

Cloud Computing: Emphasizing Load Balancing Techniques- Opportunities and Challenges

Prantosh Kumar Paul^{1*}, R Senthamarai²

¹FBAS, Indian Institute of Engineering Science and Technology [IIEST], Shibpur, West Bengal, India.

²Department of Computer Application, AVIT, VM University, Chennai, T.N.

*Corresponding author: E-Mail: prantoshkpaul@gmail.com

ABSTRACT

Cloud Computing [CC] is a kind of virtualization of various types of Information Technology Infrastructure which includes software, hardware, application, utilities, driver and so on. Cloud Computing is virtually a kind of network grid in which network and communication technology play an important role for complete virtualization. Fundamentally, Cloud Computing is the way in which any user can avail the hardware and software access from the world. Load Balancing is one of the important issues of Cloud Computing; virtually this is useful to distribute the sophisticated and dynamic workload to all of its nodes equally and depending upon need. It ensures that no single node should not gain overload. This paper talks about Cloud Computing; including its need and importance, characteristics and especially discusses about the way of Load Balancing in Cloud Architecture.

KEY WORDS: Cloud Computing, Cloud, IT, Information Technology, Advance Computing, Load Balancing, Distributed Computing, Green Computing, Workload, Dynamic Load Balancing.

1. INTRODUCTION

Computing means designing and building hardware and software system for Information Processing, Structuring and managing and so on. Thus, in a simplified manner Cloud Computing means designing and building of hardware, software and software system more over the total IT infrastructure in the sense of virtualization. Computerized Virtual Networking is possible with very efficiently, smoothly and effectively with the help of Cloud Computing. Cloud Computing and virtualization is an important method of Green Computing. Which make less use of computer, products and energy. In Cloud Computing one service provider serve so many companies at a time and depending upon customer requirement services are offered. The hardware and software requirement will vary from organization to organization but providing service to all nodes and companies need a proper balancing i.e. Workload. Load balancing technique helps in optimal utilization of resources and hence in enhancing the performance of the systems. Load Balancing is needed in the situation where some nodes are heavily loaded and others are engaged with simple work; that means little load. Managing such situation requires Load Balancing techniques.

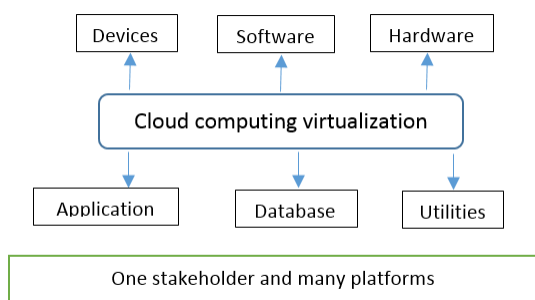


Fig.1. Showing component of virtualization at a glance

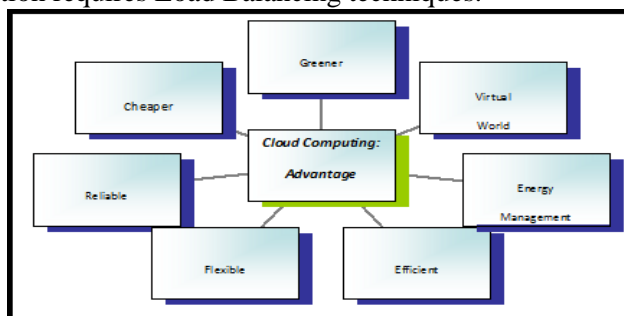


Fig.2. Main advantage of Cloud Computing

Objectives: The main aim and objective of this study includes but not limited to as follows:-

- To know basic about Cloud Computing and virtualization technique.
- To find out main aim, role as well as importance of Cloud Computing at a glance.
- To find out emerging and conventional characteristics of Cloud Computing.
- To find out models and kind of Cloud Computing, briefly.
- To learn about Load Balancing technique includes its characteristics and need.
- To know about the role, value and importance of Load Balancing Techniques.
- To know about strategies of Dynamic Load balancing at a glance.

Cloud Computing: Cloud computing is actually integration of several computing models and methods. These are like service management, virtualization including consolidation, robust security, resilience, better energy efficiency and other benefits. Cloud Computing may also be treated as Virtual Computing; it is a kind of Computing Architecture which helps in virtualization of Information Technological Infrastructure which includes hardware, software, application packages and other Computing Machinery and equipment or components. Though, Cloud Computing is run under strong networks and internet technology infrastructure. For Cloud Computing we need consistent and speedy internet which should be uninterrupted. Healthy broad band is very much essential for strong and sophisticated

Cloud Computing infrastructure. In Cloud Computing it is possible to replace hardware any time without affecting existing cloud infrastructure.

