



Data Governance using Blockchain

Project Team 3

Abhijith Anugu
Anuja Bendre
Keegan Maguigan
Kritika Agarwal
Nathaniel Pines
Shun Ting Wang

About the Team



Abhijith Anugu



Anuja Bendre



Keegan Maguigan



Kritika Agarwal



Nathaniel Pines



Shun Ting Wang

Data Governance

- Framework and set of policies to regulate and control
 - Collection
 - Storage
 - Exchange
- People, Technology and Processes



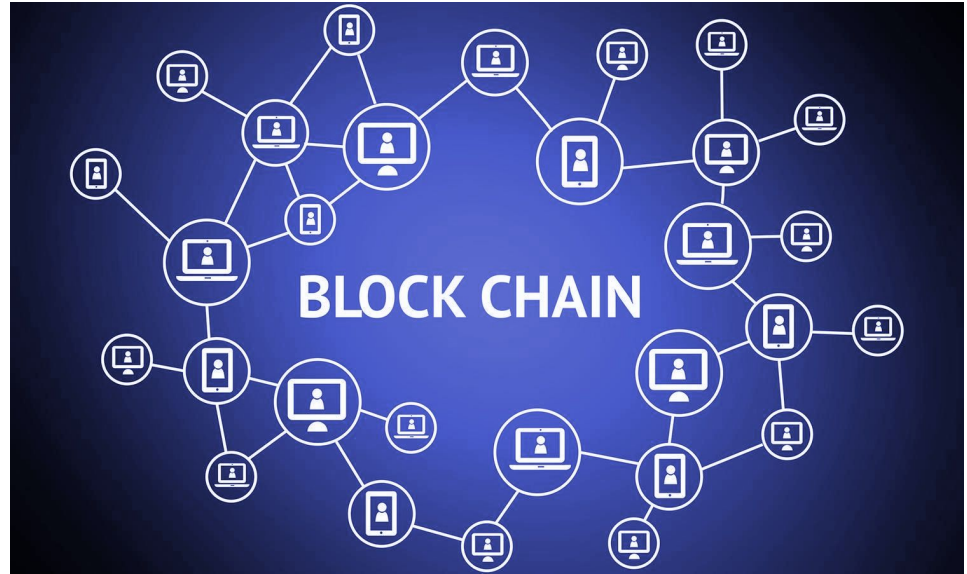
Elements of Data Governance



https://unite.un.org/sites/unite.un.org/files/styles/ww_full_width/public/news_articles/blog-oict-data-gov.png?itok=P_VAB1ul

What is Blockchain?

- Data structure that holds transactional records
- Ensuring security, transparency, and decentralization



<https://geospatialmedia.s3.amazonaws.com/wp-content/uploads/2017/07/blockchain.jpg>

Understanding Smart Contracts



https://assets-global.website-files.com/606f63778ec431ec1b930f1f/60785f4ecacc7f40fb9006fe_smart-contracts-in-block%D1%81hain-in-comparison-to-the-ordinary-contracts-image-2.png

