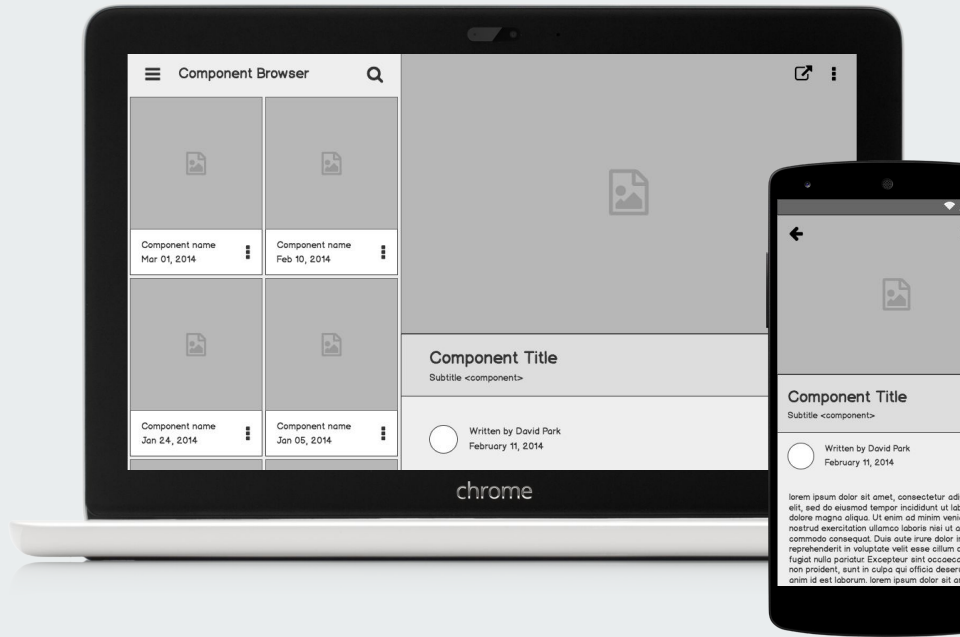


Application of Blockchain Technologies on Business Process (Study Case)

Real Estate Blockchain Application



Outline

The Problem

Market Users and KPI

User Interview and Stories

MVP Scopes

Application Demo

References and Resources



The Problem



Problem statement

Using blockchain-based smart contracts in real estate transactions

This results are cost-effective process, improves communication and trust between parties, and also can be used in rental agreements and property management.



Potential Users on the market

List of potential users possibility

- Real estate agents
- Wide community
- Government
- Building developers


Market, Users, and KPI



Market Position

advantages over traditional
contracts

- Increased efficiency
- Improved accuracy
- Enhanced security
- Reduced costs
- Automatic enforcement



Key Performance Indicator

With smart contracts, the use of automation and digital signatures can significantly reduce processing time and improve efficiency

- Percentage of Contracts Completed Without Human Intervention
- Contract Accuracy Rate
- Time to Resolution

User Interview and Stories

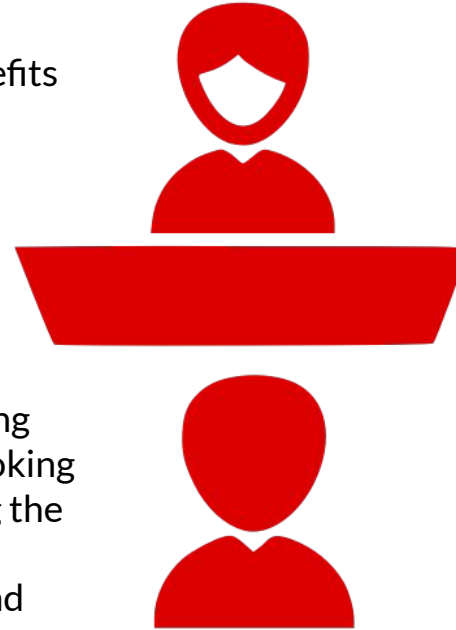
User hypothesis based on Interview 1



"The potential user is an e-commerce store owner who is interested in exploring the benefits of smart contracts to streamline payment and fulfillment processes. They have no prior experience using smart contracts but are motivated to increase efficiency and reduce administrative burden."

