Research Square

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Designing a Permissioned Blockchain Network for the Halal Industry Using Hyperledger Fabric with Multiple Channels and the Raft Consensus Mechanism

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Abstract

Blockchain is an alternative solution that can improve the performance of the halal supply chain. Blockchain can address all the issues in the halal supply chain, such as the contamination of halal products and the disobedience of halal processes among all parties in the chain, including end customers. The type of technology suitable for this case is permissioned blockchain, in which administrators can determine the rights of each halal supply chain participant category. The determination of these rights must be done by consensus so that no party feels aggrieved. This study uses a blockchain network with three channels and the Raft consensus algorithm to design a web interface and test its capabilities. With regard to the web interface, there were no validity failures during the invoke and query tests. In addition, the web interface was also successful in thwarting the formation of a block in the case of data input errors from the user. Additionally, the server can act as a provider of information and validator of the web interface. The results of simulations conducted on the blockchain network show that the system's transaction speed is fast, and all the transactions are successfully transferred to other peers. Thus, permissioned blockchain is useful for the halal supply chain not just because it can secure transactions while addressing halal issues but also because the transaction speed and rate of transfer data are very effective.

Full Text

This preprint is available for download as a PDF.

Figures

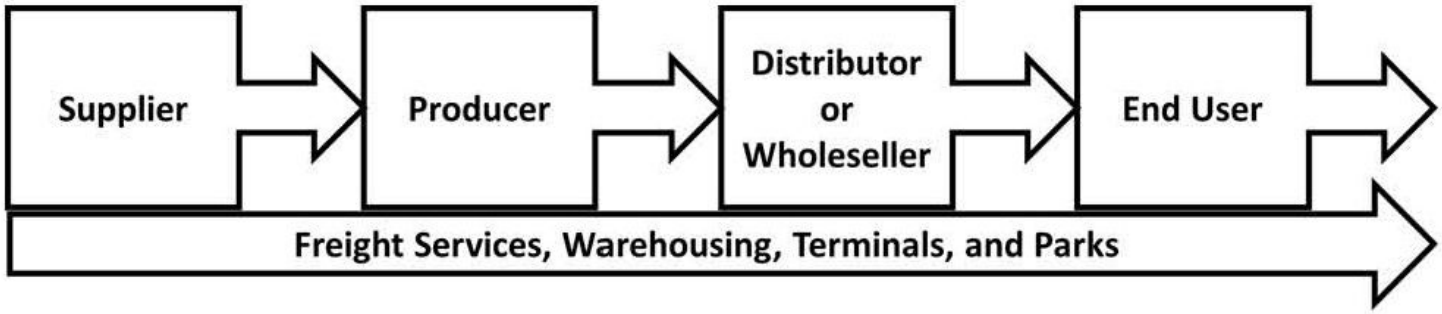

Figure 1

Ordering Service Process from the Halal Supplier to End User [29]

