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1BM19CS138

CYCLE 2

Computer Networks Lab

1 Write a program for error detecting code using CRC-CCITT (16-bits).

Program :

```
def xor1(a, b):
x = ""
   # print(len(a),len(b))
for i in range(1, len(a)):
if a[i] == b[i]:
         x += "0"
else:          x
+= "1"
   return x

def modulo2(divident, divisor):
   divlen = len(divisor)
temp = divident[0:divlen]
   # print(temp)    while(divlen
< len(divident)):
      if temp[0] == "1":
         temp = xor1(temp, divisor)+divident[divlen]
else:
         temp = temp[1:divlen]+divident[divlen]
      # print(temp)       divlen
+= 1    # print(temp)    if
temp[0] == "1":       temp =
xor1(temp, divisor)
      # return "0"+temp    #
print(len(temp),)    if
len(temp) < len(divisor):
      return "0"+temp
return temp
```

```
def encode(data, key):
   append = data+"0"*(len(key))
   # print(code)     rem =
modulo2(append, key)
print("remaindar="+rem)
code = data+rem
   print("code="+code)

   # Checking the logic:

   rem = modulo2(code, key)     print("Remaindar we get when
we do not have error="+rem)
   code = code.replace("011", "101")     rem =
modulo2(code, key)     print("Remaindar we get when
we have error="+rem)


def polytobin(string):
   keys = []
key = ""     for i
in string:        if
i == '+':
          keys.append(int(key[1:]))
key = ""           continue        key
+= i     if key != "":
       keys.append(0)     bina =
""     j = 0     print(keys)     for i
in range(keys[0], -1, -1):        if
i == (keys[j]):           bina +=
"1"           j += 1        else:
          bina += "0"
print(bina)     return
bina string =
input("Enter the
key polynomial:\n")
key =
polytobin(string)
string =
input("Enter the
```

data
polynomial:\n")
data =
polytobin(string)
print(key, data)
encode(data, key)

Output:

```
Enter the frame bits:1011
Message after appending 16 zeros:1011000000000000000
generator:10001000000100001

intermediate remainder

remainder 1:01110000001000010
remainder 2:11100000010000100
remainder 3:11010000101001010
remainder 4:1011000101101011

quotient:1011
transmitted frame:10111011000101101011
Enter transmitted frame:10111011000101101111
CRC checking

intermediate remainder

remainder 1:01100110000011001
remainder 2:11001100000110011
remainder 3:10001000000100101
remainder 4:00000000000000100

last remainder:00000000000000100Error during transmission

...Program finished with exit code 0
Press ENTER to exit console.
```

2 Write a program for distance vector algorithm to find suitable path for transmission.

Program :

```
class Graph:

    def __init__(self, vertices):
        self.V = vertices
        self.graph = []


    def add_edge(self, s, d, w):
        self.graph.append([s, d, w])


    def print_solution(self, dist, src, next_hop):
        print("Routing table for ", src)
print("Dest \t Cost \t Next Hop")        for
i in range(self.V):
            print("{0} \t {1} \t {2}".format(i, dist[i], next_hop[i]))

    def bellman_ford(self, src):

        dist = [99] * self.V        dist[src] = 0
next_hop = {src: src}        for _ in range(self.V -
1):            for s, d, w in self.graph:                if
dist[s] != 99 and dist[s] + w < dist[d]:
                    dist[d] = dist[s] + w
if s == src:
                        next_hop[d] =d
elif s in next_hop:
                        next_hop[d] = next_hop[s]

        for s, d, w in self.graph:
            if dist[s] != 99 and dist[s] + w < dist[d]:
                print("Graph contains negative weight cycle")
return
```

```
        self.print_solution(dist, src, next_hop)


def main():     matrix = []     print("Enter the no. of
routers:")     n = int(input())     print("Enter the adjacency
matrix : Enter 99 for infinity")     for i in range(0,n):         a =
list(map(int, input().split(" ")))         matrix.append(a)

    g = Graph(n)     for i
in range(0,n):         for j
in range(0,n):
            g.add_edge(i,j,matrix[i][j])

    for k in range(0, n):
        g.bellman_ford(k)

main()
```

