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A Region Based Offloading Mechanism in Mobile Cloud Computing Environment

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Abstract— Cloud computing permits the end user to access the required software or hardware structures on demand. This will reduce the cost of installation and maintenance. Mobile Cloud Computing (MCC) is introduced to increase the experience of end user by providing them the services at best. The development of cloud computing and virtualization techniques, enables smart phones to overcome the resource limitation constrained by allowing them to computation offload and transfer several parts of application for computation to very powerful cloud servers. The proposed system is based upon the user's moving path mobility. It will assume the user's region to finish the process. The proposed system will reduce the response time as well as improve the load balancing.

Keywords— Mobile-Cloud Computing; MCC; Offloading; smart mobile cloud.

I. INTRODUCTION

Cloud computing allows on demand access to computing and information storage resources that may be organized to fulfil distinctive constraints of the clients with less management overhead. The recent rise of availableness of cloud computing services makes them enticing and economically smart for clients with restricted computing or storage resources who are unwilling or unable to obtain and maintain their own computing infrastructure. The increasing requirement of storage and computational power for the steady growth in quality of cloud services providers. Clients will simply move the large amounts of data and computation to remote locations, likewise as run applications directly from the cloud. There are basically three types of Cloud services are available which are Software as a Service (SaaS), Infrastructure as a Service (IaaS) and Platform as a Service (PaaS).

In later years, main objective of IT industry can be achieved high productivity and lower computational costs. It can be completed to reduce administrative costs, improve the utility of the computing resources and avoided huge amount of the investments to offer a service. The major motive of computing model can be make better use of the resources, put together to achieve large through and enable to offer better results and large computation problems. Cloud computing is newest technology, which can be grow in applications user popularity and can be enabled by these functions. Cloud computing can be recently coined and popularity gained in 2007 that is known as Internet based Distributed Computing. These roots of the cloud computing can be traced to stages of the Distributed Computing and Grid computing. In this, Cloud computing can combination of distributed computing, utility computing, SaaS. Mobile cloud computing is intended to make advantages over the cloud computing for the mobile users. It provides additional functionality to cloud as well. Mobile cloud computing can help to decrease the limitations of the mobile devices in specific of data storage and processing power. Mobile cloud computing can be helped to increase the battery life to transfer execution of the computation intensive application to cloud.

A. TERMINOLOGY

- **Cyber Infrastructure:** It is used to develop and deploy applications easily, thus expanding the scope of applications within budget. It also helps to shift the scientist's and engineer's effort on to the research without concerning on the information technology development.
- **Virtualization:** This feature enables the abstraction of functionalities of lower-level and hardware. This enables the portability of higher-level functions and sharing and/or aggregation of physical resources.
- **Distributed Computing:** Distributed Computing is the computing environments, in which multiple autonomous computers are connected through a communication network, interact with each other to achieve common goal.

The evolution of cloud computing is derived from grid computing that provides the required infrastructure and resources to the middle size businesses but the cost of implementation is very high and to reduce this cost concept of cloud computing is introduced. Cloud computing is the successor of grid computing. They share lots of common features like architecture, vision and technology but little different in the some aspects like programming platform, security and applications of cloud computing

B. MOBILE CLOUD COMPUTING

Mobile Cloud Computing or MCC is used to enhance the user experience by improving the mobile application services. To achieve that goal mobile computing, cloud computing and wireless networks are combined together to improve the performance and computational power of applications. MCC enables the business opportunity for cloud service provider and mobile network operators. MCC basically uses the pay-as-you-use service, as the user uses the application they have to pay accordingly. MCC gives their best to provide the best service to the mobile user by providing the best cloud service in order to optimize the high computation power, centralized storage, unrestricted functionality to serve number of devices anytime, anywhere without any problem.

However, all applications are not only energy efficient when migrated to cloud. These services of mobile cloud computing can be significantly distinct from cloud services for desktops because they must offer energy savings. Existing systems solves the problem of mobile computing offloading by implementing multiple workflow mobile services. This can reduce and fulfil the complex requirements and makes decision regarding offloading problem, on whether the desired services of a workflow should be offloaded or there's any need to change it.

