BUAN 6320.502 | Database Foundations for Business Analytics

Project 1

Date: October 22, 2021
Created by: The DB_Group
Created for: Database Foundations for Business Analytics course
No. of Pages: 17

Group Details

Group Members	UTD Email ID
Runjhun Sharma	runjhun.sharma@utdallas.edu
Sarthak Jain	sxj200036@utdallas.edu
Sarthak Khanna	sxk200151@utdallas.edu
Raksha Gujarathi	rxg210027@utdallas.edu
Srishti Patil	sxp210092@utdallas.edu
Sanika Jadhav	saj200004@utdallas.edu
Priyal Gupta	Pxg200016@utdallas.edu
Varun Bhavnani	vnb210000@utdallas.edu

Document Details

Document Name	Document Owner	Date of release	Version
The DB Group_Fundamentals of Database_Project 1	The DB_Group	22nd October 2021	V1.0

Contents

1. Problem Description

1.1. Problem Statement

With the urgent requirement for a digital transformation, all retail businesses are streamlining their traditional operations to do on-the-go business with customers. Data is at the center of any digital transition, and Dynamo Electronics wants to abandon paper invoices in favor of digital ones. The first stage in such a change is business data modeling. In order to utilize analytics for revenue development and marketing in the future, Dynamo Electronics needs a relational database to monitor all transactions and maintain a customer repository.

1.2. Organization Description and goals

Dynamo Electronics was founded back in 1997 where it started off by selling vintage radio sets and TVs to customers. A small shop in South Bombay, India. In the era of recessions and fluctuating customer demands, Dynamo Electronics still relied on roots and did not upgrade their business as per the growing market.

One significant change in their business was back in 2010 where they started selling mobile phones and computers. There was a spike in their revenue for about 3 years, but since then, it has been quite stagnant. Their goal is to go global and follow the same path as big players like Amazon in order to go digital.

Following are the business goals associated with this digital transformation.
Goal 1: Data Modeling - Have a proper database that covers all the aspects of the business.
Goal 2: Go cloud - Have a cloud platform set up to maintain the database and run their analytics solutions
Goal 3: E-commerce - Implement an eCommerce website for better user experience and expand the business in the global market

1.3. Business requirements

Following are the business requirements for goal 1: Data modeling

1. Design the Entity relation diagram of the business with the following key elements:
    a. Identify attributes of each entity
    b. Identifying the weak and strong relationships between each entity
    c. Create joint entity for many to many relations
2. Create the database with relevant entity tables and insert the current business data available from the paperwork
3. Generate tables to resolve following business requirements
    a. Understanding the current revenue and setting the target for coming months
    b. Data-driven Promotional strategies
        i. Identify types of customers based on their transaction history and customize the marketing strategy accordingly
        ii. Recommendation system: Recommending products based on similar customers to increase the order values

2. Scope of the database

2.1 Customer Table

Details of all the customers and their transactions. Following are the attributes along with their data types and constraints

Attributes	Description	Data type	Constraints
Customer_ID	Unique ID for each customer	INT	NOT NULL, PRIMARY KEY
Cust_Firstname	First name of the customer	Varchar	-
Cust_Lastname	Last name of the customer	Varchar	-
Cust_email	Email address of the customer	Varchar	-
Cust_phn	Phone number of the customer	Varchar	-
Cust_billingaddress	Billing address of the customer	Varchar	-
Cust_shippingaddress	Shipping address of the customer	Varchar	-
Cust_City	City where the customer lives	Varchar	-
Cust_State	State where the customer lives	Varchar	-
Cust_Country	Country where the customer lives	Varchar	-
Postal_code	Postal code of the address	INT	-
Credits	Credit score based on the transaction history	INT	-
Lifetime_orderval	Total business from one customer till date	FLOAT	-

2.2 Order Table

Details about the orders from individual customers with the amount. Following are the attributes along with their data types and constraints

Attributes	Description	Data type	Constraints
Order_ID	Unique ID for each order	INT	NOT NULL, PRIMARY KEY
OrderDate	Date when the order was made	DATE	NOT NULL

