Abstract

Background/Objectives: The main objectives are to provide important milestones in the construction of Multi Cloud Computing Systems (MCCS).

Methods/Statistical Analysis: In this study, organizational need of MCCS is identified which in turn supports best of breed cloud services to users with optimal solution on demand. These results in core IT organizations are moving to offer cloud infrastructure services to their enterprises while ensuring governance and control over costs.

Findings: This change in paradigm of cloud adoption from shadow IT to a strategic imperative is a critical step towards MCCS. Thus the growing demand of MCCS for enterprises originates research opportunities for scholars. This study emphasizes on the design issues to be considered for multi cloud architecture, requirements for various groups involved in the development of MCCS and types of architectures like cloud hosted proxy, proxy as a service, point-to-point proxy and on-premises proxy for MCCS.

Applications/Improvements: In order to reduce complexity and cost of MCCS architecture and to improve performance of application executing in MCCS, by making Cloud Broker as a proxy instead of using above listed types of MCCS architectures.

Keywords: Cloud Hosted Proxy, Multi Cloud Computing System, On-Premises Proxy, Proxy as a Service, Point-To-Point Proxy

1. Introduction

MCCS offer different features like sharing of infrastructure, platform, resource and software among cloud users in a pay-as-you-go model which in turn facilitates decrease the cost of ownership, increase the capacity of dedicated infrastructures, reduce power consumption and respond effectively for changes in the demand. MCCS are not only provides economics of services to user but also supports pick and adopt feature that the organizations interested from multiple varieties of clouds. Most of the enterprises are focusing on use of multiple clouds for both the small scale and large scale business strategies.

A research survey results reporton April’ 2015 in Cloud Tech News published by cloud news net states:

- 77% of IT organisations are preparing to deploy multi cloud architecture for their business.
- 91% of organisations are interested to implement at least some sort of cloud based solution.

Thus the term multi cloud refers a use-case in which a business uses multiple varieties of services, platforms, and applications into single cloud architecture. In spite of a hybrid cloud, a public cloud or a private cloud, the business combines several varieties of clouds into one integrated platform. As a result multi-cloud is the hope of cloud computing within enterprise as mentioned in Right Scale 2015 state of the cloud report shown in Figure 1.

2. Design Issues

Various design issues considered during the development of MCCS architecture includes:

2.1 Cloud Service Strategy

To access the cloud content first the user has to authenticate to the cloud, the credentials are checked against the one stored in server before access. To revoke the cloud content the users has a difficulty because as their credentials
are modified in the server to make them remain freeze forever.

### 2.2 Scalability in Performance

The MCCS must be able to deal with on demand resource provisioning this dynamic allocation creates the major problem of performance degradation as the architecture size increases.

### 2.3 Confidentiality:

In MCCS the association between the clouds can only job of the Cloud Service Provider (CSP) user or admin can't attach directly to other clouds.

### 2.4 New standards and interfaces:

The MCCS hosts variety of software resources like data, programs, files and hardware resources like scientific instruments, display devices, personal digital assistants, computers and networks. Designing a common format for data, interfaces are a major design issue.

### 2.5 Mapping of Volatile Network Address

Each organization can have their own security and administrative policies to maintain their resources efficiently. This results in network Security problems, network monitoring problems and problems associated with mapping of volatile network address.

### 2.6 Shifting Computing from Desktop to Data Centres

In MCCS a cloud admin is having right to use the files uploaded, download and can modify them. There is a chance of rising disputes when confidential data is modified. For example a misbehaviour person in the department of a university may modify the faculty schedule noticed by modifying the actual notice without enlightening his individuality to others. So a log is necessarily maintained to determine such disputes.

