INTERNATIONAL JOURNAL OF RESEARCH IN COMPUTER APPLICATIONS AND ROBOTICS
ISSN 2320-7345

EFFICIENT LOAD BALANCING AND HIGH SECURITY IN CLOUD COMPUTING USING FUZZY LOGIC CONTROLLER

R.Devi[1] M.Sangeetha[2] S.T.Santhanalakshmi[3]

[1, 2, 3] Assistant Professor, Department of Computer Science and Engineering,
Panimalar Engineering College, Chennai, India.

Email: deviramakrishnan83@gmail.com[1], sangeetharemi@yahoo.co.in[2], anandh.shantha@gmail.com[3]

Abstract: This work aims to find an efficient load balancing and security in cloud computing using fuzzy logic controller. Evolution of the cloud computing which are in the virtualization, parallel processing, distributed computing and web based services in between the clients and distributed servers. There are several parameters which are analyzed based on the security, efficiency, performance, adaptability and cost. The main objective of the work is to satisfying the cloud computing users and resources. These conceptual models are discussed from the classic to the contemporary in this paper. Based on these parameters, this methodology is modeled and simulated of a cloud computing using fuzzy logic controller. In this proposed work, the fuzzy logic based cloud computing is implemented to effectively balance the load with high security in between the servers, virtually distributed servers and to the cloud computing users.

Keywords: Cloud computing security, Adaptability and Conceptual model for the performance.

1. Introduction

Cloud computing has been widely adopted as a means to provide always available, easily scalable computing resources. This has had an enormous impact on the IT industry, changing the way in which computing resources at all levels, including hardware, are designed and purchased. An innovative individual or company no longer requires a large amount of capital in order to deploy or maintain new internet-based services, and provisioning can scale (in cost and computing resources) to meet the demand for their solution. Furthermore, companies requiring timely processing of large amounts of data can buy computing time as needed, rather than maintaining expensive infrastructure that is not fully utilized. Finally, large companies can concentrate on their core business rather than on maintaining an IT infrastructure.

Vol.3 Issue.3, Pg.: 18-24
March 2015

In this proposed work, the cloud computing is effectively managed based on the several issues like a security, performance, effectively balancing the load, adaptively and cost. Information flow control for secure cloud computing, the data flow analysis in core processing are given in [1]. Proposal for a general data protection Regulation are submitted in brussels com, which are presented in [2]. Policy, Legal and Regulatory Implications of a Europe-only cloud as the social network laws for the society needs by the law framed by the university are presented in [3]. Regional Clouds: Technical Considerations are developed to share the resources without affecting the clients and to the servers are presented in [4]. Data Protection Working Party and the opinion n Cloud Computing to share the distributed resources in server networks is given in [5]. Improved delegation of computation using fully homomorphic encryption advances in cryptology is given in [6]. Information flow control for standard OS abstractions and its principles are given in [7]. Information flow control for the Cloud and its methodologies are presented in [8]. Securing distributed systems with information flow control on networked system design and Implementation are presented in [9]. Integrating middleware with information flow control is given in [10]. IFDB: Decentralized information flow control for databases by using the distributed server which are generated as virtual are presented in [11]. A view of cloud computing and communications of the ACM are presented in [12]. Towards quality of service in the cloud, which are satisfied by the consumer needs are given in [13]. From system-centric to data centric logging-accountability, trust and security in cloud computing, which are presented in [14]. The above literature does not deal with fuzzy logic controller based cloud computing. This work aims to develop the fuzzy logic based cloud computing, which is implemented to effectively balance the load with high security in between the servers, virtually distributed servers and to the cloud computing users.

2. The Conceptual Model

In this model, finally we modeled and proposed a new conceptual model. The evaluation of the trust value for CSP as well as evaluation of user satisfaction for cloud computing users comprises of two stages as shown in Figure 1. The first stage is the implementation with the help of Mamdani [Krishnan] Fuzzy Inference System. It takes policy, obstacles of cloud computing, adoption issues, security issues, performance, financial and agility as inputs and produces a range of values which could be easily fed as input to the next level of processing, which meets the cloud client's satisfaction. It takes the output of the Mamdani FIS and helps to obtain the trust rating for the CSP as well as user satisfaction rating for cloud computing users. For the mamdani [Krishnan] FIS, the membership values of policy, obstacles of cloud computing, adoption issues, security issues, performance, financial and agility parameters are assumed as low, medium, high and very high as per the requirement. The parameters can have values only in a short interval while some may vary over a larger range. The above stages are implemented hierarchically using the fuzzy logic blocks in Simulink.

