

Overview of On-Line Course

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<http://nkl.cc.u-tokyo.ac.jp/21s/>

First of All ...

- Please make sure that:
 - the OS of your PC is the most updated version
 - proper anti-virus software with the most updated version is installed to your PC
 - the most recent version of Zoom is installed
- You need to know Unix/Linux and Editors (e.g. vi, emacs), if you want to use “Supercomputers”
 - List of Unix/Linux Commands (Wikipedia)
 - https://en.wikipedia.org/wiki/List_of_Unix_commands
 - Onlie Manual for Emacs (Screen Editor for Linux/Unix)
 - <https://www.gnu.org/software/emacs/manual/>
- My e-mail: nakajima@cc.u-tokyo.ac.jp

Information

- Access UTAS (UTokyo Academic Affairs System) and ITC-LMS (ITC Learning Management System)
 - <https://utas.adm.u-tokyo.ac.jp/> <https://itc-lms.ecc.u-tokyo.ac.jp/>
- Class Materials
 - <http://nkl.cc.u-tokyo.ac.jp/21s/>
- Most of the important information (including Zoom URL for Classes) will be given through ITC-LMS
 - Please check ITC-LMS AT LEAST ONCE a WEEK
 - You can receive e-mail from ITC-LMS, if you have new “notification”
- **Please register your info. at URL in UTAS/ITC-LMS.**
 - **You receive detailed info. of lectures.**
 - **You need to register the info. just once.**
 - **Because I e-mail you the UID/PWD of the Supercomputer based on the registered info., EACH of you must register !**
 - **Your e-mail address is not used for other purposes**

Zoom “Manners”

- Please install the most recent version of Zoom
 - Please login via official account
- Basically, please keep muted, and keep camera off.
- Please do not video the lectures
 - I will record the class, and tell you the address of the recorded file (on cloud) via ITC-LMS
- Please do not forward URL's of the classes to anybody, even if he/she is a U.Tokyo student
- I often use “Raising Hand” (e.g. How many of you learned OpenMP before ?). Please respond.
- Q/A will be through combination of “Chat”/“Microphone”
 - I will make a break every 10-minutes
 - If you keep “space” pushing, “mute” is released temporarily.
 - You can also send me e-mail's after the class

Questions

- Q1: OS of Your PC
 - Widows: Many Win Users
 - MAC
 - Linux
- Q2: Your “Mother Tongue”
 - Fortran
 - C/C++
 - Java
 - Python
 - **Anyway, you must be familiar with Fortran or C/C++**
 - Materials for both of C and Fortran are provided, although I will show you those in C on the screen
- Q3: Do you like to use “Slack” ?
 - I will send invitation to each of you, while you can decline to join

Software to be installed

	C	Fortran
Windows	Cygwin Paraview FVM-in-C	Cygwin Paraview FVM-in-F
Mac	Paraview	Paraview
Linux	FVM-in-C	FVM-in-F

- Cygwin <https://www.cygwin.com/>
- Paraview <http://www.paraview.org>
- Target Application by Finite Volume Method (FVM)
 - FVM-in-F (Fortran) <http://nkl.cc.u-tokyo.ac.jp/files/multicore-f.tar>
 - FVM-in-C (C) <http://nkl.cc.u-tokyo.ac.jp/files/multicore-c.tar>
 - **Default compilers in Makefile's are “cc (FVM-in-C, C)” and “gfortran (FVM-in-F, Fortran)”. Please modify Makefile's according to compilers on your PC**

- In the following several pages, installation procedures of Cygwin are described
- Mac and Unix/Linux users do not need Cygwin

