ONLINE COURSES SYSTEM

ENG: DOAA

Overview

Team Members

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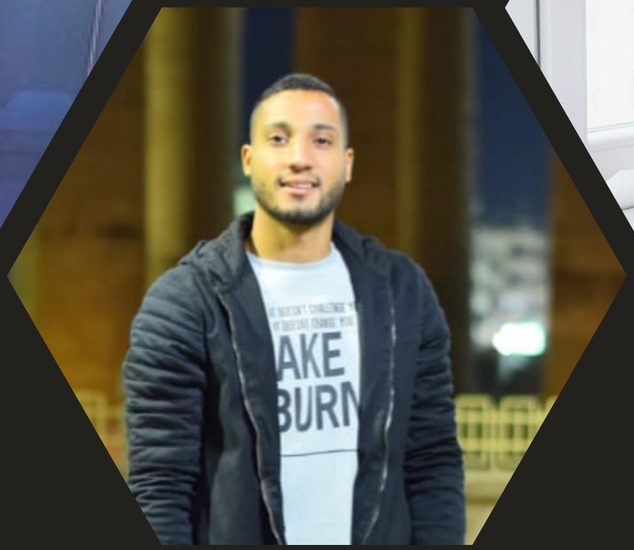
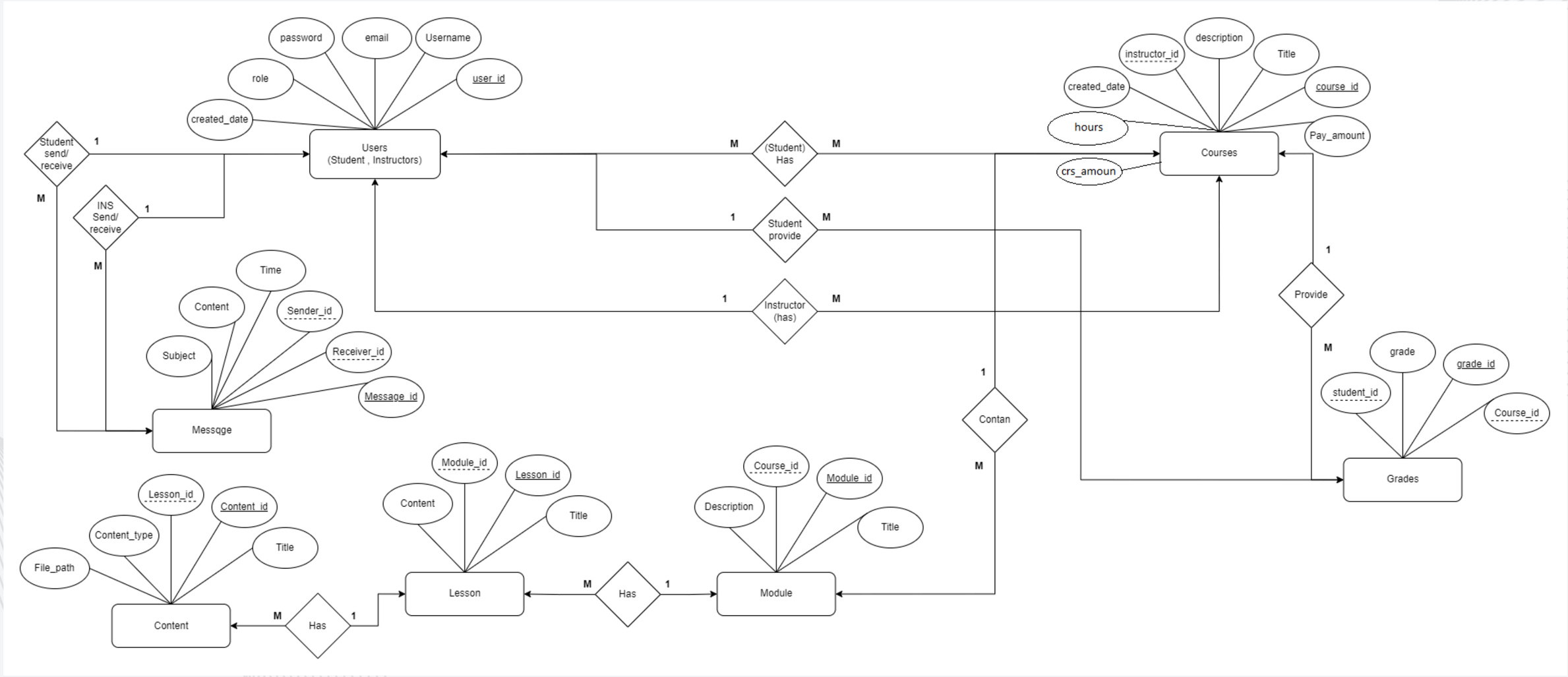


