Lab Three

More ER Diagrams

CS1103, 2021F

Learning Outcomes

At the conclusion of the lab, students should be able to

- Interpret word problems describing information and relationships
- Identify the types of entities and relationships involved
- Create entity relationship diagrams for these simple situations

Background

Lab Two introduced you to ER Diagramming and the symbolism we use. The lab is broken into two parts

1. Building the rest of the symbology for constructing conceptual ER Diagrams
2. Using software tools to construct the Logical ER Diagrams

Most database management systems come with very specialized diagramming tools specific to their software, and MySQL is no different. MySQL Workbench is available on the lab machines and can produce very detailed diagrams that embed sufficient information to enable automatic generation of database structure.

Exercise ONE

A library wants to build a simple online recommendation system for a summer reading programme. The system involves people reading and recommending books and authors.

- Readers (people) have a screen name as well as a real name and contact information, including an unknown number of phone numbers they can be contacted at.
- Books have a title, ISBN, genre and reading level.
- An author has a name and nationality. They can write zero or more books.
- Assume that Books are written by only one author.
- The database records what books a reader has read.
- Readers can “like” books.
- Readers can “like” authors independent of the books the author has written.

Create a hand-drawn, conceptual entity relationship diagram (like the last lab, except that you’re including attributes) describing this circumstance for a database designer.

Things to Note

This problem introduces two new twists. Often we get a set of items (think array), termed multi-valued attributes. We designate them by placing the attribute name inside double braces (i.e. {{ }}). As well, it's not uncommon to have weak entities – entities that cannot be uniquely identified without including a unique reference to a strong or identifying entity. Typically we identify the entity using a heavy line outlining the entity, and a solid line showing the strong relationship to the identifying entity.

Exercise Two

Take the conceptual ER diagram from Exercise One and using MySQL Workbench (available from the remote desktop/vnc on the Lab machines) create the Logical ER Diagram. To draw a diagram in MySQLWorkbench, click on the ERD button on the left-hand side,

and click on the plus sign beside the Models title, and then under EER Diagrams, double-click "Add Diagram".

You should now have a grid palette to draw on using the symbols to its left. Hovering over the icons will explain them. Note the difference between identifying and non-identifying relationships. Also note that when placing relationships between entities there are directions in the bottom-left of the window.

Things to Note

In the logical model, our diagram must become more explicit and identify all of the information in terms of tables, and not entities (entities become tables in the database, but not all tables are entities). Several circumstances need to be recognized:

- Many-to-many (M:N) relationships introduce a bridging table required to connect the entries in each of the tables. Relationship attributes become attributes of this table.
- Multi-valued attributes become their own table with a strong relationship to the original entity and a foreign key to connect it. Any record/tuple in this table must have a value in this foreign key attribute
- Weak Entities need to have the identifying table's primary key as part of its composite primary key. And like the multi-valued attribute, any record/tuple in this table must have a value in this foreign key attribute

Submission

Before due date for the lab, students should submit online to the lms

- The word-processor report as a pdf file, containing images for both the conceptual and logical ER Diagrams.