DB

TBD

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Contents

Design Purpose

As consumer behavior shifts during the COVID pandemic, new roles in e-commerce emerge. Many businesses began to market their products online in order to meet the needs of their customers. Because Amazon has the world's largest ecommerce platform, many retailers want to sell their products through the Amazon online store. But how do they manage their product and keep their budget under control? The goal of an ecommerce company database management system is to assist every retailer in selling their products through Amazon platform.

1. Define the information content of your database.

(a) Define a set of entities and appropriate attributes for each entity. Minimum 10 entities.

Entities: Transaction_Income, Customer, Amazon_Order, Employee, Store, Order_Detail, Category, Product, Transaction_Expenditure, Manufacturer, Stock

Attributes: Please see the following ER diagram for more information. That is, the columns in each entity.

(b) Define a set of relationships that might exist between/among entities and attributes. Such relationships may include one-to-one, one-to-many and many-to-many associations.

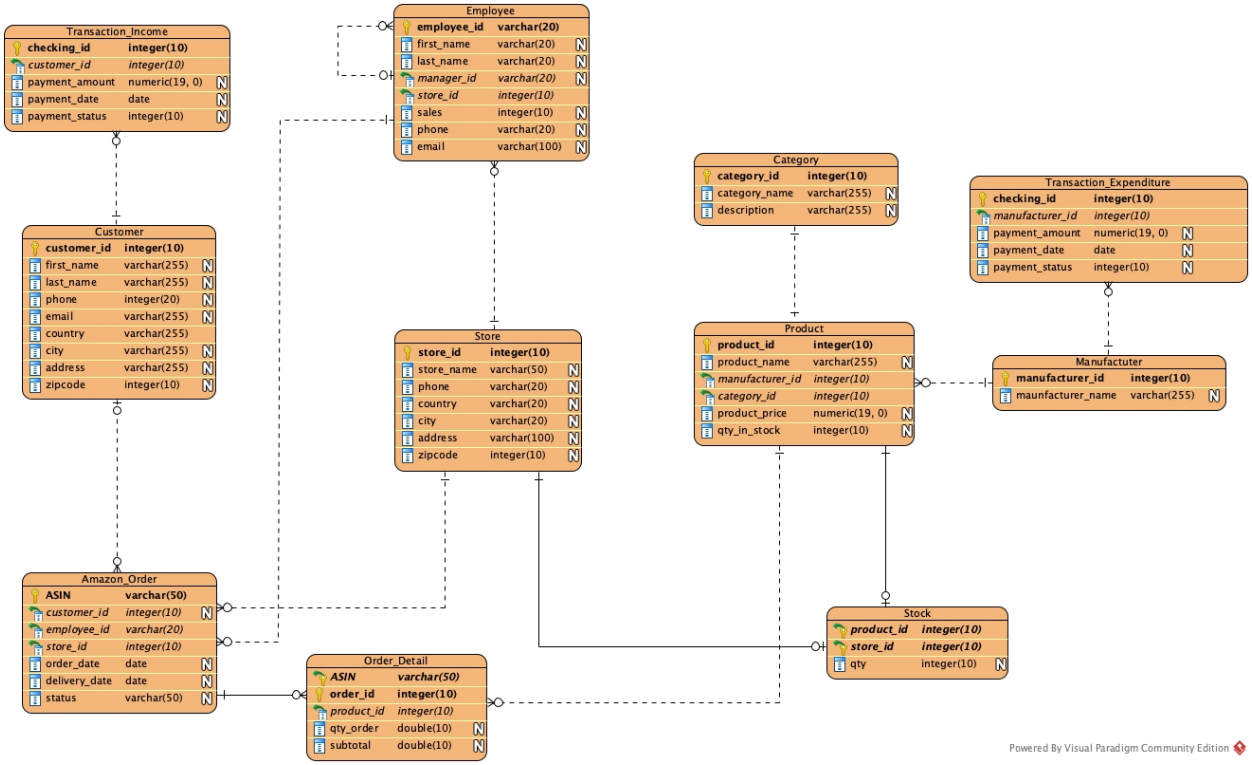
- Customer and Amazon_Order have a 1-M relationship as one customer can place multiple orders on Amazon.
- Amazon_Order and Store have a M-1 relationship as multiple orders can be shipped by one store.
- Amazon_Order and Order_Detail have a 1-M relationship as one ASIN (the primary key in Amazon_Order) can be included multiple order_id.
- Amazon_Order and Employee have an M-1 relationship because one employee can manage multiple ASINs.

