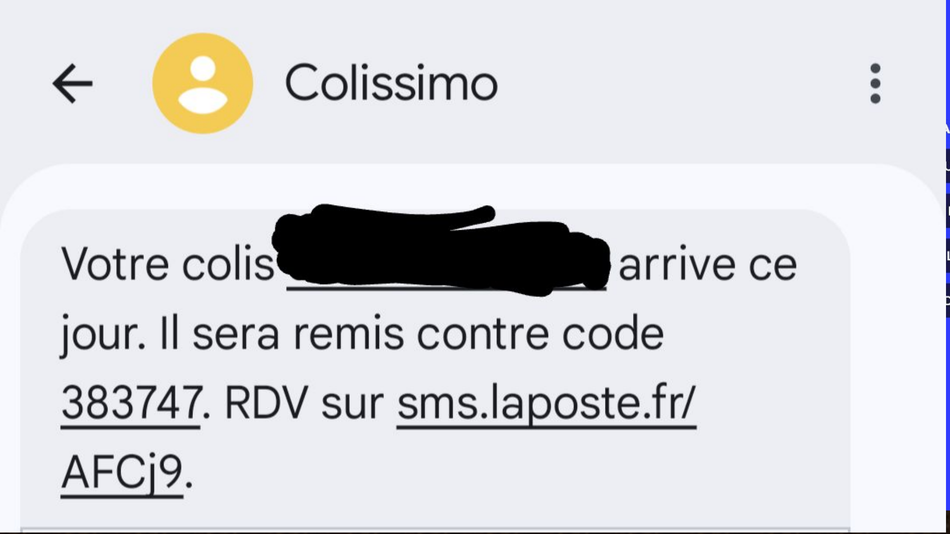
CLOUDFLARE

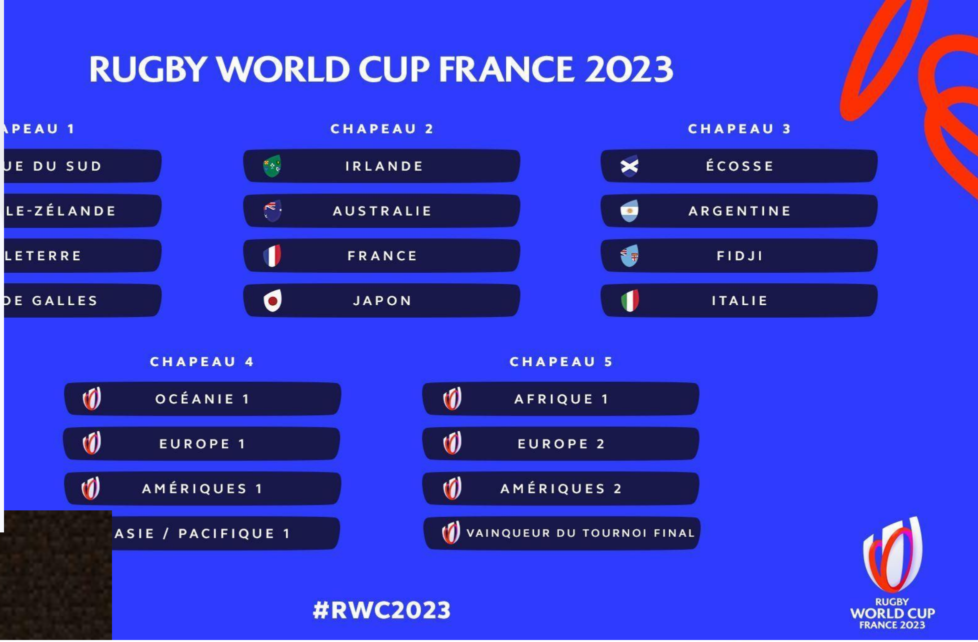
Des lampes à lave pour sécuriser Internet

Thibault Meunier
Research Engineer
Cloudflare



Colissimo

Votre colis [redacted] arrive ce jour. Il sera remis contre code 383747. RDV sur sms.laposte.fr/AFCj9.



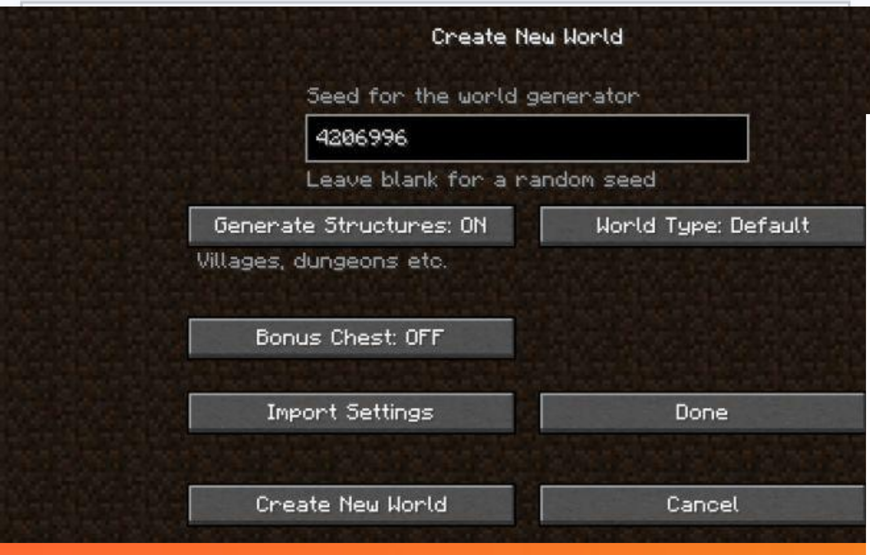
RUGBY WORLD CUP FRANCE 2023

PEAU 1	CHAPEAU 2	CHAPEAU 3
UE DU SUD	IRLANDE	ÉCOSSE
LE-ZÉLANDE	AUSTRALIE	ARGENTINE
LETERRE	FRANCE	FIDJI
DE GALLES	JAPON	ITALIE

CHAPEAU 4	CHAPEAU 5
OCÉANIE 1	AFRIQUE 1
EUROPE 1	EUROPE 2
AMÉRIQUES 1	AMÉRIQUES 2
ASIE / PACIFIQUE 1	VAINQUEUR DU TOURNOI FINAL

#RWC2023

RUGBY WORLD CUP FRANCE 2023



Create New World

Seed for the world generator

4206996

Leave blank for a random seed

Generate Structures: ON

Villages, dungeons etc.