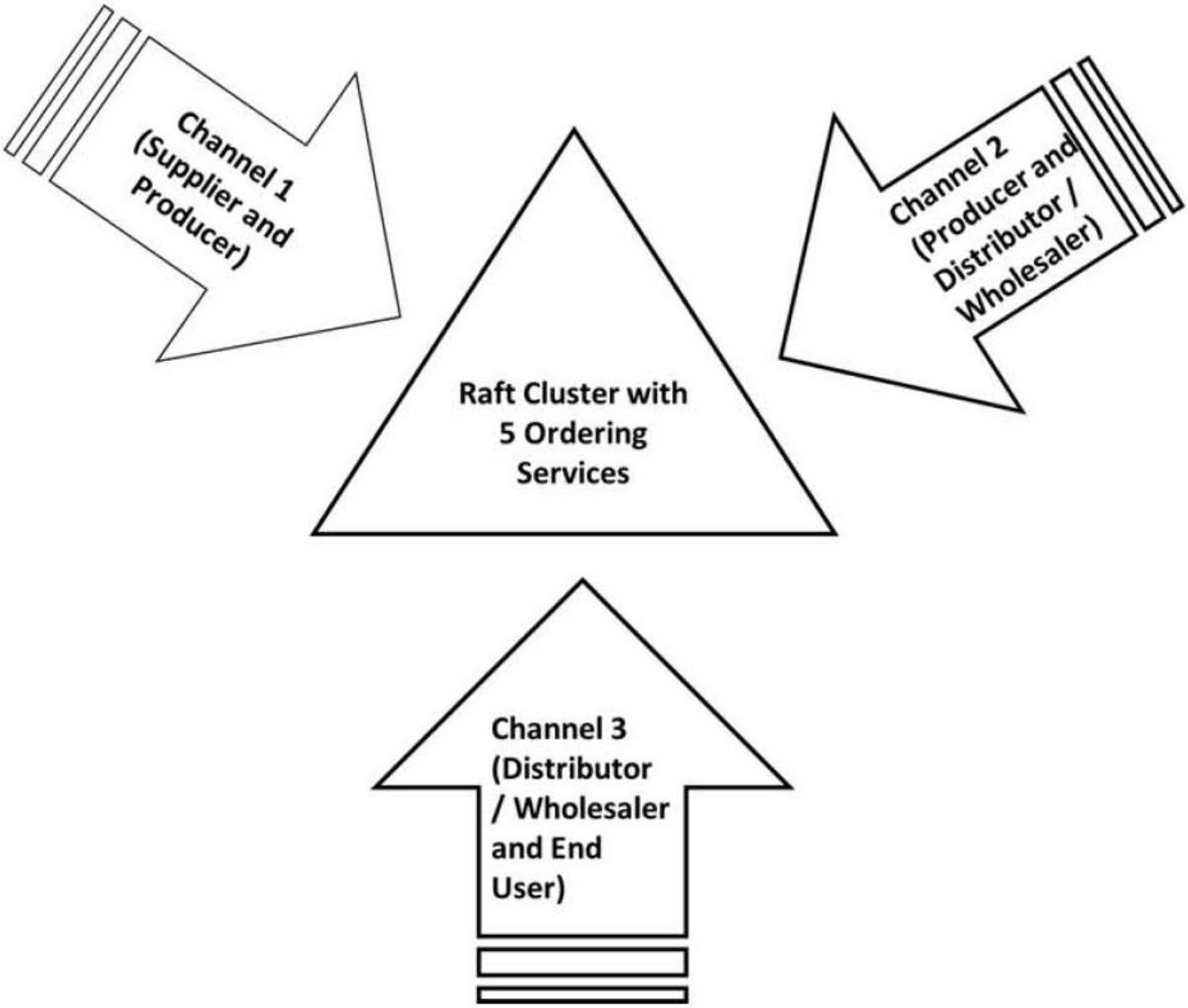

Figure 2

Blockchain Framework for the Halal Supply Chain

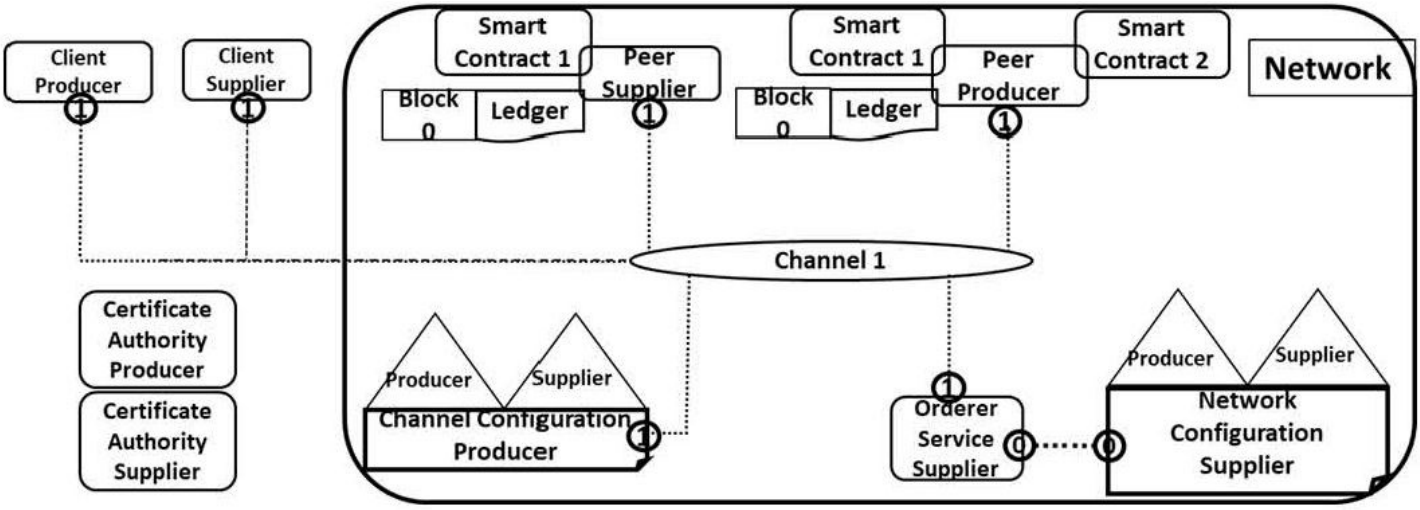

Figure 3

The Results of the Blockchain Channel for Suppliers and Producers in the First Channel of the Blockchain Network [30]