(c)-Define a set of constraints that may be imposed on data.

- **Not null and primary key constraints**: The primary key of each entity cannot have a null value. It prevents null values from being entered into one or more columns within a table. On the following SQL sessions, I will show how to create tables with constraints that the primary key has no null value.
- **Foreign key constraint**: It constraint states that the key can only contain values from the referenced main key, ensuring the referential integrity of data linked by the two keys. For instance, set "foreign key (store_id) references Store (store_id)" as a foreign key constraint when you create a table.

2. Define an E-R Diagram for your database design.

Entity Relationship Diagram (ERD)



3. Define a relational schema for your database design. Make sure that you have both one-to-many and many-to-many associations.

(a) Define one or more realistic key(s) for every relation scheme. Use both simple and composite keys.
(b) Define a realistic set of Functional / Multi-Valued Dependencies (when appropriate) for every relation scheme.
(c) Check whether your relational schema is in 2NF, 3NF, BCNF, 4NF.
(d) Put your relational schema in the highest normal form that is possible. Note that, every relation scheme should be in a specific normal form in order to have the relational schema in that normal form.

NOTE: Please provide a detailed explanation for every question when appropriate.

4. Implementation: Create your database using MySQL, or... to Perform the following operations. Create 4 tables from your database project that are connected/linked together and insert few dummy records into these tables. **Then use these tables to answer the following queries**.

(A) You are required to execute SQL queries that include the following operations. For each query, provide the SQL statements along with the output. For each of the following, try different SQL statements (i.e., using one relation, more than one relations,...)

I'm going to create four tables: Employee, Store, Order_Detail, and Amazon_Order with 6 tuples in each entity.

Create a Database

```
create database if not exists ecomDB;
use ecomDB;
```

Create Tables

Store Entity

```
create table if not exists Store (
store_id int not null primary key,
store_name varchar(50) not null,
phone varchar(20),
country varchar(20),
city varchar(20),
address varchar(100),
zipcode int
);
```

Employee Entity

```
create table if not exists Employee (
employee_id varchar(20) not null primary key,
first_name varchar(20) not null,
last_name varchar(20) not null,
manager_id varchar(20),
store_id int,
sales int,
phone varchar(20),
email varchar(100) not null unique,
foreign key (manager_id) references Employee (employee_id),
foreign key (store_id) references Store (store_id)
);
```

Amazon_Order Entity

```
create table if not exists Amazon_Order (
ASIN varchar(50) not null primary key,
customer_id int,
employee_id varchar(20),
store_id int,
order_date date,
delivery_date date,
status varchar(50),
foreign key (employee_id) references Employee (employee_id),
foreign key (store_id) references Store (store_id)
);
```

Order_Detail Entity

```
create table if not exists Order_Detail (
ASIN varchar(50) not null,
order_id int not null,
product_id int,
qty_order double,
subtotal double,
PRIMARY KEY (ASIN, order_id)
);
```

