Lab 3: Building ERDs

CS 355 Database Systems
Habib University
Fall 2023

1 Instructions

- This lab will contribute 1% towards the final grade.
- **The deadline for this lab is the end of your lab.**
- The lab must be submitted online via CANVAS. You are required to submit a PDF file that contains the final ERD.
- The PDF file should be named as *Lab_03_aa1234.pdf* where *aa1234* will be replaced with your student id.
- **Files that don't follow the appropriate naming convention will not be graded.**

1.1 Marking scheme

This lab will be marked out of 100.

- 50 Marks are for the completion of the lab.
- 10 Marks are for filling the feedback form within the lab timings.
- 40 Marks are for progress and attendance during the lab.

1.2 Late submission policy

You can submit late till 11:59 PM on the same day as your lab with a 20% penalty. No submissions will be accepted afterward.

1.3 Use of AI

Taking help from any AI-based tools such as ChatGPT is strictly prohibited and will be considered plagiarism. Course staff may call students for Viva incase if they feel that **AI** has been used for doing the lab.

2 Objective

This lab aims to build data design capabilities in students and enables them to develop data model of any business system. The focus in this lab is to identify correct entities, relationships and cardinalities.

3 dbDesigner Guide

In this lab, we will be using `https://www.dbdesigner.net/` to generate ERDs. In this section, we will be covering how to sign up and create your first project.

1. Open DbDesigner using the link above and click on **Register Now.**

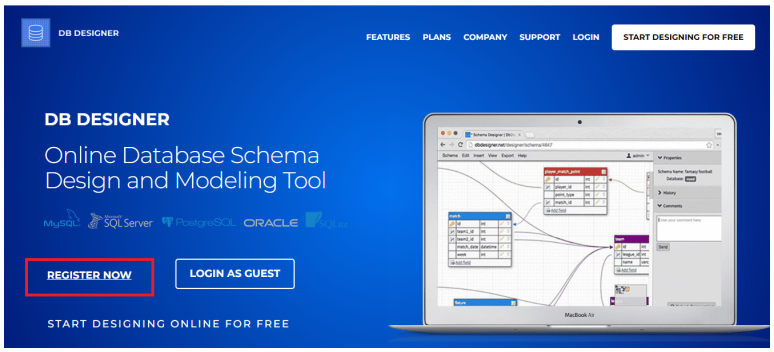

Figure 1: DbDesigner

2. Sign in using GitHub to obtain an academic license.

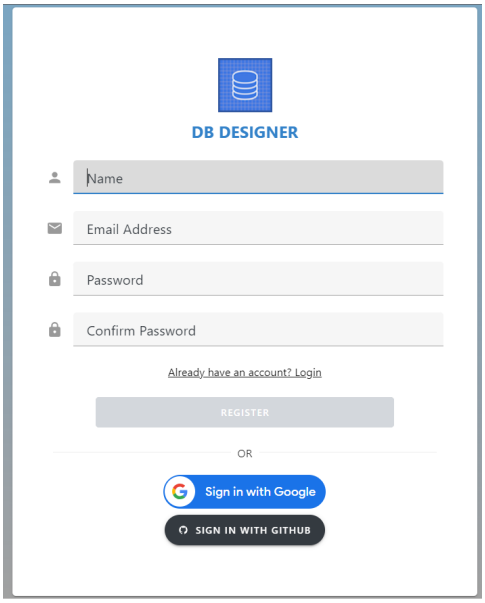

Figure 2: Register your account

3. After logging in successfully, you should be able to view the following page. Click on the new project which should redirect you to a new project page.

