Working with Ethereum Blockchain:
A Solution to Land Ownership Problem

Group Member Names:
Redwan Ibne Seraj Khan (rikhan)
Md Moniruzzaman Monir (mdmoniru)

Abstract

In this project we have implemented a simple solution to land ownership problem using a decentralized distributed system known as Blockchain. Property which have been in the family for ages almost always gives rise to dispute when it comes to inheritance. Blockchain is a modern approach to tracking and storing data which we believe will solve the problem posed in contemporary times. The project was completed through incremental development in a private (https://github.com/RedwanIbneSerajKhan/Land-Ownership-Determination-with-Ethereum-Blockchain) repository. In the first phase some introductory exercise was performed to become familiar with blockchain where we interacted with one another in exchanging coins. In the second phase, at first we worked with publicly available codes from Solidity language documentation
(https://solidity.readthedocs.io/en/v0.4.24/index.html) and Dr. Bina's Blockchain specialization at Coursera (https://www.coursera.org/specializations/blockchain) and made edits to become acquainted with the new technology in Remix IDE (remix.ethereum.org). Afterwards we carefully crafted our solution to the problem posed using the skills that we gathered from the previous phases.

The Problem of Land Ownership

Let us consider the case of inheritance between two family members. Suppose Annie's father dies and before death gives the property to his daughter. After the death of Annie's father, uncle Sam comes and demands the right to the piece of property. How can Annie prove that the property is indeed hers without running to court rooms, filing cases, spending money and time? Keep in consideration that uncle Sam is clever and deceitful who can bribe authorities into making the ownership of the land in her name. So here, we need such a system which can do the followings-

1. Able to track and store data
2. Creates trust and transparency
3. No Contact of Intermediaries

We have provided details and explanation into how this problem can be solved using Blockchain.

What is Blockchain and Why should it be Used?

Blockchain stores information in groups of blocks which are linked with one another forming a metaphorical chain of blocks. If a change needs to be made, nothing is rewritten. Instead, a new block with the changed information is added to the existing chain of blocks - showing that a changed to b at a particular time by a particular process or person. So it is a way to track data change without any destruction.