World Type: Default

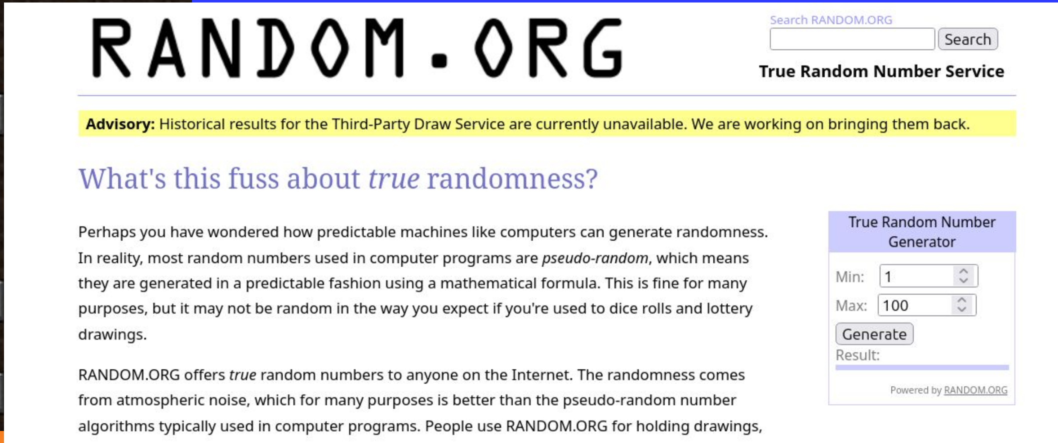
Bonus Chest: OFF

Import Settings

Done

Create New World

Cancel



RANDOM.ORG

Search RANDOM.ORG

Search

True Random Number Service

Advisory: Historical results for the Third-Party Draw Service are currently unavailable. We are working on bringing them back.

What's this fuss about *true* randomness?

Perhaps you have wondered how predictable machines like computers can generate randomness. In reality, most random numbers used in computer programs are *pseudo-random*, which means they are generated in a predictable fashion using a mathematical formula. This is fine for many purposes, but it may not be random in the way you expect if you're used to dice rolls and lottery drawings.

RANDOM.ORG offers *true* random numbers to anyone on the Internet. The randomness comes from atmospheric noise, which for many purposes is better than the pseudo-random number algorithms typically used in computer programs. People use RANDOM.ORG for holding drawings,

True Random Number Generator

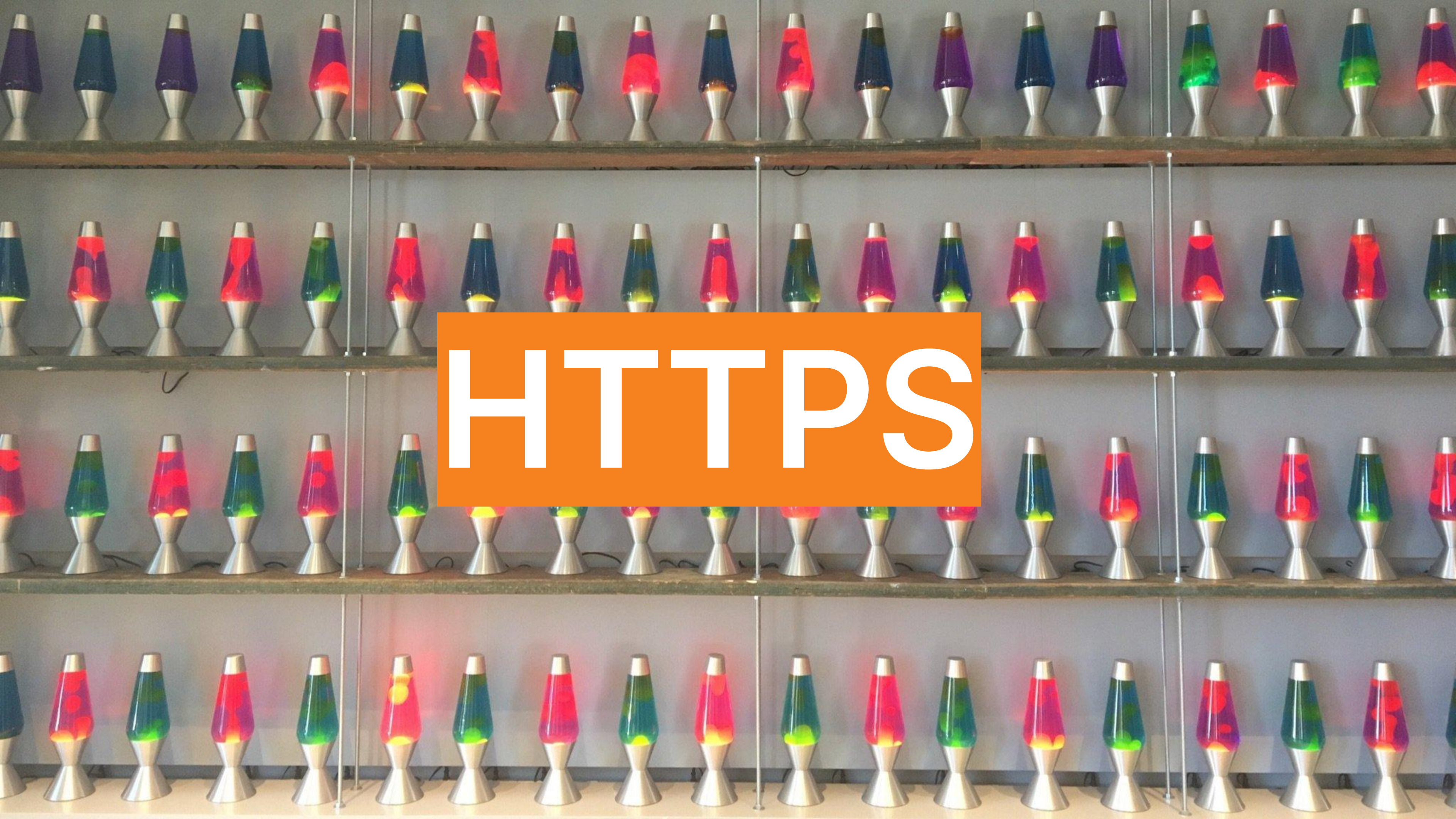
Min: 1

Max: 100

Generate

Result:

