Comparative study between Green Cloud Computing and Mobile Cloud Computing

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Abstract- While searching for information about cloud computing over the internet, I came across different computing keywords such as Green Computing and Mobile Computing. After so much of research on all these terms I myself tried to have the clear vision about them.

This paper will help the researchers and administrators to have a clear understanding of Green Computing and Mobile Computing and the differences between Green Cloud Computing and Mobile Cloud Computing. It also defines the security issues and the solution methods to these issues.

I. Introduction

Computing means any goal-oriented activity requiring, benefiting from, or creating computers. Thus, computing includes designing and building hardware and software systems for a wide range of purposes; processing, structuring, and managing various kinds of information; doing scientific studies using computers; making computer systems behave intelligently; creating and using communications and entertainment media; finding and gathering information relevant to any particular purpose, and so on.

II. Green Computing

Green computing is the environmentally responsible and eco-friendly use of computers and their resources. In broader terms, it is also defined as the study of designing, manufacturing/engineering, using and disposing of computing devices in a way that reduces their environmental impact.

Many IT manufacturers and vendors are continuously investing in designing energy efficient computing devices, reducing the use of dangerous materials and encouraging the recyclability of digital devices and paper. Green computing is also known as green information technology (green IT).

Green computing, or green IT, aims to attain economic viability and improve the way computing devices are used. Green IT practices include the development of environmentally sustainable production practices, energy efficient computers and improved disposal and recycling procedures.

III. Mobile Computing

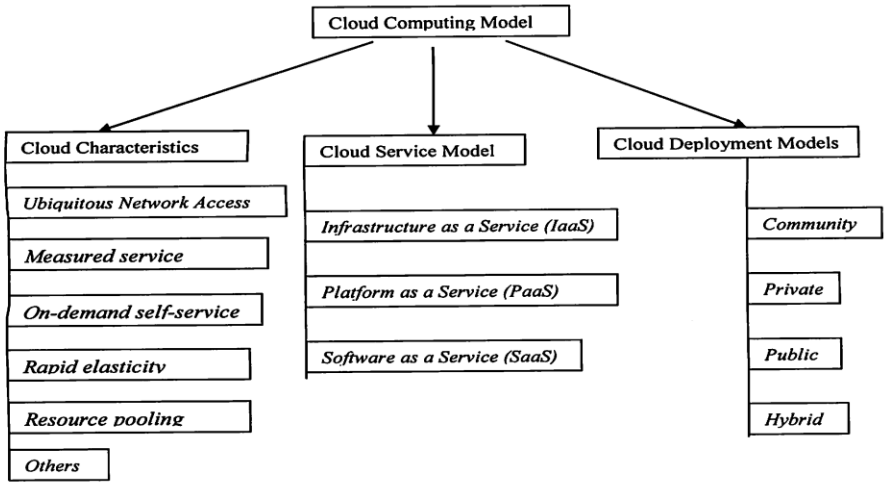
Mobile computing is human–computer interaction by which a computer is expected to be transported during normal usage. Mobile computing involves mobile communication, mobile hardware, and mobile software. Communication issues include ad-hoc and infrastructure networks as well as communication properties, protocols, data formats and concrete technologies. Hardware includes mobile devices or device components. Mobile software deals with the characteristics and requirements of mobile applications.

Thus, mobile computing is the ability to use computing capability without a pre-defined location and/or connection to a network to publish and/or subscribe to information

The purpose of this paper is to explore the comparison between Green cloud computing and Mobile Cloud computing and security issues and define which common security solutions are.

IV. Green Cloud Computing

Green cloud is a buzzword that refers to the potential environmental benefits that information technology (IT) services delivered over the Internet can offer society. The term combines the words green -- meaning environmentally friendly -- and cloud, the traditional symbol for the Internet and the shortened name for a type of service delivery model known as cloud computing.



According to market research conducted by Pike Research, the wide-spread adoption of cloud computing could lead to a potential 38% reduction in worldwide data center energy expenditures by 2020. The savings would be primarily achieved by consolidating data centers and maximizing power usage efficiency (PUE), improving recycling efforts, lowering carbon and gas emissions and minimizing water usage in cooling the remaining centers.

