Personal File for Public Usage via Block Chain Architecture

Blockchain and Digital Currency Final Project Report

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Abstract

With the rapid growth of blockchain technology, government departments desire the application of blockchain technology that help them to solve efficiency and authenticity difficulties. Blockchain unique characteristic offer many well solution for government affairs reformation. In this project, we aim to design a blockchain-based system that can record and update personal file information for government department. We firstly introduce the external development environment of blockchain technology. Then we list the reasons and feasibility of developing a blockchain-based government attesting system for personal file instead of traditional system. We introduce the unique advantage in security, reliability and availability using the blockchain technology. We also present the whole ecosystem of our project, including specify the work of common users, miners and validators, clarify the types of events, clarify the structure of the blocks, illustrate two types of accounts and the design of incentive system. Subsequently, we introduce the model of our two types of accounts management, whole routine of how our project works and other protocol like consensus protocol, incentive internal mechanism, etc. We build a java back end to complete our project's function. And we design a React front end and a related video for function presenting. We then explain the limitation of our project and future expectation. The whole report is in a paper form.

Key words: blockchain technology, personal file management, historical reputation system

Directory

1. Introduction

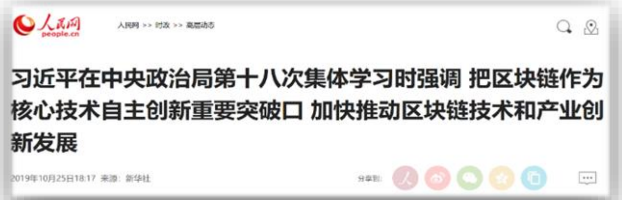
Blockchain is originated from bitcoin. Based on P2P net-work layer technology, encryption technology, timestamp, and electronic cash system architecture concept, blockchain and digital currency technology grow rapidly since January 3,2009, the birth of genesis block, with its unique characteristic of decentralization, security, publicly visible and efficiency in many given occasions.

Blockchain and digital currency develop supplement of each other. Bitcoin, with the application of blockchain technology, also known as “digital gold”, is a decentralized digital currency. Bitcoin is created after a person calling himself Satoshi Nakamoto published the bitcoin white paper "bitcoin: a peer-to-peer electronic cash system" on the website of the P2P foundation, stating his new vision for electronic money -- the introduction of bitcoin. Bitcoin has the unique currency characteristic of decentralization, pseudonym and tampering-resistance. Supporters claim that bitcoin implementation value transfer all over the world. Other voices argue that bitcoin has the ambitions to redistribute wealth. No matter how, bitcoin wins a huge success in digital currency world. Bitcoin’s success drive Ethereum’s creation. Ethereum, also known as “blockchain 2.0”, optimizes bitcoin’s hardcore shortage and firstly introduces the concept of smart contract. It increases protocol extensibility by smart contract and replace the bitcoin script language with solidity language, which is Turing-complete. These changes enable Ethereum to be more diversity, many complicated value exchange or protocol execute become possible.

Ethereum’s diversity hatch many interesting applications. Such as decentralized risk investing organization (The DAO), decentralized share options market (Etheropt), farm-to-table application or decentralized forecast market, etc. The above application both prompt us to the idea and design of our project.

However, blockchain technology is not limited in altcoins system, on the contrary, altcoins transactions have been prohibited by law in many countries for their negative usage in property transfer and money laundering. Instead, Chinese government and some corporations show strong interest in the landing of blockchain technology. Many attempts are under way. People's Bank of China began the digital currency DCEP（Digital Currency Electronic Payment） research in 2014 and mostly possible to become the first central bank that issue digital currency. Ant Finance, a Chinese fintech corporation, also develop their product traceability with the help of blockchain technology: blockchain application scenario was officially launched in November 2017 for the cross-border traceability service of Tmall overseas goods. In this scenario, Alipay users from Tmall for 26 goods from Australia, New Zealand, dairy products, provide about each bottle of milk products id tracking source service. Alipay user scan tracing the source code can clearly see the whole logistics of the dairy products from the manufacturer to the whole logistics, including quality inspection, overseas warehouse to domestic warehouse, including the whole link of end-to-end commodity circulation records of production date and circulation date. In addition to this, platform information share system, digital assets, supply chain finance, cross-border payments also build in the form of public chain, league chain or private chain.

Chinese president, Jinping Xi, emphasized that we should take blockchain as an important breakthrough in independent innovation of core technology to accelerate the development of blockchain technology and industrial innovation in the 18th study of the Political Bureau of the CPC Central Committee. He also specially emphasized the use of blockchain data sharing model and encourage government department to reform their inefficient work model by blockchain technology.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2019年10月25日18:17 来源：新华社

Graph 0 : Brief in News

Above external events both indicate the bright future of the development of blockchain technology in China, also is one of the motivations of our project design.

