iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** V **Month of publication:** May 2020

DOI: http://doi.org/10.22214/ijraset.2020.5198

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue V May 2020- Available at www.ijraset.com

Novel Survey on Power and Latency aware Cloudlet Selection Strategy in Multi-Cloudlet Atmosphere

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Abstract: ***Nowadays the cell cloud computing is a promising place in the field of studies. And the interest in using cellular cloud computing(MCC) for compute-intensive cellular devices jobs consisting of multimedia applications has been growing and these applications requires high computing supply in both the processing and communication and execution of these applications within the cloud impacts the quality of service, latency delay and power consumption so the cloudlets are introduced. Cloudlets are nothing but a set of computers located at the threshold of the internet and provides the same services as a cloud. The cloudlets can be implemented incorporation as a corporate cloudlet, home cloudlet and users can share their resources. As we know that cellular devices are unable to process all the users request so the request is offloaded to optimum cloudlet and receive results later. There are many approaches have been discussed by authors for improvement of cellular devices by minimizing the power consumption and response time. Here we propose a survey paper which gives the brief introduction about cloudlet and its architecture and features. It also discusses about computation offloading process which means offloading the execution to other rich systems with better performance .computational offloading frameworks and their contributions and the critical issues which exists in MCC. The case study about various proposed schemas used for reducing the power and latency.***
Keywords: cloudlets, offloading, computation, gadgets, virtual machines

I. INTRODUCTION

As its miles observed that the cellular smart devices are becoming extremely crucial additives in our day by day existence so the interest in using the handheld devices such as laptop, mobile are increasing day by day and theses devices go through from a few limitations consisting of restrained storage, processing capacity, brief battery lifetime because of energy drain which is noticed to be enlarged when running applications that impose extensive computations on the cellular devices. To deal with these issues cellular cloud computing is introduced by combining cloud computing and mobile computing. Cloud offers virtualization of extensive amount assets with a distributing computing version offering software program as a service (Saas), platform as a service (Pass), and infrastructure as a service (Iaas) where the users can use these services for a better life. In sequence to defeat the drawbacks of cellular gadgets the offloading process is implemented which means that with the help of MCC the most of the applications are processed inside the cloud and the outcomes are sent back to cell devices.

However, connecting the cellular device to cloud it experiences the huge latency delay and energy consumption especially when using 3G connections and by offloading the applications to cloud introduces the communication overhead which maximizes the wide-area network delay.

So the cloudlet is introduced which is trusted computer with high capabilities attached to the internet. With this cloudlet based mobile computing the intensive jobs are offloaded to the cloudlet to complete the required processing and outcomes are sent back to cellular gadget so that the latency and power consumption are reduced. One of the cloudlet benefits is the mobile user can implement the VMs on cloudlets running the required software in a thin client. It has some drawbacks. First, all devices in side LAN community can corporate in the cloudlet. Second, to achieve better performance the appliance is partitioned into elements as an alternative of executing the whole appliance in VM. The cellular gadget functions as a thin client and the computation occurs in nearer cloudlet and if no cloudlet is accessible then the cellular gadget makes a connection to the cloud. The cloudlet is connected alongside Wi-Fi APs to allow cellular devices to get right of entry to it and in a few cases, each of the cloudlets and access factors incorporated into one entity. The cellular device uses Wi-Fi to connect the cloudlet. The below table gives the comparison of 3G and Wi-Fi connections.

