Master's Thesis Evaluating MicroVM usage in Open Source Serverless Platforms

Context

Serverless computing offers a range of advantages over traditional cloud computing models. For instance, relieving developers from operational tasks such as resource management and planning while enabling new properties such as high elasticity, pay-per-use pricing, and fully managed application runtimes. In particular, the emerging model of Function-as-a-Service (FaaS), where developers write small functional blocks of code that run in response to events, is rising in popularity.

State of the Art & Problem

FaaS is originally backed by OS-Level Virtual Machines (Containers). However, the limited degree of isolation with this approach can pose a security risk. Therefore, the concept of MicroVMs was introduced, using small fully virtualized machines that promise to be as lightweight as Containers. The concept is leveraged by Amazon for its commercial FaaS offer AWS Lambda through the Firecracker virtualization stack. Even though initial efforts to create a Docker-like environment based on MicroVMs like, e.g. Weave Ignite, exist, open-source FaaS solutions currently make no use of it. Therefore, it is difficult to evaluate the differences between Container- and MicroVM-based FaaS solutions.

Thesis Topic & Goal

In this thesis, we want to investigate how FaaS platforms can use MicroVMs instead of Containers and evaluate the resulting quality implications. We are particularly interested in how MicroVMs can be integrated into an open-source FaaS environment and how a FaaS provider is impacted by adding this feature.

Skills: Linux, Virtualization/Container, Serverless Computing, Benchmarking

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Our Mission:
Our lectures cover fundamental methods and techniques in the areas of service computing, cloud computing, and enterprise computing. We like to engage students in hands-on building of distributed information systems and to take an interdisciplinary approach to evaluating such systems. Through a close mentoring of students, especially in our seminars, we aim to introduce students to our ongoing research and to excite them to do future studies and research with us.

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