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Sub - DBMS
Slot - E11+E12+E13

1.

DBMS

- A database management system (DBMS) is a software application that is used to create and manage databases.
- A database is an organized collection of data, typically stored in computer system that can be accessed and manipulated by DBMS

In Database structure, following components are typically included:

1. Tables: Tables are basic unit of data storage in database. Table consists of row and column and each row represents unique record in the table
2. Fields: Fields are the individual pieces of data that are stored in table. Each field corresponds to column in the table and each row of the table holding value for each.

3. Primary Keys: A primary key is field or a combination of fields that uniquely identifies each row in a table. Primary key are used to link tables together and ensure the integrity of the data.

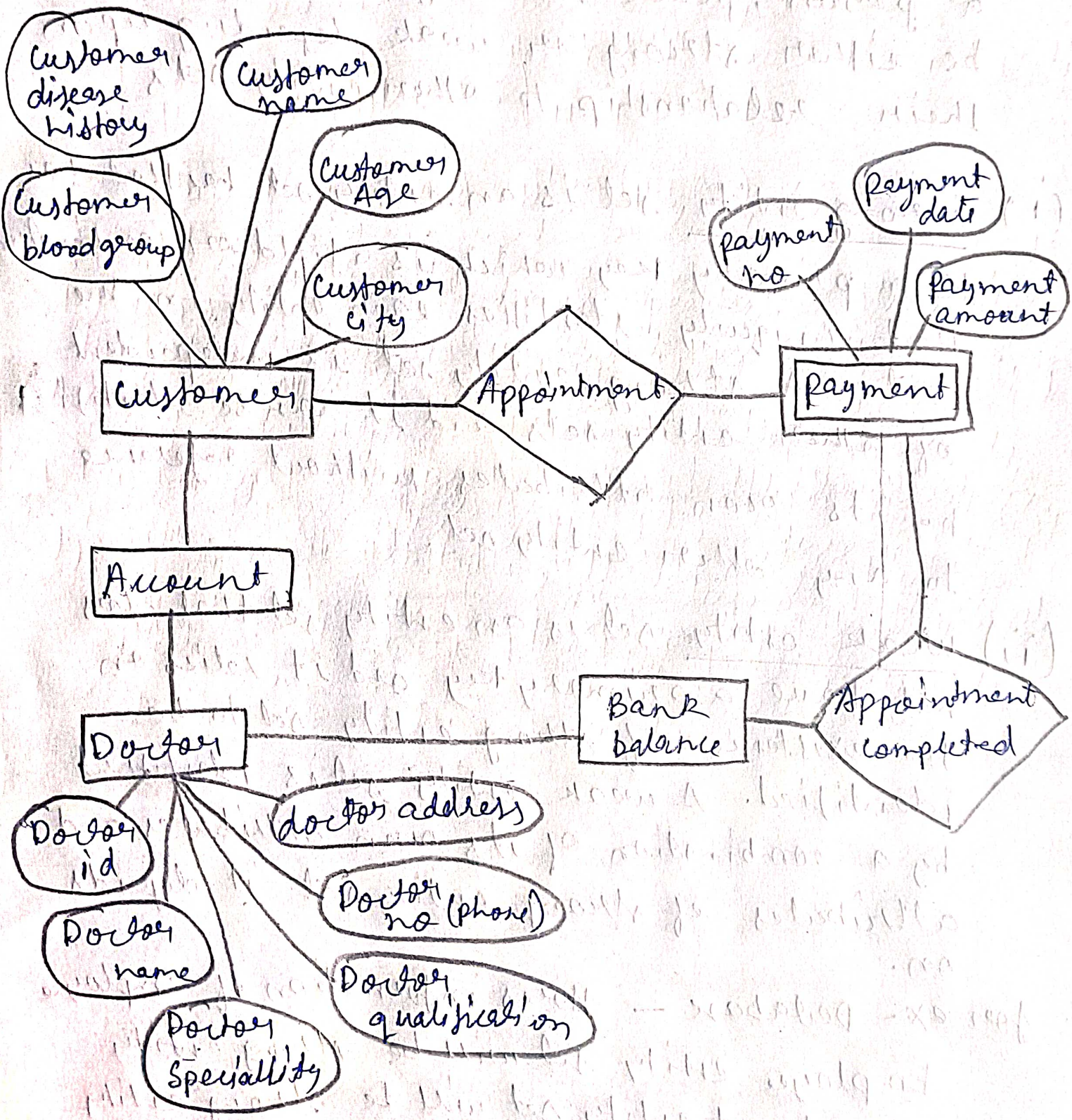
4. Foreign Keys: A foreign key is field or a combination of field that refers to primary key of another table. Foreign key are used to establish relationship between tables and ensure data is consistent across multiple tables

