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SCHEDULING PROBLEMS FOR MOBILE CLOUD COMPUTING

Nowadays the popularity of mobile devices is rapidly increased. New facilities of them (Wi-Fi, GPS, high speed processors etc.) allows to improve mobile applications in commerce, learning, gaming, health monitoring, sports etc. But really there are several reasons that limit mobile computing: limited storage capacity, limited battery life and limited processing power of mobile devices.

This paper is dedicated to Mobile cloud computing (MCC). We consider MCC as combination of mobile and cloud computing where both data storage and data processing are performed outside the mobile device but inside the cloud [1].

We analyze the following main components and their features of MCC, such as:

Mobile network

Internet service

Cloud service

Scheduling is one of the important factors in progress MCC. Scheduling methods can be divided into three categories: workflow, task and resource scheduling. In this paper we discuss all these categories and focus on task scheduling. Then we consider taxonomy of task scheduling for mobile cloud computing. We classify all methods by following characteristics:

Dynamic, static or hybrid dynamic + static;

Independent of dependent tasks;

Homogeneous or heterogeneous mobile nodes;

Heuristics types: cluster, genetic, list and duplication

We consider advantages of dynamic+static methods for heterogeneous mobile cloud computing with list scheduling heuristics. We discuss the main optimization criterions for MCC scheduling methods, such as minimization of execution time; maximization of

resources effectiveness; minimization of energy with given limits to completion time. In this paper we will focus on scheduling with last optimization criterion. Firstly, we analyze a directed acyclic graph (DAG) that uses as task graph for mobile applications. DAG includes set of task nodes and edges set that defines dependencies between tasks. Each of nodes has set of weights that correspond to execution times and set of energy consumption for different mobile resources. Each of edges also has set of weights that correspond to communication cost for mobile resources. Then we analyze one of the most effective scheduling approach for MCC [2], that combines dynamic and static technique.

We propose the development of this approach based on the static algorithm improvement. The progress of static approach for MCC is in following:

using of list scheduling;

prioritization for DAG nodes is based on b-level with average values of computational and communication costs, such as in paper [3];

allocation procedure use performance of cores, data transfer time and energy consumption.

All results of this paper can be used for MCC scheduling methods improvement.

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