

Measuring Context Switches in Serverless Environments

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Abstract

Todo

1 Introduction

In this work, we aim to answer the following research questions:

- 1.
- 2.

2 Background

2.1 Serverless environment

2.2 Context switches

3 Methodology

3.1 Challenges

Measuring the context switch time in serverless functions has several challenges:

- C1 Characteristics of context switch in serverless environments Context switch is triggered differently in serverless functions compared to in traditional operating systems as it's scheduled by the cloud provider. And the service provider has the tendency to trigger more functions in the same hardware to get more profits. Thus, context switch may happen not only due to performance factors like multi-threading/processing, but also provider's profit considerations.
- C2 Benchmark accuracy As no such benchmark is provided so far, we have to analyze the factors in our own benchmark that may lead to the potential variation to golden value, in order to reason about the accuracy of the measurement.

C3

3.2

To tackle C1, we design the following experiments to analyze the factors influencing context switch in serverless environments. We measure the execution time elapse between two adjacent lines of code repeatedly under different configurations in serverless functions. These configurations include Theoriotically, the measured time elapse should be 0 as there is not execution between these two lines. However, our initial experiments show that this is neither 0 nor a fixed value, indicating that interruption happens between these two lines and the time elapse changes with different configurations. Although the interruption is not limited to context switch but also page faults handling or container management, it can still provides insights in the influence of different configurations on context switch time in serverless environments.

3.3 Combine various benchmarks

To tackle C2, we first run our own designed benchmarks on local Linux system and compare the results with published benchmarks [1–4], ensuring the correctness of the proposed ones. Then we deploy the new benchmarks in serverless functions and compare the results. If one of the benchmarks is consistently higher or lower than others, then we'll explore the reasons and this can help us improve our accuracy.

The previous benchmarks in context switching on Linux system mainly consider Our initial study to C1 finds that context switch in serverless environments will also be influenced by We designed the following benchmarks based on prior work.

- 1.

4 Experiments

4.1 Experiment setup

4.2 Measuring local context switches

4.3 Measuring context switches in the cloud

5 Discussions

5.1 Limitations of our Experiments

5.2 Future work

6 Related Work

References

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