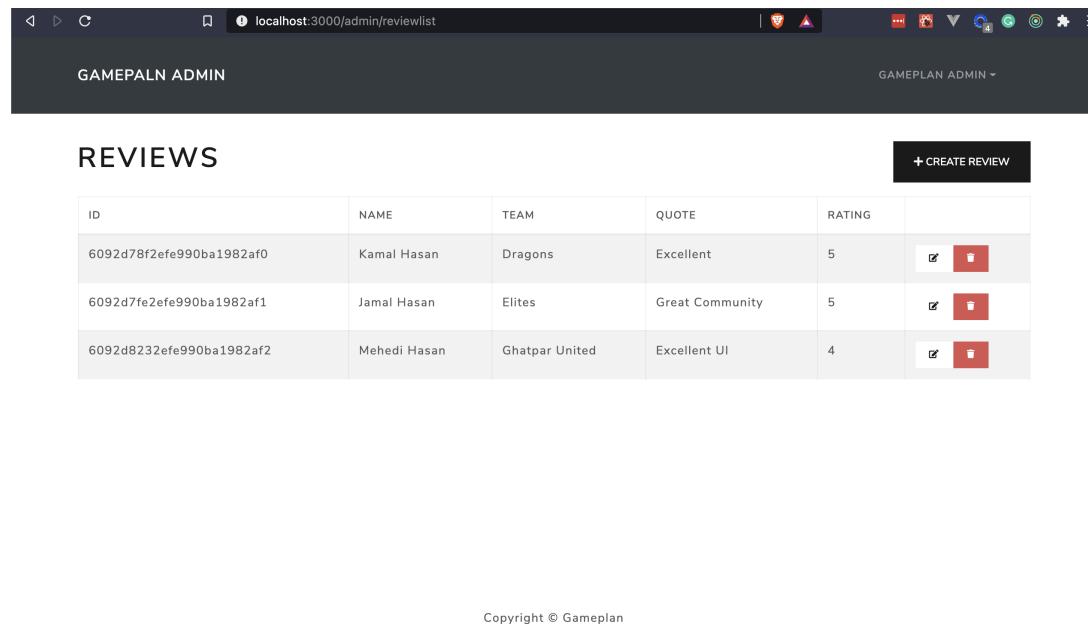
- **Edit Registered Admin:** On this page, logged in admin can change the credentials of a selected admin by rewriting name and email.



The screenshot shows a web browser window with a dark theme. The address bar displays 'localhost:3000/admin/6089f29f00c9af573666a440/edit'. The main content area is titled 'EDIT ADMIN'. It contains two input fields: 'Name' with 'Gameplan Admin' and 'Email Address' with 'admin@gameplan.com'. Below the fields is a dark button labeled 'UPDATE'. At the bottom right of the page is a copyright notice: 'Copyright © Gameplan'.

Figure 6.8: Edit Registered Admins Credentials

- **Review List Page:** On this page, the logged-in admin can see the list of reviews. The page also contains a link to create a new review page, a link to edit an existing review, and a button to delete an individual review.



