

# Le web décentralisé

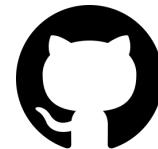
REVOLUTION

Antoine Cailly

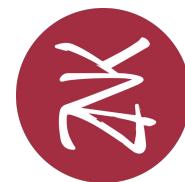
# Qui suis-je ?



@AntoineCailly



acailly



zenika  
<animés par la passion>

Great  
Place  
To  
Work.<sup>®</sup>

Best Workplaces™

50 à 500 salariés

FRANCE

2018

**Il était une fois le web  
en 2018...**



# Censure



Sat Apr 29 2017 08:02:55 GMT+0300 (+03)  
<https://en.wikipedia.org> 5005 DOWN  
<https://tr.wikipedia.org> 5009 DOWN  
<https://az.wikipedia.org> 5009 DOWN  
<https://fr.wikipedia.org> 5007 DOWN  
<https://www.wikipedia.org> 5007 DOWN



Turkey Blocks

@TurkeyBlocks



Suivre

Confirmed: All editions of the [#Wikipedia](#) online encyclopedia blocked in [#Turkey](#) as of 8:00AM local time [turkeyblocks.org/2017/04/29/wik...](http://turkeyblocks.org/2017/04/29/wik...)

07:22 - 29 avr. 2017



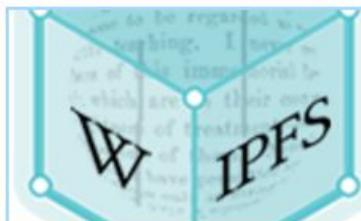
86



2 875



1 015



# Vikipedi'ye hoş geldiniz

Herkesin katkıda bulunabildiği Özgür Ansiklopedi

Türkçe madde sayısı: 288.931

9 Ocak 2017, Pazartesi

- Bilim

- Coğrafya

- Din

- Fizik

- Matematik

- Sanat

- Spor

- Tarih

- Tüm portaller

## Haftanın seçkin maddesi



**Mars**, Güneş Sistemi'nin Güneş'ten itibaren dördüncü gezegeni. Roma mitolojisindeki savaş tanrıları Mars'a ithafen adlandırılmıştır. Yüzeyindeki yaygın demir oksitten dolayı kızılımsı bir görünümü sahip olduğu için *Kızıl Gezegen* de denir. İnce bir atmosferi olan Mars gerek Ay'daki gibi meteor kraterlerini, gerekse Dünya'daki

gibi volkan, vadi, çöl ve kutup bölgelerini içeren çehresiyle bir *yerbenzeri gezegendir*. Ayrıca dönme periyodu ve mevsim dönemleri Dünya'ninkine çok benzer.

<https://ipfs.io/ipfs/QmT5NvUtoM5nWFfrQdVrFtvGfKFmG7AHE8P34isapyhCxX/wiki/Anasayfa.html>

Güneş Sistemi'nde bilinen en yüksek dağ ve *Marineris Vadisi* adlı kanyon en büyük kanyondur. Ayrıca Haziran

2008'de *Nature* dergisinde yayımlanan üç makalede

## Günün seçkin resmi





# Referèndum 2017

Inici

Normativa electoral

Sindicatures electorals

Sala de premsa

Com s'ha de votar

On votar



## Col·laboradors del referèndum

### El més destacat

- Material per descarregar
- Calendari electoral
- Call for international monitoring

### Preguntes més freqüents

Electors

Calendari electoral

Mesos electorals

# Suppression des données





**Donald J. Trump**   
@realDonaldTrump



Suivre

It's freezing in New York—where the hell is global warming?

21:37 - 23 avr. 2013



397



470



281



# Trump Just Deleted Obama's Climate Change Webpages



By Brian Kahn

Follow @blkahn

9,117 followers



Published: January 20th, 2017

At the exact hour when the presidency transferred hands, the Obama administration's climate and energy webpages became some of the first casualties of the new Trump administration.

In their place is an "["America first" energy plan](#)", which talks at length about tapping fossil fuel resources in the U.S. but makes no mention of climate change or renewable energy. Investing in the latter will be crucial to avert catastrophic changes to the world.



<http://www.climatecentral.org/news/trump-delete-climate-change-webpage-21091>

*Obama's climate page has been sent off to the archive.*

# Building refuge for federal climate & environmental data

DataRefuge helps to build refuge for federal data and supports climate and environmental research and advocacy. We are committed to fact-based arguments. DataRefuge preserves the facts we need at a time of ongoing climate change.

This site is one part of the project. The vast majority of the government information gathered through this project is available from the Internet Archive through the [End of Term project](#). This data catalog is a place to store data that is difficult or impossible to harvest through web crawlers. Data was added to this site by volunteers at [Data Rescue events](#). You can see the [workflow](#) used at many of these events on the Data Refuge project site, however this workflow is no longer supported.





**maxwell ogden**  
@denormalize

 Suivre

Today Trump removed all open data (9GB) from the White House [open.whitehouse.gov/browse](https://open.whitehouse.gov/browse) but I grabbed it all Jan 20! Will distribute soon

21:12 - 14 févr. 2017

288 8 854 12 877

# Shared with Dat

Explore public data shared with Dat.



EXECUTIVE OFFICE OF THE PRESIDENT

**Archive of open.whitehouse.gov**

Backup of the open data released by President Barack Obama  
before being deleted in February, 2017.

Preview

<https://datproject.org/explore>



# Centralisation des services



Recherche



Maps



YouTube



Play



Actualités



Contacts



Drive



Agenda



Docs



Traduction



Photos



Inbox



WhatsApp



waze



Instagram



ANDROID



chrome

A large blue square containing the white text "DELETE facebook".

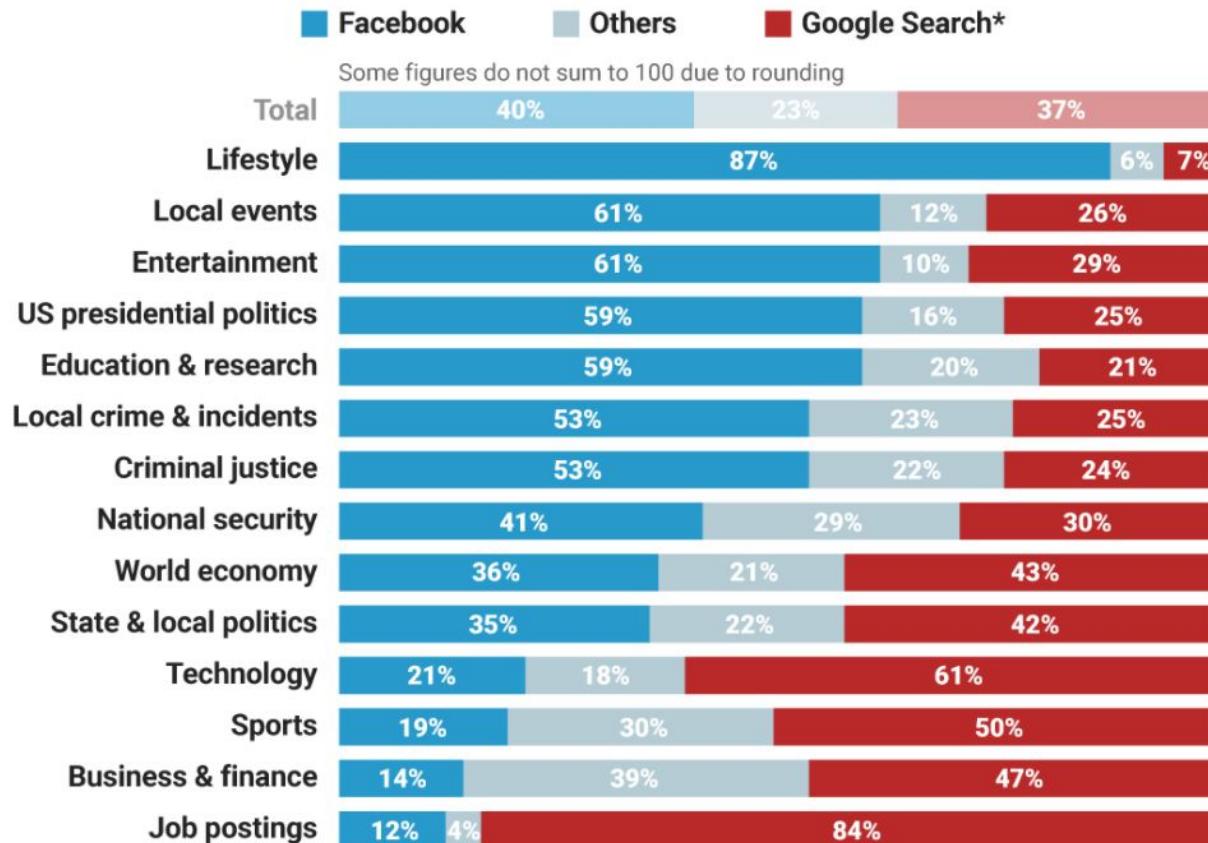
**DELETE**  
**facebook**

et Google, Amazon, Microsoft, Apple, Uber...

# Centralisation du trafic



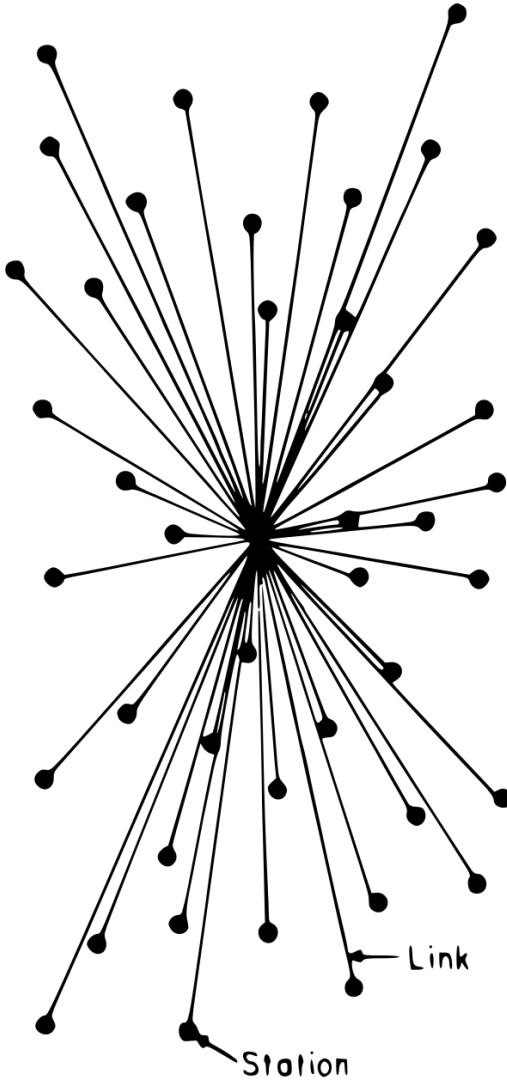
# DISTRIBUTION OF REFERRAL TRAFFIC SOURCES BY TOPIC



SOURCE: Parse.ly \*Not including Google AMP

statista | BUSINESS INSIDER

**Un point  
commun ?**



Station

Link

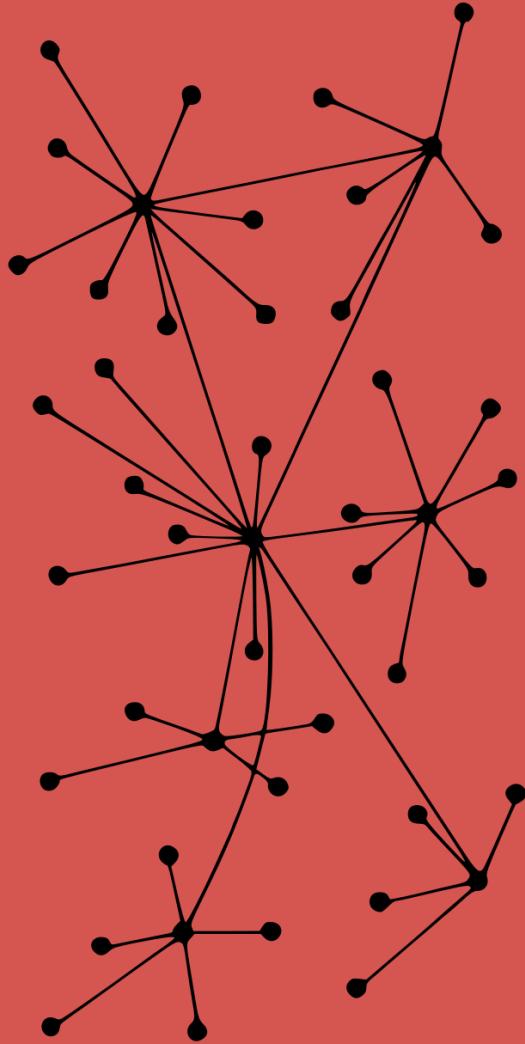
**Single  
point of**

**failure**

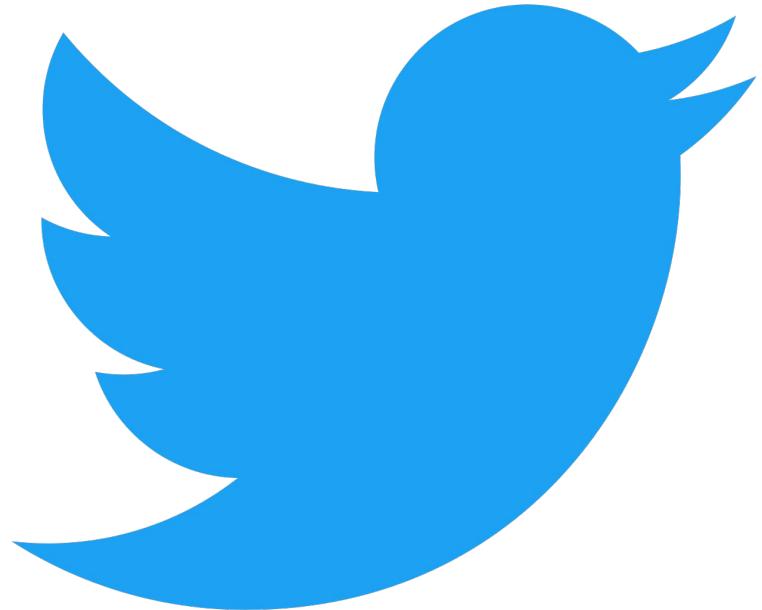
**Single  
point of  
control**

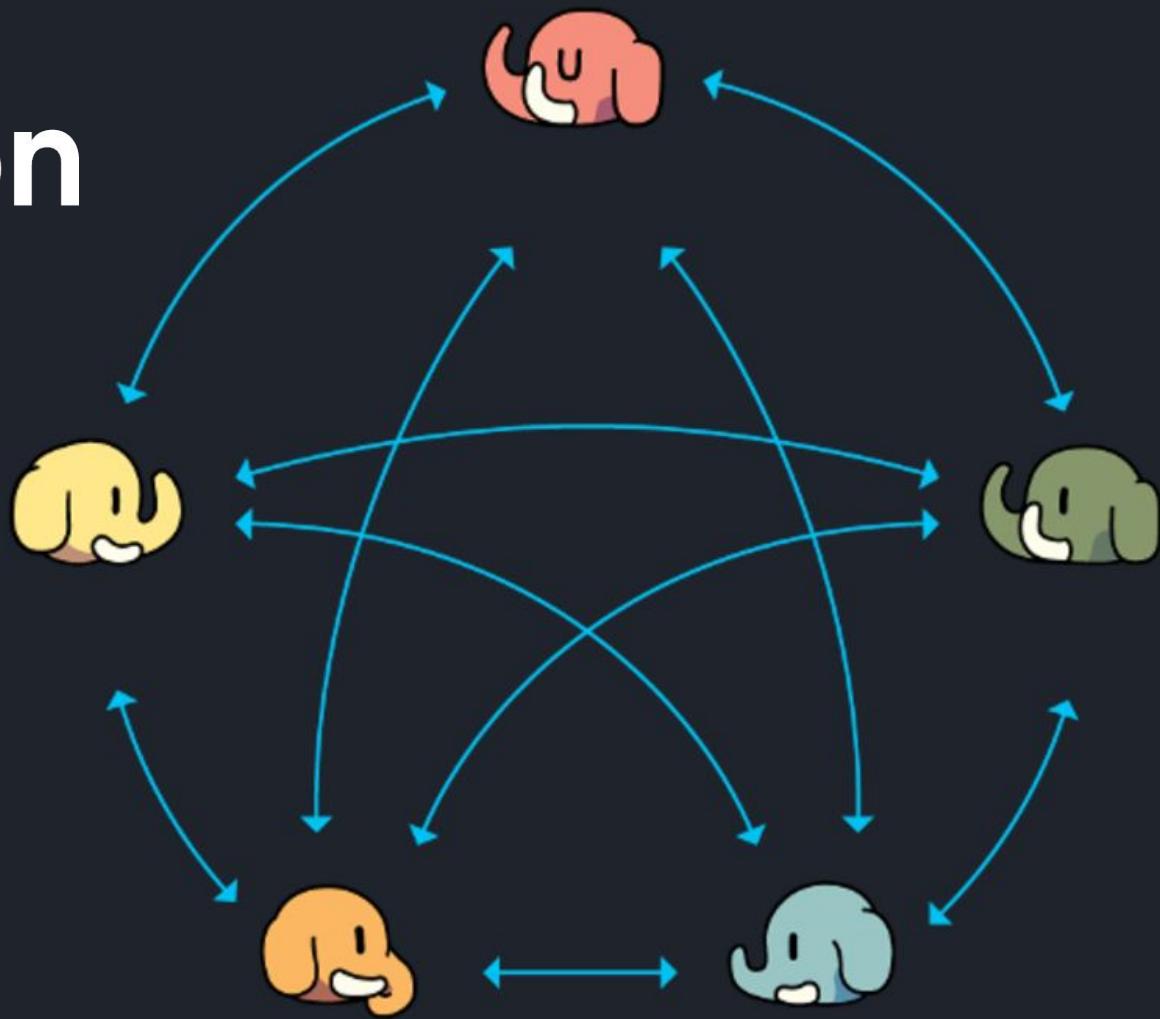
A hand is holding a lit incandescent lightbulb against a solid red background. The lightbulb is illuminated, casting a bright glow that fades into the surrounding red. The hand is visible from the side, gripping the bulb's base.

