# Structure of Cloud Sim Toolkit with Cloud

**Jaishree Jain, Ajit Singh**

**Abstract**: *Cloud computing is a worldview and works on huge scale with circulated registering, that is a repackage of currently using different ideas/advances, for example, utility processing, Grid figuring, Autonomic figuring, IoT innovations, etc. Cloud computing works on the IoT innovations for conveyance the assets to clients on the basis of their interests. As, it creates innovation, different type of issues, for example, encryption, vitality the executives, asset provisioning, dependability should be tended. The goal of said work is to think about the reenactment toolbox is known as CloudSim and a portion of exploration which already addressed the previous issues and utilizing its toolbox. Main portion of the examinations after analysis depend on reproduction in Cloud and utilizing genuine frameworks on the cloud, for example, Amazon EC2, Google, which cost with tedious assignments and furthermore enormous of cloud assets. That requires for accomplish practical outcomes and unreasonable for further analysts. This paper surveys some reenactment apparatuses and thinks about them as far as their hidden structure, programming language, GUI, accessibility, cost demonstrating, vitality displaying, reproduction time, league strategy and its respective communication model.*

*Keywords : CloudSim Tool Kit, GridSim, SimGrid, OptoSIM, GangSim*

## I. INTRODUCTION

The main focus and attraction of the Cloud computing is in the ICT industries with maintained its popularity. The most or general associations have grasped the advantages that it offers and a lot more are as yet moving in the direction of cloud computing. One of the numerous worries numerous associations and people have about cloud computing from its initiation. Clients can access Cloud framework from anyplace whenever as per their interest and take paid service according to their usage. Cloud uses virtual innovation in passed on server homesteads to assign advantages for the customers via Internet as configurable virtual machines and gives a figment of unbounded assets. The primary standard behind this model is putting forth processing, stockpiling, systems administration and programming "as an administration" and it tends to be named as "Figuring as a utility". The main focus and attraction of the Cloud

Revised Manuscript Received on October 30, 2019.
∗ Correspondence Author
**Jaishree Jain\***, Research Scholar, Department of Computer Science & Engineering, Uttarakhand Technical University, Dehradun, India.
Assistant Professor, Department of Computer Science & Engineering, Ajay Kumar Garg Engineering College, Ghaziabad, India. Email: jaishree3112@gmail.com
**Ajit Singh**, Associate Professor, Department of Computer Sciences & Engineering, BTKIT, Dwarahat, Uttarakhand, India. E-mail: er.ajit.s@gmail.com

computing is in the ICT industries with maintained its popularity. Its worldview utilization to convey the applications with high performance and adaptability is necessities. It helps associations in keeping away from capital expenses of equipment and programming.

Internet browser works as an interface among customers and cloud, which provide the whole framework. The end user is unknown about the information that where it is stored and the execution of the processor of the assignment and how the whole procedure is finished. Users can simply sign up into the respective application.

Survey of the remainder of the sections is composed in the accompanying manner: Prologue of cloud computing related to its respective work described in section II. Related to issue on research over cloud i.e. condensed in section III. Necessity of recreation is described in section IV. CloudSim toolbox and its respective applications portrayed in section V for the different type of research zones. At last, conclusion and extension is described in section VI for future work.

## II. RELATED WORK

In this section, the authors described their observation with the study from previous research papers. A few Grid test systems, for example, GridSim, SimGrid, OptoSim and GangSim is proposed for demonstration of Grid based situations. The tool boxes are not fit for separating the multilayer administration deliberations (SaaS, PaaS, and IaaS) required by Cloud figuring conditions. There is no option has been provided for displaying virtualized condition. Therefore, we have found out that CloudSim toolbox is the perfect device, related to its respective demonstration on huge scale virtualized cloud condition, which has segments for making server farms, has, virtual machines, dealers and administration demands.

## III. GENERAL RESEARCH ISSUES IN CLOUD COMPUTING

Cloud foundation has an extremely mind boggling and heterogeneous framework where assets are disseminated comprehensively. It has some broad issues as talked about in the accompanying:

### A. Security challenges

Client suspects on security features of the cloud computing condition since their data information sit by the rivals information, when the data information become re-appropriate. The significant securities and protection properties are secrecy, respectability, accessibility, responsibility, and protection preservability. Some consideration needs to take to safeguard for these properties.