2. Development background and significance

After analyzing the external environment for blockchain-based project. We then focus on internal support of our project. In other words, we need to find our potential consumers and their desire of our project. Also the main advantage of our project compared to formal one.

We design the project mainly because following reasons:

1) traditional personal file system adopts the form in combination with offline paper file and online digital file back up in database.

2) it is difficult for external users(citizens) to call their record when they handle business in different places and different apartments.

3) entity files face unsafe factor like losing and damaging during the transport process.

4) the recording of traditional digital file faces the problem of time latency because of the entity limitation.

5) each department has to reconcile the file frequently and face the risk of recording version differences.

6) tradition personal file system takes larger cost in storage and maintenance information.

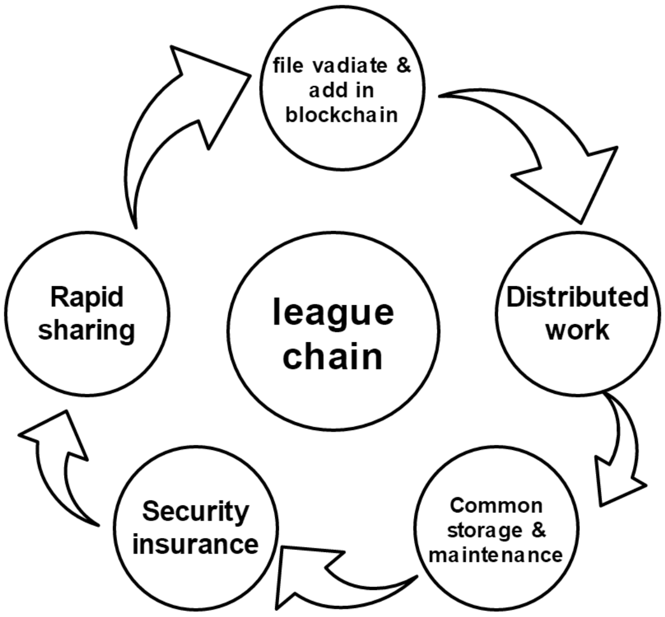
The introduction of “Personal File for Public Usage via Blockchain Architecture” increase the following characteristic:

1) the authenticity of personal file. As blockchain has the characteristic of append-only ledger and irrevocable ledger, personal file’s authenticity and reliability increase through usage after file is stored.

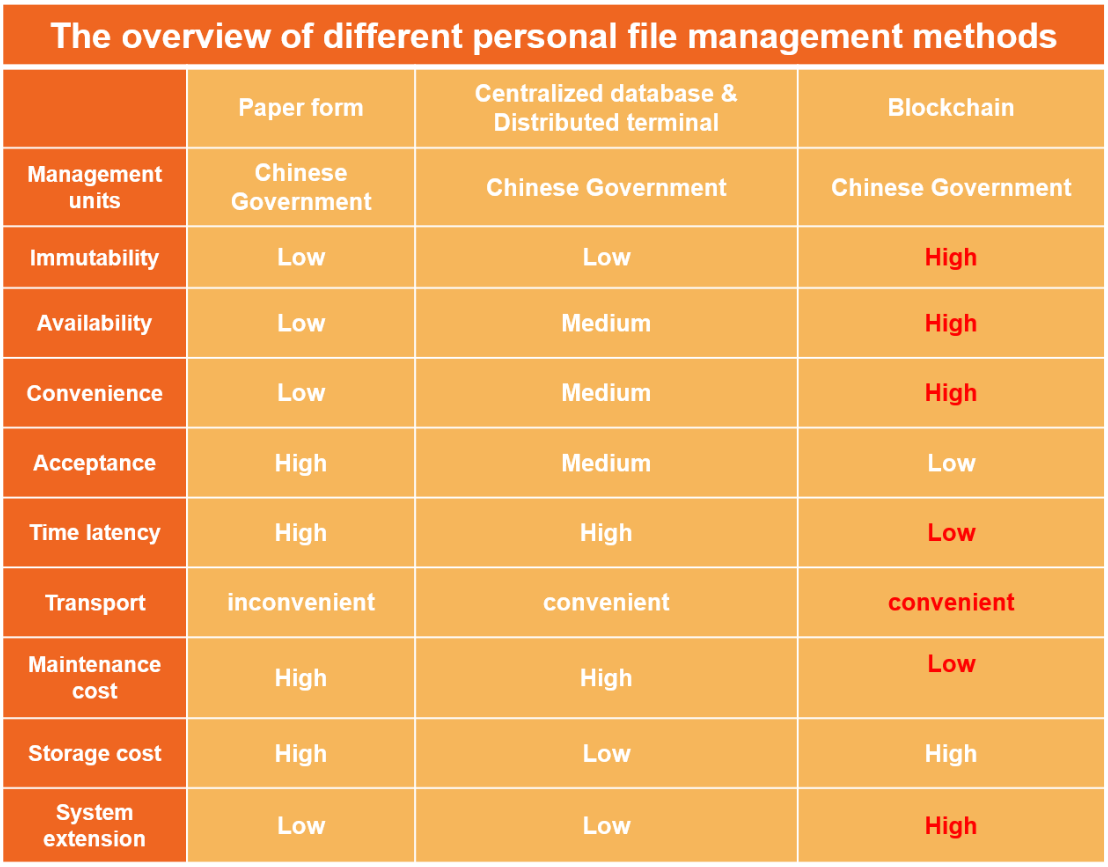
2) the security of file storage. In the process of file storage, blockchain help reduce the risk of illegal access, tampering and theft.

