Design

G-Drive

functional req^n.

* upload
* Download
* remove
* edit
* Share → public (view only / edit)
  → private
* folders

Non-functional

+ Total = 200 M

Active = 50 M

15 GB / normal user.

⇒ Total storage = 200 M x 15 GB

= 3000 PB

= 3 EB (Exabyte)

Moreover, we can't afford a file to be deleted. So, we require to replicate them.

But should the replicated file be

in the same zone ?

↳ No, because what will happen in case of a disaster or power outage.

So, at least 3 times replication.

⇒ Total Storage = 3EB x 3

= 9 EB.

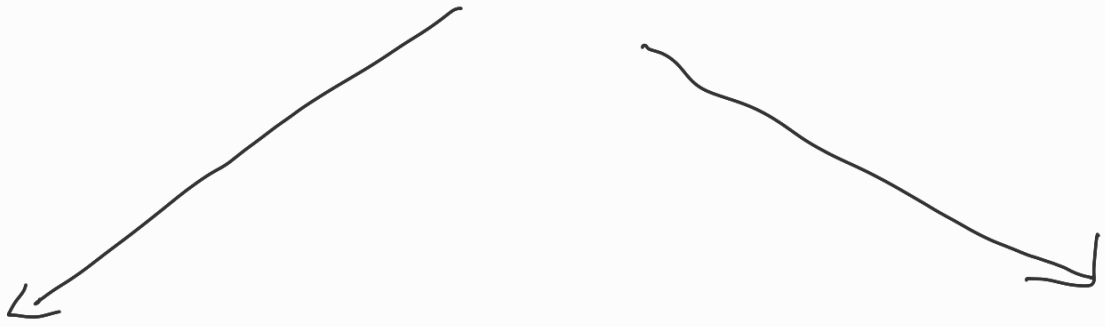
* On average, a user uploads 2 files a day. (50 MB per file).

* Read : write = 2 : 1.

* Latency (Not much imp.)

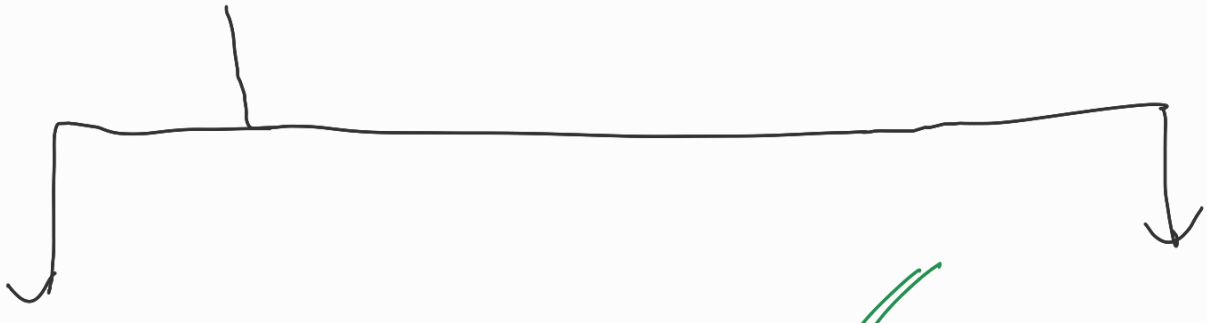
* Availability (very very important).

Data Model



Files
(text, image, video, pdf.

metadata
↓
NoSQL.



