



**MOBILE CLOUD COMPUTING:
ISSUES, CHALLENGES AND CONCERNS. SPECIAL REFERENCE WITH SOUTH
EASTERN UNIVERSITY OF SRI LANKA**

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Abstract

The improvement of mobile technology and wireless networks is rapidly growing. The device that mostly used for dialing & receiving calls and sending messages in the starting years is now capable of doing almost every task being done by the computer system. These new generation phones are better known as smartphone because of its size, speed and computing power, has become a multipurpose machine capable of handling wide range of applications. The cloud computing provides all the basic services to these mobile devices at backend as number cloud applications has been in the market like one drive by Microsoft, Google drive by Google & iCloud by apple. Most of the students are not using mobile cloud computing but few of the students are using cloud computing. Especially ICT related students are using in the south eastern university of Sri Lanka. My aim is to increase the number of students that using mobile cloud computing among Arts faculty students. This brings out a great knowledge and research opportunity in mobile cloud computing and spread knowledge of mobile cloud computing. We collect the questionnaire and analyze them deeply and find some reason for not using cloud computing. So that we should create the environment to learn about cloud computing among South Eastern university students.

Keywords

Applications, Cloud Computing, Mobile, Students, Technology

Introduction

Mobile Cloud Computing is a technology in which you can access your cloud remotely with the help of mobile phone. Internet connection and mobile phone both are necessary. In Mobile Cloud Computing, the students can access the data anytime and from anywhere very easily. It offers many education, business opportunities for the mobile network operator along with cloud providers. The goal of Mobile Cloud Computing is to allow the access of cloud from the mobile phone by providing an excellent experience to the students and to promote it. Mobile Cloud Computing is economical and it saves time too. It is economical because the platforms are based on pay as you go principle. Mobile Cloud Computing works on computational augmentation approach which is executed remotely rather than executing on the device. With the help of computational augmentation, the mobile device can use the computational resources of varied cloud-based resources. Mobile Cloud Computing consists of four types of cloud-based resources they are distant in mobile Cloud, proximate mobile computing, proximate in mobile computing entities, and hybrid cloud.

When I involve in this research these are the following reason, which clears our doubt, why we choose Mobile Cloud Computing. Rapid Development: Cloud companies are developing mobile applications which are helping customers on daily basis. These applications come up with upgrades which continuously improve the performance of the applications. As companies are improving their applications regularly this leads to the fact that there is a rapid development in mobile Cloud Computing. Flexible: The applications built are of greater reach and flexible. There are a variety of development approaches and devices which supported by mobile Cloud Computing. In Mobile Cloud Computing, the customer can select the services which require for their business which makes it more flexible. Secure: Mobile Cloud Computing is reliable and setbacks up all the data in the cloud and keeps it



secure. That backed up can retrieve anytime in a secure manner. These applications protect by a password so that if the mobile is lost or stolen the cloud does not face any risk. From one phone to another the process is very easy and no data is lost.

Mobile Cloud Computing is very essential part of this scenario. It will be help in many ways, the first one is, Hosting Services: To leverage, mobile Cloud Computing clients surrender a certain amount of control in the operating system for the promise of fewer configuration issues. It is one of the best ways to leverage the cloud. Functionality Outsourcing: Tasks such as video indexing and speech recognition offshore to the cloud living less intensive task to be executed on the phone itself. Web Analytics: In web Analytics the company gathers Information and analyses it for the product enhancement and application upgrades. The company continuously puts efforts to make their products better and make their mobile application to capture store and render information about the interface of the user. Hardware Augmentation: A clone of mobile software creates which further enhance to support high-level application which was not previously possible because of its computational capacity. Execution of Mobile Applications: To execute mobile application there is a need for several factors which are the availability of the local resource, user requirement, service level agreement, and faster network availability. This execution depends highly on the context. Remote Storage: Remote storage is a part of mobile Cloud Computing in which the data can store and retrieve with the help of mobile phone. The storage in mobile phone Will gets completely utilized if the data store on the mobile phone. So, with the help of removed storage, the data can upload in the cloud in the storage of the mobile can utilize for another purpose. The data store in the cloud remotely ensures that the desired information is in the right place and can retrieve anytime assuming the availability of reliable connectivity.

