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A Project Report on
“Voxspace”
[Code No: COMP 207]
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Science/Engineering)

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Bonafide Certificate

This project work on
“Voxspace”
is the bona fide work of
Sakshyam Chapagain
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who carried out the project work under my supervision.

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Abstract

In modern workplaces, effective internal communication and streamlined collaboration tools are essential for productivity. Existing solutions are often fragmented, overly complex, or not tailored to the specific needs of small to mid-sized organizations.

Voxspace was developed to address this challenge, offering a centralized platform where employees can share announcements, schedule meetings, message colleagues, access essential resources, and manage their work-life efficiently through integrated calendar features all within one unified interface.

Built using the MERN stack (MongoDB, Express.js, React.js, Node.js), Voxspace ensures a responsive and scalable system accessible across devices. The platform promotes a culture of transparency, accountability, and cohesion by simplifying how employees interact, plan, and stay informed.

Keywords: *Internal Communication, MERN Stack, Web Application, Scheduling, Collaboration, Employee Platform*

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Abbreviations

MERN - MongoDB, Express.js, React.js, Node.js

RAM - Random Access Memory

SSD - Solid State Drive

HDD - Hard Disk Drive

Mbps - Megabits per second

JWT - JSON Web Token

API - Application Programming Interface

GUI - Graphical User Interface

DBMS - Database Management System

SQL - Structured Query Language

HTTP - Hypertext Transfer Protocol

Chapter 1: Introduction

Effective internal communication is essential for productivity and team coordination in modern organizations. However, companies often face challenges due to the use of fragmented tools like email, messaging apps, and standalone calendars, which can lead to disorganized workflows and reduced efficiency.

Voxspace was developed to address these issues by offering a centralized platform that brings together essential internal communication features such as announcements, messaging, meeting scheduling, and employee directories into one user-friendly interface. With integrated calendar functionality, employees can manage meetings and events more effectively, helping balance their work-life schedules.

Built using the **MERN stack (MongoDB, Express.js, React.js, Node.js)**, Voxspace delivers a secure, responsive, and scalable solution suited for both in-office and remote teams. It aims to improve team connectivity and streamline daily operations within a unified digital workspace.

1.1 Background

Effective collaboration and internal communication are essential for organizational success. However, many companies still rely on disconnected tools such as emails, chat apps, and document-sharing platforms that often lead to missed updates, scheduling conflicts, and inefficient workflows. The shift to hybrid and remote work models has further highlighted the need for a unified communication system.

While platforms like Microsoft Teams, and Google Workspace offer various features, they are often complex, expensive, or not customizable to suit small and mid-sized companies. These tools typically emphasize messaging over creating a holistic, role-aware environment that supports accountability and transparency.

Voxspace addresses these limitations by providing a secure and centralized platform that brings together key functions like announcements, messaging, scheduling, and employee directories. It prioritizes simplicity, usability, and team empowerment fostering a more connected and productive work environment.

1.2 Objectives

The primary objective of Voxspace is to develop a centralized, user-friendly collaboration platform tailored for internal company use. Specific goals include:

- Creating a secure and scalable system for internal communication and employee engagement
- Integrating a meeting and event calendar for scheduling
- Building a responsive interface using the MERN stack
- Enabling structured sharing of news and announcements
- Providing an accessible employee directory and shared resource system

1.3 Motivation and Significance

Voxspace was born out of the need for a simplified yet powerful solution to internal communication challenges in modern organizations. Existing tools are often fragmented or lack customization, making them ineffective for many teams especially those operating remotely or across departments.

By combining critical communication features into one platform, Voxspace reduces the dependency on siloed systems and enhances team coordination. It promotes transparency through open access to updates and encourages inclusiveness by offering tools that support engagement at all levels.

Key features such as real-time messaging, event scheduling, announcements, and secure role-based access contribute to a stronger organizational culture. Voxspace empowers

employees to stay informed, collaborate effectively, and manage their work schedules making it a vital component of modern workplace operations.

Chapter 2: Related Works

2.1 Microsoft Teams

Microsoft Teams is a widely used collaboration platform that integrates chat, file sharing, and Office 365 applications. Microsoft Teams enhances meeting productivity through features such as PowerPoint Live for seamless presentations, Microsoft Whiteboard for real-time collaboration, and AI-generated meeting notes that help capture key insights efficiently (Microsoft-teams, n.d.). While feature-rich, it is tightly integrated with the Microsoft ecosystem, which can limit flexibility for organizations that do not rely heavily on Microsoft products. Additionally, its complex user interface can be overwhelming, particularly for new users or smaller teams.

In contrast, Voxspace focuses on simplicity and relevance, offering only the most essential features such as messaging, announcements, and scheduling in a more accessible and streamlined environment tailored for internal communication.

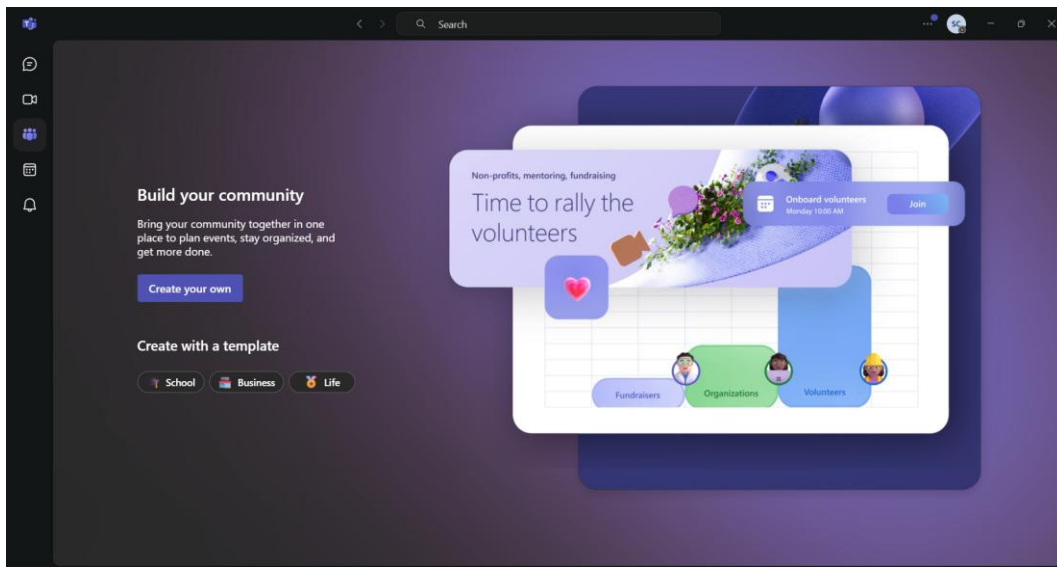


Figure 1: Microsoft Teams

2.2 Google Workspace

Google Workspace offers a suite of productivity tools, including Gmail, Google Calendar, Google Drive, and Google Meet. While these tools are highly effective for general collaboration, they are distributed across separate applications, often requiring users to switch contexts frequently. This fragmentation can interrupt workflow and reduce efficiency.

Voxspace addresses this limitation by unifying essential internal communication features such as messaging, meeting scheduling, company news, and employee directories into a single, cohesive platform, streamlining the user experience and minimizing disruptions

(Google Workspace, n.d.)

