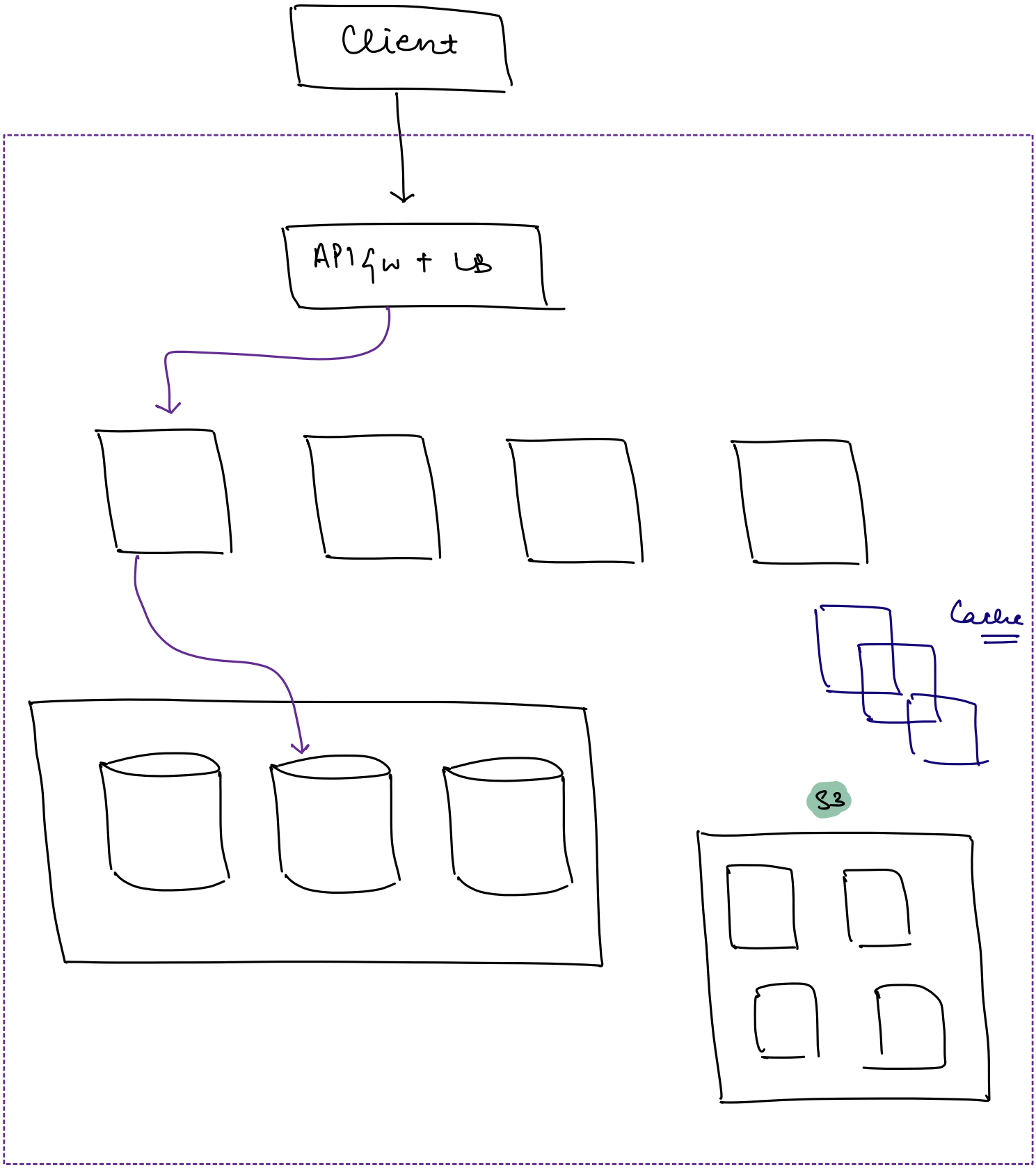
⇒ Design a Unique ID Generator.