Shipped_Date	Date when the order was shipped	DATE	NOT NULL
Cust_shippingaddress	Shipping address of the customer	Varchar	NOT NULL
Total_Amount	Amount of the order before discount	FLOAT	NOT NULL
Offer_ID	Unique ID of each offer	Varchar	NOT NULL
Discount	Discount percentage as per customer label	FLOAT	-
Customer_ID	Unique ID for each customer	INT	FOREIGN KEY

2.3 Product Categories Table

Description of the categories of different products. Following are the attributes along with their data types and constraints

Attributes	Description	Data type	Constraints
Category_ID	Unique ID for each category	INT	PRIMARY KEY
Category_name	Name of the category	Varchar	-
Category_des	Description about the category	Varchar	-

2.4 Product Table

Details of all the products along with their price. Following are the attributes along with their data types and constraints

Attributes	Description	Data type	Constraints
Product_ID	Unique ID for each product	INT	PRIMARY KEY
Product_name	Name of the product	Varchar	-
Product_price	Price of that product	FLOAT	-
Product_des	Description of that product	Varchar	-
Category_ID	Unique ID for each category	INT	FOREIGN KEY

2.5 Order details Table

More details about each order where product quantities are defined. Following are the attributes along with their data types and constraints

Attributes	Description	Data type	Constraints
Order_ID	Unique ID for each order	INT	NOT NULL
Quantity	Quantity of products purchased	INT	NOT NULL
Amount	The cost associated with each product	FLOAT	NOT NULL
Total_Amount	Amount of the order before discount	FLOAT	NOT NULL
Product_ID	Unique ID for each product	INT	FOREIGN KEY

2.6 Supplier Table

Details about the suppliers involved in the business and the amount paid to each supplier. Following are the attributes along with their data types and constraints

Attributes	Description	Data type	Constraints
Supplier_ID	Unique ID for each supplier	INT	PRIMARY KEY
supplier_name	Name of the supplier	Varchar	-
Supplier_address	Address of the supplier	Varchar	-
Supplier_Amount	Amount paid to each supplier	FLOAT	-
Category_ID	Unique ID for each category	INT	FOREIGN KEY

