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Cloud and Grid Computing - An Overview

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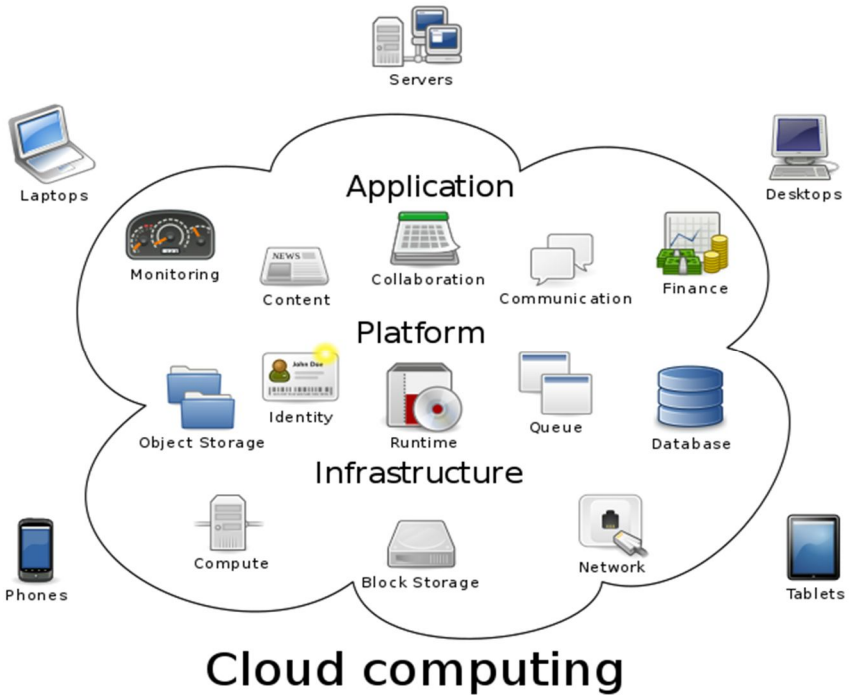
Abstract: ***Cloud computing is the new method of delivering Information Technology and Unleashing next Generation Infrastructure to Application. This is where Application, Data and Computing resources are provisioned in a shortest time possible and provided as reliable offerings. It is the next-generation technologies disruption to the conventional on-premise computing model and method to transform organization IT delivery and service model. Grid computing paves the way for the evolution of cloud computing concept. Grid computing is a processor architecture that combines computer resources from various domains to reach a main objective. In grid computing, the computers on the network works together on a particular task, thus functioning as super computer. Cloud based grid computing is commonly described as*** *the* ***use of computers connected to a public cloud system, in order to pursue large, collaborative tasks.***
Keywords: Cloud, Grid computing, Computer resources.