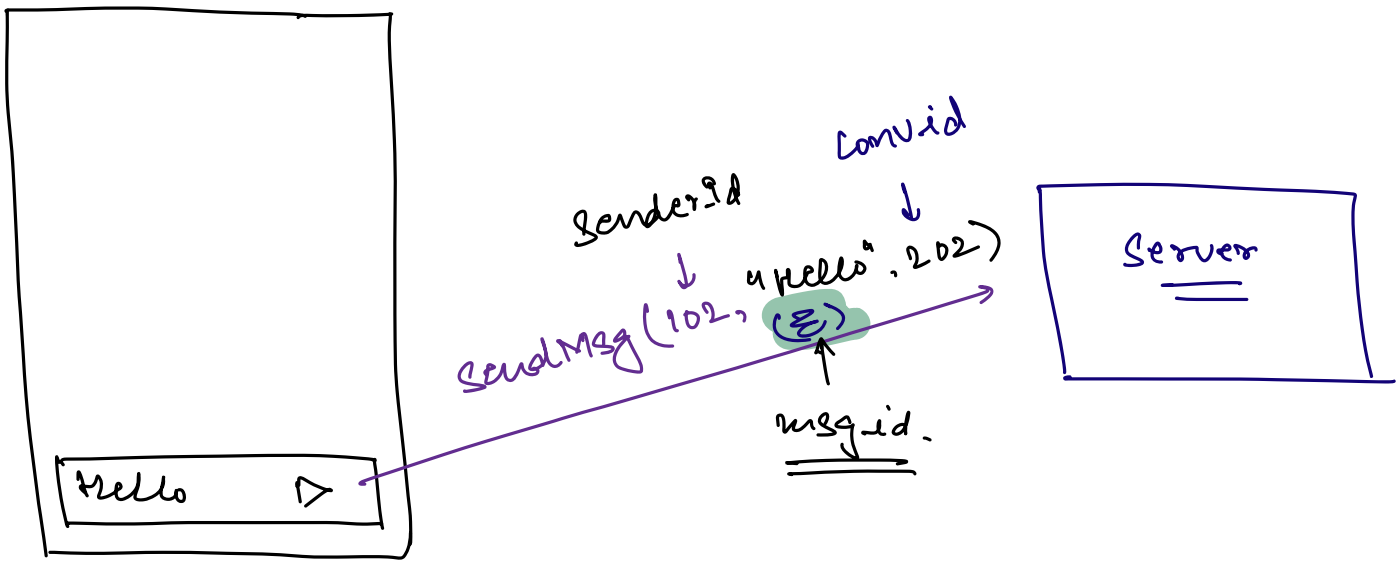
⇒ Distributed Unique ID Generator.

