

Short Communication

Environment and Sustainable Development with Cloud Based Green Computing: A Case Study

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Abstract: The awareness and activities for healthy and sophisticated environment and sustainable development gain rapidly during the last two decades. Today several programme, activities and agenda are associated with environmental and sustainable development matters. Virtually like activities and programme; so many happening are made in the field of technologies and tools for societal development. Awareness on social computing, environmental friendly technologies are increasing day by day. Cloud Computing and Green Computing are two important name in the field of modern computing and technologies. Both these computing are in favor of environment and sustainable development many ways. This paper is talks about Cloud Computing and its role and importance in the field of Green Information Infrastructure building. Paper describes so many aspects related to Green Computing and Cloud Computing in favor of Environment.

Keywords: Cloud Computing, Virtualization, Environment, Bio Sciences, Green Computing, Green Technology, Material Recycling

INTRODUCTION

‘Cloud and Green’ both are important terms in the present Information Technology age. Both the technologies are actually complimentary and supplementary to each other. Cloud Computing is a type of Computing Practice in which networks and communication Systems play an important role. This is actually virtualization of various information technological infrastructures; including software, hardware and application, utilities, drivers and so on [1, 2]. In Cloud Computing computerized virtual networking is possible with very efficient, smoothly and effectively. For better and healthy Cloud Computing practice which is nothing but reusing of information technological infrastructure practicing. Virtually, Green Computing allows laser energy consumption, better and effective product designing and development. Better and sophisticated Green Technology management directly and indirectly reflects better Cloud Computing practice which ultimately helps to build a solid environment development [3, 4].

Objective

Some of the aim are listed bellow for which we conduct the research work; which includes but limited to:-

- To know basic about Cloud Computing and Virtualization Technologies;
- To know the role and importance of Cloud Computing in general and for environmental sustainable development [5-8];

- To learn the contemporary challenges and issues of Green Computing practice and integration for better and healthy Cloud Computing practice;
- To find out Green Computing and healthy sustainable development;
- To learn the main problems of Cloud Computing and there possible solution at a glance;
- To find out main strength, weakness, opportunities and threat of Cloud based Green deployment models.

Cloud Computing and Environment sustainable development

Cloud Computing is a type of computing architecture which helps in virtualization of information technology infrastructure building which ultimately includes hardware, software, application packages and other computing equipments and facets. This is a platform in which centralized hardware can be replaced any time with out affecting the existing activities. Virtually, this is a kind of commodity based software container system. Cloud Computing is actually run with out comprising the privacy and security of their data [9-11]. Though Cloud Computing is results of several initiation; and integration of several computing models and methods. There are service management, virtualization including consolidation, robust security, resilience, better energy efficiency and other benefits.

