Business Requirement documentation

1.ERD

Purpose of ERD:

An Entity-Relationship Diagram (ERD) visually represents the structure of a database by showing the relationships between entities, attributes, and their connections. Its main purpose is to:

1. **Design a database** by defining its components and relationships.
2. **Communicate database structure** clearly to stakeholders.
3. **Analyze data requirements** for accurate database modeling.
4. **Simplify database documentation** for future maintenance or updates.

It’s a critical tool in database development to ensure alignment and efficiency.

This University’s ERD consists of 8 Entities

1.”Student” has

- “Name” as Composite attribute consists of “f_name” and “l_name”
- “Phone_Number” as **multi valued** attribute
- “National_id” as **primary key** attribute
- “Academic_id” as a **primary key** attribute
- “Email”

Notice that : There’s a “many to many “ relationship named **“Enroll to”** between **Student** and **Course .**

There’s a “one_to_many” relationship named “**Enroll**” between “**Student**” and “**Department**” .

There’s another “one_to_many” relationship named “**Paid**” between “**Student**” and “**Tuition Fees**”.

2.”Department” has

- “dp_name”
- “dp_id” as its **primary key**
- “email”

Notice That : There’s a “one_to_one” relationship named “**Manges**” between “**Department**” and “**Lecturer”**.

3.”Tuition Fees” is a weak Entity and has

- “fees”
- “invoice_id” as **primary** key
- “payment_method”

4.”Course” has

- “c_name”
- “c_id” as **primary key**
- “crh” credit hours
- “Is_prerequisite” : **recursive** Entity have “Yes/No” attribute .

Notice that : There’s a “Many_to_many” relationship named “**Teach**” between “**Lecturer**” and “**Course**”.

There’s a “Many_to_many” relationship named “**Take place in**” between “**Classroom**” and “**Course**”.

5.”Lecturer” has

- “Name” as **composite** attribute has “f_name” and “l_name”
- “academic_id” as **primary key**
- “national_id” as **primary key**
- “Salary”

Notice that : There’s a “One_to_many” relationship named “**Monitor**” between “**Lecturer**” and “**Section**”.

6.”Classroom” has

- “r_number” as primary key
- “Lecture”
- “dd/mm/yy_Time”
- “Capacity”
- “Building”

7.”Section” is a weak Entity and has

- “Date”
- “Room”

