

FRONT-END WEB DEVELOPMENT

by

Rubaiya Afrin
16101294

A thesis submitted to the Department of Computer Science and Engineering
in partial fulfillment of the requirements for the degree of
B.Sc. in Computer Science

Department of Computer Science and Engineering
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Declaration

It is hereby declared that

1. The thesis submitted is my/our own original work while completing degree at Brac University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. We have acknowledged all main sources of help.

Student's Full Name & Signature:

A handwritten signature in black ink that reads "R. Afrin." The signature is written in a cursive style and is underlined with two parallel lines.

Rubaiya Afrin
16101294

Approval

The project titled “Front-End Web Developer” submitted by

1. Rubaiya Afrin (16101294)

Of Fall, 2021 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of B.Sc. in Computer Science on January 17, 2022.

Examining Committee:

Primary Supervisor:
(Member)



Nadia Rubaiyat
Department of Computer Science and Engineering
Brac University

Head of Department:
(Chair)

Sadia Hamid Kazi, PHD
Chairperson and Associate Professor
Department of Computer Science and Engineering
Brac University

Abstract

Website Design and Developments (Front-End Developments) makes the world of website developments much easier and interactive. It is capable to help you interact with the websites in more interactive ways. It is quite useful and powerful than any other utility tools. Front-End Developments helps to achieve one particular goal that is to satisfy clients' need and taste. In order to make it smart, we need to connect three modules together in a single platform. One of the teams will stand to serve, another team stand to develop back-end architecture and on the other side, another team stand to develop front-end architecture. So, Website Design and Developments make a way where a website of any institution or an organization serves the purpose of acceptability, stability and, comfortability. It also makes complicated websites more friendly to use. Besides, it can help people who are not fond of web surfing and lacks skill in operating computers. Raw HTML, Bootstrap CSS, raw JavaScript, query were the tools in designing and developing the front-end websites. This work implements a User-Friendly base to express every website throughout the world with ease of use.

Dedication

Dedication to our parents, teacher, friends, relatives and all who loved us for all their love and inspiration. Special thanks to our supervisor for support us through the whole journey.

Acknowledgement

Firstly, I thank the Almighty ALLAH for empowering me to finish this thesis work, who blessed me to be able to pursue an undergraduate degree at BRAC University.

Secondly, I would like to express my heartiest gratitude to my Co-Supervisor Nadia Rubaiyat miss, for her wisdom, patience, and for giving me the opportunity to learn from her. Behind the fulfillment of this project, her guidance and support were the most important assets.

Thirdly, I would also like to thank my Industrial Supervisor Md. Khairul Islam Bhuiyan, Chairman at Inventive Apps Ltd. and my mentors and colleagues who helped me by giving educational directions and legitimate rules. I was closely attached to them during my internship tenure. The completion of this project would have been extremely challenging without them. Additionally, I am also extremely grateful to Mr. Shahedur Rahman, Web Team Leader at Inventive Apps Ltd. for his moral support and help during my internship period.

Fourthly, I thank Golam Rabiul Alam sir whom I have sent countless emails from before the start of my internship till the very end to all of which he replied and guided me without hesitation.

Fifthly, I would like to express gratitude toward BRAC University for giving me essential facilities and working environment and giving me the opportunity to complete the thesis and finish my Bachelor's degree.

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Chapter 1

Introduction

This report presents our experience of working with a team of designers and developers who contribute to the designing and development of websites of end-users. We intended to look into the software industry and how it looks like, what are their principles, responsibility and environment. We also got introduced to the technologies that are used in the designing and developing of websites and apps. Moreover, we were introduced to a basic technique, namely 'Wireframing'. This is the technique that brings out ideas and helps to interact with the clients and developers more effectively based on the proposal. Laravel is used for the back-end solution and connect our front-end solutions to the back-end solutions. Our work is to build an interactive front-end solution that will act as a plug-n-play module because Laravel (PHP FRAMEWORK) follows the MVC (Model View Controller) pattern. Modifications are done by the back-end programmers. For my internship, I chose Inventive Apps Ltd. which is a Private Limited Company maintaining maximum security and privacy. Our company is very cautious about quality management and it provides a variety of workplaces to design and develop apps and websites easily, which makes sure that the designers and developers deliver their best in the designing and development process. Furthermore, our company is very conservative about our products and projects as other competitive companies do not disclose their projects until it is done. For example, interns are not allowed to share raw codes and any sort of ideas outside the company.

1.1 Background

Generally Speaking, Web designing deals with big issues like program failures, wrong operations, wrong data entries, wrong alerts, etc. A user always tries to find out the best and a quick way to interact with their websites, the more the simplicity the more it is easy to use. One easy-to-overlook factor when it comes to web developments is the time and effort to build interactive designs. Delaying in designs can certainly make back-end solutions delay more. During my internship program, I have faced lots of challenges while designing websites.

Understanding the Requirement: It was a big challenge for me. Though I suffered in the beginning with the requirements because some of the requirements were not clear. But eventually, I did overcome with the help of my colleagues.

Adapting to New Techniques in Designing: Since I have been designing websites privately, I had to learn new techniques to boost-up my designing phase efficiently. Initially, my learning curve has been substantially low, but with the help of my supervisor's proper guideline, I was able to learn effectively.

Keeping up to Speed: Our back-end solutions team needed to wait until our front-end solutions are done. For this reason, I had to build our front-end solution within the given time so that the whole development process remains scheduled.

1.2 About this Report

For my completion of the bachelor's program, I have to work on a project so that BRAC University can evaluate me through this report. Basically, in this report, I have explained about the challenges and experiences I have faced at this company while working. Therefore, I have written a detailed overview of the project I have been working on as an intern.

1.3 Objective

The Objective of the report are as follows:

- To know about the problems faced in website development.
- To know how these problems are solved.
- To know the designing style and conventions of the development sector.
- To go through the development cycle and models.
- Working with documentation and customization.
- Understanding the end user's requirements.

1.4 Overview of This Report

This report is made distinctly for the academic purpose and to satisfy the requirement for industrial attachment. This report has covered the immediate and aberrant parts of front-end web development and challenges. In addition, this report is centered on Web designing and development. Because of organizational confidentiality I was unable to put or reveal all the web features, UI, mock-ups, and diagram in the report.

1.5 Literature Review

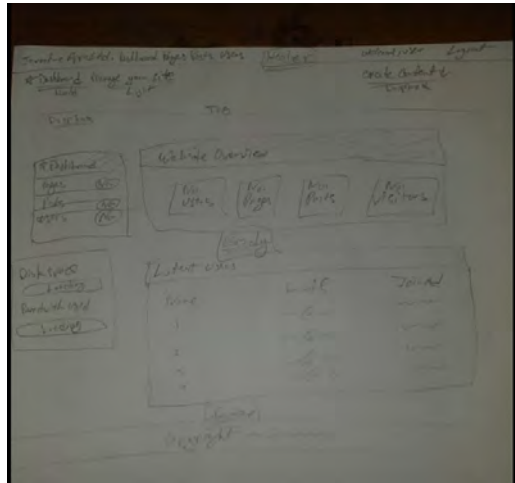


Figure 1.1: This is how a wireframing sketch looks like

Each project was a big challenge for us because the schedule was tightly packed. The requirements were not clear from the clients. Some client wants simplicity and some a bit more advanced. We tried to grasp the taste of our clients by wireframing, which is the initial stage of the designing process is done by sketching and labelling. This is the most effective way to demonstrate any website in the website development industry.