3) the availability of file information. Under the premise of security and authenticity, blockchain system let file information flow through management units, using units and public efficiently. Blockchain consensus protocol also meet the requirement of “at most one run” in government department reformation. Both characteristics increase the using value of personal file information.

General design of our project and its comparison between tradition system:


file vadiate & add in blockchain
Distributed work
Common storage & maintenance
Security insurance
Rapid sharing
league chain

Graph 1: General assumption of our project design



The overview of different personal file management methods			
	Paper form	Centralized database & Distributed terminal	Blockchain
Management units	Chinese Government	Chinese Government	Chinese Government
Immutability	Low	Low	High
Availability	Low	Medium	High
Convenience	Low	Medium	High
Acceptance	High	Medium	Low
Time latency	High	High	Low
Transport	inconvenient	convenient	convenient
Maintenance cost	High	High	Low
Storage cost	High	Low	High
System extension	Low	Low	High

Graph 2: The comparison of blockchain version and traditional version

3. Demand analysis

After analyzing the advantage of our project compared to the traditional system. We still need to do demand analysis to each stakeholders as a new project implement occur huge replacement cost. Thus above questions should take into accounts.

1. For government management departments and decision-making departments, they need more reliable national information and more efficient updated to modify management formulation and policy issuance.
2. For local archives bureau, local recording units and validation units (serve as miners, common users and validators), this project reduces their multifarious affairs and increase their working efficiency. This project conforms to their desire of department reformation. They can also get extra revenue by further reliable work.
3. For external users (citizens), blockchain system reduce time and expense costing when they handle affairs related to personal files. Blockchain trust mechanism also strengthen external users' confidence that their personal profile will not be maliciously modified.

4 Project design

We come to specific project internal structure and design after industry analysis.

4.1 Application layer design

Common users: upload information with smart contract.

Scenario 1: diploma

Specific transaction:

Message -> event	Somebody got diploma
tag	education
Series of events	false
Previous hash	null
signature	Signed by Tsinghua University

Explanation:

1. Event means the modified content of your personal file.
2. Tag is a classification of the event, help us classify and verify the information.
3. Series of events is a Boolean value used for judging whether it is series of events or not.
4. If event has antecedent events, then previous hash is previous event hash. Otherwise, it is null.
5. Signature is provided by local recording units. Used for verification and accountability.

Verification (before add in transaction pool by miners):

1. Signature is true
2. Signer have authority to publish the tag

Verification should first be classified by seeing the tag.

Scenario 2: a pair of events: census register transfer

Event a: sb apply to transfer his household (send out, from shanghai to shenzhen).

Event b: shenzhen consent & not consent for event a.

Transaction 1:

Message -> event	hyz send out from sh
tag	household
Series of events	true
Previous hash	null
signature	Signed by sh xx bureau

Transaction 2:

Message -> event	hyz send in to sz
tag	household
Series of events	true
Previous hash	eventa.gethash()
signature	Signed by sz xx bureau

Scenario 3: health care

Specific transaction:

Message -> event	rjx health check
tag	health
Series of events	true
Previous hash	null
signature	Signed by xx hospital

Scenario 4: position appointment and removement

Event c: sb outgoing xx position (departure from public security department).

Event d: sb ingoing xx position (entry Ministry of Public Security, PRC).