Cygwin: Unix-like Environment on Windows

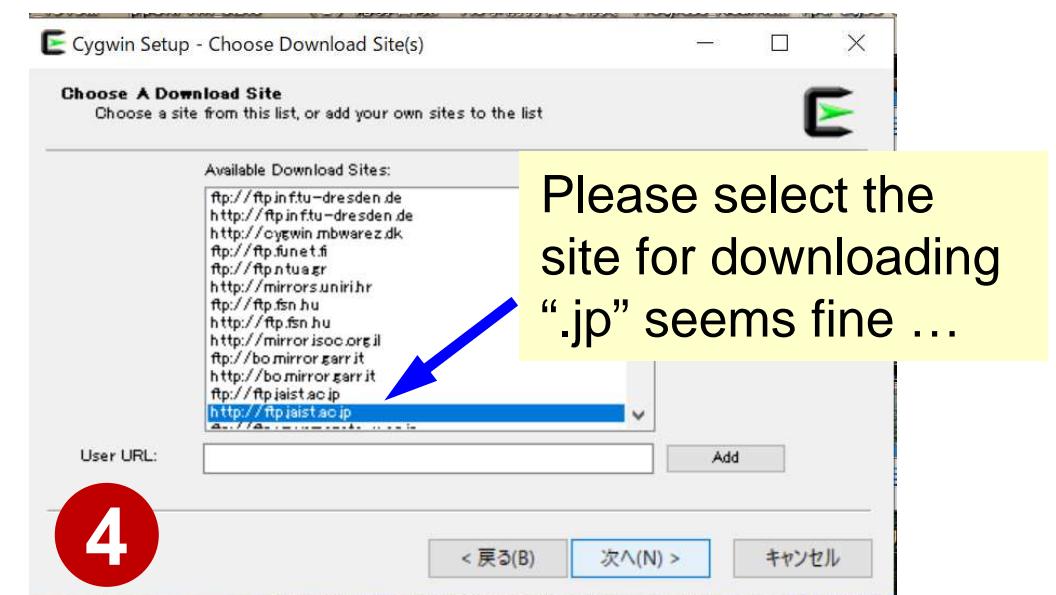
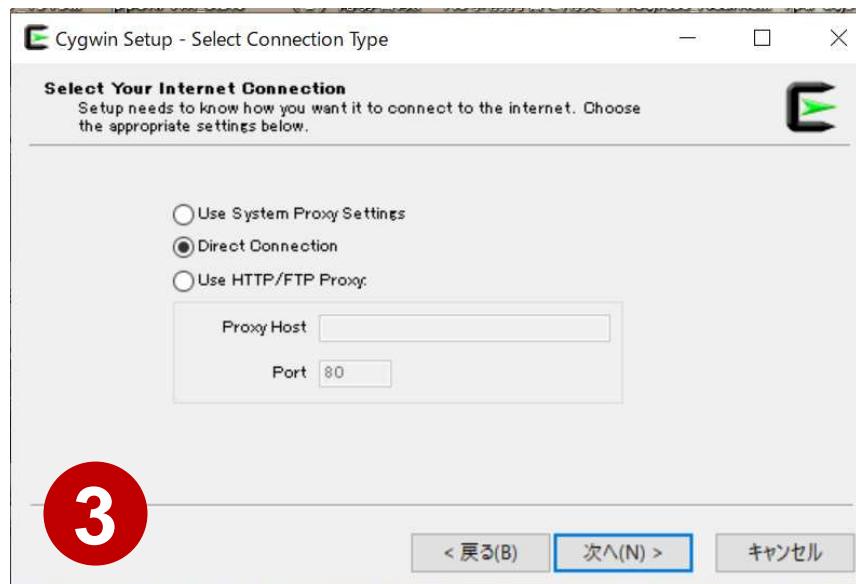
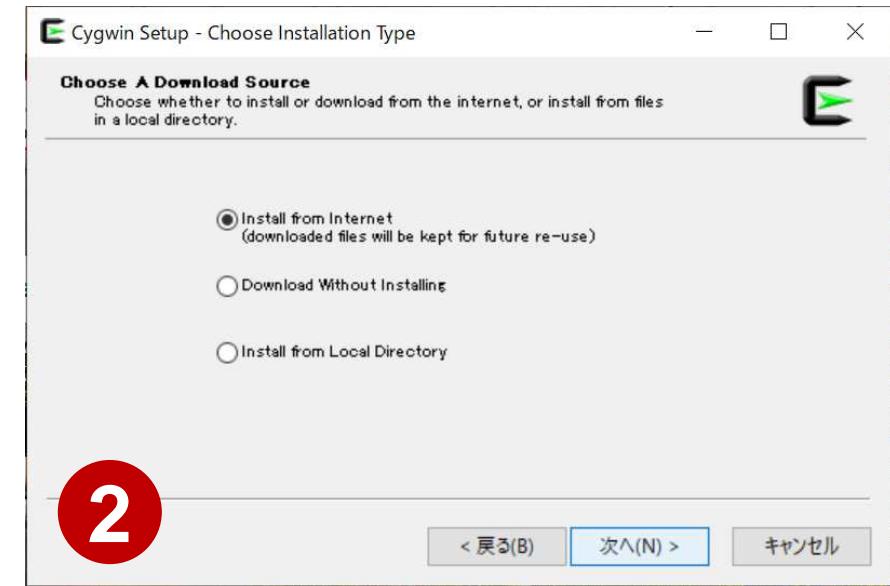
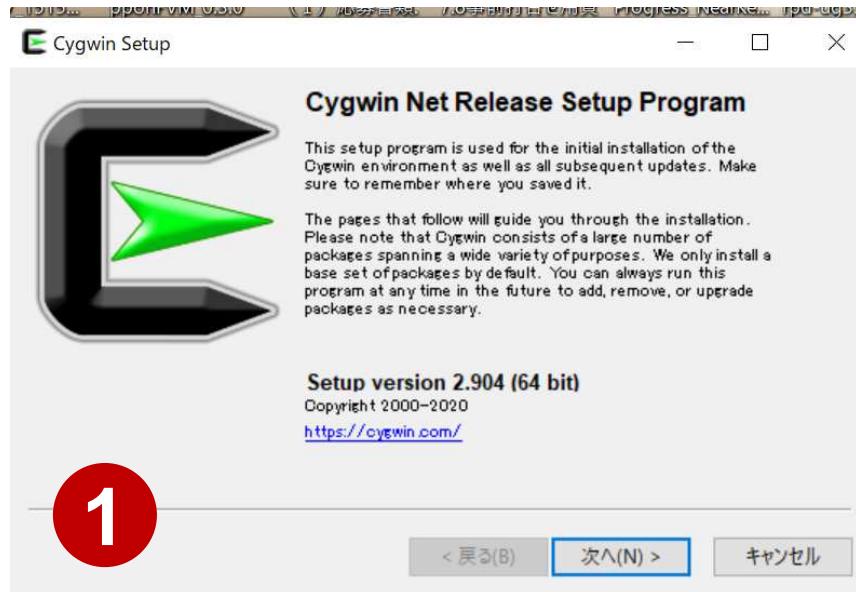
<https://www.cygwin.com/>

