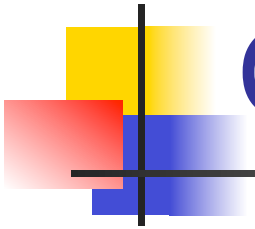
Final Project- Simple FTP Client

BUPT/QMUL

2019-5-9



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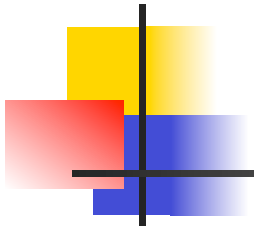
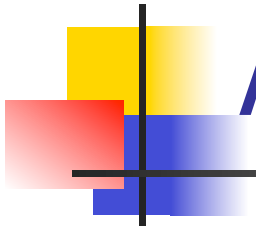
- Using *nc* command to connect FTP server
  - To learn about passive and active mode, control connection and data connection of FTP
- Using Wireshark to get familiar with FTP
  - To learn about the communication procedure, commands and replies of FTP

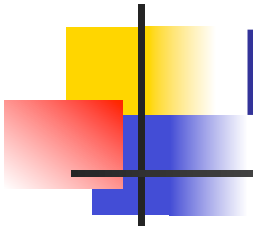


Introduction

About the Project

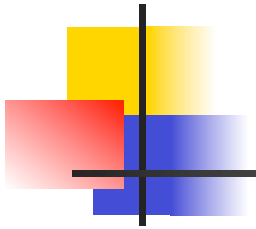


- A simple FTP client
  - Implement all the content of **Project Requirements**
  - Use C language in Linux operation system
  - Use gcc compiler and gdb debug tool
  - Use CLI (Command Line Interface) as input & output
- Important date
  - Program check: before the end of lab time in week 16
  - Source code and the report are required to be submitted
    - FTP: 10.3.255.85
    - User name/password: gjxy-project/student
    - Deadline: before 22:00, 2019-06-16 (UTC+8)



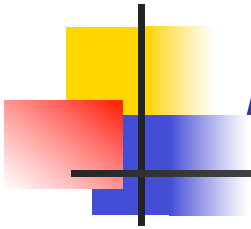
Documents to read

- *ftp client project-requirements-20190509*
  - Basic requirements – should be implemented
  - Extension requirements – if possible
- 实验指导书-20190509
  - Some helpful information for reference
- ftp client project report-20190509
  - Sample report for reference
- main.c
  - Program infrastructure for reference
  - Note: This is just a reference. You can definitely follow your own design rule.



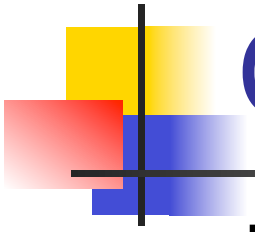
Using nc to connect FTP server (I)

- To learn about **passive mode**, control connection and data connection of FTP



nc command

- nc (netcat)
- Function: open TCP connections, send UDP packets, listen on arbitrary TCP and UDP ports, do port scanning, and deal with both IPv4 and IPv6
- Parameters
  - -4: for IPv4
  - -l: listen for an incoming connection
  - -v: give more verbose output



Objective

- Use nc to login FTP server
- Learn how to open control connection and data connection (Passive mode)
- Understand the functionality of control connection and data connection
- Learn the communication procedure, commands and replies of FTP