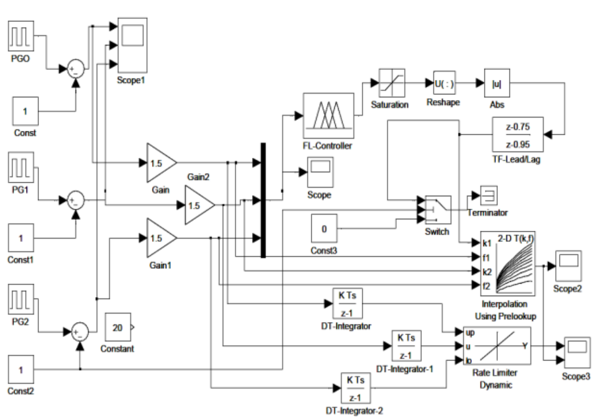

Figure 1: Conceptual model using the fuzzy logic model.

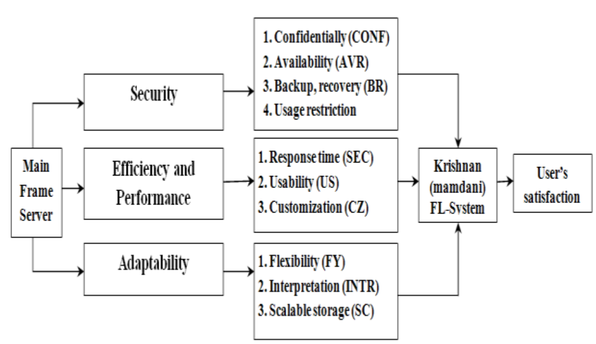

Figure 2: Conceptual model user satisfaction model.

3. Simulation Results

Load balancing is a process of reassigning the total load to the individual nodes of the collective system to the facilitate networks and resources to improve the response time of the job with maximum throughput in the system. The important things in said load balancing are estimation of load, comparison of load, stability of different system, performance of system, interaction between the nodes, nature of work to be transferred, selecting of nodes and many other ones to consider while developing such algorithm . To improve the performance substantially, backup plan in case the system fails even partially, maintain the system stability, accommodate future modification in the system are main goal of load balancing. Load balancing in the cloud computing based on standard load balancing but differs from classical thinking on load-balancing architecture and implementation by using commodity servers to perform the load balancing, which provides for new opportunities and economies of scale as well as presenting its own unique set of challenges. The load balancers served to promote availability of cloud resources and to promote performance. In complex and large systems, there is a need for load balancing to simplify it in a cloud computing environment. The conceptual model using fuzzy logic system and the conceptual user's satisfaction model are shown in Figure 1 and Figure 2.

4. Proposed work results

In this work we designed a new fuzzy logic rule based algorithm for cloud computing in order to achieve better response time and processing time. The advantages of fuzzy logic are easy to understand, flexible, tolerant of imprecise data and can model nonlinear functions of arbitrary complexity, and is used to approximate functions and can be used to model any continuous function or system. The surface view of the user's satisfaction is shown in Figure 3, and the grid view for the same model is presented in Figure 4. The fuzzy logic interface model is shown in Figure 5. Input variable for security, efficiency and adaptability are shown in Figure 6, 7, and 8. The output variable for user's satisfaction is shown in Figure 9. The rule viewer is shown in Figure 10. M-File for the rule viewer is shown in Figure 11.