Powered by RANDOM.ORG



HTTPS

Agenda

1 Base de chiffrement

2 Génération de l'aléatoire

3 Du code

4 Aller plus loin

Base de chiffrement

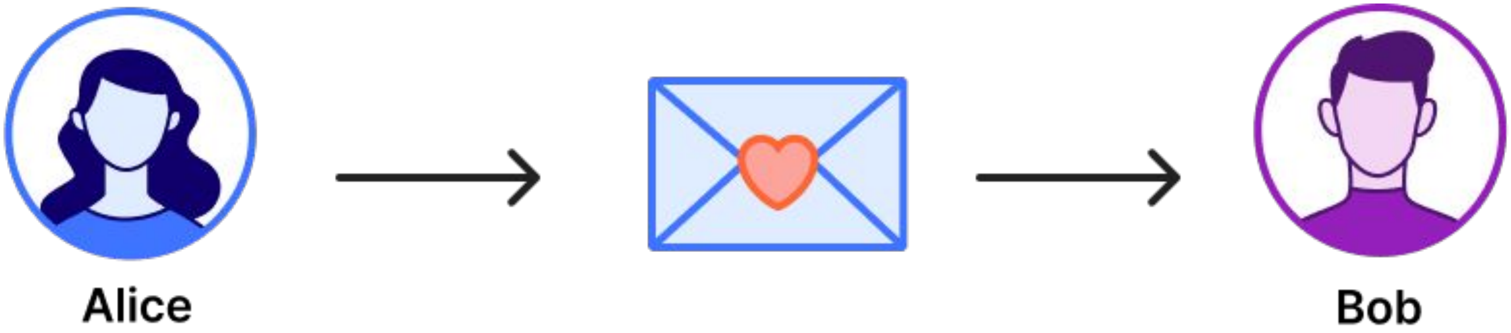
Le drop de TLS

cheveu, x	2737
chez	1040
chi	438
chiffr, e, e, r, s	1315
choi, x; si, e, r, s, t	2249
choler, a; ique, s	1091
chose, s	486
chrétien, ne, s	2437
chu	1510
ci, r, s	2379
cieu, x, se, s, m^{t}	917
circonscri, t, e; re; ption, s	271
circonspect, e, s; ion	992
circonstanc, e; ié, e, s	1707
circul, e, r; aire, s	2398
cit, e, e, r; ation, s	515
citoyen, s	1710
civilis, e, e, r, s; ation	2881
cl	1143
cla, i, r, e, s, m^{t}; rté	1811
clameur, s	2594
class, e, e, r, s	57
clandestin, e, s, m^{t}	901
commerc, e; ial, e, s; iaux	2303
comm, ettre; is, e, s, ion, s	110
commissa, ire, s	1326
commissaire, s de police	2841
commissaire, s de surveillance administrative.	94
commun, e, s, m^{t} 11	1247
communa, l, e, s; u, x	2318
communi, qu, e, e, r; cation, s	510
communiquez	2861
compagn, e, e, r; ie, s	1073
compar, aître; u, e, s	115
compat, ib, le, ilité, s	2342
compét, ent, e, s; ence	729
compétit, eur, s	149
complém, ent, aire, s	2986
complet, e, e, r, s, m^{t}	1717
compli, qu, e, e, r; cation, s	224
complicité	2004
complot, e, e, r, s	1017
compos, e, e, r; ition, s	81
compr, en, d, re; is, e, s	1265
compréhensi, b, le, s, ilité	2008
comprom, ettre; is, e, s	380

