

# MICROSERVICES AND MONOLITHS

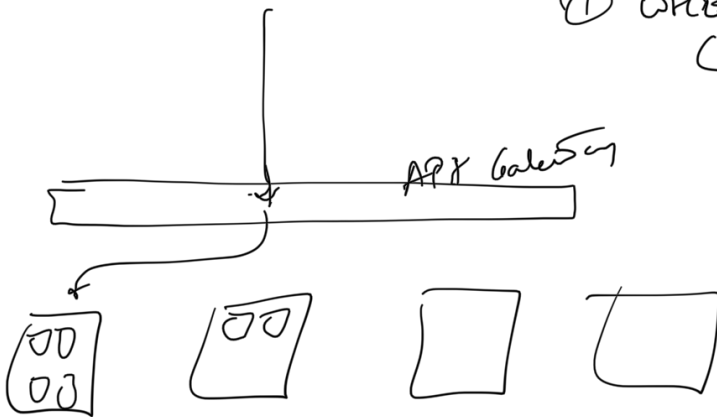
## AGENDA:

- ① Rate limiting service
- ② Microservices & Monoliths.

### ① Rate limiting service

① WHERE?

↳ Load Balancer OR  
API Gateway



### ② HOW?

7.10 req per  
5 second

Hashmap

IP Addr → count

172.10.20.30 → 10 → (11) X

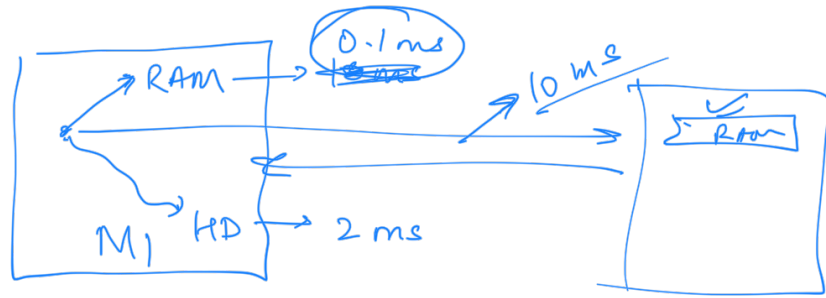
$R_1$ $R_2$	$R_3$	$R_4$	$R_5$	$R_6$	$R_7$	$R_8$	$R_9$	$R_{10}$	$R_{11}$
1	2	2	4	5	6	7	8	9	

IP Addr

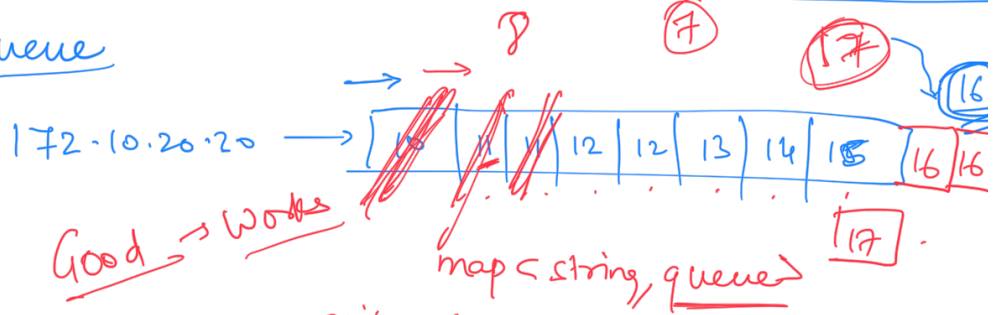
count

↳ timestamp aware

① Main memory / RAM → Really fast



## Queue



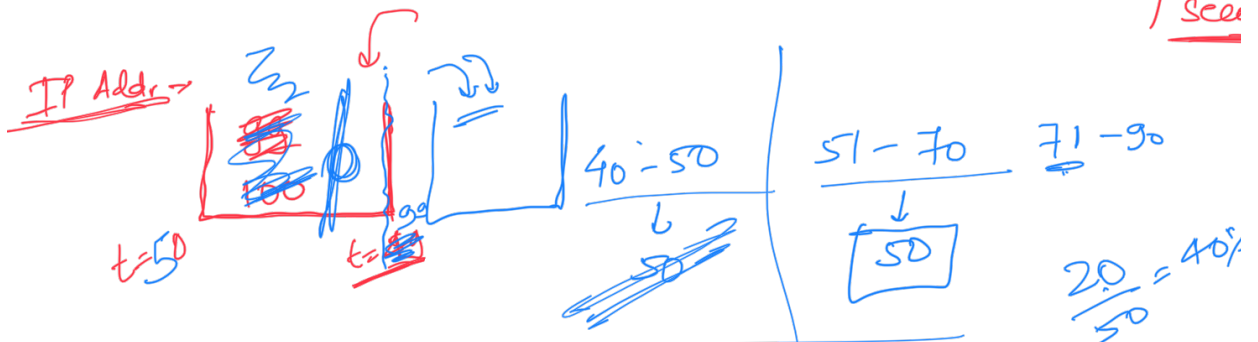
- spike in latency if there were to many pops to be done for one request.