Steps

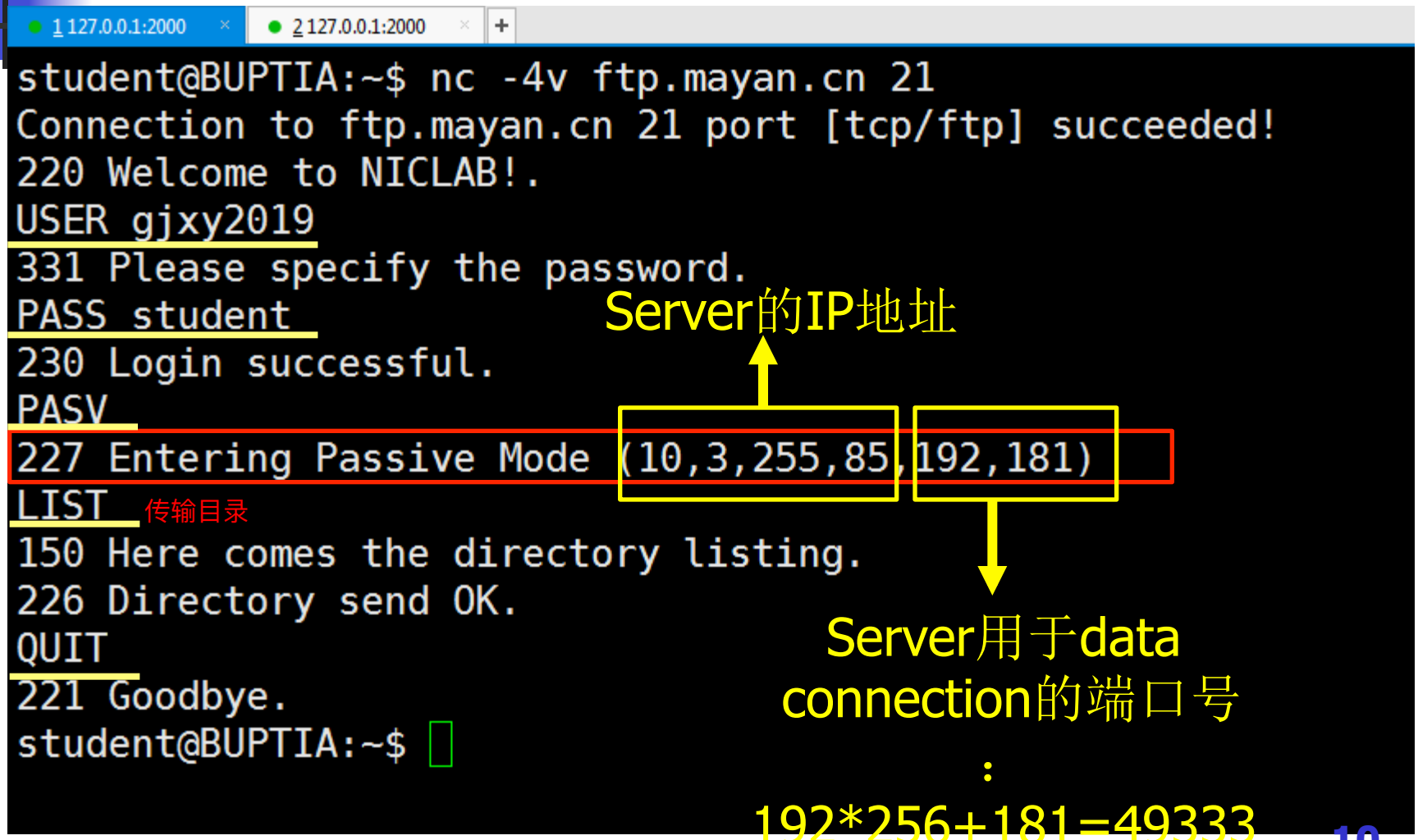
Note: After connecting to FTP server using *nc*, you should use control commands in the following steps.

- 1. Using nc to connect to given FTP server
  - $ nc -4v ftp.mayan.cn 21
- 2. login using username "gjxy2019" and password "student"
- 3. Input command "PASV", calculate port number for data connections: *port*= p1×256+p2, p1 and p2 are taken from the server's reply

被动模式，sever被动

- 4. Using another terminal to set up data connection
  - $ nc -4v ftp.mayan.cn *port*
- 5. Input command "LIST"

