

BAMM! Scholarship Program Database Management System

Sydney Nwakanma

SFSU ID: 921414907

Github Username: Sydney012

Milestone/Version	Date
M2V1	11/02/2021
M1V2	09/26/2021

Table of Contents

Section I: Project Description	2
Section II: Use Cases	3
Section III: Database Requirements (Business Rules)	5
Section IV: Detailed List of Main Entities, Attributes and Keys	9
Section V: Entity Relationship Diagram (ERD)	16
Section VI: Testing Table	17
Section VII: Database Model/EER	19
Section X: Testing	21

Section I: Project Description

The BAMM! Scholarship program is a new two-year cohort-based program designed to assist and prepare underrepresented masters students who wish to pursue a Ph.D in the mathematical sciences. The program funds students from Cal Poly Pomona, Fresno State University, and San Francisco State University. Funds are distributed yearly and participants receive up to \$10,000 per year. The program is led by faculty members in the department of mathematics from the three campuses. Also included in the program are affiliates. These students are not funded but they are invited to join the Friday weekly meetings and engage in other activities in the program.

As of today, BAMM! does not have a working database that keeps track of the program statistics and student affairs. For instance, it will be useful to match students to faculty members in mathematical sciences based on research interests. This will particularly help students who are interested in pursuing Ph.Ds. In addition, future scholars in the programs may want information on Ph.D programs former BAMM! students were likely to apply to, gain acceptance, or attend. Lastly, it is important to keep track of all current BAMM! students and alumni in order to assign mentors to scholars.

The goal for this database project is to design an effective data management system that allows easier access to information. The users of this database include faculty members that lead the program. I believe that as this program grows annually, this database will serve as a way to better guide scholars and better communicate the accomplishments of BAMM!.

Section II: Use Cases

Use Case: retrieving benchmark¹ information in previous years

Actor/s: student/affiliate/BAMM! Faculty

Description: Faculty member and BAMM! lead, Elizabeth May wants to know how many students at the SFSU campus who decided to complete an optional benchmark. The BAMM! Ilearn page does not help her effectively organize the data from all the students in the previous years. Elizabeth needs this information in order to determine which students need to complete certain benchmarks and which benchmarks were the most helpful to students.

Use Case: allocating funds based on student loans

Actor/s: student/affiliate/BAMM! Faculty

Description: In the future, BAMM! changes its terms and now allocates funds based on financial need. In order to determine how much to distribute to each student, the faculty lead has to assess how much financial aid students are receiving through loans. In this way, BAMM! can decide to budget money and even extend the program to more students.

Use Case: pairing alumni as mentors to current scholars

Actor/s: student/alumni/affiliate/BAMM! Faculty

Description: In one of the Friday weekly meetings, some students stated that they would like to have former scholars to mentor them through their Ph.D application process. The faculty lead now have to figure out how to pair alumni and students based on similar interests. These interests can be academic or extracurricular if need be.

¹ Benchmarks are assignments given to students in the program to complete

Use Case: accepting late scholars into the program

Actor/s: scholar/affiliate/BAMM! Faculty

Description: Francine applied to BAMM! For the 2020-2021 cohort. She got rejected. But a year later, she received an email from faculty lead, Ramon that there is space for one more scholar for the 2021-2022 cohort. Now, the BAMM! faculty have to decide which activities are best for someone in Francine's position as a first-year scholar yet second year masters student.

Use Case: tracking PhD programs scholars attended post-BAMM! and masters courses taken

Actor/s: student/affiliate/alumni/BAMM! Faculty

Description: On one of their weekly Friday meetings, the 2022-2023 cohort at Cal Poly Pomona asked to know what universities most scholars applied to, gained acceptance, and eventually attended. This is to help students with their applications and determine where students were more successful applying to. In addition, the students need to know the extra upper-division courses former scholars took that were necessary to ensuring success in their Ph.D programs

Use case: tracking attendance to conferences

Actor/s: student/affiliate/BAMM! faculty

Description: David wants to attend the Joint Math Conference in January. However, he has not attended the Field of Dream Conference first that took place in November the year before. The BAMM! faculty require that students attend the FoD Conference before the JMM conference. They need to confirm first that David has attended the FoD Conference before he can register for JMM.

