CSC 540 - DATABASE MANAGEMENT CONCEPTS & SYSTEMS

FALL 2018 PROJECT 1 - DATABASE APPLICATION DESIGN & IMPLEMENTATION

CARS - CAR Repair and Service management system

Milestone 2 Report - Revised ER Model and SQL Tables

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Acknowledgement of No more question on project description:
We have no more question on the project description.

Revised Tables:

Normal Form choose:

All the tables in the following section have already been considered decomposition, therefore, all the tables are in BCNF form.

Revised ER Model to SQL tables:

1. Removed User table.

2. EmployeeMR(Employee_ID(EID), Email, Password, UserType, Name, Address, Phone, Monthly_Pay, Payroll)
    - Holds data of Employee_type manager and Receptionist.
    - Functional dependencies: No other Fds except keys determines everything

3. Mechanic(Employee_ID(EID), Email, Password, Name, Address, Phone, Hour_Worked, Hourly_Pay, Payroll)
    - Holds data of Mechanic
    - Functional dependencies: No other Fds except keys determines everything

4. EmployeeMR_Work_At(Employee_ID(EID), Sevice_Center_ID(SID))
    - Holds data of relationship of manage and service center
    - Constraints:
        - one manager/Receptionist can only work at a single service center
        - A service center can only have one manager/Receptionist
        - Employee_ID foreign key from table 2 EmployeeMR Table
        - Sevice_Center_ID foreign key from table 9 Service Center Table
    - Arity of the relationship: Binary
    - Functional dependencies: No other Fds except keys determines everything

5. Mechanic_Work_At(Employee_ID, Sevice_Center_ID)
    - Holds data of relationship of manage and service center
    - Constraints:
        - one Mechanic can only work at a single service center
        - A service center has at least 5 Mechanics
        - Employee_ID foreign key from table 3 Mechanic Table
        - Sevice_Center_ID foreign key from table 9 Service Center Table
    - Functional dependencies: No other Fds except keys determines everything

6. Customer(Customer_ID(CID), Email, Password, Name, Address, Phone)
    - Holds data of Customer
    - Functional dependencies: No other Fds except keys determines everything

7. Vehicle(Licence_Plate_Number(License_ID), Make, Model, Year, Last_Mileage, Type_Recent_Service, Date_ Recent_Service, Date_of_Purchase)
    - Holds data of vehicles
    - Functional dependencies: None

8. Own(Customer_ID(CID), License_Plate_Number(License_ID))
    - Shows which customer has which car serviced/repaired.
    - Constraints:
        - Each customer has at least one car
        - Each car has at least one customer
        - Customer_ID foreign key from table 6 Customer Table
        - License_Plate_Number foreign key from table 7 Car Table
    - Functional dependencies: No other Fds except keys determines everything
    - Arity of the relationship: Binary

9. Sevice_Center(Sevice_Center_ID(SID), Name, Address, Tel_Number)
    - Holds data of service center
    - Constrains :
        - Every state has 3 centers
    - Functional dependencies: No other Fds except keys determines everything

10. Part(Part_ID(PID), Part_Name, Unit_Price)
    - Holds data of parts
    - Functional dependencies: No other Fds except keys determines everything

11. Inventory(Part_ID(PID), Service_Center_ID(SID), Current_Quantity, Minimal_Quantity_Threshold, Minimal_Order).
    - Holds data of relationship of each service center has what part and the quantity of that part.
    - Constraints:
        - Sevice_Center_ID foreign key from table 7 Service Center Table.
        - Part_ID foreign key from table 12 part table.
        - All service centers have inventory.
    - Functional dependencies: No other Fds except keys determines everything
    - Arity of the relationship: Binary

12. Distributor(Distributor_ID(DID), Name, Address, Phone)

- Holds data of distributor
- Functional dependencies: No other Fds except keys determines everything

13. Order_from_Service_Center(Seller_Center_ID(SSID), Order_ID(OID),quantity, Part_ID, Order_date, Status, Buyer_Center_ID(BSID))
    - Holds data of parts orders from one service center to another service center
    - Functional dependencies: No other Fds except keys determines everything
    - Constraints:
        - One service center can have multiple orders
        - One order has at least one part.
        - Seller_Center_ID: foreign key from table 7 Service Center table key: Sevice_Center_ID
        - Buyer_Center_ID: foreign key from table 7 Service Center table key: Sevice_Center_ID
        - Part_ID: foreign key from table 12 Part table key: Part_ID

