Beyond Microbenchmarks
The SPEC-RG Vision for
A Comprehensive Serverless Benchmark

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Exploring community-wide (performance) challenges in serverless computing.
Outline

1. An introduction to serverless computing.
2. Their current state and challenges.
3. Motivations for a (new) serverless benchmark.
4. Goals and design of the benchmark.
5. Roadmap

Serverless computing is in a desperate need of more benchmarks, which require your expertise.
Decomposing cloud applications

Cloud users: reduce (complex) operational logic

Logic related to QoS of the application

Business Logic

Logic directly related to use case of the user

Operational Logic

Cloud providers: improve resource utilization
Serverless Computing

1. Minimal operational logic
2. Granularly billed, by usage
3. Event-driven executions

Function-as-a-Service (FaaS)

- A form of serverless computing
- User provides a function (source)
- Cloud provider deploys and manages the function

Function-as-a-Service Market estimated to be worth $7.72 Billion by 2021

Adoption of FaaS (AWS Lambda)

Gartner 2017 Function-as-a-Service is one of the top trends in cloud computing.

Source: The New Stack Analysis of a February 2017 survey of 500+ IT professionals (https://newrelic.com/content/dam/newrelic/resources/ebooks/cloud-survey-report-ebook.pdf). Static Cloud: Public cloud used to some extent but applications are managed like before. Dynamic Cloud: A significant portion of strategic workloads are run in the public cloud and the enterprise is able to agilely re-allocate resources.

https://www.marketsandmarkets.com/Market-Reports/function-as-a-service-market-127202409.html
Serverless computing refers to a new model of cloud native computing, enabled by architectures that do not require server management to build and run applications. This landscape illustrates a finer-grained deployment model where applications, bundled as one or more functions, are uploaded to a platform and then executed, scaled, and billed in response to the exact demand needed at the moment.
Key problem: how to compare FaaS platforms?

Conceptually

Functionally

Architecturally

Performance-wise
Challenges of benchmarking FaaS platforms

1. Performance requirements
2. Opaqueness of the systems
3. System heterogeneity
4. Complex ecosystems
The need for yet another serverless benchmark

Prior performance evaluation studies exist, but tend to use microbenchmarks to focus only on...

1. Hardware-resource performance
2. Start-up latency
3. Concurrency and elasticity

Focus on cost

Support open-source platforms

Realistic applications

Evaluate external service integrations

Serverless benchmark design
Roadmap and future work

- First version of benchmark
- Add more (OSS) platforms
- Explore platform aspects
- Realistic applications

Data-intensive workloads
GDPR-compliant workloads
Other serverless models
Serverless computing is (still) in a desperate need of more benchmarks, which require your expertise.
Interested in serverless computing? Join us!

https://research.spec.org/working-groups/rg-cloud.html

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Additional Slides
Challenges of benchmarking FaaS platforms (2)

Motivating experiments: performance and cost differences are non-negligible.
Evolution of cloud application architectures

Monoliths

(Micro)services

FaaS
High-level goals (and non-goals) of the benchmark

- three pillars
- metrics

Add ref arch figure

Scope of the serverless benchmark (2)

Event propagation

Software flow

Cold starts

The goal of SPEC RG CLOUD - Serverless

Contributing to a deeper understanding of serverless and FaaS architectures, with a focus on performance (evaluation).

2017 - Initial exploration of serverless concepts [1]

2018 - Further exploration of serverless performance [2]

2019 - Reference architecture for FaaS platforms [3]

2020 - Use case survey and serverless benchmark
Further reading

Second International Workshop on Serverless Computing (WoSC@Middleware 2017)

9th ACM/SPEC International Conference on Performance Engineering (ICPE 2018)

IEEE Internet Computing (Nov/Dec issue, 2019)