Sir Syed University of Engineering & Technology

ANSWER SCRIPT

Date:	June 9,2021
Roll Number:	CS19-037
Section:	A
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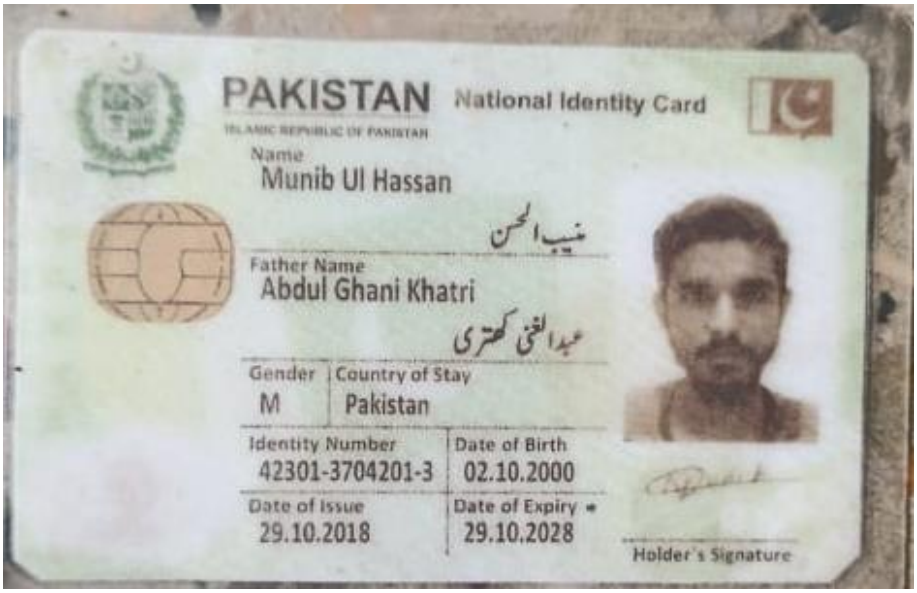
Course Name:	Database Systems (CS-329)
Degree Program:	BSCS
Total number of pages being submitted:	

