STORAGE DEVELOPER CONFERENCE
SDC 21
BY Developers FOR Developers
Virtual Conference
September 28-29, 2021
A SNIA Event

Analysis of Blockchain Storage

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Agenda

- About me
- Centralized & Decentralized Storage
- Blockchain - Birds eye view
- Off-chain & On-chain solutions
- Storj, Sia, IPFS, ILCoin
- Takeaways

About me

- Senior Software Engineer, Netflix
- Keynote speaker: Distributed systems, Cloud, Blockchain
- Senior Software Engineer, Box
- Datrium, Samsung, Cadence, Tensilica

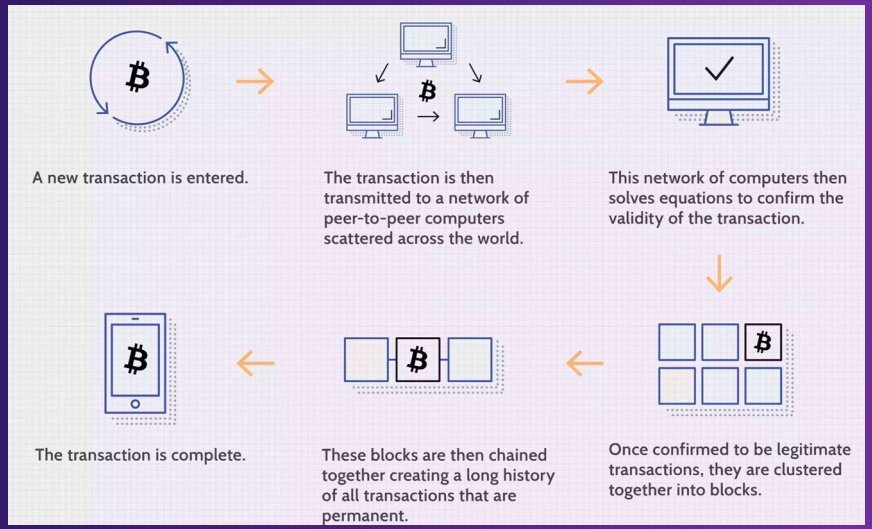
NETFLIX

Centralized & Decentralized Storage

- Centralized Storage
  - Google Drive, Dropbox, S3: Control with the enterprise
  - Data is not secure
  - Need to trust the enterprise
- Decentralized Storage
  - Secure, encrypted, scalable
  - Cost effective - marketplace for renters and buyers
  - Can use Blockchain to track storage transactions

Blockchain - Birds eye view

- Distributed ledger
- Trustless, scalable, performant, secure
- Each block: transactions, hash of the previous block
- Ideal for storing transactional data
- 3 pillars: security, scalability, decentralization
- Scalability issues: Block size = 1MB, New block time = 10 mins

