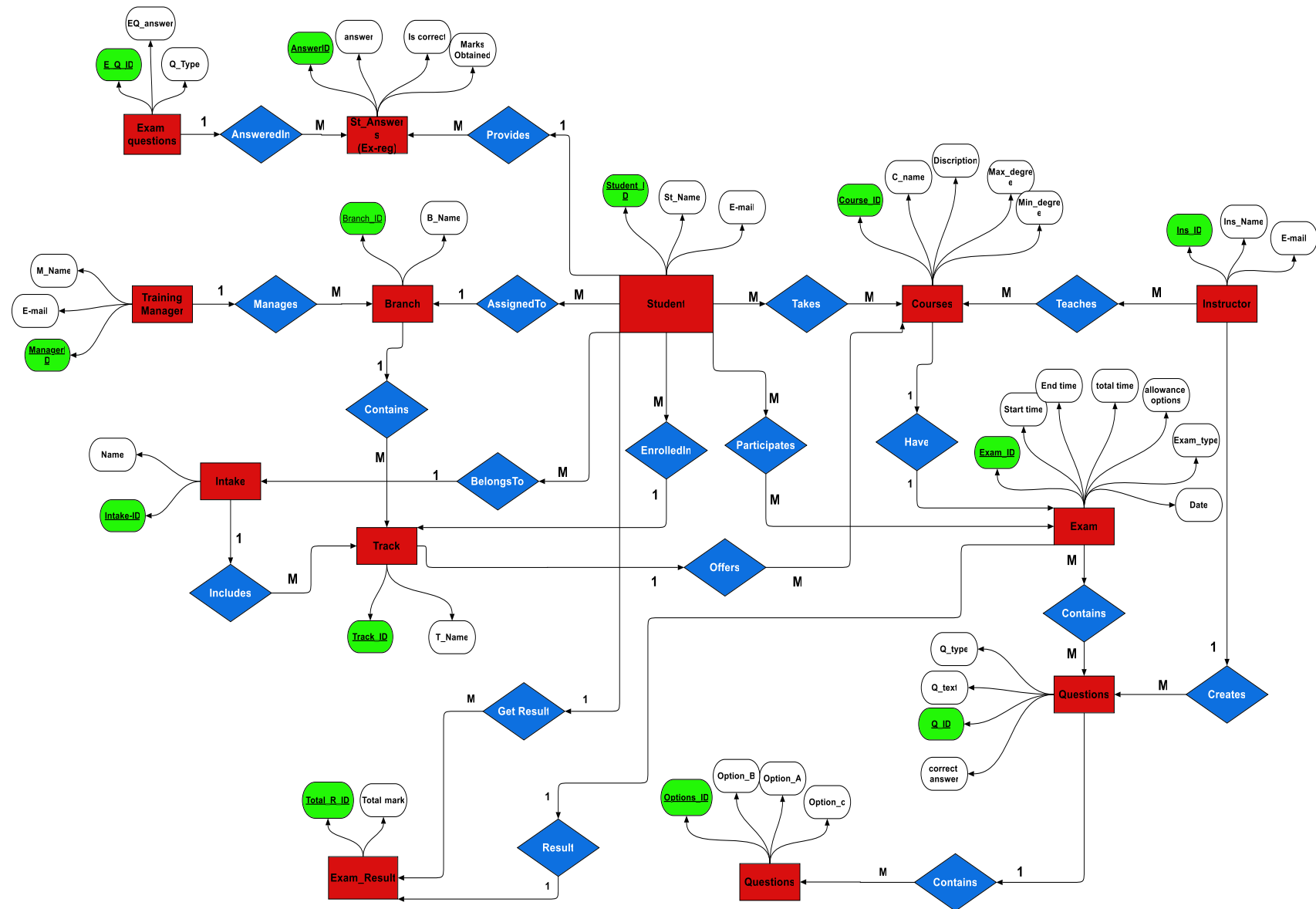


Examination System

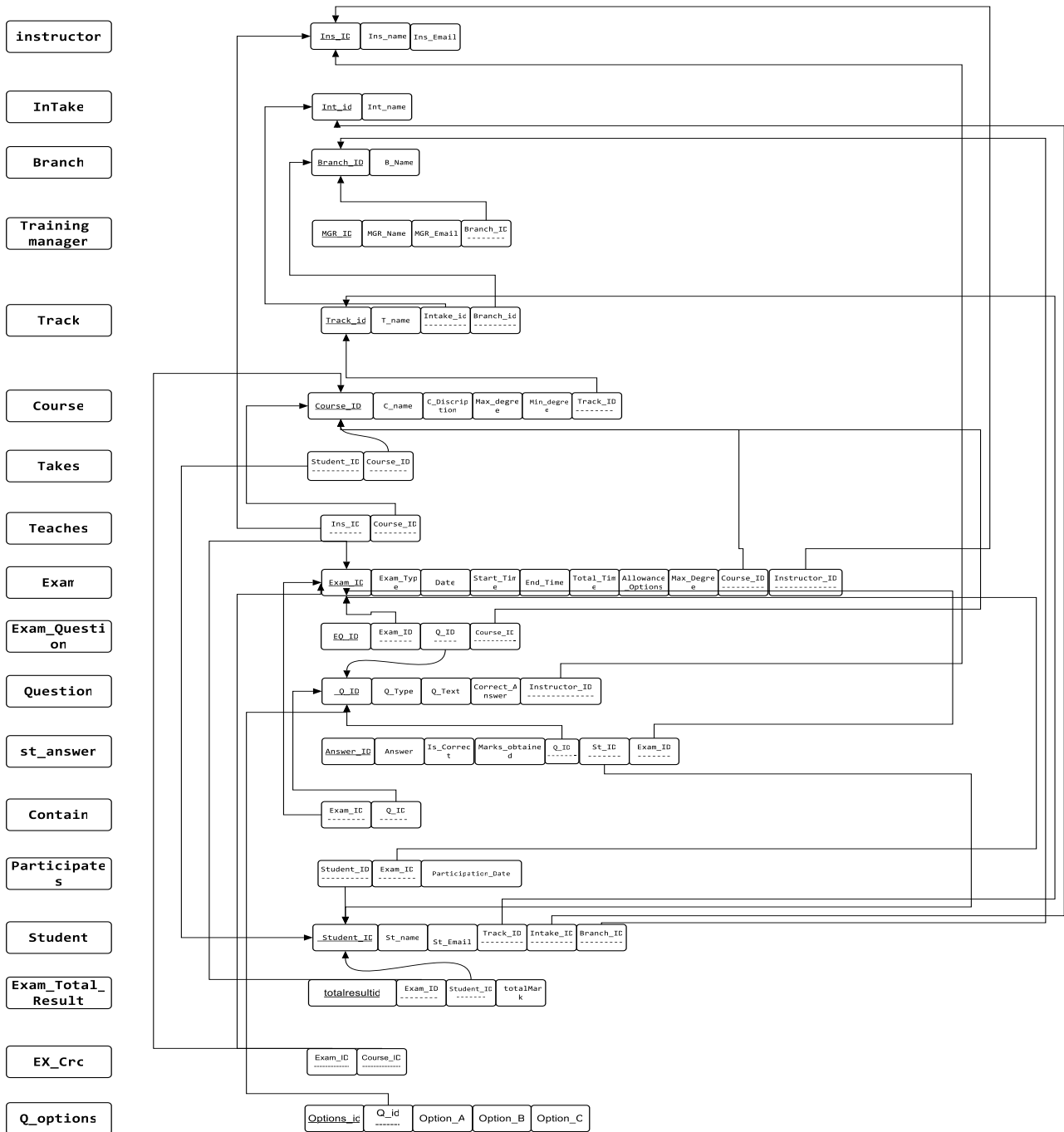


Database Project

