Fundamentals of System Security
(COMSM0122)

Lab Exercise: Dynamic Systems Design

Scenario

MaxLive is a brand-new streaming subscription service that offers on-demand access to a wide range of entertainment sources, including TV shows, movies, music, and other streaming media. To cater to the diverse needs of its customers, MaxLive has introduced a 3-tier subscription plan, namely basic, standard, and premium. These plans differ in terms of their monthly price, video quality, resolution, and download options.

To stay ahead of the competition, MaxLive has also introduced personalized services that allow customers to customize their streaming experience based on their preferences. Customers can set their preferences for maturity level, playback settings, language, and more.

MaxLive is committed to offering the best possible customer experience. To achieve this, it utilizes analytics to gain insights into customer behaviour such as viewing history, genre preferences, and content ratings. These insights are used to recommend content that is tailored to the individual customer's needs.

MaxLive also aims to differentiate itself from its competitors by supporting its customers to become local content producers. Maxlive is therefore introducing a service that allows customers to upload their own content, including videos and music, and earn money based on the number of views and ratings their content receives.

Objective

You will use above fictional description of MaxLive in the following hands-on lab. The objective is to work in groups of 4-5 to transform MaxLive requirements into a highly-available, resilient and secured microservice system architecture. You will achieve this objective by following Domain Driven Design principles to address tasks listed below.

Tasks

1. Using Domain Driven Design approach, design a microservice system architecture for MaxLive. Each microservice should be self-contained, with clear responsibility for each and identifying their relationships.
2. It is expected that MaxLive customers will come from different countries each having their data protection regulatory authority. Hence, data sovereignty and residency are primary non-functional requirements. Demonstrate how you've used well-defined bounded context in Domain Driven Design to ensure data ownership constraints are preserved.
3. MaxLive is committed to a 99.99% availability in its Service Level Agreement (SLA) with its customers. To satisfy this requirement and minimise system downtime, refactor the architecture in Task 1 using a load balancer. Explain the rationale behind your decision.
4. MaxLive needs to ensure that when any of its services fail due to network or other service issues, then other services do not become inconsistent leading to cascading system failures. Identify critical services in your architecture and refactor the

architecture in Task 3 using the circuit breaker pattern to ensure identified services are fail-safe. Explain the rationale behind your decision.

5. Microservice architecture leverages stateless RESTful protocol for communication with clients and other services. Stateless protocols do not maintain the identity of the calling client during a transaction. The problem is that strict authentication would require the client to reauthenticate each time they access a service. Refactor the architecture in Task 4 to address this problem using API Token Security pattern. Explain the rationale behind your decision.

Deliverables

Submission should be made electronically as a folder containing all deliverables via Blackboard for Lab Exercise 2. Your folder should be the name of your group]. The folder should contain the following:

1. A pdf document containing your answers to discussion Tasks. State the group name and its members including registration number at the top of the document.

One member of a group may submit on behalf of the whole group. A reflective log is not compulsory as this is a formative assessment, but you are encouraged to submit one to help us keep a record of your learning.

Ensure one of the TAs or the course lecturer has reviewed your solutions before the end of lab session.