datum

Datum Network

The decentralized data marketplace

White Paper V15

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1. singular of data
2. a piece of information

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Executive Summary

Abstract: The Datum network allows anyone to store structured data securely in a decentralized way on a smart contract blockchain. The DAT smart token enables optional selling and buying of stored data while enforcing data usage rules as set by the data owner.

Every day we create 2.5 Quintillion bytes of data, and 90% of the world's data today has been created in the last 2 years alone. Data stored grows 4x faster than the world economy and contributes to a substantial shift in economic power and source of economic value.

A lot of this data is created by individuals or organizations; browsing the internet, interacting on social networks, uploading personal files, syncing devices and shopping online. This data is owned and stored by large private organizations in huge data silos where it is susceptible to selling, tampering, extraction and other exploitation. The originator of the data mostly loses control over its data when signing up to various services such as Facebook, Google, Instagram, Snap, Twitter etc., that offer 'free' services in exchange for exploitation of data, e.g. Google's Gmail service reading emails and showing targeted ads as a result.

Datum proposes a network run on a secure smart contract blockchain that allows all of its users to retake control of their data, not just the personal and habitual data they produce every day, but also data from the (IoT)[1] devices that they control.

Datum encompasses the following key elements:

A fast decentralized data store allowing users to store structured data securely running on a smart contract blockchain

The DAT token enabling this data storage and sharing

The data marketplace, enabling individuals to monetize their data on their terms

Datum leverages BigchainDB and IPFS to provide an infinitely scalable, decentralized data storage backend.

Data storage and data sharing is paid for by the DAT token.

[1] https://en.wikipedia.org/wiki/Internet_of_things

The Datum network will consist out of 3 Billion DAT tokens, with 1.53 billion DAT tokens available in a public token crowdsale.

The Datum network aims to provide entities such as researchers, companies or individuals the most efficient and frictionless access to data while respecting the data owner's terms and conditions. By becoming a dominant data marketplace, Datum aims to revolutionize the existing data market where data creators are rarely paid for the data and the monetization happens by middle men who do not add any value.

The Datum network will support initiatives that aim to increase control of data by their sources (e.g. individuals). We aim to work towards a future where data is first and foremost owned by their creator (e.g. an individual posting an image) and where the creator can choose to share, monetize or destroy this data based on their own purview.

This is in stark contrast with current data silos which collect vast amounts of humanities data under restrictive licensing terms, e.g. an individual giving up most rights to their image when posting it on Instagram. We feel that legislation in many regions is being worked on towards giving back more control of user data to the users themselves and feel the Datum network is an important facilitator and technical solution for such a future.

The Datum network aims to disrupt current data broker model by giving more direct and better value access to users data.[2] This in turn empowers users by regaining control of how their data gets used and shared. Users are incentivized to use the Datum network for data storage not only by privacy but also by monetization incentives. The more users using the Datum network the more powerful the momentum becomes, eventually users are able to insist that data is stored and handled through the Datum network.

Datum can be thought of as a decentralized version of Apple's HealthKit, but for any type of data instead of just healthcare data. HealthKit has led to a massive opening of data by participating apps, however it is stored with a centralized entity, Apple Inc., and is only available within Apple's ecosystem. We expect to see the

[2] https://hbr.org/2017/10/smart-ledgers-can-help-us-reclaim-control-of-our-personal-data

same rapid adoption effect with the Datum network once it gains critical momentum. Datum network is being built to enable the input of multiple types of data, and allow user control of the said data types.

Background

We live in a knowledge economy where data is a strategic asset that allows companies to acquire and maintain their competitive edge. The value of raw data varies from a hundred cents to over several hundred dollars per individual. The more it is enriched, analyzed and leveraged for specialized uses, the more its value increases.

Despite the large-scale monetization of personal and business data, the only player in the chain that is currently not getting paid is paradoxically the individual him/her/itself - who happens to be ***öÈ»*** source of harvested data.

Your personal or corporate data is worth a lot of money. Facebook, Google and co. all happily collect data in return for nothing. This is the chance to gain back control of your data and determine if and when you want to sell it or share it.

There is a quote which most certainly define the world we all live in today:

“If you are not paying for the product, you ***§ì»*** the product.” - Andrew Lewis, 2010.

The Datum network model could provide a basic income for everyone by allowing them to monetize their anonymized data.

