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A Literature Survey: Resource Management Mechanism in Cloud Environment

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Abstract: Today, Cloud Computing is considered as one of the rising field of researchers. It turns out to be a quite prominent between different types of cloud users. It compromises with on demand resource since it offers reliable and assured services to the customer. Resource allocation for cloud computing is a proving work and procedure of allocating the resources to cloud relies on upon the QoS prerequisites of cloud environment. Resources are not accessible as indicated by QoS prerequisite then the Workload Management System makes a request to retransmitting the workload with new QoS necessities as SLA. In the Cloud computing world, multiple numerous cloud users could be requested number of cloud services in parallel. So there must be an arrangement that all resources which are made accessible to asking for a client in a productive way to fulfil their needs. Resource allocation is performed by the target of diminishing the costs related with it. The tasks of resource allocation are taking care of client requests and application necessities. In this paper, present a review of diverse resource allocation techniques that have been in view of the distinctive parameters and there is findings as well as discussion about the issues or challenges of cloud computing environment has been discussed. A mathematical analysis with the help of Hungarian method is also discussed

Keywords: Cloud; Resource allocation; QoS; SLA; virtual machine.

I. INTRODUCTION

All the cloud computing environment is risen as IT as an item and additionally benefit for the users. However a few procedures and scheduling process are given in writing yet the vast majority being inquisitive in nature, traded off, vitality utilization for accomplishing most extreme achievable execution. So there is a degree to advance their execution in regard of resources. Cloud computing empowers organizations to expend a register resources, for example, a virtual machine (VMs), storage or an application, as an utility. With the assistance of operations research strategies, an enhancement in the execution of distributed computing framework towards Green IT points of view may be provided [9]. The virtual machine allocation problem is divided in following parts: the new requests admission for virtual machine provisioning and placing the virtual machines on the hosts is the first part whereas the second part is the optimization of the current virtual machine allocation is discussed in [2]. Resource allocation decreases the processing time and energy consumption. Quality of Service (QoS) is the premise of cloud and resource arrangement. Resource scheduling mechanism reduces Cost of execution, time as well as energy consumption and considering the other QoS requirements such as reliability, security, availability and scalability has been discussed in [5].

To encourage SLA accord, virtual machines (VMs) can be arranged and scaled as far as CPU centers and memory, conveyed with storages and network abilities. SLA you do deliver ought to profit the business association with your service providers and help you get the service you anticipate [10]. Security, trust, and protection dependably remain challenges for associations that embrace cloud computing. Framework plan and arrangement in view of current security practices ought to be all the while implemented to guarantee consistence of data and services with next patches and strategies [32]. A risk based way to deal with the improvement of a security program that perceives fitting controls will guarantee assurance of all clients and classification, integrity, and accessibility of data [8]. The examination is to highlight the essentials of the system driven parameters, like an activity stack on the wireless, size of record containing the application and its execution states, number of clients in wireless LAN, message size, number of jumps to the cloud, and portability speed, in application migration process.

The presented paper is organized as section 1 presents the appropriate and detailed introduction. A review of work in this line has been given in section 2. Section 3 discusses the issues and challenges of the cloud computing. Conclusions and future perspectives are given in section 4.

II. REVIEW WORK

An approach that point out robustness for cloud computing environment and help to delicate portion in the comprehensive framework and in turn to moderate the hazard of reverse key framework decisions is discussed in [1]. A technique has been proposed in that present virtual machine place with the help of clustering of VM to migrate in the interest of allocation of RAM and utilization of CPU. We execute and concentrate the execution of our algorithm on a cloud computing reenactment tools known as CloudSim utilizing PlanetLab information. Reenactment comes about illustrate that our proposed strategies beat the default VM Placement algorithm planned in CloudSim [2]. Through the cloudSim they evaluated the performances of these techniques. An approach that provides the high efficiency to verification and identification will authentication of users to secure the bank as well as cloud service provider gateway [3]. A novel load of work aware process with the help of scalable driven data access patterns on transaction processing with the help of web applications. Using scaling techniques is scale out NoSQL data [4]. A probability approach consolidates workload to get the accuracy and efficiency from the filtering solutions. To monitoring logs firstly used approach is service workload pattern in probability [5]. To produce the total cast with the help of multi- indexed cloud resources scheduling algorithm and several test cases are performed in cloud environment using the multi indexed transportation problems clouds resources scheduler (MTPCRS) with mathematically formulations and sequence diagram UML [6]. There are several resources allocations techniques and issues are briefly described. This research will overcome the cloud user and

