ASSIGNMENT NO. 7

ADS LAB

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2020BTECS00054

AIM: Build the data warehouse for X-Mart

Problem Statement:

X-Mart is having different malls in city, where daily sales take place for various products. Higher management is facing an issue while decision making due to non-availability of integrated data, they can't do study on their data as per their requirement. So objective is to design a system which can help them quickly in decision making and provide Return on Investment (ROI).

Procedure:

Step1: Identify and Collect Requirements:

Need to see daily, weekly, monthly, quarterly profit of each store. Comparison of sales and profit on various time periods. Comparison of sales in various time bands of the day. Need to know which product has more demand on which location? Need to study trend of sales by time period of the day over the week, month, and year? On what day sales is higher? On every Sunday of this month, what is sales and what is profit? What is trend of sales on weekday and weekend? Need to compare weekly, monthly and yearly sales to know growth and KPI.

Step2: Schema selection for data warehouse building:

I am going to select Star Schema to design data warehouse for X-MART.

Step3: Design the Dimensional Tables:

The dimension is a master table composed of individual, non-overlapping data elements. The primary functions of dimensions are to provide filtering, grouping and labelling on your data. Dimension tables contain textual descriptions about the subjects of the business.

We need to design total 6-dimension tables.

Product, Customer, Store, Date, Time, Sales person.

Step4: Design the Fact Table:

Data in fact table are called measures (or dependent attributes), Fact table provides statistics for sales broken down by customer, salesperson, product, period and store dimensions.

Foreign Key Columns are Sales Date key, Sales Time key, Invoice Number, Sales Person ID, Store ID, Customer ID

Measures Columns are Actual Cost, Total Sales, Quantity, Fact table record count

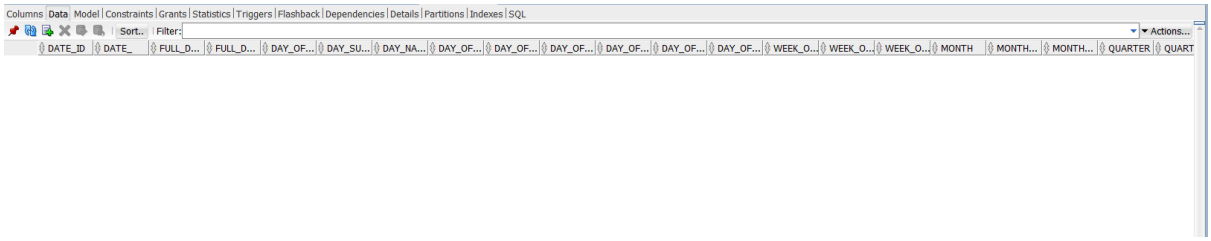
Step5: Design the Relational Database:

We have done some basic workout to identify dimensions and measures, now we have to use appropriate schema to relate this dimension and Fact tables.

Dimension Tables:

```
CREATE TABLE dim_date (
   date_id NUMBER PRIMARY KEY,
   date DATE NOT NULL,
   full_date_uk VARCHAR2(20) NOT NULL,
   full_date_usa VARCHAR2(20) NOT NULL,
   day_of_month NUMBER NOT NULL,
   day_suffix VARCHAR2(2) NOT NULL,
   day_name VARCHAR2(20) NOT NULL,
   day_of_week_usa NUMBER NOT NULL,
   day_of_week_uk NUMBER NOT NULL,
   day_of_week_in_month NUMBER NOT NULL,
   day_of_week_in_year NUMBER NOT NULL,
   day_of_quarter NUMBER NOT NULL,
   day_of_year NUMBER NOT NULL,
   week_of_month NUMBER NOT NULL,
   week_of_quarter NUMBER NOT NULL,
   week_of_year NUMBER NOT NULL,
   month NUMBER NOT NULL,
   month_name VARCHAR2(20) NOT NULL,
   month_of_quarter NUMBER NOT NULL,
   quarter NUMBER NOT NULL,
   quarter_name VARCHAR2(20) NOT NULL,
   year NUMBER NOT NULL,
   year_name VARCHAR2(20) NOT NULL,
   month_year VARCHAR2(7) NOT NULL,
   mmyyyy VARCHAR2(6) NOT NULL,
```

```
    first_day_of_month DATE NOT NULL,
    last_day_of_month DATE NOT NULL,
    first_day_of_quarter DATE NOT NULL,
    last_day_of_quarter DATE NOT NULL,
    first_day_of_year DATE NOT NULL,
    last_day_of_year DATE NOT NULL,
    is_holiday_usa CHAR(1) NOT NULL,
    is_weekday CHAR(1) NOT NULL,
    holiday_usa VARCHAR2(50),
    is_holiday_uk CHAR(1) NOT NULL,
    holiday_uk VARCHAR2(50),
    fiscal_day_of_year NUMBER NOT NULL,
    fiscal_week_of_year NUMBER NOT NULL,
    fiscal_month NUMBER NOT NULL,
    fiscal_quarter NUMBER NOT NULL,
    fiscal_quarter_name VARCHAR2(20) NOT NULL,
    fiscal_year NUMBER NOT NULL,
    fiscal_year_name VARCHAR2(20) NOT NULL,
    fiscal_month_year VARCHAR2(7) NOT NULL,
    fiscal_mmyyyy VARCHAR2(6) NOT NULL,
    fiscal_first_day_of_month DATE NOT NULL,
    fiscal_last_day_of_month DATE NOT NULL,
    fiscal_first_day_of_quarter DATE NOT NULL,
    fiscal_last_day_of_quarter DATE NOT NULL,
    fiscal_first_day_of_year DATE NOT NULL,
    fiscal_last_day_of_year DATE NOT NULL
);
```



