CSC675 Database system

College Department Database Management System
Milestone 1
M1V1
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1   Project Description

Schools like College or University has several departments like Math, History or Computer science. In this project, I will create a platform where departments of colleges and universities can manage different elements to help teachers but also for students who work in this College/University to have a better experience during studies. This will also helps the administration to manage departments.

2 Use Cases

1. **Use Case:** Courses organization
   Actor: Manon, Administration at Sfsu
   Description: Recently, Miss Manon in the administration received many messages that some students can't go in a course. They have a course in a building downtown but then they have another course in another building in the main campus. They can't go in this course on time so they ask to change the Class section so they can finally go in this course.

   Solution: Intra is a platform for management of college/university. With this platform, Manon can see the timetable of each students (and also professors) and can see also in which facilities/building the course takes place. After this, she can finally remove the student from his former section and add him in the new section. The platform will also automatically tell to the students that are applying for a course that they can't apply in some section because it's in the same time or it's too far to be in time.

2. **Use Case:** Course
   Actor: Miss Barbara, Professor
   Description: Miss Barbara is a professor at Sfsu, she noticed that many of her students did not take notes of the course or they don't understand the course and need to review again the course. She also noticed that students do not their homework because they always forget the date when it is due or that they lost the paper.

   Solution: A platform where she can store information of her courses like the lesson, assignments or also the grades for her students. Students must be assigned in this course to see elements of this course and can also sent theirs assignments.

3. **Use Case:** Collaborative assignments
   Actor: Luca, Marketing Student at Sfsu
   Description: Luca is a Marketing Major and for his Master project to get his degree, he must think about a new marketing model for a company. He have a great idea to use new technologies to support his new marketing models. But he's not a Computer science student nor an engineer student, he needs some help from students with other Major. So he needs to contact them (or also contact the professor of the other field to ask him some questions) to succeed his project. But he doesn't know no one in other departments so he struggle to find a teammate and to communicate with him.

   Solution: The platform will have a communication features. So this way, Luca can find people in Computer Science department and can write them a message that he need some help. He can also see a professor from one specific course and ask him some questions to help him how to improve his project. If many people accept to help him, Luca have the possibility to create a chat group.

4. **Use Case:** Prerequisite courses
   Actor: Daniel, Exchange student at Sfsu
   Description: Daniel is an exchange student from Slovakia, he comes to Sfsu to study but the University wants him to have some prerequisites to have courses that he wants for

his Minor. But as an exchange student, he don't have courses that are only available at Sfsu. He must check the description of the course manually and suppose that the courses he had is equivalent to the course needed at Sfsu and he's not sure because some times, the description is not precise. He put his courses that he had and was hopping that he will be enrolled, but the professor who saw his courses, also didn't understand want he knows or not because the names off the courses are different and she don't have at all the descriptions of courses he had.

Solution: During registration of the courses, the platform will ask to Daniel is he's a new Sfsu student or not. If he is, the platform will ask him his grades from Sfsu. But Daniel is a "new" student so he can't have the Sfsu courses prerequisite. The platform will show him a MCQS of knowledge that he must know (all or the most important ones, depends on the importance of the knowledge) to be enrolled in the course he wants (The MCQS is based on knowledge learned in prerequisite courses). If Daniel checks everything, the professor will know that Daniel have the knowledge to be enrolled and if not, it's up to the professor to decide if Daniel will be enrolled or not. Then he platform will ask him to send his grades from his former school as a proof and also to describe what he learned in this course to be sure he has knowledge.

5. **Use Case:** The grader's work
   Actor: Ginaluca, Lecturer at Sfsu & Clement, its grader
   Description: Mister Gianluca is a lecturer at Sfsu. He has a grader called Clement who helps him with graduate students but he also helps students during assignments. But some students complain that the grades that Clement give them is not good, they think they deserve better. So Gianluca must verify the assignments but assignments in paper take many times to verify and Gianluca don't have much time for this.

   Solution: The assignments will be submitted in the platform. The grader can access in those assignments and give a grade, the professor also have accesses and can modify what the grader wrote but the grader can't modify the grade that the professor give to one student. So this way, it will be easier for the professor to check Clement's work and he saw that Clement did a great job, the other students will have the same grade.

6. **Use Case:** On-Campus Job
   Actor: Arjun, Student at sfsu
   Description: Arjun is a civil engineer student at Sfsu. He's from India so he needs money for his housing and for foods. He's looking at LinkedIn or other web sites to find a job in San Francisco. But he didn't knew that they are also paid jobs on-Campus. Fortunately, someone told him that there are jobs on Campus, he just need to put his resume and the HR will see if Arjun will be enrolled or not. Arjun is very lucky because someone told him that he can work on Campus and he was successfully enrolled in a job that one faculty member posted so now he can finally be in the payroll. But what if no one told him about this opportunity?

