

Blockchain For Sport: Taekwondo Rate Increase Test

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Abstract

Data management and distributed transactions are characteristic of blockchain. Although the blockchain was originally a technology used for bitcoin. The use of the blockchain spread to many sectors including the sports sector. In Taekwondo Indonesia there is an agenda for the Level Up Examination held in various Cities/Regencies by the Indonesian Taekwondo Branch Management and supervised by the Indonesian Taekwondo Provincial Administrators in the province. Data management, data transactions, and limited data access between the Indonesian Taekwondo Branch Management in a province are obstacles that need to be identified. Dapps using the Vexanium public blockchain is a solution to this problem. With the Vexanium Rate Increase Test data among the Indonesian Taekwondo Branch Officers in the province can be seen transparently and becomes a preventative measure in data loss and data manipulation that often occurs. This research discusses proving the use of Dapps using Vexanium in the Level Up Testing system to be more effective and far more efficient.

Keywords: Rate Increase Test, Taekwondo, Blockchain, Vexanium

1. Introduction

Rate Increase Test is an activity in order to test and evaluate the ability of Taekwondo in to move up to the next belt level, Taekwondoin presents hand movements, leg techniques, splitting techniques (Kyokpa), one on one battles by applying attack techniques and defense techniques (Kyorugi) and the basic structure of attacks and self-defense carried out imaginatively against oneself (Poomsae) according to the assessment points that have been tested by examiners [1][2]. The Level Up examination is conducted every 4 (four) months by the Indonesian Taekwondo Branch Management in the City/Regency and is monitored directly by the Provincial IT Management in the province.

In a world that is flooded with sophisticated information technology (IT) which is integrated with systems and devices that are highly connected and intelligent [3]. Blockchain is a chain transaction technology where transactions that can be called blocks are distributed to all connected networks, and every resource connected to the blockchain gets access rights to the blocks [4][5]. The blocks are verified by consensus of each connected resource called a consensus algorithm such as Proof of Work, proof of stake, etc. [6]. The function of the consensus algorithm on the blockchain is to prevent illegal actions that occur in blockchain networks such as DNS spoofing, SQL injection, and others.

Vexanium is a public Blockchain that was first established in Indonesia which was created aimed at supporting decentralized applications (DApps), Decentralized Finance (Defi) usability, and retail penetration [7][8][9]. Vexanium is a public Blockchain with a new breakthrough in blockchain technology innovation that shifted blockchain 2.0 technology to give birth to blockchain 3.0 technology. Vexanium has several advantages such as scalability to accommodate more than 2000 TPS (transactions per second), the cost of using vexanium is not based on transactions made by users but based on the resources used [10]. consensus Delegated Proof of Stake (DPoS) is a consensus algorithm developed to secure blockchain [11]. DPoS is a representation of democracy-based technology that uses voting and candidacy in blockchain security.

Measuring the success of information systems (IS) is a very large research theme in the academic world for some time [12]. The pinnacle of an organization's success is the many contributions that work together to create strong integrity in building goals, vision, and mission [13]. Currently, the Indonesian Taekwondo Branch Board or the Indonesian Taekwondo Provincial Board have their respective databases that are not integrated. So that it has 7 (seven) problems, namely: Each organization cannot access data with each other, if an organization experiences a down server, the organization cannot access the organization's data; The process of adjusting data takes a long time from each Branch Manager to the Provincial Management, there is a gap in manipulating data, a high risk of data loss, and a low level of data security, and the possibility of redundancy between databases [14].

Success is a variable that has a relationship between expectations, confirmation, and performance, both directly and indirectly [7]. With 7 (seven) problems above, we need a system that is a solution to these problems, namely the creation of a system with the concept of Dapps with vexanium. The purpose of this system is to optimize data integration between Indonesian Taekwondo Branch Managers/Indonesian Taekwondo Provincial Administrators, prevent loss of information, prevent data manipulation, as well as an effort so that Indonesian Taekwondo Branch Managers or Indonesian Taekwondo Provincial Administrators can synergize with each other due to information one can get used one of which is a matching activity. This observation was carried out in order to improve the quality and the quality of the problems in the environment of the Level Up Examination activities and to make a system that really helped the Management of the Indonesian Taekwondo Branch and the Management of the Indonesian Taekwondo Province on the Level Increase Exam [15][16].

2. Related Work

This research is the first step towards a more transparent and technologically advanced rate increase test system. This is a high credit in the world of decentralized sport globally, and an assessment system that can offer a globally integrated perspective for students and athletes apart from taekwondo, as well as for other potential stakeholders.

Previous research has been conducted showing that biomechanical parameters used in controlling kick training status and orienting the training objectives of black belt competitors, where the technology used to view kick angles is a 3D motion capture system. From here it is seen that technology has begun to penetrate into the world of taekwondo athletes but has not been touched by blockchain technology [17].

