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Developing ISP and Database on Cloud Computing Using Load Balancing

KEYWORDS: Cloud Computing, ISP and Load balancing

Reshu Kharbanda	Ram Kumar Singh
Computer Science & Engineering	Computer Science & Engineering SITE, Swami Vivekanand Subharti University, Meerut, India

ABSTRACT *We define cloud computing as a computing paradigm where services and data reside in shared resources in scalable data centres, and those services and data are accessible by any authenticated device over the Internet our proposed work is that Cloud architecture is used to build an Internet Service provider that avails the clients to use the internet with the uniqueness of access to the server side. Cloud balancing approach extends the architectural deployment model of traditional load balanced servers to be used in conjunction with global load balanced servers off the cloud. Using load balancing method to distribute workload across one or more servers, network interfaces, hard drives, or other computing resources. This provides for new opportunities and economies-of-scale, as well as presenting its own unique set of challenges.*

INTRODUCTION

Cloud computing is a new term in the computing world and it signals the advent of a new computing. This new paradigm is quickly developing and attracts a number of customers and vendors alike. The quick development of cloud computing is being fuelled by the emerging computing technologies which allows for reasonably priced use of computing infrastructures and mass storage capabilities.

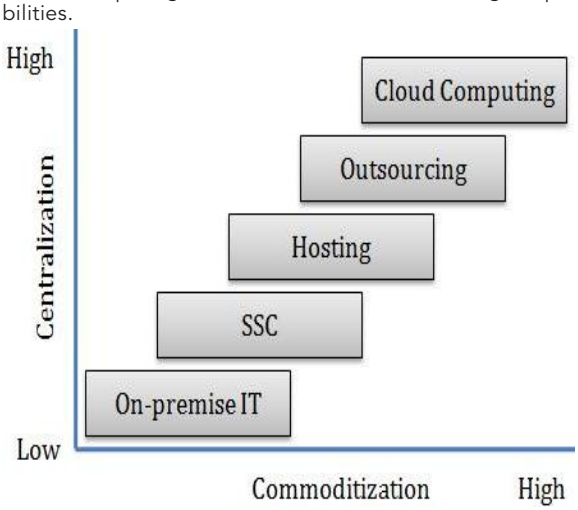

Figure 1: Paradigm shift in IT

Cloud computing provides greater flexibility and agility as new applications and services can be deployed in less time. These challenges need to be understood and managed before attempting to take advantage of what the cloud has to offer. In this paper, a cloud life cycle approach is introduced. Over the past years, the servers were shared with other businesses in shared service centres (SSC), while recently they have been outsourced to third parties. Cloud computing is the next central step in this evolution of IT, as depicted in Figure 1.

BACKGROUND

Load Balancing is a method to distribute workload across one or more servers, network interfaces, hard drives, or other computing resources. The goal of a cloud-based architecture is to provide some form of elasticity, the ability to expand and contract capacity on-demand. The implication is that at some point additional instances of an application will be needed in order for the architecture to scale and meet demand. That means there needs to be some mechanism in place to balance requests between two or more instances of that application. The mechanism most likely to be successful in performing such a task is a load balancer. In our Project cloud architecture is used to divert a request from an I-CAP Server(Self Designed) to the load balancers with the help of round robin technology and virtually the space is allocated to the request to be processed and with the help of cloud data can be travelled easily and available to the balancer which finally sends the Data (IP+URL) to the sites or links recognizing the authorization of the user o access the given URL.

CLOUD COMPUTING MODELS

Cloud computing models can be broken into three basic designs, which are shown here and described below.

Infrastructure-as-a-Service (IaaS): As the name implies, you are buying infrastructure. You own the software and are purchasing virtual power to execute as needed. This is much like running a virtual server on your own equipment, except you are now running a virtual server on a virtual disk. This model is similar to a utility company model, as you pay for what you use. An example is Amazon Web Services at http://aws.amazon.com/.

Platform-as-a-Service (PaaS): In this model of cloud computing, the provider provides a platform for your use. Services provided by this model include all phases of the system development life cycle (SDLC) and can use application program interface (APIs), website portals, or gateway software. Buyers do need to look closely at specific solutions, because some providers do not allow software created by their customers to be moved off the provider's platform. An example of PaaS is GoogleApps.

Software-as-a-Service (SaaS): This model is designed to provide everything and simply rent out the software to the user. The service is usually provided through some type of front end or web portal. While the end user is free to use the service from anywhere, the company pays a per use fee. Salesforce.com offers this type of service.