As user of Facebook, Google, LinkedIn, Twitter, Yahoo and similar services - every year you create an excess of US $2,000, created directly from your personal data alone. For corporate entities, the value is even greater. This is only the value represented by data in each of these “data silos”, when you connect this data, the richer and wider the information, the more money it is worth.

What if you could monetize this data yourself, deciding yourself how much you are willing to share in return for rewards and new opportunities.

There is already a worldwide data market enabled by various data brokers that collect all types of personal data from various databases, Datum is the secure and decentralized alternative. [3]

Stakeholders

Users

Submit data. Data can be personal or business data and collections thereof or data from IOT devices and any other data source.

Storage Nodes

Provide compute power and storage capacity to store data in the de-centralized network. Storage Nodes are part of the BigchainDB cluster that allows Datum to provide global scale storage of submitted data.

Data Consumers

Any entity wishing to access data. Users can grant data under their precise terms, either for free or for a fee.

DAT Token Holders

Govern the Datum network and provide the "fuel" enabling transactions on the Datum network.

Datum focuses on empowering the users (the source of data).

Datum is Open Source and Free to participate. Fees are paid to store data, access stored data and rewards are paid out for submitting data.

Privacy

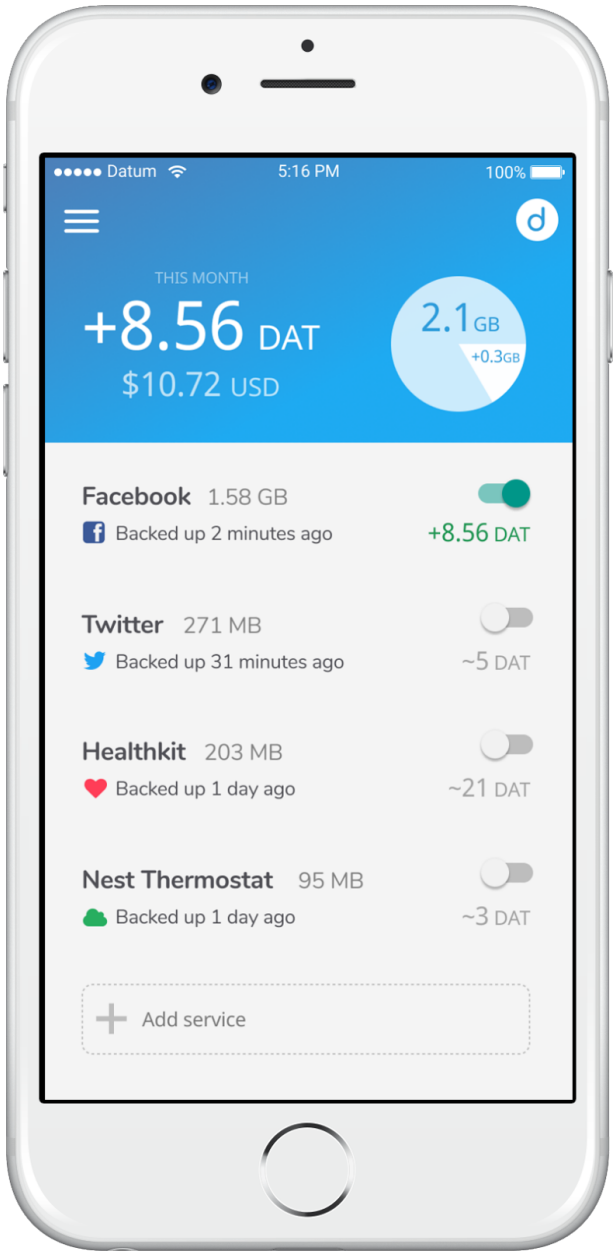
Each piece of data in the Datum network is marked with usage terms during the encryption. This way the user (the source of the data) can control in what way their data is to be shared and used by others. The usage terms are controlled by the DAT token smart contract.

[3] https://techcrunch.com/2015/10/13/whats-the-value-of-your-data/

Users have full control over privacy settings and can fine tune with whom to share data:

1. Share disabled
2. Share with specific, identified and known data consumers
3. Share with specific, identified and known data consumers for a minimum fee
4. Share with everyone
5. Share with everyone for a minimum fee

Datum Client



The Datum Client empowers users to take control of all their data and optionally share or sell their data through the Datum network.

