Parallel Programming
Laboratory 1

POSIX threads

Requirements:

For POSIX threads, we need a Unix-like system – If you do not have it I have created accounts for you on petronela server – to use it from windows you need to use putty (if it is not installed you can download it - putty). Then you must connect to petronela.uck.pk.edu.pl using ssh protocol. Your account name is based on your firstname and the default password is erasmus1 – after loging in please change it by using passwd command

Tasks:

1. Create a working directory (eg. mkdir Lab1).
2. Go to the created directory (eg. cd Lab1).
3. Compile and run provided example – what can you notice after several runs?
   (you can copy the code or use wget http://riad.pk.edu.pl/~fkruzel/thread.c --no-check-certificate)

   -to compile the code use gcc thread.c -o thread -lpthread
   -to run the code type: ./thread

4. Download the file "time.tgz" to your working directory.
5. Extract the files: Makefile and the source code of the procedures for the time measurement: tmeas.c and the corresponding header file: tmeas.h.

   -to extract archive: tar – xvzf time.tgz

6. Modify the program to use the procedures for the time measurement and measure the execution time for different number of threads.

   a) include the tmeas.h header file: #include “tmeas.h”
   b) call before the pthread_create:
   ```
   tstart();
   ```
   c) call after the pthread_join:
   ```
   t=tstop();
   ```
   d) print the obtained time:
   ```
   printf("Time: %lf",t);
   ```

   -to compile the program type: make
   -then: gcc thread.c -L. -ltmeas -lpthread -o thread

7. Based on the supplied program parallelize summation of two vectors. You can assume that vector size is divisible by the number of threads or implement the proper load balancing. Each thread should only aggregate its fragment eg:

   For NUM_THR=4 and SIZE=12
   Thread 0 is aggregating vector elements 0,1,2
   Thread 1 is aggregating vector elements 3,4,5
   Thread 2 is aggregating vector elements 6,7,8
   Thread 3 is aggregating vector elements 9,10,11

8. Modify the program to use the procedures for the time measurement and measure the execution time for different number of threads and different vector sizes.