HOTSTAR | ANY STREAMING PLATFORM
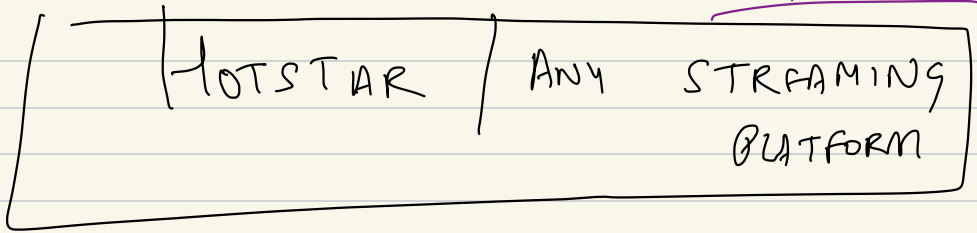
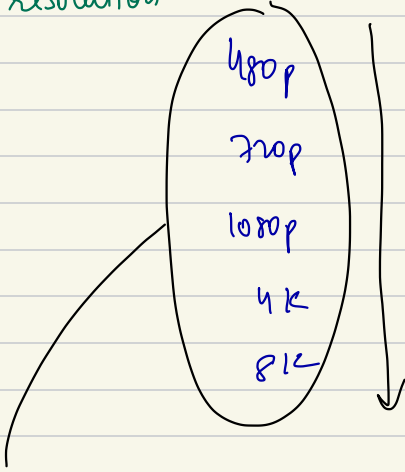> Recorded content

> Live Content

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① Ingestion

② Discoverability

③ Streaming

✓ Codec — encoding + decoding
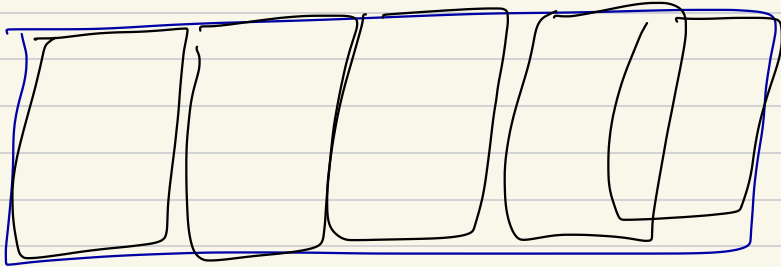
- mp4
- avi

✓ resolution

480p
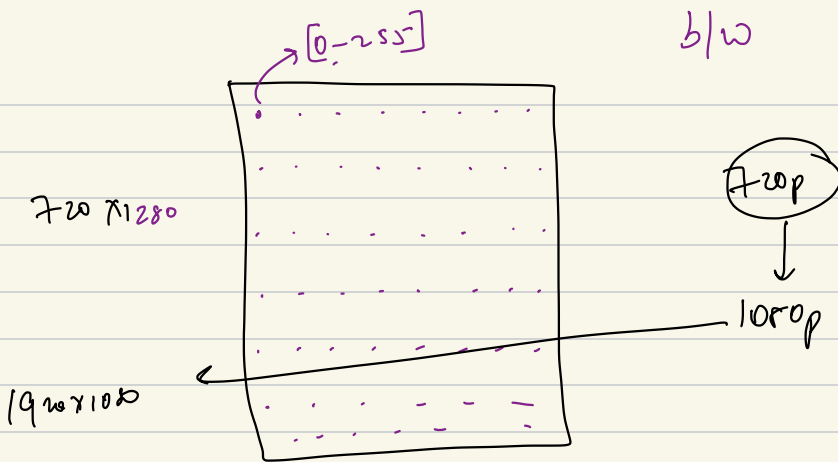720p
1080p
4k
8k

video

24
30   fps
60

$\rightarrow [0-255]$ b/w

720 X1280

$19\,20 \times 10\,80$

720p

$\downarrow$

1080p

colored

$\rightarrow$ r
g
b
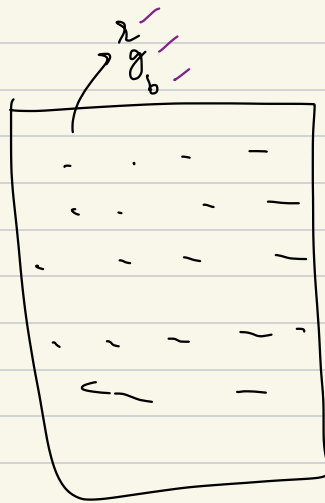
$\dfrac{30\,fps}{720p}$ = resolution

$- - - - -$ $2^{\wedge}8 = 256$ Movie $\rightarrow$ 2 hours

$2 \times 60 \times 60 \times 30 \times 720 \times 1280 \times (3) \times 1$ Byte

$128 \times 72 \times 72 \times 9$ 10^5

128×9

$2.1 \times 7.2 \times 72 \times 10^9$

100×10^9
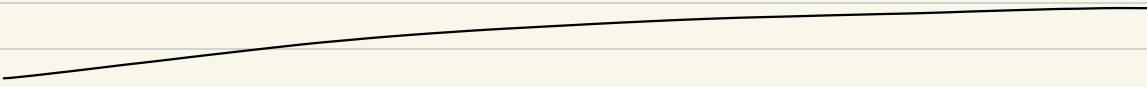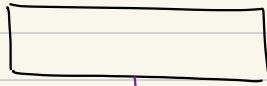
10" B

