

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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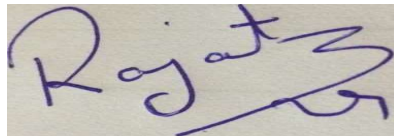
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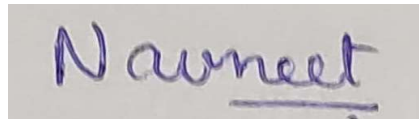
DECLARATION

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.

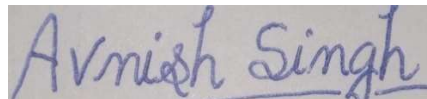
Date: 27-12-2021

A handwritten signature in blue ink that reads "Rajat" followed by a stylized flourish.

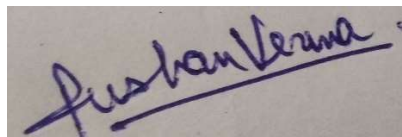
Rajat Kumar (41520802718)

A handwritten signature in blue ink that reads "Navneet" with a horizontal line underneath.

Navneet (41820802718)

A handwritten signature in blue ink that reads "Avnish Singh" with a horizontal line underneath.

Avnish Singh (4280802718)

A handwritten signature in blue ink that reads "Pushan Verma" with a horizontal line underneath.

Pushan Verma (35820802718)

Certificate by Supervisor

This is to certify that Report titled “Online Banking System Using Blockchain” is submitted by **Rajat (94), Navneet (97), Avnish (104), Pushan (114)** in partial fulfillment of the requirement for the award of degree B. Tech in Computer Science & Engineering to BPIT, GGSIP University, Dwarka, Delhi. It is a record of the candidates own work carried out by them under my supervision. The matter embodied in this Report is original and has not been submitted for the award of any other degree.



(Signature)

Date: 27-12-2021

Supervisor

Ms. Akanksha

Dhamija Assistant

Professor, CSE

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.

(signature)

Date: 27-12-2021

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, hashing 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.

