

Establishing a Service Model of Private Elastic VPN for cloud computing

¹ Priyanka Gupta, ² Ashok Verma

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¹ Computer Science, RGPV, GGITS
Jabalpur, MP, India

² Computer Science, RGPV, GGITS
Jabalpur, MP, India

Abstract

In this paper, we describe the concept of elastic VPN services with Hypervisor on Cloud Computing. Under the Cloud Computing mainly VPN is a IaaS cloud services which is create for small unit business and medium size company which is based on pay-as- much as used policy. Under this we proposed a method through which we simply create an VPN network , and also show the concept of Hypervisor which truly adjust the resources dynamically and the Load Balancing Algorithm is used which balanced the work load dynamically and also adjust the resources by need and it also improve the scalability and availability of the resources for the better performance of the network.

General Terms: Architecture of an elastic VPN, Algorithm of Load Balancing.

Keywords: Cloud Computing, IaaS, VPN , Hypervisor, Load Balancing.

1. Introduction

Few years ago, the paradigm of “cloud computing” is emolument strength, in industry as well as the private sector. The indispensable concepts of virtualization, abstracting physical computing resources into multiple logical resources, now find support in the complete range of information technology, from specific computer hardware extensions to management applications for virtualized operating systems and applications. The promise of cost-effectiveness, flexibility in provisioning, ease in management, and energy savings, improve resource availability have encouraged the effort “to go cloud.”

Certainly, cloud computing also offers many attractive benefits to enterprises. The cloud model moves IT infrastructure from an upfront capital expense to an

operational one. Companies can use the cloud for large batch-oriented tasks — those involving large spikes in requirements for processing power — that otherwise would be out of reach or require huge investment. Many enterprises provision computing resources for peak loads, which often exceed average use by a factor of 2 to 10. Consequently, server utilization in datacenters is often as low as 5 to 20 percent. One key benefit of cloud computing is that it spares companies from having to pay for these underutilized resources. Cloud computing shifts the IT burden and associated risks to the vendor, who can spread variations over many customers. Organizations can use the cloud to rapidly scale up or down; they can also buy or release IT resources as needed on a pay-as-you-go model. The cloud can be a revolutionary technology, especially for small startups, but its benefits wane for larger enterprises with more complex IT needs. [1][3]

An essential characteristic of cloud computing is that the provider provides and controls the network access between the customer data and the users across the Internet. Most significantly it seems that the customer interacts with a virtualized environment, the provider is responsible for maintaining and monitoring the hardware as well as software. The provider can use the software to monitor the connection topology, memory use, processor load, bus speed and so on. The provider can measure such quantities to effectively load-balance its resources.[2] [3], a service to provide different layers of computation resources, and SaaS[6], a special form of software encapsulation and delivery, why not to provide a public VPN service to small-and-medium sized companies and individuals in the form of SaaS? In this way, they don't

have to purchase expensive hardware and implement VPN solutions on their own, in the contrary, they pay as much as they used, and benefit from multiplexing with many others. Also, with the help of cloud computing facilities, it is easier to design an elastic model for this public VPN service, because the resources of computation, storage, et al, are almost inexhaustible. And more importantly the service providers can benefit from the “pay as much as used” feature as well, they can start their business with almost ZERO budget! Besides, benefited from cloud computing, this model can be easily implemented in a geographically distributed manner.

2.Related Result Achievements

VPN services, even running in distributed servers are not new, and there're existing VPN solutions with multiple points. For example, Cisco's Dynamic Multipoint VPN (DMVPN) uses distributed “Spokes” to resolve the scalability problem of traditional VPN system [4]. Compared to traditional dynamic VPN solutions, distributed VPN service in Cloud environment can truly dynamically adjust the scale of the system, and save the resources through careful evaluation and prediction of the resources and sophisticated designed load balancing algorithm. In cloud computing environment, there're efforts like [9][10][14] to use dynamic VPN to isolate a portion of public computing resources for single enterprise to improve security.

In this paper, we will try the other end, to design a dynamic VPN solution for public use on the top of some infrastructural cloud services.

3.Related Technology and Research Achievements

A. Hyper-V

Hyper-V™ is a Microsoft® technology that enables the deployment of virtual servers. Hyper-V is essentially a hypervisor technology, enabling a single physical machine to operate multiple operating systems simultaneously. Microsoft offers a stand-alone version of Hyper-V for free, along with a version that can be installed on particular operating systems such as Microsoft Server 2008[12]. Hypervisor turns a single real multiprocessor x64 machine with virtualization extension into a number of many virtual multiprocessor x64 machines . These virtual machine includes additional machine instructions to create other virtual machines.[7].