   Solution: The platform will have a window for job opportunities at University, this window even students and non-students have access but for the students, to give them more chances, they will always see all new jobs in the home page of the platform so they can be the first to see it and to apply.

7. **Use Case:** Researcher's publications
   Actor: Mister Hugo, Physics Researcher at Sfsu
   Description: Mister Hugo is a Physics Researcher at Sfsu and he noticed that no many students read his reports which is a shame because they can learn a lot from it.

   Solution: Hugo have a special page for his research in this platform so every students and professors can see his work.

8. **Use Case:** Need more players
   Actor: Thibault, coach of the sfsu soccer club
   Description: Thibault is the coach of the sfsu soccer club and he's worried because he needs more players to be more competitive this year. He asked to the head director of the sport University association if he can do something. The head president posted an announcement at sfsu's announcement board but one one noticed. Unfortunately, Thibault will have a complicated year.

   Solution: The University organization's announcement can be posted directly on the home page of the platform like the job announcements. So this way, everyone can notice this announcement and can come play Soccer and Thibault will be happy to have more players.

9. **Use Case:** Opportunity for students
   Actor: Jose, Lecturer at sfsu
   Description: Mister Jose is a Lecturer at sfsu, it means that he's not only teaching but he's also in a company. And he knows that many students are struggling with finding a job in the Bay Area. He also knows that students at sfsu are good and have many qualities that he can need for his company. He decided to give students an opportunity to learn even more than just having theories at University, so he wants to tell to his students that he can offer opportunities for a part-time job. But he feels bad because he's only offering for his students, others have not this opportunity.

   Solution: Faculty member as well as head president off association of administration has the right to add some announcement in the platform as an off-campus opportunity.

10. **Use Case:** Christmas Celebration
    Actor: Suzanne, president of Student Council
    Description: Suzanne is the president of the Student Council, she wants the best for students. Students had a complicated week because of the stress of final exams but now it's finished and she wants to organize a Christmas Party Celebration so students can now enjoy the end of the year.

    Solution: Suzanne can post an announcement in the platform but she can also sent a mail to everyone to announce the Party.

11. **Use Case:** Books

Actor: Michael, Student at Sfsu

Description: Michael is a student at Sfsu and he needs a book to do his homework. He went to the Library to check books that they have but they are so many so he struggles to find the book he needs. He do not even know is the Library has this book.

Solution: The database can have store all books that they have and also where to find them in the library.

