Blockchain Technology using Ethereum Network in Real Estate

Padmavathi B, Sahana R, Soumya R, Varsha H G, Veena S

¹*Assistant Professor, Department of CSE, East West Institute of Technology, Bangalore, India.*
²*Department of CSE, East West Institute of Technology, Bangalore, India.*
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Abstract - *Because of the popularity of the Internet, the integration services have gradually changed people daily life, such as e-commerce activities on transactions, transportation and so on. The blockchain based real estate, one of the popular e-commerce activities, allows buyers to directly buy the products over the Internet. As for sealed buy, the extra transaction cost is required for the intermediaries because the third-party is the important role between the buyers and the sellers help in transaction. In addition, it never guarantees whether the third-party is trust. To resolve the problems, we propose the blockchain technology with low transaction cost which is used to develop the smart contract of buyer and seller.*

Key Words: **Blockchain, Ethereum, smart contracts.**

1.INTRODUCTION

The overall market is in front of a new technological change, where several markets need a technology that can speed up the different processes and bring more safety and transparency into the market (Tapscott, 2016). One of these markets is the real estate market and this market is highly important for the overall well-being of a country. Zhao and Michales (2006) argues that a real estate crisis often affect and creates financial crises which in turn could lead economic meltdowns both on a micro- but also on a macro level. The real estate crises are in many cases linked to inefficiencies within the market, inefficiencies such as illiquid market, not transparent enough, high transaction costs, personal biases and slow transaction processes (Shiller, 2005). It takes on average 114 days from the time the property is listed to the day the official transfer day occurs for small houses in Sweden (Flink, 2017). This process is time-consuming and inefficient. Crowston and Wigand (2010) argue that a real estate transaction usually occurs in five steps; listing, searching, evaluating, negotiation and execution, which in turn includes approximately 33 steps according to Lantmäteriet et al. (2016) According to Shimizut al. (2016) the usual transaction process starts with the property owner deciding to sell and in most cases contacts a real estate broker. The broker values the property and decides with the seller an optimal asking price (reservation price). The reservation price is in most cases not modified, but in a situation where the houses are unsold and still on the market, the price can be modified (Mcgreal et al., 2009). When the reservation price is set, then the broker starts marketing the property and search for a potential buyer. When a potential buyer is found, evaluation and

negotiation are initiated. If the buyer and the seller agree upon a price, they usually write a contract and a transaction occurs. The broker reports the transaction price to a specific realtor database and the buyer usually needs to report the transaction price to a government agency. Blockchain is a new and emerging technology on the market. It is an information technology multiple classes of application i.e. any form of asset registry, exchange or inventory (Swan, 2015). Blockchain is a decentralized transaction technology first developed for Bitcoin cryptocurrency (Yli-Huumo et al., 2016), but every area of economics, finance and money could be included in the technology. The technology uses ledgers (a distributed database architecture) to register any kind of information (Pinna and Ruttenberg, 2016) and has the potential to shorten the transaction time in any kind of transaction and make systems more transparent and reliable. Saint-Paul (2008) states that the outcome of implementing new technologies, such as blockchain technology, is not always clear and could affect far more areas than imagined. The real estate market is highly important for the overall economy and should not be exposed to unnecessary risk when trying to implement new technologies.

2. PROPOSED METHODOLGY

Blockchain: The blockchain is a new system of decentralized trustless transactions of data that does not require a third party to perform the task of validating the transaction. Blockchain is a decentralized peer-to-peer technology at its origin and can be seen as a ledger of facts. Decentralized means that data is not stored in only one network with a common processor, instead it is distributed across several networks of interconnected computers. The decentralized database uses blocks where records of information are stored and it is a continuously growing list of ordered records. The blocks are linked to previous blocks and each block contains a time-stamp (nonce) and a hash-number. The system is inherently resistant to modification of data due to the linking-system, time-stamp and hash-number in all the single blocks and the data in a blockchain can therefore not be easily altered.
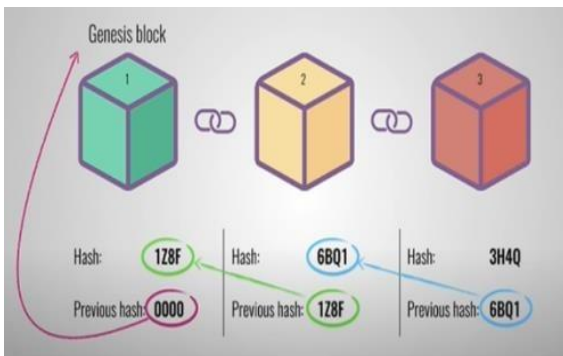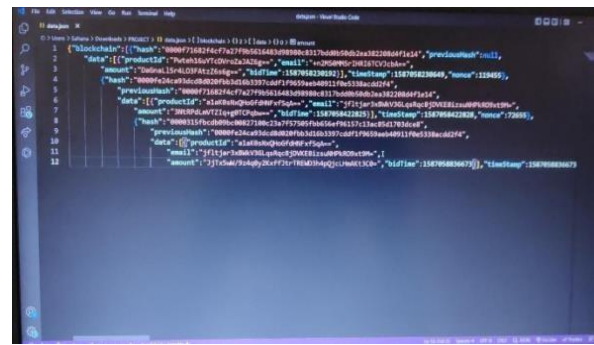
Fig-1: Creation of blocks

