Cost Effective And Scalable Approach Towards Virtual Private Cloud Network

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## **ABSTRACT**

“Cloud” is a collective term for a large number of developments and possibilities. Cloud computing is an unambiguous, unlimited technique of today’s era. It always pursues tremendous capability to serve fancy facilities to all the end users. Cloud computing has features like Multi-tenancy, virtualization, load balancing technology, security, scheduling and many more. Cloud computing Virtualization (helping nature of cloud) allows user to access multiple virtual machines or their functions, these services are provided pay per use. A virtual private cloud (VPC) can offer public cloud users the privacy of a private cloud environment. In a VPC, while the infrastructure remains public, the cloud provider lets the customer to define a virtual network by letting them select their own subnets, IP address ranges, route tables, and network gateways. Optionally, VPNs are provided to further secure the virtual networks. Stored data can also be protected by assigning ACLs. Integration challenges, the private cloud to be built should be built on a hybrid model wherein if required it could be connected to the public clouds. This does require a lot of effort including security provisions and configurations which enable workloads to be run anywhere. The propose approach will design and implementation of cloud setup with low cost and high performance features for small enterprises.

**Keywords*-*** Cloud Computing, Load Balancing, Scheduling Algorithms, VM, Data Centre controller, Statistics, Cloud Models, Deployments. Index table

***.***

# INTRODUCTION

Cloud computing [1] [12] describes computation, software, data access, and storage services that do not require end-user knowledge of the physical location and configuration of the system that delivers the services. Cloud computing is a natural evolution of the widespread adoption of virtualization, service, autonomic and utility computing. Details are abstracted from end-users, who no longer have need for expertise in, or control over, the technology infrastructure "in the cloud" that supports them. Cloud computing describes a new supplement, consumption, and delivery model for IT services based on Internet protocols, and it typically involves provisioning of dynamically scalable and often virtualized resources It is a byproduct and consequence of the ease-of-access to remote computing sites provided by the Internet. This frequently takes the form of web-based tools or applications that users can access and use through a web browser as if it were a program installed locally on their own computer

Simulating a Private Cloud in a Public Environment VPCs [7, 8, 11] (figure 1) utilize VPNs to secure communication channels by creating protected, virtually dedicated conduits within the cloud provider network. This eradicates the necessity to specify intricate firewall rules between the application in the cloud and the enterprise, because all locations would be linked by a private network isolated from the public Internet. VPNs form the construct of a private network and address space used by all VPN endpoints. Because VPNs can use specific IP addresses, the cloud provider can permit customers to utilize any IP address ranges without conflicting with other cloud customers. A VPC can contain many cloud data centers, but it appears as a single collection of resources to the customer.

Cloud architecture refers to the various components in terms of databases, software capabilities, applications, Middleware, computing power etc. and relationship between them. It leverages the power of cloud resources to solve business problems and provide services to them. Cloud architecture has front end and backend architecture (discussed in later section.) to support services named as Data Centers. (DC)

Cloud computing is the future of computing. Utilizing cloud-computing models boosts not only productivity but also provide a competitive edge to organizations. Cloud has four deployment models private, public, community, Hybrid cloud. (Table describe the difference)

Nowadays Traffic volumes are increasing and applications are becoming more complex. **Load balancers (LB)** provide the bedrock for building flexible networks that meet evolving demands by improving performance and security for many types of traffic and services, including applications. Scheduling is the method by which the work is assigned to resources that complete the work. The work may be virtual computation elements such as threads, processesor data flows, Virtual machine which are in turn scheduled onto hardware resources such as processors, network links or expansion cards.

**Virtualization** is the formulation of a virtual environment of something, such as a server, a desktop, a storage device, an operating system, network functions, computing power or network resources.

