SNIA NSF | NETWORKING STORAGE

Why Web 3.0 is Important to Enterprise Storage

Live Webinar

June 1, 2023

11:00 am PT / 2:00 pm ET

Today's Presenters

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Shawn Flynn
Host
The Silicon Valley Podcast

SNIA - By the Numbers

Industry Leading Organizations

180

Active Contributing Members

2,500

IT End Users & Storage Pros Worldwide

50,000

Technologies We Cover

Ethernet, Fibre Channel, InfiniBand®

iSCSI, NVMe-oF™, NFS, SMB

Virtualized, HCI, Software-defined Storage

Storage Protocols (block, file, object)

Securing Data

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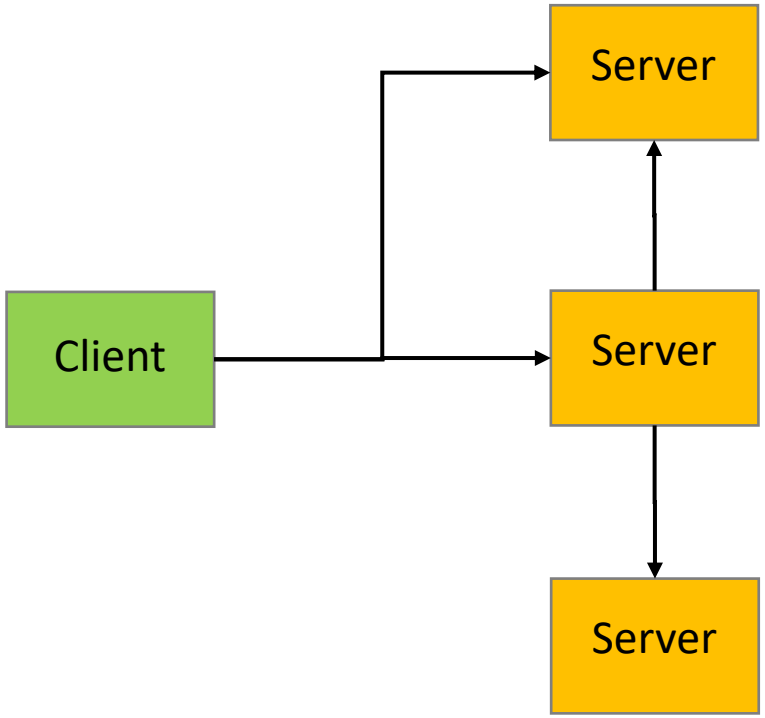
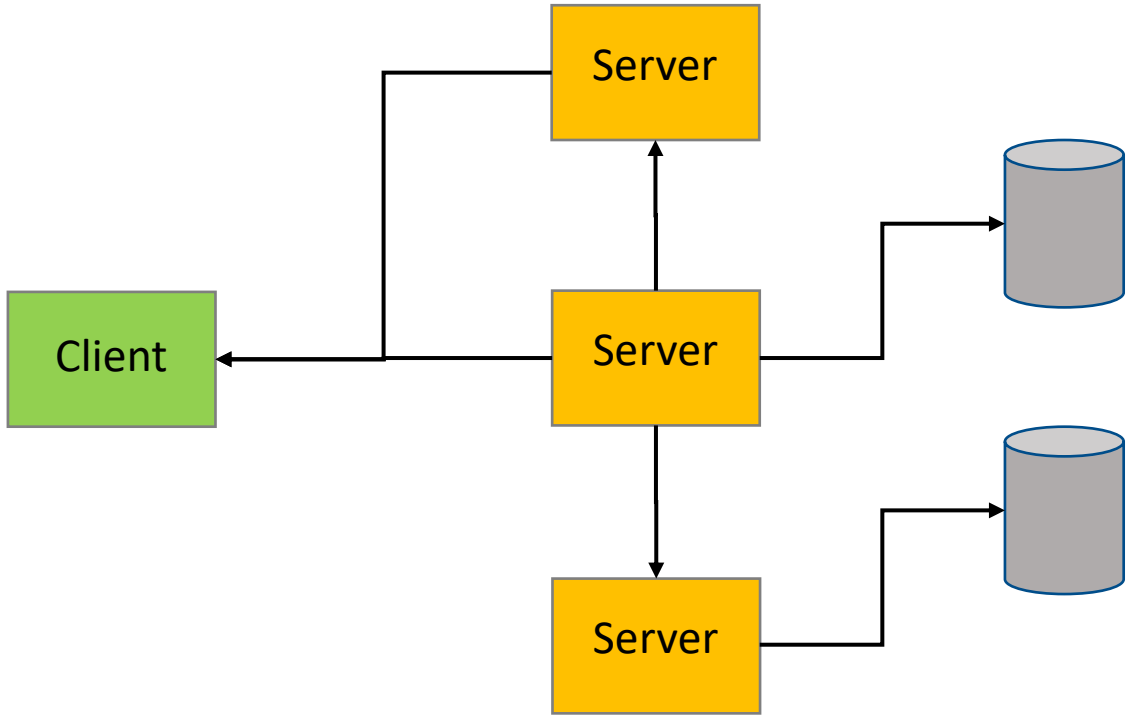
Today's Agenda

- Centralised vs. decentralised services
- Storage in Web 3.0 (but not only there)
- Panel discussion