Key Insights from Literature Review

Data Governance and Blockchain

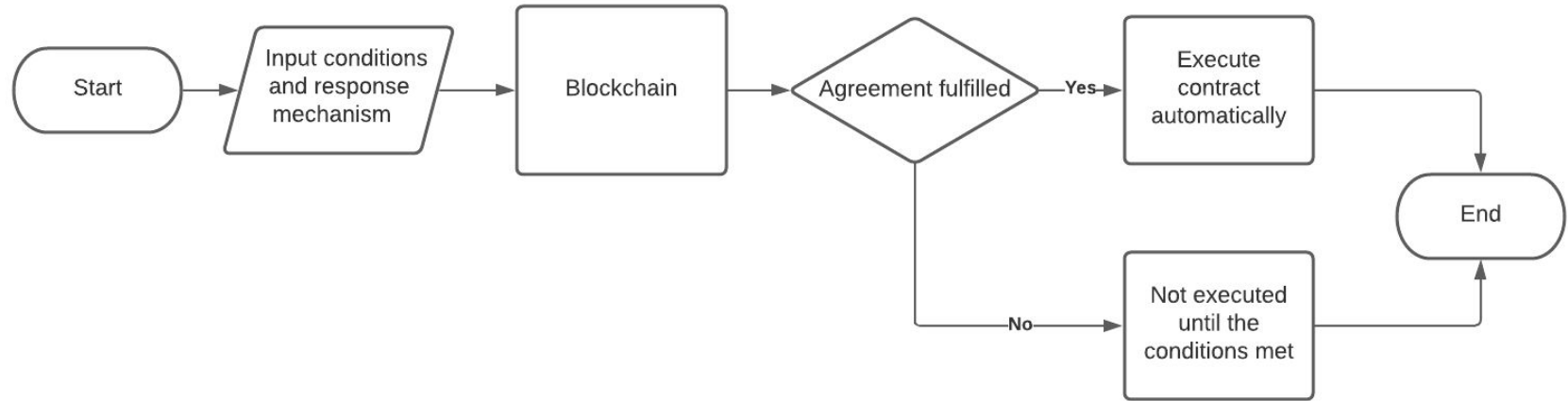
- Blockchain governance interacts with traditional governance mechanisms in both substitutive and complementary ways (Lumineau, et al. 2021).
- Blockchains fit into the two categories of centralized and decentralized data governance models (Teperdjian 2020).
- Blockchain is a decentralized core architecture. Blockchain technology also has the characteristics of centralization, block data, no tampering and trust (Li, et al. 2019).
- Blockchains are data governance platforms by default (Smith 2019).
- Blockchain system should not be the first choice when:
 - Latency is paramount;
 - Storage is at a premium;
 - Sensitive data needs to be forgotten;
 - Network governance could break down; and
 - A single organization controls the data ecosystem (Smith 2019).

Key Insights from Literature Review

Smart Contracts

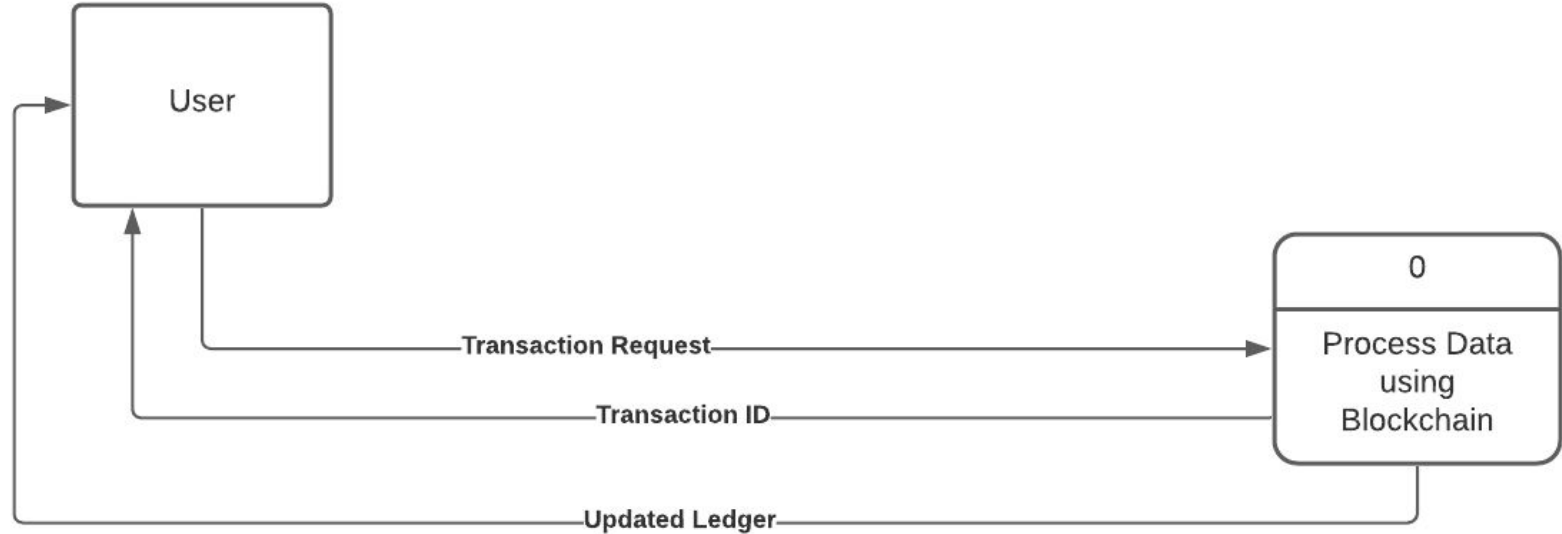
- Smart contracts are a revolutionary feature of blockchain technology. They provide flexibility, speed, security, and automation for real-world scenarios to create a trustworthy system with significant cost reductions (Bashir 2018).
- By creating smart contracts, parties no longer:
 - Have to trust others not to breach the terms of the contract; nor
 - Have to depend on an intermediary party, such as a bank, to enforce the rules of a contract (Gürkaynak, et. al 2018).
- Despite the early stages of the application of blockchain technology to copyright goods and services, there is booming deployment of applications, particularly in the online music sector (Bodó 2018).
- Several concerns continue to undermine adoption of smart contracts:
 - Security threats and vulnerabilities;
 - Legal issues;
 - Reliance on “off-chain” resources;
 - Immutability and scalability; and
 - A consensus mechanism (Khan, et. al 2021).

