Report on Lululemon Athletica, Inc.

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1. Introduction

1.1 Project Name: Lululemon Relational Database Management System

1.2 Business Sector: Clothing Line

1.3 Brief

Lululemon Athletica, styled as lululemon athletica, is an athletic apparel retailer domiciled in Delaware and headquartered in Vancouver. Founded in 1998 as a retailer of yoga pants and other yoga wear, Lululemon has since expanded to sell its products internationally in 460 stores as well as online. The company has expanded to sell a variety of athletic wear, including performance shirts, shorts, and pants, as well as lifestyle apparel and yoga accessories.

1.4 History

Lululemon was founded in 1998 by Chip Wilson in Vancouver, British Columbia, and sold its first pair of yoga pants that year. Wilson created the name to have many L's so that it would sound western to Japanese buyers, who often have difficulty pronouncing the letter.

The company's initial public offering was in July 2007, raising $327.6 million by selling 18.2 million shares. Christine Day, a former co-president of Starbucks, became chief executive officer in 2008.

In 2013, the company made its third consecutive appearance on *Fortune*'s Fastest-Growing Companies list. In December 2013, founder Chip Wilson announced his resignation as chairman, and that the president of TOMS Shoes, Laurent Potdevin, would become CEO.

In 2014, Lululemon opened its first store in Europe, a flagship shop in Covent Garden, London. In February 2015, Wilson announced that he was resigning from the board, and that Michael Casey, former lead director of the board, would replace him. In 2018, Laurent Potdevin resigned as CEO and from the company's board due to misconduct.

In 2019, Lululemon announced an investment in Mirror, a fitness startup that sells an interactive mirror for at-home workouts. The companies planned to create new content for the device, starting with meditation classes.

In April 2020, Lululemon CFO Patrick Guido stepped down from the company to assume a leadership position outside of the apparently, according to company sources.

1.5. Products

Lululemon sells athletic wear including tops, yoga pants, shorts, sweaters, jackets and undergarments, as well as hair accessories, bags, yoga mats and water bottles. Lululemon trademarked its original fabric, Luon, which included a higher-than-average amount of nylon microfiber, in 2005. Since then, the company has produced several different types of fabrics, including compression and moisture-wicking designs.

In 2017, Lululemon and Athletic Propulsion Labs began selling women's and men's shoes in 23 stores across North America. In 2019, the company launched a luxury streetwear brand called Lab in a few of its stores.

Lululemon maintains a research and development lab, "Whitespace", within its headquarters. It has around 50 employees including scientists and physiologists.

1.6 Revenue

1.5 Area Focus

Our project focus is to understand how this clothing company functions all around world offering various varieties of products with numerous stores in huge cosmopolitan cities making it easily accessible to everyone. Lululemon has vast Database and Relational Database Management System model to manage its stores and products distribution.

Through this data repository, we explore how Lululemon enables product distribution to make everything and every product accessible to customers. Our focus is to make scalable data by designing RDBMS around the world that can be expanded further in a similar fashion into states and countries to cover their area of presence.

1.7 Store Locations

- United States
- Canada
- China
- Australia
- United Kingdom
- Japan
- New Zealand
- Germany
- South Korea
- Singapore
- France
- Malaysia
- Sweden
- Ireland
- Netherlands
- Norway
- Switzerland

1.8 Data Collection

We used two kinds of data a combined it all together to run a better set of queries to allow flexibility and preciseness to our analysis.

I. **Online Data(Data present on public platform):** The data has been sourced from Lululemon Statista website which is further sourced from publicly available information from the Statista website. . The project focuses on a part of the data available. The link to the source can be referred to from https://www.statista.com/topics/2975/lululemon-athletica/

II. **Synthesized Data (Fictional Data):** Synthesised some data and used as a stand-in for test datasets and our tables. We have made up some data which was necessary to complete the functionality system of the company.

2. ENTITIES

Our design reflects seven main entities for Airbnb database and two multivalued entities.

