School of Information and Computer Technology Sirindhorn International Institute of Technology Thammasat University

CSS326 Database Programming Laboratory

Laboratory Assignment#5

Data manipulation using MySQL

Objectives:

- To understand about MySQL server usage without a GUI.
- To learn more about MySQL usage such as view and cursor.
- To understand the restrictions on tables in MySQL.

1. Create a database named "SIIT" having five tables as shown below. All the commands must be executed in the Command prompt (not in PHPMyAdmin).

instructor	
PK	instructor_ID
	first_name
	last_name
	dept_code

Table 1: instructor

student	
PK	student_ID
	first_name
	last_name
FK	dept_code

Table 2: student

salary	
PK	instructor_ID
FK	dept_code
	salary

Table 3: salary

(a). You need to have at least 3 data entries (3 rows of data) for each of the tables using SQL commands. (0.6 points)

(b). The resulting relational schema should look as shown in Figure 1 & should follow the following rules. (Instructor is related to the department, salary is related to the department as well). (1.4 points)

- If an instructor resigns, his salary record should be deleted and if the instructor ID is updated, it should be updated in the salary table.
- If an instructor leaves/ updates, the teaches table should also change accordingly.
- If a department code updates then, Instructor, course, salary and student should be updated as well.
- However, department entries should not be able to delete.
- When a course is deleted/updated, then the taches table should be changed accordingly.

(c). if the instructor table is the first one, you're creating, can you still set up a foreign key relationship with the department table?

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teaches	
PK	instructor_ID
FK	course_ID
	sec_ID
	semester
	year

Table 4: teaches

course	
PK	course_ID
	title
	credits
FK	dept_code

Table 5: course

department	
PK	dept_code
	dept_name

Table 6: department

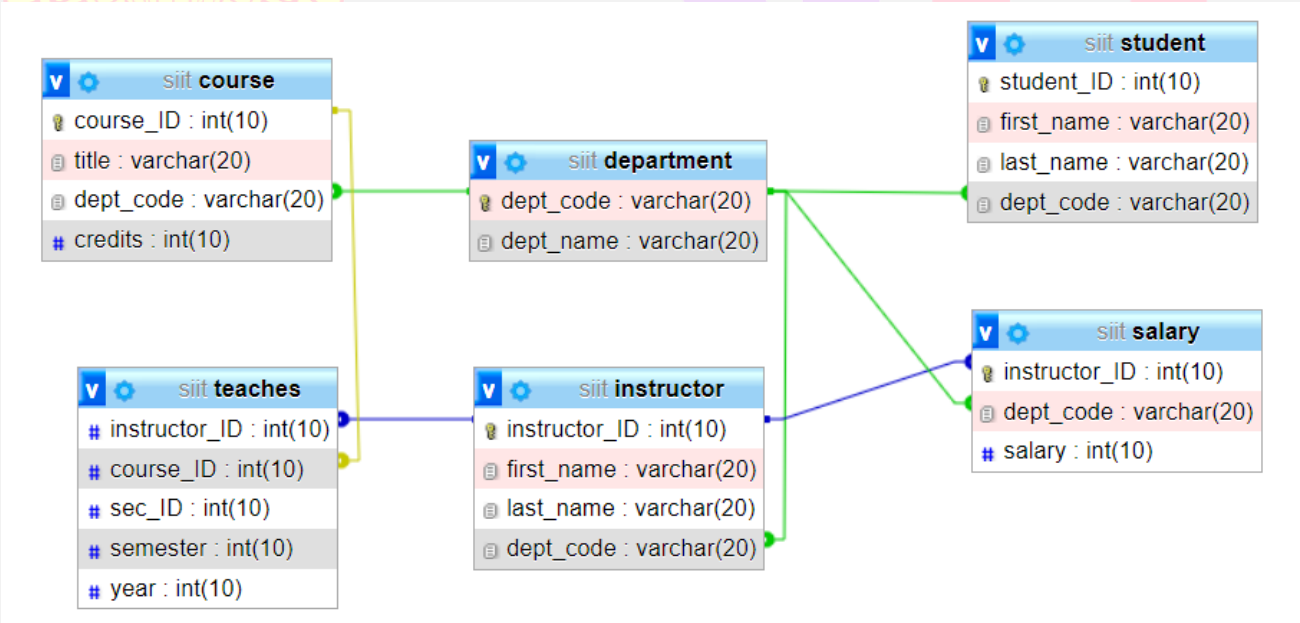

Figure 1: Relational schema

2. Let's now create a simple Library database with tables such as 'Books', 'Authors', 'Transactions' and 'Borrowers'. Then answer the following queries.
   ***creating tables, inserting records & relationships (0.4 points)
   *You have sample records, structure and relationships provided with figures.

