Shri Vile Parle Kelavani Mandal's
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)

Connect-Online Social Network

By

Ayush Prabhu	**60003220218**
Dewansh Gopani	**60003220115**
Adnan Merchant	**60003220084**
Ayush Parmar	**60003220092**

Under the guidance of

Ms.Prachi Satam

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1. Introduction

1.1 Project Overview

This project implements a full-stack social media platform using the MERN stack (MongoDB, Express.js, React.js, Node.js). Users can register and log in, post text and images, follow/unfollow other users, like and “retweet” (repost) content, and comment on posts. A real-time notification system informs users when someone likes or reposts their content or starts following them..

1.2 Purpose and Objectives

- **Enable content creation:** Allow users to publish posts containing text and images.
- **Foster engagement:** Support likes, comments, and reposts to facilitate interaction.
- **Follow system:** Let users follow/unfollow each other to curate personal feeds.
- **Notifications:** Notify users of likes, reposts, comments, and new followers in real time.
- **Responsive UI:** Ensure the interface adapts smoothly across desktop and mobile devices.

1.3 Scope and Limitations

Scope:

- User authentication and profile management.
- Post creation (text + image upload) and feed display.
- Like, comment, and repost functionality.
- Follow/unfollow and personalized feed algorithms.
- Notification centre for user interactions.

Limitations:

- No direct messaging between users.
- Image uploads limited to predefined file types/sizes.
- No hashtag search or trending-topic analysis.
- Notifications stored only in-app (no email/SMS alerts).

1.4 Contribution as a Member of Team

- Designed and implemented both frontend and backend.
- Handled API integration and MongoDB schema modeling.
- Deployed frontend and backend to Render.
- Built React front-end with state management and responsive design..

2. Requirements and Analysis

2.1 Functional Requirements

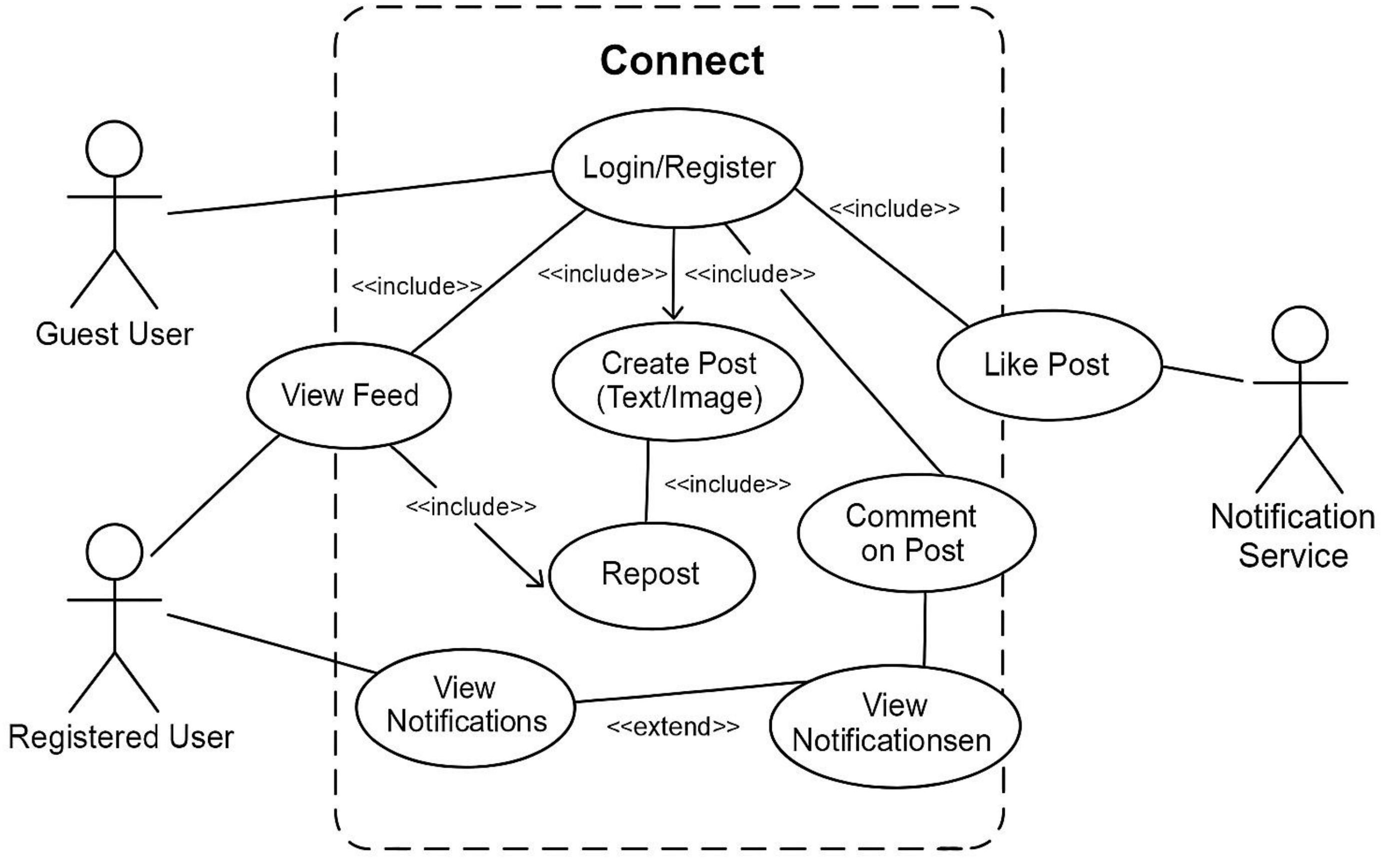
- **User Registration & Login** (JWT-based).
- **Profile Management:** Edit display name, avatar, bio.
- **Post Creation:** Upload text and images.
- **Engagement:** Like, comment, and repost posts.
- **Social Graph:** Follow and unfollow users.
- **Notifications:** Real-time alerts on likes, reposts, follows, comments.
- **Feed:** Personalized timeline ordered by recency & connections.

