CSC675 Database system

College Department Database Management System
Milestone 1
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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
5.14. Learner can have many part time 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
35. Part Time Job
    35.1. Part Time Job can be given to many Learners
    35.2. Part Time Job people are in Payroll
    35.3. Part Time Job is in a department

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
35. Part-Time Job (Strong)
    35.1. role: composite, alphanumeric
    35.2. job_id: key, numeric
    35.3. : field: composite, alphanumeric
    35.4. department: composite, alphanumeric

5 Entity Relationship Diagram (ERD)