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**CONTACT MANAGEMENT
SYSTEM
A MINI PROJECT REPORT**

Submitted By

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ABSTRACT

The Contact Management System is a comprehensive Java-based application designed to streamline the organization, storage, and management of personal and professional contact information. By leveraging Java for both front-end and back-end development and integrating MySQL as the database management system through XAMPP, this project ensures a seamless and robust experience for users. The system offers essential functionalities such as adding, updating, deleting, and viewing contacts, providing a reliable and efficient solution for managing data securely and conveniently.

The application boasts a user-friendly interface, allowing users to easily navigate through its features. Users can input key details such as contact names, phone numbers, and email addresses, which are securely stored in the database for quick retrieval. The back-end logic ensures data validation and integrity, reducing errors and enhancing usability. With integrated database connectivity, the system guarantees data persistence across sessions, ensuring that all contact information remains safe and accessible.

Developed using tools such as Notepad, CMD, and XAMPP, this project showcases Java's versatility in building standalone applications with integrated database capabilities. The design emphasizes clean and modular code, ensuring the application is scalable and easy to maintain for future enhancements or additional features. The use of MySQL as the database platform further reinforces the application's reliability, offering fast and efficient data handling.

This Contact Management System serves as an ideal tool for individuals and organizations looking for a practical and efficient way to manage contact information. It eliminates the complexities of manual data management by automating processes and minimizing errors. Whether for personal use or business purposes, this system provides an organized and reliable platform for storing and accessing contact data effortlessly. By integrating modern technologies and adhering to best practices, the Contact Management System represents a functional, scalable, and user-friendly solution to address contact management needs effectively.

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I. INTRODUCTION

1.1 INTRODUCTION

In today's interconnected world, managing and organizing contact information efficiently has become crucial for both personal and professional use. Traditional methods of maintaining contacts—whether through physical address books or scattered digital files—are often cumbersome, error-prone, and difficult to update. As the number of contacts grows, so does the complexity of maintaining and accessing them. To address these challenges, the **Contact Management System** has been developed as an automated, efficient, and user-friendly solution for securely storing, retrieving, and organizing contact information.

This system is a standalone application, entirely built using Java for both front-end and back-end functionalities. MySQL serves as the underlying database management system, ensuring the secure, structured, and efficient storage of all contact details. With the integration of XAMPP for seamless connectivity between the Java application and MySQL, the system ensures smooth and reliable interaction, allowing users to manage their contact data with ease. The application facilitates multiple essential operations such as adding new contacts, updating existing contact details, deleting contacts, and viewing the contact list, all while maintaining data integrity and consistency.

The **Contact Management System** has been designed with simplicity and usability in mind. It offers an intuitive user interface that allows even non-technical users to navigate through the system effortlessly. Users can input key contact details such as names, phone numbers, email addresses, and other relevant information, and the system will securely store and retrieve these details with minimal effort. The back-end logic automates the storage and retrieval processes, ensuring that all operations are performed accurately and quickly. By automating these tasks, the system reduces the chances of errors and manual data entry, which improves overall efficiency.

Moreover, the integration with MySQL ensures data persistence, meaning that all contact information is securely saved and can be easily accessed across sessions. The system also supports database connectivity, allowing for easy querying, sorting, and updating of contact records. As a result, the Contact Management System not only organizes contact data but also makes it more accessible, reliable, and easily manageable.

Developed using tools such as Notepad, CMD, and XAMPP, this project demonstrates Java's versatility in building standalone applications with integrated database functionalities. The system's modular and

scalable design allows it to adapt to the needs of both individuals and businesses. Whether managing personal contacts, business relationships, or a large database of customers or clients, the system provides a flexible and efficient solution.

In conclusion, the **Contact Management System** serves as an effective tool for individuals, organizations, and businesses to organize and manage their contact information. It simplifies the traditionally tedious task of maintaining contact details by automating data storage and retrieval, ensuring consistency and accuracy. By focusing on a user-friendly interface, robust functionality, and reliable database management, this system offers a practical, scalable, and efficient solution for handling contact data in a modern, fast-paced environment.

1.2 OBJECTIVES

Primary Objectives

1. **Automate Contact Management:** Provide a streamlined platform to store, update, retrieve, and delete contact information efficiently and accurately.
2. **Simplify Data Entry and Retrieval:** Enable users to easily input, manage, and access contact details such as names, phone numbers, and email addresses through a user-friendly interface.
3. **Seamless Contact Updates:** Allow users to quickly update existing contact information, ensuring that records are kept current without manual intervention.
4. **Organize Contacts:** Present contacts in a well-structured, searchable, and sortable format for easy navigation and access.
5. **Database Integration:** Securely store contact information in a MySQL database, ensuring efficient, consistent, and scalable data management for large contact lists.

Educational Objectives

1. **Promote Administrative Efficiency:** Minimize the time and effort involved in manually managing contact information, allowing for quicker data retrieval and updates.
2. **Enhance Contact Organization:** Help users easily categorize and retrieve contact details, improving the management of both personal and professional contacts.
3. **Encourage Digital Solutions:** Encourage the use of digital platforms for contact management, reducing reliance on physical records and improving accessibility.
4. **Support Modular Expansion:** Lay the groundwork for adding additional features in the future, such as contact categorization, group messaging, or automated backup.
5. **Improve User Experience:** Ensure the application offers an intuitive, simple, and engaging interface that enhances the ease of managing contact information.

1.2 MODULES

1. Contact Management Module (User Role)

- **Login & Dashboard:**

- Secure access for authorized users to manage contacts.
- Display an intuitive dashboard to navigate to different contact management functionalities.

- **Contact Entry:**

- Input contact details such as name, phone number, email address, and additional fields (e.g., address, company, etc.).
- Validate input fields to ensure correct and complete data entry.
- Support multiple contact fields for comprehensive record-keeping.

- **Record Management:**

- Add, update, or delete contact records as needed.
- Prevent duplication of contacts by validating contact names, phone numbers, or email addresses.
- Provide a mechanism to search for and edit existing contact details.

- **Search & Filter Contacts:**

- Allow users to search contacts by various parameters like name, phone number, or email address.
- Enable filtering of contacts by categories or custom tags to make management easier.

2. Display Module (User Role)

- **View Contacts:**

- Display all stored contact details in a structured and organized table format.
- Show essential contact fields like name, phone number, email address, and additional custom fields (e.g., address, organization).

- **Detailed Record View:**

- Provide the option to view individual contact records in detail.
- Include all available information for each contact in an easy-to-read format.

- **Back Navigation:**

- Ensure smooth navigation between pages with options to return to the main dashboard or previous page.
- Include buttons or links to go back to the contact list or home page.

3. Database Module

- **Contact Records:**

- Securely store all contact details (e.g., names, phone numbers, emails) in a MySQL database.
- Ensure that each contact record has a unique identifier (e.g., a contact ID) to avoid conflicts.

- **Data Retrieval:**

- Enable quick and efficient retrieval of contact records for viewing or editing.
- Support advanced search and filtering capabilities to locate contacts easily.
- **Data Integrity & Backup:**
 - Implement backup mechanisms to secure contact data and restore if necessary.
 - Ensure database integrity to avoid corruption or loss of data.

