

## **A STUDY ABOUT THE DESIGN OF A SECURE AGENT-BASED SYSTEM IN CLOUD COMPUTING FOR OPTIMISED RESOURCE SCHEDULING**

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### **ABSTRACTS**

Cloud essentially stands for on-demand Common Location-independent Online Utility service. It's a virtualized computing resource pool that serves a wide range of different workloads, including back-end batch-style jobs and user-facing interactive applications. Cloud Computing enables the deployment of resources on demand; the provision of services based on the Internet and the use of open source software through virtualization techniques. Cloud Computing is a new model that alters the perspective of the industry of inventing, designing, implementing, scaling, upgrading, sustaining, and paying for applications and the infrastructure on which they work, in contrast to the use of already developed principles, methods and best practises. It is a way to dynamically expand capability or capabilities without the need to invest in new infrastructure or licence new software. Currently, it expands the current capabilities of information technology (IT). Cloud computing has evolved from being a promising business model since its introduction in 2006 to one of the IT industry's fastest growing segments.

**Key Words:** Cloud Computing, developing, Online Utility, Software

### **INTRODUCTION**

Virtualization, on-demand deployment, Internet-based service delivery and the use of open source technologies are included in Cloud Computing. Cloud Computing is a new model that transforms the business perspective of inventing, designing, implementing, scaling, upgrading, maintaining, and paying for applications and the infrastructure on which they are installed, in comparison to the use of already developed principles, methods and best practises. It is very simple to increase the ability of hardware or software, even without investing in purchases, due to the dynamic nature of cloud computing. Cloud computing has been a promising business idea in the last few years. In nature, all current business

applications are difficult and far too costly. There is a need for data centres to support personnel and facilities such as bandwidth, networks and servers, etc., along with a dedicated team for its implementation in order to operate these applications. Organizations have to spend vast sums of funds to deploy such applications, which makes it impossible for small companies to develop themselves. Therefore, cloud computing offers a convenient alternative to beginning with far less initial investment in an IT-based business enterprise. While cloud computing provides a major advantage over conventional computing techniques, Big Data (1) is simply the data that is constantly moved to the cloud. In reality, cloud owners need to have qualified analytics in order to manage the data obtained and they must also ensure that all customers get their due services well in time and can fulfil the need. Cloud owners are now moving toward installing mobile and intelligent agents in order to simplify data centres. The current work has thus been inspired by the evolving criteria in cloud computing for improving resource planning and cost optimization algorithms. In order to overcome the obstacles, the work aims to manipulate mobile agents.

### **Cloud Computing**

Cloud essentially stands for on-demand Common Location-independent Online Utility service. It is a pool of virtualized computing resources that serves a wide range of different workloads, including back-end jobs in the batch style and user-facing interactive applications. Thus, cloud computing provides cloud-based computer technology. Compared to conventional computing, cloud computing provides many benefits, such as online services, offline access, flexibility, savings, just to name a few (see Figure 1)



**Figure 1: Advantages of Cloud Computing**

In addition to the many functionality that cloud computing supports, there are few obstacles that often serve as barriers to the business community's full acceptance of cloud computing. Cloud computing architecture (3), for example, is a service-based architecture that provides Software as a Service (SaaS), Application as a Service (PaaS) and Infrastructure as a Service (Infrastructure as a Service) (IaaS). Although SaaS enables customers to use the desired cloud infrastructure applications, PaaS offers tools such as operating systems and frameworks for software creation. On the other hand, in the form of virtual machines, storage blocks, networking and other fundamental computing tools, IaaS provides customers with processing facilities. Each service layer is now equipped with some inherent problems such as lack of storage transparency and security and data integrity at both software and platform levels. While IaaS offers basic protection such as perimeter firewall, load balancing, etc., higher levels of host security are actually needed for applications moving into the cloud. The design issues discussed above illustrate the concerns related to cloud computing security. Therefore, one of the primary goals of this research work is to solve these security problems pertaining to each layer.