CHAPTER-2

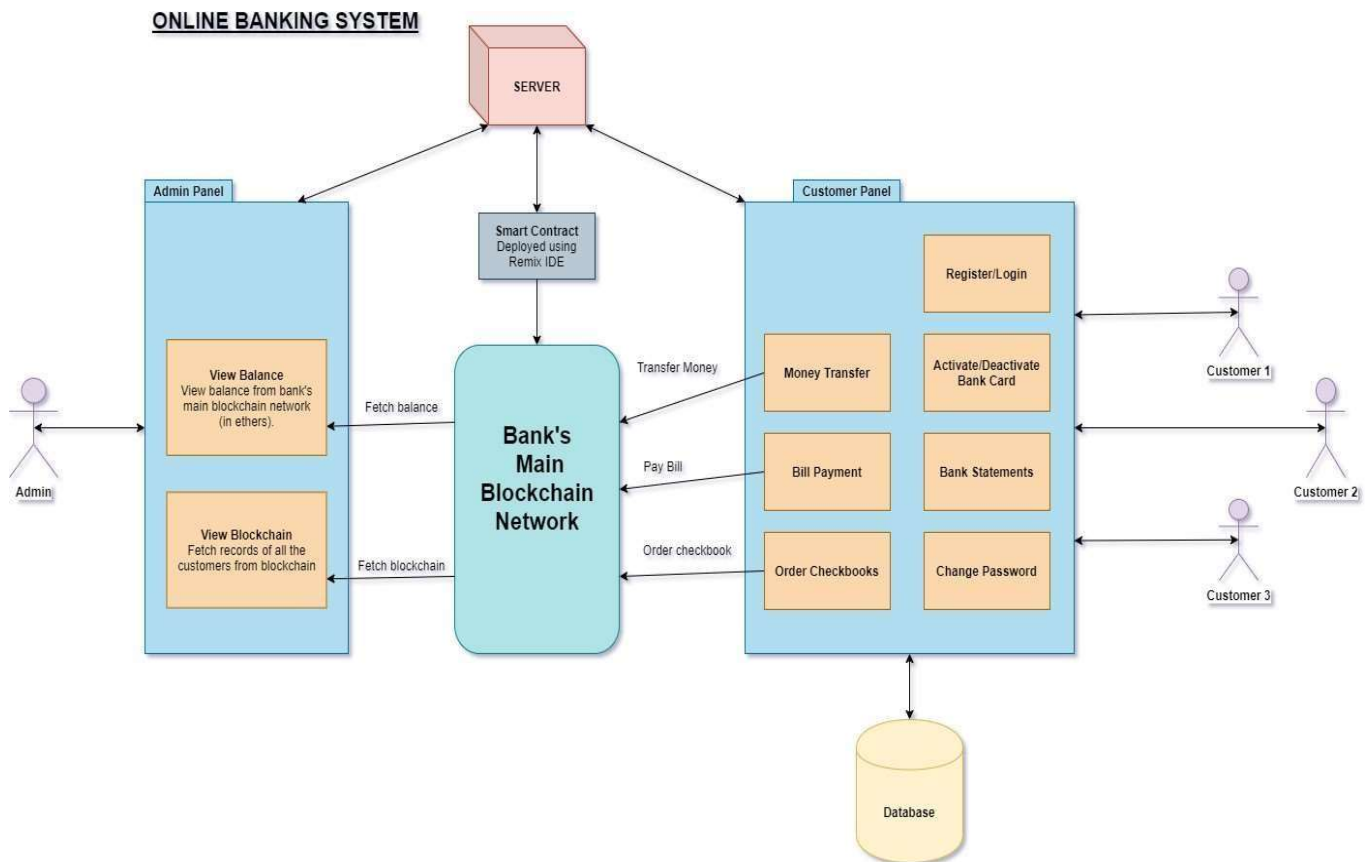
RELATED WORK

With the introduction of bitcoin , decentralized currency is introduced which can solve the problem of banking systems which can make the transactions more secure and robust . With the help of blockchain Peer to peer network, commonly known as P2P is a decentralized network communications model that consists of a nodes that collectively store and share files where each node acts as an individual peer[2]. In this network, P2P communication is done without any central administration or server, which means all nodes have equal power and perform the same tasks. Keeping this in mind, our online banking system saves all the transactions performed by any customer directly to the blockchain network.Consensus Algorithms ,the building blocks of blockchain explains the process to achieve agreement on a single data value among distributed systems. It helps to choose the best peer to sign the next block in a network. Proof of Work explains where first node to complete all transactions is rewarded from network[12].Proof of Stake , a type of consensus algorithm which focuses on block which has maximum number of resources between its peers gets the priority which has again its subparts as Delegated Pos and Leased Pos[13].A special type of proof of work, introduced to increase the security and searching in blockchain is primecoin introduced by Cunnighma, which has its 1st kind ,2nd kind and bi-twin kind.Primecoin is linked ti blockhash to preserve the security[12].Time Stamp is a small data(unix time-numbersof seconds that have elapsed since the unix epoch,excluding leap seconds) stored in each block as unique serial and whose main function is to determine exact timestamp of mining validated by blockchain.[.].Hashing and salting techniques are used to increase the security so that no chance of vulnerablility can be left. SHA256 Algorithm which converts original data tohashvalue(digest),when passed through the hash function,used for passwords and integrity verification,whereextra bits are added to message such that length is exactly 64 bits short of multiple 512.[22]

CHAPTER – 3

Architecture and Design:

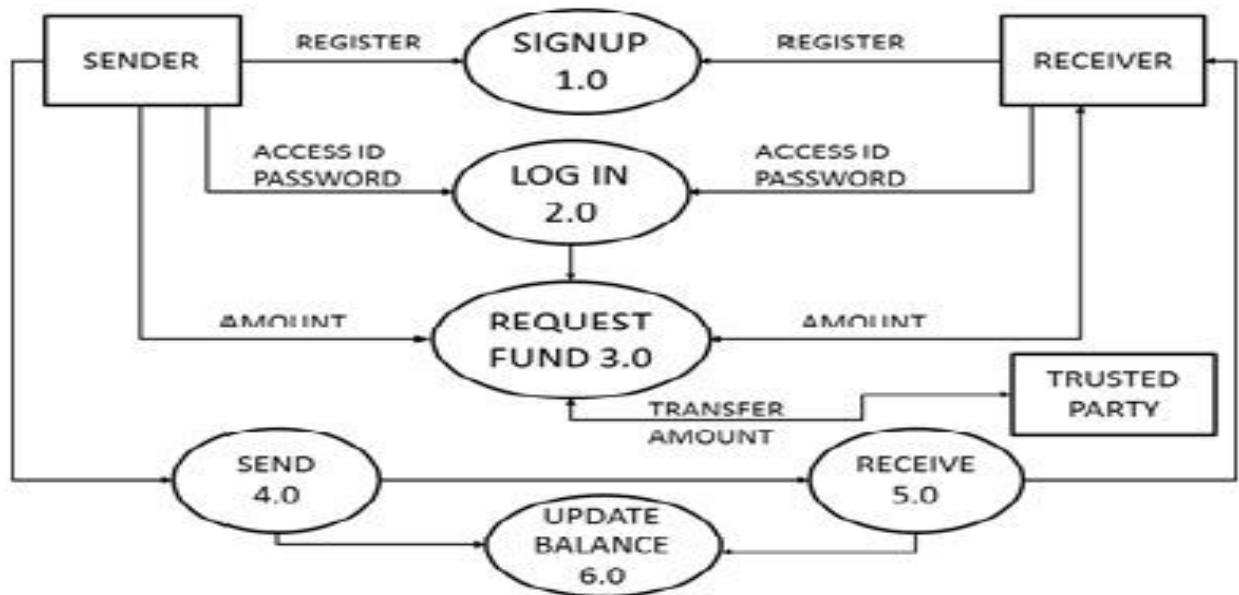
USE CASE DIAGRAM:



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.



Chapter -4

PROPOSED WORK

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 a 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-of-Work 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 runs 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:

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.

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.

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 Technology to introduce a successor to the SHA 1 family, which was steadily losing power against brute force assaults. It was published in 2001. The 256 in the name refers to the final hash digest value, which means that regardless of the amount of plaintext or cleartext, the hash value will always be 256 bits. SHA 256 is more or less comparable to the other algorithms in the SHA family. Look into learning a little more about their policies immediately.

The significance of the 256 in the name stands for the final hash digest value, i.e. irrespective of the size of plaintext/cleartext, the hash value will always be 256 bits.

You can divide the complete process into five different segments, as mentioned below:

Padding Bits

It adds some extra bits to the message, such that the length is exactly 64bits short of a multiple of 512.

During the addition, the first bit should be one, and the rest of it should be filled with zeroes.

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.

Initialising the Buffers:

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

```
a = 0x6a09e667
b = 0xbb67ae85
c = 0x3c6ef372
d = 0xa54ff53a
e = 0x510e527f
f = 0x9b05688c
g = 0x1f83d9ab
h = 0x5be0cd19
```

Compression Functions

The entire message gets broken down into multiple blocks of 512 bits each. It puts each block through 64 rounds of operation, with the output of each block serving as the input for the following block

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 and 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. 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 and 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 Transfer
4. Bill Payment
5. Generate bank statements
6. Order checkbooks
7. Change password
8. View bank details

CHAPTER - 5

Implementation and Results

Saving The Records To The Blockchain:

It is approximately taking 41 seconds to save a transaction on Ethereum's test network.

The screenshot shows the Etherscan interface for the Rinkeby Testnet Network. At the top, there's a search bar and navigation links. The main section displays the 'Overview' of a transaction with the address 0xE88a04C76C97781020D00A9d0F4b279d8387374d. The balance is 21.739681043396725365 Ether. Below this, the 'Transactions' section shows a list of the latest 25 transactions from a total of 110. The table includes columns for Txn Hash, Method, Block, Age, From, To, Value, and Txn Fee. Two transactions are visible, both with a value of 0 Ether and a fee of 0.000041487599.

