Lab 5

Use the hotelbooking database to answer the following questions:

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. $\Pi_{hotelName}\ (Hotel \rhd\lhd_{Hotel.hotelNo\ =\ Room.hotelNo}\ (\sigma_{price\ >\ 50}\ (Room))\ )$ [PS. $\rhd\lhd$ means Equijoin]
4. $Guest \ltimes (\sigma_{dateTo\ \geq\ '1\text{-}Jan\text{-}2002'}\ (Booking))$ [PS. $\ltimes$ means left-join]
5. $Hotel \rhd_{Hotel.hotelNo\ =\ Room.hotelNo}\ (\sigma_{price\ >\ 50}\ (Room))\ )$
6. $\Pi_{guestName,\ hotelNo}\ (Booking \rhd\lhd_{Booking.guestNo\ =\ Guest.guestNo}\ Guest) \div \Pi_{hotelNo}\ (\sigma_{city\ =\ 'London'}(Hotel))$ [This is a challenging question, it is optional]

Provide the equivalent tuple relational calculus and domain relational calculus expressions for each of the relational algebra queries given in the above

Describe the relations that would be produced by the following tuple relational calculus expressions:

1. $\{H.hotelName \mid Hotel(H) \wedge H.city = 'London'\}$
2. $\{H.hotelName \mid Hotel(H) \wedge (\exists R)\ (Room(R) \wedge H.hotelNo = R.hotelNo \wedge R.price > 50)\}$
3. $\{H.hotelName \mid Hotel(H) \wedge (\exists B)\ (\exists G)\ (Booking(B) \wedge Guest(G) \wedge H.hotelNo = B.hotelNo \wedge B.guestNo = G.guestNo \wedge G.guestName = 'John\ Smith')\}$

4. $\{H.hotelName, G.guestName, B1.dateFrom, B2.dateFrom \mid Hotel(H) \wedge Guest(G) \wedge Booking(B1) \wedge Booking(B2) \wedge H.hotelNo = B1.hotelNo \wedge G.guestNo = B1.guestNo \wedge B2.hotelNo = B1.hotelNo \wedge B2.guestNo = B1.guestNo \wedge B2.dateFrom \neq B1.dateFrom\}$ *[This is a challenging question, it is optional]*

Provide the equivalent domain relational calculus and relational algebra expressions for each of the tuple relational calculus expressions given in the above questions.

Generate the relational algebra, tuple relational calculus, and domain relational calculus 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.*
6. *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.*
7. *List the guest details (guestNo, guestName, and guestAddress) of all guests staying at the Grosvenor Hotel.*