14. Order_from_Distributor(Seller_Distributor_ID(SDID), Order_ID(OID),quantity, Part_ID(PID), date, Status, Buyer_Center_ID(BSID))
    - Holds data of parts orders from distributor to another service center
    - Functional dependencies: No other Fds except keys determines everything
    - Constraints:
        - One service center can have multiple orders
        - One order has at least one part.
        - Seller_Distributor_ID: foreign key from table 11 Distributor table key: Distributor_ID
        - Buyer_Center_ID: foreign key from table 7 Service Center table key: Sevice_Center_ID
        - Part_ID: foreign key from table 12 Part table key: Part_ID

15. Basic_Service(Basic_Service_Name, Time_Needed, Labor_Charge_rate)
    - Holds data of what kind of basic service can be provided
    - Functional dependencies: No other Fds except keys determines everything

16. Basic_Service_Need(Basic_Service_Name, Part_ID(PID), Quantity)
    - Holds data of each basic service need what part and how many needed
    - Functional dependencies: No other Fds except keys determines everything
    - Constraints:
        - Basic_Service_Name: foreign key from table 15 Basic_Service key: Basic_Service_Name
        - Part_ID: foreign key from table 10 Part table key: Part_ID
        - All basic services need parts.

- Arity of the relationship: Binary

17. Maintenance_Service(Service_ID(SVID), Service_Type, Is_First_Time, Maintenace_Fee)
    - Holds data of three maintenance type (A,B,C)
    - Functional dependencies: No other Fds except keys determines everything

18. Maintenance_Include(Service_ID(SVID), Basic_Service_Name)
    - Holds data for what basic service is needed for some maintenance service type.
    - Constraints:
        - Service_ID(SVID) foreign key from table 17 Maintenance_Service.
        - Basic_Service_Name: foreign key from table 15 Basic_Service.
        - All maintenance need basic service.
    - Functional dependencies: No other Fds except keys determines everything
    - Arity of the relationship: Binary

19. Repair_Service(Service_ID(SVID), Specific_Problem, Is_First_Time, Diagnostic_Report, Diagnostic_Fee, Repair_Fee)
    - Holds data of repair service
    - Functional dependencies: No other Fds except keys determines everything

