Project Name: **O**nline **C**ourse **M**anagement **S**ystem [OCMS]

| | |
|---|---|
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| ***ID*** | *2013438042* |
| ***Course Code & section*** | *CSE311L.2* |
| ***Group ID*** | *21* |
| ***Project ID*** | *1* |

# Project Objectives

The primary objective of this project is to develop an **online course management system** (OCMS), that enables students to enroll in courses, take exams, and view their results efficiently. The system also allows teachers to create and manage courses and exams while maintaining secure authentication and access control.

Here're some bullet point:

- Efficient management of student and teacher data.
- Organizing and scheduling exams and questions.
- Managing student exam performance and generating results.
- Assigning roles to users based on responsibilities.
- Representing complex relationships between entities such as departments, courses, and roles.
- Ensuring support for multiple data types (multivalued, composite, derived attributes)

# Project Functionalities

- **Student Registration & Profile Management**
  - Students can register with personal details (composite: name, address).
  - Belongs to a department.
  - Multivalued attributes: Email, Phone (a student may have multiple).
- **Course Management**
  - Teachers are assigned to courses.
  - Courses are linked to departments.
  - Students register in multiple courses (many-to-many relationship).
- **Exam & Question Management**
  - Teachers create questions for exams.
  - Each question has marks, type, and exam association.
  - Questions are organized per course.
- **Marks Entry and Result Processing**
  - Students write answers in exams (ternary relationship: Student-Exam-Question).

- Marks are recorded per question and summed in a result.
- Derived attribute: Total marks in Result or Exam.

➢ **Teacher Management**

- Includes specialization through roles (Role entity with attributes).
- Teachers belong to departments and teach multiple courses.

➢ **Role Management**

- Teachers or Students may have system roles (admin, coordinator, etc.).
- Demonstrates generalization/specialization.

# ERD Concepts

## ✓ Entities

**Strong Entities**: Student, Teacher, Department, Course, Exam, Question, Role, Result

**Weak Entities**: Marks, QuestionAnswer (existence depends on related strong entities)

## ✓ Relationships

**One-to-One**: Student ↔ Result (each student has one result)

**One-to-Many**:

- Department → Student
- Department → Course
- Teacher → Exam

**Many-to-Many**:

- Student ↔ Course (via enrollment/appears)
- Teacher ↔ Course (via teaches)

## ✓ Generalization/Specialization

**Role assignment**: General entity (Role) applies to different entities (Student/Teacher) based on context.

## ✓ Role

Students are assigned roles (write, make, etc) using the Role entity.

Role contains Role_id, Role_Name, and Role_desc.

## ✓ Ternary Relationship

Marks links Student, QuestionAnswer, and Teacher via the ternary relationship write.

## ✓ Composite, Multivalued, and Derived Attributes

**composite**: Address (may include subfields like street, city, etc.)

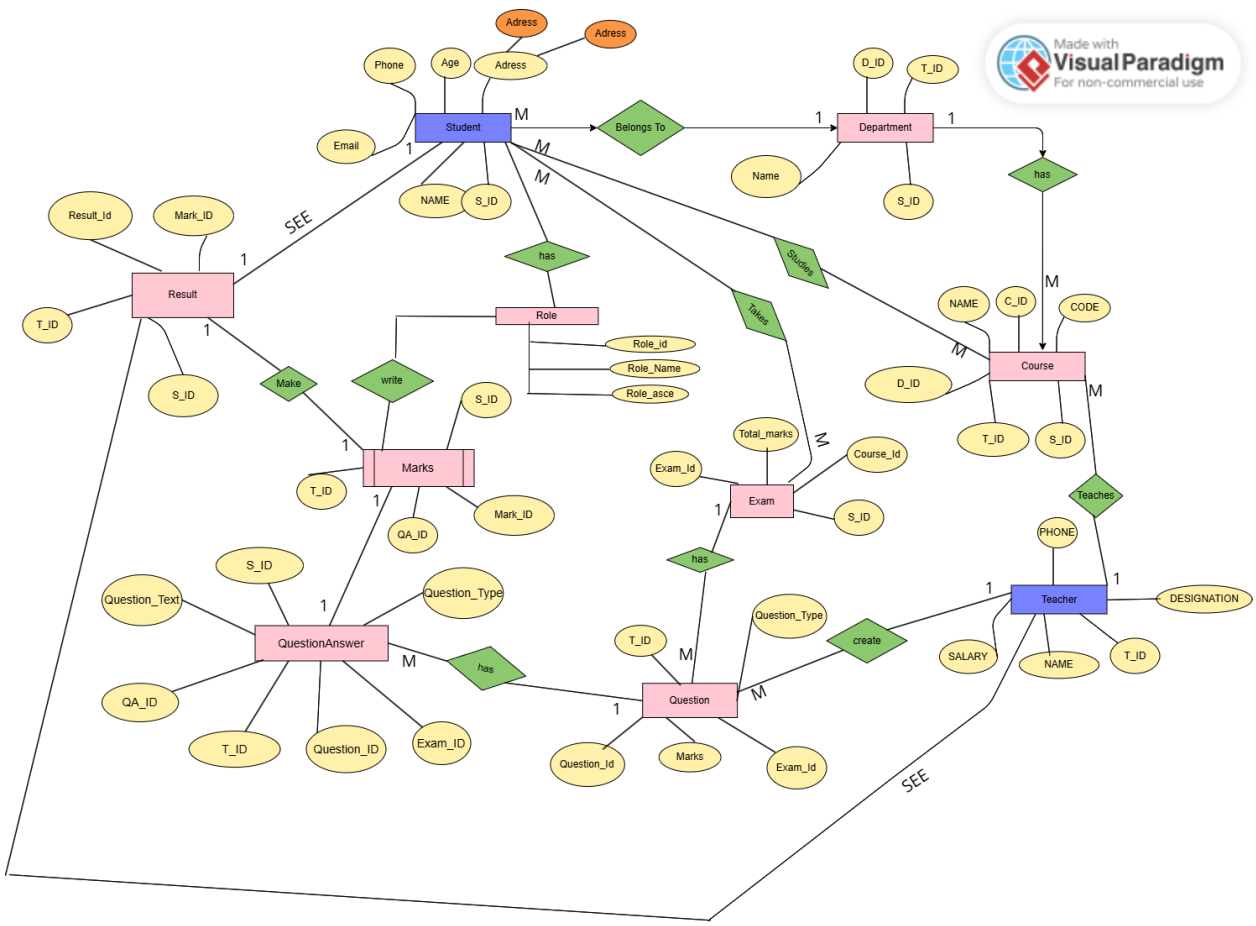
**Multivalued**: Phone (students/teachers can have multiple numbers)

**Derived**: Result may include derived total marks from Marks entries.

# Entity-Relationship Diagram (ERD)

## Link here:

https://online.visual-paradigm.com/share.jsp?id=333932323637312d34



# Relational Schema

Student (**S_ID**, Name, Age, Email, Phone, Address)
PK: S_ID

Department (**D_ID**, Name, **T_ID, S_ID**)
PK:D_ID and FK:T_ID,S_ID

Course (**C_ID**, Name, Code, **D_ID, S_ID, T_ID**)
PK:C_ID and FK: D_ID, S_ID, T_ID

Teacher (**T_ID**, Name, Phone, Designation, Salary)
PK:T_ID

Exam (**Exam_ID**, Total_marks, **Course_ID, Student_ID**)
PK:EXAM_ID and FK: Course_ID, Student_ID

Question (**Question_ID**, Marks, Types, **Exam_ID,T_ID**)
PK:Question_ID and FK: Exam_ID, T_ID

QuestionAnswer (**QA_ID**,Question_Text, **Question_ID, S_ID, T_ID, Exam_ID**)
PK:QA_ID and FK: Question_ID, S_ID, T_ID, Exam_ID

Marks (**Mark_ID, S_ID, T_ID, QA_ID**)
PK: Mark_ID and Fk: S_ID, T_ID, QA_ID

Result (**Result_ID**, **S_ID, T_ID, Exam_ID**, Marks)
PK:Result_ID and FK: S_ID, T_ID, Exam_ID

Role (**Role_ID**, Role_Name, Role_Description)
PK:Role_ID
Has_Role (**S_ID, Role_ID)**
PK/FK: S_id,Role_ID

## Relationships & Mapping:

- Belongs To (Student - Department) → Many -to-one (M:1)
- Offers (Department – Course) → One-to-Many (1:M)
- Studies (Student – Course) → Many-to-Many (M:M) (Needs an associative table)
- Teaches (Teacher – Course) → One-to-Many (1:M)
- Has (Student–Role)-> One-to-One or One-to-Many(1:M or 1:1)
- Takes (Student – Exam) → Many-to-Many(M:M)
- Creates(Teacher–Question)-> One-to-Many(1:M)
- Has (Exam - Questions) → One-to-Many (1:M)
- Writes (Student - QuestionAnswer)-> One-to-Many (1:M)
- Evaluates(Marks–QuestionAnswer)-> One-to-One(1:1)
- Make (Result – Marks)->One-to-One(1:1)
- Has(Student–Result)-> One-to-One(1:1)

## SQL DDL for the Relation Schema

```
-- Step 1: Create Database

CREATE DATABASE StudentManagementSystem;
USE StudentManagementSystem;

------- Step 2: Create Tables-----------


----Student Table----
CREATE TABLE Student (
```

```
   S_ID INT PRIMARY KEY,
   Name VARCHAR(100),
   Email VARCHAR(100),
   Phone VARCHAR(15),
   Age INT,
   Address VARCHAR(255)
);
```

---- Teacher Table----

```
CREATE TABLE Teacher (
   T_ID INT PRIMARY KEY,
   Name VARCHAR(100),
   Phone VARCHAR(15),
   Salary DECIMAL(10, 2),
   Designation VARCHAR(100)
);
```

---- Department Table----

```
CREATE TABLE Department (
   D_ID INT PRIMARY KEY,
   Name VARCHAR(100),
   S_ID INT,
   T_ID INT,
   FOREIGN KEY (S_ID) REFERENCES Student(S_ID),
   FOREIGN KEY (T_ID) REFERENCES Teacher(T_ID)
);
```

-- --Role Table----

```
CREATE TABLE Role (
   Role_id INT PRIMARY KEY,
   Role_Name VARCHAR(100),
   Role_asce VARCHAR(100)  -- Unclear attribute; possibly Role_desc?
);
```

---- Course Table----

```
CREATE TABLE Course (
   C_ID INT PRIMARY KEY,
   Name VARCHAR(100),
   Code VARCHAR(50),
   D_ID INT,
```

```
   T_ID INT,
   S_ID INT,
   FOREIGN KEY (D_ID) REFERENCES Department(D_ID),
   FOREIGN KEY (T_ID) REFERENCES Teacher(T_ID),
   FOREIGN KEY (S_ID) REFERENCES Student(S_ID)
);
```

---- Exam Table----

```
CREATE TABLE Exam (
   Exam_ID INT PRIMARY KEY,
   Course_ID INT,
   S_ID INT,
   Total_marks INT,
   FOREIGN KEY (Course_ID) REFERENCES Course(C_ID),
   FOREIGN KEY (S_ID) REFERENCES Student(S_ID)
);
```

---- Result Table----

```
CREATE TABLE Result (
   Result_ID INT PRIMARY KEY,
   Mark_ID INT,
   S_ID INT,
   T_ID INT,
   FOREIGN KEY (Mark_ID) REFERENCES Marks(Mark_ID),
   FOREIGN KEY (S_ID) REFERENCES Student(S_ID),
   FOREIGN KEY (T_ID) REFERENCES Teacher(T_ID)
);
```