100
300
500
conscience
dès que
épreuve
gen, s, t

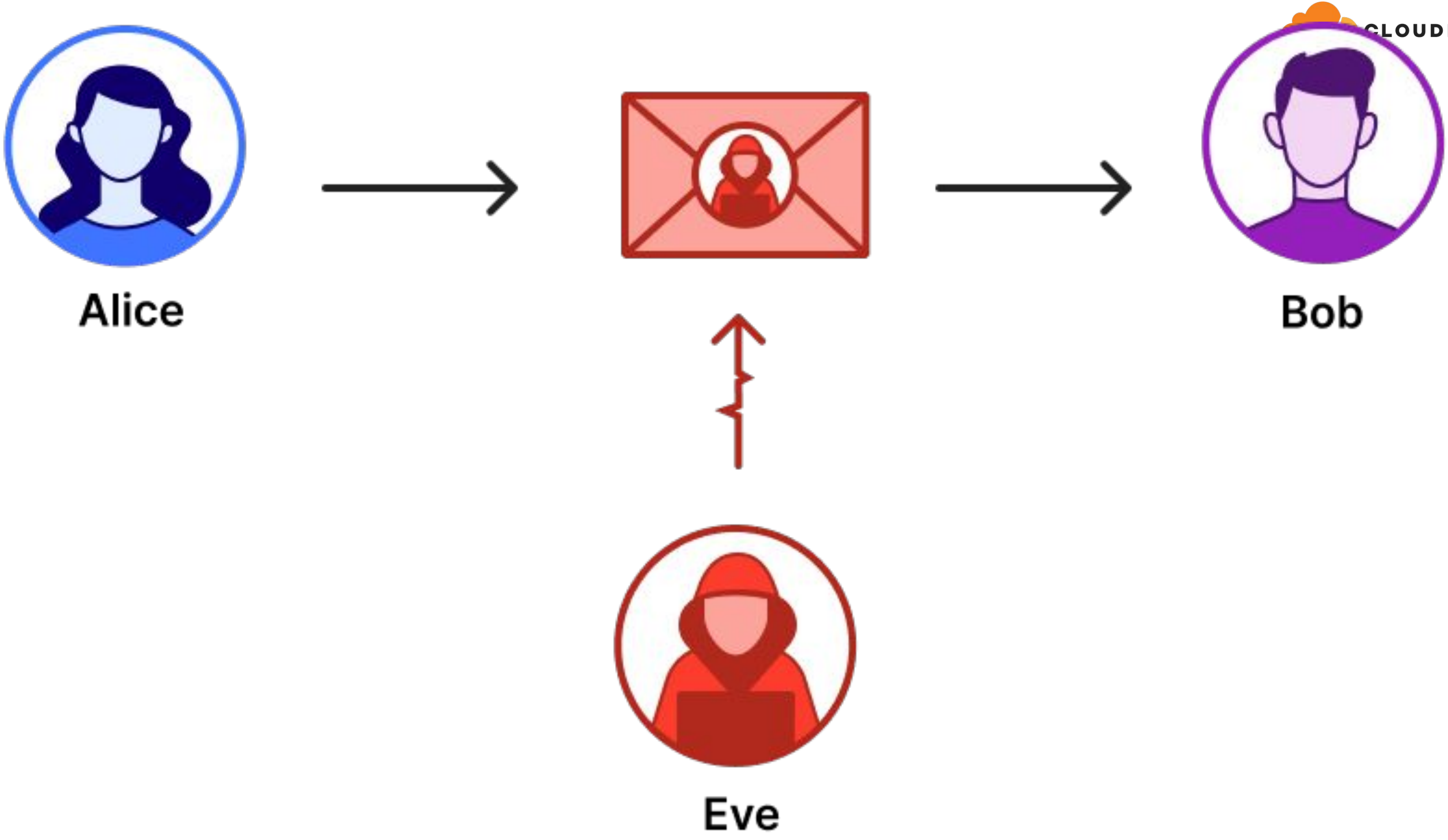
Alice

Bob



Alice

Bob



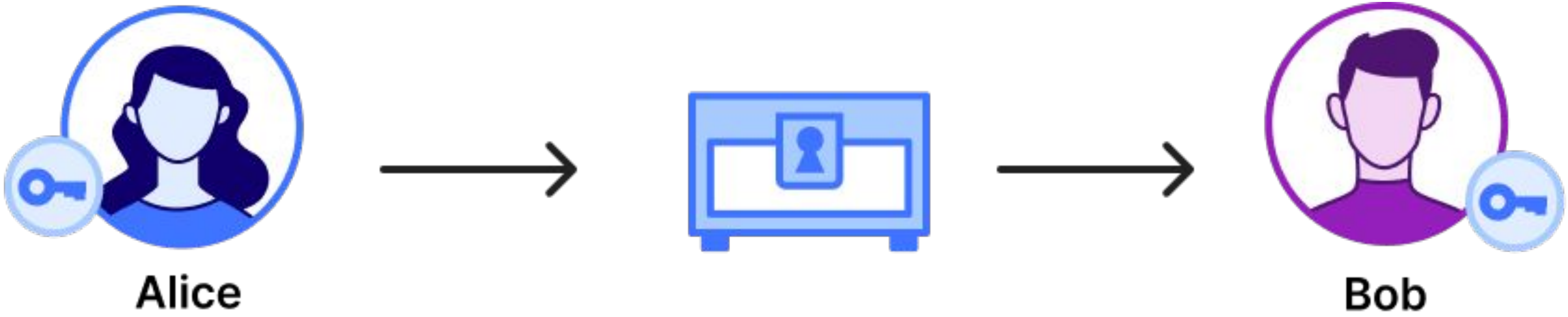
Alice

Bob

Eve

Alice

Bob


Alice
Bob

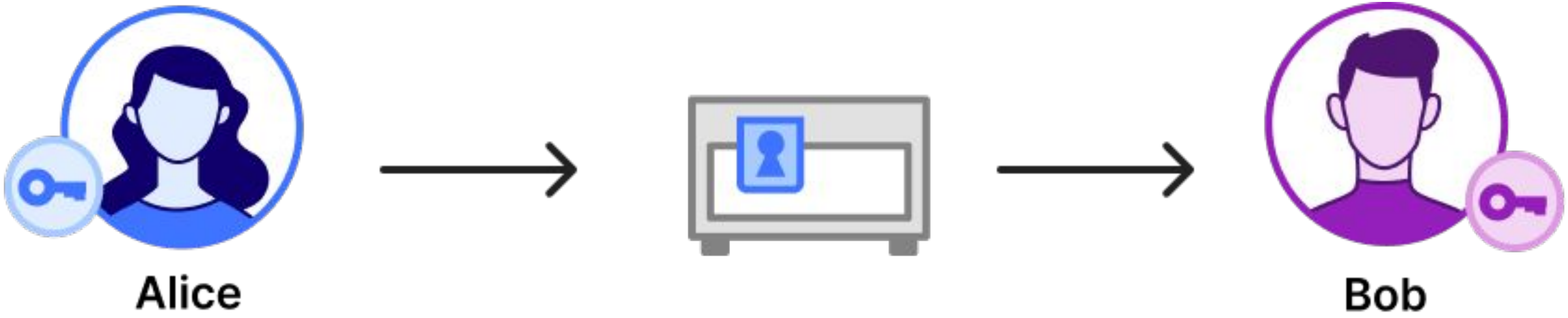
Comment partager la clé?

“Diffie-Hellman”

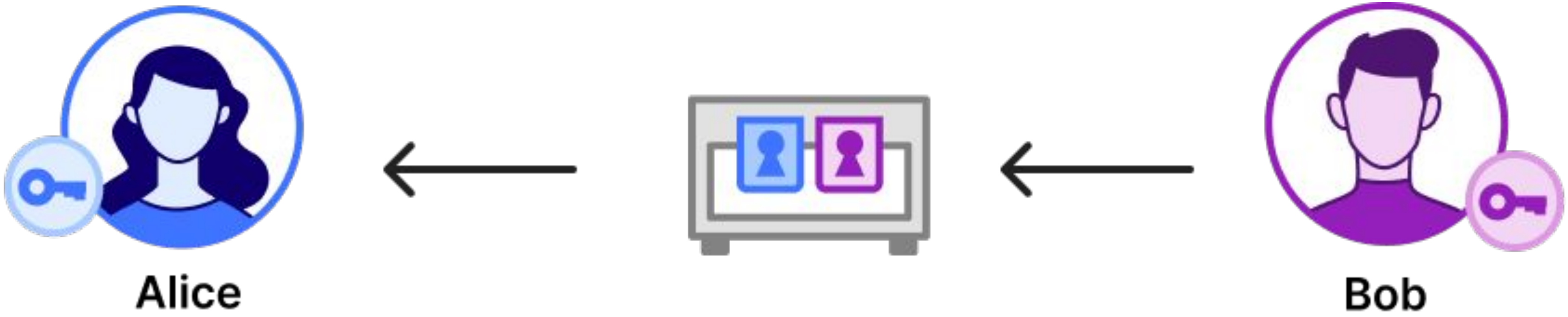
Alice

Bob

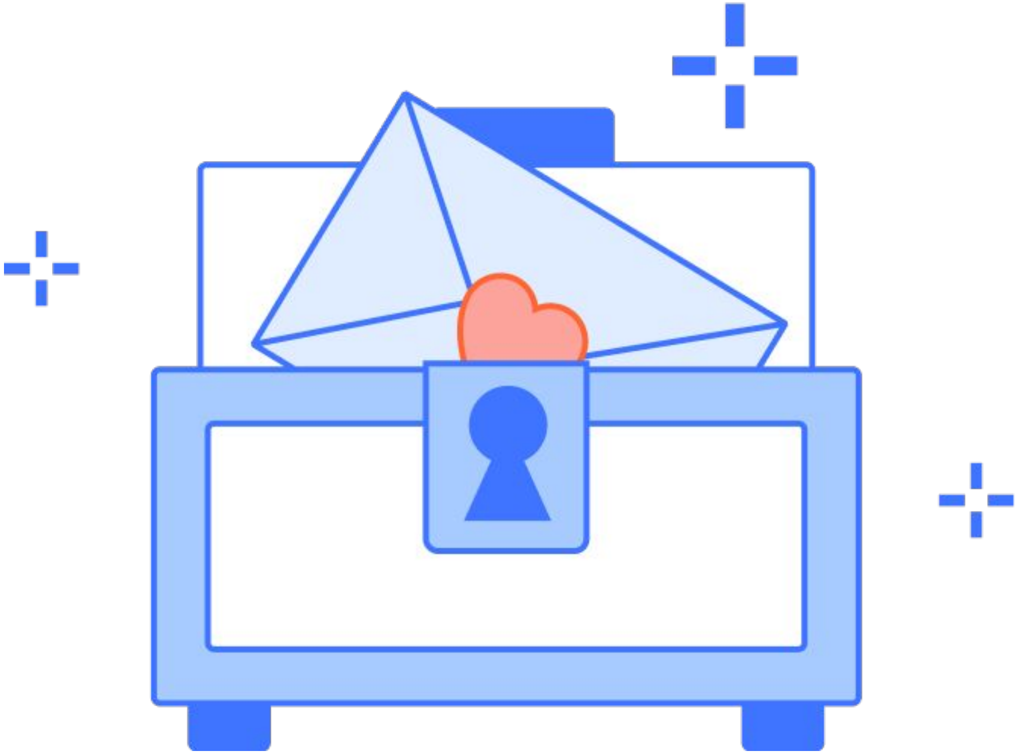
“Diffie-Hellman”



“Diffie-Hellman”



