International Journal of Research in Advent Technology, Vol.3, No.8, August 2015
E-ISSN: 2321-9637

Recent Survey on Cloud Computing

D.Sridevi[1], PrinceJeyaseelanJames[2], Dr.A.AbdulRasheed[3]
Master of Compute Applications[1,2,3] *,Valliammai Engineering College* [1,2,3]
Email:ndsdevi@gmail.com[1] *, prince_james2000@yahoo.co.in*[2] *, profaar@gmail.com*[3]

Abstract- In growing communication and network era managing data in efficient way is of primary requirement. Data management and retrieval of required data from repository with lesser infrastructure and time is the necessity. Cloud computing is a promising field which can do the data management and computing in an efficient way. Lot of researchers have given their analysis on cloud computing. This paper will discuss the advantages and limitations of cloud computing techniques analyzed by researchers. Finally the paper presents recommendations and ideas for future work.

***Index Terms*- Cloud computing, Survey techniques in Cloud Computing**

1. THE INTRODUCTION

Today, the most prevalent applications are Internet services with billions of users. Sites like Google, Yahoo! and Face book receive millions of clicks daily. This generates terabytes of invaluable data which can be used to improve online advertising strategies and user satisfaction. Real time capturing, storage, and analysis of this data are common needs of all high-end online applications.

To address these problems, a number of cloud computing technologies have emerged in last few years. Cloud computing is a style of computing where dynamically scalable and virtualized resources are provided as a service over the Internet. The cloud refers to the datacenter hardware and software that supports a clients needs, often in the form of data stores and remotely hosted applications. These infrastructures enable companies to cut costs by eliminating the need for physical hardware, allowing companies to outsource data and computations on demand. Developers with innovative ideas for Internet services no longer need large capital outlays in hardware to deploy their services; this paradigm shift is transforming the IT industry. The operation of large scale, commodity computer datacenters was the key enabler of cloud computing, as these datacenters take advantage of economies of scale, allowing for decreases in the cost of electricity, bandwidth, operations, and hardware.

Although the advantages of using clouds are unarguable, there are risks involved with releasing data onto third party servers. A client places her computation and data on machines she cannot control, and the provider agrees to run a service whose details she does not know. It is natural for the client to have concerns about the data confidentiality, security and integrity. There is a clear need for technical solutions so clients can be confident about the security and integrity of their data in the face of an untrusted cloud. This paper details survey on various techniques of cloud computing, data security and privacy which would help researchers to narrow down their thought process and make their analysis easier.

2. RELATED WORK

Nattakarn Phaphoom et al. [1] provide a comprehensive review on the building blocks of cloud computing and relevant technological aspects. It focuses on four key areas including architecture, virtualization, data management, and security issues. Gaurav Dhiman et al. [2] present v Green, a multi-tiered software system for energy efficient computing in virtualized environments. It comprises of novel hierarchical metrics that capture power and performance characteristics of virtual and physical machines, and policies, which use it for energy efficient virtual machine scheduling across the whole deployment Ramesh et al. [3] explains basic power management scheme in the general computing as well as grid computing. And this paper strongly performed an analysis on various categories of real time grid systems. The power consumption on various grid levels based on multiple volumes in the organization level is analyzed. The conclusion is focused the future requirement of research direction in the energy efficient system design of grid computing Barroso et al. [4] describes energy-proportional designs which enable large energy savings in servers, potentially doubling their efficiency in real-life use. Achieving energy proportionality will require significant improvements in the energy usage profile of every system component, particularly the memory and disk subsystems. Sahai et al. [5] proposed Attribute-Based Encryption (ABE) Fuzzy Identity-Based Encryption, with the original goal of providing an error-tolerant identity-based encryption scheme that uses biometric identities. Pirretti et al [6] proposed an efficient construction of ABE under the Random Oracle model and demonstrated its application in large-scale systems. Goyal et al. enhanced the original ABE scheme by embedding a monotone access structure into user secret key. Goyal et al. [7] proposed Key-

Policy Attribute-Based Encryption (KP-ABE), a variant of ABE. In the same work, Goyal et al. also proposed the concept of Cipher text-Policy Attribute Based Encryption (CP-ABE) without presenting a concrete construction. CP-ABE is viewed as another variant of ABE in which cipher texts are associated with an access.

