

Review Article

Survey on Decentralized Digital Governance Using Blockchain Technology

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Abstract - Efficiency and transparency in government process and service delivery mechanism is extremely important that can be achieved using blockchain technology. Blockchain is a decentralized solution that does not require any third-party organization. This acts as a huge advantage as it reduces the risk of tampering, fraud and cybercrime. All the government details are connected through a chain network, so no modification and any kind of alteration are possible. An open blockchain network has no centralized authority where the information in it is open for anyone and everyone to see, and the data can only be added in the Blockchain with time sequential order. Even though there is a constant development in Technology and adaptation towards cloud storage, there is still manual handling of files, and sometimes the documents are misplaced, lost since the files are stored physically, and also there is a misled communication between the participants in consideration of one instance such as money transactions The blockchain implementation in the government organization would give tremendous benefit to the government administration, resulting in better service delivery to the citizens.

Keywords - Blockchain technology, Cloud storage.

I. INTRODUCTION

Effectiveness and transparency in Government processes and service delivery mechanisms are extremely important. This is achieved using the concept of Blockchain. A Blockchain is a decentralized solution that does not require any third-party organization in the middle. Blockchain is originally is a list of records called blocks which are linked using cryptography. Each block contains a cryptographic hash of the previous block, a timestamp and transaction data. It is said to open because it is a distributed ledger that can record transactions between two parties efficiently in a permanent way. For the use of a ledger, the chain is managed by peer to peer network for internode communication and validating new blocks. Sometimes the files are being misplaced lost since these are stored as physical files, and there are also misled communications between participants in consideration of

one instance such as money transactions which are reduced at a high rate using this Technology. One of the important characteristics of Blockchain is to reduce the risk of tampering, fraud and cybercrime. Thus any forgery or criminal activities will be avoided. This enables informed and quicker decision making within government officers, which leads to better public service. Eg, for instance, Taxes could be held in smart contracts, and tax returns could be released automatically triggered by filling.

II. LITERATURE SURVEY

Jing Liu has proposed the Survey On security verification of blockchain smart contracts. The smart contract is one of the Important features of blockchain technology. However, with the constant development of Blockchain, Smart contracts have exposed many problems that have led to terrible problems. The contribution of this study is into three aspects. Firstly, after Retrieving all-sided studies, papers are selected to Show the security assurance of Blockchain. Secondly, a taxonomy of the security Verifications is discussed. Finally, through In-depth analysis, we can able to get the Correctness verification of the smart contracts based on the formal method to validate whether A smart contract is credible and accurate.

Maher Alharby Amjad Aldweesh has proposed Blockchain-based smart contracts. A systematic mapping study of academic research. It is basically a computer program that encodes an agreement with non-trusting participants. Smart contracts are executed on a blockchain system if a specific condition is met according to the requirements without leading the trusted third party. This project is aimed at a systematic mapping study of all peer-reviewed Technology oriented scientific publications in smart contracts. The focus is on peer-reviewed scientific publications in order to identify how academic researchers have taken up smart contract technology. All the research papers from the main database are obtained using the systematic mapping method. The papers are classified into six categories. Software engineering, privacy, application, security and stability and other related topics. The majority



of the paper falls into applications (64%) and (21%) of software engineering.

Marten Sigwart, Michael Borkowski, Marco Peise, Stefan Schulte, Stefan Tai have proposed Blockchain-based data provenance for the internet of things. Data collection has become fundamental for more applications and services collected through the internet of things. It is important that such collected data should be authenticated information. Data provenance solutions together with blockchain technology are one way to make the data more trustworthy, and solutions do not address the heterogeneous nature of IOT applications. In this, functional and non-functional requirements are identified for a generic IOT data provenance framework. This Implementation is based on Ethereum smart contracts using proof of concept. The benefits of the generic framework, simplified adaption and rapid Implementation of data provenance for the IOT.

