PROJECT REPORT
ON
SOCIAL MEDIA PLATFORM

Project-II

Department of Computer Science and Engineering
CHANDIGARH ENGINEERING COLLEGE JHANJERI, MOHALI

In partial fulfillment of the requirements for the award of the Degree of Bachelor of Technology in Computer Science & Engineering

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(Batch: 2021-2025)

DECLARATION

We, Ritesh, Rishikesh raj and Rijul modgil solemnly declare that the project report titled "SOCIAL MEDIA PLATFORM" is an original work carried out by me under the guidance of Mr. Rahul Dev Singh, Assistant professor, CGC, Jhanjeri. The report is based on my own research and analysis, and all sources of information used have been duly acknowledged. We further declare that this report has not been submitted in part or full, for the award of any degree, diploma, or other academic or professional qualification, either to this institute or to any other institution. All contributions from external sources have been properly cited and referenced according to the prescribed format.

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ACKNOWLEDGEMENT

It gives me great pleasure to deliver this report on the Project-II, We worked on for my B.Tech in Computer Science & Engineering 4th year, which was titled "SOCIAL MEDIA PLATFORM". We grateful to my university for presenting me with such a wonderful and challenging opportunity. We also want to convey my sincere gratitude toall coordinators for their unfailing support and encouragement.

We are extremely thankful to the HOD and Project Coordinator of Computer Science & Engineering at Chandigarh Engineering College Jhanjeri, Mohali (Punjab) for valuable suggestions and heartiest co-operation.

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ABSTRACT

The project titled **"Y: A Full-Stack Social Media Platform"** focuses on building a comprehensive and scalable social networking application inspired by '**X**'. This platform enables users to create accounts, post short messages (tweets), interact with other users through likes and comments, and follow accounts to customize their feed.

The application integrates both **frontend** and **backend** technologies. The frontend provides an intuitive user interface for seamless navigation and interaction, while the backend ensures robust data management, secure authentication, and efficient server-side operations. The application employs a **relational database** for managing user data, posts, and relationships, ensuring data consistency and integrity.

Key features of the platform include real-time feed updates, user authentication, notification systems, and the ability to manage user interactions such as following/unfollowing. The project also incorporates **modern web development practices**, leveraging frameworks like React for the frontend and Node.js with Express for the backend, along with RESTful APIs to ensure smooth communication between the client and server.

This project demonstrates the application of full-stack development concepts to deliver a functional, user-centric, and scalable social media platform. It also addresses essential considerations such as user experience, data flow, and system security, making it a comprehensive exercise in web application development.

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Chapter-1

INTRODUCTION

Our project is a dynamic social media platform designed to connect individuals, foster communities, and promote meaningful interactions. It offers a user-friendly interface for creating and sharing content, engaging with others through likes, comments, and messages, and discovering interests through tailored recommendations.

The platform emphasizes privacy and security while integrating innovative features like real-time updates, customizable profiles, and advanced search options. By incorporating modern technologies and scalable architecture, this platform aims to enhance user experience and adaptability. It serves as a digital space for networking, self-expression, and collaboration, catering to diverse user needs in the digital age.

1.1 Outline of the project

This project focuses on developing a feature-rich social media platform aimed at connecting users and fostering interactions. It includes key functionalities like user authentication, customizable profiles, content creation and sharing, messaging, and real-time notifications. The system is built using a scalable architecture, incorporating modern technologies for frontend, backend, and database management. Security and privacy are prioritized through robust authentication and data protection mechanisms.

The project also emphasizes efficient database design, rigorous testing, and user validation to ensure a seamless experience. Future enhancements include scaling the platform, adding advanced features, and refining user engagement for long- term adaptability.

1.2 Importance

In today's digital age, social media platforms have become essential for communication, networking, and self-expression. Our platform, inspired by '**X**', addresses the growing demand for interactive and engaging digital spaces by offering a blend of user-friendly features and modern functionalities. Its smooth, responsive UI ensures accessibility across all devices, catering to a wide audience, including professionals, influencers, and casual users. The addition of a dark theme enhances user comfort, especially during prolonged usage, while the backend powered by REST APIs ensures secure, scalable, and efficient data management.

The platform's relevance lies in its ability to foster community building and real-time interactions in a privacy-conscious environment. The inclusion of customizable user profiles and personalized recommendations enriches the user experience, making the platform versatile for different user preferences. Furthermore, the implementation of modern development practices ensures adaptability to future technological advancements.

Chapter-2

REVIEW OF LITERATURE

2.2 Content Interaction

User interaction with content, including likes, comments, shares, and retweets, plays a significant role in driving engagement. Studies show that platforms with high content interaction rates tend to have more active users, as users are motivated to interact with content they find engaging or relevant. The frequency and quality of interactions often correlate with higher user satisfaction and loyalty.

2.2 User Engagement Metrics

2.2.1 Likes Per Tweet

- Likes per tweet are an indicator of user engagement with content. Research suggests that the number of likes varies across platforms, with '**X**' often having higher engagementdue to its concise, real-time nature.