Output:

```
Enter the number of connections: 6
Enter [src] [dest] [cost]: A B 1
Enter [src] [dest] [cost]: A C 5
Enter [src] [dest] [cost]: B C 3
Enter [src] [dest] [cost]: B E 9
Enter [src] [dest] [cost]: C D 4
Enter [src] [dest] [cost]: D E 2
Routing table for A:
Dest     Cost    Next Hop
B        1       B
C        4       B
D        8       B
E        10      B
A        0       A

Routing table for B:
Dest     Cost    Next Hop
A        1       A
C        3       C
D        7       C
E        9       E
B        0       B

Routing table for C:

show more (open the raw output data in a text editor) ...

B        9       B
C        6       D
D        2       D
E        0       E
```

3 Implement Dijkstra's algorithm to compute the shortest path for a given topology.

Program:

```
#include<bits/stdc++.h>
using namespace std;

#define V 5

int minDistance(int dist[], bool sptSet[])
{

   int min = 9999, min_index;

   for (int v = 0; v < V; v++)        if (sptSet[v]
== false && dist[v] <= min)            min =
dist[v], min_index = v;

   return min_index;
}

void printPath(int parent[], int j)
{
   if (parent[j] == - 1)
      return;

   printPath(parent, parent[j]);

   cout<<j<<" ";
}

void printSolution(int dist[], int n, int parent[])
{
   int src = 0;
   cout<<"Vertex\t Distance\tPath"<<endl;
for (int i = 1; i < V; i++)
   {
      cout<<"\n"<<src<<" -> "<<i<<" \t "<<dist[i]<<"\t\t"<<src<<" ";
printPath(parent, i);
```

```
   }
}
void dijkstra(int graph[V][V], int src)
{

   int dist[V];

   bool sptSet[V];

   int parent[V];

   for (int i = 0; i < V; i++)
   {
      parent[0] = -1;
dist[i] = 9999;
      sptSet[i] = false;
   }

   dist[src] = 0;

   for (int count = 0; count < V - 1; count++)
   {
      int u = minDistance(dist, sptSet);

      sptSet[u] = true;

      for (int v = 0; v < V; v++)

         if (!sptSet[v] && graph[u][v] &&
            dist[u] + graph[u][v] < dist[v])
         {
            parent[v] = u;              dist[v]
= dist[u] + graph[u][v];
         }
   }

   printSolution(dist, V, parent);
}

int main()
```

```
{
   int graph[V][V];    cout<<"Enter the graph (Enter 99 for
infinity): "<<endl;
   for(int i = 0; i<V; i++)
   {
      for(int j = 0; j<V; j++)
         cin>>graph[i][j];
   }
   cout<<"Enter the source: "<<endl;
int src;
   cin>>src;

   dijkstra(graph, src);
cout<<endl;    return
0;
}
```

Output:

```
Enter number of nodes in the topology: 5
Enter number of edges: 6
Enter [SRC] [DEST] [WEIGHT]: 0 1 2
Enter [SRC] [DEST] [WEIGHT]: 0 2 1
Enter [SRC] [DEST] [WEIGHT]: 0 3 4
Enter [SRC] [DEST] [WEIGHT]: 1 4 3
Enter [SRC] [DEST] [WEIGHT]: 2 4 1
Enter [SRC] [DEST] [WEIGHT]: 3 4 8
Enter [SRC] to find costs: 0
```

```
: g.dijkstra(src)
```

```
Vertex  Distance from Source
0        0
1        2
2        1
3        4
4        2
```

4 Write a program for congestion control using Leaky bucket algorithm.

Program :

```
#include<bits/stdc++.h>
#include<unistd.h> using
namespace std;
#define bucketSize 500

void bucketInput(int a,int b)
{
        if(a > bucketSize)
cout<<"\n\t\tBucket overflow";
        else{           sleep(5);               while(a > b){
cout<<"\n\t\t"<<b<<" bytes outputted.";
                        a-=b;
                        sleep(5);
                }
                if(a > 0)
                        cout<<"\n\t\tLast "<<a<<" bytes sent\t";
cout<<"\n\t\tBucket output successful";
        }
}
int main()
{
        int op,pktSize;
cout<<"Enter output rate : ";
        cin>>op;    for(int
i=1;i<=5;i++)

        {
                sleep(rand()%10);
                pktSize=rand()%700;
                cout<<"\nPacket no "<<i<<"\tPacket size = "<<pktSize;
                bucketInput(pktSize,op);
        }
        cout<<endl;
        return 0;
}
```

