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TRAFFIC FINES BASED BLOCKCHAIN

SPECIAL TOPICS

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What are the main problems?

Today, all traffic fines are only written by traffic cops. In certain areas such as highways, terminals, airports;

- Unauthorized (unlicensed) vehicle users,
- Non-insurance vehicle users,
- Vehicle users exceeding the speed limit,
- Stolen vehicle users,
- Fake license plate vehicle users, etc.

Determined criminal procedures are applied. For this reason, most criminal vehicles in the city can escape the police. All these identified vehicles are sent to the system by the police officers by the police.

Officers in the branch or the traffic cops on patrol;

- If he recognizes the criminal,
- In exchange for bribes,

may not write a penalty.

Persons with a high level authority (such as the governor, governor, commander, general, deputy) may not be penalized. Or;

- The branch manager may remove the penalty in the system.

If Police know the criminal, police may not write penalty.

In addition, delinquent vehicles with flaws mentioned in the streets and streets of the city can never get caught up with the police. So;

- Traffic crime can be easily processed.

In addition, the written penalties may be delayed by the officers to be transferred to the system and therefore the driver has to pay the penalty with the interest of delay.

How can we solve these problems?

All of these penalties should not be written by traffic cops, and they should not be sent to a single branch.

- Otherwise, we encounter the problems we are talking about.

There should be such a system;

- Penalties shall not be deleted from inside or outside.
- Penalties should be treated fairly by everyone.
- Due to the lack of traffic police patrolling patrol, there is no possibility that the guilty vehicles will be overlooked.

If we register the data in the blockchain system, all police stations can see the criminal data. In this way, everyone can pay the penalty at any time. And no one can cheat because data can't be changed.

To prevent the delay of the transfer of penalties to the system and the delay interest. In this case, some drivers may cause problems and become aggressive.

Blockchain technology can allow us to develop such a system.

What is Blockchain?

The blockchain is a decentralized distributed ledger.

Keeping log of transaction

Data cannot be changed

Eliminates center.

Transport system

Why do we use Blockchain technologies?

We will automatically detect whether all vehicles and vehicle owners are guilty of any kind with cameras and digital sensor systems that will be installed on the highways as well as traffic cops to detect vehicles.

With the blockchain technology;

- A shared data storage.
- All police stations can access data, so reliable people can access data
- More than one police station can enter data.
- To keep log of data (Transactions).
- Personal information should not be shared with everyone (confidentiality).
- We will be able to make general control of all vehicles(7/24).
- The data is scattered and sent to all police stations.
- Any penalties in the system cannot be deleted or modified as it is a distributed system.
- The driver of the penalty can be informed immediately.

What are the advantages of Blockchain?

Security

In today's system, penalties are only recorded in a database. If this database is hacked, all penal procedures are lost.

- In Blockchain based system, the number of copies of the data will be sent to all relevant branches and the danger of disappearing will be reduced.

Low Cost

- If the traffic police remains at work, the fee increases.
- In Blockchain, traffic cams do not have to work overtime due to cameras and sensors installed..

Fair

- As all data will be in the relevant branch in the whole country, penalties for all people will be processed in accordance with the state protocols.

Saving on Time

- In today's system, the outside police will write the penalty and bill it, then the officials in the branch will transfer it to the system completely. A long time passes.
- In Blockchain, the penalty will automatically fall to the system as soon as the offense was committed, and information can be sent to the vehicle owner immediately after the penalty has been confirmed.

Introduction

- This system is based on private blockchain technology.
- Blocks in this system can be added by all relevant public order branches in the country and by persons with traffic police (Validator).
- Vehicle drivers can only see procedures and penalties related to their vehicle after registration. But he can't make changes.

Permissioned Blockchain;

You must have special permission to be included in the system. This special permit may have all the relevant public order branches and traffic cops (private key). Vehicle drivers and normal citizens may be passively involved in the system.

The Consensus algorithm : Proof of Authority will work in general.

- The safety system has all the information of vehicles and drivers.
- The data to be added to the block will need to be saved(image) and proven by the camera system..
- The team that will add data to the system will make the penalties in accordance with the standard state rules.

PLAYERS

1) Traffic Police/Officers

Each user has a unique private key. In this way, the vehicle owners to detect the penalty over the system writes. Users are initially assigned according to their rank. All of these users will lose their reputation if they cannot reliably add penalties. A user with a high-level reputation can create a block in the system.

2) Car Owner

Each vehicle owner must first register the system. Then he may have seen all kinds of criminal proceedings and the identity of the vehicle.