IP → ~~10k~~ request from same IP

(2) IP-address → Queue of timestamp  
↳ Memory intensive

## Fixed Time window

100 requests every 50 sec



## SLIDING WINDOW APPROACH

IP Addr



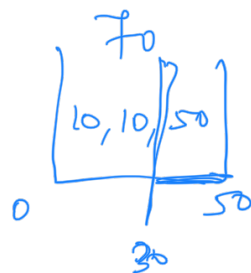
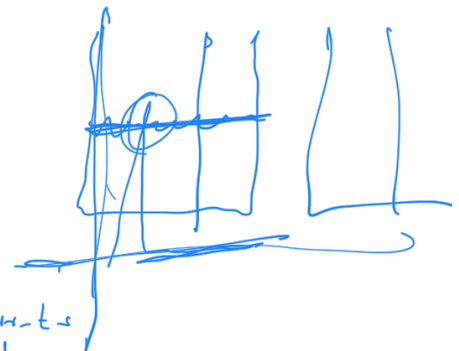
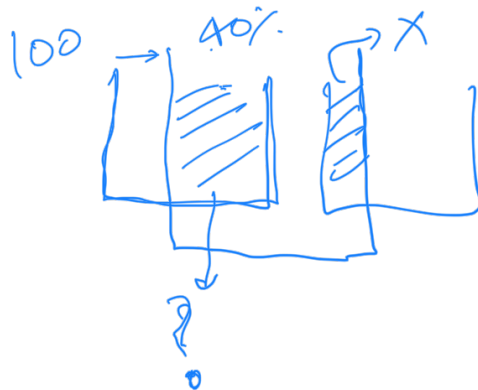


$$60\% \text{ of } \text{prev\_count} + \text{cur\_count} \quad \text{10}$$

$$= \frac{60}{100} \times 60 + 40 = 76$$

$$\% \text{ of bucket } P = \left( \frac{X - \text{bucket\_start} + 1}{\text{bucket\_size}} \right)$$

$$(100 - P)\% \text{ of } \text{prev\_count} + \text{cur\_count}$$



1. Exact Co  
X = from rece  
bucket

2. Rev % Co  
p = from bucket

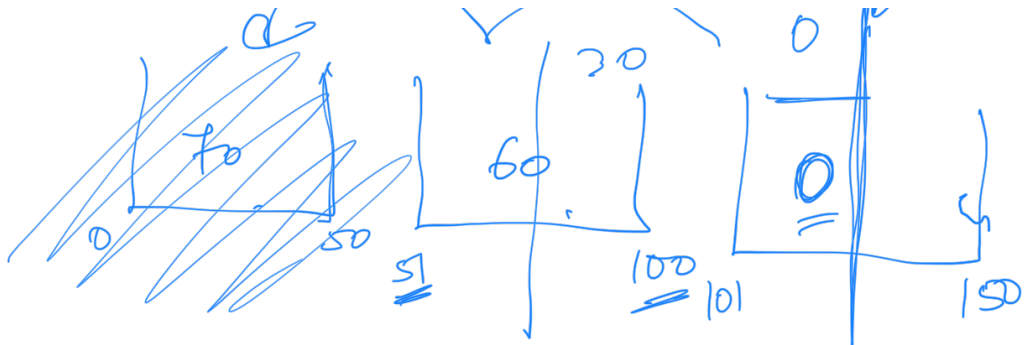
$$\rightarrow \text{Cur\_count} = 60 \quad \text{Cur\_cnt} = 0$$

$$\text{prev\_count} = 70 \quad \text{prev\_cnt} = 60$$

$$\text{prev\_count} = \text{Cur\_count}$$

$$\text{Cur\_cnt} = 0$$

✓



map < string, pair<int, int>>

cur count = cur  
cur = 0

K1: Design a system

DSA Question

Scale

- ① MVP for product
- ② Est scale → sharding  
→ read/write here
- ③ C vs A, latency, synchronous
- ④ Design problems (API, schema design, etc)

