

# Linux Tutorial

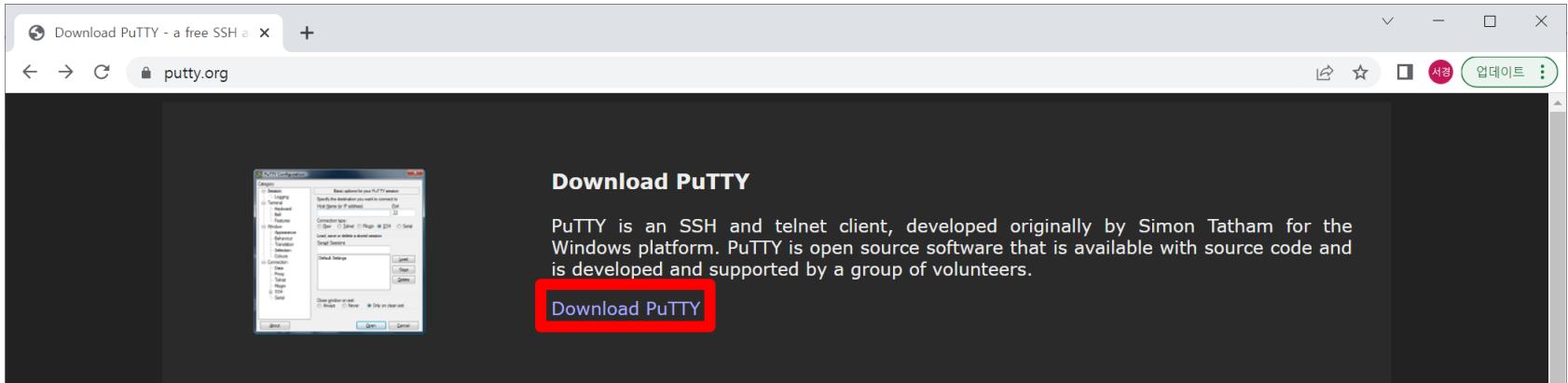
For CSE courses in Sogang University

- Connecting to CSPRO (in Windows): 3 page~
  - Putty
  - Filezilla
- Connecting to CSPRO (in Mac): 19 page~
  - Terminal
  - Filezilla
- Basic Linux commands and usages: 27 page~

# Connecting to CSPRO (in Windows)

# ▶ install PuTTY (For Windows)

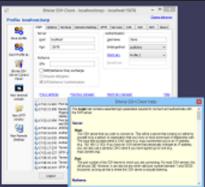
- Go to '<https://www.putty.org/>' and click 'Download PuTTY'



Below suggestions are independent of PuTTY. They are not endorsements by the PuTTY project.

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### Bitvise SSH Client



Bitvise SSH Client is an SSH and SFTP client for Windows. It is developed and supported professionally by Bitvise. The SSH Client is robust, easy to install, easy to use, and supports all features supported by PuTTY, as well as the following:

- graphical SFTP file transfer;
- single-click Remote Desktop tunneling;
- auto-reconnecting capability;
- dynamic port forwarding through an integrated proxy;
- an FTP-to-SFTP protocol bridge.

Bitvise SSH Client is **free to use**.

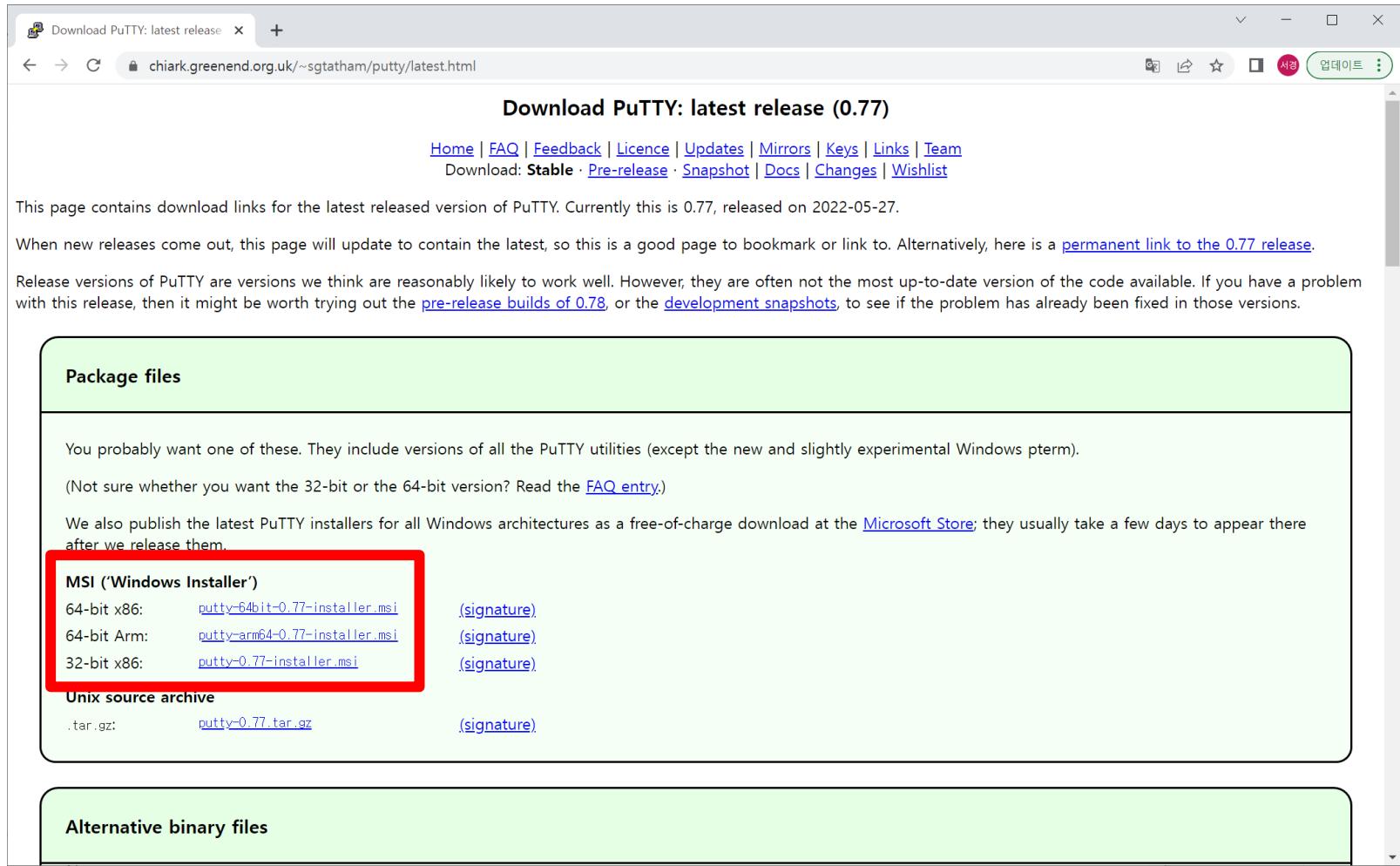
[Download Bitvise SSH Client](#)

### Bitvise SSH Server



Bitvise SSH Server is an SSH, SFTP and SCP server for Windows. It is robust, easy to install, easy to use, and works well with a variety of SSH clients, including Bitvise SSH Client, OpenSSH, and PuTTY. The SSH Server is developed and supported professionally by Bitvise.

- Choose installer according to your PC environment (maybe almost **64-bit x86**)
- And execute installer



Download PuTTY: latest release (0.77)

[Home](#) | [FAQ](#) | [Feedback](#) | [Licence](#) | [Updates](#) | [Mirrors](#) | [Keys](#) | [Links](#) | [Team](#)  
Download: [Stable](#) · [Pre-release](#) · [Snapshot](#) | [Docs](#) | [Changes](#) | [Wishlist](#)

This page contains download links for the latest released version of PuTTY. Currently this is 0.77, released on 2022-05-27.

When new releases come out, this page will update to contain the latest, so this is a good page to bookmark or link to. Alternatively, here is a [permanent link to the 0.77 release](#).

Release versions of PuTTY are versions we think are reasonably likely to work well. However, they are often not the most up-to-date version of the code available. If you have a problem with this release, then it might be worth trying out the [pre-release builds of 0.78](#), or the [development snapshots](#), to see if the problem has already been fixed in those versions.

### Package files

You probably want one of these. They include versions of all the PuTTY utilities (except the new and slightly experimental Windows pterm).

(Not sure whether you want the 32-bit or the 64-bit version? Read the [FAQ entry](#).)

We also publish the latest PuTTY installers for all Windows architectures as a free-of-charge download at the [Microsoft Store](#); they usually take a few days to appear there after we release them.

#### MSI ('Windows Installer')

64-bit x86:	<a href="#">putty-64bit-0.77-installer.msi</a>	<a href="#">(signature)</a>
64-bit Arm:	<a href="#">putty-arm64-0.77-installer.msi</a>	<a href="#">(signature)</a>
32-bit x86:	<a href="#">putty-0.77-installer.msi</a>	<a href="#">(signature)</a>

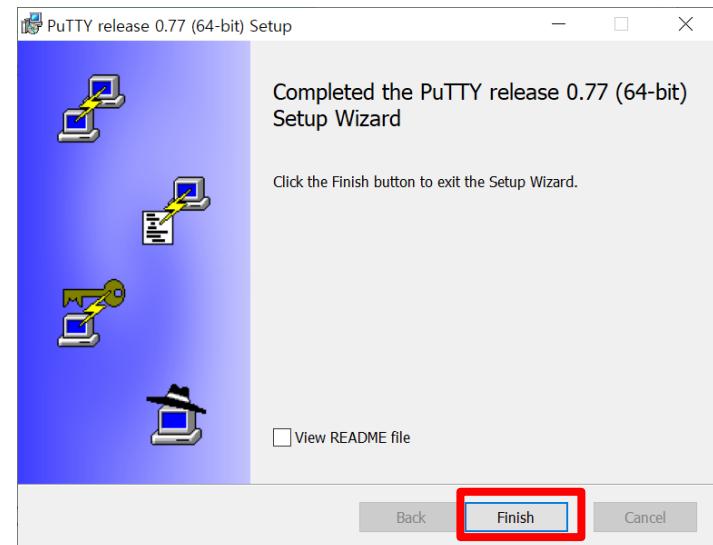
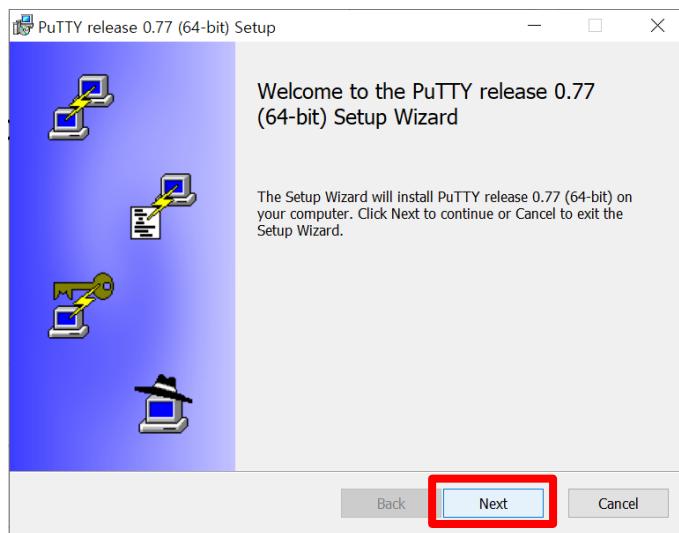
#### Unix source archive

