

A serverless computing framework based on Kubernetes for applications in the IoT domain

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The enormous growth of the Internet of Things (IoT) has led to an exponential increase in the processing of data at the edge. Serverless computing, sometimes also referred to as Function-as-a-Service (FaaS) is a technology in its nascent stages that removes the necessity of having to have active infrastructure all the time. It uses ephemeral containers for providing stateless and real-time applications without the need to maintain infrastructure. Public cloud providers have serverless platforms, such as Amazon's Lambda, Google's Cloud Function, and Microsoft's Azure Function. While they have advantages in terms of improved development speed and reduced cost, they result in a vendor lock-in with the cloud provider. To get over this, open-source serverless computing frameworks have been introduced but these have not been tested in a constrained environment such as that of an IoT setting.

This research focuses on building a prototype serverless framework based on Kubernetes and how it needs to adapt to payloads for applications in the IoT domain. The prototype uses Docker images containing functions to be executed and spins them up as Kubernetes pods based on IoT event triggers. Further to the implementation of the framework, the major point of research is to look at how the framework scales depending on the traffic from the IoT devices. The framework is loaded using traffic from Apache JMeter to measure pod creation and execution duration for 1, 20, 50 and 100 pods. Multi-node clusters using 3 Kubernetes nodes and 5 Kubernetes nodes is also evaluated and this shows a decrease in latency for creation and execution of functions.