Populating the Tables

Store

```
insert into Store values(1, 'Cable Master', '(617)-3332634',
'USA', 'Washingtion DC', '4400 Massachusetts Ave NW, Washington, DC 20016', 20006);
insert into Store values(2, 'CC Connector', '(520)-1234567',
'USA', 'New York City', '20 W 34th St, New York, NY 10001', 10001);
insert into Store values(3, 'Nerdy Computer', '(123)-6969453',
'USA', 'San Francisco', '5630 Bay St, Emeryville, CA 94608', 94608);
insert into Store values(4, 'HD DVD King', '(781)-4226358',
'USA', 'Las Vegas', '3400 S Las Vegas Blvd, Las Vegas, NV 89109', 89109);
insert into Store values(5, 'Music You And Me', '(513)-4234567',
'Canada', 'Laval', '3003 Boulevard le Carrefour, Laval, QC H7T 1C7', 12345);
insert into Store values(6, 'Super Drone', '(202)-4995340',
'USA', 'Boston', '150 Morrissey Blvd, Boston, MA 02125', 02125);
select * from Store;
```

store_id store_name phone country city address zipcode
1 Cable Master (617)-3332634 USA Washingtion DC 4400 Massachusetts Ave NW, Washington, DC 20016 20006
2 CC Connector (520)-1234567 USA New York City 20 W 34th St, New York, NY 10001 10001
3 Nerdy Computer (123)-6969453 USA San Francisco 5630 Bay St, Emeryville, CA 94608 94608
4 HD DVD King (781)-4226358 USA Las Vegas 3400 S Las Vegas Blvd, Las Vegas, NV 89109 89109
5 Music You And Me (513)-4234567 Canada Laval 3003 Boulevard le Carrefour, Laval, QC H7T 1C7 12345
6 Super Drone (202)-4995340 USA Boston 150 Morrissey Blvd, Boston, MA 02125 2125

Employee

```
insert into Employee values('HQ001', 'Yunting', 'Chiu',
NULL,  001, 3000, '(426)-888-9453', 'yc6705a@american.edu');
insert into Employee values('HQ002', 'Yi', 'Ma',
''HQ001', 002, 50000, '(123)-456-7890', 'yimama@georgetown.edu');
insert into Employee values('HQ003', 'Vitalik', 'Buterin',
'HQ001', 003, 70000, '(113)-456-7330', 'etherum@google.com');
insert into Employee values('HQ004', 'Tracey', 'Brown',
'HQ002', 003, 60000, '(223)-439-2267', 'ada@yahoo.com');
insert into Employee values('MARS001', 'Elon', 'Musk',
'HQ001', 001, 9000000, '(998)-426-6969', 'mars@tesla.com');
insert into Employee values('MARS002', 'Andrew', 'Wang',
'MARS001', 002, 48850, '(784)-345-3926', 'wonderful@spacex.com');
select * from Employee;
```

employee_id first_name last_name manager_id store_id sales phone email
HQ001 Yunting Chiu 1 3000 (426)-888-9453 yc6705a@american.edu
HQ002 Yi Ma HQ001 2 50000 (123)-456-7890 yimama@georgetown.edu
HQ003 Vitalik Buterin HQ001 3 70000 (113)-456-7330 etherum@google.com
HQ004 Tracey Brown HQ002 3 60000 (223)-439-2267 ada@yahoo.com
MARS001 Elon Musk HQ001 1 9000000 (998)-426-6969 mars@tesla.com
MARS002 Andrew Wang MARS001 2 48850 (784)-345-3926 wonderful@spacex.com

Amazon_Order

```
insert into Amazon_Order values('B014I8T0YQ', 1, 'HQ001', 1,
```

```
'2018-06-20', '2018-06-23', 'Shipped');
insert into Amazon_Order values('BB07TVK1V59', 1, 'HQ001', 1,
'2018-06-20', '2018-06-22', 'Shipped');
insert into Amazon_Order values('B093PQMWHF', 2, 'MARS001', 3,
\'2019-03-05', '2019-03-30', 'Shipped');
insert into Amazon_Order values('B094QQMWHF', 3, 'MARS001', 3,
'2021-06-16', '2021-07-25', 'Unshipped');
insert into Amazon_Order values('B07YFCD354', 4, 'HQ002', 2,
'2020-05-18', '2020-05-22', 'Shipped');
insert into Amazon_Order values('B01IQN17A4', 5, 'HQ003', 2,
'2021-06-15', '2025-05-12', 'Unshipped');
select * from Amazon_Order;
```

