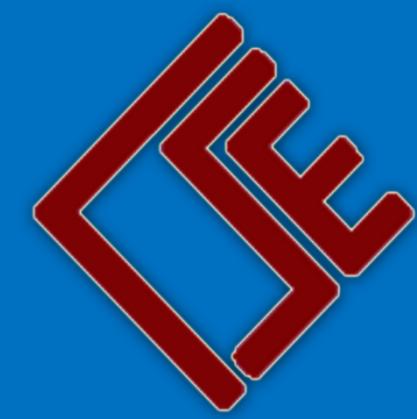


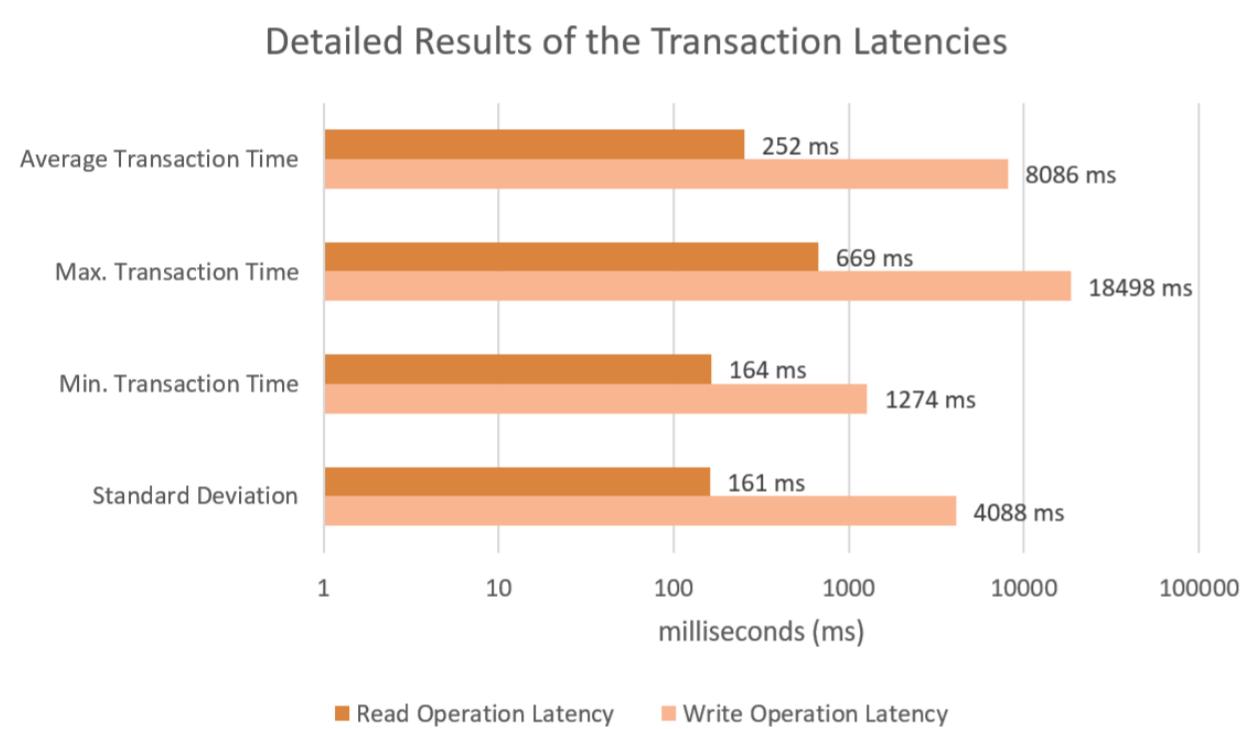
BLOCKCHAIN BASED ONLINE 3D GAME

Hürkan Uğur Onur Demir
Department of Computer Engineering, Yeditepe University



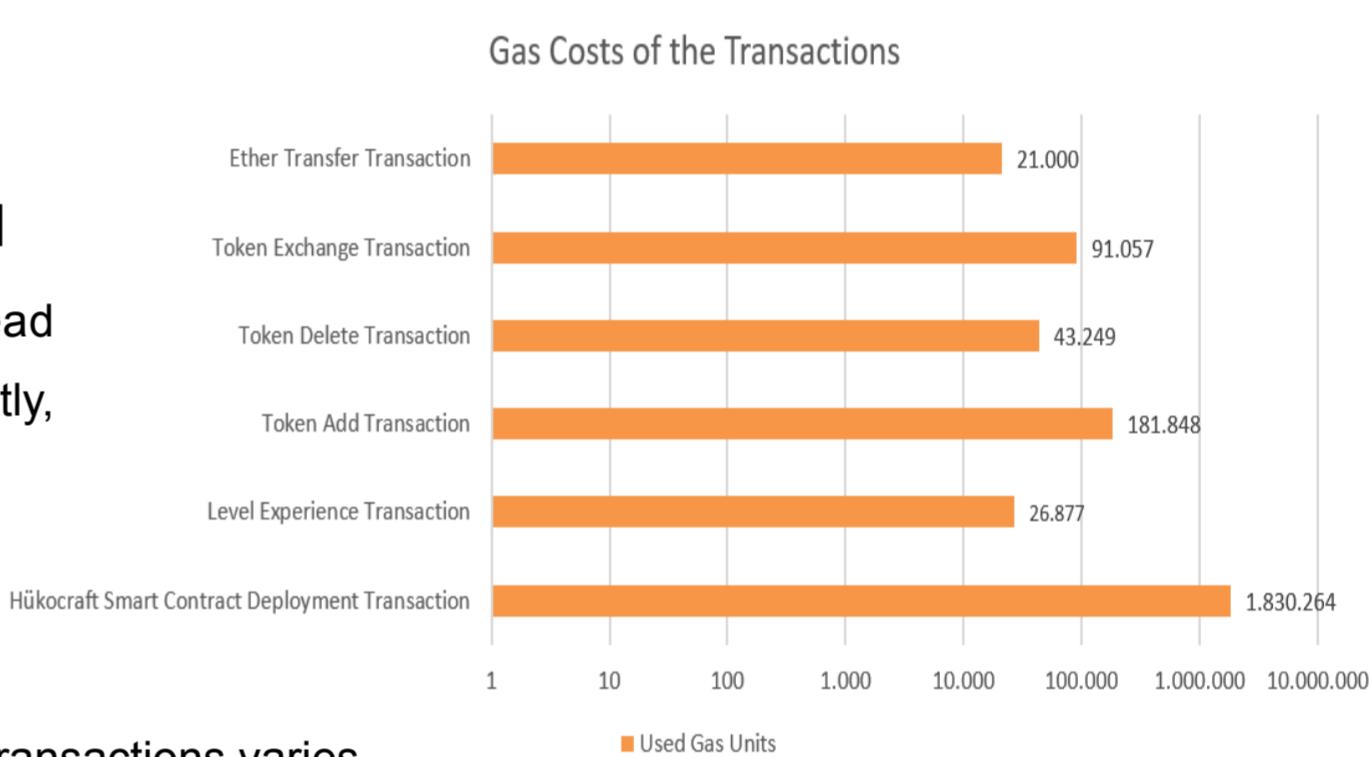
Hükocraft Smart Contract

The smart contracts of the Ethereum blockchain are the way to run programs on the blockchain. In the project, the Hükocraft Smart Contract is used to store player information, and perform peer-to-peer transactions such as Ether Transfer Transaction, Level Experience Transactions, Token Management Transactions, Token Exchange Transactions, Token Query Transactions, Inventory Query Transactions, and Scoreboard Operations.



Blockchain Transaction Speed

The test results show that while read operations are executed almost instantly, write operations take time to be fulfilled.



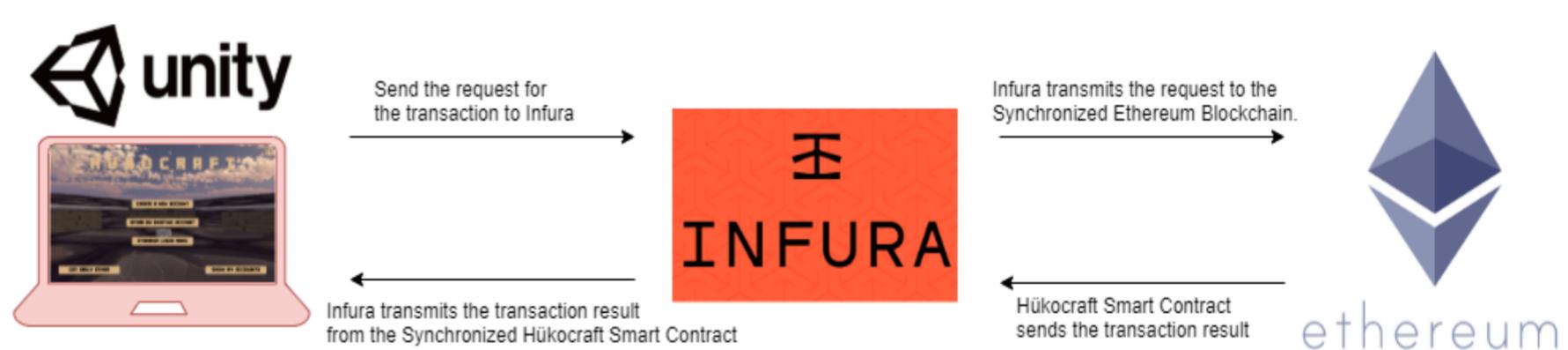
Blockchain Transaction Costs

The results show that the gas cost of the transactions varies, according to the complexity of the invoked function.

The functions with high complexity have higher gas costs, functions with low complexity have lower gas costs.

Communication Between Unity and Ethereum Blockchain

Before a blockchain transaction is performed, it is necessary for a computer node to synchronize the blockchain for itself. This process can take hours or days. Thanks to Infura, the developers do not have to synchronize the blockchain by themselves. Because Infura already does this for them.



Token Query via Ethereum Blockchain



