Worksheet # 3 – Week 5

For Practice – not graded

Date: 25 March 2024

CITS1402 Semester 1

Below is the **schema** for a set of tables that form part of a database held in a relational DBMS:-

Hotel Room Booking Guest

(hotelNo, hotelName, city)
(roomNo, hotelNo, type, price)
(hotelNo, guestNo, dateFrom, dateTo, roomNo)
(guestNo, guestName, guestAddress)

where ***Hotel*** contains hotel details and _____ is the primary key;
Room contains room details for each hotel and _____forms the primary key; ***Booking*** contains details of the bookings and _____ forms the primary key;

and ***Guest*** contains guest details and _____is the primary key.

Q1 Identify the primary keys in this schema. Identify the foreign keys in this schema. Define the two principal integrity rules for the relational model and discuss how they apply to these relations.

Q2 Produce some sample tables for these relations that observe the relational integrity rules. Suggest some general constraints that would be appropriate for this schema.

once □ a □ same □ guest □ book □ any □ same □ or □ overlap □ date(to □ and □ from) □ should □ be □ mention
quest □ name □ should □ be □ split □ last □ and □ first, □ address □ as □ well

Q3 Why do we bother with making a link between database tables and the mathematical relational model? How does this relate back to the Hotel Booking schema?

Q 4 Describe the relations that would be produced by the following relational algebra operations:

1. $\Pi_{hotelNo}(\sigma_{price > 50}(Room))$
2. $\sigma_{Hotel.hotelNo = Room.hotelNo}(Hotel \times Room)$
3. $\Pi_{hotelName}(Hotel \rhd\lhd_{Hotel.hotelNo = Room.hotelNo}(\sigma_{price > 50}(Room)))$

select □ g.name □ and □ g.city □ from □ guest □

Q5 Generate the relational algebra expressions for the following queries:

1. *List all hotels.*
2. *List all single rooms with a price below £20 per night.*
3. *List the names and cities of all guests.*
4. *List the price and type of all rooms at the Grosvenor Hotel.*
5. *List all guests currently staying at the Grosvenor Hotel.*