We made interactive layers during the wireframing process where there are layers of small blocks of pages stapled to each of the functionalities such as buttons. We had to do some research based on the requirements. For example, a client wanted a certain button to be 'more' interactive but did not provide any detailed explanation, so we had to research some interactive buttons for a website design in the market. For this reason, we thought of making 'modal' buttons which is more efficient and 'more' interactive. We have faced similar problems throughout the internship program. This is the main reason why we thought of using the wireframing technique.

While designing a website we use the bootstrap framework most commonly. This is a framework that divides any website screen into 12 grids, and within those grids, we have to decide how our contents are going to be placed accordingly. During the designing phase, we had to do lots of research on the bootstrap framework because we assure the best quality for the clients. Bootstrap helps many of our designing formats to be more interactive. JavaScript helps more in making interactive websites for which we also considered mostly on the JavaScript connecting the bootstrap framework because we were told to make our designs in a plug-n-play manner. This helps to develop back-end solutions easily because Laravel (PHP framework) follows MVC (Model View Controller) pattern. This is the main challenge we faced mostly. So, we divided our work into small modules for each functionality during designing the CMS (Content Management System) Website.

1.6 Methodology

The development Team at Inventive Apps Ltd. uses Extreme Programming (XP) to develop apps and websites. Extreme Programming (XP) is one of the Agile Frameworks. The aim of this methodology is to write high-qualitative modules quickly and being able to adapt to clients' changing requirements. XP has simple rules that are based on 5 values. They are as follows Communication, Simplicity, Feedback, Respect and Courage.

1.6.1 Reasons to choose this methodology

- The reason to choose this methodology is to deliver the projects timely. Because of the tight schedule, the time limit affects the project tentatively.
- The second reason is to ensure the client involvement, it ensures transparency with them and immediate resolution of any issues.
- The third reason is to make sure the changes do not break existing functionality because in the designing phase changes take place frequently and even during the back-end solution, there are some modifications made to ensure adequate time for accommodating changes to such an extent that the current tasks are not impacted.
- The fourth reason is to emphasize unit tests to identify and fix absconds right on time effortlessly. If the UI is more user-friendly it turns out to be more detectable.
- The fifth reason is to make clients a part of the team to ensure constant communication and clarifications.
- And lastly, to ensure enthusiasm and goodwill with the help of intensive team collaboration.

Chapter 2

Company Profile



Figure 2.1: Inventive Apps Ltd

2.1 Company Background

Inventive Apps Ltd. is mainly a software firm. For front end development they use Bootstrap, CSS, JavaScript, and Material CSS etc. They build IOS apps and web applications.

Inventive Apps Ltd. has been supplying innovative software solutions. The Chairman of the company Md. Khairul Islam Bhuiyan, originally set up the organization to service the needs of the burgeoning computer industry. Since that time, they have become forerunners in the field of software development and distribution, being at the forefront of changes in technology.

Inventive Apps Ltd. members solely believe that inspired ideas combined with Technological Embracement let you go one step ahead for true innovation. These inspired ideas call for new solutions. So, innovative application of the technology that moves the needle is much more important in producing these solutions and they firmly believe in this philosophy. Inventive Apps Ltd. members firmly believe that growth has been come and will always be driven by their people. They have people who have a creative mind, innovative thinking in their arena of service with their magical knowledge, they shape solutions for their customers and maintain a

rewarding relationship with them.

As a private company in an industry where players rarely last more than a few years, their longevity is a major accomplishment. Their experience allows them to give phenomenal expert guidance tailored to the specific necessities of their customers.

2.2 Mission

- Providing prominent services for the clients.
- Ensuring quality management in IOS app and web development.
- This company was set up to produce high-quality software products by training software engineers and web developers who can contribute locally and internationally.

2.3 Vision

To reach people who are deprived of technology and connect them to build a digital village, which is no limits, no boundaries.

2.4 Company Departments

Inventive Apps Ltd. maintains a flat organizational structure. Teams and responsibilities are generally formed and assigned around the nature and requirements of specific projects.

2.5 Recruitment process

Candidates have to provide their resumes and offer letters to the company's HR. Then, if they accept it, they will call the candidate for letting them know about the interview which will be taken face to face. However, due to this pandemic situation going on, they took my interview online where they asked me about the area I am interested in and assign me to the department I will perform best. Moreover, they also asked about my everyday life such as my hobbies etc. It was quite a very interactive and interesting interview.

Chapter 3

Training Phase

3.1 Getting familiar with the company

- I was introduced to the office staff and the environment.
- I had the opportunity to learn some basic information about our company, Inventive Apps Ltd.
- I was introduced to our Managing Director, Mr Ahmmed Ekhtear Shakil; Web Team Leader, Mr Shahedur Rahman; IOS Team Leader, Warif Akhand Rishi; Chairman, Md. Khairul Islam Bhuiyan.
- I was given a short brief by our chairman on 'how to work on a particular project accordingly and pre-plan the projects before moving towards the next stage of the development process.
- I was introduced to the marketing strategies and the clients. I was briefed by our Chairman and Managing Director on my ability to work and coding skills and Front-End Web Development skills.

The real-world problems and solutions are far different than what I had expected. We have teams and consultants to take care of these problems. What I understood is that, works get distributed. For Example, some work on the graphics and logo designing, some work on the front-end part, etc. Interns are allowed to work only on the basic parts of the project. But Interns can also take part in the advanced parts of the project to observe and learn. So, I was being assigned on the Front-End Web Development.

3.2 Work environment

Inventive Apps Ltd. has a very user-friendly working environment. I got to know some new people with various ideas and experiences. As an intern, I have been provided knowledge in various fields of work. However, since we are working from home, we still manage to communicate with ease and flexibility. As per the company, it requires some functional and non-functional requirements. They are:

3.2.1 Functional Requirements

- The websites shall accept client's orders
- The websites shall be able to cash a sale
- The websites shall be able to produce weekly, monthly and yearly reports about the sale

3.2.2 Non-Functional Requirements

- The websites shall be easy to use by all employees including sales representatives and managers
- The websites shall be available in several languages
- The websites shall allow several sales to be made at the same time without downgrading performance

3.2.3 System Requirements

- Windows 7, 8 and 10
- Dual-Core Processor
- 1GB Ram

3.2.4 System Requirements

- Chrome
- Safari
- Internet Explorer
- Firefox
- Edge

Interviewing clients/users is also an important task to accomplish the best outcome of the design to satisfy the client's needs. So, we prepare a question-answer session with the client. **The client's/user's requirements are as follows:**

- Describe your business in a few sentences
- What makes your company remarkable?
- Do you currently have a website? If so, what is/isn't working for you?
- What are your objectives for this project?
- Who is your target audience?
- What specific features do you want on the site?

- How can we avoid failure?
- Who are your main competitors?
- What makes you different from your competitors?
- What is the scope of the project?

We used Wireframing to understand the requirements and interact with the clients for the designing phase. It is very useful to visualize the user requirements more vividly. The picturesque of the design is more effectively vivid when the client is involved in the process of designing and development.