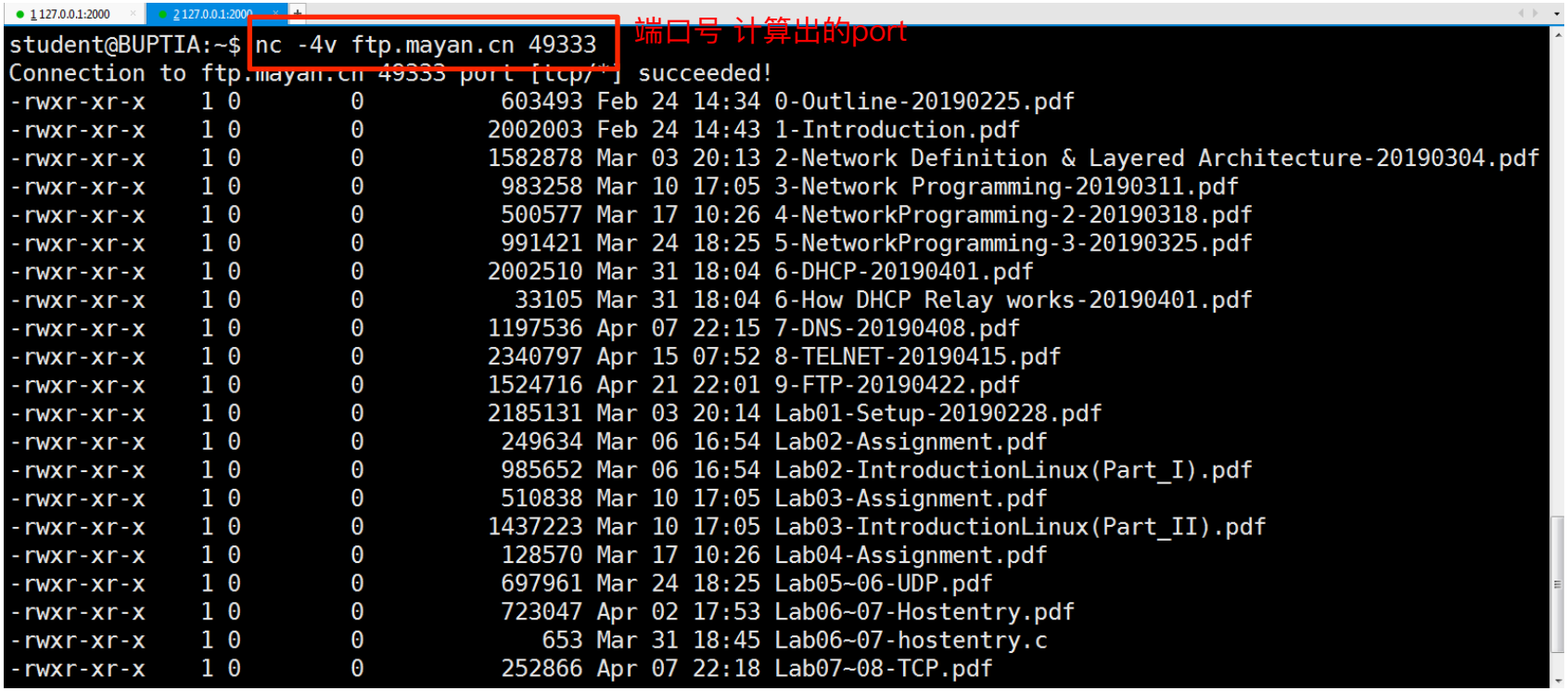
Example of FTP control connection

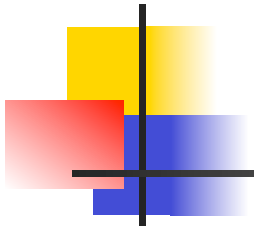


Example of FTP data connection

- After inputting command "LIST" in terminal of command connection, it displays in terminal of data connection:

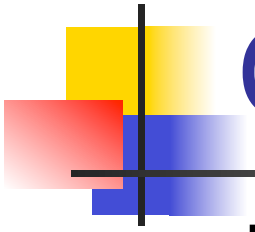
再开一个窗口 用nc重新建立连接





Using nc to connect FTP server (II)

