Cubbit

Join the swarm

A distributed, crowd-sourced Cloud Storage

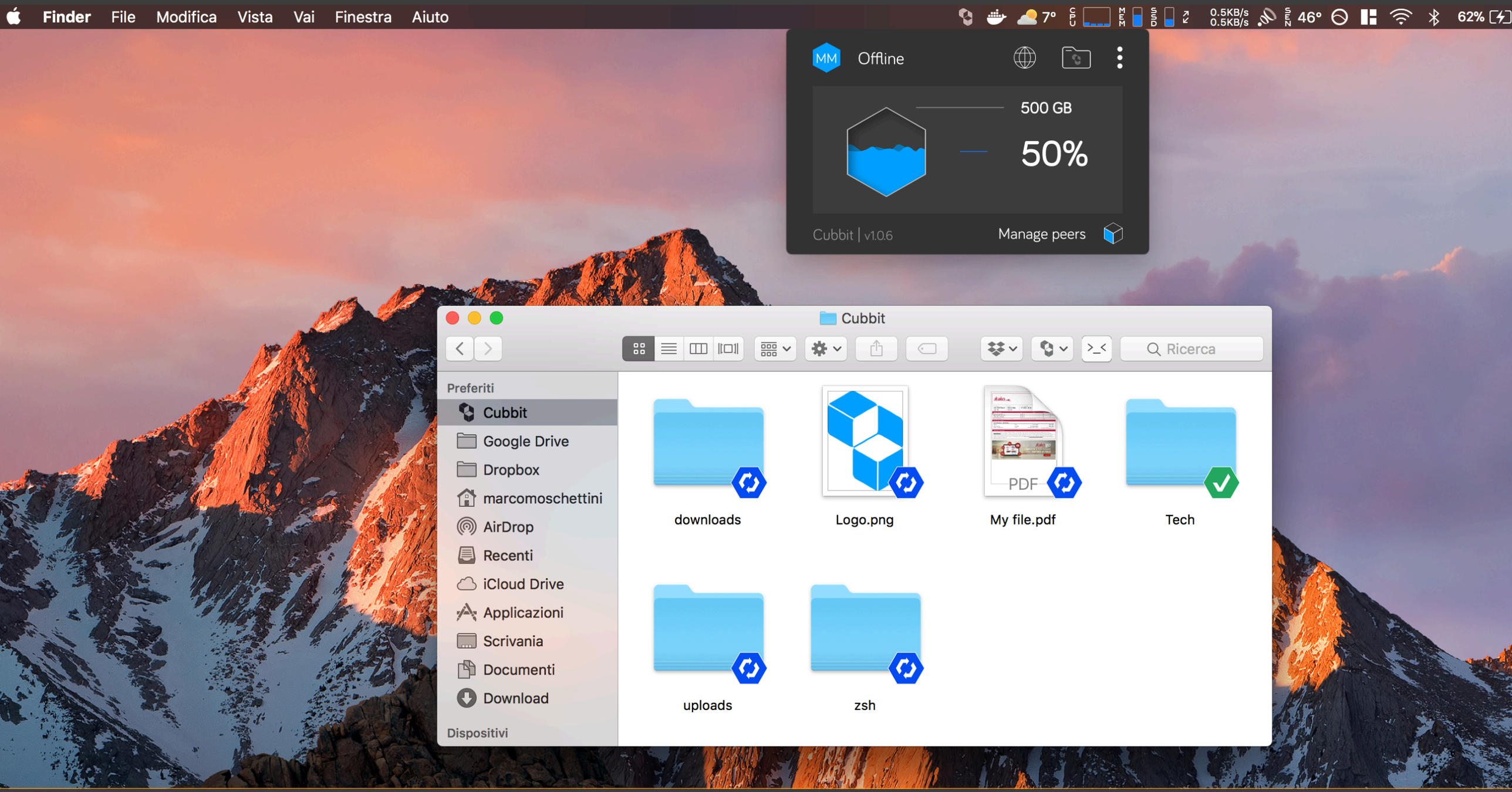
Lorenzo Posani, co-founder

Workshop on Cloud Services for Synchronisation and Sharing

Krakow, January 30, 2018

What is Cubbit?

- A sync-and-share cloud service



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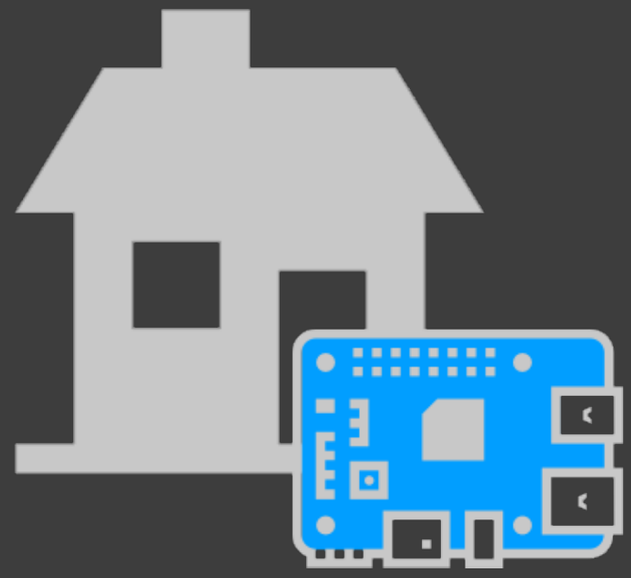
- A sync-and-share cloud service
- No data center: single-board devices in users' homes



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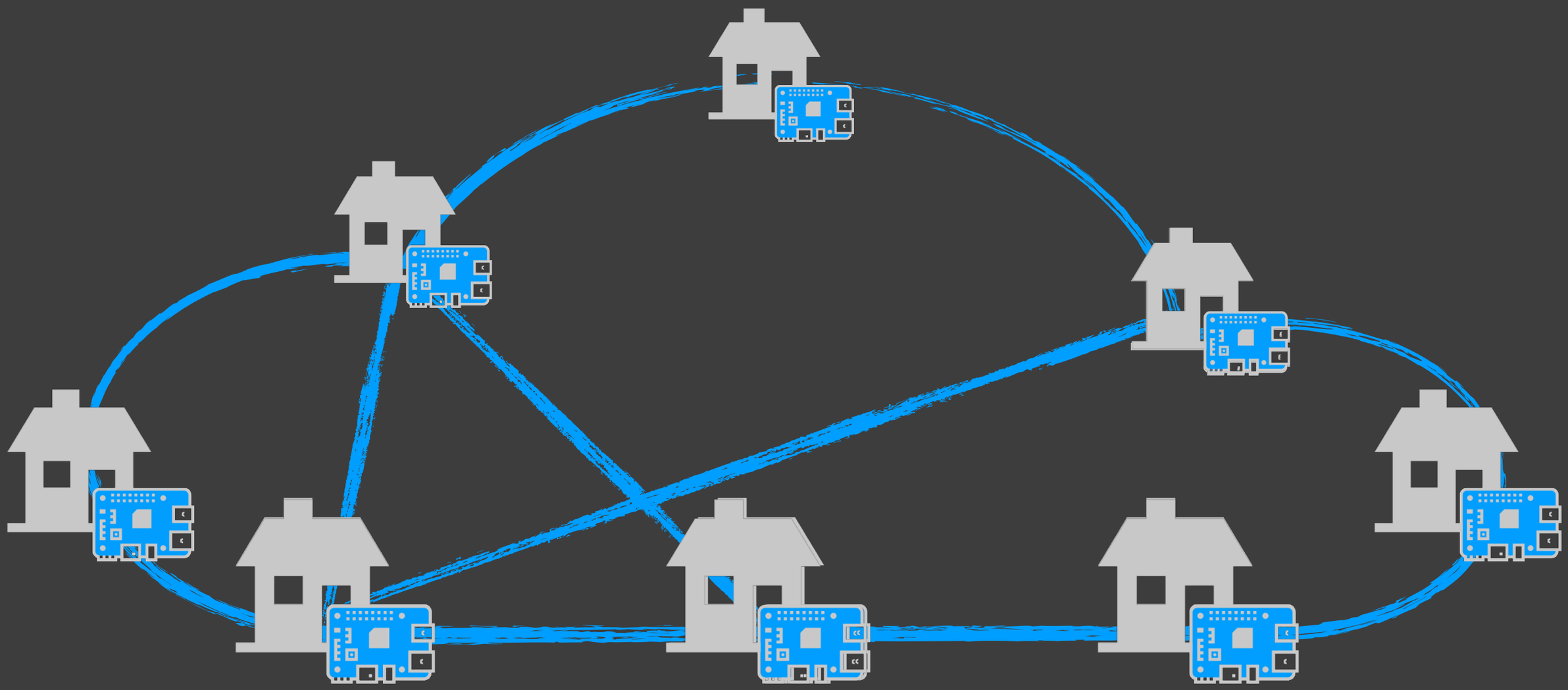