   (a) List all books checked out by 'Alice Johnson'. Title and author name should be listed, author name should be combined with last name properly. (0.4 points)

title	Author_Name
Book1	John Doe
Book3	Mark Johnson

   (b) List all overdue books as below. (0.4 points)

title	Borrower_Name	return_date
Book3	Alice Johnson	2023-09-01

   (c) List all authors who have books checked out and the number of books checked out by each as below. (0.4 points)

Author_Name	books_checked_out
Jane Smith	1
John Doe	1
Mark Johnson	1

   (d) Find the borrower who has the most books taken from library (0.4 points)

Borrower_Name	books_checked_out
Alice Johnson	2

Table structures:
Authors table:

Field	Type	Null	Key	Default	Extra
author_id	int(11)	NO	PRI	NULL	auto_increment
first_name	varchar(50)	YES		NULL	
last_name	varchar(50)	YES		NULL	

Books table:

Field	Type	Null	Key	Default	Extra
book_id	int(11)	NO	PRI	NULL	auto_increment
title	varchar(255)	YES		NULL	
author_id	int(11)	YES	MUL	NULL	
ISBN	varchar(13)	YES		NULL	
publication_year	int(11)	YES		NULL	

Borrowers table:

Field	Type	Null	Key	Default	Extra
borrower_id	int(11)	NO	PRI	NULL	auto_increment
first_name	varchar(50)	YES		NULL	
last_name	varchar(50)	YES		NULL	
email	varchar(100)	YES		NULL	

Transactions table:

Field	Type	Null	Key	Default	Extra
transaction_id	int(11)	NO	PRI	NULL	auto_increment
book_id	int(11)	YES	MUL	NULL	
borrower_id	int(11)	YES	MUL	NULL	
checkout_date	date	YES		NULL	
return_date	date	YES		NULL	

Records:
Authors table:

author_id	first_name	last_name
1	John	Doe
2	Jane	Smith
3	Mark	Johnson

Books table:

book_id	title	author_id	ISBN	publication_year
1	Book1	1	1234567890	2010
2	Book2	2	2345678901	2015
3	Book3	3	3456789012	2020

Borrowers table:

borrower_id	first_name	last_name	email
1	Alice	Johnson	alice@example.com
2	Bob	Smith	bob@example.com

Transactions table:

transaction_id	book_id	borrower_id	checkout_date	return_date
1	1	1	2023-09-01	2023-09-27
2	2	2	2023-09-05	2023-09-20
3	3	1	2023-09-10	2023-09-01

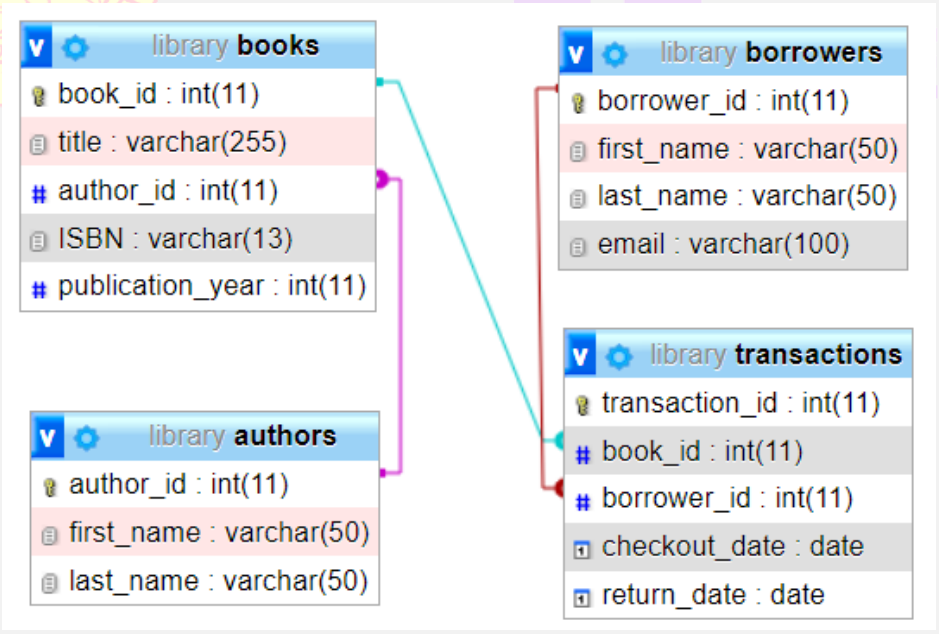

Figure 2: Relation schema for the library database (Constraints is set for restricting updates and deletions)

3. Create a Coffee shop database with tables involving 'products', customers', 'orders' and 'order_items'. Then answer the following queries.
   ***creating tables, inserting records & relationships (0.4 points)
   *You have sample records, structure and relationships provided with figures.

