Blockchain-enabled information systems

Zhaohu (Jonathan) Fan

Information Technology Management

Scheller College of Business

Georgia Institute of Technology

March 8, 2024

Goals

- **How do Blockchain-enabled information systems improve data management** and **what are their main challenges?**
  - **security** in data management
  - **efficiency** in data management
  - **transparency** in data management

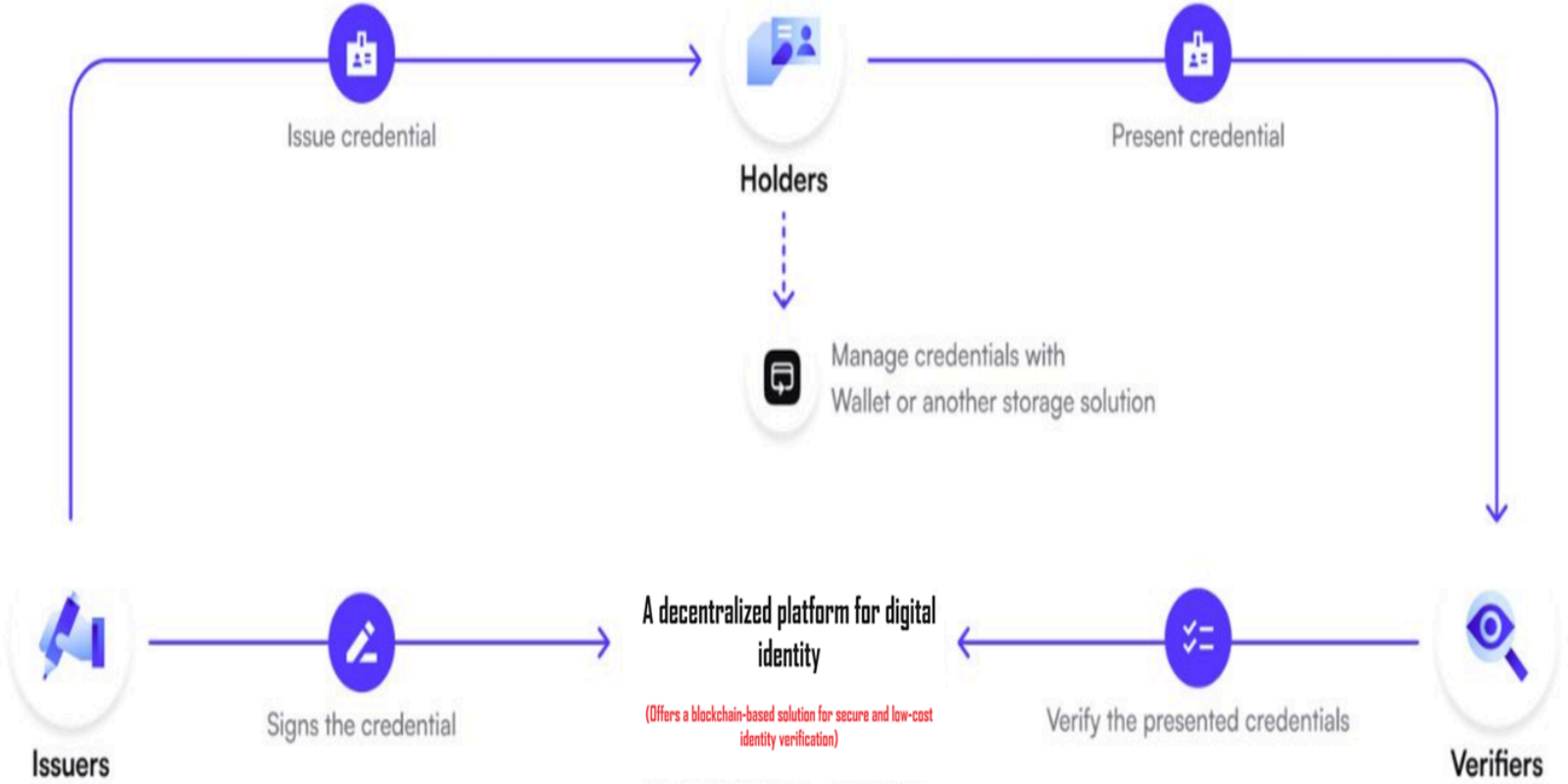
Research question(s)

- How can **blockchain technology** be used for **identity verification**, and
  - how can it be **ethically combined with data analysis** to **understand the online behavior of stakeholders** such as communities, suppliers, governments, employees, and customers?

Integrating Blockchain Identity Management with Data Analysis

- Objective
  - **Leverage blockchain technology for identity verification**
  - **Ethically integrate blockchain with data analysis**
  - Understand online behavior of stakeholders such as:
    - Communities
    - Suppliers
    - Governments
    - Employees
    - Customers

Use case


Issue credential
Holders
Present credential
Manage credentials with
Wallet or another storage solution
Issuers
Signs the credential
A decentralized platform for digital identity
(Offers a blockchain-based solution for secure and low-cost identity verification)
Verify the presented credentials
Verifiers

Use case (cont'd)

- **Understanding the Ethereum Blockchain Basics**: Getting a grip on how Ethereum works, especially its smart contracts and decentralized nature.
  - **Python Interaction**: Exploring the use of Python's web3.py library to connect and interact with Ethereum.
  - **Data Retrieval from Ethereum Blockchain**: Looking into extracting data from the Ethereum blockchain about a consumer electronics manufacturer.
    - **The goal is to analyze advertisement interactions and purchasing patterns of consumers.**

More research question(s)

- The role of zero-knowledge proofs in enhancing **privacy** and **security** in block chain networks.
  - **Blockchain-based** solutions for sustainable development goals (SDGs)
  - How does the bitcoin spot ETF work on a technical level?
  - Use cases of Blockchain in insurance industry
  - How does the use of smart contracts impact the **security** and **efficiency** of supply chain management in the food industry?
  - Studying the concept of block chain oracles and their role in connecting block chain networks with external data sources.
  - And more .....