Txn Hash	Method	Block	Age	From	To	Value	Txn Fee
0xb5705e03cddb95026c...	0x925b55	9886296	41 secs ago	0xe88a04c76c97781020...	0xbe2b3ddc939f26a37d...	0 Ether	0.000041487599
0xb66bc9e521f3a33048...	0x925b55	9881276	20 hrs 56 mins ago	0xe88a04c76c97781020...	0xbe2b3ddc939f26a37d...	0 Ether	0.000037716

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

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

Deleting A Record:

Deleting a record from database.

EXECUTE SUCCESS:


DELETE FROM transactions WHERE txId = 39

AffectedRows : 1

	Q	* 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
	2	32	avnishwick@gmail.com	662	25133801	2021-10-16 18:3
	3	33	avnishwick@gmail.com	749	johnwick@gmail.com	2021-10-16 18:4
	4	34	pushan11@gmail.com	5884	avnishwick@gmail.com	2021-10-17 16:3
	5	35	pushan11@gmail.com	5446	6393939	2021-10-17 16:4
	6	36	avnishwick@gmail.com	220	johnwick@gmail.com	2021-12-26 12:5

Record has been deleted.

But the same record is still there on the blockchain and cannot be deleted.


Address 0xE88a04C76C97781020D00A9d0F4b279d8387374d

Overview

Balance: 21.739681043396725365 Ether

More Info

My Name Tag: Not Available

Transactions

Latest 25 from a total of 111 transactions

Txn Hash	Method	Block	Age	From	To	Value	Txn Fee
0xb5705e03cddb95026c...	0x925bf55	9886296	7 mins ago	0xe88a04c76c97781020...	OUT 0xbe2b3ddc939f26a37d...	0 Ether	0.000041487599
0xb66bc9e521f3a33048...	0x925bf55	9881276	21 hrs 2 mins ago	0xe88a04c76c97781020...	OUT 0xbe2b3ddc939f26a37d...	0 Ether	0.000037716
0x2b415f8c5681aff2466...	0x925bf55	9881225	21 hrs 15 mins ago	0xe88a04c76c97781020...	OUT 0xbe2b3ddc939f26a37d...	0 Ether	0.000037716
0x7707f22ebfb387c6602...	0x925bf55	9880557	1 day 2 mins ago	0xe88a04c76c97781020...	OUT 0xbe2b3ddc939f26a37d...	0 Ether	0.000043304
0x09c4a1ed892b41e992...	0xc0bc8cd7	9480646	70 days 20 hrs ago	0xe88a04c76c97781020...	OUT 0xbe2b3ddc939f26a37d...	0 Ether	0.000040382
0x8f63e1a90f368832c4b...	0x925bf55	9480625	70 days 20 hrs ago	0xe88a04c76c97781020...	OUT 0xbe2b3ddc939f26a37d...	0 Ether	0.000043316

We can clearly view it from the admin panel.

Tue, 21 Sep 2021 11:29:26 GMT	avnishwick@gmail.com	500	johnwick@gmail.com
Sat, 16 Oct 2021 13:15:48 GMT	avnishwick@gmail.com	749	johnwick@gmail.com
Sun, 17 Oct 2021 11:08:06 GMT	pushan11@gmail.com	5884	avnishwick@gmail.com
Sun, 26 Dec 2021 07:21:12 GMT	avnishwick@gmail.com	220	johnwick@gmail.com
Sun, 26 Dec 2021 10:08:15 GMT	avnishwick@gmail.com	660	johnwick@gmail.com
Sun, 26 Dec 2021 10:21:00 GMT	avnishwick@gmail.com	554	johnwick@gmail.com
Mon, 27 Dec 2021 07:16:29 GMT	avnishwick@gmail.com	3000	johnwick@gmail.com

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 sha-256 should be included while hashing. The Algorithms used like hashing and salting make the hash value secure and 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.

CHAPTER – 7

FUTURE SCOPE

Blockchain is the vast-field to be discovered. The app contains the basic properties of the blockchain and implemented to the basic banking 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 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 sha-256 should be included while hashing .

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I hereby affirm that I have not cheated or copied for this project. I have obtained help from the following sources:

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