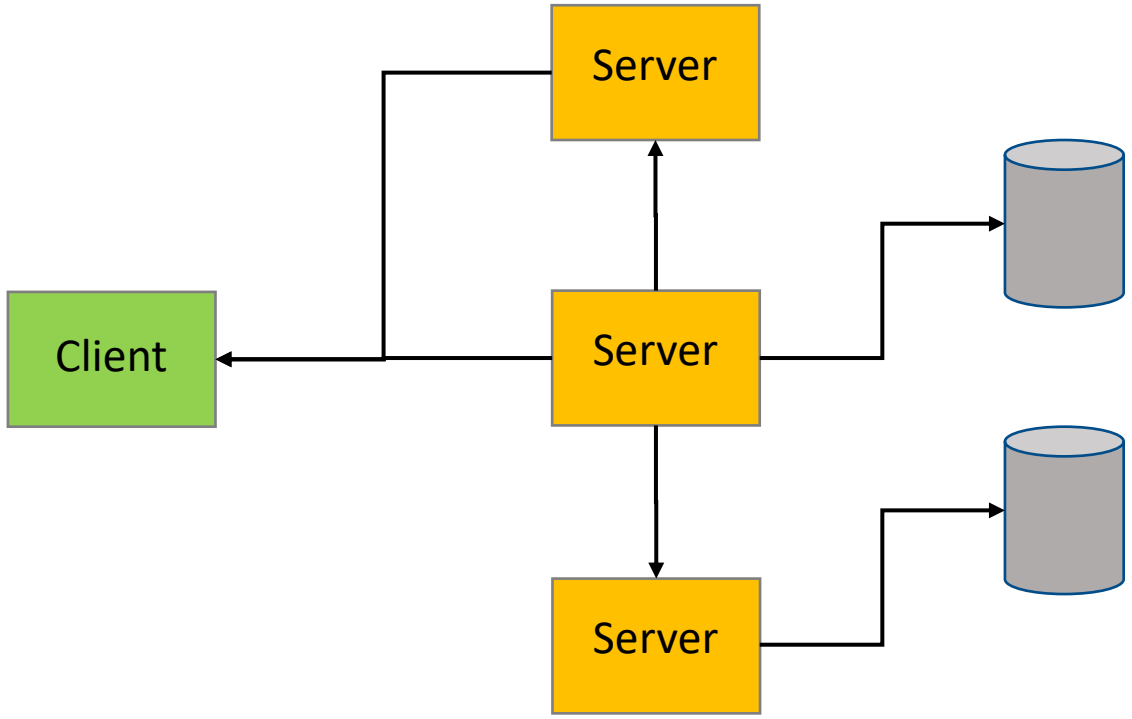
Centralised Services



Centralised Services

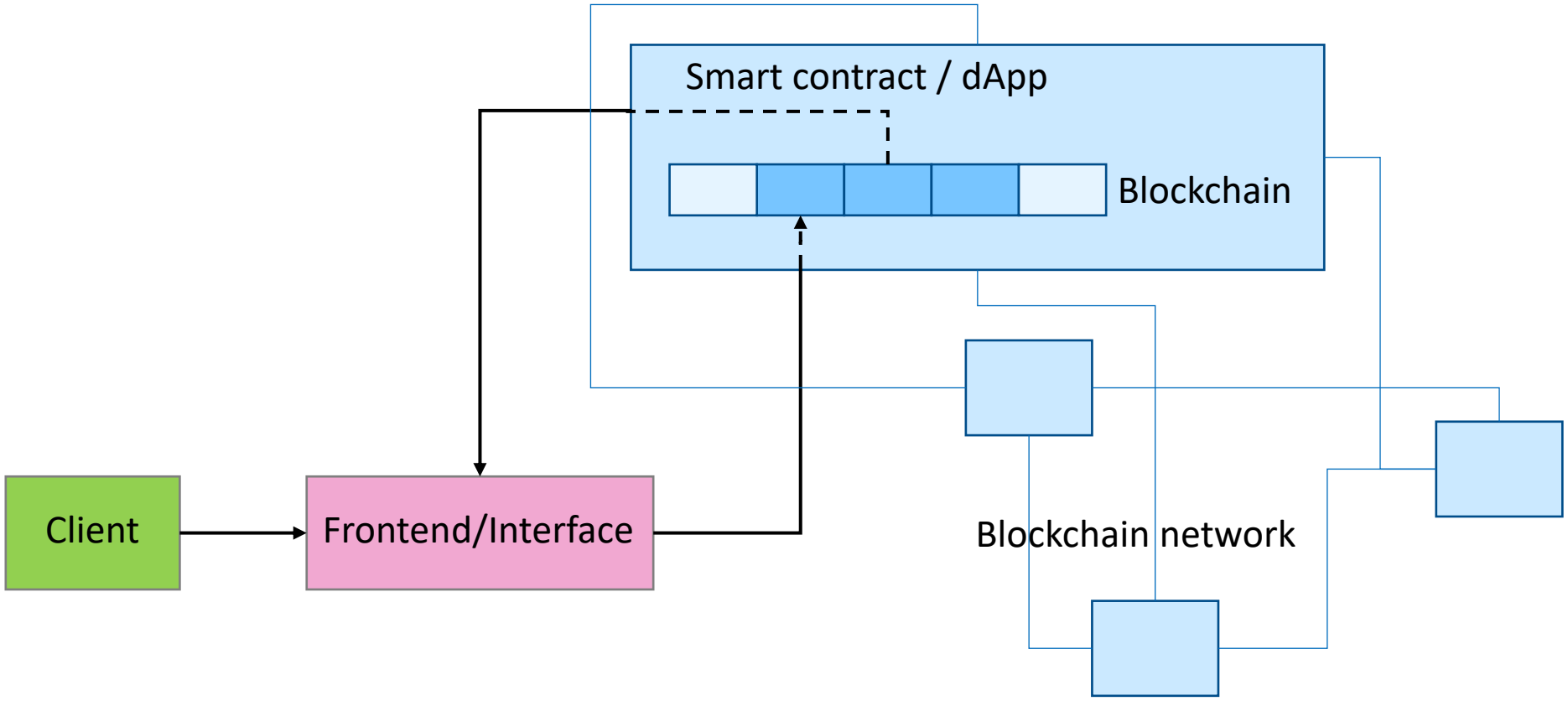


Centralised Services

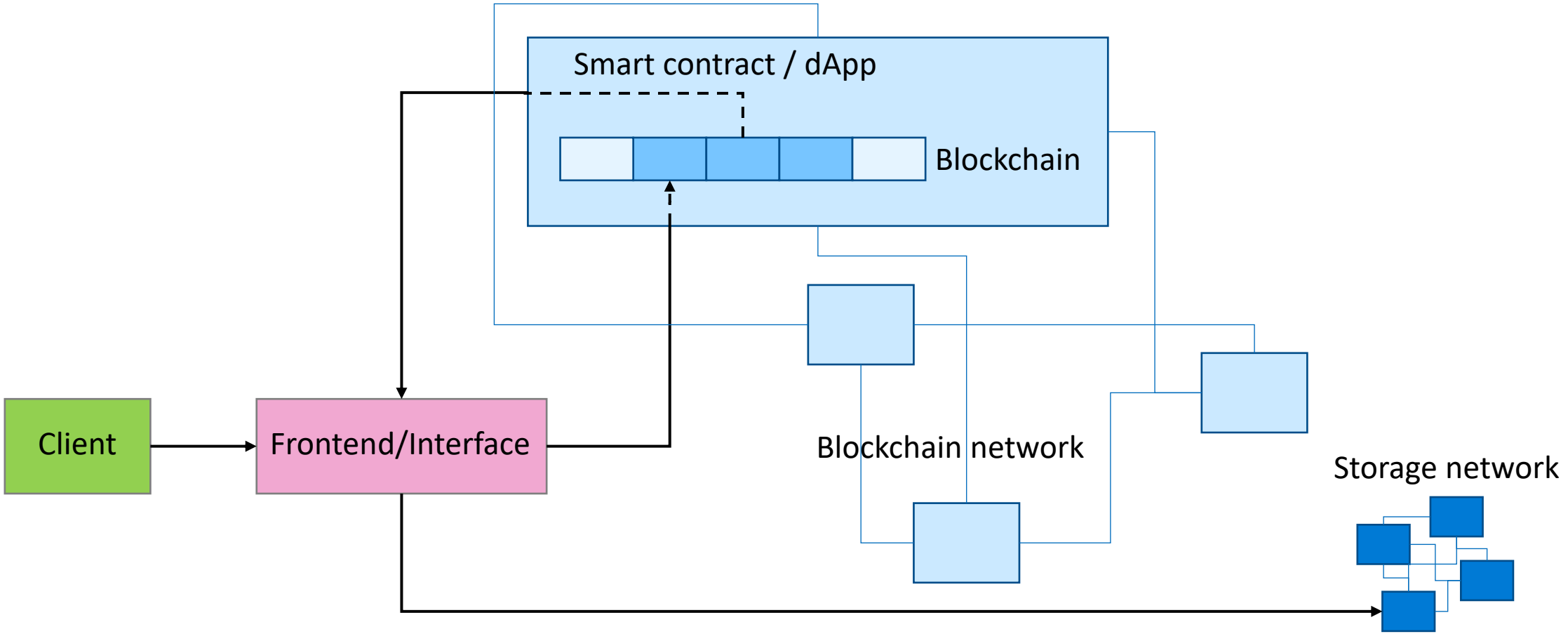


- Server side is controlled by one vendor
- It needs to be trusted
- It can fail (infrastructure, attack)

