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A REVIEW ON CLOUD COMPUTING

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ABSTRACT

There are an increasing number of Cloud Services available in the Internet. Cloud services can be a component of a system and different Cloud Servers that would provide different services. In this present work we have defined a multiple cloud environment. Each cloud server is defined with certain limits in terms of memory and the CPU specifications. Now as the users enter to the system, the user request is performed in terms of processes. To represent the parallel user requests, n number of requests are been generated by the users. All these requests are to be handled by the cloud servers in parallel by using the multiple cloud concept. A middle layer is defined between the cloud servers and the client requests that will perform the allocation of the processes to different clouds in under load and over load conditions. As user requests are performed, some parameters are also defined with each request. These parameters are the process time, deadline, input output specifications etc. In the general case, the allocations of the processes are performed in a sequential order. Each process must be executed within the deadline limit. But if more than one processes occur at same time and not get executed before the deadline, in such case the processes is switched from one cloud server to other called the process migration. In this present work, a parametric analysis is performed to identify the requirement of process migration and based on this analysis the migration will be performed on these processes. The effectiveness of the work is identified in terms of successful execution of the processes within the time limits.

INTRODUCTION TO CLOUD COMPUTING

Cloud computing is a construct that allows you to access applications that actually resides at a location other than your computer or other internet-connected device. It has become one of the most talked about technologies in recent times and has got lots of attention from media as well as analysts because of the opportunities, it is offering.

The beauty of cloud computing is that another company hosts your application (or the suite of applications, for that matter). This means that they handle the costs of servers, they manage the software updates, and—depending on how you craft your contract—you pay less for the service. It's also convenient for telecommuters and traveling remote workers, who can simply log in and use their applications wherever they are.

Cloud computing is combination of two terms: Cloud & Computing. Cloud is the Network. A network is a bulk of thousands of users. These users may or may not be connected. If they are connected, there will be one of model formed (IaaS, PaaS, SaaS), discussed further. The cloud also consists of Server & a Database. Server is also known as Cloud-Provider; while Database is a collection of user-details and applications to be worked upon by users. Computing is the term used for services of cloud.

The US National Institute of Standards and Technology (NIST) has developed a working definition that covers the commonly agreed aspects of cloud computing. The NIST working definition summaries cloud computing as: "a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction."

This definition describes cloud computing as having five essential characteristics, three service models, and four deployment models. The essential characteristics are:

- On-demand self-service
- Broad network access
- Resource pooling
- Rapid elasticity
- Measured service

Evolution of Cloud Computing

Cloud computing means different to different people, its benefits are different to different people. To IT managers, it means to minimize capital-expenditure by outsourcing most of the hardware and software resources. To ISVs, it means to reach out to more users by offering a SaaS solution. To end users, it means to access an application from anywhere using any device. The following diagram illustrates a high level overview.

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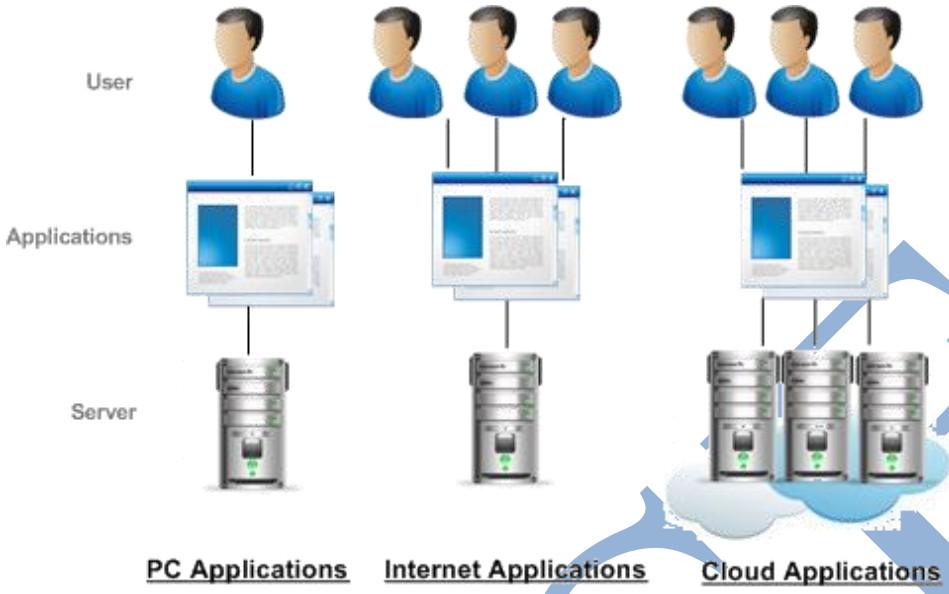

