San Francisco State University

CSC 675 - 03

COLLEGE DEPARTMENT DATABASE MANAGEMENT SYSTEM

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Milestone/Version	Date
M1V1	03/15/2022

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PROJECT DESCRIPTION

The aim of the project is to build a **College Department Database Management System**, a system that will help manage online admission, student enrollment, course information, employee records, and more information needed for any college. This project will help simplify the hassles of faculty when it comes to managing, modifying, and storing sensitive information about any college.

The College Department Management system helps colleges in various ways, such as storing important data, maintaining student enrollment information, analyzing administrative and academic data, improving communication, keeping records on current students and employees, and much more. In this day and age, students of this generation are more reliant on technology to update themselves on a daily basis. Colleges need to rethink their ways on how they look at managing their departments and records. That's where this new College Department Management system comes in. This project effortlessly ensures efficiency in the operations of large-scale institutions, compared to the competition.

Unlike the competition, such as the SFSU gateway system, this College Department Management system improves operational efficiency by automating all student and faculty lifecycle and campus administration. This system will be able to generate precise reports on college admission, enrollment, fees, academic records, student and employee information, credentials, and much more for the college department lifecycle. In increasing the efficiency of a college's department management system, it will cut costs immensely, as well as time, which can go into the sustainability of our new and improved system as well as putting money back into colleges.

USE CASES

1. **Use Case:** Paying for Classes

   Actor: Jane (Student)

   Description: Jane is a student in a community college. She is having trouble paying for her courses using her credit card payment method. She doesn't have a bank account set up yet, and a credit card is the only way she can pay for her courses. The College Department Management System is implemented to help Jane use her credit card in order to pay for her courses. She can also track her payments made because the system stores all the payments that she has made for her time at community college. That way, she can make sure she knows the amount of money that she's paid, and she can use the same payment method to pay for future courses.

2. **Use Case:** Viewing Teaching Courses

   Actor: Dr. Roberts (Professor)

   Description: Dr. Roberts is a professor/teacher at SFSU. He has a hard time browsing through the catalog of courses to see which courses he is assigned to teaching this semester. He also is not too proficient with computers, so he has trouble figuring out which students are enrolled in the classes that he is teaching. The College Department Management system is there to help Dr. Roberts because the system can aggregate the courses based on his teacher or faculty ID, showing him which courses that he is assigned to teaching. Furthermore, once he knows the courses he is teaching, he can view all the student ID's of the enrolled students in his course, skipping the hassle of searching through a previously inefficient system.

3. **Use Case:** Grading Courses

   Actor: Sarah (Student Grader)

   Description: Sarah is a student grader for a few courses. She finds it difficult to keep track of which graded assignments belong to which courses, and the course information such as the section numbers, the students they belong to, and more. The College Department Management system is there to help Sarah distinguish between the different courses and their section numbers, as the system stores all the information about which courses she is graded, the student info, course info, and much more. Sarah will now have an easier time managing the grading, and keeping track of her graded assignments to make it less of a hassle towards teachers and students.

4. **Use Case:** Accessing User Information

   Actor: Michelle (Employee)

   Description: Michelle is an Employee at a college. She is the head of the financial aid office and wants to determine if certain students are eligible for reduced tuition based on their location and address. In her previous system, it would be difficult to access that information, and she would have to go through several channels to get the information she needs. With the College Department Management System, she can easily access a student's account information, which stores their address, containing information such as country, state, and more to determine if some students are eligible for a reduced tuition.

5. **Use Case:** Student Adding New Lab Course

   Actor: Tom (Student)

   Description: Tom is a part time Student at SFSU. He works part time and doesn't have time to wait for slow and inefficient systems, such as the previous enrollment system he interacted with. Since Tom is a Senior, he only needs a Lab course to graduate. Because of the old inefficient system he used, he had a hard time finding the lab course he needed, as the incorrect results were shown to him even though he entered the information correctly. With the College Department Management System, the Lab courses are uniquely identified with their own ID, as well as being attributed to a course ID. That way, Tom can either decide to search the attributed course and filter the courses to show labs only, or to find a lab course based on its ID. This process has made Tom's life easier as he balances between his work and his school work.