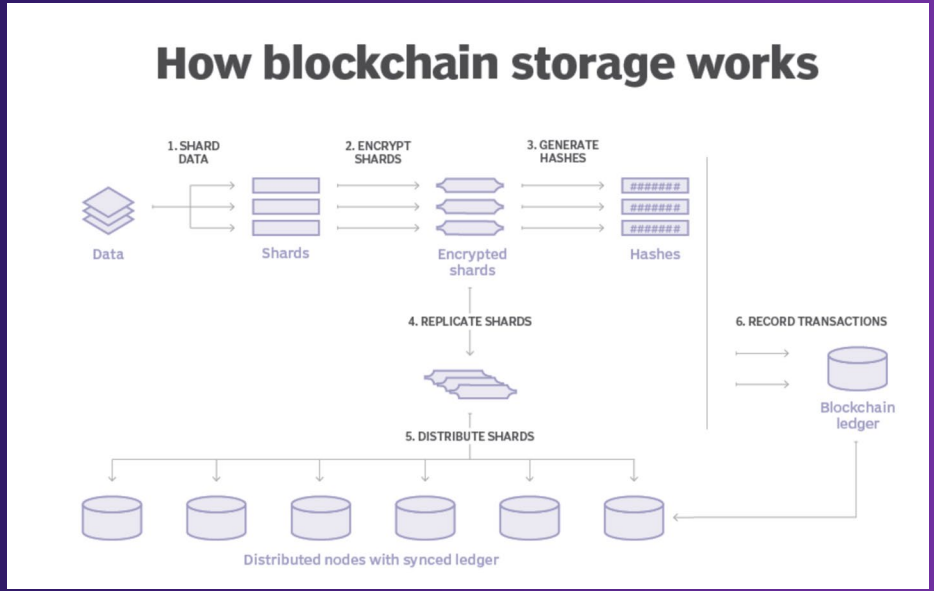


On-chain & Off-chain storage solutions

- Each participant stores entire chain of transactions
- If files on blockchain, may exhaust the storage on each node
- Even 5MB can bring down the network
- On-chain => storing data on blockchain
- Off-chain => storage data outside blockchain, and storing metadata on blockchain
- Today, most solutions are off-chain

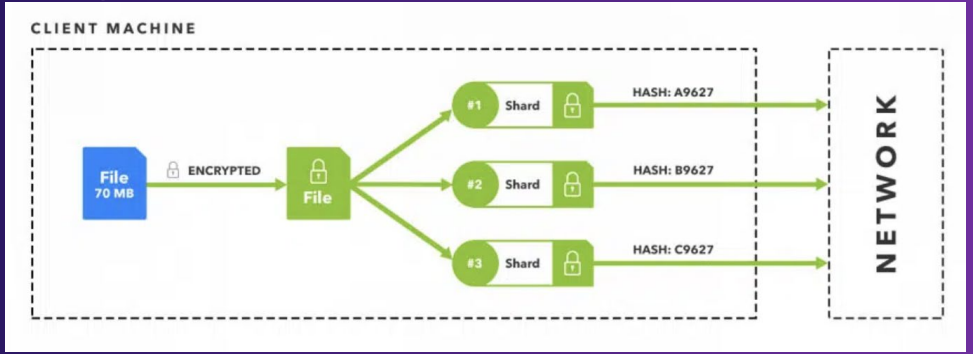
Design

- General design principle:
  - Split a file into shards
  - Encrypt shards
  - Upload shards to cluster of machines
  - Update the location of the shard on the chain
  - Client has the key to decrypt information.