Dimension Product Table:

```
CREATE TABLE DimProduct (
  ProductKey NUMBER PRIMARY KEY,
  Product_alt_key VARCHAR2(20),
  product_name VARCHAR2(50),
  product_cost NUMBER(10,2)
);
```

```
INSERT INTO DimProduct VALUES (1, 'P001', 'Product A', 10.99);
INSERT INTO DimProduct VALUES (2, 'P002', 'Product B', 20.50);
INSERT INTO DimProduct VALUES (3, 'P003', 'Product C', 5.99);
INSERT INTO DimProduct VALUES (4, 'P004', 'Product D', 15.75);
INSERT INTO DimProduct VALUES (5, 'P005', 'Product E', 8.25);
```

Columns | Data | Model | Constraints | Grants | Statistics | Triggers | Flashback | Dependencies | Details | Partitions | Indexes | SQL

Sort.. | Filter:

	PRODUCTKEY	PRODUCT_ALT_KEY	PRODUCT_NAME	PRODUCT_COST
1	1	P001	Product A	10.99
2	2	P002	Product B	20.5
3	3	P003	Product C	5.99
4	4	P004	Product D	15.75
5	5	P005	Product E	8.25

Dimension Customer Table:

```
CREATE TABLE DimCustomer (
   CustomerID NUMBER PRIMARY KEY,
   CustomerAltId VARCHAR2(20),
   CustomerName VARCHAR2(50),
   Gender VARCHAR2(10)
);

INSERT INTO DimCustomer VALUES (1, 'C001', 'John Smith', 'Male');
INSERT INTO DimCustomer VALUES (2, 'C002', 'Emily Brown', 'Female');
INSERT INTO DimCustomer VALUES (3, 'C003', 'David Johnson', 'Male');
INSERT INTO DimCustomer VALUES (4, 'C004', 'Lisa Davis', 'Female');
INSERT INTO DimCustomer VALUES (5, 'C005', 'Michael Wilson', 'Male');
```

Columns | Data | Model | Constraints | Grants | Statistics | Triggers | Flashback | Dependencies | Details | Partitions | Indexes | SQL

Sort.. | Filter:

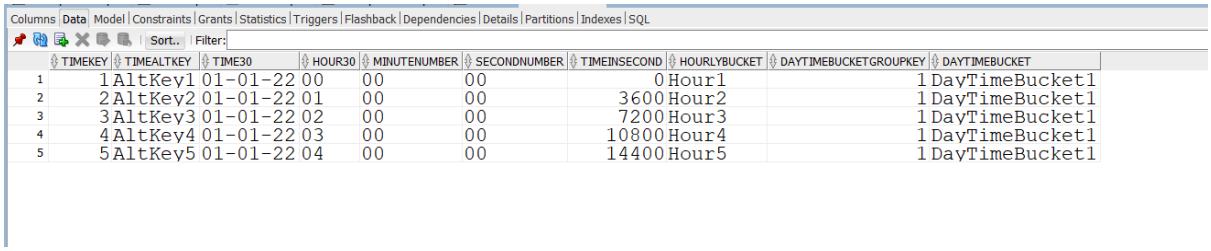
	CUSTOMERID	CUSTOMERALTID	CUSTOMERNAME	GENDER
1	1	C001	John Smith	Male
2	2	C002	Emily Brown	Female
3	3	C003	David Johnson	Male
4	4	C004	Lisa Davis	Female
5	5	C005	Michael Wilson	Male