-----Question Table----

```
CREATE TABLE Question (
   Question_ID INT PRIMARY KEY,
   Question_Type VARCHAR(50),
   Exam_Id INT,
   T_ID INT,
   Marks INT,
   FOREIGN KEY (Exam_Id) REFERENCES Exam(Exam_ID),
   FOREIGN KEY (T_ID) REFERENCES Teacher(T_ID)
);
```

-- --QuestionAnswer Table---

```
CREATE TABLE QuestionAnswer (
   QA_ID INT PRIMARY KEY,

   Question_ID INT,
   Question_Type VARCHAR(50),
   Exam_ID INT,
   S_ID INT,
   T_ID INT,

   Question_Text TEXT,
   FOREIGN KEY (Question_ID) REFERENCES Question(Question_ID),
   FOREIGN KEY (Exam_ID) REFERENCES Exam(Exam_ID),
   FOREIGN KEY (S_ID) REFERENCES Student(S_ID),
   FOREIGN KEY (T_ID) REFERENCES Teacher(T_ID)
);
```

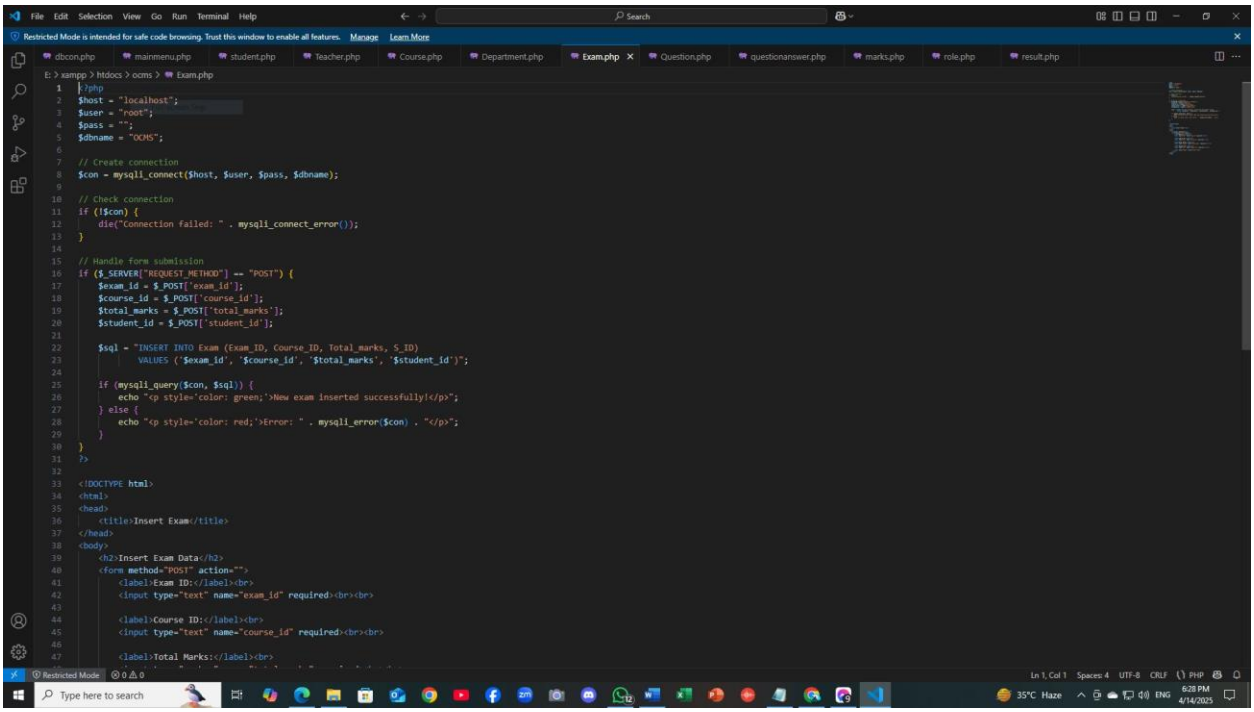
---- Marks Table----

```
CREATE TABLE Marks (
   Mark_ID INT PRIMARY KEY,
   S_ID INT,
   T_ID INT,
   QA_ID INT,
   FOREIGN KEY (S_ID) REFERENCES Student(S_ID),
   FOREIGN KEY (T_ID) REFERENCES Teacher(T_ID),
   FOREIGN KEY (QA_ID) REFERENCES QuestionAnswer(QA_ID)
);
```

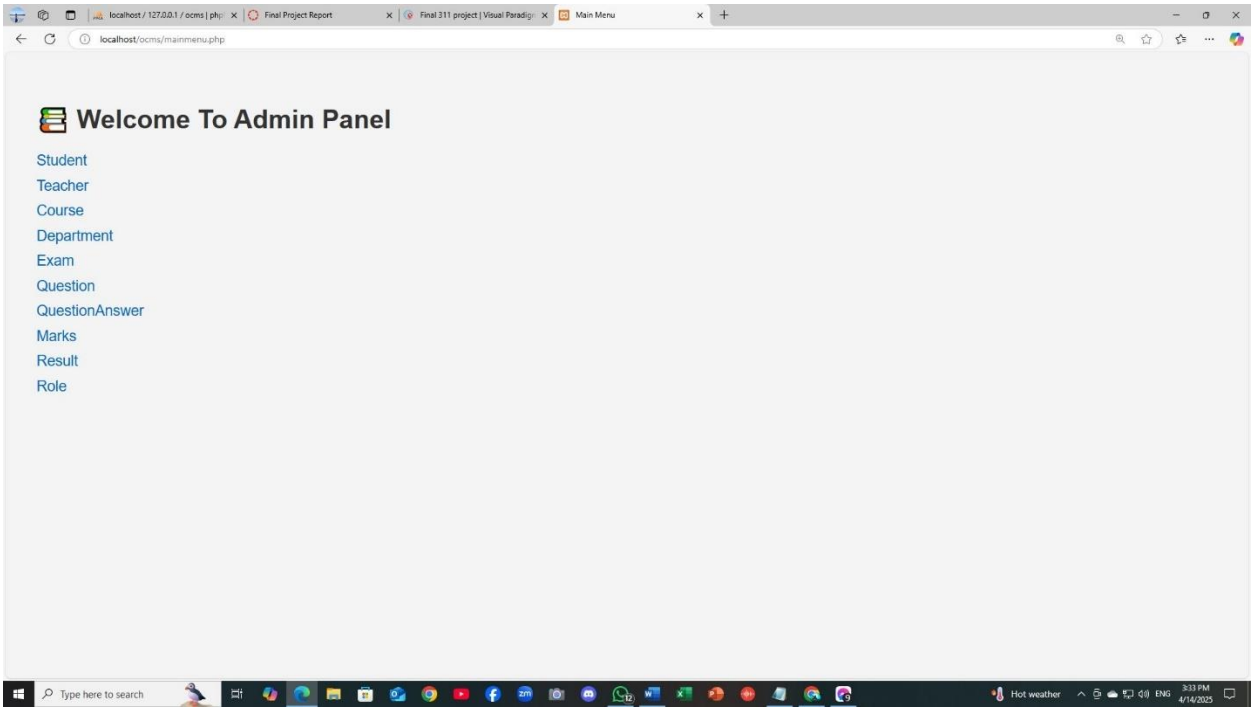
## Screenshots of the User Interface (UI) of the Implemented Project

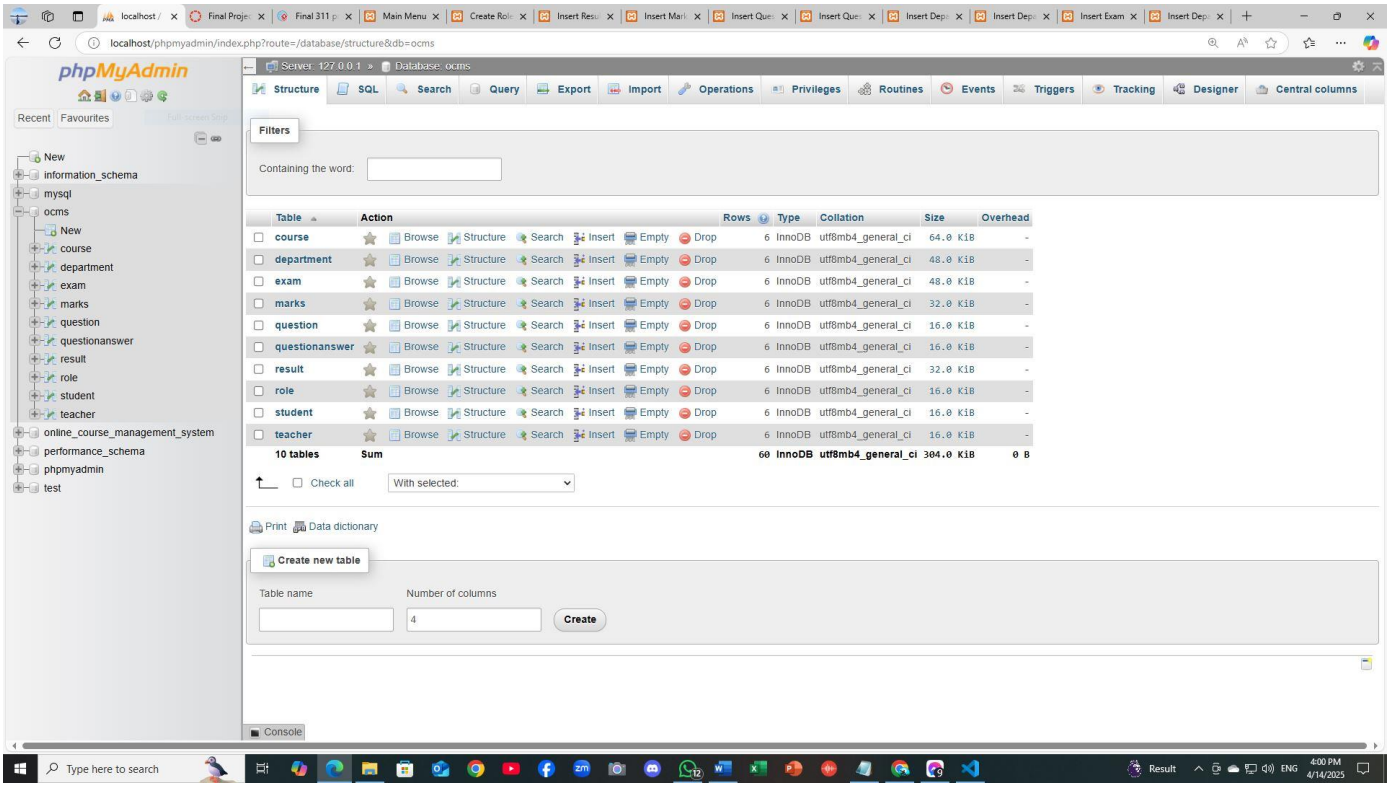
### This ScreenShot File:

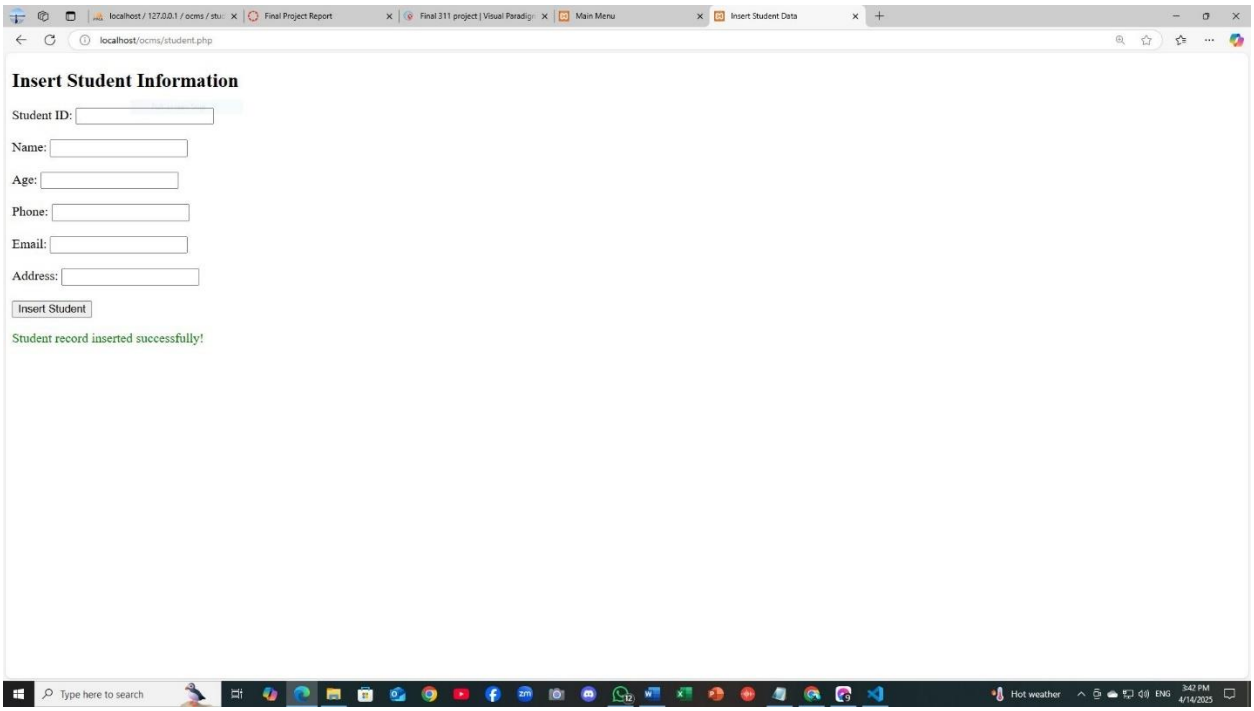
SS for Full project.zip

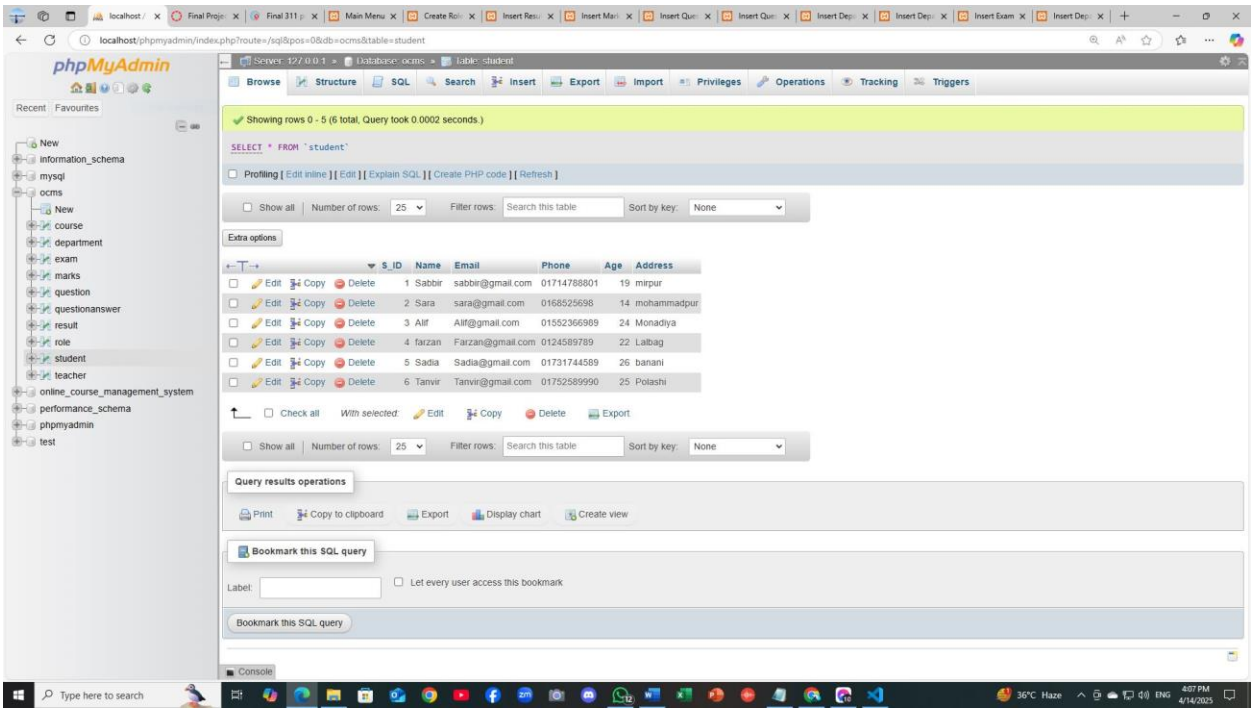


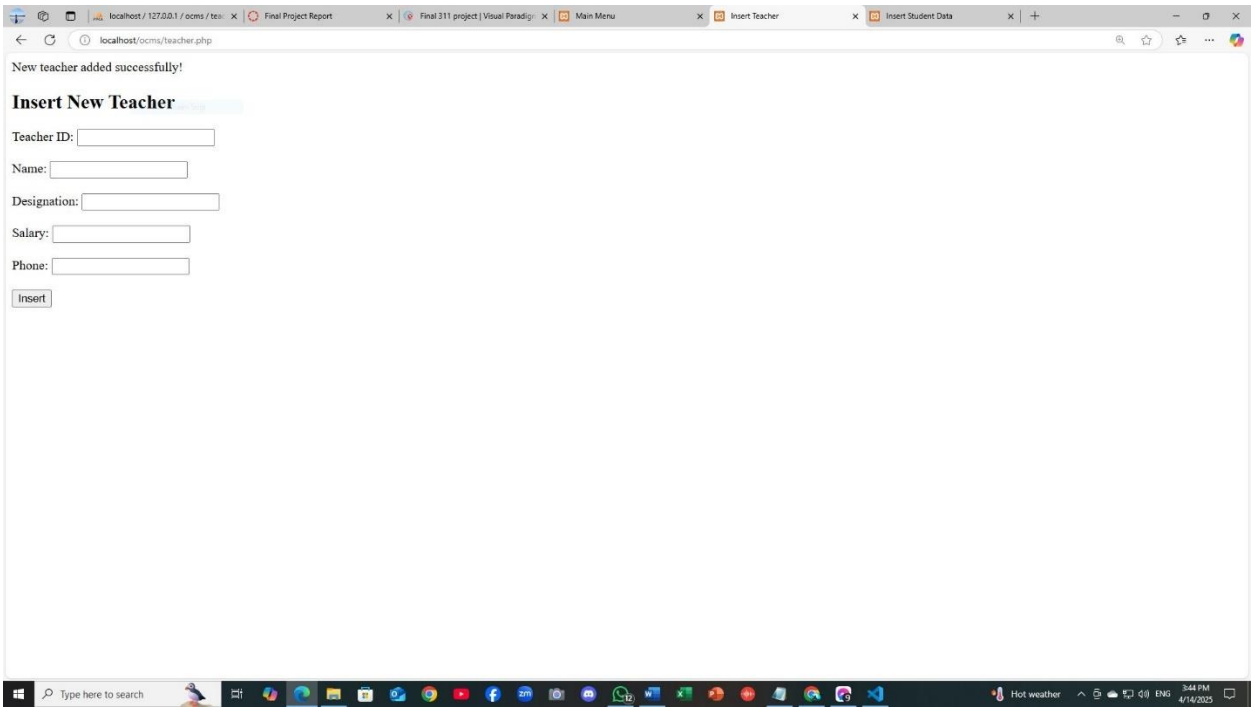

(Apply: vs-code and Note++)

