1 Development of Enterprise Resource Planning using Blockchain

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Abstract. The purpose of this research is to examine the possibility of using blockchain as a medium to operate ERP. The method used in this research is descriptive qualitative method to present a complete picture of the situation related to some of the variable situations examined. The results of this study are ways to identify whether blockhain is suitable for implementation with ERP. This research was conducted by discussing the performance, the level of resource used, and the effects caused if blockchain is used as a medium for the operation of ERP.

1 Introduction

Enterprise Resource Planning (ERP) can be defined as the implementation of standard software modules for core business processes, usually combined with bespoke customization for competitive differentiation. The aim is to provide broad integration and depth of function in various multi-functional and often multi-national organizations. For many organizations, such development can begin with a single pilot project, or in a business function. However, the potential for expansion into the integration of all companies remains a key factor in ERP implementation [1]. Blockchain is the technology that underlies Bitcoin and other cryptocurrency, which is managed by decentralized computer networks. Blockchain is considered an open ledger where all online transactions are recorded and everyone is allowed to connect, to send or verify transactions. In other words, Blockchain is a digital accounting record system that records every transaction in accordance with a set of mathematical rules to prevent illegal interference. Research on the impact of cryptocurrency, decentralized ledgers, and Blockchain has shown that they are potentially powerful tools to minimize costs and bring major changes to the financial sector in the long run [2]. The ERP system is an evolution of the MRP II system, which was designed with the aim of managing production facility orders, production plans, and inventory. ERP systems work by integrating inventory data with financial data, sales, and human resources, so that it can help organizations to determine product prices, produce financial reports, as well as manage human resources, materials, and money [3]. An ERP system with the principle of "One customer, One system" is the proof that the Legacy and ERP architecture remains until it is last converted to SAP, it is done to extend the cost and complexity of the reengineering effort, focusing on data integrity and control of changes during customer conversion as a key to success conversion, while the initial business team structure and resulting business requirements have an impact on mass adjustments and slowing down on initial projects. Thus, major changes to the business model can use ERP systems on each project [4]. Whereas Sustainable Enterprise Resource planning is a corporate system with the incorporation of important entities of sustainable value owned by the company into a centralized system, where the information system is massive, and its distribution requires a large investment of money and time. Good

plans, abundant resources, and good commitment are needed to achieve success in implementing this system [5].

Success factors in implementing ERP systems focus on characterizing the context of the implementing company and the influence of the relative importance of Critical Success Factor (CSF). The successful use of ERP also considers the ranking, modeling or assessment of CSF risks in ERP implementation explicitly by considering it internally or externally for an organization [6]. ERP learning is expected to provide various skills for users and those who study it, such as ERP Technical Knowledge, Technology Management Knowledge, Business Functional Knowledge, Interpersonal Skills, as well as Team Knowledge and Skills to assist in determining the level of benefits of ERP programs to meet industry needs [7]. ERP can be used to determine company policy; this is because there is a direct effect specifically designed for using ERP except for the effect of facilitating conditions on actual use [8]. Understanding the concept of ERP can be done while working or by using a turn-based simulation game on students, so students can simulate running their business with real-life ERP (mySAP ERP). This simulation requires the students to analyze transactional data as a consideration for making business decisions and ensuring the benefits of their operations [9,10]. Preferences and temporal dynamics in information processing can be measured by looking at the response of the use of ERP systems to the company's profit and loss (valence), by showing that the valence information to be processed [11].

This study aims to identify the performance of ERP use using blockchain rules, as a step to eliminate one of the problems of using ERP, namely the procurement and maintenance costs of the server, because the server as a resource must be measured, directed, and used properly so that it will be a determining factor of development and success the company. The method used in this research is descriptive qualitative method to present a complete picture of the situation related to some of the variable situations examined.