With the large scale adoption of cloud computing, where the essential characteristics are embraced and exploited by a larger pool of cloud providers and customers, the problem of resource allocation and management experienced a profound transformation from the traditional grid systems. In the case of the Grid Resource Management Systems(GRMS) the target was rather to obtain "high-throughput computation", by reusing some idle resources, like in the case of Condor [8], or use some decentralized scheduling\models, as in the case of Condo, or Legion [8], [9]. In the case of cloud computing, the process of negotiation and provisioning of resources is built around the principles of rapid elasticity and resource pooling, where "dynamic provisioning and reservation of computational resources" is one of the major concerns of different VM resource management solutions [10]. At the same time, on top of the measured service and on-demand self-service characteristics, strategies for market-based resource management systems are being reconsidered in the context of cloud computing [10], [11]. Different approaches exist for assuring scalability through negotiation and provisioning of cloud resources. Different SLA-based approaches for resource provisioning were considered. In [10], an SLA-oriented approach was considered for the Aneka, and CloudSim was used for performance evaluation. A policy-based approach for SLA-based negotiation was considered in [12], while [13] reconsider the problem of SLA-based provisioning by adding information about the response time, evaluated on Eucalyptus. Other SLA-based approaches were considered by [14], [15], or [16] in different application deployments.

A different approach, based on Quality of Service (QoS) maximization is offered in [17], [18]. The specific interest for scientific applications that was developed through grid systems, is exploited in conjunction with the cloud computing paradigm in various research papers. [19] describes an approach for elastic grid infrastructures, by employing a dynamic provisioning mechanism, while the approach from [20] is based on obtaining extra resources for highly resource-demanding scientific applications. On top of CloudSim, the work of [21] is oriented towards "analyze the problem of dynamic provisioning of Cloud resources to scientific workflows that do not benefit from sufficient Grid resources as required by their computational demands". Approaches for on-demand resource provisioning are offered in [22], where specific time constraints are considered for essential activities. Elasticity and dynamic adaptation of services to user's needs are considered in [23], while a similar approach, based on VM multiplexing is described in [24]. [25] [26] aims to develop a fault tolerant environment, providing some "cost-aware and failure-aware provisioning policies", with a significantly improved response time for user's requests. Different platforms are used in the context of resource negotiation and provisioning, like Aneka and the CloudSim framework ([10], [27], [28], [20]), the OPTIMIS toolkit ([29], [30], [31]), or the Coasters system for automatically-deployed node provisioning ([32]). Different optimization approaches were considered in the context of resource provisioning. The Optimal Cloud Resource Provisioning algorithm was proposed in [33], as a stochastic programming model. A "feedback control based dynamic resource provisioning algorithm" is introduced in [17], considering a series of constraints, or QoS optimizations. The Automatic Resource Allocation Strategy based on Market Mechanism (ARAS-M) was specified in [34], where the mechanism is built around a QoS-based utility function, and a genetic algorithm is developed in close relation with this mechanism. While most cloud providers do not currently offer resource/service negotiation, according to Lomuscio et al. "automated negotiation will become the dominant mode of operation" [35]. Furthermore, by coupling automated negotiation with multi-agent systems we can make use of techniques from distributed systems and artificial intelligence. General agent-based approaches toward automated negotiation have been discussed in [36], [37].

3. POTENTIAL SOLUTIONS

The above survey brings out lot of issues in cloud computing. This section explains solution for problems at high level.

i. Privacy and security: Privacy and security issues are two major obstacles to adopt cloud computing. Complex encryption method of data can provide more security. Research is going on developing such encryption method where users can send their data in encrypted bits. The cloud provider can search and calculate the encrypted data but cannot see what the actual data is. Theoretically such method
do exists. But it requires high bandwidth and processor cycle, incurring higher expenses. Using of hardware based security can be more effective in respect to bandwidth and processor speed. But it also incurs higher cost [41][44]. Again, hosting the cloud infrastructure in more trusted region like European Union can add extra privacy and security towards the customers [38][45].

ii. Vendor lock-in problem: Vendor lock-in problem can be solved by enforcing all the vendors to use a unified API. It can result in decreasing of profit for the cloud vendors, but on the other hand more customers will now be interested to adopt cloud computing [39].

