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A Blockchain based P2P Transaction Model

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Abstract: ***With the growing demand for information technology, the digital economy is developing at a large pace. Blockchain (BT) is the medium, which connects the world's economy to the digital economy. Blockchain has importance in these applications, which manage finance and cryptocurrencies etc. Blockchain technology provides distributed management of ledgers with secure and smart transactions. In existing studies, there is no reasonable proposal for P2P transactions in Blockchain technology. The proposed work is implemented a peer-to-peer (P2P) application in Python programming language with blockchain technology. The secure transaction is ensured in the proposed system using SHA hash techniques. The proposed work used BT to create smart transactions between any number of Peers and creates an association between digital transactions and physical transactions. The proposed work ensures data security and provides trust among p2p network transactions. All peer nodes in the blockchain calculate or can mine a block and create the remaining amount in parallel, and then summarize the results. This makes good use of the vast resources of the processing unit resources in the blockchain and makes the calculation precious.***
Keywords: ***Blockchain, Peer-to-Peer network, SHA hash technique, crypto-currencies***

I. INTRODUCTION

Information technology provided major support for the global economy to be the developed one. With the growing demand for information technology such as Artificial Intelligence, Cloud computing, the Internet of Things (IoT), and Blockchain technologies global economy is gaining pace. The digital economy is another growing industry for a few years, it has attracted larger investments. Integrating new technologies such as Artificial Intelligence, Cloud computing, the Internet of Things (IoT), and Blockchain may evolve a real digital economy and its development will be very vast. This integration may pave the way to promote the digital economy in the global value chain.

The Existing blockchain P2P network has two problems in transmission one is the high rate, and the other is reliability. High transmission rate helps in blockchain P2P transactions can be disseminated fatly. Transmission rate change with network connectivity. Peer-to-Peer (P2P) networks provide distributed feature which more suitable for blockchain implementations. Blockchain need not use any third party, similarly, P2P self-organize and do not require any third party for transactions. There is existing work available with P2P networks on data transfer, file transfer, and network security, etc. The blockchain integration in the P2P network is the new area of study.

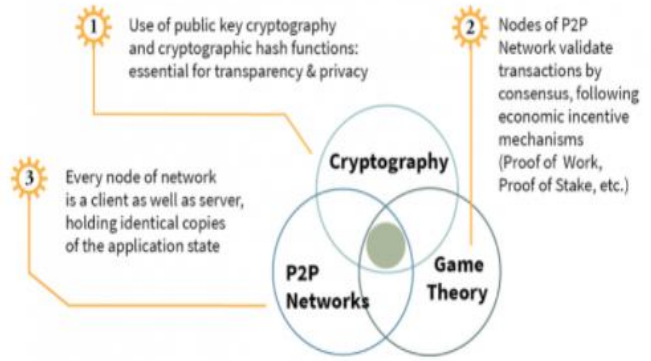

Figure: Overview of Blockchain and P2P network

There is a huge growing demand in mobile e-commerce around the world, which experiences extraordinary growth in the past decade along with the growing demand in smart mobile phones. E-commerce is very vital in global economic growth and it involves the management of huge transactions ranging from individual to institutions. Therefore, the tamper-proof mechanism is needed to provide a fully secure e-commerce transaction.

There are security risks available in E-commerce systems, which may include information leakage and data tampering, and this results in a serious threat to information stored. The security threat covers a major percentage for data tampering only, which is around 49% of information leakage. The illegitimate users may steal or tamper with the data by inducing internet users to open URLs in which they may inject the Trojan virus, thus it causes the virus to infect computers. These types of security threats are most common in e-commerce transactions and the transaction process creates issues in establishing a perfect system.

Therefore, with respect to current security threats, this proposed work aims to implement secure contracts and electronic transactions, and this application also implemented a blockchain-based P2P transaction model. The proposed method involves the mechanism handling digital transactions and physical transactions, and our technique implements the digital assets are mentioned as credit deposits. Sensitive data is handled in the transactions, the encoding method to prevent leaks of sensitive data in circulation. The proposed work exploits resources in the blockchain and makes the process feasible.

Blockchain has one of the most significant resources needed for secure transactions, which is tamper-proof and decentralized architecture. This technique can be applied to create smart contracts, Electronic-transactions for e-commerce, and a blockchain-based Peer-to-Peer (P2P) transaction can be implemented. This implementation ensures data security and transparency. Blockchain with P2P technology is useful to develop trust among entity peers, thus reducing costs. Thus, our proposed work is a centralized payment transaction application using BT.

