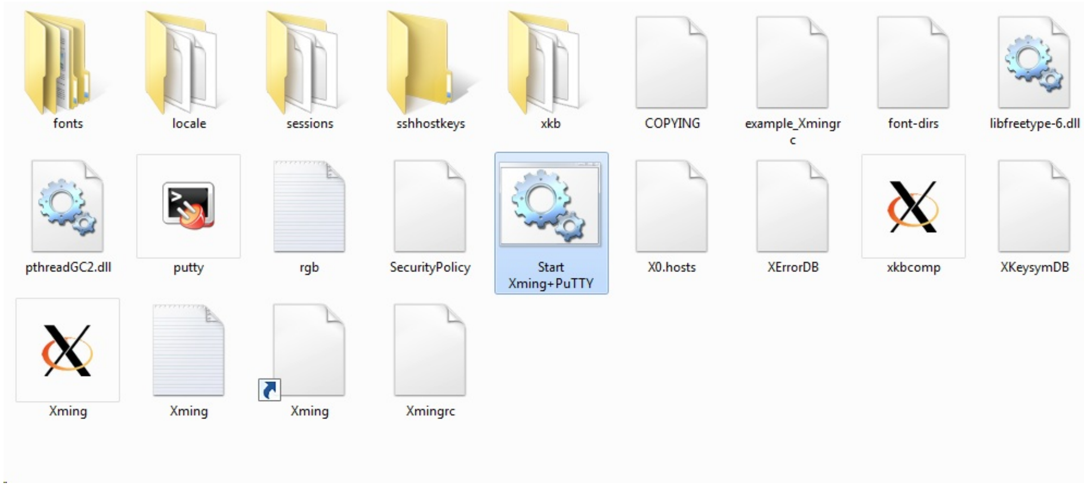
EL2208 Problem Solving with C Lab. Lab #5

Computing yield in a chemical reaction as a function of time.

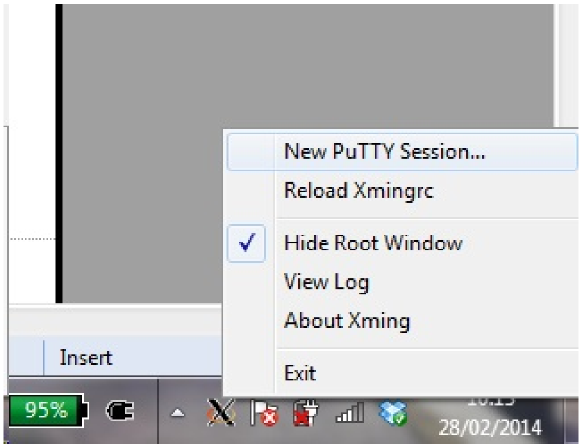
Using Putty + Xming

In this lab you will use Putty + Xming. Xming is a software that can forward Linux's Xwindow to your Windows Desktop. Here's how to use Xming in this lab:

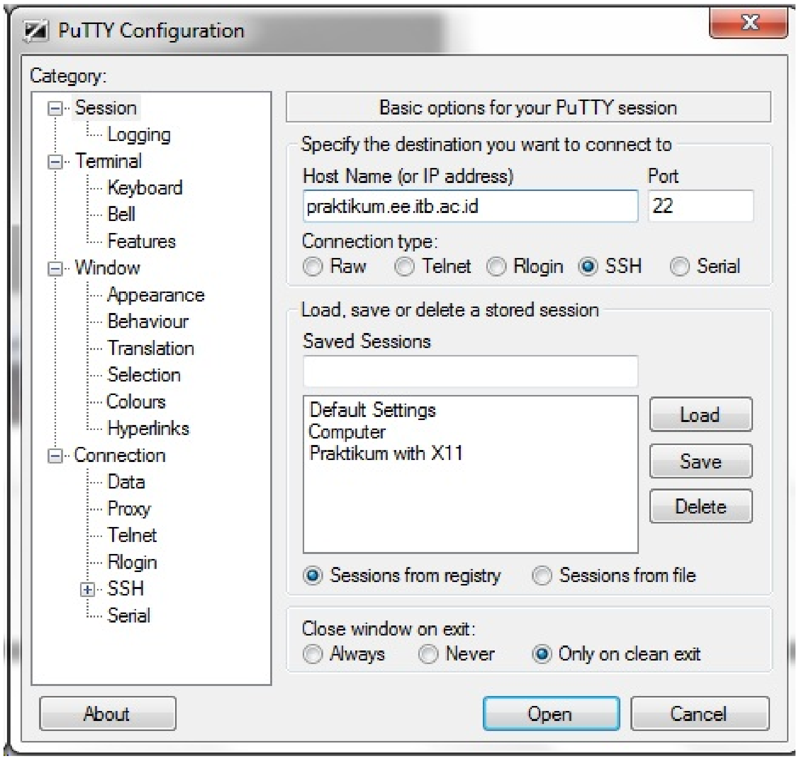
1. Download Xming.zip from praktikum.ee.itb.ac.id website, then unzip it.
2. Now, open file Start Xming+Putty.bat in the unzipped folder.



