Automated Management in Cloud Storage

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Abstract: Cloud storage is a place where users upload, save and access data from anywhere and anytime with the help of data server. Automated Management is an important quality of the cloud storage. When user uploads data on the server it is saved but when storage capacity is less than needed size then cloud storage must be able to add new storage and automatically configure itself to accommodate it and to find errors automatically.

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1. INTRODUCTION

The Cloud Computing: Cloud computing is a vast term that describes a wide range of services. Before understanding what does the cloud means it is required to understand its different components that can be helpful for an organization

2. TYPES OF SERVICES

Software as a Service (**SaaS**) is a software distribution model in which applications are hosted by a vendor or service provider and made available to customers over a network, typically the Internet.

Infrastructure as a Service (IaaS) is like an on demand service of providing servers, storage, network and operating systems instead of purchasing them.

Platform as a Service (PaaS) through this we can quickly and easily create web applications without purchasing any software.

3. WHAT IS CLOUD STORAGE

Cloud storage is a service where users files is stored on data servers and data is maintained, backed, managed remotely and available for them through network that is through internet.
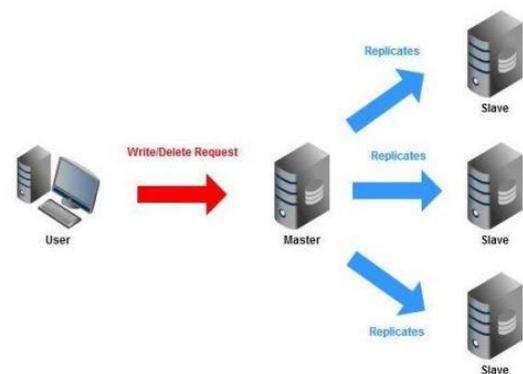

Figure 1

4. ADVANTAGESOF CLOUD STORAGE

4.1.1 Usability: Users can easily use services from any machine .

4.1.2 Bandwidth: We can send link of file instead of sending complete file with large size in emails.

4.1.3 Accessibility: Stored files can be accessed from any location via Internet connection.

4.1.4 Disaster Recovery: As these files are stored at a remote location which can be accessed through an internet connection, so user can recover files if files are lost from computer.

4.1.5 Cost Savings: Users can easily purchase cloud storage due to less pricing when compared to Hard disks & other storage devices.

4.1.6 Data security is a priority: By using techniques such as data encryption, automation and password we can secure data of Cloud storage.

4.2 DEPLOYMENT MODELS

Cloud storage deployment models represent the exact category of cloud environment and are mainly distinguished by the proprietorship, size and access. It tells about the purpose and the nature of the cloud.

4.2.1 Public cloud can be accessed publicly owned by third party and data is stored in global data centers with storage data spread across multiple regions or continents

4.2.2 Community cloud is for specific community of cloud based consumers and therefore its access is limited.

4.2.3 Private cloud it is basically used by a single organization and the organization can access to IT works by different locations, departments of the organization by making it centralized.

4.2.4 Hybrid cloud is a mixture of two or more than two different cloud environment models.

4.2.5 Virtual Private Cloud - "dedicated cloud" or "hosted cloud" this is an independent cloud environment.

4.2.6 Inter-Cloud – two or more than two inter connected clouds are involved.

5. PROBLEM STATEMENT:

Cloud computing is an essential part in today's environment as technology is growing rapidly, data is a crucial factor in era of Information technology, now days users store data securely on cloud storage technology which is cost effective. In cloud storage multiple data servers are used to save users data, these servers have many hardware's used in them like RAM, hard disk, etc. and each server is located in different geographic locations. If any problem arise in these servers hardware it is not possible to solve the issue physically now and then to visit its location to solve the problem. Hard-disk failures and mass information losses are no longer common. On the contrary, hardware failures are inevitable and could be devastating if backups were not adequate.

6. PROPOSED SOLUTION

In cloud storage users saves data on master server and master server creates replica of the data by creating copies of data into multiple servers which can be named as slave servers. These slave servers are located in different geo locations, if any issue occurs in the slave server than it cannot be solved within a quick response time therefore to overcome this situation we have a proposed solution that is automated management system for cloud storage servers.

In cloud storage hard disk plays the key role due to it stores the data, In this proposal we are focusing on automated management system which is implemented on hard disks

and also checking the performance of hard disk to reduce the risk of hard disk failure.

Each and every second bulk data is uploaded on the slave servers, in current scenario when this slave server's hard disk is full, admin is not getting any information regarding that slave server,and also of multiple slave servers in different geo location,so Admin does not get any message or alert about the completion of hard disk.