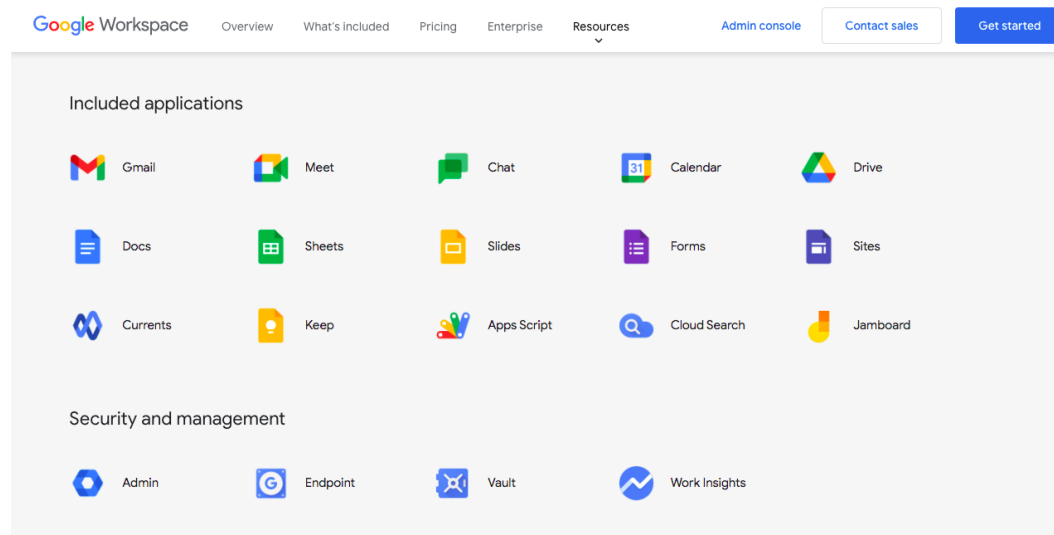


Figure 2: Google workspace

Chapter 3: Design and Implementation

After forming the team and identifying the communication challenges commonly faced by organizations, we began the development of Voxspace by analyzing existing platforms such as Microsoft Teams and Google Workspace. This research helped us pinpoint essential functionalities and usability gaps, which guided us in shaping a focused, internal-use platform tailored to the needs of companies.

We started by planning the system architecture and dividing tasks among the team members based on individual strengths. Wireframes were created to visualize the layout and functionality of core modules such as the news dashboard, calendar scheduler, messaging panel, and employee directory.

For the Graphical User Interface (GUI), we emphasized simplicity and accessibility using React.js and Tailwind CSS, aiming to deliver a clean and responsive user experience across both desktop and mobile devices. Initial pages like login, registration, and the dashboard were prioritized before integrating the announcement system, meeting scheduler, and chat features.

On the backend, we used Node.js and Express.js to manage APIs, user authentication, and role-based access control. Data was stored in MongoDB, which provided flexibility for handling dynamic content such as messages, event logs, announcements, and user profiles.

We integrated Socket.io to enable real-time communication between users, ensuring instant message delivery and event updates. A shared calendar module was also implemented, allowing users to view, create, and manage meetings directly within the platform. The notification system was designed to alert users of new announcements, events..

Throughout development, we conducted unit testing and integration testing to verify the stability of each module. We also gathered informal feedback from potential users to identify usability improvements. This feedback played a critical role in refining the user

interface, adjusting feature placement, and improving the overall responsiveness of the application.

By the end of the development phase, Voxspace had matured into a fully functional and scalable internal communication system streamlining announcements, scheduling, and collaboration in a unified digital workspace for companies.

3.1 System Requirement Specification

3.1.1 Hardware Specification

This section outlines the hardware and infrastructure necessary for the development and smooth operation of the Voxspace internal communication platform.

1. Processor (CPU):

- Minimum: Intel Core i3 (8th Gen) or AMD Ryzen 3
- Recommended: Intel Core i5 (10th Gen) or AMD Ryzen 5

2. Memory (RAM):

- Minimum: 4 GB
- Recommended: 8 GB or higher

3. Storage:

- Minimum: 128 GB SSD or 500 GB HDD
- Recommended: 256 GB SSD or higher

4. Internet Connection:

- Minimum: 5 Mbps (for development and testing)
- Recommended: 20 Mbps or higher (for real-time collaboration and testing)

5. Operating System:

- Windows 10/11, macOS, or Linux (Ubuntu recommended for development)

3.1.2 Software Specification

The following software tools and technologies were used in the development of the Voxspace platform:

1. **Programming Languages:**

- a. JavaScript (ES6+): The primary language used for both front-end and back-end development.

2. **Development Frameworks and Libraries:**

- a. React.js: A JavaScript library for building the user interface of the web application.
- b. Node.js: A runtime environment that enables server-side development using JavaScript.
- c. Express.js: A lightweight web application framework for building RESTful APIs.
- d. Tailwind: A utility-first CSS framework packed with classes like flex, pt-4, text-center and rotate-90 that can be composed to build any design, directly in your markup (Tailwind, n.d.)
- e. **FullCalendar:** JavaScript calendar library integrated into the UI for managing and displaying scheduled events and meetings

3. **Database Management System:**

- a. MongoDB: NoSQL database used to manage user profiles, announcements, messages, and events

4. **Development Tools:**

- a. Visual Studio Code: Code editor for building and debugging the application
- b. Postman: API testing and verification tool

- c. Git & GitHub: Version control and collaboration platform for managing project repositories

5. Authentication and Communication:

- a. JWT (JSON Web Tokens): Used for secure user authentication and session management
- b. Socket.io: Socket.IO is a library that enables low-latency, bidirectional and event-based communication between a client and a server. Integrated for real-time messaging between employees (Socket.io, n.d.)

6. Additional Tools :

- a. Nodemailer: For email verification and notifications. Nodemailer makes sending email from a Node.js application straightforward and secure, without pulling in a single runtime dependency (Nodemailer, n.d.)