## B. Cost

Open cloud offers paid services for utilize model, As per the terms and conditions of its paid services for the utilization cost may vary that depend on algorithms such as required with its usage.

## C. Reliability

Cloud has a high perplexing framework, which prompt huge disappointments in appropriated server farms. Adaptation to non-critical failure fills as a viable way to address unwavering quality concerns. Adaptation to non-critical failure implies that framework should keep on working under flaw nearness. Cloud computing is required or needed the approach of new fault resistance starting from conventional adaptation to non-critical failure methodologies i.e. less powerful because of reflection/abstraction layers. By the use of Virtualization Technology, we can enhance unwavering quality for the Adaptation to non-critical failure; However VM relocation with its combinations is inflexible to manage.

## D. Network Bandwidth

Required amount of movable information data to and from a server farm builds that need more data transfer capacity with more bandwidth and need appropriate algorithms to less or reduce dormancy issues.

## E. Resource Provisioning

Cloud needs to fuse effective asset provision algorithms by Service Level Agreement (SLA), which prerequisites in the complex condition. Virtualized server farms are giving as required administration adaptability, less cost, versatility; use of respective assets use and vitality productivity, yet virtualization isn't a simple errand for further proceeding.

## F. Latency

Inactivity provides influence exhibition with dependability to use the content of respective data conveyance to the end user. One of the approach uses to diminish inertness take the cloud specialist co-op, which is closer to the client for utilize the edge getting systems with structuring ideal steering advancements.

## G. Interoperability

Cloud suppliers ought to be interoperable with the goal that they can procure assets from different suppliers when their assets are not adequate to support the buyers. In any case, unmistakable VM innovations will keep subsequently with open principles, which require to solve the issue.

## H. Energy

Huge number of server farms expends tremendous measures the electrical power dispersing measure of warmth with discharge of ($CO_2$) i.e. risky in different condition. Subsequently, practices should be connected to achieve vitality effectiveness, for example, improvement of uses' algorithms, vitality proficient equipment and vitality productive asset the executives methodologies on a virtualized server farm.

## IV. WHY SIMULATION

Process by the recreation devices are broadly used to observe the cloud conditions, that is the important process to know the

advantages and disadvantages of the following experimentation.

The Experiment with the genuine cloud condition
1) High cost, since enormous measure the assets, which requires significant a lot.
2) Recycling of the tests beyond the realm of imagination.
3) Dependence on the supplier's particular framework may not bolster versatile application.

Because of these reasons, reproduction has been picked as the correct condition where clients analysis chance free. There are not many reenactment devices accessible for cloud condition, of which some are business and some are open source. In this paper an open source cloud reproduction toolbox, CloudSim is picked and considered different works done to address a portion of the exploration issues referenced in section III.

## V. CLOUDSIM TOOLKIT

CloudSim is a Cloud registering displaying and reproduction device that was created in the University of Melbourne, Australia. It is an exploratory device to lead new research approaches. It underpins the displaying and reproduction of huge scale Cloud registering conditions, including server farms, figuring hubs, Virtual machines, asset provisioning, and virtual machine provisioning, and control the board.
CloudSim is written in Java and at first was based over GridSim , an apparatus for Grid condition reenactment. We need at any rate fundamental comprehension of how to program in Java some essential Object Oriented Programming (OOP) ideas to work with CloudSim. Current variant accessible is 3.0.3.

### A. CloudSim survey within Cloud

Area shows an expansive review of research works completed utilizing CloudSim toolbox.

Table 1: Cloud Computing Research Model with CloudSim

| S.No. | Author | Research issue Considered | Research Work | Technique applied |
|---|---|---|---|---|
| 1. | R. N. Calheiros et al., [2011] | Elasticity of Resources | Cloud Elasticity management and application resources | Modeling of hybrid of cloud computing components |
| 2. | R. Buyya Et al., [2009] | Elasticity of Resources | modeling scalable environments | modeling of cloud computing components |
| 3. | R. N. Calheiros et al ., [2010] | Elasticity of Resources | Evaluation of resource elasticity algorithms | modeling of cloud computing components |