Figure 1.1: Evaluation of Cloud

In the beginning of the computing era, the relationship between the user and the machine was one-to-one. One user used to access the applications that (s) he needs to use on one machine.

Then the Internet era came. In the Internet era, the relationship between the user and the machine was many-to-one. Many users could access applications running on one machine. The applications in this case were websites or client-server applications, the machine was a central server hosting the server application, web server or/and the database.

In cloud computing, the relationship between the user and machine are many-to-many. Many users can access an application that is served from many machines.

Now, what was the reason of this evolution? What were the driving factors behind this? The reason for the evolution from PC-based application to Internet-based application was obvious. This happened because of the need of multiple users trying to access an application from their own machines. The only way that it was possible was to have the application hosted on a central server and having separate client applications communicate to it.

The evolution from internet-based applications to cloud computing, I think, is a bit more complex. There are several industry trends and user behaviors affecting this shift in the technology. We will get more into those in my next blog. Here, I touch upon what I believe is the biggest driving factor behind cloud computing.

I believe that the most important driving factor behind the rise of cloud computing is – DATA. We are all aware of that we are living in the age of information of overload. The data that we need to consume increases exponentially every moment. More is the data, higher is the need to process it, more complex becomes the business processes, and it leads to the need of higher processing power. The ever increasing demand for processing power cannot be addressed using the traditional server and data center technology. Therefore, we now have cloud computing.

LITERATURE REVIEW

In Year 2009, Kento Sato performed a work," A Model-Based Algorithm for Optimizing I/O Intensive Applications in Clouds using VM-Based Migration". Author propose a novel model-based I/O performance optimization algorithm for data-intensive applications running on a virtual cluster, which determines virtual machine(VM) migration strategies, i.e., when and where a VM should be migrated, while minimizing the expected value of file access time. Author solve this problem as a shortest path problem of a weighted direct acyclic graph (DAG), where the weighted vertex represents a location of a VM and expected file access time from the location, and the weighted edge represents a migration of a VM and time.

In Year 2010, Takahiro Hirofuchi performed a work," Enabling Instantaneous Relocation of Virtual Machines with a Lightweight VMM Extension". In this paper, Author propose an advanced live migration mechanism enabling instantaneous relocation of VMs. To minimize the time needed for switching the execution host, memory pages are transferred after a VM resumes at a destination host. In addition, for memory intensive workloads, Presented migration mechanism moved all the states of a VM faster than existing migration technology.

In Year 2010, Anton Beloglazov performed a work," Energy Efficient Resource Management in Virtualized Cloud Data Centers". Author propose an energy efficient resource management system for virtualized Cloud data centers that reduces operational costs and provides required Quality of Service (QoS). Energy savings are achieved by continuous consolidation of VMs according to current utilization of resources, virtual network topologies established between VMs and thermal state of computing nodes. Author presents first results of simulation-driven evaluation of heuristics for dynamic reallocation of VMs using live migration according to current requirements for CPU performance.

