Working Remotely

Many of the labs and projects can be worked on remotely, outside of the EWS labs. There are two ways of doing this; by connecting remotely to EWS systems over the Internet, or using your own computer.

Technical difficulties encountered while trying to connect remotely are not acceptable as an excuse for failing to submit an assignment or for turning in an assignment late!

Connecting Remotely

There are two primary ways of connecting remotely, through FastX or SSH.

FastX

Running FastX in your browser is like virtually sitting in front of a computer in the EWS lab. Follow the instructions in Engineering IT's FastX Guide. This will only work inside the University network (presumably for security reasons). If you want to connect outside the University network, you will need to connect to the Technology Services VPN (Virtual Private Network) first, so that you are virtually inside the network.

SSH

SSH stands for Secure SHell. When you connect to a machine with SSH, you get access to a terminal on that machine that allows you to work on the command line. This will only work inside the University network (presumably for security reasons). If you want to connect outside the University network, you will need to connect to the Technology Services VPN (Virtual Private Network) first, so that you are virtually inside the network.

Mac OS X, Linux

On a Unix machine you can create a remote command line by opening up a terminal on your computer and running the "ssh" program like so:

```
ssh netid@linux.ews.illinois.edu
```

Where `netid` is your netid. To disconnect from the remote machine, simply run "exit". This will only give you terminal access, so you won't be able to launch GUI applications. This may not be as big of a problem as you might think, see "Dumping the GUI" section below.

If you can't live without a GUI, you can probably enable it with something called "X forwarding". Add the `-Y` flag to your ssh invocation like so:

```
ssh -Y netid@linux.ews.illinois.edu
```

If X forwarding is successful, you should be able to run GUI applications.

Windows

On a Windows machine, you can get an SSH client called PuTTY. When you run it, use your netid as your username, and "linux.ews.illinois.edu" as the hostname. If everything goes well, you'll have a terminal on an EWS machine. Type "exit" to disconnect. Note that PuTTY only provides command line access (not GUI) access. This may not be as big of a problem as you might think, see "Dumping the GUI" section below.

Dumping the GUI

As you become more familiar with the command line, you'll discover that many of the things that you used to need a GUI for can be done on the command line. In fact, in this course, everything can be done on the command line since all the graphical tools you might use have command line equivalents. Using the command line has a number of advantages: more power, more flexibility, and simplicity.

- `nano` is a command line based text editor that provides similar functionality to `gedit`. Info about it can be found on the [Unix Command Line](https://example.com) page.
- `lc3sim-tk` is the command line equivalent to the graphical simulator `lc3sim-tk`.

Working on your own machine

Despite the recommendation to use EWS systems, you may want the independence that comes with working on your own machine. To do this, you'll need to install the programs that we use in this course on your own machine.
First of all, if you're running Windows, you'll find things a bit more challenging. This is because Windows likes to be different from all of the other operating systems, which means by itself, it won't be able to run the programs used in this class. Luckily, there's a program called Cygwin which provides a Unix environment inside of Windows.

**Text editing**

**Linux**: Gedit will work here

**Mac OS X**: Xcode is a nice text editor

**Windows**: Notepad++ is the recommended text editor. **Do not** use MS word, notepad, Wordpad as these programs format text files in ways that can break programs used in this class. See Coding Conventions for more info.

In addition to the above GUI text editors, you can use command line editors on Unix/Cygwin:

- **nano**: Easiest to use
- **emacs**: Has every feature imaginable
- **vim**: Steep learning curve, but powerful

**Subversion**

**Windows**: TortoiseSVN : Easy to use subversion client.

**Mac OS X, Linux**: The command line version of "svn" is probably already installed. You use it just like you would on the EWS machines.

**Cygwin**: you'll need to go to the Cygwin software installation menu to install SVN.

**lc3tools**

You can run these on Unix-like systems (Mac OS X, Linux, and Cygwin). See Installing LC-3 tools on your machine.

**Comments**

If you have any suggestions or tips about working remotely, post them in the comments sections so that others can benefit!