Building ION on Windows for use with Visual Studio

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These instructions are for ION version 3.4.1. Later versions should work the same with substitution of the correct ION version number in the instructions.

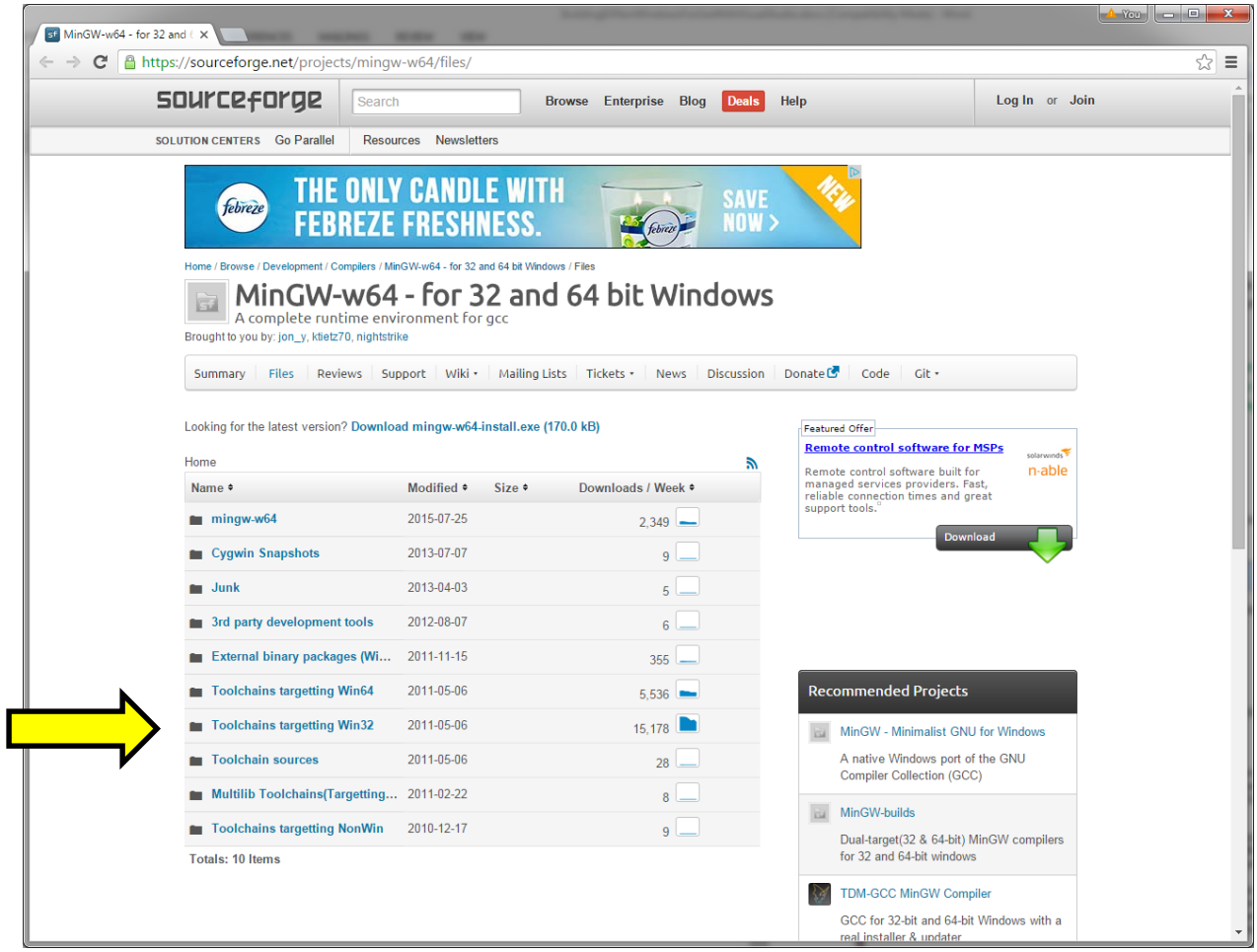
MinGW

MinGW must be loaded and properly configured prior to compiling ION. These instructions are based on the MinGW-w64 project. The main download page for all versions of MinGW can be found here:

https://sourceforge.net/projects/mingw-w64/files/

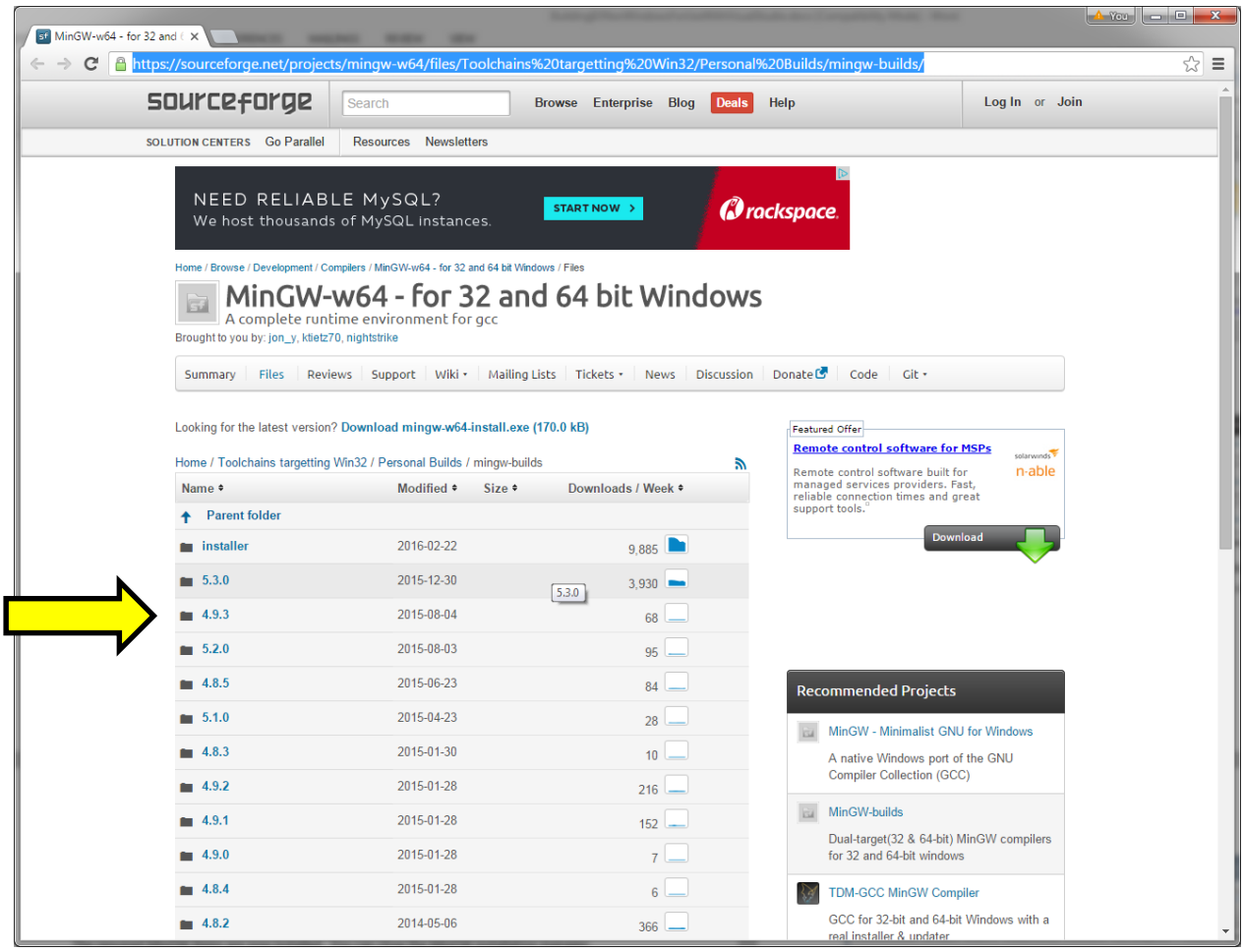
Note: While an installer is available for MinGW, it is recommended at this time to install MinGW as described below. At the time this document was written, the installer would produce a header file compatibility issue associated with phtreads. The instructions for using the installer to load MinGW are maintained at the end of this document.