Section III: Database Requirements (Business Rules)

1. Activity (Strong)
 - 1.1. An Activity shall have zero or many Students
 - 1.2. An Activity shall have zero or many Guest Speakers
 - 1.3. An Activity shall be overseen by zero or many Faculty
 - 1.4. An Activity is a Conference
2. Affiliate (Strong)
 - 2.1. An Affiliate is a Student
3. College (Strong)
 - 3.1. A College shall be attended by zero or many Students
 - 3.2. A College shall have zero or many Scholarship Amounts
 - 3.3. A College shall have zero or many Faculty
 - 3.4. A College shall have zero or many Extracurriculars
4. Conference (Strong)
 - 4.1. A Conference shall be attended by zero or many Students, Faculty
 - 4.2. A Conference is an Activity
5. Course (Strong)
 - 5.1. A Course shall have zero or many Students
 - 5.2. A Course shall be taught by zero or many Faculty
 - 5.3. A Course shall be taught by zero or many Teaching Assistants
 - 5.4. A Course shall have zero or many Majors
6. Extracurricular (Strong)
 - 6.1. An Extracurricular shall have to zero or many Students
 - 6.2. An Extracurricular shall have to zero or many Colleges

- 6.3. An Extracurricular is an Occupation
- 7. Faculty (Strong)
 - 7.1. A Faculty is a Guest Speaker
 - 7.2. A Faculty shall belong to zero or one Colleges
 - 7.3. A Faculty shall teach zero or many Subjects
 - 7.4. A Faculty shall advise zero or one Student Groups
 - 7.5. A Faculty shall attend zero or many Conferences
 - 7.6. A Faculty shall oversee zero or many Activities
 - 7.7. A Faculty shall teach zero or many Courses
- 8. Guest Speaker
 - 8.1. A Guest Speaker shall attend one or many Activity
 - 8.2. A Guest Speaker is a Faculty
- 9. Living Situation (Strong)
 - 9.1. A Living Situation shall belong to zero or many Students
- 10. Major (Strong)
 - 10.1. A Major shall have zero or many Students
 - 10.2. A Major shall have zero or many Courses
- 11. Mentor/Alumni
 - 11.1. A Mentor/Alumni is a Student
- 12. Occupation (Strong)
 - 12.1. An Occupation shall have zero or many Students
 - 12.2. An Occupation is an Extracurricular
- 13. Ph.D Program (Strong)
 - 13.1. A PhD Program shall have zero or many Students

14. Research Topic (Strong)

14.1. A Research Topic shall be taken by zero or many Students

15. Scholarship Amount (Strong)

15.1. A Scholarship Amount shall have to zero or many Students

15.2. A Scholarship Amount shall have to zero or many Colleges

16. Student (Strong)

16.1. A Student is a Mentor, Affiliate. Teaching Assistant

16.2. A Student shall belong to zero or one Colleges

16.3. A Student shall be overseen by zero or one Faculty

16.4. A Student shall belong to zero or one Student Group

16.5. A Student shall have zero or many Scholarship Amounts

16.6. A Student shall attend zero or many Conferences

16.7. A Student shall have zero or many Activities

16.8. A Student shall have zero or many Majors

16.9. A Student shall have zero or many Courses

16.10. A Student shall belong to zero or one Living Situations

16.11. A Student shall have zero or many Student Loans

16.12. A Student shall have zero or many Extracurriculars

16.13. A Student shall have zero or many Occupations

16.14. A Student shall have zero or one PhD Program

16.15. A Student shall take zero or many Research Topics

17. Student Group (Strong)

17.1. A Student Group shall have zero or many Students

17.2. A Student Group shall be advised by zero or many Faculty

18. Student Loan (Strong)

18.1. A Student Loan shall have zero or many Students

19. Subject (Strong)

19.1. A Subject shall be taught by zero or many Faculty

20. Teaching Assistant

20.1. A Teaching Assistant is a Student

20.2. A Teaching Assistant shall teach one or many Courses

Section IV: Detailed List of Main Entities, Attributes and Keys

1. Activity (Strong)

- 1.1. activity_id: pk, numeric
- 1.2. activity_name: alphanumeric
- 1.3. activity_type: alphanumeric
- 1.4. activity_date: date