Hashing: The hash function uses an algorithm that takes data of arbitrary length as an input and outputs a hash value. He further argues that the hash function will always produce the same hash value for the same input data. The hash value is a random number, with a nonce in the block header for variability. If the data is changed, then the hash value is significantly changed as well. It is very hard and time-consuming to decrypt the data from the hash value. In the analogy of a meat grinder, it is impossible to revert from the hamburger to the original piece of meat. The cryptographic hash function work in the similar way as the meat grinder (Franco, 2015). To perform consensus protocol, bitcoin uses cryptographic hash functions (Franco, 2015)The NSA(National Security Agency) designed a cryptographic hash function called SHA256, which 20gives a 256-bit long output.SHA256 meets the preimage resistance requirement, meaning that is infeasible to recover the data from a given hash value. In practice, this means that given the hash value a brute-force algorithm cannot break the hash function without taking impractical amount of time. Bitcoin uses SHA256^2 cryptographic hash function to avoid length extension attacks. SHA256^2 is the original SHA256 cryptographic hash function used twice (Franco, 2015). Backlund (2016) argues that the hash value in a blockchain works as a unique identifier of the blocks data. Each block has a unique hash value and a unique timestamp. A time-stamp confirms when in time the hash occurred. When linking blocks to each other, each single block uses its parent blocks unique hash value. All blocks that are linked together form a chain of links that goes back to the first block in the blockchain, often referred to as the genesis block. Due to the linking to the parent blocks hash, any change in the data stored in a specific block within the blockchain will change the hash and thus all descending blocks hash values. This means if data is changed within a block stored within a blockchain but the descending blocks are not recalculated, then the blockchain is considered invalid. For the blockchain to be valid, all descending blocks needs to get recalculated if any data is changed with a block.
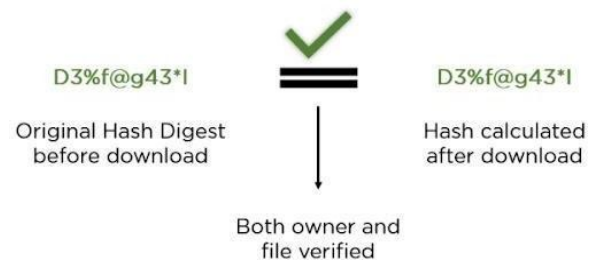

Fig -2: Hash Value

Fig-3: Authentication validation

Ethereum: Like all cryptocurrencies, Ethereum works on the basis of a blockchain network. A blockchain is a decentralized, distributed public ledger where all transactions are verified and recorded. It's distributed in the sense that everyone participating in the Ethereum network holds an identical copy of this ledger, letting them see all past transactions. It's decentralized in that the network isn't operated or managed by any centralized entity—instead, it's managed by all of the distributed ledger holders. Blockchain transactions use cryptography to keep the network secure and verify transactions. People use computers to "mine," or solve complex mathematical equations that confirm each transaction on the network and add new blocks to the blockchain that is at the heart of the system. Participants are rewarded with cryptocurrency tokens. For the Ethereum system, these tokens are called Ether (ETH).Ether can be used to buy and sell goods and services, like Bitcoin. It's also seen rapid gains in price over recent years, making it a de-facto speculative investment. But what's unique about Ethereum is that users can build applications that "run" on the blockchain like software "runs" on a computer. These applications can store and transfer personal data or handle complex financial transactions.

3. NODE IMPLEMENTATION

In this module we will be implementing the blockchain network by creating our set of distributed ledger nodes. Each node will be able to perform various operations. Receive the blockchain data once the transaction in the blockchain has been committed and the block is minded. Performs block validation by comparing the hash codes of the current block

and the hash codes of the previous blocks. Provide a read only access to the clients on that clients on that node for visualizing the number of blocks and the type of data being stored. Provide the blockchain data to the bidding application once requested. Each node will be deployed it its own platform over the cloud infrastructure. For this purpose, we make use of digital ocean cloud service provider.

