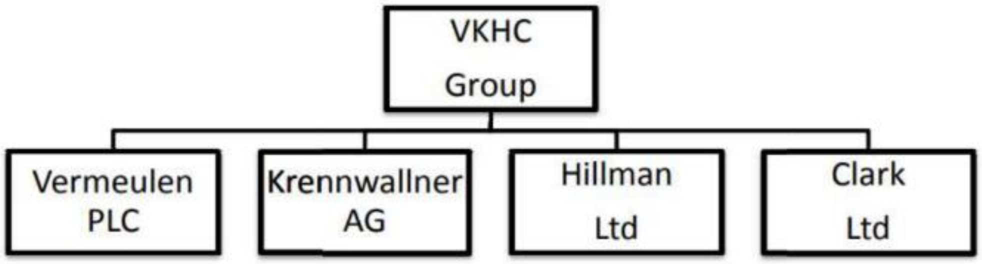
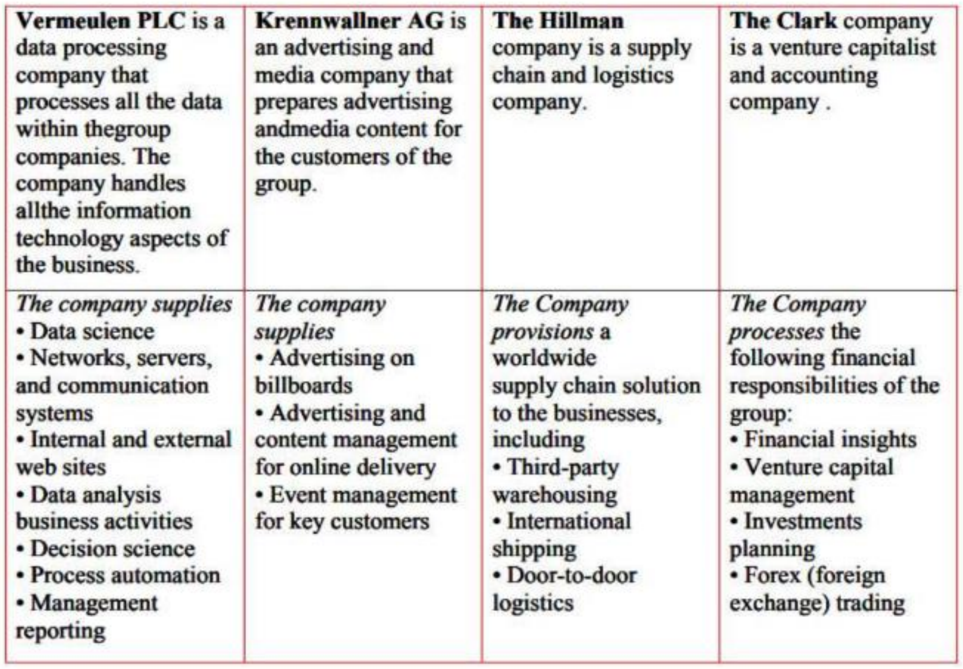
Practical NO :- 01

Aim:- Overview of Practical and Installation.

Vermeulen-Krennwallner-Hillman-Clark Group (VKHCG) is a hypothetical medium-size international company. It consists of four subcompanies: Vermeulen PLC, Krennwallner AG, Hillman Ltd, and Clark Ltd.

Software requirements:

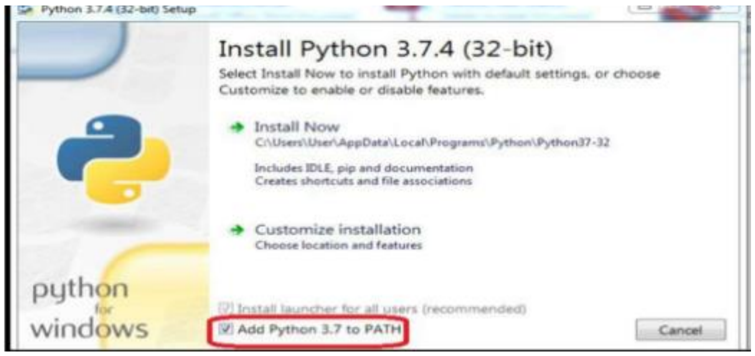




Vermeulen PLC is a data processing company that processes all the data within thegroup companies. The company handles allthe information technology aspects of the business.	**Krennwallner AG** is an advertising and media company that prepares advertising andmedia content for the customers of the group.	**The Hillman** company is a supply chain and logistics company.	**The Clark** company is a venture capitalist and accounting company .
The company supplies • Data science • Networks, servers, and communication systems • Internal and external web sites • Data analysis business activities • Decision science • Process automation • Management reporting	*The company supplies* • Advertising on billboards • Advertising and content management for online delivery • Event management for key customers	*The Company provisions* a worldwide supply chain solution to the businesses, including • Third-party warehousing • International shipping • Door-to-door logistics	*The Company processes* the following financial responsibilities of the group: • Financial insights • Venture capital management • Investments planning • Forex (foreign exchange) trading

- R-Console 3.XXX or Above
- R Studio 1.XXX or above
- Python 2.7 for Cassandra and 3.XXX or above

o While installing Python check the option to Add Python to PATH Variable



Python 3.7.4 (32-bit) Setup

Install Python 3.7.4 (32-bit)

Select Install Now to install Python with default settings, or choose Customize to enable or disable features.

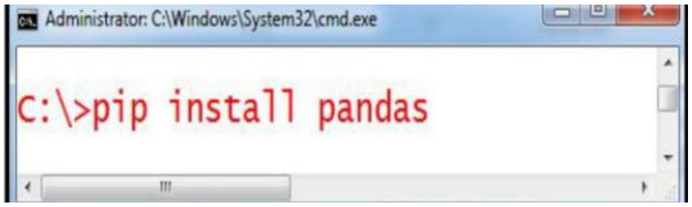
→ Install Now
C:\Users\User\AppData\Local\Programs\Python\Python37-32

Includes IDLE, pip and documentation
Creates shortcuts and file associations

→ Customize installation
Choose location and features

☑ Install launcher for all users (recommended)
☑ Add Python 3.7 to PATH

o Open CMD in Administrative Mode



```
Administrator: C:\Windows\System32\cmd.exe

C:\>pip install pandas
```

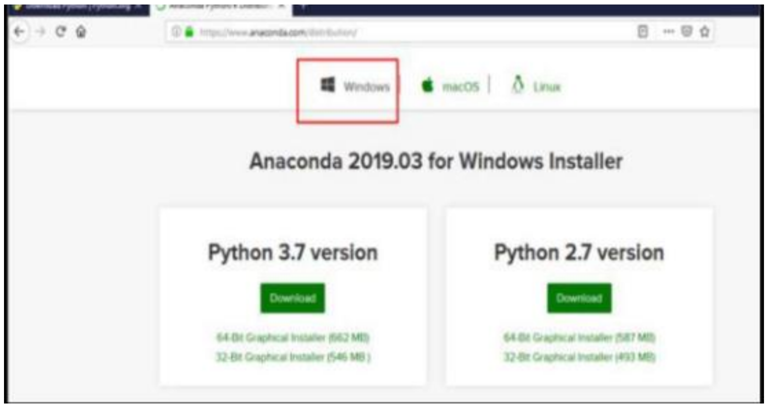
o Similarly install the following packages using pip

1.	matplotlib	8.	datetime	15.	sqlalchemy
2.	numpy	9.	json	16.	sql.connector
3.	opencv-python	10.	msgpack	17.	geopandas
4.	networkx	11.	scipy	18.	quandl
5.	sys	12.	geopy	19.	mlxtend
6.	uuid	13.	pysqlite3	20.	folium
7.	pyspark	14.	openpyxl		

Packages can also be installed using Anaconda

Download Anaconda from https://www.anaconda.com and visit downloads tab.

In the downloads page, scroll down until you see the download options for windows. Click on the download button for python 3.7. This will initiate a download for the anaconda installer.



Anaconda 2019.03 for Windows Installer

Python 3.7 version
Download
64-Bit Graphical Installer (662 MB)
32-Bit Graphical Installer (546 MB)

Python 2.7 version
Download
64-Bit Graphical Installer (587 MB)
32-Bit Graphical Installer (493 MB)

Follow through the instructions for installing as shown in the next few images. Choose any destination folder according to your liking and uncheck "Add anaconda to my PATH environment variable."

Apache Cassandra https://downloads.datastax.com/#ddacs

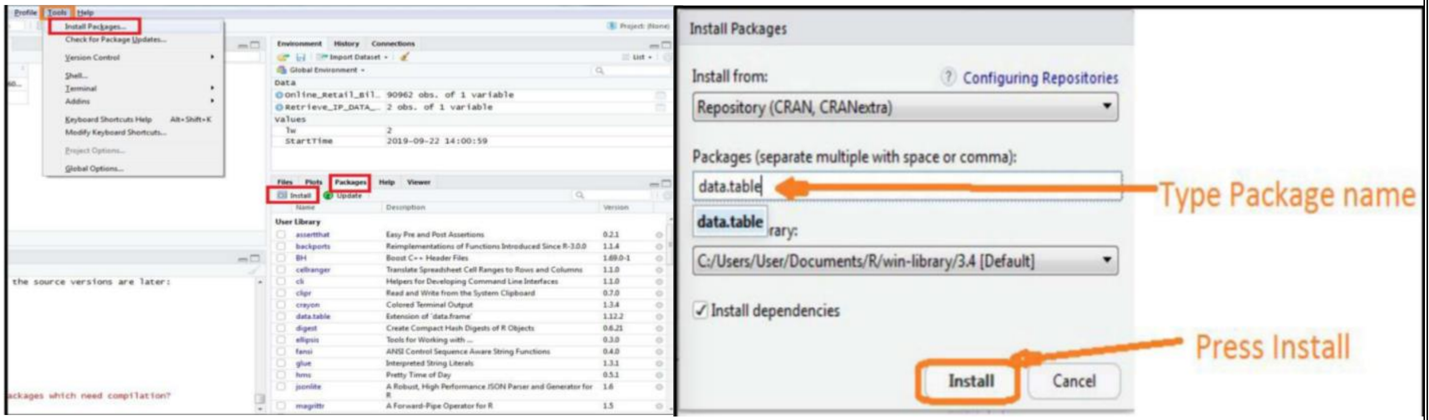
There is a dependency on the Visual C++ 2008 runtime (32bit), but Windows 7 and Windows 2008 Server R2 has it already installed. Download it from: http://www.microsoft.com/download/en/details.aspx?displaylang=en&id=29

JDK 1.8 - Sypder

If Working on Windows OS, create a Directory C:/VKHCG.

R Packages :-R- Studio

R – Studio: Go to Tools → Install Packages OR Select Install tab from Package Tab



```
Data
Online_Retail_Bil…  90962 obs. of 1 variable
Retrieve_IP_DATA_…  2 obs. of 1 variable
Values
  lw                2
  StartTime         2019-09-22 14:00:59
```

```
the source versions are later:
ackages which need compilation?
```

Name	Description	Version
User Library		
assertthat	Easy Pre and Post Assertions	0.2.1
backports	Reimplementations of Functions Introduced Since R-3.0.0	1.1.4
BH	Boost C++ Header Files	1.69.0-1
cellranger	Translate Spreadsheet Cell Ranges to Rows and Columns	1.1.0
cli	Helpers for Developing Command Line Interfaces	1.1.0
clipr	Read and Write from the System Clipboard	0.7.0
crayon	Colored Terminal Output	1.3.4
data.table	Extension of 'data.frame'	1.12.2
digest	Create Compact Hash Digests of R Objects	0.6.21
ellipsis	Tools for Working with ...	0.3.0
fansi	ANSI Control Sequence Aware String Functions	0.4.0
glue	Interpreted String Literals	1.3.1
hms	Pretty Time of Day	0.5.1
jsonlite	A Robust, High Performance JSON Parser and Generator for R	1.6
magrittr	A Forward-Pipe Operator for R	1.5

Install Packages

Install from: Repository (CRAN, CRANextra)
Configuring Repositories

Packages (separate multiple with space or comma): data.table

Install to Library: C:/Users/User/Documents/R/win-library/3.4 [Default]

✓ Install dependencies

Then type the package name in package text field

Install following package

- Data.Table Package
- ReadR Package
- JSONLite Package
- Ggplot2 Package
- Sparklyr Package
- Tibble package

R - Console

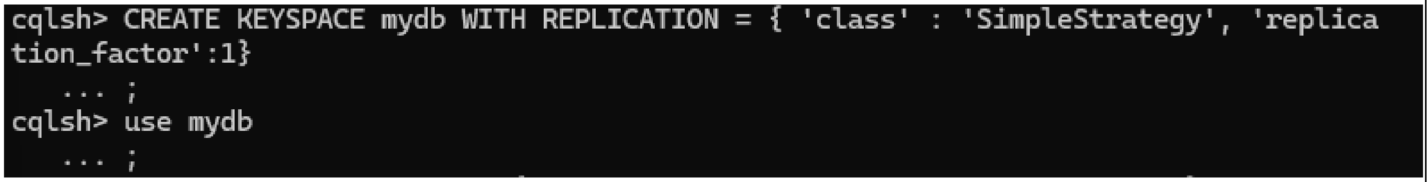
Use the following command:

- install.packages ("data.table")
- install.packages("readr")
- install.packages ("jsonlite")
- install.packages("ggplot2")
- install.packages("sparklyr")
- install.packages("tibble")

Practical NO :- 02

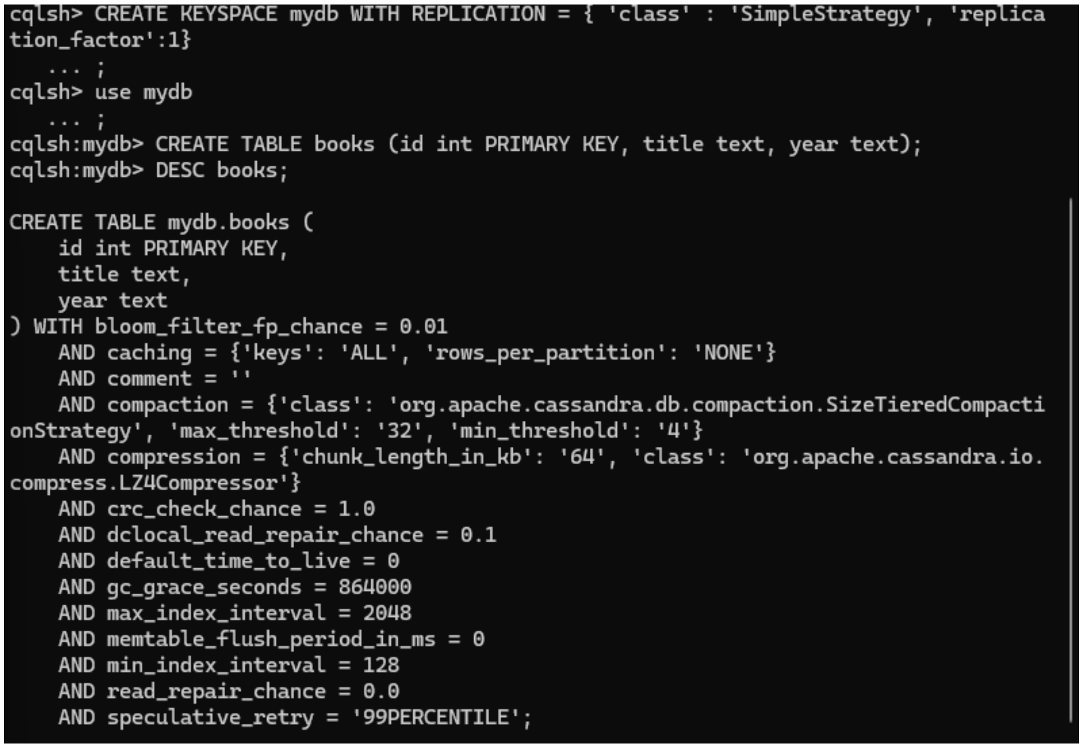
Aim:- Creating database using Cassandra

Creating and using database in Cassandra

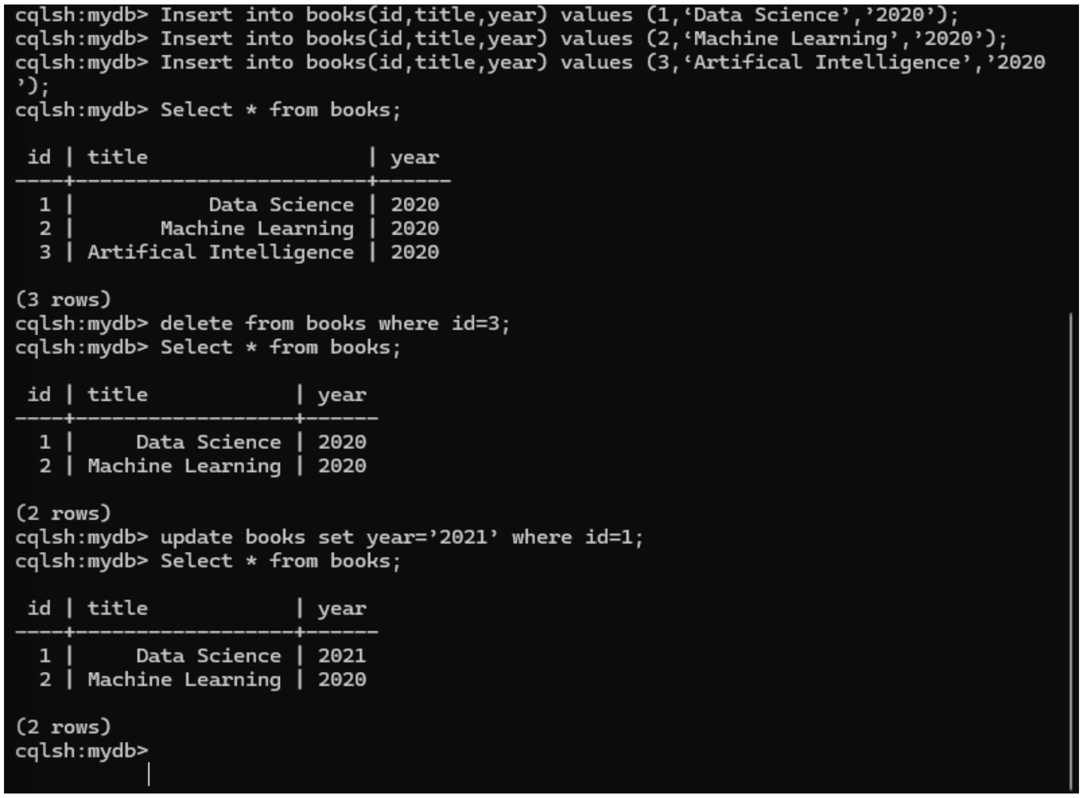


```
cqlsh> CREATE KEYSPACE mydb WITH REPLICATION = { 'class' : 'SimpleStrategy', 'replica
tion_factor':1}
   ... ;
cqlsh> use mydb
   ... ;
```

Create Database mydb and table books to store and retrieve records. Also update and delete records

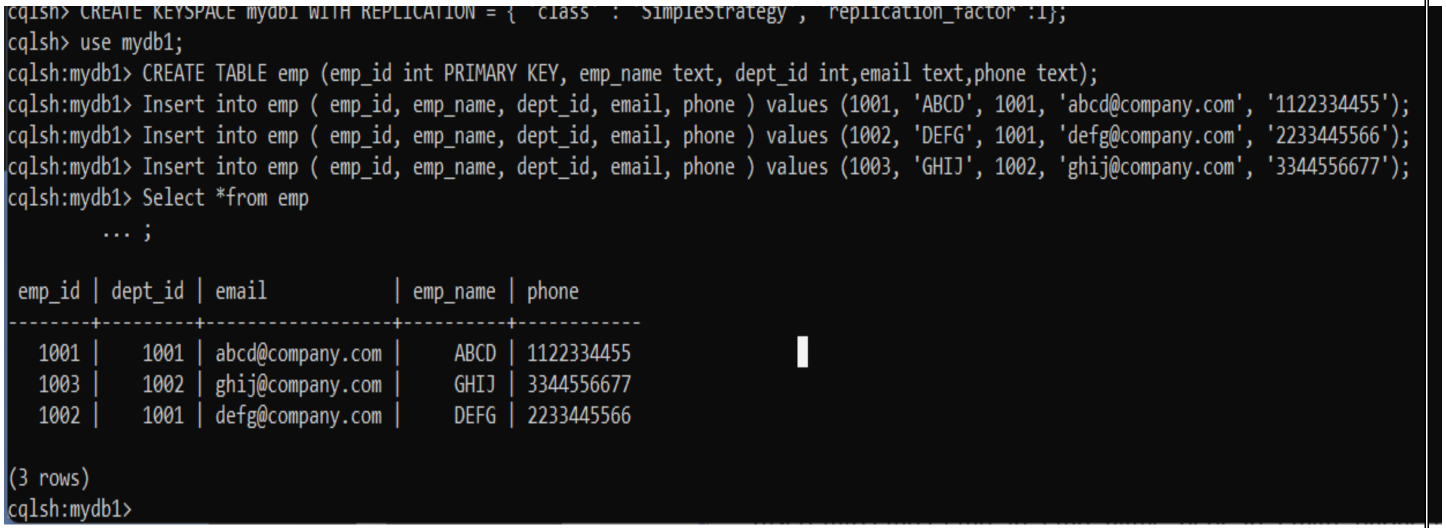


```
cqlsh> CREATE KEYSPACE mydb WITH REPLICATION = { 'class' : 'SimpleStrategy', 'replica
tion_factor':1}
   ... ;
cqlsh> use mydb
   ... ;
cqlsh:mydb> CREATE TABLE books (id int PRIMARY KEY, title text, year text);
cqlsh:mydb> DESC books;

CREATE TABLE mydb.books (
    id int PRIMARY KEY,
    title text,
    year text
) WITH bloom_filter_fp_chance = 0.01
    AND caching = {'keys': 'ALL', 'rows_per_partition': 'NONE'}
    AND comment = ''
    AND compaction = {'class': 'org.apache.cassandra.db.compaction.SizeTieredCompacti
onStrategy', 'max_threshold': '32', 'min_threshold': '4'}
    AND compression = {'chunk_length_in_kb': '64', 'class': 'org.apache.cassandra.io.
compress.LZ4Compressor'}
    AND crc_check_chance = 1.0
    AND dclocal_read_repair_chance = 0.1
    AND default_time_to_live = 0
    AND gc_grace_seconds = 864000
    AND max_index_interval = 2048
    AND memtable_flush_period_in_ms = 0
    AND min_index_interval = 128
    AND read_repair_chance = 0.0
    AND speculative_retry = '99PERCENTILE';
```



