

# C Programming Environments

COMP319 Algorithms 1

Spring 2021

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# Overview

- Suggestions for C programming environments
  - Linux (evaluation standards)
    - Account setting
    - Connecting to the Linux server with SSH clients
    - Editor suggestions
  - Offline compilers
    - Code::Blocks,
      - But check your code with linux before submission
- Notes
  - 채점기준: Ubuntu linux 16.04, gcc 5.4.0 20160609
  - Linux server가 제공되며 사용이 강하게 권장됨
    - Account (계정) 제공됨
  - 다른 IDE를 사용해도 되지만 제출전에 위의 linux 에서 검증해 보기를 바랍니다.

# Why C only?

- C언어는 가장 효율적인 코딩이 가능하게 하며 따라서 embedded device 등에서는 C 컴파일러만을 제공하는 경우도 많다.
- 다른 언어들은 나중에 사장되는 경우도 많지만 C 언어는 50년 가까이 사용되었으며 앞으로도 계속 사용될 것으로 예상된다.
- 많은 취업시험에서 코딩 테스트는 알고리즘+C언어 구현으로 주어진다.
- 컴퓨터 구조 등에 대한 이해를 도와준다.
- C언어 복습이 필요함.

# Linux Environment (1)

- Linux is a powerful OS that provides a good multi-user, shared environments.
  - Provides NATURAL programming environments
    - Linux is an OS for developers
  - Text environment → good for slow connections
- Grading standard: your submissions will be tested on the provided Linux server.
  - 채점기준: Ubuntu linux 16.04, gcc 5.4.0 20160609
- Advantages of Linux programming environments
  - Managed by the instructor and the TA
  - Your work remains in the server
    - TA does not have to access your PC, but can see your files very easily to give help to the students
    - If any mistake or loss is occurred during submission, or LMS server is down, your files will remain safely in the server

# Linux Environment (2)

- Disadvantages of Linux programming environments
  - Requires network connections
  - Mostly command-line interface: GUI available, but too slow with network connections (we do not recommend GUI at the Linux server)
  - Need to learn edit a source file, compile it, and execute the output
  - Very different from Windows and Other OS's → hard for beginners to start with
- The above disadvantages will not matter once you get used to the environment

