# CSE 3241 Project Checkpoint 02 – Relational Model and Relational Algebra

Names: Tyra Shin, Sean Kelley, Trey Thomas, Jack Kern, Justin Sparacino

In a **NEATLY TYPED** 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.
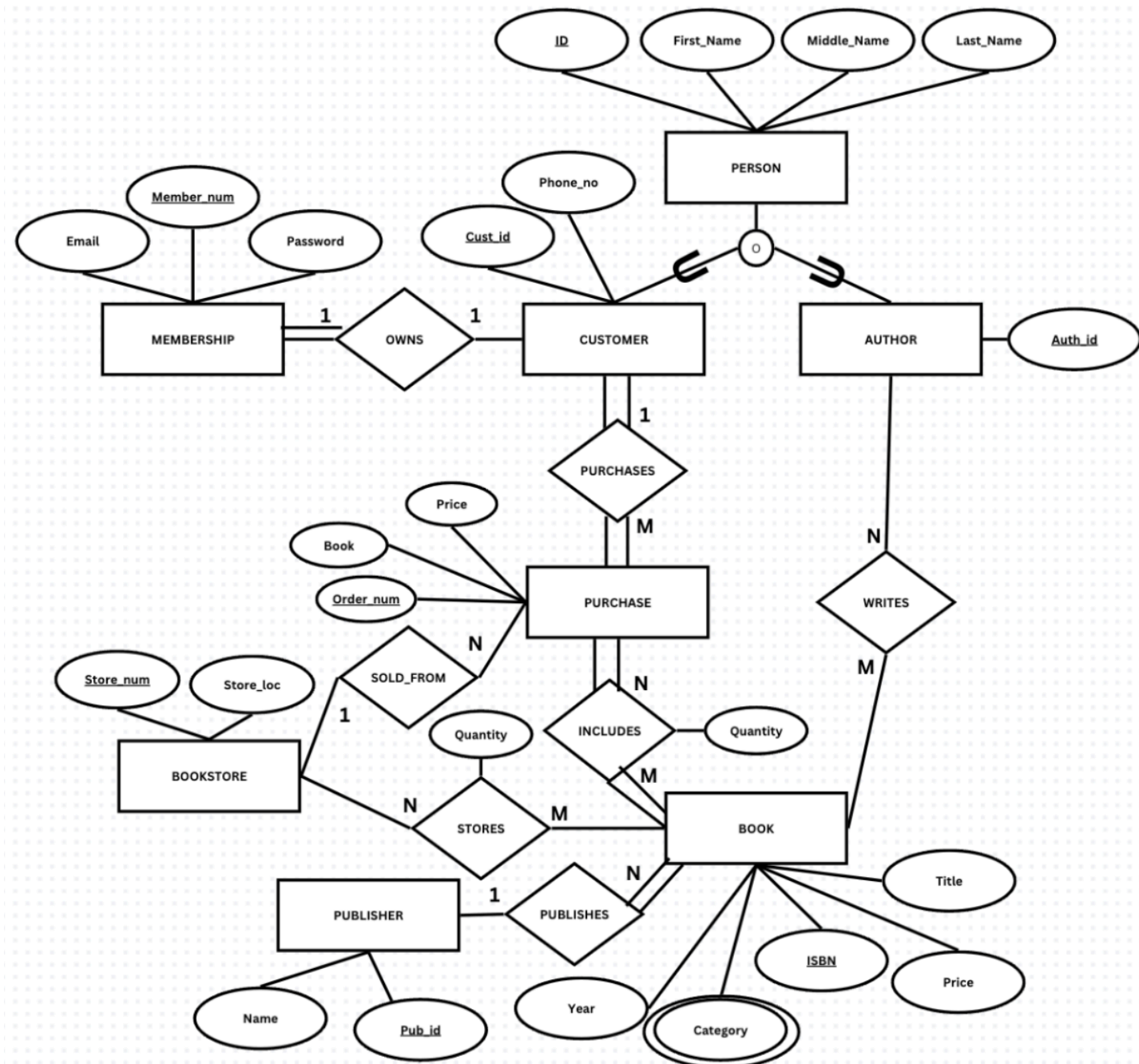
2. Map your ER model to a relational schema. Indicate all primary and foreign keys.
   Membership(Member_num, Email, Password, Cust_ID(FK))
   Person(ID, First_Name, Middle_Name, Last_Name)

Author(Auth_ID(FK))
Writes(Author_ID, ISBN)
Purchase(Order_Num, Customer_ID(FK), ISBN(FK), Price, Date)
Publisher(Pub_ID, Name)
Customer(Cust_id(FK), Phone_no)
Book(ISBN, Publisher_ID(FK), Year, price, Title)
Bookstore(Store_num, store_loc)
Stored(ISBN_Stored, Store_number, Quantity)

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
      πTitle(σPrice < 10, Name = "Pratchett" (BOOK $\bowtie$Publisher = Pub_Id PUBLISHER))

   b. Give all the titles and their dates of purchase made by a single customer (you choose how to designate the customer)
      πtitle, date(CUSTOMER $\bowtie$<cust_id = customer_id> PURCHASE)

   c. Find the titles and ISBNs for all books with less than 5 copies in stock
      πtitle, ISBN(σQuantity < 5(BOOK $\bowtie$ISBN = ISBN_Stored STORED))

   d. Give all the customers who purchased a book by Pratchett and the titles of Pratchett books they purchased
      CUSTOMER_BOOK_PUB $\leftarrow$ (PURCHASE $\bowtie$ Book = ISBN (BOOK $\bowtie$ Publisher = Pub_Id PUBLISHER))
      π Customer, Title (σName = "Pratchett" (CUSTOMER_BOOK_PUB))

   e. Find the total number of books purchased by a single customer (you choose how to designate the customer)
      fSUM(Quantity)((σCust_Id = <SELECT CUSTOMER ID>CUSTOMER) $\bowtie$ Cust_Id = Customer_ID PURCHASES))

   f. Find the customer who has purchased the most books and the total number of books they have purchased
      f MAX (num_books) (ρ (Cust_Id, Phone_no, Order_num, ISBN, Price, num_books) (Cust_Id f SUM(Quantity)(CUSTOMER $\bowtie$ Cust_Id = Customer_ID PURCHASES)))

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.

   Find the total number of books the publisher Pratchett has published.

   fCOUNT(Pub_Id)((σName = "Pratchett"(PUBLISHER)) $\bowtie$ Pub_Id = Publisher_ID BOOK)

Find the number of purchases made by customers with memberships.

f COUNT(Member_num)(MEMBERSHIP ⋈ Cust_Id = Customer_ID PURCHASE)

Find and list the titles and ISBNs of books that <a certain author> has written that are published by Pratchett.

AUTH_BOOK ← (((σAuth_Id = author_idAUTHOR)⋈Auth_Id = Author_ID"WRITES) * BOOK)

πtitle, ISBN(σName = "Pratchett"(AUTH_BOOK ⋈Publisher_ID = Pub_ID PUBLISHER))

Feedback: We received no feedback for this checkpoint.

How we addressed it: n/a since there was no feedback.