### 3. Requirements for MCCS

Depending on the applications executing on various virtual machines can have different requirements like network, CPU and storage access. Underlying requirements for MCCS are categorizes into 3 groups and are:

- Development Group
- Deployment Group
- Execution Group

#### 3.1 Requirements for Development Group

- Offer pessimistic services to Cloud vendor.
- Provides an integrated services environment to combine different clouds.
- Enhance the interoperability and portability between interconnected clouds.
- Conceptual and application level interfaces, controls for clouds of cloud.
- Provides resource and service management software interfaces.
- Justification of functional and non functional requirements of the clients.
- Provides Compatibility with the data standards and protocols in the network of clouds.

#### 3.2 Requirements for Deployment Group

- Provides choice for the selection of unpreserved cloud services and resources.
- Wires the exploitation of components of applications in multiple clouds.
- Safeguard the particularities of various clouds.
- Do not impose restrictions to the connected clouds.
- Permit faultless merging with new cloud without disturbing the functionality of old.
- Provides cloud credential databases
- Carry the connection with pinnacle cloud providers.
- Offers the volatile application relocation within the environment.
- Supports Meta scheduling, auto scaling and load balancing mechanisms.
- Chains easy mapping of volatile network address and identity management.
3.3 Requirements for Execution Group

- Supports parallel or simultaneous execution of application components.
- Offers control over the life cycle of the deployed application.
- Provides monitoring tools for cloud resource consumption.
- Offers facility for measurement of degree of acceptance with service level agreements.
- Facilitates dynamic distribution mechanisms for self adoption.
- Induces less overhead to each connected cloud.

4. Architecture of MCCS

MCCS architecture is ubiquitous, dynamic, resource pooling, on the demand collaborations among cloud based services without prior collaboration agreements, service models and standard interfaces. MCCS architecture is constructed by collaborating proxies that are logically connected as a network to provide services to cloud users. A proxy is a component with hosted software instance that a user or a service provider can allot operations to carry out on its behalf. Proxies can act as intermediaries for combining varieties of clouds. Various proxy based MCCS collaboration strategies involves:

4.1 Cloud Hosted Proxy

In this type of collaboration of MCCS the cloud service provider dynamically allocate, handle, manage and monitor the proxies within their network architecture to provide needful services to cloud users.

4.2 Proxy as a Service

In this type of MCCS large group of cloud service providers are collaborate to access the proxy which itself is a cloud. Generally a third party proxy service provider handles the collaborated CSP providers.

4.3 Point-to-Point Proxy

In this type of MCCS either the proxy provider or the cloud provider handle the proxy which can be incorporated as an additional interface to the collaborated network.

4.4 On-Premise Proxy

In this type of MCCS the collaborated CSP deploys the proxy in the requested cloud user’s domain.

5. Discussion

MCCS provides cloud service integration and supports computing intensive applications through a group of logically connected proxies that act as an efficient set of data roles to improve system performance and reliability. This paper surveyed every one research work under the area of MCCS requirements and gives an idea about new deployed in development environment, the platform on which the multi cloud services are to be imparted and finally the entrepreneur perspective that is its cost against with the cloud accessibility. Our research emphasizes on the coordination among the cloud service providers for combining their services in multi-cloud. Presently our research team is focussing on a feasible proxy based MCCS to design, develop, deploy, manage and free proxy virtual machines efficiently, reliably and securely. Such a reliable collaboration is need for tomorrow which motivates us to concentrate on an advance collaboration strategy MCCS where a proxy act as a cloud broker that integrates the number of cloud users and submits a task to cloud host depending upon application need.

6. Conclusion

By reviewing the research reports of Right scale and Cloud Tech News the need for MCCS are identified. The organizations are benefited with multiclou d environment and obtain services dependent upon their preference. After recognizing various requirements of MCCS are categorized based on the role of user involved in project development. Our future work focuses on refinement of MCCS architecture by implementing a platform for MCCS with open source tools clubbing with real world cloud scenarios depending on application needs.

7. References

3. Anitha Rani NR, Ram Kumar SK, Prem Kumar P. A survey on data redundancy check in a hybrid cloud by using convergent encryption. Indian Journal of Science and
A Roadmap to Develop Multi Cloud Computing Systems


