Ex: No: 07 WRITE A PL/SQL BLOCK THAT HANDLES

Date:22.03.24 ALL TYPES OF EXCEPTIONS.

AIM:

To Write a PL/SQL block that handles all types of exceptions

PROCEDURE:

Program to handle divide by zero exception:

```
SQL> DECLARE
  2     a NUMBER;
  3     b NUMBER;
  4     c NUMBER;
  5  BEGIN
  6     -- Prompt for user input
  7     a := &a;
  8     b := &b;
  9
 10     -- Perform division
 11     c := a / b;
 12
 13     -- Output the result
 14     dbms_output.put_line('Result of division: ' || to_char(c));
 15
 16  EXCEPTION
 17     WHEN ZERO_DIVIDE THEN
 18        dbms_output.put_line('Divisor cannot be zero');
 19     WHEN VALUE_ERROR THEN
 20        dbms_output.put_line('Invalid input, please enter valid numbers');
 21  END;
 22  /
Enter value for a: 30
old   7:     a := &a;
new   7:     a := 10;
Enter value for b: 0
old   8:     b := &b;
new   8:     b := 0;

PL/SQL procedure successfully completed.

SQL> SET SERVEROUTPUT ON
```

```
SQL> /
Enter value for a: 30
old   7:     a := &a;
new   7:     a := 10;
Enter value for b: 0
old   8:     b := &b;
new   8:     b := 0;
Divisor cannot be zero

PL/SQL procedure successfully completed.

SQL> /
Enter value for a: 100
old   7:     a := &a;
new   7:     a := 100;
Enter value for b: 10
old   8:     b := &b;
new   8:     b := 10;
Result of division: 10

PL/SQL procedure successfully completed.
```

Program to accept sno from supplier table and print name of supplier if the status is greater than 20 else raise exception:

```
SQL> CREATE TABLE supplier (
  2      sno VARCHAR2(10),
  3      sname VARCHAR2(20),
  4      status NUMBER(3),
  5      city VARCHAR2(20)
  6  );

Table created.

SQL> INSERT INTO supplier (sno, sname, status, city) VALUES ('S1', 'Supplier 1', 10,
'New York');

1 row created.

SQL> INSERT INTO supplier (sno, sname, status, city) VALUES ('S2', 'Supplier 2', 25,
'Los Angeles');

1 row created.
```

```
SQL> INSERT INTO supplier (sno, sname, status, city) VALUES ('S3', 'Supplier 3', 30,
'Chicago');

1 row created.

SQL> INSERT INTO supplier (sno, sname, status, city) VALUES ('S4', 'Supplier 4', 15,
'London');

1 row created.

SQL> INSERT INTO supplier (sno, sname, status, city) VALUES ('S5', 'Supplier 5', 20,
'Paris');

1 row created.

SQL> INSERT INTO supplier (sno, sname, status, city) VALUES ('S6', 'Supplier 6', 22,
'Berlin');

1 row created.

SQL> INSERT INTO supplier (sno, sname, status, city) VALUES ('S7', 'Supplier 7', 18,
'Madrid');

1 row created.

SQL> INSERT INTO supplier (sno, sname, status, city) VALUES ('S8', 'Supplier 8', 28,
'Rome');

1 row created.

SQL> INSERT INTO supplier (sno, sname, status, city) VALUES ('S9', 'Supplier 9', 12,
'Tokyo');

1 row created.

SQL> Select * from supplier;

SNO        SNAME                STATUS CITY
---------- -------------------- ---------- --------------------
S1         Supplier 1                   10 New York
S2         Supplier 2                   25 Los Angeles
S3         Supplier 3                   30 Chicago
S4         Supplier 4                   15 London
```

```
S5        Supplier 5          20 Paris
S6        Supplier 6          22 Berlin
S7        Supplier 7          18 Madrid
S8        Supplier 8          28 Rome
S9        Supplier 9          12 Tokyo

9 rows selected.


SQL> DECLARE
  2     sn supplier.sno%TYPE;
  3     snam supplier.sname%TYPE;
  4     stat supplier.status%TYPE;
  5     e1 EXCEPTION;
  6  BEGIN
  7     -- Prompt for user input
  8     sn := '&serialno';
  9
 10     -- Select data from supplier table
 11     SELECT sname, status INTO snam, stat FROM supplier WHERE sno = sn;
 12
 13     -- Check status and output name if greater than 20
 14     IF stat > 20 THEN
 15        dbms_output.put_line(snam);
 16     ELSE
 17        RAISE e1;
 18     END IF;
 19
 20  EXCEPTION
 21     WHEN e1 THEN
 22        dbms_output.put_line('Status <= 20');
 23     WHEN NO_DATA_FOUND THEN
 24        dbms_output.put_line('No data found for the given serial number');
 25  END;
 26  /


Enter value for serialno: S4
old   8:     sn := '&serialno';
new   8:     sn := 'S4';
Status <= 20

PL/SQL procedure successfully completed.
```

```
SQL> /
Enter value for serialno: S2
old   8:     sn := '&serialno';
new   8:     sn := 'S2';
Supplier 2
```

