Solana Health Informatics (SolHI)

Background of the Project

Arweave (General Understandings)

- Blockchain based storage platform designed to provide permanent, decentralized storage for web content and applications.
- Data and Storage Permanence: Capable of storing data (content, files or applications) in decentralized manner permanently. *Solana can be used to build applications that interact with storing data with Arweave.
- Cross-Chain Communication: Smart Contracts and Applications with Solana can be created by developers using Arweave interactions.
- Decentralised Applications (dApps): dApp can be build by leveraging the benefits from both platforms. Solana as the transaction processor and Arweave as the immutable data and content storing agent.

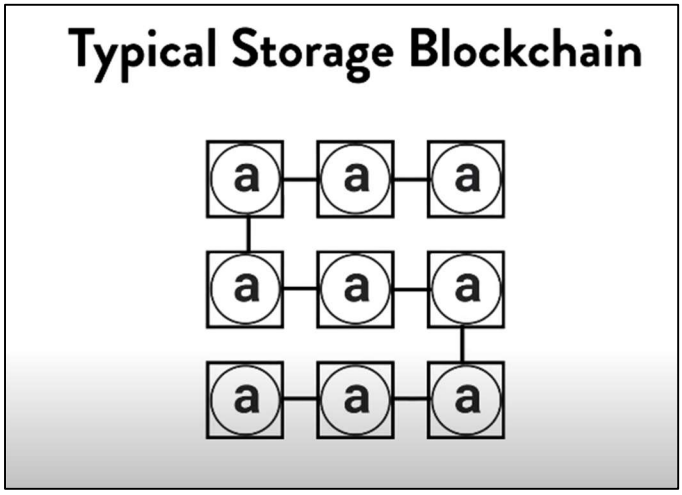

Figure 1 Typical Blockchain Storage

Typical Bank Transfer exposes the individual to the risks of technical issues, account hacking, leak personal details, a limited daily transaction and additional charges (tax).

With the introduction of blockchain technology, cryptocurrencies, which are forms of virtual currency can be transferred via this functionality. Blockchain prevents counterfeit currency transactions (money notes), does not require centralized authorities (banker/broker) and it is highly protected by strong and complex encryption algorithms.

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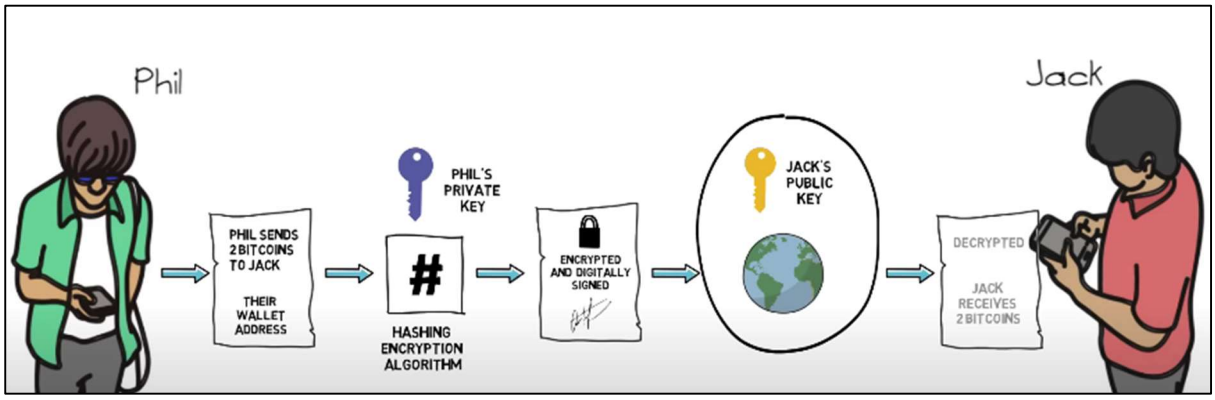
All the transactional details and user details (remaining sum of currencies after action) are linked in a block by taking the reference of the previous details of the block (updating the block data). This is also known as a ledger, a chain of transactional references in the blocks.

Hacker proof (resistant to alterations) due to each user that is taking part in the transaction having a copy of the ledger. The data within the blocks are encrypted by complex algorithms.