Decentralised Services



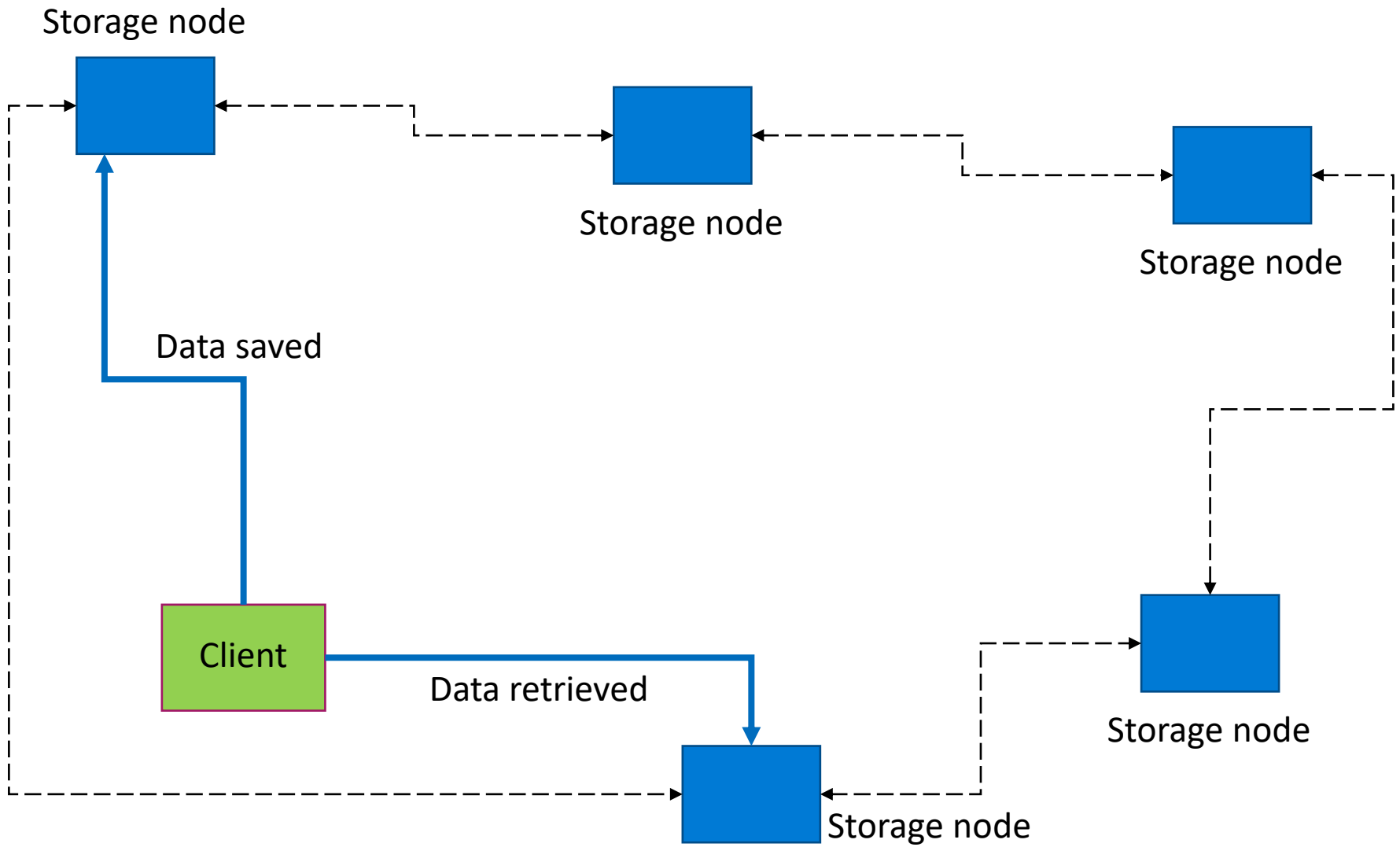
Decentralised Services



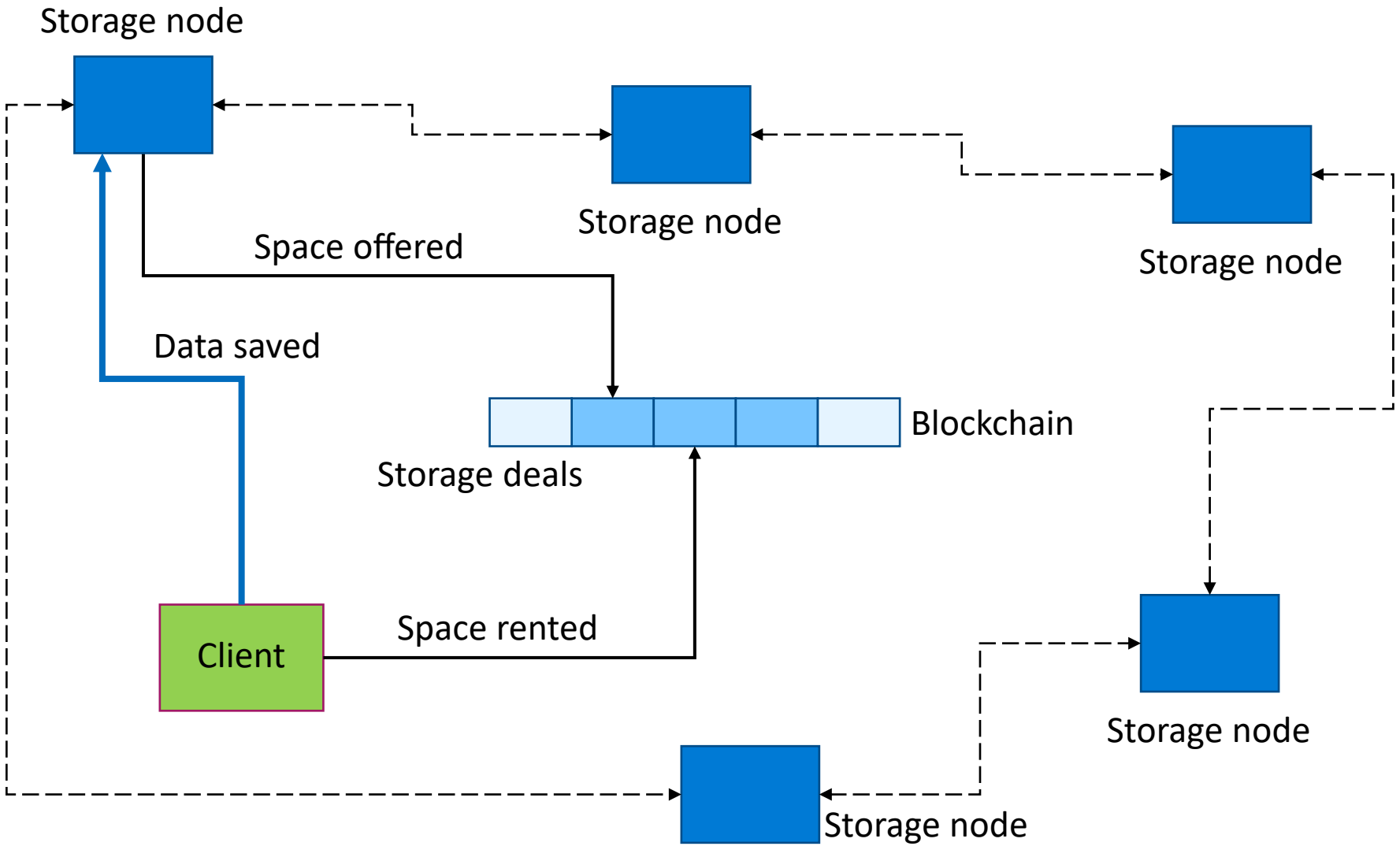
Decentralised Services – Key differences

- No vendor control over the application (“code is law”).
- Highly decentralised network of nodes means high resiliency.
- Application state is immutably recorded on the blockchain.
- No need to trust anyone.
- Users (“consumers” and “producers”) can interact with each other directly – there is no middleman.
- No need to create an account in order to use services/applications.

