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Secure Virtual Machine Migration Technique using Blockchain

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ABSTRACT— *Blockchain Technology is a dedicated chain of structured block for storing data in a Comprehensible and robust way. Cloud computing is a collection of remote servers that helps the consumers to store the data, manage and for processing the data based on pay as you go model. Virtual Machine Migration is a process of managing the virtual machines in a powerful way so that it increases the performance of the system. VM Migration over internet takes a large amount of time to migrate virtual machines to the cloud providers. It becomes mandatory for migrating virtual machines to cloud with a less amount of time, for this challenge we need load balancing. The paper discuss about how virtual machine migration takes place with the use of blockchain technology that protects the virtual machine data from malicious tampering.*

Keywords—*Cloud Computing, Migration, Virtual Machine , Blockchain Technology*

I. INTRODUCTION

Blockchain technology is an emerging technical term trend set that grasp the attention of researches. Blockchain is a collection of block which stores data securely with the help of hash code. It is a validating data ledger which is distributed in nature. Cloud computing is a collection of datacenters where each datacenters runs many servers. Cloud computing helps the consumer to make use of resources through internet in an efficient way by reducing the maintenance cost or by investing for needed computing resources. The resources offered by the cloud computing environments are software resources, hardware , runtime environments to deploy the user created applications in pay as you use model . Virtual machines runs and executes the tasks submitted by the users, if there are many tasks loaded to the virtual machine in the datacenter, this leads to downtime and outages in which it reduces the system performance. This paper gives solution to this problem by the technique called virtual machine migration with the use of blockchain technology.

Virtual machine migration on a Wireless adhoc network takes a huge amount of time to migrate the virtual machines from one server to another. There is an essential for Virtual Machine Migration are like upgrading the resources, resource balancing usage, virtual machine failures, etc. There are two types of virtual machine migration techniques these are:

1. Live or hot Migration: The migration of virtual instance from one physical system to another when the power is on. Virtual machine host is copied to target host. After transformation to target host. After transformation

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to target host the source host state is terminated or discarded and at last network is connected to the target host and the virtual machine starts in target host.

2. Regular or Cold Migration: Migration of virtual machine will be done at the powered off, so in case of powered off the configuration files, log files, and the disk of VM are transferred from one server host to the target. Here VM are not required to be an shared storage, also in cold migration, there is no need for CPU checks, that results in large shortage time.

The blockchain technology is a best solution for securing the data in virtual machine during virtual machine migration. During virtual machine migration there is a chance of vulnerability issues which results in the way for malicious attack. Block chain technology prevents the virtual machine data during migration by using encryption techniques that validates to ensure security. Block chain technology uses hashing technique where each block stores the hash code of previous block in a decentralized platform. There is no single dependent authority to store or view data which increases the reliability and scalability of the system. Each users in the blockchain can control each other where the block are transparent and if any changes happens to one block or any malicious node try to join or inject any trap against the block, then automatically the hash code will be changes.

The first ideas for VMM was suggested by Michael Nelson. He introduced the system which provide transparent VMM of existing application and OS where both of them need not to be changed. His ideas deal with the resources and the processing time required by the device. Also the disk space required for the information that is used for location during VMM. He describes a migration system Vmotion which is an essential constituent of the VMware virtual center product.

Weining Lei introduced a different approach based on recovery of the system and CPU scheduling to provide fast live migration which can be seen through with clarity. The target system generates a record of blocks that stores the messages for operating simultaneous migration from the source machine to the destination. The CPU scheduling mechanisms are taken place for adjusting the messages that are stored in blocks.

II. MIGRATING AN ON-PREMISE VM TO AWS

Steps to create VM or Instance: -

1.Click on EC2(to launch instance) for ex: -Microsoft Windows Server, Deep learning(Ubuntu) i.e Choose amazon machine image (AMI).

2.Choose an instance type then finally do review and launch. While review & launch we have to select an key pair or create a new key pair. (Every instance have its individual key pair which is unique to itself). It is unique because there are certain policies or rules that every instance should follows.

EC2 instance:-It is basically VM or space that is made available to us which we can use and perform various tasks with it. We need some place in cloud where we can store VM and we need proper access rights to carry out the process.

Virtual Machine: - It is nothing but the creation of virtual environment where we can run the software which we can’t run in our Normal environment as for ex: -We want to run certain application which can only be run in Ubuntu (to do that we had to create VM). Before moving VM to cloud we convert VM to VMDK file or the file which is supported by cloud.

