

My brain when I am sitting in a system design interview



Agenda

- Overview of Netflix Recommendation system-design



Where do we start??

SWE→

- ① Scalability
- ② Fault tolerance.
- ③ Availability

"Password Incorrect"

"Password Incorrect"

resets password

"Your password cannot be
your previous password"



MLOPS - System design

- ① Data Versioning / Flow
- ② Model Structuring / Comparison
- ③ Training - Inference - Skew
- ④ Concept drift

Why UX research is important



System design

① LLD → Low Level design
↳ implementation details

② HLD → High level design
↳ architecture

Design a Video Streaming Platform like Netflix

★ CLARIFYING QUESTIONS

① 1 Billion Users with roughly 200 million DAU

② 1 million videos → on platform

③ 1000 videos uploaded any given day

④ User access 5 times in a day

$$\frac{200 \times 10^6 \times 5}{24 \times 60 \times 60} = 12K \text{ req/second.}$$

1 FUNCTIONAL REQ

- Users should be able to stream the video on platform (pause/resume video playback).
- People should be able to search video on the platform.
- Personalized Recommendation for users.
- Producers, Directors, and Teams should be able to upload content on the website.
- It should be available on iOS/ Android/ Web.
- Users should be able to like/dislike/rate/comment the video.

2 NON - FUNCTIONAL REQ.

1. Low Latency & High availability.
2. Scalable & Efficient.

In the context of system design, what refers to the overall view of the system, including architecture, applications, and database management?

0 users have participated

A	Low-Level Design (LLD)	0%
<input checked="" type="radio"/>	B High-Level Design (HLD)	0%
C	System Data Flow	0%
D	Component Execution	0%

[End Quiz Now](#)

<div><div>A</div><div>2</div></div> <div>Akshara Shukla</div> <div>1/1 94.63</div>		<div><div>SG</div><div>1</div></div> <div>Sonali Ghosh</div> <div>1/1 95.23</div>		<div><div>SK</div><div>3</div></div> <div>Santhosh K</div> <div>1/1 94.27</div>	
4	<div><div>85</div></div> Renu Singh	1/1	92.56		
5	<div><div>86</div></div> Venkata Sai Pramod Kumar	1/1	92.37		
6	<div><div>87</div></div> <div><div></div>Gajanan Todeti</div>	1/1	92.19		
7	<div><div>88</div></div> Phani Kishore R PMP	1/1	91.33		
8	<div><div>89</div></div> Chirantan Sharma	1/1	90.16		
9	<div><div>90</div></div> Popatsing Waghele	1/1	88.30		
10	<div><div>91</div></div> Lokesh Sonawane	1/1	86.23		

What is an essential aspect of system design in regards to understanding its scale?

0 users have participated

A Estimating the color palette for the UI

0%

B Programming language to be used

0%

C Making reasonable assumptions about system metrics like requests per day or database calls

0%

D Selecting a font style for documentation

0%

[End Quiz Now](#)

Leaderboard

Based on all quizzes from the session



Renu Singh
2/2 ⚡ 187.03



Santhosh K
2/2 ⚡ 188.23



Akshara Shukla
2/2 ⚡ 184.03

4	V5	Venkata Sai Pramod Kumar	2/2	⚡ 180.47
5	FW	Popatsing Waghela	2/2	⚡ 178.69
6		Arindam Maji	2/2	⚡ 178.20
7	L	Lokesh Sonawane	2/2	⚡ 171.80
8		Gajanan Todeti	2/2	⚡ 171.39
9	L	Phani Kishore R PMP	2/2	⚡ 170.76
10	CS	Chirantan Sharma	2/2	⚡ 169.42

Different components we need to design for Netflix (MVP)

1. Data Sources
2. Data Ingestion Pipeline
3. Data Storage Systems
4. Data Processing and Feature Engineering
5. Recommendation Engine (building ML algorithm)
6. API Layer
7. Caching
8. Monitoring and Logging
9. Security And Compliance

1

Data Source

a Users / User-item interaction.