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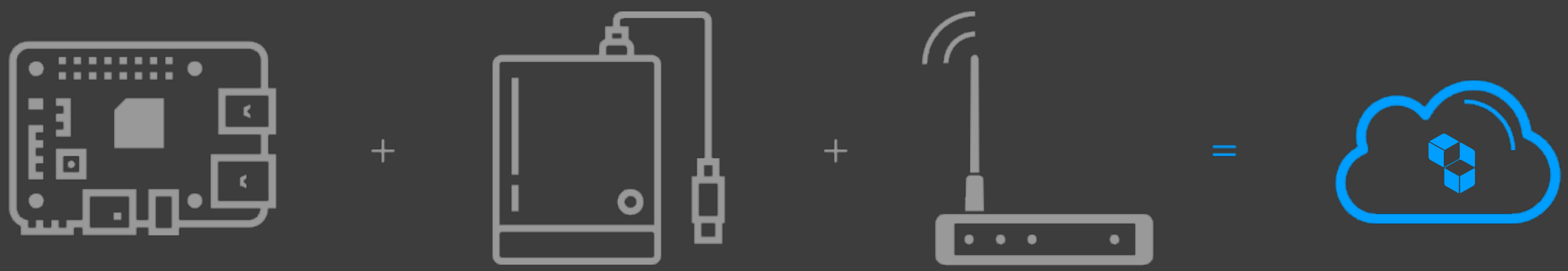
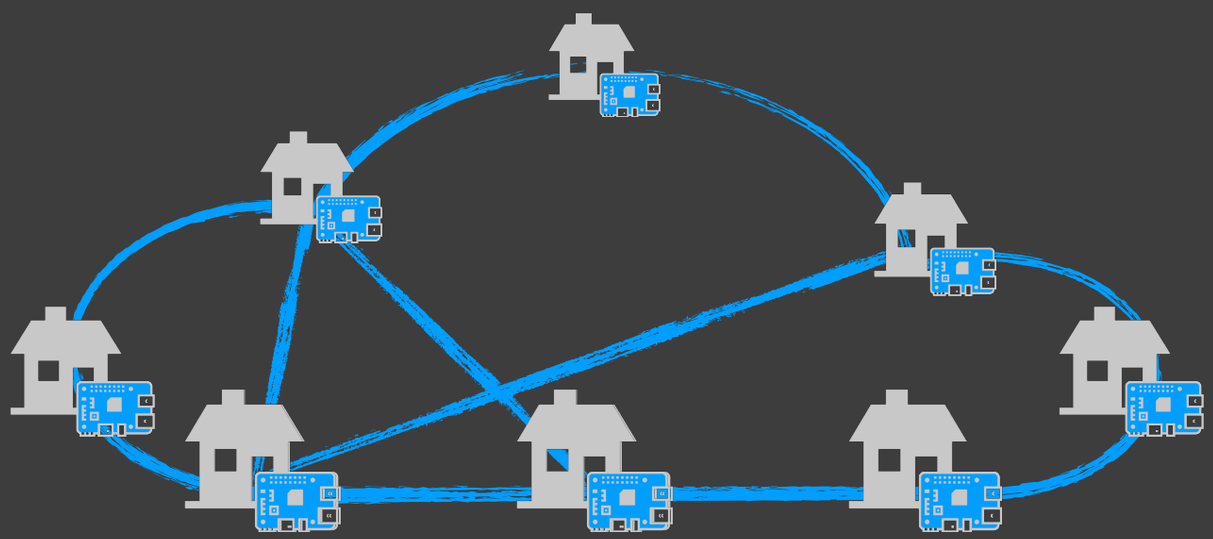
The user can transform raw, local disk space into cloud storage



Single-board computer | External Hard Drive | Internet | Cloud storage

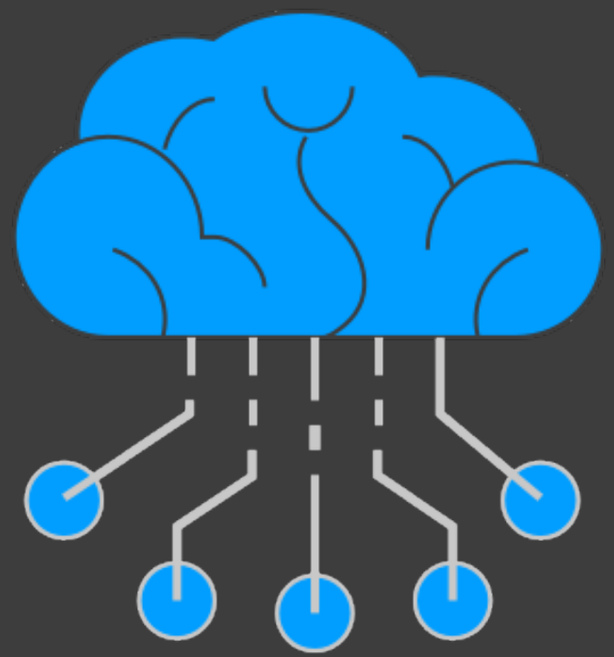
Architecture



The Swarm

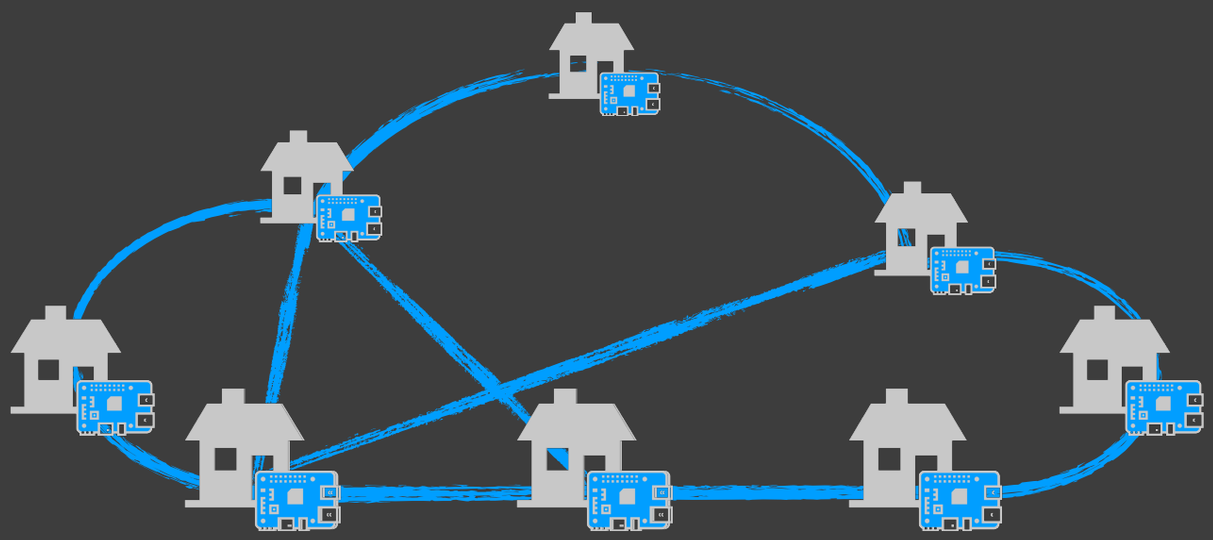
- Composed by users' devices
- Handles payloads storage and peer-to-peer transfers

Architecture



Coordinator AI Server

- Metadata
- Auth management
- Optimization of file distribution
- Uptime monitoring