Message -> event	Sb departure
tag	Appointment & removement
Series of events	true
Previous hash	null
signature	Signed by xx public security depart ment

Message -> event	Sb entry
tag	Appointment & removement
Series of events	true
Previous hash	Eventc.gethash()
signature	Signed by xx PRC

Miners: pack transactions to install a block

Scenario 4: Block structure

Block header:

Version number

POS rules

Block header hash

Previous block header hash

Uncle block header hash

Block height

Coinbase share

Dividend

MPT root hash of EOA: users' information

MPT root hash of transactions: different kinds of transactions

MPT root hash of receipt: validation

MPT root hash of personal file accounts: main information

Block body:

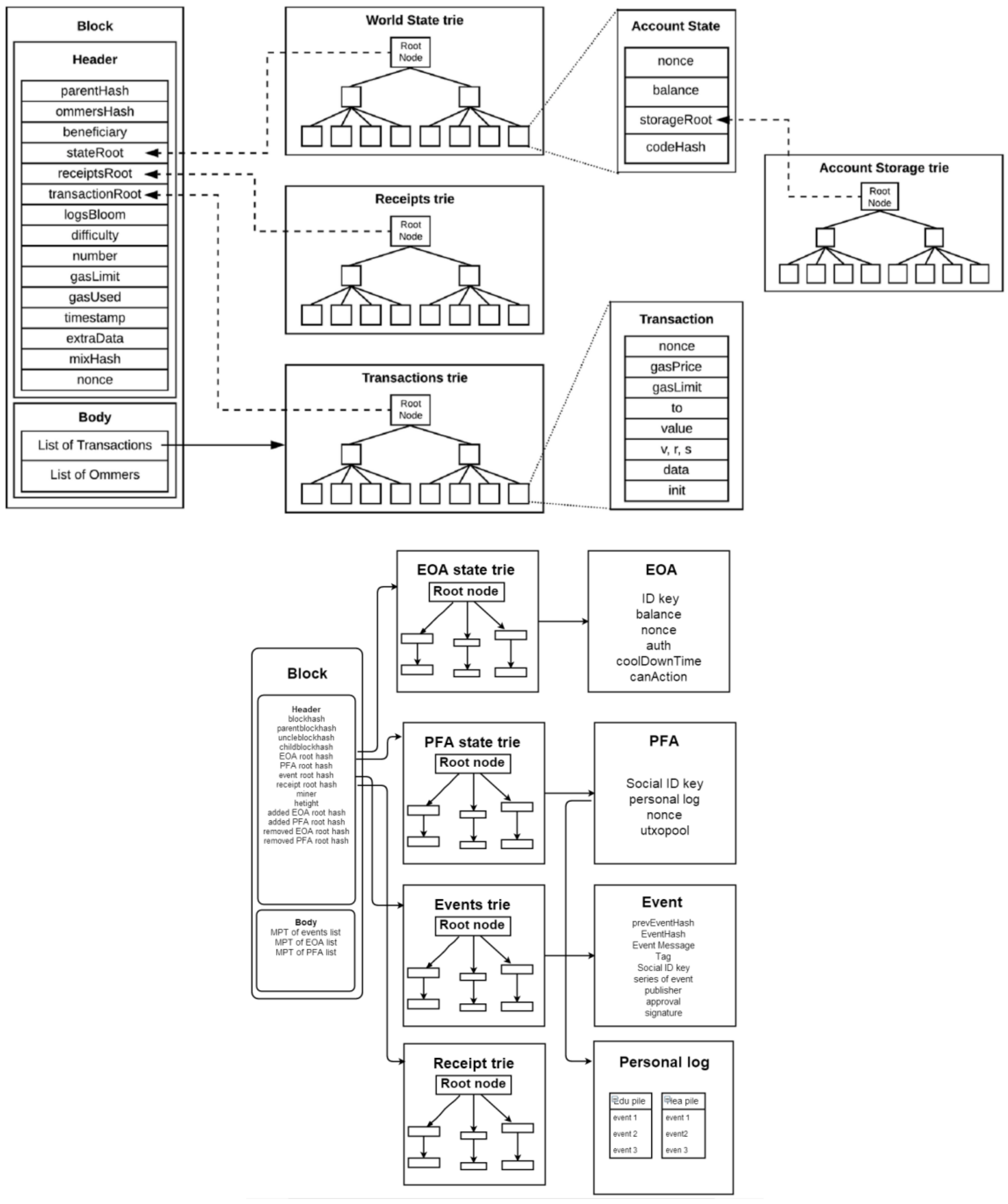
MPT structure of events

MPT structure of EOA

MPT structure of PFA

...

