

Decentralized Banking System on Ethereum Blockchain

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ABSTRACT

Banking is the backbone of the financial sector of our times. Financial sector is one of the main facilitators in the progress of our society. The world we see today would not have been possible without the banking system. But the banking system currently has a centre dependency. CORE (Centralized Online Real-Time Exchange) banking has major disadvantages like single point of failure, power and authority for planning and decision making rest with top management organized around a hierarchical structure, dictatorial & inflexible. Decentralized/Distributed banking is the need of the hour as it gives anonymity, low/no interest rates, no single point of failure, power to the masses. It is resilient, inherently democratic and efficient. Crypto Banks are decentralized banking platforms that provide the usual services similar to centralized banks, primarily lending services and credit scoring. But it essentially cuts out all of the middlemen that a centralized bank uses. There is no centralization whatsoever. The employees needed in a centralized bank to structure financial data and approve loans are replaced in a crypto banking ecosystem by smart contracts and p2p, peer-to-peer, services. Since all issues can be solved online, most of the network will be online. The bank is moulded in the form of a computer interface, whether on a desktop or a phone, and the currencies dealt with are mostly cryptocurrencies. In this project, I have created a smart contract on Ethereum blockchain that functions as a bank. It covers basic banking operations - creating new accounts, adding/withdrawing money, giving interest to the account holders, showing balances. I used Solidity programming language to write the smart contract and wrote a few tests in Javascript. To test the smart contract, I used Remix IDE. The project gives an idea of how crypto banks work in a real-time environment.

KEYWORDS: Blockchain, Ethereum, Decentralized Banking App, Crypto Bank, Decentralized Bank, Dapp, Smart Contract.

I. INTRODUCTION

Need of the Study

The banking system currently has a centre dependency. It is centralized to an authoritarian extent. CORE (Centralized Online Real-Time Exchange) banking has major disadvantages like single point of failure, power and authority for planning and decision making rest with top

management organized around a hierarchical structure, dictatorial & inflexible. Decentralized/Distributed banking is the future as it gives anonymity, low/no interest rates, no single point of failure, power to the masses. It is resilient, inherently democratic and efficient.

SCOPE OF STUDY

Ethereum is a decentralized open source blockchain containing smart contract functionality. Ether (ETH) is the native cryptocurrency token of the Ethereum decentralized platform. Ethereum is the second-largest cryptocurrency in the world.

It is the most actively used blockchain in the world. It is loved by tech giants. Our goal is to use Solidity Smart Contract for Ethereum Blockchain and develop a simple banking system with all the necessary functionalities. This project will serve as a basis for understanding the decentralized banking system. Later on, advanced features (eg: - functionality of taking out loans and setting an account through which instalments are deducted) can be added and a full-fledged decentralized banking system can be generated from this project.

OBJECTIVE OF STUDY

Demonstrate a working decentralized banking system through this project, scoped down to cover basic banking operations - creating new accounts, adding/withdrawing money, showing balances. Building a smart contract on the Ethereum Blockchain.

METHODOLOGY

Blockchains provide a way to establish trust in decentralized trustless networks. Ethereum is a blockchain which supports a turing complete programming language to develop contracts. My aim is to use Ethereum to set up contracts for deploying a decentralized banking system.

II. TERMINOLOGY

Blockchain

A blockchain can be described as a public database that is updated and shared across many computers in a network. "Block" means that data and state is stored in sequential batches or "blocks". "Chain" means that each block cryptographically references its parent. A block's data can't be altered without altering all subsequent blocks, which would require the consensus of the entire network. Each new block and the chain must be agreed upon as a whole by every node in the network. This is so everyone has the same data. For it to work, blockchains need a consensus mechanism. Proof-of-Work and Proof-of-Stake are the two widely used consensus algorithms.

Ethereum

Ethereum is a decentralized open source blockchain containing smart contract functionality. Ether (ETH) is the native cryptocurrency token of the Ethereum decentralized platform. Ethereum is the second-largest cryptocurrency in the world. It is the most actively used blockchain in the world. It was proposed in late 2013 by a cryptocurrency researcher and programmer named Vitalik Buterin. The development of Ethereum was funded by a crowdsale that took place between July and August 2014. The system went live on 30 July 2015. Ethereum Virtual Machine (EVM) is a decentralized replicated virtual machine, which can execute Turing-complete scripts and run decentralized applications. Ethereum has been utilized for many initial coin offerings (ICOs) and is also used in decentralized finance. It is currently being actively developed and is planning to implement a series of upgrades called Ethereum 2.0 with specifications including a proposed transition to Proof-of-Stake consensus mechanism and an increase in transaction throughput using sharding technology.

Dapps

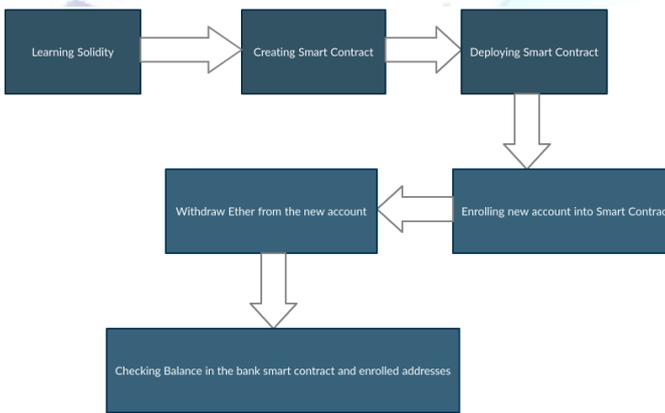
Conventionally, participants don't write new code every time they want to request a computation on the Ethereum Virtual Machine (EVM). Rather, application developers upload reusable snippets of code, also called programs, into EVM storage, and then users make requests for the execution of these code snippets with assorted parameters. The programs uploaded to and executed by the network are called smart contracts or decentralized apps (Dapps). Thus, any developer can create a dapp and make it public to the network, using the blockchain as its data layer, for a fee paid to the network. Any user can then call the dapp to execute its code, again for a fee paid to the network.

