

C/C++ Program Design

LAB 1

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1 Download and Install GNU G++/GCC Compiler(Cygwin)

1.1 Download Cygwin

1.2 Install Cygwin

1.3 Verify Cygwin

1.1 Download Cygwin

Download url: <http://cygwin.com/install.html>



Cygwin

Get that [Linux](#) feeling - on Windows

Installing and Updating Cygwin Packages

Installing and Updating Cygwin for 64-bit versions of Windows

Run [setup-x86_64.exe](#) any time you want to update or install a Cygwin package for 64-bit windows. The [signature](#) for [setup-x86_64.exe](#) can be used to verify the validity of this binary.

Installing and Updating Cygwin for 32-bit versions of Windows

Run [setup-x86.exe](#) any time you want to **Select an appropriate version to download based on your OS** of this binary.

Signing key transition

The key used to sign setup binaries has been updated. During the transition period, signatures are made using both old (676041BA) and new (1A698DE9E2E56300) public keys [here](#).

See [this mail](#) for more details.

General installation notes

When installing packages for the first time, the setup program *does not install every package*. Only the **minimal base packages** from the Cygwin distribution are installed by default, which takes up about 100 MB.

Clicking on categories and packages in the setup program package installation screen allows you to select what is installed or updated.

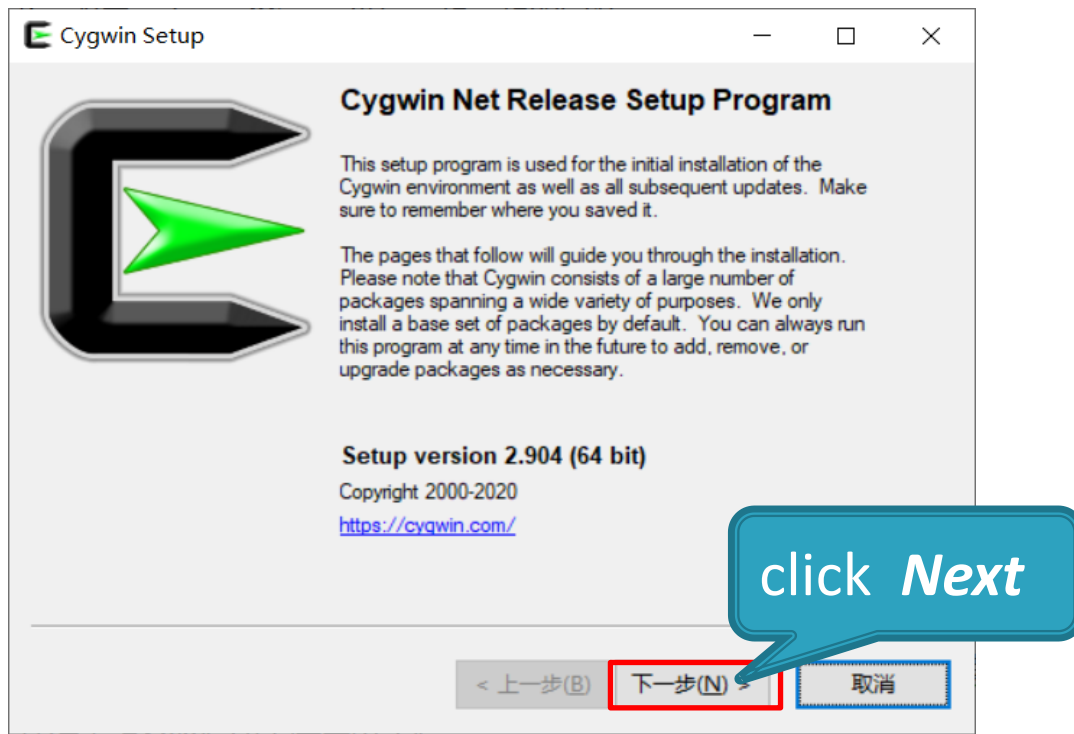
Individual packages like *bash*, *gcc*, *less*, etc. are released independently of the Cygwin DLL, so the Cygwin DLL version is not useful as a general Cygwin release number. The setup program tracks the versions of all installed components and provides the mechanism for **installing** or **updating** everything available from this site for Cygwin.

Once you've installed your desired subset of the Cygwin distribution, the setup program will remember what you selected, so re-running it will update your system with any new package releases.

On Windows Vista and later, the setup program will check by default if it runs with administrative privileges and, if not, will try to elevate the process. If you want to avoid this behaviour and install under an unprivileged account just for your own usage, run setup with the `--no-admin` option.

1.2 Install Cygwin

1. When the download is completed, you can **double-click** the *setup-x86_64.exe* to **run the installer**.



Cygwin Setup - Choose Installation Type

Choose A Download Source

Choose whether to install or download from the internet, or install from files in a local directory.

☒ Install from Internet
(downloaded files will be kept for future re-use)

☐ Download Without Installing

☐ Install from Local Directory

Choose *Install from Internet*

click *Next*

< 上一步(B)

下一步(N) >

取消

Cygwin Setup - Choose Installation Directory

Select Root Install Directory

Select the directory where you want to install Cygwin. Also choose a few installation parameters.

Root Directory

C:\cygwin64

Choose *Install Directory*

Browse...

Clicking *Browse* button can change the *Install Directory*

Install For

☒ All Users (RECOMMENDED)

Cygwin will be available to all users of the system.

Choose *All Users*

☐ Just Me

Cygwin will still be available to all users, but Desktop Icons, Cygwin Menu Entries, and important Installer information are only available to the current user. Only select this if you lack Administrator privileges or if you have specific needs.

click *Next*

< 上一步(B)

下一步(N) >

取消

Cygwin Setup - Select Local Package Directory

Select Local Package Directory

Select a directory where you want Setup to store the installation files it downloads. The directory will be created if it does not already exist.

Local Package Directory

E:\tools\Cygwin

Browse...

Choose the local package directory where you would like your installation files to be placed.

click *Next*

< 上一步(B)

下一步(N) >

取消

Cygwin Setup - Select Connection Type

Select Your Internet Connection

Setup needs to know how you want it to connect to the internet. Choose the appropriate settings below.