1. **Employee**

Employee entity stores values specific to a single employee. An employee is someone who works in the company and will belong to one of various departments. Employee entity is identified by its unique primary key- Employee ID. Employee attributes include: Employee ID, First Name, Last Name, Date of Birth, Job Role, Hire Date, Mobile.

2. **Customer**

Customer entity stores values specific to a single customer. A customer is someone who makes purchase at store. This contains details of customers from all stores. The attributes stored under each customer include customer ID, First Name, Last Name, Gender, Email, Email Subscription, City, State, Zip Code, Customer Type.

3. **Store**

This includes information about stores worldwide and its specific region, city, state, and zip code. The attributes in this are Store Name, Email, Mobile, and Region ID.

4. **Billing details**

This contains all the essential information regarding the bill and product and store. It's an essential for customizations and crucial for return and exchange polices to be applied on the product . The attributes in this are Bill number, Customer ID, employee ID, store ID, product ID, Billing Date, Unit price, Discount, Quantity.

5. **Product**

Contains Information regarding the products such as product ID, price, etc.
The attributes included in this are Product Id, Target population, Size, Colour, Prize, Product Category, Supplier ID. Here supplier ID is the foreign which is the primary key in the supplier table.

6. **Region**

Region has all the details about which region the store belonged to. The attributes are Region ID which is primary key I this table and foreign key in the store table and there are city , state, Zip code, country, country code.

7. **Supplier**

The supplier is the one who manufactures the products required and distribute volume of products to various stores. Suppliers export and import the goods and distribute according to the requirements. The attribute include supplier ID, supplier name ,supplier address, Supplier region supplier country ,

Location Manager and supplier type.

8. **Customisation**

The company customization option to alter the products which are of not a good fit for the customer. It is not necessary that every customer has to get the products , it's an additional advantage provided to customers. The attributes in this are Customization ID, Start date , End date, Customer ID, Product ID