Dimension Time Table:

```
CREATE TABLE DimTime (
  TimeKey NUMBER PRIMARY KEY,
  TimeAltKey VARCHAR2(50),
  Time30 DATE,
  Hour30 VARCHAR2(2),
  MinuteNumber VARCHAR2(2),
  SecondNumber VARCHAR2(2),
  TimeInSecond NUMBER(10,2),
  HourlyBucket VARCHAR2(50),
```

```
  DayTimeBucketGroupKey NUMBER,
  DayTimeBucket VARCHAR2(50)
);
```

```
INSERT INTO DimTime VALUES (1, 'AltKey1', TO_DATE('2022-01-01 00:00:00', 'YYYY-MM-DD HH24:MI:SS'), '00', '00', '00', 0, 'Hour1', 1, 'DayTimeBucket1');
  INSERT INTO DimTime VALUES (2, 'AltKey2', TO_DATE('2022-01-01 01:00:00', 'YYYY-MM-DD HH24:MI:SS'), '01', '00', '00', 3600, 'Hour2', 1, 'DayTimeBucket1');
  INSERT INTO DimTime VALUES (3, 'AltKey3', TO_DATE('2022-01-01 02:00:00', 'YYYY-MM-DD HH24:MI:SS'), '02', '00', '00', 7200, 'Hour3', 1, 'DayTimeBucket1');
  INSERT INTO DimTime VALUES (4, 'AltKey4', TO_DATE('2022-01-01 03:00:00', 'YYYY-MM-DD HH24:MI:SS'), '03', '00', '00', 10800, 'Hour4', 1, 'DayTimeBucket1');
  INSERT INTO DimTime VALUES (5, 'AltKey5', TO_DATE('2022-01-01 04:00:00', 'YYYY-MM-DD HH24:MI:SS'), '04', '00', '00', 14400, 'Hour5', 1, 'DayTimeBucket1');
```



Columns | Data | Model | Constraints | Grants | Statistics | Triggers | Flashback | Dependencies | Details | Partitions | Indexes | SQL

Sort.. Filter:

	TIMEKEY	TIMEALTKEY	TIME30	HOUR30	MINUTENUMBER	SECONDNUMBER	TIMEINSECOND	HOURLYBUCKET	DAYTIMEBUCKETGROUPKEY	DAYTIMEBUCKET
1	1	AltKey1	01-01-22 00	00	00	00	0	Hour1	1	DayTimeBucket1
2	2	AltKey2	01-01-22 01	00	00	00	3600	Hour2	1	DayTimeBucket1
3	3	AltKey3	01-01-22 02	00	00	00	7200	Hour3	1	DayTimeBucket1
4	4	AltKey4	01-01-22 03	00	00	00	10800	Hour4	1	DayTimeBucket1
5	5	AltKey5	01-01-22 04	00	00	00	14400	Hour5	1	DayTimeBucket1

Dimension Store Table:

```
CREATE TABLE DimStores (
   StoreID NUMBER PRIMARY KEY,
   StoreAltId NUMBER,
   StoreName VARCHAR2(50),
   StoreLocation VARCHAR2(50),
   City VARCHAR2(50),
   State VARCHAR2(50),
   Country VARCHAR2(50)
);
```

INSERT INTO DimStores (StoreID, StoreAltId, StoreName, StoreLocation, City, State, Country)

VALUES (1, 1001, 'Store 1', 'Main Street', 'New York', 'NY', 'USA');

INSERT INTO DimStores (StoreID, StoreAltId, StoreName, StoreLocation, City, State, Country)

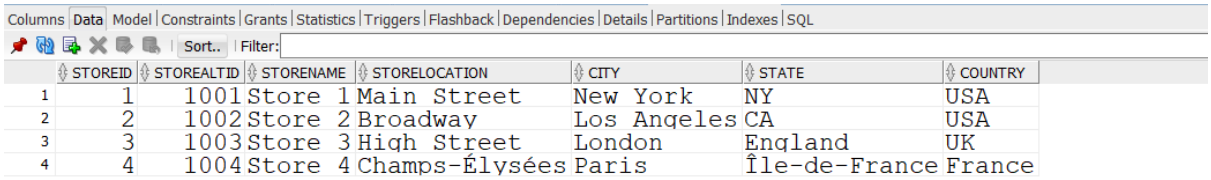
VALUES (2, 1002, 'Store 2', 'Broadway', 'Los Angeles', 'CA', 'USA');

INSERT INTO DimStores (StoreID, StoreAltId, StoreName, StoreLocation, City, State, Country)

VALUES (3, 1003, 'Store 3', 'High Street', 'London', 'England', 'UK');

INSERT INTO DimStores (StoreID, StoreAltId, StoreName, StoreLocation, City, State, Country)

VALUES (4, 1004, 'Store 4', 'Champs-Élysées', 'Paris', 'Île-de-France', 'France');



