

COMP 6320 Design and Analysis of Computer Networks

Programming Assignment 2 (Group, 100 pts)

A Programming Assignment (A Simple Datagram Forward Agent)

A Forward Agent

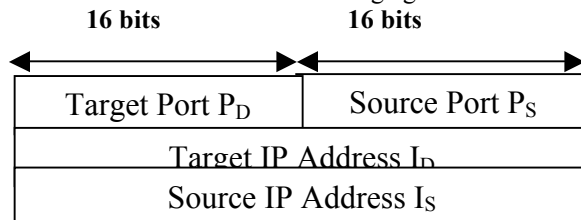
A network administrator (ill advised) wants to close all UDP ports for normal nodes. In order to send a UDP datagram, normal nodes must use a forward agent. As you will see, this forward agent will impose an extra layer to the transport layer. **Normal nodes can send only to UDP port (10100+GID) where GID is your group number.** If your GID is 25, then the port number must be 10125. Consider a message **M** to be sent to destination host D (with IP address I_D) on target port number P_D . The source machine S has IP address I_S and may be listening on port number P_S . The message **M** should not be sent directly to the destination. **The message M must be sent to the forward agent which will forward it to the destination.**

In order to achieve this, the message M must be encapsulated with a forwarding header **FHDR**.

UDP HDR	FHDR	Message M
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UDP HDR is the normal UDP header. It will be added through the system socket calls. The **FHDR** header must be built by you based on the following specifications.

The **FHDR** header of the forwarding agent **IS SPECIFIED** as follows :



When the forward agent gets the total datagram (FHDR + Message), it forwards it **AS IS** (FHDR + Message) to the destination host (including the header FHDR: this will allow the target to know the original sender of the message M).

Sender

Write a program in a language of your choice (other than C or C++) which :

- 1) takes as command line the forward agent's host name, the port number P_S , the receiver's host name and the port number P_D .
- 2) **Repetitively** prompts the user for a message M and sends the message M to the destination through the forward agent.

Students are advised to write a neat function which takes as parameters:

- 1) a message M,
- 2) the length of M,
- 3) the IP address I_D ,
- 4) the port P_D ,
- 5) the IP address of the source I_S ,
- 6) and the listening port number P_S .

This function must “compose and send the datagram which includes the forwarding header **FHDR** and the message M.

The listening P_S is the port on which the sender may be “listening” for incoming messages (for future labs). You must take $P_S = 10050 + \text{GID}$ where GID is your group number. If your GID is 25, then the port number must be 10075.

When the sender code is ready, name it `snd.XXX` (extension depends on your language)

Forwarding Agent

Write a program in C which:

- 1) Take a port number Fx as a command argument
- 2) Reads incoming datagrams on port number Fx (for your tests $Fx = 10100 + \text{GID}$)
- 3) Extracts I_D and P_D
- 4) Forwards the datagram AS IS (FHDR + Message) to the destination (I_D, P_D).

When the forward code is ready, name it `fwd.c`.

Receiver Agent

Write a program in a language of your choice (other than C or C++) which:

- 1) Take a port number P_D as a command argument
- 2) listens at port P_D . For tests, you must take $P_D = 10150 + \text{GID}$ where x is your group number.
- 3) Reads incoming datagrams
- 4) Extracts I_S , P_S , and the message M
- 5) Stores I_S , P_S , and the message M in a C structure.
- 6) Displays the message M, the hostname of the sender and the hostname of the forwarding agent.

When the receiver code is ready, call it `rec.XXX`.

NOTE: your sender code will be tested using receiver agent and forward agent codes from other groups. Make sure that you comply to the specifications. Make sure that the sender, forward, receiver agents can work on a mix of Intel, Sparc ..machines .. (Little Endian, Big Endian....)

What to turn in?

- 1) **Hard copy** of your lab report (with the code) with group id, students names and email addresses.
- 2) Electronic copy of your report and code. These sources codes named as shown above and your report must be put in a folder named lab1XX where XX is your group ID (on Canvas) by only one of the groupmates name. Zip the folder and post it on Canvas. Failing to submit the proper format will result in 25% penalty.
- 3) Your code **MUST** compile and execute on engineering machines tuxXYZ
- 4) Your report must:
 - a. state whether your code works
 - b. explain the TA how to compile and execute your code
 - c. Responses when applicable (quality of writing and presentation will greatly affect your final grade when your responses are correct).
 - d. report bugs/problems

If the TA is unable to access/compile/execute your work, no credit will be awarded.

If the turnin instructions are not followed, 25 pts will be deducted.