In the following chapter 2, we discuss the blockchain and p2p network and related work handled by different authors. In chapter 3, we described our proposed methodology and brief details about our implementation. In chapter 4, the observations and interpretation are discussed. In chapter 5, this work is concluded with future enhancement options.

II. RELATED WORK

Many existing techniques have been studied by the researchers on the blockchain and P2P networks, some of the work are discussed below.

Representation of blockchain transactions in a P2P network is handled [1]. The system provided more clarity on the transaction using blockchain methods. Vigil et.al handled different associations between transactions. The author discussed all possible parameters for the smart and secure transactions through the blockchain and P2P networks. However, they proved their model is efficient on the theoretical part, in our proposed model, we considered the smart transaction as a real-time example of the smart transaction with secure hash values.

Teofilo et.al [2] studied the digital economy as social interactions. The study has covered a vast variety including social media, social marketing, online social networking, webcasts, advertising, marketing, etc. Similarly, the study also included the digital transaction process handled for online learning, Wiki educations, semantic webs, a social web of things, etc. This study is handled as a case study in all emerging areas of the social world and its digital transactions. However, the implementation of secure transactions or handling digital transactions is more important.

Jong-Hyouk Lee [3] studied digital transactions for electronic appliances. The author studied depth on the blockchain transactions handled in consumer electronics (CE). These consumer electronic transactions are mandatory in smart cities, the health care industry, and vehicle insurance industries are studied. However, these are done as a case study. The implementation and transactions are studied in our proposed system.

Internet of Things (IoT) and blockchain is studied together for the shared economy applications [4]. The aim of the study to exploit the novelty of blockchain in the shared economy, which is mainly in smart city applications like vehicle sharing systems. The author in detail discussed the autopay system integrating the IoT technologies and blockchain for smart transactions. However, the study handled for centralized environments such as IoT cloud services.

Nicholas et.al [5] discussed blockchain for consumer electronics devices exploiting IoT techniques. IoT enables devices can perform smart contracts with the use of blockchain and maintain their ledger in a distributed manner. The author discussed the privacy of data for the customers who handle the transactions. The addition of blockchain technology to the IoT enables consumer devices to ensure security, trust and auditability, and secure and smart contracts. However, the study completely handled for IoT based electronic devices, in our proposed work these areas to be considered.

Business to Business (B2B) is one of the most important sectors, which needs secure transaction and smart contracts, which is studied in [6]. The author discussed the implications of the implementation of B2B for e-commerce.

The author in [9] discussed the security and privacy requirements for IoT networks. Keeping the view of compatibility and scalability, flexible infrastructure is handled for the dynamic environment. Security issues and privacy issues are completely studied in this work. The existing problems in IoT on security threats and privacy threats are discussed.

Security of e-commerce transaction is important; the fair transaction is handled in the study in [12]. They implemented the secure cryptography protocol for maintaining secure transactions in the blockchain. The verifiably encrypted scheme (VES) was proposed to construct a blind signature. The work was proposed to handle the centralized Trusted third party (TTP), which can be considered to the global TTP, whereas global TTP is mandatory for blockchain transactions.

Vehicular networks are growing in demand for implementing smart cities in many countries, the author [13] discussed the security in Vehicular Networks (VNs). The edge service provides, and ordinary nodes communications and incentive provisioning were handled in a secure manner using blockchain techniques. The secure transactions are validated by the Proof of Authority (PoA) assigned in the distributed storage network. Further, increase the security cryptographic key primitives were used. However, the system was secure, it can be handled for Vehicular networks.

III. PROPOSED WORK

The proposed work is an implementation of a secure blockchain application for the university to handle the transaction processes. The network is designed as a Peer-to-Peer network, in which the distributed environment is handled. The transactions are handled in a secure way using the hash techniques. The proposed system is designed with four modules are described below.

A. Modules Details

The following are the modules in our implementation

1) Peer Connection
2) Mine block
3) Transaction
4) Blockchain

B. Peer Connection

The distribution environment of peer-to-peer connection was established. A seller (Peer-A) releases amount information by updating the characteristics and relevant parameters of the product in the smart contract and sets the purchase return period. On the other hand, a buyer (User-B) purchases the product by paying the corresponding digital assets through the smart contract. The smart contract will deduct a certain amount of digital assets from both User-A and User-B as the credit deposit.

C. Mine Block

A block will be mined by a peer and it gets a credit of 1-unit price. The balance will be updated according to the peer IP address and port number. Every peer has a unique ID, with which the peer can be able to transact. A peer can do mine block any number of times, it gets the credit value one for each mine.

D. Transaction

When a peer transfers the amount to the next peer, it is considered a transaction. For each transaction to perform, the peer has to choose the available peer ID and enter the amount to transfer. The amount entered by the sender peer will be sent to the receiver peer. But the transaction is only visible when the receiver peer does the mine block. The balance will be updated and shown on the peer data.