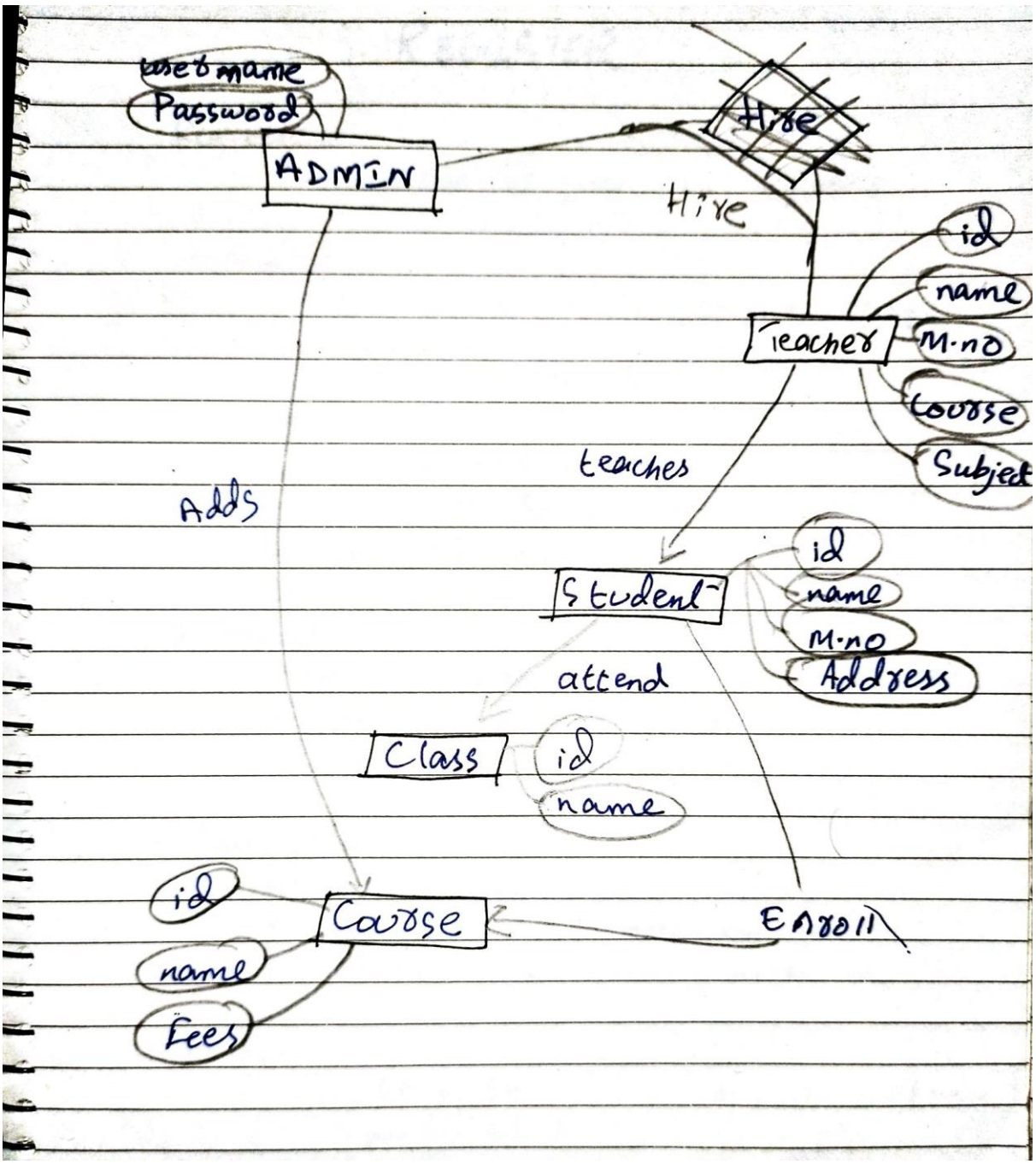


ANSWER:01:

CNIC: 42301-3704201-3

(4+2+3+0+1+3+7+0+4+2+0+1+3)/13 = 30/13 = 2.3 =2

CLASS MANAGEMENT MODULE



ANSWER:02:

1. Insert into R values (“42301-3704201-3”,”2019-CS-037”,”Munib ul hassan”, “Karachi”,”75660”)
2. Checkinf for attribute keys:
   $ABE^+ \longrightarrow ABCDE$
   $ABD^+ \longrightarrow ABDC$
   $ABC^+ \longrightarrow ABCD$
   $ABCD^+ \longrightarrow ABCD$
   $ABCE^+ \longrightarrow ABCDE$
   $ABDE^+ \longrightarrow ABCDE$

   Candidate key = $\{ABE^+\}$

   Super Keys = $\{ABCE^+, ABDE^+\}$

3. Remaining FD’s

   A → C , D, E, B

   B→ C, D, E

   B → A

4. Axioms:
   →Reflexivity
   E →D
   → Composition:
   A,B → C
   E → D
   ∴ A, B,E → C,D
   →Augmentation:
   E → D
   Then,
   EA → DA

ANSWER:03:

Student (SID, Sname, SRollNo, SAddress, SContactNo)

Project (PID, PTitle, PMembers, PStatus)

Supervisor (SupID, SupName, SupEmail , SupDesignation,SupContactNo)

1.

a.

```
insert into Student(Sname,SRollNo,SAddress,SContactNo) values ("Munib",037,"lea
market","+923142059628")
```

b.
```
insert into Project(Ptitle,Pmember,PStatus) values ("Munib",5 ,"5th
grade")
```

c.
```
insert into SuperVisor(SupName,Supemail,SupDesignation,SupContactNo) val
ues ("Munib","Munibkhatri123@gmail.com","Owner", "+923142059628")
```

2. There is no common attribute in both table so we cannot join them selves so this querry is not valid

3. $\Pi_{\text{SupContactNo}}$ (σ SuperDesignation= "Lab Teacher" (SuperVisor))
4. σ Ptitle LIKE "Management" (Project)
5. ρ *PTitle-Database CS0329* /PTitle(Project)

ANSWER:04:

Process For 1F (first Normal Foam) Anomalies:

- In student info the repeating group in course A student can take many ccouse
- Now by Removing repeating group in this case course for each student.
- The primay key must uniquely identifieythe attribute value **(Student ID,GPA)**
- After removing all the attributes related to course and student you are left with **(Student Case)** table
- The student table **Student Info** is now in 1st nomal foam with repeating group removed

Student Info

Student ID	Student Name

Student Course

Student ID	GPA	Course	Phone	Address	Credit

Process Foru Update 1NF Anamolies:

- To ad new courses, we need students.
- When course info needs to be updated we may have inconsistency.
- To delete students we may also need to delete critical information about a course.

