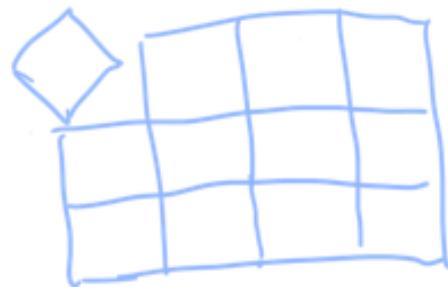


System Design : Instagram

recreating
using

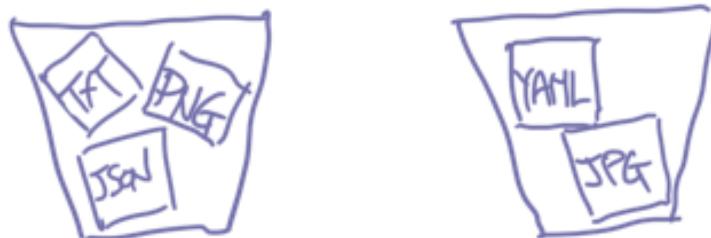


Block Storage



- file system
- NFS (Filestore)
- must overprovision
- modify files in place

Object Storage



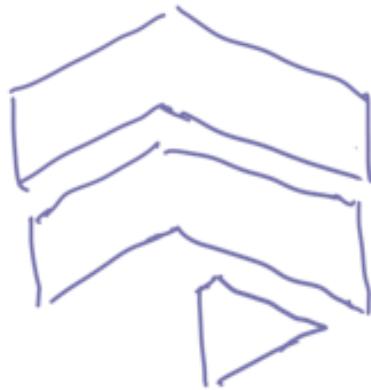
- pay for what you use
- ∞ storage
- overwrite existing file with new version
- Google Cloud Storage

SQL Database (RDBMS)



- rigid / ACID
- strongly consistent
- ideal for user DB
- ideal for banking transactions
- Cloud SQL , AlloyDB, Spanner

NoSQL Database



- Firestore
- MongoDB
- Bigtable

- document store
- K/V store
- flexible schema
- eventual consistency
- ideal for image & video metadata
- ideal for likes / comments

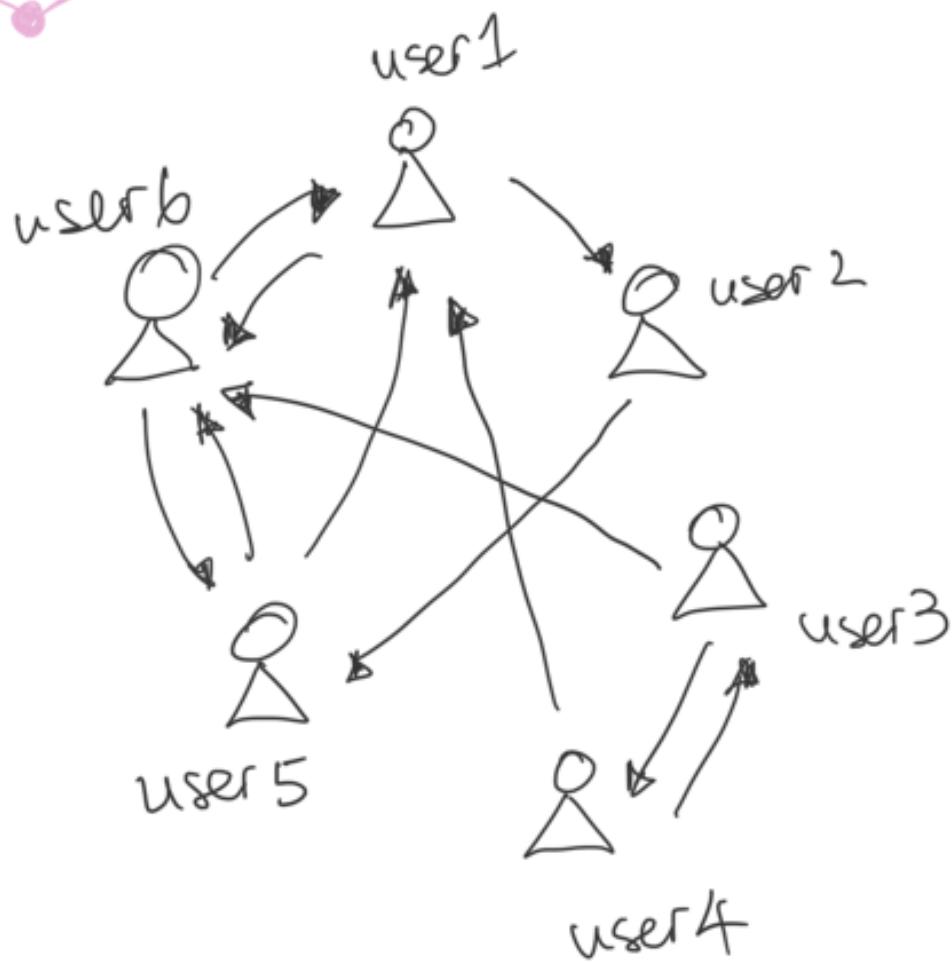
Sample (Bigtable) Schema for Likes/Comments

