Use of Blockchain Technology for Implementation of E-governance

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Abstract: Digitalization has played a huge role in making our lives simpler and efficient, what with the Indian government hugely incorporating it with its Digital India campaign. Although this remains to be true, digital technologies have also played a major role in making centralized servers, used mostly with all the conventional digitalization techniques, to become more vulnerable to attacks.

Hence, there arose a need for an idea which provided for distributed data – hard to hack in addition to added security. Blockchain thus came into the picture which had the capacity to literally record every single transaction and digital event happening anywhere in the world. This ensured transparency among internet users, thus allowing business to become more decentralized and less prone to hacking attacks.

This paper explores the application of blockchain technology with respect to e governance in India.

Index Terms **- Blockchain, Bitcoin, smart contracts, open ledger.**

I. INTRODUCTION TO BLOCKCHAIN

Blockchain was first introduced by Nakamodo as the ledger of Bitcoin [1]. Bitcoin can be termed as very widely deployed digital cash.

Blockchain being a fairly new invention has momentously grown to be appreciated in the digital market. Blockchain can be thought of as immutable records of data [2]. This data is time stamped and is managed by a cluster of computers. It does not belong to any single entity. The data here that we are talking about can be termed as a block. These data blocks are consistently linked to each other using certain cryptographic principles to form what is called a chain of blocks. The blockchain has gained momentum due to its very nature of decentralization. There is no central authority over it. Everyone and anyone who contributes towards forming this chain of data are accountable for their share making this system inherently transparent.

The entire essence of Blockchain depends on its "completely free" model. It doesn't portray any costs with an added advantage of security, since the transactions using blockchain are completely automated and safe. Any one entity can initiate the transaction and create a block, which will then be verified by millions of virtual computers over the net. Only after the verification happens, does the block get added in what is called a chain. The subsequent blocks then get added in this initial chain and form a uniquely identifiable record. So to falsify one record would mean to falsify the entire chain, a seemingly impossible task to remain undetected.

Blockchain to some extent also helps in terminating the mediating authorities in many transactions which happen online. So basically it has the capacity to replace all processes and business models which rely on charging a nominal fee for a transaction. For transactions which cannot happen completely free, blockchain helps in charging a minuscule amount which otherwise would have burnt a huge hole in the transacting party's pocket.

II. WORKING OF BLOCKCHAIN

To understand the working of blockchain we consider a simple example of a spreadsheet [3]. Imagine a single sheet of spreadsheet which is available across a huge network of computers. Not only is the spreadsheet available, but simultaneous users can actually edit and view the spreadsheet in real time. The spreadsheet does not belong to a single location, making the records truly public. Also, since the data is distributed across the entire network, it is very difficult to hack this data. The information stored in such a format is available for anyone to access since it is hosted by millions of computers. There are a few points which make blockchain so immensely popular. There are [5]:

    A. **Blockchain is not owned by any single entity and is completely decentralized.**
    B. **Data stored in the blockchain is encrypted.**
    C. **The data inside the blockchain cannot be tampered with as it is rigid.**
    D. **The data stored in a blockchain can easily be tracked as it is completely visible and transparent to its users.**

III. E-GOVERNANCE AND BLOCKCHAIN

One of the major roles of government remains to be the effective distribution of resources among its citizens [4]. These resources can extend to include monetary resources as well as social resources like security. Government also holds the responsibility to help the citizens maintain the rule of law [6]. As citizens increase, so has the centralization of government witnessed manifestation, this increasing centralization of the government results in poor customer service. Hence, the government felt the

need to introduce many new services which could accumulate the growing demand of queries in the citizens. The needs and queries of the citizens need to be responded on time. E-governance thus came into the picture by providing to the citizens' response to their queries in time and increasing its own quality and efficiency of service. E-governance though seems like a viable option, the cost involved in implementing it is already running high. In such a scenario blockchain comes up as a very tempting alternative to implement these e governance services in almost one third of their costs.

To consider a simple example of how blockchain can be incorporated into e governance, let us look at the food safety standards [1]. There is already a huge racket of suppliers, distributors, retailers and transporters which stand between products and the customers using such products. E governance can help this scenario by setting up food safety units to comply with standards. However, many such units are bound to fail if an effective mechanism of enforcing food safety is not found. To help ease into this, blockchain can help by setting up a chain of information related to each and every product bought into the market. Information about the product ranging from its expiry date to its initial origination details, almost everything can be stored in the form of a chain. Such immutable and robust chains of data can then become impossible to tamper with, providing the government with the ability to employ critical checkpoints into the lifeline of the product to detect whether there has been any compliance irregularity.

A very important aspect where blockchain can rightly be used for e governance is security [5]. Security currently is the onus that is on both the government and its citizens. Traditional governance included maintaining a central server for storing all information, making it easier for hackers to assess the data and use it for malicious purposes. However, with blockchain, there isn't any centralized authority maintaining the data. Everything is distributed across the network, making it very difficult for the hackers to hack the data. The hackers would need to hack the entire network in blockchain unlike in traditional e governance where a single centralized server made security more vulnerable.

IV. APPLICATIONS OF BLOCKCHAIN IN E GOVERNANCE

As discussed in the previous section, the role of blockchain is of utmost importance in e governance especially in a country like India. Government of India has also widely acknowledged the use of blockchain in Indian governance as implied by a statement made by Mr. Arun Jaitley, then Finance Minister of India saying that the country would "explore the use of blockchain technology proactively" [6].
We here throw light on a few of the sectors where blockchain can play a very active role.