The main page will look something like this:



These instructions are for installing a Win32 toolchain for ION. Instructions for Win64 would be similar, but ION has not been tested in a Win64 environment at this time. You can navigate through the "Toolchains targeting Win32" to get to here:

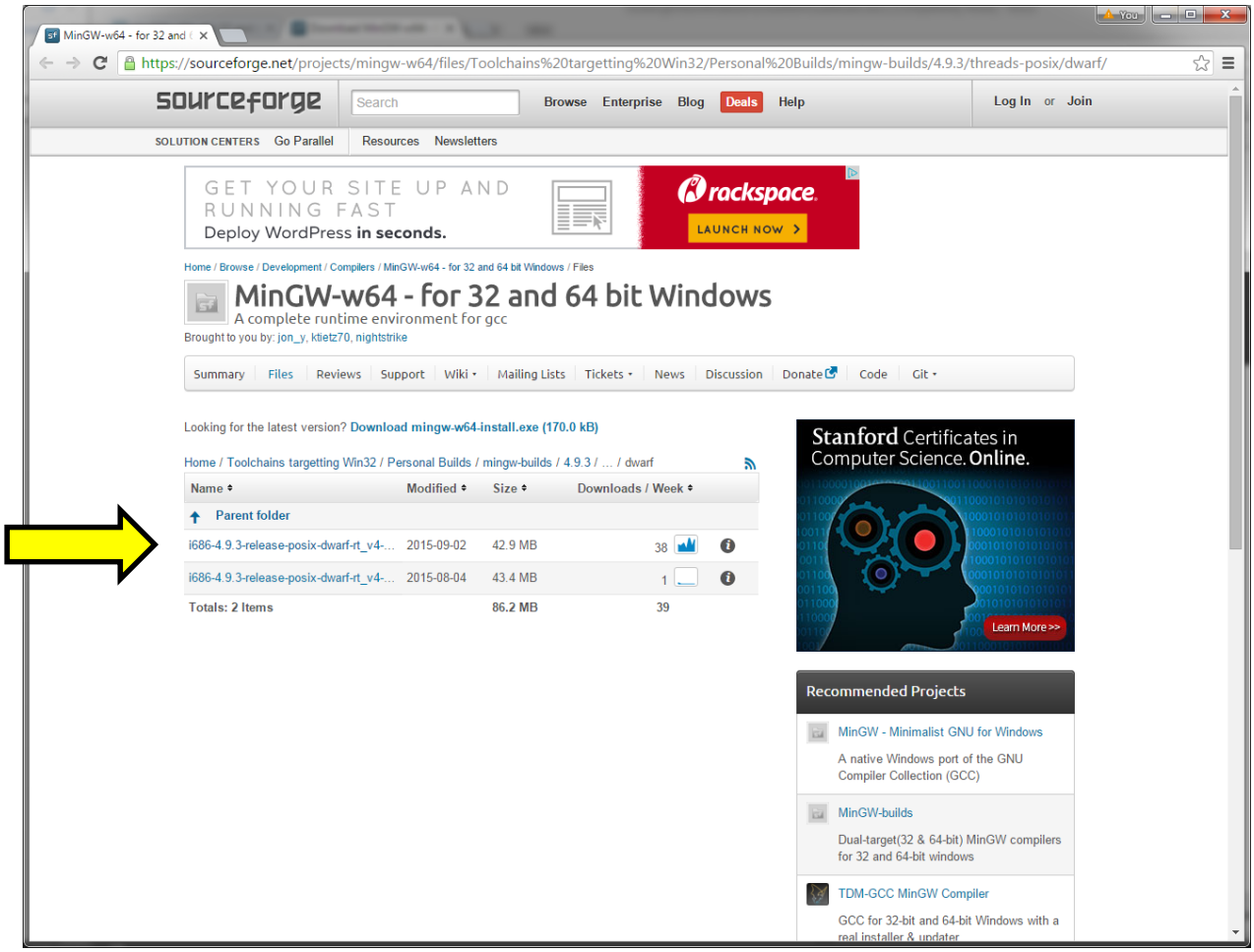
https://sourceforge.net/projects/mingw-w64/files/Toolchains%20targetting%20Win32/Personal%20Builds/mingw-builds/



You can download any version of the compiler. These instructions were tested with version 4.9.3. Versions 4.8.5 and greater were informally tested. For this example, download the pthread/dwarf version of MinGW here:

https://sourceforge.net/projects/mingw-w64/files/Toolchains%20targetting%20Win32/Personal%20Builds/mingw-builds/4.9.3/threads-posix/dwarf/