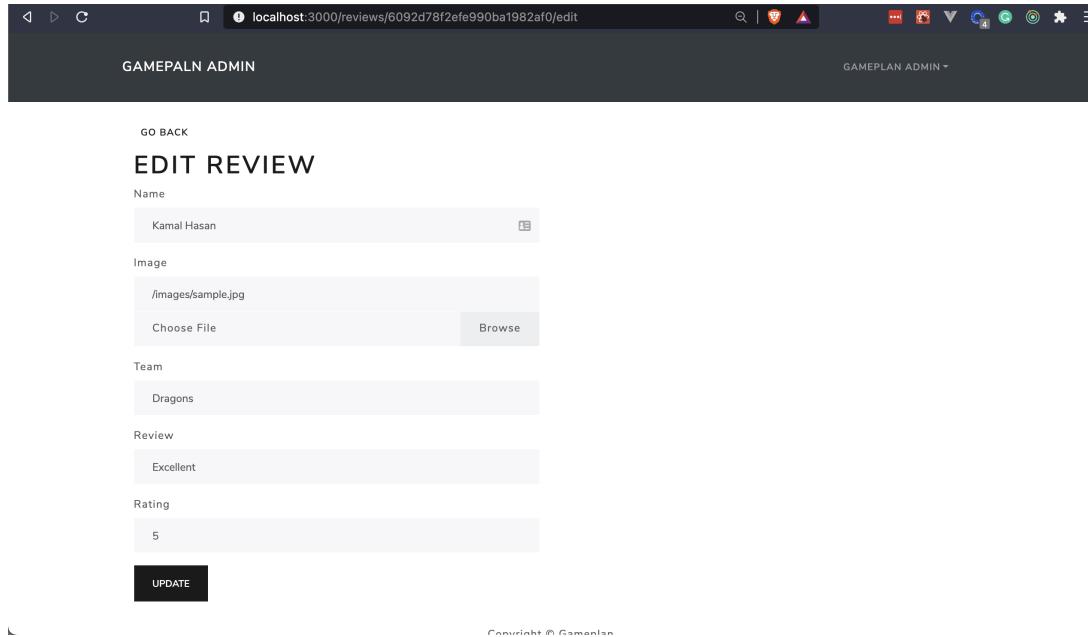
The screenshot shows a web browser window with a dark theme. The address bar displays 'localhost:3000/admin/reviewlist'. The main content area is titled 'REVIEWS' and features a table with the following data:

ID	NAME	TEAM	QUOTE	RATING	
6092d78f2efe990ba1982af0	Kamal Hasan	Dragons	Excellent	5	<input checked="" type="checkbox"/>
6092d7fe2efe990ba1982af1	Jamal Hasan	Elites	Great Community	5	<input checked="" type="checkbox"/>
6092d8232efe990ba1982af2	Mehedi Hasan	Ghatpar United	Excellent UI	4	<input checked="" type="checkbox"/>

At the top right of the table is a dark button labeled '+ CREATE REVIEW'. At the bottom right of the page is a copyright notice: 'Copyright © Gameplan'.

Figure 6.9: Review List Page

- **Review Edit Page:** On this page, the logged-in admin can edit an existing review by rewriting the reviewer's name, upload a new image, change the team name, change the quote from the reviewer and change the rating. The page also contains a button to go back to the previous page.



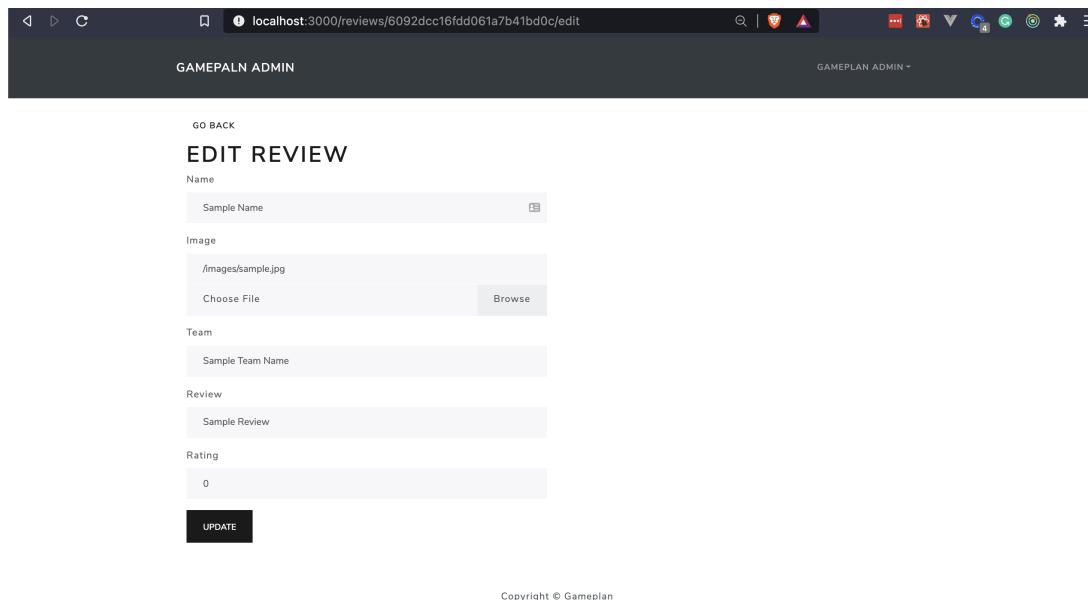
The screenshot shows a web browser window with the URL `localhost:3000/reviews/6092d78f2efe990ba1982af0/edit`. The page title is "EDIT REVIEW". It contains the following form fields:

- Name:** Kamal Hasan
- Image:** /images/sample.jpg
- Choose File:** Browse
- Team:** Dragons
- Review:** Excellent
- Rating:** 5

At the bottom is a black "UPDATE" button.

