ONLINE BANKING SYSTEM USING BLOCKCHAIN

Report submitted in partial fulfillment of the requirement for the degree of B. Tech in

Computer Science & Engineering

Under the supervision of

Ms. Akanksha Dhamija
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By

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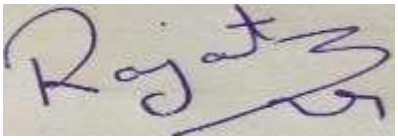
APRIL-2022

DECLARATION

-

This is to certify that Report titled “Online Banking System Using Blockchain”, is submitted by us in partial fulfillment of the requirement for the award of degree B.Tech. in Computer Science & Engineering to BPIT, GGSIP University, Dwarka, Delhi. It comprises of our original work. The due acknowledgement has been made in the report for using others work.

Date: 01-04-2022



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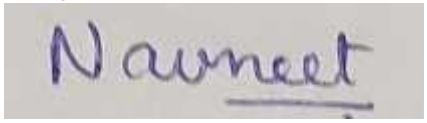

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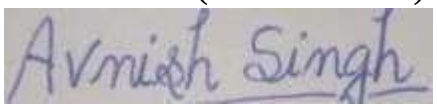

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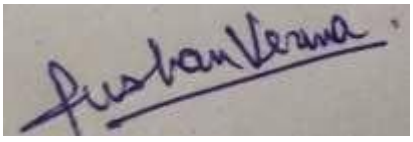

Pushan Verma (35820802718)

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(Signature)
Supervisor

Date: 01-04-2022

Ms. Akanksha Dhamija
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Certificate by HOD

This is to certify that Report titled “Online Banking System Using Blockchain” is submitted by Rajat (94), Navneet (97), Avnish (104), Pushan (114) under the guidance of “Dr. Achal Kaushik “in partial fulfillment of the requirement for the award of degree B. Tech in Computer Science & Engineering to BPIT, GGSIP University, Dwarka, Delhi. The matter embodied in this Report is original and has been dully approved for the submission.

Date: 01-04-2022

(signature)
Dr. Achal Kaushik

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CHAPTER-1

Introduction

Online banking has a considerable amount of commercial significance. No matter the existing no. of banks, online banking will always be a need. Users always want the flexibility to access their accounts and to perform transactions on runtime. Our bank management system provides all the important internet-banking services and functionalities that are in high demand.

Current banking systems are based on central server mechanisms where all the personal information of account holders, his/her bank balance, and all other necessary information related to the bank are stored. All other branches are connected to the central server where every branch retrieves personal information, bank balance and history from the server. Failure in the central server causes all other branches to fall down which results in great damage to its users. A Blockchain is the "current" part of a Blockchain which records some or all of the recent transactions, and once completed, goes into the blockchain as a permanent database. Each time a new block is generated based on the completion of each block. Blocks are linked together in a linear fashion where each block contains a hash value of the previous block. Through this Paper we are introducing, how blockchain Consensus algorithms, hushing techniques, salting techniques, time stamp algorithm and Hashing can be helpful to solve banking issues and make the overall banking procedure smooth and secure, it is decentralized. Blockchain fundamentals are based on consensus algorithms.

Consensus is a process in computer science used to achieve agreement on a single data value among distributed systems. Consensus Algorithms in Blockchain helps to choose best peer to sign the next block in a network. In consensus Algorithm, proof of work, proof of stake, proof of capacity, proof of importance is discussed heavily. The Project deals with banking systems which involves user registration, database, transactions, book keeping etc. Through blockchain the main activity i.e., transaction.

The structure of the data on a blockchain differs from that of a traditional database. A blockchain organizes data into groupings called blocks, each of which contains a collection of data. Blocks have specific storage capabilities, and when they're full, they're closed and connected to the preceding block, producing a data chain known

as the blockchain. All additional data that comes after that newly inserted block is assembled into a new document.

Ethereum is considered to be a state-transaction system. The objects in the Ethereum system are known as accounts.

There are two main types of accounts:

"Externally owned accounts" and "contracts accounts".

Ethereum is a protocol which is based on Blockchain technology and has several benefits over other crypto-currency based system and is best suited for creating a secure lending system. Thus, it provides a relationship on past transactions that happened and also, generates values belonged to a particular address. Some developers have begun looking at the creation of other different Blockchain that allows for trade-offs and improved scalability using alternative, completely independent.

Blockchain, thus, allowing for more innovation. It secures the transactions in a way that any record of the transaction that occurred in the past, cannot be modified as the modification changes the hash of several blocks. Today, banks are continuously exploring new ways to do transactions quicker for enhanced customer services by assuring transparency to customers and regulators while ensuring cost efficiency. Blockchain is an essential technology with promising application scenarios in banking industry nowadays. It can transform banking industry and make process more democratic, transparent secure and efficient. Blockchain is a technology that combine several technologies like distributed data storage, consensus mechanism. point-to-point transmission and encryption algorithms. A Blockchain act as decentralized ledger that keeps track of transactions between two parties effectively. Although these parties have simultaneous access to update digital ledger constant and system virtually impossible to hack.

CHAPTER-2

RELATED WORK

As stated by [3] individuals could have additional trust than ever before because the dealings are immutable and clear. Success in crypto-currency and different technical areas highlights several engaging options of the blockchain technology that may profit additional aspects of recent society. Time Banking may be a generalized exchange economy not supported cash, however values everyone's contribution on identical scale, the time exhausted. Time banking may be a noble plan with nice potential; however, the safety and trust problems don't seem to be well self-addressed. during this paper a Blockchain Enabled localized Time banking industry. (BlendTBS) is projected to make a trusting, dynamic and respectful community. individuals during this community area unit inspired to be engaged in mutual serving relationships. For this purpose, the BlendTBS is intended to reward the residents United Nations agency commit in socially useful activities, associate initial example is enforced on a permissioned blockchain network and a tiny low scale study is planned to look at the utility of BlendTBS to a standard community.

As stated by [6] block chain has a stimulating support of bit coin, the digital crypto currency with Associate in Nursing ever increasing sphere of users worldwide. But, blockchain in itself is far over simply bit coin, it's the new generation security system. encapsulating processes nonparallel of blocks to produce a secure method of recording transactions and it's circulated among signatories, or any target cluster being the participants within the method. It attracts it charm out of the very fact that it achieves this while not the requirement of any central authority. Current banking design is basically centralized and so at risk of load defaults and frauds just like the PNB scam, Videocon case, coraciiform bird scam and lots of a lot of. Banking everywhere the planet has adopted block chain technologies and it's the requirement of the hour for regulation and shunning of such scams. Thus, we have a tendency to square measure exploitation block chain technology for the decentralized operating of banks and therefore the complete removal of authoritarian interception. (National Electronic Fund Transfer) exploitation IFSC (Indian national economy Code) incorporating the protocols set down by tally for secure and decentralized fund transfer. Our blocks can contain the method computed in java small services. The ledger is interconnected among themselves exploitation agreement algorithms.