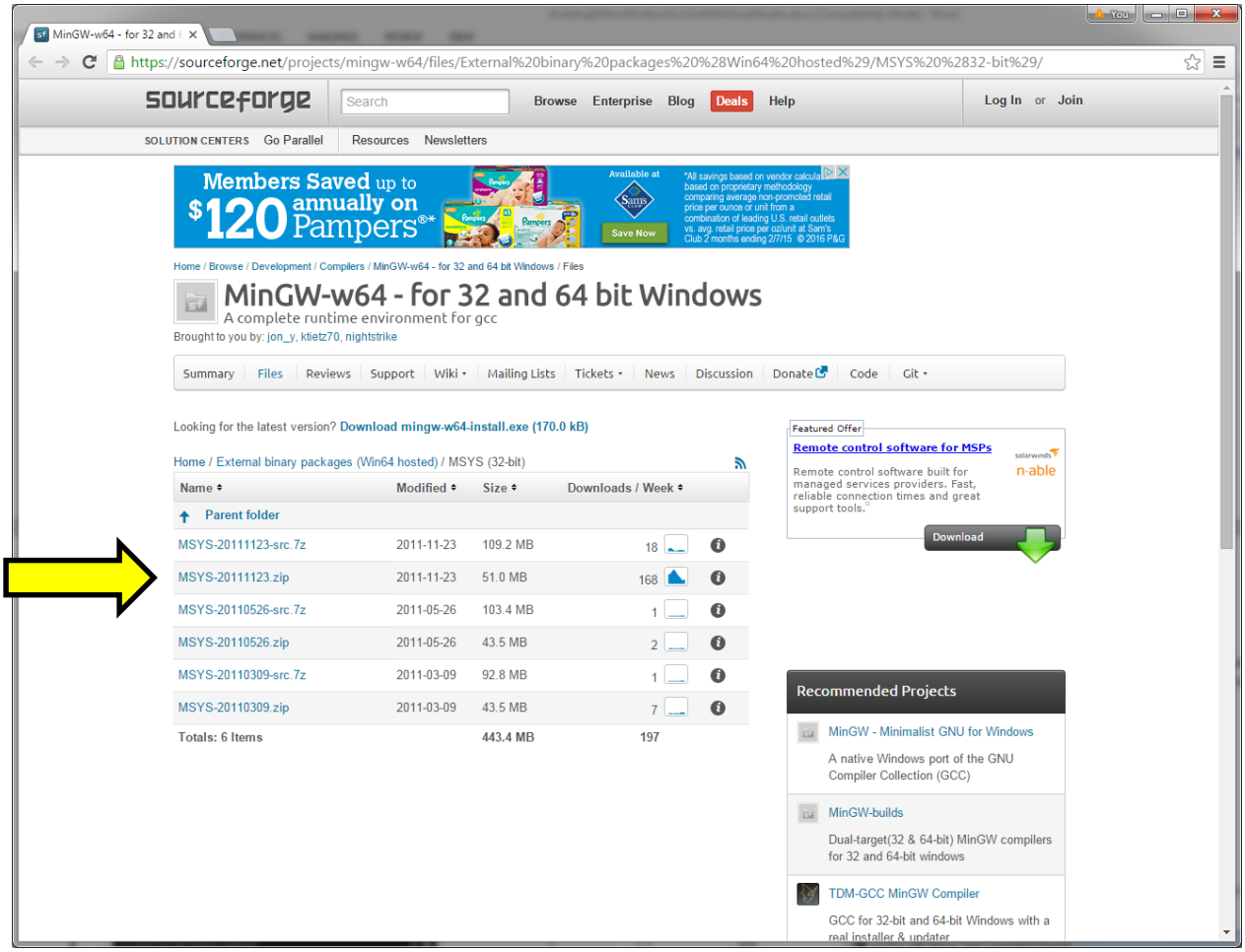
s



Extract the files to your local system. You will need to remember the directory path as this information will be needed later. For the purposes of this example, the files were extracted to D:/mingw32.

In addition to MinGW, you will also need to install MSYS. It can be found here:

https://sourceforge.net/projects/mingw-w64/files/External%20binary%20packages%20%28Win64%20hosted%29/MSYS%20%2832-bit%29/



Download an extract a version of MSYS to your computer. For this example, the directory is D:/msys.

Now that you have both MinGW (D:/mingw32) and MSYS (D:/msys) available on your local computer, you are ready to build ION. Open up a MSYS console by running the provided batch file: D:/msys/msys.bat. You will need to add a file to the PATH variable. You can do this either through the command line (using vi) or via the Windows operating system with Notepad or something else. If you want to use the command line, the directory should already be set for you (/home/<username>). If you want to use Notepad or something else, the directory will be:

D:/msys/1.0/home/<username>.

Create a file named .profile (don't forget the period at the beginning of the name). The only content required in the file is the line below:

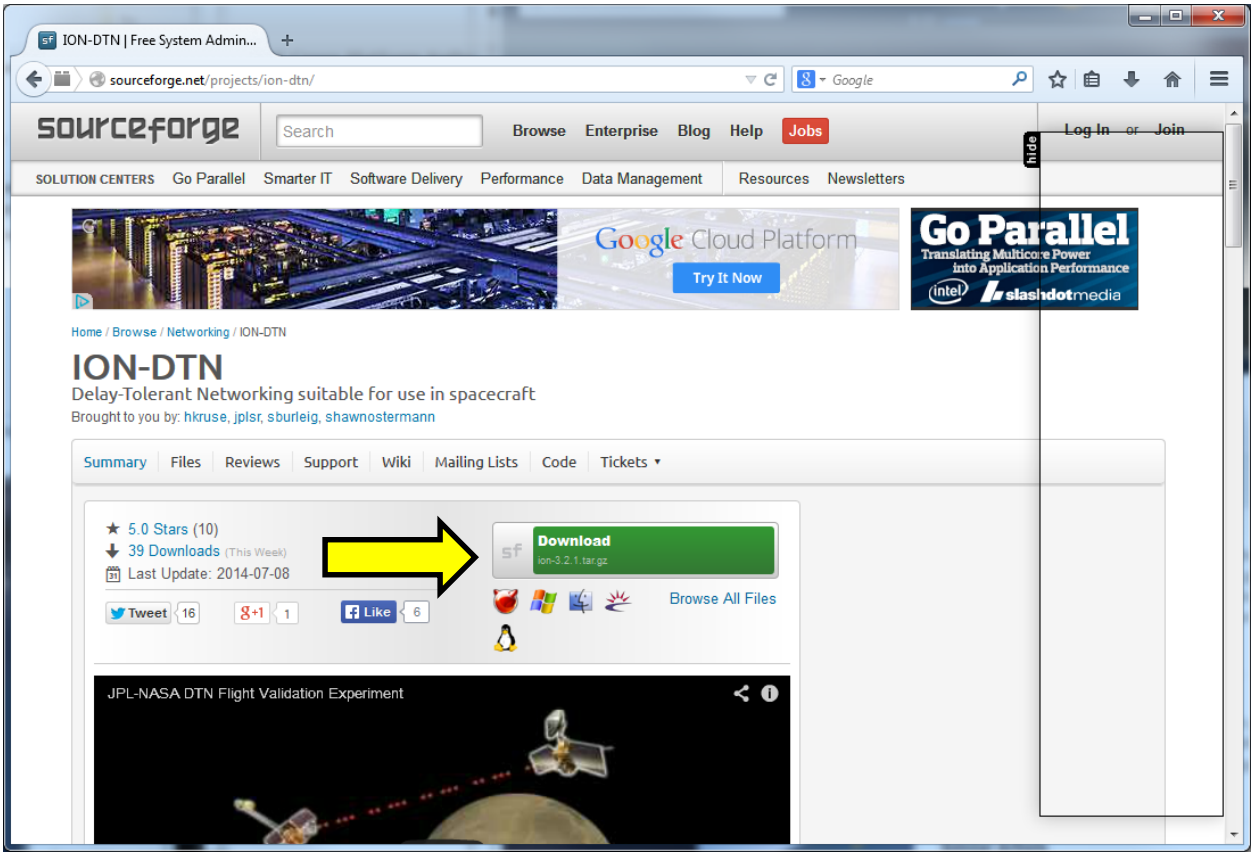
```
export PATH=/d/mingw32/bin:$PATH
```

After you edit the file, type 'source .profile' on the command line. You should be able to type gcc at the command prompt and will get an error that there are no input files. If you get an error that says the gcc

command was not found, then check you changes to make sure the path listed above is correct. MinGW is now ready to compile ION.

ION

Download ION from SourceForge at http://sourceforge.net/projects/ion-dtn/. The latest version is always available on this page as shown below.



You can extract the file using WinZip or 7-Zip or use the following commands in the shell window (the change directory command will vary based on where you download the software):

```
> cd /d/dtn
> tar xf ion-3.4.1.tar.gz
> cd ion-open-source
```

Compiling ION

To compile ION you will need to bring up a command window using the provided batch file (D:/msys/msys.bat). If you followed the steps in the MinGW section everything should be ready to go. You can make sure of that by typing 'gcc' at the command line and see if you get a message that says there are no input files. If you do, continue on. If not, go back and read the MinGW section again to make sure you did everything.

ION compilation with MinGW is a little bit different than compiling on Linux. You will need to run the following command. There's a winion.pdf file available in the ion-open-source directory that contains this information.