iii. Service level agreement: Proper SLA is far away from the light. Because the cloud computing itself is not mature enough to stick with a single unified SLA at this moment. Lots of changes are going on every day. All the vendors and standardization bodies should agree on making a unified SLA and work step by step rather than making their own SLA
and convincing it to be accepted by others [43].
iv. Performance instability: Proper scheduling technique can solve performance instability problem. Research is ongoing to fix this problem [39].
v. Scalable database: Researchers are working to solve the issue of scalable database. Creating a new storage system with unified interface for all the cloud providers may be a solution [39]. A scalable storage with an SQL-like API is under construction to solve this issue [40].
vi. Hybrid solutions: Apart from the solutions mentioned above, a hybrid solution can also be adopted. In this case, an enterprise will only move the part of its IT infrastructure which has no effect from the regular problems of cloud computing. The remaining parts of the IT infrastructure will belong to the enterprise itself [42].

4.CONCLUSION

This survey paper explains different cloud computing techniques realized by various authors. It also brings out various issues faced during the life cycle of cloud computing. Finally it gives in sight on high level solution for certain issues faced in cloud computing.

REFERENCES

[1] Phaphoom.N, Wang. X, Abrahamson.P." Foundations and Technological Landscape of Cloud Computing" (ISRN Software Engineering Volume 2013 (2013), Article ID 782174, 31 pages)
[2] Dhiman.G, Marchetti.G, Rosing.T "v: Green: a system for energy efficient computing in virtualized environments" (Proceedings of the 14th ACM/IEEE international symposium on Low power electronics and design, page 243-248, published in ACM, 2009)
[3] D. Ramesh, A. Krishnan "An Analysis on Energy Efficient System Design in Grid Computing"(Second International Conference, CCSIT 2012, Bangalore, India, January 2-4, 2012. Proceedings, pp 421-428)
[4] Barroso, L.A. Holzle, U. "The Case for Energy-Proportional Computing" (IEEE computer society, Volume: 40, Issue: 12, Dec. 2007 Page:33 – 37, ISSN :0018-9162)
[5] A. Sahai and B. Waters. Fuzzy Identity-Based Encryption. In Proc. of EUROCRYPT'05, Aarhus, Denmark, 2005.
[6] D. Boneh and M. Franklin. Identity-Based Encryption from The Weil Pairing. In Proc. of CRYPTO'01, Santa Barbara, California, USA, 2001.
[7] M. Pirretti, P. Traynor, P. McDaniel, and B. Waters. Secure Atrribute-Based Systems. In Proc. of CCS'06, New York, NY, USA, 2006.
[8] S. Subashini and V. Kavitha, "A survey on security issues in service delivery models of cloud computing," Journal of Network and Computer Applications, vol. 34, no. 1, pp. 1–11, 2011. Rubin, D. B. Discussion statistical disclosure limitation. J. Official Statistics 9, 2.
[9] DMTF. (2010, June) Architecture for Managing Clouds. Distributed Management Task Force. [Online]. Available: http://dmtf.org/sites/default/files/standards/ documents/DSP-IS0102\ 1.0.0.pdf
[10] S. Venticinque, V. Negru, V. I. Munteanu, C. Sandru, R. Aversa, and M. Rak, "Negotiation policies for provisioning of cloud resources," in Proceedings of the 4th International Conference on Agents and Artificial Intelligence. SciTePress, February 2012, pp. 347–350.
[11] K. Krauter, R. Buyya, and M. Maheswaran, "A taxonomy and survey of grid resource management systems for distributed computing," 2001.
[12] R. Buyya, S. Chapin, and D. Dinucci, "Architectural models for resource management in the grid," in In The First IEEE/ACM International Workshop on Grid Computing (GRID 2000. Springer-Verlag, 2000, pp. 18–35.
[13] R. Buyya, S. K. Garg, and R. N. Calheiros, "Slaoriented resource provisioning for cloud computing: Challenges, architecture, and solutions," in Proceedings of the 2011 International Conference on Cloud and Service Computing, ser. CSC '11. Washington, DC, USA: IEEE Computer Society, 2011, pp. 1–10. [Online].
[14] C. S. Yeo and R. Buyya, "A taxonomy of marketbased resource management systems for utility-driven cluster computing," Softw. Pract. Exper., vol. 36, no. 13, pp. 1381–1419, Nov. 2006. [Online].
[15] Z. Xiao and D. Cao, "A policy-based framework for automated sla negotiation for internet-based virtual computing environment," in Proceedings of the 2010 IEEE 16th International Conference on Parallel and Distributed Systems, ser. ICPADS '10. Washington, DC, USA: IEEE Computer Society, 2010, pp. 694–699.
[16] W. Iqbal, M. N. Dailey, D. Carrera, and P. Janecek, "Adaptive resource provisioning for read intensive multitier applications in the cloud," Future Generation Computer Systems, vol. 27, no. 6, pp. 871 – 879, 2011.
[17] A. Kertesz, G. Kecskemeti, and I. Brandic, "An sla-based resource virtualization approach for on-demand service provision," in Proceedings of the 3rd international workshop on Virtualization

technologies in distributed computing, ser. VTDC '09. New York, NY, USA: ACM, 2009, pp. 27–34.