3.3 Internship Outcome

I have been working with senior developers to learn how to deal with the office environments and how to deal with the clients. Here I was taught how to organize my designated work accordingly. I have been entitled to design an internal project, CMS (Content Management System). During this time, I learned many techniques to approach new projects and get on work with it. I was given valuable information to gather more knowledge of website development industries. In the least, my six months internship at Inventive Apps Ltd. has been very challenging and rewarding. It is so because, from the very beginning of my experience, I was learning new skills, was entrusted to contribute these skills to projects which kept me wholly into it. I had to work within a short time which basically is more thrilling and the self-recognition that is gained when my design is approved and is exhilarating. I have learned technologies used by the developers and contribution towards the development of a client's website.

Some other outcomes which I would like to present are as follows:

- Explore career alternatives preceding graduation.
- Integrate theory and practice.
- Developing work propensities and attitudes necessary for job success.
- Developing communication, interpersonal and other critical skills during the job
- Building a record of work experience.
- Acquiring employment contacts leading directly to a full-time job following graduation from university.

3.4 My Works

Some of my works are displayed below:

3.4.1 Navigation designing and retouching

Our web team leader asked me to redesign the navigation bar of some particular websites they built earlier.

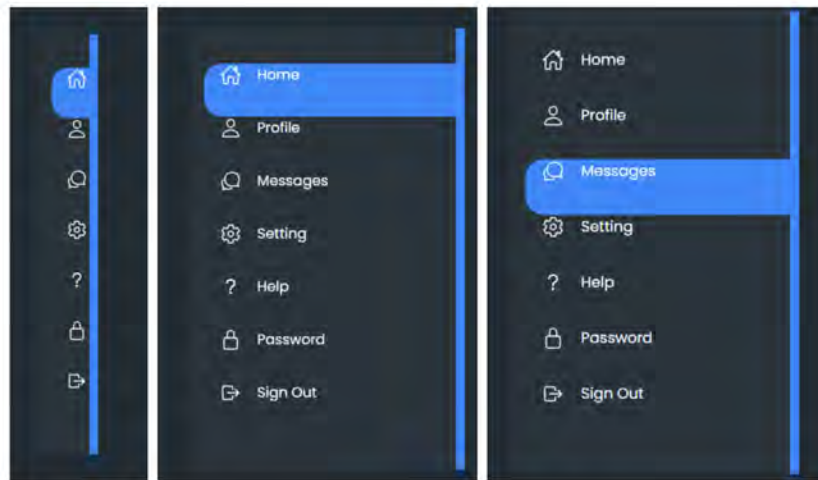


Figure 3.1: Navigation bar

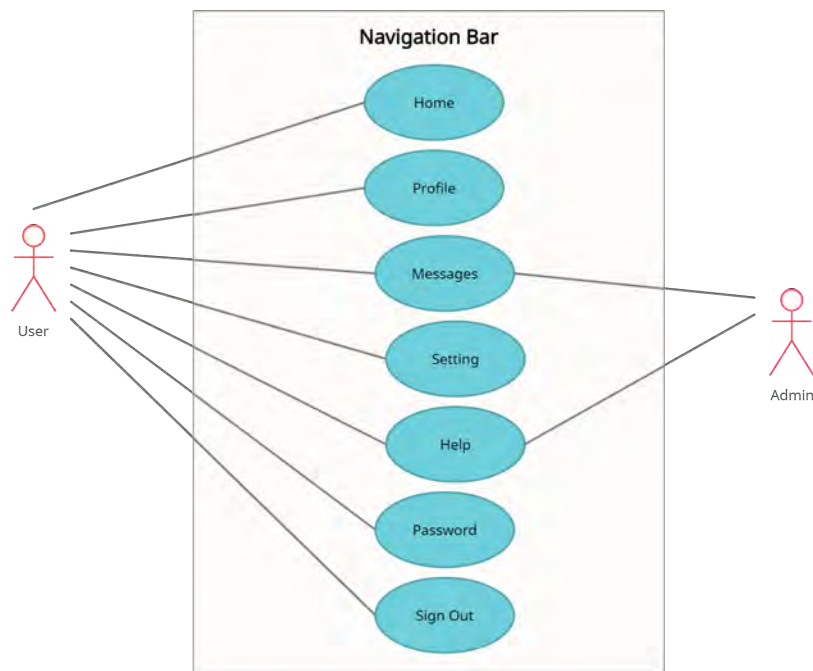


Figure 3.2: Use Case Diagram for Navigation bar

3.4.2 Social buttons redesigning and retouching

Another redesigning which I did is to graphically attract the social icons of a website.