200~~300GB~~ 597GB

≃ 100s GBs

Raw _Video_

Codec

. mp4

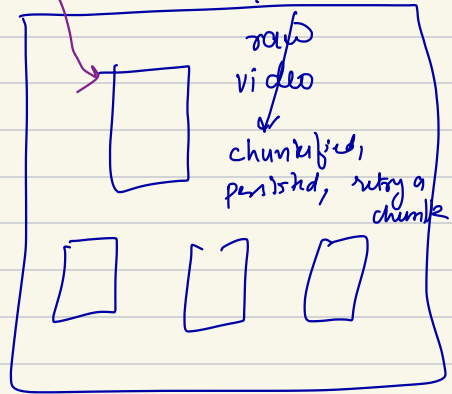. avi

(500GB) →compression→ (2GB)

upload the content ①

Gateway
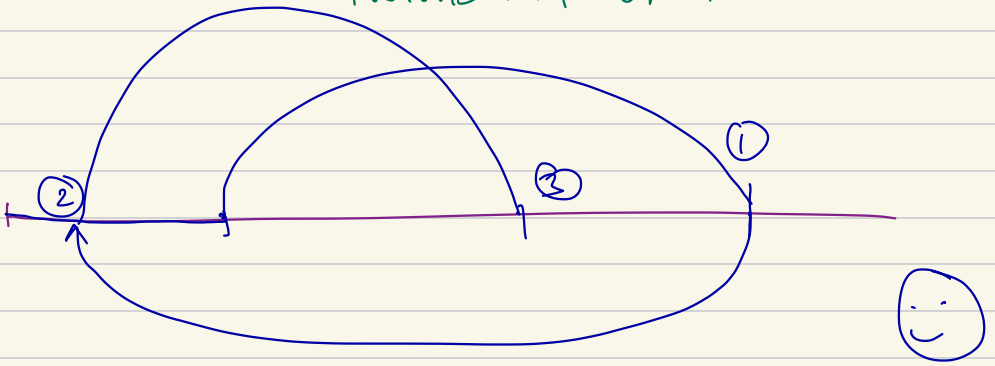
STORAGE

S3 / HDFS

raw
video
↓
chunkified,
persisted, retry a
chunk
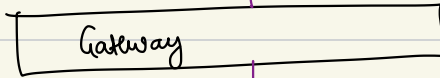
Ingestion Pipeline   follows

→ Uploaded the video   Raw Video

→ resolutions   convert

→ codec

→ Chunkifying ≡

→
→ Thumbnail Creation
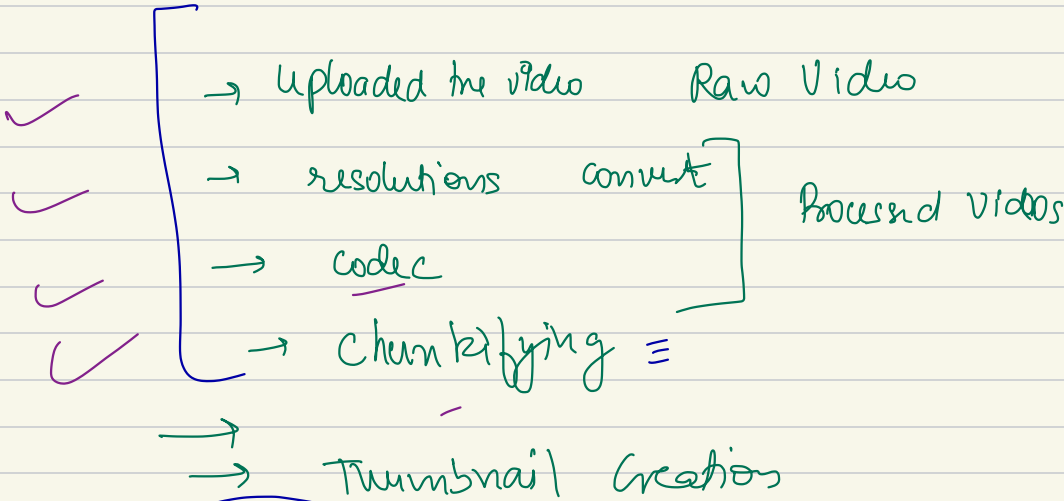
Experience for end user
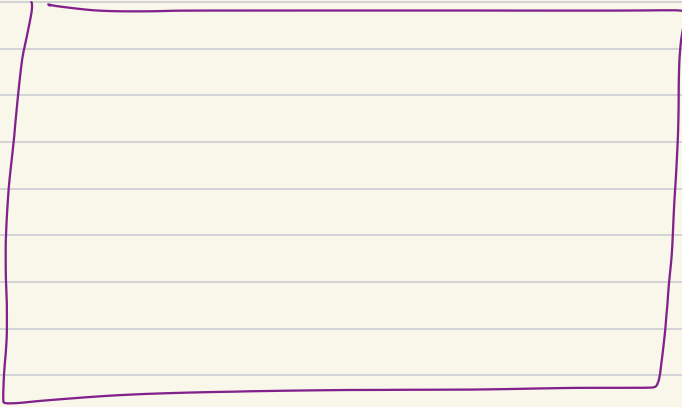
device
can vary