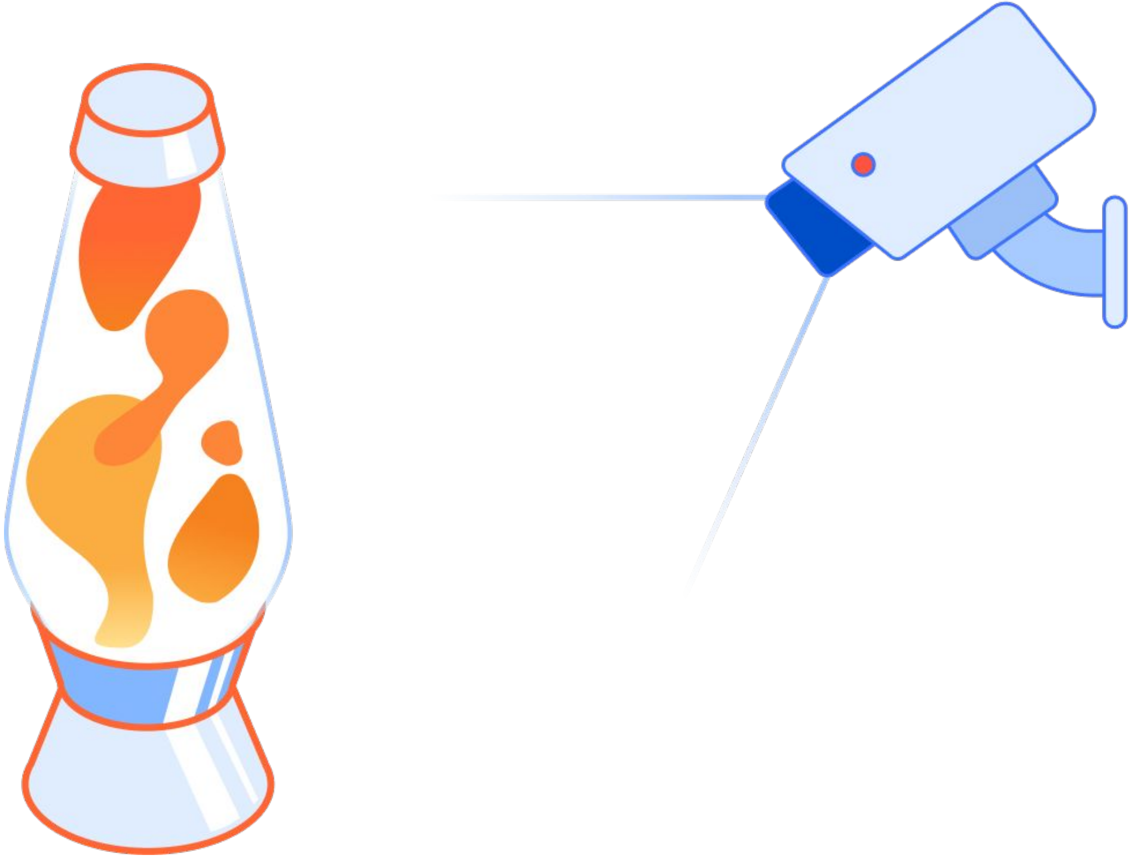
“Diffie-Hellman”