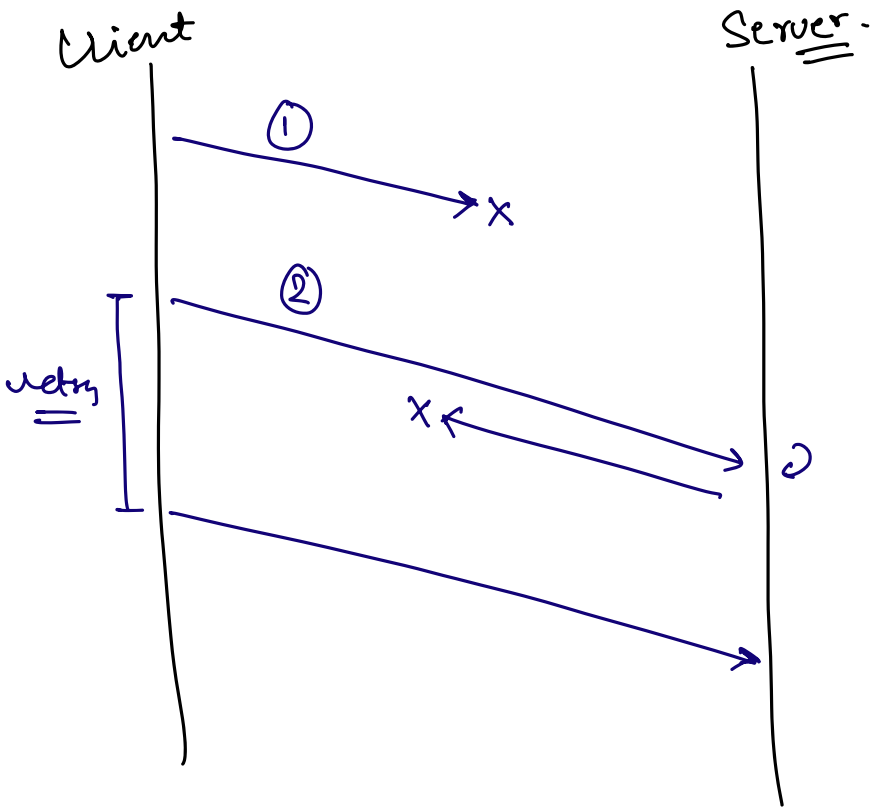


⇒ Both client and server needs to have a feature of generating unique Id.

⇒ When client is required to generate a unique Id ?

↳ To make the API's idempotent.





⇒ Idempotency.

