Network Coding Based Reliable Data Storage in Cloud: A Comprehensive Review

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Abstract— Cloud storage can be accessed anytime, anywhere. User can store and retrieve their data remote cloud server without difficulty. It is very useful technology which it can store the numerous of data in servers and it can be accessed from anywhere in the world through Internet. Distributed storage is usually considered within a cloud provider to ensure availability and reliability of the data. Network coding enabled distributed storage over multiple commercial cloud solutions, such as, Dropbox, Box, Sky drive, and Google Drive, as a way to address these reliability and privacy issues. Network coding has been considered as a promising solution in next generation networks because of the significant improvement in the transmission rate and reliability.

Key words: Network Coding, Reliable, Data Storage, Cloud, Services

I. INTRODUCTION

Cloud computing is the use of computing resources (software and hardware) that are delivered as a service Over a network (Internet). It ensures remote services with a user's data, software and computation [1]. Nowadays data is stored over the internet using cloud storage environment. The data over the cloud must be stored in such a way that its integrity should be maintained [2]. Cloud computing is the internet depend technology which is providing the services to user, small and large organization on demand. Cloud computing stored the user data and maintain in the data canter of cloud provider like Amazon, Oracle, Google, Microsoft etc. [3].

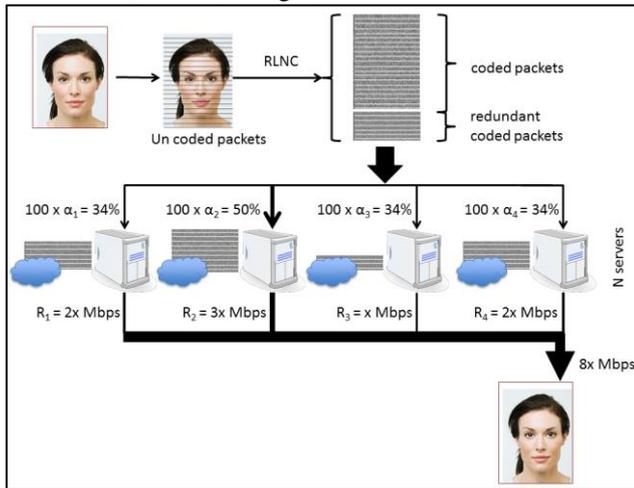Fig. 1: Main Idea of Distributed Clouds with Network Coding[4]

The main idea of this paper is to store data in a distributed fashion over multiple cloud providers. This should help to increase reliability and resolve the privacy issues to some extent. Additionally, using random linear network coding makes storage more efficient in terms of storage space and time to retrieve the distributed data [4]. The concept of network coding is a linear combination of multiple packets which belong to a generation (i.e., chunk). We use the words generation and chunk interchangeable with similar meaning. A number of native packets (i.e., original packet without coding) is also the chunk size[5].

II. SYSTEM ARCHITECTURE

There are two entities in the architecture of cloud system:

A. User

The user first encodes the original file, uploads it in cloud, and generates the challenge and check whether response coming from server is valid or not.

B. Cloud Server

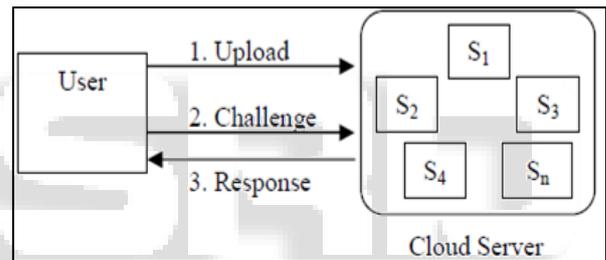Cloud server stores and maintain the data uploaded by the user.

Fig. 3: Architecture of Cloud Storage[6]

III. CLOUD COMPUTING MODEL

A. Service Model

In cloud computing everything is provided as a service (Xaas). Services may be in the form of hardware, software, storage, platform, infrastructure database and many more.

1) Software as a Service (Saas)

Software (application) is delivered over Internet. Software, which runs on provider's cloud infrastructure, is delivered to multiple clients (on demand) through web browser over the Internet.