Program to accept sno from supplier table and print name of supplier if he resides in LONDON else raise exception:

```
SQL> DECLARE
  2     sn supplier.sno%TYPE;
  3     snam supplier.sname%TYPE;
  4     stat supplier.status%TYPE;
  5     cit supplier.city%TYPE;
  6     e1 EXCEPTION;
  7  BEGIN
  8     -- Prompt for user input
  9     sn := '&sn';
 10
 11     -- Select data from supplier table
 12     SELECT sname, status, city INTO snam, stat, cit FROM supplier WHERE sno =
sn;
 13
 14     -- Debug statement to check retrieved values
 15     dbms_output.put_line('Supplier Name: ' || snam);
 16     dbms_output.put_line('City: ' || cit);
 17
 18     -- Check city and output name if it's 'LONDON'
 19     IF UPPER(cit) = 'LONDON' THEN
 20        dbms_output.put_line(snam);
 21     ELSE
 22        dbms_output.put_line('Supplier not in London');
 23     END IF;
 24
 25  EXCEPTION
 26     WHEN NO_DATA_FOUND THEN
 27        dbms_output.put_line('No data found for the given serial number');
 28     WHEN OTHERS THEN
 29        RAISE e1;
```

```
 30  END;
Enter value for sn: S4
old   9:     sn := '&sn';
new   9:     sn := 'S4';
Supplier Name: Supplier 4
City: London
Supplier 4

PL/SQL procedure successfully completed.

SQL> /
Enter value for sn: S3
old   9:     sn := '&sn';
new   9:     sn := 'S3';
Supplier Name: Supplier 3
City: Chicago
Supplier not in London

PL/SQL procedure successfully completed.
```

RESULT:

Thus the PL/SQL block that handles all types of exceptions has been verified and executed successfully

Ex: No: 08 CREATION OF PROCEDURES.
Date:12.04.24

AIM:

To work with PL / SQL Procedures

PROCEDURE

```
SQL> SET SERVEROUTPUT ON


SQL> CREATE OR REPLACE PROCEDURE pro
 2  IS
 3     a NUMBER;
 4     b NUMBER;
 5     c NUMBER;
 6     d NUMBER;
 7  BEGIN
 8     -- Prompt for user input
 9     a := &a;
10      b := &b;
11
12     IF a > b THEN
13        c := MOD(a, b);
14        IF c = 0 THEN
15           dbms_output.put_line('GCD is');
16           dbms_output.put_line(b);
17        ELSE
18           dbms_output.put_line('GCD is');
19           dbms_output.put_line(c);
20        END IF;
21     ELSE
22        d := MOD(b, a);
23        IF d = 0 THEN
24           dbms_output.put_line('GCD is');
25           dbms_output.put_line(a);
26        ELSE
27           dbms_output.put_line('GCD is');
28           dbms_output.put_line(d);
29        END IF;
30     END IF;
```

```
 31  END;
 32  /

SQL> SET SERVEROUTPUT ON;
SQL> /
Enter value for a: 212
old   9:     a := &a;
new   9:     a := 212;
Enter value for b: 12
old  10:     b := &b;
new  10:     b := 12;

Procedure created.

SQL> execute pro;
GCD is
8

PL/SQL procedure successfully completed.
```

RESULT:

Thus the implementation of PL/SQL procedure has been verified and executed successfully.

Ex: No: 09 Creation of Database Triggers and functions
Date:12.04.24

AIM:

To work with PL/SQL Triggers for the purpose of monitor the database object(table..etc) and functions .

PROCEDURE:

Program to create a DB trigger before insert for each row on the spj table not allowing insertion for sno ‘s3’ and pno ‘p4’

```
SQL> CREATE TABLE spj (
  2     sno VARCHAR2(10),
  3     pno VARCHAR2(10),
  4     jno VARCHAR2(10)
  5  );

Table created.

SQL> CREATE OR REPLACE TRIGGER t1
  2  BEFORE INSERT ON spj
  3  FOR EACH ROW
  4  BEGIN
  5     IF (:new.sno = 's3' AND :new.pno = 'p4') THEN
  6        raise_application_error(-20000, 'Cannot insert s3, p4');
  7     END IF; -- End IF statement
  8  END; -- End trigger body
  9  /


SQL> @p1001.sql
SP2-0310: unable to open file "p1001.sql"
SQL> INSERT INTO spj VALUES ('s3', 'p4', 'j2', 30);
INSERT INTO spj VALUES ('s3', 'p4', 'j2', 30)
            *
ERROR at line 1:
ORA-00913: too many values
```

Program to create a DB trigger to update the qty if qty is greater than existing qty

```
SQL> CREATE OR REPLACE TRIGGER t2
  2  BEFORE UPDATE ON spj
  3  FOR EACH ROW
  4  BEGIN
  5     IF (:new.qty < :old.qty) THEN
  6        raise_application_error(-20001, 'Cannot Update');
  7     END IF;
  8  END;
  9  /


SQL>@p1002.sql
Trigger created
SQL>update spj set qty=10 where sno='s1';
update spj set qty=10 where sno='s1'
          *
ERROR at line 1:
ORA-20001: Cannot update
ORA-06512: at "309038.T2",line 4
ORA-04088: error during execution of trigger '309038.T2'
```

