National Day's Assignment

Assignment 3:

1. Discuss each of the following concepts in the context of the relational data model:
   (a) relation
   (b) attribute
   (c) domain
   (d) tuple
   (e) degree and cardinality
   (f) relational database.

2. What are the properties of relations?

3. Discuss the differences between Superkey, Candidate Key and Primary Key.

4. What is "view"?

5. Discuss the differences between View and Base Relation.

6. What is the purpose of views?

7. Can a database user update the data through a view? If not, explain the reason. If so, discuss the restrictions about it.

8. What is "foreign key"? How does a foreign key relate to a candidate key?

9. What is the meaning of integrity constraints? How many types of integrities and what are they? How many types of constraints and what are they?

10. What is "null"? How do we use "null" in database?

11. The relations in the next page are from a same relational database. Based on the relations, please give proper answer to the following questions.
    a) How many tuples, degrees, cardinalities, and attributes for each relation?
       - Customer:
       - Order:
       - Agents:

    b) Please identify a proper primary key for each relation.
       - Customer:
       - Order:
       - Agents:

    c) Please identify all foreign keys for each relation.
       - Customer:
       - Order:
       - Agents:

Customer

CUST_CODE	CUST_NAME	CUST_CITY	CUST_COUNTRY	GRADE	PAYMENT_AMT	OUTSTANDING_AMT	PHONE_NO	AGENT_CODE
C00001	Micheal	New York	USA	2	2000	6000	CCCCCCC	A008
C00002	Bolt	New York	USA	3	9000	3000	DDNRDRH	A008
C00003	Martin	Toronto	Canada	2	7000	8000	MJYURFD	A004
C00004	Winston	Brisbane	Australia	1	7000	6000	AAAAAAA	A005
C00005	Sasikant	Mumbai	India	1	7000	11000	147-25896312	A002
C00006	Shilton	Toronto	Canada	1	6000	11000	DDDDDDD	A004
C00007	Ramanathan	Chennai	India	1	9000	9000	GHRDWSD	A010
C00008	Karolina	Toronto	Canada	1	9000	5000	HJKORED	A004
C00009	Ramesh	Mumbai	India	3	3000	12000	Phone No	A002
C00010	Charles	Hampshire	UK	3	5000	5000	MMMMMMM	A009
C00011	Sundariya	Chennai	India	3	7000	11000	PPHGRTS	A010
C00012	Steven	San Jose	USA	1	9000	3000	KRFYGJK	A012
C00013	Holmes	London	UK	2	7000	4000	BBBBBBB	A003
C00014	Rangarappa	Bangalore	India	2	7000	12000	AAAATGF	A001
C00015	Stuart	London	UK	1	3000	11000	GFSGERS	A003
C00016	Venkatpati	Bangalore	India	2	7000	12000	JRTVFDD	A007
C00017	Srinivas	Bangalore	India	2	3000	9000	AAAAAAB	A007
C00018	Fleming	Brisbane	Australia	2	9000	5000	NHBGVFC	A005
C00019	Yearannaidu	Chennai	India	1	7000	8000	ZZZZBFV	A010
C00020	Albert	New York	USA	3	6000	6000	BBBBSBB	A008
C00021	Jacks	Brisbane	Australia	1	7000	7000	WERTGDF	A005
C00022	Avinash	Mumbai	India	2	9000	9000	113-12345678	A002
C00023	Karl	London	UK	0	7000	3000	AAAABAA	A006
C00024	Cook	London	UK	2	7000	6000	FSDDSDF	A006
C00025	Ravindran	Bangalore	India	2	4000	8000	AVAVAVA	A011

Order

ORD NUM	ORD AMOUNT	ADVANCE AMOUNT	ORD DATE	CUST_ CODE	AGENT_ CODE	ORD DESCRIPTION
200100	1000	600	39661	C00013	A003	SOD
200101	3000	1000	39644	C00001	A008	SOD
200102	2000	300	39593	C00012	A012	SOD
200103	1500	700	39583	C00021	A005	SOD
200104	1500	500	39520	C00006	A004	SOD
200105	2500	500	39647	C00025	A011	SOD
200106	2500	700	39558	C00005	A002	SOD
200107	4500	900	39690	C00007	A010	SOD
200108	4000	600	39493	C00008	A004	SOD
200109	3500	800	39659	C00011	A010	SOD
200110	3000	500	39553	C00019	A010	SOD
200111	1000	300	39639	C00020	A008	SOD
200112	2000	400	39598	C00016	A007	SOD
200113	4000	600	39609	C00022	A002	SOD
200114	3500	2000	39675	C00002	A008	SOD
200116	500	100	39642	C00010	A009	SOD
200117	800	200	39741	C00014	A001	SOD
200118	500	100	39649	C00023	A006	SOD
200119	4000	700	39707	C00007	A010	SOD
200120	500	100	39649	C00009	A002	SOD

