Experiment - 4

Student Name: Sarthak Arora
UID: 23BCS12984
Branch: BE-CSE
Section/Group: KRG_2B
Semester: 6th
Date of Performance: 4/2/26
Subject Name: System Design
Subject Code: 23CSH-314

Aim:

To design a scalable and highly available OTT (Over-The-Top) video streaming platform capable of delivering movies and TV shows over the internet with adaptive bitrate streaming, subscription management, search functionality, and low latency.

Objectives:

1. To understand the architecture of a large-scale video streaming system.
2. To design microservices for user management, subscription, search, and video playback.
3. To implement adaptive bitrate streaming using modern streaming protocols.
4. To design APIs for user onboarding, subscription handling, and video streaming.
5. To apply CAP theorem principles in distributed system design.

Procedure-

1. Identify functional requirements of a live streaming platform.
2. Define non-functional requirements such as scalability, latency, and availability.
3. Analyze CAP theorem trade-offs for live streaming systems.
4. Identify core entities required for system implementation.
5. Design the system architecture using Draw.io.
6. Validate the design against real-world live streaming behavior.

Functional Requirements -

1. User should be able to register on the platform.
2. User should be able to log in securely.
3. User should be able to explore subscription plans.
4. User should be able to purchase subscription using third-party payment.
5. User should be able to search movies/TV shows by title.
6. User should be able to view video metadata before playing.
7. User should be able to stream video in multiple resolutions.
8. System should support adaptive bitrate switching automatically.
9. Notification service should inform users about subscription updates.

Non-functional Requirements

- **Scalability**
  1. System should support 200–300 million users.
  2. Around 20,000 videos (~1 hour each).
- **Availability (CAP Theorem)**
  1. High availability for video watching.
  2. Strong consistency for payments and subscription plans.
- **Latency**
  1. Response time: 50–80 ms.
  2. Zero or negligible buffering.
- **Security**
  1. JWT-based authentication.
  2. Secure payment processing.
- **High Availability**
  1. Load balancing and redundancy.
  2. CDN caching for frequently watched videos.

Outcome / Result -

The scalable OTT platform architecture was successfully designed with clearly defined microservices for user management, subscription handling, search, and video streaming. The system ensures high availability, low latency, and adaptive bitrate streaming using protocols like HTTP Live Streaming and MPEG-DASH. Performance optimization through CDN integration and distributed system principles makes the platform capable of serving millions of users efficiently and reliably.

REQUIRED SYSTEM DESIGN -