In Year 2010, Mohammad Hajjat performed a work, “Cloudward Bound: Planning for Beneficial Migration of Enterprise Applications to the Cloud". In this paper, Author tackle challenges in migrating enterprise services into hybrid cloud-based deployments, where enterprise operations are partly hosted on-premise and partly in the cloud. Author makes several contributions. First, Author highlights the complexity inherent in enterprise applications today in terms of their multi-tiered nature, large number of application components, and interdependencies. Second, Author

have developed a model to explore the benefits of a hybrid migration approach. Presented model takes into account enterprise-specific constraints, cost savings, and increased transaction delays and wide-area communication costs that may result from the migration. Author articulate the importance of ensuring assurable reconfiguration of security policies as enterprise applications are migrated to the cloud. Author present algorithms to achieve this goal, and demonstrate their efficacy on realistic migration scenarios.

In Year 2011, Sumit Kumar Bose performed a work, "CloudSpider: Combining Replication with Scheduling for Optimizing Live Migration of Virtual Machines Across Wide Area Networks". In this paper, Author deal with this problem by combining VM scheduling strategies with VM replication strategies. In particular, Author propose to replicate a VM image selectively across different cloud sites, choose a replica of the VM image to be the primary copy and propagate the incremental changes at the primary copy to all the remaining replicas of the VM image. Author propose to compensate the additional storage requirements due to replication by exploring commonality that naturally exists amongst different VM images using de-duplication techniques. In this paper Author address this issue as part for Presented integrated replication and scheduling architecture, called CloudSpider.

In Year 2011, Van Tran performed a work, "Application Migration to Cloud: A Taxonomy of Critical Factors". Author propose a taxonomy of the migration tasks involved, and Author show the breakdown of costs among categories of task, for a case-study which migrated a .NET n-tier application to run on Windows Azure. Author also indicate important factors that impact on the cost of various migration tasks. This work contributes towards Presented future direction of building a framework for cost-benefit tradeoff analysis that would apply to migrating applications to cloud platforms, and could help decision-makers evaluate proposals for using cloud computing.

In Year 2011, Muhammad Ali Babar performed a work, "A Tale of Migration to Cloud Computing for Sharing Experiences and Observations". This paper reports Presented experiences and observations gained from migrating an Open Source Software (OSS), Hackystat, to cloud computing. Author expect that Presented description of Hackystat's architecture prior and after migration and design decisions can provide some guidance about modifying architecture of a service-based system for cloud computing. Moreover, Author also hope that Presented experiences reported in this paper can contribute to the identification of some research questions for improving software engineering support for developing and evolving cloud-enabled systems.

In Year 2011, Aaron J. Elmore performed a work, "Zephyr: Live Migration in Shared Nothing Databases for Elastic Cloud Platforms". Author focuses on the problem of live migration in the database layer. Author proposed Zephyr, a technique to efficiently migrate a live database in a shared nothing transactional database architecture. Zephyr uses phases of on demand pull and

asynchronous push of data, requires minimal synchronization, results no service unavailability and few or no aborted transactions, minimizes the data transfer overhead, provides ACID guarantees during migration, and ensures correctness in the presence of failures.

In Year 2011, Sudipto Das performed a work," Albatross: Lightweight Elasticity in Shared Storage Databases for the Cloud using Live Data Migration". Author present Al- batross, a technique for live migration in a multitenant database serving OLTP style workloads where the persistent database image is stored in a network attached storage. Albatross migrates the database cache and the state of active transactions to ensure minimal impact on transaction execution while allowing transactions active during migration to continue execution. It also guarantees serializability while ensuring correctness during failures.

In Year 2012, Sean Barker performed a work, " "Cut Me Some Slack": Latency-Aware Live Migration for Databases". Author presents Slacker, an end-to-end database migration system at the middleware level satisfying these requirements. Slacker leverages off-the-shelf hot backup tools to achieve live migration with effectively zero down-time. Additionally, Slacker minimizes the performance impact of migrations on both the migrating tenant and collocated tenants by leveraging `migration slack', or resources that can be used for migration without excessively impacting query latency. Author apply a PID controller to this problem, allowing Slacker to automatically detect and exploit migration slack in real time.