- To learn about **active mode**, control connection and data connection of FTP

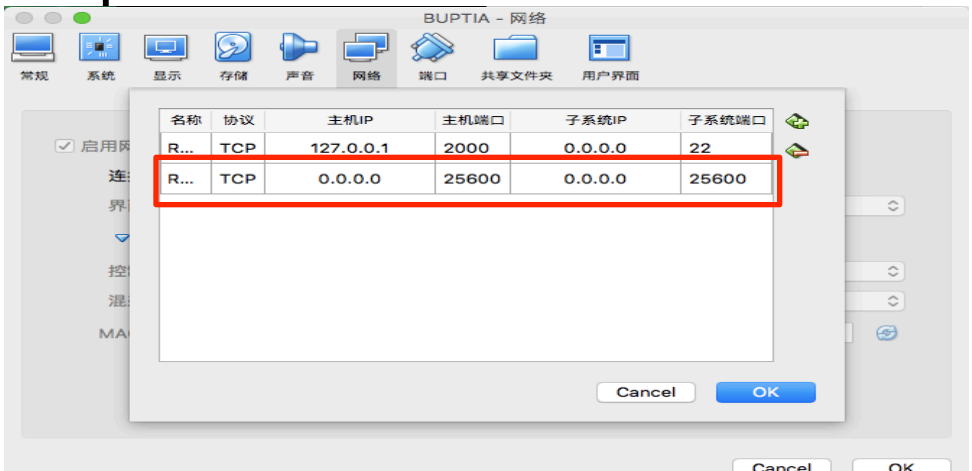


Objective

- Use nc to login FTP server
- Learn how to open control connection and data connection (Active mode)
- Fully understand the functionality of control connection and data connection
- Learn the communication procedure, commands and replies of FTP

Steps

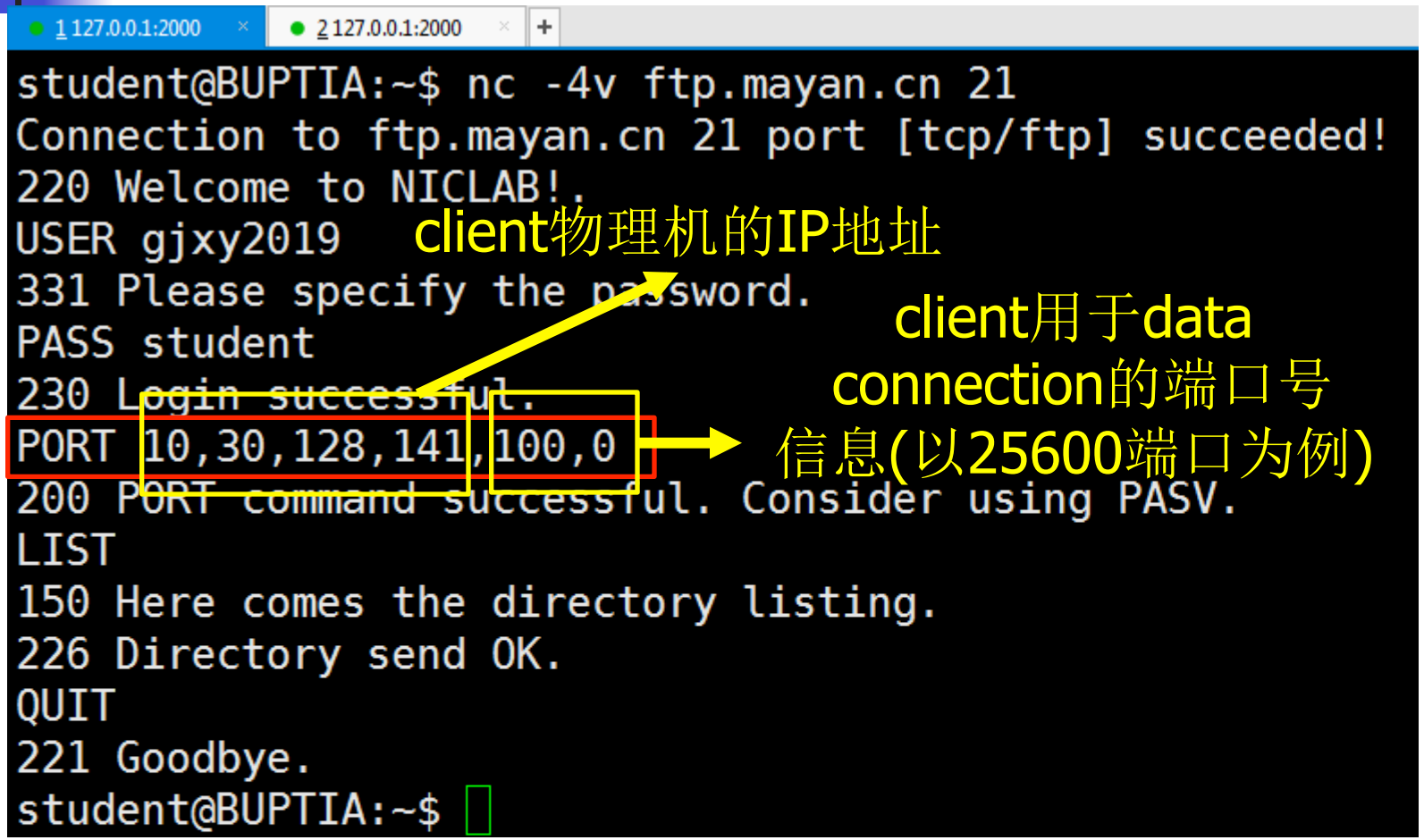
- 1. Figure out ip address *ip1.ip2.ip3.ip4* of your physical machine
  - E.g. 10.3.255.115, *ip1=10 ip2=3 ip3=255 ip4=115*
- 2. Choose the last five digits of your student ID as a port number
  - E.g. 2016225600, *port*=25600
- 3. Set port forward rule in virtualbox