.tar.gz:	<a href="#">putty-0.77.tar.gz</a>	<a href="#">(signature)</a>
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### Alternative binary files

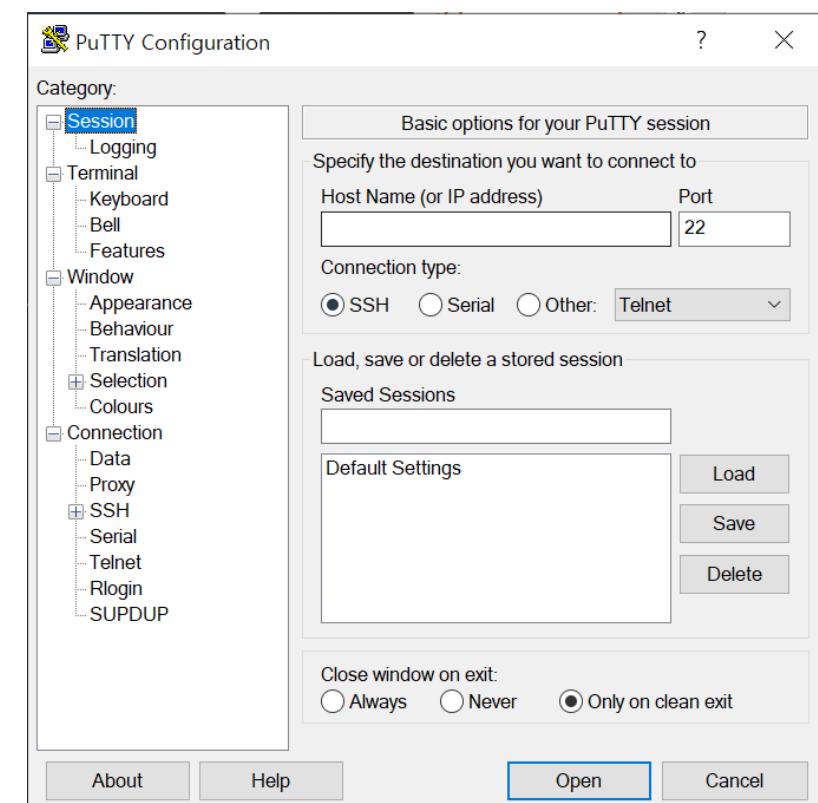
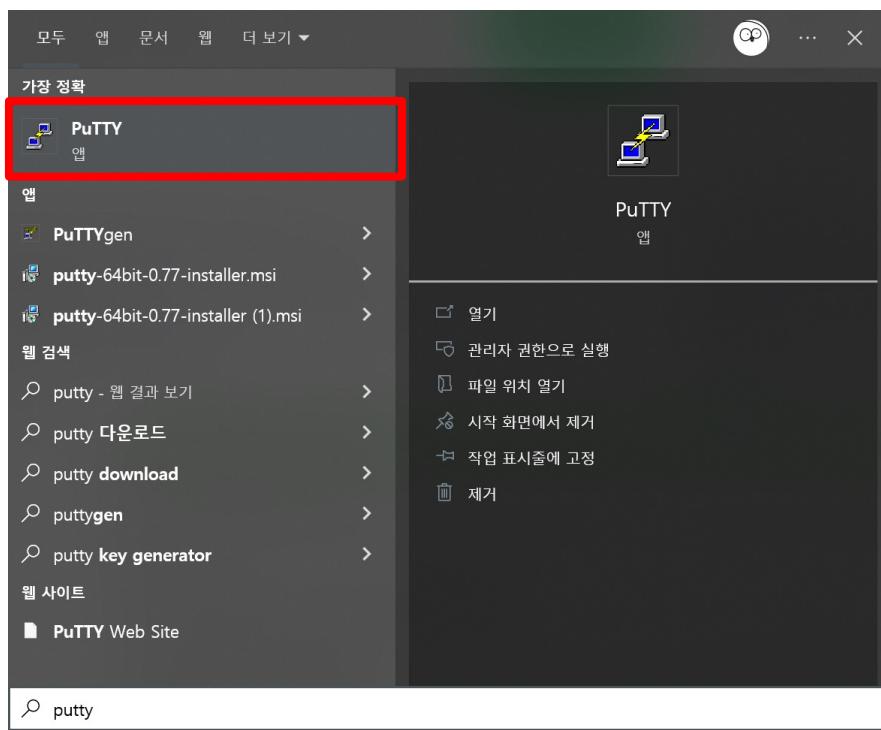
## ➤ install PuTTY (For Windows)

- Continue to press the next button and press finish after the installation is complete



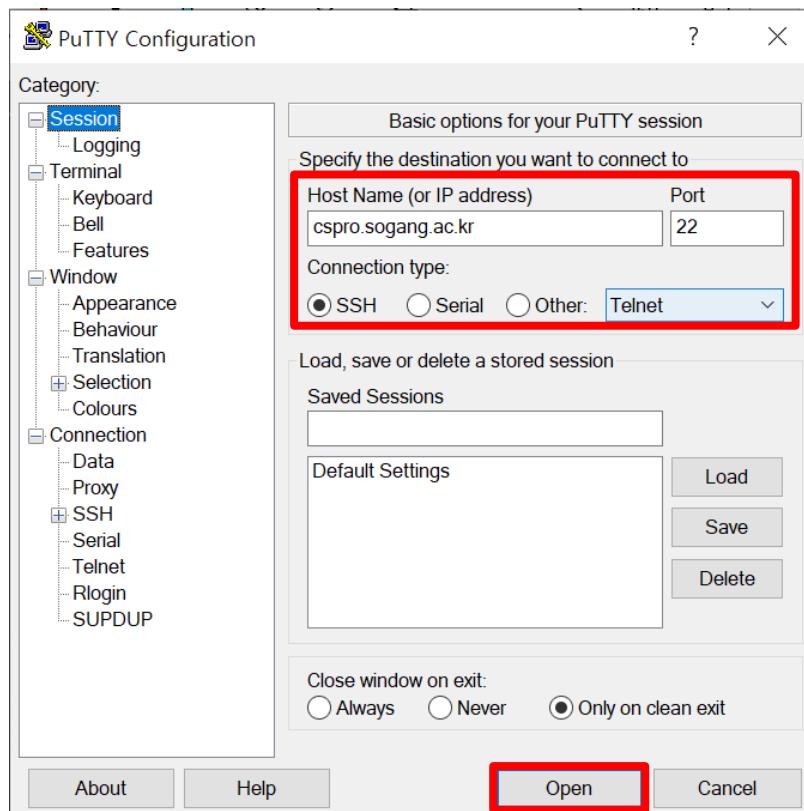
# ▶ connect to cspro by PuTTY (For Windows)

- Run PuTTY Application



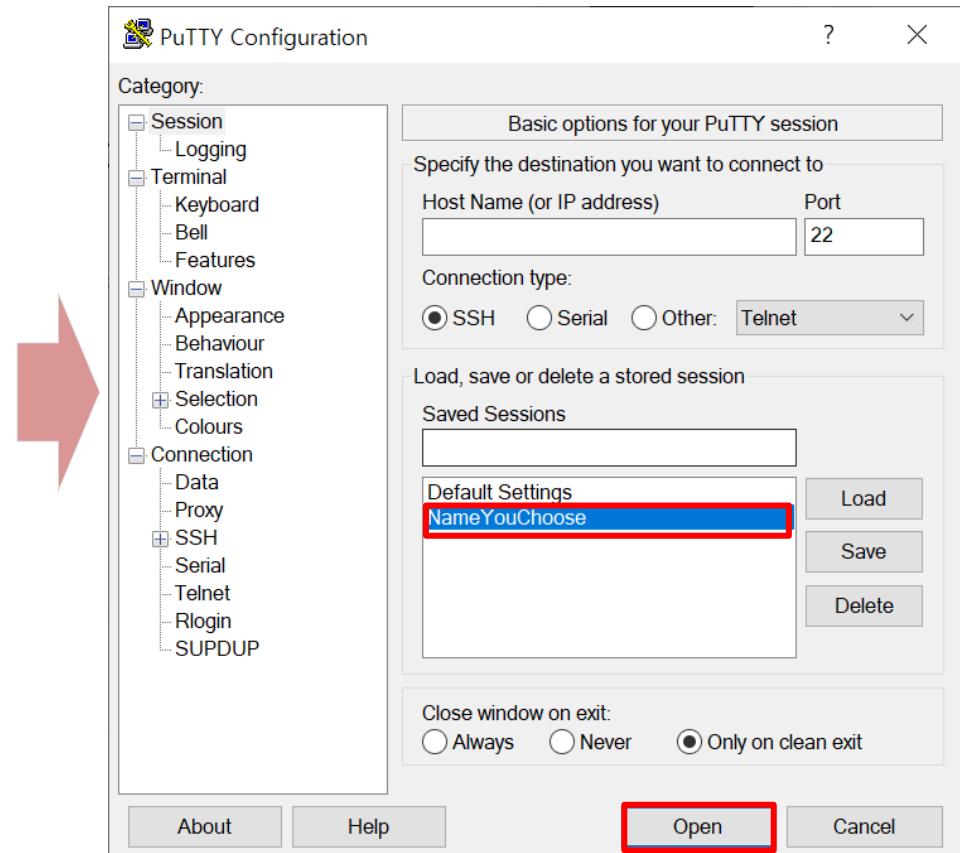
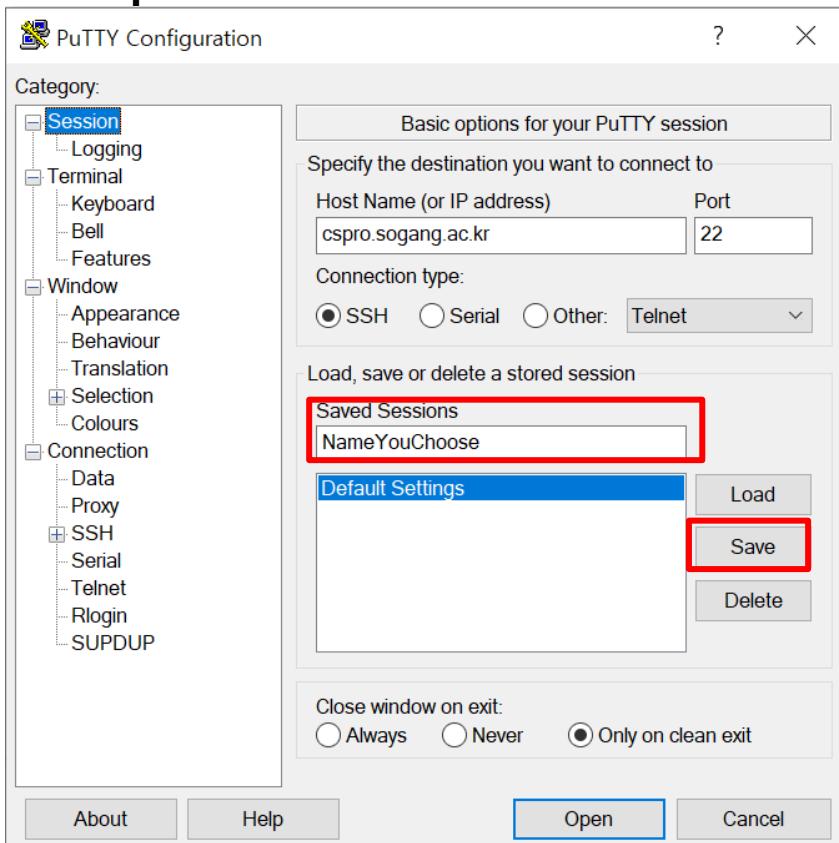
# ▶ connect to cspro by PuTTY (For Windows)