# Linux Account Setting

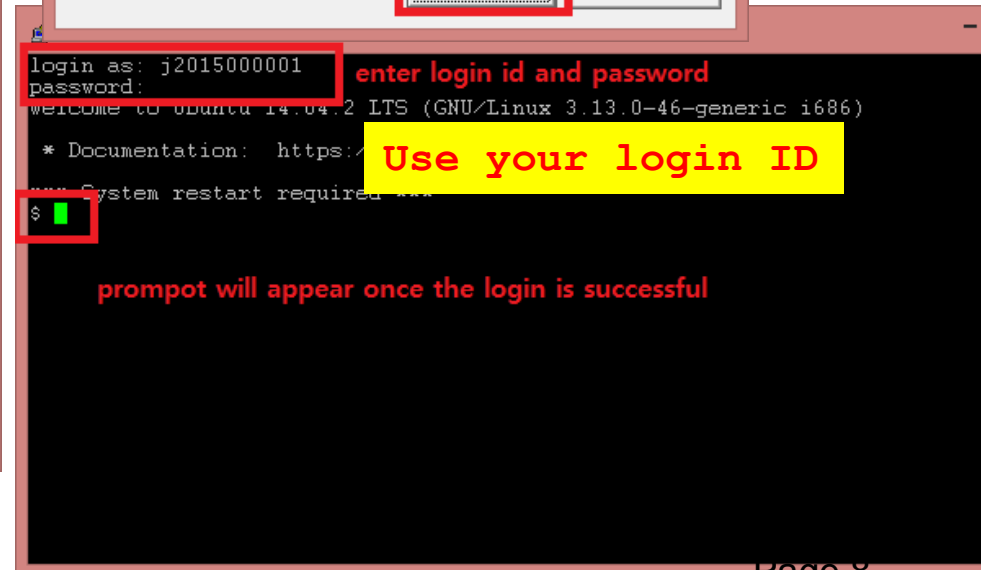
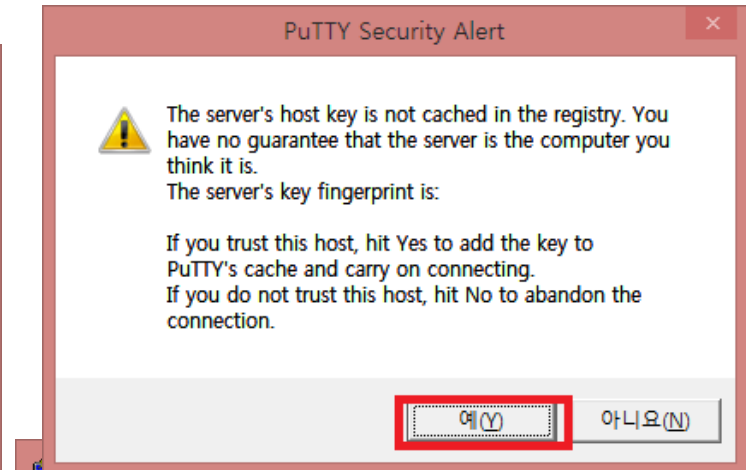
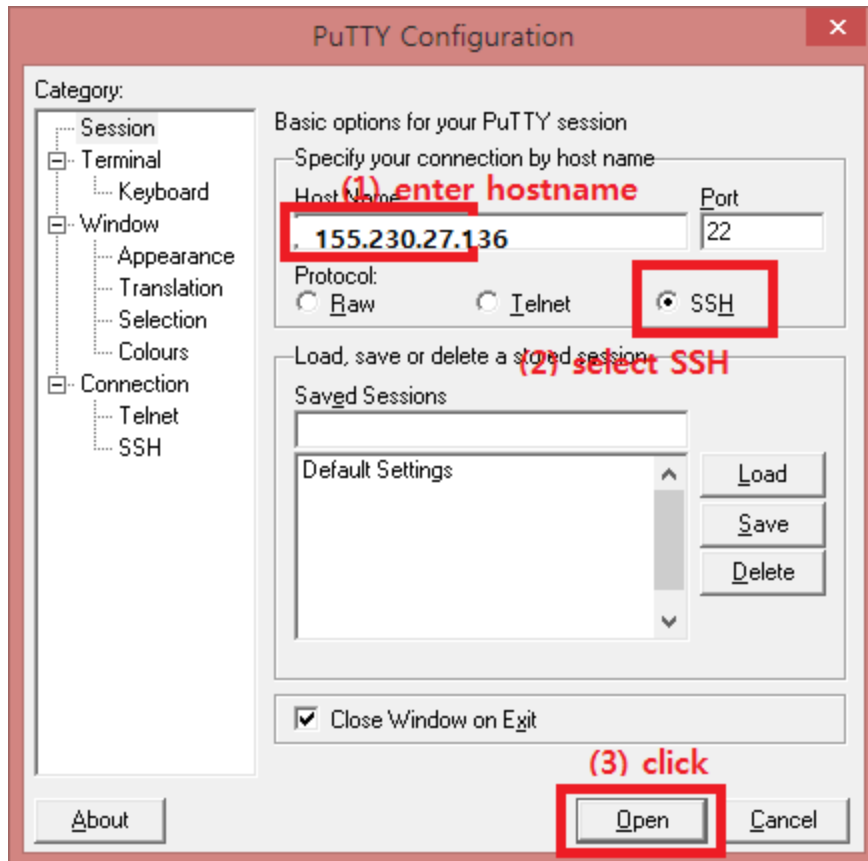
- Linux server address: 155.230.27.136
  - No named address such as [www.knu.ac.kr](http://www.knu.ac.kr), because once it is named, it will be known to outside through DNS servers, and easier to be attacked
- Account setting
  - ID: u\${YOUR\_ID}
    - For example for ID 202000319, the account name is “u20200019” (‘u’ is for graduate students)
    - The initial password is your email registered at LMS. Recommend changing it to prevent any security breach.
- The server can be accessed via SSH (secured shell) protocol to change the password, write C codes directly on the server. The term “secured” means that all the transfers are encrypted, and it is open to networks outside of KNU network (surely, inside connection is also open).

# SSH Connections for Linux and MacOS

- Linux users
  - Simple run 'ssh `${ID}@155.230.27.136`' on your terminal
- MacOS
  - The instructor does not know MacOS, so find it yourself
  - Linux terminal may be available on it

# SSH Connection: Putty for Windows

- [Putty] for Windows
  - Putty is a very light, free, SSH client for Windows.