4645

| | | | | |
|---|---|---|---|---|
| 4. | A. V. Reddy et al., [2013] | Privacy | Intrusion Detection on Cloud applications | Design of security Framework by (ITTC) |
| 5. | M. H.B et al., [2013] | Energy aware resource Provisioning | Energy aware about the allocation of data center resources | Best modify with Decreasing and Migration Algorithm |
| 6. | Liang. Lee et al., [2013] | Energy aware Resource Provisioning | Efficient energy with elasticity or resource | Manage Voltage frequency with dynamic scaling |
| 7. | WeiweiChen et al., | Elasticity of Resources | Workflow modeling | Support and extend mode management of CloudSim |
| 8. | BhatiyaWick remasinghe et al., | Elasticity of Resources | Analyze social network websites | Support and extend GUI of Cloud SIM |
| 9. | G. F. Anastasi et al., | Elasticity of Resources | Smart cloud federation | Federation modeling |
| 10. | K. Thyagarajan et al., [2013] | Elasticity of Resources | CPU scheduling | New job scheduler model |
| 11. | K. Bhatt et al., [2013] | Elasticity of Resources | Find out optimal solution by PSO Alog. | Particle Swarm Optimization |
| 12. | F. Jrad et al., | Elasticity of Resources | SLA based Inter cloud service Broker | New Broker design |
| 13. | V. C. Emeakaroha et al., | Elasticity of Resources | SLA based resource Allocation | Scheduling heuristic |
| 14. | S. Ray et al., [2012] | Elasticity of Resources | Load Balancing | Analysis and Execution of Balancing Algorithm |
| 15. | J. James et al., [2012] | Elasticity of Resources | Load Balancing of VM | Monitoring of weight load of active algorithm |
| 16. | L. Zhu et al., [2012] | Elasticity of Resources | Resources with elasticity scheduling | Analysis and apply of Ant Algorithm |
| 17. | G. Belalem et al., [2011] | Elasticity of Resources | Economic management ofresources | Auction algorithms |
| 18. | M. S. Kavith et al., [2013] | Elasticity of Resources | Providing SaaS | PIR protocol (Private Information Retrieval) |
| 19. | H. Hlavacs [2013] | Energy | VM consolidation using fuzzy | Fuzzy Q Learning (FQL) technique |
| 20. | Ts. epoMofolo et al., [2013] | Elasticity of Resources | Heuristic based resource allocation | Modified Best Fit Decreasing Algorithm |
| 21. | T. Singh [2012] | Secured Elasticity of Resources | License management incorporation | License management model |
| 22. | R. S. L [2012] | Privacy | Access control on role bases | Recycling approaches with the use of CSAR |
| 23. | P. S. Mann et al ., [2011] | Privacy | Handle from the attack of DDos | Analytical method with the Mitigation Algorithm |
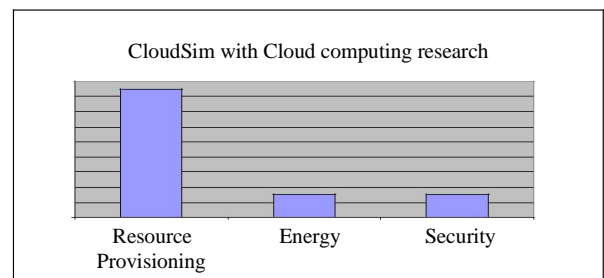


**Fig. 1.Research issue on Cloud SIM**

Table 1 and Figure 1 shows as a conclusion which gave concentration to the resources for present issue and all the work as defined below:R. N. Calheiros et al., had proposed The CloudSim. It has an extensible facsimile toolkit, which lead to enable the modeling and facsimile of cloud computing process system with its environment. The hybrid Cloud Computing model had been evaluated by different workload & scenario with CloudSim.

It gained the performance and gave the the response to reduce the time and cost cutting [1].

Rajkumar Buyya et al., proposed The CloudSim. It has an accomplish toolbox that permit the demonstration of cloud computing processing. Demonstration and Production is based on CloudSim toolbox, which supports the virtual machines (VM) on a predefined hub of the data center. In addition, It allows to reproduction of several type and various type of data centers [2].

