COMPUTER ENGINEERING DEPARTMENT

ASSIGNMENT NO-01

SUB: Database Management System

COURSE: T.E. **Year: 2020-2021** **Semester: V**

DEPT: Computer Engineering

SUBJECT CODE: CSC502 **SUBMISSION DATE: 08/09/2020**

==========

Name: Amey Thakur **Roll No.:** 50

Batch: B3 **Class:** TE COMPS B

Topic: CAR RENTAL DATABASE

Q. No	Questions	CO Mapping
1.	Describe the overall architecture of DBMS with suitable Diagram.	CO1
2.	Draw an ER/EER Diagram for a given case study.	CO2
3.	Adapt the Conceptual Model (ERD) drawn in Q2. into the relational model.	CO3

Batch: B3

Group members:

1. Nithya Gnanasekar TU3F1819119 B42
2. Anisha Gupta TU3F1819122 B45
3. Amey Thakur TU3F1819127 B50
4. Hasan Rizvi TU3F1819130 B51

Note: Q2. Case studies are assigned as per a group of 3-4 students.

Group:1: (Roll no: 42, 45, 50 & 51)
Topic: CAR RENTAL DATABASE

The company does car rental business and has several locations with different addresses (address consist of street or rural route with the number, city, province and postal code). The cars are classified as subcompacts, compacts, sedans, or luxury. Each car has a particular make, model, year made, and colour. Each car has a unique identification number and a unique license plate. The cars rented in a particular location may be returned to a different location (so-called drop off). For every car we keep the odometer reading before it is rented and after it is returned. Since we trust our customers, we do not record the defect when the car is rented out and returned back. However, we rent the car with a full tank and record the volume of gas in the tank when the car is returned, but we only indicate if the tank is empty, quarter full, half full, three-quarters full, or full. We keep track of which day a car was rented, but not of the time, similarly for car returning. If a customer requests a specific class (say sedan), we may rent the customer a higher-class car if we do not have the requested class in the stock, but we will price it at the level the customer requested (so-called upgrade). Each car class has its own pricing, but all cars in the same class are priced the same. We have rental policies for 1 day, 1 week, 2 weeks, and 1 month. Thus, if a customer rents a car for 8 days, it will be priced as 1 week + 1 day. The drop-off charge only depends on the class of the rented car, the location it was rented from and the location it is returned to. About our customers, we keep their names, addresses, possibly all phone numbers, and the number of the driver's license (we assume a unique license per person). About our employees, we keep the same information (we require that all our employees have a driver's license). We have several categories of workers, drivers, cleaners, clerks, and managers. Any of our employees can rent a car from our company for a 50% discount if the rental is less than 2 weeks. However, for any longer rental, they must pay 90% of the regular price. Every employee works in one location only. We have headquarters in Hamilton. The people who work there are all classified as managers, one of them is the president, two of them are the vice-presidents, one for operation, the other for marketing.

For certain weeks we have promotional rentals that are usually 60% of the regular price but maybe also of different percentages. They always affect only a single class of cars – i.e. we may have a promotion for subcompacts, but during that week we do not have any promotions for compacts, sedans or luxury cars. During some years we can have many promotions, in some we have none. The promotions cannot be applied to the employees.

Q.1.

Ans:

Components of Database system

- Query Processor Components
- Storage Manager / Storage Management
- Transaction Management

A. Query Processor Components

- The query processor will accept query from user and solves it by accessing the database.

Parts of Query Processor

1. DDL Interpreter
2. DML Compiler
3. Query Evalution Engine

① DDL Interpreter

- This will interpret DDL statements and fetch the definitions in the data dictionary.

② DML Compiler

- This will translate DML statements in a query language into low level instructions that the query evalution engine understands. A query can usually be translated into any of the following number of alternative evalution plans. For some query result, DML compiler will select best plan for query optimization.

③ Query Evalution Engine

- This engine will execute low level instructions generated by the DML compiler on DBMS.

B. Storage Management

① A storage manager is a program module which acts like interface between the data stored in the database and the application programs and queries submitted to the system.

② The data is stored on the disk using the file system.

③ The storage manager is programme which is responsible for the interaction with the file manager.

④ The storage manager translates the various databases language statements into low level file system commands.

⑤ Thus the storage manager is responsible for storing, retrieving and updating data in the database.