Graph 3: Internal design of a block



Graph 4: Comparison between Ethereum and our project general structure

Verify: valid signature, valid transactions, valid insertion position, if valid, update PFA and EOA.
miners local maintain: transaction pool, blockchain, accounts information (in modified MPT tree)

Validator:

Role of validator is to spot check blocks (50 blocks a time, cooling time) and re-broadcast the events that due to state fork and pass validator’s verification. We can regard this role as a special type of common users with the justification of verification.
Scenario 5: pseudo double spending; indeliberate state fork

Accounts-based management:

Pesonal file accounts (PFA):

Identification(name, birth date)

Education pile(scenario 1)

Household pile(scenario 2)

Healthcare pile(scenario 3)

Series of events(operator)

nonce

EOA (miner,common users validator):

balance(100 altcoins)

Authority:common users/miner/validation classification

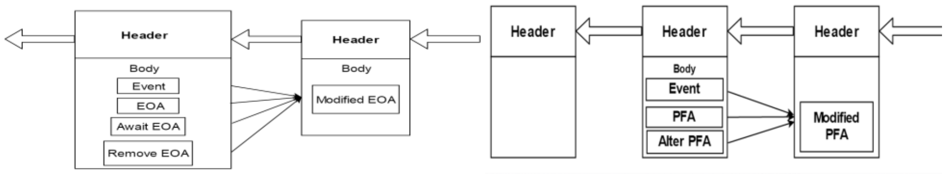
cooldown time: 100 min

nonce(incentive): 10 times

accounts access and exit

1) accounts access, included external owned accounts and personal file accounts, follow the rule that activities related to new accounts must be recorded after their creation recording. In another words, a block is forbidden to record both an account's creation and related events.

2) accounts exit must have designated approval. Personal file accounts exit should be approved by common users. External owned accounts exit should be approved by miners. Accounts exit also follow the latency mechanism introduced in accounts access.



Graph 5 : event-driven state machine

accounts storage:

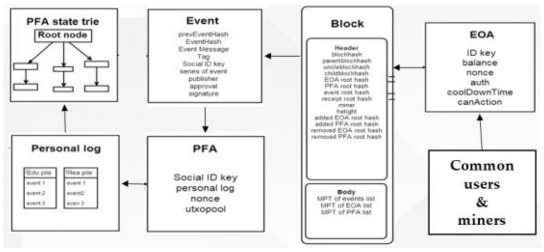
1) Personal file accounts: like Ethereum, merkle patricia tree structure, use stack without pop function, called it pile, to store specific events.

2) EOA accounts: like Ethereum, merkle patricia tree structure.

whole process:

1) citizens occur an event that needs to record in personal file
2) recording units (common users) broadcast the event after finishing offline verification and recording affairs.
3) miners accept the information after verification. They insert the transaction into their transaction pool and begin to install block.
4) the rights of charge follow the rules of PoS distribution. After a validated block inserts in blockchain, other full validating nodes should modify their local blockchain structure, local transaction pool and two local merkle patricia tree structure, PFA and EOA.
5) next mining procedure.
6) validators will randomly check continual 50 blocks to avoid pseudo double spending and

unintentional state fork problem. They have cooling time restriction to prevent them from overwork.



Graph 6: process of work

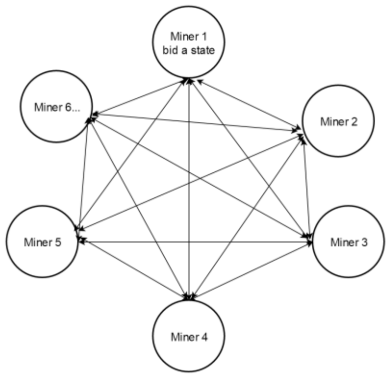
crypto principle:

We simply adopt the method that bitcoin used. Common users and miners create an account by generating a key pair similar to bitcoin system. The signature model and encryption & decryption model follow the method used in bitcoin system.

data structure:

As the graph shown above, Ethereum-based modified merkle patricia trie.

bottom network structure: Peer Network, bottom topological structure can be optimized.



Graph7: bottom network structure

incentive system:

Every creation of a block will create a coinbase event. Specific amounts of altcoins will send to miners. Miners will pre-allocate portion of altcoins to the common users contribute in this block in a given way. The altcoin itself has no value, but for common users, they can show their altcoins amounts to their superior to get extra bonus (nonce & altcoins amounts). For miners, altcoins can increase their stake in a POS system, they also get reward monthly like the common users. For validators, they get reward by check nonce and quality work.

consensus protocol:

We adopt Ethereum-based consensus protocol, ghost protocol, to solute state fork problem. The specific solution is as follow: First, when a state fork occurs, miners add their block to the block observed first. Second, each current block has a right to accept one uncle block. The accepted uncle block will get a portion of coinbase reward in a given proportion.

differentiation of node status

In our project, node status is not the same, it is classified as four types: miner(central government department), common users(local units), validator(validation organization) and external users(civilians). They have different access and rights in the system. For example, PFA can only access to see the information authorized by both miner and common users; common users edit of event should be approved by miner and validators, etc.