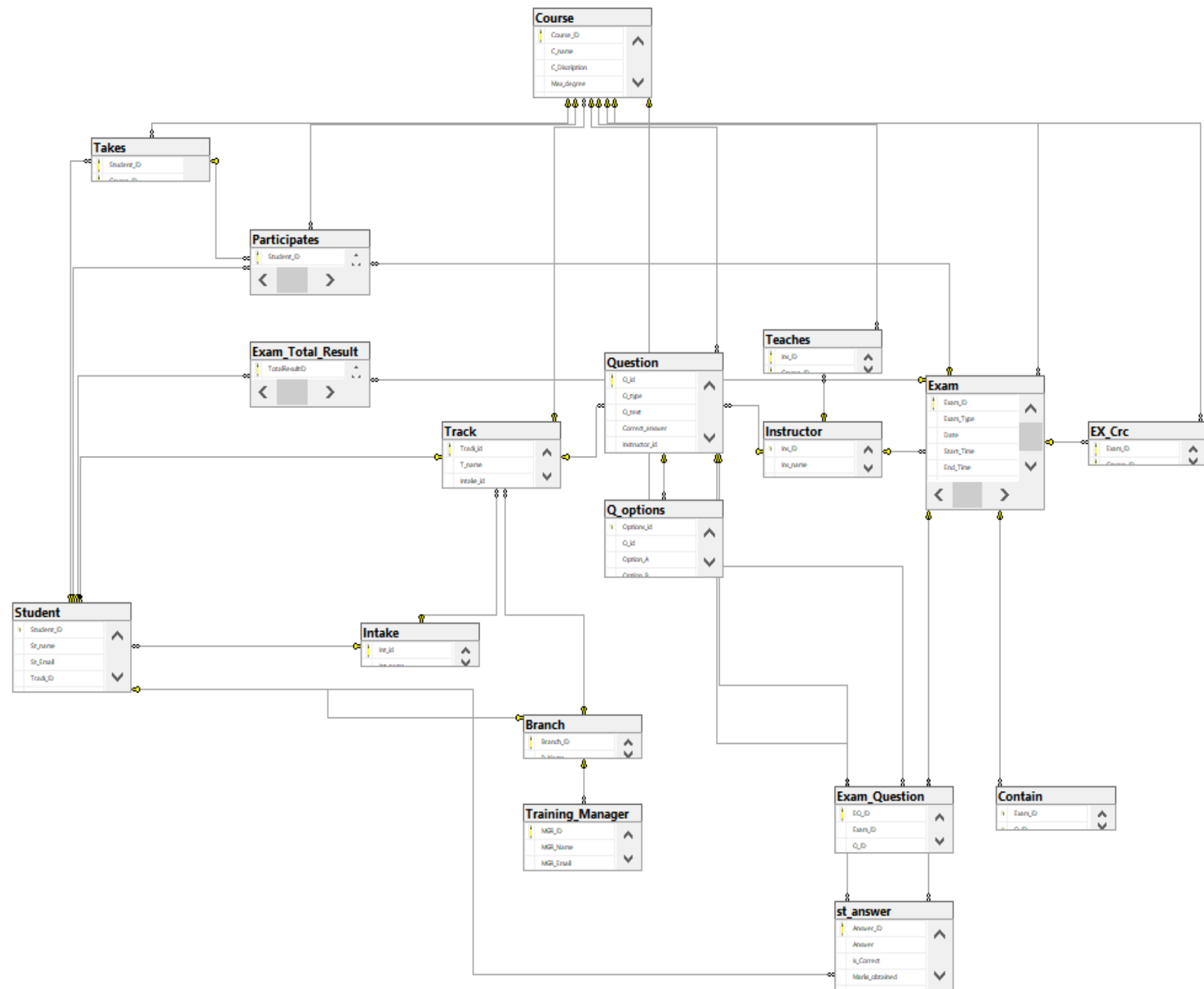
Entity Relationship Diagram - ERD



Mapping



System Schema



Stored Procedures

-- Test Procedure "GetAnExam" for retrieving Randomly specified number of questions

```
EXEC GetAnExam @exam_id= 4, @course_id = 4 , @numquestions = 10 ;
```

