Experiment - 4

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Subject Name: System Design
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Aim:

To design and analyze a scalable OTT (Over-The-Top) video streaming platform similar to Netflix/Amazon Prime that allows users to register, subscribe, search, and stream video content efficiently while ensuring high availability, low latency, and large-scale scalability using distributed system concepts.

Objectives:

1. To understand the working of a large-scale OTT video streaming platform like Netflix or Amazon Prime
2. To analyze and define the functional and non-functional requirements of the system.
3. To ensure high availability, fault tolerance, and data consistency across distributed services.
4. To design the system to handle millions of concurrent users efficiently.
5. To analyze performance optimization techniques for video streaming at scale.

Tools Required:

- Draw.io
- MY SQL
- Elastic Search
- Apache Kafka
- Redis/CDN Cache

System Design:

Functional Requirements -

- User Should be able to create an account.
- User should be able to login securely.
- User should be able to subscribe to plans.
- User Should be able to search movies/TV shows.
- User Should be able to stream videos in multiple resolutions(480p, 720p, 1080p).
- User Should be able to view thumbnails and metadata.

Non-functional Requirements

- Scalability: System should support 200 - 300 million DAU.
- Availability – System should be highly available first then consistent.

  Video Playback must not stop.

  Slight metadata delay is acceptable.

  Payment service require strong consistency.

- Latency : Required: < 50-80 ms , Minimal Buffering, CDN reduces delay.

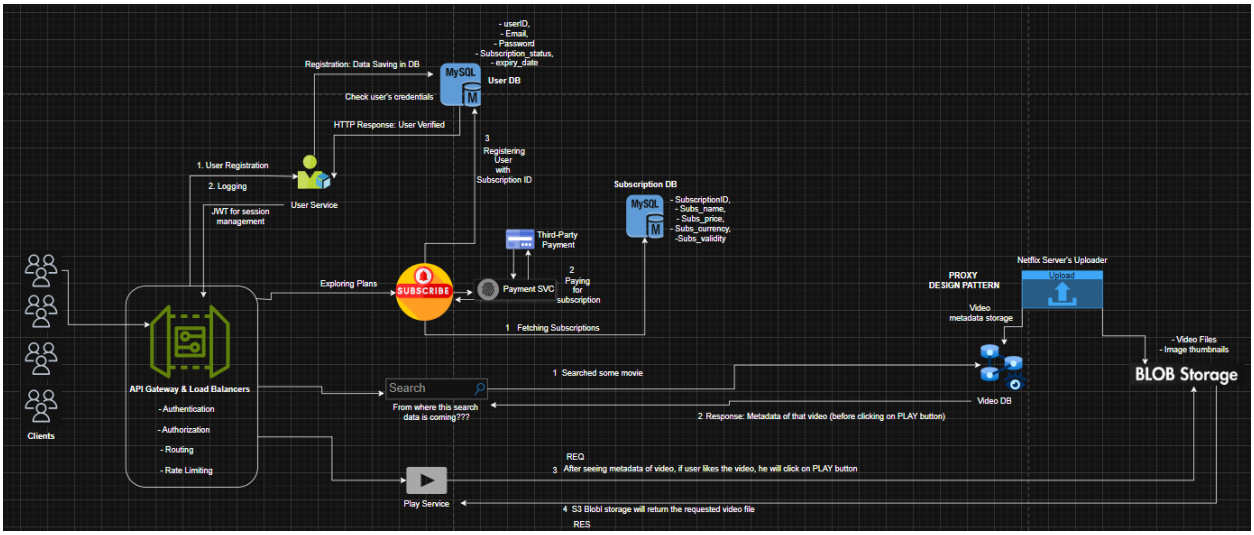
Core-Entitles of the System:

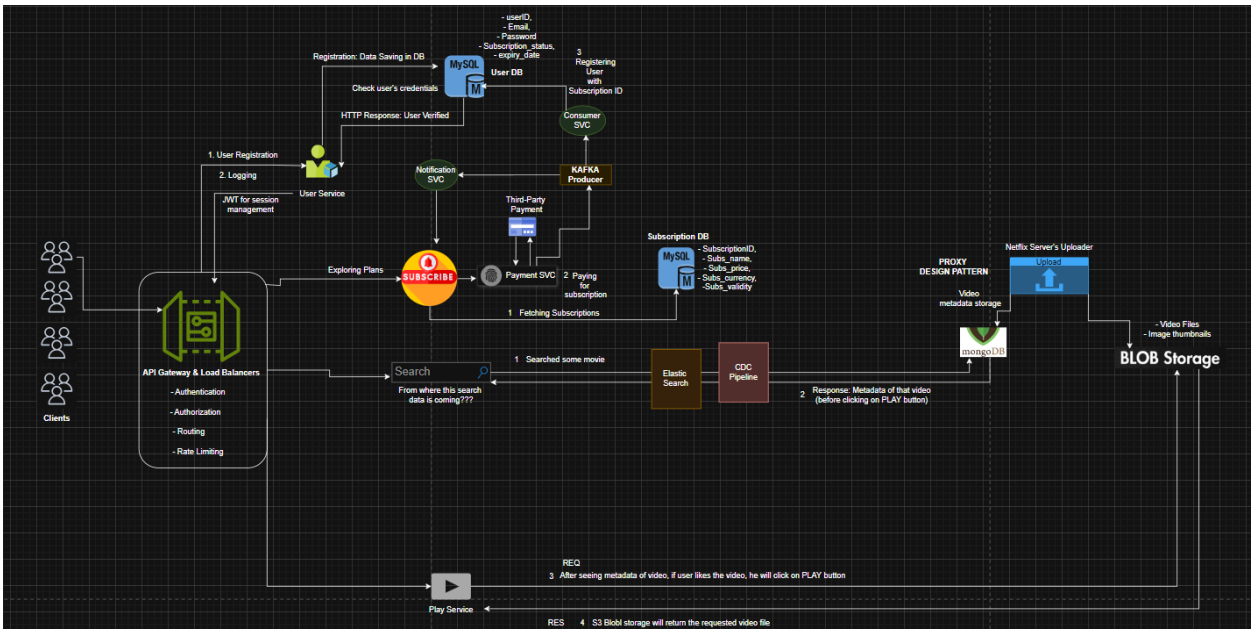
1. API Gateway.
2. Users.
3. Subscription and payment service.
4. Search Service.
5. Recommendation.

Video Streaming Workflow:

- User clicks on Play.
- Client requests manifest file (.m3u8 / .mpd).
- Manifest contains different bitrate URLs.
- Client checks network speed.
- Suitable resolution chunks are selected.
- CDN serves cached chunks.
- Video plays smoothly using adaptive bitrate.

REQUIRED SYSTEM DESIGN –





Learning Outcomes :

- Understand the real- world OTT architecture design.
- Understood functional vs non-functional requirements.
- Understood CAP theorem trade-offs.