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CMSC 461
Project Phase 4: Report and Design Description
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Phase 4 Report

During this phase of the project, I found many different changes I had to make with my database design. Most of these changes were small, like adding more specific variable types to most of columns in each table, or changing the primary key of each table. But these changes were seen everywhere throughout the database, from the creation script to the data insertion script. Here are all of the changes that were made between the last phase and this phase.

The first major change was all of the primary keys for many different tables in the database. I thought that all user's, employee or student, would be given an id. Whether a student id or employee id, I thought I would be able to use their id as a primary key. However after looking at the data, id for the employees or students is not given. So instead I decided to use the email of each employee and student as the primary key. This is similar to the way that most websites require a unique email to sign up for their service. Also since in the data csv's, no two users had the same email.

Another major change was the addition of all the different constraints, aside from the foreign key constraints. I won't list all of them but a few constraints that were made were the 'NOT NULL' constraints where a piece of information had to be provided in order for the inserted tuple to be successful. Another constraint is the CHECK constraints. These were used when a column had to be a certain string. For example in the book table, the column 'book_format' had to either be the string 'hardcover', 'paperback', or 'electronic'. The last major constraint change was adding the DATE type to columns that held a date. This requires that the string for the date be of the form ‘YYYY-MM-DD’. This applies to columns like date_created in the order table, or birth_date in the student table.

Most of the foreign key constraints that were made in phase three were kept. However some of them were removed because they constrained ‘too hard’. For example, in the trouble ticket table, there was a foreign key for the administrator that the ticket was assigned to. This meant that for a ticket inserted into the table, an administrator had to exist for the ticket to be assigned to. However when a ticket is in a state of new, it would not have an admin assigned to it. Therefore I had to remove this constraint. Another foreign key that was removed was the cart_id constraint in the order table. This one is pretty straightforward, as carts are deleted as soon as an order is made. So an order cannot have a foreign key to the cart it was made from.

The last big change that I made was the creation of a few new tables, and the deletion of other tables. A mistake I made in the last phase is that a list is not a data type of a column. Thus for columns that needed to store multiple values, I created their own tables for, and made foreign key constraints to the original table. For example, the keywords of a book are a list of words that are associated to a book. But the list of words cannot be put into a column on the book table, since lists cannot be a column data type. So I created a new table called ‘keywords’ and it only has two columns, the name of the book, and one keyword for that book. Other new tables I made were the author’s table, the category table, the being_purchased and purchased tables, the books_used table, and the student reviews table. All of these tables contain the list type attributes for a table that cannot be stored in a single column, or any definite number of columns.

The only other things worth noting in this report is that the table creation script was made using a website called ERDPlus which allows you to export your Relational diagrams as a sql script. The Insertion script was done with a mix of python scripts to generate the queries or just manually copy and pasted where I deemed it easier to just do it myself. The insertion script is a bit over 3300 lines and took 3-ish days to generate with python scripts and by hand. Lastly the 4 other scripts include the table deletion, index creation, index deletion, and data deletion were done manually since they were very short. For the index creation script, indices were put on 6 different tables: book, keyword, category, users, being purchased, and purchased. I chose to put indices on these table because they were some of the longer lists in the database.

Interface Design Description

The modules for this project will just be command line programs written in python. When opened they will act more like a shell. They will start by printing out all the options available to each specific user. Three modules will be made, a student module, a customer support user module, and an administrator module. The actions for each module are as follows:

I. For Creation
    A. Student Module
        1. Create a new student
            a) Students will either enter into an existing student user with their email, or they will be able to create a new student user. If they choose to register a new student user they will need to provide the following information:
                (1) First name
                (2) Last name
                (3) Email address
                (4) Street address
                (5) Phone number
                (6) Birthdate
                (7) College major
                (8) Student status (Graduate, Undergraduate)
                (9) Student year (1, 2, 3, 4)
                (10) University

    b) Upon entering this information their student information will be updated in the database with a data insertion

  2. Create a cart of a user
    a) Student will not have cart automatically for them. Instead a cart will be made the moment something is added to their cart. This will start with a student adding a book to their cart from the module. The cart will then be added to the cart table, and the book being purchased will be added to the being_purchased table. Afterward the students cart will be created, along with any books that are being added to it.
  3. Create a new orders based on a cart
    a) Once the student wishes to purchase their books, they will have the option to place an order. First the module will check if the student's cart exists and if it doesn't it will raise an error. Otherwise the student will have to provide the following information to complete the order:
      (1) Credit Card Number
      (2) Credit Card Expiration
      (3) Credit Card Name
      (4) Credit Card Type
    b) Other information will be generated to fill in the insertion, such as the date created being obtained from the current date, student email from the student fulfilling the order, etc.
    c) Finally after the order is successfully inserted into the orders table, the cart that the order was made from will be deleted and all books that were in the being_purchased table will be deleted. Then all books that were in the being_purchased table will then be re added to the purchased table.
  4. Create a new book review
    a) Students will be able to review any book regardless if they have purchased them before. All they will need to to is select the option for reviewing a book, pick the book they want to review by entering its title, then rate it with score between 1 and 5. Their review will be inserted into the student_reviews table. The scores for any given book will be averaged to form the book's average rating on the book table. This means the book will need to be found in the book table and its rating attribute will need to updated.