User hypothesis based on Interview 2

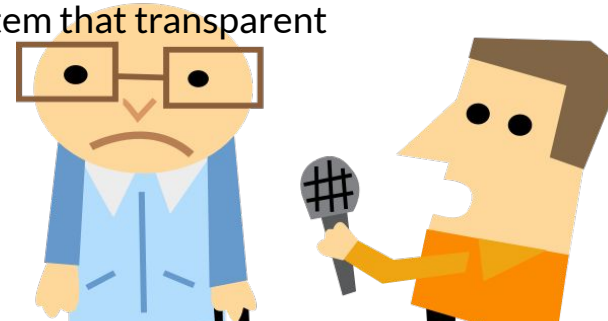
"The potential user is a business owner who is interested in the potential benefits of using smart contracts to increase transparency and security in their transactions. They are looking for ways to automate and streamline their business processes and are open to exploring the use of smart contracts. They are willing to work with a consultant to identify specific processes that could benefit from using smart contracts and are willing to invest time and resources into implementing them."



What we need to consider when we build the product

From this point, we formulate a scheme what we need to consider when we build the product:

1. Simplicity: the application interaction with the users should be easy to understand.
2. Security: based on the interview with business owners, they need to make sure that the system is secure, that is why what we offer is by using blockchain technology, it is possible to make the transaction secure and safe.
3. Efficiency: all the potential users mentioned that they want a system that transparent and relatively fast in processing time.





MVP Scope

Scope of Buyer

Category	Sub-category	App feature	Scope
Find Property	Search place to stay	Search by ID	Completed
	Browse listing	Display listing	Completed
	View listing	Display listing	Completed
Buy Property	Reserve a place	Select property	Completed
	Review property detail	Submit payment detail	Completed
	Confirm pay	Secure payment redirect	Completed



Scope of Seller/Agent

Category	Sub-category	App feature	Scope
List my property	Add property detail	Define my property's available spaces	Completed
	Set property location	Define my property's available spaces	Completed
	Amenities and available spaces	Select my property's available spaces	Completed
	Add property photo	Random photo	Completed
Manage my property	Property management	Add a listing title	Completed
	Property pricing	Price my property	Completed
	Preview my listing	View a summary of my listing detail	Completed





Application Demo



Blockchain Technologies Used



以太坊

Welcome to Ethereum

Ethereum is the community-run technology powering the cryptocurrency ether (ETH) and thousands of decentralized applications.

Explore Ethereum

- Ethereum
<https://ethereum.org/en/developers/docs/intro-to-ethereum/>



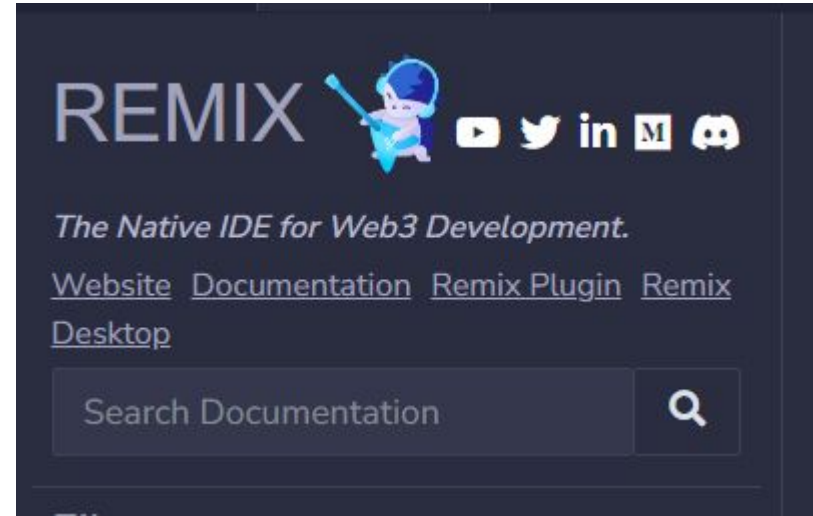
Blockchain Technologies Used

Solidity is a statically-typed curly-braces programming language designed for developing smart contracts that run on [Ethereum](#).