3. You will see an "X"-like icon on the right of your taskbar. Right click and select "New Putty Session"



4. Next, a Putty window will be opened, as usual use praktikum.ee.itb.ac.id as host



Basic options for your PuTTY session

Specify the destination you want to connect to

Host Name (or IP address): praktikum.ee.itb.ac.id

Port: 22

Connection type: ○ Raw ○ Telnet ○ Rlogin ● SSH ○ Serial

Load, save or delete a stored session

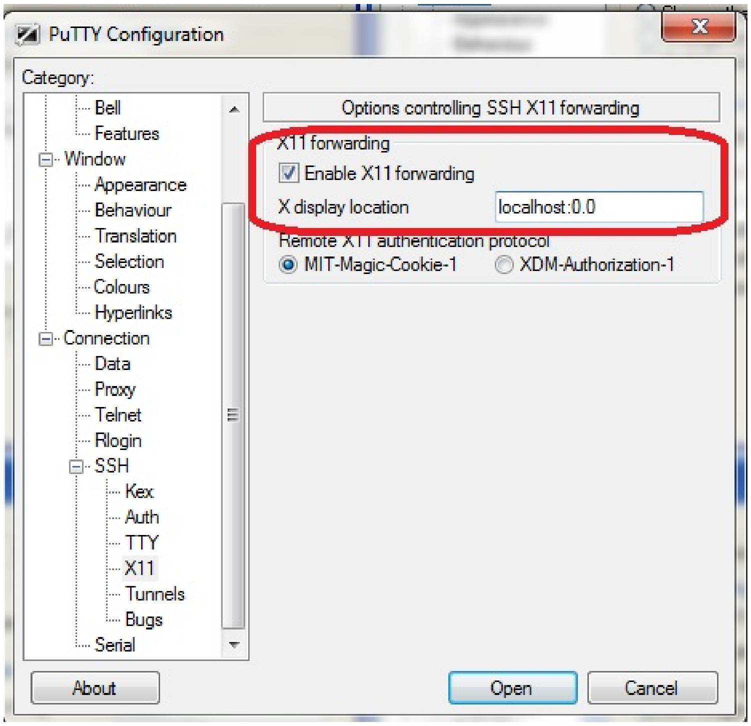
Saved Sessions

Default Settings
Computer
Praktikum with X11

● Sessions from registry ○ Sessions from file

Close window on exit: ○ Always ○ Never ● Only on clean exit

5. Do not click open before doing this step: on the left menu, click the (+) icon of SSH, then select X11. Checkmark "Enable X11 forwarding" then fill X display location with "localhost:0.0".



Options controlling SSH X11 forwarding

X11 forwarding

☑ Enable X11 forwarding

X display location: localhost:0.0

Remote X11 authentication protocol

● MIT-Magic-Cookie-1 ○ XDM-Authorization-1

6. Click Open then you will be asked for username and password of praktikum.ee.itb.ac.id, give your NIM as usual and work from there.