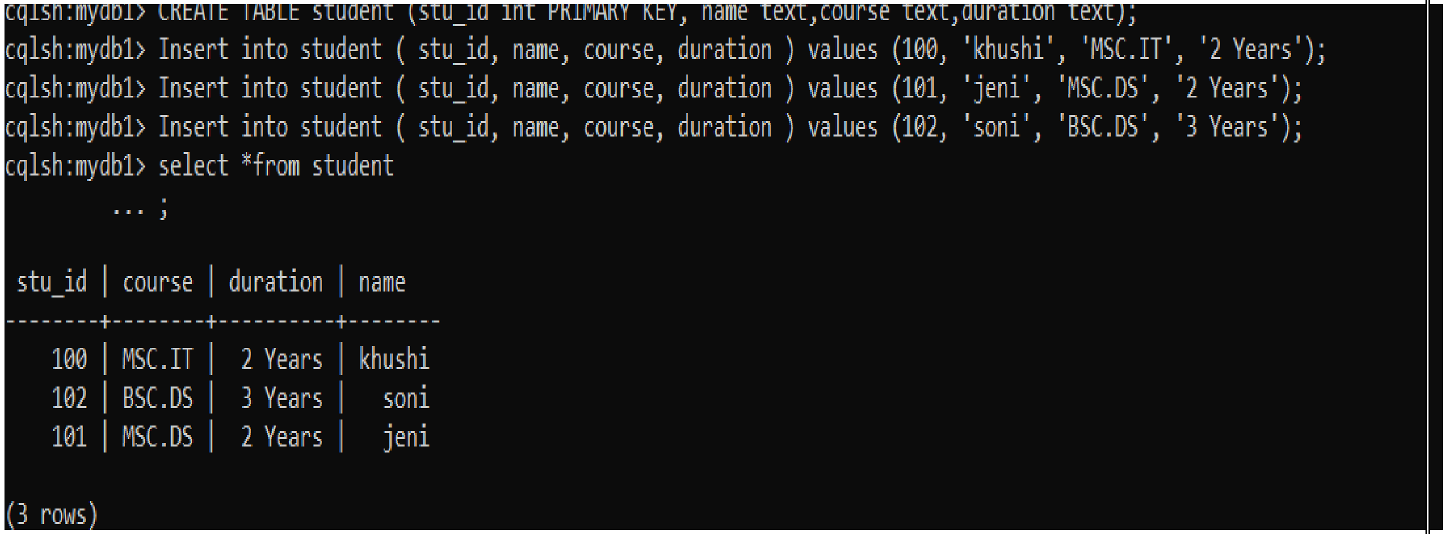
```
cqlsh:mydb> Insert into books(id,title,year) values (1,‘Data Science’,’2020’);
cqlsh:mydb> Insert into books(id,title,year) values (2,‘Machine Learning’,’2020’);
cqlsh:mydb> Insert into books(id,title,year) values (3,‘Artifical Intelligence’,’2020
’);
cqlsh:mydb> Select * from books;

 id | title                  | year
----+------------------------+------
  1 |           Data Science | 2020
  2 |       Machine Learning | 2020
  3 | Artifical Intelligence | 2020

(3 rows)
cqlsh:mydb> delete from books where id=3;
cqlsh:mydb> Select * from books;

 id | title            | year
----+------------------+------
  1 |     Data Science | 2020
  2 | Machine Learning | 2020

(2 rows)
cqlsh:mydb> update books set year=’2021’ where id=1;
cqlsh:mydb> Select * from books;

 id | title            | year
----+------------------+------
  1 |     Data Science | 2021
  2 | Machine Learning | 2020

(2 rows)
cqlsh:mydb>
```

Create Database mydb1 and table employee to store and retrieve records.



```
cqlsh> CREATE KEYSPACE mydb1 WITH REPLICATION = { 'class' : 'SimpleStrategy', 'replication_factor':1};
cqlsh> use mydb1;
cqlsh:mydb1> CREATE TABLE emp (emp_id int PRIMARY KEY, emp_name text, dept_id int,email text,phone text);
cqlsh:mydb1> Insert into emp ( emp_id, emp_name, dept_id, email, phone ) values (1001, 'ABCD', 1001, 'abcd@company.com', '1122334455');
cqlsh:mydb1> Insert into emp ( emp_id, emp_name, dept_id, email, phone ) values (1002, 'DEFG', 1001, 'defg@company.com', '2233445566');
cqlsh:mydb1> Insert into emp ( emp_id, emp_name, dept_id, email, phone ) values (1003, 'GHIJ', 1002, 'ghij@company.com', '3344556677');
cqlsh:mydb1> Select *from emp
        ... ;

 emp_id | dept_id | email            | emp_name | phone
--------+---------+------------------+----------+------------
   1001 |    1001 | abcd@company.com |     ABCD | 1122334455
   1003 |    1002 | ghij@company.com |     GHIJ | 3344556677
   1002 |    1001 | defg@company.com |     DEFG | 2233445566

(3 rows)
cqlsh:mydb1>
```

Use Database mydb1 and table student to store and retrieve records.



```
cqlsh:mydb1> CREATE TABLE student (stu_id int PRIMARY KEY, name text,course text,duration text);
cqlsh:mydb1> Insert into student ( stu_id, name, course, duration ) values (100, 'khushi', 'MSC.IT', '2 Years');
cqlsh:mydb1> Insert into student ( stu_id, name, course, duration ) values (101, 'jeni', 'MSC.DS', '2 Years');
cqlsh:mydb1> Insert into student ( stu_id, name, course, duration ) values (102, 'soni', 'BSC.DS', '3 Years');
cqlsh:mydb1> select *from student
        ... ;

 stu_id | course | duration | name
--------+--------+---------+--------
    100 | MSC.IT |  2 Years | khushi
    102 | BSC.DS |  3 Years |   soni
    101 | MSC.DS |  2 Years |   jeni

(3 rows)
```

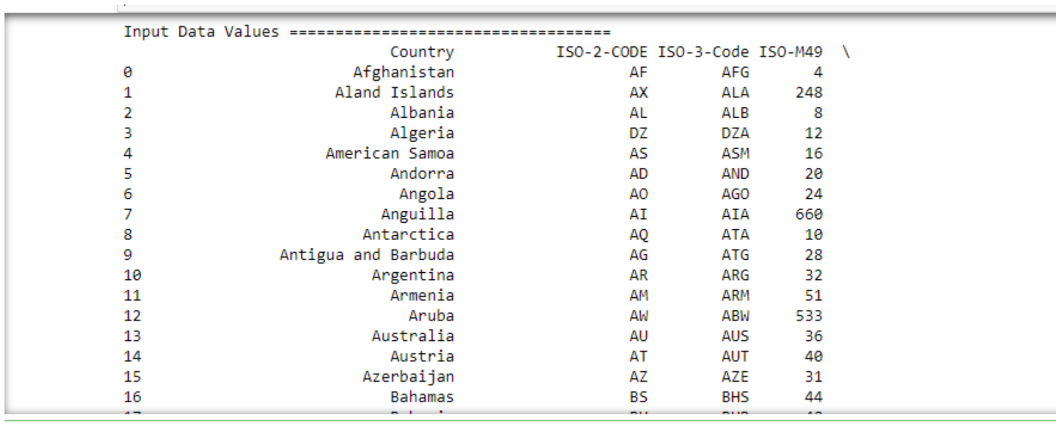
Practical NO :- 03

Aim:- Write the programs to convert Text Delimited CSV to HORUS format.

Code:-

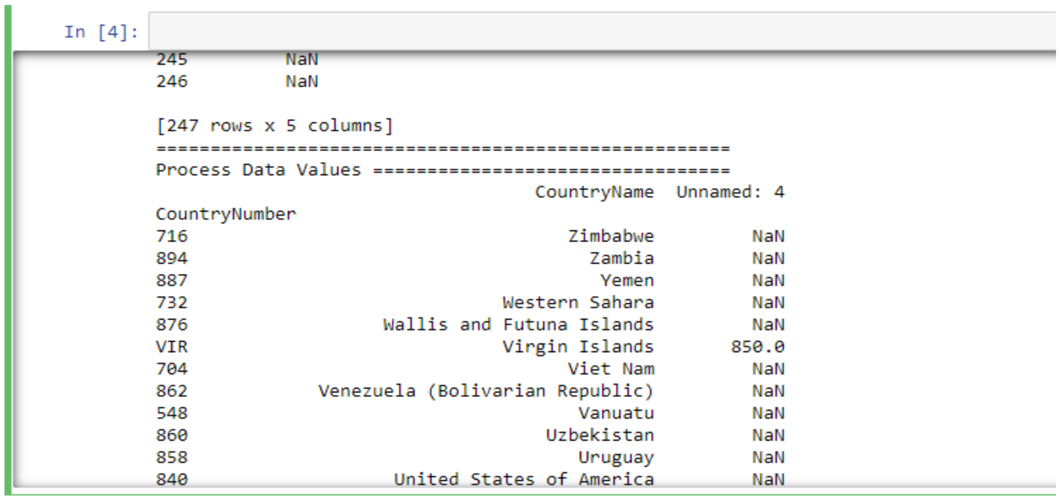
```
import pandas as pd
sInputFileName='C:/VKHCG/05-DS/9999-Data/Country_Code.csv'
InputData=pd.read_csv(sInputFileName,encoding="latin-1")
print('Input Data Values ===================================')
print(InputData)
print('=====================================================')
ProcessData=InputData
ProcessData.drop('ISO-2-CODE', axis=1,inplace=True)
ProcessData.drop('ISO-3-Code', axis=1,inplace=True)
ProcessData.rename(columns={'Country': 'CountryName'}, inplace=True)
ProcessData.rename(columns={'ISO-M49': 'CountryNumber'}, inplace=True)
ProcessData.set_index('CountryNumber', inplace=True)
ProcessData.sort_values('CountryName', axis=0, ascending=False, inplace=True)
print('Process Data Values =================================')
print(ProcessData)
print('=====================================================')
OutputData=ProcessData
sOutputFileName='C:/VKHCG/05-DS/9999-Data/HORUS-CSV-Country.csv'
OutputData.to_csv(sOutputFileName, index = False)
print('CSV to HORUS - Done')
```

Output:- Before

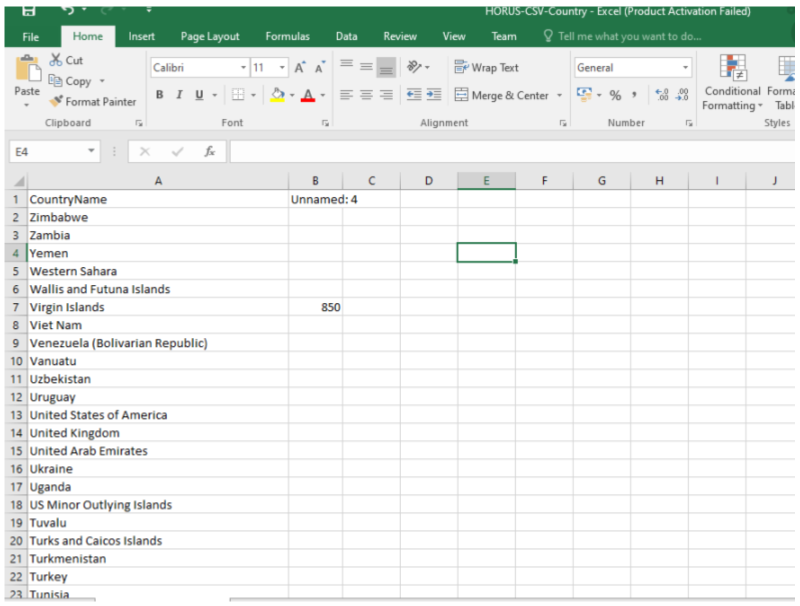


```
Input Data Values ===================================
                               Country          ISO-2-CODE ISO-3-Code ISO-M49  \
0                          Afghanistan                  AF        AFG       4
1                        Aland Islands                  AX        ALA     248
2                              Albania                  AL        ALB       8
3                              Algeria                  DZ        DZA      12
4                       American Samoa                  AS        ASM      16
5                              Andorra                  AD        AND      20
6                               Angola                  AO        AGO      24
7                             Anguilla                  AI        AIA     660
8                           Antarctica                  AQ        ATA      10
9                  Antigua and Barbuda                  AG        ATG      28
10                           Argentina                  AR        ARG      32
11                             Armenia                  AM        ARM      51
12                               Aruba                  AW        ABW     533
13                           Australia                  AU        AUS      36
14                             Austria                  AT        AUT      40
15                          Azerbaijan                  AZ        AZE      31
16                             Bahamas                  BS        BHS      44
```

After:



```
In [4]:
245          NaN
246          NaN

[247 rows x 5 columns]
=======================================================
Process Data Values ================================
                                     CountryName  Unnamed: 4
CountryNumber
716                                     Zimbabwe         NaN
894                                       Zambia         NaN
887                                        Yemen         NaN
732                               Western Sahara         NaN
876                    Wallis and Futuna Islands         NaN
VIR                               Virgin Islands       850.0
704                                     Viet Nam         NaN
862              Venezuela (Bolivarian Republic)         NaN
548                                      Vanuatu         NaN
860                                   Uzbekistan         NaN
858                                      Uruguay         NaN
840                     United States of America         NaN
```



	A	B	C	D	E	F	G	H	I	J
1	CountryName	Unnamed: 4								
2	Zimbabwe									
3	Zambia									
4	Yemen									
5	Western Sahara									
6	Wallis and Futuna Islands									
7	Virgin Islands	850								
8	Viet Nam									
9	Venezuela (Bolivarian Republic)									
10	Vanuatu									
11	Uzbekistan									
12	Uruguay									
13	United States of America									
14	United Kingdom									
15	United Arab Emirates									
16	Ukraine									
17	Uganda									
18	US Minor Outlying Islands									
19	Tuvalu									
20	Turks and Caicos Islands									
21	Turkmenistan									
22	Turkey									
23	Tunisia									

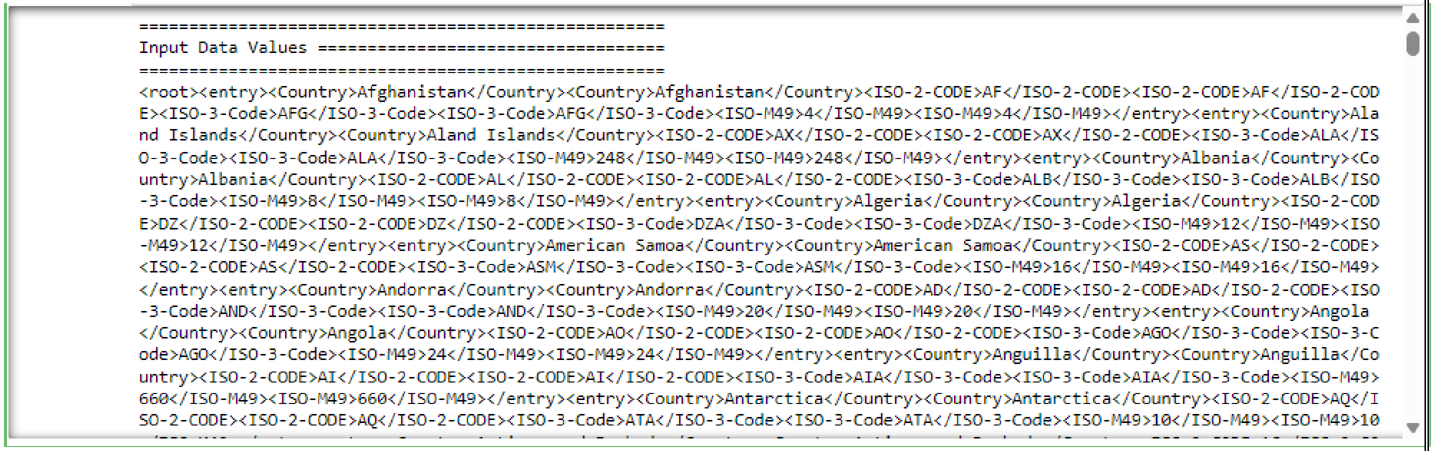
Practical NO :- 04

Aim:- Write the programs to convert XML to HORUS format.

Code:-

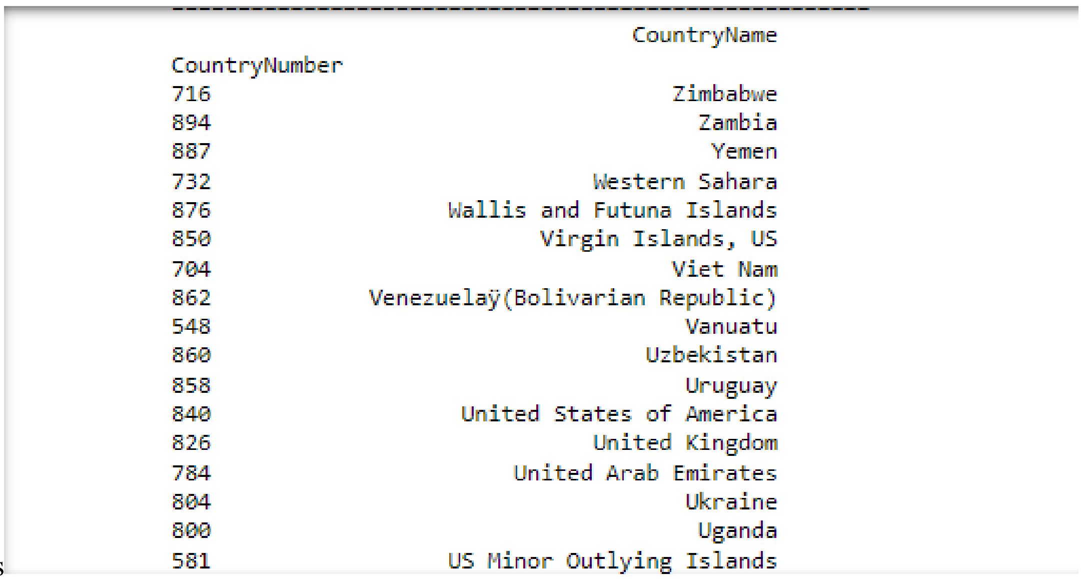
```
import pandas as pd
import xml.etree.ElementTree as ET
def df2xml(data):
    header = data.columns
    root = ET.Element('root')
    for row in range(data.shape[0]):
        entry = ET.SubElement(root,'entry')
        for index in range(data.shape[1]):
            schild=str(header[index])
            child = ET.SubElement(entry, schild)
            if str(data[schild][row]) != 'nan':
                child.text = str(data[schild][row])
            else:
                child.text = 'n/a'
            entry.append(child)
    result = ET.tostring(root)
    return result
def xml2df(xml_data):
    root = ET.XML(xml_data)
    all_records = []
    for i, child in enumerate(root):
        record = {}
        for subchild in child:
            record[subchild.tag] = subchild.text
        all_records.append(record)
    return pd.DataFrame(all_records)
sInputFileName='C:/VKHCG/05-DS/9999-Data/Country_Code.xml'
InputData = open(sInputFileName).read()
print('=====================================================')
print('Input Data Values ===================================')
print('=====================================================')
print(InputData)
print('=====================================================')
ProcessDataXML=InputData
ProcessData=xml2df(ProcessDataXML)
ProcessData.drop('ISO-2-CODE', axis=1,inplace=True)
ProcessData.drop('ISO-3-Code', axis=1,inplace=True)
ProcessData.rename(columns={'Country': 'CountryName'}, inplace=True)
ProcessData.rename(columns={'ISO-M49': 'CountryNumber'}, inplace=True)
ProcessData.set_index('CountryNumber', inplace=True)
ProcessData.sort_values('CountryName', axis=0, ascending=False, inplace=True)
print('=====================================================')
print('Process Data Values =================================')
print('=====================================================')
print(ProcessData)
print('=====================================================')
OutputData=ProcessData
sOutputFileName='C:/VKHCG/05-DS/9999-Data/HORUS-XML-Country.csv'
OutputData.to_csv(sOutputFileName, index = False)
print('=====================================================')
print('XML to HORUS - Done')
print('=====================================================')
```

