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InterPlanetary File System

The **InterPlanetary File System** (**IPFS**) is a protocol and peer-to-peer network for storing and sharing data in a distributed file system. IPFS uses content-addressing to uniquely identify each file in a global namespace connecting all computing devices.[4]

Contents

Design

IPFS allows users to host and receive content in a manner similar to BitTorrent. As opposed to a centrally located server, IPFS is built around a decentralized system[5] of user-operators who hold a portion of the overall data, creating a resilient system of file storage and sharing. Any user in the network can serve a file by its content address, and other peers in the network can find and request that content from any node who has it using a distributed hash table (DHT).

In contrast to BitTorrent, IPFS aims to create a single global network. This means that if Alice and Bob publish a block of data with the same hash, the peers downloading the content from Alice will exchange data with the ones downloading it from Bob.[6] IPFS aims to replace protocols used for static webpage delivery by using gateways which are accessible with HTTP.[7] Users may choose not to install an IPFS client on their device and instead use a public gateway. A list of these gateways is maintained on the IPFS GitHub page.[8]

History

InterPlanetary File System

Original author(s)	Juan Benet and Protocol Labs[1]
Developer(s)	Protocol Labs
Initial release	February 2015[1]
Stable release	0.9.0 / 24 June 2021[2]
Repository	github.com/ipfs /ipfs (https://githu b.com/ipfs/ipfs)
Written in	**Protocol implementations**: Go (reference implementation), JavaScript, C,[3] Python **Client libraries**: Go, Java, JavaScript, Python, Scala, Haskell, Swift, Common Lisp, Rust, Ruby, PHP, C#, Erlang
Operating system	Linux, FreeBSD, OpenBSD, macOS, Windows
Available in	Go, JavaScript,

Protocol Labs

IPFS was created by Juan Benet, who later founded Protocol Labs in May 2014.[4][9] According to its website and that of the World Economic Forum, Protocol Labs is "an open-source research, development, and deployment laboratory for blockchain technology" that "creates software systems that tackle significant challenges" and whose goal is to "make human existence orders of magnitude better through technology."[9][10] Protocol Lab's projects include IPFS, Filecoin, libp2p, Multiformats, IPLD, and SourceCred.[9]

	Python
Type	Protocol, distributed file system, content delivery network
License	MIT license, Apache license 2.0
Website	ipfs.io (https://ipfs.io/)

Protocol Labs is headquartered in the USA[10] and incorporated in Delaware,[11] but its team works remotely.[9] As of 2021, it has 130 members, $55.7M in funding, and is located in Palo Alto, California.[12][13]

Implementations and uses

IPFS was launched in an alpha version in February 2015, and by October of the same year was described by TechCrunch as "quickly spreading by word of mouth."[1]

The Catalan independence referendum, taking place in September–October 2017, was deemed illegal by the Constitutional Court of Spain and many related websites were blocked. Subsequently, the Catalan Pirate Party mirrored the website on IPFS to bypass the High Court of Justice of Catalonia order of blocking.[14][15]

Phishing attacks have also been distributed through Cloudflare's IPFS gateway since July 2018. The phishing scam HTML is stored on IPFS, and displayed via Cloudflare's gateway. The connection shows as secure via a Cloudflare SSL certificate.[16]

The IPStorm botnet, first detected in June 2019, uses IPFS, so it can hide its command-and-control amongst the flow of legitimate data on the IPFS network.[17] Security researchers had worked out previously the theoretical possibility of using IPFS as a botnet command-and-control system.[18][19]

Other notable uses

- During the block of Wikipedia in Turkey, IPFS was used to create a mirror of Wikipedia, which allows access to the content of Wikipedia despite the ban.[20] That archived version of Wikipedia is a limited immutable copy.
- Filecoin, also inter-related to IPFS and developed by Juan Benet and Protocol Labs, is an IPFS-based cooperative storage cloud.[21]
- Cloudflare runs a distributed web gateway to simplify, speed up, and secure access to IPFS without needing a local node.[22]
- Microsoft's self-sovereign identity system, Microsoft ION, builds on the Bitcoin blockchain and IPFS through a Sidetree-based DID network.[23]
- Brave uses Origin Protocol and IPFS to host its decentralized merchandise store[24] and in 2021 added support into their browser.[25]
- Opera for Android has default support for IPFS, allowing mobile users to browse `ipfs://` links to access data on the IPFS network.[26]

See also

- Content addressable storage
- Dat (software)
- Distributed file system
- Freenet
- GNUnet
- ZeroNet

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External links

- Official website (https://ipfs.io/)