A Study on Task Scheduling in Mobile Cloud Computing

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ABSTRACT

In mobile device, the resources such as computation, storage, power are limited. Quality of Experience (QoE) of user in these limited resource mobile device is not satisfied. Mobile cloud computing is a new computation paradigm to increase Quality of Service (QoS) of mobile applications by scheduling the offloaded tasks into the cloud. The scheduling of tasks is done in four architectures of mobile cloud computing. Two types of scheduling are done with lot of constraints such as data transmission, task dependency and cost etc. Different scheduling techniques are developed to improve the QoE of mobile users.

Keywords : Mobile cloud computing, Task Scheduling, Task Offloading and Quality of Service.

I. INTRODUCTION

In mobile device, large execution time tasks are consuming large amount of computation, energy, memory in mobile device. These tasks take long response time. The response time and execution time [1] can be reduced by splitting and offloading the tasks in the cloud environment. The cloud has a lot of computation and storage resource. These offloaded tasks are scheduled to different architectures. There are different conditions such as cost, ownership and bandwidth considered while scheduling. Different scheduling schemes are developed to i mprove the Quality of Experience of users.

II. TYPES OF MOBILE CLOUD ARCHITECTURES

There are different mobile cloud architectures depends on the availability of resources. The first architecture is offloading the task to cloud centers such as MAUI and CloneCloud [2]. Fig 1 shows the mobile scheduling task to cloud data center and get the result. Fig 2 shows the cloudlet [3] architecture

that will schedule the tasks to the local device with less computational capability. Communication delay is not there because the cloudlet architecture is very near to mobile device.
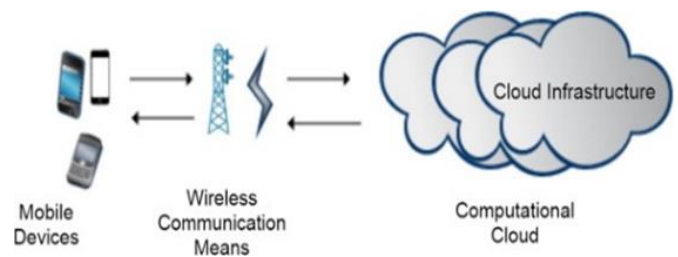

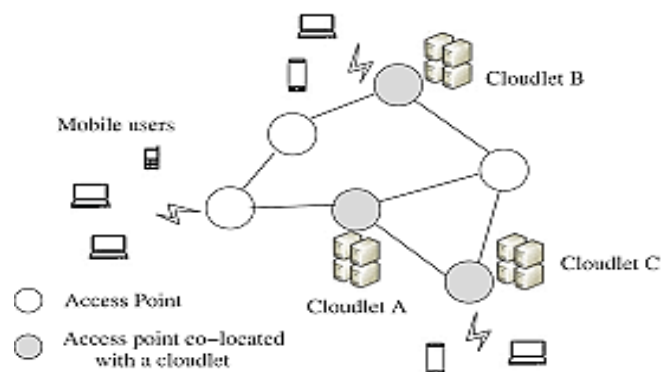**Figure 1.** Scheduling tasks to cloud data center

Figure 2. Mobile to Cloudlet Architecture

Figure 3 shows the mobile device cloud architecture such as Misco and Virtual Cloud [4]. In this architecture, the mobile device schedule the tasks to other mobile devices. Synchronization is needed between the mobile devices. It consists of servers and mobile devices. All devices are connected through network. Figure 4 shows hybrid mobile cloud computing architecture. Its infrastructure is less. Energy consumption and latency is reduced because nearby mobile devices are used. The idle resource of other mobile devices is effectively used in this architecture.
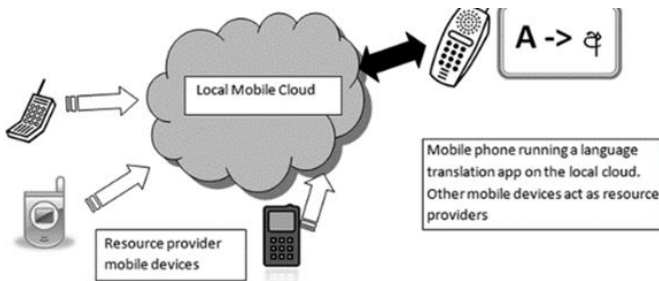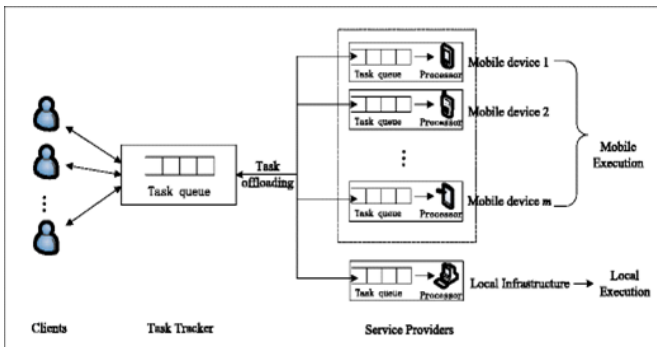

Figure 3. Mobile Device Cloud Architecture

Figure 4. Hybrid MCC Architecture

III. SCHEDULING ALGORITHMS

A. Task Level Scheduling Algorithms

There are two types of task level scheduling algorithms. Independent task scheduling and collaborative task scheduling. Independent task scheduling algorithm is divided into scheduling algorithm with time constraints and without time constraints. In collaborative scheduling algorithms,

tasks are executed one after another. Scheduling algorithms are designed to improve Quality of Experience to mobile users by reducing energy consumption, deadline completion within time, optimizing execution time, increasing profit and load balance.

B. System Level Scheduling algorithms

System level scheduling algorithms are divided into various types based on hardware resources. Some type of scheduling algorithms is designed to increase battery life, energy consumption by managing power and voltage level for decreasing monetary cost.

C. The techniques used scheduling algorithm

These scheduling algorithms are first converted into mathematical problem such as optimization and NP hard problems [5]. This problem is represented in the form of Direct Acyclic Graph (DAG). Then it is solved by using some existing concepts in their development. Initially, they use ant colony optimization and greedy algorithm [6] to solve the problem and later it will be improved. They consider some constraints such as deadline, time constraints, profit, cost, battery life and energy consumption [7].

IV. CONCLUSION

Mobile cloud computing is an emerging paradigm. Almost all desktop applications are implemented as mobile device applications which require large energy consumption. Moreover, Mobile device has limited infrastructure with less battery, CPU power and memory, small screen. So, many techniques are being developed to execute these applications in mobile devices which has limited infrastructure. The techniques are offloading and scheduling etc. New methods are being developed in these two techniques to maximize the profit, minimize the battery level in different mobile cloud architectures

V. REFERENCES

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