Row Key	Content			Reactions	
	Description	ThumbURL	FullResURL	Likes	Comments
pic#user1#a1	"At Raptors game"	"https://..."	"https://..."	5	
pic#user1#x4	"Yummy!"	"https://..."	"https://..."	254	
vid#user5#f8	"First skydive"	"https://..."	"https://..."	82	{ from: "user1", comment: "looks fun" }
:					

CRAvL



GraphQL



- created by Facebook
in 2012

- open-sourced in
2015

i.e. "follows" table

userid	seq	name
user1	1	user2
	2	user6
user2	1	user5
user3	1	user4
	2	user6
:		



Connect table

user-id	seg-id	name
Alice	1	Bob
Alice	2	Charlie
Alice	3	Dave
Bob	1	Alice
Charlie	1	Alice

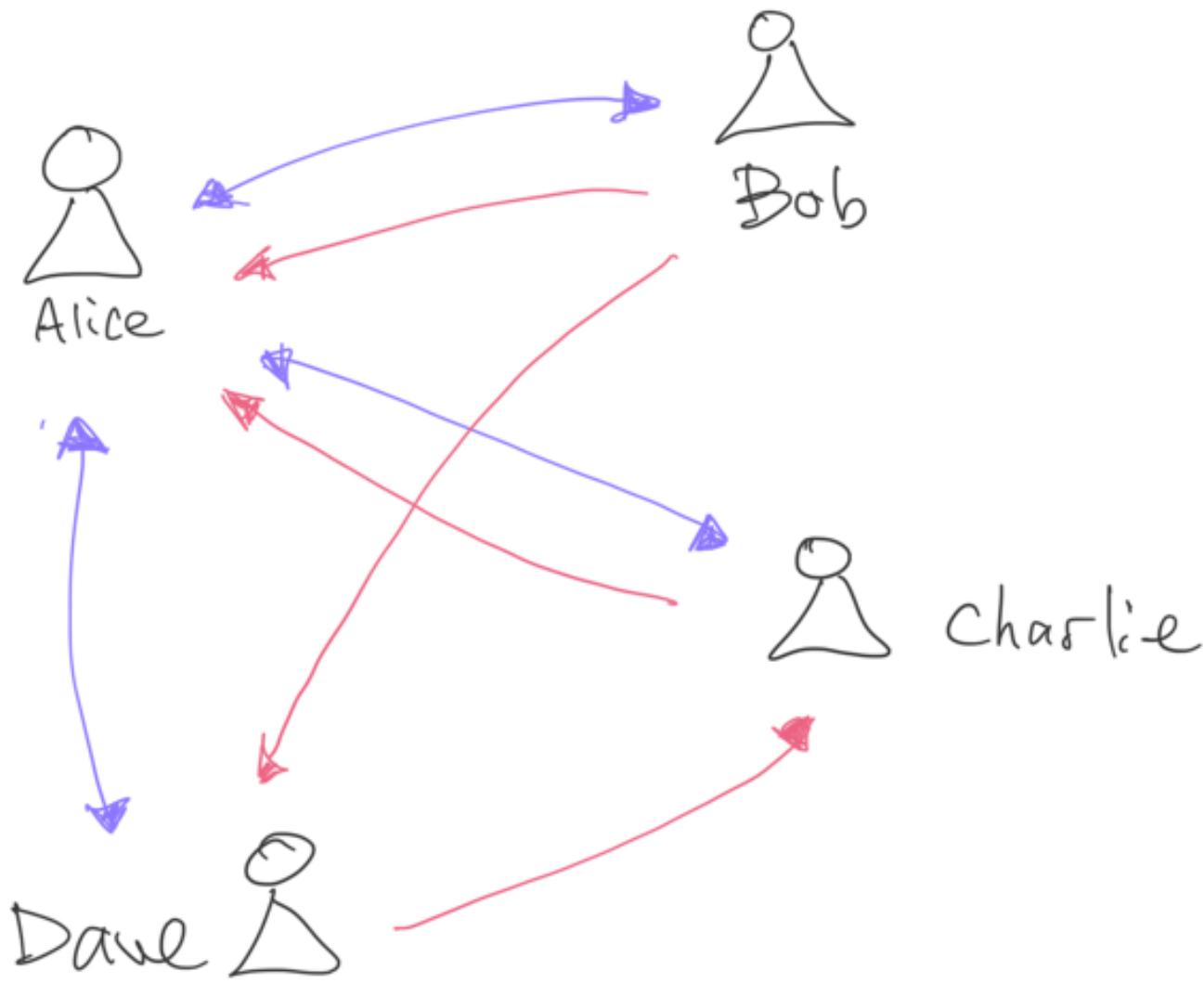
composite key

Follows table

user-id	seg-id	Name
Bob	1	Dave
Bob	2	Alice
Charlie	1	Alice
Dave	1	Charlie

composite
key

CRANL



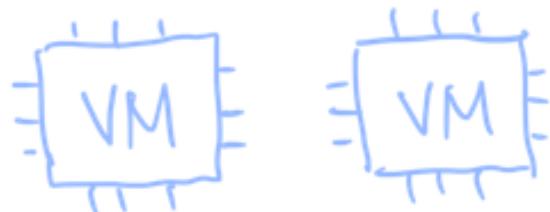
Connected

Follows

Global Load Balancer

<https://instagram.com> /register
/images
/videos
/auth

Managed Instance Group (MIG)

