Engineering 101

HOW TO Work Remotely from Windows

If you wish to work on your Eng101 assignments from outside a CAEN lab such as your home computer or an ITD lab computer, you can do so in three different ways

- In **terminal emulation** mode you use your local computer as a text-only terminal to access the CAEN computer remotely. All editing and compiling is done on the CAEN computers. This ensures that your final code is compatible with the system on which we will compile and execute it when grading.
- In **file transfer** mode you use your local computer to edit text files and compile the code. Then when you are done you transfer your program to your Eng101 directory. It is very important if you use this method to test that your program is compatible with the CAEN compiler by compiling it remotely on the CAEN computers as well.
- In **X server** mode you connect much as you would in terminal emulation mode, but you open a connection via which both text and graphics can be displayed on your computer. This will allow you to use editors with graphical user interfaces (GUI's) as well as text-based resources.

Each method differs in the ease of setup and the convenience of use. These methods also depend on your internet connection speed (or bandwidth) and the availability of software.

If you are in a CAEN lab and you are working in Windows on a PC you should simply reboot your computer into Linux, otherwise proceed with this document. We will assume that you have an internet connection on your home computer. If not you can get a Blue Disc from ITD to get connected (visit **http://www.itd.umich.edu/kits**).

Method 1 - Terminal Emulation:

This method involves making a text-based (non-graphical) terminal connection to a remote Linux/UNIX computer, where all the editing, compiling, and running of your program are done.

The connection is made with Secure Shell (SSH), which is a protocol, comparable to telnet, used to connect to remote systems securely. However unlike telnet, SSH encrypts all data sent between computers or hosts including your password.

Because SSH is a text-based terminal emulator, you cannot run remote programs with graphical user interfaces (GUI) and so mouse functions are also unavailable. Fortunately, Pine, Emacs, Pico, and g++ are all text-based programs so they can be used with just keyboard commands.

If you installed the Blue Disc:

1. In the **Start >> Programs** menu, locate and start SSH Secure Shell.

2. Type **ruby.engin.umich.edu** as the hostname, your uniqname, and your password.

If you wish to use PuTTY, another secure shell program, instead:

1. Open a web browser and download **putty.exe** from **http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html** and save it on the desktop. This needs to be done only once.

2. Double-click the **Putty** icon. Type **ruby.engin.umich.edu** in the **Host Name** box, click on the **SSH** radio button under **Protocal**, then click **Open**. If the **Putty Security Alert** window appears, click **Yes** if you trust the server (which we do). At the login prompt type your uniqname and password.

   - You can connect to other hosts. **ruby** and **rust** are Linux hosts. **blue**, **topaz**, **azure** (color names) are some of the UNIX hosts. **login.engin.umich.edu** connects you to a Linux/UNIX host with the fewest users. You can find other host names and availability by using the **hostinfo** command or at **http://www.engin.umich.edu/htbin/wwwhostinfo**

   - You can find more information on SSH and links to other SSH programs at **http://www.engin.umich.edu/caen/faqs/Accounts/CAEN/connectsecure**

3. A Linux/UNIX prompt will appear like this **ruby%** . This SSH (or PuTTY) window is your new terminal window. Type **cd eng101** , and change to your project directory.

4. To start Emacs, type **emacs** *filename* . You may use other text-based text editors like **vim** or **pico** but not graphical text editors like **gedit**, k**write** nor **nedit**, which require a graphical X-server connection (see Method 3 below).

5. Open another SSH connection so you have two SSH windows open.

6. Compile your program in the second window using **g++** while you edit your code with a text-editor in the original first window.

   - You cannot run a Linux-compiled executable on other flavored UNIX machines (Sun, HP, IBM) and vice-versa. In such a case recompile your source code.

   - In your SSH terminal window, you can also check your CAEN e-mail using Pine by typing **pine** at the prompt.

Method 2 - File Transfer:

This method involves transferring your C++ files between your Eng101 directory on CAEN and your home computer, where you will be editing and compiling your code. Once you have file transferred your C++ source code from your Eng101 directory to your home computer, you can edit your code with any text editor like Notepad. You can also compile your code on your home computer with any C++ compiler. Microsoft Visual C++ is one package that combines both text editing and compiling. Finally you can file transfer your completed source code back to your Eng101 directory for submission.

It is important that your code compile successfully under g++ version 3.3. Therefore, transferring your code to your Eng101 directory should not be the final step. Make sure to test that your code will compile correctly on the CAEN Linux machines or you are risking receiving no credit for the assignment!

File transferring is done with a Secure CoPy (SCP) program, comparable to file transfer protocol (FTP) programs. However unlike FTP, SCP uses Secure Shell to securely transfer files from one computer to another.

1. Open a web browser and download **WinSCP3.exe**, a freeware SCP program for Windows, from **http://winscp.vse.cz/eng/download.php** and save it on the desktop. This needs to be done only once.

   - You can find more information on SCP and links to other SCP programs at **http://www.engin.umich.edu/caen/faqs/Accounts/CAEN/connectsecure**

2. Double-click the **WinSCP** icon. Click on the **Basic** tab and type **login.engin.umich.edu** as the hostname, your uniqname, and your password. Click **Login** . The window on the left displays directories on your home computer, whereas the window on the right displays your CAEN home directory. Navigate the directories in the right window (start by double-clicking the Eng101 directory) and once you have found your C++ files click and drag them to the left window to copy them.

3. You can now use a text editor and compiler to write and test your C++ code.

   - ConTEXT Programmer's Editor is a free text editor that you can download from **http://www.context.cx/**

   - Borland C++ is a free command line compiler that you can download from **http://www.borland.com/bcppbuilder/freecompiler**

   - You can purchase other text editors and compilers like Microsoft Visual C++ or Metroworks CodeWarrior from ITD, your local bookstore, or online.

4. To copy your C++ files back to your Eng101 directory, open WinSCP and click and drag your C++ files from the left window to the right window in the appropriate directory.

Method 3 - X Server:

This method involves making an X window system display server (X server) connection to a remote CAEN machine, where you can open windows of graphical programs on your local screen. This method differs from a text-based terminal connection because an X server sends graphical information between your computer and the remote host, which typically requires a fast internet connection like ethernet. With an X server you can use your mouse to click on menus of remote programs, run fancier text editors with GUIs, run Data Display Debugger, etc.

1. Install **Cygwin/XFree86**, an X server, which is free from here
   http://www.cygwin.com/xfree

   or install **Exceed**, an X server, which you can purchase from ITD for $69 here http://www.itd.umich.edu/sw-info/comm/exceed.html . You can also try out Exceed on any CAEN Windows PC before you purchase it (see Step 2 for instructions).

2. Follow the instructions that come with the software or that are posted on their respective webpages. CAEN also provides instructions on how to setup an Exceed X-Session here http://www.engin.umich.edu/caen/technotes/exceed.pdf .

- You can find also find your IP address by clicking on the **Start >> Run** menu and typing **cmd** to start a command prompt. Then type **ipconfig** .

- It is recommended that you run Exceed in **passive rootless** mode.