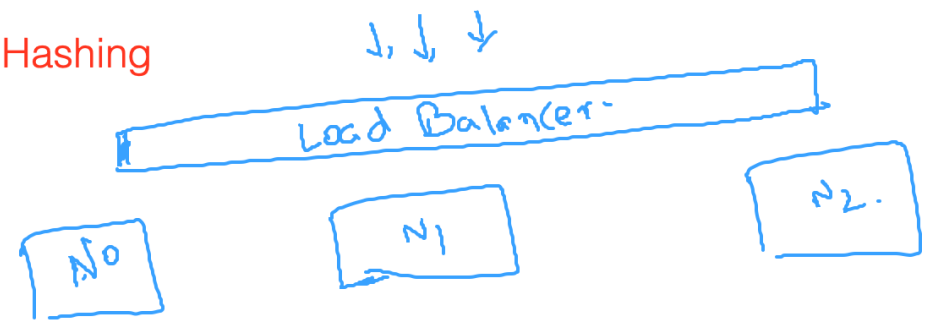
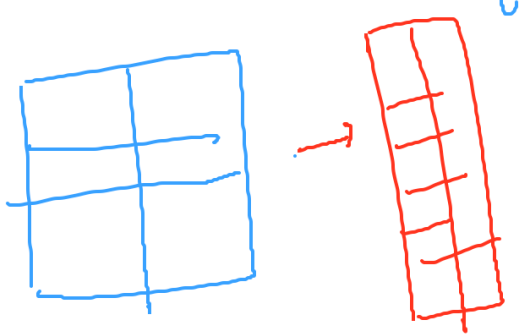
HLD : High Level Design

- Servers
- Scaling
- Monolith
- Micro-services
- Load Balancer
  - ~~Hashing~~
  - ~~Consistent Hashing~~