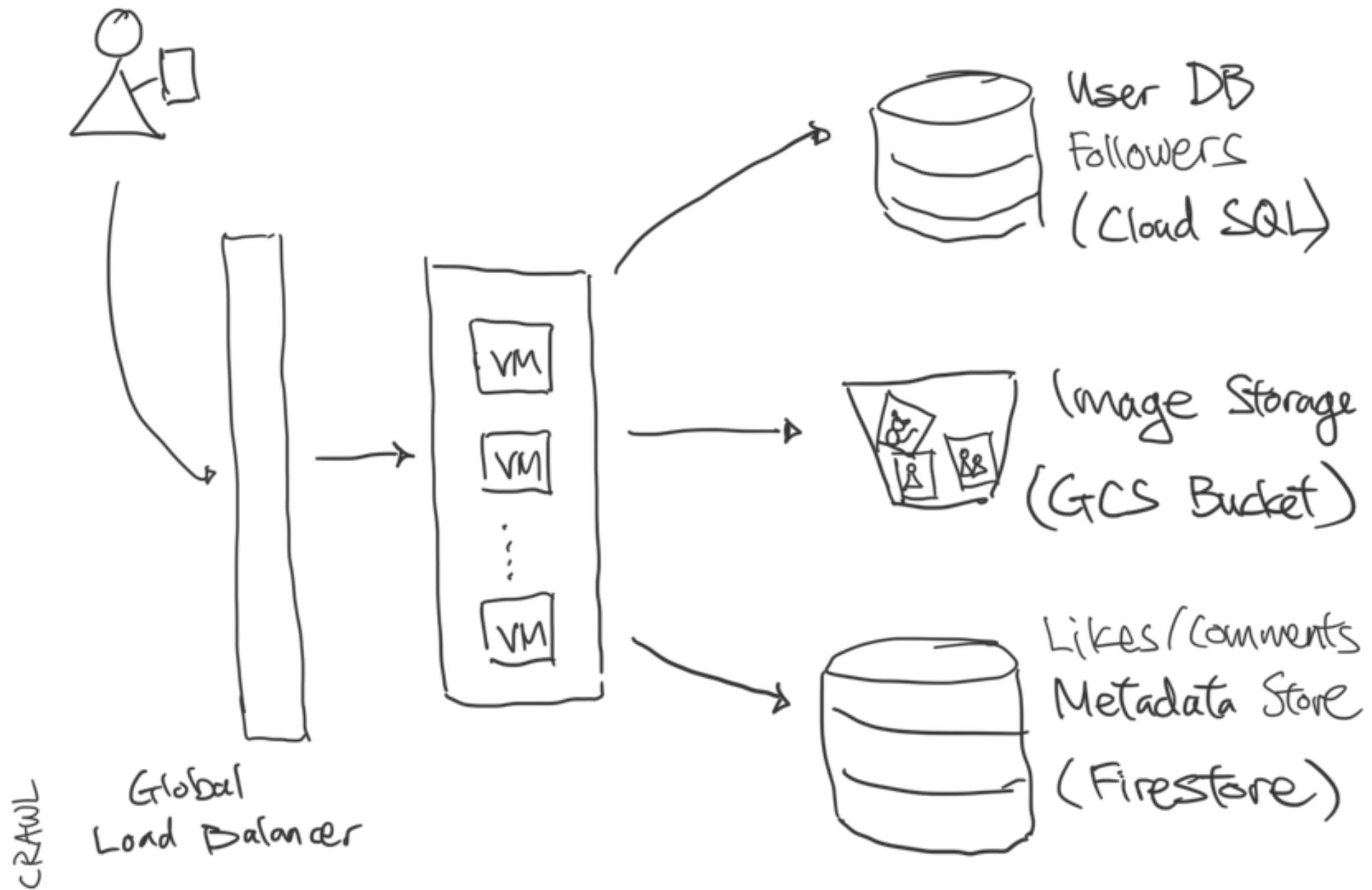


.....



Min: 2

Max: 10



mindz.eye

[Message](#)[Follow](#)[...](#)