Figure 6.10: Edit Review Page

- **Create New Review Page:** This page is quite similar to the edit review page only difference is that the page creates a review. The logged-in admin has to fill the required field to create a new review.



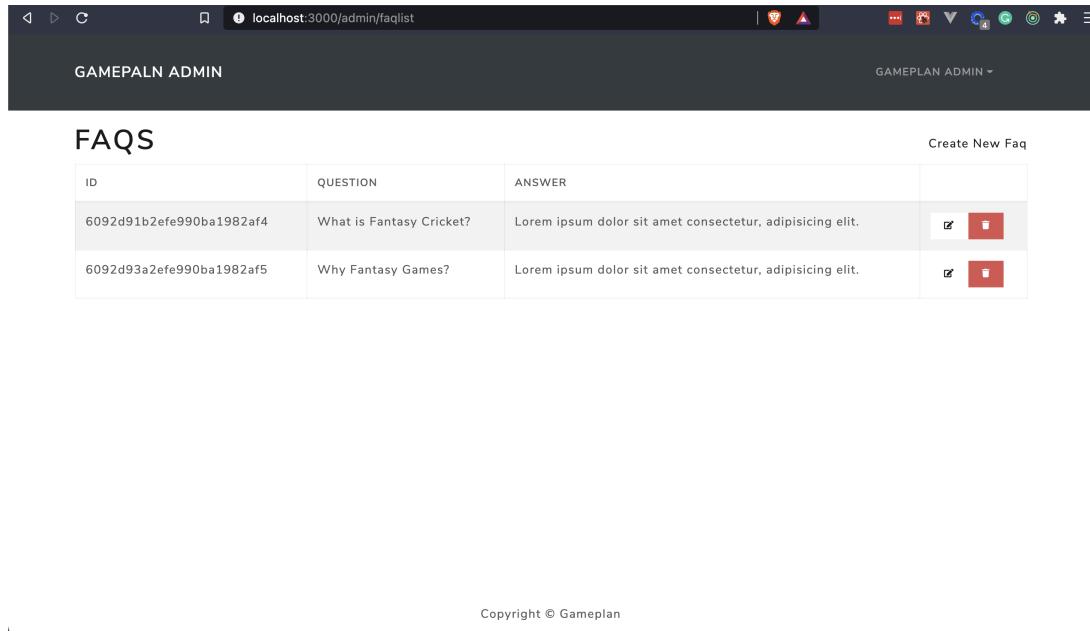
The screenshot shows a web browser window with the URL `localhost:3000/reviews/6092dcc16fd061a7b41bd0c/edit`. The page title is "EDIT REVIEW". It contains the following form fields:

- Name:** Sample Name
- Image:** /images/sample.jpg
- Choose File:** Browse
- Team:** Sample Team Name
- Review:** Sample Review
- Rating:** 0

At the bottom is a black "UPDATE" button.

Figure 6.11: Create New Review Page

- **FAQ List Page:** On this page, the logged-in admin can see the list of FAQs. The page also contains a link to create a new FAQ page, a link to edit an existing FAQ, and a button to delete an individual FAQ.