TABLE 1
Comparison of 3G\LTE and Wi Fi

	3G\LTE	Wi Fi
Power consumption	Higher	Lower
Connectivity speed	2Mbps	400Mbps
Latency	Higher	Lower

In addition to this, the computation offloading process has been discussed. Computation offloading is the transfer resource-extensive computational obligations to the separate processer like cloud, network. There are many offloading frameworks such as cloudlets, jade, mirror server, etc and their offloading mechanisms have been discussed which enhance the capabilities of the cellular device. There are some critical issues which occur while offloading the applications to cloud have been discussed in this paper. The case study of various cloudlet based offloading methods which lessen the electricity consumption and latency delay have been discussed.
The remaining of this document ready as follows: part 2 describes the literature survey. Part 3 provides the cloudlet concept and architecture. Part 4 describes the computation offloading technique. Part 5 provides the comparison of offloading frameworks. Part 6 discuses the critical issues in MCC. Part 7 provides the case study of various proposed cloudlet based offloading methods. Finally, it concluded in part 8.

II. LITERATURE SURVEY

The authors H.T Ding, C. Lee, D. Niyato, P. Wang [1] had described MCC architecture and advantages of MCC and applications of MCC like cellular commerce, cellular learning, mobile fitness care, cell gaming and detailed study about the issue, and approaches of cell cloud computing and that they highlighted some issues like low bandwidth, network administration, excellence of service, pricing, service convergence typical interface as for future research area.
The authors Fesehaye, D.; YunlongGao; Nahrstedt, K.; Guijun Wang [2] examined the use of cloudlets with almost about cloud cell computing applications. They also explained about 2 modules with relevance the system throughput and records transfer delay. And therefore the outcome of this paper declared that the usage of the cloudlet based model performed better than the cloud-based totally version.
The added paper [3] is that the authors Soyata, T.; Muraleedhara, R.; Funa I, C.; Minseok Kwon; Heinzelma, W., offered a brand novel structural design called MOCHA. The plan of this structural design is to decrease the delay during the face reorganization process. The MOCHA amalgamates the cell devices, cloudlets, cloud servers.
The author's A. Mukherjee and D .De, [4] had proposed a call making strategy to make a decision whether to dump the application to the cloud or not. And introduced a Femto cloud spece for offloading. These following algorithms are used for (decision algorithm, queue algorithm, reassignment of jobs from unsure queue integration of algorithm) to offloading the application to the cloud. Transferring the information to the cloud security plays an important role so through femtocell the secured data is transferred to the cloud .rential image-based biometric authentication is employed to attain security .and experimental results show that the proposed methods reduced the facility and latency up to 3-32% and 4-3%.
Authors M. Armbrus t, A. Fox, R. Griffith h, A. D. Josep h, R. that z, A. Konwinski, [5] given the clarity of the terms and identify the highest technical and nontechnical obstacles like availability, information transfer, bottleneck, performance, unpredictability, scalable storage, scaling quickly recognition fate sharing and opportunities.
The work exhausted paper [6] is authors Deepsubhra T, Guha Roy, Debashis De, Anwesha Mukherjee T, Rajkumar Buyya," proposed an application-specific cloudlet selection algorithm. This strategy reduced the delay about 3-27% and therefore the electricity by about 3-35% than the round-robin algorithm-based totally technique and proxy server based totally cloudlet choice theme for offloading severally.
Authors Y. Jararwe h, L. A. Tawalbe h, F. babe h, A. Khreisha h, and F. Dosari [7] given the outline about cloudlet and mobile computing proposed a brand new MCC cloudlet based model. Discussed 2 methods to handle the cell appliance running within the cloudlet. And outcome of this paper show that it reduced the facility consumption of mobile devices, reducing communication latency.

Authors M. A.Rodriguez and R.buy [8] had discussed the swam optimization algorithm, PSO modeling, schedule generation metaheuristic optimization algorithm is employed. The results of this paper are it reduces the execution cost; performance is evaluated by using cloudism framework and different workflows.