III. MOVE THE FILE TO CLOUD: -

Need a storage place for ex: - S3 (inside this create bucket and then select of region.) then the bucket made available to us. Inside bucket upload the files (i.e. VMDK file). Now create the user using which we can migrate our application. For this search IAM (Identity Access Management) for the security purposes. Now we need particular file from client system to cloud. So create Role and provide the role name also assign policy then finally create policy. We have .CSV file (which contains Access key and security key). After creation of user for migration we need to have migration as well. Now we have VM and its image file (which uploaded in S3 bucket). To move we need CLI (Command Line Interface)

Write in cmd: -Aws configure then give access key, security key also provides region name and give the file format as JSON after that migration get started.

IV. PROBLEM DESCRIPTION

VM migration over internet takes a large amount of time to migrate virtual machines to the cloud providers. It becomes mandatory for migrating virtual machines to cloud with a less amount of time. There are two types of virtual machine migration are: non-live and live migration. In non-live or cold migration, migration will be done at powered off mode. The movement of virtual machines from one physical host to another host during powered off. During the powered off, transfer and configuration files, log files and the disk of virtual machines are named from source host to target host.

Live or hot migration: The movement of a virtual machines from one physical host to another physical host that too in powered on. Source host stage is copied to target host, after that the source host will be suspended The network to the target virtual machines. In this survey we are discussing two major types of challenges of virtual machine migration are:

Total Migration Time: The total amount of time needed for transferring the virtual machines to the cloud environment There will be changes in the values obtained due to the quantity of stored data in block chain that are moved along with the virtual machine from one server to another and migration throughput. The total migration time depends based on the maximum amount of memory that are transferred from one server to another along with the bandwidth allocated.

Page irty rate: It is also the important factor which effects in virtual machine migration. It is the rate at which virtual machines memory pages are updated by VM applications and it is dependent on the number of transferred pages. If the dirty rate is high than it increases data sent per iteration which further increase in total migration time. If the dirty rate is lower than the capacity of the link, then the results will be lower total migration time as because modified or upgraded pages are sent frequently. Else, the performance of VM migration degrades significantly.

V. PROPOSED WORK

A website or a web-application are frequently retrieve by various users at any time. It causes problems for an online application to manage all the user requests at one time. It may even result in system breakdowns. For a

website owner, whose complete work depends on the portal, the anxiety of website being down or not accessed also brings lost potential customers. Here, the load balancer comes into existence which plays a vital role. Cloud Load balancing is the method of dividing the workloads and computing resources among different servers. This kind of distribution ensures maximum throughput in minimum response time. The task is splitted among two or more servers, hard drives, network interfaces or alternative computing resources, to achieve better resource utilization and system response time. Therefore, for a high traffic web site, effective use of cloud load balancing can lead to business continuity. The common objectives of using load balancers are:

- Desirable usage of resources.
- Prevent single server from getting overloaded.
- To increase capacity and reliability of applications.

Cloud service providers include Amazon Web Services (AWS), Microsoft Azure and Google provide cloud load balancing to make eaiser the distribution of workloads. For ex: AWS offers Elastic Load balancing (ELB) technology to distribute traffic among EC2 instances. Most of the AWS power- driven applications have ELBs set up as key architectural element.

VI. HOW DOES LOAD BALANCING WORK?

Load balancers are generally used to distribute the incoming traffic to the network by efficiently distributing the request across multiple servers. Reliability and high availability is maintained by redirecting these requests to the servers which are available in the network. If there are servers which are unavailable or offline, those servers will be removed from the load balancing setup and the request will not be redirected to those servers. So internally the load balancers maintain the health check of all the servers which are available and the requests are redirected only to the servers which are available. The other part is the ease of use in adding and removing. These servers in the network based on the demand. Let's say Amazon wants to scale up for a great Indian sale or a universal sale which is happening for a Black Friday or something like that they know that the number of requests which are going to come in for the UI are going to be more so they can scale up and then they can scale down based on the demand. So load balancers help in easily configuring by adding more servers and reducing more servers with just a simple configuration change. There are different algorithms which are used in these load balancers in order to redirect requests to different servers. We can see the three different commonly used algorithms which companies prefer for setting up a load balancer.