Hash function. (x) = x % n

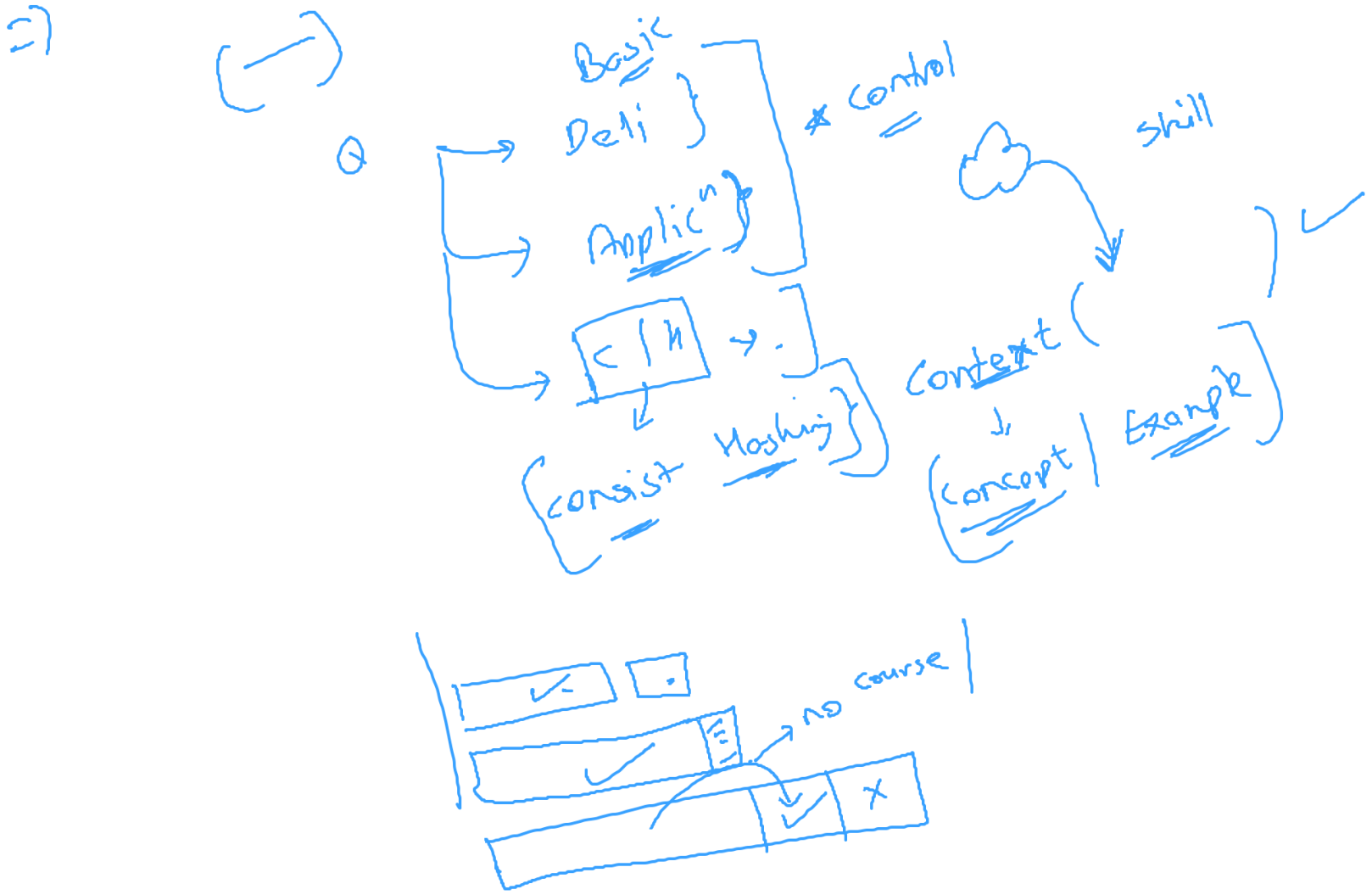
i % n



issues?? Rebalancing

(Scaling → rebal → caching issue.

Consistent Hashing)


Basic
Deli
Applic^n
* control
skill
C | H
consist Hashing
Context
concept | Exampk
no course
X