Output:

```
PS D:\codes\Artificial Inteligence Lab\CN> cd "d:\codes\Artificial Inteligence Lab\CN\" ;
 .\leeky }
Enter output rate : 100

Packet no 1     Packet size = 267
                100 bytes outputted.
                100 bytes outputted.
                Last 67 bytes sent
                Bucket output successful
Packet no 2     Packet size = 600
                Bucket overflow
Packet no 3     Packet size = 324
                100 bytes outputted.
                100 bytes outputted.
                100 bytes outputted.
                Last 24 bytes sent
                Bucket output successful
Packet no 4     Packet size = 658
                Bucket overflow
Packet no 5     Packet size = 664
                Bucket overflow
PS D:\codes\Artificial Inteligence Lab\CN>
```

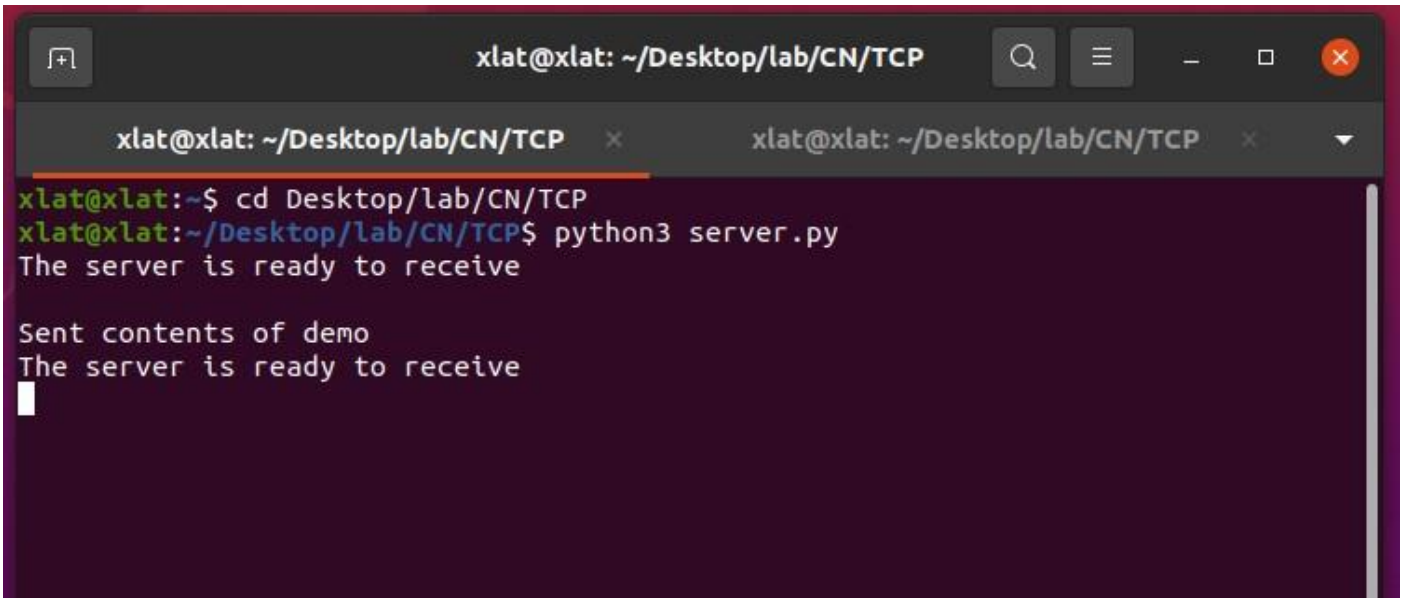
5 Using TCP/IP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.