To overcome this Problem we will run a python script on every slave server through cron job,which will be run in certain interval of time for checking hard disk memory which automatically sends an alert email to the admin when the storage capacity of the hard disk will be less than 500 mb (it may vary according to the requirement), by using this solution admin can increase the slave server size by attaching a new hard disk to the server.

Another way to increase the storage volume of the server is by adding multiple hard disk to the central processing unit at the time when the admin is creating slave servers but it will be used only when the storage capacity of hard disk is less than 500 mb, to implement this method we have to run a python script through cron job and it will automatically mount the hard disk in the cloud storage server, after one hard disk storage capacity is left with only 500 mb storage than the server uses the new hard disk and this process goes on till all the hard disk is full with only 500 mb left in the server by this method we can increase the storage capacity without visiting to the geo location and it is very beneficial to the admin and for all the cloud storage service provider.

6.1 PERFORMANCE OF THE HARD DISK ON THE FOLLOWING PARAMETER

6.1.1 Access time
The total time taken by the drive to start actual transfer
6.1.2 Seek time
The time taken for the assemble head on the actuator arm to get to the track of the disk on which the data will be read or written. $T_s = m \times n + s$

where

$T_s = $ estimated seek time

$n = $ number of tracks traversed

$m = $ constant that depends on the disk drive

$s = $ startup time

6.1.2 Latency
The amount of time it take for the platters to spin the data under the head is the rotational latency.To calculate the maximum rotational latency = 60000/RPM (60 seconds in a minute * 1000 to get milliseconds / Revolutions per minute)

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6.1.4 Transfer Time

The speed of the disk components is only part of the struggle, there is also the amount of time it take for requests to get from the system to the disk

$$T = \frac{b}{rN}$$

where

T = Transfer time

b = Number of bytes to be transferred.

N = Numbers of bytes on a track

r = Rotational speed, in revolution per second.

Thus the total average access time can be expressed as

$$T_a = T_s + \frac{1}{2r} + \frac{b}{rN} \quad \text{where} \quad T_s \text{ is the average seek time.}$$

6.1.5 Short stroking

This is a term used to describe hard disk drives that's purposely restricted in the total capacity so that the actuator that can only move heads accord fewer total number of total tracks.

6.1.6 Rotational Delay

Disk drive generally rotates at 3600 rpm, i.e. to make one revolution it takes around 16.7 ms. Thus on the average, the rotational delay will be 8.3 ms

Through all the above parameter we can check the hard disk performance and reduce the risk of hard disk failure.

Script for memory check (PYTHON)

```python
import os
from collections import namedtuple
import psutil
import smtplib


DiskUsage = namedtuple('DiskUsage', 'total used free')


def disk_usage(path):
    st = os.statvfs(path)
    free = ((st.f_bavail * st.f_frsize)/1024)/1024
    total = ((st.f_blocks * st.f_frsize)/1024)/1024
    used = (((st.f_blocks - st.f_bfree) * st.f_frsize)/1024)/1024
    return DiskUsage(total, used, free)


def send_mail(body):
    to = 'crystal.jaigupta@gmail.com'
    user = 'crystal.jaigupta@gmail.com'
    password = 'puspha@123'
    host = 'smtp.gmail.com'
    port = 587
    smtpserver = smtplib.SMTP(host, port)
    header = 'To:' + to + '\n' + 'From: ' + user + '\n' + 'Subject:Low Disk Alert! \n'
    body = '\n %s \n\n' % body
    msg = header + body
    try:
        smtpserver.ehlo()
        smtpserver.starttls()
        smtpserver.ehlo()
        smtpserver.login(user, password)
        print header
        smtpserver.sendmail(user, to, msg)
        print "Successfully sent email"
        smtpserver.close()
    except:
        print "Error: unable to send email"


partitions = psutil.disk_partitions()
min_disk_size = 100
alrt_msg = ''
for disk in partitions:
    try:
        ds = disk[1]
        st = os.stat(disk[0])
        du = st.st_blocks * st.st_blksize
        free_m = disk_usage(ds).free
        total_m = disk_usage(ds).total
        if free_m < min_disk_size:
            if alrt_msg:

                alrt_msg += "%s(%s): Memory Low!!!!, %s MB Memory Left of %s MB\n" % (ds, disk[0], free_m, total_m)
            else:
                alrt_msg = "%s(%s): Memory Low!!!!, %s MB Memory Left of %s MB\n" % (ds, disk[0], free_m, total_m)
    except:
        pass
if alrt_msg:
    print alrt_msg
    send_mail(alrt_msg)
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7. ACKNOWLEDGMENTS

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