P2P Storage Network



Blockchain Storage Network

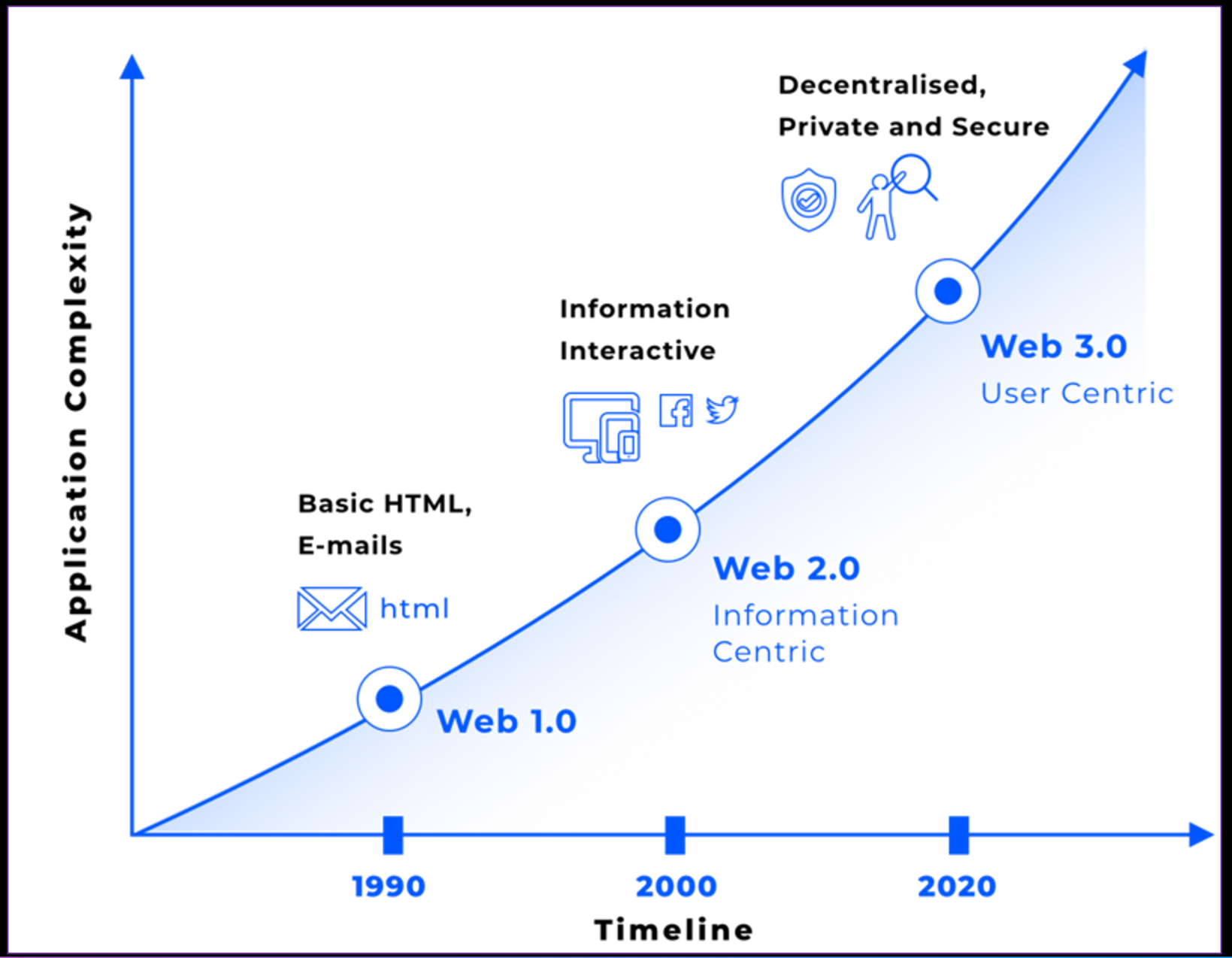


Blockchain Storage Network – Key features

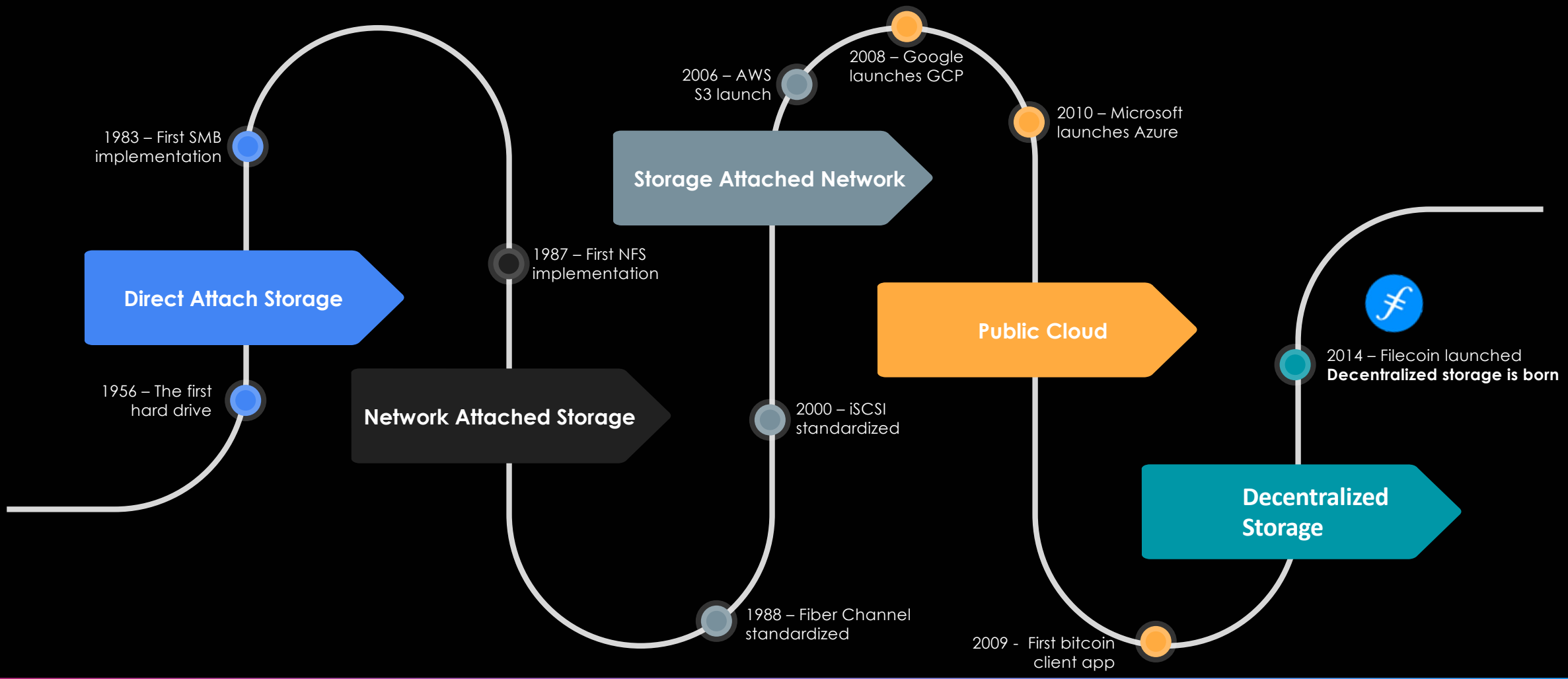
- No single vendor (or group of vendors) can control the storage.
- No need to trust anyone.
- Anyone can store in the network (no account needed).
- Anyone can offer space (to run a business or, for instance, to offset their costs).

