

## Resource Discovery using Hierarchical Agglomerative Method in Cloud Computing

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### ABSTRACT

This paper discusses about discovery of the resources using clustering algorithm in a cloud computing environment. A resource in a cloud computing environment can range from a single CPU, a cluster of computer, storage devices, software and a operating platform. Each of these resources requires a special treatment with some common underlying characteristics. Discovery of resources is the first and foremost step in effectively scheduling the resources. Identifying the resources that suits the customer requirement is an important task.

**KEYWORDS:** Cluster algorithm, Cloud Computing, resources.

### INTRODUCTION

Cloud computing also known as on-demand computing where we can share resources, data and information on a on-demand bases. In recent days the cloud computing has become a highly demanded service due to the advantage of high computing power, cheap cost of services, high performance, scalability, accessibility and availability.

One of the key component of cloud computing is sharing of resources. [1] A resource is any source of supply, support, or aid that a component in a networked environment can readily draw upon when needed. Examples are: files, measurements, CPU cycles, memory, printing, control devices, forums, online shops, etc. This definition requires further specification, since different systems support different types of resources The resources can be computational resources such as CPU, storage, memory or hardware resources such as bandwidth, virtual machines. These resources may be shared at the infrastructure, platform or application level.

Cloud computing is classified based on the location and the service offered by the cloud. The classifications under location are public cloud where the resources are shared at the vendor premises. There is no transparency to the customers how are the resources are shared, the private where the sharing is done within the same premises, the hybrid is the combination of both. The classifications based on service are Infrastructure as a service where hardware related services are offered like Amazon EC2, Rackspace, Platform as a service like MS Azure, Google App engine and Software as a service like gmail, Google doc.

This paper is divided into five sections. The section II discuss the importance of cloud, the types of cloud and advantages and disadvantages, Section II discuss about the types of resources, Section III discuss about the survey papers on discovery of resources, Section IV discuss about the proposed algorithm for discovery of resources in cloud computing and Section V gives the Conclusion.

### *Importance and Types of cloud:*

Mobile devices use resources in the cloud to enhance their functionalities and improve their processing abilities (e.g., data storage and processing speed). However, along with the development of hardware and software technologies, modern mobile devices like smart phones and tablets have many more resources than before, e.g., computing, communication, sensor and software-application resources [2]. In Educloud Cloud In education field cloud computing is becoming a new challenge with its dynamic scalability and use of the resources like digital library, lab facilities and material as a service through the internet. In medical field there are various kinds of applications like content-based image retrieval, medical information system etc. These applications require various specialists like cardiologist, General physician in determining patient's history and to diagnose them. To use these kind of applications, the use has to determine what exactly resources are used and what kind of infrastructure are needed are discussed in the paper [3]. In health cloud the resources can be a doctor, patients history etc.,

In this new era many organizations are using cloud computing because of resource sharing, green computing, reduction of e-waste and effective use of services and some of the disadvantages are need for connectivity, lack of security, time delay in accessing the resources.

### *Types OResources:*

To understand Resource discovery the first thing to understand is the meaning of resource. The general meaning of resource is any source of supply, support, or aid that a component in a networked environment [4]. In cloud computing the resource can be classified into three categories. It can be a hardware resource such as CPU, memory, scanner, printers, Software resources such as application e.g. google doc, and Network resources such as bandwidth, bridges. In cloud computing the resources will be not in one location. It will be distributed among the geographical area. The main aim of cloud computing is to utilize the benefits of distributed resources and aggregate them to attain maximize throughput to solve computation problems. To achieve this resource discovery is the foremost activity. The resource discovery is the process of locating resources that satisfies the user requirements.

### *Proposed Method For Resource Discovery:*

The first step in resource discovery is receiving the request from the users. The request can be any type of resources. We have to identify the type of resource requested and also the geographical areas from where the request is made and whether the same resource is requested by any other user. If it is a hardware resource, then it is satisfied by allocating VM (virtual machine). It is better to find a resource that is situated geographically near to the customer requesting. While this situation need not given weightage for the software resource.

