

CSC675 Database system

College Department Database Management System

Milestone 2

M2V1

November 9, 2022

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M1V1	October 5, 2022	Completed first version
M1V2	November 9, 2022	Completed second version
M2 V1	November 9, 2022	Completed Milestone 2

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1 Milestone 1

1.1 Project Description

The University has problems with students who contact professors to ask about prerequisite and about qualifications. The Database will allow students to show either their prerequisite or qualifications. The Database management system will be the gateway between students/professors/courses and extra curricular activities.

It will help students to provide an easier tool to prove qualifications for prerequisites and it will also help them facilitate communication between students/professors and administration. The database would provide students more visibility about extra curricular activities and employment which is under developed. Currently Universities do not provide a single unified location for these.

1.2 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 hoping that he will be enrolled, but the professor who saw his courses, also didn't understand what he knows or not because the names of 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 the 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: Gianluca, 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.

1.3 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

1.4 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: multivalued, 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, multivalued
 - 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, multivalued
 - 6.4. GPA: numeric
 - 6.5. major: composite, alphanumeric
 - 6.6. minor: composite, alphanumeric
 - 6.7. degree: alphanumeric

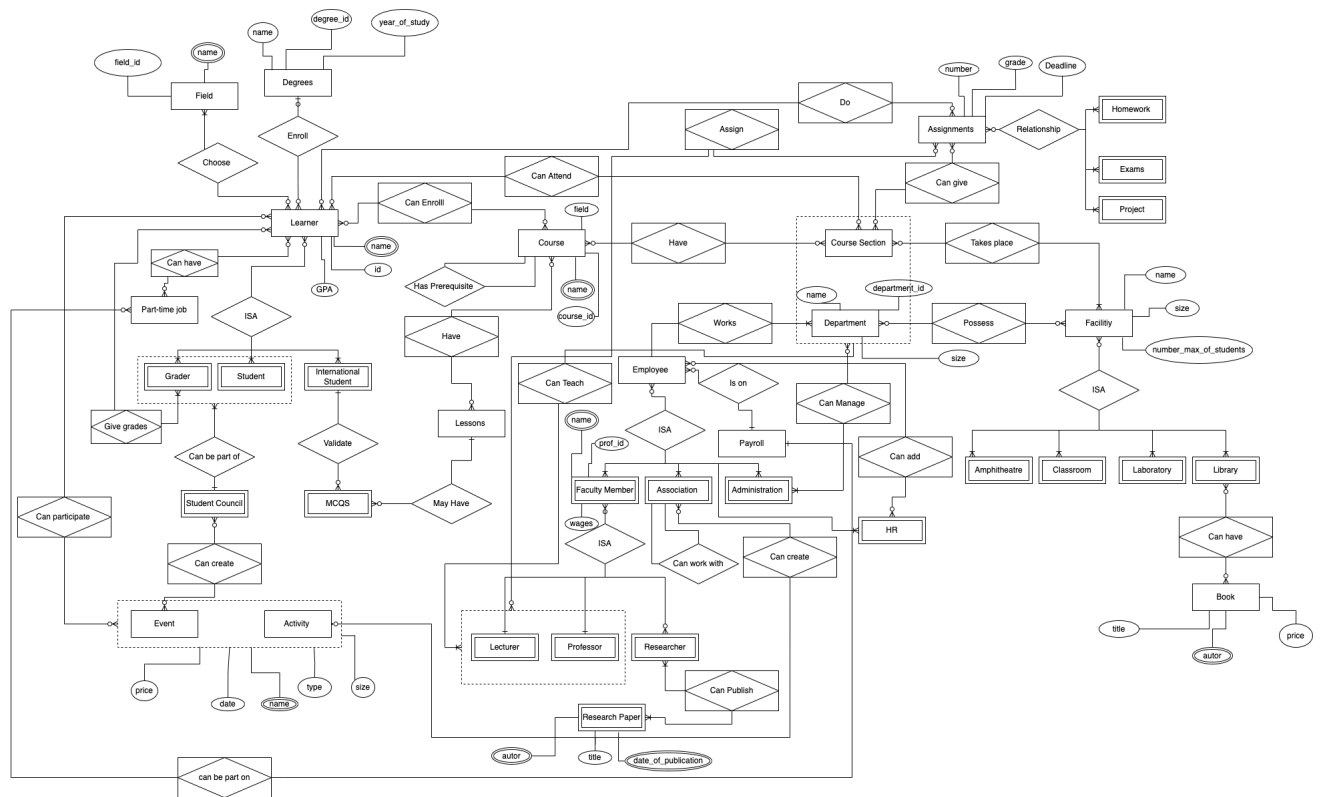
- 7. Grader (Weak)
 - 7.1. name: composite, alphanumeric
 - 7.2. id: key, numeric
 - 7.3. grade: numeric, multivalue
 - 7.4. GPA: numeric
 - 7.5. major: composite, alphanumeric
 - 7.6. minor: composite, alphanumeric
 - 7.7. degree: alphanumeric
 - 7.8. course_to_grade: composite, alphanumeric
- 8. International 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: multivalued, alphanumeric
 - 33.2. wages_of_employees: numeric, multivalued
- 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