Literature Review

Manish Kumar Aery did a research on Mobile Cloud Computing: Security Issues and Challenges. His paper first discusses the driving forces and opportunities. Then it presents an overview of Mobile Cloud Computing in terms of its concepts, distinct features, research scope and motivations, as well as advantages and benefits. Moreover, he discusses its opportunities, issues and challenges. Furthermore, the paper highlights a research roadmap for Mobile Cloud Computing.

Ruay-Shiung Chang, Jerry Zeyu Gao, Volker Gruhn, Jingsha He, George Roussos, Wei-Tek Tsai less, did a research under the heading of Mobile Cloud Computing Research - Issues, Challenges and Needs, In their study they stated that the rapid advance of mobile computing technology and wireless networking, there is a significant increase of mobile subscriptions. This drives a strong demand for mobile cloud applications and services for mobile device users. This brings out a great business and research opportunity in mobile cloud computing. This paper first discusses the market trend and related business driving forces and opportunities. Then it presents an overview of Mobile Cloud Computing in terms of its concepts, distinct features, research scope and motivations, as well as advantages and benefits. Moreover, it discusses its opportunities, issues and challenges

Antti P. Miettinen, Jukka K. Nurminen did a research on Energy efficiency of mobile clients in cloud computing. Thorough their research they stated that, Energy efficiency is a fundamental consideration for mobile devices. Cloud computing has the potential to save mobile client energy but the savings from offloading the computation need to exceed the energy cost of the additional communication. In their paper, they provide an analysis of the critical factors affecting the energy consumption of mobile clients in cloud computing. They also describe a concrete example, which demonstrates energy savings. They show that the trade-offs are highly sensitive to the exact characteristics of the workload, data communication patterns and technologies used, and discuss the implications for the design and engineering of energy efficient mobile cloud computing solutions.

Samaher Al-Janabi, Ibrahim Al-Shourbaji, Mohammad Shojafar, did a research under the heading of Mobile Cloud Computing: Challenges and Future Research Directions, in their study they stated that in society today, mobile communication and mobile computing have a significant role in every aspect of our lives, both personal and public communication. However, the growth in mobile computing usage can be enhanced by integrating mobile computing into cloud computing. This will result in emerging a new model called Mobile Cloud Computing that has recently attracted much attention in academic sector. In this work, the main challenges and issues related to mobile cloud computing are outlined.

**Problem Statement**

In this technology world most of the students are not using Mobile cloud computing properly. They have mobile phones especially smart phones but they don't have interested on spending time with this kind of technology. Most of the university students are facing lots of problems on store the documents. They managed to save the documents on flash drives, hard disk etc. But if they use mobile cloud computing they will feel free. Sometimes we don't have space to save the document in flash drives. On the other hand, we have forgot to bring flash drives always. So that we cannot manage that kind of situations. If we use mobile cloud computing, we can manage all. These are the problems that we are facing dad by day.

Objectives

The primary objectives behind this study are;

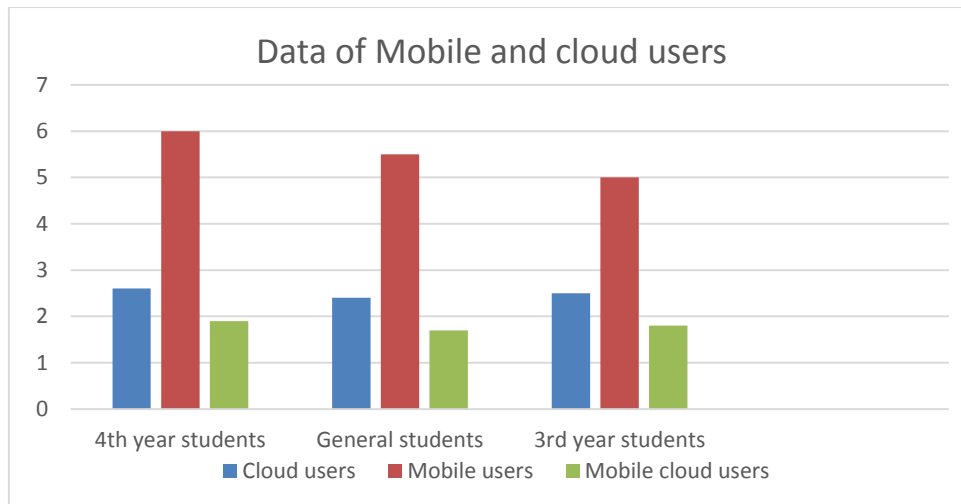
- To introduce mobile cloud computing among Arts faculty students.
- To make aware the usage of mobile cloud computing among Arts faculty students
- To analyze the advantages and disadvantages of the mobile cloud computing.
- To increase the number of students that using mobile cloud computing among Arts faculty students.