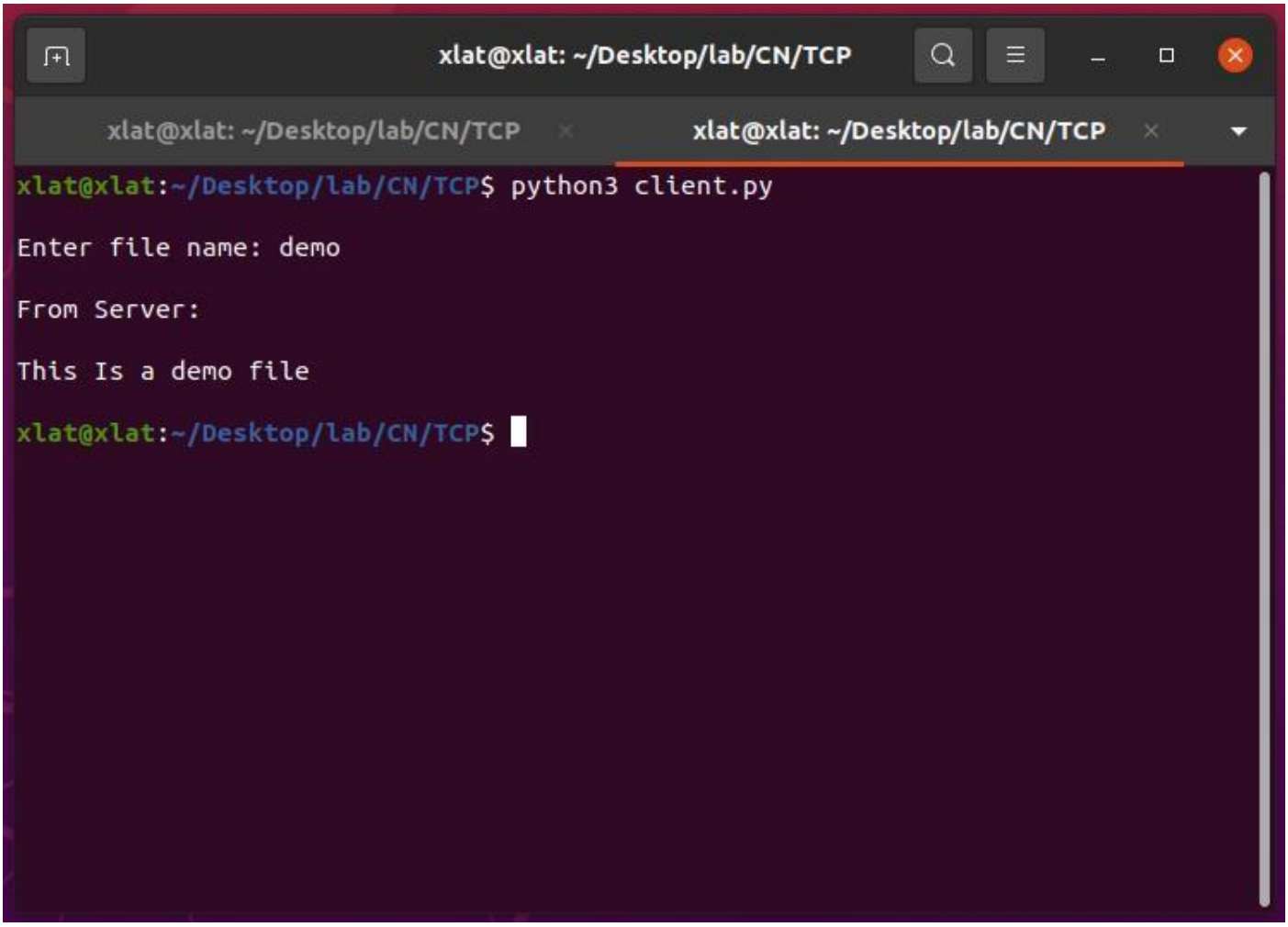
Program:

```
#Client.py from socket import * serverName =
“127.0.0.1” serverPort = 12000 clientSocket =
socket(AF_INET, SOCK_STREAM)
clientSocket.connect((serverName,serverPort))
sentence = input("Enter file name")
clientSocket.send(sentence.encode())
filecontents = clientSocket.recv(1024).decode()
print ('From Server:', filecontents)
clientSocket.close()

#Server.py from socket import *
serverName=”127.0.0.1” serverPort = 12000
serverSocket =
socket(AF_INET,SOCK_STREAM)
serverSocket.bind((serverName,serverPort))
serverSocket.listen(1) print ("The
server is ready to receive") while 1:
        connectionSocket, addr = serverSocket.accept()
        sentence =
        connectionSocket.recv(1024).decode()
        file=open(sentence,"r") l=file.read(1024)
        connectionSocket.send(l.encode()) file.close()
        connectionSocket.close()
```