The functionality of the blockchain network is focused on two keys, public key (address known in public within the network) and private key (unique address only the user knows).



A private key from a sending user is used to hash encryption algorithms and encrypt and digitally sign the transaction as evidence to the receiving user. The public key of the sending user is then sent on a worldwide scale so that only the receiving user can decrypt it by using the private key of the receiving user.

Solana uses SHA-256 Hashing Algorithm (Same as bitcoin). SHA-256 is a set of proprietary cryptographic functions that output a 256-bit value.

*Hashing is the process of transforming any given key or a string of character into another value.

Transactions are validated by miners by solving complex mathematical problems and adding the block to the blockchain (Proof of work). Adding a block to the blockchain is called mining.

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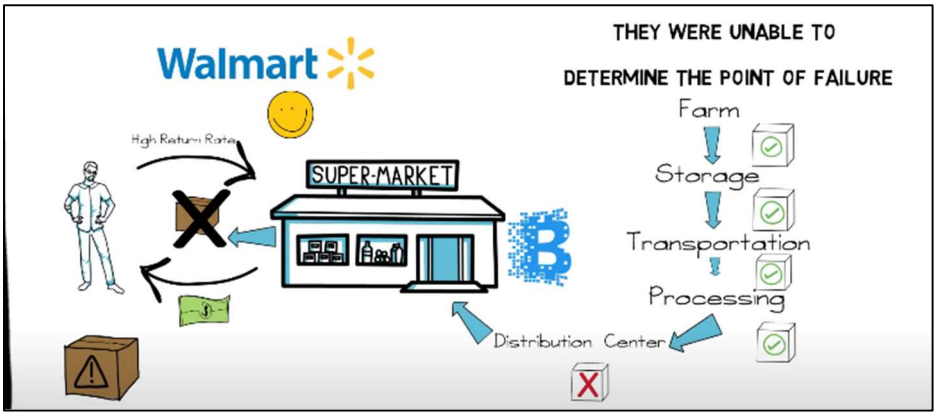

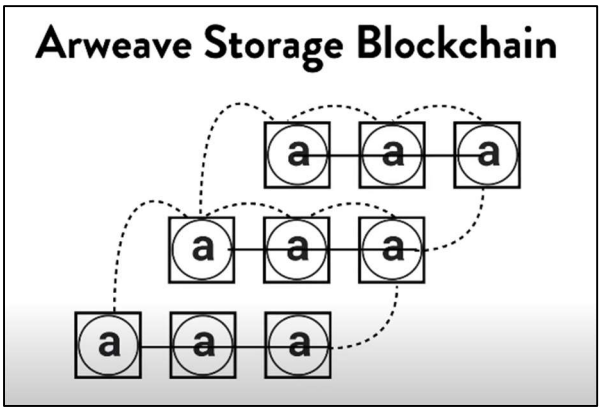

Blockweave is a specific data storage protocol developed for the Arweave cryptocurrency token (AR -8.52%). Blockweave has a specific consensus mechanism called "proof-of-access" that determines what data can be replicated and by whom. Blockweave miners must be able to recall specific blocks in the Blockweave history to interact with it.

Unlike a traditional blockchain, where each entry in the ledger is linked to the one before it, Blockweave links to both the entry before it and a randomly selected previous block in the system, "weaving" the data together. This is meant to incentivize miners to store more data locally and for much longer, ensuring a long storage life for users as well.

Revenue Stream (Arweave)

- Arweave is unique in its revenue model compared to many other blockchain platforms. It operates on a pay-once storage model, where users pay a one-time fee to store data permanently on the Arweave network.
- The cost of storing data on Arweave is calculated based on the size of the data and the current market rate of the AR token, Arweave's native cryptocurrency.

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- Additionally, Arweave may generate revenue through partnerships, consulting services, and other value-added services related to its decentralized data storage solution.

Revenue Stream (Solana)

- Generates revenue primarily through transaction fees and hosting fees.
- Transaction fees are generated when users execute transactions on the Solana network. These fees are typically paid in SOL, the native cryptocurrency of the Solana blockchain.
- Solana also offers hosting services for decentralized applications (dApps) and smart contracts. Developers who build and deploy their applications on the Solana blockchain may pay hosting fees to use the platform's infrastructure.