Rodrigo N. Calheiros et al., proposed CloudSim toolbox for the framework and the CloudSim toolbox can be supported to both i.e. framework and conduct the display of cloud computing framework parts as: Vertual Machines, Assets Equipment arrangements. But it is individual application method, which may be reached out and would be effortless or restricted. It is used to cloud register situation comprise with the support of demonstration and reproduction of both single and inter connected work i.e. mists [3].

A. Venkat Reddy et al., proposed the framework, which provides outstanding platform that is use to make cloud computing services prevent from intrusion tolerant. Proposed framework by A. Venkat Reddy et al. had been tested by Infrastructure as a Service (IaaS) and the proposed framework had been also validated by Intrusion Tolerance via Threshold Cryptography (ITTC) software appliances or tools in respective cloud. Utilize the Shamir Secret Sharing algorithm, the data center generate and authenticate the key to circulate among the hosts for encrypting [4].

Manasa H.B et al., had proposed the energy, that was used to find out the allocation of data center assets and resources to the clients of their applications. By this way, It push the energy and make the data center strong with providing negotiated Quality of Service i.e. (QoS). They did observation and study to make the energy strong of cloud computing and they proposed like architectural principals, policy of resource allocation and strong management of Clouds. Their best managements made best classification of the algorithms with the arrangement of QoS Algorithm, which consider and full fill the requirement of QoS [5].

LiangTeh Lee et al. proposed the potential asset the board by vitality sparing system. It exhibits a strategy for the potential voltage scaling for the potentially alteration of assets by the examination of CPU usage in the Cloud computing condition. For the energy saving, the voltage of computer will be reduced and the migration of heavy load works with the light loader machine. The exploratory outcomes demonstrate that vitality utilization can be spared fundamentally [6].

Weiwei Chen et al., proposed workflowSim. This logical works process examines, which broaden the current CloudSim test system by giving a higher layer of work process the executives. It helps scientists to assess their work process advancement methods with preferable exactness and more extensive help over existing arrangements [7].

Bhathiya Wickremasinghe et al. proposed the cloud nalyst, which stretched out from CloudSim and created to reproduce on huge scale applications of cloud computing to contemplate and conduct the utilizations under different sending designs. Cloud Analyst provides designers that work to disperse the applications among frameworks of cloud computing and worth included administrations, for example, advancement of uses execution and suppliers approaching

[8]. Gaetano F. Anastasi et al. proposed SmartFed that test the system for cloud computing alliances, which can demonstrate the extravagance normal of a situation with different cloud suppliers. They demonstrate the ability of SmartFed by reenacting [9]. K.Thyagarajan et al. proposed the methodology for the model to plan the employment for Cloud computing for successful increase the benefits to the Cloud computing specialist organization [10]. Kavita Bhatt et al. proposed the concept i.e. Particle Swarm Optimization (PSO) in light of swarm Knowledge and having better algorithm to a favorable out comes. The algorithm is very useful that used to find out load burden adjusting and not withstanding for work process planning .This paper gives the keep running of PSO on CloudSim with correlation examination from various test systems [11]. FouedJrad et al. proposed Intercloud registering enables clients to effective and relocate their application workloads at hand crosswise over Clouds paying little mind to the basic utilized Cloud supplier stage. The cloud services financier serves from Intercloud computing. They proposed also a conventional engineering for the cloud administration representative working in the environment of Intercloud as per the cloud norms and condition. The representative expects to locate the more reasonable to the cloud service providers, while fulfilling the clients' service necessities and as far as practical may be functional or non-functional [12]. Vincent C. Emeakaroha et al. recommended the administration distribution over clouds depends on Service Level Agreements (SLAs). From one viewpoint SLA infringement ought to be averted to maintain a strategic distance from exorbitant punishments and then again suppliers need to effectively use assets to limit cost for the administration provisioning. In this way, planning techniques thinking about various SLA parameters and proficient portion of assets are vital. Booking and conveying administration solicitations considering various SLA parameters, for example, measure of CPU required, organize data transmission, memory and capacity are as yet opened research difficulties. In their paper, its' author planned to consider different SLA parameters to convey the several application over cloud. [13]. Soumya Ray et al. proposed about the load adjustment that the load adjustment is the part of system that appropriate outstanding task at hand over various PCs to accomplish ideal asset use, expand throughput, least reaction time, and keep away from over-burden. This paper shows an audit of a couple of burden adjusting algorithms in Cloud computing. Soumya Ray et al. authors' target on distinguish subjective segments for recreation in cloud condition and after that dependent on these parts, execution investigation of burden adjusting algorithms are likewise exhibited [14]. Jasmin James et al. proposed another VM burden adjusting algorithm. That's recognize as "Weighted Active Monitoring Load Balancing Algorithm" and executed in simulated cloud computing atmosphere and implements for Infrastructure as a Service, which achieve best parameter performance like time of data processing [15]. Linan Zhu et al. had proposed latest different business calculation mode for assets planning.