The first one is the **round robin fashion** where the requests are redirected to different services in the round robin fashion. So let's say there are three servers in the network. The first request goes to the first server; second request goes to the second; the third goes to the third. The same fashion is followed for all the requests in the future cycle. So this is a round robin fashion where every server gets a new request every time. So if the server for one is hit for the first time, the next request will be redirected to the server - so that is the round robin fashion.

The next one is the **least connection** option where the request will be sent to the server which has the least request which is processing the least number of resources in order to do this. The load balancer needs to know which process or which server is having the least number of resources, so it might need to do some additional computing because it needs to know which server has the least resources. So it might take a while for the load

balancing or the load balance to identify which are the servers which are having least connections or the least resources so it needs to compute or it needs to get a metadata information from all these servers. So this might be a little bit costlier compared to the round robin fashion which was just blindly redirecting requests to each and every server in the list.

The last one is the **IP hashing.** So IP hashing is useful when let's say a client sends a request and the clients request needs to be dedicatedly going to a particular set of servers then that is when IP hashing is used. So redirection can be done based on the clients IP address and only those servers which are specific to that particular clients. IP address will be redirected to that particular network so this can be another strategy where some specific networks or some specific servers need to be given preference over the other. For example, if you see the IRCTC website in India the requests from the clients or the general people will be redirected to a bunch of server farm. However, the requests which are coming from the internal IRCTC receptions will be going to a different server. That way they will have more performance.

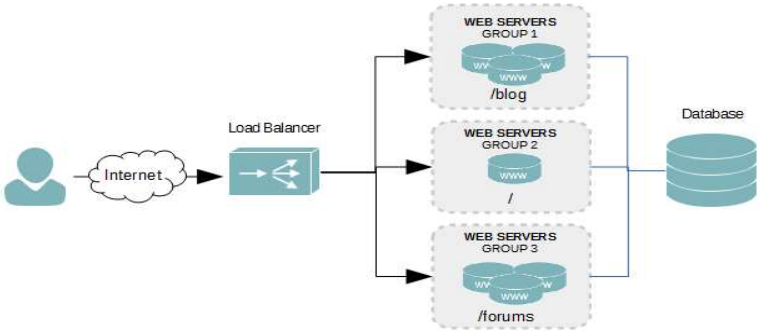

Fig 1. VM Migration Architecture

VII. CONCLUSION

This paper presents a review of virtual machine migration. Virtual machine migration means to migrate a virtual machine from one physical hardware environment to other.

Live Virtual machine migration is the process of migrating a virtual machine in a processed state. The processes which are processing on virtual machine, they should be available to the users every time. So, they should be migrated with less downtime or less total migration time. In this paper, we are dealing with virtual machine migration time. This may result in system breakdown. To resolve this problem, load balancing is used. Load balancing means to divide computer resources and workload in an environment of cloud computing. Load balancers are generally used to distribute the incoming traffic to the network by efficiently distributing the request across multiple servers. Objectives of load balancing is to keep system inflexibility, to recover system performance, defend against system breakdowns. All the techniques discussed above try to diminish the total migration time and give improved performance in small bandwidth and reduces the amount of total migration time.