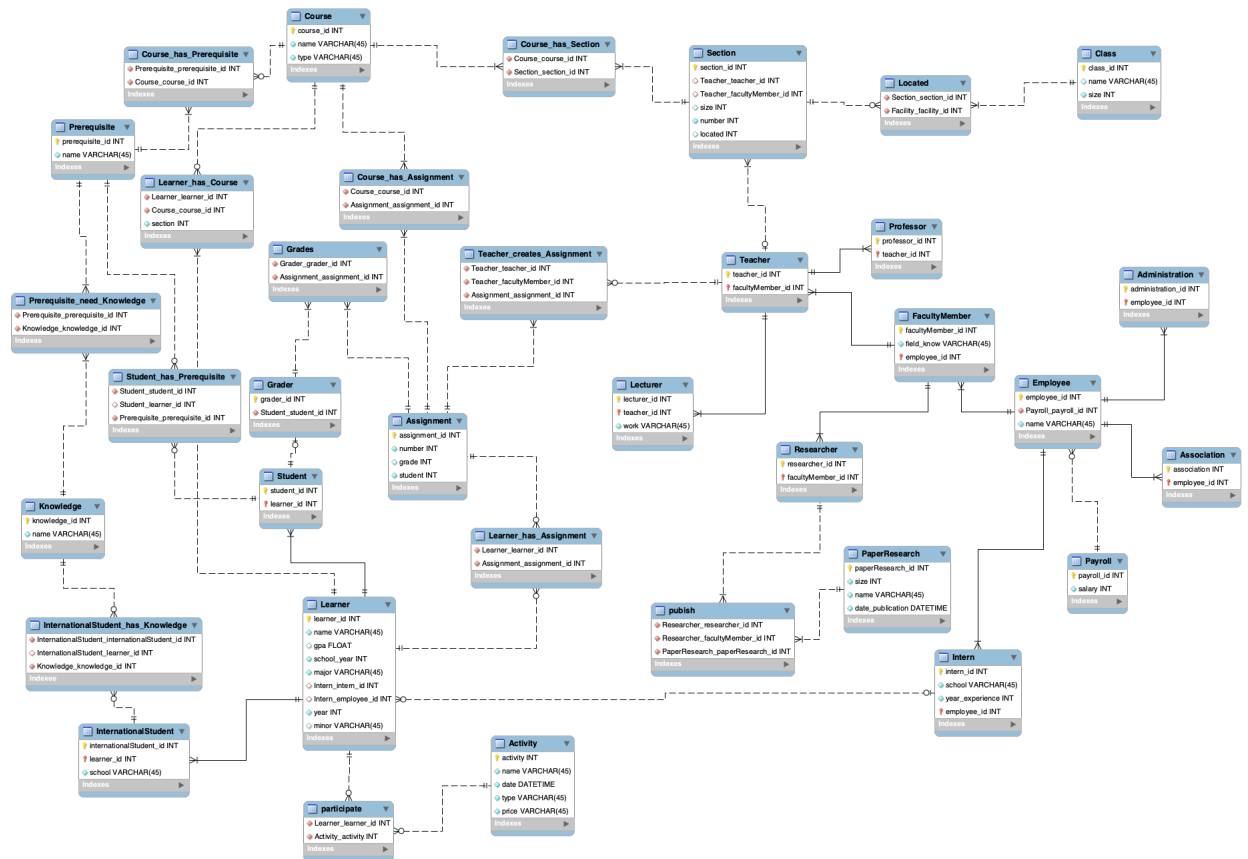
2 Entity Relationship Diagram (ERD)



