Master Thesis – Dependency-Based Orchestration of a Multi-Version Microservice RAN Application

Background
A typical Radio Access Network (RAN) application designed for cloud deployment consists of many different microservices which each come in different versions. These microservices provide and require different interfaces which also come in different versions. Manually keeping track of all these microservice versions and their provided and required interface versions is a time consuming and error prone task. Therefore, it would be beneficial to automate this as far as possible with the help of a microservice orchestrator, for example in the form of a Kubernetes operator. Based on a given set of new interface versions that the application must provide, the orchestrator could then upgrade the current deployment in the most efficient way, without breaking any dependencies and without requiring any down time, and if needed use multiple versions of the same microservice in the same deployment.

Thesis Description
The following steps are envisioned as part of the thesis work:

- Implement a Kubernetes operator that uses an algorithm for dependency-based orchestration that works based on input that is available in (or is easily made available in) a typical RAN application.
- Create a set of simplified microservices with a pattern of provided and required interfaces similar to a real RAN application.
- Measure and analyze the behavior of the operator together with the microservices and describe any possible trade-offs regarding performance versus achieving the most optimal deployment.

Qualifications
This project aims at students in computer science, computer engineering or similar.

Extent
1 student, 30hp

Location
Ericsson AB Mjärdevi, Linköping

Preferred Starting Date
Spring 2023

Keywords
Microservice architecture, Kubernetes, Mobile Telecommunication

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