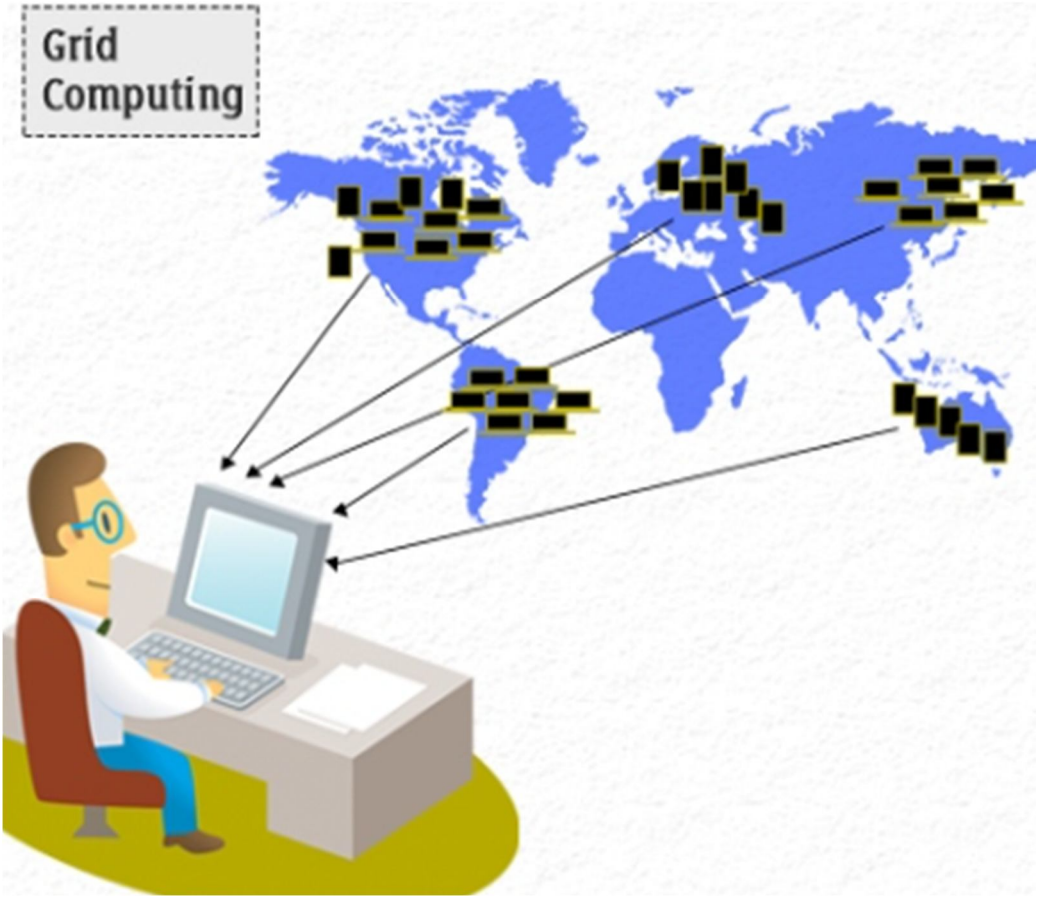
I. WHAT IS CLOUD COMPUTING

Cloud computing is a method for delivering information technology (IT) services in which resources are retrieved from the Internet through web-based tools and applications, as opposed to a direct connection to a server. Cloud-based storage makes it possible to store files on a proprietary hard drive or local storage device and save them to a remote database. As long as an electronic device has access to the web, it has access to the data and the software programs to run it. It's called cloud computing because the information being accessed is found in "the cloud" and does not require a user to be in a specific place to gain access to it. This type of system allows employees to work remotely. Companies providing cloud services enable users to store files and applications on remote servers, and then access all the data via the internet. Cloud computing is a model-driven methodology that provides configurable computing resources such as servers, networks, storage, and application as and when required over the internet with minimum efforts. The cloud also indicates essential uniqueness, service models, and deployment models.[1]



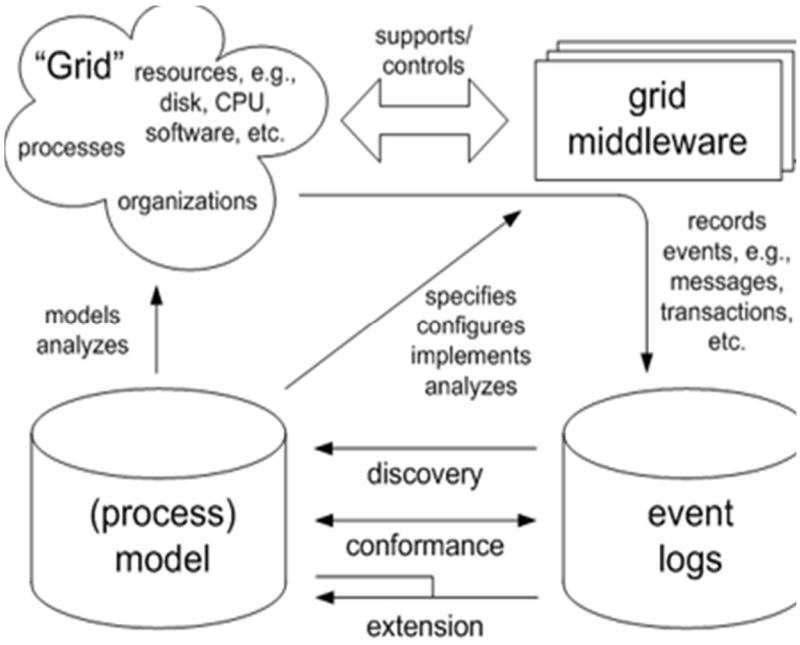
II. WHAT IS GRID COMPUTING

Grid computing widely uses distributed computer resources to reach a common goal. The grid can be thought of as a distributed system with non-interactive workloads that involve a large number of files. Grid computing is distinguished from conventional high-performance computing systems such as cluster computing in that grid computers have each node set to perform a different task/application. Grid computers also tend to be more heterogeneous and geographically dispersed (thus not physically coupled) than cluster computers. Although a single grid can be dedicated to a particular application, commonly a grid is used for a variety of purposes. Grids are often constructed with general-purpose grid middleware software libraries. Grid sizes can be quite large. Grids are a form of distributed computing whereby a "super virtual computer" is composed of many networked loosely coupled computers acting together to perform large tasks. For certain applications, distributed or grid computing can be seen as a special type of parallel computing that relies on complete computers (with onboard CPUs, storage, power supplies, network interfaces, etc.) connected to a computer network (private or public) by a conventional network interface, such as Ethernet. This is in contrast to the traditional notion of a supercomputer, which has many processors connected by a local high-speed computer bus. [2]



