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An Alternative Programmable Offloading Scheme for Mobile Cloud Computing Service

R.Priyadharsini, M.E.,¹, V. Kayathri², S. Priyadharshini³

Assistant Professor, Dept. of Computer Science and Engineering, Muthayammal Engineering College, Rasipuram,
Tamilnadu, India¹

UG Scholar, Dept. of Computer Science and Engineering, Muthayammal Engineering College, Rasipuram,
Tamilnadu, India²

UG Scholar, Dept. of Computer Science and Engineering, Muthayammal Engineering College, Rasipuram,
Tamilnadu, India³

ABSTRACT: Mobile cloud computing (MCC) is the availability of cloud computing services in a mobile environment. By providing optimal services for mobile users, MCC incorporates the elements of mobile networks and cloud computing. In mobile cloud computing, all the data and complicated computing modules can be processed in clouds, and mobile devices do not need a powerful configuration like CPU speed, memory capacity, etc. However, the mobile devices are facing up with many struggles in their resources (e.g., battery life, storage, and bandwidth) and communications (e.g., privacy, mobility, and security). These challenges have a significant effect on the improvement of service qualities. In this paper, a literature survey on the MCC and security issues in MCC has presented. Mobile cloud computing (MCC) is a paradigm of computing that enables on-demand access to remotely-based resources on the internet through mobile devices using a utilitybased payment model. Mobile computing facilitates effective, efficient and economical access to resources by mobile clients thereby making services constantly available over the internet. It eliminates the shortcomings of mobile computing by allowing information processing on the cloud to make up for the low computational capability of mobile devices, thereby increasing the battery life, providing more extensive storage services and pervasive computing.

KEYWORDS: Mobile cloud computing, VM Scheduler, Battery Life, Privacy, Mobility.

I. INTRODUCTION

From the users' perspective, they need for better performance of their mobile devices, which reflects on longer battery life and shorter processing time of any kind of services. To overcome this obstacle, mobile cloud computing is introduced. Mobile cloud computing (MCC) provides a service by bringing the abundant resources in cloud computing to the proximity of mobile devices. To empower the mobile applications performance and conserve the battery life it is very useful for us. One of the techniques which adopted in MCC is code offloading. It identifies the computing intensive code of a mobile program and offloads the task to a cloud service via wireless networks. In the concept of code offloading, cloud resources used for offloading have many different types. First the most common resource in public cloud computing services like Amazon, Google and Microsoft Azure that provide pay-as-you-go services over the Internet.

Secondly, a nearby server named cloudlet is considered as cloud resource with fast network connection as well as powerful processors. Cloudlet serves is nothing but of middle layer between mobile devices and public cloud services which is used to reduce the network delay and accelerates the computing. Third, a local mobile device like an ad-hoc network forms a device cloud which has another potential cloud resource, especially when there is no access to

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the Internet. They mainly focused on the code partitioning and offloading techniques. Assuming a stable network connection and sufficient bandwidth however, the context of a mobile device e.g. network conditions and locations are changes continuously as it moves throughout the day. For example, the network connection may not be available or the signal quality is not good. Since a mobile device usually has multiple wireless connections such as Wi-Fi, cellular networks and Bluetooth in which each connection performs differently in their terms of speed and energy consumption, the way of utilizing wireless interfaces can significantly impact the performance of the mobile cloud system and user experience. Another example can be when there is no Internet connection available, a group of mobile device users can still perform mobile cloud service by building a local mobile device network, while when a single user who has no access to local mobile device network or Internet but a cloudlet can still outsource the computation intensive tasks to improve the device performance and save the battery life. This issue has not been rigorously studied in the literature as many works only target the public cloud service as the resource.

1.1 Cloud Computing

Cloud computing is the on-demand availability of computer system resources, especially for the data storage and computing power, without direct active management by the user. The term is generally used to describe the data centers available for to many users over the Internet. Large clouds are predominant today, often they have functions distributed over the multiple locations from central servers. If the connection to the user is relatively close, it may be designated an edge server.

Clouds may be limited to a single organization (enterprise clouds), or available to many organizations (public cloud). Cloud computing relies on sharing of resources to achieve their coherence and economies of scale. Advocates of public and hybrid clouds note that cloud computing allows companies to avoid or minimize up-front IT infrastructure costs.

Proponents also claim that cloud computing allows enterprises to get their applications up and running faster, with improved manageability and less maintenance that enables IT teams to more rapidly adjust their resources to meet fluctuating and unpredictable demand. Cloud providers typically use a "pay-as-you-go" model, which can lead to unexpected operating expenses if administrators are not familiarized with cloud-pricing models. The availability of high-capacity networks, low-cost computers and storage devices as well as the widespread adoption of hardware virtualization, service-oriented architecture and autonomic and utility of computing which will led to growth of cloud computing. By 2019, Linux was the most widely used operating system, including in Microsoft's offerings and is thus described as dominant.



Fig.1.1 Cloud Computing

Cloud computing is named as such because the information being accessed is found remotely in the cloud or a virtual space. Companies that provide cloud services enable users to store their files and applications on remote servers and then access all the data via the Internet. This means the user will not require being in a specific place to gain access to it, allowing the user to work remote.

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II. EXISTING SYSTEM

Several research efforts which devoted towards computation offloading but most of the works have not considered the impact of computation offloading on response time, which leads in degradation of performance. The work of its review of mobile cloud computing (MCC), it gives a summary of the concept and the core ideas, basic model, architecture, problems and possible solutions. However, there are other problems and solutions not mentioned here but they found in other papers. Also, presented a review on the rudiments of MCC, characteristics, recent research work, and future research expectations. It also analyses the features and infrastructure of MCC. Further reporting a survey of research in MCC, it presented the challenges of the design of MCC service, and it proposed a conceptual model to analysis related to research work. However, it was not a systematic literature a review; hence, a clear explanation of the methodical approach that was used to select the set of papers that were reviewed was not provided.

