Final exam
Part 1

[15 minutes]

a. Explain Conways law

b. Explain clearly what Conways law means for a microservice architecture?

a.

> *"organizations which design systems ... are constrained to produce designs which are copies of the communication structures of these organizations"*
>
> *—Melvin Conway*

b. It means that for maximum benefit we have to organize our organization according the structure of the microservice architecture.

[15 minutes]

Suppose we have a microservice architecture with many different services. We also have an app that gets data from these different services. The app runs on both Android and IOS. The problem we face is that when we start this app, the first page on the app needs to show data that comes from 15 different microservices. The time to retrieve all this data from all 15 microservices takes 10 seconds, which is too slow and not acceptable.

The app should get all the required data as fast as possible. It should not take more than 2.5 seconds to retrieve all necessary data. We tried webfux but that did not solve our problem.

What technique did we study that solves this problem? Explain clearly how this would work and how we can load all necessary data on the first page of the app within 2.5 seconds.

The technique to solve this problem is CQRS. One query service contains all information that we need on the first page of the app. This way the app has to do only one call instead of 15. All 15 services publish data changes and this one query service subscribes to all these data changes to keep the data (eventual) consistent

[15 minutes]

What are the 3 main characteristics of a circuit breaker in a microservice architecture.

Fail fast
Fail gracefully
Recover seamlessly

[15 minutes]

Explain clearly how Spring webflux is different than normal REST with Spring

Webflux is asynchronous and non-blocking
REST is synchronous and blocking

[15 minutes]

Kafka uses **event sourcing** for its messages.

a. Explain clearly what this means.

b. Explain clearly why kafka uses event sourcing. What are the advantages.

a. We store the events instead of the state.
b. Kafka can handle multiple producers on the same topic because we only add messages.
Kafka can handle multiple consumers on the same topic because we never delete messages. Every consumer has its own offset.

[20 minutes]

Suppose you have the responsibility to design a microservice architecture for a hotel management system. In the course we learned that next to the business services we need different supporting services in a microservice architecture.

a. Give **all** **supporting services** that you need next to the business services. For every supporting service state in one or 2 sentences what this supporting service does. Note that a supporting service is microservice on itself. You can start and stop it independent of other services.

We also learned about different techniques/libraries that we need inside the business services to solve certain problems. These techniques/libraries run within a business service.

b. Give **all** **the necessary techniques/libraries** that we need inside the business services to solve certain problems related to a microservice architecture. For every techniques/library state in one or 2 sentences what this techniques/library does.

a

- Authentication server
- Config server
- API gateway
- Registry
- Zipkin
- ELK

b

- Ribbon
- Hystrix

[10 minutes]

For securing a microservice architecture we looked at **Oauth2** and **JWT**.

a. Explain the difference between Oauth2 and JWT.

b. What does JWT add to Oauth2/ In other words, why do we need JWT if we have Oauth2?

a. Oauth2 is a token based security standard but does not tell the structure of the token JWT is a token standard

b. In JWT we store the user information within the token and by using a signature the receiver of the token does not need to call the authentication server for user information.