Mohamed Ahmed

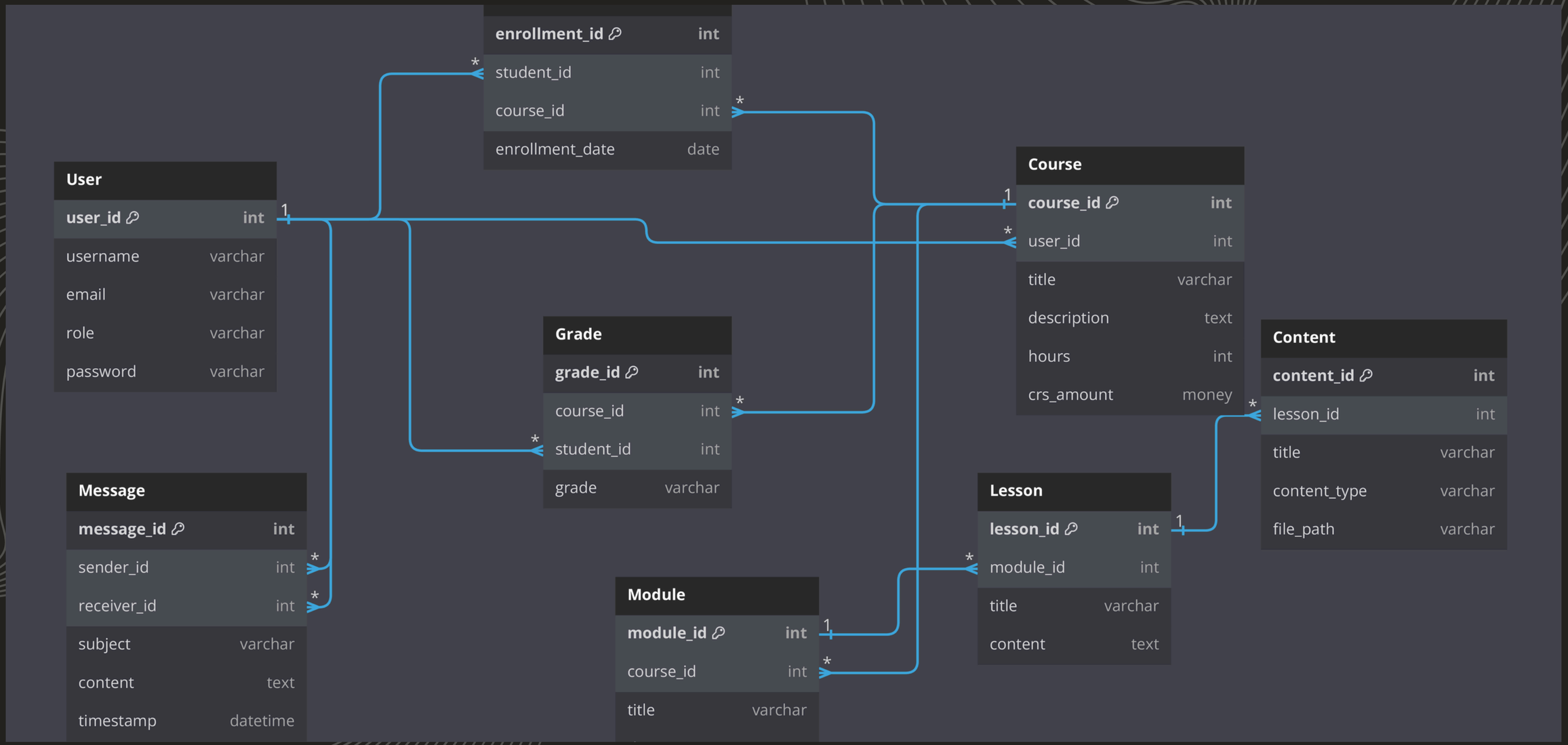
Introduction

Welcome to our Educational Management System, a comprehensive platform designed to streamline and enhance the learning experience for both students and instructors. This system encompasses a robust database structure that efficiently manages users, courses, modules, lessons, and related content. By facilitating seamless enrollment processes and grade management, our system ensures a smooth and interactive educational journey. Our goal is to provide an intuitive and user-friendly environment that promotes effective learning and teaching practices. Join us as we explore the capabilities and benefits of this innovative solution.

ERD Design


password
email
Username
role
user_id
created_date
Users
(Student , Instructors)
Student
send/
receive
1
M
INS
Send/
receive
1
M
Time
Content
Sender_id
Subject
Receiver_id
Message_id
Messqge
M
(Student)
Has
M
1
Student
provide
M
1
Instructor
(has)
M
description
instructor_id
Title
created_date
course_id
hours
Pay_amount
crs_amoun
Courses
1
Provide
M
grade
grade_id
student_id
Course_id
Grades
1
Contan
M
Module_id
Lesson_id
Content
Title
Lesson
M
Has
1
Course_id
Module_id
Description
Title
Module
Lesson_id
Content_id
Content_type
Title
File_path
