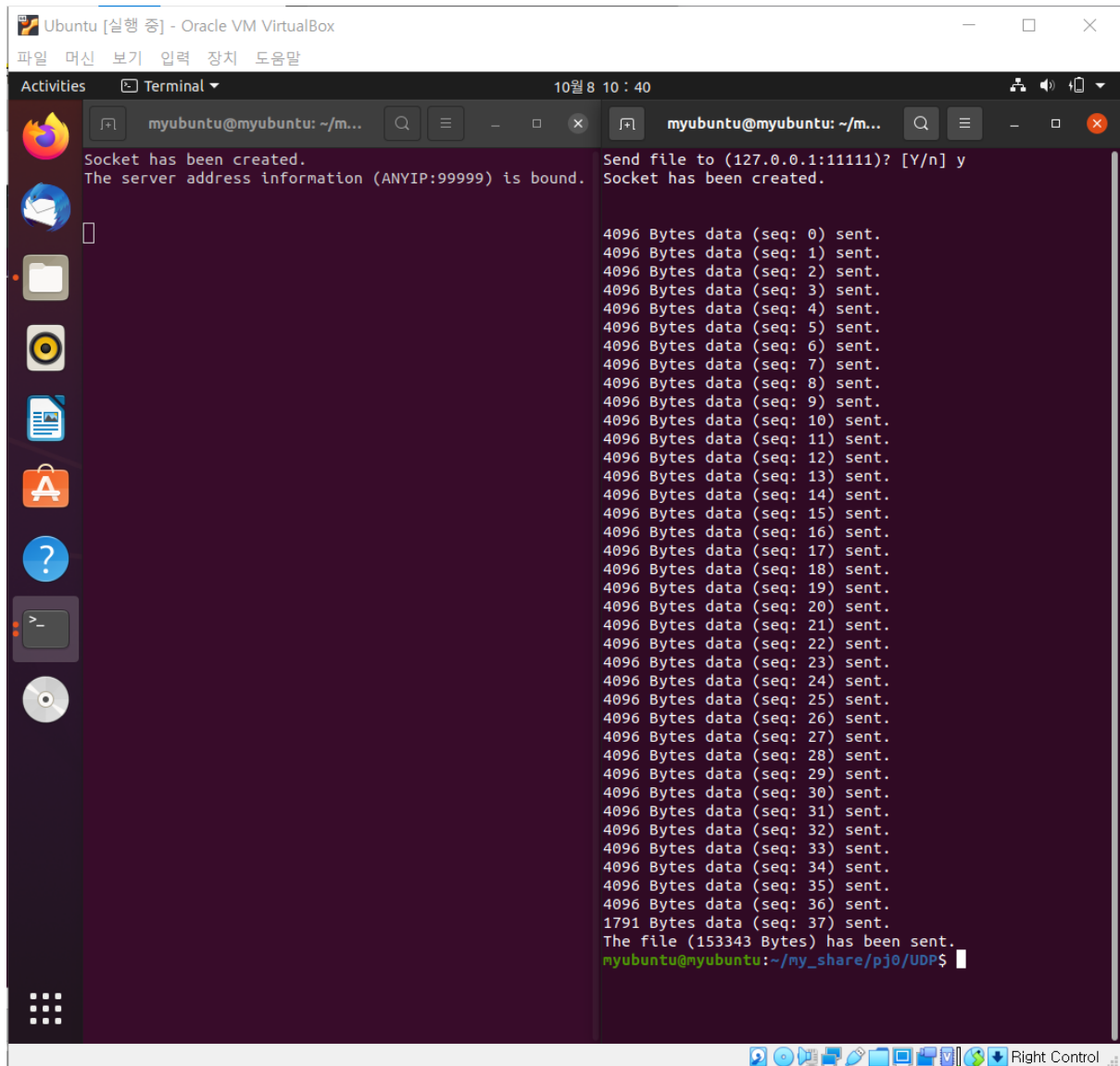


## 통신네트워크(EEE3450-02) Project 0

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### UDP

– Client가 Server port번호를 잘못 입력했을 때



```
myubuntu@myubuntu: ~/m...  
Socket has been created.  
The server address information (ANYIP:99999) is bound.  
myubuntu@myubuntu: ~/m...  
Send file to (127.0.0.1:11111)? [Y/n] y  
Socket has been created.  
4096 Bytes data (seq: 0) sent.  
4096 Bytes data (seq: 1) sent.  
4096 Bytes data (seq: 2) sent.  
4096 Bytes data (seq: 3) sent.  
4096 Bytes data (seq: 4) sent.  
4096 Bytes data (seq: 5) sent.  
4096 Bytes data (seq: 6) sent.  
4096 Bytes data (seq: 7) sent.  
4096 Bytes data (seq: 8) sent.  
4096 Bytes data (seq: 9) sent.  
4096 Bytes data (seq: 10) sent.  
4096 Bytes data (seq: 11) sent.  
4096 Bytes data (seq: 12) sent.  
4096 Bytes data (seq: 13) sent.  
4096 Bytes data (seq: 14) sent.  
4096 Bytes data (seq: 15) sent.  
4096 Bytes data (seq: 16) sent.  
4096 Bytes data (seq: 17) sent.  
4096 Bytes data (seq: 18) sent.  
4096 Bytes data (seq: 19) sent.  
4096 Bytes data (seq: 20) sent.  
4096 Bytes data (seq: 21) sent.  
4096 Bytes data (seq: 22) sent.  
4096 Bytes data (seq: 23) sent.  
4096 Bytes data (seq: 24) sent.  
4096 Bytes data (seq: 25) sent.  
4096 Bytes data (seq: 26) sent.  
4096 Bytes data (seq: 27) sent.  
4096 Bytes data (seq: 28) sent.  
4096 Bytes data (seq: 29) sent.  
4096 Bytes data (seq: 30) sent.  
4096 Bytes data (seq: 31) sent.  
4096 Bytes data (seq: 32) sent.  
4096 Bytes data (seq: 33) sent.  
4096 Bytes data (seq: 34) sent.  
4096 Bytes data (seq: 35) sent.  
4096 Bytes data (seq: 36) sent.  
1791 Bytes data (seq: 37) sent.  
The file (153343 Bytes) has been sent.  
myubuntu@myubuntu: ~/my_share/pj0/UDP$
```