- (i) Like / dislikes / reviews / ratings / comment
- (ii) Watch history
- (iii) Search history
- (iv) User interaction with platform
- (v) wish list / watch list
- (vi) Daily time spent
- (vii) Age, gender, demographics / Language.

b Content / Content-metadata.

- (i) Movies / Shows - (Genre, director, title, cast, duration, description, Rating)
 - (Kids 18+)
- (ii) Release Year
- (iii) Content popularity metrics
 - ↳ IMDb
 - ↳ Rotten tomatoes
- (iv) Technical specification → 1080 / 4K / 480p

(c) External data

- ① Social media trend / Sentiment
- ② Third party reviews

2 DATA INGESTION PIPELINE

CLIENT

- ① Information regarding your device / its usage
- ② Wakeup / Shutdown
- ③ 12/12 stream data

SERVER

- ① Which results were shown / served.
- ② What was clicked on.

```
"userId": "user123",
"sessionId": "session456",
"events": [
  {
    "eventType": "view",
    "page": "/home",
    "timeSpentSeconds": 10,
    "timestamp": "2025-01-27T10:00:00Z"
  },
  {
    "eventType": "scroll",
    "scrollPosition": 300,
    "timestamp": "2025-01-27T10:00:05Z",
    "page": "/home"
  },
  {
    "eventType": "click",
    "elementId": "signup-button",
    "timestamp": "2025-01-27T10:00:10Z",
    "page": "/home"
  },
  {
    "eventType": "view",
    "page": "/product/123",
    "timeSpentSeconds": 30,
    "timestamp": "2025-01-27T10:01:00Z"
  },
  {
    "eventType": "form_submission",
    "formId": "contact-form",
    "fields": {
      "name": "John Doe",
      "email": "john.doe@example.com"
    },
    "timestamp": "2025-01-27T10:02:00Z",
    "page": "/contact"
  }
]
```

3

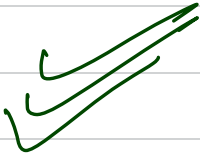
DATA STORAGE

Structured SQL

SQL

Non-Structured

NO SQL




```

// Electronics Product
{
  "product_id": 1,
  "name": "Smartphone X",
  "category": "Electronics",
  "price": 999,
  "attributes": {
    "batteryLife": "24h",
    "warrantyPeriod": "2 years",
    "brand": "TechBrand"
  },
  "reviews": [
    {
      "user_id": 101,
      "rating": 5,
      "comment": "Excellent phone with great battery life!"
    },
    {
      "user_id": 102,
      "rating": 4,
      "comment": "Good performance but a bit pricey."
    }
  ]
}

// Clothing Product
{
  "product_id": 2,
  "name": "T-Shirt Y",
  "category": "Clothing",
  "price": 29,
  "attributes": {
    "size": "L",
    "material": "Cotton",
    "gender": "Unisex"
  },
  "reviews": [
    {
      "user_id": 103,
      "rating": 4,
      "comment": "Comfortable and fits well."
    }
  ]
}

// Books Product
{
  "product_id": 3,
  "name": "Novel Z",
  "category": "Books",
  "price": 15,
  "attributes": {
    "author": "Author A",
    "ISBN": "123-4567890",
    "genre": "Fiction"
  },
  "reviews": []
}

```

4

DATA STORAGE



S3

①

Streaming

②

Downloading.

Content Delivery Network

Mumbai
CDN

Local data
Storage

Myntia → CDN - SCR day/month

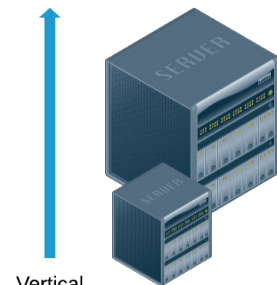
What is the main difference between horizontal scaling and vertical scaling?