researchers issues [7]. Cloud stores huge amount of data and security is the major concern in cloud environment. Many users store their personal data they always need an unauthorized access and prevent cyber attacks on cloud. Briefly describes the cloud security issues on cloud storage [8]. To achieves objective in energy efficiency on cloud. Research issues addressing can get the benefits to client and resource providers [9].Detecting SLS violation infrastructure allows requests and managed it to migrate on virtual environments. Novel framework is monitored resources and mapping it [10]. Resource scheduling is divide into several categories in cloud computing. The current resources addressed and scheduling algorithm is using various tools and different rules are defines [11]. Practically simulate our design and examine the results. Reducing the energy wastage issues in cloud environments and provides recommended models with instructions and solid results in further [12]. In a cloud computing overview, energy efficiency of several virtualized transferable resource is a boggling issue because of the nearness of heterogeneous application workloads having hostile assignment prerequisites as far as transmittable resource limits. Identical issues consolidates energy efficiency with resource allocations overview of issues and current hardware and software approaches designed [13]. Briefly discuss the main objectives, approaches and open problems. Resolving the basics of cloud computing, enhancing and investigation to driving integrations. The main focus is to provide the cloud internet of things approaches and research issues [14]. Mobile cloud computing played important role in execution of cloud-based mobile application execution frameworks, also, examines the consistent execution. Cloud-based mobile application execution frameworks are recognized seamless execution approaches for the execution areas. Examine the seamless application execution empowering ways to deal with distinguish identified and classified of utilizing such methodologies for accomplishing the seamless application execution in mobile cloud computing. The scientific classifications are thought about in view of the critical parameters of the seamless application execution approaches. Highlighted the standards for the seamless application execution in mobile cloud computing. Finally, difficulties are figuring out from seamless execution approaches [16]. A structure of cloud integrated cyber physical system and overview the current terminologies for complex industries [17]. Several workflow scheduling issues are changing the execution cost with choosing the appropriate cost techniques. To achieved the goal to survey and breakdown the hidden ideas from the techniques. Using Quality of service for least cost, framework and structure are gives the excellent results [18]. Cloud computing offers virtualized computing, storage, and organizing resources, over the Internet, to associations and itself clients in a totally dynamic way. These cloud resource are lesser, simple to perform and more versatile physically and locally, this motivated clients to outsource their applications and administrations to the cloud. The migrations of both data and applications exterior the rights space of clients into a mutual domain forces cross. Functional issues crosswise over particular stages and innovations. Networking has investigates the most appropriate and down to earth arrange issues of pertinence to the arrangement of high confirmation cloud benefit through the web including security [19]. Energy consumption is the major portion in cloud computing and improve the energy efficiency of servers [20]. Application partitioning algorithm are classified the arithmetic problems in Mobile cloud computing. Application partitioning algorithms are surveyed basic problems and suggestions extensively examine. Application partitioning algorithm are investigated in light of apportioning commonness, partitioning goals, partitioning structures, instructions support, characterized, allotment, examine and explanation. Highlight the challenges and problems dividing of versatile application to help with choosing proper research areas and investigating easier approach of cloud application preparing in Mobile cloud computing [21]. Dissect the migration procedure of network driven specification. The progress of migration procedures by simulating is examined in OMNeT++. Several procedures are followed like how many users used wireless LAN, length of files, current state, congestion on wireless nodes, numbers of leaps in cloud and speed are analyzed for migration time and performance. The studies states the current migration time converted in networks [22]. The main aim is to provide security from distributed denial of service attacks. Cloud computing provides the usual computing from distributed denial of service threat with feature and structure [24]. So Cloud an administration situated part based Platform as a Service for overseeing migration, flexibility, provisioning, and high accessibility over different mists. So Cloud depends on the OASIS Service with a specific end goal to address migration. So Cloud gives administrations to overseeing provisioning, flexibility, and high accessibility over different cloud [25]. Software Defined mobile Network coordinates with cloud computing enhance the execution capacities, energy proficiency and scalability. It is a critical part of telecommunication generations. It provides the security and cure with the layer [26]. Methodical way to deal with build up a strong programming framework which used to produced as rising administrations and investigation for strength. While utilizing the versatility as a decent case for enterprise cloud security, every single strong trademark ought to be mixed together to create more prominent effects. Structural system that mixes programming strength, benefit segments and rules together and gives genuine contextual analyses to deliver more noteworthy effects to the associations receiving cloud and security. Cloud computing adoption framework gives business arrangements and gives dexterity, effectiveness and coordination for business aggressive edge. [27]. Cloud computing adoption framework security is based on firewall protection, reorganization and encoder on file synchronization and techniques. The security framework techniques were design to explain the robustness of security. Multilayered security prevention could block all SQL injections and threat of data [28]. Increase the benefits for providers and decrease the customers cast being well disposed environment. This issue is progressed in virtual machine and allocation, multi-purpose, multi-checks job programme; resource managing integrates clouds and indifferent environment, dynamic topology for spreading data, progress performance, energy efficiency approaches and guarantee of SLA [29]. Turning out progressively Green cloud computing is to be important with less consumption of energy resources and a regularly rising more arithmetical approaches. To augment use and limit cost of the cloud computing environment, Resources should be scheduled and virtual machines might designate to perform the approaches. Execution based resources allotment conspires for the productive assignment of virtual machines on the cloud environment. Utilizing CloudSim the execution is contrasted [30].

