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A Study on E-Learning using Cloud Computing

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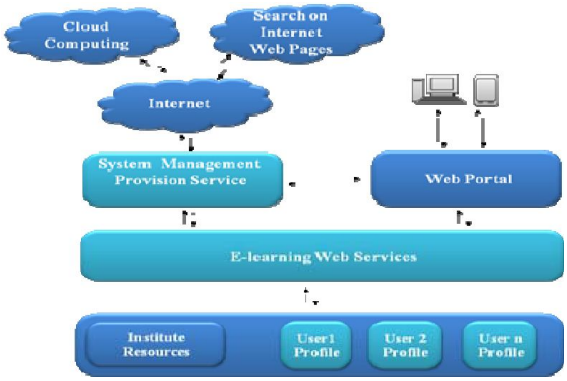
Abstract: ***E-Learning is an efficiently growing tool used for learning. Although with great power comes greater responsibilities because storing the amount of data of a particular subject will require tons and tons of storage. Even if one manages to store the data of few subjects, it would be difficult to carry it to every student. Also, E-Learning is becoming vast each coming day which includes data of many books, blogs, notes, surveys both in video as well as audio format. Storing all this huge informative data is no doubt an extremely tedious task. Moreover, portability of such huge data structure can be exceedingly dicey. To overcome this complication Cloud Computing can majorly help. Cloud helps one keep less focus on the storage and the cynosure will be the content. The reason for this research is to exaggerate the practise of cloud computing with respect to E-Learning with different aspects. In addition to E-Learning there are various vendors who provide their clouds as a service to store, retrieve and implement the particulars whenever and wherever needed. In this paper we will bring forward various clouds used for E-Learning and also their measure of effectiveness. Different Clouds are bound to have different boundaries and limitations like public or private. This will prove as a note to improve various limitations including different clouds. We will be putting light on Virtual Labs, AWS Cloud, Moodle, hypervisors and many more. This paper will be an exploration on Virtual Labs and how interestingly important it is for E-Learning with different aspects like expansion of cloud dynamically, shrinking if not in use, parallel execution, multiple users accessing same cloud.***

Keywords: E-learning, VMware, Virtualization, Cloud Computing.

I. INTRODUCTION

A significant amount of change has been noticed by switching from the traditional approach of teaching to E-Learning. Considering, the fact that huge amount of storage will be needed when switched to E-learning. This paper will be majorly focusing on the various methods of storing and using the data accordingly. Along with, it will also have a deep learning on how a virtual machine can be used as the prime focus to deploy, create and use virtual lab and its management. Presently, cloud computing is on boom and is becoming a need rather than a want. So, this paper will put light on creating a cloud for E-learning purpose with its data compression techniques, various platform to manipulate the cloud according to the learning programme. Currently, there are several different algorithms which works as the business logic behind all E-Learning technologies. Algorithms like rules-based, Bayesian network algorithm, Felder and Silverman's, Matrix based appriori algorithm are few of the most used algorithms. These algorithms are specially prepared and executed to work on cloud computing regarding to its compression, expansion, insertion of data in bulk and many more. Different fundaments of data compression are used in order to acquire appropriate storage. Data compression is a technique to reduce the number of bits representing data. Without data compression it is merely impossible to store so many different types of data on cloud. Basically, data compression eradicates the redundant data which in turns makes better space.

A virtual environment plays a very important role in E-Learning with respect to creation of its customized hardware and software [1]. A virtual environment may consist of a virtual lab where virtual in general terms means not actual. There are mainly four types of virtualization viz Storage virtualization, I/O virtualization, Network virtualization and Desktop virtualization [1]. Combinations of various virtualizations are used in E-Learning. This paper will also focus on hypervisors which are the prime reason for any running virtual environment.



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A. Virtual Environment

E- learning is definitely something which needs concurrent user. [1] The virtualization used for E-learning can be paravirtualization, full virtualization, or container-based virtualization. Without virtualization only single OS can be used for a system, the hardware and software aren't flexible because they are tightly coupled, running multiple applications was a tedious task, resources were underutilized and over-all it was a costly infrastructure. [2] Through Virtualization one can manage various OS's and applications as a single unit. This enables the creation of virtual machine which are virtual computers that can run on multiple machines by single set of hardware. Any established Virtual Environment needs a hypervisor to run successfully [1]. To be clearer, a hypervisor plays a vital role in managing and hosting virtual machines on host or server.

