Building DSDv1.8.4

This document would not be possible without the hard work done by **Louis-Erig HERVE.** We thank him for making his work publically available.

These are detailed instructions for installing Cygwin and the dependencies it needs to run correctly and compile the 3 parts needed for DSD v1.8.4. These parts are DSD and the Cygwin.dlls support itpp and the mbelibl

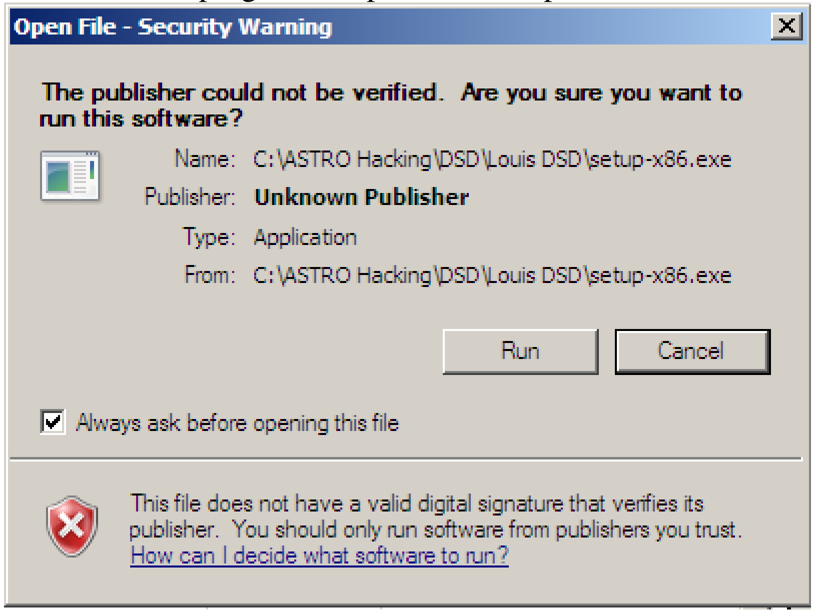
NOTE: These steps are for both 32 and 64 bit OS
NOTE: The images show the 32 files selected however the text lists the 64bit files needed (in pink) in addition to the 32 bit files.
NOTE: If you are running the 64 bit OS you need the 32 bit files.

Step 1: installing Cygwin

Go to https://www.cygwin.com/setup-x86.exe (32bit) or https://www.cygwin.com/setup-x86_64.exe (64bit) and download the installer.

NOTE: Due to how Cygwin functions some antivirus programs don't like it. They may try and block the install, popup virus found messages etc. We recommend temporarily diabling the virus program while you install and run Cygwin. AVG is especially touchy.

Run the install program setup-x86. or setup-x86_64 and select Run.


Open File - Security Warning

The publisher could not be verified. Are you sure you want to run this software?

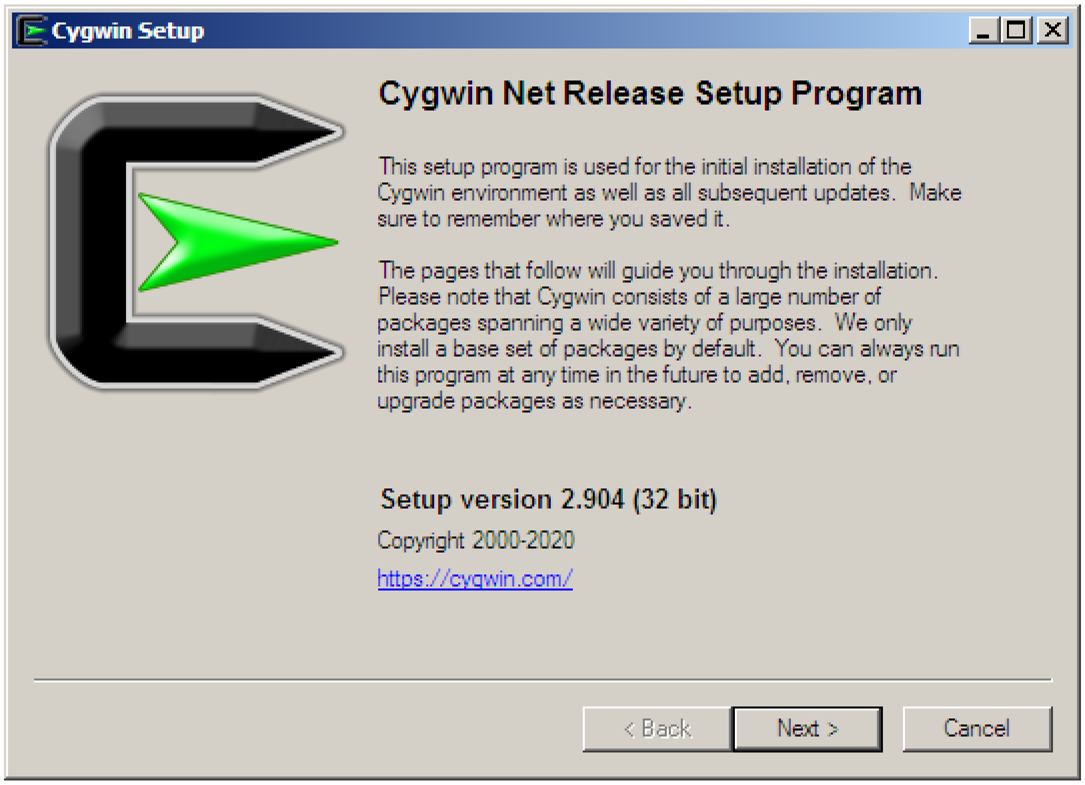
Name: C:\ASTRO Hacking\DSD\Louis DSD\setup-x86.exe
Publisher: **Unknown Publisher**
Type: Application
From: C:\ASTRO Hacking\DSD\Louis DSD\setup-x86.exe

☑ Always ask before opening this file

This file does not have a valid digital signature that verifies its publisher. You should only run software from publishers you trust.
How can I decide what software to run?

If prompted by a pop up about trusted sources select yes.

From the main entry screen select next.


Cygwin Setup

Cygwin Net Release Setup Program

This setup program is used for the initial installation of the Cygwin environment as well as all subsequent updates. Make sure to remember where you saved it.

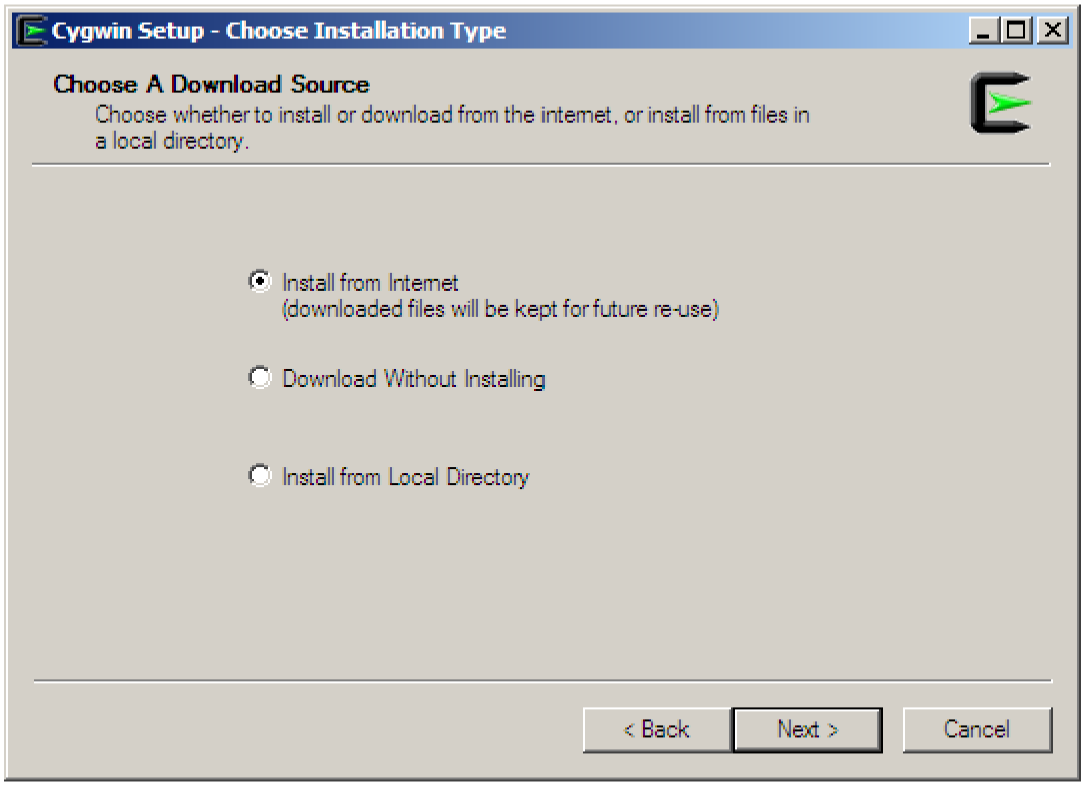
The pages that follow will guide you through the installation. Please note that Cygwin consists of a large number of packages spanning a wide variety of purposes. We only install a base set of packages by default. You can always run this program at any time in the future to add, remove, or upgrade packages as necessary.

Setup version 2.904 (32 bit)

Copyright 2000-2020

https://cygwin.com/

Select install from the internet and hit next.


Cygwin Setup - Choose Installation Type

Choose A Download Source

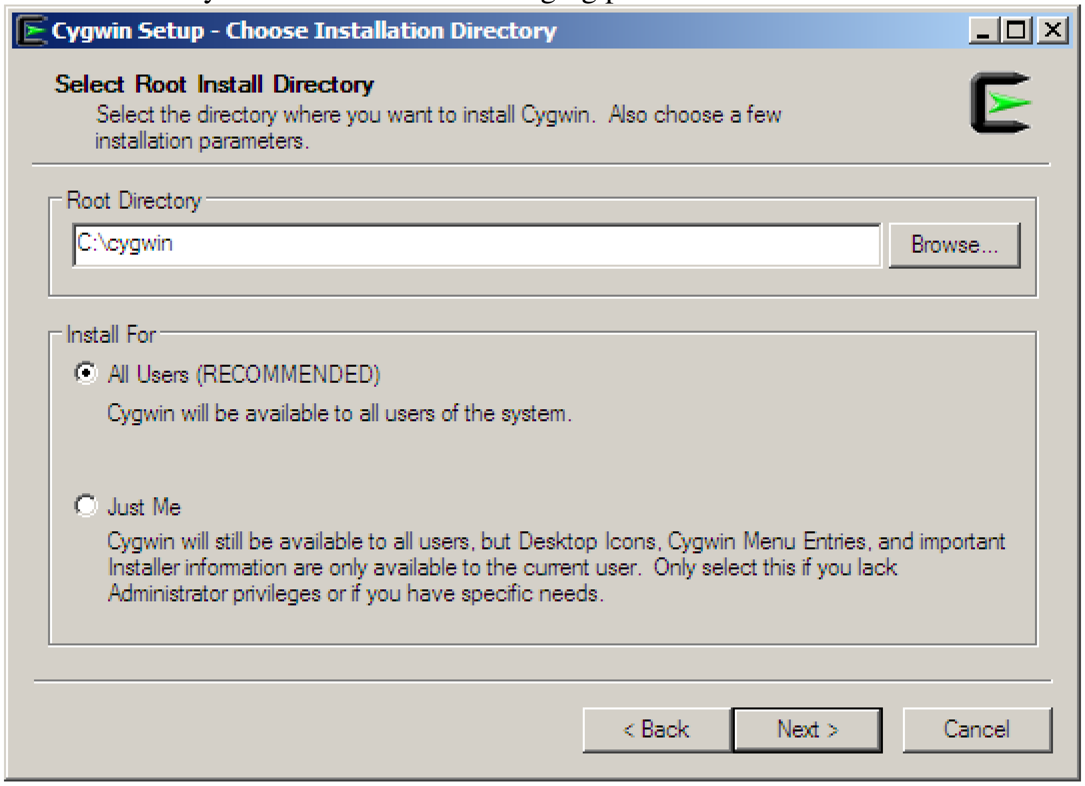
Choose whether to install or download from the internet, or install from files in a local directory.

[✓ Install from Internet (downloaded files will be kept for future re-use)]

Download Without Installing

Install from Local Directory

You will be asked to set up the default folder for Cygwin. We suggest you use the default location unless you are familiar with changing paths and directories. Click on next.



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:\cygwin

Install For

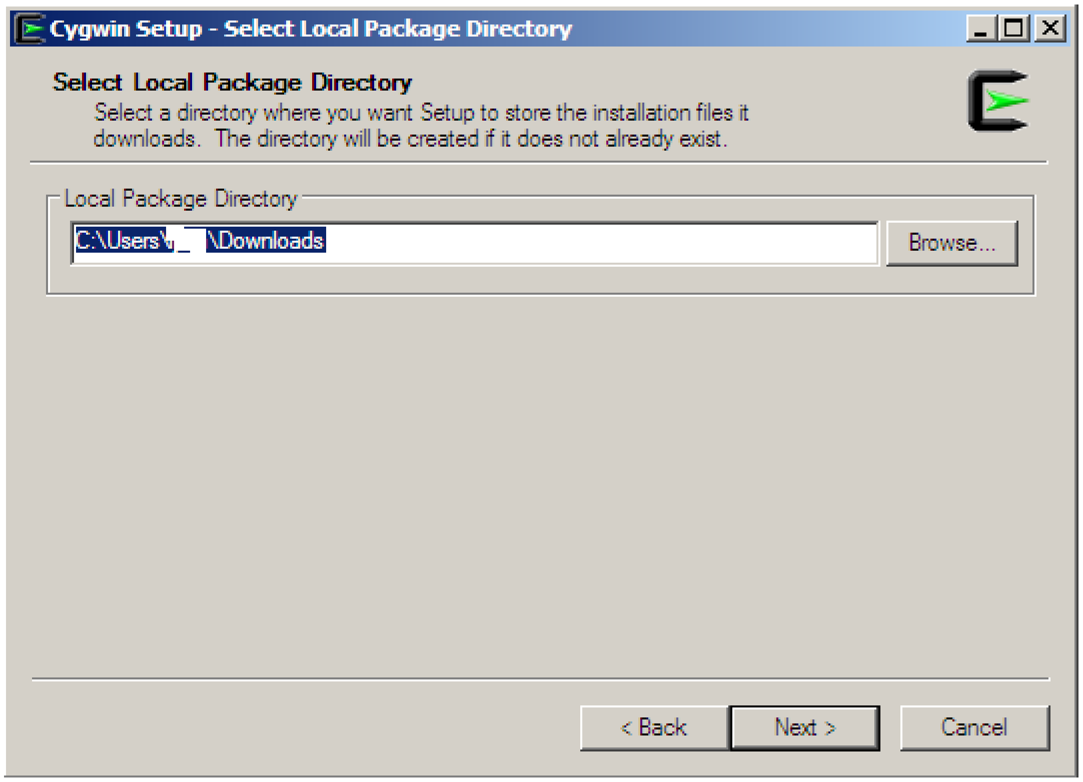
● All Users (RECOMMENDED)

Cygwin will be available to all users of the system.

○ 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.

The same goes for the install file temp directory. Again click on next.
NOTE: for privacy reasons we redacted the user name.



Cygwin Setup - Select Local Package Directory

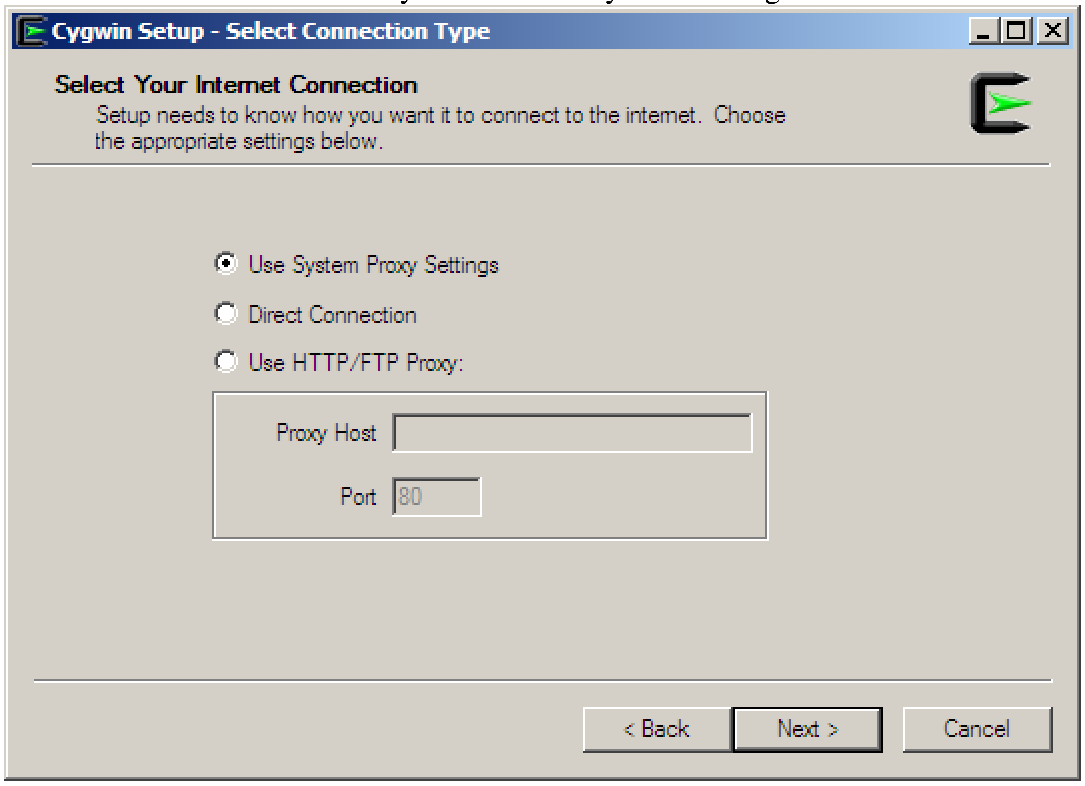
Select Local Package Directory

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

C:\Users_ \Downloads

Leave this screen alone unless you know what you are doing. Click next.



