

Agenda.

→ Design of OTT platforms.

(streaming platforms)

Prime Video / Netflix / Hotstar / ...

MVP.

→ Stream recorded content.

→ Live streaming.

→ Videos Ingestion. **

→ Recommendation System.

→ Different resolutions.

Trade Offs.

→ Consistency

(vs)

Availability.



→ low latency.

Videos.

→ Stream of Images. + Audio.

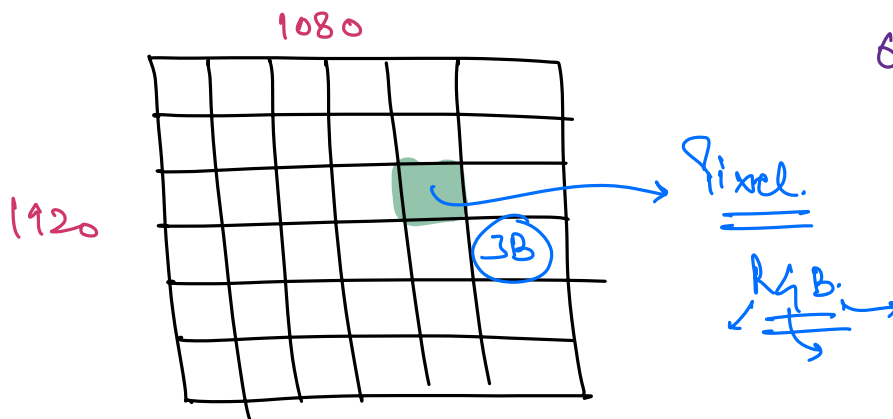
→ 24 fps | 30 fps | 60 fps.

↓
frames
per sec.

Image → 1080p. (Full HD) ⇒ $1080 \times 1920 \times 3B$
 $(1000 \times 2000 \times 3B)$

$6 \times 10^6 B$

6MB.



⇒ Size of a 2hr movie of 60fps in 1080p.

2hr movie ⇒ $(60 \times 1080 \times 1920 \times 3B \times 60 \times 60 \times 2)$

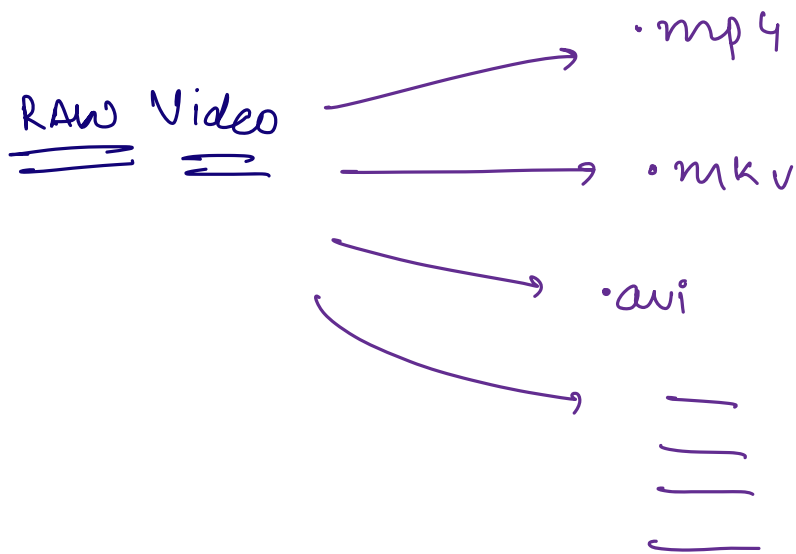
⇒ 2×10^{12} Bytes.

⇒ 2TB. → Raw Video.

⇒ Normal user will not enough n/w bandwidth to watch a movie of such a large size.

⇒ Codecs.