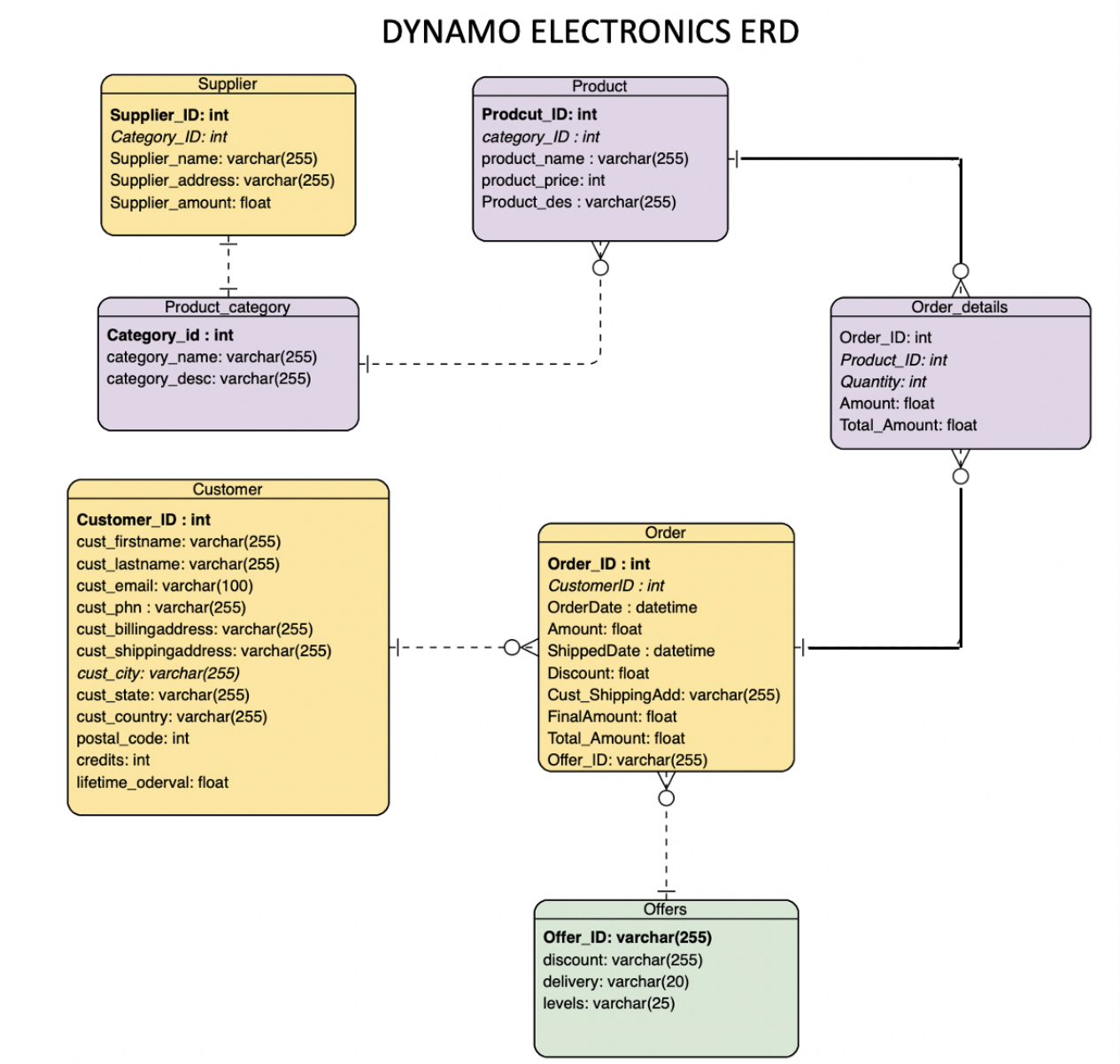
2.7 Offers Table

Details of the offers are based on customer segmentation. Following are the attributes along with their data types and constraints

Attributes	Description	Data type	Constraints
Offer_ID	Unique ID of the offer	Varchar	PRIMARY KEY
Levels	Group to which customer belongs to	Varchar	-
Discount	Discount percentage as per customer label	FLOAT	-
delivery	Type of delivery	Varchar	-

3. Entity Relationship Diagram & Database Schema

3.1. Entity Relationship Diagram



3.2. Creating Tables

Customer Table

```
CREATE TABLE Customer
(
        Customer_ID         INT NOT NULL,
        Cust_Firstname       VARCHAR(255),
        Cust_Lastname        VARCHAR(255),
        Cust_email          VARCHAR(255),
        Cust_phn            VARCHAR(255),
        Cust_billingaddress   VARCHAR(255),
        Cust_shippingaddress  VARCHAR(255),
        Cust_City           VARCHAR(255),
        Cust_State          VARCHAR(255),
        Cust_Country         VARCHAR(255),
        Postal_code         INT,
        Credits             INT,
        Lifetime_orderval     FLOAT,
        PRIMARY KEY (Customer_ID),
)
```

Order Table

```
CREATE TABLE Orders (
        Order_ID int NOT NULL,
        OrderDate DATE NOT NULL,
        Shipped_Date DATE NOT NULL,
        Cust_shippingaddress varchar(50) NOT NULL,
        Total_Amount float NOT NULL,
        Offer_ID varchar(255) NOT NULL,
        Discount float
        PRIMARY KEY (Order_ID),
        Customer_ID int foreign key references Customer(Customer_ID)
        );
```

Product Categories Table

```
CREATE TABLE Product_category(
        Category_ID int NOT NULL,
        Category_name varchar(255),
        Category_des varchar(255),
        PRIMARY KEY (Category_ID),
        );
```