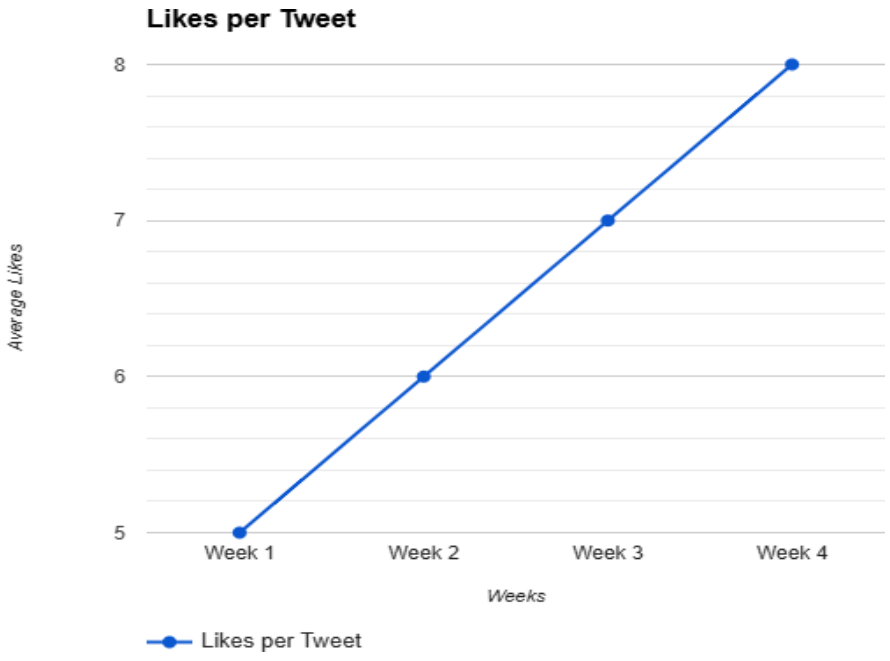

Figure 2.1: Likes per tweet

2.2.2 Average time spent per user

- Average time spent by users is crucial for understanding engagement. Platforms offering personalized content and real-time updates see higher engagement times

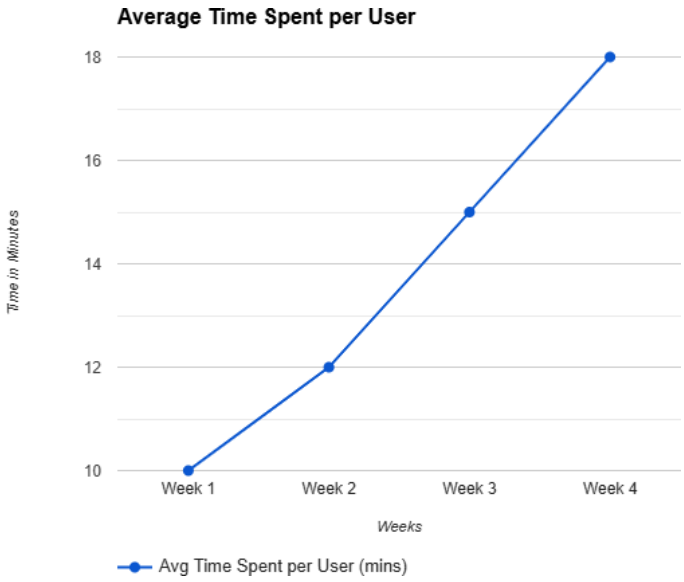

Figure 2.2: Average time spent per user

2.2.3 Active user per week

- Active users per week demonstrate platform loyalty and user base stability. Studies show consistent weekly engagement is often tied to the presence of timely updates, personalized content, and social interactions.

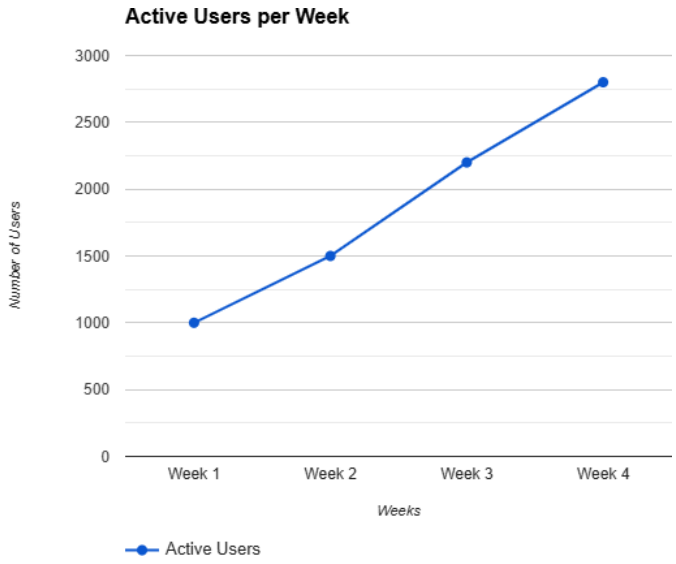

Figure 2.3: Active users

This figure represents the growth in **active users per week** for a platform over a **four-week period**. The data shows a steady increase in the number of users:

Week 1: Approximately 1,000 active users.

Week 2: About 1,750 active users.

Week 3: Around 2,500 active users.

Week 4: Close to 3,000 active users.

The linear trend in the graph suggests consistent user acquisition and engagement over time, indicating a positive growth trajectory for the platform.

Chapter-3

PROBLEM DEFINITION AND OBJECTIVE

3.1 Problem Definition

The goal of this project is to create a social media platform that enables users to share content, engage with others, and build connections, similar to '**X**'. Despite the success of existing social media platforms, many users face challenges in terms of content discoverability, ease of interaction, and personalization. Additionally, current platforms often lack flexibility in terms of user preferences such as themes, notifications, and privacy control.

Limited Personalization: Existing platforms struggle with providing highly personalized contentand notifications, leading to decreased user engagement.

User Interaction and Engagement: While users interact with content on platforms like '**X'**, the engagement often lacks depth, limiting meaningful interactions such as commenting or discussions around shared posts.

Inconsistent User Experience: Platforms often provide inconsistent user experiences across different devices, making it difficult for users to seamlessly engage on mobile, tablet, or desktop versions.

Privacy and Data Security: Many social media platforms face challenges regarding user privacyand data security, leading to concerns about personal information exposure.

Content Moderation and Misinformation: Existing platforms often face challenges in ensuring the authenticity of shared content and moderating harmful or misleading information, which impacts user trust and the overall quality of interactions.

