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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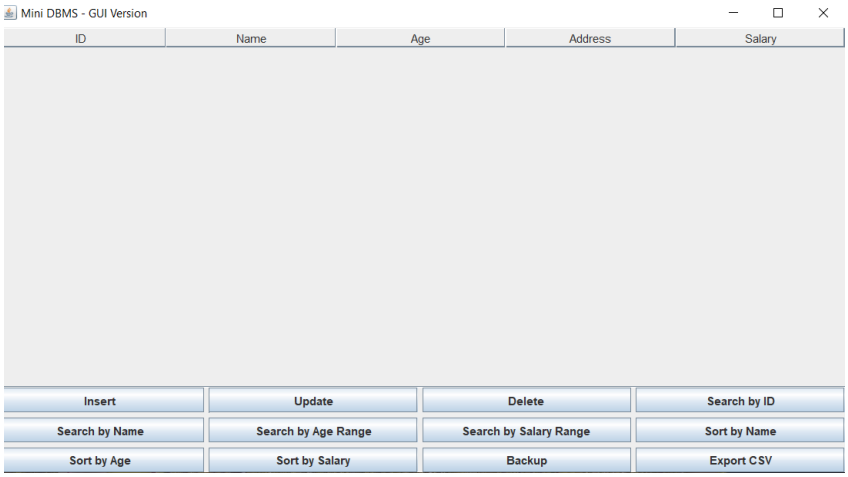
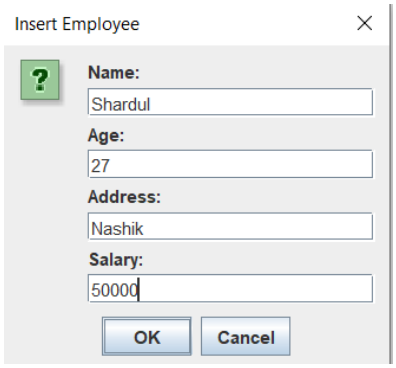
7. Example Screenshots

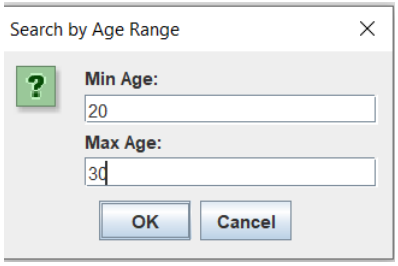
Main Application Window:

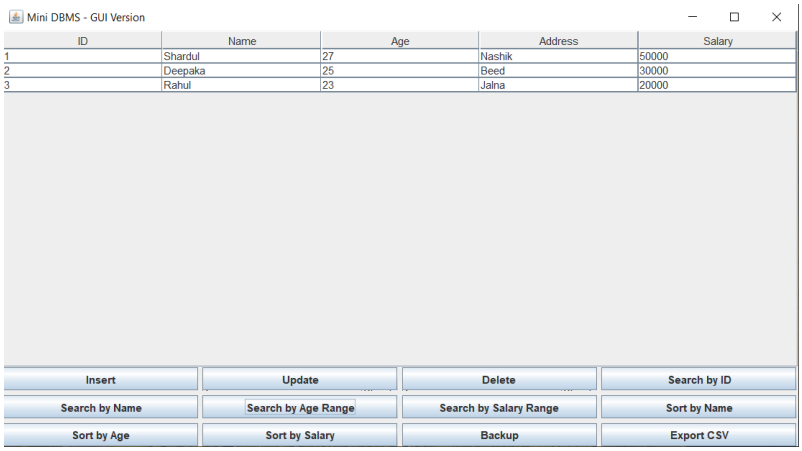


Insert Employee Dialog:

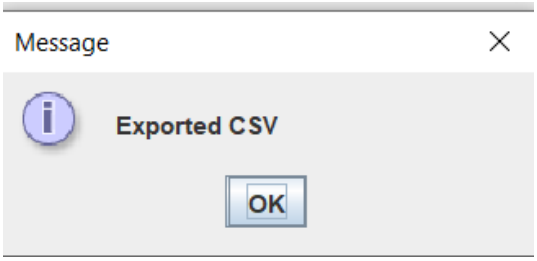


Search by Age Range:





CSV Export Dialog:



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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.