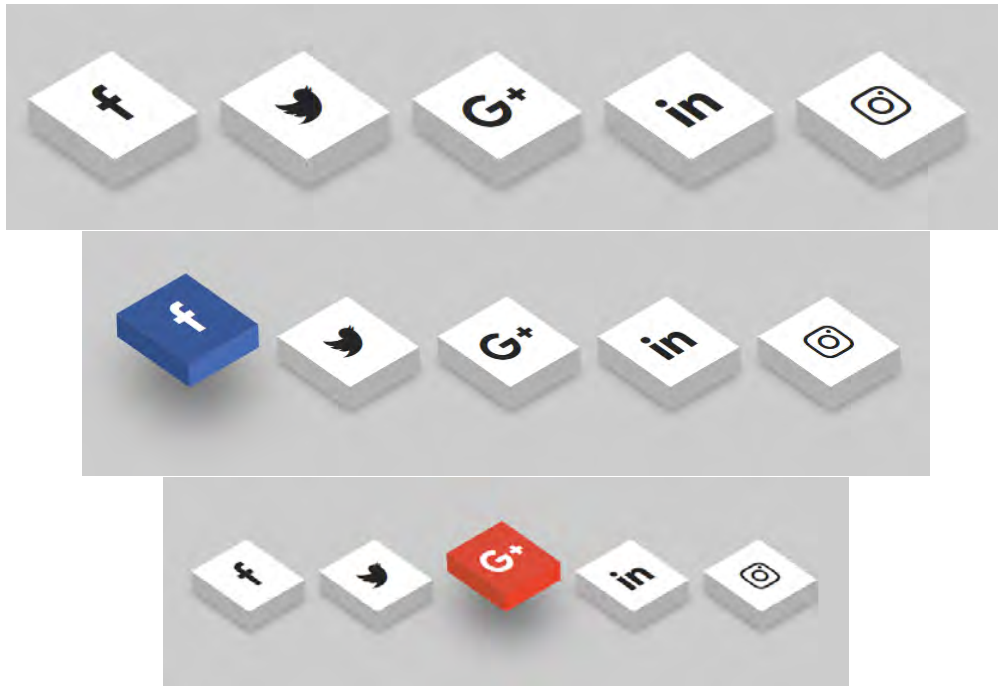


Figure 3.3: Social Buttons

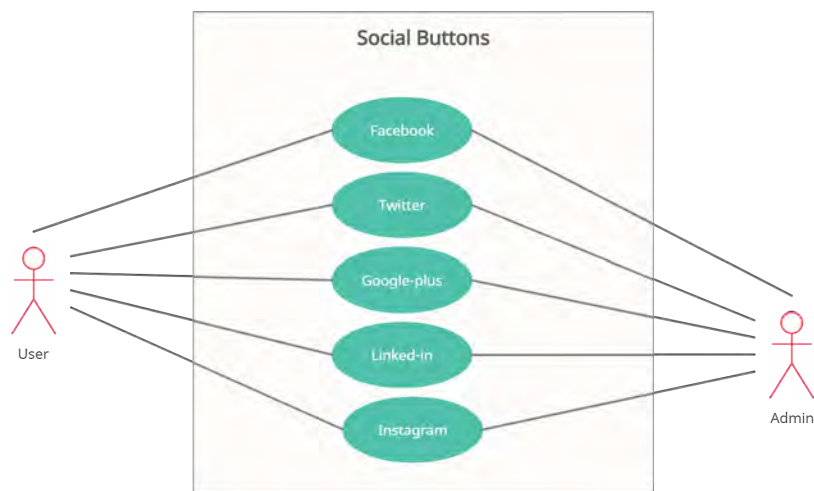


Figure 3.4: Use Case Diagram for Social Buttons

3.4.3 Website templating of Social Care and Support

Our web team leader proposed to me a website design for socially challenged, mentally ill and suicidal clients where they would get support and services online.

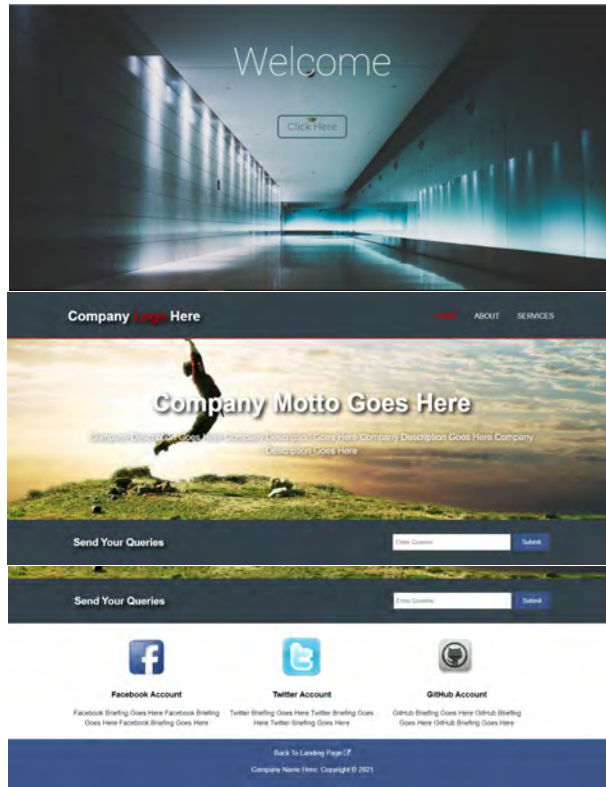


Figure 3.5: This is how the Home Page look like

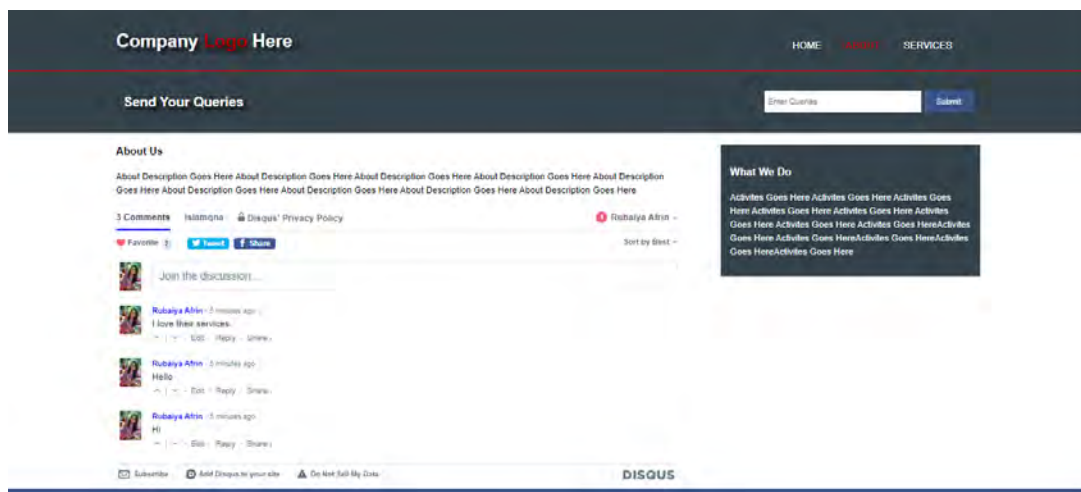


Figure 3.6: This is how the About Us design looks like

In **Fig-3.6**, we can see the about tab. We implemented the Discussion function in this page sponsored by DISQUS. Guests and visitors can discuss here freely.

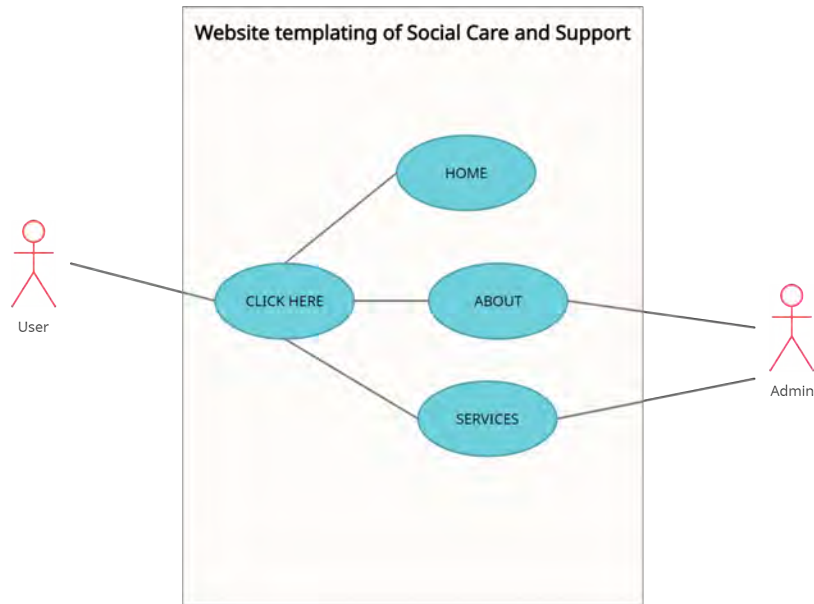


Figure 3.7: Use Case Diagram for Website templating of Social Care and Support

3.4.4 Website template for a Software and Mobile Selling Company

This is as simple template for a software and mobile selling company which is basically a local it company.

