

Evaluasi Consensus Sistem Blockchain Warehouse Supply Chain Management berbasis Hyperledger Fabric = Consensus Evaluation of Blockchain Warehouse Supply Chain Management System based on Hyperledger Fabric.

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Abstrak

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Blockchain merupakan ledger terdistribusi, dan data dalam blockchain tidak dapat diubah dan bersifat transparan yang menyebabkan siapa pun tidak dapat meragukan kebenarannya. Seiring perkembangannya, blockchain mulai banyak diterapkan dalam berbagai bidang aplikasi seperti Supply Chain Management. Hal ini dikarenakan teknologi blockchain dapat menjamin kebenaran dan integritas data tanpa memerlukan pihak ketiga, terutama pada catatan transaksi (transaction log) sehingga penggunaan teknologi blockchain dapat menyelesaikan permasalahan kurangnya trust pada Supply Chain Management. Terlebih lagi, blockchain seperti Hyperledger Fabric sangat cocok untuk diterapkan dalam Supply Chain Management dikarenakan sifatnya yang private dan permissioned. Hyperledger Fabric juga dapat menjaga sistem tetap bekerja meskipun terdapat kegagalan pada sistem. Pada penelitian ini akan dilakukan evaluasi mengenai penerapan teknologi blockchain pada warehouse Supply Chain Management berbasis Hyperledger Fabric. Selain itu akan dilakukan evaluasi mengenai consensus yang digunakan, bagaimana throughput dari sistem warehouse Supply Chain Management yang telah diusulkan serta apa saja yang mempengaruhi throughput tersebut. Berdasarkan hasil penelitian, consensus pada sistem ini merupakan crash fault tolerance (CFT) dikarenakan transaction dapat dilakukan apabila kuorum terpenuhi dan ordering service memiliki leader. Penggunaan Raft sebagai ordering service memiliki throughput yang lebih cepat dibandingkan dengan Kafka ordering service dengan nilai throughput sebesar 24.3 TPS pada Raft dan 22.7 TPS pada Kafka. Throughput dari transaction single node dan multi node memiliki nilai yang sama pada send-rate 100 dan 128 TPS. Jumlah core CPU mempengaruhi throughput Fabric, sedangkan kapasitas memori berpengaruh pada banyaknya peer yang dapat berjalan pada node tersebut.

ABSTRACT

Blockchain is a distributed ledger; data in a blockchain cannot be changed and is transparent, which makes anyone unable to doubt its truth. Through its development, blockchain began to be widely applied in various fields of application, such as Supply Chain Management. This is because blockchain technology can guarantee the correctness and integrity of data without the need for third parties, especially on transaction logs so that the use of blockchain can solve the problem of lack of trust in Supply Chain Management. In addition, a blockchain like Hyperledger Fabric is very suitable for Supply Chain Management because blockchain is private and permitted. Hyperledger Fabric can also keep the system working despite system failures. In this study, an evaluation will be conducted on the application of blockchain technology in the warehouse Supply Chain Management based on Hyperledger Fabric. Besides, an evaluation will be conducted on the consensus used and how the inputs from the proposed warehouse Supply Chain Management system and what influences the throughput. Based on the results of the study, the consensus on

this system is crash fault tolerance (CFT) because the transaction can be done if the quorum is fulfilled and ordering services has a leader. The use of Raft as an ordering service has better performance than the Kafka ordering service with a throughput of 24.3 TPS on the Raft and 22.7 TPS on the Kafka. The throughput of the single-node and multi-node transactions have the same value at send-rates of 100 and 128 TPS. The number of CPU cores affects Fabric throughput, whereas memory depends on the number of peers running on that node.