As stated by S. Sakho, Z. Jianbiao, F. Essaf and K. Badiss the bulk of banks provide many alternative on-line services to their customers and our study case can focus specifically on domestic and international banking transactions. By doing these services, these banks use enough time to conduct bank transactions from one checking account to a different, a number of that take over per week, below a security that doesn't absolutely respect the privacy of operators and below the mercy of bound third party's services, sadly, these banks face the restrictions of payment systems (such as SWIFT, SEPA, and union pay) for international transactions and different banking exchange services. To remedy these issues of third-party trust, exaggerated latency, payment of high dealings fees, issues of thieving and falsification of banking info, we are going to started a storage and bank exchange platform, supported a non-public and confidential blockchain. during this platform, variety of approved users are ready to hold and operate the nodes which will support the network. obscurity within the world is there a system that directly connects banks, currencies and money establishments while not a sure third party. In our case, these sworn users are banks. This platform can eliminate the presence of the sure third party that is that the third entity through that the assorted transactions and banking info should pass. to start with, our platform can eliminate third-party trust, promote user-user dealings so store bank transaction info within the blockchain. Our blockchain platform can enable users to create secure and confidential transactions at a lower price and while not a far-off exchange ban because of a most quantity to not exceed like the case of banks.

As stated by [7] Blockchain innovation offers the banking industry numerous interesting chances. For observable effects to happen in the financial industry, certain difficulties should be overcome. In any case, notice that new protection laws should be trailed by the financial business for utilizing this innovation. Security laws should be followed for the wellbeing of both people and associations. The financial business is inseparable from tremendous information. Thus, the applicable specialists need to control and direct the entire cycle for the wellbeing of this gigantic measure of information. Blockchain innovation is still developing and numerous new highlights of the blockchain have arisen in the long term. Presently, it may be seen very well that market is overwhelmed by a gathering of huge organizations uncommon in the tech area, where the big four. Amazon, Facebook, Google and Apple overwhelm. In any case, the truth is that nobody owns the rights to the blockchain.

As stated by [8] The paradigm of net of Things (IoT) is paving the means for a world. wherever several of our daily objects are interconnected and can move with their

setting so as to gather data and modify sure tasks. Such a vision needs, among alternative things, seamless authentication, knowledge privacy, security, lustiness against attacks, straightforward readying, and self -maintenance. Such options it brought by blockchain; a technology born with a cryptocurrency known as Bitcoin.

As stated by [9] blockchain technology platform on the financial sector through cryptocurrency, and an impact on other industries. The subject of research is not only this technology but also its commercial exploitation. In order to understand the platform, the starting point of this research is an analysis of how the technology functions, after that the advantages for business and economic transaction are identified, and finally the paper deals with an impact of new technology on business. above all on financial operations. The basic hypothesis is that blockchain has achieved a great impact on financial sector, also it has the potential to radically change only the financial sector but also the way we buy and sell, our interaction with the authorities as a way of verifying the ownership from the authorship and the organic food production. Using the available data and synthesis of knowledge from the fields of technology, economics, finance, and politics, 4 scenarios were set up for the future of underlying technology.

As stated by [10] The formation of storage contracts between peers. Contracts area unit agreements between a storage supplier and their consumer, shaping what knowledge are going to be keep and at what worth. They need the storage supplier to prove, at regular intervals, that they're still storing their client's knowledge area unit keep in an exceedingly blockchain, creating them in public a 11/28 this respect, Sia are often viewed as a Bitcoin by-product that feat such contracts.

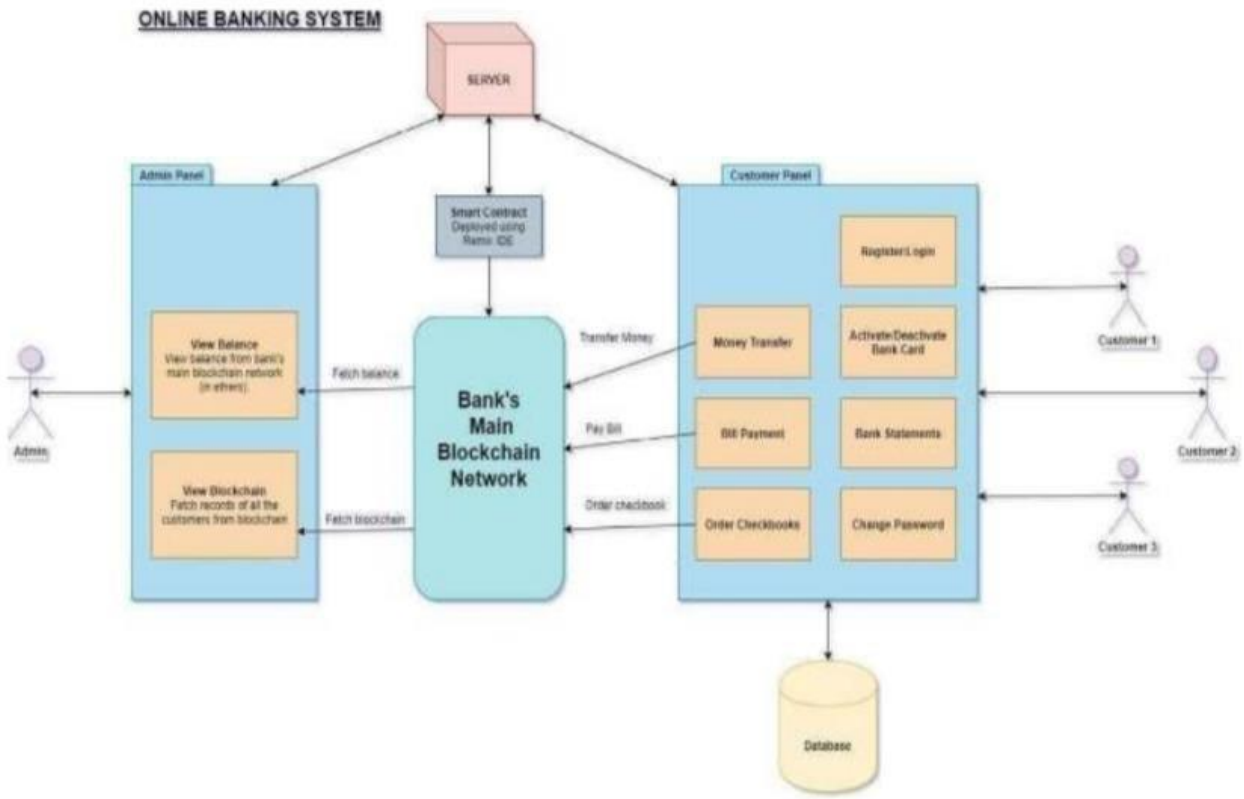
CHAPTER-3

Architecture and Design

Tools and Technologies Used:

- VS-Code
- Ganache
- Etherscan
- MY-SQL workbench
- Chrome
- Ethereum Tester

USE CASE DIAGRAM:

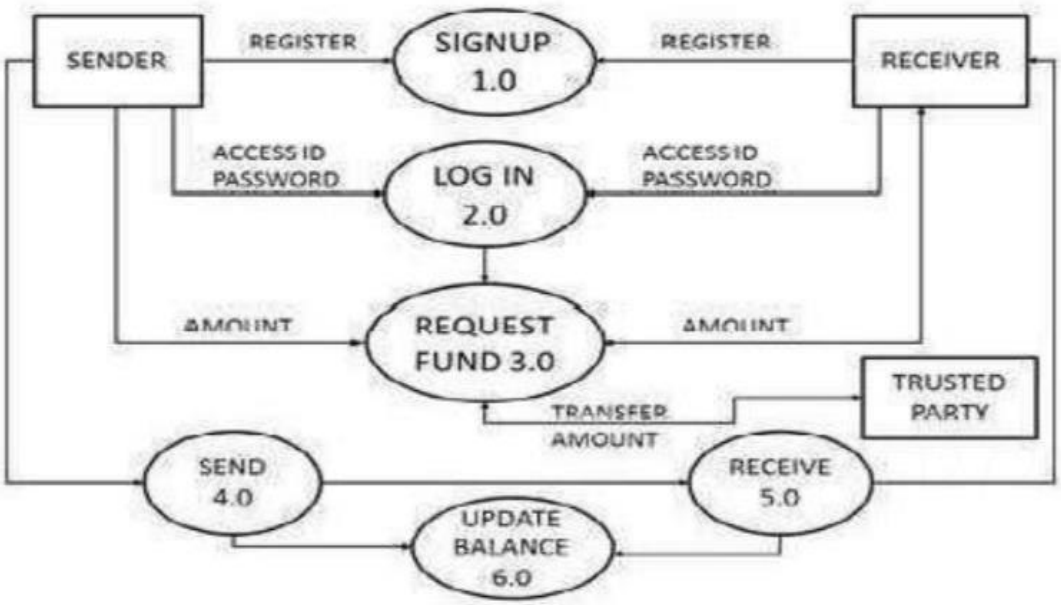


[Fig 1: Use Case Diagram]

DFD DIAGRAM:

A data flow diagram (DFD) is a graphical representation of the "flow" of data through an information system, modelling its process aspects. A DFD is often used as a preliminary step to create an overview of the system without going into great detail, which can later be elaborated. A context diagram is a top level (also known as "Level 0") data flow diagram. It only contains one process node ("Process 0") that generalizes the function of the entire system in relationship to external entities.

Draw the context diagram first, followed by various layers of data flow diagrams.



[Fig 2: DFD Diagram]

Chapter-4

Methodologies

Algorithms:

1. Consensus Algorithms:

Before Knowing Consensus Algorithms, we must know what is Consensus, it is a process in computer science used to achieve agreement on a single data value among distributed systems. In a distributed computing environment, a consensus algorithm is a technique that allows all participants in a blockchain network to reach a shared understanding (consensus) on the current data state of the ledger and trust unknown peers. It includes:

1. Proof Of Work:
   This Algorithm was introduced with first cryptocurrency i.e., Bitcoin by Satoshi Nakamoto. It is the most known way of confirming transactions. Proof of work (PoW) is a form of cryptographic proof in which one party (the prover) proves to others (the verifiers) that a certain amount of a specific computational effort has been expended. The first node to complete all necessary calculations receives a reward from blockchain network. All nodes compete against each other by increasing capacity of computing resources. The goal of proof-of-work algorithms is not to prove that particular tasks were completed or that a computational challenge was "solved," but to discourage data modification by imposing high energy and hardware-control requirements.

2. Proof Of Stake
   Proof of stake (PoS) protocols are a type of blockchain consensus method that selects validators based on their bitcoin holdings. This is done to circumvent proof of work methods' high computing costs. Therefore, node with greater number of resources get chosen to generate next block in blockchain. Just like in company, the one who has the highest number of shares has powers, node with greater number of resources is appointed to generate block in blockchain.

   (a) Delegated POS (Proof of Stake).
   Delegated POS is a type of POS consensus algorithm, in which blocks are signed by selective representatives. Owners of the largest balances choose their representative and each of them receives right to sign blocks on blockchain network. If by any chance, if the representative missed turning a block. he gets deprived from delegated votes and leaves council. Its advantages are that balance owners have an opportunity to delegate their votes. without delegating actual resources. Unlike POS, amount of unnecessary work is reduced during the process of choosing next voter.

(b) Leased POS (Proof of Stake)

Leased POS is another type of consensus algorithm user has a possibility to lease out their balance to mining nodes, in return mining nodes share a part of profit with users, which is only supported on waves platform.

3. Proof Of Capacity

POC, allows mining devices in network to use their hard drive space to decide mining rights. Proof-of-Capacity consensus is a step forward from the widely used Proof-ofWork consensus algorithm. Even before mining can begin, processor power and hard disc storage must be set aside. As a result, the system outperforms the Pow. Proof-of-Capacity produces a block in four minutes, whereas Proof-of-Work takes ten minutes. Supported by bitcoin. It tries to tackle the hashing problem in the PoW scheme. If there are more solutions or plots accessible on the computer, there is a better possibility of winning the mining dispute. The PoC technique is as follows:

- each miner calculates a huge quantity of data, which is stored on a node's disc subsystem: hard drive, cloud storage, or other. Space is the name of the first dataset in the PoC.
- The miner reads a tiny data set equal to 1/4096, or around 0.024 percent of all stored data, for each new block on the blockchain. The miner can then generate a new block after receiving the result (deadline) as elapsed time since the last block was created.
- The miner who met the minimum deadline time signs the block and earns a transaction reward.

