

National University of Computer and Emerging Sciences, Lahore Campus



Course:  
Program:  
Paper Date:  
Section:  
Exam:

Object Oriented Programming  
BS (CS,SE,R,DS)  
20-Feb-24  
BSSE-4A  
Quiz 2

Course Code: CS-1004  
Semester: Fall 2023  
Total Marks: 10  
Duration: 10 Minutes  
Roll No. 22i-2505

Instruction/Notes: Attempt all questions. Do not use pencil or red ink. In case of confusion or ambiguity make a reasonable assumption. Do not attach any extra sheet. Use extra sheet for rough work only

Question 1:

- a) Create a table Patient with following fields
- PatientID integer (4)
  - Name varchar (15)
  - Age int
  - Gender varchar(5)
  - Address varchar(20)
  - Disease varchar(10)
  - DoctorID varchar(15)

create table Patient (

PatientId int primary key Count(1000),  
Name varchar(15), Age int,  
Gender varchar(5), Address varchar(20),  
Disease varchar(10), DoctorId  
varchar(15));

Constraints.

- PatientID in Patient, is primary key. PatientID should start from 1000
- b) Change the datatype of Gender from varchar(5) to char in Patient table.

alter table Patient update column Gender char;

Question 2.

Tbl\_Sailor

sid	sname	rating	age
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
58	Rusty	10	35.0
64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

Tbl\_Reserve

sid	bid	day
22	101	10/10/98
22	102	10/10/98
22	103	10/8/98
22	104	10/7/98
31	102	11/10/98
31	103	11/6/98
31	104	11/12/98
64	101	9/5/98
64	102	9/8/98
74	103	9/8/98

Tbl\_Boats

bid	bname	color
101	Interlake	blue
102	Interlake	red
103	Clipper	green
104	Marine	red

on next page

Show the Sailor names who have age greater than 33 and has boats whose color is 'red' in ascending order.

Delete the Sailor named 'Horatio' Delete from Tbl-Sailor where sname='Horatio';

Update day to current date where sid=64 and day='9/8/98'

alter table Tbl-Reserve update day='20/2/23' where sid=64 and day='9/8/98';

select sname from Tbl\_Sailors as S, Tbl\_Reserve as  
R, Tbl\_Boats as B where S.age > 33 and  
R.bid = B.bid and B.color = 'red' order  
by sname.

are

(3)



# National University of Computer and Emerging Sciences, Lahore Campus



Course Name:	Database Systems	Course Code:	CS2005
Degree Program:	BS(computer science)	Semester:	Spring 2024
Date:		Total Marks:	20
Section:	BCS-6A	Type:	Quiz(4)
		Name:	Sufiye Ahmad
		Roll no:	211-1805

