Performance Enhancement of Android phones by offloading Computation Dynamically

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Abstract— This paper presents an offloading scheme which is an enhancement of ACOF[25]. This paper describes the challenges faced by the previous schemes and ACOF. The proposed scheme uses static as well as dynamic parameters to make the offloading decision making the offloading process very efficient.

Keywords— Cloud Computing, Mobile Cloud Computing , Smart phones, offloading, android

I. INTRODUCTION

Cloud Computing:- Cloud Computing is the use of computational resources (hardware and software) that are delivered as a service over a network. To fulfill the user's resource requirement such as storage, CPU, networks and memory , It makes a virtual pool of resource and provides on demand hardware and software. Cloud Computing works like distributed computing. In distributed computing , a huge or big problem can divided into several small parts and distributed among various computers which execute individual part of problem and get the result. The final result come by combining or integrate the individuals problem's result together.   Cloud Computing portends a major change in how we store information and run applications. Cloud Computing has emerged as the great technology in term of scalability and portability. It has changed our view of carrying data and communication.

Cloud is the collection or group of computers or servers interconnected with each others. Cloud is the network or say services provider .Clients can access resources from cloud through internet at anytime and anywhere[1]. Cloud Computing can have four types of Clouds called deployement models[2].

Deployement Models

a. **Private Cloud**:-Private Cloud is Cloud infrastructure operated only for a single organization. The cloud is either managed internally or by a third-party and hosted internally or externally. Users pay for the resources used by them i.e the cloud uses pay per use model. Only users of an organization can share data of private cloud for which it operated or build and third party sharing depends upon trust they build with them. Examples of private cloud include Amazon Virtual Private Cloud and Eucalyptus Cloud Platform.

b. **Public Cloud:-**The Cloud infrastructure provides resources for open use by the general public. It may be managed and operated by an acedemic business, or government organization, or some combination of them. Users have to pay monthly bill according to their utilizing of services. It exists on the premises of the Cloud provider. Examples of public cloud are Amazon Elastic Cloud Compute , Goolge App Engine and Blue Cloud by IBM.

c. **Hybrid Cloud:**- The Cloud infrastructure is the combination of two Cloud infrastructures (private public) that remain unique entities. IT organizations use hybrid clouds to employ cloud bursting for scaling across clouds. Cloud bursting is an application deployment model in which an application runs in a private cloud or data centre and "bursts" to a public cloud when the demand for computing capacity increases [2].
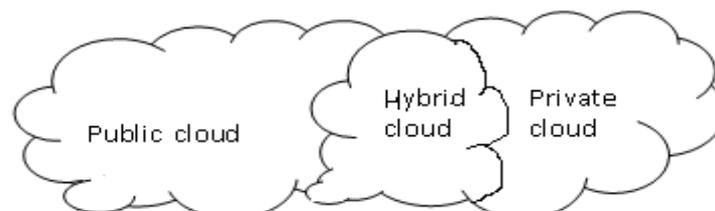

FIG 1.　　HYBRID CLOUD

d. **Community Cloud**:-In this the infrastructure is shared between several organizations from a specific community having common concerns such as security etc., whether managed internally or by a third-party and hosted internally or externally.

Using Cloud Computing the user need not buy a powerful system he just needs to connect to the internet through his net book or tablet pc and can use the computation power and memory of the Cloud. Websites like picasaweb.google.com

provide users space to store their photographs and view them globally from any part of the world. There are a number of different websites providing such services.

In Cloud Computing , three fundamental models known as services models are use for the provision of services[2].

Services Models:-

a. **IaaS** – Infrastructure as a service providers provide   provides on-demand infrastructure services like hardware, software and storage called rentable resources to the customers. The customers request for resources which they require and pay bill per usage of resources.

b. **PaaS** – Platform as a service model provides a complete platform include operating system , database and web server. Application developer develop , test or host their applications on cloud platform..

c. **SaaS** – Software as a service provider install the application software in the cloud and user can use these software by paying the Cloud hosts as per his usage and needs not to install the software on his system.

[1]   Mobile Cloud Computing:-The idea of Mobile Cloud Computing came forward with the rise of Cloud Computing. Mobile Cloud Computing is the combination of Mobile Computing, Mobile Internet and Cloud Computing. By using this technology, resources can be share and data need not be device specific that means could be stored in a central location and could be accessed from any device.The main aim of this technology is the provision of accurate, valuable and real time information to clients

The combination of mobile communication and internet is known as Mobile Internet technology. The main purpose of this technology is to check whether the clients achieve real time network resources and services or not[1].

