Dynamic Adaptation of Cooldown Period for Auto Scaling of VNFs

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Introduction

- Recently, network operators and data centers have moved towards Virtualization of Network Functions (VNFs).
- An Auto Scaling Entity (ASE) monitors the load on the VNF and scale up services depending on the usage of the VNF instance.
- ASE checks the load at each time interval called monitoring period and the VNF needs to wait for cooldown period to ensure that scaling action takes place.
- Existing algorithms, used by the operators to scale the VNFs, use a static cooldown period.
- We propose an algorithm with the dynamic adaptation of cooldown period for scaling of the VNF.

Simulation

- We generate number of HTTP requests based on poisson distribution model to a docker acting as an HTTP server and then, monitoring the CPU utilization of the docker.
- We compare the performances of both the algorithms in terms of number of instances instantiated and number of monitoring requests made over time.

Conclusions

- We conclude that the proposed algorithm is better than the existing approach, where unnecessary scalings are avoided.
- This is because the proposed algorithm checks the utilization at short and regular intervals. This enables the ASE to take the decision at the time when scaling is actually needed.
- However, the proposed algorithm induces an overhead in terms of monitoring requests to CPU.
- As future work, we will try to apply machine learning models to predict the behaviour of traffic to take effective scaling decisions.

Algorithms

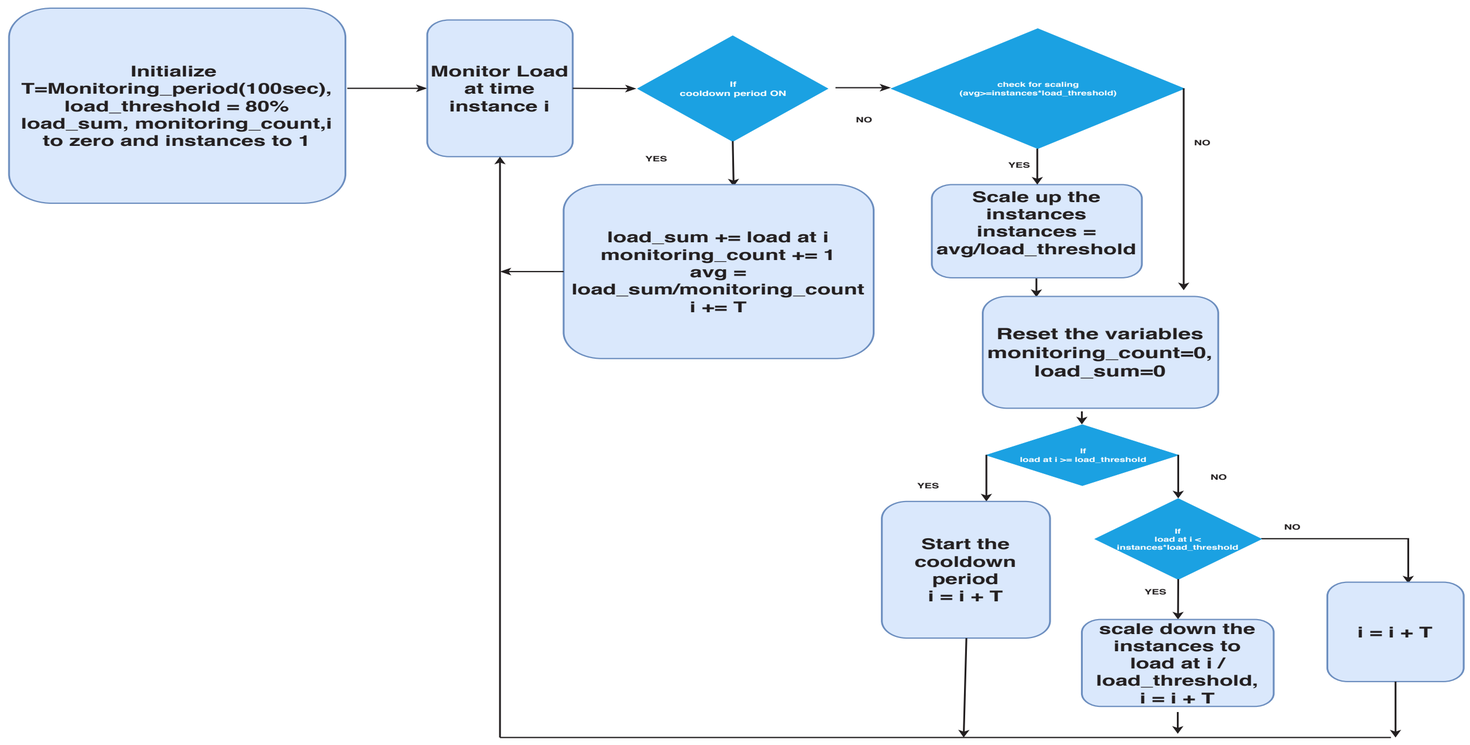


Fig. 1: **Existing Scaling Algorithm.**

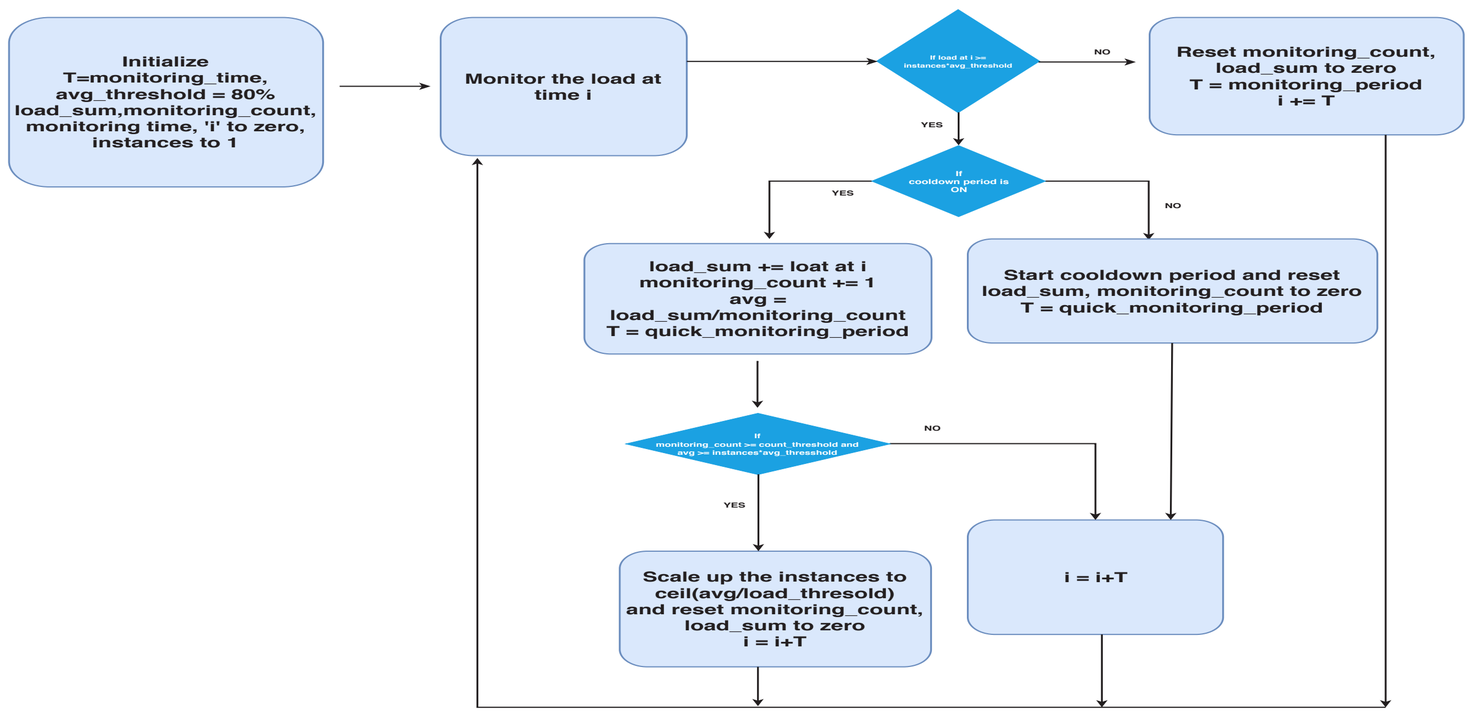
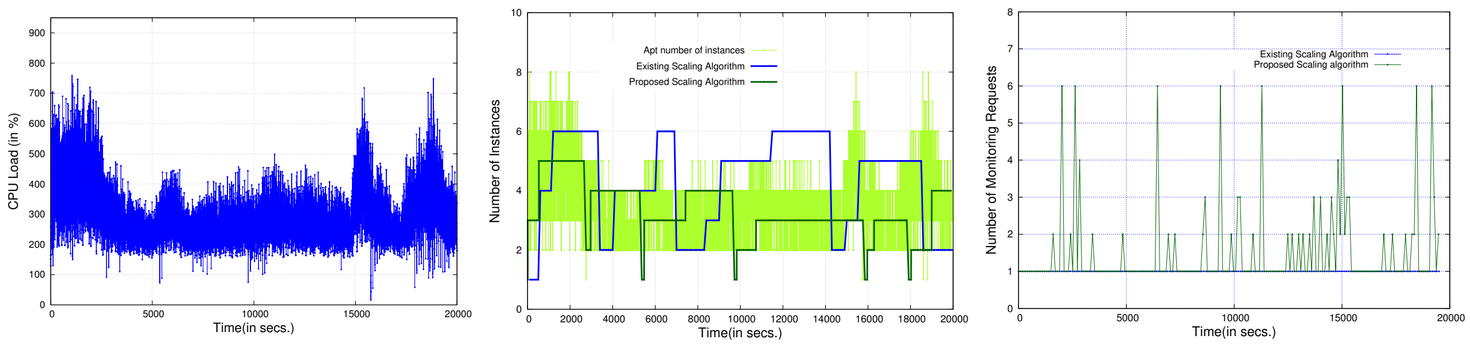


Fig. 2: **Proposed Scaling Algorithm.**

Results



(a) **CPU util. of docker.** (b) **# Active instances.** (c) **# Monitoring requests.**

Fig. 3: **Evaluation of the proposed algorithm**

- Fig. 3 (a) shows the CPU load pattern on the server, on which we test the algorithms.
- Fig. 3 (b) shows how do both algorithms react to traffic. The proposed algorithm uses less number of instances at the times when less number should have been used, and vice-versa.
- Fig. 3 (c) shows number of CPU monitoring requests made in each interval. A total of 200 and 394 monitoring requests have been made by existing and proposed algorithm respectively.