9. **Department**

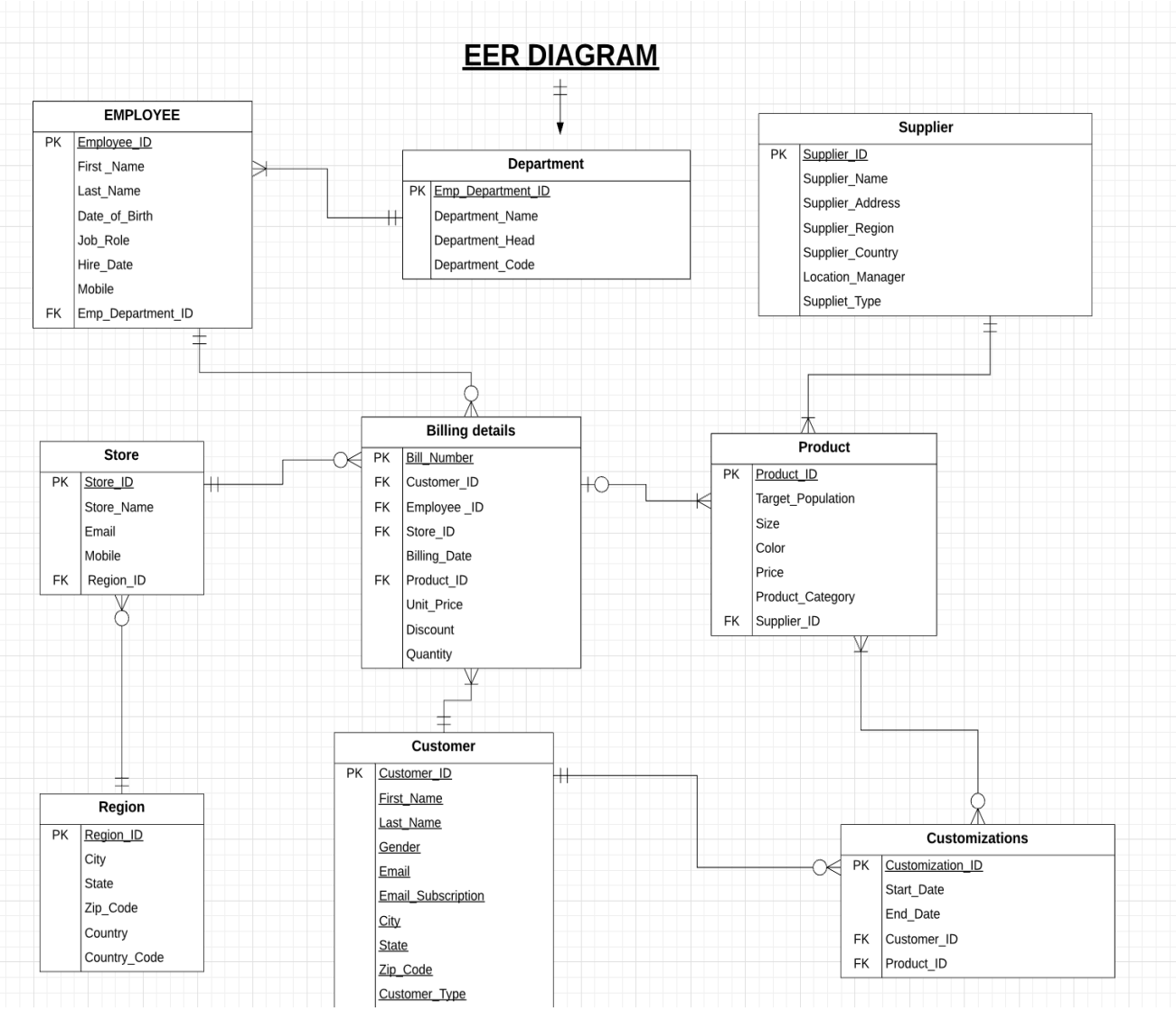
This table contains all the information regarding the number of departments in the company the department the employees belong to. The attributes in this table are Emp Department ID which is the primary key in this table and also the foreign key the employee table.

3. Business Rules

Business rules are intended to assert business structure or to control or influence the behavior of the business. Business rules describe the operations, definitions and constraints that apply to an organization. There are 10 Business rule which are stated below:

- Every employee must belong to at least one department.
- Every location manager is responsible for distributing goods delivered from supplier.
- Offer membership discounts to loyal customers.
- Cancel email subscription for customers who have made no sale in past 90 days.
- Customization request from customer must be completed within 3-5 business days.
- Bill Number is mandatory for any exchange or return policies to be applicable on the product.
- Bonus to be granted for every employee completing 2 years employment at lululemon.
- Returns or Exchange of a product are only acceptable within 14 days of purchase.
- Every new customer will receive a 10%discount on a voucher on signing up for lululemon.
- Discounts and target population will differ for every region and should be updated accordingly.

