

C++ For C Coders 1

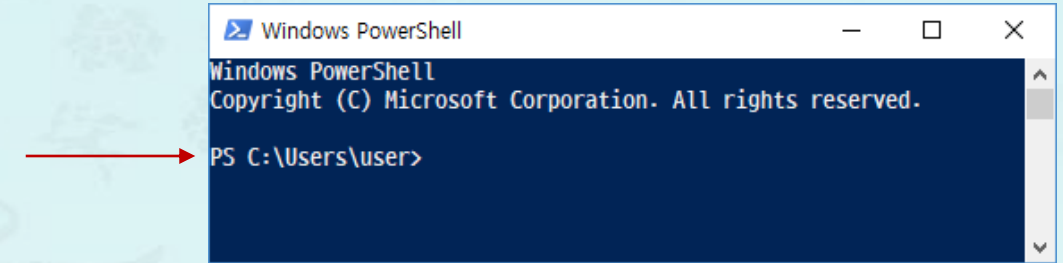
Data Structures
C++ for C Coders

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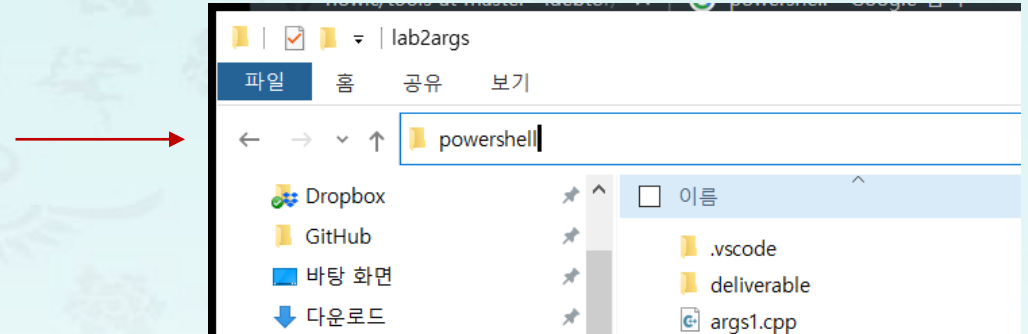
Start a console
PS, cmd, bash
Revisiting installation of g++
C vs C++
In-house programming principles
VS Code
Hello World

Start a console at your folder

1. Start PowerShell through "Start" menu

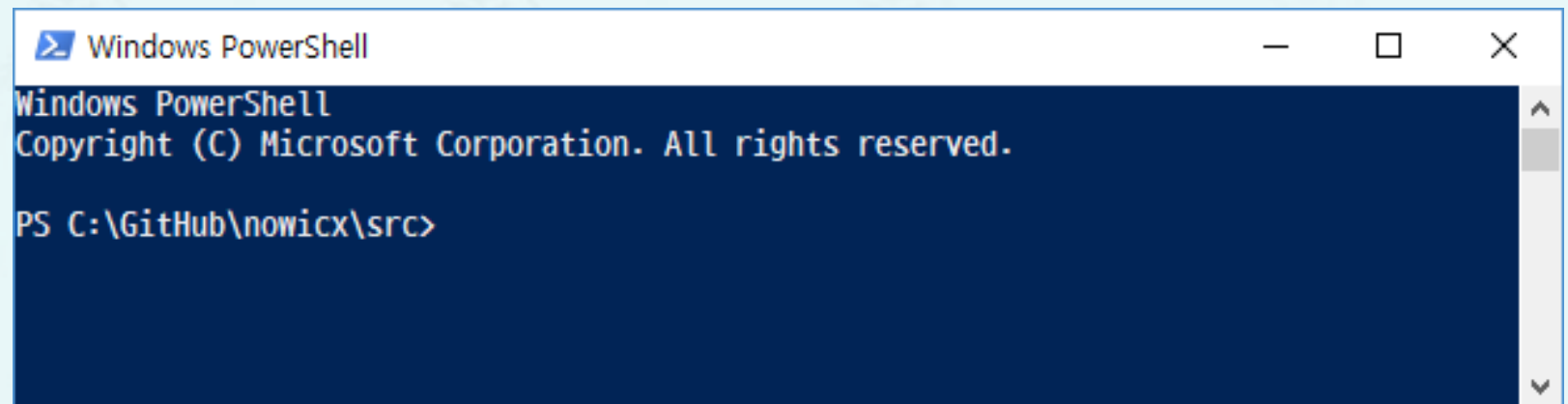
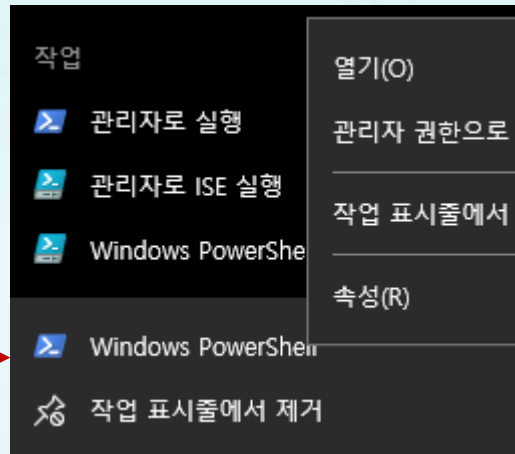