⑥ The storage manager components include:
- → Authorization and integrity manager
- → Transaction manager
- → File Manager
- → Buffer Manager

⑦ Data Structures implemented by storage manager.
- Data file: Stored in the database itself
- Data dictionary: Stores metadata about the structure of the database.
- Indices: Provides fast access to data items.

C. Transaction Management.

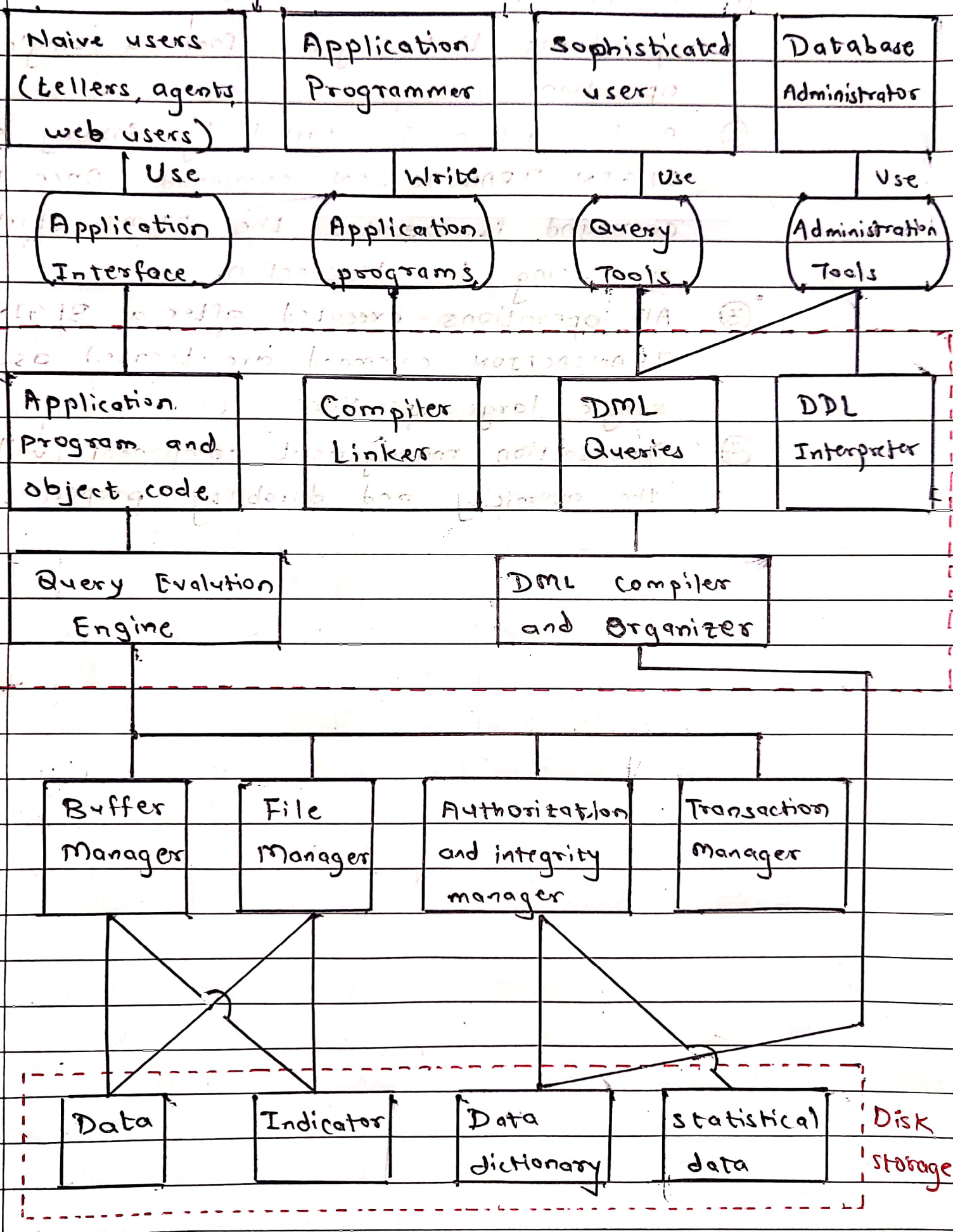
① A transaction is a series of all database operations that together form a single large operation.