2,068 posts

659K followers

1,612 following

Michael Sidofsky

Photographer

Toronto, Canada

Professional Commercial & Travel photographer

@haidafilter

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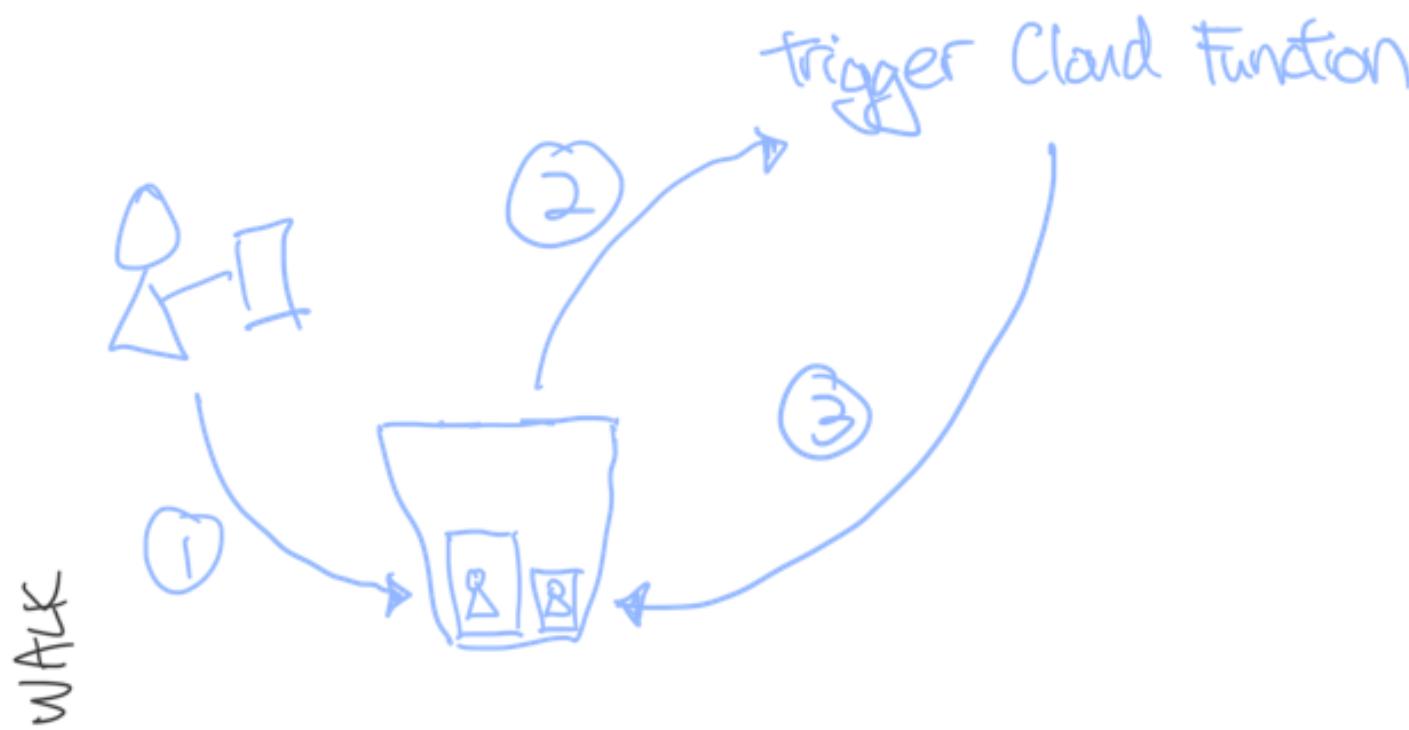