2. Move to the folder you want to start.
 - Enter 'powershell' at the File Explorer



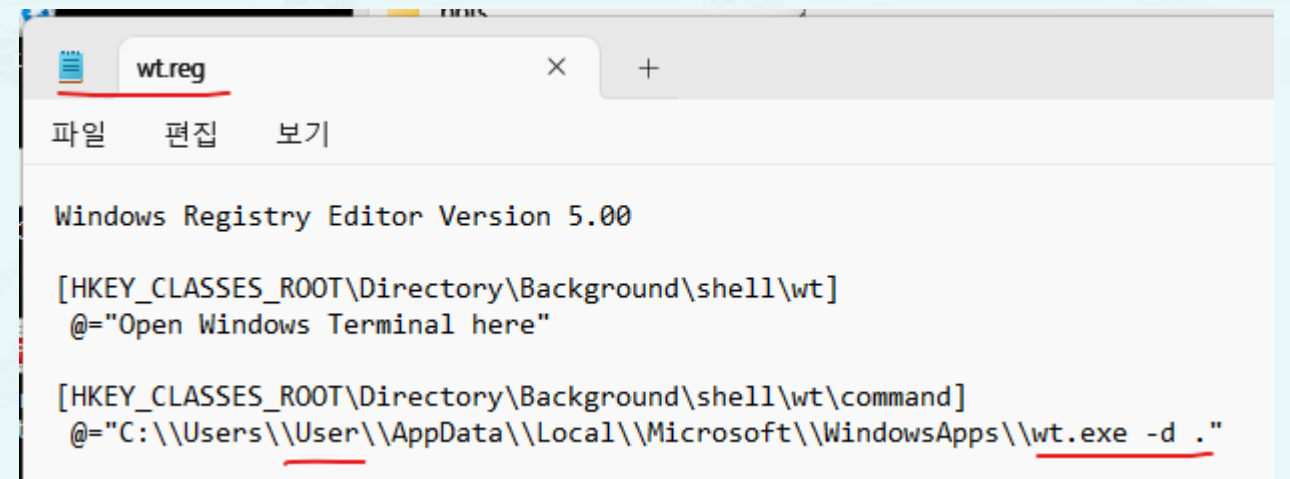
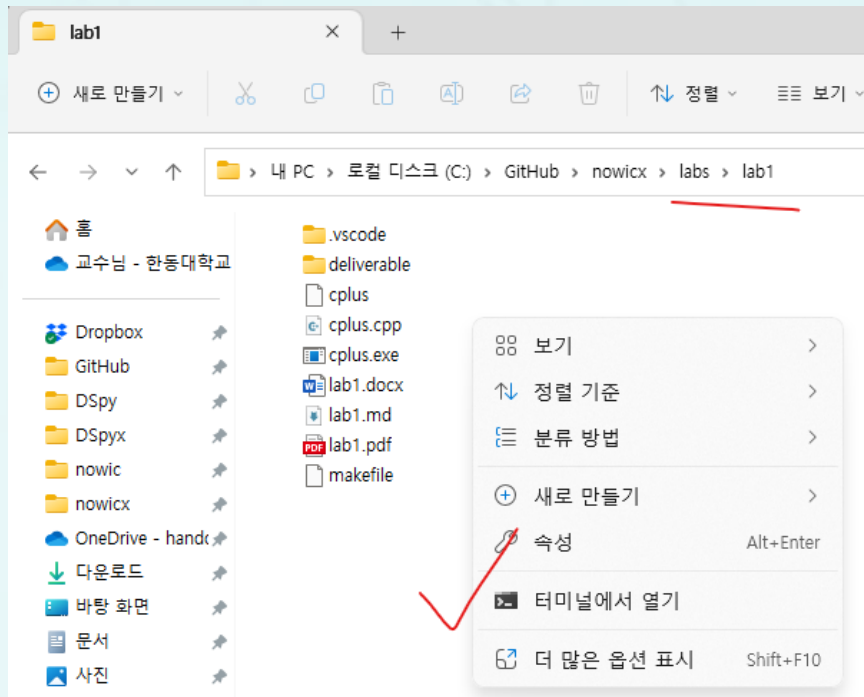
Taskbar Icon: Start a console at your favorite folder