### **Issues in Adoption of Cloud Computing**

We could recognize that in the broad adoption of cloud computing there are many problems such as technical problems, business problems, performance issues and few miscellaneous problems. Figure 2 shows the problems and is discussed as follows.

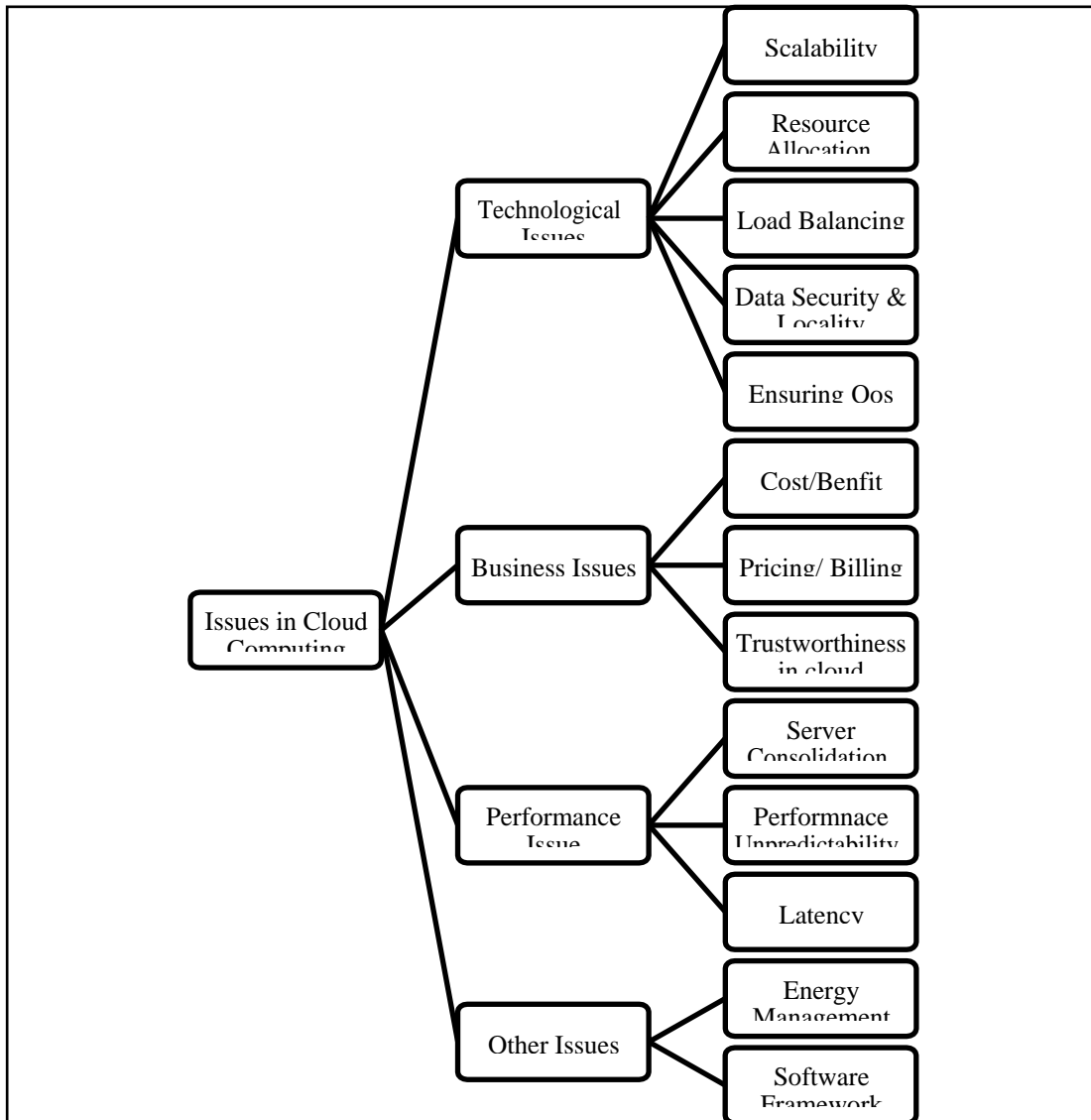


Figure 2: Issues in Cloud Computing

## RESEARCH METHODOLOGY

Analysis approach is the only way to do it in order to attain a research purpose. It provides the way for systematic analysis and various techniques to be carried out to design the goals of a study. The research work uses an exploratory approach to plan the targets, which is appropriate for insight into the new challenges and helps to explain them as well. It has

helped to grasp the basic definition of cloud computing, various innovations and other cloud computing perspectives.