4. Security Module

- **Authentication System:**
 - Restrict access to the contact management functionality with secure login credentials (username/password).
 - Implement role-based access (e.g., admin vs. regular user) to control who can manage, update, or view contacts.
- **Database Security:**
 - Safeguard stored contact data using secure SQL operations to prevent unauthorized access and SQL injection attacks.
 - Use prepared statements to avoid security vulnerabilities and maintain data privacy.
- **Error Handling:**
 - Provide user-friendly error messages for invalid inputs or when the database is not accessible.
 - Ensure that errors related to contact data entry, retrieval, or updates are handled gracefully.
 - Log and manage any unexpected errors or system failures.

5. User Interface Module (User Role)

- **Intuitive Interface:**
 - Create a clean, simple, and intuitive user interface for smooth interaction.
 - Use input forms for adding and updating contacts, with clear labels and validation messages.
- **Responsive Design:**
 - Ensure the system is accessible on various devices (e.g., desktop, tablet, mobile) with responsive design practices.
 - Provide easy-to-navigate pages for users to manage contacts with minimal effort.
- **Export & Import Contacts:**
 - Provide options to import contacts from external sources (e.g., CSV, Excel) or export contact lists to files.
 - Ensure compatibility with standard file formats for easy integration with other systems.

6. Reporting Module (Admin Role)

• Generate Reports:

- Enable the generation of reports on contact data, such as total number of contacts, contacts by category, etc.
- Provide filtering options for custom reports based on date range, categories, or other fields.

• Contact History:

- Track and log any changes made to contact records, such as when information was updated or deleted.
- Allow administrators to view a history of changes for audit purposes.

II. SURVEY OF TECHNOLOGIES

2.1 SOFTWARE DESCRIPTION: CONTACT MANAGEMENT SYSTEM

2.1.1 Java

Java is a widely-used, object-oriented programming language known for its cross-platform compatibility and strong performance. In this project, Java serves as the primary language for developing both the backend logic and the user interface (UI). Using Java's Swing library, the application offers a rich graphical interface for users to manage their contacts seamlessly. Java's robustness and scalability ensure that the system can handle a large number of contact records efficiently. Java Database Connectivity (JDBC) is employed to integrate the system with the MySQL database, enabling reliable storage, retrieval, and manipulation of contact data.

2.1.2 MySQL

MySQL is an open-source Relational Database Management System (RDBMS) that is widely used for managing structured data. In the Contact Management System, MySQL is responsible for storing all contact details, such as names, phone numbers, email addresses, and other personal information in a relational database. SQL queries are used to perform key operations such as adding, updating, deleting, and searching for contacts. MySQL provides high data integrity, performance, and scalability, ensuring that the system can manage a growing database of contact information over time. The database is hosted locally using XAMPP for ease of development and testing.

2.1.3 XAMPP

XAMPP is a free, open-source, cross-platform web server solution stack that simplifies the process of setting up a local server environment. In this project, XAMPP is used to host and manage the MySQL database server. It provides an easy-to-use interface for configuring and managing the database, making it ideal for local development and testing. XAMPP ensures smooth communication between the Java application and MySQL database, allowing for real-time updates and secure handling of contact data. Its simplicity and lightweight design make it a critical tool for developers during the application's development phase.

2.1.4 Java Swing

Java Swing is a powerful GUI toolkit used for building interactive desktop applications. Swing is used in this project to create a user-friendly interface for managing contacts. The system's front-end is developed using Swing components such as buttons, text fields, labels, and tables to provide an intuitive and visually appealing interface. Swing's event-handling mechanisms allow for dynamic interaction with the user, such as capturing input, updating contact information, and navigating between different pages. Its ability to easily customize and style components enhances the overall user experience.

2.1.5 Command Prompt (CMD)

The Command Prompt (CMD) is used as the primary interface for compiling and executing Java programs during the development and testing phases. CMD provides a simple and efficient way to run Java applications without the need for complex Integrated Development Environments (IDEs). It is used to compile the source

code and run the Contact Management System in a lightweight manner. By using CMD, developers can focus on coding and testing the system without relying on graphical IDE tools, maintaining a minimalist development approach.

2.1.6 Notepad

Notepad, a basic text editor, is employed for writing and editing the Java source code in this project. It serves as a simple tool for coding, free from the overhead of complex development environments. Notepad is ideal for small-scale projects where the focus is on writing functional code without the need for advanced IDE features. Combined with CMD for execution, Notepad provides a lightweight, straightforward development setup that suits the requirements of the Contact Management System, allowing developers to focus solely on the application's logic and functionality.

2.1.7 JDBC (Java Database Connectivity)

JDBC is an API in Java that facilitates database connectivity. It provides the necessary interface for connecting Java applications to relational databases like MySQL. In the Contact Management System, JDBC is used to manage communication between the front-end Java application and the MySQL database. It allows the system to execute SQL queries to retrieve, insert, update, and delete contact information securely and efficiently. JDBC's robustness and flexibility enable seamless data integration within the application, ensuring that the system works smoothly and reliably.

2.1.8 Apache Tomcat

Although not used directly in this particular implementation, Apache Tomcat is a widely-used open-source application server that can be used for hosting Java-based web applications. For a more scalable, web-based version of the Contact Management System, Apache Tomcat could be employed to run the Java web application in a server environment. However, in this standalone desktop application, the focus is on using local resources (XAMPP and MySQL) for managing data.

III. REQUIREMENTS AND ANALYSIS

3.1 USER REQUIREMENTS:

The Contact Management System is designed to streamline the process of managing and organizing contact information in a secure and efficient manner. It aims to provide a comprehensive platform for individuals or organizations to store, update, and retrieve contact details easily. The system caters to both personal users and organizational needs, ensuring an intuitive user experience, robust data handling, and secure access. The primary requirements focus on effective data entry, retrieval, and management of contact information, with an emphasis on ease of use and security.

Key Features:

- **Login and Authentication:**

- Role-based access control, with admins managing all contacts and users accessing their own contact information.

- **Contact Management:**

- Add, update, delete, and manage contact details such as name, phone number, email, and address.

- **Search and Filter Functionality:**

- Advanced search and filtering by name, phone number, or categories (e.g., work, personal) for easy navigation.

- **Database Integration:**

- Secure storage and retrieval of contact data in a MySQL database, ensuring scalability and fast access.

- **User-Friendly Interface:**

- Intuitive GUI designed with Java Swing, making navigation and operations simple and efficient.

- **Data Security and Privacy:**

- Secure storage of sensitive data with encryption and safeguards against unauthorized access.

- **Backup and Restore:**

- Backup and restore functionality to protect contact data.

- **Efficient Data Retrieval:**

- Quick and efficient search and retrieval of contact details.

- **Error Handling and Validation:**

- Input validation and error handling to ensure correct data entry and system stability.

