CSE 3241 Project Checkpoint 02 – Relational Model and Relational Algebra

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In a **<u>NEATLY TYPED</u>** document, provide the following:

1. Provide a current version of your ER Model as per Project Checkpoint 01. If you were instructed to change the model for Project Checkpoint 01, make sure you use the revised version of your ER Model.

   Refer to the attached revised ER Model.

2. Map your ER model to a relational schema. Indicate all primary and foreign keys.

   Refer to the attached relational schema.

3. Given your relational schema, provide the relational algebra to perform the following queries. If your schema cannot provide answers to these queries, revise your ER Model and your relational schema to contain the appropriate information for these queries:

   a. Find the titles of all books by Pratchett that cost less than $10
      Temp_1 <- Book$\bowtie_{BISBN=AISBN}$($\sigma_{ALName="Pratchett"}$Author_Write_Book)
      Result <- π title($\sigma_{price<10}$Temp_1)

   b. Give all the titles and their dates of purchase made by a single customer (you choose how to designate the customer)
      Temp_1 <- (Book_has_transaction*Book)*Transaction_History
      Result <- $\pi_{title,date}$($\sigma_{gmail="brutusbuckeye@gmail.com"}$(Temp_1))

   c. Find the titles and ISBNs for all books with less than 5 copies in stock
      Temp_1 <- ISBN F Sum amount(Book*inventory_store_book)
      Result <- $\pi_{title,ISBN}$($\sigma_{sum\_amount<5}$(Temp_1))

   d. Give all the customers who purchased a book by Pratchett and the titles of Pratchett books they purchased
      Temp_1 <- (Book * Book_hrs_tranaction)*Author_write_Book
      Temp_2 <- $\pi_{ISBN,title}$($\sigma_{ALName="Pratchett"}$(Temp_1))
      Result <- $\pi_{email,title}$(Temp_2*Book_has_transaction)*Transaction_history

   e. Find the total number of books purchased by a single customer (you choose how to designate the customer)
      Temp_1 <- $\sigma_{email="brutusbuckeye@gmail.com"AND\ sold="ture"}$(Transaction_history)
      Result <- F count Transaction_id(Temp_1)

   f. Find the customer who has purchased the most books and the total number of books they have purchased
      Temp_1 <- email F count Transaction_id ($\sigma_{sold="true"}$(Transaction_history))
      Result <- email F max count Transaction_id(Temp_1)

4. Come up with three additional interesting queries that your database can provide. Give what the queries are supposed to retrieve in plain English and then as relational algebra. Your queries should include joins and at least one should include an aggregate function. At least one of your queries should use "extra" entities you added to your model in Checkpoint 01.

a) Find titles of books which have the highest rate and their rating

$Temp\_1 <- \sigma_{email="brutusbuckeye@gmail.com"}(Review)$

$Temp\_2 <- ISBN\ F\ max\ rating\ (Temp\_1)$

$Result <- \pi_{title,max\_rating}(Temp\_2 * Book)$

Assume a customer bought textbooks for himself or herself

b) Find all the courses he or she takes this term.

$Temp\_1 <- \sigma_{email="brutusbuckeye@gmail.com"}(Transaction\_history)$

$Result <- \pi_{course\#} (Book\_has\_transaction * Temp\_1)*course\_use\_book$

c) Find all textbooks he or she might want to buy in next term.

$Temp\_1 <- \sigma_{email="brutusbuckeye@gmail.com"}(Transaction\_history)$

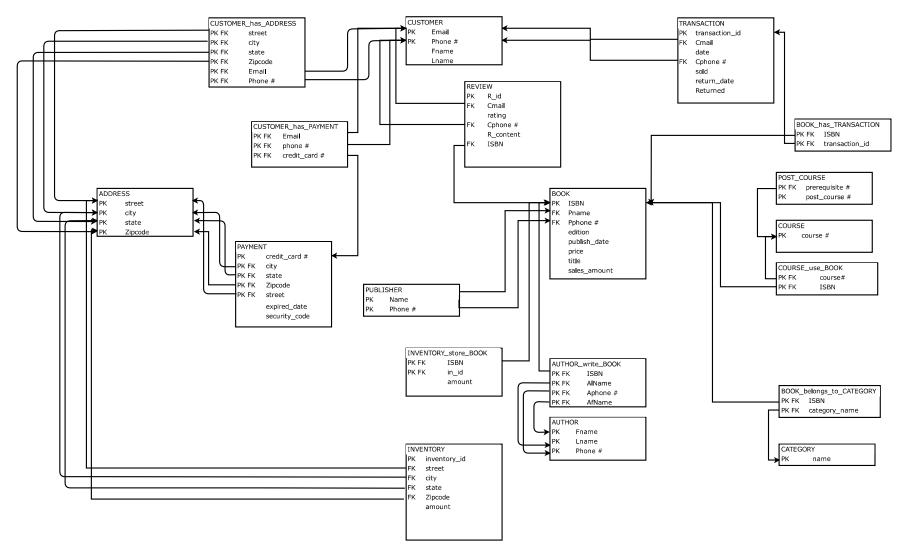$Temp\_2 <- \pi_{course\#} (Book\_has\_transaction * Temp\_1) * course\_use\_book$

$Result <- \pi_{title,ISBN} ((CBook*course\_use\_book)*post\_course)*Temp\_2)$

CUSTOMER_has_ADDRESS

PK FK	street
PK FK	city
PK FK	state
PK FK	Zipcode
PK FK	Email
PK FK	Phone #

CUSTOMER

PK	Email
PK	Phone #
	Fname
	Lname

TRANSACTION

PK	transaction_id
FK	Cmail
	date
FK	Cphone #
	sold
	return_date
	Returned

REVIEW

PK	R_id
FK	Cmail
	rating
FK	Cphone #
	R_content
FK	ISBN

CUSTOMER_has_PAYMENT

PK FK	Email
PK FK	phone #
PK FK	credit_card #

BOOK_has_TRANSACTION

PK FK	ISBN
PK FK	transaction_id

POST_COURSE

PK FK	prerequisite #
PK	post_course #

ADDRESS

PK	street
PK	city
PK	state
PK	Zipcode

BOOK

PK	ISBN
FK	Pname
FK	Pphone #
	edition
	publish_date
	price
	title
	sales_amount

COURSE

PK	course #

PAYMENT

PK	credit_card #
PK FK	city
PK FK	state
PK FK	Zipcode
PK FK	street
	expired_date
	security_code

COURSE_use_BOOK

PK FK	course#
PK FK	ISBN

PUBLISHER

PK	Name
PK	Phone #

INVENTORY_store_BOOK

PK FK	ISBN
PK FK	in_id
	amount

AUTHOR_write_BOOK

PK FK	ISBN
PK FK	AlName
PK FK	Aphone #
PK FK	AfName

BOOK_belongs_to_CATEGORY

PK FK	ISBN
PK FK	category_name

AUTHOR

PK	Fname
PK	Lname
PK	Phone #

CATEGORY

PK	name

INVENTORY

PK	inventory_id
FK	street
FK	city
FK	state
FK	Zipcode
	amount