[get started](#)

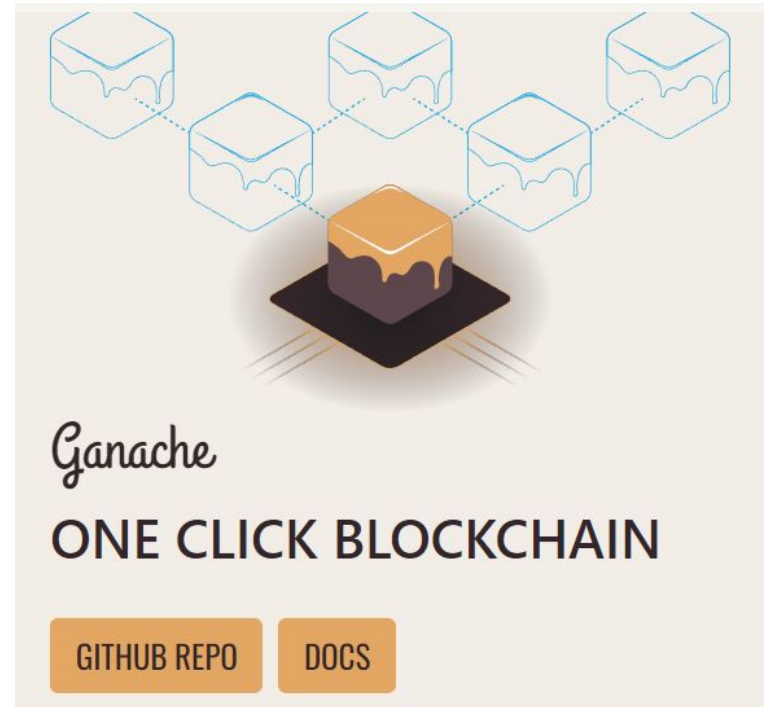
- Solidity (programming language for developing smart contract on ethereum)
- <https://soliditylang.org/>

Blockchain Technologies Used



- <https://remix.ethereum.org/#lang=en&optimize=false&runs=200&evmVersion=null&version=solison-v0.5.17+commit.d19bba13.js>
- IDE for deploying the smart contract

Blockchain Technologies Used



- <https://trufflesuite.com/ganache/>
- Local blockchain network for local testing purpose



Blockchain Technologies Used



A crypto wallet & gateway to blockchain apps

Start exploring blockchain applications in seconds. Trusted by over 30 million users worldwide.

- <https://metamask.io/>
- Crypto wallet and gateway to connect with the blockchain network



Web Technologies Used

Node.js® is an open-source, cross-platform JavaScript runtime environment.

Download for Windows (x64)

18.16.0 LTS

Recommended For Most Users

20.2.0 Current

Latest Features

[Other Downloads](#) | [Changelog](#) | [API Docs](#)

[Other Downloads](#) | [Changelog](#) | [API Docs](#)

For information about supported releases, see the [release schedule](#).

- <https://node.js>
- Node.js® is an open-source, cross-platform JavaScript runtime environment.



Web Technologies Used

Bootstrap Getting started CSS Components JavaScript Customize

CSS

Global CSS settings, fundamental HTML elements styled and enhanced with extensible classes, and an advanced grid system.

- <https://getbootstrap.com>
- Bootstrap makes use of certain HTML elements and CSS properties that require the use of the HTML5 doctype.

Smart Contract Deployment on Remix

The screenshot displays the Remix IDE interface during the deployment of a smart contract named 'RealEstate'. The interface is divided into several panels:

- Left Panel (Deploy & Run Transactions):** Contains the 'Deploy' button, a 'Publish to IPFS' checkbox, and a section for 'Transactions recorded' (showing 1 transaction). Below this is the 'Deployed Contracts' section, which lists the deployed contract 'REALSTATE AT 0XAFA...DC902'. It shows the contract's balance (0 ETH) and a list of functions: 'buyProperty' (with a 'uint256 _propertyId' parameter), 'listPropertyFor' (with 'uint256 _propertyId, uint256 _g' parameters), 'getAllProperties', 'getProperty' (with a 'uint256 _propertyId' parameter), and 'Properties' (with a 'uint256' parameter).
- Center Panel (Code Editor):** Displays the Solidity code for the 'RealEstate.sol' file. The code includes a pragma statement for Solidity version ^0.8.19, an import statement for the Math library, and the 'RealEstate' contract definition. The contract has a 'Property' struct with fields 'price', 'owner', 'forSale', 'name', 'description', and 'location'. It also includes a mapping from property IDs to property structs and an array of property IDs.
- Right Panel (File Explorer):** Shows the project structure, including the 'RealEstate.sol' file.
- Bottom Panel (Terminal):** Displays the output of the deployment process. It shows the transaction hash and the status 'creation of RealEstate pending...'. It also provides instructions on how to use the terminal, such as checking transaction details, executing JavaScript scripts, and accessing libraries.

```
1 pragma solidity ^0.8.19;
2
3 import "https://github.com/OpenZeppelin/openzeppelin-contracts/blob/master/contracts/utils/math/Math.sol";
4
5 contract RealEstate {
6     using Math for uint256;
7     struct Property {
8         uint256 price;
9         address owner;
10        bool forSale;
11        string name;
12        string description;
13        string location;
14    }
15    //Mapping from property IDs to property structs
16    mapping (uint256 => Property) public Properties;
17    uint256[] public PropertyIds;
```