2. Method
This research used descriptive method to find out the variables related to ERP and blockchain as well as network diagrams to provide an overview of the integration between ERP and Blockchain systems with test data transmission rates using sample data. Examples of these data are executed on the blockchain network owned by Stellar

3. Results and Discussion
As a first step in testing ERP applications using Blockchain, a network diagram to illustrate the outline of the scheme to be used can be seen in Figure 1.
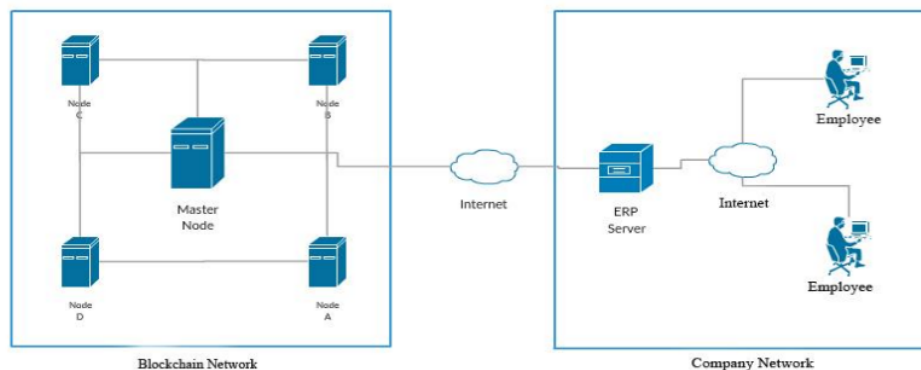
Figure 1. Network Diagram of ERP and Blockchain Integration

From the diagram above, the combination of ERP systems with Blockchain still requires a server that is a bridge between ERP interfaces and ERP data stored on the Blockchain network. For example,

an employee registers a new company asset, then the asset data is distributed through the company's intranet network, it then be forwarded to the ERP server, the ERP server store the new data by forwarding the data to one of the nodes on the Blockchain network, then the node will distribute the copies of data to other nodes (the activity is called confirmation). After the confirmation process is complete, the hash / data identity will be returned to the ERP server as a note if the stored data is going to be read again.

If an employee wanted to to retrieve data from the blockchain network, in this case a list of assets owned by the company, ERP server use a hash / data identity as a reference for what data that is gooing to be retrieved. Then, the ERP server fetch the data to the blockchain network to get data that matches the hash / identity of the requested data. After the data is retrieved, the ERP server will transmit the data into an interface that can be understood by employees.

Next is a step-by-step on how to store the data. The first step is to encrypt and save the data on the blockchain network, the data is encrypted in the form of strings or text using Archfour algorithm (See Figure 2).

Figure 2. Data Encryption Using the Arcfour Algorithm

Encrypted data is then be stored on the blockchain network; in this case, Stellar's Blockchain is used with the interface / UI of stellarport.io (See Figure 3).
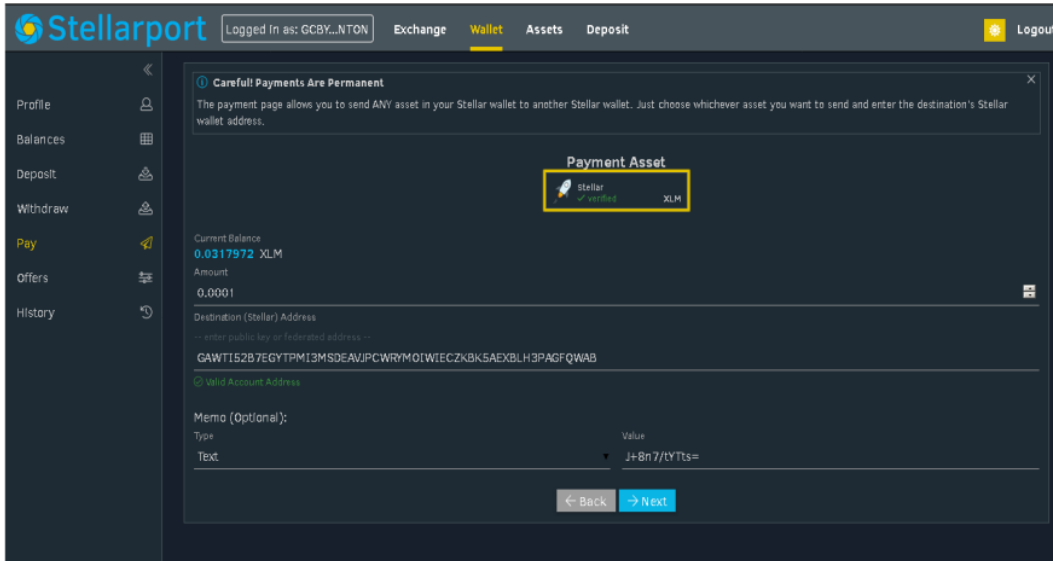
Figure 3. Form Save Data to the Blockchain Network