2) Platform as a Service (Pass)

Platform is provided to the client to build (develop, test, deploy) the applications. The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider.

3) Infrastructure as a Service (Iaas)

It offers users elastic on demand access to resources (server, storage, networking) through service API[7].
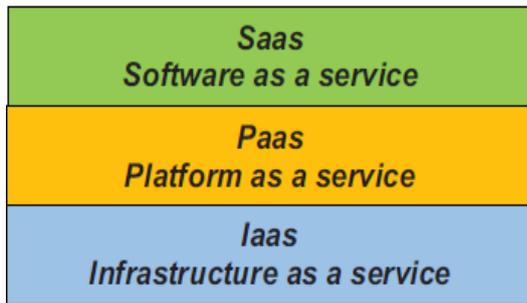
Fig. 2: Service Model[7]

B. Deployment Model

There are mainly four types of cloud, namely private cloud, public cloud, community cloud and hybrid cloud.

1) Private Cloud

A private cloud is a cloud infrastructure, which is solely operated by a single organization. It can be managed by an organization or by a third-party.

2) Public Cloud

In the public cloud, the CSP provides the resources, such as network, server, etc.

3) Community Cloud

It is managed by all these organizations or by a third party. The community cloud sometimes is used for national security purpose[8].
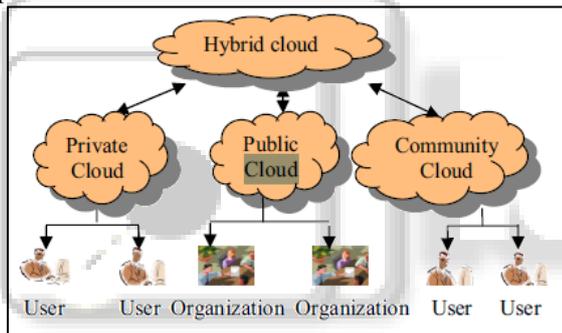

Fig. 3: Deployment Model[9]

IV. CHARACTERISTICS

A. On-Demand Self-Service

It ensures that a consumer can one-sidedly provision computing capabilities such as server time and network storage automatically without requiring human interaction with each service provider.

B. Broad Network Access

It gives access to capabilities available over the network through standard mechanisms.

C. Resource Pooling

It pools computing resources to serve multiple consumers.

D. Rapid Elasticity

It is used to elastically provision and release capabilities or resources[8].

V. STATEMENT PROBLEM

Here we considered data storage architecture with two different things. Firstly, the cloud customer has large amount of data outsourced problems in to the cloud server. Second, the cloud servers, which have different data resources and provide different utility services, like hosting the public cloud in a pay-per-use manner. In this system we focused on the data storage on the cloud. In the cloud, cloud customer / user can upload his/her data on the cloud server in the original format. So the data is not secure because the cloud sever is not fully honest model. It misbehaves with cloud customer and losses or corrupts the user's important data. So we have to analyse this problem of data security and design some goal to achieve the data security problem on cloud.

VI. APPLICATION

There are a few applications of cloud computing as follows
1) Cloud computing provides dependable and secure data storage canter.
2) Cloud computing can realize data sharing between different equipments.
3) The cloud provides nearly infinite possibility for users to use the internet.
4) Cloud computing does not need high quality equipment for the user and it is easy to use[3].

VII. RELATED WORK

Cloud computing is a developing technology that is rising fast day by day. Security in cloud computing is a major issue. Several investigators studied security challenges and proposed various mechanisms related to Cloud computing models. The reliability increases as the generation size is large with cost of long delay, complexity and a large header size of containing the coding vectors. In this approach we study about the architecture of network coding type of services and model. For reliability and security we use network coding technique.

VIII. CONCLUSION

In this paper we introduced a general framework for network coding enabled distributed storage over multiple commercial cloud solutions. The proposed work uses a secure system for protection of user data in cloud environment through division of data into fragments.

IX. FUTURE DIRECTION

The future work is store splitted data on multiple cloud service providers to enhance data security.

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