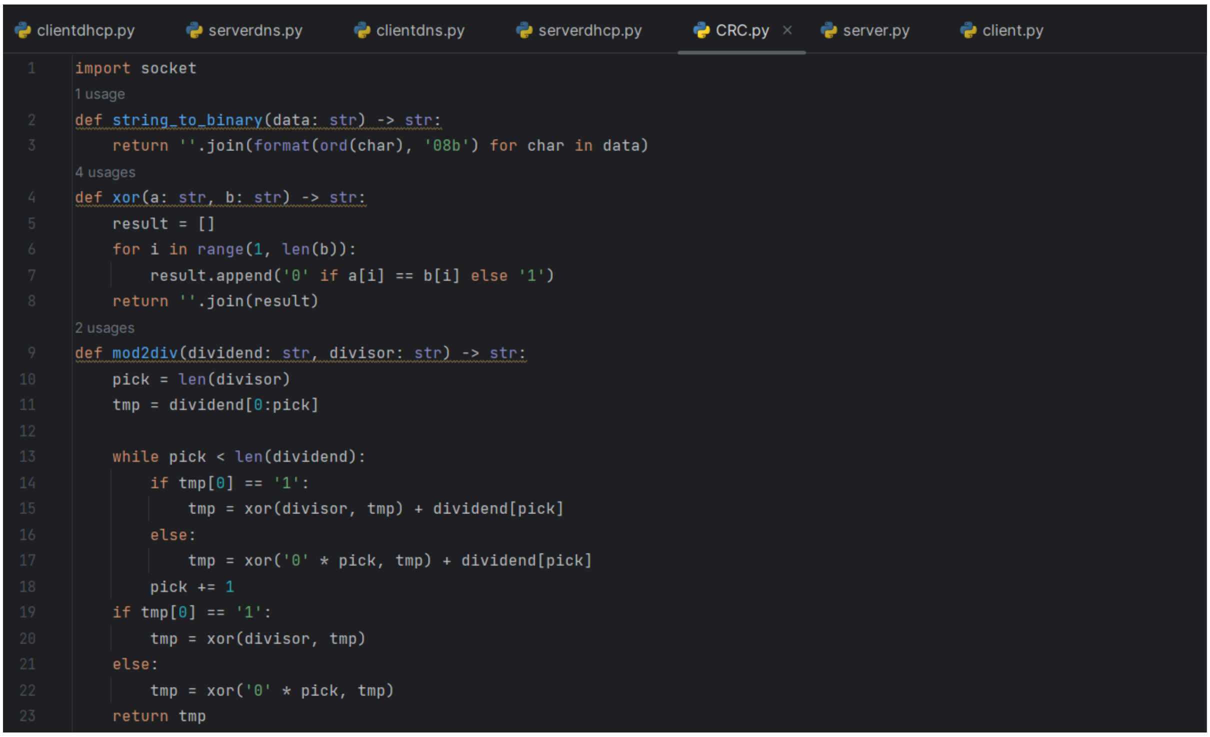
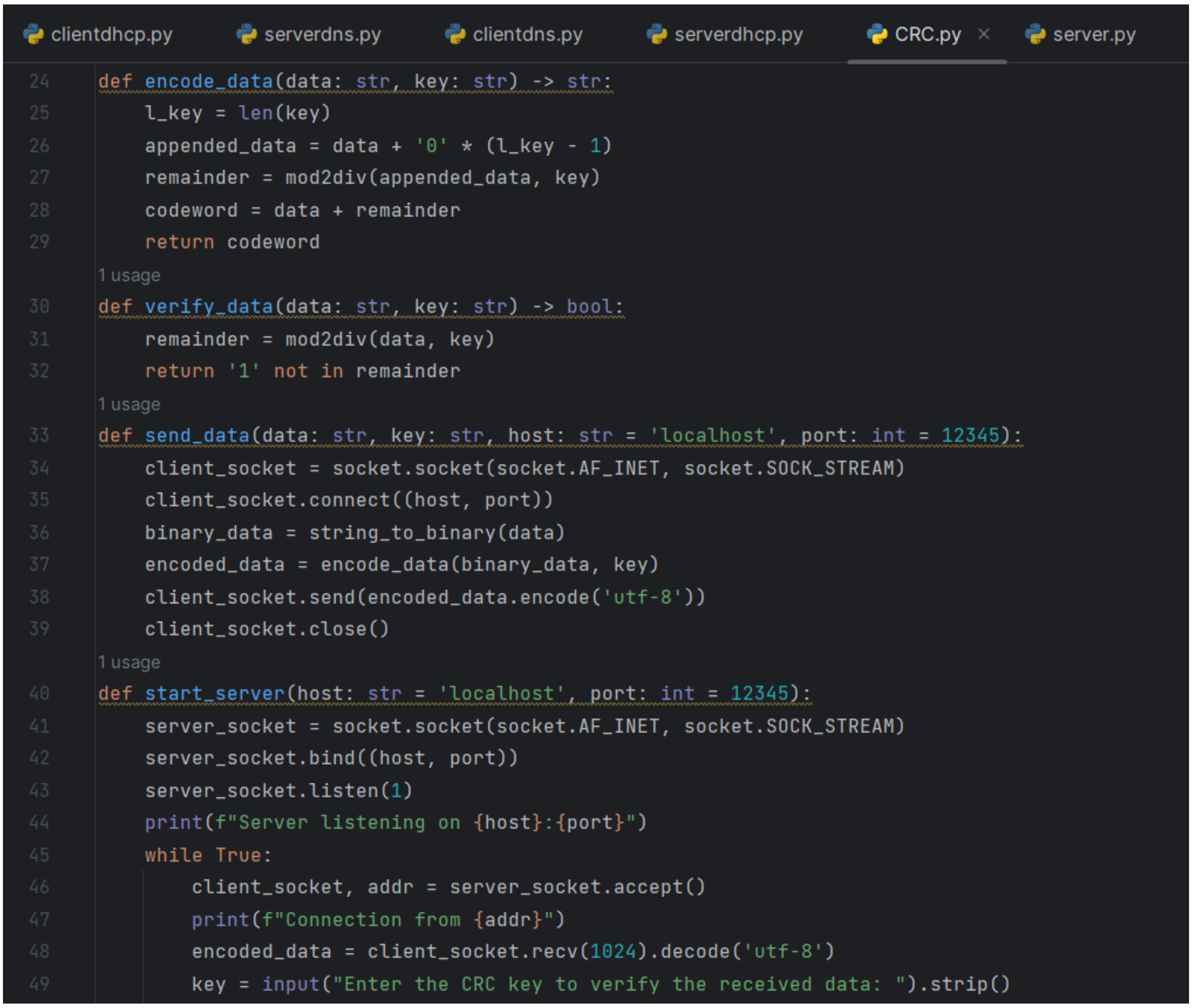
SERVER CRC

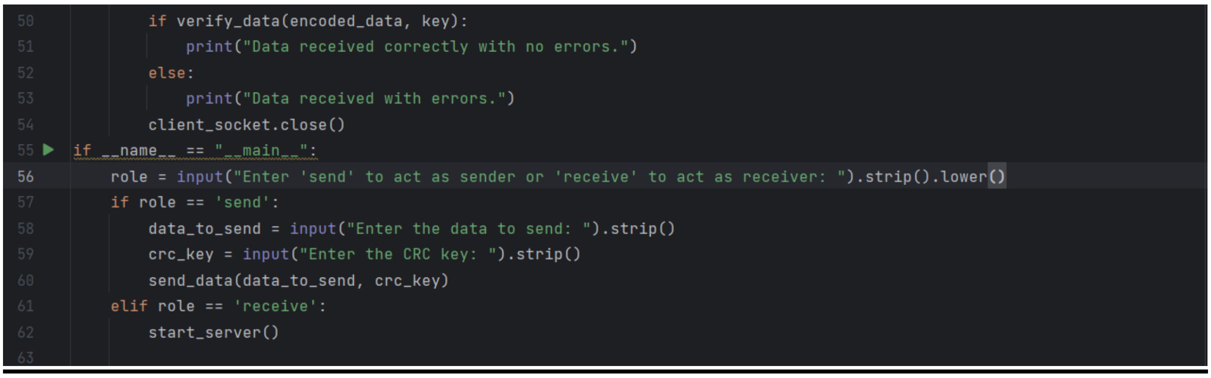


```python
import socket
def string_to_binary(data: str) -> str:
    return ''.join(format(ord(char), '08b') for char in data)
def xor(a: str, b: str) -> str:
    result = []
    for i in range(1, len(b)):
        result.append('0' if a[i] == b[i] else '1')
    return ''.join(result)
def mod2div(dividend: str, divisor: str) -> str:
    pick = len(divisor)
    tmp = dividend[0:pick]

    while pick < len(dividend):
        if tmp[0] == '1':
            tmp = xor(divisor, tmp) + dividend[pick]
        else:
            tmp = xor('0' * pick, tmp) + dividend[pick]
        pick += 1
    if tmp[0] == '1':
        tmp = xor(divisor, tmp)
    else:
        tmp = xor('0' * pick, tmp)
    return tmp
```

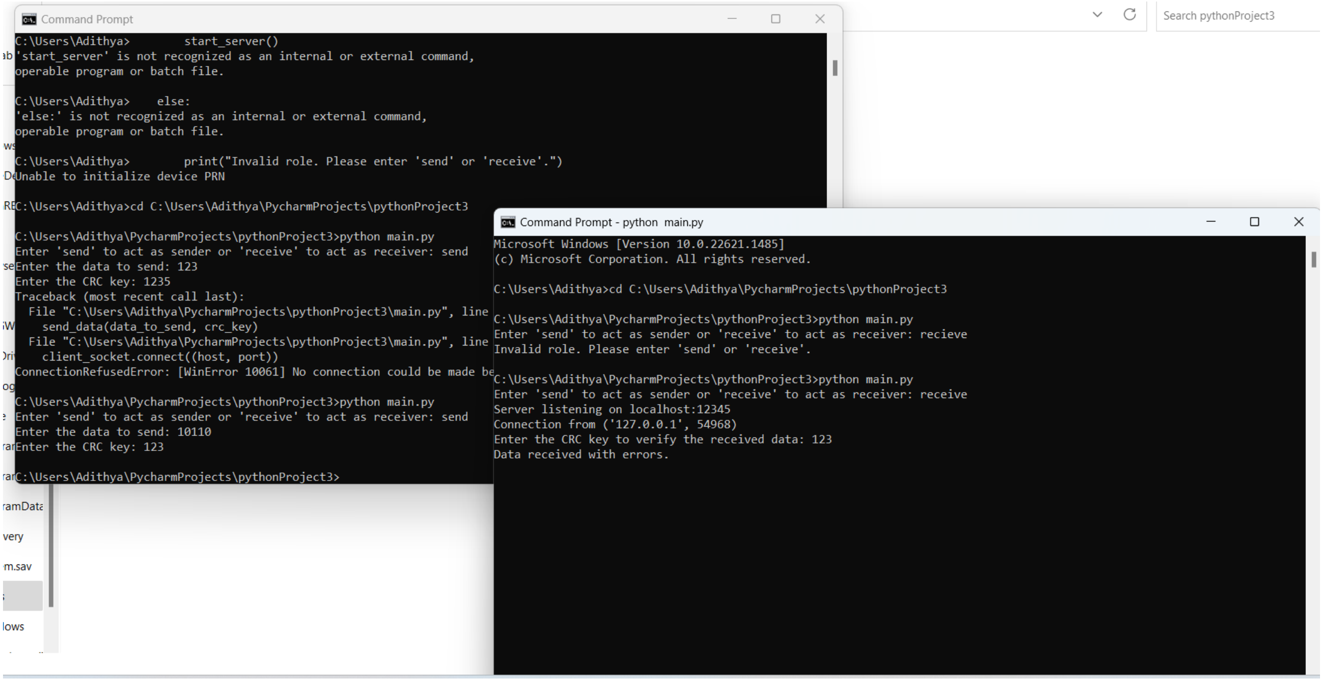


```python
def encode_data(data: str, key: str) -> str:
    l_key = len(key)
    appended_data = data + '0' * (l_key - 1)
    remainder = mod2div(appended_data, key)
    codeword = data + remainder
    return codeword
