CS443 - Lab 1

Questions:

1) Answer the following questions:
   a) Just by observing the tables below, what would you choose the primary key of each table?
   Salesreps Table: EMPL_NUM
   Offices Table: OFFICE
   Customers Table: CUST_NUM
   Orders Table: ORDER_NUM
   Products Table: PRODU, MFR
   b) Based on the explanation of the attributes given on pages 2 – 5 write down all the foreign keys. For example, if you think that Rep_Office is a foreign key in the Salesreps table, you should write:
   Rep_Office is a foreign key in the Salesreps table because it refers to the primary key (office attribute) of the offices table.

   Do the same for every foreign key that you find in the entire database.

   Salesreps Table:
   - Rep_Office is a foreign key in the Offices table because it refers to the primary key (OFFICE) of the offices table.
   - MANAGER is a foreign key in the Salesreps table because it refers to the primary key (EMPL_NUM) of the Salesreps table.

   Offices Table:
   - MGR is a foreign key in the Offices table because it refers to the primary key (EMPL_NUM) of the Salesreps table.

   Customers Table:
   - CUST_REP is a foreign key in the Customers table because it refers to the primary key (EMPL_NUM) of the Salesreps table.

   Orders Table:
   - CUST is a foreign key in the Orders table because it refers to the primary key (CUST_NUM) of the Customers table.
   - REP is a foreign key in the Orders table because it refers to the primary key (EMPL_NUM) of the Salesreps table.
   - MFR and PRODU are a composite foreign key in the Orders table because it refers to the composite primary key (MFR and PRODU) of the Products table.

   Products Table:
   - No foreign keys can be found in the following tables

2) It is true that in the office table "Office" by itself is a primary key. Suppose we do not want "office ID" to be primary key or be part of a "Composite Primary key" and we prefer "City" to the primary key or part of the Primary Key. What assumption(s) do you need to make to make city to be the primary key or part of the primary key? Note that you can add additional column to the table that may not exist. **Hint: Some cities like "San Marcos" may exist in more than one state.**

Assumptions to be made is to acknowledge or know the state of where the city is. That is because if a city named "San Marcos" is shown on the table, it is hard to know if the city may be from California or from Texas. By adding the state as a column on the table, it will easily make the city more unique to be the primary key. Another reason is that there can be a variety of offices from that city and those cities can have the same name, but the catch is that there cannot be multiple offices in the same city from the same state.

3) What is the difference between primary key and candidate key? How many primary key(s) a table can have? How many Foreign keys a table can have? How many candidate keys a table can have?

Primary key is a column or combination of two or more columns that uniquely identifies each row of a table, or in other terms, it is unique to having different IDs or items. Candidate key is a key that can identify each unique record independently of any data or a subset of any unnecessary attributes that is not significant for identifying tuples.

There can only be one primary key in a table. If there are multiple fields or keys that are used as a primary key, then it will be a composite key.

As of for foreign keys, there can be multiple or infinite amount of them that can be found, or in other terms there is no limit to the number of foreign keys in a table. That is because they are values that match with the primary key of another table (and depending on the number of tables, that is why there can be multiple foreign keys to be found.)

Similar as to foreign keys, there can be multiple candidate keys in a table. Since candidate keys are keys that can be qualified to be a unique key of a database, so there can be as much as many to infinite number of keys.

4) Suppose you have a city table with the following attribute:

- State, City name, Zip code, Population, Region
    - Is there any problem of choosing Population as primary key? Explain.

      Choosing the population as a primary key is not valid because there can be matched populations from different cities, which will be common to see. For example, if San Diego has a population of one million people and San Marcos has a population of one million people, then it will be less unique and a problem to be a primary key.

- Is there any problem of choosing Zip code as a primary key? Explain.

  Similar as with population, zip codes cannot be served as a primary key because not every city serves its own zip code, even if it is on the same state. For example, a zip code of 94608, is searched in California that will generate two cities including Emeryville and Oakland, thus making the zip code not unique and a problem to be a primary key.

- Assume that we are only considering cities and states in US.

  Considering with just cities and states in the US, it will be a primary key since each city will be unique with each state. As question 2 states, without stating the state of a city, the city or state will not be a primary key and it will be not unique, so in that case, having both cities and states will make it a primary key.