Flowchart - Smart Contracts using Blockchain

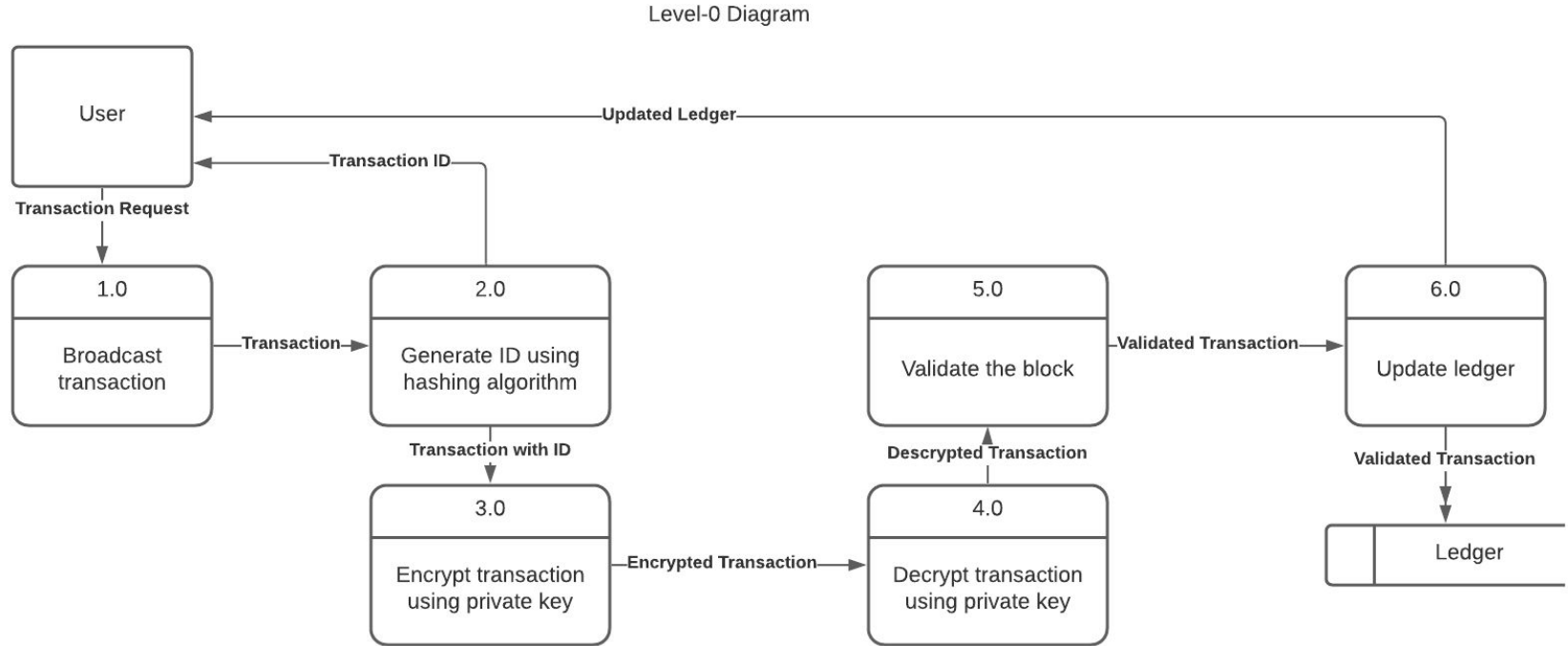


Data Flow Diagram - Context Level Diagram

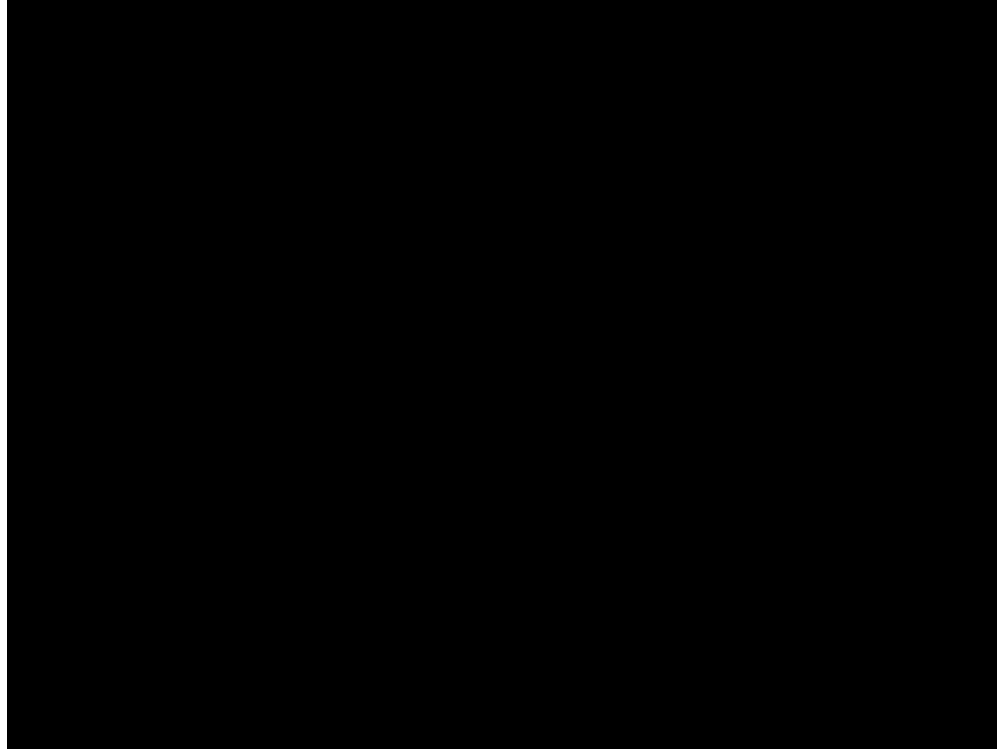
Context Level Diagram



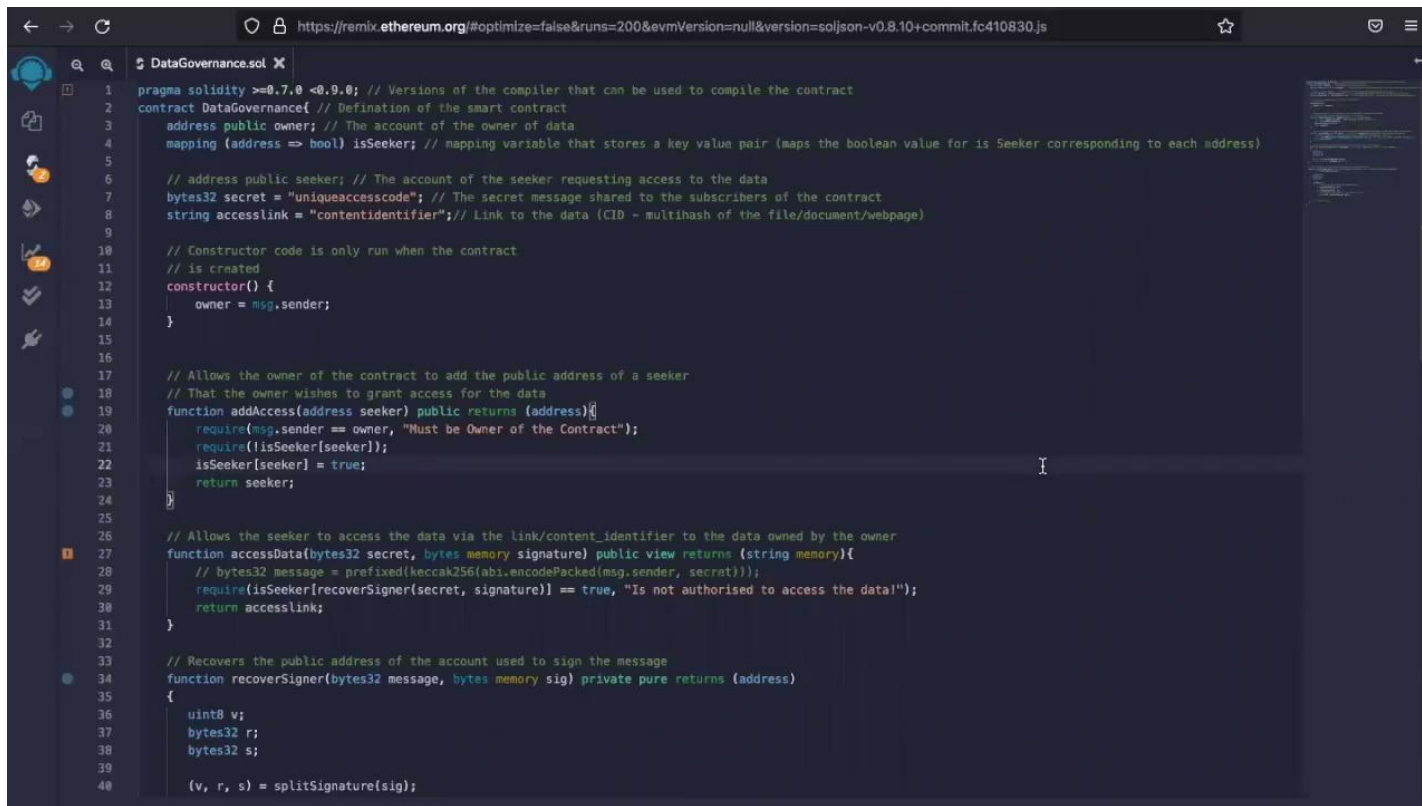
Data Flow Diagram - Level 0 Diagram



Implementation Video - Blockchain

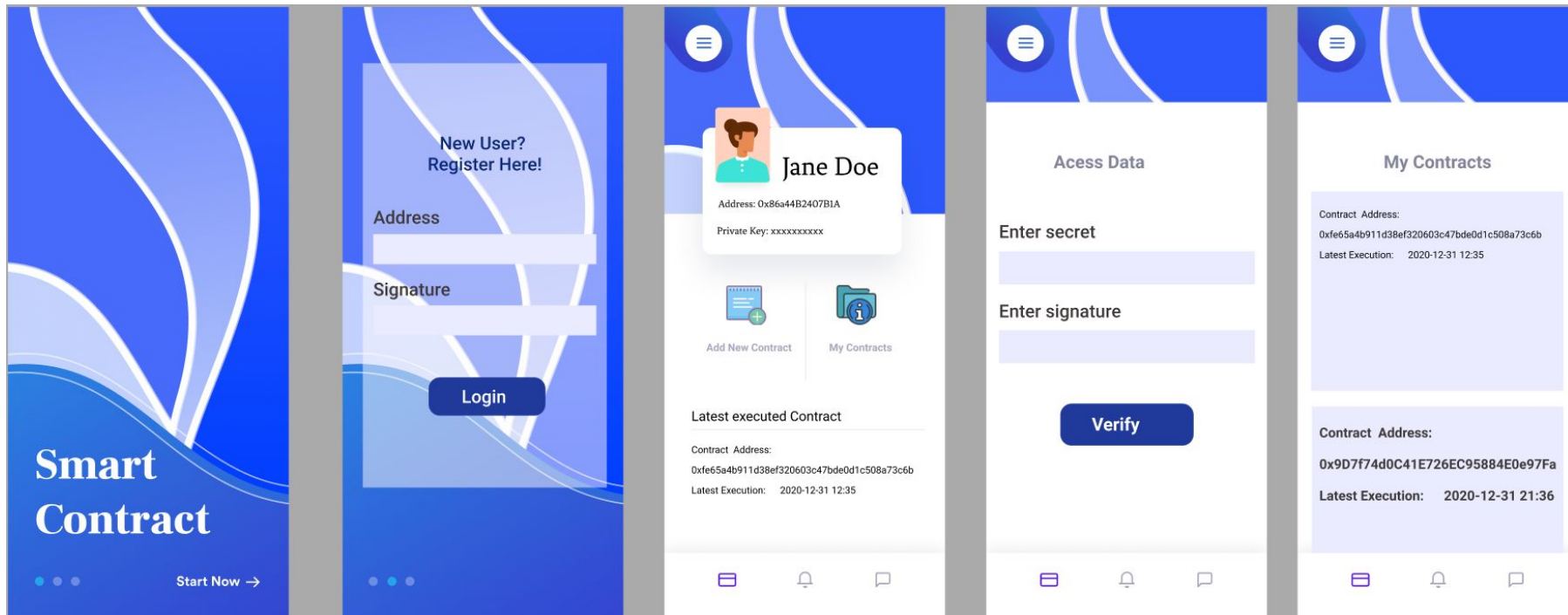


Implementation Video - Smart Contract



```
1 pragma solidity >=0.7.0 <0.9.0; // Versions of the compiler that can be used to compile the contract
2 contract DataGovernance{ // Definition of the smart contract
3     address public owner; // The account of the owner of data
4     mapping (address => bool) isSeeker; // mapping variable that stores a key value pair (maps the boolean value for is Seeker corresponding to each address)
5