⇒ Same request shouldn't processed twice by the server.

⇒ Client generates a unique Id (Idempotency key) on their side to make sure that the server will not process the same request twice.

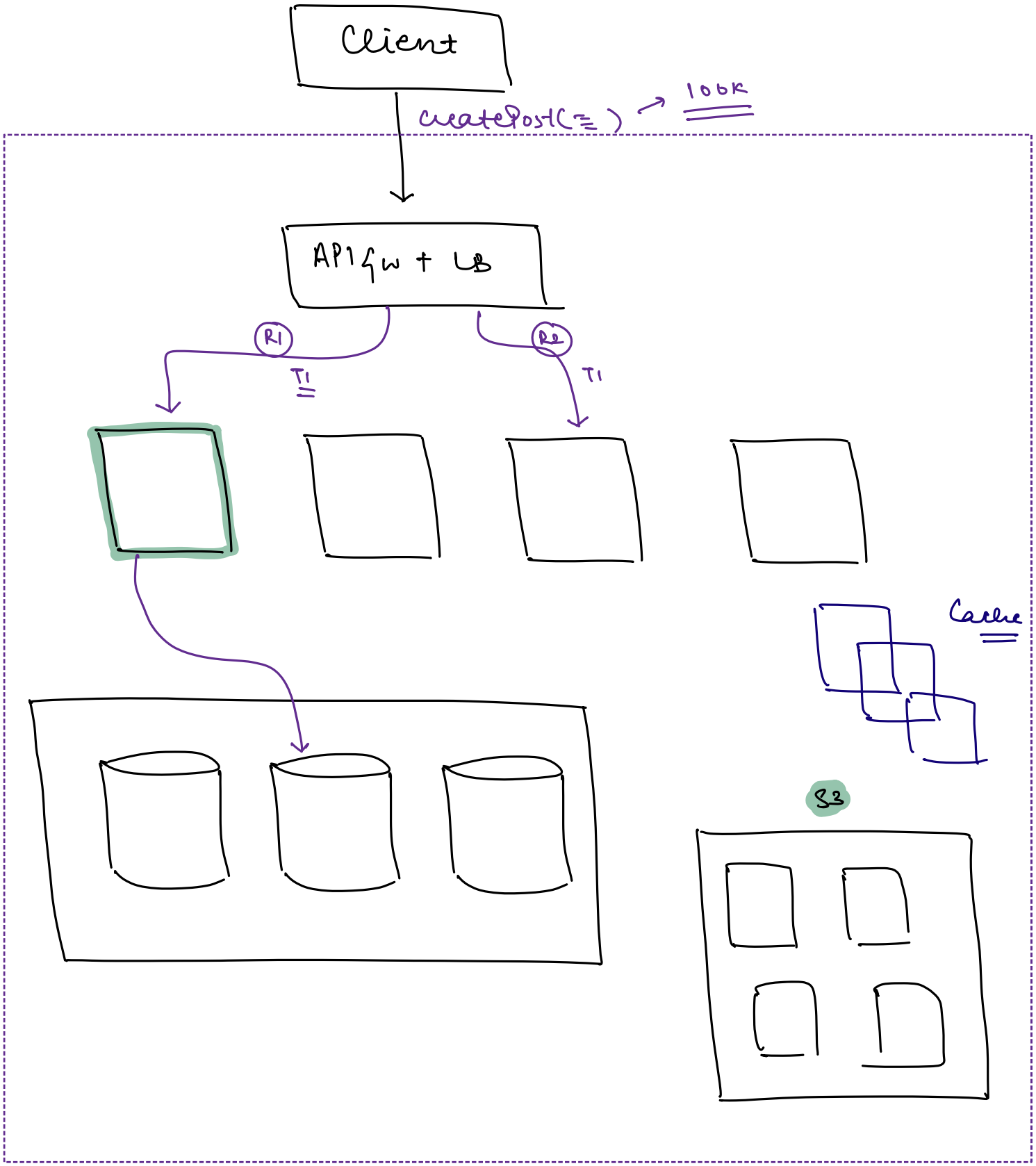
⇒ Client
- Mobile App
- Web App | Browser