B. Cloud Computing

Cloud computing provides convenient, on-demand network access to a shared pool of configurable computing resources—networks, servers, storage, applications, and services—that can be rapidly provisioned and released with minimal management effort or service provider interaction [13]. It offers organizations a way to increase capacity or add capabilities instantaneously without investing in new infrastructure, training new personnel, or licensing new software.



Will Cloud computing kill the traditional outsourcing industry?

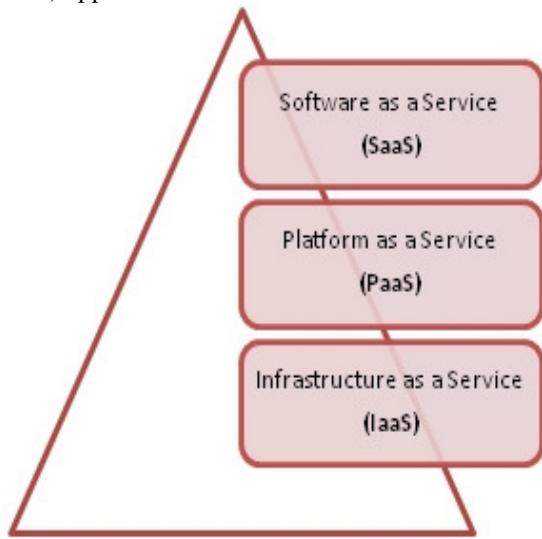
provided by Salesforce.com and infrastructure-as-a-service (IaaS) platforms like Amazon Web Services. Private clouds are apps or platforms dedicated to a specific organization and deployed on-premises, usually behind the firewall. In this paper Hyper-v platform is described for establishing the private cloud.

In addition, NIST defines three types of delivery models. Software-as-a-Service (SaaS) means that a consumer uses a provider's software applications running on a cloud infrastructure, for instance, Amazon Flexible Payments Service.

Platform-as-a-Service (PaaS) means that consumers can use a database, middleware, software development tools and other infrastructure software that has been previously deployed and configured by a cloud provider.

Finally, Infrastructure-as-a-Service (IaaS) provides processing, storage, networks, and other computing capabilities to consumers allowing them to deploy and run operating systems and applications. Cloud computing encompasses any subscription-based service that, in real time over the Internet, extends IT's existing capabilities. 1

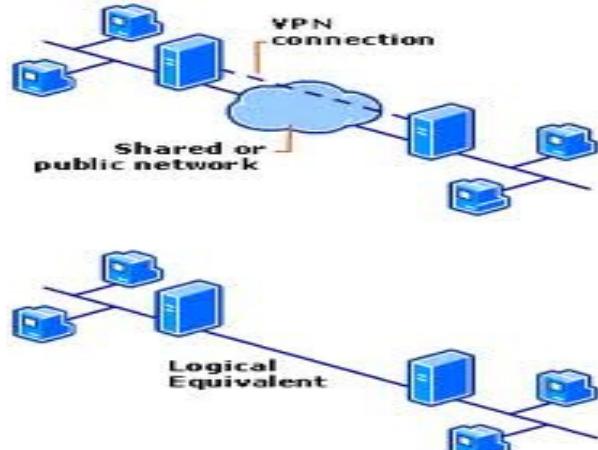
Public clouds generally refer to software-as-a-service (SaaS) apps like those



C. VPN Technology

VPN (virtual private network) is a private data network that makes use of the public telecommunication infrastructure, maintaining privacy through the use of a tunneling protocol and security procedures[5]. There are various existing VPN solutions which are different in topology, encryption method, underlying tunneling protocol, routing algorithm, etc.

In this paper, we don't pay attention to the details of VPN technology. To prepare for the following sections, we only need to know VPN service is an overlay network service that can connect a remote host to an inner network through public lines (e.g. Internet). This connection is almost always encrypted to secure the data transmitted, and emulated to some common protocol to provide a transparent service in the remote host. After the establishment of the VPN connection, the data flow from/to the remote host will be tunneled through the VPN service provider in some specific encapsulation protocol.