120 %

Results Messages

	Q_ID	Q_Text	Option_A	Option_B	Option_C	Exam_ID	Course_name
1	251	What does the term "moment" refer to in statics?	The turning effect of a force	The resistance to motion	The speed of a rotating object	4	Statics
2	248	Statics is only concerned with forces.	True	False	NULL	4	Statics
3	247	For a system to be in static equilibrium, the sum o...	True	False	NULL	4	Statics
4	260	What is a free body diagram used for in statics?	To represent forces acting on a body	To calculate stress	To analyze velocity	4	Statics
5	252	Which law states that for a system to be in equilib...	Newton's first law	Newton's second law	Law of inertia	4	Statics
6	250	The concept of equilibrium applies to both point a...	True	False	NULL	4	Statics
7	242	The sum of forces in a static system must be zero.	True	False	NULL	4	Statics
8	256	What does the term "resultant force" refer to?	A force that balances another	The single force that can replace a set of forces	A force that causes rotation	4	Statics
9	243	Moment of a force depends on the point of applic...	True	False	NULL	4	Statics
10	255	Which of the following is a type of support in static...	Fixed support	Roller support	Hinge support	4	Statics

-- Test Procedure "GetAnExam" for retrieving Randomly specified number of questions

Stored Procedures

```
ALTER PROCEDURE [dbo].[GetAnExam]
    @Exam_ID INT,
    @Course_ID INT,
    @NumQuestions INT
AS
BEGIN
    -- Randomly select questions based on Course_ID
    SELECT TOP (@NumQuestions)
        Q.Q_ID,
        Q.Q_Text,
        QO.Option_A,
        QO.Option_B,
        QO.Option_C,
        E.Exam_ID,
        C.C_name AS Course_name
    FROM Question Q
    LEFT JOIN Q_options QO ON Q.Q_ID = QO.Q_ID -- Join to get the options for each question
    JOIN Exam E ON E.Course_ID = Q.Course_id
    JOIN Course C ON Q.Course_id = C.Course_ID
    WHERE Q.Course_ID = @Course_ID
    ORDER BY NEWID(); -- Random retrieval

    -- Insert the selected questions into Exam_Question table, linking them to the specified exam
    INSERT INTO Exam_Question (Exam_ID, Q_ID, Course_ID)
    SELECT @Exam_ID, Q_ID, @Course_ID
    FROM (
        SELECT TOP (@NumQuestions) Q_ID
        FROM Question
        WHERE Course_ID = @Course_ID
        ORDER BY NEWID()
    ) AS RandomQuestions;
END;
```

```
-- Test Procedure "CalcExamResult" for calculating total result for a specific Exam-student
EXEC [dbo].CalcExamResult
    @Exam_ID = 4,
    @Student_ID = 5;
```

```
ALTER PROCEDURE [dbo].[CalcExamResult]
    @Exam_ID INT,
    @Student_ID INT
AS
BEGIN
    DECLARE @TotalMarks INT;








    -- Calculating the student's full score on the exam based on the scores for each question
    SELECT @TotalMarks = SUM(Marks_obtained)
    FROM st_answer sa
    JOIN Exam_Question eq ON sa.Q_ID = eq.Q_ID
    WHERE eq.Exam_ID = @Exam_ID AND sa.St_ID = @Student_ID;

    -- If the result already exists, update it, if it doesn't exist, insert it
    IF EXISTS (SELECT 1 FROM Exam_Total_Result WHERE Exam_ID = @Exam_ID AND Student_ID = @Student_ID)
    BEGIN
        UPDATE Exam_Total_Result
        SET Total_Mark = @TotalMarks
        WHERE Exam_ID = @Exam_ID AND Student_ID = @Student_ID;
    END
    ELSE
    BEGIN
        INSERT INTO Exam_Total_Result (Exam_ID, Student_ID, Total_Mark)
        VALUES (@Exam_ID, @Student_ID, @TotalMarks);
    END

    PRINT 'Total Marks for Exam ' + CAST(@Exam_ID AS NVARCHAR) + ' for Student ' + CAST(@Student_ID AS NVARCHAR) + ' is: ' + CAST(@TotalMarks AS NVARCHAR);
END;
```