For work planning, they used Key Research procedure and asset assignment issues dependent on insect state algorithm. Utilizing CloudSim recreation condition and reenactment analyzes, the outcomes demonstrate with the better booking, execution and burden balanced than the other algorithm [16]. Ghalem Belalem et al. suggested regarding the accessibility and execution of administrations are two significant viewpoints for uploading or lifting over cloud computing. On the grounds that clients require a specific degree of value administration as far as practicality with the cost cutting and obligations in a lower cost. To guarantee the nature of administration, they expand and improve the test system of CloudSim by the sale of algorithms acquired from GridSim test system [17].

M. S. Kavith et al. represented Pcloud compatibility with a SaaS (Software as a Service). The Pcloud known as an appropriated framework that included with various participated hubs. In Pcloud, the programming is dispersed to various hubs with the goal that inquiries, which execute in the parallel way. The said dispersed framework, correspondence work with the coordinated hubs i.e. exceptionally low. Limit impact of hub disappointments, PCloud incorporates information reincarnation. The load balancing can be accomplished by the inexactly coupled and closest neighbor properties of the cloud [18].

Helmut Hlavacs et al. suggested the dispersed dynamic VM solidification is a successful procedure with improved procedure to improve vitality proficiency in the cloud domain. The objective of this procedure is to be combined the virtual machines progressive in that manner, where streamline vitality can off at the execute exchange time on the web. Helmut Hlavacs focused on the VM determination function and also proposed further function as 'Fuzzy Q-Learning' (FQL) function system that can be settled on the ideal choices like virtual machines for relocation. They had approved their methodology with CloudSim toolbox utilized genuine world planet lab remaining burden [19].

Ts'epoMofolo et al. discussed the expenses of VM movement that requires intensive thoughts in the cloud computing system. The result of VM movement in SLA infringement; henceforth is a basic limit of quantity of relocation that degree conceivable. Inability to do so, the result in execution debasement and the supplier of that cloud should cause the expense in money related to its own terms. Ts'epoMofolo devised the algorithm that will keep the movement time least just as limiting the quantity of relocations. This will be assumed a noteworthy job in evading the presentation corruption experienced by a moving VM [20].

T. Singh recommends getting the cloud administrations of the clients requirement permit. Cloud gives the legitimate approval and specialist co-op approved the client to utilize its assets on pay per premise and assets are given on interest by the specialist co-op. In any case, because of absence of permit the board in Cloud computing it is a test to give accessibility of assets to the client. This paper displays a algorithm to give permit to their clients. By the confirmed accessibility to the assets through remote permit server. The said permit executes the design that can be conveyed in any dispersed domain [21].

Reeja S L recommended that there is no approval required for reusing the approach in cloud computing. The point of the work is to build up an approval reusing approach utilizing CSAR (Cooperative Secondary Authorization Recycling) in Cloud registering Systems. By this, every application server reuses recently gotten approvals and offers with other applications. To get the choices depend on the jobs that individual clients have as a major aspect of an association. The way toward characterizing jobs ought to be founded on an exhaustive examination of how an association works and ought to incorporate contribution from the clients in the association. The utilization of recreation instrument is known as CloudSim. [22].

Palvinder Singh Mann et al. presented a novel algorithm, that depends on the logical way to deal with alleviate Distributed Denial of Service (DDosS) assaults over the cloud and the results of recreation depend on CloudSim demonstrates. It has a powerful weigh to analogue the DDoS assaults [23].