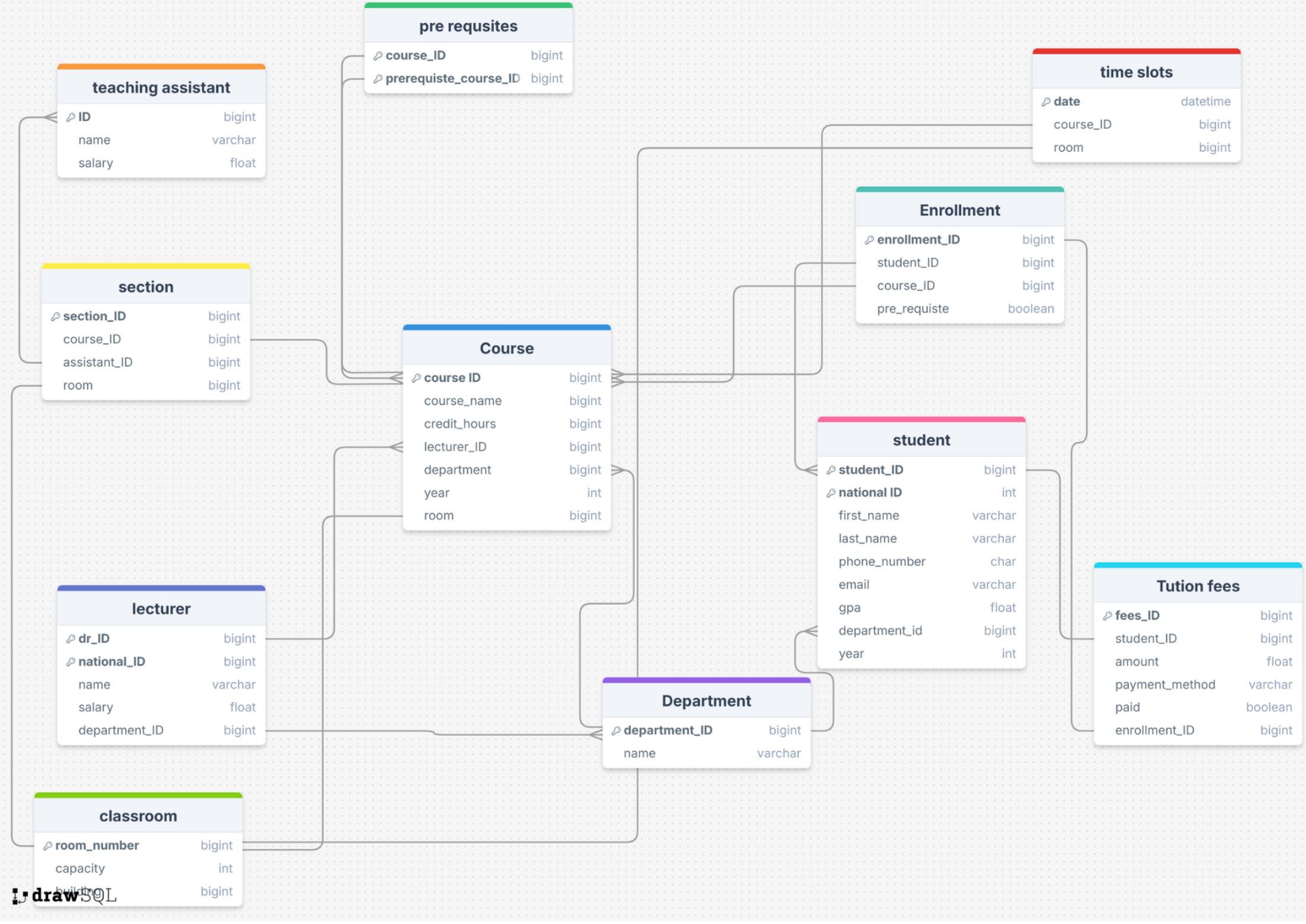
8.”Teaching Assistant” has

- “Salary”
- “Name” as Composite attribute
- “National_id” as primary key

Notice that : There’s a “Many_to_many” relationship named “**Teaches**” between “**Teaching Assistant**” and “**Section**”.

University Data Base

f_name
l_name
(Name)
Phone_Number
Academic_id
National_id
Student
Email
Grade
Enroll
dp_name
dp_id
email
Department
Enroll to
c_name
c_id
Course
crh
take plaec in
r_number
Lecture
dd/mm/yy Time
Classroom
Capacity
Building
Is_prerequisite?
Yes/No
Teach
Paid
fees
Tuition Fees
invoice_id
Payment_method
f_name
l_name
(Name)
Salary
Teaching Assistant
Teaches
Section
Date
Room
Manges
Monitor
f_name
l_name
(Name)
academic_id
national_id
Salary
Lecturer


pre requsites
course_ID bigint
prerequiste_course_ID bigint
teaching assistant
ID bigint
name varchar
salary float
time slots
date datetime
course_ID bigint
room bigint
Enrollment
enrollment_ID bigint
student_ID bigint
course_ID bigint
pre_requiste boolean
section
section_ID bigint
course_ID bigint
assistant_ID bigint
room bigint
Course
course ID bigint
course_name bigint
credit_hours bigint
lecturer_ID bigint
department bigint
year int
room bigint
student
student_ID bigint
national ID int
first_name varchar
last_name varchar
phone_number char
email varchar
gpa float
department_id bigint
year int
Tution fees
fees_ID bigint
student_ID bigint
amount float
payment_method varchar
paid boolean
enrollment_ID bigint
lecturer
dr_ID bigint
national_ID bigint
name varchar
salary float
department_ID bigint
Department
department_ID bigint
name varchar
classroom
room_number bigint
capacity int
building bigint

1-DATABASE OVERVIEW

The database consists of the following tables:

- Departments: stores details of university departments
- Courses: Stores details of courses offered, including credit hours, lecturer information, and department links.
- Students: Stores information about enrolled students
- Tuition_fees: Tracks tuition fee payments for students.
- Enrolls: Represents the enrollment of students in courses (including prerequisites)
- Pre_requisites: Defines prerequisites for courses.
- Lecturers: Stores information about lecturers, including their department affiliation
- Teaching_assistants: Stores details of teaching assistants, including their salaries
- Sections: Represents course sections, linking courses, lecturers, teaching assistants, and classrooms
- Classrooms: Tracks classroom assignments for sections, including capacity and building information

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2-Relationships between tables:

Departments table:

Primary key department_ID

Courses table:

Primary key course_ID

Foreign key lecturer (linking to lecturer table)

Foreign key department (linking to departments table)

Students table:

Primary key student_ID

Foreign key lecturer (linking to lecturer table)

Foreign key department (linking to departments table

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tuition_fees table:

Primary key invoice_id

Foreign key studend_ID (linking to students table)

Enrolls table:

Foreign key student_ID (linking to students table)

Foreign key course_ID (linking to courses table)

Pre_requisits table:

Foreign key course_ID (linking to courses table)

Foreign key pre_requisite_ID (linking to another course in the courses table)

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lecturers table:

Primary key dr_ID

Foreign key department_ID (linking to departments table)

Teaching_assistants table:

Primary key ID

Sections table:

Foreign key course_ID (linking to courses table)

Foreign key dr_ID (linking to lecturers table)

Foreign key assistant_ID (linking to teaching_assistants table)

Foreign key room (linking to classroms table)

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classrooms table:

Primary key room_number

3-conclution

This SQL script establishes a well-structured relational database for a university management system. It models essential entities, their attributes, and interrelationships effectively, ensuring data integrity and consistency. The inclusion of sample data and the query demonstrates the system's functionality and applicability in real-world scenarios.

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