Adama Science and Technology University

College of Electrical Engineering and Computing

Department of CSE [SE]

Worksheet for Database systems [SEng2208]

Answer the following questions

1. A car-rental company maintains a database for all vehicles in its current fleet. For all vehicles, it includes the vehicle identification number, license number, manufacturer, model, data of purchase, and color. Special data are included for certain types of vehicles:

   Trucks: cargo capacity

   Sports cars: horsepower, renter age requirement

   Vans: number of passengers

   Off-road vehicles: ground clearance, drive train (four or two-wheel driver)

Write SQL schema of definition for this database and the tables. Use inheritance where appropriate.

2. Explain Transaction isolation levels in SQL[serial, serializable, read uncommitted, snapshot] with brief example
3. Describe incorrect summary, lost update, temporary update problems and which and how 2PL can guarantee to avoid these problems.
4. What is the difference between conflict equivalence and view equivalence in the concept of sterilizable schedule?
5. Define the concepts of recoverable, cascadeless, and strict schedules of transaction
6. Explain serializability checking algorithm with example
7. Explain the following desirable properties of Transaction with concrete example
   A. Atomicity, Isolation, Consistency and Durability
8. Discuss why concurrency control is needed, and give informal examples.
9. What is Two-Phase Locking Technique?
10. Discuss the timestamp ordering protocol for concurrency control.
11. Explain how can problems of deadlock and starvation be occurred?
12. Given the following transactions to be executed in schedule Sa in an interleaved fashion.

Sa: *r*1(*X*); w1(X);r2(X); r1(Y);w1(Y);r2(Y)

a. Determine the conflicting operations if T1 and T2 executed in Schedule Sa.

13. Given the Schedule Sr: r1(X); w1(A); r2(A); r1(B);w2(A);c2;a1;
    a. Is Sr recoverable schedule? Explain why or why not.
14. Consider the following Three transactions T1, T2, T3 and schedule C (time goes from top to bottom).

Schedule Sc

T1	T2	T3
R(X)		
		R(Y)
		R(X)
R(Y)	R(Y)	
	R(Z)	
		W(Y)
	W(Z)	
R(Z)		
W(X)		
W(Z)		

a. Check whether a schedule, Sc is conflict-serializable? Explain why or why not.
b. Find all conflicting operations in schedule Sc
c. Draw the precedence graph for schedule Sc

15. What is a view in SQL? discuss what problem may arise when one attempts to update a view.
16. Define views, stored procedures, trigger, cursor, assertion and PL/SQL in SQL
17. What are the operations of relational algebra? list and describe each.
18. Given the following schema: EMP (Fname, Lname, SSN, Bdate, Address, Gender, Salary, SuperSIN, Dno)

DEPT(Dname, Dnumber, MgrSSN, Mgrstartdate), **PROJECT**(Pname, Pnumber, Ploc, Dnum), **WorksOn**(ESSN, Pno, Hours), **DEPENDANT** (ESSN, Depname, gender, Bdate, relationship)

1. Implement the above schema using SQl
2. Write the relational algebra expression for the following:
   a. List all female employee from dno=20 earning more than 50000
   b. List CSE department details
   c. Retrieve the fname, lname and salary of all employees also work in department number 50.
   d. Retrieve the names of the managers and name of department in each department
   e. Retrieve name of employee with no dependent
   f. List all project names, under each department names with the managers.
   g. Write the SQL query for the following relational algebra
      a. $\Pi_{bdate,\ address}(\sigma_{fname='John'\ and\ Lname='smith'}(EMPLOYEE)$

19. Given the following database

Student Table

studentid	stud_name
7007	James Bond
1313	Susan Brown
5050	Susan Smith
8989	Megan Black

Course Table

courseid	cour_name	noofpts
COMP302	Database Systems	15
COMP203	Computer Organization	22
COMP206	Program and Data Structures	22
COMP442	Issues in Database and Info Systems	15

Enrolled Table

studentid	courseid	grade
7007	COMP203	A+
7007	COMP206	A+
7007	COMP302	A+
7007	COMP442	
1313	COMP203	A
1313	COMP302	B+
5050	COMP203	C+
1313	COMP442	

Stud_Sport Table

studentid	sport_name
1313	Netball
1313	Squash
5050	Netball
8989	Netball
1313	Table Tennis
7007	Rugby
7007	Squash

Given the SQL query ***q2db=> SELECT s.StudentId, Stud_Name FROM Student s WHERE NOT EXISTS ((SELECT e.StudentId FROM Enrolled e WHERE s.Studentid = e.StudentId) EXCEPT (SELECT p.StudentId FROM Stud_Sport p WHERE Sport_Name = 'Squash' AND s.Studentid = p.StudentId));***

a. What will the statement return if executed against the database instance given above?

20. Given the following Information and answer the question that follows

Database Object	Sample Table Name	Attributes
BankDB	**Customer**	CustID, CustName, Profession, MonthlyIncome, BankBalance
BusinessDB	**Product**	Pcode,PName,PCategory,UnitPrice
	Sales	SalesCode, PCode, SaleQty,UnitPrice
GovDb	Tax	TCode,CustCode,Pcode,Amount,DatePaid

Access Matrix

Obj/Subj	User1	User2	User3	User4
BankDB	**All**	**Select only(Customer)**	**Select only(Customer)**	**None**
BusinessDB	**Select only(Product)**	**all**	**Select only(Product)**	**None**
GovDb	**Select only(Tax)**	**Select only(Tax)**	**All**	**None**

Note ***all** refers to select, update, insert, delete, etc.

A. Considering the above Access Matrix write sql statement to implement permission for **all** the users given in the above **Access Matrix Table.**
B. Considering the above Access Matrix write sql statement to take all the permission away from User3 and give all the privileges to user4
C. Write SQL statement that grant update access to PName and UnitPrice of Product Table to User2.

21. Write the difference between Authentication, Authorization, and data encryption? How each of them be useful in security?
22. Explain role based access control how it is different or related to Discretionary Access Control