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Advanced Survey on Ultra-Modern Cloud Computing Technology

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Abstract:- Cloud Computing is considered one of the emerging arenas of computer science in recent times. It is providing excellent facilities to business entrepreneurs through flexible infrastructure. There are lots of advantages the cloud computing technology like efficiency, reliability, flexibility, and security. This technology is growing day by day in Government, business as well as in education sectors. Though using Cloud Computing we have lots of opportunities in the IT industries and IT professionals are utilizing Cloud Computing in business models or other ways. We may not say that using cloud computing. Although cloud computing is facilitating the Information Technology industry, the research and development in this arena are yet to be satisfactory. Our contribution to this paper is an advanced survey focusing on the cloud computing concept and the most advanced research issues. This paper provides a better understanding of cloud computing and identifies important research issues in this burgeoning area of computer science.

Keywords:- *Cloud Computing; Virtualization; Data Centre; Server Consolidation.*

I. INTRODUCTION

The major part of cloud computing is the delivery of computing services such as servers, databases, networking, software, and storage over the cloud. In simple words, we may say that as we use the data center all these facilities are provided by cloud computing. One advantage of cloud computing is that all users whether it is the normal user or commercial users can move anywhere without having any such physical hardware. They can use cloud computing anywhere they are moving without taking care of servers or storage etc. that's why it is very flexible. We may say that Cloud Computing enables a user to customize and manage any software application on the server remotely. The cloud may be of anyone including a third party like Amazon, Google, etc. [1].

We can say that Cloud computing is a business model as well which provides solutions are software, hardware, storage providers, and platform, that deliver their offerings over the Internet. That can be expressed in a way that ' a collection of computing software and services available from a decentralized network of servers '. The term "cloud" has long been used as a figure of speech for the Internet, and there are many other services and websites which we are already using, without being aware that they are cloud-based. Social networking sites, Web-based emails like Gmail and Yahoo, Wikipedia and YouTube, and video conferences like Skype [6].

We are already aware of the services like emails, google sheets/docs, etc. these all are cloud computing products. Nowadays most famous cloud computing services are Amazon web services, google cloud platform. With an internet connection cloud computing have the advantage to smooth implementation and data from any location and any device. In cloud computing, some services are very huge in themselves like Software as a service, Infrastructure as a service, and Platform as a service.

Software as a service gives access remotely with the use of the internet instead of locally on the machines. We can see emails, use of Calendar, and office tools like MS office 365. The benefit of SAAS is that there is no additional hardware required to be installed by the customer. Also easily deployable, cost reduction, and has High scalability. One can access it anytime from anywhere.

Infrastructure as a service is a form of cloud computing that provides virtualized computing resources over the internet. In this model, the cloud provider manages IT infrastructure like storage servers and networking resources. The benefits of the IAAS are automated administrative tasks, Dynamic scaling, GUI & API bases access, etc.

Platform as a service means a cloud hosting platform with a set of deployment and scaling automation, application management, and DevOps tools that can be run on shared infrastructure. Popular examples of the PAAS are AWS Elastic Beanstalk, Windows Azure, Heroku, Google App Engine, etc. There are more benefits of PAAS like multi-tenant architecture, customizable user interface, unlimited database customization, and flexible services-enabled integration model.

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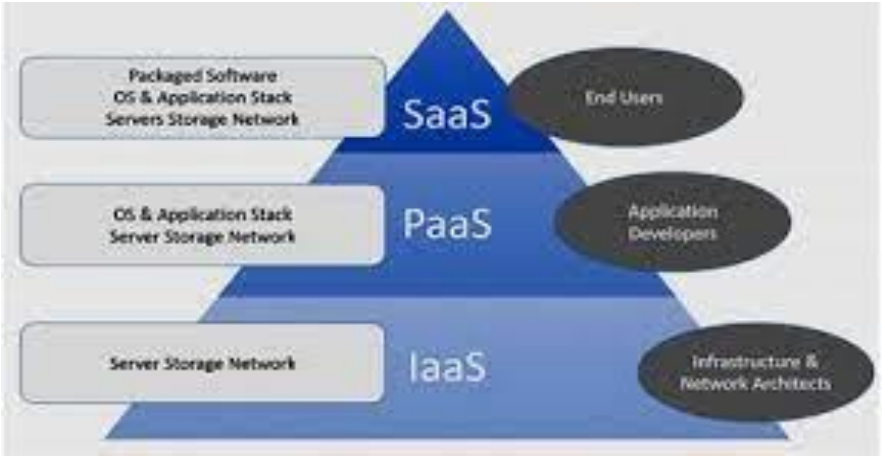

Fig. 1: Cloud Service Models

II. TYPES OF CLOUD COMPUTING

There are three types of cloud models in which we can work.