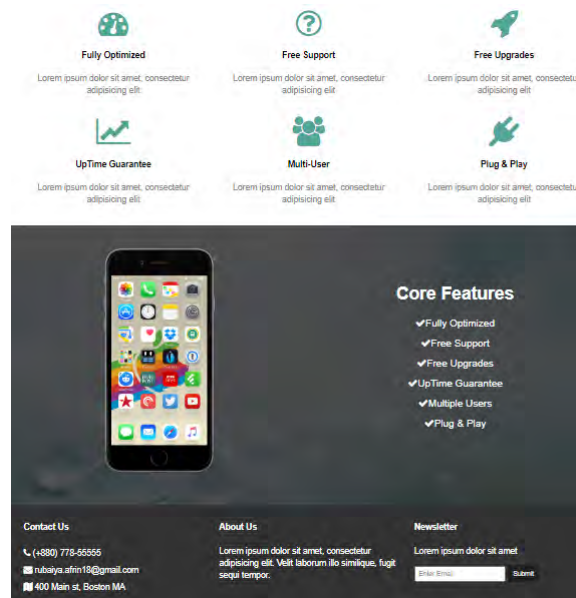


Figure 3.8: This is a small portion of the home page

The Home Page is divided into six sections, header, showcase, features, info-section, company info-section, and footer. We used FlexBox grid System which is basically like Bootstrap 4 (CSS FRAMEWORK), where we had to just tune the classes with different kind of tag names to set up the rows and columns which makes the website

fit any screen size easily and smoothly. Because this framework is very flexible and can adapt any kind of screen size. We just had to modify the media queries.

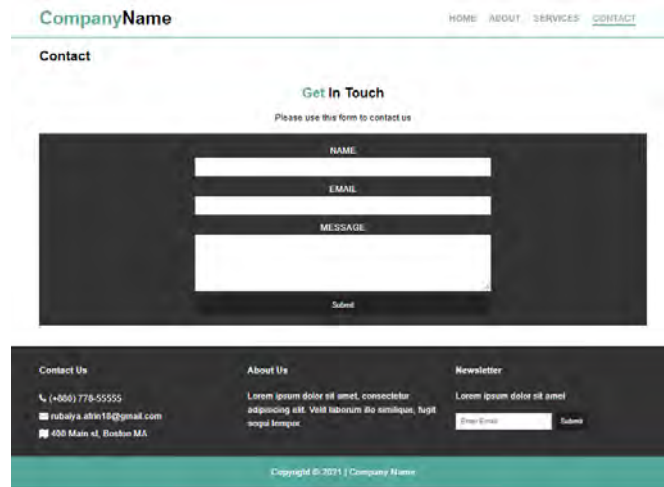


Figure 3.9: This is the Contact Tab

The Contact Tab has form handler for a back-end solution.

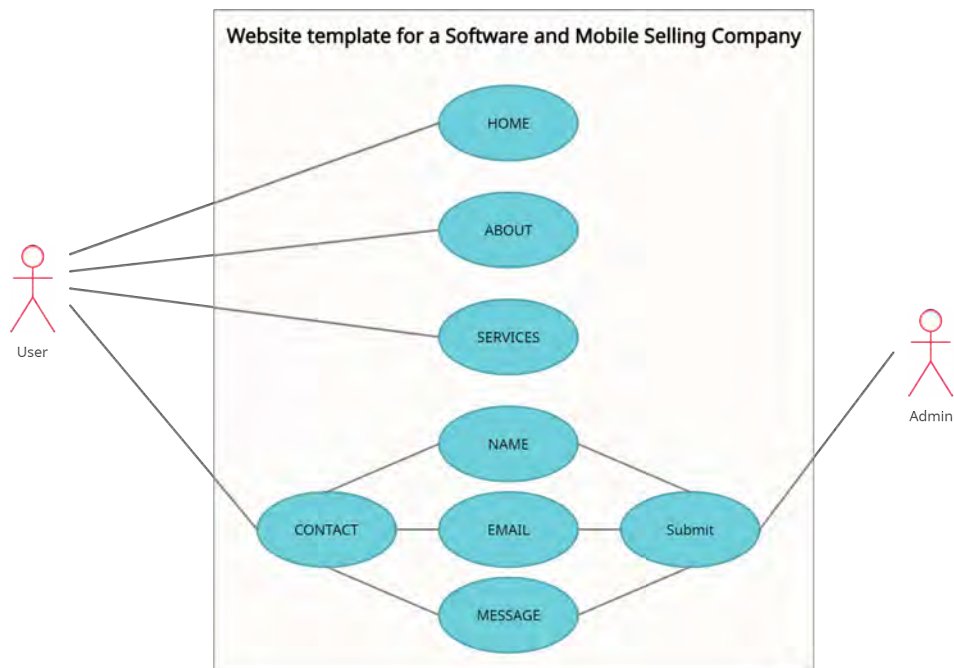


Figure 3.10: Use Case Diagram for Website template for a Software and Mobile Selling Company

3.4.5 CMS (Content Management System)

This is a very ground-level content management system for the existing members of our company. We used Bootstrap (CSS FRAMEWORK), JavaScript and GLYPH-ICON for the project design.