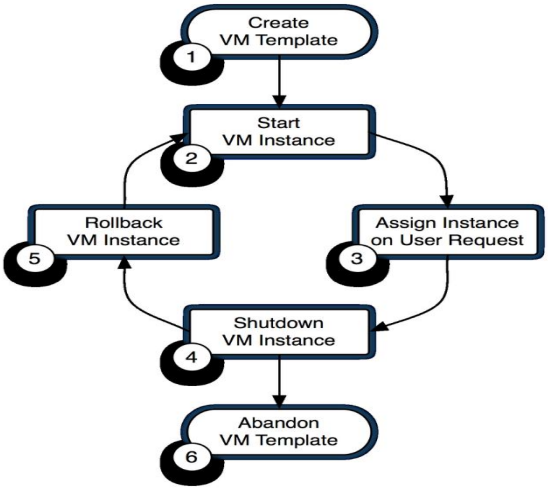
The benefit of hypervisor is that it makes the hardware and software distinct so tat one can function and manipulate hardware and software differently. In a nutshell, regarding to E-Learning one has to create virtual Labs which are implemented for its various capabilities and functioning. The main of hypervisor regarding to e-learning is to implement the virtual labs which is ultimately going to convert the manual studying pattern. [3] An E-learning platform here uses virtual environment which creates virtual labs which includes virtual machine which is hardware, Operating System and a couple of software's. The virtual environment is created completely on the basis of E-learning academic course.

B. Virtual Labs

Virtual lab is the nucleus of the VLCS, it is made up of several technologies, equipment and algorithms. Virtual labs are already being used at faster pace in various universities and workplace [1]. As said "a picture speaks louder than words" with virtual labs it creates an interactive GUI with pictures and colours which puts a greater effect on the learner. Imagine a medical intern learning about a heart transplant in a 3d video view. This could just fit in, in his mind for lifetime. Virtual labs provide authentication procedures so that anyone apart from registered user cannot just enter in. [3] Although some virtual lab comes up with free subscription but it has particular restrictions. Most of the virtual labs are password protected for now but definitely there are biometric authentication coming in. The major advantage of virtual labs is that they are loosely coupled hence deformation of any modules are pretty simple. [4] Proteomics and biotechnology are the prime stake holders of virtual labs. However, as a survey carried out the penetration level of virtual labs content is still inferior in rural areas. To conclude with a virtual lab acts as an appended resource in comparison to the traditional learning techniques.

The construction of virtual environment is a tedious task. It requires a thorough research on which operating system should be used for a specific E-Learning centre. [5] Also, which hypervisor is to be used. A hypervisor is a host machine which is mainly responsible for running a virtual machine. Antivirus management also plays a crucial role in construction a virtual environment [6]. Because it is extremely important to secure our machine. After all this important constructive framework it is also important for any E-Learning skeleton to provide add-ons like customer manuals or course introductions appended with the framework.

There are also times when we can also create a custom on-request virtual machine. This is made completely using client's pre-requisites. [2] It is checked by the administrator that whether the assets which client is requesting are present and can be allocated. The hardware part is completely left on the end user. The hardware can be number of centres, number of CPUs, Storage rooms, Storage Capacities, etc.



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C. Virtual Labs Cloud System (VLCS)

VLCS is the final product of combination of the Course design framework with the Cloud. VLCS can be further stated as a layer which will provide Virtual lab facilities. Cloud management becomes an essential integral part, whenever VLCS is spoken about or is used practically. The prime goal of using VLCS in E-Learning is to provide virtual research labs or centres with respect to private cloud [3]. Moreover, to allow the tutors to teach with more advancements, different procedures without a fret of the quality of the educational programme. Finally, the prime focus is to allow the users of E-learning and the administrators working behind the programmes of E-Learning to communicate in a placid manner [4]. The VLCS provides a complete framework to ease the user slog.