3 Milestone 2

3.1 Checkpoint 1: Database Model

3.1.1 Database Model/EER



3.1.2 Forward Engineering

3.1.3 Inserting Data

3.2 Checkpoint 2: Database Testing

3.2.1 Business Requirements

Queries in file [tests.sql](#):

1. Find all Students with their courses, its section and their professors
2. Find the number of students that each professor has
3. Find the average grade for each course that has each student

4. Find the overall average grade for each student
5. Show Students with all their assignment in all classes, if they didn't had an assignment in a class, it shows 'null' and show also the professor
6. Find the average grade for each section
7. Find the average grade for each Professor's students
8. Show the Lecturer and the professor who gives the best grades (average)
9. Find the average grades for each major
10. Find the best student for each courses
11. Find how many activities do each students
12. Which activity did every students and how many times he did the same activity
13. Who graded each Assignment, which grade ? And who has been graded and for which course ?
14. Who graded the most Assignment
15. Find all courses with all their Prerequisites
16. Find all Knowledge that the student need to know to validate Prerequisite
17. How many Knowledge a student need to have to validate a Prerequisite
18. Show all International Students with all their knowledge
19. Show all International Students and all courses that they can take because they have the knowledge
20. Show How many students they are in each section and what is the max capacity of a section
21. Find all Researcher see all their publications
22. Count how many publication did each Researcher
23. Who published the most paper research ?
24. Which student have an Intern ? And in which position ?

Function, Procedure and Triggers in file [inserts.sql](#):

1. Create a procedure where we can Put the International Students id and we'll get courses that he/she can take
2. Create a function to see if they are still place for a student to be in one specific course/section, if the result is 1, it means TRUE, 0 means FALSE
3. Create a Trigger that can insert data inside Learner_has_Assignment after inserting on Assignment
4. Create a Trigger that can insert data inside Prerequisite after inserting on Course
5. Create a Trigger that can update the students gpa each time the grade of his assignment is upgraded
6. Create a Trigger that see the size of a class, this will define the size of the section, so if the class changes, the size of the section also will change

3.2.2 Validating Business Requirements

Queries in file [tests.sql](#):

1. Find all Students with their courses, its section and their professors

Student	Course	Section	Professor
Robert Harakaly	Modern Physics	4	Charli Sasaki
Robert Harakaly	Discrete Math	4	Jose Ortiz
Robert Harakaly	Data Analysis	0	Norman Lee
Robert Harakaly	Database	1	Jose Ortiz
Hugo Suzanne	Mobile Application	3	Nina
Hugo Suzanne	Database	20	Nina
Hugo Suzanne	DevOps	5	Louis
Hugo Suzanne	Marketing Analytics	1	Valerie Randu
Radka Popovicova	Marketing Analytics	1	Valerie Randu
Radka Popovicova	Finance	0	Alice
Radka Popovicova	Sales Training	0	John
Radka Popovicova	Accounting	0	Alice
Alex San	Database	1	Jose Ortiz
Alex San	DevOps	5	Louis
Alex San	Web Application	8	Louis
Alex San	Software Engineering	2	Jose Ortiz
Clement Berard	DevOps	5	Louis
Clement Berard	Mobile Application	6	Lola
Clement Berard	Digital Marketing	7	Lola
Clement Berard	Software Engineering	2	Jose Ortiz
Luca Suter	Mechanics	5	Baumberger
Luca Suter	Electrodynamics	6	Lacobucci
Luca Suter	Analysis	7	Valerie Randu
Luca Suter	Algebra	2	Valerie Randu