A. Public Clouds
B. Private Clouds
C. Hybrid Clouds

A. Public Clouds:

A public cloud is owned by the Cloud provider and this cloud is open for use of the public. The whole infrastructure is managed by a third party and this infrastructure is provided to many of their clients. All the users can concurrently access the application equally. The main feature of the public cloud is multi-tenancy more than one user can access it anywhere any time through the internet eg. Amazon Elastic Compute Cloud, and Microsoft Azure. There are many benefits of using public clouds like cost saving, less server management, etc.

B. Private Clouds:

Private clouds may be run by private parties having his/her own data center. The services and infrastructure which is owned by any organization and that infrastructure are available to specific customers. In private hardware and software, sharing is limited and security is provided by encryption. The private cloud model is similar to the more traditional model of individual local access networks (LANs) used in the past by enterprises but with the added advantages of virtualization which we will discuss later in this. There are certain benefits of using private clouds like full control over the hardware and software choices and customizing the hardware and software according to need [2].

C. Hybrid Clouds:

The new generation of hybrid clouds enables us to build and manage across any cloud with a common platform, allowing you to skill once, build once and manage from a single pane of glass. We may say that A hybrid cloud is one in which applications are running in a combination of different environments. Though there are many benefits of this type of cloud as we know that this is a mixing computing, storage, and services environment. The primary benefit of a hybrid cloud is agility. The need to become accustomed to and change direction quickly is a core principle of a digital business. The enterprise always wants to combine public clouds, private clouds, and on-premises resources to gain the agility it needs for a competitive advantage. These clouds have the benefits of unlimited scalability due to on-demand cloud resources, you need not purchasing all your own data center equipment, and reliability due to services distributed across multiple data centers [3].

Fig. 2: Types of Cloud Computing

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III. VIRTUALIZATION IN CLOUD COMPUTING

There is an important role of virtualization in cloud computing. It allows a single machine to run multiple platforms simultaneously, which means one single computer can work in various environments. The virtual machine involves hardware as well as software engineering. In Cloud, Computing virtualization improves the capacity and improvement in energy saving, and flexibility, and decreases the IT infrastructure cost.

As we know that in cloud computing virtualization has an important role. In this technique of virtualization, we give the logical name to all the physical resources and as per the demand it provides the pointer to those physical resources. We may say that virtualization technologies are not only used for executing applications but also for memory, storage, and networking. The few important benefits of this are as follows:

- More flexible and efficient allocation of resources.
- It Enhances development productivity.
- It lowers the cost of IT infrastructure.
- Remote access and rapid scalability.
- High availability and disaster recovery.
- Pay peruse of the IT infrastructure on demand.
- Enables running multiple operating systems.

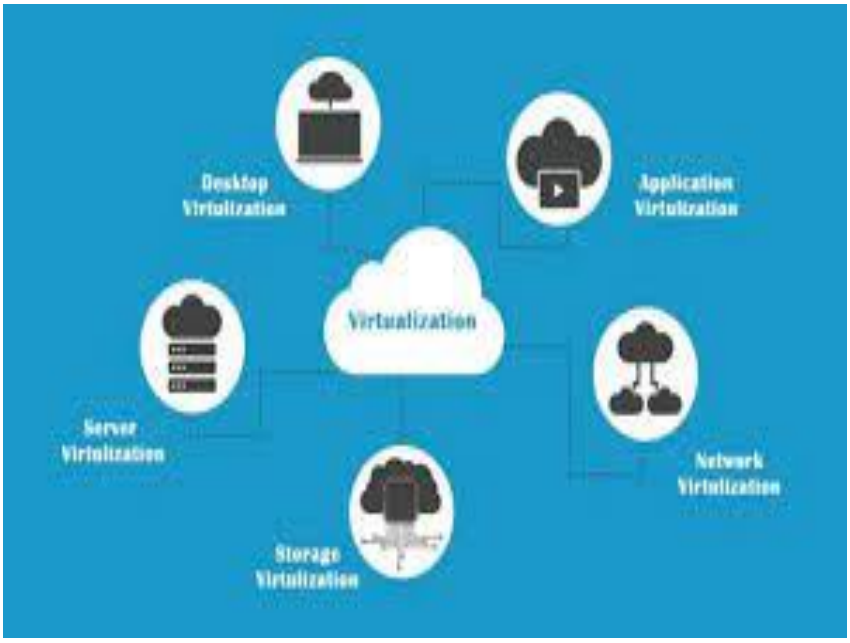

Fig. 3: Types of Virtualization

A. Application Virtualization:

Application virtualization helps a user to have remote access to an application from the server. The role of the server is to store all the personal information and other characteristics of the application. We can elaborate on this with the example that the user needs to run two different versions of the same software. In this, we use hosted applications and packaged applications.

B. Network Virtualization:

Network virtualization can run multiple virtual networks with each having separate control. It exists together on top of the physical network.