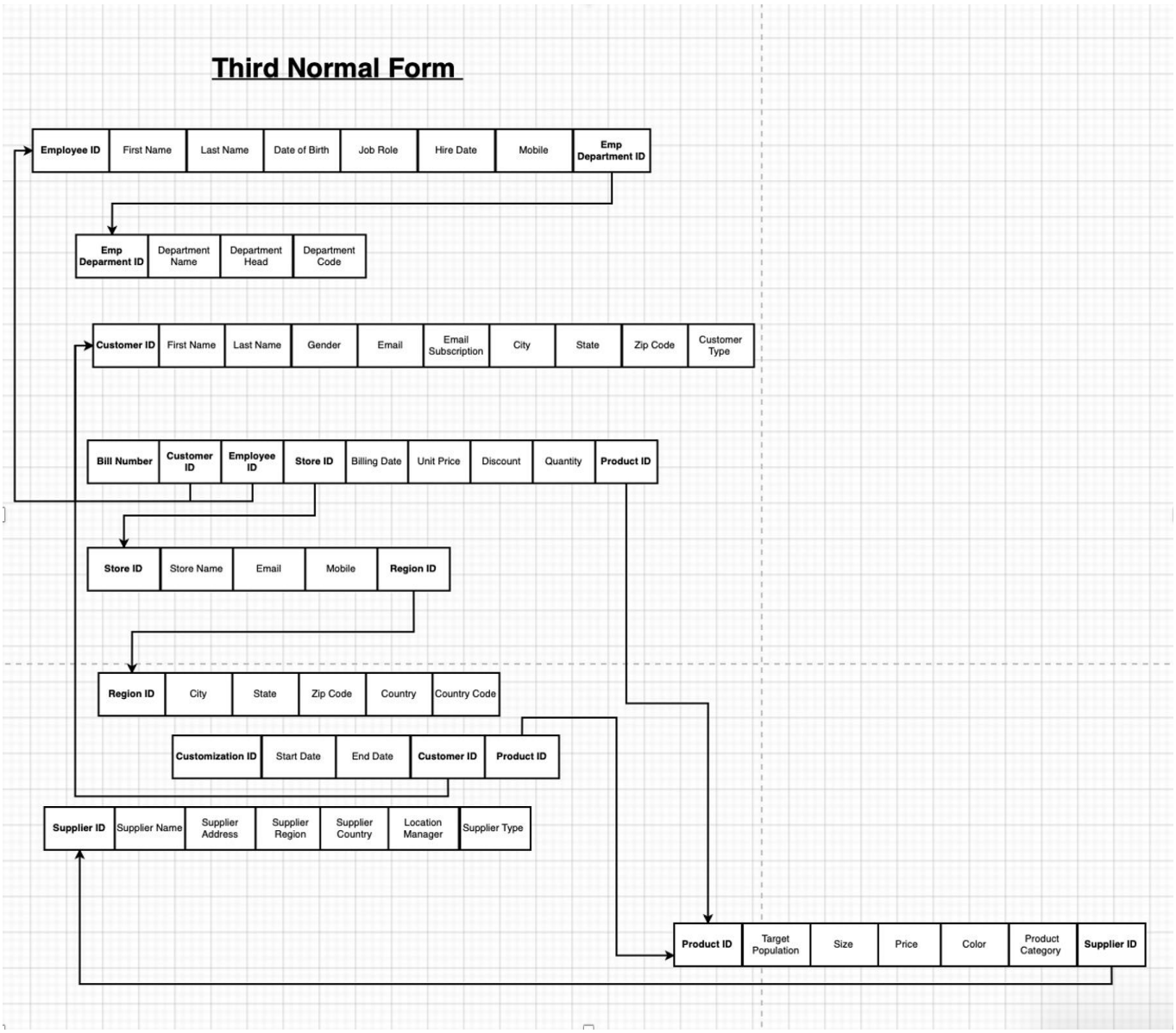
4. ER Diagram


EER DIAGRAM
EMPLOYEE
PK Employee_ID
First _Name
Last_Name
Date_of_Birth
Job_Role
Hire_Date
Mobile
FK Emp_Department_ID
Department
PK Emp_Department_ID
Department_Name
Department_Head
Department_Code
Supplier
PK Supplier_ID
Supplier_Name
Supplier_Address
Supplier_Region
Supplier_Country
Location_Manager
Suppliet_Type
Billing details
PK Bill_Number
FK Customer_ID
FK Employee _ID
FK Store_ID
Billing_Date
FK Product_ID
Unit_Price
Discount
Quantity
Store
PK Store_ID
Store_Name
Email
Mobile
FK Region_ID
Product
PK Product_ID
Target_Population
Size
Color
Price
Product_Category
FK Supplier_ID
Customer
PK Customer_ID
First_Name
Last_Name
Gender
Email
Email_Subscription
City
State
Zip_Code
Customer_Type
Region
PK Region_ID
City
State
Zip_Code
Country
Country_Code
Customizations
PK Customization_ID
Start_Date
End_Date
FK Customer_ID
FK Product_ID

5. **Normalization**

We are going to convert our ER diagram into 3NF normal form.