Web3

1. No centralized infra
2. Community built
3. User-Controlled Data
4. “Code is law”



The Storage Landscape is Evolving With It



Web3 Storage and Compute must become web-scale for Web3 to cross the chasm

Web 2.0

read-write
interactive

Web 3.0

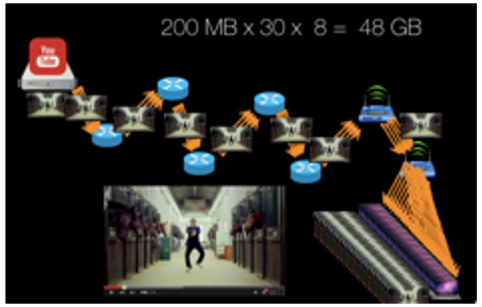
read-write-trust
verifiable

First - Fix The Data Accessibility Issues

emerging networks

Opensource stack that fixes the web challenges with data accessibility

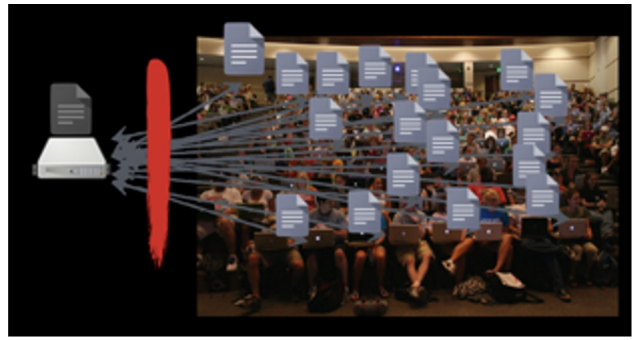
censorship



huge inefficiency

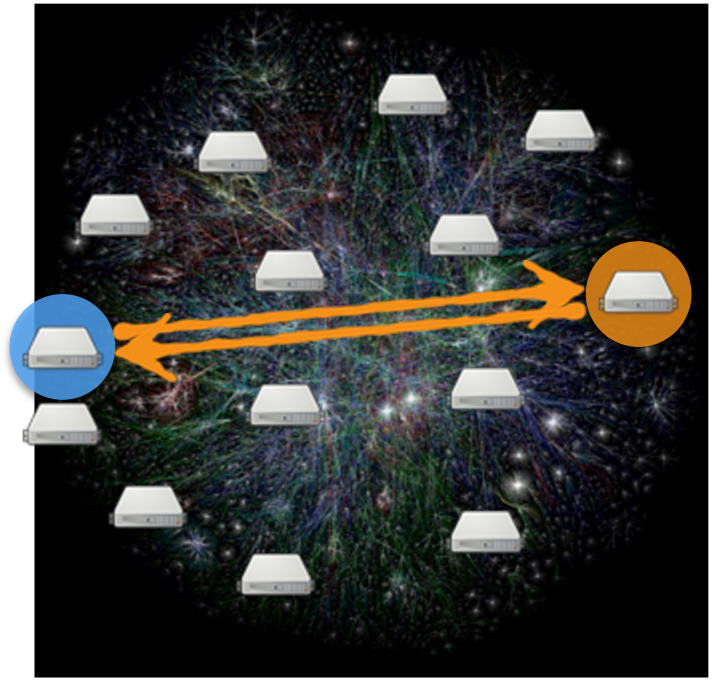
bad security model

links break



no offline use

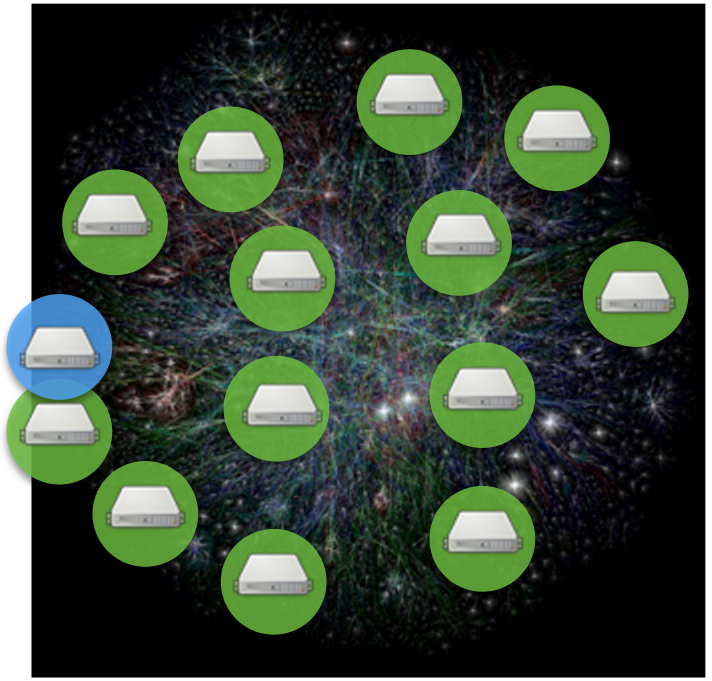
domain name http://example.com/foo/bar/baz.png



location address http://162.243.139.61/foo/bar/baz.png

domain name /dns/example.com foo/bar/baz.png

GLOBAL UNIQUE HASH IDENTIFIER (CID)

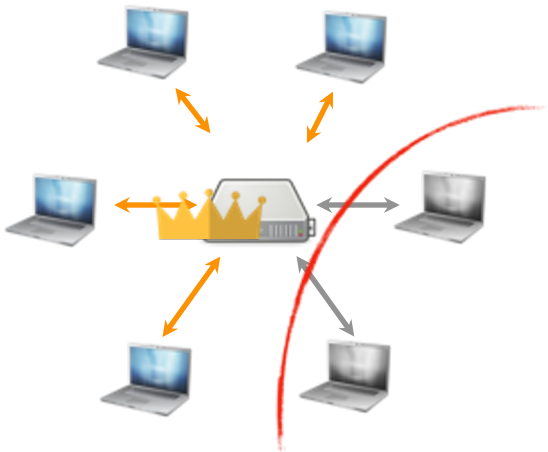


content address /ipfs QmW98pJrc6FZ6/foo/bar/baz.png

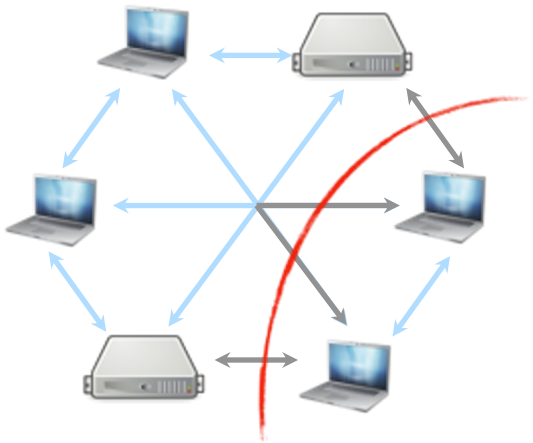
THE Data & Content Platform of Web3

IPFS, an opensource stack, makes the web work peer-to-peer

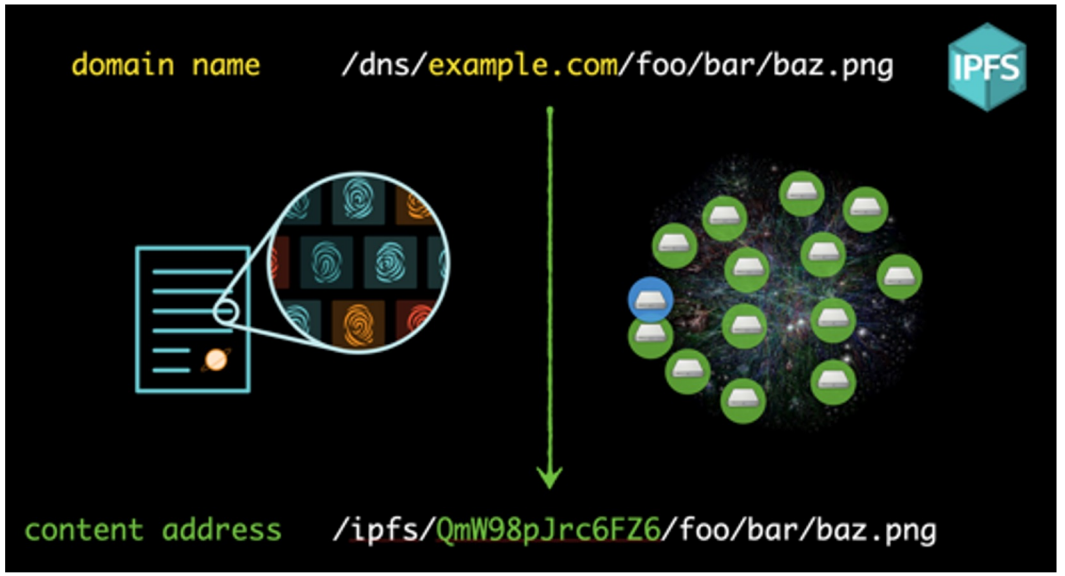
HTTP



IPFS



Content Addressing with CIDs (hashes)