Stored Procedures

More SPs

- [-]  Stored Procedures
 - [+]  System Stored Procedures
 - [+]  dbo.AddStudent
 - [+]  dbo.CalcExamResult
 - [+]  dbo.GetAnExam
 - [+]  dbo.Submit_Student_Answer
 - [+]  dbo.UpdateStudent

StudentDetailsView

DESKTOP-P42EG0V....tudentDetailsView			DESKTOP-P42EG0V....tCourseExamsView		DESKTOP-P42EG0V....bo.Exam_Question	
	Student_ID	St_name	St_Email	Branch_Na...	Track_Name	Intake_Na...
▶	1	Updated Student	updated@student.com	Giza	Mechanical Engineering	Intake 2023
	2	Sara Mohamed	sara.mohamed2@gmail.com	Alexandria	Electrical Engineering	Intake 2023
	3	Hassan Ali	hassan.ali3@gmail.com	Giza	Mechanical Engineering	Intake 2024
	4	Mohamed Salah	mohamed.salah4@gmail.com	Cairo	Civil Engineering	Intake 2023
	5	Nora Youssef	nora.youssef5@gmail.com	Alexandria	Software Engineering	Intake 2024
	6	Khaled Ibrahim	khaled.ibrahim6@gmail.com	Giza	Computer Science	Intake 2024
	7	Mona Ahmed	mona.ahmed7@gmail.com	Cairo	Electrical Engineering	Intake 2023
	8	Omar Khaled	omar.khaled8@gmail.com	Alexandria	Mechanical Engineering	Intake 2024
	9	Laila Saeed	laila.saeed9@gmail.com	Giza	Civil Engineering	Intake 2023
	10	Ahmed Ehab	ahmed.ehab10@gmail.com	Cairo	Software Engineering	Intake 2024
	11	Youssef Samir	youssef.samir11@gmail.com	Giza	Computer Science	Intake 2023
	12	Mariam Adel	mariam.adel12@gmail.com	Alexandria	Electrical Engineering	Intake 2024
	13	Amr Nabil	amr.nabil13@gmail.com	Cairo	Mechanical Engineering	Intake 2023
	14	Hanaa Ayman	hanaa.ayman14@gmail.com	Giza	Civil Engineering	Intake 2024
	15	Ola Saeed	ola.saeed15@gmail.com	Alexandria	Software Engineering	Intake 2023
	16	Ibrahim Khaled	ibrahim.khaled16@gmail.com	Giza	Computer Science	Intake 2024
	17	Salma Mahmoud	salma.mahmoud17@gmail.com	Cairo	Electrical Engineering	Intake 2023
	18	Karim Ali	karim.ali18@gmail.com	Alexandria	Mechanical Engineering	Intake 2024
	19	Hana Tarek	hana.tarek19@gmail.com	Giza	Civil Engineering	Intake 2023
	20	Dina Khaled	dina.khaled20@gmail.com	Cairo	Software Engineering	Intake 2024
	21	Omar Samir	omar.samir21@gmail.com	Giza	Computer Science	Intake 2023
	22	Rania Hassan	rania.hassan22@gmail.com	Alexandria	Electrical Engineering	Intake 2024
	23	Tamer Nabil	tamer.nabil23@gmail.com	Cairo	Mechanical Engineering	Intake 2023
	24	Hassan Ayman	hassan.ayman24@gmail.com	Giza	Civil Engineering	Intake 2024
	25	Nada Saeed	nada.saeed25@gmail.com	Alexandria	Software Engineering	Intake 2023
	26	Sara Khaled	sara.khaled26@gmail.com	Giza	Computer Science	Intake 2024
	27	Tarek Mahmoud	tarek.mahmoud27@gmail.com	Cairo	Electrical Engineering	Intake 2023
	28	Nour Ali	nour.ali28@gmail.com	Alexandria	Mechanical Engineering	Intake 2024
	29	Layla Tarek	layla.tarek29@gmail.com	Giza	Civil Engineering	Intake 2023
	30	Ola Khaled	ola.khaled30@gmail.com	Cairo	Software Engineering	Intake 2024



