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AALBORG UNIVERSITY

STUDENT REPORT

Title:

Orchestration on the Edge: Exploring Kubernetes for Edge Computing

Theme:

Bachelor of Science Thesis

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ITCOM 6.10

Participant(s):

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<https://github.com/jb-ba>

[https://cloud.docker.com/u/jbba/
repository/list](https://cloud.docker.com/u/jbba/repository/list)

Abstract:

By 2025 the vast amount of data will be produced by devices belonging to the Internet of Things (IoT). These devices are integrated into everyday objects and enable new technologies, like autonomous cars and factories. If these devices were to send their data directly to the cloud, it could topple not just individual servers but the entire system.

Edge computing is the proposed solution to this problem. In edge computing the gateway the IoT devices connect to forms an active part in the data processing pipeline. New system architectures emerged tightly coupling the edge resources to resources in the cloud. But outsourcing business logic to the edge comes with its challenges. The gateways, notoriously known for bad updates and a vast heterogeneous environment, now need to be standardized and orchestrated.

The purpose of this thesis is to show how Kubernetes, the de-facto standard for cloud orchestration, can help with orchestration and management on the edge. It will explain important Kubernetes resources and concepts in connection to the edge and provide an exemplary implementation of a Kubernetes orchestrate cloud connected edge system.

The thesis finds that Kubernetes on the edge is not yet ready for production purposes, but it is close. Standards for the edge need to be developed and the edge needs to become a first class citizen in the Kubernetes development. New initiatives clearly show that the industry is committed to this goal and that Kubernetes has good chances to become the de-fact standard for edge orchestration.

Keywords:

Kubernetes, Internet of Things, IoT gateway, Orchestration, Containers, Cluster computing, Raspberry Pi, Edge Computing, Cloud computing

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