3.2 Objective

The primary objective of this project is to create a fully functional social media platform, inspired by '**X**', that facilitates seamless communication, interaction, and content sharing among users. The platform aims to offer an intuitive, responsive, and user-friendly interface that is accessible across multiple devices. By incorporating features such as dark mode, personalized content feeds, and real-time notifications, the project seeks to enhance user engagement and provide a customized experience for each user.

The platform will be powered by a robust backend using REST APIs to ensure secure data management, including user registration, login, and profile management. It will allow users to post, like, comment, retweet, and share content with ease, promoting active interaction and community building. A key focus will be on creating a secure environment, where user data is protected through industry-standard encryption and privacy controls.

Chapter-4

DESIGN AND IMPLEMENTATION

4.1 System design and architecture

4.1.1 Entity-Relationship diagram

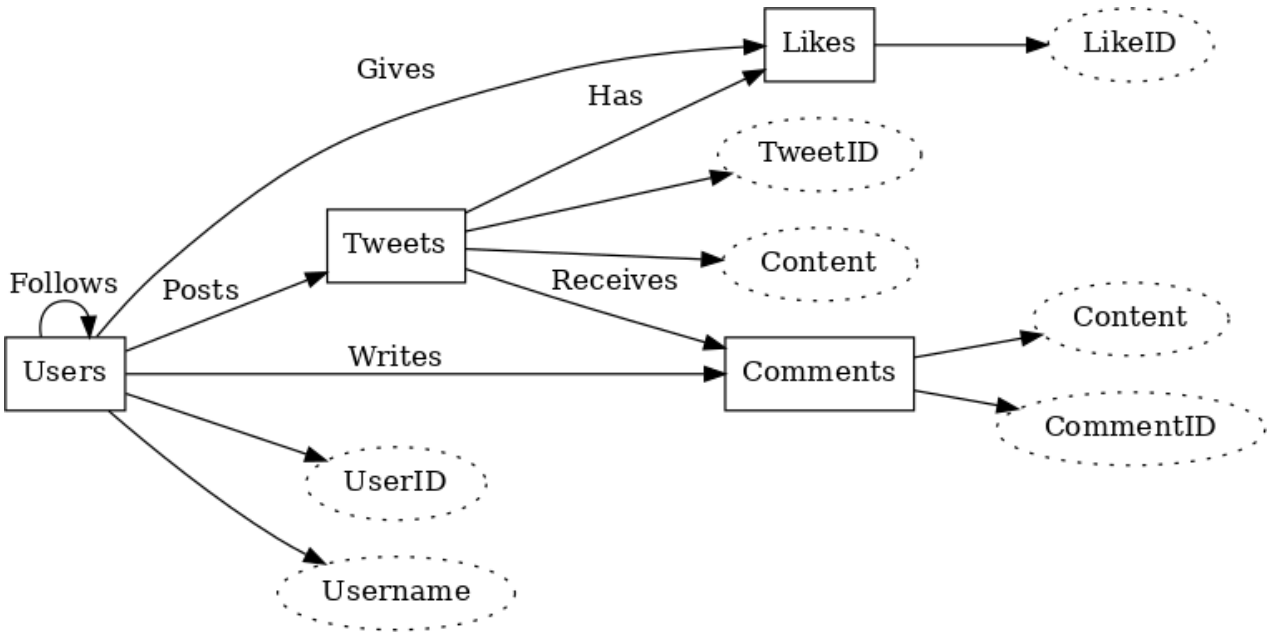

Figure 4.1: Entity-relationship diagram

Entities

- **Users**: Represents individuals using the platform. Attributes include:
  - **UserID**: A unique identifier for each user.
  - **Username**: The user's display name.
- **Tweets**: Represents posts made by users. Attributes include:
  - **TweetID**: A unique identifier for each tweet.
  - **Content**: The text or content of the tweet.

- **Likes**: Represents likes given to tweets. Attributes include:
  - **LikeID**: A unique identifier for each like.
- **Comments**: Represents comments on tweets. Attributes include:
  - **CommentID**: A unique identifier for each comment.
  - **Content**: The text of the comment.

