An Overview of Blockchain Technology

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ABSTRACT: *Blockchain technology is indeed a secure technology that saves data in such a way that changing, hacking, or deceiving the system is difficult or impossible. A blockchain is simply a computerized accounting system that is duplicated and shared across the blockchain's complete network of computer systems. Each block in the chain is mainly composed of several events, and whenever a new transaction occurs on the blockchain, a record of that transaction is added to the ledger of each participant. A blockchain is a type of smart contracts that records data using an irreversible asymmetric cryptography known as a hashing. Blockchains are futz digital ledgers that are resistant to tampering and are widely used in a decentralized fashion with no central authority. The author of this paper discusses blockchains and how it is used for security reasons. At its most basic, they enable a base of users to keep records in a shared ledger within that society, guaranteeing how no events can be altered after they have been published under standard public blockchain operation.*

KEYWORDS: *Blockchain, Crypto Currency, Cryptography, Hash Function, Technology*.

1. INTRODUCTION

At the present, blockchain technology is being created in which a digital transaction record is connected in a chain depending on its structure. Blockchain has a database that no one else can edit because of its blockchain technology (Zheng et al., 2017). The ability to conduct transactions securely without the involvement of third parties is the primary benefit of blockchain. Third-party negligence has the potential to reduce processing costs while enhancing transaction efficiency. Because it records all transactions that occur in perpetuity and then distributes them throughout the

entire blockchain network, blockchain technology provides a safe and trustworthy way of exchanging information. It may be used to solve a wide range of data-related issues (Sheth & Dattani, 2019).

Difficulties Blockchain technology is a type of technology. Adopting blockchain technology enables easy and reliable monitoring of the education system, and many online learning systems are currently built on blockchain technology. Changes have begun to be felt in all disciplines in Indonesia that have been aided by technology, most notably education, which has altered radically with the abandonment of the process of learning activities (C, 2018). Students would become bored and detached from the learning process if tactics like these are used. A better learning model, on the other hand, can improve students' comprehension of the material issues covered in each session, resulting in improved learning outcomes. Using the With blockchain technology now accessible, several companies, particularly those in the education sector, are interested in implementing it into a new learning technique that encourages inquiry in the learning process, which would, of course, boost student productivity. It is also used in blockchain-based digital payment systems (Kramer, 2019).

Bitcoin and blockchain were first proposed in 2008 by a person using the name Satoshi Nakamoto, who detailed how cryptographic as well as an interoperable ledger could be combined to create a virtual currency system. Bitcoin's extremely high volatility, and several authorities' views on its complexity, originally slowed its growth considerably, however the advantages of blockchain, bitcoin's underlying technology, attracted growing attention. (Yaga et al., 2018a). Some of the benefits of blockchain include the shared ledger, deconcentration, information exchange, futz design, and accessibility.

Blockchain technological innovation has been a lengthy and steady affair. Based on its applications, blockchain is now divided into three versions: 1.0, 2.0, and 3.0. The three of blockchain are described in the appendices. Cryptographic protocols has been utilized in a wide range of applications, including virtual money and finance, medical services, logistics, economic surveillance, energy management systems, and

intellectual property rights. (O. Jimoh et al., 2019). Blockchain is a critical technical mechanism that can carry out digital verifications such as cryptocurrency.

Blockchain technology is enabling the formation of new domains in a growing number of businesses. Blockchain technology is in the works. Further used improve Advanced Learning and construct a learning infrastructure. Individual perseverance in research, as well as strong social involvement with interest groups and expert mentorship connections, are all common components of creative scientific learning interactions. (Schinckus, 2020). Students can interact with more competent colleagues and mentors thanks to blockchain technology. Several investigations and scientific studies have shown that blockchain technology is currently widely employed in a range of fields. Furthermore, blockchain-based apps are disruptive in their domains due to their endless uses, such as electronic cash. There are many current areas of blockchain application that are actively researched in a scientific setting.