**Une solution ?**



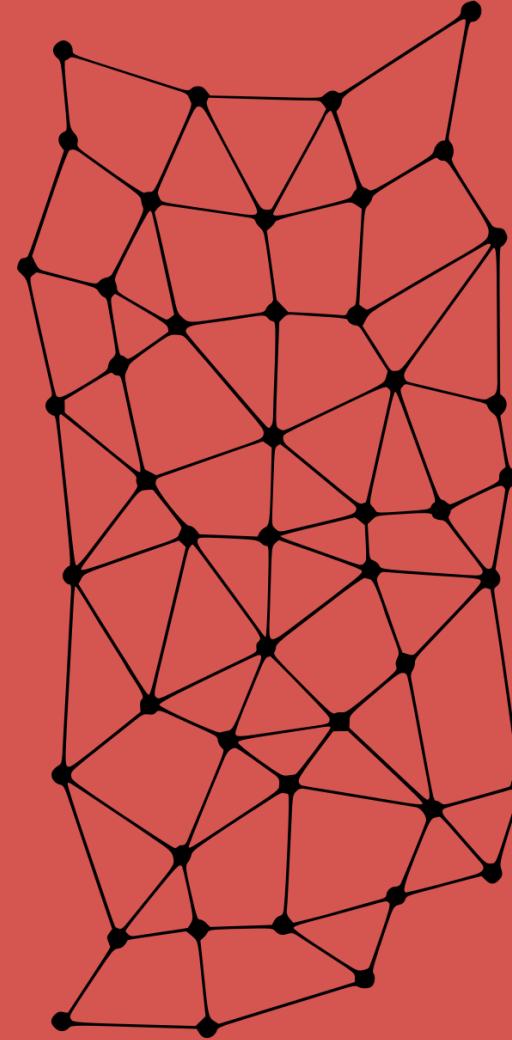
# Décentralisé

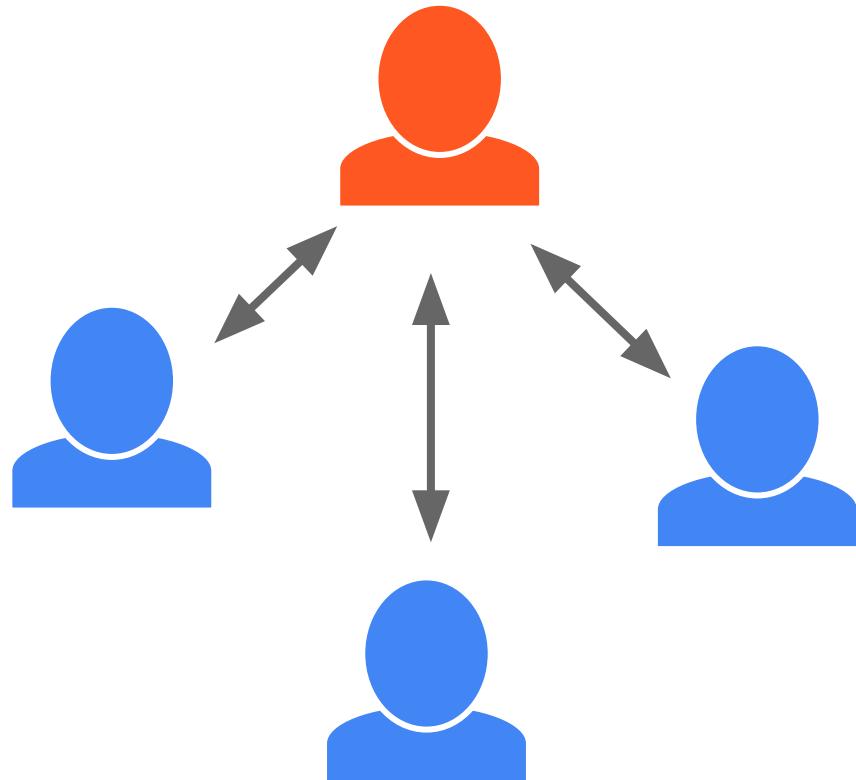




<https://joinmastodon.org/>

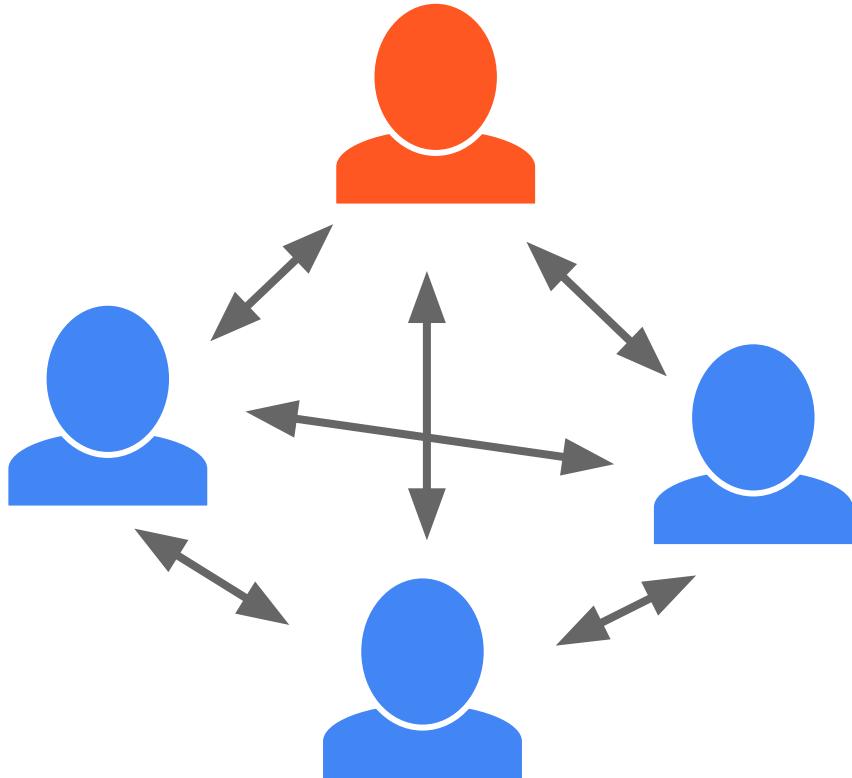
# Distribué

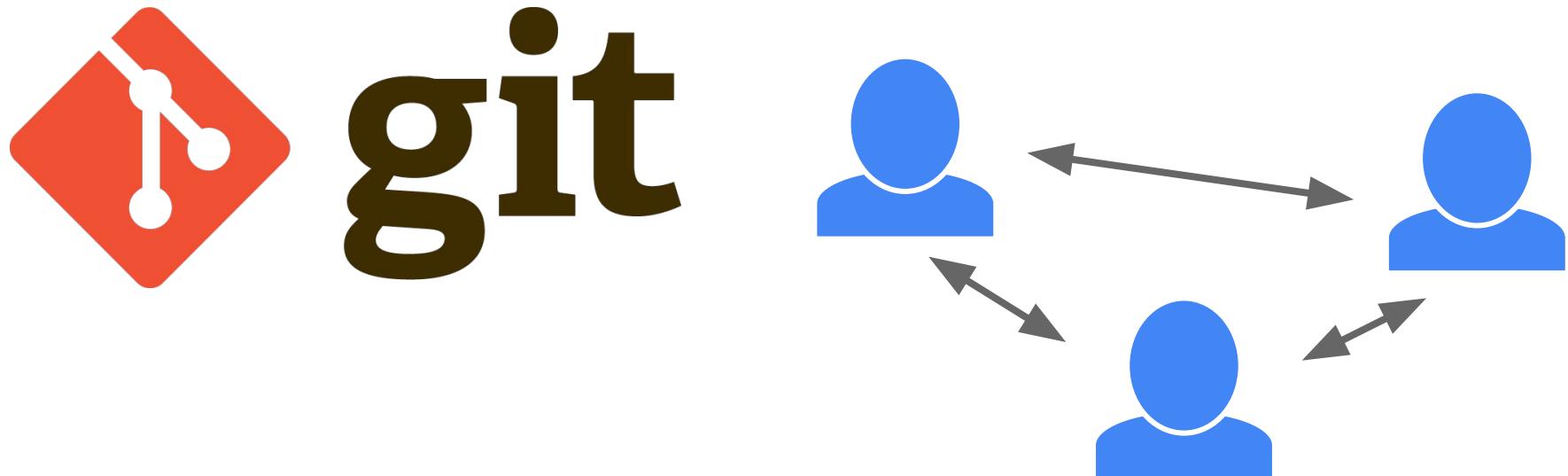






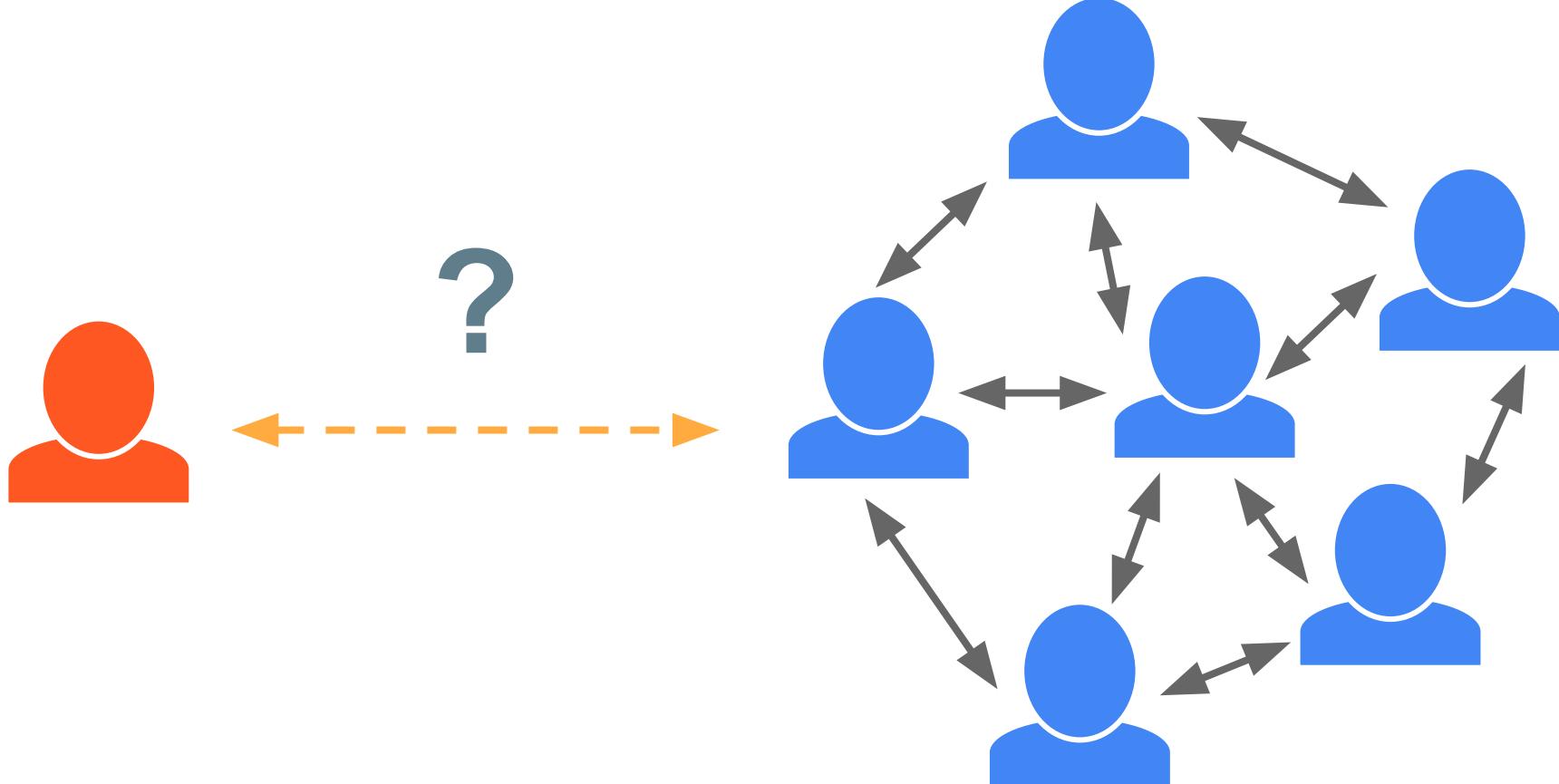
git





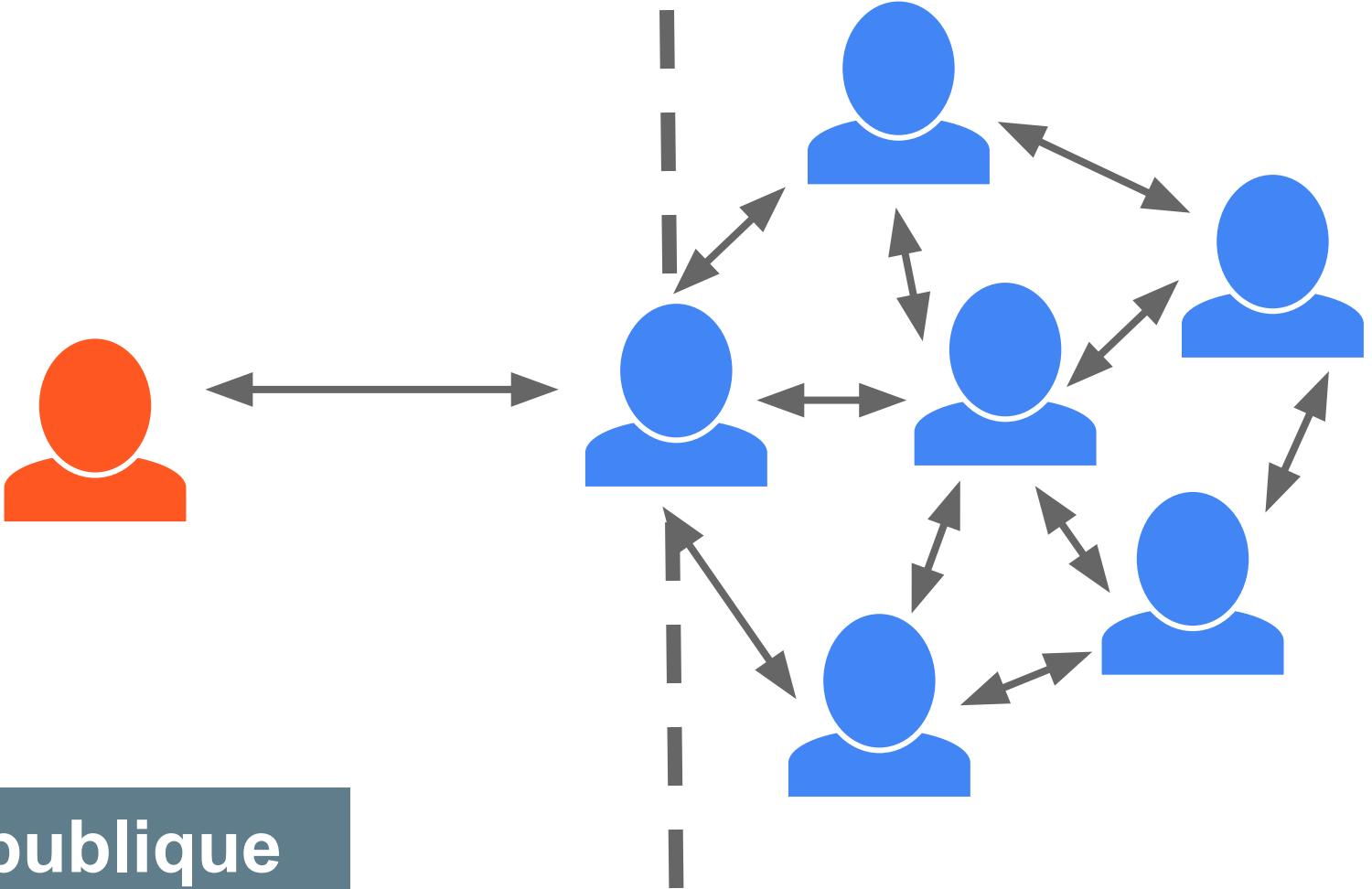


# **Comment ça marche ?**

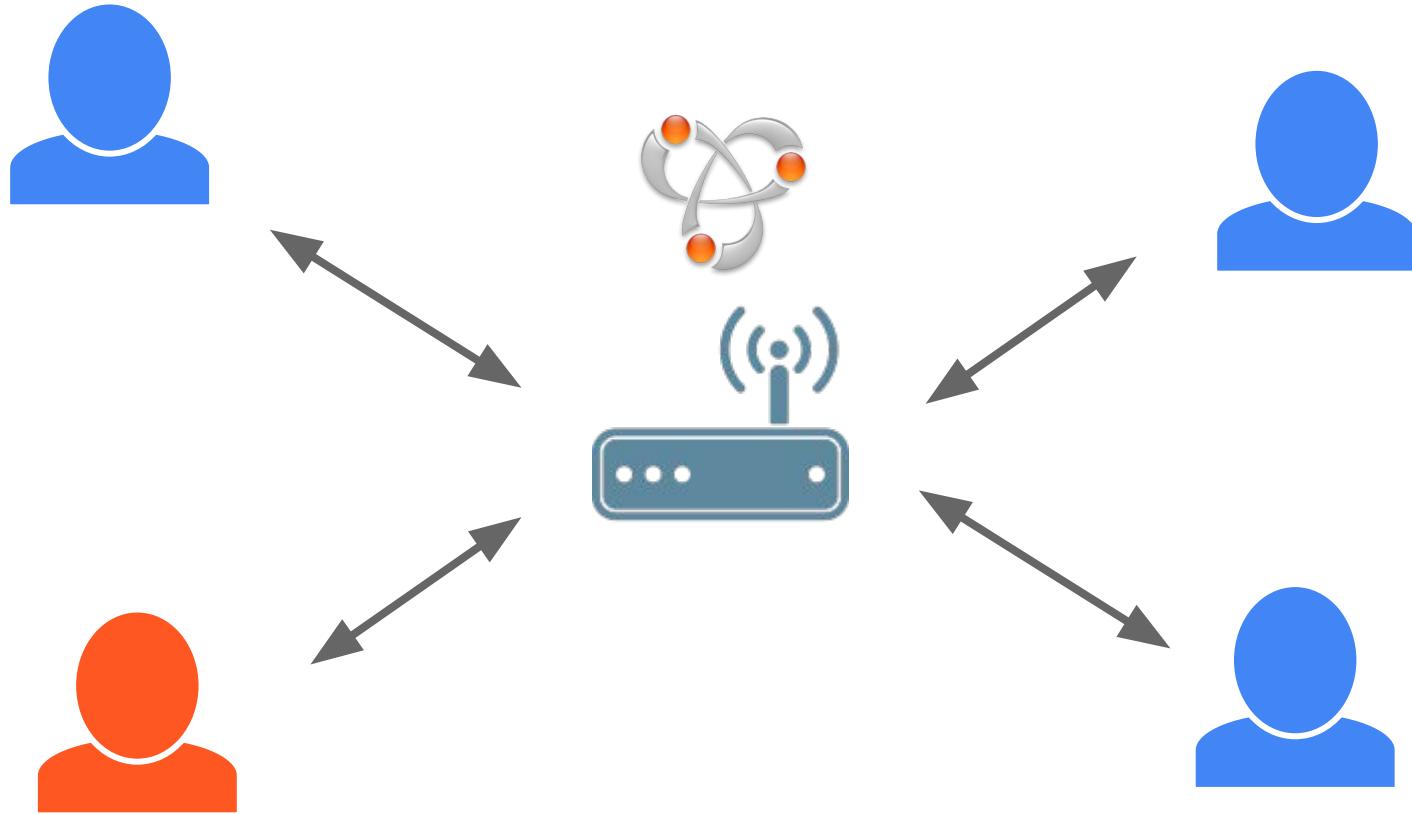


# Bootstrapping





Node publique



Multicast DNS (ZeroConf, Apple Bonjour)

# Démo

Trouver une node  
publique Bitcoin

PS C:\\_Projets\Perso\doc> nslookup bitseed.xf2.org

Serveur : dns2.proxad.net

Address: 212.27.40.241

Réponse ne faisant pas autorité :

Nom : bitseed.xf2.org

Addresses: 24.52.35.44

50.177.196.160

68.48.214.241

76.111.96.126

85.214.90.1

94.226.111.26

96.2.103.25

97.117.255.48

99.242.230.163

162.243.194.210

173.69.49.106

198.38.93.227

209.208.110.92

PS C:\\_Projets\Perso\doc> nslookup bitseed.xf2.org

Serveur : dns2.proxad.net

Address: 212.27.40.241

Réponse ne faisant pas autorité :

Nom : bitseed.xf2.org

Addresses: 24.52.35.44

50.177.196.160

68.48.214.241

76.111.96.126

85.214.90.1

✓ 85.214.90.1:8333 /Satoshi:0.15.99(UASF-SegWit-BIP148)/

99.242.230.163

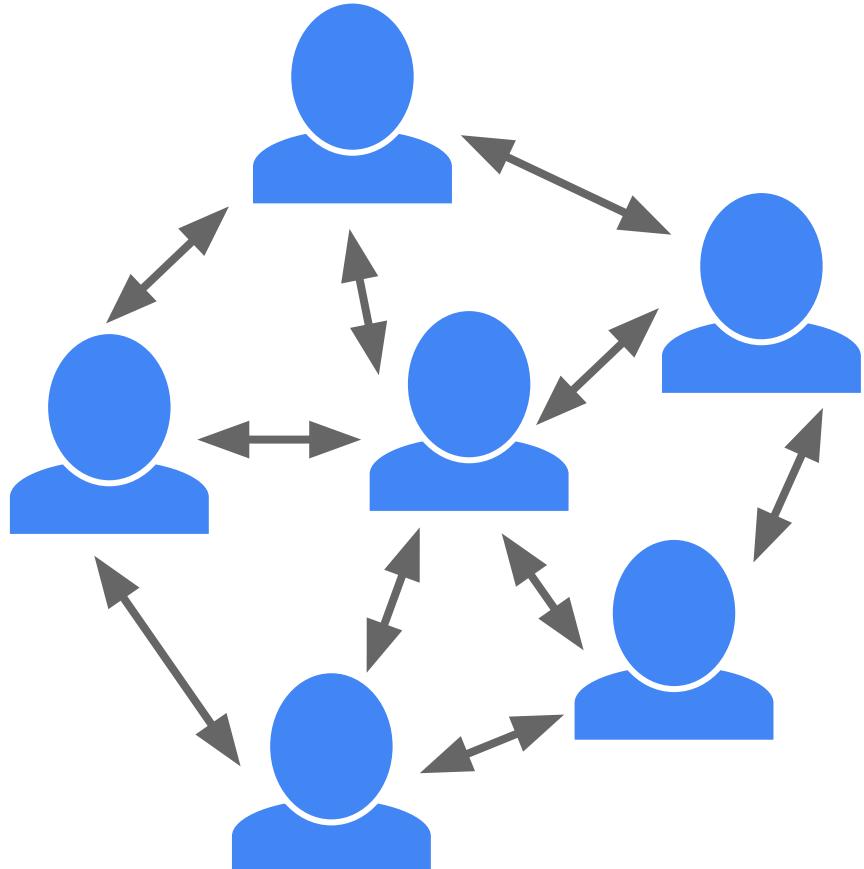
162.243.194.210

173.69.49.106

198.38.93.227

209.208.110.92

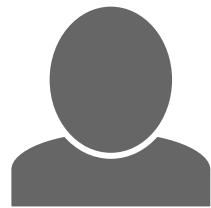
# foo.txt ?



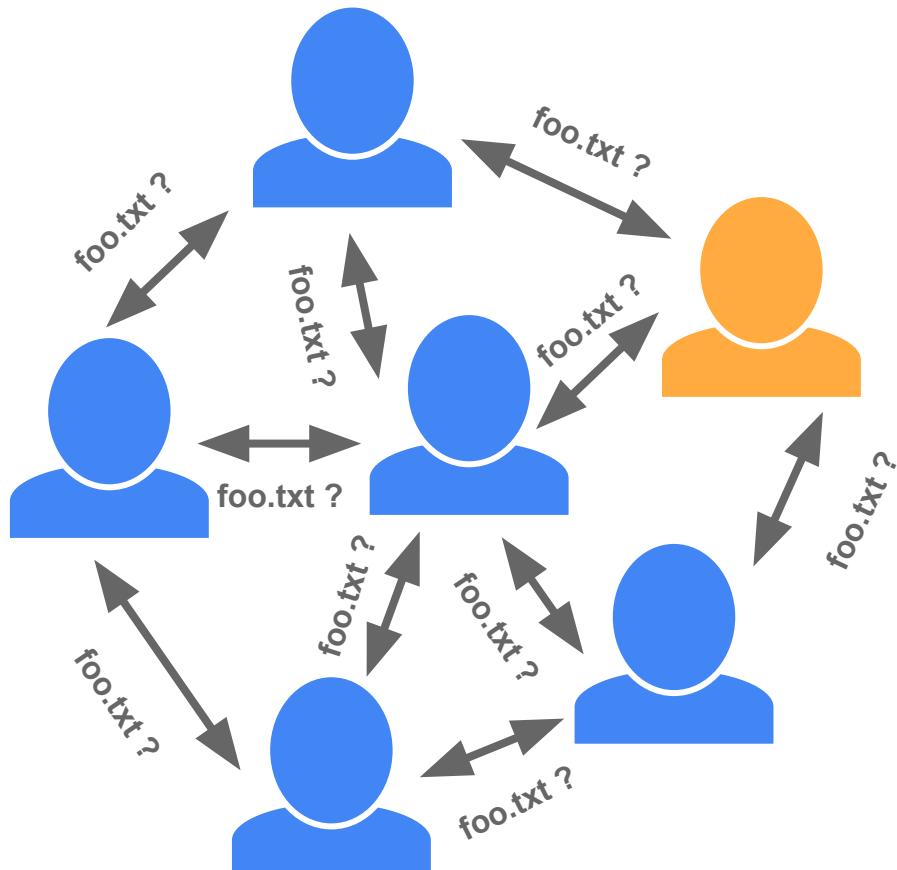
# Discovery

**Retour dans les années  
2000...**

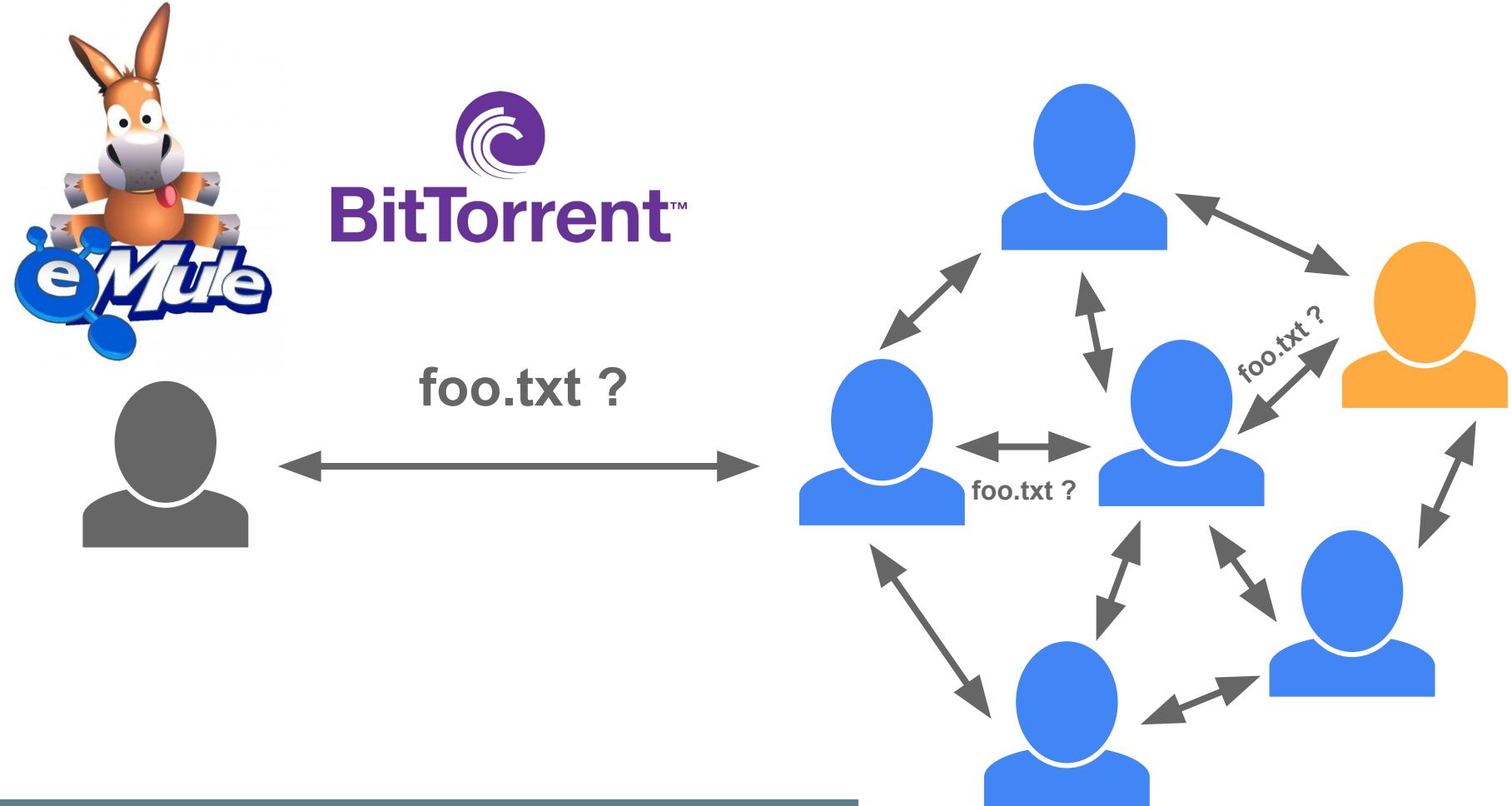
# gnutella



foo.txt ?



