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

| Names | Date |
|---|---|
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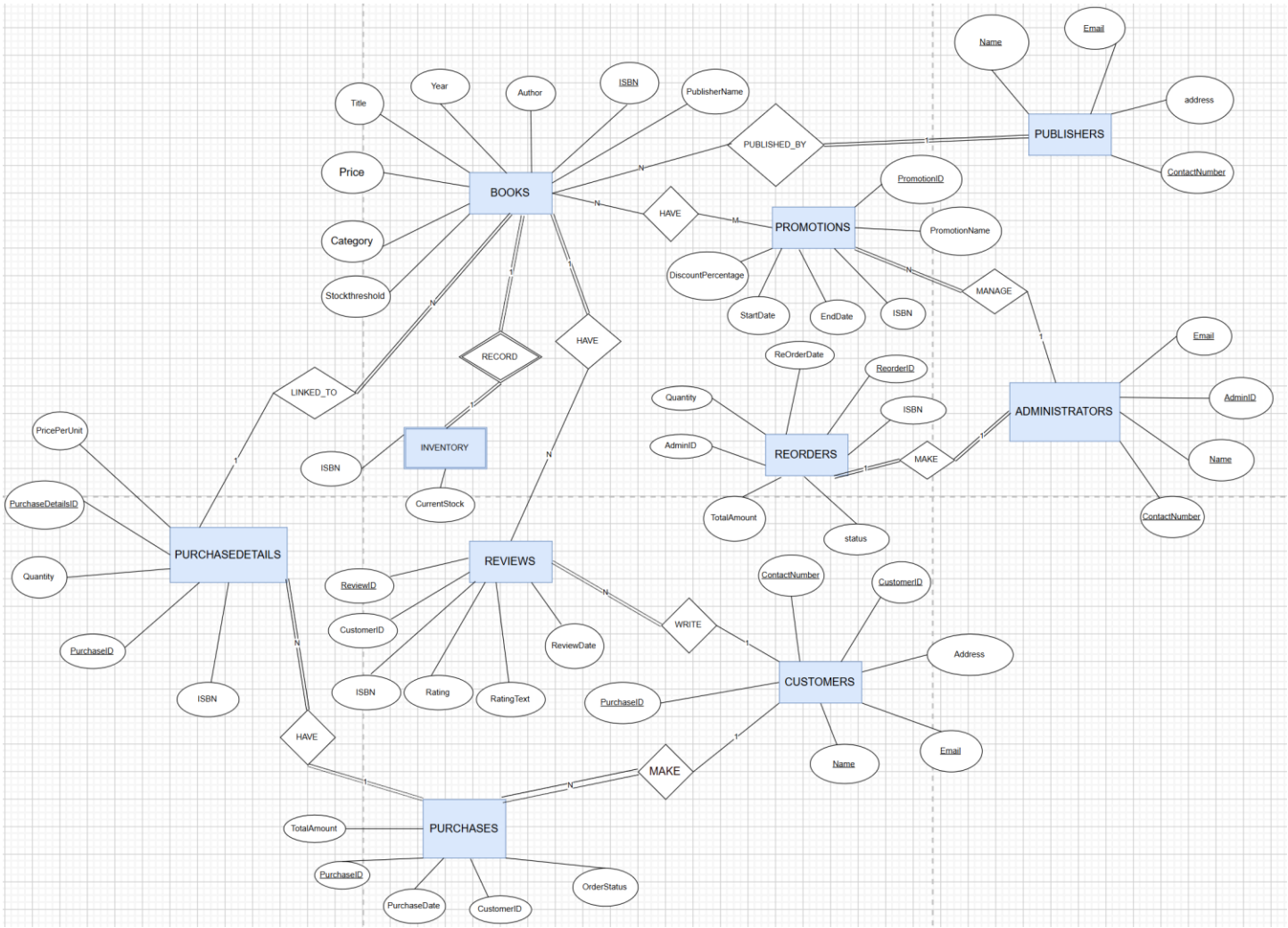
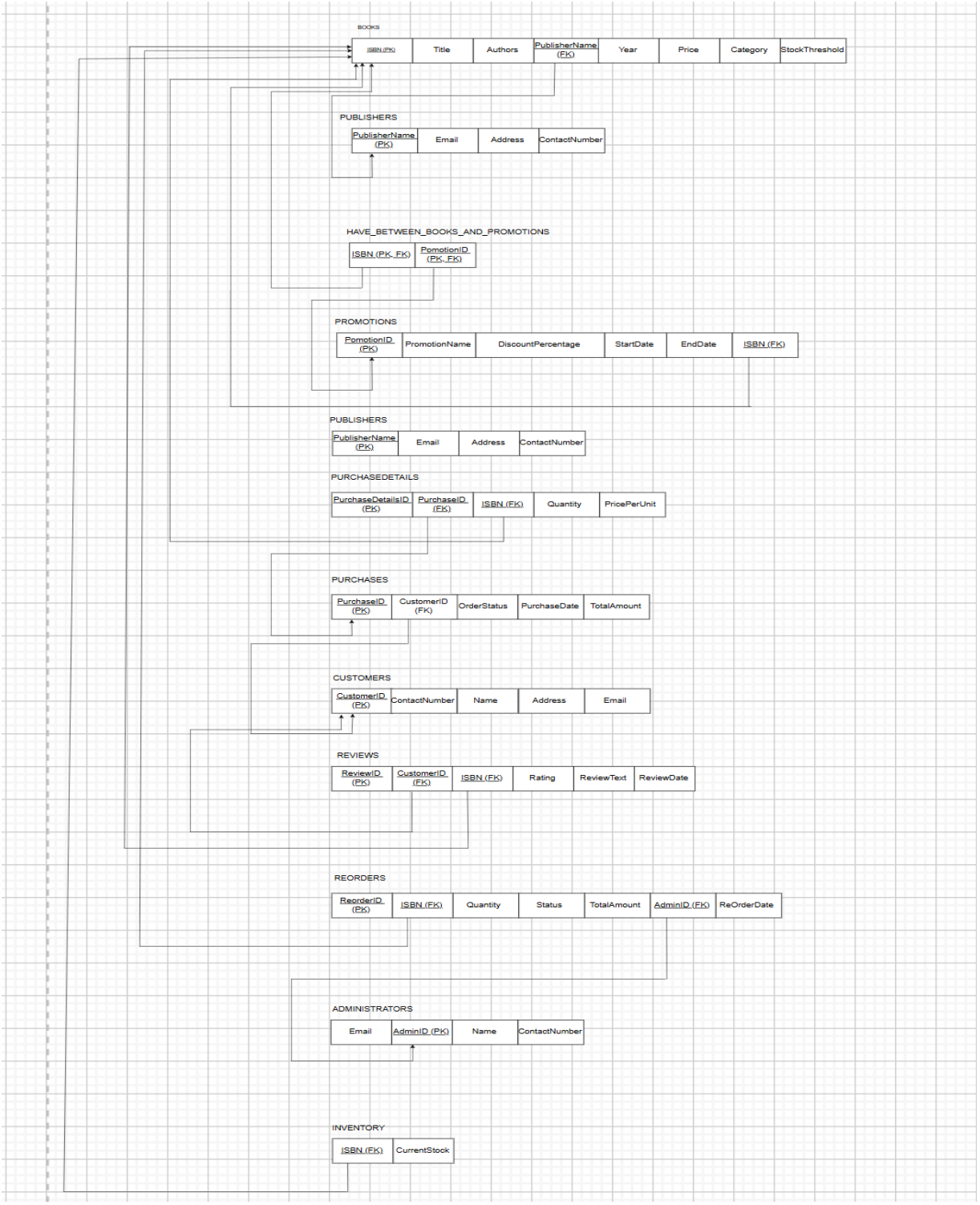
In a **NEATLY TYPED** document, provide the following:

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.




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

b. Give all the titles and their dates of purchase made by a single customer (you choose how to designate the customer)

c. Find the titles and ISBNs for all books with less than 5 copies in stock

d. Give all the customers who purchased a book by Pratchett and the titles of Pratchett books they purchased

e. Find the total number of books purchased by a single customer (you choose how to designate the customer)

f. Find the customer who has purchased the most books and the total number of books they have purchased

a $\pi_{Title}(\sigma_{Price<10 \wedge Author='Pratchett'}(Books))$

b $\pi_{Title, PurchaseDate}(\sigma_{CustomerID=X}(Purchases \bowtie PurchaseDetails \bowtie Books))$

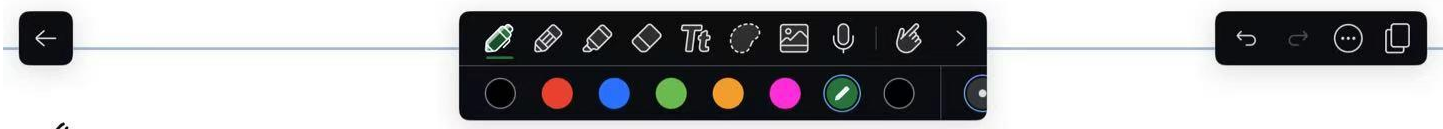
c $\pi_{title, ISBN}(\sigma_{CurrentStock<5}(Books \bowtie Inventory))$

d $\pi_{Name, Title}(\sigma_{Author='Pratchett'}(Purchases \bowtie PurchaseDetails \bowtie Books \bowtie Customers))$

e $F_{Count\ PurchaseDetailsID}(\sigma_{CustomerID=X}(Purchases \bowtie PurchaseDetailsID))$

f $Title\ F_{MAX}(F_{count\ purchaseDetailsID}(Purchases \bowtie PurchaseDetailsID \bowtie Customers))((Purchases \bowtie PurchaseDetailsID \bowtie Customers))$

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.



4.

Q1: Retrieve the names of customers who have submitted reviews, along with the titles of the books they reviewed.

It can help us to see which customers are actirely reviewing books.

Algebra:

retrieve book titles

$\pi_{CustomerID, Name, Title}(CUSTOMERS \bowtie REVIEWS \bowtie BOOKS)$

Link each review to customer who wrote it

customer who wrote it

Q2: For each book calculate total revenue generated by sum up Quantity Purchased x price per unit,

Algebra: get total revenue ↑ associate purchase with book titles ↑

$\gamma_{ISBN, Title, \Sigma(Quantity \times PricePerUnit) \rightarrow TotalRevenue}(BOOKS \bowtie PURCHASEDETAILS)$

revise:

Q3. Retrieve the list of books whose current inventory is below the stock threshold. This helps identify books that need to be reordered soon.

Relational Algebra:

$\pi(ISBN, Title, currentBook)(\sigma(CurrentStock < stockThreshold)(Books \bowtie INVENTORY))$

SQL Query:

```
SELECT b.ISBN, b.title, i.CurrentStock.
FROM Books b.
JOIN Inventory i ON b.ISBN = i.ISBN.
WHERE i.CurrentStock < b.stockThreshold.
```