Output:- Before



```
=====================================================
Input Data Values ===================================
=====================================================
<root><entry><Country>Afghanistan</Country><Country>Afghanistan</Country><ISO-2-CODE>AF</ISO-2-CODE><ISO-2-CODE>AF</ISO-2-COD
E><ISO-3-Code>AFG</ISO-3-Code><ISO-3-Code>AFG</ISO-3-Code><ISO-M49>4</ISO-M49><ISO-M49>4</ISO-M49></entry><entry><Country>Ala
nd Islands</Country><Country>Aland Islands</Country><ISO-2-CODE>AX</ISO-2-CODE><ISO-2-CODE>AX</ISO-2-CODE><ISO-3-Code>ALA</IS
O-3-Code><ISO-3-Code>ALA</ISO-3-Code><ISO-M49>248</ISO-M49><ISO-M49>248</ISO-M49></entry><entry><Country>Albania</Country><Co
untry>Albania</Country><ISO-2-CODE>AL</ISO-2-CODE><ISO-2-CODE>AL</ISO-2-CODE><ISO-3-Code>ALB</ISO-3-Code><ISO-3-Code>ALB</ISO
-3-Code><ISO-M49>8</ISO-M49><ISO-M49>8</ISO-M49></entry><entry><Country>Algeria</Country><Country>Algeria</Country><ISO-2-COD
E>DZ</ISO-2-CODE><ISO-2-CODE>DZ</ISO-2-CODE><ISO-3-Code>DZA</ISO-3-Code><ISO-3-Code>DZA</ISO-3-Code><ISO-M49>12</ISO-M49><ISO
-M49>12</ISO-M49></entry><entry><Country>American Samoa</Country><Country>American Samoa</Country><ISO-2-CODE>AS</ISO-2-CODE>
<ISO-2-CODE>AS</ISO-2-CODE><ISO-3-Code>ASM</ISO-3-Code><ISO-3-Code>ASM</ISO-3-Code><ISO-M49>16</ISO-M49><ISO-M49>16</ISO-M49>
</entry><entry><Country>Andorra</Country><Country>Andorra</Country><ISO-2-CODE>AD</ISO-2-CODE><ISO-2-CODE>AD</ISO-2-CODE><ISO
-3-Code>AND</ISO-3-Code><ISO-3-Code>AND</ISO-3-Code><ISO-M49>20</ISO-M49><ISO-M49>20</ISO-M49></entry><entry><Country>Angola
</Country><Country>Angola</Country><ISO-2-CODE>AO</ISO-2-CODE><ISO-2-CODE>AO</ISO-2-CODE><ISO-3-Code>AGO</ISO-3-Code><ISO-3-C
ode>AGO</ISO-3-Code><ISO-M49>24</ISO-M49><ISO-M49>24</ISO-M49></entry><entry><Country>Anguilla</Country><Country>Anguilla</Co
untry><ISO-2-CODE>AI</ISO-2-CODE><ISO-2-CODE>AI</ISO-2-CODE><ISO-3-Code>AIA</ISO-3-Code><ISO-3-Code>AIA</ISO-3-Code><ISO-M49>
660</ISO-M49><ISO-M49>660</ISO-M49></entry><entry><Country>Antarctica</Country><Country>Antarctica</Country><ISO-2-CODE>AQ</I
SO-2-CODE><ISO-2-CODE>AQ</ISO-2-CODE><ISO-3-Code>ATA</ISO-3-Code><ISO-3-Code>ATA</ISO-3-Code><ISO-M49>10</ISO-M49><ISO-M49>10
```

After:-



```
-----------------------------------------------------
                                   CountryName
CountryNumber
716                                   Zimbabwe
894                                     Zambia
887                                      Yemen
732                             Western Sahara
876                  Wallis and Futuna Islands
850                           Virgin Islands, US
704                                   Viet Nam
862           Venezuelaÿ(Bolivarian Republic)
548                                    Vanuatu
860                                 Uzbekistan
858                                    Uruguay
840                   United States of America
826                             United Kingdom
784                       United Arab Emirates
804                                    Ukraine
800                                     Uganda
581                   US Minor Outlying Islands
```

s

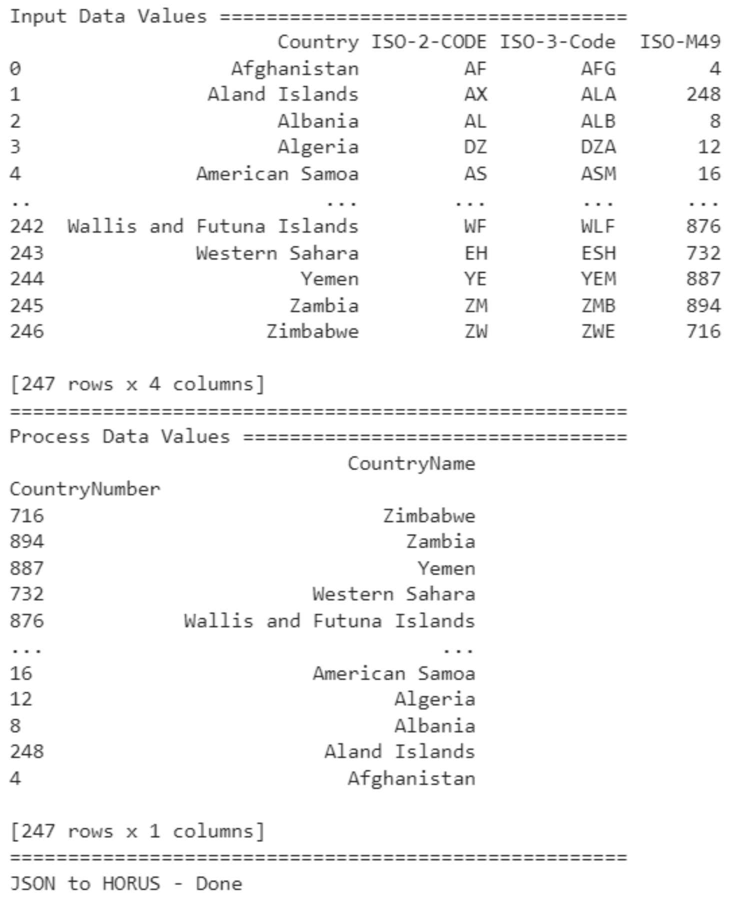
Practical NO :- 05

Aim:- Write the programs to convert JSON to HORUS format.

Code:-

```
import pandas as pd
sInputFileName='/content/Country_Code.json'
InputData=pd.read_json(sInputFileName, orient='index', encoding="latin-1")
print('Input Data Values ===================================')
print(InputData)
print('=====================================================')
ProcessData=InputData
# Remove columns ISO-2-Code and ISO-3-CODE
ProcessData.drop('ISO-2-CODE', axis=1,inplace=True)
ProcessData.drop('ISO-3-Code', axis=1,inplace=True)
# Rename Country and ISO-M49
ProcessData.rename(columns={'Country': 'CountryName'}, inplace=True)
ProcessData.rename(columns={'ISO-M49': 'CountryNumber'}, inplace=True)
# Set new Index
ProcessData.set_index('CountryNumber', inplace=True)
# Sort data by CurrencyNumber
ProcessData.sort_values('CountryName', axis=0, ascending=False, inplace=True)
print('Process Data Values =================================')
print(ProcessData)
print('=====================================================')
OutputData=ProcessData
sOutputFileName='/content/Country_Code.json.csv'
OutputData.to_csv(sOutputFileName, index = False)
print('JSON to HORUS - Done')
```

Output:-



```
Input Data Values ===================================
                    Country ISO-2-CODE ISO-3-Code  ISO-M49
0               Afghanistan         AF        AFG        4
1             Aland Islands         AX        ALA      248
2                   Albania         AL        ALB        8
3                   Algeria         DZ        DZA       12
4            American Samoa         AS        ASM       16
..                      ...        ...        ...      ...
242  Wallis and Futuna Islands      WF        WLF      876
243          Western Sahara         EH        ESH      732
244                   Yemen         YE        YEM      887
245                  Zambia         ZM        ZMB      894
246                Zimbabwe         ZW        ZWE      716

[247 rows x 4 columns]
=====================================================
Process Data Values =================================
                              CountryName
CountryNumber
716                              Zimbabwe
894                                Zambia
887                                 Yemen
732                        Western Sahara
876             Wallis and Futuna Islands
...                                   ...
16                         American Samoa
12                                Algeria
8                                 Albania
248                         Aland Islands
4                             Afghanistan

[247 rows x 1 columns]
=====================================================
JSON to HORUS - Done
```

Practical NO :- 06

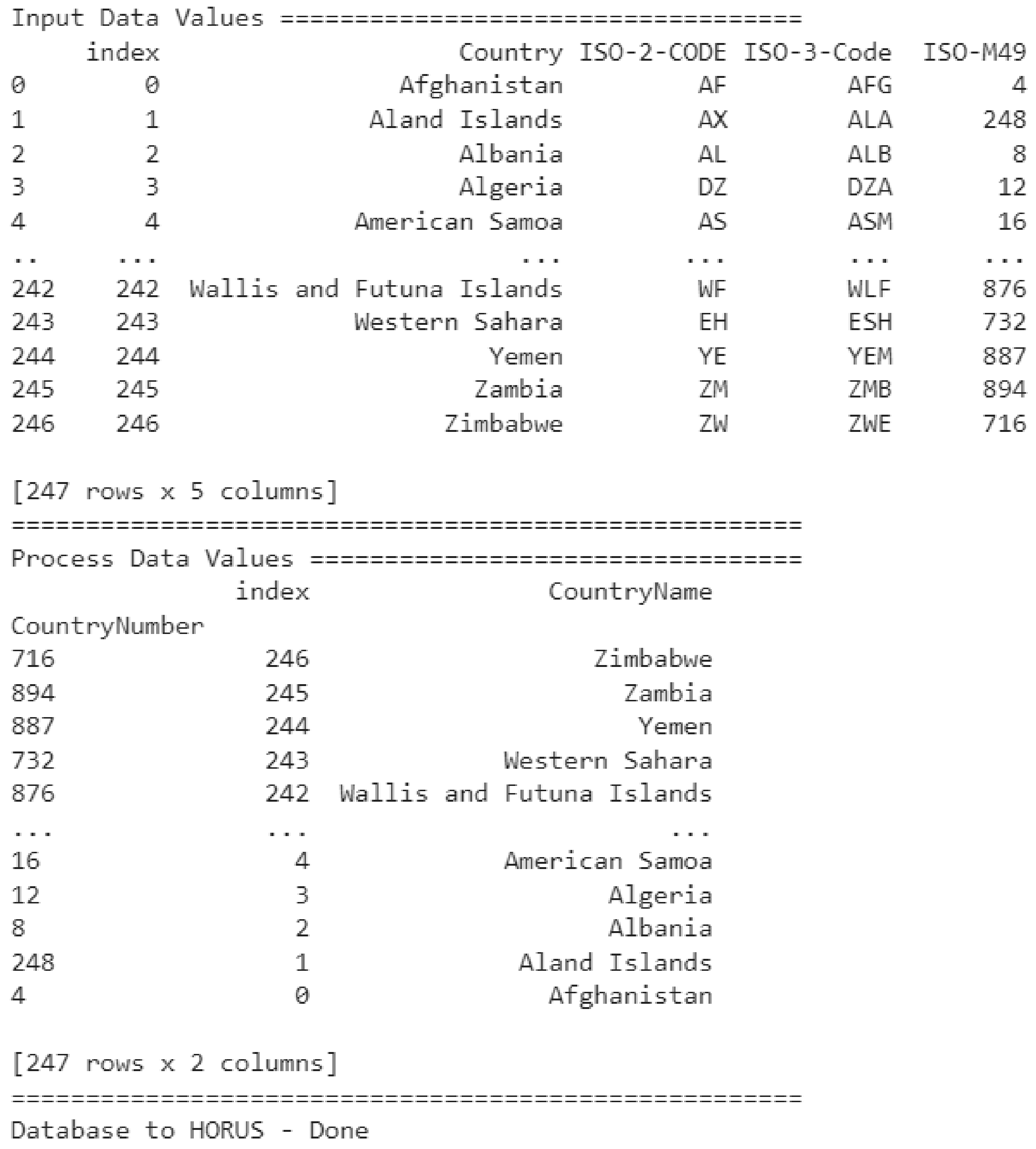
Aim:- Write the programs to convert MySQL to HORUS format.

Code:-

```
import pandas as pd
import sqlite3 as sq
# Input Agreement ============================================
sInputFileName='/content/utility (1).db'
sInputTable='Country_Code'
conn = sq.connect(sInputFileName)
sSQL='select * FROM ' + sInputTable + ';'
InputData= pd.read_sql_query(sSQL, conn)
print('Input Data Values =====================================')
print(InputData)
print('=====================================================')
# Processing Rules ===========================================
ProcessData=InputData
# Remove columns ISO-2-Code and ISO-3-CODE
ProcessData.drop('ISO-2-CODE', axis=1,inplace=True)
ProcessData.drop('ISO-3-Code', axis=1,inplace=True)
# Rename Country and ISO-M49
ProcessData.rename(columns={'Country': 'CountryName'}, inplace=True)
ProcessData.rename(columns={'ISO-M49': 'CountryNumber'}, inplace=True)
# Set new Index
ProcessData.set_index('CountryNumber', inplace=True)
# Sort data by CurrencyNumber
ProcessData.sort_values('CountryName', axis=0, ascending=False, inplace=True)
print('Process Data Values ===================================')
print(ProcessData)
print('=====================================================')
# Output Agreement ===========================================
OutputData=ProcessData
sOutputFileName='/content/utility (1).csv'
```

```
OutputData.to_csv(sOutputFileName, index = False)
print('Database to HORUS - Done')
```

Output:-



```
Input Data Values ===================================
     index                   Country ISO-2-CODE ISO-3-Code  ISO-M49
0        0               Afghanistan         AF        AFG        4
1        1             Aland Islands         AX        ALA      248
2        2                   Albania         AL        ALB        8
3        3                   Algeria         DZ        DZA       12
4        4            American Samoa         AS        ASM       16
..     ...                       ...        ...        ...      ...
242    242  Wallis and Futuna Islands         WF        WLF      876
243    243            Western Sahara         EH        ESH      732
244    244                     Yemen         YE        YEM      887
245    245                    Zambia         ZM        ZMB      894
246    246                  Zimbabwe         ZW        ZWE      716

[247 rows x 5 columns]
=====================================================
Process Data Values =================================
               index               CountryName
CountryNumber
716              246                  Zimbabwe
894              245                    Zambia
887              244                     Yemen
732              243            Western Sahara
876              242  Wallis and Futuna Islands
...              ...                       ...
16                 4            American Samoa
12                 3                   Algeria
8                  2                   Albania
248                1             Aland Islands
4                  0               Afghanistan

[247 rows x 2 columns]
=====================================================
Database to HORUS - Done
```

Practical NO :- 07

Aim:- Write the programs to convert Picture (JPEG) to HORUS format.

Code:-

```
from scipy.misc import imread
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
# Input Agreement ============================================
sInputFileName='C:/VKHCG/05-DS/9999-Data/Ang.jpg'
InputData = imread(sInputFileName, flatten=False, mode='RGBA')
print('Input Data Values ===================================')
print('X: ',InputData.shape[0])
print('Y: ',InputData.shape[1])
print('RGBA: ', InputData.shape[2])
print('=====================================================')
# Processing Rules ===========================================
ProcessRawData=InputData.flatten()
y=InputData.shape[2] + 2
x=int(ProcessRawData.shape[0]/y)
ProcessData=pd.DataFrame(np.reshape(ProcessRawData, (x, y)))
sColumns= ['XAxis','YAxis','Red', 'Green', 'Blue','Alpha']
ProcessData.columns=sColumns
ProcessData.index.names =['ID']
print('Rows: ',ProcessData.shape[0])
print('Columns :',ProcessData.shape[1])
print('=====================================================')
print('Process Data Values =================================')
print('=====================================================')
plt.imshow(InputData)
plt.show()
```

```
print('==========================================================')
# Output Agreement ===========================================
OutputData=ProcessData
print('Storing File')
sOutputFileName='C:/VKHCG/05-DS/9999-Data/HORUS-Picture.csv'
OutputData.to_csv(sOutputFileName, index = False)
print('==========================================================')
print('Picture to HORUS - Done')
print('==========================================================')
# Utility done ===============================================
```

Output:-

```
Input Data Values ===================================
X:  800
Y:  1200
RGBA:  4
=====================================================
Rows:  640000
Columns : 6
=====================================================
Process Data Values =================================
=====================================================
```

```
=====================================================
Storing File
=====================================================
Picture to HORUS - Done
=====================================================
```

Practical NO :- 08

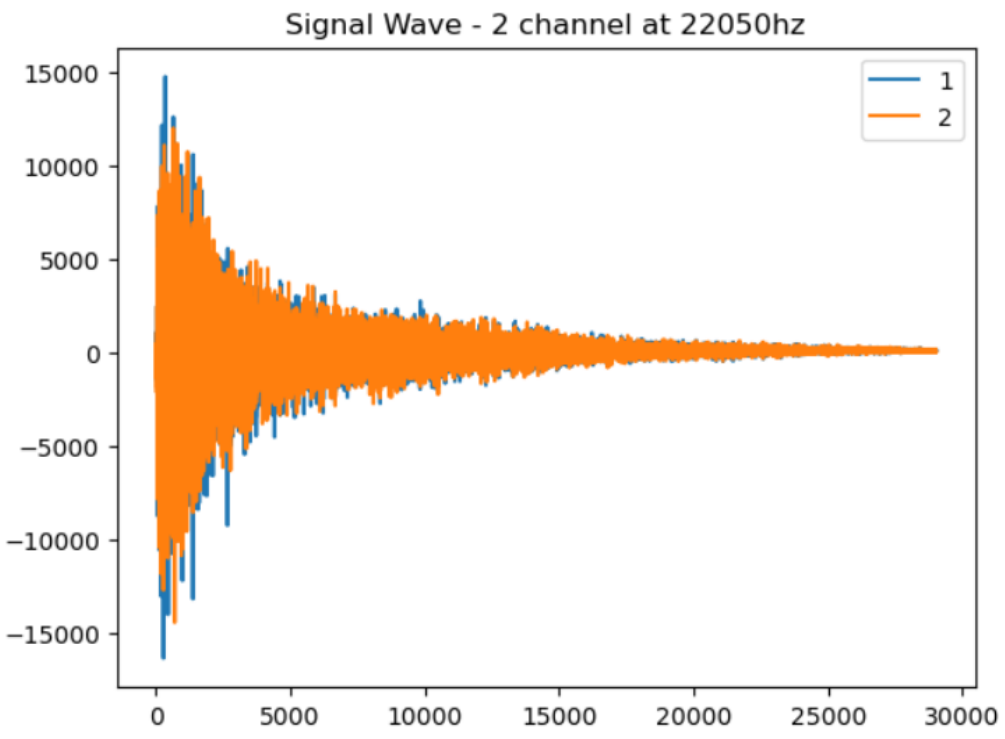
Aim:- Write the programs to convert Video to HORUS format.

Code:-

```
from __future__ import with_statement
from PIL import Image # pip install Pillow
import cv2 # pip install opencv-python
vidcap = cv2.VideoCapture('C:/VKHCG/05-DS/9999-Data/dog.mp4')
success,image = vidcap.read()
count = 0
while success:
    cv2.imwrite("C:/VKHCG/05-DS/9999-Data/temp/frame%d.jpg" % count, image)
    # save frame as JPEG file success,image = vidcap.read()
    print('Read a new frame: ', success)
    count += 1
#Part 2: Frames to Horus
num = 0
with open('Video-to-HORUS-output_fileF.csv', 'a+') as f:
    f.write('R,G,B,FrameNumber\n')
for c in range(count):
    #print('C:/VKHCG/05-DS/9999-Data/temp/frame%d.jpg'%num)
    im = Image.open('C:/VKHCG/05-DS/9999-Data/temp/frame%d.jpg'%num)
    pix = im.load()
    width, height = im.size
    with open('Video-to-HORUS-output_fileF.csv', 'a+') as f:
        for x in range(width-300):
            for y in range(height-300):
                r = pix[x,y][0]
                g = pix[x,x][1]
            b = pix[x,x][2]
            f.write('{0},{1},{2},{3}\n'.format(r,g,b,num))
    num = num + 1
    print('Movie to Frames HORUS - Done')
```

Output:-

```
=====================================================
Processing :  C:/VKHCG/2ch-sound.wav
=====================================================
----------------
Audio: 2 channel
----------------
Rate: 22050
----------------
shape: (29016, 2)
dtype: int16
min, max: -16384 14767
----------------
```



Practical NO :- 09

Aim:- Write the programs to convert Audio to HORUS format.