# SSH Connection: Putty for Windows



```
login as: j2015000001
password:
Welcome to Ubuntu 14.04.2 LTS (GNU/Linux 3.13.0-46-generic i686)

 * Documentation:  https://help.ubuntu.com/

*** System restart required ***
Last login: Fri Mar 13 04:49:23 2015 from 155.230.92.28
$ passwd
Changing password for j2015000001.
(current) UNIX password:
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
$
```

Type-in passwd to change password  
Old one, new one, retype new one

# Creating and Editing Welcome.c

comp217@minions: ~/lab01

comp217@minions:~/lab01\$ **dir**

Welcome.class Welcome.java

comp217@minions:~/lab01\$ **nano Welcome.c**

- (1) \$ **dir** % there are Welcome.java and Welcome.class only
- (2) \$ **nano Welcome.c** % open a new file
- (3) Write content → Ctrl+O (^O) → confirm file name → Ctrl+X (^X) → exit

comp217@minions: ~/lab01

GNU nano 2.5.3

File: Welcome.c

```
// This program prints Welcome to C
#include <stdio.h>
int main() {
    printf("Welcome to C!\n");
}
```

Get Help Write Out Where Is Cut Text Justify  
Exit Read File Replace Uncut Text To Spell

comp217@minions: ~/lab01

GNU nano 2.5.3

File: Welcome.c

```
// This program prints Welcome to C
#include <stdio.h>
int main() {
    printf("Welcome to C!\n");
}
```

File Name to Write: **Welcome.c**

Get Help M-D DOS Format M-A Append M-B Backup F  
Cancel M-M Mac Format M-P Prepend T To Files

```
// This program prints Welcome to C
#include <stdio.h>
int main() {
    printf("Welcome to C!\n");
}
```

[ Wrote 5 lines ]  
Get Help Write Out Where Is Cut Text Just  
Exit Read File Replace Uncut Text To

# Compiling and Running C

```
comp217@minions: ~/lab01
comp217@minions:~/lab01$ dir
Welcome.class  Welcome.java
comp217@minions:~/lab01$ nano Welcome.c
comp217@minions:~/lab01$ dir
Welcome.c  Welcome.class  Welcome.java
comp217@minions:~/lab01$ gcc Welcome.c -o Welcome.out
comp217@minions:~/lab01$ ./Welcome.out
Welcome to C!
comp217@minions:~/lab01$
```

- (1) `$ dir` % lists the files in the current folder  
A new file, "Welcome.c", is created
- (2) `$ gcc Welcome.c -o Welcome.out` % compile  
Use GNU C compiler (gcc)  
Option "-o" is specifying the output. Without this option, default output "a.out" is created.
- (3) `$ dir` % lists the files again  
A new file, "Welcome.out", is created
- (4) `$ ./Welcome.out` % execution  
The prefix "./" lets Linux the executable file is in the current folder (mandatory).

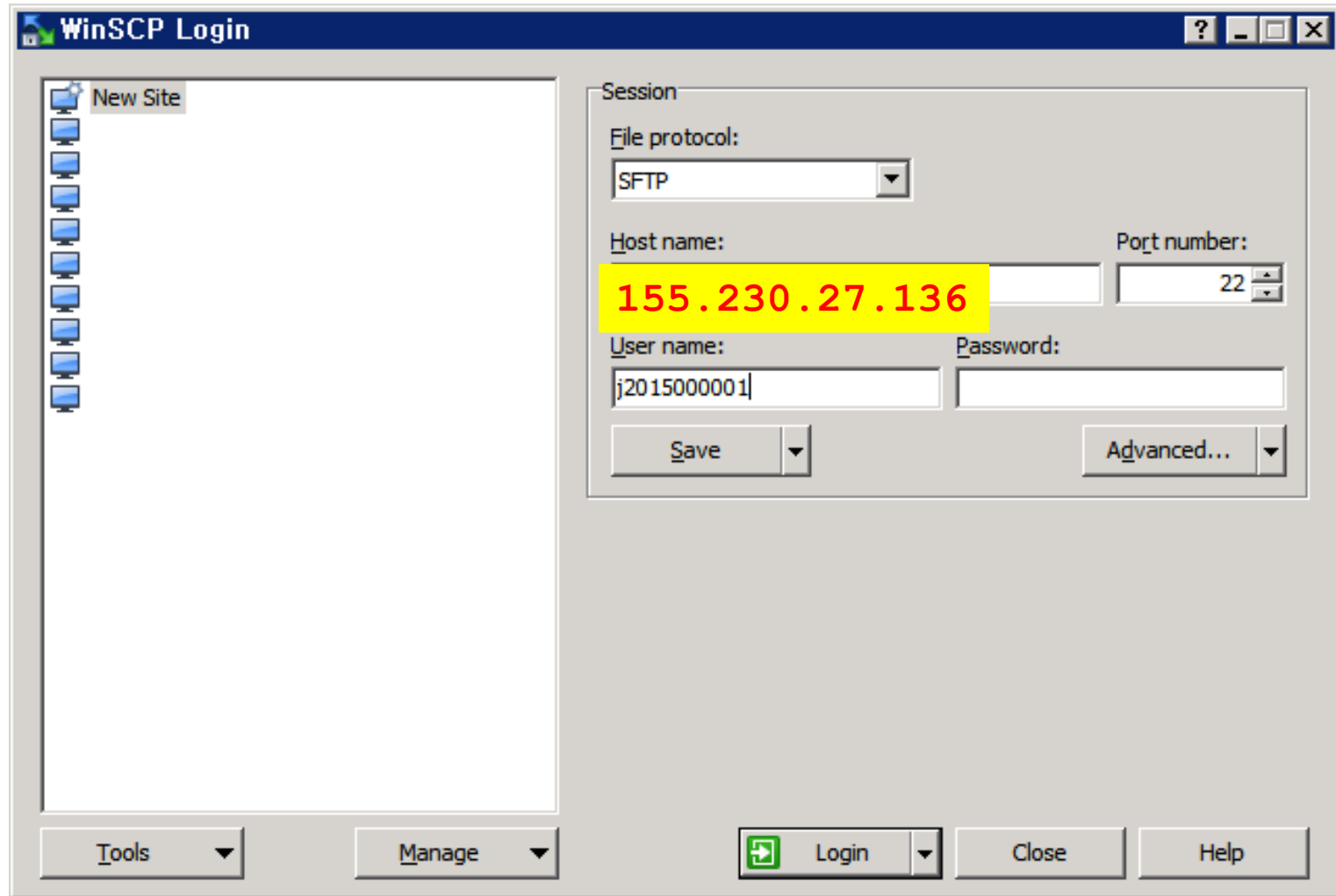
# Why nano editor?