2. Find the number of students that each professors have

Professor	Student
Jose Ortiz	3
Valerie Randu	3
Louis	3
Charli Sasaki	1
Norman Lee	1
Lola	1
Baumberger	1
Nina	1
John	1
Lacobucci	1
Alice	1

3. Find the average grade for each course that have each students

Student	Course	Grade
Alex San	Database	80.0000
Alex San	Software Engineering	85.0000
Clement Berard	DevOps	69.0000
Clement Berard	Software Engineering	70.0000
Luca Suter	Analysis	73.0000
Luca Suter	Electrodynamics	82.5000
Luca Suter	Mechanics	87.0000
Radka Popovicova	Accounting	98.0000
Radka Popovicova	Finance	96.5000
Radka Popovicova	Marketing Analytics	90.0000
Radka Popovicova	Sales Training	95.0000
Robert Harakaly	Data Analysis	100.0000
Robert Harakaly	Database	96.0000
Robert Harakaly	Discrete Math	92.5000
Robert Harakaly	Modern Physics	94.4000

4. Find the overall average grade for each student

Student	Grade
Alex San	82.5000
Clement Berard	69.5000
Luca Suter	81.2500
Radka Popovicova	94.3333
Robert Harakaly	94.0769

5. Show Students with all their assignment in all classes, if they didn't had an assignment in a class, it shows 'null' and show also the professor

Student	Course	id	Section	Grade	Assignment	Professor
Luca Suter	Mechanics	1	5	87	1	Baumberger
Luca Suter	Electrodynamics	3	6	80	1	Lacobucci
Luca Suter	Electrodynamics	3	6	85	2	Lacobucci
Luca Suter	Analysis	4	7	73	1	Valerie Randu
Luca Suter	Algebra	5	2			Valerie Randu
Robert Harakaly	Discrete Math	7	4	94	1	Jose Ortiz
Robert Harakaly	Discrete Math	7	4	100	2	Jose Ortiz
Robert Harakaly	Discrete Math	7	4	91	3	Jose Ortiz
Robert Harakaly	Discrete Math	7	4	90	4	Jose Ortiz
Robert Harakaly	Discrete Math	7	4	80	5	Jose Ortiz
Robert Harakaly	Discrete Math	7	4	100	6	Jose Ortiz
Robert Harakaly	Data Analysis	8	0	100	1	Norman Lee
Hugo Suzanne	Mobile Application	10	3			Nina
Clement Berard	Mobile Application	10	6			Lola
Alex San	Web Application	12	8			Louis
Hugo Suzanne	DevOps	13	5			Louis
Alex San	DevOps	13	5			Louis
Clement Berard	DevOps	13	5	69	1	Louis
Robert Harakaly	Database	14	1	96	1	Jose Ortiz
Hugo Suzanne	Database	14	20			Nina
Alex San	Database	14	1	80	1	Jose Ortiz
Hugo Suzanne	Marketing Analytics	17	1			Valerie Randu
Radka Popovicova	Marketing Analytics	17	1	91	1	Valerie Randu
Radka Popovicova	Marketing Analytics	17	1	89	2	Valerie Randu
Radka Popovicova	Finance	18	0	98	1	Alice
Radka Popovicova	Finance	18	0	95	1	Alice
Radka Popovicova	Accounting	19	0	98	1	Alice
Radka Popovicova	Sales Training	20	0	95	1	John
Clement Berard	Digital Marketing	21	7			Lola
Robert Harakaly	Modern Physics	26	4	100	5	Charli Sasaki
Robert Harakaly	Modern Physics	26	4	95	1	Charli Sasaki
Robert Harakaly	Modern Physics	26	4	97	2	Charli Sasaki
Robert Harakaly	Modern Physics	26	4	93	3	Charli Sasaki
Robert Harakaly	Modern Physics	26	4	87	4	Charli Sasaki
Alex San	Software Engineering	27	2	85	1	Jose Ortiz
Clement Berard	Software Engineering	27	2	70	1	Jose Ortiz