The authors of [9] had discussed the cloudlet spec and the LEAD algorithm is employed. Performance of LEAD is evaluated by comparing it to other strategies i.e. LEAN and remote DC. The key performance metrics of use of VM is to control jobs execution within the cloudlets mentioned [10].These metrics include: overhead of VM lifestyles cycle once deploying it within the execution of cloudlet allocation to VM and programming of VMs. The authors used the cloudism as a platform setting and finished that it's so essential to effectively discovered and VMs in CC to cut back the quantity of execution time as a result of antecedently mentioned performance metrics. [11] Presents a paradigm implementation of cloudlet design and indicates the gain of this design for the real time applications. The project design in [11] may be a fine-grained cloudlet to trot out the strolling utility on the issue model, wherever the cloudlet is usually designated dynamically from any resource-rich tool within the LAN and now not because of the normal plan wherever the cloudlet is mounted nearly concerning the wireless get right of entry to points.

In [12] authors analyzed the essential factors affects the ability intake of cell purchasers once the employment of CC they conjointly equipped associate example on a way to save lots of mobile client power. To outline the balance between native cellular computing and much flung cloud computing, they provided their terribly own measurements of the principle characteristics of recent cellular devices.

III.CLOUDLET CONCEPT

Cloudlet may be a small cloud positioned near the cell users [11]. It is mounted on discoverable, restricted, stateless server strolling many digital machinery VMs on that cellular gadgets offload high priced computations. A cloudlet could also be a trusted resource-rich trustworthy computer that's well linked to the net and is obtainable to be used through nearby cellular devices. Cloudlets do not must be a tough and fast infrastructure near the wireless get entry to point, but instead shaped in a very energetic manner with any tool within the LAN network with to be had assets.

Fig. 1 Cloudlet types

A. Cloudlet Architecture

The cloudlet architecture is defined as a high-stage structure for code offloading in an aggressive atmosphere. Cloudlets are the core environments in a three tire structure i.e. in-between layer some of the cloud infrastructure and cellular device. The coronary heart of this structural design is a big critical centre which can be enforced as a one of the Amazon's Microsoft's, Google's records canters or personal organization clouds. The other quit of the structural design consist of the offload rudiments for cellular gadgets cloudlets. They are placed about to the cellular gadgets they supply. The structure minimizes latency by employing a solitary- jump community, and doubtlessly lower the battery intake by use the Wi-Fi or short vary radio as an alternative of broadband wireless which naturally which devours additional power[13]

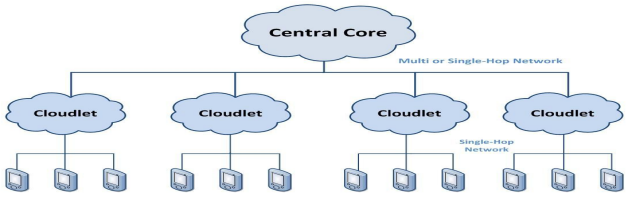


Fig. 2 Cloudlet architecture

B. Some features of cloudlets

1) *Cloudlets acts as offloading elements:* One of the best feature of cloudlet is it acts as an offloading elements. Basically the offloading elements are stateless i.e. it does not save client information for use of next session. Here the mobile tool does not have to talk with the central core rudiments basis of the term of offloading they just require to talk with the nearest cloudlets. During provisioning and configuration mobile tools talk with the central core. One of the best approaches to offload is VM synthesis. This is use full in aggressive environment in which it consists of unreliable networks, need of rapid deployment. Here we consider this scenario where the mobile tool offloads the computation intensive mobile application to the cloudlet and the application selects the nearer cloudlet. Due to loss of network connectivity and loss of some resources the mobile tool fails to execute the application over cloudlet. So it chooses the other cloudlets and executes its applications in short period of time without any configuration of application or cloudlet. So this feature allows using of available resources and update disconnected sources.
2) *Using the cloudlets in thin or fat clients:* As most of the people using mobile tools are increasing rapidly the processing power of mobile device is decreasing so the application cannot be processed completely. So the cloudlets are used in thin clients and fat clients. In case of thin clients, it consists of applications which are used for the face reorganization such as face lock and voice to text transmission i.e. Siri application. These applications are difficult to process in the mobile devices because it consist of large database and algorithms. So the cloudlets are used to process the applications most of the processing is done at the server side. In case of fat clients the processing of the application is finished on consumer side not on server side. For example consider an application called instagram where user can take photo or video and post it in the social networks. By using this application transformation of photo or video can be done directly within the cellular gadgets. Only tiny a part of the process is meted out within the cloudlets.
3) *Utilization of virtual machines in cloudlets:* By practice of the VM in cloudlets it provides the partition. Instead of setting up the software on cloudlet to carrier the cellular tool we can deliver the pre-programmed VM to cloudlet. The VM it encapsulates and separates the visitor software i.e. the software which is installed on VM and host software i.e. the software which is installed from remote server and managed by the third party vendor or software manufacture. The interface between the guest and host is solid and restricted so it ensures the toughness of the cloudlet and builds the conceivable outcomes of similarity among cloudlet and cell gadgets. The VM technique is weaker than the software program virtualization i.e. One single pc allows to run two or more OS. And it is more well known than language based approach where application should be written in particular languages such a c#, java. In this environment usage of VM in cloudlets is the major task because when the cloudlet access the duplicate VM. It regards it as a reserve duplicate and keeps it till the separation must be recovered. In the future, the mobile gadgets can be connected to that duplicate VM and same VM can be utilized for offloading by the cell device at equivalent time.