MAC | IP | ..

id : Client_id + device_info + timestamp. + ...

Unique Id.

Server Side Id Generation.



⇒ In the backend architecture, id should be unique across the entire cluster.

⇒ Id be unique globally.

⇒ Id's should be incremental.

id1 → t1

id2 → t2

```
if (t2 > t1) {
    id2 > id2
}
```

3

UUID.

2a9b98f1-b360-42b2-a0d1-7ab1d9e20ff3

(10 characters, 15 dashes)

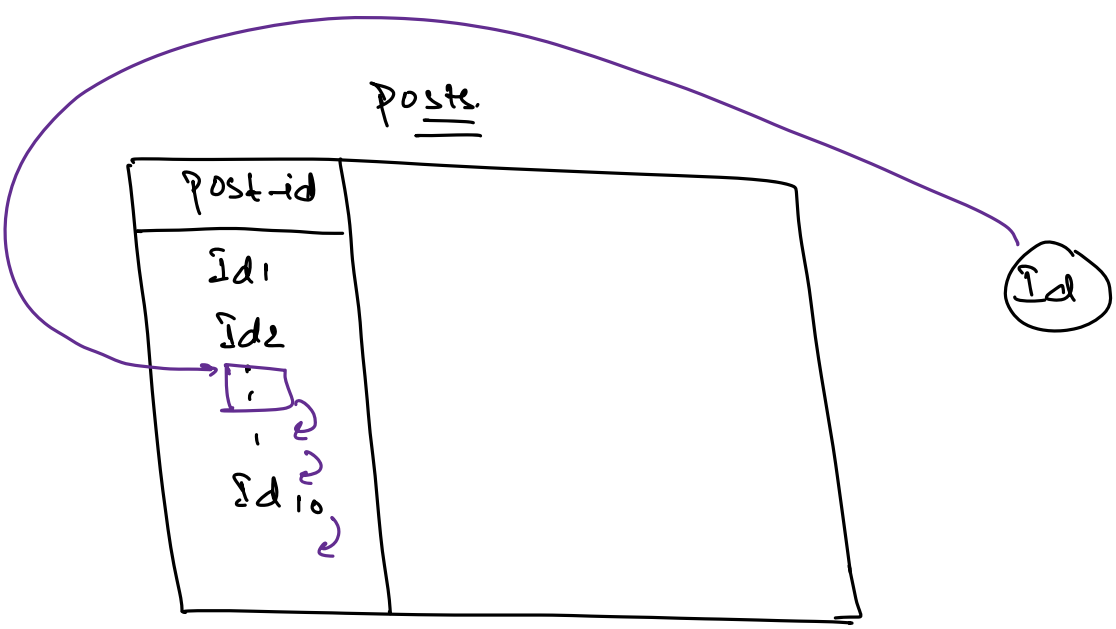
⇒ 128 bit Number

128 / 4 = 32

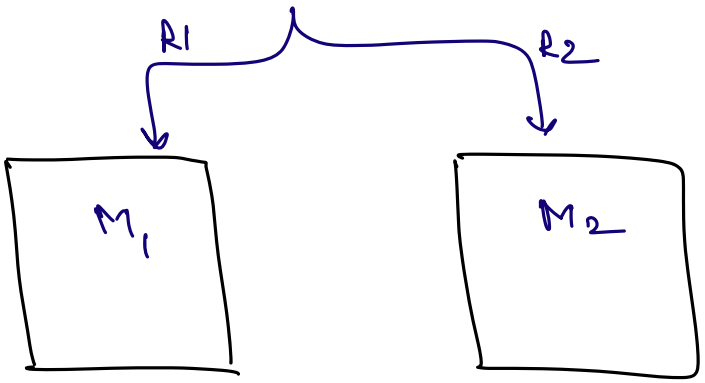
0 to 15

0000 ... 1111

0 1 2 ... 9 A→10 B→11 C→12 D→13 E→14 F→15



⇒



→ machine Id

→ timestamp

→ device_info

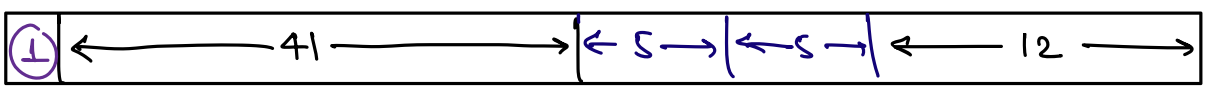
→ user_info

⇒ Twitter's Snowflake Algorithm.

↳ in 2010.

⇒ 64 Bit Number

MSB LSB.



Sign Bit. (1 Bit)

0 1

41 Bits ⇒ Timestamp.
(epoch)

5 Bits ⇒ Data Centre Id

5 Bits ⇒ Machine Id in the Data Centre.

12 Bits ⇒ Sequence Number
[Counter].

Timestamp : Epoch

⇒ No. of milliseconds passed after a particular date.

↳ 01|01|1970 00:00:00

Twitter : Start Date

↓

4th Nov, 2010. ⇒ 2080.

41 Bits ⇒ 2^{41} milliseconds.

2199023255552 ms

↓ Years

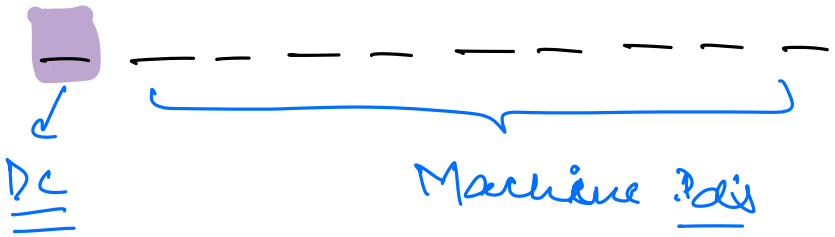
~ 70 Years.