Cache, App server, Database

Component design

- IRCTC

- Payment Gateway (PayTM)  
PhonePe

[ - Notification sy

[ - Payment Gate

[ - IRCTC

~~FB News Feed~~

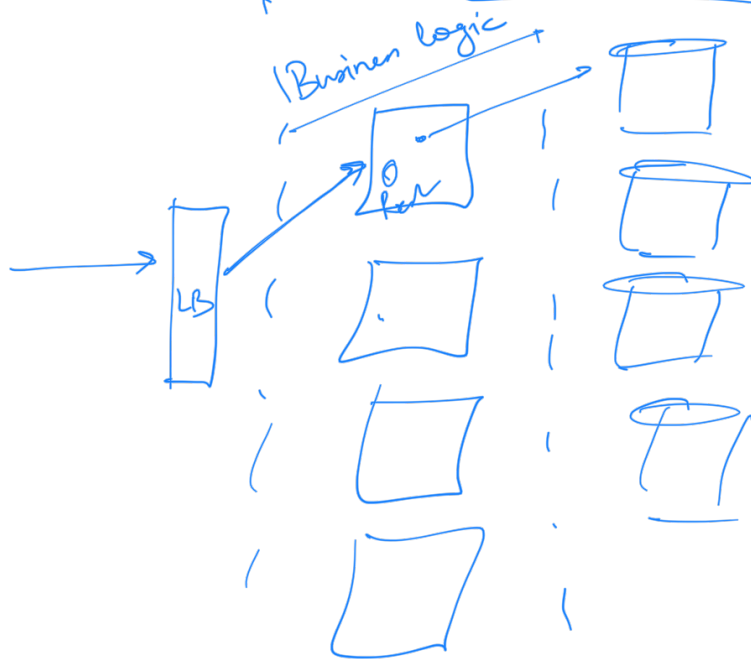
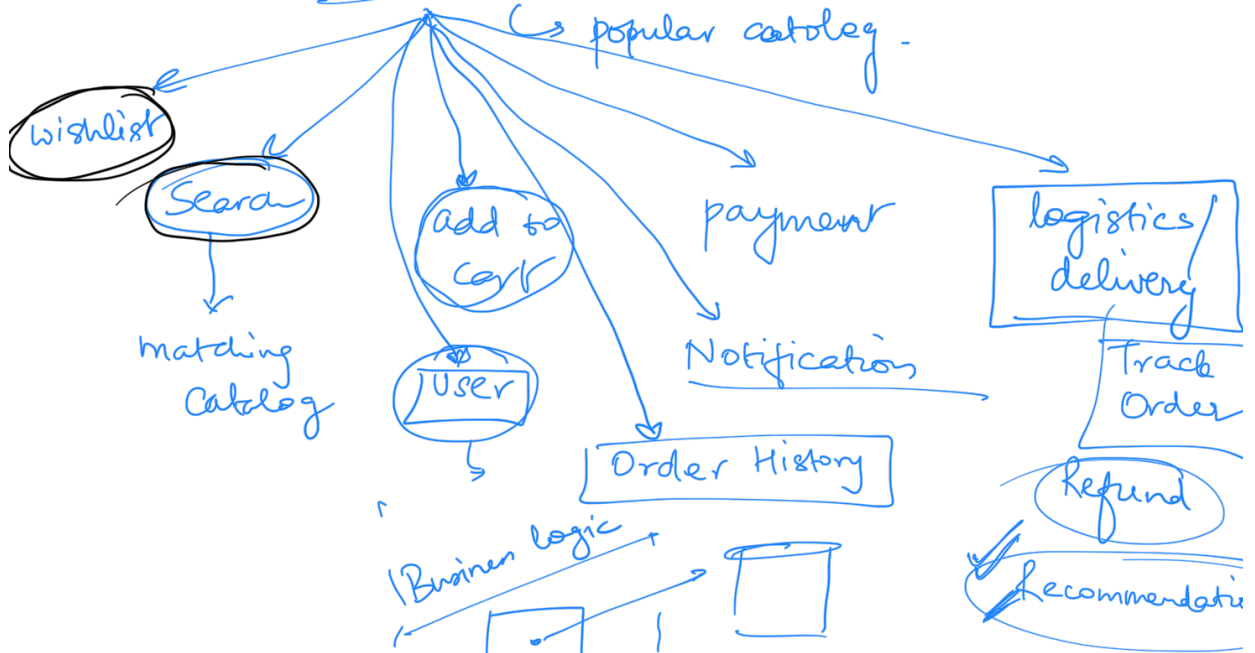
~~Twitter~~