From the extensive review of work, we find that there are some problems in the cloud computing environment. There are needs or requirements to develop such frame work which have not all but some important or vulnerable points of the cloud computing environment, incorporate important issues. The coming section have the detailed description about the selected issues or challenges.

III. ISSUES AND CHALLENGES

We find some important issues in this paper and study as challenge to implement and simulate all the issues which is discussed in this paper. The details of important issues or challenges have been discussed as:

A. Resource allocations Issue

Allocation issues include the conveyance of resource among contending options with a specific end goal to limit add up to costs or augment add up to return. Such issues have the accompanying segments: an arrangement of resources accessible in given sums; an arrangement of employments to be done, each devouring a predefined measure of resources; and an arrangement of expenses or returns for each occupation and resources. The issue is to decide the amount of every resource to assign to each employment. In the event that a greater number of resources are accessible than required, the arrangement ought to show which resources are not to be utilized, considering related expenses. Thus, if there are a greater number of employments than should be possible with accessible resources, the arrangement ought to demonstrate which occupations are not to be done, again considering the related expenses [30]. On the off chance that each employment requires precisely one resource and every resource utilized on just a single occupation, the subsequent issue is one of task. In the event that resources are distinct, and if both occupations and resources are communicated in units on a similar scale, it is named a transportation or conveyance issue. In the event that occupations and resources are not communicated in similar units, it is a general distribution issue. A task issue may comprise of appointing laborers to workplaces or employments, trucks to conveyance courses, drivers to trucks, or classes to rooms. A common transportation issue includes dispersion of purge railroad cargo autos where required or the task of requests to manufacturing plants for generation. The general assignment issue may comprise of figuring out which machines ought to be utilized to make a given item or what set of items ought to be produced in a plant amid a specific period. In distribution issues the unit expenses or returns might be either free or reliant; for instance, the arrival from putting a dollar in offering exertion may rely on upon the sum spent on promoting. On the off chance that the portions made in one period influence those in resulting periods, the issue is said to be dynamic, and time must be considered in its answer.

B. VM Placement Issue

Virtual machine arrangement is the way toward mapping virtual machines to physical machines. At the end of the day, virtual machine position is the way toward choosing the most reasonable host for the virtual machine. The procedure includes classifying the virtual machines equipment and resources necessities and the expected use of resources and the situation objective. The situation objective can either be boosting the utilization of accessible resources or it can spare of force by having the capacity to close down a few servers [2]. The autonomic virtual machine situation calculations are planned remembering the above objectives. One of the points of cloud suppliers is to robotize administration of virtual machines taking the nature of administration necessities of utilization into thought. This issue can be planned as an imperative programming issue. The objective of the limitation writing computer programs is to expand a worldwide utility capacity. This worldwide utility capacity is picked in order to take SLA satisfaction and working expenses into thought. The utility maps the present condition of every application (workload, resource limit, SLA) to a scalar esteem. This scalar esteem tries to measure the applications' fulfillment concerning the objectives that are set by the programmed supervisor.