2. Affiliate (Strong)

- 2.1. affiliate_id: primary key, numeric
- 2.2. student_id: foreign key, numeric
- 2.3. college: alphanumeric
- 2.4. name: alphanumeric, composite
 - 2.4.1. first
 - 2.4.2. middle
 - 2.4.3. last
- 2.5. email: alphanumeric
- 2.6. phone: alphanumeric, composite
 - 2.6.1. country code
 - 2.6.2. area code
 - 2.6.3. phone number

3. College (Strong)

- 3.1. college_id: key, numeric
- 3.2. name: alphanumeric
- 3.3. address: alphanumeric, multivalued, composite
 - 3.3.1. street

3.3.2. city

3.3.3. zip code

3.3.4. country

4. Conference (Strong)

4.1. conference_id: key, numeric

4.2. activity_id: fk, numeric

4.3. name: alphanumeric

4.4. conference_fund: numeric

4.5. num_of_students_attended: numeric

4.6. date: multivalue, date

4.6.1. year

4.6.2. month

4.6.3. day

5. Course (Strong)

5.1. course_id: key, numeric

5.2. course_description: alphanumeric

5.3. course_name: alphanumeric

5.3.1. prefix

5.3.2. number

5.4. is_math: boolean

5.5. is_mandatory: boolean

5.6. course_professor: alphanumeric

6. Extracurricular (Strong)

6.1. extracurricular_id: primary key, numeric

6.2. extracurricular_type: alphanumeric

7. Faculty (Strong)

7.1. faculty_id: primary key, numeric

7.2. guest_speaker_id: foreign key, numeric

7.3. college: alphanumeric

7.4. subject: alphanumeric

7.5. name: alphanumeric

7.5.1. first name

7.5.2. middle name

7.5.3. last name

7.6. is_bamm: boolean

7.7. email: alphanumeric

7.8. phone: alphanumeric, composite

7.8.1. country code

7.8.2. area code

7.8.3. phone number

8. Guest Speaker

8.1. guest_speaker_id: primary key, numeric

8.2. activity_id: foreign key, numeric

8.3. name: alphanumeric

8.3.1. first name

8.3.2. middle name

8.3.3. last name

8.4. email: alphanumeric

8.5. is_faculty: boolean

8.6. is_in_person: boolean

8.7. is_alumni: boolean

9. Living Situation (Strong)

9.1. living_situation_id: key, numeric

9.2. is_on_campus: boolean

10. Major (Strong)

10.1. major_id: key, numeric

10.2. major_name: alphanumeric

10.3. major_description: alphanumeric

10.4. department: alphanumeric

11. Mentor/Alumni

11.1. mentor_alumni_id: key, numeric

11.2. student_id: fk, numeric

11.3. college: alphanumeric

11.4. name: alphanumeric, composite

11.4.1. first

11.4.2. middle

11.4.3. last

11.5. email: alphanumeric

11.6. phone: alphanumeric, composite

11.6.1. country code

11.6.2. area code

11.6.3. phone number

12. Occupation (Strong)

- 12.1. occupation_id: key, numeric
- 12.2. extracurricular_id: fk, numeric
- 12.3. occupation_type: alphanumeric
- 12.4. is_full_time: boolean

13. PhD Program (Strong)

- 13.1. phd_program_id: key, numeric
- 13.2. phd_program_area: alphanumeric
- 13.3. is_phd_track: boolean
- 13.4. 1st choice: boolean
- 13.5. 2nd choice: boolean
- 13.6. 3rd choice: boolean
- 13.7. accepted to 1st: boolean
- 13.8. Accepted to 2nd: boolean
- 13.9. accepted to 3rd: boolean
- 13.10. Attended: alphanumeric
- 13.11. reason: alphanumeric

14. Research Topic (Strong)

- 14.1. research_topic_id: key, numeric
- 14.2. research_topic_area: alphanumeric
- 14.3. advisor: alphanumeric
- 14.4. student: alphanumeric

