# Master's Thesis

Impact of dynamicity while placing multi-resolution sensor logs in a cloud-fog topology

There are two general options to provide access to data generated by IoT devices: (1) real-time pub/sub subscription-based delivery; (2) on-demand access to long term storage. Append-only logs are a promising approach to both cater subscribers that can read real-time data at their own pace, as well as consumers requesting historic data. If, additionally, the logs just have a single write, they can also be easily replicated across cloud, fog and edge devices, making data more resilient and improving latency.
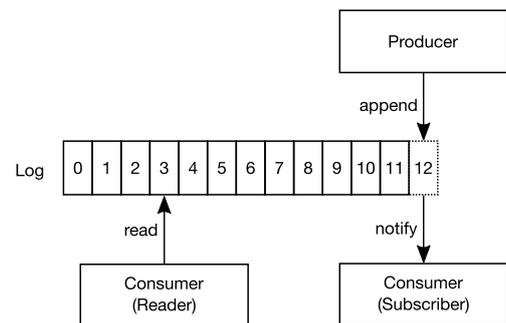
It is, however, not clear how to determine the best placement of those logs in a giveen topology, when demands rapidly change or request pattern move from publish/subscribe to a workload dominated by request/response interactions. Additionally, it is infeasible to store IoT data indefinitely in full resolution across all of those devices, which makes the problem even more challenging. Therefore this thesis should explore the impact of the dynamicity on the placement of replicas of different resolutions of the data across the network.

■ Goals of the Thesis

This thesis will have to outline different approaches of coping with the dynamicity in the placement of mutli-resolution sensor logs across a cloud and fog topology. One approach that is to be considered is deploying proxy logs and replicating full or partial logs based on statistics gathered at those probing proxies. To evaluate the appraoch, realistic network-level simulations are to be carried out, preferably in the Omnet++ framework. The thesis will then analyze the performance in term of traffic and delay of this approach in comparison to more simple heuristics, for instance the exclusive placement in the cloud. In particular, the thesis should be able to show the impact of dynamicity on the quality of the placement decision.

■ Keywords

Network Simulations, Cloud Computing, Fog Computing, IoT

[1]   D. Happ, S. Bayhan, and V. Handziski, "JOI: Joint Placement of IoT Analytics Operators and Pub/Sub Message Brokers in Fog-centric IoT Platforms," *Future Generation Comp. Sys.*, 2020, under review.

[2]   D. Happ and S. Bayhan, "On the Impact of Clustering for IoT Analytics and Message Broker Placement across Cloud and Edge," in *15th ACM European Conference on Computer Systems (EuroSys 2020), 3rd ACM International Workshop on Edge Systems, Analytics and Networking (EdgeSys 2020)*, Irákleion, Greece: ACM, Apr. 2020.