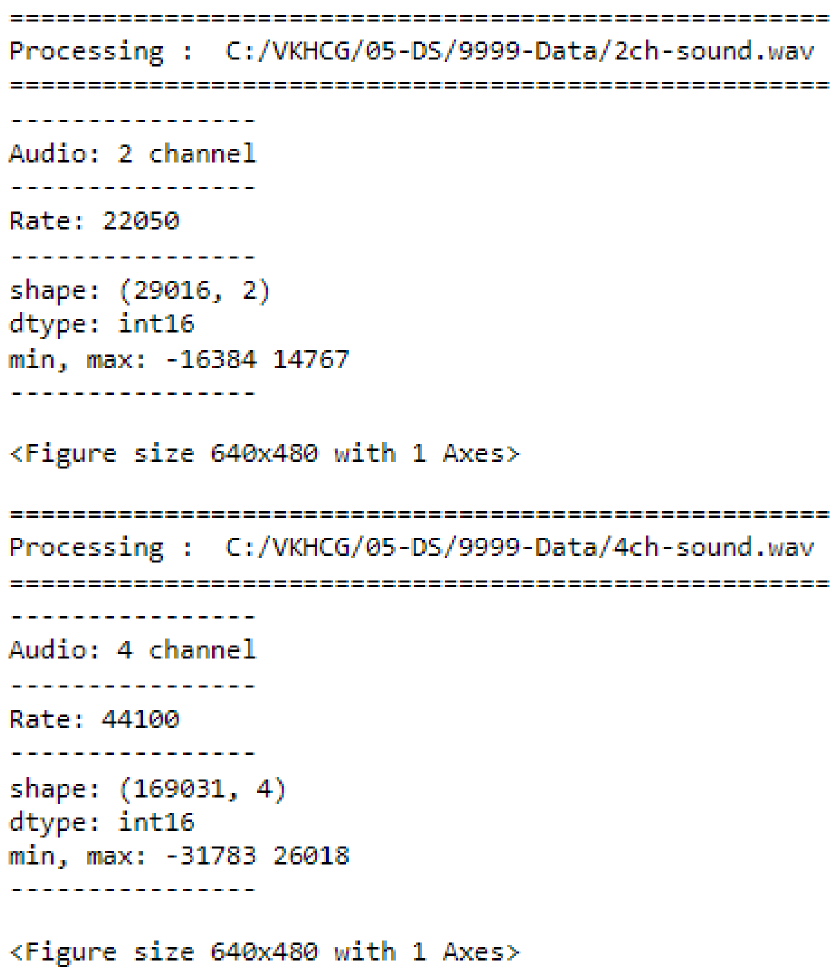
Code:-

```
from scipy.io import wavfile
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np
# ==========================================================
def show_info(aname, a, r):
    print("----------------")
    print("Audio:", aname)
    print("----------------")
    print("Rate:", r)
    print("----------------")
    print("shape:", a.shape)
    print("dtype:", a.dtype)
    print("min, max:", a.min(), a.max())
    print("----------------")
    plot_info(aname, a, r)
def plot_info(aname, a, r):
    sTitle = "Signal Wave - " + aname + " at " + str(r) + "hz"
    plt.title(sTitle)
    sLegend = []
    for c in range(a.shape[1]):
        sLabel = "Ch" + str(c + 1)
        sLegend = sLegend + [str(c + 1)]
        plt.plot(a[:, c], label=sLabel)
    plt.legend(sLegend)
    plt.show()
sInputFileName = "C:/VKHCG/05-DS/9999-Data/2ch-sound.wav"
print("Processing : ", sInputFileName)
InputRate, InputData = wavfile.read(sInputFileName)
show_info("2 channel", InputData, InputRate)
ProcessData = pd.DataFrame(InputData)
```

```
sColumns = ["Ch1", "Ch2"]
ProcessData.columns = sColumns
OutputData = ProcessData
sOutputFileName = "Audio-to-HORUS-outputG-2ch.csv"
OutputData.to_csv(sOutputFileName, index=False)
sInputFileName = "C:/VKHCG/05-DS/9999-Data/4ch-sound.wav"
print("==========================================================")
print("Processing : ", sInputFileName)
print("==========================================================")
InputRate, InputData = wavfile.read(sInputFileName)
show_info("4 channel", InputData, InputRate)
ProcessData = pd.DataFrame(InputData)
sColumns = ["Ch1", "Ch2", "Ch3", "Ch4"]
ProcessData.columns = sColumns
OutputData = ProcessData
sOutputFileName = "Audio-to-HORUS-outputG-4ch.csv"
OutputData.to_csv(sOutputFileName, index=False)
sInputFileName = "C:/VKHCG/05-DS/9999-Data/6ch-sound.wav"
print("==========================================================")
print("Processing : ", sInputFileName)
print("==========================================================")
InputRate, InputData = wavfile.read(sInputFileName)
show_info("6 channel", InputData, InputRate)
ProcessData = pd.DataFrame(InputData)
sColumns = ["Ch1", "Ch2", "Ch3", "Ch4", "Ch5", "Ch6"]
ProcessData.columns = sColumns
OutputData = ProcessData
sOutputFileName = "Audio-to-HORUS-outputG-6ch.csv"
OutputData.to_csv(sOutputFileName, index=False)
sInputFileName = "C:/VKHCG/05-DS/9999-Data/8ch-sound.wav"
print("Processing : ", sInputFileName)
InputRate, InputData = wavfile.read(sInputFileName)
show_info("8 channel", InputData, InputRate)
ProcessData = pd.DataFrame(InputData)
```

```
sColumns = ["Ch1", "Ch2", "Ch3", "Ch4", "Ch5", "Ch6", "Ch7", "Ch8"]
ProcessData.columns = sColumns
OutputData = ProcessData
sOutputFileName = "Audio-to-HORUS-outputG-8ch.csv"
print("==================================================")
print("Audio to HORUS - Done")
OutputData.to_csv(sOutputFileName, index=False)
```

Output:-



```
======================================================
Processing :  C:/VKHCG/05-DS/9999-Data/2ch-sound.wav
======================================================
----------------
Audio: 2 channel
----------------
Rate: 22050
----------------
shape: (29016, 2)
dtype: int16
min, max: -16384 14767
----------------

<Figure size 640x480 with 1 Axes>

======================================================
Processing :  C:/VKHCG/05-DS/9999-Data/4ch-sound.wav
======================================================
----------------
Audio: 4 channel
----------------
Rate: 44100
----------------
shape: (169031, 4)
dtype: int16
min, max: -31783 26018
----------------

<Figure size 640x480 with 1 Axes>
```

Practical NO :- 10

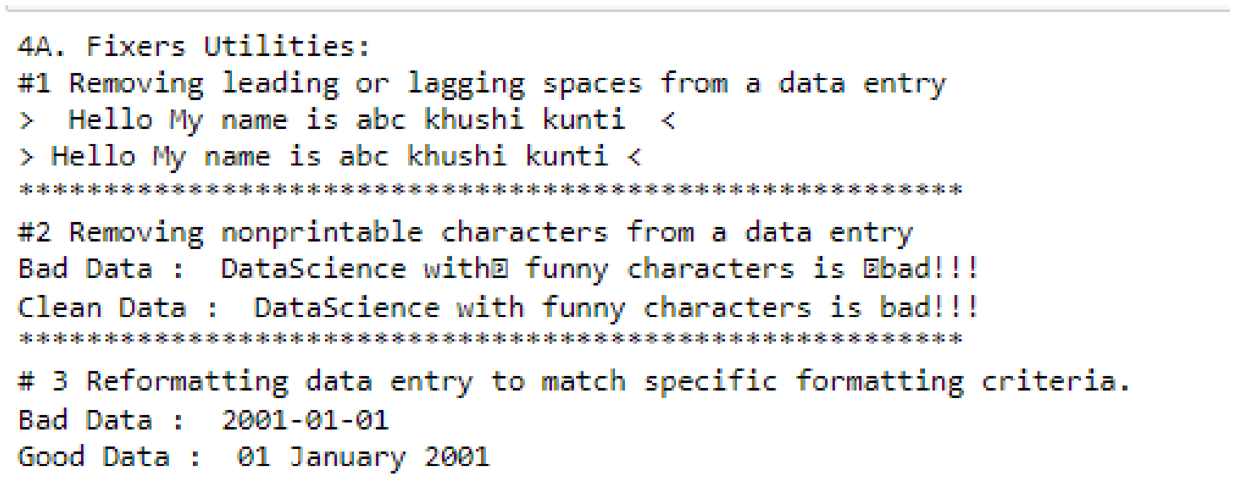
Aim:- Write the program to use fixers utilities to solve quality issues.

Code:-

```
import string
import datetime as dt
# 1 Removing leading or lagging spaces from a data entry
print('#1 Removing leading or lagging spaces from a data entry');
baddata = " Hello My name is abc khushi kunti "
print('>',baddata,'<')
cleandata=baddata.strip()
print('>',cleandata,'<')
print("******************************************************")
# 2 Removing nonprintable characters from a data entry
print('#2 Removing nonprintable characters from a data entry')
printable = set(string.printable)
baddata = "Data\x00Science with\x02 funny characters is \x10bad!!!"
cleandata=''.join(filter(lambda x: x in string.printable,baddata))
print('Bad Data : ',baddata);
print('Clean Data : ',cleandata)
print("******************************************************")
# 3 Reformatting data entry to match specific formatting criteria.
# Convert YYYY/MM/DD to DD Month YYYY
print('# 3 Reformatting data entry to match specific formatting criteria.')
baddate = dt.date(2001, 1, 1)
baddata=format(baddate,'%Y-%m-%d')
gooddate = dt.datetime.strptime(baddata,'%Y-%m-%d')
gooddata=format(gooddate,'%d %B %Y')
print('Bad Data : ',baddata)
```

print('Good Data : ',gooddata)

Output:-



```
4A. Fixers Utilities:
#1 Removing leading or lagging spaces from a data entry
>  Hello My name is abc khushi kunti  <
> Hello My name is abc khushi kunti <
********************************************************
#2 Removing nonprintable characters from a data entry
Bad Data :  DataScience with funny characters is bad!!!
Clean Data :  DataScience with funny characters is bad!!!
********************************************************
# 3 Reformatting data entry to match specific formatting criteria.
Bad Data :  2001-01-01
Good Data :  01 January 2001
```

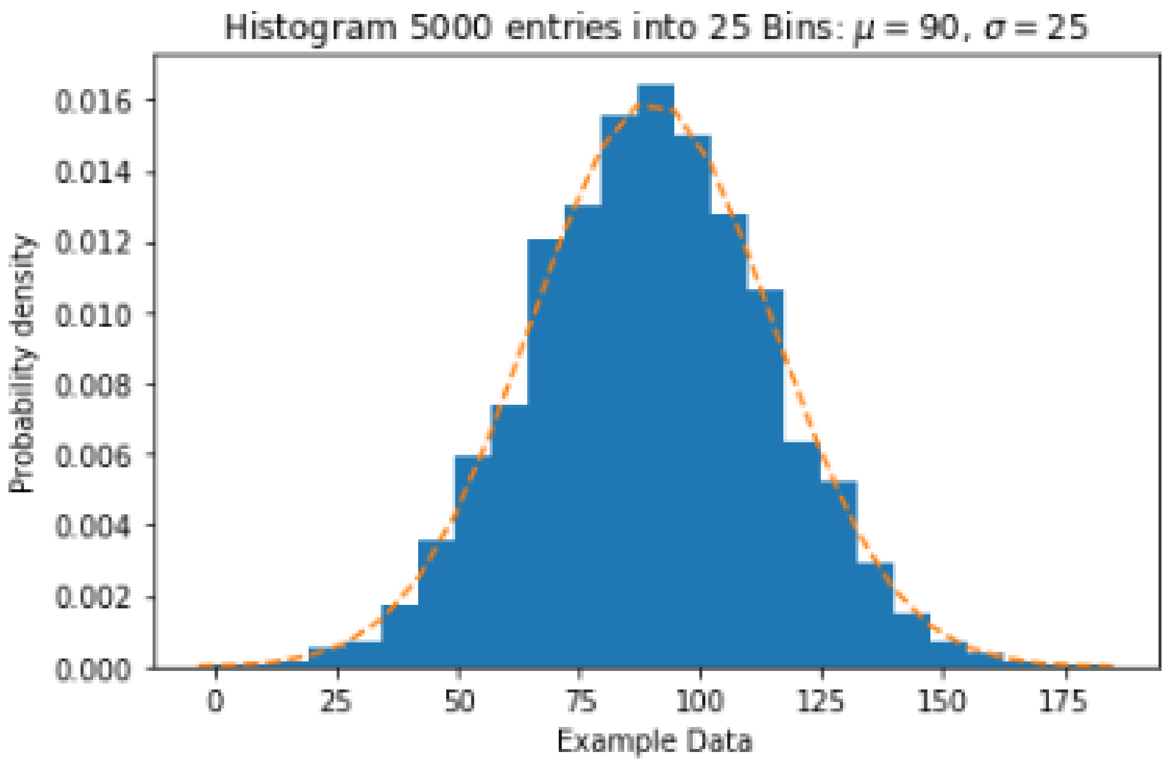
Practical NO :- 11

Aim:- Write the program to use data binning or bucketing to reduce the effects of minor observation error.

Code:-

```
import numpy as np

import matplotlib.mlab as mlab

import matplotlib.pyplot as plt

import scipy.stats as stats

np.random.seed(0)

mu = 90 # mean of distribution

sigma = 25 # standard deviation of distribution

x = mu + sigma * np.random.randn(5000)

num_bins = 25

fig, ax = plt.subplots()

# the histogram of the data

n, bins, patches = ax.hist(x, num_bins, density=1)

# add a 'best fit' line

y = stats.norm.pdf(bins, mu, sigma)

# mlab.normpdf(bins, mu, sigma)

ax.plot(bins, y, '--')

ax.set_xlabel('Example Data')

ax.set_ylabel('Probability density')

sTitle=r'Histogram ' + str(len(x)) + ' entries into ' + str(num_bins) + ' Bins: $\mu=' + str(mu) + '$,
$\sigma=' + str(sigma) + '$'

ax.set_title(sTitle)

fig.tight_layout()

sPathFig='C:/VKHCG/05-DS/4000-UL/0200-DU/DU-Histogram.png'

fig.savefig(sPathFig)

plt.show()
```

Output:-


Histogram 5000 entries into 25 Bins: $\mu = 90$, $\sigma = 25$
Probability density
0.000
0.002
0.004
0.006
0.008
0.010
0.012
0.014
0.016
0
25
50
75
100
125
150
175
Example Data

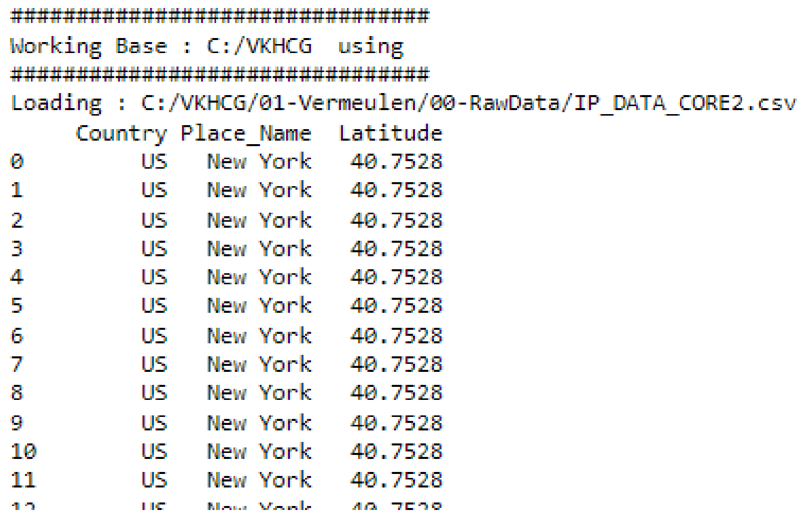
Practical NO :- 12

Aim:- Write the program to demonstrate averaging of data.

Code:-

```
import pandas as pd
InputFileName='IP_DATA_CORE2.csv'
OutputFileName='Retrieve_Router_Location.csv'
Base='C:/VKHCG'
print('4C. Averaging of Data')
print('Working Base :',Base, ' using ')
sFileName=Base + '/01-Vermeulen/00-RawData/' + InputFileName
print('Loading :',sFileName)
IP_DATA_ALL=pd.read_csv(sFileName,header=0,low_memory=False,
usecols=['Country','Place Name','Latitude','Longitude'], encoding="latin-1")
IP_DATA_ALL.rename(columns={'Place Name': 'Place_Name'}, inplace=True)
AllData=IP_DATA_ALL[['Country', 'Place_Name','Latitude']]
print(AllData)
MeanData=AllData.groupby(['Country', 'Place_Name'])['Latitude'].mean()
print(MeanData)
```

Output:-



```
################################
Working Base : C:/VKHCG  using
################################
Loading : C:/VKHCG/01-Vermeulen/00-RawData/IP_DATA_CORE2.csv
     Country Place_Name  Latitude
0         US   New York   40.7528
1         US   New York   40.7528
2         US   New York   40.7528
3         US   New York   40.7528
4         US   New York   40.7528
5         US   New York   40.7528
6         US   New York   40.7528
7         US   New York   40.7528
8         US   New York   40.7528
9         US   New York   40.7528
10        US   New York   40.7528
11        US   New York   40.7528
```

Practical NO :- 13

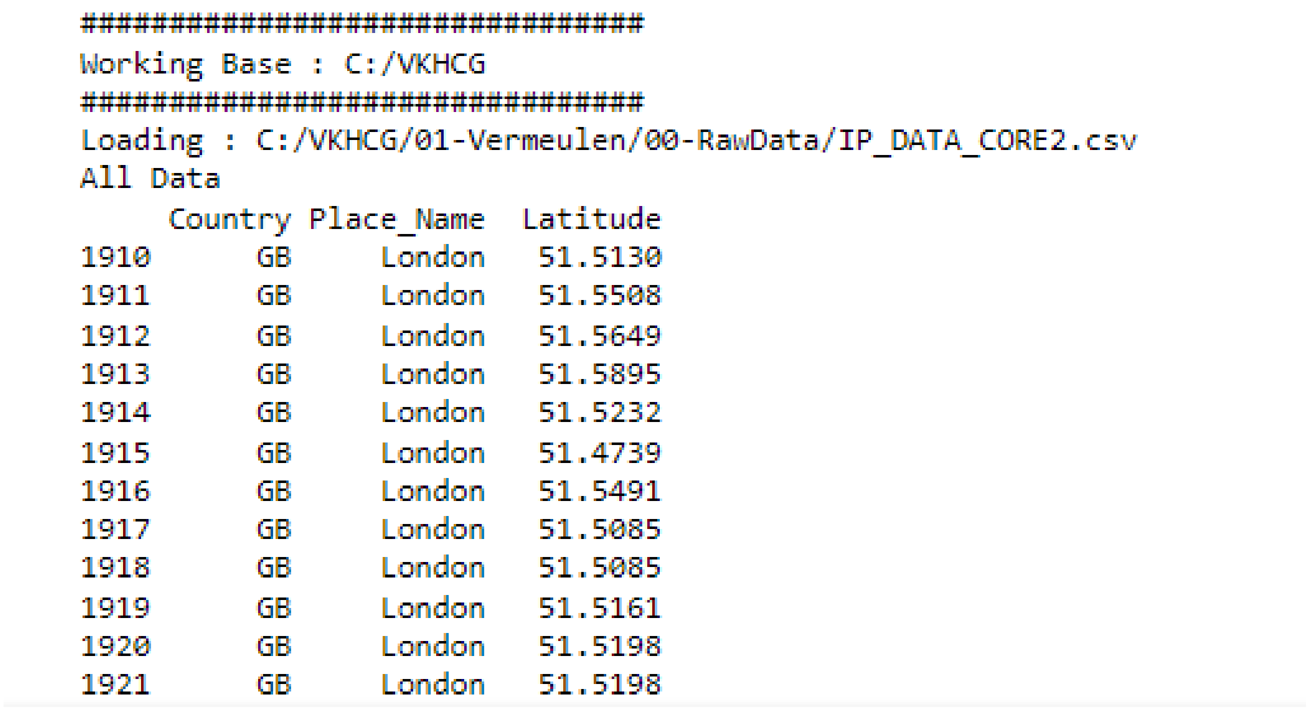
Aim:- Write the program to use outlier detection to find different data that may cause error.

Code:-

```
import pandas as pd

print('4D. Outlier Detection')

InputFileName='IP_DATA_CORE2.csv'

OutputFileName='Retrieve_Router_Location.csv'

Base='C:/VKHCG'

print('##################################')

print('Working Base :',Base)

print('##################################')

sFileName=Base + '/01-Vermeulen/00-RawData/' + InputFileName

print('Loading :',sFileName)

IP_DATA_ALL=pd.read_csv(sFileName,header=0,low_memory=False,

usecols=['Country','Place Name','Latitude','Longitude'], encoding="latin-1")

IP_DATA_ALL.rename(columns={'Place Name': 'Place_Name'}, inplace=True)

LondonData=IP_DATA_ALL.loc[IP_DATA_ALL['Place_Name']=='London']

AllData=LondonData[['Country', 'Place_Name','Latitude']]

print('All Data')

print(AllData)

MeanData=AllData.groupby(['Country', 'Place_Name'])['Latitude'].mean()

StdData=AllData.groupby(['Country', 'Place_Name'])['Latitude'].std()

print('Outliers')

UpperBound=float(MeanData+StdData)

print('Higher than ', UpperBound)

OutliersHigher=AllData[AllData.Latitude>UpperBound]

print(OutliersHigher)

LowerBound=float(MeanData-StdData)
```

```
print('Lower than ', LowerBound)
OutliersLower=AllData[AllData.Latitude<LowerBound]
print(OutliersLower)
print('Not Outliers')
OutliersNot=AllData[(AllData.Latitude>=LowerBound) & (AllData.Latitude<=UpperBound)]
print(OutliersNot)
```

Output:-



```
################################
Working Base : C:/VKHCG
################################
Loading : C:/VKHCG/01-Vermeulen/00-RawData/IP_DATA_CORE2.csv
All Data
     Country Place_Name  Latitude
1910      GB     London   51.5130
1911      GB     London   51.5508
1912      GB     London   51.5649
1913      GB     London   51.5895
1914      GB     London   51.5232
1915      GB     London   51.4739
1916      GB     London   51.5491
1917      GB     London   51.5085
1918      GB     London   51.5085
1919      GB     London   51.5161
1920      GB     London   51.5198
1921      GB     London   51.5198
```

Practical NO :- 14

Aim:- Write the python program to do basic logging in data science.

