ISSN 2278-3091

Volume 5, No.3, May - June 2016

International Journal of Advanced Trends in Computer Science and Engineering

Available Online at http://www.warse.org/IJATCSE/static/pdf/file/ijatcse03532016.pdf

# Dynamic Elasticity: Cloud Computing

**Vipan Kumar**
Bahra University
Shimla Hills
restivevipan147@gmail.com

**Parul Sharma**
Himachal Pradesh University
Summerhill Shimla
parulsharmabu@gmail.com

**Abstract: The increasing use of computing machine in our daily lives, and our more and more dependence on computing machine has always created a new demand for better, capacity and workload over time in machine which can help in making our decision better. Cloud computing refers to on demand delivery of IT resources and applications via the internet with pay as you go pricing. Cloud computing provides a simple way to access servers, storage, data bases and a broad set of applications services over the internet. Dynamic elasticity is a particular cloud layer which can automatically adapts its capacity to workload over time. Elasticity is one of the major requirement for increasing cloud computing operations and its uses resources in elastic manner. Load balancing of virtual machine is a challenging task in cloud environment due to the dynamic in nature. The help of dynamic elasticity we can easily increase the workload of a computing machine, and also we can reduce the cost and increase the quality as well as quantity. Auto scaling phenomenon, help us to maintain applications availability and allows us to scale our AMAZON EC2 capacity up or down automatically. Auto scaling use automatically increases the number of AMAZON EC2 instances during demand.**

**Keywords***:* **Dynamic elasticity, Load balancing, Auto scaling, AMAZON EC2.**

## 1. INTRODUCTION

Dynamic elasticity is a key featuring in the cloud computing context and perhaps distinguishes this computing paradigm of the other ones, such as cluster and grid computing. [1]. Elasticity is used to contribute in establishing a common under-standing of this term in the context of cloud computing. [2]. Dynamic elasticity is the core principle of cloud computing. But, shared nothing data bases architecture does not support dynamic scalability. Shared disk databases architecture supports elastic and provides high availability. [3]. Virtualization technology provides good support to achieve aim of cloud computing like higher resources utilization, elasticity, reducing IT cost or capital expenditure to handle temporary load as well as cloud computing have various flexible service and deployment models which is one of the main issue of adopting this computing paradigm. Virtualization concepts have open shared nature which is responsible for the violation of security polices and laws as well as degrades their computing reputation and performance. [4].In cloud computing technology versatile works on scheduling and resources management algorithms. To improve elastic load balancing and reduce virtual machine migration time or count with its challenges.[5].The elasticity framework which contained different components like front-end load balancer, a virtual cluster monitor system and an auto-provisioning system. Elasticity techniques can easily handle load requirements, system performance, maintaining the higher resource utilization and reducing energy cost. [6].The impact of the rules used to increase or decrease capacity. In particular, we show that the default rules of a widely-used platform give poor elasticity, and that other rules do better on our measure. [8]. A new elastic application model that enables seamless and transparent use of cloud resources to argument the capability of resources-constrained mobile devices. This model include the partition of a single application into multiple components called web lets, web lets can be platform independent and also platform independent. Its execution location is transparent-it can be run on a mobile device or migrated to the cloud, i.e., run on one or more nodes offered by an IaaS provider. [7].

### 1.1 Reflections on Dynamic Elasticity

Dynamic Elasticity is a key feature in the cloud computing context and perhaps what distinguishes this computing paradigm of the others ones, such as cluster and computing. We propose a classification for elasticity mechanism, based on the main features found in the analyzed commercial and academic solution. We examined the core aspects of elasticity explicitly differentiating it conceptually from the classical notations of scalability and efficiency. [1] [2]. It concluded that the database architectures that can be used with cloud computing environment. There are two types of architecture one is shared-disk architecture and other one is shared-nothing architecture. Shared-Disk architecture is write-limited because the related locks must coordinate across the cluster. Shared-Nothing architecture is useful for systems that need high-throughput writes when you shard your data and must be clear about the transactions that span different shards. If we require scalability over consistency, we can use shared- nothing architecture, for a business system with two or three servers, Shared-Disk is the best option. Cloud computing have several benefits over traditional environment and have capability to handle most sudden, temporary peaks in application demand on cloud infrastructures. Virtualization technology provides good support to achieve aim of cloud computing like higher resource utilization, elasticity, reducing IT cost or capital expenditure to handle temporary loads as well as cloud computing have various flexible service and deployment models which is also one of the main issue adopting this computing paradigm. [3] [4].Versatile works on scheduling and resource management algorithms in cloud computing technology to improve elastic load balancing and reduce virtual machine migration time or count with its challenges. The elasticity techniques can easily handling sudden load requirements, increasing system performance, maintaining higher resource utilization and reducing energy cost. An elastic application can augment the capabilities of a mo- bile device including computation power, storage, and net-work bandwidth, with the light of dynamic execution configuration according to device's status including CPU load, memory, battery level, network connection quality, and user preferences [5] [6] [7].

