COMSATS University
Islamabad
Abbottabad Campus

Lab Task

Name:

Syed Hussain Mustafa

Reg no:

SP22-BSE-159

Subject:

SDA

Submitted to:

Sir Mukhtiar Zamin

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Task no 01:

Social Media Platforms:

1. Scalability:

Problem: As user bases grow, social media platforms must handle increasing amounts of data and user interactions. This includes managing millions of concurrent users, posts, comments, and media uploads.

Impact: If not properly managed, platforms can experience slow performance, downtime, or crashes, leading to user dissatisfaction.

2. Data Storage and Management:

Problem: Social media platforms generate vast amounts of data daily, including user profiles, posts, images, and interactions. Efficiently storing, retrieving, and managing this data is a significant challenge.

Impact: Poor data management can lead to slow access times, data loss, or difficulties in implementing features like search and recommendations.

3. Real-time Processing:

Problem: Users expect real-time updates for notifications, messages, and news feeds. Achieving low-latency processing while handling large volumes of data is complex.

Impact: Delays in updates can frustrate users and diminish the platform's perceived responsiveness and engagement.

4. Security and Privacy

Problem: Protecting user data from breaches and ensuring compliance with privacy regulations (like GDPR) is a critical architectural challenge. This includes secure data transmission, storage, and access controls.

Impact: Security vulnerabilities can lead to data breaches, loss of user trust, and legal repercussions.

5. Content Moderation:

Problem: Social media platforms must effectively moderate user-generated content to prevent harmful or inappropriate material from being shared. This involves balancing freedom of expression with community guidelines.

Impact: Ineffective moderation can lead to the spread of hate speech, misinformation, and other harmful content, damaging the platform's reputation and user experience.

Task no 2:

- **Solution to Scalability Issues in Social Media Platforms:**

Micro services Architecture:

Description: Decompose the application into smaller, independent services that handle specific functionalities. For example:

User Service: Manages user accounts, authentication, and profiles.

Post Service: Handles the creation, retrieval, updating, and deletion of posts.

Notification Service: Manages notifications for user interactions (likes, comments, etc.).

Benefit: Each service can be developed, deployed, and scaled independently, allowing for more efficient resource utilization and faster response times.

Challenges of Microservices Architecture:

Complexity:

Description: Managing multiple services increases the overall complexity of the system. Each service has its own codebase, deployment pipeline, and dependencies.

Impact: This can lead to difficulties in understanding the entire system, making it harder to troubleshoot issues or onboard new developers.

Data Management:

Description: Each microservice may have its own database, leading to challenges in maintaining data consistency across services.

Impact: Implementing distributed transactions can be complex, and ensuring data integrity can become a significant challenge.

Inter-Service Communication:

Description: Microservices need to communicate with each other, which can introduce latency and potential points of failure.

Impact: Choosing the right communication protocol (e.g., REST, gRPC, message queues) and managing service discovery can complicate the architecture.