COEN 280 : Database Systems Project

Title: MagicWand Inc. Record Maintenance System

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Goal:

To design and develop a Record Maintenance System for MagicWand Inc. a company that provides repair and maintenance services. It is required to maintain Customer, Service Contracts and Repair Job's data.

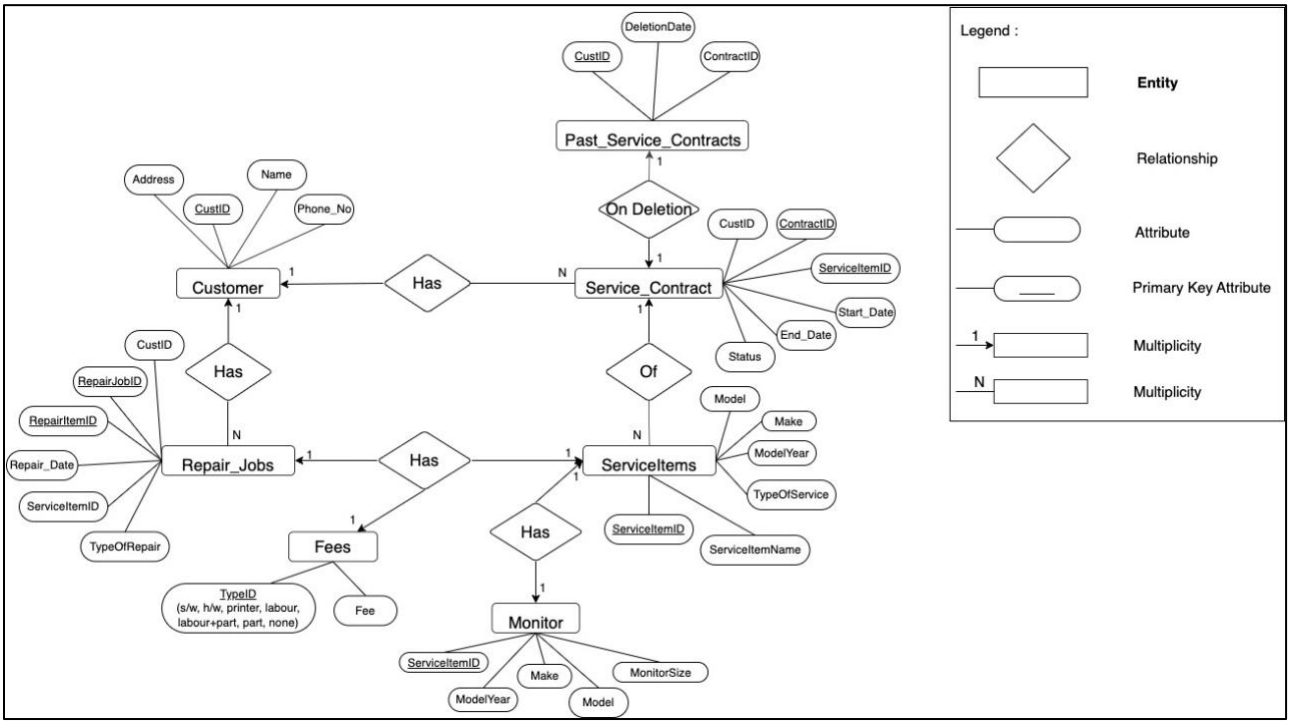
Tools Used:

I have used SQL, PL/SQL and SQL*Plus to develop this project. I have used multiple concepts of DBMS. Also, the constraints are being taken care by triggers and sequences. The operations are preformed using PL/SQL procedures. Reports are generated using SQL*Plus.