- Client가 Server port번호를 제대로 입력했을 때

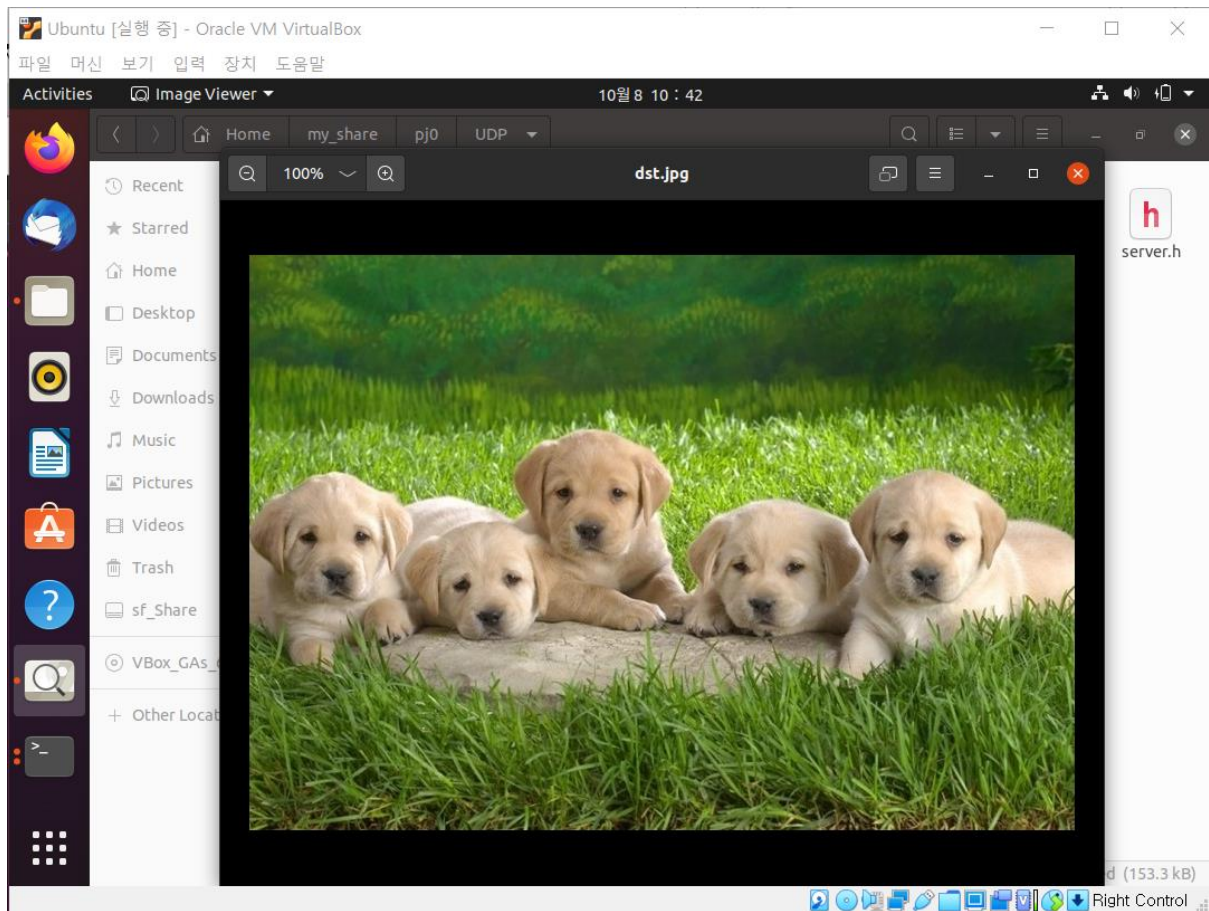
The screenshot shows two terminal windows side-by-side in an Oracle VM VirtualBox environment. The left terminal, titled 'myubuntu@myubuntu: ~/m...', shows a server-side process where a socket has been created and is bound to the address 'ANYIP:99999'. The right terminal, also titled 'myubuntu@myubuntu: ~/m...', shows a client-side process where a file is being sent to '127.0.0.1:11111'. The client terminal displays a series of status messages indicating that 4096 Bytes of data were sent for each of 37 sequences, followed by a final message stating 'The file (153343 Bytes) has been sent.' The prompt in the right terminal is 'myubuntu@myubuntu:~/my\_share/pj0/UDP\$'.

```
myubuntu@myubuntu: ~/m...
Socket has been created.
The server address information (ANYIP:99999) is bound.

myubuntu@myubuntu: ~/m...
Send file to (127.0.0.1:11111)? [Y/n] y
Socket has been created.

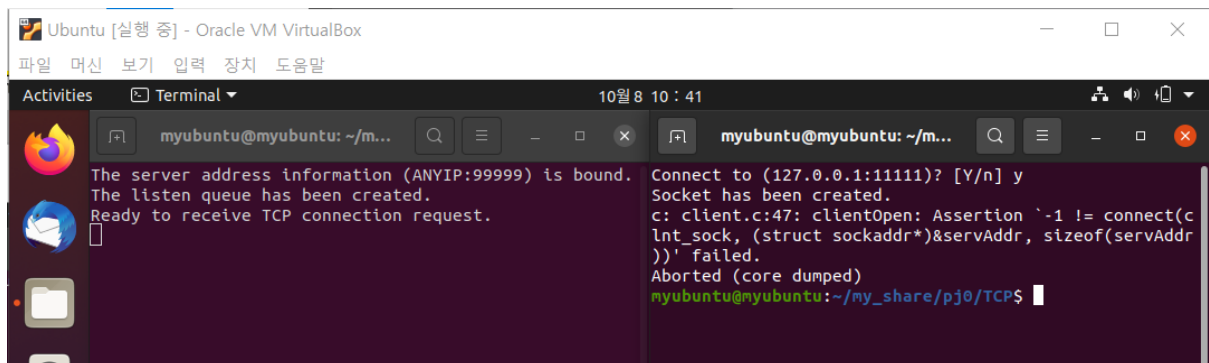
4096 Bytes data (seq: 0) sent.
4096 Bytes data (seq: 1) sent.
4096 Bytes data (seq: 2) sent.
4096 Bytes data (seq: 3) sent.
4096 Bytes data (seq: 4) sent.