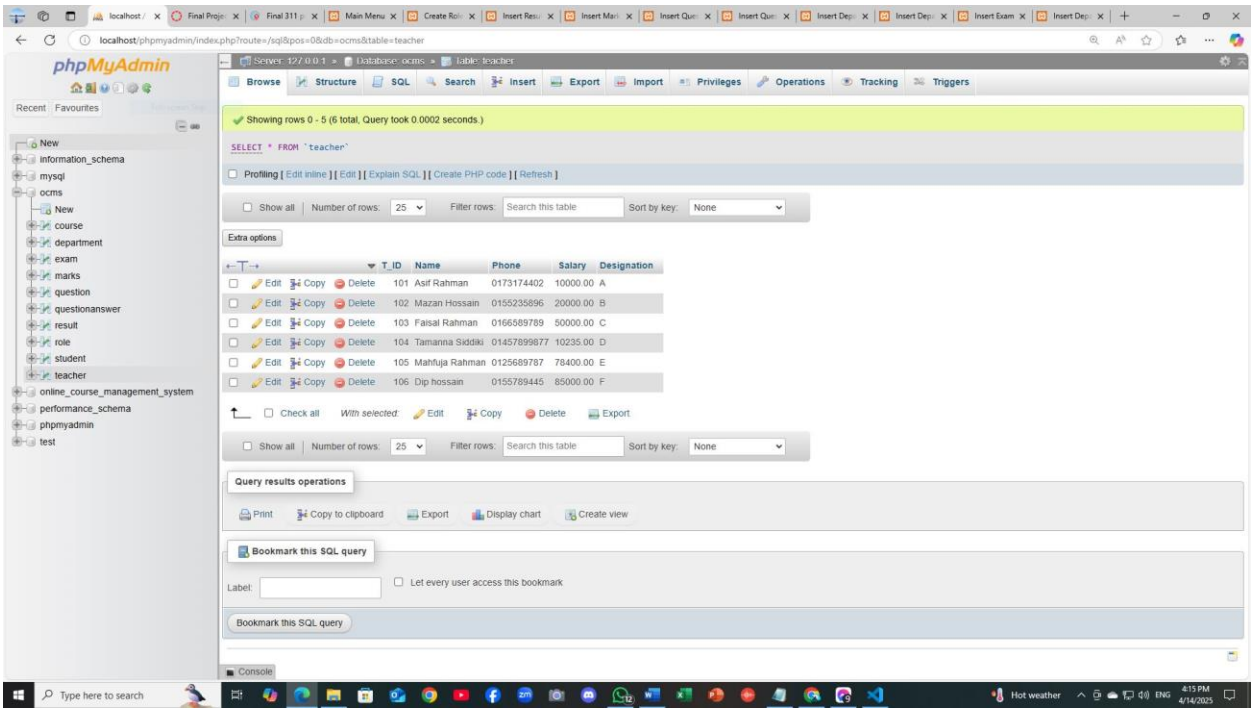


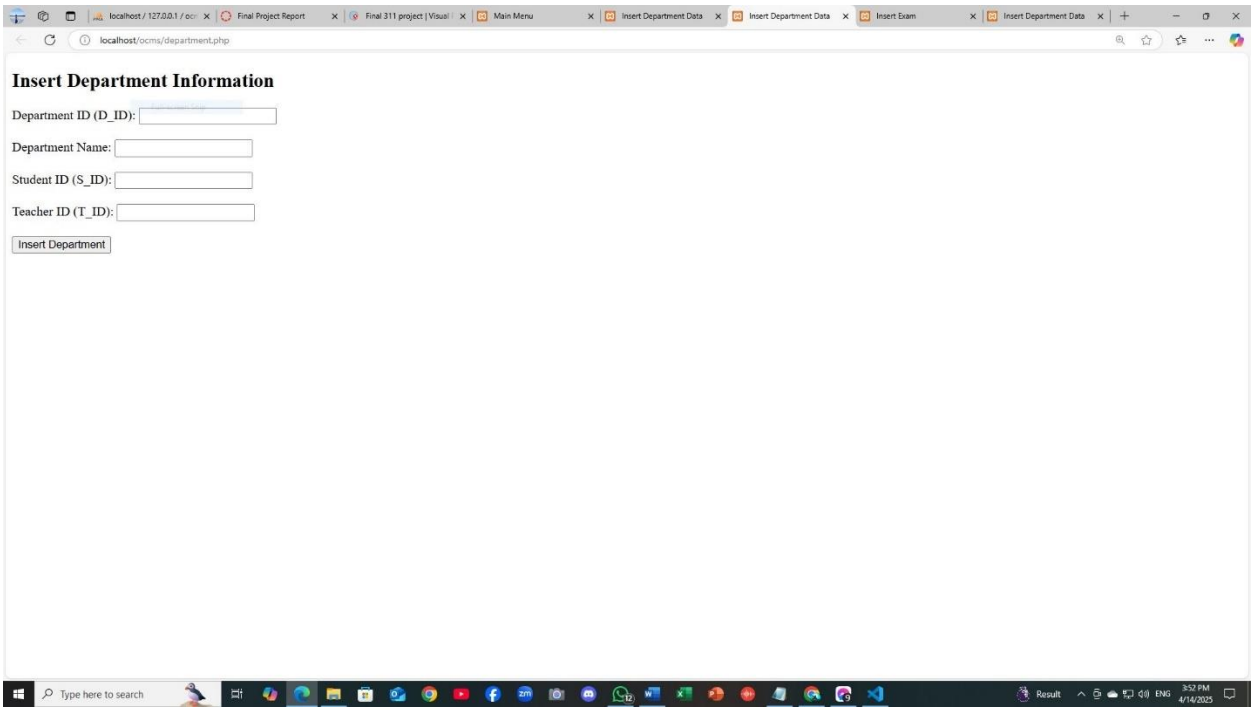

localhost/phpmyadmin/index.php?route=/database/structure&db=ocms
phpMyAdmin
Recent Favourites
New
information_schema
mysql
ocms
New
course
department
exam
marks
question
questionanswer
result
role
student
teacher
online_course_management_system
performance_schema
phpmyadmin
test
Server: 127.0.0.1 » Database: ocms
Structure SQL Search Query Export Import Operations Privileges Routines Events Triggers Tracking Designer Central columns
Filters
Containing the word:
Table Action Rows Type Collation Size Overhead
course 6 InnoDB utf8mb4_general_ci 64.0 KiB -
department 6 InnoDB utf8mb4_general_ci 48.0 KiB -
exam 6 InnoDB utf8mb4_general_ci 48.0 KiB -
marks 6 InnoDB utf8mb4_general_ci 32.0 KiB -
question 6 InnoDB utf8mb4_general_ci 16.0 KiB -
questionanswer 6 InnoDB utf8mb4_general_ci 16.0 KiB -
result 6 InnoDB utf8mb4_general_ci 32.0 KiB -
role 6 InnoDB utf8mb4_general_ci 16.0 KiB -
student 6 InnoDB utf8mb4_general_ci 16.0 KiB -
teacher 6 InnoDB utf8mb4_general_ci 16.0 KiB -
10 tables Sum 60 InnoDB utf8mb4_general_ci 304.0 KiB 0 B
Browse Structure Search Insert Empty Drop
Check all
With selected:
Print Data dictionary
Create new table
Table name
Number of columns
4
Create
Console
Type here to search
Result
ENG
4:00 PM
4/14/2025

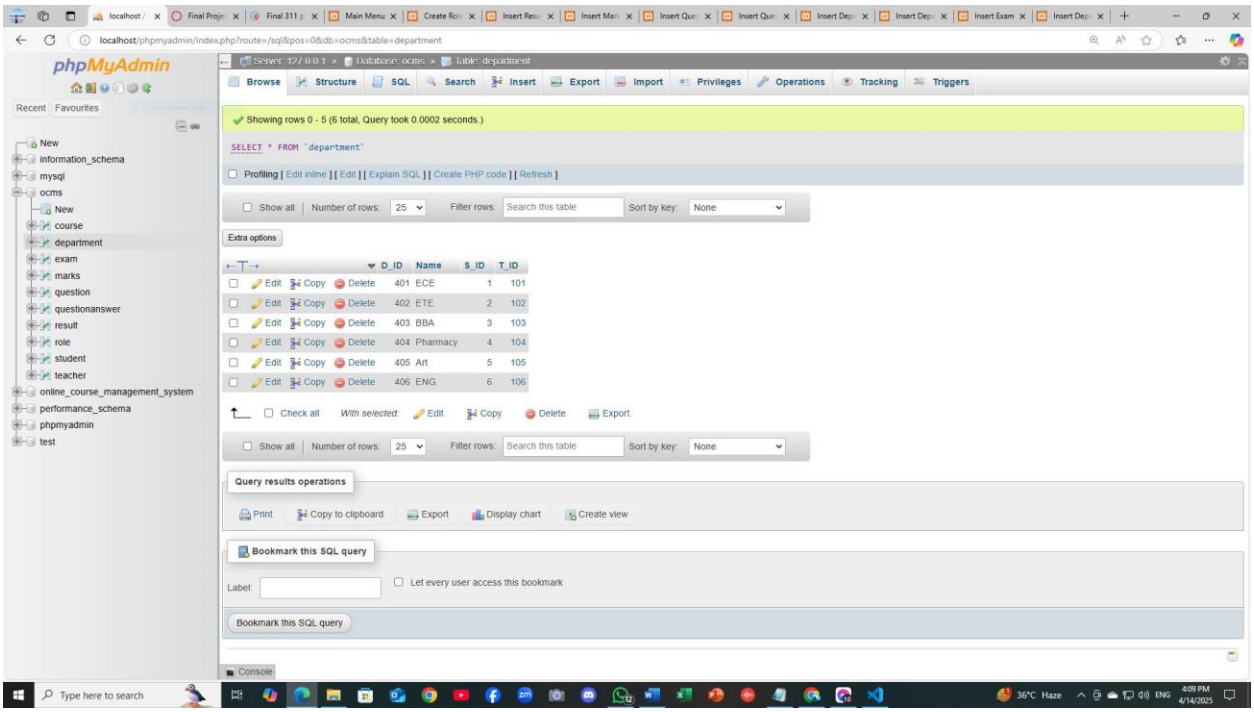

localhost/ocms/student.php
Insert Student Information
Student ID:
Name:
Age:
Phone:
Email:
Address:
Insert Student
Student record inserted successfully!

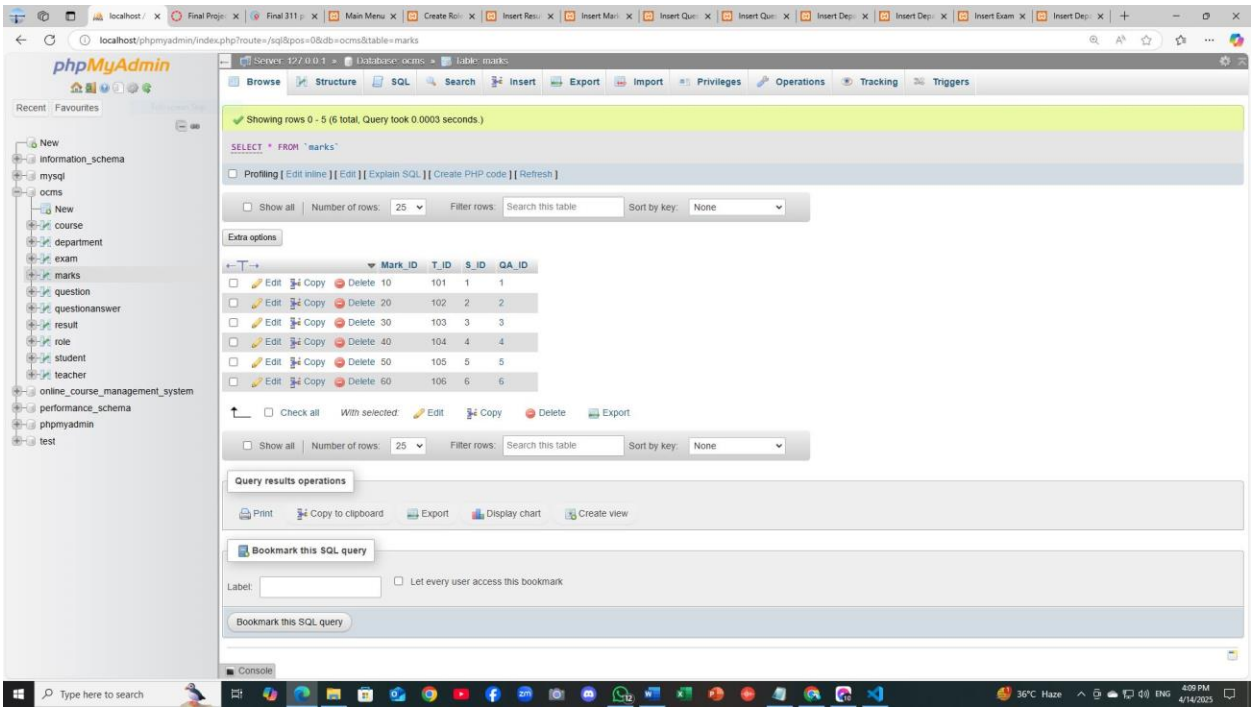

localhost/phpmyadmin/index.php?route=/sql&pos=0&db=ocms&table=student
phpMyAdmin
Recent Favourites
New
information_schema
mysql
ocms
course
department
exam
marks
question
questionanswer
result
role
student
teacher
online_course_management_system
performance_schema
phpmyadmin
test
Browse Structure SQL Search Insert Export Import Privileges Operations Tracking Triggers
Showing rows 0 - 5 (6 total, Query took 0.0002 seconds.)
SELECT * FROM `student`
Profiling [ Edit inline ] [ Edit ] [ Explain SQL ] [ Create PHP code ] [ Refresh ]
Show all Number of rows: 25 Filter rows: Search this table Sort by key: None
Extra options
S_ID Name Email Phone Age Address
1 Sabbir sabbir@gmail.com 01714788801 19 mirpur
2 Sara sara@gmail.com 0168525698 14 mohammadpur
3 Alif Alif@gmail.com 01552366989 24 Monadiya
4 farzan Farzan@gmail.com 0124589789 22 Lalbag
5 Sadia Sadia@gmail.com 01731744589 26 banani
6 Tanvir Tanvir@gmail.com 01752589990 25 Polashi
Check all With selected: Edit Copy Delete Export
Query results operations
Print Copy to clipboard Export Display chart Create view
Bookmark this SQL query
Label:
Let every user access this bookmark
Console

