INTERNSHIP REPORT

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Latency and Fault Tolerance: An Analysis of Mutual Exclusion Algorithms in Distributed Systems

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Chapter 1

Introduction

1.1 Motivation

More and more the current trend of software development is that of a departure from monolithic architecture to that of microservices this is done for scalability and flexibility. Yet despite all the benefits that microservices that brings this shift in paradigm also brings with it a host of distributed system complexities.

However, there is still a lack of tooling to help with quality assurance

1.2 Overview

Chapter 2

Presentation of the company

Forschungsgruppe für
Netzwerksicherheit, Informationssicherheit und Datenschutz

FRANKFURT UNIVERSITY OF APPLIED SCIENCES

The Network Security, Information Security, and Data Protection Research Group operates under the astute leadership of Prof. Dr. Kappes. The group's principal focus is on the research and development of advanced network security solutions for future generations. In addition to theoretical research, the group also offers practical solutions to third parties, including private companies and governmental agencies.

During this research period, I have the privilege of working under the supervision of Lukas Atkinson (M.Sc.), with additional support from Prof. Dr. Kappes. Our collaboration is entirely virtual, involving 2-3 meetings per week to discuss current progress and to exchange ideas and guidance

Chapter 3

Applied Technologies

Overall the technologies used in the internship's project can be divided into three categorizes: Prototyping, Testing, and Data visualization

3.1 Prototyping

3.1.1 Distributed System

3.1.2 Python

Python is a high level interpreted language, it is dynamically-typed, and garbage-collected. The reason for python being chosen because it eases of development stemming from python easy to read syntax and conciseness. Also, because there are state-of-the-art testing frameworks such as hypothesis and other data visualization such as Matplotlib that is widely used and documented make python the most well suited option for this project.

3.1.3 HTTP

Since the scope of the internship investigation is about HTTP communication and to mimic most closely to real life production scenario HTTP is chosen as the main communication protocol between the nodes in the system, more specifically we will be using HTTP/2 with TCP as the transport layer.

HTTP functions in a request response manner to the in the client-server model, in which a client will make a request to the server and awaits for a response from the server, all participants can include in their request or response an optional payload which in this project is encoded in the JSON format.

3.1.4 Flask

3.2 Testing

3.2.1 pytest

3.2.2 hypothesis

Chapter 4

Distributed Mutex Algorithms

4.1 Token Ring

4.2 Ricart Agrawala

4.3 Maekawa

Bibliography