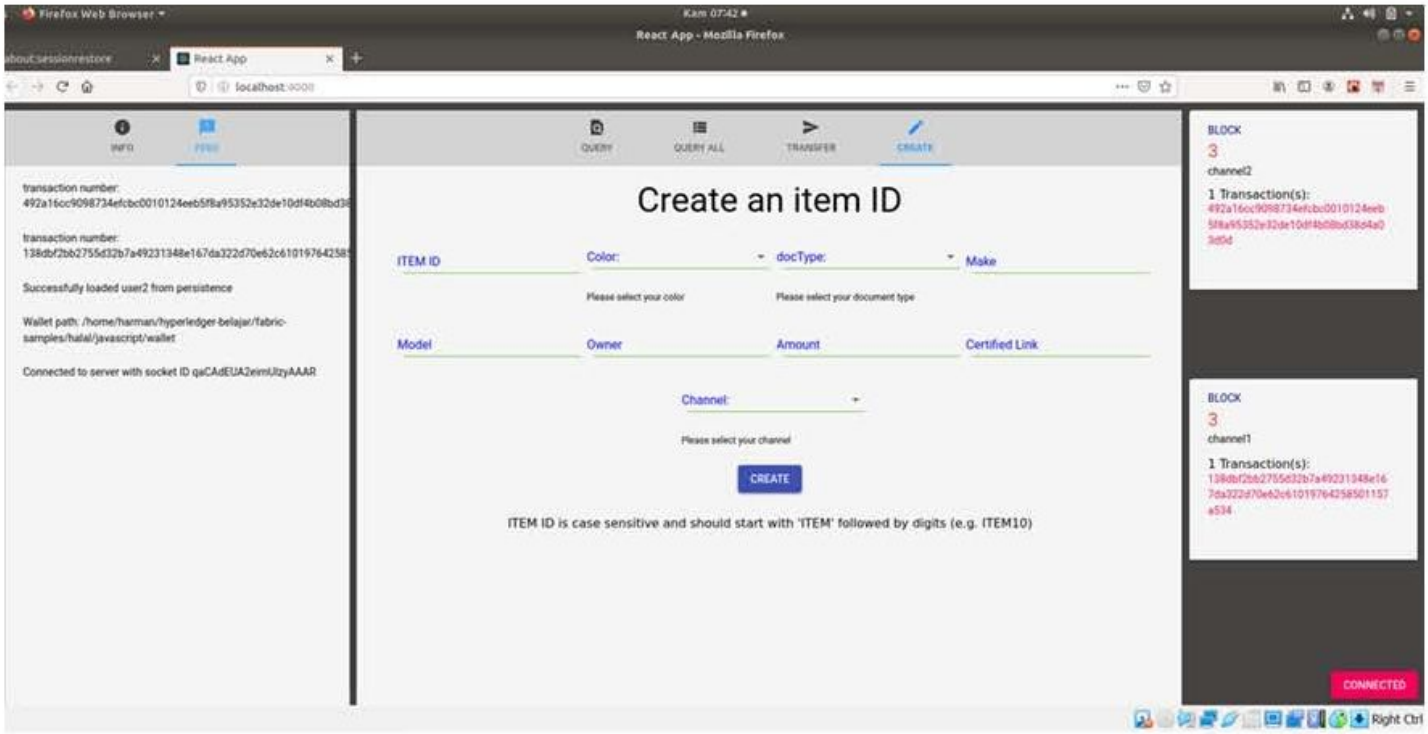

Figure 4

Display of the Blockchain Network's Web Interface

