Database Design And Implementation For E-Commerce

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Contents

1 Contribution

As of now, we did everything together.

2 Introduction

In this project, our aim was to come up with a reasonably scalable database along with basic GUI for E-Commerce purpose.

We started by listing down various requirements presented in the next section. After that we proceeed on builing an ER Diagram to fullfil the same. After that it was time to implement all this in SQL. In due time, we managed to put various important features provided by almost all E-Commerce site in our project.

So the following report touches on each of these aspects in brief and sequential manner.

2.1 Requirements

Following is the list of requirements.

1. Company maintains the details of stock like their id, name, quantity, rating etc.
2. Company maintains the details of users like their id, name, address, phone number, ewallet.
3. Only users which have purchased the product can leave rating and review to product, they can also give rating to the seller. Thus users should also be able to see their past puchases.
4. Users can add balance to their ewallet.
5. Company maintains the details of its suppliers like their id, name, address, phone number and rating. Each supplier has at least some stock for some item. (Suppliers can add new product (stock) and mention its quantity which he/she has.)
6. When users browses for a product, suppliers will be listed based on the quantity user wants.

3 Entity Relation Diagram

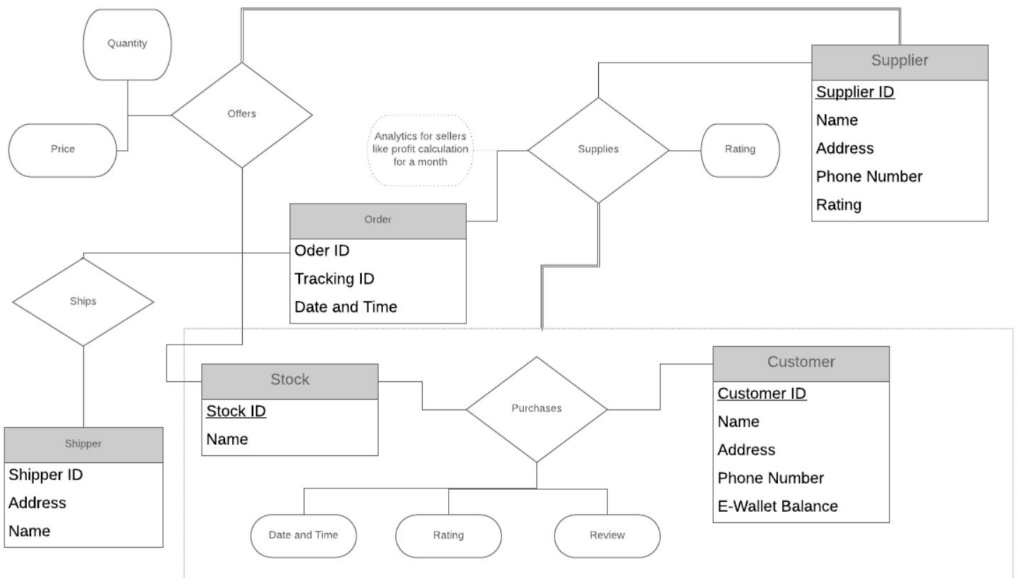


Figure 1: Entity Relationship Diagram for e-commerce

4 Database Schema And Normalization

In this section we describe various aspects of our schema and also mention that it is indeed normalized (BCNF).

Notation: A dependency $A \to B$ is called relevant dependency if all other dependencies are of the form $A \to C$ where C is a subset of B.

- *A table for basic details of customer.*

```
/*  Here: customer_id -> R is the only relevant
dependency and hence it is in BCNF */
create table customer (
  customer_id VARCHAR (20) primary key not null,
  name VARCHAR (20) not null,
  address VARCHAR (60) not null,
  phone_number DECIMAL (10) UNSIGNED not null,
  email_id VARCHAR (20) not null
);
```

- *A table for basic details of seller.*

```
/* Here: seller_id -> R is the only relevant
dependency and hence it is in BCNF */
/* Rating will be updated with the help of triggers.
*/
create table seller (
  seller_id varchar (20) primary key not null,
  name varchar (20) not null,
  address varchar (60) not null,
  phone_number decimal (10) UNSIGNED NOT NULL,
  email_id VARCHAR (20) not null,
  rating float
);
```

