Online Shopping Database

Database Specification: Purpose, Business Problems Addressed and Business Rules

Group 8

Database Purpose:

Our mission is to provide a platform which allows customers to shop online. The purpose of our database is to maintain the data to track and report customers' retention and preference. Based on data, we can make efficient marketing plan and improve profits and sales. It will be used by administrative staff and customer.

Business Problems Addressed:

- Allow administrative staff to generate descriptive reports.
- Provide information to improve profits and sales (e.g., good quality and suitable customer service can improve profits and sales.)
- Allow staff to track customer order during the system to make sure the items arrived on time and keep the customer satisfied. (e.g., optimize the shipping scheme according to the address from the shipment.)
- Offer recommendation for customers according to their order history, session and feedback.
- Analyze data for administrative staff to make effective decision when purchase inventory items.
- Collect and analyze customers feedback to improve the quality and efficiency of customer service.
- Provide shopping cart information and item inventory to make advertising campaign. (e.g., provide discounts or coupons to liquidate their inventory.) ● Permit customers to ask for customer services in time.

Business Rules:

- A customer may have zero or more order.
- A customer can only have one shopping cart.
- A customer may have zero or more credit cards.
- A customer may have zero or one invoice history.
- A customer may have zero or more user sessions.
- An order may have at least one valid item.
- An item must belong to an inventory catalog.
- A vendor may have one or more inventory items.

- A user session can have zero or one customer services.
- A user session can have zero or one customer feedback.
- A ship date cannot be prior to an order date for any given order.
- An invoice history can have zero or more invoice.
- A shopping cart may have zero or more cart details.
- A staff may have zero or more customer services.
- A staff may have zero or more customer feedback.
- A staff may have zero or more advertisements.

Design Requirements (Credit to Instructor Simon Wang):

- Use Crow's Foot Notation.
- Specify the primary key fields in each table by specifying PK beside the fields.
- Draw a line between the fields of each table to show the relationships between each table. This line should be pointed directly to the fields in each table that are used to form the relationship.
- Specify which table is on the many side of the relationship by placing a crow's feet symbol next to the field where the line ends.

Design Decisions:

No.	Entity Name	Why Entity Include	How Entity is Related to Other Entities
1	User_Account	This database is used for customers to shop online. Customers need to apply user accounts and passwords to login website. The user data collected includes demographic data, credit card data, profiles and usage history. Those data benefit to analyze customer behavior and preference.	As a core entity, the User_Account entity is related to other six entities, such as User_ Session, Shopping_Cart, Order, Invoice, Invoice_History, Credit_Card. Since each user may view product, contact with staff, purchase goods and give feedback, the relationship between the User_Session entity and it is one to many. It is linked to the Shopping_Cart entity with one-to-one relationship. It is associated with the Order, the Invoice, the Invoice_History and the

			Credit_Card entities due to the one-to-many relationship.
2	User_Session	A session is a group of action that customers perform in a website during a limited period. In order to communicate with customers and collect their data of customer behaviors, staff introduce the User_Session entity to measure the traffic amount of a website gets and keep track of what they are doing.	The User_Session entity contains IP_Address, clicks and time_stamp attributes. It is related to the User_Account due to one-to-many relationship. Besides, since each session generate once customer service or feedback, it ties the Customer_Service and the Customer_Feedback entities due to one-to-one relationship.
3	Inventory_Item	One of the important purposes of the database is to sales and purchase product. Customers are interested to know about how many products in stock or prices and types of product. Staff need to track and report the quantity of all product, in order to satisfy customers.	Firstly, the Inventory_Item is directly associated to the Inventory_catalog with a one-to-many relationship. One inventory catalog has many items. Secondly, it is related to vendors who supply product. One vendor can provide lots of inventory, each inventory comes from one vendor. Thirdly, when customer create a shopping cart or a order, it is related to the Cart_Detail and the Order_Item entities due to one-to-many relationship. Finally, company will promote certain types of product, it ties to the Advertising entity due to one-to-many relationship.