☐ Use System Proxy Settings

☒ Direct Connection:

☐ Use HTTP/FTP Proxy:

Proxy Host

Port 80

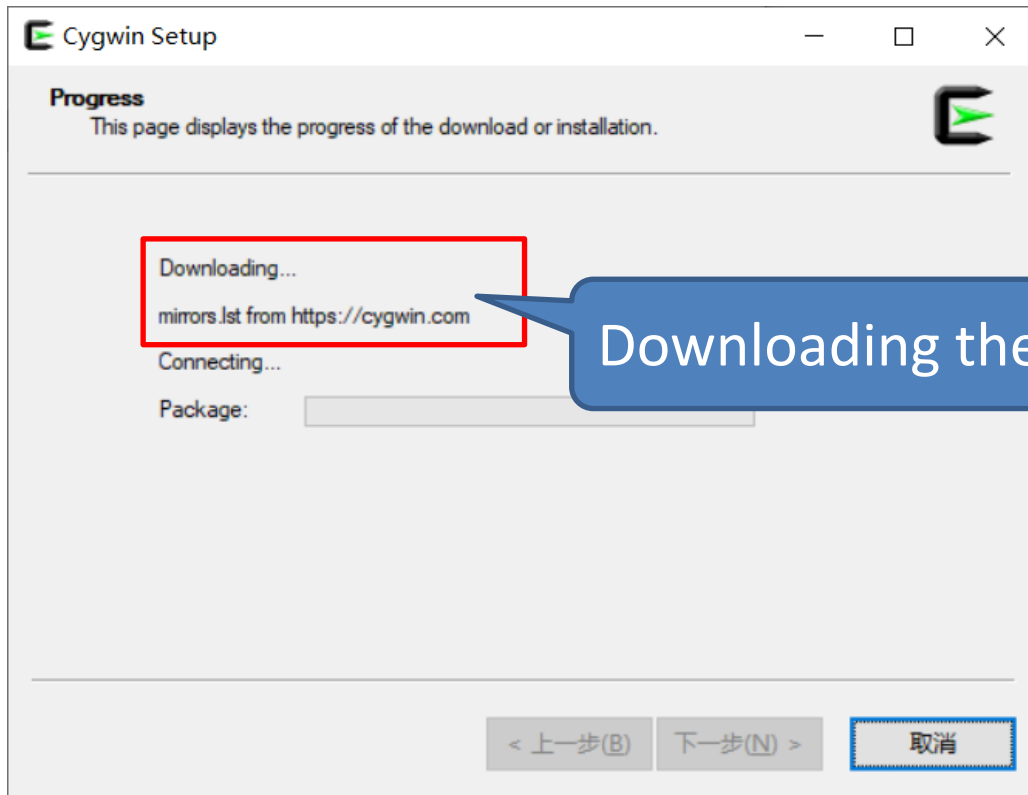
Choose *Direct Connection*

click *Next*

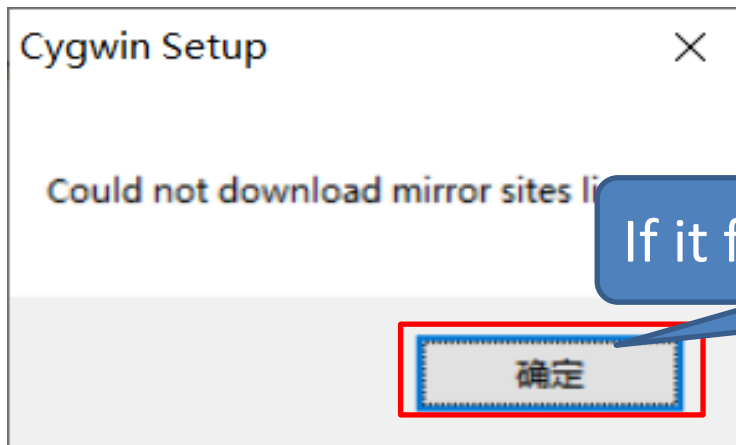
< 上一步(B)

下一步(N) >

取消



Downloading the mirror sites



If it failed to download , click **OK**

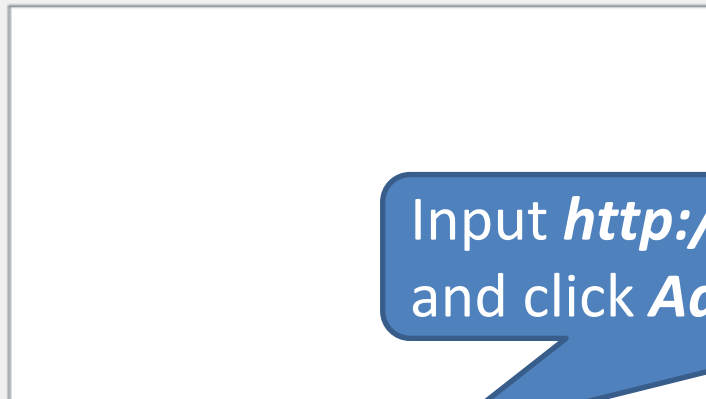
Cygwin Setup - Choose Download Site(s)

Choose A Download Site

Choose a site from this list, or add your own sites to the list



Available Download Sites:



Input *<http://mirrors.163.com/cygwin/>*
and click **Add**

User URL:

<http://mirrors.163.com/cygwin/>

Add

< 上一步(B)

下一步(N) >

取消

Cygwin Setup - Choose Download Site(s)

Choose A Download Site

Choose a site from this list, or add your own

Available Download Sites:

<http://mirrors.163.com>

User URL:

< 上一步(B)

下一步(N) >

取消

The mirror site adds to the Available Download Sites, choose it

click *Next*

Packages you may want to install include: binutils, gcc, mingw, gdb, make and cmake.



Select the packages you want to install

Packages you may want to install include: binutils, gcc, mingw, gdb, make and cmake.