Requirements:

1. Create and Show Service Contracts
2. Create and Show Repair Jobs
3. Show Revenues

ER- Diagram:



Relationships :

1. As per the given requirement following are the relationships between the entities given above in ER-Diagram
   a. One Customer can have multiple Service Contracts - 1: N Relationship
   b. One Customer can have multiple Repair Jobs - 1:N Relationship
   c. One Repair Item ID can have only one Service Item ID - 1:1 Relationship
   d. One Service Contract can have multiple service items - 1:N Relationship

e. One Service Item can have one monitor - 1:1 Relationship
f. One Service Item has One Service TypeID - 1:1 Relationship
g. One Repair Item has One Repair TypeID - 1:1 Relationship

Functional Dependencies:

1. Functional dependencies are the constraints that specifies the relationships between two sets of attributes, where one set can accurately determine the value of other set. In other words, FDs are business rules, which we need to enforce while creating database to maintain integrity.
2. It is denoted as X -> Y,
    a. X : This attributes will determine the value of attributes which are to the right side of the '->'
    b. Y : This attribute called a Dependent Attribute.
3. Functional Dependencies for MagicWand Inc. based on the given requirements are :
    a. CustID -> Name, Phone_No, Address
    b. ContractID -> CustID
    c. ServiceItemID -> ContractID, ServiceItemName, TypeID
    d. TypeID -> Fee
    e. RepairItemID -> RepairJobID, ServiceItemID, TypeID, CustID, Repair_Date

Database Schema:

1. Based on the above ER Diagram, we have created Following Tables:
    i. Customer(CustID, Phone_No, Name, Address)
    ii. Fees(TypeID, Fee)
    iii. ServiceItems(ServiceItemID, ServiceItemName, TypeOfService, Model, Make, ModelYear)
    iv. Monitor(ServiceItemID, Model, Make, ModelYear, MonitorSize)
    v. Service_Contract(ContractID, CustID, ServiceItemID, Start_Date, End_Date, Status)
    vi. Repair_Jobs(RepairJobID, CustID, RepairItemID, ServiceItemID, TypeOfRepair, Repair_Date)
    vii. Past_Service_Contracts(CustID, Deletion_Date, ContractID)

Normalization:

1. We need to normalize the given relations to minimize the redundancy. Normal forms are used to eliminate or reduce the redundancy from the database tables.
2. Based on the given FDs , we will find the closures :
    a. CustID+ = { CustID, Name, Phone_No, Address }
    b. ContractID+ = { ContractID, CustID }
    c. ServiceItemID+ = { ServiceItemID , ContractID, ServiceItemName, TypeID, Fee, CustID, Repair_Date, Fee, CustID, Name, Phone_No, Address }
    d. TypeID+ = { TypeID, Fee }
    e. RepairItemID+ = { RepairItemID, RepairJobID, ServiceItemID, TypeID, CustID, Repair_Date, Fee, CustID, Name, Phone_No, Address }
3. Based on the closures above and relations given, the tables are already in BCNF.

Execution:

1. First, we need to create database schema, i.e., tables, primary keys, foreign keys, sequences, procedures and triggers, and fill the tables with data, run: *1_Database.sql*

```
start 1_Database.sql
```

2. This file runs 2 files:
    a. *MagicWandSchemaCreation.sql* – Creates tables, triggers as per requirements, sequnces
    b. *MagicWandDatabaseCreation.sql* – Fills the tables with data
3. Second, to do the operation based on Service Contracts, run : *2_ProjectDemoServiceContract.sql*

```
start 2_ProjectDemoServiceContract.sql
```

4. This file will provide following functionalities:
    a. Show Service Contract using Contract ID
        i. It will ask user to enter Service Contract and then show all the details of corresponding Service Contract as well as create a report for it.
    b. Show Service Contract using Phone Number.
        i. It will ask user to enter Phone Number of Customer and then show all the details of corresponding Service Contract as well as create a report for it.
    c. It will Display all the Active Service Contracts
    d. Let you UPDATE the status of the Service Contract of your choice to 'Inactive'
        i. It will ask user to enter Service Contract ID and then update the status to 'inactive'
    e. Let you DELETE the Service Contract of your choice
        i. It will ask user to enter Service Contract ID and delete it from Service Contracts
        ii. On deletion the trigger will hit and update the Past Service Contact data with deleted Service Contract.
5. Third, to do operations based on Repair Jobs, run: *3_ProjectDemoRepairJobs.sql*