The Datum Client is being designed for a large number of various platforms such as mobile and desktop. We are also designing support for embedded device platforms used in IoT devices, electric cars etc. to unlock the value of such device data.

In the first phase the datum client will be offered as mobile app for iOS and Android.

Focusing on the following key development goals:

- Overview of stored data
- Overview of DAT token holdings
- Simple privacy controls
- Detailed data access reports
- Focused on end user adoption

Full Transparency means users can inspect the data that is being transmitted at any time.

Traceable Access: Users can trace who accessed their data at any time.

Open Data

To allow humanitarian and other legitimate projects access to the data, these can register as projects. The user clients shows currently running projects requesting data access and users can control whether to give access or not based on their decision.

An example could information from digital health devices to medical institutions and researchers, or IoT devices in case of accidents such as natural disasters.

Datum - The Data Network

Datum solves the following key problems. By focusing on data represented as key/value pairs, Datum ensures that availability, latency and query-ability/searchability are preserved and incentivized/rewarded.

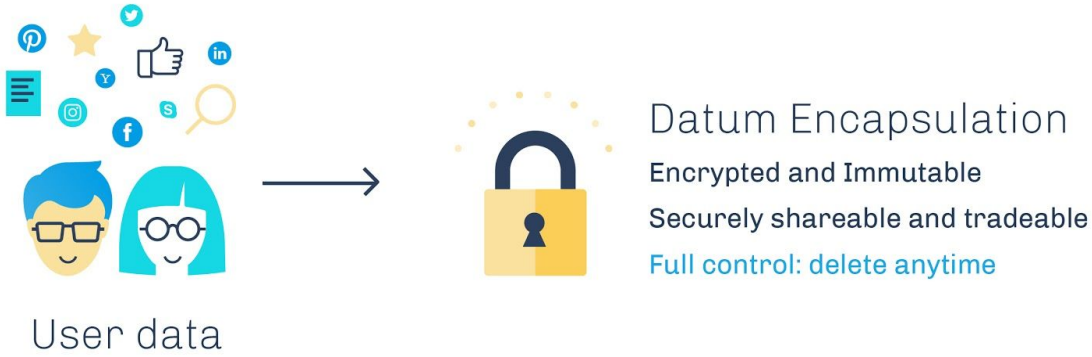
All data is encrypted and protected using AES256-GCM with 256-bit key size for every 128-bit block, ensuring data integrity.

1. Data Storage
    a. Decentralized: Not controlled by any single party
    b. Secure: Encrypted at source and immutable
    c. Performant:
        i. Latency
        ii. Throughput
    d. Functionally Rich:
        i. Able to query data
        ii. Able to search data
2. Marketplace
    a. Request data
    b. Bid for data
    c. Sell data

User Specs

The user (source of data) is looking to solve the following criterias:

1. **Secure:** Data is encrypted at source
2. **Tamper Proof:** Data is immutable
3. **Unlock value:** Data can be monetized
4. **Storage:** Decentralized storage
5. **Privacy:** Data is stored anonymously
6. **Control:** User stays in control of critical points such as:
    a. Life of data
    b. Detail of data
    c. Future use of data



Data Consumers

Data Consumers can request for data. Ultimately, it is down to individual network users to grant access to data. The credibility of data consumers is an important aspect. As such data consumers should be incentivized to build a trusted track record in handling data responsibly.

The Datum network puts great importance on “Know your Consumer”. While there is an industry focus on “Know your Customer (e.g. YOU), there is hardly anything advocating user’s right to know their counterparty. The Datum network fixes this by empowering its users to determine who gets access to their data.

Data Consumers can choose to disclose the following (or nothing):

1. Identity
2. General Privacy Policy
3. Use of Data
4. Lifetime of Data
5. Datum Network Trust Rating

Regarding data requests consumers can specify further data specific items:

1. Use of Data
2. Lifetime of Data

Data Network Incentives

The various parties and stakeholders making up the Datum network have different incentives.

Users:

1. Control of use of data
2. Secure and infinitely scalable data storage
3. Monetization of data

Data Consumers:

1. Direct access to validated and verifiable data
2. Lower costs by eliminating “data broker” middlemen

Storage Node:

1. Rewards for hosting data and providing compute power

Data Validation

Initially the Datum Network will rely on buyers to validate data and regulate fake or invalid data. However, the data validation mechanism can be implemented going forward and Datum also plans to implement a trust ranking system for all users (this includes owners of data and buyers of data as well as storage node operators).