Query Flooding

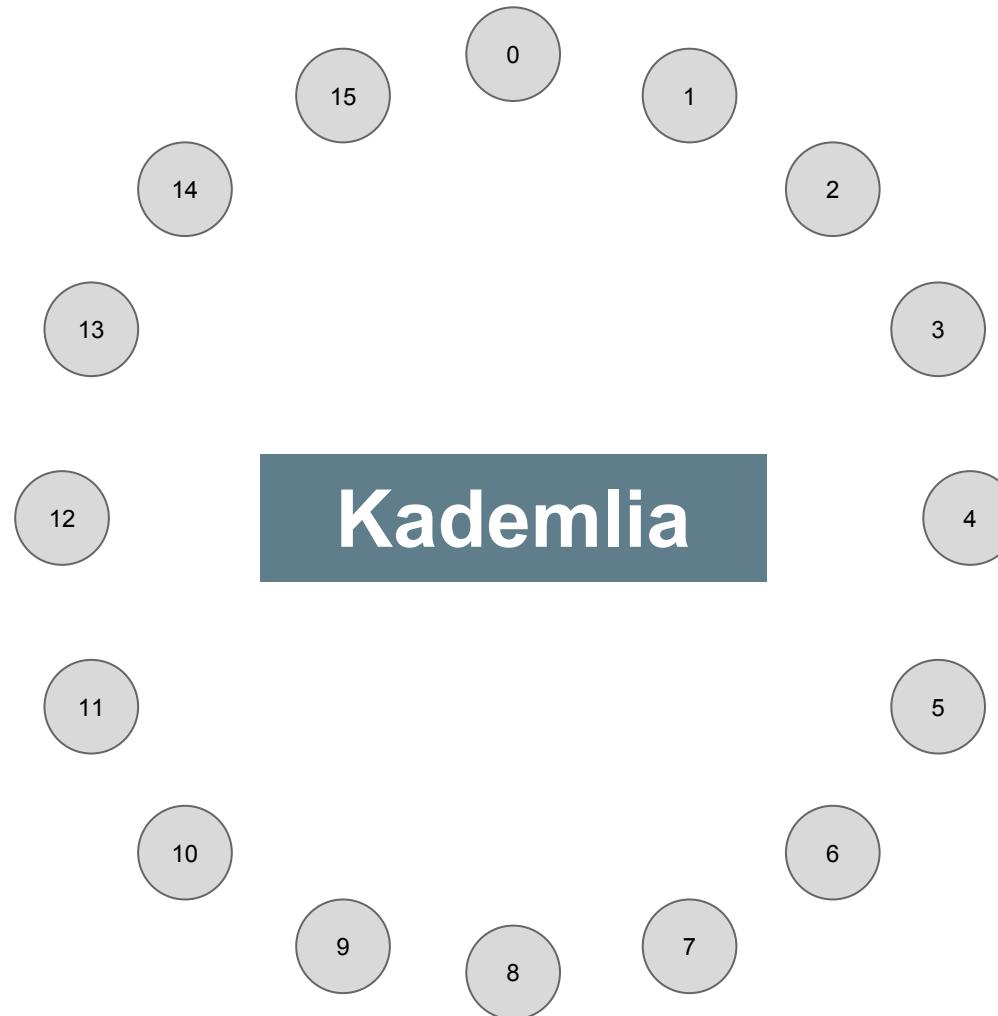


# Distributed Hash Table

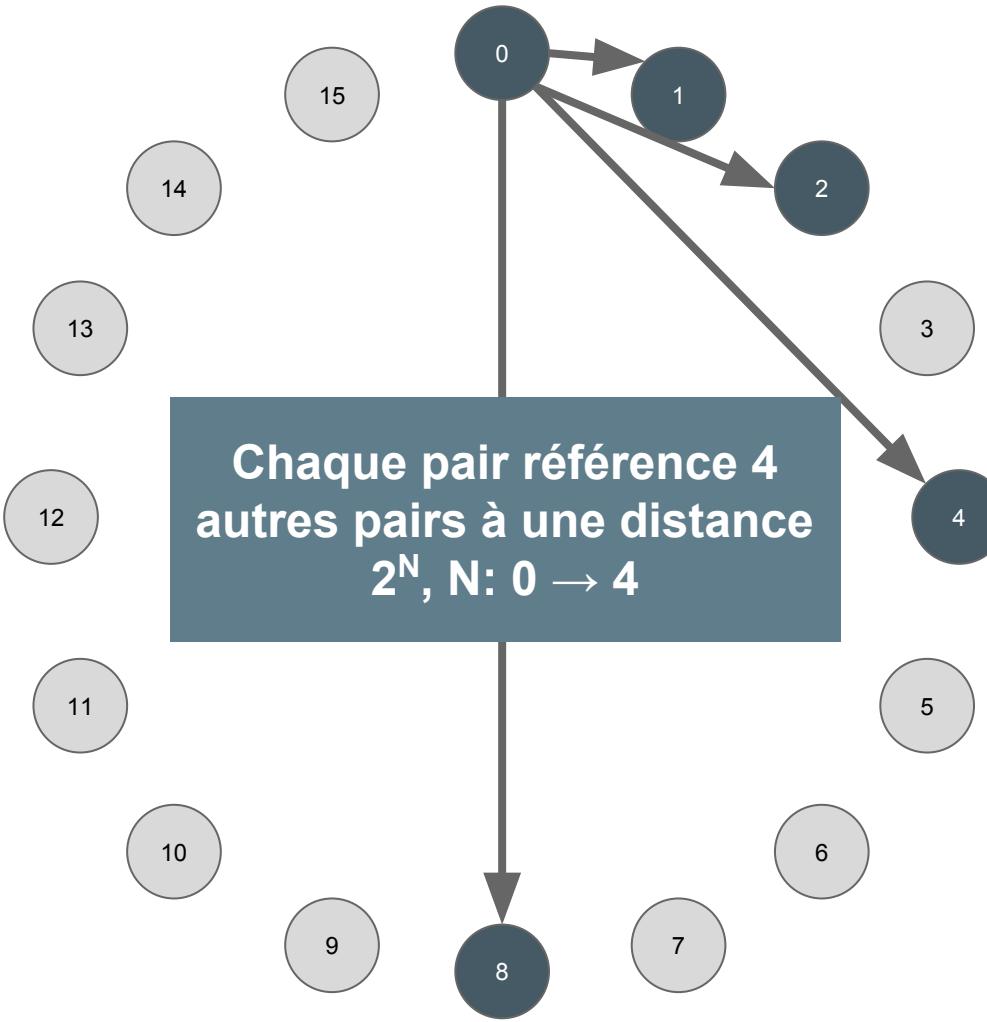
# **Distributed Hash Table**

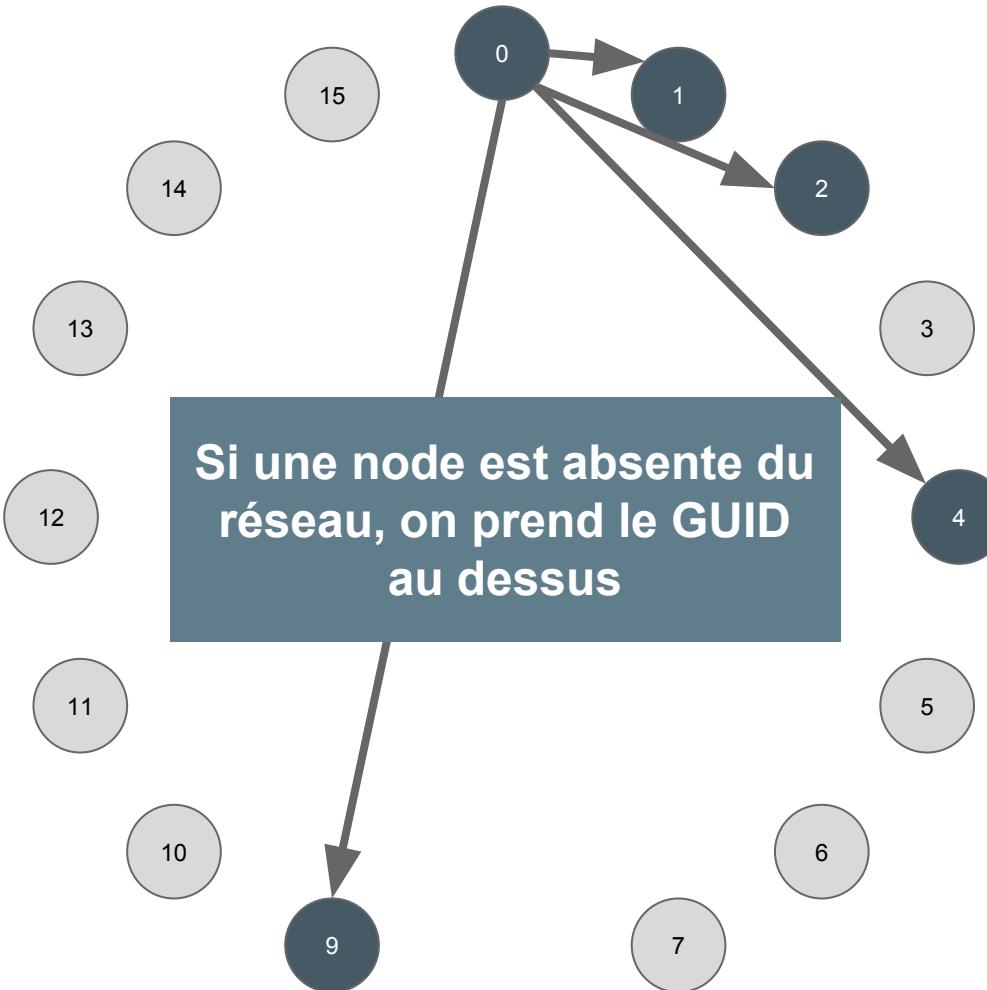
# **DHT ?**

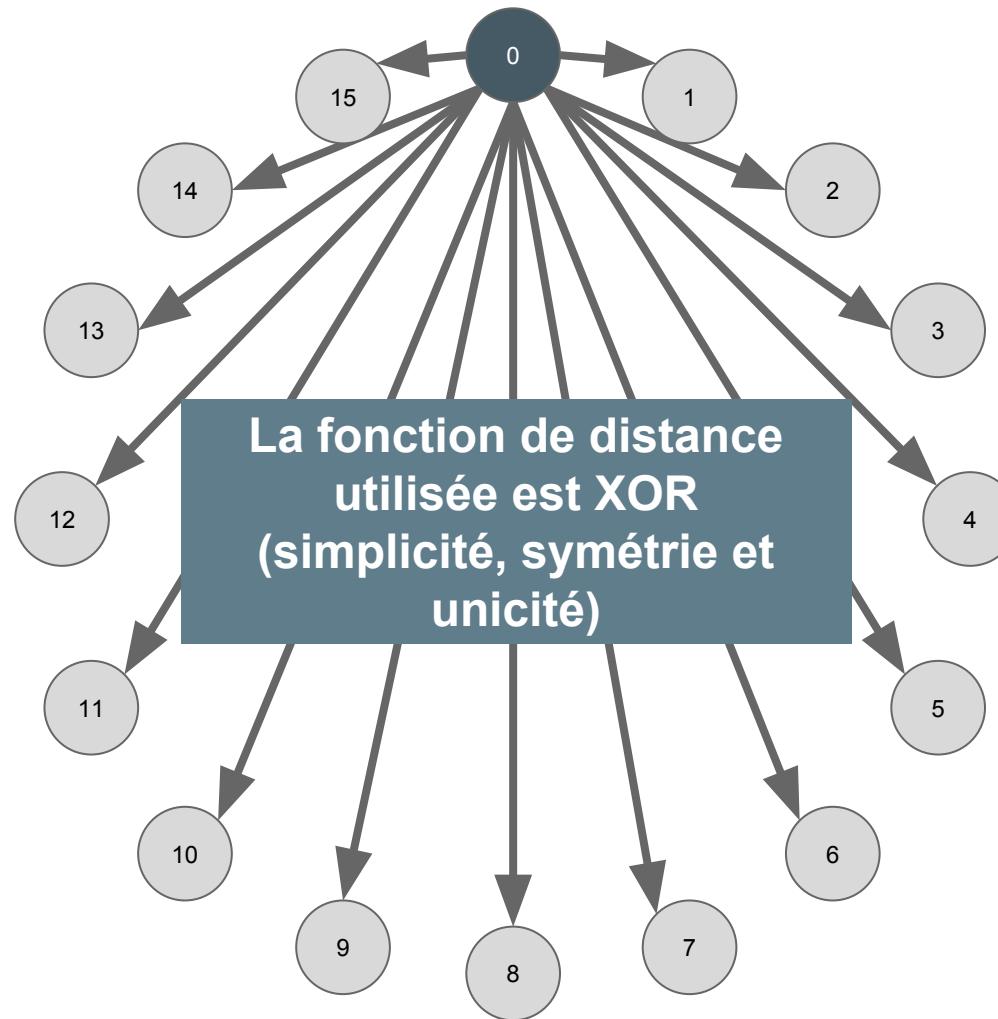
# Kademlia



**GUID sur 4 bits**  
**0 → 15**  
**15 pairs max.**







0

qui possède  
foo.txt ?

15

14

1

2

13

3

12

4

11

5

10

6

9

7

8

*infohash(foo.txt) = 15*

0

15

14

qui possède  
foo.txt ?

1

2

13

3

12

4

11

5

10

6

9

7

8

il sait !

$\text{infohash}(\text{foo.txt}) = 15$

15

0

1

14

2

13

3

12

4

11

5

10

6

9

7

qui possède  
foo.txt ?

On prend le plus près

8

9

7

6

5

10

11

12

13

14

15

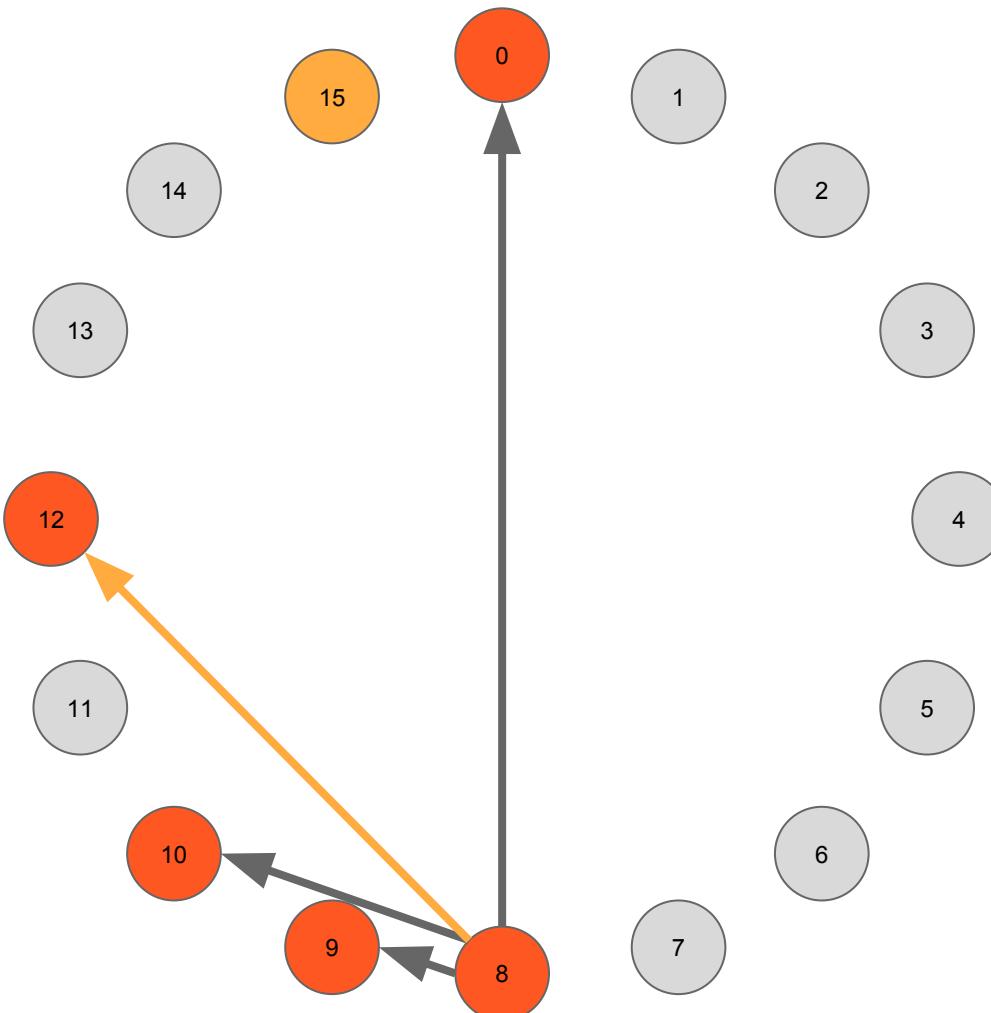
0

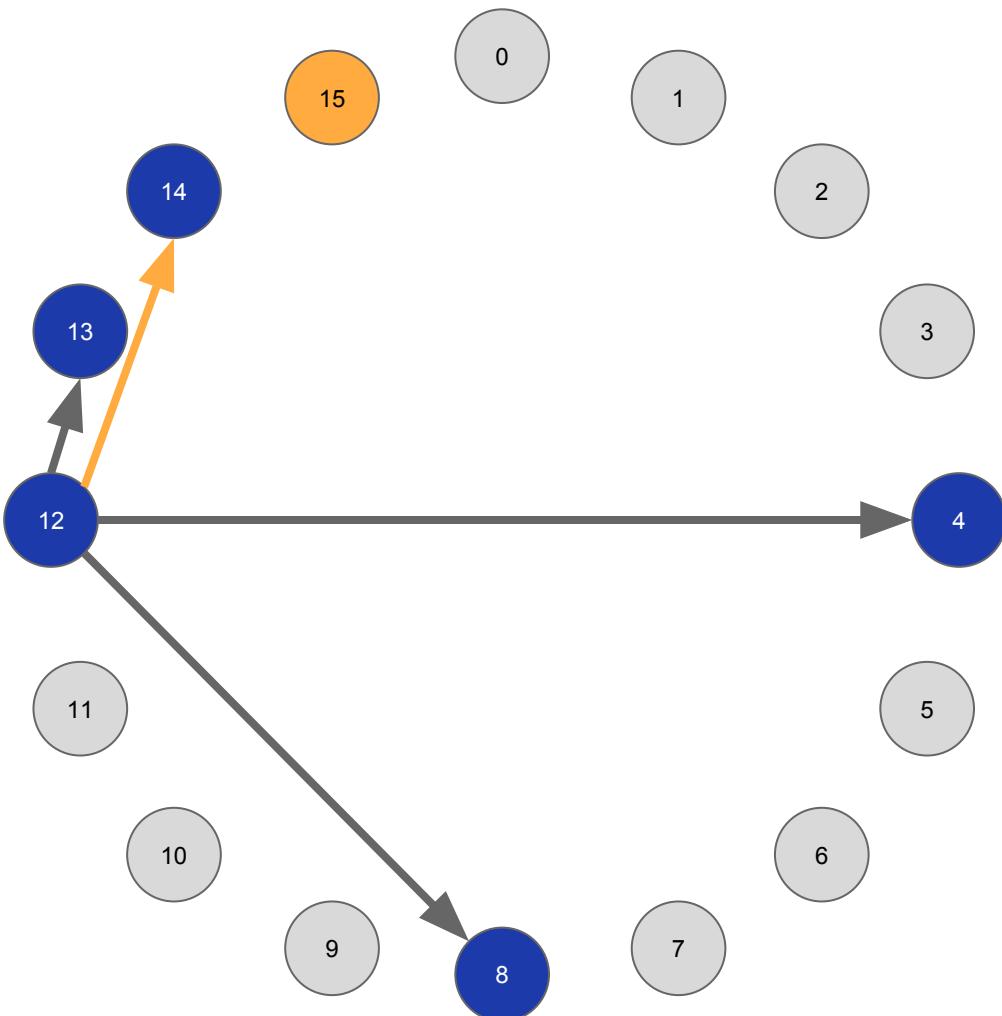
1

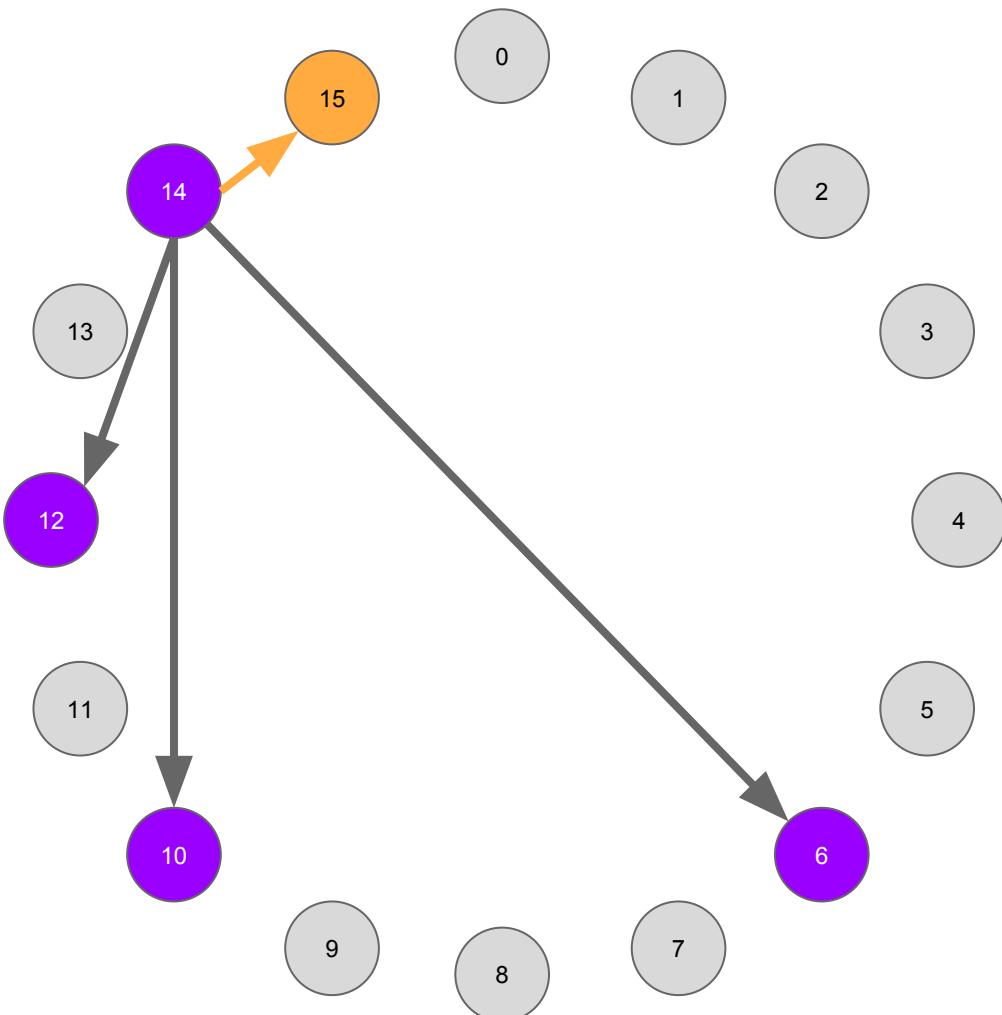
2

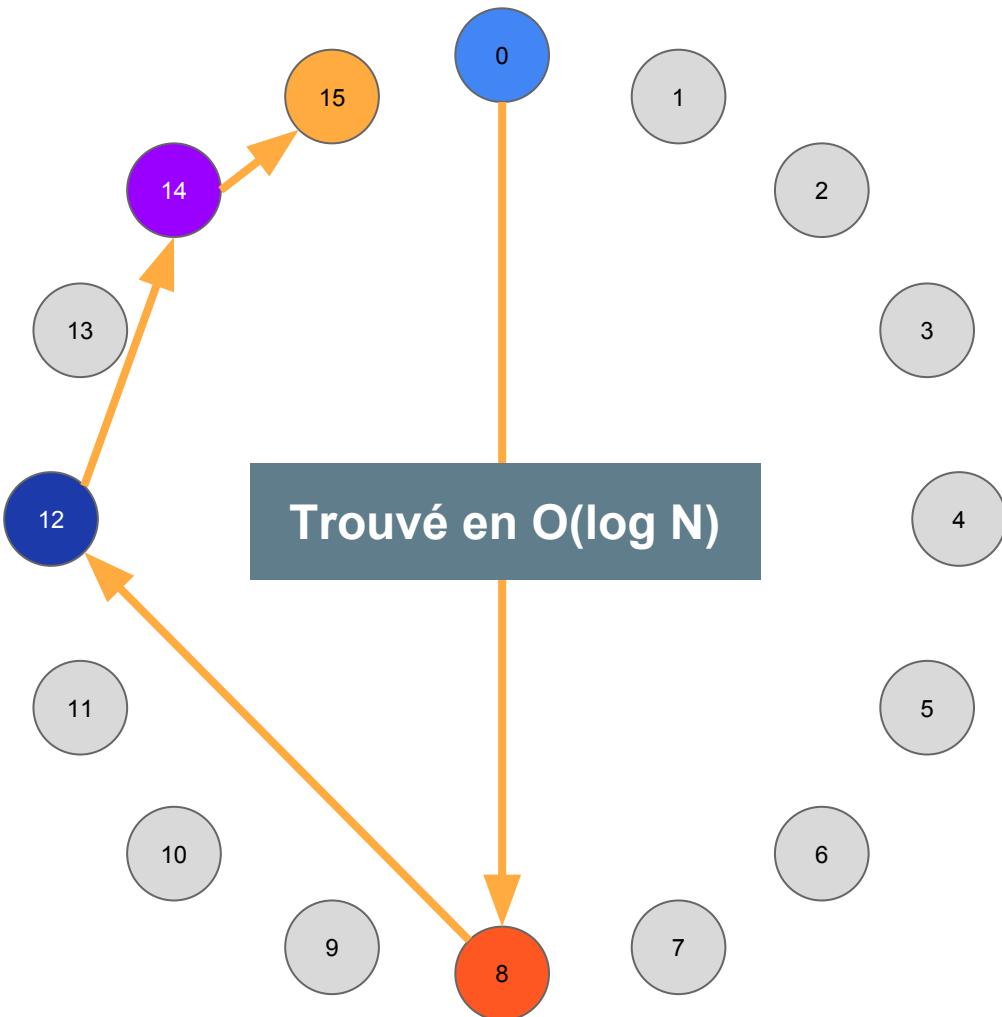
3

4









# Démo

Les magnet links  
sur Bittorrent

# Hadopi

**Haute Autorité pour la diffusion des œuvres  
et la protection des droits sur internet**

TELEMA ET LE STUDIO CANAL+ PRESENTENT UN FILM

PRODUIT PAR CHARLES GASSOT

# LE FILM DE LES NULS<sup>®</sup>



## LA CITE DE LA PEUR

Une comédie familiale.