→ Compression + Decompression

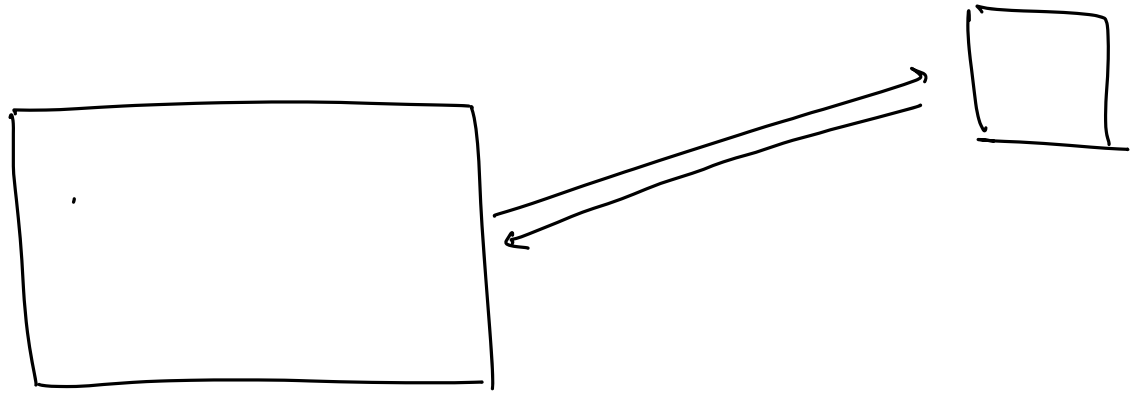


100GB ⇒ < 1GB

⇒ Compression Algorithms tries to only stores the changing frames.

⇒ Static frames will be stored for entire range

2-3 GB video.



- ⇒ We'll not have enough bandwidth to download even 2-3 gb of data in one go.
- ⇒ Client fetches the video in chunks.
- ⇒ Video gets divided into multiple chunks at the time of uploading / Ingestion itself.
- ⇒ Chunkification of videos
 - ↙ Max # chunk needs to be processed in case of any failure
 - ↘ Parallelisation while uploading OR downloading

Adaptive Bitrate Streaming

⇒ Not all the users are going to be same.

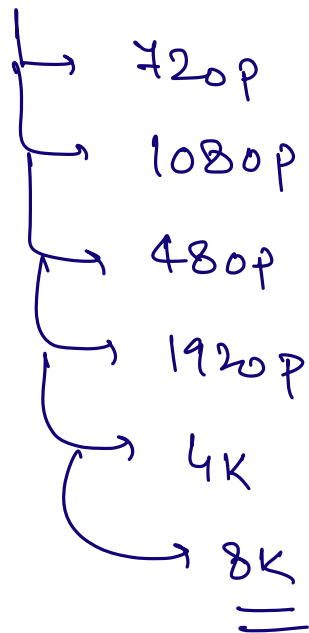
→ Different bandwidth

→ Different screen resolutions.

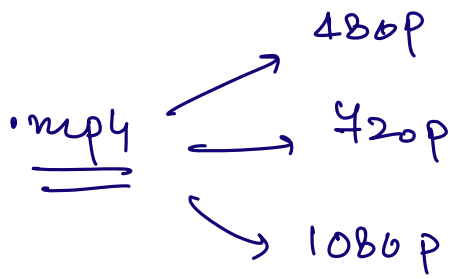
→ N/w bandwidth can keep changing

→ User agent: Browser App | Mobile App.

⇒ To different clients, we need to provide videos into different resolutions/quality etc.

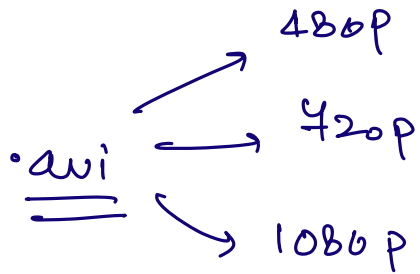


⇒ OTT platforms while ingestion, preprocesses the raw video & converts into multiple formats & multiple resolutions so that at the time of downloading we can just fetch the video.