Real Estate:

Since time immemorial, land and property details were stored on paper in India. The obvious disadvantages to this, the immense amount of corruption related to forging of documents, tampering of data, escalated costs of managing real estate's needed some respite. The inefficiency of such a method needed a revamp and hence blockchain came into the forefront. Blockchain would enable to provide a distributed database for all the land registration details. This data would of course be permanent by the nature of blockchain itself. With the help of such a method the number of intermediaries, demanding the details of the real estate and change of ownership would reduce immensely. This reduction would also help in reducing the cost which had to be incurred by the customer to be given to such intermediaries. The very nature of blockchain being immutable, the above would thus help a lot to avoid property frauds.
In addition to this blockchain would also help to digitalize any government action and financial transaction for the property into a transparent and immutable ledger of data called a chain. This would in turn help unravel any hidden illegal deeds.

Voting:

India is the biggest democracy in the world and it prides itself in it rightly so. Having understood this voting becomes a much researched candidate to be explored for the blockchain technology to hold in. The need for this research arises from the fact that blockchain enables a very effective way for handling reliable and transparent records of data. If the voting system would be implemented by blockchain it would produce the most reliable, robust and trustworthy voting system to be implemented till date in comparison with the immensely centralized and stealthy voting system currently in use. Traditional voting systems have always made the voter to wait for a minimum of 24 hours or more for the results to be out. However, with the help of blockchain the viewers would be able to see real time, transparent results. Currently all the voters have their voter ID cards to identify them uniquely in the voting system. With the help of blockchain we can enable the voter to have a single unique digital identity which would allow the voter to enter a single unique transaction in the blockchain voting specific network [6]. In this specific scenario giving one vote would mean generating one transaction towards the party that the voter wishes to vote.

Taxation:

The current tax scenario has been implemented digitally, no doubt. However, there have been some evident lapses with respect to them. The taxation system is still quite based on the trading of physical goods and this needs to change. Blockchain can play an impactful role in this. Blockchain can help in easing out the administrative difficulties still faced because of the current taxation system and can help collect taxes more peacefully. Blockchain would not be a "one size fits all" kind of a solution for taxation, however it can to some extent streamline the taxation system by making it more efficient because of its inherent transparent nature. Blockchain essentially can work as an open ledger here and all the transactions being added to it would be completely transparent and visible to all. This would in turn help to check if there have been any VAT discrepancies and VAT related frauds can be reduced to a great extent.

Finance:

Probably the most obvious use for blockchain can be thought of in finance or banking. The current banking system in India is essentially centralized and relying heavily on third party contractors. Transferring and transacting money in such a case becomes extremely time taking and expensive. We have often come across cyber security breaches and hacks. In lieu of this the software outsourcing companies are always vigilant. New technology advancements have in turn made the financial system more vulnerable. Blockchain can be thought of to be the best bet in this case. Blockchain will help in completely eliminating these third parties involved in financial transactions making it way more reliable and trustworthy than it currently is [1]. Elimination of the possible third parties will eventually lead to lesser financial frauds. The current time taking financial transactions would also speed up and be more robust and secure due to blockchain. Blockchain would also help in reducing the operational costs and would also help in providing the customer with real time banking information.

Also the smart contracts mentioned about in the previous section would help to set up trigger points for financial transactions after a certain set of criteria have been achieved.

Healthcare:

The healthcare system in India has typically been fragmented widely in the form of hospitals, community specific clinics, super or multi-specialty hospitals and diagnostic centers.

To implement such a diversified healthcare system on blockchain would mean to create a private blockchain network for the purpose of healthcare where all the above mentioned healthcare hospitals and clinics are added [7]. Creation and execution of such a private blockchain network would mean to integrate and execute what we would call as smart contracts. Smart contracts would help all the healthcare professionals to come under one roof and share their ideas in the form of data [1]. The patients in this case would initiate their data and attach it to a smart contract. Strictly speaking smart contacts are published computer programs agreed by both parties on blockchain. This data would then be accessed by the healthcare professionals through smart contracts and acted upon.

V. BLOCKCHAIN IN INDIA

Blockchain has been widely recognized as a viable alternative by the Indian government and it is taking the necessary steps to ensure blockchain assimilates in the existing system. For example, IDRBT, the technology arm of Reserve bank of India (RBI) has initiated two proof of concepts related to blockchain, one in domestic trade finance letter of credit and the other one in enhanced information of payment. For this they have employed banking and technology firms like Infosys and IBM [6].

General insurance companies have also run a pilot to track health insurance policies with the help of blockchain [6].

Andhra Pradesh has become the first state in the country to incorporate blockchain in their land records and have also set up a Blockchain Center of Excellence [10]. Other states like Maharashtra, Karnataka, Kerala and Rajasthan are also taking the lead. The NITI Aayog is also working on a national strategy to leverage Blockchain technology [6] [8] [9].

VI. CONCLUSION

Blockchain truly has emerged as a dominant technology to improve the effectiveness of business process, to streamline them with an added advantage of privacy protection. The technology though still in its nascent stage has widely been experimented with. A lot of use cases have also been explored not only in the finance sector but also in retail, education, and healthcare and public sector industries.

The government has been steadfast about improving inclusiveness and accessibility across the country, in lieu of increased Digital India's budget. This digitally sound economy will surely percolate among the most rural and remotest of India in the coming days.

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