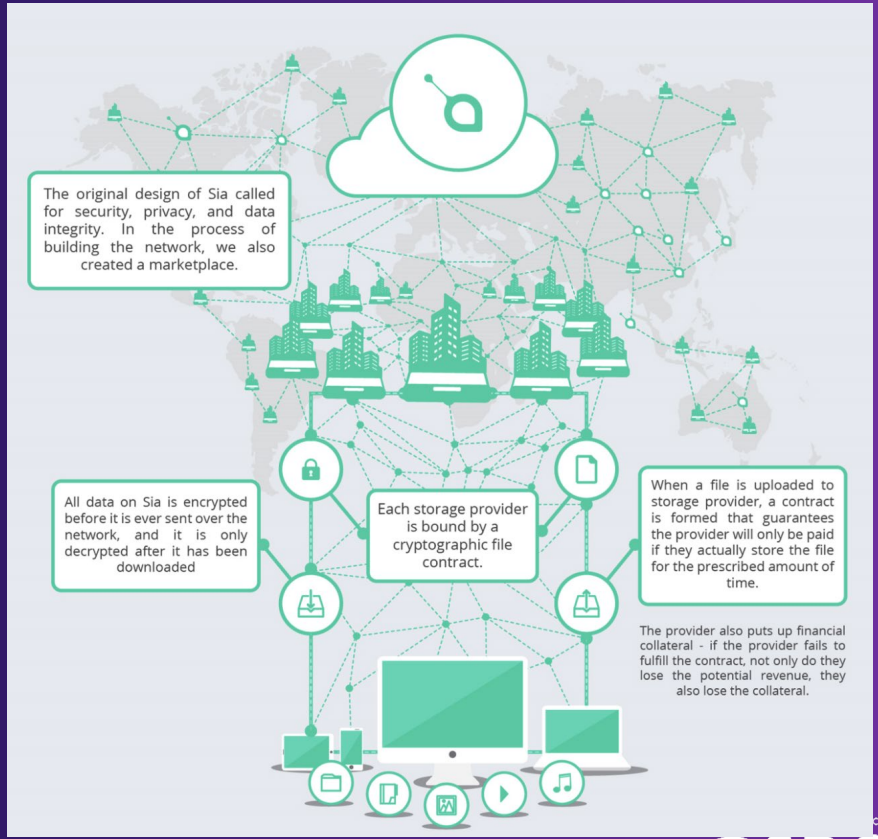
Storj

- One of the first projects to tackle storage on blockchain
- Stages in Storj Protocol
  - Client side encryption
  - Data sharding
  - Distribution across network
  - Periodic verification
    - Farmers need to prove that they have the shards
    - Data owner sends a short challenge in the form of a hash to the farmer; farmer responds with Merkle proof



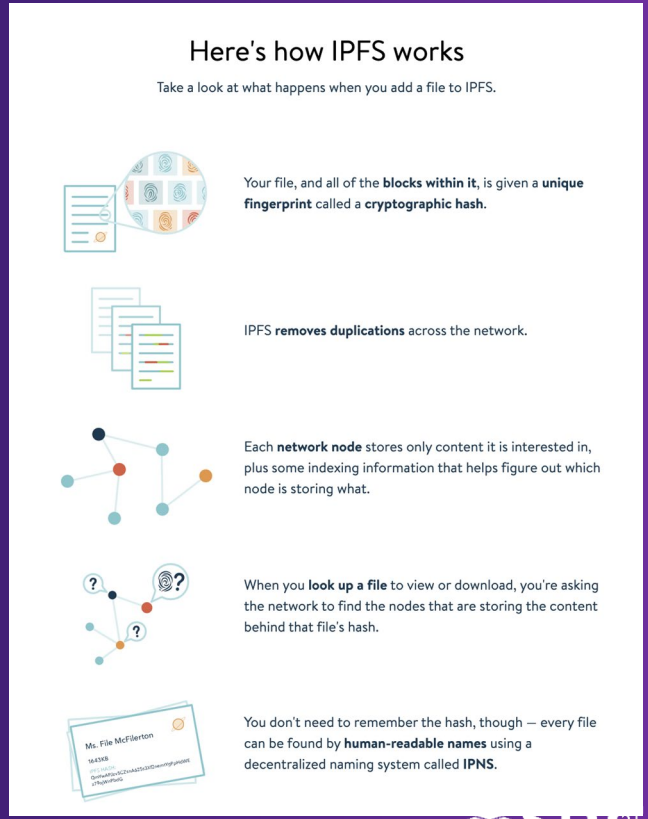
Sia

- Files are divided prior to upload
- Each file segment is encrypted
- Files are sent to hosts using smart contracts
- Renters and hosts pay with SiaCoin
- Contracts renew over time
- Hosts submit storage proofs