Program to create a DB trigger not allowing deletion in supplier table

```
SQL> CREATE OR REPLACE TRIGGER t3
  2  BEFORE DELETE ON supplier
  3  FOR EACH ROW
  4  BEGIN
  5     raise_application_error(-20002, 'Deletion Not allowed');
  6  END;
  7  /

Trigger created.

SQL> DELETE FROM supplier WHERE sno = 'S1';
DELETE FROM supplier WHERE sno = 'S1'
          *
ERROR at line 1:
ORA-20002: Deletion Not allowed
ORA-06512: at "SCOTT.T3", line 2
ORA-04088: error during execution of trigger 'SCOTT.T3'
```

Create a PL/SQL trigger which prevents the insertion of new record into the

employee table.

```
SQL> create or replace trigger trig before insert on emp for each row
  2  begin
  3  raise_application_error (-20998, 'insertion not allowed');
  4  end;
  5  /

Trigger created.

SQL> INSERT INTO emp (empno, ename) VALUES (123, 'John');
INSERT INTO emp (empno, ename) VALUES (123, 'John')
            *
ERROR at line 1:
ORA-20998: insertion not allowed
ORA-06512: at "SCOTT.TRIG", line 2
ORA-04088: error during execution of trigger 'SCOTT.TRIG'
```

Create a PL/SQL trigger which prevents all DML operations on the table account.

```
SQL> CREATE OR REPLACE TRIGGER kkks
  2  BEFORE INSERT OR DELETE OR UPDATE ON accounts
  3  FOR EACH ROW
  4  BEGIN
  5      raise_application_error(-04098, 'Changes not allowed');
  6  END;
  7  /

Trigger created.

SQL> INSERT INTO accounts (account_id, account_name) VALUES (6, 'Mortgage');
INSERT INTO accounts (account_id, account_name) VALUES (6, 'Mortgage')
            *
ERROR at line 1:
ORA-21000: error number argument to raise_application_error of -4098 is out of
range
ORA-06512: at "SCOTT.KKKS", line 2
ORA-04088: error during execution of trigger 'SCOTT.KKKS'
```

Create a PL/SQL trigger to update the salary of employee if the salary is greater than the existing salary.

```
SQL> CREATE OR REPLACE TRIGGER kkt
  2  BEFORE UPDATE ON emp
  3  FOR EACH ROW
  4  BEGIN
  5     IF :new.sal < :old.sal THEN
  6        raise_application_error(-20002, 'Salary cannot be reduced');
  7     END IF;
  8  END;
  9  /

Trigger created.


SQL> UPDATE emp SET sal = 3000 WHERE empno = 7844;

1 row updated.

SQL> UPDATE emp SET sal = 2000 WHERE empno = 7844;
UPDATE emp SET sal = 2000 WHERE empno = 7844
       *
ERROR at line 1:
ORA-20002: Salary cannot be reduced
ORA-06512: at "SCOTT.KKT", line 3
ORA-04088: error during execution of trigger 'SCOTT.KKT'
```

FUNCTIONS

To write a PL/SQL block to find factorial of given number using function

```
SQL> CREATE OR REPLACE FUNCTION fact(limit NUMBER) RETURN
NUMBER IS
  2     ans NUMBER(3);
  3  BEGIN
  4     ans := 1;
  5     FOR i IN 1..limit LOOP
  6        ans := ans * i;
  7     END LOOP;
  8     RETURN ans;
  9  END;
 10  /

Function created.
```

```
SQL>
SQL> DECLARE
  2     n NUMBER(3);
  3     f NUMBER(3);
  4  BEGIN
  5     n := &limit;
  6     f := fact(n);
  7     dbms_output.put_line(n || '! = ' || f);
  8  END;
  9  /
Enter value for limit: 5
old   5:     n := &limit;
new   5:     n := 5;
5! = 120

PL/SQL procedure successfully completed.
```

Create a function which count total no.of employees having salary less than 6000.

```
SQL> CREATE OR REPLACE FUNCTION count_emp(esal NUMBER) RETURN
NUMBER AS
  2     CURSOR vin_cur IS SELECT empno, sal FROM emp;
  3     Xno emp.empno%TYPE;
  4     Xsal emp.sal%TYPE;
  5     C NUMBER := 0;
  6  BEGIN
  7     OPEN vin_cur;
  8
  9     LOOP
 10        FETCH vin_cur INTO Xno, Xsal;
 11        EXIT WHEN vin_cur%NOTFOUND;
 12
 13        IF Xsal < esal THEN
 14           C := C + 1;
 15        END IF;
 16     END LOOP;
 17
 18     CLOSE vin_cur;
 19
 20     RETURN C;
 21  END;
 22  /

Function created.
```

```
SQL> /* Function specification */
SQL> DECLARE
  2     Ne NUMBER;
  3     Xsal NUMBER := 3000; -- Example salary value
  4  BEGIN
  5     Ne := count_emp(Xsal);
  6     DBMS_OUTPUT.PUT_LINE('Number of employees with salary less than ' ||
Xsal || ': ' || Ne);
  7  END;
  8  /
Number of employees with salary less than 3000: 9

PL/SQL procedure successfully completed.
```