DATABASE REQUIREMENTS

1. **College**

    a. A college shall have one or more Departments.

    b. A college shall have one or more Addresses.

    c. A college shall have zero or more Employees.

2. **Department**

    a. A department shall belong to only one College.

    b. A department shall have zero or more Faculty Members.

3. **Faculty Member**

    a. A faculty member shall work in one Department.

    b. A faculty member shall be a Researcher.

    c. A faculty member shall be a Teacher.

    d. A faculty member shall be an Employee.

    e. A faculty member shall have one or more addresses.

    f. A faculty member shall have an Account.

4. **Teacher**

    a. A teacher shall be a Faculty Member.

    b. A teacher shall teach one or more Courses.

    c. A teacher shall be a Professor.

    d. A teacher shall be a Lecturer.

5. **Course**

    a. A course shall be taught by zero or many Teachers.

    b. A course shall have zero or many enrolled Students.

c. A course shall be graded by zero or many Students.

6. **Lab**

   a. A lab shall be a type of Course.

7. **Student**

   a. A student shall be able to enroll in zero or more Courses.

   b. A student shall be able to grade zero or more Courses.

   c. A student shall have one Account.

   d. A student shall have one or more Addresses.

   e. A student shall make zero or more Payments.

8. **Account**

   a. An account shall be owned by a Faculty Member.

   b. An account shall be owned by a Student.

   c. An account shall be owned by an Employee.

9. **Researcher**

   a. A researcher shall publish one or more papers.

   b. A researcher is a Faculty Member.

10. **Professor**

   a. A professor is a Teacher.

11. **Lecturer**

   a. A lecturer is a Teacher.

12. **Paper**

   a. A paper shall be published by one or more Researchers.

13. **Payment**

    a. A payment shall be made by a Student.

    b. A payment shall be a Credit Card.

    c. A payment shall be a Bank Account.

14. Credit Card

    a. A credit card shall be one mode of Payment.

15. Bank Account

    a. A bank account shall be one mode of Payment.

16. Address

    a. Multiple addresses shall belong to multiple Colleges.

    b. Multiple addresses shall belong to multiple Employees.

    c. Multiple addresses shall belong to multiple Faculty Members.

    d. Multiple addresses shall belong to multiple Students.