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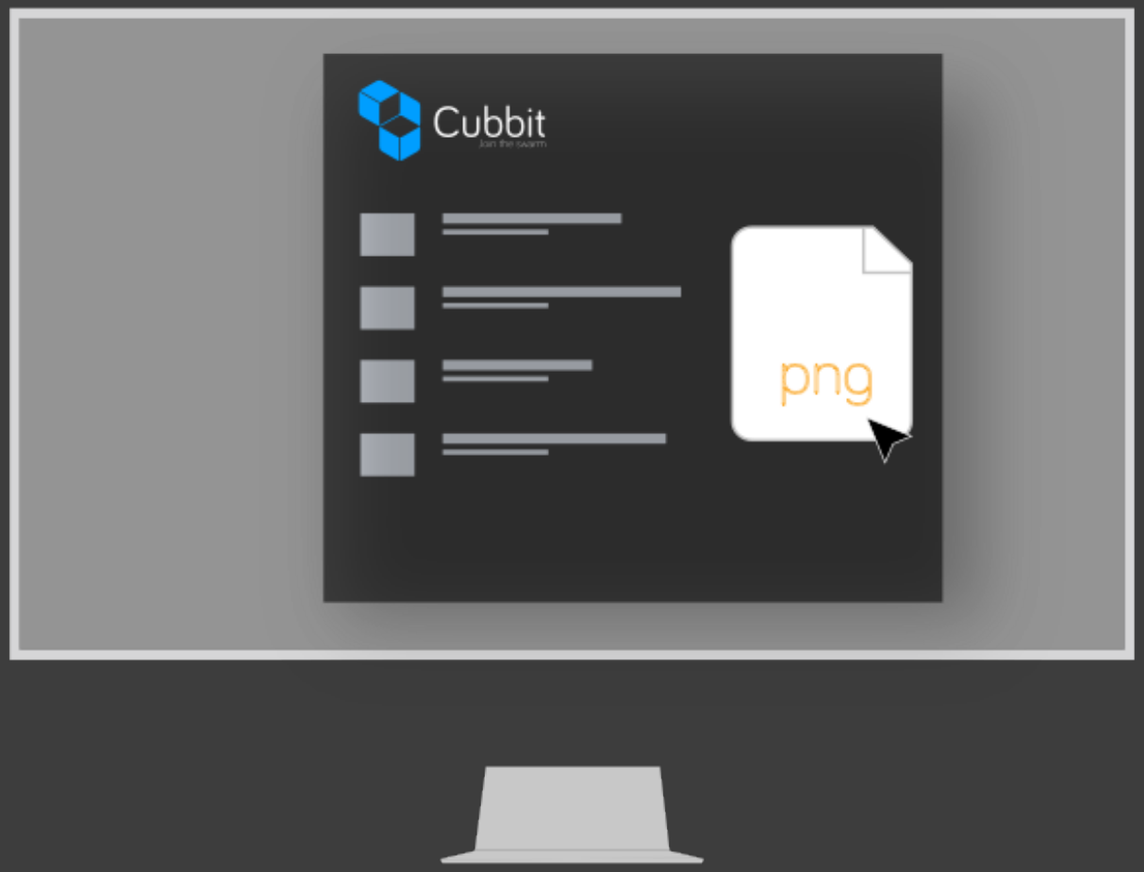
The path of a file

{**Stage 1**} pre-processing - encryption and redundancy



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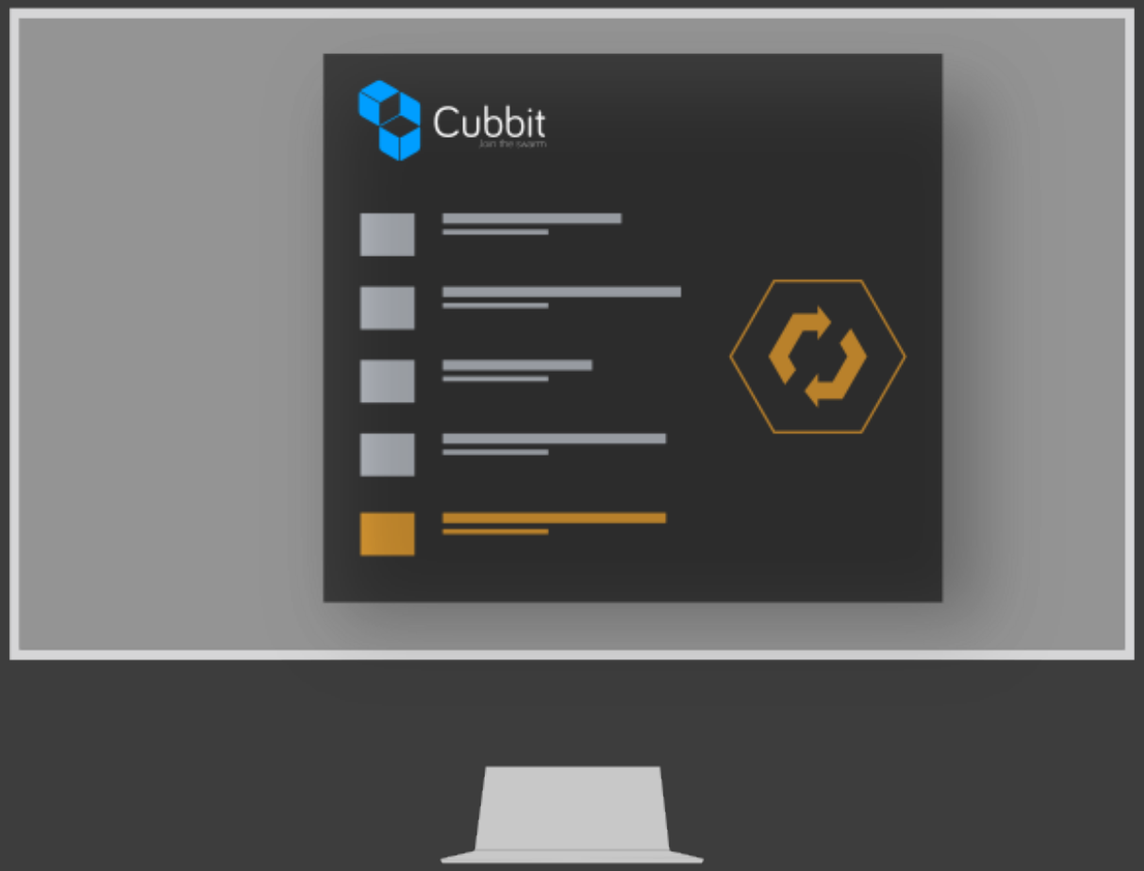

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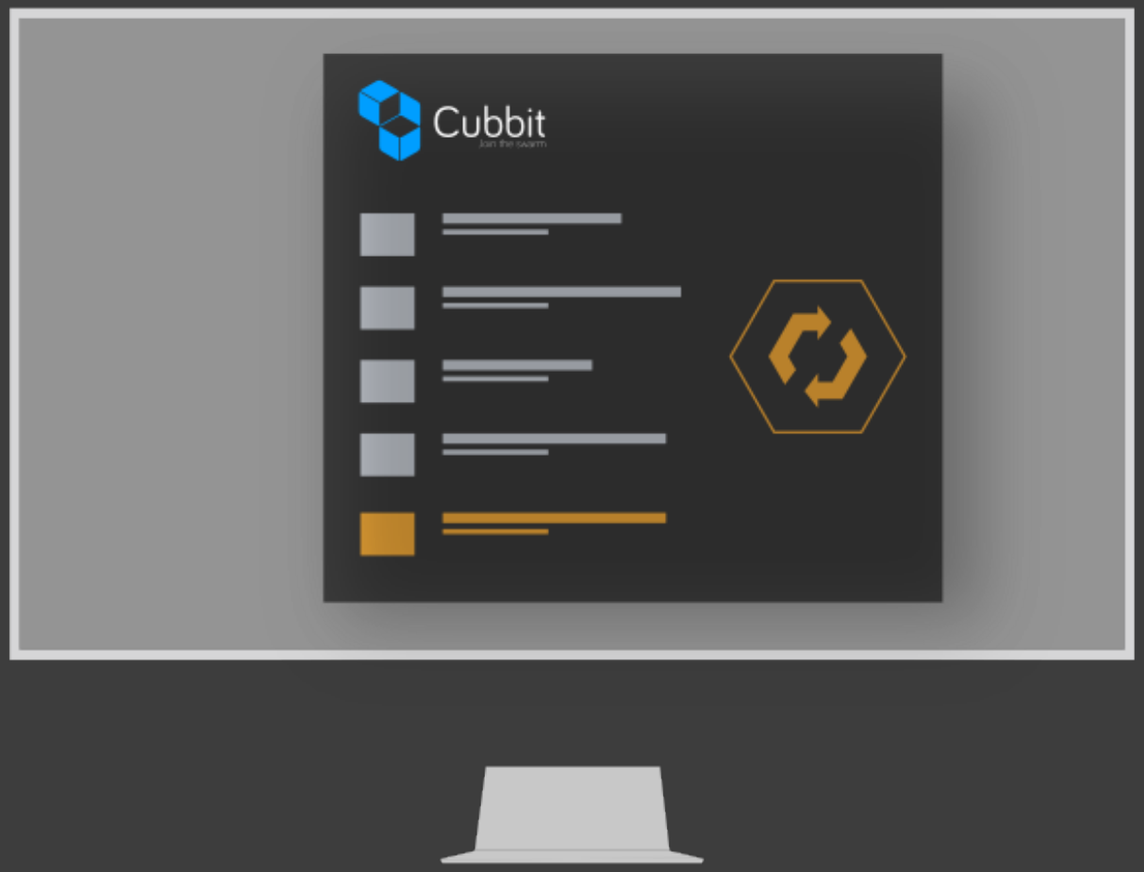