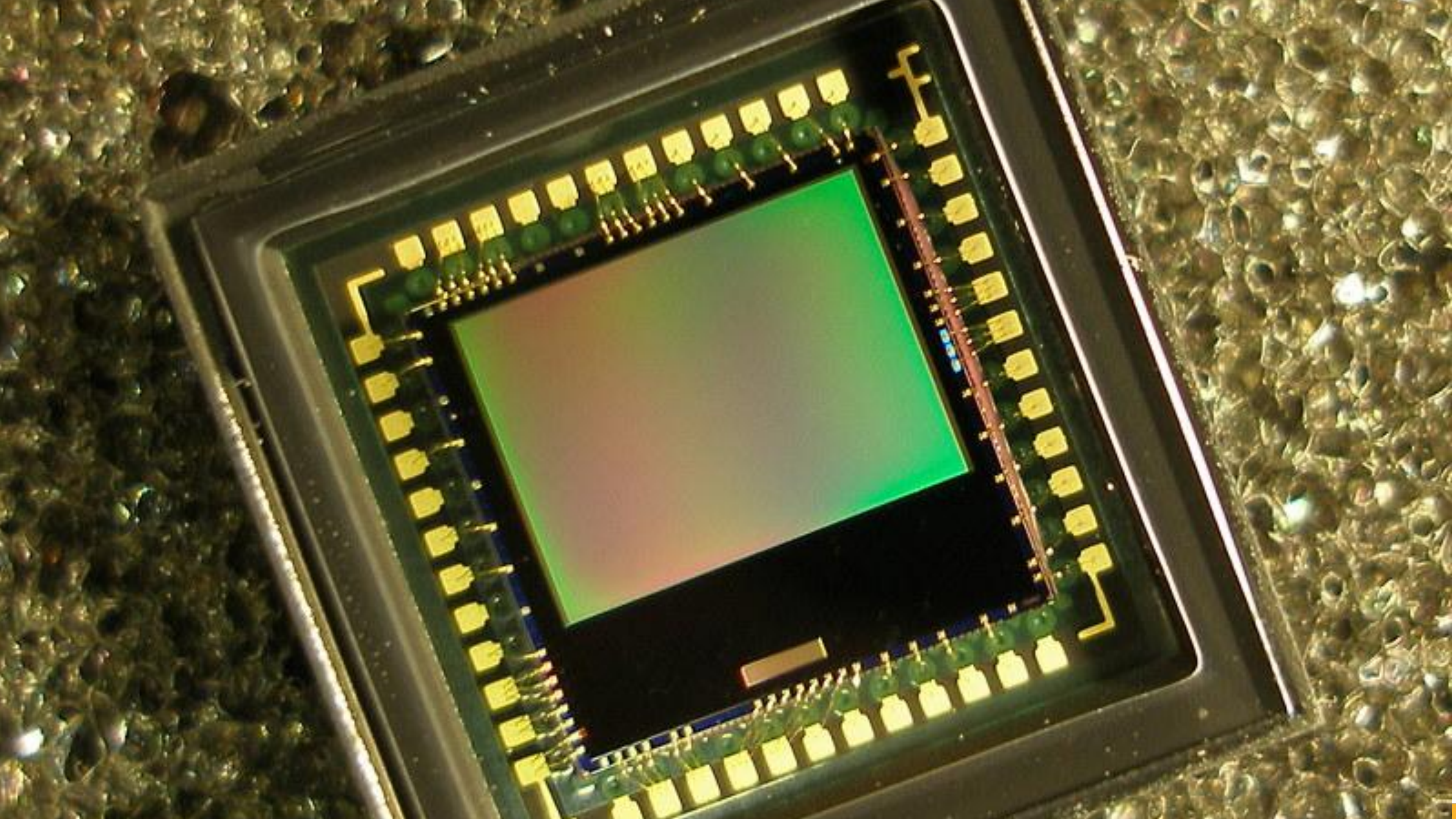


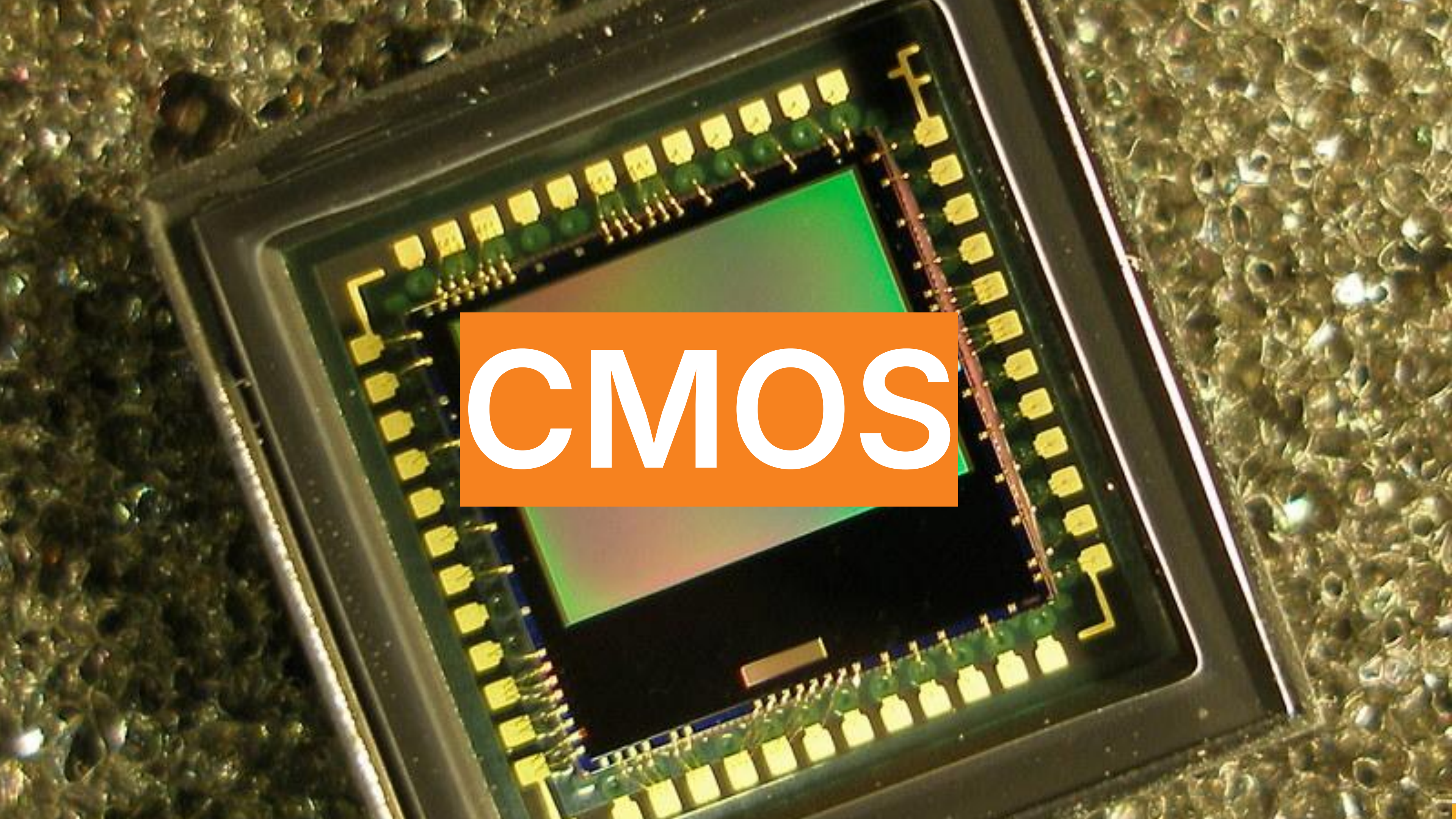
Des clés uniques

Génération d'aléatoire

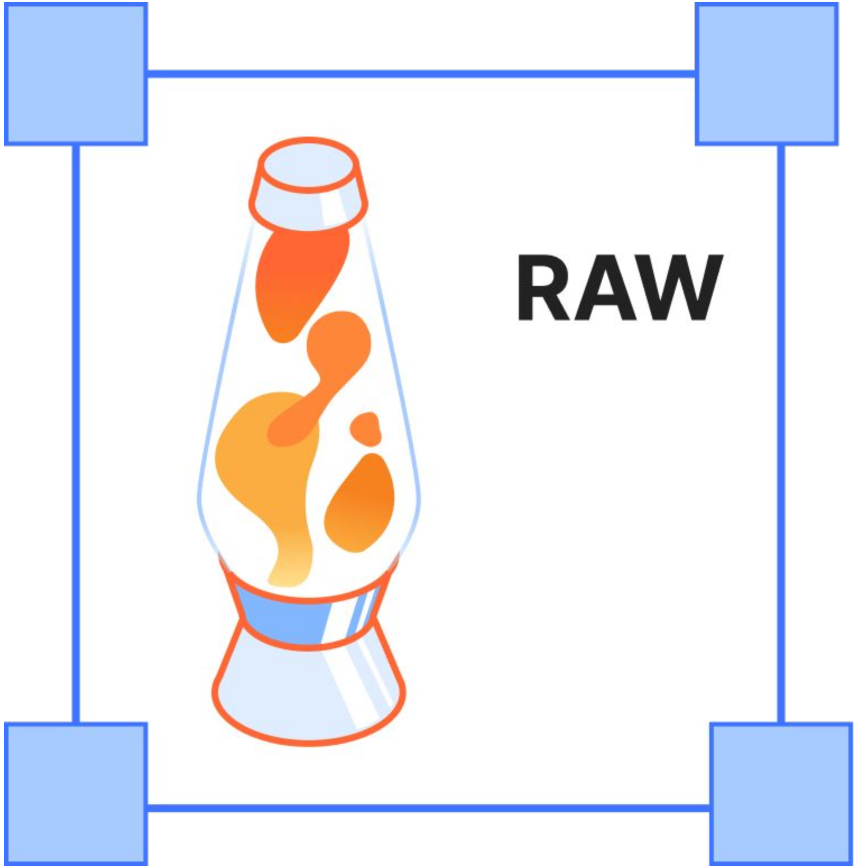
Faites du bruit

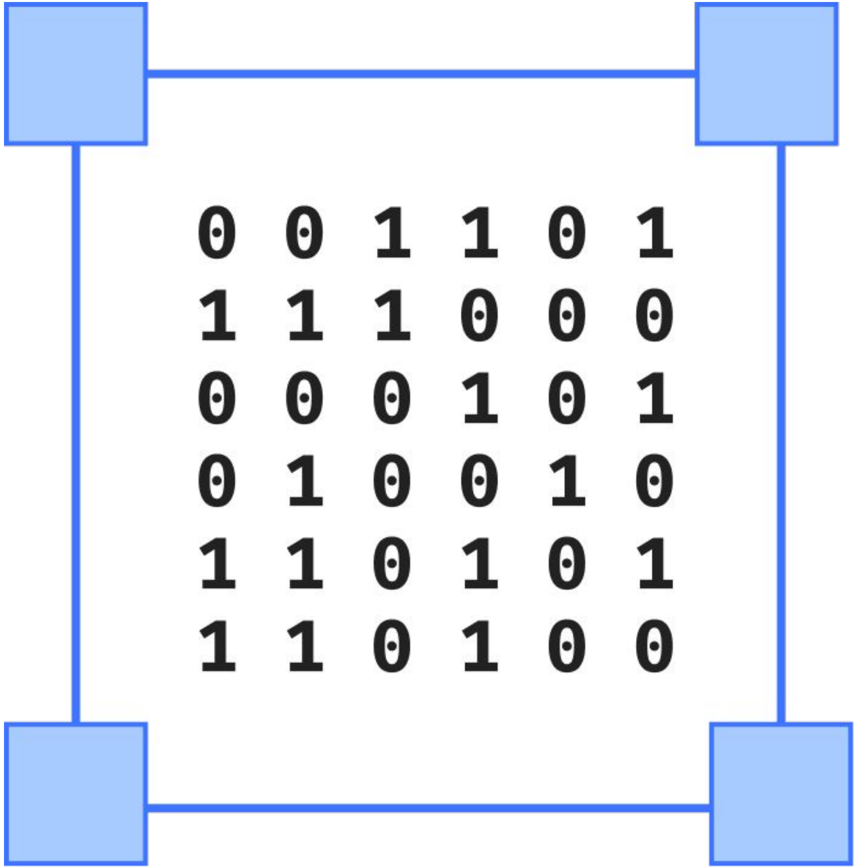