Third normal form is a database schema design approach for relational databases which uses normalizing principles to reduce the duplication of data, avoid data anomalies, ensure referential integrity, and simplify data management



6. SQL Queries

Now that the data model is designed and normalized, we can define the columns needed for each table. In this section, we shall go over some of the important steps made while creating the tables.

1) Each table has its unique primary key. Other non-primary key columns in the table that are required to be not null are designated as NOT NULL or decided for default values.
2) Metadata is defined to describe the data records and relationships within entities.
3) Referential integrity is maintained by defining a parent-child relationship in the form of foreign keys to avoid anomalies related to deletion, updating and insertion.
4) Validation rules have been established to constraint the values that are inserted for some of the columns.

6.1 Displaying product ID and the Fabric that costs more than $100 (conditional query).

SQL Command:

```
SELECT Product_ID, Fabric, Price
FROM product
WHERE product.Price > '$100'
order by product.Price asc;
```

Result of the Query**:**

Product_ID	Fabric	Price
11	Everlux	$118.00
15	Everlux	$118.00
289	Everlux	$118.00
285	Everlux	$118.00
30	Everlux	$118.00
191	Everlux	$118.00

6.2 Displaying a list of top 10 customers from various states (grouping and sorting).

SQL Command:

```
SELECT COUNT(Customer_ID) as 'Number of Customers' , State
FROM Customer
GROUP BY State
ORDER BY COUNT(Customer_ID) DESC LIMIT 10;
```

Result:

Number of Customers	State
72	CA
52	NJ
46	NY
32	TX
29	PA

6.3 Displaying only those products that have had customizations done (left outer join- multiple tables).

SQL Command:

```
SELECT customization.Alterations_ID, Start_Date, End_Date
FROM customization LEFT OUTER JOIN product ON
customization.Alterations_ID = Product.Product_ID ;
```

Result:

Alterations_ID	Start_Date	End_Date
125	19-12-2019	06-11-2019
128	15-12-2019	18-4-2019
131	30-4-2019	11-06-2019
134	07-05-2019	06-08-2019
137	04-12-2019	30-12-2019
140	07-11-2019	27-01-2020

6.4 Displaying the top 3 departments that has most jobs (conditional and join).

SQL Command:

```
SELECT department.Department_Name, COUNT(employee.Job_Role) AS Count_of_Jobs
FROM (department
INNER JOIN employee ON department.Emp_Department_ID = Employee.Emp_Department_ID)
GROUP BY Department_Name
ORDER BY COUNT(employee.Job_Role) desc limit 3 ;
```

Result:

Department_Name	Count_of_Jobs
Marketing	76
Accounting and Finance	68
Human Resource management	67

6.5 Displaying the customer and billing details of all the stores in California region (multiple join for 4 tables).

SQL Command:

```
SELECT Customer.Customer_ID, Customer.First_Name, Customer.Last_Name,
Customer.City, Customer.State, Customer.Gender,
billing.Bill_Number, billing.Billing_Date, billing.Unit_Price,
store.Store_ID, region.Store_Region_ID
FROM Customer, billing, store, region
WHERE customer.Customer_ID = billing.Customer_ID
AND billing.Store_ID = store.Store_ID
AND store.Store_Region_ID = region.Store_Region_ID
AND region.State = 'California' ;
```

Result:

Customer_ID	First_Name	Last_Name	City	State	Gender	Bill_Number	Billing_Date	Unit_Price	Store_ID	Store_Region_ID
2337206	Fletcher	Flosi	Rockford	IL	Male	11666420	3/19/2020	133	214	1044
8880745	Bette	Nicka	Aston	PA	Male	11673198	4/7/2020	50	172	1047
7104067	Veronika	Inouye	San Jose	CA	Male	11679976	4/8/2020	127	125	1050
6917054	Willard	Kolmetz	Irving	TX	Male	11686754	4/10/2020	142	229	1053
3093324	Maryann	Royster	Albany	NY	Male	11693532	4/21/2020	194	372	1056

6.6 Displaying list of products having more than 50% discount-- and the target population for the product (conditional query).