IV. COMPUTATIONAL OFFLOADING TECHIQUE

As we know that executing the mobile applications in cellular devices are computationally intensive and consume large amount of energy so the computation offloading technique is introduced. The authors Ellouze et at, Flores et al, Chen et at (2005, 2005, 2006) had described briefly about computational offloading process. The computational offloading is a task of transferring computational demanding applications to the remote server. The mobile devices offload the applications to cloud and later it receives the results .this process involves three steps that is partition, preparation and offloading decision. In first step the utility is partitioned into offloadable and non offlodable additives which mean that the additives to maintain at the cellular device and which migrate to cloud server. The choice whether or not the additives are offloadable are taken by means of various facts such as by analyzing the source code. Next step is preparation in which it involves the choice of the remote server and setting up of code and transfer, as proxy receives and executes the tasks on behalf of cellular devices. The last step is offloading decision; this is made before execution of offlodable components on cloud. There are many offloading mechanisms to be had for the offloading the programs on cloud and they are classified as frameworks based totally on virtual machine cloning and frameworks based on code offloading.

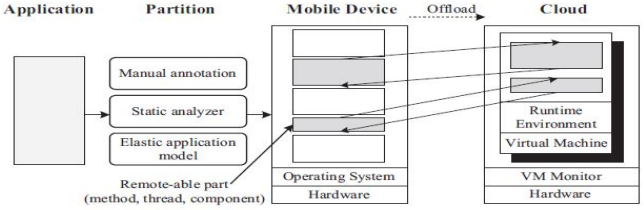


Fig. 3 Computational offloading process

V. COMPARISONS OF OFFLOADING FRAMEWORKS

The authors M. Satyanarayanan, P. Bahl, R. Caceres, N. Davies had described about VM Cloudlets [14] this is VM based framework and the offloading mechanism of this is the cellular gadget transmits all the forms of the appliance to the cloudlet that applies it to the bottom VM to discharge and carry out the VM and contribution of this framework is it provides the cloudlet primarily based resource wealthy cell computing.

The authors F. Xia, F. Ding, J. Li, X. Kong, L.T. Yang, J. Ma described about phone2cloude [15] which is code based framework and offloading mechanism of this is the far away execution manager receives needed computer file, it executes offloading computation at the cloud server, and sends back results to the offloading proxy. The contribution of this is the improvement of the applications presentation and enhancement of power effectiveness of smart phones.

