University of the Philippines Open University

CMSC206

Assignment 1
ER and relational models

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Due date:	
Total Number of Pages:	3

1 Exercise 1: modelling

1.1 Problem definition

You have started playing this great new online game called Final Fantasy XIV[1]. You are having great fun with the game as it really appeals to your completionist instinct, as the game has many collectables: *mounts*, *minions* and *achievements* to collect. The game has a lot of content, as it also has four *content packs* (the base game and 3 expansions), each with a name and a release date and each of the collectables belongs to one of these packs.

You started tracking your collection in a notebook, but it's quickly getting messy, so you decide to design a proper database to store information on the collectables in the game. Here is the information you want to store:

- For each pack, its unique name and its release date
- For each mount, its unique name, whether it can fly, what pack it belongs to, and if you have unlocked it
- For each minion, its unique name, if it has a special animation (some can climb on your shoulder!), what pack it belongs to, and if you have unlocked it
- For each achievement, its unique name, the number of achievement points you earn by unlocking it, what pack it belongs to, and if you have unlocked it.

(a) A minion in FFXIV

(b) Mounts in FFXIV

Figure 1: Examples of in-game collectables

1.2 Tasks

1. Build a conceptual model of the the DB you will need using an Entity Relationships diagram.
2. You have played some more and you discovered that sometimes unlocking an achievement automatically unlocks a mount (exciting!). You want to track these cases in your database. Build a modified ER model to support this.

[1] `https://en.wikipedia.org/wiki/Final_Fantasy_XIV`

3. Your friends in your free company (a group of players in FFXIV) have heard of your great DB and they would like to use it too so they can track the things they have unlocked (but only they can see what they have unlocked). Each of your friends is identified by their unique character name, and they have a password to log into the app you built on top of your DB. Build a modified ER model to support this.

4. Your friends now want to share their collections, but only with people they choose. Build a modified ER model to support this.

5. Build a physical relational model from the last ER model.

2 Exercise 2: normalisation

2.1 Problem description

In this exercise we will consider the information system a library uses to keep track of their books. Books have a title, an author, a position (shelf number), and are divided in categories. The library may have multiple copies of the same book but no two books have the same title.

The library's database currently uses the following schema:
Book(Title, Author, Category, Shelf, Category, Copy_number)

An extract from the database is shown in table 1:

Title	**Author**	**Category**	**Shelf**	**Copy_number**
The Fellowship of the Ring	Tolkien	Fantasy	F10	1
Ulysses	Joyce	Novel	B50	1
The Hitchhiker's Guide to the Galaxy	Adams	SciFi	H20	1
The Hitchhiker's Guide to the Galaxy	Adams	SciFi	H20	2
Les Miserables	Hugo	Novel	B50	1
Les Miserables	Hugo	Novel	B50	2
Fundamentals of Database systems	Elmasri	TextBook	T30	1

Table 1: Extract from the library's database

2.2 Tasks

1. What are the (non trivial) functional dependencies in this model?

2. Is this model in the third normal form (3NF)?

3. If not, decompose the model so that it is. Is your decomposition in Boyce-Codd normal form (BCNF)?

3 Submission instructions

Submit your work as a PDF report named Firstname_Surname_Assignment1.pdf (e.g. Thomas_Laurent_Assignment1.pdf) on Moodle before October 10th 23:59. You can use tools like draw.io to build your diagrams.

For exercise 1, each task should have its own diagram, I will not accept a "final" diagram where I have to guess what part answers which task.

If you make any assumptions (e.g. assuming that X can be linked to multiple Y, assuming that Z is unique, or assuming that something is always true), that are not stated in the instructions, make them clear in your report. I can not read your minds (yet ;)). e.g. "Here I assume that an employee can work for multiple companies at the same time".

Submissions are personal. No late submissions accepted.