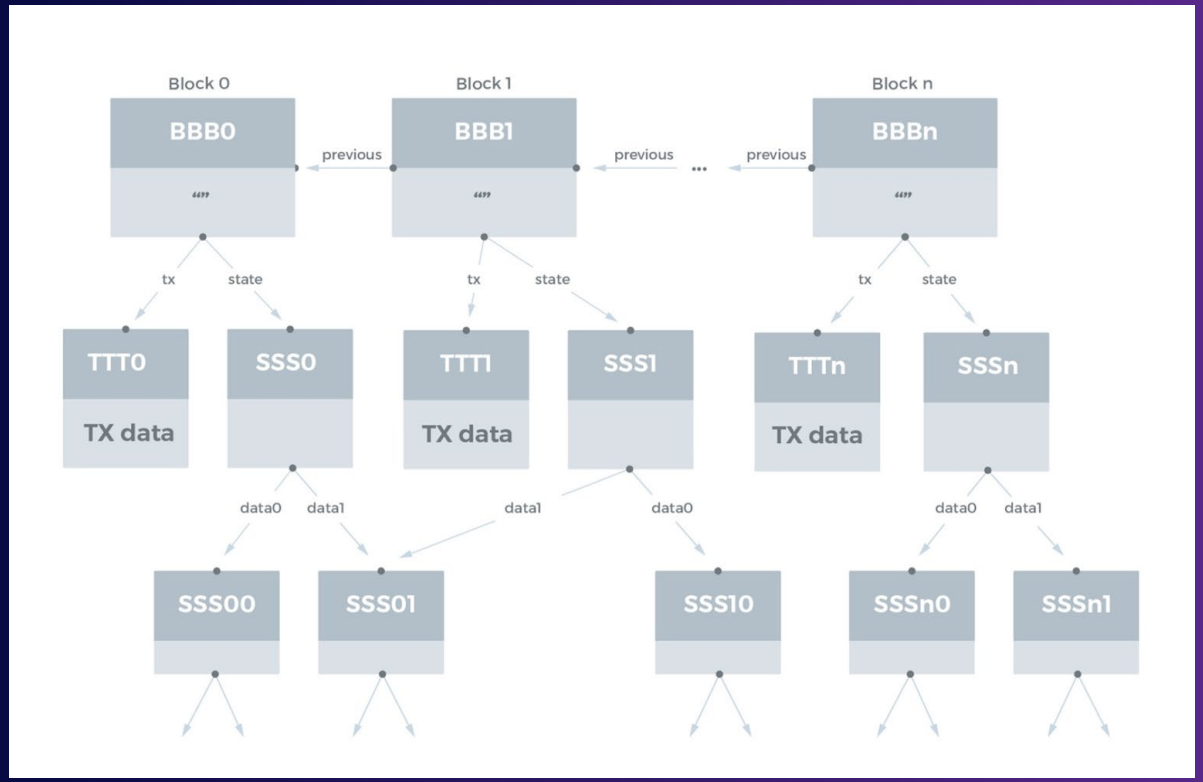


IPFS

- Distributed system for storing & accessing files, websites, applications & data
- Content addressable system
- HTTP v/s IPFS to find and retrieve a file
- IPFS object: Data, [] Links
- Modeling blockchain on IPFS: Storing hashes on the chain.