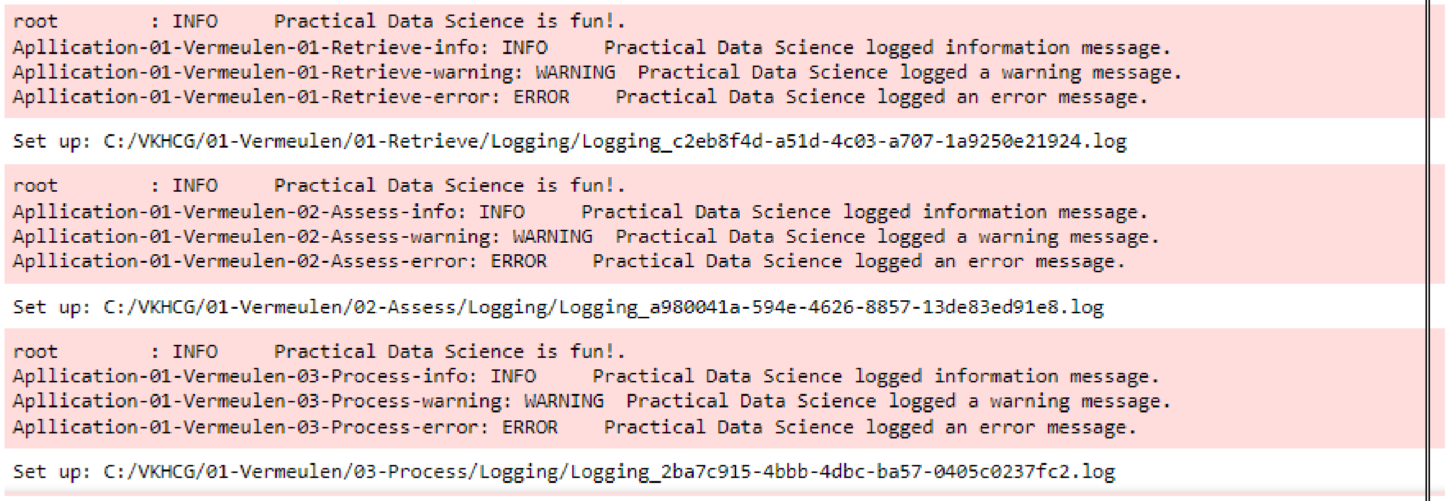
Code:-

```
import sys
import os
import logging
import uuid
import shutil
import time
if sys.platform == "linux":
    Base = os.path.expanduser("~") + "/VKHCG"
else:
    Base = "C:/VKHCG"
sCompanies = ["01-Vermeulen", "02-Krennwallner", "03-Hillman", "04-Clark"]
sLayers = [
    "01-Retrieve",
    "02-Assess",
    "03-Process",
    "04-Transform",
    "05-Organise",
    "06-Report",
]
sLevels = ["debug", "info", "warning", "error"]
for sCompany in sCompanies:
    sFileDir = Base + "/" + sCompany
    if not os.path.exists(sFileDir):
        os.makedirs(sFileDir)
    for sLayer in sLayers:
        log = logging.getLogger()  # root logger
```

```
for hdlr in log.handlers[:]:  # remove all old handlers
    log.removeHandler(hdlr)
sFileDir = Base + "/" + sCompany + "/" + sLayer + "/Logging"
if os.path.exists(sFileDir):
    shutil.rmtree(sFileDir)
time.sleep(2)
if not os.path.exists(sFileDir):
    os.makedirs(sFileDir)
skey = str(uuid.uuid4())
sLogFile = (
    Base + "/" + sCompany + "/" + sLayer + "/Logging/Logging_" + skey + ".log"
)
print("Set up:", sLogFile)
# set up logging to file - see previous section for more details
logging.basicConfig(
    level=logging.DEBUG,
    format="%(asctime)s %(name)-12s %(levelname)-8s %(message)s",
    datefmt="%m-%d %H:%M",
    filename=sLogFile,
    filemode="w",
)
# define a Handler which writes INFO messages or higher to the sys.stderr
console = logging.StreamHandler()
console.setLevel(logging.INFO)
# set a format which is simpler for console use
formatter = logging.Formatter("%(name)-12s: %(levelname)-8s %(message)s")
# tell the handler to use this format
console.setFormatter(formatter)
# add the handler to the root logger
logging.getLogger("").addHandler(console)
```

```
# Now, we can log to the root logger, or any other logger. First the root...
logging.info("Practical Data Science is fun!.")
for sLevel in sLevels:
    sApp = "Apllication-" + sCompany + "-" + sLayer + "-" + sLevel
    logger = logging.getLogger(sApp)
    if sLevel == "debug":
        logger.debug("Practical Data Science logged a debugging message.")
    if sLevel == "info":
        logger.info("Practical Data Science logged information message.")
    if sLevel == "warning":
        logger.warning("Practical Data Science logged a warning message.")
    if sLevel == "error":
        logger.error("Practical Data Science logged an error message.")
```

Output:-



```
root        : INFO     Practical Data Science is fun!.
Apllication-01-Vermeulen-01-Retrieve-info: INFO     Practical Data Science logged information message.
Apllication-01-Vermeulen-01-Retrieve-warning: WARNING  Practical Data Science logged a warning message.
Apllication-01-Vermeulen-01-Retrieve-error: ERROR    Practical Data Science logged an error message.

Set up: C:/VKHCG/01-Vermeulen/01-Retrieve/Logging/Logging_c2eb8f4d-a51d-4c03-a707-1a9250e21924.log

root        : INFO     Practical Data Science is fun!.
Apllication-01-Vermeulen-02-Assess-info: INFO     Practical Data Science logged information message.
Apllication-01-Vermeulen-02-Assess-warning: WARNING  Practical Data Science logged a warning message.
Apllication-01-Vermeulen-02-Assess-error: ERROR    Practical Data Science logged an error message.

Set up: C:/VKHCG/01-Vermeulen/02-Assess/Logging/Logging_a980041a-594e-4626-8857-13de83ed91e8.log

root        : INFO     Practical Data Science is fun!.
Apllication-01-Vermeulen-03-Process-info: INFO     Practical Data Science logged information message.
Apllication-01-Vermeulen-03-Process-warning: WARNING  Practical Data Science logged a warning message.
Apllication-01-Vermeulen-03-Process-error: ERROR    Practical Data Science logged an error message.

Set up: C:/VKHCG/01-Vermeulen/03-Process/Logging/Logging_2ba7c915-4bbb-4dbc-ba57-0405c0237fc2.log
```

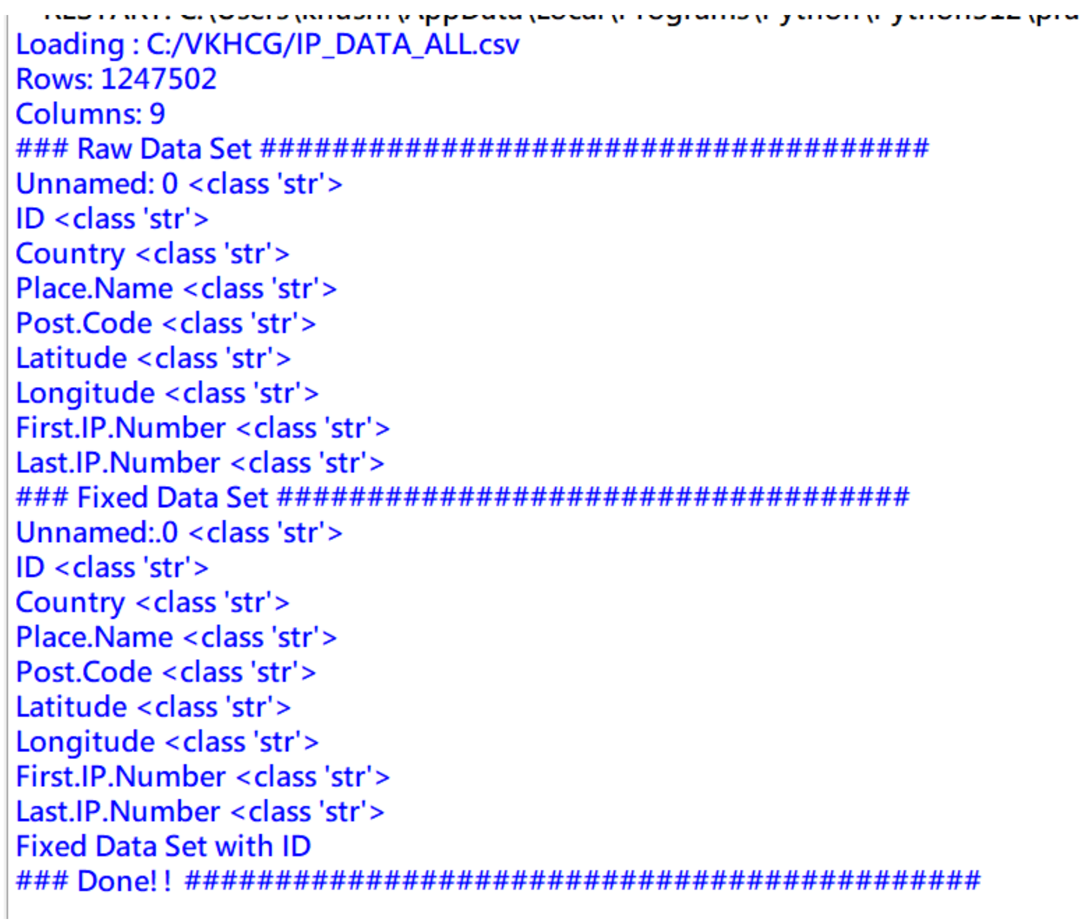
Practical NO :- 15

Aim:- Write the program to retrieve different attributes of the data

Code:-

```
import sys

import os

import pandas as pd

if sys.platform == 'linux':

    Base=os.path.expanduser('~') + '/VKHCG'

else:

    Base='C:/VKHCG'

sFileName=Base + '/IP_DATA_ALL.csv'

print('Loading :',sFileName)

IP_DATA_ALL=pd.read_csv(sFileName,header=0,low_memory=False, encoding="latin-1")

sFileDir=Base + '/01-Vermeulen/01-Retrieve/01-EDS/02-Python'

if not os.path.exists(sFileDir):

    os.makedirs(sFileDir)

print('Rows:', IP_DATA_ALL.shape[0])

print('Columns:', IP_DATA_ALL.shape[1])

print('### Raw Data Set #####################################')

for i in range(0,len(IP_DATA_ALL.columns)):

    print(IP_DATA_ALL.columns[i],type(IP_DATA_ALL.columns[i]))

print('### Fixed Data Set ###################################')

IP_DATA_ALL_FIX=IP_DATA_ALL

for i in range(0,len(IP_DATA_ALL.columns)):

    cNameOld=IP_DATA_ALL_FIX.columns[i] + '     '

    cNameNew=cNameOld.strip().replace(" ", ".")

    IP_DATA_ALL_FIX.columns.values[i] = cNameNew
    print(IP_DATA_ALL.columns[i],type(IP_DATA_ALL.columns[i]))
#print(IP_DATA_ALL_FIX.head())
print('Fixed Data Set with ID')
IP_DATA_ALL_with_ID=IP_DATA_ALL_FIX
IP_DATA_ALL_with_ID.index.names = ['RowID']
#print(IP_DATA_ALL_with_ID.head())
sFileName2=sFileDir + '/Retrieve_IP_DATA.csv'
IP_DATA_ALL_with_ID.to_csv(sFileName2, index = True, encoding="latin-1")
print('### Done!! ################################################')
```

Output:-



```
Loading : C:/VKHCG/IP_DATA_ALL.csv
Rows: 1247502
Columns: 9
### Raw Data Set ######################################
Unnamed: 0 <class 'str'>
ID <class 'str'>
Country <class 'str'>
Place.Name <class 'str'>
Post.Code <class 'str'>
Latitude <class 'str'>
Longitude <class 'str'>
First.IP.Number <class 'str'>
Last.IP.Number <class 'str'>
### Fixed Data Set #####################################
Unnamed:.0 <class 'str'>
ID <class 'str'>
Country <class 'str'>
Place.Name <class 'str'>
Post.Code <class 'str'>
Latitude <class 'str'>
Longitude <class 'str'>
First.IP.Number <class 'str'>
Last.IP.Number <class 'str'>
Fixed Data Set with ID
### Done!! ###########################################
```

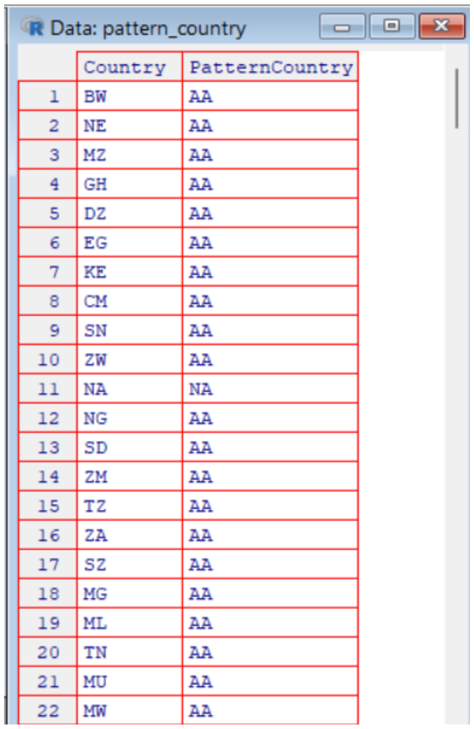
Practical NO :- 16

Aim:- Write the program to determine the pattern of data values using R

Code:-

```
> library(readr)

> library(data.table)

data.table 1.16.0 using 6 threads (see ?getDTthreads).  Latest news: r-datatable.com

> FileName=paste0('c:/VKHCG/IP_DATA_ALL.csv')

> IP_DATA_ALL <- read_csv(FileName)
[1mindexing[0m [34mIP_DATA_ALL.csv[0m [--------------------------------] [32m459.92MB/s[0m, eta:
[36m 0s[0m
[1mindexing[0m [34mIP_DATA_ALL.csv[0m [==============================---]
[32m442.84MB/s[0m, eta: [36m 0s[0m
[1mindexing[0m [34mIP_DATA_ALL.csv[0m [================================-]
[32m452.20MB/s[0m, eta: [36m 0s[0m
[1mindexing[0m [34mIP_DATA_ALL.csv[0m [=================================]
[32m449.49MB/s[0m, eta: [36m 0s[0m
New names:

• `` -> `...1`

Rows: 1247502 Columns: 9

── Column specification
────────────────────────────────────────────────────────

Delimiter: ","

chr (3): Country, Place.Name, Post.Code

dbl (6): ...1, ID, Latitude, Longitude, First.IP.Number, Last.IP.Number

ℹ Use `spec()` to retrieve the full column specification for this data.

ℹ Specify the column types or set `show_col_types = FALSE` to quiet this message.

> hist_country=data.table(Country=unique(IP_DATA_ALL$Country))

> pattern_country=data.table(Country=hist_country$Country,

+                          PatternCountry=hist_country$Country)

> oldchar=c(letters,LETTERS)

> newchar=replicate(length(oldchar),"A")
> for (r in seq(nrow(pattern_country))){
+   s=pattern_country[r,]$PatternCountry;
+   for (c in seq(length(oldchar))){
+     s=chartr(oldchar[c],newchar[c],s)
+   };
+   for (n in seq(0,9,1)){
+     s=chartr(as.character(n),"N",s)
+   };
+   s=chartr(" ","b",s)
+   s=chartr(".","u",s)
+   pattern_country[r,]$PatternCountry=s;
+ };
> View(pattern_country)
```

Output:-



Data: pattern_country

	Country	PatternCountry
1	BW	AA
2	NE	AA
3	MZ	AA
4	GH	AA
5	DZ	AA
6	EG	AA
7	KE	AA
8	CM	AA
9	SN	AA
10	ZW	AA
11	NA	NA
12	NG	AA
13	SD	AA
14	ZM	AA
15	TZ	AA
16	ZA	AA
17	SZ	AA
18	MG	AA
19	ML	AA
20	TN	AA
21	MU	AA
22	MW	AA

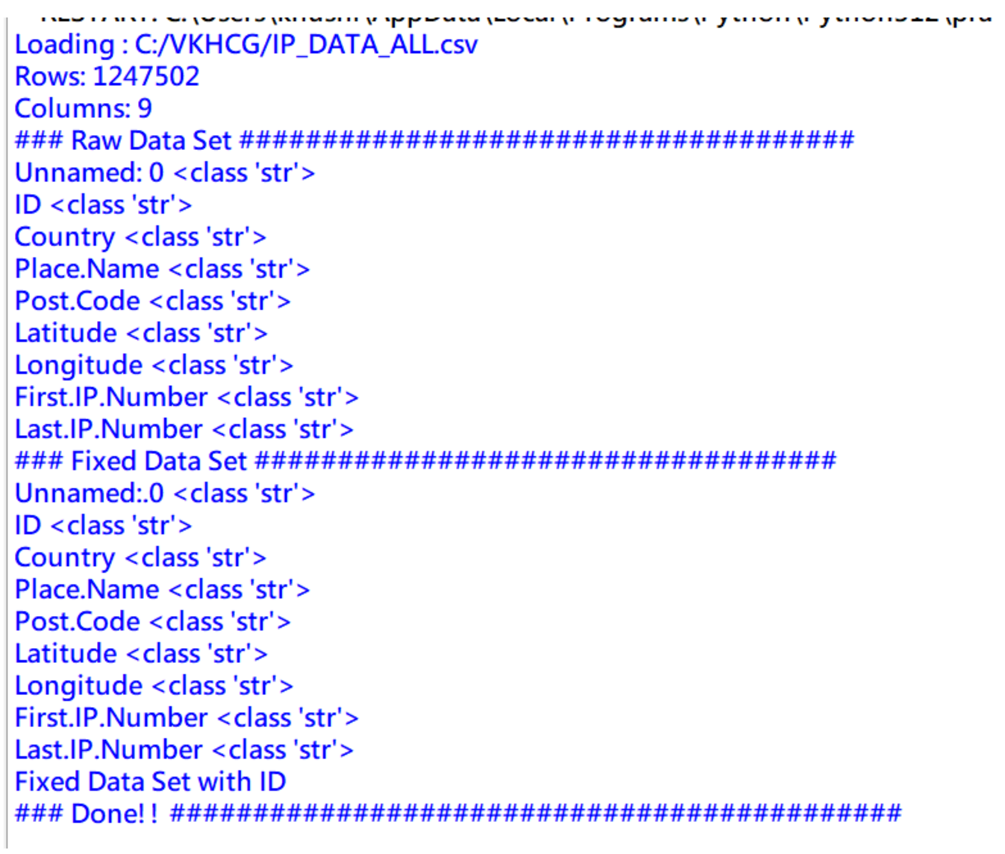
Practical NO :- 17

Aim:- Write the program to load data set containing different ip addresses allocation.