Program to accept pno from parts table and print name of parts (using function):

```
SQL> -- Create the parts table
SQL> CREATE TABLE parts (
  2     pno VARCHAR2(10),
  3     pname VARCHAR2(100),
  4     CONSTRAINT pk_parts PRIMARY KEY (pno)
  5  );

Table created.

SQL>
SQL> -- Insert sample values into the parts table
SQL> INSERT INTO parts (pno, pname) VALUES ('P1', 'Engine Assembly');

1 row created.

SQL> INSERT INTO parts (pno, pname) VALUES ('P2', 'Chassis Frame');

1 row created.

SQL> INSERT INTO parts (pno, pname) VALUES ('P3', 'Brake System');

1 row created.

SQL> INSERT INTO parts (pno, pname) VALUES ('P4', 'Transmission Unit');

1 row created.
```

```
SQL> INSERT INTO parts (pno, pname) VALUES ('P5', 'Suspension Kit');

1 row created.


SQL> CREATE OR REPLACE FUNCTION findname(p parts.pno%TYPE) RETURN
VARCHAR2 IS
  2     a parts.pname%TYPE;
  3  BEGIN
  4     SELECT pname INTO a FROM parts WHERE pno = p;
  5     RETURN a;
  6  END;
  7  /

Function created.

SQL> SELECT findname('P1') AS part_name FROM DUAL;

PART_NAME
--------------------------------------------------------------------------------
Engine Assembly
```

RESULT:

Thus the implementation of functions and database triggers has been executed successfully.

Ex: No: 10 Database Connectivity with Front End Tools
Date:26.04.24

EB BILL PREPARATION

AIM:

To prepare a form in VB to generate EB bill and connect it SQL back end.

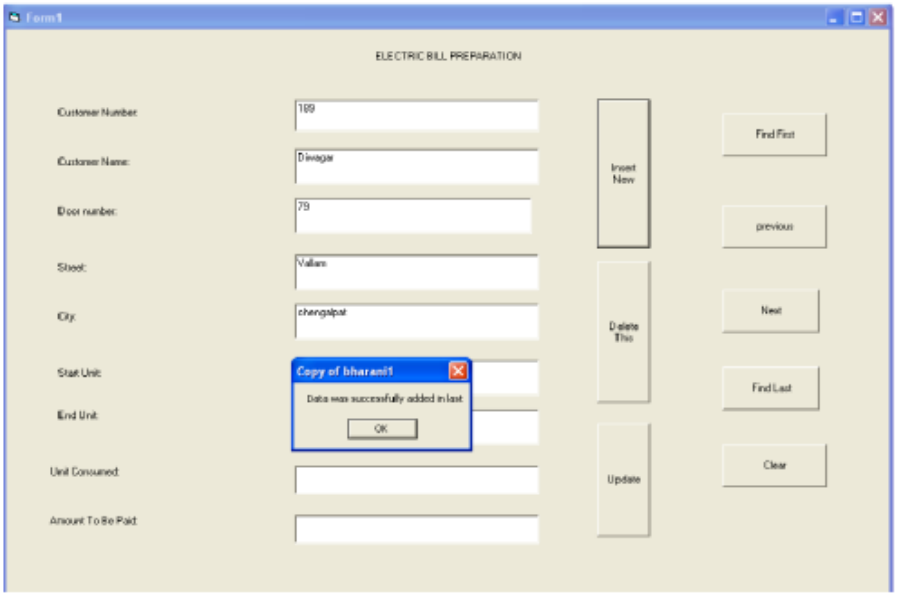
PROCEDURE:

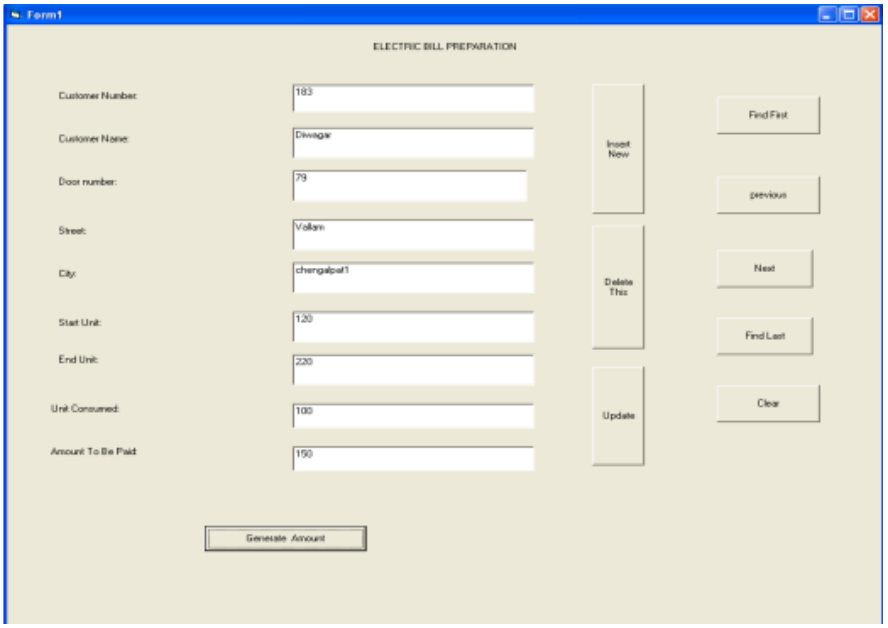
```
Dim su As Integer
Dim eu As Integer
Dim consumed As Integer
Dim amount As Integer
Dim var1 As Integer
Dim cn As New ADODB.Connection
Dim rs As New ADODB.Recordset

Private Sub clear_Click()
   ' Clear all text boxes
   Text1.Text = ""
   Text2.Text = ""
   Text3.Text = ""
   Text4.Text = ""
   Text5.Text = ""
   Text6.Text = ""
   Text7.Text = ""
   Text8.Text = ""
   Text9.Text = ""
End Sub

Private Sub Delete_Click()
   ' Delete the current record in the recordset
   rs.Delete
   ' Clear all text boxes after deleting
   Text1.Text = ""
   Text2.Text = ""
   Text3.Text = ""
   Text4.Text = ""
   Text5.Text = ""
   ' Update the recordset
   rs.Update
   ' Display a message box indicating the record is deleted
   MsgBox "Record Deleted"
End Sub
```