4.1.2 Class diagram

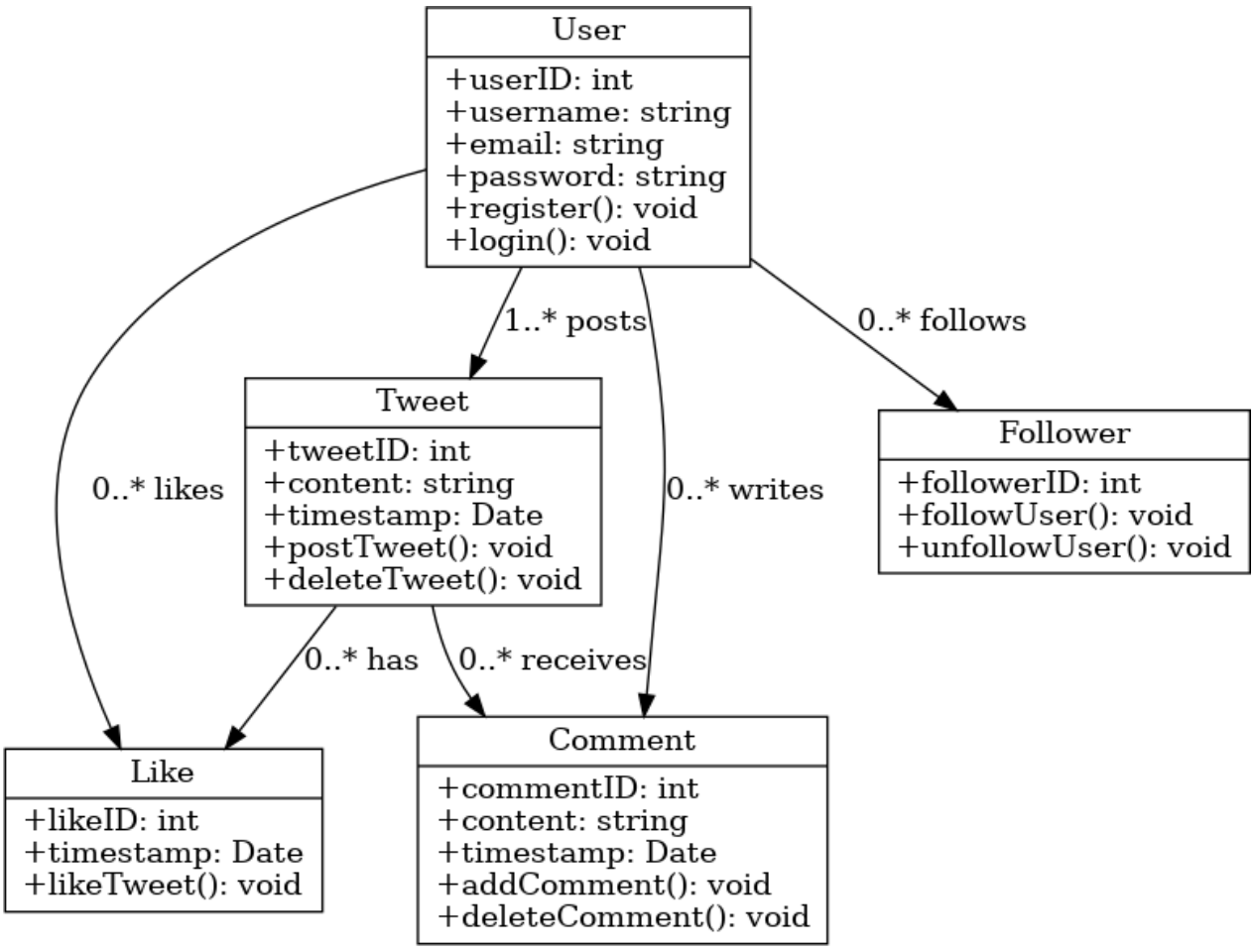

Figure 4.2: Class diagram

4.1.2 Data Flow diagram

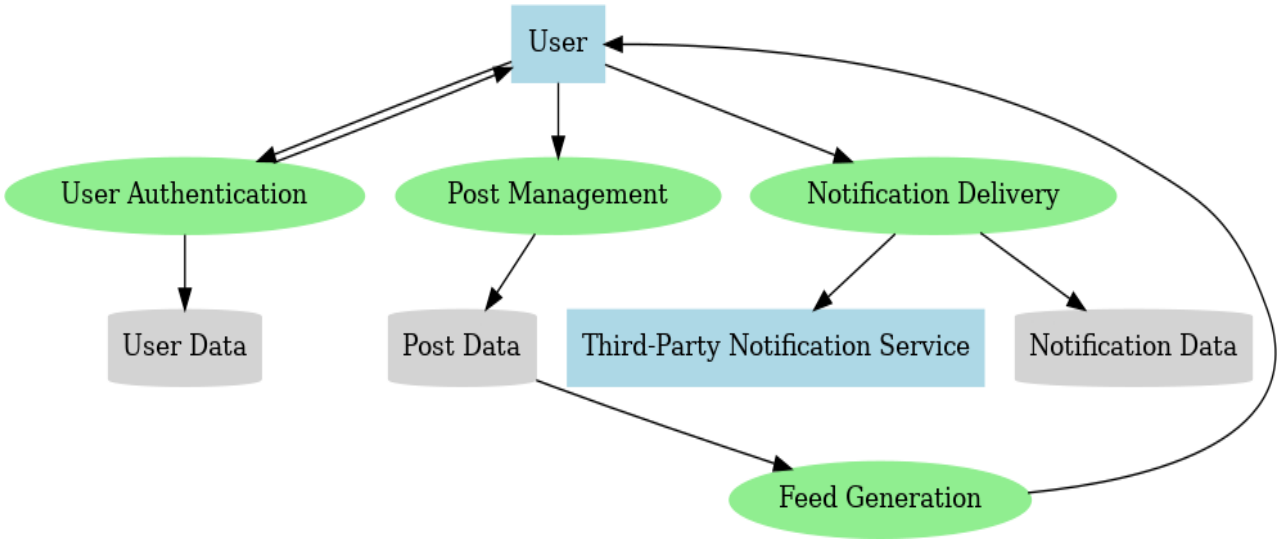

Figure 4.3: Data flow diagram

External Entities

- **User**: The primary actor interacting with the system, responsible for actions like logging in, creating posts, viewing feeds, and receiving notifications.
- **Third-Party Notification Service**: External service used for delivering push notifications or emails to users.

Processes

- **User Authentication**:
  - Handles login and signup.
  - Verifies credentials and stores/retrieves user data in/from the **User Data** store.
  - Sends feedback to the user about the success or failure of authentication.

- **Post Management**:
  - Manages user actions like creating, editing, or deleting posts.
  - Stores new posts in the **Post Data** store.
- **Feed Generation**:
  - Uses data from **Post Data** and user relationships to generate personalized content feeds for users.
  - Sends the generated feed to the user.
- **Notification Delivery**:
  - Processes events like new followers, likes, or comments.
  - Stores event data in the **Notification Data** store.
  - Sends notifications directly to the user or via the **Third-Party Notification Service**.

4.2 Technical Stack

4.2.1 Frontend Technologies

HTML/CSS/JavaScript (Client-Side): HTML provides the structure, CSS styles the layout, and JavaScript adds interactivity to the user interface. These technologies form the backbone of the frontend development, allowing for the creation of responsive and visually appealing web pages.

React.js or Vue.js: These popular JavaScript libraries are commonly used for building interactive user interfaces. They offer component-based architecture, virtual DOM rendering, and state management capabilities, making them ideal choices for complex frontend development in job finder web apps.