Code:-

```
import sys

import os

import pandas as pd

if sys.platform == 'linux':

    Base=os.path.expanduser('~') + '/VKHCG'

else:

    Base='C:/VKHCG'

sFileName=Base + '/IP_DATA_ALL.csv'

print('Loading :',sFileName)

IP_DATA_ALL=pd.read_csv(sFileName,header=0,low_memory=False, encoding="latin-1")

sFileDir=Base + '/01-Vermeulen/01-Retrieve/01-EDS/02-Python'

if not os.path.exists(sFileDir):

    os.makedirs(sFileDir)

print('Rows:', IP_DATA_ALL.shape[0])

print('Columns:', IP_DATA_ALL.shape[1])

print('### Raw Data Set #####################################')

for i in range(0,len(IP_DATA_ALL.columns)):

    print(IP_DATA_ALL.columns[i],type(IP_DATA_ALL.columns[i]))

print('### Fixed Data Set ###################################')

IP_DATA_ALL_FIX=IP_DATA_ALL

for i in range(0,len(IP_DATA_ALL.columns)):

    cNameOld=IP_DATA_ALL_FIX.columns[i] + '     '
    cNameNew=cNameOld.strip().replace(" ", ".")
    IP_DATA_ALL_FIX.columns.values[i] = cNameNew
    print(IP_DATA_ALL.columns[i],type(IP_DATA_ALL.columns[i]))
#print(IP_DATA_ALL_FIX.head())
print('Fixed Data Set with ID')
IP_DATA_ALL_with_ID=IP_DATA_ALL_FIX
IP_DATA_ALL_with_ID.index.names = ['RowID']
#print(IP_DATA_ALL_with_ID.head())
sFileName2=sFileDir + '/Retrieve_IP_DATA.csv'
IP_DATA_ALL_with_ID.to_csv(sFileName2, index = True, encoding="latin-1")
```

Output:-



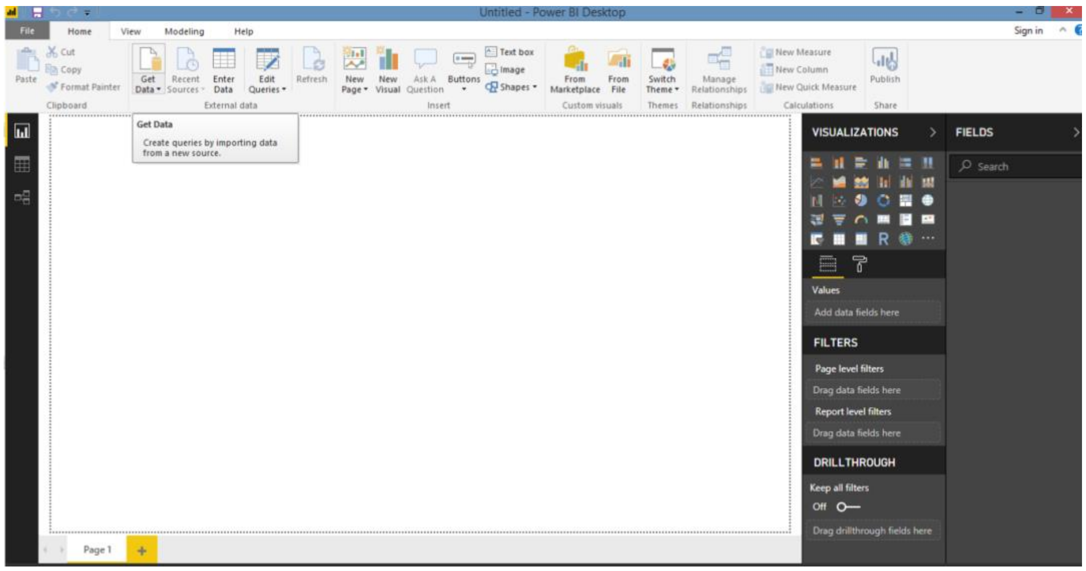
```
Loading : C:/VKHCG/IP_DATA_ALL.csv
Rows: 1247502
Columns: 9
### Raw Data Set ######################################
Unnamed: 0 <class 'str'>
ID <class 'str'>
Country <class 'str'>
Place.Name <class 'str'>
Post.Code <class 'str'>
Latitude <class 'str'>
Longitude <class 'str'>
First.IP.Number <class 'str'>
Last.IP.Number <class 'str'>
### Fixed Data Set ###################################
Unnamed:.0 <class 'str'>
ID <class 'str'>
Country <class 'str'>
Place.Name <class 'str'>
Post.Code <class 'str'>
Latitude <class 'str'>
Longitude <class 'str'>
First.IP.Number <class 'str'>
Last.IP.Number <class 'str'>
Fixed Data Set with ID
### Done!! #############################################
```

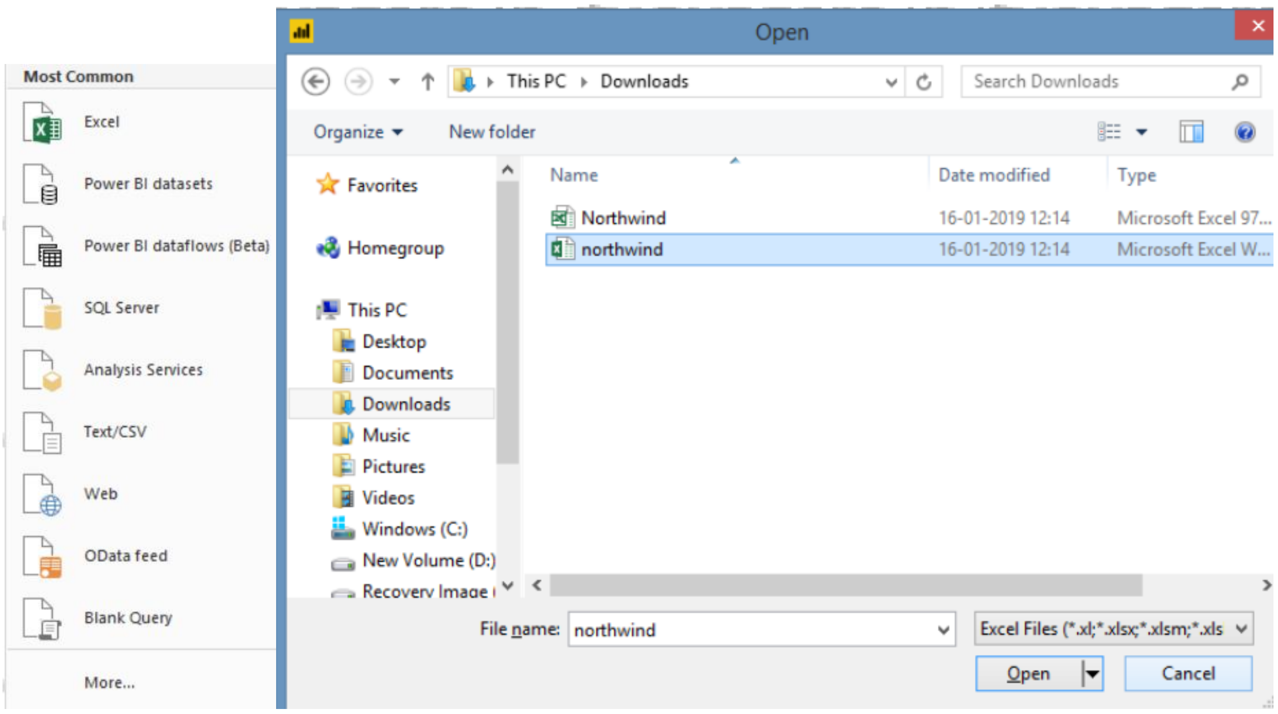
Practical NO :- 18

Aim:- Demonstrate organizing data using power BI.

To effectively organize and analyze data using Power BI, follow these structured steps:

Data Acquisition: Import data from sources like Excel, CSV, or databases using the 'Get Data' feature.

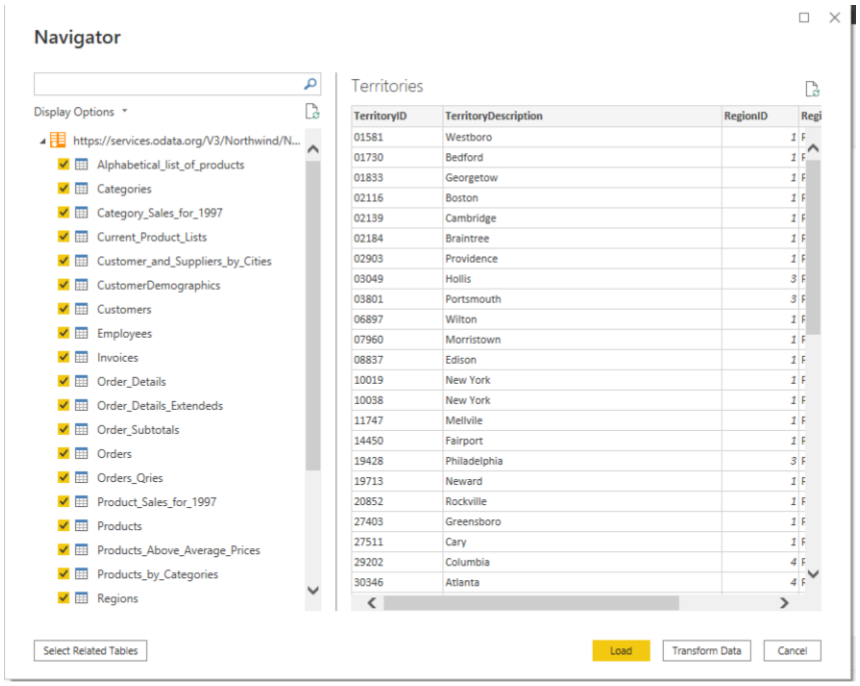




Name	Date modified	Type
Northwind	16-01-2019 12:14	Microsoft Excel 97...
northwind	16-01-2019 12:14	Microsoft Excel W...

File name: northwind
Excel Files (*.xl;*.xlsx;*.xlsm;*.xls

Open Cancel



Navigator

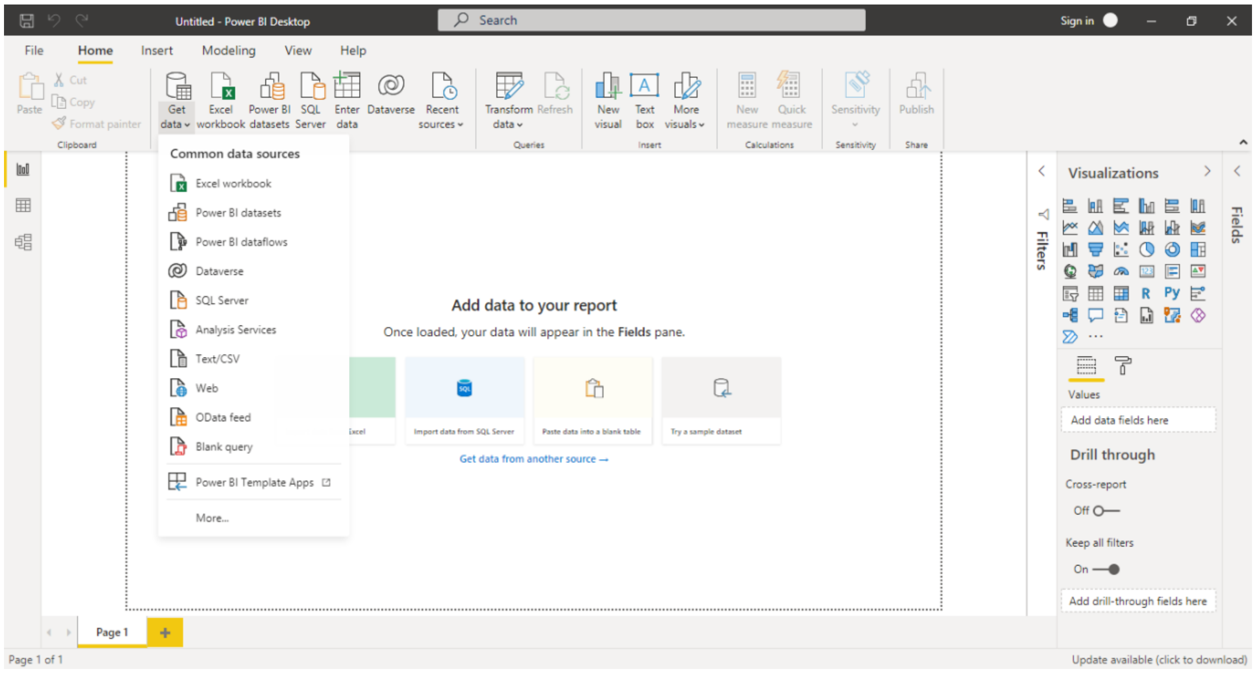
Display Options

https://services.odata.org/V3/Northwind/N...

- Alphabetical_list_of_products
- Categories
- Category_Sales_for_1997
- Current_Product_Lists
- Customer_and_Suppliers_by_Cities
- CustomerDemographics
- Customers
- Employees
- Invoices
- Order_Details
- Order_Details_Extendeds
- Order_Subtotals
- Orders
- Orders_Qries
- Product_Sales_for_1997
- Products
- Products_Above_Average_Prices
- Products_by_Categories
- Regions

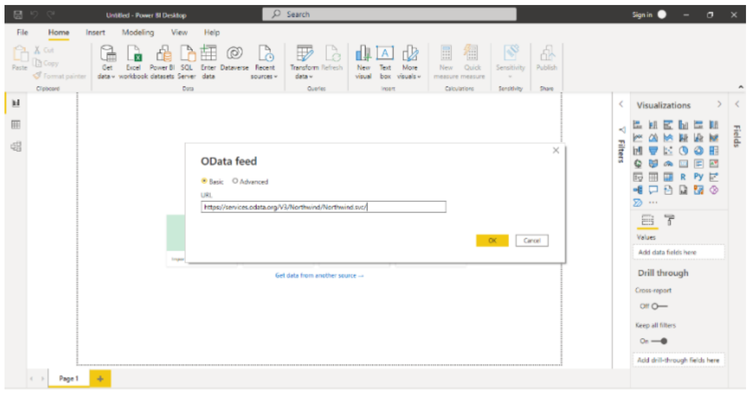
Territories

TerritoryID	TerritoryDescription	RegionID	Regi
01581	Westboro	1	F
01730	Bedford	1	F
01833	Georgetow	1	F
02116	Boston	1	F
02139	Cambridge	1	F
02184	Braintree	1	F
02903	Providence	1	F
03049	Hollis	3	F
03801	Portsmouth	3	F
06897	Wilton	1	F
07960	Morristown	1	F
08837	Edison	1	F
10019	New York	1	F
10038	New York	1	F
11747	Mellvile	1	F
14450	Fairport	1	F
19428	Philadelphia	3	F
19713	Neward	1	F
20852	Rockville	1	F
27403	Greensboro	1	F
27511	Cary	1	F
29202	Columbia	4	F
30346	Atlanta	4	F



Add data to your report

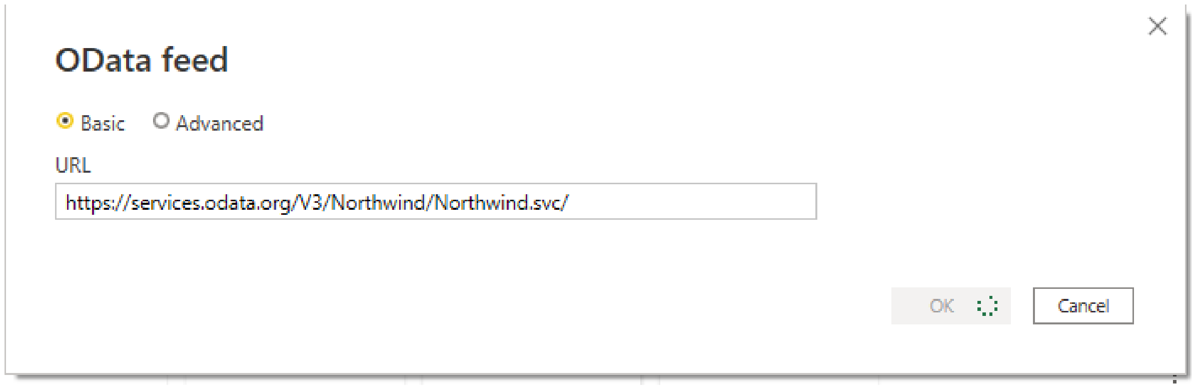
Once loaded, your data will appear in the **Fields** pane.



OData feed

Basic [✓] Advanced

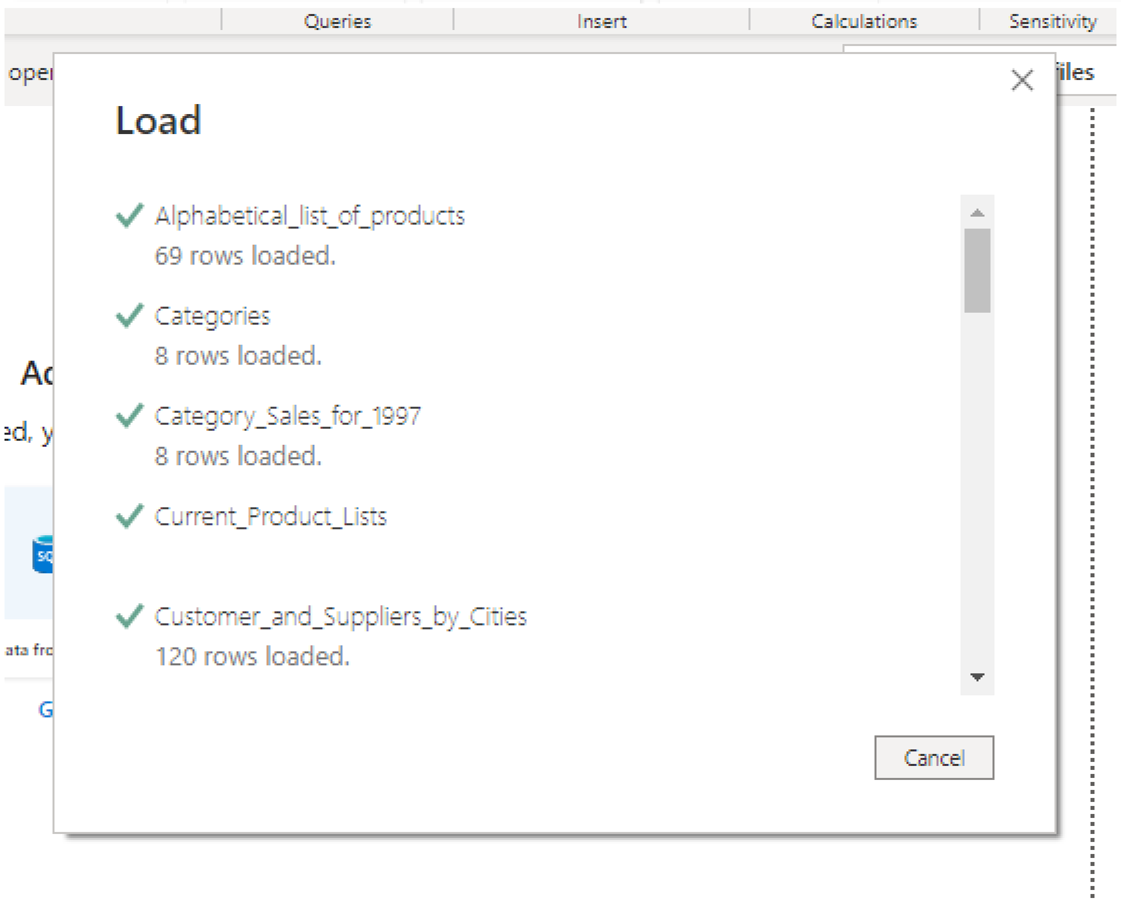
URL https://services.odata.org/V3/Northwind/Northwind.svc/


OData feed

[✓ Basic] Advanced

URL

https://services.odata.org/V3/Northwind/Northwind.svc/



Load

✓ Alphabetical_list_of_products
69 rows loaded.

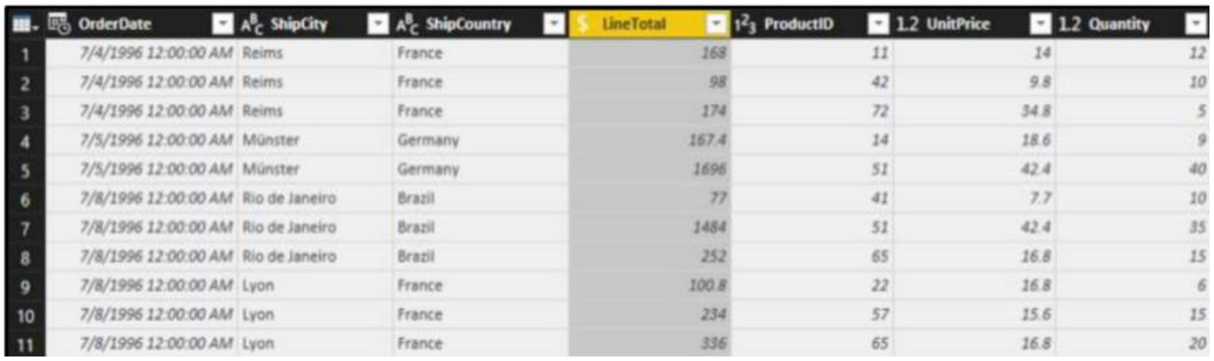
✓ Categories
8 rows loaded.

✓ Category_Sales_for_1997
8 rows loaded.

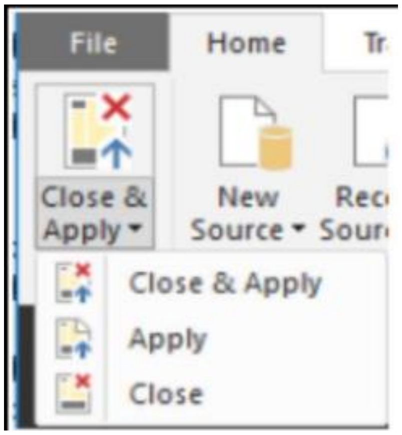
✓ Current_Product_Lists

✓ Customer_and_Suppliers_by_Cities
120 rows loaded.

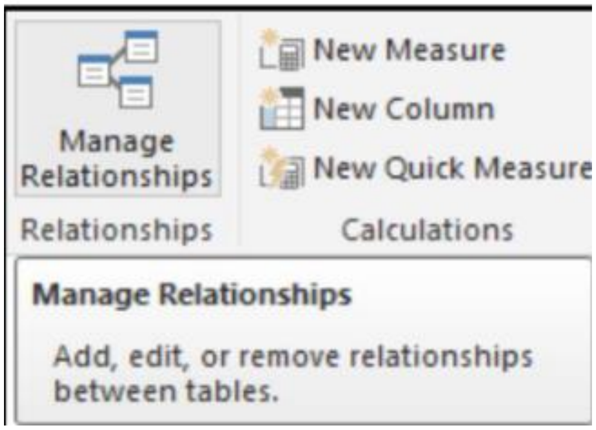
Data Cleaning and Transformation: Use the Power Query Editor to clean data — remove duplicates, handle missing values, and rename columns.