Smart Contracts

A smart contract is a transaction protocol or a computer program which is intended to automatically execute, control or document legally relevant events and actions according to the terms of a contract or an agreement. Using smart contracts, developers can build and deploy arbitrarily complex user-facing apps and services: marketplaces, games, financial services, etc.

III. IMPLEMENTATION

For this project, I used Solidity, Truffle, VSCode, Javascript and Remix IDE. I created smart contracts in Solidity on Ethereum blockchain. Together, the smart contracts work as a basic decentralized banking system. It allows basic operations like creating/enrolling new accounts, deposit & withdrawal of cryptocurrency, showing balances, basic FD etc. One smart contract was for basic banking operations & the other was for FD. The first smart contract was named "CryptoBank.sol" & the other was named "FD.sol". Tests and deployment code were written in Javascript. Tests can also be written in Solidity. The decentralized bank gives interest to select customers on "first come first serve". So, only the initial few account holders get a constant interest for enrolling into the bank. It is done to create a priority-based system. Other interest lending methods can be explored and implemented too



IV. EXPERIMENTAL RESULTS

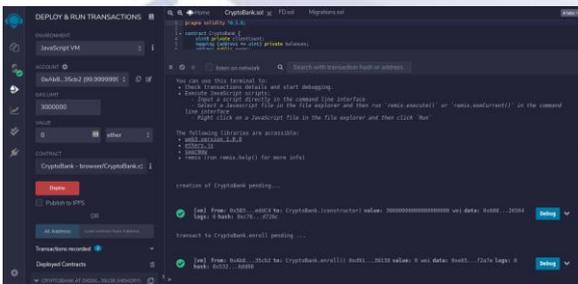


Fig 1: Enrolling into bank

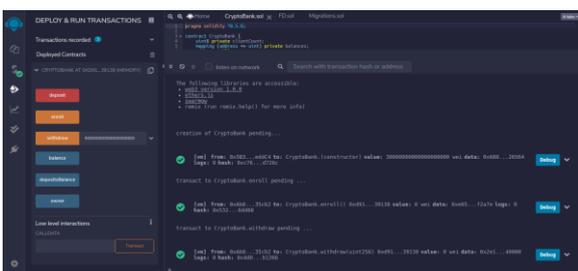


Fig 2: Withdrawing from Bank

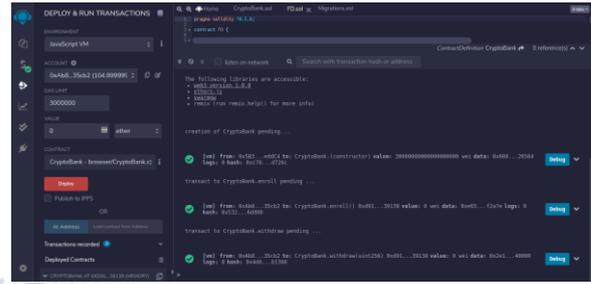


Fig 3: Balance in account/address after withdrawing from Bank

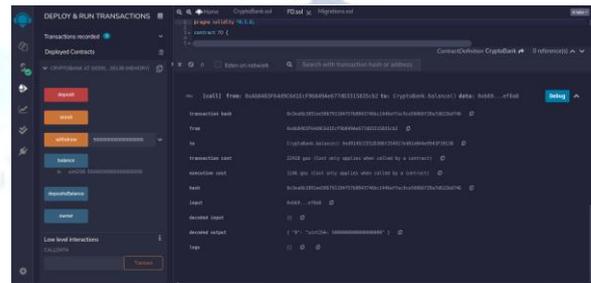


Fig 4: Showing balance

V. CONCLUSION AND FUTURE SCOPE

By working on this project, I learned a lot about the banking system and how it works. Also, I gained valuable insight into the crypto industry and blockchain. I learned a lot about Ethereum blockchain, writing smart contracts and Solidity programming language.

The project work serves as a basis for understanding decentralized banking systems. It covers all the basic banking operations - creating new accounts, adding/withdrawing money, giving interest to the account holders, showing balances. Later on, advanced features (eg:- functionality of taking out loans and setting an account through which instalments are deducted) can be added and a full-fledged decentralized banking system can be generated from this project. The benefits of decentralized banking that we saw through this project were no single point of failure, swift transactional processing, smooth currency transfer, impeccable security, financial freedom, 99.99% uptime and no need to set up buildings for banking institutions. Every transaction recorded on the blockchain can't be practically altered. So, it removes the risk of frauds. Everything is open and the financial power is in the hands of the people.

Also, Ethereum 2.0 is around the corner. It is expected to be a revolutionary step in the crypto

world. So, in future, the project can be used to deliver a full-fledged crypto bank using an even more secure and functional blockchain.

It is expected that in the next 5 years, the world will gradually switch over to decentralized banking. Such a world will be truly financially democratic, where the public will have financial freedom. The people will no longer be the puppets of selfish institutions & crony capitalists.

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