

CSC112 **Spring 2011**
Fundamentals of Computer Science
Lab 3

In this lab, we will continue to improve our Ununtu/Linux working environment, and we will continue learning the C++ language.

Your C++ programming assignment consists of three programs which progressively introduce new language features. Create a directory named Lab3. Keep all of your source and compiled programs in the directory Lab3.

Improving your Ubuntu/Linux working environment

Start your Linux/Ubuntu virtual machine and select full screen mode. Start the firefox web browser in your Linux/Ubuntu virtual machine, and point it to:

`http://mehune.opt.wfu.edu/CSC112`

Do not use your windows browser for this step!

You will see three links for downloading:

1. Install script for extra packages (shell script)
2. Xforms (Tar Archive)
3. xtt (Linux/Ubuntu 32-bit executable)

Getting our install script

If you click on “Install script” with the left mouse button, the browser will display the shell script. To download it, hold down the right mouse button while pointing to the link. Select “Save Link As...”, and click on “Save”. You should now have a shell script named `install_list` in your download directory. The exact location of the file `install_list` depends on your browser settings. By default, your downloads go into a sub-directory named `Downloads`. Look there first. Use the commands:

```
% cd ~/Downloads
% ls
```

If you do not see the file named `install_list`, use the `find` command:

```
% cd
% find . -name install_list
```

The find command will show you where the script `install_list` is saved.

Getting Xforms

Using your web browser, Click on “Xforms” with the left button, a dialog box should appear. Select “Save File” and “Ok”. You should receive a file named “Xforms.tar”

Getting xtt

Click on “xtt (Linux/Ubuntu 32-bit executable)” with the left mouse button. A dialog box will appear. Select “Save File”.

So now what ?

1. Change to the directory containing the downloaded files. Use the commands:

```
cd ~/Downloads
ls
```

You should see the files:

```
install_list Xforms.tar xtt
```

Now, we need to ensure that the downloaded files `install_list` and `xtt` have the correct execute permissions. Use the command:

```
chmod ugo+x install_list xtt
```

To simplify the later steps, copy the files `Xforms.tar` and `xtt` to the `/tmp` directory. Use the command:

```
cp -p Xforms.tar xtt /tmp
```

The shell script named `install_list` will install some useful packages that we will need for our work. We need to run the shell script with elevated privilege to do the install. Use the command:

```
sudo ./install_list
```

While the install script is running, it will ask for your permission to proceed. Answer 'Y' (and press the Enter key) to all installation questions.

2. Next, we will install Xforms. Xforms is a library for creating programs with graphical user interfaces (GUI). For this part of the install, you will need to be in a root shell. Start a root shell by typing:

```
sudo su -
```

Enter your password when prompted. When you get a prompt that includes a "#", you are in a root shell. Change to the directory `/usr/local/src`. Extract the tar archive you previously copied into `/tmp` into `/usr/local/src`:

```
# cd /usr/local/src
# tar xf /tmp/Xforms.tar
```

Now, change to the sub-directory named `Xforms/xforms-1.0.94pre3`, and type "make install".

```
# cd Xforms/xforms-1.0.94pre3
# make install
```

3. Finally, we will install `x11vnc` by copying it to `/usr/local/bin`

```
# cp -p /tmp/x11vnc /usr/local/bin
# exit
```

Exit from the root shell by typing `exit` as shown above.

In a terminal window, type `x11vnc` and hit enter. A window should appear which allows you to launch terminal windows of various size and color.

Putting `x11vnc` in the menu

Using the pull-down menus in the upper left portion of your Ubuntu screen, go to:

```
System-->Preferences-->Main Menu
```

Make sure “Applications” is highlighted in the left column and select “New Item” from the upper right region of your Main Menu window. A window will appear with three text-entry boxes. Fill them in as shown below and click “Ok”.

```
Name:      x11vnc
Command:   /usr/local/bin/x11vnc
Comment:   Xterm launcher
```

Close the “Main Menu” window. You should now be able to start `x11vnc` from the “Applications” menu.

Continuing with C++

1. Write a function named “is_prime” with the following header

```
bool is_prime(int k)
```

Your function should return true if k is a prime number and return false otherwise. We have not discussed arrays yet, so we will **not** be using the sieve of Eratosthenes method for finding primes. To check if a number is prime:

- (a) If the integer k is less than two, then it is not prime.
 - (b) The integer k is equal to two, then it is prime.
 - (c) If k is greater than two, check if it is divisible by two. If k is divisible by two, then it is not prime.
 - (d) If checks 1a, 1b, and 1c have not proven whether k is prime (or not), then do the following:
For every odd integer j from three up to the square root of k , check if k is divisible by j , but stop searching if you find such j .
 - (e) If a divisor of k was found in step 1d return *false*, otherwise, return *true*.
2. Write a simple main program that reads a number, calls your function “is_prime” and outputs the conclusion “prime” or “not prime”. Run your program with several different numbers to convince yourself that `is_prime()` is working correctly. Don’t forget to check the so-called “corner cases”, i.e., for this example, try inputting 2, try again, inputting zero. This process is called “unit testing”.
 3. Using your function `is_prime()`, write a program that prints all prime numbers less than 100.

Turn in: Change to the directory containing the sub-directory “Lab3” Create a file named “lab3.tar” using the command:

```
tar cf lab3.tar Lab3
```

Upload the file “lab3.tar” to your account on telesto.