4. Proof Of Importance

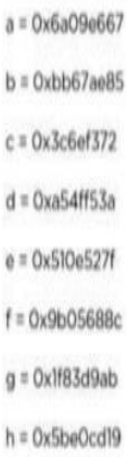
The NEM blockchain platform employs this consensus mechanism. The quantity of resources available on a user's balance and the number of transactions in their wallet determine their importance in the NEM network. Unlike the more prevalent PoS method, which solely considers user balance. Poi considers both the number of resources and the amount of user activity in the blockchain network. This strategy encourages customers to not just maintain money in their accounts, but also to spend it. Line time is responsible for signing the block and receiving a payment for each transaction.

2. Hashing:

Hashing is the process of scrambling raw data to the point that it can no longer be reproduced in its original form. It takes a chunk of data and rums it through a function that manipulates the plaintext with math. The hash function produces the hash value/digest, which is the result of the hash function. Two main applications of Hashing are

1. Password Hashes: In most website servers, it converts user passwords into a hash value before being stored on the server. It compares the hash value re-calculated during login to the one stored in the database for validation.
2. Integrity Verification: When it uploads a file to a website, it also shared its hash as a bundle. When a user downloads it, it can recalculate the hash and compare it to establish data integrity.
3. SHA 256 is a member of the SHA 2 algorithm family, with SHA standing for Secure Hash Algorithm. It was a cooperative effort between the National Security Agency and the National Institute of Standards and It adds some extra hits to the message, such that the length is exactly 64bits short of a multiple of $12. During the addition, the first bit should be one, and the rest of it should be filled with zeroes.
4. Padding Length You can add 64 bits of data now to make the final plaintext a multiple of 512.You can calculate these 64 bits of characters by applying the modulus to your original cleartext without the padding.

Initializing the Buffers:
You need to initialize the default values for eight buffers to be used in the rounds as follows:



[Fig 3: Buffer Values]

3. Salting:

In cryptography, a salt is random data that is used as an additional input to a one-way function that hashes data, a password or passphrase. Salts are used to safeguard passwords in storage.

4. Timestamp:

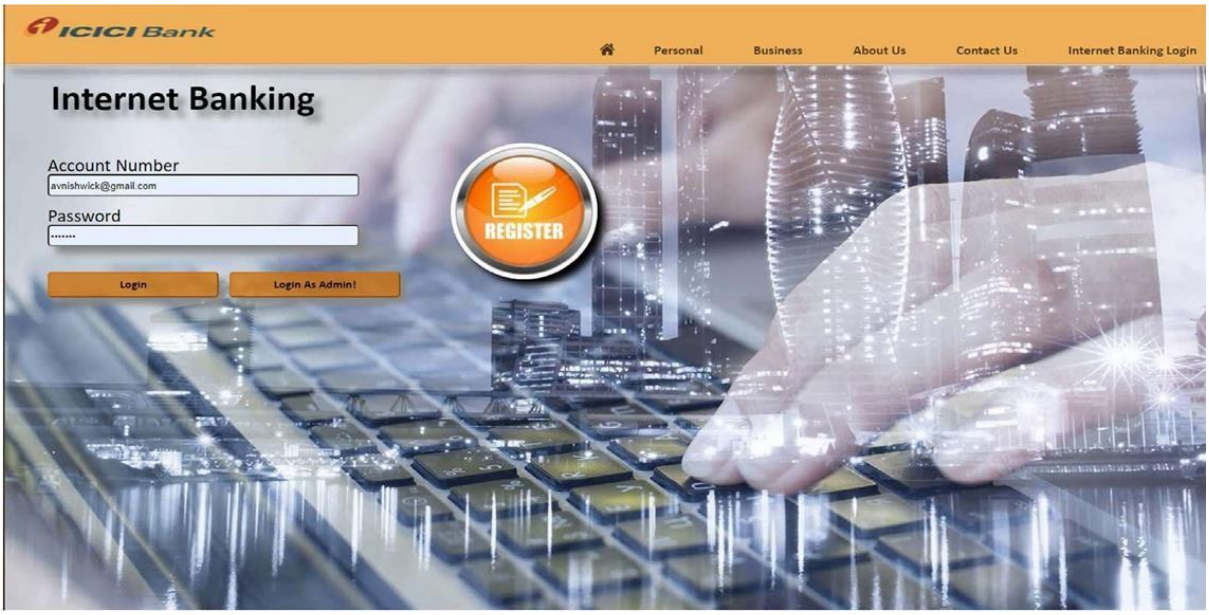
The timestamp or timestamp is a small data stored in each block as a unique serial and whose main function is to determine the exact moment in which the block has been mined validated by the blockchain network. In cryptography, a salt is random data that is used as an additional input to a one-way function that hashes data, a password or passphrase. Salts are used to safeguard passwords in storage. One of the main uses of timestamp is to establish the parameters of the process of mining. This

is because these timestamps allow nodes to correctly adjust the mining difficulty to be used for each block generation period. Timestamps help the network determine how long it takes to extract blocks for a certain period, and from there adjust the mining difficulty parameter.

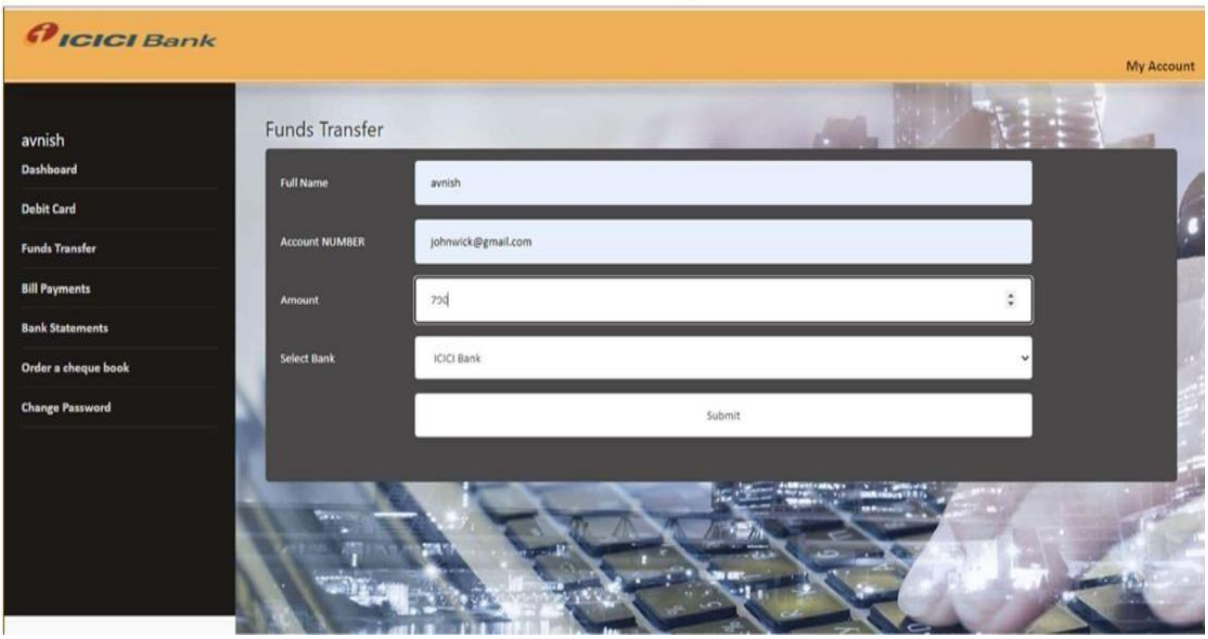
Offered Functionalities:

1. Registration/Login
2. Debit card activation/deactivation
3. Money '1“ransfer
4. Bill Payment
5. Generate Bank statements
6. Order check brinks
7. Change password
8. View bank details

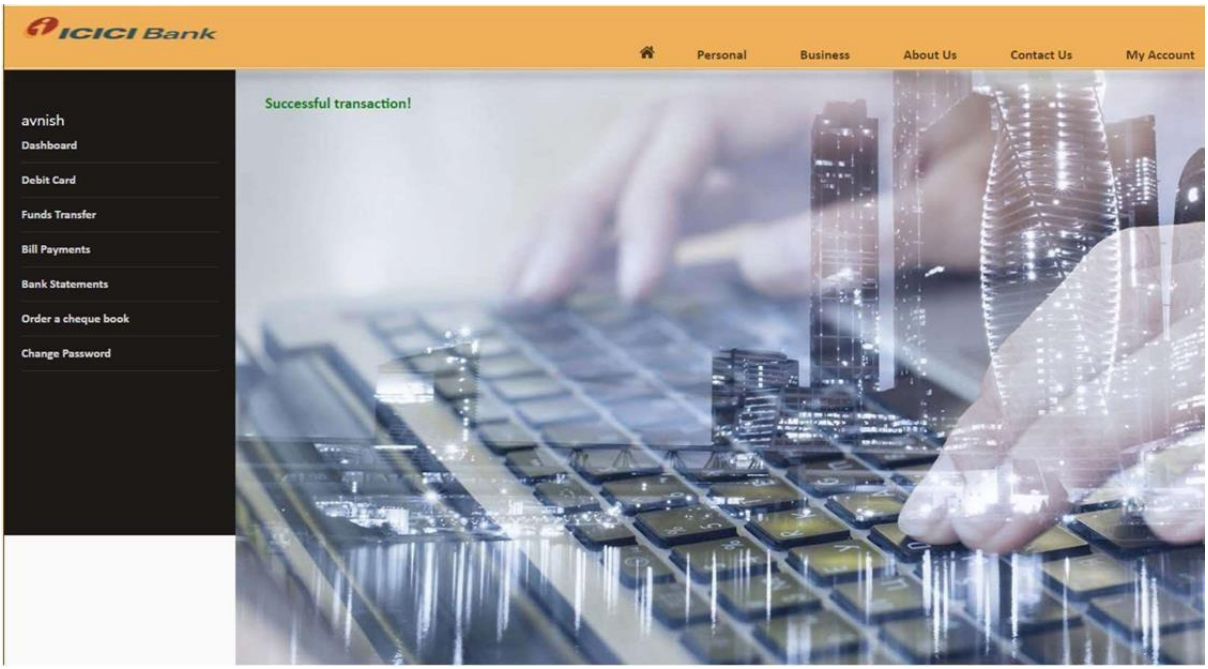
CHAPTER -5
Result



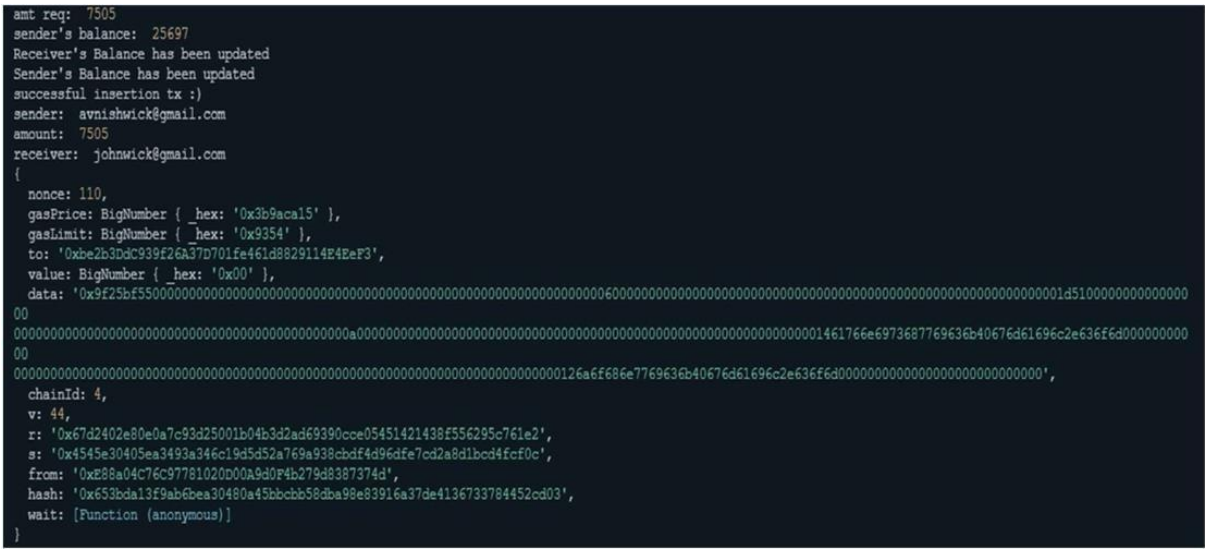
[Fig 4: Logging]



[Fig 5: Making the Transactions]



