IPFS - InterPlanetary File System

- DApps need to store/retrieve data;
- Ethereum is not free. Saving data on the blockchain is **very expensive;**
- We need to modify the data storage strategy and save the data off-chain as opposed to the on-chain approach;
- IPFS and Swarm are two popular decentralized, reliable, censorship-resistant, off-chain options used for data storage;
- **Data (video, audio, documents etc) will be saved on IPFS** and on the Blockchain (as a smart contract state variable) will be saved **only the hash** that uniquely identifies data on IPFS;

IPFS - InterPlanetary File System

- InterPlanetary File System (IPFS) is a protocol designed to create a permanent and decentralized method of storing and sharing files.
- IPFS aims to replace HTTP and build a better web

  Properties:
  - peer-to-peer, decentralized, distributed file-system;
  - "data sharing network", **files are addressed based on their hash** and not on their name
  - used for saving static content
  - reliable, fault-tolerant, zero-downtime, censorship-resistant
  - IPFS files are chunked into blocks and saved on many IPFS peers around the Internet
- **Content-addressed vs. location-addressed**
  - Location-addressed: **Whoever controls that location controls the content: what content to return or if to return any content at all.**
  - Content-addressed : there is no location, no one controls the file

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- Files aren't anymore accessed based on ***"where they are"*** https://www.domain.com/a.jpg) but based on ***"what they are"***: ipfs/QmeomffUNfmQy78CQGy9NdmqEjnHU9soCexBnGU3ezPHVH).
- Pinning is the mechanism that allows you to tell ipfs to always keep a given object local.

Installing IPFS on Linux

1. Download IPFS: https://dist.ipfs.io/go-ipfs/

2. Install IPFS
tar -xzvf go-ipfs…
cd go-ipfs
sudo ./install.sh

3. Initialise key-pair and create repository
ipfs init

4. Start ipfs daemon
ipfs daemon

5. Peers list
ipfs swarm peers

Running and testing IPFS on Linux

1. Adding file (auto pinning)
ipfs add -r directory/

-r → recursively add directory content

2. Local pinning content from other node (not to be garbage collected)
ipfs pin add /ipfs/QmfJkMNdByWsKVsdcY4tipKo8pmTfswTtrKjxJmTVxPX3t
pinned QmfJkMNdByWsKVsdcY4tipKo8pmTfswTtrKjxJmTVxPX3t recursively

3. More commands
ipfs ls directory_hash → list directory content, ls style
http://localhost:8080/ipfs/directory_hash
Accessing ipfs file from local repository using http
http://localhost:8080/ipfs/QmXpGjVrNTUeZjqHyaNF7ieJAc2kxSi1Z4ykSqefAUagFw

Web UI
http://localhost:5001/webui