

Land Registration using Blockchain

J-COMPONENT REPORT

Submitted for CAL in B.Tech -EEE for
CSE2001 – Data Structure and Algorithms

By

Supratim Paul – 17BEE1091

Vishnu S. Nair – 17BEE1094

Yashwant Rao – 17BEE1174

Slot: F1

Name of Faculty: Dr. Braveen M

SCHOOL OF COMPUTING SCIENCES ENGINEERING

NOVEMBER 2019



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Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

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ACKNOWLEDGEMENT

I would like to express my special thanks of gratitude to our faculty Dr. BRAVEEN M who gave me the golden opportunity to do this wonderful project on the topic LAND REGISTRATION USING BLOCKCHAIN, which also helped me in doing a lot of Research and I came to know about so many new things I am really thankful to them.

Secondly, I would also like to thank my parents and friends who helped me a lot in finalizing this project within the limited time frame.

*Supratim Paul
17BEE1091*

*Vishnu S. Nair
17BEE1094*

*Yashwant Rao
17BEE1174*

ABSTRACT

Technology is a never-ending process. To be able to design a product using the current technology that will be beneficial to the lives of others is a huge contribution to the community. This project presents the design and implementation of a land registration system using blockchain. Blockchain is one the latest technology in the world and is widely used for cryptocurrency. We would like to extend its approach to land registration system as it would much more safe, efficient and fast.

‘Blockchains’ are one of the most talked about technologies in recent years, especially within the IT community and the financial services industry. The influential bank Goldman Sachs stated the following in December 2015 regarding blockchain technology: “Silicon Valley and Wall Street are betting that the underlying technology behind [the Bitcoin hype cycle], the Blockchain, can change ... well everything.”

In a survey of experts by the World Economic Forum in 2015, the majority (57% of respondents) estimated that 10% of the world’s GDP will be registered in a blockchain by the year 2025². Recent events in 2017 such as the World Economic Forum, South by South West and the Mobile World Congress have made the growing interest in the blockchain still more evident.

CHAPTER-1

INTRODUCTION

1.1 What is Blockchain?

Blockchain is a form of distributed ledger technology (DLT) where data is distributed across a network of computers rather than being copied. Because it's distributed, rather than copied, the danger of copies being altered and differing across the network is removed. With blockchain everyone who has access to the network automatically receives any changes made to the data.

By way of an analogy, if a digital document were emailed to multiple people, all of whom were making their own amends, blockchain would be the mechanism synchronising these documents. This would ensure that whenever the document was opened, and no matter who it was opened by, everyone would see the amends that had been made previously by the rest of the group.

A smart contract built on blockchain is essentially a self-executing contract that uses automation. Rules are put in place so that if an event occurs it generates an action. For example, if blockchain was being used to coordinate the delivery of goods, a rule could be put in place so that payment is only released when an item has arrived, and delivery has been confirmed.

1.2 How is blockchain being used in land registry and real estate?

The use of blockchain in land registry is primarily being explored for its potential to enable the "almost instant" transfer of property securely. With smart contracts enabling self-execution when certain conditions are met transactions could be completed faster. For example, a rule could be put in place to facilitate the title of a property being automatically transferred to the new owner when they deposit funds to the appropriate account.

There is also the potential for the registration gap to be removed. The use of smart contracts would speed up the process by automatically updating the ledger, instead of buyers having to transfer ownership through an application form.

1.3 What examples are there of blockchain being used in land registry?

The real estate sector is beginning to explore the benefits of blockchain; the technology is being considered for use in land registration due to its ability to manage financial transactions, asset transfers and regulatory obligations.

HM Land Registry's Digital Street is one example of how blockchain is being adopted in the sector. The Digital Street research project is part of HM Land Registry's business strategy

for 2017 to 2022 to digitise and automate daily transactions and explores the use of a digital register to make buying and selling property simpler, faster and cheaper.