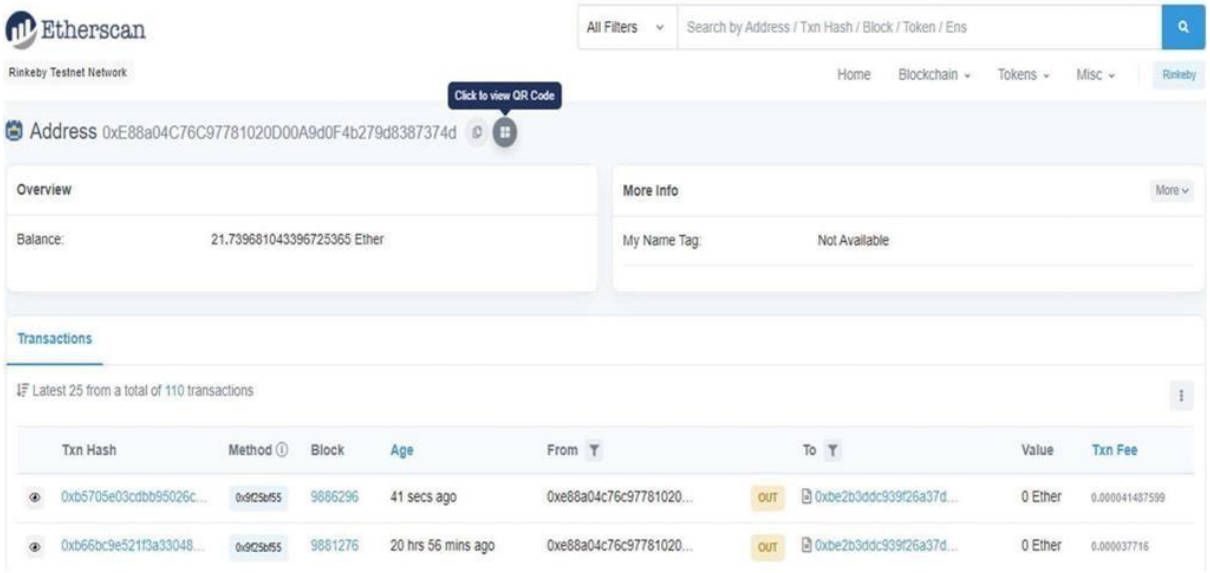
[Fig 6: The Transaction is successful]



[Fig 7: Saving the record to Blockchain]

It is approximately taking 41 seconds to save a transaction on Ethereum's test network. This is where, time stamp algorithms are used, generally a modest mines 10^8 hashes/sec. So ,4 x 10^9 nonce covered in 40 seconds. In Timestamp block tables, a row is added i.e., time stamp which stores time in Unix (a system for describing a point in time. It is the number of seconds that have elapsed since the Unix epoch, excluding leap seconds) every second value of timestamp will change and due to avalanche effect (considered as desirable property of encryption algorithm), a slight change in the key will change the output i.e., hash value. Minor exhausts 4 billion nonce in 40 sec, so minor exhausts 0.1 billion in l second.

New record is created on blockchain as shown on Etherscan website.



[Fig 8: Blockchain Transaction Hash]

Saving a transaction to a database is much faster but overhead of saving to blockchain is valuable

		Filter	Filter	Filter	Filter	Filter
	1	31	avnishwick@gmail.com	8832	12293	2021-10-16 18:29:22
	2	32	avnishwick@gmail.com	662	25133801	2021-10-16 18:30:54
	3	33	avnishwick@gmail.com	749	johnwick@gmail.com	2021-10-16 18:45:28
	4	34	pushan11@gmail.com	5884	avnishwick@gmail.com	2021-10-17 16:37:51
	5	35	pushan11@gmail.com	5446	6393939	2021-10-17 16:43:03
	6	36	avnishwick@gmail.com	220	johnwick@gmail.com	2021-12-26 12:50:55
	7	39	avnishwick@gmail.com	3000	johnwick@gmail.com	2021-12-27 12:46:17

[Fig 9: Database]

Deleting a record from database to check if the blockchain entry will be deleted or not

EXECUTE SUCCESS:

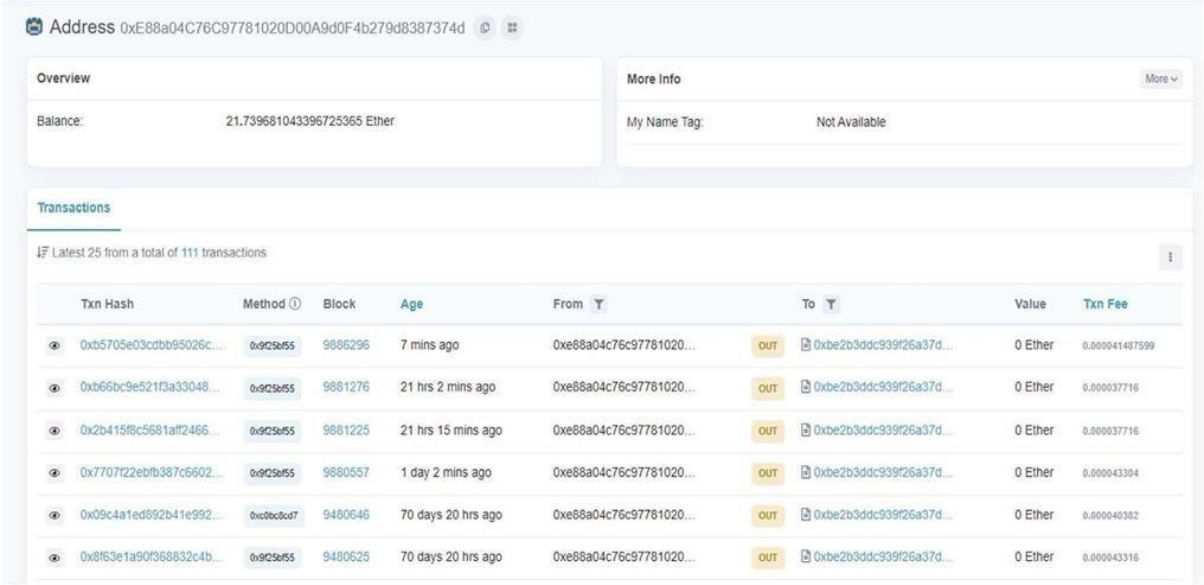
DELETE FROM transactions WHERE txId = 39