4.2 code design & analysis:

Crypto.java

Simply follow the method using in bitcoin system, return true when the signature is a valid digital signature with corresponding message and public key, use RSA signature

Pile

Pile is a data structure that is similar to stack but can only add string element and no pop function.

PersonalFileAccount.java

Personal file account are the accounts being managed, they can only be viewed but not edit. It is the digital personal file for external users.

Attributes:

Private String social_id_key: social identification number (i.e. id card number)

private HashMap<String, Pile> personalLog: hashmap, dictionary illustrates your personal file specific events, in the code, we simply add “education” and “household”. But the log can be expanded as needed.

private BigInteger nonce: a paired number that makes search space more sparce

private HashMap<byte[], Event> utxoPool: arraylist of HashMap<EventHash, Event>, used to store personal event with attribute series_of_event = true

Construct functions:

public PersonalFileAccount(): default method

public PersonalFileAccount(String social_id_key, BigInteger nonce): given method

functions:

get methods & set methods

functions for printing and adding personalLog

ExternalOwnedUser.java

EOA are common users/miners/validator in p-chain, they're processor instead of owner of each personal file. Thus, they undertake the work of broadcast events/mine block/validate.

Attributes:

private PubicKey id_key: institute identification code, public key

private int balance: altcoin owned by EOA

private string auth: type of EOA, miner/common_user/validator

private int coolDownTime: for miner/validator, restriction constant mining/validating

private int nonce: counter, an incentive, major usage is to work with "coolDownTime", can also be used as an incentive

private boolean canAction: judgement for whether you can mine/validate or not

Construct functions:

public ExternalOwnedUser(): default method public ExternalOwnedUser (PublicKey id_key, String auth) : given method

get methods & set methods & add methods

Handler functions:

public void EOAHandler(): cool down time operator for miner and validator. Change canAction attribute.

Event.java

Event is a class used to record message proposed by common users

Attributes:

private byte[] prevEventHash: will only be useful when series of event is true

private byte[] signature: publisher signature

private String social_id_key: strings indicate that whose personal file are going to be changed

private String eventMsg: recording detail message of the event

private String tag: classification of EOA accounts

private boolean series_of_event: whether it is series of events or not

private byte[] hash: the hash of whole event

private PublicKey publisher: which EOA publish the event

private String approval: a simplified version of receipt state, reveal whether the action is approved or not.

Construct functions:

public Event(): default method

public public Event(String social_id_key, String eventMsg, String tag, boolean series_of_event, byte[] prevEventHash, PublicKey publisher): given method

get methods & set methods & sign methods

EventPool.java

A class map Event with it proposer EOA, used for fasten searching efficiency

Attributes:

private Event event

private ExternalOwnedUser externalOwnedUser

private HashMap<Event, ExternalOwnedUser> proposedEvents: hashmap, matching table illustrates the event is proposed by specific EOA

Construct functions:

public EventPool(): default method

public EventPool (EventPool eventPool) : given method

get methods & add methods & remove methods & contain method

PersonalFileAccountUTXOPool.java

A class automatically combines with EventPool, to connect with EOA, event and PFA.

Attributes:

private HashMap<Event, PersonalFileAccount> H: hashmap, matching table illustrates the event is related to specific PFA

Construct functions:

public PersonalFileAccountUTXOPool(): default method public PersonalFileAccountUTXOPool(PersonalFileAccountUTXOPool p_utxoPool): given method

get method & add method & remove method

EventHandler.java

Event handler is used to process multiple events in one time, which is prior to packing a block.

Attributes:

private EventPool eventPool

private PersonalFileAccountUTXOPool personalFileAccountUTXOPool

Construct functions:

public EventHandler(): default method

public EventHandler(PersonalFileAccountUTXOPool p_utxoPool): given method

Functions:

public boolean isValidEvent(Event event): validation for whether the event is proposed by authorized unit, whether the proposer is common users, whether the series of event can match each other.

public ArrayList<Event[]> handleEvent(Event[] waitingEvents): process events, select those are valid to be included in a block;the length of Arraylist<Event[]> is of length 2, where 0-th event[] is the valid Events, and 1-st event[] are those invalid one, and will be broadcast to validator

Block.java

For simplicity, we use list instead of MP tree in this class.