REFERENCES

1. Gurpreet Singh, Manisha Malhotra, Ajay Sharma "An Agent Based Virtual Machine Migration Process for Cloud Environment", IEEE - 2019
2. M. Sasitharagai, A. Renuga, A. Padmashree , T. Rajendran "Trust Based Communication In Unstructured P2p Networks Using Reputation Management And Self Certification Mechanism"
3. Ali Aydin Selpk Ersin Uzun Mark Regat Pariente (2004)"A Reputation-Based Trust Management System for P2P Networks" IEEE International Symposium on Cluster Computing and the Grid
4. Yanzhen Zou, Liang Gu, Ge Li, Bing Xie, Hong Mei (2007) "Rectifying Prejudicial Feedback Ratings in Reputation based Trust Management "IEEE International Conference on Services Computing (SCC 2007)
5. Yuqiong Sun, Giuseppe Petracca, Trent Jaeger, Hayawardh Vijayakumar, Joshua Schiffman (2015) "CloudArmor: Protecting Cloud Commands from Compromised Cloud Services" IEEE 8th International Conference on Cloud Computing
6. Makbule Gulcin Ozsoy and Faruk Polat "Trust Based Recommendation Systems" .
7. Talal H. Noor and Quan Z. Sheng (2011), "Credibility-Based Trust Management for Services in Cloud Environments" pringer-Verlag Berlin Heidelberg 2011
8. Talal H. Noor1, Quan Z. Sheng1, Abdullah Alfazi,Jeriel Law, and Anne H.H. Ngu (2013)," Identifying Fake Feedback for Effective Trust Management in Cloud Environments" Springer-Verlag Berlin Heidelberg 2013.
9. TALAL H. NOOR, QUAN Z. SHENG, SHERALI ZEADALLY, JIAN YU (2013), "Trust Management of Services in Cloud Environments: Obstacles and Solutions" ACM 0360-0300/13/00-0001
10. Talal H. Noor, Quan Z. Sheng, and Abdullah Alfazi (2013),"Detecting Occasional Reputation Attacks on Cloud Services" Springer-Verlag Berlin Heidelberg .
11. Talal H. Noor, Quan Z. Sheng, and Abdullah Alfazi "Reputation Attacks Detection for Effective Trust Assessment Among Cloud Services" 2013 12th IEEE International Conference on Trust, Security and Privacy in Computing and Communications.
12. Santhi, K., Saravanan, R. (2016), Facilitate refined keywords search over encrypted data on cloud. International Journal Of Pharmacy & Technology, 8(3), p 15552-15557.
13. Santhi, K., Patel, R.(2016), Sheds: A simple and secure cost efficient data storage in heterogeneous multiple cloud. International Journal Of Pharmacy & Technology, 8(4), p.26058-26065.
14. Santhi, K., Saravanan, R. (2016), A survey on queueing models for cloud computing, International Journal Of Pharmacy & Technology, 8(2), p. 3964-3977.
15. Santhi.K, Priyadarshini.C (2014). Efficiently Allocating the Virtual Machines in Cloud, International Journal of Applied Engineering Research, 9(3). P 387-392.
16. Santhi, K., Saravanan, R, (2017) Performance Analysis of Cloud Computing in Healthcare System Using Tandem Queues. International Journal of Intelligent Engineering and System, 10(4). P.256-264.
17. Santhi, K., Saravanan, R, (2017) Performance Analysis of Cloud Computing Bulk Service Using Queueing Models. International Journal of Applied Engineering Research, 12(7), p.6487- 6492.
18. Santhi, K., & Saravanan, R. (2017). Performance Analysis of Cloud Computing Using Batch Queueing Models in Healthcare Systems. Research Journal of Pharmacy and Technology, *10*(10),p.3331-3336.
19. Shri, M. L., & Subha, D. S. (2013). An implementation of e-learning system in private cloud. International Journal of Engineering and Technology, 5(3), 3036.

20. Jothipriya, G., & Shri, M. L. (2013). Database Synchronization of Mobile-build by using Synchronization framework. International Journal of Engineering and Technology, 5(3), 2316-2321.
21. Shri, M. L., Devi, E. G., Balusamy, B., Kadry, S., Misra, S., & Odusami, M. (2018, December). A Fuzzy Based Hybrid Firefly Optimization Technique for Load Balancing in Cloud Datacenters. In International Conference on Innovations in Bio-Inspired Computing and Applications (pp. 463-473). Springer, Cham.
22. Lawanyashri, M., Balusamy, B., & Subha, S. (2017). Energy-aware hybrid fruitfly optimization for load balancing in cloud environments for EHR applications. Informatics in Medicine Unlocked, 8, 42-50.
23. Lawanyashri, M., Balusamy, B., & Subha, S. (2016). Threshold-based workload control for an under-utilized virtual machine in cloud computing. International Journal of Intelligent Engineering and Systems, 9(4), 234-241.
24. LawanyaShri, M., Subha, S., & Balusamy, B. (2017). Energy-aware fruitfly optimisation algorithm for load balancing in cloud computing environments. *International Journal of Intelligent Engineering and Systems*, *10*(1), 75-85.
25. S.Meenatchi, S. Prabu "Investigation on different clustering techniques in wireless sensor networks", Published in International Journal of Advanced Intelligence Paradigms (IJAIP-Inderscience), ISSN no.: 1755-0394, Vol. 10, No.1/2, pp. 194 - 207, Jan 2018.
26. S.Meenatchi, S. Prabu "Cluster-based EA-PATM protocol for energy consumption in hierarchical WSNs", International Journal Reasoning-based Intelligent Systems (IJRIS-Inderscience), Vol. 10, Nos. 3/4, pp. 233 - 241, 2018.
27. S.Meenatchi, S. Prabu "Energy Efficient Cluster Head Selection Algorithm in Wireless Sensor Networks Using EA-FKPSO Protocol", Published in Journal of Advanced Research in Dynamical & Control Systems (JARDCS), ISSN no.: 1943-023X, Vol. 13, pp. 252-265, September 2017.
28. S.Meenatchi, et. al. "Enhancement of QOS for Multi-user Environment in Cognitive Radio Network", Published in International Journal of Innovative Technology and Exploring Engineering (IJITEE), ISSN: 2278-3075, Volume-9 Issue-3, Jan2020.
29. S.Meenatchi et. al. "Water Level Monitoring using Blynk Application in IoT", Published in International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8 Issue-4, November 2019 pp 1676- 1679 (Indexed in SCOPUS).
30. S.Meenatchi, et. al. "The Sequence Way of Performance Analysis for Device to Device Communication", Published in Journal of Advanced Research in Dynamical & Control Systems (JARDCS), ISSN no.: 1943-023X, Issue 5, pp. 1562-1570, 2018.
31. S.Meenatchi, et. al. "Arranging Job Flow on Hadoop", Published in Journal of Advanced Research in Dynamical & Control Systems (JARDCS), ISSN no.: 1943-023X, Issue 5, pp. 1571-1575, 2018.
32. C.Navaneethan, V.Sumathy "Enhanced AES Algorithm for Strong Encryption*"* Published in (IJAET) International Journal of Advances in Engineering & Technology ISSN: 2231-1963, Volume-4, Issue-2 , pp (547-553), September 2012
33. C.Navaneethan, J.Daphney Joann, "AODV-SEC: A secure on-demand routing Protocol for mobile ad hoc networks*"* Published in International Journal of Engineering Sciences & Emerging Technologies (IJESET) ISSN: 2231 – 6604 Volume 4, Issue 1, pp: 35-41, December 2012.