The authors H. Qian, D. Andresen, described about jade[26]which is code based framework and offloading mechanism of this is the an offloaded entity can be executed on the remote server. The contribution of this structure is an energy aware computation offloading system. The authors B.-G. Chun, S. Ihm, P. Maniatis, M. Naik, A. Patti had described about clonecloude[17]which is virtual machine based framework and the offloading mechanism of this is the offloaded additives of an appliance are running interior a virtual machine and contribution is the elastic execution among cellular gadgets and clouds while adapting the appliance partitioning. The authors R. Kemp, N. Palmer, T. Kielmann, H. Bal had described about cuckoo[18]]which is code based framework and offloading mechanism of this is the frameworks receives the approach calls and evaluates whether to offload the approach using heuristics information. Contribution of this framework is simplifying the growth of cell phone appliances while benefiting from computation offloading.

The authors B. Zhao, Z. Xu, C. Chi, S. Zhu, G. Cao had described about mirror server[19]which is VM based framework and the offloading mechanism of this is for the duration of the copying technique no operation from user is authorized lessen the workload and growth the aid of Smartphone in virtual manner.

The authors E.Cuervo, A.alasubramanian, D.-K.Cho, A.Wolman, S. Saroiu, R.Chandra,P.Bahl had described about MAUI[13] which is code based and offloading mechanism of this is MAUI does no longer help executing best quantities of a technique distantly and contribution of this is energy aware code offload.

VI. CRITICAL ISSUES IN MCC

A. Inadequate Computational ability and Battery life

As the cellular phones face limited computational capability and battery life that limit lots of its functions. For example the utilization of spot services like GPS that consumes heap of power because as a result of it contains sensors. Similarly, there are some appliances like image processing, natural language processing which require high computational power. This has become the challenge for application developers. By considering this issue the researchers examined that by offloading applications to cloud the processing power can be saved. The authors kakero and Paulson and zhang[20] declared that by offloading the whole process to the cloud we can enhance the cellular device capabilities and minimize the battery life.

B. Connectivity

In mobile cloud computing maintaining the connectivity across various connections is main challenge. As the users move from one place to other the strength of the connection gets stronger and weaker. The latency and cost is increased by using 3G connectivity. in order to overcome this connectivity challenge the author satyanarayanan et al.[14] make use of VM based technology “to swiftly instantiate custom designed service software on a close-by cloudlet” as a strategy to this problem where in the mobile device acts as thin consumer and the services can be used over wireless LAN. By using the cloudlet consumer can assure the connectivity even they move.

C. Data Security And Privacy Issue

In MCC maintaining the privacy and data security is major task and secured data transmission over cloud is very important. The authors parasad and gyani[21] have been discussed about some of the security concerns associated with MCC such as encryption, decryption and physical security .there is a concern about data security while offloading the data to cloud also concerns about violations such as hacking a particular device for stealing a information. So in order to provide the secure data transmission and data access the authors Anwesha Mukherjee, Debashis De [4] proposed the femto cloud architecture and implemented the retinal picture identification based bio metric authentication for protected data transmission. The researches [22] proposed that using a feature of SDN can provide a dynamic authentication based on hosts information which is obtained during registration.

D. Latency

The architecture of MCC consists of cellular client, communication channel, cloud and this organization consists the term latency which means time interval between the stimulation and response. This is also a main challenge in MCC. To eliminate this problem the cloudlets are implemented between the mobile client and cloud .The main purpose of these cloudlets is to decrease the latency. Some authors have been proposed some strategies for reducing the latency by implementing the cloudlets. In order to offer capability and conserve assets and save power cyber foraging move towards the cellular augmentation is achieved with the age of offloading the applications to non-cell computing gadgets had been discussed in by satyanarayana [14].\

E. User Interface Issue

As the size of the mobile devices are small most of the applications depends on the user interfaces which have static factors such as tool bars, popup menu etc. Another disadvantage is because of small screen size the typing speed is reduced. Assumed that mobile devices are used only to viewing data and less data entry. In order to provide the computational power the applications are running on a remote host mobile devices are used as user interface. By using remote servers the data can be restored in case of mobile device crashing [23].

