



DATABASE ASSIGNMENT 2

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Question 1: Describe the result of the relational algebra expression based on the following schema:

The following tables form part of a database held in a relational DBMS:

Hotel (hotelNo, hotelName, city)
Room (roomNo, hotelNo, type, price)
Booking (hotelNo, guestNo, dateFrom, dateTo, roomNo)
Guest (guestNo, guestName, guestAddress)

where Hotel contains hotel details and hotelNo is the primary key;

Room contains room details for each hotel and (roomNo, hotelNo) forms the primary key;

Booking contains details of bookings and (hotelNo, guestNo, dateFrom) forms the primary key;

Guest contains guest details and guestNo is the primary key.

1. $\Pi_{\text{hotelName}} (\text{Hotel} \bowtie \text{Hotel.hotelNo} = \text{Room.hotelNo} (\sigma_{\text{price} > 50} (\text{Room})))$

From the relation room we select all the tuples (rows) with price more than 50, then we do a cartesian product of the relation hotel with the selected rows of the relation Room (Hotel X ($\sigma_{\text{price} > 50} (\text{Room})$)), then we do a selection based on the given condition (Hotel.hotelNo = Room.hotelNo), then from the result we select the attribute hotelName.

HotelName
Sapphire Serenity.
The Velvet Vista.
Azure Skyline Resort.
Royal Rose Residency.

2. Guest $\bowtie (\sigma_{\text{dateTo} \geq \text{'1-Jan-2002'}} (\text{Booking}))$

Selecting from the relation Booking the rows which has (DateTo) value more than or equal to '1-Jan-2002', then we match the common attributes with equaljoins, and the

and each row that doesn't match (isn't a common attribute with relation Booking) in relation Guest will have null row values in relation Booking in the result.

GuestID	fName	lName	DateTo	roomNo
B007	Michael	Mitchell	1-Sep-2002	509
B006	Goerge	Joseph	2-Nov-2002	202
B005	Ashley	Times	null	null
B004	Sofia	Rodregez	4-Jan-2002	405
B003	Dan	Daniell	null	null

3. Hotel \bowtie Hotel.hotelNo = Room.hotelNo (σ price > 50 (Room)))

We select all the tuples that has room more 50 price, then we do a equajoining of (Hotel \bowtie Room.hotelNo = Room.hotelNo(σ price > 50 (Room))).

Then eliminating the common attribute,

hotelNo	hotelName	street	roomNo	price
403	Sapphire Serenity.	St.025	405	57
206	Royal Rose Residency.	St.022	508	70
307	The Velvet Vista.	St.032	702	65

4. Π guestName, hotelNo (Booking \bowtie Booking.guestNo = Guest.guestNo Guest)

$\div \Pi$ hotelNo (σ city = 'London'(Hotel))

From the Hotel relation we select the rows that contain the city London then we take the attribute(column) hotelNo, then an equajoint between the relation Booking and Guest with a property (Booking.guestNo = Guest.guestNo), then from the result of the joint we select the attribute guestName and hotelNo, then we will select the set of tuples in the result relation that match combination of every tuple in the projection Π hotelNo (σ city = 'London'(Hotel)).

guestName	hotelNo
Alina	B006
Daniel	B004

Jester	B007
Daniel	B006
Daniel	B007

÷

hotelNo
B006
B004
B007

=

guestName
Daniel

Question 2: Write the relational algebra expression for the following statements (refer to the Hotel schema in previous question):

1. List the price and type of all rooms at the Grosvenor Hotel.

$\Pi(\text{hotelNo}, \text{hotelName})(\sigma \text{ hotelName} = \text{'Grosvenor'}(\text{Hotel})) \bowtie$
 $(\text{Hotel.hotelNo} = \text{Room.hotelNo})(\Pi(\text{price}, \text{type})(\text{Room}))$

2. List all guests currently staying at the Grosvenor Hotel.

$\Pi(\text{hotelNo}, \text{hotelName})(\sigma \text{ hotelName} = \text{'Grosvenor'}(\text{Hotel})) \bowtie (\text{Guest})$

3. List the details of all rooms at the Grosvenor Hotel, including the name of the guest staying in the room, if the room is occupied.

$\Pi(\text{hotelNo}, \text{hotelName})(\sigma \text{ hotelName} = \text{'Grosvenor'}(\text{Hotel})) \text{--} \bowtie (\text{Room})$

4. List the guest details (guestNo, guestName, and guestAddress) of all guests staying at the Grosvenor Hotel.

$$(\Pi(\text{hotelNo}, \text{hotelName})(\sigma \text{ hotelName} = \text{'Grosvenor'}(\text{Hotel}))) \bowtie$$

$$(\text{Hotel.guestNo} = \text{Guest.guestNo})(\Pi(\text{guestNo}, \text{guestName}, \text{guestAddress})(\text{Guest}))$$

Question 3: Describe the result of the relational algebra expression:

$$\Pi \text{ guestName, hotelNo } (\text{Booking} \bowtie \text{Booking.guestNo} = \text{Guest.guestNo } (\text{Guest})) \div$$

$$\Pi \text{ hotelNo } (\sigma \text{ city} = \text{'London'}(\text{Hotel}))$$

From the Hotel relation we select the rows that contain the city London then we take the attribute (column) hotelNo, then an equajoint between the relation Booking and Guest with a property (Booking.guestNo = Guest.guestNo), then from the result of the joint we select the attribute guestName and hotelNo, then we will select the set of tuples in the result relation that match combination of every tuple in the projection $\Pi \text{ hotelNo } (\sigma \text{ city} = \text{'London'}(\text{Hotel}))$.