[ - Amazon/Myntra

① Microservices vs Monolith

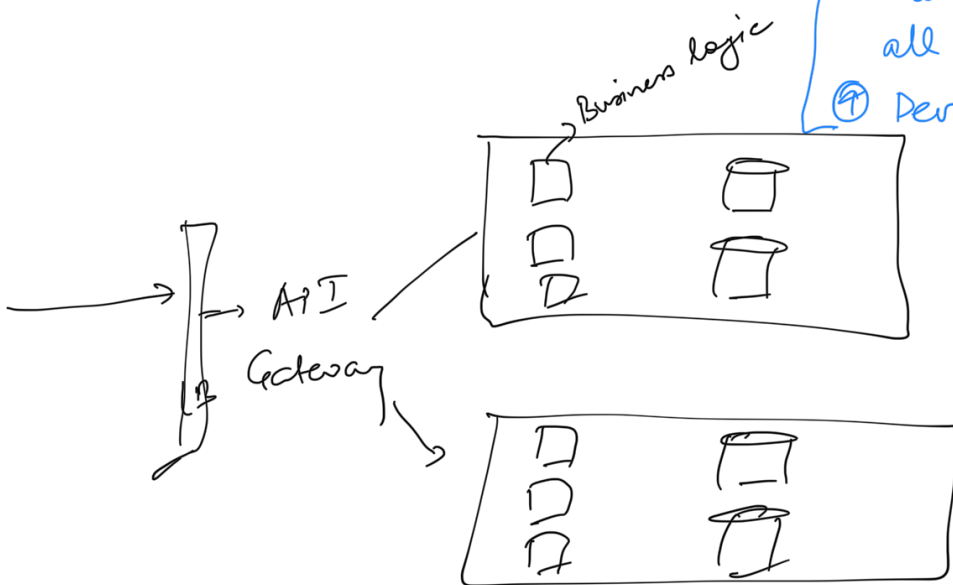
10:20

① Amazon.com

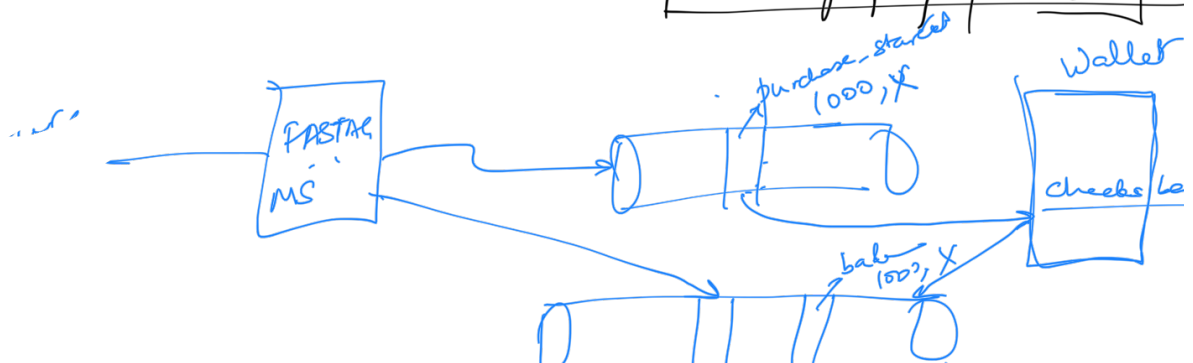
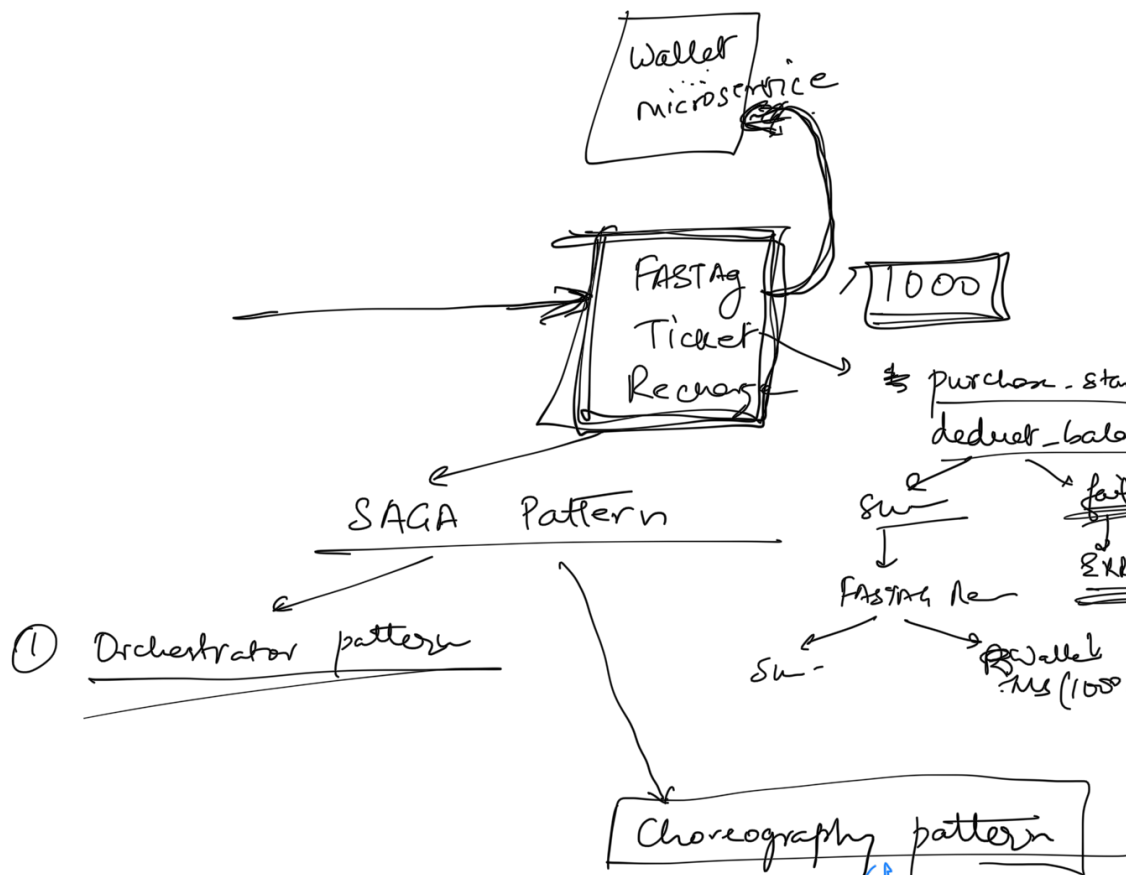