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]

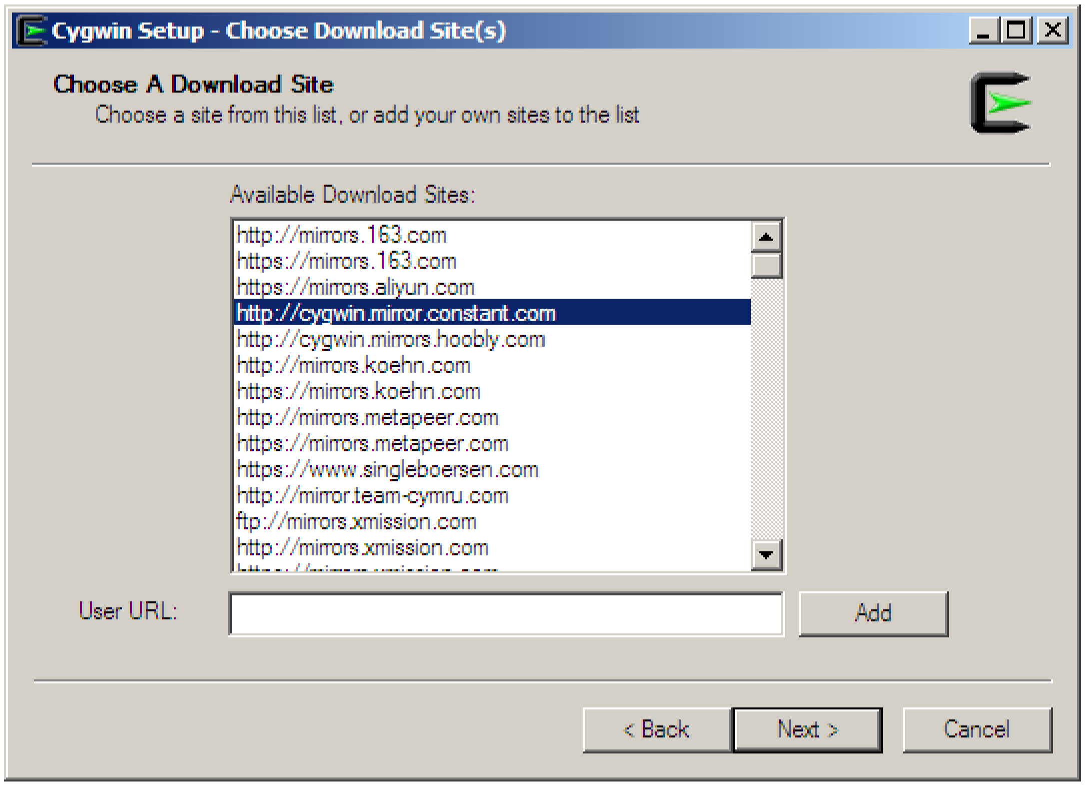
Direct Connection

Use HTTP/FTP Proxy:

Proxy Host

Port 80

You will be taken to a download site page. There are many fine sources for the files on this page. We have chosen the highlighted at random. Make your selection and click on next.



Choose A Download Site

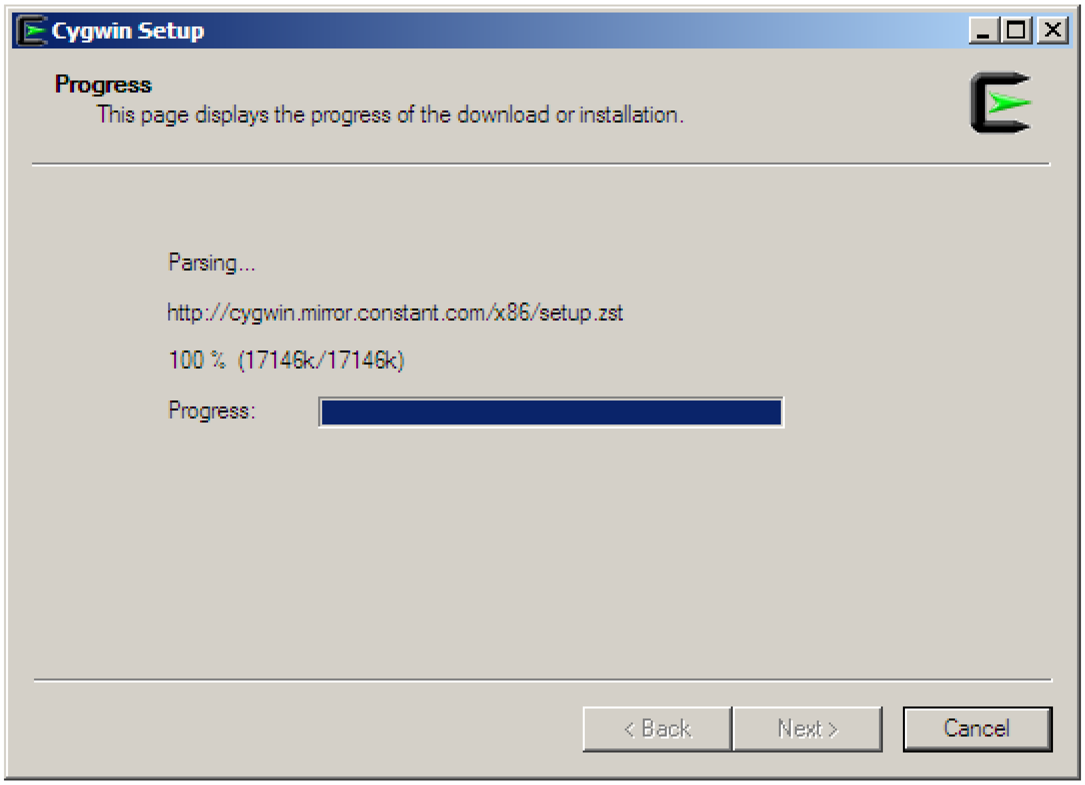
Choose a site from this list, or add your own sites to the list

Available Download Sites:

```
http://mirrors.163.com
https://mirrors.163.com
https://mirrors.aliyun.com
http://cygwin.mirror.constant.com
http://cygwin.mirrors.hoobly.com
http://mirrors.koehn.com
https://mirrors.koehn.com
http://mirrors.metapeer.com
https://mirrors.metapeer.com
https://www.singleboersen.com
http://mirror.team-cymru.com
ftp://mirrors.xmission.com
http://mirrors.xmission.com
```

User URL:

The program will connect to the server and download the basic Cygwin files.


Cygwin Setup

Progress

This page displays the progress of the download or installation.

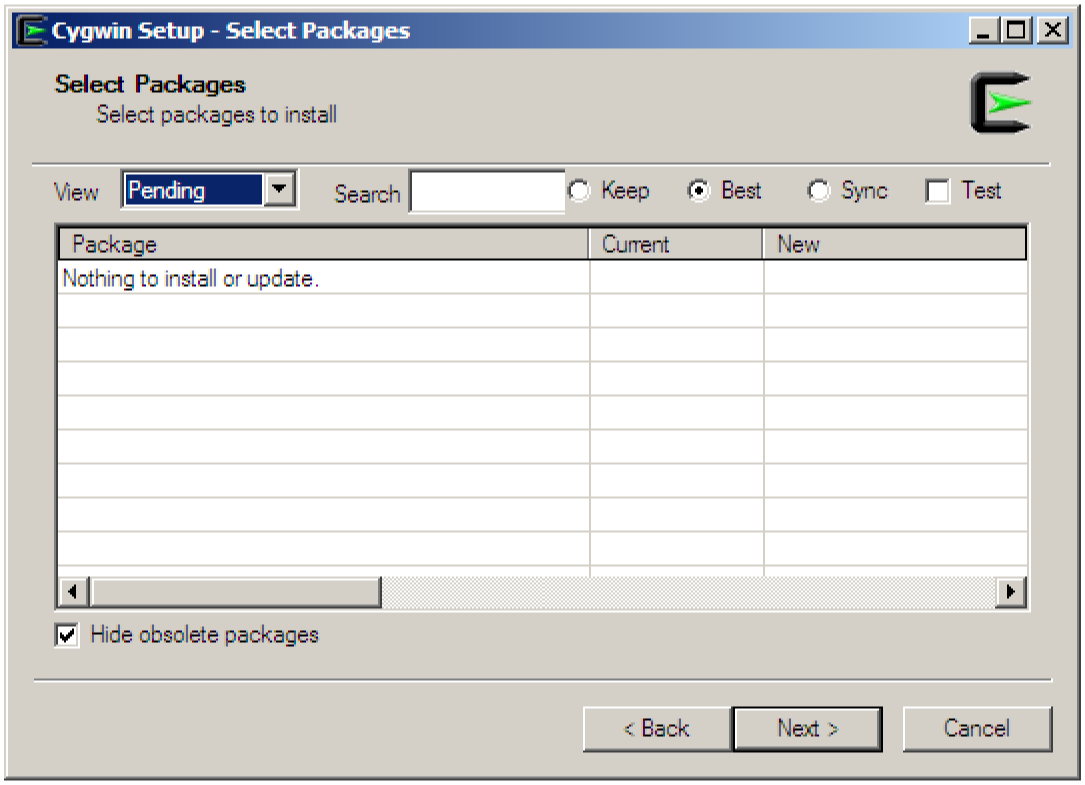
```
Parsing...
http://cygwin.mirror.constant.com/x86/setup.zst
100 %  (17146k/17146k)
Progress:
```

You will be prompted to place a icon on the desk top we recommend you do so. If you stop now you will only install Cygwin. Like many Linux programs there are a pile of dependencies that will also need to be downloaded. We recommend that you install Cygwin first then exit the install program. For the next step you will restart the install program and it will automatically navigate to the steps below.

Step 2: Installing the dependencies.

DSDv1.8.3 requires a pile of dependencies to be installed so that it can properly open and build the program and necessary support files. Below are the steps needed to download and install these dependencies? The dependences needed are gcc, make, sndfile, git, wget, zip, lepack, fft and libas. Each will be discussed below.

NOTE: The gcc files will be discussed first and in detail. The other files are all selected by identical steps.
NOTE: It is assumed you have completed the step1 section above.
NOTE: it is assumed that you have restarted the install program and are now looking at a screen similar to the one below.


Cygwin Setup - Select Packages

Select Packages

Select packages to install

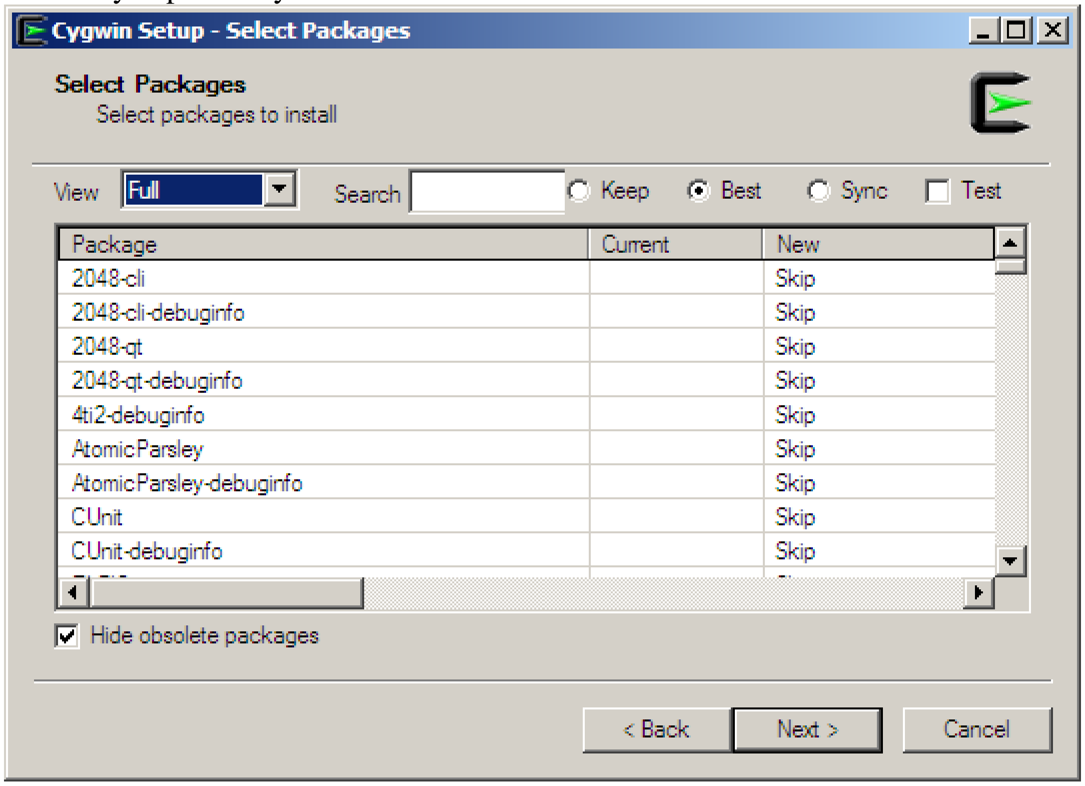
View: Pending Search ( ) Keep (●) Best ( ) Sync ☐ Test

Package	Current	New
Nothing to install or update.		

☑ Hide obsolete packages

< Back Next > Cancel

The first thing to do is to change the View dropdown from "Pending" to "Full". You can ignore all the file packages that appear. We are now ready to search for and select the necessary dependency files.


Cygwin Setup - Select Packages

Select Packages

Select packages to install

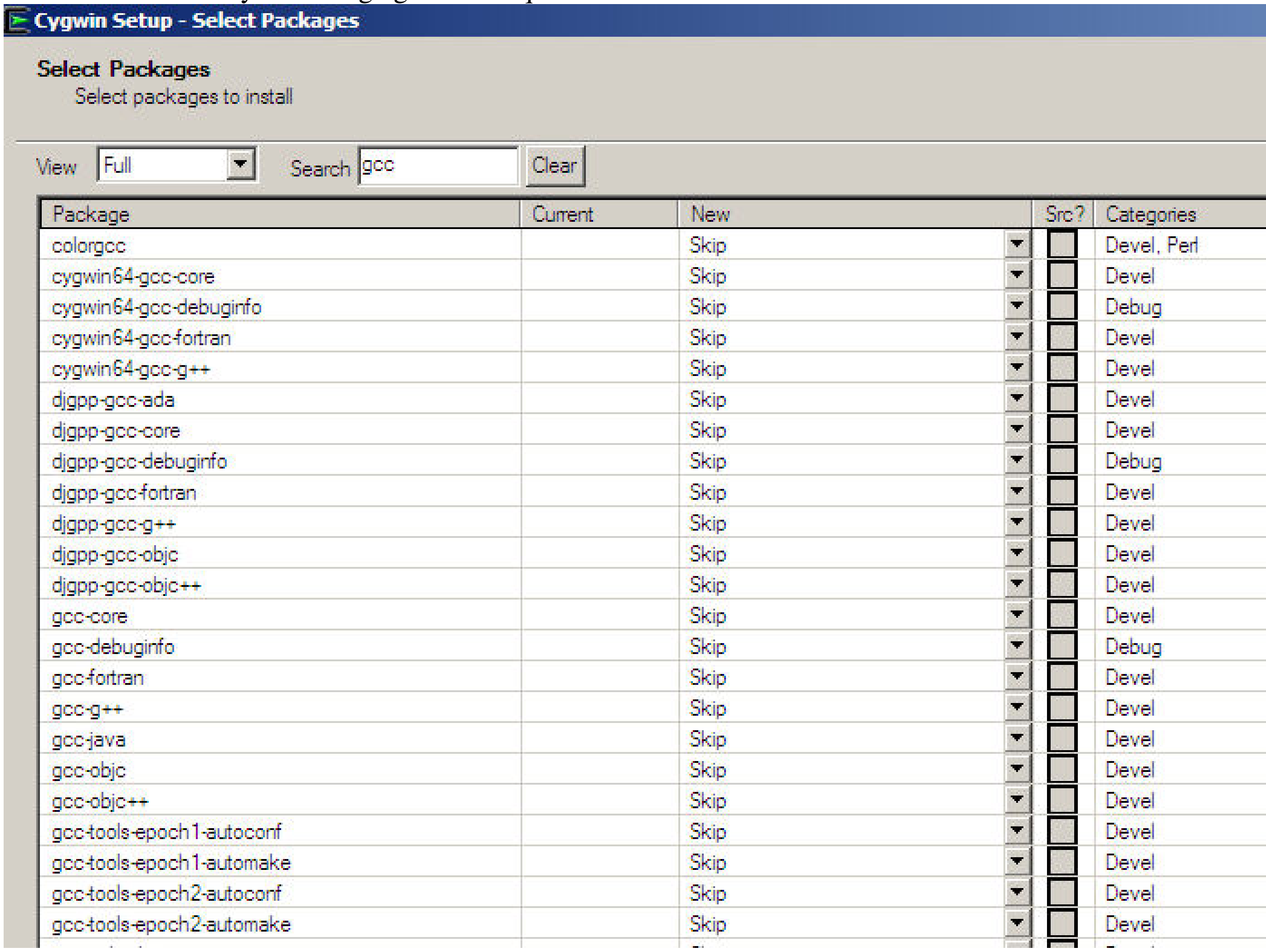
View: Full Search ( ) Keep (●) Best ( ) Sync ☐ Test

Package	Current	New
2048-cli		Skip
2048-cli-debuginfo		Skip
2048-qt		Skip
2048-qt-debuginfo		Skip
4ti2-debuginfo		Skip
AtomicParsley		Skip
AtomicParsley-debuginfo		Skip
CUnit		Skip
CUnit-debuginfo		Skip

☑ Hide obsolete packages

< Back Next > Cancel

To locate the dependency files we will be using the search window. We will also change the view to full screen so you can see the information better. The first set of dependencies we want are found by searching "gcc" – No quotes.



