

Practical Cloud Workloads for Serverless FaaS

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ABSTRACT

Serverless computing is gaining popularity with the Function-as-a-Service (FaaS) execution model. Without incurring overheads involved in provisioning cloud instances and with high availability and scalability, serverless computing allows developers to focus on implementation of core application logic using other well-developed cloud services. By abstracting the complex resource management task, serverless computing opens new opportunities for the cloud service adoption even to non-cloud experts [2]. With the popularity, many research results have been published using the FaaS execution model. They include investigation of serverless computing opportunities [1], proposing new serverless applications, function run-time optimization, and public service comparison. Without a common test benchmark suite, authors in the previous work had evaluated proposed systems using fairly simple FaaS applications, such as micro-benchmarks that emphasize specific resources exclusively, e.g., CPU, disk I/O, and network. However, such simple workloads do not represent realistic FaaS system applications, and the evaluations might not compare proposed systems appropriately.

To overcome the limitation of lacking a comprehensive benchmark suite for the serverless computing and FaaS execution model, the authors create *FunctionBench* that provides various FaaS workloads that are ready to be executed on public cloud function execution services - AWS Lambda, Google Cloud Functions, and Azure functions¹. Since the inception of serving the FaaS workloads, we keep working to expand the supported applications and add scenarios in big-data processing, back-end web applications, and security. To represent big-data applications, we add a *MapReduce WordCount* workload, which counts the number of occurrences of each word in a given partitioned input dataset from Wikipedia. To cover web back-end applications, we add *Chameleon*. The application renders a template using the Chameleon module in Python PIP library to create an HTML table of N rows and M columns that are provided as input arguments. Another web-related application is JSON serialize-deserialize module. The application performs JSON deserialization using a JSON-encoded string dataset (*Awesome JSON Dataset*) downloaded from a public object storage service, and it serializes the JSON object again. To represent security-related applications, we add *Pyaes* benchmark that performs private key-based encryption and decryption. It is a pure-Python implementation of the AES block-cipher algorithm in CTR mode. We also add *gzip-compression*

¹<https://github.com/kmu-bigdata/serverless-faas-workbench>

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SoCC '19, November 20–23, 2019, Santa Cruz, CA, USA

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ACM ISBN 978-1-4503-6973-2/19/11.

<https://doi.org/10.1145/3357223.3365439>

Table 1: Newly added workloads in *FunctionBench*

Application	Name	Amount of Load			
		CPU	RAM	Disk	Net.
Bigdata	MapReduce	H	H	M	M
Web	Chameleon	M	M	-	-
	JSON	M	M	-	H
Security	pyaes	H	H	-	-
Media	Image	M	M	L	L
	Video	H	H	M	M

benchmark to represent realistic disk IO-heavy applications. The degree (High, Medium, Low) of resource usage characteristics of newly proposed applications are summarized in Table 1. Please refer to [3] to read the description of comprehensive applications list.

The proposed *FunctionBench* provides a variety of FaaS applications in multiple categories, and we are sure that it will enable fair evaluation of new research work in the relevant field with practical application scenarios.

CCS CONCEPTS

• Networks → Cloud computing; • Computer systems organization → Cloud computing.

KEYWORDS

serverless, faas, workload, benchmark, cloud computing

ACM Reference Format:

Jeongchul Kim and Kyungyong Lee. 2019. Practical Cloud Workloads for Serverless FaaS. In *ACM Symposium on Cloud Computing (SoCC '19)*, November 20–23, 2019, Santa Cruz, CA, USA. ACM, New York, NY, USA, 1 page. <https://doi.org/10.1145/3357223.3365439>

ACKNOWLEDGMENTS

This work is supported by the National Research Foundation of Korea Grant funded by MSIP (NRF-2015R1A5A7037615), the IITP (2017-0-00396), and the AWS Cloud Credits for Research program.

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