### 1.2. Features of Dynamic Elasticity

- **Resources availability**: Scaling to larger sets of subscribers and resources is one of the important strategies for public clouds to achieve low costs and economies of scale. However, the elasticity of a cloud computing provider is limited by its capacity, and consequently, current public cloud providers have to impose strict limits on the amount of resources that a single user can acquire in each instant of time, neglecting the infinite resources premise .For instance, Amazon allows normal users request simultaneously 20 on-demand instances and 100 spot instances per region; in Rackspace, all accounts have a pre configured limit of 65 GB of total memory or approximately 130 individual 512 MB servers per region. Actually, for the vast majority of users the quota allowed is larger than their applications (generally, web applications) require. As resource-intensive, highly scalable applications begin to use cloud computing, however, they will begin to reach the scaling limits imposed by resources availability.

- **Clouds interoperability**. A possible solution to the resources availability problem is the use of multiple clouds to ensure the required amount of resources. Some academic works, have addressed this issue combining local and public clouds resources. However, the combined use of different public clouds remains challenging. The reason for the current poor portability and limited interoperability between clouds is the lack of standardized API's, and consequently, each cloud provider has its own way on how cloud clients/applications/users interact with the cloud. As a consequence the interaction and migration of virtual machines and applications between clouds is a hard (if not impossible) task. An evolution towards standardized API's would provide a firm basis to progress towards large scale elastic computing models. There are some initiatives attempting to create cloud standards. The Cloud Computing Interoperability Forum, are working on the creation an open and standardized cloud interface for the unification of various cloud API's. The IEEE also has a project (P2301) on cloud portability and interoperability.

- **Resources Granularity**: In most IaaS clouds, clients acquire resources as a fixed set of compute, memory, and I/O resources (instance types in Amazon and server sizes in Go Grid and Rackspace). However, renting a fixed combination of cloud resources cannot and does not reflect the interests of clients. The other related problem is that providers do not allow changing instance (or server) type without rebooting. The ability to dynamically mix different amounts of compute, memory, and I/O resources would be very valuable for real elasticity, since it could allow users to adjust the resources to their needs in a fine-grained fashion.

- **Startup time**: The great advantage of the elasticity is the ability to dynamically provision resources in response to demand. However, one important fact in this dynamic process is that though cloud users can make their acquisition requests at any time, it may take some time for the acquired resources to be ready to use. This time period is called startup time (or spin-up time). In a perfectly elastic cloud, resourcing is instantaneous, i. e., there is no time delay between detecting load changes and changing resourcing levels. However, in real world clouds, the startup time can vary (ranging from 1 to 10 minutes), depending on a number of factors including: type of cloud platform; operating system type; number, size, or speed of resources requested; the availability of spare resources in the requested region and the demand on the cloud platform from other users. Thus, the resources provisioning could be slower than expected, affecting the efficacy and efficiency of actual elasticity mechanisms in handling highly dynamic workloads. Some works present techniques to speed up the virtual provisioning process.

- **Tools and platforms for elastic applications development:** Much of the elasticity solutions implemented by public providers are appropriate for server-based applications, such as, http, e-mail and database, which relies on the replication of virtual machines and load balancers to distribute the workload among the numerous instances. There are some alternative tools and frameworks presented in the technical literature, but they still limited to a specific type of application and master-slave.

## 2. CLOUD COMPUTING: TRENDS AND DIRECTIONS

Cloud computing is a way to increase the capacity or add capabilities dynamically without investing in new infrastructure, training new personnel, or licensing new software. It extends Information Technology’s (IT) existing capabilities. In the last few years, cloud computing has grown from being a promising business concept to one of the fast growing segments of the IT industry [13]. Cloud computing is said to be an emerging new computing paradigm for delivering computing services. This computing approach relies on a number of existing technologies, e.g., the Internet, virtualization, grid computing, Web services, etc. The provision of this service in a pay-as-you-go way through (largely) the popular medium of the Internet gives this service a new distinctiveness [14].A consumer with an instantaneous need at a particular timeslot can avail computing resources (such as CPU time, network storage, software use, and so forth) in an automatic (i.e. convenient, self-serve) fashion without resorting to human interactions with providers of these resources [15].

## 3. CLOUD SERVICE MODEL

Cloud computing is a delivery of computing where massively scalable IT-related capabilities are provided ―as a service across the internet to numerous external clients. This term effectively reflects the different facets of the Cloud Computing paradigm which can be found at different infrastructure levels. Cloud Computing is broadly classified into three services: ―IaaS", "PaaS" and "SaaS” [9].