Attributes:

public static final int COINBASE = 10:altcoins send back to miners and common users involved for reward

private byte[] hash: hash of whole block

private byte[] prevBlockHash: hash of previous block

private ArrayList<Event> events: simply replace modified MPT structure with list in code; analogue to transaction list in canonical cryptocurrency block

private ExternalOwnedUser miner: the miner of the block

Construct functions:

Block's EOA should be designated to miners.

public Block(): default method

public Block(byte[] prevBlockHash, ExternalOwnedUser miner): given method

Get methods & sign methods

BlockNode.java

Expand block's attributes, make it convenient to connect previous and forwarding block (enclosed in block node), help maintain 2 pools (personalFileAccountUTXOPool and eventPool)

Attributes:

public static final int CUT_OFF_HEIGHT = 1: only an indicator, no actual usage, implies max

number of uncle BlockNode to be included
private static final double COINBASE = 10: the same as block class
private static final double FRACTION_NUMBER = 0.1: a reward distribution portion to common users
private Block block: enclosed block information, inheriting from block class
private int height: record height of a block, counting from 1
private BlockNode parentNode: a block node, current node's parent node, unique
private ArrayList<BlockNode> childNodes: current node's child nodes, not unique
private ArrayList<PersonalFileAccount> p_accounts: an ArrayList<PersonalFileAccount>, maintaining status of personal file account

private ArrayList<ExternalOwnedUser> eoa_accounts: an ArrayList< ExternalOwnedUser >, maintaining status of external owned account
private EventPool eventPool: a pool, recoding existing events with their publisher(EOA) in current block

private PersonalFileAccountUTXOPool p_pool;
private ArrayList<ExternalOwnedUser> awaitEOAs;
private ArrayList<PersonalFileAccount> awaitPersonalFileAccounts: these PFAs are in waiting list to add into current PFAs' MPT

private ArrayList<ExternalOwnedUser> removeEOA;
private ArrayList<PersonalFileAccount> removePersonalFileAccount;
private BlockNode uncleBlockNode;
Construct functions:
public BlockNode(Block block) : default method
private BlockNode(Block block, int height, BlockNode parentNode, ArrayList<BlockNode> childNodes, ArrayList<PersonalFileAccount> p_accounts, ArrayList<ExternalOwnedUser> eoa_accounts, EventPool eventPool, PersonalFileAccountUTXOPool p_pool, ArrayList<ExternalOwnedUser> awaitEOAs, ArrayList<PersonalFileAccount> awaitPersonalFileAccounts, ArrayList<ExternalOwnedUser> removeEOA, ArrayList<PersonalFileAccount> removePersonalFileAccount): given method
Get methods & set methods
Functions:
public boolean addBlock(BlockNode parentBlockNode,Block block,ArrayList<ExternalOwnedUser> proposedAddEOAs, ArrayList<ExternalOwnedUser> proposedRemoveEOAs,ArrayList<PersonalFileAccount> proposedAddPAccount, ArrayList<PersonalFileAccount> proposedRemovePAccount): while adding block, first, check the following facts:
1. if the block's prevBlockHash equal to parent block's hash
2. if all events in the new block are valid
2.1. additionally, check whether personal account and EOA exist or not
2.2. also, check potential removes or adds
3. if the block's height > current max height - CUT_OFF_HEIGHT(not shown here, depend

on genesis block node, checked in {@class BlockChain})
Second, if validation test passed, update newest blockNode, including:
0. update parent node's child node
1. update block's parentBlockNode
2. update block's height
3. update event pool
4. update personal file account utxoPool
5. according to above information, update EOA and personal file accounts
6. update awaiting account list and remove account list

BlockChain.java

BlockChain is the structure of a chain, it should contain a genesis block, addblock will extend a block chain automatically. For the aim of experiment, we introduce manual fork function. More explanation on genesis block; genesis block is special, because it has no valid miners/other users based on our rule in genesis block, prevBlockHash = null; events is empty, miner is arbitrary; its height is 1, it removal list is empty, only has entry list.

Construct function

public BlockChain(Block genesisBlock, ArrayList<ExternalOwnedUser> entryEOAs, ArrayList<PersonalFileAccount> entryP_accounts): default method
no given method

Functions:

public BlockNode getMaxHeightBlockNode(BlockNode blockNode): get max height block node
public boolean automaticExtendBlockChain(Block block, ArrayList<ExternalOwnedUser> entryEOAs, ArrayList<ExternalOwnedUser> removeEOAs, ArrayList<PersonalFileAccount> entryP_accounts,ArrayList<PersonalFileAccount> removeP_accounts): extend the block chain automatically, return Boolean value for whether success or not

Prints Methods

5.System test

5.1 test design

testPile.java

Simply test the implementation of pile data structure (no pop function stack).

testValidSignature.java

Simply test the implementation of our encrypted algorithm signature.

testEvent.java

Simply test the implementation of our event class.

testAuto_p_Chain.java

In this test class, we simulate the scenarios we present in application design part. We test all the blockchain functions and the scenario with print functions. This part will be mainly shown in front end webpages.

