BroskiesHub LMS Database Project Report

Project Name: BroskiesHub LMS Database

Goal: To design and analyze a relational database for an online learning platform that manages students, instructors, courses, modules, grades, and attendance efficiently.

DBMS Used: MySQL Workbench

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1. Database Design Summary

Students - Stores personal and academic info

Instructors - Faculty data

Courses - Course catalog

Modules - Course breakdown

Enrollments - Many-to-many link (Student to Course)

Grades - Assessment results

Attendance - Daily presence tracking

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2. Normalization & Integrity

- Schema follows Third Normal Form (3NF)
- Primary & Foreign keys maintain integrity
- CHECK and UNIQUE constraints ensure valid data
- Eliminates redundancy and ensures consistency

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3. Optimization Strategies

- Indexing on join & filter columns (student_id, course_id, module_id)
- EXPLAIN used to analyze query plans
- Efficient data types (INT, VARCHAR, TIMESTAMP)
- Referential integrity with foreign keys

- Optional materialized views for heavy reports

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4. Analytical Findings

- Average Grade per Course: ML = 3.8 GPA > DB = 3.4
- Top Performers: Aarav Sharma -> GPA 3.9
- Attendance Rate: Avg = 92%
- Instructor Workload: Ramesh Iyer -> 2 courses

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5. Conclusions

- Designed a robust, normalized LMS database
- Created optimized SQL queries for operations and reports
- Indexing improved performance significantly
- Scalable for future expansion and analytics

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6. Future Enhancements

- Add user roles & authentication
- Create stored procedures & triggers for automation
- Build dashboards using Power BI / Tableau
- Implement backup & recovery scripts

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7. Deliverables Checklist

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schema.sql - Table creation

populate_data.sql - Sample data

queries.sql - All queries

final_report.pdf - Summary & optimization strategies