VII. CASE STUDY

In this section case study of various existing systems have been done. The authors L.A Tawalbeh, Y, Jararweh, and F. Dosarihad published the massive scale cloudlets deployment for resourceful cellular cloud computing paper where a variety of cloudlets are deployed and cell devices below the coverage of a cloudlet use its service. As per client area the closer cloudlet is chosen for offloading. If no cloudlet is to be had nearby, the far away cloud occurred and it reduced the power and latency than cloud based offloading.

The authors K.Gai, M.Qiu, H.Zhao, L.Tao, and Z.Zong, had published the “Dynamic Energy aware Cloudlet-based mobile cloud computing. Here also the two levels and three level offloading are done. In this paper most excellent cloudlet placement and consumer to cloudlet allocation in wireless metropolitan location networks, authors M. Jib, J. Cao, and W. Liang, had examined that cloudlets are allotted to the customers in a thickly inhabited place in such a way that load is balanced and gadget reaction time is decreased. Here also the two level and three level offloading done. It reduced the power and latency than cloud primarily based offloading. In the paper Mobile Cloud Computing: important study of Application Deployment in Virtual Machines, authors M.Shiraz, A.Gani had discussed that the cloudlets are allotted to VMs in a way that the service great is stepped forward in terms of execution time. In all these systems the power and latency reduced as follows:25%-28%,15%-18%,11%-12%,21%-24%.

VIII. CONCLUSION

This paper discusses that the main aim of using cloudlets is to minimize the energy utilization and latency delay and it enhance the possible capabilities of cellular devices by offloading the applications to the nearer cloudlet and if cloudlet could not provide the expected results then the application is offloaded to cloud. The cloudlets can be implemented in various places such as coffee shop so the user can use these as cache. This paper shows the cloudlet concept. And architecture and the computational offloading process and current offloading frameworks. Here we investigate some of the offloading mechanisms and their contributions. Some of the challenges and issues which come under MCC while offloading applications to cloud have been discussed. Al though there exist a variety of methods, all of them targets the identical goal that is the development of the smart phone device capabilities through reducing the power consumption, decreasing the response time.

REFERENCES

[1] H. T. Dinh, C. Lee, D. Niyato, and P. Wang, “A Survey of Mobile Cloud Computing: Architecture, Applications, and Approaches,” Wireless Communications and Mobile Computing, vol. 13, no. 18, pp. 1587-1611, 2013.

[2] Fesehaye, D.; YunlongGao; Nahrstedt, K. ; Guijun Wang,"Impact of Cloudlets on Interactive Mobile Cloud Applications, " Enterprise Distributed Object Computing Conference (EDOC), 2012 IEEE 16th International, vol.,

[3] Soyata, T. ; Muraleedharan, R. ; Funai, C. ; Minseok Kwon; Heinzelman, W., "Cloud-Vision: Real-time face recognition using a mobile-cloudlet cloud acceleration architecture, " *Computers and Communications (ISCC), 2012 IEEE Symposium on*, vol., no., pp. 59-66, 1-4 July 2012

[4] A. Mukherjee and D. De, “Low Power Offloading Strategy for Femto-Cloud Mobile Network,” Engineering Science and Technology, an International Journal, vol. 19, no 1, pp. 260-270, 2016.

[5] M. Armbrust, A. Fox, R. Griffith, A. D. Joseph, R. Katz, A. Konwinski, G. Lee, D. A. Patterson, A. Rabkin, I. Stoica, and M. Zaharia, “A View of Cloud Computing,” Communications of the ACM, vol. 53, no. 4, pp. 50-58, 2010 .

[6] Deepsubhra ,Guha Roy, Debashis De, Anwesha Mukherjee ,Rajkumar Buyya," Application aware cloudlet selection for computation offloading in multi-cloudlet environment"2017.

