

# MiniDBMS - Mini Database Management System

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## 1. Introduction

The Marvellous Mini DBMS App is a desktop application built with Java Swing for managing employee records. It allows users to insert, update, delete, search, and sort employee records. The application supports backup, restoration, and exporting employee data to CSV files for future use.

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## 2. Objective

- To provide a desktop application for managing employee records efficiently.
  - To implement basic DBMS operations like Insert, Update, Delete, Search, and Sort.
  - To persist data using serialization.
  - To allow export of employee data to CSV for external use.
  - To provide a user-friendly GUI interface.
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## 3. Features

- Add Employee Records (Name, Age, Address, Salary)
  - Display All Employees in a JTable
  - Update Employee Records
  - Delete Employee Records
  - Search Employees by ID, Name, Age Range, Salary Range
  - Sort Employees by Name, Age, Salary
  - Backup and Restore Data
  - Export Employee Data to CSV
  - Input Validation
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## 4. Technologies Used

- Java: Core programming language
  - Swing: GUI design
  - Collections Framework: LinkedList for dynamic storage
  - Serialization (java.io): Backup and restore functionality
  - CSV Export: Using PrintWriter
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## 5. System Flow

1. Start Application: On startup, previous backup (MiniDBMS.ser) is restored if available.
  2. Insert Employee: Users enter Name, Age, Address, and Salary.
  3. Display Employees: View all employees in a JTable.
  4. Update Employee: Modify details by Employee ID.
  5. Delete Employee: Remove employee by ID.
  6. Search Employees: Search by ID, Name, Age range, or Salary range.
  7. Sort Employees: Sort by Name, Age, or Salary.
  8. Backup: Save data to file.
  9. Export CSV: Export all records to CSV.
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## 6. Classes and Description

### 6.1 Employee

- Represents a single employee record.
- Attributes: EmpID, EmpName, EmpAge, EmpAddress, EmpSalary
- Methods: Constructor, toTableRow()

### 6.2 MarvellousDBMS

- Manages all employee records.
- Attributes: LinkedList Table
- Methods: InsertEmployee(), getAllEmployees(), getEmployeeByID(), updateEmployee(), deleteEmployee(), takeBackup(), restoreBackup(), exportCSV(), sortByName(), sortByAge(), sortBySalary(), searchByAgeRange(), searchBySalaryRange()

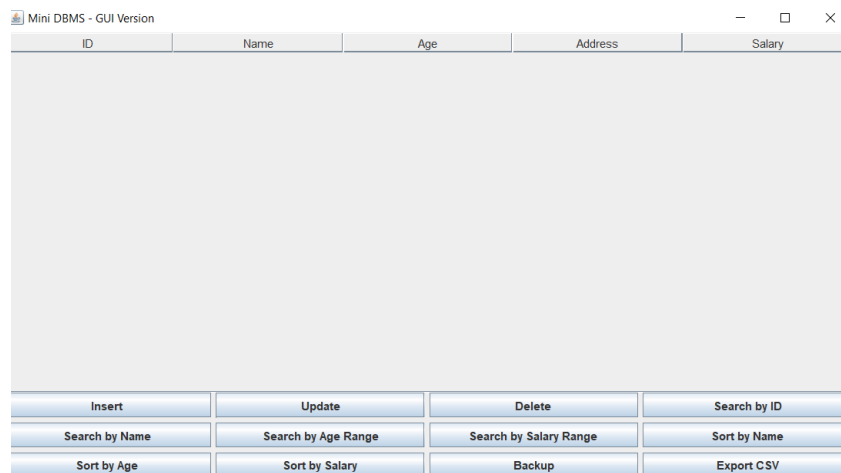
### 6.3 MiniDBMS (GUI)

- Main JFrame class.
- Handles GUI components: JTable, Buttons, Dialogs
- Methods: insertEmployee(), updateEmployee(), deleteEmployee(), searchByID(), searchByName(), searchByAgeRange(), searchBySalaryRange(), refreshTable(), main()