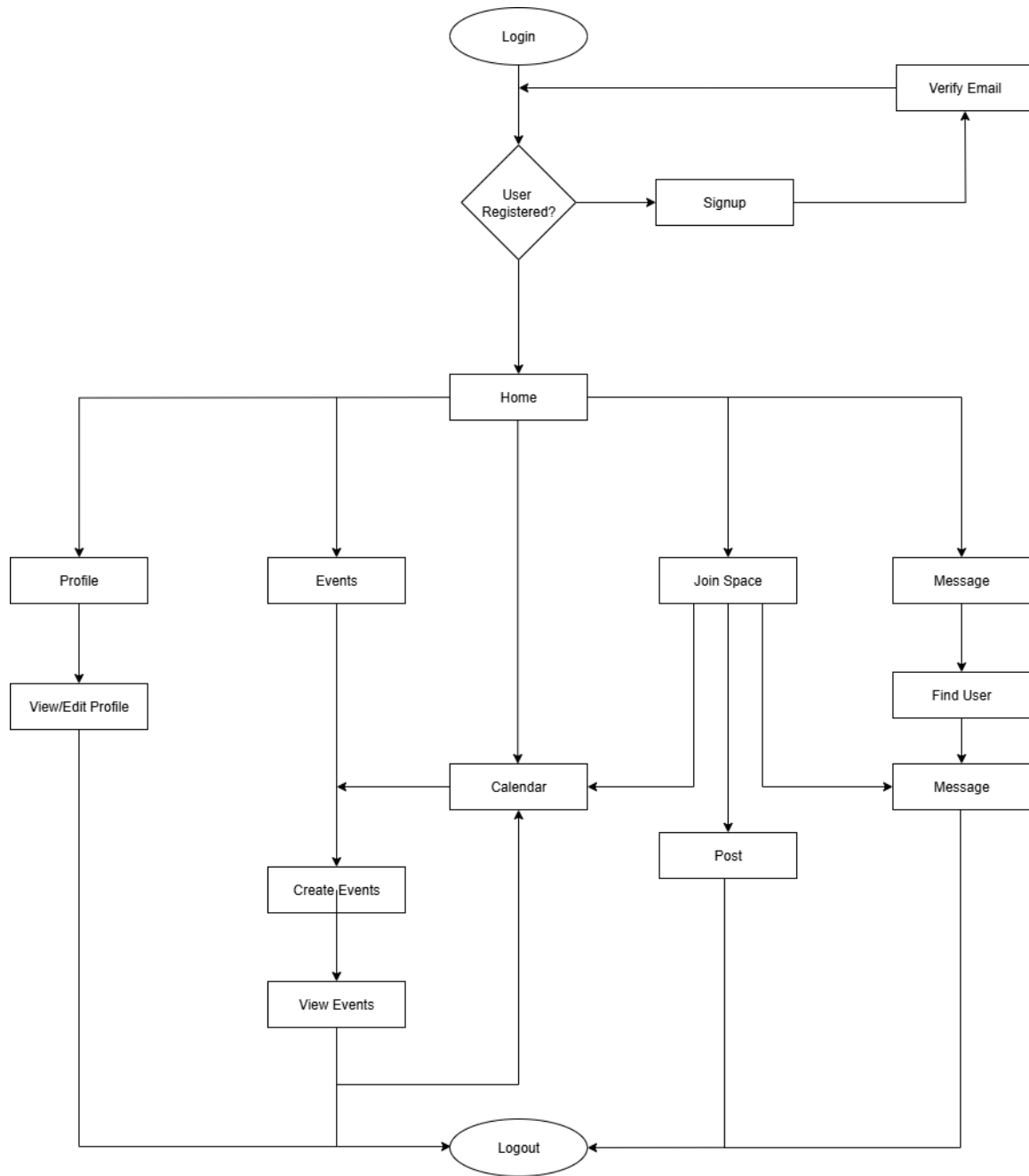


Figure 3: Program flow diagram

Chapter 4: Working Mechanism

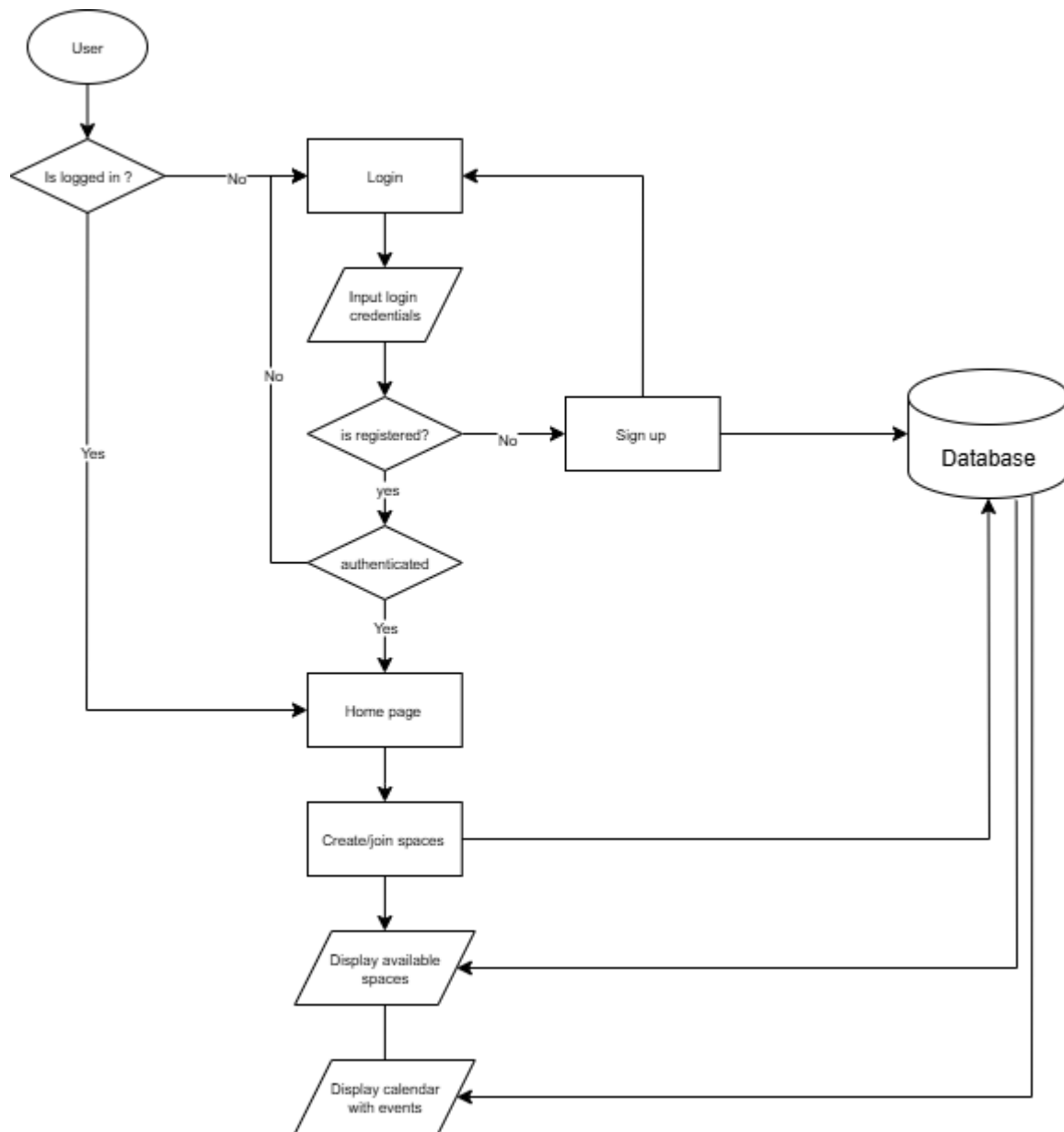


Figure 4: Mechanism of home page

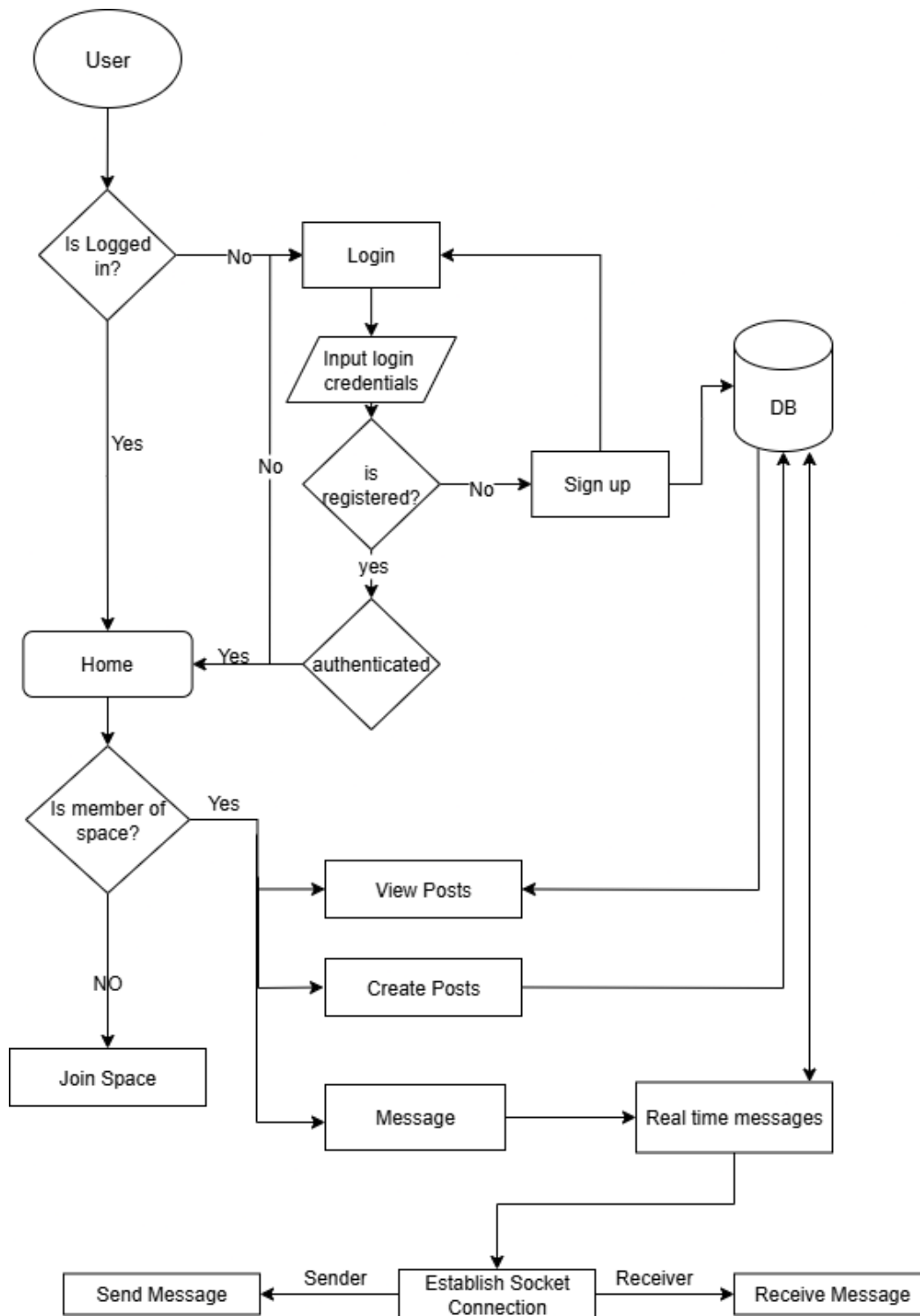


Figure 5: Mechanism of Space page

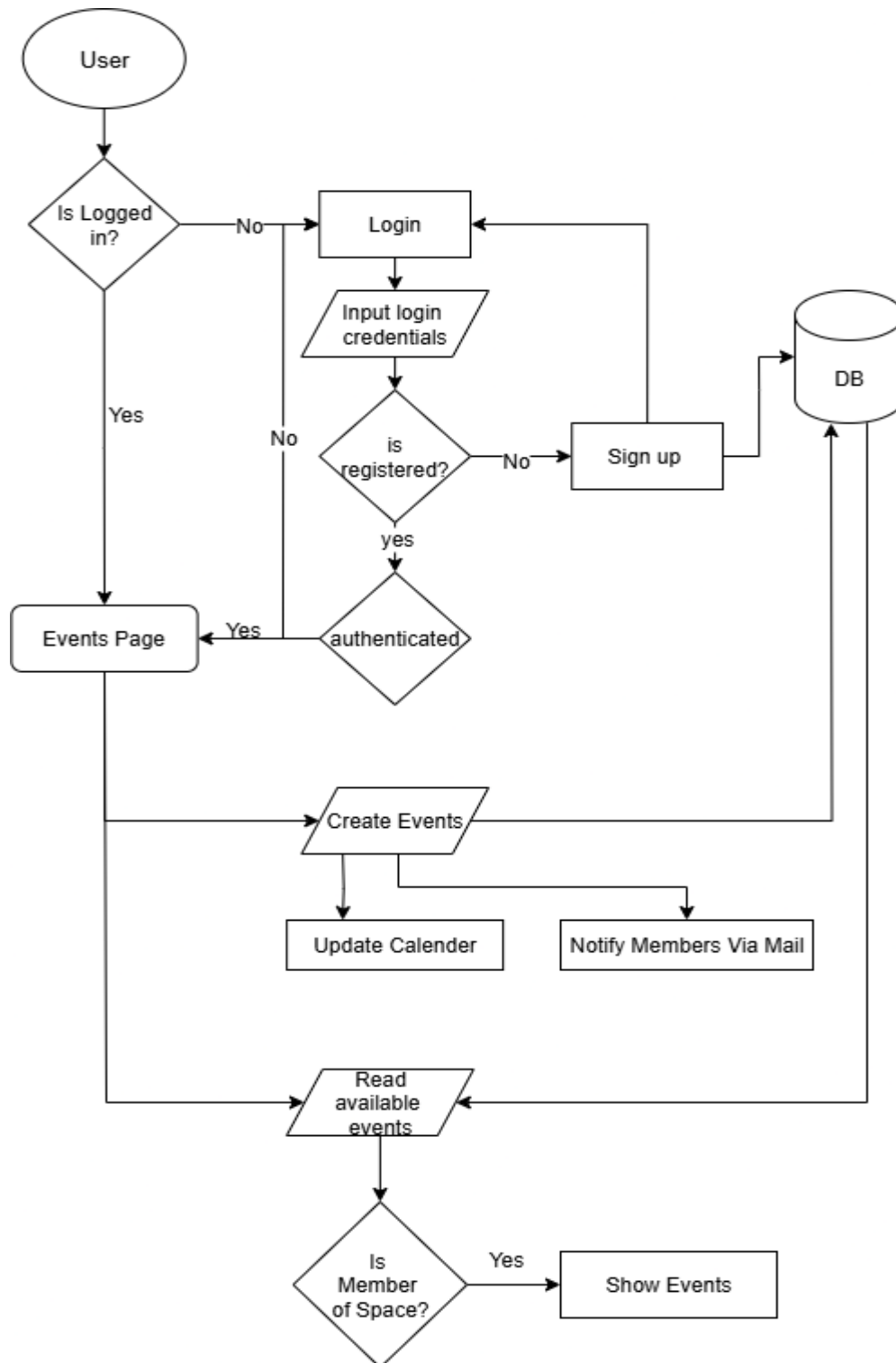


Figure 6: Mechanism of Event page

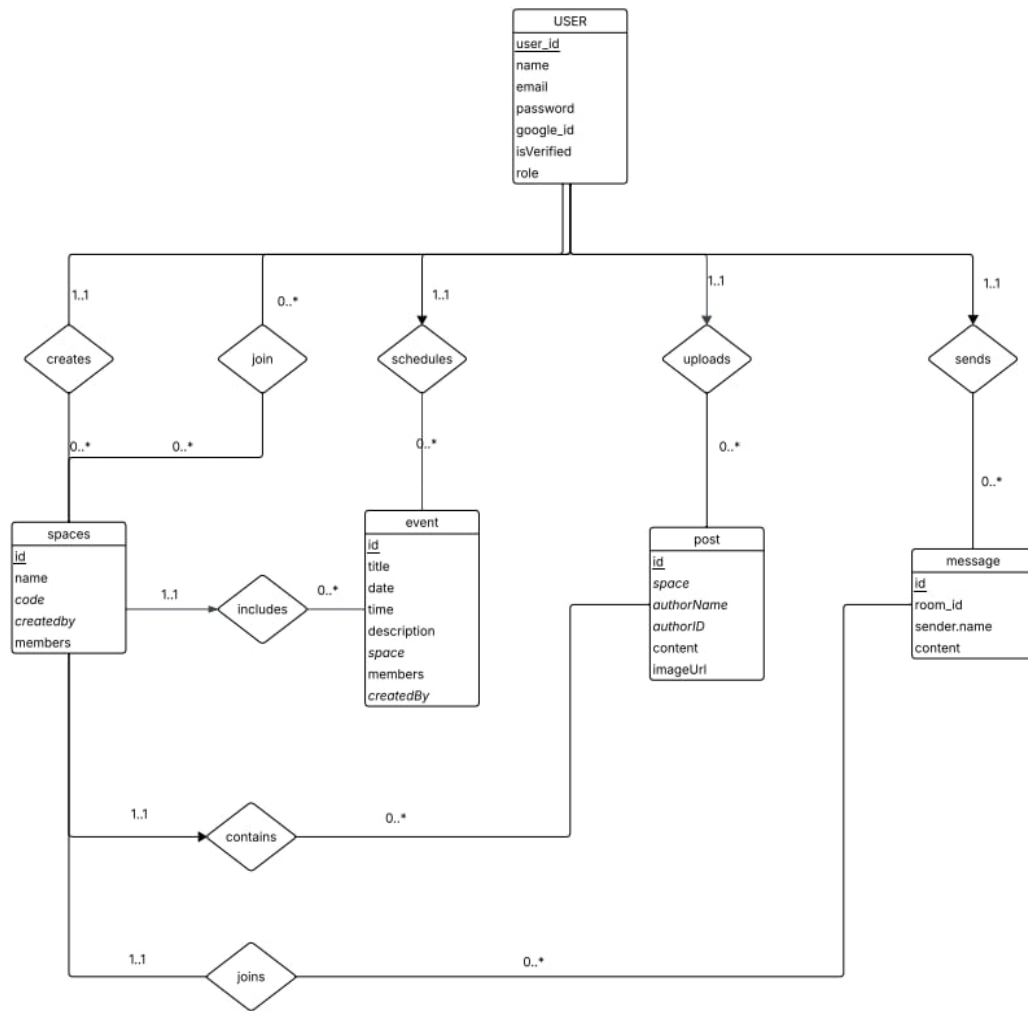


Figure 7:ER diagram

5: Discussion on Achievements

5.1 Features

As we progressed through the development of Voxspace, we encountered several design and implementation challenges that led us to modify our initial plans. While not all envisioned features could be implemented within the given time frame, we adapted by introducing other valuable functionalities that aligned with our project's objectives.

Below are the key features that were successfully implemented:

Signup-page

This page allows new users to register by entering their name, email, and password. Form validation is used to ensure proper input, and user credentials are securely stored. If the user already has an account, a link to the login page is provided.

Login-Page

The login page allows registered users to access the platform by verifying their credentials through secure authentication. Proper error messages are shown for incorrect inputs, and users are redirected to the home page upon successful login.

Home-Page

The home page serves as the central dashboard of the platform. From here, users can view upcoming events, navigate to joined spaces, or explore available spaces to join. It provides quick access to calendars, messages, announcements, and the user's profile. The layout is designed for ease of use and smooth interaction.

Profile-Page

Users can view their personal information, such as name and email. The profile page includes an integrated edit feature, allowing users to update their data and profile picture, with validation to ensure accurate updates.

Events-Page

This section enables users to create new events and view scheduled ones. Events can be added with titles, descriptions, and dates. They are stored in the database and displayed in an organized format, helping users keep track of important activities.

Calendar-Page