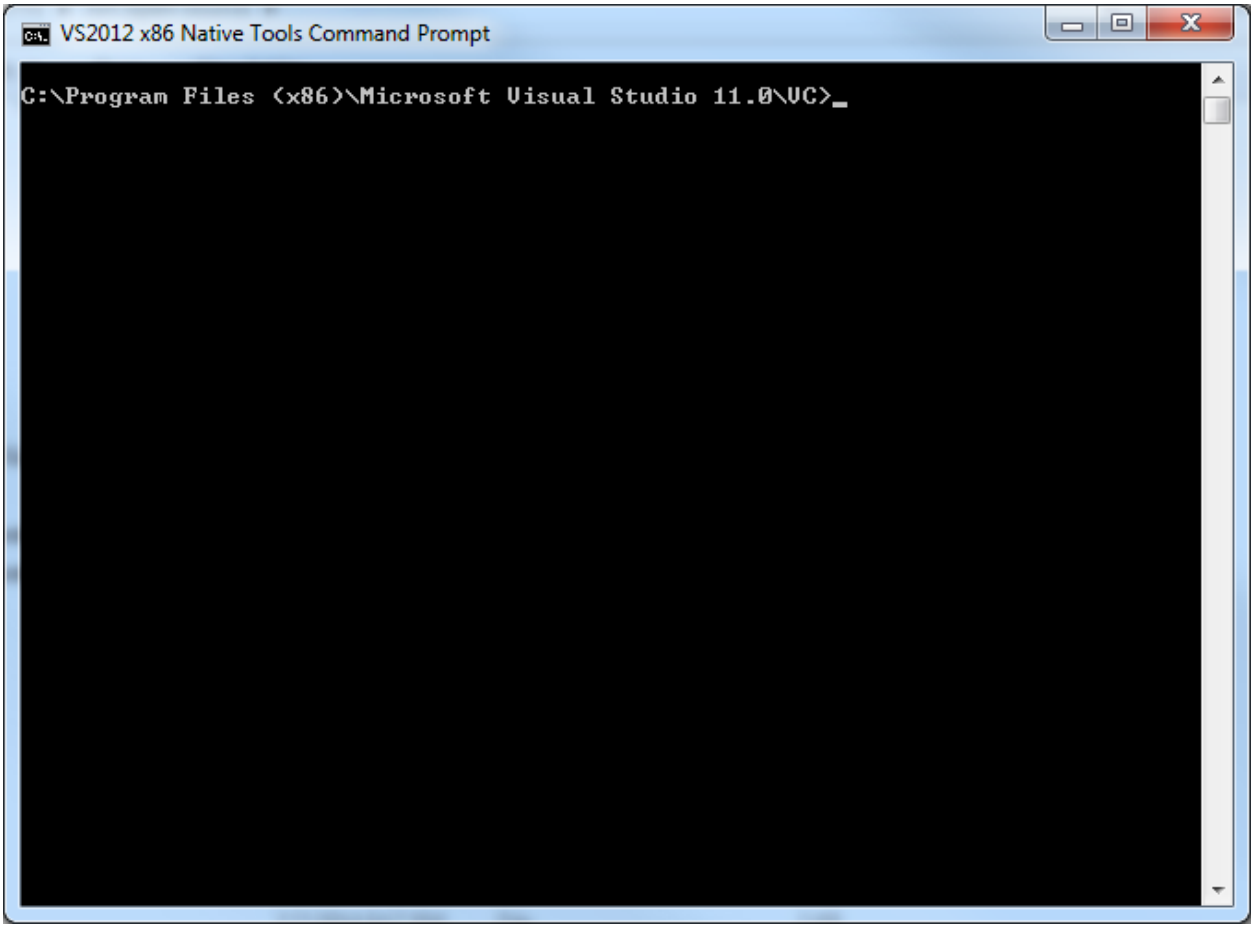
```
> cd /d/dtn/ion-open-source
> mkdir /opt
> ./mingw-setup
> make
```

That should compile and install ION in the /opt directory. You can check the contents of the install directory by running the 'ls –R' command. There should be files in the following directories:

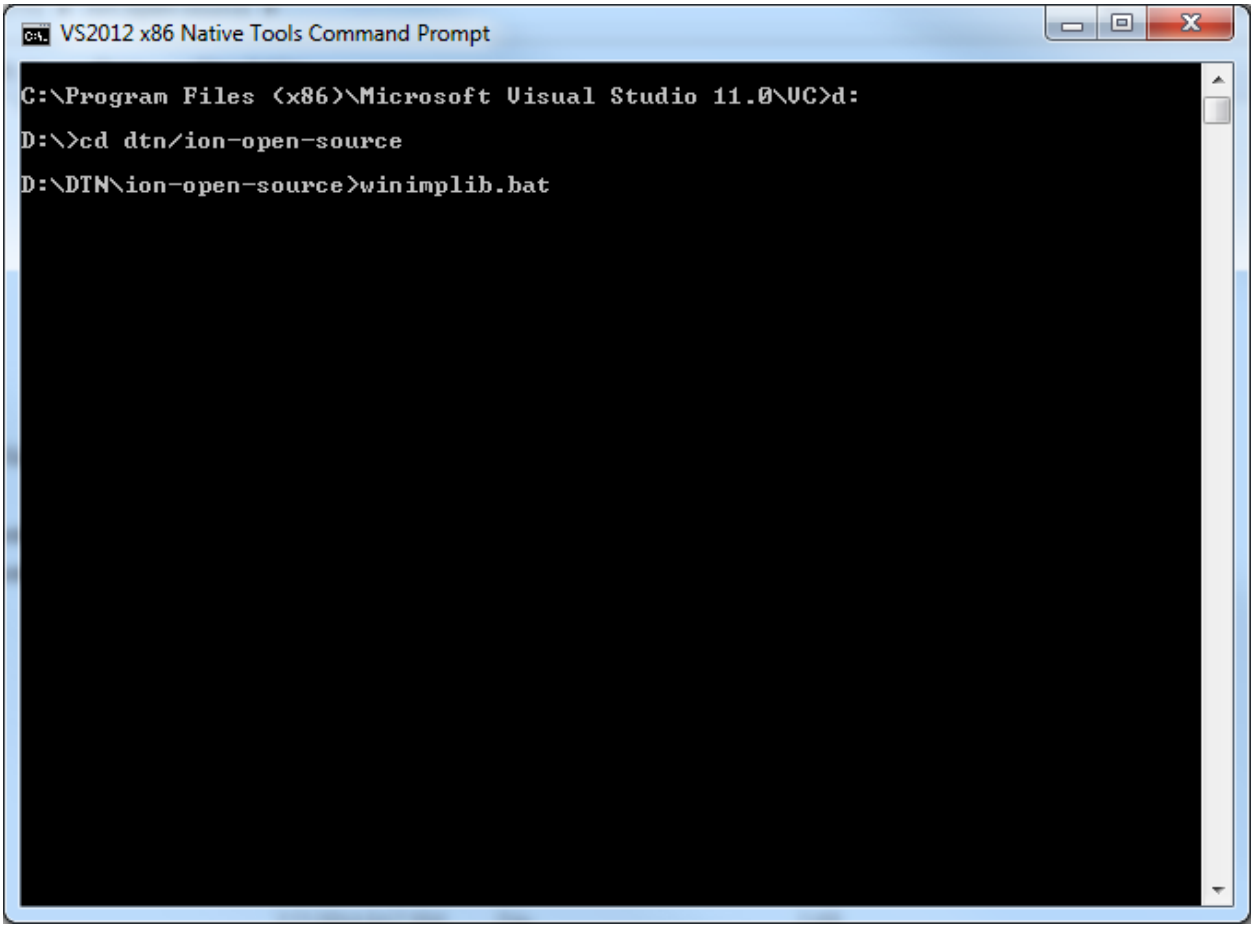
```
/opt/bin
/opt/include
/opt/lib
/opt/man/man1
/opt/man/man3
/opt/man/man5
```

Generating Import Libraries for ION DLLs

To generate the import libraries needed for linking within Visual Studio, you will need to bring up a Visual Studio command prompt similar to the one shown below.