DETAILED LIST OF MAIN ENTITIES, ATTRIBUTES AND KEYS

1. **College**

   - College_id: key, numeric

   - College_name: alphanumeric

2. **Department (Strong)**

   - Department_id: key, numeric

   - Department_name: alphanumeric

3. **Faculty Member (Strong)**

   - Faculty_id: key, numeric

   - Name: alphanumeric

   - Gender: alphanumeric

   - Age: alphanumeric

   - Ssn: numeric

   - Salary: composite, numeric

   - Department_id: weak key, numeric

4. **Teacher (Weak)**

   - Teacher_id: key, numeric

   - Faculty_id: weak key, numeric

5. **Course (Strong)**

   - Course_id: key, numeric

   - Code: alphanumeric

   - Title: alphanumeric

   - Description: alphanumeric

6. **Lab (Weak)**

   - Lab_id: key, numeric

   - Course_id: weak, numeric

   - Code: alphanumeric

   - Title: alphanumeric

   - Description: alphanumeric

7. **Student (Strong)**

   - Student_id: key, numeric

   - Name: alphanumeric

   - Age: numeric

   - Gender: alphanumeric

8. **Account**

   - Account_id: key, numeric

   - Email: multivalued, alphanumeric

   - Phone: multivalued, numeric

   - Password: alphanumeric

   - dob: numeric

9. **Researcher (Weak)**

   - Researcher_id: key, numeric

   - Faculty_id: weak key, numeric

10. **Professor (Weak)**

   - Professor_id: key, numeric

   - Teacher_id: weak key, numeric

11. Lecturer (Weak)

- Lecturer_id: key, numeric

- Teacher_id: weak key, numeric

12. Paper (Weak)

- Paper_id: key, numeric

- Title: alphanumeric

- Conference: alphanumeric

13. Payment (Strong)

- Payment_id: key, numeric

- Amount: composite, numeric

- Student_id: weak key, numeric

14. Credit Card (Weak)

- Credit_id: key, numeric

15. Bank Account (Weak)

- Bank_id: key, numeric

16. Address (Strong)

- Address_id: key, numeric

- Street: alphanumeric

- City: alphanumeric

- State: alphanumeric

- Country: alphanumeric

- Zipcode: numeric

17. Teaching_Course (Weak)

- Teach_course_id: key, numeric

- Teacher_id: weak key, numeric

- Course_id: weak key, numeric

18. Enrollment (Weak)

- Enrollment_id: key, numeric

- Student_id: weak key, numeric

- Course_id: weak key, numeric

- Semester: alphanumeric

- Section: numeric

19. Grader (Weak)

- Grader_id: key, numeric

- Student_id: weak key, numeric

- Course_id: weak key, numeric

- Semester: alphanumeric

- Section: numeric

20. Employee_Address (Weak)

- Employee_address_id: key, numeric

- Address_id: weak key, numeric

- Employee_id: weak key, numeric

21. Faculty_Address (Weak)

- Faculty_address_id: key, numeric

- Address_id: weak key, numeric
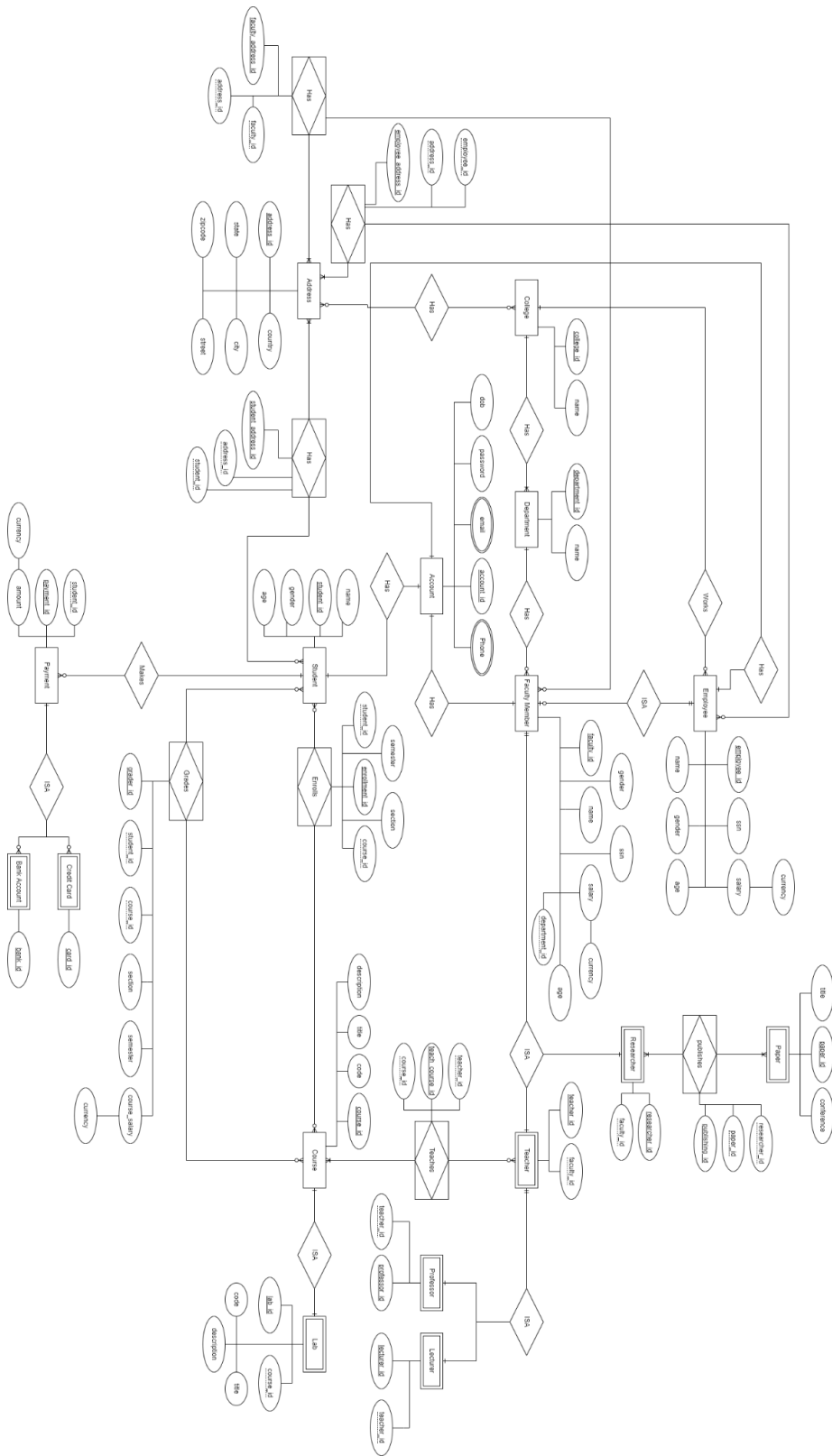
- Faculty_id: weak key, numeric