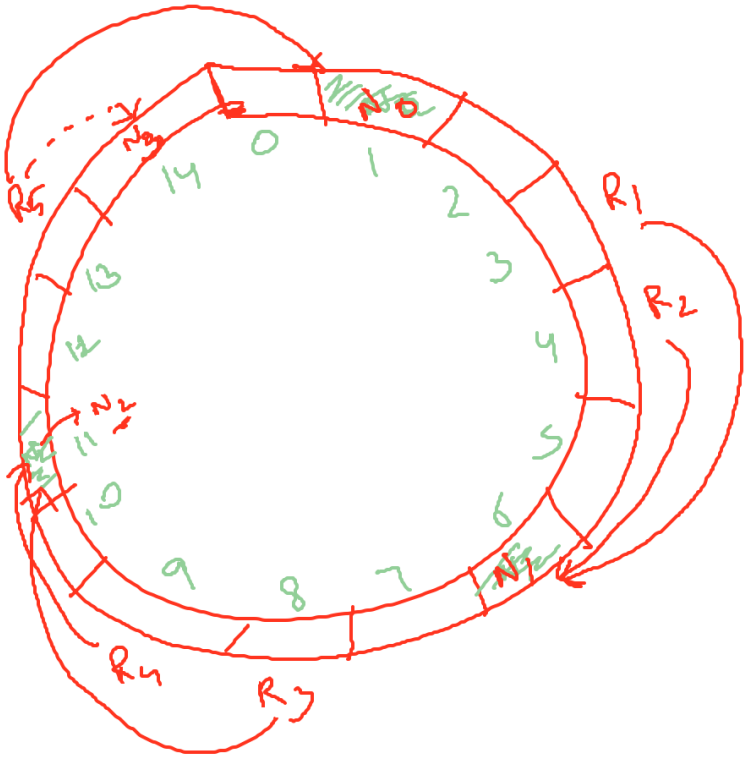
Consistent Hashing

↳ virtual Ring

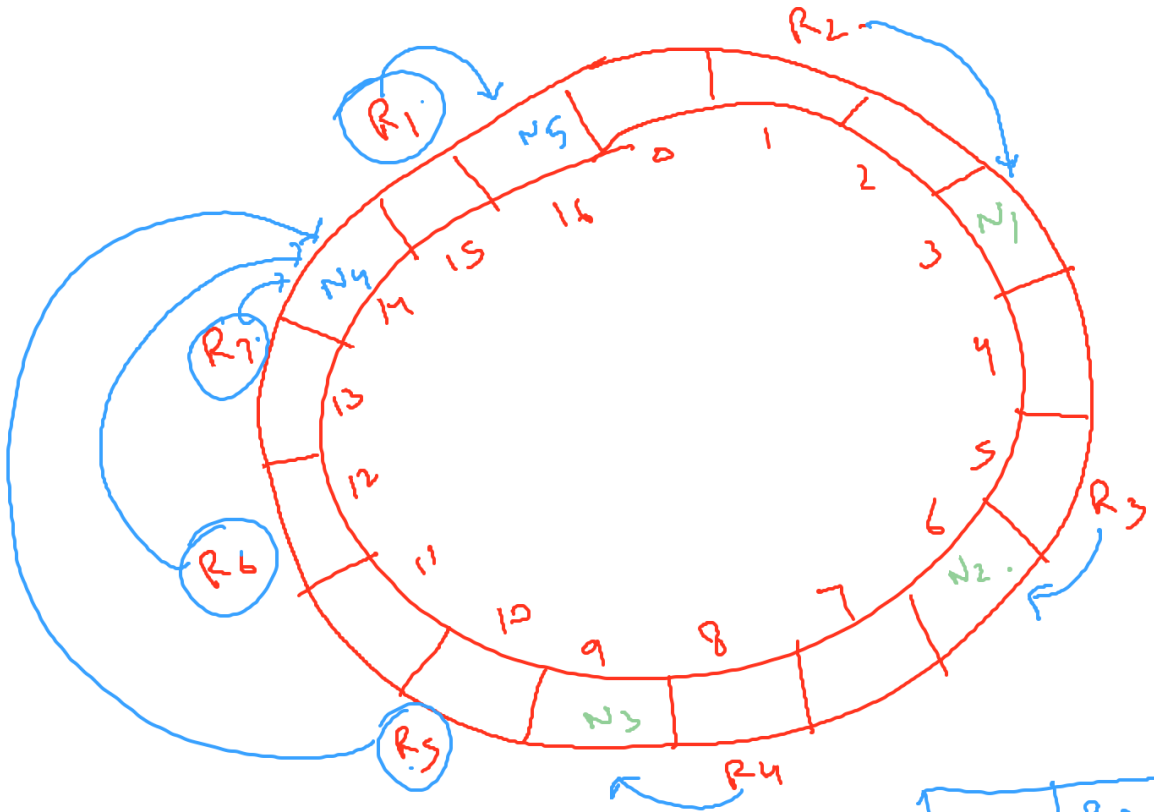
3 → 4

Hash → Nodes request

