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Secure Distributed Adaptive Bin Packing Algorithm for Cloud Storage

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Abstract

Cloud computing delivers highly scalable and flexible computing and storage resources on pay-per-use policy. Cloud Computing's services for computation and storage are getting increasingly popular and many organizations are now moving their data from in-house data centres to the Cloud Storage Providers (CSPs). However, increasing user base and remote storage of data introduces challenges like inefficient usage of resources and insider threat to data at rest in the cloud storage. Time varying workload and data intensive applications are vulnerable to encounter such challenges while using cloud computing services. The consolidation of virtual machines to minimize the total number of active servers is a promising solution to conserve the energy but it requires efficient resource management strategies. Additionally, the encryption strategies and third party auditors to maintain data integrity are still in their developing stage and therefore the data at rest is still a concern for the cloud storage users. In this paper, we designed a distributed storage allocation architecture for fair utilization of storage resources and we also design an integrated end to end security framework for data at rest in cloud storage to eliminate insider threats.

Keywords— Data at rest, Cloud Storage, Insider Threat, Encryption, Data Security

1. Introduction

Cloud computing today is a mature technology which has empowered the IT industry by diminishing the surcharge by introducing the concept of paying only for the usage and nothing more. It has drastically reduced the computing costs because today the users have to pay only for the service or infrastructure they have utilized. Likewise, Cloud Storage is an online virtual distributed storage provisioned by the cloud computing vendors. This storage could be accessed via a web service interface or a web based user interface. Some of the popular cloud storage providers are Amazon S3, Google Cloud Storage, Dropbox and others. The cloud storage system architecture constitutes of several storage servers interconnected to form a large pool of storage resources. A front end server or node manager co-ordinates the services between the cloud users and the storage servers [1].

The connection between the cloud users and the front end server is maintained secure by several encryption strategies and secure connections [2]. Through these methods, the users can be assured that the data in motion is secure. On the other side, multi-tenant data storage architecture poses a threat to the data at rest.

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