InstructorCoursesView



	Ins_ID	Ins_name	Course_ID	Course_Name
▶	1	Dr. Ahmed Mohamed	1	Data Structures
	1	Dr. Ahmed Mohamed	2	Circuits
	2	Dr. Sara Ali	3	Thermodynamics
	2	Dr. Sara Ali	4	Statics
	3	Dr. Mahmoud Hassan	5	Operating Systems
	3	Dr. Mahmoud Hassan	6	Algorithms
	4	Dr. Mona Khaled	7	Digital Logic
	4	Dr. Mona Khaled	8	Fluid Mechanics
	5	Dr. Youssef Nabil	9	Structural Analysis
	5	Dr. Youssef Nabil	10	Software Engineering II
	6	Dr. Hala Fathy	11	Computer Networks
	6	Dr. Hala Fathy	12	Power Electronics
	7	Dr. Omar Khalil	13	Heat Transfer
	7	Dr. Omar Khalil	14	Reinforced Concrete
	8	Dr. Rania Magdy	15	Database Systems
	8	Dr. Rania Magdy	16	Machine Learning
	9	Dr. Samir Tarek	17	Microprocessors
	9	Dr. Samir Tarek	18	Mechanics of Materials
	10	Dr. Leila Hassan	19	Soil Mechanics
	10	Dr. Leila Hassan	20	Advanced Programming
*	NULL	NULL	NULL	NULL



ExamDetailsView



More Viwes

 System Views

  **dbo.BranchCoursesView**

  **dbo.CourseDetailsView**

  **dbo.ExamDetailsView**

  **dbo.ExamStatisticsView**



 dbo.InstructorCoursesView

 dbo.StudentCourseExamsView

 dbo.StudentDetailsView

 dbo.StudentExamResultsView

 `dbo.StudentPerformanceView`

  `dbo.TrackDetailsView`

 `dbo.TrainingManagerView`

[illegible]

Indecies

```
-- Indexes for Student Table
CREATE NONCLUSTERED INDEX idx_Student_Track_ID ON Student(Track_ID);

-- Indexes for Course Table (updated)
CREATE NONCLUSTERED INDEX idx_Course_Track_ID ON Course(Track_ID);

-- Indexes for Exam Table
CREATE NONCLUSTERED INDEX idx_Exam_Course_ID ON Exam(Course_ID);

-----

-- Indexes for Participates Table (Foreign Keys and Frequently Queried Columns)
CREATE NONCLUSTERED INDEX idx_Participates_Student_ID ON Participates(Student_ID);
CREATE NONCLUSTERED INDEX idx_Participates_Exam_ID ON Participates(Exam_ID);
CREATE NONCLUSTERED INDEX idx_Participates_Participation_Date ON Participates(Participation_Date);

-----

-- Indexes for Takes Table
CREATE NONCLUSTERED INDEX idx_Takes_Student_ID ON Takes(Student_ID);
CREATE NONCLUSTERED INDEX idx_Takes_Course_ID ON Takes(Course_ID);

-----

-- Indexes for Teaches Table
CREATE NONCLUSTERED INDEX idx_Teaches_Instructor_ID ON Teaches(Ins_ID);
CREATE NONCLUSTERED INDEX idx_Teaches_Course_ID ON Teaches(Course_ID);

-----

-- Indexes for Contains Table
CREATE NONCLUSTERED INDEX idx_Contains_Exam_ID ON Contain(Exam_ID);
CREATE NONCLUSTERED INDEX idx_Contains_Question_ID ON Contain(Q_ID);

-----

-- Indexes for Exam_Question Table
CREATE NONCLUSTERED INDEX idx_Exam_Question_Exam_ID ON Exam_Question(Exam_ID);
CREATE NONCLUSTERED INDEX idx_Exam_Question_Question_ID ON Exam_Question(Q_ID);

-----
```