C. Migration Issue

Cloud relocation is the procedure of somewhat or totally conveying an association's advanced resources, administrations, IT resources or applications to the cloud. The moved resources are open behind the cloud's firewall. Cloud relocation is involve moving an aggregate hierarchical framework, where figuring, stockpiling, programming and stage administrations are exchanged to the cloud for get to. Cloud relocation in some cases includes moving information or different business components between cloud situations, which is known as cloud-to-cloud movement [22]. The way toward transitioning to various cloud specialist co-ops is known as cloud administration relocation. Regardless, fruitful relocation to a specialist co-op's condition may require the utilization of middleware, for example, a cloud joining device, to connect any holes between the merchant's and the client's (or other vendor's) advances. Transitioning to the cloud or between cloud conditions introduces the standard IT issues, yet the issues are intensified by having information put away and oversaw remotely, by outside associations and frequently in different areas. Among these issues are uncommon contemplations for protection, interoperability, information and application versatility, information trustworthiness, business progression, and security.

D. Scaling Issues

The idea implies the capacity of a framework to suit an expanding number of components or items, to process developing volumes of work nimbly, and additionally to be vulnerable to extension [31]. An adaptable design is one where the different segments of the engineering are autonomous of each other. For instance, a support of recover client data ought to run freely of any application or administration that calls it. The administration ought not to mind which UI calls it, what database stores the information it needs, or what server it keeps running on. These things ought to be referenced in the Meta information that is passed in the messages to and from the administration. This inexactly coupled or benefit situated approach permits draftsmen to scale segments autonomously of each other empowering frameworks to scale at remarkable levels. This sort of configuration is known as an appropriated engineering in light of the fact that the work units can be circulated all through the framework crosswise over free registering resources. Versatility is one of the significant favorable circumstances of the cloud worldview [4]. All the more particularly, the preferred standpoint recognizes mists from cutting edge outsourcing arrangements. Notwithstanding, some vital pending issues must be tended to before the fantasy of mechanized scaling of utilizations can be figured it out. The most outstanding activities towards entire application adaptability in cloud conditions are as take after.

E. Energy Management in Cloud Computing Environment

There are numerous vitality effective booking approaches that have been examined from various planning points of view. Vitality proficient errand planning is a booking calculation that powerfully assigns occupations into processor to accomplish better execution and to limit vitality utilization. The framework execution and vitality utilization ought to be measured all through the assignment execution either amid pinnacle or sit without moving state, thus collective vitality utilization is achieved and comprehensive conditions are cooked [13]. The principle issue here of research is the manner by which to adjust between the exhibitions of the errand planning while

limiting vitality utilization. It is a test to locate the best exchange off (adjust/harmony) between the best yield (i.e., execution) and vitality devoured. In this paper we have thought about three distinctive planning approaches for vitality proficiency, and have concentrated their quality, adequacy and potential use later on. We have researched the technique of heuristic, amusement hypothesis and figuring out how to decide the components and parameters that are utilized to assess vitality utilization and framework execution. Many reviews have considered proficient vitality utilization in Data Centers with virtualized situations. Be that as it may, few reviews clarify how the operational and power utilization information was gathered for such classifications as CPUs and memory. Such information gathering postures challenges, particularly in Clouds, since sensor must be joined from numerous server farm.

F. QoS and SLA Issue

The cloud has significantly disentangled the limit provisioning process. It represents a few novel difficulties in the territory of Quality-of-Service (QoS) administration. QoS indicates the levels of execution, dependability, and accessibility offered by an application and by the stage or foundation that hosts it. QoS is principal for cloud clients, who anticipate that suppliers will convey the promoted quality attributes, and for cloud suppliers, who need to locate the correct tradeoffs between QoS levels and operational expenses. Finding ideal exchange off is a troublesome choice issue, regularly exacerbated by the nearness of SLA indicating QoS targets and efficient punishments related to SLA infringement. While QoS properties have gotten steady consideration well before the approach of distributed computing, execution heterogeneity and resource segregation systems of cloud stages have altogether muddled QoS examination, forecast, and affirmation. This is inciting a few scientists to examine computerized QoS administration techniques that can use the high programmability of equipment and programming resources in the cloud. This paper goes for supporting these endeavors by giving an overview of the cutting edge of QoS demonstrating approaches material to distributed computing and by portraying their underlying application to cloud computing environment [5]. The cloud QoS demonstrating space, ordering commitments as per applicable zones and strategies utilized. Our strategy endeavors to expand scope of works, instead of which grants unlimited utilize, dissemination, and propagation in any medium, gave the first work is legitimately credited. Specifically, we concentrate on late displaying works distributed from 2006 onwards concentrating on QoS in cloud frameworks. We likewise talk about a few systems initially created for displaying and element administration in big business server farms that have been progressively connected in the cloud setting. Besides, the study considers QoS displaying methods for intelligent cloud administrations, for example, multi-level applications.