	OrderDate	ShipCity	ShipCountry	LineTotal	ProductID	UnitPrice	Quantity
1	7/4/1996 12:00:00 AM	Reims	France	168	11	14	12
2	7/4/1996 12:00:00 AM	Reims	France	98	42	9.8	10
3	7/4/1996 12:00:00 AM	Reims	France	174	72	34.8	5
4	7/5/1996 12:00:00 AM	Münster	Germany	167.4	14	18.6	9
5	7/5/1996 12:00:00 AM	Münster	Germany	1696	51	42.4	40
6	7/8/1996 12:00:00 AM	Rio de Janeiro	Brazil	77	41	7.7	10
7	7/8/1996 12:00:00 AM	Rio de Janeiro	Brazil	1484	51	42.4	35
8	7/8/1996 12:00:00 AM	Rio de Janeiro	Brazil	252	65	16.8	15
9	7/8/1996 12:00:00 AM	Lyon	France	100.8	22	16.8	6
10	7/8/1996 12:00:00 AM	Lyon	France	234	57	15.6	15
11	7/8/1996 12:00:00 AM	Lyon	France	336	65	16.8	20

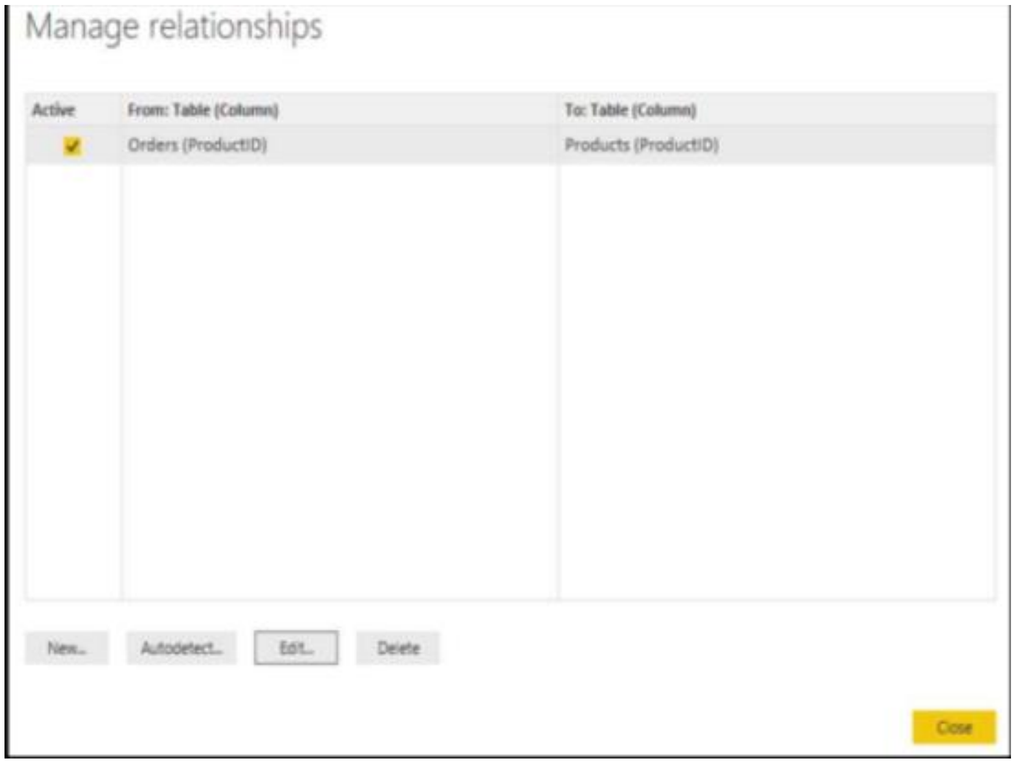


Creating a Data Model: Establish relationships between tables based on keys and choose an appropriate model type (e.g., Star Schema).



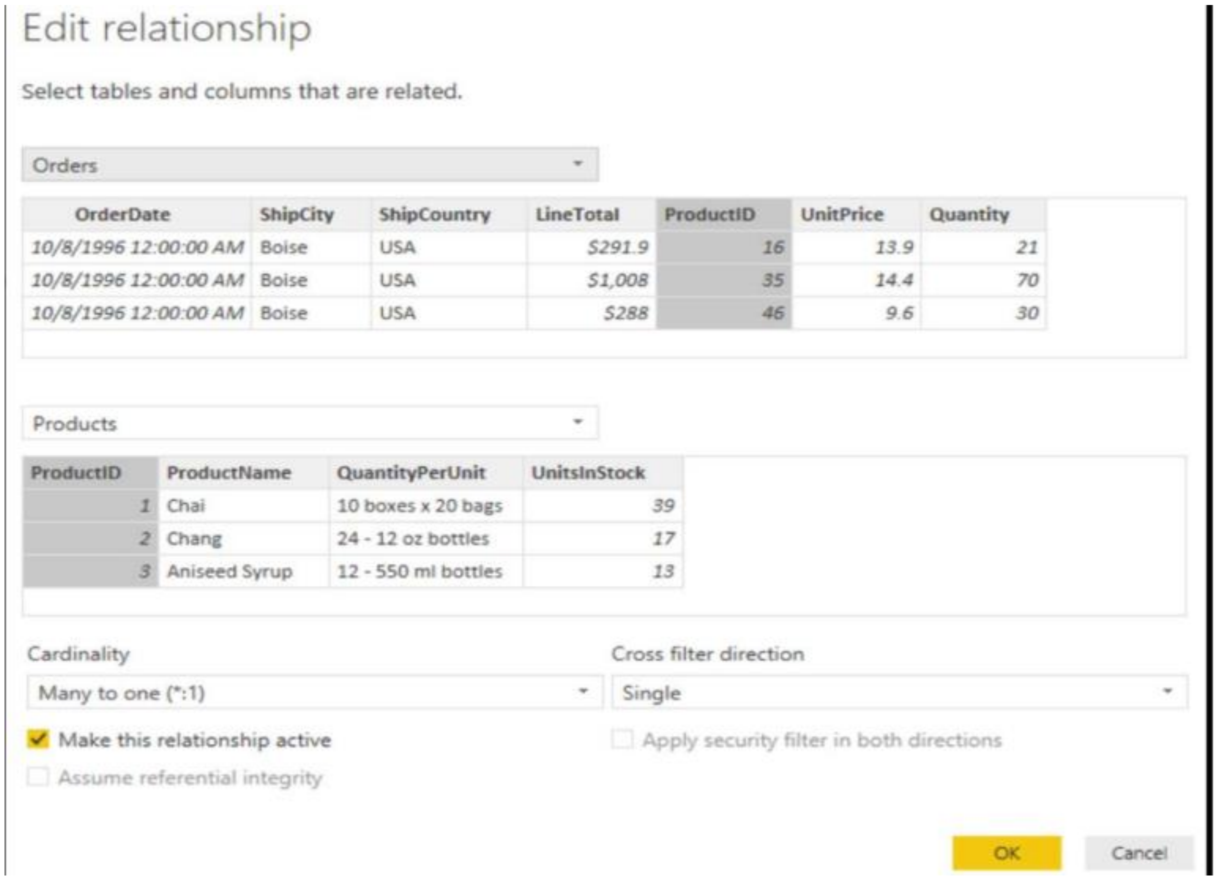
Manage Relationships

Add, edit, or remove relationships between tables.



Manage relationships

Active	From: Table (Column)	To: Table (Column)
✓	Orders (ProductID)	Products (ProductID)



Edit relationship

Select tables and columns that are related.

Orders

OrderDate	ShipCity	ShipCountry	LineTotal	ProductID	UnitPrice	Quantity
10/8/1996 12:00:00 AM	Boise	USA	$291.9	16	13.9	21
10/8/1996 12:00:00 AM	Boise	USA	$1,008	35	14.4	70
10/8/1996 12:00:00 AM	Boise	USA	$288	46	9.6	30

Products

ProductID	ProductName	QuantityPerUnit	UnitsInStock
1	Chai	10 boxes x 20 bags	39
2	Chang	24 - 12 oz bottles	17
3	Aniseed Syrup	12 - 550 ml bottles	13

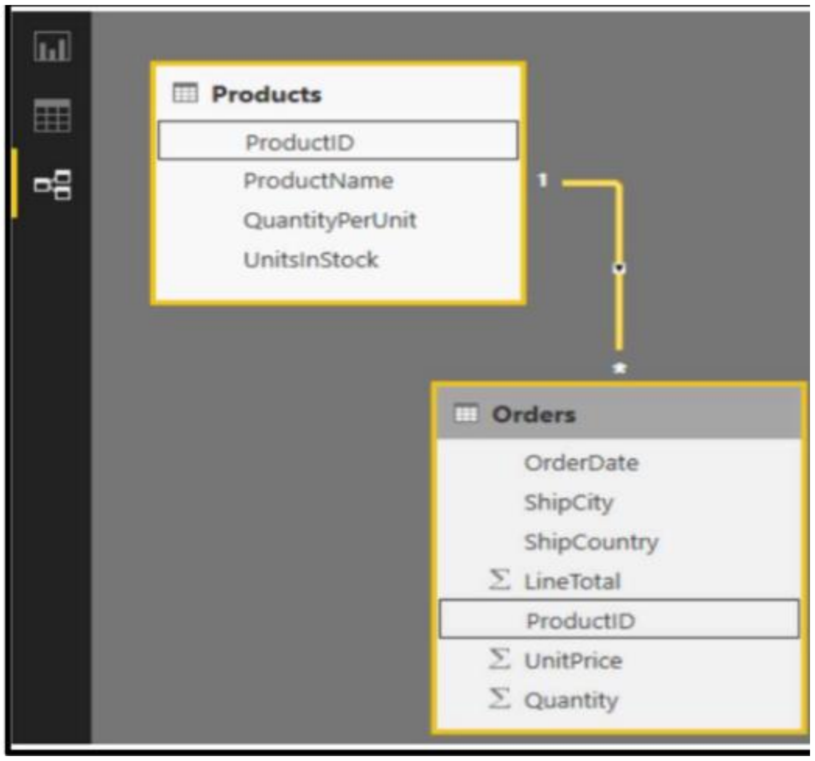
Cardinality: Many to one (*:1)

Cross filter direction: Single

[✓] Make this relationship active

[ ] Apply security filter in both directions

[ ] Assume referential integrity



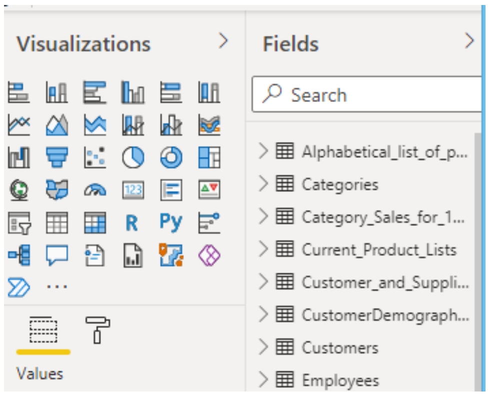
Organizing Measures: Create DAX measures for calculations and organize them into dedicated measures tables.

Practical NO :- 19

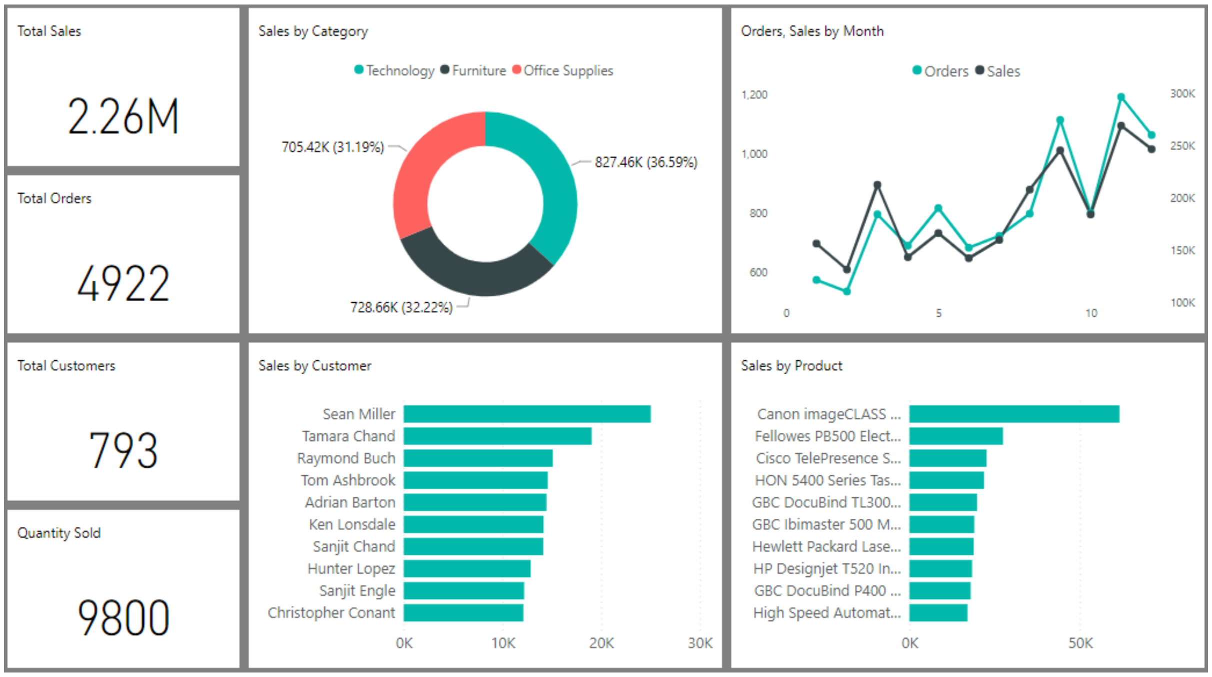
Aim:- Demonstrate generating data using power BI.

Setting up Filter and Fact Tables: Arrange lookup (filter) tables at the top and fact tables below for easier navigation.

Building Visualizations: Create charts, tables, and maps by dragging fields onto the report canvas.



- Alphabetical_list_of_p...
- Categories
- Category_Sales_for_1...
- Current_Product_Lists
- Customer_and_Suppli...
- CustomerDemograph...
- Customers
- Employees



Creating Dashboards: Pin visuals to dashboards for a consolidated view of key metrics.

Reviewing and Sharing Insights: Regularly check model accuracy and share reports/dashboards with stakeholders.

Practical NO :- 20

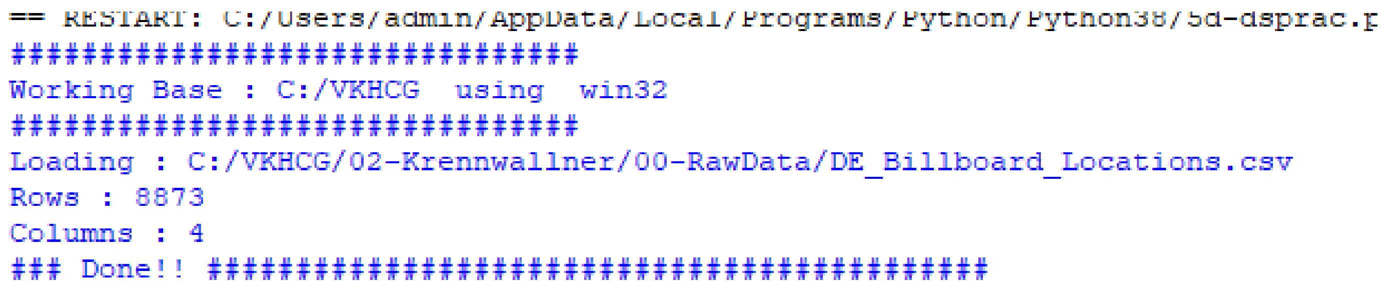
Aim:- Write the program to perform error management on the given data using pandas package.

Code:-

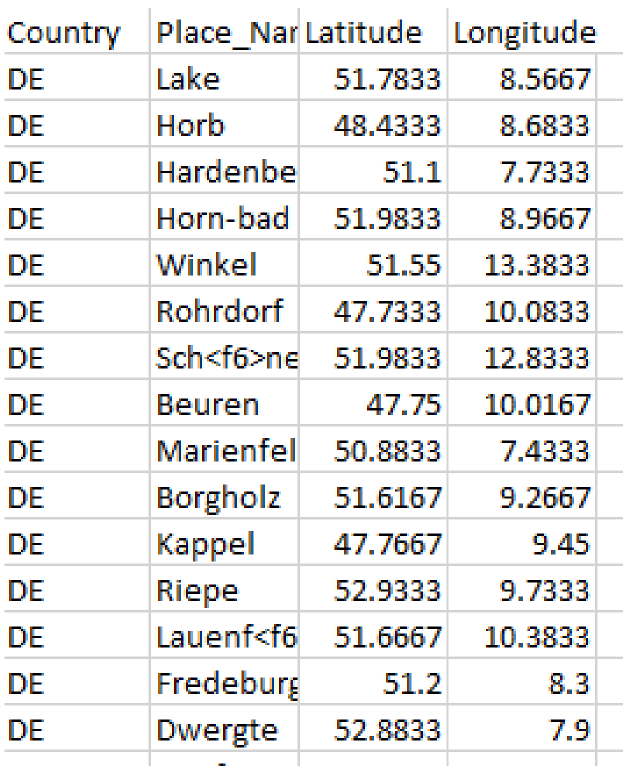
```
import sys

import os

import pandas as pd

InputFileName='DE_Billboard_Locations.csv'

OutputFileName='Retrieve_DE_Billboard_Locations.csv'

Company='02-Krennwallner'

if sys.platform == 'linux':

   Base=os.path.expanduser('~') + '/VKHCG'

else:

   Base='C:/VKHCG'

print('Working Base :',Base, ' using ', sys.platform)

Base='C:/VKHCG'

sFileName=Base + '/' + Company + '/00-RawData/' + InputFileName

print('Loading :',sFileName)

IP_DATA_ALL=pd.read_csv(sFileName,header=0,low_memory=False,usecols=['Country','PlaceName'
,'Latitude','Longitude'])

IP_DATA_ALL.rename(columns={'PlaceName': 'Place_Name'}, inplace=True)

sFileDir=Base + '/' + Company + '/01-Retrieve/01-EDS/02-Python'

if not os.path.exists(sFileDir):

   os.makedirs(sFileDir)

ROUTERLOC = IP_DATA_ALL.drop_duplicates(subset=None, keep='first', inplace=False)
```

```
print('Rows :',ROUTERLOC.shape[0])

print('Columns :',ROUTERLOC.shape[1])

sFileName2=sFileDir + '/' + OutputFileName

ROUTERLOC.to_csv(sFileName2, index = False)
```

Output:-



```
== RESTART: C:/Users/admin/AppData/Local/Programs/Python/Python38/5d-dsprac.p
################################
Working Base : C:/VKHCG  using  win32
################################
Loading : C:/VKHCG/02-Krennwallner/00-RawData/DE_Billboard_Locations.csv
Rows : 8873
Columns : 4
### Done!! ############################################
```



Country	Place_Nar	Latitude	Longitude
DE	Lake	51.7833	8.5667
DE	Horb	48.4333	8.6833
DE	Hardenbe	51.1	7.7333
DE	Horn-bad	51.9833	8.9667
DE	Winkel	51.55	13.3833
DE	Rohrdorf	47.7333	10.0833
DE	Sch<f6>ne	51.9833	12.8333
DE	Beuren	47.75	10.0167
DE	Marienfel	50.8833	7.4333
DE	Borgholz	51.6167	9.2667
DE	Kappel	47.7667	9.45
DE	Riepe	52.9333	9.7333
DE	Lauenf<f6	51.6667	10.3833
DE	Fredeburg	51.2	8.3
DE	Dwergte	52.8833	7.9

Practical NO :- 21

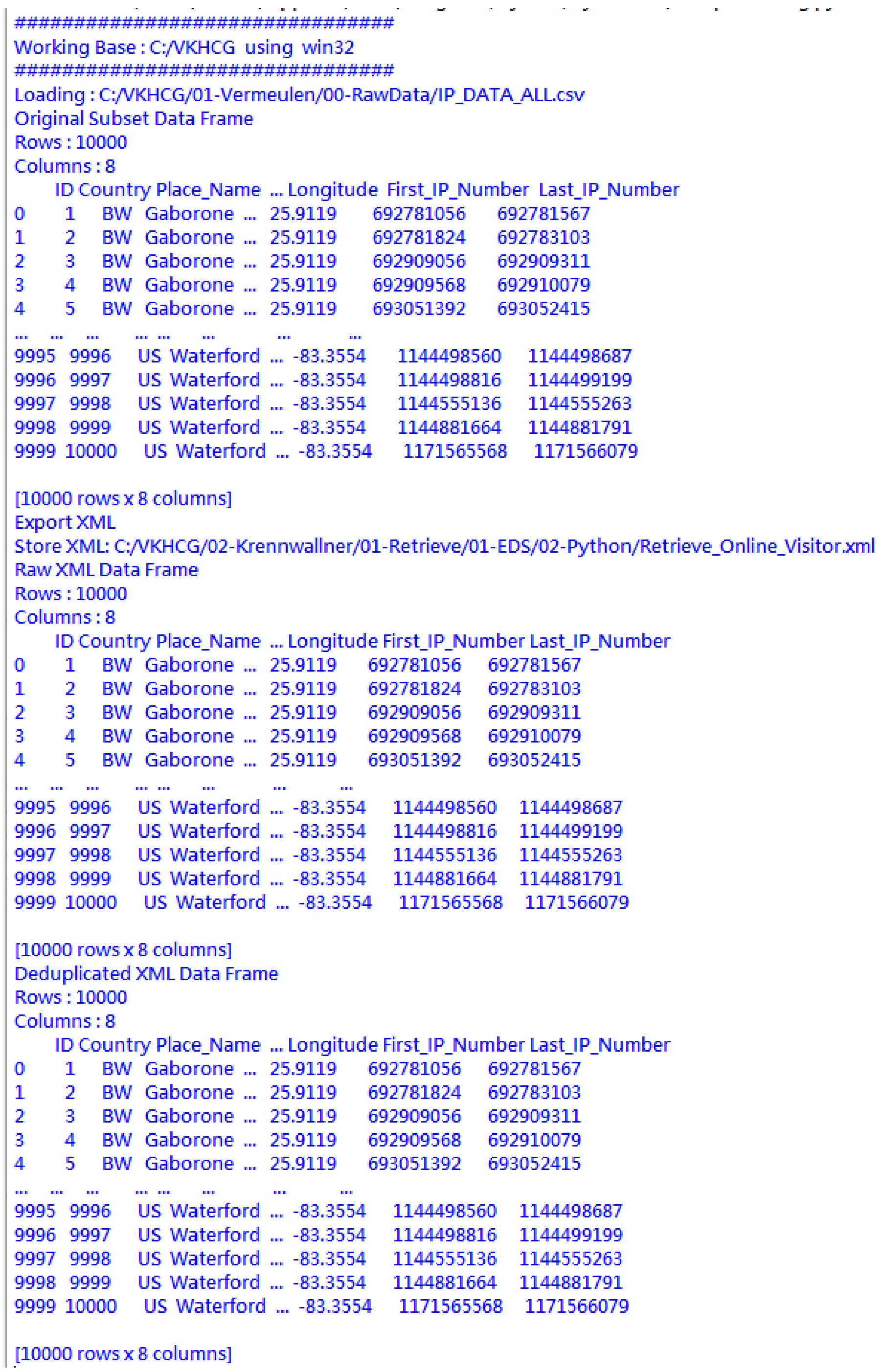
Aim:- Write python/R program to pick the content for Billboard's from the given Data XML Processing.