[7] Y. Jararweh, L. A. Tawalbeh, F. Ababneh, A. Khreishah, and F. Dosari, "Scalable Cloudlet-based Mobile Computing Model," Procedia Computer Science, vol. 34, pp. 434-441, 2014.

[8] M. A. Rodriguez and R. Buyya, "Deadline Based Resource Provisioning and Scheduling Algorithm for Scientific Workflows on Clouds," IEEE Trans. Cloud Computing, vol. 2, no. 2, pp. 222-235, 2014.

[9] Xiang sun,nirwan ansari, Latancy aware workload offloading in the cloudlet network 2017

[10] M. Shiraz and A. Gani, "Mobile Cloud Computing: Critical Analysis of Application Deployment in Virtual Machines," International Proceedings of Computer Science & Information Tech, vol. 27, pp. 11-16, 2012.

[11] Verbelen, Tim, Pieter Simoens, Filip De Turck, and Bart Dhoedt. 2012. "Cloudlets : Bringing the Cloud to the Mobile User" In 3rd ACM Workshop on Mobile Cloud Computing and Services, Proceedings, 29–35. Ghent, Belgium: Ghent University ,Department of Information technology

[12] Antti P. Miettinen, Jukka K. Nurminen; "Energy efficiency of mobile clients in cloud computing ".HotCloud'10 proceedings of the 2nd USENIX conference on hot topics in cloud computing.

[13] E. Cuervo, A. Balasubramanian, D.-k. Cho, A. Wolman, S. Saroiu, R. Chandra, and P. Bahl, "Maui: making smartphones last longer with code offload," in Proceedings of the 8th international conference on Mobile systems, applications, and services. ACM, 2010, pp. 49–62

[14] M. Satyanarayanan, P. Bahl, R. Caceres, and N. Davies, "The Case for VM-based Cloudlets in Mobile Computing," Pervasive Computing, IEEE, vol. 8, no. 4, pp. 14-23, 2009

[15] F.Xia, F.Ding, J.Li, X.Kong, L.T.Yang, J.Ma, and Phone2cloud: exploiting computation offloading for energy saving on smart phones in mobile cloud computing, inform Syst.Front. 16 (1)(2014)95–111.

[16] H.Qian, D.Andresen, Jade: reducing energy consumption of android app, Int.J.Network.Distrib.Comput (IJNDC) 3(3) (2015) 150–158(Atlantis Press).

[17] B.G.Chun,S.Ihm,P.Maniatis,M.Naik,A.Patti,CloneCloud:elastic execution between mobile device and cloud, in: Proceedings of the Sixth Conference on Computer Systems, ACM,2011,pp.301–314.

[18] R.Kemp,N.Palmer,T.Kielmann,H.Bal,Cuckoo:a computation offloading framework for smart phones, in: Mobile Computing, Applications, and Services, Springer,2010, pp. 59–79.