Second – Enable Communities To Collaborate

Market Protocols are

programmable,

value-creating networks,

with economic structures & incentives

→ **Decentralized Storage Network**

CRYPTO
is not short for …

CRYPTOCURRENCY

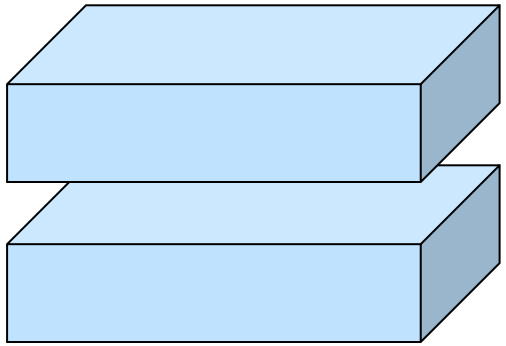
But instead…

CRYPTOGRAPHY

Which has 2 critical features…

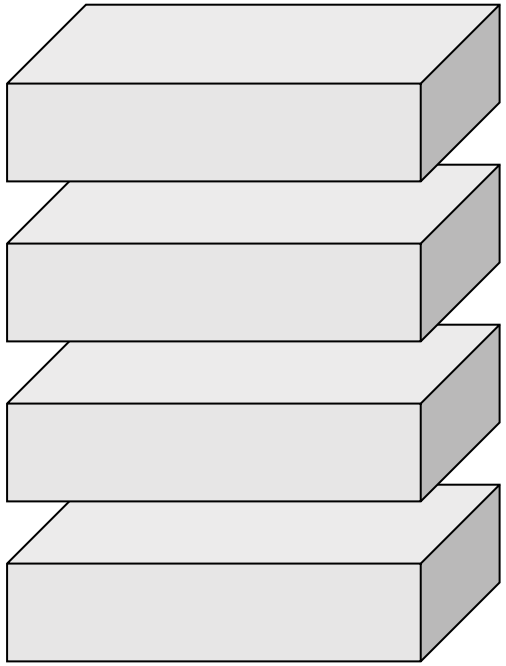
CRYPTOGRAPHY

1. Authenticate
2. Protect



PAYMENTS APPLICATIONS

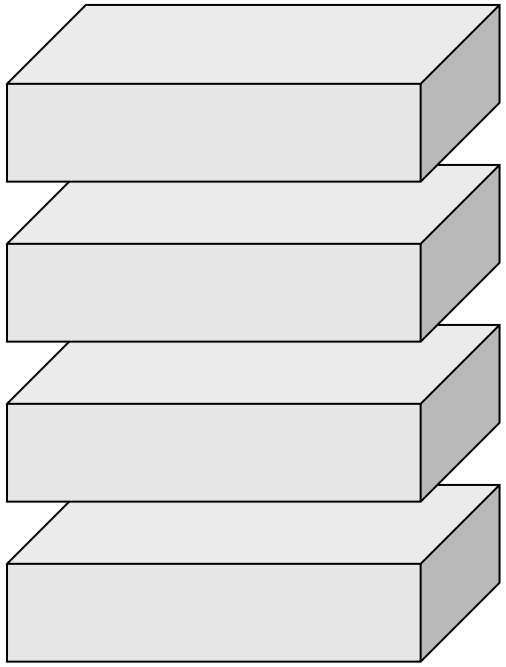
Crypto Asset



STORAGE

Utility token

Benefits of Decentralized Storage Enabled by Blockchain

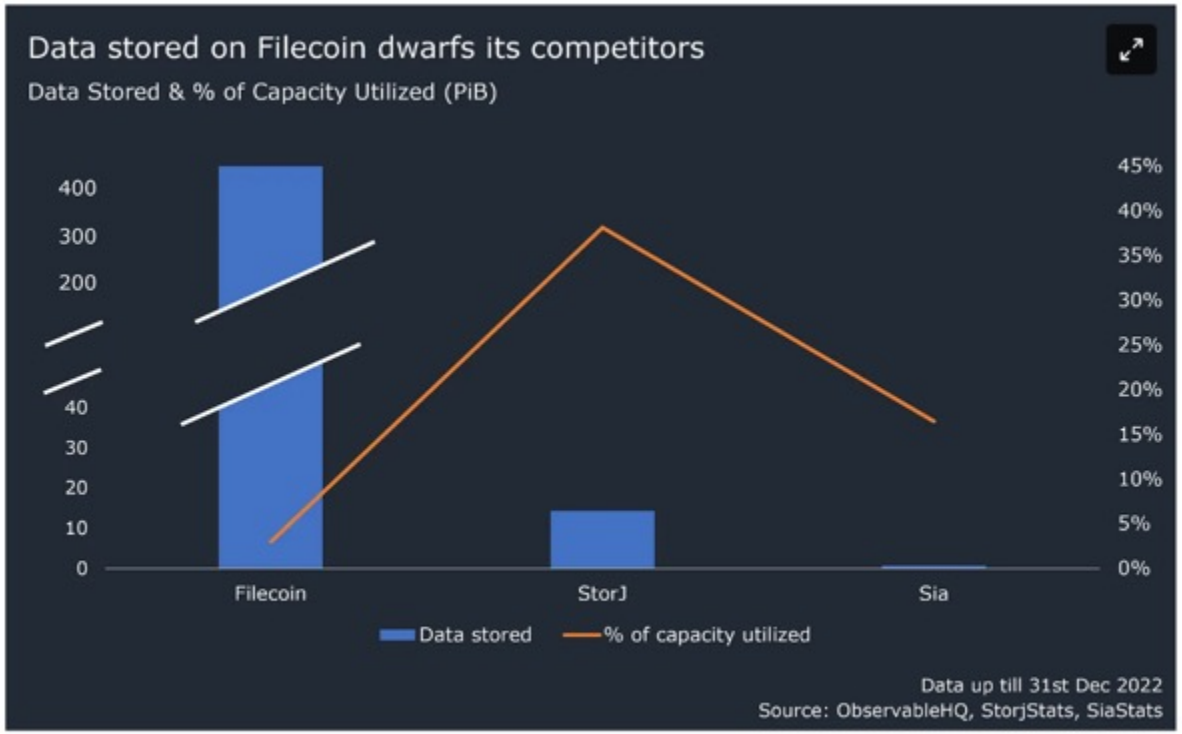


OPEN SOURCE
Anyone can join, innovate

- **COST OPTIMIZED**
  % of the cost of Public Cloud
- **AUTHENTIC**
  Proof of Daily integrity verification / auditing
- **INTEROPERABLE**
  Portable from day one across providers
- **IMMUTABLE**
  Data is stored and preserved immutable
- **PROVABLE STORAGE**
  Chain of custody
- **SMART CONTRACTS**
  Unique ways to lock in value (DATADAO)

Landscape of Decentralized Storage Networks

		Filecoin	Sia	Arweave	StorJ
INFO	Founding Date	2014	2014	2017	2014
	Value Proposition	Permissionless market for storage, retrieval and compute	Permissionless market for storage (retrieval arm has shut down)	Permanent storage	Storage (and retrieval) layer for decentralized internet
INFRA	Level of Decentralization	Fully	Fully	Fully	Partially
	Network	Independent L1	Independent L1	Independent L1	No, uses Ethereum for payment processing only
	Smart Contract Capabilities	Yes, via FVM	Yes, via File Contracts	Yes, via SmartWeave	
	Data Persistence	Contract-based + Cryptoeconomic system to incentivize good behaviour	Contract-based + Cryptoeconomic system to incentivize good behaviour	Data is stored on-chain + Endowment based	Contract-based
	Consensus Algorithm	Proof-of-Spacetime	Proof-of-Work	Proof-of-Access	Not Applicable
	Proof-of-Storage	Proof-of-Replication to prove successful storage Proof-of-Spacetime to prove continuous storage	Merkle Proofs	Yes, via SmartWeave	Merkle Proofs

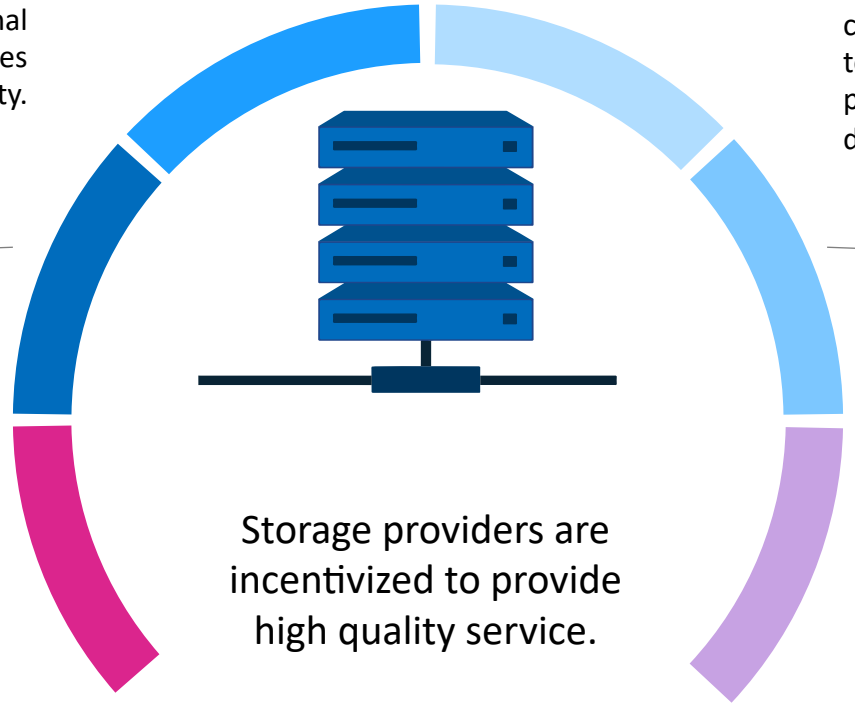


Note: Arweave is excluded due to lack of capacity data

https://blockcrunch.substack.com/p/why-2023-is-a-new-beginning-for-filecoin

		Filecoin	Sia	Arweave	Storj
FEATURES	Data-encryption	Provided by 3rd-party partners / storage providers	Default	Provided by 3rd-party partners / storage providers	Default
	S3 compatibility for seamless migration		Provided by 3rd-party partners / storage providers		
	Storage redundancy	Not natively, only through multiple storage deals	Yes, divided into dozens of overlapping "shards" & distributed to different hosts	Yes, blockweave mechanism encourages data to be replicated across storage providers	Yes, files are split into 80 or more overlapping pieces and distributed globally; only 29 pieces are actually needed to reconstitute the file
ECONOMICS	Open market for pricing	Yes	Yes	Yes	No, prices are fixed and determined by Storj
	Estimated fee for storing 100 TB of data for a year	- Free under Filecoin Plus deal - $234 USD under regular Filecoin deal	$720 USD	$245,000 USD for 200 years ~ $1,200 for 1 year	$4,800 USD
	Revenue stream of storage providers	- Fee for storage provision - Block rewards - Transaction tips	- Fee for storage provision	- Fee for storage provision - Block rewards	- Fee for storage provision
TRACTION	No. of storage providers	3,912	511	62	18,500
	Total storage capacity (PiB)	15,185	4.5	Not available	37.5
	Total data stored (PiB) / Network utilization (%)	457 / 3%	0.74 / 16%	0.12	14.3 / 38%

Filecoin, an Example Of Incentive Based Storage



Tuned QoS

Providers can optimize SLAs per region or sector. Public cloud leverages traditional SLAs which allow for failures and outages without penalty.