15. Scholarship Amount (Strong)

- 15.1. scholarship_amount_id: key, numeric

15.2. student: alphanumeric

15.3. is_first_year: boolean

15.4. is_completed: boolean

15.5. date: multivalue, date

15.5.1. year

16. Student (Strong)

16.1. student_id: key, numeric

16.2. livinSituation_id: fk, numeric

16.3. phd_id: fk, numeric

16.4. college_id: fk, numeric

16.5. college: alphanumeric

16.6. name: alphanumeric, composite

16.6.1. first

16.6.2. middle

16.6.3. last

16.7. email: alphanumeric

16.8. phone: alphanumeric, composite

16.8.1. country code

16.8.2. area code

16.8.3. phone number

16.9. address: alphanumeric, multivalue, composite

16.9.1. street

16.9.2. zipcode

16.9.3. state

16.9.4. country

16.10. is_mentor: boolean

16.11. is_affiliate: boolean

17. Student Loan (Strong)

17.1. student_loan_id: key, numeric

17.2. student_id: fk, numeric

17.3. student_loan_type: alphanumeric

17.4. student_loan_amount: numeric

18. Student Group (Strong)

18.1. student_group_id: key, numeric

18.2. campus: alphanumeric

18.3. faculty: alphanumeric

18.4. num_of_students: numeric

18.5. date: multivalue, date

18.5.1. year

19. Subject (Strong)

19.1. subject_id: key, numeric

19.2. professor: alphanumeric

19.3. subject_type: alphanumeric

20. Teaching Assistant

20.1. teaching_assistant_id: key, numeric

20.2. student_id: fk, numeric

20.3. is_first_year: boolean

20.4. subject_type: alphanumeric

20.5. name: alphanumeric, composite

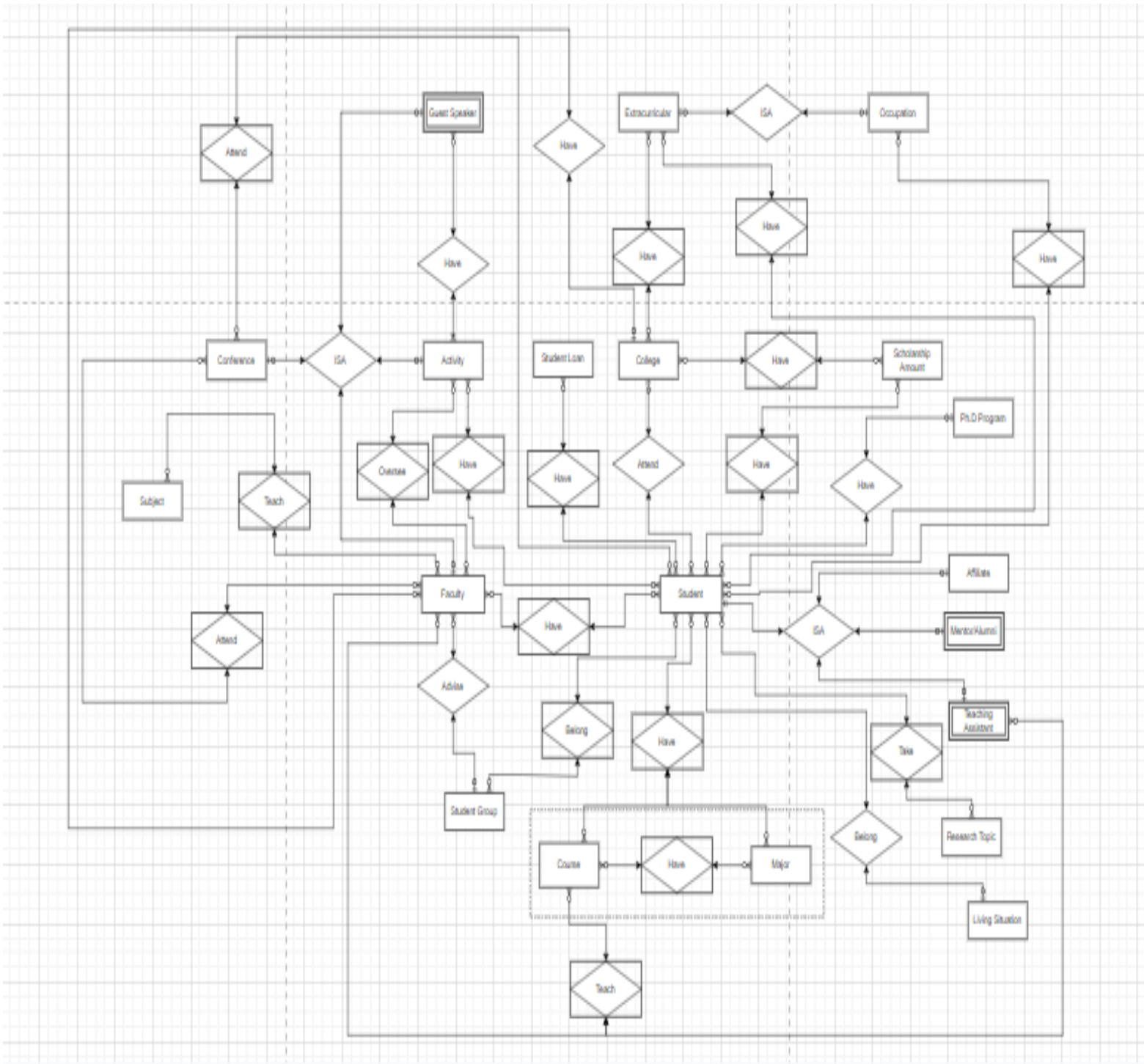
20.5.1. first

20.5.2. middle

20.5.3. last

20.6. email: alphanumeric

Section V: Entity Relationship Diagram (ERD)



Section VI: Testing Table

Rule	Entity A	Relation	Entity B	Cardinality	Pass/Fail	Error Description
1	Activity	Has	Guest Speaker	1-to-M	Fail	An Activity can have zero or many Guest Speakers.
2	Affiliate	ISA	Student	1-to-1	Pass	None
3	Activity	Have	Student	0-to-M	Pass	None
4	Mentor/Alumni	ISA	Student	0-to-M	Fail	A Mentor/Alumni has to be one and only one student.
5	College	Have	Scholarship Amount	0-to-M	Pass	None
6	Conference	Attend	Students	0-to-M	Pass	None
7	Course	Teach	Teaching Assistant	0-to-M	Pass	None
8	College	Have	Faculty	0-to-1	Fail	A College can have zero or many faculty
9	Faculty	Belong	College	0-to-1	Pass	None
10	Guest Speaker	Attend	Activity	1-to-M	Pass	None