- *A table for basic details of shipper.*

```
    /*  Here: shipper_id -> R is the only relevant
    dependency and hence it is in BCNF  */
create table shipper (
  shipper_id varchar (20) primary key not null,
  name varchar (20) not null,
  head_quarters varchar (60) not null,
  phone_number decimal (10) UNSIGNED not null,
  email_id VARCHAR (20) not null
);
```

- *Having described these basic tables, we can now describe table for products. Note that each product can be sold by different sellers in different price and quantity, thus, primary key is formed by both product_id and seller_id.*

```
/*  Here: (product_id, seller_id) -> R is the only
relevant dependency and hence it is in BCNF  */
/* Rating will be updated with the help of triggers.
*/
create table product (
  product_id varchar (20) not null,
  product_name varchar (20) not null,
  seller_id varchar (20) not null,
  price float not NULL,
  total_stock int,
  pickup_address varchar (60) not null,
  description varchar (60),
    rating float,
    foreign key (seller_id) references seller
    (seller_id) on delete cascade,
    primary key (product_id, seller_id)
  );
```

- *When user makes a payment, we want to store payment details for which we have the following table.*

  ```
  /*   Here: payment_id -> R is the only relevant
  dependency and hence it is in BCNF  */
  create table payment (
    payment_id VARCHAR (20) primary key not null,
    credit_card_number VARCHAR (20) not null,
    date_ timestamp,
    billing_address varchar(60) not null
  );
  ```

- *User will have a front end feature to add items in cart. When the user is ready to buy, it will generate an order_id for all those products which he or she chose. Note that order_id will be generated only when user successfully does the payment.*

  ```
  /* Here: order_id -> R is the only relevant
  dependency and hence it is in BCNF  */
  create table order_ (
    order_id VARCHAR (20) primary key not null,
    customer_id VARCHAR (20),
    shipping_address varchar(60) not null,
    payment_id VARCHAR (20),
    foreign key (customer_id) references customer
    (customer_id) on delete set null,
    foreign key (payment_id) references payment
    (payment_id) on delete set null
  );
  ```

- *After generating the payment, we have to put the details of the bought items along with their order_id.*

  ```
  /*  Here: (product_id, order_id, seller_id) -> R is
  the only relevant dependency and hence it is in BCNF
  */
  create table product_order (
  ```

```
    product_id varchar(20) not null,
    order_id varchar (20) not null,
    seller_id varchar (20),
    product_rating int check (product_rating in (NULL,
    1, 2, 3, 4, 5)),
    seller_rating int check (seller_rating in (NULL, 1,
    2, 3, 4, 5)),
    ship_index int,
    product_review varchar (60),
    seller_review varchar (60),
    quantity int,
    selling_price float,
    primary key (product_id, order_id, seller_id),
    foreign key (product_id) references product
    (product_id) on delete cascade,
    foreign key (order_id) references order_ (order_id)
    on delete cascade,
    foreign key (seller_id) references seller
    (seller_id) on delete cascade,
    foreign key (ship_index) references track (index_)
    on delete set null
  );
```