Scoreboard via Ethereum Blockchain



Token Exchange via Ethereum Blockchain

Summary

Through this project, the people are provided a blockchain-based online 3D game, where their game data is managed by themselves without needing a 3rd party. The data management is conducted on the Ropsten Ethereum Blockchain Test Network. The players can perform Token Search Operations, Inventory Query Operations, Retrieving Game Ranking Scoreboard Operation, Real-Time Item Exchange, and Ether Transfer Operations.

Future Work

Due to the fact that the Gas prices are very expensive on the Ethereum blockchain currently, the smart contract of the game is kept on Ropsten Ethereum Test Network. Currently, the players are intimidated by the Gas prices on the Ethereum blockchain. When the Gas prices are optimized in the future, the smart contract of the game can be moved into the Ethereum blockchain. Furthermore, the current game system holds the public address and private keys in a local file named Hükocraft.txt. Therefore, MetaMask can be used to provide more transparency on private key security. Lastly, the game server can be moved into the cloud so that, it can handle more and more people in the future.

References

- Ethereum.org, "What are smart contracts?", <https://ethereum.org/en/smart-contracts/>, Online; Accessed October 27, 2021.
- IBM, "What is Blockchain Technology?", <https://www.ibm.com/topics/what-is-blockchain>, Online; Accessed October 25, 2021.

Contact

Onur Demir: odemir@cse.yeditepe.edu.tr
Hürkan Uğur: hurkan.ugur@std.yeditepe.edu.tr