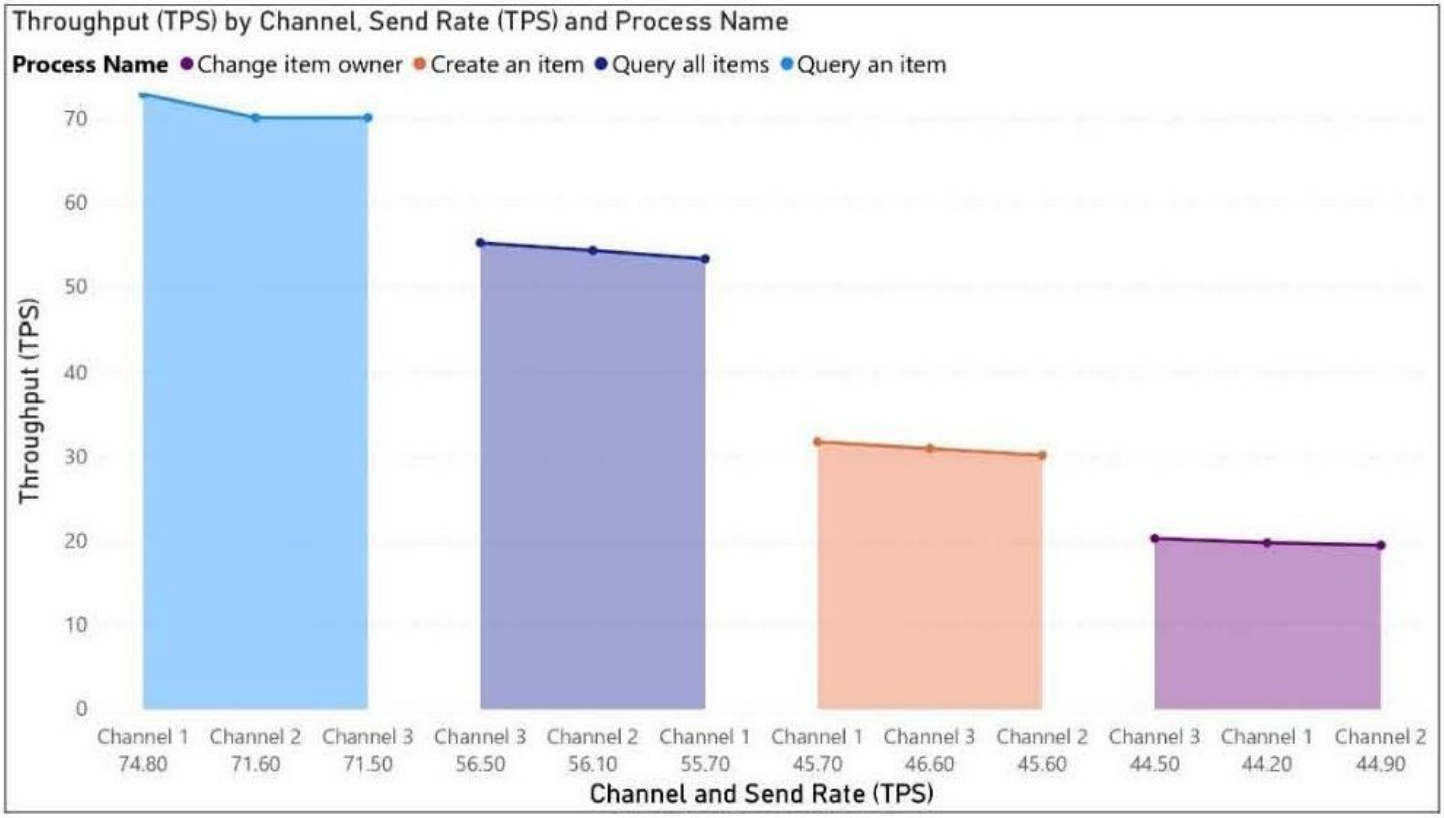

Figure 5

Simulation Results, First Iteration