Code:-

```
import sys

import os

import pandas as pd

import xml.etree.ElementTree as ET

def df2xml(data):

    header = data.columns

    root = ET.Element('root')

    for row in range(data.shape[0]):

        entry = ET.SubElement(root,'entry')

        for index in range(data.shape[1]):

            schild=str(header[index])

            child = ET.SubElement(entry, schild)

            if str(data[schild][row]) != 'nan':

                child.text = str(data[schild][row])

            else:

                child.text = 'n/a'

            entry.append(child)

    result = ET.tostring(root)

    return result

def xml2df(xml_data):

    try:

        root = ET.XML(xml_data)
    except ET.ParseError as e:
        print(f"XML parsing error: {e}")
        return pd.DataFrame()  # Return an empty DataFrame or handle as needed
    all_records = []
    for i, child in enumerate(root):
        record = {}
        for subchild in child:
            record[subchild.tag] = subchild.text if subchild.text else 'n/a'
        all_records.append(record)
    return pd.DataFrame(all_records)
InputFileName='IP_DATA_ALL.csv'
OutputFileName='Retrieve_Online_Visitor.xml'
CompanyIn= '01-Vermeulen'
CompanyOut= '02-Krennwallner'
if sys.platform == 'linux':
    Base=os.path.expanduser('~') + '/VKHCG'
else:
    Base='C:/VKHCG'
print('Working Base :',Base, ' using ', sys.platform)
sFileName=Base + '/' + CompanyIn + '/00-RawData/' + InputFileName
print('Loading :',sFileName)
IP_DATA_ALL=pd.read_csv(sFileName,header=0,low_memory=False)
IP_DATA_ALL.rename(columns={'Place.Name': 'Place_Name'}, inplace=True)
IP_DATA_ALL.rename(columns={'First.IP.Number': 'First_IP_Number'}, inplace=True)
IP_DATA_ALL.rename(columns={'Last.IP.Number': 'Last_IP_Number'}, inplace=True)
IP_DATA_ALL.rename(columns={'Post.Code': 'Post_Code'}, inplace=True)
```

```
sFileDir=Base + '/' + CompanyOut + '/01-Retrieve/01-EDS/02-Python'
if not os.path.exists(sFileDir):
    os.makedirs(sFileDir)
visitordata = IP_DATA_ALL.head(10000)
print('Original Subset Data Frame')
print('Rows :',visitordata.shape[0])
print('Columns :',visitordata.shape[1])
print(visitordata)
print('Export XML')
sXML=df2xml(visitordata)
sFileName=sFileDir + '/' + OutputFileName
file_out = open(sFileName, 'wb')
file_out.write(sXML)
file_out.close()
print('Store XML:',sFileName)
xml_data = open(sFileName).read()
unxmlrawdata=xml2df(xml_data)
print('Raw XML Data Frame')
print('Rows :',unxmlrawdata.shape[0])
print('Columns :',unxmlrawdata.shape[1])
print(unxmlrawdata)
unxmldata = unxmlrawdata.drop_duplicates(subset=None, keep='first', inplace=False)
print('Deduplicated XML Data Frame')
print('Rows :',unxmldata.shape[0])
print('Columns :',unxmldata.shape[1])
print(unxmldata)
```

Output:



```
################################
Working Base : C:/VKHCG  using  win32
################################
Loading : C:/VKHCG/01-Vermeulen/00-RawData/IP_DATA_ALL.csv
Original Subset Data Frame
Rows : 10000
Columns : 8
      ID Country Place_Name  ... Longitude  First_IP_Number  Last_IP_Number
0      1   BW  Gaborone  ...  25.9119     692781056     692781567
1      2   BW  Gaborone  ...  25.9119     692781824     692783103
2      3   BW  Gaborone  ...  25.9119     692909056     692909311
3      4   BW  Gaborone  ...  25.9119     692909568     692910079
4      5   BW  Gaborone  ...  25.9119     693051392     693052415
...   ...   ...      ... ...       ...           ...           ...
9995  9996   US  Waterford  ...  -83.3554    1144498560    1144498687
9996  9997   US  Waterford  ...  -83.3554    1144498816    1144499199
9997  9998   US  Waterford  ...  -83.3554    1144555136    1144555263
9998  9999   US  Waterford  ...  -83.3554    1144881664    1144881791
9999  10000   US  Waterford  ...  -83.3554    1171565568    1171566079

[10000 rows x 8 columns]
Export XML
Store XML: C:/VKHCG/02-Krennwallner/01-Retrieve/01-EDS/02-Python/Retrieve_Online_Visitor.xml
Raw XML Data Frame
Rows : 10000
Columns : 8
      ID Country Place_Name  ... Longitude First_IP_Number Last_IP_Number
0      1   BW  Gaborone  ...  25.9119     692781056     692781567
1      2   BW  Gaborone  ...  25.9119     692781824     692783103
2      3   BW  Gaborone  ...  25.9119     692909056     692909311
3      4   BW  Gaborone  ...  25.9119     692909568     692910079
4      5   BW  Gaborone  ...  25.9119     693051392     693052415
...   ...   ...      ... ...       ...           ...           ...
9995  9996   US  Waterford  ...  -83.3554    1144498560    1144498687
9996  9997   US  Waterford  ...  -83.3554    1144498816    1144499199
9997  9998   US  Waterford  ...  -83.3554    1144555136    1144555263
9998  9999   US  Waterford  ...  -83.3554    1144881664    1144881791
9999  10000   US  Waterford  ...  -83.3554    1171565568    1171566079

[10000 rows x 8 columns]
Deduplicated XML Data Frame
Rows : 10000
Columns : 8
      ID Country Place_Name  ... Longitude First_IP_Number Last_IP_Number
0      1   BW  Gaborone  ...  25.9119     692781056     692781567
1      2   BW  Gaborone  ...  25.9119     692781824     692783103
2      3   BW  Gaborone  ...  25.9119     692909056     692909311
3      4   BW  Gaborone  ...  25.9119     692909568     692910079
4      5   BW  Gaborone  ...  25.9119     693051392     693052415
...   ...   ...      ... ...       ...           ...           ...
9995  9996   US  Waterford  ...  -83.3554    1144498560    1144498687
9996  9997   US  Waterford  ...  -83.3554    1144498816    1144499199
9997  9998   US  Waterford  ...  -83.3554    1144555136    1144555263
9998  9999   US  Waterford  ...  -83.3554    1144881664    1144881791
9999  10000   US  Waterford  ...  -83.3554    1171565568    1171566079

[10000 rows x 8 columns]
```

Practical NO :- 22

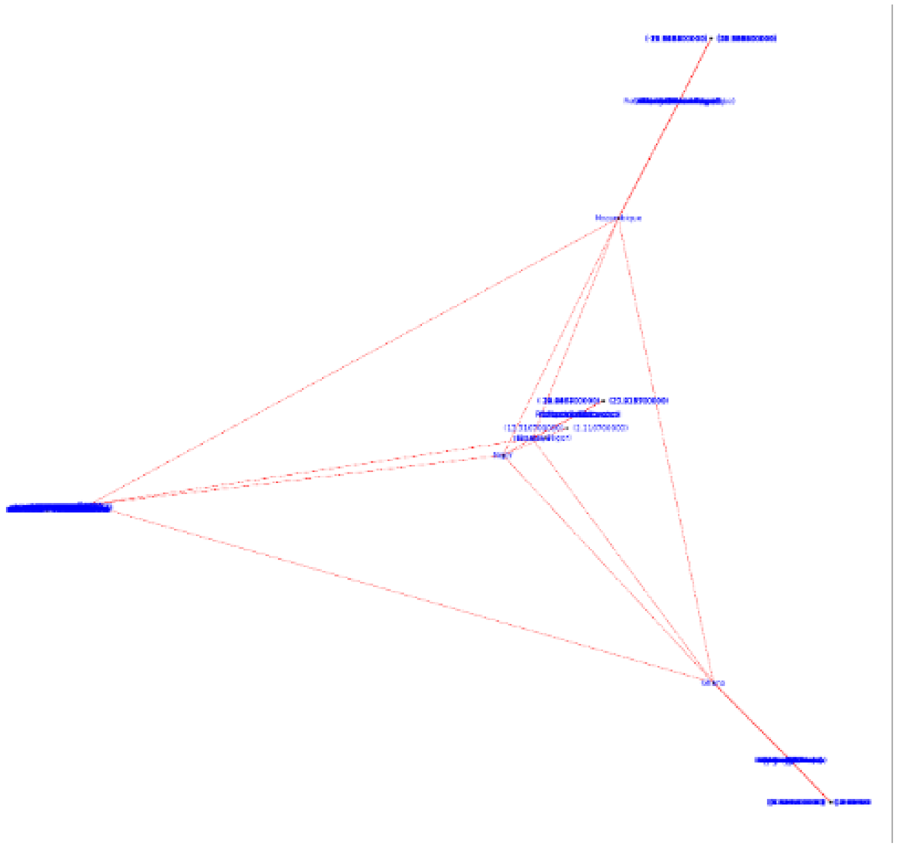
Aim:- Write the python/R program to create the network routing diagram from the Data on routers.

Code:-

```
import sys

import os

import pandas as pd

import networkx as nx

import matplotlib.pyplot as plt

pd.options.mode.chained_assignment = None

if sys.platform == 'linux':

    Base=os.path.expanduser('~') + 'VKHCG'

else:

    Base='C:/VKHCG'

print('###################################')

print('Working Base :',Base, ' using ', sys.platform)

print('###################################')

sInputFileName='02-Assess/01-EDS/02-Python/Assess-Network-Routing-Customer.csv'

sOutputFileName1='06-Report/01-EDS/02-Python/Report-Network-Routing-Customer.gml'

sOutputFileName2='06-Report/01-EDS/02-Python/Report-Network-Routing-Customer.png'

Company='01-Vermeulen'

### Import Country Data

sFileName=Base + '/' + Company + '/' + sInputFileName

print('###################################')

print('Loading :',sFileName)
print('##################################')

CustomerDataRaw=pd.read_csv(sFileName,header=0,low_memory=False, encoding="latin-1")

CustomerData=CustomerDataRaw.head(100)

print('Loaded Country:',CustomerData.columns.values)

print('##################################')

print(CustomerData.head())

print(CustomerData.shape)

G=nx.Graph()

for i in range(CustomerData.shape[0]):

   for j in range(CustomerData.shape[0]):

      Node0=CustomerData['Customer_Country_Name'][i]

      Node1=CustomerData['Customer_Country_Name'][j]

      if Node0 != Node1:

         G.add_edge(Node0,Node1)

for i in range(CustomerData.shape[0]):

   Node0=CustomerData['Customer_Country_Name'][i]

   Node1=CustomerData['Customer_Place_Name'][i] + '('+
CustomerData['Customer_Country_Name'][i] + ')'

   Node2='('+ "{:.9f}".format(CustomerData['Customer_Latitude'][i]) + ')\

   ('+ "{:.9f}".format(CustomerData['Customer_Longitude'][i]) + ')'

   if Node0 != Node1:

      G.add_edge(Node0,Node1)

   if Node1 != Node2:

      G.add_edge(Node1,Node2)

print('Nodes:', G.number_of_nodes())
print('Edges:', G.number_of_edges())

sFileName=Base + '/' + Company + '/' + sOutputFileName1

print('##################################')

print('Storing :',sFileName)

print('##################################')

nx.write_gml(G, sFileName)

sFileName=Base + '/' + Company + '/' + sOutputFileName2

print('##################################')

print('Storing Graph Image:',sFileName)

print('##################################')

plt.figure(figsize=(25, 25))

pos=nx.spectral_layout(G,dim=2)

nx.draw_networkx_nodes(G,pos, node_color='k', node_size=10, alpha=0.8)

nx.draw_networkx_edges(G, pos,edge_color='r', arrows=False, style='dashed')

nx.draw_networkx_labels(G,pos,font_size=12,font_family='sans-serif',font_color='b')

plt.axis('off')

plt.savefig(sFileName,dpi=600)

plt.show()

print('##################################')

print('### Done!! ######################')

print('##################################')
```

Output:-

```
################################
Working Base : C:/VKHCG  using  win32
################################
################################
Loading : C:/VKHCG/01-Vermeulen/02-Assess/01-EDS/02-Python/Assess-Network-Routing-Customer.csv
################################
Loaded Country: ['Customer_Country_Code' 'Customer_Place_Name' 'Customer_Latitude'
 'Customer_Longitude' 'Customer_Country_Name']
################################
  Customer_Country_Code Customer_Place_Name  Customer_Latitude  \
0                    BW            Gaborone           -24.6464
1                    BW         Francistown           -21.1667
2                    BW                Maun           -19.9833
3                    BW          Molepolole           -24.4167
4                    NE              Niamey            13.5167

   Customer_Longitude Customer_Country_Name
0             25.9119              Botswana
1             27.5167              Botswana
2             23.4167              Botswana
3             25.5333              Botswana
4              2.1167                 Niger
(100, 5)
Nodes: 205
Edges: 210
################################
Storing : C:/VKHCG/01-Vermeulen/06-Report/01-EDS/02-Python/Report-Network-Routing-Customer.gml
################################
################################
Storing Graph Image: C:/VKHCG/01-Vermeulen/06-Report/01-EDS/02-Python/Report-Network-Routing-Customer.png
################################
```



Practical NO :- 23

Aim:- Perform Linear Regression.

Code:-

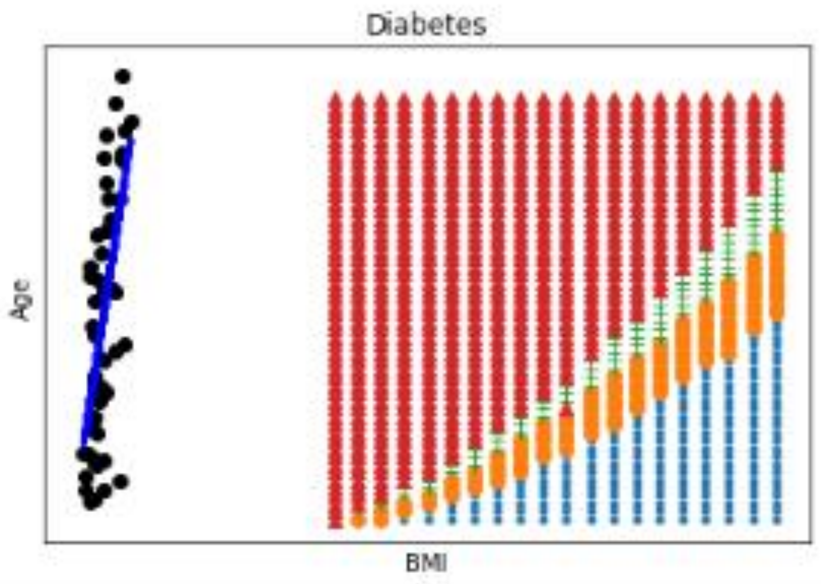
```
import sys

import os

import pandas as pd

import sqlite3 as sq

import matplotlib.pyplot as plt

import numpy as np

from sklearn import datasets, linear_model

from sklearn.metrics import mean_squared_error, r2_score

from collections import OrderedDict

person_data = []

t = 0

tMax = ((300 - 100) / 10) * ((300 - 30) / 5)

for heightSelect in range(100, 300, 10):

    for weightSelect in range(30, 300, 5):

        height = round(heightSelect / 100, 3)

        weight = int(weightSelect)

        bmi = weight / (height * height)

        if bmi <= 18.5:

            BMI_Result = 1

        elif bmi > 18.5 and bmi < 25:

            BMI_Result = 2

        elif bmi > 25 and bmi < 30:
            BMI_Result = 3
        else:
            BMI_Result = 4
        person_data.append({
            'PersonID': str(t),
            'Height': height,
            'Weight': weight,
            'bmi': bmi,
            'Indicator': BMI_Result
        })
        t += 1
        print('Row:', t, 'of', tMax)
        DimPerson = pd.DataFrame(person_data)
        DimPersonIndex = DimPerson.set_index(['PersonID'], inplace=False)
    sTable = 'Transform-BMI'
    print('Storing :',sDatabaseName,'\n Table:',sTable)
    DimPersonIndex.to_sql(sTable, conn1, if_exists="replace")
    sTable = 'Person-Satellite-BMI'
    print('Storing :',sDatabaseName,'\n Table:',sTable)
    DimPersonIndex.to_sql(sTable, conn2, if_exists="replace")
    sTable = 'Dim-BMI'
    print('Storing :',sDatabaseName,'\n Table:',sTable)
    DimPersonIndex.to_sql(sTable, conn3, if_exists="replace")
    fig = plt.figure()
    PlotPerson=DimPerson[DimPerson['Indicator']==1]
```

```
x=PlotPerson['Height']
y=PlotPerson['Weight']
plt.plot(x, y, ".")
PlotPerson=DimPerson[DimPerson['Indicator']==2]
x=PlotPerson['Height']
y=PlotPerson['Weight']
plt.plot(x, y, "o")
PlotPerson=DimPerson[DimPerson['Indicator']==3]
x=PlotPerson['Height']
y=PlotPerson['Weight']
plt.plot(x, y, "+")
PlotPerson=DimPerson[DimPerson['Indicator']==4]
x=PlotPerson['Height']
y=PlotPerson['Weight']
plt.plot(x, y, "^")
plt.axis('tight')
plt.title("BMI Curve")
plt.xlabel("Height(meters)")
plt.ylabel("Weight(kg)")
plt.plot()
diabetes = datasets.load_diabetes()
diabetes_X = diabetes.data[:, np.newaxis, 2]
diabetes_X_train = diabetes_X[:-30]
diabetes_X_test = diabetes_X[-50:]
diabetes_y_train = diabetes.target[:-30]
```

```
diabetes_y_test = diabetes.target[-50:]

regr = linear_model.LinearRegression()

regr.fit(diabetes_X_train, diabetes_y_train)

diabetes_y_pred = regr.predict(diabetes_X_test)

print('Coefficients: \n', regr.coef_)

print("Mean squared error: %.2f"

% mean_squared_error(diabetes_y_test, diabetes_y_pred))

print('Variance score: %.2f' % r2_score(diabetes_y_test, diabetes_y_pred))

plt.scatter(diabetes_X_test, diabetes_y_test, color='black')

plt.plot(diabetes_X_test, diabetes_y_pred, color='blue', linewidth=3)

plt.xticks(())

plt.yticks(())

plt.axis('tight')

plt.title("Diabetes")

plt.xlabel("BMI")

plt.ylabel("Age")

plt.show()
```

Output:-

```
Row: 1070 of 1080.0
Row: 1071 of 1080.0
Row: 1072 of 1080.0
Row: 1073 of 1080.0
Row: 1074 of 1080.0
Row: 1075 of 1080.0
Row: 1076 of 1080.0
Row: 1077 of 1080.0
Row: 1078 of 1080.0
Row: 1079 of 1080.0
Row: 1080 of 1080.0

##################################
Storing : C:/VKHCG/99-DW/datawarehouse.db
 Table: Transform-BMI


##################################
Storing : C:/VKHCG/99-DW/datawarehouse.db
 Table: Person-Satellite-BMI

##################################

##################################
Storing : C:/VKHCG/99-DW/datawarehouse.db
 Table: Dim-BMI

##################################
Coefficients:
 [941.43097333]
Mean squared error: 3477.50
Variance score: 0.41
```


Diabetes
Age
BMI