[18] D. Jiang, G. Pierre, and C.-H. Chi, "Autonomous resource provisioning for multi-service web applications," in Proceedings of the 19th international conference on World wide web, ser. WWW '10. New York, NY, USA: ACM, 2010, pp. 471–480.

[19] Caceres, L. M. Vaquero, L. Rodero-Merino, l. Polo, and J. J. Hierro, "Service scalability over the cloud," in Handbook of Cloud Computing, B. Furht and A. Escalante, Eds. Springer US, 2010, pp. 357–377.

[20] Q. Zhu and G. Agrawal, "Resource provisioning with budget constraints for adaptive applications in cloud environments." in HPDC, S. Hariri and K. Keahey, Eds. ACM, 2010, pp. 304–307. [Online].

[21] T. Voith, K. Oberle, and M. Stein, "Quality of service provisioning for distributed data center inter-connectivity enabled by network virtualization," Future Generation Computer Systems, vol. 28, no. 3, pp. 554 – 562, 2012.

[22] C. V´azquez, E. Huedo, R. S. Montero, and I. M. Llorente, "On the use of clouds for grid resource provisioning," Future Gener. Comput. Syst., vol. 27, no. 5, pp. 600–605, May 2011.

[23] C. Vecchiola, R. N. Calheiros, D. Karunamoorthy, and R. Buyya, "Deadline-driven provisioning of resources for scientific applications in hybrid clouds with aneka," Future Generation Computer Systems, vol. 28, no. 1, pp. 58 – 65, 2012.

[24] S. Ostermann, K. Plankensteiner, and R. Prodan, "Using a new event-based simulation framework for investigating resource provisioning in clouds," Sci. Program., vol. 19, no. 2-3, pp. 161–178, Apr. 2011.

[25] G. P. Silvana and A. Costanzo, "Cloud control and management planes for service provisioning," in Proceedings of the 2011 IEEE Ninth International Conference on Dependable, Autonomic and Secure Computing, ser. DASC '11. Washington, DC, USA: IEEE Computer Society, 2011, pp. 540–546.512

[26] I. M. Llorente, R. Moreno-Vozmediano, and R. S. Montero, "Cloud computing for on-demand grid resource provisioning." in High Performance Computing Workshop, ser. Advances in Parallel Computing, W. Gentzsch, L. Grandinetti, and G. R. Joubert, Eds., vol. 18. IOS Press, 2008, pp. 177–191. [Online].

[27] X. Meng, C. Isci, J. Kephart, L. Zhang, E. Bouillet, and D. Pendarakis, "Efficient resource provisioning in compute clouds via vm multiplexing," in Proceedings of the 7th international conference on Autonomic computing, ser. ICAC '10. New York, NY, USA: ACM, 2010, pp. 11–20. [Online].

[28] T. Dornemann, E. Juhnke, and B. Freisleben, "On-demand resource provisioning for bpel workflows using amazon's elastic compute cloud," in Proceedings of the 2009 9th IEEE/ACM International Symposium on Cluster Computing and the Grid, ser. CCGRID '09. Washington, DC, USA: IEEE Computer Society, 2009, pp. 140–147.

[29] B. Javadi, P. Thulasiraman, and R. Buyya, "Cloud resource provisioning to extend the capacity of local resources in the presence of failures," in 14th IEEE International Conference on High Performance Computing and Communications (HPCC-2012), 2012. [Online]. Available:http://www.cloudbus.org/papers/CRP-HPCC2012.pdf

[30] R. N. Calheiros, C. Vecchiola, D. Karunamoorthy, and R. Buyya, "The aneka platform and qos-driven resource provisioning for elastic applications on hybrid clouds," Future Generation Computer Systems, vol. 28, no. 6, pp. 861 – 870, 2012.