C. Desktop Virtualization:

In Desktop virtualization, OS may be stored remotely in the server on the data center. One can access the desktop virtually from any location by any machine. Users having a different OS than windows should have a virtual desktop. The advantage of Desktop Virtualization is portability, updates, and patches, and makes the installation of software easy.

D. Storage Virtualization:

There is an array of servers that are managed by the virtual storage system. Multiple resources are used to manage the storage. storage virtualization software upholds horizontal operations, unfailing performance, and a nonstop set of progressive functions despite changes.

E. Server Virtualization:

In server virtualization masking of server and resources take place. In this, the central server is divided into multiple different virtual servers by changing the identity number and processors. Each system will operate its operating system and each sub-server knows the identity of the central server. This way there are so many benefits like enhancement of performance and reduced operating cost as we have divided the server into sub-server resources. It is also beneficial in virtual migration, energy reduction and cost, etc.

F. Data virtualization:

In data virtualization data is collected from various sources and that data is to be managed in a single place. It does not know how data is collected, stored, and arranged data logically so that one can access its virtual view for their use.

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IV. BENEFITS AND DRAWBACKS OF VIRTUALIZATION

It reduces workload and it is cost-predictable and cheaper. It can obtain resources from the available poll and it can fulfill the requirement for additional resources. We may say that in virtualization management of resources is much easier. It improves the efficiency of the resources in the virtual environment. The IT operations can be done more smoothly. Though there are some drawbacks of virtualization too like Data security since the servers are managed by a third party, Virtualization takes time it uses more time over the long run when compared to the local system. Sometimes IT infrastructure might not be compatible with the virtualized solution since all system servers and applications are not virtualization friendly.

V. CLOUD SECURITY CONCERNS AND ISSUES

Fig. 4: Cloud computing security issues and challenges

A. Misconfiguration

Misconfiguration of cloud infrastructure is a huge problem and it leads to data ruptures. If the cloud environment of any organization is not configured properly, critical business data and applications may become vulnerable to an outbreak. The accessibility to the cloud infrastructure is very easy and sharing of data is taking place, it is very difficult for the organization who is accessing the data ie the authorized user, or else. This problem can be aggravated due to a lack of visibility. We may say that misconfiguration poses serious cloud security issues to businesses and the fallout can adversely impact day-to-day processes [4].

B. Cyberattacks

As most of the time we share everything in cloud computing, cyber attackers are constantly practicing hacking and the cloud environment becomes the primary target of these attackers due to sharing abilities in cloud computing that enables the capabilities of hacking more.

According to Global Security reports the volume of attacks on cloud services is increasing day by day. The report shows that although the corporate and internal networks are the most target domains of the attackers but cloud environment is also the most target of these attackers.

It is important to understand the risk of cyber so that they may do the necessary adjustment to protect against cyber-attacks. We have to understand the weakness of the security technology, we must have to identify the gaps so that from time to time we may give the solution to these security concerns [5].

C. Lack of Visibility

In cloud computing the lack of visibility can lead to security issues in the cloud computing, it put the organization at risk including malicious threats. We must ensure have effective security controls. Cloud-based resources can easily become "solid containers" which are invisible to your monitoring infrastructure. This causes blind spots that may limit your ability to control security and performance.

Cloud providers provide log files that provide information about the activity of cloud workloads. You might think these logs can help you monitor for security and performance issues because you can trigger alerts using log files. You might think these logs can help you monitor for security and performance issues because you can trigger alerts using log files. This problem is that alerts are not enough—analysts or operations teams need to investigate those alerts, identify the root cause or threat and remediate it.

D. Data Leakage

One of the major benefits of Cloud Computing is sharing of data and the capability to flawlessly act as a team among associates and even external individuals. As the data shared in the cloud is mainly done by inviting using emails or by allotting the public link to a specific group of users, this may result in security concerns and major challenges in cloud computing. Sharing of public links anyone knowing links can access the stored information in them. Hackers have so many tools by using those tools they can access instances of unsecured deployment on the cloud. Day to day the rate of leakage of data in the cloud environment is increasing. It has

been seen by various reports that the most frequent threats are due to hardware failures, insecure interfaces, and APIs.

VI. CONCLUSION

This work is expected to be a significant contribution to the area of cloud computing which will not only reduce time or effort but will also improve knowledge The use of Cloud Computing has several benefits. Cloud computing provides many services including storage, server, databases, networking, and software analytics over the internet. The use of cloud computing lowers the operating cost of infrastructure. Virtualization plays an important role in cloud computing, Cloud computing is close to virtualization. By using virtualization that allows an organization to make useful use of its IT resources. Virtualization is very important for cloud computing and as a result brings another benefit that cloud computing is famous for, scalability. This technology enables us to run multiple platforms by sharing a single machine concurrently. In this, we have discussed the benefits of Cloud Computing as well as the drawbacks of the same. The sharing of resources in cloud computing is one of the biggest worries for security. There are many other security issues that we have tried to discuss in this paper.

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