3 Database Requirements

1. Department

   1.1. Department is managed by one or many member of the Administration

   1.2. Department have many employees

   1.3. Department have many Facilities

2. Administration

   2.1. Administration admit Many students

   2.2. Administration can manage many departments

   2.3. Administration can manage many Class section

   2.4. Administration is a Employee

3. Course

   3.1. Course have many Students

   3.2. Course have many Professors

   3.3. Course can be assigned to a student by at least one member of the Faculty member

   3.4. Course can have one or many Class Section

   3.5. Course can have many Assignments

   3.6. Course have many Prerequisites

   3.7. Course have many Exams

   3.8. Course have one Description

   3.9. Course can have many Group Chat

   3.10. Course can be in many Fields

   3.11. Course have many lessons

4. Class Section

   4.1. One Class Section is assigned to one Course

   4.2. Class Section can have one Professor

   4.3. Class Section can have many students

   4.4. One Class Section is in one Facility

   4.5. Class Section can have many Homeworks

   4.6. Class Section can have many Exams

   4.7. Class Section can have many Group Chat

5. Learner

   5.1. Learner can have many Courses

   5.2. Learner can have one or many Field

   5.3. Learner have one Degree

   5.4. Learner can be a Grader

  5.5. Learner can be a Exchange student

  5.6. Learner can be in many class Section

  5.7. Learner have many Homework

  5.8. Learner can be in many associations

  5.9. Learner can go in many events

  5.10. Learner can have many activities

  5.11. Learner can have many exams

  5.12. Learner can be in many group chat

  5.13. Learner can have many jobs

6. Student

  6.1. Student is a Learner

  6.2. Students can be in one or zero Student Council

7. Grader

  7.1. Grader is a Learner

  7.2. Grader is in one Payroll

  7.3. Grader can give many grades to many students

8. Exchange student

  8.1. Exchange student is a Learner

  8.2. Exchange student must answer one or many MQCS for prerequisite

9. Employee

  9.1. Employee can be a Faculty member

  9.2. Employee can be a Administration member

  9.3. Employee is in one payroll

10. Faculty member

  10.1. Faculty member can be a Professor

  10.2. Faculty member can be a Lecturer

  10.3. Faculty member can be a Researcher

  10.4. Faculty member is a Employee

  10.5. Faculty member is in one payroll

11. Professor

  11.1. Professor can have many Courses

  11.2. Professor can have many students

  11.3. Professor can be assigned in many class sections

  11.4. Professor is a Faculty member

  11.5. Professor can grade many students

11.6. Professor can give many homework

11.7. Professor can give many exams

11.8. Professor can be in many group chat

12. Researcher

12.1. Researcher can write many paper research

12.2. Researcher is a faculty member

13. Lecturer

13.1. Lecturer is a Faculty member

13.2. Lecturer can have many students

13.3. Lecturer can have many courses

13.4. Lecturer can be assigned in many class section

13.5. Lecturer can have many jobs

13.6. Lecturer can be in at least one payroll

13.7. Lecturer can give many assignments

13.8. Lecturer can give many exams

13.9. Lecturer can graduate many students

13.10. Lecturer can be in many group chat

14. Homework

14.1. One Homework can be assigned to many Students

14.2. One Homework can be assigned by many Professors

14.3. One Homework can be assigned by many Lecturer

14.4. One Homework can have zero or one grade

14.5. One Homework can be graded by many Graders

15. Student Council

15.1. Student Council can have many Students

15.2. Student Council can create many Events

16. Association

16.1. Association have many Learners

16.2. Association can have many Activities

16.3. Association can work with many Association

17. Library

17.1. A Library is a Facility

17.2. A Library have many Books

18. Book

18.1. A Book can be in many Library

18.2. A Book can be in possession off many Students

19. Activity

    19.1. There can be many students in one Activity

    19.2. Activity can be created by at least one Associations

20. Event

    20.1. There can be many students in one Event

    20.2. Event can be created by at least one Student Council

21. Prerequisites

    21.1. One prerequisite can be in many Courses

    21.2. Prerequisite is a Course

22. Assignment

    22.1. Assignment is given by a professor

    22.2. Assignment is done by many students

    22.3. Assignment is given in many courses

23. Exams

    23.1. Exam is a Assignment

    23.2. Exams are graded by many Graders

24. Group Chat

    24.1. One group chat can have many students

    24.2. One group chat can have many members of the Faculty member

25. HR

    25.1. HR can hire many employees

    25.2. HR is a employee

26. Payroll

    26.1. A payroll can have many employees

27. Paper research

    27.1. A paper research is written by one or many Researcher

28. Facility

    28.1. A Facility can belongs to many departments

    28.2. A Facility is a place where they are many courses

29. Amphitheater

29.1. Amphitheater is a Facility

30. Laboratory

    30.1. Laboratory is a Facility

31. Classroom

    31.1. Classroom is a Facility

32. Degree

    32.1. A degree is enrolled by many students

33. Field