Significance of the Study

Mobility has become a very poplar word and rapidly increasing part in today's computing world, Mobile Cloud applications try to reduce the resource requirement and consumption of an application while keeping the quality of it at the peak. The application requires very less space and provides maximum availability. The mobile applications come up with the new updates which continuously provide better services to the customers. The main aim of the company is to enable maximum flexibility and deliver a rich User experience to end user. Nowadays, both hardware and software of mobile devices get greater improvement than before, some smartphones such as iPhone 4S, Android serials, Windows Mobile serials and Blackberry, are no longer just traditional mobile phones with conversation, SMS, Email and website browser, but are daily necessities to users. Meanwhile, those smartphones include various sensing modules like navigation, optics, gravity, orientation, and so on. Which brings a convenient and intelligent mobile experience to users. In 2010, Google CEO Eric Schmidt described mobile cloud computing in an interview that 'based on cloud computing service development, mobile phones will become increasingly complicated, and evolve to portable super computer. In the face of various mobile cloud services provided by Microsoft, Apple, Google, HTC, and so on, users may be confused about what mobile cloud computing exactly is, and what its features are.

Research Methodology

Research Methodology is the most important part of a research. This is a survey type research. Here we have used primary and secondary data collections method. The target population of the study was 4th year students of Faculty of Arts & Culture, of South Eastern University of Sri Lanka. Total population of the study was 160. (third year = 125, fourth year = 35) of South Eastern University of Sri Lanka. We randomly selected students of each batch. Totally 120 students were selected to the study. Relevant data & information were collected through structured questionnaire. Finally, we analyzed the data with the help of excel package. And also we used observation, interview and discussion were held regarding the apps of cloud computing. And also we used internet, research articles, and statistic reports as secondary data collection method.



Cloud Computing Applications

In addition to the questionnaire (survey) discussed above, information on current available cloud applications was gathered from many Internet resources. To the best knowledge of the authors the information collected reflects all what could be found from the Internet.

Dropbox:

Operated by Dropbox Inc., this application is a file-hosting service which offers cloud storage. It lets the users access their files in the 'Dropbox' from their Android devices, which can be synced to other computers or mobile devices.

Amazon Cloud Player: One of the most popular applications on Android platform, Amazon Cloud Player is used to store and play MP3 files. Here the 'Cloud Drive' acts as a hard drive set in the cloud. Users can play their MP3 files via the web or they can conveniently stream them on their Android devices using Amazon 'Cloud' MP3 application.

Google Drive: Google Drive is an online storage service that provides a word processor, presentation, and spreadsheet program, creating a nice alternative to Microsoft Office. The highlight of Google Drive is that you'll find that the menus and interface are natural to use and everything is saved online automatically.

One Drive: One Drive is Microsoft's storage service for hosting files in the "cloud." It is available for free to all the owners of a Microsoft account. One Drive offers users a simple way to store, sync and share various types of files, with other people and devices on the internet. Windows 10, Windows 8.1, and Xbox One also use One Drive also to synchronize system settings, visual customizations, themes, app settings, and even Microsoft Edge's tabs, browsing history and saved passwords.