E. Blockchain

The chain will be created for every transaction of peers. The transactions are mine block or transfer to the other peer. The chain created will be having information such as sender, recipient, hash value, previous hash value, the time stamp of transaction. The hash value is generated through the SHA 256 algorithm. The SHA key created for each transaction is unique.

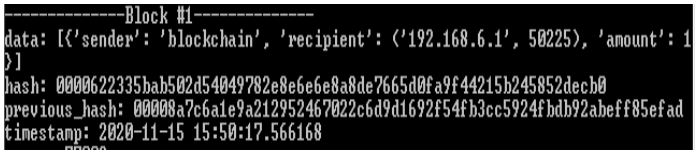

Figure1: Blockchain View

The below architecture, Figure 3, shows the overall flow of proposed work, which has the following advantages

1) Implement an application for the university to handle the transactions
2) Highly secured transaction handling through blockchain techniques

The execution is carried out with the following steps

a) Activate more than one peer
b) Establish a distributed connection between peers
c) Peers identify their neighbour peers in the network
d) Peer instantiates the mine block process and gets the credits
e) Peers make secure transactions to the other peer
f) Blockchain created for the transactions
g) Update chain to all available peers in the network

The application is built in such a way that any possible improvement is also easily implementable. The project is being designed in such a way that minimal maintenance is required. The application is developed in such a way that communication can be handled through User Interface, which is designed in TKinter. The users can make their secure transactions from the UI input on this GUI screen and can get output accordingly.

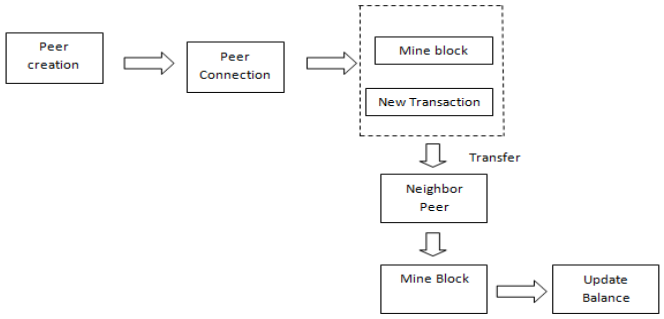

Figure 3: Overall architecture of blockchain-based p2p transactions

The above figure represents the system architecture of the proposed system. First, the distributed environment is created with peers. The peer can communicate and make payment transfers. The peer whenever mine the block will get the amount credited to a particular peer account.

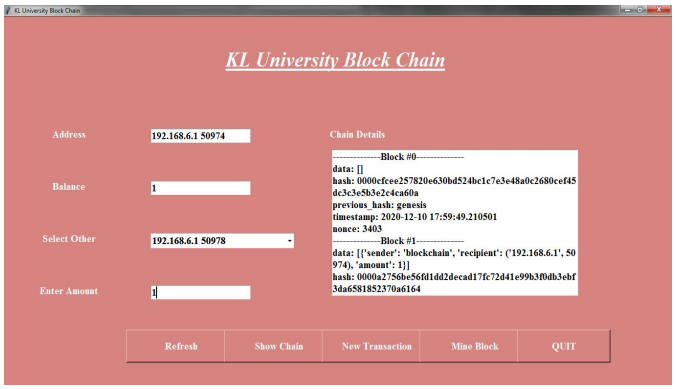

Figure 5: Application for Blockchain P2P

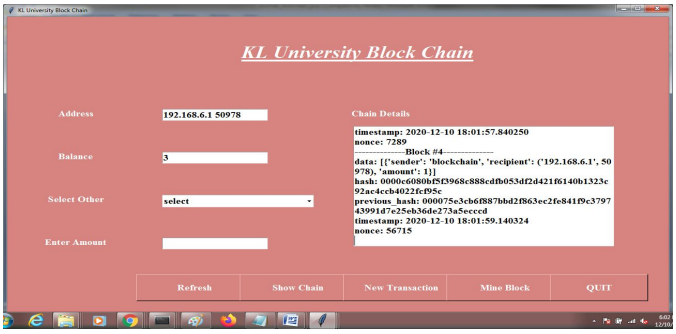

Figure 5: Transaction details

IV. RESULTS AND DISCUSSIONS

The proposed work is implemented in Anaconda 3 with libraries PyInquirer and other mandatory libraries. SHA 256 algorithm is used for hash value creation, this is available in hashlib in Python. The experimental results show that the transaction using blockchain is more secure as every one of the participants can view the chain. The below figure shows the chain of transactions in one peer command prompt.

