6.10.25

TASK - 8

Normalizing databases using functional dependencies upto BCNF

Aim: To normalize the Hotel Management system Database upto BCNF using functional dependencies, reducing redundancy and ensuring data

Step-1: Identify Entities And Attributes

Hotel: Hotel_ID, Hotel_name, Location, Rating

Room: Room_ID, Room_Type, Rate, Hotel_ID

Customer: Customer_ID, customer_Name, Phone, Email, Address

Booking: Booking_ID, Customer_ID, Room_ID, check IN DATE, CHECK OUT

Step-2: Determine Functional Dependencies:-

1.) Hotel_ID → Hotel_Name - Name, Location, Rating

2.) Room_ID → Rom_Type, Rate, Hotel_ID

3.) Customer_ID → Customer_name, Phone, Email, Address

4.) Booking_Type → Rate (if same type rooms have identical rates)

Unnormalized Table

Booking_ID	Customer_name	Phone	Location	Room_Type
B01	John	9840000000	Kochi	Deluxe, Standard
B02	maria	1515151515	Sea View	Chennai

Repeating values in Room_Type violate INF

First Normal Form (1NF)

Remove repeating and multi valued attributes - each field must contain only atomic values

Booking_ID	Customer_name	Phone	Location	Room-Type
B01	John	9840158933	Kochi	Deluxe
B01	John	1001001000	Kochi	Standard
B02	Maria	1101101101	Chennai	suite

All columns hold single atomic values

Table is in 1NF

Second Normal Form (2NF)

1. Table must be in 1NF
2. Remove partial dependency from the Table

Hotel Table

Hotel_ID	Hotel_Name	Location	Rating
H01	Blue Heaven	Kochi	4.5
H02	Sea view	chennai	4.2

Customer Table

Customer_ID	Customer_name	Phone	Email	Address
C01	John	9876543210	John@gmail.com	Kochi
C02	Maria	8765432109	maria@gmail.com	chennai

Room Table

Room_ID	Room_Type	Rate	Hotel_ID
R01	Deluxe	2000	H01
R02	standard	1500	H03
R03	Suite	3000	H02

Booking Table

Booking_ID	Customer_ID	Room_ID	check_in_date	check_out_date	Payment
B01	C01	R01	10-10-2025	12-10-2025	Paid
B01	C01	R02	10-10-2025	12-10-2025	Paid
B02	C02	R03	11-10-2025	13-10-2025	Pending

Result: No partial dependencies → Database is 2NF.

Third Normal Form :-

Must be in 2NF

Remove transitive dependencies

Decomposition into 3NF :

Hotel (Hotel_ID, Hotel_Name, Location, Rating)
Room (Room_ID, Room_Type, Hotel_ID)
RoomType (Room_Type, Rate)
Customer (Customer_ID, Customer_Name, Phone, Email, Address)
Booking (Booking_ID, Customer_ID, Room_ID, checkin_Date, checkout Date)
All transitive dependencies removed.

For every FD ($X \rightarrow Y$), X must be a candidate key.
Room_Type → Rate has no determinant it violates BCNF.
To Fix ~~BCNF violation~~ -
~~Decompose~~ Room Table :
Room (Room_ID, Room_Type, Hotel_ID)
RoomType (Room_Type, Rate)
Now every determinant is a candidate key.

VEL TECH - CSE	
EX NO.	09
PERFORMANCE (5)	5
RESULT AND ANALYSIS (5)	5
VIVA VOCE (5)	5
RECORD (5)	-
TOTAL (20)	15
	0

12/11/25

RESULT: Thus, the normalized database using functional dependency upto BCNF executed successfully.