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TESTS OF DIFFERENT MPI IMPLEMENTATIONS IN HPC/KVM CLUSTER

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The work explored the possibility of combining Cloud and High-performance computing (HPC) cluster into a single system. Message Passing Interface (MPI) is the most popular programming technology used for parallel calculations conducted on HPC cluster. The solution of the problem of combining Cloud and HPC cluster is of interest to investigate the efficiency of MPI technology when it is used on virtual machines.

In this paper various MPI implementations (IntelMPI, OpenMPI) were tested on virtual machines based on Kernel Virtual Machine (KVM) [1] hypervisor. The test polygon was placed on the Dell PowerEdge FX2 server which consists of 8 computing units with 2x CPU Intel Xeon E5-2680 v3, 256 GB RAM. Each computing unit was connected to others by integrated 10 Gbit/s switch.

During the tests all available combinations of connections to local network and types of virtual network card supported by KVM hypervisor were investigated. For each combination the test of network's bandwidth and processor load were measured.

Testing was carried out for two cases: 1) when virtual machines were placed on different physical computing units; 2) when virtual machines were placed on the same physical computing unit.

Various MPI implementations were used following tests: Intel MPI Benchmarks [2], the program for calculating CVC in Long Josephson Junctions [3], science package GIMM_FPEIVE [4] and so on. The results of the efficiency of MPI-tasks performed in HPC/KVM cluster are presented.

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