RÉALISÉ PAR ALAIN BERBERIAN

TELEMA ET LE STUDIO CANAL+ PRESENTENT UN FILM PRODUIT PAR CHARLES GASSOT LE FILM DE LES NULS LA CITE DE LA PEUR UNE COMEDIE FAMILIALE

CHANTAL LAUBY • ALAIN CHABAT • DOMINIQUE FARRUGIA • GERARD BARRONI • SAM KAHAN

SCÉNARIO ORIGINAL CHANTAL LAUBY ALAIN CHABAT DOMINIQUE FARRUGIA • DIRECTEUR DE LA PHOTOGRAPHIE LAURENT DAILLAND

MUSIQUE PHILIPPE CHANY • MONTAGE VÉRONIQUE PARNET

PRODUCTEUR DÉLEGUÉ CHARLES GASSOT • PRODUCTEUR EXÉCUTIF DOMINIQUE BRUNNER

UNE PRODUCTION TELEMA LE STUDIO CANAL+ FRANCE 3 CINEMA M6 FILMS

[Pirate Search](#)

Audio  Video  Applications  Games  Porn  Other [All](#) ▾

## Details for this torrent

### La citÃ© de la Peur by LADB

Type: [Video > Movies](#)  
Files: 2  
Size: 691.28 MiB (724855831 Bytes)  
Spoken language(s): French  
Texted language(s): French

Uploaded: 2008-05-02 19:15:37  
GMT  
By: [wazany](#)  
Seeders: 13  
Leechers: 0  
Comments: 1

#### Info Hash:

96BFF9E1F47398C3807071B55AD658ED50F2042F

[GET THIS TORRENT](#) [PLAY/STREAM TORRENT](#)

(Problems with magnets links are fixed by upgrading your torrent client!)

#### Synopsis :

Odile Deray, attachÃ©e de presse, vient au Festival de Cannes pour prÃ©senter le film "Red is Dead". Malheureusement, celui-ci est d'une telle faiblesse que personne ne souhaite en faire l'Ã©cho. Mais lorsque les projectionnistes du long-mÃ©trage en question meurent chacun leur tour dans d'Ã©tranges circonstances, "Red is dead" bÃ©nÃ©ficie d'une incroyable publicitÃ©. Serge Karamazov est alors chargÃ© de protÃ©ger le nouveau projectionniste du film...

```
var _ = require('lodash')
var DHT = require('bittorrent-dht')
var geoip = require('geoip-lite-country')
```

```
var _ = require('lodash')
var DHT = require('bitTorrent-dht')
var geoip = require('geoip-lite-country')
```

```
var peers = []
var dht = new DHT()
```

```
var _ = require('lodash')
var DHT = require('bittorrent-dht')
var geoip = require('geoip-lite-country')

var peers = []
var dht = new DHT()
```

```
dht.on('peer', function (peer, infoHash, from) {
  var geo = geoip.lookup(peer.host)
  peers.push(
    peer.host + ':' +
    peer.port + ':' +
    geo.country
  )
})
```

```
var _ = require('lodash')
var DHT = require('bittorrent-dht')
var geoip = require('geoip-lite-country')

var peers = []
var dht = new DHT()

dht.on('peer', function (peer, infoHash, from) {
  var geo = geoip.lookup(peer.host)
  peers.push(
    peer.host + ':' +
    peer.port + ':' +
    geo.country
  )
})
})
```

```
setTimeout(function () {
  dht.destroy()
  console.log(_.uniq(peers))
}, 10 * 1000)
```

```
var _ = require('lodash')
var DHT = require('bittorrent-dht')
var geoip = require('geoip-lite-country')

var peers = []
var dht = new DHT()

dht.on('peer', function (peer, infoHash, from) {
  var geo = geoip.lookup(peer.host)
  peers.push(
    peer.host + ':' +
    peer.port + ':' +
    geo.country
  )
})

setTimeout(function () {
  dht.destroy()
  console.log(_.uniq(peers))
}, 10 * 1000)
```

dht.lookup(infoHash)

```
var _ = require('lodash')
var DHT = require('bitTorrent-dht')
var geoip = require('geoip-lite-country')

var peers = []
var dht = new DHT()

dht.on('peer', function (peer, infoHash, from) {
  var geo = geoip.lookup(peer.host)
  peers.push(
    peer.host + ';' +
    peer.port + ';' +
    geo.country
  )
})

setTimeout(function () {
  dht.destroy()
  console.log(_.uniq(peers))
}, 10 * 1000)

dht.lookup(infoHash)
```

Done crawling

Found 12 peers

```
[ '91.138.225. [REDACTED]:62762:GR',
  '178.194.206. [REDACTED]:17132:CH',
  '5.51.42. [REDACTED]:33457:FR',
  '51.15.3. [REDACTED]:54728:NL',
  '5.51.42. [REDACTED]:45442:FR',
  '88.191.54. [REDACTED]:62348:FR',
  '51.15.3. [REDACTED]:51413:NL',
  '178.194.206. [REDACTED]:60482:CH',
  '82.253.38. [REDACTED]:61818:FR',
  '82.249.8. [REDACTED]:33876:FR',
  '178.194.206. [REDACTED]:45429:CH',
  '178.194.206. [REDACTED]:37603:CH' ]
```

Crawl ended

Done in 10.57s.