1. Start PowerShell if you don't have a PowerShell icon in Taskbar.
2. In the Taskbar right-click and pin to keep a link there.
3. **Again right click the icon in taskbar** and then right-click Windows PowerShell and choose Properties
4. Enter your preferred directory in the Start in: input field and press OK.
5. Start from the taskbar icon



Start a "Windows Terminal" at the current folder in File Explorer

1. Download "**Windows Terminal**" form MS Store.
2. Have "**wt.reg**" file ready to add it to the registry.
Make sure that you **use your own user's name** and replace "**User**" shown below:
3. Merge[병합] it to the registry. (Click right on the file "wt.reg" and choose "병합")
4. You may restart the Windows if it is not effective immediately.



PowerShell, Cmd, vs Bash (Borne-again shell), sh, ksh, csh

PowerShell (Cmdlet)	PowerShell (Alias)	Windows Cmd	Unix shell	Description
Get-ChildItem	gci, dir, ls	dir	ls	Lists all files and folders in the current or given folder
Get-Content	gc, type, cat	type	cat	Gets the content of a file
Get-Command	gcm	help	type, which	Lists available commands
Get-Help	help, man	help	man	Prints a command's documentation on the console
Clear-Host	cls, clear	cls	clear	Clears the screen
Copy-Item	cp, copy, cp	copy, xcopy	cp	Copies files and folders to another location
Move-Item	mi, move, mv	move	mv	Moves files and folders to a new location
Remove-Item	ri, del, rmdir , rd, rm	del, rmdir, rd	rm, rmdir	Deletes files or folders
Rename-Item	rni, ren, mv	ren, rename	mv	Renames a single file, folder, hard link or symbolic link
Get-Location	gl, cd, pwd	cd	pwd	Displays the working path (current folder)
Pop-Location	popd	popd	popd	Changes the working path to the location most recently pushed onto the stack
Push-Location	pushd	pushd	pushd	Stores the working path onto the stack
Set-Location	sl, cd , chdir	cd, chdir	cd	Changes the working path, cd .. (move to parent folder), cd ~ (move to HOME folder)
Write-Output	echo , write	echo	echo	Prints strings or other objects to the standard output
Get-Process	gps, ps	tlist, tasklist	ps	Lists all running processes
Stop-Process	spps, kill	kill, taskkill	kill	Stops a running process
Select-String	sls	findstr	find, grep	Prints lines matching a pattern
Set-Variable	sv, set	set	env, export, set, setenv	Creates or alters the contents of an environment variable

PowerShell, Cmd, vs Bash (Borne-again shell), sh, ksh, csh

This Linux Command Handbook covers **60 core Bash commands** you will need as a developer. Each entry includes example code and tips for when to use that command.