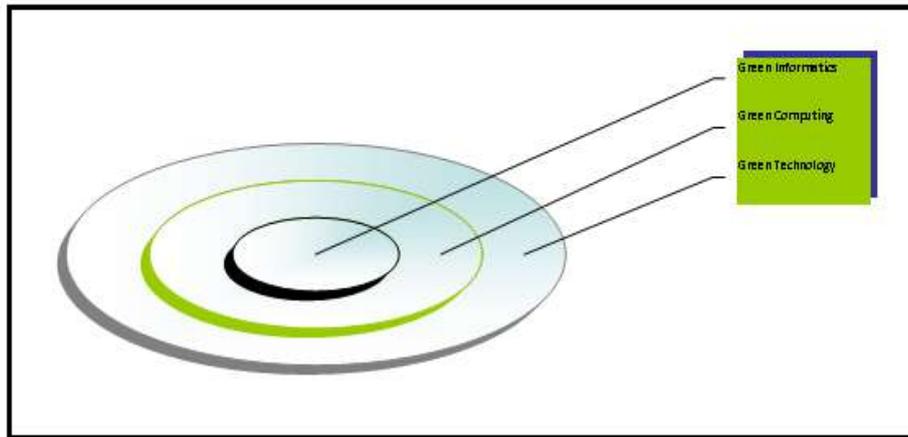


Fig. 1: From lower to Higher Green World

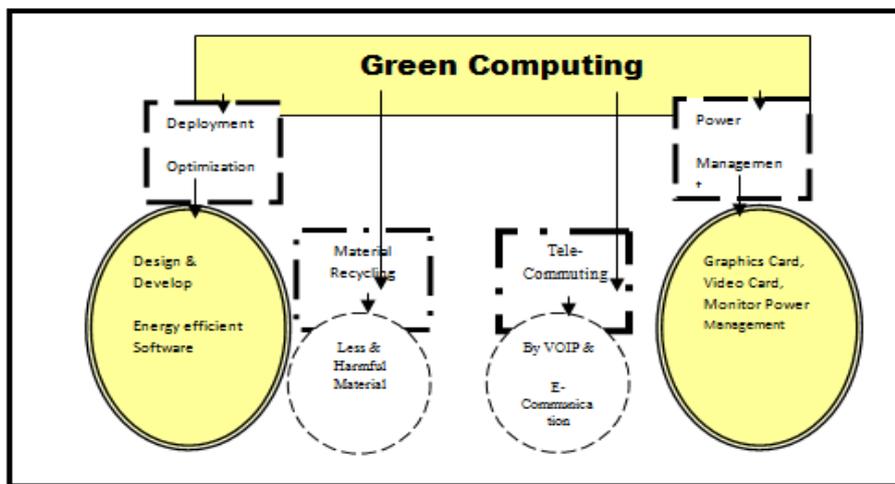


Fig. 2: Green Computing Approaches

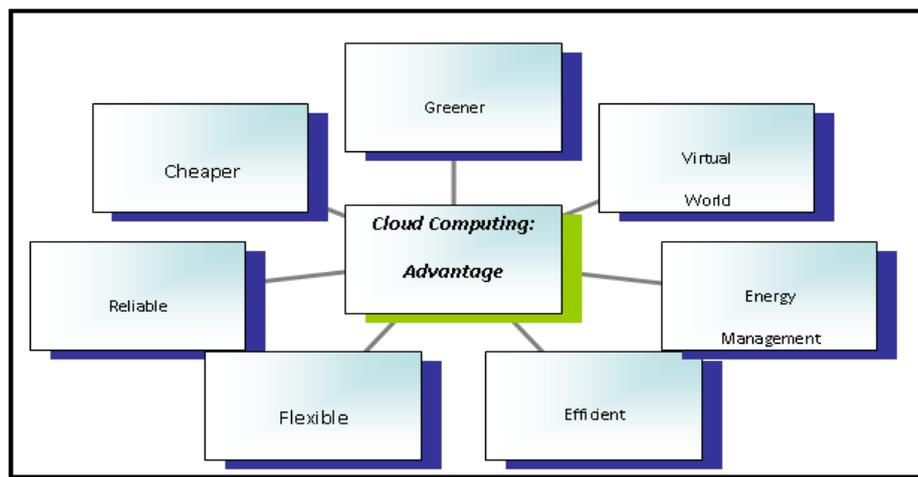


Fig. 3: Main advantage of Cloud Computing

Cloud Computing actively promoting environmental computing or Green Computing as it believes to use centralized information technology infrastructure rather than individual IT system for each set up or establishment or organization. Cloud Computing promote Green Computing and service many ways; as

this is promotes use of less power consumption and hardware used [2, 12, 13]. Practically, Cloud Computing helps to keep Green aspects in IT system following way:

- Energy Consumption;
- Material Cycling;

- Power Management;
- Virtualization Promotion;
- Ergonomics;
- Using hazard free material.

- Cloud Computing gives us easily available IT solutions;
- It creates Green Computing infrastructure.

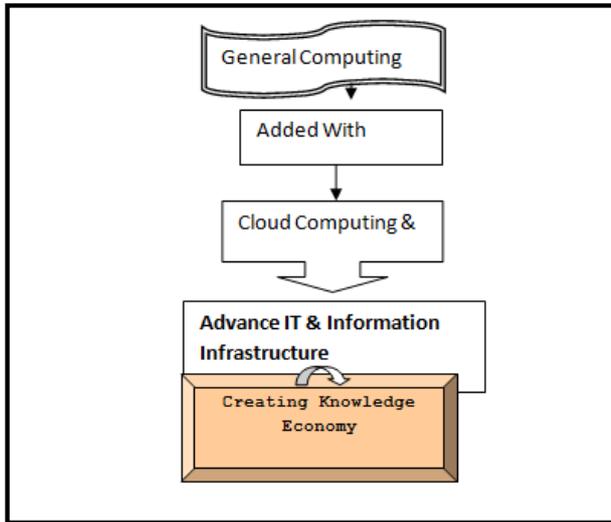


Fig. 4: Role of Green & Cloud Computing for society building

Cloud Computing: Methods and Environments

Cloud Computing and Green Computing [which supports environment and sustainable development] both are closely related, first of all both the computing concept consider as advance computing. Secondly, Cloud Computing is actively design and development of Computing and other hand computing also design and development of computing and systems [2, 13-15]. Thirdly, Green Computing is actively designed for Eco-Friendly computing and technological infrastructure which supports less power utilization and power management. Thus Cloud Computing helps following way:

- Not to use several Computing and Information Technology Infrastructure and promoting centralized IT and computing infrastructure development [8];
- Use of Recycling Technologies are supports the utilization of old computers and machinery; thus it helps in Environmental development as unused computers are using again and again. Virtually for following reason it is useful:-
 - Healthy and sophisticated efficiencies in information activities;
 - Reduction in existing and future hardware and IT cost;
 - Hassle free deployment of database, software and maintenance of use databases;
 - Better collaboration as well as cooperation among the entities and section of the organizations;

Green Computing and Sustainability

Green Computing emerged during 1980’s but was emerged in the last decade; due to its wonderful benefits. In 1992, ‘Energy Star’ of USEPA inspires many companies to introduce environment friendly computing and technologies and this helps by following way:

- Use of better algorithm design for minimizing energy consumption;
- Eco friendly and environmental supported Green Computing supports extra carbon dioxide [CO₂];
- It inspire to ‘Turn Off’, the computers and other machine and equipments if they are not in actual uses; thus it saves energy during power off;
- It promotes integration of all the Computing as well as other IT products;
- It keeps all organization Green and Eco Friendly Infrastructure;
- Use of various new technologies and equipments like- cellular phone, laptop, satellite receiver, kiosk is essential to user;
- For the promotion and eye catching of the manufacture towards further design of information technology provides based on Green Computing principles [11, 16].

Virtually, following things and activities are essential for building Green Information Technology:

- Companies and organizations need to use Green Computing and adopt such Technological practices;
- IT companies should use Energy Star and other standardization for building healthy Green Computing Infrastructure;
- Healthy and better financial supports is must to promote Green initiatives [2];
- Awareness among the user of computers and technology are urgently needed;
- It is essential and development of Green Computing or Environmental Computing related design in Compute Science [UG/PG] programmes or full fledged programmes on such topic [11, 14].

Cloud Based Green Information Technology: Some challenges

Countries like India has so many challenges and issues related to Cloud Computing based environment free sustainable development practice:

- Still most of the people and small companies are not aware about Cloud Computing and Green Computing briefly;
- Cloud Computing and virtualization depends on consistent and speedy internet connection;
- Still there is no policy for Cloud Computing and environment friendly technological utilization [2, 15];
- Lack of collaboration is limited in India; which is very much essential in countries like India[4, 16];