The calendar module, built using FullCalendar, offers an intuitive interface where users can view upcoming events, meetings, and tasks. Events are dynamically fetched and rendered, providing users with a visual representation of their schedule for better time management. According to the official documentation, FullCalendar is “*powerful and lightweight and suitable for just about anything*” (Keenthemes, n.d.), making it an ideal choice for implementing real-time scheduling features in web applications.

Spaces-Page

Each space represents a collaborative environment similar to a digital workspace or team. Users can create or join spaces, post announcements, share messages, and upload files. Each space supports real-time communication and team-based interaction, fostering transparency and collaboration.

Logout

The logout functionality securely ends the user session and redirects the user back to the login page. It ensures security by clearing the authentication token from local storage.

Overall, the Voxspace platform evolved into a functional and engaging system that supports internal communication, event management, and team collaboration. Despite the limitations faced, we were able to build a system that meets the essential needs of modern organizations and lays the foundation for future enhancements.

5.2 Limitations

Due to time constraints and the academic nature of this project, certain features of Voxspace could not be fully developed or optimized. While the platform successfully implements core functionalities like announcements, events, messaging, and calendar integration, it still has several limitations:

Basic Messaging Only: No file previews, reactions, editing/deletion, encryption, or group chat tools.

No In-App Notifications: Lacks alerts for messages, announcements, or events (only limited email notifications).

No Role-Based Access in Spaces: All users have equal permissions; no admin/moderator roles.

No Activity Logs: No tracking of actions like event creation or login timestamps.

Limited Calendar Features: No recurring events, RSVPs, reminders, or external calendar sync.

Chapter 6: Conclusion and Recommendations

6.1 Future Enhancements

With more time, resources, and user feedback, the Voxspace platform can be expanded significantly to meet professional-grade internal communication standards. The following are proposed enhancements:

Advanced Messaging Features

Add support for multimedia sharing (images, documents, voice notes), message editing/deletion, reactions, and end-to-end encryption using real-time communication tools like **Socket.IO** or **Firebase**.