- Cygwin User's Guide
 - <https://cygwin.com/cygwin-ug-net.html>
- The first things what you have to do
 - Get “setup-x86_64/32.exe (installer)” from Cygwin site
 - Connect to the Internet and Double-Click the Installer
 - Just follow the instructions



Just Follow as they guide ...

<https://www.cygwin.com/>



Starting from the Default Installation

<https://www.cygwin.com/>

- Most of the fundamental tools/functions are installed, but some essential ones for this class are NOT ...
 - Therefore, you need to add them manually
 - You can install them later if you double-click the installer
- **The following functions must be installed, because they are not necessarily installed as default**
 - **gcc-core (for C/C++ users)**
 - **gcc-fortran (for Fortran users)**
 - **openssh (for all users)**
 - **openssl (for all users)**
 - **make (for all users)**
 - **emacs, vim etc.**
- **You can also check whether these are installed, or not**

Checking installation of “gcc-core”

Type “gcc-core”

The screenshot shows the Cygwin Setup interface for selecting packages. A red arrow points to the search bar at the top left, which contains the text "gcc-core". The search results table lists several packages related to GCC:

Package	Current	New	Src?	Categories	Size	Description
cygwin32-gcc-core		Skip	<input type="checkbox"/>	Devel	16,464k	GCC for Cygwin 32bit toolchain (C, OpenMP)
djgpp-gcc-core		Skip	<input type="checkbox"/>	Devel	7,926k	GCC for DJGPP toolchain (C)
gcc-core	9.3.0-1	Keep	<input type="checkbox"/>	Devel	20,500k	GNU Compiler Collection (C, OpenMP)
mingw64-i686-gcc-core		Skip	<input type="checkbox"/>	Devel	16,851k	GCC for Win32 (i686-w64-mingw32) toolchain (C, OpenMP)
mingw64-x86_64-gcc-core		Skip	<input type="checkbox"/>	Devel	17,464k	GCC for Win64 toolchain (C, OpenMP)

At the bottom left, there is a checked checkbox labeled "Hide obsolete packages". The bottom right corner displays the system tray with icons for network, battery, and date/time (20:19, 2020/04/14).

