Analisis Performansi Topologi Fat Tree dan BCube pada Data Center Network Menggunakan Routing Protocol XPATH = Performance Analysis of Fat Tree and BCube Topologies on a Data Center Network Using Routing Protocol XPath

Gerry Italiano Wowiling, author

Abstrak

Data Center Network (DCN) adalah sebuah pendekatan populer dalam membangun jaringan dengan skala besar yang dapat melakukan pemrosesan data. Komponen-komponen yang ada pada DCN seperti server, switches, dan link dipandang sebagai sebuah kesatuan yang saling bekerja sama untuk dapat melayani permintaan proses data. Dalam operasinya, DCN membutuhkan topologi, dimana topologi tersebut adalah representasi bentuk jaringan dan bagaimana masing-masing komponen dalam DCN terhubung dan saling berkomunikasi. Beberapa topologi yang dapat dimplementasikan pada DCN diantaranya adalah topologi fat tree (yang paling sering digunakan) dan topologi BCube. Masing-masing topologi membutuhkan routing protocol yang dapat menentukan jalur terbaik bagi node server untuk dapat berkomunikasi. Pada penelitian ini mengusulkan penggunaan routing protocol XPath yang dapat meminimalisir penggunaan path berlebihan dengan cara melakukan kompresi menggunakan algoritma two step compression. Routing protocol XPath dimplementasikan pada masing-masing topologi dan disimulasikan menggunakan NS-3 Simulator untuk mendapatkan perbandingan hasil akhir berupa rata-rata throughput dan delay masing-masing topologi. Dari hasil penelitian dan pengujian didapat bahwa topologi BCube pada data center network yang mengimplementasikan routing protocol XPath menghasilkan nilai performansi yang lebih baik dibandingkan topologi Fat Tree. Implentasi routing protocol XPath juga secara signifikan meningkatkan throughput dan menurunkan delay masing-masing topologi.

.....Data Center Network (DCN) is a popular approach to build a big and scalable network, which process big data in its core. Each component in DCN such us node server, switches, and link are likely to be seen as one system working together to process request data from user. In its operation DCN need at least one topology in each manageable system. Topology is the representation of network communication, and how each component in DCN can connect to each other. There are many topology that can be implemented in DCN architecture such as Fat Tree topology which is commonly use in DCN architecture and also BCube topology. Each of that topology in DCN also need a routing protocol that can arrange and manage a best path or desired path for each node server to transfer data accros network. In this research, XPath routing protocol is proposed to be implemented in both Fat Tree based DCN and BCube based DCN. XPath routing protocol is choosen because its nature to compress excess possible path become desired path only, using two-step compression algorithm. XPath routing protocol are implemented in each topology using NS-3 Simulator as simulation framework. The purpose of the research is to get comparison result between Fat Tree and BCube using average throughput and average delay metrics. Result of this research and simulation indicating that BCube data center network which implement XPath routing protocol shows a better performance than Fat Tree. The implementation of XPath routing protocol in each topology also show throughput increase and delay decrease significantly, which make XPath routing protocol a good idea to be implemented in data center network.