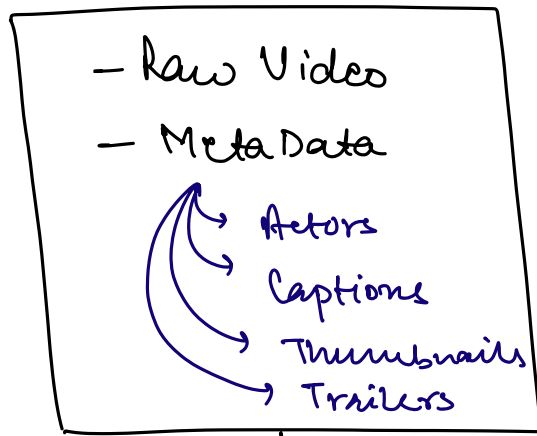
≡
≡
≡

⇒ Storage



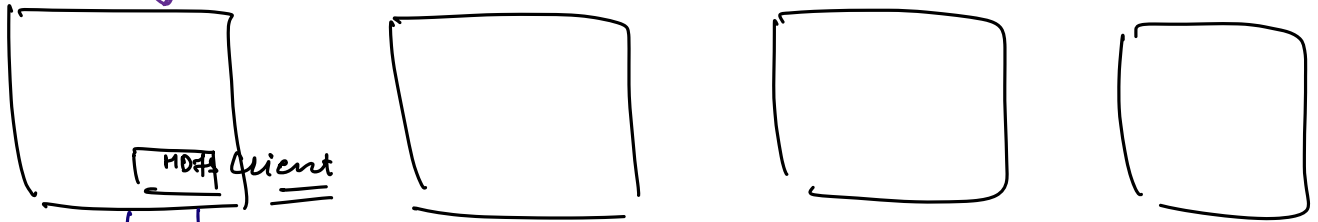
≡
≡
≡

Ingestion of Videos.
Uploading

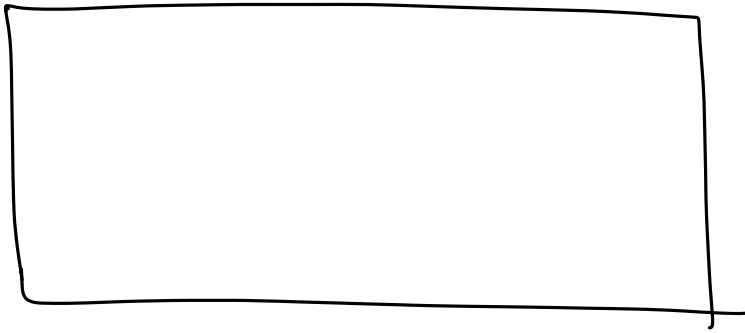


Upload
Clients

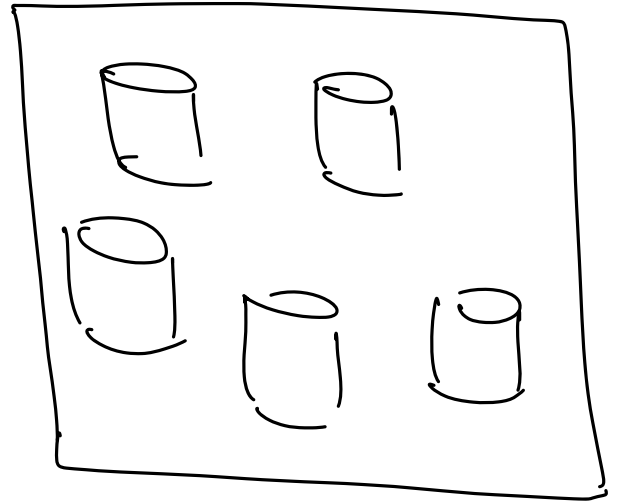
API hw + LB.