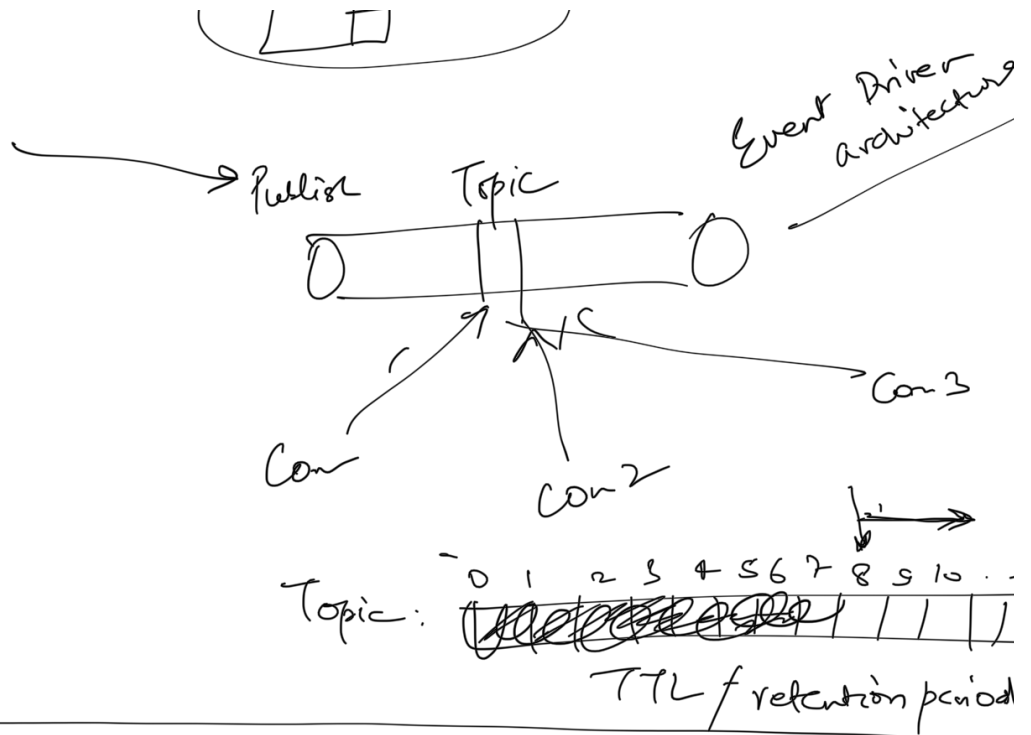


MonoLith

- ① Changes to Code become harder.
- ② Deployment becomes hard
- ③ Tech stack is the same for all functionalities
- ④ Dev productivity







balance sheet  
1000, X

