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A Hybrid Model for Cloud Computing using Storage Mode Switch and Content based Switching through Server Virtualization

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Abstract: Cloud computing is one of the service oriented technology that delivers the result to the enterprises and users on the basis of cost effective model. This paper is written to study the research challenges, and a proposed architecture is given that does the virtualization of cloud server and Centralized Location and then delivers the services on the basis of pay per use, demand based and content switching model. We are trying to implement content based switching and storage mode switch together in virtualized environment of cloud to create a cost effective nature with high availability of data.

Keywords: Storage Mode Switch, *Virtualization in Cloud Domain, Content Switching, High Availability.*

1.INTRODUCTION

Cloud computing and storage solutions provide users and enterprises with various capabilities to store and process their data in third-party data centers. It relies on sharing of resources to achieve coherence and economies of scale, similar to a utility (like the electricity grid) over a network. At the foundation of cloud computing is the broader concept of converged infrastructure and shared services.

Cloud computing, or in simpler shorthand just "the cloud", also focuses on maximizing the effectiveness of the shared resources. Cloud resources[4] are usually not only shared by multiple users but are also dynamically reallocated per demand. This can work for allocating resources to users. For example, a cloud computer facility that serves European users during European business hours with a specific application (e.g., email) may reallocate the same resources to serve North American users during North America's business hours with a different application (e.g., a web server). This approach should maximize the use of computing power thus reducing environmental damage as well since less power, air conditioning, rack space, etc. are required for a variety of functions. With cloud computing, multiple users can access a single server to retrieve and update their data without purchasing licenses for different applications.

On the other hand, in recent, cloud computing is getting popular for various business fields because of its easy and efficient introduction and elastic expandability. Using cloud computing services [5], a series of preliminary works including design and maintenance of hardware and software are carried out at a data center. Since the users do not need to newly introduce servers physically for business, the maintenance cost can be largely reduced. Furthermore, by introducing virtual technology, user can construct and run his own private cloud computing system.

We are trying to implement content based switching[1] and storage mode switch[2] together in virtualized[1] environment of cloud to create a cost effective nature with high availability of data.

2. PROPOSED SYSTEM DESIGN

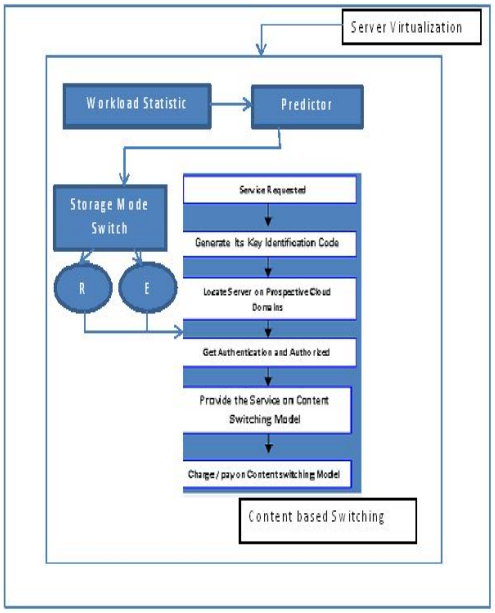

Figure1: System Architecture

System Features

- Two widely used redundancy mechanisms i.e. replication and erasure coding are used in storage modes.
- Access logs are used to keep track of user access status and the meta data contents.
- Workload statistics collects the meta data provided by the access logs and provides statistics information to the predictor.
- The predictor guides the placement of data in storage mode using storage mode switch.
- Storage mode switch is used whether the data to be switched from replication mode to erasure mode or vice-versa.
- The Server Virtualization concept is used to physically map a hub of cloud servers.
- The Cloud server has a service that creates the track of the Cloud which is distributed on the basis of the basis of the concerned applications handled by the respective clouds.
- A unique key is generated by the cloud to the users trying to access the desired cloud.
- After identification and verification of the server and the type of request that is being asked, the control switches over to content that is concerned for providing the service using content based switching.
- The content based switching is charged on the basis of services requested.

a. Storage mode switching

Intuitively, when a file changes from "hot" to "cold", we should change its storage mode. More specifically, when the read frequency of the file drops below or increases above a certain value, changing storage mode can save more money. The value is determined by the prices of clouds. Given the available clouds including their prices and availability, we can figure out the storage mode and the selected clouds with the input of file's size and read count, using Algorithm 1.Heuristic algorithm of data placement. We calculate the storage modes for different file sizes and read counts, in order to get a storage mode table. The table has two dimensions: file size and read count. There is one corresponding storage mode for each pair of file size and read count, but the storage modes are the same for many different pairs. There are explicit boundaries between different storage modes in the table.