Videos_db



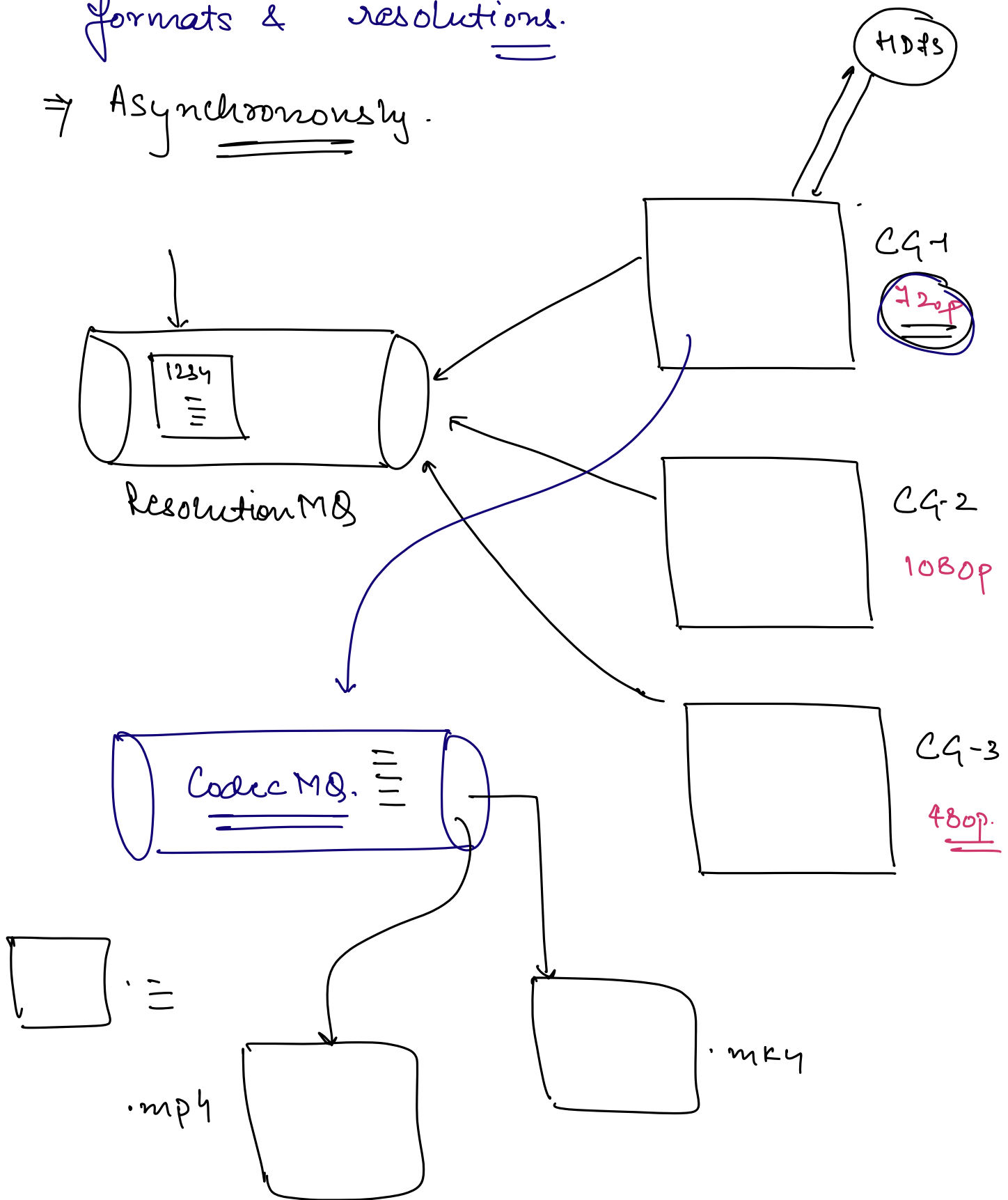
File Storage (S3 / HDFS / ...)



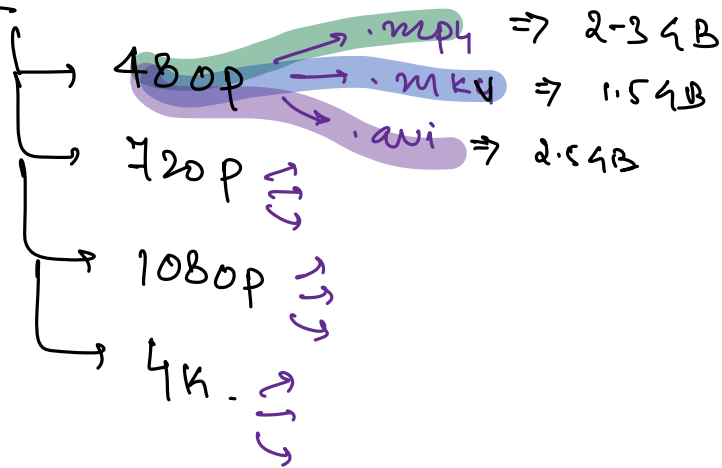
⇒ All the processing like chunkification (or) converting video into multiple resolutions is done after uploading the Raw Video to the system.

→ Convert the Raw Video into multiple formats & resolutions.