Ingestion Pipeline
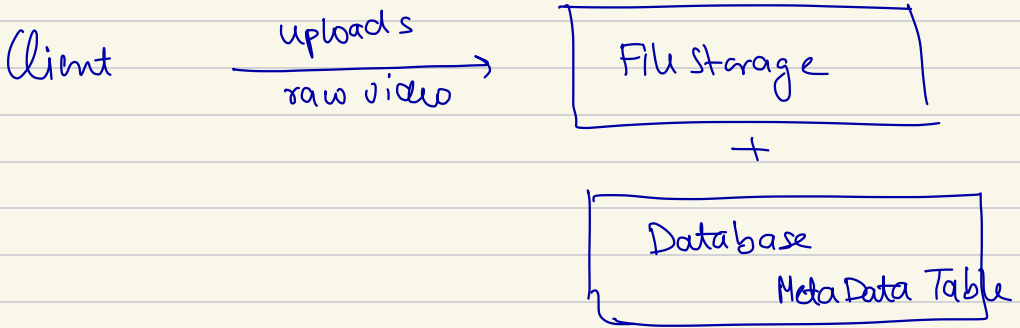
Client — uploads raw video → File Storage

+

Database
Meta Data Table

raw-video — meta data

id	Title	owner	size	.S3. link

Content moderation policies are met

Content moderation

'id

Resolution - mapping

'id

1140p

1080p

c - g

480p

Consumer group