Output:


xlat@xlat: ~/Desktop/lab/CN/TCP
xlat@xlat: ~/Desktop/lab/CN/TCP
xlat@xlat: ~/Desktop/lab/CN/TCP
xlat@xlat:~$ cd Desktop/lab/CN/TCP
xlat@xlat:~/Desktop/lab/CN/TCP$ python3 server.py
The server is ready to receive
Sent contents of demo
The server is ready to receive


xlat@xlat: ~/Desktop/lab/CN/TCP
xlat@xlat: ~/Desktop/lab/CN/TCP
xlat@xlat: ~/Desktop/lab/CN/TCP
xlat@xlat:~/Desktop/lab/CN/TCP$ python3 client.py
Enter file name: demo
From Server:
This Is a demo file
xlat@xlat:~/Desktop/lab/CN/TCP$

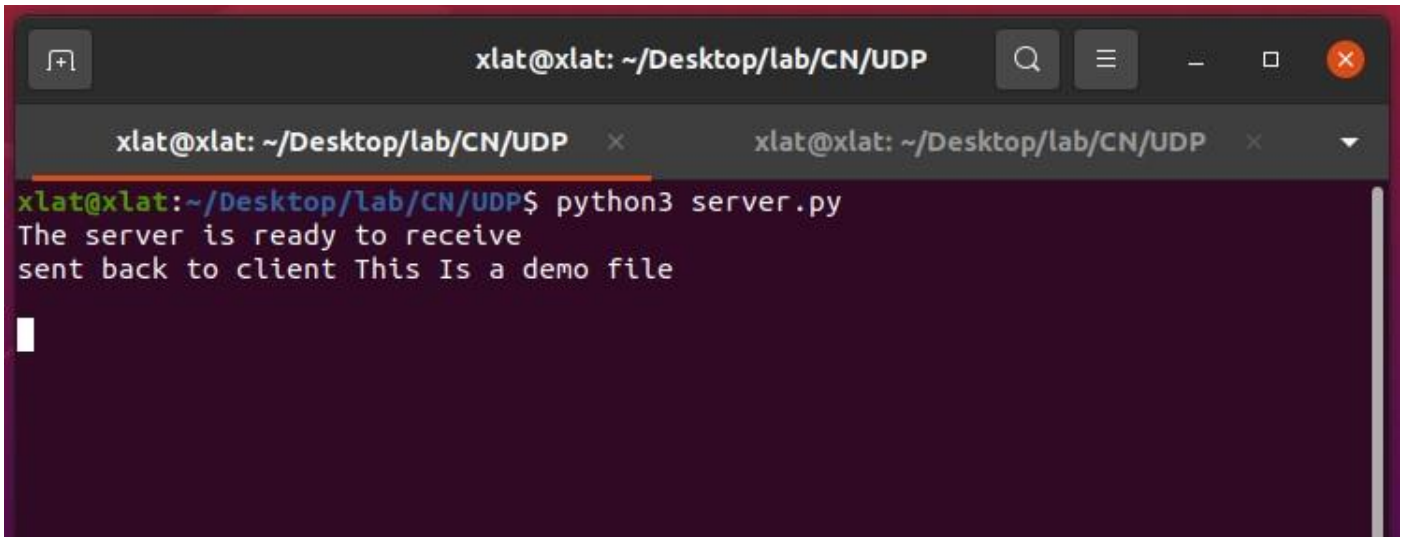
6 Using UDP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.

