International Journal of Advanced Computer Research (ISSN (print): 2249-7277 ISSN (online): 2277-7970)
Volume-1 Number-1 Issue-1 September 2011

Cloud Aggregation and Bursting for Object based Sharable Environment

Pradeep Kumar Tripathi[1], Surendra Mishra[2], Pankaj Kawadkar[3]
M.Tech Scholar, Department of Computer Science, SSSIST Sehore, India[1]
Head, PG Department of Computer Science, SSSIST Sehore, India[2]
Head, MCA, SSSIST Sehore, India[3]

Abstract

Cloud computing promises innate scalability and high availability at low cost. So far cloud storage deployments were subject to big companies but an increasing amount of available open-source systems allow also smaller private cloud installations. In this paper we discuss cloud aggregation and cloud bursting with their empirical review. Based on the review we map class and object in the sharable small clouds for making clouds more efficient. We also consider some of the security concern for the cloud computing for authorized data sharing between clouds.

Keywords

Cloud Aggregation, Cloud Bursting, Object mapping, Security

1. Introduction

The term Cloud first appeared in the early 1990s, referring mainly to large ATM networks. Cloud computing began in the beginning of this century, just a short nine years ago with the advent of Amazon‘s web-based services. Less than three years ago, Yahoo and Google announced plans to provide cloud computing services to some countries‘largest universities: Carnegie Mellon, University of Washington, Stanford and MIT [1]. The IBM quickly announced plans to offer cloud computing technologies. More recent entries into the encounter include well-known companies: Sun, Intel, Oracle, SAS and Adobe. All of these companies invested mightily in cloud computing infrastructure to provide vendor-based cloud services to the masses [2].

Cloud computing has become a buzzword of today. Cloud Computing is not a completely new concept; it has intricate connection to the established Grid Computing paradigm, and other relevant technologies such as utility computing, cluster computing, and distributed systems in general [3]. The term cloud is used as a metaphor for the internet.

Cloud Computing is a concept of computing in which dynamically scalable and often virtualized resources are provided as a service over the internet. Cloud Computing consists of hardware and software resources made available on the internet as managed by third-party services. These services typically provide access to advanced software applications and high-end networks of server computers. To get Cloud Computing to work, three things are required: thin clients (or clients with a thick-thin switch), grid computing, and utility computing. Grid computing links disparate computers to form one large infrastructure, harnessing unused resources. Utility computing is paying for what users use on shared servers like consumers pay for a public utility such as electricity, gas, and so on [4].

Public cloud or external cloud describes cloud computing in the traditional mainstream sense, whereby resources are dynamically provisioned on a fine-grained, self-service basis over the Internet, via web applications/web services, from an offsite third-party provider who share resources and bills on a fine-grained utility computing basis [5].

Private clouds are built exclusively for a single enterprise. They aim to address concerns on data security and offer greater control, which is typically lacking in a public cloud. Fig 1 shows public and private cloud. We also emphasize on private cloud so that security concern is applied in the entire sharable mode.

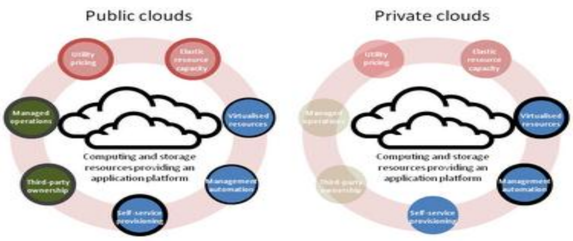

Fig 1. Public and private Cloud

We provide here an overview of executing data mining services on grid. The rest of this paper is arranged as follows: Section 2 introduces computing in the cloud; Section 3 describes about cloud bursting; Section 4 shows the cloud aggregation; Section 5 describes the security issues. Section 6 describes Conclusion. Section 7 includes the references.

2. Computing in the cloud

Cloud computing is a new and promising paradigm delivering IT services as computing utilities [6]. It overlaps with some of the concepts of distributed, grid and utility computing; however it does have its own meaning. Cloud computing is the notion accessing resources and services needed to perform functions with dynamically changing needs. An application or service developer requests access from the cloud rather than a specific endpoint or named resource.