   (a) List all orders along with the customer's name and order total as below. (0.4 points)

order_id	customer_name	order_total
1	Alice Johnson	7.00
2	Bob Smith	6.50

   (b) Calculate the total revenue for the coffee shop as below image. (0.4 points)

total_revenue
13.50

   (c) Create a view to see the most popular products and list them as below. (0.4 points)

name	total_quantity_sold
Muffin	2
Espresso	2
Latte	1
Croissant	1

   (d) Find the top-spending customers as the below image. (0.4 points)

customer_name	total_spent
Alice Johnson	7.00
Bob Smith	6.50

Table structures:
Products table:

Field	Type	Null	Key	Default	Extra
product_id	int(11)	NO	PRI	NULL	auto_increment
name	varchar(255)	YES		NULL	
price	decimal(10,2)	YES		NULL	

Customers table:

Field	Type	Null	Key	Default	Extra
customer_id	int(11)	NO	PRI	NULL	auto_increment
first_name	varchar(50)	YES		NULL	
last_name	varchar(50)	YES		NULL	
email	varchar(100)	YES		NULL	

Orders table:

Field	Type	Null	Key	Default	Extra
order_id	int(11)	NO	PRI	NULL	auto_increment
customer_id	int(11)	YES	MUL	NULL	
order_date	date	YES		NULL	

Order_items table:

Field	Type	Null	Key	Default	Extra
item_id	int(11)	NO	PRI	NULL	auto_increment
order_id	int(11)	YES	MUL	NULL	
product_id	int(11)	YES	MUL	NULL	
quantity	int(11)	YES		NULL	

Records:

Products table:

product_id	name	price
1	Espresso	2.50
2	Latte	3.50
3	Cappuccino	3.00
4	Croissant	2.00
5	Muffin	1.50

Customers table:

customer_id	first_name	last_name	email
1	Alice	Johnson	alice@example.com
2	Bob	Smith	bob@example.com

Orders table:

order_id	customer_id	order_date
1	1	2023-09-01
2	2	2023-09-05

Order_items table:

item_id	order_id	product_id	quantity
1	1	1	2
2	1	4	1
3	2	2	1
4	2	5	2

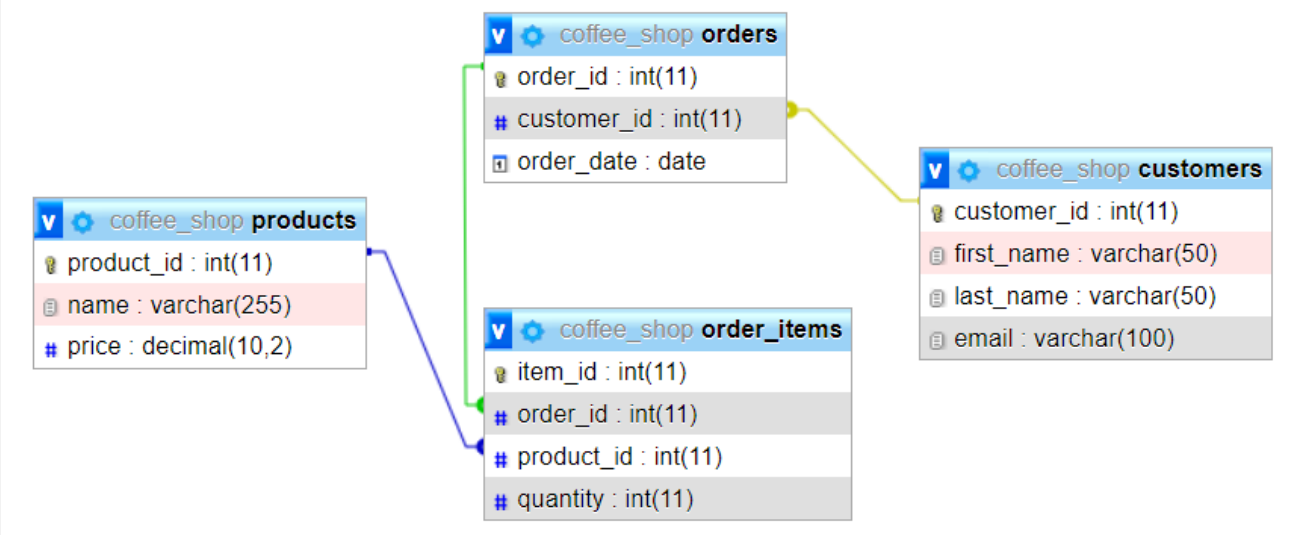

Figure 3: Relation schema for the Coffee shop database (Constraints is set for restricting updates and deletions)