<https://www.freecodecamp.org/news/the-linux-commands-handbook/>

Install GNU C/C++ Compiler (**MSYS2** first, **MinGW-w64** next)

- MSYS = "**M**inimal **SYS**tem", is a Bourne Shell command line interpreter system
MinGW = "**M**inimalist **G**NU for **W**indows"

- Install MSYS2 first from <http://www.msys2.org/>
Then use a command at the msys2 window.

```
$ pacman -Syu
```

```
$ pacman -S mingw-w64-x86_64-gcc
```

- Add the following path to the PATH environment variable

```
C:/msys64/mingw64/bin
```

```
# for g++
```

```
C:/msys64/usr/bin
```


```
# for commands such as ls, cat, rm
```

 be cautious, not 'user'

- Add .bash_profile

```
C:/msys64/home/user/.bash_profile
```

```
# a sample is provided
```

 check your home folder

.bash_profile (an example) in C:\msys64\home\user

```
alias ls='ls -Gp --color=auto'
alias ll='ls -alkF'
alias rm='rm -i'
alias h='history'
LS_COLORS=$LS_COLORS':no=00:di=36;01'
LS_COLORS=$LS_COLORS':*.h=1;33:*.exe=31:*.o=1;32:*.md=1;33'
export LS_COLORS
export PATH=$PATH:"/c/msys64/mingw64/bin"
export PATH=$PATH:"/c/msys64/usr/bin"
export PATH=$PATH:"/c/Program Files/Git/bin"
export PATH=$PATH:"/c/Users/$USER/AppData/Local/Programs/Microsoft VS Code/bin"
# code () { VSCODE_CWD="$PWD" open -n -b "com.microsoft.VSCode" --args $* ;} For macOS
# Setting my dev folder as a startup folder of msys.
HOME="/c/GitHub/nowic"
cd $HOME
echo $PWD

# @$(hostname) may be added, if necessary, after $(whoami)
GREEN="$(tput setaf 2)"
RESET="$(tput sgr0)"
PS1='${GREEN}$(pwd -W)> ${RESET}'
```

↙ This is the folder Code is installed.

↙ check your github folder

.bash_profile (an example) in C:\msys64\home\user

For macOS

```
alias ls='ls -Gp --color=auto'
alias ll='ls -alkF'
alias rm='rm -i'
alias h='history'
LS_COLORS=$LS_COLORS':no=00:di=36;01'
LS_COLORS=$LS_COLORS':*.h=1;33:*.exe=31:*.o=1;32:*.md=1;33'
export LS_COLORS
export PATH=$PATH:"/c/msys64/mingw64/bin"
export PATH=$PATH:"/c/msys64/usr/bin"
export PATH=$PATH:"/c/Program Files/Git/bin"
export PATH=$PATH:"/c/Users/$USER/AppData/Local/Programs/Microsoft VS Code/bin"
# code () { VSCODE_CWD="$PWD" open -n -b "com.microsoft.VSCode" --args $* ;}
# Setting my dev folder as a startup folder of msys.
HOME="/c/GitHub/nowic"
cd $HOME
echo $PWD

# @$(hostname) may be added, if necessary, after $(whoami)
GREEN="$(tput setaf 2)"
RESET="$(tput sgr0)"
PS1='${GREEN}$(pwd -W)> ${RESET}'
```

Open a terminal & run the following commands

참고: <https://qastack.kr/superuser/886132/where-is-the-zshrc-file-on-mac>

> **touch ~/.zshrc** # 폴더와 파일 생성

> **open ~/.zshrc** # 파일 열고, .bash_profile 내용 입력

Close the file and reopen a terminal.

↙ This is the folder Code is installed.

