

EFFICIENT TRUSTED CLOUD STORAGE USING PARALLEL CLOUD COMPUTING

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Abstract- In last few years, rapidly increasing businesses and their capabilities & capacities in terms of computing has grown in very large scale. To manage business requirements High performance computing with very large scale resources is required. Businesses do not want to invest & concentrate on managing these computing issues rather than their core business. Thus, they move to service providers. Service providers such as data centers serve their clients by sharing resources for computing, storage etc. and maintaining all those. To make optimal or maximum utilization of available resources, service providers (data centers) use one of emerging technology called, "Cloud Computing". [1]

I. PURPOSE

This thesis work presents a prototype / model to small and medium scale businesses, or hosting businesses, which allows them to make maximum/optimal use of available resources with reduced cost. This model will improve cloud server availability and performance with elastic, scalable cloud storage. Parallels Cloud Storage uses the existing unused disk space on server nodes to deliver cloud storage at a fraction of the cost of competing solutions. This model will provide no single point of failure i.e. fault tolerant, high performance and low cost.

II. SCOPE

Most service providers today provision their servers with direct attached storage (DAS). While DAS is fast and inexpensive to procure, it is has a high overall cost of ownership and high failure rates that can significantly impact service availability. In order to address the issues with DAS, many service providers have considered storage area networks (SAN) as an alternative; however these are typically too costly for low cost hosting. [2]

In this thesis work, a prototype of Parallels Cloud Storage reduces total operation cost and compares the capabilities and relative cost of Parallels Cloud Storage to DAS and Storage Area Network (SAN) alternatives.

Parallels Cloud Storage solves the problems associated with DAS by providing a distributed, shared solution that decouples storage from computation. This approach enables virtual machines and containers to be instantly migrated to an operational physical server if the original physical server becomes unavailable.

III. INTRODUCTION

A. Objective

The main objective of this thesis work is to build and present a prototype of Cloud Computing environment which must fulfill high performance and high data availability of

resources as well as fast and flexible storage solution for modern datacenters.

B. Architecture

Parallels Cloud Storage Architecture:

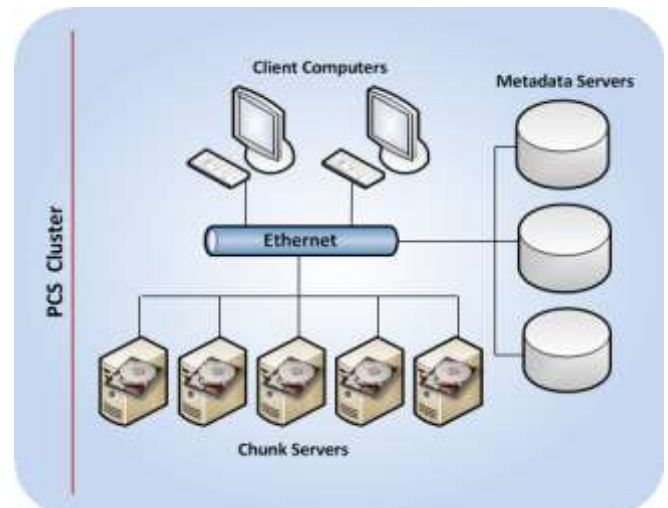


Fig 1.2 Typical parallel cloud storage Architecture

The basic component of Parallels Cloud Storage is a cluster. The cluster is a group of physical computers connected to the same Ethernet network and performing the following roles:

C. Chunk Servers:

Chunk servers store all the data, including the contents of virtual machines and Containers, in the form of fixed-size chunks and provide access to these chunks.

D. Metadata Servers:

Metadata (MDS) servers store metadata about chunk servers and control how files keeping the contents of virtual machines and Containers are split into chunks and where these chunks are located.

E. Clients:

Clients are computers with Parallels Cloud Server 6.0 from where you run virtual machines and Containers stored in a Parallels Cloud Storage cluster. [3]

F. Parallel Cloud Computing - Brief Overview:

Parallel Cloud Server

Parallels Cloud Server is a virtualization solution that allows you to simultaneously run Parallels virtual machines and

containers on the same physical server, thereby making more efficient use of your server's hardware resources. Parallel Cloud Server is the only solution available today, that allows deploying both containers and hypervisor on the same physical server. This flexibility offers advantage of the scalability and streamlined operations of operating system virtualization (containers), while also making use of high-performance virtual machines (hypervisors) for isolated applications or simultaneous heterogeneous environments.

Parallel Cloud server has following features:

- Parallel Cloud Storage
- Container-in-an-image-file layout
- Memory and IOPS deduplication
- Rebootless Updates
- Console Access to containers
- Updates with yum
- Container with preinstalled application templates
- Virtual Machines with 32 CPU Cores, 128 GB of RAM, and 5 TB of Disk Space
- Support for Open vSwitches
- CPU identification masks for virtual machines
- Virtual Machine configuration samples. [4]

IMPLEMENTATION

Setting up of parallel cloud storage cluster includes following steps:

- A. Install Parallel Cloud Server 6.0 on Server [Master and Slave]
- B. Configuring Parallels Cloud Storage cluster discovery.
- C. Checking data flushing.
- D. Setting up Metadata Servers.
- E. Setting up Chunk Servers.
- F. Setting Up Clients.
- G. Managing Parallel Cloud Storage Cluster using PVA agent

IV. CONCLUSION

This thesis work helped to understand one of emerging technology called, Cloud Computing and its pros and cons.

This project work helped to understand about cloud computing in broad aspect including parallel computing and storage technology. and areas which can be improve in the same domain to meet newly and faster growing requirements of businesses and solution which can be served, for long-time.

Being an ideal storage solution, Parallel Cloud Storage has overcome single-point failures with much more efficient use of existing storage. The ability of replication of data chunks in parallel, across all servers in the cluster makes it faster than RAID; also its reliability is much more.

The 3 MDS servers (1 Master and 2 Slave) & 3 chunk servers shows automatic rebalancing of storage and recovery of data from different chunks if any server goes down or fails. Hence 100% uptime achieved with no single point failure model. It is one of the low cost solution.

Implemented model also offers platform as a service with many flavors of Linux based OS. Implemented server can also be used for web hosting by assigning static IP address and global DNS and registering it into Global DNS server.

Current model can be accessed in Local Area Network only.

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