Applications and tools

- There are several applications and tools designed for analyzing block chain technology. These tools can vary in their complexity and the specific features they offer. **Here are a few notable ones**:
    - **Block Explorer**: This is a fundamental tool for blockchain analysis. It allows users to view details of blocks, transactions, and addresses on a blockchain. Examples include Bitcoin Block Explorer for Bitcoin and Etherscan for **Ethereum**.
    - **Chainalysis**: A popular tool used for detecting and preventing fraud and money laundering on the blockchain. Chainalysis provides insights into the movement of cryptocurrencies and is widely used by law enforcement agencies and financial institutions.
    - **Coin Metrics**: This platform offers in-depth analysis of different aspects of various cryptocurrencies. It provides data on network activity, market data, and other key metrics that are valuable for research and investment decisions.

Applications and tools (cont'd)

- **CryptoCompare**: This tool offers a comprehensive overview of cryptocurrency markets. **It provides data on prices, volumes, market cap, and other relevant information, useful for both investors and researchers.**
    - **Glassnode**: An analytics platform that provides insights into blockchain and cryptocurrency markets. **It includes data on various metrics like network health, market indicators, and investor behavior.**
    - **Nansen**: This is an analytics platform that combines on-chain data with a massive and constantly growing database containing millions of wallet labels. **It's used to analyze the behavior of investors and trends in the crypto market.**
    - **Santiment**: A market intelligence platform that offers insights into the cryptocurrency market. It provides data on social media sentiment, development activity, and other unique metrics.

- Python Demo Examples include Etherscan for **Ethereum**

Demo

jupyter Meeting notes blockchain technology Last Checkpoint: 08/22/2023 (autosaved)

Logout

File Edit View Insert Cell Kernel Widgets Help

Trusted

Python 3 (ipykernel)

Run

Markdown

In [2]:

```
import requests

def get_latest_transactions(api_key):
    url = "https://api.etherscan.io/api"

    # Get the latest block number
    params = {
        'module': 'proxy',
        'action': 'eth_blockNumber',
        'apikey': api_key
    }

    response = requests.get(url, params=params)
    data = response.json()

    # Check if the response contains the expected data
    if 'result' in data:
        block_number = data['result']
    else:
        print("Error: Unable to fetch the latest block number.")
        print("Response:", data)
        return

    # Get transactions from the latest block
    params = {
        'module': 'proxy',
        'action': 'eth_getBlockByNumber',
        'tag': block_number,
        'boolean': 'true',
        'apikey': api_key
    }
```

Demo (cont'd)

```
    response = requests.get(url, params=params)
    data = response.json()

    # Check if the response contains the expected data
    if 'result' in data and 'transactions' in data['result']:
        transactions = data['result']['transactions']
    else:
        print("Error: Unable to fetch transactions from the latest block.")
        print("Response:", data)
        return

    # Print details of the first 10 transactions
    for tx in transactions[:10]:
        print(f"Transaction Hash: {tx['hash']}")
        print(f"From: {tx['from']}")
        print(f"To: {tx['to']}")
        print(f"Value: {int(tx['value'], 16) / 10**18} Ether")
        print("-" * 20)

# Use your Etherscan API key here
api_key = 'F9RBH8ZAN1IGKVU3V23FT4VD54MDBK2CNN'
get_latest_transactions(api_key)
```

Demo (cont'd)

```
Requirement already satisfied: requests in c:\users\fanzh\anaconda3\lib\site-packages (2.31.0)
Requirement already satisfied: charset-normalizer<4,>=2 in c:\users\fanzh\anaconda3\lib\site-packages (from requests) (2.0.4)
Requirement already satisfied: idna<4,>=2.5 in c:\users\fanzh\anaconda3\lib\site-packages (from requests) (3.4)
Requirement already satisfied: urllib3<3,>=1.21.1 in c:\users\fanzh\anaconda3\lib\site-packages (from requests) (1.26.16)
Requirement already satisfied: certifi>=2017.4.17 in c:\users\fanzh\anaconda3\lib\site-packages (from requests) (2023.7.22)
Transaction Hash: 0x5fec738e1bc00808427240051cc02970ce7e27c57940ce49b60ed8c7c1186cc6
From: 0x5cc6b8a6fff8a2dc842c762f2fa8d8746934283d
To: 0x5cc6b8a6fff8a2dc842c762f2fa8d8746934283d
Value: 0.03562242195936925 Ether
------------------
Transaction Hash: 0x4227371fe1d78bff36d1c114716c54050319618b27dd95b5d03a4d05396d1fbc
From: 0xfcb0279b4cb7aae200cc1baa78042fed4e7e8ec7
To: 0xf439465c59c33c6f960639a64bb30e6d977f3840
Value: 0.009252910513411065 Ether
------------------
Transaction Hash: 0xaadd6959587552009 4af3d631078f1eed5e419a3ca35ba23ed613dcc0968373c
From: 0x4b8e718e9cd89e6de322b735b60164aabc51e2ad
To: 0xfa86ba49a7a17065a6e853e6b5e935c95b8ae114
Value: 0.147913762267643 Ether
```

Appendix

API

- API stands for **Application Programming Interface**.