Cygwin Setup - Select Packages

Select Packages
Select packages to install

View Category Clear

Package	Current	New	Src?	Categories
All		Default		
Debug (5)		Default		
Devel (5)		Default		

Input "binutils" in the Search textbox

Click "+"

Cygwin Setup - Select Packages

Select Packages
Select packages to install

View Category Clear

Package	Current	New	Src?	Categories
All		Default		
Debug (5)		Default		
Devel (5)		Default		
binutils	Skip			
cygwin32-binutils	Skip			
djgpp-binutils	Skip			
mingw64-i686-binutils	Skip			
mingw64-x86_64-binutils	Skip			

Choose "binutils"

Click the arrow, and choose 2.34-1

Uninstall
Skip
2.31.1-1
2.34-1
2.34-2 (Test)
2.34+1git.de9c1b7cfe-1

Cygwin Setup - Select Packages

Select Packages
Select packages to install

View Category Search binutils Clear

Keep Best Sync Test

Package	Current	New	Src?	Categories	Size	Description
All		Default				
Debug (5)		Default				
Devel (5)		Default				
binutils		2.34-1	<input checked="" type="checkbox"/>	Devel	64.101k	GNU assembler, linker, and similar utilities
cygwin32-binutils		Skip	<input type="checkbox"/>	Devel	3.235k	Binutils for Cygwin 32bit toolchain
djgpp-binutils		Skip	<input type="checkbox"/>	Devel	1.264k	Binutils for DJGPP toolchain
mingw64-x86_64-binutils		Skip	<input type="checkbox"/>	Devel	2.041k	Binutils for MinGW-w64 Win32 toolchain
mingw64-x86_64-binutils		Skip	<input type="checkbox"/>	Devel	2.200k	Binutils for MinGW-w64 Win64 toolchain

binutils

Cygwin Setup - Select Packages

Select Packages
Select packages to install

View Category Search gcc Clear

Keep Best Sync Test

Package	Current	New	Src?	Categories	Size	Description
All		Default				
Debug (5)		Default				
Devel (28)		Default				
colorgcc		Skip	<input type="checkbox"/>	Devel, Perf	14k	Colorizer for GCC warning/error messages
cygwin32-gcc-core		6.4.0-1	<input checked="" type="checkbox"/>	Devel	90.857k	GCC for Cygwin 32bit toolchain (C, OpenMP)
cygwin32-gcc-fortran		Skip	<input type="checkbox"/>	Devel	7.014k	GCC for Cygwin 32bit toolchain (Fortran)
cygwin32-gcc-g++		6.4.0-1	<input checked="" type="checkbox"/>	Devel	84.849k	GCC for Cygwin 32bit toolchain (C++)
djgpp-gcc-ada		Skip	<input type="checkbox"/>	Devel	13.501k	GCC for DJGPP toolchain (Ada)
djgpp-gcc-core		Skip	<input type="checkbox"/>	Devel	7.926k	GCC for DJGPP toolchain (C)
djgpp-gcc-fortran		Skip	<input type="checkbox"/>	Devel	6.296k	GCC for DJGPP toolchain (Fortran)
djgpp-gcc-g++		Skip	<input type="checkbox"/>	Devel	8.279k	GCC for DJGPP toolchain (C++)
djgpp-gcc-objc		Skip	<input type="checkbox"/>	Devel	5.087k	GCC for DJGPP toolchain (Objective-C)
djgpp-gcc-objc++		Skip	<input type="checkbox"/>	Devel	5.349k	GCC for DJGPP toolchain (Objective-C++)
gcc-core		7.4.0-1	<input checked="" type="checkbox"/>	Devel	79.869k	GNU Compiler Collection (C, OpenMP)
gcc-fortran		Skip	<input type="checkbox"/>	Devel	9.333k	GNU Compiler Collection (Fortran)
gcc-g++		7.4.0-1	<input checked="" type="checkbox"/>	Devel	73.278k	GNU Compiler Collection (C++)
gcc-objc		Skip	<input type="checkbox"/>	Devel	6.755k	GNU Compiler Collection (Objective-C)
gcc-objc++		Skip	<input type="checkbox"/>	Devel	7.037k	GNU Compiler Collection (Objective-C++)
gcc-tools-epoch1-autoconf		Skip	<input type="checkbox"/>	Devel	425k	(gcc-special) automatic configure script builder
gcc-tools-epoch1-automake		Skip	<input type="checkbox"/>	Devel	419k	(gcc-special) a tool for generating GNU-compliant Makefiles
gcc-tools-epoch2-autoconf		Skip	<input type="checkbox"/>	Devel	712k	(gcc-special) automatic configure script builder
gcc-tools-epoch2-automake		Skip	<input type="checkbox"/>	Devel	583k	(gcc-special) a tool for generating GNU-compliant Makefiles
gccmakedep		Skip	<input type="checkbox"/>	Devel	6k	X Makefile dependency tool for GCC
mingw64-x86_64-gcc-core		7.4.0-1	<input checked="" type="checkbox"/>	Devel	76.174k	GCC for Win32 (x86_64-mingw32) toolchain (C, OpenMP)
mingw64-x86_64-gcc-fortran		Skip	<input type="checkbox"/>	Devel	9.083k	GCC for Win32 (x86_64-mingw32) toolchain (Fortran)
mingw64-x86_64-gcc-g++		7.4.0-1	<input checked="" type="checkbox"/>	Devel	72.106k	GCC for Win32 (x86_64-mingw32) toolchain (C++)
mingw64-x86_64-gcc-objc		Skip	<input type="checkbox"/>	Devel	13.619k	GCC for Win32 (x86_64-mingw32) toolchain (Objective-C, C++)
mingw64-x86_64-gcc-core		7.4.0-1	<input checked="" type="checkbox"/>	Devel	76.666k	GCC for Win64 toolchain (C, OpenMP)
mingw64-x86_64-gcc-fortran		Skip	<input type="checkbox"/>	Devel	9.436k	GCC for Win64 toolchain (Fortran)
mingw64-x86_64-gcc-g++		7.4.0-1	<input checked="" type="checkbox"/>	Devel	72.483k	GCC for Win64 toolchain (C++)
mingw64-x86_64-gcc-objc		Skip	<input type="checkbox"/>	Devel	13.806k	GCC for Win64 toolchain (Objective-C, C++)
Libs (2)		Default				
Perf (1)		Default				