0 users have participated

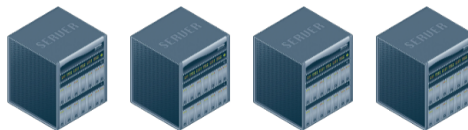
- A Horizontal scaling adds more machines, while vertical scaling adds new software. 0%
- B Horizontal scaling adds physical locations, while vertical scaling focuses on security enhancements. 0%
- C Horizontal scaling adds resources to a single machine, while vertical scaling adds more machines. 0%
- ☒ D Horizontal scaling adds more machines, while vertical scaling adds resources to a single machine. 0%

[End Quiz Now](#)

VS		k	
Venkata Sai Pra...		Phani Kishore R ...	Gajanan Todeti
3/3		3/3	3/3
260.50		267.62	256.89
4	Lokesh Sonawane	3/3	252.17
5	Manoj	3/3	230.67
6	Santhosh K	2/3	188.23
7	Renu Singh	2/3	187.03
8	Akshara Shukla	2/3	184.03
9	Popatsing Waghela	2/3	178.69
10	Arindam Maji	2/3	178.20



Vertical
Scaling
(scaling up)

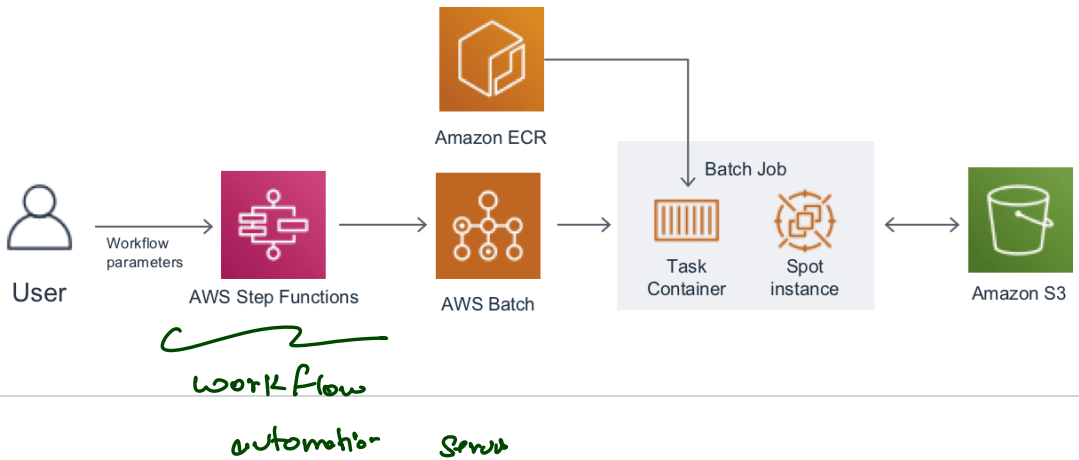


Horizontal Scaling
(scaling out)

