ISSN : 2494-9150 Vol-02, Issue 01, APR 2016.

Study on Resource Allocation in Cloud Computing

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Abstract - Cloud computing is based on the concepts of virtualization, utility computing, grid computing, and distributed computing. It is an on-demand service because it offers active flexible resource distribution for consistent and guaranteed services in pay as-you-use style. In order to promise users requests, it becomes difficult to distribute resources accurately to the user demands as there are the rapidly increasing demands of the users for services or resources. Cloud computing service providers think to use the resources efficiently to get maximum profit and satisfy the customers. This leads resource allocation as a challenging issue in cloud system. This paper talks about the basics of cloud computing and Resource Allocation.

Keywords -- Cloud Computing, virtualization, resource allocation, scheduling, task, infrastructure

I. INTRODUCTION

To provide resources to the users, a group of computers or servers are interconnected together to form a cloud. This is an effective pool of resources which are provided to users via Internet. Virtualization, distribution and dynamic extendibility are the basic uniqueness of cloud computing.

Cloud computing can be considered as the next step in the growth of the Internet. The cloud in cloud computing provides the means in which everything from computing influence to computing infrastructure and applications, from business processes to personal association can be delivered as a service wherever and whenever required. Cloud computing can be defined as a new approach of computing in which vigorously scalable and commonly virtualized resources are offered as a services over the Internet. Cloud computing has turn into a significant technology style, and many experts be expecting that cloud computing will reform information technology (IT) processes and the IT marketplace[1].

II. TYPES OF CLOUD COMPUTING

Cloud computing is normally classified in three types as shown in Fig. 1.

A. Public cloud

In Public cloud the computing resource is possessed, governed and operated by government, an academic or business organization. The customer has no visibility and management over where the computing infrastructure is hosted. The computing infrastructure is shared between any institutions.

B. Private cloud

The computing infrastructure is devoted to a particular organization and not shared with other organizations. Some experts think that private clouds are not actual examples of cloud computing. Private clouds are more costly and more safe when compared to public clouds. Private clouds are of two types: On-premise private clouds and on the exterior hosted private clouds. Externally hosted private clouds are also exclusively used by one organization, but are hosted by a third party focusing in cloud infrastructure. Externally hosted private clouds are less costly than On-premise private clouds.

C. Hybrid cloud

Organizations may host serious applications on private clouds and applications with comparatively a smaller amount security concerns on the public cloud. The handling of both private and public clouds jointly is called hybrid cloud. A related word is Cloud Bursting. Here in Cloud bursting, institute use their own computing infrastructure for normal practice, but access the cloud using services like Sales force for high/peak load requirements. This ensures that an abrupt increase in computing requirement is handled kindly[2].

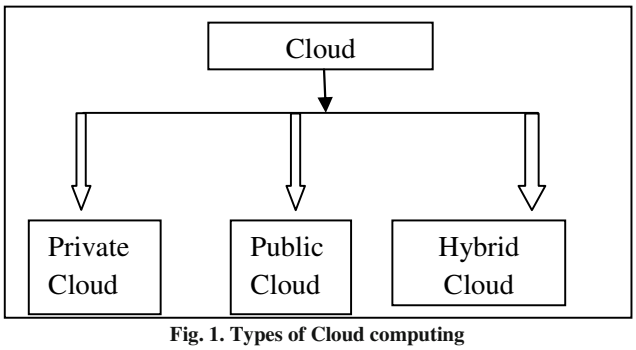

Fig. 1. Types of Cloud computing

ISSN : 2494-9150 Vol-02, Issue 01, APR 2016

Comparison between these three types of clouds is given in following table 1.

	Private	Public	Hybrid
Advantages	-Highly secure. -Enhancing service quality -Better control over the server	-Easy scalability - Cost effectiveness - Increased reliability	-Operational Flexibility -Scalability: run peak & bursty workload on public cloud.
Drawback	-High Investment -New operational processes are required.	-Low security -possibility to loss of control over data center function	-are still being developed. -Control of security between private and public cloud.
This can be the obvious choice when	-Your business is part of an industry that must conform to strict security and data privacy issues.	-Your standardized workload for applications is used by lots of people.	Your company offers services that are tailored for different vertical markets.

Table 1. Comparison between three types of clouds

III. CLOUD SERVICE DELIVERY MODELS

A. Infrastructure as a service

It gives computing infrastructure like network connections, virtual server space, load balancers, IP addresses and bandwidth. The pool of hardware resource is extracted from several servers and networks generally distributed across numerous data centers. IaaS(Infrastructure as a service) is a whole package for computing. For small level businesses who are looking for cutting cost on IT infrastructure, IaaS is one of the solutions. Lot of money is spent in maintenance and buying new components like hard-drives, network connections, and external storage device every year, which a business owner could have saved for other expenses by using IaaS. In the IaaS Customer charges for computing resources instead of buying and installing them in his own data center.

B. Platform as a service

Platform as a service, is known as PaaS, it provides a platform and environment to allow developers to construct applications and services. This service is hosted in the cloud and accessed by the users via internet. PaaS services are continuously updated and new features are added. Software developers, web developers and business can take advantage of PaaS. It provides platform to support application development. It contains software support and management services, networking, storage, testing, deploying, hosting, collaborating, and maintaining applications. The provider deliver middleware i.e. integrated set of software that provides everything a developer wants to build an application

C. Software as a service

Software as a service is model for software distribution, in which applications are maintained by a dealer or service provider and made available to customers over a network (internet). SaaS is a complete operating environment. It contains applications, management and the user interface. In the SaaS model, the application is provided to the user through a thin client interface (a browser, usually), and customers responsibility begins and ends with entering and managing its data user interaction[1][2].