2.2 Non-Functional Requirements

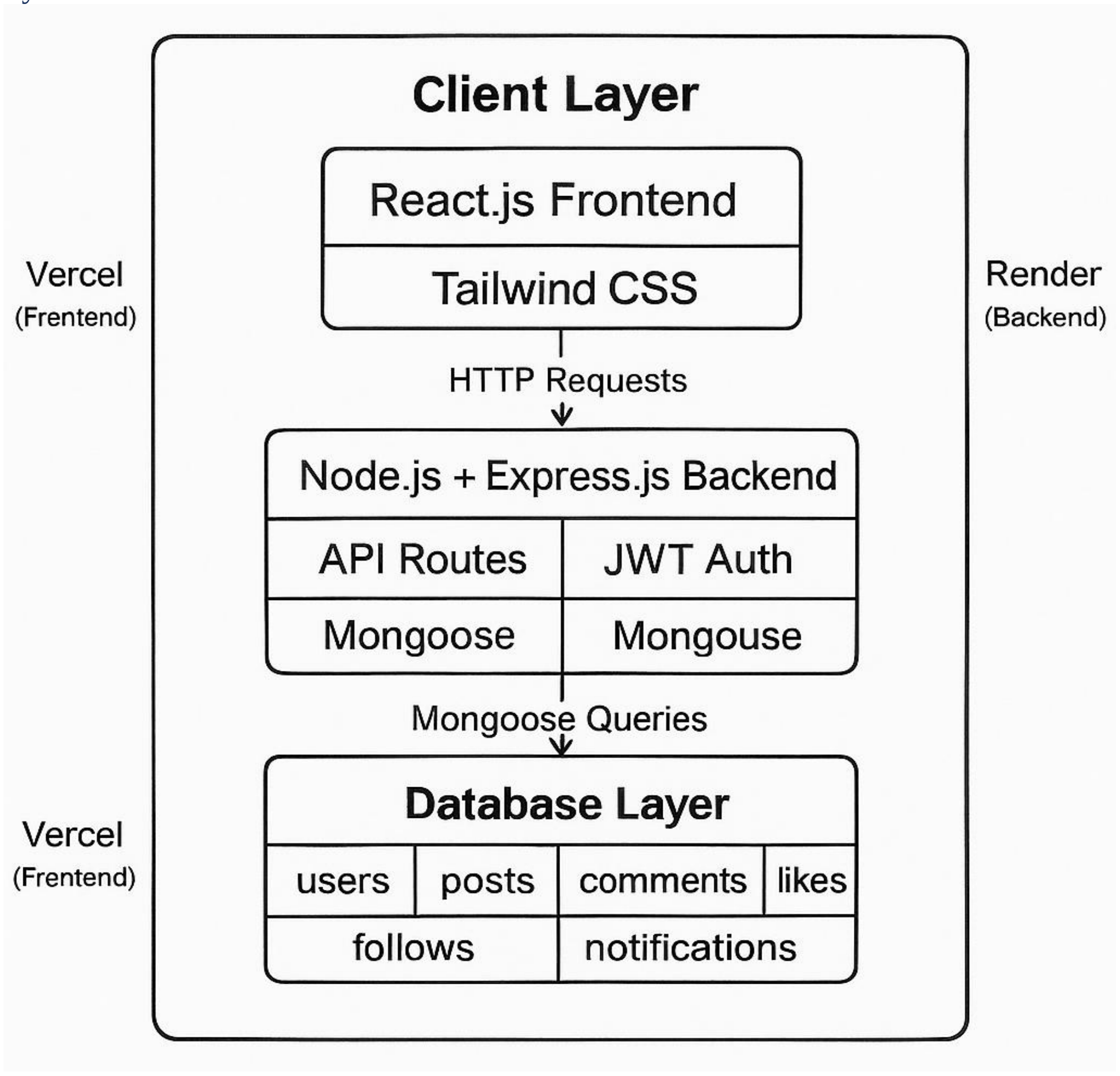
- **Performance:** API latency under 200 ms for common queries.
- **Scalability:** Horizontal scaling of back end and database sharding ready.
- **Security:** Secure password hashing, JWT expiry, CORS policy.
- **Usability:** Intuitive, mobile-first UI with accessible components.
- **Reliability:** Automatic retries for failed image uploads.

2.3 Use Case Diagrams

- **Visitor:** Browse public posts feed.
- **Registered User:**
- Login → Create/Edit Post → View Feed → Engage (like/comment/repost) → View Notifications → Follow/Unfollow.
- **System Admin (future):** Moderate posts, manage user accounts.


Connect
Login/Register
Guest User
<<include>>
<<include>>
<<include>>
<<include>>
View Feed
Create Post (Text/Image)
Like Post
Notification Service
<<include>>
<<include>>
Comment on Post
Repost
Registered User
View Notifications
<<extend>>
View Notificationsen

3. System Architecture



3.1 Database Architecture

MongoDB collections include:

- user (username, fullname, password, email,followers,unfollowers, likedpost,timestamp)
- post (user,test,img,likes,comment)
- notification (from,to,type)

3.2 Interaction Flow between Frontend and Backend

- Frontend sends HTTP requests (Axios/Fetch) to backend routes.
- Backend APIs interact with MongoDB and return responses.
- JWTs are used to secure protected routes.