AffectedRows : 1

	* txId int	* sender varchar(255)	* amount int	receiver varchar(255)	RegDate timestamp
	Filter	Filter	Filter	Filter	Filter
1	31	avnishwick@gmail.com	8832	12293	2021-10-16 18:
2	32	avnishwick@gmail.com	662	25133801	2021-10-16 18:
3	33	avnishwick@gmail.com	749	johnwick@gmail.com	2021-10-16 18:
4	34	pushan11@gmail.com	5884	avnishwick@gmail.com	2021-10-17 16:
5	35	pushan11@gmail.com	5446	6393939	2021-10-17 16:
6	36	avnishwick@gmail.com	220	johnwick@gmail.com	2021-12-26 12:

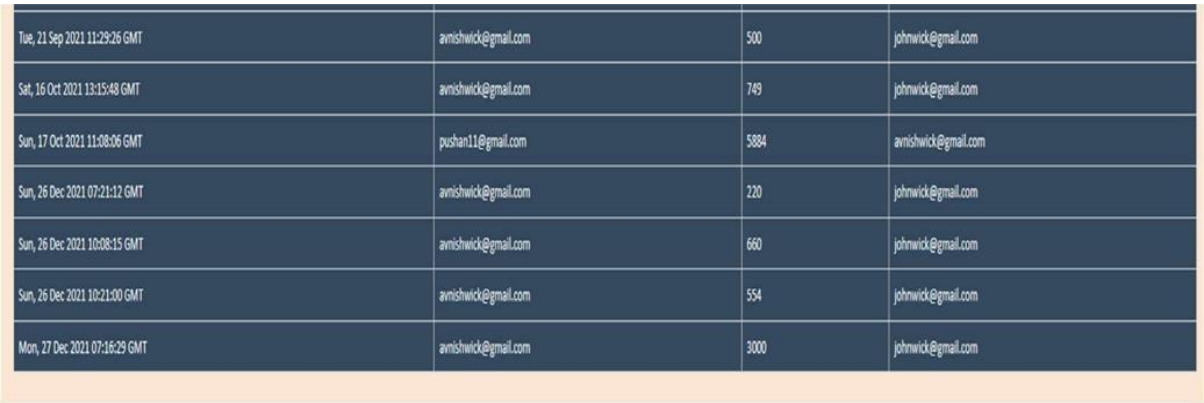
[Fig 10: Deletion of Record]

Record has been deleted from the SQL table but the same record is still there on the blockchain and cannot be deleted.



[Fig 11: Deleted record in Blockchain]

We can clearly view it from the admin panel.



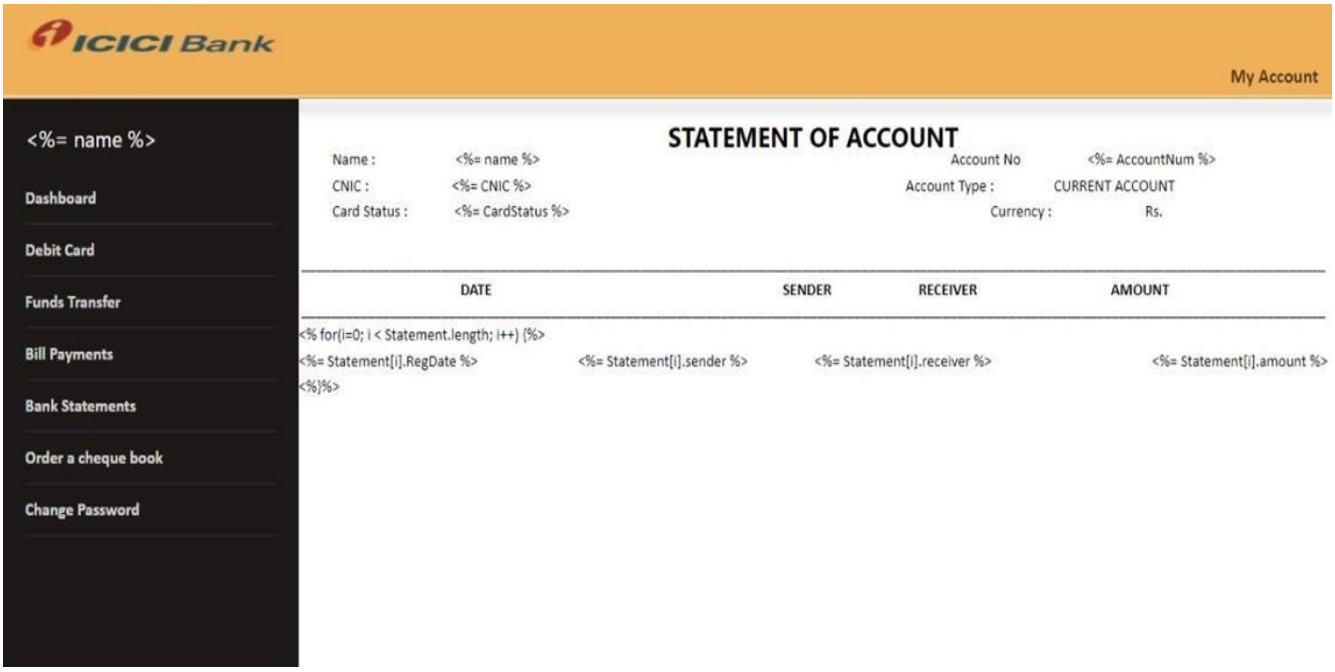
[Fig 12: Rollback of Deleted Record in Admin Panel]

This justifies even if the record is deleted from the tables, it will still be there in the blockchain and can be rolled back one it refreshes. This make the system loss of data is kind of negligible.