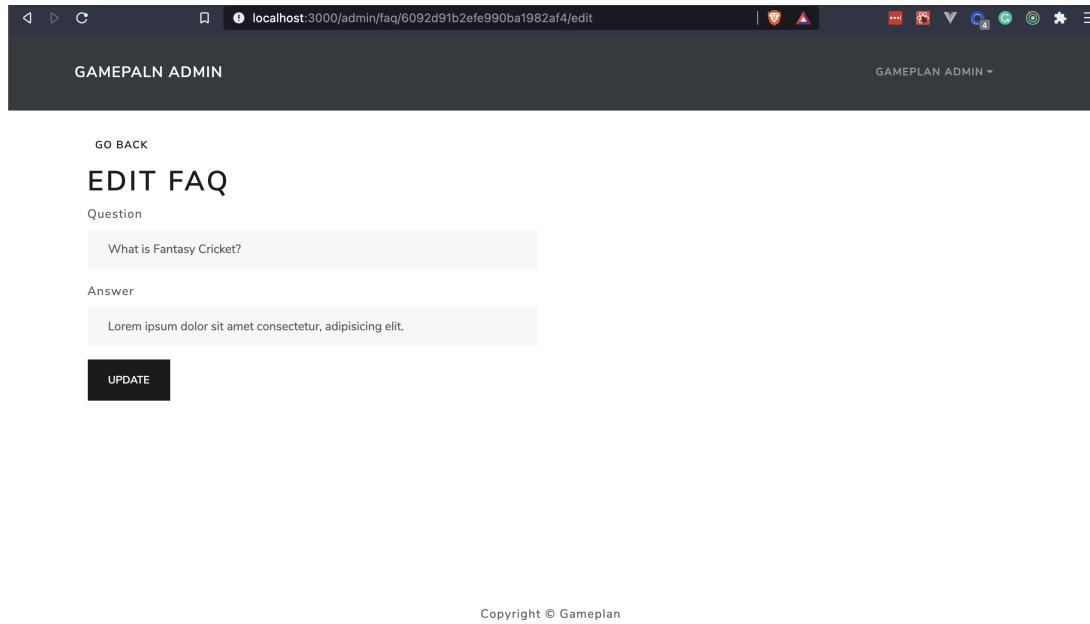


The screenshot shows a web browser window with the URL `localhost:3000/admin/faqlist`. The title bar says "GAMEPALN ADMIN". The main content area is titled "FAQS" and contains a table with two rows. The columns are labeled "ID", "QUESTION", and "ANSWER". The first row has an ID of "6092d91b2efe990ba1982af4" and a question "What is Fantasy Cricket?", with an answer placeholder "Lorem ipsum dolor sit amet consectetur, adipisicing elit.". The second row has an ID of "6092d93a2efe990ba1982af5" and a question "Why Fantasy Games?", with an identical answer placeholder. Each row has a red rectangular button with a white icon at the end of the table row.

ID	QUESTION	ANSWER	
6092d91b2efe990ba1982af4	What is Fantasy Cricket?	Lorem ipsum dolor sit amet consectetur, adipisicing elit.	<input type="checkbox"/> 
6092d93a2efe990ba1982af5	Why Fantasy Games?	Lorem ipsum dolor sit amet consectetur, adipisicing elit.	<input type="checkbox"/> 

Figure 6.12: FAQ List Page

- **FAQ Edit Page:** The logged-in admin can edit an existing FAQ by rewriting the question and answer field on this page. The page also contains a button to go back to the previous page.



The screenshot shows a web browser window with the URL `localhost:3000/admin/faq/6092d91b2efe990ba1982af4/edit`. The title bar says "GAMEPALN ADMIN". The main content area is titled "EDIT FAQ". It contains two input fields: "Question" with the value "What is Fantasy Cricket?" and "Answer" with the value "Lorem ipsum dolor sit amet consectetur, adipisicing elit.". Below the inputs is a black "UPDATE" button. At the top left, there is a "GO BACK" link.

Figure 6.13: Edit FAQ Page

- **Create New FAQ Page:** This page is quite similar to the edit FAQ page only difference is that the page creates a FAQ. The logged-in admin has to fill the required field to create a new FAQ.

The screenshot shows a browser window with the URL `localhost:3000/faq/new`. The title bar says "GAMEPALN ADMIN". The main content area is titled "ADD NEW FAQ". It contains two input fields: one for "Question" with placeholder "Enter question" and another for "answer Address" with placeholder "Enter answer". Below these is a "SUBMIT" button. At the bottom right of the page, there is a copyright notice: "Copyright © Gameplan".