Reduces cost to users

Open market place where providers compete for your data. This allows users to negotiate very low storage rates. The protocol provides higher incentives for data storing providers.

Capacity Guarantees

Providers “pledge” space to the network for its exclusive use. This ensures the network always has the necessary stated capacity.

Reinforces Uptime

If providers cannot respond to requests in an appropriate time, they will lose revenue.

Provider diversity

Public cloud locks you into one vendor, allows you to leverage multiple providers or a single provider.

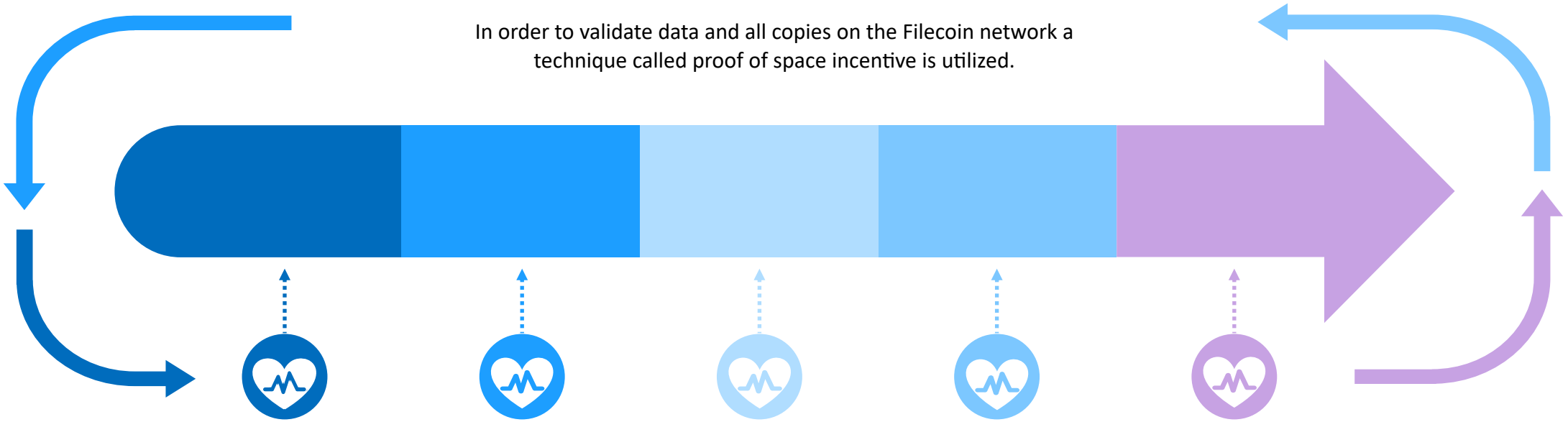
Reinforces data integrity

Providers that cannot meet the proof of space requirements are financially penalized.

Filecoin, How Data Integrity is Ensured

Proof of Space

In order to validate data and all copies on the Filecoin network a technique called proof of space incentive is utilized.



The Process

Chunks of a CAR file are randomly checked for cryptographic integrity to ensure the data is properly preserved. This process is executed on the network every 24 hours.

Providers are held accountable

If providers fail to verify the data, providers will be slashed and loose FIL tokens as a penalty.

The network code will automatically slash the providers (“Code is Law”)

The Steps to Onboarding Data

Client Begins Negotiation

Client negotiates deal parameters with providers.

Client Provides Data

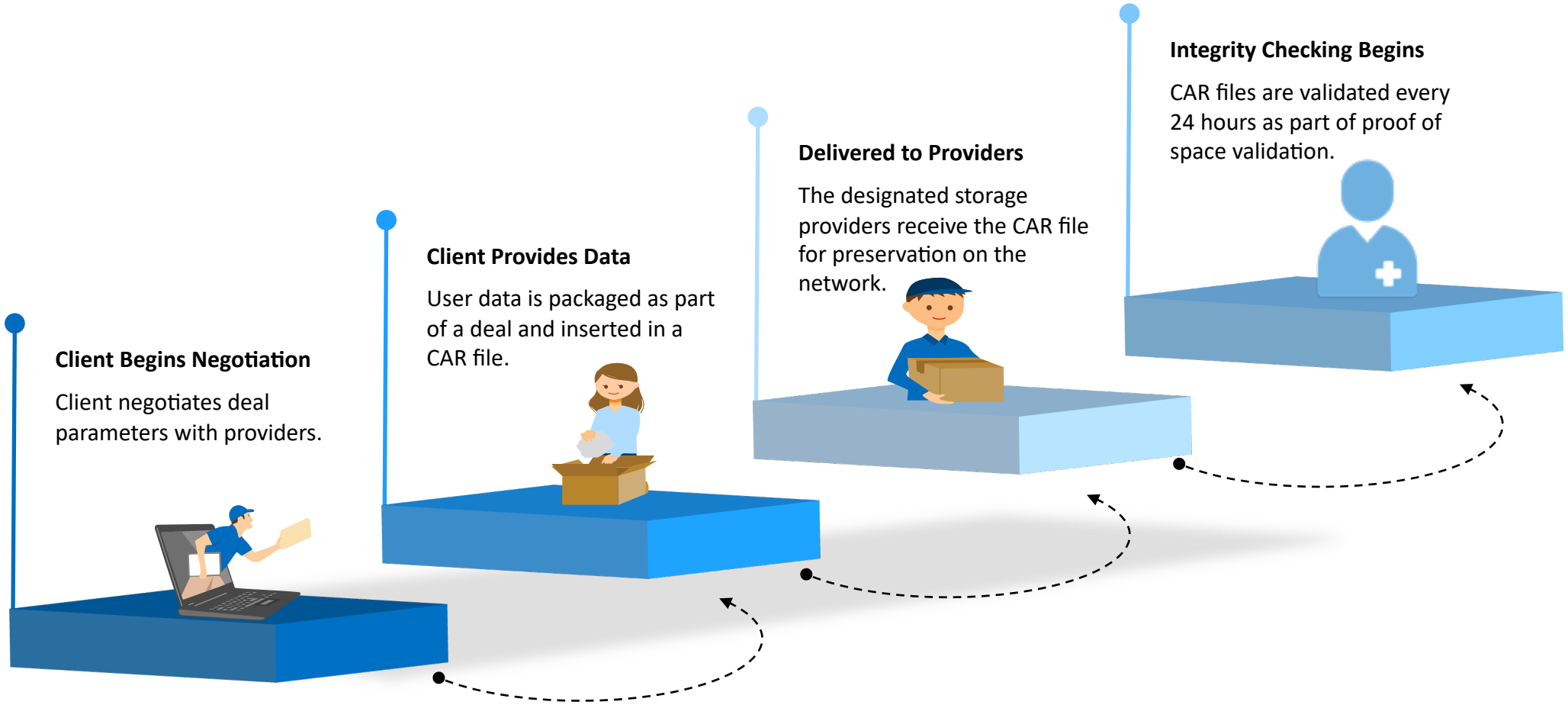
User data is packaged as part of a deal and inserted in a CAR file.

Delivered to Providers

The designated storage providers receive the CAR file for preservation on the network.

Integrity Checking Begins

CAR files are validated every 24 hours as part of proof of space validation.