Product Table

```
CREATE TABLE Product(
        Product_ID         INT NOT NULL,
        Product_name        VARCHAR(255),
        Product_price       FLOAT,
        Product_des         VARCHAR(255),
        PRIMARY KEY (Product_ID),
        Category_ID INT FOREIGN KEY REFERENCES Product_category(Category_ID) ON DELETE CASCADE
);
```

Order Details Table

```
CREATE TABLE Order_details (
        Order_ID int NOT NULL,
        Quantity int NOT NULL,
        Amount float NOT NULL,
        Total_Amount float NOT NULL,
        Product_ID INT FOREIGN KEY REFERENCES Product(Product_ID) ON DELETE CASCADE
        );
```

Suppliers Table

```
CREATE TABLE Suppliers (
        Supplier_ID int,
        supplier_name varchar(40),
        Supplier_address varchar(100),
        Supplier_Amount float,
        PRIMARY KEY (Supplier_ID),
        Category_ID int FOREIGN KEY REFERENCES Product_category (Category_ID)
  );
```

Offers Table

```
CREATE TABLE Offers (
            Offer_ID varchar(255),
            Levels varchar (255),
            discount float,
            delivery varchar(255),
            PRIMARY KEY (Offer_ID)
  );
```

3.3. Displaying tables

Customer Table

	Customer_ID	Cust_Firstname	Cust_Lastname	Cust_email	Cust_phn	Cust_billingaddress	Cust_shippingaddress	Cust_City	Cust_State	Cust_Country	Postal_code	Credits	Lifetime_orderval
1	1	Kasha	Todd	kasha.todd@gmail.com	646-720-2170	910 Vine Street	910 Vine Street	Campbell	CA	USA	95008	1	1000
2	2	John	Doe	john.doe@gmail.com	870-732-7448	9273 Thorne Ave	9273 Thorne Ave	Orchard Park	NY	USA	14127	3	3000
3	3	Sarah	Daniels	sarah.daniels@yahoo.com	417-253-2217	769C Honey Creek St	769C Honey Creek St	Redondo Beach	CA	USA	90278	6	6000
4	4	Alex	Parker	alex.parker@gmail.com	210-785-4848	3815 Williams Mine Road	3815 Williams Mine Road	Maplewood	New Jersey	USA	7040	7	7000
5	5	Tony	Stark	tony.stark@gmail.com	620-892-9654	2395 Jerome Avenue	2395 Jerome Avenue	Edinburg	Texas	USA	78539	9	9000
6	6	Celia	Parker	celia.parker@gmail.com	210-785-4848	427 Don Jackson Lane	427 Don Jackson Lane	Detroit	Michigan	USA	48219	8	8000
7	7	Natasha	Sethi	natasha.sethi@gmail.com	9876241090	12/216 Mahal Samuel Street	12/216 Mahal Samuel Street	Mumbai	Maharashtra	India	41109	5	5000
8	8	Aditya	Birla	aditya.birla@gmail.com	8820196583	398 Spring Building Nsr Road,	398 Spring Building Nsr Road	Ranchi	Jharkhand	India	41152	6	6000
9	9	Avanti	Sharma	avanti.sharma@gmail.com	7598001249	201 City View Building	89 D Kamla Nagar	Delhi	Delhi	India	11100	4	4000
10	10	Ben	Miller	ben.miller@gmail.com	847-525-4886	476 Chestnut Ave	476 Chestnut Ave	Monroe	NY	USA	10950	2	2000

Order Table

	Order_ID	OrderDate	Shipped_Date	Cust_shippingaddress	Total_Amount	Offer_ID	Discount	Customer_ID
1	1	2021-01-01	2021-01-03	910 Vine Street	200	axs1	5	1
2	2	2021-01-02	2021-01-04	Orchard Park	760	axs2	10	2
3	3	2021-01-02	2021-01-04	769C Honey Creek St	1200	axs2	10	3
4	4	2021-01-03	2021-01-05	3815 Williams Mine Road	1960	axs3	15	4
5	5	2021-01-14	2021-01-16	2395 Jerome Avenue	760	axs3	15	5
6	6	2021-01-18	2021-01-20	427 Don Jackson Lane	670	axs3	15	6
7	7	2021-01-08	2021-01-10	12/216 Mahal Samuel Street	890	axs2	10	7
8	8	2021-01-12	2021-01-14	398 Spring Building Nsr Road	960	axs2	10	8
9	9	2021-01-14	2021-01-16	89 D Kamla Nagar	140	axs2	10	9
10	10	2021-01-24	2021-01-26	476 Chestnut Ave	230	axs1	5	10