 Medical surveillance and financial fraud detecting markets for in-vehicle communications systems for confidentiality, translational research, intellectual property rights, secure broadband spectrum sensing, and security advancements in real estate, federated learning, and the pharmaceutical industry Unfortunately, there is little study on the use of blockchain technology in higher education in this and other reference publications, which this paper wishes to improve. (Yalla & Nikhilendra, 2020). To use blockchain technology in higher education, all of the procedures must be understood. The researchers plan to summarize the current level of blockchain technology in education, evaluate the technology's benefits and disadvantages, and to provide practical solutions that Higher Ed, particularly those who are in low- and middle-income nations, can use.(Yaga et al., 2018b).

The study's goal was to understand students' views by using framework like a format file, which is the most standard pattern for published scientific journal papers. The survey's investigators are indeed inspired with having periods of participation in academic design methods in their own nations. Furthermore, at the HEI and EdTech firms where they operate owning, they have been at the forefront of blockchain technology adoption. Another important motivation for this study is the scarcity of

research on blockchain utilization among college students (in total), particularly in the selected countries, so we are confident that the findings of this paper may be very important for global implementation, particularly in low- and middle-income countries. (Mermer et al., 2018).
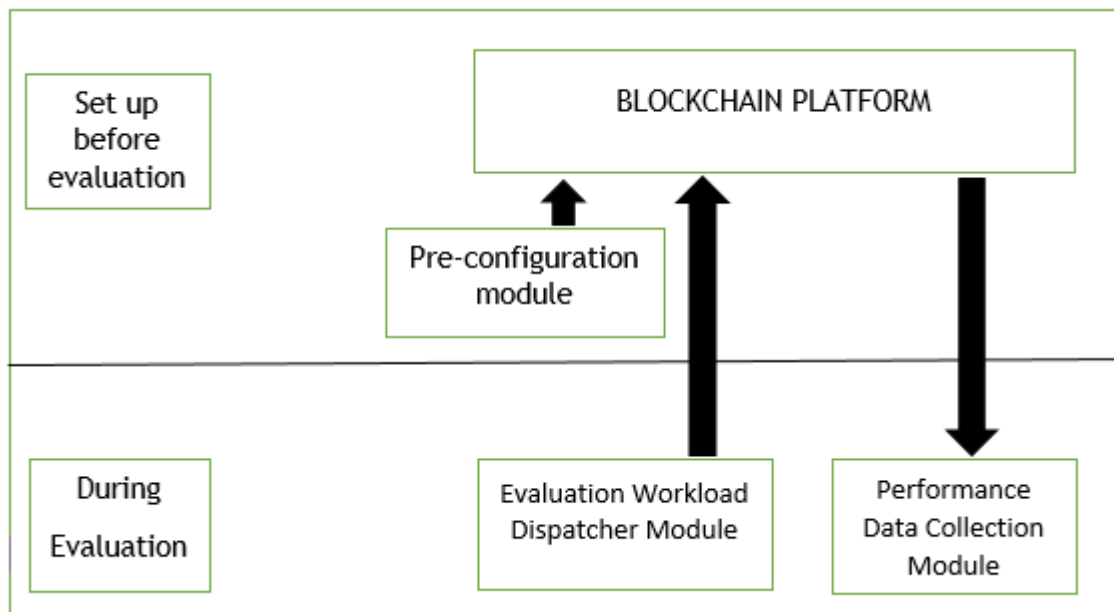
2. DISCUSSION

Figure 1: This shows the working of Blockchain Technology.

Construction of Blockchain Platforms and Buildings This article covers two blockchain platforms, which are also depicted in Figure 1: Hyperledger Fabric and Ethereum. For the tests, an Amazon Web services (aws) EC2 (c4.2xlarge example) including an Intel Intel core i5-1650 Eight core CPU, 15Gb Of memory, a 128GB Ssd storage, and Linux 16.04 is utilized. Evey site has a single blockchain station, which would be installed by download and install the necessary software, and that is Ethereum's geth and Hyper ledger Fabric 0.6. When just one blockchain node is installed, the consensus mechanism is deactivated by configuration.