☒ Hide obsolete packages

GCC

mingw

Select Packages

Select packages to install

View Category Search Clear☐ Keep ☒ Best ☐ Sync ☐ Test

Package	Current	New	Src?	Categories	Size	Description
All		Default				
Database (1)		Default				
Debug (3)		Default				
Devel (4)		Default				
gdb		Skip	<input type="checkbox"/>	Devel	719k	A curses-based interface to the GNU Debugger (GDB)
gdb		8.1.1-1	<input checked="" type="checkbox"/>	Devel	22.50k	The GNU Debugger
mingw64-i686-gdbm		Skip	<input type="checkbox"/>	Devel	56k	GNU dbm implementation for Win32 toolchain
mingw64-x86_64-gdbm		Skip	<input type="checkbox"/>	Devel	57k	GNU dbm implementation for Win64 toolchain
Libs (4)		Default				

gdb

Select Packages

Select packages to install

View Full Search Clear☐ Keep ☒ Best ☐ Sync ☐ Test

Package	Current	New	Src?	Categories	Size	Description
automake1.4		Skip	<input type="checkbox"/>	Devel	248k	(1.4) a tool for generating GNU-compliant Makefiles
automake1.5		Skip	<input type="checkbox"/>	Devel	332k	(1.5) a tool for generating GNU-compliant Makefiles
automake1.6		Skip	<input type="checkbox"/>	Devel	365k	(1.6) a tool for generating GNU-compliant Makefiles
automake1.7		Skip	<input type="checkbox"/>	Devel	426k	(1.7) a tool for generating GNU-compliant Makefiles
automake1.8		Skip	<input type="checkbox"/>	Devel	499k	(1.8) a tool for generating GNU-compliant Makefiles
automake1.9		Skip	<input type="checkbox"/>	Devel	557k	(1.9) a tool for generating GNU-compliant Makefiles
cmake		3.13.1-1	<input checked="" type="checkbox"/>	Devel	12.96k	Cross-platform makefile generation system
cmake-debuginfo		Skip	<input type="checkbox"/>	Debug	223.140k	Debug info for cmake
cmake-doc		Skip	<input type="checkbox"/>	Devel	1.351k	Cross-platform makefile generation system (documentation)
cmake-gui		Skip	<input type="checkbox"/>	Devel	1.502k	Cross-platform makefile generation system (GUI)
emacs-cmake		Skip	<input type="checkbox"/>	Editors	4k	Cross-platform makefile generation system (Emacs mode)
extra-cmake-modules		Skip	<input type="checkbox"/>	Devel	281k	Extra CMake Modules for KDE
gcc-tools-epoch1-automake		Skip	<input type="checkbox"/>	Devel	419k	(gcc-special) a tool for generating GNU-compliant Makefiles
gcc-tools-epoch2-automake		Skip	<input type="checkbox"/>	Devel	589k	(gcc-special) a tool for generating GNU-compliant Makefiles
gcomakdep		Skip	<input type="checkbox"/>	Devel	6k	X Makefile dependency tool for GCC
imake		Skip	<input type="checkbox"/>	Devel	35k	X Imake legacy build system
imake-debuginfo		Skip	<input type="checkbox"/>	Debug	64k	Debug info for imake
libWMaker-devel		Skip	<input type="checkbox"/>	Libs	3k	Window Maker interface library (development)
libWMaker1		Skip	<input type="checkbox"/>	Libs	4k	Window Maker interface library (runtime)
libpagemaker-tools		Skip	<input type="checkbox"/>	Graphics	5k	MS Publisher file converters
libpagemaker0.0-debuginfo		Skip	<input type="checkbox"/>	Debug	591k	Debug info for libpagemaker0.0
libpagemaker0.0-devel		Skip	<input type="checkbox"/>	Libs	2k	Adobe PageMaker import filter library (development)
libpagemaker0.0-doc		Skip	<input type="checkbox"/>	Libs	109k	Adobe PageMaker import filter library (API documentation)
libpagemaker0.0_0		Skip	<input type="checkbox"/>	Libs	65k	Adobe PageMaker import filter library (runtime)
make		4.2.1-2	<input checked="" type="checkbox"/>	Devel	1.829k	The GNU version of the 'make' utility
make-debuginfo		Skip	<input type="checkbox"/>	Debug	441k	Debug info for make
makedepend		Skip	<input type="checkbox"/>	Devel	29k	X Makefile dependency tool
makedepend-debuginfo		Skip	<input type="checkbox"/>	Debug	75k	Debug info for make
makepasswd		Skip	<input type="checkbox"/>	Perl, Utils	14k	Generate and encrypt passwords
makeutils		Skip	<input type="checkbox"/>	Archive	26k	Utility to generate self-extractable archives
mingw64-i686-libpagemaker0.0		Skip	<input type="checkbox"/>	Libs	76k	Adobe PageMaker import filter library for Win32 toolchain
mingw64-i686-qt4-qmake		Skip	<input type="checkbox"/>	Devel	7.326k	Qt4 development tools for Win32 toolchain
mingw64-i686-qt4-qmake-debuginfo		Skip	<input type="checkbox"/>	Debug	79.179k	Debug info for mingw64-i686-qt4-qmake

cmake

make

click *Next*

下一步(N) >

取消

Cygwin Setup - Review and confirm changes

Review and confirm changes

Install _autorebase 001007-1
Install alternatives 1.3.30c-10
Install base-cygwin 3.8-1
Install base-files 4.3-2
Install bash 4.4.12-3
Install binutils 2.34-1
Install binutils-src 2.34-1 (source)
Install bzip2 1.0.8-1
Install ca-certificates 2.40-1
Install cmake 3.13.1-1
Install cmake-src 3.13.1-1 (source)
Install coreutils 8.26-2

Review and confirm the changes and click *Next*

< 上一步(B)

下一步(N) >

取消

Cygwin Setup - Installation Status and Create Icons

Create Icons

Tell setup if you want it to create a few icons for convenient access to the Cygwin environment.