The cloud is a virtualization of resources that maintains and manages itself [7].The big advantage of cloud computing is that scalability and almost 24=7 availability is guaranteed by the service vendor.
In general it is a combination of several concepts like software as a service (SaaS), platform as a service (PaaS) and infrastructure as a service (IaaS) [7].SaaS "Software as a service" is a business model that provides software on demand. A vendor offers a piece of software, which can be used with a web browser and usually is not installed on the client side. An example for SaaS is Google Docs [8] or Gmail.
PaaS Providers of "platform as a service" allow you to build your own applications on their infrastructure. Customers are usually restricted to use the vendor's development software and platforms. Examples are Google App Engine [9], Facebook [10] or Microsoft's Azure [11].

IaaS "Infrastructure as a service" seems to be the next big step on the IT market. Compared to PaaS there is usually no restriction for a customer. The idea is that everybody can rent any amount and size of services and virtual servers they need and has fully access to the infrastructure.

At a high level, there are a few usage models of Cloud computing that have begun to take shape. SaaS or Software as a Service is what is generally thought of when you consider services like Google Apps. Let's face it, from the end user and SOHO crowd; to big businesses that are making use of services like Sales force, you can see the huge value in outsourcing certain applications, not only from a cost standpoint but for ease of use and collaborative efforts. Then there's Utility Computing, another variation on the Cloud concept, that offers raw virtual server resources to corporate entities, IT departments, and even educational institutions. Need more capacity or throughput from your Data Center Just provision more resources with a place like Liquid Computing and kick back for a coffee break. Not to mention, you'll probably sleep better at night because someone else has built the infrastructure for you already that will cover your assets, so to speak, should some sort of catastrophic hardware or other failure take place.

In the final analysis, there's no question that Cloud Computing, Grid Computing, Utility Computing or whatever else you'd like to call it, is definitely the wave of the future for many applications and usage models. Granted, the average power user or enthusiast will likely still have a powerful desktop or notebook system for many years to come. However there's something taking shape on the horizon that looks a little like Web 2.0 for computing hardware and compute resources a shared, collaborative and leased commodity, always accessible and shaped by the customer. It's a compelling business case to be sure with lots of competition filing into the market place.

3. Cloud Bursting

Cloud bursting is a new paradigm that applies an old concept to cloud computing. It describes the procedure in which new servers are rented if needed and returned if not needed anymore. Cloud bursting represents the dynamic part of computing in the cloud.

Having cloud environment in mind, cloud bursting means that if the system is overloaded for any reason, the load balancer automatically integrates new nodes from the cloud. The big advantage of this is that without any human interaction a highly scalable system is available. The system grows and shrinks depending on the load and because of that automatically minimizes the overall cost.

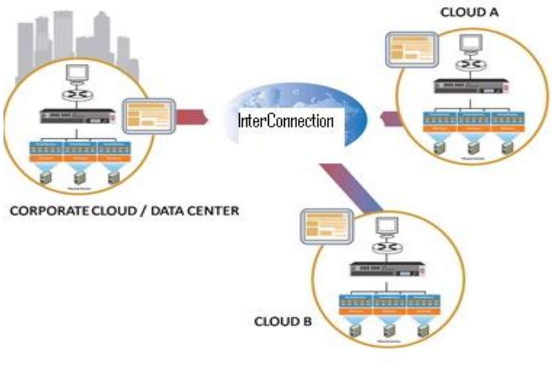

Fig 2. Cloud interconnection

Cloud bursting has already been talked to death but just as a refresher cloud bursting is the practice of "bursting" into a cloud when capacity has been reached in the corporate cloud/data center. The business case for cloud bursting primarily revolves around seasonal or event-based peaks of traffic that push infrastructure over its capacity but is not consistent enough to justify the cost of investing in additional hardware that would otherwise sit idle.

Cloud bursting takes advantage of global application delivery (load balancing) or some strategic control point that acts very much the same - as a means to provide nearly immediate redirection of requests to an external cloud in the event that corporate resources are depleted. When a request is received the global load balancer decides which data center (corporate or cloud) should handle the request based on its understanding of capacity. Other variables can of course, be introduced, but basing the decision on where to route a request on other business or technical metrics immediately moves the architecture into one of cloud balancing, not cloud bursting.

So basically there's a rule that tells the global application delivery solution to direct requests to CLOUD A or CLOUD B when the CORPORATE CLOUD is near or at capacity. It's a bit more complex than that in implementation, of course, but when distilled down to its basic operations, it really is that simple.