	STOREID	STOREALTID	STORENAME	STORELOCATION	CITY	STATE	COUNTRY
1	1	1001	Store 1	Main Street	New York	NY	USA
2	2	1002	Store 2	Broadway	Los Angeles	CA	USA
3	3	1003	Store 3	High Street	London	England	UK
4	4	1004	Store 4	Champs-Élysées	Paris	Île-de-France	France

Dimension Sales Person Table:

CREATE TABLE DimSalesPerson (

salesPersonId NUMBER PRIMARY KEY,

SalesPersonAltID VARCHAR2(50),

SalesPersonName VARCHAR2(50),

StoreID NUMBER,

City VARCHAR2(50),

State VARCHAR2(50),

Country VARCHAR2(50)

);

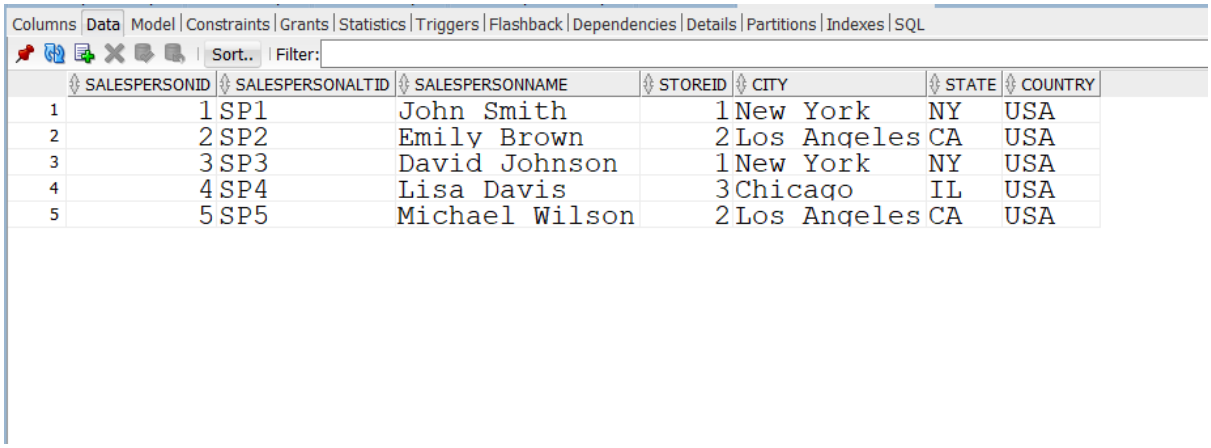
INSERT INTO DimSalesPerson VALUES (1, 'SP1', 'John Smith', 1, 'New York', 'NY', 'USA');

INSERT INTO DimSalesPerson VALUES (2, 'SP2', 'Emily Brown', 2, 'Los Angeles', 'CA', 'USA');

INSERT INTO DimSalesPerson VALUES (3, 'SP3', 'David Johnson', 1, 'New York', 'NY', 'USA');

INSERT INTO DimSalesPerson VALUES (4, 'SP4', 'Lisa Davis', 3, 'Chicago', 'IL', 'USA');

INSERT INTO DimSalesPerson VALUES (5, 'SP5', 'Michael Wilson', 2, 'Los Angeles', 'CA', 'USA');



	SALESPERSONID	SALESPERSONALTID	SALESPERSONNAME	STOREID	CITY	STATE	COUNTRY
1	1	SP1	John Smith	1	New York	NY	USA
2	2	SP2	Emily Brown	2	Los Angeles	CA	USA
3	3	SP3	David Johnson	1	New York	NY	USA
4	4	SP4	Lisa Davis	3	Chicago	IL	USA
5	5	SP5	Michael Wilson	2	Los Angeles	CA	USA

Fact Product-Sales Table:

```
CREATE TABLE factProductSales (
    TransactionId NUMBER PRIMARY KEY,
    SalesTimeKey NUMBER,
    Quantity NUMBER,
    TotalAmount NUMBER(10,2),
    DateKey NUMBER,
    TimeKey NUMBER,
    SalesDateKey NUMBER,
    SalesTimeAltKey NUMBER,
    StoreID NUMBER,
    CustomerID NUMBER,
    ProductID NUMBER,
    SalesPersonID NUMBER,
    FOREIGN KEY (SalesDateKey) REFERENCES dim_date(date_id),
    FOREIGN KEY (SalesTimeAltKey) REFERENCES dimTime(timeKey),
    FOREIGN KEY (StoreID) REFERENCES dimStores(StoreID),
```

```
    FOREIGN KEY (CustomerID) REFERENCES dimCustomer(CustomerID),
    FOREIGN KEY (ProductID) REFERENCES dimProduct(Productkey),
    FOREIGN KEY (SalesPersonID) REFERENCES dimSalesPerson(SalesPersonID)
);
```