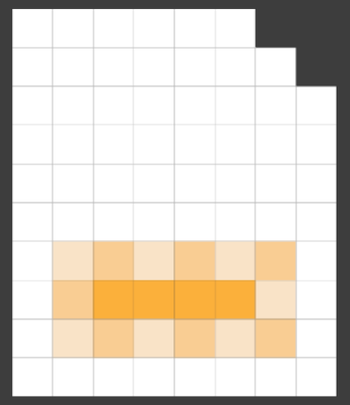

AES 256

The path of a file

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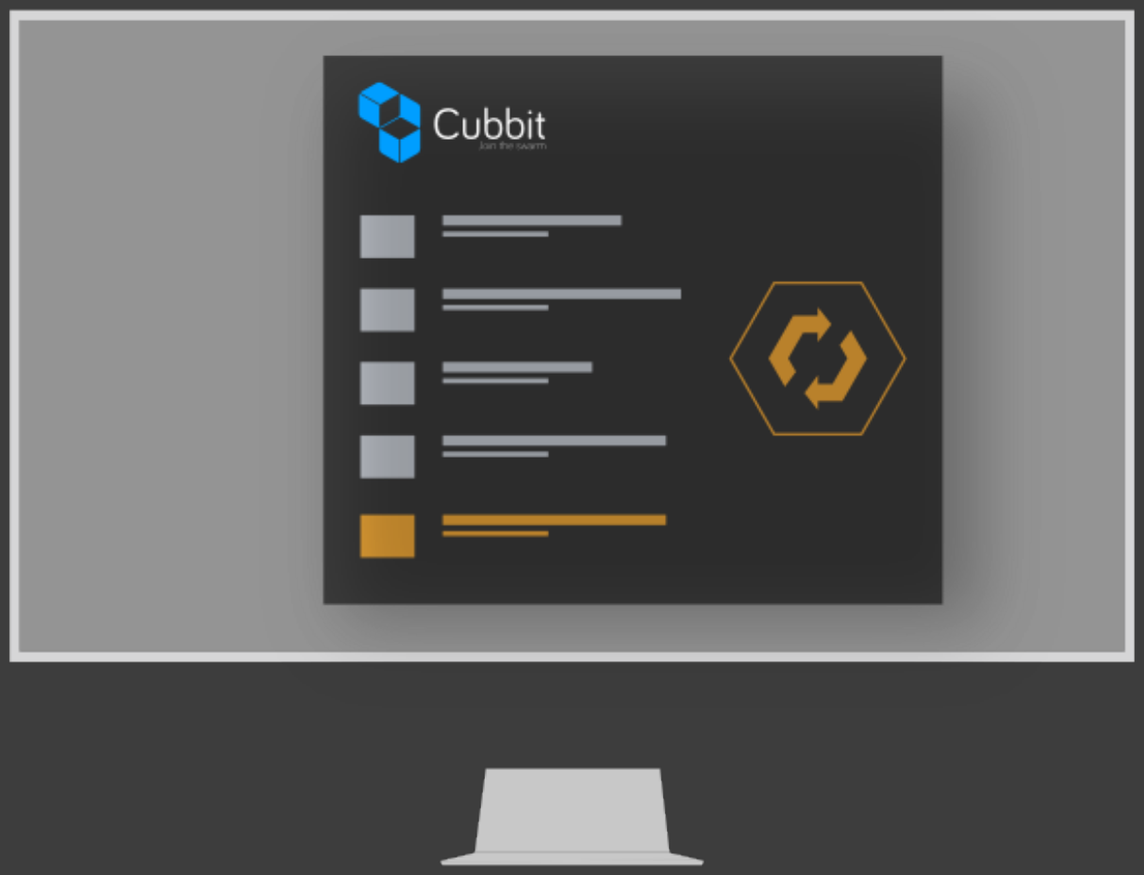

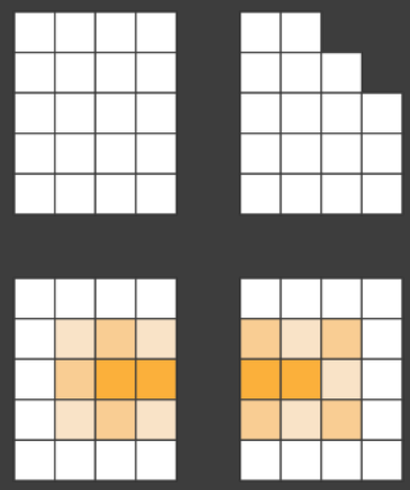

N chunks

The path of a file

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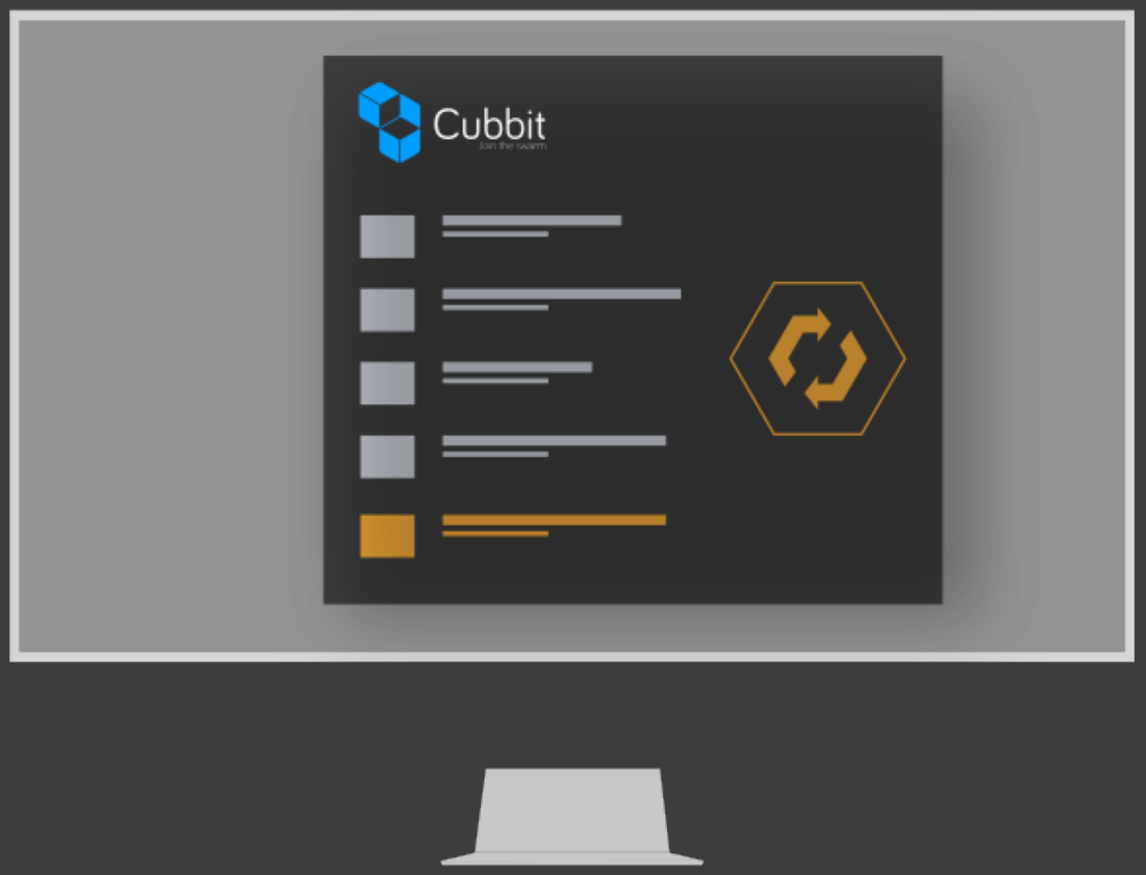
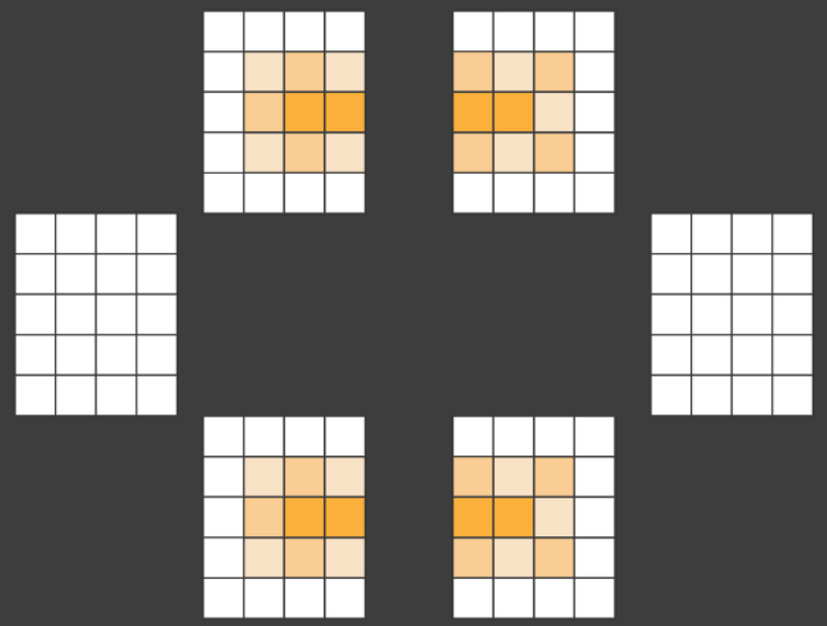