What is the Mobile Cloud Computing exactly? Mobile Cloud Computing based on three concepts:- Hardware, Software and Communication. Hardware include mobile devices like smartphones, laptops or PDAs. Software include the mobile applications in the mobile devices like browsers , games , antivirus softwares , Google's gmail , Maps and Navigation systems for mobile, Voice Search and so on. Communication includes infrastructure of mobile networks, protocols and data delivery in their use. Mobile Cloud Computing is an extension to Cloud Computing.   In MCC, all the data processing , mobile –based intensive computing could happen on cloud thus reducing the resource requirement of mobile devices mobile such as capability of CPU , memory and so on[5]. Offloading data and the execution of mobile's application in Cloud Computing is known as MCC. MCC could be a solution to the various problems find by Mobile Computing and this is done by using resources of cloud rather than the mobile devices itself to execute the mobile applications. Such a infrastructure where data and the mobile applications executions or processing could happen outside of mobile devices i.e on the cloud known as "Mobile Cloud". Many applications based on Mobile Cloud Computing, such as Maps and Navigation systems , google's gmail for mobile, Voice Search, and some applications on LiveMesh from Microsoft an Android platform, and Motoblur from Motorola, have been developed and served to users[3].

Challenges in MCC

a. Data Security

b. Privacy

c. Quality of communication

[2]   Basic Model and System Architecture of Mobile Cloud Computing

The concept of Mobile Cloud Computing is same as of Cloud Computing but the client end of Mobile Cloud Computing are mobile devices . The clients require the services according to their need and the cloud end server provides those services to the clients [1].
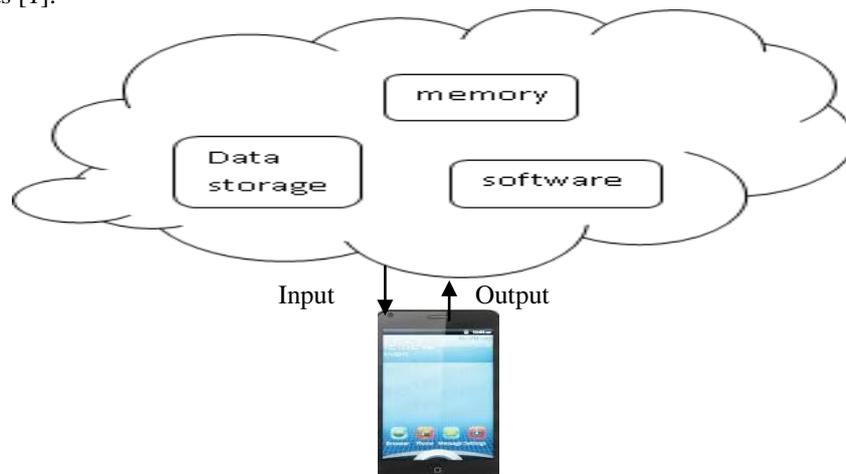

FIG. 2 BASIC MODEL OF MOBILE CLOUD COMPUTING.

[3] WORKING PROCEDURE

 The service procedure of Mobile Cloud Computing is that   mobile users obtain service through user interact interface ,then the needs or requirements of users are sent to the management system whose main focus is on to manage the system or data , the management system finds out the correct data resources by using configuration tools and uses suitable system services .These services separate necessary resources from the cloud[1]. After when the application is

started, then according to the situation of cloud , the monitoring and calculating function of system will follow. The system will check whether the correct resources can be distributed to the suitable clients or not by using synchronizing configuration and load balancing configuration[1].
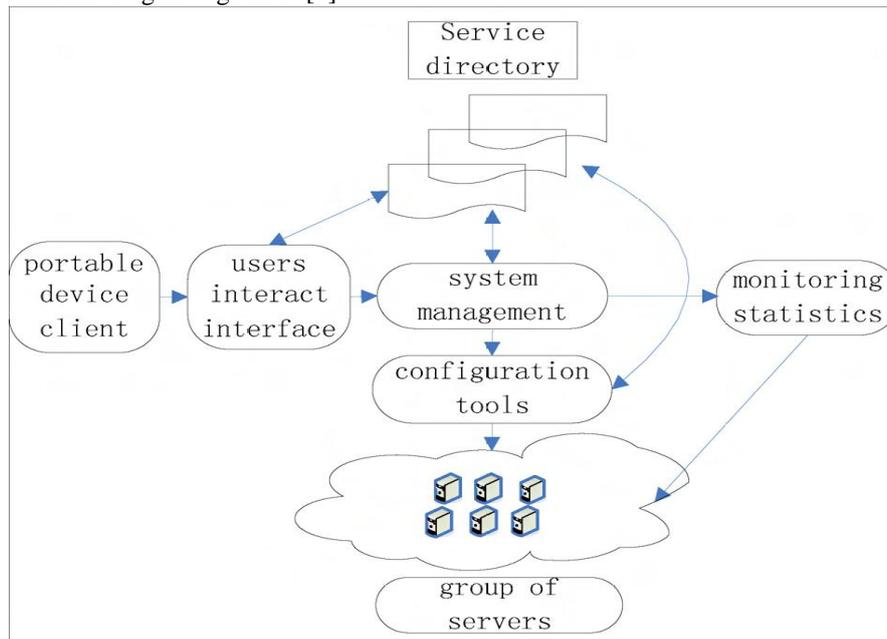