- **Setting in Session tap.**
  - Host Name : cspro.sogang.ac.kr ( or cspro1~10.sogang.ac.kr. ex) cspro7.sogang.ac.kr )
  - Port: 22 (fixed)
  - Connexion type: SSH (fixed)
- **And press Open**

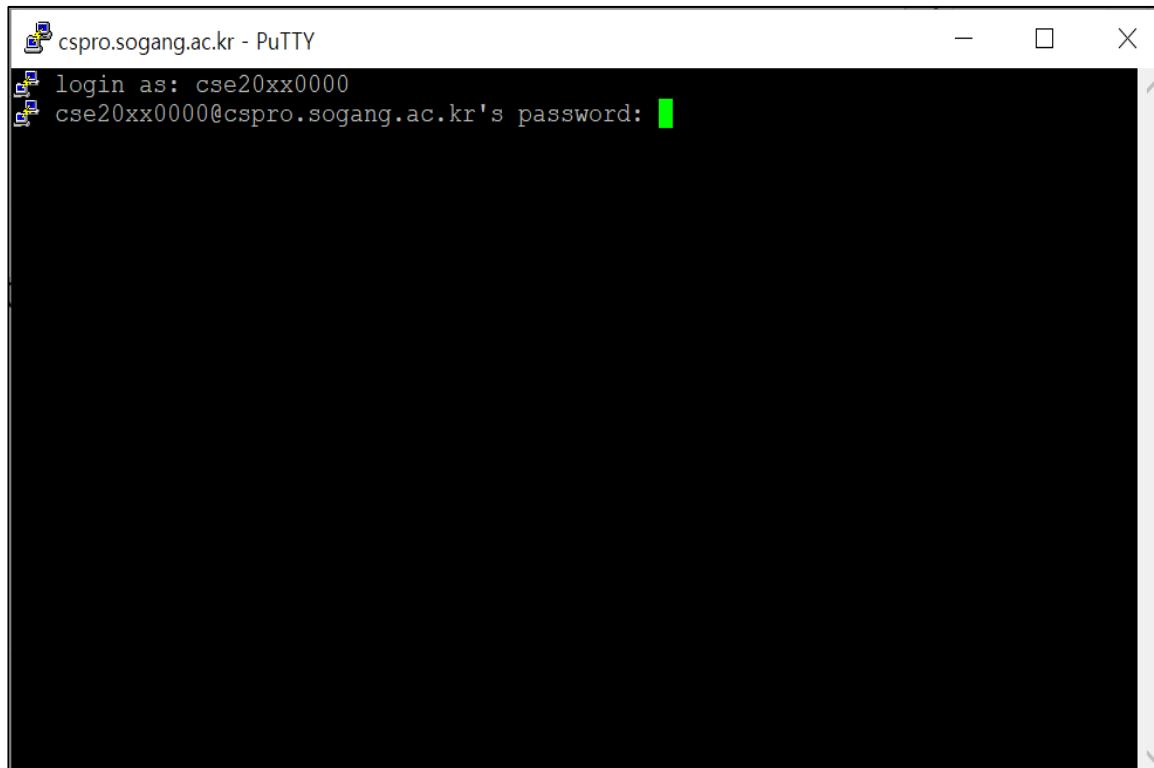


## ▶ connect to cspro by PuTTY (For Windows)

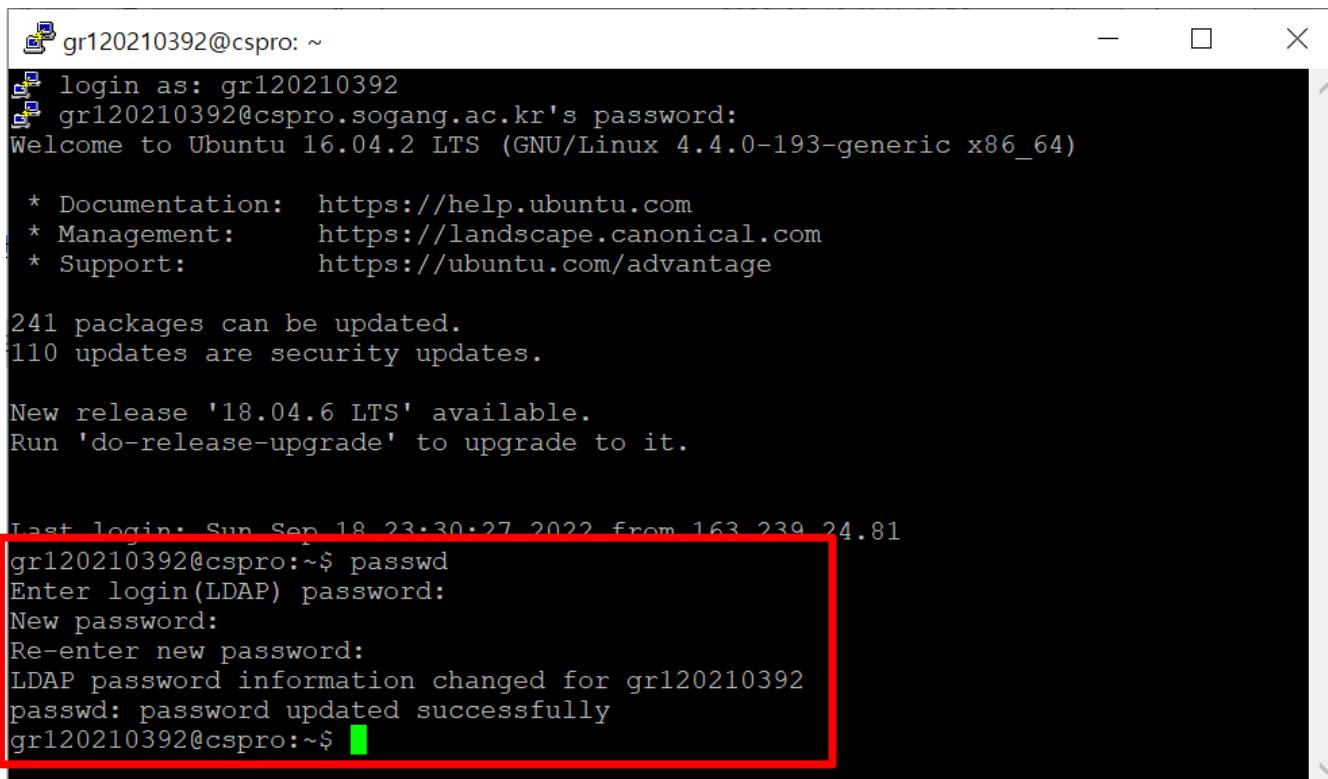
- If you don't want to set these settings every time you run PuTTY, you can save the settings.
  - Enter the settings described on the previous page, select the setting name under Saved Sessions
  - And press the Save button
- Next time you open the PuTTY, you can simply select the session name and press Open button.



- Enter your account ID + press 'Enter key'
  - ID: cse+student ID. Ex) cse20221234
- And Enter password + press 'Enter key' (it can't be seen as it is being typed)
  - Default password: **asdf1234**
  - If you are taking another class that uses CSPRO, your account may have been created with a different default password.



- **IMPORTANT:** You **MUST** need to change your password
  - Enter 'passwd' command
  - and enter current password (the default password in the previous page)
  - and enter your new password twice



The screenshot shows a terminal window on an Ubuntu 16.04.2 LTS system. The session is for user gr120210392. The terminal displays a welcome message, package update information, and a password change sequence. A red box highlights the 'passwd' command and its interaction with the user.

```
gr120210392@cspro: ~
login as: gr120210392
gr120210392@cspro.sogang.ac.kr's password:
Welcome to Ubuntu 16.04.2 LTS (GNU/Linux 4.4.0-193-generic x86_64)

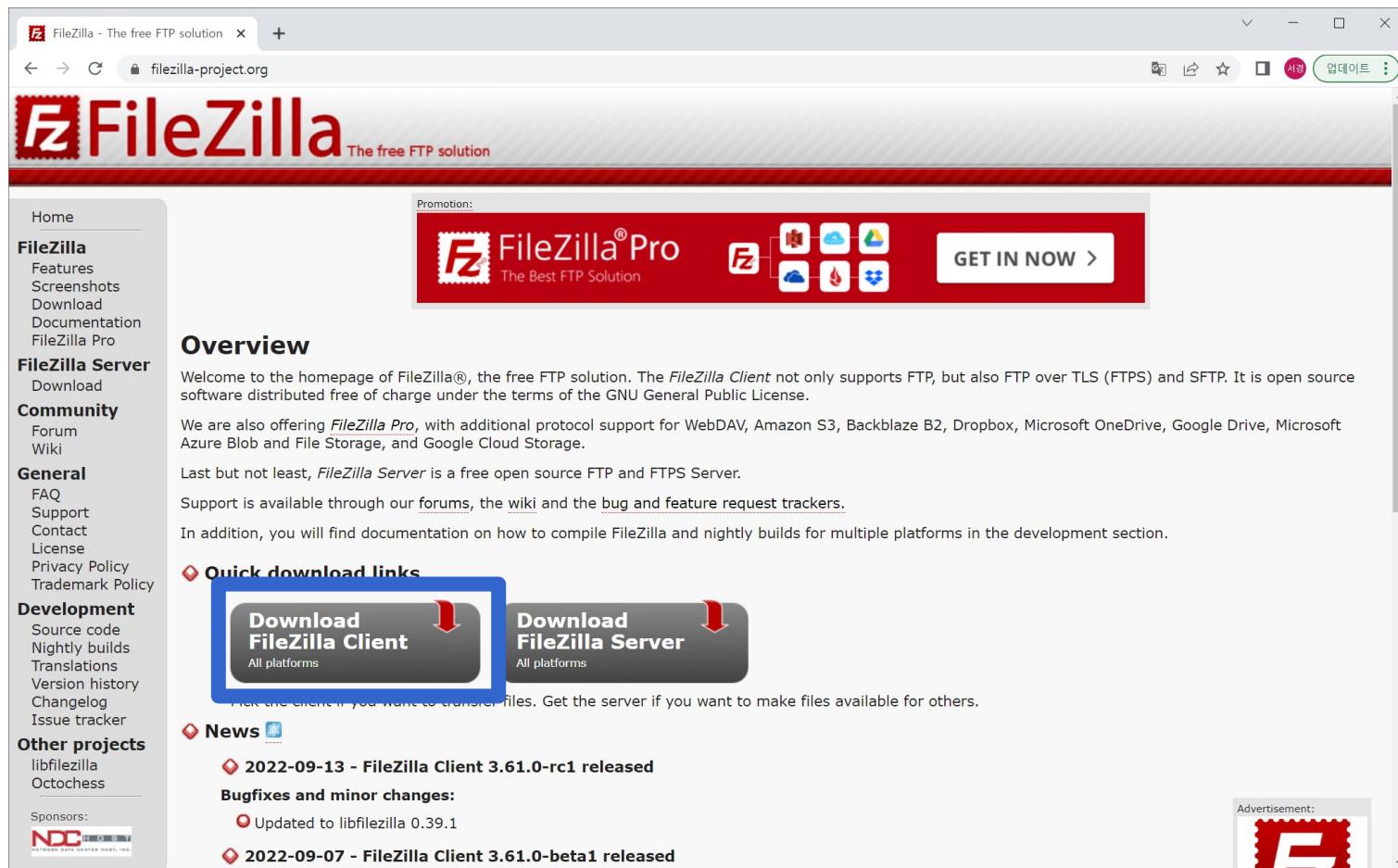
 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

241 packages can be updated.
110 updates are security updates.

New release '18.04.6 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

Last login: Sun Sep 18 23:30:27 2022 from 163.239.24.81
gr120210392@cspro:~$ passwd
Enter login(LDAP) password:
New password:
Re-enter new password:
LDAP password information changed for gr120210392
passwd: password updated successfully
gr120210392@cspro:~$
```