Cloud balancing is the routing application requests across applications or workloads that reside in multiple clouds. It assumes that all instances of the application deployed in the various clouds are accessible at all times, which makes it different than cloud bursting as bursting may actually require the deployment and/or launching of the application at a remote cloud. Cloud balancing is not simply load balancing across clouds. The simplification of load balancing down to a dumb process is part of what causes problems with the definition of such concepts. If one assumes that load balancing in general is a rudimentary, dumb process that has no awareness of context and no ability to make intelligent routing decisions then I suppose that the misconception that cloud balancing and cloud bursting have very little in common makes more sense.

But load balancing has not been, for quite some time, dumb. It evolved years ago into what analysts and vendors call "application delivery" and it is capable of quite intelligent, on-demand request routing based on everything from technical to business metrics. Cloud balancing requires that level of intelligence; it requires a context-aware decision maker that can collaborate with the rest of the infrastructure and solutions providing business-level metrics and information in order to make a decision, in real-time, regarding which "cloud" should respond to any given request. Service-level agreements, business metrics, response time, capacity, cost, power, etc... Any one or combination of these variables can provide the basis for deciding how to route a request.

So basically there's a set of rules that tell the global application delivery solution to direct requests to CLOUD A or CLOUD B or the CORPORATE CLOUD when certain conditions exist. Those conditions are contextual, which is why the notion of context-awareness in application delivery solutions in general is an imperative when architecting a cloud-based (on-demand) infrastructure.

Consider the case of a company owning their own cloud infrastructure, a private cloud and willing to use resources from an external cloud provider, for certain time intervals and given certain circumstances triggering this use. Such a capability, termed cloud bursting, would enable the organization to scale out their infrastructures and rent the resources from a third-party provider if and when needed, in a seamless manner. The renting of the external resources exponentially improves the elasticity of the company's IT infrastructure and allows them to confront the fluctuations on demand dynamically. In this section we look into the salient features and requirements for implementing a cloud bursting capability.

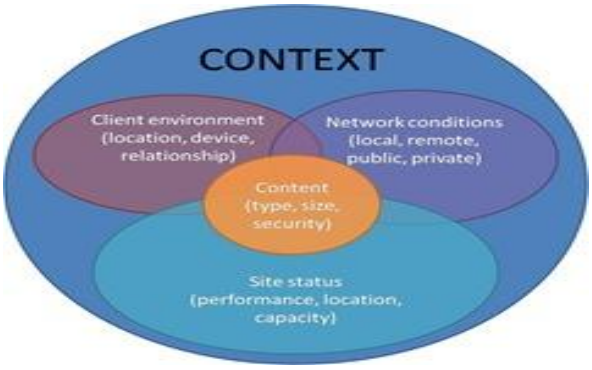

Fig 3. Cloud Context

4. Cloud Aggregation

Cloud Aggregation. Research challenges in the aggregation of resources from diverse cloud providers adding additional layers of service management.

- Novel architectural models for aggregation of cloud providers
- Brokering algorithms for high availability, performance, proximity, legal domains, price, or energy efficiency
- Sharing of resources between cloud providers
- Networking in the deployment of services across multiple cloud providers
- SLA negotiation and management between cloud providers
- Additional privacy, security and trust

management layers atop providers

- Support of context-aware applications
- Automatic management of service elasticity

Cloud Management. Research challenges in delivering infrastructure resources on-demand in a multi-tenant, secure, elastic and scalable environment.

- Scalable management of network, computing and storage capacity
- Scalable orchestration of virtualized resources and data
- Placement optimization algorithms for energy efficiency, load balancing, high availability and QoS
- Accounting, billing, monitoring and pricing models
- Security, privacy and trust issues in the cloud
- Energy efficiency models, metrics and tools at system and datacenter levels

Cloud Enablement. Research challenges in enhancing platform infrastructure to support cloud management requirements.

- Technologies for virtualization of infrastructure resources
- Virtualization of high performance infrastructure components
- Autonomic and intelligent management of resources
- Implications of Cloud paradigm on networking and storage systems
- Support for vertical elasticity
- Provision of service related metrics

Cloud Interoperability. Challenges to ensure that the available cloud services can work together and interoperate successfully.

- Common and standard interfaces for cloud computing
- Portability of virtual appliances across diverse clouds providers

The above phenomena are shown in fig 4.