ASIN customer_id employee_id store_id order_date delivery_date status
B014I8T0YQ 1 HQ001 1 2018-06-20 2018-06-23 Shipped
B01IQN17A4 5 HQ003 2 2021-06-15 2025-05-12 Unshipped
B07YFCD354 4 HQ002 2 2020-05-18 2020-05-22 Shipped
B093PQMWHF 2 MARS001 3 2019-03-05 2019-03-30 Shipped
B094QQMWHF 3 MARS001 3 2021-06-16 2021-07-25 Unshipped
BB07TVK1V59 1 HQ001 1 2018-06-20 2018-06-22 Shipped

Order_Detail

```
insert into Order_Detail values('B014I8T0YQ', 1, 1, 40, 3400);
insert into Order_Detail values('BB07TVK1V59', 2, 2, 30, 6000);
insert into Order_Detail values('B093PQMWHF', 3, 3, 100, 40000);
insert into Order_Detail values('B094QQMWHF', 4, 4, 50, 4000);
insert into Order_Detail values('B07YFCD354', 5, 5, 60, 20000);
insert into Order_Detail values('B01IQN17A4', 6, 6, 5, 39500);
select * from Order_Detail;
```

ASIN order_id product_id qty_order subtotal
B014I8T0YQ 1 1 40 3400
B01IQN17A4 6 6 5 39500
B07YFCD354 5 5 60 20000
B093PQMWHF 3 3 100 40000
B094QQMWHF 4 4 50 4000
BB07TVK1V59 2 2 30 6000

Select Query

select involving one/more conditions in Where Clause

Q: Which ASIN is from Cable Master?

```
select ASIN from Amazon_Order A inner join Store S
on A.store_id = S.store_id
where store_name  = "Cable Master";
```

ASIN
B014I8T0YQ
BB07TVK1V59

select with aggregate functions (i.e., SUM,MIN,MAX,AVG,COUNT)

Q: Look at the average sales for each store.

```
select store_name, round(avg(sales), 2) from Employee E inner join Store S
on E.store_id = S.store_id
group by E.store_id
```

store_name avgSales
Cable Master 4501500.00
CC Connector 49425.00
Nerdy Computer 65000.00

select with Having, Group By, Order By clause

Q: I would like to confirm that the order status has shipped more than one order.

```
select status, count(*) as cnt from Amazon_Order
group by status
having count(*) > 1
order by count(*) desc;
```

status cnt
Shipped 4
Unshipped 2

Nested Select

Q: Find the ASINs which is from the Mars office.

```
select ASIN from Amazon_Order where employee_id in (
    select employee_id from Employee where employee_id like "MARS%");
```

ASIN
B093PQMWHF
B094QQMWHF

select involving the Union operation

Q: find all store ID in the database.

```
(select store_id from Employee)
union
(select store_id from Store)
union
(select store_id from Amazon_Order);
```

store_id
1
2
3
4
5
6

Insert Query

Insert one tuple into a table (for 2 tables, just add 3 records for each table)

Q: insert three tuples into a Order_Detail table

Before the query

ASIN
B01IQN17A4
B07YFCD354
B093PQMWHF
B094QQMWHF
BB07TVK1V59

After the query

```
insert into Order_Detail values('B014I8T0YQ', 6, 1, 20, 1700);
insert into Order_Detail values('B014I8T0YQ', 7, 1, 10, 850);
insert into Order_Detail values('B014I8T0YQ', 8, 1, 40, 3400);
select ASIN from Order_Detail;
```

ASIN
B014I8T0YQ
B014I8T0YQ
B014I8T0YQ
B01IQN17A4
B07YFCD354
B093PQMWHF
B094QQMWHF
BB07TVK1V59

Q: insert three tuples into a Employee table

Before the Query

first_name last_name
Yunting Chiu
Yi Ma
Vitalik Buterin
Tracey Brown
Elon Musk
Andrew Wang