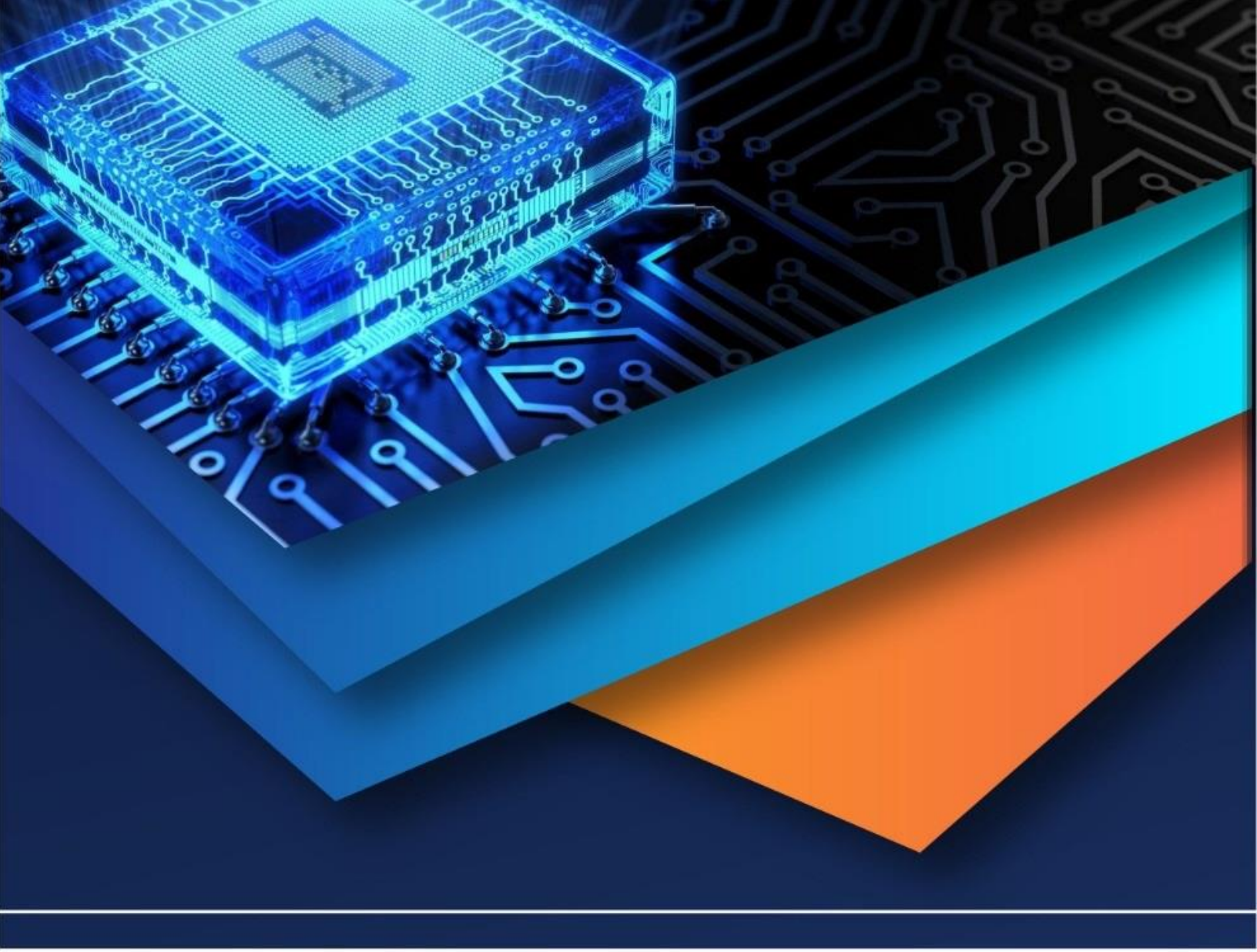
[19] B.Zhao,Z.Xu,C.Chi,S.Zhu,G.Cao,Mirroring smartphone for good: a feasibility study,in:Mobile and Ubiquitous Systems:Computing, Networking,andServices,Springer,2010,pp.26– 38.

[20] R. Kakerow, "Low power design methodologies for mobile communication," in IEEE International Conference on Computer Design: VLSI in Computers and Processors, 2002.

[21] M. Prasad, J. Gyani, and R. Murt, "Mobile Cloud Computing: Implications and Challenges," Journal of Information Engineering and Applications, vol. 2, no. 7, 2012.

[22] Q. Yan, F. R. Yu, Q. Gong and J. Li, "Software Defined Networking (SDN) and Distributed Denial of Service (DDoS) Attacks in Cloud Computing Environments: A Survey, Some Research Issues, and Challenges," IEEE Communications Surveys & Tutorials, vol. 18, no. 1, pp. 602-622, 2016.

[23] B. Sotomayor, R. Montero, I. Lorent, and I. Foster, "Virtual Infrastructure Management in Private and Hybrid Clouds," IEEE Internet Computing, vol. 13, no. 5, pp. 14-22, 2009



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