4. Let's create a simple Bank database with 'customers', 'accounts', and 'transactions' tables.
   ***creating tables, inserting records & relationships (0.4 points)
   *You have sample records, structure and relationships provided with figures.

   (a) List all customers and their account types along with the total balance for each customer as below. (0.8 points)

customer_name	account_types	total_balance
Alice Johnson	Checking, Savings	15000.00
Bob Smith	Checking	3000.00

   (b) Find the top 3 customers with the highest total balance across all accounts as the given image. (0.8 points)

customer_name	total_balance
Alice Johnson	15000.00
Bob Smith	3000.00

Table structures:

Customers table:

Field	Type	Null	Key	Default	Extra
customer_id	int(11)	NO	PRI	NULL	auto_increment
first_name	varchar(50)	YES		NULL	
last_name	varchar(50)	YES		NULL	
email	varchar(100)	YES		NULL	
phone_number	varchar(15)	YES		NULL	

Accounts table:

Field	Type	Null	Key	Default	Extra
account_id	int(11)	NO	PRI	NULL	auto_increment
customer_id	int(11)	YES	MUL	NULL	
account_type	enum('Checking','Savings','Loan')	YES		NULL	
balance	decimal(10,2)	YES		NULL	

Transactions table:

Field	Type	Null	Key	Default	Extra
transaction_id	int(11)	NO	PRI	NULL	auto_increment
account_id	int(11)	YES	MUL	NULL	
transaction_date	date	YES		NULL	
amount	decimal(10,2)	YES		NULL	
description	varchar(255)	YES		NULL	

Records:
Customers table:

customer_id	first_name	last_name	email	phone_number
1	Alice	Johnson	alice@example.com	123-456-7890
2	Bob	Smith	bob@example.com	987-654-3210

Accounts table:

account_id	customer_id	account_type	balance
1	1	Checking	5000.00
2	1	Savings	10000.00
3	2	Checking	3000.00

Transactions table:

transaction_id	account_id	transaction_date	amount	description
1	1	2023-09-01	-1000.00	Withdrawal
2	1	2023-09-05	2000.00	Deposit
3	2	2023-09-02	-500.00	Withdrawal
4	3	2023-09-07	1000.00	Deposit

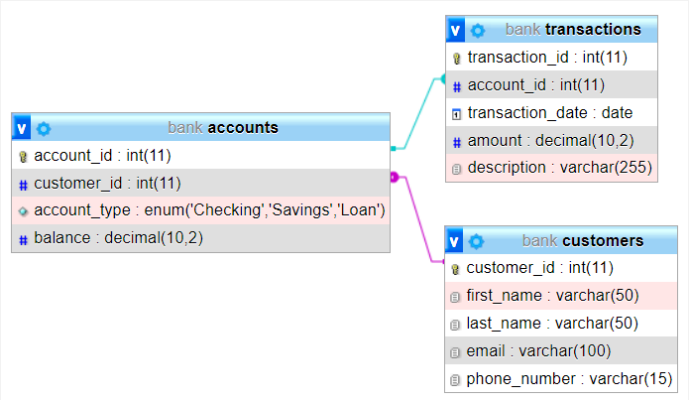

Figure 4: Relation schema for the Bank database (Constraints is set for restricting updates and deletions)

5. Let's create a simple search engine with 'web pages', 'search queries', and 'search results' tables. Then answer the following queries.
   ***creating tables, inserting records & relationships (0.8 points)
   *You have sample records, structure and relationships provided with figures.

   (a) Update the content of a web page based on its URL as below. (0.4 points)

page_id	url	title	content
1	http://www.example.com/page1	Example Page 1	This is the updated content of page 1.
2	http://www.example.com/page2	Example Page 2	This is the content of page 2.
3	http://www.example.com/page3	Example Page 3	This is the content of page 3.