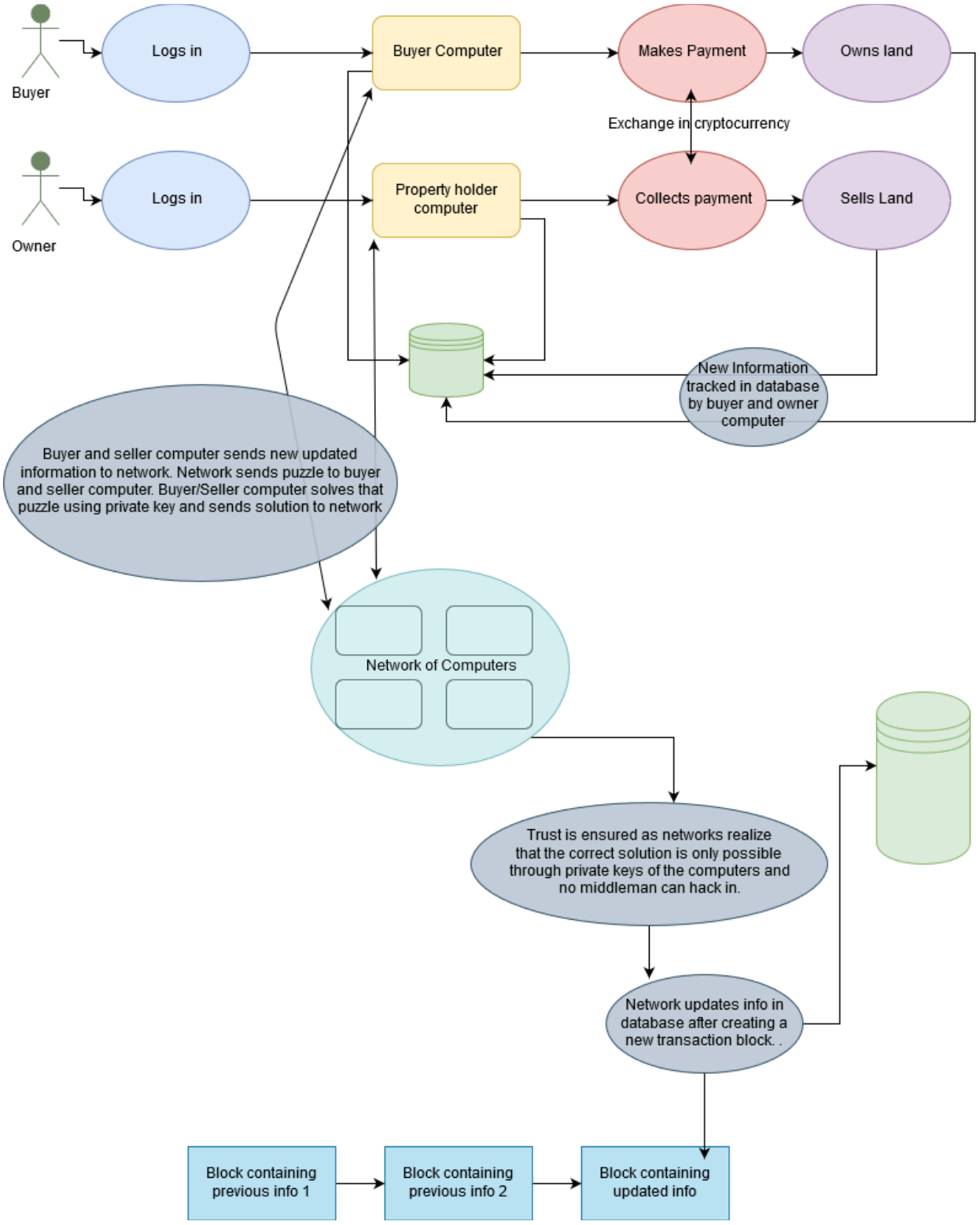
Blockchain was designed to be distributed across a large network of computers using the principle of decentralization. The ability for data tampering is reduced through decentralizing of information. Before a new block can be added to the chain a system of operations need to take place. In the network of computers each computer shares a public key with one another. Using the public key the network of computers sends a puzzle that needs to be solved which in turn is solved using the private key that is stored in the computer which is requesting the change. The solution is sent to the network of computers which can then guarantee that a trusted source had made the change. This creates trust in the network.

At present we need intermediaries when trying to do business, like banks and lawyers which are prone to hacks and intervention. Blockchain reduces the time of interaction with these intermediaries ensuring reliable transactions between different parties.

Thus it can seen it can be seen that all of the problems that was associated with the ownership of land/property can be solved using Blockchain technology.

The Blockchain model that we propose is a hybrid(public-private) blockchain model. Here the user's private information like social security number is associated with the name of the property but it is not shown to the rest of the world for security purposes. The name of the property and the owner name is public. The transactions will take place in cryptocurrencies.

Architectural Model (with use cases)



Technologies and UI Details

We have used solidity language for the implementation of blockchain. The solidity code was run and tested in Remix IDE. Smart contract: applications that run exactly as programmed without any possibility of downtime, censorship, fraud or third-party interference (ethereum.org) was designed in Ethereum, which is a decentralized platform that runs smart contracts. Draw.io was used to construct the architectural model of the system.

Sample Code for Implementation of Model

The actual implementation can also be found under LandOwnerBlockchain.sol.

```
pragma solidity ^0.4.25;
contract LandOwner {
	string public LandName = "250 Comstock Avenue";
	string public Owner = "Annie";
	uint private Social_Security;
	uint public askingPrice;
	bool public  eligible_for_sale;
	uint constant minimumsellingprice = 1000;

	function setName(string Lname, string ownerName, uint ss) public {
		LandName = Lname;
		Owner = ownerName;
		Social_Security = ss;
	}
	function setAskingPrice(uint askPrice) public {
		askingPrice  = askPrice;
	}
	function determineifLandCanBeSold() public {
		if (askingPrice >= minimumsellingprice ) eligible_for_sale = true;
		else eligible_for_sale = false;
	}
	function changeOwner(string name,uint ss) public{
		if(eligible_for_sale){
			Owner = name;
			Social_Security = ss;
		}
	}

}
```

References

https://blockgeeks.com/guides/what-is-ethereum/

https://www.coursera.org/specializations/blockchain

https://solidity.readthedocs.io/en/v0.4.24/index.html