Push/In-App Notifications

Implement real-time in-app or push notifications for new messages, announcements, and events to improve user responsiveness.

Role-Based Access Control in Spaces

Enable roles such as Admin, Editor, and Member within each space for better permission control over content, uploads, and settings.

Enhanced Calendar Integration

Upgrade calendar to support recurring events, RSVP, reminders, and sync with external services (e.g., Google Calendar, iCal).

Admin Dashboard & Analytics

Build a dashboard for administrators to track active users, usage metrics, and engagement levels across spaces.

Technical & Development Recommendations

- Strengthen **MERN stack** skills (state management, REST APIs, React components).

- Follow secure coding practices (JWT handling, authentication, input validation).
- Learn **DevOps fundamentals**: CI/CD, version control, scalable hosting.
- Focus on **UI/UX design principles** for responsive, intuitive interfaces.
- Adopt testing practices (unit, integration) and maintain proper documentation.

6.2 Conclusion

The development of Voxspace marks a significant step toward enhancing internal communication and collaboration within organizations. By integrating essential features such as messaging, event scheduling, announcements, and shared spaces into a single, user-friendly platform, Voxspace simplifies day-to-day coordination and fosters a more connected and transparent work culture. Although certain advanced functionalities are yet to be implemented, the current system provides a solid foundation for real-time interaction, centralized information sharing, and team engagement. With continued development and user feedback, Voxspace has the potential to evolve into a comprehensive internal communication hub tailored to the dynamic needs of modern workplaces.

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APPENDIX-I

Gantt chart:

This section includes a GANTT chart with actions and milestones. One kind of bar chart that shows a project timetable is a Gantt chart. Gantt charts show the beginning and ending dates of a project's summary and terminal elements. The components of the project's work breakdown structure are summary and terminal parts. This endeavor advanced in tandem with our increased understanding.