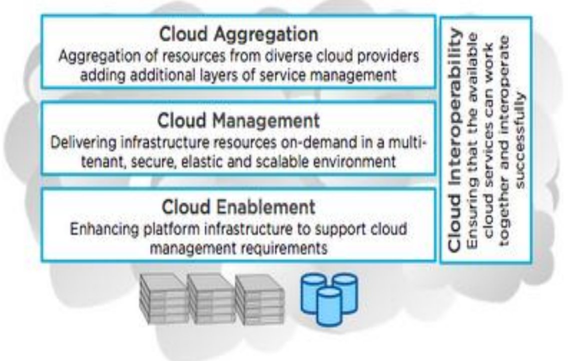

Fig 4. Cloud Aggregation and management

However the lack of mature operational models like that of cloud bursting and cloud brokerage has meant that the cloud capabilities have not yet been developed and researched to a level that allows their exploitation to a full degree. This has contributed to a lack of uptake of the cloud computing model in all but the simplest of enterprise IT setups. In future we can implement those aspects using practical approach.

5. Security Issues

Privileged user access
Sensitive data processed outside the enterprise brings with it an inherent level of risk, because outsourced services bypass the physical, logical and personnel controls IT shops exert over in-house programs.

Regulatory compliance
Customers are ultimately responsible for the security and integrity of their own data, even when it is held by a service provider. Traditional service providers are subjected to external audits and security certifications. Cloud computing providers who refuse to undergo this scrutiny are signalling that customers can only use them for the most trivial functions.

Data location
When users use the cloud, they probably won't know exactly where their data will be hosted. In fact, they might not even know what country it will be stored in. Service providers need to be asked if they will commit to storing and processing data in specific jurisdictions, and whether they will make a contractual commitment to obey local privacy requirements on behalf of their customers.

Data security
Security refers to confidentiality, integrity and availability, which pose a major issue for cloud vendors. Confidentiality refers to who stores the encryption keys data from company A, stored in an encrypted format at company B must be kept secure from employees of B, thus the client company should own the encryption keys. Integrity refers that no common policies exist for approved data exchanges

Data recovery
Even if we don't know where your data is, a cloud provider should tell us what will happen to our data and service in case of a disaster.

6. Conclusion

Cloud computing promises infinite scalability and high availability at low cost. So far cloud storage deployments were subject to big companies but an increasing amount of available open-source systems allow also smaller private cloud installations. In this paper we discuss cloud aggregation and cloud bursting with their empirical review. Based on the review we map class and object in the sharable small clouds for making clouds more efficient. We also consider some of the security concern for the cloud computing for authorized data sharing between clouds. However the lack of mature operational models like that of cloud bursting and cloud brokerage has meant that the cloud capabilities have not yet been developed and researched to a level that allows their exploitation to a full degree. This has contributed to a lack of uptake of the cloud computing model in all but the simplest of enterprise IT setups. In future we can implement those aspects using practical approach.

References

[1] B. Raghavan, K. Vishwanath, S. Ramabhadran, K.Yocum, A.C. Snoeren. Cloud control with distributed ratelimiting. SIGCOMM Computer Communication Review,ACM, pp. 337-348 , October 2007.
[2] A. Croll. Why Cloud Computing Needs Security‖. 2008. Available at http://gigaom.com/2008/06/10/the-amazon-outage-fortresses-in-the-clouds.
[3] I. Foster, Y. Zhao, I. Raicu, S. Lu. ―Cloud Computing and Grid Computing 360-Degree Compared. In Proc. of IEEE Grid Computing Environments Workshop, pp.1-10, 2008- 2009.
[4] A. Velte, T. Velte, R. Elsenpeter .―Your organization and cloud computing. In Cloud Computing-A practical Approach, McGraw-Hill, pp.35-36, 2010.
[5] T. Grob, ―Security analysis of the SAML single sign on browser/artifact profile. In Proc. of 19th Annual Computer Security Applications Conference, pp.298-308,2003.
[6] R. Buyya, C. Yeo, S. Venugopal, M. Ltd, and A. Melbourne, "Market-oriented cloud computing: Vision, hype, and reality for delivering it services as computing utilities," in Proceedings of the 10th IEEE International Conference on High Performance Computing and Communications (HPCC-08, IEEE CS Press, Los Alamitos, CA, USA), 2008.
[7] "Twenty experts define cloud computing." http://cloudcomputing.sys-con.com/read/612375_p.htm.
[8] "Google docs." docs.google.com.
[9] "Google app engine." http://code.google.com/appengine/.
[10] "Facebook." www.facebook.com.
[11] "Azure service platform." www.microsoft.com/azure.