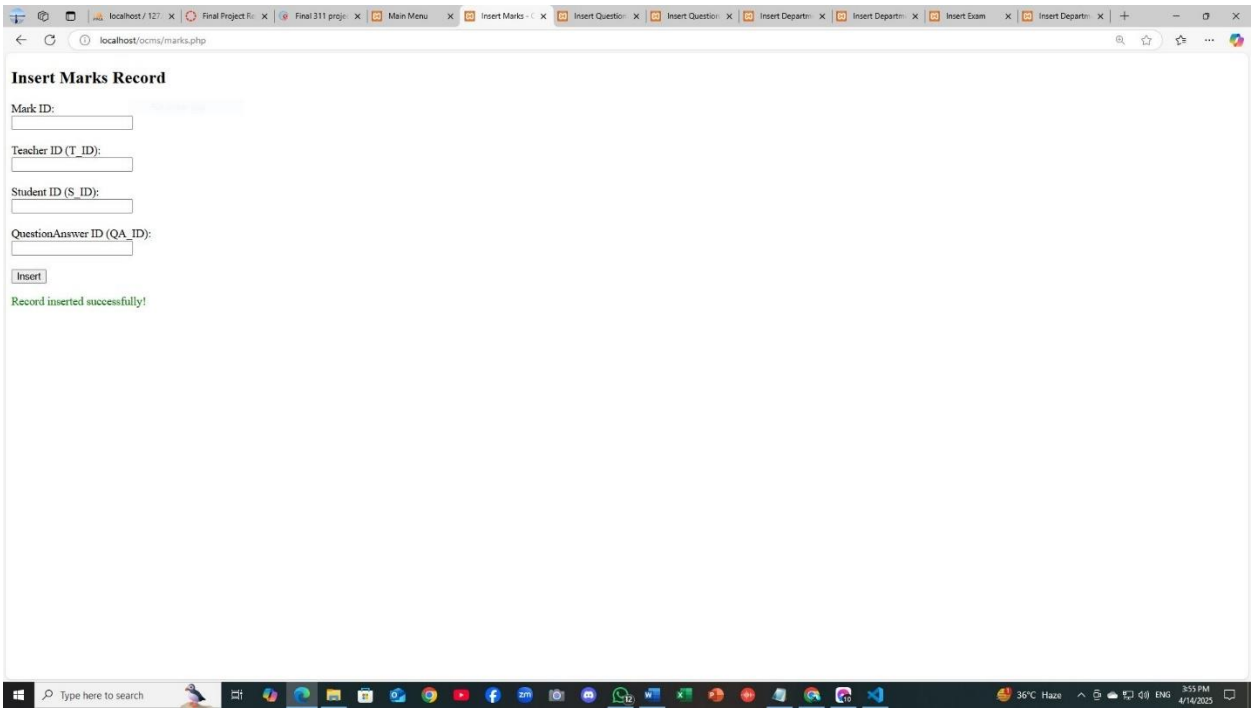

localhost/ocms/teacher.php
New teacher added successfully!
Insert New Teacher
Teacher ID:
Name:
Designation:
Salary:
Phone:
Insert

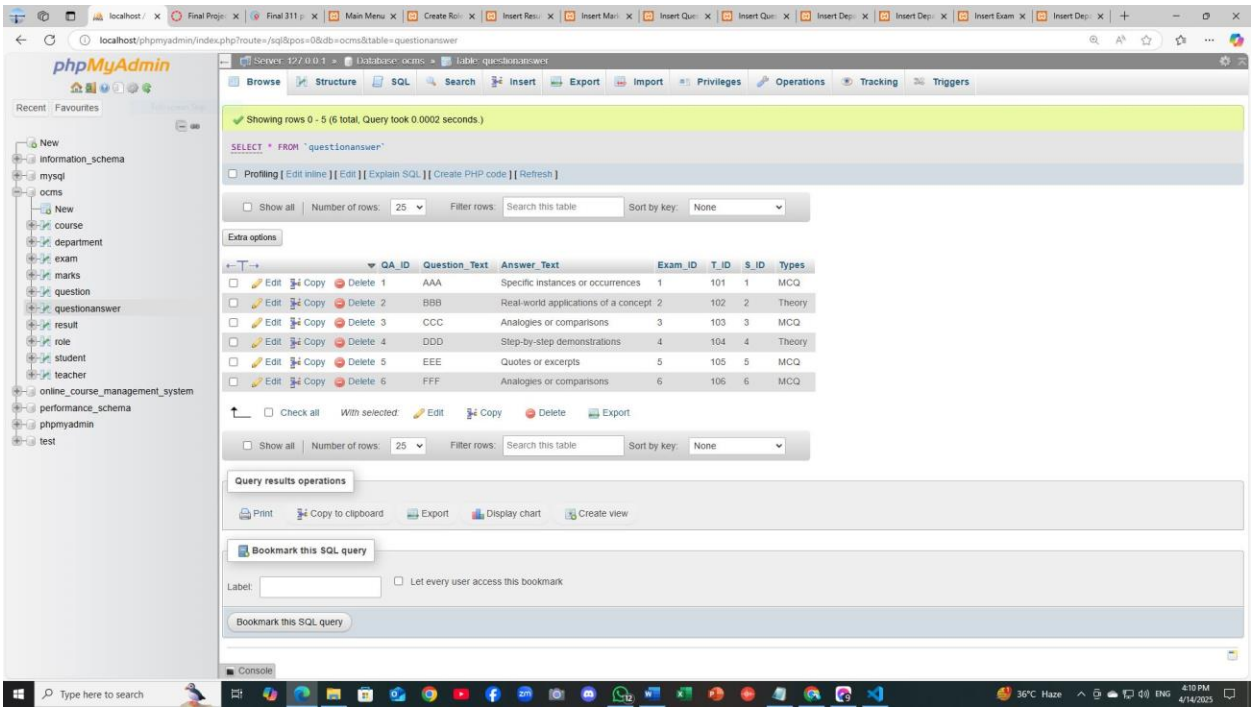

localhost/phpmyadmin/index.php?route=/sql&pos=0&db=ocms&table=teacher
phpMyAdmin
Recent
Favourites
New
information_schema
mysql
ocms
New
course
department
exam
marks
question
questionanswer
result
role
student
teacher
online_course_management_system
performance_schema
phpmyadmin
test
Server: 127.0.0.1 » Database: ocms » Table: teacher
Browse
Structure
SQL
Search
Insert
Export
Import
Privileges
Operations
Tracking
Triggers
Showing rows 0 - 5 (6 total, Query took 0.0002 seconds.)
SELECT * FROM `teacher`
Profiling [ Edit inline ] [ Edit ] [ Explain SQL ] [ Create PHP code ] [ Refresh ]
Show all
Number of rows: 25
Filter rows: Search this table
Sort by key: None
Extra options
T_ID Name Phone Salary Designation
Edit Copy Delete 101 Asif Rahman 0173174402 10000.00 A
Edit Copy Delete 102 Mazan Hossain 0155235896 20000.00 B
Edit Copy Delete 103 Faisal Rahman 0166589789 50000.00 C
Edit Copy Delete 104 Tamanna Siddiki 01457899877 10235.00 D
Edit Copy Delete 105 Mahfuja Rahman 0125689787 78400.00 E
Edit Copy Delete 106 Dip hossain 0155789445 85000.00 F
Check all
With selected:
Edit
Copy
Delete
Export
Query results operations
Print
Copy to clipboard
Export
Display chart
Create view
Bookmark this SQL query
Label:
Let every user access this bookmark
Bookmark this SQL query
Console

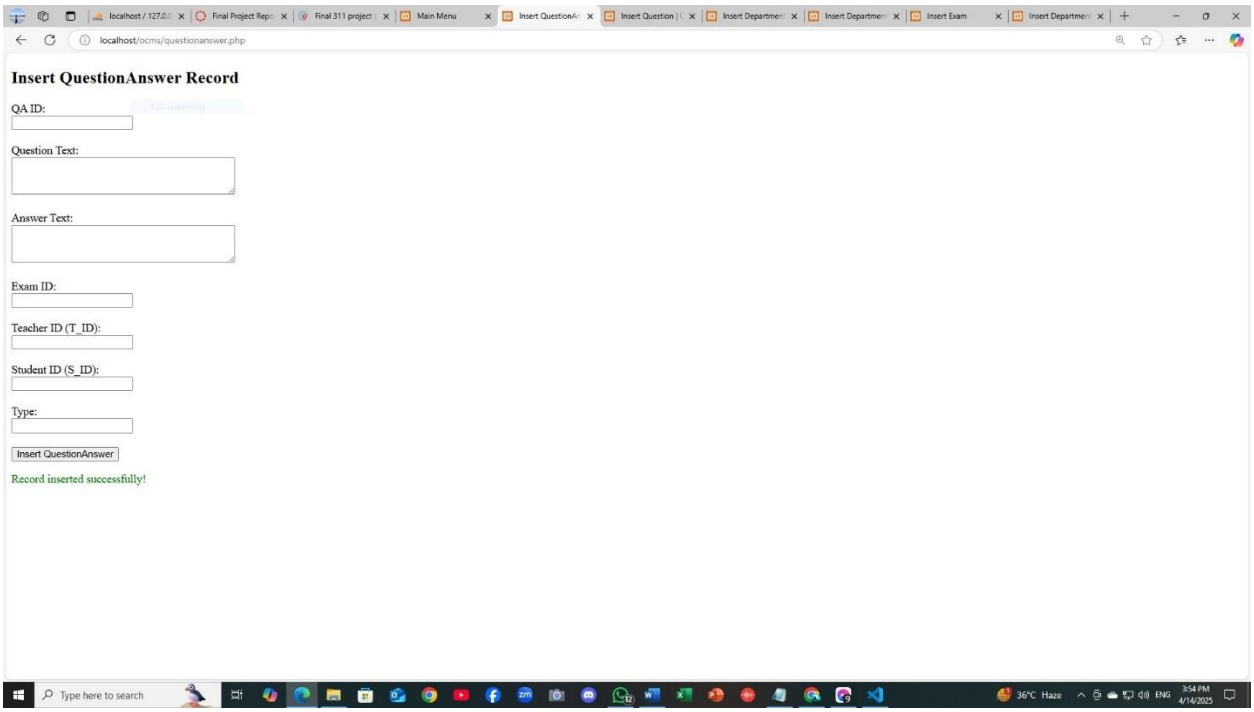

localhost/ocms/department.php
Insert Department Information
Department ID (D_ID):
Department Name:
Student ID (S_ID):
Teacher ID (T_ID):
Insert Department

