PROJECT 04: ONLINE COURSE MANAGEMENT SYSTEM

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Project Objective

The objective of this project is to design and implement a database-driven online course management system that supports efficient organization of courses, instructors, students, and learning materials, enabling flexible and interactive digital learning.

Database and Programming Languages

- **Database Management System:** MySQL
- **Programming Language:** Python

Detailed Project Requirements

System Analysis and Requirements

- Manage detailed information about courses, instructors, learners, course content, and enrollments.

Main Functionalities

- Instructor management (add, update, manage expertise and contact information).
- Course management (create, update course descriptions and assign instructors).
- Lecture content management (create, edit titles and content of lectures).
- Learner management (registration, updates, contact information).
- Enrollment and progress tracking.
- Reporting and statistics on course participation and learner progress.

Database Design and Implementation

1. **Data Model Design**
    - Create Entity-Relationship (ER) diagrams for the full system.
    - Convert ER diagrams into relational schemas identifying PKs, FKs, and integrity constraints.
2. **Table Structures**
    - Learners (LearnerID, LearnerName, Email, PhoneNumber)
    - Instructors (InstructorID, InstructorName, Expertise, Email)
    - Courses (CourseID, CourseName, Description, InstructorID)
    - Lectures (LectureID, CourseID, Title, Content)
    - Enrollments (EnrollmentID, LearnerID, CourseID, EnrollmentDate)
3. **Sample Data**
    - Provide 5-10 sample entries for each table.
    - Create a database diagram using MySQL Workbench.

Advanced Database Objects

- **Indexes:** Improve query speed for course search and enrollments.
- **Views:** Provide quick access to enrolled courses per learner or teaching load per instructor.
- **Stored Procedures:** Automate course enrollment and generate course completion summaries.
- **User Defined Functions:** Calculate learner completion percentage or total lectures viewed.
- **Triggers:** Automatically update enrollment status or record audit trails.

Database Security and Administration

- Implement user account management and access control.
- Apply strategies for securing learner and course information.
- Backup and recovery planning for learning data.
- Optimize queries and resource management.

Python Application Development

- **Database Connection:** Use mysql-connector-python or SQLAlchemy for MySQL integration.
- **Data Management:** Develop Python scripts for managing learners, courses, and enrollments.
- **Reports and Queries:** Generate statistics on active courses, learner numbers, and instructor workloads.
- **Interactive Interface:** Build a simple CLI or GUI application to register and track learner progress.

Deliverables

- Full report written according to university standards (20–30 pages).
- All required sections including ER model, SQL code, Python code, testing screenshots, and results.
- Source files: ERD diagram, SQL schema and data scripts, Python project files.

Conclusion and Recommendations

- Summarize accomplishments and functionality achieved.
- Recommend possible improvements for real-world applications or future expansion.

References

- List all learning materials, articles, and documentation referenced during the project.