Nour Diallo, Weidong Shi, Lei Xu, Zhimin Gao, Lin Chen, Yang Lu, Nolan Shah, Larry Carranco, Ton-Chanh Le, Abraham Bez Surez, Glenn Turner have proposed eGov - DAV: A better government using Blockchain-based decentralized autonomous organization. The E-government system has greatly improved the efficiency and transparency of the daily operation of government. The highly centralized IT infrastructure is more vulnerable to outside attacks. The dependence on individuals to monitor and control some of the workflows makes the system error-prone and has a higher probability of corruption occurrence. These challenges are addressed by the use of blockchain technology and decentralized autonomous organization to improve the e-governance system. The operations are only controlled by predefined rules; thus, the error caused by the processes is greatly reduced.

Saikat Mondal, Kanishka P.Wijewardena, Saranraj Karuppuswami, Nity Kriti, Deepak Kumar, and Premjeet Chahal have proposed Blockchain inspired RFID-based information architecture for the food supply chain. This project is aimed at creating a transparent supply chain inspired by the internet of things. The architecture uses a proof-of-object-based authentication protocol which is similar to the cryptocurrency proof of work protocol. The complete architecture can be described by RFID (Radio-frequency identification) at the physical layer and the Blockchain at the cyber layer. This helps in real-time quality monitoring by providing a unique identity of products and sensor data. A small feature RFID coupled sensor of size 900mh was demonstrated for real-time sensor data acquisition. Thus, enabling the creation of a tamper-proof digital database of food chain packages at each instance.

Svein Olnes have proposed Beyond bitcoin, enabling smart government using blockchain technology. Recently a lot of attention has been gained on bitcoin, which was presented in late 2008 and implemented early in 2009. The main attention is given to the Currency and not so much to the underlying blockchain technology. This paper states

that we must look beyond Currency and investigate the potential use of blockchain technology to enable smarter government. It is secure, distributed, open, inexpensive database technology. The objective is to give an overview of bitcoin literature in general and in e-governance and to study the potential usage of bitcoin technology in private sector services.

Tariq, Faizan vfc & Colomo-Palacios, Ricardo have proposed the Use of Blockchain Smart Contracts in Software Engineering: A Systematic Mapping. This paper aimed to cover the usage, benefits and challenges of the use of Blockchain Smart Contracts. The main concept of the smart contract is to work digitally for the role of mediator, which will eliminate human intervention. The professionals available in this area are reported challenges along with the client's trust in usability with respect to security. Now every company wants to have more clients, but the domains are getting more complex and in a wider range, and small companies cannot have enough employees to cover all the fields or business aspects. To meet these requirements, outsourcing to third-party contractors is a regular practice in the software arena.

Tatiana Antipova has stated that the Blockchain technology for government auditing. This project is aimed at providing blockchain technology for government auditing, which is usually conducted by government auditors in the public sector. The main idea behind the research is to get the issue or survey the issue and technique to use blockchain technology for government auditing. This approach is similar to the game of chess since controlled processes are studied from all interrelated sides, taking into consideration of the time factor. This concludes by stating that the day today usage of blockchain technology is a perfect way to prevent any kind of forgery with budget money.

Wei Xiong and Li Xiong have proposed the Survey on smart contract-based data trading mode using Blockchain and machine learning. There are 2 traditional Data trading modes, namely the hosting mode and the Aggregation mode. They depend on trusted third parties to a large extent. In hosting mode, Data is completely hosted In the data trading centre, so the data trading centre retains the data. In aggregation mode, the data centre does not retain the Data, but it has the ability to do so. There is a difference between the ability to retain data and the inability to retain data. The data owners are afraid to share the data trading Because of these two modes. In this paper, a solution to the Data trading mode is provided based on smart contracts Using Blockchain and machine learning. In this paper, Challenge-response mechanisms and off-chain download Mechanisms are used. The challenge-response mechanism is used to authenticate and authorize the data owners, whereas The off-chain download mechanism is used to authenticate And authorize the data purchaser to download the purchased data. The goal of removing the trusted third party in data trading is successfully achieved by the design and Implementation of data trading and smart contract. Thus the problem in the data trading centre

is solved, and The automatic payment by using etherium encrypted Currency among trading participants is realized.

