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ASSESSMENT TO DELEGATE THE TASK TO CLOUD FOR INCREASING ENERGY EFFICIENCY OF MOBILE PHONES

Mrs. Arulmozhi B[1], Ms. S. kavitha[2] , Ms. A. Sivasankari [3]

[1]HOD (BCA), Department of Computer Science and Application, DKM College for Women (Autonomous), Vellore, Tamil Nadu, India.
[2]Research Scholar, Dept of Computer Science and Application, DKM College for Women (Autonomous), Vellore, Tamil Nadu, India.
[3]HOD (BSC), Department of Computer Science and Application, DKM College for Women (Autonomous), Vellore, Tamil Nadu, India.

Abstract - *Smart phones have suit an significant fraction of our life. To implement this objective, an in depth knowledge of energy consumption patterns in cloud environment is necessary. We investigate energy consumption patterns. Specifically, we make use of measurable metrics based on runtime tasks to compare rationally the relation existing between energy consumption and cloud workload and computational tasks, as well as system performance. Our research results can be integrated into cloud computing systems to monitor energy consumption and support static and dynamic system level optimization. They provide a variety of services counting those required for daily use. Battery life of smart phones is limited and the main hindrance in its utility. The paper presents the comprehensive way of energy estimation and decide whether to offload the task to cloud for increasing energy efficiency of mobile phones.*

***Key Words*: Mobile Cloud Computing, Smart phones, Energy estimation, offloading decision.**

1. INTRODUCTION

Moreover, apart the enormous energy cost, heat released increases with higher power consumption increases the probability of hardware system failures. Therefore, minimizing the energy consumption has a momentous outcome on the total productivity, reliability and availability of the system. Therefore, minimizing this energy consumption does not only reduce the huge cost and improves system reliability, but also helps in protecting our natural environment. Thus, reducing the energy consumption of cloud computing system and data center is a challenge because data and computing application are growing in a rapid state that increasingly disks and larger servers are required to process them fast within the required period of time. Means if we are using mobile cloud computing on a high speed internet stable connections such as of 10Mbps or 100Mbps in the near future. It will be more convenient than performing the operation on the device itself.

The battery power, processing power and memory of the smart phones is limited. In the last few years there has been tremendous advancement in the phone batteries. From Nickel Cadmium batteries, which suffered from memory effect to Nickel Metal Hydride with high cost to today's Lithium Poly ion batteries with no memory effect and light weight, the batteries have come a long way. Smart phones today come with powerful operating systems like Windows, Android, Blackberry, Apple iOS and Sembilan. They are capable of running applications similar to the one that run on desktop computers. These applications and other smart phone features consume energy that hinders the use of smart phones.

There is a need to reduce energy consumption and a number of researchers are working towards it. Many techniques are suggested like smart batteries, power scheduling, increasing efficiency of operating systems and applications, energy-aware communication protocols and task offloading. Task offloading is a favorable technique for reducing energy consumption with the development of the high speed wireless Internet access. High speed networks increase the connection availability between the portable and the cloud. Utilizing the offloading system, cell phones shave their vitality by offloading substantial calculation errands to the cloud. The cell phone offloads the substantial undertaking to the cloud, the cloud executes the assignments and send the outcomes back to the cell phone. This will enable the mobile device to save the energy spent in executing the task. An example of a task could be video format conversion, in which the mobile uploads the video to the cloud, the cloud converts it into desired format fitting the smart phone capabilities. The processing will take place on the cloud. Errand offloading is a significant strategy as sometimes it might expand the vitality utilization of PDAs. Every task involves data and processing.

In this work, we prove that the energy efficiency of the mobile phone can be improved by offloading the tasks to cloud. Though there can be different types of connectivity, WLAN is used for modeling.

2. CORRELATED WORK

The first technique involves offloading the task to a local high performance server. The server and the mobile device are located in the same or nearby network. The mobile

device would offload the heavy computation task to the server, the server will process and generate the results. The mobile device would download the results.

Several techniques for offloading have been proposed. The techniques can be categorized into three methods based on the type of the remote machine. The first technique uses a web proxy. The web proxy lies between the web server and the mobile device. The mobile device sends the request to the web proxy and the web proxy forwards the request to the web server. The web server processes the request and delivers the processed content to the proxy which in turn delivers the content to the mobile device. The third technique involves offloading the tasks to cloud. The cloud provides different resources to the mobile device like storage and processing. In this paper, we use the third technique and decide whether it is feasible to offload a particular task or local processing is preferable.

3. PROPOSED MODEL

Http protocol will be used for offloading. The wireless NICs and the protocols are the most important factors that affect the cost of offloading the task. Virtualization is a fundamental feature of cloud computing. It allows the applications from different users to run on different virtual machines. This provides separation and protection. The proposed model consists of the mobile device and the cloud both of which are connected to the Internet. The mobile devices are connected to the Internet through the WLAN access point. They could be connected through Base Station Subsystem (3G/4G). The mobile devices provide mobile computing facilities to the end users via different apps. The cloud consists of the cloud data center and the cloud service provider, which can be accessed through the Internet. The cloud provides the mobile devices with all the functionalities needed for mobile computing and the processing facilities for the offloaded tasks. The mobile devices access the cloud via the Internet. Offloading is hence dependent on the network. The network interface cards have their own characteristics. One of the important characteristic is the data rate supported by NICs.