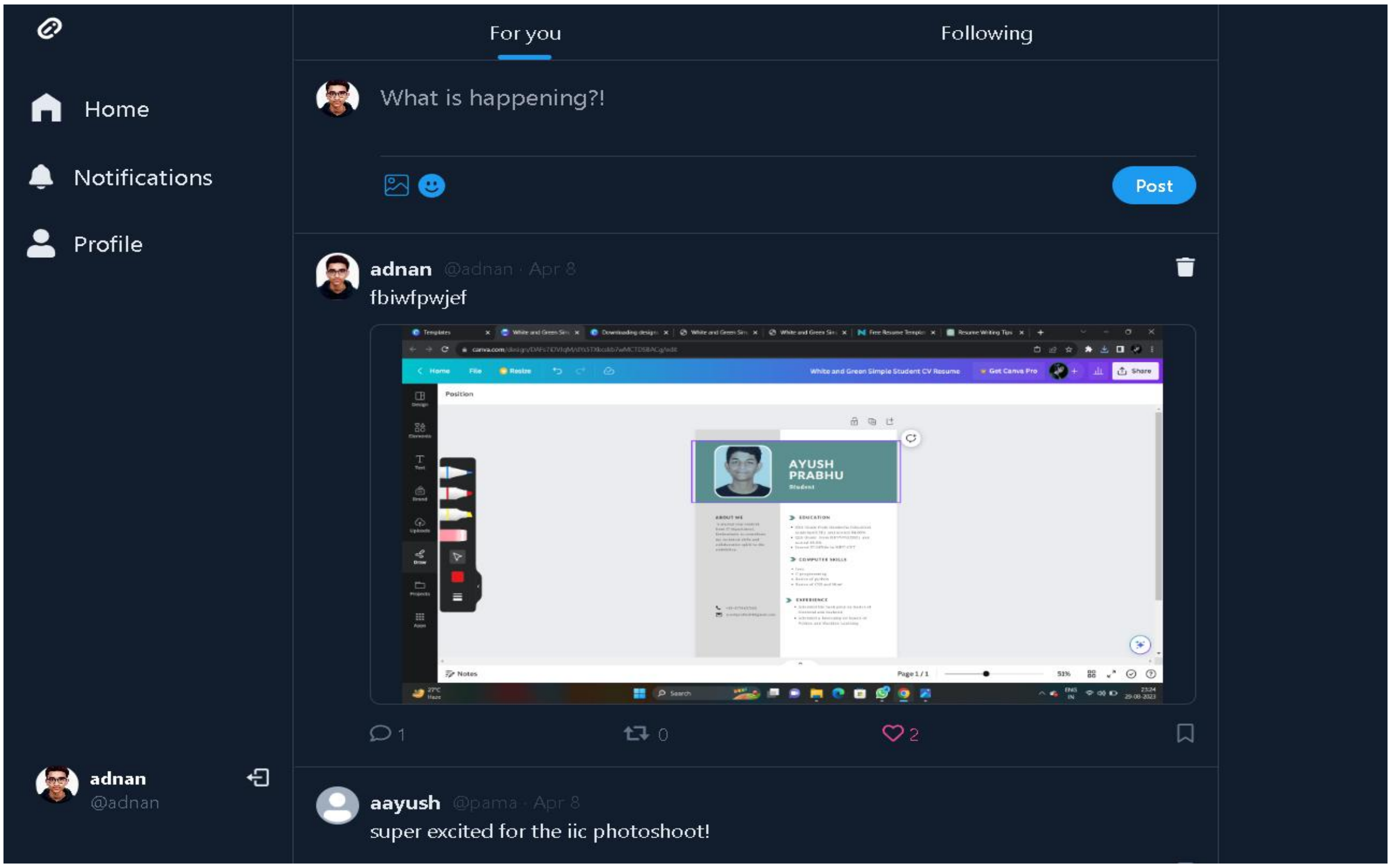
3.3 Tools and Frameworks

- **Frontend**: React.js, TailwindCSS,
- **Backend**: Node.js, Express.js, MongoDB, Mongoose

- **Authentication**: JWT
- **Deployment**: Render(Frontend), Render (Backend)

4. Frontend Development

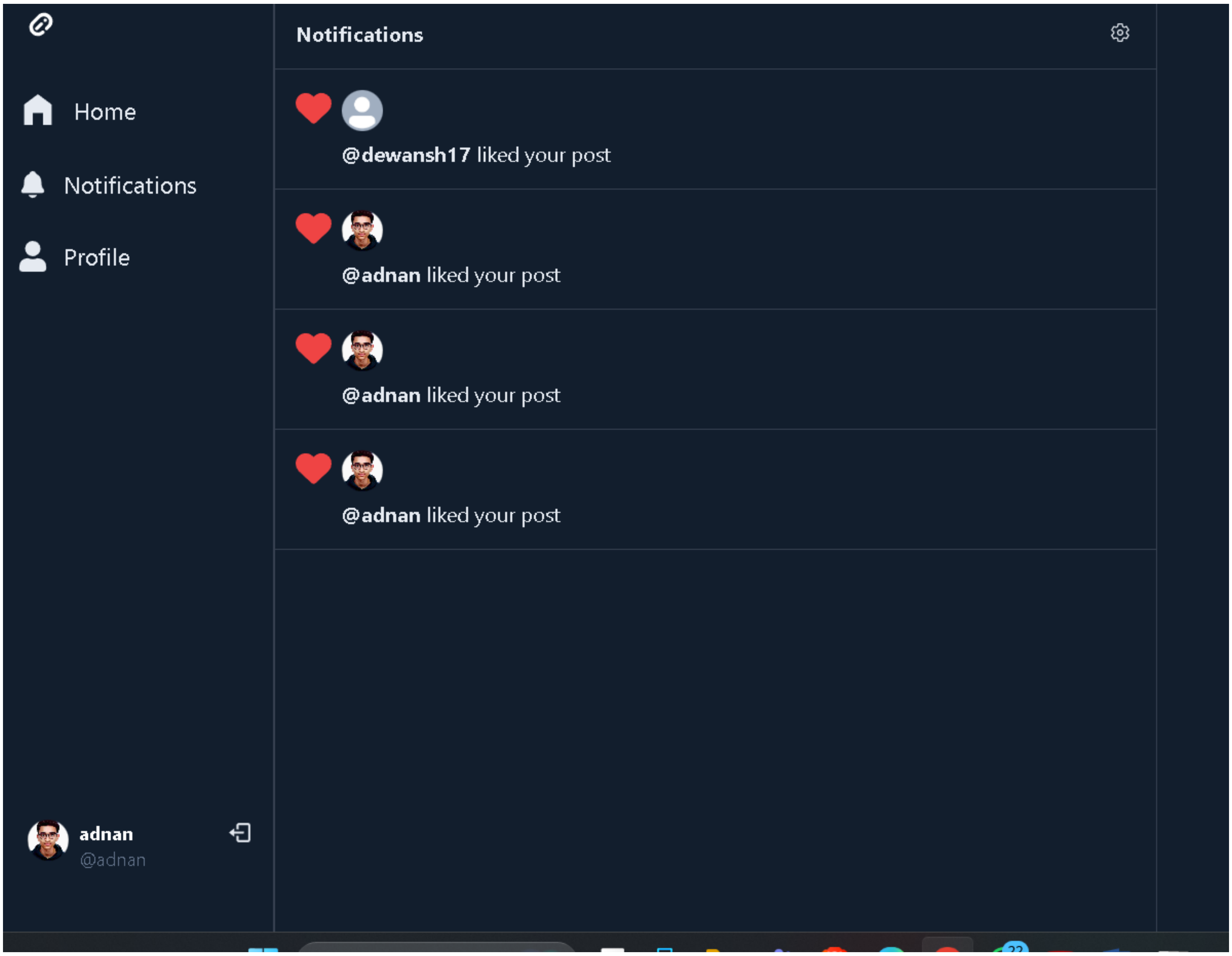
4.1 Design and Layout (UI/UX)



