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Bitcoin-based Fair Payments for Outsourcing Computations of Fog Devices

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Abstract

Fog computing can be viewed as an extension of cloud computing that enables transactions and resources at the edge of the network. In the paradigms of fog computing, the fog user (outsourcer) with resource-constraint devices can outsource the distributed computation tasks to the untrusted fog nodes (workers) and pays for them. Recently, plenty of research work has been done on fair payments. However, all existing solutions adopt the traditional e-cash system to generate payment token, which needs a trusted authority (i.e. a bank) to prevent double-spending. The bank will become the bottleneck of the payments system. In this paper, we propose a new fair payment scheme for outsourcing computations based on Bitcoin. Due to the advantages of Bitcoin syntax, the users can transact directly without needing a bank. Besides, the proposed construction can guarantee that no matter how a malicious outsourcer behaves, the honest workers will be paid if he completed the computing tasks.

Keywords: Fog computing, Outsourcing computations, Bitcoin contract, Commitment-based sampling

1. Introduction

Fog computing, also called edge computing, enables computing and storage to be realized at the edge of the network. Its prominent advantage is providing new applications and services for various users [1]. Vaquero et al. [2] have defined fog computing as that the storage and processing tasks can be performed

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