## VI. CONCLUSION

In this paper, there is wide review by utilization on CloudSim toolbox with the study from the different research zones of cloud has written. Furthermore, Our research survey has unwavering quality, where The complete work have not been finished utilizing CloudSim tool compartment as far as we could possibly know. Cloud has a high perplexing framework, which may prompt huge disappointments in circulated server farms. Adaptation to non-critical failure fills in as a successful way to address dependability concerns. Adaptation to internal failure implies that framework should keep on working under deficiency nearness. Cloud computing is required or needed the approach of new fault resistance starting from conventional adaptation to non-critical failure methodologies i.e. less powerful because of reflection/abstraction layers. By the use of Virtualization Technology, we can enhance unwavering quality for the Adaptation to non-critical failure; However VM relocation with its combinations is inflexible to manage.

In our future work, we would like to accomplish unwavering quality by methods for adaptation to internal failure utilizing CloudSim toolbox by improving the tool compartment.

## REFERENCES

1. R. N. Calheiros, R. Ranjan, A. Beloglazov, C. A. F. De Rose, and R. Buyya, " CloudSim : A Toolkit for Modeling and Simulation of Cloud Computing Environments and Evaluation of Resource Provisioning Algorithms", Software: Practice and Experience, 41(1):, Wiley, January 2011, pp. 23-50.
2. RajkumarBuyya, Rajiv Ranjan and Rodrigo N. Calheiros, "Modeling and Simulation of Scalable Cloud Computing Environments and the CloudSim Toolkit: Challenges and Opportunities", 2009 International Conference on High Performance Computing & Simulation, 2009, pp-1-11.
3. Rodrigo N. Calheiros, Rajiv Ranjan, Anton Beloglazov, César A. F. De Rose, and RajkumarBuyya, "CloudSim A Toolkit for Modeling and Simulation of Cloud Computing Environments and Evaluation of Resource Provisioning Algorithms", Softw. Pract. Exper. 2011, pp. 23–50.
4. A. Venkat Reddy, K. Sharath Kumar, V. Hari Prasad, "Intrusion detection on cloud applications, International Journal of Computer Science and Mobile Computing", Vol. 2, Issue. 9, September 2013, pp. 1-7.

*Retrieval Number F8918088619/2019©BEIESP*
*DOI: 10.35940/ijeat.F8918.088619*
*Journal Website:* www.ijeat.org

4648

*Published By:*
*Blue Eyes Intelligence Engineering*
*& Sciences Publication*

5. Manasa H.B, AnirbanBasu, "Energy Aware Resource Allocation in Cloud Datacenter", International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume2, Issue5, June 2013, pp. 1163–1182.

6. LiangTeh Lee, KangYuan Liu, HuiYang Huang and ChiaYing Tseng, "A Dynamic Resource Management with Energy Saving Mechanism for Supporting Cloud Computing", International Journal of Grid and Distributed Computing Vol. 6, No.1, February, 2013.

7. WeiweiChen ,EwaDeelman, "WorkflowSim : A Toolkit for Simulating Scientific Workflows in Distributed Environments", 2012 IEEE 8th International Conference on E-Science, 8-12 Oct. 2012.

8. BhathiyaWickremasinghe, Rodrigo N. Calheiros, and RajkumarBuyya "CloudAnalyst: A CloudSimbased Visual Modeller for Analysing Cloud Computing Environments and Applications", International Journal of Computer applications, 20-23 April 2010 pp. 446-452.

9. Gaetano F. Anastasi,EmanueleCarlini,PatrizioDazzi, "Smart Cloud Federation Simulations with CloudSim" Proceedings of the first ACM workshop on Optimization techniques for resources management in clouds, June 2013, pp. 1-18.

10. K.Thyagarajan, S.Vasu, S.SriHarsha, "A Model for an Optimal Approach for Job Scheduling in Cloud Computing", International Journal of Engineering Research & Technology (IJERT), Vol. 2 Issue 10, October 2013.

11. Kavita Bhatt, Dr. Mahesh Bundele, "Study and Impact of CloudSim on the run of PSO in Cloud Environment", International Journal of innovations in Engineering and technology, Vol. 2 Issue 4, August 2013, pp. 254-262.

12. FouedJrad, Jie Tao and AchimStreit, "SLA Based Service Brokering in InterCloud Environments", CLOSER 2012 - 2nd International Conference on Cloud Computing and Services Science, April 2012, pp. 76-81.