6. Find the average grade for each section

Course	Grade	Professor
Accounting	98.0000	Alice
Analysis	73.0000	Valerie Randu
Data Analysis	100.0000	Norman Lee
Database	88.0000	Jose Ortiz
DevOps	69.0000	Louis
Discrete Math	92.5000	Jose Ortiz
Electrodynamics	82.5000	Lacobucci
Finance	96.5000	Alice
Marketing Analytics	90.0000	Valerie Randu
Mechanics	87.0000	Baumberger
Modern Physics	94.4000	Charli Sasaki
Sales Training	95.0000	John
Software Engineering	77.5000	Jose Ortiz

7. Find the average grade for each Professor's students

Grade	Professor
-----	-----
100.0000	Norman Lee
97.0000	Alice
95.0000	John
94.4000	Charli Sasaki
88.6000	Jose Ortiz
87.0000	Baumberger
84.3333	Valerie Randu
82.5000	Lacobucci
69.0000	Louis

8. Show the Lecturer and the professor who gives the best grades (average)

Professor	Grade	Type
-----	-----	-----
Norman Lee	100.0000	Lecturer
Alice	97.0000	Professor

9. Find the average grades for each major

Grade	Major
-----	-----
94.3333	Business
89.8235	Computer Science
81.2500	Physics

10. Find the best student for each courses

Student	Course	Grade
-----	-----	-----
Alex San	Software Engineering	85.0000
Clement Berard	DevOps	69.0000
Luca Suter	Analysis	73.0000
Luca Suter	Electrodynamics	82.5000
Luca Suter	Mechanics	87.0000
Radka Popovicova	Accounting	98.0000
Radka Popovicova	Finance	96.5000
Radka Popovicova	Marketing Analytics	90.0000
Radka Popovicova	Sales Training	95.0000
Robert Harakaly	Data Analysis	100.0000
Robert Harakaly	Database	96.0000
Robert Harakaly	Discrete Math	92.5000
Robert Harakaly	Modern Physics	94.4000

11. Find how many activities do each students

Student	# of activities
Alex San	0
Alexis Jeronimo	0
Ali Baba	0
Arjun Kumar	0
Clement Berard	0
Daniel Harakaly	0
Gianluca Zanin	0
Hugo Suzanne	0
Luca Suter	0
Mika idk	0
Noam Toumi	0
Radka Popovicova	1
Robert Harakaly	3
Thibault Randu	0
Zuzka Hadvabova	0

12. Which activity did every students and how many times he did the same activity

Student	Activity	How many time
Alex San		0
Alexis Jeronimo		0
Ali Baba		0
Arjun Kumar		0
Clement Berard		0
Daniel Harakaly		0
Gianluca Zanin		0
Hugo Suzanne		0
Luca Suter		0
Mika idk		0
Noam Toumi		0
Radka Popovicova	Gator Fest	1
Robert Harakaly	Gator Fest	1
Robert Harakaly	Soccer	2
Thibault Randu		0
Zuzka Hadvabova		0