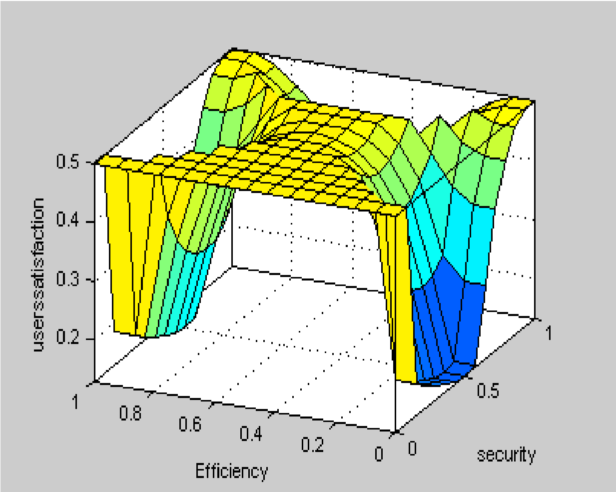

Figure 3: Surface view of the user's satisfaction

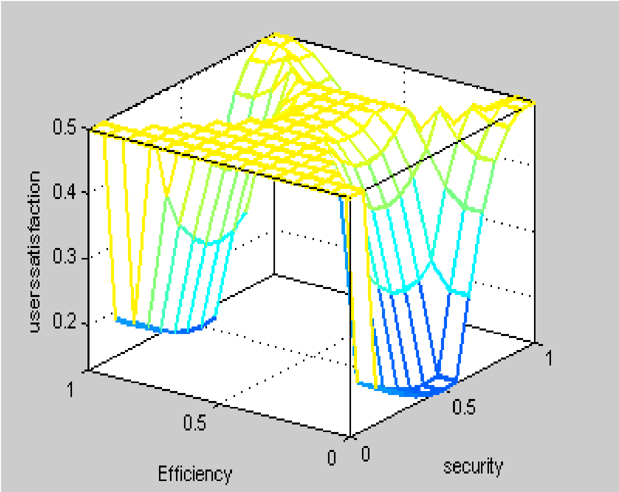

Figure 4: Grid view of user's satisfaction

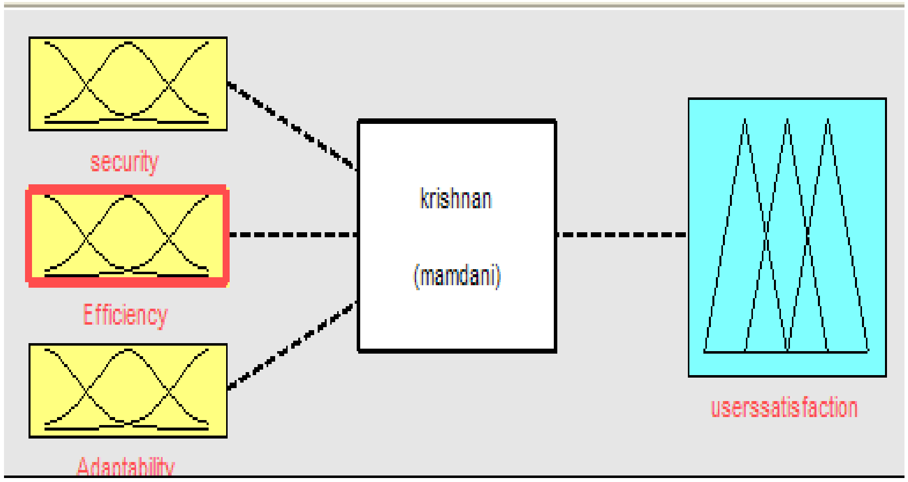

Figure 5: Fuzzy logic interface model.

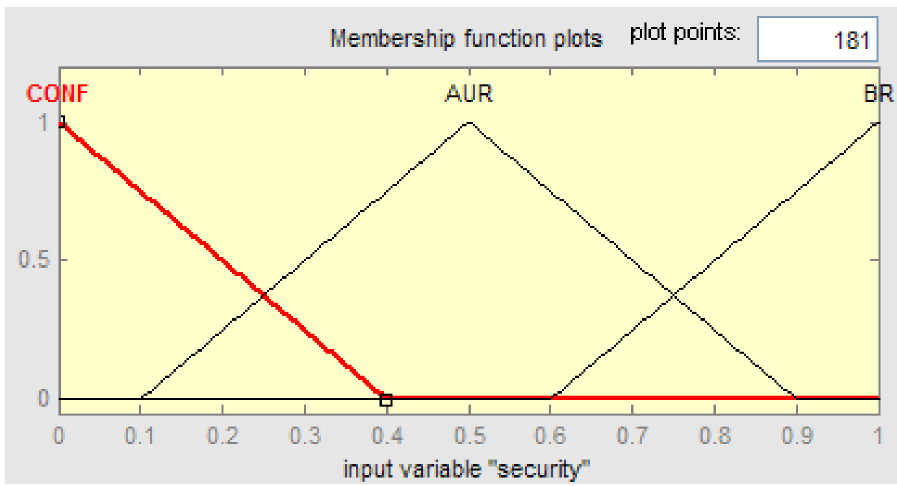

Figure 6: Input variable for security.