4. POWER INVESTIGATION FOR COMPUTATON OFF-LOAD

With the continuous expansion of power grid, the ever-increasing fault current level is threatening the safe and stable operation of power system. New current limiting technology research has become an urgent issue to solve . Series resonance type fault current limiter (SRFCL) is characterized by zero reactance at resonance of inductor and capacitor under normal condition. When a system failure occurs, the capacitor will be bypassed quickly and the series resonance current limiter is equivalent to a large inductance to limit fault current. This scheme has some remarkable advantages, such as high reliability, lower price, better performance and automatic operation. So this SRFCL has great potential applications in the EHV power system. At the same time, the mutual influence between this type of series resonance current limiter a power system is ``.

5. LOGICAL REPRESENTATION USING WLAN

Remote is an unbounded medium that does not experience the ill effects of confinements, for example, wiring. It is flexible and robust and does not have to be protected or routed between specific physical points. For originators, it might entice to just take after the design of a current wired system and play out a "reorder" for a remote system. While this process may seem expedient, it will also repeat the wired network's mistakes and shortcomings and end up costing more in the long-term. When in doubt, less gear and establishment ability are required for actualizing a remote neighborhood (WLAN) than for a wired system. With wireless, less is often more. Wireless LAN design is a distinct departure from wired design, and the components that make up the framework will be the focus of the next several articles.

Most of the smart phones and mobile devices support 802.11g network. We consider 802.11 g single channel Wi-Fi network. It uses CSMA/CA protocol. If the mobile device needs to transmit a data packet, it senses the channel. If the channel is idle for DIFS duration, the device transmits RTS packet. If the channel is busy, the mobile device defers the transmission. It detects idle DIFS and waits for random back off time to avoid collision The value of the back off timer is decreased as long as the medium is sensed to be idle for a DIFS and stopped when a transmission is detected on the medium and resumed when the channel is detected as idle again for a DIFS interval. When the back off reaches 0, the mobile device transmits if packet. In IEEE 802.11, time is opened in an essential time unit, which is the time expected to identify the transmission of a parcel from some other station. If two or more mobile devices decrease their back off timer to 0 at the same time, collision occurs and CW is doubled for each retransmission until it reaches maximum value.

SIFS is used to give priority access to the ACK packets. When the packet is received correctly, the receiver waits for SIFS interval immediately after the reception is completed and transmits an ACK back to the source mobile device to confirm the reception. If the source device dos not receive and ACK due to collision or transmission errors, it reactivates the back off timer after the channel remains idle for EIFS interval.

Assume one mobile device is communicating with an Access Point using TCP (e.g. transferring a file via FTP, accessing a web page via HTTP). Additionally expect that every TCP information parcel is trailed by TCP ACK bundle.

a. Silence during at least one DIFS slot, signaling that medium is available. (This could be more than one if back off is being executed.)

b. The data frame containing TCP data.

c. The SIFS gap between data frame and 802.11 ACK frame.

d. The 802.11 ACK frame.

6. EXPERIMENTAL SETUP

The experimental setup consists of smart phone (Used here is Red mi 1S) with power tutor software, video converter software, the cloud service (simulated on the computers), Wi-Fi router connected to the Internet and laptop.

The file used is 30 MB fly 720p converted to mp4 format of size 11 MB with the quality for mobile 320 X 240 pixels. Battery monitor is used to calculate the energy used. The tasks involved are:

T1: The file is kept on the mobile phone and converted from fly to mp4 using Video Converter for Android.

T2: The file is kept on the mobile phone and converted from fly to mp4 by sending the file to the cloud, converting the file on the cloud and downloading the converted file on the mobile again.

T3: The fly file is kept on the cloud and request is sent from the mobile to download the file. The conversion of the file takes place on the mobile.

T4: The fly file is kept on the cloud and request is sent from the mobile to convert the file in the mp4 format and download the file in the mp4 format. The conversion of the file takes place on the cloud.

The following table summarizes the time taken and the energy used for the four tasks:

T1: When the data is on the mobile phone and the processing is also on the mobile phone, the time taken is 180 s and the energy consumed is 31 J.

T2: When the data is on the mobile phone and the processing is to be done on the cloud, the task is broken into three steps:

Step1: Upload the data on the cloud (30 MB fly file was uploaded, the time taken was 63 seconds and the energy used was 15 J.

Step 2: The file was converted from fly to mp4 format on the cloud. The time taken was 36 seconds and the mobile phone was idle during this time consuming 1 J of energy.

7. CONCLUSION AND FUTURE SCOPE

The offloading is advantageous only if the energy consumed in offloading the task is less than the energy consumed without it. The IEEE 802.11g standard was used for analysis. The analysis and the experiments can be carried out for newer IEEE802.11x standards and 3G and 4G interfaces. In future, the analysis can be extended to the newer 802.11xx standards.

The energy efficiency of the mobile phone can be increased by offloading the task to cloud. We observe from the results; the speed of execution is faster and energy consumption is lower when the task is offloaded to the cloud. It is vital to compute the energy that will be consumed in processing

The future mobile phones can be designed with built in software to take the decision. Whenever any task is to be executed, the software will check the conditions and constraints and decide to offload or execute locally. The mobile service operators can have their clouds for the subscribers and the service can be provided at the minimal cost.

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BIOGRAPHIES

Mrs. B. Arulmozhi,
Head of the Department (BCA), Dept of Computer Science and Application, D.K.M College for Women (Autonomous), Vellore, Tamilnadu, India.

Mrs. S. Kavitha
Research Scholar, Dept of Computer Science and Application, D.K.M College for Women (Autonomous), Vellore, Tamilnadu, India.

Ms. A. Sivasankari
Head of the Department (CS), Dept of Computer Science and Application, D.K.M College for Women (Autonomous), Vellore, Tamilnadu, India.