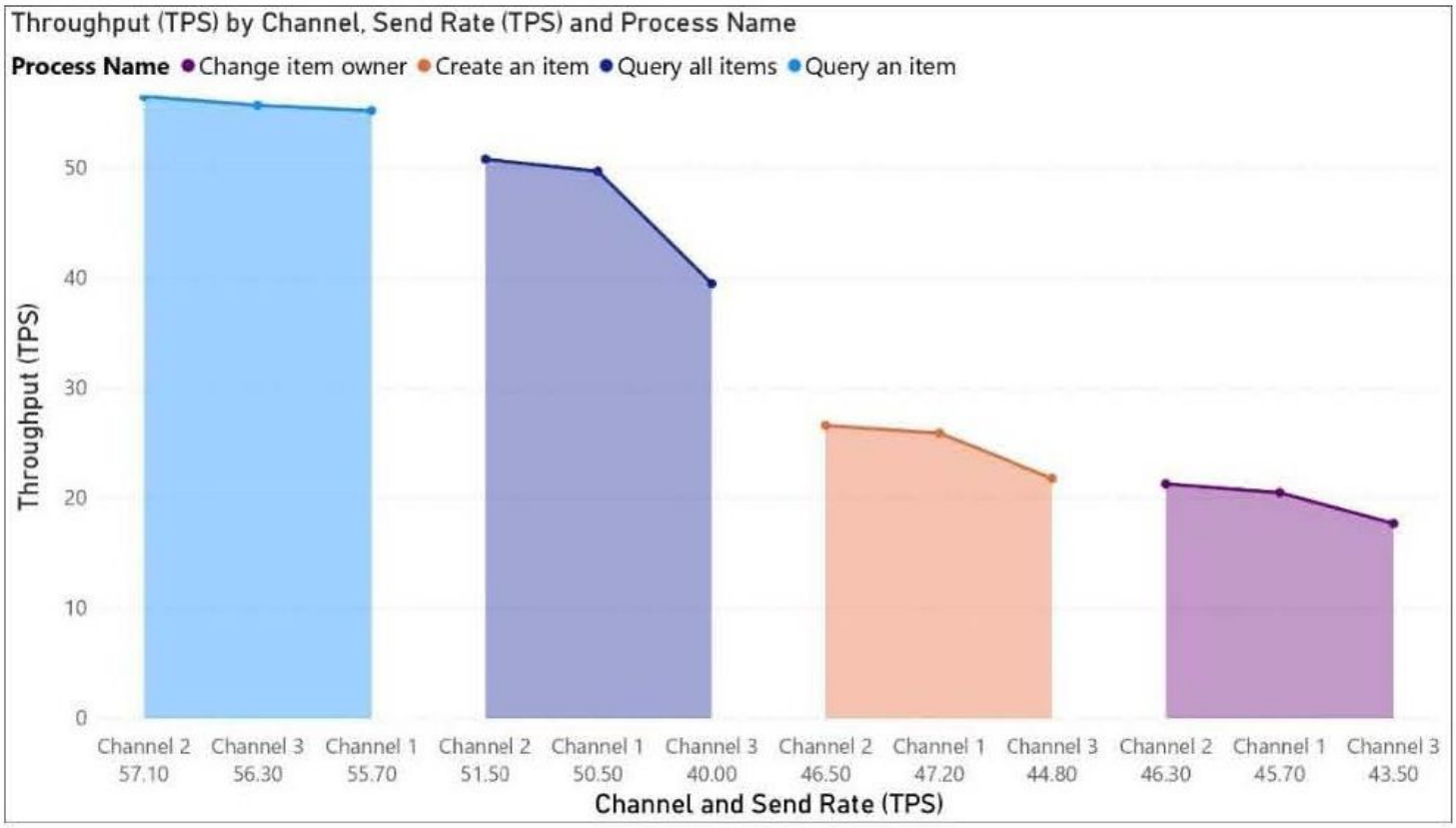

Figure 6

Simulation Results, Second Iteration