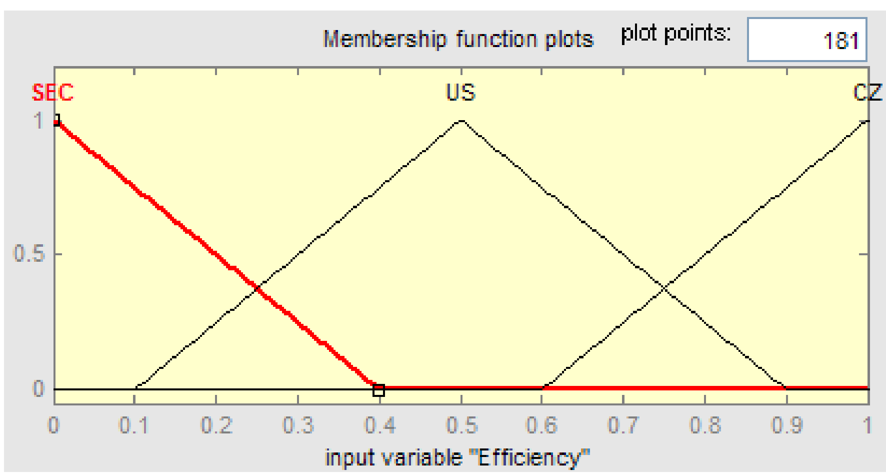

Figure 7: Input variable for efficiency.

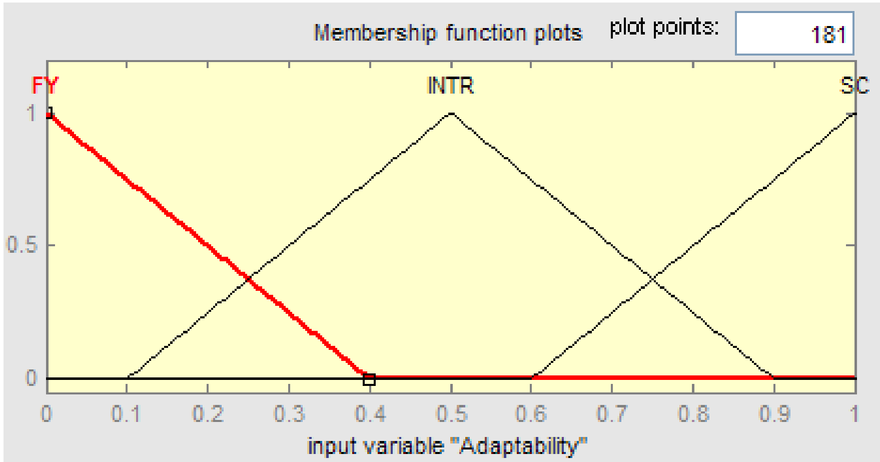

Figure 8: Input variable for adaptability.

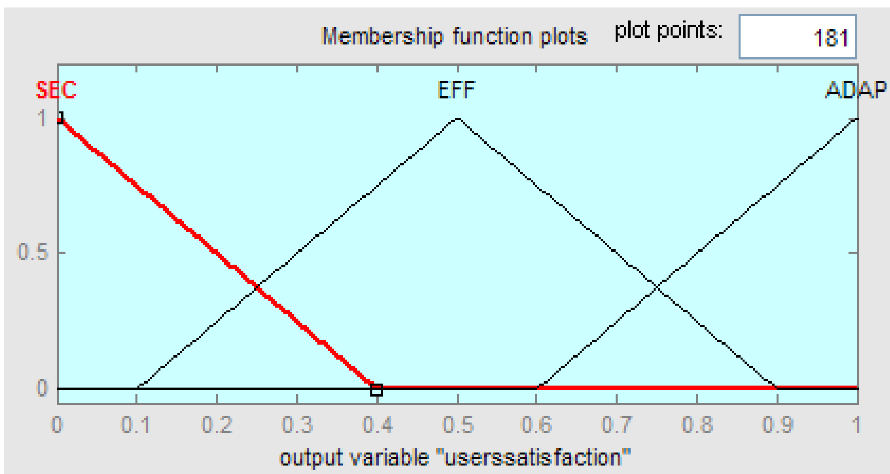

Figure 9: Output variable for the user's satisfaction.

