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New Method to Use Idle Personal Computers for Solving Coherent Tasks

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Abstract

In this paper authors offer the new method for solving coherent tasks in distributed computing system, based on resources of personal computers. Parameters of such resources are dynamically varying and that makes it hard for their application in distributed computations. To achieve ability of effective usage of personal computers, proposed method uses multiagent approach: proactive agent controls every personal computer in distributed computing system, and process of task solving is dispatched decentralized by interactions of agents. To solve every incoming coherent task agents of the system unite into community and that makes it easier to dispatch and perform computations. The main benefit of proposed method is decreasing the price for creating and maintenance of distributed computing system.

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1. Introduction

The idea of using distributed personal computing resources for solving complex tasks appeared more than thirty years ago, but only about ten years ago due to progress in global and local networking different

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organizations begin to use distributed computing systems (CS) based on such resources. At first it were GRIDs proposed in early 2000s [1]. Today, the relevance of such systems grows, powered by a progress of both networking and personal computers.

While analyzing some widely spread distributed CS [2][3] we noticed that majority of them have limitations: part of such systems can solve only easily decomposing non-coherent tasks and other part can be based only on a set of similar dedicated computing nodes. However, today networks connect many personal computers and almost all such computers are not fully loaded all the time.

The main problem of using such personal computers (PCs) in distributed CS is varying of their parameters (such as performance and so on) any moment due to their owners actions. Another problem is probability of coexistence of many different PCs in one distributed CS. All that makes the process of effective distributing and solving of tasks very complicated.

Solving coherent tasks in such distributed CSs based on private PCs collaboration is considerably more difficult task. Today effective loading of a distributed CS while solving coherent tasks is a challenge [5]. However, solving such tasks in case of varying of parameters of PCs dynamically changes is even harder, that is why creation of new method of organizing of distributed computation of coherent tasks is very important task.

2. New method of solving tasks in distributed computing system based on personal computers

This new method is based on multiagent approach [6] and collective decision-making principles [7]. In the proposed method of distributed CS organization, we try to avoid dedicated servers and to make a decentralized organization of the distributed CS [8]. Every PC of distributed CS has proactive agent software installed. Interaction between program agents of the system realizes process of dispatching of task solving.

The first problem we faced appeared because distributed CS can consist of different set of PCs any moment. That is why interaction between user and distributed CS is complicated because user does not know where to send his task. To solve this problem, we decided to use passive service nodes that serve as "bulletin boards" (BB) [9]. A structure chart of proposed decentralized distributed CS is shown on figure 1.

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