In the command window, change directory to where the ION files are located. Once there run the 'winimp.bat' command as shown in the next screen dump.



When it completes you will have a new directory named winimplib that contains all of the .lib files needed for linking Visual Studio applications with the ION DLLs.

All of the files needed to compile and link ION with Visual Studio are now ready. You will need to set a preprocessor directive named ION4WIN. This will prevent the compiler from trying to load mingw specific include files. You may need to include the libgcc_s_dw2-1.dll and pthreadGC2.dll in addition to the ION DLLs in your run directory when executing your program.

MinGW with Graphical Installer

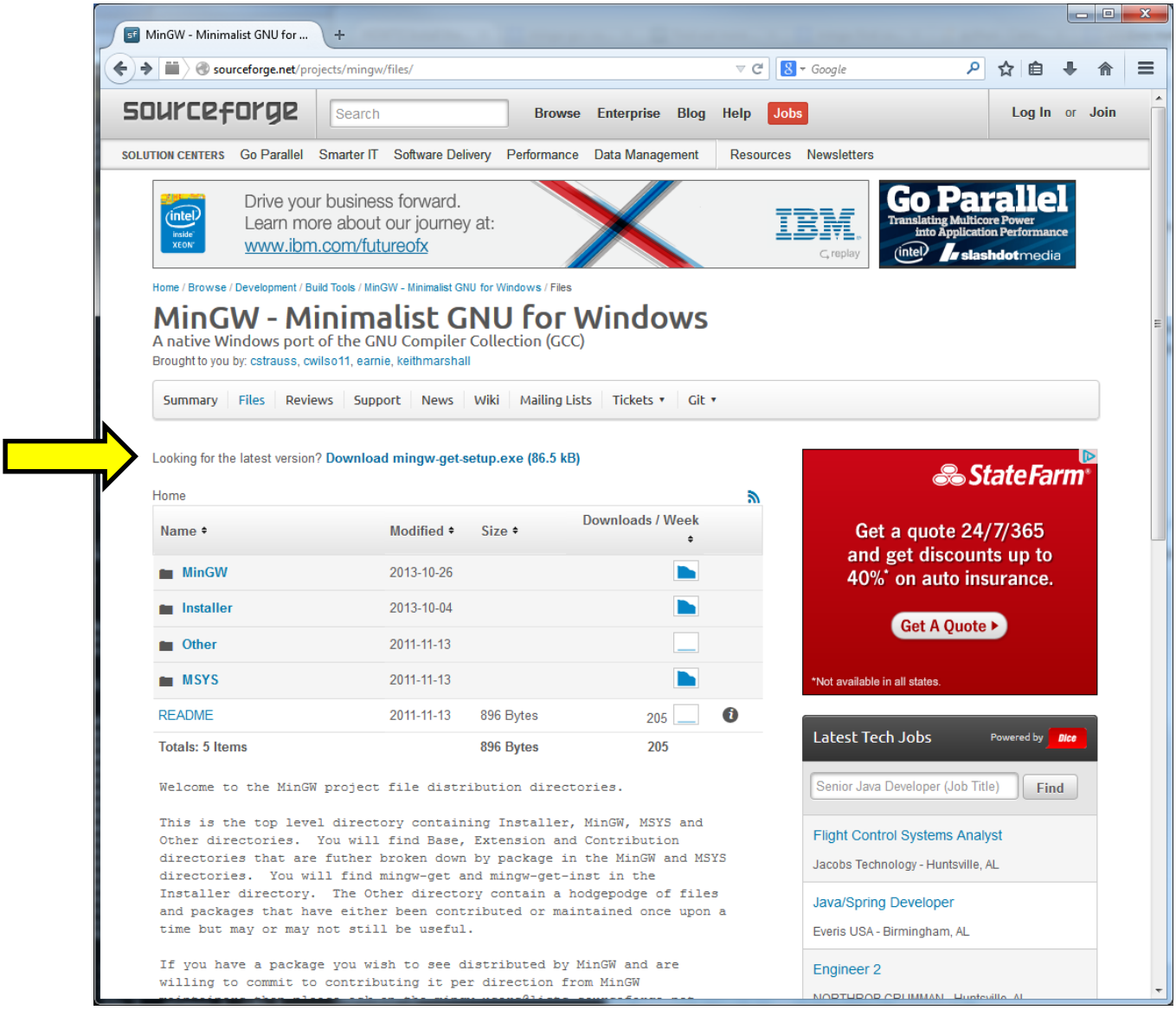
Note: This section provides information that does not work as of the release date for ION 3.4.1. If you choose to use this section to install MinGW and ION will not compile, please return to the beginning of the document and try the other method.

MinGW must be loaded and properly configured. There is a download link on the main MinGW page http://www.mingw.org which should take you to here:

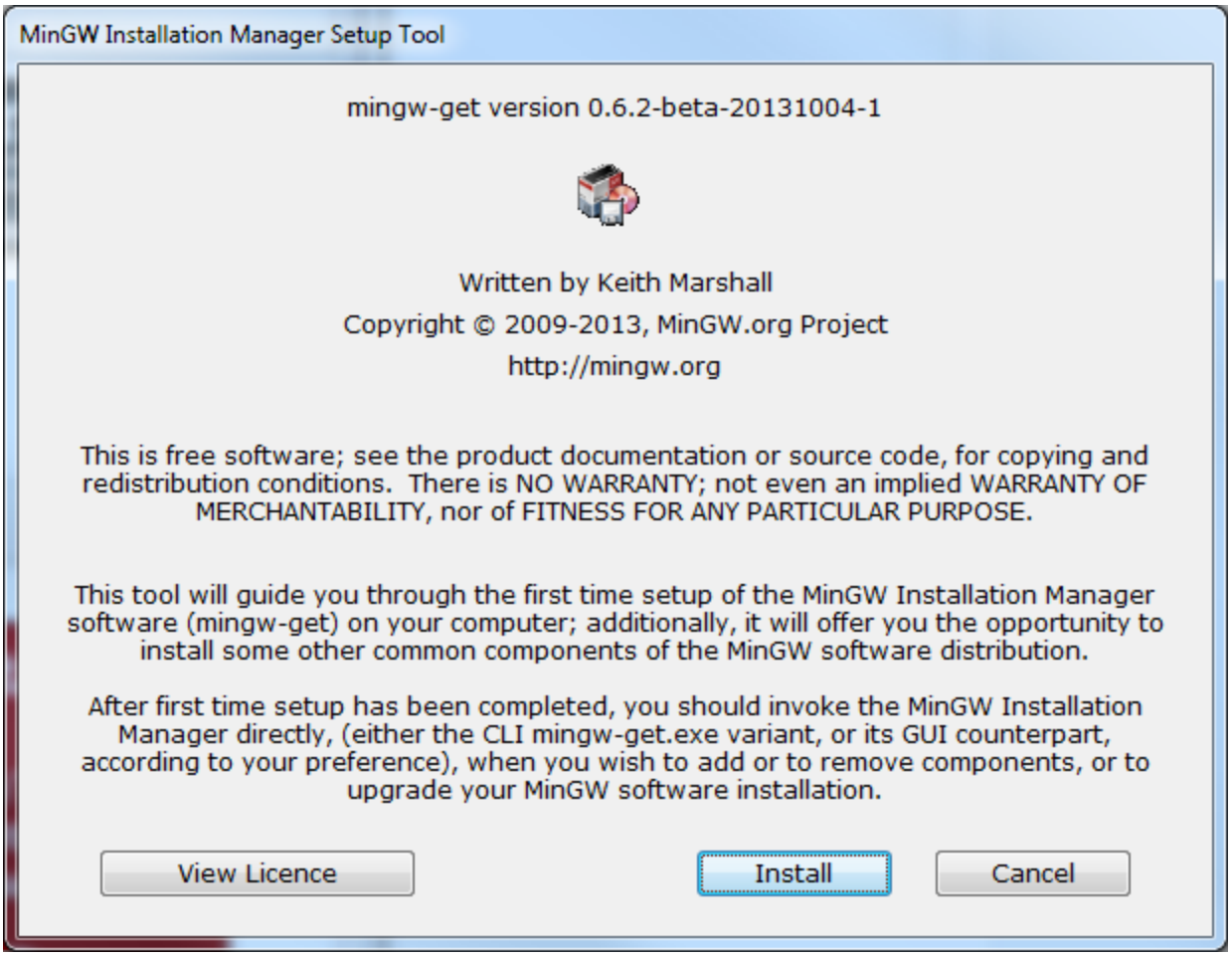
http://sourceforge.net/projects/mingw/files/

Note: While an installer is available for MinGW, it is recommended at this time to install MinGW as described below. At the time this document was written, the installer would produce a header file compatibility issue associated with phtreads. The instructions for using the installer to load MinGW are maintained at the end of this document.

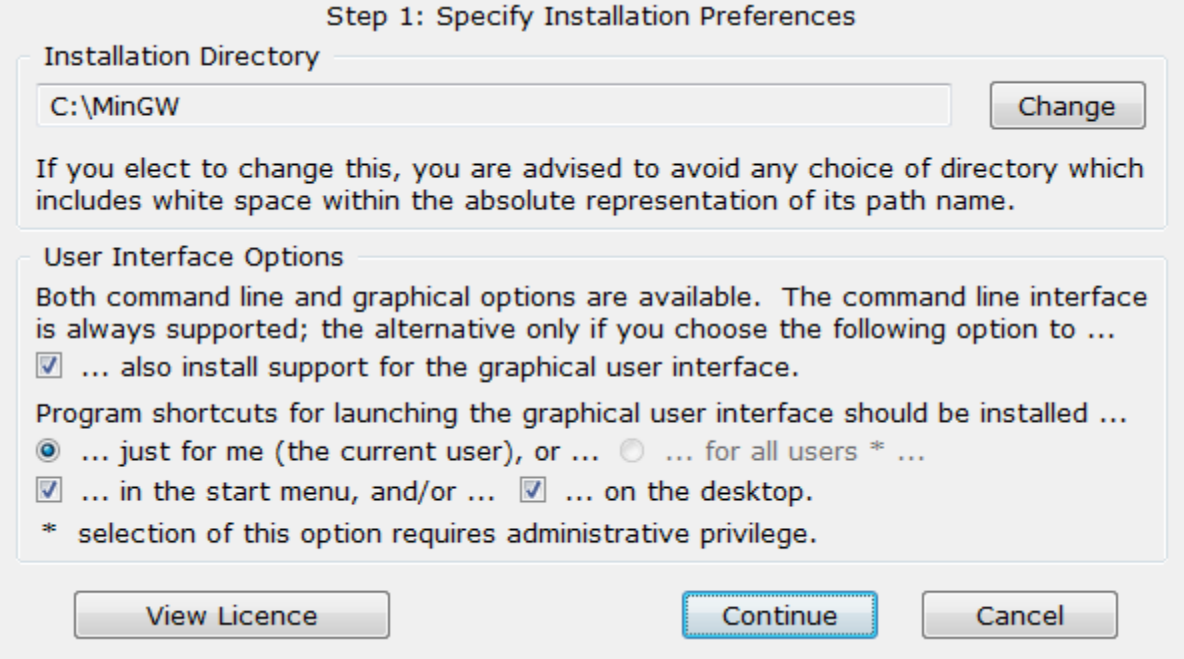
You will want to download the graphical installer. There should be a link on the main page as shown below (mingw-get-setup.exe):



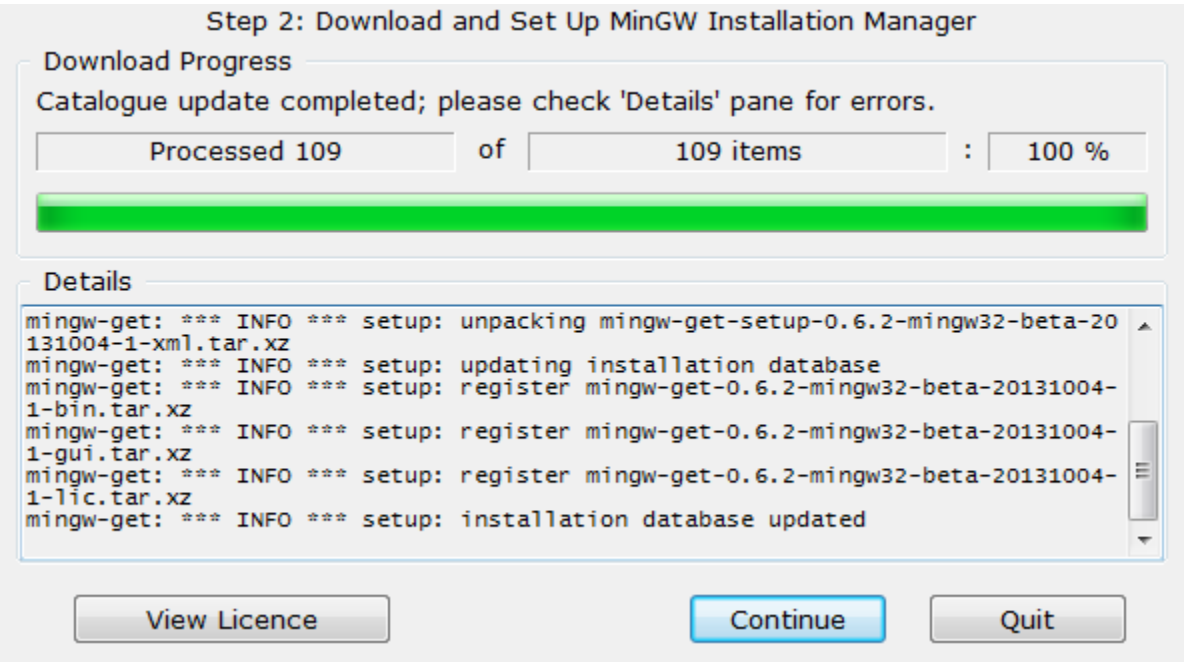
Once the package downloads, open the file and follow the installation instructions. The first screen you see should be this:



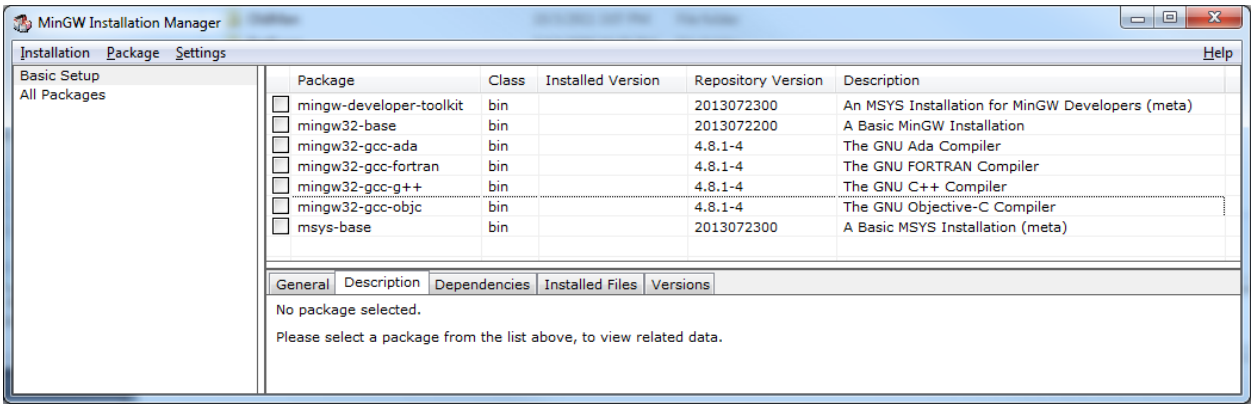
Click on Install and choose the defaults on the next screen. You can install “for all users” if you want, but it isn’t necessary.



Click Continue to install the program. You will see a series of downloads coming in on a screen similar to the one below. It can take a minute or two to finally get everything. Once it is complete the Continue button will be available.



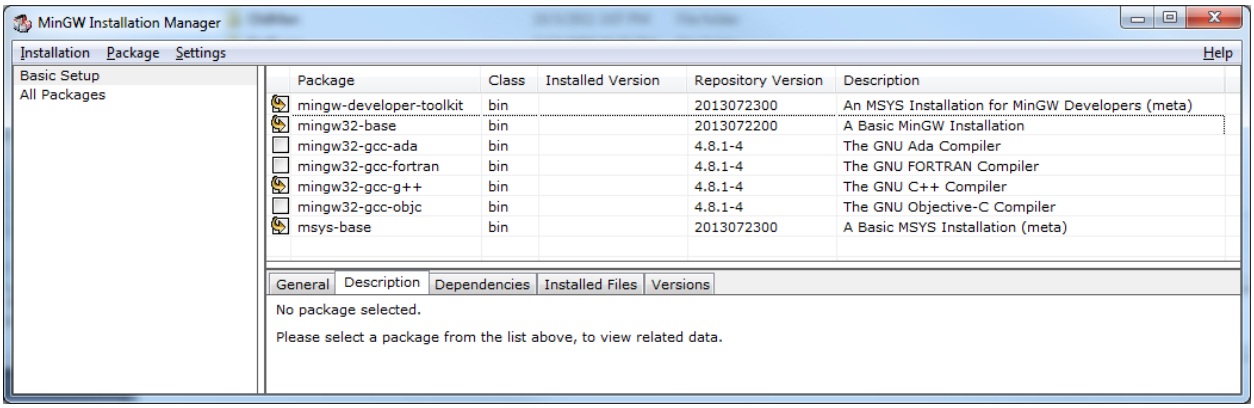
Push the Continue button and the MinGW Installation Manager will be started. If you close it for any reason, there's a link on the Windows Start menu under "All Programs" named MinGW Installation Manager. The window below should appear:



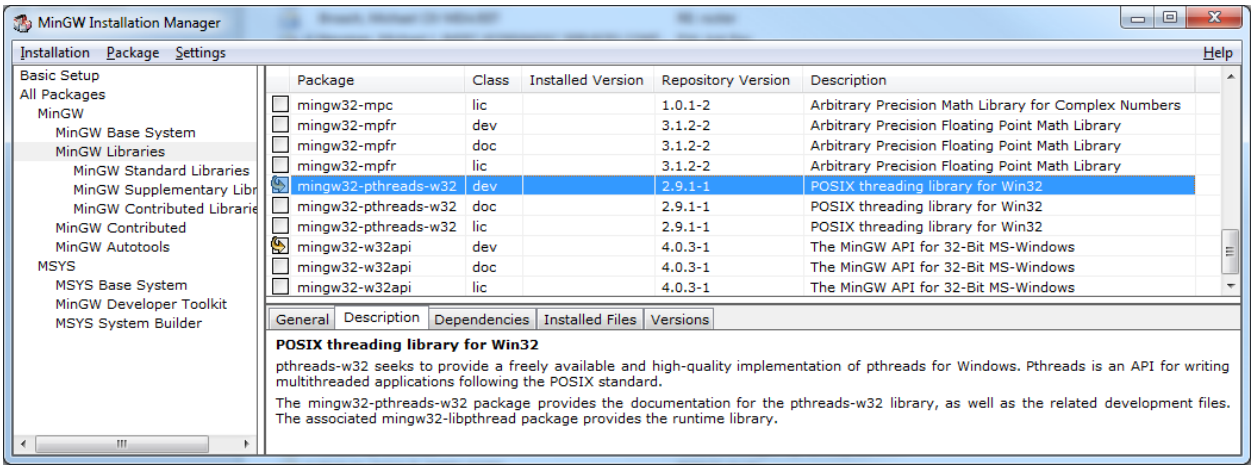
You will need to install the several items. Most of them can be selected from the main page shown above. To select an item, use the right mouse button and choose “Mark for Installation” from the popup menu. The needed items are:

- mingw-developer-toolkit
- mingw32-base
- mingw32-gcc-g++
- msys-base
- mingw32-pthreads-w32 (dev)