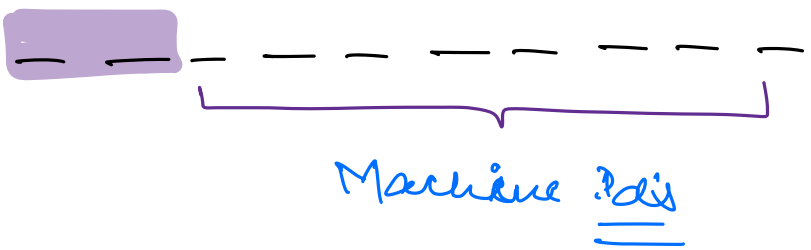
5 Bits : Data Centre Id.

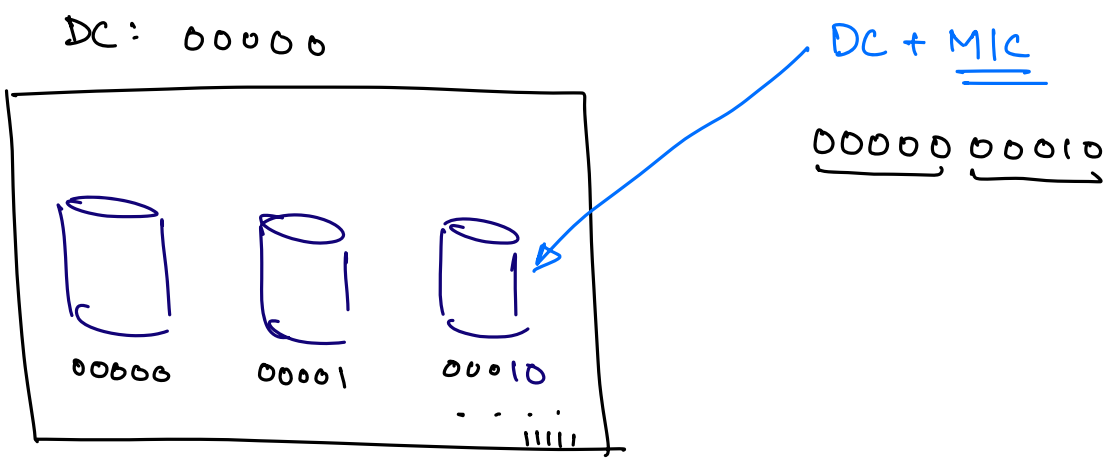
↳ 0 to 31

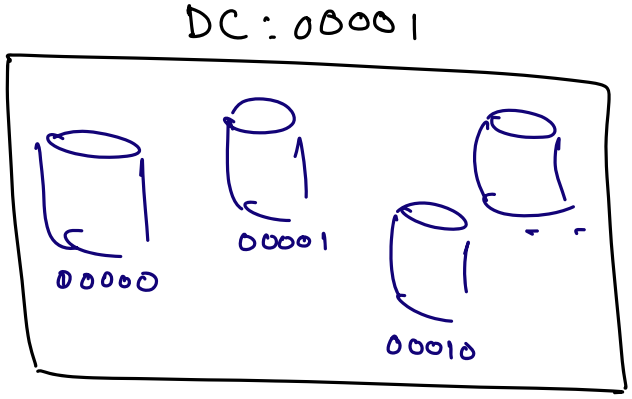
5 Bits : Machine Id.