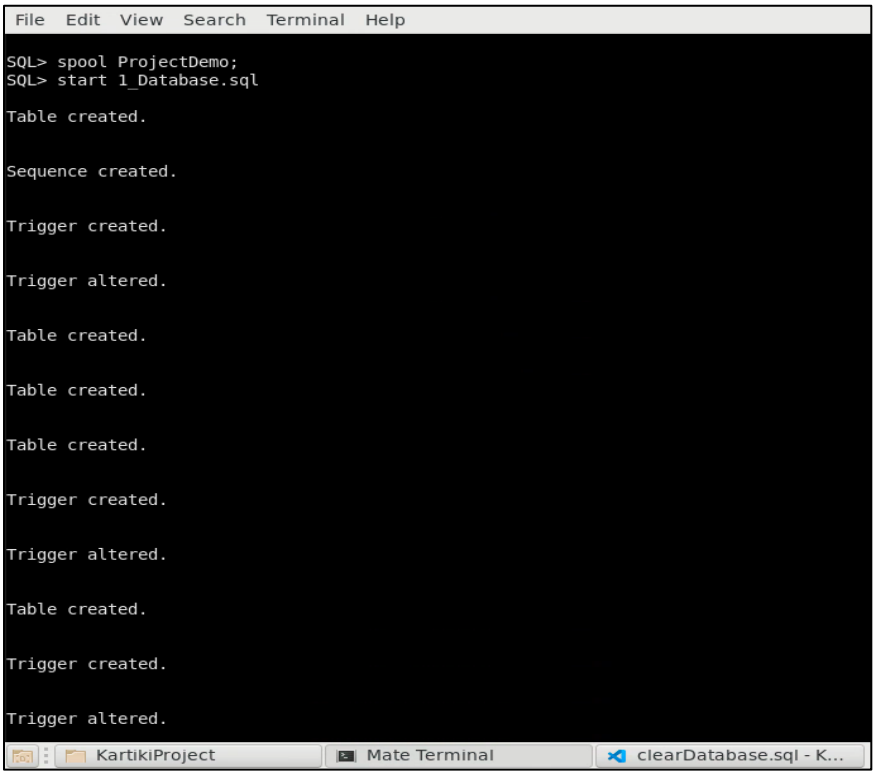
```
start 3_ProjectDemoRepairJobs.sql
```

6. This file will provide following functionalities:
    a. Show Repair Job Details using Repair Job ID
        i. It will ask user to enter Repair Job ID and then show all the details of corresponding Repair Job as well as create a report for it.
    b. Show Revenue from Repair Jobs by Month
        i. It will ask user to enter the month and then show all the details of corresponding month's Repair Jobs and their revenue as well as create a report for it
7. Please refer the table.xlsx from the same folder for all the details about tables, triggers, sequences, and procedures created
8. If you want to run the project again from scratch then run clearDatabase.sql
    a. It will delete all the triggers, sequences, tables and data

```
start clearDatabase.sql
```

Demo:

1. Database Creation: `start 1_Database.sql`



2. Operations on Service Contracts: `start 2_ProjectDemoServiceContract.sql`
   a. Enter Service Contract ID on terminal to get output

3. Service Contract Details using Phone Number, enter mobile number on the terminal (you can check MagicWandDatabaseCreation.sql file to get all the phone numbers or enter '5559821241')

```
==================== Service Contract Details Using Phone Number ====================

Please enter Phone Number : 5559821241
Cust#   Contract#   StartDate   EndDate     Item#   ServiceType   Fee/Month
13         5         21-FEB-23   29-MAR-23    S06      Software      10
13         5         28-FEB-23   28-MAR-23    S05      PHardware      5
```

4. All the active Service Contracts

```
============================== Active Service Contracts ==============================

Cust#   Contract#   StartDate   EndDate     Item#   ServiceType   Fee/Month  Status
13         5         21-FEB-23   29-MAR-23    S06      Software      10     Active
10         7         02-JAN-23   02-MAR-23    S07      Software      10     Active
2          3         02-JUN-22   02-FEB-23    S02      Software      10     Active
3          2         09-MAY-22   09-MAR-23    S01      Software      10     Active
12         14         15-MAR-23   15-SEP-23    S17      Hardware      15     Active
11         13         25-MAR-23   25-AUG-23    S16      Hardware      15     Active
8          11         22-FEB-23   22-MAR-23    S14      Hardware      15     Active
7          10         19-JAN-23   19-MAR-23    S13      Hardware      15     Active
6          9         11-JAN-23   11-MAR-23    S12      Hardware      15     Active
4          6         25-MAR-23   25-JUN-23    S10      Hardware      15     Active
10         4         19-NOV-22   19-MAR-23    S03      Hardware      15     Active
1          1         10-APR-22   10-MAR-23    S08      Hardware      15     Active
9          12         25-FEB-23   25-MAR-23    S15      PHardware      5     Active
5          8         27-MAR-23   27-JUL-23    S11      PHardware      5     Active
13         5         28-FEB-23   28-MAR-23    S05      PHardware      5     Active
10         8         05-NOV-22   05-MAR-23    S04      PHardware      5     Active
1          1         09-APR-22   09-MAR-23    S09      PHardware      5     Active
```