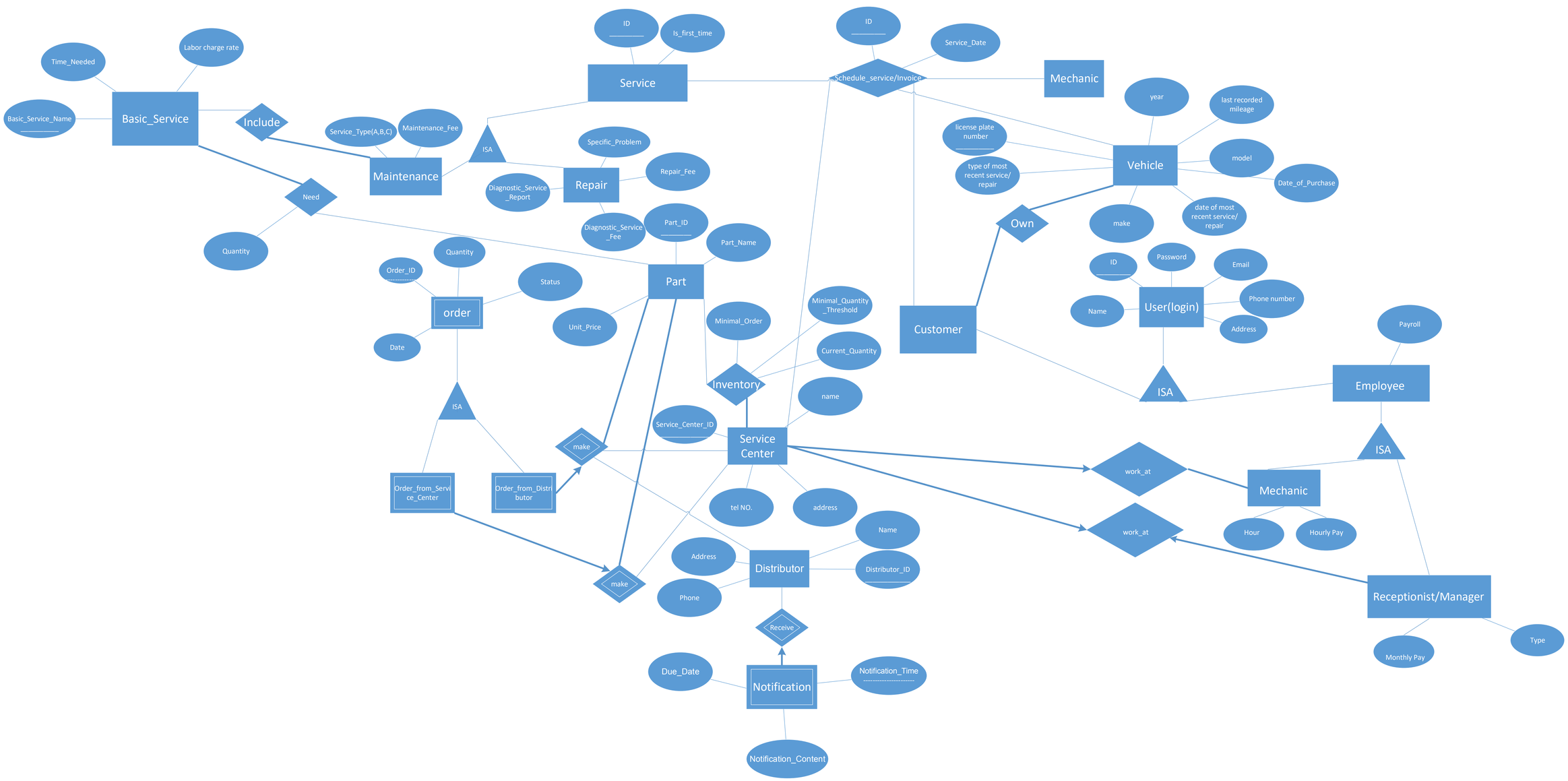
20. Schedule_Service(Service_ID(SVID), Service_Center_ID(SID), Customer_ID(CID) , Licence_Plate_Number(Licence_ID), Employee_ID(EID) , Service_date)
    - Holds data of scheduled service, what kind of service type, where, when, whose car, and who is going to service this car.
    - Constraints:
        - Service_ID(SVID) foreign key from table 17 maintenance_Service OR 19 Repair_Service: Service_Type
        - Service_Center_ID foreign key from 9 Sevice_Center table key :Service_Center_ID
        - Customer_ID foreign key from table 8 Customer table: Customer_ID
        - Licence_Plate_Number foreign key from table 9 Car table : Licence_Plate_Number
        - Employee_ID foreign key from table 3 Mechanic table: Employee_ID
    - Functional dependencies: No other Fds except keys determines everything
    - Arity of the relationship: Penta(5)

21. Notification (Distributor_ID, Notification_Time, Due_Date, Notification_Content)

- Holds data of notification to send to customer
- Constraints:
    - Distributor_ID foreign key from table 12 Distributor table: Distributor_ID
    - Functional dependencies: No other Fds except keys determines everything

22. Invoice (Service ID(SID), Service Start Date, Service End Date, Licence Plate Number, Service Type, Mechanic Name, Parts used and cost, Total labor hours, Labor wages per hour, Total cost)

This is not a real table, we will calculate the invoice information from Schedule_Service table(table 20).


Basic_Service
Basic_Service_Name
Time_Needed
Labor charge rate
Include
Need
Quantity
Maintenance
Service_Type(A,B,C)
Maintenance_Fee
Service
ID
Is_first_time
ISA
Repair
Specific_Problem
Repair_Fee
Diagnostic_Service_Report
Diagnostic_Service_Fee
Part
Part_ID
Part_Name
Minimal_Order
Minimal_Quantity_Threshold
Current_Quantity
Unit_Price
order
Order_ID
Quantity
Status
Date
ISA
Order_from_Service_Center
Order_from_Distributor
make
Inventory
name
Service Center
Service_Center_ID
tel NO.
address
Distributor
Name
Distributor_ID
Address
Phone
make
Receive
Notification
Due_Date
Notification_Time
Notification_Content
Schedule_service/Invoice
ID
Service_Date
Mechanic
Customer
Own
Vehicle
license plate number
type of most recent service/ repair
year
last recorded mileage
model
Date_of_Purchase
make
date of most recent service/ repair
User(login)
ID
Password
Email
Name
Phone number
Address
ISA
Employee
Payroll
ISA
Mechanic
Hour
Hourly Pay
work_at
work_at
Receptionist/Manager
Monthly Pay
Type