Steps

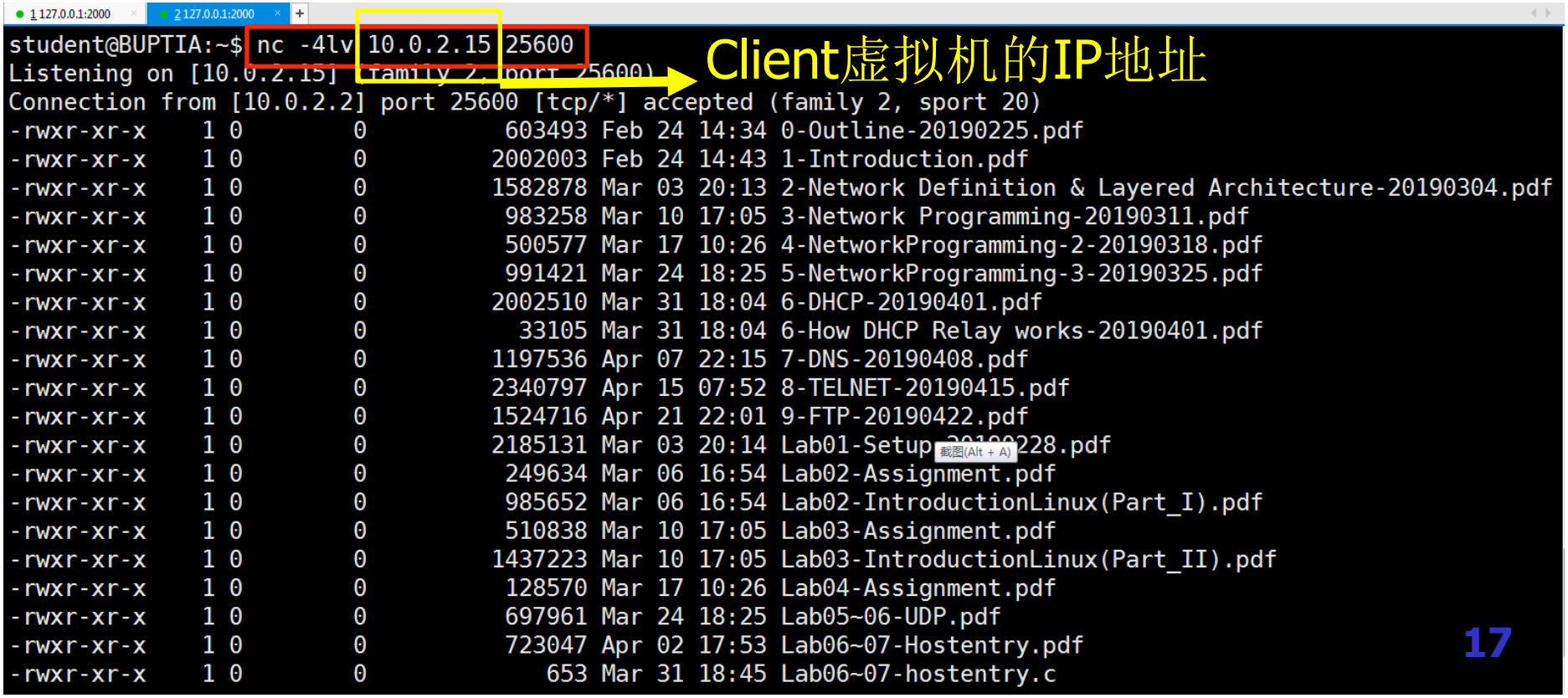
- 4. Using nc to connect to given FTP server
  - $ nc -4v ftp.mayan.cn 21
- 5. login using username “gjxy2019” and password “student”
- 6. Using another terminal to listen to data connection
  - Using IP address of eth0 in virtual machine
  - $ nc **-4lv** *ip-eth0 port*
- 7. Return to first terminal, calculate port number for data connections: *p1*= [*port*/256], *p2*=*port* –*p1*256*, input command “PORT *ip1*,*ip2*,*ip3*,*ip4*,p1,p2”
- 8. Input command “LIST”
- Note: Firewall in physical machine may nee to be closed