☒ Create icon on Desktop

☒ Add icon to Start Menu

Installation Status

Installation Complete

Keep the default chooses
and click *Finish*

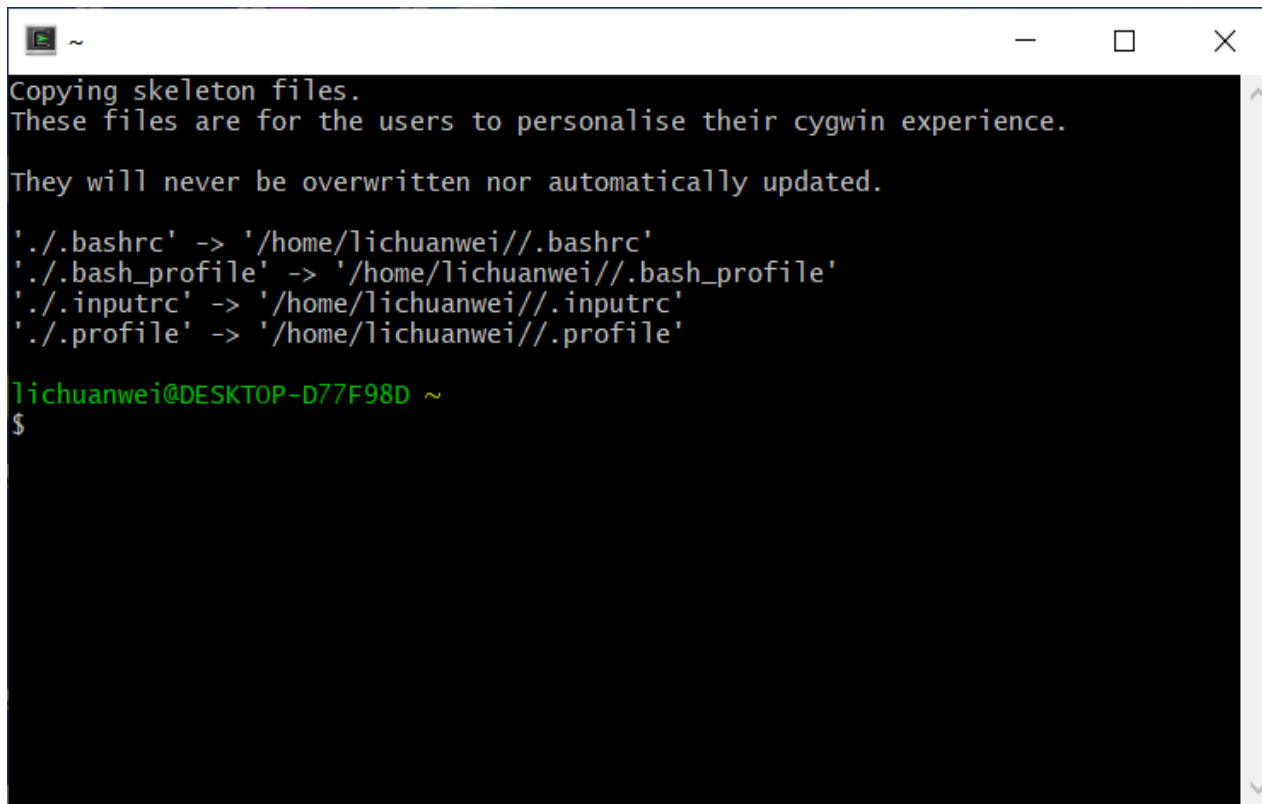
< 上一步(B)