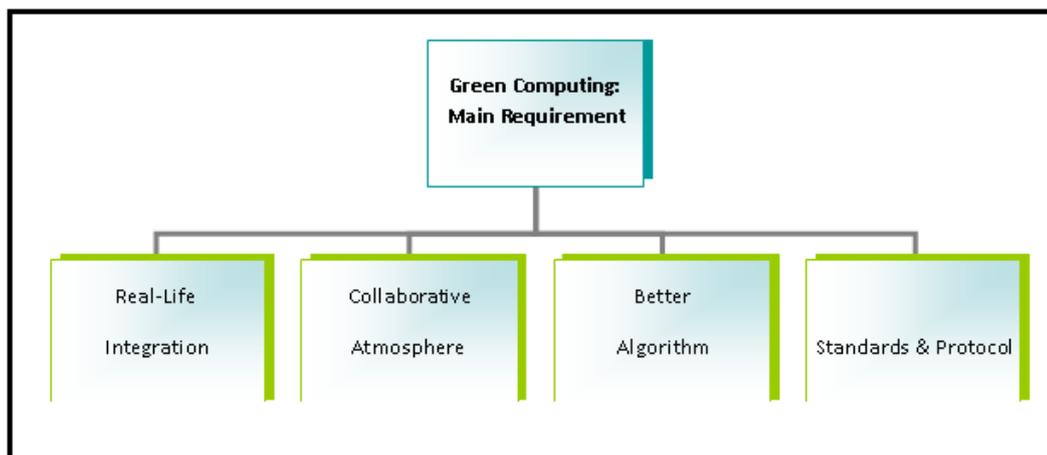


Fig. 5: the fundamental requirement of Green Computing

- Hassle free deployment of hardware, software and related technological infrastructure development is tough in many cases;
- Government need to take proper policy for environmental development through IT integration;
- Fund for resource allocation, cloud architecture deployment optimization is still an important issue [11, 18];
- Cloud Computing Green IT needs skilled manpower; still there is a problem in this sector; designing and development of energy efficient algorithm is a big issue till date;
- In many cases, properly Virtualization of Technology may not work [2].

Suggestion

- It is essential that, adequate financial supports should be provided by the Government agencies to implement Green ICT;
- As like computer and computing, networks and allied technologies also needed fore advancement as Cloud Computing utilization;
- Proper deployment optimization, power management and material recycling are essential to ensure for better environmental practice;
- Proper and adequate skilled manpower in such areas are also very much essential for better eco friendly computing practice.

CONCLUSION

Green Computing is no doubt a powerful solution for energy management and cost management. Due to its several benefits it is essential that the Green Computing

projects should started in the organizations, institutions and educational institutions; where so many computers are used. Today apart from Private companies, the Government departments are also moving towards launching of Green Computing and Technologies [8, 16]. It is essential to build IT task force for development and popularization of the field. Cloud Computing and making awareness on Cloud Based Green ICT through adequate infrastructure. Though, there are some problems and disadvantage in both the computing methods and we need to keep in mind these methods for healthy information society [11].

REFERENCES

1. Ritu A, Venkatesh V; Assessing a firms web presence: A Heuristic Evaluation Procedure for the measurement of usability. Information Systems Research, 2002; 13(3): 168-186.
2. Paul PK, Chatterjee D, Ghosh M; Medical Information Science: Emerging Domain of Information Science and Technology (IST) for sophisticated Health & Medical Infrastructure Building — An Overview. International Scientific Journal of Sports Science, 2002; 1(2): 97-104.
3. Aladwani AM; An integrated performance model of information systems projects. Journal of Management Information Systems, 2002; 19(1): 225-230.
4. Murugesan S; Harnessing Green IT: Principles and Practices. IEEE IT Professional, 2008: 24-33.
5. Kalam APJA; IT Strategy in Defense Environment. DESIDOC Bulletin of Information Technology, 2003; 20(1-2): 7-12.

6. Aries JA, Banerjee S, Brittan MS, Dillon E, Kowalik JS, Lixvar JP; Capacity and Performance Analysis of Distributed Enterprise System. *Communication of the ACM*, 2002; 45(6): 100-105.
7. Paul A, Rule J; Computing and organization: what we know and what we don't know. *Communications of the ACM*, 1984; 27(12): 1184-1192.
8. Paul PK, Chaterjee D, Karn B; Information Science Education and Research: emphasizing contemporary Indian scenario- an overview. IEM/IEEE sponsored international conference proceedings (IEMCON-12). 2011: 349-353.
9. Bates M; Where should the person stop and the information search interface start? *Information Processing & Management*, 1990; 26(5): 575–591.
10. Belkin NJ, Robertson SE; Information science and the phenomena of information. *Journal of the American Society for Information Science*, 1976; 27(4): 197–204.
11. Paul PK, Kumar A, Chaterjee D; Health Informatics and its Practice: Emerging Domain of Information Science-Indian Scenario. *Current Trends in Biotechnology and Chemical Research*, 2012; 2(2): 83-87.
12. Belkin NJ, Cool C, Stein A, Thiel U; Cases, scripts, and information seeking strategies: On the design of interactive information retrieval systems. *Expert Systems with Applications*, 1995; 9(3): 379–395.
13. Bell D; The coming of post-industrial society. A venture in social forecasting. New York, NY: Basic Books, 1973.
14. Borko H; Information science: What is it? *American Documentation*, 1969; 19(1): 3–5.
15. Bourne CP; On-line systems: History, technology and economics. *Journal of the American Society for Information Science*, 1980; 31(3): 155–160.
16. Buckland MK, Liu Z; History of information science. *Annual Review of Information Science and Technology*, 1995; 30: 385–416.
17. Bush V; As we may think. *Atlantic Monthly*, 1945; 176(1): 101–108.