4096 Bytes data (seq: 5) sent.
4096 Bytes data (seq: 6) sent.
4096 Bytes data (seq: 7) sent.
4096 Bytes data (seq: 8) sent.
4096 Bytes data (seq: 9) sent.
4096 Bytes data (seq: 10) sent.
4096 Bytes data (seq: 11) sent.
4096 Bytes data (seq: 12) sent.
4096 Bytes data (seq: 13) sent.
4096 Bytes data (seq: 14) sent.
4096 Bytes data (seq: 15) sent.
4096 Bytes data (seq: 16) sent.
4096 Bytes data (seq: 17) sent.
4096 Bytes data (seq: 18) sent.
4096 Bytes data (seq: 19) sent.
4096 Bytes data (seq: 20) sent.
4096 Bytes data (seq: 21) sent.
4096 Bytes data (seq: 22) sent.
4096 Bytes data (seq: 23) sent.
4096 Bytes data (seq: 24) sent.
4096 Bytes data (seq: 25) sent.
4096 Bytes data (seq: 26) sent.
4096 Bytes data (seq: 27) sent.
4096 Bytes data (seq: 28) sent.
4096 Bytes data (seq: 29) sent.
4096 Bytes data (seq: 30) sent.
4096 Bytes data (seq: 31) sent.
4096 Bytes data (seq: 32) sent.
4096 Bytes data (seq: 33) sent.
4096 Bytes data (seq: 34) sent.
4096 Bytes data (seq: 35) sent.
4096 Bytes data (seq: 36) sent.
1791 Bytes data (seq: 37) sent.
The file (153343 Bytes) has been sent.
myubuntu@myubuntu:~/my_share/pj0/UDP$
```