D. Allocation and Scheduling Resources

VLCS employs RBAC. RBAC stands for Role based access control. This is mainly used for having a look on the terms and policies user has been signed up for. This will showcase the permissions and roles allocated to each person. There are many roles when we speak about the whole scenario of E-Learning for instance A content creator, A distributor, A cloud Manager, A learner. Each role must have different permissions, this will avoid the serendipity of tight coupling. RBAC will allocate assets according to one's role. [6] There should be different people designated different properties. The allocation should cover the fulfilment of all the deliverables like programs, equipment, accessibility to cloud etc. Al this should be primarily verified by the VLCS administrator before allotment. For instance, and tutor can request for 50 Virtual machines with similar technical environment. In this case 49 can be assigned as required whereas 1 machine can be used as server to keep a control check for the rest 49 machines. The Virtual Environment administrator allocates the permissions only on a wider picture. The content manager has to be skilled enough to additionally allocate the properties to the particular research centres and the different consumers [1]. Channelizing the virtual labs according the consumer needs is a an important of task of the content generator. The content manager should manage to display various different research facilities to avoid the monotonous way of traditional learning. The content manager should take into consideration the assets provided by the cloud to a particular region. After the channelizing the contents to each of the regions, the distribution takes place. In this process the contents are categorized so that correct contents propagate to correct research facility [3]. Consumer authorization is the end of this process. Consumer authorization gives the content manager and the cloud manager a confirmation that the content is delivered to the desired research region. Assure that, arranging the virtual lab is started [5]. With this the content generator categorizes the VM environment, The virtual design and the timetable. The progression starts with distributing and initiating the virtual research centres as per the calendar. As per the diagram of life cycle of virtual lab, covering up and deactivating of virtual research is equally important. The delayed or the completed assets provided by the cloud should be demolished at its prescribed time. Ultimately, the end goal is to utilize the cloud assets to fullest. One should be able to use the dismissed virtual environments again later. The assets should be used differently on different situation. The virtual machine should work bug free regardless of the environment. Be it a pooled work area or an individual work area the environment should not affect the working of the Virtual Machines.

II. DATA COMPRESSION TECHNIQUES FOR E-LEARNING

E-Learning and data compression ought to go hand in hand. Since there is immensely interchangeable data which are exchanged every minute [7]. Hence it evident how much a load balancer will need to put efforts. Also, the virtual environment needs to become stronger to handle the data with its concurrent updating behaviour. If a scenario without data compression techniques is taken into consideration then the main concern of any E-Learning medium would be its storage [7]. Be it Moodle or Course management machine, the amount of pressure angled on the storage devices keeps increasing on every transaction or updation of data. One would need number of storage devices for every virtual environment also with increasing load on the virtual labs the load on storage devices will increase immensely [6]. To avoid all this repercussion, it is a resolute thing to use data compression techniques. Well, there are many algorithms which are being used to compress the data used in E-learning. These algorithms are acknowledged as techniques of data compression.

No	Compression Techniques	Description
1	Lossy Compression	In this compression a particular amount of loss of data is acceptable
2	Lossless Compression	In this compression the data is compressed in such a way that data is not lost in any which way. It is used in areas where all the data working on is equally important cannot be borne to be lost.
3	Null Compression	In this technique the blank spaces aren't wasted but it is replaced with a compression code
4	Run-Length Compression	It is an extension of null compression wherein repeated words are replaced by a compressed code.
5	Keyword Encoding Compression	It this technique the frequently used keywords are tokenized for instance the, for, and are. So, they are tokenized with a compression code and the space is then saved.

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III.FUTURE SCOPE

The future in E-Learning is extremely colossal. The presence of textbooks in future is vexed. Using augmented reality, Virtual reality and various skill constructed technology E-learning can progress widely. The world has explored new avenues for E-Learning. E-learning has a major scope of creating a world without textbook which would eventually be a paper free educational world. The future scope of E-Learning will also primarily focus to reach out to rural places to introduce them to E-Learning. It will not only be limited to medical or teaching sector but will possibly wrap all other areas like parts of automobiles, agriculture etc. In future E-learning will get limitless wherein the boundaries of storage, hardware, technologies would not affect. In future there are biometrics compatibilities will make way so that voice recognitions could accompany the E-learning process.

IV.CONCLUSION

Technology is becoming a need over a want. E-Learning is making learning fun and more effective because of its graphical representation and a step closer to reality. Cloud System makes it easier to back the data up so there wouldn't be any data loss. Even if there is data loss cloud in E-Learning will use different techniques to lower the proximity of data loss. Different data compression techniques are being used effectively so that surplus data can be stored without fearing storage limit. Furthermore, E-Learning is proven to be one of the biggest assets to the world of technologies. Virtual Labs are equally important when it comes to using E-Learning which provides an essential operative framework with magnificent techniques which learner can effortlessly grasp. Besides how Role Based protocols are used to delegate roles and also to allocate each role with different assets. Hence the task as well as the assets don't collide. The work is rightly distributed using RBAC (Role based access control) so that each role gets a firm idea of what one's doing. Concluding to this we will also see the future scope of E-learning which is gigantic and is going to excel in all possible areas.