II. LITERATURE SURVEY

Deng et al. [1] proposes a novel and robust solution to the problem of mobile computation-offloading arises due to workflows mobile services occurred to fulfil their complex requirements. Because of portable devices mobility offloading decision can be altered due to unstable connectivity of mobile networks. They focus on the dependency relation to optimize the energy and execution time. Fernando et al. [2] discusses the impact of multidimensional heterogeneity over MCC. Authors covers MCC major challenges over different networks like wired and wireless and also covered the heterogeneity in MCC. The roots of heterogeneity can be divided as platform, API, hardware, feature and network. By using these factors related challenges and opportunities are investigated, identified and can be defined to be handled like virtualization, SOA etc. Rahimi et al. [4] proposes a system to overcome the decision making issue in the area of decentralized computation offloading game. After analysing the game structure, this could be deduced that game has always nash equilibrium. So, authors developed a system to achieve the nash equilibrium of the game compare it with the optimal solution of centralized algorithm. Using real-time environment for MCC on android mobiles, ASM can be computed by using the benchmarking prototype. Proposed model shows the computational off loading's lightweight nature. Khan et al. [5] proposes a thematic taxonomy for mobiles inter networking and techniques to overcome the challenges faced during internetworking of mobile devices. Also compute the implication occurred due to these techniques. To classify the techniques different parameters are used like mobility approach, latency, packet loss, architecture and overhead while signalling. Wan et al. [6] proposes theEMC, a novel system by using the MCC to offer the personalized services for emotions. To achieve the proposed system objective (like intelligent emotion aware services, human centric and personalized services) some changes are made in the existing MCC architecture for 5G. Abolfazil et al. [7] studies the applications partitions runtime overhead on SMD. To so author uses the Smart simulation environment and this could be deduced that additional resources for computing are used by the application which increases the overhead of the application. Shiraz et al [8] proposes a system in which number of hops covered and mobile cloud distance is considered. Authors compute the overhead on the system and results shows that mobile cloud distance makes negligible impact on the application overhead by the number of hops covered increases the overhead of communication that degrade the performance of application. Chen et al [9] proposes the VCMIA system by selecting the VMS (vehicle maintenance services). Proposed system designed for classification of application model and offloading decision making to analyse the system and directed to the future research. Gani et al. [10] discusses the mobile cloud computing applicability in various fields like social media, health, mobile computing and commerce etc. Authors also discuss the MCC environments critical aspects in order to maintain the security, offloading and privacy.

III. RESULTS

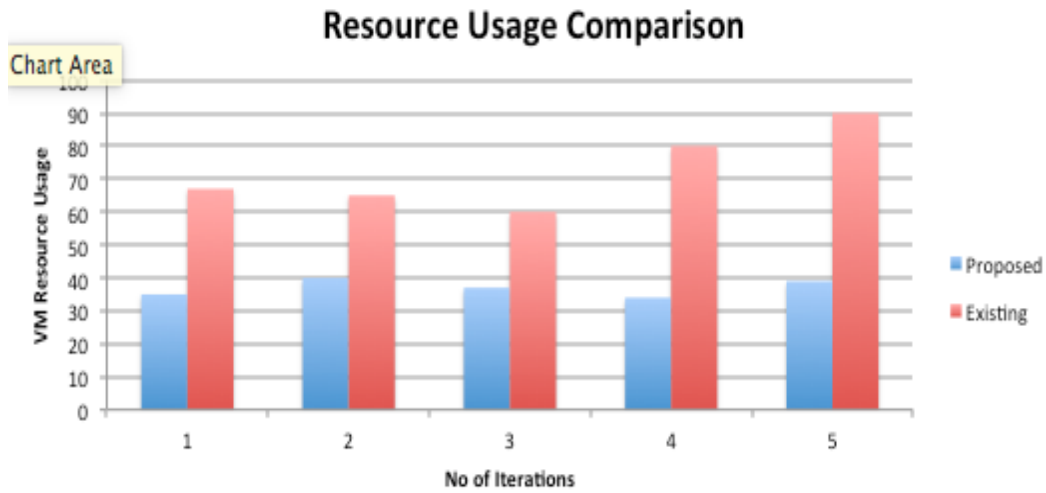


Image 1: resource usage comparison

Above displayed image 1, demonstrate the comparison of resources usage of proposed system and existing system during the simulation time. This shows the number of iterations over the resource usage of virtual machines. Image 2 shows the time taken for various procedures of key exchange and management schemes of client server architecture. Where, client needs the key to make communication possible between them. They have to share a key between them. Image 3 shows the Entropy comparison of keys generated from 10 subjects. The highest level of entropy is approximately 2.18 for numerous rounds of key mechanism.