- *Note that we used a foreign key in the above table which we haven't defined yet, which is ship_index . It is basically a unique identifier for each ordered product serving as an index of track table which we will use to track our items.*

```
  /*  Here: index_ -> R is the only relevant dependency
  and hence it is in BCNF  */
  create table track (
    index_ INT AUTO_INCREMENT primary key not null,
    shipper_id varchar (20),
    tracking_id varchar (20),
    foreign key (shipper_id) references shipper
    (shipper_id) on delete set null
  );
```

```
create table Users (
  username VARCHAR (20) primary key not null,
  passcode VARCHAR (20) not null,
  role VARCHAR (20) not null
```

```
);

create table customer (
  customer_id VARCHAR (20) primary key not null,
  name VARCHAR (20) not null,
  address VARCHAR (60) not null,
  phone_number DECIMAL (10) UNSIGNED not null,
  email_id VARCHAR (20) not null,
  foreign key (customer_id) references Users(username) on
  delete cascade
);

create table payment (
  payment_id VARCHAR (20) primary key not null,
  credit_card_number VARCHAR (20) not null,
  date_ timestamp,
  billing_address varchar(60) not null
);

create table order_ (
  order_id VARCHAR (20) primary key not null,
  customer_id VARCHAR (20),
  shipping_address varchar(60) not null,
  payment_id VARCHAR (20),
  foreign key (customer_id) references customer
  (customer_id) on delete set null,
  foreign key (payment_id) references payment (payment_id)
  on delete set null
);

create table supplier (
  supplier_id varchar (20) primary key not null,
  name varchar (20) not null,
  address varchar (60) not null,
  phone_number decimal (10) UNSIGNED NOT NULL,
  email_id VARCHAR (20) not null,
  foreign key (supplier_id) references Users(username) on
  delete cascade
);

create table shipper (
  shipper_id varchar (20) primary key not null,
  name varchar (20) not null,
  head_quarters varchar (60) not null,
  phone_number decimal (10) UNSIGNED not null,
  email_id VARCHAR (20) not null,
  foreign key (shipper_id) references Users(username) on
  delete cascade
);

create table track (
  index_ INT AUTO_INCREMENT primary key not null,
  shipper_id varchar (20),
  tracking_id varchar (20),
  foreign key (shipper_id) references shipper (shipper_id)
  on delete set null
);

create table product (
  product_id varchar (20) not null,
  supplier_id varchar (20) not null,
  price float not NULL,
  total_stock int,
  description varchar (60),
  foreign key (supplier_id) references supplier
  (supplier_id) on delete cascade,
  primary key (product_id, supplier_id)
);

create table product_order (
  product_id varchar(20) not null,
  order_id varchar (20) not null,
  supplier_id varchar (20),
  product_rating int check (product_rating in (1, 2, 3, 4,
  5)),
  supplier_rating int check (supplier_rating in (1, 2, 3,
  4, 5)),
  ship_index int,
  product_review varchar (60),
  supplier_review varchar (60),
  quantity int,
  primary key (product_id, order_id),
  foreign key (product_id) references product (product_id)
  on delete cascade,
  foreign key (order_id) references order_ (order_id) on
  delete cascade,
  foreign key (supplier_id) references supplier
  (supplier_id) on delete set null,
  foreign key (ship_index) references track (index_) on
  delete set null
);
```

5 Roles, Triggers, Views

5.1 Views

- *A view to allow a customer to check his personal previous orders/order history.*
- *A view to check the current status of a particular package.*
- *A view to check the spendings done by the customer per month.*
- *A view for supplier to check his pending (not shipped) packages.*
- *A view for supplier to check his previously processed packages.*
- *A view for supplier to check various important statistics like sale per month.*
- *A view for shipper to check his not yet delivered packages.*
- *A view for shipper to know his past delivered packages.*
- *A view for shipper to know various statistics like sales per month, sales associated with particular supplier, etc.*

5.2 Roles

- *A role for database administrator.*
- *A role for customer.*
- *A role for supplier.*
- *A role for shipper.*

5.3 Triggers

- *Trigger to notify addition of a new customer.*
- *Trigger to notify addition of a new supplier.*
- *Trigger to notify addition of a new shipper.*
- *Trigger to notify addition of new item.*
- *A trigger to add a tuple in track relation before an insertion into product_order relation.*
- *Trigger to notify cutomer of successful order.*
- *Trigger to notify supplier about successful dispatch.*
- *Trigger to notify when the stock goes below a specific amount.*
- *Trigger to delete corresponding entries in various tables if the stock decreases to 0.*
- *Trigger to notify customer that the package has been delivered.*
- *Trigger to notify supplier that the package has been recieved.*
- *Trigger to notify supplier that a customer has left a review.*

6 Use Cases

Lets for this case assume that we a supplier. We first want to register and then add products to sell.

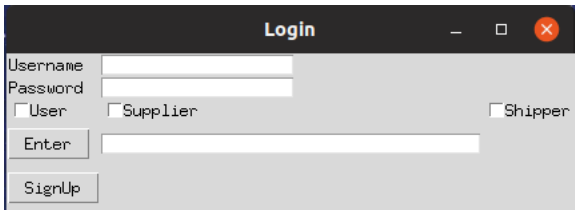


Figure 2: Login page.

So at the login page we will select SignUp. It will then open up the SignUp page.

