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Blockchain Based KYC System

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***Abstract* - From what we observe today, Blockchain is a revolutionary technology that will shape everything from the way we browse data, market on 3rd party apps, and exchange money for elementary to big transactions. Blockchain, if implemented and understood properly, can ensure reliability, security in all facets of human life through its decentralized processes. KYC (Know Your Customer) is the mandatory process of identifying and verifying the client's identity when opening an account in a Bank and the 1st step to client-service provider relationship, yet it is one of the most tedious paperwork which has not developed much even with the recurring developments in technology to store and authenticate data and prove credibility. In this work, we propose a Blockchain-based solution where documents like photocopies of ID proof; address proof, photograph and ancillary documents can be authorized by developing a platform where bank authorities, as well as the client, can verify the credibility of both parties, respectively. This also has the added advantage of creating a more transparent and secure platform.**

Keywords: Blockchains; Application; IPFS; Decentralized; KYC.

I. INTRODUCTION

Blockchains are now talked about in the news worldwide. Many applications of various domains have adopted blockchain to implement decentralized approach towards frauds elimination without handing the power to any one particular authority. In a blockchain, the data is cryptographically protected from alterations and any revisions. Storing information using blockchain gives all these advantages proving it to be the best way to ensure proper verification of documents required for KYC. The verification process is mandated by the Reserve bank of India. While quick on boarding with minimum checks and documentation is expected; financial institutions are penalised for inconsistencies by the regulators. To overcome this, we can implement attestation using blockchain. Thus a standardised KYC verification through the government using blockchain can make the tedious KYC registration process very smooth. One can access the records from the block and verify if the customer is legitimate and quickly set up his/her respective account. The organisation can verify the documents and process the block on the blockchain which cannot be then edited so the legitimacy will be forever maintained.

In this way, blockchain-based KYC can implement a conserved system for customer authentication and registration. This blockchain-based KYC record system will provide deep mutual trust between each organization. Presently, KYC are overseen by banks and other financial institutions, while clients are denied the option to uninhibitedly regulate their own KYC. By using blockchain innovation, principles for recording information and overseeing characters are built up, and the blockchain of KYC is developed. Additionally, this innovation records the evaluating hints of all exchanges during a changeless circulated record, which ensures duty and straightforwardness in the parade of information trade. In this manner, it becomes easy for both to maintain authenticity and mutual trust.

II. BLOCKCHAIN

A. What Is Blockchain?

A blockchain is a decentralised ledger that records all peer-to-peer transactions that are connected using nodes, which are the devices present across the internet. Participants can confirm and verify transactions that happen on the network without the requirement for a central authority using this technology. Blockchain, as a shared, secure ledger of transactions spread across a network of computers, saves waste, lowers the chance of fraud, and enables the establishment of additional revenue streams. Money transfers, trade settlements, voting, and various other implementations are all possible applications of this versatile technology. Blockchain is a system that is both visible and verifiable.

B. Why Blockchain?

Collaborative technology, such as blockchain, promises to improve business operations between firms, minimizing the "cost of trust" dramatically. It's beneficial to conceive of blockchain technology as a form of next-generation business process optimization software from a strategic viewpoint. As a result, which may provide much better yields per dollar invested than most traditional internal investments? Financial

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organizations are investigating how blockchain technology could revolutionise everything from clearing & settlement to insurance.

III. KYC-KNOW YOUR CUSTOMER

KYC is a due diligence process used by the business to know the authenticity of their customers. It is a procedure that aids the financial institutions to verify the customer's identity before they can provide him/her with services. It includes verifying various user documents related to their address, work profile, financial status along with personal details. This KYC document is not just a legal process in India but a globally known document.

The KYC usually is done every time the user wants to make a consumer relation with the business. In a effort to counter illegal activities that use the financial institutions to stow away money, governments and central banks across the world have been improvising the implementation and reach of their KYC policies with creating new, or extending existing regulations to make a stable, illegal activity free global financial ecosystem.

A. The Traditional KYC Procedure

Institutions and organisations initiate the KYC process by asking customer to provide different basic information about their business operations. Banks are able to gather information about the entity or individual from sources such as Adhaar card, PAN card etc. The institutions then verify the authenticity and update necessary information about the entity. This offline traditional process is very monotonous and time consuming; one must visit the organisation and perform this procedure.

Steps to establish a KYC process in India as of now is:

1. User wishes to quote a financial transaction or a consumer relation with a financial institution.
2. User is provided with a form to fill in his/her details.
3. User submits the form along with the requested documents.
4. Bank verifies the user identity through these submitted documents.
5. If the user is certified, the bank provides the user with the Issued KYC.
6. User wishes to quote a relation with another bank.
7. User wishes to quote a relation with another bank. Repeat steps 1 to 5.