!

1. Users can link their data to their verified identity such as uPort or Civic.
2. Users can enrich their data with social media and other profiles.
3. Users can enrich their data with trusted 3rd party validators.

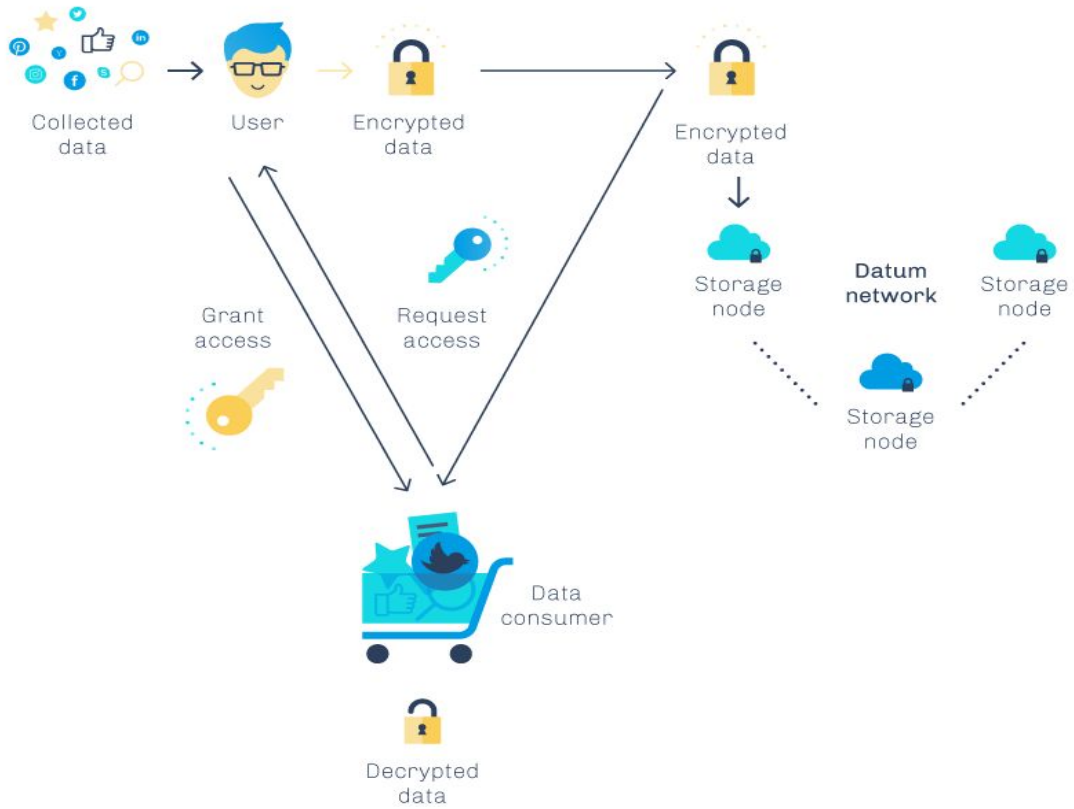
An algorithm based on scientific method consensus, such as DSensor SenseMaking[4], can be implemented.

[4] http://dsensor.org/

Use Cases

User submits data and gets paid by a consumer;

1. User submits a piece of data to the Datum Network using the client software. The user pays gas to submit the data. As the data is encrypted, only the user can provide a decryption key to all the interested parties.
2. A Storage Node receives the data and stores the data. The data is replicated to many other storage nodes.
3. A Data Consumer declares interest to purchase the piece of data.
4. The User receives a data purchase request with the details such as purchaser and price offered. He can agree to the purchase request or counter offer with a modified proposal.
5. The User accepts the proposal, the user receives DAT Tokens and the decryption key is sent to the Data Consumer who pays in DAT Tokens.



Data can be purchased as one-off, or on an on-going subscription basis.

Token Economics

DAT is a utility token that can be exchanged for certain privileges on the Datum Network. Such as participation in the data market and registration as the storage node etc. Tokens exchanged for these activities shall be destroyed, as the supply of DAT is fixed at issuance the net effect of these activities is that the supply of DAT will decrease over time (deflation).