Figure: Showing chain of transactions

V. CONCLUSIONS

With the growing demand for internet and information technology, Blockchain technologies have become the backbone of the digital economy. This has become an important medium to promote the integration of the real-world economy to the digital economy. Blockchain technologies can be used in any industry such as asset transactions, finance, and traceability. However, existing technology has no trading method or application framework to handle P2P transactions. The proposed system is a blockchain-based P2P transaction method, which we simulated using Python. We apply blockchain for creating smart contracts/ transactions. The proposed method can ensure data security data and establish trust between entities. For the sensitive data involved in a transaction, we propose a hashing algorithm to prevent leaks of sensitive data in a centralized environment.

In the future, the application can be extended to perform more real-time transactions.

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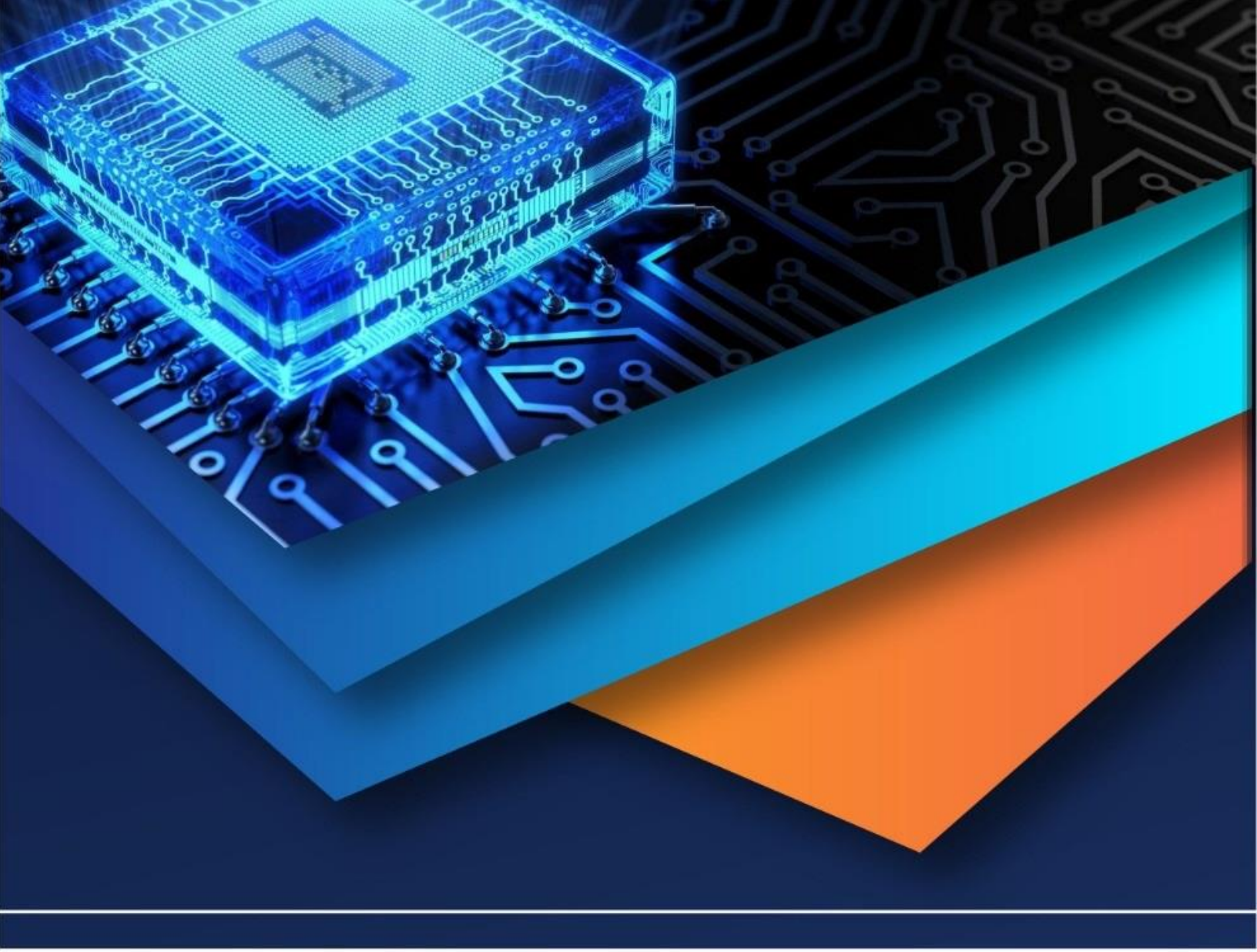

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