Result and Discussion

In this section, the survey results are presented and analyzed. We were selected the population is youth (3rd and 4th year students of faculty of Arts and Culture SEUSL). Because these people are mostly used the smart phones. It means youths are addicted to the phone. And also nowadays mobile companies are produce the phones for younger peoples. The total number of people participated in this survey was 120. The ratio of females to Males participating in this survey was 67.6: 30.4, respectively. Therefore, this confirms with the objective of the survey to investigate educated people who are exposed to different forms of digital technology such as personal computers, smart phones, tablets, and all sorts of portable digital gadgets. The participants of the survey were students from 3rd and 4th year of faculty of Arts and Culture South Eastern University of Sri Lanka. We were given 15 questions in the questionnaire.

- To introduce mobile cloud computing among Arts faculty students.
 - ✓ Introduce the cloud computing packages.



- ✓ Give an awareness program regarding mobile cloud computing.
- ✓ Conduct some workshops regarding mobile cloud computing.
- To make aware the usage of mobile cloud computing among Arts faculty students
 - ✓ Understanding the mobile web services.
 - ✓ Cloud consumers have more features on their mobile phones.
 - ✓ Developers can obtain greater markets through the mobile phones.
 - ✓ No need more knowledge for using.
 - ✓ Users can access applications that could not otherwise be supported
 - ✓ It makes the work easy and efficient.
 - ✓ Mobile cloud computing completely makes use of cloud computing to deliver applications to certain mobile devices.
 - ✓ We can get real time data by using mobile cloud applications.
 - ✓ It provides multiple platform support.
 - ✓ It seems like flexibility.
 - ✓ No need more capacity
 - ✓ Easy to finish all works via mobile cloud computing.
 - ✓ It costs less and it saves the large initial cost.
 - ✓ We can use variable mobile devices to access without purchasing.
 - ✓
- To analyze the advantages and disadvantages of the mobile cloud computing. Flexible: Mobile Cloud Computing is flexible as it allows accessing data from anywhere and at any time. The customer only requires an Internet connection and a device with which they can access cloud data. Multiple Platform Availability: The cloud computing application introduced by the company, use in multiple platforms such as Android, IOS, and many more. The cloud can easily access and modify regardless of the platform. Economical: Mobile Cloud Computing eliminates the cost of hardware and it is one of the most cost-efficient methods to use and maintain. Mobile Cloud computing has very less upfront cost in the customer has to pay only for what they have used. Backup and recovery: The data stored with the help of mobile Cloud application can back up easily and retrieve when in need. Cloud disaster recovery is a plan which consists of storing and maintaining copies of data at several places while keeping the security measures at its peak.
 - ✓ Easy access to information
 - ✓ Boost collaborative work among students.
 - ✓ Students can store information more than one place.
 - ✓ This helps guarantee speedy access at any time, and back up data in case of any physical or digital problem with a server.
 - ✓ Students can access information from their computers without the installation of any program.

Disadvantages

- ✓ Less security, confidentiality
- ✓ Technical errors.
- ✓ Lack of control.
- ✓ We cannot use without internet connection or power.
- To increase the number of students that using mobile cloud computing among Arts faculty students.
 - ✓ Give an awareness program regarding mobile cloud computing.
 - Example: Introduce the packages
 - ✓ We should all resources for the students.
 - Example: Internet connections
 - ✓ Teach how to use mobile cloud computing to the students.



- ✓ Contact the assessments, exams by virtual learning environment. So that they will increase the usage of mobile cloud computing.
- ✓ Lecturers should be instructing them to do their works using mobile cloud computing.
- ✓ Reduce the use of hardcopies among the students.
- ✓ Introduce wireless devices among the students

Findings

End of the study we found something related to the mobile cloud computing that are

- It is noticed that many of the cloud computing applications are available on the online platform.
- Most of the students are not using cloud computing.
- Most of the students are eager to learn if they have resources.
- We should provide enough resources for their knowledge.
- Most of the students will be used cloud computing in near future.