Other studies have also been obtained regarding kicks in the taekwondo branch, where electrogoniometer sensors have been used to measure the angular motion of ankle and knee joints [18]. Not yet seen that blockchain technology was adopted in the study. Regarding the world of taekwondo

competition research has also been carried out, but it is not related and blockchain technology but rather focuses on the tactical technical development of junior athletes on the basis of selection following the Olympics [19].

In recent years the robotics world has penetrated into the world of sports, one of which is in the branch of taekwondo because research has been carried out on a robot presented in the taekwondo championship in interacting and children and also adult taekwondo athletes [20].

In addition to robot technology, research in the field of taekwondo has also discussed the subject of data, where the data obtained can develop a special training program, which takes into account the temperamental characteristics of athletes[21]. However, the data has not been processed for the process of securing privacy using blockchain technology. The performance of other taekwondo athletes made as research and related to the athlete's privacy data collection has been carried out in different places, but the data is still not guaranteed whether it is safe from the intervention of those responsible or not [22].

The management of the results of adolescent pencaksilat physical tests of the comparative categories conducted by previous researchers has adopted an online system that uses software [23], but the software created at that time cannot even be said of its reality. Because reviewing the data at this time is an invaluable resource, because it can guide all business decisions in most human activities. Threats to data integrity are thus very relevant, because damaging a data can influence an important business decision [24].

There needs to be a system update from the database on the local server to blockchain technology so that the existence of rate increase test results can maintain its authenticity and aims to improve the work that is effective and efficient in managing data collection [26]. Basically a blockchain processor can be combined into a database that belongs to. Blockchain can receive data to enter the database in the form of a hash that is guaranteed to be safe from the reach of hackers [25].

It can be concluded that current blockchain technology is indeed needed in the field of sports and athletes, especially taekwondo, in accordance with the elaboration of the problems found in 10 (ten) previous studies.

3. Research Method

By becoming familiar with the history of the subject to be studied, it is possible to identify common areas of concern that can provide clues to certain things that are worth studying [26]. Study literature has been carried out as one of the applications of research methods and supports research methods to be conducted [13][27].

Various Use Cases Of Blockchain Technology

Blockchain to be a solution to the existing problem. The following is the application of Blockchain technology in several types of use cases such as Figure 1:



Figure 1. Various Use Cases Of Blockchain Technology (VUCB)

Through the framework contained in Figure 1, it can be translated into 4 points of Various Use Cases of Blockchain Technology (VUCB) as follows:

- **VUCB 01:** Supply chain transparency and traceability using blockchain technology becomes complex because the supply chain includes distributed activities such as the utilization of human resources, the production process, and the entire sales process [28]. The application of the blockchain in the supply chain sector eliminates intermediaries, transparency, traceability, and increasing trust [29].
- **VUCB 02:** Agricultural product data security uses the blockchain consensus algorithm, in the process of planting until consumers can buy agricultural products that can be tracked in real-time [30]. However, centralized data storage is still a problem in data security. Thus, the blockchain consensus algorithm verifies each block that is created and rejects the block if verification fails [10].
- **VUCB 03:** Data management makes use of the immutable nature of the blockchain, the problems with electronic records such as information leakage, information destruction, and information loss are problems that are often faced [34]. Blockchain is the solution to this problem because all transactions recorded on the Blockchain cannot be changed [31]. Because if there is a change that occurs in a good data that is only one small scratch or an unwanted character, then the assessment in this level increase test is not valid and is considered to be a forgery.
- **VUCB 04:** Certificate can be used by blockchain in the academic world in managing content, teaching, and competency transactions, is assessed by consensus by students, coaches, and entrepreneurs, to eliminate once and for all the "distance" between the academic world and the world of work. All types of certificates issued by an educational institution can be stored permanently and can be trusted using Blockchain technology [32]. Counterfeiting is something terrible, and with blockchain certificate forgery can be overcome [33][34][35].

SHA256 Algorithm

SHA256 is a form of one-way encryption where encryption results are static and have an important role in blockchain technology [36]. Computing SHA256 is divided into 2 steps. Pre-process original messages that involve padding and expanding messages to gather computational results. Padding aims to add bits according to several rules until the total length of 512-bit integers. As one example of data that can have been converted into a hash is as follows:

42E16F1C754C91E6C0514D0E0B34A72FECD91E515ED56F011DC4E9A0CED93031

4. Result And Analysis

1. Problem Analysis

With the development of technology in the digital age, anyone can get information from various sources easily, including through online media. With the great need for information today, many agencies innovate in technology for the sake of information. The website is a web page that can be used using an Internet connection [37]. Redundant data, information leakage, loss of information, to information damage often occurs on a system that is not integrated and still uses a centralized database. Blockchain is a solution to overcome these shortcomings and problems[38]. With the application of the test system to increase the level using blockchain technology has several advantages such as integrated data between the Branch Managers of Taekwondo Indonesia in a Province, recording data that is permanent and permanent, immutable data, and data transparency and ease in tracking data[39].