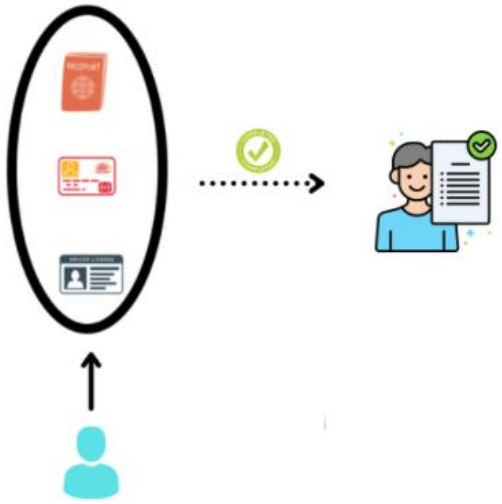
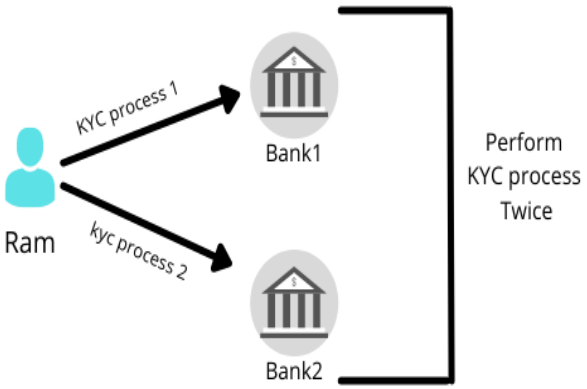


Figure 1: KYC procedure

IV. PROBLEM STATEMENT

With so many advancements made in making offline to partially online, the process has grown into a more secure one. But even with these developments, KYC faces a lot of operational issues due to its poor record keeping, inefficient alert systems, time consumption and labor required. A hopeful burgeoning of the corporations of financial institutions and service providers the problems are being solved using AI and other cognitive technologies.

- **Expenditure:** According to 2020 research almost $1.2 billion are spent globally on the KYC process.
- **Laborious:** It is reckoned that 80% of the KYC efforts are required for just data gathering and processing while only 20% for the actual accessing and monitoring.
- **Repetitive:** If a user creates a KYC with Bank1, he'll have to create a KYC again if wishes to create another account in Bank 2. Thus, the client (Ram) has to go through the same process of KYC creation over and over every time. But with the use of block chains and standardized KYC norms we can establish a universal KYC or AML.



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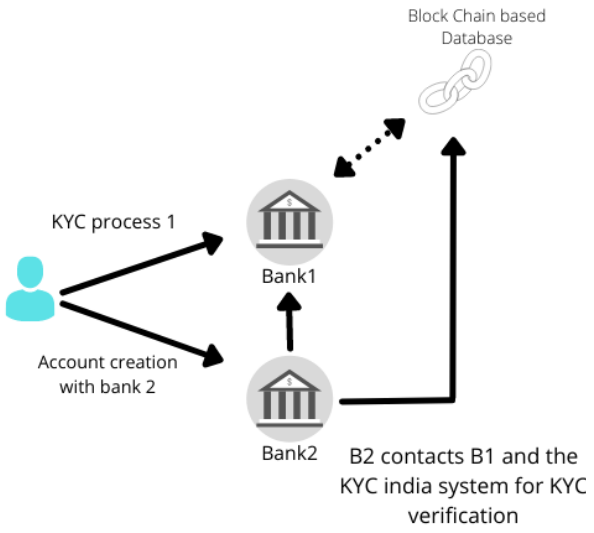

Figure 2: Problem faced

V. PROPOSED SYSTEM

These days with the digitization of record keeping and banking processes the financial institutions are using cybernetic means for tracking and maintaining a user profile. As this traditional method is a centralized concentrated one, the data often gets tampered with, stolen and misused. Making this process a decentralized one not only provides an effective solution to all these problems but also gives way to more benefits and an at ease process. A block chain link of all the users taking part can be created where only the hash key (Key - data) of the user will be stored. Every bank the user has a transaction account with will manage this block, and not just any one authority. Even though other banks with which the user has no transaction with have any access to the user profile, yet they prove to be an important node to maintain the node connectivity. In case of any kind of malicious activity all the banks connected to this block chain will be notified. Thus, this creates a safer, transparent while maintaining the privacy, mutually hand in hand environment for the relationship between a single user and one or many banks the user wishes to transact with.