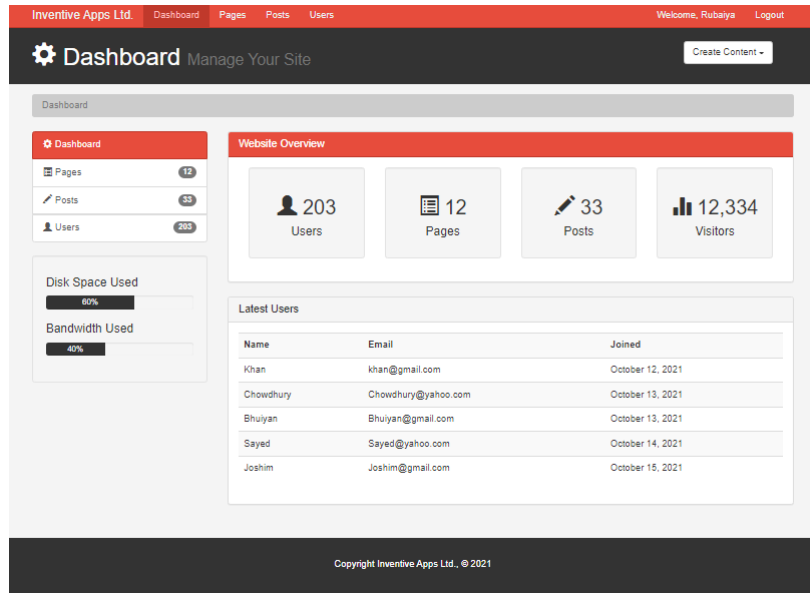


Figure 3.11: This is how the homepage design looks like

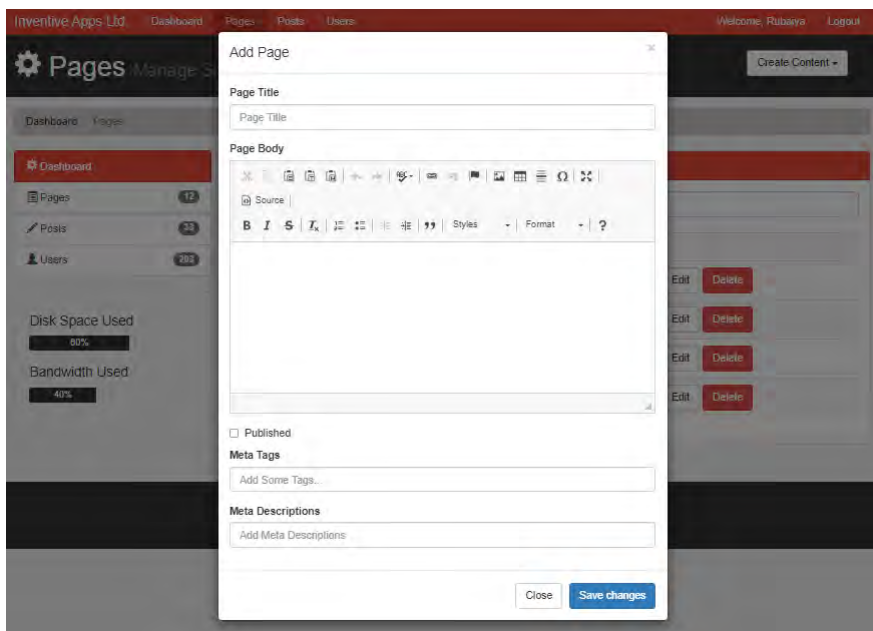


Figure 3.12: This is how the Modal Tab design for Add Page looks like

In **Fig-3.12**, we can see the modal tab, that is when a user clicks the ‘create content’ Dropbox, options to add a page, post and users are shown. When a user clicks the add page item, modal pop up and lets the user add page instance.

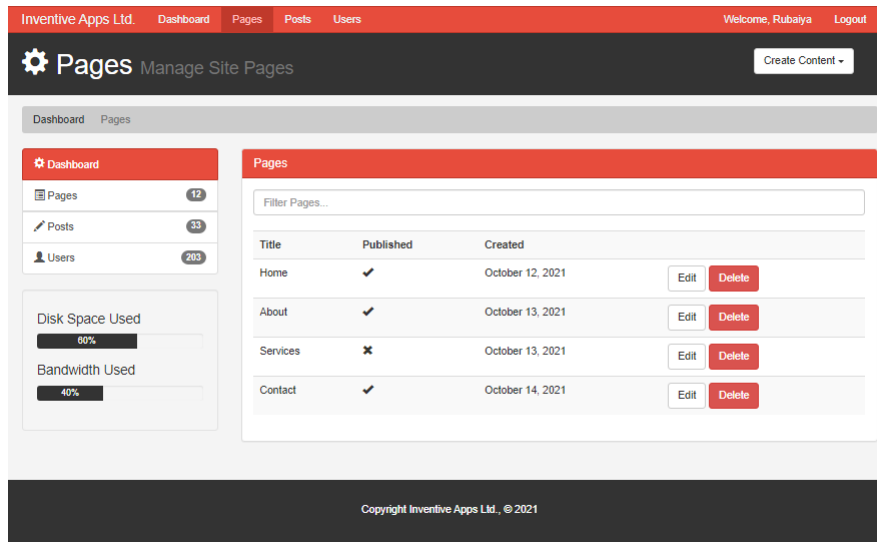


Figure 3.13: This is how the Pages Tab design looks like.

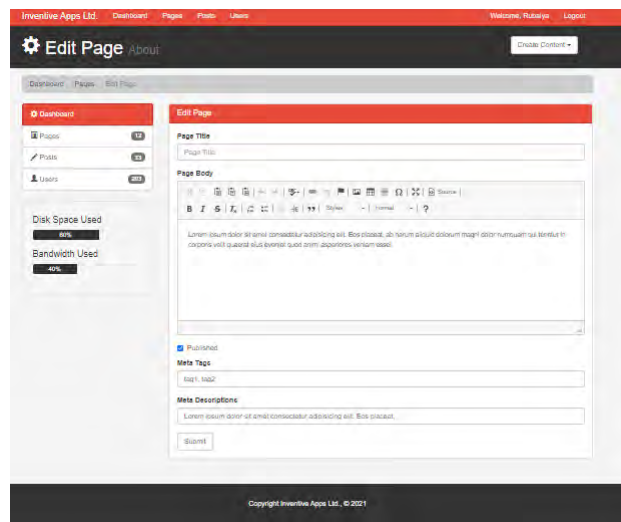


Figure 3.14: This is how the Edit Page design looks like for the Edit Button.

In **Fig-3.13**, we can see the Pages Tab, that is when a user clicks the ‘edit’ button, it takes the user to another page which we can see in the **Fig-3.14**. We decided to make it more dynamic, so we plugged the edit method in the edit page. Here we did not make the edit page as a modal because users will be able to post articles and edit as well. So, if it were modals, then it is possible that the user’s article may get huge and the modal is only for small posts and articles.

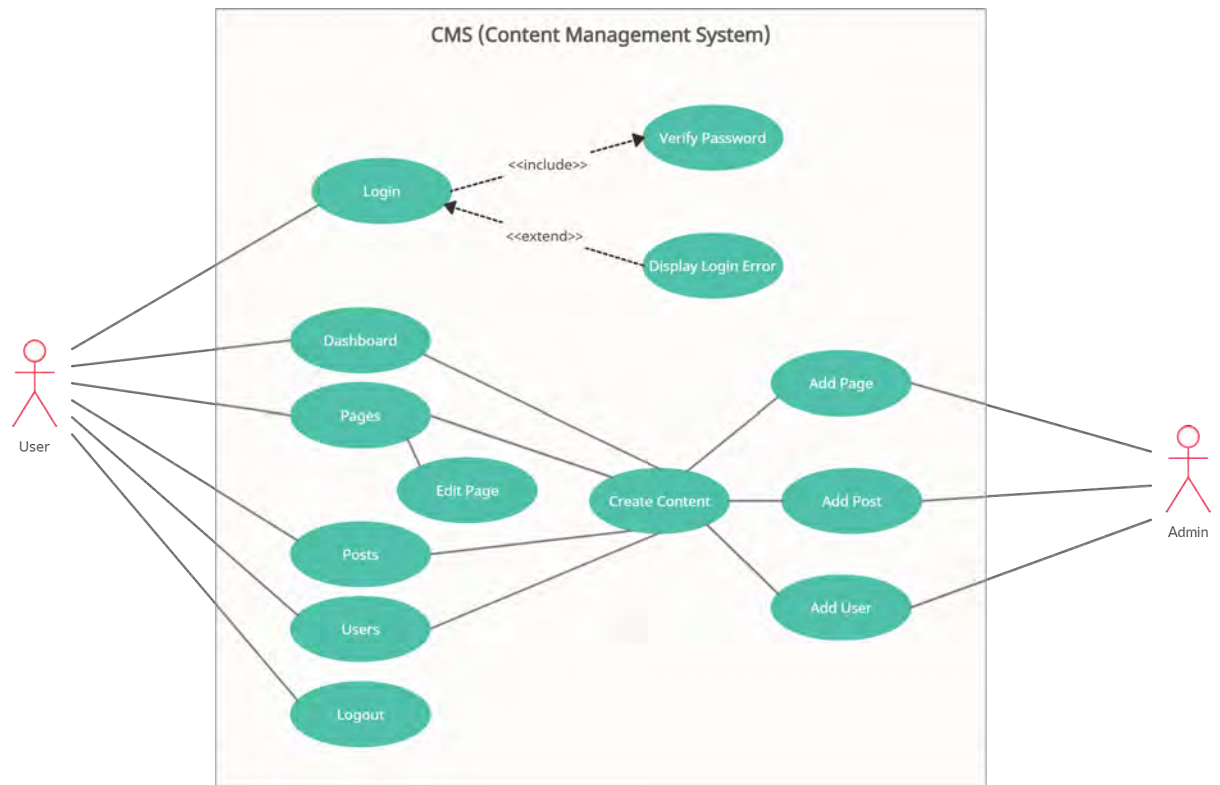


Figure 3.15: Use Case Diagram for CMS (Content Management System).