Bootstrap or Material-UI: Frontend frameworks like Bootstrap or Material-UI provide pre-designed UI components and responsive layout grids, enabling developers to create consistent and mobile-friendly interfaces with minimal effort.

4.2.2 Backend Technologies

Node.js: Node.js is a server-side JavaScript runtime environment known for its nonblocking I/O and event-driven architecture. It allows developers to build scalable and highperformance backend services for job finder web apps.

Express.js: Express.js is a minimalist web framework for Node.js, providing a set of robust features for building RESTful APIs and handling HTTP requests/responses. It simplifies the development of backend logic, routing, and middleware integration in job finder web apps.

MongoDB or PostgreSQL: MongoDB is a NoSQL database that offers flexibility and scalability for storing unstructured data, making it suitable for job listings, user profiles, and application data in job finder web apps. Alternatively, PostgreSQL is a relational database known for its ACID compliance and support for complex queries, ideal for handling structured data in job finder apps.

Chapter-5

RESULT AND DISCUSSION

5.1 Result

Home page

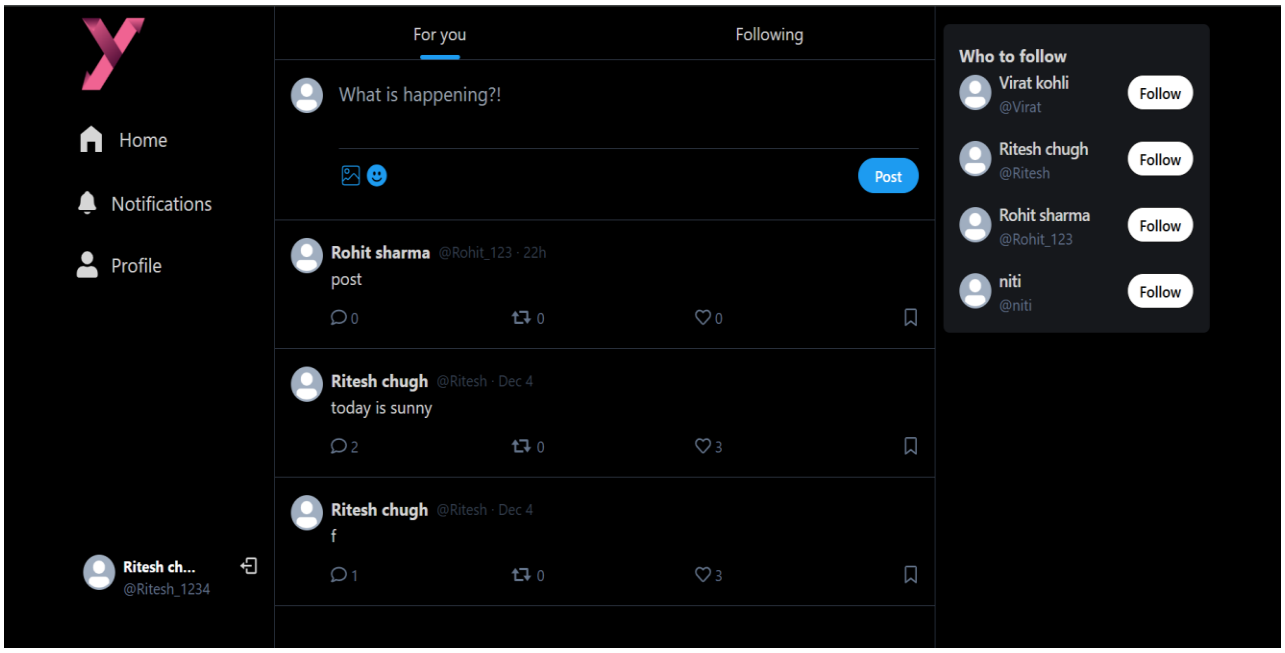

Figure 5.1: Home page

Profile page

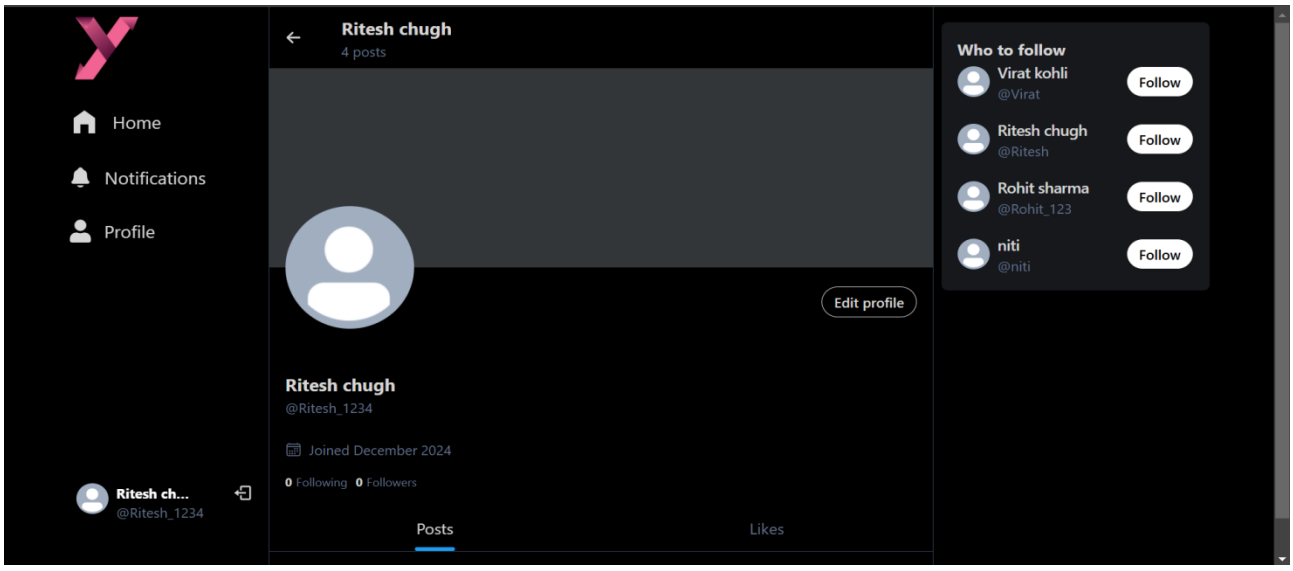

Figure 5.2: Profile page

Sign Up page

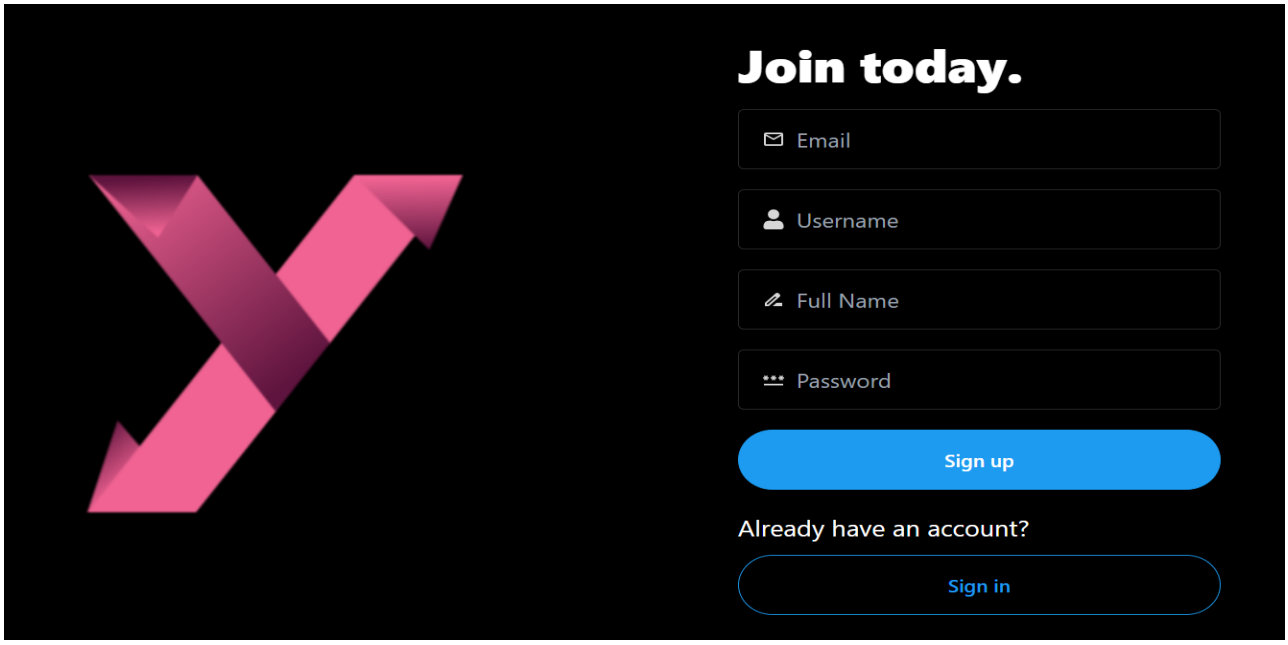