# **Peer to Peer**



# **Privé**

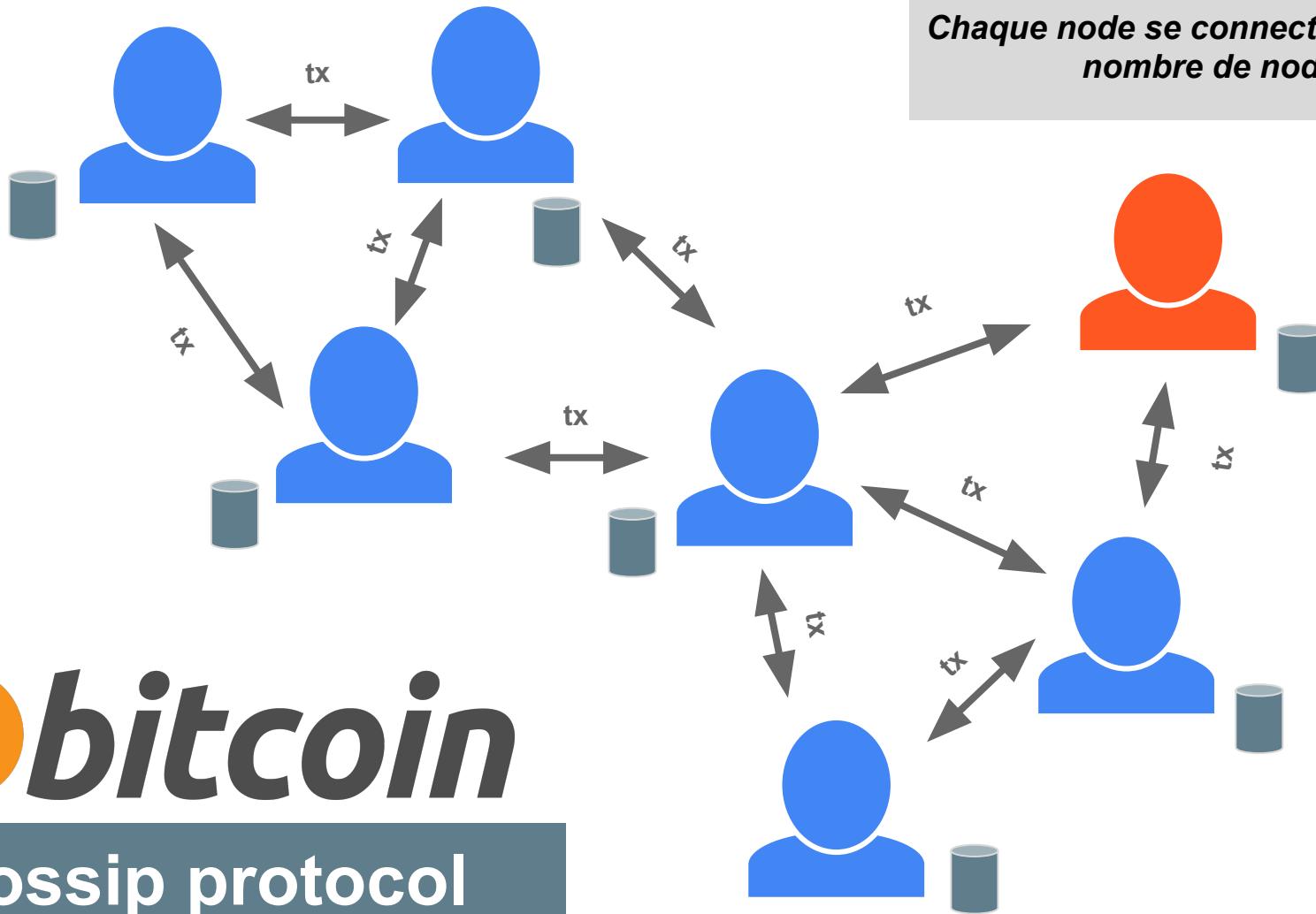


**Et la blockchain dans tout ca ?**



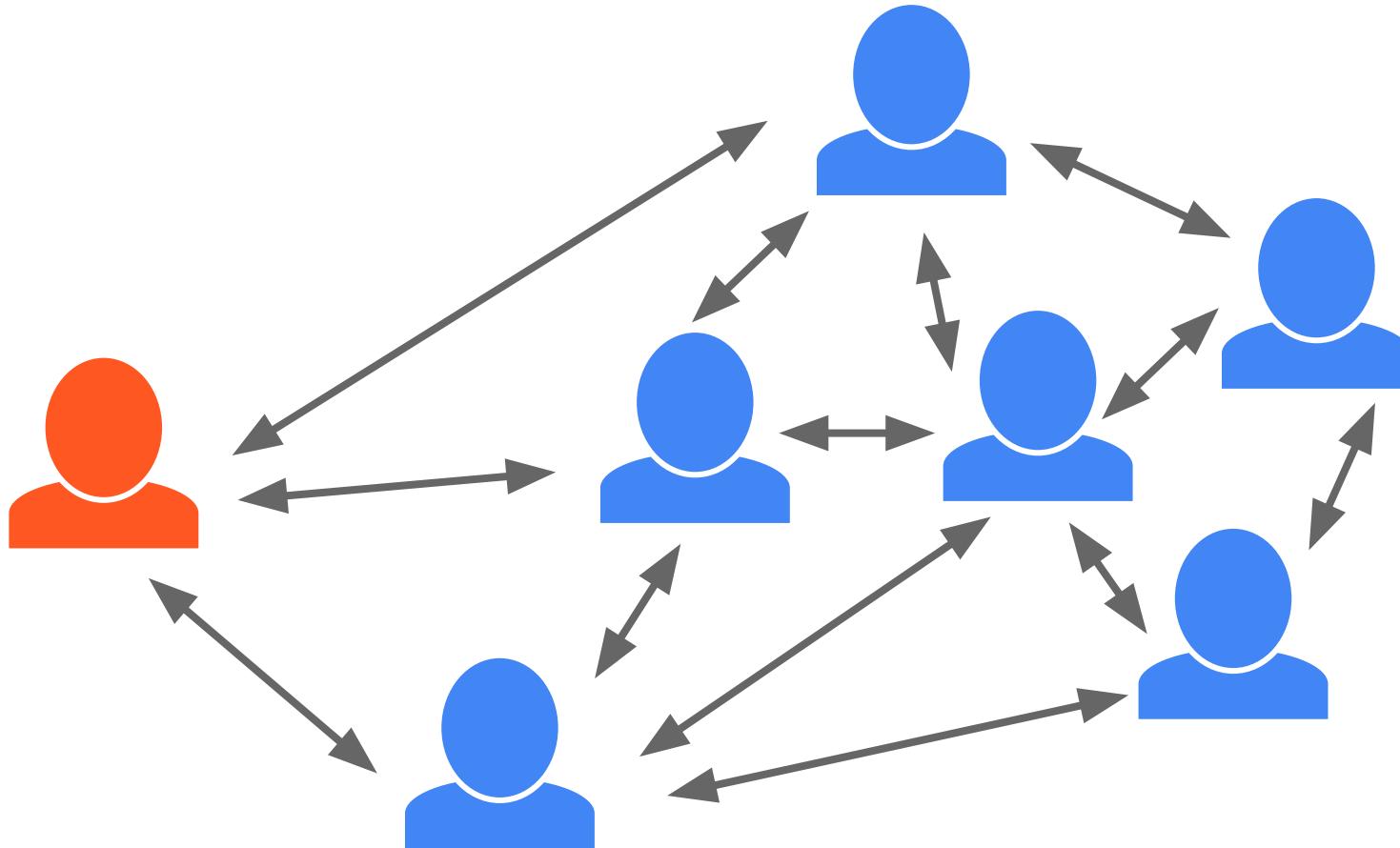
# bitcoin

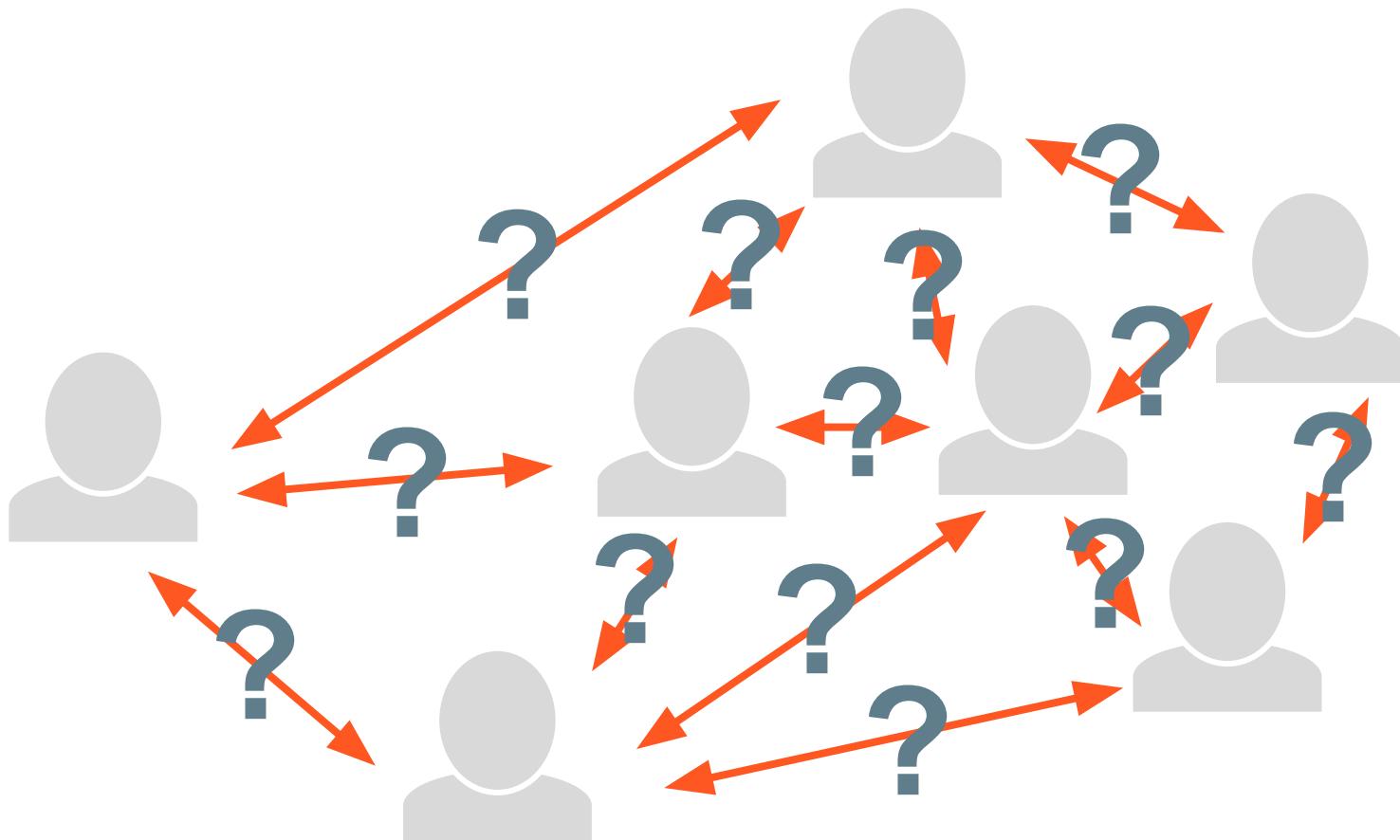
## Gossip protocol



*Chaque node se connecte à un grand  
nombre de nodes*

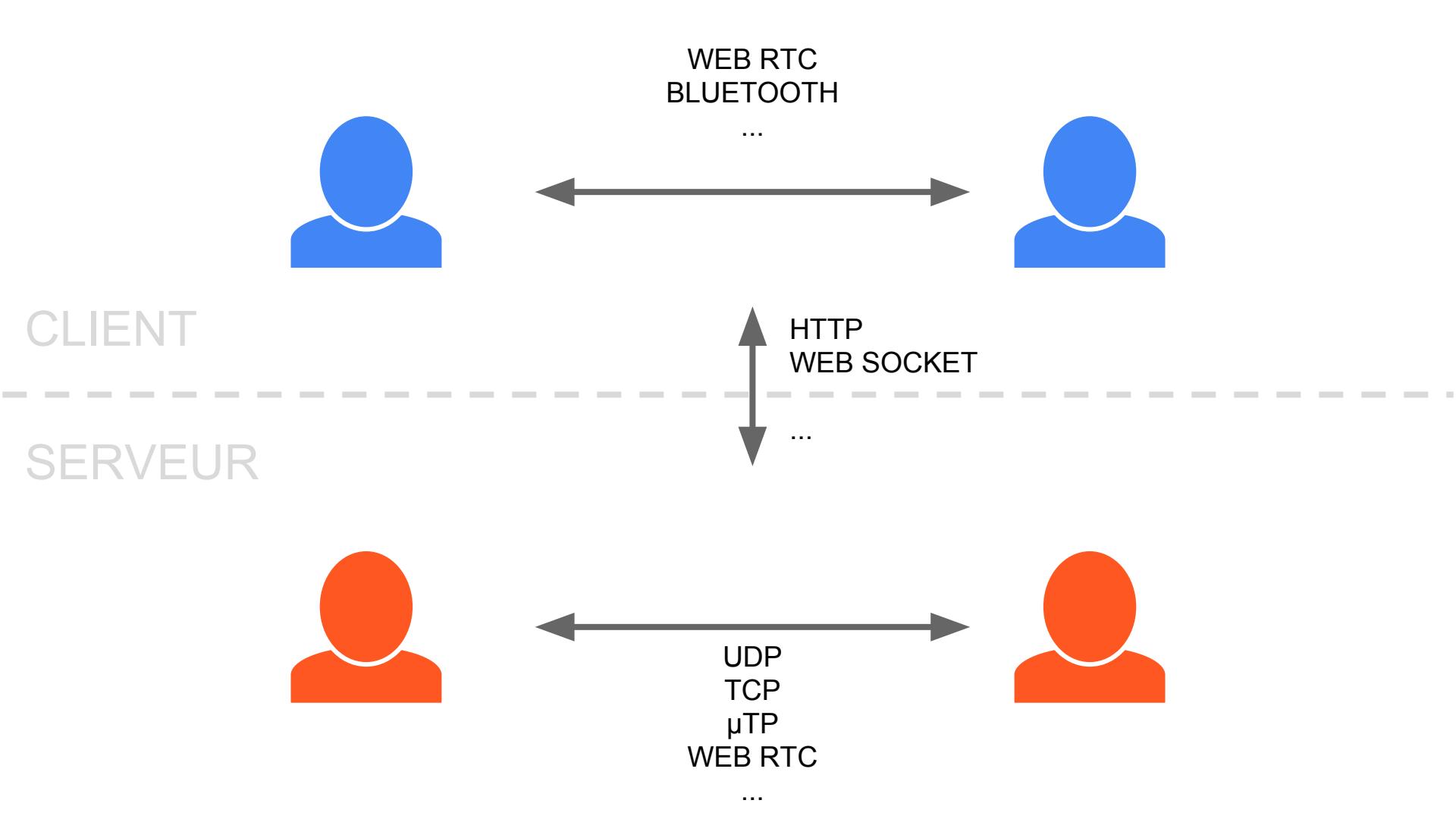




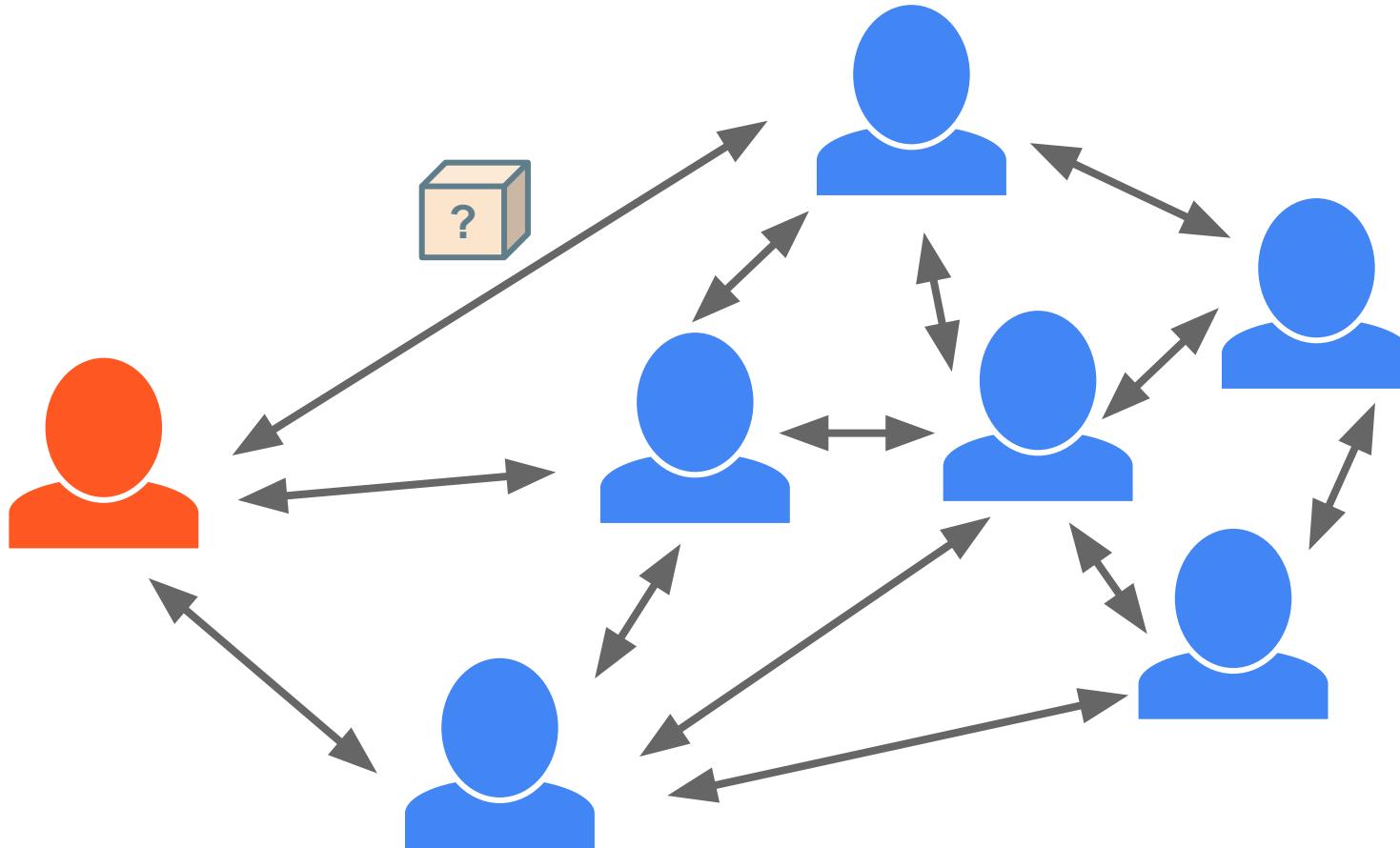


# Transport



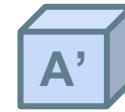








**diff ?**





# Data integrity

# **Merkle “Tree”**

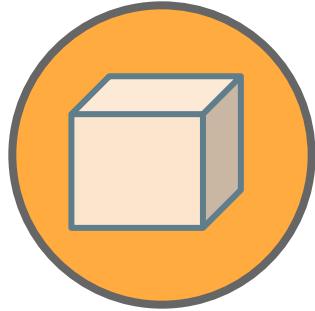
# **Merkle Directed Acyclic**

# **Graph**

# Merkle “Tree”

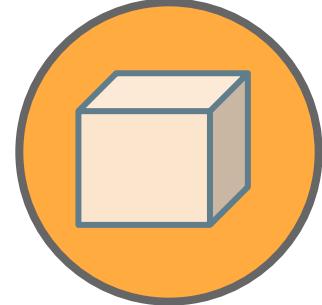
# Merkle Directed Acyclic Graph



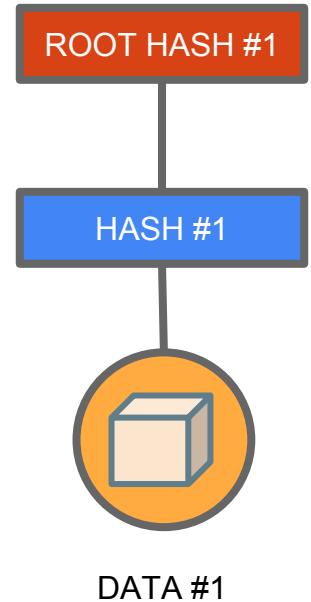


DATA #1

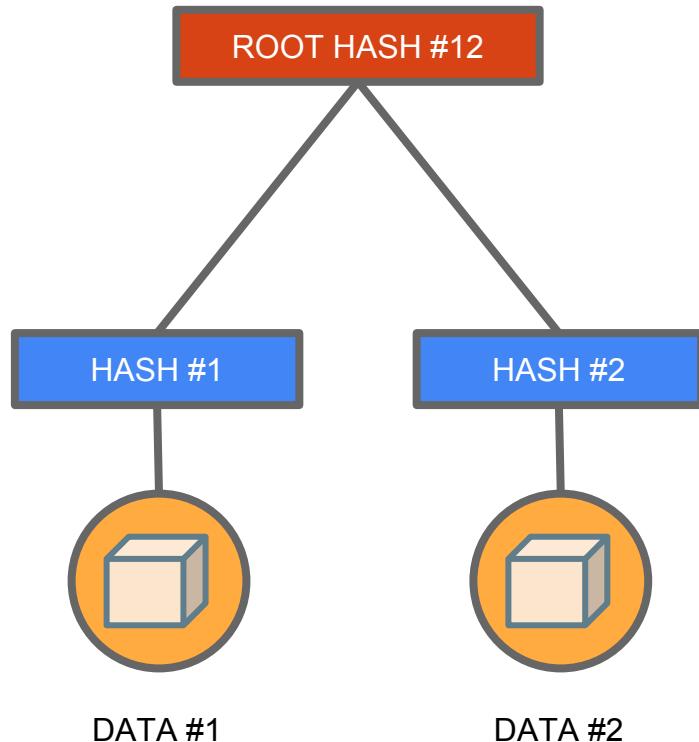
HASH #1

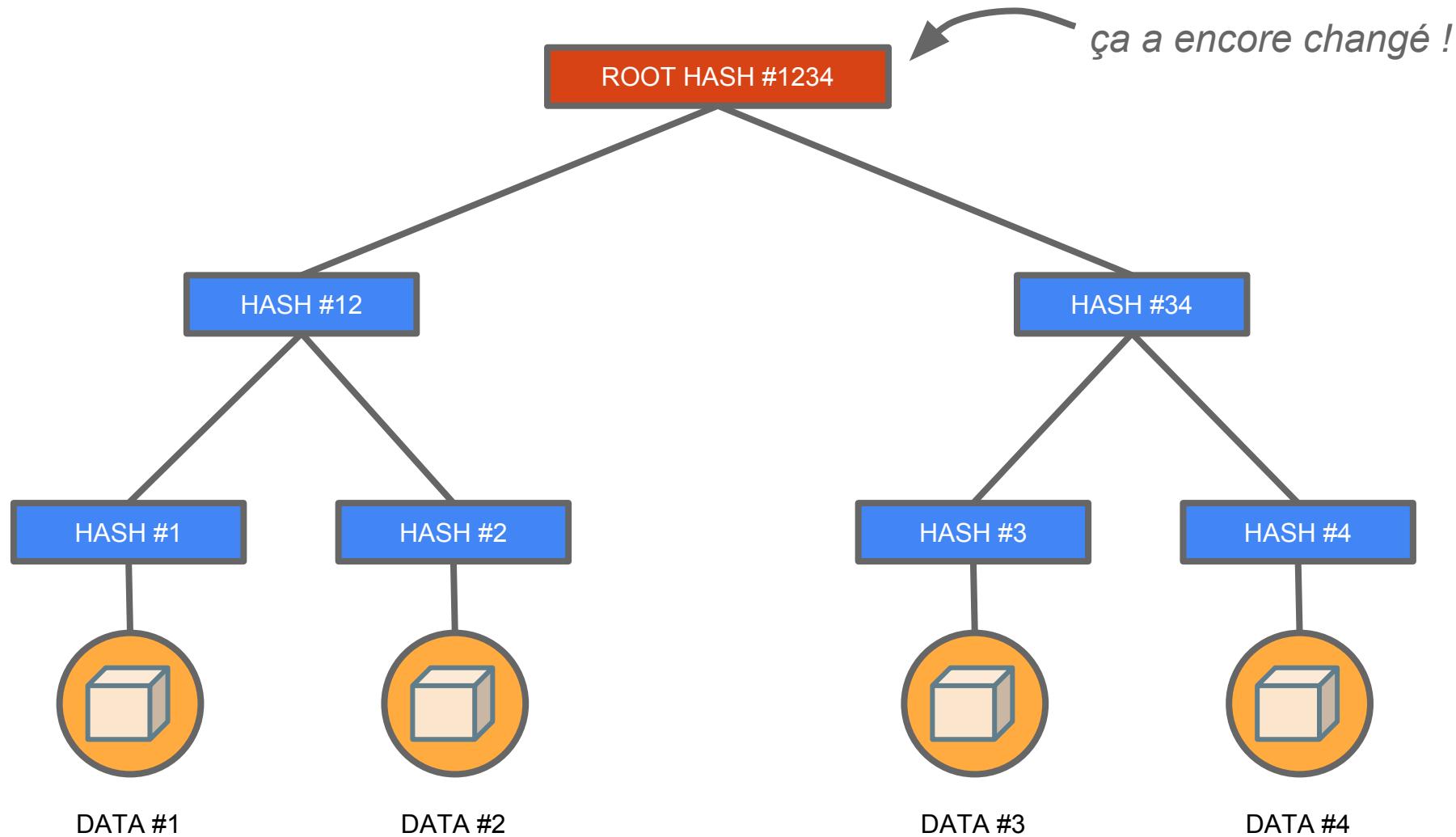


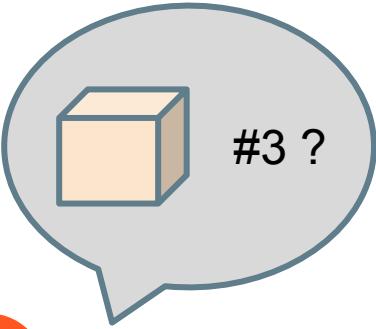
DATA #1



*ça a changé !*









*je connais le  
root hash de  
source sûre*

ROOT HASH #1234

HASH #12

HASH #34

HASH #1

HASH #2

HASH #3

HASH #4



DATA #1



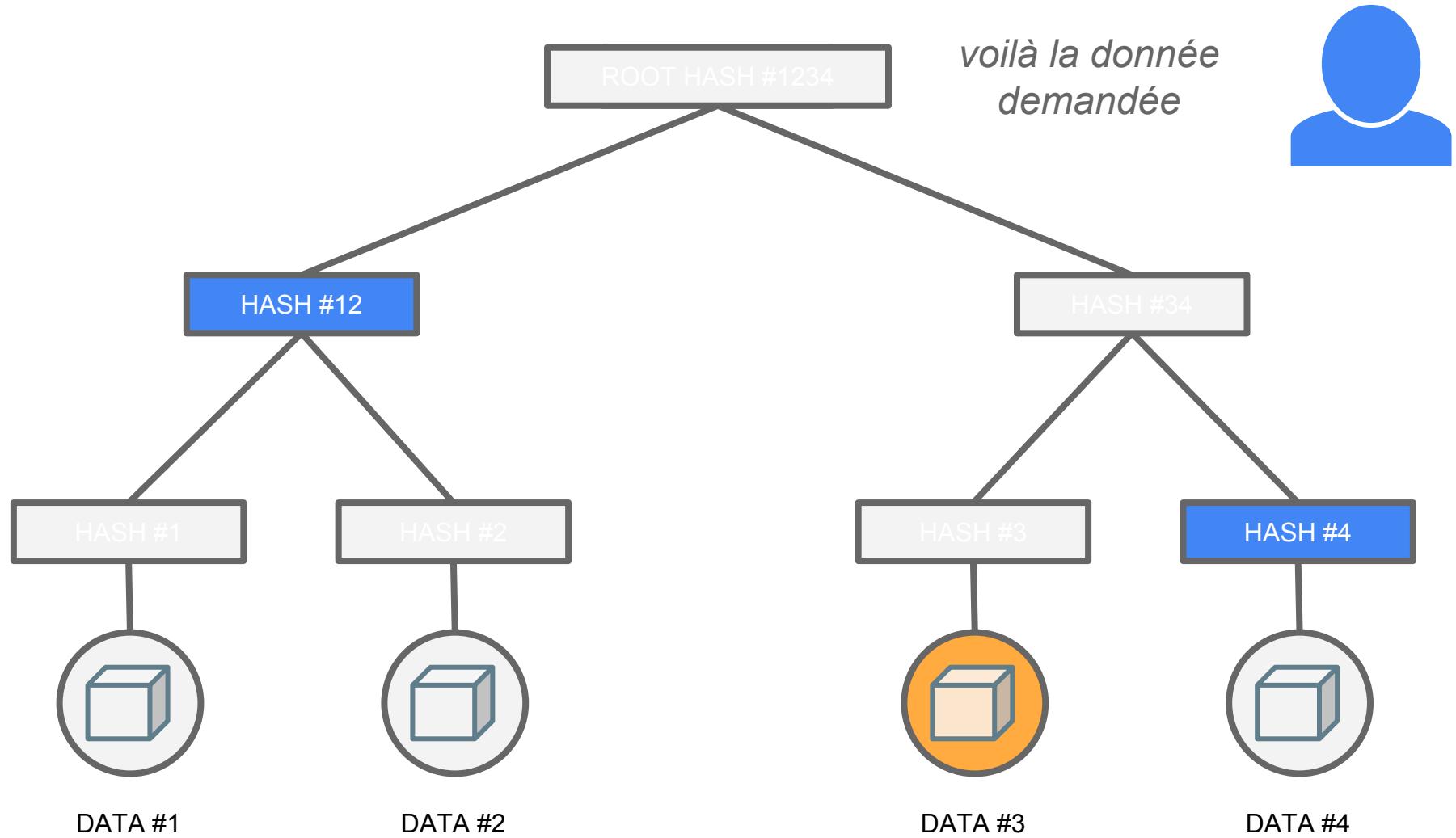
DATA #2

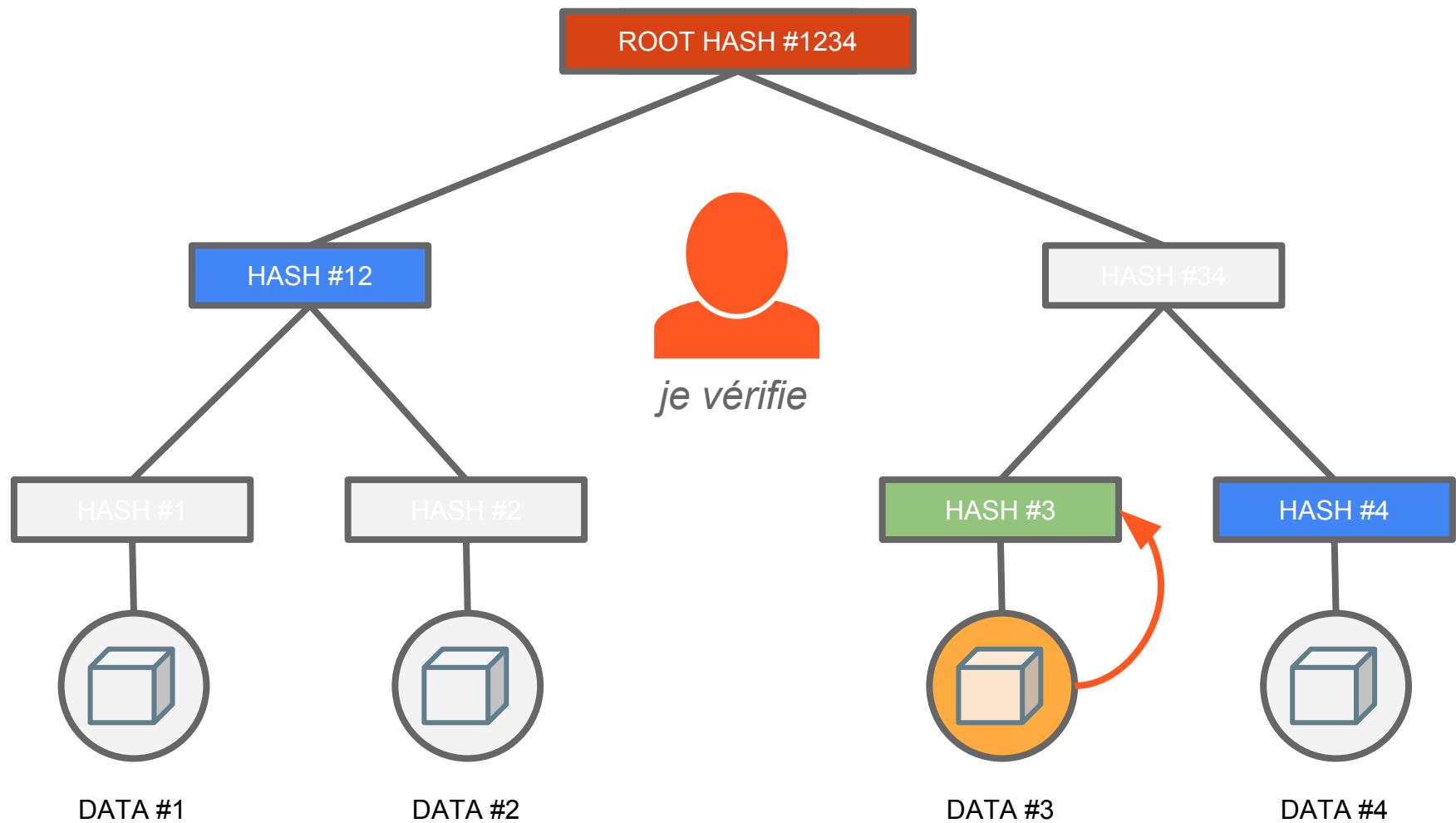