gs://na-ig-bucket

```
└── user1/  
    └── videos/  
        └── images/  
            └── selfie1.jpg  
                └── selfie1-thumb.jpg  
└── user2/  
└── user3/  
    :  
    :
```

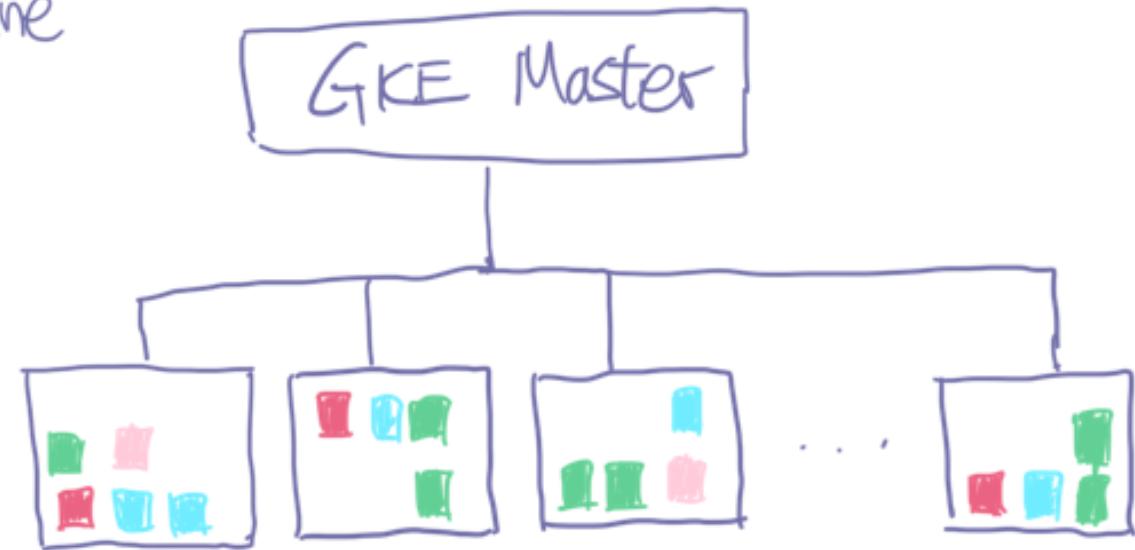
...

