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PDA6: Task 2
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Project description

I built a non-trivial database application on the video game industry. The goal is to keep track of the various details of the video games being made, on who makes them, and on who buys them. I designed a schema for the database, then using MySQL database management system: created my database, generated synthetic data, loaded the data into the database, queried the database, and developed an application that uses the database. My process was a six-step procedure that involved planning out each individual element involved in what would become my database application.

Summary

(1) Requirement analysis

The video game industry is built on established relationships between multiple parties. Firstly, we have the video game developers, who can range from being a single software engineer or a company that employs software engineers. Moreover, developing and publishing companies often have to collaborate to get the game ready for launch. Video game developers create the video games that are then published and marketed by video game publishers. After being published, the video games are sold to or rented by customers through various stores. I utilized this information to establish our entities and the relationships between each other in our database.

(2) ER Modelling

I expanded on my essential entities by defining their cardinality and participation constraints. Then I used these established details to craft an ER model of my database. I made sure to keep track of the cardinality of each relation and the strength, or lack thereof, of all the entities when representing them on the model.

(3) DB Design

I converted my ER model to a relational model and made sure to represent the primary and foreign keys appropriately on the diagram. Moreover, I used MySQL Workbench to create tables that represent each of the entities and the relationships between them. Each table had a defined set of attributes of specified types that I made sure to keep consistent. Also, I initialized the primary and foreign keys for each table based off my relational model. Additionally, I inserted some valid values into the tables to check if the attributes were set correctly and even checked the description of each table using DESC. I also discovered that a foreign key can not be changed until it is updated from its original table.

(4) Data population
I created CSV files that contained data to be inserted into each of my tables in the database. I used http://generatedata.com/ to generate all of my data. For each table, all I had to do was to set the right column, data type, and file type and then press "generate" to output the .csv file. I was limited to generating 100 rows per file so for some files I generated up to 10-30 files and then copy/pasted all rows except the first one into one file to have sufficient number of tuples for each table. I imported each file into my database and connected them to the appropriate table with matching attributes.

(5) SQL Queries
I tested my database by performing all the following queries on it:

> 1) A select from one relation that limits the results to 20 or fewer tuples.
> 2) A query that must involve a two-way join that limits the results to 20 or fewer tuples.
> 3) A query that must be aggregate using a group by clause.
> 4) One simple insert.
> 5) One simple update.
> 6) An update that updates several tuples at once.
> 7) A delete that deletes a tuple.

(6) Application Accessing
I developed an application program, using HTML and PHP, to store, query and update data on the database. This program allows me to view descriptions of all my tables, view the contents and aggregates of specific tables, and join specific tables all with the press of a button. Additionally, the user can enter a tuple into one of my tables. Now with access to the serves and a simple URL, I can open the program and access my database.

Conclusion
Throughout this course, I learned many things about the database applications and how they are made. I feel like I have a basic understanding of how the process of developing a database application works. I know how to start off with just a basic outline of our entities to modelling them as ER and relational models and then inserting entities as tables into our database. This six-step process has helped me in realising the long time taken and logic involved in building a database application. I personally felt the most I achieved was when I learned something on my own during the process. For instance, when I initially inserted dates into a table through a generated CSV file, I was given an error due to the fact that MySQL Workbench has a specific date format that I didn't follow. It was frustrating to take the time to build that CSV file again, but it was satisfactory to have learned something important in the process. I think challenges like these throughout the course have been my greatest achievement in this series of assignments.