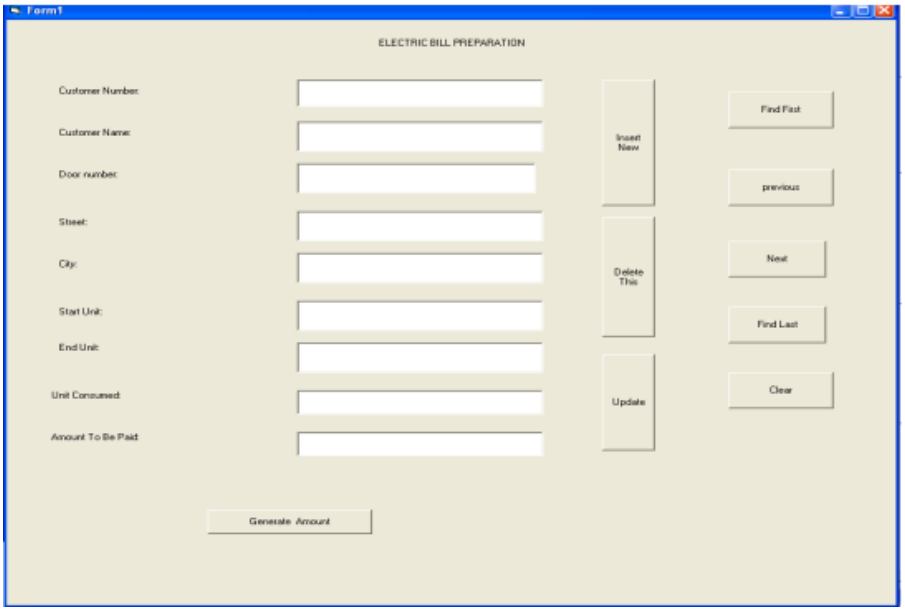
```
Private Sub eb_Click()
    ' Show the DataReport1
    DataReport1.Show
End Sub

Private Sub first_Click()
    ' Move to the first record in the recordset
    rs.MoveFirst
    ' Update Text1 to Text5 with the corresponding field values
    Text1.Text = rs.Fields(0)
    Text2.Text = rs.Fields(1)
    Text3.Text = rs.Fields(2)
    Text4.Text = rs.Fields(3)
    Text5.Text = rs.Fields(4)
    ' Display a message box indicating this is the first record
    MsgBox "This is the first record"
End Sub

Private Sub gm_Click()
    ' Calculate consumed and amount based on Text6 and Text7 values
    su = Text6.Text
    eu = Text7.Text
    consumed = eu - su
    Text8.Text = consumed
    If (consumed > 400) Then
        amount = consumed * 2
    Else
        amount = consumed * 1.5
    End If
    Text9.Text = amount
End Sub

Private Sub insert_Click()
    ' Add a new record to the recordset based on Text1 to Text5 values
    rs.AddNew
    rs.Fields(0) = Text1.Text
    rs.Fields(1) = Text2.Text
    rs.Fields(2) = Text3.Text
    rs.Fields(3) = Text4.Text
    rs.Fields(4) = Text5.Text
    ' Update the recordset
    rs.Update
    ' Display a message box indicating data was successfully added
    MsgBox "Data was successfully added"
```