Architecture has been assessed. The assessment architecture consists of four major modules: the objective blockchain system, which was before, assessment load scheduler, and efficiency information gathering. According to the assessment, the

first two parameters are displayed. (Komalavalli et al., 2020). During the evaluation, the workload dispatcher sends transactions to the decentralized network, and the performance data collecting component gathers event outcomes. Periodically (B): Ability To integrate and Simulated Uses To assess the platforms, we develop a simulated application for the trials that serves as a control. A cash transfer application that allows you to create an user profile (through the Create Account option) and send money to another account (via the function Issue Money). Payment can be transferred from one bank to another using the Issue Money feature (with function Transfer Money).

On every platform, each function is implemented individually. We create an Ethereum account by entering a password that will be used to decrypt the private key on the disc. We build two important tuples in the Hyper ledger Fabric contract, one for storing the account name and the other for storing account balances. We add money to an account by utilizing the account name as the code when we release payment to it. Finally, monies may be transferred from one account to another by deducting funds from either the parent profile and depositing them in the destination account.

Code extracts from Transfer Money's Ethereum smart contract and hyper ledger Fabric chain code, respectively. All smart contracts for each platform are prepared and deployed during reconfiguration, prepared for use throughout the test phase.

The range of queries (N) is fixed at one, ten, one hundred, one thousand, and ten thousand. Create Account, Issue Money, and Transfer Money are all possible transaction types. There are two blockchain platform alternatives.

Blockchain technologies include Ethereum and Hyper ledger Fabric. To imitate data, randomization is utilised (for example, the quantity of money or the account to be sent to). Furthermore, every investigation's findings are aggregated across 10 separate trials.

```
contract TransferMoney {

   mapping (address => uint) balances;

 ...

function sendCoin(address receiver,

 uint amount) returns(bool sufficient)

 {

 if (balances[msg.sender] < amount)

 return false;

 balances[msg.sender] -= amount;

  balances [receiver] += amount;

 return true;

 } ...

 }
```

An example of Solidity script from the Ethereum smart contract's Transfer Money function.

```
...

func (t *Chaincode) TransferMoney

(stub shim.ChaincodeStubInterface,

args []string) ([]byte, error) {

Avalbytes, err := stub.GetState(A)

Aval = strconv.Atoi(string(Avalbytes))

...

Aval = Aval − amount

Bval = Bval + amount

...

stub.PutState(A, []byte(strconv.Itoa(Aval)))

...

}

...
```

With The go script example from either the Transfer Money function of the hyper ledger Fabric chain code (i.e. smart contract). HTTP requests are being used in the Node.js application to interact between the client and the blockchain platform. Web3.js handles all Ethereum queries, which connect with a local node using JSONRPC call APIs. All queries in hyper ledger Fabric are implemented via Restful APIs. D. Information Gathering on Effectiveness This section goes through the data that was gathered for the analysis as well as the assessment measures that were utilized to describe the findings.

Transactional info: For each transaction, To monitor the efficiency of blockchain systems, the following information is gathered:

i.   In UNIX, the payment execution time (T1) is the moment once the transaction was executed.

ii.   The payment execution time(T2) is the UNIX time at where transaction was confirmed by the blockchain. For Ethereum, this data is immediately gathered via web3js APIs that report transactions d Hyper ledger Fabric, it is

implemented via a chain code that can connect to a peer and receive block events.

Metrics for Assessment: The metrics to be assessed for this inspection are efficient implementation, latency, and throughput. It's time to get started. The entire length of time (in seconds) that the blockchain platform takes to execute and confirm all operations in the given dataset is referred to as the execution time for each batch of transactions (maximum T2 - minimum T1). Latency The difference between the deployment time (T2T1) and the completion time (T2T2) is the latency for each transaction (T2T1). The average latency of a collection of operations is the sum of all the delay with in statistical model. Packet generation Bandwidth is calculated as the number of completed operations per second beginning with the first operation process is due. The average throughput is the total throughput divided by the execution time.