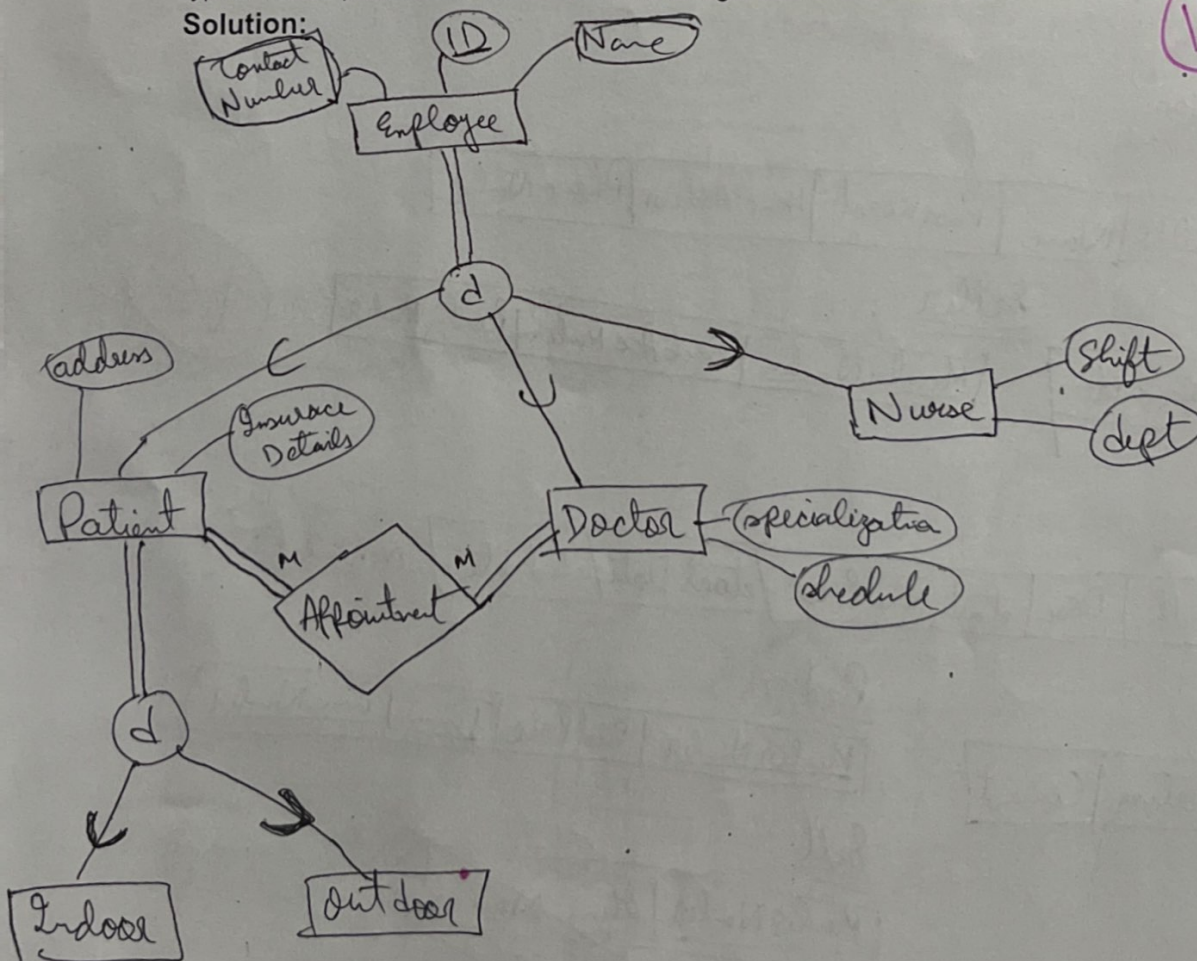
20/20

## QUESTION 1 (10 MARKS)

In the hospital management system, there are three main types of employees: Patients, Doctors, and Nurses. Patients are characterized by attributes such as ID, Name, Address, Contact Number, and Insurance Details. Doctors have attributes like ID, Name, Specialization, Contact Number, and Schedule. Nurses are identified by attributes such as ID, Name, Department, Contact Number, and Shift. Patients can have multiple appointments with doctors, and doctors can have multiple appointments with patients. Patients are categorized into two types: indoor patients or outdoor patients. Design EERD/ERD of the scenario.

Solution:

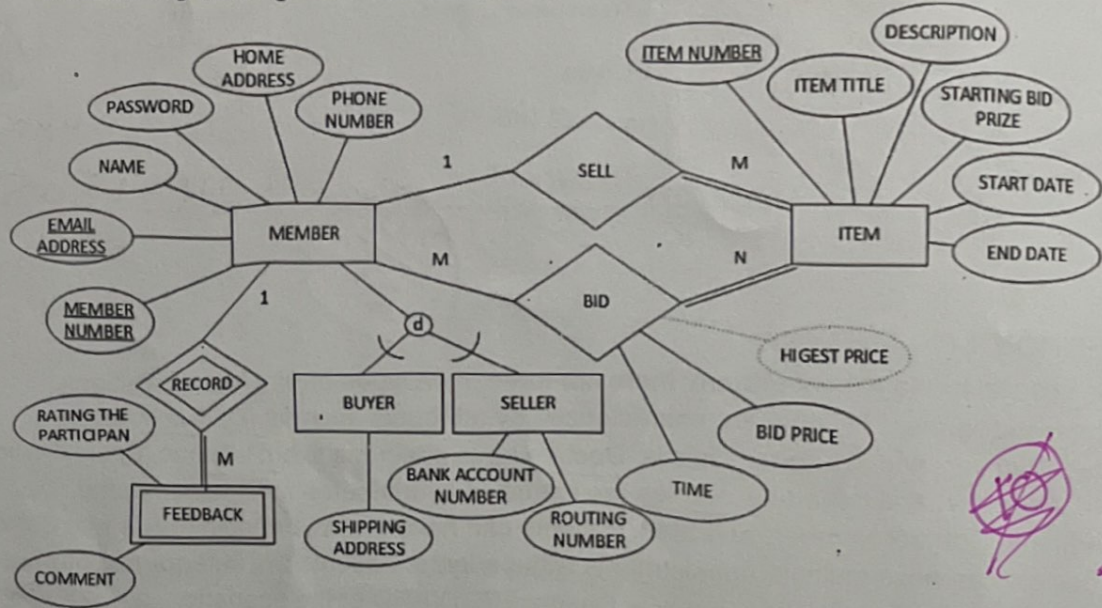
10





## QUESTION 2 (10 MARKS)

The following EER diagram models the business rules of an online auction website.



Solution:

Member:

Member Number	Home Address	Name	Password	Phone Number
---------------	--------------	------	----------	--------------

Buyer:

Member Number	Shipping address
---------------	------------------

Seller:

Member Number	Bank Account Number	Routing Number
---------------	---------------------	----------------

10

Item:

Item Number	Item Title	Description	Starting Bid Price	Start Date	End Date
-------------	------------	-------------	--------------------	------------	----------

member

email Add

Feed Back:

Member Number	Rating	Comment
---------------	--------	---------

Bid

Member Number	Bid Price	Time	Item Number
---------------	-----------	------	-------------

Sell

Member Number	Item Number
---------------	-------------

Email Address as a foreign key can pass too.

## Quiz No.2

Design ERD for each case study given below. Each case study carries equal [10] marks. The ERD you design will be evaluated against three things i.e. Entity, Relationship and Cardinality.

### Case Study No.1 [10 marks]

Consider the following set of requirements for a COMPANY database that is used to keep track of its employees, departments and projects.

- The company stores information about currently working employees. The information includes employee code, name, gender, date of birth, salary, hire date, address and phone number. Each employee works for a department on a particular project for a specified number of hours.
- The information about department includes department number and name. Each department controls some projects running in the company. Each department is managed by a particular employee who becomes the manager for that department. This employee also supervises all the other employees working in that department.
- The project's information includes project number, name, budget and description.
- An employee can work for only one department; however, a department can have any number of employees. A department is managed by only one manager and a manager can manage only one department. A department can control any number of projects; however, one project can be handled by only one department. Any number of employees can work on any number of projects.

### Case Study No.2 [10 marks]

Consider the following set of requirements for a hospital database that is used to keep track of operation theaters where patients are passed through minor or major surgeries performed by doctors and supporting nurses.

- A patient can pass through one or many operations but each operation is performed on one patient only.
  - An operation must be performed by one or many doctors.
  - One doctor may or may not perform any operations.
  - An operation must be supported by one or many nurses.
  - A nurse may or may not support any operations.
- The information recorded by hospital are
- patient no, name, gender, age and address of a patient
  - doctor id, name, gender and specialization of a doctor
  - nurse id, name and birthdate of a nurse
  - operation no, date

#### **Submission instruction:**

Use any tool to draw ERD. Handmade ERD will not be accepted. Submit hardcopy on Monday before 12pm.