SQL Command:

```
SELECT customization.Alterations_ID, Start_Date, End_Date
FROM customization LEFT OUTER JOIN product ON
customization.Alterations_ID = Product.Product_ID ;
```

Result:

Alterations_ID	Start_Date	End_Date
125	19-12-2019	06-11-2019
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6.7 Displaying the top 3 departments that has most jobs (conditional and join).

SQL Command:

```
SELECT department.Department_Name, COUNT(employee.Job_Role) AS Count_of_Jobs
FROM (department
INNER JOIN employee ON department.Emp_Department_ID = Employee.Emp_Department_ID)
GROUP BY Department_Name
ORDER BY COUNT(employee.Job_Role) desc limit 3 ;
```

Result:

Department_Name	Count_of_Jobs
Marketing	76
Accounting and Finance	68
Human Resource management	67

7.1 Benefits

Through this project we gained an understanding of how to map a business through its database because of its self-describing nature. This is because a DBMS not only contains the database itself, but also metadata to define and describe the data and relationships between tables in the database. the management system prevents data redundancy or duplication of data and any change in it is reflected immediately.

Another advantage we learnt is how helpful is a scalable database system design for a growing business especially across countries. To make the database scalable, we understood the importance of RDBMS principles of data integrity, security, privacy, consistency and backup and recovery.

Especially, the enforcement of integrity constraints gives the benefit of adding restriction or rule that dictates what can be entered or edited in a table such as phone number is 10 digit long. Data independence is another advantage through DBMS wherein the data describing data (metadata) are separated from the application programs because the changes to the data structure are handled by the DBMS and not through embedding in the program.

7.2 Challenges

It was a challenge to decide the approach of the humongous Lululemon data of myriad countries with the perspective of DBMS. In other words, should we take a top down or bottom up approach. However, designing a base ERD and taking a scalable approach i.e. to start from a city that can be scaled to a state and in turn a country level data worked effectively. We faced errors and inefficiencies with our initial ERD model and after evaluating all of them stepwise as per the database management process, we set out to systematically resolve those problems.

Designing for data integrity was another challenge which took quite a lot of brainstorming amongst the group members, so that they don't have a conflict of overlap from the perspective of organization and also facilitate entering of records. For this we explored various options like auto prefix or auto increments and found that adding a unique code in front of each entity to make it unique was effective.

8. Appendix

Tables Data

8.1 Employee Data

Employee_ID	First_Name	Last_Name	Job_Role	Date_Of_Birth	Hire_Date	Mobile	Emp_Department_ID
4837291	Eden	Simmons	Cashier	12-10-1970	29-09-2000	(331) 719-3500	6789034
4837299	Don	Fletcher	Visual Merchandiser	02-11-1970	24-11-2000	(494) 724-2507	6789112
4837307	Micheline	Solomon	Customer Service Re	21-01-1971	09-01-2002	(684) 663-0374	6789190
4837315	Mckenzie	Schaefer	Store Assistant	23-04-1972	03-07-2002	(764) 456-5501	6789268
4837323	Venus	Chen	Store Assistant	29-07-1972	14-11-2003	(563) 758-7567	6789346

8.2 Store Data

Store_ID	Store_Name	Email	Mobile	Store_Region_ID
263	5th Avenue Mall	anchorage-store@lululemon.com	(907) 274-0003	987
387	Summit Birmingham	birmingham-store@lululemon.com	(205) 967-1765	990
271	Merchants Walk	merchantswalk-store@lululemon.com	(256) 535-0422	993
12	Mobile Seasonal	mobile-seasonal@lululemon.com	(251) 461-0971	996
347	Tuscaloosa Seasonal	tuscaloosa-seasonal@lululemon.com	(205) 349-3029	999