Content
M
Has
1

Mapping


enrollment_id int
student_id int
course_id int
enrollment_date date
User
user_id int
username varchar
email varchar
role varchar
password varchar
Course
course_id int
user_id int
title varchar
description text
hours int
crs_amount money
Grade
grade_id int
course_id int
student_id int
grade varchar
Content
content_id int
lesson_id int
title varchar
content_type varchar
file_path varchar
Message
message_id int
sender_id int
receiver_id int
subject varchar
content text
timestamp datetime
Lesson
lesson_id int
module_id int
title varchar
content text
Module
module_id int
course_id int
title varchar
1
*

Create DB

```
use Online_Courses_Sys

CREATE TABLE [User] (
  [user_id] int PRIMARY KEY,
  [username] nvarchar(255),
  [email] nvarchar(255),
  [role] nvarchar(255),
  [password] nvarchar(255)
)
GO
CREATE TABLE [Message] (
  [message_id] int PRIMARY KEY,
  [sender_id] int,
  [receiver_id] int,
  [subject] nvarchar(255),
  [content] text,
  [timestamp] datetime
)
```

```
CREATE TABLE [Course] (
  [course_id] int PRIMARY KEY,
  [user_id] int,
  [title] nvarchar(255),
  [description] text
)
GO
CREATE TABLE [Enrollment] (
  [enrollment_id] int PRIMARY KEY,
  [student_id] int,
  [course_id] int,
  [enrollment_date] date
)
GO
```