Solana (General Understandings)

- A high-performance blockchain platform designed to provide fast, secure and scalable infrastructure for decentralised apps (dApps) and cryptocurrencies.
- Built with combinations of technologies that enable low latency and high throughput.

1) Utilize consensus mechanism (Proof of History) which helps to order and timestamp transactions efficiently.
2) Tower BFT (Byzantine Fault Tolerance) for consensus that enhances the network’s scalability and security.

- Solana aims to support thousands of transactions per second (TPS) which allows a key feature which is scalability. That is making this technology suitable for high-demand applications such as decentralised finance (DeFi) and non- fungible token (NFT).
- With such high TPS, Solana attracts vibrant ecosystems of developers, projects and decentralised applications. Its ecosystem includes projects ranging from DeFi protocols and NFT marketplaces for gaming platforms and social media networks.
- SOL token is a native cryptocurrency used for paying transaction fees, staking (secure the network and earn rewards), and interacting with decentralized applications built on Solana blockchain.

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- Solana forged many partnerships and integrations with various projects and platforms in the blockchain space. This enhances the Solana ecosystem, expand its utility, and foster within the decentralized finance (DeFi) and Web3 domains.

Aim and Problem Solving of SolHI

There are several aims and goals pertaining to this project. One of the most crucial aims is enhancing the privacy and security of the patients around the globe. The decentralized storage system which is the core of this project is used to improve the patient's privacy by encrypting health data and information by distributing it across a network of nodes. This reduces the risks usually faced by centralised data such as breaching by hackers and unauthorised access. Decentralised data has no single point of failure.

Patients who are registered with SolHI have full control and data ownership of their personal details and medical records. Patients have a greater control of their health data in a decentralised system. With this feature, the patient can grant or revoke access to their data based on their will. They have a total transparent view of who accesses the data and the purpose as well. This empowers patients to make informed decisions about sharing their sensitive information.

A decentralised system provided by SolHI provides an easy data portability and interoperability of the patient's details. This system facilitates the interpretability between different healthcare providers and systems. This function allows a seamless sharing of patient data while maintaining data integrity and security. Patient can easily access their health records across various healthcare providers and platforms.

Next, the patient's records that are saved in the system are immutable (unchangeable). Blockchain-based decentralized storage ensures the immutability and tamper-proof nature of the patient's health record. Any alterations are denied, providing a reliable audit trail of patient health information.

This system also provides a faster access to the patient enabling a faster treatment and care given to the patient. Decentralized healthcare data storage provided in SolHI enables healthcare providers to access patient records more efficiently, leading the patient to undergo diagnosis, treatment and decision-making by the doctor faster and way much more efficient. This is very crucial during emergency situations where quick access to the chronically ill patient's accurate health information can save lives.

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SolHI with further development could collaborate with researching firms related to health such as cancer and Alzheimer's research to fuel new medical discovery. By securely sharing anonymized heath data with researchers and innovators, discovery of new and advance cure for incurable disease can turn into reality which can save many lives. Patient within the data storage of SolHI can contribute to scientific advancement while maintaining control over their privacy and data usage.

Lastly, streamlining data management through a decentralised storage can lead to cost savings for healthcare providers by reducing administrative overhead cost, data duplication and reconciliation efforts.

Project (SolHI) Front End Development

The front-end development of the project is the built of the application that allows the users to access their personal health information efficiently and allow the attended doctor to the specific patient to access the patient's medical history easily with the user's permission.

At the starting phase of the application, there is a login feature that requires the user's email address to log on to their SolHI account that stores their medical data. After the login phase, the application page of the user's account will be displayed and shown to the user. A QR code is presented on that user's page as a code of permission to the attended hospital or clinic that needed to inspect the user's medical background.

Another feature added to the application is that the user can edit their personal profile with their personal profile pictures and descriptions about themselves in order for the attended doctor to know the user's situation better before performing a surgery or prescribing medicine.

The application can also change the colour theme between dark mode and light mode based on the user's preference.