3.2 HARDWARE AND SOFTWARE REQUIREMENTS

Software Requirements

- Operating System: Windows 10 or higher
- Programming Language: Java (JDK 8 or higher)
- Frontend: Java Swing for the graphical user interface
- Backend: MySQL for database operations
- Database Management System (DBMS): MySQL 8.0 or higher, hosted locally using XAMPP
- Development Tools:
 - Text Editor: Notepad for writing source code
 - Command Line: CMD for compiling and running the application
- Libraries/Packages: Java JDBC for database connectivity

Hardware Requirements

- System Type: Desktop PC or Laptop
- Operating System: Windows 10 or higher
- Processor: Intel® Core™ i3-6100 or higher
- RAM: 4 GB or higher
- Storage: 200 MB available disk space (for application files and database)
- Display: Monitor with a minimum resolution of 1280 x 720 pixels
- Input Devices: Standard Keyboard and Mouse

3.3 DATA DICTIONARY

□ Contacts Table

- **Table Name:** contacts
- **Description:**
This table stores the contact information of individuals, including their names, phone numbers, email addresses, and categories.
- **Usage:**
 - **ID:** A unique identifier for each contact record in the database.
 - **FirstName:** The first name of the contact person.
 - **LastName:** The last name of the contact person.
 - **Phone Number:** The phone number of the contact person (stored as a string to accommodate different formats).
 - **Email:** The email address of the contact person.
 - **Address:** The physical address of the contact person (optional field).
 - **Category:** Categorizes the contact (e.g., work, personal, emergency).
 - **CreatedAt:** The date and time when the contact was added to the database.
 - **UpdatedAt:** The date and time when the contact details were last updated.

□ Backup Table

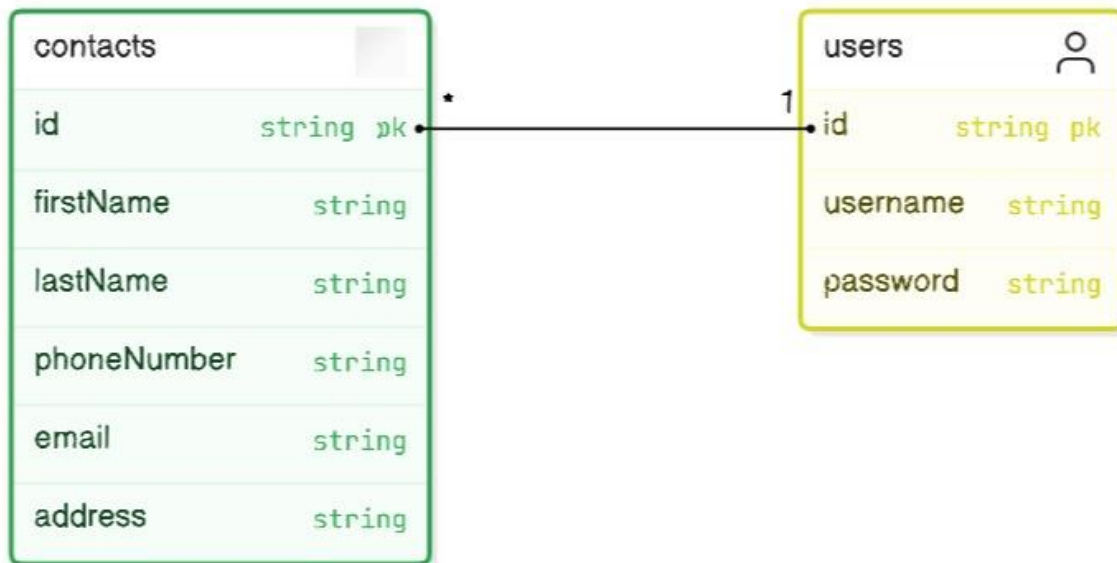
- **Table Name:** backups
- **Description:**
This table is used to store backups of the contact data to ensure data safety and recovery.
- **Usage:**
 - **BackupID:** A unique identifier for each backup record.
 - **BackupDate:** The date and time when the backup was created.
 - **BackupData:** A serialized version of the contact data or a reference to the backup file.
 - **CreatedAt:** The timestamp when the backup record was created.

□ User Table (If Role-Based Authentication is used)

- **Table Name:** users
- **Description:**
This table stores the user information for the application, handling login and access roles.
- **Usage:**
 - **UserID:** A unique identifier for each user record.
 - **Username:** The username for the user's login credentials.
 - **Password:** The password for user authentication (stored securely using hashing).
 - **Role:** The role of the user (e.g., Admin, User) that determines their access level.
 - **CreatedAt:** The timestamp when the user record was created.
 - **LastLogin:** The date and time when the user last logged in.

3.4 ER DIAGRAM :

Contact Management System ERD



IV. PROGRAM CODE:

LoginPage.java:

```
import javax.swing.*;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;

public class LoginPage {
    public static void main(String[] args) {
        JFrame frame = new JFrame("Login Page");

        JLabel userLabel = new JLabel("Username:");
        JLabel passLabel = new JLabel("Password:");
        JTextField userField = new JTextField();
        JPasswordField passField = new JPasswordField();
        JButton loginButton = new JButton("Login");

        userLabel.setBounds(30, 30, 100, 30);
        userField.setBounds(140, 30, 150, 30);
        passLabel.setBounds(30, 80, 100, 30);
        passField.setBounds(140, 80, 150, 30);
        loginButton.setBounds(100, 130, 100, 30);

        loginButton.addActionListener(new ActionListener() {
            @Override
            public void actionPerformed(ActionEvent e) {
                String username = userField.getText();
                String password = new String(passField.getPassword());

                if (username.equals("admin") && password.equals("admin123")) {
                    JOptionPane.showMessageDialog(frame, "Login Successful!");
                    frame.dispose();
                    MainMenuPage.main(null);
                } else {
                    JOptionPane.showMessageDialog(frame, "Invalid credentials. Try again.");
                }
            }
        });

        frame.add(userLabel);
        frame.add(userField);
        frame.add(passLabel);
        frame.add(passField);
        frame.add(loginButton);

        frame.setSize(350, 250);
        frame.setLayout(null);
        frame.setVisible(true);
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
    }
}
```


MainMenuPage.java:

```
import javax.swing.*;

public class MainMenuPage {
    public static void main(String[] args) {
        JFrame frame = new JFrame("Main Menu");

        JButton addButton = new JButton("Add Contact");
        JButton updateButton = new JButton("Update Contact");
        JButton deleteButton = new JButton("Delete Contact");
        JButton viewButton = new JButton("View Contacts");

        addButton.setBounds(50, 50, 200, 30);
        updateButton.setBounds(50, 100, 200, 30);
        deleteButton.setBounds(50, 150, 200, 30);
        viewButton.setBounds(50, 200, 200, 30);

        addButton.addActionListener(e -> AddContact.main(null));
        updateButton.addActionListener(e -> UpdateContact.main(null));
        deleteButton.addActionListener(e -> DeleteContact.main(null));
        viewButton.addActionListener(e -> ViewContacts.main(null));

        frame.add(addButton);
        frame.add(updateButton);
        frame.add(deleteButton);
        frame.add(viewButton);

        frame.setSize(300, 350);
        frame.setLayout(null);
        frame.setVisible(true);
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
    }
}
```