34. C.Navaneethan, Dr.K.HelenPrabha, “Signature Analyzer Block for Secure Node Entry” Published in International Review on Computers and Software (IRECOS) ISSN: 1828-6003 Vol. 8. N. 4, pp. 1033--1036 , April 2013 (Indexed in SCOPUS)
35. C.Navaneethan, S.Meenatchi, “Inclusion of Facts Collateral Issues with Context Switching Semaphore Using Self Healing Tactics” Published in International Journal of Advanced Research in Computer Science and Software Engineering (IJARCSSE) ISSN: 2277 128X Vol 3, Issue 6, pp. 683-687 June 2013.
36. C.Navaneethan, S.Meenatchi, “Handover Process Optimization in Mobile IPv6” Published in International Journal of Advanced Research in Computer Science and Software Engineering (IJARCSSE) ISSN: 2277 128X Volume 3, Issue 6, pp. 966-968 June 2013.
37. C.Navaneethanet al, “TMAS-Trio Measure Assessment Scheme for Efficient Routing in Wireless Sensor Networks” Published in Journal of Theoretical and Applied Information Technology (JATIT) (E-ISSN 1817-3195 / ISSN 1992-8645) Volume 60, Issue 2, pp. 200-207 February 2014 (Indexed in SCOPUS).
38. C.Navaneethan, Dinesh Kumar.V.S “Protection Against Denial of Service (DoS) Attacks in Wireless Sensor Networks” Published in International Journal of Advanced Research inComputer Science & Technology (IJARCST 2014) ISSN: 2347 – 8446 Vol. 2 Issue Special 1 Jan-March 2014, pp. 439-443.
39. C.Navaneethanet al, “CBCDR-Cluster Based Cyclic Diversionary Routing: Energy Efficient Routing Strategy For Location Privacy” Published in Journal of Theoretical and Applied Information Technology (JATIT) (E-ISSN 1817-3195 / ISSN 1992-8645) Volume 61, Issue 2, pp. 310-318 March 2014
40. C.Navaneethan, Dr.K.HelenPrabha, “Clustering Wireless Nodes Based On Adaptive Modulation With Customized Kernel” Published in Journal of Theoretical and Applied Information Technology (JATIT) (E-ISSN 1817-3195 / ISSN 1992-8645) Volume 63, Issue 3, pp. 825-835 May 2014 .
41. C.Navaneethanet al, “SWBC - Security in Wireless Sensor Networks by Broadcasting Location Claims"Published in Journal of Theoretical and Applied Information Technology (JATIT) (E-ISSN 1817-3195 / ISSN 1992-8645) Volume 64, Issue 1, pp. 16-21 June 2014

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