Product Categories Table

	Category_ID	Category_name	Category_des
1	1	TV & Video	Latest Television with OTT features that will enhance the entertainment experience for you. Variety of TV brands along with their accessories are includes in this category
2	2	Cell Phones & Accessories	Covers all types of cellphones like Iphone, Onplus, Samsung, etc along with their accessories
3	3	Computers & Accessories	Covers all types of computers like Mac, Windows surface, Dell, Lenovo, etc along with their accessories
4	4	Home Audio & Theater	Covers all types of home theaters and bluetooth speakers for better entertainment experience
5	5	Printers and Accessories	Covers all types of office printers and their accessories

Order Details Table

	Order_ID	Quantity	Amount	Total_Amount	Product_ID
1	1	1	200	200	100
2	2	1	730	730	600
3	2	2	15	30	800
4	3	1	1200	1200	900
5	4	1	1500	1500	1000
6	4	1	30	30	1100
7	4	1	180	180	100
8	4	1	20	20	200
9	4	1	260	260	1300
10	5	1	730	730	600
11	5	2	15	30	800
12	6	1	600	600	700
13	6	2	20	40	1400
14	6	1	30	30	1100
15	7	1	400	400	300
16	7	1	230	230	400
17	7	1	260	260	1300
18	8	1	730	730	600
19	8	1	230	230	400
20	9	5	20	100	1400
21	9	1	30	30	1100
22	9	1	10	10	500
23	10	1	230	230	400

Product Table

	Product_ID	Product_name	Product_price	Product_des	Category_ID
1	100	HP Ink Tank 315 Colour Printer	180	Wireless Touchscreen printer, Auto Document feeder,Sc...	5
2	200	JS Nova Printer Stand	20	Printer cart with 2 tier wood storage shelves,brown color ...	5
3	300	Amazon Fire TV 65 inch	400	Omni series 4K UHD smart TV with dolby Vision, hands fr...	1
4	400	Roku Smart LED TV	230	TCL 40-inch 1080p Smart LED roku TV-model 40S325,bl...	1
5	500	Universal Remote Control	10	Remote for Samsung Smart TV LED,QLED TVs, with Net...	1
6	600	iphone 13	730	iphone 13 64GB Blue color	2
7	700	One plus 8	600	OnePlus 8 Glacial Green 8GB RAM+128GB Storage	2
8	800	Cordking iphone13 case	15	Silicone ultra slim shockproof protective phone case, 6.1 i...	2
9	900	Apple MacBook Pro	1200	Apple MacBook Pro (13.3-inch/33.78 cm, Apple M1 chip ...	3
10	1000	Dell 15 laptop	1500	Ryzen 5-5600H Gaming Laptop, 8GB DDR4, 512GB SS...	3
11	1100	Matein Travel Laptop Backpack	30	Business anti theft slim durable laptop backpack with US...	3
12	1200	Rockville channel Home Theater	180	ROCKVILLE HTS56 1000w 5.1 channel Home Theater s...	4
13	1300	Bose TV Speaker	280	Soundbar for TV with bluetooth and HDMI-ARC connecti...	4
14	1400	Pro universal Folio case	20	Case for 9-10 inch tablet,leather and black in color	2

Suppliers Table

	Supplier_ID	supplier_name	Supplier_address	Supplier_Amount	Category_ID
1	1	Jeffrey Lebowski	Silver Lake Los Angeles 75626	2000	5
2	2	Nicholas McDunnough	Scottsdale Arizona 76566	2000	2
3	3	Tyler Durden	Milford Drive Delaware 75248	2000	4
4	4	Luke Skywalker	Brooklyn New York 76651	2000	1
5	5	John McClane	Nakatomi Plaza Los Angeles 79015	2000	3

