PROJECT 1
Milestone-2

Team Members:

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Step 3: Relational Model

A. List of Tables: **Type**

1. **Users(**user_id,f_name,l_name,password,dob**)** **ENTITY**
   Primary Key:user_id

2. **Professors**(user_id,designation,teaching_since) **ENTITY**
   Primary Key:user_id
   Foreign Key:user_id references **Users**
   ON DELETE NO ACTION
   ON UPDATE NO ACTION

3. **Students**(user_id,type_id,is_TA,TA_Course_ID) **ENTITY**
   Primary Key:user_id
   Foreign Key:user_id references **Users,** TA_Course_ID references Course_ID in **Courses**
   ON DELETE NO ACTION
   ON UPDATE NO ACTION
   Type_id=0 corresponds to undergraduate student
   Type_id=1 corresponds to graduate student
   Type_id=1 corresponds to graduate student and if is_TA =1 then s/he is TA.
   Type_id=1 corresponds to graduate student and if is_TA =0 then s/he is not a TA.

4. **Courses(**course_id,course_name,course_startdatetime,course_enddatetime**)** **ENTITY**
   Primary key : (course_id)

5. **Teaches(**user_id,course_id**)** **RELATION(BINARY)**
   Primary key : (user_id,course_id)
   Foreign Key: user_id references **Users,** course_id references **Courses**
   ON DELETE NO ACTION
   ON UPDATE NO ACTION

6. **Enrolled_In(**user_id,course_id**)** **RELATION(BINARY)**
   Primary key : (user_id,course_id)
   Foreign Key: :user_id references **Users,** course_id references **Courses**
   ON DELETE NO ACTION
   ON UPDATE NO ACTION

7. **Topics**(topic_id,topic_name) **ENTITY**
   Primary key : (topic_id)

8. **Courses_Topics**(course_id,topic_id) **RELATION(BINARY)**

Primary key : (course_id,topic_id)
Foreign Key: topic_id references **Topics,** course_id references **Courses**
ON DELETE NO ACTION
ON UPDATE NO ACTION

9. **Homeworks(**hw_id,hw_name,hw_type, scoring_policy **ENTITY**
hw_startdatetime,hw_enddatetime,no_of_retries,no_of_questions,penalty_per_question**)**
Primary key : (hw_id)

10. **Courses_Homeworks**(course_id,hw_id) **RELATION(BINARY)**
Primary key : (course_id,hw_id)
Foreign Key course_id references **Courses,** hw_id references **Homeworks**
ON DELETE NO ACTION
ON UPDATE NO ACTION

11. **Qbank(**q_id,q_points,detailed_answer,difficulty_level,hint) **ENTITY**
Primary Key(q_id**)**
difficulty_level **=1 corresponds to question of 1 point(q_point)**
difficulty_level **=2 corresponds to question of 2 point(q_point)**
difficulty_level **=3 corresponds to question of 3 point(q_point)**
difficulty_level **=4 corresponds to question of 4 point(q_point)**
difficulty_level **=5 corresponds to question of 6 point(q_point)**
difficulty_level **=6 corresponds to question of 8 point(q_point)**

12. Qbank_topics(q_id,topic_id) **RELATION(BINARY)**
Primary key : (q_id,topic_id)
Foreign Key: topic_id references **Topics,** q_id references **Qbank**
ON DELETE NO ACTION
ON UPDATE NO ACTION

13. **Qset(**hw_id,qset_id**)** **WEAK ENTITY**
Primary key(hw_id,qset_id**)**
Foreign Key (hw_id) references Homeworks
Partial Key: qset_id
This is weak entity w.r.t Homeworks
ON DELETE NO ACTION
ON UPDATE NO ACTION

14. **Hw_Qset_Qbank(hw_id,qset_id,q_id)** **RELATION(TERNARY)**
Primary key (hw_id,qset_id,q_id)
Foreign Key hw_id references Homeworks, qset_id references Qset, q_id references Qbank
ON DELETE NO ACTION
ON UPDATE NO ACTION

15. **Std_questions(q_id,q_text)** **ENTITY**
Primary key((q_id)
Foreign Key (q_id) references Qbank
ON DELETE NO ACTION
ON UPDATE NO ACTION

16. **Param_questions(q_id,q_text)** **ENTITY**
Primary key((q_id)
Foreign Key (q_id) references Qbank

ON DELETE NO ACTION
ON UPDATE NO ACTION

17. **Parameters(q_id,p_id,p1,p2,p3,p4)** **WEAK ENTITY**
    Primary key(q_id,p_id)
    Foreign Key (q_id) references Qbank
    Partial Key: p_id
    This is weak entity w.r.t Param_questions which in turn is a type of Entity Qbank.
    ON DELETE NO ACTION
    ON UPDATE NO ACTION

18. **Answers(q_id,ans_id,is_correct)** **WEAK ENTITY**
    Primary key(q_id,ans_id)
    Foreign Key (q_id) references Qbank
    Partial Key: ans_id
    This is weak entity w.r.t Qbank.
    ON DELETE NO ACTION
    ON UPDATE NO ACTION

19. **Responses(User_Id,hw_id,qset_id,q_id,ans_id,attempt_no,** **WEAK ENTITY**
    is_correct,points_scored,response_time)
    Primary key(User_Id,hw_id,qset_id,q_id,ans_id,attempt_no)
    Foreign Key (User_Id) references Users, (hw_id) references Homeworks , (qset_id) references Qset, (q_id) references Qbank , (ans_id) references Answers
    Partial Key: attempt_no
    This is weak entity w.r.t Homeworks.
    ON DELETE NO ACTION
    ON UPDATE NO ACTION

B. LIST OF FUNCTIONAL DEPENDENCIES

NOTE: In our database model, all primary keys determine all the attributes of that table. We do not have any other explicit dependencies. Therefore our database tables are in BCNF.

C. LIST OF APPLICATION CONSTRAINTS

1) A course can only be created by the instructor.
2) A person enrolled as student cannot be enrolled as TA for the same subject.
3) Exercises can only be created by instructor.
4) Exercises should not be available to students before and after the start and end dates respectively to the student, but it can be available to the instructors and TAs.
5) Only students who are enrolled in a particular course can view those assignment for that course.
6) A student can attempt an assignment for the maximum of number of permissible tries until the assignment deadline.
7) Only instructors, irrespective of the course taken by them, can view questions and their answers.
8) Only instructors for that particular course can add or edit questions for that particular course.
9) TAs can only see exercises and their solutions created by the instructor for that course but they cannot modify them at any point of time.
10) TAs can see the class roll and homework attempts and grades of all students.