<b>Program:</b>	BSE – 3B (Spring 2017)	<b>Obtained Marks</b>	
<b>Section:</b>			
<b>Course Code:</b>	CSC271	<b>Total</b>	20
<b>Course Title:</b>	Database Systems 4 (3+1)	<b>Marks</b>	

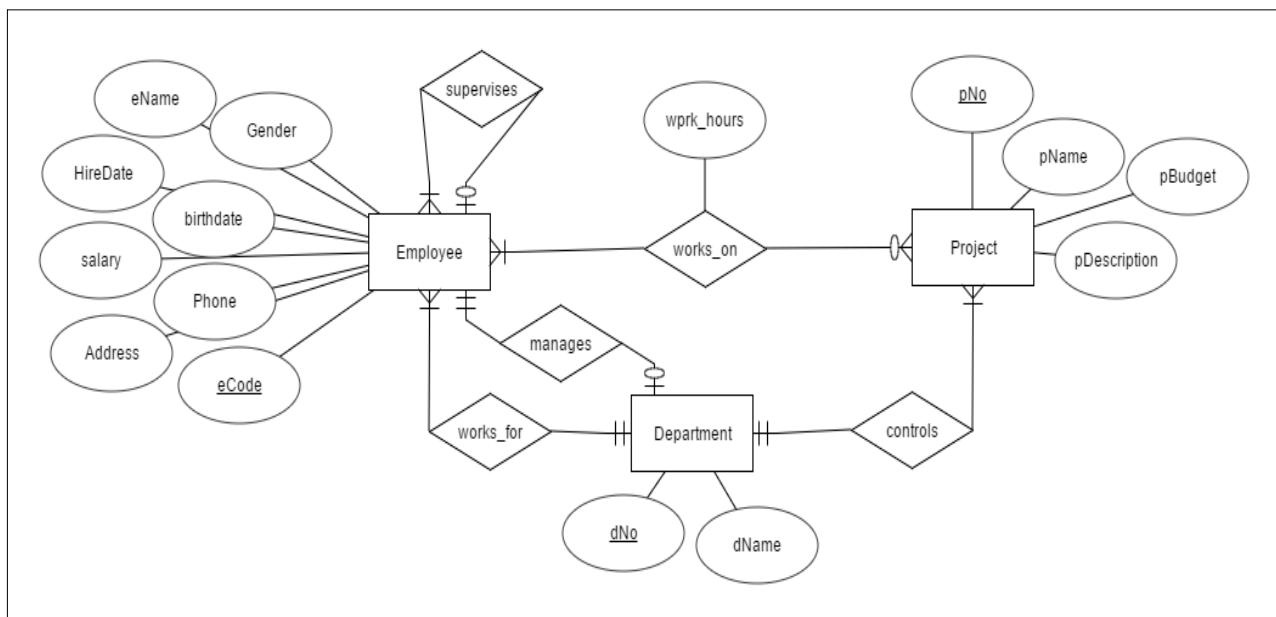
## **Assignment No.2: Model Solution**

### Case Study No.1 [10 marks]

Consider the following set of requirements for a COMPANY database that is used to keep track of its employees, departments and projects.

- The company stores information about currently working employees. The information includes employee code, name, gender, date of birth, salary, hire date, address and phone number. Each employee works for a department on a particular project for a specified number of hours.
- The information about department includes department number and name. Each department controls some projects running in the company. Each department is managed by a particular employee who becomes the manager for that department. This employee also supervises all the other employees working in that department.
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- An employee can work for only one department; however, a department can have any number of employees. A department is managed by only one manager and a manager can manage only one department. A department can control any number of projects; however, one project can be handled by only one department. Any number of employees can work on any number of projects.