→ 0 Minimized



3 → 5



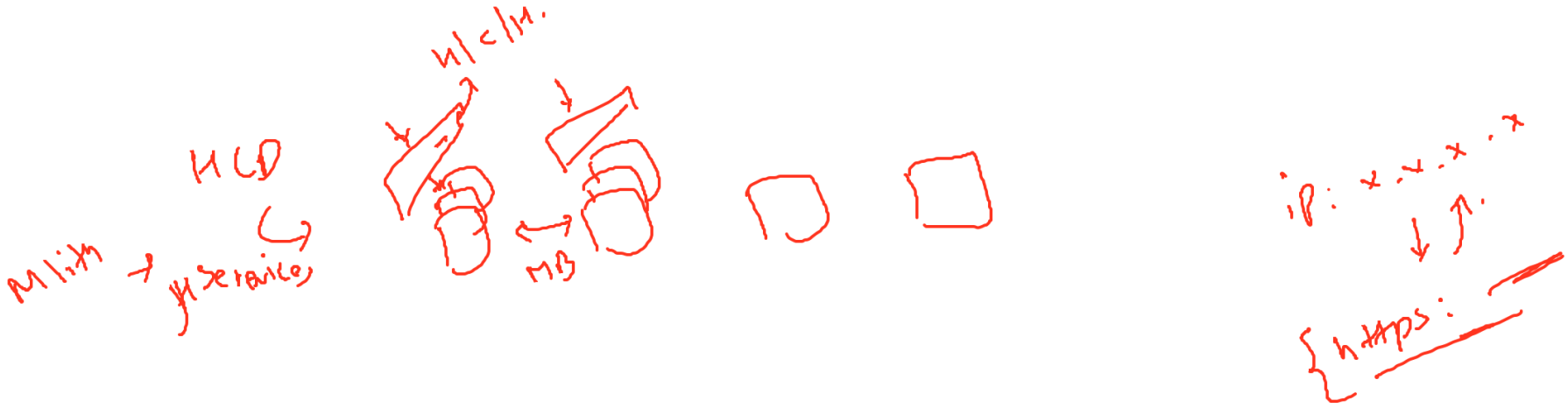
N0	R5
N1	R1 R6
N2	R2 R7
N3	R3
N4	R4

5

N0	R3
N1	R1
N2	R2

R6 R4 R5 R7.