# LITERATURE SURVEY

 **[2]**By, [T V Radhika](https://www.researchgate.net/scientific-contributions/T-V-Radhika-2035138204?_sg%5B0%5D=Dmf5_tmbDECN2i4Ct6aDSZEEG6zDvzYWwmLadRyfZ4KGPrEJG2qj9a52HJ8DLKhFR3Bd7dU.FuYyPNbUcBIOLAHp75X_KHP3K0VajDfMg7tZVpKvMv3gNhcCl8Ls0Ap9m8AnvEW_xvXaKVURxo5WcxwAAYEcsQ&_sg%5B1%5D=OsEOzc9FhDUL2Imz8BV0-tXsfC4kCsrsShcom-Y6quu7aPDP77b7FKu8CMUZS2ei1gH-VwY.WJN75FJWnqjNhlklMfogto_1vsbiCA_EhRZIZnuIw0m3Og4D8RMCWWvUEYaeEMqBxoCKdhTAPzDRBKDMEYsAEg), In this paper, we have discussed different concepts of VPC with scenarios along with the need of VPC and its advantages. Also how effectively they have use VPC is also been discussed.

[4]In this paper, they are carries out a high level comparison of the significant features delivered by key public cloud providers of the industry and key considerations that enterprises need to take into account while they embark on Cloud computing. Setting up of Private Cloud to provide IaaS (Providing an Operating System to the user) And SaaS Services (Web Applications).

**[8]** By, Dongxu Yang, This paper presents the framework of a power dispatching automation system (PDAS) based on a virtual private cloud, which extracts advantages of technologies, such as a virtual private cloud, a virtual private network, an https protocol, etc

[12, 13, 14] These papers they made, Survey on cloud computing security, challenges, placement etc.

[10] In this paper, the author proposed a new hybrid scheduling strategy, which consists of a Pod scheduler and a throughput-limited helper

[23] In this paper, effective measures taken to avoid these threats are done with the help of VPC. In this paper, we have discussed different concepts of VPC with scenarios along with the need of VPC and its advantages. Also how effectively we can use VPC is also been discussed.

[24] This poster focuses on the experimental validation of two main properties of Snooze: scalability and fault-tolerance.

[25] Here they concentrate on an auto scaling method that handles Bag-of- Tasks jobs in Private and Public cloud environment. The results of Simulation show how effectively the resources are allocated considering the deadline as parameter.

[26] Focus of this paper is to distinguish between the issues of private and public cloud computing and what are the challenges faced during Building up your own private and public cloud

[27] They present energy costs while enabling self-service, automation, scalability, and elasticity. A comparison of resource utilization in cloud and cost of infrastructure has been done and the benefits of using private cloud are identified.

[28] The performance of the proposed dynamic load-balancing policy is compared to that of static policies as well as existing dynamic load-balancing policies by considering the average completion time per task and the system processing rate in the presence of random arrivals of the external loads.

[29] In this paper, a load balancing algorithm has been proposed to avoid deadlocks among the Virtual Machines (VMs) while processing the requests received from the users by VM migration.

In this approach, Chandu Vaidya, ETL[20] propose the methodology of fake objects and watermarking were developed in order to prevent stealing of data by an unauthorized user

Another approach is similar to, again by Chandu Vaidya, ETL [18] propose that file which would be uploaded and downloaded through a cloud environment will be handled by a trusted party to ensure the data integrity and exposing risks of cloud services on behalf of the cloud client to verify data integrity.

[30] They conclude study which will helps individuals and organizations understand how cloud computing can provide them with customized, reliable and cost-effective services in a wide variety of applications

[31] The main purpose of this paper is to give an overview of cloud computing and more importantly it emphasizes the auto scaling mechanism. It also put some light on its types and usage in cloud computing applications.

[32] They develop a novel energy-aware scheduling algorithm named EARH for real-time, a periodic, independent tasks.

[33] In this paper, a generic comparison between the Enterprise Public and Private Cloud is analyzed based on its features and service provided*.*

[34]Here the entire memory management techniques clubbed together then in both public and private cloud environment one can scale virtual infrastructure rapidly with reducing memory requirement and overhead.

[35] This paper presents a framework of power dispatching automation system (PDAS) based on virtual private cloud, which takes advantages of technologies such as virtual private cloud, virtual private network, https protocol, etc.

