**Project Documentation: University Management System**

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**1. Introduction**

The University Management System (UMS) is a Java-based desktop application integrated with MySQL for efficient management of university operations. It streamlines activities such as student registration, course allocation, attendance management, and faculty records.

**2. Objectives**

* Simplify and automate administrative tasks.
* Provide secure data storage and retrieval.
* Facilitate seamless communication between students, faculty, and administrators.

**3. System Requirements**

**Hardware Requirements:**

* Processor: Intel i5 or higher
* RAM: 4GB minimum
* Storage: 5GB minimum

**Software Requirements:**

* Operating System: Windows/Linux/MacOS
* JDK: Java Development Kit 8 or higher
* Database: MySQL 8.0 or higher
* IDE: IntelliJ IDEA/Eclipse/NetBeans

**4. Features of the System**

* **Student Management:** Add, update, and view student records.
* **Faculty Management:** Maintain faculty details and schedules.
* **Course Management:** Add and allocate courses to students and faculty.
* **Attendance Tracking:** Monitor and record attendance.
* **Examination Records:** Store and manage grades and results.

**5. Architecture**

The system follows a three-tier architecture:

1. **Presentation Layer:** Swing-based GUI.
2. **Business Logic Layer:** Java classes for core functionalities.
3. **Database Layer:** MySQL database for data persistence.

**6. Database Design**

**Tables:**

* **students:** Stores student information (ID, name, contact, etc.).
* **faculty:** Stores faculty details (ID, name, department, etc.).
* **courses:** Stores course information (course ID, name, credits, etc.).
* **attendance:** Tracks student attendance.
* **grades:** Stores examination results.

**Sample Schema:**

CREATE TABLE students (

student\_id INT PRIMARY KEY AUTO\_INCREMENT,

name VARCHAR(100),

contact VARCHAR(15),

email VARCHAR(100),

department VARCHAR(50)

);

CREATE TABLE faculty (

faculty\_id INT PRIMARY KEY AUTO\_INCREMENT,

name VARCHAR(100),

department VARCHAR(50),

contact VARCHAR(15)

);

**7. User Roles and Functionalities**

**Administrator:**

* Manage students, faculty, and courses.
* Generate reports.

**Faculty:**

* Manage attendance and grades.
* View assigned courses.

**Students:**

* View personal details, attendance, and grades.

**8. Implementation Details**

**Technologies Used:**

* **Programming Language:** Java (Swing for GUI)
* **Database:** MySQL
* **Connector:** MySQL Connector/J for database integration

**Key Classes and Methods:**

* DbConnection: Handles database connectivity.
* Student: Manages student-related operations.
* Faculty: Manages faculty-related operations.
* Course: Handles course allocation and management.

**9. Testing**

* Unit Testing: Ensure individual modules function correctly.
* Integration Testing: Verify seamless interaction between modules.
* User Acceptance Testing (UAT): Validate the system with end-users.

**10. Deployment**

* Package the application as a .jar file.
* Deploy the database on a MySQL server.
* Distribute the application to end-users.

**11. Future Enhancements**

* Develop a web-based version using Java Spring Boot.
* Integrate a notification system for important updates.
* Implement advanced analytics for student performance tracking.

**12. Conclusion**

The University Management System simplifies university operations, enhances data accessibility, and reduces manual workload. Its modular architecture and scalable design ensure it can evolve with the institution's needs.

**Appendix**

* **References:**
  + [Java Documentation](https://docs.oracle.com/javase/)
  + [MySQL Documentation](https://dev.mysql.com/doc/)
* **Contact:** For inquiries, contact the development team at [support@ums.com](mailto:support@ums.com).