   (b) List the web pages ranked by their appearance in search results for a specific query as the given image. (0.8 points)

query_text	title	url	rank
Search engine	Example Page 2	http://www.example.com/page2	1
Search engine	Example Page 3	http://www.example.com/page3	2

Table structures:
Web_pages table:

Field	Type	Null	Key	Default	Extra
page_id	int(11)	NO	PRI	NULL	auto_increment
url	varchar(255)	YES	UNI	NULL	
title	varchar(255)	YES		NULL	
content	text	YES		NULL	

Search_queries table:

Field	Type	Null	Key	Default	Extra
query_id	int(11)	NO	PRI	NULL	auto_increment
query_text	varchar(255)	YES		NULL	
search_date	date	YES		NULL	

Search_results:

Field	Type	Null	Key	Default	Extra
result_id	int(11)	NO	PRI	NULL	auto_increment
query_id	int(11)	YES	MUL	NULL	
page_id	int(11)	YES	MUL	NULL	
rank	int(11)	YES		NULL	

Records:
Web_pages table:

page_id	url	title	content
1	http://www.example.com/page1	Example Page 1	This is the content of page 1.
2	http://www.example.com/page2	Example Page 2	This is the content of page 2.
3	http://www.example.com/page3	Example Page 3	This is the content of page 3.

Search_queries table:

query_id	query_text	search_date
1	MySQL tutorial	2023-09-01
2	Search engine	2023-09-02

Search_results table:

result_id	query_id	page_id	rank
1	1	1	1
2	1	2	2
3	2	2	1
4	2	3	2

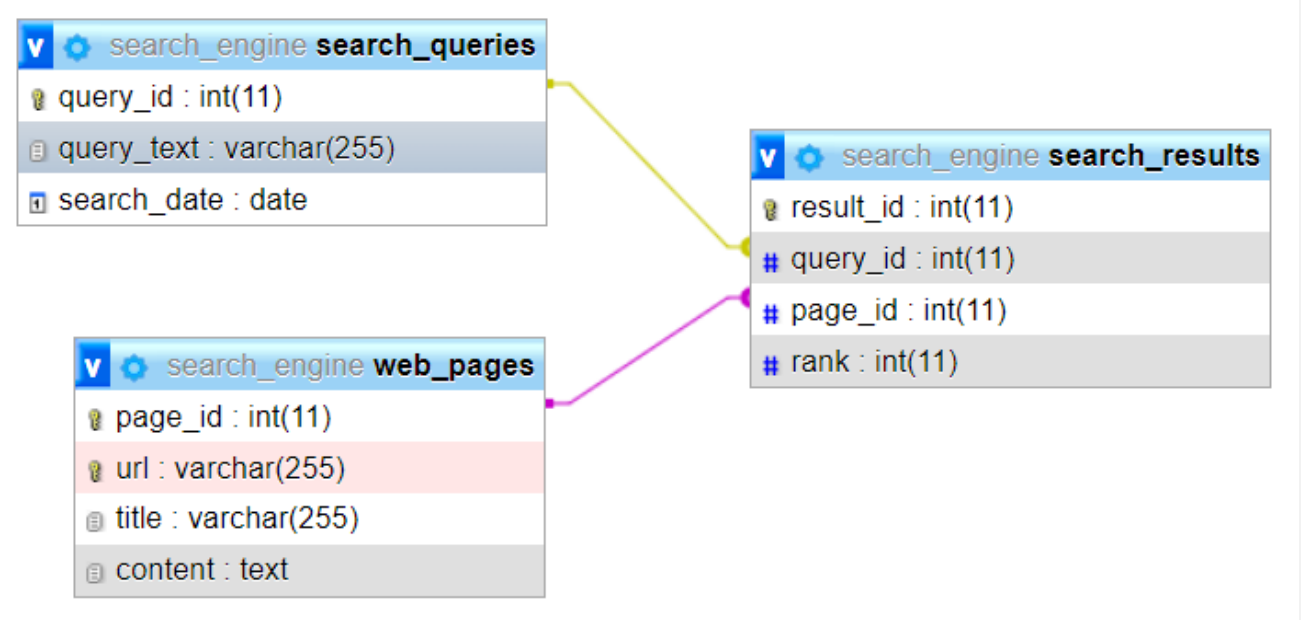

Figure 5: Relation schema for the Search_engine database (Constraints is set for restricting updates and deletions)

***** Put all the SQL commands in a Text file (or a word file) in the sequence and Name it as "YourID.txt" ("YourID.pdf",convert to a pdf) .**