Cloud Computing: Characteristics:

- Cloud Computing is a kind of Architecture and model for virtualization than that of Technology.
- Cloud Computing is actually run without comprising the privacy and security of their data.
- Cloud Computing is actually promotes Green Computing as this is promotes uses of centralizing machine, thus client no need to take own machineries and equipment.
- Hassle free deployment of hardware, software, IT Infrastructure is possible with Cloud Computing.
- Cloud Computing uses Community Based Hardware as its base.
- In Cloud Computing it is possible of hardware replacement without affecting the Cloud Architecture.
- Cloud Computing may be classified as Public Cloud, Private Cloud and Hybrid Cloud Computing.
- Cloud Computing run under strong and sophisticated broadband Internet Technology.
- Cloud Computing kinds may be choose depending upon need of customers.
- Cloud Computing helps to build healthy Information Infrastructure building as it helps in Information Compliances, converted service offering as well as management.
- Cloud Computing promotes Green Computing Strategies and policies.

Cloud Models: Cloud Computing depending upon characteristics may be classified as Public Cloud Computing, Private Cloud Computing and Hybrid Cloud Computing. Public Cloud Computing are those; which provides to the user from common and general internet services; this type of computing is very much elastic, cost effective. Private Cloud Computing is actually run by the company's own server and Internet Technology. The weakness of Private Cloud are includes, Own Infrastructure requirement and need to host in house deployment models. Other hand Hybrid Cloud Computing is nothing but the Combination of Public Cloud Computing and Private Cloud Computing. Here user prepares Private Cloud Computing depending upon need and mainly for confidential data/ section and avail other services from Public Cloud. In Defense, Bank and others commercial firms such services are useful.

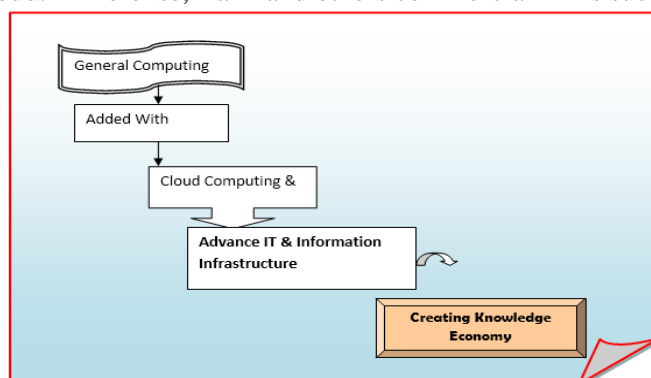


Fig.3. Role of Green & Cloud Computing for society building

Load Balancing: Load Balancing is a kind of technique which is needed for distributing dynamic workloads across multiple computers and basically keep ensure no single system or node is overloaded. This is fundamentally, also helps in highest degree of optimal resources and thus it helps in better efficiency in overall performance. Through Lad Balancing it is possible to support Green Computing Policies and thus it helps in consumption as well as carbon emission rate. Loads Balancing is helps in Computing where Every IT resources is distributed efficiency and fairly. It helps in provisioning and de-provisioning of the systems rather than computing application failure. It is further helps in a way where each and every hardware and software including additional packages works properly and efficiently. Thus by healthy resource utilization Load Balancing promotes in Green computing and Green IT practice, properly.

Importance of Load Balancing in Cloud Computing: The main aim and objective of Load Balancing is includes as follows

- Load Balancing helps in the process of Computing where each and every Computing devices avail Facility equally;
- It manage total processing time depending upon computing requirement;
- It is useful to achieve consumer satisfaction and healthy Resource utilization;
- It is ultimately minimizes resource consumption through proper balancing;
- As it uses resource properly thus Load Balancing technique is helps in scalability; which is very much important for healthy Cloud Computing.
- As it promote equal level of hardware and software and node utilization thus promotes energy consumption properly;

- Load Balancing maintain the whole computing systems stability;
- Provide and arrangement of healthy backup if systems fails during unbalanced computing utilization.
- It is essential to improve the performance sustainability;
- Load Balancing helps in reducing energy consumption and thus indirectly it helps in reducing carbon emission and thus achieve Green Computing;
- It make that no single node is overloaded;
- It helps in money saving as it promote less computing uses and carbon emission;
- It helps by avoiding so many device integration later after unbalanced computing utilization;
- It helps public Cloud Computing better than private and hybrid; due to its nature.

Strategies for Healthy and Dynamic Balancing: There are so many places and strategies are available for healthy and sophisticated Load Balancing which includes as follows:-

Information Strategy: Actually this part of dynamic Load Balancing algorithm is dedicated to Information Seeking on Computing Systems and this is called as Information Strategies or policy;

Transfer Policy: The Load Balancing algorithm which is needed for the transferring job for local to remote or vice versa is called Transfer Strategy.