In Year 2012, Madhan Kumar Srinivasan performed a work," State-of-the-art Cloud Computing Security Taxonomies - A classification of security challenges in the present cloud computing environment". Cloud computing has taken center stage in the present business scenario due to its pay-as-you-use nature, where users need not bother about buying resources like hardware, software, infrastructure, etc. permanently. This paper analyzes the current security challenges in cloud computing environment based on state-of-the-art cloud computing security taxonomies under technological and process-related aspects.

In Year 2012, Xiulei Qin performed a work," Optimizing Data Migration for Cloud-based Key-Value Stores". In this paper Author explore a new approach to optimize the data migration. Explicitly, Author build two interference-aware models to predict the migration time and performance impact for each migration action using statistical machine learning, and then create a cost model to strike a balance between the two ingredients. Using the load rebalancing scenario as a case study, Author have designed one cost-aware migration algorithm that utilizes the cost model to guide the choice of possible migration actions.

In Year 2013, Ruijin Zhou performed a work, "Optimizing Virtual Machine Live Storage Migration in Heterogeneous Storage Environment". This paper, for the first time, addresses the efficiency of VM live storage migration in heterogeneous storage environments from a multi-

dimensional perspective, i.e., user experience, device wearing, and manageability. Author derive a flexible metric (migration cost), which captures various design preference. Based on that, Author propose and prototype three new storage migration strategies, namely: 1) Low Redundancy (LR), which generates the least amount of redundant writes; 2) Source-based Low Redundancy (SLR), which keeps the balance between IO performance and write redundancy; and 3) Asynchronous IO Mirroring, which seeks the highest IO performance.

REFERENCES

[1] T. Hirofuchi, H. Ogawa, H. Nakada, S. Itoh, and S. Sekiguchi, "A Storage Access Mechanism for Wide-Area Live Migration of Virtual Machines," *In Summer United Workshops on Parallel, Distributed and Cooperative Processing*,2008, pp. 19–24.

[2] I. Foster, T. Freeman, K. Keahey, D. Scheftner, B. Sotomayor, and X. Zhang, "Virtual Clusters for Grid Communities," *In IEEE Int. Symp. On Cluster Computing and the Grid*, 2006, pp 513– 520.

[3] M. Strasser and H. Stamer, "A Software-Based Trusted Platform Module Emulator," *In Trust '08 Proc. of the 1st Int. Conf. on Trusted Computing and Trust in Information Technologies*, 2008, pp. 33–47.

[4] Y. Luo, B. Zhang, X. Wang, Z. Wang, Y. Sun, and H. Chen, "Live and incremental whole-system migration of virtual machine using block-bitmap," *In IEEE Int. Conf. on Cluster Computing*, 2008.

[5] H. Nishimura, N. Maruyama, and S. Matsuoka, "Virtual Clusters on the Fly - Fast Scalable and Flexible Installation," *In IEEE Int. Symp. On Cluster Computing and the Grid*, 2007,pp. 549–556.

[6] M. Tatezono, H. Nakada, and S. Matsuoka, "Mpi environment with load balancing using virtual machine," In *Symp. On Advanced Computing Systems and Infrastructures SACSIS*, 2006, pp. 525–532.

[7] S. Venugopal, R. Buyya, and K. Ramamohanarao. A taxonomy of Data Grids for distributed data sharing, management, and processing. In *ACM Computing Surveys*, volume 38,2006.

[8] A. Gopalakrishnan. 2009. Cloud Computing Identity Management. *SET Labs Briefings*. Vol. 7, No. 7. pp. 45-55.

[9] M. K. Srinivasan, P. Rodrigues, "A roadmap for the comparison of identity management solutions based on state-of-the-art IdM taxonomies," *Springer Communications in*

Computer and Information Science,2010, pp. 349-358. Springer-Verlag Berlin Heidelberg, New York, USA.

[10] M. K. Srinivasan, P. Rodrigues, "Analysis on identity management systems with extended state- of-theart IdM taxonomy factors," *International Journal of Ad hoc, Sensor & Ubiquitous Computing*. (December 2010), Vol.1, No.4. pp. 62-70. DOI=10.5121/ijasuc.2010.1406.