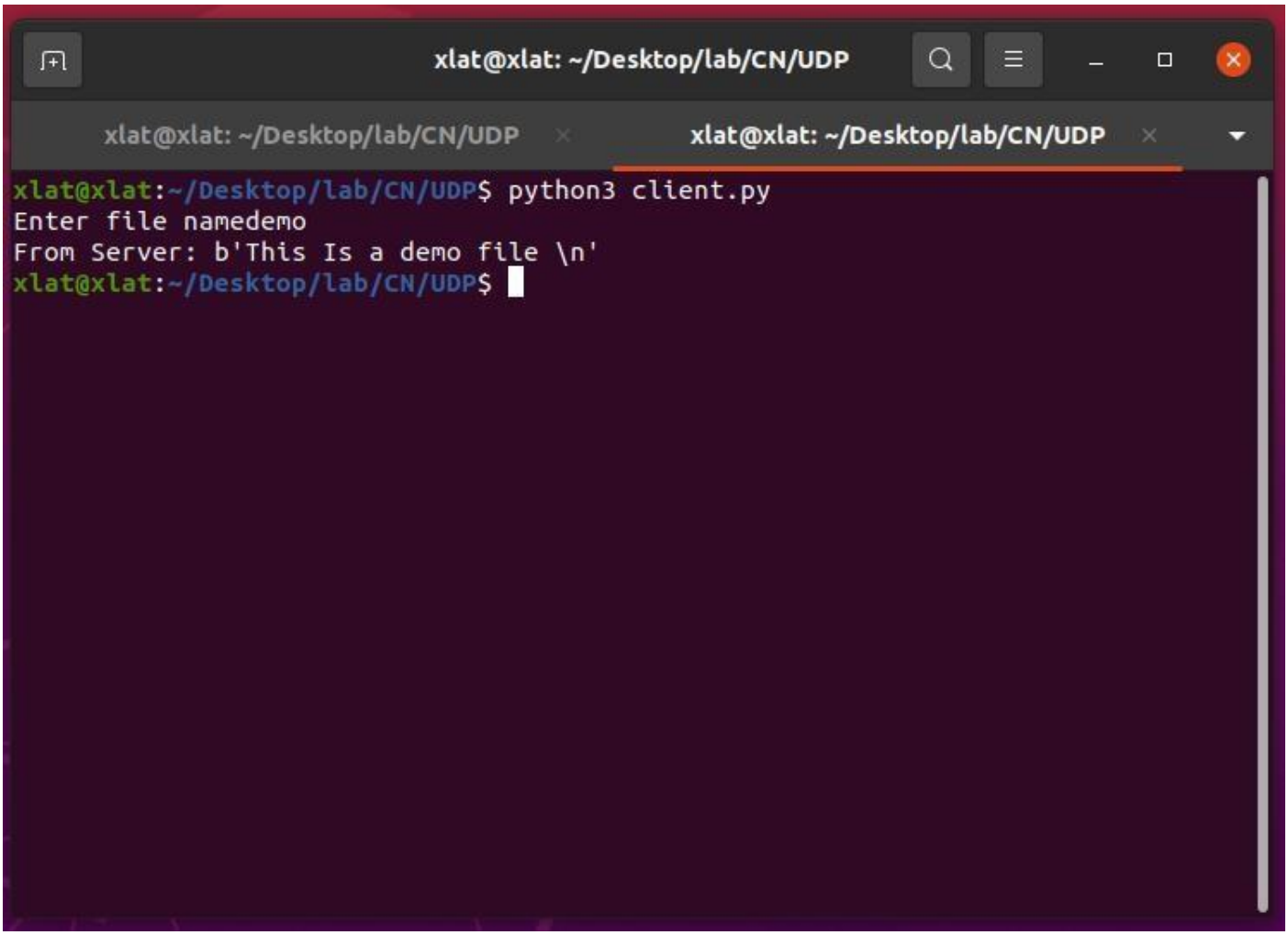
Program:

```
#ClientUDP.py from socket import *
serverName = "127.0.0.1" serverPort = 12000
clientSocket = socket(AF_INET, SOCK_DGRAM)
sentence = input("Enter file name") clientSocket.sendto(bytes(sentence,"utf-
8"),(serverName, serverPort)) filecontents,serverAddress =
clientSocket.recvfrom(2048)
print ('From Server:', filecontents)
clientSocket.close()


#ServerUDP.py from socket import * serverPort
= 12000 serverSocket = socket(AF_INET,
SOCK_DGRAM) serverSocket.bind(("127.0.0.1",
serverPort)) print ("The server is ready to
receive") while 1:
        sentence,clientAddress = serverSocket.recvfrom(2048)
        file=open(sentence,"r") l=file.read(2048)
        serverSocket.sendto(bytes(l,"utf-8"),clientAddress)
        print("sent back to client",l)
        file.close()
```

Output:


xlat@xlat: ~/Desktop/lab/CN/UDP
xlat@xlat: ~/Desktop/lab/CN/UDP
xlat@xlat: ~/Desktop/lab/CN/UDP
xlat@xlat:~/Desktop/lab/CN/UDP$ python3 server.py
The server is ready to receive
sent back to client This Is a demo file


xlat@xlat: ~/Desktop/lab/CN/UDP
xlat@xlat: ~/Desktop/lab/CN/UDP
xlat@xlat: ~/Desktop/lab/CN/UDP
xlat@xlat:~/Desktop/lab/CN/UDP$ python3 client.py
Enter file namedemo
From Server: b'This Is a demo file \n'
xlat@xlat:~/Desktop/lab/CN/UDP$