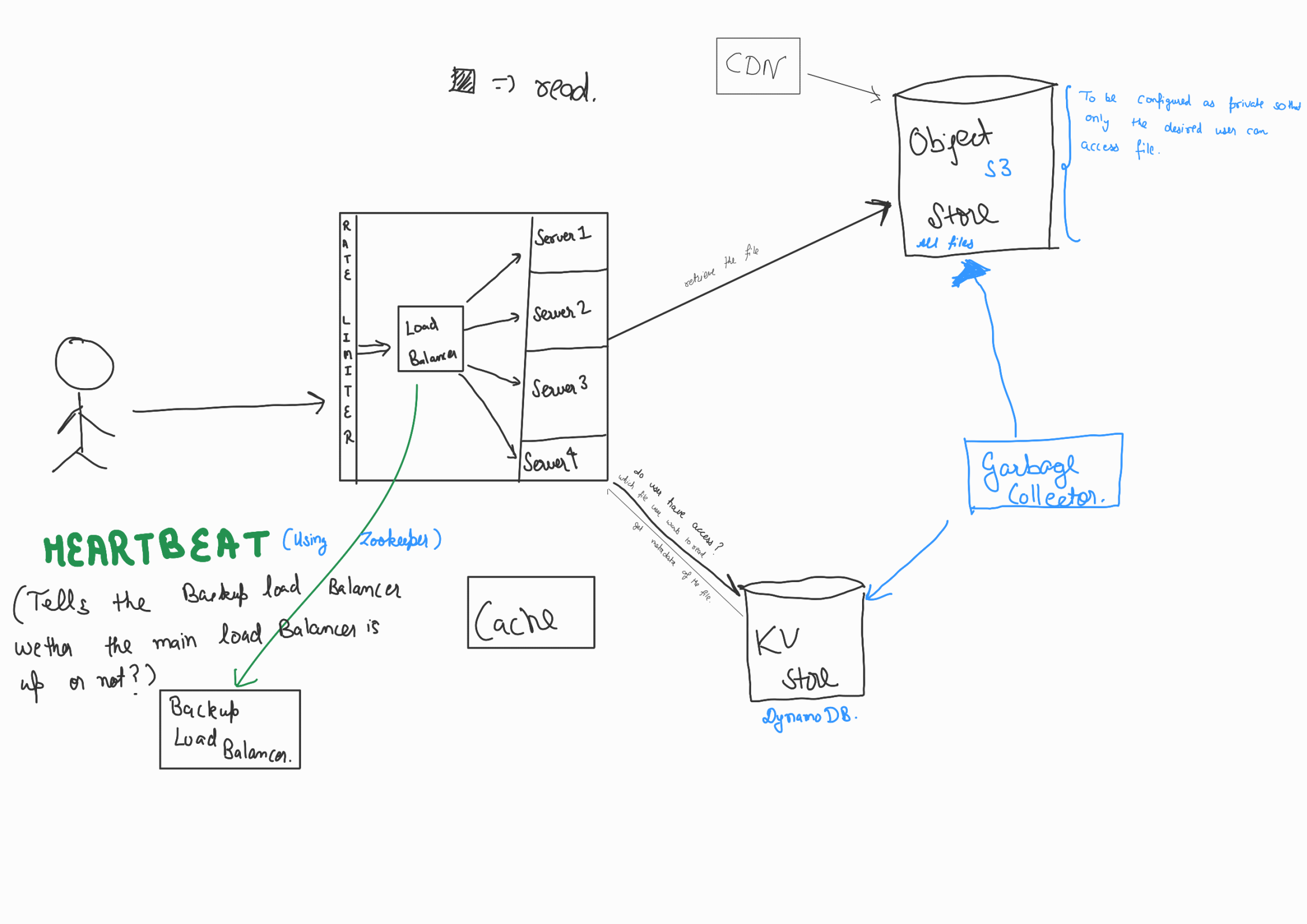
Distubted file System	✓ Object Storage.
* A tree like view. * Might be Helpful because it supports	

folders.

* But actually going to be complicated.

* less scalabale.

* Editable files.


▨ => read.
CDN
Object
S3
Store
all files
To be configured as private so that only the desired user can access file.
RATE LIMITER
Load Balancer
Server 1
Server 2
Server 3
Server 4
retrieve the file
do user have access? which file user wants to read
get metadata of the file
Garbage Colleetor.
KV
Store
DynamoDB.
Cache
HEARTBEAT (Using Zookeeper)
(Tells the Backup load Balancer wether the main load Balancer is up or not?)
Backup Load Balancer.

* Block Level Storage :-

* Each uploaded file will be broken into smaller chunks (say 4mb) and these chunks will be stored in object store
* Each time we will re-assemble them, based on the metadata stored in the KV store.

Advantage :- De duplication.

:- Suppose, two diff. files have same chunk. Then instead of storing two chunks, we will store only one.

:- Save a lot of storage.

Challenge :- How to delete a file then ? Because if one user tries to delete its block, which is in use by another users, then it will cause issues.

Ans :-
- i) Maintain a key-value pair for (block vs no. of references to it)
- ii) if count == 0 ; delete it.

- Every 24 hrs, run a garbage collector..

How to check if a content is duplicated or not?

↳ Use a content addressable storage.

What if a file upload fails?

No worries. Suppose only first 1 GB data got uploaded and 1 GB left. So, simply start from the next 1 GB.

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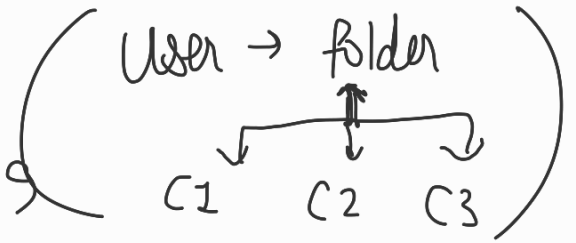
folders?

↳ Metadata will have folder



↳ Children (C) will have a pointer to the parent folder.