G. Security Issue

Security is the most organized angle for any type of figuring, making it an undeniable desire that security issues are significant for cloud condition also. As the distributed computing methodology could be related with having clients' delicate information put away both at customers' end and additionally in cloud servers [26], character administration and confirmation are exceptionally pivotal in distributed computing. Confirmation of qualified clients' qualifications and ensuring such certifications are a piece of principle security issues in the cloud - infringement in these zones could prompt to undetected security rupture in any event to some degree for some period. Distributed computing accompanies various conceivable outcomes and difficulties all the while. Of the difficulties, security is thought to be a basic obstruction for distributed computing in its way to achievement. The security challenges for distributed computing methodology are fairly rapid and limitless. Information area is a vital considers distributed computing security [32]. Area straightforwardness is one of the unmistakable adaptabilities for distributed computing, which is a security risk in the meantime – without knowing the particular area of information stockpiling, the arrangement of information insurance represent some district may be extremely influenced and damaged. Cloud clients' close to home information security is in this manner a critical worry in a distributed computing condition. A security concern is constantly some kind of hazard yet any hazard can't be aimlessly judged to be a security concern. Allotment of duties among the gatherings required in a distributed computing foundation may bring about encountering irregularity which may in the long run prompt to a circumstance with security vulnerabilities. Like whatever other system situation, the arrangement of insider-assault stays as a legitimate danger for distributed computing. As distributed computing regularly implies utilizing open systems and along these lines putting the transmitting information presented to the world, digital assaults in any frame are foreseen for distributed computing. The current contemporary cloud based administrations have been found to experience the ill effects of helplessness issues with the presence of conceivable security escape clauses that could be misused by an aggressor. Security and protection both are worries in distributed computing because of the way of such registering approach [8]. Cloud condition is related with both physical and virtual resources and they posture distinctive level of security issues – having no modern validation instrument to completely address the security dangers is a current issue for distributed computing. It has predominantly brought about the circumstances where network processing has been taken as an installed some portion of distributed computing. One of the more evident cloud concerns is partition between a cloud supplier's clients (who might contend organizations or even programmers) to maintain a strategic distance from unintentional or deliberate access to delicate data. Regularly a cloud supplier would utilize virtual machines and a hypervisor to separate clients. Advancements are presently accessible that can give huge security upgrades to VMs and virtual system division. Moreover, the put stock in stage module can give equipment based confirmation of hypervisor and VM uprightness and accordingly guarantee solid system partition and security. Lawful and administrative issues are critical in distributed computing that has security suggestions. To check that a cloud supplier has solid arrangements and practices that address lawful and administrative issues, every client must have its legitimate and administrative specialists assess cloud supplier's approaches and practices to guarantee their sufficiency. The issues to be considered in such manner incorporate information security and fare, consistence, reviewing, information maintenance and obliteration, and legitimate revelation. In the territories of information maintenance and cancellation, trusted capacity and trusted stage module get to methods can assume a key part in restricting access to touchy and basic information.

IV. CONCLUSIONS

In this paper, presents a technical review and some analysis regarding the vulnerable issues or challenges such as resource allocation, quality of services, service level agreement, virtual machine, migration, energy efficiency, and security concerns.

After extensive review of literature in this line or area there is findings are discussed in detail and finally there is got the success to find the issues of cloud computing environment. We discussed the different types of resource allocation techniques and we will try to implement with mathematical formulation on simulator like CloudSim or OmNet++ to examine and optimization the cost and time etc. and at last of this whole research work we will try to presents a complete framework which will give a solution to solve the cloud computing environment problem in future.