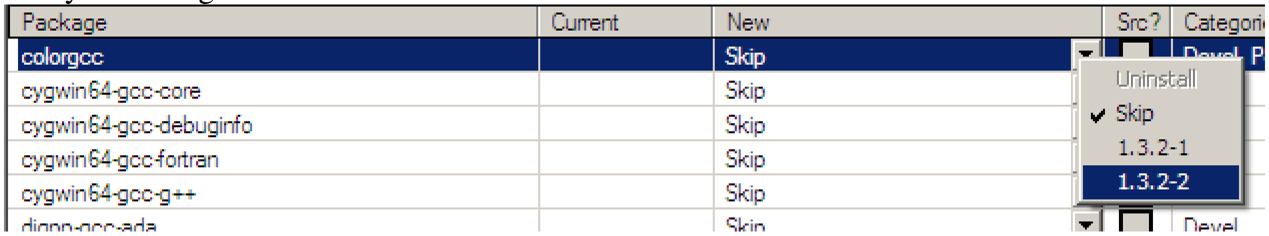
Cygwin Setup - Select Packages

Select Packages
Select packages to install

View: Full Search: gcc Clear

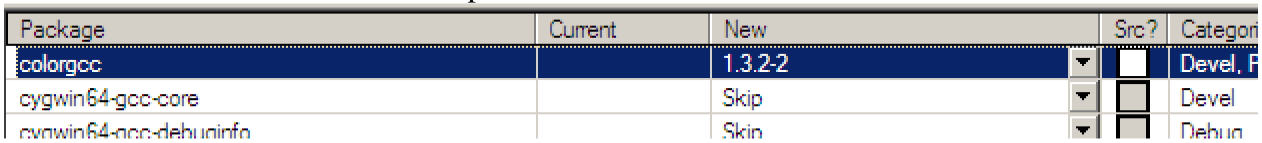
Package	Current	New	Src?	Categories
colorgcc		Skip		Devel, Perl
cygwin64-gcc-core		Skip		Devel
cygwin64-gcc-debuginfo		Skip		Debug
cygwin64-gcc-fortran		Skip		Devel
cygwin64-gcc-g++		Skip		Devel
djgpp-gcc-ada		Skip		Devel
djgpp-gcc-core		Skip		Devel
djgpp-gcc-debuginfo		Skip		Debug
djgpp-gcc-fortran		Skip		Devel
djgpp-gcc-g++		Skip		Devel
djgpp-gcc-objc		Skip		Devel
djgpp-gcc-objc++		Skip		Devel
gcc-core		Skip		Devel
gcc-debuginfo		Skip		Debug
gcc-fortran		Skip		Devel
gcc-g++		Skip		Devel
gcc-java		Skip		Devel
gcc-objc		Skip		Devel
gcc-objc++		Skip		Devel
gcc-tools-epoch1-autoconf		Skip		Devel
gcc-tools-epoch1-automake		Skip		Devel
gcc-tools-epoch2-autoconf		Skip		Devel
gcc-tools-epoch2-automake		Skip		Devel

The files we want are "colorgcc, gcc-core, gcc-g++, libgcc1 and libgccpp1. mingw64-i686-gcc-core, mingw64-i686-gcc-g++, mingw64-x86_64-gcc-core, mingw64-x86_64-gcc-g++
NOTE: The pink file names are for 64bit OS.
To select the files select the small dropdown arrow and the end of the "skip" area. This will open up a dropdown with one or more version numbers for the file. We recommend always selecting the latest version.



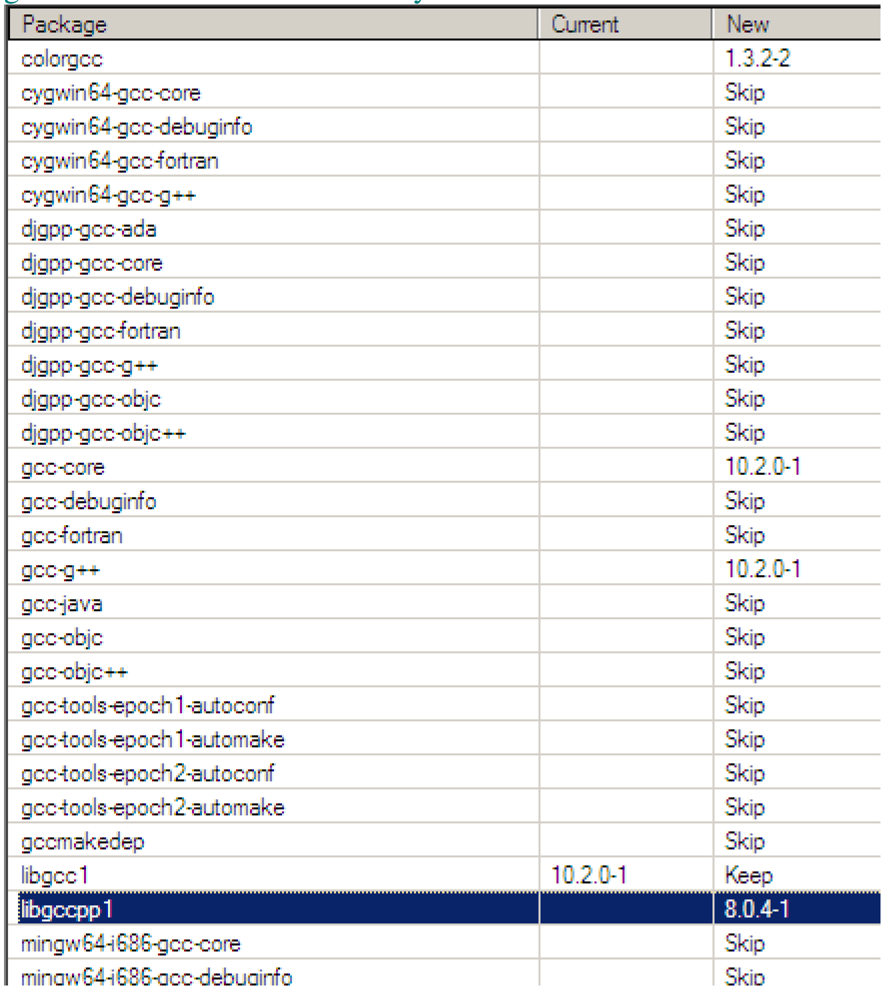
Package	Current	New	Src?	Categori
colorgcc		Skip		Devel, P
cygwin64-gcc-core		Skip		
cygwin64-gcc-debuginfo		Skip		
cygwin64-gcc-fortran		Skip		
cygwin64-gcc-g++		Skip		

Once the version is selected the “skip” line will show the version number selected.



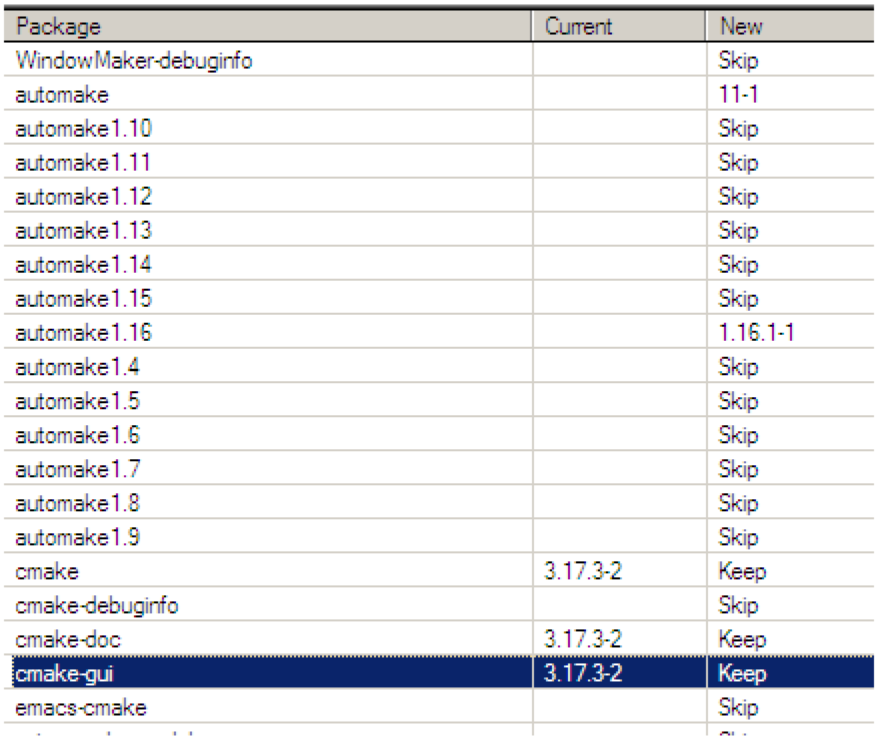
Package	Current	New	Src?	Categori
colorgcc		1.3.2-2	☐	Devel, F
cygwin64-gcc-core		Skip	☐	Devel
cygwin64-gcc-debuginfo		Skip	☐	Debug

Repeat the process for the other files listed above. The more observant will have noticed that the file libgcc1 already has a version number this means that this particular file was already installed.
NOTE: Different computers will have some files already there from other applications. Leave them there do not remove them.
NOTE: If a file already exists you can use the dropdown to update it if you want to. If in doubt leave it alone.
NOTE: If you are building DSD v1.8.3 or earlier you need to select a gcc.core, and gcc++ Earlier than v10.2.0.1 or you will have build issues.



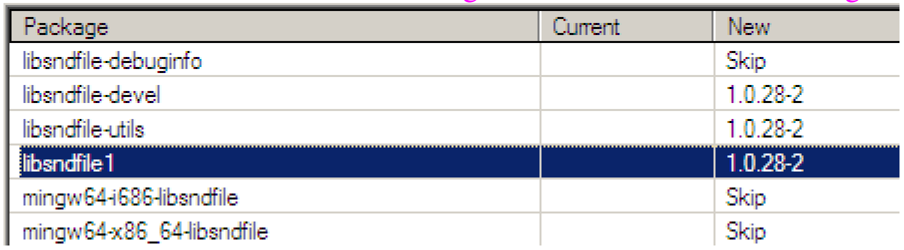
Package	Current	New
colorgcc		1.3.2-2
cygwin64-gcc-core		Skip
cygwin64-gcc-debuginfo		Skip
cygwin64-gcc-fortran		Skip
cygwin64-gcc-g++		Skip
djgpp-gcc-ada		Skip
djgpp-gcc-core		Skip
djgpp-gcc-debuginfo		Skip
djgpp-gcc-fortran		Skip
djgpp-gcc-g++		Skip
djgpp-gcc-objc		Skip
djgpp-gcc-objc++		Skip
gcc-core		10.2.0-1
gcc-debuginfo		Skip
gcc-fortran		Skip
gcc-g++		10.2.0-1
gcc-java		Skip
gcc-objc		Skip
gcc-objc++		Skip
gcc-tools-epoch1-autoconf		Skip
gcc-tools-epoch1-automake		Skip
gcc-tools-epoch2-autoconf		Skip
gcc-tools-epoch2-automake		Skip
gccmakedep		Skip
libgcc1	10.2.0-1	Keep
libgccpp1		8.0.4-1
mingw64-i686-gcc-core		Skip
mingw64-i686-gcc-debuginfo		Skip

This concludes the gcc file selection we now continue on with the other files. Change the search from gcc to make. Select the following files automake, automake1.16, cmake and make. There are no 64bit OS versions.



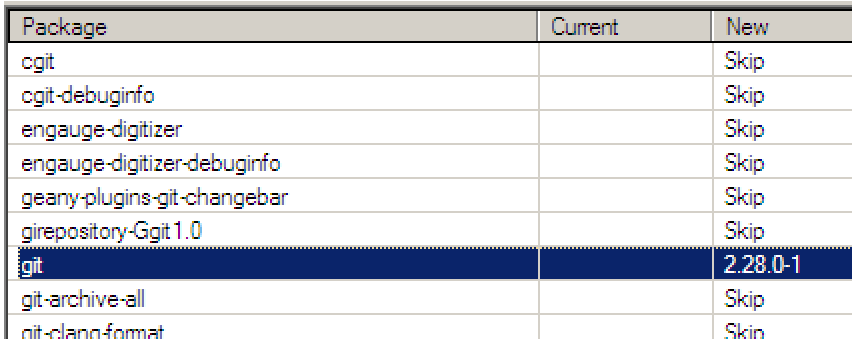
Package	Current	New
WindowMaker-debuginfo		Skip
automake		11-1
automake1.10		Skip
automake1.11		Skip
automake1.12		Skip
automake1.13		Skip
automake1.14		Skip
automake1.15		Skip
automake1.16		1.16.1-1
automake1.4		Skip
automake1.5		Skip
automake1.6		Skip
automake1.7		Skip
automake1.8		Skip
automake1.9		Skip
cmake	3.17.3-2	Keep
cmake-debuginfo		Skip
cmake-doc	3.17.3-2	Keep
cmake-gui	3.17.3-2	Keep
emacs-cmake		Skip

Change the search from make to sndfile. Select the following files libsndfile-devel, libsndfile-utils and libsndfile1. mingw64-i686-libsndfile and mingw64-x86_64-libsndfile



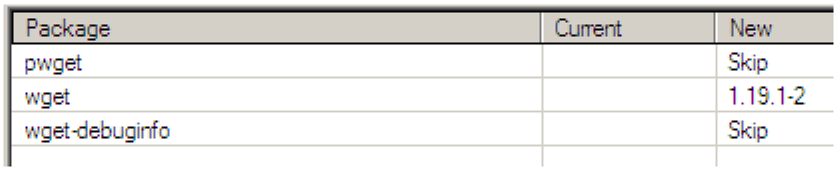
Package	Current	New
libsndfile-debuginfo		Skip
libsndfile-devel		1.0.28-2
libsndfile-utils		1.0.28-2
libsndfile1		1.0.28-2
mingw64-i686-libsndfile		Skip
mingw64-x86_64-libsndfile		Skip

Change the search from sndfile to git. Select git. There are no 64bit OS versions.



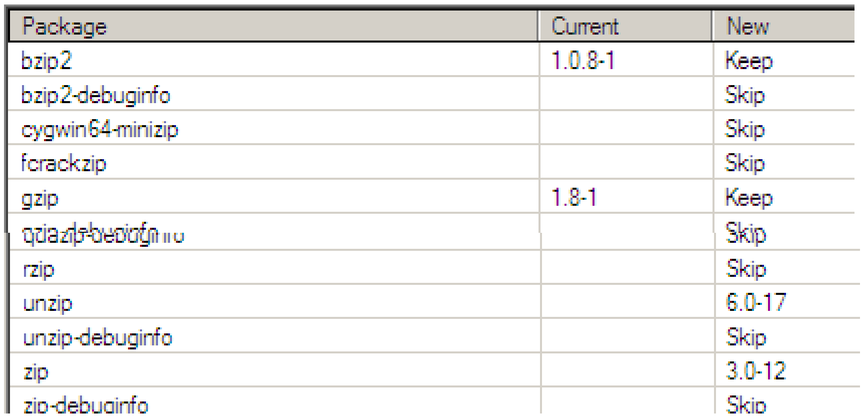
Package	Current	New
cgit		Skip
cgit-debuginfo		Skip
engauge-digitizer		Skip
engauge-digitizer-debuginfo		Skip
geany-plugins-git-changebar		Skip
girepository-Ggit1.0		Skip
git		2.28.0-1
git-archive-all		Skip
git-clang-format		Skip

Change the search from git to wget. Select wget. There are no 64bit OS versions.



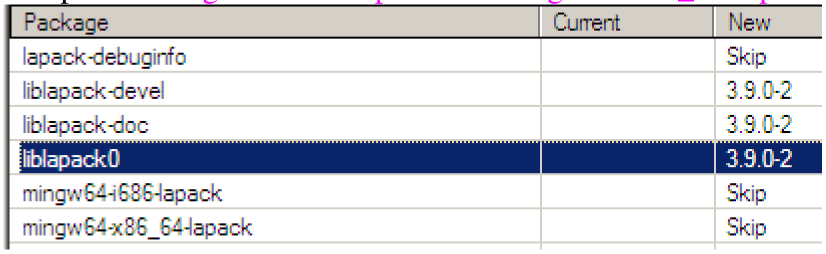
Package	Current	New
pwget		Skip
wget		1.19.1-2
wget-debuginfo		Skip

Change the search from wget to zip. Select bzip2, gzip, zip and unzip. There are no 64bit OS versions.