Consumer group

raw – 2440p
raw – 8K
raw – 4k

codec

12 fail_8k . mp4

metadata | movie7-14up.mp4 | chunk 1 | 7k.mp4 | 5.5

n.mp4

chunkifying
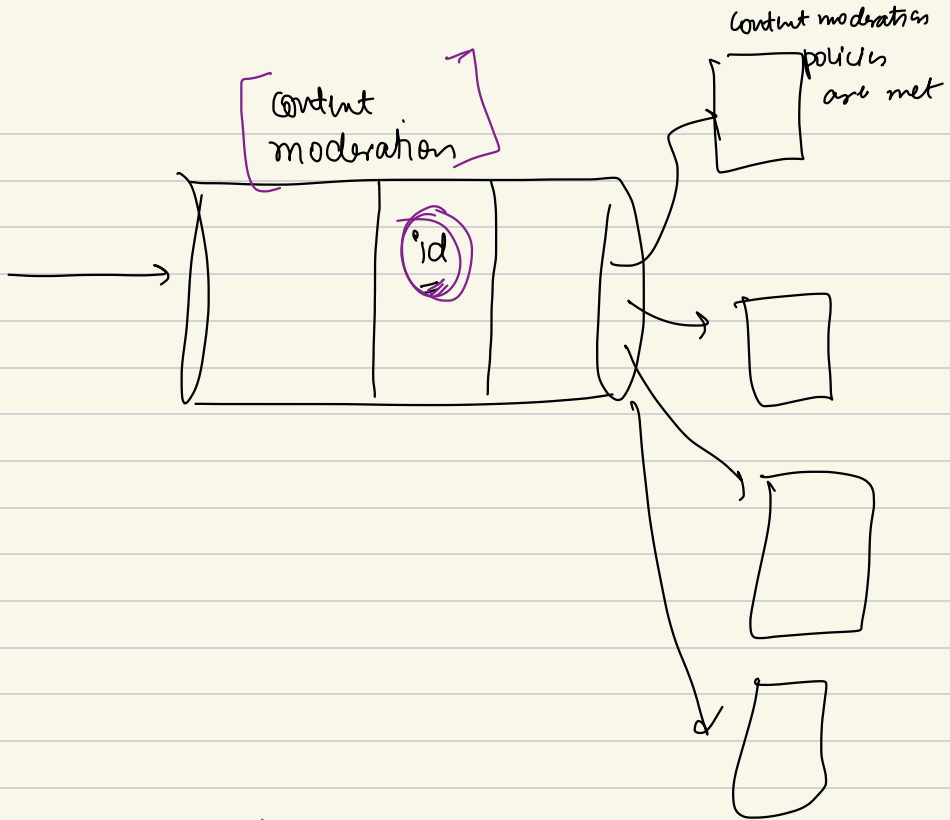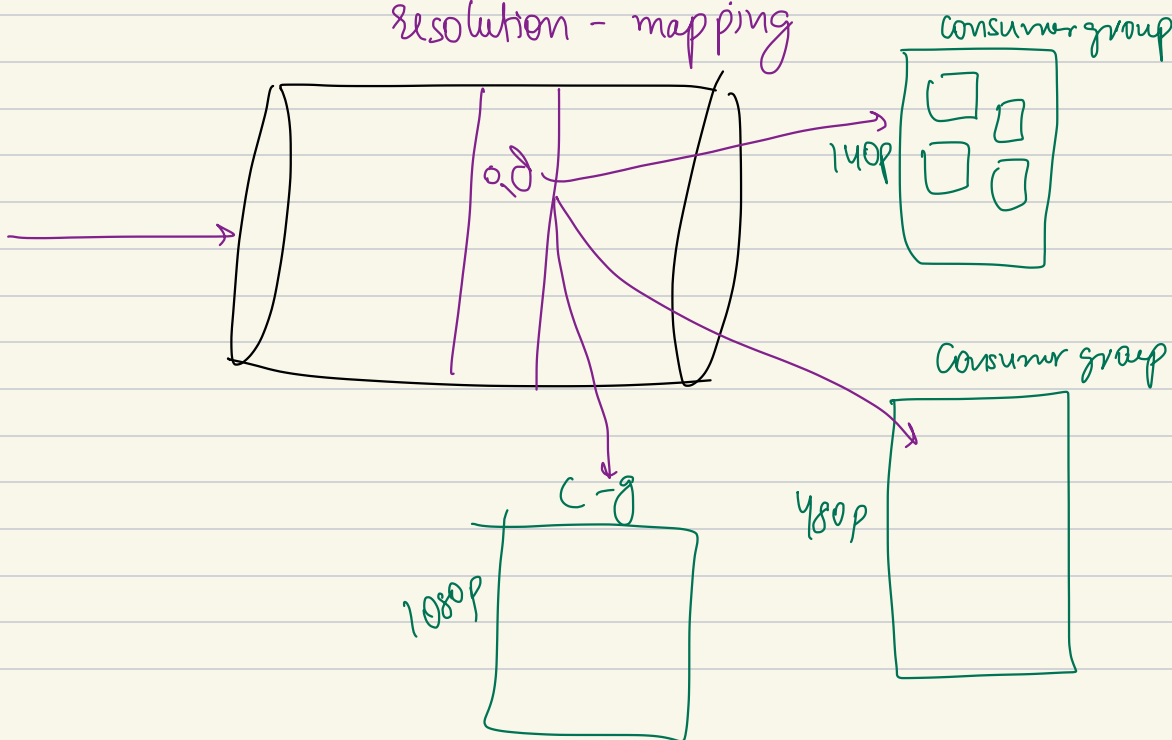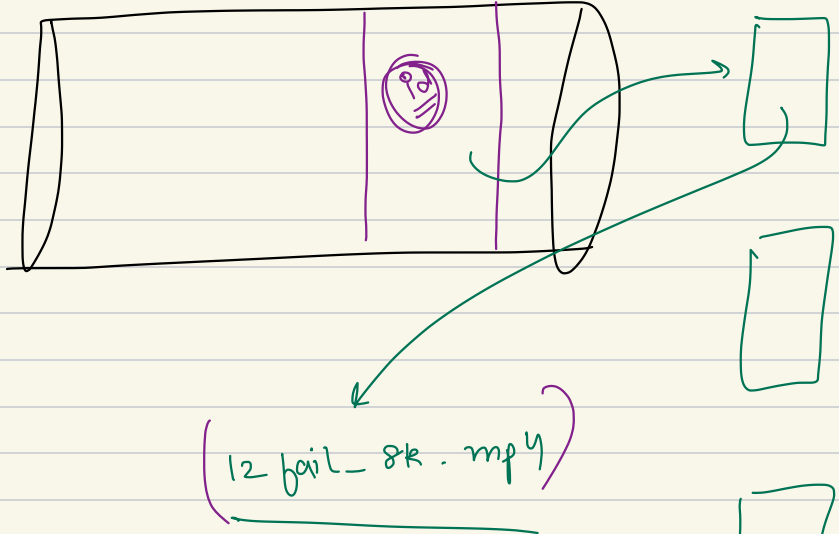
movie1-2k.mp4 | movie 1-720p.mp4 | movie7-14up.mp4

