

- (vii) SELECT DESIGNATION, SUM(SALARY) FROM DESIG GROUP BY DESIGNATION
HAVING COUNT (*) < 3;
(viii) SELECT SUM(BENIFTS) FROM DESIG WHERE DESIGNATION = "salesman";

CHAPTER -15

DATABASE TRANSACTIONS

Brief Summary of the Chapter:

Reliability is a quality, which we seek for in everything that we get. The same is applicable to software and to database. A reliable database system is that which retains our database in a consistent state despite occurrence of many failures. Database Transaction is the field which requires utmost consistency. This chapter describes fundamentals of database transactions and its reliable implementation. A database can be called consistent when it follows ACID properties. A transactions can be called reliable when it either COMMITed i.e. successfully all its steps are carried out and changes are permanently reflected in the database or be ROLLBACKed i.e. in case of failures, if transaction cannot be successfully completed then any data changes made by the transaction are brought back to the state that earlier was prior to the execution of this transaction.

KEY POINTS OF THE CHAPTER

TRANSACTION-A set of successive statements that succeed or fail as a group so that all effected statements of the group are retained or all are discarded are called transactions. When a transaction is done on the database is called **database transaction**.

COMMIT-This statement is used to end a transaction and make all changes permanent. Until a transaction is committed, other users cannot see the changes made to the database.

ROLLBACK- The ROLLBACK statement is used to end a transaction and undo the work done by that transaction. After ROLLBACK, it looks like that transaction had never begun.

SAVEPOINT-It is point in a transaction, up till which all changes have been saved permanently.

ACID- It is an acronym of ATOMICITY, CONSISTENCY, ISOLATION, DURABILITY

(For Details see **SOLVED QUESTIONS**.)

SOLVED QUESTIONS

1. Define a transaction.

Ans. -A transaction is a logical unit of a work that must succeed or fail in its entirety. It is an atomic operation which can be divided into smaller operations.

2. What are the two ways in which multiple transactions can be executed?

Ans. - Multiple transactions can be executed in one of the following two ways:

- (i) Serially (ii) Concurrently

3. What is a savepoint?

Ans. - Savepoints are special operations that allow you to divide the work of a transaction into different segments. In case of a failure, you can execute rollbacks to the savepoint only, leaving prior changes intact.

4. What do you understand by a database transaction?

Ans. - A database transaction is a logical unit of work that must succeed or fail in its entirety.

5. Why do understand by transaction COMMIT and ROLLBACK?

Ans.-COMMITting a transaction means all the steps of a transaction are carried out successfully and all data changes are made permanent in the database. Transaction ROLLBACK means transaction has not been finished completely and hence all data changes made by the transaction in the database if any, are undone and the database returns to the state as it was before this transaction execution started.

6. What do you understand by ACID properties of database transaction?

Ans. -To ensure the data-integrity, the database system maintains the following properties of transaction. The properties given below are termed as ACID properties-an acronym derived from the first letter of each of the properties.

- (i) Atomicity-This property ensures that either all operations of the transactions are reflected properly in the database, none are. Atomicity ensures either all-or-none operations of a transaction are carried out.
- (ii) Consistency-This property ensures that database remains in a consistent state before the start of transaction and after the transaction is over.
- (iii) Isolation-Isolation ensures that executing transaction execution in isolation i.e. is unaware of other transactions executing concurrently in the system.
- (iv) Durability-This property ensures that after the successful completion of a transaction i.e. when a transaction COMMITs, the changes made by it to the database persist i.e. remain in the database irrespective of other failures.

7. What the function is of redo and undo logs?

Ans. -Every database has a set of redo log files. It records all change in data including both committed and uncommitted changes. Undo logs stored roll backed data.

8. What TCL commands are supported by SQL?

Ans. -SQL supports following TCL commands

- **BEGIN | START TRANSACTION**-Marks the beginning of a transaction
- **COMMIT**-Ends the current transaction by saving database changes and starts a new transaction.
- **ROLLBACK**-Ends the current transaction by discarding changes and starts a new transaction.
- **SAVEPOINT**-Defines breakpoints for the transactions to allow partial rollbacks.
- **SET AUTOCOMMIT**-Enables or disable the default autocommit mode.

9. Which two statements complete a transaction?

- A. DELETE employees;
- B. DESCRIBE employees;
- C. ROLLBACK TO SAVEPOINT C;
- D. GRANT SELECT ON employees TO SCOTT;
- E. ALTER TABLE employees
MODIFY COLUMN sal;
- F. Select MAX(sal)
FROM employees
WHERE department_id=20;

Ans. - C, E

UNSOLVED QUESTIONS

- 1. What is the benefit of transaction?
- 2. What are the five states of the transactions?
- 3. What will happen when COMMIT statement is issued?
- 4. What will happen when ROLLBACK statement is issued?
- 5. How can you start a new transaction?