Review of Master's Thesis

Student: Hamran Peter, Bc.
Title: Framework for Development and Operation of Cloud Services (id 24791)
Reviewer: Rychlý Marek, RNDr., Ph.D., DIFS FIT BUT

1.   Assignment complexity   **average assignment**

The assignment is of the moderate complexity. Global cloud computing providers, their cloud services and related distributed technologies are well-documented and it is not difficult to design and implement a sample computing application or framework with requested functionality.

2.   Completeness of assignment requirements   **assignment fulfilled**

The assignment has been fulfilled.

3.   Length of technical report   **in usual extent**

The technical report consists of 59 pages from the first to the last chapter, and it is in the usual extent. Also the length and information value of individual chapters are appropriate.

4.   Presentation level of technical report   **65 p. (D)**

The report has a logical structure that addresses the most important topics given by the assignment. While the general structure is ok, an internal structure of chapters could be improved, e.g., in Chap. 4 "Cloud Native Tech Stack", the described technologies could be categorized according their usage in the cloud computing. There is also incorrect information, e.g., in Sec. 3.2 "Microservice Architecture", the author states that service-oriented architecture (SOA) uses just "a single database schema" while the truth is that database schema is a technical term which has nothing in common with SOA and moreover, SOA can easily integrate several database services. The design and implementation of the framework should be done more thoroughly, e.g., the framework lacks a component-based system architecture description, a list of extension points and well-established interfaces, usage patterns, etc. In the ER diagram in Fig. 5.3, page 50, multiplicities and descriptions of relationships are missing.

5.   Formal aspects of technical report   **75 p. (C)**

The technical report is written in English and both grammar and style are very good. Also typographical level of the report is good, despite some minor issues, such as the usage of a hyphen instead of a dash, missing spaces, or the usage of capital letters.

6.   Literature usage   **60 p. (D)**

The bibliography consists of 24 items: mostly online resources of technical documentation or explanations of basic concepts, but also several books and papers, which is satisfactory. The bibliography items are referred from the content of the technical report, however, many of them are used just to adopt figures or to explain particular terms and they are rarely used in the text to indicate the origins of adopted ideas (i.e., as citations). This issue complicates Chap. 2 "State of the art Cloud Computing", where the absence of references in the text is quite surprising as the chapter should describe the state-of-the-art work. There are also some errors in the references (e.g., the reference 13 in the first paragraph of Sec. 32, page 22, should describe Instagram, while the 13th item in the bibliography does not correspond to this). Also formatting of the bibliography list is not correct (missing citation dates for online resources, wrong authors, etc.).

7.   Implementation results   **55 p. (E)**

The student designed a framework for monitoring and management of micro-service applications that are deployed in cloud environments (particularly in Google Cloud Platform). The framework has been utilized in a sample application that was created by the student. While the thesis describes many interesting concepts and technologies for cloud computing, many of them are not utilized by the author (e.g., GraphQL, OpenAPI, or Java technologies) and the framework and the application are just simple Python/Django (back-end) and React.js (front-end) based web applications that, besides running in Docker containers, are not ready for distributed cloud environments (no scalability and high availability, the usage of SQLite as an embedded database instead a distributed one, etc.). Also design of the framework is not sufficient (missing template architecture, extension points and interfaces, usage patterns, etc.).

8.   Utilizability of results

The implementation result, neither the framework nor the sample application, is not, in my opinion, usable in practice and also cannot be used as a use-case or a proof-of-concept for technologies and approaches described in the first part of the thesis.

9. Questions for defence

- In Sec. 3.1 "Monolithic Architecture", you are using two terms quite freely, "layers" and "tiers", however, they usually have exact meaning in software engineering books and papers. Explain these terms in the context of cloud applications and your thesis and explain also how they relate and how they differ.
- Describe which concepts presented in the theoretical part of the thesis (besides the micro-service architecture) are utilized in your framework and the application and how.
- How the framework (and the software artefacts that you submitted with the thesis) can be applied or reused to develop application for cloud computing platforms?

10. Total assessment
60 p. satisfactory (D)

The result of the thesis is an interesting technical report with minor issues and a good, yet unorganized and sometimes confusing overview of cloud service technologies and concepts. The software product is not much usable as it is quite simple and does not demonstrate the presented concepts sufficiently. Still, the overall result is not bad and the thesis can be graded as **satisfactory (D)**.

In Brno 1 June 2022

Rychlý Marek, RNDr., Ph.D.
reviewer