Functionalities

1. Bank Statement

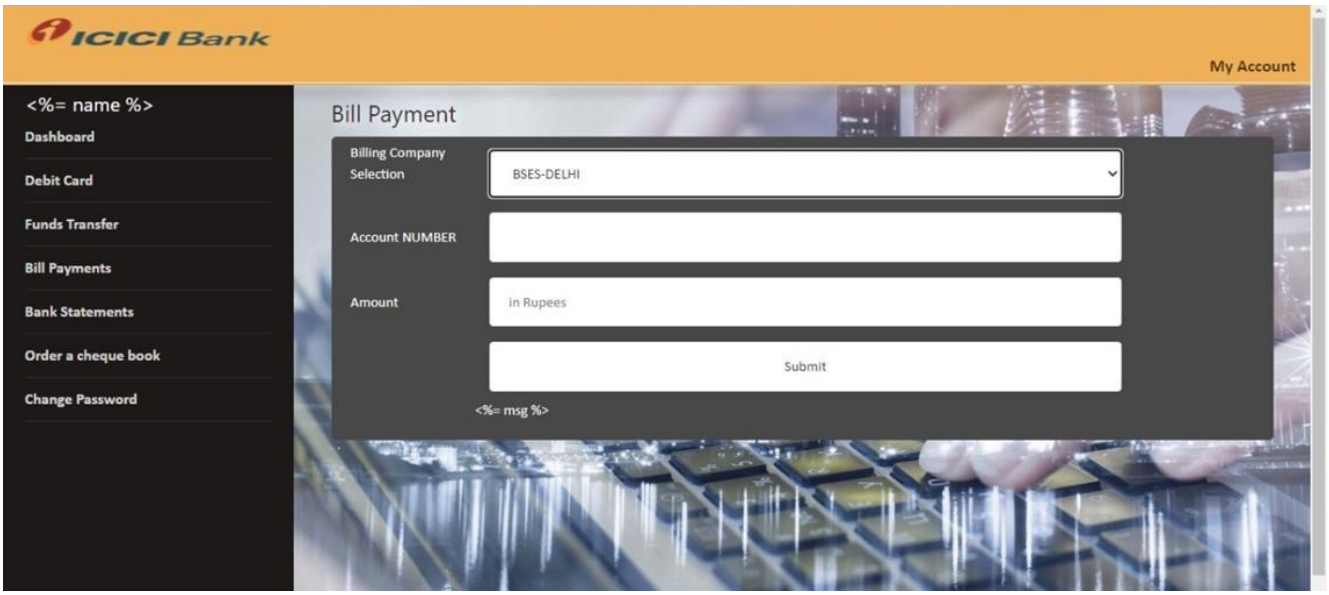
While transacting money from one account to another, the most important thing is to maintain a ledger, to keep a record of money transferred and received. The Bank Statement provides a comprehensive view of cash flow. Firstly, it displays the personal details of user's account and according to date, it maintains a small table displaying the date when the money is transferred, sender's account number, and receivers account number and the amount that is being transferred.



[Fig 13: Account Statement]

2. Bill Payment

Bill payment comes with the facility to pay personal bills through portal to several government bodies as well as telecom services. The user has to select the company to which bill is to be paid, has to enter amount to be paid and from which account money is being paid



[Fig 14: Bill Payment Portal]

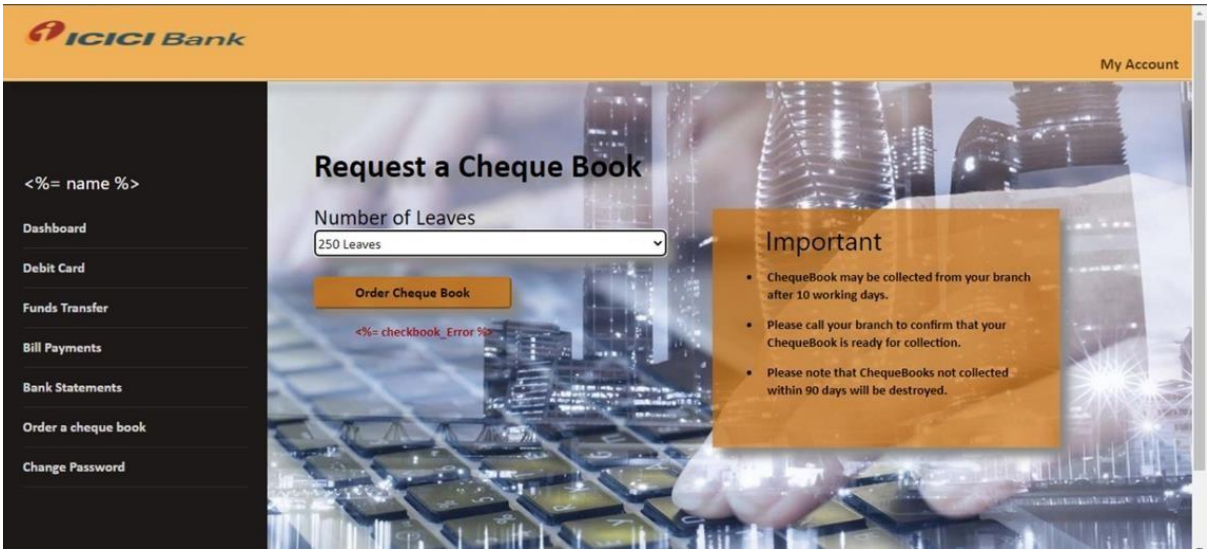
3. Changing Passwords

For security reasons if user is not quite sure that the password is not safe anymore, they can change the password of their account by entering the current password and new password twice

[Fig 15: Change Password]

4. Ordering Cheque Book

If the user faces shortage of cheques, user can request through online portal, and can select leaves (cheque pages) according to his/her needs. The bank offers 4 types of leaves i.e., 50 pages,100 pages, 150 pages, and 250 pages. User can get the cheque book within 10 days of requesting from portal.



[Fig 16: Cheque Book Request]

CHAPTER -6

Conclusion

Online Bank Management System provides user-friendly interface to the customers and admin. The objective of the project was to provide flexible access of multiple banking services to the Customers and secure their transactions. Both objectives were met, Furthermore, our banking system has plenty of room for more development, to conclude, the project is easy to understand, secure and has a lot of potential for development. Using blockchain the system and transactions are secured and even if the system clashes the data entries in the SQL table can be rolled back by the properties of Blockchain. Since bitcoin and other similar cryptocurrencies uses pow as their main algorithm, which is energy consuming and highly costly, PoS techniques should be introduced to new systems and as users increases, use of decentralized cloud platform be in use to provide smooth experience to users hashing techniques sha256 should be included while hashing. The Algorithms used like dashing and halting make the hash value secure arid un-traceable and provide extra- security to the system. So, with the implementation of blockchain the banking system can be more secured and reliable and reduces the amount of loss at times of intrusions

Future Scope

Blockchain is the vast-field to be discovered. The app contains the basic properties of the blockchain and implemented to the basic baking system which can be extended to the more of the other use cases of banking system like fundraising, NEFTs, foreign transactions. Alongside the system right now carries the data in SQL table which can be replaced by much secure format so that to reduce the risk of intrusions ahead of it. The banking can be much more decentralized and efficient blockchain in it. Since bitcoin and other similar cryptocurrencies uses PoW as their main algorithm, which is energy consuming and highly costly, PoS technique should be introduced to new systems as users increases, use of decentralized cloud platform be in use to provide smooth experience to users, hashing technique sha-256 should be included while hashing

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