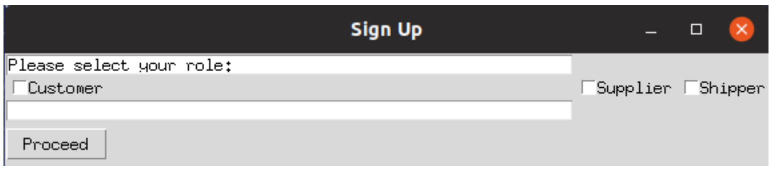
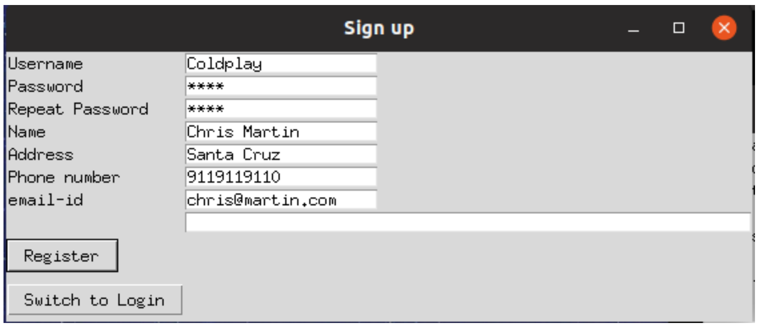


Figure 3: SignUp page(Selecting role).

Since we are Supplier we will select supplier option and then proceed.

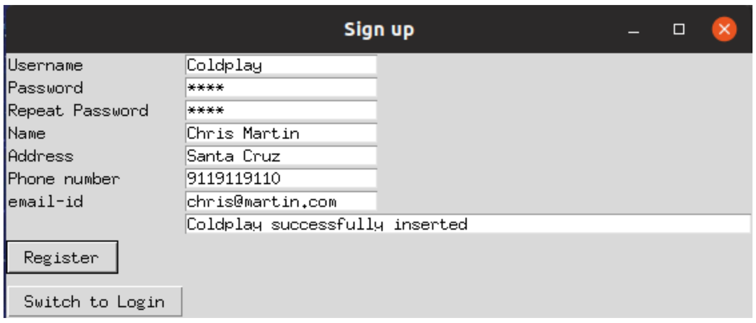


Sign up

Username	Coldplay
Password	****
Repeat Password	****
Name	Chris Martin
Address	Santa Cruz
Phone number	9119119110
email-id	chris@martin.com

Figure 4: SignUp page(Entering Details).

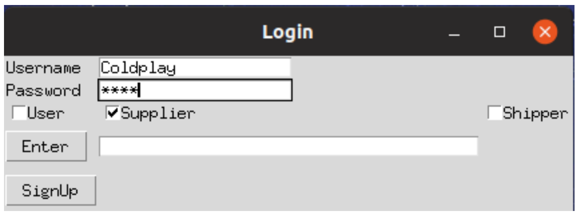
After entering the details press the Register button. It will display that the user is successfully created.


Sign up

Username	Coldplay
Password	****
Repeat Password	****
Name	Chris Martin
Address	Santa Cruz
Phone number	9119119110
email-id	chris@martin.com
	Coldplay successfully inserted

Figure 5: SignUp page(Conformation).

After registering goto the login page by pressing the Switch to Login button.


Login

Username	Coldplay
Password	****

[ ] User [✓ Supplier] [ ] Shipper

Figure 6: Login page(Entering Details).

After login you will be taken to a welcome page which will have two options for you

- *Either to add new products in the market.*
- *Or to change the quantites or price of existing products.*

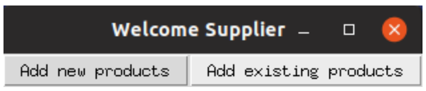
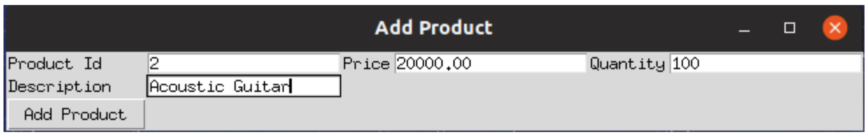


Figure 7: Welcome page for Supplier.

So lets add a new product. You will be taken to a page which will ask to fill the details of the product.


Add Product

Product Id: 2 Price: 20000.00 Quantity: 100
Description: Acoustic Guitar

Figure 8: Add new product.

Now the product has been added successfully.

7 Useful links

Hosted on github with love - *Link*
GUI source code - *Link*

8 Logs

For Developers Use only

- $11^{th} Feb 2019$ **-**
  1. *Table Schema Modified.*
  2. *Basic Application Interface Completed.*
  3. *Added Use Cases in Report.*
  4. *And yes we are calling it AmaKart.*