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Enhance Energy Efficiency In Smart Phones

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***Abstract*- Apart from three basic need of human being fourth one is a smart phone, because its features to make human life more comfort and it generate voluminous data and for processing such data smart phones are not capable due to its limited resources such as battery life, storage capacity and processing capacity. Today users become demanding and expect to execute computational intensive application on their smart phones. For extending capabilities of smart devices we need cloud services, but integrating smart devices with cloud infrastructure is a typical task. In this paper we focus on integrating smart devices with Cloud by offloading computation technique for enhance battery life of smart devices.**

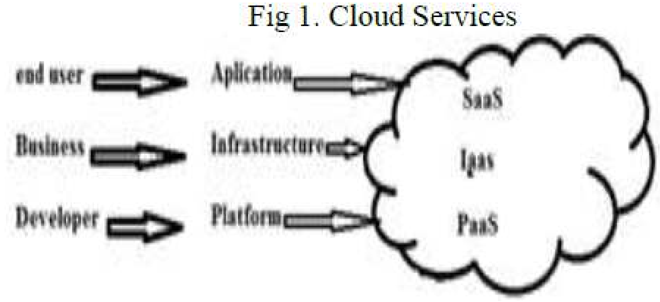
***Keywords*- Smart devices, mobile cloud computing, cloud computing.**

I. INTRODUCTION

Cloud computing is the combination of technology such as cluster computing &Grid Computing. It is also called as ondemand Computing,[1] on demand access to a shared pool of configurable computing resource eg. N/W servers, storage, applications & services.

Cloud Computing defined on the basis of services like Software as a Services(SaaS), Platform as a Services(PaaS) & Infrastructure as a Services.

Fig 1. Cloud Services



SaaS: Software as a Service: Cloud computing popular due to its features, like elasticity, Scalable, pay as you go, multitenant, etc. so in SaaS model Customer need not be installed software, no need of purchasing software, customer can use his own system to run heavy software.

For example. If DTP business man start business & want DTP Software like Microsoft word, MS,influence point for that if he go traditional ,so he first need updated companionable hardware for running this application & need to purchase legal license copy of that software & also have responsibility to upgrade regularly for the security aspects. Means in traditional way customer have entire security of all software as well as data. It is very typical to protect & used from any where of this software for this business, instead of this if this businessman go through Cloud Computing SaaS Service then Customer can access his data from any corner of the word, as well entire responsibility of software is of Cloud service provider(CSP).

For the purpose of accessing Cloud services it need:

- High Speed Internet Connectivity
- Updated Java Script Enable Browser

In Cloud Computing all Services access through internet & using application software called as Web Browser, that's why there is no need of installation of software, as well no need of upgrading old system like p4 etc. In cloud computing customer only answerable for the operational of service i.e. data security & we can say 90% Provider is answerable for entire security of Software.

a PaaS solution should include the following elements:

• A PaaS development studio solution should be browser based.

• An end-to-end PaaS solution should provide a high productivity integrated development environment (IDE) running on the actual target delivery platform so that debugging and test scenarios run in the same environment as production deployment.

A PaaS solution should provide integration with external web services and databases.

• A PaaS solution must provide comprehensive examining of application and user activity, to help developers understand their applications and effect improvements.

• Scalability, reliability, and security should be built into a PaaS solution without requiring additional development, configuration, or other costs.

Examining can be done for various service models of the Cloud. Service models like Platform as a Service (PaaS) and Software as a Service (SaaS) are a result of the abstractions built over the Infrastructure as a Service (IaaS) model. In order to monitor at the application or platform level, it becomes mandatory to have necessary monitors in place for the infrastructural resources. Unless performance promises at the level of hardware resources like CPU, Memory and I/O Devices arenot given, there is no way that an application's performance can be promised. In other words, PaaS and SaaS models can not promise performance unless a examining and control framework for IaaS model exists. Hence, as a first step, we explore the resource examining frameworks for IaaS clouds.

The smart device is not capable to run such services as battery and performance concern. Mobile cloud computing is an technique or model in which mobile applications are built, influence and hosted using cloud computing technology. A mobile cloud approach enables developers to build applications designed specifically for mobile users without being bound by the mobile operating system and the computing or memory capacity of the smart phone. Mobile cloud computing centered are generally accessed via a mobile browser from a remote webserver, typically without the need for installing a client application on the recipient phone. This paper we classified into multiple section such as I introduction,

II Related Work, III challenges & conclusion.

II. RELETED WORK

A. Techniques to save energy for mobile systems

Mobile systems, such as smart phones, become the primary computing platforms for many users. Various studies have shown that "longer battery lifetime" is the most desired feature of mobile systems. A study in 2005 among users across 15 countries [2] also showed longer battery life was the top concern, above all other features, such as cameras or storage. A 2009 survey by Changewave Research [3] shows short battery life to be the most disliked feature on Apple's iPhone 3GS In August 2009, a Nokia poll showed that "battery life" is the most desired feature for music phones. There are many applications that are too computation-intensive to be performed on a mobile system. If a mobile user wants to use such applications, the computation has to be performed on the cloud. applications such as image retrieval, voice recognition, gaming, navigation, etc can be performed on a mobile system.