2. Blockchain Scheme

Blockchain has a flow in storing a transaction as described in figure 1, first, there is a transaction request to be linked to the blockchain. Then the data that is ready to be submitted to the system will be converted into a hash-shaped sha-256[40].

Requests that have been received are then shared with the P2P network for approval, then each node connected to the network performs a data verification process based on the Delegated Proof of Stake (DPoS) consensus algorithm according to the hash algorithm received.

After the data has been successfully verified, the data is stored on the Blockchain and is joined to all transactions to create a new data block for the ledger. Finally, a new block is permanently made on the blockchain and is immutable. And if the 6 steps in the blockchain scheme have been implemented then the transaction is considered complete.

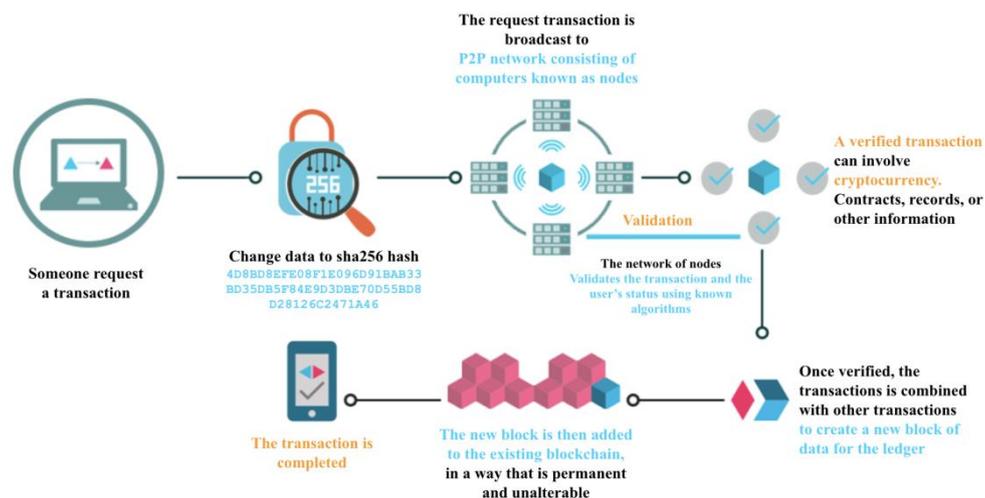


Figure 1. Blockchain Scheme

3. Listing Program

The following program listing is a prototype of the Taekwondo Promotion Belt test. Users only need to authenticate once to get permission to access the services provided. The purpose of designing this application is to improve data security and good data transparency [29]. Figure 2 displays a method to check the hash value of the old block with the new block where if the hash value matches then it will return true, and if not then return false.

```
import json
import hashlib
import time

# Create a new Blockchain called iBlockchain
class iBlockchain(object):
    def init(self):
self.currentTrx = []
self.BlockChain = []

        # Genesis BlockChain
self.newTrx(previous_hash=1, proof=100)

# Create a new Block in the iBlockchain
def newBlock(self, proof, previous_hash=None):

    block = {
        'index': len(self.BlockChain) + 1,
        'timestamp': time(),
        'transactions': self.currentTrx,
        'proof': proof,
        'previous_hash': previous_hash or self.hash(self.BlockChain[-1]),
    }

    # Reset the current list of transactions
self.currentTrx = []

self.BlockChain.append(block)
    return block

# Creates new Trx in iBlockchain
def newTrx(self, amount, sender, recipient):

self.currentTrx.append({
        # integers
        'amount': amount,
        'sender': sender,
        'recipient': recipient,
```

```
    })

    return self.lastTrx['index'] + 1

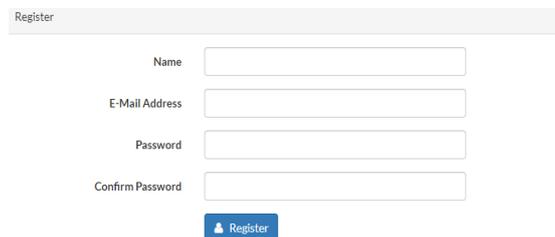
@property
def lastTrx(self):
    return self.BlockChain[-1]

@staticmethod
# Creates a SHA-256 hash of a Block
def hash(block):

    blockSHA = json.dumps(block, sort_keys=True).encode()
    return hashlib.sha256(blockSHA).hexdigest()
```

Figure 2. Creating New Blocks Syntax

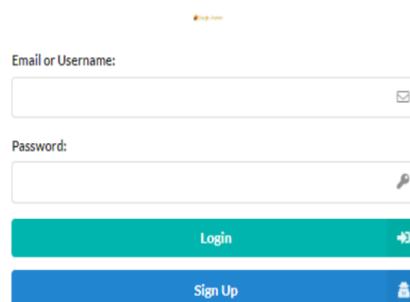
When a user accesses the website it will be redirected to the welcome page, where 3 options have been given for the user to enter, register, or enter as a guest. New users can click on the signup button as seen in Figure 2. And be directed to be able to fill in their personal data such as name, email, and password.