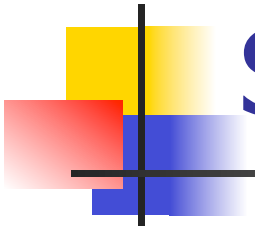
Example of FTP control connection



Example of FTP data connection

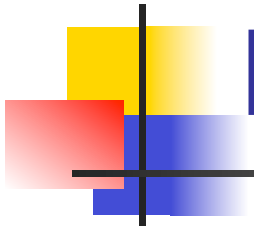
- After inputting command "LIST" in terminal of command connection, it displays in terminal of data connection:





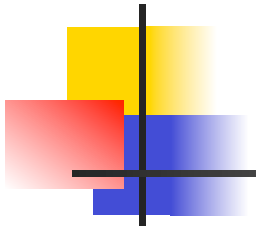
Servers to connect

- Our lesson's ftp server
  - ftp.mayan.cn
- Some public ftp servers that can be used for testing:
  - ftp.sjtu.edu.cn
  - You can use *anonymous* as user name and *guest* or an email address as password. E.g.:
    - anonymous, guest
    - anonymous, abc@123
    - ftp, guest
    - ftp, ftp@



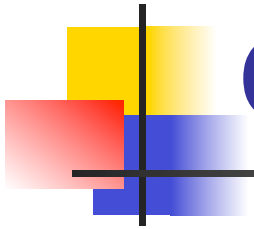
FTP control commands to try

- USER
- PASS
- PWD
- CDUP
- LIST
- STOR
- TYPE
- QUIT
- …



Using Wireshark to get familiar with FTP

- To learn about the communication procedure, commands and replies of FTP



Objective

- Observe the replies from FTP server
- Learn about the function and usage of major FTP commands and reply codes
- Using Wireshark to capture FTP messages and learn about the message flow

Note: You should use user commands in the following steps.

