Project Title: ProfileBook

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Date: 08 Sept 2025

Batch Name: WIPRO NGA- .Net Full Stack

Angular- FY26

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1. Problem Definition and Objectives

ProfileBook is an online social media platform that connects people virtually. Users can post content, message other users, and report users. Admins manage users, approve posts, and handle reported users.

Project Goals and Objectives

- **Primary Goal:** Develop a full-stack social media platform with comprehensive admin management

- **User Management:** Implement secure user registration, authentication, and profile management

- **Content Management:** Create post creation, approval workflow, and content moderation system

- **Administrative Control:** Build admin dashboard for user management, content approval, and reporting

- Group Functionality: Enable users to create and manage groups with messaging capabilities

2. Frontend & Backend Architecture

Technology Stack Overview

Frontend Architecture

- Framework: Angular 17 with Standalone Components

- UI Framework: Bootstrap 5.3 with custom SCSS styling

- State Management: RxJS with BehaviorSubject pattern

- Routing: Angular Router with lazy loading and route guards

- Authentication: JWT-based token management with localStorage

- HTTP Client: Angular HttpClient with interceptors

Backend Architecture

- Framework: ASP.NET Core 8.0 Web API

- Database: SQL Server with Entity Framework Core

- Authentication: ASP.NET Core Identity with JWT Bearer tokens

- Architecture Pattern: Service-Repository pattern with dependency injection

- API Documentation: Swagger/OpenAPI integration

- Security: CORS policy, JWT validation, role-based authorization

3. Component Breakdown & API Design

Frontend Component Architecture

Core Components (8 Main Components)

1. **Authentication Components**

- `LoginComponent` - User login with JWT token handling
- `RegisterComponent` - User registration with validation

2. **User Components**

- `FeedComponent` - Main social media feed with posts
- `ProfileComponent` - User profile management
- `MessagesComponent` - Direct messaging system
- `SearchComponent` - User and content search functionality
- `MyPostsComponent` - Personal post management
- `NotificationsComponent` - User notification center

3. **Admin Components**

- `AdminDashboardComponent` - Administrative overview
- `PostApprovalComponent` - Content moderation
- `UserManagementComponent` - User administration
- `ReportManagementComponent` - Report handling

- `GroupManagementComponent` - Group administration

Service Layer (8 Services)

- `AuthService` - Authentication and user session management
- `PostService` - Post CRUD operations and interactions
- `MessageService` - Direct messaging functionality
- `UserService` - User profile and management operations
- `AdminService` - Administrative operations
- `NotificationService` - User notification management
- `ReportService` - Report creation and management
- `UserGroupsService` - Group functionality and messaging

API Design & Endpoints

Authentication Endpoints

POST /api/auth/register - User registration

POST /api/auth/login - User authentication

POST /api/auth/logout - User logout

User Management Endpoints

GET /api/users - Get all users (Admin only)

GET /api/users/{id} - Get user by ID

PUT /api/users/{id} - Update user profile

DELETE /api/users/{id} - Delete user (Admin only)