完成

取消

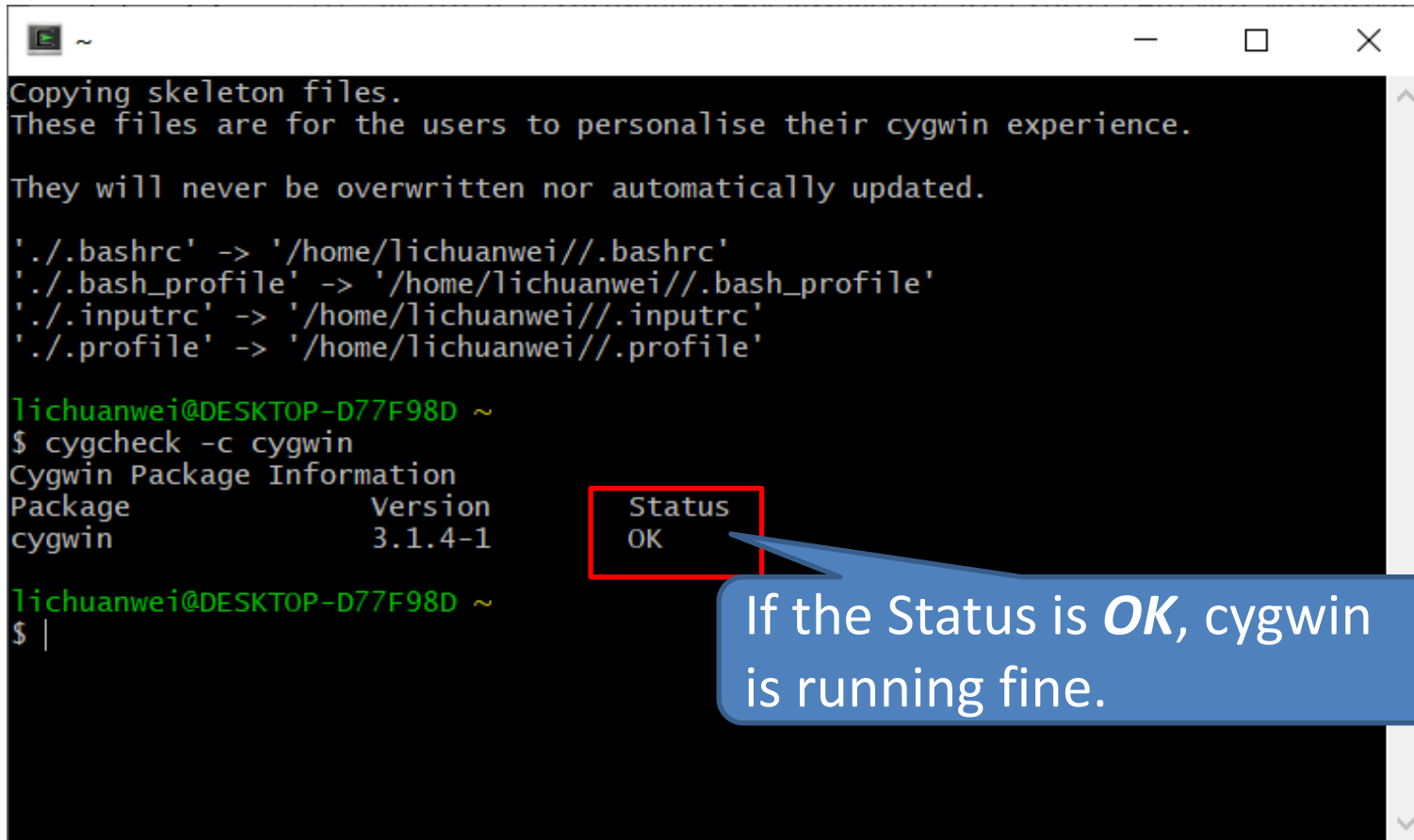
1.3 Verify Cygwin

1. Double click the Cygwin icon on the desktop to start Cygwin.

The image shows a screenshot of the Cygwin64 Terminal window. The window has a standard Windows title bar with a minimize button, a maximize button, and a close button. The terminal content is as follows:

```
~  
Copying skeleton files.  
These files are for the users to personalise their cygwin experience.  
  
They will never be overwritten nor automatically updated.  
  
'./bashrc' -> '/home/lichuanwei//.bashrc'  
'./bash_profile' -> '/home/lichuanwei//.bash_profile'  
'./inputrc' -> '/home/lichuanwei//.inputrc'  
'./profile' -> '/home/lichuanwei//.profile'  
  
lichuanwei@DESKTOP-D77F98D ~  
$
```

2. Input “cygcheck -c cygwin” after \$ prompt.



A terminal window with a black background and white text. The window title bar shows a small icon and a tilde (~). The text in the terminal is as follows:

```
Copying skeleton files.  
These files are for the users to personalise their cygwin experience.  
They will never be overwritten nor automatically updated.  
  
'./.bashrc' -> '/home/lichuanwei/./.bashrc'  
'./.bash_profile' -> '/home/lichuanwei/./.bash_profile'  
'./.inputrc' -> '/home/lichuanwei/./.inputrc'  
'./.profile' -> '/home/lichuanwei/./.profile'  
  
lichuanwei@DESKTOP-D77F98D ~  
$ cygcheck -c cygwin  
Cygwin Package Information  
Package          Version  
cygwin            3.1.4-1  
  
lichuanwei@DESKTOP-D77F98D ~  
$ |
```

The word "Status" is highlighted with a red rectangular box, and the word "OK" is directly below it. A blue speech bubble points from the "Status OK" text to the right, containing the text: "If the Status is *OK*, cygwin is running fine."

3. Verify the GCC installation by listing the version of gcc, g++, gdb, make and cmake.

```
lichuanwei@DESKTOP-D77F98D ~  
$ gcc --version  
gcc (GCC) 7.4.0  
Copyright © 2017 Free Software Foundation, Inc.  
本程序是自由软件：请参看源代码的版权说明。本软件没有任何担保：  
包括没有适销性和某一专用目的下的适用性担保。  
lichuanwei@DESKTOP-D77F98D ~  
$ g++ --version  
g++ (GCC) 7.4.0  
Copyright © 2017 Free Software Foundation, Inc.  
本程序是自由软件：请参看源代码的版权说明。本软件没有任何担保：  
包括没有适销性和某一专用目的下的适用性担保。  
lichuanwei@DESKTOP-D77F98D ~  
$ gdb --version  
GNU gdb (GDB) (Cygwin 8.1.1-1) 8.1.1  
Copyright (c) 2018 Free Software Foundation, Inc.  
License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl.html>  
This is free software: you are free to change and redistribute it.  
There is NO WARRANTY, to the extent permitted by law. Type "show copying"  
and "show warranty" for details.  
This GDB was configured as "x86_64-pc-cygwin".  
Type "show configuration" for configuration details.  
For bug reporting instructions, please see:  
<http://www.gnu.org/software/gdb/bugs/>.  
Find the GDB manual and other documentation resources online at:  
<http://www.gnu.org/software/gdb/documentation/>.  
For help, type "help".  
Type "apropos word" to search for commands related to "word".  
lichuanwei@DESKTOP-D77F98D ~  
$ make --version  
GNU Make 4.2.1  
为 x86_64-unknown-cygwin 编译  
Copyright (C) 1988-2016 Free Software Foundation, Inc.  
许可证: GPLv3+: GNU 通用公共许可证第 3 版或更新版本<http://gnu.org/licenses/gpl.html>.  
本软件是自由软件：您可以自由修改和重新发布它。  
在法律允许的范围内没有其他保证。  
lichuanwei@DESKTOP-D77F98D ~  
$ cmake --version  
cmake version 3.13.1  
CMake suite maintained and supported by Kitware (kitware.com/cmake).  
lichuanwei@DESKTOP-D77F98D ~  
$
```