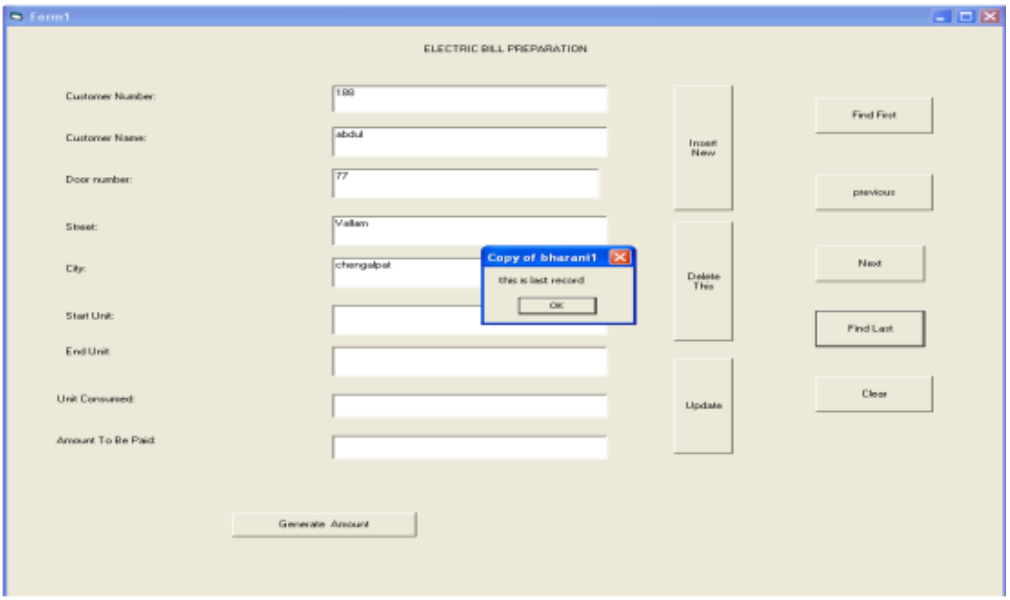
```
End Sub

Private Sub last_Click()
    ' Move to the last record in the recordset
    rs.MoveLast
    ' Update Text1 to Text5 with the corresponding field values
    Text1.Text = rs.Fields(0)
    Text2.Text = rs.Fields(1)
    Text3.Text = rs.Fields(2)
    Text4.Text = rs.Fields(3)
    Text5.Text = rs.Fields(4)
    ' Display a message box indicating this is the last record
    MsgBox "This is the last record"
End Sub

Private Sub next_Click()
    ' Move to the next record in the recordset
    rs.MoveNext
    ' If at the end of the recordset, display a message box
    If (rs.EOF) Then
        MsgBox "This is the last record"
    Else
        ' Update Text1 to Text5 with the corresponding field values
        Text1.Text = rs.Fields(0)
        Text2.Text = rs.Fields(1)
        Text3.Text = rs.Fields(2)
        Text4.Text = rs.Fields(3)
        Text5.Text = rs.Fields(4)
    End If
End Sub

Private Sub previous_Click()
    ' Move to the previous record in the recordset
    rs.MovePrevious
    ' If at the beginning of the recordset, display a message box
    If (rs.BOF) Then
        MsgBox "This is the first record"
    Else
        ' Update Text1 to Text5 with the corresponding field values
        Text1.Text = rs.Fields(0)
        Text2.Text = rs.Fields(1)
        Text3.Text = rs.Fields(2)
        Text4.Text = rs.Fields(3)
        Text5.Text = rs.Fields(4)
    End If
```

```
End Sub

Private Sub Form_Load()
    ' Establish connection to the database
    Set cn = New ADODB.Connection
    Set rs = New ADODB.Recordset
    cn.Open "dsn=eb;UserId=96017;Password=96017;"
    rs.Open "eb", cn, adOpenDynamic, adLockOptimistic
End Sub

Private Sub report_Click()
    ' Show the DataReport1
    DataReport1.Show
End Sub

Private Sub update_Click()
    ' Update the current record in the recordset with Text1 to Text5 values
    rs.Fields(0) = Text1.Text
    rs.Fields(1) = Text2.Text
    rs.Fields(2) = Text3.Text
    rs.Fields(3) = Text4.Text
    rs.Fields(4) = Text5.Text
    ' Update the recordset
    rs.Update
    ' Display a message box indicating data was updated
    MsgBox "Data Updated"
End Sub
```




Form1
ELECTRIC BILL PREPARATION
Customer Number:
183
Customer Name:
Diwagar
Door number:
79
Street:
Vallam
City:
chengalpet1
Start Unit:
120
End Unit:
220
Unit Consumed:
100
Amount To Be Paid:
150
Insert New
Delete This
Update
Find First
previous
Next
Find Last
Clear
Generate Amount


Form1
ELECTRIC BILL PREPARATION
Customer Number:
Customer Name:
Door number:
Street:
City:
Start Unit:
End Unit:
Unit Consumed:
Amount To Be Paid:
Insert New
Delete This
Update
Find First
previous
Next
Find Last
Clear
Generate Amount



RESULT:

Thus the mini project for eb bill with sql back end was created Successfully

Exp No. 11 **Implementation of Decision tree**
Date:10.05.24

AIM:

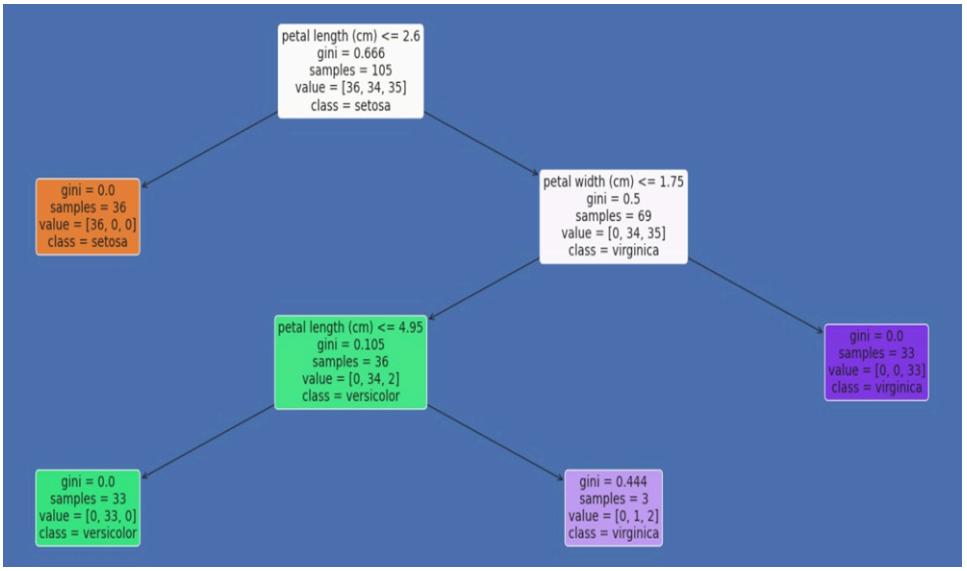
To create a program to implement Decision Tree in Python sklearn