4. PRODUCT ADDITION

In this module the seller of the product in our portal will be given an user interface through which he/she can add the product which he/she is planning to sell. The seller will have to provide some basic information about the product like the name, description, and the URL to the actual product. All the above fields are mandatory to be provided by the seller. The product once added, it will immediately be shown up in the market where the users can start bidding for it. The end users will not be given a luxury to upload the products images due to the limitations in the cloud storage space. Instead, the sellers must be specifying the URL to the image of the product from google drive or any other hosting sites.
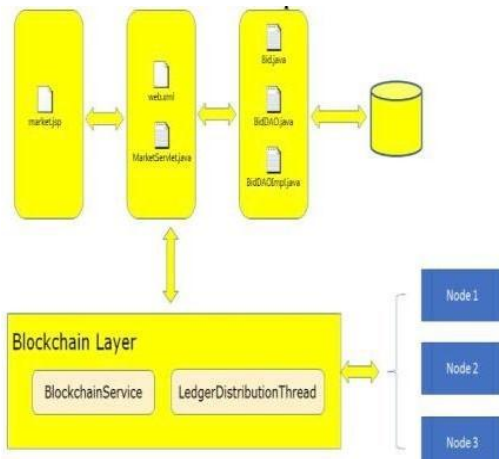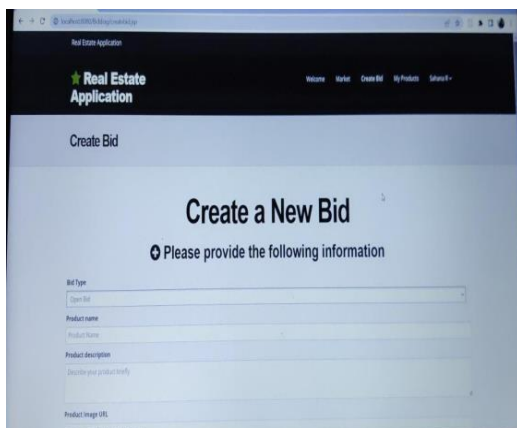

Fig-4 : Blockchain Layer

Fig -4: Addition of documents

5. MARKET AND PARTICIPATION

The product once added by the seller, it will immediately be shown up in the market where the users can start bidding for it. The user must be entering the amount in the textbox provided against the product of interest. The amount bid by the buyers along with the unique identifier for the product will be stored in the blockchain network. There will be a blockchain service. Class which does the operation of writing and reading and from blockchain network. This blockchain service class will make use of the ledger distribution thread to write.
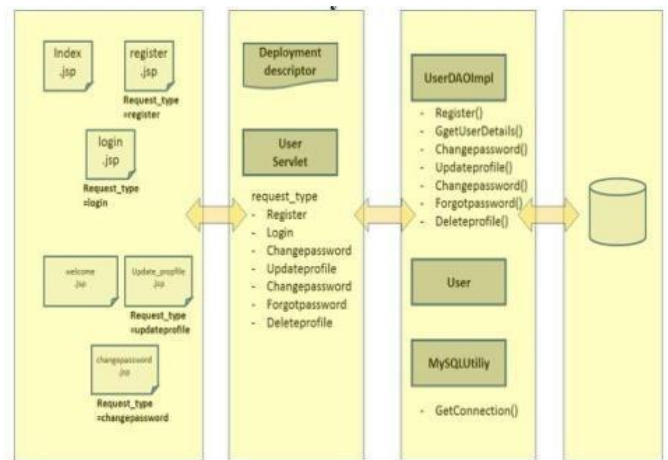

Fig-6 : Account access layer

6. APACHE TOMCAT TO DEVELOP THE PRODUCT

Apache Tomcat (or simply Tomcat, formerly also Jakarta Tomcat) is an open source web server and servlet container developed by the Apache Software Foundation (ASF). Tomcat implements the Java Servlet and the Java Server Pages (JSP) specifications from Sun Microsystems, and provides a "pure Java" HTTP web server environment for Java code to run. Apache Tomcat includes tools for configuration and management, but can also be configured by editing XML configuration files.
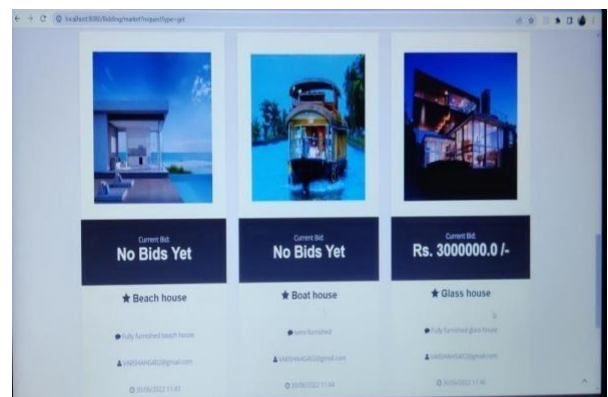

Fig-7 : Market place

7. CONCLUSION

A fundamental change towards more digitalization is most likely one change that must be done in the real estate market, where blockchain-based systems is one solution. This is necessary to maintain the actors' positions on the market in the long-run perspective. Blockchain could change the real estate market fundamentally, with less inefficiencies. Inefficiencies such as personal biases could be addressed and improved and a more liquid market could be reached due to reduced transaction costs. Real estate cycles and volatility within the market could decrease with more transparency. One of the biggest challenges for a smooth implementation of a blockchain-based system, is probably a fundamental change of how people value properties and their opinion regarding trust toward a digital system. Another big challenge for blockchain technology is to convince the companies and institutions that the technology is reliable and worth investing in. Intermediates, such as brokers, will have changed work tasks due to a shorter transaction processes. This can save money in the transaction process, and also make the process more efficient and smooth-going. Some level of transparency on the market is necessary and valuation of properties is a suitable area for more transparency. One of the biggest advantages with the system is its high level of security an un-hackability.

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