Cloud Function

- serverless code/scripts
- execution triggered by events , HTTPS endpoint, Pub/Sub topics (message queue)

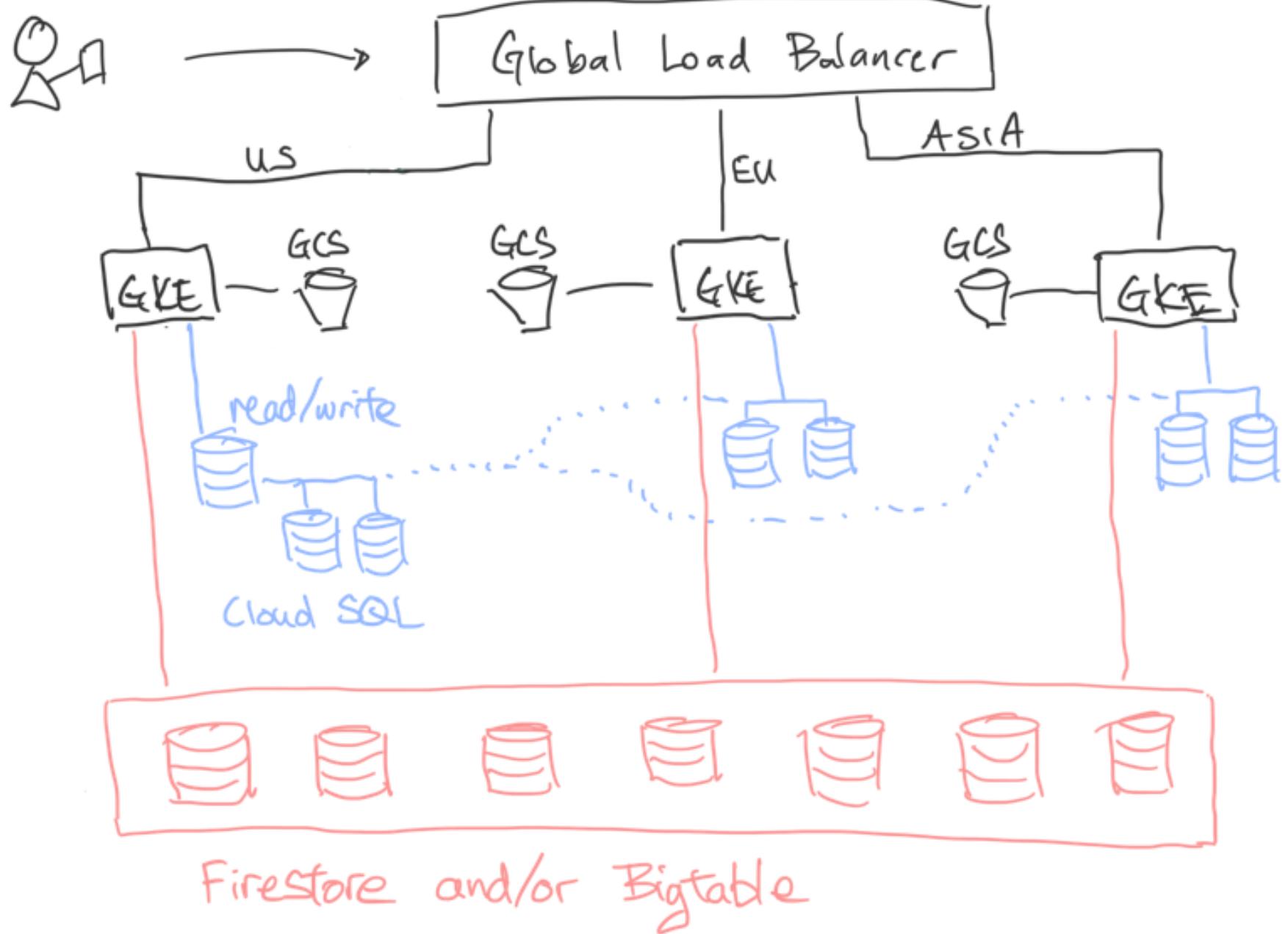