Logins, Users, and Roles

For more security

```
-- Create SQL Server Logins

CREATE LOGIN admin_login WITH PASSWORD = 'AdminPass2024!' ;

CREATE LOGIN student_login WITH PASSWORD = 'StudentPass2024!';

CREATE LOGIN instructor_login WITH PASSWORD = 'InstructorPass2024!';

CREATE LOGIN training_manager_login WITH PASSWORD = 'TrainingManagerPass2024!';

=====
-- Create Users for each login

CREATE USER admin_user FOR LOGIN admin_login ;

CREATE USER student_user FOR LOGIN student_login;

CREATE USER instructor_user FOR LOGIN instructor_login;

CREATE USER training_manager_user FOR LOGIN training_manager_login;

=====
--Create Roles

CREATE ROLE AdminRole;

CREATE ROLE StudentRole;

CREATE ROLE InstructorRole;

CREATE ROLE TrainingManagerRole;
```

Granting Permissions for each role/user

```
--=====
-- Grant Permissions to AdminRole

-- THE ADMIN CAN CONTROL THE WHOLE DATABASE
GRANT CONTROL ON DATABASE::Examination_System TO AdminRole;

GRANT SELECT ON dbo.CourseDetailsView TO AdminRole;
GRANT SELECT ON dbo.ExamQuestionsView TO AdminRole;
GRANT SELECT ON dbo.InstructorCoursesView TO AdminRole;
GRANT SELECT ON dbo.StudentCourseExamsView TO AdminRole;
GRANT SELECT ON dbo.StudentDetailsView TO AdminRole;
GRANT SELECT ON dbo.StudentExamResultsView TO AdminRole;
GRANT SELECT ON dbo.TrainingManagerView TO AdminRole;

GRANT EXECUTE ON dbo.AddExamResult TO AdminRole;
GRANT EXECUTE ON dbo.AddStudent TO AdminRole;
GRANT EXECUTE ON dbo.CalculateExamResult TO AdminRole;
GRANT EXECUTE ON dbo.UpdateStudent TO AdminRole;

-----
-- Grant permissions to TrainingManagerRole
GRANT SELECT, INSERT, UPDATE, DELETE ON Branch TO TrainingManagerRole;
GRANT SELECT, INSERT, UPDATE, DELETE ON Track TO TrainingManagerRole;
GRANT SELECT, INSERT, UPDATE, DELETE ON Intake TO TrainingManagerRole;
GRANT SELECT, INSERT, UPDATE, DELETE ON Student TO TrainingManagerRole;

GRANT SELECT ON dbo.TrainingManagerView TO TrainingManagerRole;
GRANT SELECT ON dbo.InstructorCoursesView TO TrainingManagerRole;
GRANT SELECT ON dbo.StudentDetailsView TO TrainingManagerRole;
GRANT SELECT ON dbo.StudentExamResultsView TO TrainingManagerRole;

GRANT EXECUTE ON dbo.AddStudent TO TrainingManagerRole;

-----
-- Grant Permissions to InstructorRole
GRANT SELECT ON dbo.InstructorCoursesView TO InstructorRole;
GRANT SELECT ON dbo.StudentDetailsView TO InstructorRole;
GRANT SELECT ON dbo.StudentExamResultsView TO InstructorRole;

GRANT EXECUTE ON dbo.CalculateExamResult TO InstructorRole;
```