Uncomment for macOS

↙ check your github folder

How to test .bash_profile in C:\msys64\home\user

Open a terminal & run the following commands

참고: <https://qastack.kr/superuser/886132/where-is-the-zshrc-file-on-mac>

> **touch ~/.zshrc** # 폴더와 파일 생성

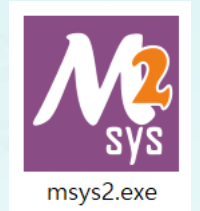
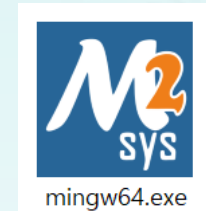
> **open ~/.zshrc** # 파일 열고, .bash_profile 내용 입력

Close the file and reopen a terminal.

- For windows users, after adding .bash_profile as shown below:

C:/msys64/home/user/.bash_profile # a sample is provided

- Create a short-cut from either mingw64.exe or msys2.exe.
- Double click the short-cut and test g++ installation as shown below:



```
MSYS2 MSYS Shell
c:/msys64/home/User/.bash_profile
/home/User
C:/GitHub/nowic> g++ --version
g++.exe (Rev5, Built by MSYS2 project) 10.3.0
Copyright (C) 2020 Free Software Foundation, Inc.
This is free software; see the source for copying conditions. There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

C:/GitHub/nowic> |
```

C++ for C Coders

- C
- Dennis Ritchie
- 1972
- 29 Keywords
 - Procedural programming
- C++
- Stroustrup
- 1985
- 63 Keywords by 1996
- C++ as a better C
 - Object-oriented programming
 - **Generic programming**
STL(Standard Template Library)
“Swiss Army Knife”

C++ specific keywords

asm	dynamic_cast	namespace	reinterpret_cast	try
bool	explicit	new	static_cast	typeid
catch	false	operator	template	typename
class	friend	private	this	using
const_cast	inline	public	throw	virtual
delete	mutable	protected	true	wchar_t

From C to C++

- Even if C++ is slanted toward object-oriented programming (OOP), you can nevertheless use any C++ compiler to compile C code and benefits from some C++ goodies.
- C++ as a better C

In-house Programming Principles

- DRY or DIE
 - Don't repeat yourself, or Duplication is Evil.
 - To make you professional coders and save time.
- KISS
 - Keep it simple, stupid!, Keep it simple and short.
 - To make you professional coders – code maintainable
- NMN
 - No magic number
 - To make you professional coders - code robust.
- NSE
 - No side effects
 - To make you professional coders - code clean.

Source Code Editor: Visual Studio Code

- Code is an open source and a cross-platform editor software developed by Microsoft. It becomes one of the best code editors in the market, lately.
- Features:
 - IntelliSense - autocomplete
 - Refactoring
 - Run and Debug
 - Built-in Git
 - Extensions
- Refer to the following documents in nowic/tools
 - [VSCode Step1. GCC 및 MSYS2 설치.pdf](#)
 - [VSCode Step2. C C++ 코딩 준비.pdf](#)
 - [VSCode Step3. Makefile 사용 방법.pdf](#)
 - [VSCode Step4. JSON 파일 설정 및 사용 방법.pdf](#)
 - [VSCode Step5. 코딩 및 디버깅 테스트.pdf](#)

Write "Hello World" program in C++

- Open Code editor

```
$ code hello.cpp
```

- Add the source code.
- Save the file.

- Compile and Execute

```
$ g++ hello.cpp
```

```
$ ./a.exe
```



PowerShell

```
$ ./a
```

macOS

```
$ a
```

cmd

- Compile and Execute

```
$ g++ hello.cpp -o hello
```

```
$ ./hello.exe
```

```
$ ./hello
```

```
$ hello
```

```
// file: hello.cpp
#include <iostream>

int main() {
    std::cout << "Hello World!" << std::endl;
}
```

```
// file: hello.cpp
#include <iostream>
using namespace std;

int main() {
    cout << "Hello World!" << endl;
}
```

C++ For C Coders 1

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