- Picture photo records
- The vehicle's age, helmet, insurance, tax can see.

Only registered vehicles can be seen on the system. Information about which traffic police gave the penalty is kept confidential. After the penalty is confirmed in the system, the information message is transmitted to the vehicle owner immediately.

3) Motorway Cameras and Digital Sensors

Thanks to these cameras;

- Insurance information,
- Model type,
- stolen vehicle or vehicle is a wanted,
- Fake plate,
- Immediately detect whether or not a violation of the rule sends the information to the system automatically.

Thanks to Digital Sensors;

- Speed limit control
- Radar control
- Reverse lane control
- U-turn control instantly detect and send information to the system automatically.

4) Public Cameras

Penalties will be detected on security cameras in highways and in the city.

Permissioned Blockchain

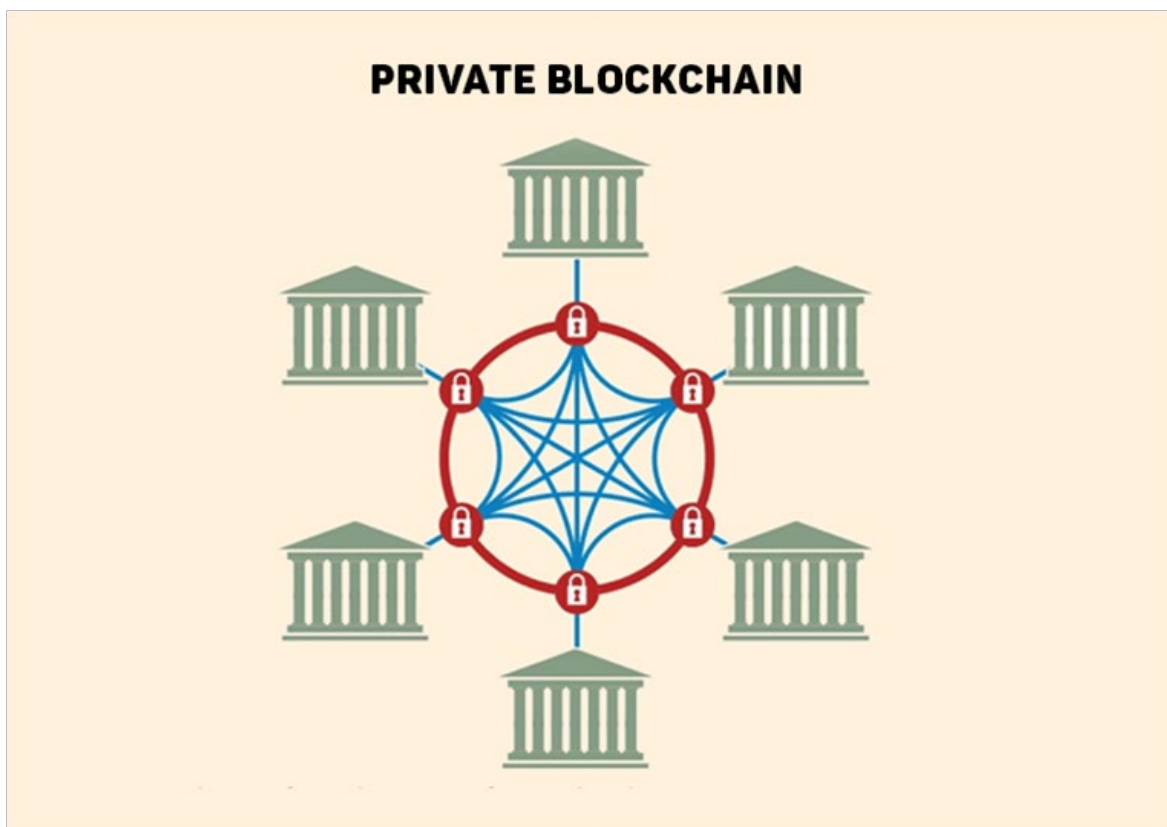


Figure 1

Permission blockchain is held centrally in an organization. Read permissions may be public or restricted to any degree. In our project, they give write permissions and read permits to police centers. Permissioned Blockchain fits better with state data security and privacy regulations.

Unlike public Blockchain, in permissioned blockchain technology, you need to get permission from a user who is considered the authority to join the network. In this way, any one of the society, everyone can see the process or penalty, only those who have permission can see. Even this access control mechanism can be varied according to the pre-determined rules. For example, with these rules, who can do the transaction, who can see the transactions, who can add blocks to the block chain etc. determinable.