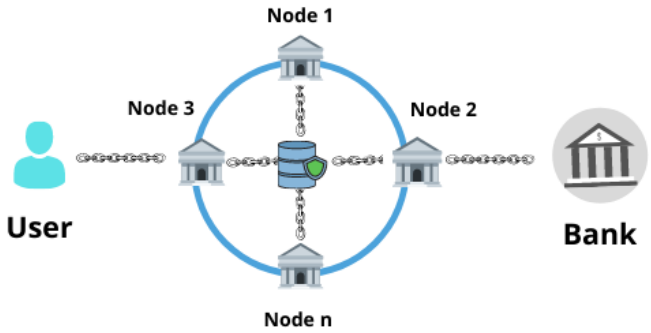

Figure 3: Proposed system

A. Technology Integration

1) Building user profile

The user requests Bank 1 to establish an account, the bank 1 then creates a block on the IPFS. The user uploads all the required documents on the block chain based KYC database platform. The user submits the following documents for verification:

- Passport
- Voter's Identity Card
- Driving License
- Aadhaar Letter/Card
- PAN Card

Once the documents are uploaded the bank 1 is provided with key (access to user's database). These documents then become accessible to bank1 for verification purposes.

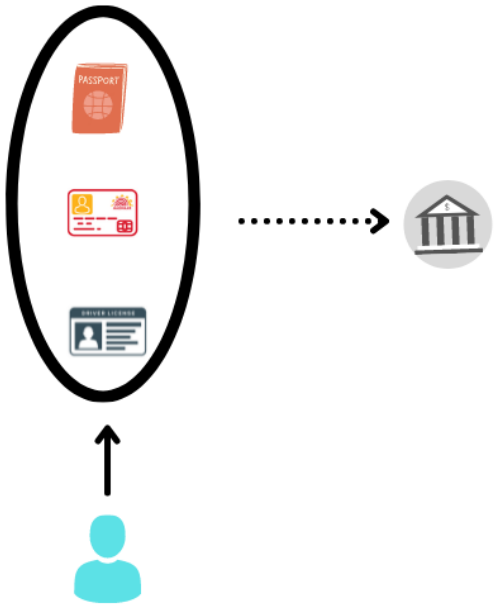

Figure 4: User documents

2) Creation of hash function

The bank 1 with the provided access uses the KYC data documents for users verification and saves a copy of each on their own server along with a Hash function If the user is verified as appropriate the KYC document is issued. The copy of KYC along with the embedded hash function matching the one saved on their server is uploaded on the DLT platform. If anyone tries to alter the KYC data, the Hash function won't match to 2 of its nodes i.e the DLT platform and bank. Thus, creating an alert. Refer fig 5. Generating Hash Value. The documents can be stored using the IPFS (Interplanetary File System) which is a distributed file storing mechanism.

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3) Unique id is allocated

The user is given a unique id saved in the KYC INDIA blockchain (DLT platform) which is broadcasted to all the nodes of block chain system. The user can use this key to access and monitor its database records or the saved copy of the signed KYC. This key can also be provided to other financial institutions when asked for verification.

4) User performs a transaction with Bank 2

When bank 2 asks the user to perform the KYC, the user provides it with its unique id. This id helps the bank 2 to review all the previous institutions and records of the user i.e giving access to user's profile. Bank 2 reviews if the hash functions provided by the IPFS and the one embedded on the Block chain match each other; bank2 knows the validity of the KYC.

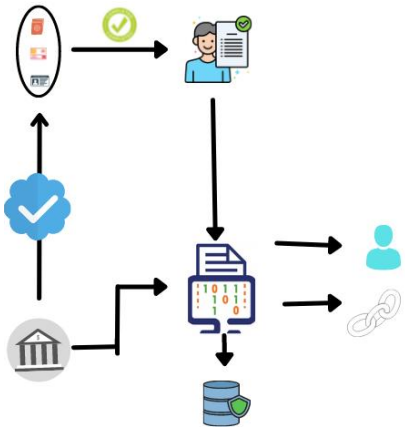

Figure 5: Generating Hash Value

In case if they don't match bank 2 can either manually validate the KYC documents and update the block chain by involving the previous bank nodes or decline its request and broadcast the user as unverified to increase the credibility and management of the system.