12 fail — 8k. mp4   =   8GB
            ↳ 2hours

|s-|

24 chunks

12-fail_8k_chunk1. mp4

12-fail - 8k_ chunk2. mp4
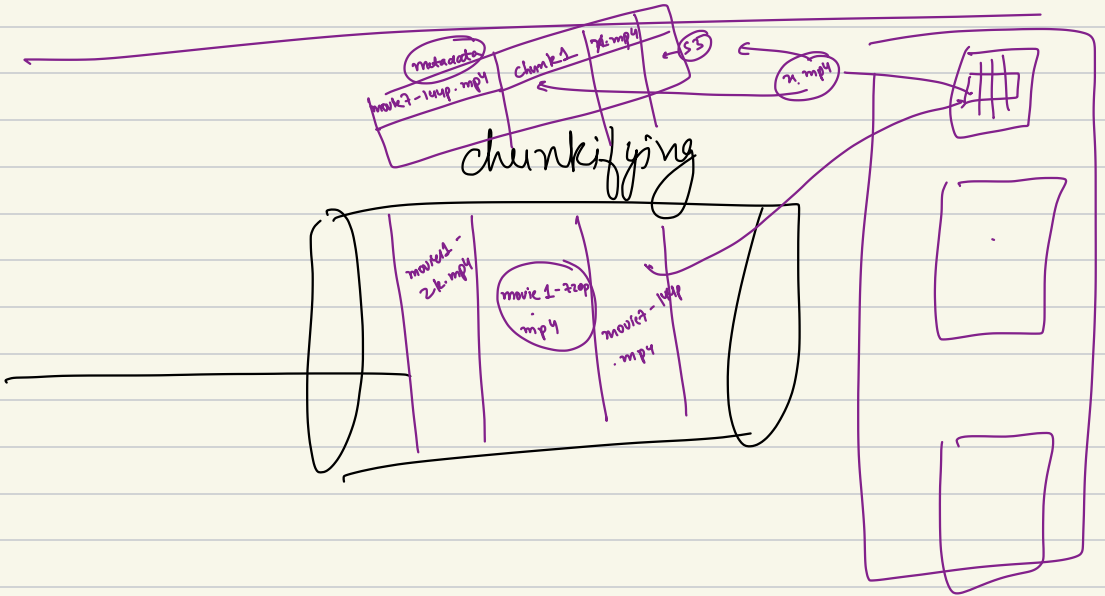
12-fail—8k—
Chunk 24.
mp4
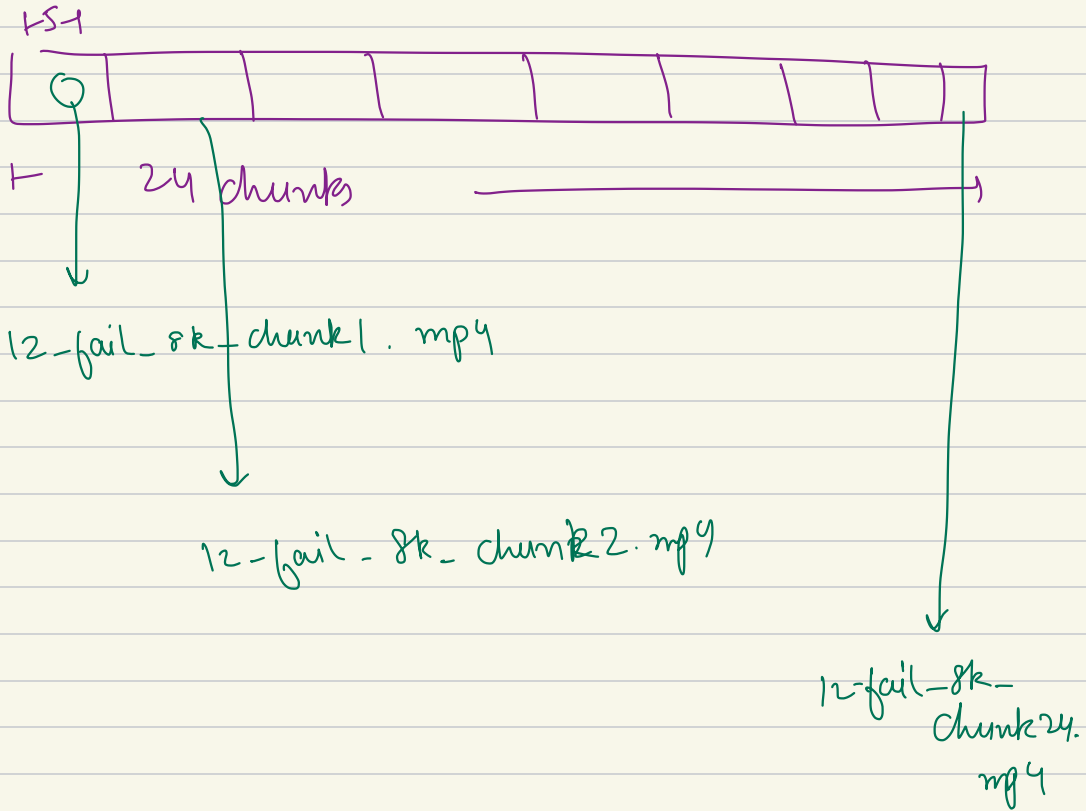
$$\frac{8GB}{24}$$ = $\frac{\cancel{8000}^{\ 333}\ ^{4000}}{24\quad 12}$ MB

		Size	S3
①	Raw-video	1 TB	#chunks = $\dfrac{1\,TB}{\lceil 128\,MB\rceil}$
②	Raw-video_144p	100 GB	#chunks = $\dfrac{100\,GB}{\lceil 128\,MB\rceil}$
③	Codec_720p.mp4	4 GB	#chunks = $\dfrac{4\,GB}{128\,MB}$
④	Codec_720p-chunk 1.mp4	500 MB	#chunk = $\dfrac{500\,MB}{128\,MB}$

Ingestion

Discoverability
=
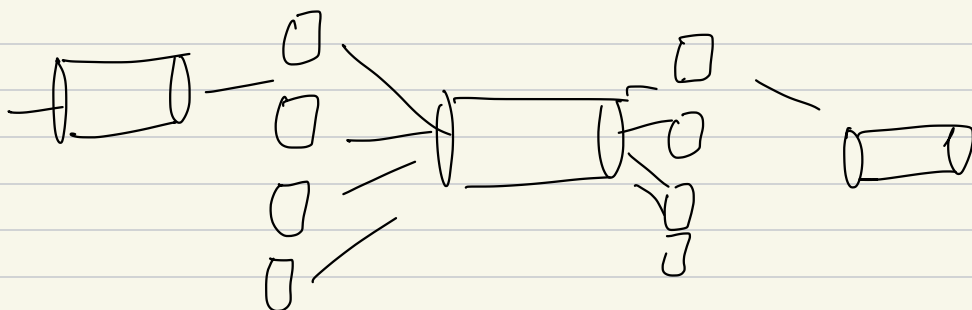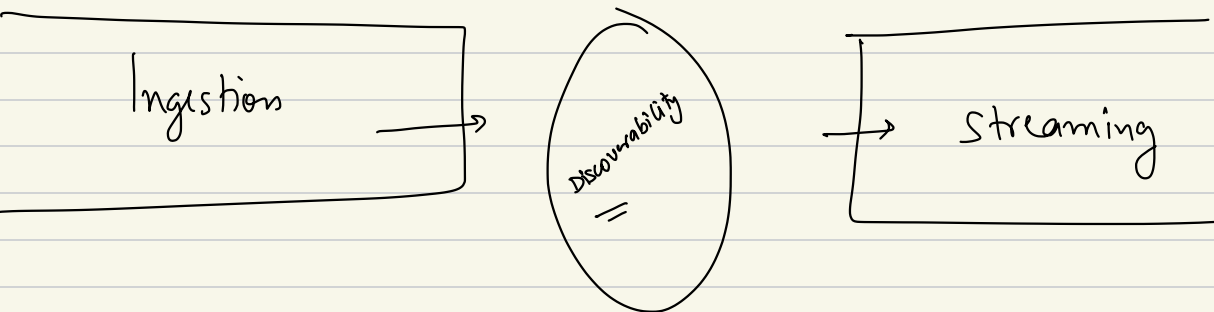
Streaming

