National University of Sciences and Technology (NUST)
School of Electrical Engineering and Computer Science

Department of Computing

CS220: Database Systems

Class: BSCS6C

Lab 12: Entity-Relationship Model and Diagrams

Date: Dec. 14, 2017

Time: 0900-1200

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Introduction

The goal of relational database design is to generate a set of relational schemas that allows us to store information without unnecessary redundancy, yet also allows us to retrieve information easily.

Objectives

After performing this lab students should be able to:

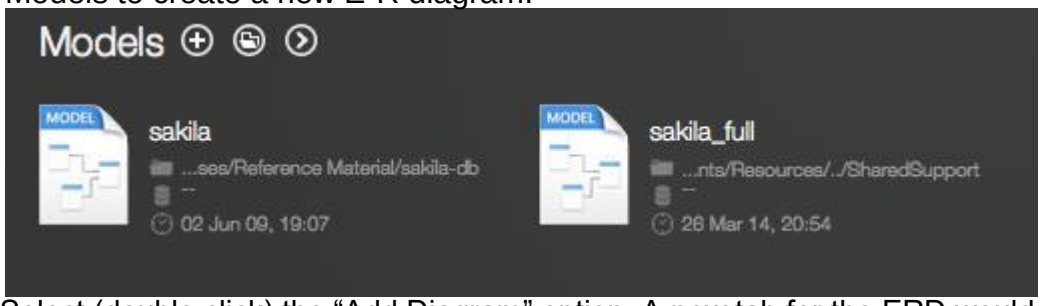
1. Identify relations and associations given a case study or scenario.
2. Design and develop an E-R model using E-R Diagram notations.

Tools/Software Requirement

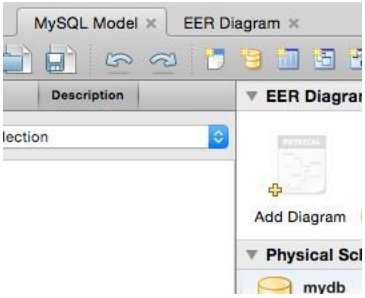
- MySQL Community Server 5.6
- MySQL Workbench 6.1

Description

1. This lab assumes that MySQL Community Server is running and MySQL Workbench is loaded.
2. From the bottom of the main Workbench screen, select the plus sign near Models to create a new E-R diagram.



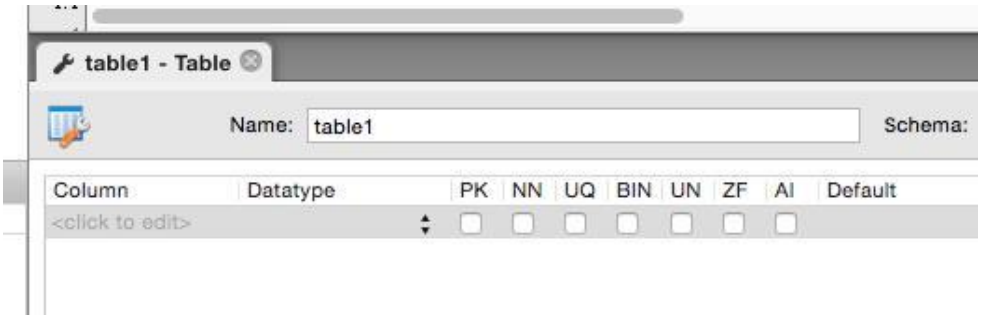
3. Select (double click) the “Add Diagram” option. A new tab for the ERD would open.



4. You may click the entity (table) icon from the tool bar  and then click an appropriate portion of the diagram to create a new entity in the model.

5. Double click the table 

in the diagram to open its properties in the bottom of the screen. There you can specify name of the relation and may also add attributes and their constraints.



6. Before modeling an association between two relations, make sure that the target relations have primary keys. Later, click (DON'T DRAG) the relevant association icon from the toolbar and select first and then second relation. In case of many-to-many associate, a new relation would be created that you may modify.

Adding Foreign Key Relationships Using an EER Diagram

The vertical toolbar on the left side of an EER Diagram has six foreign key tools:

- one-to-one non-identifying relationship
- one-to-many non-identifying relationship
- one-to-one identifying relationship
- one-to-many identifying relationship
- many-to-many identifying relationship
- Place a Relationship Using Existing Columns

Differences include:

- An identifying relationship: identified by a solid line between tables
  An identifying relationship is one where the child table cannot be uniquely identified without its parent. Typically this occurs where an intermediary table is created to resolve a many-to-many relationship. In such cases, the primary key is usually a composite key made up of the primary keys from the two original tables.