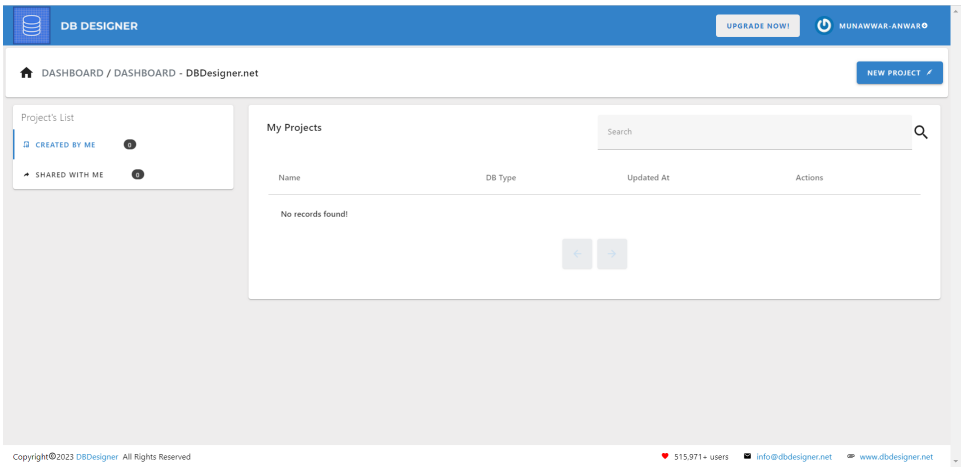

Figure 3: Dashboard

4. When creating a New Schema, select MS SQL Server from the drop-down box and then click on Create new schema.

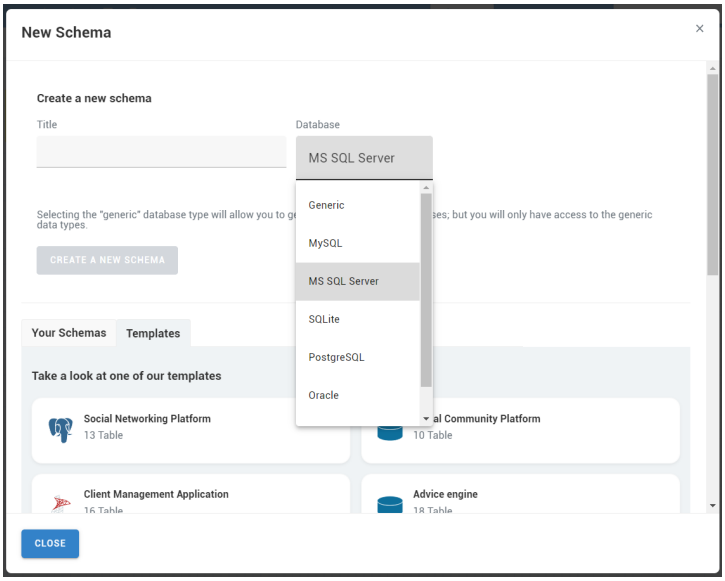

Figure 4: New Schema

5. After your new schema is created, the following screen will be displayed. Click on the 'New Table' button on the toolbar which will open a new window for creating a new table.

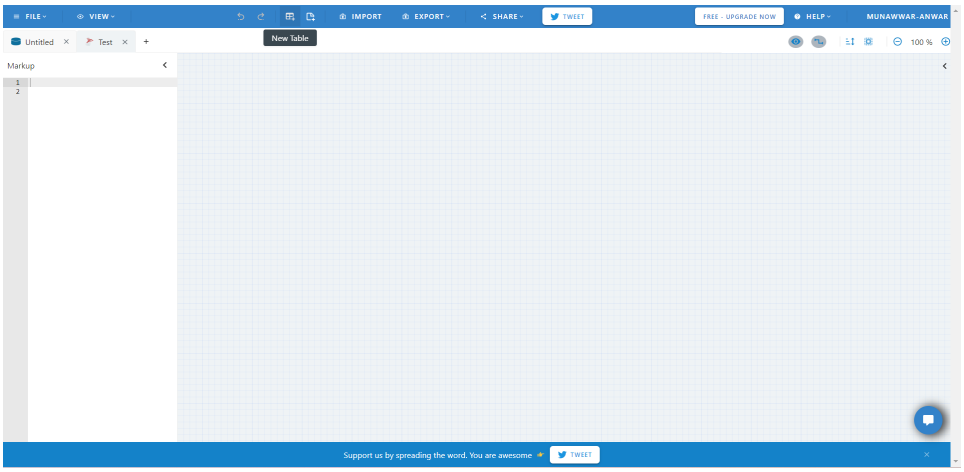

Figure 5: Create new Table

6. You can add attributes to the table by clicking the '+' button. Here you can change the Type of each attribute as well as their name and add additional properties.