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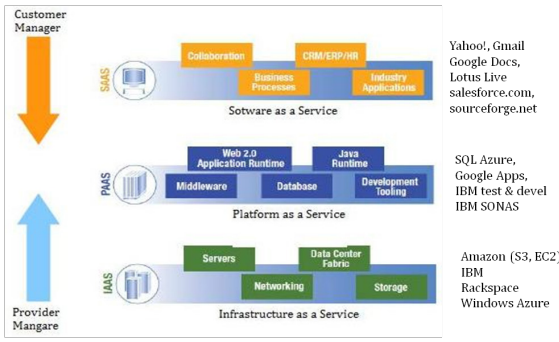

Figure 2: Cloud computing service delivery models

INTERNET SERVICE PROVIDER (ISP)

An ISP is a company that supplies Internet connectivity to home and business customers. ISPs support one or more forms of Internet access, ranging from traditional modem dial-up to DSL and cable modem broadband service to dedicated T1/T3 lines.

More recently, wireless Internet service providers or WISPs have emerged that offer Internet access through wireless LAN or wireless broadband networks.

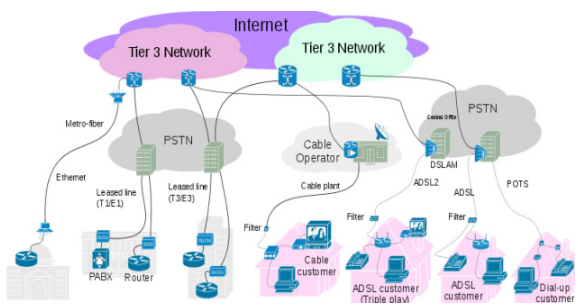

Figure 3: Structure of ISP

A few companies also offer free ISP service to those who need occasional Internet connectivity. These free offerings feature limited connect time and are often bundled with some other product or service.

Classification of ISP

Information service providers can be classified according to the kind of information they deliver. We distinguish five different roles that a stakeholder can take on:

Application Service Provider: The service of an application service provider comprises the lease of usage time of software applications they own. The application software provider takes care of maintenance and management of the software. Examples of such applications SAP and FileMaker.

Content Provider: Content providers collect, organize, and present information. There are content providers as, for instance, Market watch and CNN, which specialize on certain topics. Other content providers help people to find information quicker (e.g. Yahoo).

Internet Retailer: A stakeholder in the role of an Internet retailer sells products on the Internet. Examples for product retailers are Amazon.com and Barnesandnoble.com.

Communication Service Provider: The communication service provider offers services like Internet telephony, email, web-site hosting, or fax. Companies like Net2Phone, AOL, and efax.com belong to this group of Internet service providers.

Market Place Provider: A market place provider operates and maintains an environment for service providers and consumers to offer, respectively, request services. In both cases, consumers can easily evaluate services. Examples of this kind of service provider BandX and RateXchange.

INTERNET ACCESS TECHNOLOGIES

The connection between your Internet enabled device and the global network is executed through a specific digital data transmission technology. It represents the transfer of information packets through an Internet Protocol route. According to the method of data transmission, the Internet access that ISPs provide to users can be divided into several types, the most popular of which are:

Dial-Up Internet Access

This is the oldest method of providing access to the Internet. It uses a telephone line to perform a modem-to-modem connection. The dial-up Internet is today considered outdated in most Internet societies due to the slow connection speed it ensures (about 40-50 kbps).

DSL (Digital Subscriber Loop)

DSL is an advanced version of the dial-up Internet access method. In contrast to dial-up, DSL uses high frequency to execute a connection over the local telephone network. This allows the Internet and the phone connections to be run on one and the same telephone line.

Cable Internet

The cable Internet is among the most preferred methods for providing residential Internet access. To use cable Internet you will need a cable modem at home that will be connected with the CMTS (Cable Modem Termination System) of your cable ISP. The cable Internet access can be offered together with a cable television subscription and separately, for customers' convenience.

Wireless Broadband (WIBB)

This is a new-generation broadband Internet access technology, allowing the delivery of high-speed wireless Internet within a large area. Wireless broadband ISPs (WISPs) ensure connection speeds that come close to the wired broadband speeds provided by DSL and cable ISPs.

Wi-Fi Internet

Wi-Fi has become one of the most widely distributed Internet access methods, with the growing usage of portable computers and Internet enabled mobile devices, such as smart phones, PDAs, game consoles, etc. Due to its ability to serve mobile devices, Wi-Fi is used in public places such as airports, hotels and restaurants to provide Internet access to customers. There are also specialized Wi-Fi hotspots where the service is either free or paid. Some of the largest cities in the world are in the process of building Wi-Fi networks that cover all the public places in the central areas.