5. Indexes: An Index is special data structure that is used to improve the performance of database queries. Indexes allow the DBMS to quickly locate and retrive specific records from table.

6. View: A view is an virtual table is created by executing a SELECT statement. Views do not store data themselves, but rather provide a way to display data from one or more tables in a specific way

7. Stored Procedure: A stored procedure is pre-defined set of SQL statements that are stored in the database and can be called by the DBMS to perform a specific task. Stored procedure are often used to encapsulate complex business logic to improve the performance of frequently asked queries

ER Diagram for Online Doctor Service



In database, an entity set is collection of similar entities, where entity is an object that represent a real world element, such as a person, place, or thing. Entity sets can be either strong or weak depending upon their relationship to other entity sets

(i) Strong entity set is an entity set that has a primary key which is a field or combination that uniquely identifies each entity in the set. A strong entity set is independent of other entity sets and it can be identified by its own attributes without reference to any other entity set.

(ii) Weak entity set is an entity set that does not have a primary key and it relies on the existence of strong entity set to be identified. A weak entity set is identified by a combination of its own attributes and attributes of strong entity set it depends on.

for ex- Database — stores information of employee
Employee entity set will be strong entity
Department entity set will be strong entity
on the other hand Projects entity should be weak entity.

5.

Given Schemas

- EmployeeDetails (EmpId, FullName, MangerID, DOJ, City)
- Employee Salary (EmpId, Project No, Salary)

1. To count the number of employee working in project 'P1'.

```
SELECT COUNT(EmpId)
FROM EmployeeSalary
WHERE Project No = 'P1';
```

2. To find the employee id whose salary lies in the range of 9000 and 15000

```
SELECT EmpId
FROM EmployeeSalary
WHERE Salary BETWEEN 9000 AND 15000
```

3. To find EmpId and full name of all the employee working under Manager id - '986'

```
SELECT EmpId, FBull Name
FROM EmployeeDetails
WHERE MangerId = '986';
```

4. To find employee who lives in Toronto and work under the manger with manger Id - 321 (6)

```
SELECT EmpId, FullName
From Employee Details
Where MangerId = 321 AND City = 'Toronto';
```

5. To fetch different projects available

```
SELECT DISTINCT ProjectNo
From Employee Salary
```

10.

Q4

Given

R (A, B, C, D, E)

Function dependency

{ A → B, B → E, C → D }

PD PD

Act = { A, C, B, D, E }

CK | PK

$B \rightarrow E$

$B^+ = \{B, E\}$

$A \rightarrow B$

$A^+ = \{A, B, E\}$

$C \rightarrow D$

$C^+ = \{C, D\}$

$R_1(A, B, E)$

$A \rightarrow B$

$B \rightarrow E$

↓

Not 3NF

$R_2(C, D)$

$C \rightarrow D$

↓

3NF

$R_3(A, C)$

↓

3NF

R_1 is decomposed into:

$R_1(B, E)$

$R_1(A, B)$

$R_2(C, D)$

$R_1(A, C)$

$R_1(B, E)$

$R_1(A, B)$

Converted to 3NF

(3) A candidate Key is set of attributes that can uniquely identify a tuple in a relation.

Prime attributes are the attributes that are part of the candidate key.

- $A \rightarrow B$
  It tells that A is candidate key and B is a non prime attribute
- $BC \rightarrow D$
  It tells that BC is candidate key and D is non prime attribute
- $E \rightarrow C$
  It tells that E is candidate key and C is a non prime attribute
- $D \rightarrow A$
  It tells that D is candidate key and A is non prime attributes

So

Candidate Keys are :- A, BC, [redacted], E, D

Prime Attribute are :- A, BC, [redacted]

Non Prime attribute :- D, E, H