However, it does not mean we should change the storage mode once a file's storage mode crosses the boundary, because the transition of storage mode also generates cost, which is definitely not negligible. Bandwidth is (much) more expensive than storage space for online storage services. The cost of one read access for a file can afford this file to be stored for around 4 months with no read access. Thus, we should be prudent to deal with storage mode transition.

A good transition scheme can actually save large amount of money. We first demonstrate the implementation of storage mode transition: the proxy gets the data from the clouds where the data is originally stored, and puts it into the newly selected clouds using new storage mode. The implementation consumes out-going bandwidth, in-going bandwidth, and several operations (i.e., GET, DELETE, and PUT). Since DELETE and in-going bandwidth are free, the transition[2] cost T is composed of out-going bandwidth, GET, and PUT. Out-going bandwidth is more expensive than storage, so we have to make sure that the cost of transition can be earned back by the new storage mode. That is, the following inequality has to be met:

$$M_f > M_p + T$$

Where M_f and M_f are the monetary cost of the previous storage mode and new storage mode respectively. They are both calculated using the read frequency provided by Predictor.

b. Workload Statistics

Workload Statistic keeps collecting and tackling access logs to guide the placement of data. It also sends statistic information to Predictor which guides the action of SMS. Data Hosting stores data using replication or erasure coding, according to the size and access frequency of the data. SMS decides whether the storage mode of certain data should be changed from replication to erasure coding or in reverse, according to the output of Predictor. The implementation of changing storage mode runs in the background, in order not to impact online service.

c. Predictor

Predictor is used to predict the future access frequency of files. The time interval for prediction is one month, that is, we use the former months to predict access frequency of files in the next month. However, we do not put emphasis on the design of predictor, because there have been lots of good algorithms for prediction. Moreover, a very simple predictor, which uses the weighted moving average approach, works well in our data hosting model.

d. Content based Switching

Content switching refers to the ability to distribute user requests to servers based on Layer 7 payload. Generally, this is done by examining content and "switching" the requests to the appropriate servers or group of servers. The basics behind content switching revolve around the ability to provide a single point to which a session is established by using the concept of a virtual IP address (VIP) that is configured on the content switch, the user can connect to this single point and it is the content switch that determines or load balances the request to the appropriate server.

Content switches are able to support hundreds of servers behind a single VIP. This concept allows businesses to create a single entry point to their site because the VIP is associated with the domain name. It also allows the backend servers to be in a secure, non-accessible zone from external devices.

On identification and verification of the server and the type of request that is being asked, the control switches over to content that is responsible for providing the services.

The content based switching is charged on the basis of services requested and the deliverables are recorded so as to have minimum response time from the server.

e. Data availability

Data is made highly available since we are maintaining multiple data centers and placing a copy of data in closest data centers that is being available to the users. We can even maintain multiple copies of data so that we can prevent data loss as well as the client's requests for frequent access of data.

f. Virtualization in Cloud Domain

The Server Virtualization concept is used where in the Virtualization is done in such a way that the HUB of servers is physically mapped with each other. The Cloud server has a service that creates the track of the Cloud which is distributed on the basis of the applications they cater to.

The intelligence logic is that the servers forms the private tunnel and receives the requests. Whenever any service through client is requested, a key identification code is generated. Based on the signature of the request the server is located that is meant for providing this kind of service.

1) **ADVANTAGES**

- Accelerate the way to create new products and services for enterprises.
- Increasing the ability of organizations to mine their data for important trend information.
- Leveling the lane field between large and small companies of all sizes access to information technologies.
- Cost effectiveness is achieved through deployment of content based switching.

2) **DISADVANTAGES**

- Retrieval of data is time consuming since both content based switching and storage mode switching is been involved.

3. CONCLUSION

We are achieving higher security and data availability with the help of content based switching and storage mode switch through server virtualization. Further enhancement can be done by adding virtual IP table which can keep track of entire list of IP address of cloud for fast access.

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