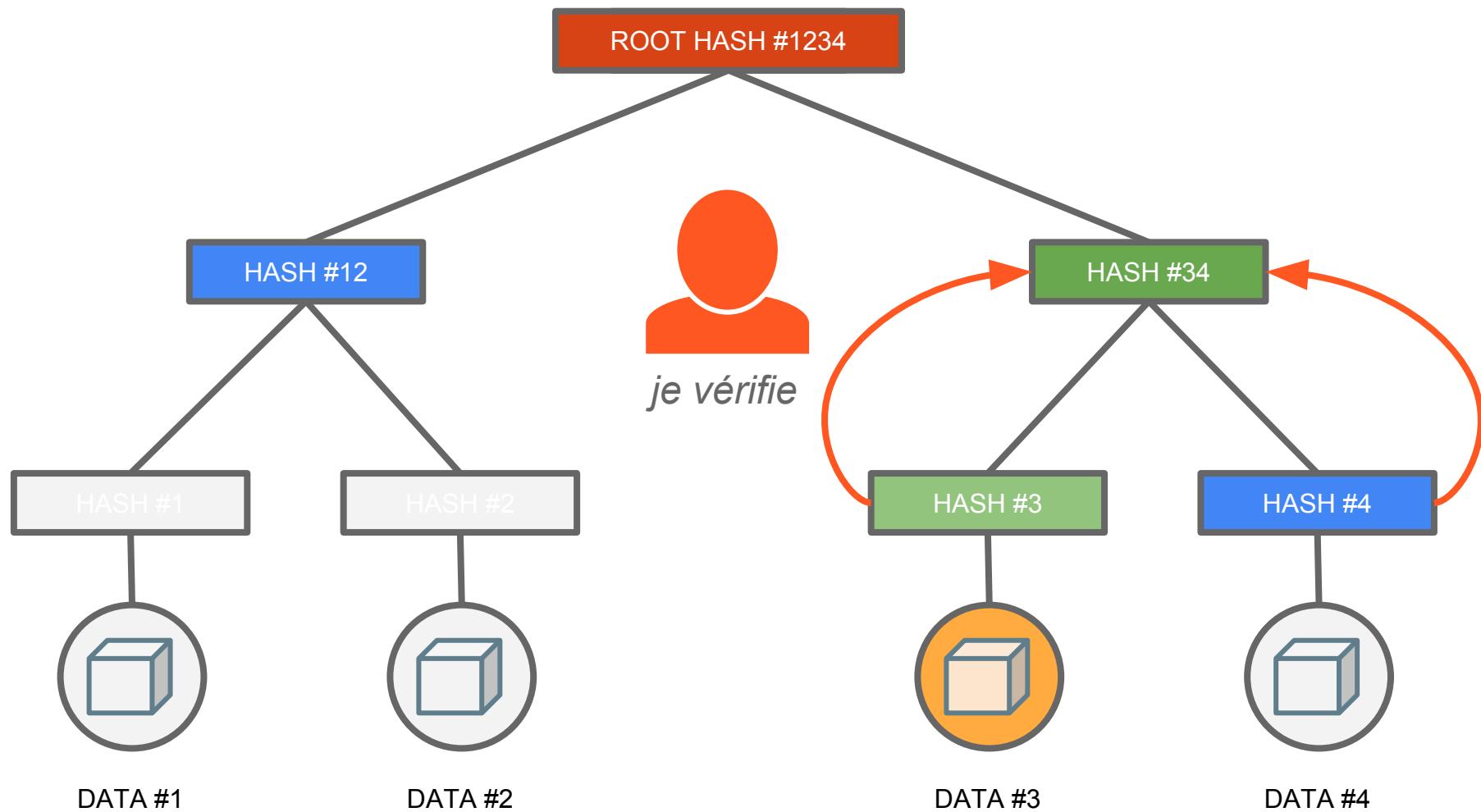
DATA #3

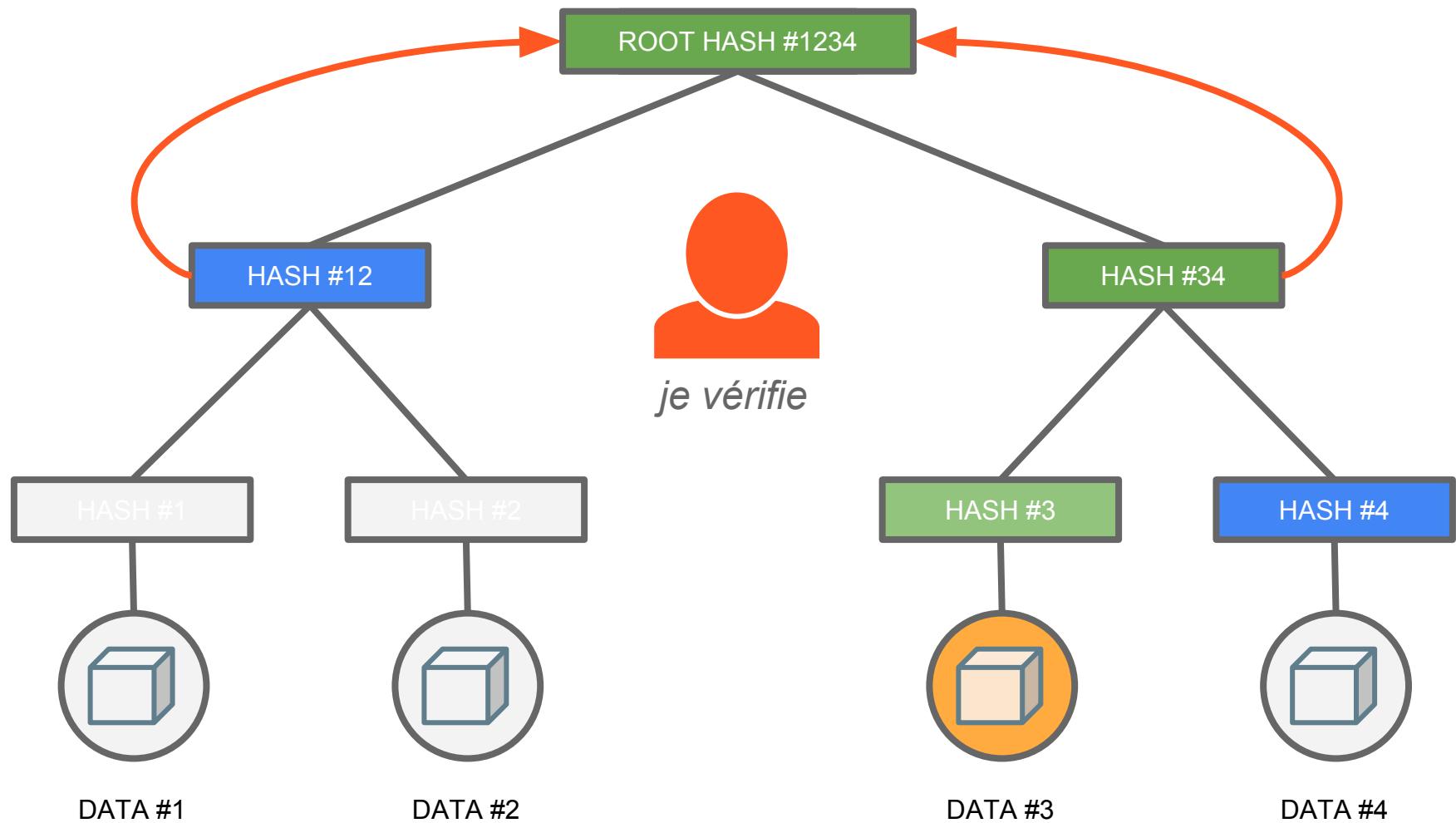


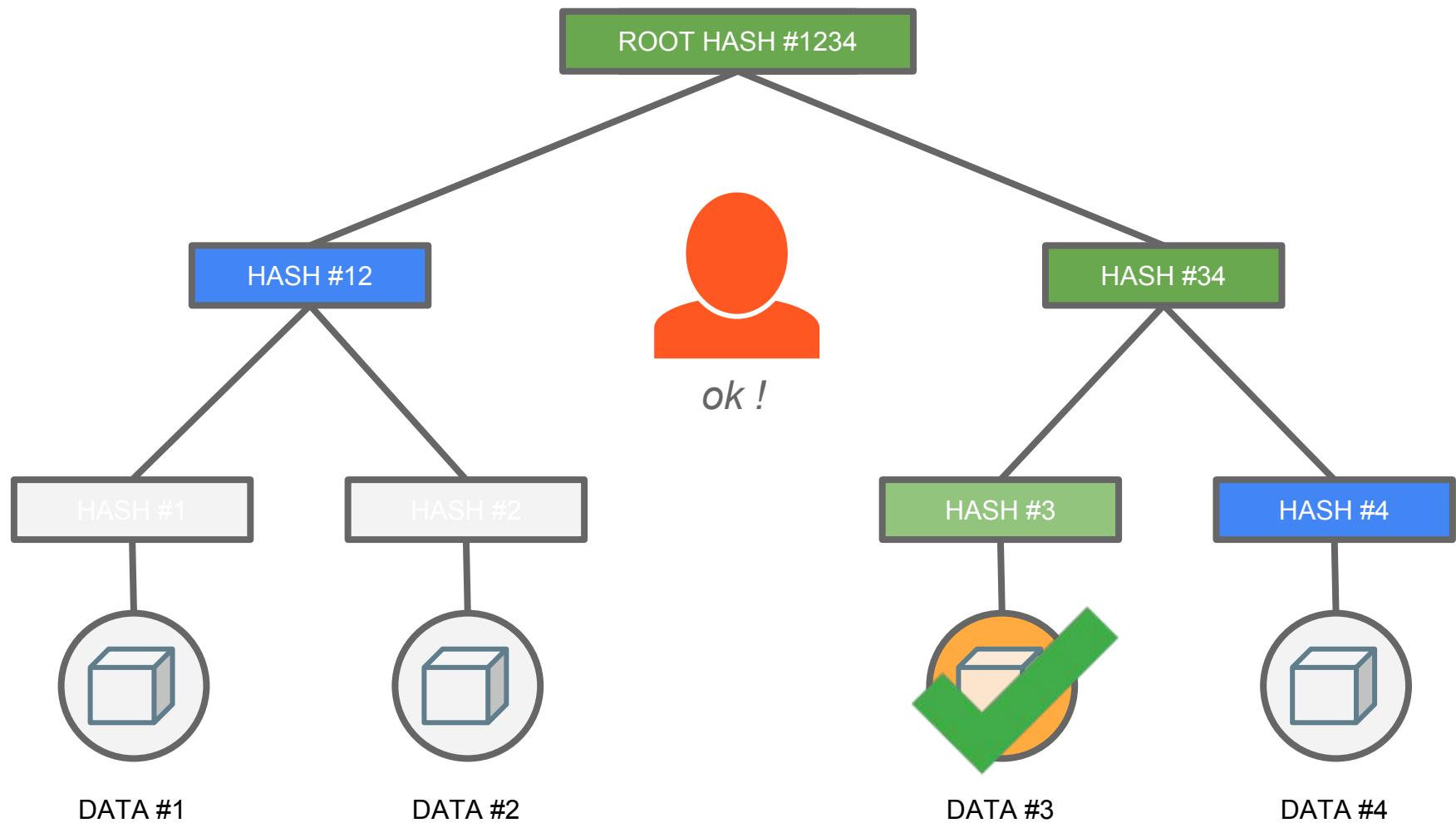
DATA #4



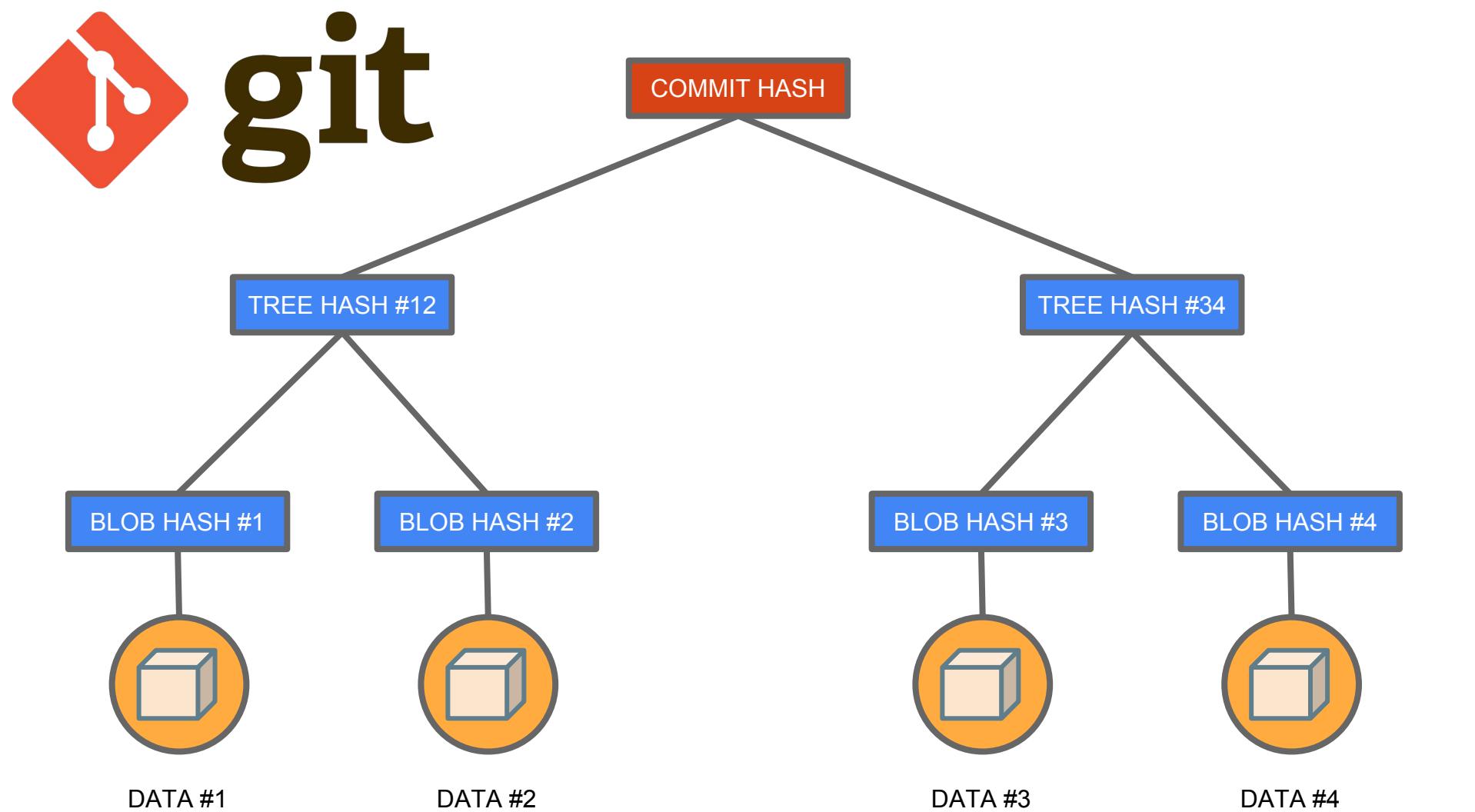


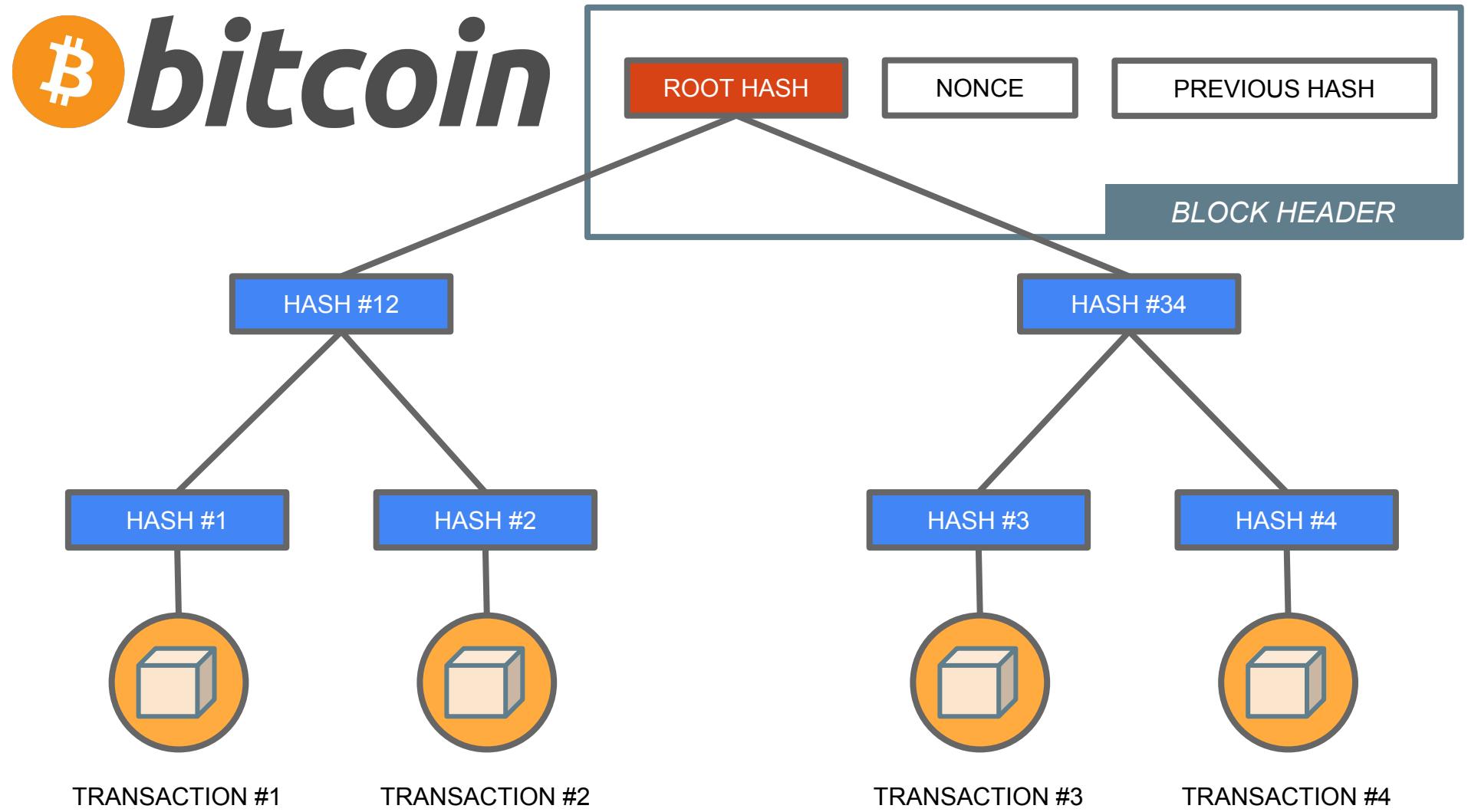






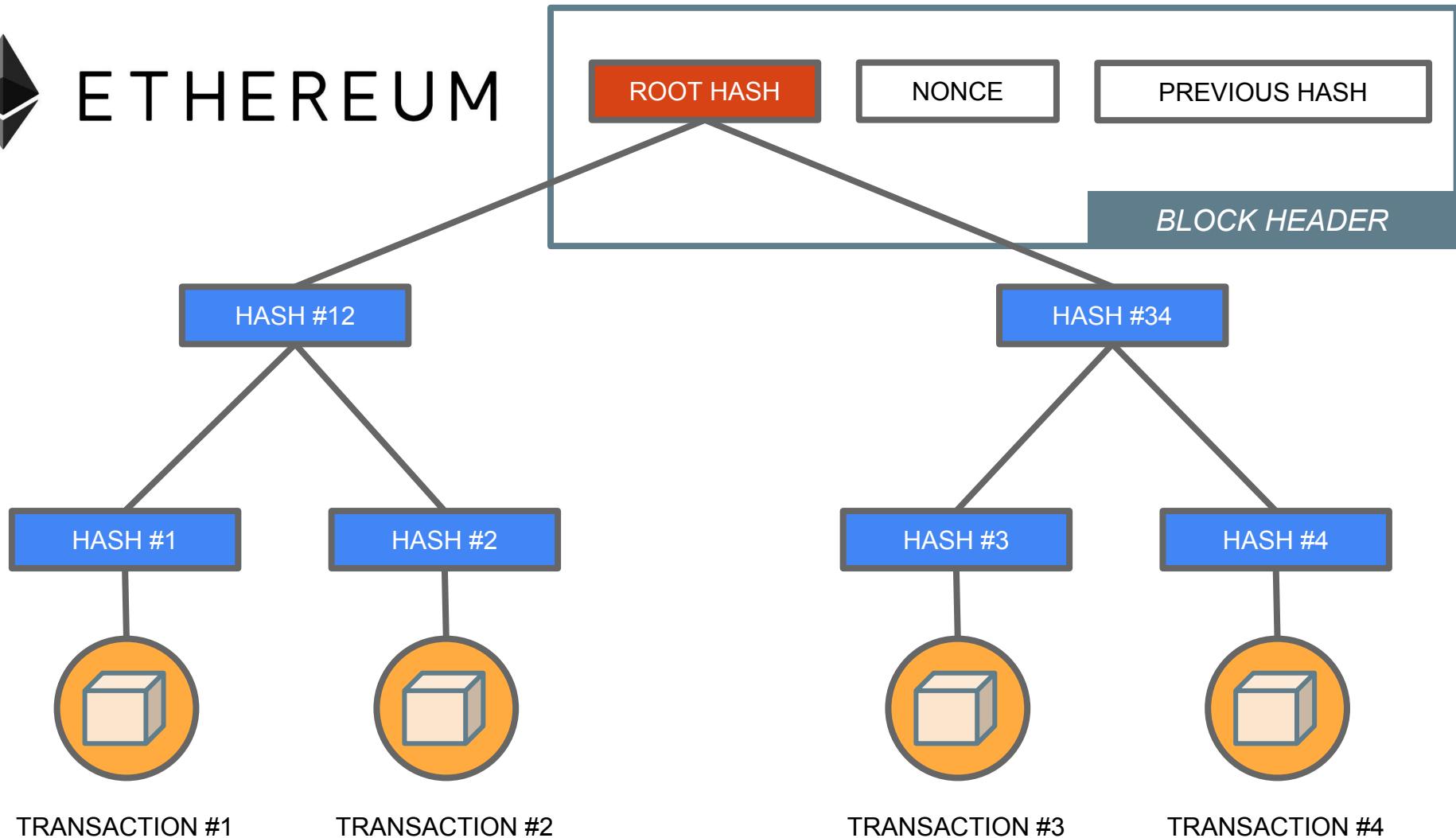
Utilisé ?







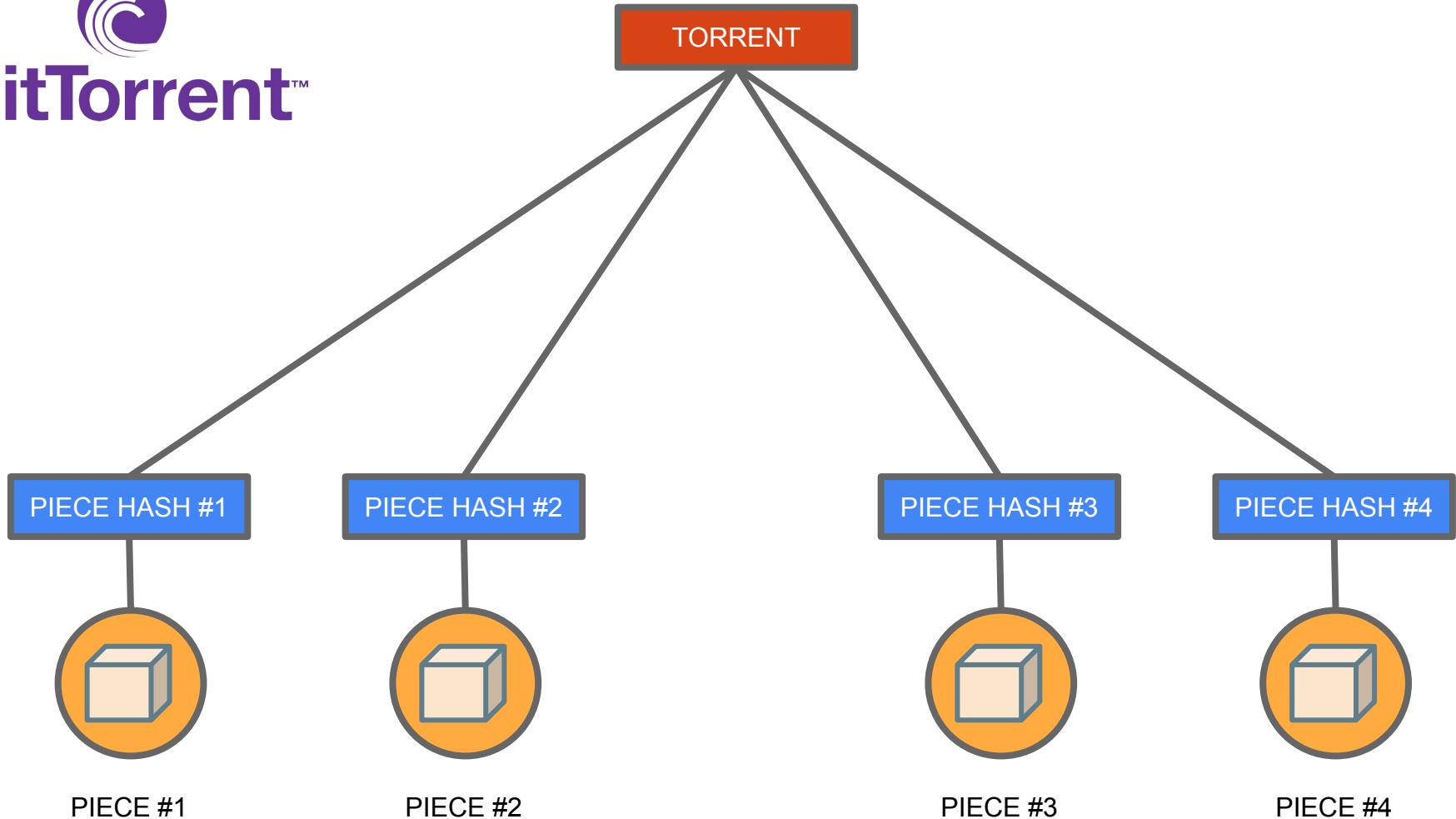
# ETHEREUM

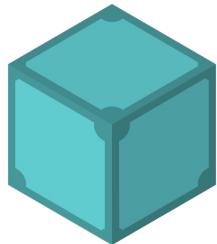




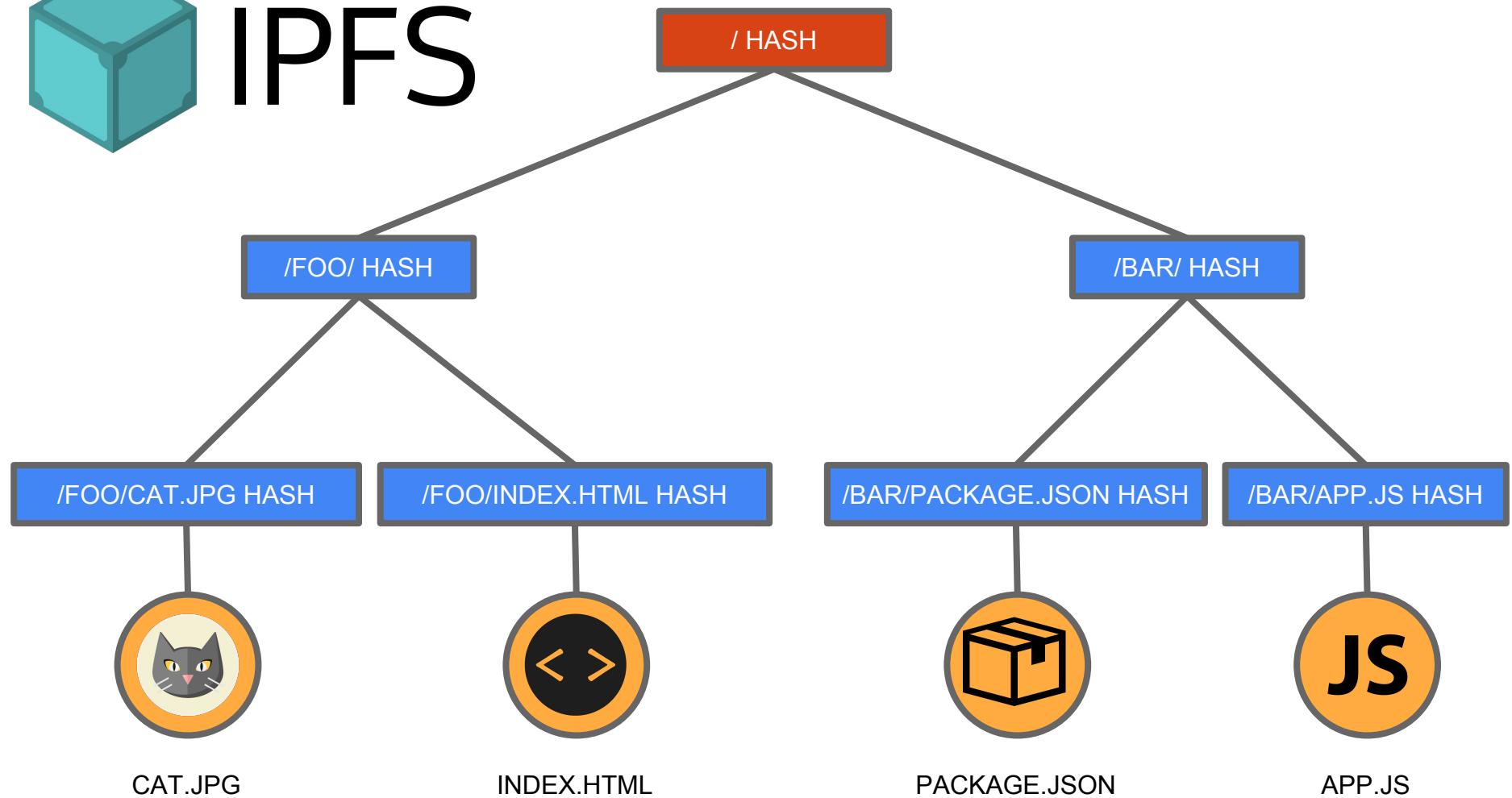
# BitTorrent™

TORRENT





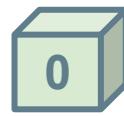
# IPFS



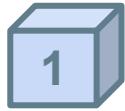


<https://ipld.io>





+1





+2





# Conflict resolution



# **Conflict-free Replicated Data Types**

**CRDT ?**



INSTITUT NATIONAL DE RECHERCHE EN INFORMATIQUE ET EN AUTOMATIQUE

## *Conflict-free Replicated Data Types*

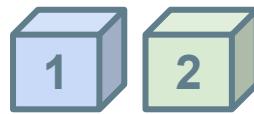
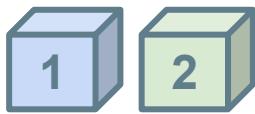
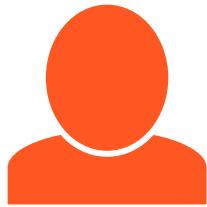
Marc Shapiro, INRIA & LIP6, Paris, France

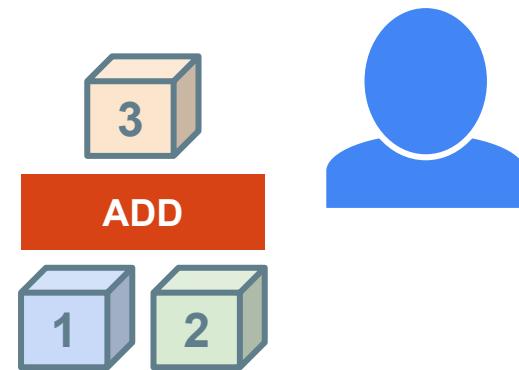
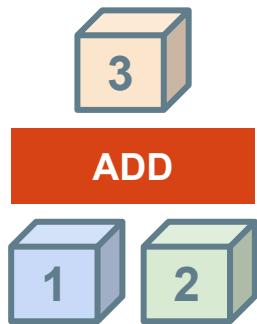
Nuno Preguiça, CITI, Universidade Nova de Lisboa, Portugal