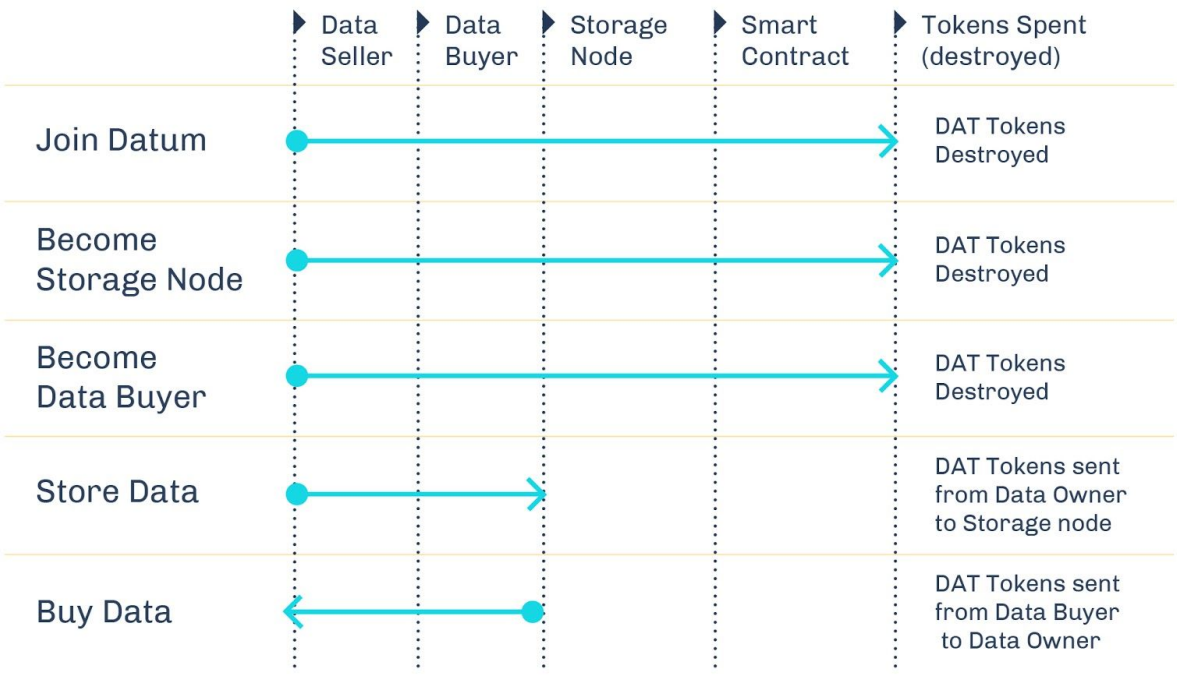
- ŏ Marketplace participation and activity drives spending (destruction) of tokens for privileged services

Storage Nodes are paid fees for storing and transmitting data.

An overview of the DAT Token role in various processes on the Datum Network

Process	Role	Feature
Join Datum Network	Participation Right	Become a user of the Datum Network
Become a Storage Node	Participation Right	Become a storage node on the Datum Network
Become a Data Buyer	Participation Right	Become a data buyer on the Datum Network
Store Data	Value Exchange	Pay DAT Tokens to store data
Buy Data	Value Exchange	Pay DAT Tokens to buy data

Overview of DAT Tokens flows in the Datum Network



Mechanics of the Token Economy described in this section are under review by our legal counsel and subject to change.

Storage Nodes

Storage nodes require 3 resources:

1. Compute Power
2. Storage Capacity
3. Bandwidth

Storage Nodes are economically incentivized by DAT Token rewards, paid out as a fixed percentage of each transaction and shared amongst storage nodes according to their contribution of resources.

Smart Contract

The Datum network smart contract governs the following aspects;

DAT Tokens are MiniMe enabled and as such allow for upgradeability.

Datum Artifact Structure

The Datum structure is as follows;

1. **Owner**
    a. Can have no owner, one owner or several owners
    b. Can be encrypted
    c. Can be public
2. **Metadata**
    a. Can be encrypted
    b. Can be public
3. **Time Stamp**
    a. Can be encrypted
    b. Can be public
4. **Data Payload**
    a. Any arbitrary JSON structure