FIG 3. WORKING PROCEDURE OF MCC [1]

[4]   Off loading :- Offloading[6] is the concept of sending intensive computation to resource rich servers and receiving the result from that servers(Cloud).Before actually offloading the computation, a decision is required *whether* there is need of offloading or not and if yes then *what* computation to migrate.

Need of Offloading **:** Offloading helps in overcoming the issues of limited resources of mobile systems such as battery life , network bandwidth, storage capacity and processor performance.

Types of Offloading:-
    a.   Static Offloading :The decision parameters are defined at the development time .
    b.   Dynamic Offloading : The decision is taken by considering dynamic parameters i.e   at run-time of an application.

II.   PROPOSED WORK

The main problem which is identified through survey is that the techniques proposed are software packages which a user needs to install in the phone along with the other applications. Now, this application [3,4] will decide whether to offload the application to cloud or not depending on the static and dynamic profiling. Firstly, the above architectures can work for only some applications which follow the coding technique compatible with the above architectures. Secondly, the application offloader will be a third party software which will statically and dynamically[9,10] test all the applications to take the offloading decision which may result in a lot of CPU utilization if the applications running are small and need not to be offloaded.
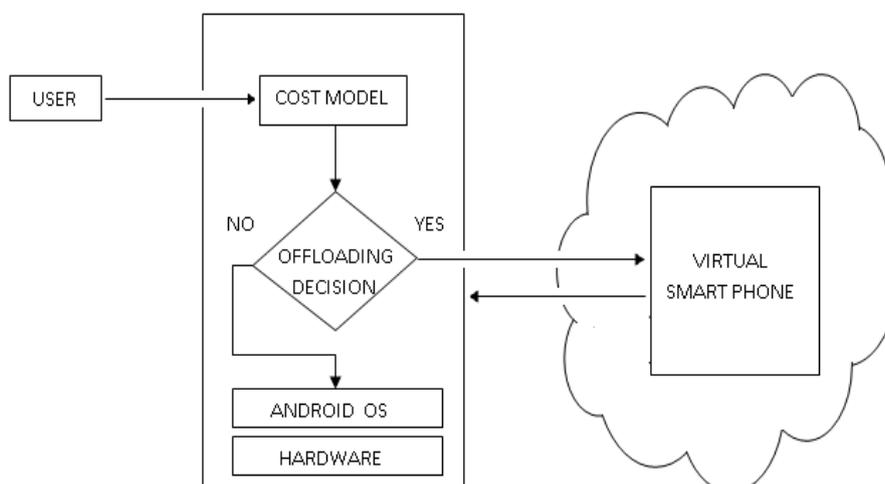

FIG 4. PROPOSED ARCHITECTURE

In the proposed techniques the application developer had to either code in a specific order to achieve offloading[9,10] or they had to insert some code into their applications which made them compatible with the offloader[11]. Moreover the framework proposed in [12] solves much of the above discussed problems but the offloading decision is just static.

It is proposed that we develop a framework which is used by the developers of the applications and thus giving the decision making power to the application itself weather to offload to the cloud or not. Thus making the applications more efficient and the overall system more lighter because this framework will only be used by the heavy applications. Thus the analysis done to take the offloading decision need not be done for lighter applications which may never need to be offloaded. The offloading decision will be taken by considering static paremeters as in[12] as well as dynamic parameters

It is proposed that when the user will send a request to the Smartphone to do a task a cost model would be generated using different static as Well as dynamic parameters. The values of the cost model would be supplied to the offloading unit to take the decision. Depending upon the values of the cost model if offloading will be beneficial then the application would be offloaded otherwise the application will not be offloaded and the OS will be directed to run the application.

III.   CONCLUSION

Mobile cloud computing aims to empower the mobile user by providing a seamless and rich functionality, regardless of the resource limitations of mobile devices. Although still in its infancy, mobile cloud computing could become the dominant model for mobile applications in the future. We have proposed a new technique to offload the application partially from the smartphone to the Virtual Smartphone on the Cloud. This research is an extension of Autonomous Computation Offloading Application for Android phones using cloud[12]. This technique used static parameters for the decision making process. The new architecture proposed will be using static as well as dynamic parameters.

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