Offers Table

	Offer_ID	Levels	discount	delivery
1	axs1	level 1	5	Paid
2	axs2	level 2	10	Free
3	axs3	level 3	15	Free

4. Retrieving the data according to business goals

4.1.Business Goal 1: Understanding the current revenue and setting the target for coming months

Query

```
/*Creating view table*/
CREATE VIEW Revenue as
select DISTINCT
 (
  SELECT
   SUM(Total_Amount) as val1
  from
   Orders
 ) - (
  SELECT
   SUM(Supplier_Amount) as val2
  from
   Suppliers
 ) as Revenue
 FROM Suppliers;
```

```
SELECT *
FROM Revenue;

/*Setting up target for next month*/
SELECT SUM(Revenue) as Current_month_profit,
CASE
   WHEN Revenue < 0  THEN 'Sell more and puchase less'
   WHEN Revenue < 2000 AND Revenue > 0  THEN 'Purchase less and sales target for next month should be'
   ELSE 'Purchase less and sales target for next month should be'
END AS current_status,
CASE
   WHEN Revenue < 0  THEN Revenue*(-2)
   WHEN Revenue < 2000 AND Revenue > 0  THEN Revenue*(2)
   ELSE Revenue*(1.5)
END AS Targets
FROM Revenue
GROUP BY Revenue;
```

Output:

Calculating the revenue

	Revenue
1	-2230

Setting up the target for next month

	Current_month_profit	current_status	Targets
1	-2230	Sell more and puchase less	4460

4.2. Business Goal 2: Identify types of customers based on their transaction history and customize the marketing strategy accordingly

Query

```
/* Segmenting customers based on lifetime order value*/
SELECT Lifetime_orderval,
CASE
   WHEN Lifetime_orderval < 3000 THEN 'level 1'
   WHEN Lifetime_orderval between 3000 and 6000 THEN 'level 2'
   ELSE 'level 3'
END AS Levels
FROM Customer;
```

```
/*Calculating the discounts*/
CREATE VIEW Final_Amount as
SELECT Total_Amount,
CASE
   WHEN Offer_ID='axs1' THEN Total_Amount*(100-5)/(100)
   WHEN Offer_ID='axs2' THEN Total_Amount*(100-10)/(100)
   ELSE Total_Amount*(100-15)/(100)
END AS Final_Amount
FROM Orders;

SELECT *
FROM Final_Amount;
```

Output:

Segmenting customers based on lifetime order value

	Lifetime_orderval	Levels
1	1000	level 1
2	3000	level 2
3	6000	level 2
4	7000	level 3
5	9000	level 3
6	8000	level 3
7	5000	level 2
8	6000	level 2
9	4000	level 2
10	2000	level 1

Calculating the discounts

	Total_Amount	Final_Amount
1	200	190
2	760	684
3	1200	1080
4	1960	1666
5	760	646
6	670	569.5
7	890	801
8	960	864
9	140	126
10	230	218.5

4.3. Business Goal 3: Recommending products based on similar customers to increase the order values

Query

```
SELECT distinct o.order_id, o.product_id,p.product_name as Recommendation
FROM order_details o
INNER JOIN Product p
on o.product_id=p.product_id
where order_id=2
AND o.product_id NOT IN ( select product_id
from order_details
where order_id=8 );
```

Output:

Order 2 is similar to order 8. Since there is one additional product in order 8, we recommend that additional product to the customer with order 2

	order_id	product_id	Recommendation
1	2	800	Cordking iphone13 case

5. Members contribution

Topics	Members
Entity relation diagram	Sarthak Khanna, Sanika Jadhav, Varun Bhavnani
Creating tables and inserting values	All
Coming up with business queries	All
Documentation	Sarthak Khanna, Sanika Jadhav, Varun Bhavnani

- End of Document -