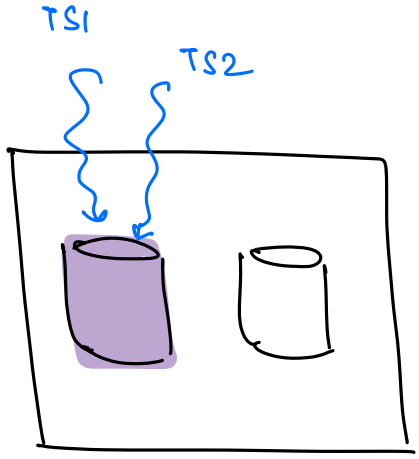
↳ 32 m/c











12 Bits. : Sequence No. ⇒ Gets reset to zero after every 1 ms.

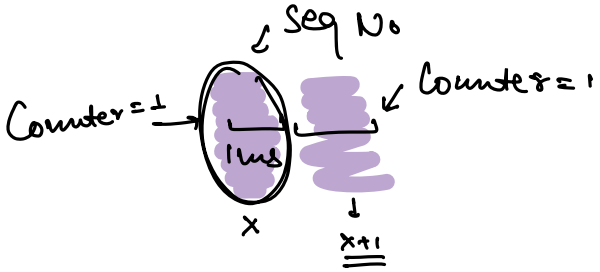
Counter = 0

⇒ Race Condition.

R1
R2

⇒ Lock.

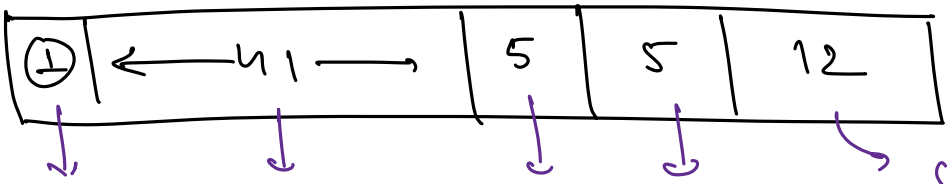
⇒ 12 Bits. ⇒ 2^{12} : 4096.



1 ms ⇒ 4096

1 sec ⇒ 4096×10^3

⇒ 4×10^6 ⇒ 4M rps



Sign Bit.

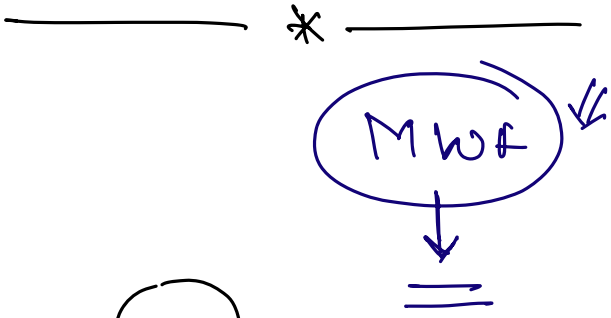
TS

DC

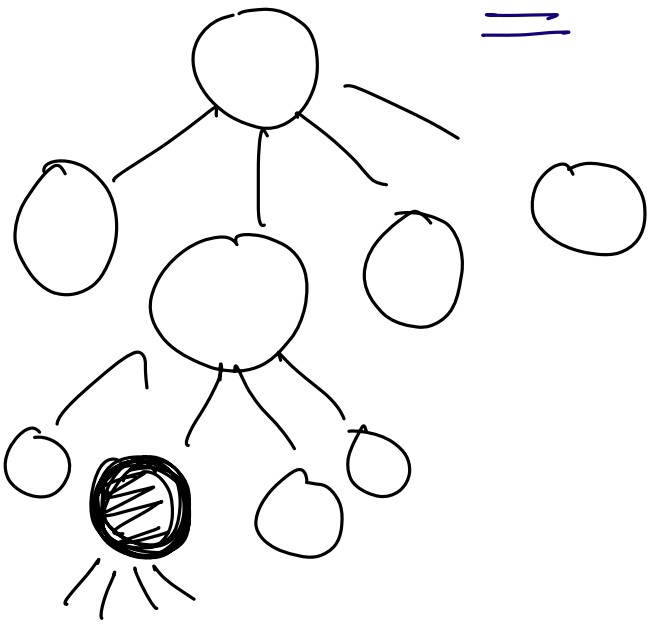
M/C

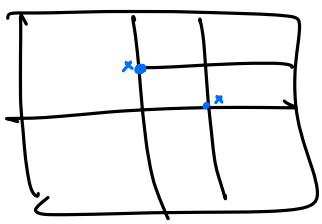
Sequence no.

$\Rightarrow 0$ or 1_0



MWF





Quad Tree.