Create DB

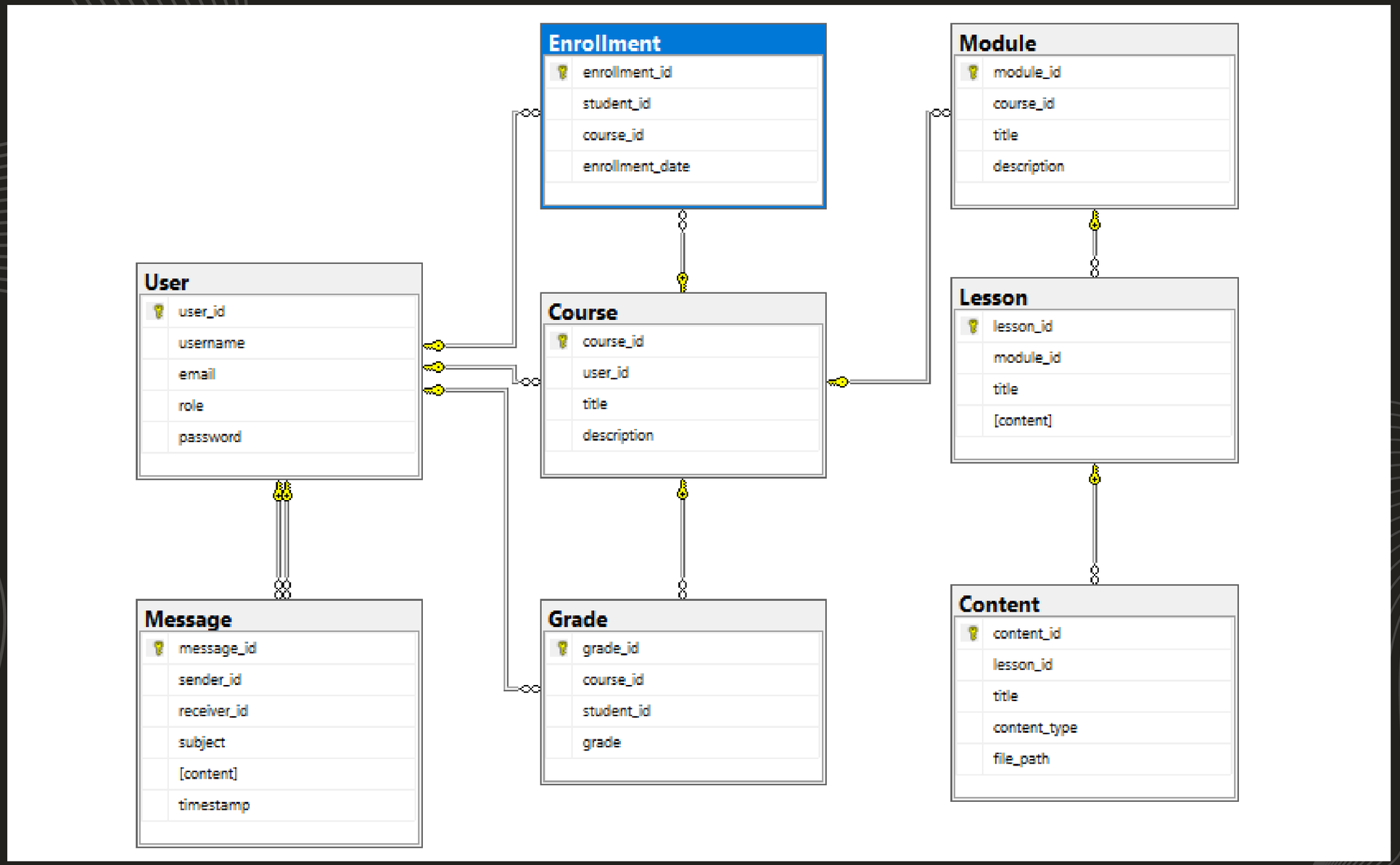
```
CREATE TABLE [Grade] (
    [grade_id] int PRIMARY KEY,
    [course_id] int,
    [student_id] int,
    [grade] nvarchar(255)
)
GO

CREATE TABLE [Module] (
    [module_id] int PRIMARY KEY,
    [course_id] int,
    [title] nvarchar(255),
    [description] text
)
GO
```

```
CREATE TABLE [Lesson] (
    [lesson_id] int PRIMARY KEY,
    [module_id] int,
    [title] nvarchar(255),
    [content] text
)
GO

CREATE TABLE [Content] (
    [content_id] int PRIMARY KEY,
    [lesson_id] int,
    [title] nvarchar(255),
    [content_type] nvarchar(255),
    [file_path] nvarchar(255)
)
GO
```

DB Diagram


Enrollment
enrollment_id
student_id
course_id
enrollment_date
Module
module_id
course_id
title
description
User
user_id
username
email
role
password
Course
course_id
user_id
title
description
Lesson
lesson_id
module_id
title
[content]
Message
message_id
sender_id
receiver_id
subject
[content]
timestamp
Grade
grade_id
course_id
student_id
grade
Content
content_id
lesson_id
title
content_type
file_path