However, they consume significant amounts of energy. Can offloading these applications to the cloud save energy and extend battery lifetimes for mobile users? Low influence has been an active research topic for many years. In IEEExplore, searching "low" and "influence" in the document title produces over 5,000 papers. Techniques for saving energy and extending battery lifetime can be classified into several categories: (1) Adopt new generation of semiconductor technology.

As transistors become smaller, each transistor consumes less influence. Unfortunately, as transistors become smaller, more transistors are used to provide more functionalities and better performance; as a result, influence consumption actually increases. (2) Avoid wasting energy. Whole systems or individual components may enter standby or sleep modes to save influence. (3) Execute programs slowly. When a processor's clock speed doubles, the influence consumption nearly octuples. If the clock speed is reduced by half, the execution time doubles but only one quarter of energy is consumed. (4) Eliminate computation all together. This sounds like a free lunch but it is possible, except that the computation is not performed at the mobile system. Instead, computation is performed somewhere else and the mobile system's battery lifetime can be extended. This article focuses on the last approach for energy conservation.

B. Offloading computation to save energy

Sending computation to another machine is not truly a new idea. The currently popular client-server computing model is an example. Mobile users can launch web browsers, search the Internet, or shop on-line. What separates cloud computing from the existing client-server model is the adoption of virtualization in cloud mobile systems and save energy. In other words, cloud computing. Through virtualization, cloud vendors can execute arbitrary programs given by the users. This is different from client-server computing because the programs running on the servers are managed by the service providers. In contrast, cloud vendors provide computing cycles and users, in particular, mobile users, can use the cycles to reduce the amounts of computation on the computing provides the possibility of energy savings as a service for mobile users. This is called computation offloading[4].

c. Energy analysis for computation offloading

Various studies about offloading focus on the question whether to offload computation to a server [5], [6]. The following is a simple analysis for this decision. Suppose the computation requires C instructions. Let S and M be the speeds, instructions per second, of the cloud server and the mobile system. The same task takes C/S and C/M seconds on the server and the mobile system respectively. Suppose D bytes of data are exchanged between the server and the mobile system. B is the network bandwidth. It takes D/B seconds for transmitting and receiving data. Suppose the mobile system consumes Pc for computing, Pi while being idle, and Ptr for sending and receiving data. In general, transmission influence is higher than reception influence but we use the same influence in this simplified analysis.

If the computation is performed at the mobile system, the energy consumption is . If the computation is performed at the server, the energy consumption is $P_i \times \frac{C}{S} + P_{tr} \times \frac{D}{B}$. The amount of energy saved is

$$P_c \times \frac{C}{M} - P_i \times \frac{C}{S} - P_{tr} \times \frac{D}{B} \quad (1)$$

Suppose the server is F times faster, i.e. S = F ×M. We can rewrite the formula as

$$\frac{C}{M} \times (P_c - \frac{P_i}{F}) - P_{tr} \times \frac{D}{B} \quad (2)$$

Energy is saved when this formula produces a positive number. The formula is positive if (a) D/B is sufficiently small compared with C/M and (b) F is sufficiently large. The values of M, Pi, Pc, and Pth are parameters specific to the mobile system. For example, an HP iPAQ PDA with a 400 MHz (M = 400) Intel Xscale processor has the following values Pc ≈ 0.9 W, Pi ≈ 0.3 W, and Ptr ≈ 1.3 W. If we use a 4 core server, with a clock speed of 3.2 GHz, the server speedup F may be given by $\frac{S}{M} \approx \frac{3.2 \times 1024 \times 4 \times X}{400}$, where X is the speedup due to additional memory, more aggressive pipeline, etc. If we assume X = 5, we obtain the value of F ≈ 160. The value of F can increase even further for cloud computing if the application is parallelizable, since we can offload to multiple servers. If we assume that F = 160, equation (2) becomes

$$\frac{C}{400} \times (0.9 - \frac{0.3}{160}) - 1.3 \times \frac{D}{B} \approx (0.00225 \times C) - 1.3 \times \frac{D}{B} \quad (3)$$

For offloading to break-even, we equate equation (3) to zero, and we obtain

$$Bo \approx 577.77 \times D/C \quad (4)$$

where Bo is the minimum bandwidth need for offloading to save energy, determined by ratio of D/C . If D/C is low, then offloading can save energy. Thus offloading is beneficial when large amounts of computation C are needed with relatively small amounts of communication D. Existing studies focus on determining whether to offload by predicting the relationships between D,C, and B. Following figure shows
how these variables affect the offloading decision. We use two examples to illustrate these factors: (1) chess game and (2) image retrieval.

