Home Test Assignment - Professional Development Test

Time Limit: 3.5 hours

Overview

Build a complete eco-system application with database, monitoring and logging frameworks and dashboards.

Note: You are permitted to use any tools, resources, and AI assistance during this assignment.

Important: After submission, you should expect follow-up questions about your implementation. You must be able to explain all aspects of your solution in detail, including architecture decisions, how each component works, database design, Docker configuration, logging implementation, and any AI-assisted code.

Part 1: TIDB Implementation

Requirements:

1. Database Setup:
    - Use TiDB database
    - Configure TiDB in Docker environment
2. Message Queue Integration:
    - Implement Apache Kafka as message broker
    - Set up Kafka brokers in Docker environment
3. Database Initialization:
    - When Docker loads, automatically:
        - Import database tables structure
        - Create a default user with password
4. Database Change Monitoring:
    - Every update/insert/delete operation in the database should be logged
    - Implement using Change Data Capture (CDC) with TiDB
    - You must run the TiDB CDC component and configure a CDC task to capture database changes
    - The TiDB CDC component must be included and properly configured in your docker compose.yml file

Ensure the CDC task is automatically started when the Docker environment loads

Part 2: Monitoring & Logging

Requirements:

1. Real-time Data Processing:

   Write a consumer application in Node.js that:

   Consumes database change messages from Kafka

   Processes these changes and logs them

   For each consumed message increase a prometheus counter - tablename, and op (insert/update/delete) should be dimensions
2. Real-time Data Processing:

   Dockerize Elasticsearch, filebeat/logstath or other logs collector tool, prometheus and grafna

   The grafna should be automatically configured:

   a dashboard that contains raw lists of CDC events -from elasticsearch

   and a pie chart - 1 hour updates splitted by operation type (insert/update/delete) - from promethus

Submission Requirements:

1. Complete source code in a Git repository
2. Docker configuration files (docker-compose.yml, Dockerfiles)
3. Database schema and seed files
4. README.md with setup and running instructions
5. The entire project must be runnable with a single command:docker-compose up

Good luck with your assignment!