Master's Thesis

Job Budgets for Serverless Big Data Processing

Serverless Big Data processing (SBDP) executes jobs on top of cloud platform services, e.g., FaaS. Recent publications indicate that SBDP can provide high scalability and performance with good cost-efficiency. As a consequence, SBDP has a high potential to become a valuable tool for data analysts.

Due to exceptional scalability and elasticity, the execution of a single job can generate significantly high bills in a few minutes. At the same time, the costs of a job are commonly unknown before execution. Therefore, it becomes easy for a single analyst to break cost budgets in a short time, by executing a set of costly jobs, e.g., during the initial exploration of a large dataset.

To provide cost control, cloud providers commonly enforce an upper bound to the number of computing resources that can be provisioned by a single cloud user at the same time, e.g., the number of services functions that can be executed in parallel. Depending on the configured limits, this approach potentially (i) delays job execution or results in failed jobs or (ii) does not provide the desired cost control. As a consequence, we argue that such an approach is insufficient.

In this thesis, you propose a novel approach for budget control in SBDP on a per job level. This includes the detection of current aggregated execution costs at runtime that is matched against a job budget. Furthermore, you propose mitigation approaches for handling exceeded budgets, e.g., send a notification, pause and resume after approval through a manager.

You evaluate the approach by implementing a prototype using matrix multiplication as an example of an SBDP job.

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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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