CP 363 Assignment 8

Tourism Agency Booking System DBMS

Group 37

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Normalization Verification for All Tables

All existing tables are verified to be in BCNF using functional dependencies

1. Customer

Attributes:
(customer_id, first_name, last_name, email, address)
FDs:

- customer_id → first_name, last_name, email, address

Justification:

- customer_id is the only candidate key and determines all non-key attributes.
- No partial or transitive dependencies.
  Conclusion: Table is in BCNF.

2. Customer_Phone

Attributes:
(phone, customer_id)
FDs:

- phone → customer_id

Justification:

- phone is the primary key.
- Single dependency with a candidate key as determinant.
  Conclusion: Table is in BCNF.

3. Tour_Package

Attributes:
(package_id, package_name, destination, price_per_person, start_date, end_date)
FDs:

- package_id → package_name, destination, price_per_person, start_date, end_date

Conclusion: Table is in BCNF.

4. Booking

Attributes:
(booking_id, booking_date, customer_id, package_id, number_of_people, total_cost)
FDs:

- booking_id → booking_date, customer_id, package_id, number_of_people, total_cost

Conclusion: Table is in BCNF.

5. Payment

Attributes:
(booking_id, payment_date, payment_amount, payment_mode)
FDs:

- booking_id → payment_date, payment_amount, payment_mode

Conclusion: Table is in BCNF.

6. Guide

Attributes:
(guide_id, guide_name, language, availability_status)
FDs:

- guide_id → guide_name, language, availability_status

Conclusion: Table is in BCNF.

7. Guide_Contact

Attributes:
(contact_number, guide_id)
FDs:

- contact_number → guide_id

Conclusion: Table is in BCNF.

Modified Table: Booking (To Simulate 2NF to BCNF Normalization)

To fulfill the rubric requirement, one table was intentionally modified to no longer satisfy BCNF.

Attributes:
(customer_id, package_id, booking_date, number_of_people, total_cost)
Assumed Composite Primary Key: (customer_id, package_id)

Functional Dependencies:

- (customer_id, package_id) → booking_date, number_of_people, total_cost
- booking_date → total_cost (partial dependency)

BCNF Violation:
booking_date → total_cost violates BCNF because booking_date is not a superkey.

Decomposition to BCNF

Step 1: Identify violating dependency

- booking_date → total_cost is the BCNF-violating FD.

Step 2: Decompose into BCNF-compliant tables

1. **Booking_Info**
    - Attributes: (customer_id, package_id, booking_date, number_of_people)
    - FD: (customer_id, package_id) → booking_date, number_of_people
2. **Date_Cost**
    - Attributes: (booking_date, total_cost)
    - FD: booking_date → total_cost

Both resulting tables now satisfy BCNF.

```
INSERT INTO Booking_Info (customer_id, package_id, booking_date, number_of_people)
VALUES
(1, 1, '2025-05-01', 2),
(2, 2, '2025-06-15', 3),
(3, 3, '2025-07-20', 1),
(4, 4, '2025-08-10', 4),
(5, 5, '2025-09-05', 2);

INSERT INTO Date_Cost (booking_date, total_cost)
VALUES
('2025-05-01', 2400.00),
('2025-06-15', 2700.00),
('2025-07-20', 750.00),
('2025-08-10', 6000.00),
('2025-09-05', 2600.00);

SELECT * FROM Booking_Info;
SELECT * FROM Date_Cost;
```