4	Shopping_Cart	Customers would like to put the product they intend to buy in a shopping cart, although the items in shopping cart may or may not be actually ordered. Staff need to record and track its status and total amount.	As long as users sign up in the website, they have their own shopping cart. Thus, the Shopping_Cart entity is directly related to the User_Account due to one-to-one relationship. Moreover, while users choose the product they want, the shopping cart creates a list of product which shows the details of product. In this case, the
			Shopping_Cart entity is related to the Cart_Detail due to one-to-many relationship.
5	Cart_Detail	The Cart_Detail entity provides further information about shopping cart, including cart_id, item_id, quantity of items and timestamp, so that users can check and decide whether or not to place the order.	The Cart_Detail entity is related to Shopping_Cart entity and Inventory_Item entity both due to one-to-many relationship. Each shopping cart has one or more items. Its prime key is card_detail_id, its foreign keys are item_id and cart_id, which derives from other entities.
6	Payment	The Payment entity is related to the customer. Customers could pay for the order or prepay some amount of money in case that they want to buy some products for emergency. The Payment entity contains amount and status of the payment.	When the customers generate an order, there will be payment related to the order.The Payment entity contains order_id tied to the Order entity. And it also contains card_id which is related to the card_id from the Credit_Card entity.
7	Credit_Card	Credit card is related to the payment. Customers could pay by their credit card, and also the staff could get more information of customers from their credit history.	Credit card belongs to the customer(its owner), so the entity has user_id key. On the other hand, payment should contain card_id.

8	Order	An order could keep track of individual order items, discounts, sale prices, commissions, taxes, cancels, and any changes in order status. The Order entity is related to Customer entity.	Since order belongs to customer, Order entity contains user_id tied to the User_Account entity. Also, an order could generate order_items, payment, shipping and invoice.
9	Order_Item	Order_item entity, a weak entity of order, could record every item number, category and price from an order. Therefore, the staff could know exactly what a customer have purchased.	This entity is derived from the Order entity, so it contains order_id. And it is related to Inventory_Item and connected by item_id.

10	Order_Item_History	The Order_Item_History entity is a weak entity of order item. The history of each order item can be recorded separately to keep track of the history of the state changes.	The Order_Item_History entity is derived from the Order_Item entity, and every state change of the order item should be record as an order item history.
11	Customer_Service	Customer service and customer feedback can give the staff more information to sale their items and can do some adjustments on time.	Customer service is related to user session and staff. Customers can use user session to return or change their goods. Also, staff can deal with many customer services for improving their service and helping their customer better.