Deployed Contract on Ganache

Ganache

ACCOUNTS

BLOCKS

TRANSACTIONS

CONTRACTS

EVENTS

LOGS

SEARCH FOR BLOCK NUMBERS OR TX HASHES

CURRENT BLOCK
54

GAS PRICE
20000000000

GAS LIMIT
6721975

HARDFORK
MERGE

NETWORK ID
5777

RPC SERVER
HTTP://127.0.0.1:7545

MINING STATUS
AUTOMINING

WORKSPACE
MISCREANT-JUMP

SWITCH

← BACK

BLOCK 23

GAS USED
24215

GAS LIMIT
6721975

MINED ON
2023-05-10 07:53:56

BLOCK HASH
0x29edb29d1049d68fc329d750b3cc22841a930804ce0a352d6f9517c845561a41

TX HASH
0x82a62e78154566796c4a209b80fe39764321e421a2118098ea0c712b52aba447

CONTRACT CALL

FROM ADDRESS
0xB1a2e0545AeC50Dc057C1269Dbc42584Eb5Fc49D

TO CONTRACT ADDRESS
0x031FDb5a6D2D4000D5618608Bed68B496684a70e

GAS USED
24215

VALUE
1



Main Interface

logo

[Home](#)

[Buy a property](#)

[Sell a property](#)

Easy Way to Find a Perfect Property

Sample text. Click to select the Text Element.

Image from **Freepik**

Enter a valid email address

Submit





List Properties Interface

logo

[Home](#)

[Buy a Property](#)

[Sell a Property](#)

List of Properties





Selling Property Interface

logo

[Home](#)

[Buy a Property](#)

[Sell a Property](#)

Add New Property

Price:

Name:

Description:

Location:

Submit

Transaction Sample Interface

ptun Konyvtar ELTE FSZEK WIFI - Kapcs... Canvas

localhost:5000 says
Property added!

OK

Learning Engli... BBC Learning Englis...

Buy a Property Sell a Property

logo

Add New Property

Price:
10


Name:
Budapest Apartement Exclusive

Description:
1 kitchen 2 beds

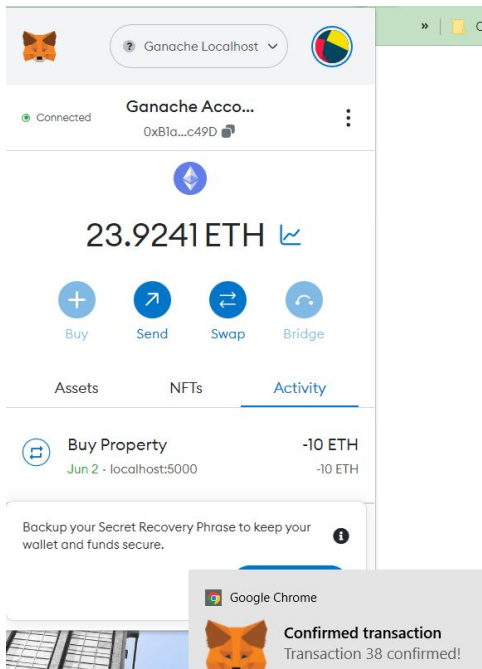
Location:
District 5

Submit

Google Chrome

 **Confirmed transaction**
Transaction 37 confirmed!

Transaction Sample Interface

[illegible]



Conclusion

Implementing blockchain-based smart contracts on a real estate website, using Ganache in a local environment, offers increased security, transparency, and efficiency in transactions. It ensures tamper-proof records and automates processes, reducing the need for intermediaries. However, challenges include the technology's novelty and potential resistance from traditional players. Despite this, embracing blockchain and smart contracts can improve the real estate industry by streamlining and enhancing trust in transactions.



References and Resources

<https://github.com/oxtervlox/BlockchainApplicationsInBusinessProcesses>