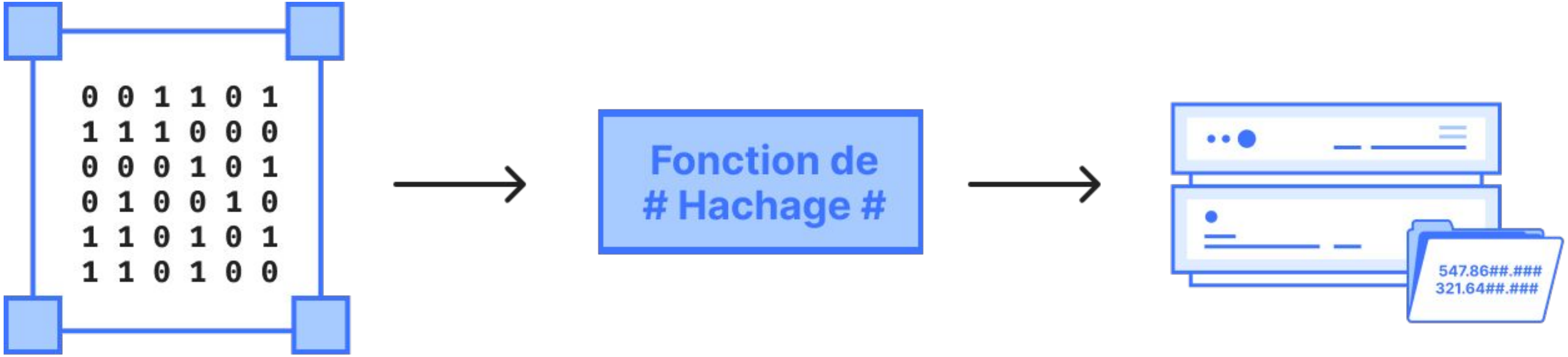


CMOS


RAW



```
0 0 1 1 0 1
1 1 1 0 0 0
0 0 0 1 0 1
0 1 0 0 1 0
1 1 0 1 0 1
1 1 0 1 0 0
```



```
0 0 1 1 0 1
1 1 1 0 0 0
0 0 0 1 0 1
0 1 0 0 1 0
1 1 0 1 0 1
1 1 0 1 0 0
```