- FileZilla is a FTP solution that can manage the files which is on server
- go to '<https://filezilla-project.org/>' and click 'Download FileZilla Client'



The screenshot shows the homepage of the FileZilla Project website (<https://filezilla-project.org/>). The page features a large red header with the FileZilla logo and the text "The free FTP solution". On the left, there is a sidebar with links for Home, FileZilla (Features, Screenshots, Download, Documentation, FileZilla Pro), FileZilla Server (Download), Community (Forum, Wiki), General (FAQ, Support, Contact, License, Privacy Policy, Trademark Policy), Development (Source code, Nightly builds, Translations, Version history, Changelog, Issue tracker), and Other projects (libfilezilla, Octochess). The main content area includes a promotion for FileZilla Pro, followed by an "Overview" section with text about the software's capabilities and support. Below this are sections for "Quick download links" (with "Download FileZilla Client" highlighted with a blue box) and "News" (listing recent releases like "2022-09-13 - FileZilla Client 3.61.0-rc1 released"). An advertisement for "Advertisement" is visible in the bottom right corner.

# ▶ install FileZilla (For Windows)



- Click Download FileZilla Client and then Download button
- After downloading the FileZilla, execute the FileZilla

The latest stable version of FileZilla Client is 3.60.2

Please select the file appropriate for your platform below.

**Download FileZilla Client for Windows (64bit x86)**

The 64bit versions of Windows 8.1 and 10 are supported.

More download options

Other platforms:

Not what you are looking for? Show additional download options

Prerelease versions

To download the latest prerelease version (currently 3.61.0-rc1), go to the [download page](#) for unstable releases.

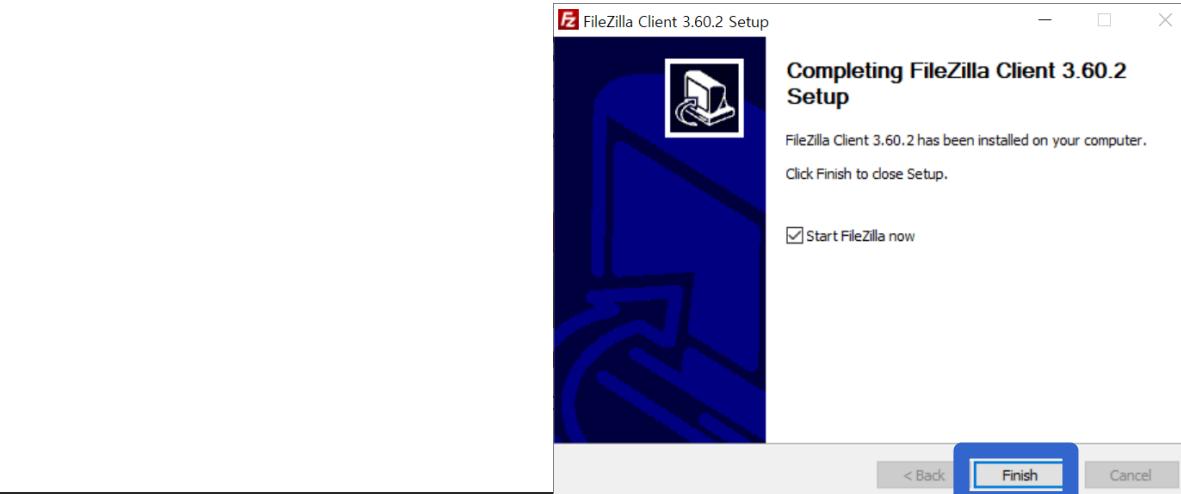
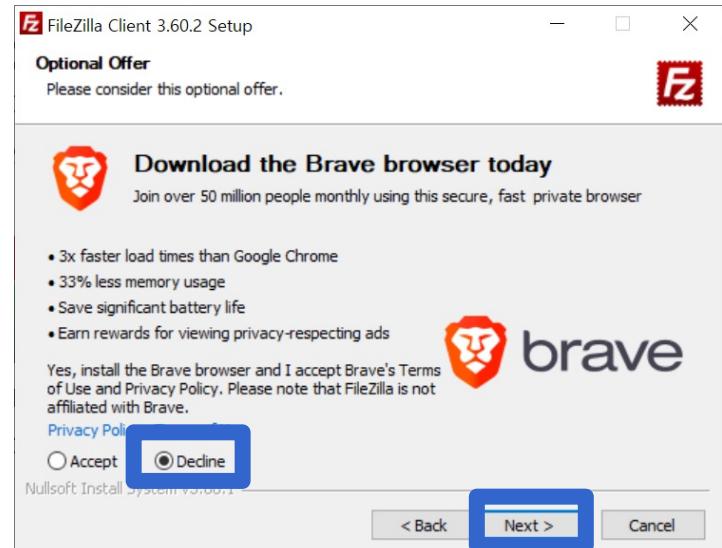
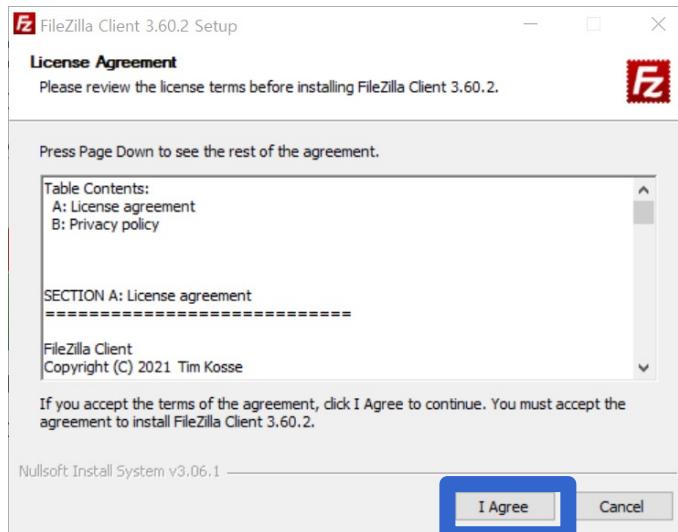
	FileZilla	FileZilla with manual	FileZilla Pro	FileZilla Pro + CLI
Standard FTP	Yes	Yes	Yes	Yes
FTP over TLS	Yes	Yes	Yes	Yes
SFTP	Yes	Yes	Yes	Yes
Comprehensive PDF manual	-	Yes	Yes	Yes
Amazon S3	-	-	Yes	Yes
Backblaze B2	-	-	Yes	Yes
Dropbox	-	-	Yes	Yes
Microsoft OneDrive	-	-	Yes	Yes
Google Drive	-	-	Yes	Yes
Google Cloud Storage	-	-	Yes	Yes
Microsoft Azure Blob + File Storage	-	-	Yes	Yes
WebDAV	-	-	Yes	Yes
OpenStack Swift	-	-	Yes	Yes
Box	-	-	Yes	Yes
Site Manager synchronization	-	-	Yes	Yes
Command-line interface	-	-	-	Yes
Batch transfers	-	-	-	Yes

Please select your edition of FileZilla Client

Download Select Select Select

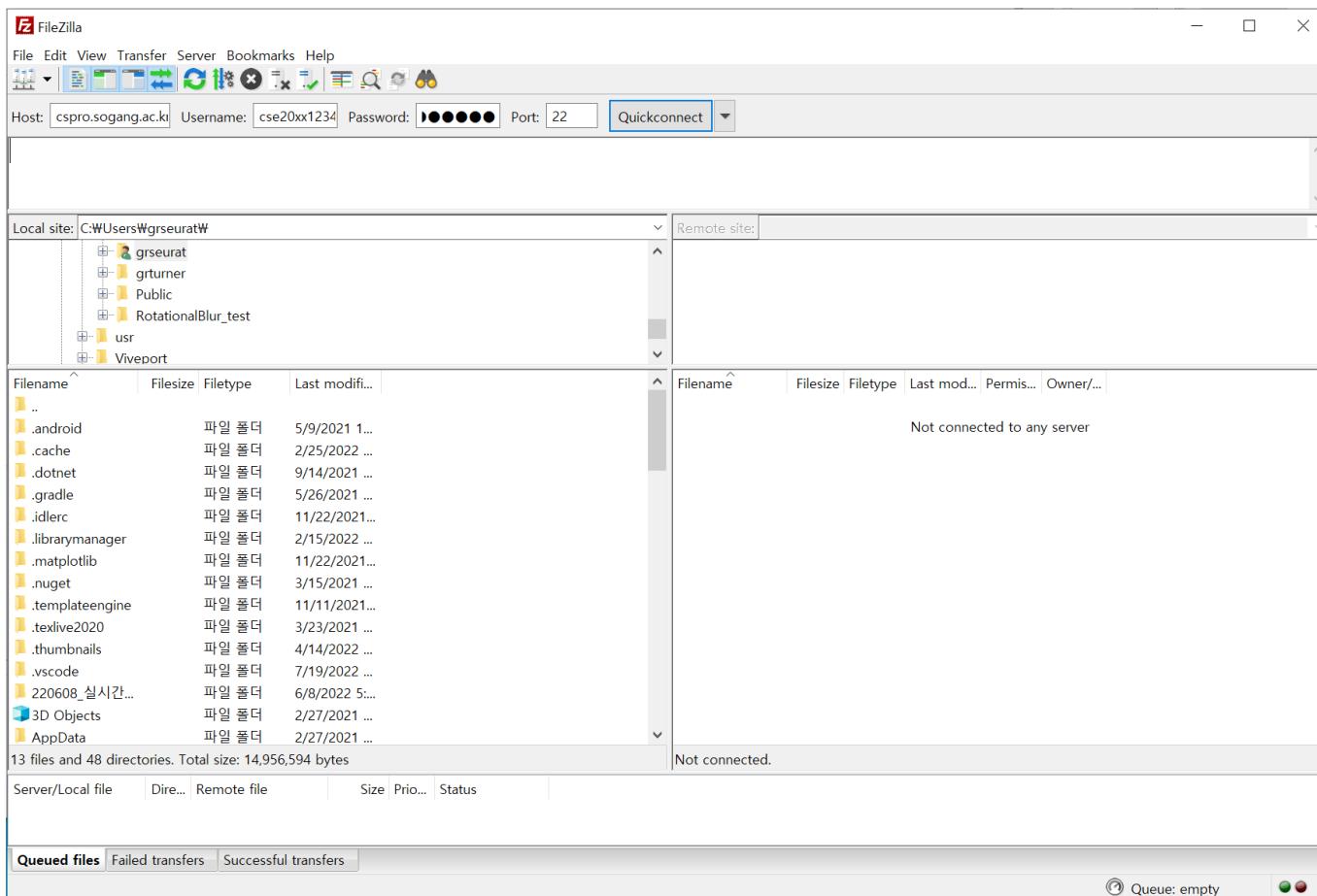
# ➤ install FileZilla (For Windows)

