An Offloading Framework for Saving Energy in Mobile Device using Cloud Environment

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Abstract— over the current thread, mobile devices are become more popular among people because of they offering the primary voice communication of our routing life, but mobile devices are still suffering from limited energy supply. Due to the small capacity of battery, therefor battery can store only a small amount of energy. In the literature there is some specialist techniques proposed in academia as well as industry to ensuring to save the mobile device energy and contribute to solve this problem to some extent, but it's not satisfactorily. Here propose Task offloading from mobile devices to cloud computing is a promising technique for handling this kind of problem, especially the emergence of high-speed wireless networks and the ubiquitous resources from the cloud computing. To make task offloading sure to save energy for mobile devices, Proposed a task offloading framework, But in some cases wherever the energy being use for the computation is might be less than the energy used for the communication, So energy is not saved in this type of situation. To ensuring this kind of problem, need for the effectiveoffloading decision system to make sure the offloading is beneficial.

Keywords— Mobile device energy, offloading, cloud computing.

I. INTRODUCTION

Now a day mobile devices (i.e., smartphones and tablets) has been growing exponential, comparatively with other computing devices. These new mobile devices are rich in data resources, like sensors and camera, and also in user interfaces, like speakers and colourful screens. With the Internet connectivity users has ability to communicate with each other through social networking. Online gaming, video calling, etc. [1-2]. The main issue for mobile device users is highly energy consumption from the limited energy capacity of battery. The Task Offloading is a promising solution to overcome many of the mobile device limitations, especially the energy limitation [3] which is most allowancing the user uses. In the world of cloud computing, remote computing resources are accessible at anywhere and anytime. Cloud computing provides its users with virtually unlimited computing resources from its data canter [4]. However, offloading is a one of the technique which depends on the system parameters of the mobile device as well as the cloud computing. These technique is working effectively if the mobile device consumes energy on offloading the task more than consuming energy in executing the task on the device. That's why effective design making system is required to enhancing energy saving in mobile device with offloading technique. The offloading decision engine estimates the required energy in both cases and then decides to do offloading of that particular task or not. In the framework all sources of the system parameters and consider them as profiles. These profiles are used in the proposed framework to accurately make the correct offloading decision that save energy on mobile devices these profiles are used to estimate the energy consumption cost of the networking and computing activities, which is needed for effective the offloading decision. The wireless communication technology increasing day by day and availability of wireless access points is almost everywhere. While Semiconductor technology related to mobility with much enhanced functionalities supports small and light devices by high dense electronics, On the other hand, Cloud Computing (CC) is a new computing paradigm that provides unrestricted computing resources to the end-users.

II. LITERATURE SURVEY

Smartphone become an important source of data in the current ICT. The hardware and software of a smartphone support the capability to generate a huge amount of data in many formats and types, but they need an intensive processing, whichrequired large amount of energy supply. [5]. Cloud computing is a new emerging computing paradigm. Cloud computing provides its virtually unlimited resources of its infrastructure as services with minimum effort needed by end-users. [6, 7]. Cloud computing becomes the reality as a result of advances in the networking, semiconductor, and computing technologies [8]. Cloud computing define as IT resources and services that are abstracted from the underlying infrastructure and provided "on-demand" and "at scale" in a multitenant environment [9]. Offloading technique is for computation task distribution. The first introduction to the offloading concept was in early at 1970s for load balancing between servers of a cluster. Communication between local machine and remote machine is the key player for the offloading technique.

However communication consumes energy, There are several purposes to do the offloading in general [10]. Wolski et al. presented a framework for the computation grid to make offloading decision based on network bandwidth[12]. Offloading can increase the quality of an application because of the result of A powerful machine definitely are better than if they produced at less computation power [10, 11]. Energy saving could be gained from the offloading, offloading is a technique for energy limited devices such as smartphones [14, 13]. Miettinen et al. consider the opportunity to offload mobile device task to Cloud Computing in case of saving mobile energy [15]. An analysis is presented similar to the work in [3] for the trade-off between energy cost of mobile application and energy cost of offloading communication. The other techniques are propose and study several offloading schemes like standalone, full offloading, and partial offloading.

III. SAVING MOBILE DEVICE ENERGY BY THE OFFLOADING

In the literature, Almost work has been reported in the area of energy saving using the offloading techniques in smartphones. Offloading approaches are classified in three major classes: (i) using the cloud computing [15, 3, 7]; (ii) using power-aware web proxy [80, 3]; and (iii) using local powerful servers [18, 12, 15, 13]. Kelenyi et al. proposed an offloading technique where the cloud servers are used as a BitTorrent client to download torrent pieces [16]. Kumar et al. [3] introduce the concept of computation task offloading to cloud computing for saving energy in mobile device. TEW MATHEMATICALLY Model for calculating cost to run on a mobile device and on the cloud. So require effective offloading strategy by design making approach for enhancing energy saving mobile device

IV. OFFLOADING FRAMEWORK

Task offloading is a promising solution for mobile device to overcome many limitations, especially the energy consumption. Task offloading from the mobile device to the cloud is essential for enhancing their battery energy for computing capabilities, at the same time. For the task offloading required some system parameters which impact on offloading performance. Effective offloading framework allows the mobile devices to make proper decision to whether or not, performing the task offloading, and this decision based on the system parameters .Accepting the challenge to developing an offloading framework which powered to mobile devices that able to make the correct offloading decision. System parameter are consider as profile to design framework. To design an offloading procedure for making the offloading decision using system parameter as profiles. These profiles are User, Application, Network, Location, Task, hardware, Battery, Cloud

V. OFFLOADING DECISION PROCEDURE

1. User perform some task on application A, offloading process is started
2. The engine check is any wireless network is embedded. Which is store in system file. if the user disable the network feature, then end the offloading process
3. If the networking is enabled, engine determine the available networks and online clouds, built sets NT and CC.
4. Based on set engine finds cloud clone for A. CC^A. selected cloud provide QoS^{cc}greaterthan or equal to the mobile application could, value of CC^A on 0 or 1
5. If the set CC^A is empty, offloading process is stop.
6. If there is at least one in CC^A, then select the network which provides lower energy consumption per byte e.
7. The engine calculates the expected energy E^{off} needed to offload the task, and required time to complete it.
8. Engine have to check if the battery has enough energy to complete the offloading by $E^{off} \leq E^B$. The time to complete should not exceed the time limit defined by the user where $T^{off} = T^{NT} + T^{CC}$. Otherwise, terminates the procedure.
9. If offloading can be done within time limit, need to calculate the total energy consumed E^A, if the task is performed at base application.
10. Whether the offloading will be performing to the smartphone or not, Calculate energy consumption difference between the application and the offloading $G = E^A - E^{off}$.
11. If the G is positive, then the offloading will be beneficial to the mobile device.
12. In any case procedure is terminated, device execute the task locally.

VI. CONCLUSION

The limited energy capacity of smartphones limits the growth of smartphones capabilities. Task offloading motivate to propose offloading framework to saves mobile devices energy with the cloud computing features. Since the offloading task to the cloud is in infant state. In the framework necessary to introduce a set of parameters that are perform the offloading decision effective. The validation study emphasizes that proposed framework is really applicable to the mobile and cloud augmentation. Offloading framework can consider more scop like considering cloud waiting time and security parameters etc.

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