fbiwfpwjef

super excited for the iic photoshoot!

Notification



Notifications

@dewansh17 liked your post

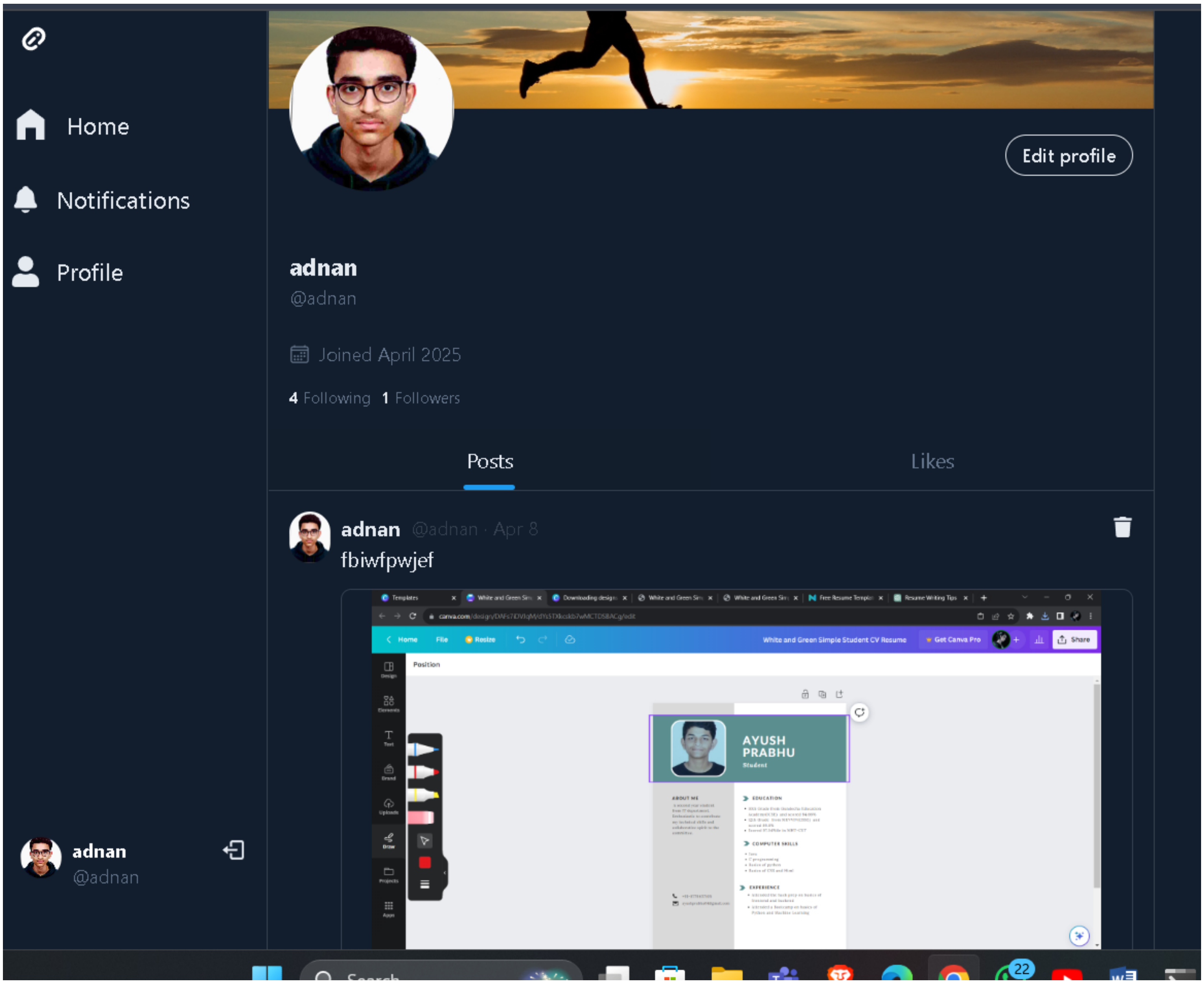
@adnan liked your post

@adnan liked your post