- Very simple screen editor that can be run on text terminals
- All the hotkey commands are displayed on the bottom, so novice users can easily use it without any difficulty
- This is just a suggestion. Any text editors including vi is fine as long as they can create plain source code files
- Use no special/Hangul characters. They may cause encoding failures in different OSs. Use characters from the basic ASCII tables only.

# File Transfer using SFTP

- If use a linux server, your files are stored on the server, so you have to download the files to your PC to submit to LMS. You will also need to upload the files from your PC as well
- Need SFTP (secured file transfer protocol) client to do these
- Windows: winscp (winscp.net)
  - In the next 3 slides
- Linux: use command “sftp” in the shell
- MacOS: try to figure it out yourself

# WinSCP login



# WinSCP interface

WinSCP interface showing the local file system (C:\Users\gjang\Documents) and the remote file system (/home/j2015000001).

Local File System (C:\Users\gjang\Documents):

Name	Ext	Size	Type	Chang
..			Parent directory	2015-0
worktmp			파일 폴더	2015-0
Dropbox			파일 폴더	2015-0
pgms			파일 폴더	2015-0
gil			파일 폴더	2014-1
My Data Sources			파일 폴더	2014-1
MATLAB			파일 폴더	2014-0
Custom Office Templates			파일 폴더	2014-0
Sample9			파일 폴더	2014-0

Remote File System (/home/j2015000001):

Name	Ext	Size	Changed
..			15-03-10 오후 1:19:31
.cache			15-03-10 오후 2:37:36
java9_submit			15-03-10 오후 1:42:18
.bash_history		27 B	15-03-10 오후 1:18:26
.bash_logout		220 B	13-03-31 오전 12:32:01
.bashrc		3,637 B	13-03-31 오전 12:32:01
.profile		675 B	13-03-31 오전 12:32:01

WinSCP interface showing the local file system (C:\Users\gjang\Documents) and the remote file system (/home/j2015000001/java9\_submit).

Local File System (C:\Users\gjang\Documents):

Name	Ext	Size	Type	Chang
..			Parent directory	2015-0
worktmp			파일 폴더	2015-0
Dropbox			파일 폴더	2015-0
pgms			파일 폴더	2015-0
gil			파일 폴더	2014-1
My Data Sources			파일 폴더	2014-1
MATLAB			파일 폴더	2014-0
Custom Office Templates			파일 폴더	2014-0
Sample9			파일 폴더	2014-0
My Music			파일 폴더	2014-0
My Pictures			파일 폴더	2014-0

Remote File System (/home/j2015000001/java9\_submit):

Name	Ext	Size	Changed
..			15-03-10 오후 2:37:36
hw01_March13			15-03-10 오후 1:42:18

# End of Programming Environments

Proceed with your homework assignments