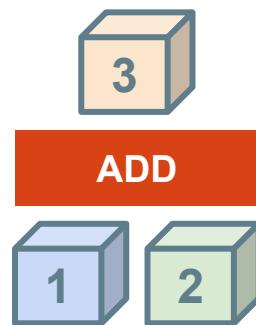
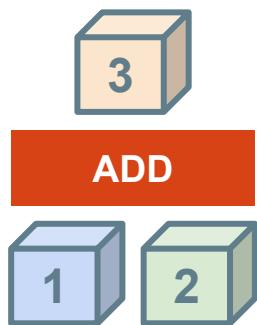
Carlos Baquero, Universidade do Minho, Portugal

Marek Zawirski, INRIA & UPMC, Paris, France

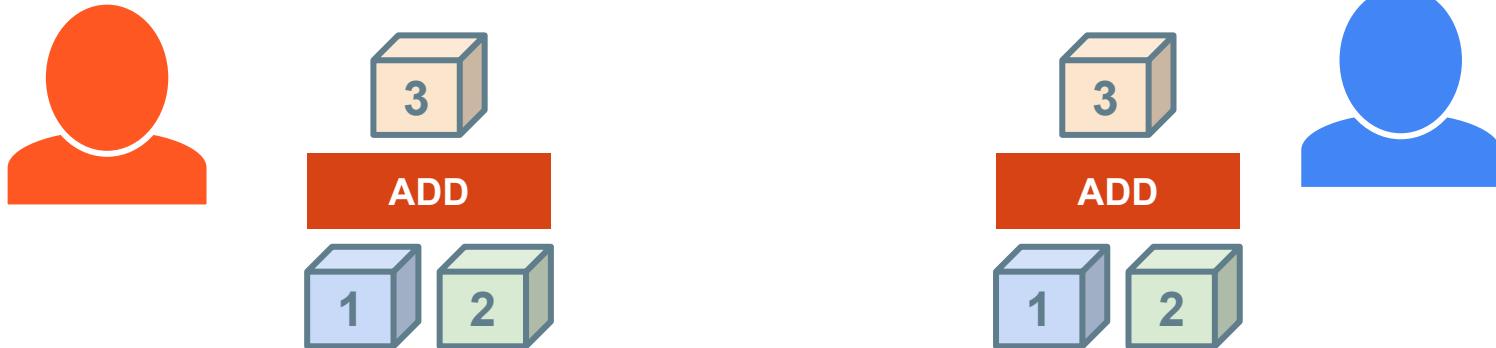








# Grow-only Counter



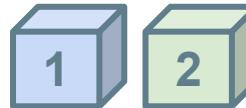
-1



ADD



ADD



**-1**



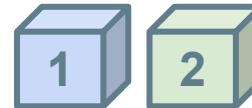
**ADD**



**- ADD**



**ADD**



**-1**



**ADD**



**- ADD**



**-3**



**ADD**



**- ADD**





2

ADD

1 2

- ADD

1



0

ADD

1 2

- ADD

3





-1

ADD

1 2

- ADD

1 3

-1

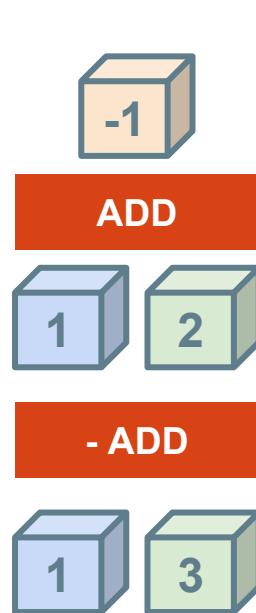
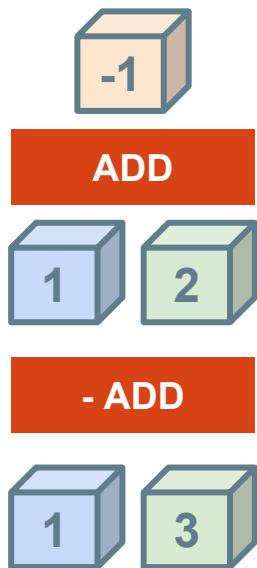
ADD

1 2

- ADD

1 3

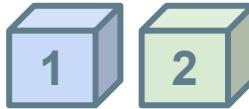




# Positive-Negative Counter



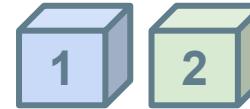
**ADD**



**- ADD**



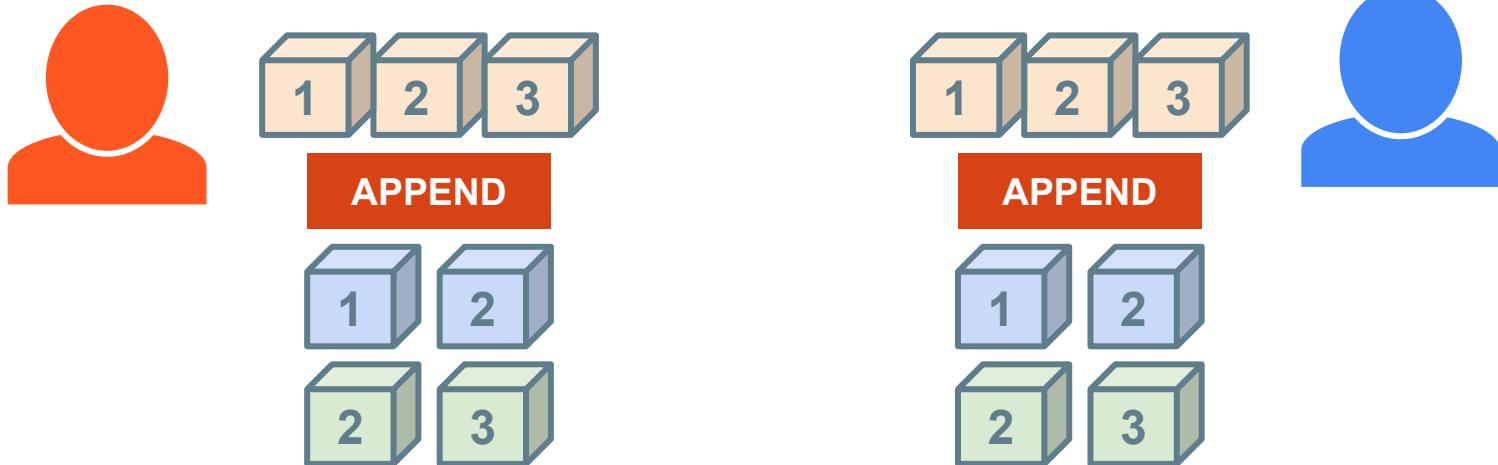
**ADD**



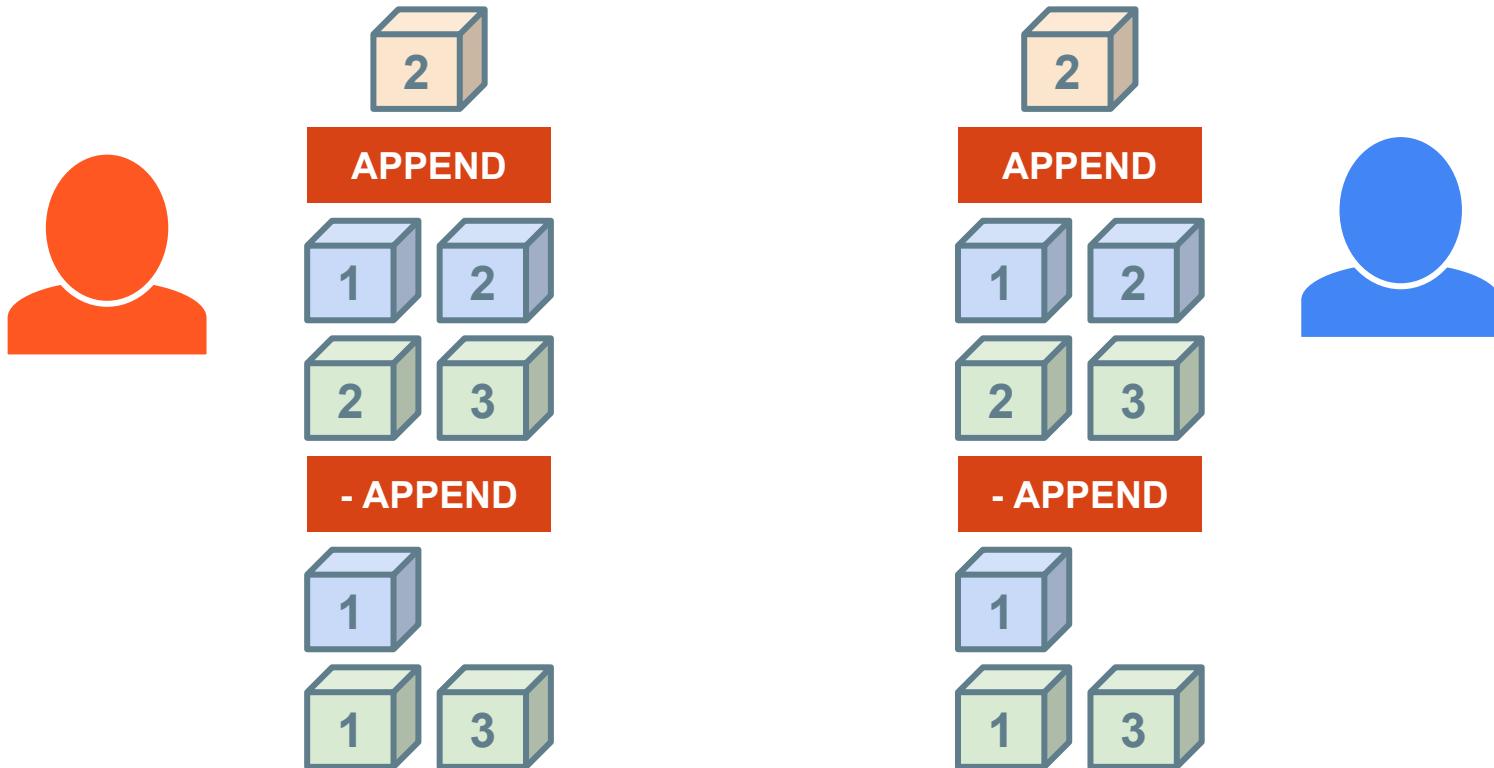
**- ADD**



# Grow-only Set



# 2-Phase Set



# 2-Phase Set

+



Timestamp



=

Last-Write-Wins-Element-Set

*OR-Set*

*MC-Sets*

*U-Set*

*LWW-Register*

*MV-Register*

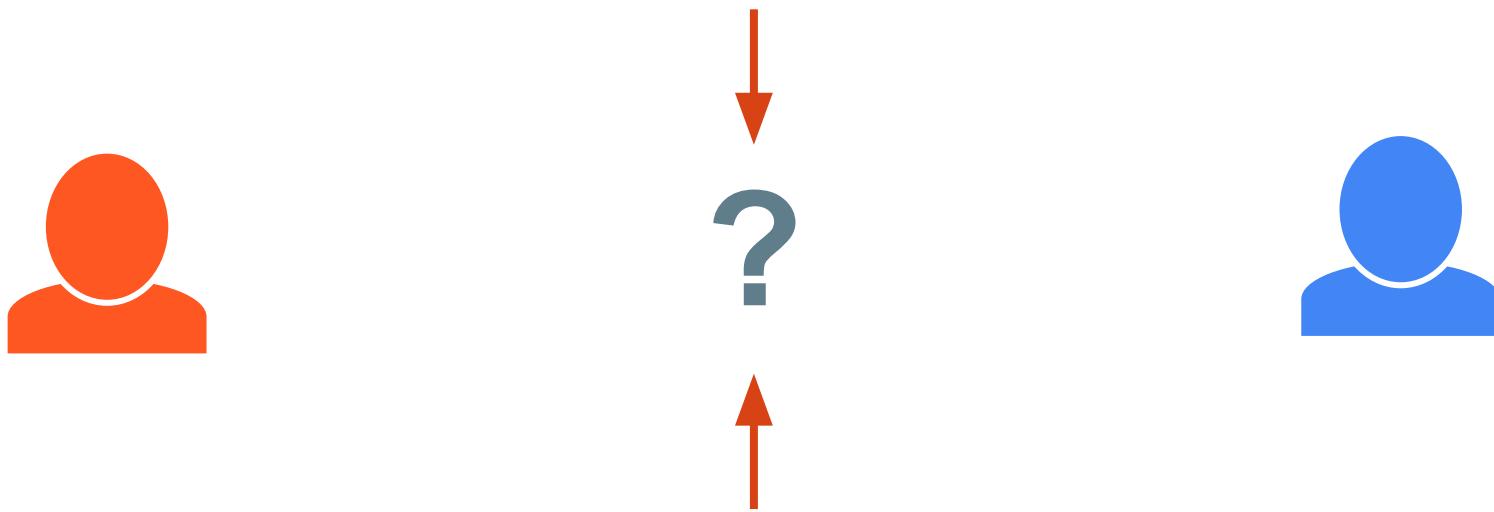


*Add-only monotonic DAG*

*Add-Remove Partial Order*

...

# **Compromis sur les fonctionnalités (Ajout, Suppression, Modification...)**



# **Compromis sur la performance (bande passante, perte de paquet, mémoire...)**

Utilisé ?



Bases de données distribuées



Distributed Data



SOUNDCLOUD

News feed



Chat (70M utilisateurs)



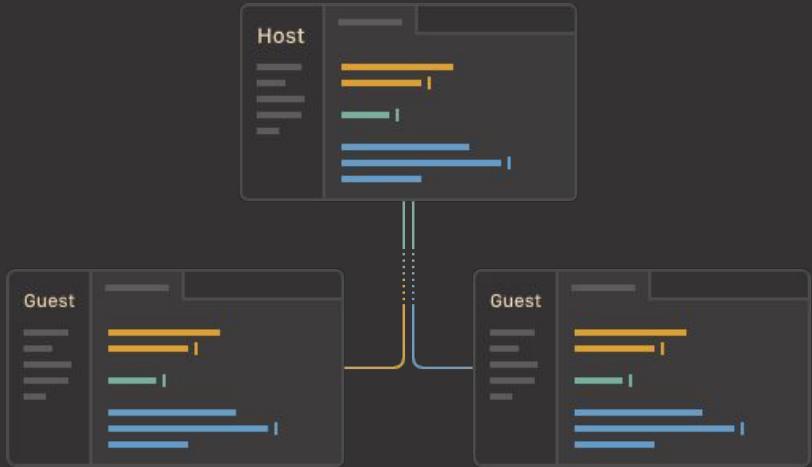
Sync. des localisations  
favorites

Mais aussi...



## Collaborate in real time in Atom

**Teletype<sup>(beta)</sup> for Atom** lets developers share their workspace with team members and collaborate on code in real time.



# Mais aussi...

# Démo

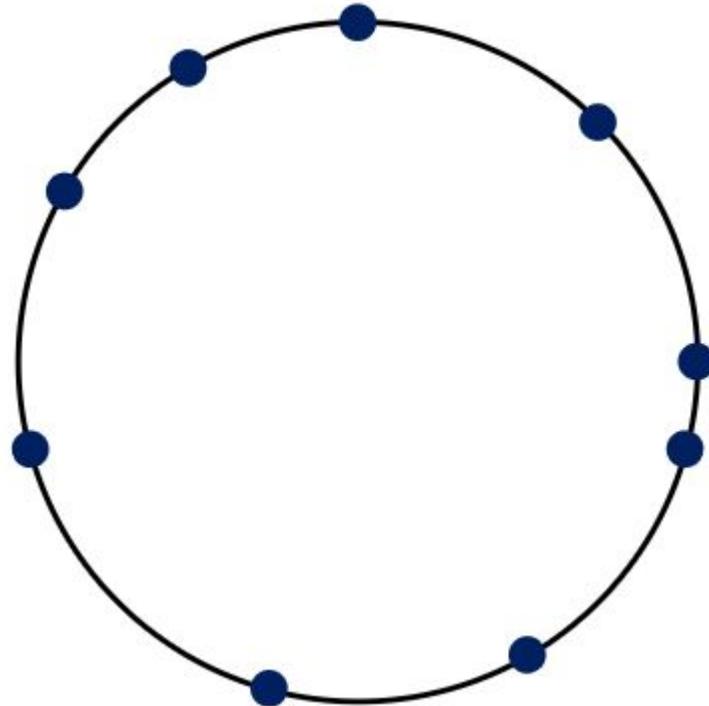
à la fin...

<https://acailly.github.io/roti/>

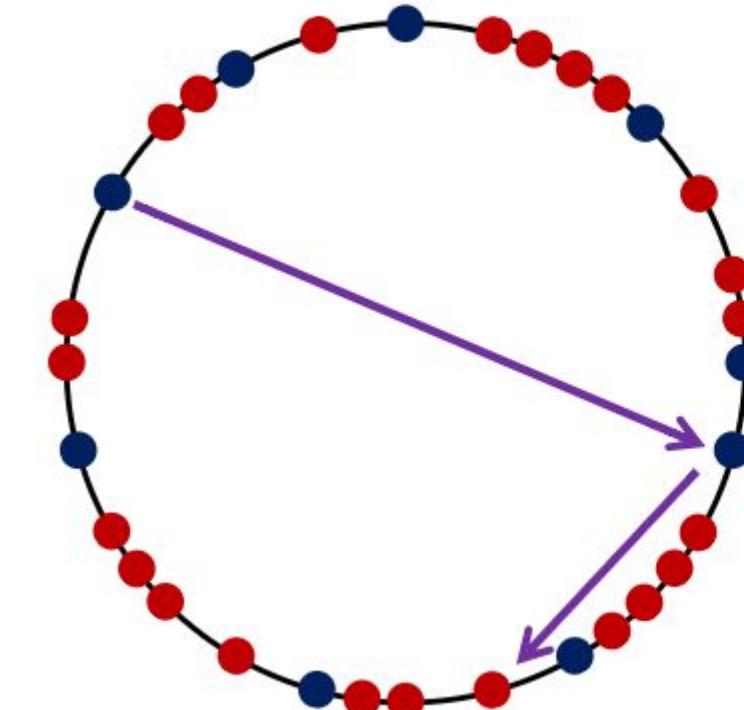


Et si on quittait le monde des bisounours ?

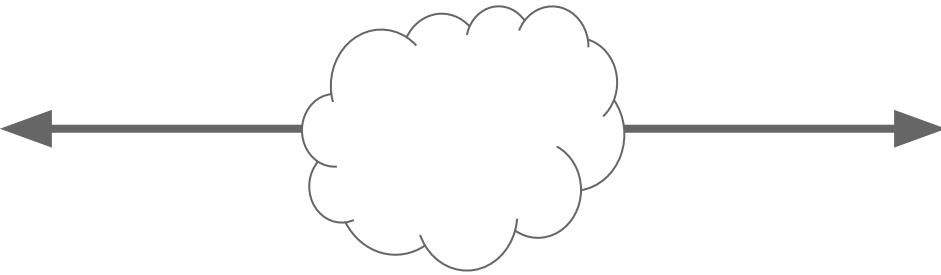
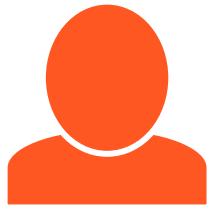
## Sybil attack