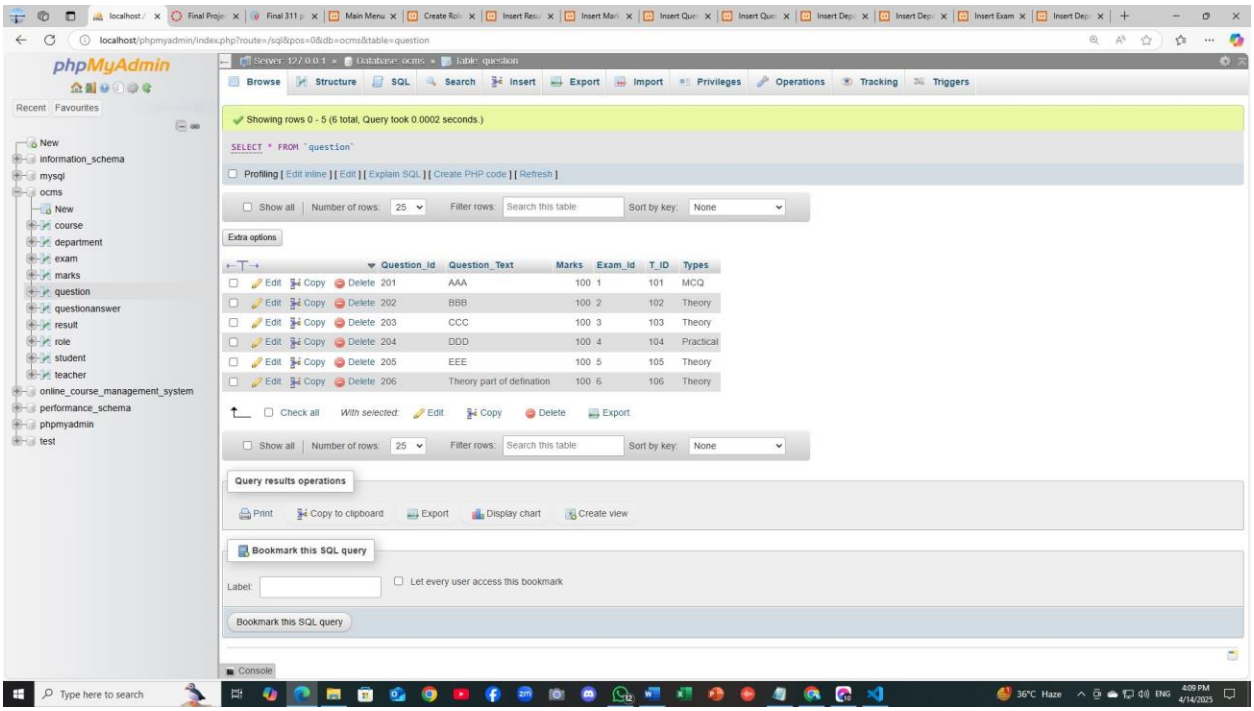

localhost/phpmyadmin/index.php?route=/sql&pos=0&db=ocms&table=department
phpMyAdmin
Recent
Favourites
New
information_schema
mysql
ocms
New
course
department
exam
marks
question
questionanswer
result
role
student
teacher
online_course_management_system
performance_schema
phpmyadmin
test
Server: 127.0.0.1 » Database: ocms » Table: department
Browse
Structure
SQL
Search
Insert
Export
Import
Privileges
Operations
Tracking
Triggers
Showing rows 0 - 5 (6 total, Query took 0.0002 seconds.)
SELECT * FROM `department`
Profiling [ Edit inline ] [ Edit ] [ Explain SQL ] [ Create PHP code ] [ Refresh ]
Show all
Number of rows: 25
Filter rows: Search this table
Sort by key: None
Extra options
D_ID Name S_ID T_ID
Edit Copy Delete 401 ECE 1 101
Edit Copy Delete 402 ETE 2 102
Edit Copy Delete 403 BBA 3 103
Edit Copy Delete 404 Pharmacy 4 104
Edit Copy Delete 405 Art 5 105
Edit Copy Delete 406 ENG 6 106
Check all
With selected:
Edit
Copy
Delete
Export
Query results operations
Print
Copy to clipboard
Export
Display chart
Create view
Bookmark this SQL query
Label:
Let every user access this bookmark
Bookmark this SQL query
Console

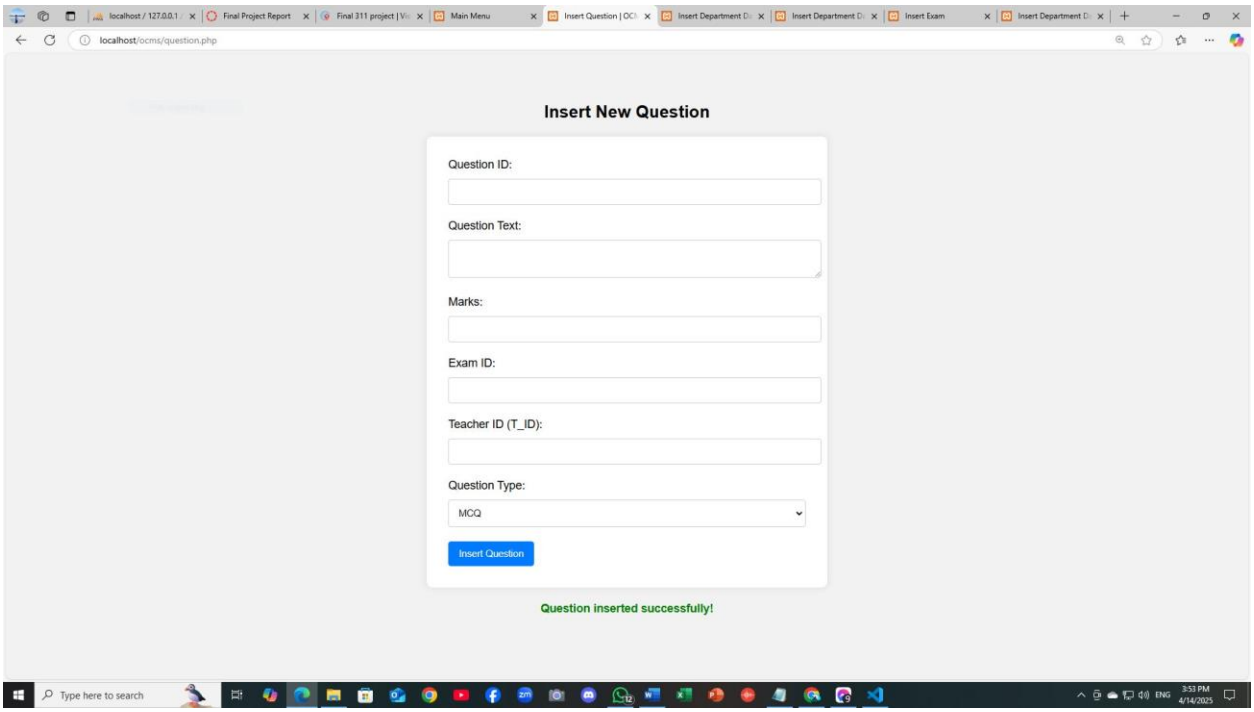

phpMyAdmin
Recent Favourites
New
information_schema
mysql
ocms
New
course
department
exam
marks
question
questionanswer
result
role
student
teacher
online_course_management_system
performance_schema
phpmyadmin
test
Server: 127.0.0.1 » Database: ocms » Table: marks
Browse Structure SQL Search Insert Export Import Privileges Operations Tracking Triggers
Showing rows 0 - 5 (6 total, Query took 0.0003 seconds.)
SELECT * FROM `marks`
Profiling [ Edit inline ] [ Edit ] [ Explain SQL ] [ Create PHP code ] [ Refresh ]
Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None
Extra options
Mark_ID T_ID S_ID QA_ID
Edit Copy Delete 10 101 1 1
Edit Copy Delete 20 102 2 2
Edit Copy Delete 30 103 3 3
Edit Copy Delete 40 104 4 4
Edit Copy Delete 50 105 5 5
Edit Copy Delete 60 106 6 6
Check all With selected: Edit Copy Delete Export
Query results operations
Print Copy to clipboard Export Display chart Create view
Bookmark this SQL query
Label: Let every user access this bookmark
Bookmark this SQL query
Console

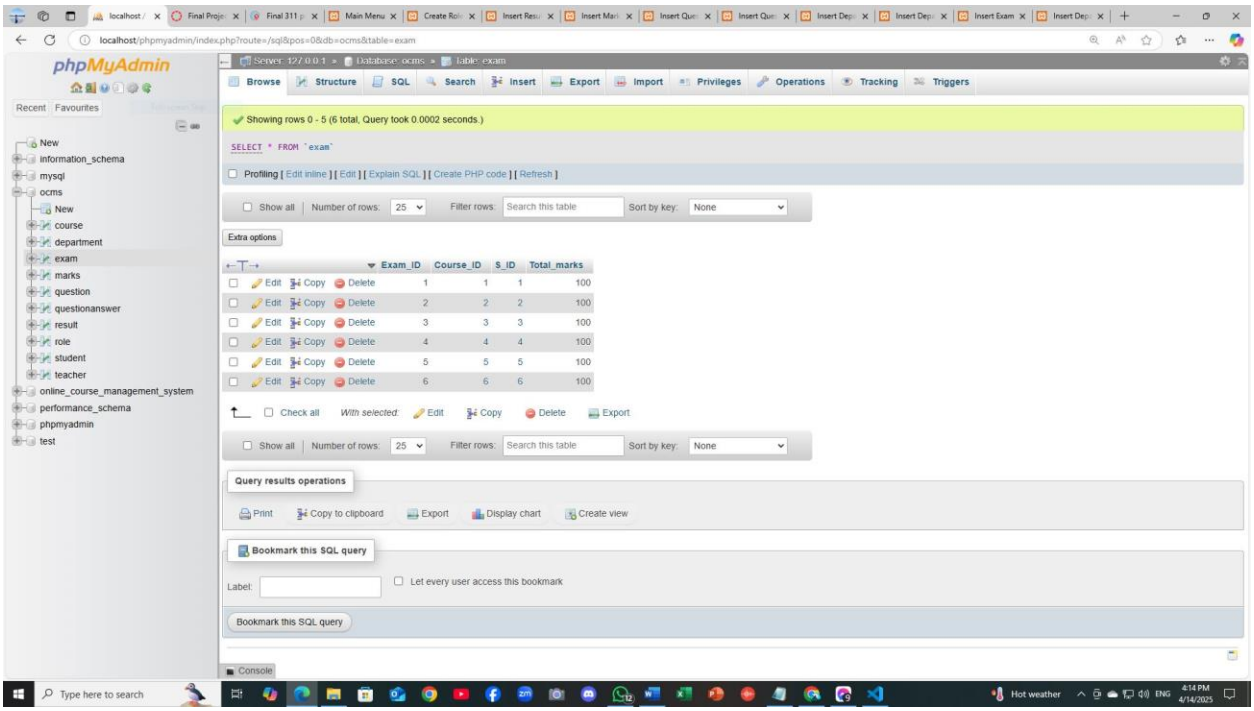

localhost/ocms/marks.php
Insert Marks Record
Mark ID:
Teacher ID (T_ID):
Student ID (S_ID):
QuestionAnswer ID (QA_ID):
Insert
Record inserted successfully!