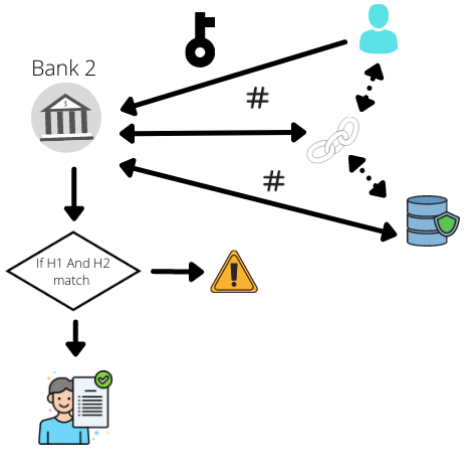

Figure 6: Bank Process

5) Smart contracts

Changes are required in KYC are not generally required but for safety, a user can create a new block every year to update any necessary information.

B. System Architectural Components

Refer [fig.10 System Architecture], some of the components used are

1) Interplanetary File System

HTTP is the current standard for exchanging data over the Internet, although it fails in particular instances. IPFS is used to circumvent all of these shortcomings. An IPFS network is content addressed, unlike HTTP, which is IP addressed. This means that when data is uploaded to an IPFS network, it produces a Hash, which is then used to request the data. On the IPFS network, anyone can supply storage, and everyone is rewarded with crypto tokens. Data is disseminated and duplicated over the network, resulting in data persistence. When requesting data, it looks for the closest copy of that data, resulting in excessive latency and bypassing any bottlenecks. Because the data is entirely scattered, there is no way to centralize it.

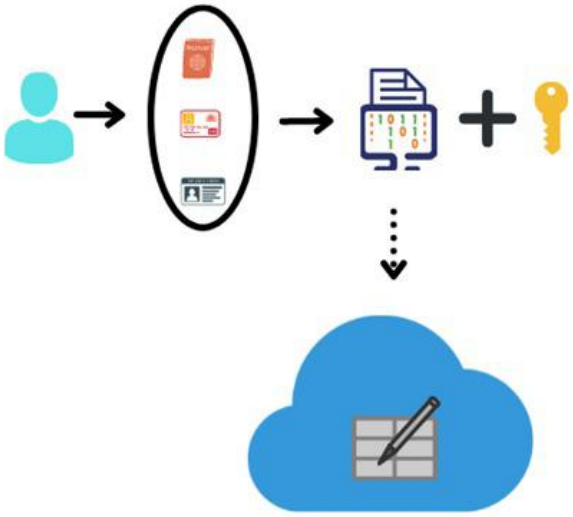

Figure 7: IPFS

2) Distributed hash tables

A distributed hash table (DHT) is a distributed system that functions similarly to a hash table in that it stores key-value pairings and allows any participating node to quickly get the value associated with a particular key. The fundamental benefit of a DHT is that nodes can indeed be added or withdrawn with minimal effort in terms of key distribution. Keys are one of kind identifiers that correspond to certain values, which can range from addresses to documents to

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arbitrary data. The duty for managing the key-value mapping is allocated among the nodes in such a way that a shift in the set of participants causes the least degree of disruption. This enables a DHT to scale to extraordinarily high numbers of nodes and to deal with node arrivals, departures, and failures on a continuous basis.

3) Hash function

A hash algorithm is a mathematical function that converts any input to a predetermined output size. The hash function must be collision-resistant to be cryptographically safe and usable in blockchain technology at the same time. This signifies that it is nearly impossible to discover two inputs that yield identical output.

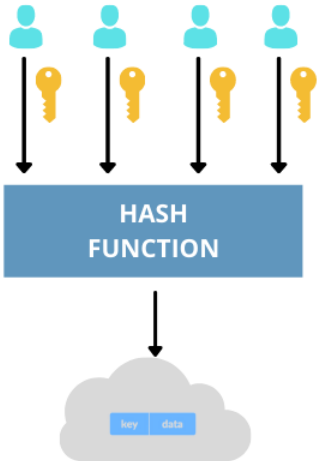


Figure 8: DHT

Whereas a hashing function is a type of cryptography, it is not the same as encryption. In contradiction to encryption, a hashing function is a one-way function; if all you have is the hash, you won't be able to find the original message. Similarly, everyone who possesses the original message and the hashing algorithm will get the same result.