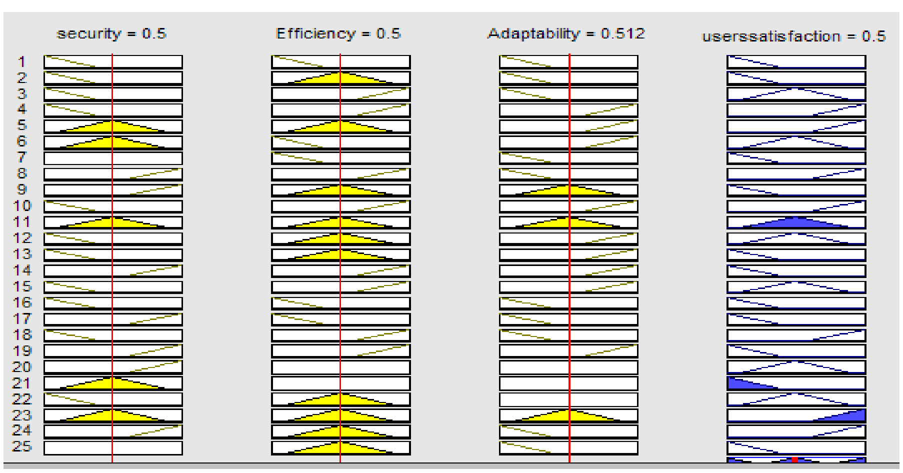

Figure 10: Rule viewer.

M-File for the rule viewer

Name='krishnan', Type='mamdani', Version=2.0, NumInputs=3, NumOutputs=1, NumRules=25, AndMethod='min' OrMethod='max', ImpMethod='min', AggMethod='max', DefuzzMethod='centroid'
[Input1]: Name='security', Range=[0 1], NumMFs=3, MF1='CONF':'trimf',[-0.4 0 0.4], MF2='AUR':'trimf',[0.1 0.5 0.9], MF3='BR':'trimf',[0.6 1 1.4]
[Input2]: Name='Efficiency', Range=[0 1], NumMFs=3, MF1='SEC':'trimf',[-0.4 0 0.4], MF2='US':'trimf',[0.1 0.5 0.9], MF3='CZ':'trimf',[0.6 1 1.4]
[Input3]: Name='Adaptability', Range=[0 1], NumMFs=3, MF1='FY':'trimf',[-0.4 0 0.4], MF2='INTR':'trimf',[0.1 0.5 0.9], MF3='SC':'trimf',[0.6 1 1.4]
[Output1]: Name='userssatisfaction',Range=[0 1],NumMFs=3, MF1='SEC':'trimf',[-0.4 0 0.4], MF2='EFF':'trimf',[0.1 0.5 0.9], MF3='ADAP':'trimf',[0.6 1 1.4]
[Rules]: 1 1 1, 1 (1) : 1, 1 2 1, 1 (1) : 1, 1 3 1, 2 (1) : 1, 1 3 3, 3 (1) : 1, 2 2 3, 3 (1) : 1, 2 1 3, 2 (1) : 1, 0 1 1, 1 (1) : 1, 3 3 1, 3 (1) : 1, 3 2 2, 1 (1) : 1, 1 3 3, 3 (1) : 1, 2 2 2, 2 (1) : 1, 1 2 3, 2 (1) : 1, 1 2 3, 1 (1) : 1, 3 3 3, 1 (1) : 1, 1 3 3, 2 (1) : 1, 1 1 1, 1 (1) : 1, 3 1 1, 1 (1) : 1, 1 3 1, 3 (1) : 1, 3 3 3, 1 (1) : 1, 3 0 0, 2 (1) : 1, 2 0 0, 1 (1) : 1, 1 2 0, 2 (1) : 1 2 2 2, 3 (1) : 1, 3 2 1, 3 (1) : 1, 0 2 1, 1 (1) : 1

Figure 11: M-File for the rule viewer.

5. Conclusion

The development of cloud computing as a paradigm, which are computing can be done exclusively on resources leased only when needed as per user's requirement from big data centers are faced with a new platform option. So, the initial target of clouds needs the scientific load balancing technique in the cloud computing environment. In this work the new efficient fuzzy logic technique is used to obtain measurable improvements in resource utilization and availability of cloud-computing environment. The network structure or topology also required to take into consideration, when creating the logical rules for the load balancer. The results obtained with performance evaluation from the processing time as well as improvement of overall response time, which are leading to maximum user‘s resources, in real life application efficient and effectively. Cloud service provision will be increasingly regulated and it will be important to providers, users and regulators of services that there is a high degree of proactive compliance with law and regulation.

6. REFERENCES

[1] J. Bacon, D. Eyers, T. Pasquier, J. Singh, I. Papagiannis, and P. Pietzuch, "Information Flow Control for Secure Cloud Computing," IEEE TNSM SI Cloud Service Management, vol. 11, no. 1, pp. 76–89, March 2014.

