

ABSTRACT

The current Internet of Things network still stores data centrally, namely on the database server, if the server is down then all data cannot be accessed or the database cannot be used. In addition, the basis for the development of the energy industry is a decentralized network in which all components are integrated and dynamically integrated. Blockchain is a decentralized and distributed database technology. Therefore, the author tries to implement a blockchain that has a decentralized and distributed system on a smart energy meter where data will be stored in a decentralized manner and distributed to all nodes on the blockchain network.

To create a private blockchain system there is the Ethereum framework. The author created a two node virtual machine that uses ubuntu in virtualbox. Two nodes will be connected to each other and perform the mining and validation process. The PZEM-004T sensor is connected to a Raspberry Pi 4B which will be programmed in python to send the data to node 1 with the MQTT communication protocol. The data is received at node 1 which will be stored and then displayed on the user's web displaying power and blockhash. The data will be saved to the blockchain database and data retrieval using python-specific web3 API or web3py to access smart contracts. So that power and blockhash data can be displayed to the user's web, the author uses a special python backend microframework, namely Flask.

Based on the results of measuring the performance of the mQTT protocol and blockchain system when compared to traditional databases, blockchain is less fast in the storage process because there is a transaction process and data verification. However, if it is applied to smart energy meter data, it doesn't matter because the time required for the storage process is a maximum of 1 minute. The number of nodes and the size of the data or block does not affect the performance of the proof of authority consensus algorithm because what affects the consensus performance is the CPU and the quality of the network at each node. In addition, there are other processes besides mining, namely the Flask and MQTT processes.

And the blockchain system and smart energy meter system run on a virtual machine that uses some of the CPU performance of the author's host OS.

Keywords : Internet of Things, Blockchain, Smart Contract, Ethereum, MQTT