Smart contracts, underpinned by blockchain technology, are being considered for use in the Digital Street project to automate the process of moving funds and updating the register. Blockchain is still a young technology and it is likely to be years before the UK adopts a registry built on it, yet its use in real estate has the potential to bring many benefits to the industry if it is successfully explored.

1.4 What are the benefits of using blockchain in land registry and real estate?

HM Land Registry has stated that it believes that if all parties involved with the purchase of a property have the right data at the right time then they could make decisions faster, making the process simpler with more certainty. The plans for a digital register would allow buyers to access data about a property so that they can conduct their due diligence faster. The use of blockchain and smart contracts to create this register is hoped to automate systems to provide absolute assurance about property ownership in England and Wales.

The automation offered by smart contracts using blockchain has the ability to streamline processes enabling business transactions to be faster and more efficient. The technology can also enhance trust between parties in transactions due to the contracts being automatically executed and enforced, ensuring that outcomes are validated by everyone in the blockchain's network.

1.5 Understanding the impact of blockchain for real estate

The impact of the research being undertaken by HM Land Registry regarding blockchain and land registration will be interesting to observe. Businesses in the real estate sector should continue to remain aware of how blockchain could improve processes and speed up transactions.

Our Insights and Resources are recommended for businesses considering implementing blockchain technology. We will update you regularly with information from our legal experts in our real estate and tech teams, as well as other sectors and services you may be interested in.

CHAPTER-2

BLOCKCHAIN AS A SOLUTION

2.1 Digital units impossible to copy

If we look at a central bank that is about to issue money to the market in the form of cash, i.e. physical bills, we can easily identify some of the concerns that they would have. It is obvious that one property is of utmost importance; the bills must be very difficult to copy. If everyone could take a home printer and make thousands of copies of their bills, they will soon be worthless.

The same would be true for digital cash. If a central bank would like to issue money in digital form, it is still crucial that it cannot be copied. However, such a property of the digital world hasn't existed until recently. Bitcoin was the first to solve this 'double spending' problem. A lot of central banks, and commercial banks, have during the past year communicated that they are looking at the opportunity to issue digital cash on the blockchain, or with distributed ledger technology. None of them has done so, and none has said they are looking at doing it with any other technology. As far as we know, the blockchain is the only solution being investigated by this growing group of central banks and commercial banks. Perhaps the main reason for this is the possibility to create transferrable digital units, which are impossible to copy. If you want to create a digital IOU and be sure that there are no copies of this IOU, and that its properties are securely preserved, the blockchain is the only known solution.

2.2 Digitals files that can't be manipulated

While digitization has come far in many respects there is another property, except for being possible to copy, that traditional IT has not solved yet. It is very difficult to know if a digital file, photo, contract etc. has been manipulated. As an example, the Swedish law states that any changes in the bookkeeping of a company must be registered with a notification of who made the change, why was it made, and when was it made. The problem with this rule is that it is impossible to audit. A savvy IT person can make changes in the registry of the bookkeeping that cannot be detected. There is no practical way for a manager or the organization, an accountant or the tax authority to know who made these changes and when they were made, or to notice at all that any change has been made.

With the blockchain it is now possible to make sure that a digital file, register, patent, video etc. is still the same as it was when it was first registered in the blockchain. The hashing technology and the blockchain is the only known technology that can do this. If we want to digitally represent binding contracts it is of paramount importance that they be

impossible, or at least very hard, to manipulate. The blockchain is the most trustworthy solution for this.

2.3 Digital processes that can't be manipulated

A third problem the blockchain has solved is securing a process. The most discussed example of such a process is trade finance, where a sequence of actors must confirm what they are doing at various stages in the agreement. They must take responsibility for the goods being shipped and confirm the process for actors throughout the chain of transportation. Securing a process is also valuable in a contract such as a purchasing contract of real estate. It is important for all parties involved to be confident that all other parties are signing the contract in an acceptable order. This also makes it possible to proceed even if some of the actors are not physically present.

This may also be of help in securing processes related to objects connected to 'the Internet of Things'. It is very important to prevent or detect any manipulation of the processes these products are involved in, before they do any damage.