- Be careful, Press the decline button to prevent unnecessary Brave Brower installation
- After that, you can keep pressing the “next” button



# ▶ connect to cspro by FileZilla (For Windows)

- Enter settings, select 'Quickconnect' button. (settings are same with PuTTY)
  - Host: cspro.sogang.ac.kr ( or cspro1~10.sogang.ac.kr. ex) cspro7.sogang.ac.kr )
  - Username: ID( cse+studentID )
  - Password
  - Port: 22 (fixed)



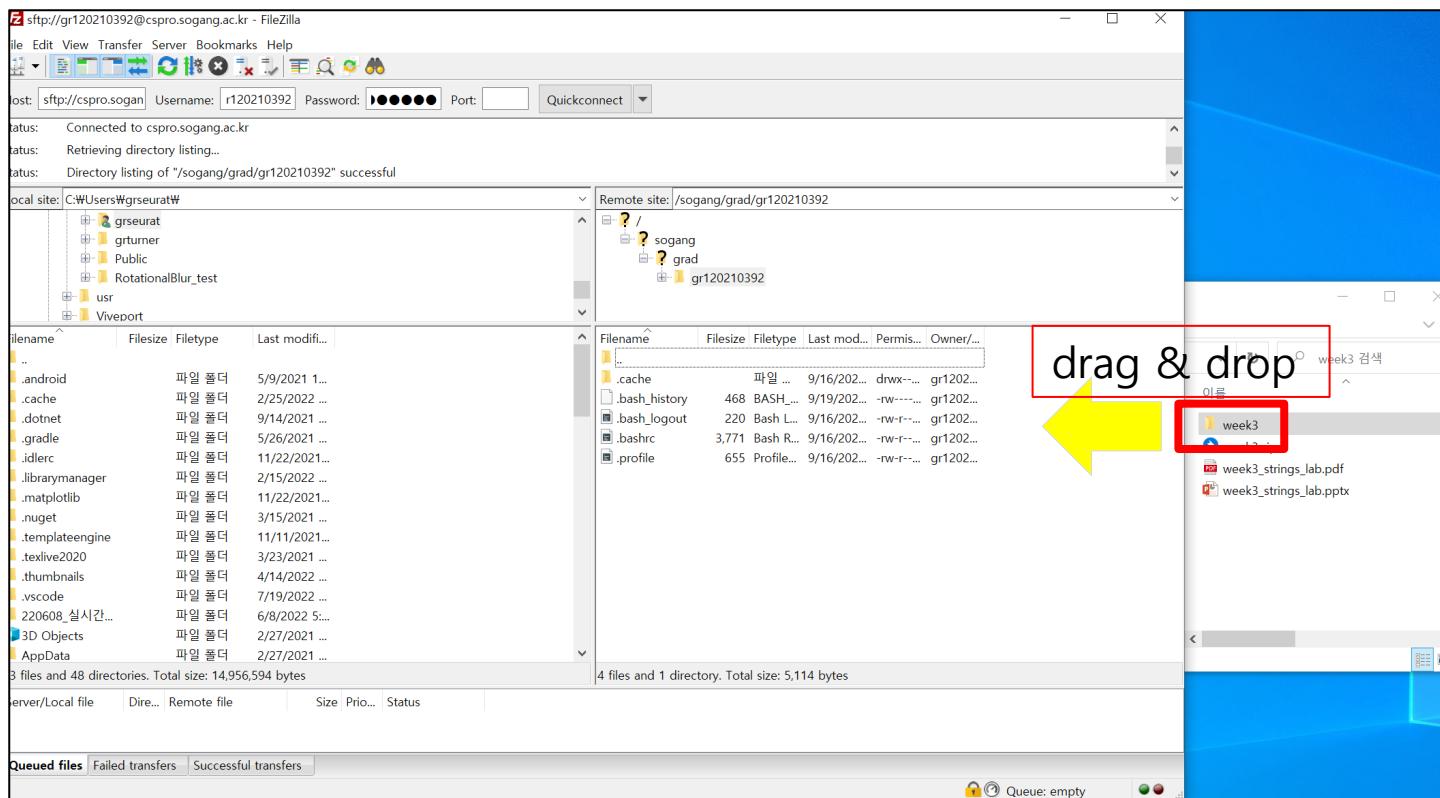
# ▶ copy file to cspro by FileZilla (For Windows)



- There is no file in the Linux server yet (we will learn about 'ls' command later)

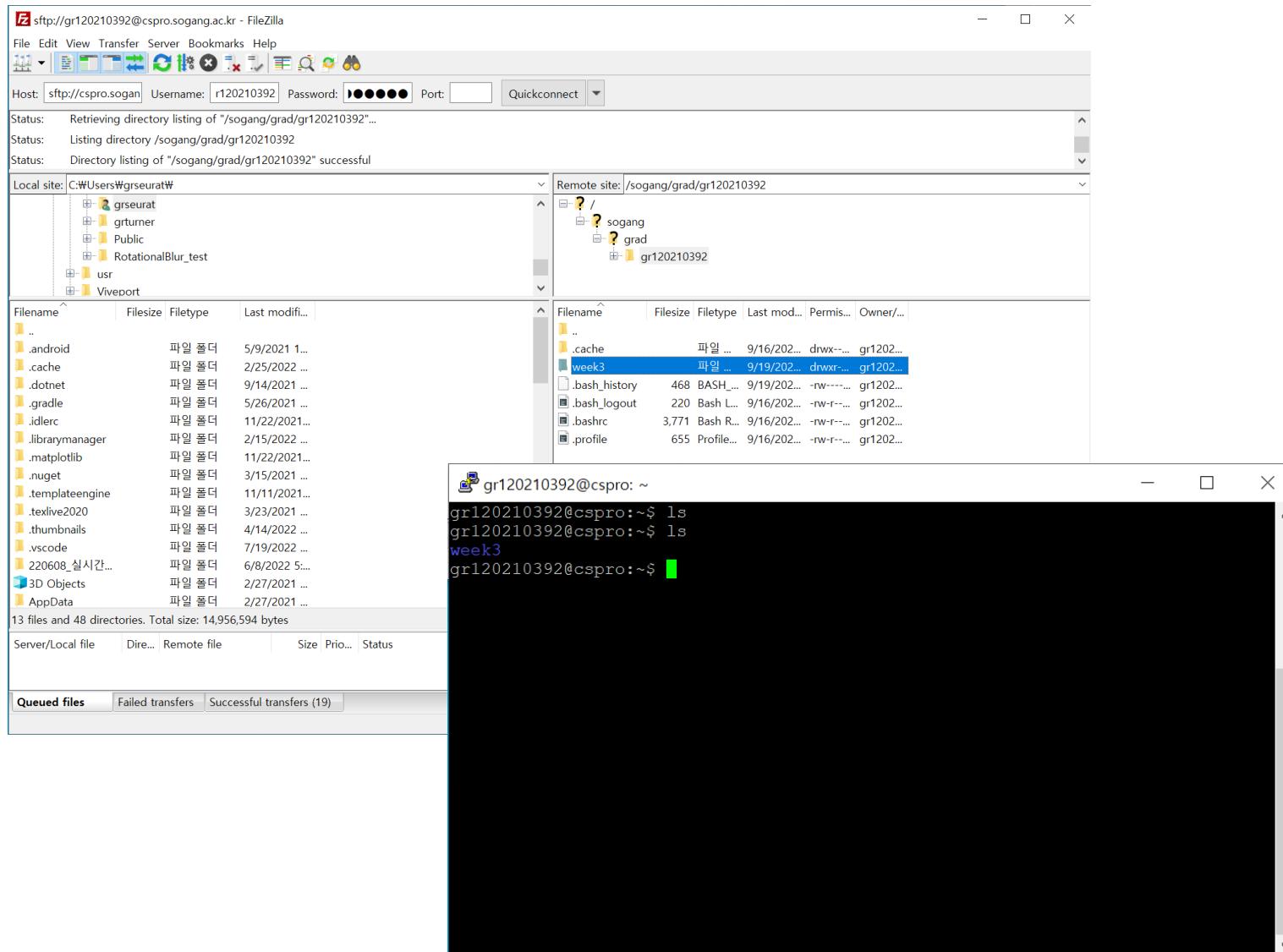
```
gr120210392@cspro: ~
gr120210392@cspro: ~$ ls
gr120210392@cspro: ~$
```

- Drag and drop the file that you want to see on the Linux server



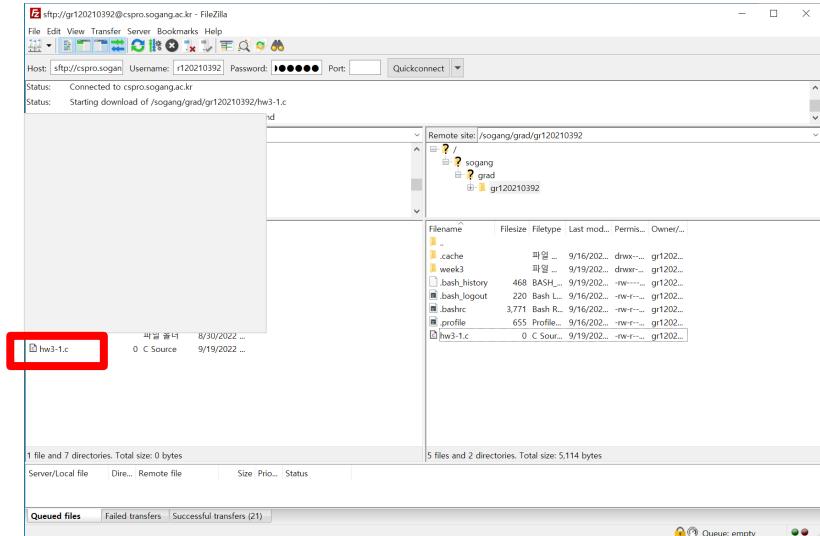
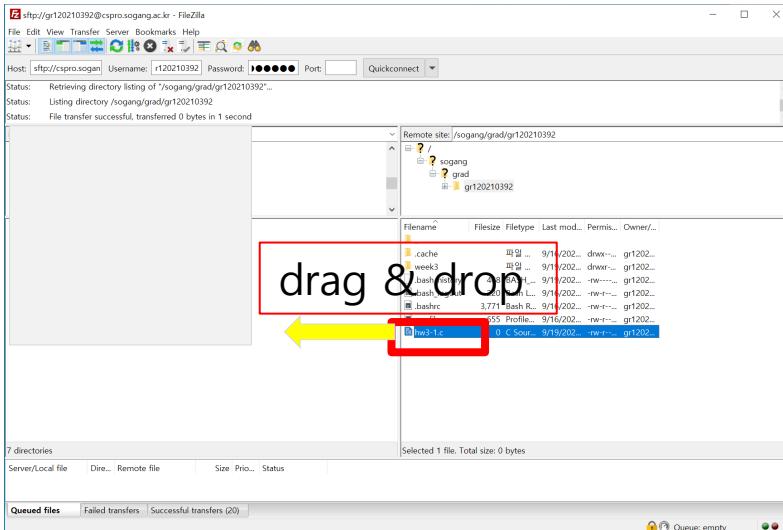
# ▶ copy file to cspro by FileZilla (For Windows)

- Now you can work with your file on server



# ▶ download file from FileZilla (For Windows)

- To download the file from server to your pc:
- it is simple, just drag & drop Filezilla to your pc