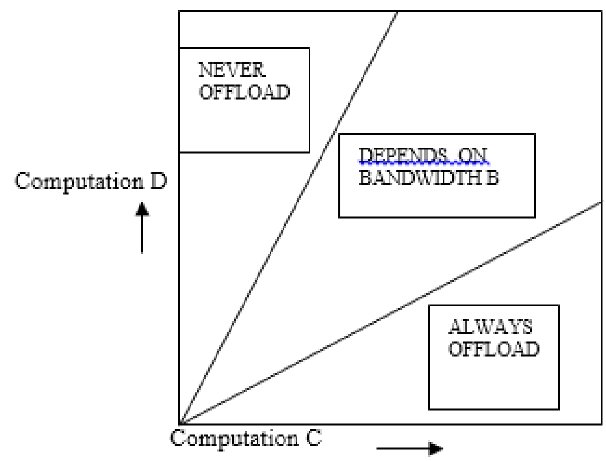


Fig 2. The offloading decision depends on the values of C, D, and B.

III. CHALLENGES IN OFFLOADING COMPUTATION IN MCC

A. Platform diversity

One of the challenges in the current computation offloading frameworks is the diversity and heterogeneity of smartphone architectures and operating systems. This diversity is seen in the following example: MAUI[7] is an offloading framework which is applicable for the .Net framework whereas Mirror Server is a framework which is companionable with the Android platform. A consistent access to cloud services is expected wherein SMDs are enabled to access cloud computing services regardless of the installed operating system or the used hardware. A standardized offloading framework for different smartphone platforms is still a challenging issue in the MCC field.

B. Automatic mechanism

The available computation offloading frameworks still need to be automated. This will help the offloading process to be performed in a flawless fashion while discovering the surrounded environment [8,9,10]. The achievement of such automation is not an easy task as it needs the implementation of a protocol dedicated to finding and discovering services depending on the current context and its constraints.

C. Offloading economy/cost

Using cloud infrastructure resources imposes financial charges on the end-users, who are need to pay according to the Service Level Agreement (SLA) agreed on with the cloud vendor serving them. Generally, the operations of content offloading and data transfer between cloud providers incur additional costs on end-users. Therefore, economic factors should be taken into consideration while making the offloading decisions.

IV. CONCLUSION

In this paper we focus on integrating smart devices with Cloud by offloading computation technique for enhance battery life of smart devices

REFERENCES

1. R. R. Papalkar, P. R. Nerkar, N. S. Band "Analysis of run-time examining system in cloud computing- Review" Volume 3, Special Issue 1, ICSTSD 2016
2. CNN. Battery life concerns mobile users. available at http://www.cnn.com/2005/TECH/ptech/09/22/phone.st udy/index.ht
3. John Paczkowski. iphone owners would like to replace battery,att. available at http://digitaldaily.allthingsd.com/20090821/iphone- owners-would-like-to-replace-batte
4. K. Yang, S. Ou, and H.H. Chen. On effective offloading services for resource-constrained smart devices running heavier mobile Internet applications. IEEE Communications Magazine, 46(1):56–63, 2008.
5. Cheng Wang and Zhiyuan Li. Parametric Analysis for Adaptive Computation Offloading. In ACM SIGPLAN Conference on Programming Language Design and Implementation, pages 119–130, June 2004.
6. R. Wolski, S. Gurun, C. Krintz, and D. Nurmi. Using Bandwidth Data to make Computation Offloading Decisions. In IEEE International Symposium on Parallel and Distributed Processing, pages 1–8, 2008.
7. E. Cuervo, A. Balasubramanian, D.-K. Cho, A. Wolman, S. Saroiu, R. Chandra, P. Bahl, Maui: making smartphones last longer with code offload, in: Proceedings of the 8th International Conference on Mobile Systems, Applications, and Services, ACM, 2010, pp. 49–62.
8. W.-C. Chuang, B. Sang, S. Yoo, R. Gu, M. Kulkarni, C. Killian, Eventwave: programming model and runtime support for tightly-coupled elastic cloud applications, in: Proceedings of the 4th annual Symposium on Cloud Computing, ACM, 2013, p. 21.
9. Y. Cui, X. Ma, H. Wang, I. Stojmenovic, J. Liu, A survey of energy efficient wireless transmission and modeling in mobile cloud computing, Mobile Networks and Applications 18 (1) (2013) 148–155.
10. M.S. Gordon, D.A. Jamshidi, S. Mahlke, Z.M. Mao, X. Chen, Comet: Code offload by migrating execution transparently, in: Presented as part of the 10th USENIX Symposium on Operating Systems Design and Implementation (OSDI 12), 2012, pp. 93–106.