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180905330
DS Lab End Sem

Q1)
Write a socket program in python using TCP :Client should send a number to the server. Server should find the sumof even digitsand return the result to the client.

client.py:

```
import socket


number = int(input('Enter number to send  '))

server_address=('127.0.0.1',8000)

client_sock =socket.socket(socket.AF_INET,socket.SOCK_STREAM)

client_sock.connect(server_address)

client_sock.send(str(number).encode())

data=client_sock.recv(1024)

data=data.decode()

print(f'Recieved {data} from server')
```

server.py:

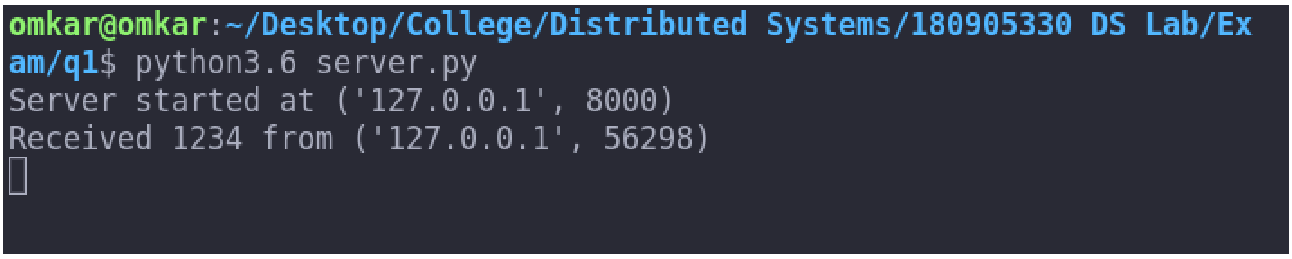
```
import socket


def find_sum(number:str)->int:
    sum =0
    for digit in number:
        digit=int(digit)
        if digit%2==0:
            sum+=digit

    return sum


address=('127.0.0.1',8000)

server_sock=socket.socket(socket.AF_INET,socket.SOCK_STREAM)

server_sock.bind(address)
```

```
print(f'Server started at {address}')

server_sock.listen(1)

try:
    while True:
        acc_socket,addr=server_sock.accept()
        message=acc_socket.recv(1024)

        print(f'Received {message.decode()} from {addr}')

        num=message.decode()
        sum=find_sum(num)

        acc_socket.send(str(sum).encode())

except KeyboardInterrupt:
    print('\nClosing server')
    server_sock.close()
```

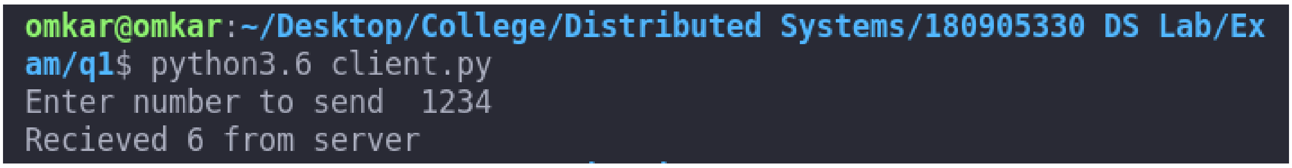
Logic Used:

Client is a normal client which is making a TCP Connection to the server and waiting for a reply from the server

Server is binding to address 127.0.0.1:8000 and accepting connections on the same through TCP connections. When it accepts a connection, it accepts the data it has received. The function find_sum(number:str) accepts a number in the string format and return an integer which is the desired sum. It computes the sum of all the digits which are even.



```
omkar@omkar:~/Desktop/College/Distributed Systems/180905330 DS Lab/Exam/q1$ python3.6 server.py
Server started at ('127.0.0.1', 8000)
Received 1234 from ('127.0.0.1', 56298)
```



```
omkar@omkar:~/Desktop/College/Distributed Systems/180905330 DS Lab/Exam/q1$ python3.6 client.py
Enter number to send  1234
Recieved 6 from server
```

Q2)
Write a map reduce program that returns the total numberof confirmedCovid casesfor each Country/ Regionin the dataset covid_data_lab_ds.csv

mapper.py:

```
import pandas as pd
import numpy as np

df=pd.read_csv('covid_data_lab_ds.csv')

#Data Preprocessing
df=df.drop(labels=['SNo','ObservationDate','Province/State','Last
Update','Deaths','Recovered'],axis=1)

df.dropna(inplace=True)

#Mapping
for index,row in df.iterrows():
   print(f"{row['Country/Region']}\t{int(row['Confirmed'])}")
```

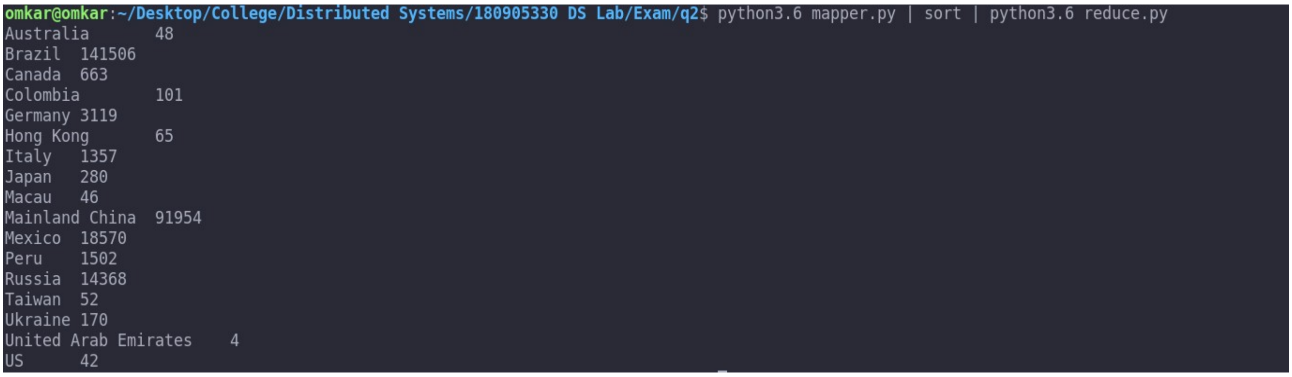
reduce.py:

```
import sys

import sys
mappings= {}

for data in sys.stdin:

   country,count = data.strip().split('\t')
   count =int(count)
   mappings[country] = mappings.get(country,0)+count

for country,count in mappings.items():
   print(f"{country}\t{count}")
```

Logic used:

In the mapper function, I am first reading the csv file into a dataframe using pandas. Then i am preprocessing the data by first dropping all columns which are not required and then dropping all NaN rows.

In the reducer, I am computing the sum of all ‘Confirmed’ based on the ‘Country/Region’.



```
omkar@omkar:~/Desktop/College/Distributed Systems/180905330 DS Lab/Exam/q2$ python3.6 mapper.py | sort | python3.6 reduce.py
Australia       48
Brazil  141506
Canada  663
Colombia        101
Germany 3119
Hong Kong       65
Italy   1357
Japan   280
Macau   46
Mainland China  91954
Mexico  18570
Peru    1502
Russia  14368
Taiwan  52
Ukraine 170
United Arab Emirates    4
US      42
```