V. REFERENCES

[1] Franck Chauvel, Hui Song, Nicolas Ferry and Franck Fleurey, "Evaluating robustness of cloud-based systems" Journal of Cloud Computing: Advances, Systems and Applications (2015) 4:18 DOI s13677-015-0043-7

[2] Mohammed Rashid Chowdhury, Mohammad Raihan Mahmud and Rashedur M. Rahman, "Implementation and performance analysis of various VM placement strategies in CloudSim" Journal of Cloud Computing: Advances, Systems and Applications (2015) 4:20 DOI 10.1186/s13677-015-0045-5

[3] Sabout Nagaraju and Latha Parthiban, "Trusted framework for online banking in public cloud using multi-factor authentication and privacy protection gateway" Journal of Cloud Computing: Advances, Systems and Applications (2015) 4:22 DOI 10.1186/s13677-015-0046-4

[4] Swati Ahirrao and Rajesh Ingle, "Scalable transactions in cloud data stores", Journal of Cloud Computing: Advances, Systems and Applications (2015) 4:21, DOI 10.1186/s13677-015-0047-3

[5] Li Zhang, Yichuan Zhang, Pooyan Jamshidi, Lei Xu and Claus Pahl, "Service workload patterns for Qos-driven cloud resource management" Journal of Cloud Computing: Advances, Systems and Applications (2015) 4:23 DOI 10.1186/s13677-015-0048-2

[6] Narander Kumar, Shalini Agrawal and Vipin Saxena, "LP based Adaptive Resource Management Framework in Cloud Environment", JCEM International Journal of Computational Engineering & Management, Vol. 17 Issue 1, January 2014 ISSN (Online): 2230 – 7893

[7] V.Vinothina, R.Sridaran, admavathiGanapathi, " A Survey on Resource Allocation Strategies in Cloud Computing", International Journal of Advanced Computer Science and Applications, Vol. 3, No.6, 2012

[8] Manpreet Kaur, Hardeep Singh, "A Review of Cloud Computing Security Issues" International Journal of Advances in Engineering & Technology, June, 2015. ©IJAET ISSN: 22311963

[9] Anton Beloglazov, Jemal Abawajy, Rajkumar Buyya, "Energy-aware resource allocation heuristics for efficient management of data centers for Cloud computing", Future Generation Computer Systems, 28 (2012) 755–768

[10] Vincent C. Emeakarohaa, Marco A.S. Netto, Rodrigo N. Calheiros, Ivona Brandic, Rajkumar Buyya, César A.F. De Rose, "Towards autonomic detection of SLA violations in Cloud infrastructures" Future Generation Computer Systems 28 (2012) 1017–1029

[11] Sukhpal Singh, Inderveer Chana, "A Survey on Resource Scheduling in Cloud Computing:Issues and Challenges", Grid Computing (2016) 14:217–264, © Springer Science+Business Media Dordrecht 2016, DOI 10.1007/s10723-015-9359-2

[12] KekeGai, MeikangQiu, HuiZhao, LixinTao, ZiliangZong, "Dynamic energy-aware cloudlet-based mobile cloud computing model for green computing" Journal of Network and Computer Applications 59 (2016) 46–54.

[13] Abdul Hameed, Alireza Khoshkbarforoushha, Rajiv Ranjan, Prem Prakash Jayaraman, Joanna Kolodziej, Pavan Balaji, Sherali Zeadally, Qutaibah Marwan Malluhi, Nikos Tziritas, Abhinav Vishnu, Samee U. Khan, Albert Zomaya," A survey and taxonomy on energy efficient resource allocation techniques for cloud computing systems" © Springer Computing (2016) 98:751–774 DOI 10.1007/s00607-014-0407-8.

[14] Alessio Botta, Walter de Donato, Valerio Persico, Antonio Pescap, "Integration of Cloud computing and Internet of Things: A survey" Future Generation Computer Systems 56 (2016) 684–700

[15] Parnia Samimi, Youness Teimouri, Muriati Mukhtar, "A combinatorial double auction resource allocation model in cloud computing" ©2014 Elsevier Information Sciences 357 (2016) 201–216.

