

Experiment-3

Student Name Sandeep kumar

UID: 23BCS11489

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Section/Group: KRG_3B

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Subject Name: System Design

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1. AIM : To design a Social Media Platform similar to Facebook / Instagram

Description: A Social Media platform is a platform which allows users to share photos, videos, and text with their friends and followers. To design a scalable and highly available **Social Media System** where users can register, create posts, follow others, and interact with content through likes and comments.

2. Objectives

- To understand the working of a large-scale social media system
- To design functional and non-functional requirements
- To identify core system entities
- To design API endpoints for communication
- To ensure scalability, availability, and low latency

3. Tools Required

- System Design Tools (Draw.io, Lucidchart, etc.)
- Programming Language (Java / Python / JavaScript)
- Database (MySQL / MongoDB)
- API Testing Tool (Postman)
- Web Browser
- IDE (VS Code, IntelliJ, etc.)

4. SYSTEM DESIGN / SYSTEM SPECIFICATION

4.1 Functional Requirements

1. User should be able to register and login.
2. User should be able to create posts (text / image / video).
3. Users should be able to follow each other / send friend requests.
4. Users should be able to like and comment on posts.
5. Users should be able to view feed from people they follow.

4.2 Non-Functional Requirements

1. Scalability:

- System should support 500 million DAU.

2. Consistency & Availability (CAP Theorem):

- This system needs to be highly available first, then consistent.
- Reason: If the system is not operational, it becomes useless.
- Example:
 - If Instagram is down for 1 hour → huge issue.
 - But if a post takes 500ms to reach followers → acceptable.
- Hence:
Availability >>> Consistency

3. Latency:

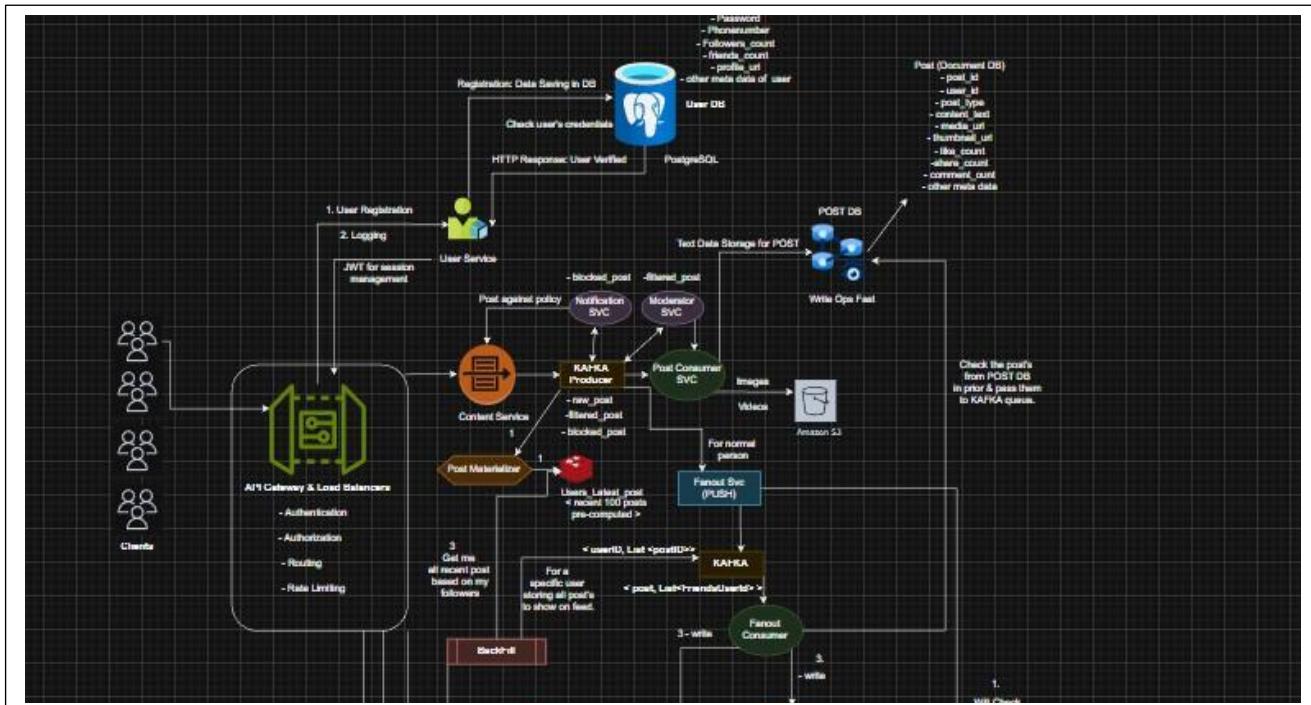
- Uploading / publishing post should take ≤ 500 ms.

4.3 Core Entities of the System

- User
- Post
- Comment
- Like
- Follow / Friend Request
- Feed
- Media (Image/Video)

5. HLD(High Level Design):

We have to follow a distributed / micro-services approach not the monolithic one



7. Learning Outcomes

- Understand the design and architecture of a scalable E-commerce platform.
- Gain hands-on experience with Apache Kafka for real-time data streaming.
- Learn to implement fast and efficient search using Elasticsearch.
- Understand Change Data Capture (CDC) pipelines for real-time data synchronization.
- Develop skills in integrating distributed systems for high availability and scalability.