## Connecting to CSPRO (in Mac)

- In mac OS, **you don't need PuTTY.**
- You can connect to cspro by just opening built-in Terminal and type as follows:
  - ssh cseStuentID@cspro.sogang.ac.kr (ex) cse20xx1234@cspro.sogang.ac.kr
  - Are you sure you want to continue connection (yes/no)? -> yes
- Next, enter your password to log in
  - Default password is given in page 10
- After logging in, change your password
  - See page 11

- I recommend to use **scp** to move files/directories from local to remote server and vice versa, instead of Filezilla

- How to use**

- ◆ From local to remote

- ✓ Be careful not to miss the **slash!**

```
scp [local filename] [your id]@[cspro1~10].sogang.ac.kr:[remote path to locate file]
```

```
scp -r [local directory name] [your id]@[cspro1~10].sogang.ac.kr:[remote path to locate file]
```

ex) scp a.txt cse20220123@cspro8.sogang.ac.kr:/sogang/....

```
files > ls  
a.txt  
files > scp a.txt gr120230193@cspro.sogang.ac.kr:/sogang/grad/gr120230193  
gr120230193@cspro.sogang.ac.kr's password:  
a.txt  
files > mkdir dir  
files > touch dir/test.txt  
files > ls  
a.txt dir  
files > scp -r dir gr120230193@cspro.sogang.ac.kr:/sogang/grad/gr120230193  
gr120230193@cspro.sogang.ac.kr's password:  
test.txt  
files >
```

Local

move  
a.txt

```
gr120230193@cspro:~$ ls  
gr120230193@cspro:~$ pwd  
/sogang/grad/gr120230193  
gr120230193@cspro:~$ ls  
a.txt  
gr120230193@cspro:~$ ls  
a.txt dir  
gr120230193@cspro:~$
```

Remote

- How to use
  - ◆ From remote to local

```
scp [your id]@[cspro1~10].sogang.ac.kr:[remote path the file located] [local path to locate file]  
scp -r [your id]@[cspro1~10].sogang.ac.kr:[remote path the dir located] [local path to locate dir]
```

ex) scp cse20220123@cspro8.sogang.ac.kr:/sogang/....

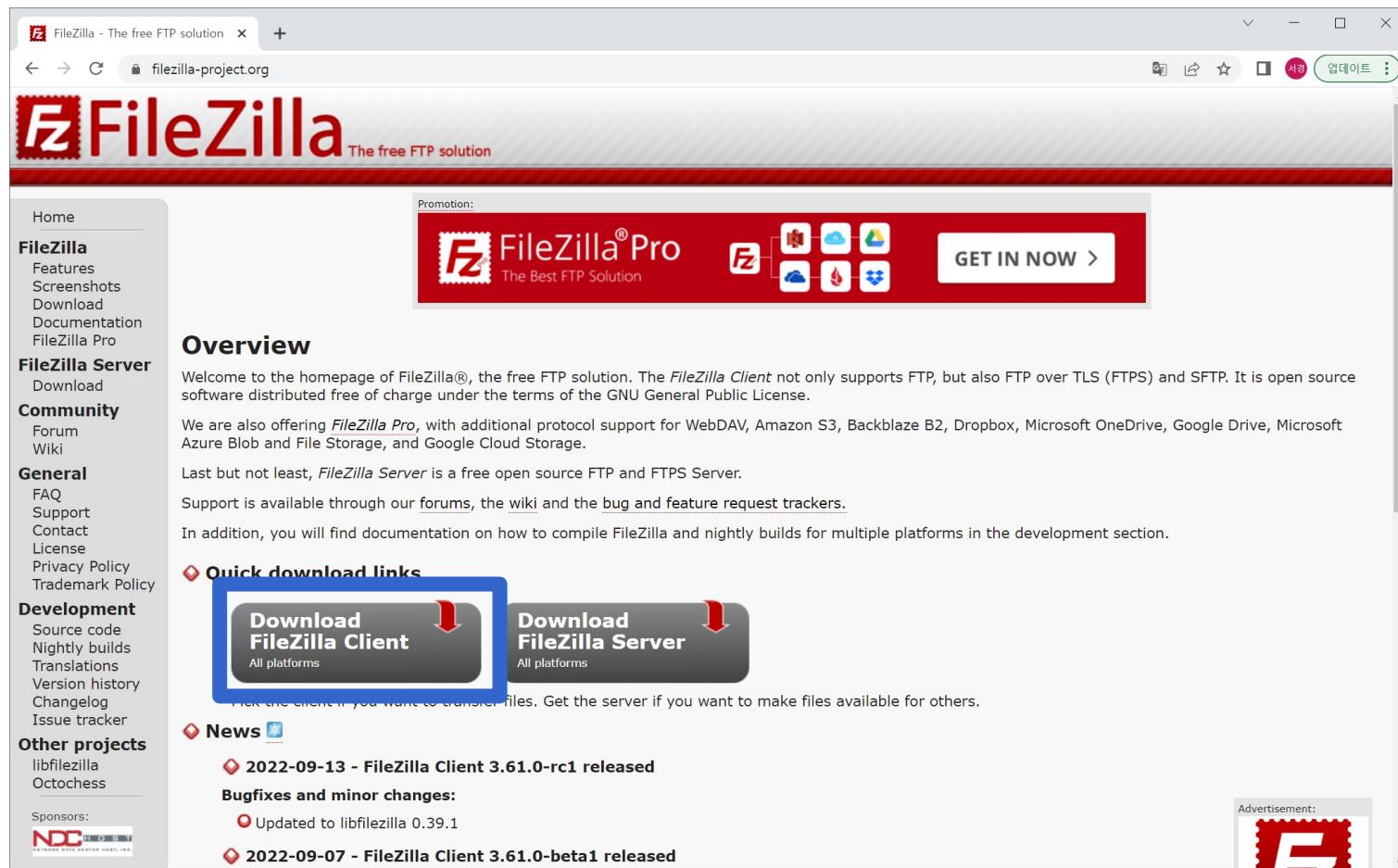
Local

```
original  
files > ls  
files > pwd  
/Users/ieunji/files  
files > scp gr120230193@cspro.sogang.ac.kr:/sogang/grad/gr120230193/tolocal.txt /Users/ieunji/files  
gr120230193@cspro.sogang.ac.kr's password:  
tolocal.txt  
files > ls  
tolocal.txt  
files > █
```

Remote

```
gr120230193@cspro:~$ ls  
tolocal.txt  
gr120230193@cspro:~$ pwd  
/sogang/grad/gr120230193  
gr120230193@cspro:~$ █
```

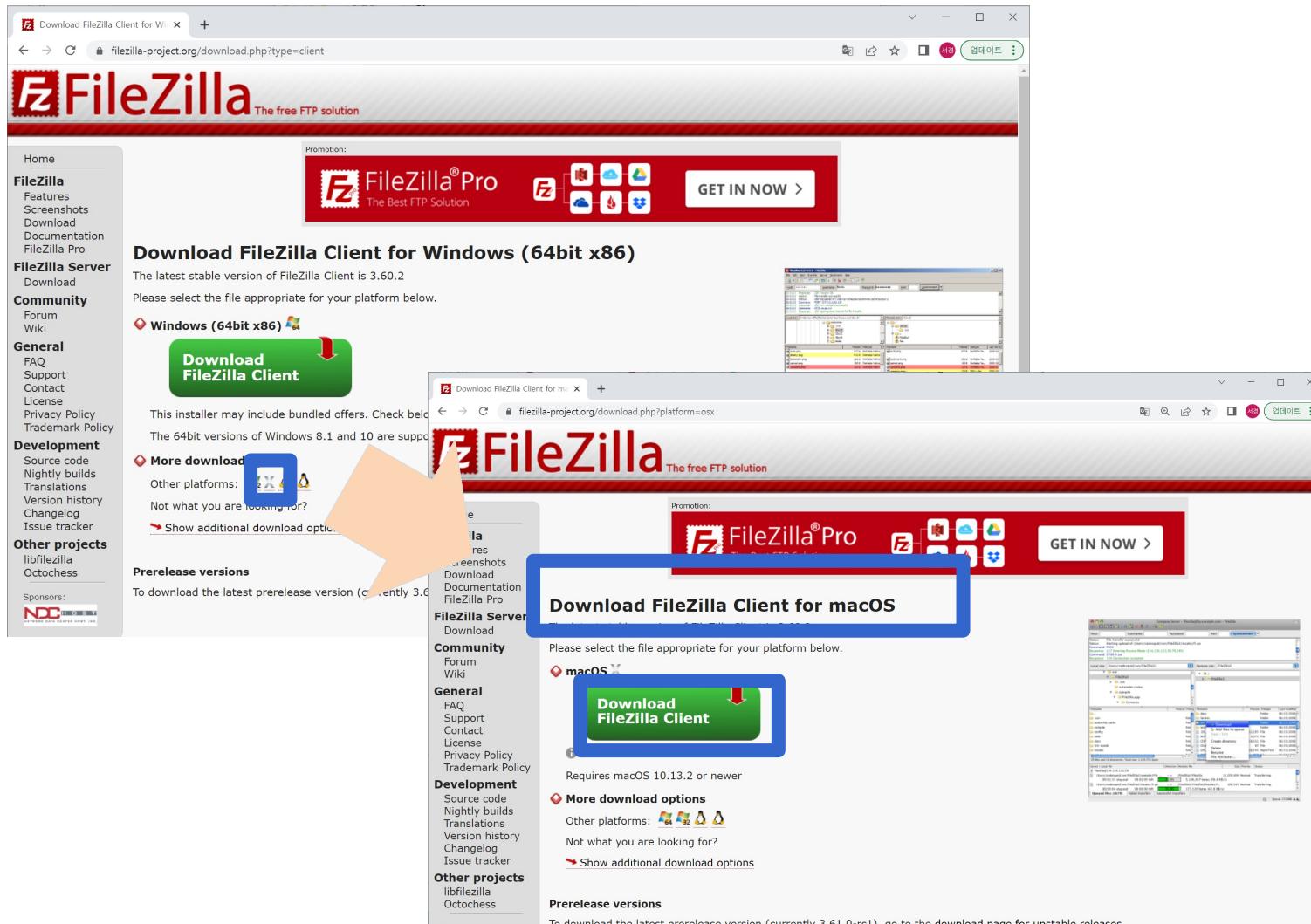
- FileZilla is a FTP solution that can manage the files which is on server
- go to '<https://filezilla-project.org/>' and click 'Download FileZilla Client'



The screenshot shows the official website for FileZilla at <https://filezilla-project.org/>. The page features a large red header with the FileZilla logo and the text "The free FTP solution". On the left, a sidebar contains links for Home, FileZilla (Features, Screenshots, Download, Documentation, FileZilla Pro), FileZilla Server (Download), Community (Forum, Wiki), General (FAQ, Support, Contact, License, Privacy Policy, Trademark Policy), Development (Source code, Nightly builds, Translations, Version history, Changelog, Issue tracker), and Other projects (libfilezilla, Octochess). The main content area includes a "Promotion" banner for FileZilla Pro, followed by an "Overview" section with text about the software's capabilities and support. Below this is a "Quick download links" section with two prominent buttons: "Download FileZilla Client" (All platforms) and "Download FileZilla Server" (All platforms). A note below the buttons says "Get the client if you want to transfer files. Get the server if you want to make files available for others." Further down, there's a "News" section with a recent update about the release of FileZilla Client 3.61.0-rc1 and a bugfixes and minor changes section. An advertisement for NDC (National Data Center) is visible on the right.