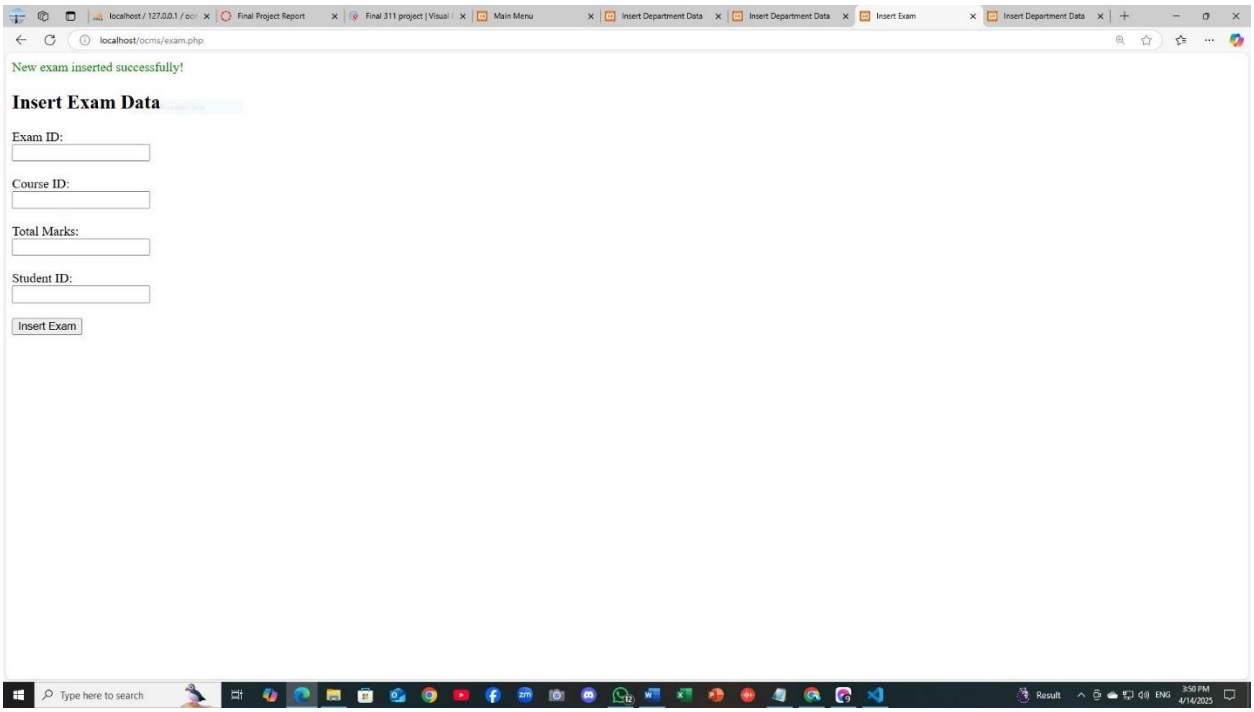

phpMyAdmin
Recent Favourites
New
information_schema
mysql
ocms
New
course
department
exam
marks
question
questionanswer
result
role
student
teacher
online_course_management_system
performance_schema
phpmyadmin
test
Server: 127.0.0.1 » Database: ocms » Table: questionanswer
Browse Structure SQL Search Insert Export Import Privileges Operations Tracking Triggers
Showing rows 0 - 5 (6 total, Query took 0.0002 seconds.)
SELECT * FROM `questionanswer`
Profiling [ Edit inline ] [ Edit ] [ Explain SQL ] [ Create PHP code ] [ Refresh ]
Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None
Extra options
QA_ID Question_Text Answer_Text Exam_ID T_ID S_ID Types
Edit Copy Delete 1 AAA Specific instances or occurrences 1 101 1 MCQ
Edit Copy Delete 2 BBB Real-world applications of a concept 2 102 2 Theory
Edit Copy Delete 3 CCC Analogies or comparisons 3 103 3 MCQ
Edit Copy Delete 4 DDD Step-by-step demonstrations 4 104 4 Theory
Edit Copy Delete 5 EEE Quotes or excerpts 5 105 5 MCQ
Edit Copy Delete 6 FFF Analogies or comparisons 6 106 6 MCQ
Check all With selected: Edit Copy Delete Export
Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None
Query results operations
Print Copy to clipboard Export Display chart Create view
Bookmark this SQL query
Label: Let every user access this bookmark
Bookmark this SQL query
Console

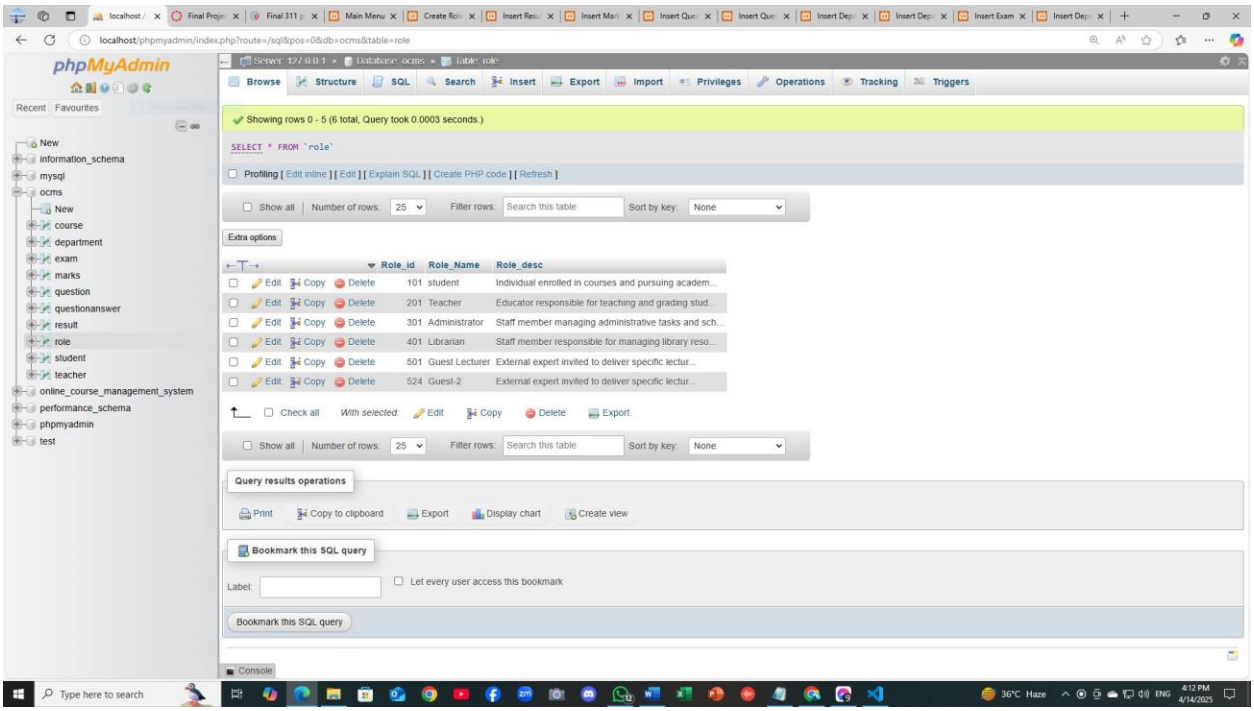

localhost/ocms/questionanswer.php
Insert QuestionAnswer Record
QA ID:
Question Text:
Answer Text:
Exam ID:
Teacher ID (T_ID):
Student ID (S_ID):
Type:
Insert QuestionAnswer
Record inserted successfully!

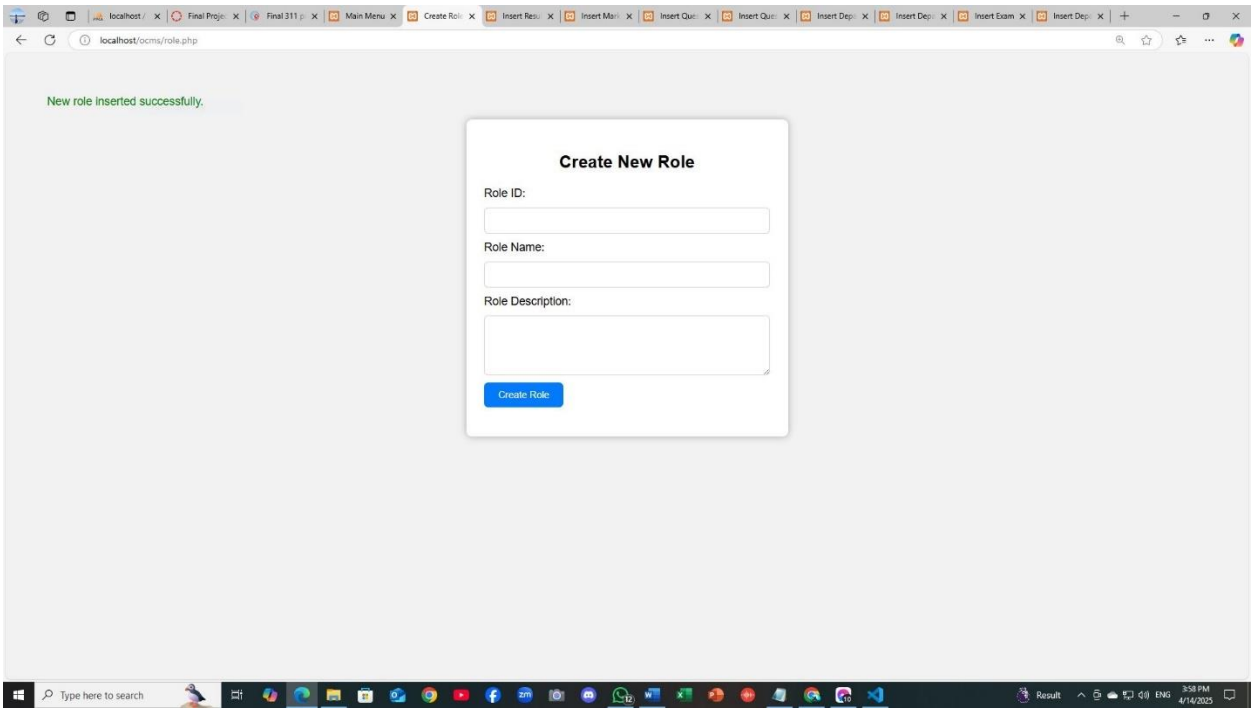

phpMyAdmin
Recent Favourites
New
information_schema
mysql
ocms
New
course
department
exam
marks
question
questionanswer
result
role
student
teacher
online_course_management_system
performance_schema
phpmyadmin
test
Server: 127.0.0.1 » Database: ocms » Table: question
Browse Structure SQL Search Insert Export Import Privileges Operations Tracking Triggers
Showing rows 0 - 5 (6 total, Query took 0.0002 seconds.)
SELECT * FROM `question`
Profiling [ Edit inline ] [ Edit ] [ Explain SQL ] [ Create PHP code ] [ Refresh ]
Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None
Extra options
Question_Id Question_Text Marks Exam_Id T_ID Types
Edit Copy Delete 201 AAA 100 1 101 MCQ
Edit Copy Delete 202 BBB 100 2 102 Theory
Edit Copy Delete 203 CCC 100 3 103 Theory
Edit Copy Delete 204 DDD 100 4 104 Practical
Edit Copy Delete 205 EEE 100 5 105 Theory
Edit Copy Delete 206 Theory part of defination 100 6 106 Theory
Check all With selected: Edit Copy Delete Export
Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None
Query results operations
Print Copy to clipboard Export Display chart Create view
Bookmark this SQL query
Label: Let every user access this bookmark
Bookmark this SQL query
Console