AddContact.java:

```
import javax.swing.*;
import java.awt.event.ActionEvent;
import java.sql.*;

public class AddContact {
    public static void main(String[] args) {
        JFrame frame = new JFrame("Add Contact");

        JLabel nameLabel = new JLabel("Name:");
        JLabel phoneLabel = new JLabel("Phone:");
```

```

JLabel emailLabel = new JLabel("Email:");

JTextField nameField = new JTextField();
JTextField phoneField = new JTextField();
JTextField emailField = new JTextField();

JButton addButton = new JButton("Add");
JButton backButton = new JButton("Back to Main Menu");

nameLabel.setBounds(30, 30, 100, 30);
nameField.setBounds(140, 30, 150, 30);
phoneLabel.setBounds(30, 80, 100, 30);
phoneField.setBounds(140, 80, 150, 30);
emailLabel.setBounds(30, 130, 100, 30);
emailField.setBounds(140, 130, 150, 30);
addButton.setBounds(60, 180, 100, 30);
backButton.setBounds(170, 180, 150, 30);

addButton.addActionListener(e -> {
    String name = nameField.getText();
    String phone = phoneField.getText();
    String email = emailField.getText();

    try (Connection con = DatabaseConnection.getConnection();
        PreparedStatement ps = con.prepareStatement(
            "INSERT INTO contacts (name, phone, email) VALUES (?, ?, ?)") {
        ps.setString(1, name);
        ps.setString(2, phone);
        ps.setString(3, email);

        ps.executeUpdate();
        JOptionPane.showMessageDialog(frame, "Contact added successfully!");
    } catch (SQLException ex) {
        ex.printStackTrace();
    }
});

backButton.addActionListener((ActionEvent e) -> {
    frame.dispose();
    MainMenuPage.main(null);
});

frame.add(nameLabel);
frame.add(nameField);
frame.add(phoneLabel);
frame.add(phoneField);
frame.add(emailLabel);
frame.add(emailField);
frame.add(addButton);
frame.add(backButton);

frame.setSize(350, 300);
frame.setLayout(null);

```

```

        frame.setVisible(true);
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
    }
}

```

UpdateContact.java:

```

import javax.swing.*.*;
import java.awt.event.ActionEvent;
import java.sql.*;

public class UpdateContact {
    public static void main(String[] args) {
        JFrame frame = new JFrame("Update Contact");

        JLabel idLabel = new JLabel("Contact ID:");
        JLabel nameLabel = new JLabel("New Name:");
        JLabel phoneLabel = new JLabel("New Phone:");
        JLabel emailLabel = new JLabel("New Email:");

        JTextField idField = new JTextField();
        JTextField nameField = new JTextField();
        JTextField phoneField = new JTextField();
        JTextField emailField = new JTextField();

        JButton updateButton = new JButton("Update");
        JButton backButton = new JButton("Back to Main Menu");

        idLabel.setBounds(30, 30, 100, 30);
        idField.setBounds(140, 30, 150, 30);
        nameLabel.setBounds(30, 80, 100, 30);
        nameField.setBounds(140, 80, 150, 30);
        phoneLabel.setBounds(30, 130, 100, 30);
        phoneField.setBounds(140, 130, 150, 30);
        emailLabel.setBounds(30, 180, 100, 30);
        emailField.setBounds(140, 180, 150, 30);
        updateButton.setBounds(60, 230, 100, 30);
        backButton.setBounds(170, 230, 150, 30);

        updateButton.addActionListener(e -> {
            int id = Integer.parseInt(idField.getText());
            String name = nameField.getText();
            String phone = phoneField.getText();
            String email = emailField.getText();

            try (Connection con = DatabaseConnection.getConnection();
                PreparedStatement ps = con.prepareStatement(
                    "UPDATE contacts SET name=?, phone=?, email=? WHERE contact_id=?")) {
                ps.setString(1, name);
                ps.setString(2, phone);
                ps.setString(3, email);
            }
        });
    }
}

```

```

        ps.setInt(4, id);

        int rowsUpdated = ps.executeUpdate();
        if (rowsUpdated > 0) {
            JOptionPane.showMessageDialog(frame, "Contact updated successfully!");
        } else {
            JOptionPane.showMessageDialog(frame, "Contact not found.");
        }
    } catch (SQLException ex) {
        ex.printStackTrace();
    }
});

backButton.addActionListener((ActionEvent e) -> {
    frame.dispose();
    MainMenuPage.main(null);
});

frame.add(idLabel);
frame.add(idField);
frame.add(nameLabel);
frame.add(nameField);
frame.add(phoneLabel);
frame.add(phoneField);
frame.add(emailLabel);
frame.add(emailField);
frame.add(updateButton);
frame.add(backButton);

frame.setSize(350, 350);
frame.setLayout(null);
frame.setVisible(true);
frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
}
}

```

ViewContact.java:

```

import javax.swing.*;
import java.awt.event.ActionEvent;
import java.sql.*;
import java.util.Vector;

public class ViewContacts {
    public static void main(String[] args) {
        JFrame frame = new JFrame("View Contacts");

        String[] columnNames = {"ID", "Name", "Phone", "Email"};
        JTable table = new JTable();

        try (Connection con = DatabaseConnection.getConnection();

```

```

Statement st = con.createStatement();
ResultSet rs = st.executeQuery("SELECT * FROM contacts") {

Vector<Vector<String>> data = new Vector<>();
while (rs.next()) {
    Vector<String> row = new Vector<>();
    row.add(String.valueOf(rs.getInt("contact_id")));
    row.add(rs.getString("name"));
    row.add(rs.getString("phone"));
    row.add(rs.getString("email"));
    data.add(row);
}

table = new JTable(data, new Vector<>(java.util.Arrays.asList(columnNames)));
} catch (SQLException ex) {
    ex.printStackTrace();
}

JScrollPane scrollPane = new JScrollPane(table);
scrollPane.setBounds(20, 20, 450, 300);

JButton backButton = new JButton("Back to Main Menu");
backButton.setBounds(200, 340, 150, 30);
backButton.addActionListener((ActionEvent e) -> {
    frame.dispose();
    MainMenuPage.main(null);
});

frame.add(scrollPane);
frame.add(backButton);
frame.setSize(500, 450);
frame.setLayout(null);
frame.setVisible(true);
frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
}
}

```

DeleteContact.java:

```

import javax.swing.*.*;
import java.awt.event.ActionEvent;
import java.sql.*.*;

public class DeleteContact {
    public static void main(String[] args) {
        JFrame frame = new JFrame("Delete Contact");

        JLabel idLabel = new JLabel("Contact ID:");
        JTextField idField = new JTextField();
        JButton deleteButton = new JButton("Delete");
        JButton backButton = new JButton("Back to Main Menu");
    }
}

```

```

idLabel.setBounds(30, 30, 100, 30);
idField.setBounds(140, 30, 150, 30);
deleteButton.setBounds(60, 80, 100, 30);
backButton.setBounds(170, 80, 150, 30);

deleteButton.addActionListener(e -> {
    int id = Integer.parseInt(idField.getText());

    try (Connection con = DatabaseConnection.getConnection();
        PreparedStatement ps = con.prepareStatement("DELETE FROM contacts WHERE contact_id=?")) {
        ps.setInt(1, id);

        int rowsDeleted = ps.executeUpdate();
        if (rowsDeleted > 0) {
            JOptionPane.showMessageDialog(frame, "Contact deleted successfully!");
        } else {
            JOptionPane.showMessageDialog(frame, "Contact not found.");
        }
    } catch (SQLException ex) {
        ex.printStackTrace();
    }
});

backButton.addActionListener((ActionEvent e) -> {
    frame.dispose();
    MainMenuPage.main(null);
});

frame.add(idLabel);
frame.add(idField);
frame.add(deleteButton);
frame.add(backButton);

frame.setSize(350, 200);
frame.setLayout(null);
frame.setVisible(true);
frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
}
}

```

DatabaseConnection.java:

```

import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.SQLException;

public class DatabaseConnection {
    public static Connection getConnection() {
        try {
            return DriverManager.getConnection("jdbc:mysql://localhost:3306/contact_manager", "root", "");
        } catch (SQLException e) {
            e.printStackTrace();
            return null;
        }
    }
}