[31] 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," Softw. Pract. Exper., vol. 41, no. 1, pp. 23–50, Jan. 2011.

[32] R. Badia, M. Corrales, T. Dimitrakos, K. Djemame, E. Elmroth, A. Ferrer, N. Forg, J. Guitart, F. Hernndez, B. Hudzia, A. Kipp, K. Konstanteli, G. Kousiouris, S. Nair, T. Sharif, C. Sheridan, R. Sirvent, J. Tordsson, T. Varvarigou, S. Wesner, W. Ziegler, and C. Zsigri, "Demonstration of the optimis toolkit for cloud service provisioning," in Towards a Service-Based Internet, ser. Lecture Notes in Computer Science, W. Abramowicz, I. Llorente, M. Surridge, A. Zisman, and J. Vayssi`ere, Eds. Springer Berlin / Heidelberg, 2011, vol. 6994, pp. 331–333.

[33] C. Chapman, W. Emmerich, F. G. M´arquez, S. Clayman, and A. Galis, "Software architecture definition for ondemand cloud provisioning," Cluster Computing, vol. 15, no. 2, pp. 79–100, Jun. 2012.

[34] A. J. Ferrer, F. Hernndez, J. Tordsson, E. Elmroth, A. Ali-Eldin, C. Zsigri, R. Sirvent, J. Guitart, R. M. Badia, K. Djemame, W. Ziegler, T. Dimitrakos, S. K. Nair, G. Kousiouris, K. Konstanteli, T. Varvarigou, B. Hudzia, A. Kipp, S. Wesner, M. Corrales, N. Forg, T. Sharif, and C. Sheridan, "Optimis: A holistic approach to cloud service provisioning," Future Generation Computer Systems, vol. 28, no. 1, pp. 66 – 77, 2012.

[35] M. Hategan, J. M. Wozniak, and K. Maheshwari,"Coasters: Uniform resource provisioning and access for clouds and grids." in UCC. IEEE Computer Society, 2011, pp. 114–121. [Online].

[36] S. Chaisiri, B.-S. Lee, and D. Niyato, "Robust cloud resource provisioning for cloud computing environments." in SOCA. IEEE, 2010, pp. 1–8.

[32] X. You, J. Wan, X. Xu, C. Jiang, W. Zhang, and J. Zhang, "Aras-m: Automatic resource allocation strategy based on market mechanism in cloud computing," Journal of Computers, vol. 6, no. 7, 2011.

[37] A. R. Lomuscio, M. Wooldridge, and N. R. Jennings, "A classification scheme for negotiation in electronic commerce," Group Decision and Negotiation, vol. 12, pp. 31–56, 2003. [Online].

[38] Arinze, B. & Anandarajan, M. 2010, 'Factors that determine the adoption of cloud computing: a global perspective', International Journal of Enterprise Information Systems, IJEIS, vol. 6, no. 4, pp. 55-68.

[39] Armbrust, M., Fox, A., Gri_th, R., Joseph, A.D., Katz, R., Konwinski, A., Lee, G., Patterson, D., Rabkin, A., Stoica, I.O.N. & Zaharia, M. 2010, 'A view of cloud computing', Communications of the ACM, vol. 53, no. 4, pp. 50-8.

[40] Armbrust, M., Lanham, N., Tu, S., Fox, A., Franklin, M.J. & Patterson, D.A. 2010, 'The case for PIQL: a performance insightful query language', Proceedings of the 1st ACM symposium on Cloud computing, Indianapolis, Indiana, USA.

[41] Gatewood, B. 2009, 'Clouds on the information horizon: how to avoid the storm', Information Management Journal, vol. 43, no. 4, pp. 32-6.

[42] Khalidi, Y. 2011, 'Building a cloud computing platform for new possibilities', IEEE Computer Society, vol. 44, no. 3, pp. 29-34.

[43] Ortiz, S. 2011, 'The problem with cloudcomputing standardization', IEEE Computer Society, vol. 44, no. 7, pp. 13-6.

[44] Ryan, M.D. 2011, 'Cloud computing privacy concerns on our doorstep', Communications of the ACM, vol. 54, no. 1, pp. 36-8.

[45] Bristow, R., Dodds, T., Northam, R., & Plugge, L. 2010, 'Cloud Computing and the Power to Choose', EDUCAUSE Review, 45(3), 14.

.