What are the benefits?

Permissioned blockchain technology has two most important benefits over public blockchain technology. The first one is the protection of privacy and the second is the prevention of waste of energy. Thanks to the access control mechanism, as we have mentioned above, it can be determined by the rules who can access the transactions. In this way, only the privacy of the users can be protected by allowing authorized persons to see the transactions. Secondly, one of the most criticized points of bitcoin and public blockchain technology is that the work proof algorithm consumes a lot of energy. However, in the permissioned blockchain technology, the use of the proof of work algorithm is optional. Only the user who is allowed to add new blocks can add new blocks to the blockchain chain, so that no proof of work algorithm is required.

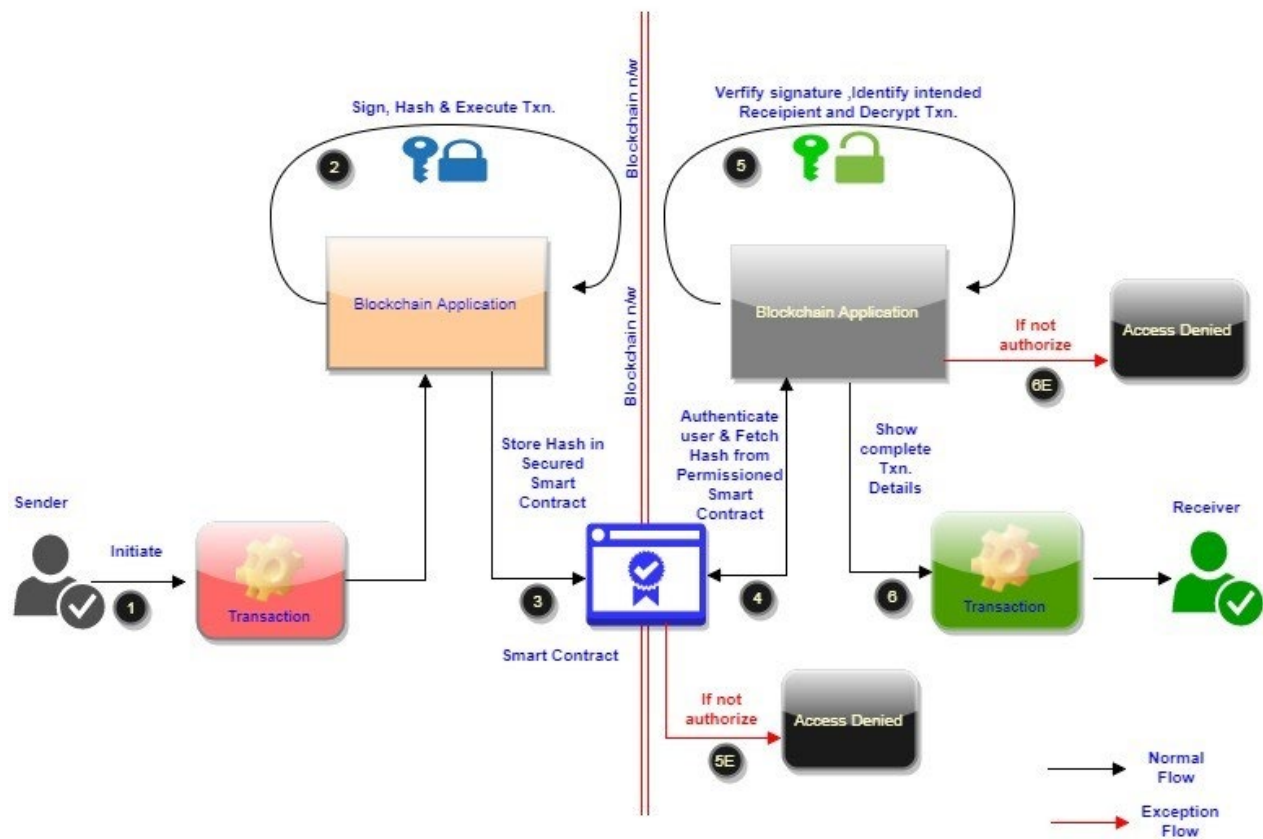


Figure 2

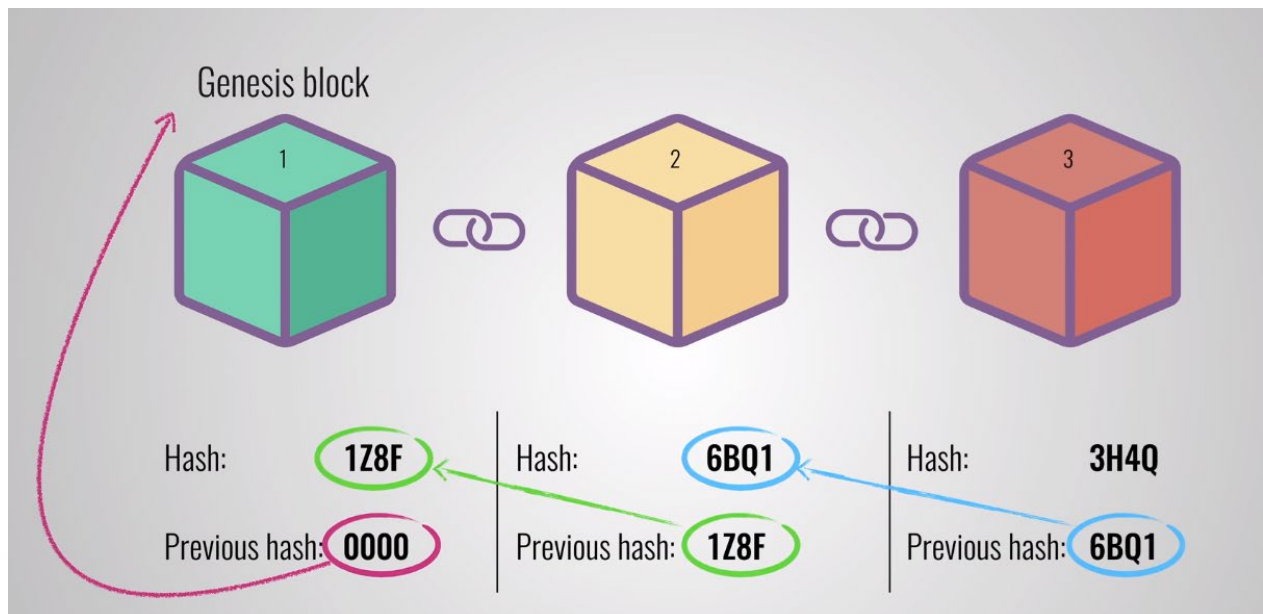


Figure 3

TRANSACTIONS

1) Private Key

- Users' privileges in the system.
- Validated have special permission. (Private key)
- Each node has separate access capability.
- Each node has a separate reputation.
- Nodes with Private Key do not add fines properly. Their reputation drops.

2) Traffic Fine Transactions

- Traffic rules and penalties should be uploaded and updated according to state laws and obligations.
- Type of penalty and fee.

3) Data

- ID plate or identification number of people, vehicle records, driver's license information, penalty fee, penalty record (official), date of penalty
- The information of people who are punished come to the system. This process is approved by the system and signed with digital signature. Thus, it is not possible to change it.
- Photo registration: penalty record of criminal-eating vehicles.

Transactions are sent by system members, computers at police stations are registered, identified by a pre-approved group of approvers (authorities) to verify the transactions and blocks within the network.

There are 3 basic requirements to become a validator with significant impacts on the stimulating structure that directs their actions to honest behavior.

1. They must be officially identified as chains in order to be able to cross-reference these identities with publicly available data (such as a notary database).
2. The validity of being a validator should be difficult to achieve in order to ensure that the validators long-term possible position remains a valid validator for both financial and reputation.
3. There must be a complete uniformity in the process of selecting validators..