Checking installation of “gcc-core”

Type “gcc-core”

The screenshot shows the Cygwin Setup interface for selecting packages. A red arrow points from the text "Type ‘gcc-core’" to the search bar. A blue box highlights the row for "gcc-core" in the list, which has a status of "Keep". A callout box with a blue border contains the text: "‘gcc-core’ is already installed if you find ‘Keep’".

Package	Current	New	Src?	Categories	Size	Description
cygwin32-gcc-core		Skip		Devel	16,464k	GCC for Cygwin 32bit toolchain (C, OpenMP)
gcc		Skip		Devel	7,926k	GCC for DJGPP toolchain (C)
gcc-core	9.3.0-1	Keep		Devel	20,500k	GNU Compiler Collection (C, OpenMP)
mingw32-gcc-core		Skip		Devel	16,851k	GCC for Win32 (i686-w64-mingw32) toolchain (C, OpenMP)
mingw64-gcc-core		Skip		Devel	17,464k	GCC for Win64 toolchain (C, OpenMP)

Hide obsolete packages

<戻る(B) 次(N) > キャンセル

20:19 2020/04/14

Installing “g++” (1/4)

Type “g++”

The screenshot shows the Cygwin Setup interface with the title "Cygwin Setup - Select Packages". In the top left, there's a search bar with "g++" typed into it, highlighted with a red box and a red arrow pointing to it from the text above. Below the search bar is a table of packages. The first row, "cygwin32-gcc-g++", has "Skip" listed under both "Current" and "New". The second row, "dmcpp-gcc-g++", also has "Skip" listed under both columns. The third row, "gcc-g++", has "Skip" listed under both columns. The fourth row, "mingw64-i686-gcc-g++", has "Skip" listed under both columns. The fifth row, "mingw64-x86_64-gcc-g++", has "Skip" listed under both columns. To the right of the table, there are columns for "Src?", "Categories", "Size", and "Description". A blue box highlights the "gcc-g++" row, and a blue arrow points from the "Skip" entry in that row to a green callout box below.

Package	Current	New	Src?	Categories	Size	Description
cygwin32-gcc-g++	Skip	Skip	<input type="checkbox"/>	Devel	10,456k	GOO for Cygwin 32bit toolchain (C++)
dmcpp-gcc-g++	Skip	Skip	<input type="checkbox"/>	Devel	8,279k	GOO for DJGPP toolchain (C++)
gcc-g++	Skip	Skip	<input type="checkbox"/>	Devel	16,257k	GNU Compiler Collection (C++)
mingw64-i686-gcc-g++	Skip	Skip	<input type="checkbox"/>	Devel	14,358k	GOO for Win32 (i686-w64-mingw32) toolchain (C++)
mingw64-x86_64-gcc-g++	Skip	Skip	<input type="checkbox"/>	Devel	14,781k	GOO for Win64 toolchain (C++)

If “Skip” appears, it is not installed yet

In the following 4-pages, a example of manual install of “g++” is described.

Installing “g++” (2/4)

