Introduction to DB2 SQL/PL

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Agenda

- SQL/PL Overview
- Advantages
- Database Application Objects
  - Stored Procedures
  - User Defined Functions
  - Cursors
  - Triggers
- Error Handling
- Packages

SQL/PL Overview

- Procedural Language is extension to Structure Query Language.
- It is more powerful than SQL.
- It is a combination of SQL & Procedural Features of Programming Languages.
- SQL PL is a high level programming language with a simple syntax, and common programming control statements including the IF, ELSE, WHILE, FOR, ITERATE, and GOTO statements, as well as other statements.
- It was developed by Oracle in early 1990's to enhance the capabilities of SQL.

Advantages

- Block Statements
  - Multiple statements are available to create Business Logic
- Re-usability
- Procedural Language Capability
- Better Performance
- Supports Error Handling
- Easy to Learn

Database Application Objects

- Database Application Objects
  - Stored Procedures
  - User Defined Functions
  - Cursors
  - Triggers

Stored Procedure

- It is a sub-program, which is stored in the database and whenever it is called, it does something but doesn't return any value.
- Can return values indirectly through OUT parameters.
- Are used to encapsulate multiple SQL statements with flow logic so that you can reduce the number of calls to the database and decrease network traffic.

User Defined Functions

- It is a subprogram, which is stored in the database and whenever it is called, it does something and return some value.
- Are useful for simplifying application development by encapsulating commonly used calculations.

Triggers

- A trigger is a block of statements, which are fired automatically when a DML operation takes place.
- Triggers are always associated with the database tables.
- Useful for enforcing business rules consistently and automatically across many applications that share a database.
- Trigger types:
  - Row Level Trigger
  - Statement Level Trigger
  - Before Trigger
  - After Trigger

Types of Triggers

- **Row Level Trigger:** A trigger defined FOR EACH ROW is invoked once per individual row changed.
- **Statement Level Trigger:** A trigger defined FOR EACH STATEMENT is invoked once per statement. This type of trigger granularity cannot be specified for a BEFORE trigger .
- **Before Triggers:** These triggers are fired before the execution of the DML statements.
- **After Triggers:** These triggers are fired after the execution of the DML statements.

Referencing

- In the body of the trigger the object being changed can be referenced using a set of optional correlation names:
  - OLD refers to each individual row before the change (does not apply to an insert).
  - NEW refers to each individual row after the change (does not apply to a delete).
  - OLD_TABLE refers to the set of rows before the change (does not apply to an insert).
  - NEW_TABLE refers to the set of rows after the change (does not apply to a delete).

Trigger for Insertion

```
CREATE TRIGGER MIRACLE.Totalsal_insert
 AFTER INSERT ON Emp
 REFERENCING new AS new_sal
 FOR EACH ROW
 BEGIN
     UPDATE Dept1 SET totalsal = totalsal + new_sal.sal          WHERE
Deptno = new_sal.Deptno;
 END
```

Trigger for Updation

```
CREATE TRIGGER MIRACLE.Totalsal_update
 AFTER UPDATE ON Emp
 REFERENCING NEW AS new_sal OLD AS old_sal
 FOR EACH ROW
 BEGIN
UPDATE Dept1 SET totalsal = totalsal - old_sal.sal +        new_sal.sal
WHERE Deptno = new_sal.Deptno
 END
```

Error Handling

- SQLCODE: Populated each time an SQL statement is executed.
- SQLCODE is a integer and it is Vendor specified. But some are common to all the DB Vendors.
  - 0 – Success
  - +100 – Not Found
- SQLSTATE : Five digit Numeric-String ISO/ANSI SQL 92 Standard. Common code across DB2 family.
- The first two digits in SQLSTATE are called CLASS CODE.
  - 00 – Success
  - 01 – Warning
  - 02 – Not Found

Cursors

- A cursor is a memory context area, A PL/SQL program controls the context area using the cursor.
- A CURSOR can be viewed as a pointer to one row in set of rows.
- The CURSOR can reference only one row at any given time, but can be move to others rows of the result set as needed.
- Cursors are two types. 1. Implicit Cursor. 2. Explicit Cursor.
  - Implicit Cursor: SQl queries returns a single row, PL/SQL implicitly declares cursors for all DML statements.
  - Explicit Cursors: These are used in queries. That returns multiple rows explicit cursors are declared in [DECLARE SECTION] of PL/SQL program.

Stages in Cursors

- There are 4 Stages of a Cursor
- **DECLARE** Cursor :

DECLARE <Cursor_Name> CURSOR FOR <select statement>;

- **OPEN** cursor :

OPEN <Cursor_Name>;

- **FETCHES** the records into the Cursor :

FETCH <Cursor_Name> INTO <variables>;

- **CLOSING** the cursor :

CLOSE <Cursor_Name>;

Any Queries ...

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Thank
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