8.3 Customer Data

Customer_ID	First_Name	Last_Name	Gender	City	State	Zip_Code	Email	Email_Subscri	Customer_Type
4220645	James	Butt	Male	New Orleans	LA	70116	jbutt@gmail.com	Yes	Potential Customer
1220308	Josephine	Darakjy	Female	Brighton	MI	48116	josephine_darakjy@darakjy.org	No	Loyal customer
5732808	Art	Venere	Female	Bridgeport	NJ	8014	art@venere.org	No	Loyal customer
2772856	Lenna	Paprocki	Male	Anchorage	AK	99501	lpaprocki@hotmail.com	No	New Customer
2061335	Donette	Foller	Female	Hamilton	OH	45011	donette.foller@cox.net	No	Potential Customer

8.4 Product data

Product_ID	Product_Name	Target_Popul	Product_Cate	Size	Color	Fabric	Price	Supplier_ID
268	Invigorate High-Rise Crop 23"	Woman	Pants	0	Blue	Everlux	$118.00	9876765
15	Invigorate High-Rise Crop 23"	Woman	Pants	2	Blue	Everlux	$118.00	9876863
285	Invigorate High-Rise Crop 23"	Woman	Pants	4	Blue	Everlux	$118.00	9876961
463	Invigorate High-Rise Crop 23"	Woman	Pants	6	Blue	Everlux	$118.00	9877059
213	Invigorate High-Rise Crop 23"	Woman	Pants	8	Blue	Everlux	$118.00	9877157

8.5 Billing Details

Bill_Number	Billing_Date	Discount	Unit_Price	Quantity	Customer_ID	Product_ID	Store_ID	Employee_ID
11537638	5/31/2019	15	214	1	4220645	268	263	4837291
11544416	06-06-2019	25	335	4	1220308	15	387	4837299
11551194	07-05-2019	25	139	5	5732808	285	271	4837307
11557972	07-12-2019	75	165	4	2772856	463	12	4837315
11564750	8/22/2019	10	22	3	2061335	213	347	4837323

8.6 Supplier

Supplier_ID	Supplier_Name	Location_Manag	Supplier_Address	Supplier_Region	Supplier_Countr	Supplier_Type
9876765	Nicewell Industry	Dominick Fox	2411-C North Lom	South El Monte	USA	Exporting
9876863	Nicewell Industry	Malakai Garner	2411-C North Lom	South El Monte	USA	Sub-contracter
9876961	Nicewell Industry	Laurel Spears	2411-C North Lom	South El Monte	USA	Distributor
9877059	Nicewell Industry	Xiomara Leon	2411-C North Lom	South El Monte	USA	Sub-contracter
9877157	Shanghai Weijie Garment Co	Adrian Wagner	1231 Huiping Roac	Nanxiang Jiading	China	Sub-contracter

8.7 Department

Department_Name	Emp_Department_ID	Department_Head	Department_Code
Research and Devlopment	6789034	Houston Hardin	1100
Sales	6789112	Silas Best	1102
Sales	6789190	Anabella Bruce	1102
Research and Devlopment	6789268	Arjun Acosta	1100
Marketing	6789346	Julie Browning	1101

8.8 Region

City	State	Zip_Code	Country	Store_Region_ID	Country_Code
Anchorage	Alaska	99501	United States	987	US
Birmingham	Alabama	35243	United States	990	US
Huntsville	Alabama	35801	United States	993	US
Mobile	Alabama	36608	United States	996	US
Tuscaloosa	Alabama	35401	United States	999	US

8.9 Customization

Alterations_ID	Product_ID	Start_Date	End_Date	Customer_ID
125	278	19-12-2019	06-11-2019	3236753
128	286	15-12-2019	18-04-2019	5557490
131	20	30-04-2019	11-06-2019	7896802
134	51	07-05-2019	06-08-2019	1381632
137	300	04-12-2019	30-12-2019	9923092