Pipeline

<u>Discoverability</u>

①   Full Text   Search   →   Elastic search   :)

②   Continue   Watching   → Facebook News Feed   :)

+ Recommendion

User

access
Token

Gateway

User Authenticator
Service

Landing Page
Service
OR
Discoverability Service
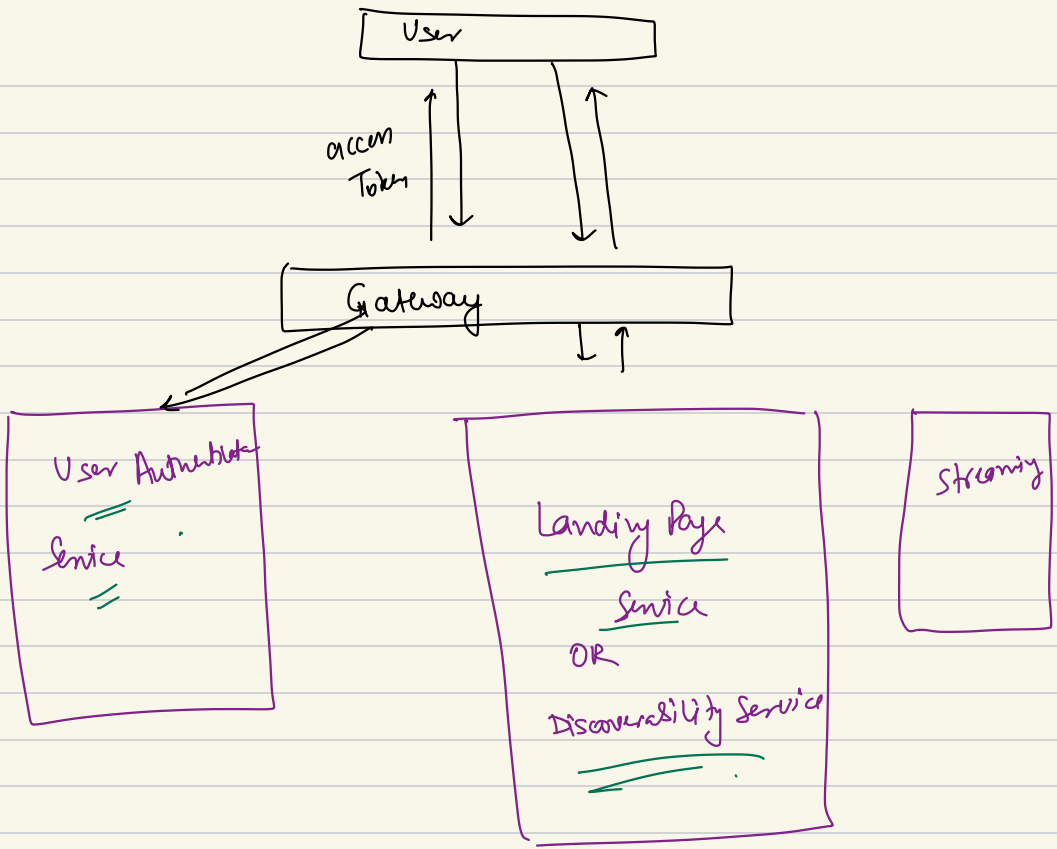
Streaming
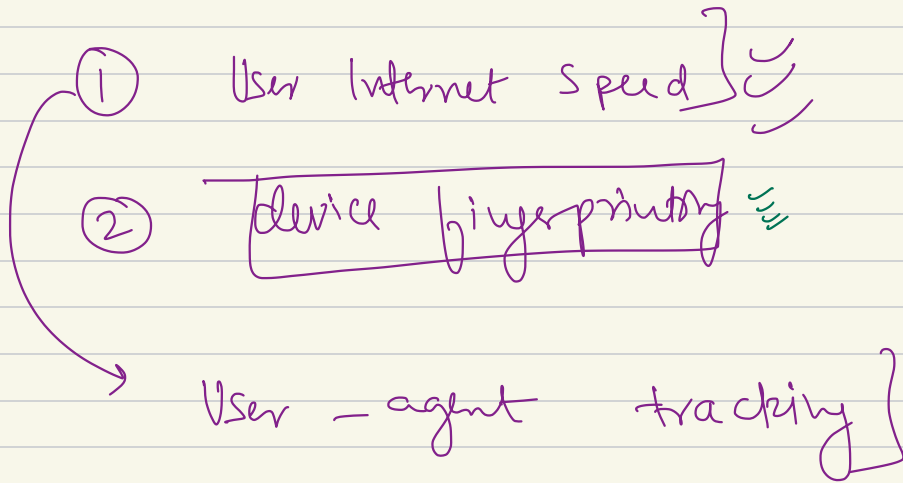
Streaming : how to ensure good experiensce for varied clients