Cygwin Setup - Select Packages

Select Packages
Select packages to install

View Full Search g++ Clear

Keep Best Sync Test

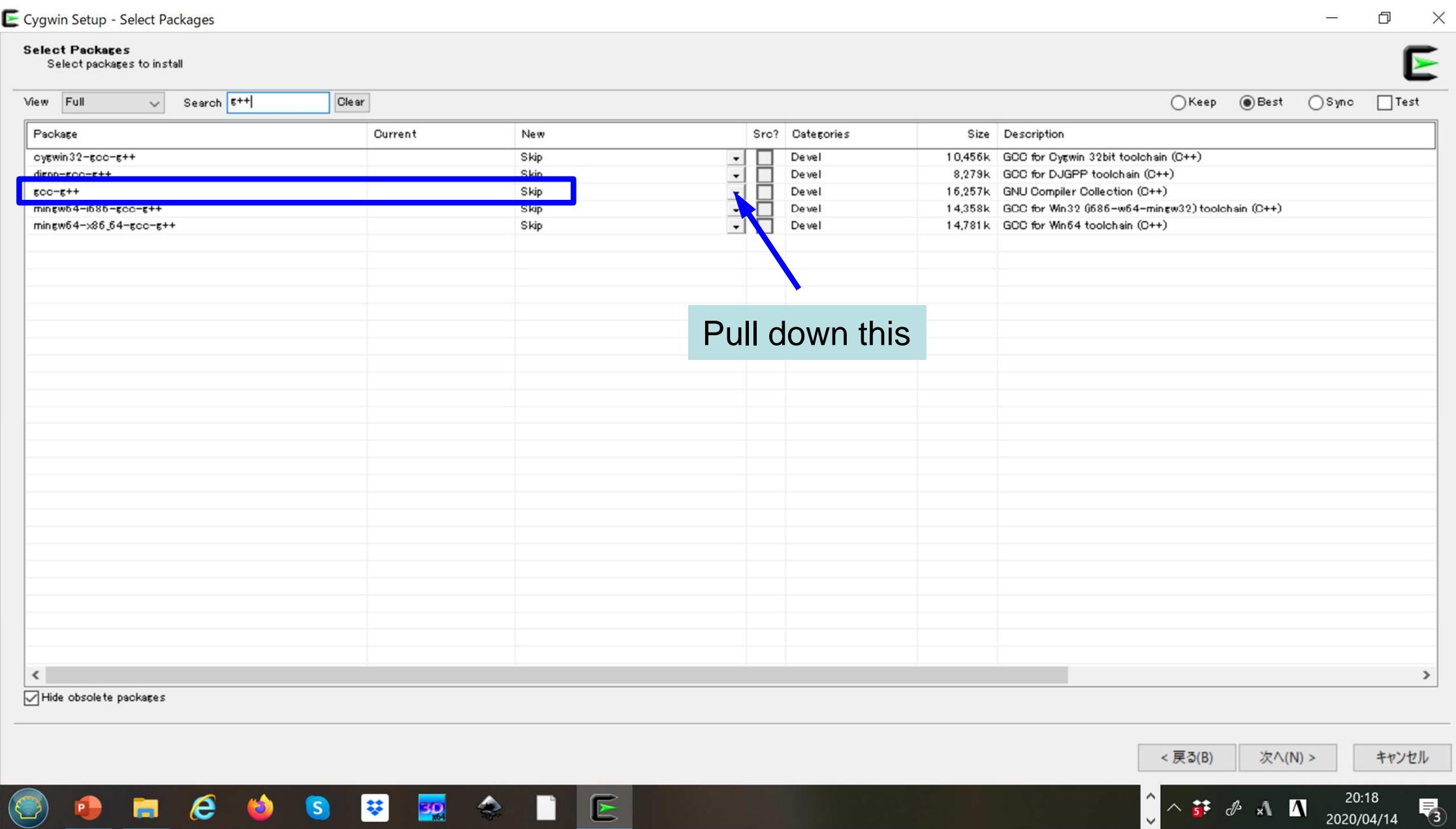
Package	Current	New	Src?	Categories	Size	Description
cygwin32-gcc-g++		Skip	<input type="checkbox"/>	Devel	10,456k	GCC for Cygwin 32bit toolchain (C++)
djgpp-gcc-g++		Skip	<input type="checkbox"/>	Devel	8,279k	GCC for DJGPP toolchain (C++)
gcc-g++		Skip	<input type="checkbox"/>	Devel	16,257k	GNU Compiler Collection (C++)
mingw32-i686-gcc-g++		Skip	<input type="checkbox"/>	Devel	14,358k	GCC for Win32 (i686-w64-mingw32) toolchain (C++)
mingw64-x86_64-gcc-g++		Skip	<input type="checkbox"/>	Devel	14,781k	GCC for Win64 toolchain (C++)

Pull down this

<戻る(B) 次へ(N) > キャンセル

Hide obsolete packages

20:18 2020/04/14



Installing “g++” (3/4)

Cygwin Setup - Select Packages

Select Packages
Select packages to install

View Full Search g++ Clear

Keep Best Sync Test

Package	Current	New	Src?	Categories	Size	Description
cygwin32-gcc-g++		Skip	<input type="checkbox"/>	Devel	10,456k	GCC for Cygwin 32bit toolchain (C++)
djgpp-gcc-g++		Skip	<input type="checkbox"/>	Devel	8,279k	GCC for DJGPP toolchain (C++)
gcc-g++		Skip	<input checked="" type="checkbox"/>	Devel	16,257k	GNU Compiler Collection (C++)
mingw64-i686-gcc-g++		Skip	<input type="checkbox"/>	Uninstall	14,358k	GCC for Win32 (i686-w64-mingw32) toolchain (C++)
mingw64-x86_64-gcc-g++		Skip	<input type="checkbox"/>	Skip	14,781k	GCC for Win64 toolchain (C++)