III. WORKING OF GRID

The grid computing environment has a Central Computing Server which maintains the control of all processes. The central processor divides a task into Subtasks(processes), and finds Computational resources Which agree to accept the processes and perform the assigned task. Each of these computational resources have their own manager and own policies to accept or not accept a task and at what cost if any. The computational resources may be a server, which may distribute the task received from the central server to other servers and to the computational resources. The central server and the other servers try to assign works to computers with surplus processing power on the grid. The main strategy of grid computing is to use the middleware to divide and apportion pieces of an among several computers, sometimes up to as many as thousands. It also involves the aggregation of large-scale clusters. The Grid technology has been applied to computationally intensive scientific, mathematical and academic through Volunteer computing.



IV. EMERGING THROUGH CLOUD

Cloud computing provides a way of managing large pools of servers that are virtualized. However, from the consumer point of view, it is regarded as a single, large resource pool. The Cloud technology gives us the offerings to face the challenges in multiple ways by

A. Decreasing the Capex and Opex cost.
B. Enhancing the service quality and offer the next generation services.
C. Maintaining the desired and right level of security, compliances, regulations, and policies across the different functions of enterprise.
D. Rapid provisioning agility, and business transparency for consistent self-service delivery.

Thus Cloud computing is the service and deployment model using large resource pool based provisioning of virtual or physical resources in a service model using the Internet (public cloud) or (private cloud).[3]

V. WHY CLOUD

Cloud technology typically contains a significant pool of resources, which could be reallocated to different purposes within short time frames, and allows the cloud owner to benefit significantly from economics of scale as well as from statistical multiplexing. The entire process of requesting and receiving resources is typically automated and is completed within minutes. Cloud services today are delivered in a user-friendly manner and offered on an unprecedented scale. The payment model is pay-as-you-go and pay-for-what-you-use thus eliminating the need for an up-front investment or a long-term contract. It leads to a less disruptive business opportunity for business unpredictable IT demands, as they are able to easily provision massive amounts of resources on a moment's notice and release them back into the cloud just as quickly. The various reasons for adopting the cloud technology are listed as follows

A. Very big, Web-scale infrastructure that is abstracted
B. Dynamic allocation, Scaling, Movement of applications
C. Pay-per-use
D. No long-term commitments
E. Operating system (OS), application architecture independent
F. No hardware or software to install. [3]

VI. CLOUD VIRTUALIZATION

Virtualization is the basis of modern cloud computing. Virtualization refers to running multiple virtual computers, or virtual machines, inside a single physical computer. While the basic idea of virtualization is old (dating back to mainframe computers in 1960s), it has become mainstream only in the last 10-15 years. Today, most new servers are virtualized.

A. Hypervisor is the operating system running on actual hardware. Virtual machines run as processes within this operating system. Sometimes the hypervisor is called Dom0 or Domain 0.
B. Virtual machine is a virtual computer running under a hypervisor.
C. Container is a lightweight virtual machine that runs under the same operating system instance (kernel) as the hypervisor. Essentially, a container is nothing but a group of processes with their own name space for process identifiers etc.
D. Virtual network is a logical network within a server, or possibly extending to multiple servers or even multiple data centers.
E. Virtualization software is software that implements virtualization on a computer. It can be part of an operating system (or a special version of an operating system) or an application software package. [4]

VII. PARAVIRTUALIZATION TECHNOLOGY

Paravirtualization is a virtualization technique that provides an interface to virtual machines that are similar to their underlying hardware. In paravirtualization, the guest operating system is explicitly ported before installing a virtual machine because a non-tailored guest operating system cannot run on top of a virtual machine monitor (VMM). Paravirtualization enables several different operating systems to run on one set of hardware by effectively using resources such as processors and memory. In paravirtualization, the operating system is modified to work with a virtual machine. Paravirtualization has many significant performance advantages and its efficiencies offer better scaling. As a result, it is used in various areas of technology such as

A. Partitioning development environments from test systems
B. Disaster recovery
C. Migrating data from one system to another
D. Capacity management [5]

