High-Performance Computing

Laboratory 6:

Development and testing of network performance for the two-point and group communication

Objective:

- Acquiring the ability to carry out experiments on the performance of distributed computing.
- Estimation of the communication performance.

Tasks **(small font – instructions to use two computers if you have the possibility):**

1. Create a working directory (eg. Lab_6) .

2. *Generate ssh keys to enable connection without a password between computers:*

   >> ssh-keygen (do not write anything, only press Enter key)

3. *Add ssh key to a computer that you will want to join to the cluster in order to add it to the keyring:*

- *check the IP of your computer:*
  user@pc152j>>ifconfig
- *Ask your neighbor to give you his IP*

  Copy ssh key to the destination machine

  user@pc152j>>ssh-copy-id 149.156.136.39
  user@149.156.136.39 password?>> password (for your user account!)
  user@149.156.136.39>>exit
  user@pc152j>>ssh 149.156.136.39
  user@149.156.136.39>> *(if it asks for password it means that there is a problem with ssh configuration and we must work only on local machine)*

4. *Create a hostfile by syntax:*

   idcomp1 slots = number_of_processors
   idcomp2 slots = number_of_processors

   fe:
   149.156.136.38 slots=2
   149.156.136.39 slots=3

5. Compile (mpicc) and run (mpirun) a sample program

   fe:
   mpicc examplempi.c -o empi
   mpirun *--hostfile hosts* -np 7 ./empi

6. Develop a methodology for measuring the network performance (initiation time and bandwidth) for the two-point communication through the implementation of appropriate MPI procedures (time can be measured using the MPI_Wtime procedure).
7. Write a program implementing the measurements and perform the tests.
8. Prepare results as a graphs: communication time depending on the size of the message.
9. Basing on the results of measurements estimate the parameters of network initialization time and bandwidth (if the connection wasn't possible – compare the results with the data from the Stream benchmark)

Assessment:

1. Complete all steps .
2. Prepare a report containing :
   a) description of measurement methodology .
   b) the test program code
   c) the test results in the form of tables and graphs
   d) analysis of the results and conclusions