Adaptive Bitrate Streaming (ABS)

① User Internet speed

② device fingerprinting

User-agent tracking

Discoverability

Client

Title, duration, ...

Metadata + Thumbnails

Gateway

Client ←——→ CDN

chunk 7, 8, 9, 10

Title   genre   yh
description   Cast
comments   rating

(1)

(get VideoStream Metadata) (content $^{?}_{id}$)

all chunk
    metadata

chunk 1	0 - 2	→ thumbnail url
chunk 2	2 - 4	↗
:		↗
:		↗
chunk 90	- -	↗

$$\frac{3 \text{ hour}}{2 \text{ mins}} = 90 \text{ chunks}$$

12th Fail

Title .

discription
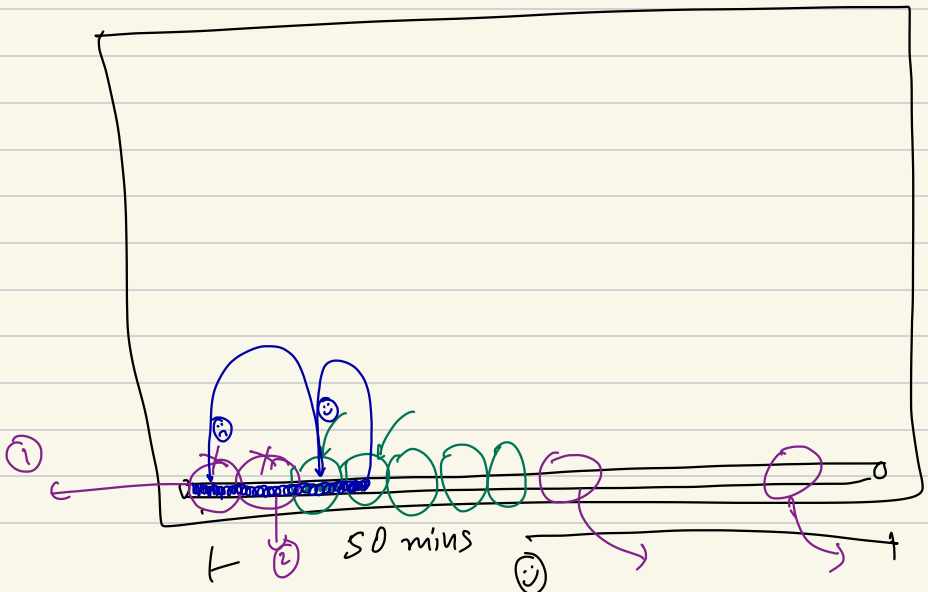
.
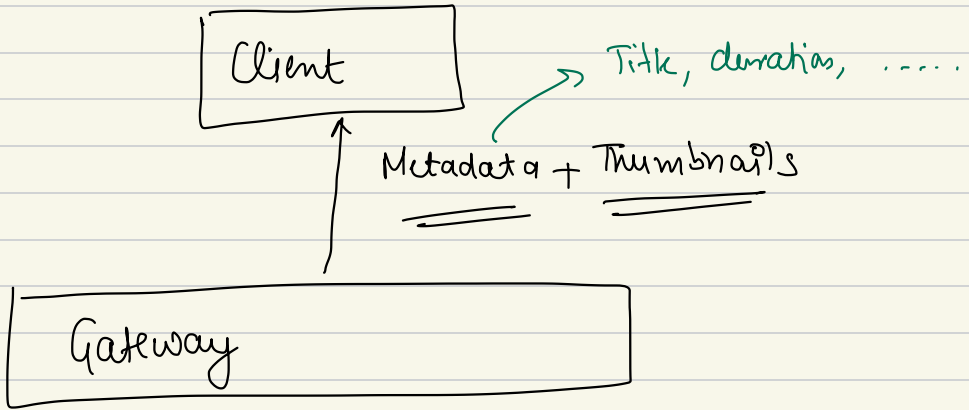
Preemptively

cdn-link

2 mins

100MBS

[✓ get Video Chunk (107, chunk1)