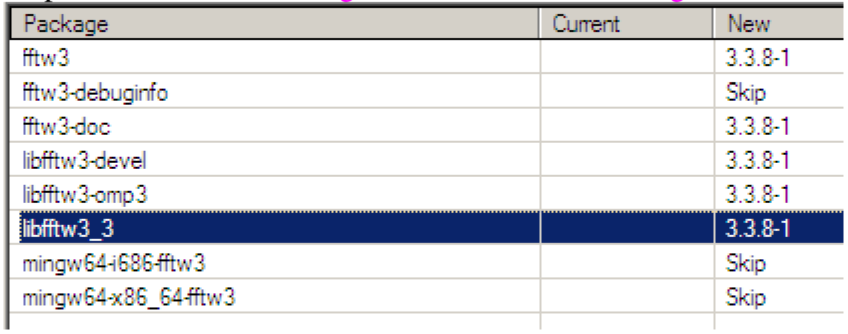
Package	Current	New
bzip2	1.0.8-1	Keep
bzip2-debuginfo		Skip
cygwin64-minizip		Skip
fcrackzip		Skip
gzip	1.8-1	Keep
gzip-debuginfo		Skip
rzip		Skip
unzip		6.0-17
unzip-debuginfo		Skip
zip		3.0-12
zip-debuginfo		Skip

Change the search from zip to lapack. Select liblapack-devel, liblapack-doc and liblapack0. mingw64-i686-lapack and mingw64-x86_64-lapack.



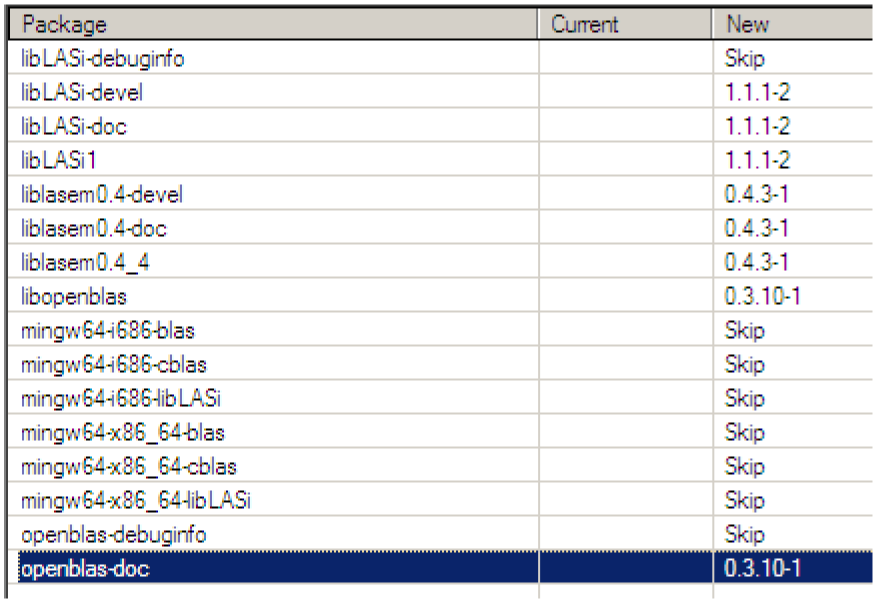
Package	Current	New
lapack-debuginfo		Skip
liblapack-devel		3.9.0-2
liblapack-doc		3.9.0-2
liblapack0		3.9.0-2
mingw64-i686-lapack		Skip
mingw64-x86_64-lapack		Skip

Change the search from lapack to fft. Select fftw3, fftw3-doc, libfftw3-devel, libfftw3-omp3 and libfftw3_3. mingw64-i686-fftw3 and mingw64-x86_64-fftw3.



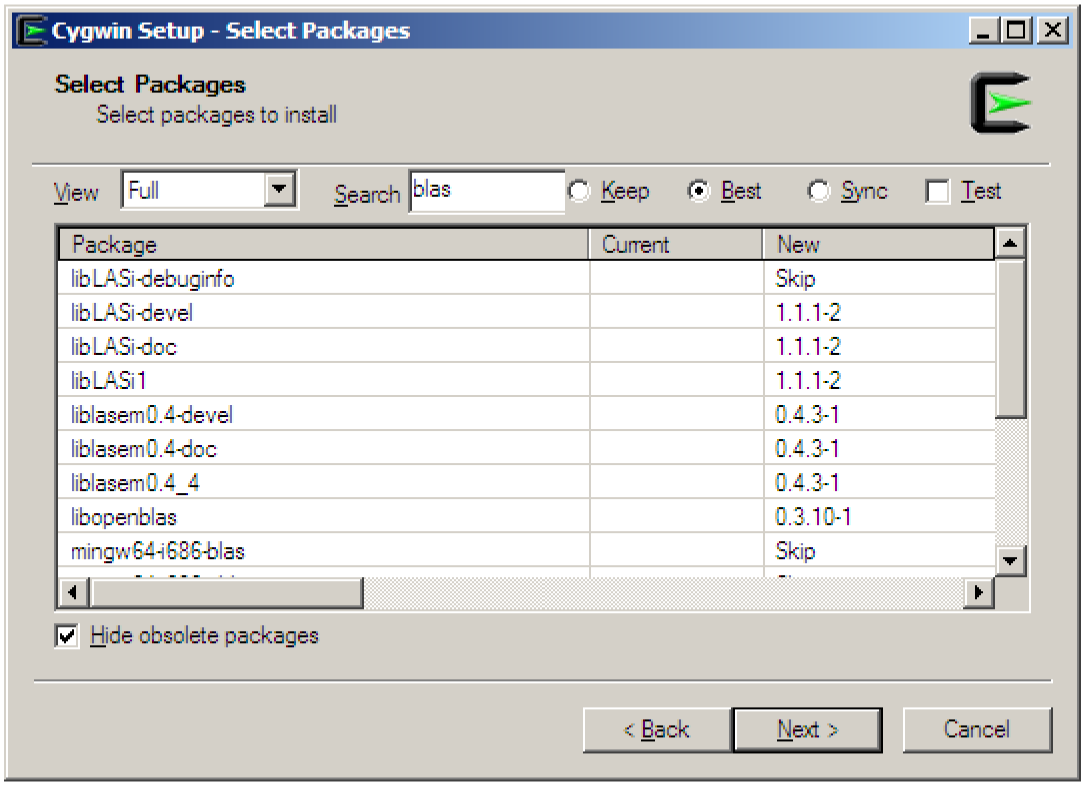
Package	Current	New
fftw3		3.3.8-1
fftw3-debuginfo		Skip
fftw3-doc		3.3.8-1
libfftw3-devel		3.3.8-1
libfftw3-omp3		3.3.8-1
libfftw3_3		3.3.8-1
mingw64-i686-fftw3		Skip
mingw64-x86_64-fftw3		Skip

Change the search from fft to blas. Select libLASi-devel, libLASi-doc, liblasi1, liblasem0.4-devel, liblasem0.4-doc, liblasem0.4_4, libopenblas and openblas.doc. mingw64-i686-libblas, mingw64-i686-libcblas, mingw64-i686-libLASi and mingw64-x86_64-blas, mingw64-x86_64-cblas, mingw64-x86_64-libLASi.



Package	Current	New
libLASi-debuginfo		Skip
libLASi-devel		1.1.1-2
libLASi-doc		1.1.1-2
libLASi1		1.1.1-2
liblasem0.4-devel		0.4.3-1
liblasem0.4-doc		0.4.3-1
liblasem0.4_4		0.4.3-1
libopenblas		0.3.10-1
mingw64-i686-blas		Skip
mingw64-i686-cblas		Skip
mingw64-i686-libLASi		Skip
mingw64-x86_64-blas		Skip
mingw64-x86_64-cblas		Skip
mingw64-x86_64-libLASi		Skip
openblas-debuginfo		Skip
openblas-doc		0.3.10-1

We have now selected are all the dependencies needed. We now need to download and install them. At the bottom of the window there is a next button click on it.

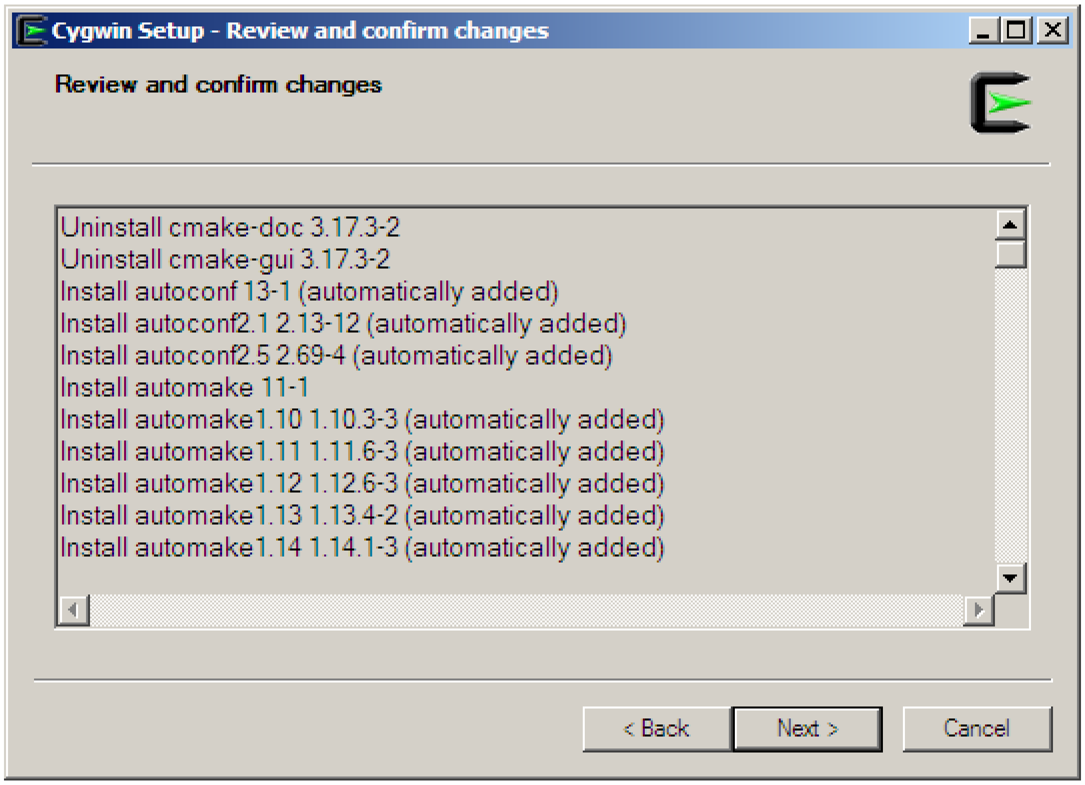


View: Full — Search: blas — ( ) Keep [● Best] ( ) Sync — [ ] Test

Package	Current	New
libLASi-debuginfo		Skip
libLASi-devel		1.1.1-2
libLASi-doc		1.1.1-2
libLASi1		1.1.1-2
liblasem0.4-devel		0.4.3-1
liblasem0.4-doc		0.4.3-1
liblasem0.4_4		0.4.3-1
libopenblas		0.3.10-1
mingw64-i686-blas		Skip

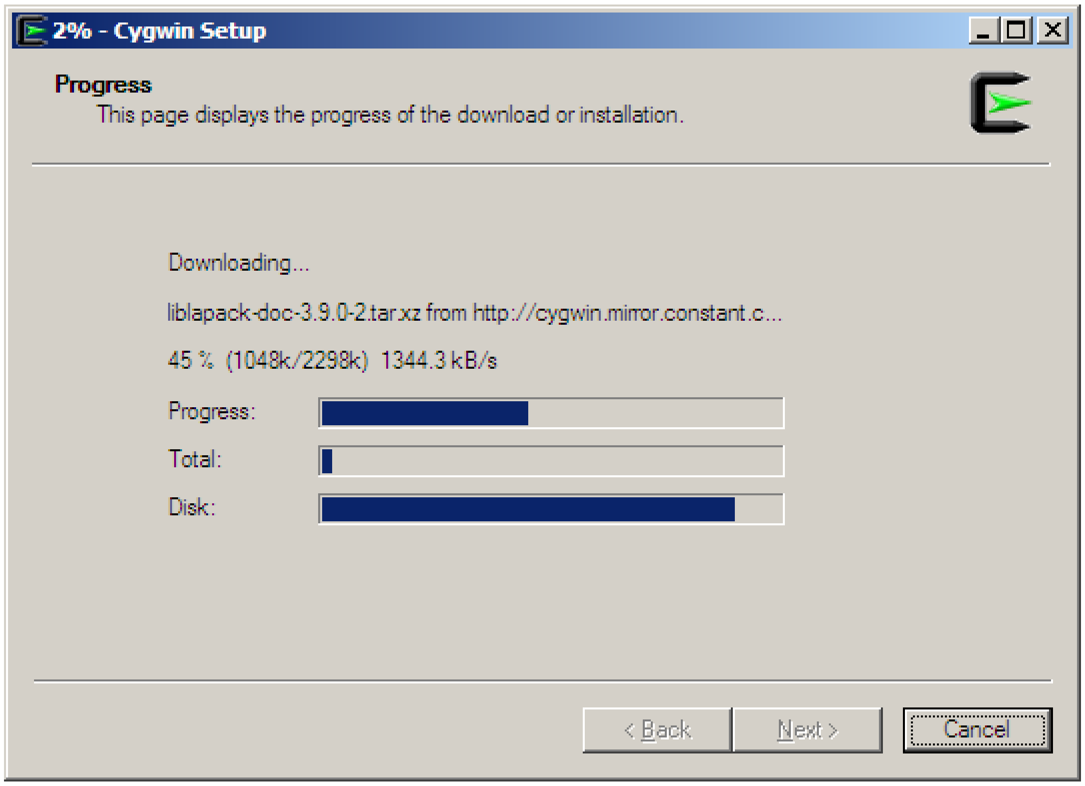
[✓] Hide obsolete packages

This opens a window asking you to confirm the changes. Click next and the program will start downloading and installing the dependencies selected.


Cygwin Setup - Review and confirm changes
Review and confirm changes
< Back
Next >
Cancel

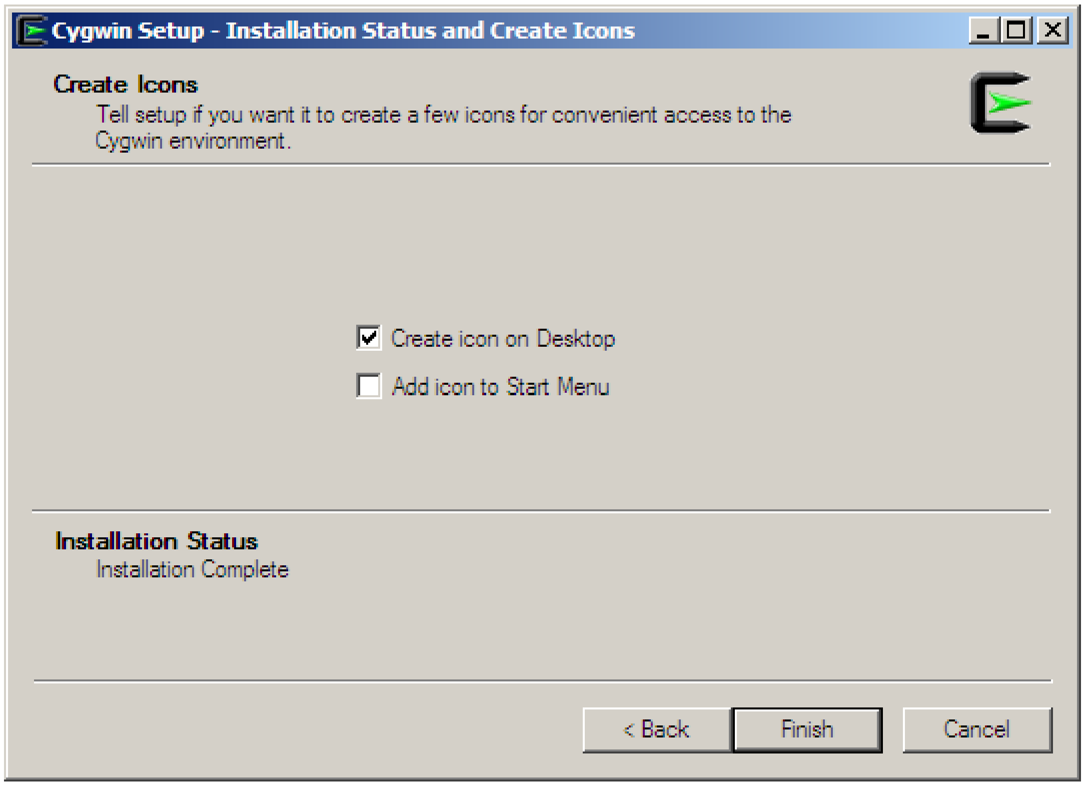
```
Uninstall cmake-doc 3.17.3-2
Uninstall cmake-gui 3.17.3-2
Install autoconf 13-1 (automatically added)
Install autoconf2.1 2.13-12 (automatically added)
Install autoconf2.5 2.69-4 (automatically added)
Install automake 11-1
Install automake1.10 1.10.3-3 (automatically added)
Install automake1.11 1.11.6-3 (automatically added)
Install automake1.12 1.12.6-3 (automatically added)
Install automake1.13 1.13.4-2 (automatically added)
Install automake1.14 1.14.1-3 (automatically added)
```

Click next and the program will start downloading and installing the dependencies selected.


2% - Cygwin Setup
Progress
This page displays the progress of the download or installation.
Progress:
Total:
Disk:
< Back
Next >
Cancel

```
Downloading...
liblapack-doc-3.9.0-2.tar.xz from http://cygwin.mirror.constant.c...
45 %  (1048k/2298k)  1344.3 kB/s
```

When all the files have downloaded and installed you will see this. We suggest you select making the desktop icon as it makes opening and running the Cygwin commands a lot easier.


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

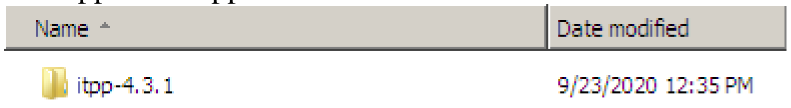
Installation Status
Installation Complete

Select finish and you are done downloading and installing the dependencies.