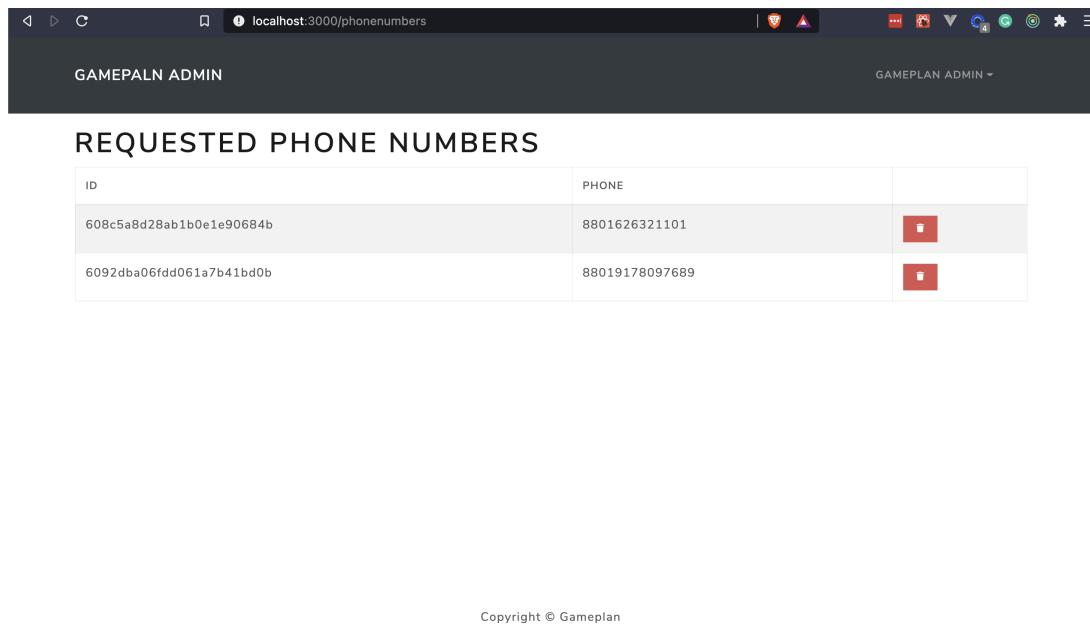
Figure 6.14: Create New Faq Page

- **Contact Us List Page:** The logged-in admin can see the recent queries from the user. The page also contains a delete button to remove a specific query.

The screenshot shows a browser window with the URL `localhost:3000/contacts`. The title bar says "GAMEPALN ADMIN". The main content area is titled "CONTACT LISTS". It displays a table with five columns: ID, NAME, EMAIL, PHONE, and MESSAGE. The first four columns have data: ID "6092da4cbd8c3e0004cce80c", NAME "John Doe", EMAIL "john@email.test", and PHONE "1611111121". The MESSAGE column contains the text "How can i get the download link?". To the right of the MESSAGE column is a small red square button with a white minus sign, which is likely a delete or edit button. At the bottom right of the page, there is a copyright notice: "Copyright © Gameplan".

Figure 6.15: Contact Us List Page

- **Phone Numbers Requested for Download Link Page:** The logged-in admin can see the recently requested phone numbers for the game download link on this page. The page also contains a delete button to remove a specific phone number.



ID	PHONE	
608c5a8d28ab1b0e1e90684b	8801626321101	
6092dba06fdd061a7b41bd0b	88019178097689	

Copyright © Gameplan

Figure 6.16: Requested Numbers Page

Chapter 7

Project as Engineering Problem Analysis

7.1 Sustainability of the Project/Work

The sustainability of the product refers to its ability to be managed and refreshed. In this modern world, new applications are released every day, and these applications need to be maintained and continuously updated for their user base.

The use of smartphones and the internet have drastically increased among all classes of people in Bangladesh. The growth suggests that it would increase even further in the future. Community sustainability means how much and how actively the users will support the project. Support comes in many forms, such as visiting the website, giving feedback, refereeing to other people, etc. The "Gameplan" is a fantasy app that currently only has a mobile version, so the website is just a communication medium between the users and the organizers. Gameplan already has a large user base in the application market, so it is believed that users will be more active on the website to get the latest updates about the app. Moreover, more users will be attracted to find informative information about the app and how to play the game. So, as the users will grow, it can be said that it is sustainable in the community.