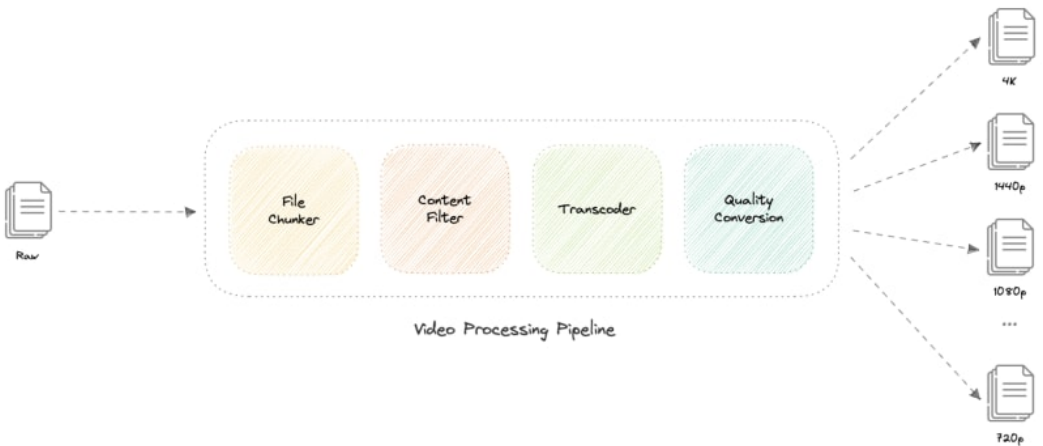
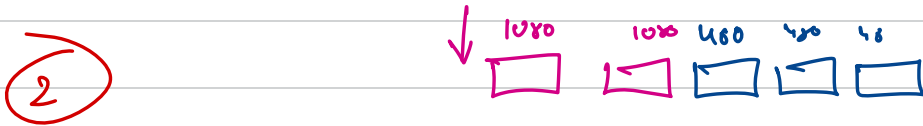
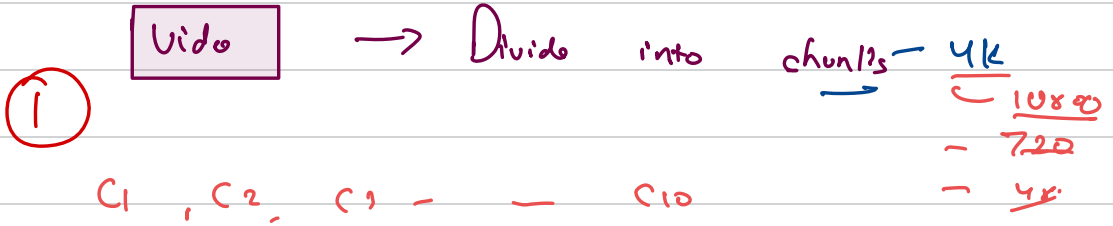
Serverless

not serverless
EC2 instance

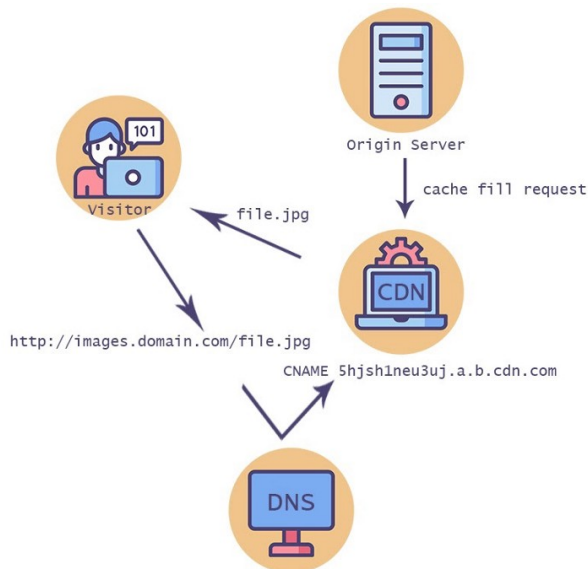
ECS instance
serverless



Transcoding



Video Resolution	Video Bitrate
240p	300 kbps
360p	500 kbps
HD 480p	1000 kbps
HD 720p	1500 kbps
HD 720p	2250 kbps
Full HD 1080p	3000 kbps
Full HD 1080p	4500 kbps
Quad HD 1440p	6000 kbps
Quad HD 1440p	9000 kbps
4K UHD 2160p	13,000 kbps
4K UHD 2160p	20,000 kbps



What is the role of a Content Delivery Network (CDN) in video streaming?

0 users have participated

- A To slow down the delivery of content to manage server load 0%
- B To provide a single centralized server for content storage 0%
- C To offer geographically distributed servers for fast content delivery 0%
- D To increase internet connection speeds universally 0%

End Quiz Now

based on all quizzes from the session



Venkata Sai Pra...
4/4 352.36



Phani Kishore R...
4/4 360.79



Lokesh Sonawane
4/4 344.50

4	M	Manoj	4/4	304.83
5	SK	Santhosh K	3/4	284.06
6	A	Akshara Shukla	3/4	271.89
7	PW	Popatsing Waghela	3/4	269.49
8		Gajanan Todeti	3/4	256.89
9	SG	Sonali Ghosh	3/4	248.00
10	BS	Renu Singh	2/4	187.03