CHAPTER-

REAL STATE TRANSACTIONS TODAY

3.1 Summary of current situation

What we see above is that the Government is involved relatively late in the process. Not until item 28 does Government make any active decisions or receive any of the submitted documents. Prior to that, it is primarily the agent who checks the land registry to check the ownership of the property. There are several disadvantages with this system. Government is the actor with the highest credibility, and if Government is involved earlier, the confidence and transparency in the process increases.

The second thing that can be noticed is that the process takes a long time. There are likely advantages with the process because the buyer and seller of a residence will often want to have time to sell the previous residence and find a new one. It also takes significant time to prepare all the information. The agent needs to check on the owner and the property several times. The bank may check credit and real estate information several times. Information that is already listed in the purchasing contract is written again into the bill of sale.

A third thing we notice is that there are still a lot of documents that are signed on paper and sent via regular mail. Checking these documents and the identity of the people who signed them must be done manually. Today, agents, buyers and sellers can be sitting for two hours signing several hundred pages of documents when signing a purchasing contract, since all the documents and often all of the pages in several documents need a signature or initials written by hand. This takes time and it's easy to make mistakes.

The amount of documentation and information that must be saved also leads to mistakes. In 2015, Government granted 91% of all applications and 94% of all e-applications. Therefore, it is relatively common that papers need to be filled in a second time because they are incomplete or there are mistakes.

All these records must be stored by law for ten years, which requires physical space and increased security, e.g. in the agent's offices and at the banks. Searching for information in old records is also time-consuming.

CHAPTER-

PROPERTY TRANSACTION IN BLOCKCHAIN

The example above illustrates the current process for real estate transactions. With the example below, we want to illustrate what this would look like in the future. The testbed that has been developed by us as part of this project makes it possible trial the process, including a large part of the suggested improvements below, in an environment that closely resembles a real-world implementation.

4.1 Possibilities with the new technology

The future process example includes several improvements. The time between when the purchasing contract is written and when the pending property title is registered with Government can be reduced from 4 months to a few days. Eventually, this could take place in real time. The Buyer is granted the pending property title, and the property cannot be sold a second time by the seller.

The information that is needed for the bill of sale is already registered in the system for the most part. Therefore, in practice, the buyer and seller sign the same information upon taking occupancy. The risk that the property title will not be granted is sharply reduced since the system can ensure that the information that is required by law is included in the system and is required by the system before the parties are able to provide their signatures.

In fact, Government may automate the land title registration. If no other transactions or changes have been made in the property Government can execute the registration automatically since the manual checks that are necessary, have already been made. Government wants it to be easy for citizens and stakeholders to do things correctly, and this is considerably easier in a digital system.

Digital signatures provide a significantly greater level of assurance that the correct people will be filling out the correct documents. Since digital signatures are provided with the same application at several instances, the risk of errors and fraud is reduced. The process involves multiple contact points and multiple signatures by the parties involved. This increases confidence in the system since it is more difficult to manipulate the system over a long period of time.

In addition, the purely manual portion of sending paper by mail is streamlined and made more secure. All the parties can save the digital files and verification records of the entire chain of events digitally. Paper copies can be printed out if desired, but the process saves a lot of documentation.