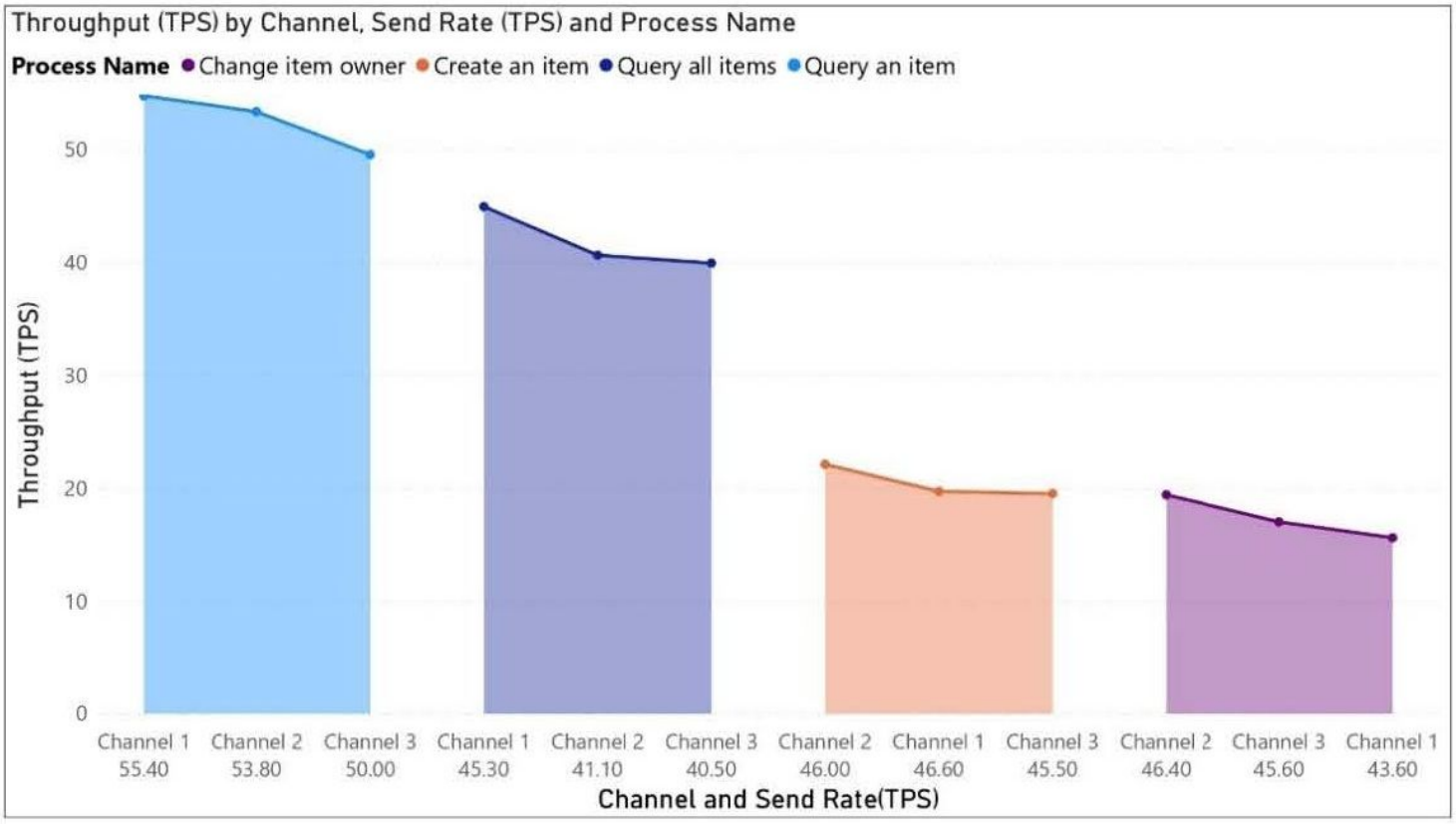

Figure 7

Simulation Results, Third Iteration