DBMS SQL

Lesson 11: Transaction Control Language

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Lesson Objectives

- To understand the following topics:
  - Transactions
    - Statement execution
    - Transaction control
    - Commit Transactions
    - Commit Command
    - Rollback transactions
    - Save points

Defining Transaction

- A “transaction” is a logical unit of work that contains one or more SQL statements.
  - “Transaction” is an atomic unit.
  - The effects of all the SQL statements in a transaction can be either:
    - all committed (applied to the database), or
    - all rolled back (undone from the database)
  - A “transaction” begins with the first executable SQL statement.

Defining Transaction

- A “transaction” ends when any of the following occurs:
  - A user issues a COMMIT or ROLLBACK statement without a SAVEPOINT clause.
  - A user runs a DDL statement such as CREATE, DROP, RENAME, or ALTER.
    - If the current transaction contains any DML statements, Oracle first commits the transaction, and then runs and commits the DDL statement as a new, single statement transaction.
  - A user disconnects from Oracle. The current transaction is committed.
  - A user process terminates abnormally. The current transaction is rolled back.

Statement Execution and Transaction Control

- A “SQL statement” that runs successfully is different from a committed transaction.
- However, until the “transaction” that contains the “statement” is committed, the “transaction” can be rolled back. As a result, all the changes in the statement can be undone.
- Hence we can say, “a statement, rather than a transaction, runs successfully”.

Commit Transactions

- Committing a transaction means making “permanent” all the changes performed by the SQL statements within the transaction.
  - This can be done either explicitly or implicitly.

Commit Transactions

- COMMIT statement makes “permanent” all the changes that are performed in the current transaction.
- Syntax:

```
COMMIT [WORK];
```

Commit Transactions

- COMMIT types:
  - Implicit: Database issues an implicit COMMIT before and after any data definition language (DDL) statement
  - Explicit

Example of COMMIT command:

```
DELETE FROM student_master
WHERE student_name = 'Amit';
COMMIT ;
```

Rollback Transactions

- Rolling back a transaction means “undoing changes” to data that have been performed by SQL statements within an “uncommitted transaction”.
  - Oracle uses “undo tablespaces” (or rollback segments) to store old values.
  - Oracle also uses the “redo log” that contains a record of changes.

Rollback Transactions

- Oracle lets you roll back an entire “uncommitted transaction”.
- Alternatively, you can roll back the trailing portion of an “uncommitted transaction” to a marker called a “savepoint”.

Savepoints in Transactions

- In a transaction, you can declare intermediate markers called “savepoints” within the context of a transaction.
  - By using “savepoints”, you can arbitrarily mark your work at any point within a long transaction.
  - In this manner, you can keep an option that is available later to roll back the work performed, however:
    - before the current point in the transaction, and
    - after a declared savepoint within the transaction

Savepoints in Transactions

- For example: You can use savepoints throughout a long complex series of updates. So if you make an error, you do not need to resubmit every statement.

Examples of Rollback and Savepoints

- Example 1:

```
INSERT INTO department_master
VALUES (70, 'PERSONNEL'') ;
SAVEPOINT A ;
INSERT INTO department_master
VALUES (80, 'MARKETING') ;
SAVEPOINT B ;
```

```
ROLLBACK TO A ;
```

Summary

- Transactions
  - Statement execution
  - Transaction control
  - Commit Transactions
  - Commit Command
  - Rollback transactions
  - Save points

Review – Questions

- Question 1 : ___ is a logical unit of work.

- Question 2: A transaction is committed when the user issues a DDL statement.
  - True/False

- Question 3: A transaction is rolled back when ___.
  - Option 1: rollback statement is issued
  - Option 2: the user session is abruptly terminated
  - Option 3: an error occurs in DML statement
  - Option 4: none of the above