```

```

    }
}
}

```

Compile each file:

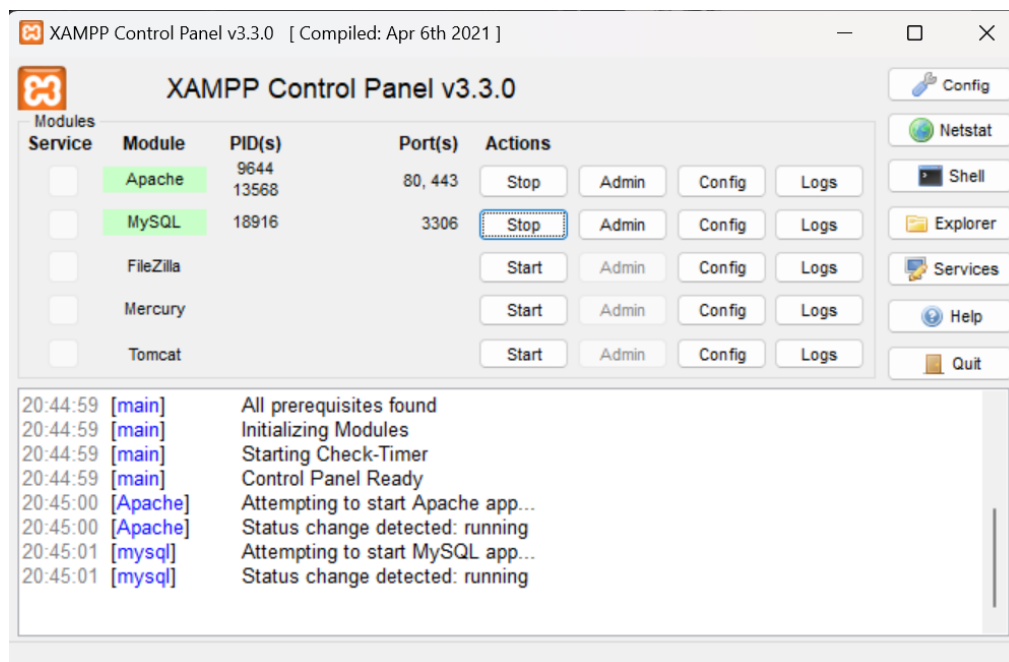
`javac -cp .; mysql-connector-j-9.1.0.jar *.java`

Run the main program:

`java -cp mysql-connector-j-9.1.0.jar LoginPage`

V. RESULT AND DISCUSSION

XAMPP



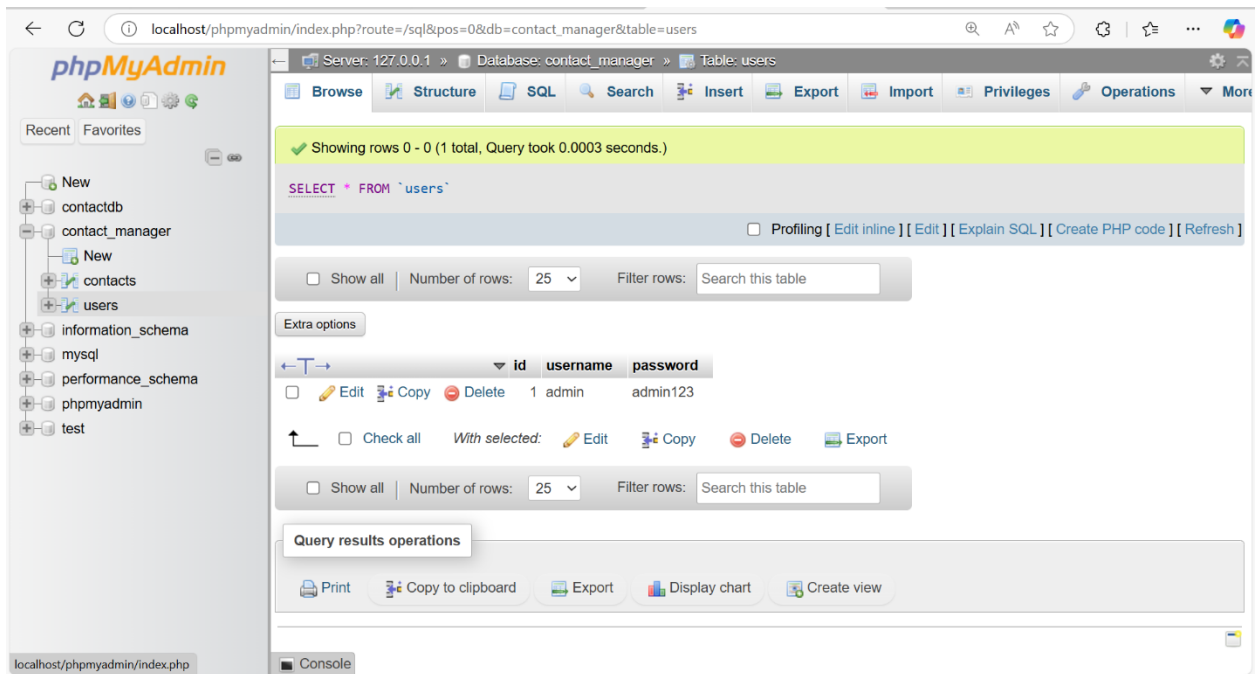
DATABASE

The screenshot shows the phpMyAdmin interface for the 'contact_manager' database. The left sidebar displays a tree view of databases, including 'contactdb', 'contact_manager', 'information_schema', 'mysql', 'performance_schema', 'phpmyadmin', and 'test'. The main panel shows the 'Structure' tab for the 'contact_manager' database. It lists two tables: 'contacts' and 'users'. The 'contacts' table has 9 rows, InnoDB engine, utf8mb4_general_ci collation, and a size of 16.0 KiB. The 'users' table has 1 row, InnoDB engine, utf8mb4_general_ci collation, and a size of 16.0 KiB. Below the table list, there is a 'Create new table' section with fields for 'Table name' and 'Number of columns' (set to 4), and a 'Create' button. The top navigation bar includes links for Structure, SQL, Search, Query, Export, Import, Operations, Privileges, and Routines.


Table	Action	Rows	Type	Collation	Size	Overh
<input type="checkbox"/> contacts	Browse Structure Search Insert Empty Drop	9	InnoDB	utf8mb4_general_ci	16.0 KiB	
<input type="checkbox"/> users	Browse Structure Search Insert Empty Drop	1	InnoDB	utf8mb4_general_ci	16.0 KiB	
2 tables Sum		10	InnoDB	utf8mb4_general_ci	32.0 KiB	

The screenshot shows the phpMyAdmin interface for the 'contacts' table. The left sidebar is the same as the previous screenshot. The main panel shows the 'Browse' tab for the 'contacts' table. It displays a list of 11 rows with columns 'contact_id', 'name', 'phone', and 'email'. Each row has action links for Edit, Copy, and Delete. The table is sorted by 'contact_id' in ascending order. The top navigation bar includes links for Browse, Structure, SQL, Search, Insert, Export, Import, Privileges, and Operations. Below the table list, there is a 'Create new table' section with fields for 'Table name' and 'Number of columns' (set to 4), and a 'Create' button.