Solution



### Case Study No.2 [10 marks]

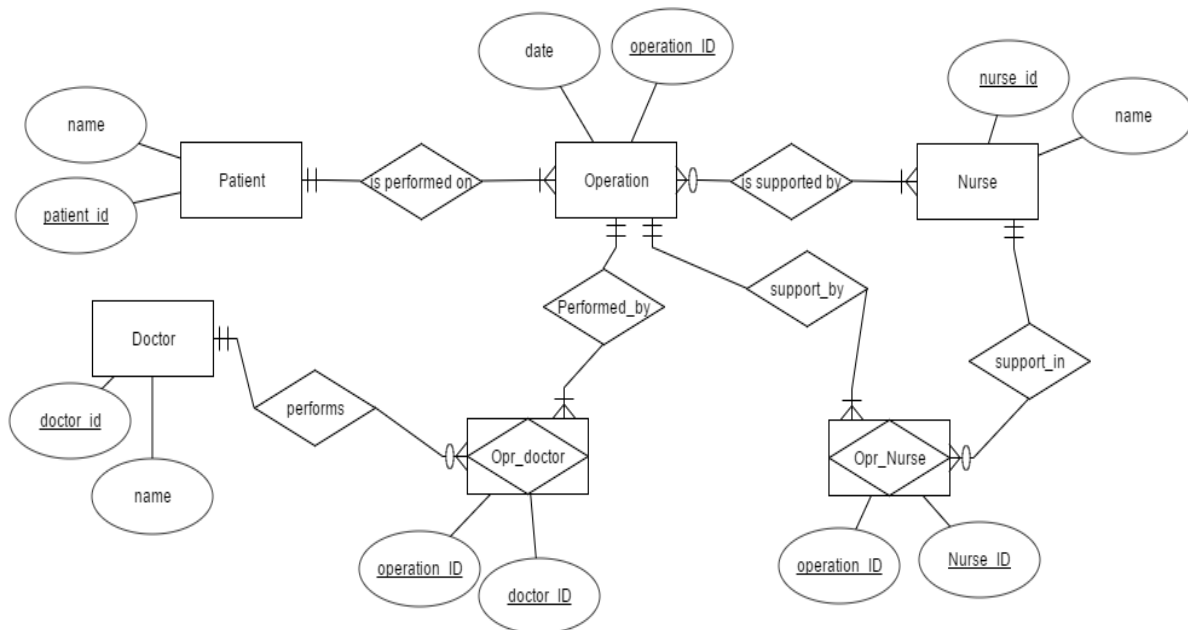
Consider the following set of requirements for a hospital database that is used to keep track of operation theaters where patients are passed through minor or major surgeries performed by doctors and supporting nurses.

- A patient can pass through one or many operations but each operation is performed on one patient only.
- An operation must be performed by one or many doctors.
- One doctor may or may not perform any operations.
- An operation must be supported by one or many nurses.
- A nurse may or may not support any operations.

The information recorded by hospital are

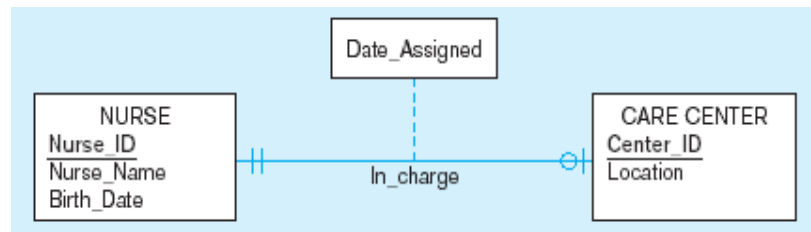
- patient no, name, gender, age and address of a patient
- doctor id, name, gender and specialization of a doctor
- nurse id, name and birthdate of a nurse
- operation no, date

Solution



## Quiz.No. 1

Draw relational model of the given ERD .....[10 marks]



The above relationship can be read as:

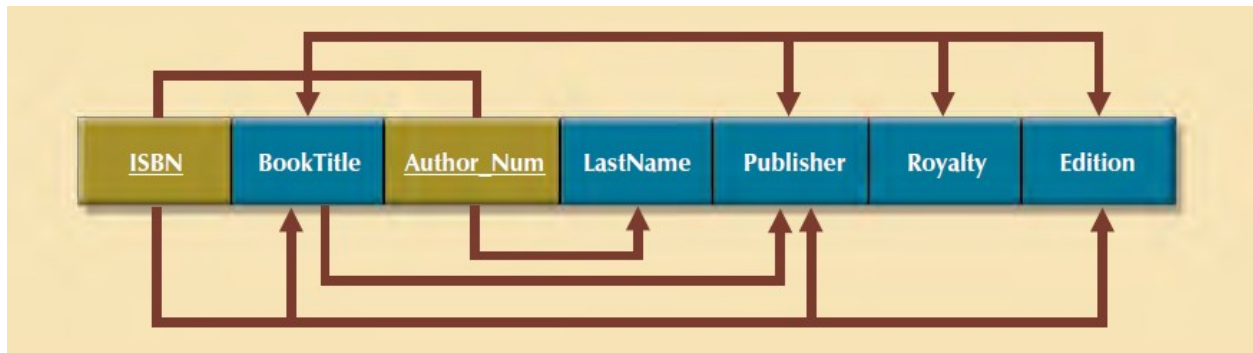
Each nurse can be in-charge of any care center or not. While each care center is in-charged by only one nurse. The nurse takes in-charge ship of a care center on a specific date. There is 1:1 relationship between nurse and care center in which participation of nurse is mandatory. According to binary 1:1 mapping rule, the primary key of nurse and the relationship attribute “date \_assigned” will go to care center. So the relations will be like:

Nurse (nurse\_ID, \_Nurse\_name, birth\_date)

Care\_center (Center\_ID, Location, **Incharge\_Nurse** [FK→referencing to nurse\_ID in nurse table], Date\_assigned)



### Quiz. 3



Royalty means the amount of money paid to each author for contributing in each book. You can consider it like book writing fee or charges.

The functional dependencies between different attributes are shown through arrow keys.

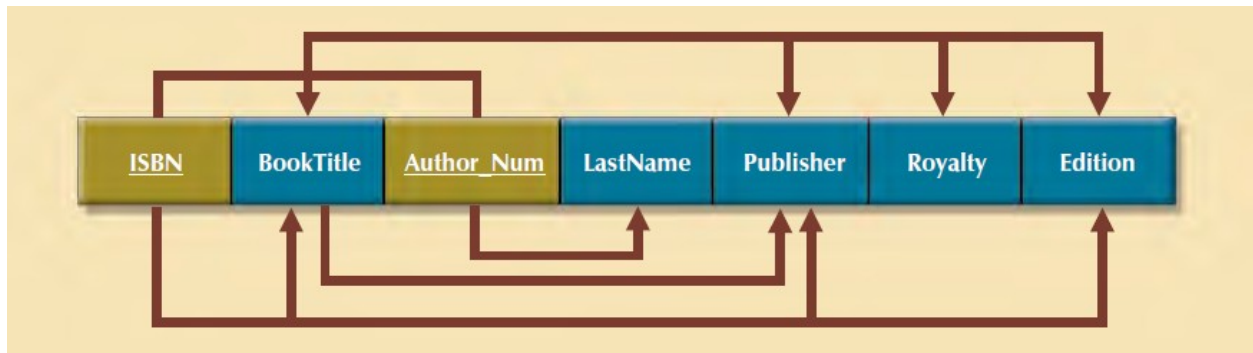
Use proper steps of normalization to normalize this relation.

1. Remove repeating groups  
→ First Normal Form
2. Remove partial functional dependency  
→ Second Normal Form
3. Remove transitive functional dependency  
→ Third Normal Form

#### **Important Instructions:**

It is individual assignment and you have to submit it in hard form at the start of lab.