[2] "ECom: Proposal for a General Data Protection Regulation, 2012/0011(COD), C7-0025/12, Bru-Com (2012) 11 final," 2012.

[3] K. Hon, C. Millard, C. Reed, J. Singh, I. Walden, and J. Crowcroft, "Policy, Legal and Regulatory Implications of a Europe-Only Cloud," Queen Mary University of London, School of Law, Tech. Rep., 2014.

[4] J. Singh, J. Bacon, J. Crowcroft, A. Madhavapeddy, T. Pasquier, W. K. Hon, and C. Millard, "Regional Clouds: Technical Considerations," University of Cambridge, Computer Laboratory, Tech. Rep. UCAM-CL-TR-863, 2014.

[5] K.-M. Chung, Y. Kalai, and S. Vadhan, "Improved Delegation of Computation Using Fully Homomorphic Encryption," in Advances in Cryptology–CRYPTO 2010. Springer, 2010, pp. 483–501.

[6] M. Krohn, A. Yip, M. Brodsky, N. Cliffer, M. F. Kaashoek, E. Kohler, and R. Morris, "Information Flow Control for Standard OS Abstractions," in 21st ACM Symposium on Operating Systems Principles, 2007, pp. 321–334.

[7] T. F. J.-M. Pasquier, J. Bacon, and D. Eyers, "FlowK: Information Flow Control for the Cloud," in 6th International Conference on Cloud Computing Technology and Science (CloudCom). IEEE, Dec 2014.

[8] N. Zeldovich, S. Boyd-Wickizer, and D. Mazieres, "Securing Dis- ` tributed Systems with Information Flow Control," in 5th USENIX Symposium on Networked System Design and Implementation, 2008, pp. 293–308.

[9] J. Singh, T. Pasquier, J. Bacon, and D. Eyers, "Integrating Middleware with Information Flow Control," in International Conference on Cloud Engineering (IC2E). IEEE, 2015.

[10] D. Schultz and B. Liskov, "IFDB: Decentralized Information Flow Control for Databases," in 8th ACM European Conference on Computer Systems (Eurosys). ACM, 2013, pp. 43–56.

[11] M. Armbrust, A. Fox, R. Griffith, A. D. Joseph, R. Katz, A. Konwinski, G. Lee, D. Patterson, A. Rabkin, I. Stoica et al., "A View of Cloud Computing," Communications of the ACM, vol. 53, no. 4, pp. 50–58, 2010.

[12] R. Buyya, C. S. Yeo, and S. Venugopal, "Market-oriented Cloud Computing: Vision, Hype, and Reality for Delivering IT Services as Computing Utilities," in 10th IEEE International Conference on High Performance Computing and Communications. IEEE, 2008, pp. 5–13.

[13] D. Armstrong and K. Djemame, "Towards Quality of Service in the Cloud," in 25th UK Performance Engineering Workshop, 2009.

[14] R. K. Ko, M. Kirchberg, and B. S. Lee, "From System-centric to Data centric Logging-accountability, Trust & Security in Cloud Computing," in Defense Science Research Conference and Expo (DSR), 2011. IEEE, 2011, pp. 1–4.

BIOGRAPHIES

R.Devi received her B.Tech degree in Information Technology from V.R.S College of Engineering and Technology, Anna University, Chennai, India in 2005and M.E degree in Computer Science and Engineering from Sri Krishna Engineering College, Anna University, Chennai, India in 2007. Currently she is working as Assistant Professor in Panimalar Engineering College, Chennai, India. She has 8 years of teaching experience. Her interested area in the field of System software, Compiler design, Oops, and Data structures.

M.Sangeetha received her M.Sc degree in Information Technology from P.R College Madras University, Chennai, India in 2002 and M.Tech degree in Computer Science and Engineering from M.G.R Engineering College, Dr.M.G.R. University, Chennai, India in 2007. Currently she is working as Assistant Professor in Panimalar Engineering College, Chennai, India. She has 10 years of teaching experience. Her interested area in the field of Computer networks, software engineering, Data structures and cloud computing to the distributed parallel architecture based Systems.

S.T.Santhana lakshmi received her B.E degree in Computer Science and Engineering from V.L.B Janakiammal College of engineering & technology, Bharathiyar University, Chennai, India in 2003 and M.Tech degree in Information Technology from Sathyabama University, Chennai, India in 2009. Currently she is working as Assistant Professor in Panimalar Engineering College, Chennai, India. She has 11 years of teaching experience. Her interested area in the field of Artificial Intelligence, Data structures, Compiler design, Networking and Operating systems.