All kinds of computational services are offered by cloud computing, such as scalability, resource provisioning, protection, fault tolerance and sustainability, etc. It is important to test cloud applications before implementing or deploying them in the real world to ensure the applicability of all these features. The main explanation behind this is that it is very hard to adjust the limitations that have arisen in real time during execution. It can contribute to supplier overhead, increased costs and time wastage. Simulation is the best way to escape all these frustrations of this nature. Another advantage of simulation tools is that the hypothesis established by the user prior to software development is open to evaluation. The performance and bottlenecks of the established framework before implementation in the real cloud environment are also clarified (179). These simulation tools provide both cloud users and cloud providers with assistance.

## **RESULTS AND DISCUSSION**

### **CLOUD COMPUTING**

Cloud computing is one of the most recent fields of research interest, but it is not necessarily something new at the heart. It can be compared to post-paid cell phones where the subscribed services can be used by the customer and paid depending on use. The customer is unaware of the technical specifics of the network configuration and provision of services. The service provider manages all of those information. The same idea is the essence of the oriented technologies where consumers now enjoy limitless computer system resources without necessarily owning them. Thus, service provisioning at the end of the service provider without overloading the node in a safe way is an essential consequence. As discussed in chapter 1, the technology revolves around some common key points such as optimum resource allocation at minimum cost, load balancing, data protection and scalability etc. The detailed history of this chapter includes important features, underlying technologies and platforms that make cloud computing popular and an open area of study.

## History of Cloud Computing

While cloud computing was at the forefront in 2007, the concept itself was born in 2006 when Elastic Compute Cloud was launched by Amazon (EC2). Since then, due to its ability to deliver scalable and dynamic IT infrastructures, Quality of Service (QoS), computer environments and configurable software services, its popularity has increased rapidly.

The mainframe computing that provided the large computational facilities was earlier computing technologies. For large data movements and major I/O operations, mainframes were powerful, highly reliable, specialised. Large companies have mainly used them for bulk data processing. Batch processing was worked on by mainframes. Cluster computing originated in 1980, after mainframes and supercomputers. Its advanced technologies lowered supercomputer costs and sizes and became the mainstream parallel and high-performance computing technology. Grid computing emerged in the early 1990s due to advances in technology. Grid computing has now been able to access the massive processing capacity and different types of services. Initially, grids were formed by merging clusters that were geographically distributed. These clusters belonged to various organisations and were made to share the power of computation. Clusters have been confined to common resources that contribute to grid growth. The successor of grid computing is also called Cloud Computing. In figure 3, the root of cloud computing is shown.

