PL/SQL - EXCEPTIONS

An error condition during a program execution is called an exception in PL/SQL. PL/SQL supports programmers to catch such conditions using **EXCEPTION** block in the program and an appropriate action is taken against the error condition. There are two types of exceptions:

- System-defined exceptions
- User-defined exceptions

Syntax for Exception Handling

The General Syntax for exception handling is as follows. Here you can list down as many as exceptions you want to handle. The default exception will be handled using *WHEN others THEN*:

```
DECLARE
   <declarations section>
BEGIN
   <executable command(s)>
EXCEPTION
   <exception handling goes here >
   WHEN exception1 THEN
       exception1-handling-statements
   WHEN exception2  THEN
      exception2-handling-statements
   WHEN exception3 THEN
      exception3-handling-statements
   ........
   WHEN others THEN
      exception3-handling-statements
END;
```

Example

Let us write some simple code to illustrate the concept. We will be using the CUSTOMERS table we had created and used in the previous chapters:

```
DECLARE
   c_id customers.id%type := 8;
   c_name  customers.name%type;
   c_addr customers.address%type;
BEGIN
   SELECT  name, address INTO  c_name, c_addr
   FROM customers
   WHERE id = c_id;

   DBMS_OUTPUT.PUT_LINE ('Name: '||  c_name);
   DBMS_OUTPUT.PUT_LINE ('Address: ' || c_addr);
EXCEPTION
   WHEN no_data_found THEN
      dbms_output.put_line('No such customer!');
   WHEN others THEN
      dbms_output.put_line('Error!');
END;
/
```

When the above code is executed at SQL prompt, it produces the following result:

```
No such customer!

PL/SQL procedure successfully completed.
```

The above program displays the name and address of a customer whose ID is given. Since there is no customer with ID value 8 in our database, the program raises the run-time exception **NO_DATA_FOUND**, which is

captured in **EXCEPTION** block.

Raising Exceptions

Exceptions are raised by the database server automatically whenever there is any internal database error, but exceptions can be raised explicitly by the programmer by using the command **RAISE**. Following is the simple syntax of raising an exception:

```
DECLARE
   exception_name EXCEPTION;
BEGIN
   IF condition THEN
      RAISE exception_name;
   END IF;
EXCEPTION
   WHEN exception_name THEN
   statement;
END;
```

You can use above syntax in raising Oracle standard exception or any user-defined exception. Next section will give you an example on raising user-defined exception, similar way you can raise Oracle standard exceptions as well.

User-defined Exceptions

PL/SQL allows you to define your own exceptions according to the need of your program. A user-defined exception must be declared and then raised explicitly, using either a RAISE statement or the procedure DBMS_STANDARD.RAISE_APPLICATION_ERROR.

The syntax for declaring an exception is:

```
DECLARE
   my-exception EXCEPTION;
```

Example:

The following example illustrates the concept. This program asks for a customer ID, when the user enters an invalid ID, the exception invalid_id is raised.

```
DECLARE
   c_id customers.id%type := &cc_id;
   c_name  customers.name%type;
   c_addr customers.address%type;

   -- user defined exception
   ex_invalid_id  EXCEPTION;
BEGIN
   IF c_id <= 0 THEN
      RAISE ex_invalid_id;
   ELSE
      SELECT  name, address INTO  c_name, c_addr
      FROM customers
      WHERE id = c_id;

      DBMS_OUTPUT.PUT_LINE ('Name: '||  c_name);
      DBMS_OUTPUT.PUT_LINE ('Address: ' || c_addr);
   END IF;
EXCEPTION
   WHEN ex_invalid_id THEN
      dbms_output.put_line('ID must be greater than zero!');
   WHEN no_data_found THEN
      dbms_output.put_line('No such customer!');
   WHEN others THEN
      dbms_output.put_line('Error!');
END;
/
```

When the above code is executed at SQL prompt, it produces the following result:

```
Enter value for cc_id: -6 (let's enter a value -6)
old  2: c_id customers.id%type := &cc_id;
new  2: c_id customers.id%type := -6;
ID must be greater than zero!

PL/SQL procedure successfully completed.
```

Pre-defined Exceptions

PL/SQL provides many pre-defined exceptions, which are executed when any database rule is violated by a program. For example, the predefined exception NO_DATA_FOUND is raised when a SELECT INTO statement returns no rows. The following table lists few of the important pre-defined exceptions:

Exception	Oracle Error	SQLCODE	Description
ACCESS_INTO_NULL	06530	-6530	It is raised when a null object is automatically assigned a value.
CASE_NOT_FOUND	06592	-6592	It is raised when none of the choices in the WHEN clauses of a CASE statement is selected, and there is no ELSE clause.
COLLECTION_IS_NULL	06531	-6531	It is raised when a program attempts to apply collection methods other than EXISTS to an uninitialized nested table or varray, or the program attempts to assign values to the elements of an uninitialized nested table or varray.
DUP_VAL_ON_INDEX	00001	-1	It is raised when duplicate values are attempted to be stored in a column with unique index.
INVALID_CURSOR	01001	-1001	It is raised when attempts are made to make a cursor operation that is not allowed, such as closing an unopened cursor.
INVALID_NUMBER	01722	-1722	It is raised when the conversion of a character string into a number fails because the string does not represent a valid number.
LOGIN_DENIED	01017	-1017	It is raised when s program attempts to log on to the database with an invalid username or password.
NO_DATA_FOUND	01403	+100	It is raised when a SELECT INTO statement returns no rows.
NOT_LOGGED_ON	01012	-1012	It is raised when a database call is issued without being connected to the database.
PROGRAM_ERROR	06501	-6501	It is raised when PL/SQL has an internal problem.
ROWTYPE_MISMATCH	06504	-6504	It is raised when a cursor fetches value in a variable having incompatible data type.
SELF_IS_NULL	30625	-30625	It is raised when a member method is invoked, but the instance of the object type was not initialized.
STORAGE_ERROR	06500	-6500	It is raised when PL/SQL ran out of memory or memory was corrupted.
TOO_MANY_ROWS	01422	-1422	It is raised when s SELECT INTO statement

			returns more than one row.
VALUE_ERROR	06502	-6502	It is raised when an arithmetic, conversion, truncation, or size-constraint error occurs.
ZERO_DIVIDE	01476	1476	It is raised when an attempt is made to divide a number by zero.