1 Accessing the student environment
If you have never logged into a school computer, you will first have to set your password through https://www.student.cs.uwaterloo.ca/password/.

1.1 Computing Labs
If you do not wish to install these programs on your personal computer, you can ssh into your linux.student.cs.uwaterloo.ca account using Mac and Linux Labs in the MC.

To enable X11 forwarding, include the -X and -Y flags in the ssh command. You should also check your ssh application’s settings to ensure that X11 forwarding is enabled.

Login using a terminal and the command: ssh -X -Y userid@linux.student.cs.uwaterloo.ca

1.2 Using Windows
1. Install PuTTY, which is a free SSH client.
2. Login by entering ssh userid@linux.student.cs.uwaterloo.ca into the box labelled Host Name or IP address. (We recommend saving this as your default setting.) Press the Open button at the bottom right of the window. A terminal will open after requesting your password. Note: no characters will appear while you are typing your password.

1.3 Using Mac OS X
1. Open a terminal using either Terminal or XQuartz (they can usually be found in the Utilities folder in your Applications folder).
2. Type the command: ssh -X -Y userid@linux.student.cs.uwaterloo.ca. This will ask for your password. Note: no characters will appear while you are typing your password.
3. If you are using XQuartz, make sure that you enable the Authenticate connections option under the Security pane from the Preferences menu option.

2 Using Linux
If you are new to Linux, see the provided Linux commands sheet, linuxCommands.pdf.

3 Using GTKmm with ssh
To use GTKmm through an ssh connection, X11 forwarding must be used. You must first install:
- On Windows: Xming. Install an X-server for Windows such as Xming and run it. Nothing will show up on the screen when you run Xming. You will need to make sure Xming is turned on each time you access your linux.student.cs.uwaterloo.ca account. To enable X forwarding in PuTTY, under Connection/SSH/X11, check the box labeled Enable X11 forwarding. You may want to save this setting.
- On Mac: XQuartz. To enable X11 forwarding include the -X and -Y flags in the ssh command. You should also check your ssh application’s settings to ensure that X11 forwarding is enabled.

4 Debugging GTKmm over ssh connections
You may experience some trouble using GTKmm over an ssh connection. A common error message is Gtk-WARNING **: cannot open display:
When having trouble using GTKmm over an ssh connection, first try removing all of the files starting with .Xauth in your home directory by entering the following commands:

```
$ cd
$ pwd
/u/userid
$ rm .Xauth*
```

### 5 Working with GTKmm

First, make sure that you have the correct version of GTKmm installed. The newer student environment (ubuntu1604-NNN) is using version 3.18 (GTKmm 3.0) as the default, while version 2.24.4 (GTKmm 2.0) is the default version in the old student environment (ubuntu1404-NNN). You can use the command `dpkg -l "*gtkmm*"` to see what version is installed if you want to be sure.

Note that when you both compile and link, you must specify the GTKmm package as the last argument on each of your compilation and linking command, as in:

```
g++ -c Window.cc `pkg-config gtkmm-3.0 --cflags --libs` -std=c++14
...  
g++ -o Window.o ... -o game `pkg-config gtkmm-3.0 --cflags --libs` -std=c++14
```

It is thus highly recommended that you set up your Makefile to do this for you, so that you don't forget. (Since `pkg-config` generates the flag `-std=c++11` at the moment, if you want to use C++14 features such as `std::make_unique`, make sure that you put `-std=c++14` after the invocation of `pkg-config`.) See the sample in the provided examples, `gtkmm-examples-3.0.zip`.

### Resources

- GTKmm 3 examples
  - [https://www.student.cs.uwaterloo.ca/~cs247/current/Lectures/code/MVC-gtkmm3.0](https://www.student.cs.uwaterloo.ca/~cs247/current/Lectures/code/MVC-gtkmm3.0)

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1 Note that `$` is the bash shell prompt, so you don't actually type it in. You don't need to enter the `pwd` command, but it's useful to confirm that you're in the correct location first.