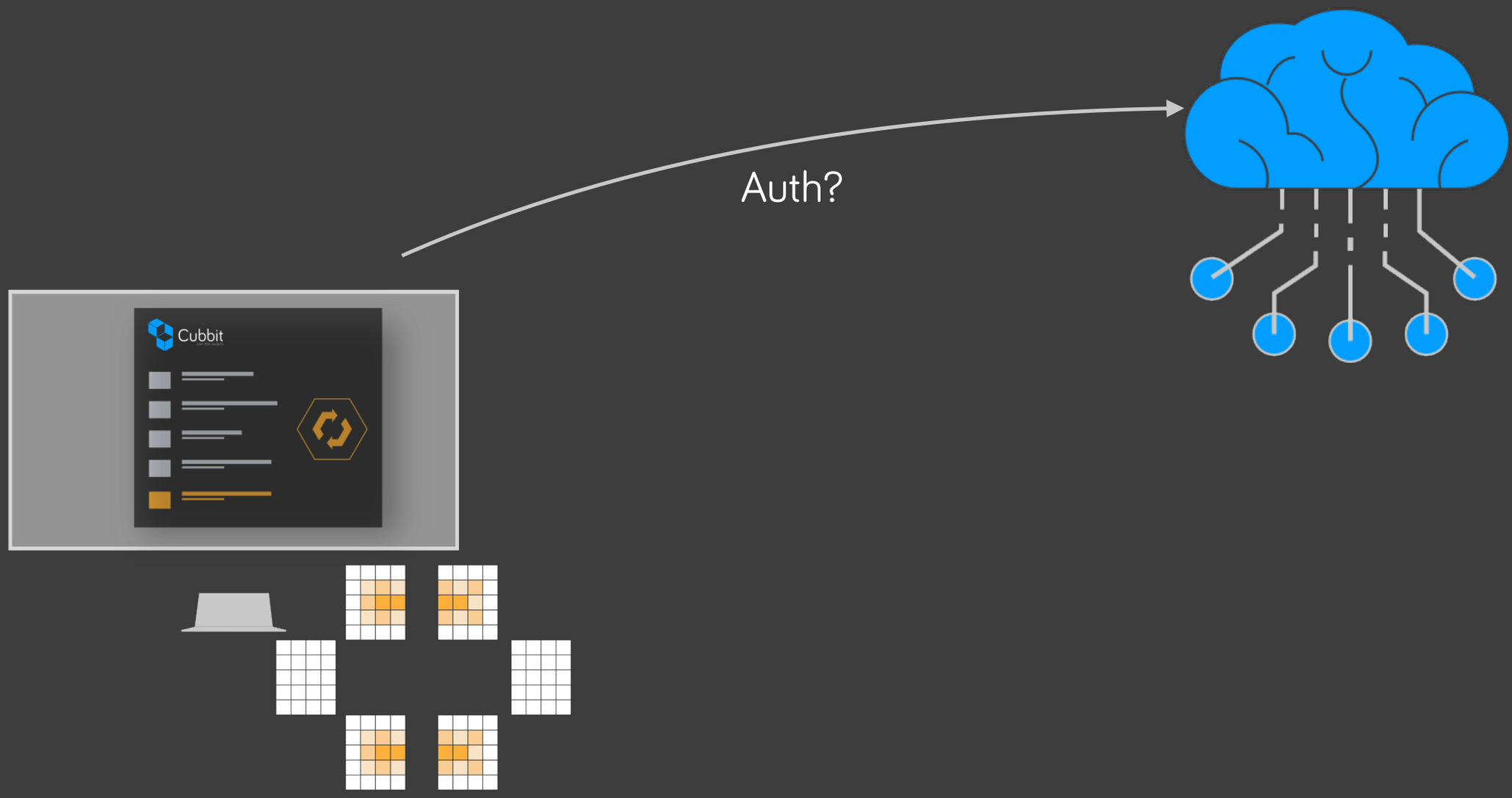


Erasure code ⟶ N + K shards

The path of a file

{Stage 1} pre-processing - encryption and redundancy

{Stage 2} authorization



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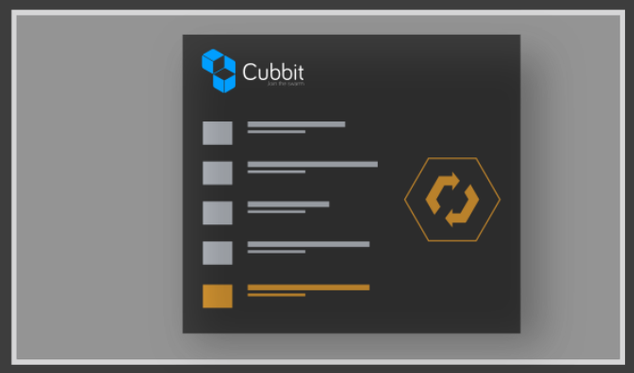
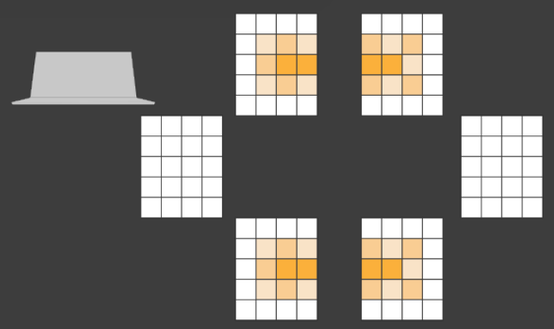
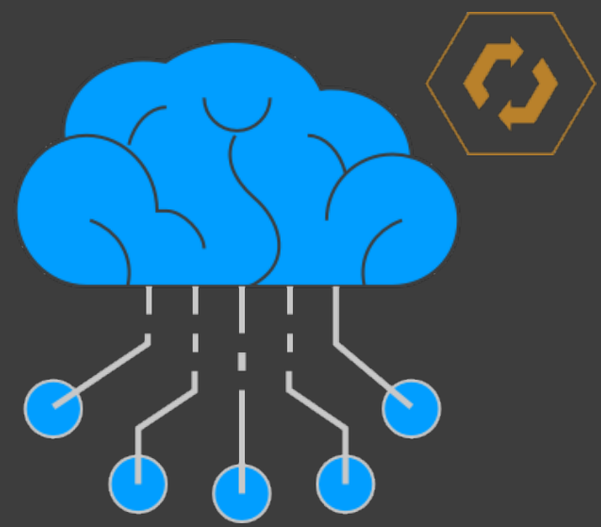




Check permissions



AI optimization: select the best peers

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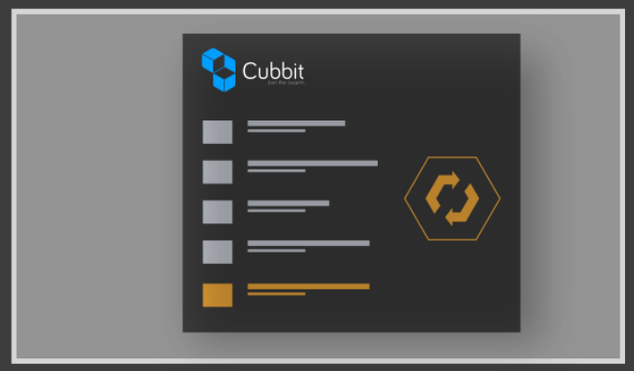
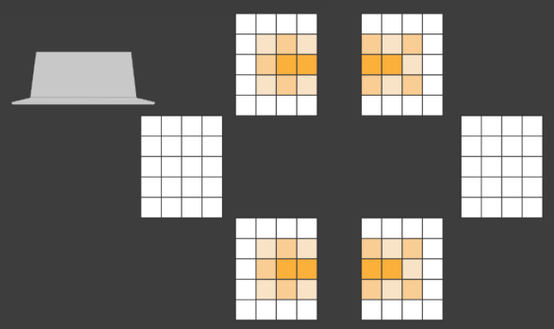
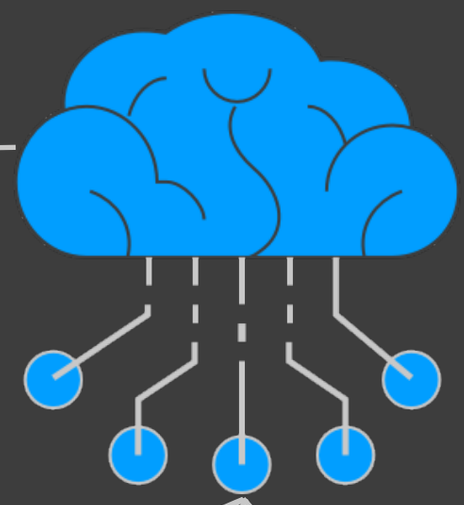
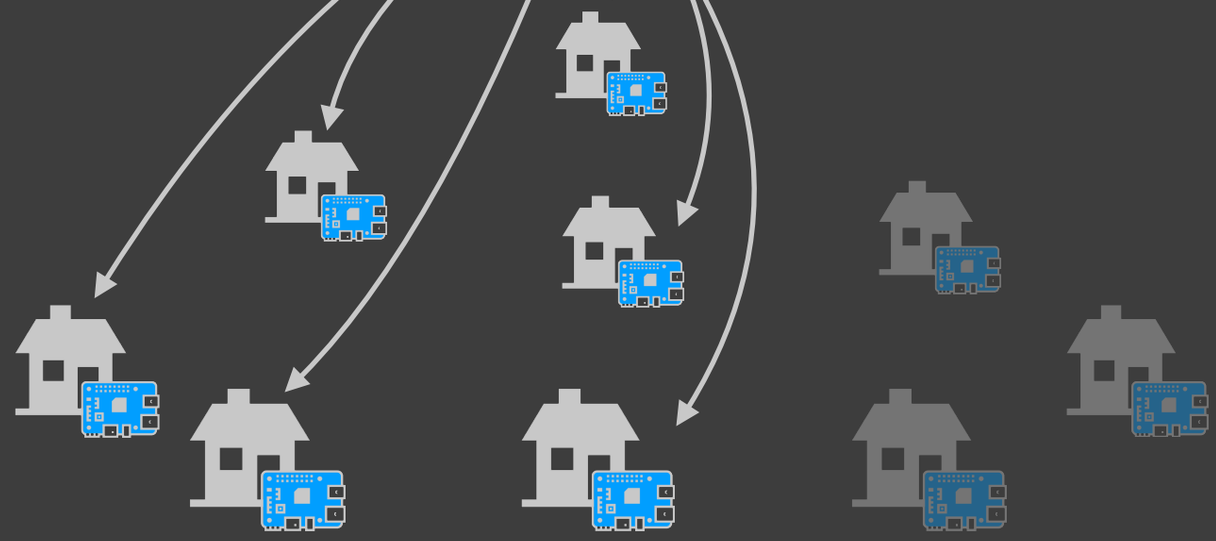