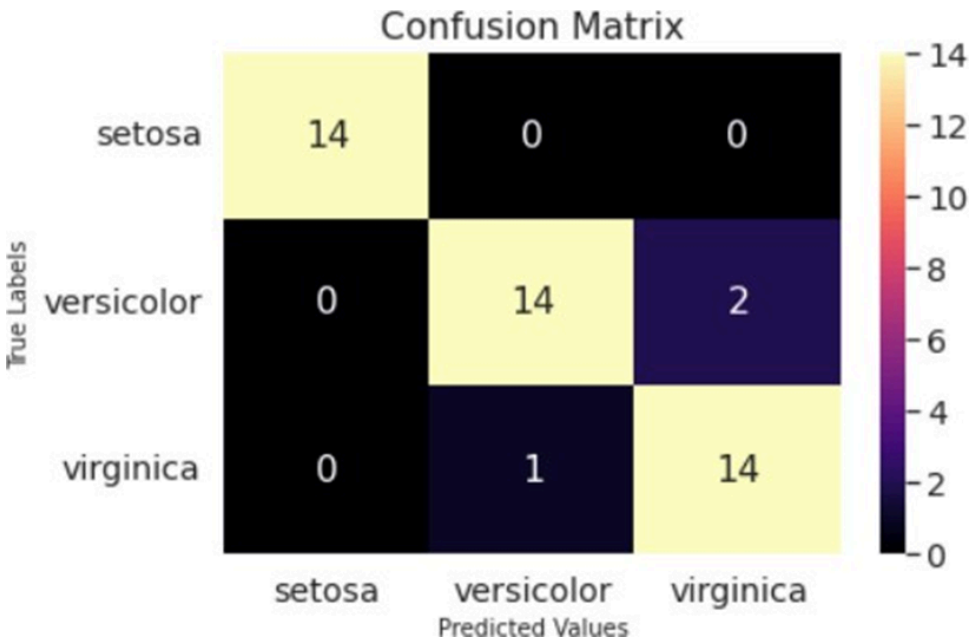
PROCEDURE:

```
import pandas as pd import numpy as np

Import matplotlib.pyplot as plt

from sklearn import metrics import seaborn as sns

from sklearn.datasets import load_iris

from sklearn.model_selection import train_test_split

from sklearn import tree

iris = load_iris()

data = pd.DataFrame(data = iris.data, columns iris.feature_names)
data['Species'] = iris.target
target = np.unique(iris.target)
target_n = np.unique(iris.target_names) target_dict = dict(zip(target,
target_n))

data['Species']=data['Species'].replace(target_dict)

 x =data.drop(columns = "Species")

y = data["Species"]

names_features = x.columns target_labels = y.unique()

x_train, x_test, y_train, y_test = train_test_split(x, y, test_size = 0.3,
random_state =93)
```

```
from sklearn.tree import DecisionTreeClassifier

dtc = DecisionTreeClassifier(max_depth = 3,random_state = 93)
dtc.fit(x_train, y_train)

plt.figure(figsize = (30, 10), facecolor = 'b')

Tree = tree.plot_tree(dtc, feature_names = names_features, class_names =
target_labels, rounded = True, filled = True, fontsize = 14)

plt.show()

y_pred = dtc.predict(x_test)

confusion_matrix = metrics.confusion_matrix(y_test, y_pred)
matrix = pd.DataFrame(confusion_matrix)
axis = plt.axes() sns.set(font_scale = 1.3)

plt.figure(figsize = (10,7))

sns.heatmap(matrix, annot = True, fmt = "g", ax = axis, cmap = "magma")
axis.set_title('Confusion Matrix')

axis.set_xlabel("Predicted Values", fontsize = 10)
axis.set_xticklabels(['] + target_labels)

axis.set_ylabel( "True Labels", fontsize = 10)
axis.set_yticklabels(list(target_labels), rotation = 0)

plt.show()
```

OUTPUT





RESULT:

Thus the program to implement the decision tree is implemented and the output is obtained.