GET /api/users/search - Search users

Post Management Endpoints

GET /api/posts - Get all posts

POST /api/posts - Create new post

PUT /api/posts/{id} - Update post

DELETE /api/posts/{id} - Delete post

POST /api/posts/{id}/like - Like/unlike post

GET /api/posts/{id}/comments - Get post comments

POST /api/posts/{id}/comments - Add comment

Admin Endpoints

GET /api/admin/posts/pending - Get pending posts for approval

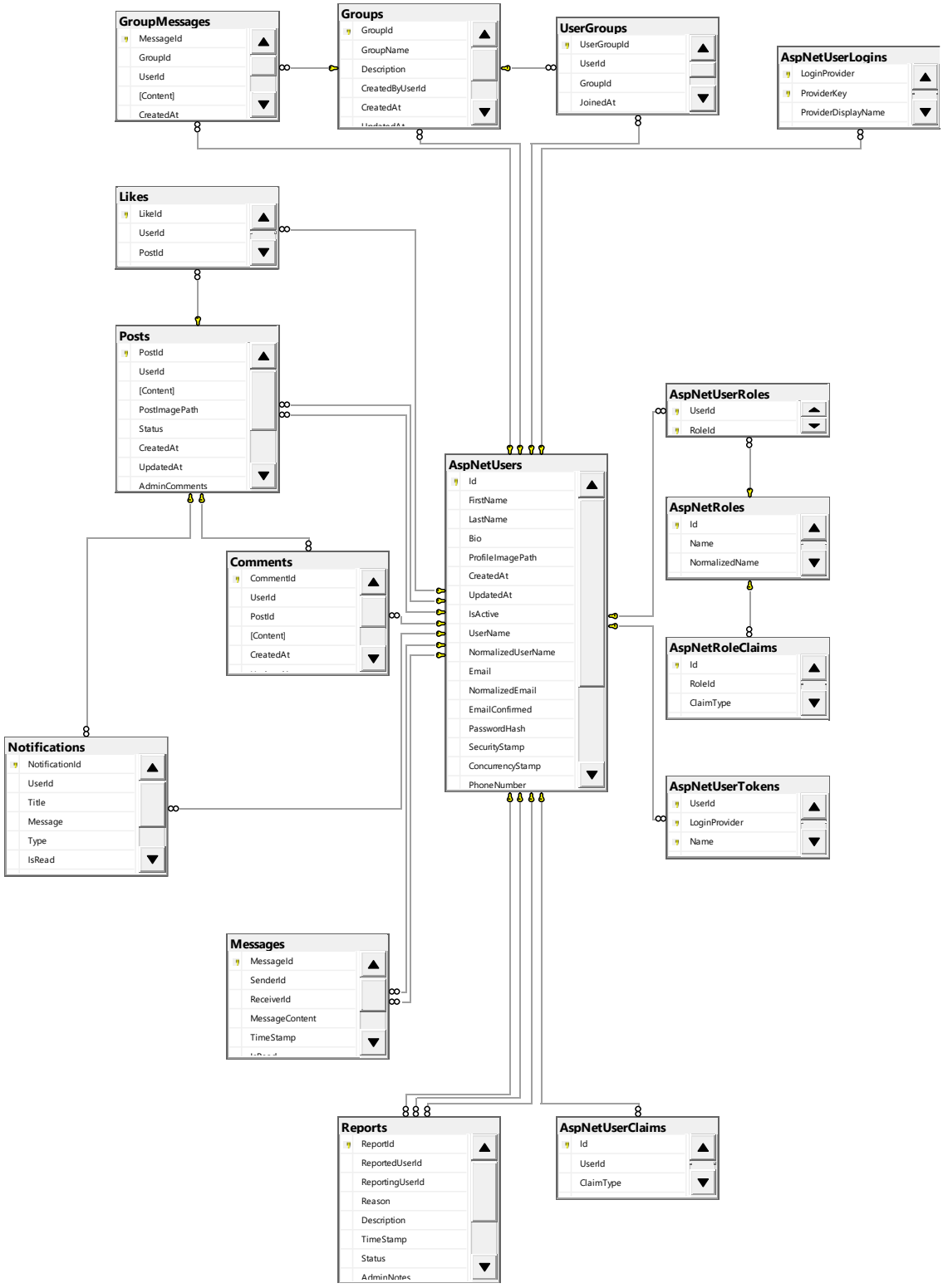
PUT /api/admin/posts/{id}/approve - Approve post

GET /api/admin/reports - Get all reports

PUT /api/admin/reports/{id} - Update report status

4. Database Design & Storage Optimization

Entity-Relationship Diagram (ERD)



Core Entities

1. **AspNetUsers** (Identity Framework)

- Primary Key: Id (nvarchar(450))

- Extended with: FirstName, LastName, Bio, ProfilePicture, CreatedAt, UpdatedAt, IsActive

2. **Posts**

- Primary Key: PostId (int, Identity)

- Foreign Keys: UserId, ApprovedByUserId

- Fields: Content, ImageUrl, Status, CreatedAt, UpdatedAt

3. **Groups**

- Primary Key: GroupId (int, Identity)