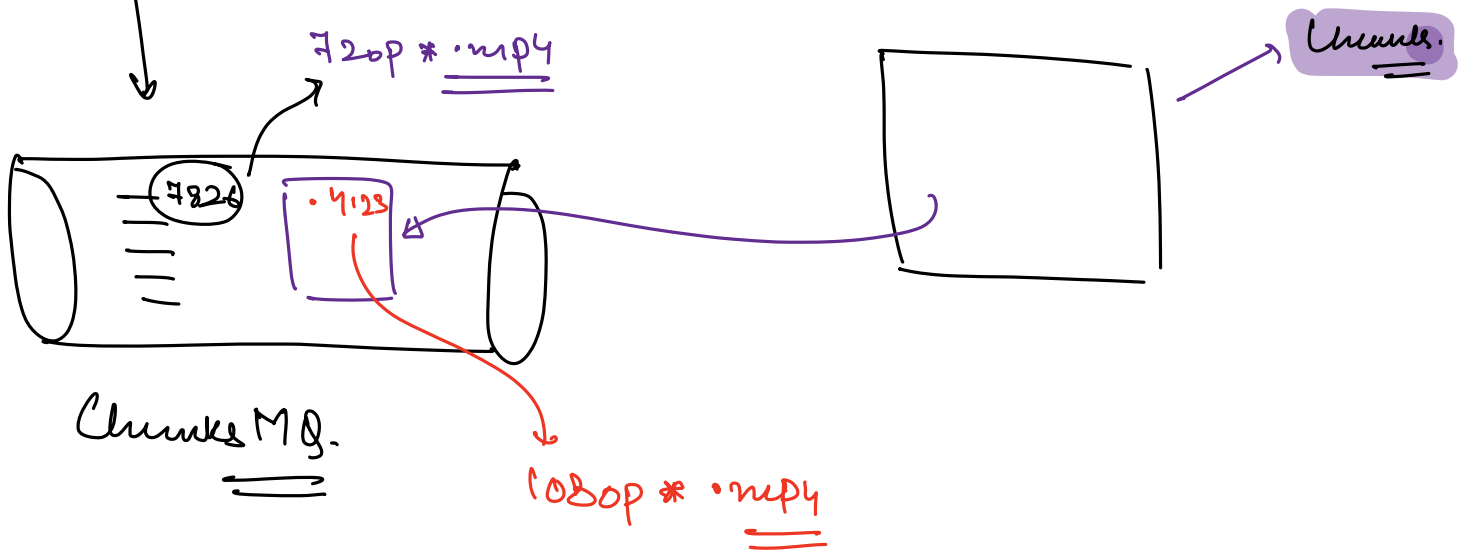
⇒ Asynchronously.



Avengers. \Rightarrow Raw Videos.



