Development Environment Installation for Coding Relating to CS240 Practicals

In order to do our practicals remotely during the current health crisis, and as most of you will have access to Windows platforms and not Unix, I have modified the remaining practicals so that we can use the Eclipse IDE on Windows platforms to make it possible to continue our practical work.

You will need to install Eclipse and a C compiler on your windows computer. If you have access to a Unix machine then you can use the Unix based lab handouts instead and do not need to install Eclipse.

Install Eclipse on Windows 10

Eclipse is built using Java and runs on a Java Virtual Machine, so the Java SE Runtime Environment must be installed first.

(Optional) Download and install the Java platform

If you need Java, go to https://java.com/en/ and use the provided link to download the recommended 64-bit version of the java standard edition platform, containing the Java Development Kit(jdk) and Runtime Environment(jre). The eclipse installer automatically installs the java platform required for the release.

Different releases of the jdk and jre are available here
http://www.oracle.com/technetwork/java/javase/downloads/index.html

On windows, the jdk should be installed in C:/Program Files/Java

Download Eclipse

Go to https://www.eclipse.org/downloads/eclipse-packages/ and download the windows 64-bit eclipse installer, run the installer and select an installation package such as **Eclipse IDE for Java Developers**. The installer will also install the required version of java needed for Eclipse.

The installer will make a **desktop shortcut** to the eclipse installation folder at

c:\users\<your userid>\eclipse\<java version>\eclipse

If Eclipse indicates any natures are missing to properly support your existing projects, then install the recommended solutions from the Eclipse marketplace under the Help menu. Eclipse Web Developer Tools and Eclipse Java EE Developer Tools will be needed from the market place. Eclipse may need to restart to apply the software updates.

Install additional C/C++ plugins for eclipse (if not already installed)

Run Eclipse and go to the Help menu and select Install New Software.

Under “Work with” select eclipse version you are using (e.g. 2019-12)

Search and select the following plugins for installation if not already installed

C/C++ Development Tools (from Programming Languages)

Compiling C/C++ Code in Eclipse

Step 1: Install the gcc Compiler – MinGW - A native Windows port of the GNU Compiler Collection (GCC)

Go to the web site www.equation.com and under "Programming Tools select "Fortran, C,C++" and download the latest 64 bit release of the gcc compiler as a self-extracting file *gcc-9.2.0-64*.

Run the downloaded gcc self extracting archive application **as Administrator** (right click on the file icon and select "Run as Adminstrator") and change the installation path to C:\MinGW (Minimalist GNU for Windows). This installation sets up the C compiler in the PATH for use with Eclipse.

Step 2: installing gcc with Pthreads support

If you want to use pthreads you can alter the previous gcc compiler installation as follows:-

Mingw-w64 https://mingw-w64.org/ offers a gcc C/C++ compiler package and support environment for Windows systems that has gained widespread use. It provides support for Windows 64 bit & 32 bit.

The package provides a **complete runtime environment for gcc**, that includes pthreads.

Download and run the *MinGW-W64-install.exe* installer from the page link below:-

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

Select the x86_64 architecture and posix pthreads option when prompted.

After installation, the package files can then be found at the chosen installation location here:-

C:\Program Files\mingw-w64\x86_64-8.1.0-posix-seh-rt_v6-rev0**mingw64**

Rename the original gcc C:\MinGW directory (created by Step 1 above) to C:\MinGW-gcc9.2.0-64, create a new C:\MinGW directory and move the **contents** of **mingw64** directory (in bold above) into the new empty C:\MinGW directory. The path to gcc set up by the initial installation of gcc in step 1 above then remains the same.
This avoids having to change anything in toolchain for Eclipse or the $PATH and allows you to revert to the old MinGW toolchain installation (without pthread support) if you wish by first renaming the original MinGW to keep the old configuration.

Using POSIX PThreads in Eclipse

Mingw-w64 https://mingw-w64.org/doku.php gcc C/C++ compiler package and support environment for Windows systems is required to use pthreads. Installation has been referred to earlier in these notes to replace the original gcc installation.

Creating a Pthread C project

Create a new C project. In order to use Pthreads, you may have to configure the include paths for the build. Right click on the project name and select properties->C/C++ Build->Settings

Under Compiler Includes, add the following directory to the include path (the top pane):-

C:\MinGW\x86_64-w64-mingw32\include

Under Linker Libraries, add the following directory to the Library search path (the bottom pane)

C:\MinGW\x86_64-w64-mingw32\lib

And also under Linker Libraries add “pthread” to the include libraries (in the top pane)

You should now be able to compile and run any complete pthread example programmes.