5. Update the Service Contract Status to Inactive
    a. Enter the Service Contract ID which you want to inactivate

```
==================== Update the Service Contract Status ====================


CONTRACTID STATUS
---------- ----------
         1 Active
         2 Active
         3 Active
         4 Active
         5 Active
         6 Active
         7 Active
         8 Active
         9 Active
        10 Active
        11 Active

CONTRACTID STATUS
---------- ----------
        12 Active
        13 Active
        14 Active
Please enter Contract ID you want to update : 11

CONTRACTID STATUS
---------- ----------
        11 Inactive
```

6. Delete a Service Contract
    a. Enter the service contract ID you want to delete on to the terminal

```
==================== Delete the Service Contract ====================


CONTRACTID
----------
         1
         2
         3
         4
         5
         6
         7
         8
         9
        10
        11

CONTRACTID
----------
        12
        13
        14
Please enter Contract ID you want to DELETE : 11

CONTRACTID
----------
         1
         2
         3
         4
         5
         6
         7
         8
         9
        10
        12

CONTRACTID
----------
        13
        14

    CUSTID CONTRACTID DELETION_
---------- ---------- ---------
         8         11 22-MAR-23

Reports Generated !
SQL>
```

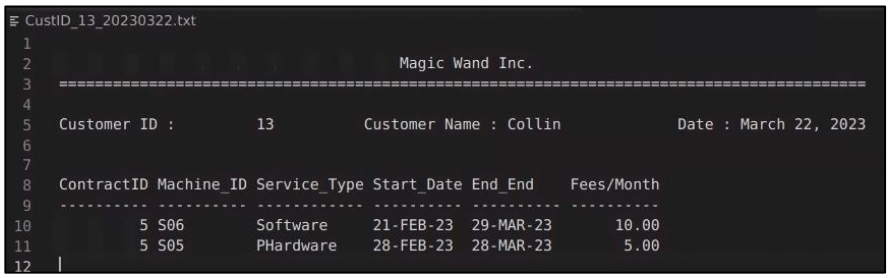
7. Generated Reports
    a. It will generate a report for the Contract ID you have entered in 2.a step.
    b. The Report file name will in format : *'ServiceContract<ID>_<TodaysDate>.txt'*

ServiceContract_2_20230322.txt

```
                                    Magic Wand Inc.
================================================================================

Service Contract ID : 2                                    Date : March 22, 2023
Customer ID :          3                                    Customer Name : John


Machine_ID Service_Type Start_Date End_End    Fees/Month
---------- ------------ ---------- ---------- ----------
S01        Software     09-MAY-22  09-MAR-23       10.00

```

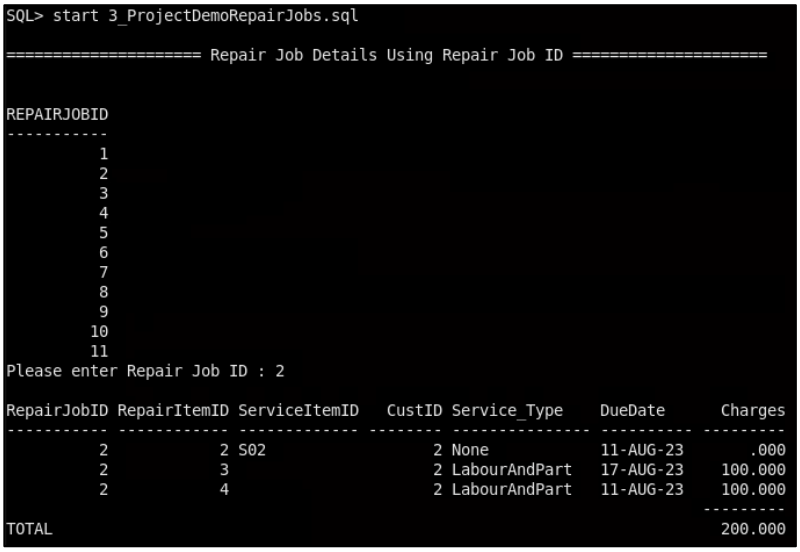
c. It will generate a report for the Customer having phone number which you have entered in 3rd step.