def verify_data(data: str, key: str) -> bool:
    remainder = mod2div(data, key)
    return '1' not in remainder
def send_data(data: str, key: str, host: str = 'localhost', port: int = 12345):
    client_socket = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
    client_socket.connect((host, port))
    binary_data = string_to_binary(data)
    encoded_data = encode_data(binary_data, key)
    client_socket.send(encoded_data.encode('utf-8'))
    client_socket.close()
def start_server(host: str = 'localhost', port: int = 12345):
    server_socket = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
    server_socket.bind((host, port))
    server_socket.listen(1)
    print(f"Server listening on {host}:{port}")
    while True:
        client_socket, addr = server_socket.accept()
        print(f"Connection from {addr}")
        encoded_data = client_socket.recv(1024).decode('utf-8')
        key = input("Enter the CRC key to verify the received data: ").strip()
```



```
        if verify_data(encoded_data, key):
            print("Data received correctly with no errors.")
        else:
            print("Data received with errors.")
        client_socket.close()
if __name__ == "__main__":
    role = input("Enter 'send' to act as sender or 'receive' to act as receiver: ").strip().lower()
    if role == 'send':
        data_to_send = input("Enter the data to send: ").strip()
        crc_key = input("Enter the CRC key: ").strip()
        send_data(data_to_send, crc_key)
    elif role == 'receive':
        start_server()
```

CRC OUTPUT



```
C:\Users\Adithya>        start_server()
'start_server' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\Adithya>    else:
'else:' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\Adithya>        print("Invalid role. Please enter 'send' or 'receive'.")
Unable to initialize device PRN

C:\Users\Adithya>cd C:\Users\Adithya\PycharmProjects\pythonProject3

C:\Users\Adithya\PycharmProjects\pythonProject3>python main.py
Enter 'send' to act as sender or 'receive' to act as receiver: send
Enter the data to send: 123
Enter the CRC key: 1235
Traceback (most recent call last):
  File "C:\Users\Adithya\PycharmProjects\pythonProject3\main.py", line
    send_data(data_to_send, crc_key)
  File "C:\Users\Adithya\PycharmProjects\pythonProject3\main.py", line
    client_socket.connect((host, port))
ConnectionRefusedError: [WinError 10061] No connection could be made be

C:\Users\Adithya\PycharmProjects\pythonProject3>python main.py
Enter 'send' to act as sender or 'receive' to act as receiver: send
Enter the data to send: 10110
Enter the CRC key: 123

C:\Users\Adithya\PycharmProjects\pythonProject3>
```

```
Microsoft Windows [Version 10.0.22621.1485]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Adithya>cd C:\Users\Adithya\PycharmProjects\pythonProject3

C:\Users\Adithya\PycharmProjects\pythonProject3>python main.py
Enter 'send' to act as sender or 'receive' to act as receiver: recieve
Invalid role. Please enter 'send' or 'receive'.

C:\Users\Adithya\PycharmProjects\pythonProject3>python main.py
Enter 'send' to act as sender or 'receive' to act as receiver: receive
Server listening on localhost:12345
Connection from ('127.0.0.1', 54968)
Enter the CRC key to verify the received data: 123
Data received with errors.
```