After the Query

```
insert into Employee values('HQ005', 'Doge', 'Brown',
'HQ002',  003, 70000, '(858)-838-9123', 'dogetothemoon@american.edu');
insert into Employee values('HQ006', 'Barry', 'Smith',
''HQ001', 001, 45000, '(432)-456-7890', 'noschool@lol.edu');
insert into Employee values('Earth', 'Mother', 'Ground',
'HQ001', 002, 58990, '(222)-333-8888', 'googleearth@apple.com');
select first_name, last_name from Employee;
```

first_name last_name
Mother Ground
Yunting Chiu
Yi Ma
Vitalik Buterin
Tracey Brown
Doge Brown
Barry Smith
Elon Musk
Andrew Wang

Q: insert three tuples with a specific attribute

Before the Query

ASIN customer_id employee_id store_id order_date delivery_date status
B014I8T0YQ 1 HQ001 1 2018-06-20 2018-06-23 Shipped
B01IQN17A4 5 HQ003 2 2021-06-15 2025-05-12 Unshipped
B07YFCD354 4 HQ002 2 2020-05-18 2020-05-22 Shipped
B093PQMWHF 2 MARS001 3 2019-03-05 2019-03-30 Shipped
B094QQMWHF 3 MARS001 3 2021-06-16 2021-07-25 Unshipped
BB07TVK1V59 1 HQ001 1 2018-06-20 2018-06-22 Shipped

After the Query

```
Insert into Amazon_Order (ASIN) values ('B0741WGQ36');
Insert into Amazon_Order (ASIN) values ('B0741WGQ23');
Insert into Amazon_Order (ASIN) values ('B00BAXRQ3K');
select * from Amazon_Order;
```

ASIN customer_id employee_id store_id order_date delivery_date status B00BAXRQ3K
B014I8T0YQ 1 HQ001 1 2018-06-20 2018-06-23 Shipped
B01IQN17A4 5 HQ003 2 2021-06-15 2025-05-12 Unshipped
B0741WGQ23
B0741WGQ36
B07YFCD354 4 HQ002 2 2020-05-18 2020-05-22 Shipped
B093PQMWHF 2 MARS001 3 2019-03-05 2019-03-30 Shipped
B094QQMWHF 3 MARS001 3 2021-06-16 2021-07-25 Unshipped
BB07TVK1V59 1 HQ001 1 2018-06-20 2018-06-22 Shipped

Insert a set of tuples (by using another select statement)

Q: insert the ASIN to Order_Detail from Amazon_Order which ASIN start with "B".

Before the Query

ASIN order_id product_id qty_order subtotal B014I8T0YQ 1 1 40 3400
B014I8T0YQ 6 1 20 1700
B014I8T0YQ 7 1 10 850
B01IQN17A4 6 6 5 39500
B07YFCD354 5 5 60 20000
B093PQMWHF 3 3 100 40000
B094QQMWHF 4 4 50 4000

BB07TVK1V59 2 2 30 6000

After the Query

```
insert into Order_Detail (ASIN)
select ASIN from Amazon_Order
where ASIN like "B%";
select * from Order_Detail;
```

ASIN order_id product_id qty_order subtotal
B00BAXRQ3K 0
B014I8T0YQ 0
B014I8T0YQ 1 1 40 3400
B014I8T0YQ 6 1 20 1700
B014I8T0YQ 7 1 10 850
B01IQN17A4 0
B01IQN17A4 6 6 5 39500
B0741WGQ23 0
B0741WGQ36 0
B07YFCD354 0
B07YFCD354 5 5 60 20000
B093PQMWHF 0
B093PQMWHF 3 3 100 40000
B094QQMWHF 0
B094QQMWHF 4 4 50 4000
BB07TVK1V59 0
BB07TVK1V59 2 2 30 6000

Insert involving two tables

Before the Query

Q: Insert the ASIN to Order_Detail from Amazon_Order which ASIN in Order_Detail is less than 800.