ISDN

Another online data transmission method worth considering is ISDN (Integrated Services Digital Network). ISDN represents a telephone system network, integrating a high-quality digital transmission of voice and data over the ordinary phone line. Ensuring a much better data transmission over the phone line than an analog line could allow, the ISDN offers a fast upstream/downstream Internet connection speed of 128 kbps.

Ethernet

Another Internet access type worth mentioning is Ethernet - the most widespread wired LAN (local area network) technology, also used in wireless LANs. The Ethernet technology may ensure various speed levels and can thus be divided into several types: regular Ethernet, providing transmission speeds of up to 10 mbps, fast Ethernet, offering up to 100 mbps, gigabit Ethernet, supporting 1 gbps and 10-Gbit Eth-

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ernet, coming at up to 10 gbps.

Load Balancing Servers in Cloud Computing
Load Balancing is a method to distribute workload across one or more servers, network interfaces, hard drives, or other computing resources. Load balancing ensures that all the processor in the system or every node in the network does approximately the equal amount of work at any instant of time. Load balancing in the cloud differs from classical thinking on load-balancing architecture and implementation by using commodity servers to perform the load balancing. This provides for new opportunities and economies-of-scale, as well as presenting its own unique set of challenges.

Load balancing is used to make sure that none of your existing resources are idle while others are being utilized. To balance load distribution, you can migrate the load from the source nodes (which have surplus workload) to the comparatively lightly loaded destination nodes.

When you apply load balancing during runtime, it is called dynamic load balancing — this can be realized both in a direct or iterative manner according to the execution node selection:

In the iterative methods, the final destination node is determined through several iteration steps.

In the direct methods, the final destination node is selected in one step.

Types of Load balancing algorithms
Depending on who initiated the process, load balancing algorithms can be of three categories as:

Sender Initiated: If the load balancing algorithm is initialized by the sender.

Receiver Initiated: If the load balancing algorithm is initiated by the receiver.

Symmetric: It is the combination of both sender initiated and receiver initiated.

Depending on the current state of the system, load balancing algorithms can be divided into two categories as given:

Static: It does not depend on the current state of the system. Prior knowledge of the system is needed.

Dynamic: Decisions on load balancing are based on current state of the system. No prior knowledge is needed. So it is better than static approach. Here we will discuss on various dynamic load balancing algorithms for the clouds of different sizes.

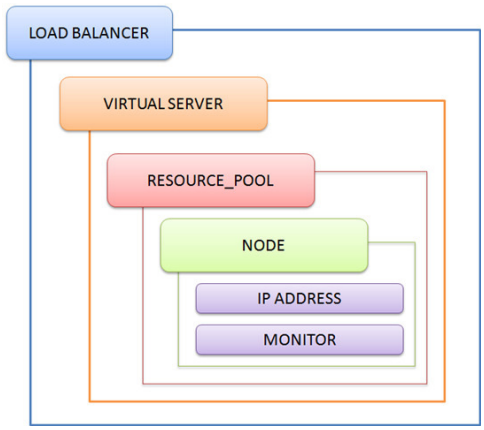

Figure 4: Load Balancer
Strategies in dynamic load balancing
There are four policies:

Transfer Policy: The part of the dynamic load balancing algorithm which selects a job for transferring from a local node to a remote node is referred to as Transfer policy or Transfer strategy.

Selection Policy: It specifies the processors involved in the load exchange (processor matching)

Location Policy: The part of the load balancing algorithm which selects a destination node for a transferred task is reffered to as location policy or Location strategy.

Information Policy: The part of the dynamic load balancing algorithm responsible for collecting information about the nodes in the system is reffered to as Information policy or Information strategy.

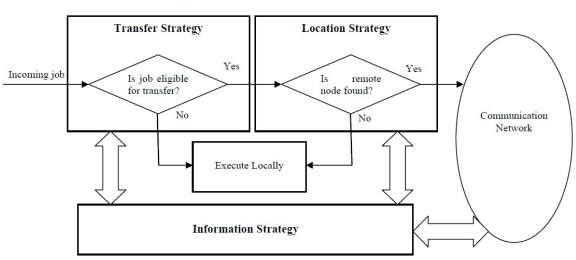

Figure 5: Interaction among components of a dynamic load balancing algorithm

CONCLUSION

The concept of load balancing, types of load balancing algorithms, general idea about dynamic load balancing algorithms and the different policies that can be used in it. Till now we have discussed on basic concepts of Cloud Computing and Load balancing. In addition to that, the load balancing technique that is based on ISP has been discussed. Researchers can proceed to include the fault tolerance issues in their future researches.

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