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## 7. Example Screenshots

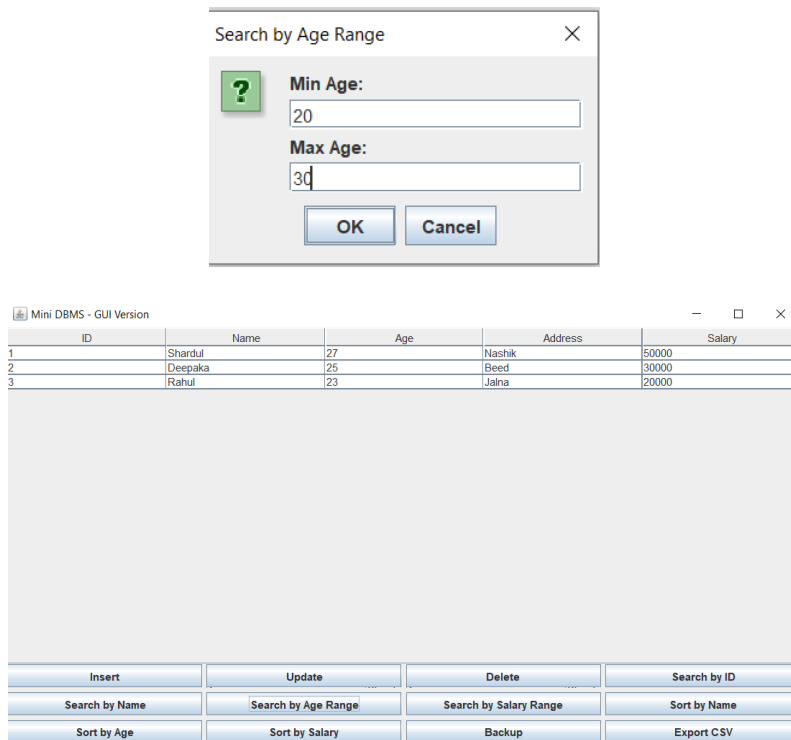
### Main Application Window:



### Insert Employee Dialog:

The screenshot shows a dialog box titled "Insert Employee". It contains a green question mark icon in a box. Below the icon are four text input fields with labels: "Name:" (containing "Shardul"), "Age:" (containing "27"), "Address:" (containing "Nashik"), and "Salary:" (containing "50000"). At the bottom of the dialog are two buttons: "OK" and "Cancel".

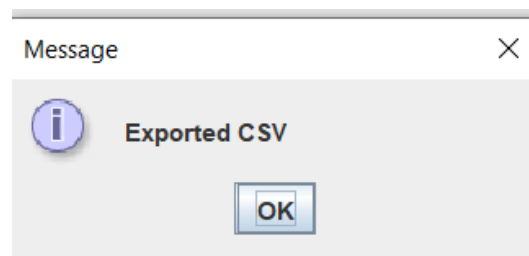
## Search by Age Range:



The image shows two screenshots from the Mini DBMS application. The top screenshot is a dialog box titled "Search by Age Range" with a close button (X). It contains a green question mark icon, a "Min Age:" label with a text field containing "20", a "Max Age:" label with a text field containing "30", and "OK" and "Cancel" buttons. The bottom screenshot is the main Mini DBMS GUI window, titled "Mini DBMS - GUI Version". It features a table with 5 columns: ID, Name, Age, Address, and Salary. The table contains 3 rows of data. Below the table is a large empty area. At the bottom of the window is a grid of buttons: Insert, Update, Delete, Search by ID, Search by Name, Search by Age Range, Search by Salary Range, Sort by Name, Sort by Age, Sort by Salary, Backup, and Export CSV.

ID	Name	Age	Address	Salary
1	Shardul	27	Nashik	50000
2	Deepaka	25	Beed	30000
3	Rahul	23	Jalna	20000

## CSV Export Dialog:



The image shows a "Message" dialog box with a close button (X). It contains an information icon (i), the text "Exported CSV", and an "OK" button.

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## 8. Sample Output Table

ID	Name	Age	Address	Salary
1	Shardul	27	Nashik	50000
2	Deepak	25	Beed	60000
3	Rahul	23	Jalna	55000

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## 10.Future Enhancements

- Real-time validation while typing inputs
- Column header click sorting in JTable
- Integration with SQL databases for larger datasets
- Multi-user login functionality
- Export reports in PDF/Excel formats

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## 10. Conclusion

The MiniDBMS project demonstrates the application of object-oriented programming, GUI design, and data persistence in Java. It is a practical desktop application for managing employee records efficiently.