# ▶ install FileZilla (For Mac)

- Click 'X' Icon (blue boxed) and redirect to download for mac page
- And click 'Download FileZilla Client' button
- After downloading the FileZila, execute the FileZilla



- click once more 'Download' button

The screenshot shows the official FileZilla download page for macOS. A modal window titled "Please select your edition of FileZilla Client" is displayed over the main content. The modal contains a table comparing three editions: FileZilla, FileZilla with manual, and FileZilla Pro. The table lists various features and supported services, with "FileZilla Pro" being the most feature-rich edition.

	FileZilla	FileZilla with manual	FileZilla Pro
Standard FTP	Yes	Yes	Yes
FTP over TLS	Yes	Yes	Yes
SFTP	Yes	Yes	Yes
Comprehensive PDF manual	-	Yes	Yes
Amazon S3	-	-	Yes
Backblaze B2	-	-	Yes
Dropbox	-	-	Yes
Microsoft OneDrive	-	-	Yes
Google Drive	-	-	Yes
Google Cloud Storage	-	-	Yes
Microsoft Azure Blob and File Storage	-	-	Yes
WebDAV	-	-	Yes
OpenStack Swift	-	-	Yes
Box	-	-	Yes
Site Manager synchronization	-	-	Yes

Below the table are two prominent green buttons: "Download" and "Select". To the right of the "Download" button is a link to "Download on the Mac App Store". The background of the modal shows a blurred screenshot of the FileZilla application interface.

## ▶ connect to cspro by FileZilla (For Mac)



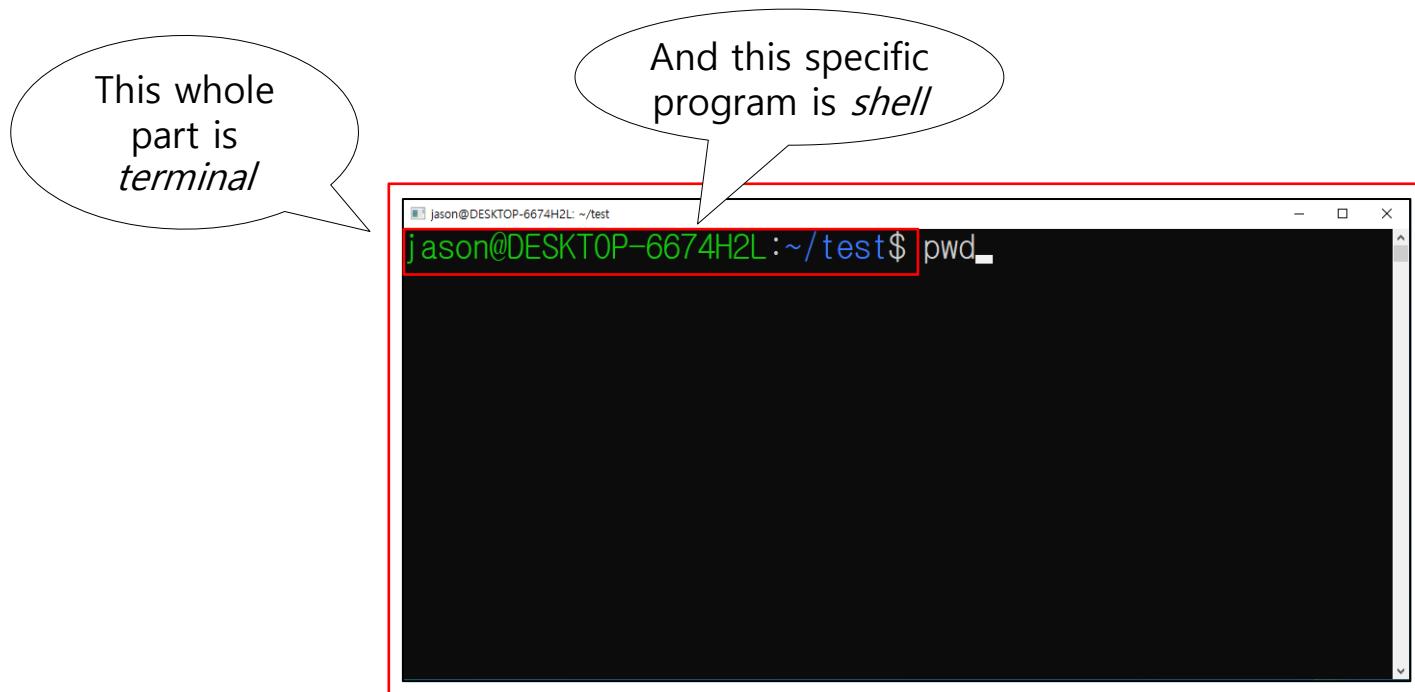
- Next steps to connect to cspro by FileZilla is almost the same with Windows (page 14 ~ )

## Basic Linux commands and Usages

- man
- mkdir/rmdir
- cp
- cd
- mv
- ls
- rm
- cat
- echo
- grep
- ps
- kill
- pwd
- su/passwd
- tar
- chmod

# ▶ What is shell?

- **Terminal** is an environment (interface) where a user can type text commands
- **Shell** is a program that interacts with you: it takes in a command from a user and passes it to the operating system (Linux here) to perform some task
- So, roughly speaking:



- **man: manual for specific instruction**
  - man [instruction]
  - ex. man grep
- **mkdir/rmdir**
  - mkdir: make directory
  - rmdir: remove directory
  - ex. mkdir /temp (absolute path) / mkdir ./temp (relative path)
  - In principle, rmdir is only possible if there is any files in the directory

```
GREP(1)          General Commands Manual      GREP(1)

NAME
    grep, egrep, fgrep, rgrep - print lines matching a pattern

SYNOPSIS
    grep [OPTIONS] PATTERN [FILE...]
    grep [OPTIONS] [-e PATTERN]... [-f FILE]... [FILE...]

DESCRIPTION
    grep searches the named input FILES for lines containing a
    match to the given PATTERN. If no files are specified, or if
    the file "-" is given, grep searches standard input. By
    default, grep prints the matching lines.

    In addition, the variant programs egrep, fgrep and rgrep are
    the same as grep -E, grep -F, and grep -r, respectively. These
    variants are deprecated, but are provided for backward
    compatibility.

OPTIONS
    Manual page grep(1) line 1 (press h for help or q to quit)
```

man grep

```
gr120230193@cspro:~$ ls
gr120230193@cspro:~$ mkdir folder
gr120230193@cspro:~$ ls
folder
gr120230193@cspro:~$
```

mkdir folder

- **cp: copy file**
  - cp [filename1] [filename2] : copy filename1 to filename2
  - cp [filename1] [dir1/filename2] : copy filename1 to filename2 in the directory dir1
  - ex) cp a.c /temp, cp ./a.c ./temp
- **cd: change directory**
  - cd : change directory to your home directory
  - cd [dir\_name] : change directory to directory named “dir\_name”
  - cd .. : change directory to parent directory
- **mv: move and rename files**
  - mv [filename] [directory] : move file to directory
  - mv [filename1] [filename2] : rename filename1 as filename2
  - mv [filename] .. : move filename to parent directory
  - mv [filename] . : move filename to current directory
  - mv [file1] [file2] [dir1]: move file1, file2, and dir1 to dir

```
● ● ●  
files > ls  
coffee lemon tea  
files > mv lemon icetea  
files > ls  
coffee icetea tea  
files > █
```

rename the file with mv

- **ls**: print file list in the current directory
  - ls -a : print even hidden files (files that begin with .(dot))
  - ls -l : print detail information of files. (type, permission, link, owner, group, size, last modification time)
- **rm**: remove file or directory
  - rm [option] [filename]
  - options
    - -rf : recursive + force
    - -r: recursive – this option allows you to delete folders and recursively remove their content first
    - -f: force – there is no confirmation prompt and ignores non-existent files
- **cat**: concatenates inputs and prints on the screen
  - cat [filename] : print the contents of filename
  - cat [filename1] [filename2] [filename3]: concatenate the contents of filenames
  - cat [filename1] [filename2] > [filename3]: concatenate the contents of filename1 and filename2, and save as filename3
- **echo**
  - print value of variable
  - ex) echo \$USER

- **grep:** search text data sets for lines that match a regex
  - grep [option] pattern [file...]
  - search the row including or matching the word
  - -n: print with line number
  - -i: ignore case
  - ex) grep -n ftp /etc/group
- **ps:** print processes
  - ps 1000: print status of process whose id is 1000
- **kill**
  - exit program
  - ex) kill 9 pid(force termination)
- **pwd:** print (current) working directory

```
gr120230193@cspro:~$ cat colors
red
pink
blue
green
gr120230193@cspro:~$ grep pink colors
pink
gr120230193@cspro:~$ grep yellow colors
gr120230193@cspro:~$ █
```

- **su: become a super user**
- **passwd: change password**
- **tar: zip/unzip files**
  - **z: gzip filetype(.tar.gz or .tgz)**
  - **x: unzip**
  - **c: zip**
  - **v: verbose**
  - **f: file name to compress**
  - **ex) tar xvf ./states.tar, tar xzf software.tar.gz / tar cvfz files.tar.gz**
- **chmod: change the access permissions and the special mode flags**

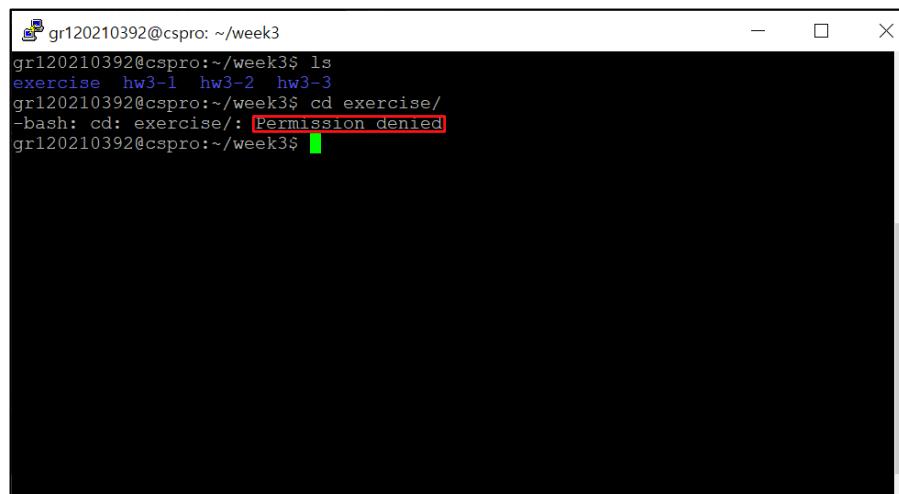
#	Sum	Permission	
7	4(r) + 2(w) + 1(x)	rwx	read, write and execute
6	4(r) + 2(w)	rw-	read and write
5	4(r) + 1(x)	r-x	read and execute
4	4(r)	r--	read only
3	2(w) + 1(x)	-wx	write and execute
2	2(w)	-w-	write only
1	1(x)	--x	execute only
0	0	---	none

For example, 754 would allow:

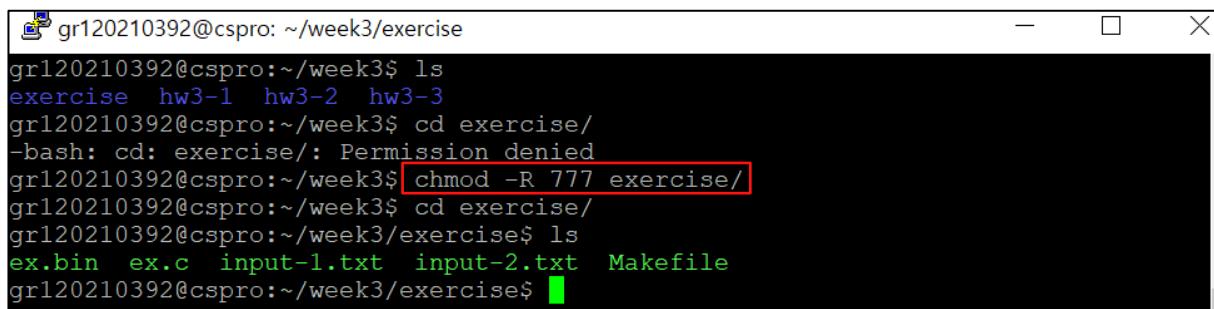
- "read" (4), "write" (2), and "execute" (1) for the *User* class;
- "read" (4) and "execute" (1) for the *Group* class;
- Only "read" (4) for the *Others* class.