You can select the proper version
(generally, the most recent one)

<戻る(B) 次へ(N) > キャンセル

Hide obsolete packages

20:18 2020/04/14

Installing “g++” (4/4)

Cygwin Setup - Select Packages

Select Packages
Select packages to install

View Full Search g++ Clear Keep Best Sync Test

Package	Current	New	Src?	Categories	Size	Description
cygwin32-gcc-g++		Skip	<input type="checkbox"/>	Devel	10,456k	GCC for Cygwin 32bit toolchain (C++)
djgpp-gcc-g++		Skip	<input type="checkbox"/>	Devel	8,279k	GCC for DJGPP toolchain (C++)
gcc-g++		9.3.0-1	<input checked="" type="checkbox"/>	Devel	16,257k	GNU Compiler Collection (C++)
mingw64-i686-gcc-g++		Skip	<input type="checkbox"/>	Devel	14,358k	GCC for Win32 (i686-w64-mingw32) toolchain (C++)
mingw64-x86_64-gcc-g++		Skip	<input type="checkbox"/>	Devel	14,781k	GCC for Win64 toolchain (C++)

If the version number appears instead of “Skip”,
“g++” is selected for installation
(Not installed yet)

Click this

< 戻る(B) 次へ(N) > キャンセル

Hide obsolete packages

任务栏图标包括：文件夹、IE、Firefox、S、3D、命令提示符、记事本、画图、控制面板、任务管理器。

状态栏显示：21:58, 2020/04/14, 3

Confirm Successful Installation of “gcc”

```
$ gcc -v
```

組み込み spec を使用しています。

```
COLLECT_GCC=gcc
COLLECT_LTO_WRAPPER=/usr/lib/gcc/x86_64-pc-cygwin/9.3.0/lto-wrapper.exe
ターゲット: x86_64-pc-cygwin
configure 設定: /cygdrive/i/szsz/tmp/gcc/gcc-9.3.0-1.x86_64/src/gcc-9.3.0/configure --
srcdir=/cygdrive/i/szsz/tmp/gcc/gcc-9.3.0-1.x86_64/src/gcc-9.3.0 --prefix=/usr --exec-prefix=/usr --
localstatedir=/var --sysconfdir=/etc --docdir=/usr/share/doc/gcc --htmldir=/usr/share/doc/gcc/html -C
--build=x86_64-pc-cygwin --host=x86_64-pc-cygwin --target=x86_64-pc-cygwin --without-libiconv-prefix
--without-libintl-prefix --libexecdir=/usr/lib --enable-shared --enable-shared-libgcc --enable-static
--enable-version-specific-runtime-libs --enable-bootstrap --enable_cxa_atexit --with-dwarf2 --with-
tune=generic --enable-languages=c, c++, fortran, lto, objc, obj-c++ --enable-graphite --enable-
threads=posix --enable-libatomic --enable-libgomp --enable-libquadmath --enable-libquadmath-support --
disable-libssp --enable-libada --disable-symvers --with-gnu-ld --with-gnu-as --with-cloog-
include=/usr/include/cloog-isl --without-libiconv-prefix --without-libintl-prefix --with-system-zlib
--enable-linker-build-id --with-default-libstdcxx-abi=gcc4-compatible --enable-libstdcxx-fs-filesystem-ts
スレッドモデル: posix
gcc バージョン 9.3.0 (GCC)
```