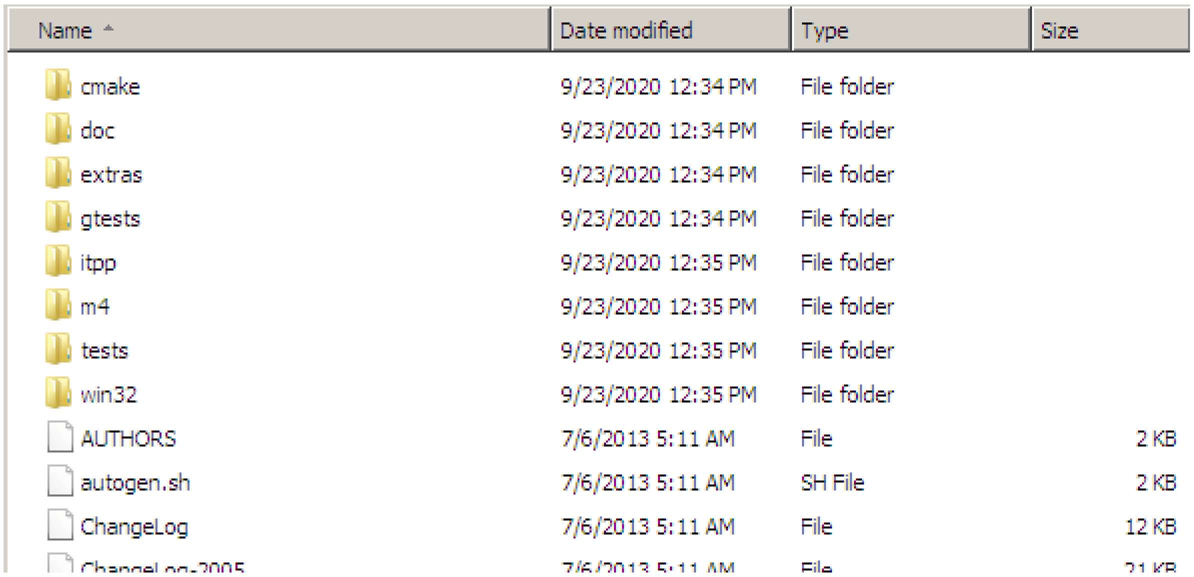
Step 3: Building Itt and mbelib .dlls

NOTE: Cygwin does not like folders with too many dashes,spaces in the names. Try to use single word folder names.

Go to https://sourceforge.net/projects/itpp/ and download the itt install files. Place the files in a known folder and unzip them. Use WinRar to decompress the .bz2 file directly. Check that the files all extracted to a single folder directly and not an nested folder pair like itpp-4.3.1/itpp-4.3.1/**files are here**.

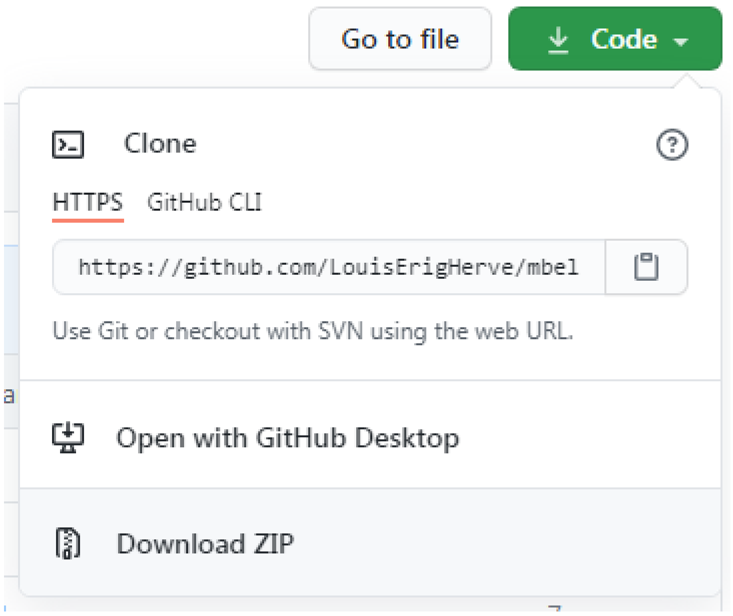


Name	Date modified
itpp-4.3.1	9/23/2020 12:35 PM



Name	Date modified	Type	Size
cmake	9/23/2020 12:34 PM	File folder	
doc	9/23/2020 12:34 PM	File folder	
extras	9/23/2020 12:34 PM	File folder	
gtests	9/23/2020 12:34 PM	File folder	
itpp	9/23/2020 12:35 PM	File folder	
m4	9/23/2020 12:35 PM	File folder	
tests	9/23/2020 12:35 PM	File folder	
win32	9/23/2020 12:35 PM	File folder	
AUTHORS	7/6/2013 5:11 AM	File	2 KB
autogen.sh	7/6/2013 5:11 AM	SH File	2 KB
ChangeLog	7/6/2013 5:11 AM	File	12 KB
ChangeLog-2005	7/6/2013 5:11 AM	File	21 KB

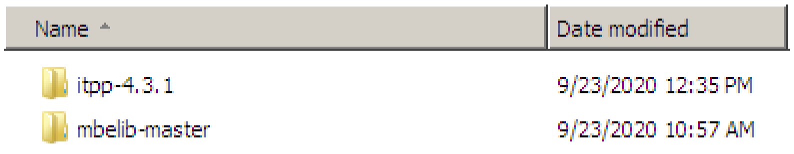
Do the same for the mbelib files. They are at https://github.com/LouisErigHerve/mbelib. click on the green code and select download as zip.



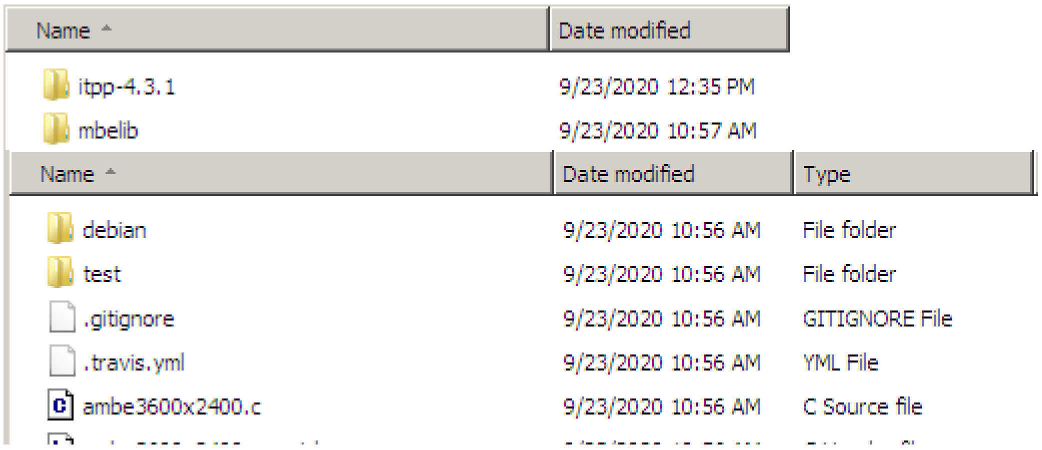
```
https://github.com/LouisErigHerve/mbel
```

Use Git or checkout with SVN using the web URL.

For ease of compiling place the unzipped files in the same master folder as the .itt files above. The mbelib files will extract to a folder called mbelib-master. This folder contains a second folder called mbelib-master. For ease of compiling cut and paste all the files from this second folder back into the first folder named mbelib-master. Then rename the folder mbelib.



Name	Date modified
itpp-4.3.1	9/23/2020 12:35 PM
mbelib-master	9/23/2020 10:57 AM

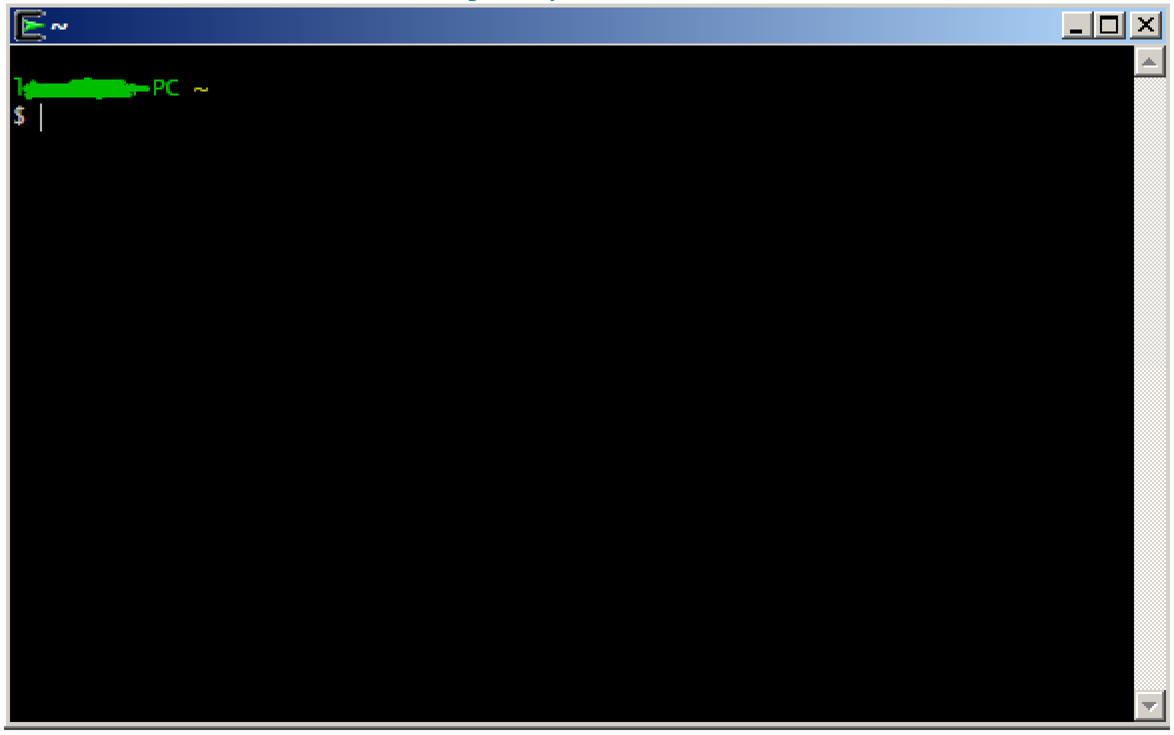


Name	Date modified
itpp-4.3.1	9/23/2020 12:35 PM
mbelib	9/23/2020 10:57 AM

Name	Date modified	Type
debian	9/23/2020 10:56 AM	File folder
test	9/23/2020 10:56 AM	File folder
.gitignore	9/23/2020 10:56 AM	GITIGNORE File
.travis.yml	9/23/2020 10:56 AM	YML File
ambe3600x2400.c	9/23/2020 10:56 AM	C Source file

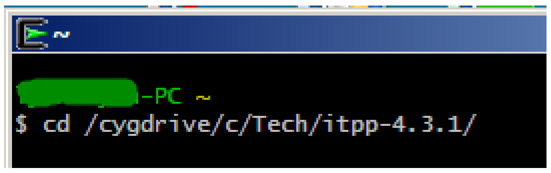
We are now ready to compile the files.
NOTE: The itt files will be compiled first and in detail. The mbelib files are compiled by identical steps with just the paths being changed to represent the different file.
Run Cygwin this is a command prompt type application so you will be typing in commands and then hitting enter.

NOTE: the PC name is redacted for privacy.



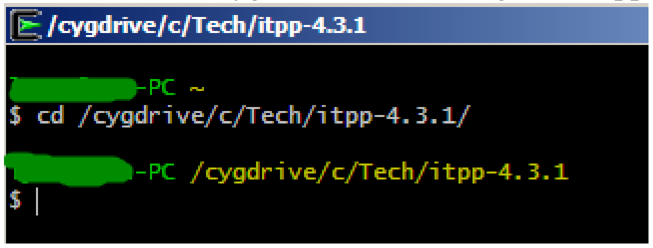
```
[redacted]PC ~
$ |
```

NOTE: On all Cygwin commands watch out for spaces, upper/lower case, oddball characters and spelling.
The first command to enter is. cd /cygdrive/c/**your folder name with itt and mbelib files from above**/itt4.3.1. We are using Tech as our folder name so we will type in cd /cygdrive/c/Tech/itpp-4.3.1.



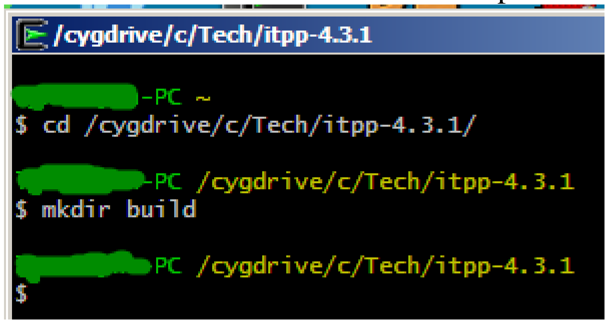
```
~
[redacted]-PC ~
$ cd /cygdrive/c/Tech/itpp-4.3.1/
```

Hit enter and the command is processed and Cygwing is ready for the next command. You will notice Cygwin is now looking at the itpp folder and its contents.



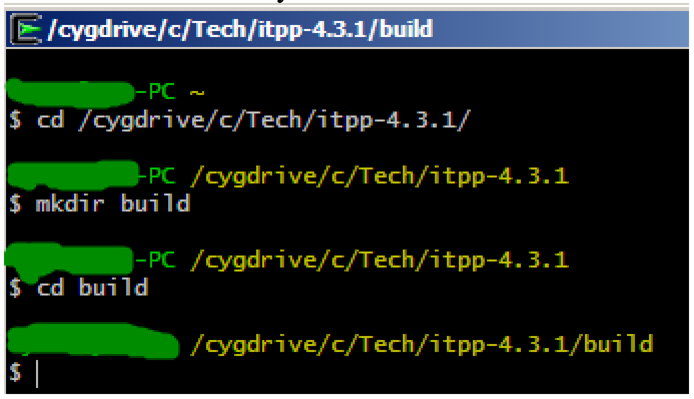
```
/cygdrive/c/Tech/itpp-4.3.1
[redacted]-PC ~
$ cd /cygdrive/c/Tech/itpp-4.3.1/

[redacted]-PC /cygdrive/c/Tech/itpp-4.3.1
$ |
```

Next we create the folder the compiled files will be placed into. This is done by using the command mkdir build and hit enter to process it. This says make directory called build.



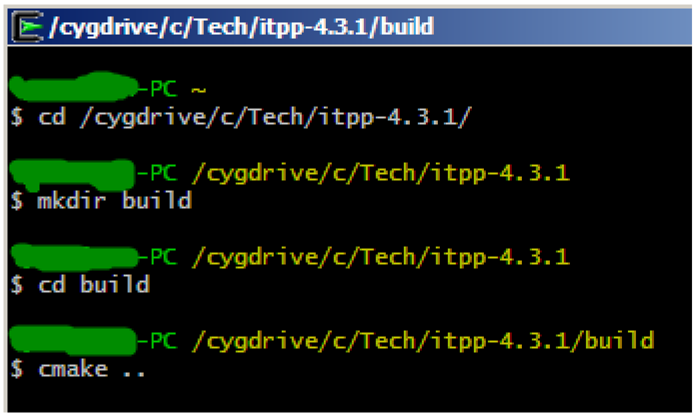
```
/cygdrive/c/Tech/itpp-4.3.1
[redacted]-PC ~
$ cd /cygdrive/c/Tech/itpp-4.3.1/

[redacted]-PC /cygdrive/c/Tech/itpp-4.3.1
$ mkdir build

[redacted]PC /cygdrive/c/Tech/itpp-4.3.1
$
```

Next we need to navigate to the build folder just created. This is done with the cd build command followed by enter.