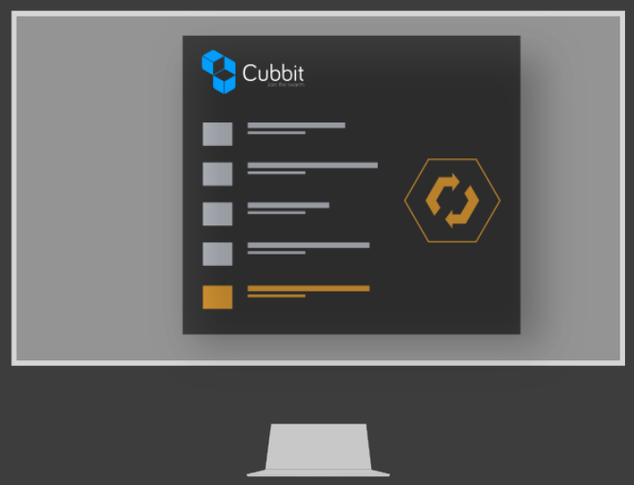
Auth & N + K IPs

Multicast (N + K)

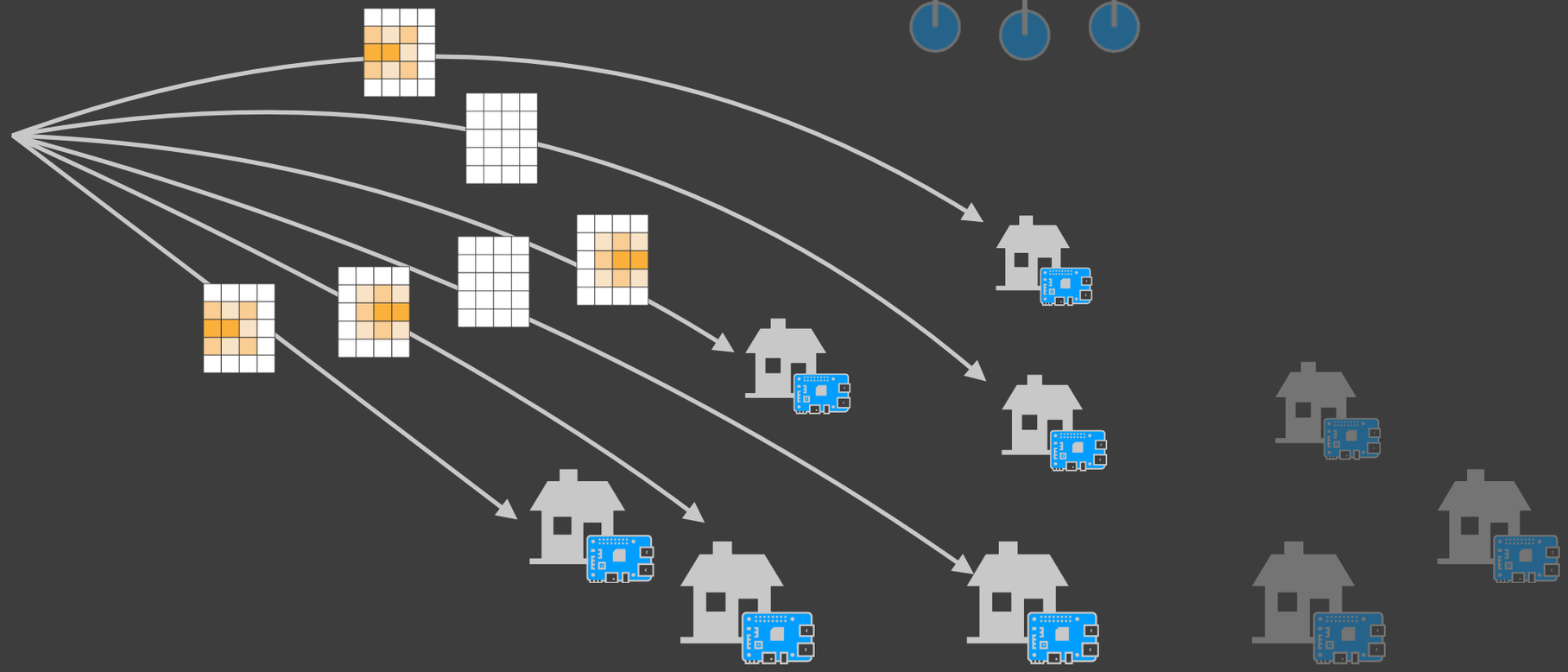


The path of a file

{Stage 1} pre-processing - encryption and redundancy
{Stage 2} authorization
{Stage 3} upload to the swarm