Literature Survey

Sr no	Title	Author	Journal	Description	limitations
1	A study on virtualization and hypervisor in cloud computing	G.S.Bohar	ijcsma	In this paper the researcher has studied about the entire virtualization process and how different types are hypervisors	This research is only limited to hypervisors and virtualization no particular algorithms are included.
2	Virtual Labs: E-learning for tomorrow	Huang C	PLOS	In this paper the researcher has explained the importance of virtual labs in reference to E-Learning	This paper is currently limited only to virtual labs and its relationship E-Learning.
3	E-Learning system techniques and algorithms	Mrs N. Vigneshwari, Mr. R. Rajkumar	ijetcse	This researcher has explained not only about algorithms related to eLearning but also differed techniques related to it.	The researcher has limited his work to techniques and algorithms
4	Data Compression techniques in Cloud computing	Monika Soni, Dr Neeraj Shukla	ijarcce	This paper focuses on data compression techniques and how it is implemented	The techniques are just explained but its algorithms are not explained.
5	A review on Data compression techniques in cloud computing	Supreet kaur, Amarpreet kaur	ijcert	The paper is a useful content for finding data compression techniques in cloud computing	The paper appears to be limited to comparing the techniques to each other.
6	Pipeline Data Compression and Encryption Techniques in eLearning environment.	A.V.N.Krishna , Dr. A.Vinaya Babu	Journal of Theoretical and applied information technology	This journal briefs about data compression and also about how encryption is done	This journal does not showcase the practical implementation of any technique.
7	Application Research for Role based Access Control Technique in E-Learning	Yank-zong kai	cnki	The journal gets us through role-based access control and how it is used in E-Learning	The journal is restricted to the types of RBAC and its processing ways.
8	Encoding a T-RBAC Model for E-Learning Platform on ORBAC Mode	kasid asmaa, elkamoun najib	International Journal of Advanced Computer Science and Applications	In this the writer has beautifully explained how a e-learning platform accepts T-RBAC and ORBAC	The paper is only limited to two categories of RBAC

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9	Usability and Instructional Design Heuristics for E-Learning Evaluation	Lisa Benson, Dean Elliott, Michael Grant, Doug Holschuh, Beaumie Kim, Hyeonjin Kim, Erick Lauber, Sebastian Loh, Thomas C. Reeves	Association for the Advancement of Computing in Education (AACE)	The authors here have come together to review and research on evaluation of E-learning	There are no algorithms exhibited in the paper.
10	An approach to usability evaluation of e-learning applications	C. Ardito, M. F. Costabile, M. De Marsico, R. Lanzilotti, S. Levialdi, T. Roselli & V. Rossano	Springer	The authors have provided the applications on E-Learning and its usability	The research is just theoretical and practical implementations are involved.

The survey was carried out both in audio and video format. For this paper, few videos were also being referred. Papers like study on hypervisor, Study on virtualization were thoroughly studied. The focus was also on how VMware and virtual labs are useful for E-Learning. Moreover, the research was also on how beneficial is cloud in order to long last any E-Learning technology. In [6] we studied about different compression tools [8], referencing to this we carried out the research of how is it used in E-Learning. Using [3] the paper came up with what are the evident scope of E-Learning in future. In [2] various virtualization technologies are described and also how virtualization is impacted on E-Learning. Also, in this paper we have studied about different algorithms and techniques used in E-Learning referencing [5]. This paper also showcases on how virtualization places a key role in E-Learning [1] and how hypervisor is a core of virtualization. The resources optimized by E-Learning [4] is studied in this paper. Our ultimate goal for this research is reviewing of how does the present E-Learning works and how it is impacting today as well as in future [9].

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REFERENCES

[1] G. s. Bohar singh, "A study on virtualization and hypervisor in cloud computing," ijcsma, vol. 6, no. 1, p. 6, 2018.
[2] M. Siegrist, "learningsolutionmag," [Online]. Available: https://learningsolutionsmag.com/articles/615/leveraging-virtualization-technology-for-e-learning.
[3] H. C, "Virtual labs: E-Learning for Tomorrow," journal.pbio, 2004.
[4] s. s. B. N. S. D. sandipan ray, "natureasia," 27 august 2015. [Online]. Available: https://www.natureasia.com/en/nindia/article/10.1038/nindia.2015.114. [Accessed february 2020].
[5] M. Mrs.N.Vigneshwari, "E-Learning system techniques and algorithms".
[6] D. N. S. Monika Soni, "Data Compression techniques in Cloud computing," IJARCCE, vol. 5, no. 3, p. 2, 2016.
[7] A. k. Supreet kaur, "A review on Data compression techniques in cloud computing," International journal of computer engineering in research trends, vol. 2, no. 5, pp. 319-321, 2015.
[8] D. A. B. A.V.N.Krishna, "Pipeline Data Compression and Encryption Techniques in ELearning environment.," Journal of Theoretical and Applied Information Technology, 2005.
[9] E. Kristiano, "semanticscholar," [Online]. Available: https://www.semanticscholar.org/paper/The-perfomance-of-e-learning-Website-on-open-source-Kristianto.
[10] L. H.-b. L. Q.-t. Yang zong-kai, "Application Research for Role based Access Control Technique in E-Learning," cnki, p. 10, 2005.
[11] E. n. kasid asmaa, "Encoding a T-RBAC Model for E-Learning Platform on ORBAC Model," International Journal of Advanced Computer Science and Applications, vol. 7, 2016.
[12] D. E. M. G. D. H. B. K. Lisa Benson, "Usability and Instructional Design Heuristics for E-Learning Evaluation," Association for the advancement of computing of Education, 2002.
[13] M. F. C. M. D. M. R. L. S. L. T. R. &. V. R. C. Ardito, "An approach to usability evaluation of e-learning applications," Springer, vol. 4, pp. 270-283, 2005.