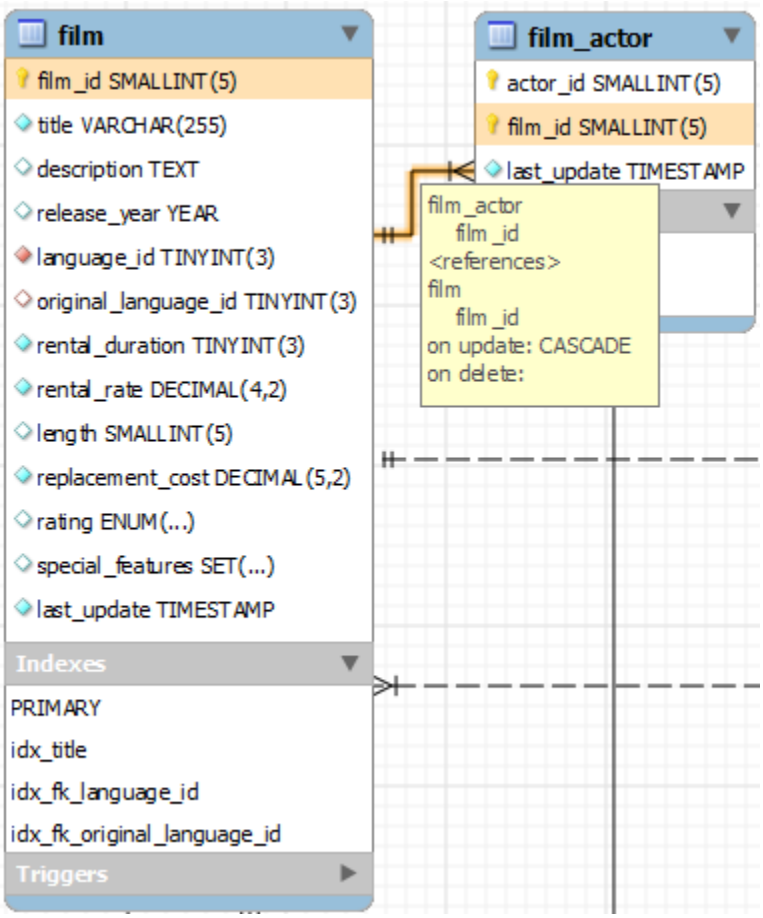
- A non-identifying relationship: identified by a broken (dashed) line between tables

Create or drag and drop the tables that you wish to connect. Ensure that there is a primary key in the table that will be on the "one" side of the relationship. Click on the appropriate tool for the type of relationship you wish to create. If you are creating a one-to-many relationship, first click the table that is on the "many" side of the relationship, then on the table containing the referenced key. This creates a column in the table on the many side of the relationship. The default name of this column

is table_name_key_name where the table name and the key name both refer to the table containing the referenced key.
When the many-to-many tool is active, double-clicking a table creates an associative table with a many-to-many relationship. For this tool to function there must be a primary key defined in the initial table.

To edit the properties of a foreign key, double-click anywhere on the connection line that joins the two tables. This opens the relationship editor.

Mousing over a relationship connector highlights the connector and the related keys as shown in the following figure. The film and the film_actor tables are related on the film_id field and these fields are highlighted in both tables. Since the film_id field is part of the primary key in the film_actor table, a solid line is used for the connector between the two tables. After mousing over a relationship for a second, a yellow box is displayed that provides additional information.



If the placement of a connection's caption is not suitable, you can change its position by dragging it to a different location.

Explore other tools of standard toolbar

Lab Task

Given the following scenario, create an ERD using the standard ERD notation:

1. A hospital has a large number of registered physicians. Attributes of PHYSICIAN include Physician ID (the identifier) and Specialty. Patients are admitted to the hospital by physicians. Attributes of PATIENT include Patient ID (the identifier) and Patient Name. Any patient who is admitted must have exactly one admitting physician. A physician may optionally admit any number of patients. Once admitted, a given patient must be treated by at least one physician. A particular physician may treat any number of patients, or may not treat any patients. Whenever a patient is treated by a physician, the hospital wishes to record the details of the treatment (Treatment Detail). Components of Treatment Detail include Date, Time, and Results.
   Include on the ERD the need to represent the date on which a patient is admitted for each time they are admitted.

2. Each publisher has a unique name; a mailing address and telephone number are also kept on each publisher. A publisher publishes one or more books; a book is published by exactly one publisher. A book is identified by its ISBN, and other attributes are title, price, and number of pages. Each book is written by one or more authors; an author writes one or more books, potentially for different publishers. Each author is uniquely described by an author ID, and we know each author's name and address. Each author is paid a certain royalty rate on each book he or she authors, which potentially varies for each book and for each author. An author receives a separate royalty check for each book he or she writes. Each check is identified by its check number, and we also keep track of the date and amount of each check. As you develop the ERD for this problem, follow good data naming guidelines.

Deliverable

Submit the MWB file created to design ERD of the model using the Workbench.