**Messaging System Documentation**

**Overview**

This document outlines the design and implementation details of a messaging system for an educational platform. The system facilitates communication between administrators, students, teachers, and staff through both broadcast and individual messages.

**Features**

1. **Admin Functionality**:
   * Send broadcast messages to specific groups (students, teachers, sub-teachers, staff).
   * Send individual messages to selected recipients.
   * Attach files or other attachments to messages.
2. **Users (Students, Teachers, Sub-Teachers, and Staff) Functionality**:
   * View messages (individual and broadcast) in their dashboard inbox.
   * Send individual messages to the admin.
3. **Message Visibility**:
   * Individual messages are visible only to the recipient.
   * Broadcast messages are visible to all users in the targeted group.

**Database Schema**

**Tables**

1. **grades**
2. CREATE TABLE grades (
3. id INT PRIMARY KEY AUTO\_INCREMENT,
4. grade\_name VARCHAR(50) NOT NULL

);

1. **user**
2. CREATE TABLE user (
3. username VARCHAR(50) PRIMARY KEY,
4. role ENUM('Teacher', 'NoClass\_Teacher', 'Staff') NOT NULL,
5. password VARCHAR(255) NOT NULL,
6. active TINYINT(1) DEFAULT 1

);

1. **students**
2. CREATE TABLE students (
3. id INT PRIMARY KEY,
4. name VARCHAR(100) NOT NULL,
5. username VARCHAR(50) NOT NULL,
6. password VARCHAR(255) NOT NULL,
7. grade\_id INT,
8. FOREIGN KEY (id) REFERENCES student\_admissions(id) ON DELETE CASCADE,
9. FOREIGN KEY (grade\_id) REFERENCES grades(id) ON DELETE CASCADE

);

1. **admin**
2. CREATE TABLE admin (
3. id INT PRIMARY KEY,
4. username VARCHAR(50) NOT NULL,
5. password VARCHAR(255) NOT NULL

);

1. **messages**
2. CREATE TABLE messages (
3. id INT PRIMARY KEY AUTO\_INCREMENT,
4. sender\_username VARCHAR(50) NOT NULL,
5. receiver\_username VARCHAR(50), -- NULL for broadcast messages
6. content TEXT NOT NULL,
7. attachment\_path VARCHAR(255), -- Optional file attachment path
8. is\_broadcast TINYINT(1) DEFAULT 0, -- 1 for broadcast messages
9. target\_group ENUM('Students', 'Teachers', 'NoClass\_Teachers', 'Staff') NULL, -- Broadcast target group
10. grade\_id INT NULL, -- For student broadcasts
11. timestamp TIMESTAMP DEFAULT CURRENT\_TIMESTAMP,
12. is\_read TINYINT(1) DEFAULT 0,
13. FOREIGN KEY (sender\_username) REFERENCES admin(username) ON DELETE CASCADE,
14. FOREIGN KEY (receiver\_username) REFERENCES user(username) ON DELETE CASCADE

);

**Process Flow**

### ****Admin Workflow****

1. **Admin Login and Dashboard**
   * Admin logs in and navigates to the **Message Page**.
   * Choose between **Broadcast** and **Individual Messaging**.
2. **Broadcast Messaging**
   * Select **Broadcast** mode.
   * View recipient options: Students, Teachers, NoClass\_Teachers, Staffs.
   * For **Students**:
     + Dropdown to select a grade.
     + Message and optional file attachment form.
     + Submit → Store a single broadcast message with grade\_id.
   * For **Teachers, NoClass\_Teachers, Staff**:
     + Send message to all in the respective role.
     + Submit → Store as broadcast with target\_group.
3. **Individual Messaging**
   * Select **Individual** mode.
   * View recipient categories: Students, Teachers, NoClass\_Teachers, Staffs.
   * For **Students**:
     + Dropdown to select a grade.
     + Checkboxes to select one or multiple students from the grade.
     + Message and optional file attachment form.
   * For **Teachers, NoClass\_Teachers, Staff**:
     + Checkbox list of individuals in the selected role.
     + Message and optional file attachment form.
   * Submit → Store individual message(s) for each selected recipient.

### ****Other Users' Workflow****

1. **Student/Teacher/Staff Login**
   * Log in and navigate to the **Message Page**.
   * Compose a message addressed to the **Admin**.
   * Submit → Store the message with receiver\_username set as admin's username.
2. **Viewing Messages**
   * Inbox shows received messages (individual and broadcast).
   * For broadcasts:
     + Students see messages targeted to their grade\_id.
     + Teachers/Staff see messages targeted to their role.
   * Use filters to separate read/unread messages.

**UI Design**

1. **Admin Messaging Page**:
   * Options:
     + **Broadcast**: Dropdown to select target group (Students, Teachers, Sub-Teachers, Staff).
     + **Individual**: Dropdown to select target group and multi-select checkboxes for individual users.
   * Message Composition:
     + Textbox for content.
     + File upload for attachments.
2. **Inbox for Users**:
   * Display individual messages in one section.
   * Display broadcast messages in another section.
   * Include sorting and search functionality.

**Security Measures**

1. **Authentication**:
   * All pages are secured using session-based authentication.
2. **Authorization**:
   * Role-based access control ensures only authorized users can access specific features.
3. **Data Validation**:
   * Validate all inputs (message content, file uploads) to prevent SQL injection and XSS attacks.
4. **File Uploads**:
   * Restrict file types and sizes.
   * Store uploaded files outside the web root with a reference path in the database.
5. **Access Control**:
   * Messages are retrieved and displayed only for the intended recipients.

**Future Enhancements**

1. **Notification System**:
   * Add real-time notifications for new messages.
2. **Message Read Receipts**:
   * Track when a message is read by updating the is\_read column.
3. **Advanced Search and Filters**:
   * Allow users to search messages by sender, date, or content.
4. **Group Messaging**:
   * Enable users to create custom groups and send messages to those groups.