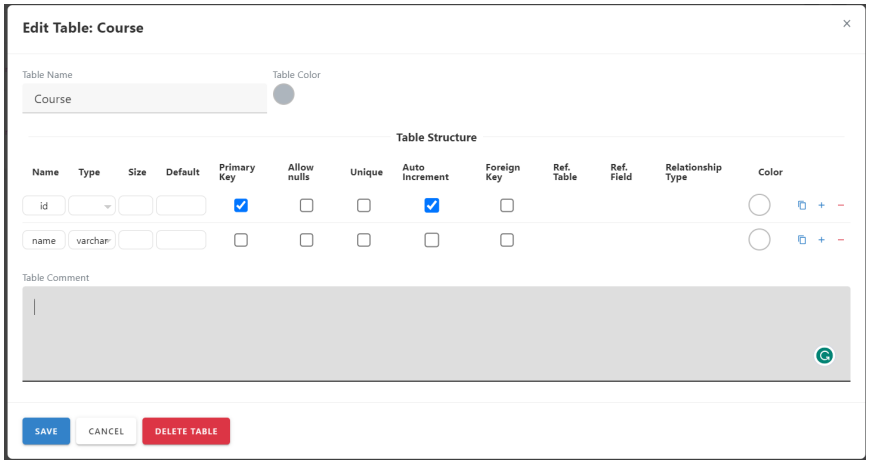

Figure 6: Inserting Attributes

7. Once you've created at least two tables, you can add their relations (if any). Select the 'Edit Table' option. Then select a certain attribute as a foreign key and then, using the 'Ref Table' option, choose the second table. Finally, specify the 'Relationship Type' and click 'Save'.