Location Strategy: This is actually responsible for the section of destination node for the transferring task or location task;

Process Transfer Strategy: This is responsible or used for deciding execution of a particular work that is to be completed locally or from remote place;

Priority Assignment Strategy: This is responsible or used for assigning priority for execution of local as well as remote process.

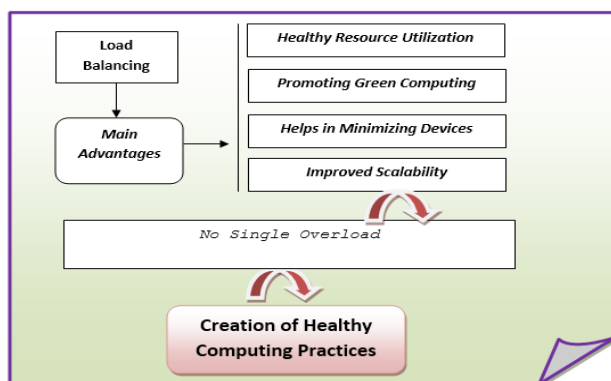


Fig.4. The main advantages of Load balancing in Cloud Computing at a glance

Selection Strategy: It is used or responsible for the processor matching of the Cloud Computing systems.

Migration Limiting Strategy: This strategy is used for limit on the maximum number of times a task can migrate from one node or system to other system.

Findings:

- Cloud Computing' is one of the important virtualization which is makes IT infrastructure including hardware, software and application packages and utilities;
- 'Cloud Computing' may be public or private or hybrid in nature depending upon requirement and situation;
- 'Cloud Computing' is a valuable on-demand IT service provide in centralized nature and there no need to personal computers or infrastructure;
- Virtually 'Cloud Computing' as a demand computing is various types, like low end server, on demand server, dynamic capacity building.
- Load Balancing is a Mechanism which distributes the dynamic level work load within the whole Cloud;
- Load Balancing helps to keep Green Computing nature in Cloud Computing [CC];
- Load Balancing facing some of the Challenges like-virtual machine migration, energy management, stored data management for future uses, emergence of small data centre for cloud systems, automated service provisioning and so on.

Suggestion:

- During designing of Cloud Computing Architecture it is essential to take care about Load Balancing Technique;
- Depending upon need it is essential to choose policies and strategies;
- Small Data Centre and Cloud Service provider may be much better, cheaper and less energy consumers than that of large cloud system service provider as it keep balance properly.

2. CONCLUSION

Energy saving is one of the important activities and key concerned now a days. Load Balancing in Cloud Computing saves energy and this is also promote Green Computing and Green IT properly. There also some question may arise; like way of dynamic load balancing among the machine of the data center or data center to data center and so on. Failure of service may be harmful and affect user; thus proper and balance Load Balancing Techniques is always welcome.

REFERENCES

- Abdul Azeez T.A, How to Design A Digital Library, SRELS Journal of Information Management, 40 (3), 2003, 267-273.
- Abdul Kalam A.P.J, IT Strategy in Defense Environment, DESIDOC Bulletin of Information Technology, 20 (1&2), 2003, 7-12.
- Adhikary, Madhabmohan, and Amitava Nandi, Ideas of Ranganathan's Classification Theory Pervaded by Oriental Philosophy, SRELS Journal of Information management, 40 (3), 2003, 275-284.
- Agarwal, Ritu, and Viswanath Venkatesh, Assessing a firms web presence: A Heuristic Evaluation Procedure for the measurement of usability, Information systems research, 13 (3), 2002.
- Aladwani, Adel M, An integrated performance model of information systems projects, Journal of management information systems, 19 (1), 2002.
- Alleman, James, Real options real opportunities, Optimize magazine, 2002.
- Aparajita, Virtual Information Center: How Close To Reality, SRELS Journal of information Management, 42 (4), 2005, 419-426.
- Aries, James A, Subhankar Banerjee, Marc S Brittan, Eric Dillon, Janusz S. Kowalik, and John P. Lixvar, Capacity and performance analysis of distributed enterprise system, Communication of the ACM, 45 (6), 2002.
- Attewell, Paul, and James, Computing and organization: what we know and what we don't know, Communications of the ACM, 27 (12), 1984.
- Paul, Prantosh Kumar, Kalyan Kumar, Information Management & Its Needs with Focus on Job Based Versatile Academic Programmes in India, International Conference on Emerging Market and Issues in Management, [ICEMIM-12], VIT University, Vellore, 2012.
- Paul, Prantosh Kumar, Shyamsundar Bairagya, Management Science and its increasing influence and interaction with Information Science (IS): an Overview, International Conference on Emerging Market and Issues in Management, [ICEMIM-12], VIT University, Vellore, 2012.