

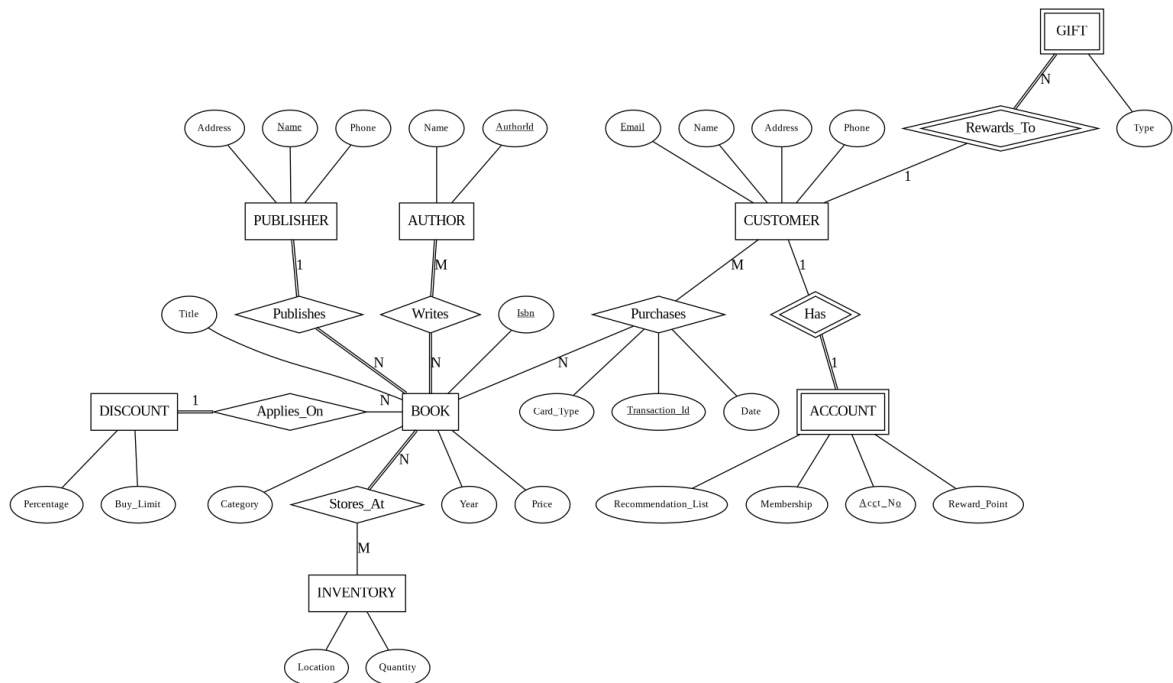
# The Final Report

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# 0.1 Database Description

## 1. ER-model of the Database Design



## 2. Relational Schema for the Database



The bold field refers to the primary keys of the relational schema

## 3. Levels of normalization for each table: All tables achieve BCNF.

## 4. Indices for the Database

We chose the Tree-based index for our BOOK table since the tree-based index is good for looking up values based on range tests. It will speed up our queries when we want to retrieve the book based on the range of the year or the range of the price. Also it is not too bad for looking up values based on equality tests, so it also can slightly speed up our queries when we are trying to look up books based on the titles, categories, authors, and publishers.

## 5. Views for the Database

- View A

Description: This view is able to show all the titles and their dates of purchase made by each customer. And this could be useful to make book recommendations for a customer by looking at his or her purchase history.

Relational algebra expression:

$$R1 \leftarrow PURCHASE \bowtie_{Customer=Email} Customer$$

$$R2 \leftarrow BOOK \bowtie_{Isbn=Book} R1$$

$$Result \leftarrow \pi_{Name, Title, Date} R2$$

```

1 CREATE VIEW CUSTOMER_P AS
2   SELECT C.Name, B.Title, P.Date
3   FROM BOOK AS B, PURCHASE AS P, CUSTOMER AS C
4   WHERE B.Isbn = P.Book AND P.Customer = C.Email

```

Sample output:

Luqman Finnegan	OCP: Oracle9i Certification Kit	07/01/16
Phebe Christian	SQL Server 2000 for Experienced DBA's	09/16/18
Charlie Dolan	The Data Warehouse Toolkit: The Complete Guide to Dimensional Modeling	07/20/18
Kiya Mcguire	How To Do Everything with Your Tablet PC	01/26/19
Amal Terrell	Data Mining: Practical Machine Learning Tools and Techniques with Java Implementations	06/15/17

- View B

Description: This view is able to show the total number of books purchased by each customer. And this could be useful to see if this customer deserves a gift by making a certain amount of purchases in this store.

Relational algebra expression:

$$R1 \leftarrow PURCHASE \bowtie_{Customer=Email} Customer$$

$$Result \leftarrow_{Customer} \mathcal{F}_{COUNT\ Book}(R1)$$

```

1 CREATE VIEW CUSTOMER_N AS
2   SELECT P.Customer, COUNT(Book)
3   FROM PURCHASE AS P, CUSTOMER AS C
4   WHERE P.Customer = C.Email
5   GROUP BY P.Customer

```

Sample output:

Ahmed.12@osu.edu	1
Christian.2@osu.edu	1
Dolan.3@osu.edu	1
Finnegan.1@osu.edu	1
Firth.9@osu.edu	1

## 6. Sample Transactions for the Database

- Transaction A

Description: The customer adds a book to a order and update the book quantity in the inventory

```

1 BEGIN TRANSACTION NEW_P;
2
3 INSERT INTO PURCHASE
4 VALUES (22,
5         'Finnegan.1@osu.edu',
6         '782140661',
7         104.97,
8         DATE(),
9         'AMEX');
10
11 UPDATE Inventory
12     SET Quantity = Quantity - 1
13     WHERE Isbn = '782140661' AND Location = 'warehouse';
14
15 COMMIT;
```

- Transaction B

Description: A certain amount(10) of books(Isbn: 616601654) transmitted from one inventory(warehouse) to another(in-store)

```

1 BEGIN TRANSACTION MOVE;
2
3 UPDATE Inventory
4     SET Quantity = Quantity + 10
5     WHERE Isbn = '782140661' AND Location = 'warehouse';
6
7 UPDATE Inventory
8     SET Quantity = Quantity - 10
9     WHERE Isbn = '782140661' AND Location = 'in-store';
10
11 COMMIT;
```

- Transaction C

Description: Customer redeem 100 reward points to a keychain

```
1 BEGIN TRANSACTION NEW_GIFT;
2
3 UPDATE ACCOUNT
4     SET Reward_point = Reward_point - 100
5     WHERE Email = 'Finnegan.1@osu.edu';
6
7 INSERT INTO GIFT
8 VALUES ('Finnegan.1@osu.edu', 'keychain');
9
10 COMMIT;
```

## 0.2 User Manual