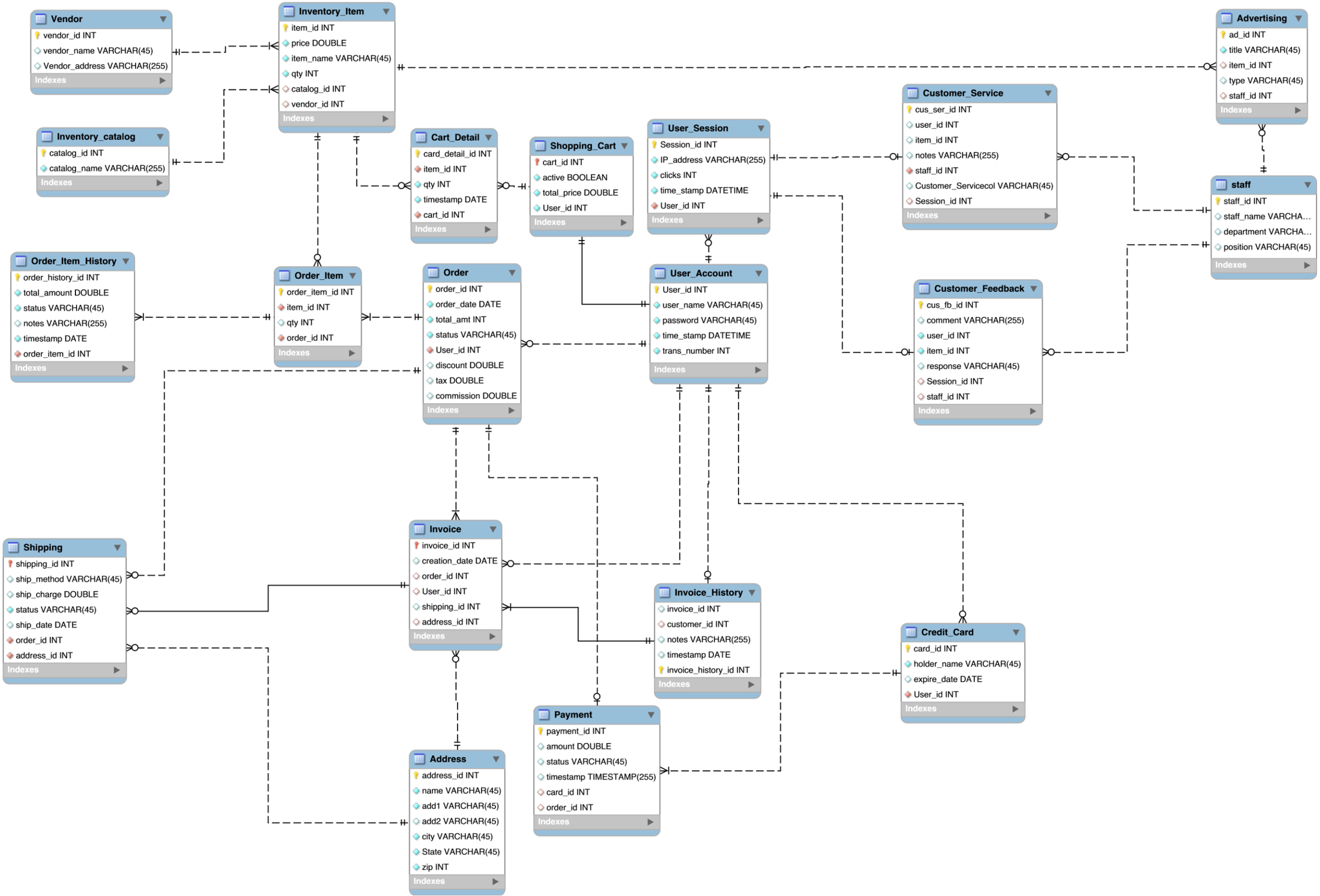
12	Shipping	Shipping is important for the whole system to let the customers get their items by all kinds of shipping methods. It has a lot of contents for customers to trace the items that they already bought. It is convenient for both customers and staff to know more about the items status.	Shipping is related to order invoice and address. One order may have many shippings. There may have out of stock situation, and it will be some day for inventory to recharge it. So maybe one order has many shippings. As the same situation, one invoice will have many shippings too. According to customers, one address will have many shippings from different order or the same order arrived.
13	Invoice	This is an evidence that shows a customer bought items. It is important for shipping staff to give the items to a correct person. And it will be helpful for customers if the items aren't suitable or in other situations.	The Invoice entity has five relationship. As said above, an invoice will have many shippings and one address will have many invoices. Invoice history is a repository for storing many invoices. What's more, each user account has one or more invoice for one order.
14	Invoice_History	Customers or staff can use invoice history to find the invoice details. There are descriptions about the date, notes for customers and staff	Invoice history store many invoices and each user account have only one invoice history.

		review. The Invoice_History entity is related to the Invoice entity.	
15	Address	Shipping will need address for them to deliver the items to customers. It has details about the country, State and city. The Address entity is related to the Shipping and the Invoice entities.	The Address entity is related to the Shipping and the Invoice entities. One address may have many invoices and shippings.

16	Staff	Administrative staff can look at records of order item history, customer feedback, and recent inventory catalog in order to seize customer preferences, and will be able to plan an appropriate marketing strategy, establish a good relationship with customers, and further increase profits of a company.	A staff entity is related to other three entities due to one-to-many relationship: Advertising, Customer_Service and Customer_feedback. A staff can advertise multiple items, but an item will only be managed by one staff. Each staff can provide many customer services; however, a service can only belong to a staff. A staff will receive numerous customer feedbacks, but each feedback will only correspond to a staff.
17	Inventory_Catalog	The Inventory_Catalog entity is used to record goods. In order to accurately monitor inventory, we need to list inventory items in a catalog. In this way, staff can have better and continuous control on inventory, as well as record the most current product information, so that the company can improve profits and sales in the end.	Inventory catalog entity is related to Inventory_Item entity due to one-to-many relationship. A catalog may include many inventory items in it. Furthermore, a catalog will include at least one inventory item. Each inventory item can only belong to one catalog.
18	Customer_Feedback	The Customer_Feedback is one of the most important factors when we want to make right decisions. For those compliments, we can know customer preferences and purchase tendency; for those	Each customer feedback may only belong to one user session, and a user session can only have zero or one customer feedback. Therefore, they are one-to-one relationship. Since each feedback will only
		non-malicious criticisms, company will be able to correct sales strategies.	correspond to a staff, and a staff may have multiple customer feedbacks. As a result, the Customer_Feedback entity and the Staff entity is a one-to-many relationship.