P2P data channels



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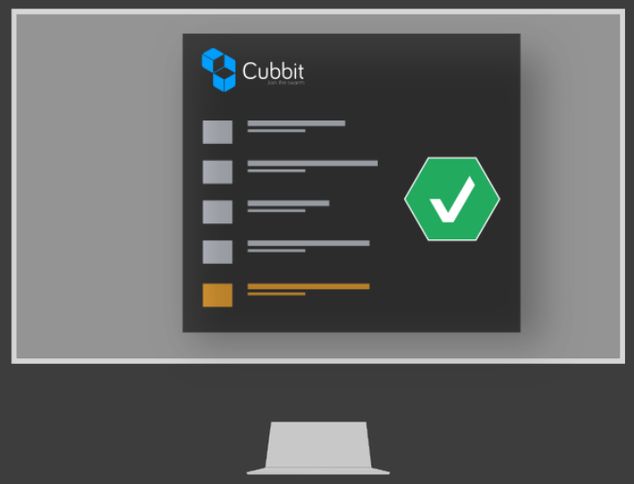
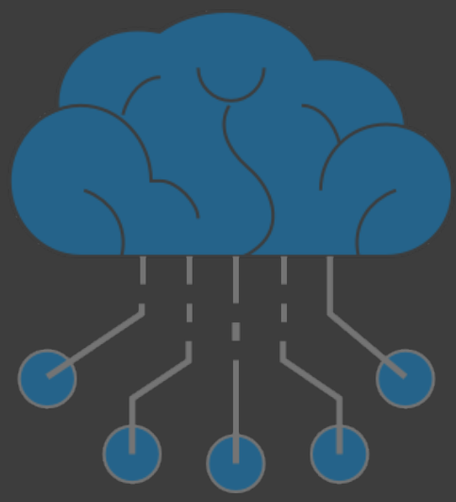
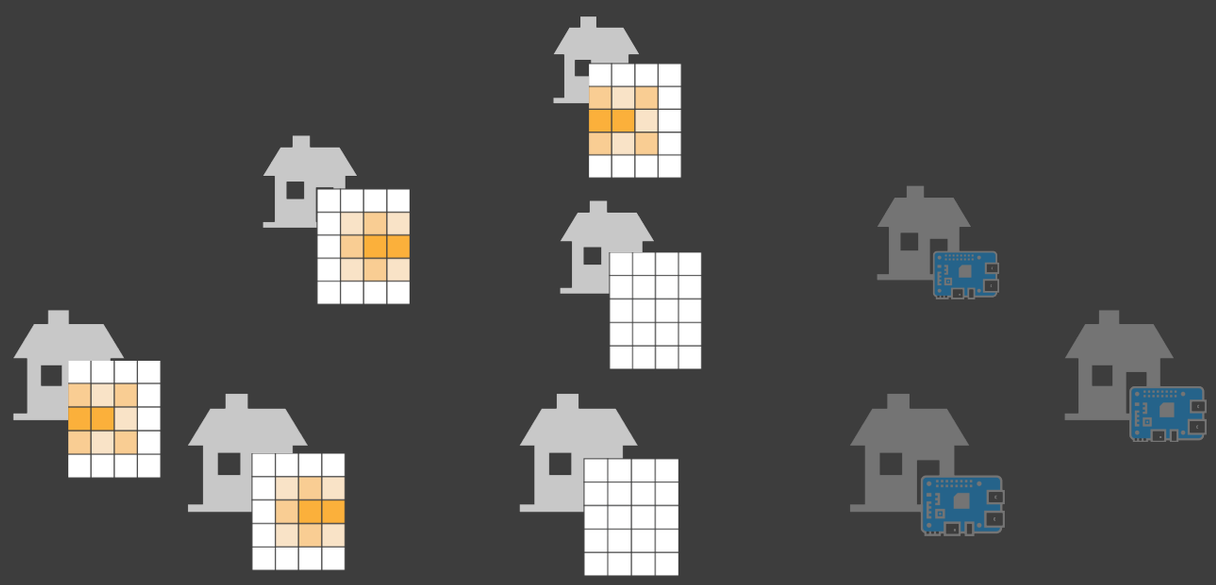
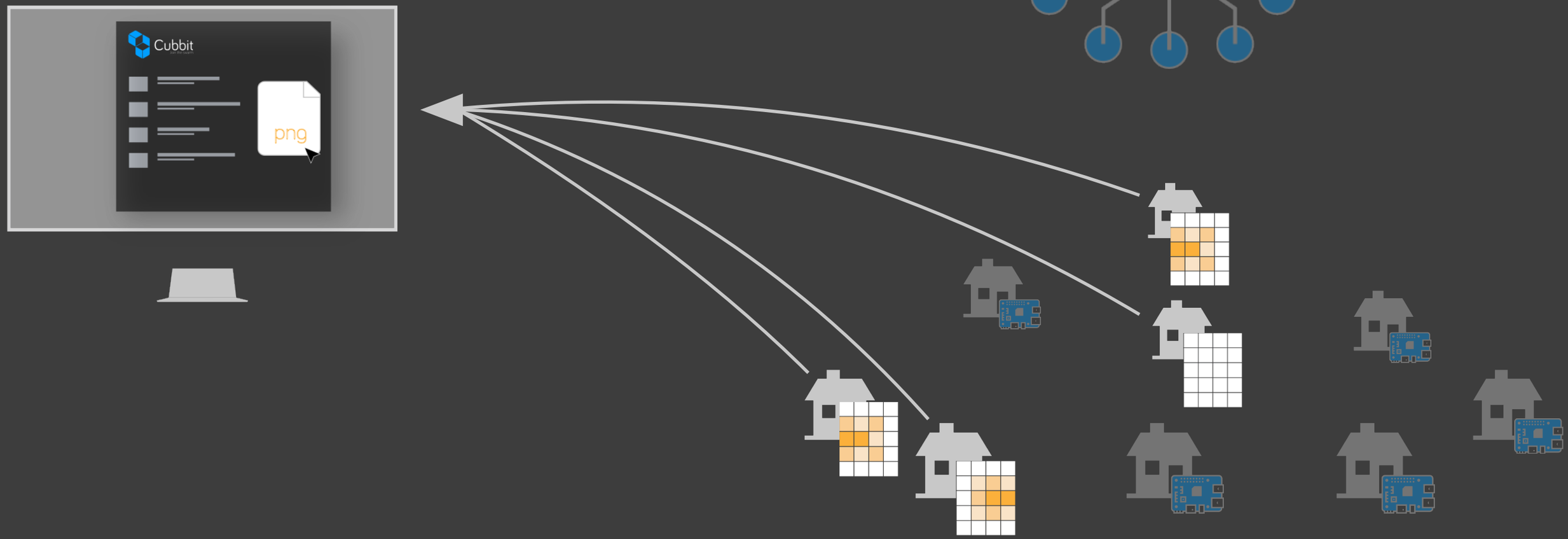




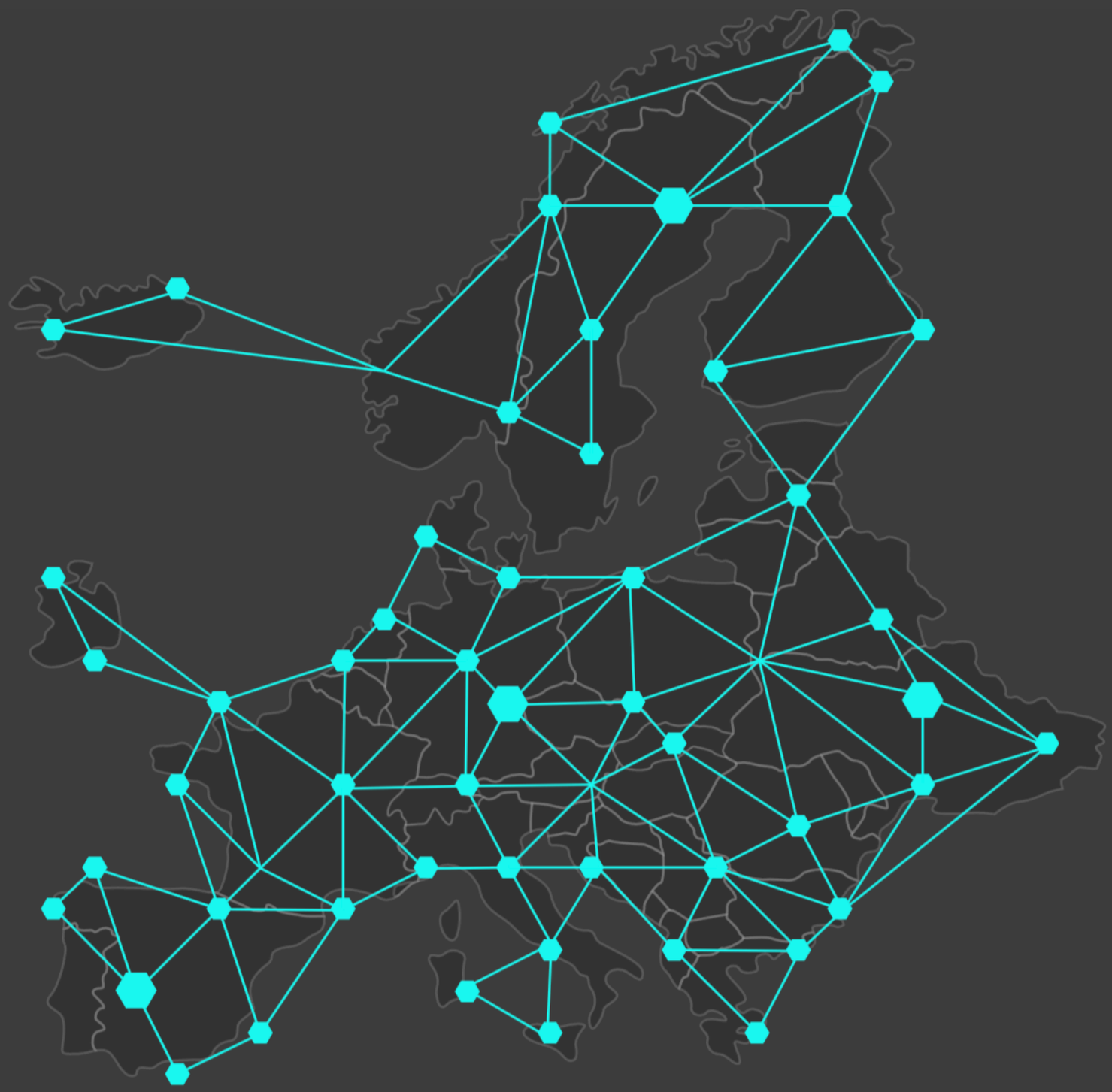


The path of a file

{Download} only need N over N + K shards to retrieve the file!