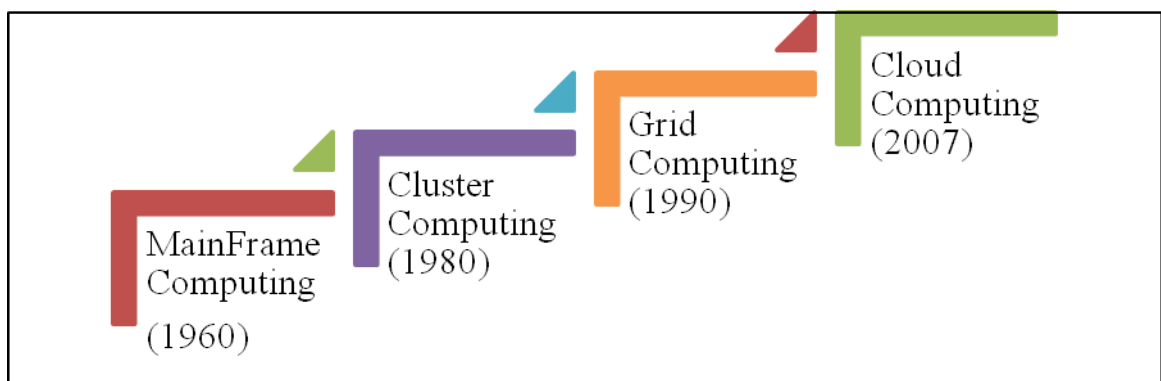


Figure 3: Origin of Cloud Computing

**Table 1: Developments in Cloud Computing**

Year	Description

<b>2007</b>	Virtual Private Network (VPN) introduced with Good QoS at lower cost. Introduction of Cloud Symbol.
<b>2008</b>	Introduced Eucalyptus and Open Nebula which can deploy a private cloud by Helion organization (HP). In the Mid of this year, Gartner realized that companies shifted their assets to per-use service based models. Microsoft Azure was also launched by Microsoft.
<b>2010</b>	Introduced Rack space, an open source cloud software. Launched Open Stack which helps to offer internet based services.
<b>2011</b>	IBM announced IBM Smart Cloud Framework that supports Smarter Planet.
<b>2012</b>	Oracle announced Oracle Cloud that is still in the development stage. This cloud offers each kind of service like Applications (SaaS), Platforms (PaaS), and Infrastructures (IaaS).
<b>2013 onwards</b>	Many Organizations and users joined cloud (around 800 subscribers)

### Features of Cloud Computing

Cloud Computing is equipped with many appealing features contributing towards its commercial applicability and popularity. As depicted by table 1, these features make it distinguishable from other computing paradigms. Because of the appealing features mentioned above, cloud computing is becoming a temptation for small and medium business organizations. Also organizations such as Amazon, Google, IBM are putting their maximum potential towards developing the products based on cloud computing and services for their users at negligible cost.

<b>Sr.No</b>	<b>Feature</b>	<b>Description</b>
<b>1.</b>	<b>No Initial Investment</b>	Eliminates the need for investment in building an infrastructure for small organizations. Business organizations can lease resources from the cloud according to their requirement and pay on usage basis.
<b>2.</b>	<b>Deployment</b>	Using this model the deployment becomes very easy. The user doesn't need to worry about the deployment of system. From development to deployment, everything is done by service provider
<b>3.</b>	<b>Pay as per use</b>	The user has to pay only for usage of resources. It is just like the rental system. After using the resources, the user puts a request for releasing those resources.
<b>4.</b>	<b>Lower costs</b>	This business model is cheaper for service provider as well as for users. Resources can be allocated and released according to demand. Due to this, it provides large saving in operating cost

		when resources are released.
5.	<b>Data storage solutions</b>	Data Center is the solution for storing the data on cloud. It has the capacity to store billion gigabits of data. So now the storage capacity is not the concern of organization.
6.	<b>On-demand security controls</b>	Cloud provides special security provisions for organizations. Providers have multiple options of various security levels for users to choose from.
7.	<b>Greater resiliency</b>	From user registration to machine deployment, the provider encapsulates the whole mechanism. So users do not have to worry about its operation process. Due to this reason organizations are shifting their businesses on the cloud.
8.	<b>Ubiquitous network access</b>	Cloud computing is inherently ubiquitous since it is spread over the internet and thus can be utilized anywhere anytime. Eg Dropbox, Boxnet etc.
9.	<b>Rapid provisioning And Rapid elasticity</b>	Whenever the resources available with a provider gets exhausted and further demand arises, it may get the resources from other providers and satisfy the request. Customer is unaware of the real location of services.
10.	<b>Scalability</b>	Scalability is the core of cloud computing. The service provider can easily increase its services in order to fulfill the requirement of cloud users.