@adnan liked your post

`

Profile



adnan
@adnan

Joined April 2025

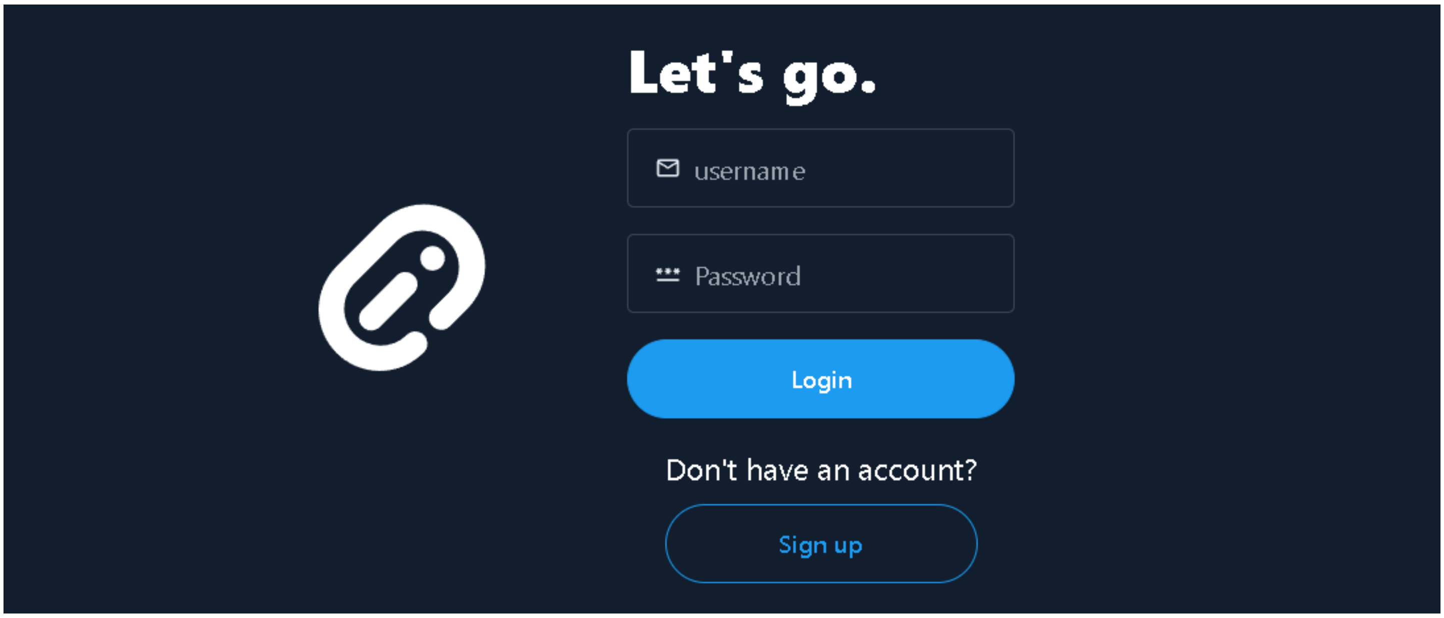
4 Following 1 Followers

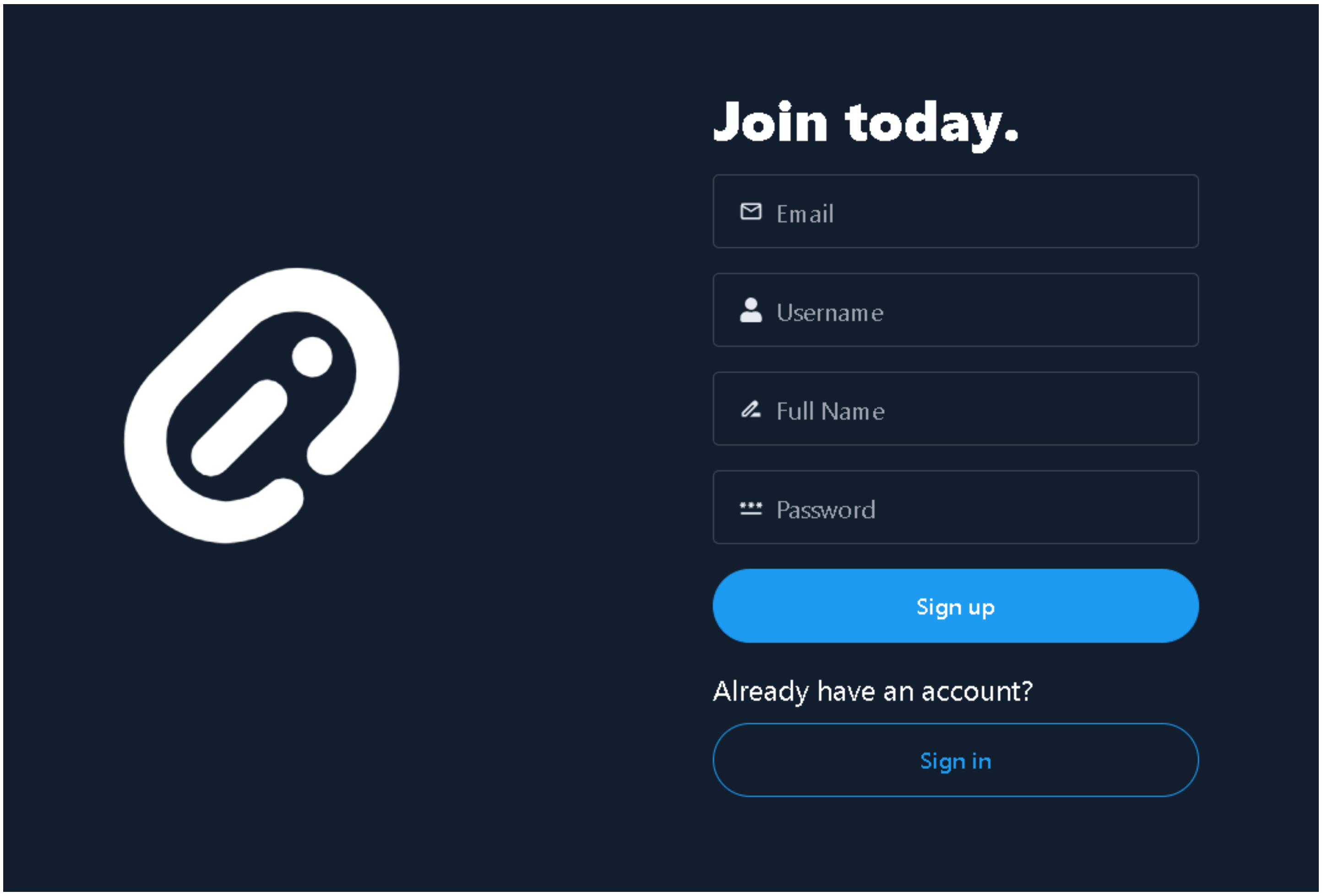
adnan @adnan · Apr 8
fbiwfpwjef

adnan