contact_id	name	phone	email
2	Archana	6382995599	archana@gmail.com
3	Hannah james	7010530745	hannahjames@gmail.com
5	John Doe	1234567890	johndoe@example.com
6	Jane Smith	9876543210	janesmith@example.com
7	Alice Johnson	5551234567	alicej@example.com
8	Bob Williams	4449876543	bobw@example.com
9	Charlie Brown	3334567899	charlieb@example.com
10	David Clark	2229876543	davidc@example.com
11	Eve Adams	6661237890	evea@example.com



LOGIN PAGE:

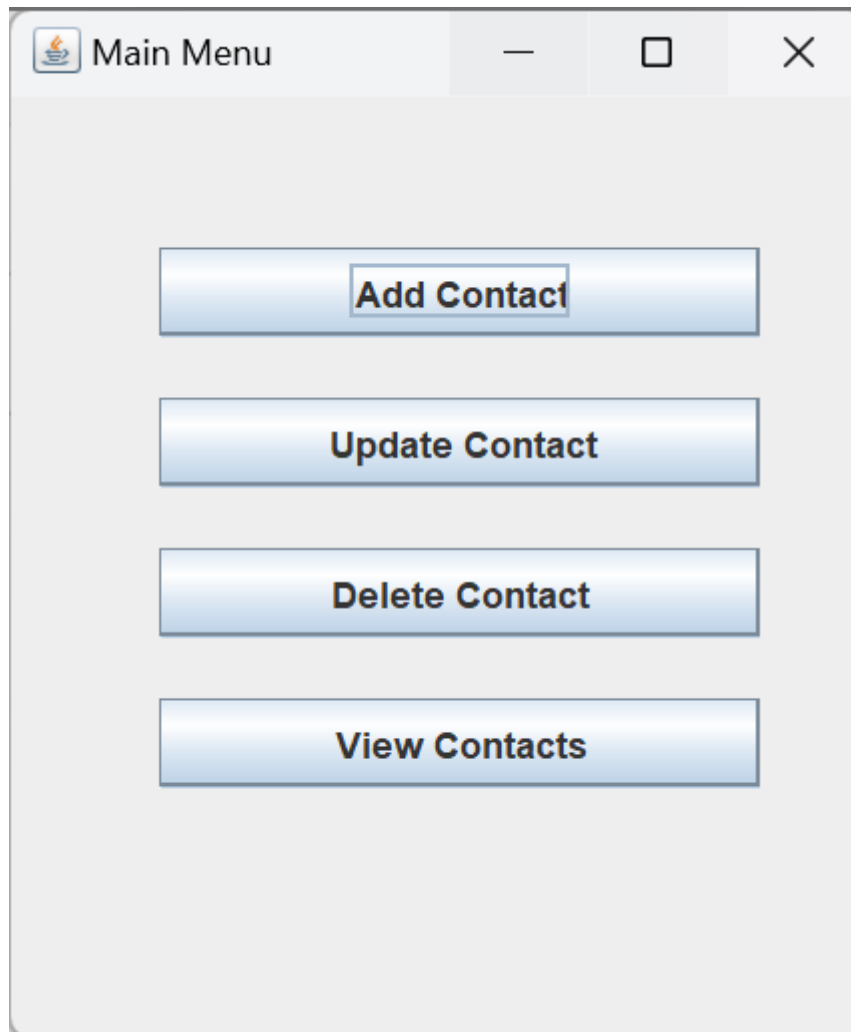
 Login Page

Username:

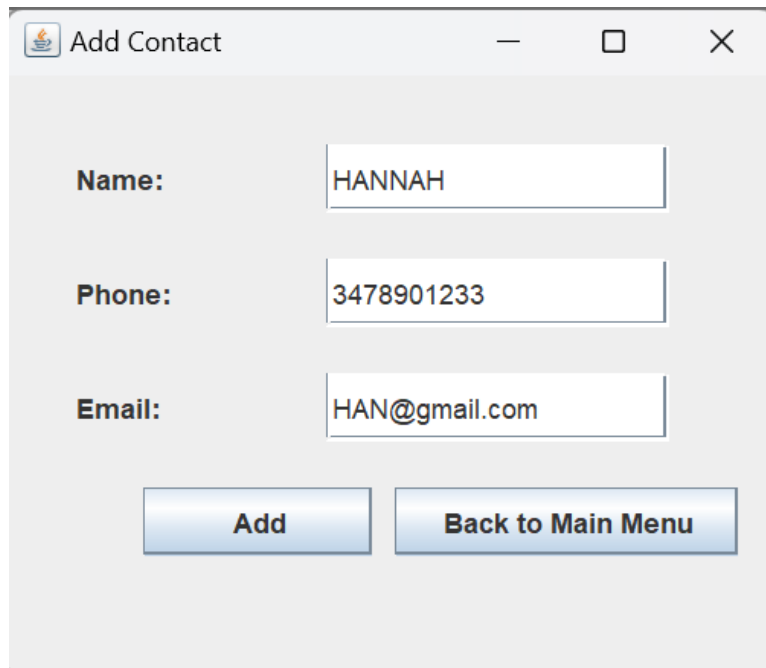
Password:

Login

MAIN MENU PAGE:



ADD CONTACTS:

A screenshot of a software window titled "Add Contact". It features three input fields: "Name:" with the text "HANNAH", "Phone:" with "3478901233", and "Email:" with "HAN@gmail.com". Below the fields are two buttons: "Add" and "Back to Main Menu".

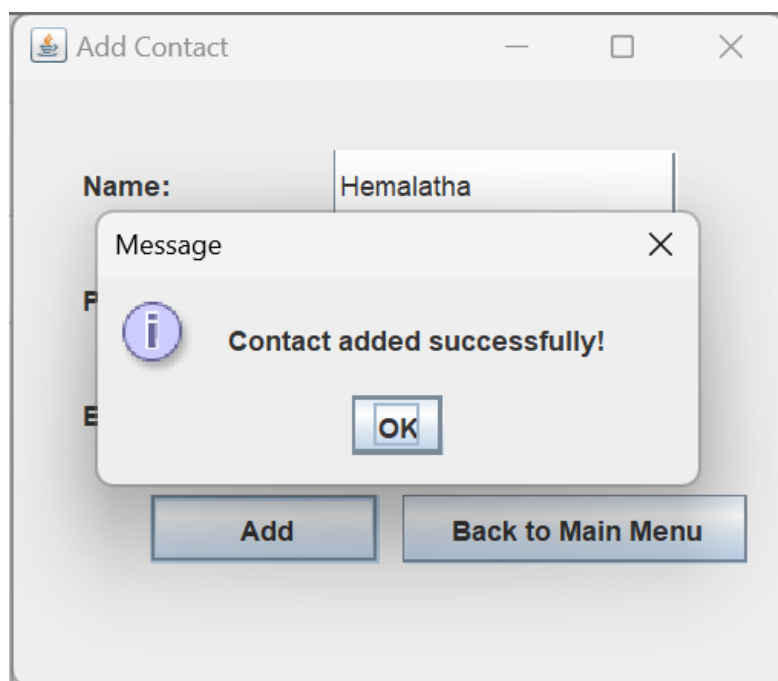
Add Contact

Name: HANNAH

Phone: 3478901233

Email: HAN@gmail.com

Add **Back to Main Menu**

A screenshot of the "Add Contact" window with the "Name" field containing "Hemalatha". A modal message box is overlaid on top, displaying an information icon, the text "Contact added successfully!", and an "OK" button. The "Add" and "Back to Main Menu" buttons are visible at the bottom of the main window.