    33.1. A Field is enrolled by many students

    33.2. A Field is in many courses

34. Lesson

    34.1. A Lesson is in many courses

    34.2. A Lesson have then MCQS for international students

4 Detailed List of Main Entities, Attributes and Keys

1. Department (Strong)

    1.1. name: composite, alphanumeric

    1.2. department_id: key, numeric

    1.3. size: numeric

2. Administration (Weak)

    2.1. nb_person: numeric

    2.2. person_name: composite, alphanumeric

    2.3. size: numeric

3. Course (Strong)

    3.1. name: composite, alphanumeric

    3.2. course_id: key, numeric

    3.3. prerequisite: composite, alphanumeric

    3.4. field: composite, alphanumeric

4. Class Section (Strong)

    4.1. section_id: key, numeric

    4.2. Timetable: multivalue, timestamp

    4.3. class_size: numeric

    4.4. field: composite, alphanumeric

5. Learner (Strong)

    5.1. name: composite, alphanumeric

    5.2. id: key, numeric

    5.3. grade: numeric, multivalue

    5.4. GPA: numeric

    5.5. major: composite, alphanumeric

    5.6. minor: composite, alphanumeric

    5.7. degree: alphanumeric

6. Student (Weak)

    6.1. name: composite, alphanumeric

    6.2. id: key, numeric

    6.3. grade: numeric, multivalue

    6.4. GPA: numeric

    6.5. major: composite, alphanumeric

    6.6. minor: composite, alphanumeric

6.7. degree: alphanumeric

7. Grader (Weak)

    7.1. name: composite, alphanumeric

    7.2. id: key, numeric

    7.3. grade: numeric, multivalue

    7.4. GPA: numeric

    7.5. major: composite, alphanumeric

    7.6. minor: composite, alphanumeric

    7.7. degree: alphanumeric

    7.8. course_to_grade: composite, alphanumeric

8. International Student (Weak)

    8.1. name: composite, alphanumeric

    8.2. id: key, numeric

    8.3. grade: numeric, multivalue

    8.4. GPA: numeric

    8.5. major: composite, alphanumeric

    8.6. minor: composite, alphanumeric

    8.7. degree: alphanumeric

9. Employee (Strong)

    9.1. name: composite, alphanumeric

    9.2. e_id: key, numeric

    9.3. wages: numeric

10. Faculty member (Weak)

    10.1. name: composite, alphanumeric

    10.2. f_id: key, numeric

    10.3. wages: numeric

11. Professor (Weak)

    11.1. name: composite, alphanumeric

    11.2. prof_id: key, numeric

    11.3. wages: numeric

12. Researcher (Weak)

    12.1. name: composite, alphanumeric

    12.2. r_id: key, numeric

    12.3. wages: numeric

13. Lecturer (Weak)

    13.1. name: composite, alphanumeric

    13.2. l_id: key, numeric

    13.3. wages: numeric

14. Homework (Weak)

    14.1. number: composite, alphanumeric

    14.2. grade: numeric

    14.3. deadline: multivalue, timestamp

15. Assignments (Strong)

    15.1. number: composite, alphanumeric

    15.2. grade: numeric

    15.3. deadline: multivalue, timestamp

16. Student Council (Weak)

    16.1. name: composite, alphanumeric

    16.2. size: numeric

    16.3. budget: numeric

17. Association (Weak)

    17.1. name: composite, alphanumeric

    17.2. size: numeric

    17.3. budget: numeric

18. Book (Strong)

    18.1. title: composite, alphanumeric

    18.2. author: composite, alphanumeric

    18.3. price: numeric

19. Activity (Strong)

    19.1. name: composite, alphanumeric

    19.2. size: numeric

    19.3. date: multivalue, timestamp

    19.4. price: numeric

    19.5. type: alphanumeric

20. Event (Strong)

    20.1. name: composite, alphanumeric

    20.2. size: numeric

    20.3. date: multivalue, timestamp

20.4. price: numeric

21. Exams (Weak)

    21.1. number: composite, alphanumeric

    21.2. grade: numeric

    21.3. date: multivalue, timestamp

22. Group Chat (Strong)

    22.1. name: composite, alphanumeric

    22.2. number_people: numeric

    22.3. chat_id: key, numeric

23. HR (Weak)

    23.1. name: composite, alphanumeric

    23.2. wages: numeric

    23.3. number_hr: numeric

24. Paper research (Weak)

    24.1. title: composite, alphanumeric

    24.2. author: composite, alphanumeric

    24.3. date_of_publication: multivalue, timestamp

25. Facility (Strong)

    25.1. name: composite, alphanumeric

    25.2. size_of_the_facility: numeric

    25.3. number_max_students: numeric

26. Amphitheater (Weak)

    26.1. name: composite, alphanumeric

    26.2. size: numeric

    26.3. number_max_students: numeric

27. Laboratory (Weak)

    27.1. name: composite, alphanumeric

    27.2. size: numeric

    27.3. number_max_students: numeric

28. Classroom (Weak)

    28.1. name: composite, alphanumeric

    28.2. size: numeric

    28.3. number_max_students: numeric

29. Library (Weak)

   29.1. name: composite, alphanumeric

   29.2. size: numeric

   29.3. number_max_students: numeric

30. Field (Strong)

   30.1. name: composite, alphanumeric

   30.2. field_id: key, numeric

   30.3.

31. Degree (Strong)

   31.1. name: composite, alphanumeric

   31.2. field_id: key, numeric

   31.3. year_of_study: numeric

32. Lessons (Strong)

   32.1. name: composite, alphanumeric

   32.2. field: composite, alphanumeric

   32.3. autor: composite, alphanumeric

33. Payroll (Strong)

   33.1. list: multivalue, alphanumeric

   33.2. wages_of_employees: numeric, multivalue

34. Prerequisite (Weak)

   34.1. name: composite, alphanumeric

   34.2. course_id: key, numeric

   34.3. : field: composite, alphanumeric

5 Entity Relationship Diagram (ERD)