3.4.6 Loading Page Animation for a website

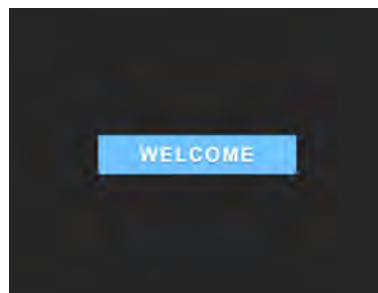


Figure 3.16: Loading Page before hovering over the box.

I divided the animation into two segments, Before and After. The animation was coded in the stylesheet. The 'before' section was set to absolute position so that it matches with the 'after' section. The transition was set to 0.5 sec.

I faced a problem while doing the transition tuning because both layers started to move at the same time as the same layer. So, I simply added the z-index to specify the animation over one another. The z-index of the 'before' section has -1 and the 'after' section has 1.

I added the keyframes for the animation module. The 'before' section has 'animate-before' module and was set to 10 sec to linear infinite. Same goes for the 'after'

section. And finally, the keyframes for both the sections were set to 0% to 100% as background-position at 0% to 100% simultaneously.

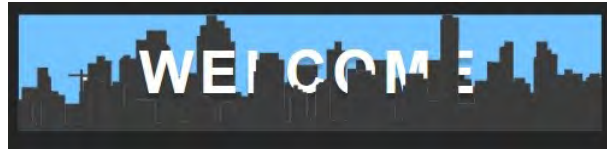


Figure 3.17: Loading Page after hovering over the box.

3.4.7 Dark and Light Theme

I applied an effect for a webpage where the user can toggle Dark theme and Light theme at a time.

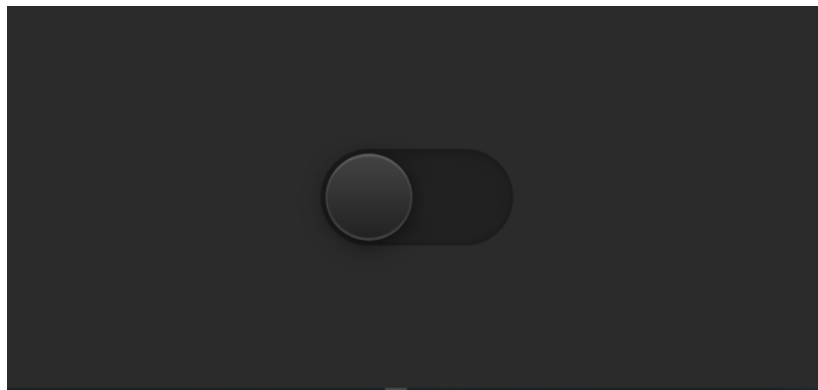


Figure 3.18: This is the Dark mode.



Figure 3.19: This is the Light mode.

3.4.8 Animated Loading Page

I have designed a loading page where a user can see upon loading a website.

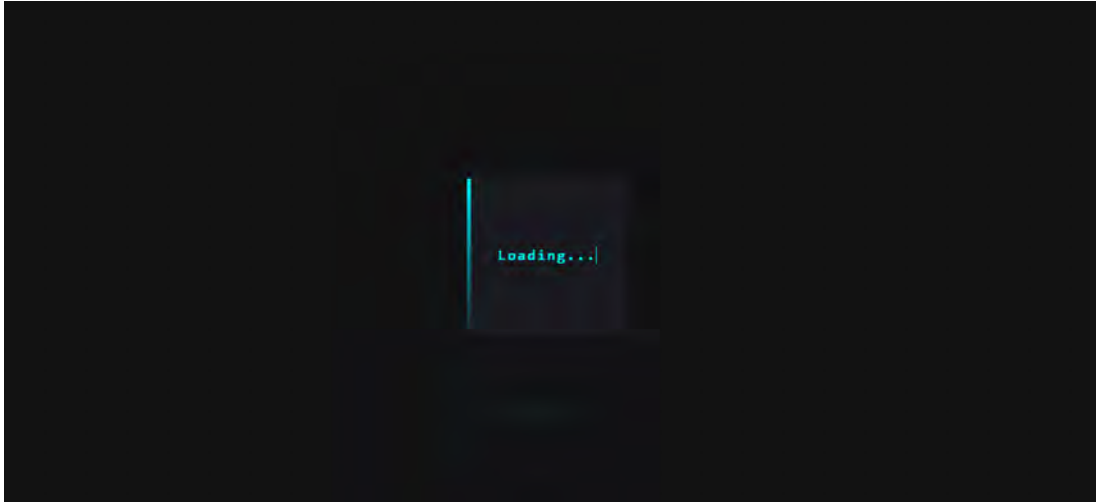


Figure 3.20: Animated loading page when the cursor is not hovering over.

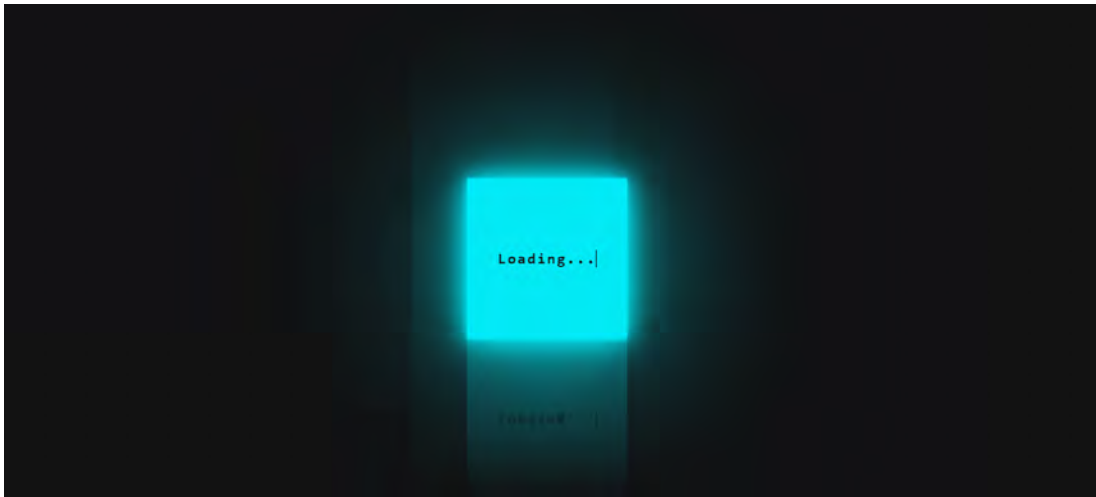


Figure 3.21: Animated loading page when the cursor is hovering over.

3.4.9 Interactive Navigation Panel

I have designed this interactive navigation panel for a website where the user can click on the plus (+) sign to see the menu.



Figure 3.22: Interactive Navigation Panel when the plus sign is not clicked.