6     // address public seeker; // The account of the seeker requesting access to the data
7     bytes32 secret = "uniqueaccesscode"; // The secret message shared to the subscribers of the contract
8     string accesslink = "contentidentifier"; // Link to the data (CID - multihash of the file/document/webpage)
9
10    // Constructor code is only run when the contract
11    // is created
12    constructor() {
13        owner = msg.sender;
14    }
15
16
17    // Allows the owner of the contract to add the public address of a seeker
18    // That the owner wishes to grant access for the data
19    function addAccess(address seeker) public returns (address){
20        require(msg.sender == owner, "Must be Owner of the Contract");
21        require(!isSeeker[seeker]);
22        isSeeker[seeker] = true;
23        return seeker;
24    }
25
26    // Allows the seeker to access the data via the Link/content_identifier to the data owned by the owner
27    function accessData(bytes32 secret, bytes memory signature) public view returns (string memory){
28        // bytes32 message = prefixed(keccak256(abi.encodePacked(msg.sender, secret)));
29        require(isSeeker[recoverSigner(secret, signature)] == true, "Is not authorised to access the data!");
30        return accesslink;
31    }
32
33    // Recovers the public address of the account used to sign the message
34    function recoverSigner(bytes32 message, bytes memory sig) private pure returns (address)
35    {
36        uint8 v;
37        bytes32 r;
38        bytes32 s;
39
40        (v, r, s) = splitSignature(sig);
```

Implementation Mockup



Other plausible Information Services using Blockchain



Supply chain



Healthcare



Government



Retail



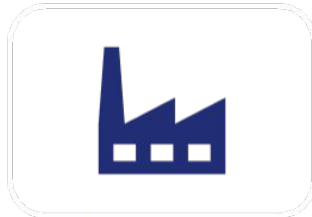
Media and advertising



Oil and gas



Telecommunications



Manufacturing



Insurance



Financial services

Image Sources

- Google Images
 - <https://geospatialmedia.s3.amazonaws.com/wp-content/uploads/2017/07/blockchain.jpg>
 - https://assets-global.website-files.com/606f63778ec431ec1b930f1f/60785f4ecacc7f40fb9006fe_smart-contracts-in-block%D1%81hain-in-comparison-to-the-ordinary-contracts-image-2.png
- Imperva
 - <https://www.imperva.com/learn/wp-content/uploads/sites/13/2019/01/Data-Governance.png>
- United Nations
 - https://unite.un.org/sites/unite.un.org/files/styles/uw_full_width/public/news_articles/blog-oict-data-gov.png?itok=P_VAB1ul

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Thank You!

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