[11] R. Bradford, E. Kotsovinos, A. Feldmann, and H. Schi¨oberg, "Live wide-area migration of virtual machines including local persistent state In VEE '07," *Proc. of the 3rd Int. Conf. on Virtual execution environments*,2007,pp. 169–179.

[12] M. Shiels, "*Malicious insider attacks to rise"*. BBC News, Silicon Valley, Tech. Rep. 2009.

[13] W. Baker, A. Hutton "*Data Breach Investigations Report, A study conducted by the Verizon RISK Team with cooperation from the U.S. Secret Service and the Dutch High Tech Crime Unit"*. Tech. Rep. Verizon, New Jersey, 2010.

[14] B. Sunderland, A. Chandramouly. "*Overcoming Security Challenges to Virtualize Iternetfacing Applications"*. Intel Corporation Tech. Rep. November 2011.

[15] F. Sabahi, "Virtualization-level security in cloud computing," *Proc. of IEEE Int. Conf. CommunicationSoftwareand Networks*, DOI: 10.1109/ICCSN.2011.6014716,2011,pp. 250-254.

[16] L.M.Vaquero, L. Rodero-Merino, J.Caceres, , M. Lindner, 2009. A Break in the Clouds: Towards a Cloud Definition. *ACM SIGCOMM Computer Communication Review*. 39(1).

[17] W.A. Jansen, "Cloud Hooks: Security and Privacy Issues in Cloud Computing," *Proc. of 44th Hawaii Int. Conf.e on System Sciences*, DOI: 10.1109/HICSS.2011.103,2011,pp. 1-10.

[18] B. R. Kandukuri, V. R. Paturi, A. Rakshit, 2009. Cloud Security Issues. *IEEE Computer Society*. pp. 517-520. DOI 10.1109/SCC.2009.84.

[19] R. P. Padhy, M. R. Patra, S. C. Satapathy. March 2012. SLAs in Cloud Systems: The Business Perspective. *International Journal of Computer Science and Technology*. Vol. 3, Issue 1. pp. 481-488.

[20] M. Gregg. " *Security Concerns for Cloud Computing"*. Global Knowledge.Tech. Rep. 2010.

[21] P. Mell, T. Grance. September 2011. *The NIST Definition of Cloud Computing. NIST Special Publication 800-145*. National Institute of Science and Technology.

[22] *Security Guidance for Critical Areas of Focus in CloudComputing V2.1*. December 2009. Cloud Security Alliance.

[23] H. Li, J. Sedayao, J. H.Steichen, E. Jimison, C. Spence, and S. Chahal. "*Developing an Enterprise Cloud Computing Strategy"* Intel Corporation,Tech. Rep. January 2009.

[24] T. Garfinkel and M. Rosenblum, "When virtual is harder than real: security challenges in virtual machine based computing environments," *Proceedings of the 10th conference on Hot Topics in Operating Systems*, 2005,pp. 20–20.

[25] S. Berger, R. C´aceres, K. A. Goldman, R. Perez, R. Sailer, and L.V. Doorn, " vTPM: Virtualizing the trusted platform module," *Proc. of the 15th conf. on USENIX Security Symp.*,2006,pp. 305–320.

[26] F. Stumpf and C. Eckert, "Enhancing Trusted Platform Modules with Hardware-Based Virtualization Techniques," *Proceedings of the 2008 Second International Conference on Emerging Security Information, Systems and Technologies*, 2008, pp.1–9.

[27] P. England and J. Loeser, "Para-Virtualized TPM Sharing," *Proc. of the 1st Int. Conf. on Trusted Computing and Trust in Information Technologies*,2008, pp. 119–132.

[28] A.R.Sadeghi, C. St¨uble, and M. Winandy, "Property-Based TPM Virtualization," *Proc. of the 11th Int. Conf. on Information Security*,2008,pp.1–16.

[29] V. Scarlata, C. Rozas, M. Wiseman, D. Grawrock, and C. Vishik. TPM Virtualization: Building a General Framework. In Trusted Computing, pp. 43–56, 2007