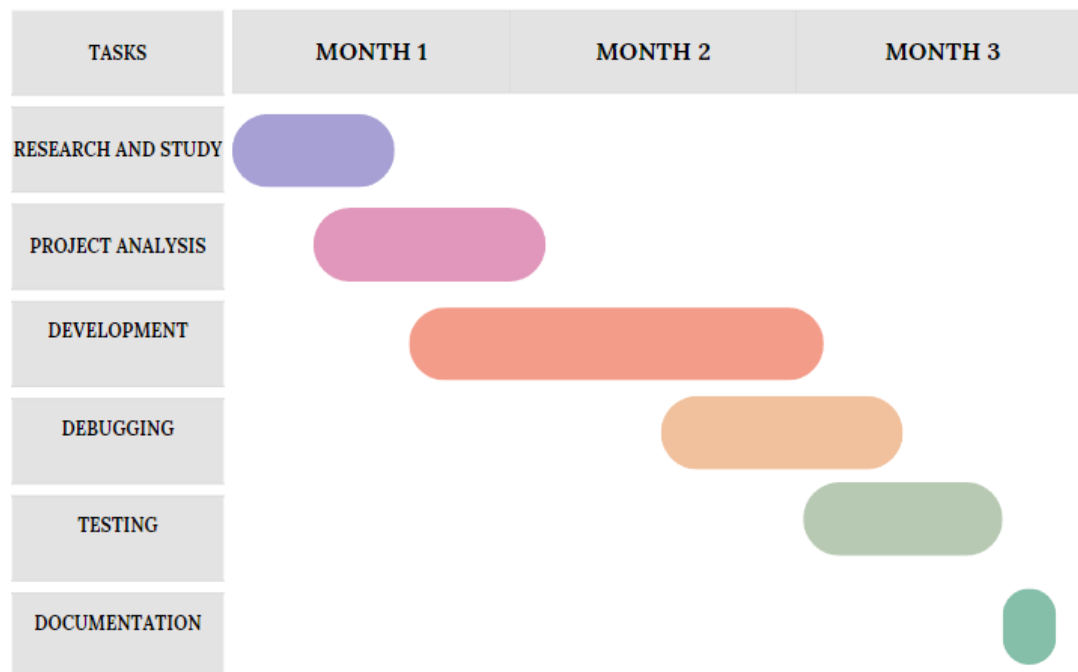
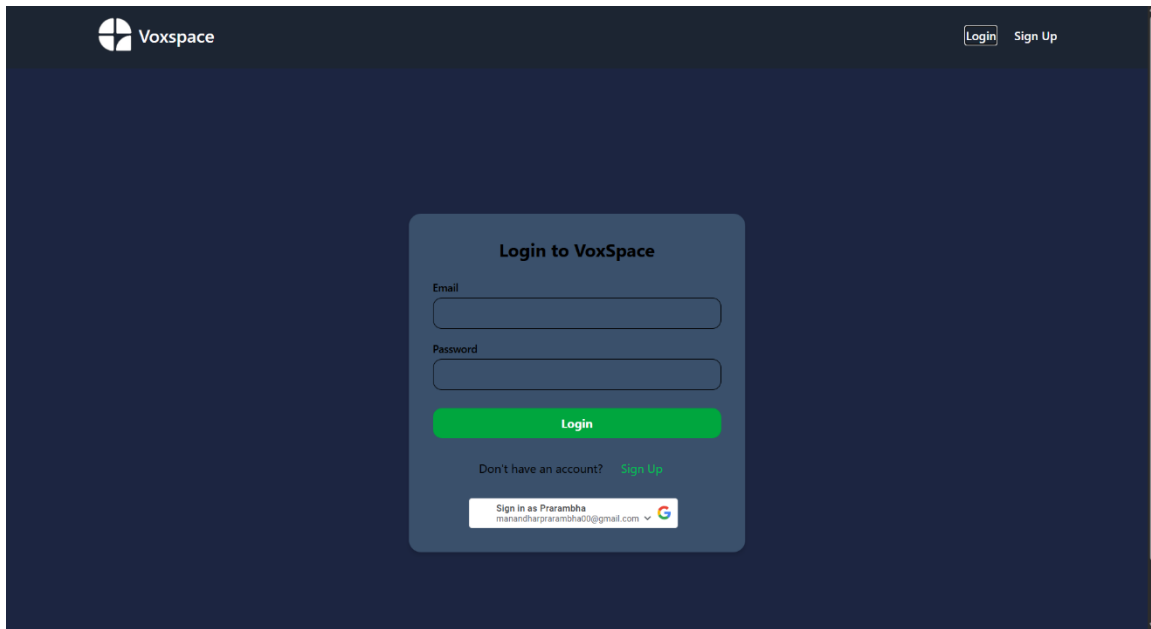


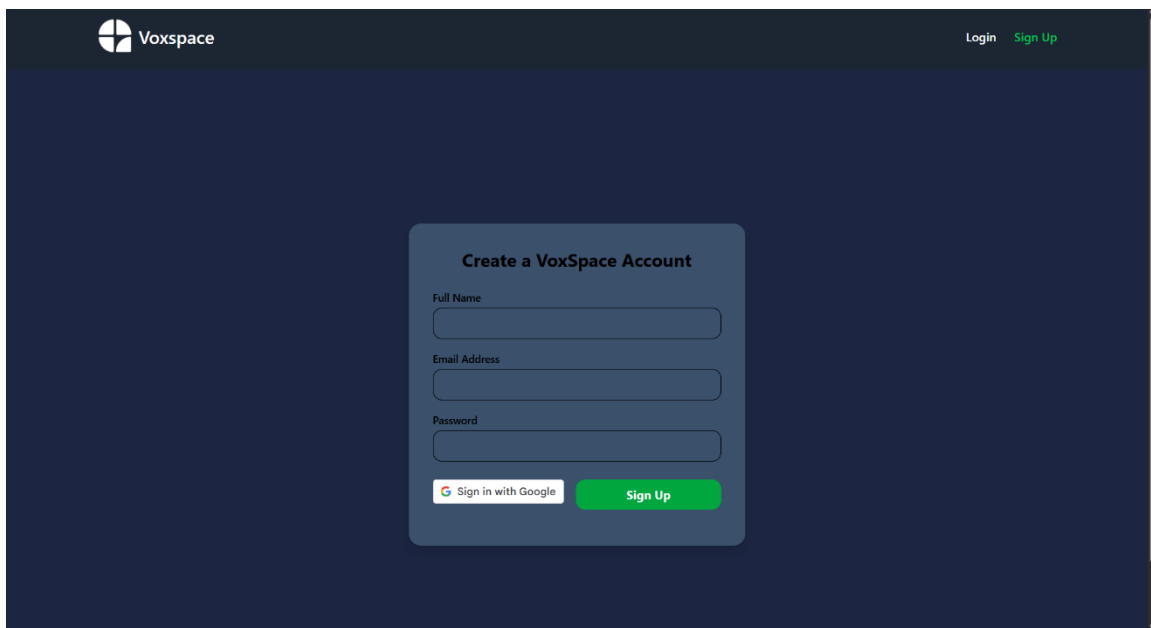
Table 1:Gantt chart

APPENDIX-II



The screenshot shows the Voxspace login interface. At the top left is the Voxspace logo. At the top right are links for 'Login' and 'Sign Up'. The main content area features a dark blue background with a central light blue login box. The box is titled 'Login to VoxSpace' and contains input fields for 'Email' and 'Password'. Below these fields is a green 'Login' button. Under the button, there is a link 'Don't have an account? Sign Up'. At the bottom of the box is a 'Sign in as Prarambha' section with the email 'manandharprarambha0@gmail.com' and a Google sign-in button.