EX 12 Implementation of Apriori Algorithm

Date: 10.05.24

Aim:

To implement the apriori algorithm in python

Procedure:

```
import numpy as np

import pandas as pd

from mlxtend.frequent_patterns import apriori, association_rules

# Now, we will load the Data

data1 = pnd.read_excel('Online_Retail.xlx') data1.head()
```

Output:

	Invoice No	Stock Code	Description	Q ua nti ty	InvoiceDa te	Uni tP rice	Custo m erID	Country
0	536365	85123A	WHITE HANGING	6	2010-12-0 1 08:26:00	2.55	17850.0	United Kingdom
1	536365	71053	WHITE METAL LANTERN	6	2010-12-01 08:26:00	3.39	17850.0	United Kingdom

2	536365	84406B	CREAM CUPID HEARTS COAT HANGER	8	2010-12-01 08:26:00	2.75	17850.0	United Kingdom
3	536365	84029G	KNITTED UNION FLAG HOT WATER BOTTLE	6	2010-12-01 08:26:00	3.39	17850.0	United Kingdom
4	536365	84029E	RED WOOLLY HOTTIE WHITE HEART.	6	2010-12-01 08:26:00	3.39	17850.0	United Kingdom

Input:

```
# here, we will explore the

columns of the data

data1.columns
```

Output:

```
Index(['InvoiceNo', 'StockCode', 'Description',
       'Quantity', 'InvoiceDate', 'UnitPrice',
       'CustomerID', 'Country'],
```

Dtype = 'object')

Input:

```
# Now, we will explore the different

regions of transactions

data1.Country.unique()
```

Output:

```
array(['United Kingdom', 'France', 'Australia',
       'Netherlands', 'Germany', 'Norway',
       'EIRE', 'Switzerland', 'Spain', 'Poland',
       'Portugal',

'Italy', 'Belgium', 'Lithuania', 'Japan', 'Iceland',

'Channel Islands', 'Denmark', 'Cyprus',
'Sweden', 'Austria', 'Israel', 'Finland',
'Bahrain', 'Greece', 'Hong Kong',
'Singapore', 'Lebanon', 'United Arab
Emirates', 'Saudi Arabia',
'Czech Republic', 'Canada',
'Unspecified', 'Brazil', 'USA',
'European Community', 'Malta',
'RSA'], dtype = object)
```

```
# here, we will strip the extra spaces in the description data1['Description']

=data1['Description'].str.strip()

# Now, drop the rows which does not have any invoice number

data1.dropna(axis = 0, subset = ['InvoiceNo'], inplace = True)
```

```
data1['InvoiceNo']=data1['InvoiceNo'].astype('str')

# Now, we will drop all transactions which were done on

credit_data1=data1[~data1['InvoiceNo'].str.contains('C')]

# Transactions done in France

basket1_France=(data1[data1['Country']=="France"].groupby(['InvoiceNo'

, 'Description'])['Quantity'].sum().unstack().reset_index().fillna(0)


.set_index('InvoiceNo'))

 # Transactions done in the United Kingdom

basket1_UK = (data1[data1['Country'] == "UnitedKingdom"].groupby(['InvoiceNo',
'Description'])['Quantity'].sum().unstack().reset_index().fillna(0).set_index('Invoice
No'))

 # Transactions done in Portugal

basket1_Por = (data1[data1['Country'] =="Portugal"].groupby(['InvoiceNo',
'Description'])['Quantity'].sum().unstack().reset_index().fillna(0).set_index('In
voiceNo'))


basket1_Sweden=(data1[data1['Country']=="Sweden"].groupby(['InvoiceN
o',
'Description'])['Quantity'].sum().unstack().reset_index().fillna(0).set_index(
'InvoiceNo'))



# Here, we will define the hot encoding function # for making the data

suitable encode the datasets


basket1_encoded = basket1_France.applymap(hot_encode1) basket1_France =
```

basket1_encoded# for the concerned libraries

```
def hot_encode1(P):
    if(P<= 0):
        return 0
    if(P>= 1):
        return 1
```

```
# Here, we will
basket1_encoded = basket1_UK.applymap(hot_encode1)
basket1_UK = basket1_encoded
basket1_encoded = basket1_Por.applymap(hot_encode1)
basket1_Por = basket1_encoded
basket1_encoded = basket1_Sweden.applymap(hot_encode1)
basket1_Sweden = basket1_encoded
```

France:

```
# Build the model
frq_items1 = AP(basket1_France, min_support = 0.05,
use_colnames = True) # Collect the inferred rules in a dataframe
rules1 = AR(frq_items1, metric = "lift", min_threshold = 1)
rules1 = rules1.sort_values(['confidence', 'lift'], ascending = [False, False])
```

print(rules1.head()

Output:

antecedents \
45 (JUMBO BAG WOODLAND ANIMALS)
260 (PLASTERS IN TIN CIRCUS PARADE, RED TOADSTOOL ...

272 (RED TOADSTOOL LED NIGHT LIGHT, PLASTERS IN TI...
302 (SET/6 RED SPOTTY PAPER CUPS, SET/20 RED RETRO...
301 (SET/6 RED SPOTTY PAPER PLATES, SET/20 RED RET...
consequents antecedent support consequent support \
45 (POSTAGE) 0.076531 0.765306
260 (POSTAGE) 0.051020 0.765306
272 (POSTAGE) 0.053571 0.765306
302 (SET/6 RED SPOTTY PAPER PLATES) 0.102041s 0.127551
301 (SET/6 RED SPOTTY PAPER CUPS) 0.102041 0.137755
support confidence lift leverage conviction

45 0.076531 1.000 1.306667 0.017961 inf
260 0.051020 1.000 1.306667 0.011974 inf
272 0.053571 1.000 1.306667 0.012573 inf
302 0.099490 0.975 7.644000 0.086474 34.897959
301 0.099490 0.975 7.077778 0.085433 34.489796

It can be seen that paper cups, paper and plates are brought together in France.

RESULT:

Thus the python program to implement the apriori algorithm is executed and the output is obtained succesfully.