VIII. GOGRID CLOUD BASED SERVER

GoGrid is one of the first Infrastructure as a service (IaaS) provider to offer Windows server 2008 in the Cloud. It acts as a Service provider of Windows and Linux cloud-based server hosting, and offers 32-bit and 64-bit editions of windows Server 3008 within its Cloud computing infrastructure. GoGrid enables system administers to quickly and easily create, deploy, load-balance, and manage Windows and Linux cloud servers within minutes. GoGrid ‘s API is a kind of web service that allows developers to control their interaction with GoGrid’s cloud hosting infrastructure. The GoGrid API provides two-way communication for controlling GoGrid’s control panel functionality. Typically uses for the API include

A. Auto-scaling network servers
B. Listing assigned public and private IP address
C. Deleting servers
D. Listing billing details

The GoGrid API requires the users to be a GoGrid customer and to have technical knowledge and programming skills which supports technical languages like JAVA, PHP, PYTHON, RUBY

1) *APEX:* The Apex Web services API is one of the world’s most widely used enterprise web services, handling more than 50 percent of Salesforce.com’s 3.7 billion service transaction. The Apex Web Services API makes it possible to access and manage complex data relationships such as a set of information about an account, all the products they have bought, and all of their contacts in a single request. Apex is a development platform for building Software as a Service (SaaS) application on top of Salesforce,co’s customer relationship management(CRM) functionality. The Apex platform consists of three tools

a) *Apex Builder:* An on-demand component allowing easy drag-and-drop customization with a limited set of features.
b) *Apex API:* A method of retrieving a raw data from Salesforce.com’s servers. The API is used by programs that are external to Salesforce.com like JAVA applications that need access to information on a client’s Salesforce.com account.
c) *Apex code:* A programming language that is executed on Salesforce.com’s servers. The Apex code offered flexibility in developing by using the Apex API while reducing the number of calls between the client and server. [6]

IX. CLOUD VERSUS GRID COMPUTING

Grid and cloud computing are bit similar and share the same purpose of providing services to the users. Both are network technology and it has the capacity of multitasking so that the user can access single or multiple applications to perform various tasks. In grid computing resources are distributed Whereas in cloud computing resources are managed.

A. Grid Computing

1) The resources are distributed among different computing units for processing a single task.
2) Grids are generally personalized and managed within premises by an organization.
3) It operates in a network within a corporate
4) It provides a shared computing resources on a needed basis
5) It is application oriented
6) It is a collection of inter connected networks and computers. That can be called for large-scale processing tasks

B. Cloud Computing

1) The computing resources are managed are managed centrally and are placed over multiple servers in clusters.
2) The clods servers are personalized by infrastructure providers and are placed in physically disparate situation.
3) It can also accessed through the internet.
4) It involves dealing with a common problem using various number of computing resources.
5) It is service oriented.
6) More number of computers coordinates to resolve the problem together.

X. REAL TIME APPLICATIONS

Cloud computing is a growing field, and there will likely be new players in the marker in the foreseeable future. Top most leading companies like AMAZON, GOOGLE and MICROSOFT offers cloud service to the public

A. Amazon

Amazon was one of the first companies to offer cloud service to the public, and they are very sophisticated. Amazon's virtual machine are versions of Linux distributions. The applications can be written by the user's own machine and it can be uploaded to cloud. Amazon offers a number of cloud services, including

1) *Elastic Compure Cloud (EC2):* Offers virtual machines and extra CPU cycles for Organization.
2) *Simple Storage Service (S3):* Allows to store items up to 5GB in size in Amazon's virtual storage service.
3) *Simple Queue Service:* Allows machines to talk to each other using this message-passing API.
4) *Simple DB:* A web service for running queries on structured data in real time. This service works in close conjunction with Amazon Simple Storage Service (Amazon S3) and Amazon Elastic Compute Cloud (Amazon EC2), collectively providing the ability to store, process, and query data sets in the cloud.

B. Google

Google offers online documents and spreadsheets, and encourages developers to build feature for those and other online software, using its Google App Engine. Google removed the web applications to a core set of features, and build a good framework for delivering them. Google also offers handy debugging feature. Groups and individuals will likely get the most out of App Engine by writing a layer of Python that sits between the use and the database.

C. Microsoft

Microsoft's Cloud computing solution is called Windows azure, an operating system that allows Organizations to run Windows applications and store files and data using Microsoft's datacenter. It also offers azure Service Platform, which are services that allow developers to establish user identities, manages workflows, synchronize data, and perform other functions as they build software programs on Microsoft's online computing platform.