d. The Report file name will in format : *'CustID_<ID>_<TodaysDate>.txt'*

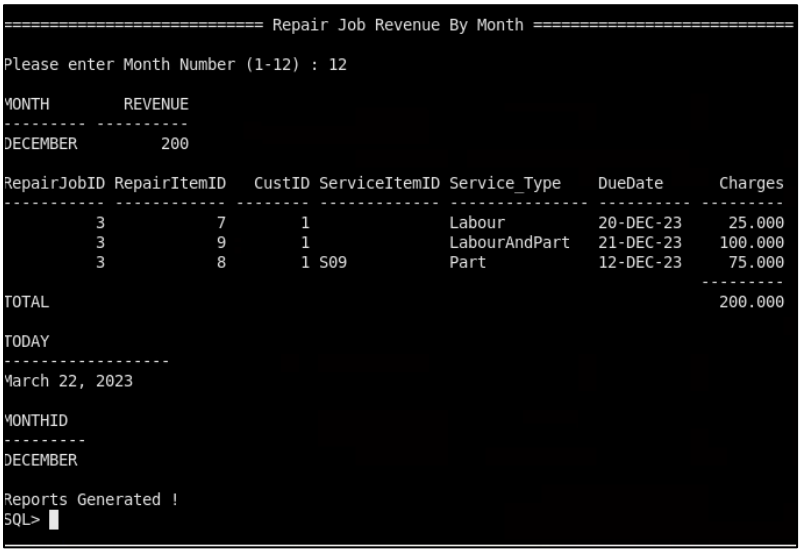


8. Operations on Repair Jobs: `start 3_ProjectDemoRepairJobs.sql`

a. Enter the Repair Job Id you want to check from the available Repair Jobs



9. Repair Revenue by month: Enter the month number to get revenue for that month



10. Generated Reports:
    a. It will generate a report for the Repair Job ID you have entered in 8.a step.
    b. The Report file name will in format : *'RepairJob_<ID>_<TodaysDate>.txt'*

RepairJob_2_20230322.txt

```
                                    Magic Wand Inc.
================================================================================================
                                    Repair Job Report
Repair Job ID :2                                                        Date : March 22, 2023
Customer ID :         2                                               Customer Name : Akshara
Customer PhoneNo : 5559821231                                 Customer Address : Santa Monica


RepairItemID ServiceItemID Service_Type    DueDate      Charges
------------ ------------ -------------- ---------- ---------
           2 S02          None           11-AUG-23        .000
           3              LabourAndPart  17-AUG-23    100.000
           4              LabourAndPart  11-AUG-23    100.000
                                                     ---------
TOTAL                                                 200.000
```

    c. It will generate a revenue report for the month you have entered in 9th step.
    d. The Report file name will in format : *'RepairJobRevenueMonth<MonthNo>_<TodaysDate>.txt'*

RepairJobRevenueMonth12_20230322.txt

```
                                    Magic Wand Inc.
================================================================================================
                                Revenue - Repair Jobs Report
Revenue of Month : DECEMBER                                             Date : March 22, 2023


MONTH        REVENUE
--------- ----------
DECEMBER         200

                                    Magic Wand Inc.
================================================================================================
                                Revenue - Repair Jobs Report
Revenue of Month : DECEMBER                                             Date : March 22, 2023


RepairJobID RepairItemID CustomerID ServiceItemID Service_Type    DueDate     Charges
----------- ------------ ---------- ------------ -------------- ---------- --------
          3            7          1              Labour         20-DEC-23     25.00
          3            9          1              LabourAndPart  21-DEC-23    100.00
          3            8          1 S09          Part           12-DEC-23     75.00
                                                                           --------
TOTAL                                                                       200.00
```