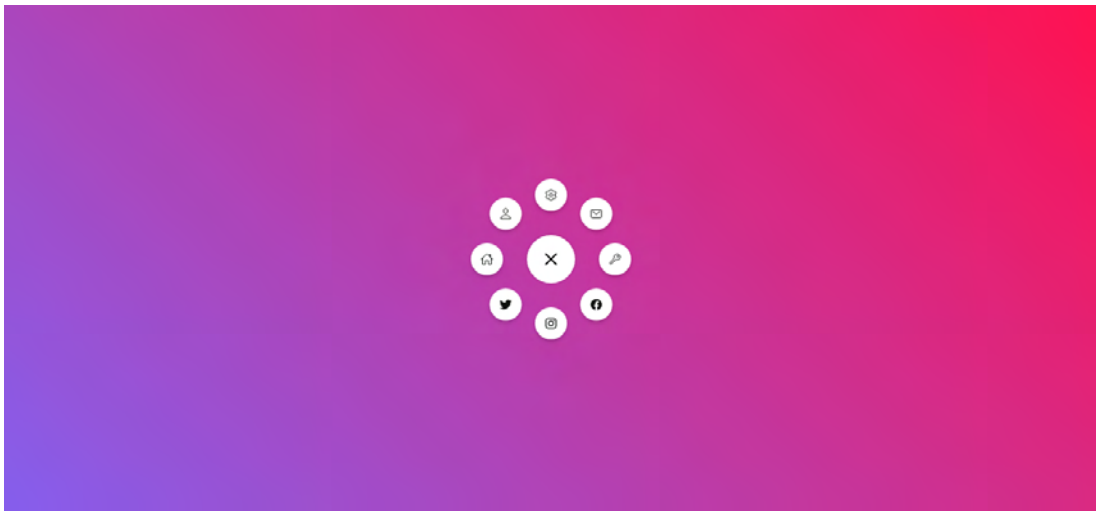


Figure 3.23: Interactive Navigation Panel when the plus sign is clicked.

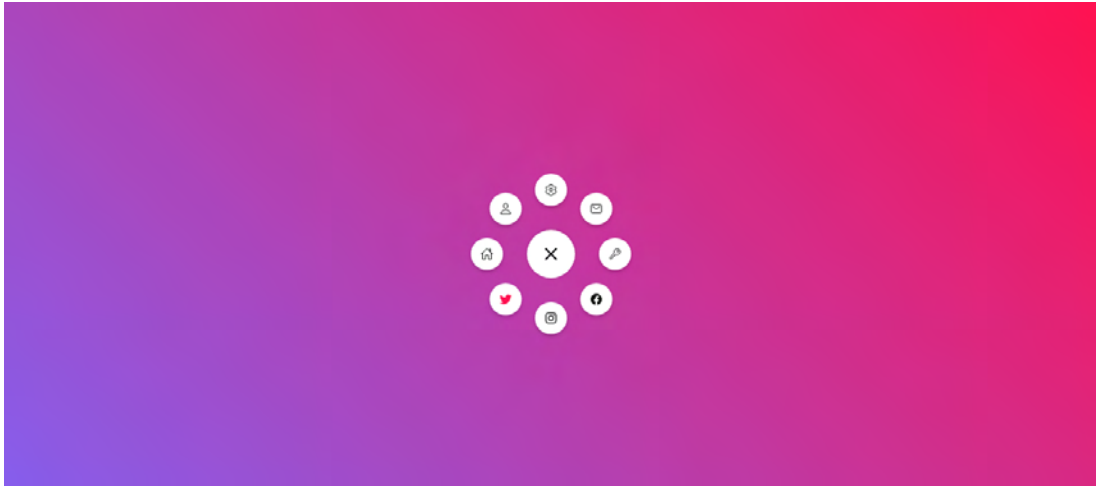


Figure 3.24: Here the Twitter is being highlighted when the cursor is hovering on it.

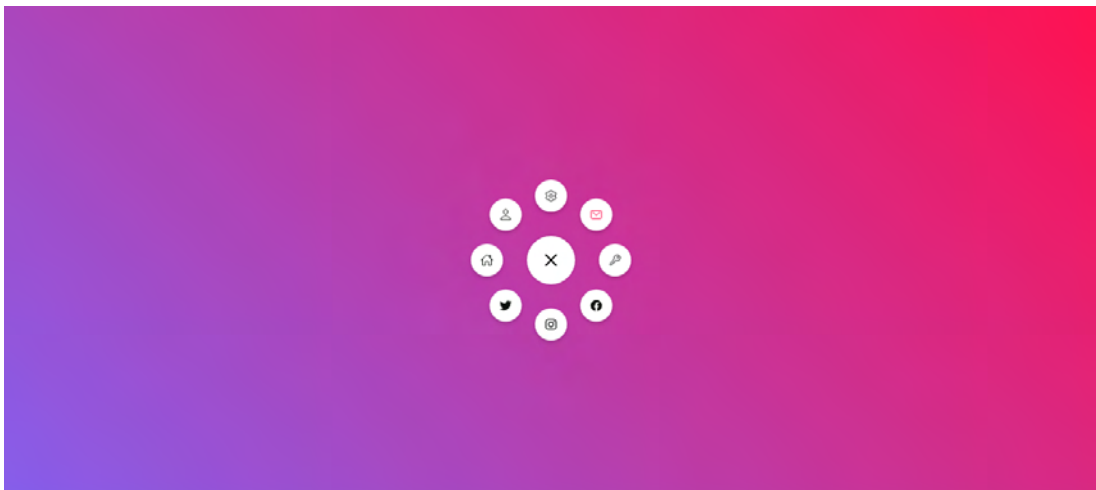


Figure 3.25: Here the Email is being highlighted when the cursor is hovering on it.

Chapter 4

Conclusion

My internship experience so far is very pleasant and worthwhile. It will help me a lot in my future career. The challenges and the scheduled workflow taught me how to manage each project very efficiently. Learning is just grabbing the knowledge, whilst applying or implementing practically is a different thing. It taught me to synergize up with the client's requirements, what they need, what they want, etc. My supervisor, the team leader and the mentors have given me proper guidance and advice.

4.1 Achievements

I have achieved what I intended to achieve before joining the Internship program. 'Experience' is the main achievement for me. Because in such industries one cannot work without any experience. And during my program, I gathered valuable resources and information about the web development industries. I improved my social involvement by collaborating with the team. I achieved more what I can use it for my future opportunities.

4.2 Critical Appraisal

As an Intern, I was not given detailed work which is involved deeply with a more advanced approach. I was being put under mentors and team leaders so that I watch and learn. Inventive Apps Ltd. cannot risk their company by handing over big projects to interns who have no experience in the field so they designate their interns with simple jobs that make the interns easy to engage with more work in the process. The more the work an intern does, the more the work he/she gets.

4.3 Limitations of the report

There are always some limitations during the study. Despite the limitations, we tried hard to prepare our report.

- Preparing the report on time. Because the internship program is for a very short period of time the topics are not touched deeply.

- Page Limitations. It is also a big reason to wrap up professionally by focusing on important fields and valuable topics.
- On account of the organizational privacy, we were unable to put or uncover all the web features, UI, models and outlines in the report.

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