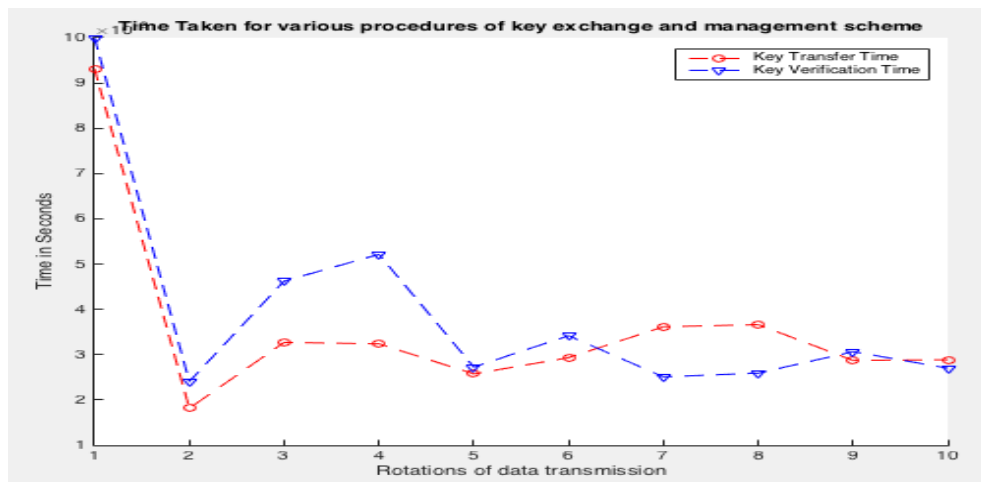


Image 2: time taken for various procedures of key exchange and management schemes.

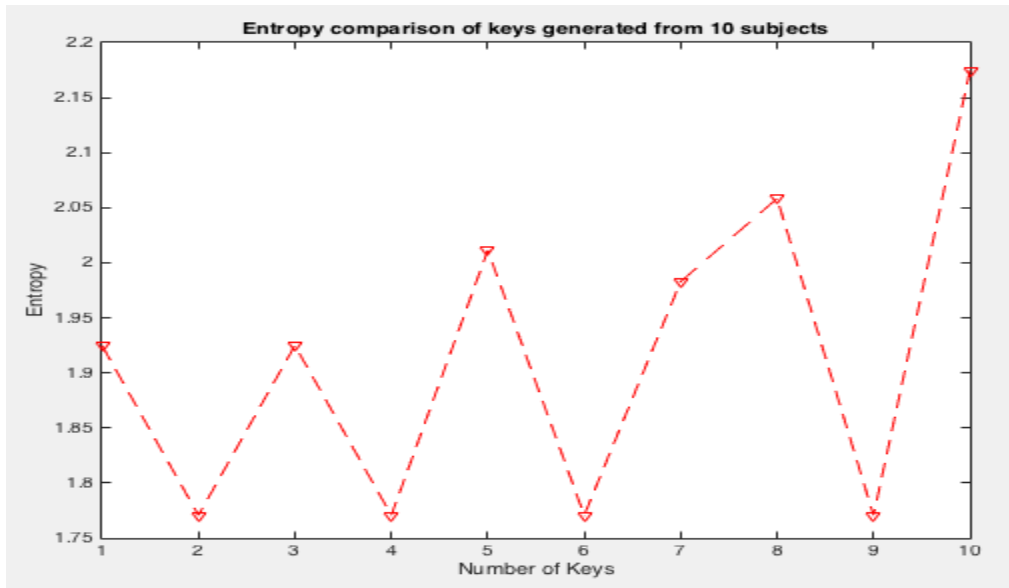


Image 3: Entropy comparison of keys generated from 10 subjects

IV. CONCLUSION

The development of cloud computing and virtualization techniques enables mobile devices to overcome the severity of scarce resource constrained by allowing them to offload computation and migrate several computation parts of an application to powerful cloud servers. The existing system does not consider the user's region. The same machine on which the request is generated handles the offloading. This system can be improved further by dividing the virtual machines region wise. The proposed system is based upon the user's moving path mobility. It will assume the user's region to finish the process. The proposed system will reduce the response time as well as improve the load balancing.

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