19	Advertising	Through online payment records, order item history and customer's browser history, shopping system can collect and integrate all these records to advertise company's product. Company will be able to display advertisement online (official website) or through direct mail.	The Advertising entity is related to other two entities due to one-to-many relationship. Each advertisement can only advertise one inventory item, but each inventory item may have plenty of advertising. In addition, an advertising will only manage by a staff, but a staff can advertise multiple items.
20	Vendor	A vendor is the one who purchases products from manufacturers or distributors and sells them to companies. A vendor is also a source of inventory items from a company.	The Vendor entity and Inventory_Item entity is a one-to-many relationship. A vendor can provide a lot of inventory items, but each inventory item will only belong to a vendor. Moreover, a vendor must have at least one inventory item.

Entity-Relationship diagram (ERD): attached in next page.


Vendor
vendor_id INT
vendor_name VARCHAR(45)
Vendor_address VARCHAR(255)
Indexes
Inventory_Item
item_id INT
price DOUBLE
item_name VARCHAR(45)
qty INT
catalog_id INT
vendor_id INT
Indexes
Advertising
ad_id INT
title VARCHAR(45)
item_id INT
type VARCHAR(45)
staff_id INT
Indexes
Inventory_catalog
catalog_id INT
catalog_name VARCHAR(255)
Indexes
Cart_Detail
card_detail_id INT
item_id INT
qty INT
timestamp DATE
cart_id INT
Indexes
Shopping_Cart
cart_id INT
active BOOLEAN
total_price DOUBLE
User_id INT
Indexes
User_Session
Session_id INT
IP_address VARCHAR(255)
clicks INT
time_stamp DATETIME
User_id INT
Indexes
Customer_Service
cus_ser_id INT
user_id INT
item_id INT
notes VARCHAR(255)
staff_id INT
Customer_Servicecol VARCHAR(45)
Session_id INT
Indexes
staff
staff_id INT
staff_name VARCHA…
department VARCHA…
position VARCHAR(45)
Indexes
Order_Item_History
order_history_id INT
total_amount DOUBLE
status VARCHAR(45)
notes VARCHAR(255)
timestamp DATE
order_item_id INT
Indexes
Order_Item
order_item_id INT
item_id INT
qty INT
order_id INT
Indexes
Order
order_id INT
order_date DATE
total_amt INT
status VARCHAR(45)
User_id INT
discount DOUBLE
tax DOUBLE
commission DOUBLE
Indexes
User_Account
User_id INT
user_name VARCHAR(45)
password VARCHAR(45)
time_stamp DATETIME
trans_number INT
Indexes
Customer_Feedback
cus_fb_id INT
comment VARCHAR(255)
user_id INT
item_id INT
response VARCHAR(45)
Session_id INT
staff_id INT
Indexes
Shipping
shipping_id INT
ship_method VARCHAR(45)
ship_charge DOUBLE
status VARCHAR(45)
ship_date DATE
order_id INT
address_id INT
Indexes
Invoice
invoice_id INT
creation_date DATE
order_id INT
User_id INT
shipping_id INT
address_id INT
Indexes
Invoice_History
invoice_id INT
customer_id INT
notes VARCHAR(255)
timestamp DATE
invoice_history_id INT
Indexes
Credit_Card
card_id INT
holder_name VARCHAR(45)
expire_date DATE
User_id INT
Indexes
Payment
payment_id INT
amount DOUBLE
status VARCHAR(45)
timestamp TIMESTAMP(255)
card_id INT
order_id INT
Indexes
Address
address_id INT
name VARCHAR(45)
add1 VARCHAR(45)
add2 VARCHAR(45)
city VARCHAR(45)
State VARCHAR(45)
zip INT
Indexes