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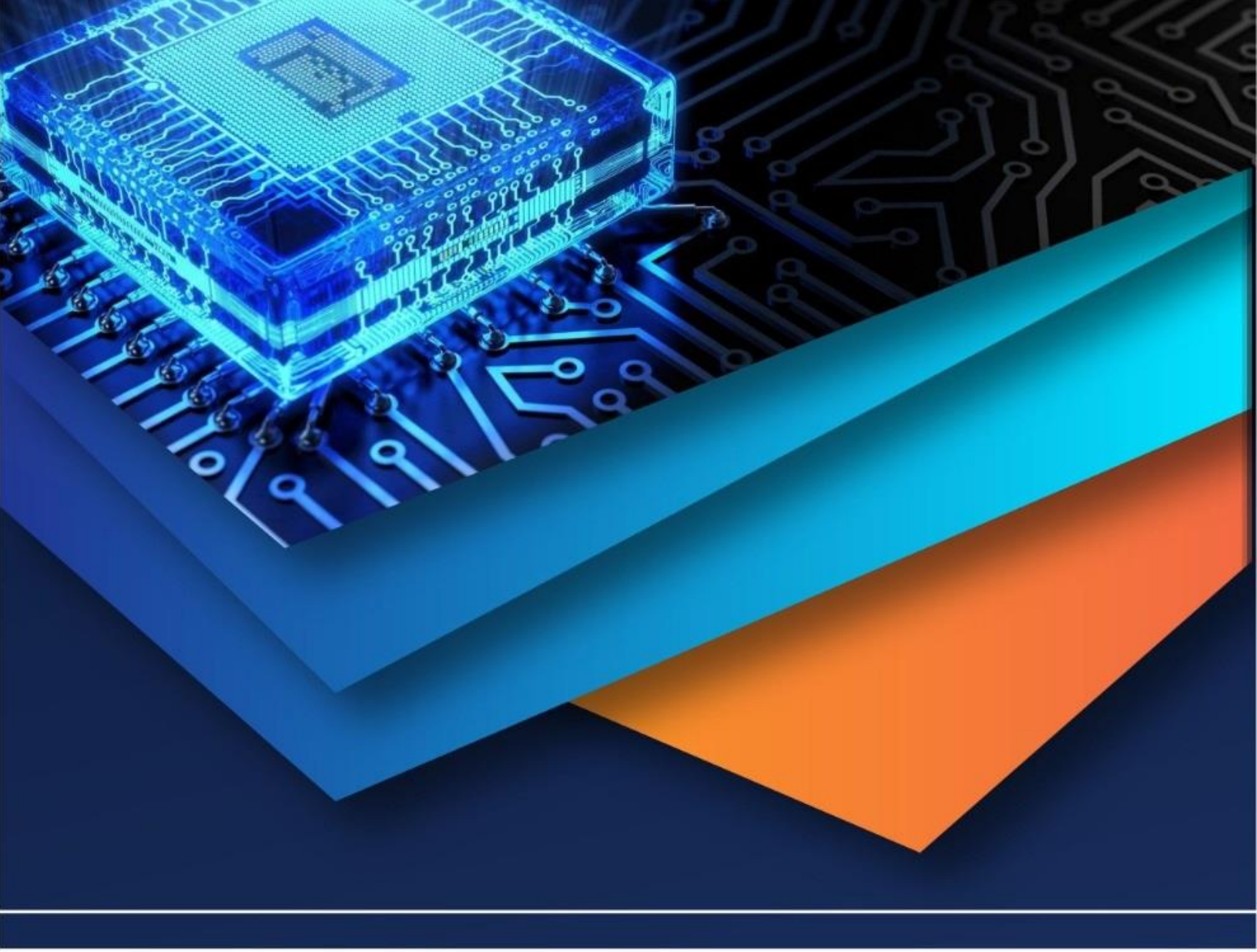

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