Stored Procedure

```sql
---============== User Table =>

--=== insert

CREATE PROCEDURE InsertUser
    @Username NVARCHAR(255),
    @Email NVARCHAR(255),
    @Role NVARCHAR(50),
    @Password NVARCHAR(255)
AS
BEGIN
    INSERT INTO [User] (username, email, role, password)
    VALUES (@Username, @Email, @Role, @Password);
END;

--====  Delete

CREATE PROCEDURE DeleteUser
    @UserID INT
AS
BEGIN
    DELETE FROM [User]
    WHERE user_id = @UserID;
END;
```

```sql
--======  Course Table  =>

--===== Insert

CREATE PROCEDURE InsertCourse
    @UserID INT,
    @Title NVARCHAR(255),
    @Description NVARCHAR(MAX)
AS
BEGIN
    INSERT INTO Course (user_id, title, description)
    VALUES (@UserID, @Title, @Description);
END;


--===== Delete

CREATE PROCEDURE DeleteCourse
    @CourseID INT
AS
BEGIN
    DELETE FROM Course
    WHERE course_id = @CourseID;
END;
```

```sql
--===== Insert

CREATE PROCEDURE InsertModule
    @CourseID INT,
    @Title NVARCHAR(255),
    @Description NVARCHAR(MAX)
AS
BEGIN
    INSERT INTO Module (course_id, title, description)
    VALUES (@CourseID, @Title, @Description);
END;


--====== Update

CREATE PROCEDURE DeleteModule
    @ModuleID INT
AS
BEGIN
    DELETE FROM Module
    WHERE module_id = @ModuleID;
END;
```

Stored Proc

```sql
----------------------  Lesson Table =>

-------------insert

CREATE PROCEDURE InsertLesson
    @ModuleID INT,
    @Title NVARCHAR(255),
    @Content NVARCHAR(MAX)
AS
BEGIN
    INSERT INTO Lesson (module_id, title, content)
    VALUES (@ModuleID, @Title, @Content);
END;


------ Delete

CREATE PROCEDURE DeleteLesson
    @LessonID INT
AS
BEGIN
    DELETE FROM Lesson
    WHERE lesson_id = @LessonID;
END;
```

```sql
-----------------  Content Table =>

------  Insert

CREATE PROCEDURE InsertContent
    @LessonID INT,
    @Title NVARCHAR(255),
    @ContentType NVARCHAR(50),
    @FilePath NVARCHAR(255)
AS
BEGIN
    INSERT INTO Content (lesson_id, title, content_type, file_path)
    VALUES (@LessonID, @Title, @ContentType, @FilePath);
END;

-------------- Delete

CREATE PROCEDURE DeleteContent
    @ContentID INT
AS
BEGIN
    DELETE FROM Content
    WHERE content_id = @ContentID;
END;
```

```sql
---------------  Enrollment Table=>

---- insert

CREATE PROCEDURE InsertEnrollment
    @StudentID INT,
    @CourseID INT,
    @EnrollmentDate DATE
AS
BEGIN
    INSERT INTO Enrollment (student_id, course_id, enrollment_date)
    VALUES (@StudentID, @CourseID, @EnrollmentDate);
END;



----------- Delete

CREATE PROCEDURE DeleteEnrollment
    @EnrollmentID INT
AS
BEGIN
    DELETE FROM Enrollment
    WHERE enrollment_id = @EnrollmentID;
END;
```

Stored Proc

```sql
--==================  Grade Table =>

--== insert

CREATE PROCEDURE InsertGrade
    @CourseID INT,
    @StudentID INT,
    @Grade NVARCHAR(2)
AS
BEGIN
    INSERT INTO Grade (course_id, student_id, grade)
    VALUES (@CourseID, @StudentID, @Grade);
END;


--=== delete

CREATE PROCEDURE DeleteGrade
    @GradeID INT
AS
BEGIN
    DELETE FROM Grade
    WHERE grade_id = @GradeID;
END;
```

```sql
--================== Message Table =>

--=== insert----------------------

CREATE PROCEDURE InsertMessage
    @SenderID INT,
    @ReceiverID INT,
    @Subject NVARCHAR(255),
    @Content NVARCHAR(MAX)
AS
BEGIN
    INSERT INTO Message (sender_id, receiver_id, subject, content, Timestamp )
    VALUES (@SenderID, @ReceiverID, @Subject, @Content, getdate());
END;


--=== delete

CREATE PROCEDURE DeleteMessage
    @MessageID INT
AS
BEGIN
    DELETE FROM Message
    WHERE message_id = @MessageID;
END;
```