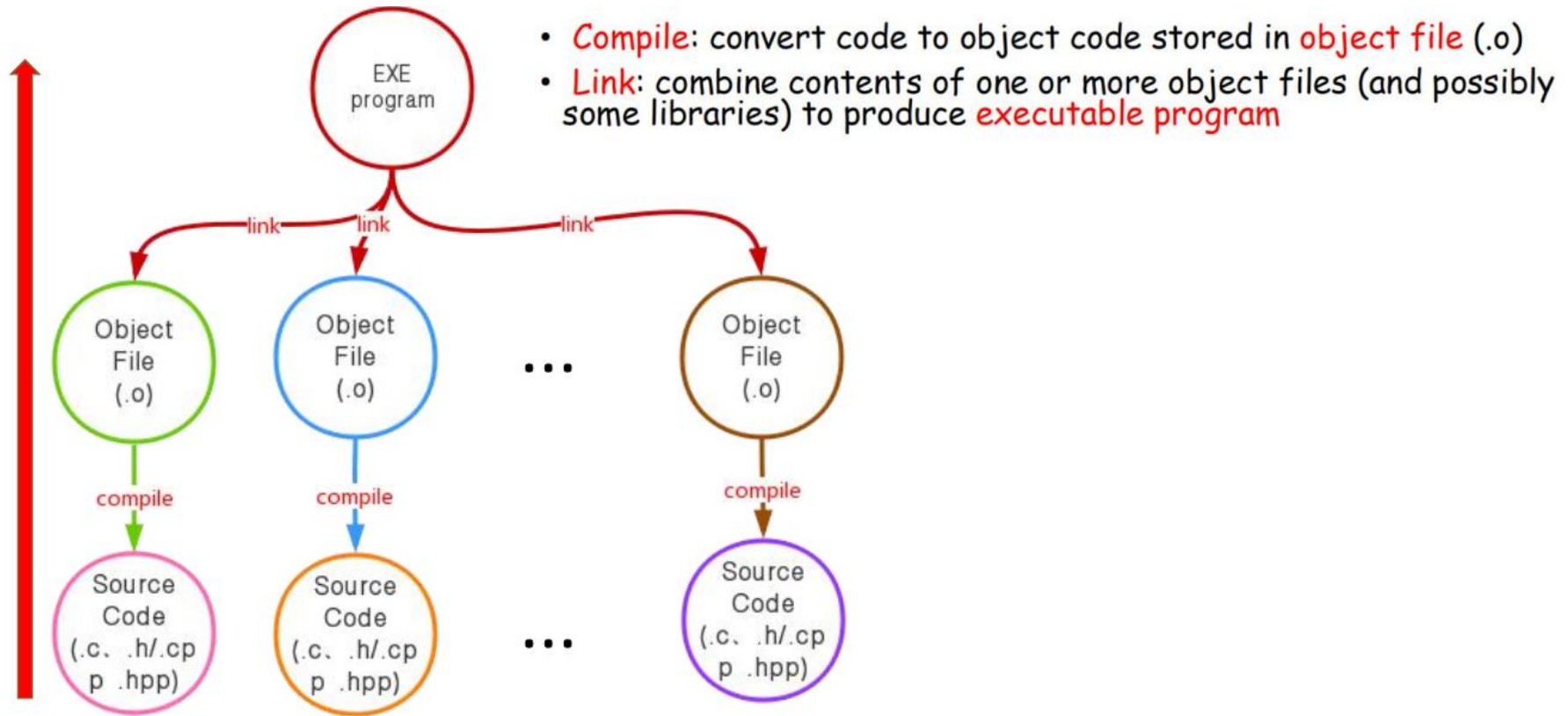
2 Compile, Link and Run C/C++ Programs

2.1 Learn the program compilation process

2.2 Compile ,Link and Run C Programs

2.3 Compile ,Link and Run C++ Programs

2.1 The program compilation process



2.2 Compile, Link and Run C programs

Compile/Link/Run a simple C program – hello.c

Edit the codes below in Notepad++, and save it as hello.c file to the D:\Software\Cygwin\code.

```
1 //hello.c
2 #include <stdio.h>
3 int main()
4 {
5     printf("Hello World!\n");
6     return 0;
7 }
```

Start Cygwin, switch the current directory to the “D:\Software\Cygwin\code” in which hello.c is stored.

or

```
/cygdrive/d/Software/Cygwin/code
lichuanwei@DESKTOP-D77F98D ~
$ cd /cygdrive/d

lichuanwei@DESKTOP-D77F98D /cygdrive/d
$ cd Software

lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software
$ cd Cygwin

lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin
$ cd code

lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code
$
```

```
lichuanwei@DESKTOP-D77F98D ~
$ cd /cygdrive/d/Software/Cygwin/code

lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code
$ |
```



```
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code  
$ gcc -c hello.c
```

```
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code  
$ ls  
hello.c hello.o
```

compile

```
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code  
$ gcc hello.o -o hello
```

```
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code  
$ ls  
hello.c hello.exe hello.o
```

link

```
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code  
$ ./hello  
Hello World!
```

run

```
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code  
$
```

The default output executable file is called “a.exe”(Windows) or “a.out”(Unix and Mac OS) if you don’t specify the name in Compiling and linking step.

```
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code
$ gcc hello.c compile and link

lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code
$ ls
a.exe hello.c hello.cpp hello.exe hello.o morning.c morning.exe

lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code
$ ./a run a.exe
Hello World!

lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code
$
```

```
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code  
$ gcc morning.c -o morning
```

compile and link

```
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code  
$ ls  
hello.c hello.exe hello.o morning.c morning.exe
```

output file name

```
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code  
$ ./morning  
Good morning!
```

```
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code  
$
```

2.3 Compile, Link and Run C++ programs

Compile/Link/Run a simple C++ program – hello.cpp

Edit the codes below in Notepad++, and save it as hello.cpp file to the D:\Software\Cygwin\code.

```
1 //hello.cpp
2 #include <iostream>
3 using namespace std;
4 int main()
5 {
6     cout << "Hello world!" << endl;
7     return 0;
8 }
```

You need to use g++ to compile C++ program, as follows. We use the -o option to specify the output file name.

```
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code
$ g++ -c hello.cpp
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code
$ ls
hello.c hello.cpp hello.exe hello.o morning.c morning.exe
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code
$ g++ hello.o -o hello
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code
$ ls
hello.c hello.cpp hello.exe hello.o morning.c morning.exe
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code
$ ./hello
Hello World!
```

compile

link

run

```
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code
$ g++ -o hello hello.cpp
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code
$ ls
hello.c hello.cpp hello.exe hello.o morning.c morning.exe
lichuanwei@DESKTOP-D77F98D /cygdrive/d/Software/Cygwin/code
$ ./hello
Hello world!
```

