



Chapter

# Performance Comparison of On-Chain and Off-Chain Data Storage Model Using Blockchain Technology

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In recent years, the blockchain technology has attracted a lot of attention. Blockchains' rapid ascent to prominence is largely due to the openness and efficiency they provide. Businesses have begun blockchain technology. As the need for blockchain is growing day by day, it is necessary to evaluate the storage capacity of blockchains. There are two solutions to store data in native to blockchain namely on-chain or off-chain storage. The choice of the storage is based on the scenario or application. Hence in this paper, the data storage in on-chain model and off-chain model is implemented for a real-time scenario "blood donation and transfusion system" using Hyperledger Fabric tool and the performance of the system for both the model is been analyzed. From the results it is found that, off-chain data storage model is faster (50%) than on-chain data storage model. Also, the off-chain data storage model is slower (90.425% slower) than on-chain model to retrieve data from blockchain. By interpreting the results it is concluded that on-chain data storage is better than off-chain data storage scenario "blood donation and transfusion system" that we have taken for comparison. On-chain data storage model is needed for applications with high trust on data as it is stored in blockchain. Off-chain data storage is not needed for text-based data.

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Component	Description / Specification
OS	Ubuntu 20.04
CPU	Intel(R) Core(TM) i3 CPU @ 2.40GHz
Memory	16 GB
Blockchain	Hyperledger Fabric v2.0
IDE	Visual Studio
Frontend	Node JS v10.24.1
Container	Docker version 20.10
Build Tool	Composer version 1.29.2

Query	Job
getRegistrationDetails	To get the registration details from blockchain
getBloodDetails	To get blood details
getBloodTestingDetails	To get blood testing details
getBloodTransfusionDetails	To get blood transfusion details
getEntireChainDetails	To get the entire chain details such as registration, blood donation, blood testing, and transfusion.

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