Lab part

This week you will compute yield in a chemical reaction as a function of time and plot the resulting data using Gnuplot. Gnuplot is a command-line program that can generate two- and three-dimensional plots of functions, data, and data fits.We'll use it as a plotting package.

The chemical reaction of interest has a yield given by the equation

$$yield = 1 - e^{-kt} \tag{1}$$

where

$$k = e^{-q} \tag{2}$$

and

$$q = \frac{2000}{T + 273.16} \tag{3}$$

The variable **t** is the time in seconds and **T** is the temperature of the reaction in degrees Celsius. Use the #define statement to set **T** to 10 degrees. Vary **t** from **0** to **4000** seconds at increments of 1 second using a `while` loop. Compute the yield as shown in Equations (1), (2) and (3). For each pass through the `while` loop, print the time and the yield, 2 numbers per line. Use free formating (just %lf). Do NOT put any column headings at the top of the two columns. You should see output that looks similar to:

```
0.000000 0.000000
1.000000 0.000856
2.000000 0.001711
3.000000 0.002565
4.000000 0.003418
5.000000 0.004271
     .         .
     .         .
     .         .
```

When your code is running correctly, redirect the output to a file called lab5.out by typing

```
./lab5 > lab5.out
```

if lab5 is the name of your executable file. You can see the contents of the output file by typing

```
more lab5.out
```

Use the space bar to move down in the file, the **b** key to move up in the file and **ctrl-c** to quit the **more** command. More information on the **more** command can by found by typing **man more**.

Next, start Gnuplot by typing **gnuplot** on the Command Prompt.

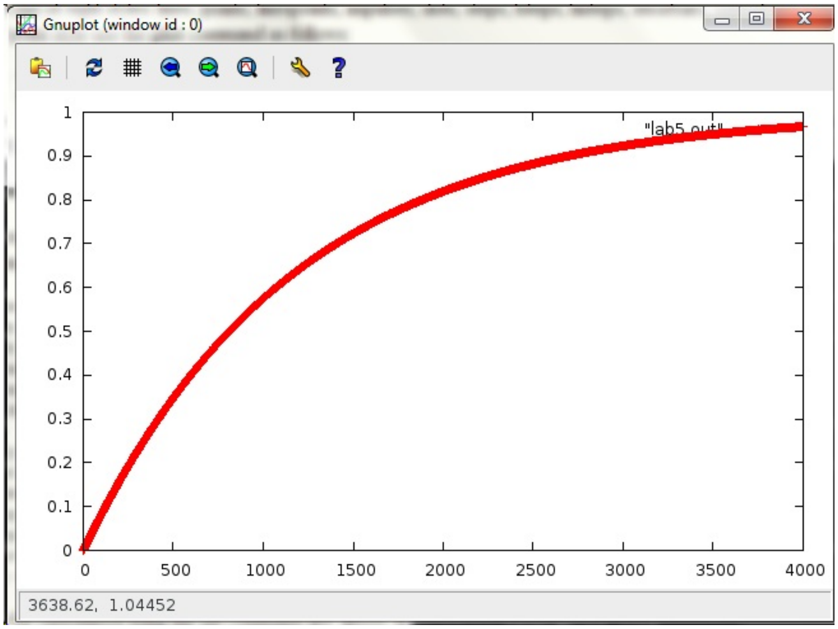
```
        G N U P L O T
        Version 4.6 patchlevel 3    last modified 2013-04-12
        Build System: Linux x86_64
```

```
	Copyright (C) 1986-1993, 1998, 2004, 2007-2013
	Thomas Williams, Colin Kelley and many others

	gnuplot home:     http://www.gnuplot.info
	faq, bugs, etc:   type "help FAQ"
	immediate help:   type "help"  (plot window: hit 'h')

Terminal type set to 'wxt'
gnuplot>
```

The gnuplot> is the gnuplot command prompt. Then type

```
plot “lab5.out”
```

at the command prompt. If your program is correct, you should see a window like this (**It’s may be slow if there’s network problem, be patient)**.



Show your lab instructor the plot when you are done then submit it using perl submission code. **Submit only the C code.**