CHAPTER-

OVERVIEW OF IT ARCHITECTURE

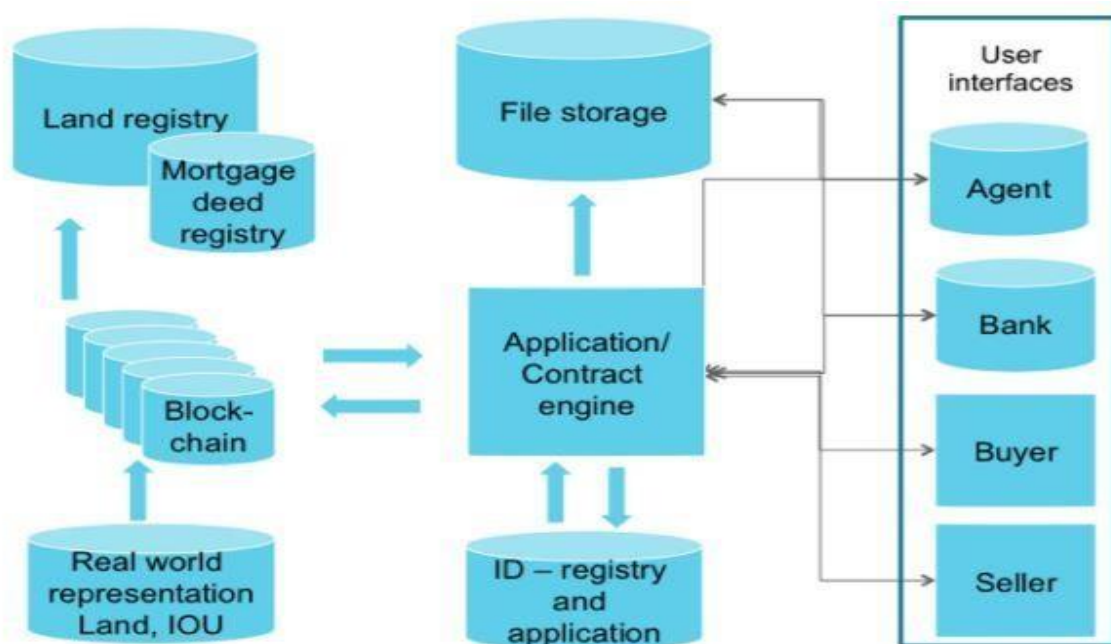
5.1 The solution in short

In an initial stage, the database of Lantmäteriet remains intact. Updates to the land registry are retrieved from the blockchain and are then also checked by Lantmäteriet. Registration in the blockchain is digital and based on the legal requirements, which minimizes errors in the information.

The blockchain for the transactions is open source and is checked by Lantmäteriet, and other nodes running the blockchain. The chain of authorization, signing with a Telia ID, etc. can be edited in the administration interface, but any changes will be visible to all parties to prevent fraudulent changed of the contract/application. The blockchain saves the verification records of documents such as the bill of sale and the purchasing contract, all signatures etc. Storing the original documents and their verification records can be performed by an external party, but can also be stored digitally by each party in the agreement, the bank, buyer, seller, agent, etc. The documents and verification records are then stored in multiple locations, which creates redundancy. The verification records are also summarized in an external blockchain and/or transparent to the public, which means that all the parties can feel secure that they can recreate and demonstrate the chain of events on their own, if the other parties suffer a breach of data or similar event.

5.2 Technical Overview

There are seven parts of a blockchain solution that can be standard, at least in the case of private blockchains. These components are described below.



5.3 The Blockchain

The blockchain is the part where the transparent transactions are recorded and stored. This is equivalent to the distributed ledger. The nodes decide what is going to be committed to the blockchain. There may also be nodes that are not part of the validation process but simply store the record.

In a public blockchains such as Bitcoin and Ethereum, anyone can be a node and keep a copy of the ledger. They can be a node which verifies and accept transactions and information that is going to be stored in the blocks. or they can simply keep a record of what is committed to the blockchain by the others. In practice those who want to be nodes which verify transactions need substantial processing power to have the chance to be part of the system. In our case the blockchain is permissioned which means that only trusted partners can validate transactions and blocks.

CONCLUSION AND FUTURE SCOPE

In this project we have introduced design and implementation of a land registration using blockchain. A blockchain based property ownership recording system described in this article eliminates most potential failures and attacks through transparency and use of cryptographic primitives for authentication. Thus, it can be used to reduce reliance on trusted third parties, reduce costs (through automatization) and reduce number fraud and errors.

This project can be used world-wide for registration of land as it is cheap, fail proof and very easy to access. So, this project has a good future scope.