13. Vincent C. Emeakaroha, IvonaBrandic, Michael Maurer, Ivan Breskovic, "SLA Aware Application Deployment and Resource Allocation in Clouds", 2011 IEEE 35th Annual Computer Software and Applications Conference Workshops, July 2011.

14. Soumya Ray and Ajanta De Sarkar, "Execution Analysis of Load Balancing Algorithms in Cloud Computing Environment", International Journal on Cloud Computing: Services and Architecture (IJCCSA),Vol.2, No.5, October 2012.

15. Jasmin James, Dr. BhupendraVerma, "Efficient VM load balancing Algorithm for a Cloud Computing Environment" ,International Journal on Computer Science and Engineering (IJCSE), Vol. 4 No. 09 Sep 2012, pp. 1658-1663.

16. Linan Zhu, Qingshui Li, and Lingna He, "Study on Cloud Computing Resource Scheduling Strategy Based on the Ant Colony Optimization Algorithm", IJCSI: International Journal of Computer Science Issues, Vol. 9, Issue 5, No 2, September 2012 ,ISSN (Online): 16940814.

17. GhalemBelalem, SamahBouamama, LarbiSekhri, "An Effective Economic Management of Resources in Cloud Computing", Journal of computers, vol. 6, no. 3, March 2011.

18. M. S. Kavitha and P. Damodharan , "Software as a Service in Cloud Computing", International Journal on Advanced Computer Theory and Engineering (IJACTE), ISSN (Print) : 2319 – 2526, Volume-1, Issue-2, 2013.

19. Helmut Hlavacs , "Integrating VM Selection Criteria in Distributed Dynamic VM Consolidation Using Fuzzy QLearning", 9th CNSM 2013:Workshop SVM 2013, ISBN 978-3-901882-53-1, pp. 332-338.

20. Ts`epoMofolo, R Suchithra , " Heuristic Based Resource Allocation Using Virtual Machine Migration: A Cloud Computing Perspective", International Refereed Journal of Engineering and Science (IRJES) ISSN (Online) 2319183X, (Print) 23191821 Volume 2, Issue 5, May 2013, PP.40-45.

21. Tejprakash Singh, Dept. of E & CE, IIT Roorkee, India, "Incorporating License Management in Cloud Simulation Environment", International Journal of Advanced Research in Computer Engineering & Technology Volume 1, Issue 1, March 2012.

22. Reeja S L, "Role based access control mechanism in cloud computing using cooperative secondary authorization recycling method", International Journal of Emerging Technology and Advanced Engineering, ISSN 22502459, Volume 2, Issue 10, October 2012, pp. 444-450.

23. Palvinder Singh Mann, Dinesh Kumar, "Improving Network Performance and mitigate DDoS attacks using Analytical Approach under Collaborative Software as a Service (SaaS) Cloud Computing Environment", IJCST Vol. 2, Issue 1, March. 2011, pp. 119-122.

## AUTHORS PROFILE

**Jaishree Jain** is an Assistant Professor Department of Computer Science & Engineering, Ajay Kumar Garg Engineering College, Ghaziabad, affiliated to AKTU, Lucknow, Uttar Pradesh, INDIA. She has 9.1 years teaching experience in CSE & IT Departments including Chandigarh University, Punjab and affiliated college of AKTU, Lucknow since July 2010. She is a Ph.D. scholar of Uttarakhand Technical University, Dehradun, INDIA with her profession. She had done her B.Tech. in Information Technology from Uttar Pradesh Technical University, Lucknow. She had qualified GATE two times in 2007 & 2008 with 94.86 percentile. She had done her M.Tech. in Software Engineering from MNNIT, Allahabad. She had published about 26 research papers in International/National/UGC Journals and Conferences and she had also been published one patent in 2018. Her research interests include Image Processing, Cloud Security, and Steganography. She is the member of professional bodies' i.e life time member of **ISTE**, lifetime member of **ICSES** and member of Engineering Council of India as an Professional Engineer by ECI, INDIA.

**Ajit Singh** had completed his Ph.D. in Computer Science & Engineering. He is an Associate Professor & HOD of Computer Science & Engineering Department at BTKIT, Dwarahat, affiliated to Uttarakhand Technical University, Dehradun, INDIA. He has 12 years teaching experience. He has published 2 papers in SCI Journals. His research interests include Artificial Intelligence, Genetic Algorithms and Data Mining.