DB Views

```sql
--=== 1. View to Show Students Only

CREATE VIEW StudentsOnly AS
SELECT user_id, username, email, role
FROM [User]
WHERE role = 'student';


--===2. View to Show Instructors Only

CREATE VIEW InstructorsOnly AS
SELECT user_id, username, email, role
FROM [User]
WHERE role = 'instructor';
```

```sql
--=== 3. View to Show Enrolled Courses Only

CREATE VIEW EnrolledCoursesOnly AS
SELECT c.course_id, c.title, c.description,
e.student_id, e.enrollment_date
FROM Course c INNER JOIN Enrollment e
ON c.course_id = e.course_id;

--=== 4. View to Show Non-Enrolled Courses Only

CREATE VIEW NonEnrolledCoursesOnly AS
SELECT c.course_id, c.title, c.description
FROM Course c LEFT JOIN Enrollment e
ON c.course_id = e.course_id
WHERE e.course_id IS NULL;
```

DB Views

```sql
--=== 5. View to Show Instructors Without Courses

CREATE VIEW InstructorsWithoutCourses AS
SELECT u.user_id, u.username, u.email, u.role
FROM [User] u LEFT JOIN Course c
ON u.user_id = c.user_id
WHERE u.role = 'instructor' AND c.course_id IS NULL;

--=== 6. View to Show Students Not Enrolled in Any Courses

CREATE VIEW StudentsNotEnrolledInCourses AS
SELECT u.user_id, u.username, u.email, u.role
FROM [User] u LEFT JOIN Enrollment e ON u.user_id = e.student_id
WHERE u.role = 'student' AND e.course_id IS NULL;
```

DB Index

```sql
--=== Index on username in the User table

CREATE INDEX IDX_User_Username ON [User] (username);

--=== Index on title in the Course table

CREATE INDEX IDX_Course_Title ON Course (title);
```

DB Functions

```sql
--===  Functions


--=== get the top n courses with the highest number of enrolled
CREATE FUNCTION dbo.GetTopNCoursesWithHighestSold (@TopN INT)
RETURNS TABLE
AS
RETURN
(
    SELECT TOP (@TopN) c.course_id, c.title, COUNT(e.course_id) AS enrollment_count
    FROM Course c JOIN Enrollment e
    ON c.course_id = e.course_id
    GROUP BY c.course_id, c.title
    ORDER BY enrollment_count DESC
);
```

DB Functions

```sql
--4= the top n courses with the highest number of student enrolled in
--=> Function GetTopNCoursesWithHieghestSold()

CREATE FUNCTION dbo.GetTopNCoursesWithHighestSold (@TopN INT)
RETURNS TABLE
AS
RETURN
(
    SELECT TOP (@TopN) c.course_id, c.title, COUNT(e.course_id) AS enrollment_count
    FROM Course c JOIN Enrollment e
    ON c.course_id = e.course_id
    GROUP BY c.course_id, c.title
    ORDER BY enrollment_count DESC
);
```