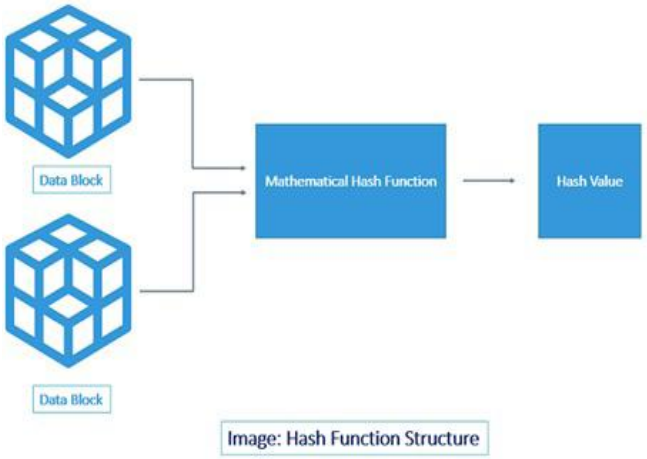
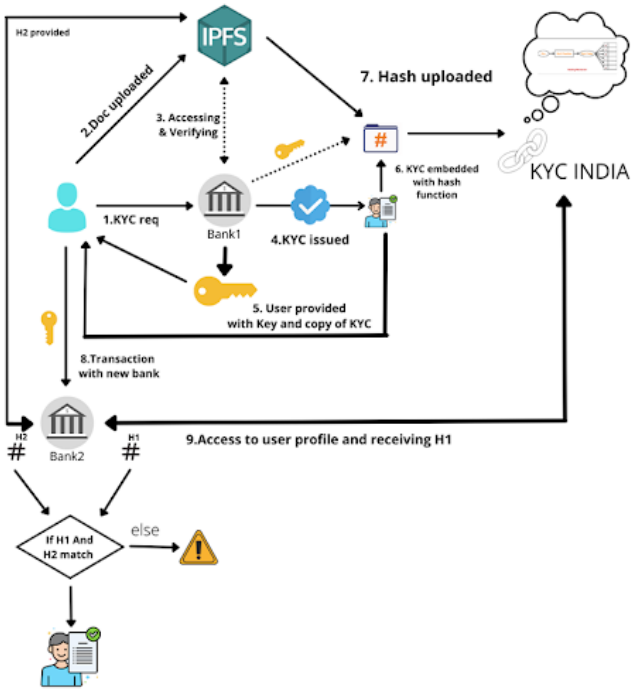


Figure 9: Hash Function

VI. CURRENT PROGRESS

The reserve bank of India with the cooperation of SEBI, IRDAI and PFRDA can register their customers under CKYC. k has stepped forward in implementing CKYCs that is Central KYC which is the centralized repository of KYC records. Once the user submits and gets verified he/she will receive a 14 digit unique CKYC number also termed as KYC Identification Number (KIN).



By providing this number to any financial institution you can quote for any financial transaction without the need to submit the KYC document again unless there are any updates. The KYC repository will be accessible to the institutions for user verification. The process of verification and document submission under the Central Registry of Securitization and Asset Reconstruction and Security Interest of India (CERSAI) is similar to the traditional process.

VII. PROBLEMS BEFORE THE DECENTRALIZED KYC SYSTEM

Just like every system have its advantages and disadvantages the decentralized KYC has its own:

The biggest pullback of a blockchain implemented system is the underlying cost. Even though there are a lot of open-source blockchain solutions, they require a huge amount of investment but with high returns on investment, the blockchain is a good investment in the long run. Blockchains, as discussed, are immutable, which in our case proves to be the best solution in discarding the problem of mutability but at

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the same time if a customer wishes to make updates in their KYC it would be an intricate task via the involvement of Smart Contracts. There are other ways to rectify this is by making a new block and adding it to the blockchain Storing all the data documents submitted by the customer isn't possible in a decentralized system hence we need to add the complexities of another files system like IPFS in our case. Some other blockchain-based databases are BigchainDB, Cassandra, ChainifyDB, CovenantSQL, ModexBCDB, Post chain, ProvenDB.

IPFS doesn't require any server and the nodes/data can be spread amongst the bank users without any cost, but this at the same time makes it less user friendly with abnormal bandwidth consumption. The most crucial and important part of this process is the cooperation of banks in making this shift possible. Only the establishment of mutual trust among them will help in the smooth functioning of this process. Also getting acquitted with the new technology and updating the skills or hier personals with knowledge will take time to mature. With the growing advancements in technologies and the day by day maturity of the blockchain, a solution to these are being developed and researched like Ethereum. The processing capabilities of various computational devices are exponentially increasing. Also, the storage capacity has gradually increased over the past few years and will keep on growing. The advancements made in the technology sector will aid in the process of blockchain.

VIII. CONCLUSION

The blockchain application in KYC can be very beneficial for the overall customers and business entity connection. The process can be tedious if the blockchain wasn't involved. The businesses can now verify the KYC with minimal procedures. The KYC frauds done using call phishing, hacking and various other methods. The proposed blockchain system provides a solution to all of these problems. Apart from this it also provides a way to overcome the global problem of identity jeopardizing in banking systems. The traditional KYC process can be developed into a Blockchain-based system with the cooperation of the financial institutions and the customers.

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