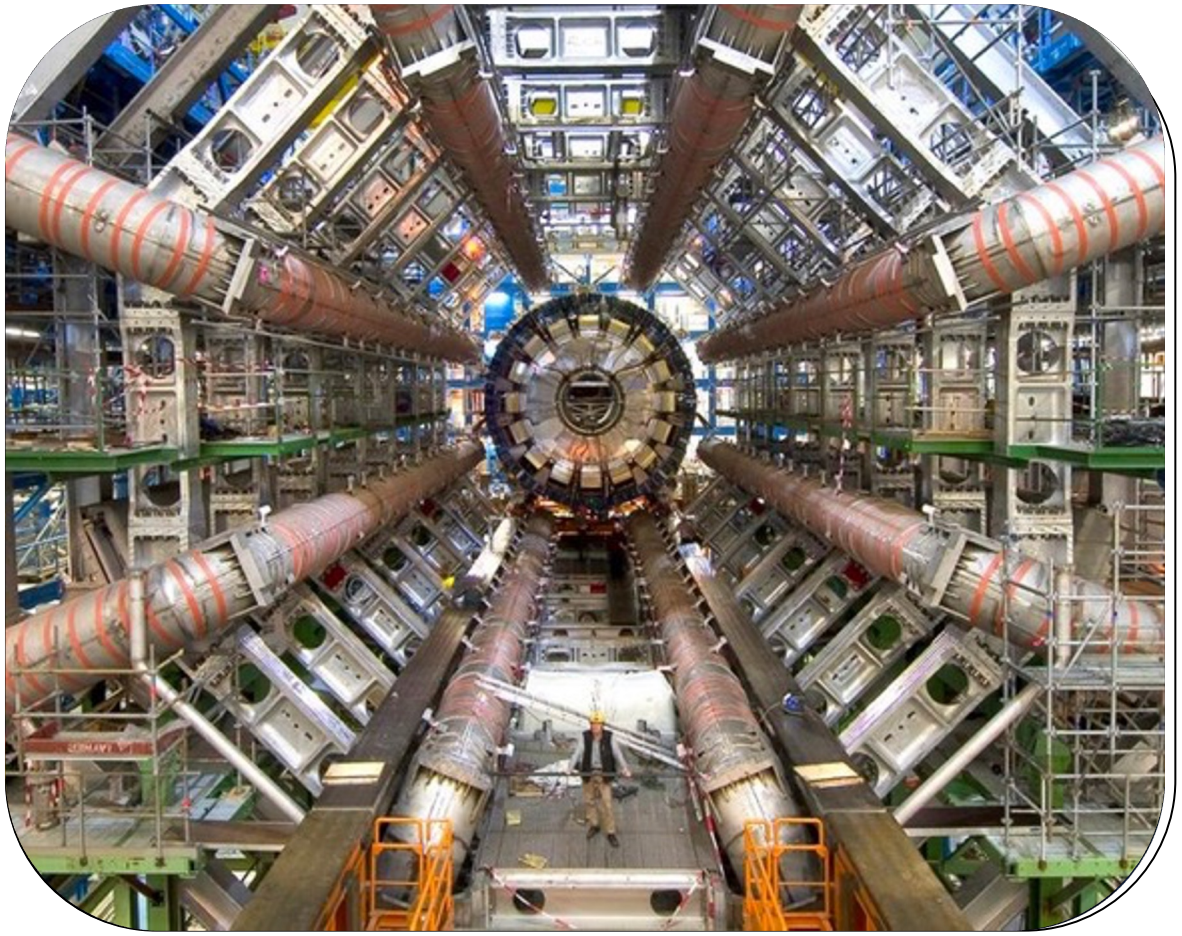


Scaling Data Storage for CERN's Atlas Project

Demand for archival storage capacity at CERN was outpacing their tier-1 storage process.

Filecoin was selected in lieu of magnetic tape to increase data processing speeds and strengthen data integrity through native immutability & geo-replication.

10 pebibytes of decentralized storage capacity is now being utilized by CERN's Atlas Project for archival storage.



Client:

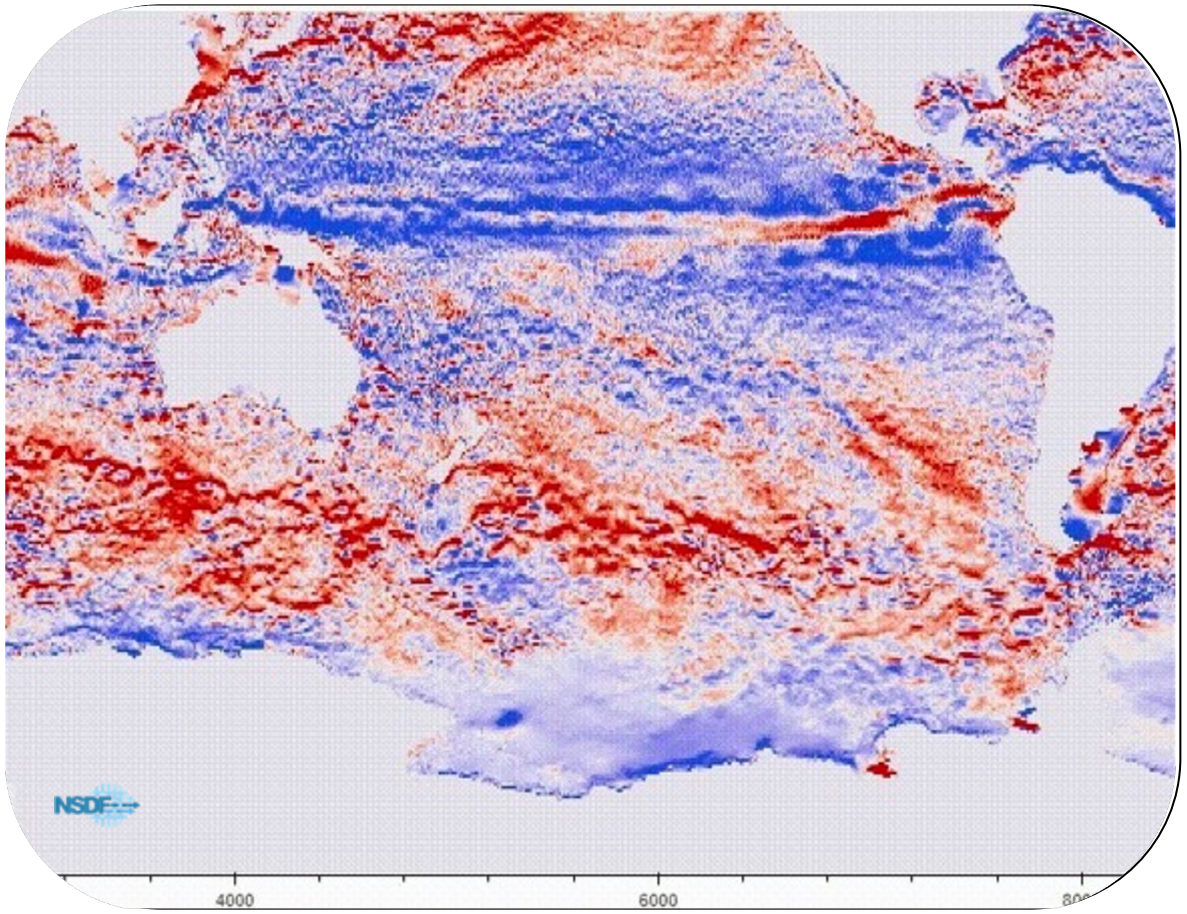
Storage Provider:

Enabling Open Science for the University of Utah

Closed storage systems and egress fees were limiting researcher access to critical climate data.

Utilizing Filecoin, climate data was stored across an open, global network of storage providers removing the necessity for egress fees.

200 terabytes of NASA atmospheric wind velocity and ocean current datasets are now openly available to researchers globally.



Client:

THE UNIVERSITY OF UTAH

Storage Provider:

SEAL

Safeguarding USC Shoah's Holocaust Testimonies

Protect historical memories of atrocities like genocide from manipulation.

Filecoin provides a continuous record to show that testimony data are secure and have not been tampered with.

9 pebibytes of USC Shoah Visual History Archive data, including 115,589 hours of video and 719,000 images from 55,000 survivors are securely preserved for future generations.

Client:

USC Shoah Foundation

Storage Provider:

PiKNiK

The Decentralized Storage Alliance

Scan to learn more!

Panel Discussion

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- A Q&A from this webinar, including answers to questions we couldn't get to today, will be posted on our blog at https://sniansfblog.org/
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Thank You