Remote access VPN connection enable users
D. IaaS

Infrastructure as a Service (IaaS). Cloud consumers directly use IT infrastructures (processing, storage, networks, and other fundamental computing resources) provided in the IaaS cloud. Virtualization is extensively used in IaaS cloud in order to integrate/decompose physical resources in an ad-hoc manner to meet growing or shrinking resource demand from cloud consumers. The basic strategy of virtualization is to set up independent virtual machines (VM) that are isolated from both the underlying hardware and other VMs. Notice that this strategy is different from the multi-tenancy model, which aims to transform the application software architecture so that multiple instances (from multiple cloud consumers) can run on a single application (i.e. the same logic machine). An example

of IaaS is Amazon's EC2.. According to a report of Gartner [11], SaaS revenue accounts for over 10 percent of the combined markets in 2009, and this figure will increase to more than 16 percent in 2014.

4.Elastic VPN Model For Private Cloud

Private cloud. The cloud infrastructure is operated solely within a single organization, and managed by the organization or a third party regardless whether it is located premise or off premise. The motivation to setup a private cloud within an organization has several aspects. First, to maximize and optimize the utilization of existing in-house resources. Second, security concerns including data privacy and trust also make Private Cloud an option for many firms. Third, data transfer cost [2] from local IT infrastructure to a Public Cloud is still rather considerable. Fourth, organizations always require full

control over mission-critical activities that reside behind their firewalls. Last, academics often build private cloud for research and teaching purposes.[8]

Through the HyperV method first virtual machine is prepared. VM Cloud computing services with virtual machines (VM) which are dynamically provided over networks have become increasingly popular. Almost all users can utilize the VMs without even being aware of the geometrical locations and the physical network topology of the servers, on which VMs are running. Network functions, such as firewall, datacaching and data-compression, are necessary for computing environments, and are usually implemented in individual servers. If the functions are separated from the servers, the servers implementing the functions can be consolidated. The consolidation is expected to result in a cost reduction and an enhancement of manageability. The challenge is to establish connection methods among the VMs and servers implemented with the functions, because VMs are assigned dynamically.

After this we proceed for the preparation of VPN network and when the network is successfully established than we do the load balancing by using the algorithm which is used for rapid elasticity. For consumers, computing resources become immediate rather than persistent: there are no up-front commitment and contract as they can use them to scale up whenever they want, and release them once they finish to scale down. Moreover, resources provisioning appears to be infinite to them, the consumption can rapidly rise in order to meet peak requirement at any time. So for achieving this we use the algorithm which gives better performance which is introduced below.

The NLB means the Network load balancing which is a part of balancing the network and gives the dynamic cloud in VPN. The DNS Round Robin Algorithm is used in it which can perform to manage server connection.

This elementary “load balancing” mechanism works as soon as a DNS query is made. When a client attempts to access the Website, a local DNS lookup is performed to determine what the corresponding IP address is. The first time this query is made, the remote DNS server returns all the address records it has. The local DNS server then determines what address record to return to the client. If all records are returned, the client will take the first one that it is given. With each request, the Round Robin algorithm rotates the order in which the address records are returned, so each DNS query will result in a client using a different IP address. When the fourth query is made, the address records are returned in the same order as the first. This process effectively distributes the load across all servers. It is extremely simple to implement and scales quite well. However, there are a number of

significant disadvantages in using it. First and foremost, some clients will cache the lookups they've performed in order to improve performance. Second Successive queries may not be performed because the address resolution has already been performed. The end result is that the same IP address record will be returned to multiple clients. This caching all but breaks this load balancing scheme. Secondly, RRDNS doesn't deal well with machines that are non-responsive. The DNS server has absolutely no means for monitoring the health of individual hosts. Consequently, a DNS server using the Round Robin algorithm could very well return the IP address of a server that has been turned off or one that's on but has had its web service crash. Lastly, there are occasions when session state is important and you need to tie a client to the same server, which is something that cannot be done using Round Robin DNS.

5.Result and Future Work

This elastic VPN model can perform better in private cloud with respect to availability and scalability , through which the total cost can be reduced effectively for IT industry small-medium-sized. With the help of this model security is also can be maintained because of secure VPN model. For the future this model can be enhanced by using different topologies. The effects of caching will distort the effectiveness of any IP address allocation algorithm unless a 0 TTL is used - which has the effect of significantly increasing the load on the DNS and is not always implemented consistently. We have great load balancing but with the 0 TTL worked consistently we need 17 more DNS servers! This can be improved for further experiments.

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