compile and link

run

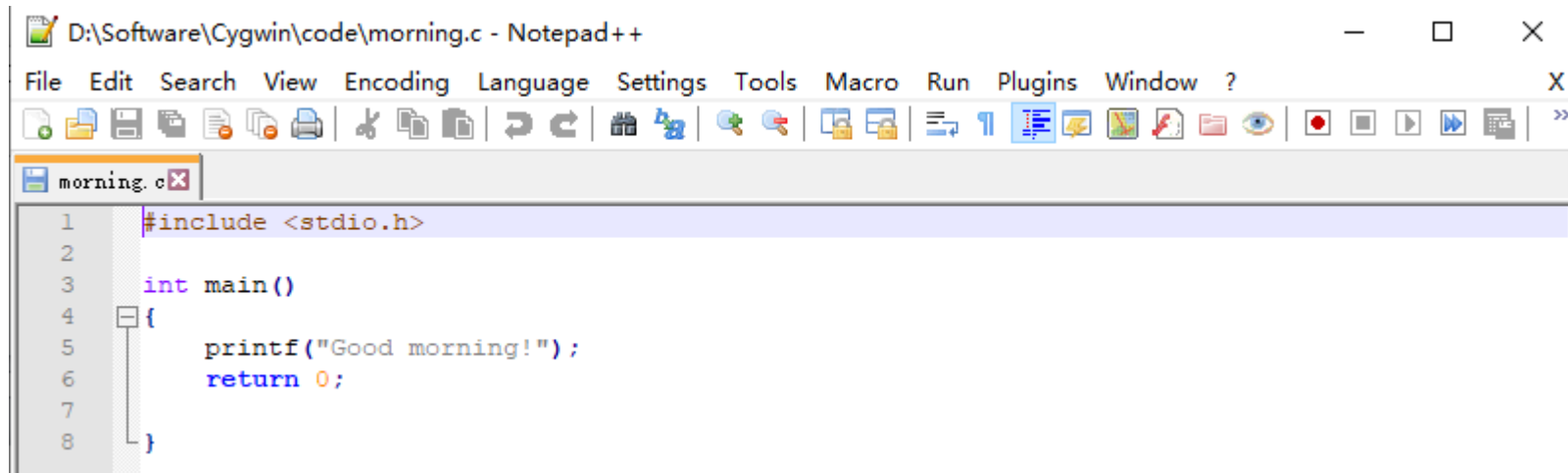
3 Download and Install Editor

Editor: Notepad++ , a user-friendly Editor for beginners

Download url: <https://notepad-plus-plus.org/>



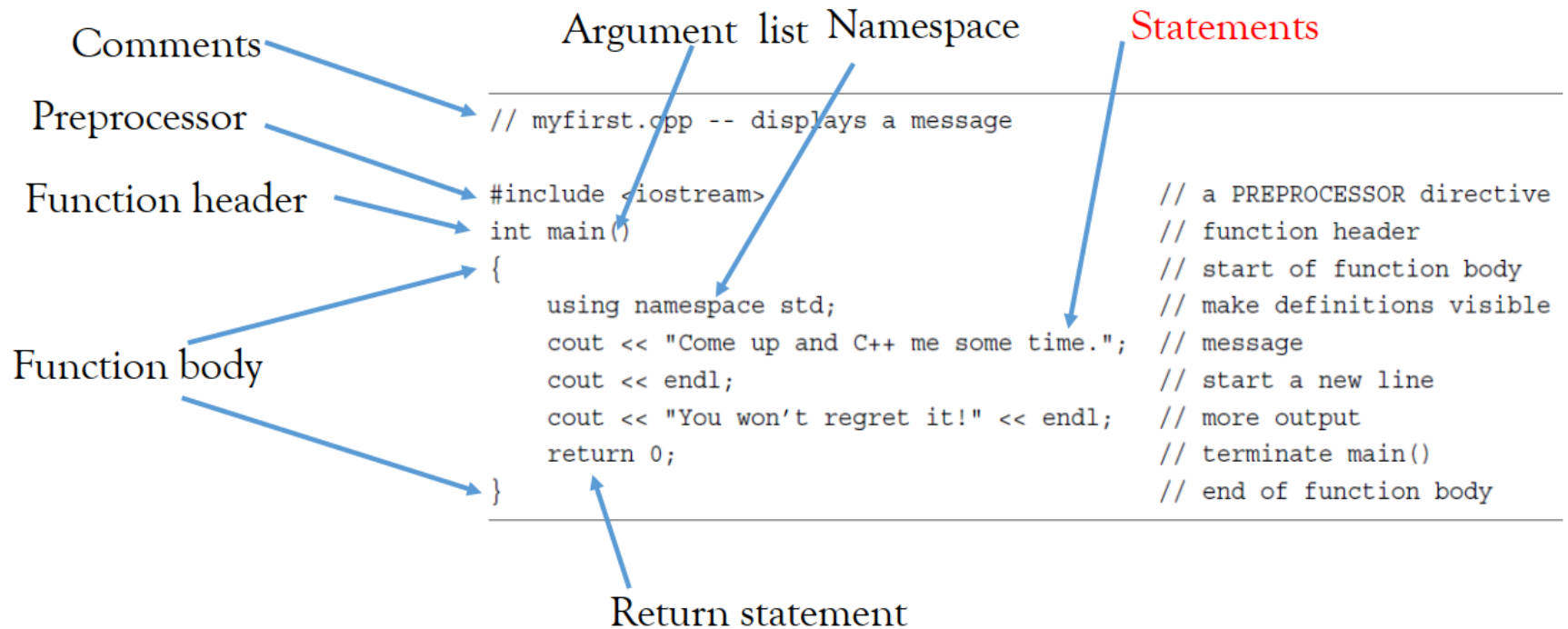
Using **Notepad++** to create the C/C++ source code file, as following shown.



```
D:\Software\Cygwin\code\morning.c - Notepad++
File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?
morning.c
1 #include <stdio.h>
2
3 int main()
4 {
5     printf("Good morning!");
6     return 0;
7 }
8 }
```

NOTE: The source file must end with the extension **.c** or **.cpp**

C/C++ program's structure



```
#include <iostream>
```

```
void simple(); // function prototype
```

```
int main()
```

```
{
```

```
    using namespace std;
```

```
    cout << "main() will call the simple() function.\n";
```

```
    simple(); // function call
```

```
    cout << "main() is finished with the simple() function.\n";
```

```
    return 0;
```

```
}
```

```
// function definition
```

```
void simple()
```

```
{
```

```
    using namespace std;
```

```
    cout << "I'm but a simple function.\n";
```

```
}
```


C++ Source Code Style

- One statement per line
- An opening brace and a closing brace for a function, each of which is on its own line
- Statements in a function indented from the braces
- No whitespace around the parentheses associated with a function name

4 Exercises

1. Write a program to print your name and address.
2. Many studies suggest that smiling has benefits. Write a program that produces the following output:

```
Smile!Smile!Smile!
```

```
Smile!Smile!
```

```
Smile!
```

Have the program define a function that displays the string Smile! once, and have the program use the function as often as needed.