Optimum Fare Cloud Storage Services across Several Cloud Service Providers

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ABSTRACT

Many cloud service providers (CSPs) provide worldwide distributed data storage services with datacenters. These data centers have different latencies to get / put and unit rates for resource use and reservation. Such datacenters have specific latencies for the use and reservation of services and unit prices. Thus, when choosing the datacenters of various CSPs, cloud customers with globally distributed applications (e.g. online social networks) face two challenges: how to assign data to global datacenters to meet the requirements of application service level (SLO), including both data retrieval of latency and availability, and how to assign data and reserve space in various CSP datacenters to reduce payment costs. To address these problems, we first use the integer programming to model the cost minimization problem under SLO constraints. We then introduce our heuristic solution, including a dominant cost-based data allocation algorithm, because of its NP-hardness. We also propose three methods of enhancement to reduce the cost of payment and service latency: coefficient-based data reallocation; multicast-based data transfer; and request congestion control based on redirection. Finally, we are introducing an infrastructure to allow the algorithms to be conducted. Our trace-driven tests on a supercomputing cluster and on actual clouds (i.e., Amazon S3, Windows Azure Storage, and Google Cloud Storage) demonstrate the efficacy of our SLO-guaranteed services algorithms and reduce customer costs.