IV. ADVANTAGES OF CLOUD COMPUTING

There are many advantages of cloud computing, the most basic ones being lesser costs, re-provisioning of resources and remote ease of access. By avoiding the capital expenses by the company in charging the physical infrastructure from a third party provider, Cloud computing lowers cost. Due to the elastic nature of cloud computing, we can speedily access more resources from cloud providers when we need to enlarge our business. The distant accessibility allows us to use the cloud services from anywhere at any time. To gain the maximum degree of the above declared advantages, the services presented in terms of resources should be allocated optimally to the application running in the cloud[3].

V. CLOUD COMPUTING ARCHITECTURE

Now we will see into the Cloud Computing and observe what Cloud Computing is made of. Basically Cloud computing contains two components first one is front end and second is back end as shown in Fig.2. Client part of cloud computing system is known as Front end. It comprises of interfaces and applications that are needed to access the cloud computing platform. Back end of cloud computing is the Cloud itself. It contains resources that are required for cloud computing services, which includes virtual machines, servers, data storage and security mechanism etc. Cloud computing spreads the file system over multiple hard disks and machines. Data is not saved in one place only and if one unit fails the other will take over routinely. The user disk space is allocated on the distributed file system, while another chief component is algorithm for resource allocation. Cloud computing is a strong scattered

ISSN : 2494-9150 Vol-02, Issue 01, APR 2016

environment and it heavily depends upon powerful algorithm[4][5].

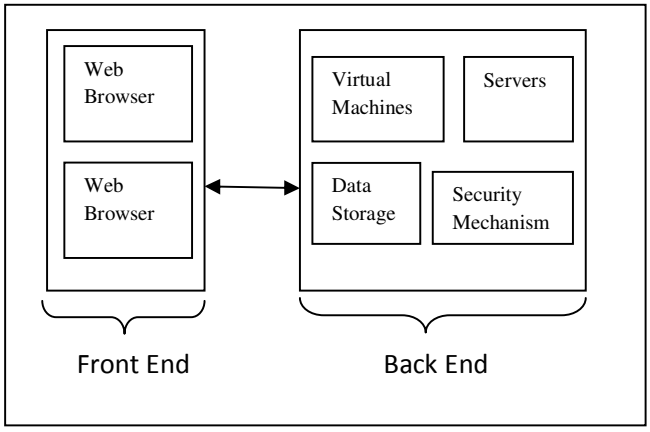

Fig. 2. Cloud computing Architecture

RESOURCE ALLOCATION

Resources in cloud computing is nothing but the source to supply the required computing need. These are of two types, Hardware resources and Software resources. Servers and data centers are hardware resources. Software running at client and server side, information and applications are software resources[6]. Resource Allocation is discussed in many computing areas, like datacenter management, operating systems and grid computing. A Resource Allocation System (RAS) in Cloud Computing can be considered as any system that intends to guarantee that the applications requirements are attended to properly by the provider's infrastructure. Along with this assurance to the developer, resource allocation mechanisms should also consider the present status of each resource in the Cloud environment, in order to affect algorithms to better allocate physical and/or virtual resources to developers' applications, thus reducing the operational cost of the cloud environment. A significant point when allocating resources for arriving requests is how the resources are modeled. There are many levels of abstraction of the services that a cloud can offer for developers, and many parameters that can be optimized during allocation. The modeling and explanation of the resources should consider at least these requirements in order for the RAS works properly. Cloud resources can be considered as any resource (physical or virtual) that developers may demand from the Cloud. For example, developers can have computational requirements, such as CPU, memory and storage and network requirements, such as bandwidth and delay. Additionally, other requirements are also feasible of Clouds, such as topology of the network of all nodes, maximum delay between nodes, interaction between different applications and jurisdiction issues. Generally, resources are positioned in a datacenter. These are used by several clients, and should be vigorously assigned and adjusted according to requirement. It is important to note that the developers and clients may see those finite resources as unlimited and the tool that will make this feasible is the RAS. The RAS should deal with these unpredictable requests in a flexible and transparent way. This flexibility should allow the dynamic use of physical resources, thus avoiding both the below-provisioning and above provisioning of resources[7].

There is massive need for the cloud services to schedule the resources as this scheduling will further followed by the job/task scheduling inside of the resources. There can be several instances of the single resource that they can be run simultaneously. There is requirement of checking of availability and consistency and also the load must be fair among the resources of the same type. For the above parameters there need to be a procedure or function that could check them and allocation should be done in the greatest and optimal way[8].

Application scalability is the prime advantage of moving to Clouds. Unlike Grids, scalability of Cloud resources allows real-time provisioning of resources to suit application requirements. Cloud services like storage, compute and bandwidth resources are available at considerably lower costs. Generally tasks are scheduled by user requirements. New scheduling strategies need to be planned to defeat the problems posed by network properties between user and resources. New scheduling policies may use some of the usual scheduling concepts to combine them together with some network aware strategies to give solutions for superior and more efficient job scheduling. Generally tasks are scheduled by user requirements[9].

VI. CONCLUSION

Cloud computing is a rising technology and various researches have been carried out in order to resolve the challenges faced by cloud. There are several challenges that cloud is facing, out of which a main challenge is the resource allocation techniques. This paper provides basics of cloud computing and resource allocation in cloud computing.

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