The image shows a registration form titled "Register". It contains four input fields: "Name", "E-Mail Address", "Password", and "Confirm Password". Below the fields is a blue button with a white arrow and the text "Register".

Figure 3. Register Page

Meanwhile, it can be seen in Figure 3. If someone has already registered and already has an account before, then you can directly click the login button and enter the registered data such as username and password.



The image shows a login form. It has two input fields: "Email or Username:" and "Password:". Below the fields are two buttons: a teal "Login" button with a white arrow and a blue "Sign Up" button with a white lock icon.

Figure 4. Login Page

When successfully logged in, it will be transferred to the dashboard page according to Figure 5. The dashboard component consists of the number of participants who have taken the Taekwondo Rate Increase Test, the estimated average amount of time verified data on the blockchain, the data linked by the blockchain, and the total guests who have seen Taekwondo Rate Increase test. The dashboard puts forward the line graph display so that it looks more elegant, but still, numbers are embedded as detailed information because not all users can read line graphs.



Figure 5. Dashboard Page

When the Promotion Test menu is clicked, it will be redirected to the promotion test page. There is a notification about the data promotion test, if it has been linked to the blockchain then the notification color is green that says "Your data is anchored to Blockchain. Your data is safe." and if it has not been successfully linked to the blockchain network, the display will match what is shown in Figure 7. The notification color is orange and reads to link to the blockchain.

Please note that linking a hash-shaped data to a blockchain network takes up to 10 minutes, and expensive fees are also required for payments using bitcoin. Therefore, the quality is well maintained and we can be sure that the promotion test data in the taekwondo assessment system will be safe.

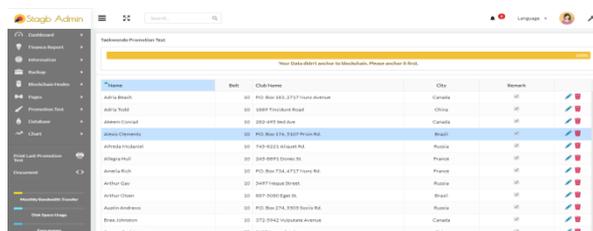


Figure 7. Taekwondo Rate Increase Test Page

To link data that has not been linked to the Blockchain. Click on the side menu "Blockchain Nodes". As illustrated in Figure 8. There is a column to anchor data to the blockchain where there are 2 (two) options namely anchor and later. There are 4 stages of verification. First, checking data integrity; Then, checking the data whether it has been linked to the blockchain, checking the authenticity of the issuer, and finally checking the integrity of the file. Information about data previously linked to the blockchain is stored in the archive column. Data that has not been linked to the Blockchain and is not secure will be informed in the notification column. Verification progress regarding the latest data linked to the Blockchain can be seen and there is a status message.

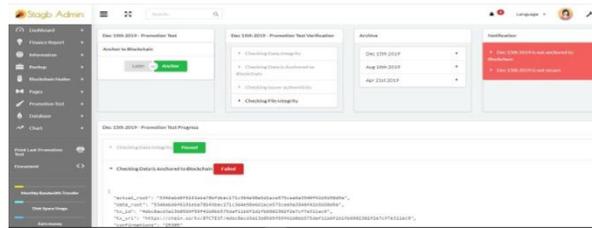


Figure 8. Blockchain Nodes Page

5. Conclusion

Optimizing data integration between the Indonesian Taekwondo Branch Management or the Indonesian Taekwondo Provincial Board, preventing information loss and data manipulation resulted in a prototype of a Taekwondo Rate Increase Test System using Blockchain Technology. With this prototype, data security is not a problem, it is more structured, data transparency and the use of information obtained can be used in the future, one of which is for competition activities.

Where in its implementation, any assessment data that has been obtained during the test can be linked to the blockchain network. So the value obtained is still original to reduce cheating that often occurs in the realm of sports, especially for the preparation of the Taekwondo Olympics.

Rate Increase Test using the current blockchain does not stop the need for further research on blockchain technology. Instead, the next important step is to understand and formalize interactions between chains to solve other problems in the sports field. Not only for the rate increase test, it could be for other things such as athlete's health data, athlete's champion data during the Olympics and even the certificates that have been achieved by the athletes. Separating the objectives of the implementation using blockchain technology can help explore all variants of the sports sector data security implementation better.

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