A project is financially sustainable when the project's running costs are maintained by the revenue generated by the product that the project sells. An application's running cost includes - server cost, database storage cost, third-party API cost, etc. As Gameplan is a fantasy app that already generates enough profit, adding this website only brings more users, ultimately leading to more revenue. Thus, the project can be determined as financially sustainable.

Organizational sustainability is related to how the organization will continue to operate the release of the application. The game plan is a fantasy app that currently has only a mobile version. The main goal of this project is to make communication and information medium for the users, and it also aims to go full website version shortly, so this project is just the beginning of the vision. Since Gameplan is the number one fantasy app in Bangladesh, the project on the web will only grow. In conclusion, it can be said that the project is organizationally sustainable.

7.2 Social and Environmental Effects and Analysis

Websites are popular among people for the characteristics they offer to users. Websites make interaction with people quite more straightforward. People experience many advantages of using websites in different forms of their everyday work. Some benefits of having a website are - increased customer base, increased accessibility, easy access to information, continuous fresh content, gaining clients, securing brand online, and much more. The "Gameplan" website aims to reach more people, get them to know about the app, and lower the boundary between the users and the app.

As a social phenomenon and a burgeoning industry, fantasy sport is clearly on the rise. From ordinary match-ups between friends and co-workers to a more competitive online range of highly involved professional players, fantasy sport has entered the collective consciousness of a growing mainstream audience, and it appears to be enjoying its stay. For many players, fantasy sport is simply a way to reveal a passion for sports while also providing an entertaining and immersive form of social interaction. This project will break the boundary between the users and the app-makers. The most crucial social effect of this project is its time-saving quality. Many users use the app, and now they can easily be updated about the app, and some users do not understand how to use the app; they also get trained by this website. [21]

7.3 Addressing Ethics and Ethical Issues

There is an immense amount of data generated every day in today's world, which sometimes ends up with data collection, hacking, cybercrime, etc. Moreover, some rules and ethics are needed to be followed when working on an application. Since the "Gameplan" website is currently the only informative website about the fantasy app, we believe that the application does not breach any code of conduct of application release and development since they all have been taken into serious concern.

At the "Gameplan" website, there is only a collection of limited and relevant user data. The website collects the data strictly related to queries and requests for the app link; other than those, no other data is collected or stored. The website only collects limited amounts of data if the user interacts. The website does not let any service, application, or third party access the collected data. So there is no data sharing or selling.

Chapter 8

Future Work & Conclusion

8.1 Future Works

This project "Gameplan" website is just the beginning, and there are numerous mapped features that are to be added in the imminent future. The whole idea of making this website with the latest front-end technologies is to implement a web application similar to the mobile app.

8.2 Conclusion

I carried out my internship at Debug BD Ltd. this internship gave me a chance to work with a real-life software application. This report is about the landing page of the Gameplan website. This internship course requires me to join a company in a department of my field of study, which is my major, Computer Science and Engineering. I have joined this company as a web developer intern. It allowed me to gain raw firsthand experience working in a corporate company, attend online meetings, and develop projects for the company. Therefore, this experience was challenging yet crucial to help me elevate my skills and confidence for me to be ready to pursue my career in this line of work. The internship was three months, and the report was mainly documented solely based on my overall learning and experiences from this course of time.

During my internship at Debug BD Ltd., I worked on a web application called "Gameplan." Currently, the website only deals with user queries and user requests for the app link and all the necessary information about the mobile app. Working in Debug BD Ltd. as an intern has been a wonderful experience. I have discovered a lot about developing different kinds of applications and also about development methods. Working with cutting-edge technologies like React.js, Gatsby.js, Node.js, Express.js, GraphQL, MongoDB are the main takeaways from the internship program. Throughout this internship

program, I discovered a developer's working life. Besides, the project obliquely assisted me in learning individually, leading a more managed lifestyle, and making the mindset for solving problems. This internship program created a way for me to get to know the software engineering industry of Bangladesh.

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