Because so much of a data center's energy expenditures support data storage, the Storage Networking Industry Association (SNIA) has promoted new technologies and architectures to help save energy. Advances in SAS drive technologies, automated data duplication, storage virtualization and storage convergence reduce the amount of physical storage a data center requires, which helps decrease its carbon footprint and lower operating expenditures (OPEX) and capital expenditures (CAPEX).

Because the color green is also associated with paper money, the label *green cloud* is sometimes used to describe the cost-efficiency of a cloud computing initiative

4.1 Benefits of Green Cloud Computing

- Reduced Cost
- Automatic Updates
- Green Benefits of Cloud computing
- Remote Access
- Disaster Relief
- Self-service provisioning
- Scalability
- Reliability and fault-tolerance
- Ease of Use
- Skills and Proficiency
- Response Time
- Increased Storage
- Mobility

4.2 Security Issues in Green cloud computing

The chief concern in cloud environments is to provide security around multi-tenancy and isolation, giving customers more comfort besides "trust us" idea of clouds. There has been survey works reported that classifies security threats in cloud based on the nature of the service delivery models of a cloud computing system However, security requires a holistic approach. Service delivery model is one of many aspects that need to be considered for a comprehensive survey on cloud security. Security at different levels such as Network level, Host level and Application level is necessary to keep the cloud up and running continuously. In accordance with these different levels, various types of security breaches may occur.

There are four types of issues raise while discussing security of a cloud.

- Data Issues
- Privacy issues
- Infected Application
- Security issues

4.3 Solution to security issues in Green Cloud Computing

1) Control the consumer access devices:

Be sure the consumer's access devices or points such as Personal Computers, virtual terminals, gazettes, pamphlets and mobile phones are secure enough. The loss of an endpoint access device or access to the device by an unauthorized user can cancel even the best security protocols in the cloud. Be sure the user computing devices are managed properly and secured from malware functioning and supporting advanced authentication features.

2) Monitor the Data Access:

Cloud service providers have to assure about whom, when and what data is being accessed for what purpose. For example many website or server had a security complaint regarding snooping activities by many people such as listening to voice calls, reading emails and personal data etc.

3) Share demanded records and Verify the data deletion:

If the user or consumer needs to report its compliance, then the cloud service provider will share diagrams or any other information or provide audit records to the consumer or user. Also verify the proper deletion of data from shared or reused

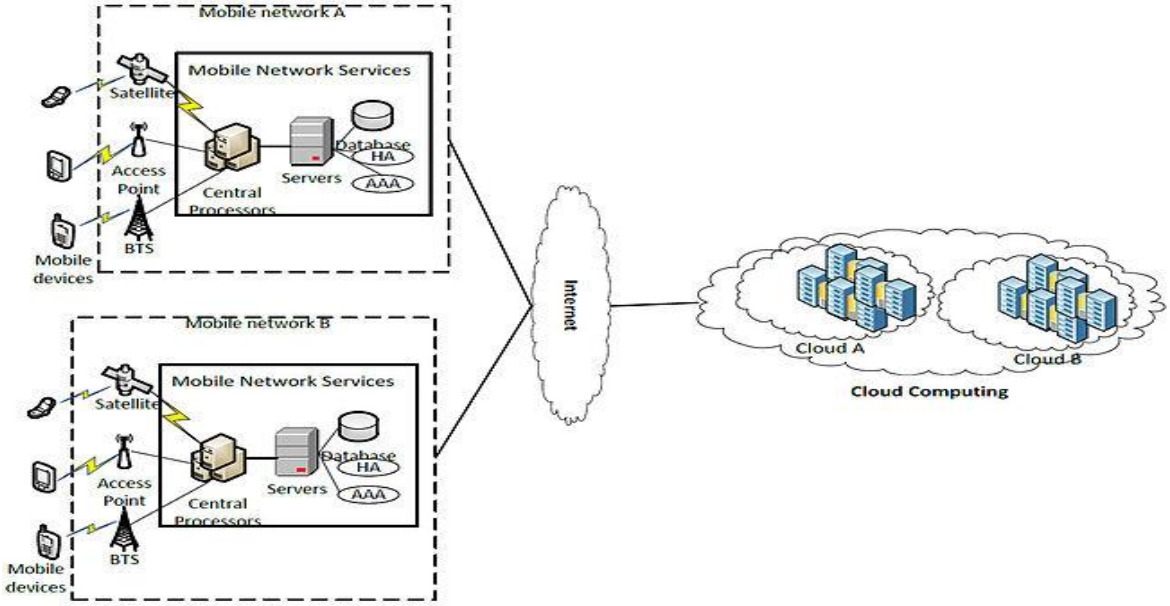
devices. Many providers do not provide for the proper degaussing of data from drives each time the drive space is abandoned. Insist on a secure deletion process and have that process written into the contract.