The tables are shown below:

Student Info

Student ID	Name
S01	Ahmed Ali
S02	Saleem Khan
S03	Asad Mujtaba

Student Course:

Student ID	GPA	Course	Phone	Address	Credit
S01	2.5	C++	222,443	A1	3+1
S02	2.8	Java	111,234	A2	3+1
S03	3.5	NA	333,335	A3	3+0
S01	3.6	NA	227,443	A1	3+0
S02	2.9	C++	111,234	A2	3+1
S03	3.2	Java	333,335	A3	3+1

Process For 2NF (Second Normal Foam):

- The student info is already in 2NF it has a single colum primary key
- When examining the student course table,we see that not all the attributes ae fully dependent,or primary key specifically all cedit hours only dependent attributes in GPA.
- Identify the primary key for the new table

The tables are shown below:

Student Info

(Student ID,Name, Major)

Course GPA

(Student ID, Credit Hr ,GPA)

Student Data

(Course, Credit Hr, Address,Phone)

How to Update 2NF Anomalies:

- When adding new credit, we need course
- Updating course information could lead to inconsistency for credit hour.
- Deleting course may also delete credit hour
- **Student Info**

Student ID	Name
S01	Ahmed Ali
S02	Saleem Khan
S03	Asad Mujtaba

Student Course:

Student ID	GPA	Course
S01	2.5	C++
S02	2.8	Java
S03	3.5	NA
S01	3.6	NA
S02	2.9	C++
S03	3.2	Java

Student Data:

Credit	Course	Address
3+1	C++	A1
3+1	Java	A2
3+0	NA	A3
3+0	NA	A1
3+1	C++	A2
3+1	Java	A3

Process For 3F:

- Eliminte all dependent attributes in transitive relationships from each of the table that have a transitive relationship
- New table to be created with removed dependency
- Check new table to make sure that each table has a determinant and no table cantains inappropiate dependencies

Student Info

(Student ID,Name, Major)

Course GPA

(Student ID, Credit Hr ,GPA)

Student Data

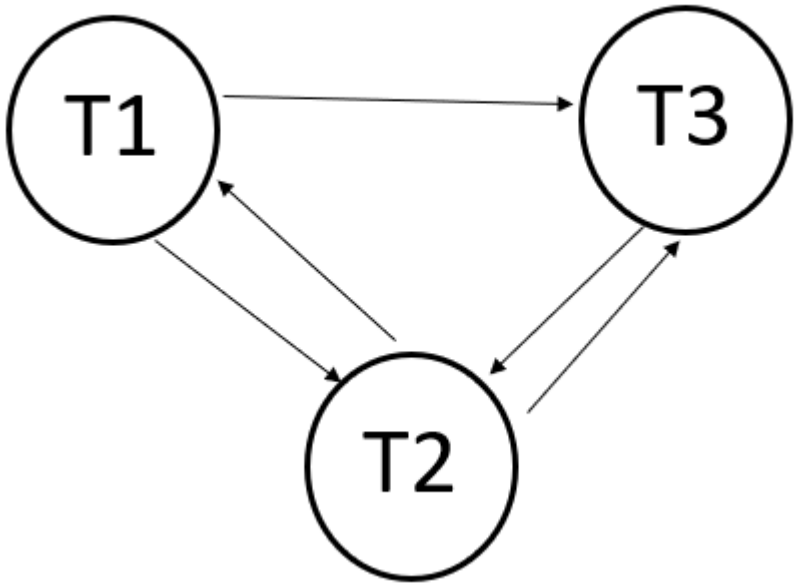
(Name ,Address,Phone)

ANSWER:05:

The given schedule is not conflict- serializable because the paerendecy graph we get is cyclic and the condition to be conflict-serializable is that the procederay graph of schedules should be Acyclic.

PART A:

We convert the given transactions by adding locks in it accordingly to 2pl but the given schedule is not conflict serializable so the modify table well only to complete T1 transaction and T2.T3 locks are denied due to 2PL



T1	T2	T3
L(A)		
R(A)		
W(A)		
L(A)		
U(A)		
		L(A)
		R(A)
		W(A)
	L(A)	
	R(A)	
R(B)		
		L(B)
		R(B)
W(B)		

U(B)		
		W(B)
		U(A)
		U(B)
	L(B)	
	R(B)	
	U(A)	
	U(B)	
	COMMIT	
COMMIT		
		COMMIT

PART B:

2pl restrictions not sufficient to avoid irrecoverable, cascading rollback and last update problem

so te ensure schedule is conflict serializable and strict recoverable we make furhter addition to 2pl to convert it to strict 2pl as follow:

BASIC 2PL: lock request not allowed in unlocking phase

STRICT RECOVERABLE: All exclusive locks of trancaction must held untill commit/Rollback if that trabsacton.