Before entering the Fourth Industrial Revolution, there was still a lot of media used in Indonesia that had not yet been computerized or online, also known as traditional learning methods, so there were still many learning processes using traditional methods, making the information published less effective and efficient. Students must have a big number of books for the learning process using this conventional approach, and assignment collection is still done by submitting sheets of assignments to lecturers. This traditional technique requires pupils to direct their queries to the teacher. Allowing youngsters to become inactive through the use of archaic learning approaches that are still very abstract and theoretical leads to identifying the Problem. In terms of the aforementioned difficulties, blockchain technology introduces notions that have never been seen before. Unlike traditional systems, which keep all data in a single digital ledger on a server, blockchain is decentralized. In Figure 2 shown the Blockchain Technology.
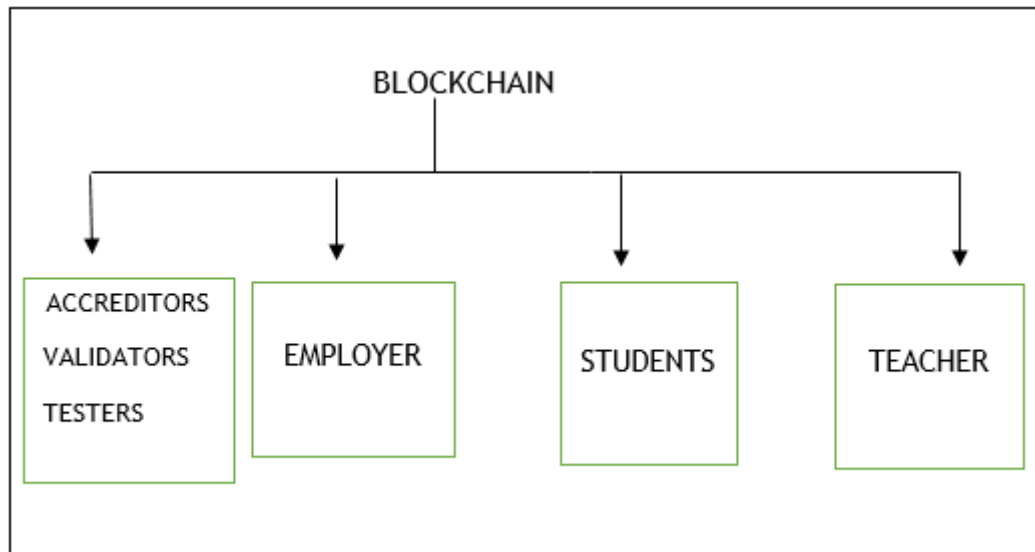
Figure 2: This shows where we can use Blockchain Technology.

Now that blockchain technology is being applied in education, it has the advantages of a decentralized system and robust encryption, and it may even help schools build infrastructures such as transcripts, certificates, and degrees. Implementing blockchain technology will result in a safe and trustworthy data storage saver, allowing the implementation of different digital or online learning approaches. Learners may utilize virtual education approaches to not only receive information through books but also to access learning material at any time and from any location, helping them to be more productive and effective.

➢ *The benefits and drawbacks of Bitcoin:*

Aces: In a de decentralized game, the government or banks have no ties with the cash. This can be beneficial if a country is experiencing financial difficulties or a general economic slowdown (like the "Unique Recession" in the United States). Normally, exchanges are assessed as absolved and moderate.

Cash is quite easy to trade to locations all around the world. In fact, in every practical sense, it takes no time at all. Banks are not permitted to employ a man's accumulated bitcoins for their use assumptions. Again, this implies that monetary torments imposed by the government will not affect the value of a bitcoin.

Bitcoin and other computer computerized standards are highly volatile. This implies that the value of a bitcoin can fluctuate without a doubt and there is frequently no real way to predict or explain why a shift may have occurred. Because bitcoins are not tied to a consolidated organization or bank, their costs can fluctuate dramatically. Bitcoins are increasingly being stored in virtual, online wallets. While it would require the ability and desire of a skilled software engineer to gain access to these virtual wallets, it has been done in the past, and hacking has occurred.

3. CONCLUSION

According to the preceding discussion, blockchain technology has recently garnered a lot of attention. Many industries, including cryptocurrencies, healthcare, economics, voting, identity management, IoT, and energy, have profited from technology. However, security concerns are the main hurdle to broader use. In this study, we examined the principles of BC technology. Following that, the BC security assaults and responses were described. We will focus on increasing the security and efficiency of numerous BC-utilized public-key systems in the future. The improved methods will then be used to ensure the safety of BC-based IoT.

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