## Cloud Technologies

As cloud computing is in its progressive stage, the related technologies are also present and are listed below:

- **Virtualization Technology**

The spirit of cloud computing is virtualization. It offers a scalable platform, such as vmware, xenetc, by partitioning the hardware. In order to move a VM from one computer to another, virtualization enables the entire VM state to be mixed over the network.

- **Data Center**

The cloud has a storage system for the network that provides storage space. It may migrate or be combined with other data centres where a group of interconnected, virtualized, and geographically dispersed physical machines is a data centre. As the customer may have distinct geographical locations, a service provider could have dispersed data centres across the world to provide consumers with services. The gap between datacenters in cloud



computing results in undesirable network latency, which in turn leads to services being delayed.

- **Cloud File System**

To support distributed computing, the cloud is based on the Hadoop Distributed File System (HDFS) (23) introduced by Google. This stores huge files in the nodes that are geographically distributed. It is similar to Google's developed Google File System (GFS). In order to provide optimum data throughput and low latency delays, it is designed specifically for data centres.

- **Cloud Application Framework**

Google implemented the cloud application framework, popularly known as the MapReduce framework (24), which supports distributed computation on large data sets on computer clusters (or nodes). It is the blend of two processes known as Map and Reduce. The master node takes the input in the map phase, breaks it up into smaller sub-tasks, and distributes those to worker nodes. The smaller task is processed by the worker node and the response is passed back to the master node. The master node takes the responses of all the sub-tasks in the reduction process and combines them to get the output, which is the outcome of the original task. The benefit of this technology is that it facilitates the distributed processing and reduction operations of the map. Because each mapping operation is independent, it is possible to conduct all maps in parallel, thus reducing the total computation time.

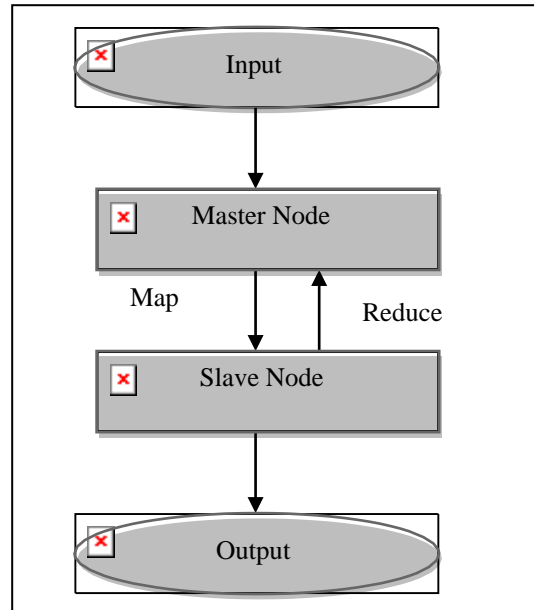


Figure 4: Conceptual View of Map Reduce

- **Web Service**

Cloud computing typically utilises the same web service as used in industry standards. For example, Simple Object Access Protocol (SOAP), Web Service Description Language (WSDL), Universal Description, Discovery and Integration (UDDI), just to name a few. The difference is that it is given on the basis of pay when you use cloud storage.

- **Service Templates**

A full collection of service models is offered by the cloud service provider. These templates can be selected by the user or can be modified as needed.

## CONCLUSIONS

Everything that already exists is included in Cloud computing. It is divided into three categories, namely software, systems and infrastructure." The concept of cloud computing primarily revolves explicitly around concepts such as scalability, pay-per-use model, and virtualization. In fact, interoperability, portability, component integration, ease of deployment, pay as per use, economic, rapid provisioning and elasticity are enablers supporting cloud computing, and so on. Cloud computing is becoming a temptation for all

business organisations due to the appealing characteristics listed above. In addition to these problems, some software agent-related issues still need to be addressed, such as the degree of interdependence of the agents deployed in the proposed mechanism and the level of capabilities to be given to agents should also be carefully determined. While there are still many challenges in the cloud world, but with the keen interest of researchers and organisations in this area, new technologies will certainly be implemented in the future to make this domain more suitable for commercial use.

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