- **IaaS (Infrastructure as a service) model:-**The main concept behind this model is virtualization where user have virtual desktop and consumes the resources like network, storage, virtualized servers, routers and so on, supplied by cloud service provider. . Usage fees are calculated per CPU hour, data GB stored per hour, network bandwidth consumed, network infrastructure used per hour, value added services used, e.g., monitoring, auto-scaling etc. Examples: Storage services provided by AmazonS3, Amazon EBS. Computation services: AmazonEC2, Layered tech and so on [10].

- **PaaS (Platform as a service) model:-**It refers to the environment that provides the runtime environment, software deployment framework and component on pay to enable the direct deployment of application level assets or web applications. PaaS is a platform where software can be developed, tested and deployed. It means the entire life cycle of software can be operated on a PaaS. This service model is dedicated to application developers, testers, deplorers and administrators. Examples: Google App Engine (GAE), Microsoft Azure, IBM Smart Cloud, Amazon EC2, salesforce.com and jelastic.com and so on [11].

- **SaaS (Software as a service):-**Through this service delivery model end users consume the software application services directly over

Network according to on-demand basis. For example, Gmail is a SaaS where Google is the provider and we are consumers. Other well-known examples of PaaS include billing services provided by Arial system, op source. Financial services: Concur, workday, Backup and recovery services and so on [12].

## 4. CONCLUSION

In cloud computing the demand of the resources vary none uniformly over a period of time. As such the resource utilization is not the acceptable. One of the main principle in computer science, cpu utilization, resource utilization and performance should be high always. In cloud computing, if we can predict the demand beforehand then we can considerably increase the resource utilization along with overall profit to the organization. The proposed framework is designed to meet the demands of resources in a dynamic manner. The main aim of this study is to propose with a help of frame work which manage the elasticity in the demand of resources over a cloud dynamic allocation of resource and dynamic elasticity.

# REFERENCES


[1] Nikolas Roman Herbst, Samuel Kounev, Ralf Reussner," Elasticity in Cloud Computing: What It Is, and What It Is Not "Institute for Program Structures and Data Organisation Karlsruhe Institute of Technology Karlsruhe, Germany.

[2] Dr. M. Duraira, "Elastic Resource Allocation Challenges in Cloud computing System," School of Computer Science, Engineering and Applications, Bharathidasan University, Tiruchirappalli, India.

[3] Pancham Baruah, Impact of Elasticity on Cloud Systems," Department of Computer Engineering, Dr. D. Y. Patil School of Engineering and Technology, Charoli Bdk, Pune, India.

[4] Suruchee V.Nandgaonka," A Comprehensive Stud on Cloud Computing" Associate Professor, Computer Science and Engineering, H.V.P.M, C.O.E.T, Amravati, India.

[5] Dr.K.Chitra,"DES: Dynamic and Elastic Scalability in Cloud Computing Database Architecture, Dept of Computer Science Govt Arts College Melur, Madurai Dt, TN, India.

[6] Dr. Guilherme Galante," A Survey on Cloud Computing Elasticity" Department of Informatics Federal University of Paran´ a Curitiba, PR – Brazil.

[7] Xinwen Zhang, Anugeetha Kunjithapatham, Sangoh Jeong, Simon Gibbs," Towards an Elastic Application Model for Augmenting the Computing Capabilities of Mobile Devices with Cloud Computing", Huawei Research Center, 2014.

[8] Sadeka Islam, Kevin Lee, Alan Fekete, Anna Liu," How A Consumer Can Measure Elasticity for Cloud Platforms", University of New South Wales, Sydney, 2012.

[9] Puneet Singh Duggal, Sanchita Paul," Big Data Analysis: Challenges and Solutions" International Conference on Cloud, Big Data and Trust 2013, Nov 13-15, RGPV

[10] Tharam Dillon, Chen Wu and Elizabeth Chang" Cloud Computing: Issues and Challenges" Curtin University of Technology Perth, Australia, 2010 24th IEEE International Conference on Advanced Information Networking and Applications.

[11] S. Subashini, V. Kavitha," A survey on security issues in service delivery models of cloud computing", Anna University Tirunelveli, Tirunelveli, TN 627007, India, July 2010.

[12] Farzad Sabahi," Secure Virtualization for Cloud Environment Using Hypervisor-based Technology", Member, IEEE, Vol. 2, No. 1, February 2012.

[13] S. Subashini, V. Kavitha," A survey on security issues in service delivery models of cloud computing", Anna University Tirunelveli, Tirunelveli, TN 627007, India, July 2010.

[14] Nabil Sultan," Cloud computing for education: A new dawn?" Liverpool Hope University, Hope Park, Liverpool, L16 9JD, UK, 2010.

[15] Tharam Dillon, Chen Wu and Elizabeth Chang" Cloud Computing: Issues and Challenges" Curtin University of Technology Perth, Australia, 2010 24th IEEE International Conference on Advanced Information Networking and Applications.