Confirm Successful Installation of “gfortran”

```
$ gfortran -v
```

組み込み spec を使用しています。

```
COLLECT_GCC=gfortran
ターゲット: x86_64-pc-cygwin
configure 設定: /cygdrive/i/szsz/tmpp/gcc/gcc-9.3.0-1.x86_64/src/gcc-9.3.0/configure --srcdir=/cygdrive/i/szsz/tmpp/gcc/gcc-9.3.0-1.x86_64/src/gcc-9.3.0 --prefix=/usr --exec-prefix=/usr --localstatedir=/var --sysconfdir=/etc --docdir=/usr/share/doc/gcc --htmldir=/usr/share/doc/gcc/html -C --build=x86_64-pc-cygwin --host=x86_64-pc-cygwin --target=x86_64-pc-cygwin --without-libiconv-prefix --without-libintl-prefix --libexecdir=/usr/lib --enable-shared --enable-shared-libgcc --enable-static --enable-version-specific-runtime-libs --enable-bootstrap --enable_cxa_atexit --with-dwarf2 --with-tune=generic --enable-languages=c, c++, fortran, lto, objc, obj-c++ --enable-graphite --enable-threads=posix --enable-libatomic --enable-libgomp --enable-libquadmath --enable-libquadmath-support --disable-libssp --enable-libada --disable-symvers --with-gnu-ld --with-gnu-as --with-cloog-include=/usr/include/cloog-isl --without-libiconv-prefix --without-libintl-prefix --with-system-zlib --enable-linker-build-id --with-default-libstdcxx-abi=gcc4-compatible --enable-libstdcxx-fs
```

スレッドモデル: posix

gcc バージョン 9.3.0 (GCC)

Confirm Successful Installation of “ssh-keygen (OpenSSH)”

```
$ ssh-keygen --h

ssh-keygen: unknown option -- -
usage: ssh-keygen [-q] [-b bits] [-C comment] [-f output_keyfile] [-m format]
                  [-t dsa | ecdsa | ecdsa-sk | ed25519 | ed25519-sk | rsa]
                  [-N new_passphrase] [-O option] [-w provider]
ssh-keygen -p [-f keyfile] [-m format] [-N new_passphrase]
            [-P old_passphrase]
ssh-keygen -i [-f input_keyfile] [-m key_format]
ssh-keygen -e [-f input_keyfile] [-m key_format]
ssh-keygen -y [-f input_keyfile]
(...)
ssh-keygen -L [-f input_keyfile]
ssh-keygen -A [-f prefix_path]
ssh-keygen -k -f krl_file [-u] [-s ca_public] [-z version_number]
            file ...
ssh-keygen -Q -f krl_file file ...
ssh-keygen -Y find-principals -s signature_file -f allowed_signers_file
ssh-keygen -Y check-novalidate -n namespace -s signature_file
ssh-keygen -Y sign -f key_file -n namespace file ...
ssh-keygen -Y verify -f allowed_signers_file -I signer_identity
            -n namespace -s signature_file [-r revocation_file]
```

Confirm Successful Installation of “ssh (OpenSSH)”

```
$ ssh  
  
usage: ssh [-46AaCfGgKkMNnqsTtVvXxYy] [-B bind_interface]  
           [-b bind_address] [-c cipher_spec] [-D [bind_address:]port]  
           [-E log_file] [-e escape_char] [-F configfile] [-I pkcs11]  
           [-i identity_file] [-J [user@]host[:port]] [-L address]  
           [-l login_name] [-m mac_spec] [-O ctl_cmd] [-o option] [-p port]  
           [-Q query_option] [-R address] [-S ctl_path] [-W host:port]  
           [-w local_tun[:remote_tun]] destination [command]
```

Confirm Successful Installation of “make, emacs, vi etc”

```
$ make -version
```

GNU Make 4.3

このプログラムは x86_64-pc-cygwin 用にビルドされました

Copyright (C) 1988–2020 Free Software Foundation, Inc.

ライセンス GPLv3+: GNU GPL バージョン 3 以降 <<http://gnu.org/licenses/gpl.html>>

これはフリーソフトウェアです：自由に変更および配布できます。

法律の許す限り、無保証 です。

```
$ emacs -version
```

GNU Emacs 26.3

Copyright (C) 2019 Free Software Foundation, Inc.

GNU Emacs comes with ABSOLUTELY NO WARRANTY.

You may redistribute copies of GNU Emacs

under the terms of the GNU General Public License.

For more information about these matters, see the file named COPYING.

```
$ vi -version
```

VIM – Vi IMproved 8.2 (2019 Dec 12, compiled Mar 30 2020 21:54:08)

Garbage after option argument: “-version”

More info with: “vim -h”

Please install ALL environments before April 21 (W)

- Generally, installation of Cygwin takes a time (60-90 mins)
- I recommend you to complete this during coming weekend
- Another choice is WSL (Windows Subsystem for Linux), if you are familiar with both of Linux and Windows