Salesreps Table:

EMPL_NUM	NAME	AGE	REP_OFFICE	TITLE	HIRE_DATE	MANAGER	QUOTA	SALES
105	Bill Adams	37	13	Sales Rep	12-FEB-88	104	350000	367911
109	Mary Jones	31	11	Sales Rep	12-OCT-89	106	300000	392725
102	Sue Smith	48	21	Sales Rep	10-DEC-86	108	350000	474050
106	Sam Clark	52	11	VP Sales	14-JUN-88		275000	299912
104	Bob Smith	33	12	Sales Mgr	19-MAY-87	106	200000	142594
101	Dan Roberts	45	12	Sales Rep	20-OCT-86	104	300000	305673
110	Tom Synder	41		Sales Rep	13-JAN-90	101		75985
108	Larry Fitch	62	21	Sales Mgr	12-OCT-89	106	350000	361865
103	Paul Cruz	29	12	Sales Rep	01-MAR-87	104	275000	286775
107	Nacy Angelli	49	22	Sales Rep	14-NOV-88	108	300000	186042

Offices Table:

OFFICE	CITY	REGION	MGR	TARGET	SALES
22	Denver	Western	108	300000	186042
11	New York	Eastern	106	575000	692637
12	Chicago	Eastern	104	800000	735042
13	Atlanta	Eastern	105	350000	367911
21	Los Angeles	Western	108	725000	835915

Customers Table:

CUST_NUM	COMPANY	CUST_REP	CREDIT_LIMIT
2111	JCP Inc.	103	50000
2102	First Corp.	101	65000
2103	Acme Mfg.	105	108000
2123	Carter and Sons	102	40000
2107	Ace International	110	35000
2115	Smithson Corp.	101	20000
2101	Jones Mfg.	106	65000
2112	Zetacorp	108	108000
2121	QMA Assoc.	103	45000
2114	Orion Corp.	102	43200
2124	Peter Brothers	107	40000
2108	Holm and Landis	109	55000
2117	J.P. Sinclair	106	35000
2122	Three-Way Lines	105	30000
2120	Rico Enterprises	102	50000
2106	Fred Lewis Corp.	102	65000
2119	Solomon Inc.	109	25000
2118	Midwest Systems	108	60000
2113	Ian and Schmidt	104	20000
2109	Chen Associates	103	25000

2105	AAA Investments	101	45000

Orders Table:

ORDER_NUM	ORDER_DAT	CUST	REP	MFR	PRODU		QTY	AMOUNT
112961	17-DEC-89	2117	106	REI	2A44L	7	31500	
113012	11-JAN-90		2111	105	ACI	41003	35	3745
112989	03-JAN-90		2101	106	FEA	114	6	1458
113051	10-FEB-90	2118	108	QSA	K47	4	1420	
112968	12-OCT-89	2102	101	ACI	41004	34	3978	
113036	30-JAN-90		2107	110	ACI	4100Z	9	22500
113045	02-FEB-90	2112	108	REI	2A44R	10	45000	
112963	17-DEC-89	2103	105	ACI	41004	28	3276	
113013	14-JAN-90		2118	108	BIC	41003	1	652
113058	23-FEB-90	2108	109	FEA	112	10	1480	
112997	08-JAN-90		2124	107	BIC	41003	1	652
112983	27-DEC-89	2103	105	ACI	41004	6	702	
113024	20-JAN-90		2114	108	QSA	XK47	20	7100
113062	24-FEB-90	2124	107	FEA	114	10	2430	
112979	12-OCT-89	2114	102	ACI	4100Z	6	15000	
113027	22-JAN-90		2103	105	ACI	41002	54	4104
113007	08-JAN-90		2112	108	IMM	773C	3	2925
113069	02-MAR-90	2109	107	IMM	775C	22	31350	
113034	29-JAN-90		2107	110	REI	2A45C	8	632
112992	04-NOV-89	2118	108	ACI	41002	10	760	
112975	12-OCT-89	2111	103	REI	2A44G	6	2100	
113055	15-FEB-90	2108	101	ACI	4100X	6	150	
113048	10-FEB-90	2120	102	IMM	779C	2	3750	
112993	04-JAN-89		2106	102	REI	2A45C	24	1896
113065	27-FEB-90	2106	102	QSA	XK47	6	2130	
113003	25-JAN-90		2108	109	IMM	779C	3	5625
113049	10-FEB-90	2118	108	QSA	XK47	2	776	
112987	31-DEC-89	2103	105	ACI	4100Y	11	27500	
113057	18-FEB-90	2111	103	ACI	4100X	24	600	
113042	02-FEB-90	2113	101	REI	2A44R	5	22500	

Products Table:

MFR	PRODU	DESCRIPTION	PRICE	QTY_ON_HAND

REI	2A45C	RATCHET LINK		79	210
ACI	4100Y	WIDGET REMOVER		2750	25
QSA	XK47	REDUCER	355	38	
BIC	41672	PLATE		180	0
IMM	779C	900-LB BRACE		1875	9
ACI	41003	SIZE 3 WIDGET		107	207
ACI	41004	SIZE 4 WIDGET		117	139
BIC	41003	HANDLE		652	3
IMM	887P	BRACE PIN	250	24	
QSA	XK48	REDUCER	134	203	
REI	2A44L	LEFT HINGE	4500	12	
FEA	112	HOUSING	148	115	
IMM	887F	BRACE HOLDER		54	223
BIC	41089	RETAINER	225	78	
ACI	41001	SIZE 1 WIDGET		55	277
IMM	775C	500-LB BRACE		1425	5
ACI	4100Z	WIDGET INSTALLER		2500	28
QSA	XK48A	REDUCER		177	37
ACI	41002	SIZE 2 WIDGET		76	167
REI	2A44R	RIGHT HINGE		4500	12
IMM	773C	300-LB BRACE		975	28
ACI	4100X	WIDGET ADJUSTER		25	37
FEA	114	MOTOR MOUNT		243	15
IMM	887X	BRACE RETAINER		475	32
REI	2A44G	HINGE PIN	350	14	

Description of the database:

Salesreps table:

Empl_Num:	Employee Id of the sales person. Each sales rep (employee) is given a different employee id
Name:	Name of the sales person
Age:	Age of the of the sales person
Rep_Office:	It is the id of the office where sales person is working
Title:	Title of the sales person
Hire_Date:	The date when the salesperson was hired
Manager:	The employee id of the his/her boss
Sales:	Total sales made by the sales person since he/she has been hired

Example:

Empl_Num	Name	Age	Rep_Office	Title	Hire_Date	Manager
105	Bill Adams	37	13	Sales Rep	12-FEB-88	104

Quota	Sales
350000	367911

This indicates that Bill Adams is a 37 years sales Rep, with the employee id 105. He was hired on Feb 12, 1988 and work in office 13 (office 13 is in Atlanta – see offices table). The employee id of his boss is 104 (employee id 104 is Bob Smith – see Salesreps table). Bill Adams's sales Quota is $350000 and his total sales is $367911.

Products table:

Mfr_Id:	It is the manufacturer id of the product
Product_Id:	It is the Product id of the product
Description:	It is the description of this product
Price:	Price per unit
Qty_On_Hand:	number of this product available in stock

Example:

Mfr_Id	Product_Id	Description	Price	Qty_On_Hand
REI	2A45C	RATCHET LINK	79	210

This indicates that "RATCHET LINK" is a product with product Id 2A45C made by manufacturer REI (where REI is the three letters code for the manufacturer). The price of "RATCHET LINK" is $79.00 per unit. There are 210 pieces are currently available. It is important to note that manufacturer may make the same product. Clearly, a manufacturer may make more than one product.

Orders table:

Order_Num: Order number of a particular order. Each order is given a different order number
Order_Date: It is the date that order was made
Cust: It is the customer id of the customer who makes the order
Rep: It is the id of the sales rep who takes care of the order
Mfr: It is the manufacturer code associated with the product that the customer orders
Product: It is the product id of the product the customer orders
QTY: It is the quantity of the product the customer orders
Amount: It is the total amount of money (Quantity ordered * price per unit) the customer pays for the product

Example:

Order_Num	Order_Date	Cust	Rep	MFR	Product	QTY	Amount
112961	17-DEC-89	2117	106	REI	2A45C	7	31500

This indicates that sales rep 106 (who is Sam Clark – see salesreps table) took order 112961 for customer 2117 (who is "J.P. Sinclair" – see customer table) on Dec 17, 1989. Customer 2117 ordered 7 piece of the product REI 2A45C (which is "RATCHET LINK" – see products table). Customer 2117 paid total of $31500. This amount also refers to one of the sales (not all the sales) made by sales rep 106 (who is "Sam Clark")

Customer table:

Cust_Num: It is the id of the customer. Each customer has a different id
Company: It is the name of the company (the name of the customer)
Cust_Rep: It is the sales person who represents this customer
Credit_Limit: It is the credit limit of the customer (company) associated with each order the customer requests (not with all the orders the customer has requested). For example, if the Credit_Limit of a customer is $50,000. Based on this Credit Limit, the customer makes an order. Then this credit Limit is reset back to $50, 000 for the next order the customer makes.

Example:

Cust_Num	Company	Cust_Rep	Credit_Limit
2111	JCP Inc	103	50000

This indicates customer id 2111, known as "JCP Inc" is represented by the sales person 103 (who is "Paul Cruz" – see salesreps table). "JCP Inc's" credit limit for every specific order is $50,000.

Offices table:

Office: id of each office. Each office has a different office id
City It is the city where the office is located
Region: It is the region (western or eastern) where the office is located
Mgr: It is the id of the sales person who is the manager of that office

Target: It is the target sale of that office
Sales: It is the total sales made in that office up to now

Example:

Office	City	Region	Mgr	Target	Sales
22	Denver	Western	108	300000	186042

This indicates office 22 is in “Denver”. Denver is in Western region of North America. The target sale of this office is $300,000. The total sale made in this office is $186, 042 up to now.