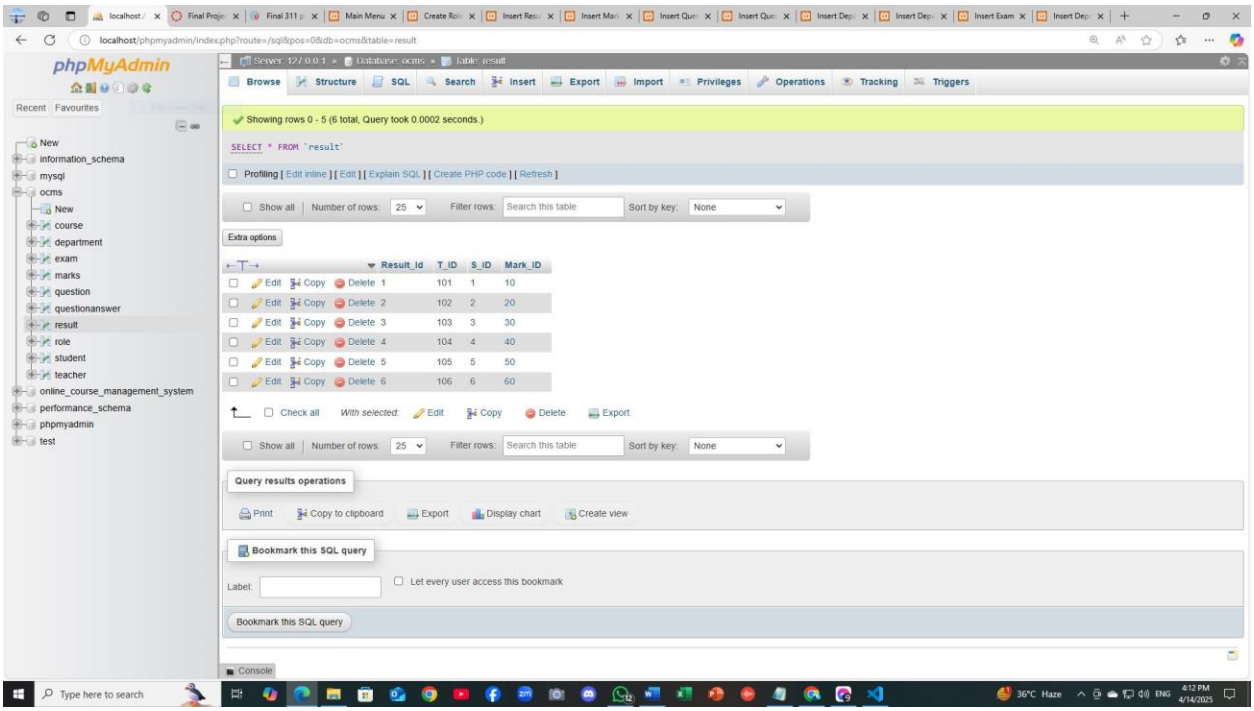

localhost/ocms/question.php
Insert New Question
Question ID:
Question Text:
Marks:
Exam ID:
Teacher ID (T_ID):
Question Type:
MCQ
Insert Question
Question inserted successfully!

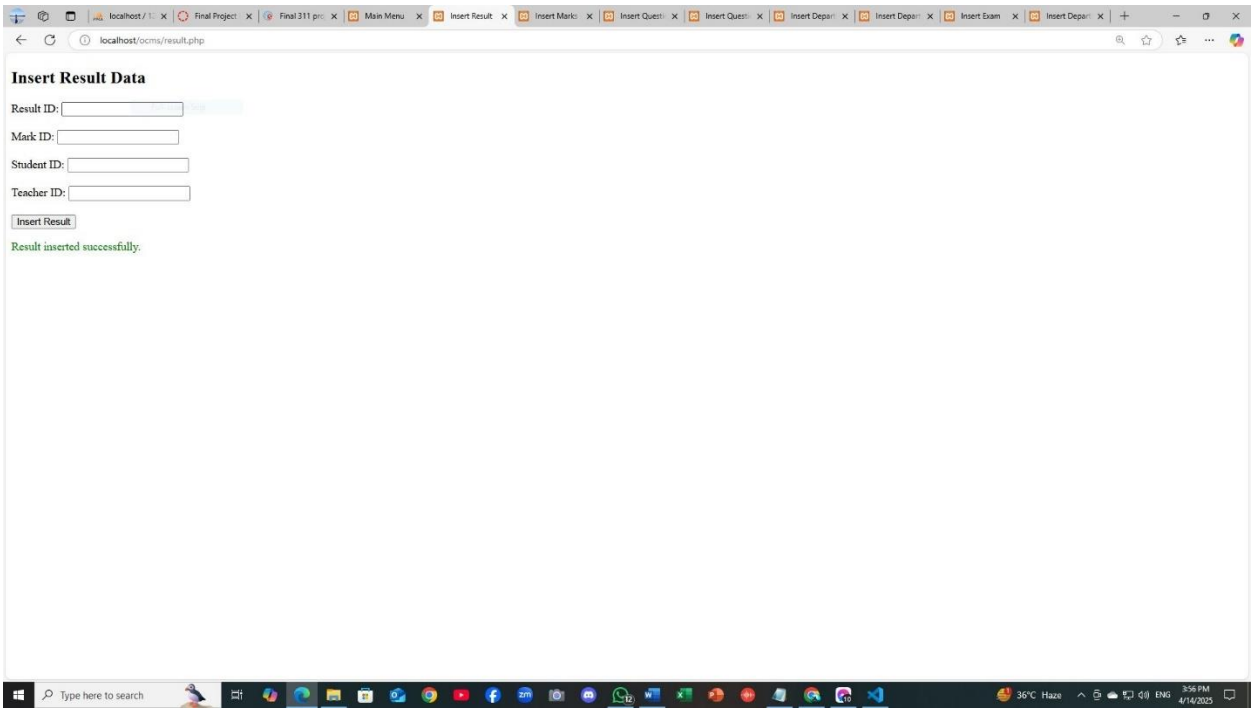

phpMyAdmin
Recent Favourites
New
information_schema
mysql
ocms
New
course
department
exam
marks
question
questionanswer
result
role
student
teacher
online_course_management_system
performance_schema
phpmyadmin
test
Server: 127.0.0.1 » Database: ocms » Table: exam
Browse Structure SQL Search Insert Export Import Privileges Operations Tracking Triggers
Showing rows 0 - 5 (6 total, Query took 0.0002 seconds.)
SELECT * FROM `exam`
Profiling [ Edit inline ] [ Edit ] [ Explain SQL ] [ Create PHP code ] [ Refresh ]
Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None
Extra options
Exam_ID Course_ID S_ID Total_marks
Edit Copy Delete 1 1 1 100
Edit Copy Delete 2 2 2 100
Edit Copy Delete 3 3 3 100
Edit Copy Delete 4 4 4 100
Edit Copy Delete 5 5 5 100
Edit Copy Delete 6 6 6 100
Check all With selected: Edit Copy Delete Export
Query results operations
Print Copy to clipboard Export Display chart Create view
Bookmark this SQL query
Label: Let every user access this bookmark
Bookmark this SQL query
Console


localhost/ocms/exam.php
New exam inserted successfully!
Insert Exam Data
Exam ID:
Course ID:
Total Marks:
Student ID:
Insert Exam


phpMyAdmin
Recent Favourites
New
information_schema
mysql
ocms
New
course
department
exam
marks
question
questionanswer
result
role
student
teacher
online_course_management_system
performance_schema
phpmyadmin
test
Server: 127.0.0.1 » Database: ocms » Table: role
Browse Structure SQL Search Insert Export Import Privileges Operations Tracking Triggers
Showing rows 0 - 5 (6 total, Query took 0.0003 seconds.)
SELECT * FROM `role`
Profiling [ Edit inline ] [ Edit ] [ Explain SQL ] [ Create PHP code ] [ Refresh ]
Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None
Extra options
Role_id Role_Name Role_desc
Edit Copy Delete 101 student Individual enrolled in courses and pursuing academ...
Edit Copy Delete 201 Teacher Educator responsible for teaching and grading stud...
Edit Copy Delete 301 Administrator Staff member managing administrative tasks and sch...
Edit Copy Delete 401 Librarian Staff member responsible for managing library reso...
Edit Copy Delete 501 Guest Lecturer External expert invited to deliver specific lectur...
Edit Copy Delete 524 Guest-2 External expert invited to deliver specific lectur...
Check all With selected: Edit Copy Delete Export
Query results operations
Print Copy to clipboard Export Display chart Create view
Bookmark this SQL query
Label: Let every user access this bookmark
Bookmark this SQL query
Console


localhost/ocms/role.php
New role inserted successfully.
Create New Role
Role ID:
Role Name:
Role Description:
Create Role


phpMyAdmin
Recent Favourites
New
information_schema
mysql
ocms
New
course
department
exam
marks
question
questionanswer
result
role
student
teacher
online_course_management_system
performance_schema
phpmyadmin
test
Server: 127.0.0.1 » Database: ocms » Table: result
Browse Structure SQL Search Insert Export Import Privileges Operations Tracking Triggers
Showing rows 0 - 5 (6 total, Query took 0.0002 seconds.)
SELECT * FROM `result`
Profiling [ Edit inline ] [ Edit ] [ Explain SQL ] [ Create PHP code ] [ Refresh ]
Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None
Extra options
Result_Id T_ID S_ID Mark_ID
Edit Copy Delete 1 101 1 10
Edit Copy Delete 2 102 2 20
Edit Copy Delete 3 103 3 30
Edit Copy Delete 4 104 4 40
Edit Copy Delete 5 105 5 50
Edit Copy Delete 6 106 6 60
Check all With selected: Edit Copy Delete Export
Query results operations
Print Copy to clipboard Export Display chart Create view
Bookmark this SQL query
Label: Let every user access this bookmark
Bookmark this SQL query
Console


localhost/ocms/result.php
Insert Result Data
Result ID:
Mark ID:
Student ID:
Teacher ID:
Insert Result
Result inserted successfully.

# Contribution/*Working* Statements

***Teacher Module:***

Designed the TEACHER entity including attributes like Teacher_ID, Name, Department, Contact_Info, and handled the assignment of teachers to courses. <br>

***Department Module:***

Designed the DEPARTMENT entity with attributes like Department_ID, Department_Name, and managed the association of teachers and courses with departments. <br>

***Exam Module:***

Developed the EXAM entity including attributes like Exam_ID, Course_ID, Exam_Date, Exam_Type, and its relationship with questions and results. <br>

***Question and QuestionAnswer Module:***

Designed the QUESTION entity with attributes like Question_ID, Course_ID, Question_Text, and the QUESTIONANSWER entity to store correct answers, linking them to exams.

Concentrates on the administrative and assessment components of the system. This involves managing the teaching and their departments, as well as the creation and management of examinations and their associated questions and answers.

***Student Module:***

Designed the STUDENT entity including attributes like Student_ID, Name, Enrollment_Date, Contact_Info, and linked it to courses and results. <br>

***Course Module:***

Designed the COURSE entity with attributes like Course_ID, Course_Name, Course_Code, Credits, and established relationships with teachers and students. <br>

***Marks Module:***

Developed the MARKS entity to store student scores for different assessments within a course, linking it to students and courses. <br>

***Result Module:***

Designed the RESULT entity to calculate and store final results for students in each course, potentially including GPA calculations and linking to student and course data.

# Conclusion

The Online Course Management System (OCMS) provides a complete solution for managing students and instructors in online education. It uses ERD concepts in its database design for efficient student registrations, course enrollments, and progress tracking. By modeling relationships among students, courses, and instructors, the system adapts easily to future changes and offers advanced features like real-time updates and multi-channel communication. This ERD ensures a well-organized data flow, enabling seamless interaction between students, teachers, and course-related activities. The system follows key database design principles such as normalization, referential integrity, and entity relationships, reducing redundancy and ensuring efficient data retrieval.

❖ **Key Findings:**

- Well-structured relationships between users, courses, exams, and results.
- Efficient authentication and enrollment processes for security and accessibility.
- Streamlined exam and result management, enhancing performance tracking.

❖ **Challenges Faced:**

- Ensuring data consistency and integrity across multiple entities.
- Designing optimal relationships between users, courses, and exams.

This project successfully implements **a relational database model** that ensures scalability, data integrity, and ease of access, making it a robust solution for educational institutions.