B. Customer Service Module
  1. Create a new trouble ticket
    a) Using the customer support module, customer support users will have the option to create a trouble ticket. To create a trouble ticket, the following information must be provided

(1) Category of the service (user profile, products, cart, orders, other)

(2) A title for the ticket

b) Optionally a short description may also be provided

c) Once the following are provided, the new ticket will be inserted into the trouble_ticket table, and the ticket will be looked at by a customer support user, which progresses the trouble ticket lifecycle.

d) All other information for inserting a trouble ticket will be generated, and is not needed by the user, such as the date of creation, the ticket number, the state, etc.

C. Administrator

1. Create a new book with inventory

a) Administrators can insert new books by choosing to insert a new book in their module. They will be able to insert new books into the book table given they provide the following information:

(1) The ISBN and ISBN-13 of the book

(2) The book's type (new, old)

(3) The purchase type (buy, rent)

(4) The book's price

(5) The quantity of the book for inventory

(6) The book's title

(7) The book's publisher

(8) The book's publish date

(9) The book's edition number

(10) Average rating

(11) The book's language

(12) The book's format (hardcover, paperback, electronic)

(13) The book's weight

(14) The book's authors

(15) The book's categories

(16) The books keywords

b) In the book table the following will be inserted: ISBN, ISBN-13, type, purchase type, price, publisher, publish date, edition number, language, format, weight, average rating

c) The book's authors will be inserted into the authors table along with the book's title

d) The books categories will be inserted into the categories table along with the book's title

e) The book's individual keywords will be inserted into the keywords table along with the book's title

2. Create a new university with department, courses, and book association

D. Super Administrator

1. Create a new customer service employees and administrators
    a) The designated super administrator will be able to insert new customer service users into the employees table and the customer service users table if they chose the option to insert a new employee.
    b) The designated super administrator will be able to insert new customer service users into the employees table and the customer service users table if they chose the option to insert a new employee.
    c) In both cases they will need to provide the following information for the new employee:
        (1) First name
        (2) Last name
        (3) Email
        (4) Street address
        (5) Phone number
        (6) Gender
        (7) Salary
        (8) Social Security number

II. For Updates

A. Student Module

1. Update a cart
    a) Students will be able to view and modify their cart if they choose the option to view and edit cart. Once viewing they will be given several other options to select the book in their cart, and to update any of the information in the cart, such as:
        (1) Purchase type (buy, rent)
        (2) Book format (hardcover, paperback, electronic)
        (3) Quantity
        (4) Remove the selection entirely
    b) Upon removing all items in their cart, their cart will be deleted and their cart will be deleted, returning them to their main menu

B. Customer Service Module

1. Update a new trouble ticket
    a) Customer Service Users will be able to choose an option from their module to view all standing tickets. However they will only be able to update those tickets that are in a state of new. They will be able to set the ticket to a state of assign then they assign the ticket to an administrator.
    b) To update the state, they will be able to choose the option to assign when viewing the tickets, then they will need to provide the name of an administrator. From the there the ticket will be

changed to a state of ‘assigned’ and only an administrator will be able to touch the ticket.

C. Administrator Module

1. Update an assigned or inprocess trouble ticket

a) Admins will be able to see all standing trouble tickets, but will only be able to update tickets that are in the state of ‘assigned’ or ‘in-process’, and only if they ticket is assigned to them. For assigned tickets they will be able to set the state of the ticket to in-process to indicate that they are working on the error. For tickets that are in the state of in-process, they will be able to the set the state to ‘complete’ once the issue has been resolved. Once a tickets state is complete, no user will be able to touch it, as it is archived and protected.

III. For Deletes

A. Customer Service Module

1. Delete a student order

a) If a student wishes to cancel their order they can submit a trouble ticket to cancel their order and a customer support user will see the ticket and cancel the order on their behalf. If some other error occurs with payment, a customer support user will be able cancel the order.

b) Customer support users will have the option to see the list of all standing orders. From there they will have the option to delete and remove an order.

B. Super Administrator

1. Delete an Administrator or Customer Support User

a) If an employee is to be deleted, the super administrator will need to supply the first and last name and the email of the employee who will be removed. If they exist in the users table, the employee table, and either the administrator table, or the customer_support_user table, their entries will be deleted from all three tables.