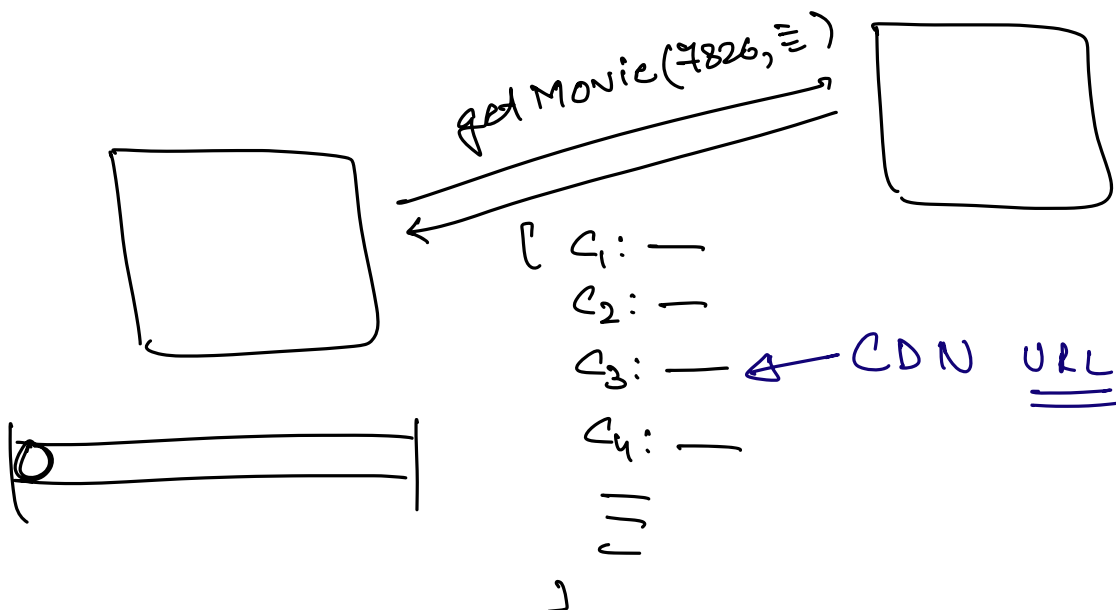
\Rightarrow

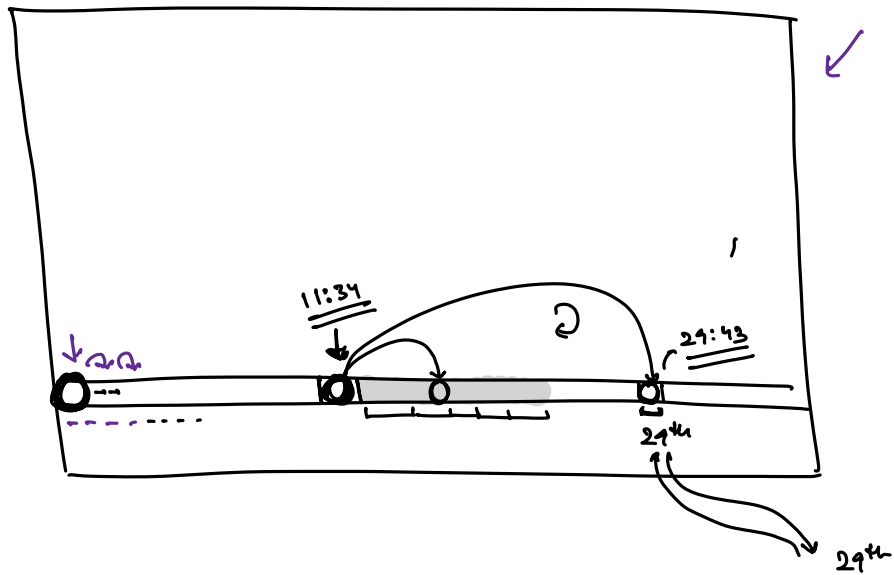


720p * .mp4 \Rightarrow 100 Chunks.

movie-id	resolution		Video-id
<u>7826</u>	720p	— —	1784
7826	1080p	— —	8417
7826	4k	≡ ≡	9178

Video-id	chunk-id	Start-time	End-time	hdfl-url
1784	1	0	1	x42
1784	2	1	2	abc
1784	3	2	3	muo
— —	— —	— —	— —	— —





OS: Resource Management

CDN -
↓
Cache

Netflix

Own CDN: OpenConnect

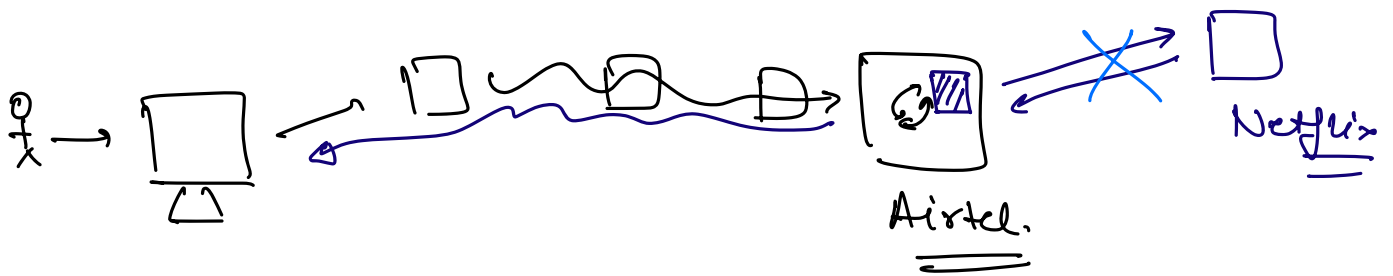
ISP → Airtel
→ Jio
→
→
→



Akamai
↓
CDN

Ind (US) BK

SOM



Cloudfront CDN.

Agora

⇒ live streaming. → 29th

⇒ Rate limiter ⇒ 31st

⇒ MS-1 ⇒ 3rd Feb

⇒ MS-2 ⇒ 5th Feb

⇒ NoSQL ⇒ 7th Feb.