DB Functions

```sql
--================= student QUestions & answers =========

--7= show a specific course with it's grade
--=> FUNCTION show_course_with_grade(student_id INT, course_id INT)

CREATE FUNCTION show_course_with_grade(@student_id INT, @course_id INT)
RETURNS TABLE
AS
RETURN
    SELECT c.title AS course_title, g.grade
    FROM Course c
    JOIN Grade g ON c.course_id = g.course_id
    WHERE g.student_id = @student_id AND c.course_id = @course_id;
```

```sql
--8= show his all courses and his grades
--=> FUNCTION show_student_courses_and_grades(student_id INT)

CREATE FUNCTION show_student_courses_and_grades(@student_id INT)
RETURNS TABLE
AS
RETURN
    SELECT c.title AS course_title, g.grade
    FROM Course c
    JOIN Grade g ON c.course_id = g.course_id
    WHERE g.student_id = @student_id;


--================  instructor QUestions & answers ==========
```

```sql
--9= show all his courses and the count of student enrolled in
--=> FUNCTION show_instructor_courses_and_enrollment_count(instructor_id INT)

CREATE FUNCTION show_instructor_courses_and_enrollment_count(@instructor_id INT)
RETURNS TABLE
AS
RETURN
    SELECT c.title AS course_title, COUNT(e.student_id) AS student_count
    FROM Course c
    LEFT JOIN Enrollment e ON c.course_id = e.course_id
    WHERE c.user_id = @instructor_id
    GROUP BY c.course_id, c.title;
```

DB Functions

```sql
--10= show all his courses with the highest enrolled
--=> FUNCTION show_instructor_courses_with_highest_enrollment(instructor_id INT)

CREATE FUNCTION show_instructor_courses_with_highest_enrollment(@instructor_id INT)
RETURNS TABLE
AS
RETURN
    WITH CourseEnrollments AS (
        SELECT c.course_id, c.title, COUNT(e.student_id) AS student_count
        FROM Course c
        LEFT JOIN Enrollment e ON c.course_id = e.course_id
        WHERE c.user_id = @instructor_id
        GROUP BY c.course_id, c.title
    )
    SELECT ce.title, ce.student_count
    FROM CourseEnrollments ce
    WHERE ce.student_count = (
        SELECT MAX(student_count)
        FROM CourseEnrollments
    );
```

DB Functions

```sql
--11= show all his courses with no enrollments
--=> FUNCTION show_instructor_courses_with_no_enrollments(instructor_id INT)

CREATE FUNCTION show_instructor_courses_with_no_enrollments(@instructor_id INT)
RETURNS TABLE
AS
RETURN
    SELECT c.title AS course_title
    FROM Course c
    LEFT JOIN Enrollment e ON c.course_id = e.course_id
    WHERE c.user_id = @instructor_id
    GROUP BY c.course_id, c.title
    HAVING COUNT(e.student_id) = 0;
```

DB Functions

```sql
--========== mix
--12= show all the instrucors name with he searches for
--=>  FUNCTION search_instructors_by_name(search_term VARCHAR)

CREATE FUNCTION search_instructors_by_name(@search_term VARCHAR)
RETURNS TABLE
AS
RETURN
    SELECT u.username AS instructor_name
    FROM [User] u
    WHERE u.role = 'instructor' AND u.username LIKE '%' + @search_term + '%';

--13= show all the courses to a spesific instructor
--=> FUNCTION show_instructor_courses_and_student_count(instructor_id INT)

CREATE FUNCTION show_instructor_courses_and_student_count(@instructor_id INT)
RETURNS TABLE
AS
RETURN
    SELECT c.title AS course_title, COUNT(e.student_id) AS student_count
    FROM Course c
    LEFT JOIN Enrollment e ON c.course_id = e.course_id
    WHERE c.user_id = @instructor_id
    GROUP BY c.course_id, c.title;
```

DB Functions

```sql
--14= Show all courses name with he searches for
--=> FUNCTION search_courses_by_name(search_term VARCHAR)

CREATE FUNCTION search_courses_by_name(@search_term VARCHAR)
RETURNS TABLE
AS
RETURN
    SELECT c.title AS course_title
    FROM Course c
    WHERE c.title LIKE '%' + @search_term + '%';
--15= show The Course data , course's modules , course's lessons and course's contents to a specific course
--=> get_course_details(@course_id INT)
CREATE FUNCTION get_course_details(@course_id INT)
RETURNS TABLE
AS
RETURN
    WITH CourseDetails AS (
        SELECT c.course_id, c.title AS course_title,c.description AS course_description, m.module_id,
            m.title AS module_title, m.description AS module_description, l.lesson_id,
            l.title AS lesson_title, co.content_id, co.title AS content_title,
            co.content_type, co.file_path
        FROM Course c
        LEFT JOIN Module m ON c.course_id = m.course_id
        LEFT JOIN Lesson l ON m.module_id = l.module_id
        LEFT JOIN Content co ON l.lesson_id = co.lesson_id
        WHERE c.course_id = @course_id
    )
    SELECT *
    FROM CourseDetails;
```