@adnan

4.2 Components and Pages

- Login/Register page





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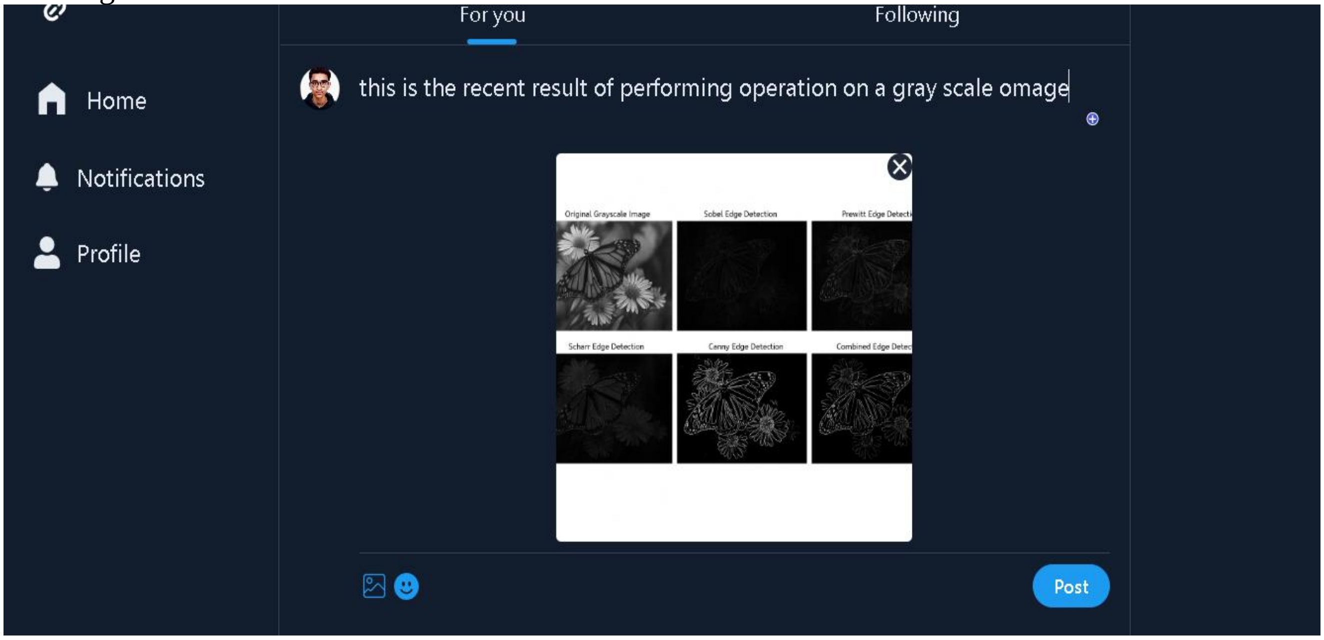
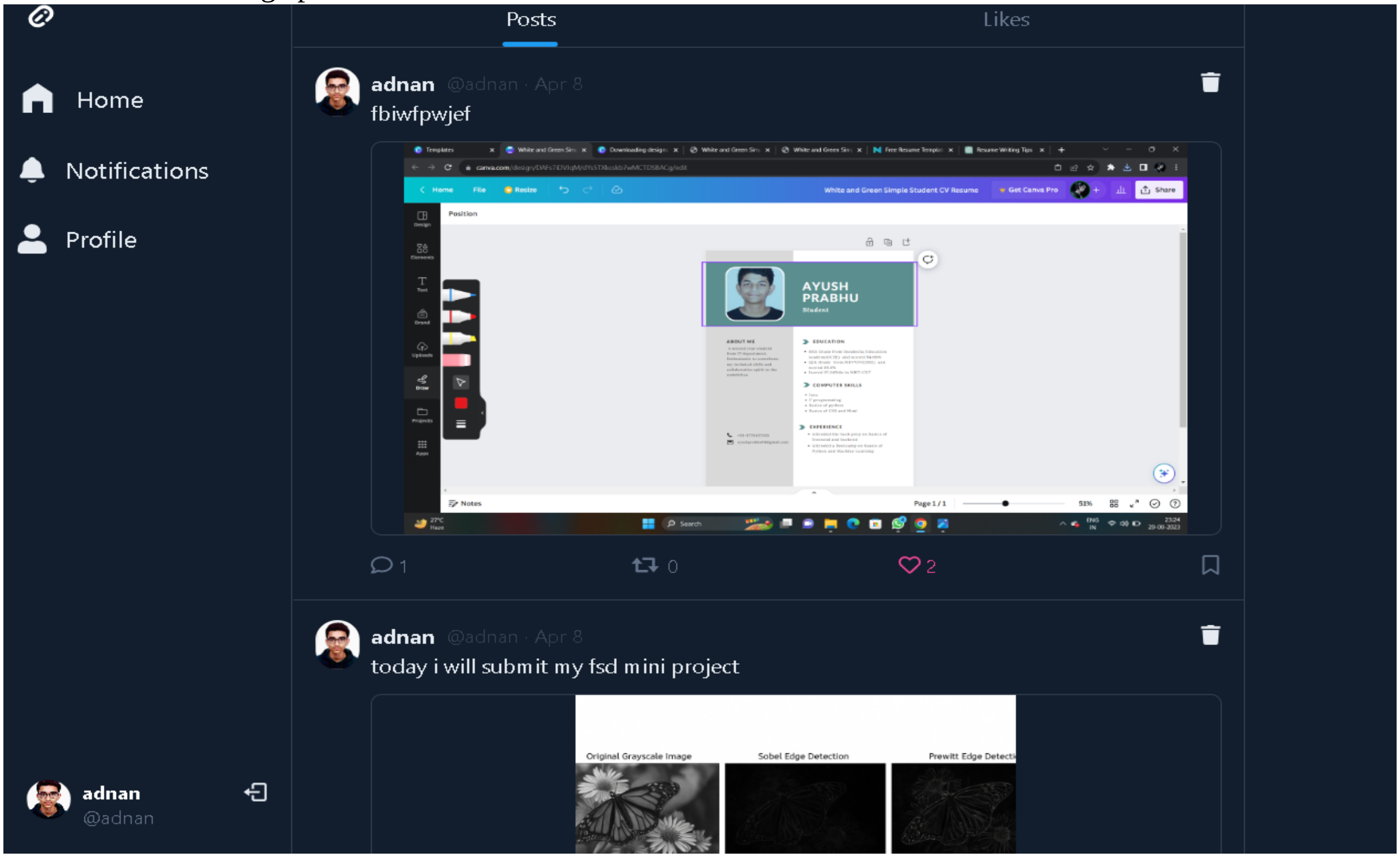
- Post Page