## ▶ if permission denied

- when permission denied, you can modify permission of the file/directory
- you can use 'chmod -r 777 [directory name]'
  - r option means apply to every below directory and files in [directory name]
  - 777 option means apply Read/Write/Execute(all) permission for Owner/Group/Public user(all)
  - for more information of chmod, refer <https://linuxize.com/post/chmod-command-in-linux/> and <https://recipes4dev.tistory.com/175>



```
gr120210392@cspro: ~/week3
gr120210392@cspro:~/week3$ ls
exercise hw3-1 hw3-2 hw3-3
gr120210392@cspro:~/week3$ cd exercise/
-bash: cd: exercise/: Permission denied
gr120210392@cspro:~/week3$
```

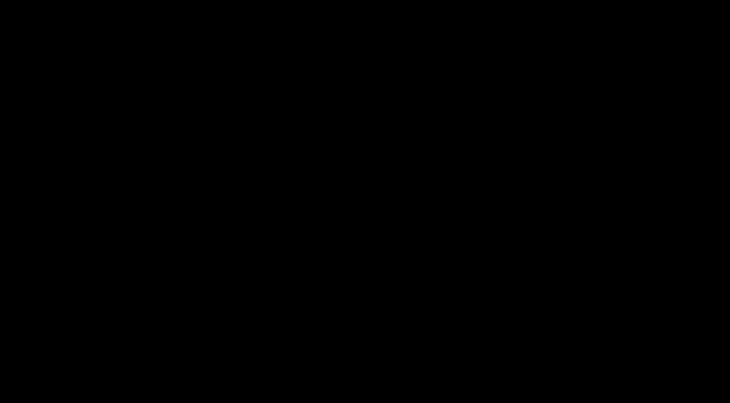


```
gr120210392@cspro: ~/week3/exercise
gr120210392@cspro:~/week3$ ls
exercise hw3-1 hw3-2 hw3-3
gr120210392@cspro:~/week3$ cd exercise/
-bash: cd: exercise/: Permission denied
gr120210392@cspro:~/week3$ chmod -R 777 exercise/
gr120210392@cspro:~/week3$ cd exercise/
gr120210392@cspro:~/week3/exercise$ ls
ex.bin ex.c input-1.txt input-2.txt Makefile
gr120210392@cspro:~/week3/exercise$
```

# ➤ Vim (Vi IMproved)

- Vim is improved version of 'vi text editor' and free, open-source
  - Vim is included(built-in) in Linux
  - We will use Vim on Linux to write our code
  - On Linux, command '**vim [Filename]**' creates a file and then opens it with '**Normal mode**'
    - If the file already exist, vim opens that existing file and lets you edit it
    - Even if you type 'vi [Filename]', it is automatically redirected to 'vim [Filename]'

```
gr120210392@cspro:~$ vi new.c
```



A screenshot of a terminal window titled "gr120210392@cspro: ~". The window is mostly empty, with only a few small green and blue icons visible at the top left. The bottom status bar shows the file name "new.c" [New File] and the coordinates 0, 0-1. The title bar also includes standard window control buttons for minimize, maximize, and close.

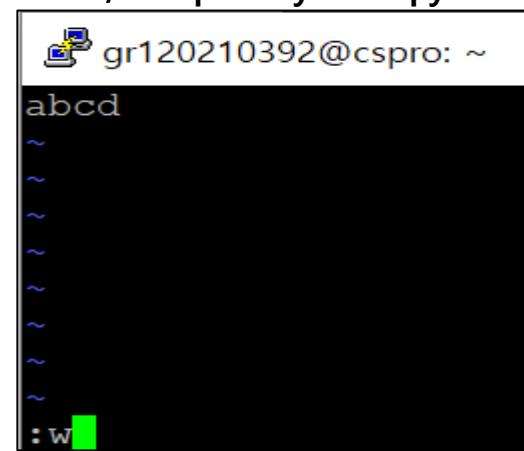
- Normal mode. ' ~ ' means there's nothing in the line.

# Vim mode

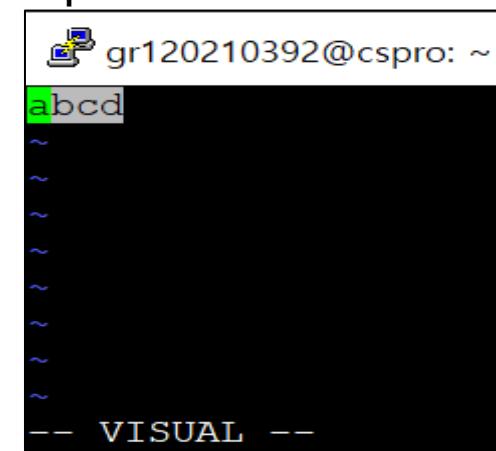
- Vim has several modes, normal, command, insert, visual
  - Normal mode is the first state you create file. Mode conversion should always go through this normal mode
    - To return to normal mode from another mode, press 'ESC' key
  - You can edit text in Insert mode
    - To enter to insert mode, press any of 'A', 'a', 'O', 'o', 'Insert' key in normal mode
    - And you can write what you want (code)
  - You can save, quit, etc. files in Command mode
    - To enter to command mode, press ':' key in normal mode
    - To quit vim (without save), enter ':q'. To save, enter ':w'. To save and quit, enter ':wq'
    - If the file was modified and you wanted to quit without saving(':q'), you would use ':q!' or ':wq!'. '!' tells vim to force the operation
  - You can copy and paste in Visual mode
    - To enter to Visual mode, press 'v' key in normal mode
    - use 'arrow' key to highlight a selection, and press 'y' to copy and 'p' to paste



insert mode



## command mode



## visual mode

- You can also copy & paste using mouse drag(copy) & right click(paste)
- You can delete one character by press 'd' in normal mode or visual mode
  - also you can delete a line by press 'dd' in normal mode or visual mode (useful)
- A swp file can be created if:
  - If you are shutting down abnormally after modifying a file. (for example, if terminal shut down)
  - When other people(or you) open a file that you are already working on
  - etc.
- swp(swap) files store changes you've made to the files. It can be used when you want to recover the files.
  - if swp file is created and situation like the picture shown below, select an operation you want to do.

```
gr120210392@cspro: ~

E325: ATTENTION
Found a swap file by the name ".new.c.swp"
    owned by: gr120210392    dated: Thu Mar  2 17:52:23 2023
    file name: ~gr120210392/new.c
    modified: YES
    user name: gr120210392    host name: cspro
    process ID: 131437
While opening file "new.c"
    dated: Thu Mar  2 17:31:40 2023

(1) Another program may be editing the same file. If this is the case,
    be careful not to end up with two different instances of the same
    file when making changes. Quit, or continue with caution.
(2) An edit session for this file crashed.
    If this is the case, use ":recover" or "vim -r new.c"
    to recover the changes (see ":help recovery").
    If you did this already, delete the swap file ".new.c.swp"
    to avoid this message.

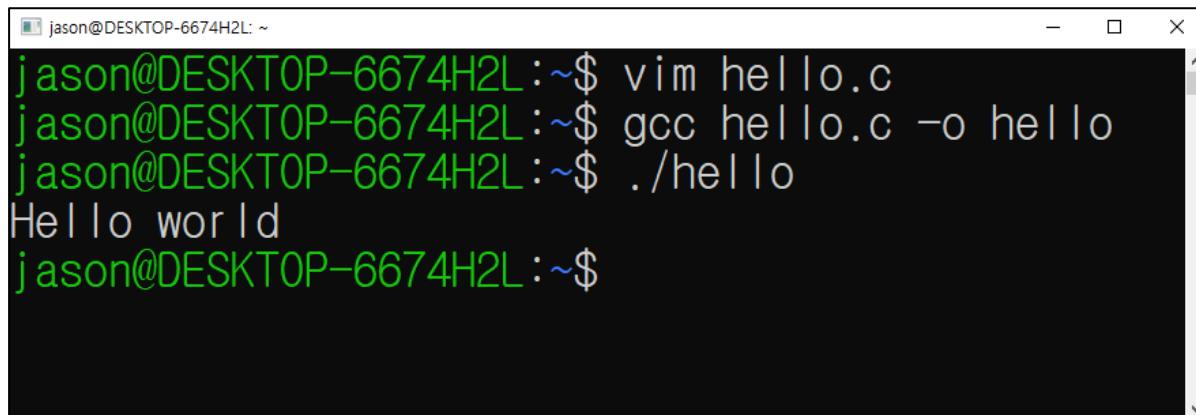
Swap file ".new.c.swp" already exists!
[O]pen Read-Only, (E)dit anyway, (R)ecover, (D)elete it, (Q)uit, (A)bort: [
```

## Commands

- **insertion**
  - i: insert mode in front of cursor
  - a: insert mode behind cursor
  - o: insert line just below the cursor
- **deletion**
  - dd: delete a line on the cursor
  - x: delete a letter
- **search**
  - /: write the what you want to search after the slash
- **copy & paste**
  - yy: copy(yank) the line on the cursor
  - p: paste the yanked line just on the cursor
  - v: by moving the cursor, you can make a block. And press y, then you yanked the block.

**These commands work in only normal mode.**

- Once you write a program with an editor, you have to compile it
- “Compile” is the process of translating your source code into an *executable file*
- In Linux, GCC will do this for us
- There are many options in GCC, but for now it is enough to know the following:  
\$ gcc <source file> -o <output executable file>
- For example, the following commands compile “hello.c” into an executable file named “hello”



```
jason@DESKTOP-6674H2L:~$ vim hello.c
jason@DESKTOP-6674H2L:~$ gcc hello.c -o hello
jason@DESKTOP-6674H2L:~$ ./hello
Hello world
jason@DESKTOP-6674H2L:~$
```

- Now you can work with your works on Linux
- If you want to get more help and know other commands, please refer the pages below
- Linux tutorial
  - <https://maker.pro/linux/tutorial/basic-linux-commands-for-beginners>
- Linux commands
  - <https://personales.unican.es/corcuerp/Linux/commands/Bash%20Command%20Reference.html>
- Vim tutorial
  - <https://www.freecodecamp.org/news/vim-beginners-guide/>
- Vim commands
  - <https://www.phcomp.co.uk/Tutorials/Unix-And-Linux/Vi-and-vim-reference-sheet.html>