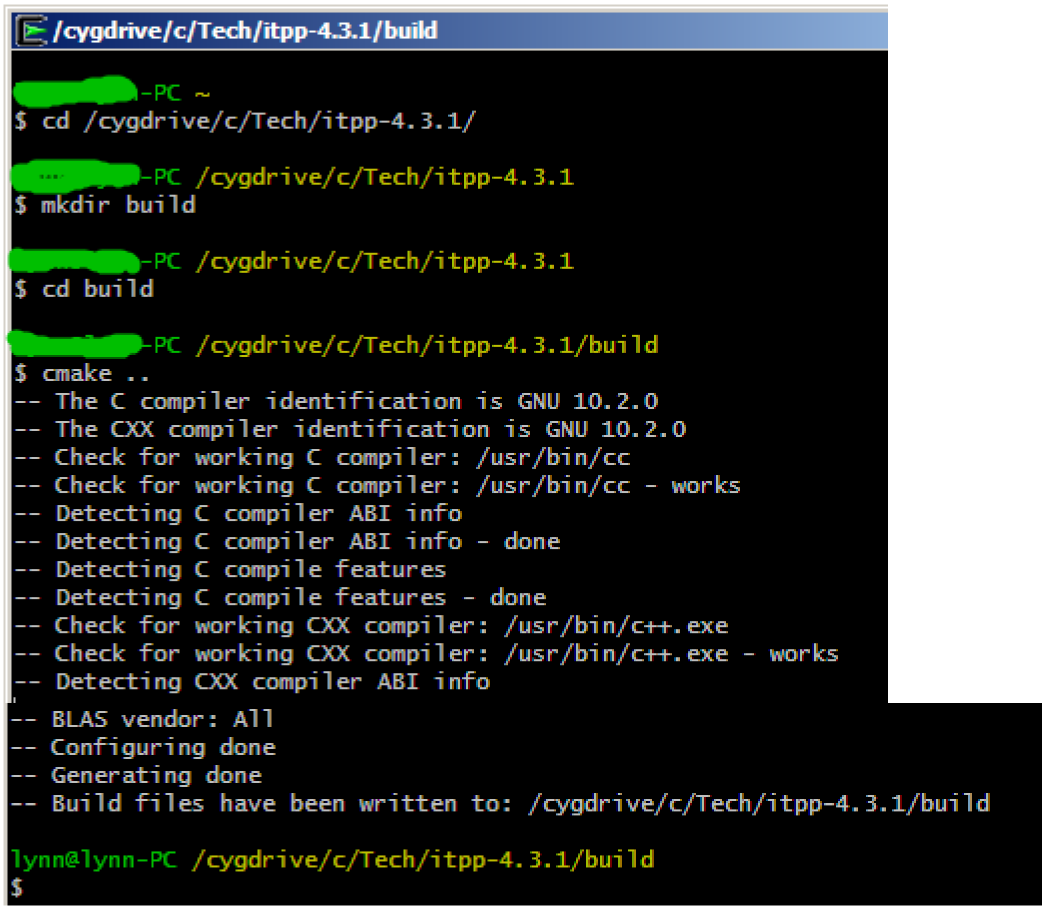
```
/cygdrive/c/Tech/itpp-4.3.1/build
[redacted]-PC ~
$ cd /cygdrive/c/Tech/itpp-4.3.1/

[redacted]-PC /cygdrive/c/Tech/itpp-4.3.1
$ mkdir build

[redacted]-PC /cygdrive/c/Tech/itpp-4.3.1
$ cd build

[redacted] /cygdrive/c/Tech/itpp-4.3.1/build
$ |
```

The next command is cmake .. followed by enter this tells Cygwin to start compiling the files.



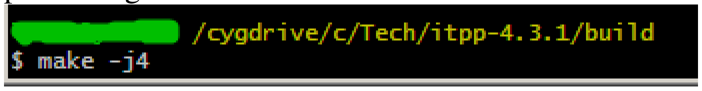
```
/cygdrive/c/Tech/itpp-4.3.1/build

[redacted]-PC ~
$ cd /cygdrive/c/Tech/itpp-4.3.1/

[redacted]-PC /cygdrive/c/Tech/itpp-4.3.1
$ mkdir build

[redacted]-PC /cygdrive/c/Tech/itpp-4.3.1
$ cd build

[redacted]-PC /cygdrive/c/Tech/itpp-4.3.1/build
$ cmake ..
```

Once you hit enter you will see Cygwin processing the command.
NOTE: If you get an error like this 1 [main] cmake 2054 child_info_fork::abort: \??\C:\Cygwin\bin\cygcrypto-1.1.dll: Loaded to different address: parent(0xD10000) != child(0xA30000). The solution found is to remove (delete it) the Cygwing folder from C:\ drive. Turn off your antivirus and run the setup to reinstall Cygwin. Let it download and install everything including dependency files. Keep the antivirus turned off until everything in this document is done then turn it back on.

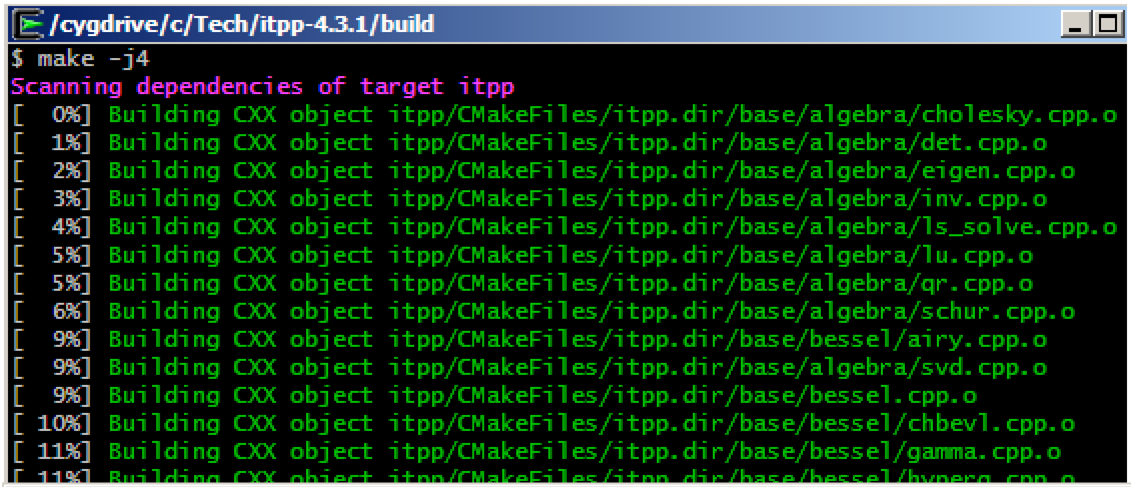


```
/cygdrive/c/Tech/itpp-4.3.1/build

[redacted]-PC ~
$ cd /cygdrive/c/Tech/itpp-4.3.1/

[redacted]-PC /cygdrive/c/Tech/itpp-4.3.1
$ mkdir build

[redacted]-PC /cygdrive/c/Tech/itpp-4.3.1
$ cd build

[redacted]-PC /cygdrive/c/Tech/itpp-4.3.1/build
$ cmake ..
-- The C compiler identification is GNU 10.2.0
-- The CXX compiler identification is GNU 10.2.0
-- Check for working C compiler: /usr/bin/cc
-- Check for working C compiler: /usr/bin/cc - works
-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
-- Detecting C compile features
-- Detecting C compile features - done
-- Check for working CXX compiler: /usr/bin/c++.exe
-- Check for working CXX compiler: /usr/bin/c++.exe - works
-- Detecting CXX compiler ABI info
-- BLAS vendor: All
-- Configuring done
-- Generating done
-- Build files have been written to: /cygdrive/c/Tech/itpp-4.3.1/build

lynn@lynn-PC /cygdrive/c/Tech/itpp-4.3.1/build
$
```

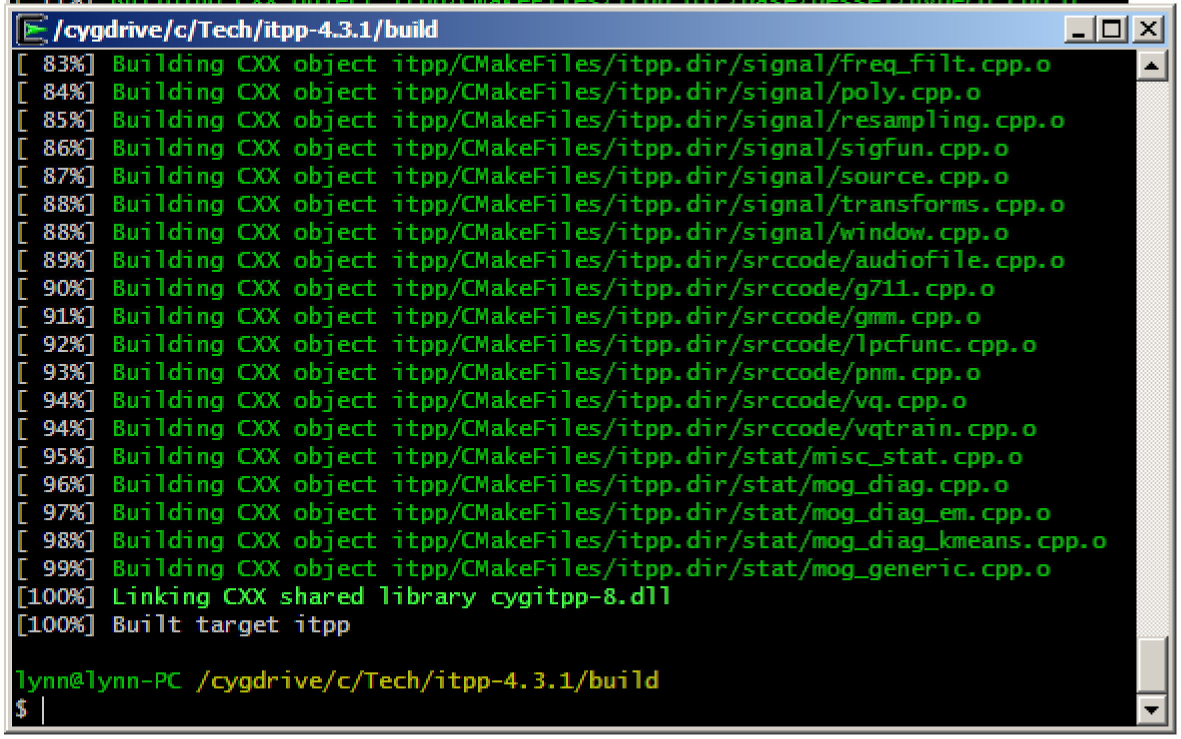
Next use the make -j4 command followed by enter. Again you will see Cygwin processing the command.



```
[redacted] /cygdrive/c/Tech/itpp-4.3.1/build
$ make -j4
```

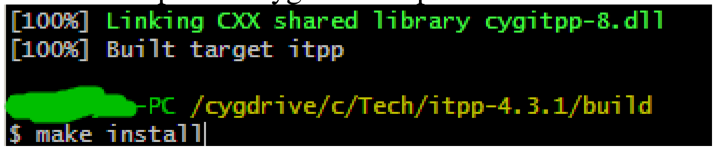


```
$ make -j4
Scanning dependencies of target itpp
[  0%] Building CXX object itpp/CMakeFiles/itpp.dir/base/algebra/cholesky.cpp.o
[  1%] Building CXX object itpp/CMakeFiles/itpp.dir/base/algebra/det.cpp.o
[  2%] Building CXX object itpp/CMakeFiles/itpp.dir/base/algebra/eigen.cpp.o
[  3%] Building CXX object itpp/CMakeFiles/itpp.dir/base/algebra/inv.cpp.o
[  4%] Building CXX object itpp/CMakeFiles/itpp.dir/base/algebra/ls_solve.cpp.o
[  5%] Building CXX object itpp/CMakeFiles/itpp.dir/base/algebra/lu.cpp.o
[  5%] Building CXX object itpp/CMakeFiles/itpp.dir/base/algebra/qr.cpp.o
[  6%] Building CXX object itpp/CMakeFiles/itpp.dir/base/algebra/schur.cpp.o
[  9%] Building CXX object itpp/CMakeFiles/itpp.dir/base/bessel/airy.cpp.o
[  9%] Building CXX object itpp/CMakeFiles/itpp.dir/base/algebra/svd.cpp.o
[  9%] Building CXX object itpp/CMakeFiles/itpp.dir/base/bessel.cpp.o
[ 10%] Building CXX object itpp/CMakeFiles/itpp.dir/base/bessel/chbevl.cpp.o
[ 11%] Building CXX object itpp/CMakeFiles/itpp.dir/base/bessel/gamma.cpp.o
[ 11%] Building CXX object itpp/CMakeFiles/itpp.dir/base/bessel/hyperg.cpp.o
```

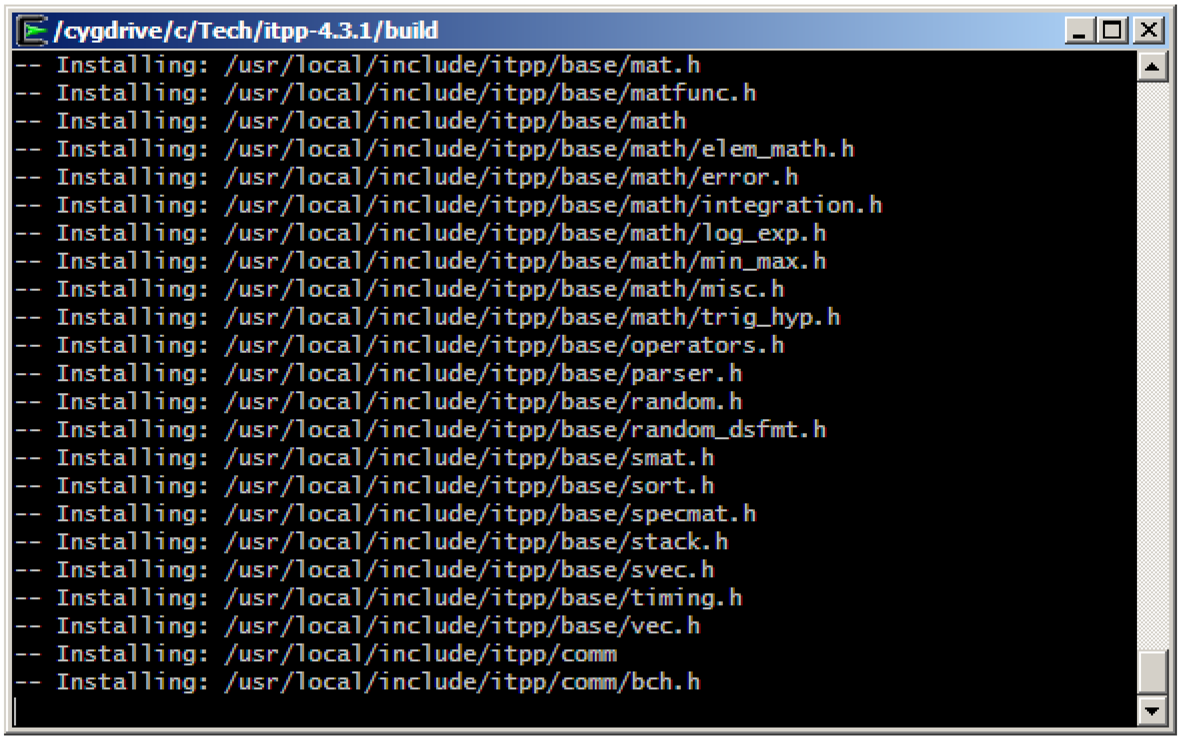


```
[ 83%] Building CXX object itpp/CMakeFiles/itpp.dir/signal/freq_filt.cpp.o
[ 84%] Building CXX object itpp/CMakeFiles/itpp.dir/signal/poly.cpp.o
[ 85%] Building CXX object itpp/CMakeFiles/itpp.dir/signal/resampling.cpp.o
[ 86%] Building CXX object itpp/CMakeFiles/itpp.dir/signal/sigfun.cpp.o
[ 87%] Building CXX object itpp/CMakeFiles/itpp.dir/signal/source.cpp.o
[ 88%] Building CXX object itpp/CMakeFiles/itpp.dir/signal/transforms.cpp.o
[ 88%] Building CXX object itpp/CMakeFiles/itpp.dir/signal/window.cpp.o
[ 89%] Building CXX object itpp/CMakeFiles/itpp.dir/srccode/audiofile.cpp.o
[ 90%] Building CXX object itpp/CMakeFiles/itpp.dir/srccode/g711.cpp.o
[ 91%] Building CXX object itpp/CMakeFiles/itpp.dir/srccode/gmm.cpp.o
[ 92%] Building CXX object itpp/CMakeFiles/itpp.dir/srccode/lpcfunc.cpp.o
[ 93%] Building CXX object itpp/CMakeFiles/itpp.dir/srccode/pnm.cpp.o
[ 94%] Building CXX object itpp/CMakeFiles/itpp.dir/srccode/vq.cpp.o
[ 94%] Building CXX object itpp/CMakeFiles/itpp.dir/srccode/vqtrain.cpp.o
[ 95%] Building CXX object itpp/CMakeFiles/itpp.dir/stat/misc_stat.cpp.o
[ 96%] Building CXX object itpp/CMakeFiles/itpp.dir/stat/mog_diag.cpp.o
[ 97%] Building CXX object itpp/CMakeFiles/itpp.dir/stat/mog_diag_em.cpp.o
[ 98%] Building CXX object itpp/CMakeFiles/itpp.dir/stat/mog_diag_kmeans.cpp.o
[ 99%] Building CXX object itpp/CMakeFiles/itpp.dir/stat/mog_generic.cpp.o
[100%] Linking CXX shared library cygitpp-8.dll
[100%] Built target itpp

lynn@lynn-PC /cygdrive/c/Tech/itpp-4.3.1/build
$ 
```

When completed the cygotpp-8.dll will have been created. The final step will be to install the.dll so that it can be used. This is done with the make install command followed by enter. As expected Cygwin will process the command.



```
[100%] Linking CXX shared library cygitpp-8.dll
[100%] Built target itpp

[redacted]-PC /cygdrive/c/Tech/itpp-4.3.1/build
$ make install
```

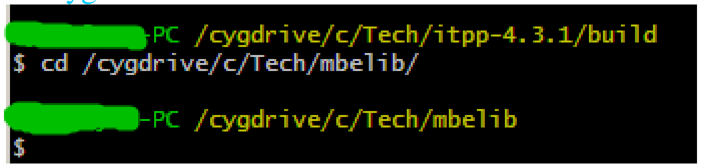


```
/cygdrive/c/Tech/itpp-4.3.1/build
-- Installing: /usr/local/include/itpp/base/mat.h
-- Installing: /usr/local/include/itpp/base/matfunc.h
-- Installing: /usr/local/include/itpp/base/math
-- Installing: /usr/local/include/itpp/base/math/elem_math.h
-- Installing: /usr/local/include/itpp/base/math/error.h
-- Installing: /usr/local/include/itpp/base/math/integration.h
-- Installing: /usr/local/include/itpp/base/math/log_exp.h
-- Installing: /usr/local/include/itpp/base/math/min_max.h
-- Installing: /usr/local/include/itpp/base/math/misc.h
-- Installing: /usr/local/include/itpp/base/math/trig_hyp.h
-- Installing: /usr/local/include/itpp/base/operators.h
-- Installing: /usr/local/include/itpp/base/parser.h
-- Installing: /usr/local/include/itpp/base/random.h
-- Installing: /usr/local/include/itpp/base/random_dsfmt.h
-- Installing: /usr/local/include/itpp/base/smat.h
-- Installing: /usr/local/include/itpp/base/sort.h
-- Installing: /usr/local/include/itpp/base/specmat.h
-- Installing: /usr/local/include/itpp/base/stack.h
-- Installing: /usr/local/include/itpp/base/svec.h
-- Installing: /usr/local/include/itpp/base/timing.h
-- Installing: /usr/local/include/itpp/base/vec.h
-- Installing: /usr/local/include/itpp/comm
-- Installing: /usr/local/include/itpp/comm/bch.h
```

This concludes the compiling and installation of itt. Next is the installation of mbelib. The commands used are identical with the exception of the first. The difference being the file name is changed to mbelib from itpp-4.3.1.