this is the recent result of performing operation on a gray scale omage

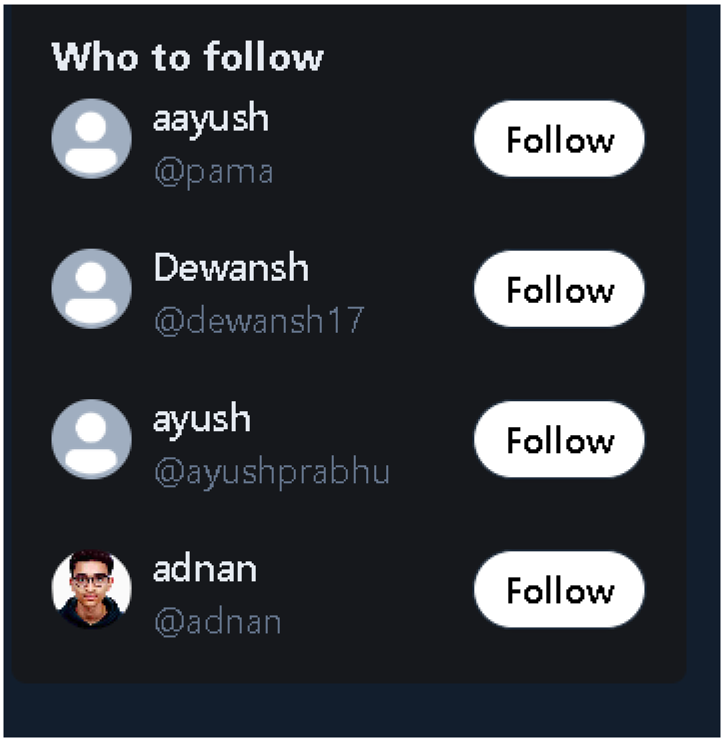
-
- Profile Page post



adnan @adnan · Apr 8
fbiwfpwjef

adnan @adnan · Apr 8
today i will submit my fsd mini project

- Personalised User recommendation



4.3 Error Handling and Validation

- Client-side validation using regex and conditionals.
- Toast messages for success/error status.
- Display messages for invalid login or failed uploads.

5. Backend Development

5.1 Backend Technologies Used

- Node.js with Express.js
- MongoDB with Mongoose
- JSON Web Tokens (JWT)

5.2 RESTful API Development

- `POST /api/auth/login`
- /api/notificarion – view notification
- /api/profile/username– profile page

5.3 Database Schema and Models

- user (username, fullname, password, email,followers,unfollowers, likedpost,timestamp)
- post (user,test,img,likes,comment)
- notification (from,to,type)

5.4 Server Configuration and Setup

- .env file for environment variables
- Configured CORS and middleware in server.js
- MongoDB connected using Mongoose

5.5 Authentication and Authorization

- JWT-based login, with role-based access control
- Middleware to check token and user role

5.6 Data Validation and Error Handling

- Backend input validation using custom middleware
- Try-catch blocks and Express error handling middleware