13. Who graded each Assignment, which grade ? And who has been graded and for which course ?

Grader	Assignment	Grade Given	Course	Student Graded
Luca Suter	22	87	Mechanics	Luca Suter
Arjun Kumar	20	80	Electrodynamics	Luca Suter
Arjun Kumar	21	85	Electrodynamics	Luca Suter
Arjun Kumar	23	73	Analysis	Luca Suter
Arjun Kumar	7	94	Discrete Math	Robert Harakaly
Luca Suter	8	100	Discrete Math	Robert Harakaly
Luca Suter	9	91	Discrete Math	Robert Harakaly
Luca Suter	10	90	Discrete Math	Robert Harakaly
Luca Suter	11	80	Discrete Math	Robert Harakaly
Zuzka Hadvabova	12	100	Discrete Math	Robert Harakaly
Zuzka Hadvabova	13	100	Data Analysis	Robert Harakaly
Arjun Kumar	27	69	DevOps	Clement Berard
Arjun Kumar	6	96	Database	Robert Harakaly
Arjun Kumar	24	80	Database	Alex San
Zuzka Hadvabova	16	91	Marketing Analytics	Radka Popovicova
Alex San	17	89	Marketing Analytics	Radka Popovicova
Zuzka Hadvabova	14	98	Finance	Radka Popovicova
Zuzka Hadvabova	15	95	Finance	Radka Popovicova
Arjun Kumar	19	98	Accounting	Radka Popovicova
Alex San	18	95	Sales Training	Radka Popovicova
Arjun Kumar	1	95	Modern Physics	Robert Harakaly
Arjun Kumar	2	97	Modern Physics	Robert Harakaly
Arjun Kumar	3	93	Modern Physics	Robert Harakaly
Arjun Kumar	4	87	Modern Physics	Robert Harakaly
Arjun Kumar	5	100	Modern Physics	Robert Harakaly
Zuzka Hadvabova	25	85	Software Engineering	Alex San
Arjun Kumar	26	70	Software Engineering	Clement Berard

14. Who graded the most Assignment

Grader	Quantity	Average of grades
Arjun Kumar	14	86.9286

15. Find all courses with all their Prerequisites

Course	Prerequisite
Quantum Mechanics	Mechanics
Modern Physics	Mechanics
Thermodynamics	Electrodynamics
Geometry	Analysis
Geometry	Algebra
Machine Learinig	Algebra
Complex Algebra	Algebra
Marketing Analytics	Algebra
Modern Physics	Algebra
Machine Learinig	Data Analysis
Software Engineering	Mobile Application
Software Engineering	Web Application
Earthquake Engineering	Mechanical and Vibration Structure
Quantum Mechanics	Modern Physics
Mechanics	
Electrodynamics	
Analysis	
Algebra	
Discrete Math	
Data Analysis	
Mobile Application	
Advanced Concrete Structure	
Web Application	
DevOps	
Database	
Finance	
Accounting	
Sales Training	
Digital Marketing	
Hydrodynamics	
Energy Dissipation	
Mechanical and Vibration Structure	

16. Find all Knowledge that the student need to know to validate Prerequisite

Prerequisite	The International Student need to know
Machine Learinig	Mathematics
Machine Learinig	Algebra
Machine Learinig	Set Theory
Machine Learinig	Python
Machine Learinig	R
Machine Learinig	Basic Programming
Mobile Application	Basic Programming
Advanced Concrete Structure	Basic Engineering
Web Application	Basic Programming
DevOps	Basic Programming
Database	Basic Programming
Complex Algebra	Mathematics
Complex Algebra	Advanced Mathematics
Quantum Mechanics	Mathematics
Quantum Mechanics	Advancced Physics
Quantum Mechanics	Duality Particle/Wave
Marketing Analytics	Mathematics
Marketing Analytics	Finance
Accounting	Finance
Sales Training	Finance
Digital Marketing	Finance
Digital Marketing	Python
Hydrodynamics	Vibration
Energy Dissipation	Basic Engineering
Energy Dissipation	Basic Engineering
Mechanical and Vibration Structure	Basic Engineering
Software Engineering	Basic Programming
Software Engineering	Java

17. How many Knowledge a student need to have to validate a Prerequisite

Prerequisite	# Courses to know
Accounting	1
Advanced Concrete Structure	1
Complex Algebra	2
Database	1
DevOps	1
Digital Marketing	2
Energy Dissipation	2
Hydrodynamics	1
Machine Learinig	6
Marketing Analytics	2
Mechanical and Vibration Structure	1
Mobile Application	1
Quantum Mechanics	3
Sales Training	1
Software Engineering	2
Web Application	1

