IT Technology

Assignment 22
Synchronised transmission from client to server

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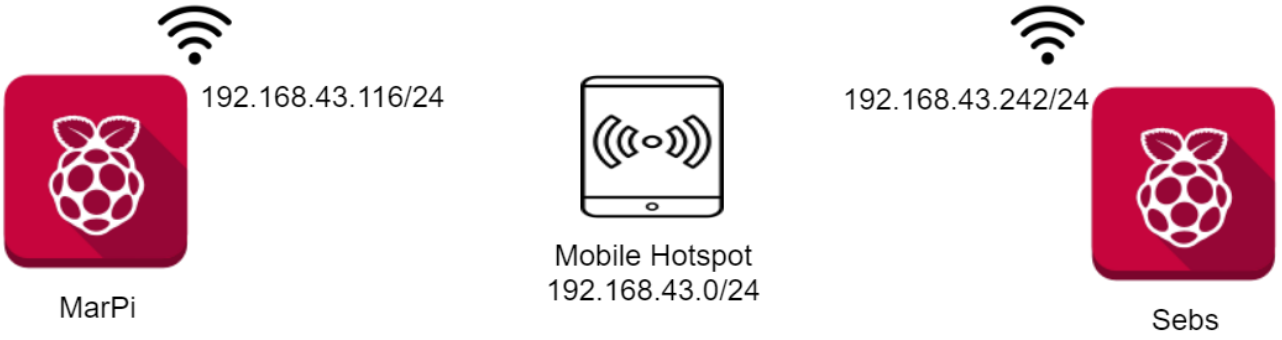
A network diagram with brief explanation

The diagram shows two Raspberry Pi's and a mobile hotspot. Each Pi can be either the server or the client and they are connected to the same mobile hotspot.

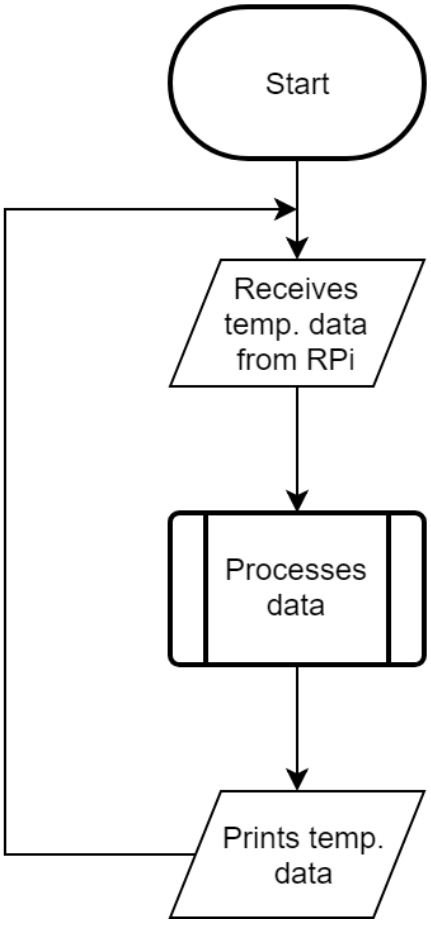


Illustrate graphically and explain the developed application layer protocol

The server receives the data one character at a time and saves each character to a list. It does this until it encounters the string “q” (short for quit) in the datastream. The server then removes the “q” entry from the list, and prints the list. It finally resets the list, emptying it.

To print the list, the server decodes every character and then prints the combined string.
The user can interrupt the program at any time.

See the code in the Appendix.