22. Student_Address (Weak)

- Student_address_id: key, numeric

- Address_id: weak key, numeric

- Student_id: weak key, numeric

23. Publishing (Weak)

- Publishing_id: key, numeric

- Paper_id: weak key, numeric

- Researcher_id: weak key, numeric

ENTITY RELATIONSHIP DIAGRAM

TESTING TABLE

Rule	Entity A	Relation	Entity B	Cardinality	Pass/Fail	Error Description
1	College	Has	Department	1-to-N	Pass	None
2	College	Has	Address	1-to-N	Fail	An address can have multiple colleges, as well as a college can have multiple addresses.
3	College	Has	Address	M-to-N	Pass	None
4	Department	Has	Faculty Member	1-to-N	Pass	None
5	Faculty Member	ISA	Employee	1-to-1	Pass	None
6	Faculty Member	ISA	Teacher	1-to-1	Pass	None
7	Faculty Member	ISA	Employee	1-to-1	Pass	None
8	Faculty Member	Has	Address	M-to-N	Pass	None
9	Faculty Member	Has	Account	1-to-1	Pass	None
10	Faculty Member	Works	Department	M-to-1	Pass	None
11	Teacher	ISA	Faculty Member	1-to-1	Pass	None
12	Teacher	Teaches	Course	1-to-N	Fail	A Teacher can teach one or many courses. A course can be taught by zero or many Teachers.
13	Teacher	Teaches	Course	M-to-N	Pass	None

14	Teacher	ISA	Professor	1-to-1	Pass	None
15	Teacher	ISA	Lecturer	1-to-1	Pass	None
16	Course	Taught	Teacher	M-to-N	Pass	None
17	Course	Enrolls	Student	M-to-N	Pass	None
18	Course	Graded	Student	M-to-N	Pass	None
19	Course	Has	Lab	1-to-N	Fail	A lab is a type of course. A lab should be a type of course, and as a weak entity.
20	Lab	ISA	Course	1-to-1	Pass	None
21	Student	Enrolls	Course	M-to-N	Pass	None
22	Student	Grades	Course	M-to-N	Pass	None
23	Student	Has	Account	1-to-1	Pass	None
24	Student	Has	Address	M-to-N	Pass	None
25	Student	Makes	Payment	1-to-N	Pass	None
26	Account	Has	Faculty Member	1-to-1	Pass	None
27	Account	Has	Student	1-to-1	Pass	None
28	Account	Has	Employee	1-to-1	Pass	None
29	Researcher	Publish	Paper	1-to-N	Fail	A paper can be published by one or more Researchers. A Researcher can publish one or more papers.
30	Researcher	Publish	Paper	M-to-N	Pass	None
31	Researcher	ISA	Faculty Member	1-to-1	Pass	None

32	Professor	ISA	Teacher	1-to-1	Pass	None
33	Lecturer	ISA	Teacher	1-to-1	Pass	None
34	Paper	Published	Researcher	M-to-N	Pass	None
35	Payment	Made	Student	M-to-1	Pass	None
36	Payment	ISA	Credit Card	1-to-N	Pass	None
37	Payment	ISA	Bank Account	1-to-N	Pass	None
38	Credit Card	ISA	Payment	M-to-1	Pass	None
39	Bank Account	ISA	Payment	M-to-1	Pass	None
40	Address	Has	College	M-to-N	Pass	None
41	Address	Has	Employee	M-to-N	Pass	None
42	Address	Has	Faculty Member	M-to-N	Pass	None
43	Address	Has	Student	M-to-N	Pass	None