– UDP/dst.jpg



## TCP

– Client가 Server port번호를 잘못 입력했을 때



- Client가 Server port번호를 제대로 입력했을 때

The screenshot shows two terminal windows side-by-side in an Oracle VM VirtualBox environment. The left terminal, titled 'myubuntu@myubuntu: ~/m...', shows the server's perspective. It starts with the message 'The server address information (ANYIP:9999) is bound. The listen queue has been created. Ready to receive TCP connection request. a client (127.0.0.1:59770) has been connected...'. This is followed by a series of 37 lines, each reporting '4096 Bytes data (seq: X) received.' for X from 0 to 36. The final line reports '1791 Bytes data (seq: 37) received.' and 'The file (153343 Bytes) has been received.' The prompt is 'myubuntu@myubuntu:~/my\_share/pj0/TCP\$'. The right terminal, titled 'myubuntu@myubuntu: ~/m...', shows the client's perspective. It starts with 'Connect to (127.0.0.1:9999)? [Y/n] y', followed by 'Socket has been created.', 'TCP connection has been constructed.', and 'Send file to (127.0.0.1:9999)? [Y/n] y'. This is followed by a series of 37 lines, each reporting '4096 Bytes data (seq: X) sent.' for X from 0 to 36. The final line reports '1791 Bytes data (seq: 37) sent.' and 'The file (153343 Bytes) has been sent.' The prompt is 'myubuntu@myubuntu:~/my\_share/pj0/TCP\$'. The bottom of the window shows a taskbar with various icons and the text 'Right Control'.