- Foreign Key: CreatedByUserId

- Fields: GroupName, Description, CreatedAt, UpdatedAt, IsActive

4. **UserGroups** (Many-to-Many)

- Primary Key: UserGroupId (int, Identity)

- Foreign Keys: UserId, GroupId

- Composite Unique Index: (UserId, GroupId)

5. **Messages**

- Primary Key: MessageId (int, Identity)

- Foreign Keys: SenderId, ReceiverId

- Fields: MessageContent, TimeStamp, IsRead

6. **Notifications**

- Primary Key: NotificationId (int, Identity)
- Foreign Keys: UserId, PostId (nullable)
- Fields: Title, Message, Type, IsRead, CreatedAt

Database Relationships

- **One-to-Many:** User → Posts, User → Messages (Sent/Received), User → Groups (Created)
- **Many-to-Many:** Users ↔ Groups (via UserGroups)
- **Self-Referencing:** Posts → Comments, Users → Followers

Storage Optimization Techniques

1. **Indexing Strategy**

- Clustered indexes on primary keys
- Non-clustered indexes on foreign keys
- Composite indexes for frequently queried combinations
- Unique indexes for business constraints

2. **Query Optimization**

- Entity Framework query optimization with Include() for eager loading
- Pagination implementation for large datasets
- Stored procedures for complex queries
- Database connection pooling

3. **Performance Features**

- Default value constraints with GETUTCDATE()
- Cascade delete rules for data integrity
- Proper normalization to 3NF
- Connection string optimization with MultipleActiveResultSets

5. Implementation Details

Authentication & Security

- **JWT Implementation:** 24-hour token expiration with HMAC SHA256 signing

- **Role-Based Authorization:** Admin and User roles with route guards

- **Password Security:** ASP.NET Core Identity with configurable password policies

- **CORS Configuration:** Specific origin allowance for frontend-backend communication

Key Features Implemented

1. **User Registration & Login** - Complete authentication flow

2. **Admin CRUD Operations** - Full administrative control panel

3. **Post Management** - Create, approve, edit, delete posts with image support

4. **Group Functionality** - Create groups, manage members, group messaging

5. **Real-time Notifications** - Event-driven notification system

6. **Responsive Design** - Bootstrap-based responsive UI with custom styling

6. Testing Strategy

Backend Testing (NUnit Framework)

- **Unit Tests:** 39 comprehensive tests covering all controllers and services

- **Test Coverage:** AuthController, AdminController, PostsController, UsersController, GroupsController

- **Service Testing:** TokenService validation and JWT generation testing

- **Database Testing:** In-memory Entity Framework for isolated testing

- **Mock Implementation:** Moq framework for dependency mocking

Testing Infrastructure

- **Framework:** NUnit 3.14.0 with modern Assert.That() syntax

- **Mocking:** Moq 4.20.69 for UserManager and service dependencies

- **Database:** Entity Framework InMemory for unit test isolation

- **Coverage:** Authentication, authorization, CRUD operations, error handling

7. Deployment & Configuration

Configuration Files

- **appsettings.json:** Database connection, JWT configuration, logging settings

- **Program.cs:** Service registration, middleware configuration, CORS setup

- **Environment Configuration:** Development and production environment separation

GitHub Deployment

- **Repository Structure:** Organized solution with API, Frontend, and Tests projects

- **Version Control:** Git with proper .gitignore for sensitive files

- **Documentation:** Comprehensive README with setup instructions

8. Conclusion

Project Achievements

ProfileBook successfully delivers a comprehensive social media platform meeting all evaluation criteria:

✅ **Database & Schema** - Complete relational database with proper relationships

✅ **Admin Login CRUD** - Full administrative control panel

✅ **User Registration & Login** - Secure authentication system

✅ **Angular Frontend Template** - Professional responsive design

✅ **Code Sanitization -** Clean, well-structured codebase

✅ **CRUD Functionalities** - Complete data operations

✅ **Responsiveness & Validation** - Bootstrap responsive design with validation

✅ **Session Handling** - JWT-based session management

✅ **Frontend-Backend Integration** - Seamless API integration

✅ **Testing** - Comprehensive NUnit test suite