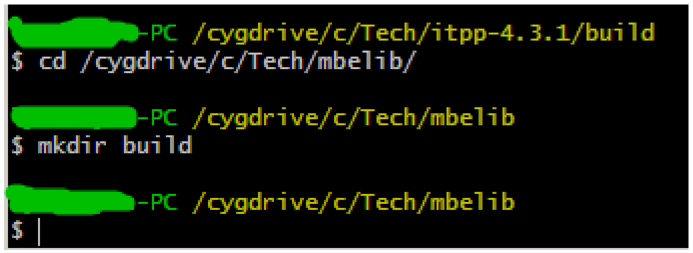
NOTE: you can continue these steps right after the itpp install. There is no need to close and restart Cygwin.

cd /cygdrive/c/Tech/mbelib/



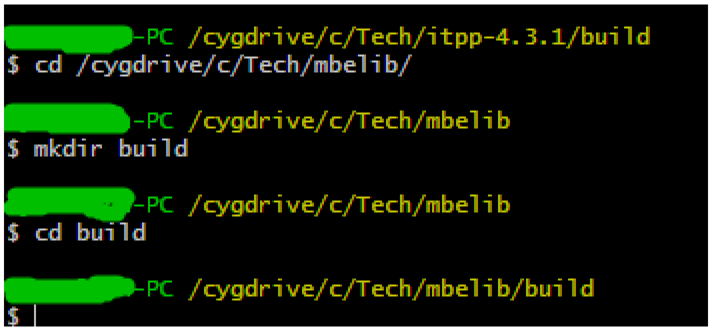
```
[redacted]-PC /cygdrive/c/Tech/itpp-4.3.1/build
$ cd /cygdrive/c/Tech/mbelib/

[redacted]-PC /cygdrive/c/Tech/mbelib
$
```

mkdir build



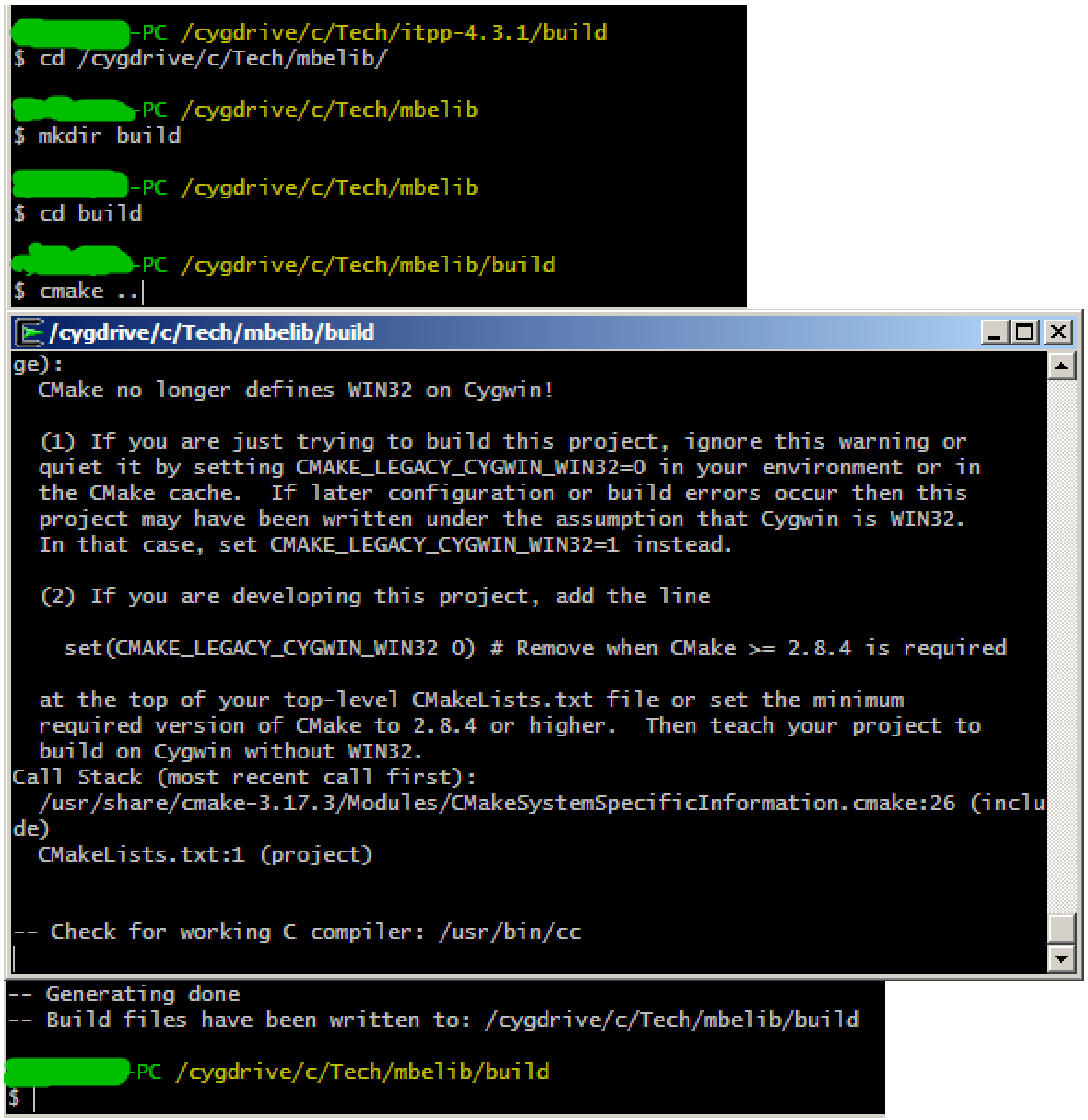
```
[redacted]-PC /cygdrive/c/Tech/itpp-4.3.1/build
$ cd /cygdrive/c/Tech/mbelib/

[redacted]-PC /cygdrive/c/Tech/mbelib
$ mkdir build

[redacted]-PC /cygdrive/c/Tech/mbelib
$ |
```

cd build



```
[redacted]-PC /cygdrive/c/Tech/itpp-4.3.1/build
$ cd /cygdrive/c/Tech/mbelib/

[redacted]-PC /cygdrive/c/Tech/mbelib
$ mkdir build

[redacted]-PC /cygdrive/c/Tech/mbelib
$ cd build

[redacted]-PC /cygdrive/c/Tech/mbelib/build
$ |
```

cmake ..



```
[redacted]-PC /cygdrive/c/Tech/itpp-4.3.1/build
$ cd /cygdrive/c/Tech/mbelib/

[redacted]-PC /cygdrive/c/Tech/mbelib
$ mkdir build

[redacted]-PC /cygdrive/c/Tech/mbelib
$ cd build

[redacted]-PC /cygdrive/c/Tech/mbelib/build
$ cmake ..|
```

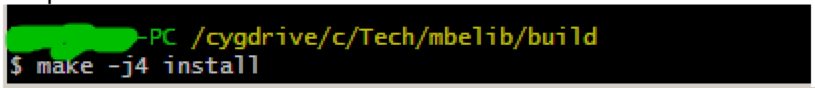
/cygdrive/c/Tech/mbelib/build

```
ge):
  CMake no longer defines WIN32 on Cygwin!

  (1) If you are just trying to build this project, ignore this warning or
  quiet it by setting CMAKE_LEGACY_CYGWIN_WIN32=0 in your environment or in
  the CMake cache.  If later configuration or build errors occur then this
  project may have been written under the assumption that Cygwin is WIN32.
  In that case, set CMAKE_LEGACY_CYGWIN_WIN32=1 instead.

  (2) If you are developing this project, add the line

    set(CMAKE_LEGACY_CYGWIN_WIN32 0) # Remove when CMake >= 2.8.4 is required

  at the top of your top-level CMakeLists.txt file or set the minimum
  required version of CMake to 2.8.4 or higher.  Then teach your project to
  build on Cygwin without WIN32.
Call Stack (most recent call first):
  /usr/share/cmake-3.17.3/Modules/CMakeSystemSpecificInformation.cmake:26 (inclu
de)
  CMakeLists.txt:1 (project)


-- Check for working C compiler: /usr/bin/cc
|
```

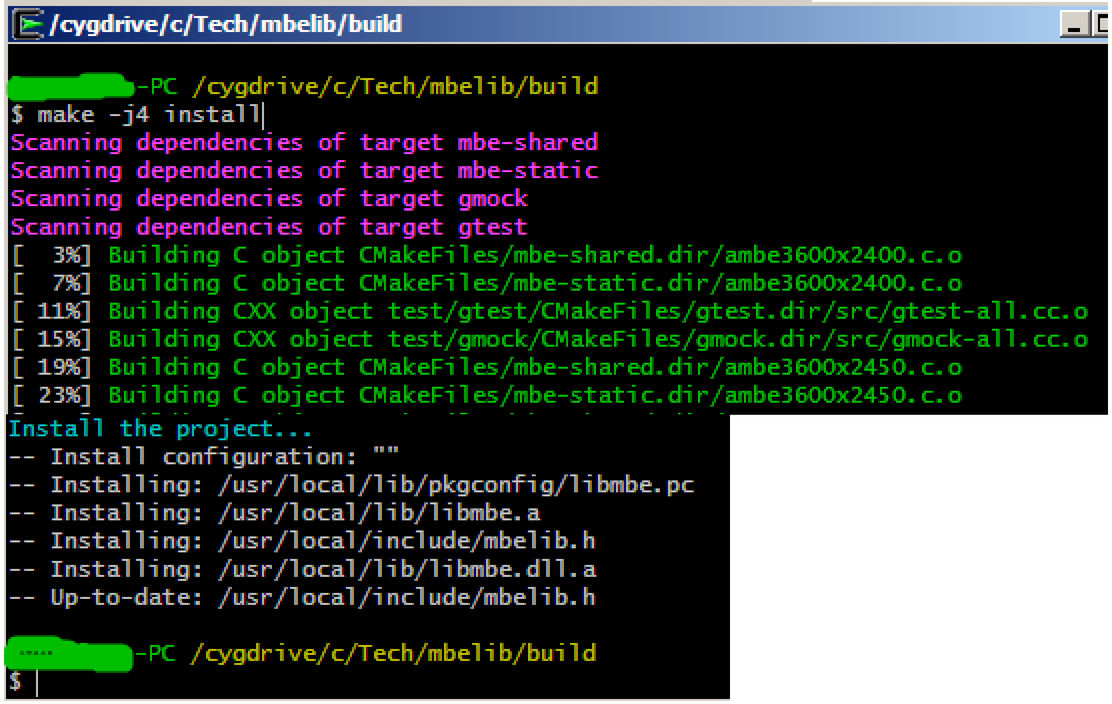
```
-- Generating done
-- Build files have been written to: /cygdrive/c/Tech/mbelib/build

[redacted]-PC /cygdrive/c/Tech/mbelib/build
$ |
```

make -j4 install

NOTE: this is a combined command. You can use the `$ make -j4 command and when completed use the make install command.`



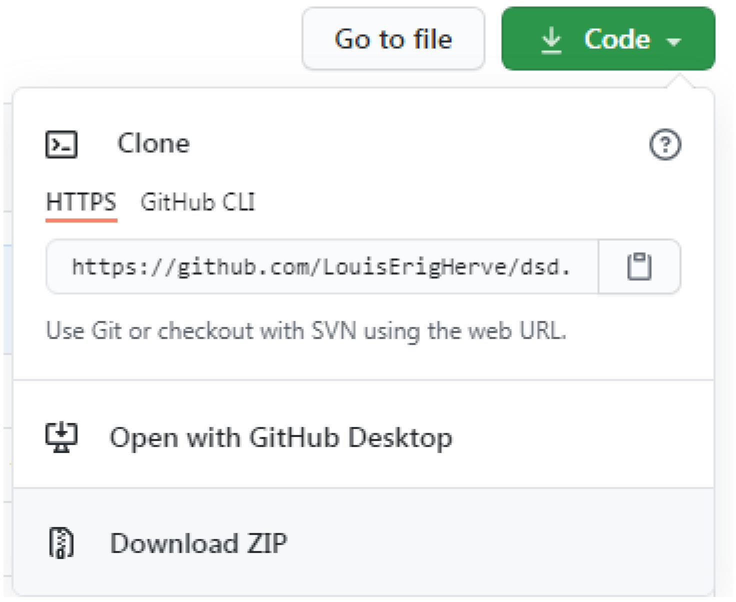
```
[redacted]-PC /cygdrive/c/Tech/mbelib/build
$ make -j4 install
```



```
[redacted]-PC /cygdrive/c/Tech/mbelib/build
$ make -j4 install
Scanning dependencies of target mbe-shared
Scanning dependencies of target mbe-static
Scanning dependencies of target gmock
Scanning dependencies of target gtest
[  3%] Building C object CMakeFiles/mbe-shared.dir/ambe3600x2400.c.o
[  7%] Building C object CMakeFiles/mbe-static.dir/ambe3600x2400.c.o
[ 11%] Building CXX object test/gtest/CMakeFiles/gtest.dir/src/gtest-all.cc.o
[ 15%] Building CXX object test/gmock/CMakeFiles/gmock.dir/src/gmock-all.cc.o
[ 19%] Building C object CMakeFiles/mbe-shared.dir/ambe3600x2450.c.o
[ 23%] Building C object CMakeFiles/mbe-static.dir/ambe3600x2450.c.o
Install the project...
-- Install configuration: ""
-- Installing: /usr/local/lib/pkgconfig/libmbe.pc
-- Installing: /usr/local/lib/libmbe.a
-- Installing: /usr/local/include/mbelib.h
-- Installing: /usr/local/lib/libmbe.dll.a
-- Up-to-date: /usr/local/include/mbelib.h

[redacted]-PC /cygdrive/c/Tech/mbelib/build
$
```

When completed the cygmbe-1.dll will have been created and installed. This completes the building and installation of mbelib.
NOTE: you do not need to shut down Cygwin if you wish to continue with the building of DSD

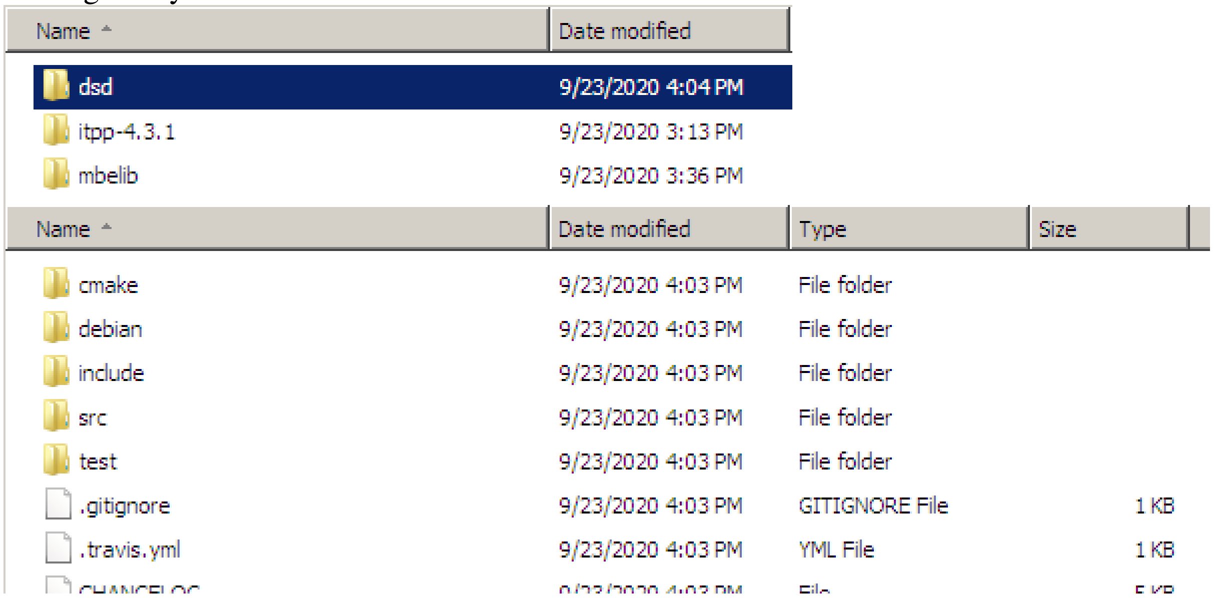
Step 4: Building DSD v1.8.4.
Get the files for v1.8.4. They are at https://github.com/LouisErigHerve/dsd. Click on the green code and select download as zip.



```
https://github.com/LouisErigHerve/dsd.
```

Use Git or checkout with SVN using the web URL.