5.2 Front end presentation

The whole progress of testing will be presented as a video and the related front end webpages. We will upload them to our Github. In addition, we will provide our back end code completely in our Github.

A basic summary of our front end is to create PFAs and EOAs and related events. Then test different occasion and corresponding result images.

6. Design conclusion

6.1 Differences between application layer and code implementation

Compared the project design in application layer and the code design, several simplified measures are as follow:

PersonalFileAccount

1) In the personal file account code design, we simply add two types of tag, “education” and “household”, in the personal log. But as the types of log can be expanded, we can add new types of log in our code at any time.
2) In our code, we build a hashmap (key,value) pair utxopool for quick searching of the link between event and event hash.

PersonalFileAccountUTXOPool

In this class, we aim to build a fast channel for matching event and its related personal account. It will not affect our application design.

Event

1) In our code, we simply separate personal id from event message to realize the classification function (put event in corresponded personal account).
2) We also separate publisher id from signature for verification.
3) We simplify the receipt MPT tree structure to a attribute approval in our code. It can be optimized if we have adequate time.

EventPool

We build this class to set a fast channel for the link of event and the propose EOA. It build for fast matching, no conflicts with our application design.

EventHandler

We build this class for mainly two reasons. First, we build a fast channel to link event and its related PFA and EOA. Second, we encapsulate a class for validating a series of events and return valid events set and invalid events set. Validating function before events are packed and added in a block by miners.

Block & BlockNode

1) These two classes realize the function of a block in our project system. In our code, we add the miner account in the class directly. This differs from our application design.
2) For better realizing the block function, we add following addition attributes to perfect the block: childnodes which contain the information of children blocks, eventpool and p_pool which respectively indicates link between event and EOA & PFA, changes of EOA & PFA including await and remove list.
3) The addblock function in our code have some characteristic that meet the application design in another way. After validation success, the block automatically add the parent block’s EOA & PFA, await list of parent block’s EOA & PFA, and remove the remove list of

parent block's EOA &PFA. In the meantime, the current block updates the newest await list and remove list of EOA & PFA. At last, we update three state to finish addblock function. First, the function update miner's balance and status after adding a block. Second, the function inherits the status of our MPT trees (simply arraylist). Third, the function updates the series of events.

BlockChain

1) In BlockChain class, we construct one attribute genesisNode belongs to BlockNode class. It is different to the nature of our application design. This feature does not affect our application design concept.
2) In BlockChain class, we construct many print functions, including printing EOA & PFA information, event information, personal log information and the whole block information. We design the code in this way to help us build front end.

6.2 Problems unsolved & limitation

1) Take a look at our blockchain file management application scenarios, it can be seen that our blockchain file management is still a partial change of the management mode based on the traditional mode, or a simplified private chain demonstration sample, rather than a real blockchain file management application with the characteristics of extensive distribution without trust.
2) Several application problems still exist: first is file quantity is little, second is specific catalog not classified, third is the application scope is limited, fourth is have authority for its endorsement and decentralization is not complete, fifth the application is all in the pilot phase, sixth is making use of the archives and information content should be timely feedback users types, has the certain passivity.
3) Some other external limitation likes: traditional trust concept may hard to convert; the potential risk of leaks via public held system; technique rule may depress the motivation for specific units; lack of technical standard in the industries and the lack of law built already.

6.3 Future expectation

As the maturity of blockchain technology, more success application samples of blockchain technology, more trust built with civilian, government and blockchain-based application and industry standard and law standard built, government can build the whole ecosystem of government affairs public chain to absorb all the league chains serviced for government departments. To achieve information sharing in different government departments.

7.Acknowledgement

We sincerely thanks to our professor, Haiyang Zheng, for guiding our project design patiently, and our TA, Cong Fang, who gives several guidance for our code design.

Specially thanks to Tingwei Shen and Tianqi Gao for giving us thoughts and guidance of front-end unit design.

8.Appendix

Proposal and code support would be put in our Github.

9.Reference

[1] 杨茜茜. 基于区块链技术的电子档案信任管理模式探析:英国 ARCHANGEL 项目的启示[J]. 档案学研究,2019(03):135-140.

[2] 李文华. 浅谈区块链技术在档案信息化管理中的应用[J]. 图书情报导刊,2018,3(12):54-57.

[3] Ethereum White Paper

[3] Bitcoin White Paper