DB Triggers

```
--=== Triggers


--=== stop all the delete process from enrollment table
create TRIGGER stop_deleting
on  Enrollment
INSTEAD OF delete
as
SELECT 'can’t delete any  record in that table'
```

DB Triggers

```
--=== Store all the log info for the insertion on enrollment table
-- create a log table (Audit)
create  table Audit_log(
st_id int,
cu_id int,
name varchar(50),
cnew_Id int,
oldhours date,
date2 date
)
--=== create Trigger to insert the log data to the Audit Table
create trigger Log_data
on Enrollment
after update
as
declare @st_ID int,@cu_ID int,@oldhours date ,@date2 date,@cnew_Id int
select @st_id=student_id from deleted
select @cu_id=course_id from deleted
select @oldhours= enrollment_date from deleted
select @cnew_Id=course_id from inserted
select @date2=  enrollment_date from inserted
INSERT INTO Audit_log (st_id,cu_id,oldhours,cnew_Id,date2,name)
VALUES(@st_id,@cu_id , @oldhours , @cnew_Id , getdate(),SUSER_NAME())
```

Schema

```
--=== Create Schema for all the student data
create schema [user]
alter schema [user] transfer dbo.StudentsOnly
alter schema [user] transfer dbo.StudentsNotEnrolledInCourses


--=== Create Schema for all the Courses data
create schema courses
alter schema courses transfer dbo.EnrolledCoursesOnly
alter schema courses transfer dbo.NonEnrolledCoursesOnly
```

DB Cursor

```sql
--============== Cursor
--=== Useing the Cursor, we will return all the students names and grades
--=== that Enrolled in this course
CREATE FUNCTION GetUsersAndGradesInCourse (@user_id INT, @course_name NVARCHAR(100))
RETURNS @result TABLE (
    username NVARCHAR(100),
    grade CHAR(1)
)
AS
BEGIN
    DECLARE @course_id INT
    DECLARE @student_id INT
    DECLARE @username NVARCHAR(100)
    DECLARE @grade CHAR(1)
    -- Find the course_id from the course_name
    SELECT @course_id = course_id
    FROM Course
    WHERE title = @course_name;
    -- Cursor to iterate through students enrolled in the course
    DECLARE student_cursor CURSOR FOR
    SELECT e.student_id, u.username, g.grade
    FROM Enrollment e
    JOIN [User] u ON e.student_id = u.user_id
    JOIN Grade g ON e.course_id = g.course_id AND e.student_id = g.student_id
    WHERE e.course_id = @course_id;
    OPEN student_cursor;
```

DB Cursor

```
    FETCH NEXT FROM student_cursor INTO @student_id, @username, @grade;
    WHILE @@FETCH_STATUS = 0
    BEGIN
        -- Insert each student's name and grade into the result table
        INSERT INTO @result (username, grade)
        VALUES (@username, @grade);

        FETCH NEXT FROM student_cursor INTO @student_id, @username, @grade;
    END;

    CLOSE student_cursor;
    DEALLOCATE student_cursor;

    RETURN;
END;

-- Example usage
SELECT * FROM GetUsersAndGradesInCourse(54, 'Introduction to Biology');
```

CONSTRAINTS & RULES

```
--============= CONSTRAINTS & Rules ==================

---=== puting a constrain to make sure that we will have just a Students and instructor
--==== in the User Table
ALTER TABLE [user] ADD CONSTRAINT check_role CHECK (role IN ('student', 'instructor'));

--=== Buting a Rule to the Grade to make sure
--=== that what we will insert will be a real grade
CREATE RULE Grade_Values AS @vales IN ('A', 'B', 'C' , 'D' , 'F')
sp_bindrule 'Grade_Values', 'dbo.[grade].[grade]'
```

Thank You

Project Link on GitHub

Gerente General