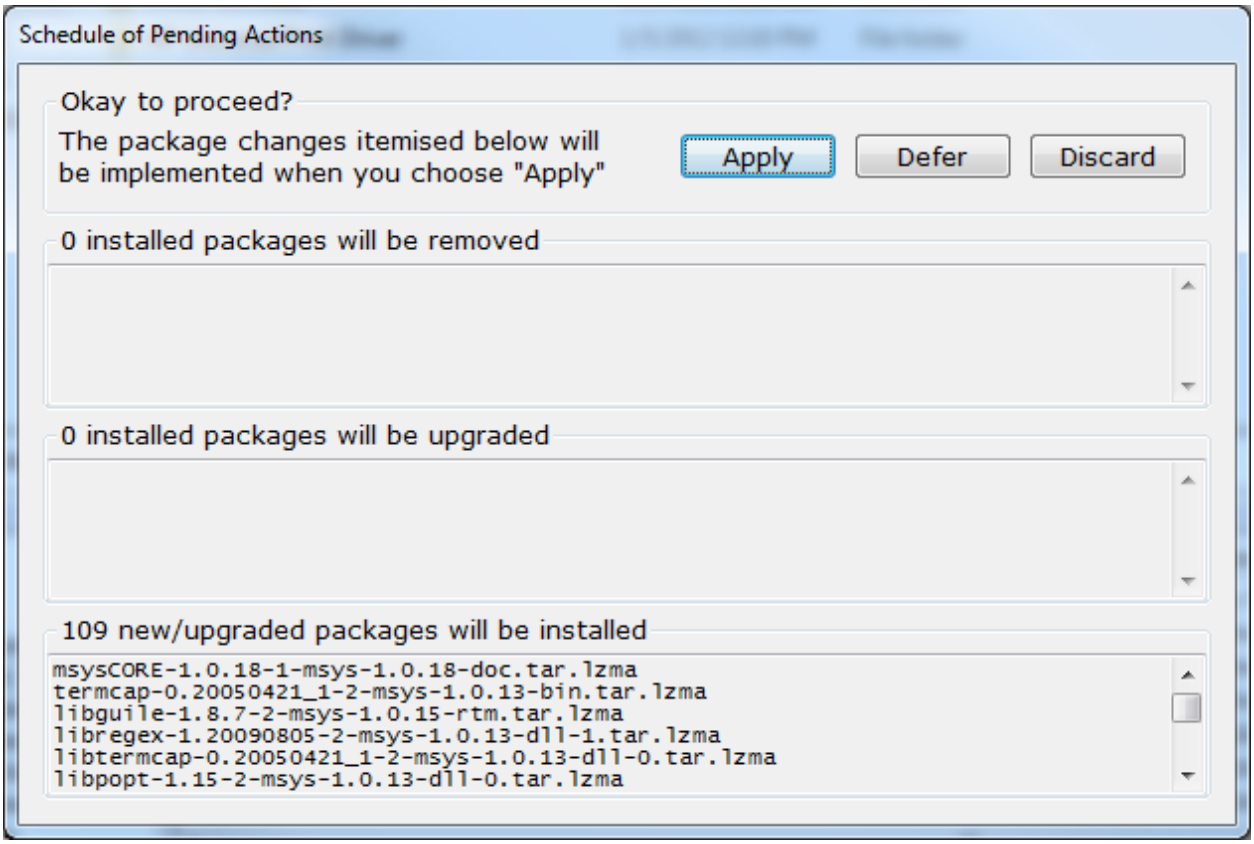
The first four items are available in the “Basic Setup”. Your main window should look like this now:



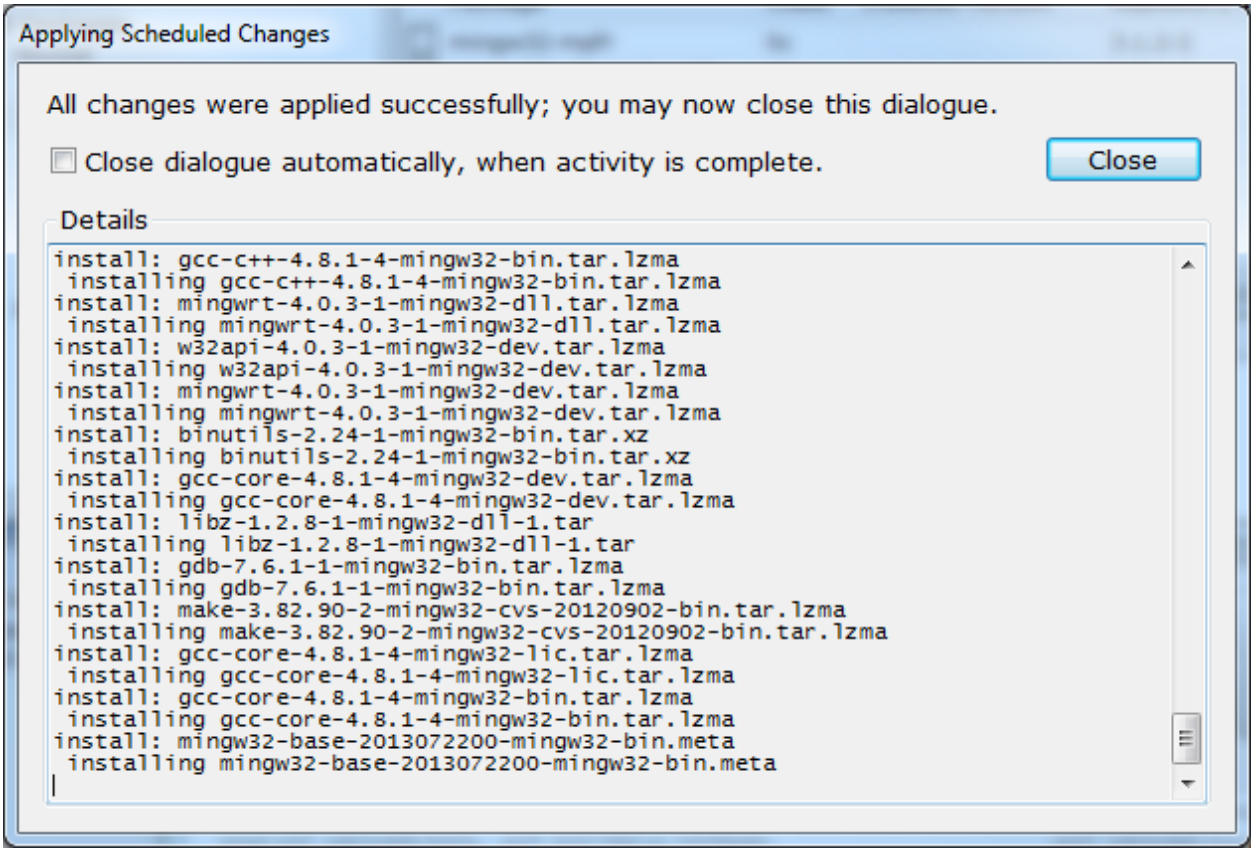
To get the pthreads developer library, select the “All Packages” item in the left hand column and then select MinGW and MinGW Libraries. You’ll have to scroll down to find pthreads. It’s almost at the bottom of the list. Make sure you get the version with Class of “dev”. Otherwise, you’ll have to choose it again. The window below shows where it was selected for installation:



You can now go to the Installation menu and select “Apply Changes”. The following dialog will appear:



Select Apply. You will see a dialog pop up and show the different libraries being downloaded. There are over 100, so it takes a few minutes. Once the files are downloaded…



The required MinGW items are now installed. You can close the MinGW installation manager.

If you installed MinGW in the default location, you can bring up a command window by going to the c:\MinGW\msys\1.0 directory and double clicking on msys.bat. You will need to add a file to the PATH variable. You can do this either through the command line (using vi…actually vim) or via the Windows operating system with Notepad or something else. If you want to use the command line, the directory should already be set for you (/home/<username>). If you want to use Notepad or something else, the directory will be:

C:/MinGW/msys/1.0/home/<username>.

Create a file named .profile (don't forget the period at the beginning of the name). The only content required in the file is the first line below. The others are helpful for command line users:

```
export PATH=/c/MinGW/bin:$PATH
alias vi=vim
alias ll='ls -ls'
```

After you edit the file, type 'source .profile' on the command line. You should be able to type gcc at the command prompt and will get an error that there are no input files. If you get an error that says the gcc

command was not found, then check you changes to make sure the path listed above is correct. MinGW is now ready to compile ION.