ASIN order_id product_id qty_order subtotal
B00BAXRQ3K 0
B014I8T0YQ 0
B014I8T0YQ 1 1 40 3400
B014I8T0YQ 6 1 20 1700
B014I8T0YQ 7 1 10 850
B01IQN17A4 0
B01IQN17A4 6 6 5 39500
B0741WGQ23 0
B0741WGQ36 0
B07YFCD354 0
B07YFCD354 5 5 60 20000
B093PQMWHF 0
B093PQMWHF 3 3 100 40000
B094QQMWHF 0
B094QQMWHF 4 4 50 4000
BB07TVK1V59 0
BB07TVK1V59 2 2 30 6000

After the Query

```
insert into Order_Detail (ASIN)
select ASIN from Amazon_Order
where ASIN in (select ASIN from Order_Detail where subtotal < 800);
```

0 row(s) affected Records, but the code can be executed.

Delete Query

Delete one tuple or a set of tuples: from one table, from multiple tables.

From One Table

Q: Remove the store name that is not in the United States.

Before the Query

store_name country
Cable Master USA
CC Connector USA
Nerdy Computer USA
HD DVD King USA
Music You And Me Canada
Super Drone USA

After the Query

```
delete from Store
where country != "USA";
select store_name, country from Store;
```

store_name country
Cable Master USA
CC Connector USA
Nerdy Computer USA
HD DVD King USA
Super Drone USA

From Multiple Tables

Q: Cancel ASINs in Amazon_Order with subtotals less than 3000.

Before the Query

ASIN
B00BAXRQ3K
B0741WGQ23
B0741WGQ36
B014I8T0YQ
BB07TVK1V59
B01IQN17A4
B07YFCD354
B093PQMWHF

B094QQMWHF

After the Query

```
delete from Amazon_Order
where ASIN in (select ASIN from Order_Detail where subtotal < 3000);
select ASIN from Amazon_Order;
```

ASIN
B00BAXRQ3K
B0741WGQ23
B0741WGQ36
BB07TVK1V59
B01IQN17A4
B07YFCD354
B093PQMWHF
B094QQMWHF

Update Query

Update one tuple or a set of tuples: from one table, from multiple tables

From One Rable

Q: Update the country name from USA to United States

Before the Query

store_name country
Cable Master USA
CC Connector USA
Nerdy Computer USA
HD DVD King USA
Super Drone USA

After the Query

```
update Store
set country = "United States"
where country = "USA";
select store_name, country from Store;
```

store_name country
Cable Master United States
CC Connector United States
Nerdy Computer United States
HD DVD King United States
Super Drone United States

From Multiple Tables

Q: Increase the balance of each order by 20% if the shipping status is still unshipped.

Before the Query

ASIN order_id product_id qty_order subtotal
B014I8T0YQ 1 1 40 3400
B014I8T0YQ 6 1 20 1700
B014I8T0YQ 7 1 10 850
B01IQN17A4 6 6 5 39500
B07YFCD354 5 5 60 20000
B093PQMWHF 3 3 100 40000
B094QQMWHF 4 4 50 4000
BB07TVK1V59 2 2 30 6000

After the Query

```
update Order_Detail
set subtotal = round(subtotal * 1.2, 2)
where ASIN in (select ASIN from Amazon_Order where status = "Unshipped");
select * from Order_Detail where qty_order is not null;
```

ASIN order_id product_id qty_order subtotal
B014I8T0YQ 1 1 40 3400
B014I8T0YQ 6 1 20 1700
B014I8T0YQ 7 1 10 850
B01IQN17A4 6 6 5 47400
B07YFCD354 5 5 60 20000
B093PQMWHF 3 3 100 40000
B094QQMWHF 4 4 50 4800
BB07TVK1V59 2 2 30 6000

View Query