Figure 7:Login page



The screenshot shows the Voxspace signup interface. At the top left is the Voxspace logo. At the top right are links for 'Login' and 'Sign Up'. The main content area features a dark blue background with a central light blue signup box. The box is titled 'Create a VoxSpace Account' and contains input fields for 'Full Name', 'Email Address', and 'Password'. Below these fields are two buttons: 'Sign in with Google' and a green 'Sign Up' button.

Figure 8:Signup page

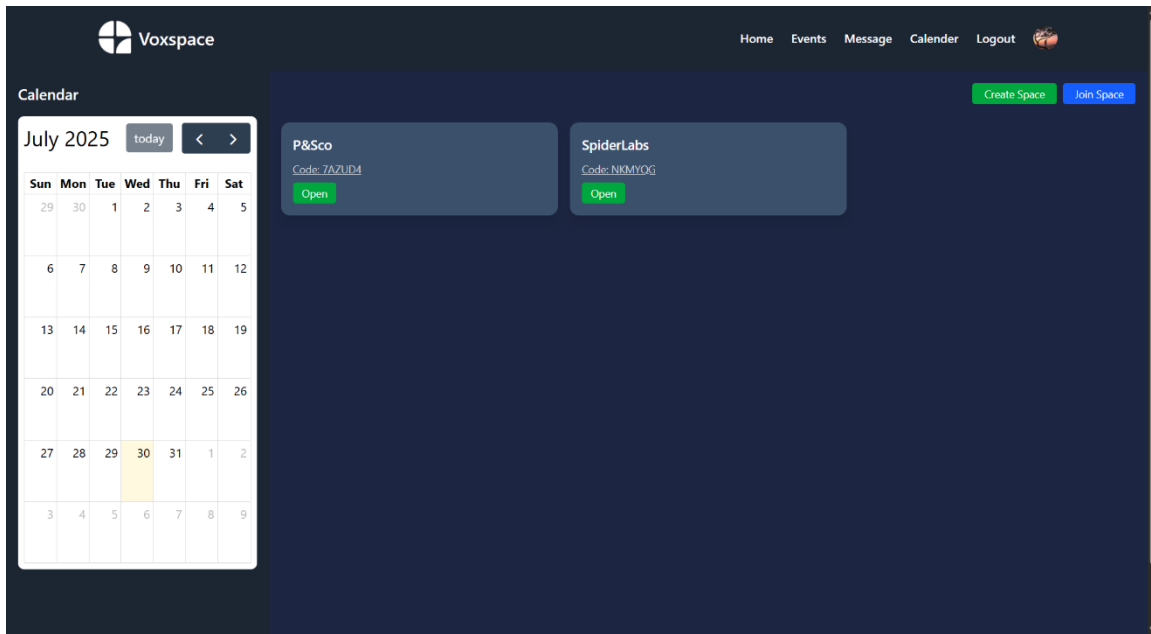


Figure 9: Home page

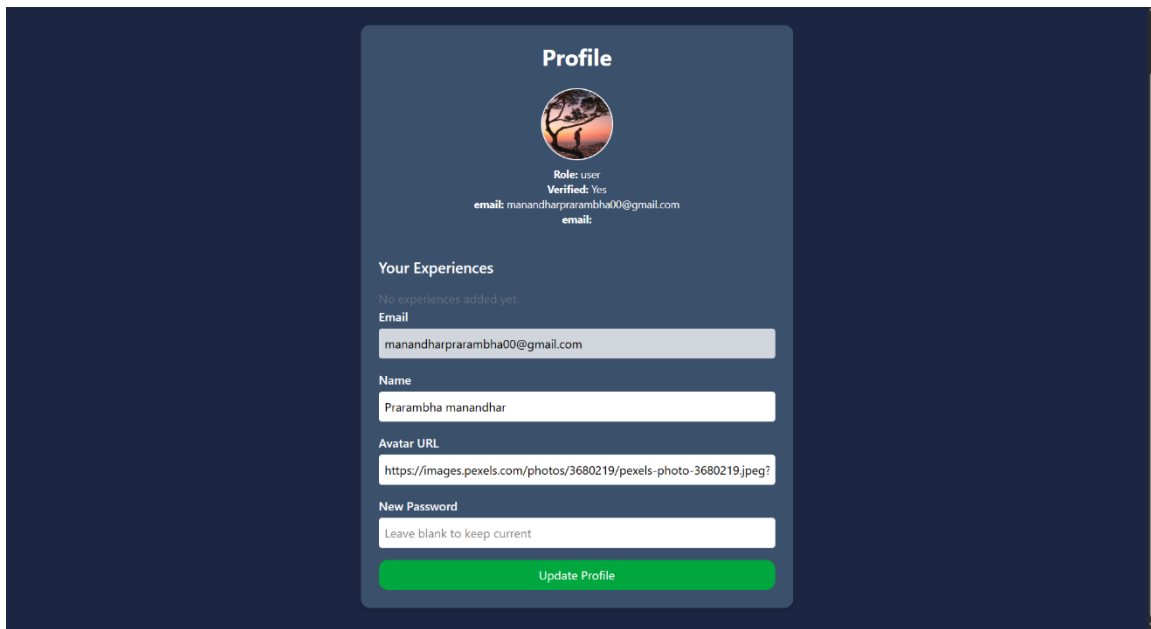


Figure 10: Profile page

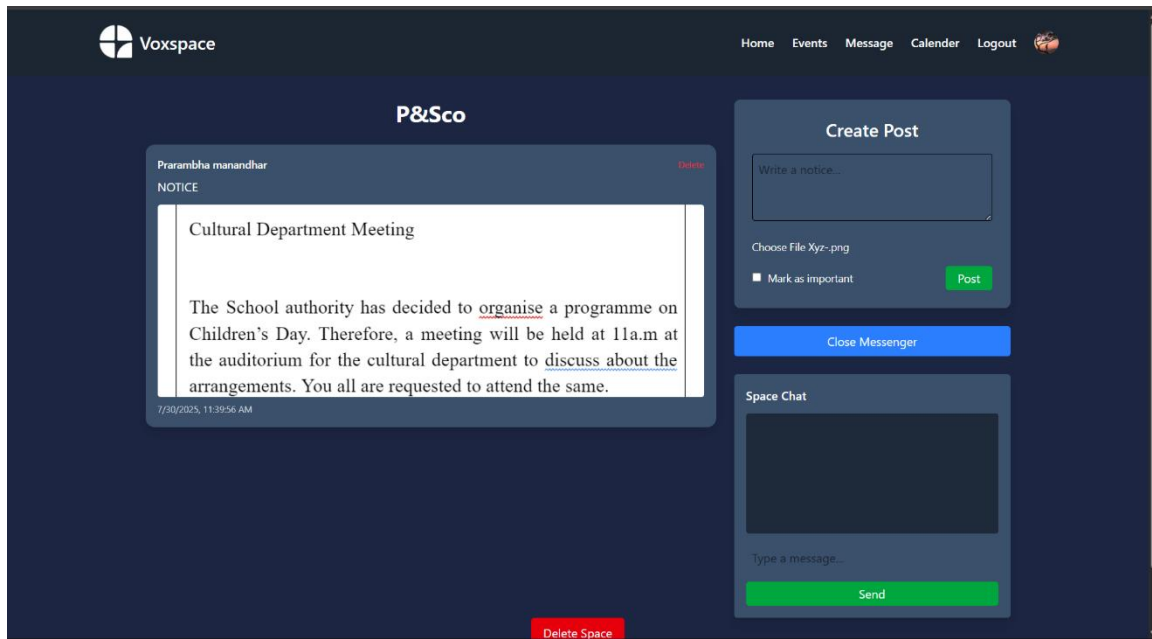


Figure 11:Space page

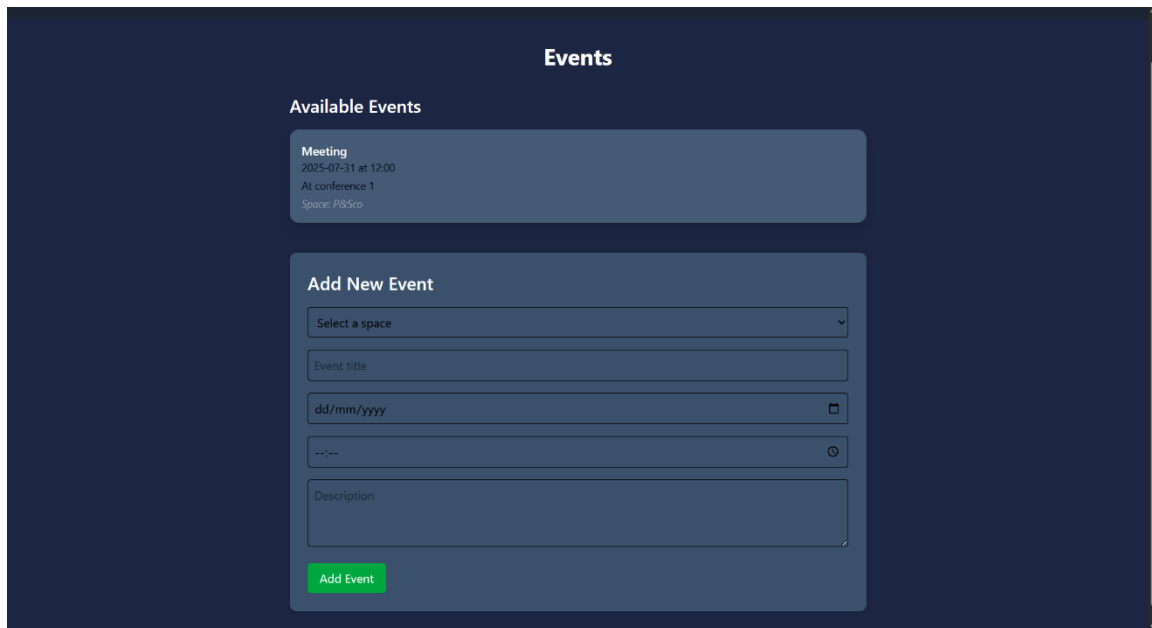


Figure 12:Event page

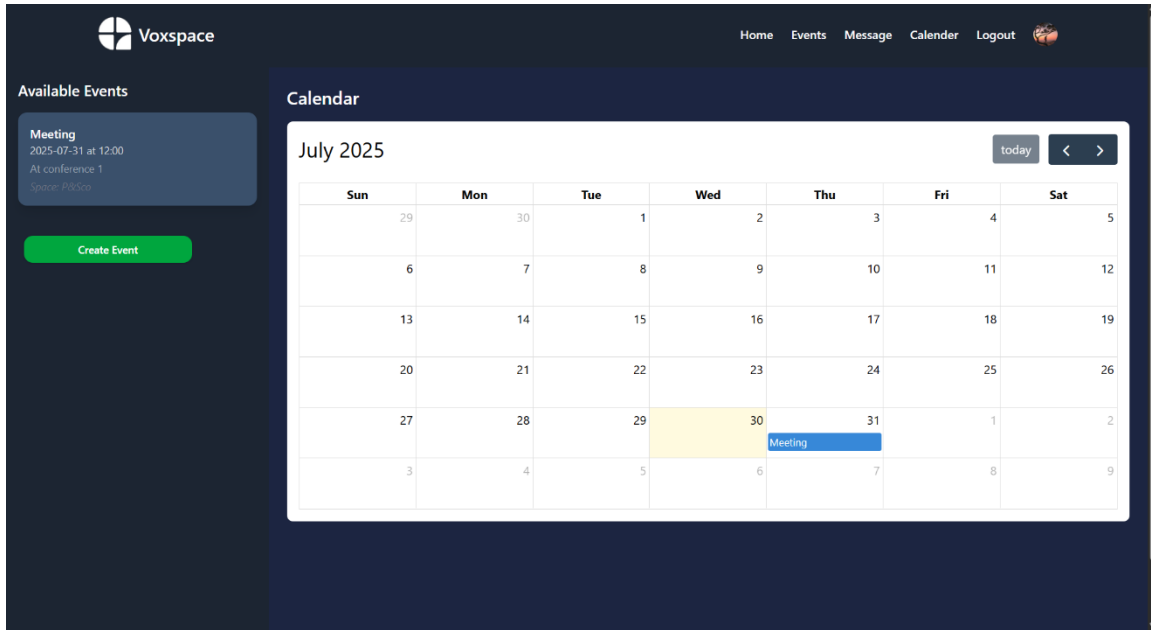


Figure 13:Calendar page

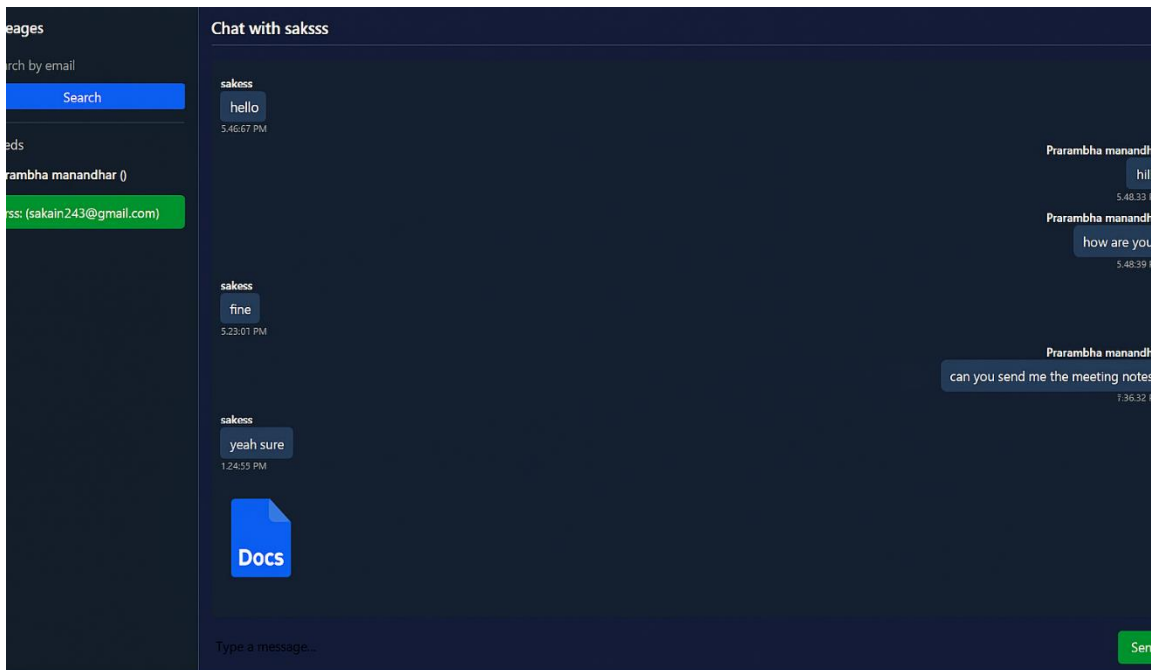


Figure 14:Message page