Now m 4


HCD
MB

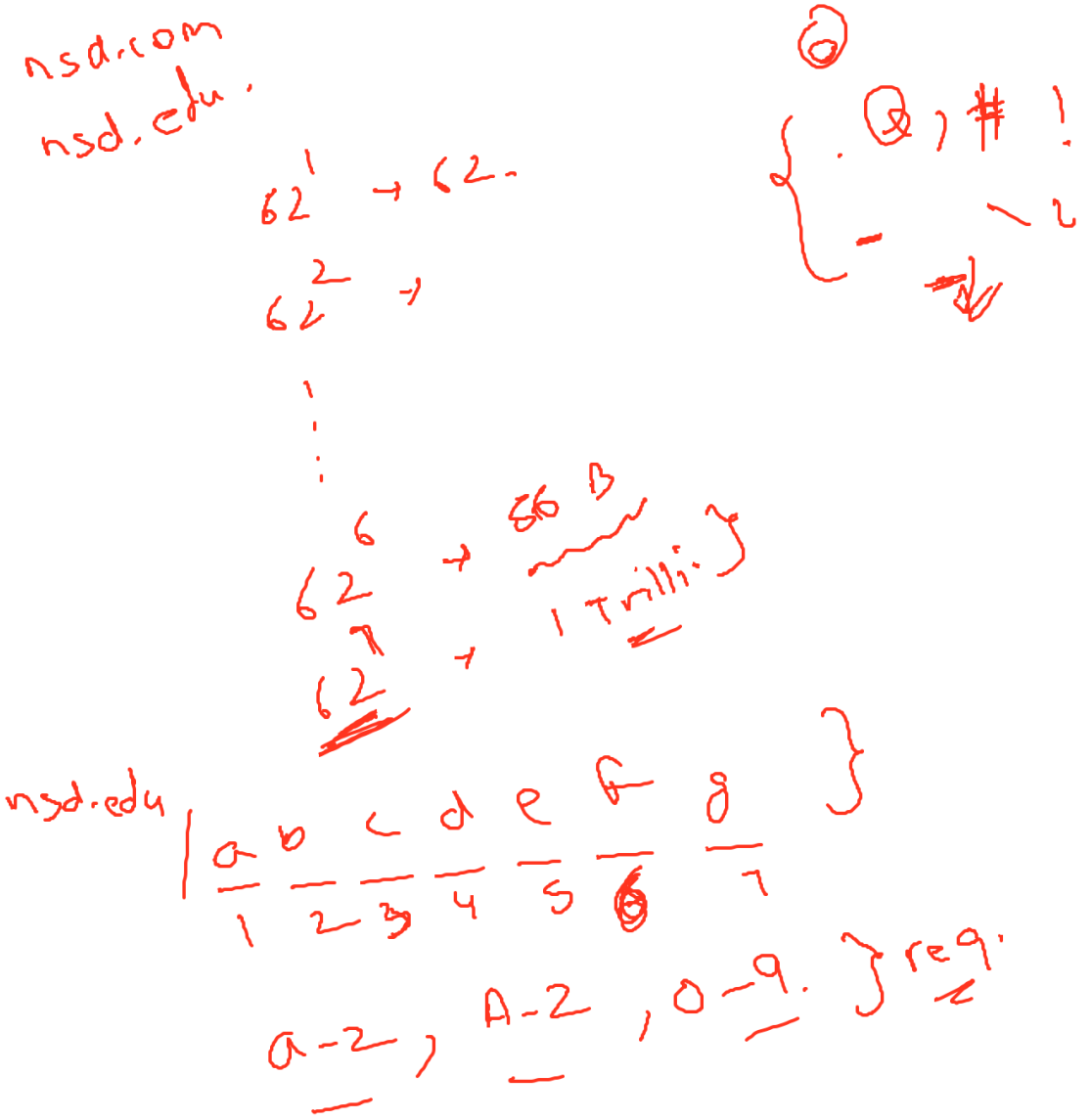
System Design : URL Shortener

Examples :
1. Bilty
2. Linkedin /in/tarun-kushwaha

Applications :
1. Mass sharing
   bit.ly/NSD-event

Servers / Databases / Scale : 10M people / day
Requirements
1. Long URL -> Short URL
2. Redirect : short URL -> Long URL
3. Unique
4. short : limited length
5. characters : a-z, A-Z, 0-9; = 26 + 26 +10 = 62
   - no special characters
6. validity? 100 years

10M * 365 * 100 = 365000M = 365B
   - Length



DB → SQL, MongoDB

③ Redirection

yt | → nsd.com | sd-playlist

MongoDB → content → blogs, jsons

fast, flexible

② URL Shortener:

SQL

Txn Mgt

fixed schema.

① DB:

id (auto.)	Long URL	Short URL	clicks	user	C	U

Gener Unique short URL

Break till 8:20 pm

nsd405 →

a

_ _ _ _ _ _

① Hashing.

↳ length → 14 – 15 32, 64

↳ Collision. → _ _ _ _ _ _ _

Hash funcns

↳ MD5 → 128 bit → 32 hex digit → collisions.

↳ SHA. → 256 → 40 hex digit

~~unique~~

② Base 62

a 0 →

2

A

2

0

9 61.

62 | 1000

Chara.	Num.
0	
9	
A	16
Z	
G	
Z.	

5 → 57

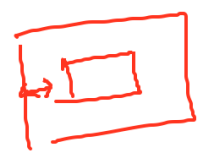
62 | 1000 — 8 8. = G8

16 → G.