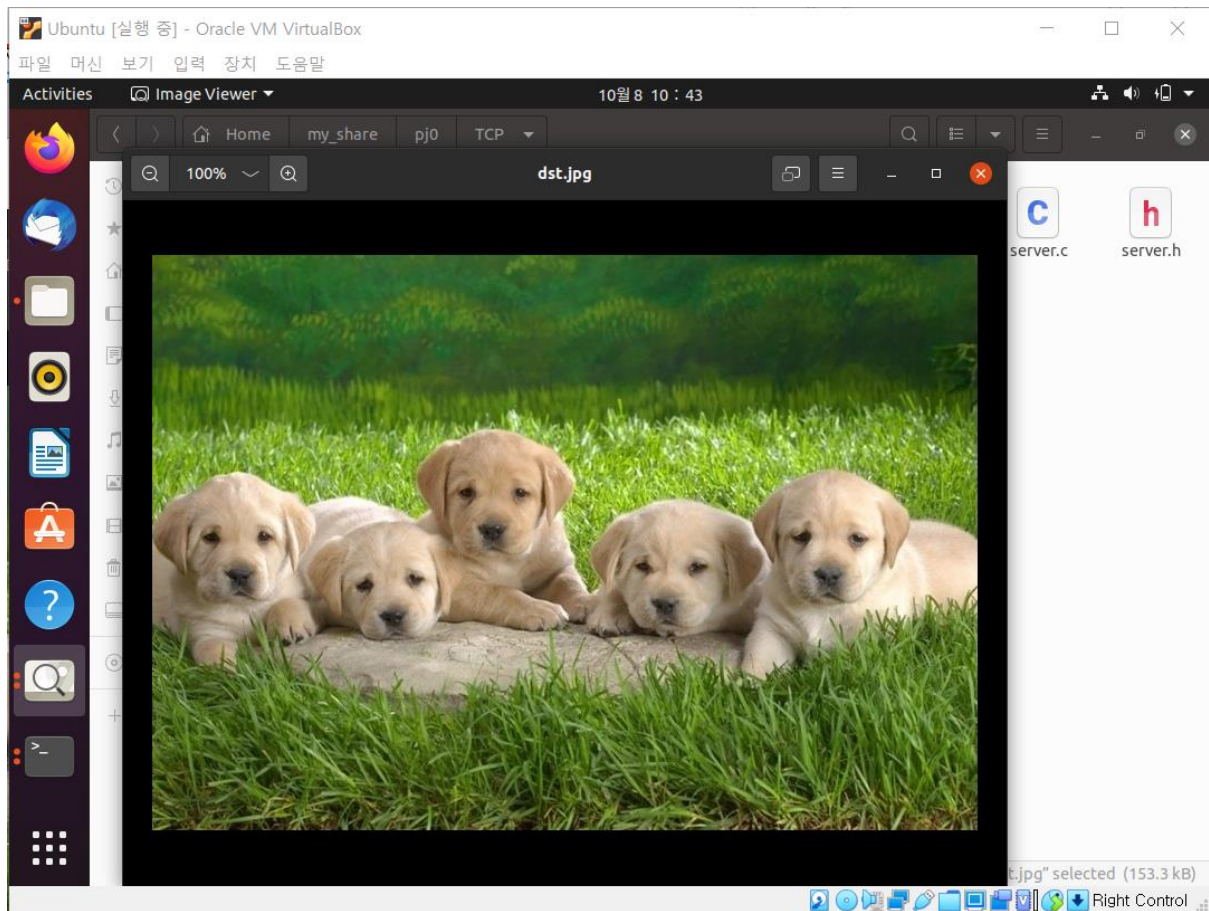
```
myubuntu@myubuntu: ~/m...
The server address information (ANYIP:9999) is bound.
The listen queue has been created.
Ready to receive TCP connection request.
a client (127.0.0.1:59770) has been connected...

4096 Bytes data (seq: 0) received.
4096 Bytes data (seq: 1) received.
4096 Bytes data (seq: 2) received.
4096 Bytes data (seq: 3) received.
4096 Bytes data (seq: 4) received.
4096 Bytes data (seq: 5) received.
4096 Bytes data (seq: 6) received.
4096 Bytes data (seq: 7) received.
4096 Bytes data (seq: 8) received.
4096 Bytes data (seq: 9) received.
4096 Bytes data (seq: 10) received.
4096 Bytes data (seq: 11) received.
4096 Bytes data (seq: 12) received.
4096 Bytes data (seq: 13) received.
4096 Bytes data (seq: 14) received.
4096 Bytes data (seq: 15) received.
4096 Bytes data (seq: 16) received.
4096 Bytes data (seq: 17) received.
4096 Bytes data (seq: 18) received.
4096 Bytes data (seq: 19) received.
4096 Bytes data (seq: 20) received.
4096 Bytes data (seq: 21) received.
4096 Bytes data (seq: 22) received.
4096 Bytes data (seq: 23) received.
4096 Bytes data (seq: 24) received.
4096 Bytes data (seq: 25) received.
4096 Bytes data (seq: 26) received.
4096 Bytes data (seq: 27) received.
4096 Bytes data (seq: 28) received.
4096 Bytes data (seq: 29) received.
4096 Bytes data (seq: 30) received.
4096 Bytes data (seq: 31) received.
4096 Bytes data (seq: 32) received.
4096 Bytes data (seq: 33) received.
4096 Bytes data (seq: 34) received.
4096 Bytes data (seq: 35) received.
4096 Bytes data (seq: 36) received.
1791 Bytes data (seq: 37) received.
The file (153343 Bytes) has been received.
myubuntu@myubuntu:~/my_share/pj0/TCP$

myubuntu@myubuntu: ~/m...
Connect to (127.0.0.1:9999)? [Y/n] y
Socket has been created.
TCP connection has been constructed.