Add Contact

Name: Hemalatha

Message

Contact added successfully!

OK

Add **Back to Main Menu**

UPDATE CONTACT:

Update Contact

Contact ID:

New Name:

New Phone:

New Email:

Update Contact


Contact ID:

New Name:

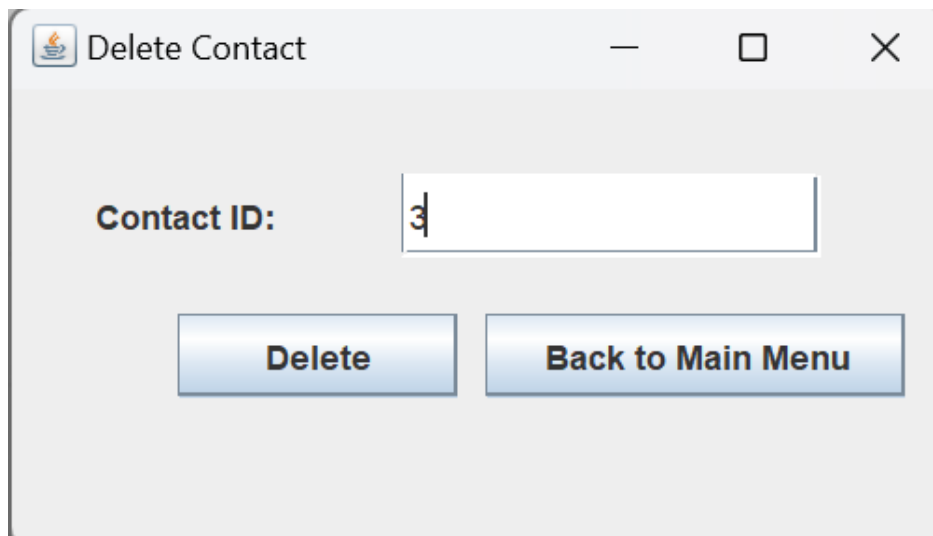
New Phone:

New Email:

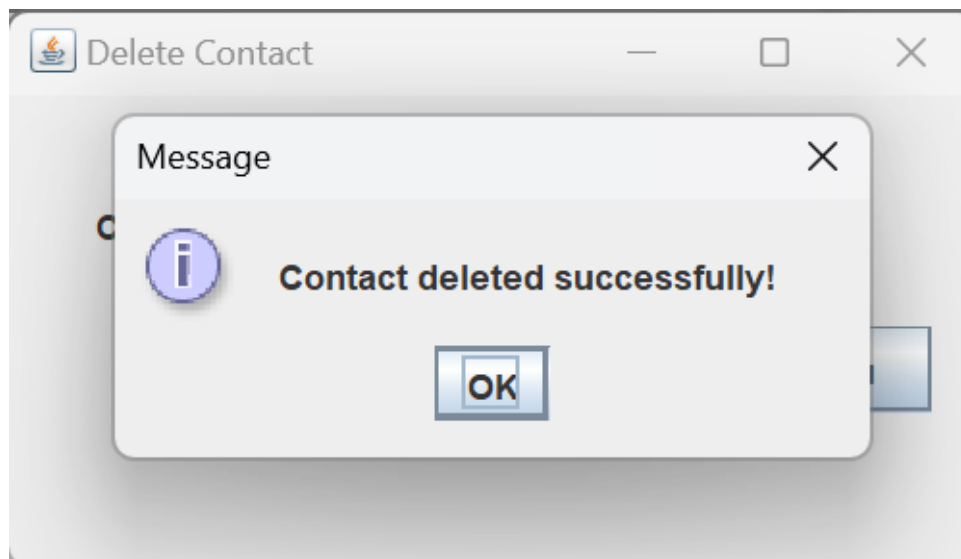
Message

 **Contact updated successfully!**


DELETE CONTACT:



A dialog box titled "Delete Contact" with a standard window title bar (minimize, maximize, close buttons). Inside, there is a label "Contact ID:" followed by a text input field containing the number "3". Below the input field are two buttons: "Delete" and "Back to Main Menu".



VIEW CONTACT:

 View Contacts—□×

ID	Name	Phone	Email
2	Merlia	7825461239	merlia@gmail.com
5	John Doe	1234567890	johndoe@exampl...
6	Jane Smith	9876543210	janesmith@exam...
7	Alice Johnson	5551234567	alicej@example.c...
8	Bob Williams	4449876543	bobw@example.c...
9	Charlie Brown	3334567899	charlieb@exampl...
10	David Clark	2229876543	davidc@example....
11	Eve Adams	6661237890	evea@example.com
12	Hemalatha	9944519529	hamalatha@gmail...

Back to Main Menu

RESULTS

□ User Features:

- **Login System:** Implemented a secure login system for users to access their contact management features. Users can log in with unique credentials, ensuring that each individual has access to their own contact data.
- **User Dashboard:** Users can view, add, and manage their contacts, including personal information such as names, phone numbers, emails, and addresses. This allows for easy organization and retrieval of contact details.
- **Admin Dashboard:** Admin users can manage all user accounts and perform administrative tasks, such as adding or removing users, and overseeing the overall contact management system.

□ Functionalities:

- **Add/Update Contacts:** Users can add new contacts or update existing contact information, including names, phone numbers, emails, and addresses.
- **Search and View Contacts:** Users can search for contacts using different search criteria (name, phone number, etc.), and view detailed information for each contact.
- **Delete Contacts:** Users can delete any unnecessary or outdated contact records to maintain an organized system.
- **Database Management:** All contact information is stored and managed in a MySQL database, ensuring persistent storage and efficient retrieval of contact details.

□ Database Interaction:

- **User Records:** The MySQL database is used to store user data such as usernames and passwords for authentication purposes.
- **Contact Records:** The **Contacts** table in the database stores individual contact details, including name, phone number, email, and address for each user.
- **Dynamic Updates:** Any updates to contact information (such as adding, editing, or deleting contacts) are reflected immediately in the database.
- **Error Handling:** The system manages errors such as invalid data inputs or duplicate contacts with validation messages to ensure data consistency and accuracy.

□ User Interface (UI):

- **Simple and Intuitive Design:** A user-friendly design has been implemented to ensure a smooth user experience. The interface is clean, intuitive, and easy to navigate.
- **Interactive Frontend:** Developed using Java Swing, the frontend includes input fields, buttons, and display tables to manage and interact with contact data efficiently.
- **Custom Branding:** A logo has been added to the homepage to enhance the visual appeal and user

recognition of the system.

□ **Performance:**

- **Real-Time Updates:** Contact data is added, updated, and deleted in real time, with immediate feedback to users after each action.
- **Optimized Database Queries:** The database queries are optimized for quick and efficient retrieval and modification of contact information.

□ **Security Considerations:**

- **Error Validation:** The system ensures that only valid data is entered, such as checking for valid phone numbers and email formats, and preventing blank fields.
- **Basic User Authentication:** A login system is implemented to ensure secure access, although password encryption has not been implemented in this version.
- **Data Integrity:** Database constraints prevent duplicate entries and ensure that data is consistent, accurate, and properly organized.