18. Show all International Students with all their knowledge

Student	name
Robert Harakaly	Mathematics
Radka Popovicova	Mathematics
Robert Harakaly	Duality Particle/Wave
Robert Harakaly	Algebra
Radka Popovicova	Algebra
Robert Harakaly	Set Theory
Robert Harakaly	Python
Hugo Suzanne	Python
Robert Harakaly	R
Radka Popovicova	Finance
Robert Harakaly	Basic Programming
Hugo Suzanne	Basic Programming
Clement Berard	Basic Programming
Hugo Suzanne	Java
Clement Berard	Java

19. Show all International Students and all courses that they can take because they have the knowledge

International Students	Courses that the student can take
Clement Berard	Database
Clement Berard	DevOps
Clement Berard	Mobile Application
Clement Berard	Web Application
Clement Berard	Software Engineering
Hugo Suzanne	Database
Hugo Suzanne	DevOps
Hugo Suzanne	Mobile Application
Hugo Suzanne	Web Application
Hugo Suzanne	Software Engineering
Radka Popovicova	Accounting
Radka Popovicova	Sales Training
Radka Popovicova	Marketing Analytics
Robert Harakaly	Database
Robert Harakaly	DevOps
Robert Harakaly	Mobile Application
Robert Harakaly	Web Application
Robert Harakaly	Machine Learning

20. Show How many students they are in each section and what is the max capacity of a section

Course	Section #	# MAX Capacity	# Students
Accounting	0	22	1
Algebra	2	4	1
Analysis	7	4	1
Data Analysis	0	5	1
Database	1	20	2
Database	20	40	1
DevOps	5	4	3
Digital Marketing	7	4	1
Discrete Math	4	4	1
Electrodynamics	6	40	1
Finance	0	22	1
Marketing Analytics	1	4	2
Mechanics	5	40	1
Mobile Application	6	4	1
Mobile Application	3	5	1
Modern Physics	4	5	1
Sales Training	0	22	1
Software Engineering	2	5	2
Web Application	8	22	1

21. Find all Researcher see all their publications

Researcher	Publication
Albert	New way to program Python
Albert	Machine Learning
Albert	Using Python for SQL
Charles	Medicine
Jack	Black hole
Jack	Gravitation

22. Count how many publication did each Researcher

Researcher	# Publication
Albert	3
Charles	1
Jack	2

23. Who published the most paper research ?

Researcher	# Publication
Albert	3

24. Which student have an Intern ? And in which position ?

Student	Position name
-----	-----
Zuzka Hadvabova	Nurse
Ali Baba	Shop
Arjun Kumar	Teacher Assistant

Function, Procedure and Triggers in file [inserts.sql](#):

1. Create a procedure where we can Put the International Students id and we'll get courses that he/she can take

International Students	Courses that the student can take
-----	-----
Hugo Suzanne	Database
Hugo Suzanne	DevOps
Hugo Suzanne	Mobile Application
Hugo Suzanne	Web Application
Hugo Suzanne	Software Engineering

2. Create a function to see if they are still place for a student to be in one specific course/section, if the result is 1, it means TRUE, 0 means FALSE

In this example, I created a query that call the function, we want to know iff the international student number 1 can take the course number 1 section number 5. The third column show us if this student can take this course.

Student	Course	Section	Boolean if he can take the course
-----	-----	-----	-----
Robert Harakaly	DevOps	5	1

3. Create a Trigger that can insert data inside Learner_has_Assignment after inserting on Assignment
4. Create a Trigger that can insert data inside Prerequisite after inserting on Course
5. Create a Trigger that can update the students gpa each time the grade of his assignment is upgraded
6. Create a Trigger that see the size of a class, this will define the size of the section, so if the class changes, the size of the section also will change