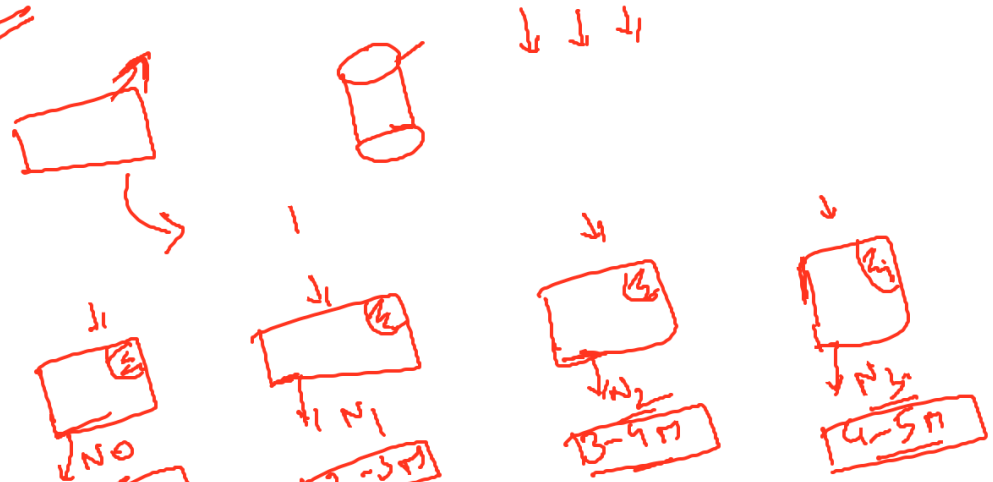
G8 0 0 0 0 0 →

Padding

<S>



scalability



10%
80%

Zookeeper Working

1-2M
2-3M
3-4M
4-5M.

single server??

↓ issue?

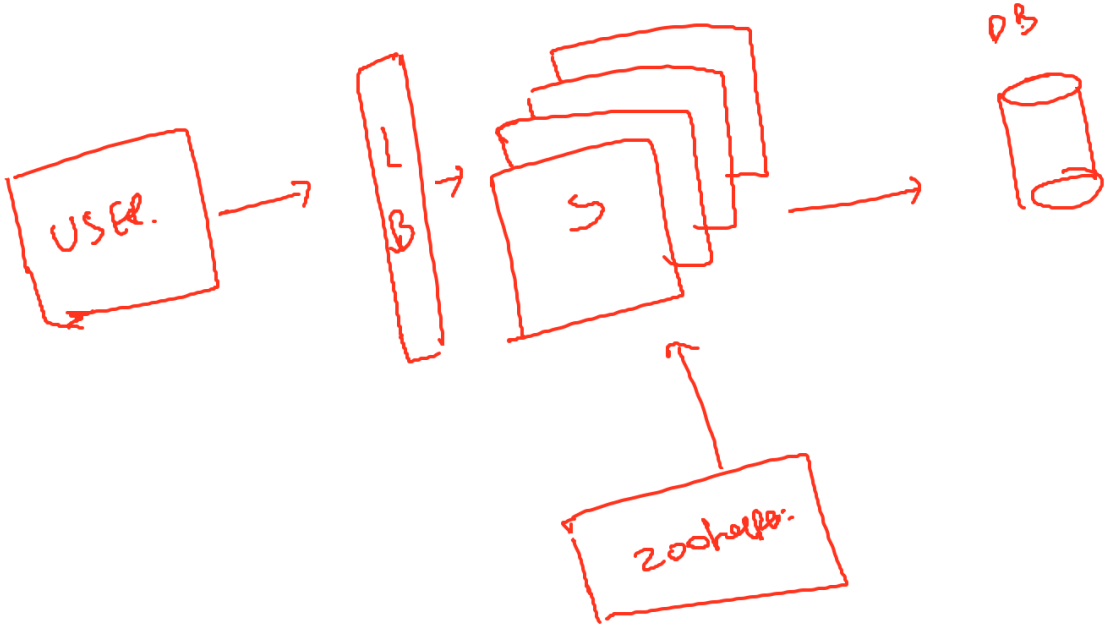
Zookeeper

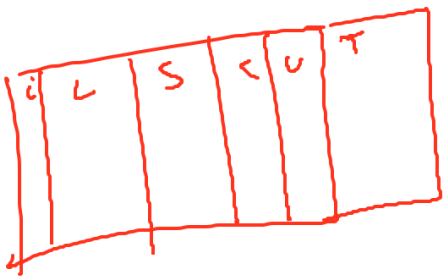
$62^7 \simeq 1$ Trillion

80% 20%

{ A n u b h v Ø } x

reserving





HLD : URL Shortener

URL Shortener

Requirements :
1. Unique - Base62
2. Length - 7 characters, 0-9,A-Z,a-z
3. DB choose, Schema : L,S,C,User
4. Servers & Scaling : Zookeeper

Rate Limiter

Scraping the data : Get all the data
DDoS : Denial of Service

What are the ways to apply to Rate limiter?
1. Slider Window
2. Bucket
3.