② A transaction is started by issuing a BEGIN TRANSACTION command. Once this command is executed the DBMS starts monitoring the transaction.

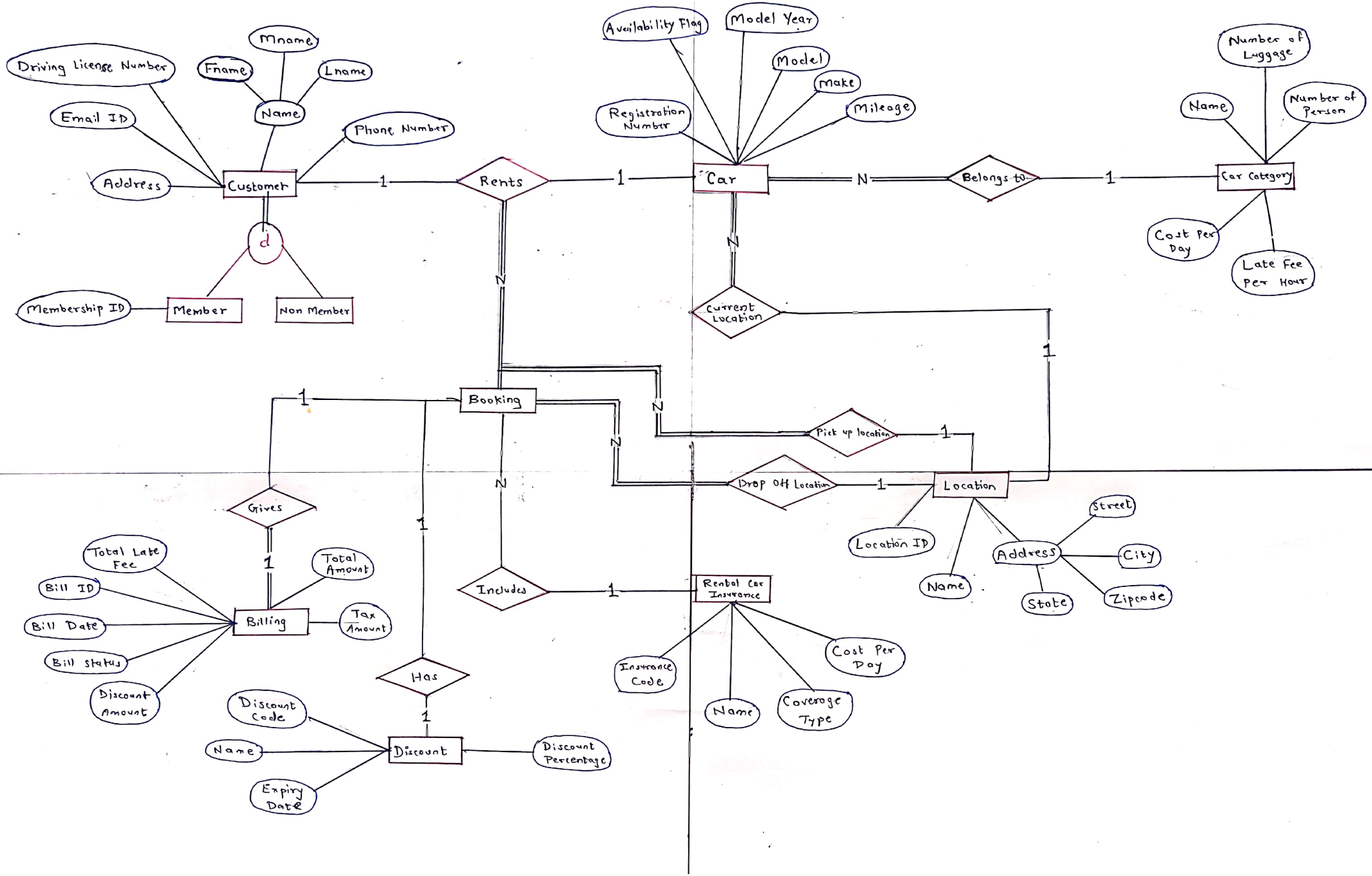
③ All operations executed after a BEGIN TRANSACTION command are treated as a single large operation

④ Transaction management component will ensure the atomicity and durability properties.

Query Evalution Engine



Q.2 ER / EER Diagram



Q.3 Relational Model