Zainab Alhadhrami, Salma Alghfeli, Mariam Alghfeli, Juhar Ahmed Abedlla have proposed blockchain technology for healthcare to facilitate money exchange transactions and eliminate the need for the third party to verify any such transactions and for data security. This paper states the use of blockchain technology in managing

and sharing electronic health and medical records to allow patients, clinics and other stakeholders to share data among them, thus increasing interoperability. Even though the use of blockchains may reduce Redundancy, it still comes with a few challenges. The selection of Blockchain used depends on the entities participating in the developed Blockchain.

III. COMPARISON OF DIFFERENT ALGORITHMS IN BLOCKCHAIN TECHNOLOGY

S.NO	PAPER	TECHNIQUE	RESULT	ISSUES
1.	A Security verification of blockchain smart contracts	Blockchain technology, formal method	Method to validate whether the smart contract is credible and accurate	Only known vulnerabilities can be analyzed, and unknown vulnerabilities cannot be discovered. Scanning is inefficient to analyze the huge smart contract
2.	A systematic mapping study of academic research based on smart contracts	Blockchain technology, Peer-reviewed technology, systematic mapping	This structures and characterize the practice of software engineering and smart contracts	Lack of richer set of primary studies and analysis of previous work for discovering the potential gaps
3.	Blockchain-based data provenance for the internet of things	Ethereum, internet of things	Provides data provenance for IOT and trustworthy data collection.	Scalability remains Blockchain's weakness and uses excessive energy.
4.	eGov-DAV: A better government using Blockchain-based decentralized autonomous organization	Blockchain, smart-contract	A distributed ledger is developed that involves multiple participants to achieve consensus over a data set and maintain it locally.	It limits the litigation between the parties increases the space of allocation and execution of contracts.
5.	Blockchain inspired RFID-based information architecture for food supply chain	Blockchain, radio frequency identification (RFID), internet of things (IOT)	Steps involved in the food supply chain is monitored and reported simultaneously by the customer and the producer	Only the food supply chain is monitored, whereas food adulteration cannot be identified.
6.	Beyond bitcoin enabling smart government using blockchain technology	Bitcoin blockchain technology, e-governance	Implementation of Bitcoin usage in government using blockchain technology	Technology doesn't have any potential benefit for the public sector.

7.	Use of Blockchain Smart Contracts in Software Engineering: A Systematic Mapping	Smart contracts, Software engineering, Blockchain.	Eliminate the human intervention and the role of intermediary And enables working digitally.	One threat of this project is that it is researcher bias. Further research knowledge inside software engineering would have provided a richer set of primary studies.
8.	Blockchain technology for government auditing	Blockchain technology digital Technology	Propose the usage of blockchain technology for government auditing in the public sector to avoid any kind of fraud.	This Technology threatens the existing approaches to regulation and legislation, and the technique of deep integration is not well known.
9.	Smart contract-based data trading mode using Blockchain and machine learning.	Blockchain and machine learning.	Propose a challenge-response mechanism between data purchaser and data owner. An off-chain download mechanism is used to authenticate and authorize data purchasers to download purchased data.	The Data has its particularity. That is, there is no uniqueness, no clear ownership constraints; once seen, there is the owner; the data replication is completely undifferentiated. Therefore, when the data owners trade the data through the data trading centres, it is critical that the data trading centres Cannot retain the data.
10.	Blockchain technology for healthcare	Chain networks, Blockchain technology	Increases interoperability by enabling the parties to share the electronic health and medical records	Reliable and reduces Redundancy but could infringe patients' privacy

IV. CONCLUSION AND FUTURE SCOPE

Blockchain technology is both highly secure and resilient, employing public-key cryptography to protect value transfer and ownership. Thus this technology enables the user to view their documents, and the entire process is transparent to them. It prevents forgery and tampering, thus enabling security to the users. The timestamp is provided so that whenever any process is completed, it is intimated to the user.

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