

Constraints & Business Rules

- **Tables:**

- **Role:**
 - **Role_id:** PK, begins from 1 and incremental by 1
 - **Role_name:** not Null
- **User:**
 - **User_id:** PK, begins from 1 and incremental by 1
 - **email:** Unique, not Null
 - **password:** not Null
 - **Constraints:**
 - **FK_User_Role:** role_id references role_id in table Role
- **Student:**
 - **F_name & L_name:** not null
 - **Constraints:**
 - **CHK_Student_Gender:** check (gender in ('M', 'F'))
 - **FK_Student_User:** student_id references user_id in User
 - **FK_Student_Track:** track_id references track_id in Track
- **Instructor:**
 - **instructor_name:** not Null
 - **Constraints:**
 - **FK_Instructor_User:** instructor_id references user_id in User

- **Training_Manager:**
 - **manager_name:** not Null
 - **Constraints:**
 - **FK_Manager_User:** manager_id references user_id in User
- **Track:**
 - **track_id:** PK, begins from 1 and incremental by 1
 - **track_name:** not Null
 - **Constraints:**
 - **FK_Track_Branch:** branch_id references branch_id in table Branch
- **Branch:**
 - **branch_id:** PK, begins from 1 and incremental by 1
 - **branch_name:** not Null
- **Course:**
 - **course_id:** PK, begins from 1 and incremental by 1
 - **course_name:** not Null
 - **Constraints:**
 - **CHK_Course_Degrees:** check (max_degree >= min_degree)
 - **CHK_Course_Positive_Degrees:** check min_degree >= 0

- **Instructor_Course:**
 - **PK:** Composite (instructor_id, course_id, year)
 - **Constraints:**
 - **FK_InstCourse_Instructor:** instructor_id references instructor_id in table Instructor
 - **FK_InstCourse_Course:** course_id references course_id in table Course
 - **CHK_InstCourse_Year:** check (year between 1000 and 9999)
- **Question:**
 - **question_id:** PK, begins from 1 and incremental by 1
 - **question_text:** not Null
 - **question_type:** not Null
 - **Constraints:**
 - **FK_Question_Course:** course_id references course_id in table Course
 - **CHK_Question_Type:** check (question_type in ('MCQ', 'TF', 'Text'))
- **Question_MC:**
 - **question_id:** PK
 - **Constraints:**
 - **FK_QuestionMC_Question:** question_id references question_id in table Question

- **Exam:**
 - **exam_id:** PK, begins from 1 and incremental by 1
 - **exam_type:** not Null

- **Constraints:**
 - **FK_Exam_Course:** course_id references course_id in table Course
 - **FK_Exam_Instructor:** instructor_id references instructor_id in table Instructor
 - **CHK_Exam_Type:** check (exam_type in ('Exam', 'Corrective'))
 - **CHK_Exam_Time:** check (end_time > start_time)
 - **CHK_Exam_Year_4Digits:** check (year between 1000 and 9999)
 - **CHK_Exam_TotalTime:** check total_time > 0

- **Exam_Options:**
 - **PK:** Composite (exam_id, option_name)

- **Constraints:**
 - **FK_ExamOptions_Exam:** exam_id references exam_id in table Exam

- **Exam_Question:**
 - **PK:** Composite (exam_id, question_id)
 - **question_degree:** check > 0
 - **sequence_number:** check > 0

- **Constraints:**
 - **FK_ExamQuestion_Exam:** exam_id references exam_id in table Exam

- **FK_ExamQuestion_Question:** question_id references question_id in table Question
- **Student_Exam:**
 - **PK:** Composite (student_id, exam_id)
 - **Is_reviewd:** bit ,default 0
 - **Total_score:** derived attribute
 - **Constraints:**
 - **FK_StudentExam_Student:** student_id references student_id in table Student
 - **FK_StudentExam_Exam:** exam_id references exam_id in table Exam
 - **CHK_StudentExam_Time:** check submit_time > start_time