11	Major	Have	Student	0-to-M	Pass	None
12	Mentor	ISA	Student	1-to-1	Pass	None
13	Faculty	Advise	Student Group	0-to-M	Fail	A Faculty can advise zero or one student group and not zero or many
14	Occupation	Have	Student	0-to-M	Pass	None
15	Ph.D Program	Have	Student	0-to-M	Pass	None
16	Research Topic	Take	Student	1-to-1	Fail	A Research Topic can be taken by

						zero or many Students
17	Student	Attend	Conference	1-to-M	Fail	A Student can attend zero or many Conferences
18	Student	Have	Student Loans	0-to-M	Pass	None
19	Student Group	Have	Student	0-to-M	Pass	None
20	Teaching Assistant	Teach	Course	1-to-M	Pass	None

Section VII: Database Model/EER

Table	FK	ON DELETE	ON UPDATE	Comment
Activity	NA			
Affiliate	Student	ON CASCADE	ON CASCADE	If a student is deleted, then student name in the affiliate table shall be deleted as well
College	NA			
Conference	Activity	ON CASCADE	ON CASCADE	If activity is deleted, then activity in conference table will also be deleted.
Course	NA			
Extracurricular	Occupation	ON CASCADE	ON CASCADE	If occupation is deleted, then occupation in the extracurricular table will be deleted.
Faculty	Guest Speaker	NO ACTION	ON CASCADE	If guest speaker is deleted, its data will still remain in the faculty table.
Guest Speaker	Activity	ON CASCADE	ON CASCADE	If activity is deleted, then activity will also be deleted in the guest speaker table.
Living Situation	NA			
Major	NA			
Mentor/Alumni	Student	ON CASCADE	ON CASCADE	If student is deleted, then the student will be deleted in mentor/alumni table.
Occupation	Extracurricular	ON CASCADE	ON CASCADE	If an extracurricular is deleted, then

				extracurricular will also be delete in the occupation table
PhD Program	NA			
Research Topic	NA			
Scholarship Amount	NA			
Student	Living Situation PhD Program College	ON CASCADE	ON CASCADE	If PhD. living, situation and college are deleted, then they will also be deleted in student
Student Loan	Student	ON CASCADE	ON CASCADE	If a student is deleted, then it will also be deleted in student loans.
Student Group	NA			
Subject	Faculty	NO ACTION	ON CASCADE	If faculty is deleted, then it will remain in subject,
Teaching Assistant	Student	ON CASCADE	ON CASCADE	If student is deleted, then it will be deleted in teaching assistant