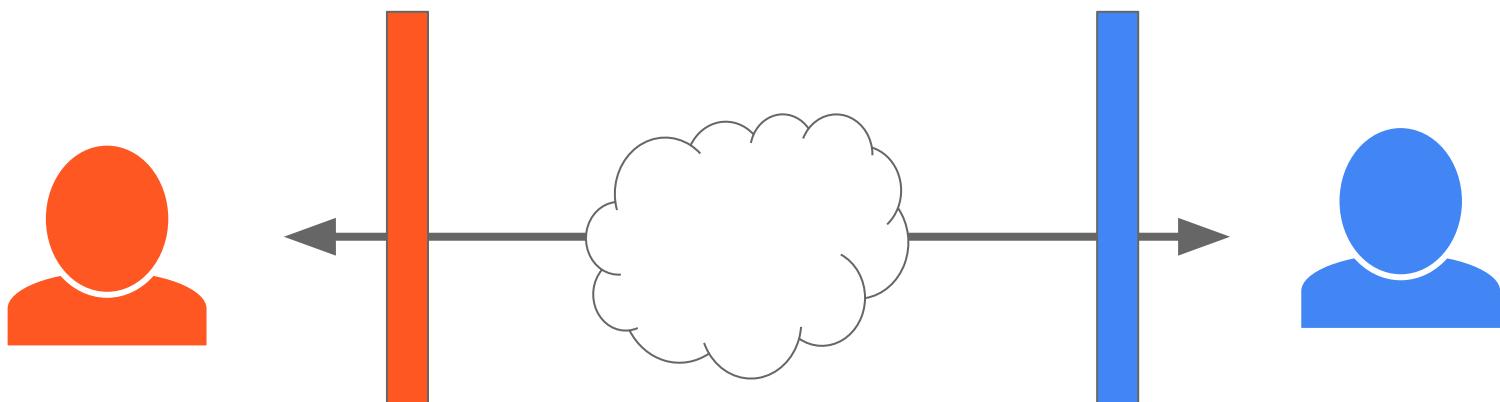


## Brute-force attack







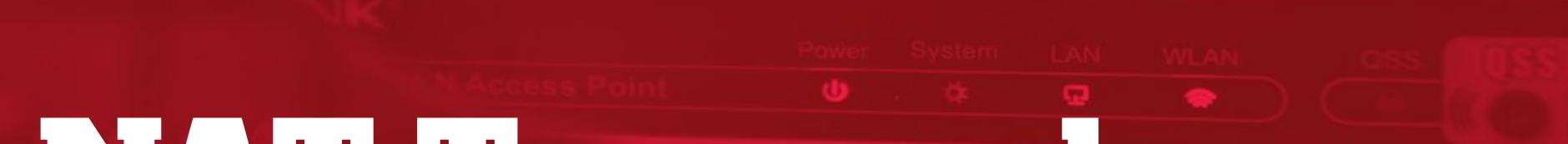


Réseau privé

Réseau public

Réseau privé

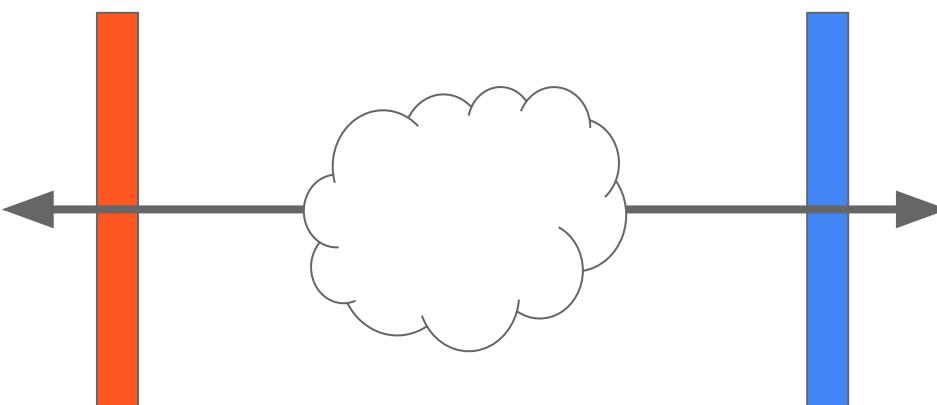
# NAT Traversal



# **Session Traversal Utilities for NAT (STUN)**

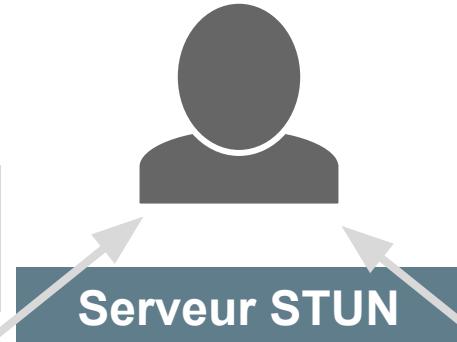


Adresse IP  
privée



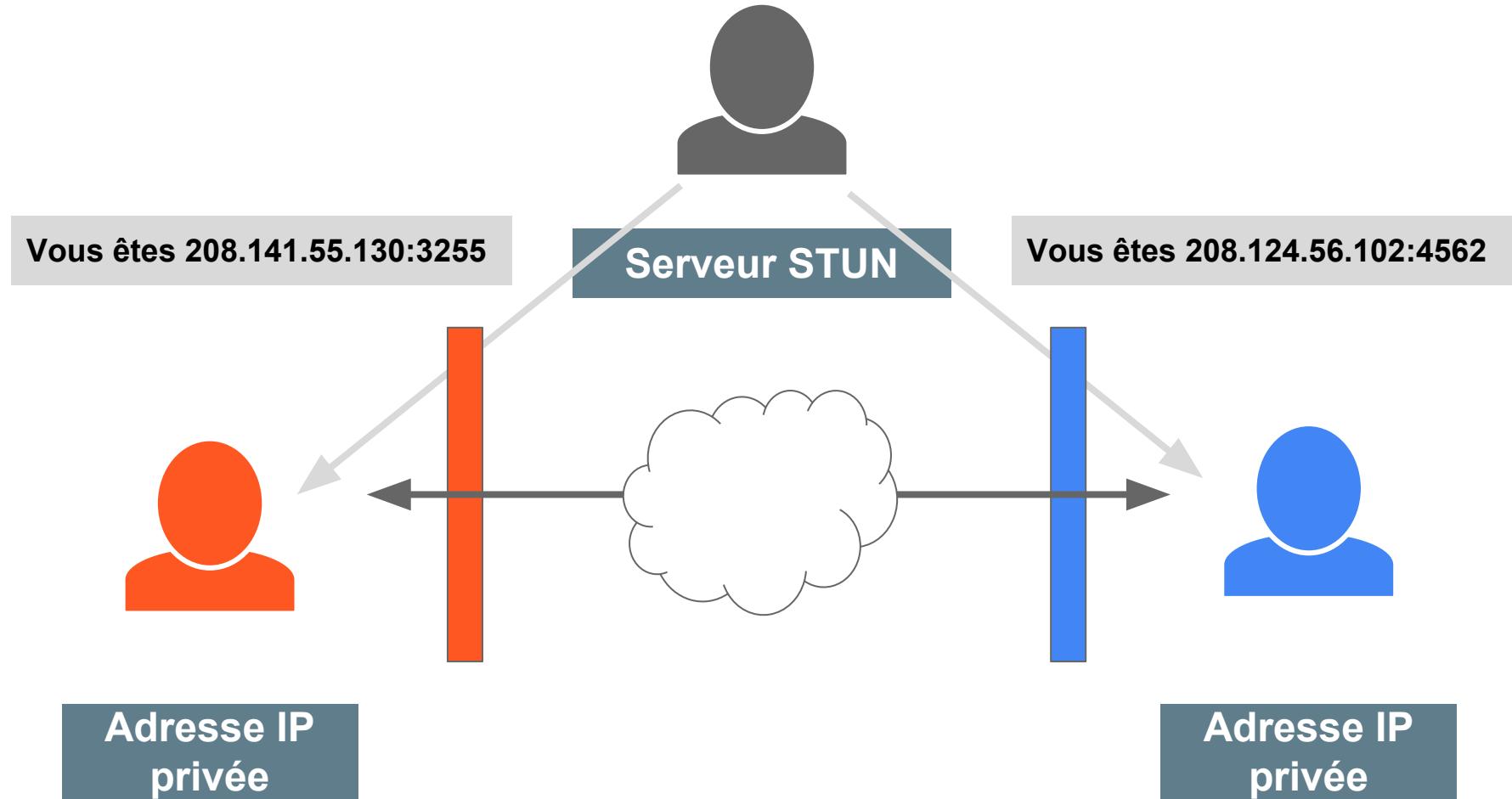
Adresse IP  
privée

Quelle est mon adresse IP publique ?  
Suis-je accessible de l'extérieur ?



Adresse IP  
privée

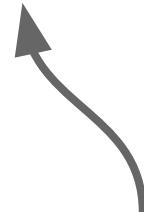
Adresse IP  
privée



Adresse publique du routeur

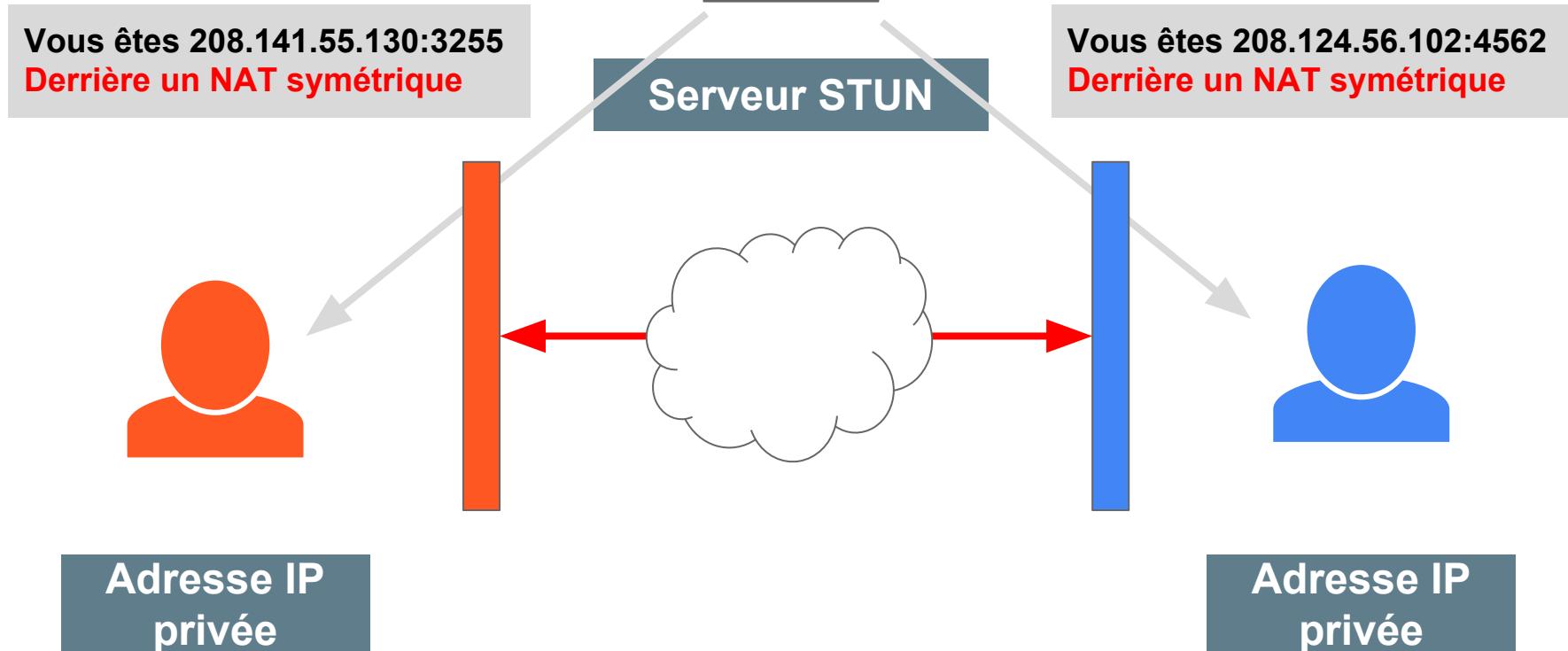


**208.141.55.130:3255**

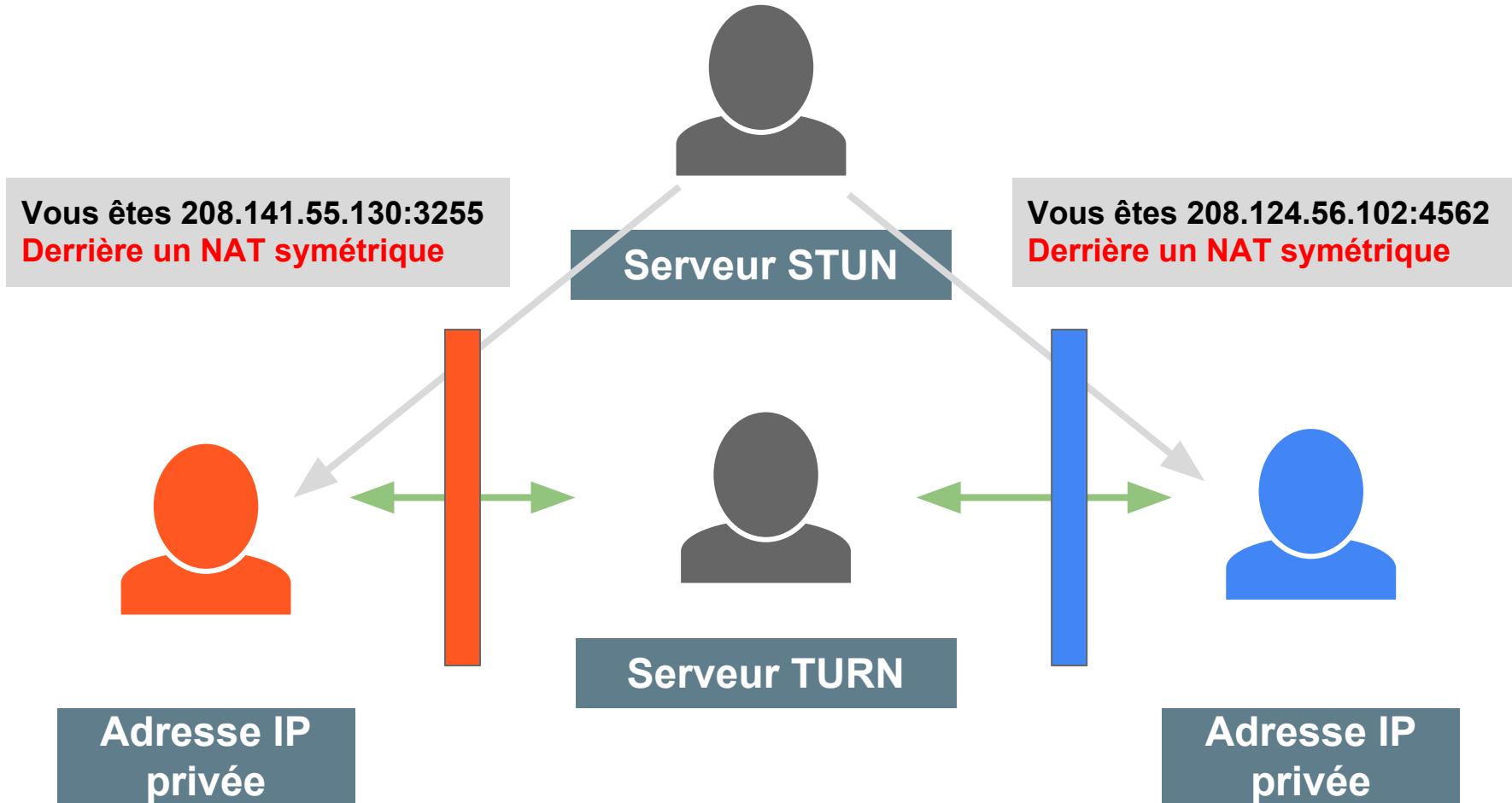


Port unique pour chaque device  
derrière le routeur

*Qui n'accepte que les connexions entrante s'il y a une connexion sortante sur ce pair*



# **Traversal Using Relays around NAT (TURN)**





# Que nous réserve le futur ?







Scalabilité ?

Impact écologique ?

Arnaques ?

Centralisation ?

# IPFS is the Distributed Web

---

A peer-to-peer hypermedia protocol  
to make the web faster, safer, and more open.

Try it

Watch demo

# The IPFS Stack

applications

Using the Data

IPNS

naming

IPLD

merkldag

Defining the Data

libp2p

exchange

routing

network

Moving the Data

<https://www.coindesk.com/257-million-filecoin-breaks-time-record-ico-funding/>

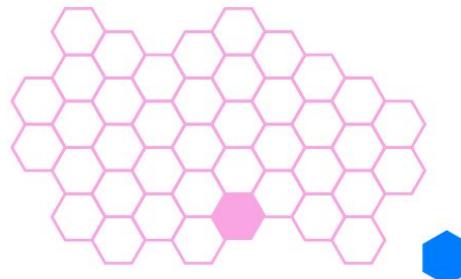
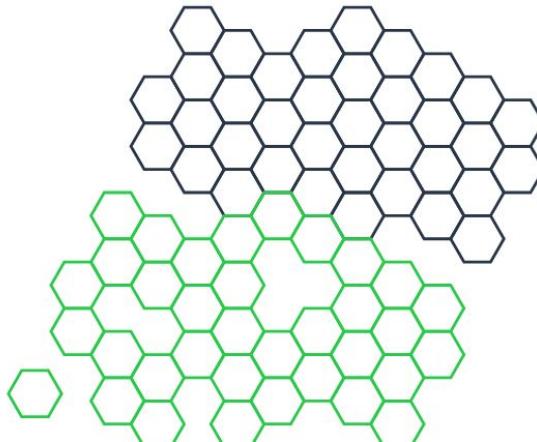


# \$257 Million: Filecoin Breaks All-Time Record for ICO Funding

Sep 7, 2017 at 20:45 UTC by Stan Higgins

# A distributed **data** community

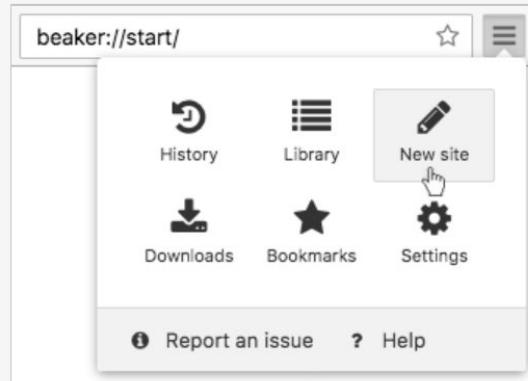
Dat is a nonprofit-backed community & open protocol for building apps of the future.



## Rethink the Web browser

Beaker is a peer-to-peer browser with tools to create and host websites. Don't just browse the Web, build it.

<https://beakerbrowser.com/>



Can your browser do this?



None of us are as smart as all of us.

Fork



@leokewitz  
December 13th, 2017  
3 min read

## New release 0.2.0

I'm really happy to announce that I finally learned how to version <sup>[^1]</sup>! Also there are a lot of new features!

### Footnotes

As you might noticed one of the new features is being able to add footnotes <sup>[^2]</sup>. Footnotes can be inlined or manually referenced.

```
This is how you manually[^manual] reference something[^1].
```

```
This is how you add inline^[You don't need to specify inlined notes at the end of the file.] notes.
```

...

```
// In the end of the file...
```

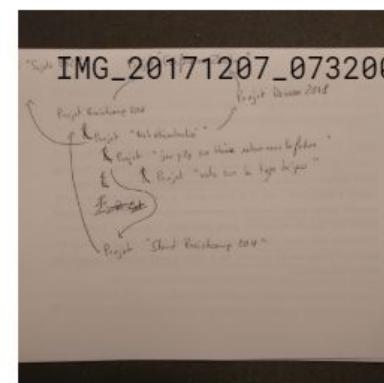
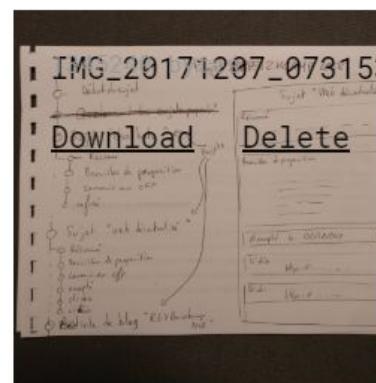
[^1]: This is a manual note.  
[^manual]: This is an inlined note.

<https://github.com/kewitz/dat-medium>

kontain 0.0.4

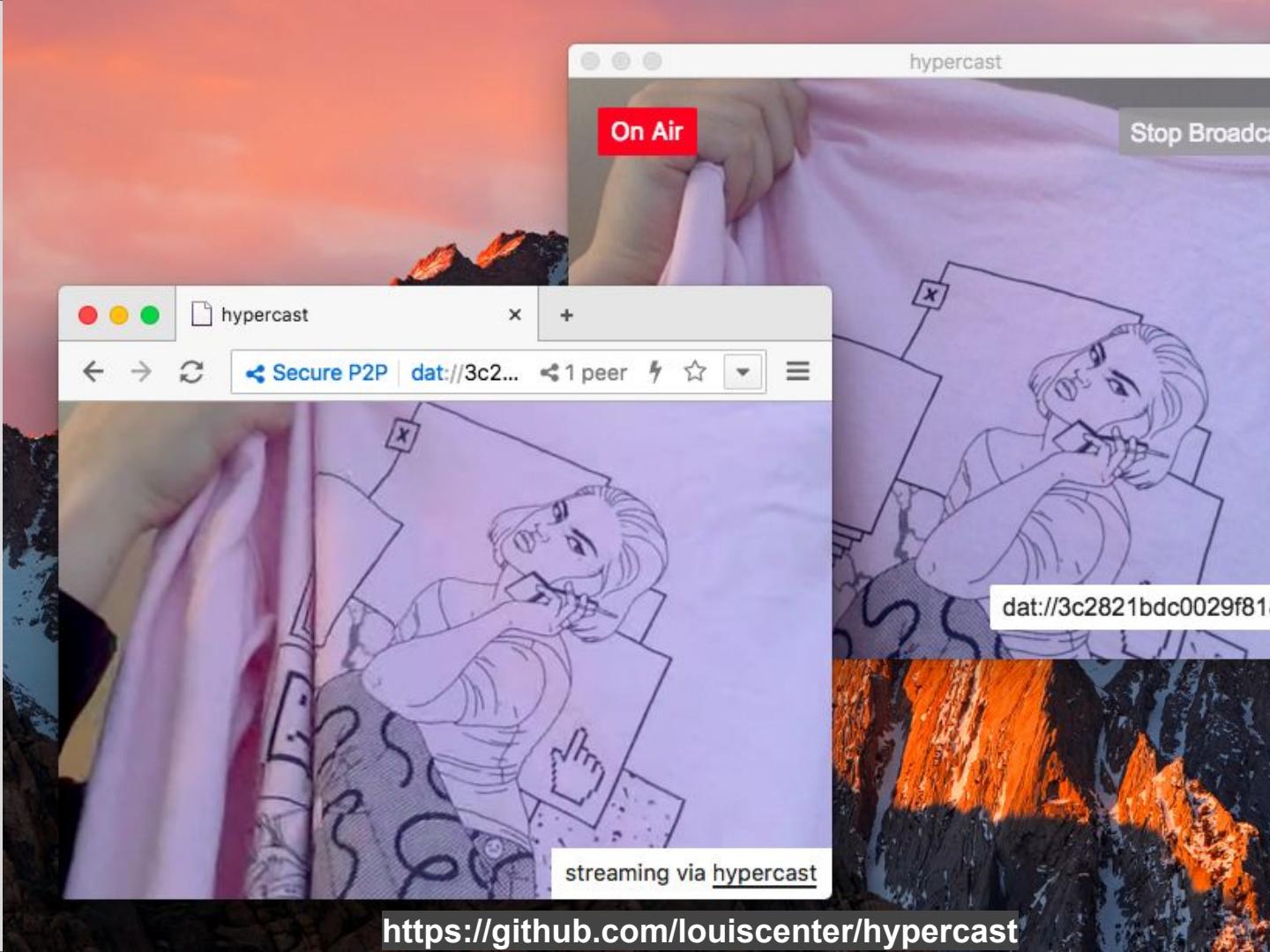
peer-to-peer file sharing

drop files anywhere

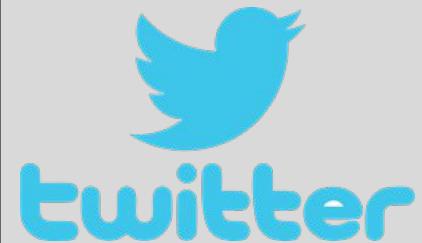


<http://hex22.org/projects/ntain/>





<https://github.com/louiscenter/hypercast>



Home Notifications Settings acailly | New post

Paul Frazee Following

Web nerd re-decentralizing the Web. Unblockchain consultant. Founder of the Beaker browser and Hashbase. Previously Secure Scuttlebutt.

Make sure your profile stays online! Share your profile URL with a public peer like Hashbase.

Feeling ambitious? Deploy your own public peer.

[Copy your profile URL](#)

Who to follow

Tim Caswell [Follow](#)

Ross Schulman [Follow](#)

Sander Moolin [Follow](#)

PsaeBrai [Follow](#)

Posts  
68

Following  
39

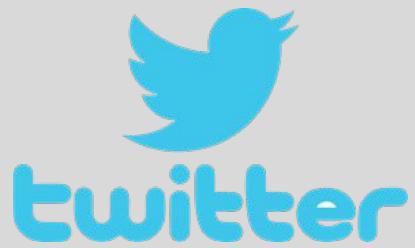
Paul Frazee · 4d ago  
No need to fret that you're missing frets. Fritter now tells you (once again) when there are new frets.  
[Reply](#) [Heart](#)

Paul Frazee · 4d ago  
Fritter update was published. You shouldn't need to be afraid to click on links anymore.  
[Reply](#) [Heart](#)

Paul Frazee · 4d ago  
Doing some work on Fritter today, fixing some of the annoying things like the issue clicking on links and the lack of "new posts" notification. Also going to look at Sander's mentions PR (finally!). Also using this to QA our 0.8 fork & edit flows... which needs a little work but it's working ok so far.  
[Reply](#) [Heart](#)

Paul Frazee · 4d ago  
Replying to this post  
Cool idea! I'm certain people will find that interesting and worth talking about.  
[Reply](#) [Heart](#)

<https://github.com/beakerbrowser/fritter>



> Discovering network of 82 portals... 0C 0W

168 Entries 0 Mentions 0 Whispers 2170 Discoveries

~neauoire quoted ~jimpick 13 days ago

very cool! Where was this? Where even is the internet archive?

~jimpick Scene from the Internet Archive...

Expand Entry

A photograph showing a person from the waist up, wearing a grey hoodie and glasses, standing next to a large screen. The screen displays a social networking platform interface with a profile picture, a bio about the Internet Archive, and a 'Who to follow' section. A chandelier is visible in the background.

# Mozilla Add-ons Blog

<https://blog.mozilla.org/addons/2018/01/26/extensions-firefox-59/>



## Extensions in Firefox 59

### Support for Decentralization Protocols

Mozilla has always been a [proponent of decentralization](#), recognizing that it is a key ingredient of a healthy Internet. Starting with Firefox 59, several protocols that support decentralized architectures are approved for use by extensions. The newly approved protocols are:

- [Dat Project](#) (dat://)
- [IPFS](#) (dweb:// ipfs:// ipns://)
- [Secure Scuttlebutt](#) (ssb://)

Firefox [itself](#) does not implement these protocols, but having them on the approved list means the browser recognizes them as valid protocols and extensions are free to provide implementations.

**Mais aussi...**



Scuttlebot  
a peer-to-peer log store

<http://scuttlebot.io/>



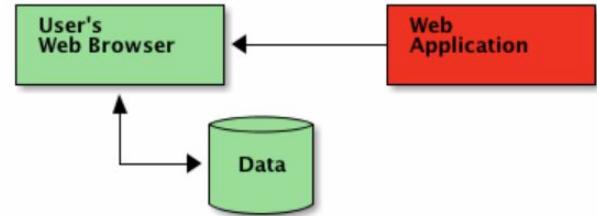
<https://solid.mit.edu/>



<https://matrix.org/>



remoteStorage



<https://remotestorage.io/>

<https://unhosted.org/>



<https://ethereum.org/>



**André Staltz** @andrestaltz · 25 févr.

If SpaceX's Starlink will provide internet access, obviously it will also provide a single IPv6 network, and could be a great opportunity for NAT-less peer-to-peer connections within Starlink only.

I hope [@elonmusk](#) chooses wisely.

À l'origine en anglais

16

217

3,2 k



**Elon Musk**

@elonmusk

Abonné

En réponse à [@andrestaltz](#)

Will be simpler than IPv6 and have tiny packet overhead. Definitely peer-to-peer.

# Démo

Rotonde,  
twitter peer to peer

<https://louis.center/p2p-social-networking/>

# Démo

ROTI en peer to peer

<https://acailly.github.io/roti/>

A close-up photograph of a spider's web, composed of fine, silvery threads against a dark, textured background.

**Merci**