□ **Next Steps for Improvement:**

- **Password Security:** Implement password hashing (using libraries like BCrypt) to enhance security during user authentication.
- **Role-Based Permissions:** Add specific user roles (e.g., regular user, admin) to control access to sensitive features, ensuring data privacy and security.
- **Enhanced Validation:** Implement more comprehensive input validation, such as checking for valid email formats or phone number lengths.
- **UI Enhancements:** Improve the design and responsiveness of the user interface by using more advanced Java frameworks such as JavaFX for a more modern look and feel.
- **Contact Grouping:** Introduce functionality to categorize contacts into groups (e.g., family, work) for better organization.
- **Export Functionality:** Add an option for users to export their contacts to external formats (e.g., CSV or PDF) for offline use or backup.
- **Session Management:** Implement session-based login and logout functionality for enhanced security and user convenience.

Conclusion:

The Contact Management System effectively streamlines the process of adding, updating, and managing contact information. Key features include secure user authentication, dynamic contact management, and seamless database interaction. The project offers a clean, user-friendly interface and ensures real-time updates of contact details. However, there is room for improvement by enhancing security measures (such as password encryption), adding role-based permissions, improving validation for data inputs, and incorporating features like contact grouping and export functionality for better organization and usability.

DISCUSSION

1. User Experience:

○ Strengths:

- **Intuitive Interface:** The "Student Grading System" offers a simple and user-friendly interface. The layout is clear, with well-organized input fields and functionality accessible with minimal technical knowledge.
- **Seamless Grade Management:** The system provides an efficient way for teachers to input marks, calculate grades, and view results. Students can easily log in to view their grades, which enhances transparency and user satisfaction.
- **Dynamic Updates:** Real-time grade calculation ensures instant feedback for teachers and immediate updates for students upon changes in marks or grade entries.

○ Areas for Improvement:

- **Enhanced Interactivity:** Adding features like drop-down menus for subject selection or auto-complete suggestions for student names could improve user experience and reduce errors during data entry.
- **UI Aesthetics:** Although the interface is functional, enhancements such as a more modern design, use of icons, and better color schemes would make the application visually appealing.
- **Mobile Compatibility:** Optimizing the system for mobile devices would provide better accessibility for teachers and students who prefer using smartphones or tablets.

2. Database Integration:

○ Strengths:

- **Efficient Data Handling:** The MySQL database ensures smooth storage and retrieval of student records, including names, marks for five subjects, and grades.
- **Dynamic Data Interaction:** Teachers can add or update student records, and the changes are instantly reflected in the database. The backend ensures consistent and reliable data management.
- **Real-Time Operations:** The system allows real-time grade calculations and immediate updates in the database, providing a dynamic user experience.

○ Areas for Improvement:

- **Advanced Data Validation:** The current system could benefit from stricter data validation to prevent invalid entries (e.g., restricting marks to a valid range of 0-100).
- **Optimized Queries:** As the dataset grows, implementing indexing or optimized queries can enhance performance, especially for operations involving large datasets.

- **Data Relationships:** Introducing a relational database design with separate tables for students, subjects, and grades could improve scalability and make the system more modular.

3. Security Considerations:

- **Strengths:**
 - **Role-Based Access:** The system separates access for students and teachers, ensuring that users only interact with the data relevant to their role.
 - **Error Handling:** Basic validation prevents invalid inputs, and error messages inform users about issues like missing data fields.
- **Areas for Improvement:**
 - **Password Security:** Currently, passwords are stored in plain text. Implementing encryption (e.g., bcrypt) for storing passwords would significantly improve security.
 - **Secure Communication:** Adding SSL/TLS encryption for communication between the application and the database would ensure data confidentiality.
 - **Two-Factor Authentication:** For an added layer of security, integrating two-factor authentication during login would protect against unauthorized access.
 - **Audit Logs:** Introducing logging mechanisms for user actions (e.g., grade updates, record additions) could improve security and provide a record of system activities.

4. Performance:

- **Strengths:**
 - **Smooth Functionality:** The system performs well under standard use cases, with quick database interactions and real-time feedback for user actions.
 - **Minimal Latency:** The application operates efficiently with the current dataset, providing instant responses for queries and updates.
- **Areas for Improvement:**
 - **Scalability:** As the system grows to accommodate more students and teachers, optimizations such as caching frequently accessed data and batch processing could improve performance.
 - **Stress Testing:** Conducting tests to simulate high usage scenarios (e.g., multiple simultaneous logins or grade updates) would help identify bottlenecks and ensure system reliability under heavy loads.
 - **Performance Monitoring:** Integrating tools to monitor database query performance and application response times can help in proactively addressing potential issues.

5. Future Enhancements:

○ User Experience:

- Add features like a student search bar, personalized dashboards, and improved navigation options for teachers to manage multiple students more effectively.
- Provide downloadable grade reports in PDF format for students and teachers.
- Mobile responsiveness to make the system accessible across devices.

○ Admin Efficiency:

- Extend the teacher dashboard to include advanced analytics, such as average scores for a class, grade distributions, and student performance trends.
- Introduce an administrator role to oversee all student records and system operations, enhancing manageability.

○ Security:

- Implement advanced user authentication methods, including two-factor authentication and session management, to ensure secure logins.
- Use database encryption to protect sensitive data such as user credentials and student records.
- Regular security audits and vulnerability testing to ensure compliance with data protection standards.

○ Scalability:

- Implement database normalization to ensure a modular design that can handle larger datasets effectively.
- Introduce cloud-based database solutions for better performance and reliability.

Conclusion:

The "Student Grading System" is a robust application that addresses core requirements, including grade calculation, record management, and role-based access. The system is efficient and user-friendly but could benefit from enhancements in security, scalability, and UI design. By addressing these areas and incorporating additional features, the application can evolve into a comprehensive grading and student management solution suitable for larger educational institutions.

VI. CONCLUSION

The development of the "Student Grading System" has successfully demonstrated core functionalities that streamline the management of student records and teacher interactions within an educational environment. This project lays a strong foundation by addressing essential features like student grading, secure login, and seamless data handling, catering effectively to both teachers and students.

From a **user perspective**, the application provides a well-organized and straightforward experience. The login system functions reliably, enabling role-based access for students and teachers. Students can easily access their grade records, while teachers are equipped with tools to input and calculate grades efficiently. The intuitive interface ensures ease of use for users with varying levels of technical expertise.

The system's **grading management functionality** is a standout feature, promoting accuracy, transparency, and efficiency. Teachers can calculate grades in real-time, and students receive instant updates on their results, fostering trust and clarity. The process is streamlined, eliminating manual errors and ensuring organized record-keeping.

From an **administrative standpoint**, the program demonstrates effective management of user accounts and grade records. The ability for teachers to add and manage student data simplifies administrative workflows. The integration of MySQL ensures efficient data storage and retrieval, making the system dynamic and responsive.

While the application includes basic **security measures**, such as role-based access, it highlights areas for enhancement, including password encryption and two-factor authentication (2FA). Future iterations can focus on these critical upgrades to bolster data protection and system integrity.

Overall, the project successfully achieves its primary objectives of delivering a functional, user-friendly, and reliable grading system. While the foundation is strong, the application has significant potential for growth. By incorporating advanced security features, enhancing the user interface, and optimizing the system for scalability, the platform can evolve into a comprehensive, robust solution for managing academic processes in schools. This iterative improvement approach will ensure the system's relevance, effectiveness, and adaptability to diverse educational environments.

VII. REFERENCES

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- 5. Verma, P., & Yadav, R. (2018).** *Designing an Efficient Student Grading System with MySQL and Java. International Journal of Software Engineering and Applications*, 9(1), 49-56.