This paper proposes a improved version of Hierarchical Agglomerative clustering algorithm for discovery the resources. In this method representation of resource usage distribution for group of of similar resources usage pattern is discussed. The hierarchical clustering segregates a dataset with a specific metric distance. The Agglomerative is a process of gathering information into a mass or clusters. It is a large group, collection or pile of different things. The working of the algorithm is explained in fig1. This method uses a bottom up approach where each observation starts its own cluster and pairs of clusters are merged as one moves up the hierarchy. The fig1 explains the following process.

1. Assign each node to a separate cluster.
2. Evaluate the distance between the clusters by using Euclidean distance method.
3. Erect a distance matrix by means of distance values.
4. Pair the nodes with the shortest distance.
5. Delete the pair from the matrix and merge them.
6. Evaluate all distance from this new cluster to all other clusters and update the matrix.
7. Replicate till the distance matrix is reduced to a single element.

### *Example:*

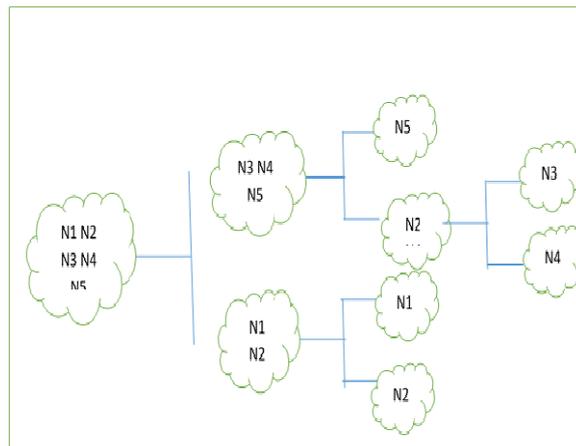
Let us consider the case of resource consisting of five nodes. Now each node is characterized as N1, N2, N3, N4, N5. First at the outset, we generate the random weight for each of the five nodes. Then the tree is generated by using the weight which is calculated by means of the agglomerative hierarchical clustering technique.

### *Related Work:*

The cloud computing has emerged as the novel paradigm of functioning in the domain of information technology.

Clustering is the cost effective platform for executing parallel applications that computes large amount of data with the nodes of a cluster through the interconnected network. Malathy.G R.M. Souundarajan [5] in their

proposed system discusses about the clustering method of resource discovery. The algorithm used for clustering must not assume the existence of a standard distribution of certain parameters



**Fig. 1:** Hierarchical Agglomerative Clustering Method.

With the help of mobile cloud computing, wireless body area networks may be considerably enhanced for the massive deployment of pervasive healthcare applications. However, several technical issues and challenges are associated with the integration of WBANs and MCC. In this article, Jiafu Wane *et al.* [6] proficiently proposed a cloud enabled WBAN architecture and its applications in pervasive healthcare systems. Further, they have focused on the techniques for communicating critical sign data to the cloud by employing energy-efficient routing, cloud resources allocation, semantic interactions and data security mechanisms.

Application level performance is highly dependent on the characteristics of workload and sensitive to cloud dynamics. To address these problem Joa Rio *et al* [7] have extended a self-tuning fuzzy control (STFC) approach originally developed for response time assurance in web servers for resource allocation in virtualized environments.

The inter cloud project proposed by Bernstein.D , Vij.D [8] implements an ontology based resource catalog that captures the features and capabilities offered by cloud providers. This system defines the physical attributes of resources such as CPU and storage. It also defines other features of resources such as security, recovery and compliance capability from the providers point of view but it does not consider the qos for the customers.

In [9] Wright *et al* discusses about the resource discovery model based on the notion of service-centric system considering two phase selection model by using a constraint based approach which enables users to match their applications. By adopting this approach services can be mapped to a specific application sets of a customer.

Imanitch propose resource discovery approach in [10] based on unstructured network on a fully decentralized resource discovery in Grid environment using Gnutella protocol combined with more sophisticated query forwarding strategies from the Freenet overlay network. It improves the central control of the traditional Grid disovery in Grid environments.

In [11] brokers are used as resource representative to select the best resource. Resource brokers are used to maintain a repository of resource registrations. The Performance is measured by using random walk algorithm considering the response time as a parameter.

#### Conclusion:

This papers addresses the problem of resource discoveryin cloud computing system. The proposed system uses adapted hierarchical agglomerative clustering algorithm for resource discovery. The algorithm consider distance as a metric and it helps to form a tree construction which can further used to allocate the resource to the customers. This algorithm is used to achieve the scalability.

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