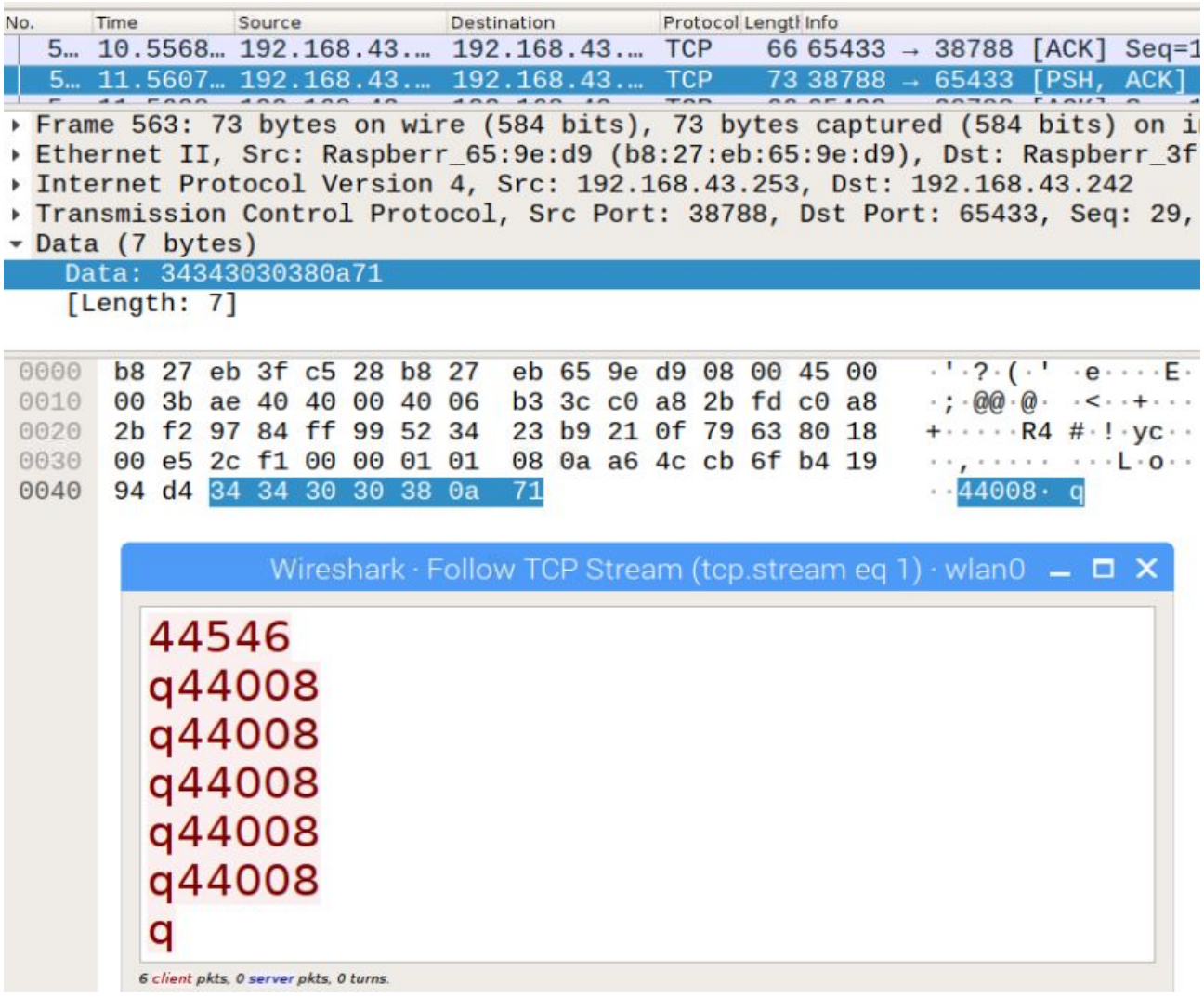


Show and explain the output from the server program when client and server are executed

The client sends the RPi's CPU temperature, between 0 and 100, every second. The server then prints the temperature converted like shown below.

```
pi@sebs:~/Documents/Networking/ass22 $ python3 server.py
Awaiting connection on IP:  0.0.0.0  Port:  65433
Connection from: ('192.168.43.253', 38790)
44.008
45.084
44.546
```

Show in Wireshark that the transmitted data can be monitored in plain text



Appendix

Client:

```
#!/usr/bin/env python3

import socket
from time import sleep
from random import randint

HOST = '192.168.43.242'      # The server's hostname or IP address
PORT = 65433            # The port to send data to on the server
mySensorReadings = 'go'  # The application layer protoll


def temperatureSensor():
   with open("/sys/class/thermal/thermal_zone0/temp", "r") as f:
       t = f.readline()

   #out = randint(0, 100)
   return str(t) + "q"


def pad(i):
   if len(i) == 1:
       return "00" + str(i)
   elif len(i) == 2:
       return "0" + str(i)
   else:
       return str(i)


s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
s.connect((HOST, PORT))

input("Press enter to begin")
while True:
   try:
       mySensorReadings = temperatureSensor()
       print(mySensorReadings)
       s.sendall(mySensorReadings.encode('utf-8'))
       sleep(1)

   except KeyboardInterrupt:
       s.close()
       exit()
```

Server:

```
#!/usr/bin/env python3
# TCP server. Will listen and receive data until client closes connection
# Adapted by Per dahlstrøm
import socket       # Fetch the socket module
from time import sleep

HOST = ''  # Standard loopback interface address (localhost)
PORT = 65433        # Port to listen on (non-privileged ports are > 1023)
receivedData = []


def decode(s):
    return s.decode('utf-8')


def processData(lst):
    return list(map(decode, lst))


try:
    s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
    s.bind((HOST, PORT))
    s.listen()
    print('Awaiting connection on IP: ', s.getsockname()[0],
          ' Port: ', s.getsockname()[1])
    connection, fromAddress = s.accept()  # Wait and create connection object
    print('Connection from:', fromAddress)
    while True:
        receivedData.append(connection.recv(1))
        if receivedData[-1].decode("utf-8") == "q":
            receivedData.pop()
            receivedData = processData(receivedData)
            print("".join(receivedData))
            receivedData = []


except Exception as e:
    print(e)
    connection.close()
    print('Connection closed')
    s.close()
    print('Socket closed')
```