Transaction Chain Structure

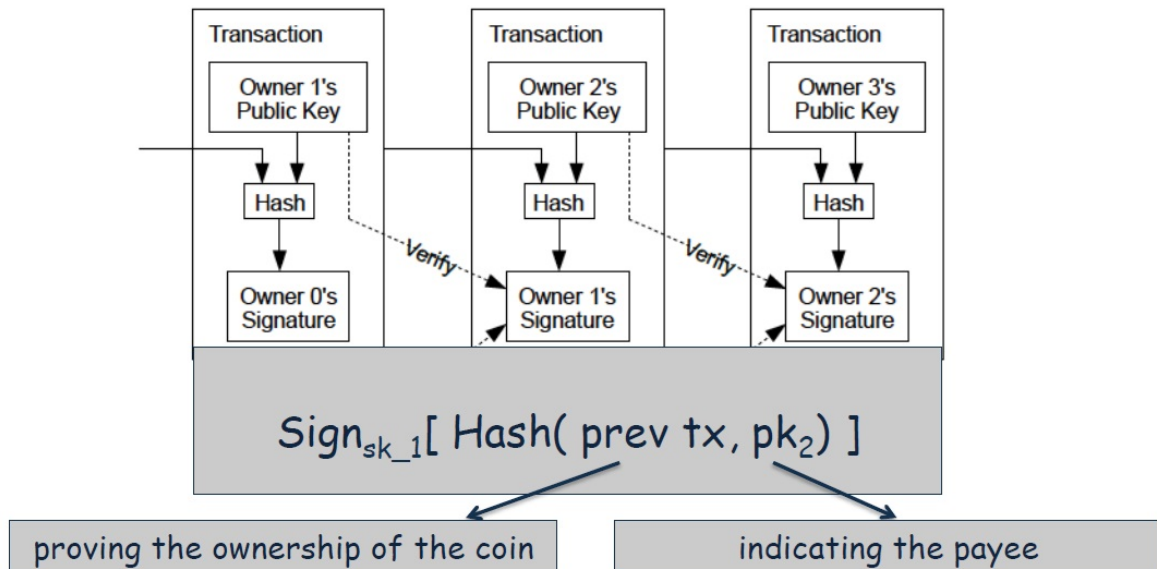


Figure 4

SECURITY

Objective = Traffic Fines application

Resources= Players

Threat Model= Data does not change the attackers can not change data

Algorithm= With PoA, it is valid if the trusted contacts try to make a trick that adds data to the validator authority is taken.

Assumption = Since this system operates reliably, the rules are equal and equal to everyone, since the data is registered and prevent corruption.



Figure 5



Figure 6

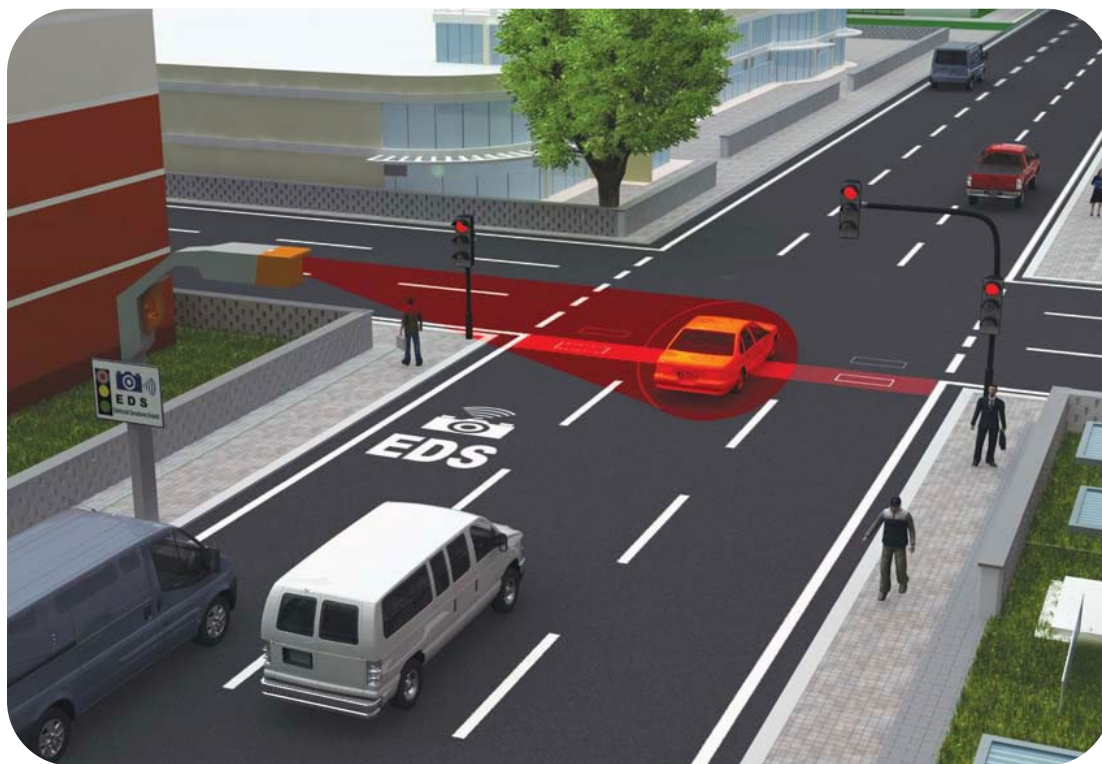


Figure 7