LOW LATENCY SCHEDULING FOR DELAY SENSITIVE APPLICATIONS

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INTRODUCTION

In today's world, Internet of Things (IoT) is developing rapidly. Wireless sensor network (WSN) as an infrastructure of IoT has limitations in the processing power, storage, and delay for data transfer to cloud. The large volume of generated data and their transmission between WSNs and cloud are serious challenges. Fog computing (FC) as an extension of cloud to the edge of the network reduces latency and traffic; thus, it is very useful in IoT applications such as healthcare applications, wearables, intelligent transportation systems, and smart cities. Certain delay sensitive applications require low latency, to address this we introduce a number of scheduling algorithms. Our proposed method was simulated in iFogsim(simulator) as a standard simulator for FC. We compare the benefits of different scheduling algorithms First-Come-First-Serve (FCFS), Priority Scheduling, Priority Scheduling based on threshold. We review the scheduling strategies and parameters as well as providing a knapsack-based scheduling algorithm for allocating resources appropriately to modules in fog network. Application that uses knapsack algorithm performs 3.6 times better in terms of latency and decrease in network usage by 92% than that of FCFS algorithm.

METHODOLOGY

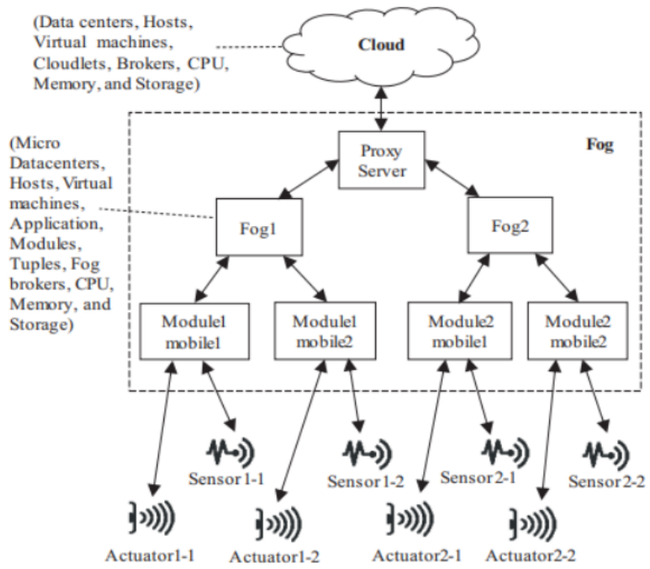

Fig.1 Fog Computing Architecture

FLOW CHART

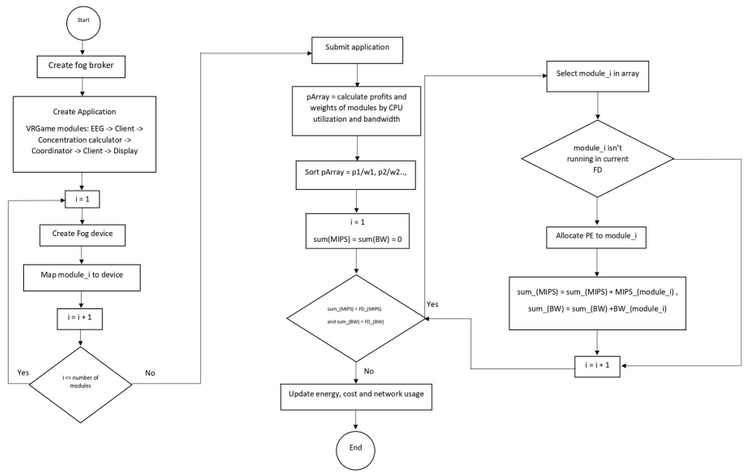

Fig.2 Flow chart of Knapsack Algorithm

RESULTS AND DISCUSSION

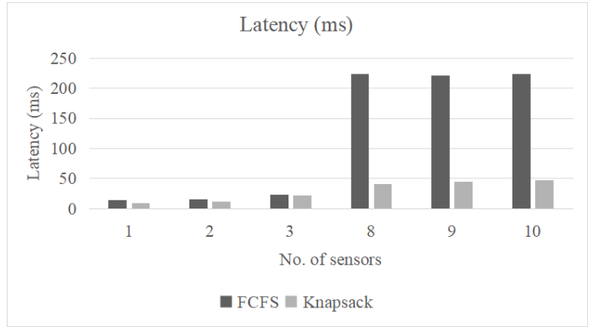

Fig.3 Latency Comparison

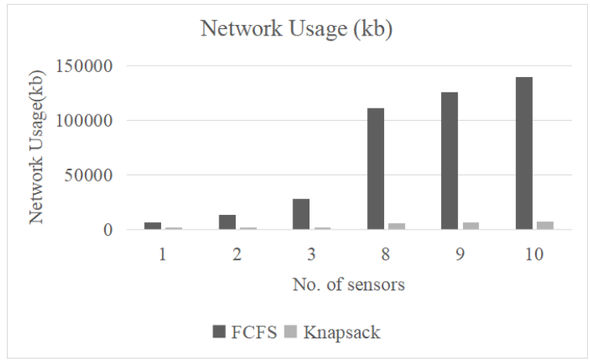

Fig.4 Network Usage Comparison

From the results, it is found that some algorithms perform better for execution time and some perform better cost-wise. Depending on the requirements of the system, one can choose priority scheduling for quicker execution or one can choose knapsack algorithm for low latency.

CONCLUSION

Many IoT devices process lot of data and request need to be handled with as less delay as possible. Fog layer takes care of this as it is placed between client and the cloud layer. It brings the cloud environment physically closer to the client. Fog computing provides lower communication latency and computing capacity closer to the final user. We show that scheduling strategies can be designed to cope with different application classes according to the demand coming from users, taking advantage of both the fog proximity to the end user and the cloud computing elastic characteristic. Thus using knapsack algorithm, we have reduced latency by 3.6 times and network usage by 92% when compared with FCFS algorithm.

REFERENCES

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