Recommendation

Research work has donated hugely to the success of mobile cloud computing. But there are still some issues, which need to be addressed to take this technology to the next level and make sure that it is used by a majority of the population. Low Bandwidth: Although researchers are proposing optimal and efficient way of allocating bandwidth, limited bandwidth still poses a huge concern because the number of mobile and cloud users are increasing radically. Therefore, further studies should try to incorporate technologies like 4G to overcome this issue. (Manish Kumar Aery Assistant Professor IET, Bhaddal, Ropar (PB), INDIA). Standard interface: The current interface between mobile devices and cloud is based on web interfaces. These interfaces are not designed for the mobile devices and thus carry huge overheads. Also, compatibility among mobile devices may be an issue. To overcome this flaw, a standard protocol and interface needs to be designed.

Quality of service: The original goal of mobile cloud computing is to provide PC-like services on the mobile devices. Since, there are a diverse features existing between PCs and mobile devices, we cannot directly shift the services from the computer's platform to mobile devices. In addition, mobile users may face delay in communication with the cloud because of congestion due to bandwidth limitation, network disconnection and signal attenuation. Service convergence: In future, there may be cases where a single cloud cannot suffice the needs of the mobile users. Hence, a new model is needed where the users can make use of services from multiple clouds in a unified manner. One of the possible solutions of this issue is „Sky Computing“, which is a level above cloud computing. To put sky computing in simple terms, it just means leveraging resources from multiple clouds to create a distributed framework. Similarly, the mobile sky computing will enable users to support cross cloud communication and deploy other mobile applications and services. For all these requirements to be met, service convergence needs to be explored.

Conclusion

In conclusion, this paper describes the Mobile Cloud Computing which is a hybrid model that is combination of Mobile devices retrieving the services that are remotely available on the cloud. I strongly suggest to the undergraduate students to use Mobile Cloud Computing for their learning. It is becoming the active research field, due to excessive usage of mobile devices by large amount of individuals and cloud computing by many organization is in initial stage. In this paper we focus on the today's most important field Mobile Cloud Computing as the demand of mobile devices are increasing. Along with this as the usage of internet is also growths very much the data storage is shifted in the cloud environment that leads to the improvement of Mobile Cloud Computing. As all the transaction is on the mobile network with the use of internet the chances of different kinds of threats are increasing, we have mention some of the challenges that Mobile Cloud Computing has to suffer. As we studied that MOBILE CLOUD COMPUTING is very important for today's advance technical world, this helps guarantee



speedy access at any time. The rapid advance of mobile computing technology and wireless networking, there is a significant increase of mobile subscriptions. This drives a strong demand for mobile cloud applications and services for mobile device users. With the help of mobile Cloud, the efforts save and the work is done in the time limit cloud computing stretch to reduce the maintenance cost and enhance data safety and privacy for all students. In mobile Cloud reducing resource consumption achieve by programming architecture and supporting cloud and mashup. This leads to the fact that the future generation of the mobile application is highly dependent on the cloud.

References

1. Antti P. Miettinen, Jukka K. Nurminen. Energy efficiency of mobile clients in cloud computing. pp-1-7
2. A.N. Khana, M. L. M. Kiaha, S. U. Khanb and S. A. Madanic, "Towards secure mobile cloud computing: A survey", *Future Generation Computer Systems*, vol. 29, Issue 5, (2013) July.
3. Manish Kumar Aery. (2016). Mobile Cloud Computing: Security Issues and Challenges. *International Journal of Advanced Research in Computer Science*. Volume 7, No.3, pp 191 – 194
4. Miss. Poonam S. Sharma. Prof. Sneha U. Bohra. (2015) Mobile Cloud Computing: Its Challenges and Solutions. *IJCSMC*, Vol. 4, Issue. 5, May 2015, pg.287 – 293
5. Thilaksha H. Tharanganie, W. N. Wickremasinghe and G. P. Lakraj, (2011) an Assessment of Computer Awareness and Literacy among Entry-Level University of Colombo Undergraduates: A Case Study. *International Journal on Advances in ICT for Emerging Regions*, pp15 – 25
6. W.-T. Tang, C.-M. Hu, and C.-Y. Hsu, "A mobile phone based homecare management system on the cloud," in *Biomedical Engineering and Informatics (BMEI)*, 2010 3rd International Conference on, vol. 6. IEEE, 2010, pp. 2442–2445.