Like in the steps above unzip and place the files in the same folder you used. Again making sure you don't have the nested file folders.



Name	Date modified
dsd	9/23/2020 4:04 PM
itpp-4.3.1	9/23/2020 3:13 PM
mbelib	9/23/2020 3:36 PM

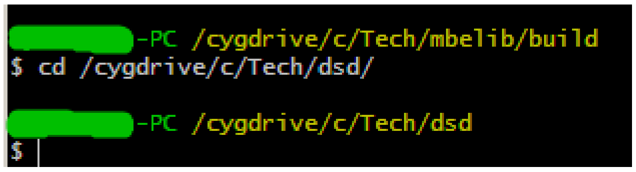
Name	Date modified	Type	Size
cmake	9/23/2020 4:03 PM	File folder	
debian	9/23/2020 4:03 PM	File folder	
include	9/23/2020 4:03 PM	File folder	
src	9/23/2020 4:03 PM	File folder	
test	9/23/2020 4:03 PM	File folder	
.gitignore	9/23/2020 4:03 PM	GITIGNORE File	1 KB
.travis.yml	9/23/2020 4:03 PM	YML File	1 KB

If you did not shut down Cygwin you can now continue to enter in the commands. If you did shut Cygwin restart it. With Cygwin running type in this command cd /cygdrive/c/Tech/dsd/

NOTE: remember to edit it to go to the folder you have created for the install files in step3 above.

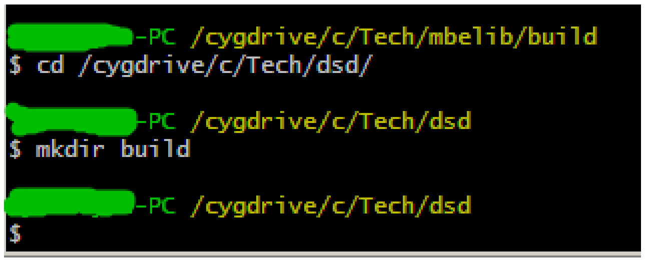
NOTE: We did not shut down Cygwin so the image below still shows the previous folder information in yellow.

cd /cygdrive/c/Tech/dsd/



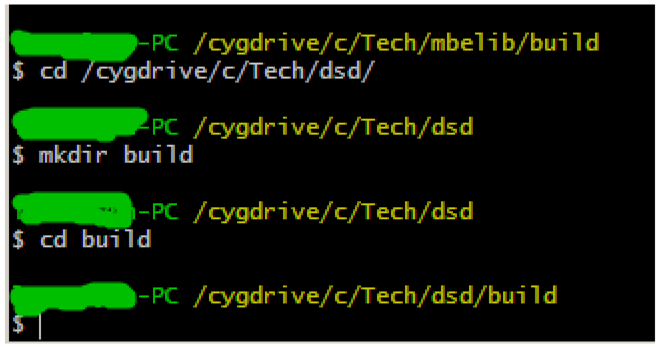
```
[redacted]-PC /cygdrive/c/Tech/mbelib/build
$ cd /cygdrive/c/Tech/dsd/

[redacted]-PC /cygdrive/c/Tech/dsd
$ |
```

mkdir build



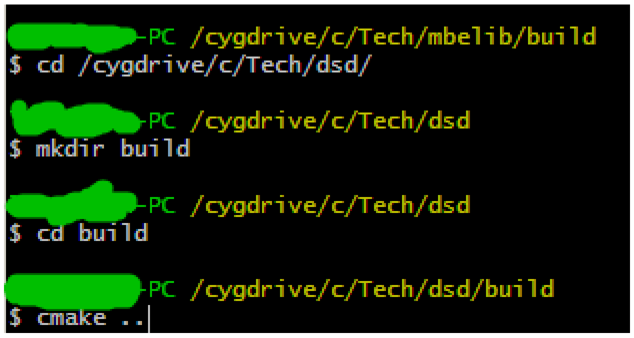
```
[redacted]-PC /cygdrive/c/Tech/mbelib/build
$ cd /cygdrive/c/Tech/dsd/

[redacted]-PC /cygdrive/c/Tech/dsd
$ mkdir build

[redacted]-PC /cygdrive/c/Tech/dsd
$
```

cd build

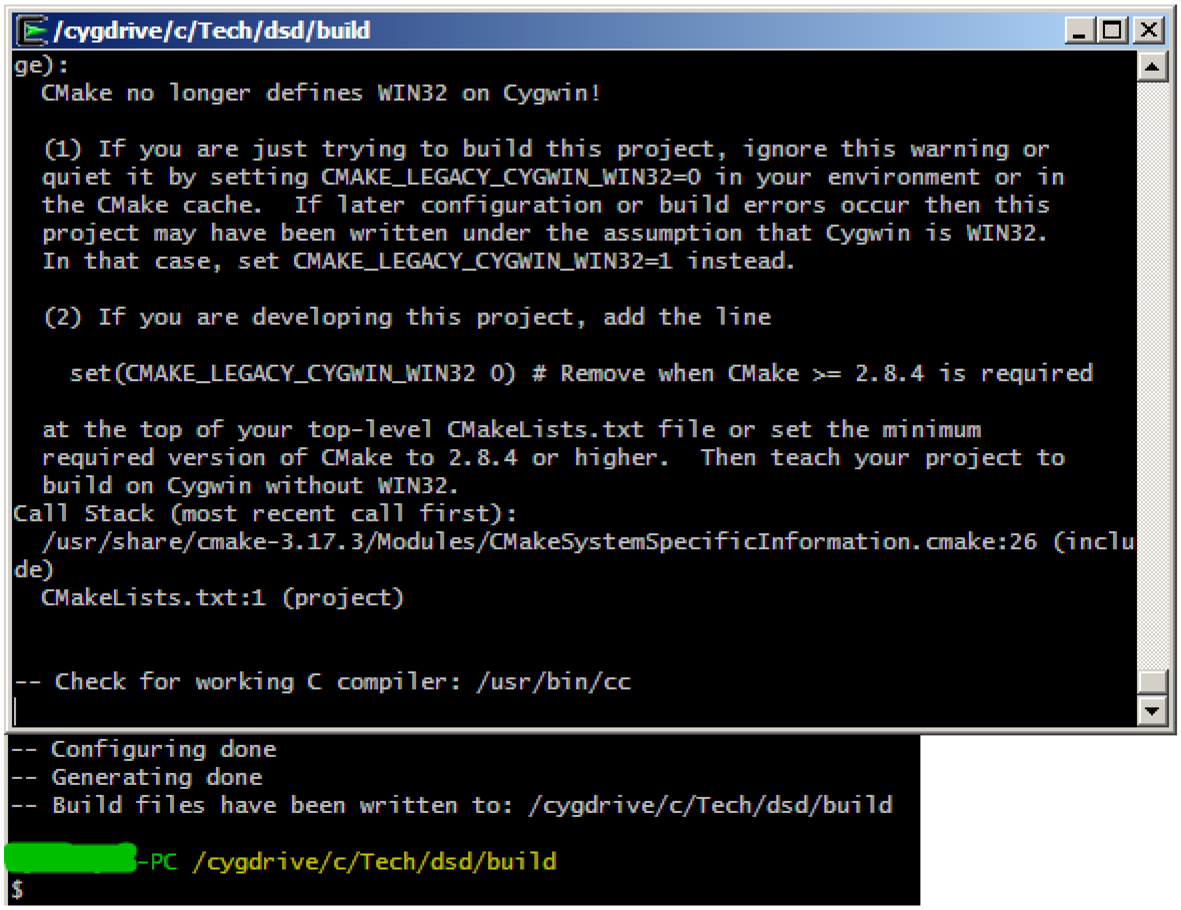


```
[redacted]-PC /cygdrive/c/Tech/mbelib/build
$ cd /cygdrive/c/Tech/dsd/

[redacted]-PC /cygdrive/c/Tech/dsd
$ mkdir build

[redacted]-PC /cygdrive/c/Tech/dsd
$ cd build

[redacted]-PC /cygdrive/c/Tech/dsd/build
$ |
```

cmake ..



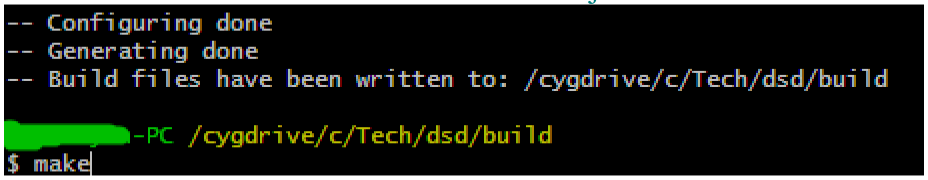
```
[redacted]-PC /cygdrive/c/Tech/mbelib/build
$ cd /cygdrive/c/Tech/dsd/

[redacted]-PC /cygdrive/c/Tech/dsd
$ mkdir build

[redacted]-PC /cygdrive/c/Tech/dsd
$ cd build

[redacted]-PC /cygdrive/c/Tech/dsd/build
$ cmake ..|
```



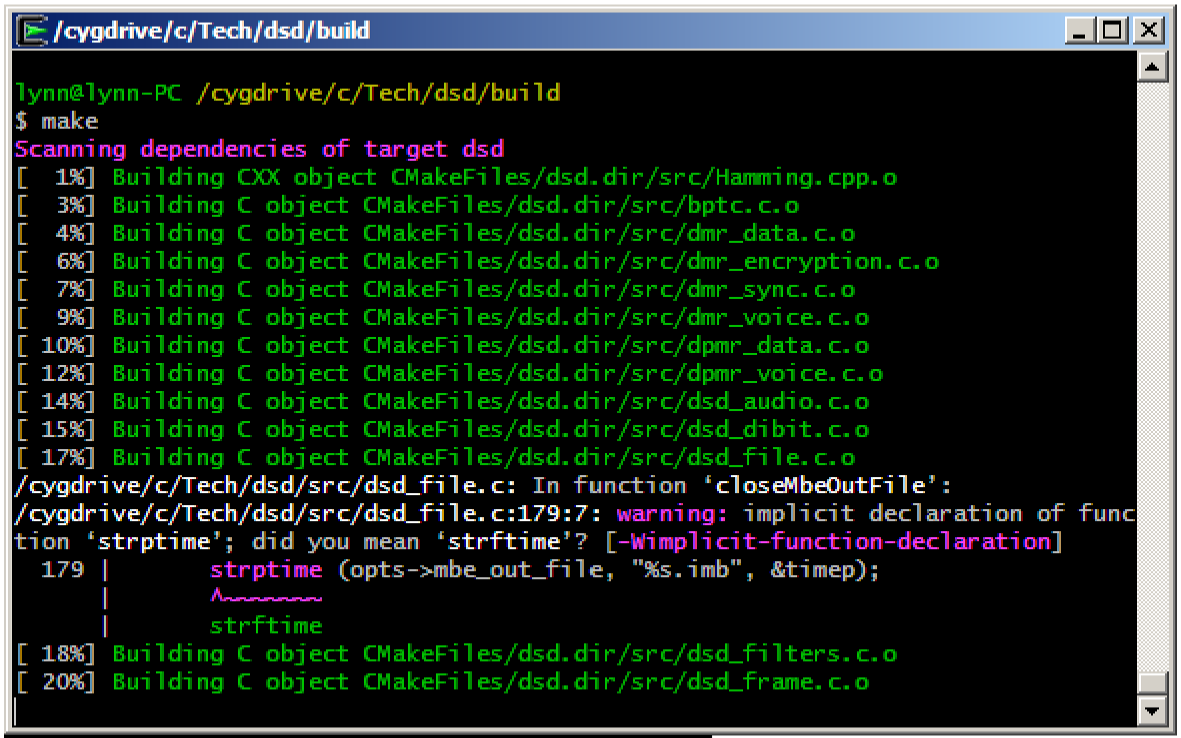
```
/cygdrive/c/Tech/dsd/build
ge):
  CMake no longer defines WIN32 on Cygwin!

  (1) If you are just trying to build this project, ignore this warning or
  quiet it by setting CMAKE_LEGACY_CYGWIN_WIN32=0 in your environment or in
  the CMake cache.  If later configuration or build errors occur then this
  project may have been written under the assumption that Cygwin is WIN32.
  In that case, set CMAKE_LEGACY_CYGWIN_WIN32=1 instead.

  (2) If you are developing this project, add the line

    set(CMAKE_LEGACY_CYGWIN_WIN32 0) # Remove when CMake >= 2.8.4 is required

  at the top of your top-level CMakeLists.txt file or set the minimum
  required version of CMake to 2.8.4 or higher.  Then teach your project to
  build on Cygwin without WIN32.
Call Stack (most recent call first):
  /usr/share/cmake-3.17.3/Modules/CMakeSystemSpecificInformation.cmake:26 (inclu
de)
  CMakeLists.txt:1 (project)


-- Check for working C compiler: /usr/bin/cc

-- Configuring done
-- Generating done
-- Build files have been written to: /cygdrive/c/Tech/dsd/build

[redacted]-PC /cygdrive/c/Tech/dsd/build
$
```

make

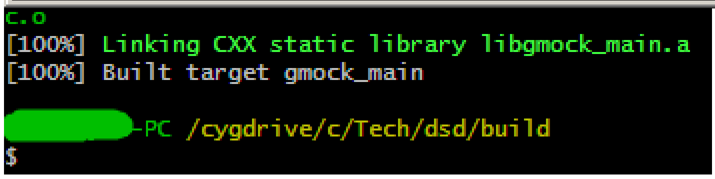
NOTE: the command is make and not make –j4



```
-- Configuring done
-- Generating done
-- Build files have been written to: /cygdrive/c/Tech/dsd/build

[redacted]-PC /cygdrive/c/Tech/dsd/build
$ make
```

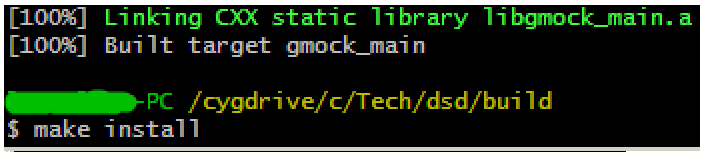


```
lynn@lynn-PC /cygdrive/c/Tech/dsd/build
$ make
Scanning dependencies of target dsd
[  1%] Building CXX object CMakeFiles/dsd.dir/src/Hamming.cpp.o
[  3%] Building C object CMakeFiles/dsd.dir/src/bptc.c.o
[  4%] Building C object CMakeFiles/dsd.dir/src/dmr_data.c.o
[  6%] Building C object CMakeFiles/dsd.dir/src/dmr_encryption.c.o
[  7%] Building C object CMakeFiles/dsd.dir/src/dmr_sync.c.o
[  9%] Building C object CMakeFiles/dsd.dir/src/dmr_voice.c.o
[ 10%] Building C object CMakeFiles/dsd.dir/src/dpmr_data.c.o
[ 12%] Building C object CMakeFiles/dsd.dir/src/dpmr_voice.c.o
[ 14%] Building C object CMakeFiles/dsd.dir/src/dsd_audio.c.o
[ 15%] Building C object CMakeFiles/dsd.dir/src/dsd_dibit.c.o
[ 17%] Building C object CMakeFiles/dsd.dir/src/dsd_file.c.o
/cygdrive/c/Tech/dsd/src/dsd_file.c: In function ‘closeMbeOutFile’:
/cygdrive/c/Tech/dsd/src/dsd_file.c:179:7: warning: implicit declaration of func
tion ‘strptime’; did you mean ‘strftime’? [-Wimplicit-function-declaration]
  179 |       strptime (opts->mbe_out_file, "%s.imb", &timep);
      |       ^~~~~~~~
      |       strftime
[ 18%] Building C object CMakeFiles/dsd.dir/src/dsd_filters.c.o
[ 20%] Building C object CMakeFiles/dsd.dir/src/dsd_frame.c.o
```

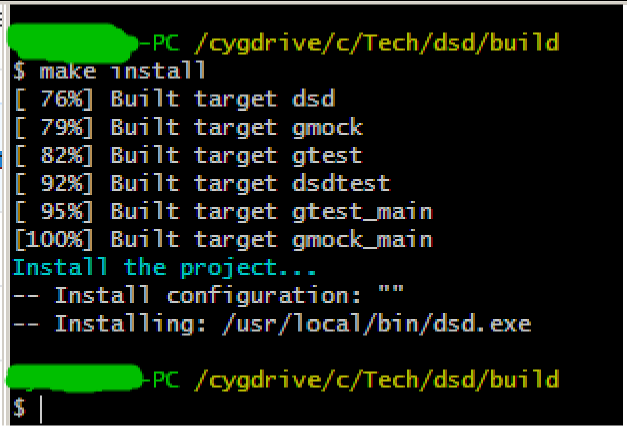


```
c.o
[100%] Linking CXX static library libgmock_main.a
[100%] Built target gmock_main

[redacted]-PC /cygdrive/c/Tech/dsd/build
$
```

make install



```
[100%] Linking CXX static library libgmock_main.a
[100%] Built target gmock_main

[redacted]-PC /cygdrive/c/Tech/dsd/build
$ make install
```



```
[redacted]-PC /cygdrive/c/Tech/dsd/build
$ make install
[ 76%] Built target dsd
[ 79%] Built target gmock
[ 82%] Built target gtest
[ 92%] Built target dsdtest
[ 95%] Built target gtest_main
[100%] Built target gmock_main
Install the project...
-- Install configuration: ""
-- Installing: /usr/local/bin/dsd.exe

[redacted]-PC /cygdrive/c/Tech/dsd/build
$ |
```

This concludes the build instructions for DSD v1.8.4. The program can be run either from the build file or the files can be copied from the build folder to another folder more convienient.