Key components of azure service Platform include

1) *Windows Azure:* Provides service hosting and management and low-level scalable storage, computation, and networking
2) *Microsoft SQL Services:* Provides database services and reporting
3) *Microsoft.Net Service:* Provides service-based implementations of .NET Framework concepts such as workflow
4) *Live Services:* Used to share, store, and Synchronize documents, phots, and files across PCs, phones, PC applications, and web sites.
5) *Microsoft Dynamics CRM Services:* Used for business content, collaboration, and solution development in the Cloud.[6]

XI. CONCLUSION

Grid and Cloud computing share common goals which includes Delivering computation as a Utility, Virtualize use of computing resources and Eliminate the need for dedicated computing resources and dramatically improve computational price- performance. Cloud serves the Information Technology on demand and the Grid serves the Extreme-Scale computation on demand.

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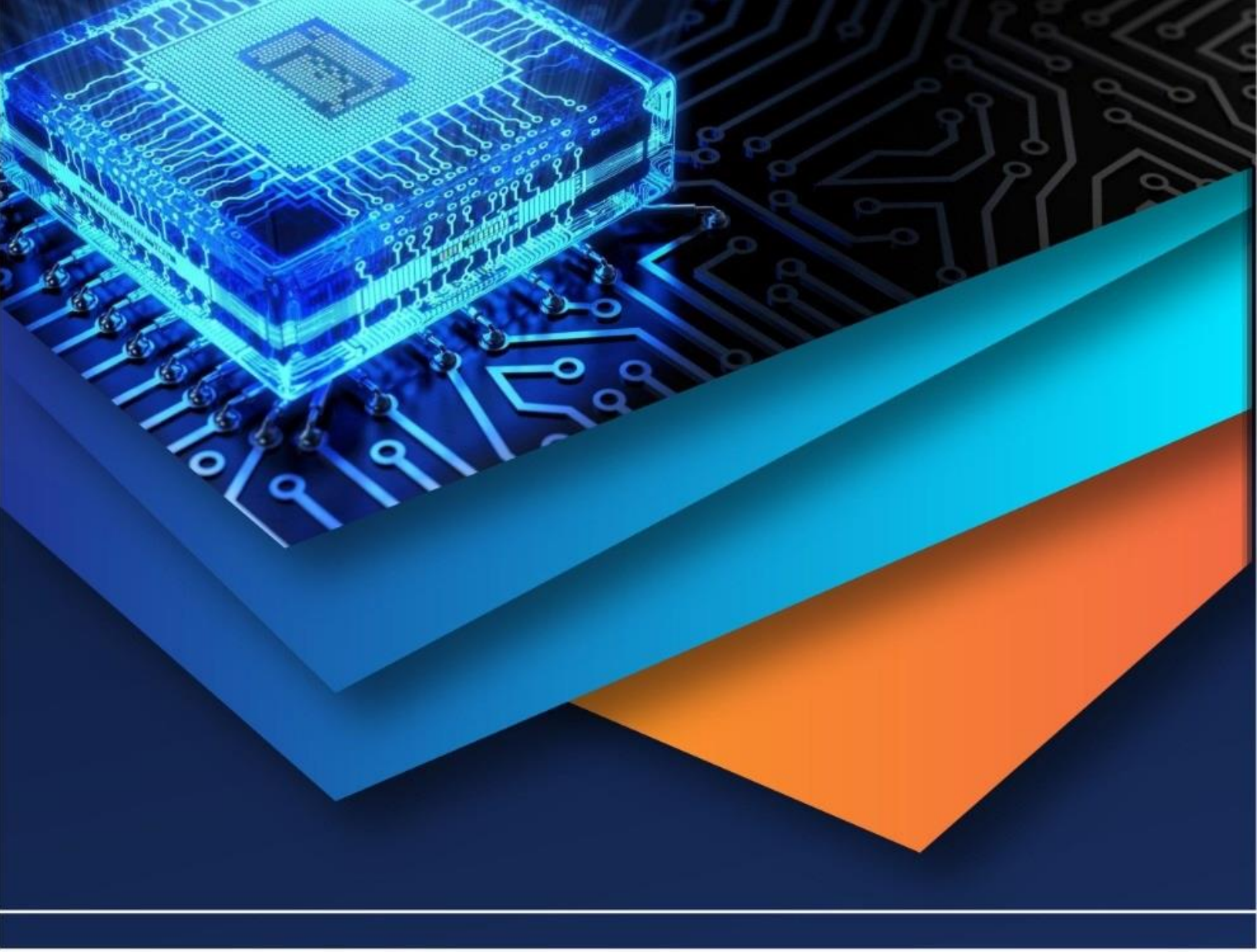

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