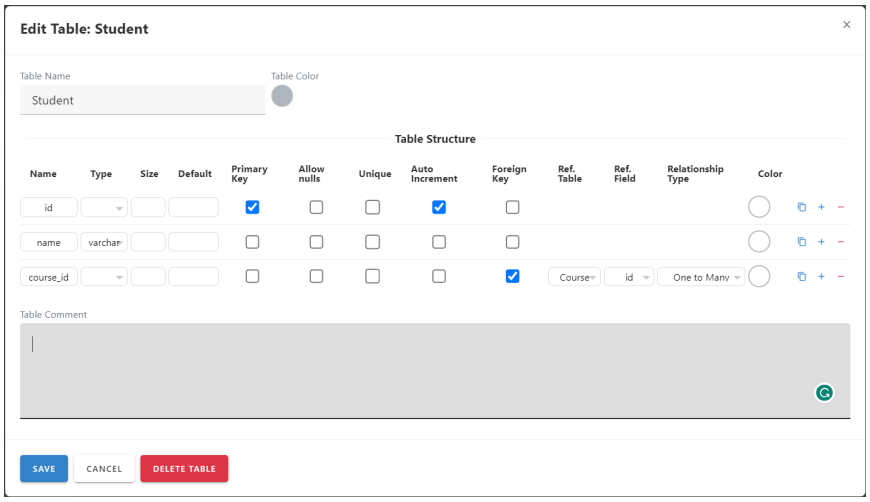

Figure 7: Creating Relationships

8. After creating the two tables successfully, your ERD should look something like this.

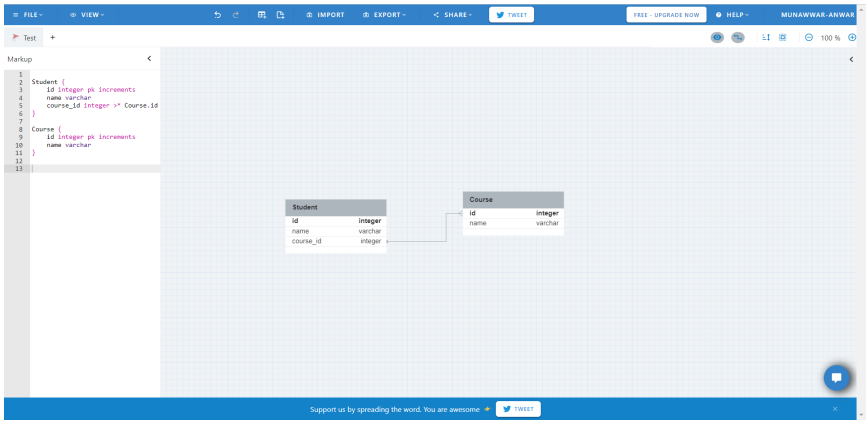

Figure 8: Final ERD

4 Exercise

You have to build ERDs for the given scenarios in DB Designer. The ERDs should contain:

- Entities
- Attributes and their data types, null/not null constraints
- Primary Keys, Foreign Keys
- Relationships (1-1, 1-M)

Entities correctly identified	25%
All Attributes mentioned	15%
Relationships drawn and resolved correctly	20%
Correct Cardinalities	15%
PK, FK identified and FK is placed in appropriate Entity table	25%

Table 1: Rubric for Scenario 1

Scenario 1 - Hotel Management System

A hotel management system keeps information about rooms, floors and halls in a hotel and their arrangements. A data model has to be designed for this system based on the following information:

- The hotel has several rooms (RoomNo, Description) located in a multi-floor building and limited number of dining halls (HallNo, Description) located on different floors.
- Each room is assigned a certain occupancy type (i.e. Single, Double, Twin, Triple, Quad) and a category (e.g. A, B, C etc). The category defines facilities available in that room (e.g. internet access, laundry service, pickup, dropoff etc).
- Each room is assigned a dining hall for breakfast/lunch/dinner.
- Same dining hall can be assigned to multiple rooms and same or different halls can be assigned to a single room for breakfast, lunch and dinner.
- Each floor contains rooms of any one category (e.g. this is not possible to have both category A and B room located on same floor.)
- Room charges are defined on per night basis for each category and occupancy type. E.g. All rooms belonging to category 'A' and occu-

pancy type ‘Double’ have same per night charges.

5 Ungraded Practice Problems

The two scenarios in this section are ungraded and for your practice. Consequently, no submission is required for them.

Scenario 2 - Cricket Tournament

- A cricket tournament is being held in Pakistan in which 8 different countries are participating.
- Each country has nominated its 12 players who will participate in the tournament.
- The System keeps record of different stadiums of the country, the city they are located in and their capacities.
- A panel of umpires, belonging to different countries, has been established. For each match, any two umpires will be selected from the panel.
- A schedule of matches will be published describing the date and time of each match, participating teams, selected umpires, name of the city and the stadium where the match will be held, the wining team and man of the match.
- The systems keeps record of total runs scored and total wickets taken by each player in every match

Scenario 3 - TV Programs

A software system is being developed to maintain information about all TV programs telecasted on different channels and their schedules. Here are some particulars of that system:

- There are many channels. Each channel is sponsored by an organisation.
- Different programs are telecasted on different channels.
- Each Program belongs to a certain category. These categories can further be divided into sub-categories, hence forming a hierarchy. (e.g. Programs can be categorized as Entertainment, News, Sports, Religious or Informative. 'Entertainment' category can further be divided into Drama, Stage Shows, Movies etc)
- The system keeps track of the whole cast of a program. Different people play different roles (Actor, Producer, Director, Technician, Anchor etc) in making a program.
- Each program has many sponsors.
- The programs are normally divided in episodes.
- The system maintains a schedule of programs for each channel. The schedule describes that which program/episode is telecasted on a particular weekday and time on a particular channel.
- One program can be telecasted multiple times a week. Also, some programs (or episodes) are re-telecasted the same day or some other day of the week.