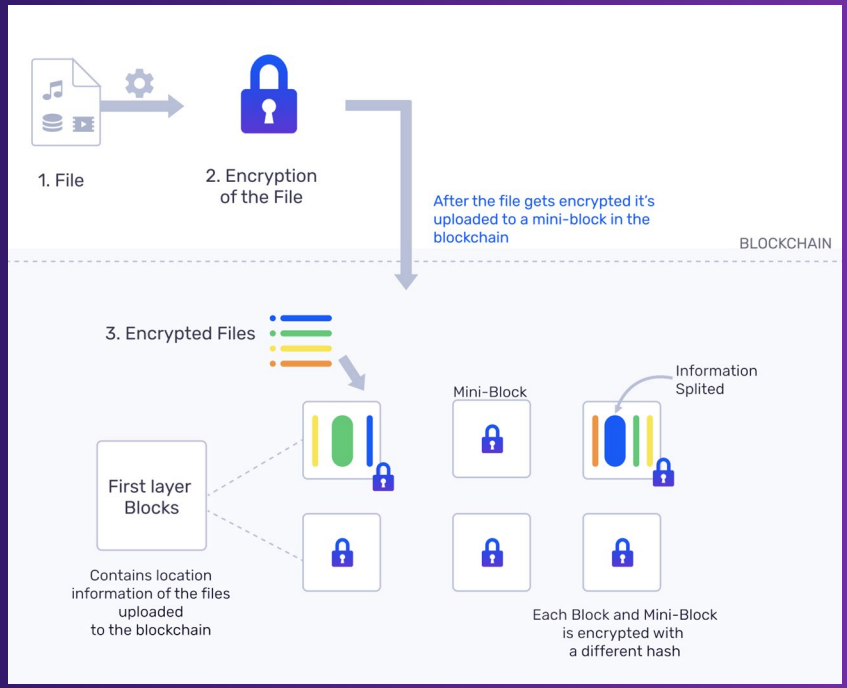


IPFS - Store hashes on chain.

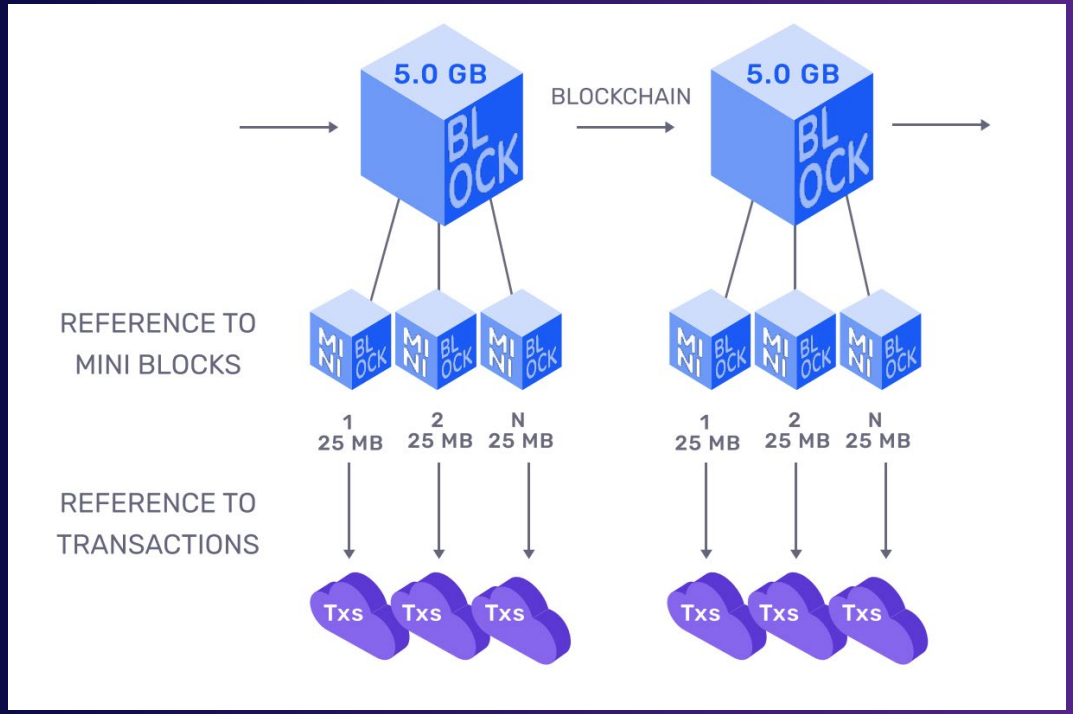


ILCoin

- Goal: Create a viable on-chain data storage solution
- Relies on a layer on indirection - essence of RIFT protocol
- Can theoretically have block sizes of 5GB
- Solves the problem of scalability



RIFT protocol



Results & Takeaways

- Using blockchain, cloud storage can become truly decentralized
- Blockchain alternatives can reduce the price of storing data on cloud
- Opens up a marketplace for providers of hard drive space, and consumers.
- Still nascent technology, needs more users to generate significant dent in the market
- Newer alternatives such as ILCOIN promise on-chain solutions that can truly offer the benefits of secure decentralized storage