How to connect to the FTP server

- In xShell or Terminal: Login virtual machine and start wireshark ;
- In another xShell or Terminal: Type user command as follows:

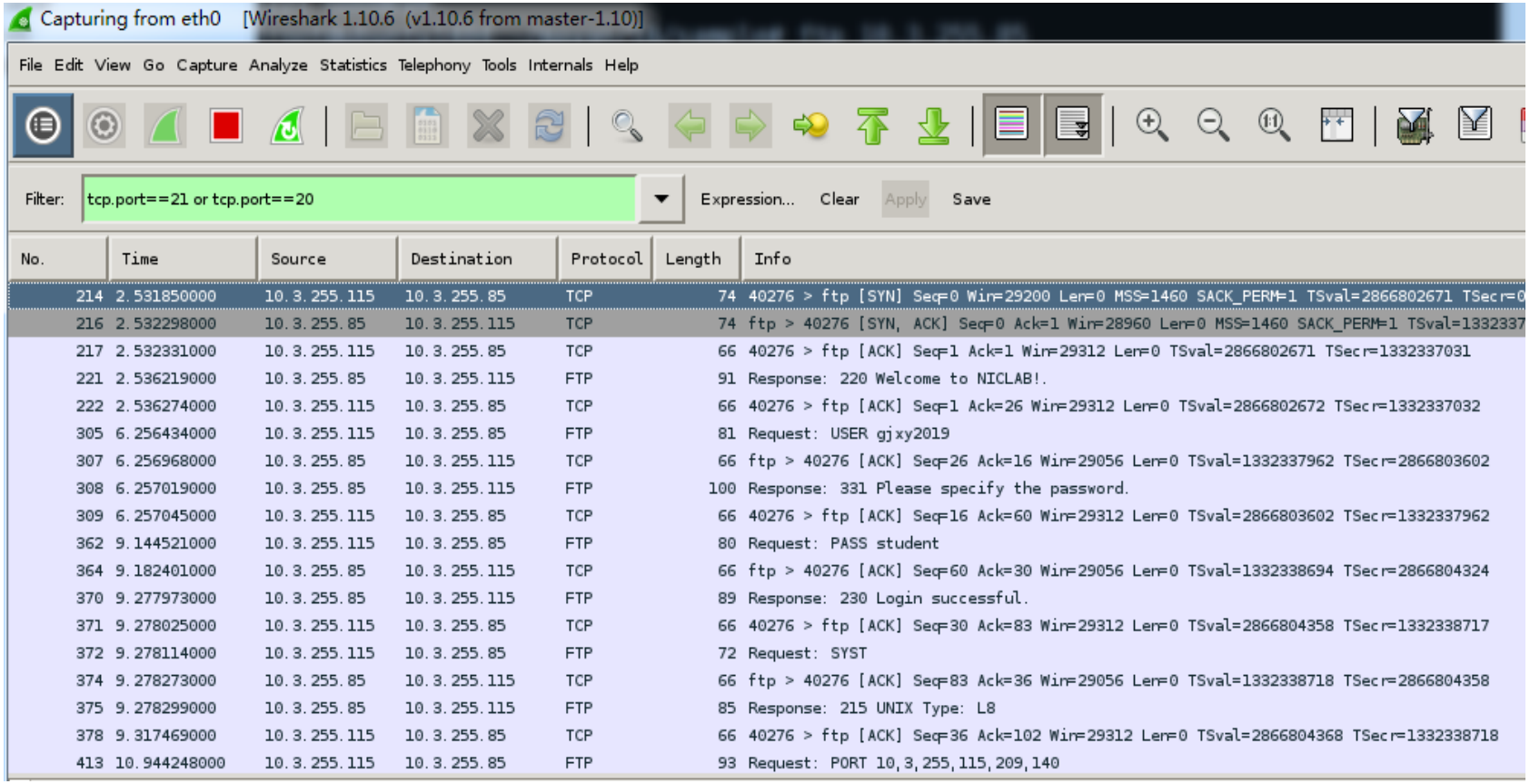
```
#ftp 10.3.255.85
(This is the IP address of ftp.mayan.cn.)
Name: gjxy2019
Password: student
ftp> ls
ftp> pwd
ftp> get **  (** is the name of the file)
ftp> put **
ftp> binary
ftp> ascii
```

- Try user commands: *ls, pwd, cd, put, get, type, ascii, binary, quit*
- Understand user command and FTP command using wireshark

Note: Only passive mode could be used because of the network configuration in VM. Please use *passive* command in ftp to switch to passive mode.

How to analyze FTP packets

- Set filter as: tcp.port==20 or tcp.port==21



End