Advantages of a distributed architecture



Advantages of a distributed architecture

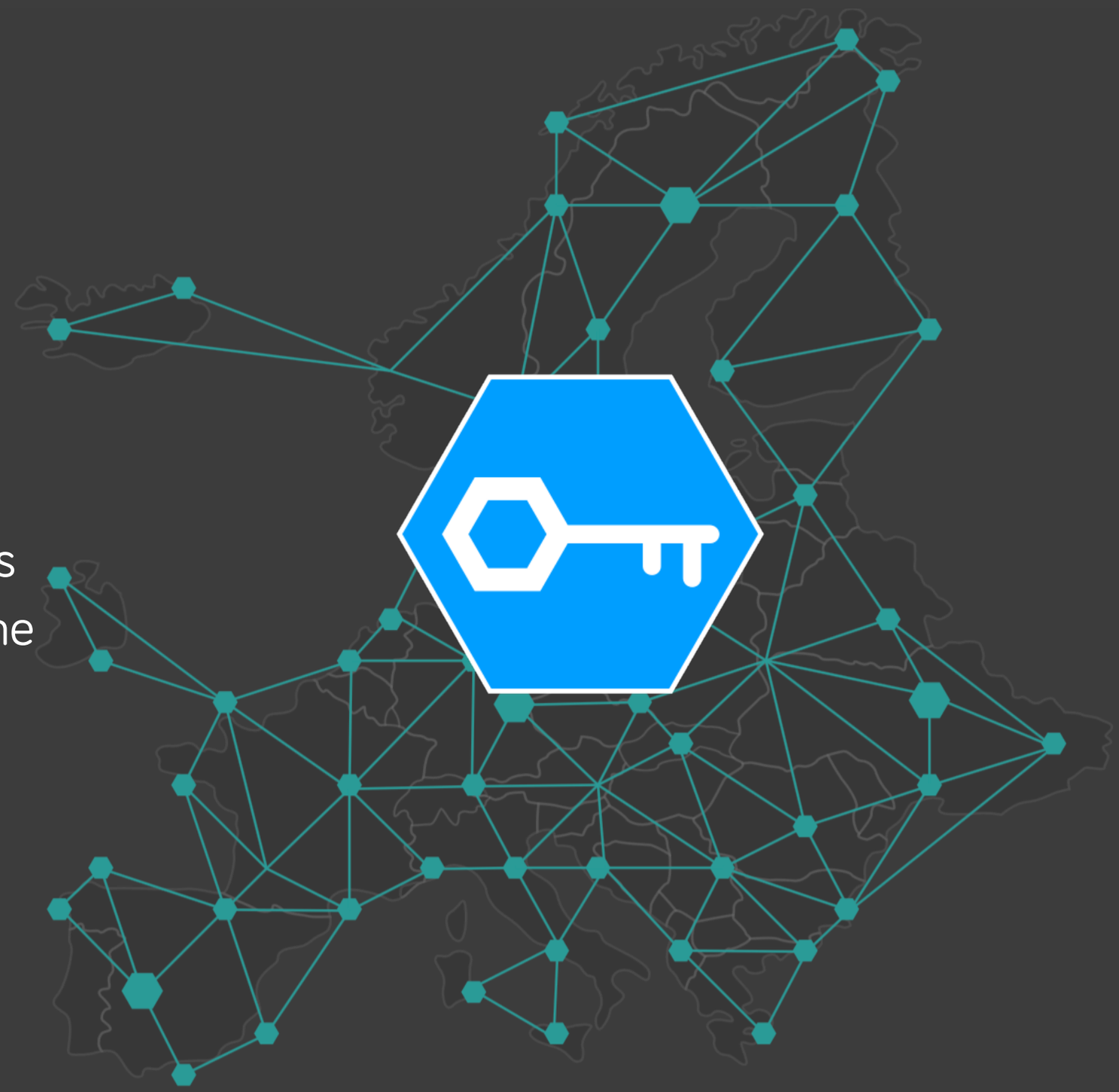
1. Scalability by design

- No construction costs
- No maintenance costs
- No CDN costs
- Low managing cost for users and peers

Advantages of a distributed architecture

1. Scalability by design
2. Security by design
   - Client-side encryption
   - Network resilience to disasters
   - Statistically-guaranteed uptime

P(downtime of a file) < 10^{-9}



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3. Reduced environmental impact

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1. Scalability by design
2. Security by design
3. Reduced environmental impact

270 cycles

~ 190 KWh/year/TB [1, 2]

[1] *Jayant Baliga, Robert W. A. Ayre, Kerry Hinton, and Rodney S. Tucker*
Green Cloud Computing: Balancing Energy in Processing, Storage, and Transport
Proceedings of the IEEE 99.1 (2011): 149-167.

[2] *Lorenzo Posani, Marco Moschettini, and Matteo Monti*
The Environmental Footprint of Distributed Cloud Storage
Draft

Who are we? A growing startup!

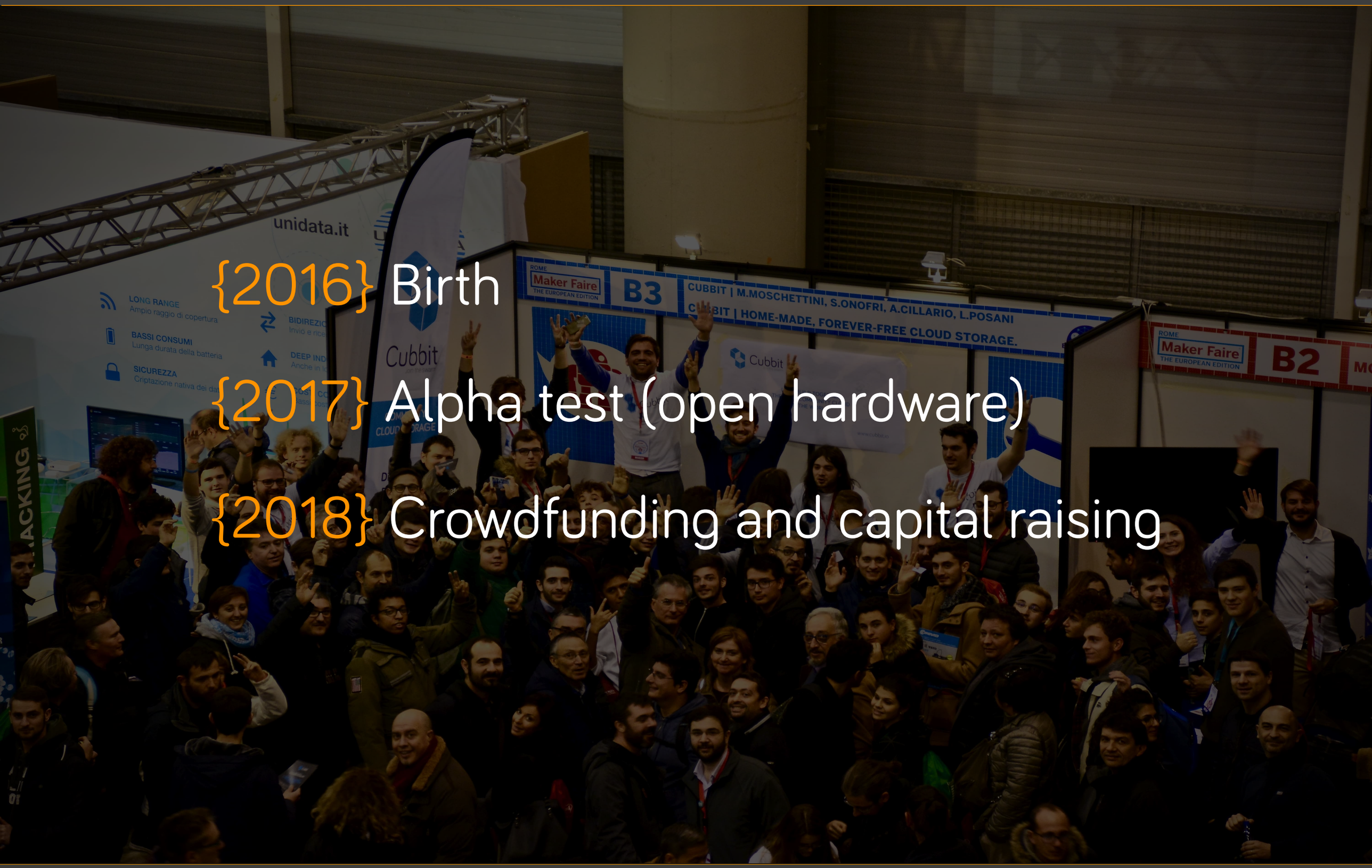
PREMIO NAZIONALE INNOVAZIONE

Barcamper VENTURES

eit Climate-KIC

Who are we? A community!

Where are we? Public alpha test



{2016} Birth

{2017} Alpha test (open hardware)

{2018} Crowdfunding and capital raising

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Today

Unused disk space

↓

Distributed Cloud Storage
Object Storage (B2B)

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Distributed Cloud Storage
Object Storage (B2B)

Tomorrow

Bandwidth and CPU

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Distributed Hosting
Distributed CDN
Distributed VPN
DDoS protection
...

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Community cloud

Thank you for your attention

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