[36]Present a system which uses the virtualization technology for dynamic allocation of data center resources on the demands of application and also supports green computing by enhancing the number of servers in use. To achieve this objective the author has introduces the “skewness” algorithm to enumerate the unevenness utilization of multiple resources on the server. The system executes this algorithm periodically for the status evaluation of resource allocation on the basis of prediction of resource demands of VMs in future. It defines the server as hot spot and if any of its resource utilization is above a hot threshold then it indicates that the server is overloaded and hence the VMs running on it should be wander away.

Now a day in virtual machine load balancing is based on live migration and this strategy is based on measurement of the threshold that is, when the load on the host machine is more than the threshold then that machine get migrated immediately to avoid overhead.

KeYang [37] considers optimized control strategy which combines multi strategy mechanism with prediction mechanism. This strategy separately monitors the utilization of different resources component which include CPU, Memory, I/O and network bandwidth. He has consider different domain on which the decision of virtual machine taken such as light load domain, optimal domain, warning domain and overhead domain.

#  III. PROPOSED METHODOLOGY

Proposed system comprise of following terminologies- First is Virtualization where Multiple O.S. on single host machine. Secondly term is Green Computing, where Energy saving by shutting down idle HW will be done. Third is Cloud Computing where Dynamic Resource allocation on demand will carry out. Fourth is Load balancer where Web session auto switching on the basis of some logic it can be priority or threshold based and finally the DCC i.e. data center controller.

**Technical Flow:-**

1. Built cloud platform with virtual Machines in consideration of cloud services and session management
2. The Load Balancer maintains an index table of VMs and the number of requests currently allocated to the VM. At the start all VM’s have 0 allocations.
3. When a request to allocate a new VM from the Data Center Controller (DCC) arrives, it parses the table and identifies the least loaded VM (Threshold/Priority based). If there are more than one, the first identified is selected.
4. The Load Balancer returns the VM ID to the Data Center Controller.
5. The Data Center Controller sends the request to the VM identified by that id.
6. Data Center Controller notifies the Load Balancer of the new allocation.
7. The Load Balancer updates the allocation table incrementing the allocations count for that VM.
8. When the VM finishes processing the request, and the Data Center Controller receives the response cloudlet, it notifies the Load Balancer of the VM de-allocation.
9. The Load Balancer updates the allocation table by decrementing the allocation count for the VM by one.
10. Continue from step 2.

**PROPOSED PSEUDO CODE (MAIN):-**

1. *START*
2. *Built a cloud platform*
3. *Built Data Center Controller*
4. *Prepare index Table for all resource on DCC*
5. *Collect statistics*
6. *Analyze the resource statistics and Identification of VM*
7. *Manage the VM as per availability of resource capacity*
8. *Decision making based on resource capacity*
	1. *Index Table*
	2. *Threshold/Priority based*
9. *Distribute the load*
10. *Handle the query of VM (Go to step number 5 and 7)*
11. *Testing the algorithm with different cases/load/requests*
	1. *Overloaded of server ( Jump to Scalability Code)*
	2. *Crash of VM (Reflect to Index table)*
	3. *Routing/Scheduling policy (Refer to step number 8)*
12. *Analyze the performance*
13. *END*

***PSEUDO CODE FOR SCALABILITY:-***

1. *START*
2. *Refer Data Center Controller*
3. *If first DCC Gets overloaded*
	1. *Then Create new DCC and Add new VM*
	2. *Update Index Table ( Jump to Step number 4 of Main code)*
4. *If DCC not overloaded then jump to step 5 of Main code.*
5. *END*

**IV. CONCLUSION**

In the existing algorithm there exists a communication between the Load Balancer and the Data Center Controller for updating the index table leading to an overhead. It has been observed that, the idea we proposed that definitely use for small enterprises to built their private cloud computing with virtualization technology. Also to allocate resources of datacenter dynamically based on demands of application .By shifting multiple servers on improved and high capability single server we can save the computation power of dynamic resource. This system has been responsive by dynamic migration of task based on threshold basis.

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