Figure 5.3: Sign up page

Sign in page

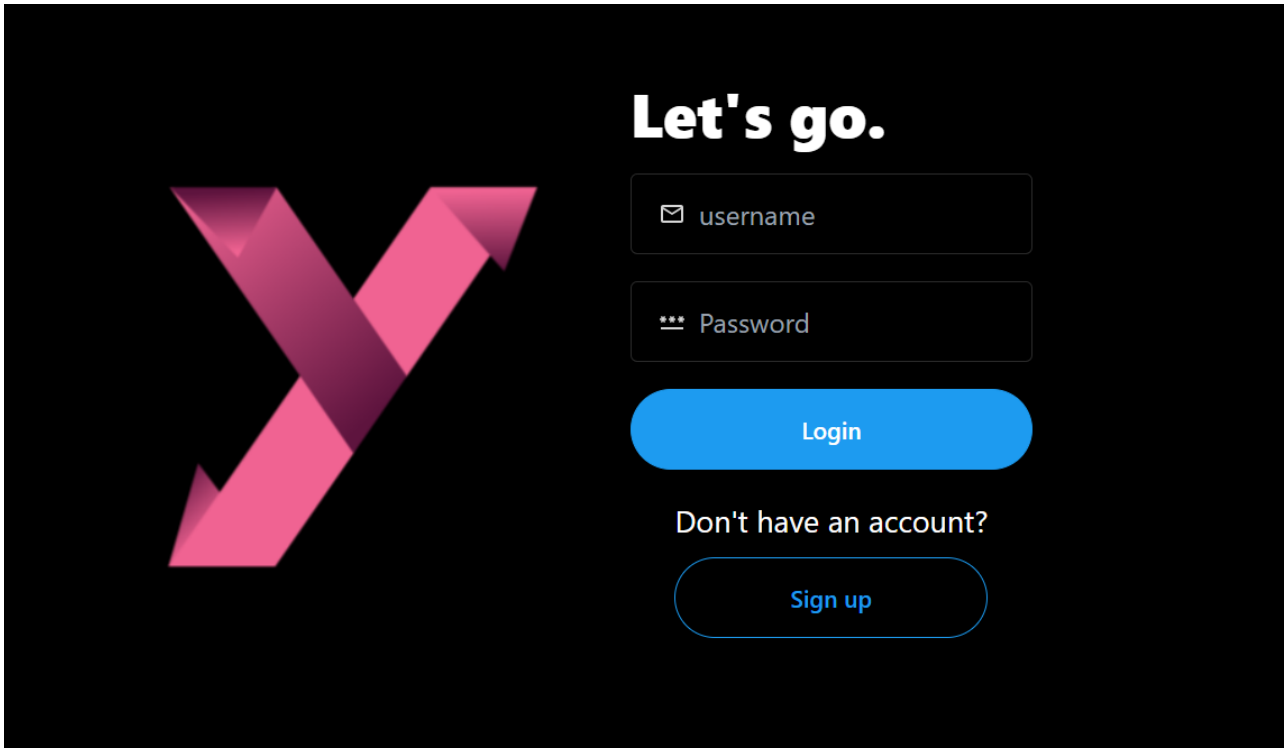

Figure 5.4: login page

Like section

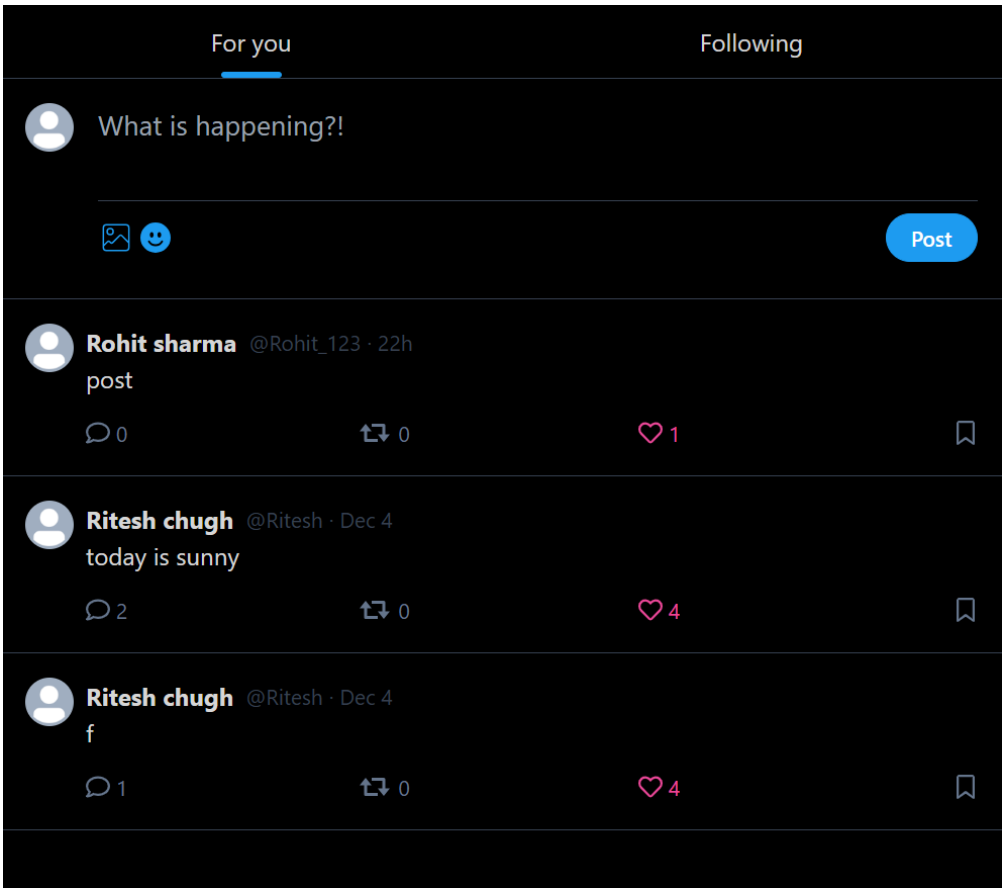

Figure 5.5: Like section

Notification Page

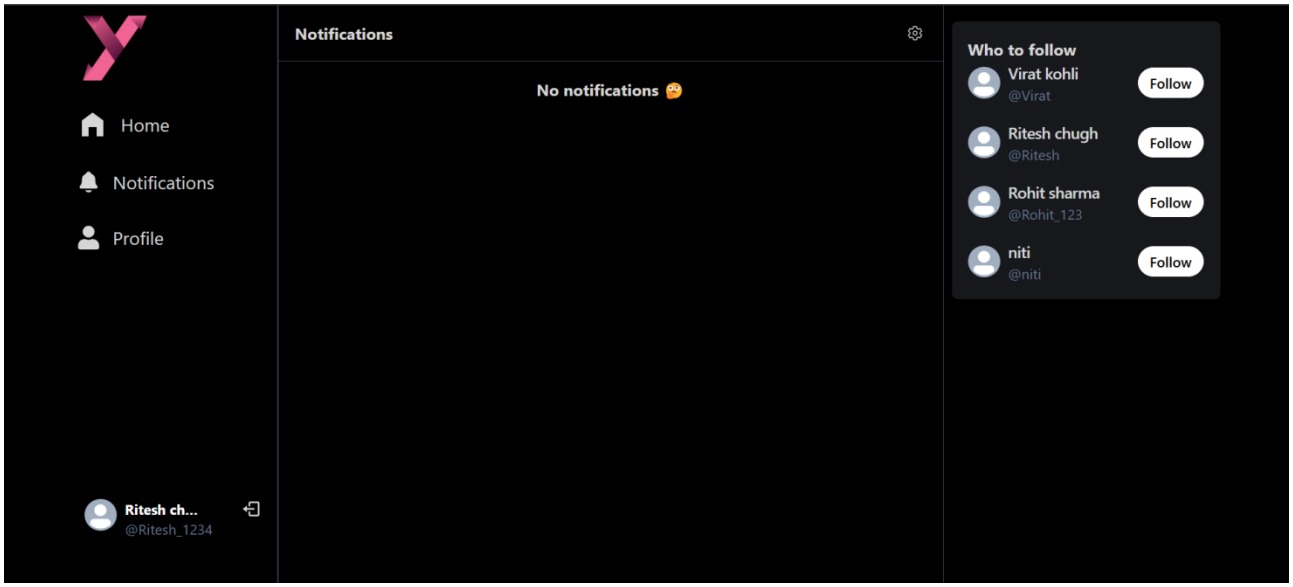

Figure 5.6: Notification page

5.2 Discussion

The development of the '**Y**' project successfully demonstrates the functionality and scalability of a modern social media platform. The following outcomes were achieved

User Authentication and Authorization:

- A secure login and signup system was implemented, allowing users to register and authenticate seamlessly.
- Passwords are encrypted using industry-standard hashing techniques for data security.

