Assembling a Beowulf cluster on Debian Wheezy for parallel computing using OpenMPI libraries

Kussainov, A.S.1,2, Kussainov, S.G.3

1National Nanotechnology Open Laboratory, al-Farabi Kazakh National University, Almaty, Kazakhstan

2Physics and Technology Department, al-Farabi Kazakh National University

E-mail: arman.kussainov@gmail.com

3Department of Industrial Engineering, K.I. Satpaev Kazakh National Technical University, Almaty, Kazakhstan

E-mail: sain.kussainov@gmail.com

We have assembled and tested computer cluster in one server two nodes configuration running *Debian Wheezy* (Debian 7.4.0 for 64-bit architecture processors). Computers were connected into the local subnet by the 1000 Gb/s switch using their on-board LAN cards supporting this speed. In order to keep the cluster homogeneous three identical in hardware and software configuration PCs were used. The project includes networked Windows machine as well.

We have chosen *Open MPI project* for the message passing interface libraries [1]. These libraries come with *Debian* dvd installation images ready for deployment on demand. Compiler wrappers *mpicc* and *mpicxx* for *C* and *C++* programs have being installed. We have tested reliability of *SSH* data exchange protocol and successfully run the wide range of *C* and *C++* parallel programs [2]. Fortran compiler wrapper is readily available on OpenMPI. Each PC’s processor has a quad-core structure (Intel Core i5-3470 3.2 GHz) which was specified in hostnames configuration file.

 Preconfigured libraries for parallel computing on our cluster configuration in solid state physics are available [3]. The further development of the cluster and parallel computing methods are of the great value for our quantum computations projects.

The work is done at the National Nanotechnology Open Laboratory with the help of research grant №2532/ГФ3 provided by the Science Committee at the Ministry of Science and Education of Republic of Kazakhstan.

References:

1. <http://www.open-mpi.org/>

2. <http://people.sc.fsu.edu/~jburkardt/cpp_src/cpp_src.html>

3. Aksamija, Z. and Ravaioli, U. Parallel Implementation of Boltzmann Transport Simulation of Single-Walled Carbon Nanotubes. International Workshop on Computational Electronics (IWCE) Beijing, China (May 2009), proceedings available on IEEEXplore.com.