2.1 NEED OF SYSTEM

From the scratch, an adequate scope was defined for the research spanning the concept, its challenges and solutions. This led to the preliminary research questions and the identification of keywords. The keywords were searched in standard and rich databases such as IEEE Xplore, ACM Digital Library, Scopus and SpringerLink. From the research results, the scope, questions and keywords were re-model, search strings restructured, and searches conducted afresh. Furthermore, to harvest numerous relevant papers, the list of databases was increased.

2.2 OVERVIEW OF SYSTEM

In our daily life, mobile devices have become common entity. Energy or Battery is the only resource in mobile devices that cannot be restored immediately and needs external resources to be renewed. Computation offloading is a way to improve performance and save energy. Cloud computing provide services based on pay-as-you-use principle like water, electricity, telephone etc. and provides a model for "enabling ubiquitous, convenient, on demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) .

III. PROPOSED ARCHITECTURE

The proposed framework adopts client-server communication model, in which the cloud resources (e.g. mobile device cloud, public cloud) are servers and the mobile device is the client to access the services on servers. On the client side, the framework consists of three components, namely a context monitor, a communication manager and a decision engine.

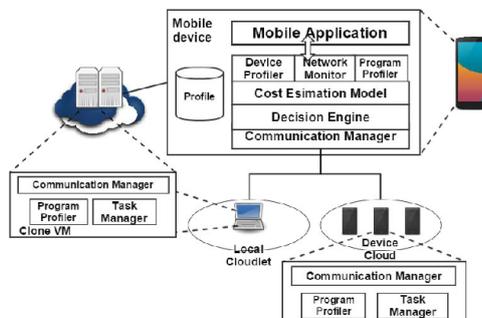


Fig.2.1 Proposed architecture

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On the server side, it includes on server-side communication manager, a program profiler and a task manager. Our system which has build in Think-Air framework, which uses Java reflection and annotation to perform the offloading on method level, Think-Air also considers scalability of the VMs on the server.

3.1 FEASIBILITY

Technical Feasibility

First, we present the design of an MCC architecture with nearby mobile cloud, cloudlet and public cloud VMs. Cloud computing is the fastest growing platform and using many areas of current Information and Communications Technology (ICT). It provides service using Internet for users and the services are virtualized resources and scalability.

Economical Feasibility

Second, we provide cost estimation models for cloud VM, local mobile ad-hoc network, and clone VM running on cloudlet and public cloud, and devise an context-aware decision making algorithm taking into consideration the estimation results from the models and the mobile device context to provide offloading policies of where, when and how to offload for the mobile applications.

3.2 COST-BENEFIT ANALYSIS

This includes an evolution of the development cost weighted against the ultimate income derived from the developed system. Various expenditures needed in this project are as follows:

- Actual equipment purchased or lease costs. This includes the cost of computer System,
- Android Mobile phone.
- Cost of operating system installation.
- Cost of application software.
- Cost of data collection.

IV. METHODOLOGIES

- VM Scheduler
- Predictor
- Host-spot Solver
- Cold-spot Solver
- Migration List
- Communication Manager

VM SCHEDULER

VM Scheduler run and invoked periodically receives from the user LNM (Local Node Manager) the resource demand history of VMs (virtual machines), the capacity and the load history of PMs (personal machine), and the current layout of VMs on PMs. Then it can forward the request to predictor.

PREDICTOR

The predictor predicts the future resource demands of VMs and the future load of PMs based on past statistics. We compute the load of a PM by aggregating the resource usage of its VMs. The details of the load prediction algorithm will be described in the next section. The LNM at each node first attempts to satisfy the new demands locally by adjusting the resource allocation of VMs sharing the same VMM. Xen can change the CPU allocation among the VMs by adjusting their weights in its CPU scheduler. The MM Allover on domain 0 of each node is responsible for adjusting the local memory allocation

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HOTSPOT SOLVER

The hot spot solver in our VM Scheduler detects if the resource utilization of any PM is above the hot threshold (i.e., a hot spot). If so, some VMs running on them will be migrated away to reduce their load. Then it can give the request to cold-spot solver.

COLD SPOT SOLVER

The cold spot solver checks if the average utilization of actively used PMs (APMs) is below the green computing threshold. If so, some of those PMs could potentially be turned off to save energy. It identifies the set of PMs whose utilization is below the cold threshold (i.e., cold spots) and then attempts to migrate away all their VMs then it forward request to migration list.

MIGRATION LIST

When migration list can receive the request from cold-spot solver and it can compiles list of VMs and migration list can pass it response to the Usher CTRL (user controller) for execution.

COMMUNICATION MANAGER:

The communication manager on both client and server- side handles connections between client mobile device and the remote execution in either local mobile device cloud or remote cloud VMs. Once the decision engine produces the offloading policy, the communication manager takes over the task and executes the policy. In case of remote execution failure, the communication manager will fall back and execute the task locally, while reconnecting to the faulty device.

V. CONCLUSION

To reduce response time and save energy for mobile devices at a time is a challenging task as unit of execution time and power consumption are different. System develops mechanism for profiling to evaluate the enhancement in a performance. Proposed computation offloading framework can attain significant improvements in battery savings and time. Also, reduce memory consumption at mobile side. Based on Partition algorithm and decision accuracy of offloading framework, resource intensive modules of application for finding road roughness can be offloaded to the cloud.

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