CONSTRUCTION AND PERFORMANCE EVALUATION OF MULTICORE WORKSTATION CLUSTER UNDER WINDOWS AND LINUX OPERATING SYSTEMS

I. S. Karunawansha

Theoretical and Computational Science Research Unit

Institute of Fundamental Studies (IFS)

Hantana Road, Kandy

Sri Lanka

Postgraduate Institute of Science

University of Peradeniya

Sri Lanka

Computer cluster is a system which consists of a set of computers (Nodes). Computers in a cluster are connected through a network and work as a single system. There are many different types of computer clusters such as high-performance clusters, high-availability clusters and load balancing clusters. Computer clusters can be used as a high performance computing (HPC) system to solve advanced computation problems which are time consuming. A computer cluster can be constructed using several personal computers or workstation computers and archive higher performance and it is low cost compared to supercomputers. As a result nowadays scientific community tends to use computer clusters to carry out scientific calculations which require high processing powers.

Performance is the major factor for a computer cluster which is used for high performance computing. Performance of a computer cluster depends on many factors such as the number of computers, number of processors, number of cores, speed of each computer, inter-computer communication speed, efficiency of operating system and also some specialized technologies like Intel-hyper threading technology. Due to limitations in performance and memory of a single computer, it has become necessary to use a cluster of computers to solve certain important science problem.

In this project, high performance computing cluster was constructed and configured for both Linux (Ubuntu) and Windows (Windows 7) operating systems. The cluster was configured to MPICH2 message passing interface (MPI) implementation to run MPI parallel programs. Next, detailed performance evaluation for the cluster was carried out to compare different types of computers in the system as well as Linux (Ubuntu) and Windows (Windows 7) operating systems. Further another study was carried out to measure performance impact of Intel Hyper-Threading Technology on HPC cluster.