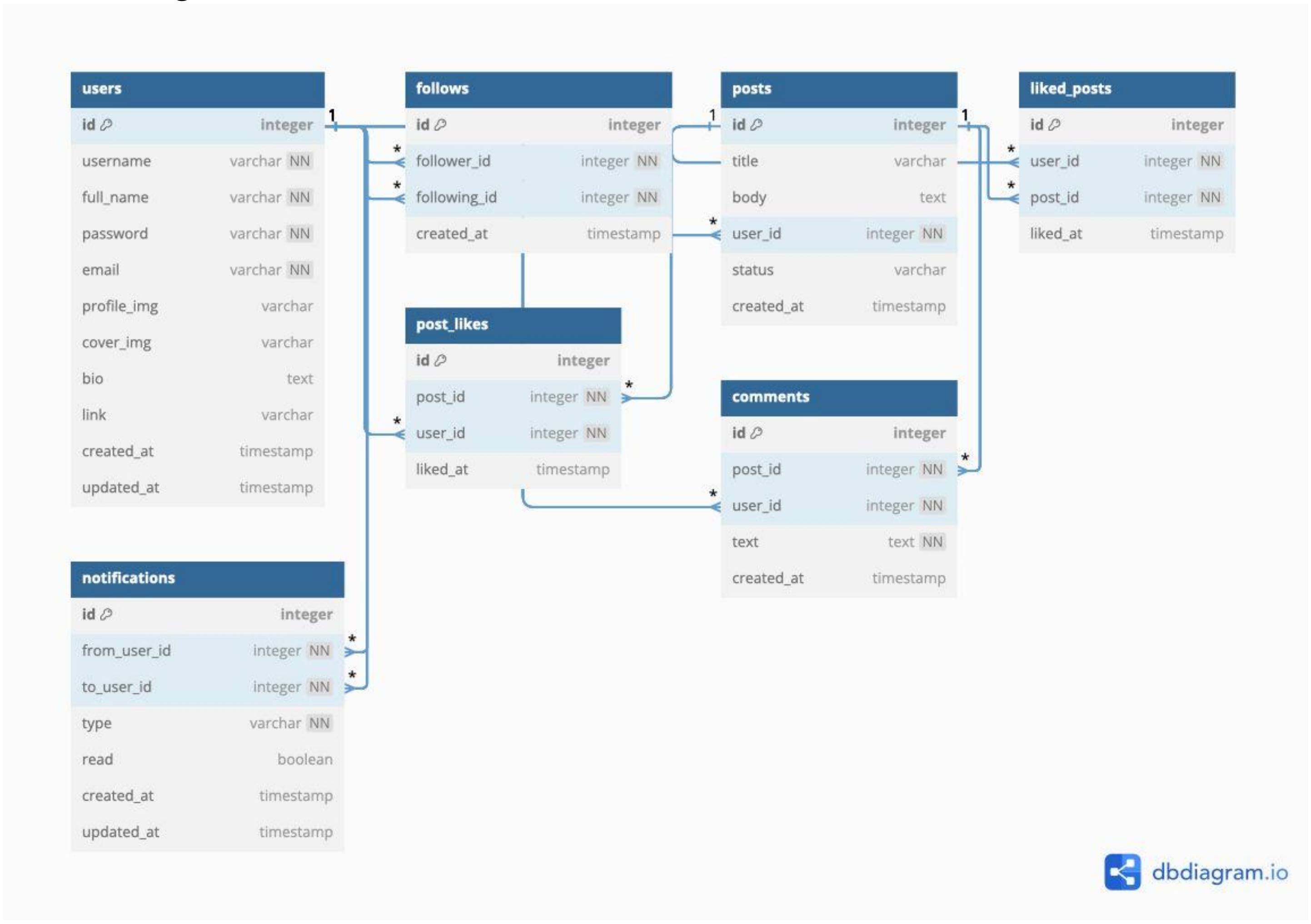
6. Database Design

6.1 Schema Design

```
// models/User.js
import mongoose from "mongoose";

const userSchema = new mongoose.Schema(
	{
		username: {
			type: String,
			required: true,
			unique: true,
		},
		fullName: {
			type: String,
			required: true,
		},
		password: {
			type: String,
			required: true,
			minLength: 6,
		},
		email: {
			type: String,
			required: true,
			unique: true,
		},
		followers: [
			{
				type: mongoose.Schema.Types.ObjectId,
				ref: "User",
				default: [],
			},
		],
		following: [
			{
				type: mongoose.Schema.Types.ObjectId,
				ref: "User",
				default: [],
			},
		],
		profileImg: {
			type: String,
			default: "",
		},
		coverImg: {
```

```
                        type: String,
                        default: "",
                },
                bio: {
                        type: String,
                        default: "",
                },

                link: {
                        type: String,
                        default: "",
                },
                likedPosts: [
                        {
                                type: mongoose.Schema.Types.ObjectId,
                                ref: "Post",
                                default: [],
                        },
                ],
        },
        { timestamps: true }
);

const User = mongoose.model("User", userSchema);

export default User;

  // models/Post.js

  import mongoose from "mongoose";

  const postSchema = new mongoose.Schema(
        {
                user: {
                        type: mongoose.Schema.Types.ObjectId,
                        ref: "User",
                        required: true,
                },
                text: {
                        type: String,
                },
                img: {
                        type: String,
                },
                likes: [
                        {
                                type: mongoose.Schema.Types.ObjectId,
					ref: "User",
				},
			],
			comments: [
				{
					text: {
						type: String,
						required: true,
					},
					user: {
						type: mongoose.Schema.Types.ObjectId,
						ref: "User",
						required: true,
					},
				},
			],
	},
	{ timestamps: true }
);

const Post = mongoose.model("Post", postSchema);

export default Post;

// models/notification.js

import mongoose from "mongoose";

const notificationSchema = new mongoose.Schema(
	{
			from: {
				type: mongoose.Schema.Types.ObjectId,
				ref: "User",
				required: true,
			},
			to: {
				type: mongoose.Schema.Types.ObjectId,
				ref: "User",
				required: true,
			},
			type: {
				type: String,
				required: true,
				enum: ["follow", "like"],
			},
			read: {
				type: Boolean,
                    default: false,
            },
    },
    { timestamps: true }
);

const Notification = mongoose.model("Notification", notificationSchema);

export default Notification;
```

6.2 ER Diagram



6.3 Data Integrity and Validation

- Unique constraints on email
- Status enum for booking requests
- Role-based constraints enforced via middleware

7. Integration of Frontend and Backend

7.1 API Integration Overview

- Role tokens stored in local storage for auth.
- Protected routes render conditionally based on login state.

7.2 State Management (if applicable)

- React useState and useEffect hooks
- Context API used to share auth/user info globally

7.3 Error Handling During Integration

- Try-catch blocks and error boundaries in React.
- Backend errors passed via JSON response and shown in frontend alerts

8. Testing

8.1 Unit Testing (Frontend and Backend)

- Basic testing using console and Postman for backend APIs.
- Component testing using manual validation in browser.

8.2 Integration Testing

- End-to-end booking flow tested from form to approval.
- Timetable upload tested for various Excel formats.

8.3 Functional Testing

- All roles tested with expected and edge-case inputs.
- Booking rejection and update scenarios verified.

9. Deployment

9.1 Deployment Strategy

- Frontend deployed on Vercel (CI/CD enabled with GitHub)
- Backend deployed on Render with auto-redeploy on commit

9.2 Setting Up the Server

- Render backend: Configured start command and environment variables
- MongoDB Atlas used as cloud DB

9.3 Domain Name and Hosting

- Vercel auto-generated URL used (can map custom domain if needed)
- Render backend served via HTTPS endpoint

10. Conclusion

10.1 Project Summary
Built a scalable, real-time social media platform with core features: posting, liking, commenting, following, and notifications..
10.2 Challenges Faced

- Handling concurrent updates to likes/reposts.
- Efficiently pushing real-time notifications at scale.
- Designing a clean, responsive UI.
- API integration with proper error handling.

10.3 Future Enhancements and Improvements

- Direct messaging between users.
- Hashtag and search functionality.
- Email/SMS notification integration.
- Analytics dashboard (post reach, engagement metrics).

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10.4 Learning Outcomes

- Deepened understanding of MERN architecture.
- Experience with real-time WebSocket integrations.
- Best practices in REST API design and secure authentication.
- Improved understanding of role-based authentication and backend integration.

11. References

- MongoDB & Mongoose documentation
- Express.js official guides
- React.js and Tailwind CSS docs
- Socket.io real-time communication guide