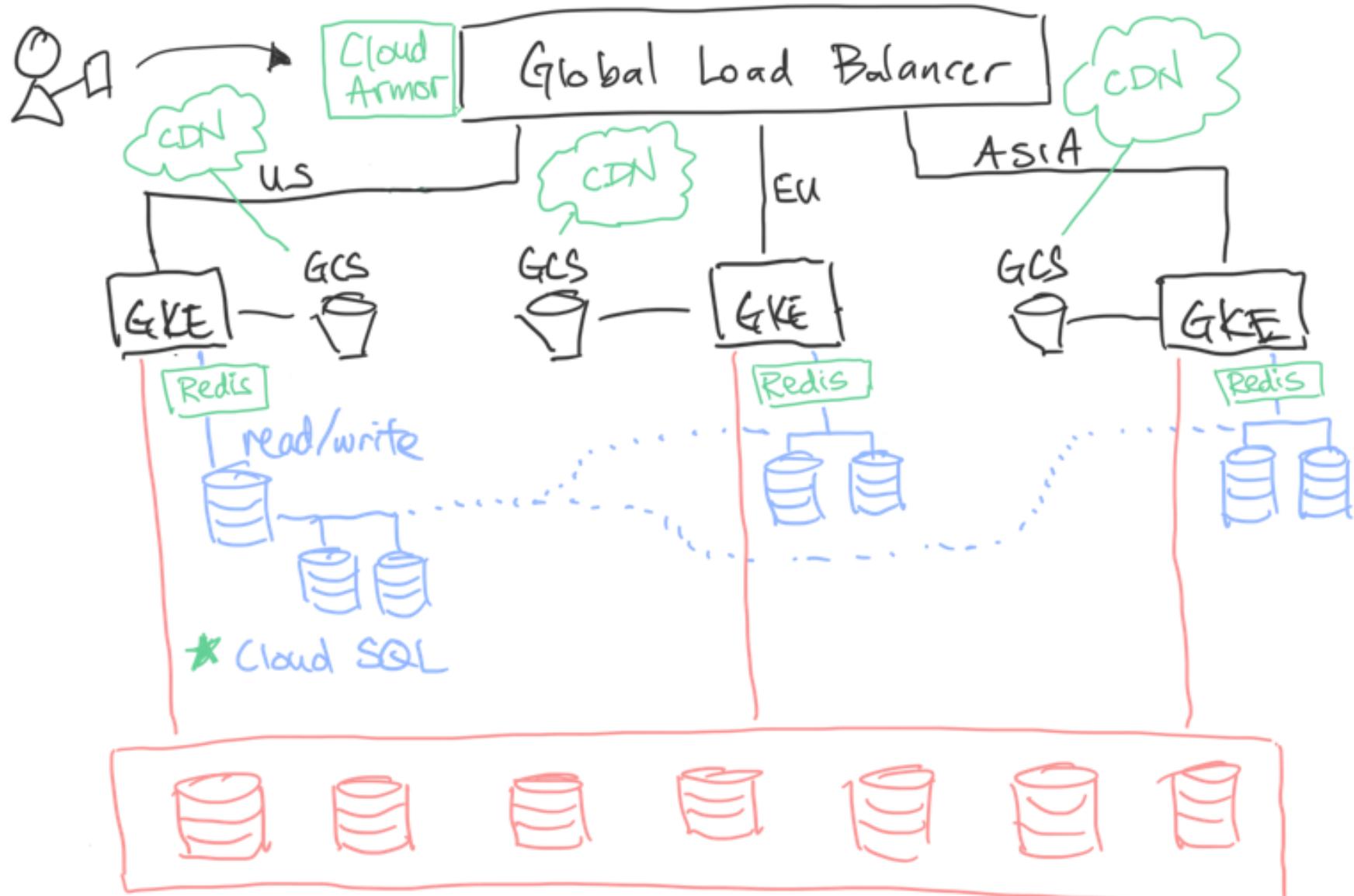
Google Kubernetes Engine



https://instagram.com / register
/ images
/ videos
/ auth

WALK ↵





Run