Fonction de
Hachage

Générer de nouveaux nombres

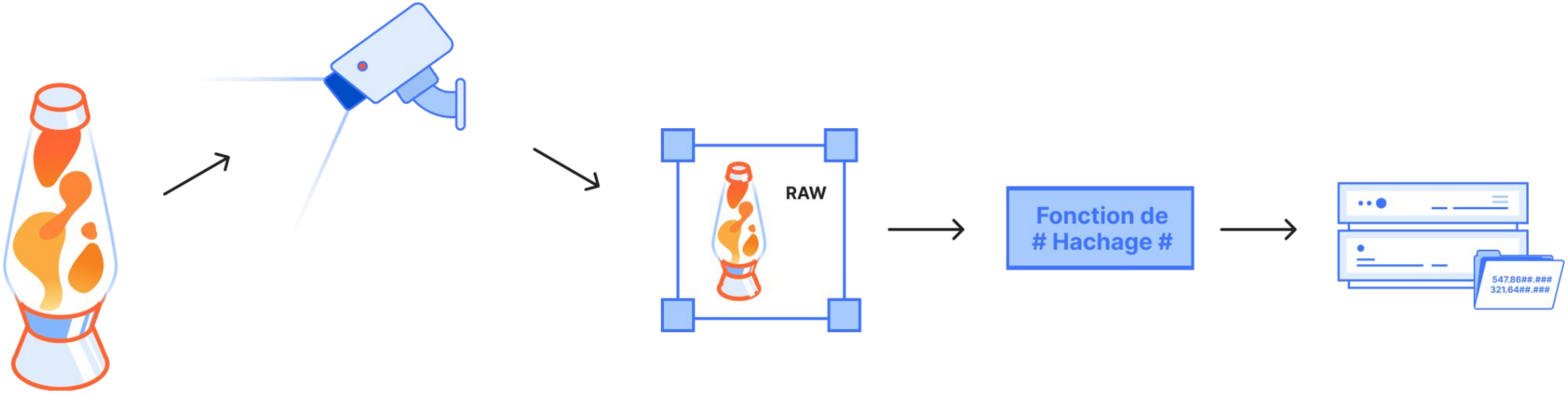
Utilisation d'un CSPRNG

Cryptographically secure pseudorandom number generator

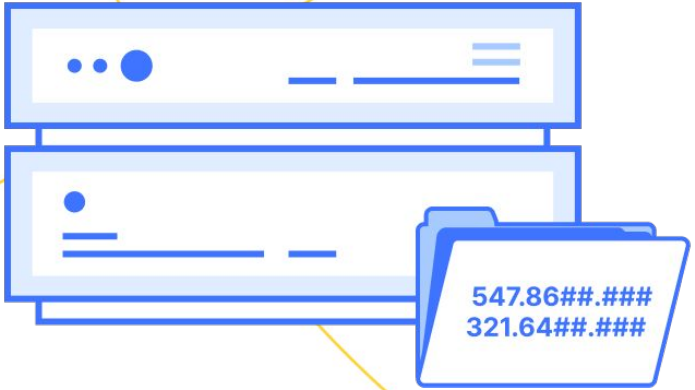
Par exemple

RFC 7539 - ChaCha20 and Poly1305

Vue d’ensemble



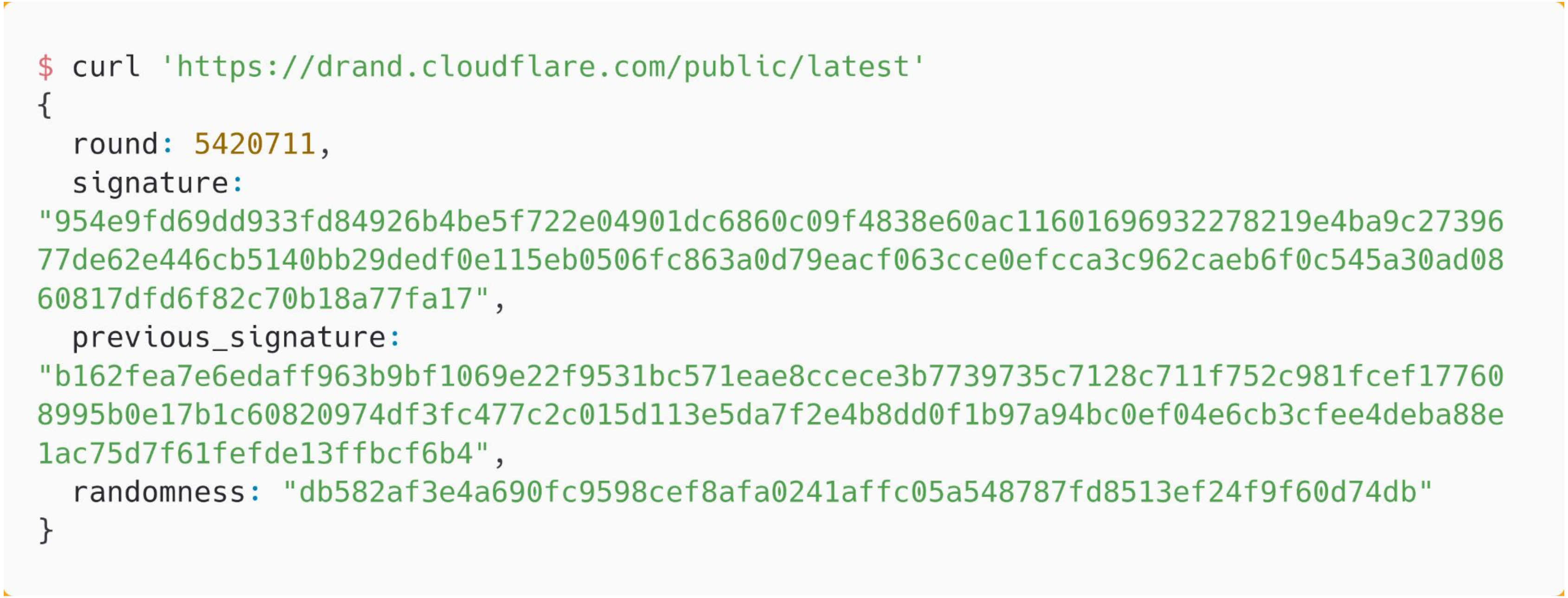
Initialisation terminée



Du code

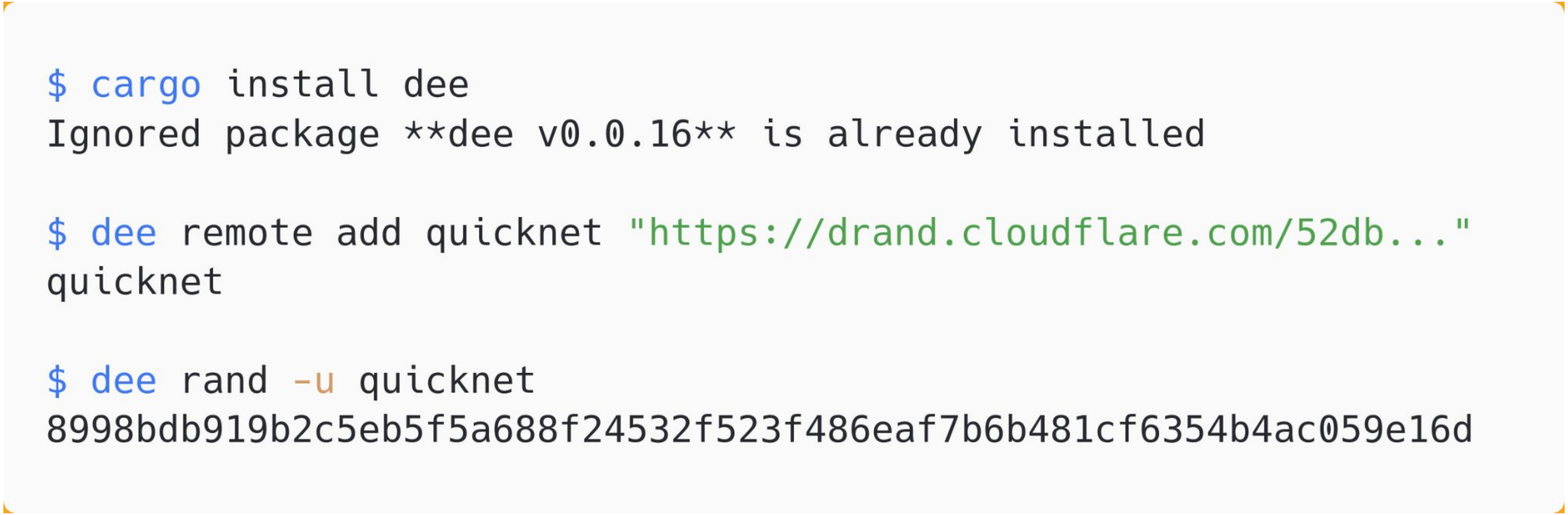
10010010000001

Récupérer l'entropie



```
$ curl 'https://drand.cloudflare.com/public/latest'
{
  round: 5420711,
  signature:
"954e9fd69dd933fd84926b4be5f722e04901dc6860c09f4838e60ac1160169693227821 9e4ba9c27396
77de62e446cb5140bb29dedf0e115eb0506fc863a0d79eacf063cce0efcca3c962caeb6f0c545a30ad08
60817dfd6f82c70b18a77fa17",
  previous_signature:
"b162fea7e6edaff963b9bf1069e22f9531bc571eae8ccece3b7739735c7128c711f752c981fcef17760
8995b0e17b1c60820974df3fc477c2c015d113e5da7f2e4b8dd0f1b97a94bc0ef04e6cb3cfee4deba88e
1ac75d7f61fefde13ffbcf6b4",
  randomness: "db582af3e4a690fc9598cef8afa0241affc05a548787fd8513ef24f9f60d74db"
}
```

En une seule ligne de commande



```
$ cargo install dee
Ignored package **dee v0.0.16** is already installed

$ dee remote add quicknet "https://drand.cloudflare.com/52db..."
quicknet

$ dee rand -u quicknet
8998bdb919b2c5eb5f5a688f24532f523f486eaf7b6b481cf6354b4ac059e16d
```

Sur votre machine

Bash

```
RANDOM=$(dee get --format json | jq -r '.randomness')
echo “$RANDOM $RANDOM $RANDOM”
```

Python

```
import random
random.seed(int("dee-randomness", 16))
print(random.random())
print(random.random())
print(random.random())
```

Aller plus loin

C'est pour vous à la maison

En conclusion

Aléatoire

Tirer parti du chaos dans les bureaux de Cloudflare - Cloudflare (Blog)

La ligue d'entropie - Cloudflare (Blog)

The Randomness crisis threatening the Internet - Be Smart (Video)

How the Minecraft seed was found - SalC1 (Video)

Securité Internet

La fin du cadenas - Chrome & Safari (Article)

crypto/tls - Mainteneurs Go (Code)

Diffie Hellman - Wikipedia (Article)

Merci 💌

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