4) Security checks events:

Ensure that the cloud service provider gives enough details about fulfillment of promises, break remediation and reporting contingency. These security events will describe responsibility, promises and actions of the cloud computing service provider.

V. Mobile Cloud Computing

Mobile cloud computing is the combination of cloud computing and mobile networks to bring benefits for mobile users, network operators, as well as cloud providers. Cloud computing exists when tasks and data are kept on the Internet rather than on individual devices, providing on-demand access.



Mobile apps may use the cloud for both app development as well as hosting. A number of unique characteristics of hosted apps make the mobile cloud different from regular cloud computing. Mobile apps may be more reliant upon the cloud to provide much of the computing, storage, and communication fault tolerance than regular cloud computing does.

5.1 Benefits of Mobile Cloud Computing

- Extending battery lifetime
- Improving data storage capacity and processing power
- Improving reliability

5.2 Security Issues in Mobile cloud Computing

Cloud computing as opposed to standard computing has several issues which can cause reluctance or fear in the user base. Some of these issues include concerns about privacy and data ownership and security. Some of these concerns are especially relevant to mobile devices. In this section, the paper discusses some of these issues, including both incidents involving them and techniques used to combat them.

- Privacy
- Data Ownership
- Data Access and Security

5.3 Solution to Security issues in Mobile Cloud computing

Individuals and enterprises take advantage of the benefits for storing large amount of data or applications on a cloud. However, issues in terms of their integrity, authentication, and digital rights must be taken care of

1) Integrity:

Every mobile cloud user must ensure the integrity of their information stored on the cloud. Every access they make must me authenticated and verified. Different approaches in preserving integrity for one's information that is stored on the cloud is being proposed.

2) Authentication:

Different authentication mechanisms have been presented and proposed using cloud computing to secure the data access suitable for mobile environments. Some uses the open standards and even supports the integration of various authentication methods. For example, the use of access or log-in IDs, passwords or PINS, authentication requests, etc.

3) Digital rights management:

Illegal distribution and piracy of digital contents such as video, image, audio and e-book, programs becomes more and more popular. Some solutions to protect these contents from illegal access are implemented such as provision of encryption and decryption keys to access these contents. A coding or decoding

platform must be done before any mobile user can have access to such digital contents

VI. Comparison between Security issues and solutions in Green Cloud and Mobile Cloud Computing

Issues	Green Cloud Computing	Mobile Cloud Computing	Common solution
Data Issues	- lack of control over personal data - Insufficient information regarding how, where and by whom data is being processed.	communications no longer run over a private network; some run over less-secure public carrier networks	Data can be Authenticated before transferring on network.
Privacy Issues	Sensitive data is being stored on cloud which may be private and can be accessed by anybody. Extra password protection needed.	As Data is stored remotely, it leads to concerns that companies will use or sell this information as well as concerns that the information could be given to government agencies without the user's permission	Every access they make must be authenticated assuring that it is their own information and thus verifying its integrity
Security Issues	key risk factor for all cloud computing services, particularly where the data to be transferred to the service provider is sensitive and is to be held offshore	there can be issues of data becoming locked in to a particular service.	Data should be encrypted before sending data on the cloud.

References

[1] http://www.techopedia.com/definition/14753/green-computing
[2] http://en.wikipedia.org/wiki/Mobile_computing
[3] http://searchcloudstorage.techtarget.com/definition/green-cloud
[4] http://en.wikipedia.org/wiki/Mobile_cloud_computing
[5] http://www.eecis.udel.edu/~cshen/367/papers/survey_MCC.pdf
[6] http://www.cse.wustl.edu/~jain/cse574-10/ftp/cloud/index.html#sec5
[7] http://www.sersc.org/journals/JSE/vol9_no2_2012/2.pdf

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