Database Management System – cs422 DE

Assignment 3 – Week 3 & 4

This assignment is based on lecture 3 & 4 (chapter 6 & 7).

- Submit your *own work* on time. No credit will be given if the assignment is submitted after the due date.
- Note that the completed assignment should be submitted in .doc, .docx, .rtf or .pdf format only.
- In MCQs, if you think that your answer needs explanation to get credit then please write it down.
- You are encouraged to discuss these questions in the Sakai forum.

---

1) The database schema is written in

(A) HLL (B) DML (C) DDL (D) DCL

ANS: C

2) The language used in application programs to request data from the DBMS is referred to as

(A) DML (B) DDL (C) VDL (D) SDL

ANS: A

3) Count function in SQL returns the number of

(A) values (B) distinct values (C) groups (D) columns

ANS: A

4) 'AS' clause is used in SQL for

(A) Selection (B) Rename (C) Join (D) Projection

ANS: B

5) Which is not a DDL statement ?

(A) Create (B) Alter (C) Delete (D) Drop

ANS: C

6) The statement in SQL which allows to change the definition of a table is

(A) Alter (B) Update (C) Create (D) Select

ANS: A

7) What restrictions apply to the use of the aggregate functions within the SELECT statement? How do nulls affect the aggregate functions?

ANS: We can't use aggregate functions in the WHERE clause; they're only allowed in the SELECT list or the HAVING clause. If we use GROUP BY, then every column you select must either be grouped or aggregated.

If we tried to execute the SELECT statement using either of these compound conditions, we would get an empty result table. Instead, we have to test for null explicitly using the special keyword IS NULL

8) List the order in which the WHERE, GROUP BY, and HAVING clauses are executed by the database in the following SQL statement.

```
SELECT section_id, COUNT(*), final_grade
FROM enrollment
WHERE TRUNC(enroll_date) > TO_DATE('2/16/2003', 'MM/DD/YYYY')
GROUP BY section_id, final_grade HAVING COUNT(*) > 5
```

ANS: The database processes those clauses in this logical order:

WHERE , GROUP BY, HAVING

9) Explain how the GROUP BY clause works. What is the difference between WHERE and HAVING clauses?

ANS: GROUP BY takes all the rows that have the same values in the listed columns (here section_id, final_grade) and puts them into groups. Then any aggregate functions like COUNT(*), SUM, AVG are calculated per group, not for the whole table.
WHERE filters individual rows before the grouping happens. It cannot use aggregate functions.
HAVING filters groups after the grouping and aggregation. It can use aggregates like COUNT(*) > 5.

So: WHERE is filter rows first; GROUP BY is make groups; HAVING is filter groups

10) Can the ANY and ALL operators be used on the DATE data type? Write a simple query to prove your answer.

ANS: Yes, ANY and ALL can be used with the DATE data type, dates can be compared just like numbers or strings..

```
SELECT student_id, enroll_date
FROM enrollment
WHERE enroll_date > ALL (
  SELECT enroll_date
  FROM enrollment
  WHERE section_id = 10
);
```

11) The following SQL lists staffs who work in branch at '163 Main St'.

```
SELECT staffNo, fName, lName, position
FROM Staff
WHERE branchNo =
      (SELECT branchNo
      FROM Branch
      WHERE street = '163 Main St');
```

Will there be any problem with this query if there is more than one branch at '163 Main St'? If yes, then explain the problem and right down the correct query.

ANS: Yes, there can be a problem. If more than one branch has street '163 Main St', then the

subquery returns multiple rows, but = expects only one value. The DBMS will raise an error like: "subquery returns more than one row".

```
SELECT s.staffNo, s.fName, s.lName, s.position FROM Staff s
JOIN Branch b ON s.branchNo = b.branchNo
WHERE b.street = '163 Main St';
```

12) What is Referential integrity constraint?

ANS: Referential integrity is the rule that a foreign key value must either:
match an existing primary key value in the parent table; or be NULL (if allowed).
It prevents "orphan" rows and keeps relationships between tables consistent when we insert, update, or delete data.

13) What is the difference between primary key and unique key?

ANS:

Primary key
- Identifies each row uniquely.
- Only one primary key per table.
- Normally cannot be NULL.
- Often used as the target of foreign keys.

Unique key
- Also enforces uniqueness of values.
- A table can have many unique keys.
- Usually allows NULL (often at most one NULL, DBMS-dependent).
- Not required to be the "main identifier" of the row.

14) Solve the question 7.10 from the course text book (5th edition).

ANS:

```
CREATE TABLE Hotel (
   hotelNo   CHAR(4)     NOT NULL,
   hotelName VARCHAR(20)  NOT NULL,
   city      VARCHAR(20)  NOT NULL,
   CONSTRAINT Hotel_PK PRIMARY KEY (hotelNo)
);
```

15) Solve the question 7.12 from the course text book (5th edition).

ANS:

- Create an archive table with the same structure

```
CREATE TABLE Booking_Archive AS
SELECT *
FROM Booking
WHERE 1 = 0;       -- copy structure only, no rows
```

- Copy old bookings (before 1 Jan 2013) into the archive

```
INSERT INTO Booking_Archive
SELECT *
FROM Booking
WHERE dateFrom < DATE '2013-01-01';
```

- Delete those old bookings from the main Booking table

```
DELETE FROM Booking
WHERE dateFrom < DATE '2013-01-01';
```