[16] Ejaz Ahmed, AbdullahGani, MuhammadKhurramKhan, RajkumarBuyya, Samee U.Khan," Seamless application execution in mobile cloud computing: Motivation, taxonomy, and open challenges" Journal of Network and Computer Applications 52 (2015) 154–172.

[17] Zhaogang Shu, Jiafu Wan, Daqiang Zhang, Di Li, "Cloud-Integrated Cyber-Physical Systems for Complex Industrial Applications", Mobile Netw Appl (2016) 21:865–878 DOI 10.1007/s11036-015-0664-6

[18] Ehab Nabiel Alkhanak, Sai Peck Lee, Saif Ur Rehman Khan, "Cost-aware challenges for workflow scheduling approaches in cloud computing environments: Taxonomy and opportunities", Future Generation Computer Systems 50 (2015) 3–21.

[19] Xiaoli Wang, Yuping Wang, Yue Cui, "An energy-aware bi-level optimization model for multi-job scheduling problems under cloud computing", Soft Comput (2016) 20:303–317, DOI 10.1007/s00500-014-1506-3

[20] Jose Moura, David Hutchison, "Review and analysis of networking challenges in cloud computing", Journal of Network and Computer Applications 60 (2016) 113–129

[21] Jieyao Liu, Ejaz Ahmed, Muhammad Shiraz, Abdullah Gani, Rajkumar Buyya, AhsanQureshi, "Application partitioning algorithms in mobile cloud computing: Taxonomy, review and future directions", Journal of Network and Computer Applications 48 (2015) 99–117.

[22] Ejaz Ahmed, Adnan Akhunzada, Md Whaiduzzaman, Abdullah Gani, Siti Hafizah Ab Hamid, Rajkumar Buyya, "Network-centric performance analysis of runtime application migration in mobile cloud computing", Simulation Modelling Practice and Theory 50 (2015) 42–56.

[23] Muhammad Anshari, Yabit Alas, Lim Sei Guan, "Developing online learning resources: Big data, social networks, and cloud computing to support pervasive knowledge" Educ Inf Technol (2016) 21:1663 – 1677, DOI 10.1007/s10639-015-9407-3

[24] Opeyemi Osanaiye, Kim-Kwang Raymond Choo, Mqhele Dlodlo, "Distributed denial of service (DDoS) resilience in cloud: Review and conceptual cloud DDoS mitigation framework", Journal of Network and Computer Applications 67 (2016) 147–165.

[25] Fawaz Paraiso, Philippe Merle, Lionel Seinturier, "soCloud: a service-oriented component-based PaaS for managing portability, provisioning, elasticity, and high availability across multiple clouds" Computing (2016) 98:539–565, DOI 10.1007/s00607-014-0421-x

[26] Min Chen, Yongfeng Qian, Shiwen Mao, Wan Tang, Ximin Yang,"Software-Defined Mobile Networks Security" Mobile Netw Appl (2016) 21:729–743, DOI 10.1007/s11036-015-0665-5.

[27] Victor Changa, Muthu Ramachandrana, Yulin Yaob, Yen-Hung Kuoc, Chung-Sheng Li, "A resiliency framework for an enterprise cloud", International Journal of Information Management 36 (2016) 155–166.

[28] Victor Changa, Yen-Hung Kuob, Muthu Ramachandrana, "Cloud computing adoption framework: A security framework for business clouds", Future Generation Computer Systems 57 (2016) 24–41.

[29] Florin Popa, Maria Potop-Butucaru, "ARMCO: Advanced topics in resource management for ubiquitous cloud computing: An adaptive approach" Future Generation Computer Systems 54 (2016) 79–81.

[30] Hwa Min Lee, Young-Sik Jeong, Haeng Jin Jang, "Performance analysis based resource allocation for green cloud computing", J Supercomput (2014) 69:1013–1026. DOI 10.1007/s11227-013-1020-x.

[31] André B. Bondi, "Characteristics of scalability and their impact on performance", In Proceedings of the 2Nd International Workshop on Software and Performance, WOSP '00, pages 195–203, New York, NY, USA, 2000. ACM. ISBN 1-58113-195-X. DOI: 10.1145/350391.350432.

[32] Manpreet Kaur, Hardeep Singh,"A Review Of Cloud Computing Security Issues" International Journal of Advances in Engineering & Technology, ISSN: 22311963 June, 2015.