### Assignment No.4 - Model Solution



First write all the attributes in one relation

Book						
ISBN	AuthorNum	BookTitle	LastName	Publisher	Royalty	Edition

#### Step1. Identify repeating groups

Since a book can be written by many authors, so there exists repeating group. So to remove repeating groups, create a composite primary key of the above relation. Since the relation contains two type of entities i.e. book and author, so make them primary key.

Book						
<u>ISBN</u>	<u>AuthorNum</u>	BookTitle	LastName	Publisher	Royalty	Edition

This relation contains no repeating groups now and the relation is in **First Normal Form**.

#### Step2. Identify full and partial functional dependency

Since dependencies are shown in the figure which are:

ISBN → BookTitle, Publisher, edition (partial functional dependency)

AuthorNum → LastName (partial functional dependency)

ISBN, AuthorNum → Royalty (full functional dependency)

To remove the partial dependency, we need to split the relation according to the determinants. The determinants becomes the primary key in respective relations.

Author	
<u>AuthorNum</u>	LastName

Book			
<u>ISBN</u>	BookTitle	Publisher	Edition

Book Royalty		
<u>ISBN</u>	<u>AuthorNum</u>	Royalty

The relations above are all in **second normal form**.

### Step3. Identify transitive dependency

BookTitle → publisher

Make another relation with determinant as primary key as shown below.

Title Publisher	
<u>BookTitle</u>	Publisher

The primary key of this relation will also become foreign key in the previous relation Book.

Book		
<u>ISBN</u>	<u>BookTitle</u>	Edition

So the overall resultant relations are:

Author (AuthorNum, LastName)    TitlePublisher (BookTitle, publisher)

BookRoyalty (ISBN, AuthorNum, Royalty)    Book (ISBN, BookTitle, Edition)



Course: Database Systems  
 Program: BS(Software Engineering)  
 Duration: 15 Minutes  
 Paper Date: 16-Mar-2021  
 Section: BSE-4A  
 Exam: Quiz-1

Course Code: CS2005  
 Semester: Spring 2022  
 Total Marks: 10  
 Weight: -  
 Page(s): 1  
 Roll No: [REDACTED]

Question 1: Consider the following relational database of a bank. The underlined attributes are primary keys. The attribute 'Holder\_ID' in Accounts is a foreign key (from AccountHolders table) and the attribute 'Account\_ID' in Transactions is a foreign key (from Account table).

Accounts				AccountHolders		Transactions				
<u>ID</u>	Holder_ID	Account_Type	Balance	<u>ID</u>	Name	<u>Trans_ID</u>	Account_ID	Tran_Type	Amount	Date
10	1	Current	1000	1	John	100	10	Deposit	3000	9/2/2018
20	2	Saving	2000	2	Jane	101	20	Withdraw	100	9/2/2018
30	1	Saving	3000	3	Alex	102	40	Deposit	500	8/10/2018
40	2	Student	3000	-	-	103	40	Deposit	5000	8/4/2017

Write relational algebra for the following statement.

Give the name of all account holders who have done at least two transactions.

$R_1 \leftarrow \text{Accounts} \bowtie \text{Transactions}$   
 $\#0$   
 $R_1 \leftarrow \text{Accounts} \bowtie \text{AccountHolders}$   
 $\text{Accounts.Holder\_ID} = \text{AccountHolders.ID}$   
 $R_2 \leftarrow R_1 \bowtie \text{Transactions}$   
 $R_2.ID = \text{Account\_ID}$   
 $R_3 \leftarrow \pi_{\text{name}} (\text{Transactions} - R_2)$



## Employee

ID	Name	Department ID
1	Olivia	1
2	John	3
3	Isla	2
4	Sam	NULL

## Department

ID	Department_Name
1	CS
2	EE
3	BBA
4	Physics

**Question 1.** Perform the following operations on the above given database, and show the new state of Database if the operation is successful. If the operation is not successful, then explain the reason. (Assume that all operations are independent of each other). Assume that Foreign key with Cascading option is implemented

a. Change the id of Department 'CS' to 5 in department table.