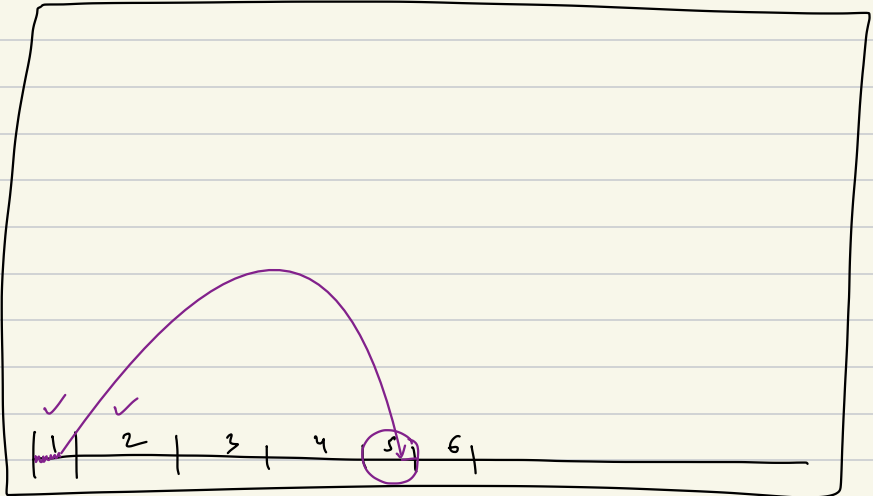✓ get Video Chunk (107, chunk 2)

✓ Get Videochunk (107, chunk 3)

— data-analysis —

✓ get Video Chunk (107, chunk 17)

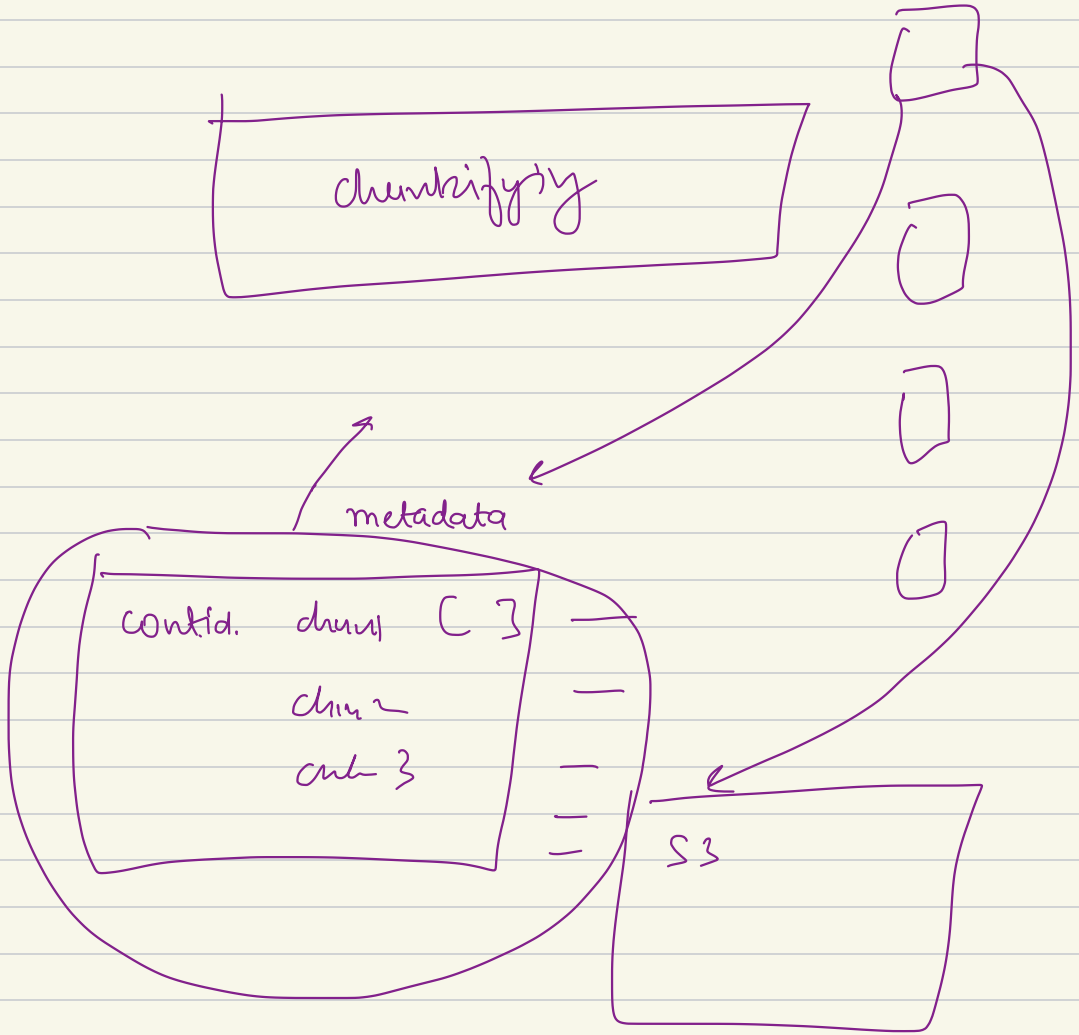✓ get Video Chunk (107, chunk, 18)

50 mins

Things / Concepts that enable streaming

①   Chunking

②   Pre - emptive loading

③   Browser Caching | Client Side Caching

④   CDN

⑤   Server Side Caching

⑥   Adaptive Bitrate Streaming (ABS)

question

Ingestion   Pipeline

chunkifying

metadata

contid.	chunk [ ]
	chunk
	chunk 3

S3

- ✓ CN lectures
- ✓ Orchestration
- ✓ deeper lectures
- ✓ Rides ✓

- ✓ Cassandra
- ✓ Discoverability
- ✓ IRCTC]]