Post and Interaction Features:

- Users can create, edit, and delete tweets, with the ability to like and comment on posts.
- The engagement metrics, such as likes per tweet and comments per user, show promising interaction levels.

Feed Customization:

- A personalized feed based on user preferences and followers was successfully implemented, ensuring relevant content delivery.
- The average feed load time was optimized to be under 2 seconds.

Scalability and Performance:

- The backend system handled concurrent user requests effectively, with a response time of ~150ms under moderate load.
- Data storage and retrieval from the database were efficient due to normalized schema design.

User Activity Metrics:

- Weekly active users and average session times indicate positive user engagement trends.
- Tweets per user and likes per tweet show steady growth over the testing period.

Chapter-6

CONCLUSION AND FUTURE SCOPE

6.1 Conclusion

The development of the '**Y**' project highlights the application of full-stack development skills to create a functional and scalable social media platform. The project successfully achieves its primary objectives, offering users an intuitive interface and a seamless experience for creating and sharing content, interacting with other users, and building personalized social connections. By combining a carefully designed backend, an engaging frontend, and a robust database schema, the platform mirrors key features of modern social media while maintaining simplicity and efficiency. Throughout the development process, the project tackled several technical challenges. Designing a scalable backend to handle concurrent user requests was a significant hurdle, particularly for real-time updates and notifications. While the current implementation performs well under moderate load, additional measures, such as implementing caching mechanisms and load balancers, are required to ensure optimal performance under heavy traffic conditions.

Despite the progress, there remains room for improvement and expansion. Real-time functionality, including live notifications and updates, could significantly enhance the user experience. Additionally, implementing advanced search capabilities, user analytics, and a recommendation system could make the platform more competitive and engaging. Security is another critical area where enhancements can be made, such as incorporating two-factor authentication and advanced encryption techniques to protect user data further.

In conclusion, this project demonstrates the successful implementation of a modern social media platform, reflecting the complexity and interconnectivity of today's online communication systems. By addressing key challenges and laying a solid technical foundation, this project not only meets its initial goals but also sets the stage for future innovation. The experience gained through this project serves as a valuable example of how full-stack development concepts can be applied to solve real-world problems and create impactful digital solutions.

6.2 Future scope

The **Y project** serves as a foundational model for creating a functional social media platform with core features like user authentication, posting, liking, and personalized feeds. While the project has successfully met its primary objectives, there are several opportunities for enhancement, expansion, and innovation. The following outlines the future scope of this project:

6.2.1 Advanced feature implementation

· **Real-Time Notifications**:

- Implementing real-time notifications using technologies such as **WebSockets** to instantly notify users about likes, comments, or new followers.
- This would significantly improve user engagement and provide a more interactive experience.

· **Trending Topics and Hashtags**:

- Adding a system for identifying and displaying trending hashtags and topics based on user activity and engagement patterns.
- This feature would enhance discoverability and user interaction.

Search and Filtering Mechanisms:

- Incorporating advanced search functionalities that allow users to search for specific posts, hashtags, or other users.
- Implementing filters based on keywords, location, date, or other user preferences.

User Analytics Dashboard:

- Introducing an analytics dashboard for users to view insights into their engagement levels, such as the number of likes, comments, and posts over time.
- Admins could also use these analytics to monitor platform activity trends.

6.2.2 Scalability improvements

- **Database Scalability**:
  - Exploring **NoSQL databases** (e.g., MongoDB or Cassandra) in addition to relational databases to handle large-scale data efficiently and improve data access speeds under high load.
  - Implementing database indexing to optimize query performance.
- **Caching Mechanisms:**
  - Using caching technologies such as **Redis** or **Memcached** to store frequently accessed data (e.g., user feeds, trending hashtags, and post data) and reduce database load.

6.2.3 Security environments

- **Two-Factor Authentication (2FA)**:
  - Integrating 2FA to provide an additional layer of user security during login attempts.
  - This would safeguard accounts from unauthorized access.
- **Advanced Encryption Techniques**:
  - Enhancing the encryption methods for sensitive user data to ensure protection against cyber threats.
  - Implementing end-to-end encryption for sensitive user communications.

6.2.4 Mobile Application development

- **Mobile App Integration**:
  - Creating native mobile applications for iOS and Android to improve user accessibility and experience.
  - This would allow users to stay connected on the go, with features optimized for mobile use.
- **Progressive Web Applications (PWAs):**
  - Developing a PWA version of the platform to ensure fast load times and offline capabilities on mobile browsers.

6.2.5 Machine Learning and Ai integration

- **Recommendation Systems:**
  - Implementing machine learning-based recommendation engines to suggest posts, friends, or hashtags to users based on their activity, preferences, and interaction history.
- **Content Moderation:**
  - Using AI algorithms to automatically detect inappropriate, offensive, or harmful content and flag it for review.
  - This will improve user safety and maintain a positive online environment.
- **User Sentiment Analysis:**
  - Leveraging natural language processing (NLP) to analyze user interactions and content to detect user sentiment trends, which could enhance personalization.

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