Agents

AGENT_CODE	AGENT_NAME	WORKING_AREA	COMMISSION	PHONE_NO	COUNTRY
A001	Subbarao	Bangalore	0.14	077-12346674	
A002	Mukesh	Mumbai	0.11	029-12358964	
A003	Alex	London	0.13	075-12458969	
A004	Ivan	Torento	0.15	008-22544166	
A005	Anderson	Brisban	0.13	045-21447739	
A006	McDen	London	0.15	078-22255588	
A007	Ramasundar	Bangalore	0.15	077-25814763	
A008	Alford	New York	0.12	044-25874365	
A009	Benjamin	Hampshair	0.11	008-22536178	
A010	Santakumar	Chennai	0.14	007-22388644	
A011	Ravi Kumar	Bangalore	0.15	077-45625874	
A012	Lucida	San Jose	0.12	044-52981425	

Assignment 4:

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. Identify the **foreign keys** in this schema. Explain how the entity and referential integrity rules apply to these relations.

2. Suggest some **general constraints** that would be appropriate for this schema.

3. Based on the general constraints you suggested, try to define the **domain** for each relation.

4. Based on the domain you defined, identify the **alternate keys** in this schema.

5. What kind of **views** should be generated for the **hotel manager**? Please give an example of it and give a short explanation.

6. Generate the **relational algebra** and **tuple relational calculus** expressions for the following queries:

   a) List all **hotels**.
   b) List all **single rooms** with a price below **£20** per night.
   c) List the **names** and **cities** of all guests.
   d) List the **price** and type of all **rooms** at the **Grosvenor** Hotel.
   e) List all **guests** currently staying at the **Grosvenor** Hotel.
   f) 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**.
   g) List the **guest** details (**guestNo**, **guestName**, **guestAddress**) of all guests staying at the **Grosvenor** Hotel.

7. Please give proper queries that would be expressed by the following **relational algebra** expressions:

(a) $\Pi_{hotelNo}(\sigma_{price > 50}(Room))$

(b) $\sigma_{Hotel.hotelNo = Room.hotelNo}(Hotel \times Room)$

(c) $\Pi_{hotelName}(Hotel \bowtie_{Hotel.hotelNo = Room.hotelNo}(\sigma_{price > 50}(Room)))$

(d) $Guest \rtimes (\sigma_{dateTo \geq '1\text{-}Jan\text{-}2007'}(Booking))$

(e) $Hotel \triangleright_{Hotel.hotelNo = Room.hotelNo}(\sigma_{price > 50}(Room))$

(f) $\Pi_{guestName, hotelNo}(Booking \bowtie_{Booking.guestNo = Guest.guestNo} Guest) \div \Pi_{hotelNo}(\sigma_{city = 'London'}(Hotel))$

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

a) $\{H.hotelName \mid Hotel(H) \wedge H.city = "London"\}$

b) $\{H.hotelName \mid Hotel(H) \wedge (\exists R)\ (Room(R) \wedge H.hotelINo = R.hoteINo \wedge R.price > 50)\}$

c) $\{H.hotelName \mid Hotel(H) \wedge (\exists B)\ (\exists G)\ (Booking(B) \wedge Guest(G) \wedge H.hotelNo = B.hotelINo \wedge B.guestNo = G.guestNo \wedge G.guestName = "John\ Smith")\}$

9. Please convert the following **relational algebra expressions** with **join** into relational algebra expressions only with **basic operations**:

a) $\text{Hotel} \bowtie (\sigma_{\text{price} > 50}(\text{Room}))$

b) $\text{Hotel} \bowtie_{\text{Hotel.hotelNo} = \text{Room.hotelNo}} (\sigma_{\text{price} > 50}(\text{Room}))$

c) $\text{Hotel} \triangleright_{\text{Hotel.hotelNo} = \text{Room.hotelNo}} (\sigma_{\text{price} > 50}(\text{Room}))$