Section X: Testing

Entity	SQLQuery	Pass/Fail	Error Description	Possible Solution
Activity	Delete	Pass	None	None
Activity	Update	Pass	None	None
College	Delete	Fail	Cannot Delete or Update a parent row: Teaching Assistant	Change college.id foreign key in Teaching Assistant table from On Delete No Action to On Delete Cascade
College	Update	Pass	None	None
Scholarship Amount	Delete	Pass	None	None
Scholarship Amount	Update	Pass	None	None
Course	Delete	Pass	None	None
Course	Update	Pass	None	None
Major	Delete	Pass	None	None
Major	Update	Pass	None	None
Living Situation	Delete	Fail	Cannot delete or update a parent row	Change student.id foreign key table to On Delete Cascade
Living Situation	Update	Pass	None	None
PhD Program	Delete	Pass	None	None
PhD Program	Update	Pass	None	None
Research Topic	Delete	Pass	None	None
Research Topic	Update	Pass	None	None
Student Group	Delete	Pass	None	None
Student Group	Update	Pass	None	None

Extracurricular	Delete	Pass	None	None
Extracurricular	Update	Pass	None	None
Conference	Delete	Pass	None	None
Conference	Update	Pass	None	None
Student	Delete	Pass	None	None
Student	Update	Pass	None	None
Student Loan	Delete	Pass	None	None
Student Loan	Update	Pass	None	None
Mentor/Alumni	Delete	Pass	None	None
Mentor/Alumni	Update	Fail	Unknown column 'extracurricular_type' in 'where clause'	Change extracurricular_type to mentor_name
Teaching Assistant	Delete	Pass	None	None
Teaching Assistant	Update	Pass	None	None
Affiliate	Delete	Pass	None	None
Affiliate	Update	Pass	None	None
Occupation	Delete	Pass	None	None
Occupation	Update	Pass	None	None
CollegeExtracurricular	Delete	Pass	None	None
CollegeExtracurricular	Update	Pass	None	None
CollegeScholarshipAmount	Delete	Pass	None	None
CollegeScholarshipAmount	Update	Pass	None	None
CourseMajor	Delete	Pass	None	None
CourseMajor	Update	Pass	None	None
Guest Speaker	Delete	Pass	None	None

Guest Speaker	Update	Pass	None	None
Faculty	Delete	Pass	None	None
Faculty	Update	Pass	None	None
FacultyConference	Delete	Pass	None	None
FacultyConference	Update	Pass	None	None
FacultyCourse	Delete	Pass	None	None
FacultyCourse	Update	Pass	None	None
FacultyStudent	Delete	Pass	None	None
FacultyStudent	Update	Pass	None	None
Subject	Delete	Pass	None	None
Subject	Update	Pass	None	None
FacultySubject	Delete	Pass	None	None
FacultySubject	Update	Pass	None	None
StudentConference	Delete	Pass	None	None
StudentConference	Update	Pass	None	None
StudentCourse	Delete	Pass	None	None
StudentCourse	Update	Pass	None	None
StudentExtracurricular	Delete	Pass	None	None
StudentExtracurricular	Update	Pass	None	None
StudentGroupStudent	Delete	Pass	None	None
StudentGroupStudent	Update	Pass	None	None
StudentMajor	Delete	Pass	None	None
StudentMajor	Update	Pass	None	None
StudentOccupation	Delete	Pass	None	None
StudentOccupation	Update	Pass	None	None
StudentResearch	Delete	Pass	None	None

StudentResearch	Update	Pass	None	None
StudentScholarshipAmount	Delete	Pass	None	None
StudentScholarshipAmount	Update	Pass	None	None
TACourse	Delete	Pass	None	None
TACourse	Update	Pass	None	None