Successful

ID	Department_Name
5	CS
2	EE
3	BBA
4	Physics

Employee

ID	Name	Department
1	Olivia	5
2	John	3
3	Isla	2
4	Sam	NULL

b. Delete the department which has ID=4.

Successful

Department

ID	Department_Name
1	CS
2	EE
3	BBA

No change to employee table

(5)

## National University of Computer and Emerging Sciences, Lahore Campus



Course: Database Systems  
Program: BS (Computer Science)  
Pages: 2

Section:

BCS-4J

Date: 02/09/23

Course Code: CS2005  
Semester: Spring 2023  
Total Marks: 14

RollNo:

Name:

### Quiz 1

Question 1:

CLO-6

1a. Consider the following schema

Country(countryId, name)

State(stateId, countryId, stateName)

City(cityId, stateId, cityName)

Region(regId, cityId, regName, developed)

Where:

countryId, stateId, cityId and regId are the primary keys of each of the above tables.

Identify the foreign key in this schema. Explain how the referential integrity rules apply to these relations. (4 Marks)

countryId in State, stateId in City and cityId in Region are foreign keys. The rules apply like this like if the countryId or stateId or cityId is not the same as the one referenced in the primary key or is one not referenced in the primary key table, then it is not allowed.



1b. Alter/ Modify the Schema given above.(3 Marks)

i. Alter table and Add countryCode in Country table.

alter table Country add countryCode int

ii. Alter table and add Unique Constraint on country code.

alter table Country add constraint ^countryCode int unique

iii. Consider that city Id is of data type integer. Modify it to varchar.

alter table City alter column cityId varchar(50)

1c. Choose the most appropriate primary key from each of the schema and give your reasoning in 1-2 lines. Answer without reasoning will not be considered. Keep the concept of composite primary key in mind while solving.(3 Marks)

i. Card(cardNo, cardTypeId, PIN)

CardNo as it is uniquely defines the card

ii. ProductOwner(productId, ownerId, productDetails )

~~ownerId as the productId as the name of owner~~  
~~and productId as product Id will be~~  
~~may be same but unique.~~  
productId and ownerId as it will uniquely identify the owner and the unique product Id.

iii. Vehicle(chassisNo, modelNo, licenseNo, make )

LicenseNo as the number of license number which identifies the vehicle will be unique

Question 02: What is the cardinality and degree of each relational schema defined in Question 01.CLO-1 [4]

Schema Name	Degree	Cardinality
Country	2	1
State	3	1
City	3	1
Region	4	1

Best of Luck



**Instruction/Notes:**

Attempt all questions. Do not use pencil or red ink. In case of confusion or ambiguity make a reasonable assumption. Do not attach any extra sheet. Use extra sheet for rough work only

**Question 1:**

- a) Create a table **Person** with following fields
- PersonID varchar (5)
  - Name varchar (15)
  - Age int
  - Gender varchar(5)
  - Address varchar(20)

**Constraints.**

- **PersonID** in Person, is primary key. Also apply check constraint for Gender to be Male only.
- b) Change the datatype of Gender from varchar(5) to char in **Person** table.

**Question 2.**

**Tbl\_Sailor**

sid	sname	rating	age
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
58	Rusty	10	35.0
64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

**Tbl\_Reserve**

sid	bid	day
22	101	10/10/98
22	102	10/10/98
22	103	10/8/98
22	104	10/7/98
31	102	11/10/98
31	103	11/6/98
31	104	11/12/98
64	101	9/5/98
64	102	9/8/98
74	103	9/8/98

**Tbl\_Boats**

bid	bname	color
101	Interlake	blue
102	Interlake	red
103	Clipper	green
104	Marine	red

Update the color of boat to Green where The sailor is Lubber and the boat is reserved for '11/10/98'

Display all the sailors( who don't have any reservation) according to rating in desc order.