An identity called a hash appears after storing the data, the hash that appears from the sample transaction that the writer exemplifies is "*b5015f850fb0b06beab4149c057a262e9a8386e14ebc4b49a 771490030850277*", hash is used as a reference for retrieving data stored in the network.

To read the data that was stored before, Stellar's Blockchain is still used to test the data. For data retrieval, the tools provided by the blockchain owner namely Stellar Laboratory can be used. First of all, enter the hash before the proof of storage transaction data. After executing the data, an encrypted data is received, the data then be decrypted again in the ERP server because the ERP server stores the keys and hashes of the data. The example can be seen in Figure 4.

Figure 4. Description Data

4. Conclusion

It can be concluded that the development of ERP using Blockchain can be realized and it can make a new breakthrough for all industries that use ERP as a software to manage the company's management.

References

[1] Hughes, D. L., Rana, N. P., & Dwivedi, Y. K. 2020. Elucidation of IS project success factors: an interpretive structural modelling approach. *Annals of Operations Research*, **285**(1), pp. 35-66.

[2] Wang, J., Wang, S., Guo, J., Du, Y., Cheng, S., & Li, X. 2019. A Summary of Research on Blockchain in the Field of Intellectual Property. *Procedia computer science*, **147**, pp. 191-197.

[3] Markus, M. L., Tanis, C., & Van Fenema, P. C. 2000. Enterprise resource planning: multisite ERP implementations. *Communications of the ACM*, **43**(4), pp. 42-46.

[4] Cowan, E. J., & Eder, L. B. 2020. The transformation of AT&T's enterprise network systems group to Avaya: enabling the virtual corporation through reengineering and enterprise resource planning. *Journal of Information Systems Education*, **14**(3), pp. 15.

[5] Chofreh, A. G., Goni, F. A., Klemeš, J. J., Malik, M. N., & Khan, H. H. 2020. Development of guidelines for the implementation of sustainable enterprise resource planning systems. *Journal of Cleaner Production*, **244**, p. 118655.

[6] Vargas, M. A., & Comuzzi, M. 2020. A multi-dimensional model of Enterprise Resource Planning critical success factors. *Enterprise Information Systems*, **14**(1), pp. 38-57.

[7] Boyle, T. A., & Strong, S. E. 2020. Skill Requirements of ERP Graduates. *Journal of Information Systems Education*, **17**(4), p. 6.

[8] Uddin, M., Alam, M. S., Mamun, A. A., Khan, T. U. Z., & Akter, A. 2020. A Study of the Adoption and Implementation of Enterprise Resource Planning (ERP): Identification of Moderators and Mediator. *Journal of Open Innovation: Technology, Market, and Complexity*, **6**(1), pp. 2.

[9] Leger, P. M. 2020. Using a Simulation Game Approach to Teach Enterprise Resource Planning Concepts. *Journal of Information Systems Education*, **17**(4), pp. 10.

[10] Volkoff, O. 2020. Configuring an ERP system: introducing best practices or hampering flexibility? *Journal of Information Systems Education*, **14**(3), pp. 14.

[11] Kwak, Y., Chen, X. J., McDonald, K., & Boutin, B. 2020. Money for me and money for friend: An ERP study of social reward processing in adolescents and adults. *Social neuroscience*, **15**(1), pp. 83-97.

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