Send file to (127.0.0.1:9999)? [Y/n] y

4096 Bytes data (seq: 0) sent.
4096 Bytes data (seq: 1) sent.
4096 Bytes data (seq: 2) sent.
4096 Bytes data (seq: 3) sent.
4096 Bytes data (seq: 4) sent.
4096 Bytes data (seq: 5) sent.
4096 Bytes data (seq: 6) sent.
4096 Bytes data (seq: 7) sent.
4096 Bytes data (seq: 8) sent.
4096 Bytes data (seq: 9) sent.
4096 Bytes data (seq: 10) sent.
4096 Bytes data (seq: 11) sent.
4096 Bytes data (seq: 12) sent.
4096 Bytes data (seq: 13) sent.
4096 Bytes data (seq: 14) sent.
4096 Bytes data (seq: 15) sent.
4096 Bytes data (seq: 16) sent.
4096 Bytes data (seq: 17) sent.
4096 Bytes data (seq: 18) sent.
4096 Bytes data (seq: 19) sent.
4096 Bytes data (seq: 20) sent.
4096 Bytes data (seq: 21) sent.
4096 Bytes data (seq: 22) sent.
4096 Bytes data (seq: 23) sent.
4096 Bytes data (seq: 24) sent.
4096 Bytes data (seq: 25) sent.
4096 Bytes data (seq: 26) sent.
4096 Bytes data (seq: 27) sent.
4096 Bytes data (seq: 28) sent.
4096 Bytes data (seq: 29) sent.
4096 Bytes data (seq: 30) sent.
4096 Bytes data (seq: 31) sent.
4096 Bytes data (seq: 32) sent.
4096 Bytes data (seq: 33) sent.
4096 Bytes data (seq: 34) sent.
4096 Bytes data (seq: 35) sent.
4096 Bytes data (seq: 36) sent.
1791 Bytes data (seq: 37) sent.
The file (153343 Bytes) has been sent.
myubuntu@myubuntu:~/my_share/pj0/TCP$
```

- UDP/dst.jpg



## 결과 분석

주어진 코드를 실행할 때의 터미널 화면을 비교하여 드러나는 차이점을 다음과 같이 정리할 수 있다.

- (1) TCP는 connection 생성시 server(receiver)가 listen queue를 생성하고 client(sender)로부터 TCP connection request를 받아 data 전송 이전에 connection을 먼저 생성하는 반면, UDP는 별도의 connection 생성 과정 없이 바로 data를 전송하고 수신한다.
- (2) Port 번호를 잘못 입력했을 때, UDP의 경우 별도의 connection을 생성하지 않기 때문에 client는 이와 관계없이 잘못된 port로 데이터를 전송하지만 server에서 수신하지 못하는 반면, TCP의 경우 connection이 생성되지 못해 client에서 fail이 일어나고 data를 전송하지 않는다.