Rancangan sistem high performance computing berbasis cloud menggunakan layanan openstack untuk mengimplementasikan sistem penilaian esai otomatis = Design of cloud based high performance computing cluster using openstack services to implement automatic essay grading system

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Abstrak

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Teknologi di bidang perangkat lunak dan perangkat keras semakin berkembang cepat. Masalah keterbatasan kapasitas suatu komputer memicu berkembangnya sebuah inovasi yang disebut dengan High Performance Computing HPC . HPC merupakan sekumpulan komputer yang digabungkan dalam sebuah jaringan dan dikoordinasi oleh software khusus. Cloud Computing merupakan paradigma yang relatif baru dalam bidang komputasi. Pada penelitian ini dilakukan pengujian terhadap performansi High Performance Computing Cluster HPCC berbasis cloud menggunakan layanan OpenStack dalam menjalankan fungsi dasar Message Passing Interface. Pengujian dilakukan menggunakan program Mpptest dan SIMPLE-O. Penggunaan server yang tidak mendukung hypervisor KVM pada pengujian point-to-point communication dapat menurunkan performansi HPCC berbasis cloud sebesar 3,1 - 12,4 dibandingkan dengan HPCC berbasis non-cloud. Pada pengujian point-to-point communication dengan 2 server yang mendukung hypervisor KVM, HPCC berbasis cloud unggul dibandingkan HPCC berbasis non-cloud sebesar 1,6 ndash; 2,7 . Pada pengujian performansi HPCC dalam melakukan fungsi MPI collective communication tidak ditemukan perbedaan berarti antara kedua cluster dimana HPCC berbasis non-cloud mengungguli HPCC berbasis cloud sebesar 0 - 1,4 . Pada pengujian menggunakan program SIMPLE-O didapati performansi HPCC berbasis cloud dan non-cloud imbang jika semua instance dijalankan dengan server yang mendukung hypervisor KVM, apabila terdapat instance yang dijalankan server tanpa dukungan KVM maka HPCC berbasis non-cloud unggul 96,2 dibandingkan HPCC berbasis cloud. Ketersedian modul KVM pada server yang menjadi host suatu instance sangat berpengaruh terhadap performansi HPCC berbasis cloud.
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ABSTRACT
Software and hardware technologies have been developing rapidly. Capacity limation problems found in computers triggered a development of a new innovation called High Performance Computing HPC . HPC is a cluster of computers in a network coordinated by a special software. Cloud Computing is a new paradigm in computation field. In this research, series of test are done to find out the performance of cloud and non cloud based High Performance Computing Cluster HPCC while running basic functions of Message Passing Interface. Tests are done using Mpptest and SIMPLE O program. By using a server that does not support KVM in point to point communication test could decrease the performance of cloud based HPCC by 3,1 to 12,4 compared to non cloud based HPCC. During the test of point to point communication using 2 servers that support KVM hypervisor, cloud based HPCC is ahead of non cloud based HPCC by 1,6 to 2,7 . During the test of collective communication, there are no significant differences between performances of the two cluster, with non cloud based HPCC is ahead by 0 to 1,4 compared to cloud based HPCC. During the test

using SIMPLE O program, the two cluster is even in term of performance as long as every instance is run by servers that support KVM hypervisor, if there is an instance that is run by a server that does not support KVM hypervisor then the performance of non cloud based HPCC is still ahead by 96,2 compared to cloud based HPCC. During the performance testing of HPCC while running collective communication, noticable performance difference between cloud and non cloud based HPCC was not found. The availability of KVM module in a server that is used to host an instance is really essential to the cloud based HPCC performance.